

Underwriters Laboratories (UL LLC) Safety Certification Report



Model: IGS-150B
Device Description: Open type, Industrial Ethernet Switch
Applicant: ORING INDUSTRIAL NETWORKING CORP
3F 542-2 ZHONGZHENG RD XINDIAN DISTRICT
NEW TAIPEI CITY, 231 TAIWAN
Manufacturer: Same as Applicant

Manufacturing Facility(ies): PRONOLOGY SERVICES INC
3RD FL 48 WU-KU INDUSTRIAL PARK
NEW TAIPEI, 248 TAIWAN
Report No.: E331061-D1009-1/A1/C0-UL
Report (Re)Issue Date: 2019-11-20; 2022-11-24 (A1)

Base Standard(s): UL 61010-1, 3rd Edition, May 11, 2012, Revised April 29, 2016
CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 2016
Additional Standards: UL 61010-2-201 (First Edition) dated 2017-02-20
CAN/CSA C22.2 No. 61010-2-201 dated 2014-02

Report Types: This report consists of the following report types:
[Yes] US Certification (UL Listing)
[Yes] CAN Certification (cUL Listing)

This report covers the Safety evaluation of the referenced model(s) according to the standard(s) specified above.

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Report Modifications Summary

The following changes were made to this report. If none listed in the below table, this report is the originally issued report.

The following scheme is used throughout this report to reflect the **Report No.:**

(File No.) – (Report Ref. No.) – (x) / A(y) / C(z) – YYY, where:

(x) = Report (Re)Issue No.

(y) = Amendment No.

(z) = Correction No.

YYY = Report Type (UL/CB/IEC)

Date Modified (Year-Month-Day)	Modifications Made (include Report Reference Number)	Modified By
2022-11-24	Amendment 1: -Added one alternative side board. -Added interchangeable options for Label and Printing Ink in CCL.	Hans Tu

Test Report issued under the responsibility of:



TEST REPORT
IEC 61010-1
Safety requirements for electrical equipment for measurement, control, and
laboratory use
Part 1: General requirements

Report Reference No.: E331061-D1009-1/A1/C0-UL

Date of issue: 2019-11-20; 2022-11-24 (A1)

Total number of pages: 63

Testing Laboratory: Wendell Electrical Testing Lab
 Address: 5F., No. 4, Ln. 7, Baogao Rd., Xindian Dist., New Taipei City 231,
 Taiwan (R.O.C.)

Amendment 1:
 Wendell Electrical Testing Lab
 3F., No. 6, Ally. 6, Lane. 235, Baoqiao Rd., Xindian District, New
 Taipei City 231028, Taiwan

Applicant's name: ORING INDUSTRIAL NETWORKING CORP

Address: 3F 542-2 ZHONGZHENG RD XINDIAN DISTRICT
 NEW TAIPEI CITY, 231 TAIWAN

Test specification:

Standard: IEC 61010-1:2010

Test procedure: UL Certification

Non-standard test method.....: N/A

Test Report Form No.....: IEC61010_1M

General disclaimer:

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the Issuing UL testing laboratory. The authenticity of this Test Report and its contents can be verified by contacting UL.

Test item description:	Open type, Industrial Ethernet Switch	
Trade Mark:	Trademark image(s): 	
Manufacturer:	Same as Applicant	
Model/Type reference:	IGS-150B	
Ratings:	Power input: redundant 12-48 Vdc, 0.29-0.09 A	
Testing procedure and testing location:		
<input checked="" type="checkbox"/> UL/DAP Testing Laboratory:		
Testing location/ address:	Wendell Electrical Testing Lab 5F., No. 4, Ln. 7, Baogao Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.) Amendment 1: Wendell Electrical Testing Lab 3F., No. 6, Ally. 6, Lane. 235, Baoqiao Rd., Xindian District, New Taipei City 231028, Taiwan	
Tested by (name, function, signature):	Hans Tu, Project handler	
Approved by (name, function, signature):	Michael Tseng, Project reviewer	
<input type="checkbox"/> Testing procedure: WMT:		
Testing location/ address:		
Tested by (name, function, signature):		
Approved by (name, function, signature):		

List of Attachments (including a total number of pages in each attachment):

Refer to Appendix A of this report. All attachments are included within this report.

Summary of testing

Tests performed (name of test and test clause):

Testing location:

Refer to the Test List in Appendix D of this report if testing was performed as part of this evaluation.

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective owners of these marks.

Refer to the enclosure(s) titled Marking Label in the Enclosures section in Appendix A of this report for a copy.

Test item particulars :	
Type of item:	Control
Description of equipment function:	IGS-150B is an open type Unmanaged Ethernet Switch with 5 RJ-45 type ethernet ports.
Connection to mains supply:	None (Not directly connected to MAINS)
Overvoltage category:	None (Not directly connected to MAINS)
Pollution degree:	2
Means of protection:	Class III
Environmental conditions:	-40 to 75 °C
For use in wet locations:	No
Equipment mobility:	Fixed
Operating conditions:	Continuous
Overall size of equipment (W x D x H)	26.1 x 70 x 95 mm
Mass of equipment (kg):	IGS-150B: 222 g
Marked degree of protection to IEC 60529:	IP30 (not certificated by UL)
Classification of installation and use	Din rail mounted in the Industrial control panel
Supply Connection	Terminal block connected
Testing	
Date of receipt of test item(s)	2019-10-29; 2022-07-20 (A1)
Dates tests performed	2019-10-29; 2022-08-10 (A1)
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement.....	Pass (P)
- test object was not evaluated for the requirement	N/E
- test object does not meet the requirement.....	Fail (F)
Abbreviations used in the report:	
- normal condition: N.C.	- single fault condition: S.F.C.
General remarks:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.	
Throughout this report a point is used as the decimal separator.	
GENERAL PRODUCT INFORMATION:	
Report Summary	
All applicable tests according to the referenced standard(s) have been carried out. Refer to the Report Modifications for any modifications made to this report.	
Product Description	
IGS-150B is an open type Unmanaged Ethernet Switch, with 5 RJ-45 ports.	
Model Differences	

N/A

Additional Information

None

Technical Considerations

- The product was investigated to the following standards:

Main Standard(s):

UL 61010-1, 3rd Edition, May 11, 2012, Revised April 29, 2016

CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 2016

From Country Differences:

UL 61010-1, 3rd Edition, May 11, 2012, Revised April 29, 2016

CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 2016

Additional Standards:

UL 61010-2-201 (First Edition) dated 2017-02-20

CAN/CSA C22.2 No. 61010-2-201 dated 2014-02

- The following additional investigations were conducted: None
- The product was not investigated to the following standards or clauses: None
- The following accessories were investigated for use with the product: None
- No Other Considerations

Engineering Conditions of Acceptability

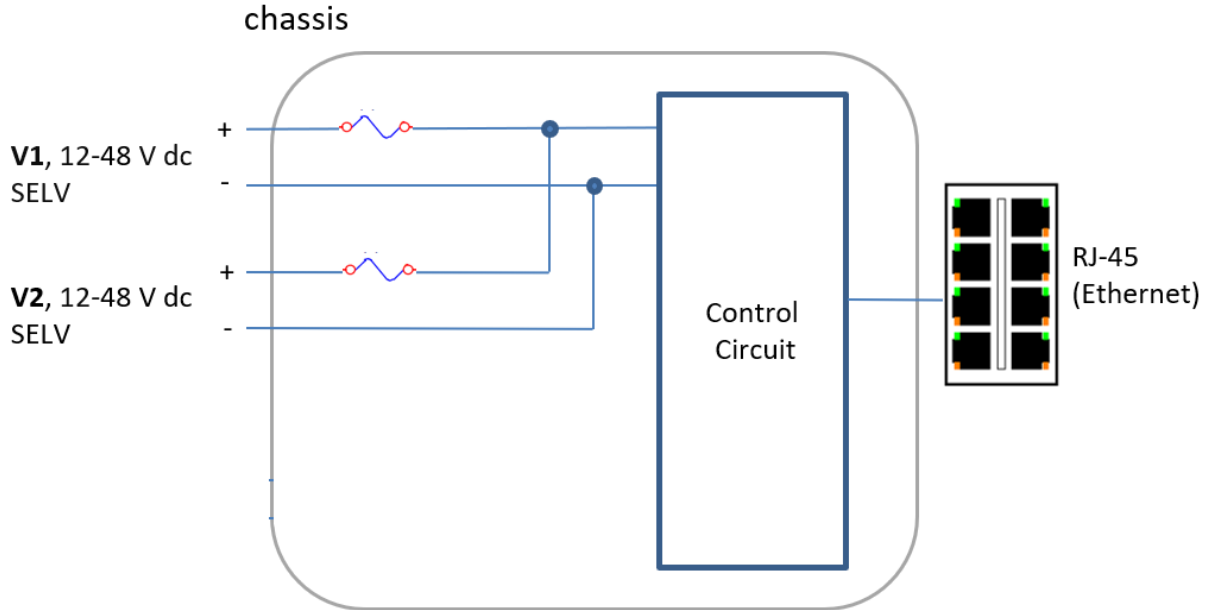
When installed in an end-product, consideration must be given to the following:

None

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

Insulation Diagram - (001) Insulation Diagram

Insulation Diagram - (001) Insulation Diagram



4	TESTS		Pass
4.4	Testing in SINGLE FAULT CONDITIONS		Pass
4.4.1	Fault tests	See datasheet for details.	Pass
4.4.2	Application of SINGLE FAULT CONDITIONS		Pass
4.4.2.1	SINGLE FAULT CONDITIONS not covered by 4.4.2.2 to 4.4.2.14		-
4.4.2.2	PROTECTIVE IMPEDANCE		N/A
4.4.2.3	PROTECTIVE CONDUCTOR		N/A
4.4.2.4	Equipment or parts for short-term or intermittent operation		N/A
4.4.2.5	Motors		-
	- stopped while fully energized		N/A
	- prevented from starting		N/A
	- one phase interrupted (multi-phase)		N/A
4.4.2.6	Capacitors		N/A
4.4.2.7	MAINS transformers		N/A
4.4.2.7.2	Short circuit		N/A
4.4.2.7.3	Overload		N/A
4.4.2.8	Outputs		N/A
4.4.2.9	Equipment for more than one supply		N/A

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.4.2.10	Cooling	See datasheet for details.	-
	- air holes closed		Pass
	- fans stopped		N/A
	- coolant stopped		N/A
	- loss of cooling liquid		N/A
4.4.2.11	Heating devices		N/A
	- timer overridden		N/A
	- temperature controller overridden		N/A
4.4.2.12	Insulation between circuits and parts		N/A
4.4.2.13	Interlocks		N/A
4.4.2.14	Voltage selectors		N/A
4.4.3	Duration of tests		-
4.4.4	Conformity after application of fault conditions	See datasheet for details.	Pass
5	MARKING AND DOCUMENTATION		Pass
5.1.1	Required equipment markings		-
	- visible from the exterior; or		Pass
	- visible after removing cover or opening door		N/A
	- visible after removal from a rack or panel		N/A
	Not put on parts which can be removed by an operator		N/A
	Letter symbols (IEC 60027) used		Pass
	Graphic symbols (IEC 61010-1: Table 1) used		Pass
5.1.2	Identification		Pass
	Equipment is identified by:		-
	a) Manufacturer's or supplier's name or trademark		Pass
	b) Model number, name or other means		Pass
	Manufacturing location identified		N/A
5.1.3	MAINS supply	Device is not connected to MAINS directly.	N/A
	Equipment is marked as follows:		-
	a) Nature of supply:		-
	1) a.c. RATED MAINS frequency or range of frequencies:		-
	2) d.c. with symbol :		-
	b) RATED supply voltage(s) or range:		-
	c) Max. RATED power (W or VA) or input current:		-

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The marked value not less than 90 % of the maximum value		Pass
	If more than one voltage range:		-
	Separate values marked; or		N/A
	Values differ by less than 20 %		N/A
	d) OPERATOR-set for different RATED supply voltages:		-
	Indicates the equipment set voltage		N/A
	Portable equipment indication is visible from the exterior		N/A
	Changing the setting changes the indication		N/A
	e) Accessory MAINS socket-outlets accepting standard MAINS plugs are marked:		-
	With the voltage if it is different from the MAINS supply voltage:		-
	For use only with specific equipment		N/A
	If not marked for specific equipment it is marked with:		-
	The maximum rated current or power; or		N/A
	Symbol 14 with full details in the documentation		N/A
5.1.4	Fuses		N/A
	Operator replaceable fuse marking (see also 5.4.5):		-
5.1.5	TERMINALS, connections and operating devices		Pass
5.1.5.1	General		-
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators marked		Pass
	If insufficient space, symbol 14 used		N/A
	Push-buttons and actuators of emergency stop devices and indicators:		-
	- used only to indicate a warning of danger; or		N/A
	- the need for urgent action		N/A
	- coloured red		N/A
	- coded as specified in IEC 60073		N/A
	Supplementary means of coding provided, if meaning of colour relates (see IEC 60073):		-
	- to safety of persons; or		N/A
	- safety of the environment		N/A

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.5.2	TERMINALS		-
	MAINS supply TERMINAL identified	Device is not connected to MAINS directly.	N/A
	Other TERMINAL marking:		-
	a) FUNCTIONAL EARTH TERMINALS (symbol 5 used)	Symbol 7 is used for enclosure ground.	Pass
	b) PROTECTIVE CONDUCTOR TERMINALS:		-
	Symbol 6 is placed close to or on the TERMINAL; or		N/A
	Part of appliance inlet		N/A
	c) TERMINALS of control circuits (symbol 7 used)		N/A
	d) HAZARDOUS LIVE TERMINALS supplied from the interior		N/A
	Standard MAINS socket outlet; or		N/A
	RATINGS marked; or		N/A
	Symbol 14 used		N/A
5.1.6	Switches and circuit breakers		N/A
	If disconnecting device, off position clearly marked		N/A
	If push-button used as power supply switch:		-
	- symbol 9 and 15 used for on-position		N/A
	- symbol 10 and 16 used for off-position		N/A
	- pair of symbols 9, 15 and 10, 16 close together		N/A
5.1.7	Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION		N/A
	Protected throughout (symbol 11 used)		N/A
	Only partially protected (symbol 11 not used)		N/A
5.1.8	Field-wiring TERMINAL boxes		Pass
	If TERMINAL or ENCLOSURE exceeds 60 °C:		-
	Cable temperature RATING marked:	Caution symbol (symbol 14) is marked on product label, and information of supply cable temperature rating is provided in installation guide.	-
	Marking visible before and during connection or beside TERMINAL	Symbol 14 is used	Pass
5.2	Warning markings		Pass
	Visible when ready for NORMAL USE	On the label.	Pass
	Are near or on applicable parts	On the label.	Pass
	Symbols and text correct dimensions and colour:		-

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	a) symbols min 2,75 mm and text 1,5 mm high and contrasting in colour with background		Pass
	b) symbols and text moulded, stamped or engraved in material min. 2,0 mm high and		N/A
	0,5 mm depth or raised if not contrasting in colour		N/A
	If necessary marked with symbol 14		N/A
	Statement to isolate or disconnect if access by using a tool to HAZARDOUS LIVE parts is permitted		N/A
5.3	Durability of markings		Pass
	The required markings remain clear and legible in NORMAL USE	See test record for details.	Pass
5.4	Documentation		Pass
5.4.1	General		Pass
	Equipment is accompanied by documentation for safety purposes for OPERATOR or RESPONSIBLE BODY	User manual is shipped with purchase.	Pass
	Safety documentation for service personnel authorized by the manufacturer		N/A
	Documentation necessary for safe operation is provided in printed media or	Printed user manual is shipped with purchase.	Pass
	in electronic media if available at any time		N/A
	Documentation includes:		-
	a) intended use		Pass
	b) technical specification		Pass
	c) name and address of manufacturer or supplier		Pass
	d) information specified in 5.4.2 to 5.4.6		Pass
	e) information to mitigate residual RISK (see also subclause 17)		N/A
	f) accessories for safe operation of the equipment specified		N/A
	g) guidance provided to check correct function of the equipment, if incorrect reading may cause a HAZARD from harmful or corrosive substances of HAZARDOUS live parts		N/A
	h) instructions for lifting and carrying		N/A
	Warning statements and a clear explanation of warning symbols:		-
	- provided in the documentation; or		Pass
	- information is marked on the equipment		N/A
5.4.2	Equipment ratings		Pass

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Documentation includes:		-
	a) Supply voltage or voltage range:	IGS-150B : redundant power input 12- 48 Vdc	-
	Frequency or frequency range:		-
	Power or current rating:	See product information in this report for detail.	-
	b) Description of all input and output connections in accordance to 6.6.1 a)	Power input connecting by terminal block.	Pass
	c) RATING of insulation of external circuits in accordance to 6.6.1 b)	Power supplied by SELV circuit.	Pass
	d) Statement of the range of environmental conditions (see 1.4)		Pass
	e) Degree of protection (IEC 60529)		Pass
	f) If impact rating less than 5 J:		-
	IK code in accordance to IEC 62262 marked; or		N/A
	symbol 14 of table 1 marked, with		N/A
	RATED energy level and test method stated		N/A
5.4.3	Equipment installation		Pass
	Documentation includes instructions for:		-
	a) assembly, location and mounting requirements	See user manual.	Pass
	b) protective earthing		N/A
	c) connections to supply	See user manual.	Pass
	d) PERMANENTLY CONNECTED EQUIPMENT:		-
	1) Supply wiring requirements	Replaced by part 2-201.	N/A
	2) If external switch or circuit-breaker, requirements and location recommendation		N/A
	e) ventilation requirements		N/A
	f) special services (e. g. air, cooling liquid)		N/A
	g) instructions relating to sound level		N/A
5.4.4	Equipment operation		Pass
	Instructions for use include:		-
	a) identification and description of operating controls		Pass
	b) positioning for disconnection		N/A
	c) instructions for interconnection		N/A
	d) specification of intermittent operation limits		N/A
	e) explanation of symbols used		Pass
	f) replacement of consumable materials		N/A

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	g) cleaning and decontamination		N/A
	h) listing of any poisonous or injurious gases and quantities		N/A
	i) RISK reduction procedures relating to flammable liquids (see 9.5)		N/A
	j) RISK reduction procedures relating burn from surfaces permitted to exceed limits of 10.1		N/A
	Additional precautions for IEC 60950 conforming equipment in regard to moistures and liquids		N/A
	A statement about protection impairment if used in a manner not specified by the manufacturer		Pass
5.4.5	Equipment maintenance and Service		N/A
	Instructions for RESPONSIBLE BODY include:		-
	Instructions sufficient in detail permitting safe maintenance and inspection and continued safety:		-
	Instruction against the use of detachable MAINS supply cord with inadequate rating		N/A
	Specific battery type of user replaceable batteries		N/A
	Any manufacturer specified parts		N/A
	Rating and characteristics of fuses	No external or replaceable fuse.	N/A
	Instructions include following subjects permitting safe servicing and continued safety:		-
	a) product specific RISKS may affect service personnel		N/A
	b) protective measures for these RISKS		N/A
	c) verification of the safe state after repair	Repair is not carried out in the field.	N/A
5.4.6	Integration into systems or effects resulting from special conditions		N/A
	Aspects described in documentation		N/A
6	PROTECTION AGAINST ELECTRIC SHOCK		N/A
6.1	General		N/A
6.1.1	Requirements		N/A
	Protection against electric shock maintained in NORMAL CONDITION and SINGLE FAULT CONDITION		N/A
	ACCESSIBLE parts not HAZARDOUS LIVE		N/A
	Voltage, current, charge or energy below the limits in NORMAL CONDITION and in SINGLE FAULT CONDITION between:		-

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	ACCESSIBLE parts and earth		N/A
	two ACCESSIBLE parts on same piece of the equipment within a distance of 1,8 m		N/A
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		N/A
6.1.2	Exceptions		N/A
	Following HAZARDOUS LIVE parts may be ACCESSIBLE to an OPERATOR:		-
	a) parts of lamps and lamp sockets after lamp removal		N/A
	b) parts to be replaced by OPERATOR only by the use of tool and warning marking		N/A
	Those parts not HAZARDOUS LIVE 10 s after interruption of supply		N/A
	Capacitance test if charge is received from internal capacitor		N/A
6.2	Determination of ACCESSIBLE parts	(see Form A.4)	Pass
6.2.1	General		N/A
	Unless obviously determination of ACCESSIBLE parts as specified in 6.2.2 to 6.2.4		N/A
6.2.2	Examination		N/A
	- with jointed test finger (as specified B.2)		N/A
	- with rigid test finger (as specified B.1) and a force of 10 N		N/A
6.2.3	Openings above parts that are HAZARDOUS LIVE		N/A
	- test pin with length of 100 mm and 4 mm in diameter applied		N/A
6.2.4	Openings for pre-set controls		N/A
	- test pin with length of 100 mm and 3 mm diameter applied		N/A
6.3	Limit values for ACCESSIBLE parts		N/A
6.3.1	Levels in NORMAL CONDITION	(see Form A.5)	-
	a) Voltage limits less than 33 V r.m.s. and 46,7V peak or 70 V d.c.		N/A
	for WET LOCATIONS voltage limits less than 16 V r.m.s. and 22,6 V peak or 35 V d.c.		N/A
	Voltages are not HAZARDOUS LIVE the levels of:		-
	b) Current less than 0,5 mA r.m.s. for sinusoidal, 0,7 mA peak non-sinusoidal or mixed frequencies or 2 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz		N/A

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	for WET LOCATIONS measuring circuit A.4 used		N/A
	70 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	or		-
	c) Levels of capacitive charge or energy less:		-
	1) 45 μ C for voltages up to 15 kV peak or d.c. or line A of Figure 3		N/A
	2) 350 mJ stored energy for voltages above 15 kV peak r d.c.		N/A
6.3.2	Levels in SINGLE FAULT CONDITION	(see Form A.6)	-
	a) Voltage limits less than 55 V r.m.s. and 78 V peak or 140 V d.c.		N/A
	for WET LOCATIONS voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.		N/A
	Voltages are not HAZARDOUS LIVE the levels of:		-
	b) Current less than 3,5 mA r.m.s. for sinusoidal, 5 mA peak non-sinusoidal or mixed frequencies or 15 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz		N/A
	for WET LOCATIONS measuring circuit A.4 used		N/A
	500 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	or		-
	c) Levels of capacitive charge or energy less line B of Figure 3		N/A
6.4	Primary means of protection	All circuit is SELV for use in dry location.	N/A
6.4.1	ACCESSIBLE parts prevented from being HAZARDOUS LIVE by one or more of following means:		-
	a) ENCLOSURES or PROTECTIVE BARRIERS (see 6.4.2)		N/A
	b) BASIC INSULATION (see 6.4.3)		N/A
	c) Impedance (see 6.4.4)		N/A
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	(see Form A.15 and A.16)	-
	- meet rigidity requirements of 8.1		N/A
	- meet requirements for BASIC INSULATION, if protection is provided by insulation		N/A

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- meet requirements of 6.7 for CREEPAGE and - CLEARANCES between ACCESSIBLE parts and - HAZARDOUS live parts, if protection is provided by - limited access		N/A
6.4.3	BASIC INSULATION	(see Form A.15 and A.16)	-
	- meet CLEARANCE, CREEPAGE DISTANCE and solid - insulation requirements of 6.7		N/A
6.4.4	Impedance	(see Form A.12 and A.15)	-
	Impedance used as primary means of protection meets all of following requirements:		-
	a) limits current or voltage to level of 6.3.2		N/A
	b) RATED for maximum WORKING VOLTAGE and the amount of power it will dissipate		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of BASIC INSULATION of 6.7		N/A
6.5	Additional means of protection in case of SINGLE FAULT CONDITION		N/A
6.5.1	ACCESSIBLE parts are prevented from becoming HAZARDOUS live by the primary means of protection and supplemented by one of:		-
	a) PROTECTIVE BONDING (see 6.5.2)		N/A
	b) SUPPLEMENTARY INSULATION (see 6.5.3)		N/A
	c) automatic disconnection of the supply (see 6.5.5)		N/A
	d) current- or voltage-limiting device (see 6.5.6)		N/A
	Alternatively one of the single means of protection is used:		-
	e) REINFORCED INSULATION (see 6.5.3)		N/A
	f) PROTECTIVE IMPEDANCE (see 6.5.4)		N/A
6.5.2	PROTECTIVE BONDING		N/A
6.5.2.1	ACCESSIBLE conductive parts, may become HAZARDOUS LIVE in SINGLE FAULT CONDITION:		-
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or		N/A
	Separated by conductive screen or barrier bonded to PROTECTIVE CONDUCTOR TERMINAL		N/A
6.5.2.2	Integrity of PROTECTIVE BONDING		-

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Clause	Requirement + Test	Result - Remark	Verdict
	a) PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		N/A
	b) Soldered connections:		-
	Independently secured against loosening		N/A
	Not used for other purposes		N/A
	c) Screw connections are secured		N/A
	d) PROTECTIVE BONDING not interrupted; or		N/A
	exempted as removable part carries MAINS SUPPLY input connection		N/A
	e) Any movable PROTECTIVE BONDING connection specifically designed, and meets 6.5.2.4		N/A
	f) No external metal braid of cables used (not regarded as PROTECTIVE BONDING)		N/A
	g) IF MAINS SUPPLY passes through:		-
	Means provided for passing protective conductor;		N/A
	Impedance meets 6.5.2.4		N/A
	h) Protective conductors bare or insulated, if insulated, green/yellow		N/A
	Exceptions:		-
	1) earthing braids;		N/A
	2) internal protective conductors etc.;		N/A
	Green/yellow not used for other purposes		N/A
	TERMINAL suitable for connection of a PROTECTIVE CONDUCTOR, and meets 6.5.2.3		N/A
6.5.2.3	PROTECTIVE CONDUCTOR TERMINAL		-
	a) Contact surfaces are metal		N/A
	b) Appliance inlet used		N/A
	c) For rewirable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to MAINS supply TERMINALS		N/A
	d) If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:		-
	Is near terminals of circuit for which protective earthing is necessary		N/A
	External if other terminals external		N/A
	e) Equivalent current-carrying capacity to MAINS supply TERMINALS		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	f) If plug-in, makes first and breaks last		N/A
	g) If also used for other bonding purposes, PROTECTIVE CONDUCTOR:		-
	Applied first;		N/A
	Secured independently;		N/A
	Unlikely to be removed by servicing		N/A
	h) PROTECTIVE CONDUCTOR of measuring circuit:		-
	1) Current RATING equivalent to measuring circuit TERMINAL;		N/A
	2) PROTECTIVE BONDING: not interrupted by any switch or interrupting device		N/A
	i) FUNCTIONAL EARTH TERMINALS allow independent connection		N/A
	j) If a binding screw used for PROTECTIVE CONDUCTOR TERMINAL:		-
	Suitable size for bond wire		N/A
	Not smaller than M 4		N/A
	At least 3 turns of screw engaged		N/A
	Passes tightening torque test		N/A
	k) Contact pressure not capable being reduced by deformation of materials		N/A
6.5.2.4	Impedance of PROTECTIVE BONDING of plug-connected equipment	(see Form A.9)	-
	Impedance between PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part where PROTECTIVE BONDING is specified, is:		-
	- less than 0,1 Ohm; or		N/A
	- less than 0,2 Ohm if equipment is provided with non-detachable cord		N/A
6.5.2.5	Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT	(see Form A.10)	-
6.5.2.6	Transformer PROTECTIVE BONDING screen	(see Form A.11)	-
	Transformer provided with screen for PROTECTIVE BONDING:		-
	screen bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses (see 6.5.2.2 a)		N/A
	screen bonding with soldered connection (see 6.5.2.2 b) is:		N/A
	- Independently secured against loosening		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- Not used for other purposes		N/A
6.5.3	SUPPLEMENTARY and REINFORCED INSULATION		N/A
	Meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		N/A
6.5.4	PROTECTIVE IMPEDANCE		N/A
	Limits current or voltage to level of 6.3.1 in NORMAL and to level of 6.3.2 in SINGLE FAULT CONDITION		N/A
	CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of DOUBLE or REINFORCED INSULATION of 6.7		N/A
	The PROTECTIVE IMPEDANCE consists of one or more of the following:	(see TABLE 1 and Form A.12)	-
	a) appropriate single component suitable for safety and reliability for protection, it is:		-
	1) RATED twice the maximum WORKING VOLTAGE		N/A
	2) resistor RATED for twice the power dissipation for maximum WORKING VOLTAGE		N/A
	b) combination of components		N/A
	Single electronic device not used as PROTECTIVE IMPEDANCE		N/A
6.5.5	Automatic disconnection of the supply		N/A
	a) RATED to disconnect the load within time specified in Figure 2		N/A
	b) RATED for the maximum load conditions of the equipment		N/A
6.5.6	Current- or voltage-limiting devices		N/A
	Device complies with all of:		-
	a) RATED to limit the current or voltage to the level of 6.3.2		N/A
	b) RATED for the maximum WORKING VOLTAGE; and		N/A
	RATED for the maximum operational current if applicable		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of SUPPLEMENTARY INSULATION of 6.7		N/A
6.6	Connections to external circuits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.6.1	Connections do not cause ACCESSIBLE parts of the following to become HAZARDOUS LIVE in NORMAL CONDITION or SINGLE FAULT CONDITION:		-
	- the external circuits		N/A
	- the equipment		N/A
	Protection achieved by separation of circuits; or		N/A
	short circuit of separation does not cause a HAZARD		N/A
	Instructions or markings for each terminal include:		-
	a) RATED conditions for TERMINAL		N/A
	b) Required RATING of external circuit insulation		N/A
6.6.2	TERMINALS for external circuits	See part 2-201 TRF.	Pass
	TERMINALS which receive a charge from an internal capacitor are not HAZARDOUS LIVE after 10 s of interrupting supply connection		N/A
6.6.3	Circuits with terminals which are HAZARDOUS LIVE		N/A
	These circuits are:		-
	Not connected to ACCESSIBLE conductive parts; or		N/A
	Connected to ACCESSIBLE conductive parts, but are not MAINS CIRCUITS and have one TERMINAL contact at earth potential		N/A
	No ACCESSIBLE conductive parts are HAZARDOUS LIVE		N/A
6.6.4	ACCESSIBLE terminals for stranded conductors		N/A
	No RISK of accidental contact because:		-
	- Located or shielded		N/A
	- Self-evident or marked whether or not connected to ACCESSIBLE conductive parts		N/A
	ACCESSIBLE TERMINALS will not work loose		N/A
6.7	Insulation requirements		N/A
6.7.1	The nature of insulation		-
6.7.1.1	Insulation between ACCESSIBLE parts or between separate circuits consist of CLEARANCES, CREEPAGE DISTANCES and solid insulation if provided as protection against a HAZARD		N/A
6.7.1.2	CLEARANCES		-
	Required CLEARANCES reflecting factors of 6.7.1.1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Equipment rated for operating altitude greater than 2000 m correction factor of Table 3 of 61010-1 applied		N/A
6.7.1.3	CREEPAGE DISTANCES		-
	Required CREEPAGE DISTANCES reflecting factors of 6.7.1.1 a) to d)		N/A
	CTI material group reflected by requirements		N/A
	CTI test performed		N/A
6.7.1.4	Solid insulation		-
	Required solid insulation reflecting factors of 6.7.1.1 a) to d)		N/A
6.7.1.5	Requirements for insulation according to type of circuit	(see Form A.14 and A.15)	-
	a) 6.7.2 MAINS circuits of OVERVOLTAGE CATEGORY II up to nominal supply voltage of 300 V		N/A
	b) 6.7.3 secondary circuits separated from circuits defined in a) by transformer		N/A
	c) K.1 MAINS circuits of OVERVOLTAGE CATEGORY III and IV or OVERVOLTAGE CATEGORY II over 300 V		N/A
	d) K.2 secondary circuits separated from circuits defined in c) by transformer		N/A
	e) K.3 circuits having one or more of:		-
	1) maximum TRANSIENT OVERVOLTAGE is limited to known level below the level of MAINS CIRCUIT		N/A
	2) maximum TRANSIENT OVERVOLTAGE above the level of MAINS CIRCUIT		N/A
	3) WORKING VOLTAGE is the sum of more than one circuit or a mixed voltage		N/A
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		N/A
	5) WORKING VOLTAGE with a frequency above 30 kHz		N/A
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V		N/A
6.7.2.1	CLEARANCES and CREEPAGE DISTANCES	(see Form A.14 and A.15)	-
	Values for MAINS CIRCUITS of Table 4 are met		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.7.2.2	Solid insulation		-
6.7.2.2.1	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		N/A
	Equipment passed voltage tests of 6.8.3 with values of Table 5		N/A
	Complies as applicable:		-
	a) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	b) moulded and potted parts requirements of 6.7.2.2.2		N/A
	c) inner layers of printed wiring boards requirements of 6.7.2.2.3		N/A
	d) thin-film insulation requirements of 6.7.2.2.4		N/A
6.7.2.2.2	Moulded and potted parts		-
	Conductors between same two layers are separated by at least 0,4 mm after moulding is completed		N/A
6.7.2.2.3	Inner insulating layers of printed wiring boards		-
	Separated by at least 0,4 mm between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		-
	a) thickness of insulation is at least 0,4 mm		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION		N/A
	c) insulation is assembled of minimum two separate layers, where the combination is rated for test voltage of Table 5 for REINFORCED INSULATION		N/A
6.7.2.2.4	Thin-film insulation		-
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.2.1		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		-
	a) thickness through the insulation at least 0,4 mm		N/A
	b) insulation is assembled of min two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) insulation is assembled of min three separate layers, where the combination of two layers passed voltage tests of 6.8.3 with values of Table 5 for REINFORCED INSULATION		N/A
6.7.3	Insulation for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V		N/A
6.7.3.1	Secondary circuits where separation from MAINS CIRCUITS is achieved by a transformer providing:		-
	- REINFORCED INSULATION		N/A
	- DOUBLE INSULATION		N/A
	- screen connected to the PROTECTIVE CONDUCTOR TERMINAL		N/A
6.7.3.2	CLEARANCES		-
	a) meet the values of Table 6 for BASIC INSULATION and SUPPLEMENTARY INSULATION; or		N/A
	twice the values of Table 6 for REINFORCED INSULATION		N/A
	or		-
	b) pass the voltage tests of 6.8 with values of Table 6;	(see Form A.18)	-
	with following adjustments:		-
	1) values for reinforced insulation are 1,6 times the values for basic insulation		N/A
	2) if operating altitude is greater than 2000 m values of CLEARANCES multiplied with factor of Table 3		N/A
	3) minimum CLEARANCE is 0,2 mm for POLLUTION DEGREE 2 and 0,8 mm for POLLUTION DEGREE 3		N/A
6.7.3.3	CREEPAGE DISTANCES		-
	Based on WORKING VOLTAGE meets the values of Table 7 for BASIC and SUPPLEMENTARY INSULATION		N/A
	Values for REINFORCED INSULATION are twice the values of BASIC INSULATION		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.3.4	Solid insulation		-
6.7.3.4.1	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		-

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Equipment passed voltage test of 6.8.3.1 for 5 s with VALUES of Table 6 for BASIC and SUPPLEMENTARY INSULATION		N/A
	values for REINFORCED INSULATION are 1,6 times the values of BASIC INSULATION		N/A
	b) if WORKING VOLTAGE exceeds 300 V, equipment passed voltage test of 6.8.3.1 for 1 min with a test voltage of 1,5 times working voltage for BASIC or SUPPLEMENTARY INSULATION		N/A
	value for REINFORCED INSULATION are twice the WORKING VOLTAGE		N/A
	Complies as applicable:		-
	1) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	2) moulded and potted parts requirements of 6.7.3.4.2		N/A
	3) inner layers of printed wiring boards requirements of 6.7.3.4.3		N/A
	4) thin-film insulation requirements of 6.7.3.4.4		N/A
6.7.3.4.2	Moulded and potted parts		-
	Conductors between same two layers are separated by applicable distances of Table 8		N/A
6.7.3.4.3	Inner insulation layers of printed wiring boards		-
	Separated by at least by applicable distances of Table 8 between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		-
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION		N/A
	c) insulation is assembled of min two separate layers, where the combination is RATED for 1,6 times the test voltage of Table 6		N/A
6.7.3.4.4	Thin-film insulation		-
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.3.2 and 6.7.3.3		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		-
	a) thickness at least applicable distance of Table 8		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) insulation is assembled of min. two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION		N/A
	c) insulation is assembled of min. three separate layers, where the combination of two layers passed voltage tests with 1,6 time values of Table 6:	(see Form A.18)	-
	a.c. test of 6.8.3.1; or		N/A
	d.c. test of 6.8.3.2 for circuits stressed only by d.c. voltages		N/A
6.8	Procedure for dielectric strength tests		N/A
6.9	Constructional requirements for protection against electric shock		N/A
6.9.1	If a failure could cause a HAZARD:		-
	a) security of wiring connections		N/A
	b) screws securing removable covers		N/A
	c) accidental loosening		N/A
	d) CLEARANCES and CREEPAGE DISTANCES not reduced below the values of basic insulation by loosening of parts or wires		N/A
6.9.2	Insulating materials		N/A
	Material not to be used for safety relevant insulation:		-
	a) easily damaged materials not used		N/A
	b) non-impregnated hygroscopic materials not used		N/A
6.9.3	Colour coding		-
	Green-and-yellow insulation shall not be used except:		N/A
	a) protective earth conductors;		N/A
	b) PROTECTIVE BONDING conductors;		N/A
	c) potential equalization conductors;		N/A
	d) functional earth conductors		N/A
6.10	Connection to MAINS supply source and connections between parts of equipment		N/A
6.10.1	MAINS supply cords		-
	RATED for maximum equipment current (see 5.1.3 c)		N/A
	Cable complies with IEC 60227 or IEC 60245		N/A
	Heat-resistant if likely to contact hot parts		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Temperature RATING (cord and inlet):		-
	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		N/A
	Detachable cords with IEC 60320 MAINS connectors:		-
	Conform to IEC 60799; or		N/A
	Have the current RATING of the MAINS connector		N/A
6.10.2	Fitting of non-detachable MAINS supply cords		-
6.10.2.1	Cord entry		-
	a) inlet or bushing with a smoothly rounded opening; or		N/A
	b) insulated cord guard protruding >5 D (diameter)		N/A
6.10.2.2	Cord anchorage		-
	Protective earth conductor is the last to take the strain		N/A
	a) cord is not clamped by direct pressure from a screw		N/A
	b) knots are not used		N/A
	c) cannot push the cord into the equipment to cause a HAZARD		N/A
	d) no failure of cord insulation in anchorage with metal parts		N/A
	e) not to be loosened without a tool		N/A
	f) cord replacement does not cause a HAZARD and method of strain relief is clear		N/A
	Push-pull and or torque test		N/A
6.10.3	Plugs and connectors		N/A
	MAINS supply plugs, connectors etc., conform with relevant specifications		N/A
	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		-
	Plugs of supply cords do not fit MAINS sockets above rated SUPPLY voltage		N/A
	MAINS type plugs used only for connection to MAINS supply		N/A
	Plug pins which receive a charge from an internal capacitor		N/A
	Accessory MAINS socket outlets:		-
	a) marking if accepts a standard MAINS supply plug (see 5.1.3e)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) input has a protective earth conductor if outlet has EARTH TERMINAL CONTACT		N/A
6.11	Disconnection from supply source		N/A
6.11.1	Disconnects all current-carrying conductors		N/A
6.11.2	Exceptions		N/A
6.11.3	Requirements according to type of equipment		-
6.11.3.1	PERMANENTLY CONNECTED EQUIPMENT and multi-phase equipment		N/A
	Employs switch or circuit-breaker		N/A
	If switch or circuit-breaker is not part of the equipment, documentation requires:		-
	a) switch or circuit-breaker to be included in building installation		N/A
	b) suitable location easily reached		N/A
	c) marking as disconnecting for the equipment		N/A
6.11.3.2	Single-phase cord-connected equipment		N/A
	Equipment is provided with one of the following:		-
	a) switch or circuit-breaker		N/A
	b) appliance coupler (disconnectable without tool)		N/A
	c) separable plug (without locking device)		N/A
6.11.4	Disconnecting devices		N/A
6.11.4.1	Disconnecting device part of equipment		N/A
	Electrically close to the SUPPLY		N/A
	Power-consuming components not electrically located between the supply source and the disconnecting device		N/A
	Except electromagnetic interference suppression circuits permitted to be located on the supply side of the disconnecting device		N/A
6.11.4.2	Switches and circuit-breakers		N/A
	When used as disconnection device:		-
	Meets IEC 60947-1 and IEC 60947-3		N/A
	Marked to indicate function:		-
	Not incorporated in MAINS cord		N/A
	Does not interrupt PROTECTIVE EARTH CONDUCTOR		N/A
6.11.4.3	Appliance couplers and plugs		N/A
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.11.3.2):		-

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Clause	Requirement + Test	Result - Remark	Verdict
	Readily identifiable and easily reached by the operator		N/A
	Single-phase portable equipment cord length not more than 3 m		N/A
	PROTECTIVE EARTH CONDUCTOR connected first and disconnected last		N/A
7	PROTECTION AGAINST MECHANICAL HAZARDS		N/A
7.1	Equipment does not cause a mechanical HAZARD in NORMAL nor in SINGLE FAULT CONDITION	Device is open type and intended to be installed in a suitable enclosure.	N/A
	Conformity is checked by 7.2 to 7.7		N/A
7.2	Sharp edges		N/A
	Easily touched parts are smooth and rounded		N/A
	Do not cause injury during NORMAL USE and		N/A
	Do not cause injury during SINGLE FAULT CONDITION		N/A
7.3	Moving parts		N/A
7.3.1	HAZARDS from moving parts limited to a tolerable level with the conditions specified in 7.3.2 and 7.3.5		N/A
	RISK assessment in accordance with 7.3.3 carried out		N/A
7.3.2	Exceptions		N/A
	Access to HAZARDOUS moving parts permitted under following circumstances:		-
	a) obviously intended to operate on parts or materials external of the equipment		N/A
	inadvertent touching of moving parts minimized by equipment design (e .g. guards or handles)		N/A
	b) If OPERATOR access is unavoidable outside NORMAL USE following precautions have been taken:		-
	1) access requires TOOL		N/A
	2) statement about training in the instructions		N/A
	3) warning markings on covers prohibiting access by untrained OPERATORS		N/A
	or symbol 14 with full details in documentation		N/A
7.3.3	RISK assessment for mechanical HAZARDS to body parts		N/A
	RISK is reduced to a tolerable level by protective measures as specified in table 12		N/A
	Minimum protective measures:		-

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Clause	Requirement + Test	Result - Remark	Verdict
	A. Low level measures		N/A
	B. Moderate measures		N/A
	C. Stringent measures		N/A
7.3.4	Limitation of force and pressure		N/A
	Following levels are met in NORMAL and SINGLE FAULT CONDITION:		-
	Continuous contact pressure below 50 N / cm ² with force below 150 N		N/A
	Temporary force below 250 N for an area at least of 3 cm ² for a maximum duration of 0,75 s		N/A
7.3.5	Gap limitations between moving parts		N/A
7.3.5.1	Access normally allowed		-
	If levels of 7.3.4 exceeded and body part may be inserted minimum gap as specified in table 13 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.3.5.2	Access normally prevented		-
	Maximum gap as specified in table 14 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.4	Stability		N/A
	Equipment not secured to building structure is physical stable		N/A
	Stability maintained after opening of drawers etc. by automatic means, or		N/A
	warning marking requires the application of means		N/A
	Compliance checked by following tests as applicable:		-
	a) 10° tilt test for other than handheld equipment		N/A
	b) multi-directional force test for equipment exceeds height of 1 m and mass of 25 kg		N/A
	c) downward force test for floor-standing equipment		N/A
	d) overload test with 4 times maximum load for castor or support that supports greatest load		N/A
	e) castor or support that supports greatest load removed from equipment		N/A
7.5	Provisions for lifting and carrying		N/A
7.5.1	Equipment more than 18 kg :		-
	Has means for lifting or carrying; or		N/A
	Directions in documentation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.5.2	Handles and grips		-
	Handles or grips withstand four times weight		N/A
7.5.3	Lifting devices and supporting parts		-
	RATED for maximum load; or		N/A
	tested with four times maximum static load		N/A
7.6	Wall mounting		N/A
	Mounting brackets withstand four times weight		N/A
7.7	Expelled parts		N/A
	Equipment contains or limits the energy		N/A
	Protection not removable without the aid of a tool		N/A
8	RESISTANCE TO MECHANICAL STRESSES		N/A
8.1	Equipment does not cause a HAZARD when subjected to mechanical stresses in NORMAL USE	See part 2-201 TRF. These devices are open type and intended to be installed in an enclosure.	N/A
	Normal protection level is 5 J		N/A
	Levels below 5 J but not less than 1 J are acceptable if all of following criteria are met:		-
	a) lower level justified by RISK assessment of manufacturer		N/A
	b) equipment installed in its intended application is not easily touched		N/A
	c) only occasional access during NORMAL USE		N/A
	d) IK code in accordance to IEC 62262 marked or symbol 14 used with full information in the documentation		N/A
	for non-metallic ENCLOSURES rated below 2 °C ambient temperature value chosen for minimum RATED temperature		N/A
	impact energies between IK values, the IK code marked for nearest lower value		N/A
	Conformity is checked by performing following tests:		-
	1) static test of 8.2.1		N/A
	2) impact test of 8.2.2 with 5 J except for HAND-HELD EQUIPMENT		N/A
	if impact energy not selected to 5 J alternate method of IEC 62262 used		N/A
	3) drop test of 8.3.1 or 8.3.2 except for FIXED EQUIPMENT and equipment with mass over 100 kg		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Equipment RATED with an impact rating of IK 08 that obviously meets the criteria		N/A
	After the tests inspection with following results:		-
	- HAZARDOUS LIVE parts above the limits of 6.3.2 not ACCESSIBLE		N/A
	- insulation pass the voltage tests of 6.8		N/A
	i) no leaks of corrosive and harmful substances		N/A
	ii) ENCLOSURE shows no cracks resulting in a HAZARD		N/A
	iii) CLEARANCES not less than their permitted values		N/A
	iv) insulation of internal wiring remains undamaged		N/A
	v) PROTECTIVE BARRIERS not damaged or loosened		N/A
	vi) No moving parts exposed, except permitted by 7.3		N/A
	vii) no damage which could cause spread of fire		N/A
8.2	ENCLOSURE rigidity test		N/A
8.2.1	Static test		N/A
	- 30 N with 12 mm rod to each part of ENCLOSURE		N/A
	- in case of doubt test conducted at maximum RATED ambient temperature		N/A
8.2.2	Impact test		N/A
	Impact applied to any part of ENCLOSURE causing a HAZARD if damaged		N/A
	Impact energy level and corresponding IK code:		-
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C		N/A
8.3	Drop test		N/A
8.3.1	Other than HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		N/A
	Tests conducted with a drop height or angle of:		-
8.3.2	HAND-HELD and DIRECT-PLUG-IN EQUIPMENT		-
	Non-metallic ENCLOSURES cooled to minimum RATED ambient temperature if below 2 °C		N/A
	Drop test conducted with an height of 1 m		N/A
9	PROTECTION AGAINST THE SPREAD OF FIRE		Pass
9.1	No spread of fire in NORMAL and SINGLE FAULT CONDITION		Pass

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	MAINS supplied equipment meets requirements of 9.6 additionally		N/A
	Conformity is checked by minimum one or a combination of the following (see Figure 11):	(see Form A.22)	-
	a) SINGLE FAULT test of 4.4; or		Pass
	b) Application of 9.2 (eliminating or reducing the sources of ignition); or		N/A
	c) Application of 9.3 (containment of fire within the equipment)		Pass
9.2	Eliminating or reducing the sources of ignition within the equipment		N/A
	a) 1) Limited-energy circuit (see 9.4); or		N/A
	b) 2) BASIC INSULATION provided for parts of different potential; or		N/A
	Bridging the insulation does not cause ignition		N/A
	c) Surface temperature of liquids and parts (see 9.5)		N/A
	d) No ignition in circuits designed to produce heat		N/A
9.3	Containment of the fire within the equipment, should it occur		Pass
9.3.1	Spread of fire outside equipment reduced to a tolerable level if:		-
	a) Energizing of the equipment is controlled by an OPERATOR held switch		N/A
	b) ENCLOSURE is conform with constructional requirements of 9.3.2; and		Pass
	Requirements of 9.5 are met		N/A
9.3.2	Constructional requirements		-
	a) Connectors and insulating material have flammability classification V-2 or better	See critical component list.	Pass
	b) Insulated wires and cables are flame retardant (VW-1 or equivalent)		N/A
	c) ENCLOSURE meets following requirements:	Open type equipment	-
	1) Bottom and sides in arc of 5 ° (see Figure 13) to non-limited circuits (9.4) meets:		-
	i) no openings; or		N/A
	ii) perforated as specified in table 16; or		N/A
	iii) metal screen with a mesh; or		N/A
	iv) baffles as specified in Figure 12		N/A
	2) Material of ENCLOSURE and any baffle or flame barrier is made of:		-

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Clause	Requirement + Test	Result - Remark	Verdict
	Metal (except magnesium); or		N/A
	Non-metallic materials have flammability classification V-1 or better		N/A
	3) ENCLOSURE and any baffle or flame barrier have adequate rigidity		N/A
9.4	Limited-energy circuit		N/A
	a) Potential not more than 30 r.m.s. and 42,4 V peak, or 60 V dc		N/A
	b) Current limited by one of following means:		-
	1) Inherently or by impedance (see table 17); or		N/A
	2) Overcurrent protective device (see table 18); or		N/A
	3) A regulating network limits also in SINGLE FAULT CONDITION (see table 17)		N/A
	c) Is separated by at least BASIC INSULATION		N/A
	Fuse or a nonadjustable electromechanical device is used		N/A
9.5	Requirements for equipment containing or using flammable liquids		N/A
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire		N/A
	RISK is reduced to a tolerable level:		-
	a) The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point		N/A
	b) The quantity of liquid is limited		N/A
	c) Flames are contained within the equipment		N/A
	Detailed instructions for RISK-reduction provided		N/A
9.6	Overcurrent protection		N/A
9.6.1	MAINS supplied equipment protected		N/A
	BASIC INSULATION between MAINS parts of opposite polarity provided		N/A
	Devices not in the protective conductor		N/A
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		N/A
9.6.2	PERMANENTLY CONNECTED EQUIPMENT		N/A
	Overcurrent protection device:		-
	Fitted within the equipment; or		N/A
	Specified in manufacturer's instructions		N/A
9.6.3	Other equipment		-
	Protection within the equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10	EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT		Pass
10.1	Surface temperature limits for protection against burns	See Part 2-201	Pass
	Easily touched surfaces within the limits in NORMAL and in SINGLE FAULT CONDITION:		-
	- at an specified ambient temperature of 40 °C		N/A
	- for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C	See datasheet.	Pass
	Heated surfaces necessary for functional reasons exceeding specified values:		-
	- Are recognizable as such by appearance or function; or		N/A
	- Are marked with symbol 13		N/A
	- Guards are not removable without tool		N/A
10.2	Temperatures of windings		N/A
	Limits not exceeded in:		-
	NORMAL CONDITION		N/A
	SINGLE FAULT CONDITION		N/A
10.3	Other temperature measurements	See temperature test in datasheet.	Pass
	Following measurements conducted if applicable:		-
	a) Value of 60 °C of field-wiring terminal box not exceeded		Pass
	b) Surface of flammable liquids and parts in contact with this liquids		N/A
	c) Surface of non-metallic ENCLOSURES		N/A
	d) Parts made of insulating material supporting parts connected to MAINS supply		N/A
	e) Terminals carrying a current more than 0,5 A		N/A
10.4	Conduct of temperature tests		Pass
10.4.1	Tests conducted under reference test conditions and manufacturer's instructions		Pass
10.4.2	Temperature measurement of heating equipment		N/A
	Tests conducted in test corner		N/A
10.4.3	Equipment intended for installation in a cabinet or wall		N/A
	Equipment built in as specified in installation instructions		N/A
10.5	Resistance to heat		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.5.1	Integrity of CLEARANCE and CREEPAGE DISTANCES		N/A
10.5.2	Non-metallic ENCLOSURES		N/A
	Within 10 min after treatment:		-
	Equipment subjected to suitable stresses of 8.2 and 8.3 complying with criteria of 8.1		N/A
10.5.3	Insulating material		N/A
	a) Parts supporting parts connected to MAINS supply		N/A
	b) TERMINALS carrying a current more than 0,5 A		N/A
	Examination of material data; or		N/A
	in case of doubt:		N/A
	1) Ball pressure test; or		N/A
	2) Vicat softening test of ISO 306		N/A
11	PROTECTION AGAINST HAZARDS FROM FLUIDS		N/A
11.1	Protection to OPERATORS and surrounding area provided by EQUIPMENT		N/A
	All fluids specified by manufacturer considered		N/A
11.2	Cleaning		N/A
11.3	Spillage		N/A
11.4	Overflow		N/A
11.5	Battery electrolyte		N/A
	Battery electrolyte leakage presents no HAZARD		N/A
11.6	Specially protected equipment	IP30 (not certificated by UL)	N/A
11.7	Fluid pressure and leakage		N/A
11.7.1	Maximum pressure:	(see Form A.31)	-
	Maximum pressure of any part does not exceed PRATED		N/A
11.7.2	Leakage and rupture at high pressure		-
	Fluid-containing parts subjected to hydraulic test if:	(see Form A.31)	-
	a) product of pressure and volume > 200 kPa; and		N/A
	b) pressure > 50 kPa		N/A
	Parts of refrigerating systems meets pressure-related requirements of IEC 60335-24 or IEC 60335-2-89		N/A
11.7.3	Leakage from low-pressure parts		N/A
11.7.4	Overpressure safety device		N/A

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Does not operate in NORMAL USE		N/A
	a) Connected as close as possible to parts intended to be protected		N/A
	b) Easy access for inspection, maintenance and repair		N/A
	c) Adjustment only with TOOL		N/A
	d) No discharge towards person		N/A
	e) No HAZARD from deposit of discharged material		N/A
	f) Adequate discharge capacity		N/A
	No shut-off valve between overpressure safety device and protected parts		N/A
12	PROTECTION AGAINST RADIATION, INCLUDING LASER SOURCES, AND AGAINST SONIC AND ULTRASONIC PRESSURE		Pass
12.1	Equipment provides protection		N/A
12.2	Equipment producing ionizing radiation		N/A
12.2.1	Ionizing radiation		N/A
12.2.1.1	Equipment meets the following requirements:		-
	a) if intended to emit radiation meets requirements of 12.2.1.2; or		N/A
	tested, classified and marked in accordance to IEC 60405		N/A
	b) if only emits stray radiation meets requirements of 12.2.1.3		N/A
12.2.1.2	Equipment intended to emit radiation		-
	Effective dose rate of radiation measured:		-
	If dose rate exceeds 5 $\mu\text{Sv/h}$ marked with the following:		-
	a) symbol 17 (ISO 361)		N/A
	b) abbreviations of the radionuclides:		-
	c) with maximum dose at 1 m; or:		-
	with dose rate value between 1 $\mu\text{Sv/h}$ and 5 $\mu\text{Sv/h}$ in m:		-
12.2.1.3	Equipment not intended to emit radiation	(see Form A.34)	-
	Limit for unintended stray radiation of 1 $\mu\text{Sv/h}$ at any easily reached point kept :		-
12.2.2	Accelerated electrons		-
	Compartments opened only by the use of a TOOL		N/A
12.3	Ultraviolet (UV) radiation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	No unintentional HAZARDOUS escape of UV radiation:		-
	- checked by inspection; and		N/A
	- evaluation of RISK assessment documentation		N/A
12.4	Microwave radiation		N/A
	Power density does not exceed 10 W/m ² :		N/A
12.5	Sonic and ultrasonic pressure		N/A
12.5.1	Sound level	(see Form A.35)	-
	No HAZARDOUS sound emission		N/A
	Maximum sound pressure level measured and calculated for maximum sound power level as specified in ISO 3746 or ISO 9614-1		N/A
	Instruction describes measures for protection		N/A
12.5.2	Ultrasonic pressure		N/A
	Equipment not intended to emit ultrasound does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	Equipment intended to emit ultrasound:		N/A
	Outside useful beam does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	If inside useful beam above values exceeded:		-
	Marked with Symbol 14 of table 1		N/A
	and following information in the documentation:		-
	a) dimensions of useful beam		N/A
	b) area where ultrasonic pressure exceed 110 dB		N/A
	c) maximum sound pressure inside beam area		N/A
12.6	Laser sources		N/A
	Equipment meets requirements of IEC 60825-1		N/A
13	PROTECTION AGAINST LIBERATED GASES AND SUBSTANCES, EXPLOSION AND IMPLOSION		N/A
13.1	Poisonous and injurious gases and substances		N/A
	No poisonous or injurious gases or substances liberated in NORMAL CONDITION		N/A
	Attached data/test reports demonstrate conformity		N/A
13.2	Explosion and implosion		N/A
13.2.1	Components		N/A
	Components liable to explode:		-
	Pressure release device provided; or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Apparatus incorporates operator protection (see also 7.7)		N/A
	Pressure release device:		-
	Discharge without danger		N/A
	Cannot be obstructed		N/A
13.2.2	Batteries and battery charging	(see Form A.37)	-
	If explosion or fire HAZARD could occur:		-
	Protection incorporated in the equipment; or		N/A
	Instructions specify batteries with built-in protection		N/A
	In case of wrong type of battery used:		-
	No HAZARD; or		N/A
	Warning by marking and within instructions		N/A
	Equipment with means to charge rechargeable batteries:		-
	Warning against the charging of non-rechargeable batteries; and		N/A
	Type of rechargeable battery indicated; or		N/A
	Symbol 14 used		N/A
	Battery compartment design		N/A
	Single component failure		N/A
	Polarity reversal test		N/A
13.2.3	Implosion of cathode ray tubes		N/A
	If maximum face dimensions > 160 mm:		-
	Intrinsically protected and correctly mounted; or		N/A
	ENCLOSURE provides protection:		N/A
	If non-intrinsically protected:		-
	Screen not removable without TOOL		N/A
	If glass screen, not in contact with surface of tube		N/A
14	COMPONENTS AND SUBASSEMBLIES		Pass
14.1	Where safety is involved, components and subassemblies meet relevant requirements		N/A
14.2	Motors		N/A
14.2.1	Motor temperatures		N/A
	Does not present a HAZARD when stopped or prevented from starting; or		N/A
	Protected by over-temperature or thermal protection device conform with 14.3		N/A
14.2.2	Series excitation motors		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Connected direct to device, if overspeeding causes a HAZARD		N/A
14.3	Overtemperature protection devices		N/A
	Devices operating in a SINGLE FAULT CONDITION		N/A
	a) Reliable function is ensured		N/A
	b) RATED to interrupt maximum current and voltage		N/A
	c) Does not operate in NORMAL USE		N/A
	If self-resetting device used to prevent a HAZARD, protected part requires intervention before restarting		N/A
14.4	Fuse holders		N/A
	No access to HAZARDOUS LIVE parts		N/A
14.5	MAINS voltage selecting devices		N/A
	Accidental change not possible		N/A
14.6	MAINS transformers tested outside equipment		N/A
14.7	Printed circuit boards	See critical component list.	Pass
	Data shows conformity with V-1 of IEC 60695-11-10 or better; or		Pass
	Test shows conformity with V-1 of IEC 60695-11-10 or better		N/A
	Not applicable for printed wiring boards with limited-energy circuits (9.4)		N/A
14.8	Circuits or components used as TRANSIENT OVERVOLTAGE limiting devices		N/A
	Test conducted between each pair of MAINS SUPPLY TERMINALS		N/A
	No HAZARD resulting from rupture or overheating of the component:		-
	- no bridging of safety relevant insulation		N/A
	- no heat to other parts above the self-ignition points		N/A
15	PROTECTION BY INTERLOCKS		N/A
15.1	Interlocks are designed to remove a HAZARD before OPERATOR exposed		N/A
15.2	Prevention of reactivation		N/A
15.3	Reliability		N/A
	Single fault unlikely to occur; or		N/A
	Cannot cause a HAZARD		N/A

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict
16	HAZARDS RESULTING FROM APPLICATION		N/A
16.1	REASONABLY FORESEEABLE MISUSE		N/A
	No HAZARDS arising from settings not intended and not described in the instructions		N/A
	Other cases of REASONABLY FORESEEABLE MISUSE addressed by RISK assessment		N/A
16.2	Ergonomic aspects		N/A
	Factors giving rise to a HAZARD the RISK assessment is reflecting those aspects:		-
	a) limitation of body dimensions		N/A
	b) displays and indicators		N/A
	c) accessibility and conventions of controls		N/A
	d) arrangement of TERMINALS		N/A
17	RISK ASSESSMENT		N/A
	RISK assessment conducted, if HAZARD might arise and not covered by Clauses 6 to 16		N/A
	TOLERABLE RISK achieved by iterative documented process covering the following:		-
	a) RISK analysis		N/A
	Identifies HAZARDS and estimates RISK		N/A
	b) RISK evaluation		N/A
	Plan to judge acceptability of resulting RISK level based on the estimated severity and likelihood of a RISK		N/A
	c) RISK reduction		N/A
	Initial RISK reduced by counter measures;		N/A
	Repeated RISK evaluation without new RISKS introduced		N/A
	RISKS remaining after RISK assessment addressed in instructions to RESPONSIBLE BODY:		-
	Information contained how to mitigate these RISKS		N/A
	Following principles in methods of RISK reduction applied by manufacturer in given order:		-
	1) RISKS eliminated or reduced as far as possible		N/A
	2) Protective measures taken for RISKS that cannot be eliminated		N/A
	3) User information about residual RISK due to any defect of the protective measures		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Indication of particular training is required		N/A
	Specification of the need for personal protective equipment		N/A
	Conformity checked by evaluation of the RISK assessment documentation		N/A
ANNEX F	ROUTINE TESTS		N/A
	Manufacturer 's declaration		N/A
ANNEX H	QUALIFICATION OF CONFORMAL COATINGS FOR PROTECTION AGAINST POLLUTION		N/A
H.1	General		N/A
	Conformal coatings meet the requirements of Clause H.2 and H.3.		N/A
H.2	Technical properties		N/A
	Technical properties of conformal coatings are suitable for the intended application. In particular:		-
	a) Manufacturer indicate that it is a coating for PWBs;		N/A
	b) RATED operating temperature include the temperature range of the indicated application;		N/A
	c) CTI, insulation resistance and dielectric strength are suitable for the intended application;		N/A
	d) Coating have adequate UV resistance, if it is exposed to sunlight;		N/A
	e) Flammability RATING of the coating is at least the required flammability RATING of the applied PWB.		N/A
H.3	Qualification of coatings		N/A
	Coating complies with the conformity requirements.		N/A
ANNEX K	INSULATION REQUIREMENTS NOT COVERED BY CLAUSE 6.7		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

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Clause	Requirement + Test	Result - Remark	Verdict

SP	TABLE: Additional or special tests conducted		N/A
Clause and Name of Test	Test type and condition	Observed results	

Supplementary information:

This table is used to identify test results for tests other than referenced in the above test tables. Refer to Appendix D for all tests performed within this report.

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE: List of critical components					Pass
Component/ Part No.	Manufacturer/ Trademark	Type No./model No./	Technical data	Standard No. / Edition ²	Mark(s) & Certificates of conformity ¹
Chassis	Interchangeable	Interchangeable	SECC. See Diagram Enclosure for dimension details.	-	-
Label	KOAN HAO TECHNOLOGY LTD	TKSMB75	Suitable for use on metal surface (SECC) and rated 100 °C. Used with suitable ink type if applicable.	UL 969, CSA-C22.2 No. 0.15	UL R/C (PGGU2), MH18636
(alternate)	Interchangeable	Interchangeable	Suitable for use on metal surface (SECC) and rated 100 °C. Used with suitable ink type if applicable.	UL 969, CSA-C22.2 No. 0.15	UL R/C (PGDQ2/8) or (PGJI2/8)
Printing Ink	Teikoku Printing Inks Mfg. Co., Ltd	611C	Suitable for use on metal surface (SECC) and rated 100 °C.	UL 969, CSA-C22.2 No. 0.15	-
(alternate)	Interchangeable	Interchangeable	Suitable for use on metal surface (SECC) and rated 100 °C.	UL 969, CSA-C22.2 No. 0.15	-
Socket, Terminal Block	DINKLE ENTERPRISE CO LTD	2EHDR-04P	Socket rated 300V, 15A, 105°C. Plastic part, rated V-2.	UL 1059, CSA-C22.2 No. 158	UL R/C (XCFR2/8), E102914
(alternate)	Interchangeable	Interchangeable	Any Socket rated min 300V, 15A, 105°C. Plastic part, rated V-2	UL 1059, CSA-C22.2 No. 158	UL R/C (XCFR2/8)
Plug, Terminal Block	DINKLE ENTERPRISE CO LTD	2ESDSR	Plug rated 300V, 10A, 105°C, FW=2, AWG=12-24. Plastic part, rated V-2. UG = B or D. Torque value 4.5 lb-in.	UL 1059, CSA-C22.2 No. 158	UL R/C (XCFR2/8), E102914
(alternate)	Interchangeable	Interchangeable	Any Plug rated min 300V, 10A, 105°C, FW=2, AWG=12-24 UG: B or D, Tq 4.5 lb-in. Plastic part, rated V-2. Same manufacturer as Terminal Block socket.	UL 1059, CSA-C22.2 No. 158	UL R/C (XCFR2/8)
RJ45 type Ethernet connector, external	Interchangeable	Interchangeable	Plastic part, rated V-2, 100°C or better.	UL 94, UL746B	UL R/C (QMFZ2)
Printed Wiring Boards	Interchangeable	Interchangeable	Rated 130°C, V-1 or better.	UL 796	UL R/C (ZPMV2/8)
Fuse F1	LITTELFUSE INC	0451002. MRL	Rated 125 Vdc 8A.	UL 248-14, CSA-C22.2 No. 248-14-00	UL R/C (JDYX2/8) E10480
Bridge Diodes D3, D7	Interchangeable	Interchangeable	Rated 800 V, 2A or better.	-	-
Choke (L8, L9)	Interchangeable	Interchangeable	Rated 125°C min.	-	-
Choke (L1, L2) on side board	Interchangeable	Interchangeable	Rated 125°C min.	-	-

IEC 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: List of critical components					Pass
Component/ Part No.	Manufacturer/ Trademark	Type No./model No./	Technical data	Standard No. / Edition ²	Mark(s) & Certificates of conformity ¹
Capacitor (C137) on main board	Interchangeable	Interchangeable	Rated 63V, 100uF, min. 105 °C.	-	-
Capacitor (C7) on side board	Interchangeable	Interchangeable	Rated 63V, 100uF, min. 105 °C.	-	-
Thermal Pad (near U2)	Interchangeable	Interchangeable	Thermal Conductivity : 3 W/mK, See Diagram Enclosure for dimension details.	--	--

Supplementary information:

The Test Laboratory has verified the component information.

- 1) An asterisk indicates a mark which assures the agreed level of surveillance. See Licenses and Certificates of Conformity for verification.
- 2) Anything specified within brackets “()” is for reference purposes only and can be used to specify the UL Product Category CCN(s)/File Number if the component includes an UL Certification. This can be useful for the UL Follow-Up Service Inspection associated with the UL Mark; however if in brackets, should not be a required element of the UL Inspection.

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Clause	Requirement + Test	Result - Remark	Verdict

National Differences

The following National Differences are included in this Report. If not 'Selected', the device was not evaluated to these Differences.

If selected, Group Differences are applicable for CENELEC member countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Selected? (y/n)	Group / Country	Standard	Abbreviation
Yes	USA / Canada	UL 61010-1, 3rd Edition, May 11, 2012, Revised April 29, 2016 CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 2016	USC
No	Switzerland	SN EN 61010-1:2010	SW
No	Japan	-	JP
No	Austria	EN 61010-1:2010	-
No	Denmark	DS/EN 61010-1:2010	-
No	Republic of Korea	K 61010-1	-
No	Slovenia	SIST EN 61010-1	-
No	Sweden	SS-EN 61010-1:2010	-
No	United Kingdom	BS EN61010-1:2010	-

USA / Canada(UL 61010-1, 3rd Edition, 2012-05-11 / CAN/CSA-C22.2 No. 61010-1, 3rd Edition, 2012-05)			
1.1.4 DV[DR]	This standard applies to equipment to be employed in accordance with ANSI/NFPA 70, National Electrical Code® (NEC); designed to be installed in accordance with the Canadian Electrical Code (CEC), Part I, CSA C22.1, and CSA C22.2 No. 0; or designed to comply with both the NEC and CEC	Open type Ethernet Switch intended to be installed in industrial control panel.	Pass
9.2.3 [SCC]	CBs shall include dual language safety labeling within their product certification requirements, if so required by the standard or by the authority having jurisdiction.		Pass
	The manufacturer has confirmed they have the ability to include English and French safety labeling (markings associated with the signal words DANGER, WARNING, and CAUTION) when required.	The ability of the manufacturer to include these markings was verified by either (1) visual inspection of the markings on the actual product or (2) draft of labels that will be applied to the product or (3) written	Pass

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Clause	Requirement + Test	Result - Remark	Verdict
		confirmation from the customer of the markings that will appear on the product. If the product standard provides the exact translation, the evidence must match the exact translation. If the product standard does NOT provide the exact translation, the evidence must simply include French text (no translation required).	
	Manufacturer has a method to manage distribution of products, IF all products with the Canadian certification mark are NOT going to include the dual language.	Evaluation staff are to only verify that the manufacturer has a method to control distribution. Evaluation staff do not have to record the method of control nor are the evaluation staff expected to verify the effectiveness of the method of control. This requirement to verify that a method exist will be noted in the FUS Procedure. The UL Field Engineer will verify the method during surveillance. If the manufacturer is going to include the dual language on all products with the Canadian certification mark, then this item is N/A; no further action required.	N/A
6.3.1	Replace (a) with: The a.c. voltage levels are 30 V r.m.s., 42.4 V peak and the d.c. voltage level is 60 V. For equipment intended to be used in WET LOCATIONS, the voltage levels are 16 V r.m.s., 22.6 V peak and the d.c. voltage level is 35 V d.c.		N/A
6.3.2	Replace (a) with: The a.c. voltage levels are 50 V r.m.s., 70 V peak and the d.c. voltage level is 120 V. For equipment intended to be used in WET LOCATIONS, the a.c. voltage levels are 33 V r.m.s., 46.7 V peak and the d.c. voltage level is 70 V. For voltages of short duration, the duration versus voltage levels are those of figure 2.DV, measured across a 50 kohm resistor.		N/A
6.5.2.4	Replace with the following: The impedance between the PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part for which PROTECTIVE BONDING is specified shall not cause a potential drop of more than 4 V. Metal that is part of the protective bond shall not melt, and heating and burning shall not occur to the extent		N/A

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Clause	Requirement + Test	Result - Remark	Verdict										
	<p>that could cause a fire HAZARD.</p> <p>Conformity is checked by inspection and by applying an a.c. test current for the duration specified in Table 6.5.2.4DV and then measuring the voltage drop. See 4.4.4.3 for test conditions regarding the spread of fire.</p> <p>The test current is twice the rating of the attachment plug cap, but not less than 40 A. If the equipment contains overcurrent protection devices for all poles of the MAINS supply, and if the wiring on the supply side of the overcurrent protection devices cannot become connected to ACCESSIBLE conductive parts in the case of a single fault, the test current need not be more than twice the RATED current of the internal overcurrent protection devices. If the test current exceeds 500A, see CSA 0.4.</p>												
6.5.2.4 D.1[D2]	<p>Duration of protective bonding test</p> <p>Value of building MAINS supply overcurrent protection means (A) Time (Min)</p> <table border="0"> <tr> <td>0 - 30</td> <td>2</td> </tr> <tr> <td>31 - 60</td> <td>4</td> </tr> <tr> <td>61 - 100</td> <td>6</td> </tr> <tr> <td>101 - 200</td> <td>8</td> </tr> <tr> <td>201 and over</td> <td>10</td> </tr> </table>	0 - 30	2	31 - 60	4	61 - 100	6	101 - 200	8	201 and over	10		N/A
0 - 30	2												
31 - 60	4												
61 - 100	6												
101 - 200	8												
201 and over	10												
6.5.2.5	<p>In the last sentence of the conformity statement, replace "1 min" with "the duration specified in Table 6.5.2.4DV".</p> <p>In the second sentence of the conformity statement, replace "10 V" with "4 V".</p>		N/A										
6.10.1	Delete: reference to requirements of IEC 60227 or IEC 60245 for MAINS supply cords in the second paragraph.		N/A										
	Replace the fifth paragraph with: Green covered conductors (with or without yellow stripes) shall be used only for connection to PROTECTIVE CONDUCTOR TERMINALS.		N/A										
	Delete: reference to requirements of IEC 60799 for detachable MAINS supply cords in the sixth paragraph.		N/A										
	Add after the sixth paragraph: Requirements for MAINS cords or cord sets are contained in ANSI/UL 817 and CSA C22.2 No. 21.		N/A										
	Add after the sixth paragraph: Requirements for general use receptacles, attachment plugs, and similar wiring devices are contained in ANSI/UL 498 and CSA C22.2 No. 42, CSA C22.2 No. 182.1, CSA C22.2 No. 182.2, and CSA C22.2 No. 182.3.		N/A										
	Add after the sixth paragraph: Note: Clause 6.10.1 only applies to cords connected to the external fixed MAINS socket-outlet and to external interconnecting MAINS		N/A										

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Clause	Requirement + Test	Result - Remark	Verdict
	cords. Clause 6.10.1 does not apply to cords fully contained within the equipment enclosure.		
6.10.3	Add: Requirements for plugs of MAINS cords are contained in ANSI/UL 498 and CSA C22.2 No. 42, CSA C22.2 No. 182.1, CSA C22.2 No. 182.2, and CSA C22.2 No. 182.3.		N/A
6.10.4	Permanently-connected Equipment		N/A
	Equipment intended for permanent connection to the mains shall have provision for connection of Annex DVD.		N/A
	Conformity is checked as specified in Annex DVD.		N/A
6.11	Add: "and maintaining polarity" to the end of the subclause title		N/A
6.11.5	Polarity of connections to the MAINS circuit		N/A
	Add: Any line-connected single-pole switch, any center contact of a lampholder, and any automatic control with a marked off position shall be connected to a TERMINAL or lead intended for connection to the ungrounded conductor of the supply circuit.		N/A
	Note: An "ungrounded" supply conductor is one that is not connected to protective earth at any point in the building installation.		N/A
9.3.2	Add the following to the end of item a): Flammability RATINGS of ANSI/UL 94 V-0, V-1, and V-2 are equivalent to the same classifications of IEC 60695-11-10.		Pass
	Add the following to the end of Note 2: Flammability RATINGS FT-1 of CSA C22.2 No. 0.3 and VW-1 ANSI/UL 1581 are considered acceptable for insulated wire and cable.		N/A
9.6.1 A	Add: A single-pole circuit breaker used as an overcurrent protective device shall be connected in the ungrounded supply conductor.		N/A
	Note: An "ungrounded" supply conductor is one that is not connected to the protective earth at any point in the building installation. A "grounded" supply conductor is one that is connected to protective earth at some point in the building installation. It is sometimes called the "neutral conductor".		N/A
	Add: A multiple-pole circuit breaker used as an overcurrent protective device or devices shall be so constructed as to interrupt all of the neutral (grounded) and ungrounded conductors of the MAINS supply simultaneously.		N/A
	Add: A single fuse used as an overcurrent protective device shall be connected in the ungrounded supply conductor.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Add: Where fuses are used as overcurrent protective devices in both the neutral (grounded) and ungrounded supply conductors, the fuseholders should be mounted adjacent to each other and the fuses shall be of the same RATING and characteristics.		N/A
	Add: The screw shell of a plug fuseholder and the ACCESSIBLE contact of an extractor fuseholder connected to the ungrounded supply conductor shall be connected towards the load. The ACCESSIBLE contact or screw shell of fuseholders connected in the neutral (grounded) conductor shall be located towards the grounded supply line.		N/A
11.7.1	Add: Annex G is the normative for certain types of products.		N/A
	Add: Laboratory equipment and testing and measurement equipment having both of the following characteristics shall meet the requirements of 11.7.2 of G.5: a) a product of pressure and volume greater than 200kPa-l. b) a pressure greater than 50 kPa.		N/A
	Add: Laboratory equipment and testing and measurement equipment that do not have those characteristics shall meet the requirements of 11.7.3 and 11.7.4 as applicable.		N/A
	Add: Other types of equipment shall meet the requirements of Annex G, as applicable.		N/A
	Add: Conformity is checked as specified in 11.7.2 to 11.7.4 and Annex G.		N/A
11.7.2	Replace the note with the following note: Note: National authorities may allow safety to be established by calculation, for example according to the ASME Boiler and Pressure Vessel Code.		N/A
12.1	Add: Note: In the USA, x-ray equipment is within the scope of 21 CFR 1020 and laser equipment is within the scope of 21 CFR 1040. In Canada, both are within the scope of the Canadian Radiation Emitting Devices Act.	The device uses CDRH Class 1 category optical transceivers only. The optical transceiver modules comply with a CDRH letter of assurance. (FDA, CDRH Laser Products and Instruments notice 42.)	Pass
12.3	Add: Note 3: The ACIGH UV Guidelines, UL 746C, and CSA C22.2 No. 0.17 may provide useful guidance to the RISK assessment.		N/A
14.1.1	Add: In item a), replace "IEC" with "ANSI", CAN, CSA, IEC, ISO, or UL".		Pass
14.1.2	Add: In item b), replace "IEC" with "ANSI", CAN, CSA, IEC,		Pass

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Clause	Requirement + Test	Result - Remark	Verdict
	ISO, or UL".		
14.1.3	Add: In item c), replace "IEC" with "ANSI", CAN, CSA, IEC, ISO, or UL".		Pass
14.1.4	Add: In item d), replace "IEC" with "ANSI", CAN, CSA, IEC, ISO, or UL", in three instances.		Pass
	Add: Note 3: Annex DVA provides applicable safety requirements.		Pass
14.7	Add the following to the end of the first paragraph: A flammability RATING of ANSI/UL94 V-1 or and CAN/CSA C22.2 No. 0.17 is considered equivalent to the same classifications of IEC 60695-11-10.		Pass
14.9	Enclosures intended for outdoor use		N/A
	Nonmetallic enclosures intended for outdoor use shall meet the UV resistance requirements of ANSI/UL 746C or CSA C22.2 No. 0.17, or both as appropriate.		N/A
	Note: ANSI/UL 746C, clause 25 requires a 1 000 hour UV/water exposure preconditioning using a xenon-arc or alternatively a 720 hour UV/water exposure preconditioning using twin carbon arcs. CSA C22.2 No. 0.17, subclause 5.9, permits only the 1 000 hour UV/water exposure preconditioning.		N/A
14.10	Conductive coatings, shields, and tape		N/A
14.10.1	Conductive coatings The bond of a conductive (metallic) coating applied to a polymeric part shall be evaluated.		N/A
	Add: Conformity is checked by: a) Evaluating the bond in accordance with the requirements for "Adhesives" in ANSI/UL 746C and/or CSA C22.2 No. 0.17, or b) Evaluating the product to determine that peeling or flaking of the coating would not reduce spacings or bridge live parts so as to introduce a risk of fire or electric shock.		N/A
14.10.2	Conductive shield or tape		N/A
	If peeling of the conductive shield or tape may introduce a RISK of fire or electric shock, the bond between a conductive shield or tape and any other surface shall be investigated.		N/A
	Conformity is checked by inspection.		N/A
14.11	Direct plug-in transformer units Direct plug-in transformer units are subject to additional requirements found in ANSI/UL 1310, CAN/CSA C22.2 No. 223, ANSI/UL 60950-1, or CSA C22.2 No. 60950-1 as applicable.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex DVC	UV radiation limits: Guidelines from the American Conference of Governmental Industrial Hygienists (ACGIH)		N/A
Annex DVC.1	<p>General</p> <p>These threshold limit values (TLV) refer to ultraviolet (UV) radiation in the spectral region between 180 nm and 400 nm, and represent levels to which nearly all workers may be repeatedly exposed without adverse health effects.</p> <p>These values for exposure of the eye or the skin apply to UV radiation from arc, gas, and vapor discharges, fluorescent and incandescent sources, and solar radiation, but they do not apply to UV lasers (see the TLV for lasers). These values do not apply to UV radiation exposure of photosensitive individuals or of individuals concomitantly exposed to photosensitizing agents. These exposures to the eye do not apply to aphakics. (See light and near-infrared radiation TLV). These values should be used as guides in the control of exposure to continuous sources where the duration of exposure is not less than 0,1 s. Likewise, these values should not be regarded as a fine line between safe and dangerous levels.</p>		N/A
Annex DVC.2	<p>Recommended values: The TLV for occupational exposure to UV radiation incident upon skin or eye where irradiance values are known and exposure time is controlled are as follows:</p> <p>a) UV-A (315 to 400 nm) radiation to the unprotected eye:</p> <p>1) For exposure times less than 1 000 seconds, the total energy should not exceed 1 J/cm² (1 000 mJ/cm²).</p> <p>2) For exposure times greater than 1 000 seconds, the average power level should not exceed 1 mW/cm²; and no 1 000 second time period should present a total energy that exceeds 1 J/cm² (1 000 mJ/cm²).</p> <p>b) For monochromatic sources, the TLV for exposure to the unprotected skin or eye is shown in Table DVC.4.1 (also represented in figure DVC.4.1) and should not be exceeded within an 8-hour period.</p> <p>c) For broad-spectrum or multi-peak sources, the TLV for exposure of the unprotected skin or eye should be calculated based on an effective weighting formula:</p> $E_{eff} = \sum (E_{\lambda} \cdot S_{\lambda} \cdot \Delta\lambda)$ <p>Where: E_{eff} is the effective irradiance relative to a monochromatic source at 270 nm in mW/cm² [mJ/(s•cm²)];</p> <p>E_{λ} is the spectral irradiance in W/(cm²•nm);</p> <p>S_{λ} is the relative spectral effectiveness (unitless);</p> <p>$\Delta\lambda$ is the bandwidth in nm.</p> <p>The result of the calculation, E_{eff}, should then be either applied to table DVC.4.2 or should be used in the following calculation:</p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>Exposure time TLV = 3 (mJ/cm²)/E_{eff} (where E_{eff} is in mW/cm²)</p> <p>d) For most white-light sources and all open arcs, the weighting of spectral irradiance between 200 and 315 nm should suffice to determine the effective irradiance. Only specialized UV sources designed to emit UV-A radiation would normally require spectral weighting from 315 to 400 nm.</p> <p>All of the preceding TLVs for UV energy apply to sources which subtend an angle less than 80°. Sources which subtend a greater angle need to be measured only over an angle of 80°.</p> <p>NOTE 1 Conditioned (tanned) individuals can tolerate skin exposure in excess of the TLV without erythema effects. However, such conditioning may not protect persons against skin cancer.</p> <p>NOTE 2 Ozone (O₃) is produced in air by sources emitting UV radiation at wavelengths below 250 nm. Refer to chemical substances TLV for ozone.</p>		
Annex DVD	Permanent connection to MAINS		N/A
Annex DVD.1	<p>General</p> <p>Equipment intended for permanent connection to the MAINS shall have provision for connection of a wiring system in accordance with ANSI/NFPA 70, NEC, with CSA C22.1, CEC, Part 1 or with both as appropriate, and shall meet the requirements of DVD.2 to DVD.3, as applicable. Conformity is checked by inspection, and as specified in DVD.2 to DVD.3.</p>		N/A
Annex DVD.2	<p>Wiring TERMINALS and leads</p> <p>PERMANENTLY CONNECTED EQUIPMENT shall be provided with TERMINALS or leads for the connection of conductors having an ampacity that, in accordance with the National Electrical Code and/or the Canadian Electrical Code, Part 1, is acceptable for the equipment.</p> <p>A TERMINAL or splice compartment shall be complete. The top, all sides, and a complete bottom shall be provided when the equipment is shipped from the factory and shall enclose all FIELD WIRING TERMINALS and splices intended to be made in the field. Equipment with an ENCLOSURE that is complete need not be provided with a separate compartment.</p> <p>The TERMINAL or splice compartment in which MAINS connections to PERMANENTLY CONNECTED EQUIPMENT are made shall be located so that:</p> <p>a) Internal wiring and electrical components are not exposed to mechanical damage or strain while connections are being made, and</p> <p>b) These connections may be readily inspected after the equipment is installed as intended.</p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Conformity is checked by inspection.		
Annex DVD.2.1	<p>Wiring Terminals Wiring TERMINALS shall provide effective connections, by use of screws, nuts or equally effective devices.</p> <p>Wire binding screws are permitted as follows:</p> <p>a) A No. 6 or M4 screw may be used to connect a 14 AWG (2.1 mm²) or smaller wire.</p> <p>b) A No. 8 or M4.5 screw may be used to connect a 12 AWG (3.3 mm²) or smaller wire.</p> <p>c) A No. 10 or M5 screw may be used to connect a 10 AWG (5.3 mm²) or smaller wire.</p> <p>Conformity is checked by inspection.</p>		N/A
Annex DVD.2.2	<p>Leads The free length of a lead inside a wiring compartment shall be at least 6 inches (150 mm). Conformity is checked by inspection.</p>		N/A
	<p>TERMINAL and lead identification TERMINALS and leads shall be identified in a manner that will permit the equipment to be connected as intended by the manufacturer.</p> <p>Equipment containing either a MAINS-connected polarized convenience receptacle or a MAINS-connected polarized lamp socket shall have an identified neutral (grounded) conductor.</p> <p>NOTE A "grounded" supply conductor is one that is connected to protective earth at some point in the building installation. It is sometimes called the "neutral conductor".</p> <p>A wiring TERMINAL that is intended solely for connection of the neutral (grounded) MAINS conductor shall be readily distinguishable from all other TERMINALS. It shall be constructed of, or plated with, metal that is substantially white in color or shall be clearly identified in some other manner, such as on a wiring diagram permanently attached to the equipment.</p> <p>A lead intended solely for field wiring connection to the neutral (grounded) MAINS conductor shall be readily distinguishable from all other leads by means of it being finished to show a white or natural gray color.</p> <p>The protective grounding (earthing) TERMINAL shall be marked in accordance with 5.1.6 (b) or marked "G", "GR", "GND", "GRD", "GROUND", or "GROUNDING" or provided with a green colored screwhead that is</p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>hexagonal, slotted, or both.</p> <p>A lead intended for field connection to the protective grounding conductor shall be readily distinguishable from all other leads by being finished to show a green color with or without yellow stripes.</p> <p>Conformity is checked by inspection.</p>		
Annex DVD.3	<p>ENCLOSURE requirements for conduit entry</p> <p>An ENCLOSURE shall not pull apart or sustain damage such as cracking and breaking, and knockouts shall remain in place when subjected to the pulling, torque, and bending that is likely to occur.</p> <p>ENCLOSURES having sheet metal members with a thickness no less than 0.81 mm if of uncoated sheet steel, no less than 0.86 mm if of galvanized sheet steel, no less than 1.11 mm if of sheet aluminum, and no less than 1,09 mm if of sheet copper or sheet brass are not required to be tested.</p> <p>NOTE ENCLOSURES complying with ANSI/UL 50 are deemed to comply with DVD.4.1 and DVD.4.2.</p> <p>An ENCLOSURE made either wholly or in part of insulating material shall have an acceptable bonding means to provide continuity of bonding between all metallic conduits entering the ENCLOSURE.</p> <p>Conformity is checked by inspection and by performing the applicable tests of DVD.4.</p>		N/A
Annex DVD.4	Conduit ENCLOSURE entry tests		N/A
Annex DVD.4.1	<p>Conduit pull-out test</p> <p>The ENCLOSURE is suspended by a length of rigid conduit installed in one wall of the ENCLOSURE or mounted as intended in service, and a pulling force of 200 lb (890 N) is applied for 5 min to a length of conduit installed in the opposite wall (or wall with conduit entry if ENCLOSURE is mounted rather than suspended).</p>		N/A
Annex DVD.4.2	<p>Conduit torque test</p> <p>The ENCLOSURE is securely mounted as intended in service. A torque in accordance with table DVD.1 is applied to a length of installed conduit in a direction tending to tighten the connection. The lever arm is measured from the center of the conduit.</p>		N/A
Annex DVD.4.3	<p>Bending</p> <p>A length of conduit at least 1 ft (300 mm) long of the intended size is installed:</p> <p>-a) In the center of the largest unreinforced surface, or</p>		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>-b) In a hub or an opening if provided as part of the ENCLOSURE.</p> <p>The ENCLOSURE is securely mounted as intended in service, but positioned so that the installed conduit extends in a horizontal plane. A weight is suspended from the end of the conduit to produce the bending moment specified in Table DVD.2. The magnitude of the weight is determined from the equation: $W = (M - 0.5 \cdot C \cdot L) / L$, in which: W is the weight, in lb, to be hung at the end of the conduit; L is the length of the conduit, in inches, from the wall of the ENCLOSURE to the point at which the weight is suspended; C is the weight of the conduit, in lb; and M is the bending moment required in lb-in.</p> <p>For the SI system of units, the equation is: $W = (0.1 \cdot M - 0.5 \cdot C \cdot L) / L$, in which: W and C are measured in kg; M is measured in N•m; and L is measured in m.</p> <p>If the ENCLOSURE surface can be installed in either a horizontal or a vertical plane, the vertical bending moment value is used.</p> <p>The test procedure may be terminated prior to attaining the values specified if the deflection of the conduit exceeds 10 in (250 mm) for a 10 ft (3.05 m) length of conduit.</p> <p>For an end-of-line ENCLOSURE as defined in Table DVD.1, the bending moment is 150 lb in (17.0 N•m).</p>		
Annex DVD.4.4	Knockouts A knockout is subjected to a force of 20 lb (89 N) applied at right angles by means of a mandrel with a 1/4-in (6.4-mm) diameter flat end. The mandrel is applied at the point most likely to cause movement of the knockout.		N/A
Annex DVE	Permanently installed equipment		Pass
Annex DVE.1	<p>General</p> <p>These requirements cover permanently installed, open-type or enclosed-type, equipment rated 1000 volts or less and intended for installation in accordance with the National Electrical Code, ANSI/NFPA 70 and the Canadian Electrical Code, C22.1.</p> <p>NOTE This equipment may also be intended for use in metering, monitoring, and measuring electrical power. Its primary function is to monitor, measure, or record power consumption. These devices could communicate with other devices by means of power line carrier, satellite/radio frequency, or wired/wireless signaling</p>		Pass

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>communications.</p> <p>With the exception of open-type energy-monitoring current transformers evaluated as part of an equipment, these devices and their associated communication modules evaluated to these requirements are not intended for retrofit installation within the enclosure of switchgears/panel boards. Equipment intended for installation within a switchgear/panel board shall meet these requirements and be additionally evaluated as accessories for use with specific switchgear/panel boards, in accordance with the appropriate standards for safety of that equipment.</p> <p>These requirements do not apply to detachable (Type S) meters and non-detachable bottom-connected (Type A) electric utility meters that measure, monitor, record, transmit, or receive electrical energy generation or consumption information, including plug-in-type meters intended for installation in meter sockets, meter-socket bases, metering transformer cabinets, or other equipment (such as panel boards) incorporating provisions for plug-in-type meters.1</p> <p>NOTE 1 The safety requirements for utility equipment can be found in the Standard for Safety of Electric Utility Meters, UL 2735 or alternating-current electricity metering, CSA CAN3-C17.</p> <p>NOTE 2 These safety requirements do not apply to equipment intended for use in utility substations or equivalent areas that have over voltages greater than Cat. IV.</p> <p>The requirements in this Annex are to be used as supplements to the general requirements in this standard.</p>		
Annex DVE.3	Marking and documentation		Pass
Annex DVE.3.1	Marking		Pass
Annex DVE.3.1.1	A contact device intended for control of different types of load (e.g. pilot duty, horsepower, general purpose, resistive, etc.) shall be rated accordingly in volt, current, power, and/or horse power rating. Contacts marked "Pilot Duty" may be additionally marked with a pilot duty rating code.		N/A
Annex DVE.3.1.2	An equipment provided with or intended for use with an external power-line current-sensing transformer shall be marked with the following the word "Warning" and the following or the equivalent: "To reduce risk of electric shock, always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing current-sensing transformers."		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Additionally, such equipment shall be marked with a correlation marking to identify the specific manufacturers name and model designations of the current transformers that have been tested for use with the equipment. Alternatively, the equipment may be marked with the following, or equivalent: "For use with Listed Energy-Monitoring Current Transformers".		
Annex DVE.3.1.3	Field-wiring terminal markings		Pass
Annex DVE.3.1.3.1	Equipment having field-wiring terminals shall be marked: a) "Use Copper Conductors Only" if the terminal is only for connection to copper wire; b) "Use Copper or Copper-Clad Aluminum Conductors Only" if the terminal is only for connection to copper and copper-clad aluminum wire; c) "Use Aluminum Conductors Only" or "Use Aluminum or Copper-Clad Aluminum Conductors Only" if the terminal is only for connection to aluminum wire; and d) "Use Copper or Aluminum Conductors" or "Use Copper, Copper-Clad Aluminum, or Aluminum Conductors" if the terminals is for connection to either copper or aluminum wire.		Pass
Annex DVE.3.1.3.2	Alternatively, the markings in DVE.3.1.3.1 may be abbreviated as follows: a) Equipment having a connector intended only for use with aluminum wire shall be plainly marked with the letters "AL". b) Equipment having a connector intended for use with aluminum or copper-clad aluminum and copper wire shall be plainly marked "AL-CU" or "CU-AL". c) Equipment having a connector intended for use with copper-clad aluminum and copper wire shall be plainly marked "CC-CU" or "CU-CC".		N/A
Annex DVE.3.1.3.3	Equipment provided with a wire connector for field-installed wiring as covered in DVE.4.4.3 shall be marked to specify that the connector provided is to be used in making the field connection. A wiring terminal that is not intended to receive a conductor one size larger than that specified in DVE.4.4 shall be marked to restrict its use to the smaller size conductor.		N/A
Annex DVE.3.2	Documentation: equipment installation		N/A
Annex	Equipment intended for use with field installed current		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
DVE.3.2.1	transformers that could be installed in panel boards or switchgears shall include the following statements: a) "Always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing current transformers". b) "The current transformers may not be installed in equipment where they exceed 75 percent of the wiring space of any cross-sectional area within the equipment". c) "Restrict installation of current transformer in an area where it would block ventilation openings". d) "Restrict installation of current transformer in an area of breaker arc venting". e) "Not suitable for Class 2 wiring methods" and "Not intended for connection to Class 2 equipment". f) "Secure current transformer and route conductors so that they do not directly contact live terminals or bus". g) The word "WARNING" and the following or equivalent statement: "To reduce the risk of electric shock, always open or disconnect circuit from power distribution system (or service) or building before installing or servicing current transformers".		
Annex DVE.3.2.2	Unless intended for use with listed energy-monitoring current transformers, the following information and instructions shall be included for open-type equipment with field installed accessory current transformers that could be installed within the same overall enclosure: a) A correlation statement to identify the specific manufacturer's name and model designation of the current transformers that have been determined suitable for use with the equipment. Alternatively, the manual may include the following statement: "For use with Listed Energy-Monitoring Current Transformers". b) "Associated leads of the current transformers shall be maintained within the same overall enclosure" or similar. c) Unless the current transformers and its leads have been evaluated for REINFORCED INSULATION, a statement to segregate or insulate the leads from different circuits shall be provided. d) "The current transformers are intended for installation within the same enclosure as the equipment. These may not be installed within switchgears and panel boards" or similar.		N/A
Annex DVE.4	Protection against electric shock		N/A
Annex DVE.4.1	Primary means of protection		N/A
Annex	Due to the potential co-mingling of hazardous live		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
DVE.4.1.1	conductors with the output conductors of field-installed energy-monitoring current transformers, these incoming field-installed leads from switchgears/panel boards shall be reclassified as NFPA 70 and C22.1 Class 1 wiring.		
Annex DVE.4.1.2	There shall be reliable segregation or separation by barriers between the following different circuits: a) Class 1 field and factory installed wiring (such as CT output leads, voltage measurement leads, mains input power), terminals, and uninsulated live parts; and b) Class 2 and Class 3 field installed and factory wiring, terminals, and uninsulated live parts.		N/A
Annex DVE.4.1.3	Segregation is accomplished by clamping, routing, or equivalent means that provides a minimum permanent 6.0 mm (per NFPA 70, Article 725.136, and C22.1 Rule 4-010) between parts of different circuits.		N/A
Annex DVE.4.1.4	Conductors provided with insulation rated for the highest voltage involved need not be separated or segregated.		N/A
Annex DVE.4.1.5	Routing and separation between conductors and parts of different circuits can be achieved by provision of flexible tubing as part of an installation kit with the equipment. The tubing shall be rated not less than the highest working voltage involved between the two circuits. The installation manual shall include the following statement: "All Class 2 wiring is to be installed within the provided flexible tubing to maintain segregation between circuits."		N/A
Annex DVE.4.2	Connections to external circuits		N/A
Annex DVE.4.2.1	Circuits and connections intended for Class 2 wiring method shall comply with Class 2 limits as specified in Article 725 of NFPA 70 and Section 16 of C22.1. The cable external to the equipment and supplied by the manufacturer shall comply with the requirements for the intended application.		N/A
Annex DVE.4.3	Insulation requirements		N/A
Annex DVE.4.3.1	Neutral conductors and parts, if any, shall be considered hazardous live as if they were a line circuit.		N/A
Annex DVE.4.4	Permanent connection to MAINS		N/A
Annex DVE.4.4.1	A field-wiring lead shall not be more than two standard wire sizes smaller than the copper conductor to which it will be connected, and shall not be smaller than 18 AWG (0.82 mm ²).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex DVE.4.4.2	As an option to the requirement in DVE.4.4.1, an 18 AWG size field-wiring lead may be provided for connection to a No. 12 (3.3 mm ²) size branch circuit conductor.		N/A
Annex DVE.4.4.3	As an option to the requirements in DVE.4.4.1, a lead may be more than two wire sizes smaller than the field-provided copper conductor to which it will be connected, but not smaller than 18 AWG, if more than one factory-provided copper lead is intended for connection to the same field-provided lead, and the construction complies with the conditions a) to c) below: a) A wire connector for connection of the field-provided wire is provided as part of the unit, and the wire connector can be used with the combination of wires that will be spliced. b) The factory-provided leads are bunched or otherwise arranged so that stress does not result on an individual lead. c) The equipment is marked to specify that the wire connector for field-installed wiring is to be used in making the field connection.		N/A
Annex DVE.4.4.4	A pigtail lead intended for field-wiring connection shall be subjected to the test specified in DVE.4.4.5.		N/A
Annex DVE.4.4.5	A pigtail lead intended for field-wiring connection shall withstand without damage or displacement a direct pull of: a) 89 N (20 lb) for 1 minute applied to a lead extending from the enclosure such as through a hub or nipple and; b) 44.5 N (10 lb) for 1 minute applied to a lead within a wiring compartment.		N/A
Annex DVE.4.4.6	In addition to the protective grounding terminals marking as noted in DVD.2.4.5, a marking on a wiring diagram provided on the product may also be marked.		N/A
Annex DVE.5	Resistance to mechanical stresses		N/A
Annex DVE.5.1	Impact test		N/A
Annex DVE.5.1.1	For the Impact test, 8.2.2, replace the X test distance to 1.3 meters.		N/A
Annex DVE.6	Protection against the spread of fire		N/A
Annex DVE.6.1	Enclosures complying with UL 50 and/or UL 50E and CSA C22.2 Nos. 94.1 or 94.2 for the intended application need not be subjected to the applicable requirements in		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	this standard. Non-metallic materials of enclosures complying with the above standards relied upon for containment of fire within the equipment shall have a minimum flammability rating of V-1.		
Annex DVE.7	Equipment temperature limits and resistance to heat		Pass
Annex DVE.7.1	Conduct of temperature tests		N/A
Annex DVE.7.1.1	<p>OPEN EQUIPMENT shall be mounted in an enclosure considered representative of the least favorable intended use. The maximum enclosure dimensions shall be determined by one of the following methods:</p> <p>a) 150 % of the dimensions of the device, length, width, and height;</p> <p>b) The dimensions of the device, length, width, and height, plus any keep out zone around the device if marked on the device or defined by the manufacturer in the installation sheet;</p> <p>c) The minimum enclosure size if marked on the device or defined by the manufacturer in the installation sheet; or</p> <p>d) The intended enclosure, such as a standard outlet box if marked on the device or defined by the manufacturer in the installation sheet.</p>		N/A
Annex DVE.7.1.2	When utilizing a) or b), for any device face which has wire(s) exiting it, 20 times the largest accommodated wire diameter may be added, as bend radius, to the appropriate dimension(s), length, width, and/or height. This is to allow proper wire bending space.		N/A
Annex DVE.7.2	Equipment intended for permanent installation		Pass
Annex DVE.7.2.1	Permanently installed equipment shall be tested with a minimum 1.22 m (4 ft) of wire attached to each field-wiring terminal. Wire size shall be determined in accordance with Table 310-15(B) of NFPA 70, and Tables 1 to 5 of C22.1. The size shall be based upon wire that is rated for a temperature of 60 °C (140 °F) for connection to a branch circuit with a rating of 100 amperes or less, and upon wire that is rated per the 75 °C (167 °F) column for a rating greater than 100 amperes.		Pass
Annex DVE.7.2.2	Permanently installed equipment shall be installed so that it is located as close to the wall or corner as the construction will permit.		N/A
Annex DVE.8	Components and subassemblies		N/A
Annex DVE.8.1	Current transformers		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex DVE.8.1.1	Listed energy monitoring current transformers intended for field installation shall be used when installed within distribution and control equipment such as panel boards, switchgears, industrial control equipment, and energy-monitoring/management equipment.		N/A

-----END OF MAIN REPORT-----

APPENDIX A: Enclosures

Collateral/Particular Standard Enclosures

Enclosures

<u>Supplement ID</u>	<u>Description</u>
Particular Standard - (001)	IEC61010_2_201B(W)

Particular Standard - (001) IEC61010_2_201B(W)Particular Standard - (001) IEC61010_2_201B(W)

Test Report issued under the responsibility of:



TEST REPORT IEC 61010-2-201 Safety requirements for electrical equipment for measurement, control, and laboratory use Part 2-201: Particular requirements for control equipment	
Report Number	E331061-D1009-1/A1/C0
Date of issue	2019-11-20; 2022-11-24 (A1)
Total number of pages	31
Name of Testing Laboratory preparing the Report	Wendell Electrical Testing Lab
Applicant's name	ORING INDUSTRIAL NETWORKING CORP
Address	3F 542-2 ZHONGZHENG RD XINDIAN DISTRICT NEW TAIPEI CITY, 231 TAIWAN
Test specification:	
Standard	IEC 61010-2-201: 2013 (First Edition)
Test procedure	CB Scheme
Non-standard test method	N/A
Test Report Form No.	IEC61010_2_201B
Test Report Form(s) Originator	UL(US)
Master TRF	2014-10
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General disclaimer:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.	

Particular Standard - (001) IEC61010_2_201B(W)

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Report No. E331061-D1009-1/A1/C0

Test item description	Open type, Industrial Ethernet Switch	
Trade Mark	N/A	
Manufacturer	Same as Applicant	
Model/Type reference	IGS-150B	
Ratings	Power input: redundant 12- 48 Vdc, 0.29-0.09 A	
Testing procedure and testing location:		
<input checked="" type="checkbox"/> CB Testing Laboratory:		
Testing location/ address:	Wendell Electrical Testing Co Ltd. 5F., No. 4, Ln. 7, Baogao Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.) Wendell Electrical Testing Co Ltd. (A1) 3F., No. 6, Alley. 6, Lane. 235, Baoqiao Rd., Xindian District, New Taipei City 231028, Taiwan	
<input type="checkbox"/> Associated CB Testing Laboratory:		
Testing location/ address:		
Tested by (name + signature):	Hans Tu, Project handler	
Approved by (name + signature):	Michael Tseng, Project reviewer	
<input type="checkbox"/> Testing procedure: TMP/CTF Stage 1:		
Testing location/ address:		
Tested by (name + signature):		
Approved by (name + signature):		
<input type="checkbox"/> Testing procedure: WMT/CTF Stage 2:		
Testing location/ address:		
Tested by (name + signature):		
Witnessed by (name + signature):		
Approved by (name + signature):		
<input type="checkbox"/> Testing procedure: SMT/CTF Stage 3 or 4:		
Testing location/ address:		
Tested by (name + signature):		
Witnessed by (name + signature):		
Approved by (name + signature):		
Supervised by (name + signature):		

TRF No. IEC61010_2_201B

Particular Standard - (001) IEC61010_2_201B(W)

List of Attachments (including a total number of pages in each attachment):	
Summary of testing:	
Tests performed (name of test and test clause): See Part 1	Testing location: See Part 1
Summary of compliance with National Differences: List of countries addressed – See Part 1 for List of Country Differences applied.	
<input checked="" type="checkbox"/> The product fulfils the requirements of UL 61010-1, 3rd Edition, May 11, 2012, Revised July 15 2015, CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated July 2015	

Copy of marking plate: The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBS that own these marks. See part 1 TRF

Particular Standard - (001) IEC61010_2_201B(W)

Test item particulars:	
Type of item	Control
Modular equipment.....	No / Yes (Specify):
Description of equipment function (intended use)	IGS-150B is an open type Unmanaged Ethernet Switch with 5 RJ-45 ports.
Switching device, intended use	AC / DC // general use / resistance / pilot duty
Enclosure type.....	enclosed equipment / open equipment
Connection to MAINS supply.....	None (Not directly connected to MAINS)
Overvoltage category	None (Not directly connected to MAINS)
POLLUTION DEGREE	2
Means of protection	Class III
Environmental conditions	-40 to 75 °C
For use in wet locations	No
Equipment mobility	Permanently Mounted
Operating conditions.....	Continuous
Overall size of equipment (W x D x H).....	26.1 x 70 x 95 mm
Mass of equipment (kg).....	IGS-150B: 222 g
Marked degree of protection to IEC 60529.....	IP30 (not certificated by UL)
Possible test case verdicts:	
- Test case does not apply to the test object	N/A
- Test object does meet the requirement	P (Pass)
- Test object does not meet the requirement	F (Fail)
Testing:	
Date of receipt of test item.....	2019-10-29; 2022-07-20 (A1)
Date (s) of performance of tests.....	2019-10-29; 2022-08-10 (A1)
General remarks:	
"(see Attachment #)" refers to additional information appended to the report.	
"(see appended Table)" refers to a table appended to the report.	
The tests results presented in this report relate only to the object tested.	
This report shall not be reproduced except in full without the written approval of the testing laboratory.	
List of test equipment must be kept on file and available for review.	
This Test Report Form is intended for the investigation of control equipment in accordance with IEC 61010-2:2011. It cannot be used alone but only together with IEC 61010-1:2010 (Third Edition) Test Report.	
Additional test data and/or information are provided in the attachments to this report.	
Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	

Manufacturer's Declaration per sub-clause 4.2.5 of IEC61010-2:2011:

TRF No. IEC61010_2_201B

Particular Standard - (001) IEC61010 2 201B(W)

<p>The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided: Not Applicable</p> <p>When differences exist; they shall be identified in the General product information section.</p>
<p>General product information: See Part 1 TRF</p>
<p>Test configuration (cl. 4.1): See Part 1 TRF</p>

Particular Standard - (001) IEC61010_2_201B(W)

IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
4.4	Testing in SINGLE FAULT CONDITIONS		N/A
4.4.1	Fault tests		N/A
4.4.1.101	Switching devices test	(see Table 4.4.1.101)	N/A
4.4.1.101.1	Overload test		N/A
4.4.2.101.2	Endurance test		N/A
	Exemption for solid state devices for general or resistive use		N/A
	Required by 14.102		N/A
5	MARKING AND DOCUMENTATION		Pass
5.4.3	Equipment installation		Pass
	a) PERMANENTLY CONNECTED EQUIPMENT:		Pass
	1) Supply and field wiring requirements		Pass
	b) Open control equipment specifies the final safety enclosure characteristics		Pass
6	PROTECTION AGAINST ELECTRIC SHOCK		Pass
6.1.2	Exceptions: Parts for operating reasons HAZARDOUS LIVE and ACCESSIBLE to SERVICE PERSONNEL during NORMAL USE:		N/A
	a) parts of lamps and lamp sockets after lamp removal		N/A
	b) parts intended to be replaced by SERVICE PERSONNEL or other action if accessible only by a tool and having a warning marking		N/A
	Parts not HAZARDOUS LIVE 10 s after interruption of supply	(see Table 6.3.2)	N/A
	Charge received from an internal capacitor tested to clause 6.3, below levels of 6.3.1 c).....	(see Table 6.3.2)	N/A
6.2	Determination of ACCESSIBLE parts	SELV circuit	Pass
6.2.1	General.....	This sub clause is applicable for enclosed equipment	N/A
6.2.2	Examination.....	This sub clause is applicable for enclosed equipment	N/A
6.2.3	Openings above parts that are HAZARDOUS LIVE	This sub clause is applicable for enclosed equipment	N/A
6.2.4	Openings for pre-set controls		N/A
	EUT is enclosed equipment		N/A

Particular Standard - (001) IEC61010_2_201B(W)

IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
	- test pin with length of 100 mm and 3 mm in diameter applied		N/A
6.2.101	Accessibility of Interfaces / Ports / Terminals		Pass
	Operator accessible interfaces, ports, terminals not hazardous live under normal and single-fault conditions		Pass
	Operator accessibility under special circumstances specified in user manual		N/A
6.2.102	Control equipment		Pass
6.2.102.1	Accessible parts		Pass
	No hazardous live parts accessible at enclosed equipment or at open equipment installed to manufacturer's instructions (See 6.2.2)		Pass
	Protection from hazards for service personnel making adjustments at open equipment (See 6.2.2)		N/A
6.2.102.2	SELV circuits		Pass
	Intended use at dry locations		Pass
6.5.2.5	Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT	(see Table 6.5.2.5)	N/A
	No overcurrent protection means specified in manual:		N/A
	a) test current 25A d.c. or a.c. r.m.s at rated frequency		N/A
	Measured voltage (V)..... :		—
	Calculated impedance (Ω)		—
	b) test current equal to twice the rated current		N/A
	Measured voltage (V)..... :		—
	Calculated impedance (Ω)		—
6.5.2.6	Transformer PROTECTIVE BONDING screen	(see Table 6.5.2.6)	N/A
	No overcurrent protection means for the winding		N/A
	Test current twice the rating of equipment overcurrent protection means		N/A
	Overcurrent protection means		N/A
	a) integrated into equipment		N/A
	b) specified in manual		N/A
6.5.2.101	Classes of equipment or equipment classes		N/A
6.5.2.101.2	Class I equipment		N/A
	Flexible cord includes protective earth (PE)		N/A
	Accessible conductive parts connected to PE		N/A

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IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
	PE circuit not interrupted by removing parts of enclosure for normal maintenance		N/A
6.5.2.101.3	Class II equipment		N/A
	Double or reinforced insulation used or		N/A
	Protective impedance used		N/A
	Means for maintaining continuity of double insulated for protection		N/A
	Connection to earth terminals for functional purposes doesn't break continuity of double insulation		N/A
	Is one of the following types:		N/A
	a) Insulation encased		N/A
	- by durable and continuous enclosure of insulating material		N/A
	- envelops all conductive parts with exception of small parts		N/A
	- small parts insulated by reinforced insulation or equivalent		N/A
	b) Metal-encased		N/A
	- by continuous metal enclosure		N/A
	- double insulation used throughout, except:		N/A
	- parts have reinforced insulation		N/A
	c) combination of a) and b)		N/A
6.5.2.101.4	Class III equipment		Pass
	All circuits SELV		Pass
	Voltages do not exceed SELV limits		Pass
	Earthing terminals for functional purposes		Pass
	Wiring for SELV/PELV circuits and other circuits:		N/A
	- segregated, or		N/A
	- insulation rated for the rated voltage, or		N/A
	- earthed screen, or		N/A
	- additional insulation based on 60364-4-41		N/A
6.5.2.102	Protective earthing requirement for enclosed equipment		N/A
	Accessible parts of Class I equipment electrically interconnected and		N/A
	- are interconnected to protective earth terminal		N/A
	- for connection to an external protective earth		N/A

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IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
	Structural parts providing electrical continuity independent of usage on its own or incorporated in an assembly		N/A
	Cord or cable that supplies Class I portable equipment has a PE conductor		N/A
	Accessible isolated conductive parts are so located that contact with live parts excluded and		N/A
	Dielectric voltage test passed for reinforced insulation	(see Table 6.8)	N/A
	Class II equipment with internal earth connection, without PE terminal or PE conductor in input cord		N/A
	Class I equipment with PE terminal		N/A
	PE terminal readily accessible, and		N/A
	Connection maintained when cover or any removable part removed		N/A
	Mains cord connected equipment with PE terminal integral to plug cap or socket		N/A
	PE terminal is screw, stud or pressure type and made of corrosion resistant material		N/A
	Clamping means PE terminals adequately locked against accidental loosening and		N/A
	- only to be loosed by aid of a tool		N/A
	PE terminals and earthing contacts not connected direct to neutral terminal within equipment		N/A
	Devices (as capacitors or surge suppression devices) appropriately rated, when used to connect PE terminal and neutral		N/A
	PE terminal and subsequent protective internal equipment complies with requirements in 6.5.2.5		N/A
	PE terminal has no other function		N/A
6.5.2.103	Protective earthing requirements for open equipment		N/A
	Open equipment complies with the requirements of clause 6.5.2.4 or 6.5.2.5. Except that the provision for connection to an external protective conductor is replaced by a means for bonding to the enclosure accessible to the operator.		N/A
6.6.2	TERMINALS for external circuits		Pass
	All parts of terminals that maintain contact and carry current are of metal, and have adequate mechanical strength in		Pass
	Conformity with 60947-7-1 or relevant IEC standard.		Pass

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IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
	Bending of each conductor not possible to radius curvature less than six times of its diameter after removal of common elements		N/A
	Clearances between terminals and between terminals and earthed parts in conformity to 6.7.101		N/A
6.6.3	Circuits with terminals which are HAZARDOUS LIVE		N/A
	No accessible conductive parts of terminals and ports of enclosed equipment are hazardous life		N/A
	Ports of open equipment protected as defined in table 103		N/A
6.6.4	ACCESSIBLE terminals for stranded conductors		N/A
	A stranded conductor of stripped 8 mm length does contact other conductive parts		N/A
6.7	Insulation requirements..... :	(see Table 6.7)	N/A
6.7.1	The nature of insulation		N/A
6.7.1.1	Insulation between ACCESSIBLE parts or between separate circuits consist of CLEARANCES, CREEPAGE DISTANCES and solid insulation if provided as protection against a HAZARD		N/A
	Insulation in conformity with Figure 102..... :	(see Table 6.7)	N/A
	SELV / PELV circuits and ungrounded conductive accessible parts meet insulation requirements between these and hazardous live parts		N/A
6.7.1.5	Requirements for insulation according to type of circuit	(see Table 6.7A and 6.7B)	N/A
	a) requirements as specified in Figure 102, or		N/A
	b) requirements as specified in Part 1 Annex K.3 for circuits that have one or more of the following characteristics		N/A
	1) maximum TRANSIENT OVERVOLTAGE is limited to known level below the level of MAINS CIRCUIT		N/A
	2) maximum TRANSIENT OVERVOLTAGE is above the level of MAINS CIRCUIT		N/A
	3) WORKING VOLTAGE is the sum of more than one circuit or a mixed voltage		N/A
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		N/A
	5) WORKING VOLTAGE with a frequency above 30kHz		N/A
6.7.1.101	Non-metallic material supporting hazardous live parts		N/A
	CTI \geq 175 for non-metallic material supporting hazardous live parts		N/A

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IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
6.7.1.102	Non-metallic barriers and related applications		N/A
	CTI \geq 100 for non-metallic material used to increase clearance and/or creepage distances		N/A
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300V		N/A
	For mains circuits above 300 V Annex K applies		N/A
6.7.2.1	CLEARANCES and CREEPAGE DISTANCES..... :	(see Table 6.7A and 6.7B)	N/A
	Values for MAINS CIRCUITS of replacement Table 4 are met		N/A
6.7.2.2	Solid insulation		N/A
6.7.2.2.1	For mains > 300V values of Annex K applied		N/A
	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of clause 1.4		N/A
	Voltage tests of 6.8.3 with values of Table 5..... :	(see Table 6.8)	N/A
	A.C. circuits with the A.C. test of 6.8.3.1		N/A
	D.C. circuits with the D.C. test of 6.8.3.2		N/A
	The 1 min & the 5 s test or a single test representing the worst case combination of both tests		N/A
6.7.3	Insulation for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V		N/A
6.7.3.2	CLEARANCES		N/A
	a) meet the values of replacement Table 6 for BASIC INSULATION and SUPPLEMENTARY INSULATION; OR		N/A
	twice the values of replacement Table 6 for REINFORCED INSULATION, OR		N/A
	b) pass the voltage tests of 6.8 with values of replacement Table 6 ; with following adjustments :	(see Table 6.8)	N/A
	1) values for REINFORCED INSULATION are 1,6 times the values for BASIC INSULATION		N/A
	2) if operating altitude is greater than 2000 m values of CLEARANCES multiplied with factor of Table 3		N/A
6.7.3.3	CREEPAGE DISTANCES		N/A
	Based on WORKING VOLTAGE meets the values of Table 7 WITH THE REPLACEMENT OF THE FIRST COLUMN HEADING 'SECONDARY WORKING VOLTAGE A.C.R.M.S V'		N/A
	NEW FOOTNOTE D.C OR A.C PEAK VALUES ARE $\sqrt{2}$ X V A.C.R.M.S		N/A
6.7.101	Insulation for field wiring terminals of overvoltage category II with a nominal voltage up to 1000 V		N/A

Particular Standard - (001) IEC61010_2_201B(W)

IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
	Minimum clearances at field wiring terminals comply with Table 104		N/A
	Minimum creepage distances at field wiring terminals comply with Table 104		N/A
6.8	Procedure for dielectric strength tests with test generator / test equipment as specified	(see Tables 6.7A and 6.8)	N/A
6.8.3	The a.c. voltage test equipment is able to supply a current of at least 100 mA a.c. r.m.s. for voltages below 5 kV and a power of 500 VA at and above 5kV or the test generator as specified in IEC 60664-1:2007, 6.1.3.6 can be utilized		N/A
7	PROTECTION AGAINST MECHANICAL HAZARDS		N/A
7.1.101	Open and panel mounted equipment		N/A
	Open equipment installed in another enclosure		N/A
	For panel mounted equipment, the portion that is not within the additional enclosure complies with clauses 7.2 to 7.7		N/A
7.3	Moving parts		N/A
7.3.3	RISK assessment for mechanical HAZARDS to body parts		N/A
	For control equipment having only cooling fans as moving parts only accessibility checked		N/A
8	RESISTANCE TO MECHANICAL STRESSES		Pass
8.1.101	Open equipment		Pass
	Additional enclosure providing safety required by the manual		Pass
8.1.102	Panel mounted equipment		N/A
	When portion inside the required additional enclosure is an open equipment, the portion outside the additional enclosure is in conformity with cl. 8		N/A
8.2	ENCLOSURE rigidity test		N/A
8.2.2	Impact test	(see Table 8.2.2)	N/A
	Impact applied to any part of ENCLOSURE causing a HAZARD if damaged, X test distance is 1.3m		N/A
8.3	Drop test	(see Table 8.3)	N/A
	Table 105 applied		N/A
9	PROTECTION AGAINST THE SPREAD OF FIRE		Pass
9.3	Containment of the fire within the equipment, should it occur		Pass

Particular Standard - (001) IEC61010_2_201B(W)

IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
9.3.2	Constructional requirements		Pass
	Open equipment conforms with a) and b)		Pass
	Enclosed equipment conforms with a), b) und c)		N/A
	Non-metallic enclosure of open equipment forming part of enclosed equipment		N/A
	- has flammability rating of V-1 or better, or		N/A
	- the glow-wire test is passed		N/A
10	EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT		Pass
10.1	Surface temperature limits for protection against burns		Pass
	Easily touched surfaces within the limits in NORMAL and in SINGLE FAULT CONDITION (Table 19 of Part 201 applied)	See datasheet.	Pass
	- at an specified ambient temperature of 40 °C		N/A
	- for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C	Product ambient temperature rated -40°C to 75°C	Pass
	Heated surfaces necessary for functional reasons exceeding specified values:		N/A
	- Are recognizable as such by appearance or function; or		N/A
	- Are marked with symbol 13		N/A
	- Guards are not removable without tool		N/A
10.3	Other temperature measurements		Pass
	Following measurements conducted if applicable ... :	(see Table 10.2)	N/A
	f) Least favourable combination of cooling conditions for equipment to be used at altitudes above 2000 m		N/A
	g) Temperature of field wiring terminals measured, and		Pass
	- temperature rating checked		Pass
10.4	Conduct of temperature tests		Pass
10.4.1	Tests conducted under reference test conditions and manufacturer's instructions	(see Table 10)	Pass
	Test conditions for control equipment considered		Pass
	Test ambient temperature measured at		—
	Wiring for test		Pass
10.4.3	Equipment intended for installation in a cabinet or wall		N/A

Particular Standard - (001) IEC61010_2_201B(W)

IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
	Open equipment mounted in an enclosure for test; dimensions		—
	Equipment built in as specified in installation instructions	(see Table 10)	N/A
10.5	Resistance to heat		N/A
10.5.2	Non-metallic enclosures		N/A
	This sub clause is applicable for enclosed equipment		N/A
11	PROTECTION AGAINST HAZARDS FROM FLUIDS		N/A
11.6	Specially protected equipment	(See combined Tables 8 & 11)	N/A
	Inspection of the equipment	IP rating: _	N/A
	Test of the equipment to IEC 60529	See appended Report	N/A
	Voltage test to 6.8 without humidity preconditioning	(see Tables 6.7A and 6.8)	N/A
14	COMPONENTS AND SUBASSEMBLIES		Pass
14.101	Components bridging insulation		N/A
14.101..1	Capacitors		N/A
	Capacitor(s) connected between 2 line conductors in mains circuit or between line conductor and neutral complies with subclass X1 or X2 of IEC 60384-14,		N/A
	- used in accordance with its rating		N/A
	Capacitor(s) bridging any double or reinforced insulation in conformity		N/A
14.101.2	Surge suppressors		N/A
	Surge suppressor in mains circuit is a VDR, and		N/A
	- complies with IEC 61051-2		N/A
14.102	Switching devices		N/A
	Switching devices controlling outputs operate within their ratings either		N/A
	- according to IEC 60947-5-1, or		N/A
	- overload and endurance tests to 4.4.2.15 passed		N/A
16	HAZARDS RESULTING FROM APPLICATION		N/A
16.1	REASONABLY FORESEEABLE MISUSE		N/A
	Foreseeable misuse from the viewpoint of the operator		N/A
	Foreseeable misuse from the viewpoint of service personnel (minimum of protection is required)		N/A

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IEC 61010-2-201			
Clause	Requirement + Test	Result - Remark	Verdict
17	RISK ASSESSMENT		N/A
	Aspects of operator versus service personnel addressed in RISK assessment		N/A
ANNEX F	ROUTINE TESTS		N/A
	Manufacturer 's declaration		N/A

Particular Standard - (001) IEC61010 2 201B(W)

IEC 61010-2-201				
Clause	Requirement — Test		Result — Remark	Verdict
4.4	TABLE: Testing in SINGLE FAULT CONDITION – Results			N/A
Test sub-clause	Fault No.	Fault description	How was test terminated Comments	Meets 4.4.4
NOTE Td = Test duration in hh:mm:ss Record dielectric strength test in Table 6.8 and temperature tests in Table10 or 10.2. Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.				
Supplementary information: See Part 1 for Testing Conducted.				

Particular Standard - (001) IEC61010 2 201B(W)

IEC 61010-2-201		
Clause	Requirement – Test	Verdict

4.4.1.101.1	TABLE: Switching devices tests - Overload test		N/A
Parameter	Test value	Note	—
Intended use			—
Current			—
Voltage			—
Power factor			—
Number of cycles	50	each cycle: 1 sec on / 9 sec off	—
Endurance test follows	YES / NO		—
Electrical function	--	--	
Mechanical function	--	--	
No dielectric breakdown	--	--	
Supplementary information:			

4.4.1.101.2	Endurance test		N/A
Parameter	Test value	Note	—
Intended use			—
Current			—
Voltage			—
Power factor			—
Number of cycles	6000	each cycle: 1 sec on / 9 sec off	—
		except first 1000 cycles of pilot duty test: 1 cycle per second, except first 10 to 12 cycles as fast as possible	
Electrical function	--	--	
Mechanical function	--	--	
No dielectric breakdown	--	--	
Supplementary information:			

Particular Standard - (001) IEC61010_2_201B(W)

IEC 61010-2-201			
Clause	Requirement — Test		Verdict
6.2	TABLE: Determination of ACCESSIBLE parts (List of parts)		N/A
6.1.2	Exceptions		—
Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)
NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.2) NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2) NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see 6.4). NOTE 4 – Capacitor test may be required (see Table 6). NOTE 5 – The determination methods are: V = visual; R = rigid test finger; J = jointed test finger; P3 = pin 3 mm diameter; P4 = pin 4 mm diameter.			
Supplementary information: See Part 1 for Accessible Parts.			

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IEC 61010-2-201													
Clause	Requirement — Test												Verdict
6	TABLE: PROTECTION AGAINST ELECTRIC SHOCK												N/A
6.1.2	Exceptions												—
6.6.2	Terminals for external circuit												—
Item (see Table 6.2)	Voltage			Current			Capacitance		10 s / 5 s test (NOTE)			Comments	
	V r.m.s.	V peak	V d.c.	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	μC	mJ	V	μC		mJ
NOTE – A 10 s test is specified in 6.1.2 a) b). A 5 second test is specified in 6.10.3. The capacitance level versus voltage below the limits given from figure 3 of IEC 61010-1.													
Supplementary information: See Part 1 for Test Results.													

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IEC 61010-2-201			
Clause	Requirement — Test		Verdict
6.5.2.5	TABLE: Bonding impedance of permanently connected equipment		N/A
ACCESSIBLE part under test	Test current (A)	Voltage attained after 1 min (maximum 10 V) (V)	Verdict
Supplementary information: See Part 1 for Testing Conducted.			

IEC 61010-2-201				
Clause	Requirement — Test		Verdict	
6.5.2.6	TABLE: Transformer PROTECTIVE BONDING screen		N/A	
ACCESSIBLE part under test	Test current (see NOTE) (A)	Voltage attained after 1 min (max. 10 V), (V)	Calculated resistance (maximum 0,1 Ω) (Ω)	Verdict
NOTE – Test current must be twice the value of the over current protection means of the winding. Test is specified in 6.5.2.6 a) or b).				
Supplementary information: See Part 1 for Testing Conducted.				

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IEC 61010-2-201							
Clause	Requirement — Test					Verdict	
6.7	TABLE: Insulation requirements- Block diagram of system						
See Part 1 for Block Diagram							
Pollution degree			Overvoltage category				
Area	Location	Insulation type (NOTE 1)	WORKING VOLTAGE			Test voltage (NOTE 2) (V)	Comments (NOTE 3)
			RMS (V)	Peak (V)	Frequency (kHz)		
A							
B							
C							
D							
E							
F							
NOTE 1 – Type of insulation:		NOTE 2 - Types of voltage		NOTE 3 - OVERVOLTAGE CATEGORIES			
BI = BASIC INSULATION		Peak impulse test voltage (pulse)		or POLLUTION DEGREES which differ			
DI = DOUBLE INSULATION		r.m.s.		should be shown under "Comments"			
PI = PROTECTIVE IMPEDANCE		d.c.					
RI = Reinforced INSULATION		peak					
SI = Supplementary INSULATION							
see also Table 6.7B for further details							
Supplementary Information: See Part 1 for Block Diagram and Details.							

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IEC 61010-2-201											
Clause	Requirement — Test										Verdict
6.7A	TABLE: Insulation requirements- Clearances and Creepage										N/A
6.7.101	Insulation for field wiring terminals										—
Area	Location (See Table 6.7A)	Insulation type (NOTE 1)	WORKING VOLTAGE (NOTE 2)			Clearance		Creepage		CTI	Comments
			RMS (V)	Peak (V)	Frequency (kHz)	Required (mm)	Measured (mm)	Required (mm)	Measured (mm)		
A											
B											
C											
D											
E											
F											
NOTE 1 – refer to Table 6.7A for type of insulation shown in the insulation diagram						NOTE 2 - to be used for definition of required insulation (see Table 6.7A)					
Input supply voltage.....:		V	Hz								
Supplementary information: See Part 1 for Measurements.											

Particular Standard - (001) IEC61010 2 201B(W)

IEC 61010-2-201						
Clause	Requirement — Test					Verdict
6.8	TABLE: Dielectric strength tests					N/A
6.6	Connections to external circuits					
6.7.	Insulation requirements ² (see Annex K)					
11.6	Specially protected equipment					
	Test site altitude				m	—
	Test voltage correction factor (see Table 10)					—
Location or references from Tables 4.4 and 6.7	Clause or sub-clause	Humidity Yes/No	Working voltage V	Test voltage r.m.s./peak/d.c.	Comments (NOTE), Testing time Verdict	
¹ Record the fault, test or treatment applied before the dielectric strength test. ² Humidity preconditioning required. NOTE: Test duration may be recorded. Supplementary information: See Part 1 for Testing Conducted.						

Particular Standard - (001) IEC61010 2 201B(W)

IEC 61010-2-201		
Clause	Requirement — Test	Verdict

8.2.2	Table: Impact test		N/A
	Material of enclosure	Metal / non-metallic	—
	Corresponding IK-code		—
	Preparation for the test		—
	Cooled to (temperature)	° C	—
	Location	Comments	
	1) Top		
	2) Side left / right		
	3) Bottom		
Supplementary information: See Part 1 for Testing Conducted.			

8.3	Drop test			N/A
	Material of enclosure	Metal / non-metallic		—
	Preparation for the test			—
	Cooled to (temperature)	° C		—
	Mass of equipment	kg		—
Free Fall	Lands in position	Comments		
	1 st trial			
	2 nd trial			
	Dropping onto a face	Raised up to		
	Location	mm	30 °	
	1)			
	2)			
	Dropping onto an edge or corner	Raised up to		
	Location	mm	30 °	
	1)			
	2)			
Supplementary information: See Part 1 for Testing Conducted.				

Particular Standard - (001) IEC61010 2 201B(W)

IEC 61010-2-201			
Clause	Requirement — Test		Verdict
9	TABLE: Protection against the spread of fire		N/A
Item	Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)	Protection Method (9a, 9b or 9c)	Protection details
Supplementary information: See Part 1 for Details.			

Particular Standard - (001) IEC61010 2 201B(W)

IEC 61010-2-201				
Clause	Requirement — Test			Verdict
10.	TABLE : Temperature Measurements			N/A
10.1	Surface temperature limits - NORMAL CONDITION and / or SINGLE FAULT CONDITION			
10.3	Other temperature measurements			
Operating conditions:				
Frequency (Hz).....:		Test room ambient temperature (ta)		°C
Voltage (V).....:		Test duration (hours: min)		
Part / Location	t_m (°C)	t_c (°C)	t_{max} (°C)	Comments
NOTE 1 - t_m = measured temperature $t_c = t_m$ corrected ($t_m - t_a + 40$ °C or max. RATED ambient) t_{max} = maximum permitted temperature NOTE 2 - see also 14.1 with reference to component operating conditions NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Table NOTE 4 - see Table 10.2 for details of winding temperature measurements Supplementary information: See Part 1 for Testing Conducted.				

Particular Standard - (001) IEC61010_2_201B(W)

IEC 61010-2-201							
Clause	Requirement — Test						Verdict
10.2	TABLE: Temperature of windings Resistance method Temperature Measurements						N/A
Operating conditions .:							
Frequency (Hz).....:		Test room ambient temperature (ta1/ta2) :				°C (initial / final)	
Voltage (V).....:		Test duration (hours: min)					
Part / Designation	R _{cold} (Ω)	R _{warm} (Ω)	Current (A)	t _r (K)	t _c (°C)	t _{max} (°C)	Comments
NOTE 1- R _{cold} = initial resistance R_{warm} = final resistance t _r = temperature rise t_c = t_r corrected (t_c = t_r - { t_{a2} - t_{a1} } + [40 °C or max RATED ambient]) t _{max} = maximum permitted temperature							
NOTE 2 - Indicate insulation class (IEC 60085) under comments (optional)							
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Table							
Supplementary information: See Part 1 for Testing Conducted.							

Particular Standard - (001) IEC61010_2_201B(W)

IEC 61010-2-201				
Clause	Requirement — Test			Verdict
11	TABLE : Protection against HAZARDS from fluids			N/A
8	Mechanical resistance to shock and impact			
Voltage tests can be carried out once after performing the tests of clause 8 and clause 11. However, if voltage tests are carried out separately after each set of tests, two forms can be used.				
Location (see Table 6.7.A)	Clause 11 tests			Comments
	IEC 60529 (11.6)	Working voltage, (V)	Test voltage (V)	
NOTE 1 - t_m = measured temperature $t_c = t_m$ corrected ($t_m - t_a + 40$ °C or max. RATED ambient) t_{max} = maximum permitted temperature NOTE 2 - see also 14.1 with reference to component operating conditions NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Table NOTE 4 - see Table 10.2 for details of winding temperature measurements Supplementary information: See Part 1 for Testing Conducted.				

Particular Standard - (001) IEC61010 2 201B(W)

List of test equipment used:

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to TMP/CTF stage 1 or WMT/CTF stage 2 procedure has been used.

Note: This page may be removed when TMP/CTF stage 1 or WMT/CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

Clause	Measurement / testing	Testing / measuring equipment / material used, (Equipment ID)	Range used	Last Calibration date	Calibration due date

Other Enclosures

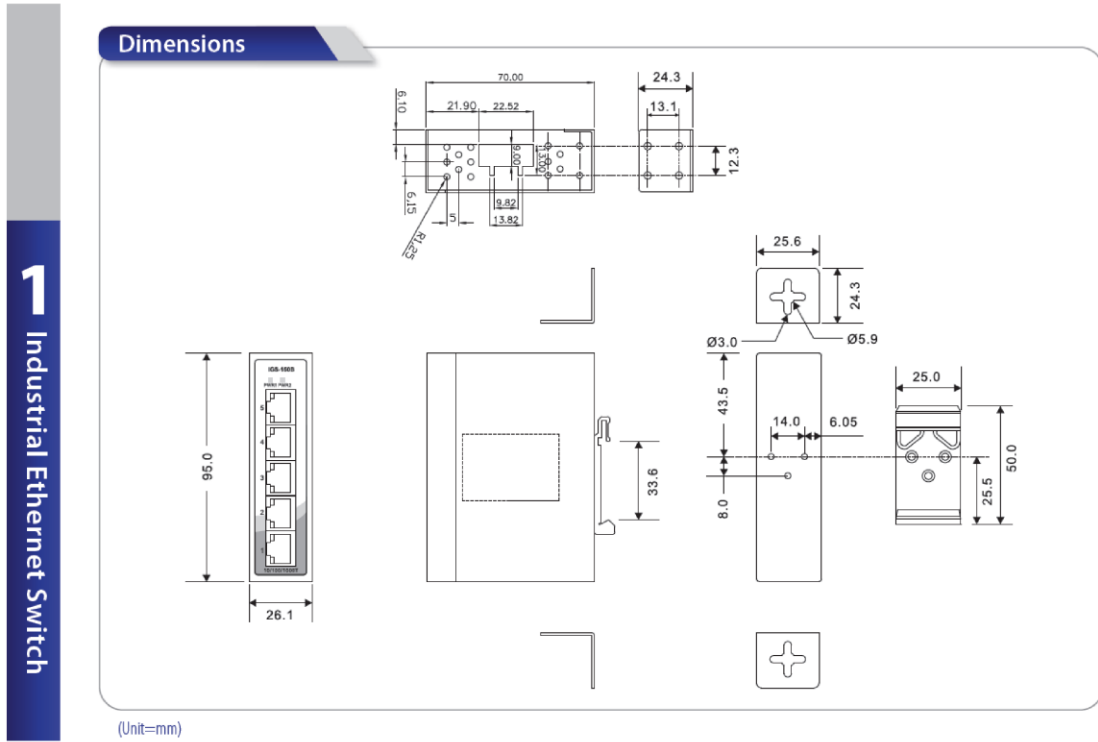
All Enclosures associated with this report are shown below.

Enclosures

<u>Supplement - (ID)</u>	<u>Description</u>
Diagrams - (001)	Enclosure dimension
Diagrams - (002)	Thermal pad
Marking Label - (001)	Label_IGS-150B_20191108
Miscellaneous - (001)	Circuit
Miscellaneous - (002)	Layout
Miscellaneous - (003)	Manual
Photographs - (001)	IGS-150B (01)
Photographs - (002)	IGS-150B (02)
Photographs - (003)	IGS-150B (03)
Photographs - (004)	IGS-150B (04)
Photographs - (005)	IGS-150B (05)
Photographs - (006)	IGS-150B (06)
Photographs - (007)	IGS-150B (07)
Photographs - (008)	IGS-150B (08)
Photographs - (009)	IGS-150B (08)_(Alt)
Photographs - (010)	IGS-150B (09)
Photographs - (011)	IGS-150B (09)_(Alt)

Diagrams - (001) Enclosure dimension

Diagrams - (001) Enclosure dimension



Diagrams - (002) Thermal pad

Diagrams - (002) Thermal pad

威力工業網絡股份有限公司

零部件承認書

威力料號：1508-Z012012T35-KB1H48X00供應商名稱：高柏科技股份有限公司供應商型號：H48-6AC原廠型號：H48-6AC廠牌：無規格(含包裝方式)：H48-6AC 12*12*3.5mm 1000PCS/15000 箱 不背膠附件：1. RoHS 2. REACH 3. UL 4. 宣告書

承認日期	總頁數
2019.01.28	1

核決程序

威力工業網絡股份有限公司	供應商
	 

本文件管制狀態

登 錄	發 行	廢 止	技術保留

Diagrams - (002) Thermal pad

高柏科技股份有限公司

檢驗報告表

INSPECTION REPORT

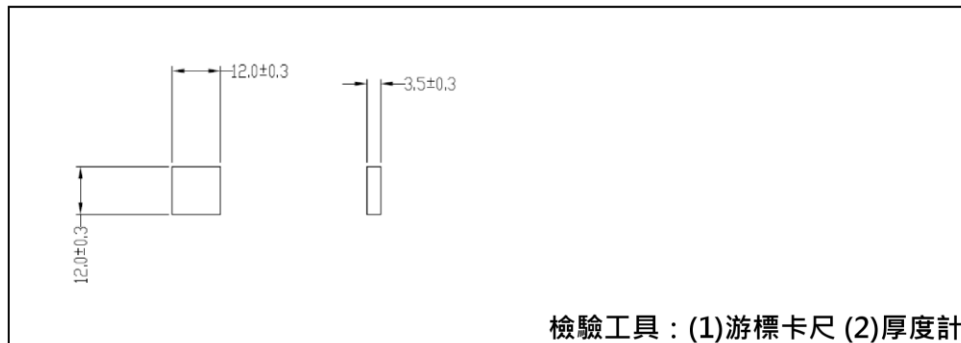
承認書編號：20190128-TG-19-H4621

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客戶料號	1508-Z012012T35-KB1H48X00	高柏料號	H48-6AC-001200x001200x0350-00000-00-RO
客戶品名	H48-6AC 導熱矽膠 12*12*3.5mm 不背膠	樣品總數	35 PCS
		抽樣數	5 PCS

檢驗標準

項目	圖面尺寸	公差	檢測值				
			TEST(1)	TEST(2)	TEST(3)	TEST(4)	TEST(5)
A	12.00	±0.3	12.03	12.01	11.97	11.96	12.03
B	12.00	±0.3	12.01	12.08	11.98	12.05	11.92
C	3.50	±0.3	3.55	3.41	3.55	3.46	3.60

參考圖面：



檢驗工具：(1)游標卡尺 (2)厚度計

檢驗結果： 不合格 REJECT 合格 ACCEPTED

核 准	審 核	檢 測 人
Shelly	Alex	Candice

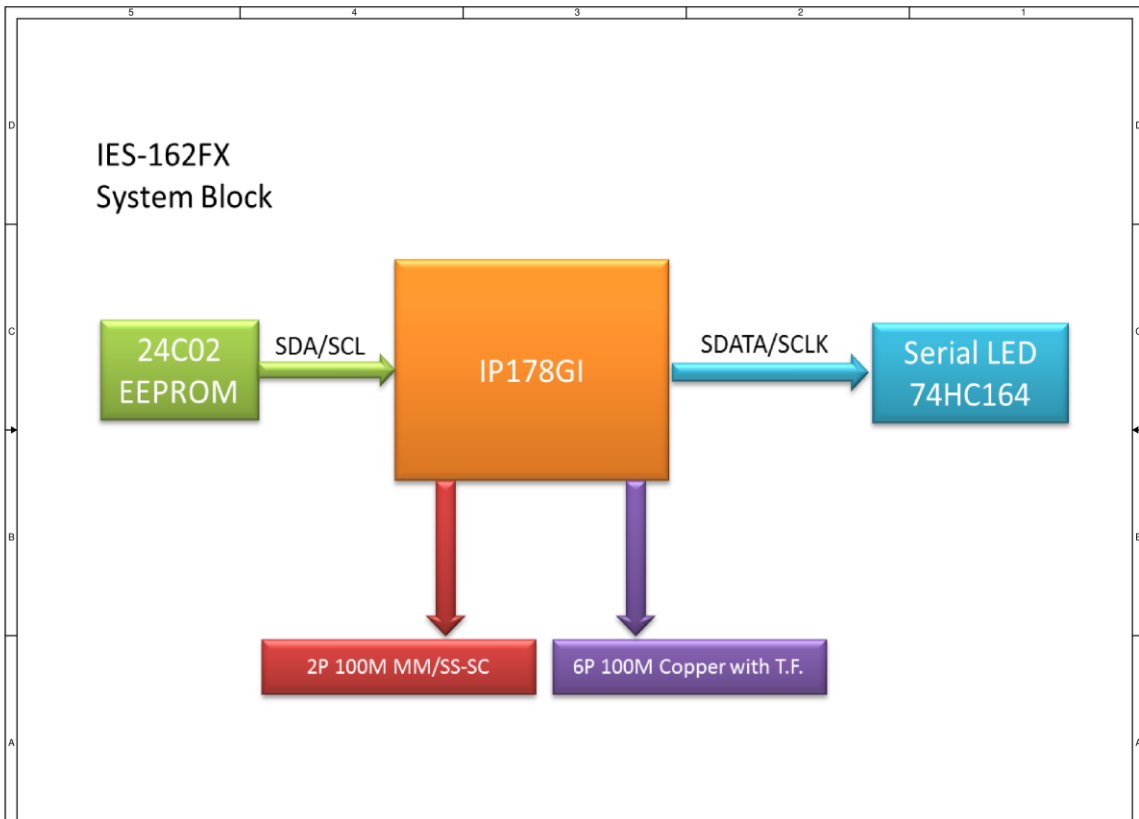
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Marking Label - (001) Label IGS-150B 20191108

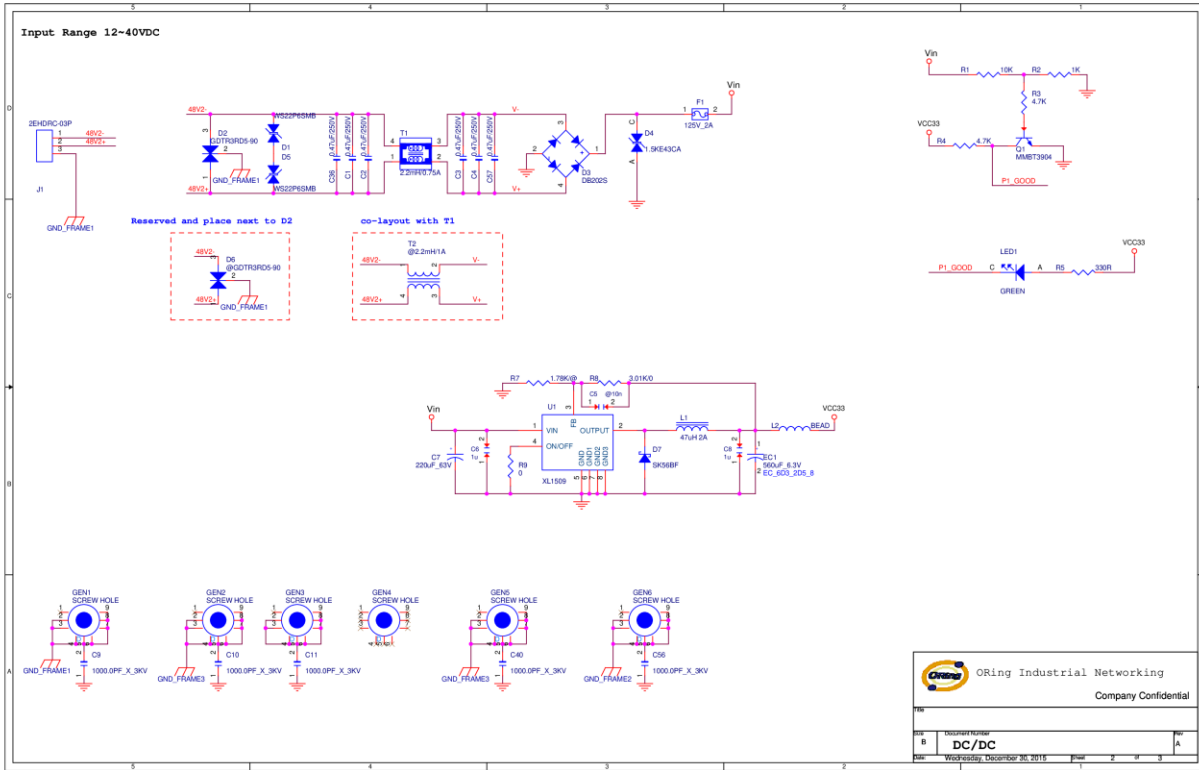


Miscellaneous - (001) Circuit

Miscellaneous - (001) Circuit

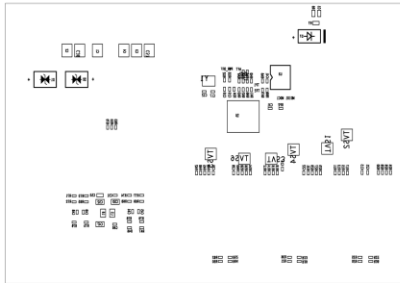


Miscellaneous - (001) Circuit

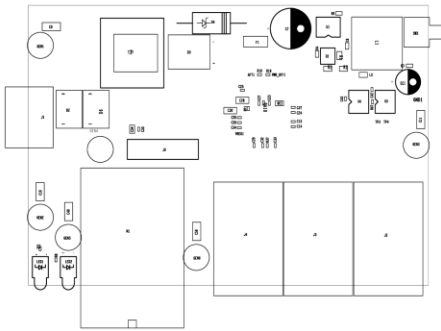


Miscellaneous - (002) Layout

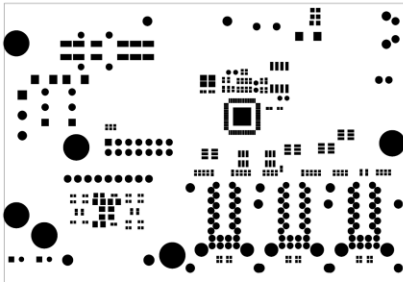
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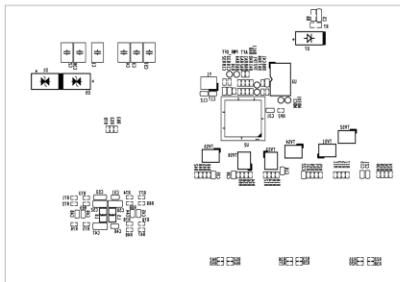
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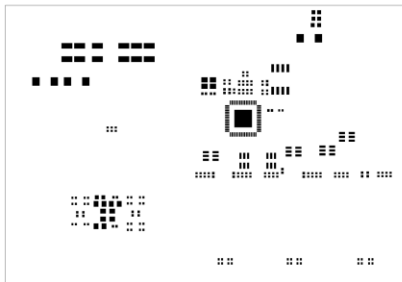
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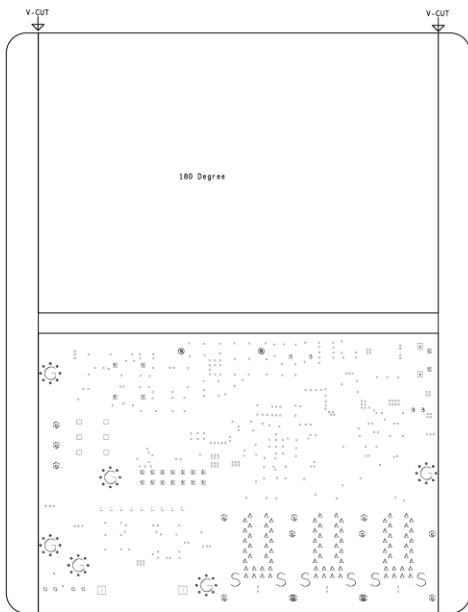
Miscellaneous - (002) Layout



Miscellaneous - (002) Layout

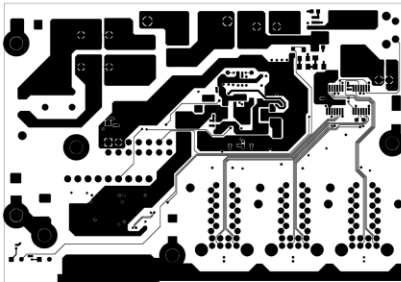


Miscellaneous - (002) Layout

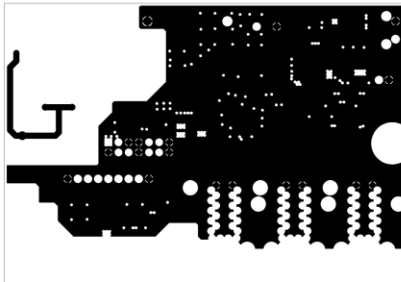


DRILL CHART: TOP to BOTTOM			
ALL UNITS ARE IN MILS			
FIGURE	SIZE	PLATED	QTY
.	12.0	PLATED	336
•	20.0	PLATED	48
◦	30.0	PLATED	4
△	35.0	PLATED	84
◡	36.0	PLATED	9
◦	37.0	PLATED	4
⊛	40.0	PLATED	20
□	43.0	PLATED	6
⊞	52.0	PLATED	2
⊙	55.0	PLATED	2
⊚	63.0	PLATED	15
⊠	80.0	PLATED	2
G	126.0	NON-PLATED	6
S	128.0	NON-PLATED	6

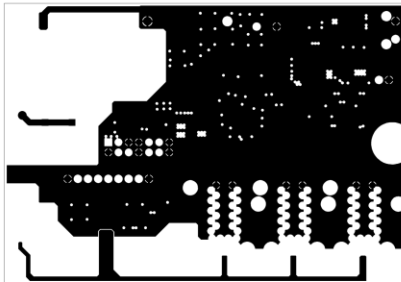
Miscellaneous - (002) Layout



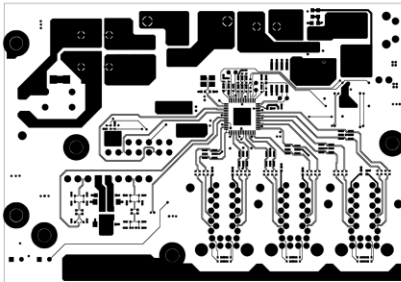
Miscellaneous - (002) Layout



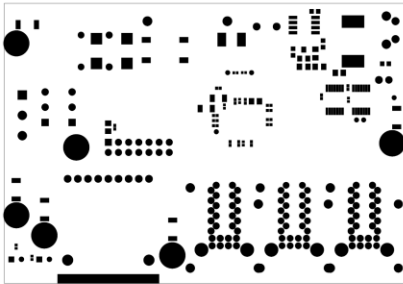
Miscellaneous - (002) Layout



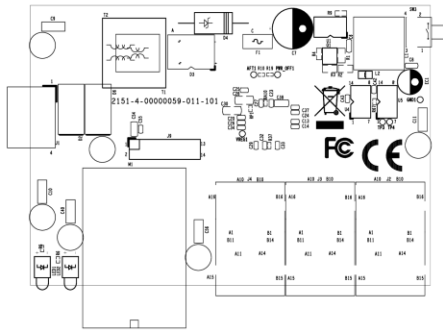
Miscellaneous - (002) Layout



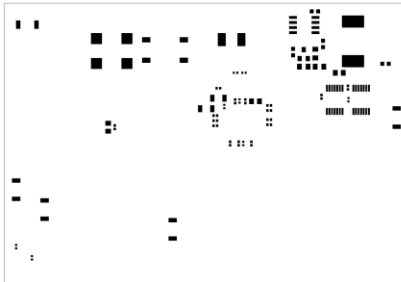
Miscellaneous - (002) Layout



Miscellaneous - (002) Layout



Miscellaneous - (002) Layout



Miscellaneous - (003) Manual

Miscellaneous - (003) Manual

Version 1.0



ORing

Quick Installation Guide

IES-162FX-L Series

Industrial Unmanaged Switch

Introduction

IES-162FX-L is an unmanaged Ethernet switch with six 10/100Base-T(X) ports and two 100Base-T(X) fiber ports in a compact form factor. The fiber ports enable the switch to provide long-haul connections. The easy-to-install switch comes with rigid IP-30 housing and can operate in harsh environments. The wide operating temperature range from -40°C to 75°C ensures the switch can operate reliably in extreme weather conditions.

Package Contents

The device is shipped with the following items. If any of these items is missing or damaged, please contact your customer service representative for assistance.

Contents	Pictures	Number
IES-162FX-MM-L or IES-162FX-SS-L		X 1
Din-rail Kit		X 1
Wall-mount Kit		X 2
QIG		X 1

Preparation

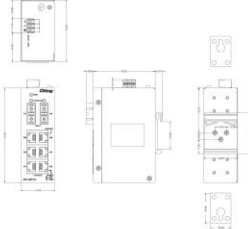
Before you begin installing the switch, make sure you have all of the package contents available.

Safety & Warnings

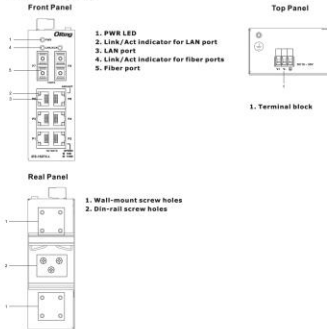
- Elevated Operating Ambient:** If installed in a closed cabinet, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- Reduced Air Flow:** Installation of the equipment should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- Mechanical Loading:** Mounting of the equipment in the din-rail should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- Circuit Overloading:** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

- Indoor use and pollution degree II:** It must be wiped with a dry cloth for clean up the labelling.
* Utilisation en intérieur et degré de pollution II, il faut l'essuyer avec un chiffon sec pour nettoyer l'étiquetage.
- Do not block air ventilation holes.**
* Ne bloquez pas les orifices de ventilation.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.**
* Si l'appareil est utilisé d'une manière non spécifiée par le fabricant, la protection qu'il apporte peut se voir diminuée.
- Should be mounted in the Industrial Control Panel and ambient temperature is not exceed 75 degrees C.**
* doit être monté dans le panneau de commande industriel et la température ambiante ne doit pas dépasser 75 degrés C.

Dimension (Unit: mm)



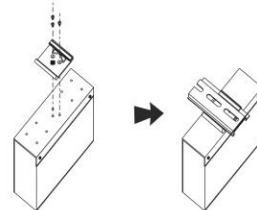
Panel Layouts



Installation

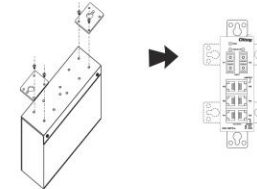
DIN-rail Installation

- Step 1:** Slant the switch and screw the Din-rail kit onto the back of the switch, right in the middle of the back panel.
- Step 2:** Slide the switch onto a Din-rail from the Din-rail kit and make sure the switch clicks into the rail firmly.



Wall-mounting

- Step 1:** Screw the two pieces of wall-mount kits onto both sides of the switch. A total of eight screws are required, as shown below.
- Step 2:** Use the switch, with wall-mount plates attached, as a guide to mark the correct locations of wall-mount screws.
- Step 3:** Insert screw through the large parts of the keyhole-shaped apertures, and then slide the switch downwards. Tighten the four screws for added stability.



Miscellaneous - (003) Manual

Version 1.0



ORing
Quick Installation Guide

IES-162FX-L Series

Industrial Unmanaged Switch

Network Connection

The device has standard Ethernet ports. According to the link type, the switch uses CAT 3, 4, 5, 5e UTP cables to connect to any other network devices (PCs, servers, switches, routers, or hubs). Please refer to the following table for cable specifications.

Cable Types and Specifications:

Cable	Type	Max. Length	Connector
100BASE-T	Cat. 3, 4, 5 100-ohm UTP	UTP 100m (328ft)	RJ-45
100BASE-TX	Cat. 5 100-ohm UTP	UTP 100m (328ft)	RJ-45

For pin assignments for the cables, please refer to the following table.

Pin Assignments:

Pin Number	Assignment
1	TD+
2	TD-
3	RxD
4	Not used
5	Not used
6	TD+
7	Not used
8	Not used

Note: "+" and "-" signs represent the polarity of the wires that make up each wire pair.

Wiring

Power Inputs

The switch provides a 10-30 VDC voltage power input on a 3-pin terminal block. Follow the steps to connect the power.

STEP 1: Insert the negative/positive wires into the V-/V+ terminals, respectively.

STEP 2: To keep the DC wires from pulling loose, use a small flat-blade screwdriver to tighten the wire-clamp screws on the front of the terminal block connector.



Configurations

After installing the switch and connecting cables, start the switch by turning on power. The green power and LEDs should turn on.

LED Indication table

LED	Color	Status	Description
Power	Green	On	5V power module activated
1000Base-TX RJ45 Port	Green	On	Port is linked
	Blinking		Transmitting data
10/100Base-TX RJ45 Port	Green	On	Port is linked
	Blinking		Transmitting data

Specifications

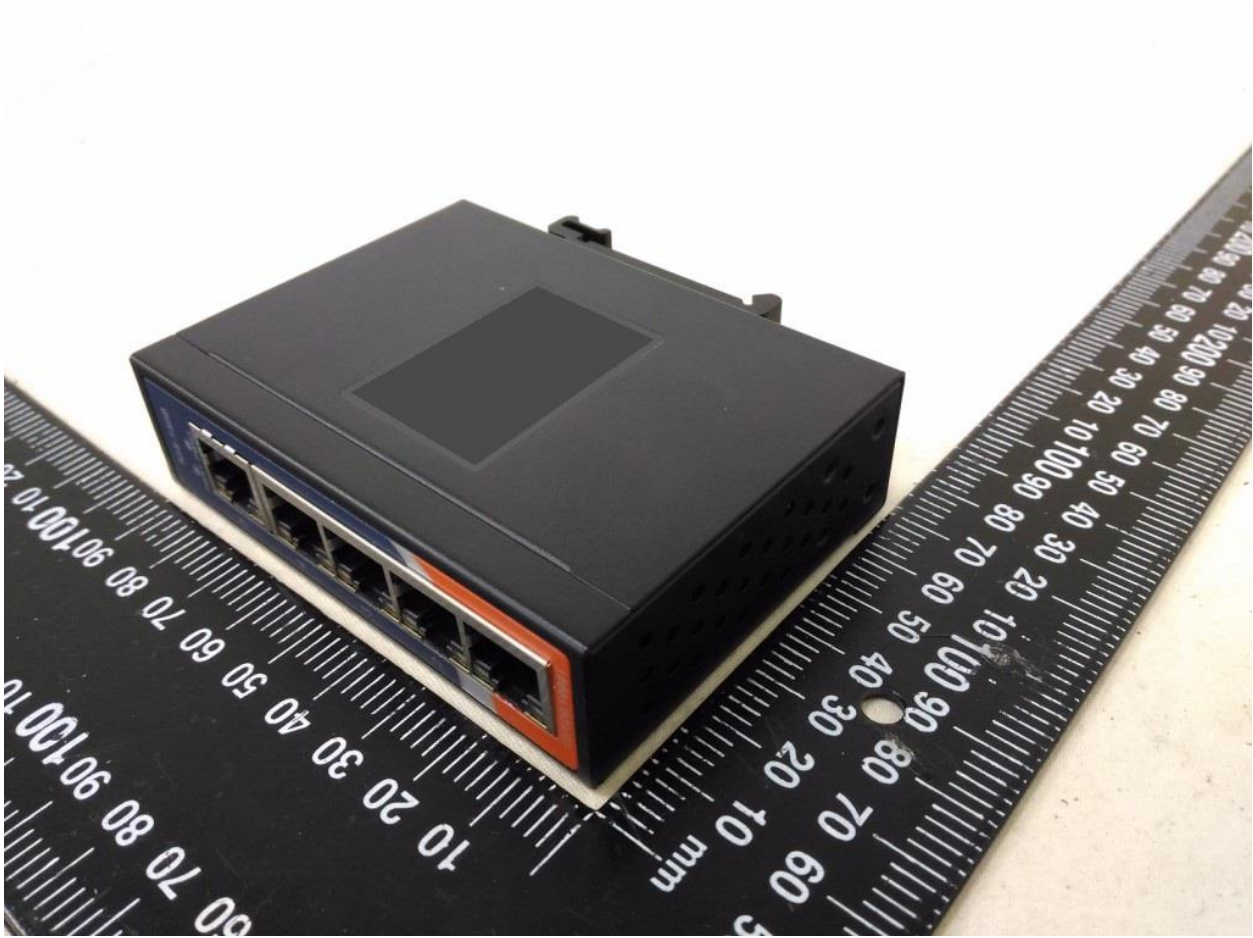
ORing Switch Model	IES-162FX-MM-SC-L	IES-162FX-SS-SC-L
Physical Ports		
10/100 Base-TX Ports (w/ RJ45 Auto MDIX)	4	4
1	Fiber Ports Number	2
2	Fiber Ports Standard	100Base-FX
3	Fiber Mode	Multi-mode
4	Fiber Diameter (µm)	62.5/125 µm
5	Fiber Optical Connector	SC
6	Typical Distance (km)	2 km
7	Wavelength (nm)	1310 nm
8	Max. Output Optical Power (dbm)	-14 dbm
9	Min. Output Optical Power (dbm)	-23.5 dbm
10	Max. Input Optical Power (Saturation)	0 dbm
11	Max. Input Optical Power (Sensitivity)	-31 dbm
12	Link Budget (dB)	7.5 dB
Technology		
Ethernet Standards	IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-TX IEEE 802.3x for Flow control	
MAC Table	256B MAC Addresses	
Packet Buffer	448Kbits	
Processing	Store-and-Forward	
Power		
Input power	10-30 VDC voltage power input on 3-pin terminal block *Supported by BDLV or double insulation source evaluated by UL E101511 or E10152-201 power supply only *Fournir par source BDLV ou double isolation évaluée uniquement par l'organisme UL E101511 ou UL E10152-201.	
Power consumption (Typ.)	3.6 Watts max.	3.6 Watts max.
Overload current protection	Present	
Reverse polarity protection	Present	
Physical Characteristic		
Enclosure	IP-30 (max UL certified)	
Dimension (W x D x H)	41 (W) x 75 (D) x 118 (H)mm (1.61 x 2.95 x 4.53 inch)	
Weight (g)	328 g	328 g
Environmental		
Storage Temperature	-40 to 80°C (-40 to 180°F)	
Operating Temperature	-40 to 70°C (-40 to 158°F)	
Operating Humidity	5% to 95% Non-condensing	
Regulatory Approvals		
CE	FCC Part 15, Class B (EN55022) Class A	
UL	EN61000-4-2 (ESD), EN61000-4-3 (RF), EN61000-4-4 (SFT), EN61000-4-5 (Surge), EN61000-4-6 (CS), EN61000-4-8, EN61000-4-11	
Shock	IEC60068-2-27	
Vibration	IEC60068-2-32	
Surge	IEC60068-2-6	
Warranty	EN60950-1, IEC60950-1, IEC60950-2 3 years	

Warning (AVERTISSEMENT)
Take into consideration the following guidelines before wiring the device.
Tenez compte des directives suivantes avant de câbler l'appareil.
1. Terminal block is mating with 2ESDV Plug and suitable for 12-28AWG.
Le boîtier est compatible avec les connecteurs 2ESDV et convient pour 12-28AWG. Valeur de couple 4.5 lb-in.
2. The temperature rating of the input connection cable should higher than 105°C.
La température de service nominale du câble d'entrée doit être supérieure à 105 °C.



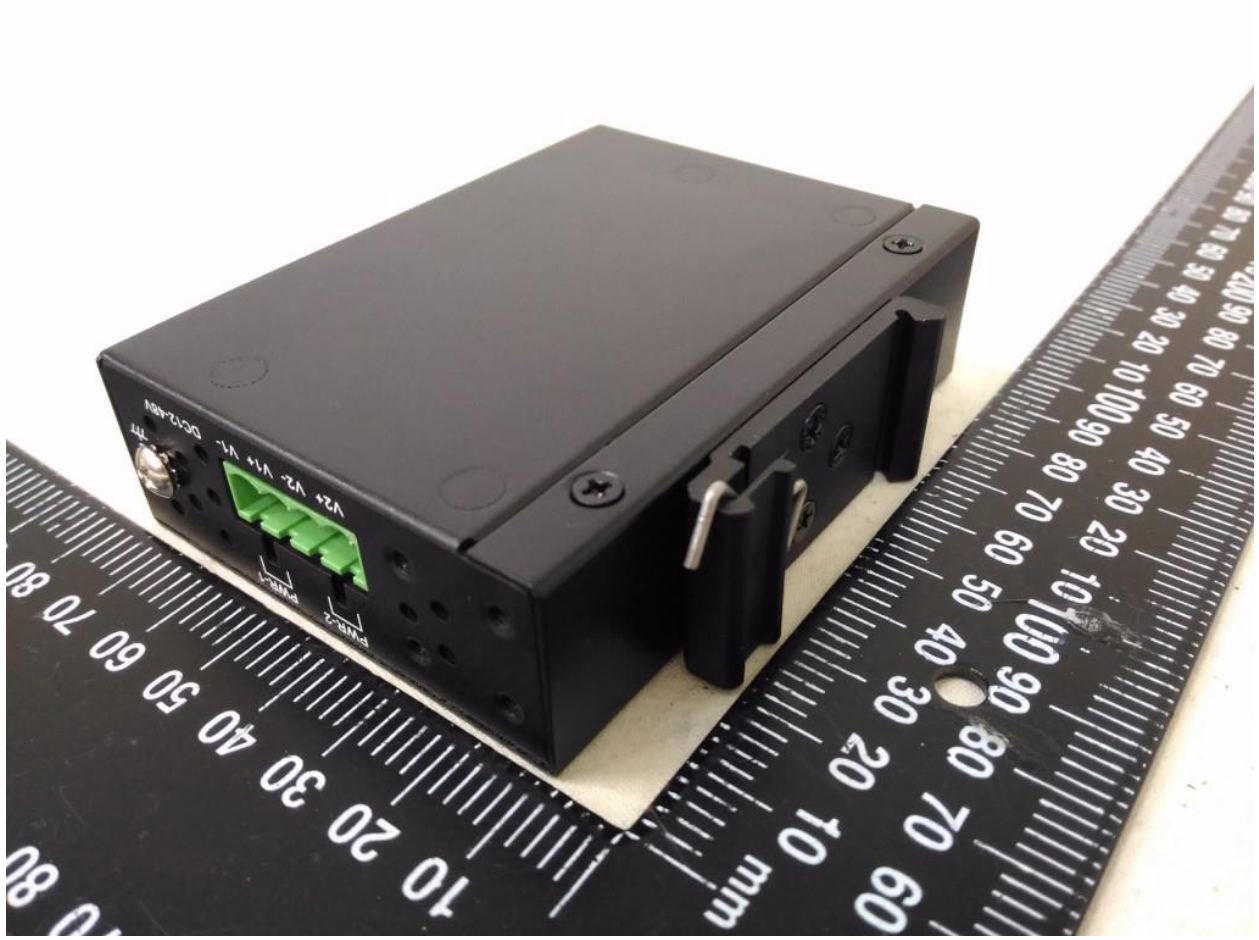
Photographs - (001) IGS-150B (01)

Photographs - (001) IGS-150B (01)



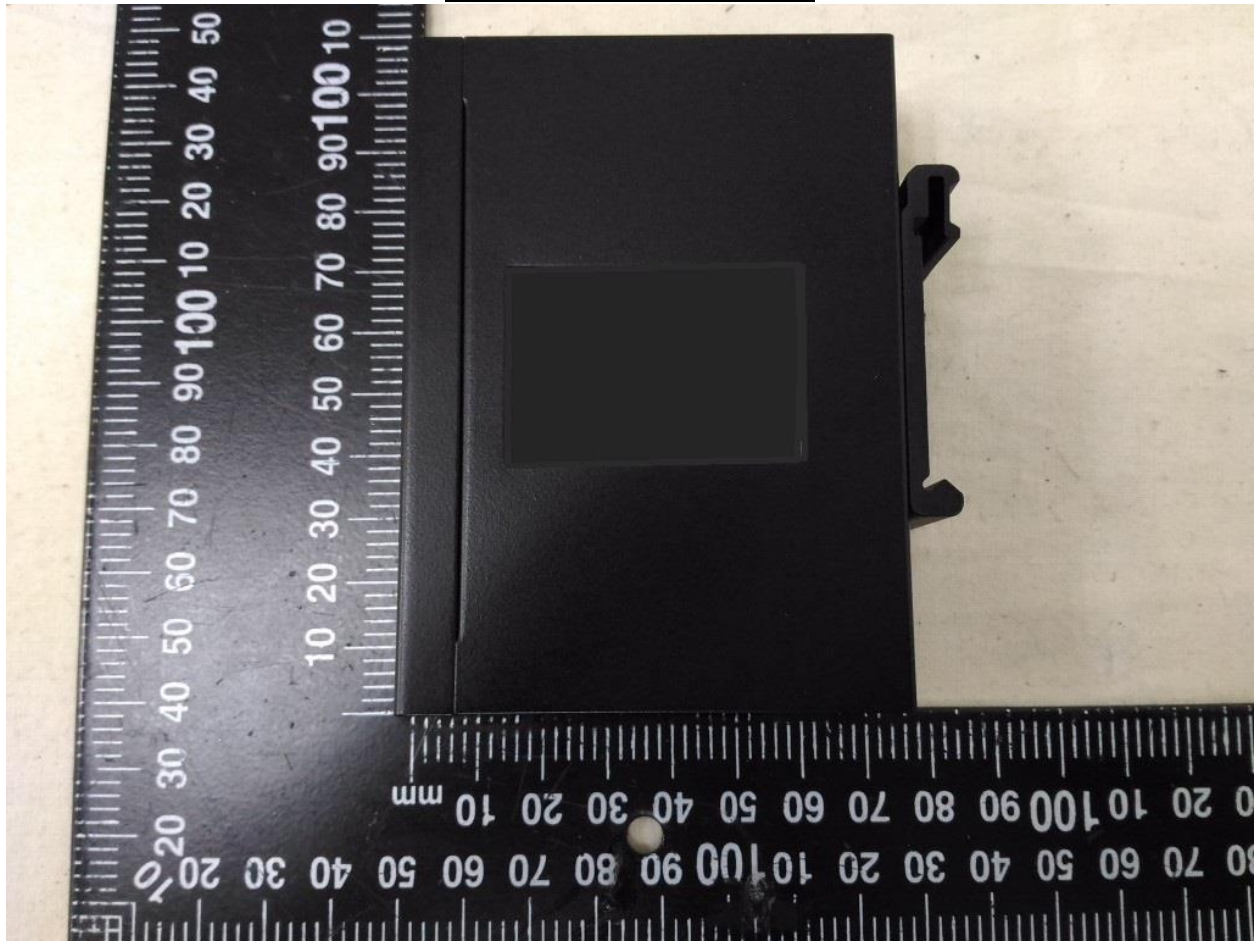
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Photographs - (002) IGS-150B (02)



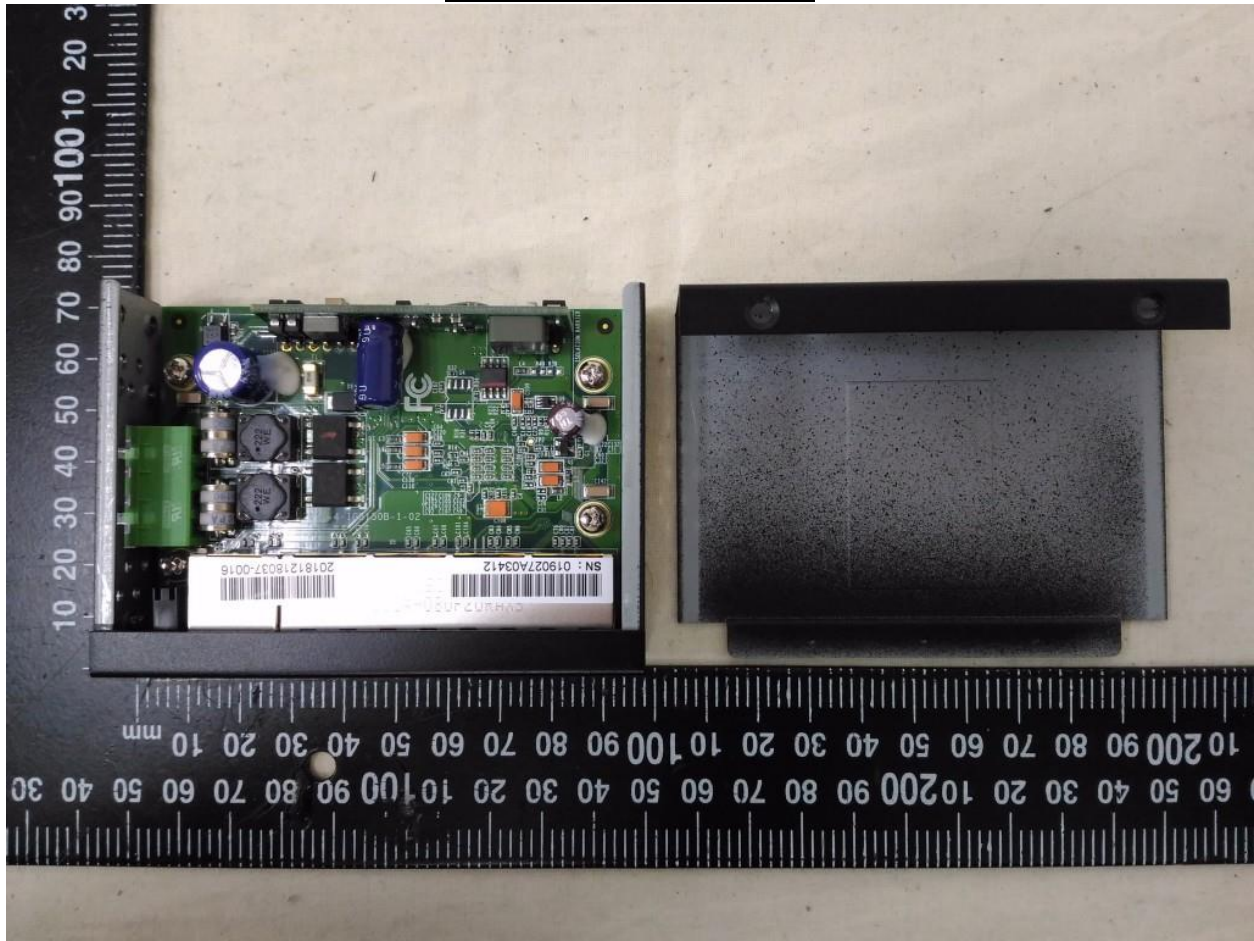
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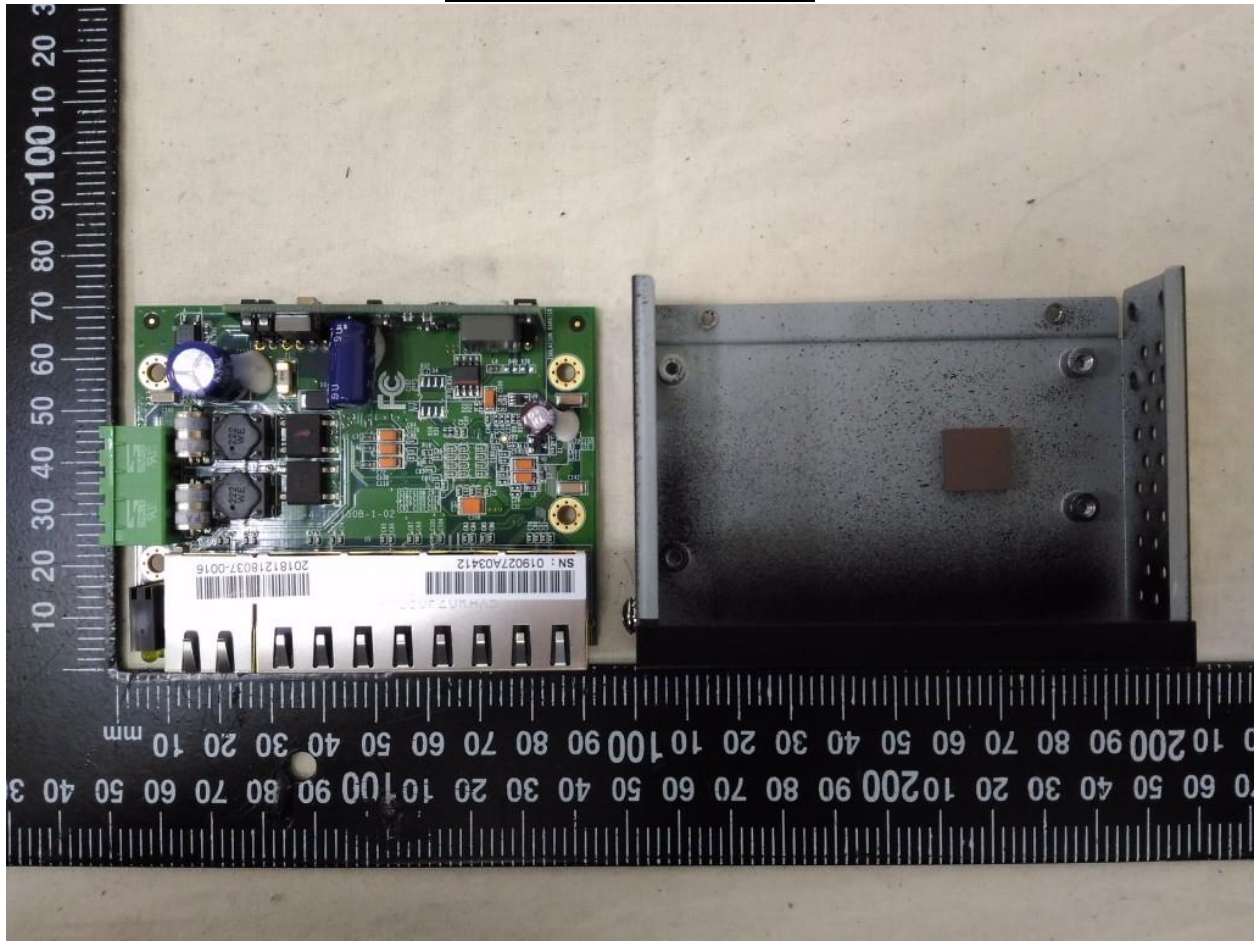
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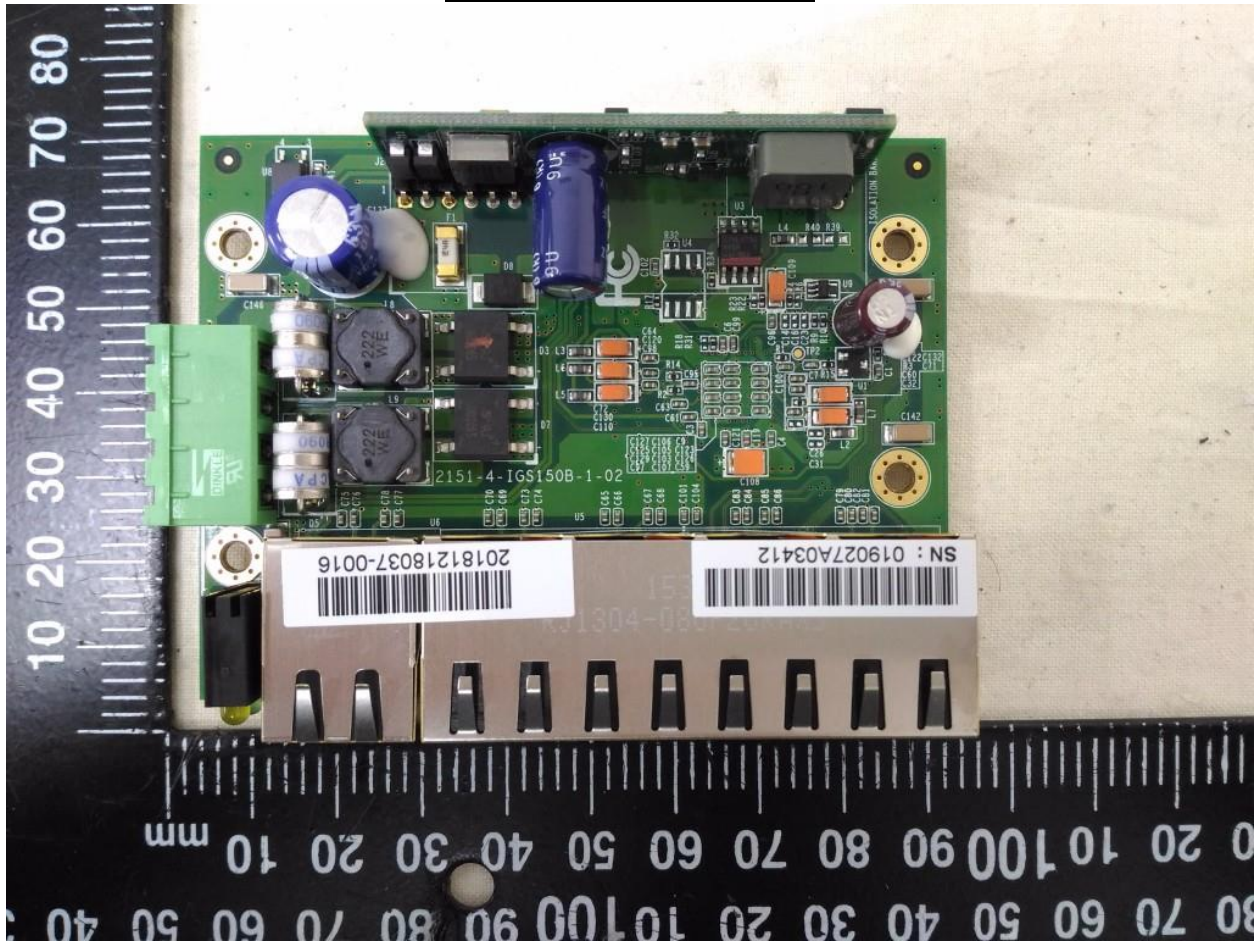
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Photographs - (005) IGS-150B (05)



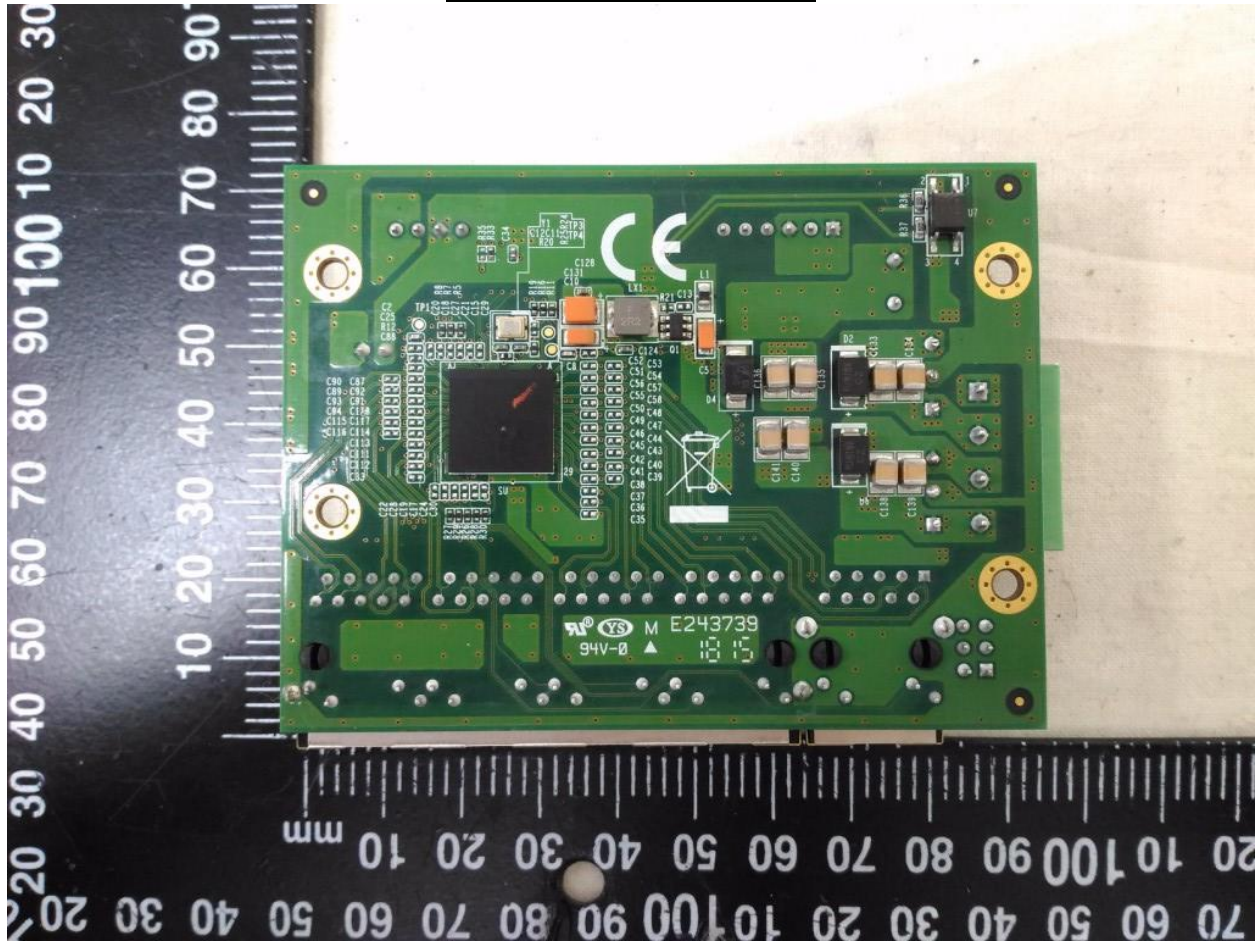
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Photographs - (006) IGS-150B (06)



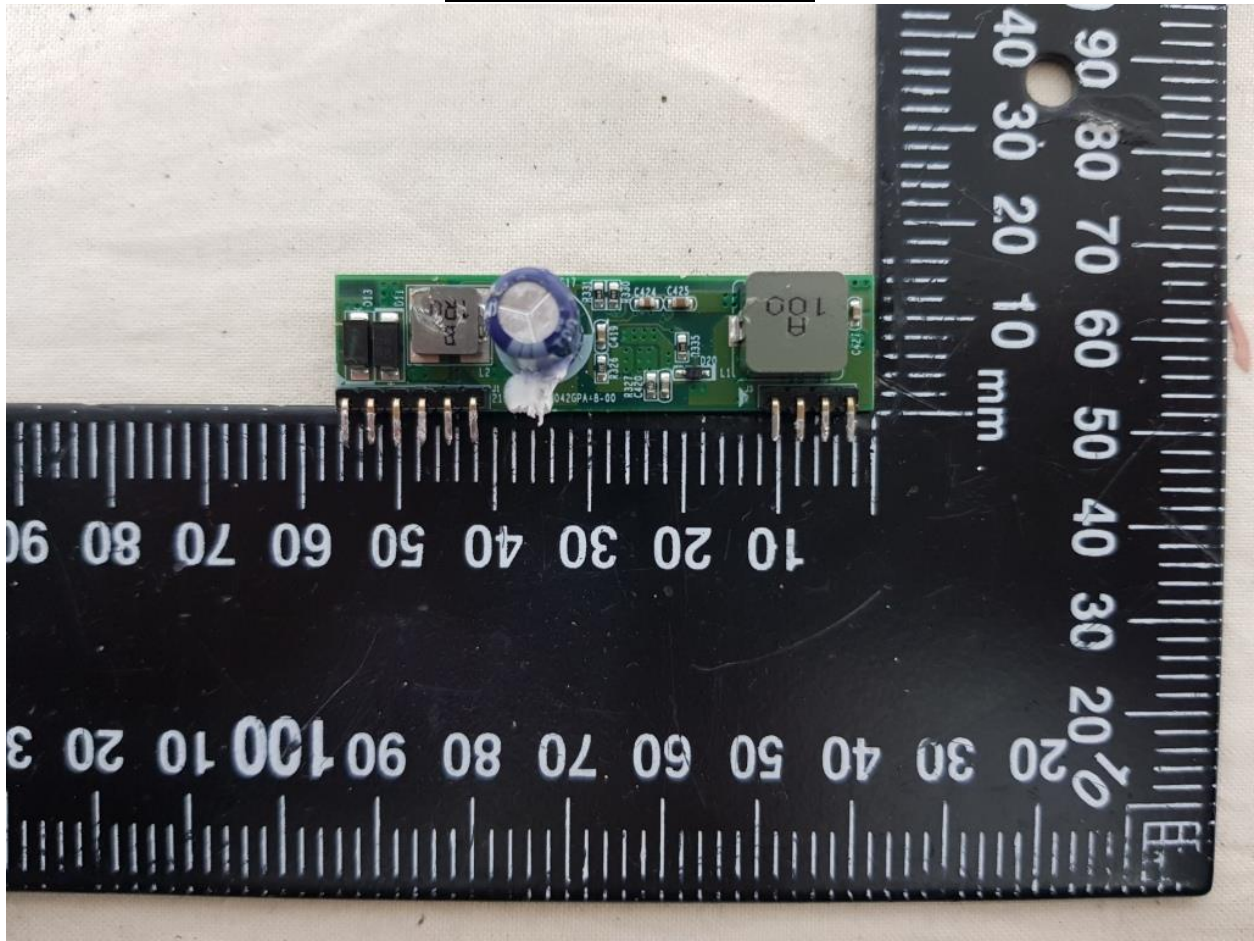
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Photographs - (007) IGS-150B (07)



Photographs - (008) IGS-150B (08)

Photographs - (008) IGS-150B (08)



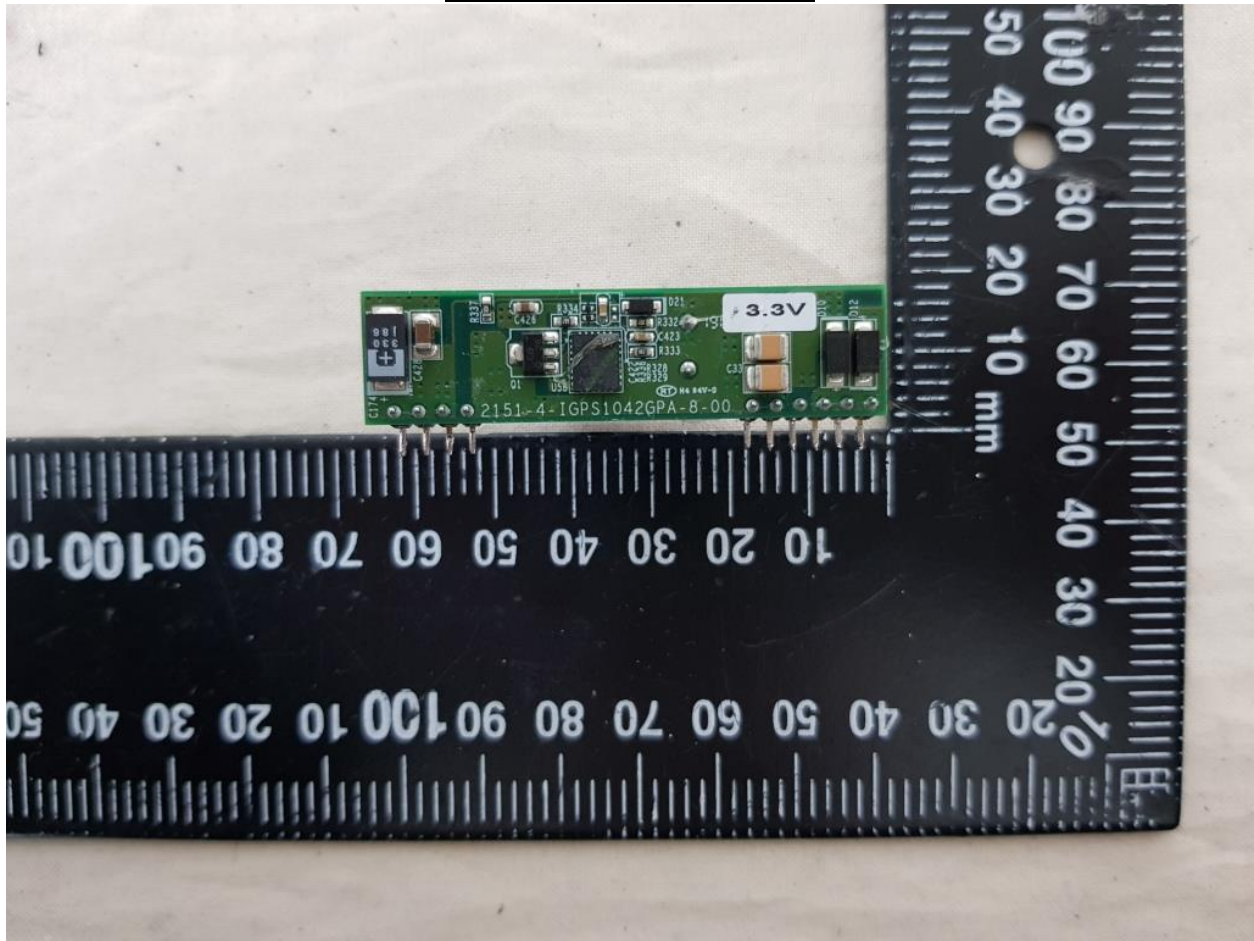
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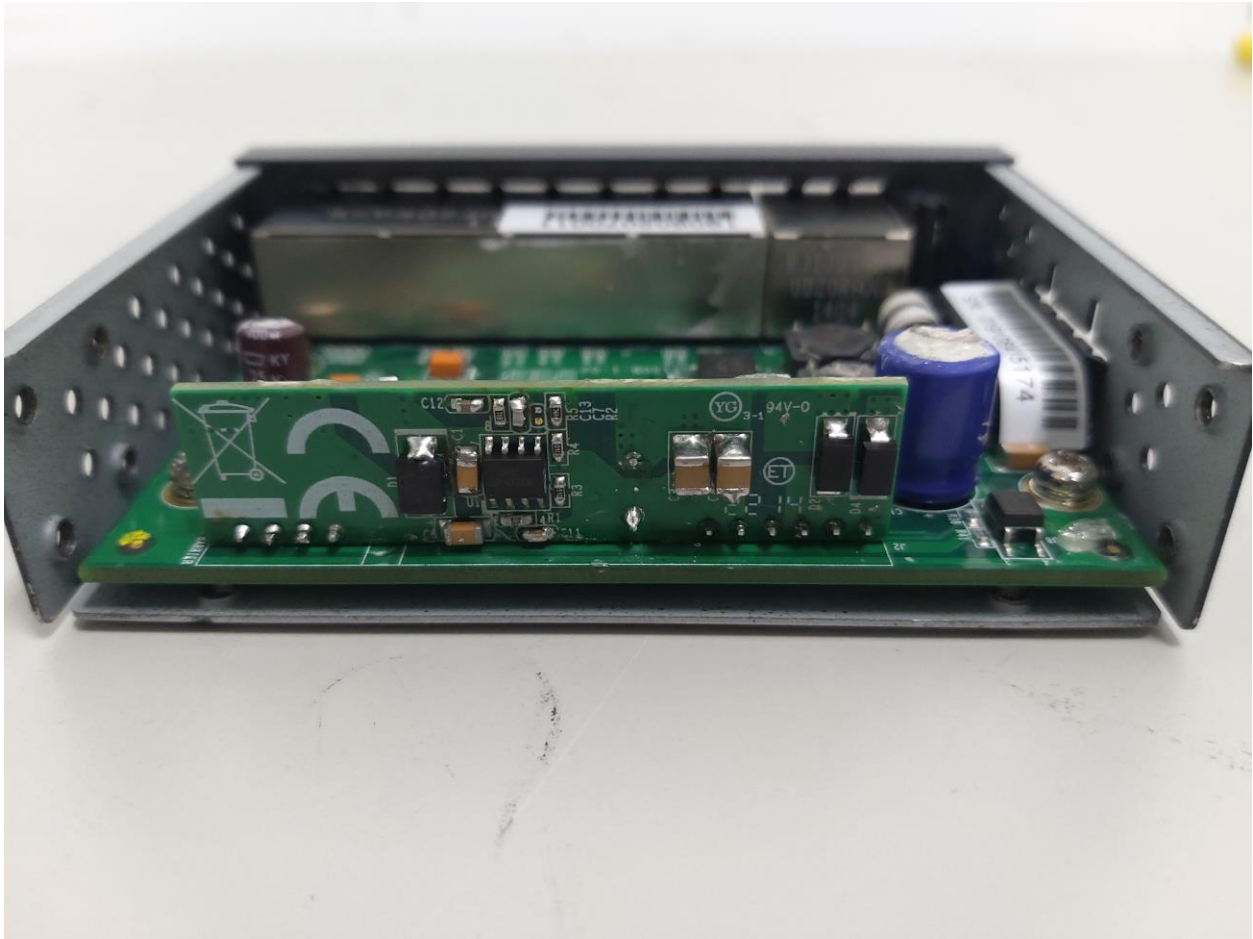
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Photographs - (011) IGS-150B (09)_Alt

Photographs - (011) IGS-150B (09) (Alt)



-----END OF APPENDIX A-----

UL CERTIFICATION DOCUMENTATION:

APPENDIX B: UL Certification Documentation

This Appendix includes additional documentation for the UL Certification.

Test Record

The manufacturer submitted representative production samples of Model IGS-150B. Label and printing ink is accepted and referred from tests conducted in E331061-D1007 (interchangeables are not allowed in these items when under PGGU2).

Amendment 1:

Model IGS-150B was submitted as an representative production sample. All tests were conducted on IGS-150B for the amendment.

All applicable tests according to the referenced standard(s) have been carried out.

The following tests were conducted:

Refer to the Test List in Appendix D of this report if testing was performed as part of this evaluation.

Test results are valid only for the tested equipment. These tests are considered representative of the products covered by this Test Report. The test methods and results of the above tests have been reviewed and found to be in accordance with the requirements in the Standard(s) referenced at the beginning of this Test Report.

Compliance of the tested equipment was determined based on the requirements of the below listed standards.

Base Standard(s): UL 61010-1, 3rd Edition, May 11, 2012, Revised April 29, 2016
 CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 2016

Additional Standards: UL 61010-2-201 (First Edition) dated 2017-02-20
 CAN/CSA C22.2 No. 61010-2-201 dated 2014-02

Any supplements provided as a part of this Test Record are located in Appendix A of this report.

NOTE: If there is a Multiple Listee associated with this report, the ML Correlation Sheet is not included in this report and is located as a separate file in UL's CDA system.

-----END OF APPENDIX B-----

APPENDIX C: Follow-Up Service Documentation

Follow-Up Service Procedure

It is important to keep UL Procedures and Test Reports up-to-date as new or revised pages are received. Correct maintenance will decrease the amount of time the UL Representative spends when visiting your facility.

UL LLC offers MyHome @UL, a dedicated website providing secure access to online tools and databases that can help simplify your compliance activities. You can customize your personal MyHome @UL page to include the content needed most, including timely information about certification updates and links to other Web sites you visit regularly. Visit <http://my.home.ul.com/> to sign up today!

PAGES (in content order)	FUNCTION	HOW TO UPDATE
Authorization Page	Displays the Product Category, the type of Follow-Up Service (Type R=Reexamination / Type L=Label), the File Number and the Volume Number associated with each Applicant's, Manufacturer's and Listee's company name and address.	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Addendum to Authorization Page*	Lists the additional names and addresses of manufacturing locations, when multiple locations exist	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Listing Mark Data (LMD), Classification Mark Data (CMD) or Recognized Component Mark Data (RCMD) Pages* #	Used only for products covered under Type R Service. Displays the correct LMD, CMD, or RCMD Mark, the Control Number for Listed and Classified categories and additional information regarding minimum size, application, procurement, and any other optional markings, in addition to the UL Mark.	Replace existing page by matching the UL File Number and Volume Number. Discard the older page (refer to "Issued" or "Revised" date).
Multiple Listing (ML) Correlation Sheet*	Correlates product model numbers between those products made by a Manufacturer for the Basic Applicant and those supplied to another company, the Multiple Listee.	Replace, add or delete page(s) with most current "Issued" or "Revised" date.
Index*	Catalogs the contents of the Procedure by some logical means, i.e. Section Number, Report Reference Number, or Issue Date.	Replace present page by matching the UL File Number, Volume Number, Page Number and most current "Revised" date.
Appendices* # (App.)	Contains instructions for the Manufacturer and UL Representative concerning specific responsibilities and required periodic tests. May also outline tests to be conducted on samples to be forwarded to UL's facilities.	Replace present page by matching the UL File Number, Volume Number, Appendix letter (eg. App. A), Page Number and most current "Revised" date.
	Standardized Appendix Pages are the same for all manufacturers within a particular product category.	Replace present page by matching the Appendix letter (eg. App. A), Page Number and most current "Revised" date.
Follow-Up Inspection Instructions (FUII) Pages*	Contains information similar to that in the Appendices. FUII Pages are issued as part of the Procedure when a UL Standard is used in conjunction with the Procedure, and are the same for all manufacturers within a particular category.	Replace present pages by matching the Page Number and most current "Issued" or "Revised" date.
Section General* # (Sec. Gen.)	Contains description, requirements, identifications and/or specifications that are common to all products covered by the entire volume and supplements the information provided in the Description Section.	Replace present page by matching the UL File Number, Volume Number, Page Number and most current "Revised" date.
Description, or Section (Sec.)*	Contains the specific description of one or more products or systems. This includes written text supplemented by photographs, drawings, etc., as necessary, to define features that affect compliance with the applicable requirements.	Replace present page by matching the UL File Number, Volume Number, Section Number, Page Number and most current "Issued" date.

* The above page(s) may not appear in all UL Follow-Up Service Procedures; UL's Conformity Assessment Services staff determines their inclusion.

These pages are combined in the **Generic Inspection Instructions** for International Style Reports, identified, as example by Vol. X1, X2, etc.

PLEASE NOTIFY YOUR LOCAL UL OFFICE OF ANY CHANGES IN CONTACT NAME, COMPANY NAME OR ADDRESS, SO THIS MATERIAL AND IMPORTANT INFORMATION CONTINUES TO BE DELIVERED TO YOUR FACILITY WITHOUT INTERRUPTION.

UL Authorization Page

File E331061

Vol D1

Issued: 2019-11-20; 2022-11-24 (A1)

FOLLOW-UP SERVICE PROCEDURE (TYPE R)

Programmable Controllers
(NRAQ / NRAQ7)

Manufacturer: SEE ADDENDUM FOR MANUFACTURER LOCATIONS

555405 (Party Site)
Applicant: ORING INDUSTRIAL NETWORKING CORP
(100524405) 3F 542-2 ZHONGZHENG RD XINDIAN DISTRICT
NEW TAIPEI CITY, 231 TAIWAN

Recognized Company: SAME AS APPLICANT (unless specified differently below)

Same as Applicant

Use of the Mark

This Follow-Up Service Procedure authorizes the above Manufacturer(s) to use the marking specified by UL LLC, or any authorized licensee of UL LLC, including the UL Contracting Party, only on products when constructed, tested and found to be in compliance with the requirements of this Follow-Up Service Procedure and in accordance with the terms of the applicable service agreement with UL Contracting Party. The UL Contracting Party for Follow-Up Services is listed in the addendum to this Follow-Up Service Procedure ("UL Contracting Party"). UL Contracting Party and UL LLC are referred to jointly herein as "UL."

It is the responsibility of the Applicant, Manufacturer(s), and Listee/Classified Company. to make sure that only the products meeting the aforementioned requirements bear the authorized Marks of UL LLC, or any authorized licensee of UL LLC.

Additional Responsibilities

Additional responsibilities, duties and requirements for the Applicant and Manufacturers are defined under Additional Resources at the following website: <https://www.ul.com/fus>. Manufacturers without Internet access may obtain the current version of these documents from their local UL customer service representative or UL field representative. For assistance, or to obtain a paper copy of these documents or the Follow-Up Service Terms referenced below, please contact UL's Customer Service at <https://www.ul.com/aboutul/locations/>, select a location and enter your request, or call the number listed for that location.

Acceptance of Follow-Up Services

The Applicant and the specified Manufacturer(s) and any Listee/Classified Company in this Follow-Up Service Procedure must agree to receive Follow-Up Services from UL Contracting Party. If your applicable service agreement is a Global Services Agreement ("GSA"), the Applicant, the specified Manufacturer(s) and any Listee/Classified Company will be bound to a Service Agreement for Follow-Up Services upon the earliest by any Subscriber of a) use of the prescribed UL Mark, b) acceptance of the factory inspection,

or c) payment of the Follow-Up Service fees. The Service Agreement incorporates such GSA, this Follow-Up Service Procedure and the Follow-Up Service Terms which can be accessed by clicking the following link: <https://www.ul.com/resources/contracts/follow-up-service-terms>. In all other events, Follow-Up Services will be governed by and incorporate the terms of your applicable service agreement and this Follow-Up Service Procedure.

Use and Ownership of the Follow-Up Service Procedure

This Follow-Up Service Procedure, and any subsequent revisions, is the property of UL and is not transferable. This Follow-Up Service Procedure contains confidential information for use only by the Applicant, the specified Manufacturer(s), and representatives of UL and is not to be used for any other purpose. It is provided to the Subscribers with the understanding that it is not to be copied, either wholly or in part unless specifically allowed, and that it will be returned to UL, upon request.

Definition of Terms

Capitalized terms used but not defined herein have the meanings set forth in the GSA and the applicable Service Terms or any other applicable UL service agreement.

No Third Party Liability

UL shall not incur any obligation or liability for any loss, expense or damages, including incidental, consequential or punitive damages arising out of or in connection with the use or reliance upon this Follow-Up Service Procedure to anyone other than the above Manufacturer(s) as provided in the agreement between UL LLC or an authorized licensee of UL LLC, including UL Contracting Party, and the Manufacturer(s).

Certification Body

UL LLC has signed below solely in its capacity as the certification body to indicate that this Follow-Up Service Procedure fulfills the requirements for certification documentation issued by the certification body. The certification body's accreditation status for the applicable certification scheme and identification of the accreditation body can be found at <https://www.ul.com/resources/accreditation>.

Bruce A. Mahrenholz
Director
Conformity Assessment Programs (CPO)
UL LLC

Addendum to Authorization Page

LOCATION

Manufacturing Factory(ies)
Information:

PRONOLOGY SERVICES INC
3RD FL 48 WU-KU INDUSTRIAL PARK
NEW TAIPEI, 248 TAIWAN
Party Site: 449547
Subscriber No: 109849001
Factory ID:
UL Contracting Party: AG TW

UL Appendix:**GENERIC INSPECTION INSTRUCTIONS**

Product Category	Product Category CCN
Programmable Controllers	NRAQ

These instructions consist of the following Parts:

Part	Description
AA	Instructions and Responsibilities for UL Representative
AB	Instructions for Follow-Up Tests at UL
AC	Responsibilities and Requirements for Manufacturer
AD	General Terminology
AE	General Product Construction Requirements
AF	UL Certification Marks

PART AA**INSTRUCTIONS AND DUTIES FOR UL REPRESENTATIVE**

AA1.0	UL REPRESENTATIVE'S DUTIES
AA1.1	<p>The UL Representative's duties include, but are not limited to:</p> <ul style="list-style-type: none"> A. Examining the construction of production intended to bear the UL Mark or Marking to determine compliance with the description of the product and any other requirements expressed in this Procedure. B. Where so specified in each Test Report, forwarding samples to UL for Follow-Up tests. C. Where so specified by Part AC, inspecting the test records and facilities of the manufacturer to ensure that: <ul style="list-style-type: none"> 1. The proper number of samples are undergoing the required tests, and 2. The required tests are being performed correctly, and 3. The proper information is being recorded and is up-to-date, and 4. The instruments being used for the tests have been calibrated at the prescribed interval and are in good working order.

AA2.0	PROCEDURE IN CASE OF NONCONFORMANCE
AA2.1	<p>Report to the manufacturer and UL LLC by means of a Variation Notice (VN) if:</p> <ul style="list-style-type: none"> A. Variations in construction are found, or B. The manufacturer's method and/or frequency of testing is not as described, or C. The test records maintained by the manufacturer are not as described, or D. The manufacturer's inspection program is not being performed as described, or E. Nonconforming test results are witnessed during tests conducted specifically for the UL Representative.
AA2.2	<p>Explain to the manufacturer that a VN is a means of communication with the manufacturer and applicant and forms a record of those items where nonconformance to the Procedure has been found.</p>
AA2.3	<p>When a product does not conform with the Procedure, require that the manufacturer:</p> <ul style="list-style-type: none"> A. Remove any markings referencing UL from the product, or obliterate these markings where the marking is imprinted, die-stamped, molded, etc., or B. Suitably modify all products that do not comply with the Procedure, or C. Hold shipment pending further instructions from UL LLC D. Demonstrate that one of the conditions shown below exist and be able to provide any of the referenced information or documentation. Under the following conditions, variations from Procedure described constructions shall be noted on a Variation Notice, however, the manufacturer is not required to remove UL markings, rework the product or hold shipment. <ul style="list-style-type: none"> 1. A part is called out as Listed and the manufacturer or part number is not as described and the alternate part being used is Listed and all other attributes for the part are met. 2. A part is called out as a Recognized Component (R/C) and the manufacturer or part number is not as described and the alternate part being used is Recognized under the described category and all other attributes for the part are met.

	<p>3. Internal wiring is identified by UL Style Number and the manufacturer is using (R/C) Appliance Wiring Material (AWM) with Style Numbers not referenced in the Procedure description. The manufacturer must be able to provide documentation that the voltage and temperature ratings of the alternate Style Number are equal to or greater than the ratings of the Style Numbers specified in the Procedure. AWM with Style Numbers not specified in the Procedure must be rated VW-1.</p>
AA2.4	It is the manufacturer's responsibility to forward a copy of the Variation Notice to the Applicant.
AA2.5	<p>If the manufacturer or Applicant question the rejection of the product, the material may be held at the point of inspection, typically at the factory, pending an appeal. The manufacturer has the right to appeal a decision with which they disagree. Provide the name of the UL engineer to whom the appeal is to be made. To resolve issues involving variations in construction, the manufacturer and Applicant may also be offered the option of contacting their New Work assignment engineer. Held shipment appeals involving Follow-Up Services issues (e.g. -improper labeling, etc.) should be directed to an appropriate staff member designated by the Reviewing Office for the product category. Should UL grant temporary authorization for the continued use of the UL Mark, such temporary authorization shall only be for the time needed to review and/or process the Procedure revisions, or as otherwise specified to cover a particular lot or production run. The manufacturer shall satisfy the UL Representative that all marks referencing UL are removed from the rejected material. Those marks referencing UL not destroyed during their removal from the product shall be turned over to the UL Representative for destruction.</p>

AA3.0	EXAMINATIONS TO BE WITNESSED BY UL REPRESENTATIVE
AA3.1	Inspection of Printed Wiring Boards and Printed Wiring Board Assemblies
AA3.1.1	The UL Representative shall determine that the printed wiring board is as specified in the Procedure.
AA3.1.2	If the soldering operation is performed at the Original Equipment Manufacturer's factory (OEM) and the soldering temperature and dwell time are given in the Procedure, the temperature and dwell time shall also be checked to determine that they do not exceed the limits specified.
AA3.1.3	<p>The UL Representative shall determine that the printed wiring board is as specified in the Procedure. The UL Representative then shall make a visual inspection of the printed wiring board assemblies for any mechanical damage or evidence of exposure to excessive temperatures that may have occurred during the soldering operation. The base material and the conductors shall be examined for nonconforming features as indicated below:</p> <p>A. Conductors, Terminal Pads, and Tabs</p> <ol style="list-style-type: none"> 1. Reduction in cross-section, such as scratches, nicks, pin holes, tearing. 2. Loosening or lifting of printed wiring conductor, pad, or tab from the base material. 3. Sections missing or damaged. 4. Blistering 5. Breaks <p>B. Base Material</p> <ol style="list-style-type: none"> 1. Warping 2. Cracking 3. Charring, blistering, or other heat damage due to solder process 4. Delamination

AA3.1.4	Samples shall be selected at random as shown in Table AA1 in accordance with the size of the incoming lot. The lot is to be rejected in accordance with the fifth column of the table.
AA3.1.5	With respect to printed wiring boards using Surface Mounted Technology (SMT), if the SMT assembly process is done at temperatures and times below the soldering limits, the UL Representative will accept the boards. If the assembly process is conducted on-site with temperatures/times in excess of soldering limits or if the process is conducted off-site and the temperatures/times cannot be verified, a visual inspection will be conducted by the UL Representative in accordance with the guidelines shown above. If any instructions for SMT components are specified in the Procedure, then these SMT instructions are superseded.

TABLE AA1
PRINTED WIRING BOARD SAMPLE SELECTION

Size of incoming lot# for each type##	Initial number of samples taken	Number of nonconforming samples requiring additional samples	Additional number of samples to retest lot	Cumulative number of nonconforming samples to reject lot
1 - 500	8	1	13	2
501 – 3200	13	1	20	2
3201 - 35000	20	1	32	2
Above 35000	32	1	50	2

Notes:

A lot is considered to comprise all printed wiring board assemblies of the same type at the manufacturer's factory at the time of the UL Representative's visit, which have not been previously checked by the UL Representative.

A type is considered a printed wiring board assembly meeting all the following:

1. Same vendor who mounts and solders the components.
2. Same board manufacturer and type or catalog number.
3. Same size
4. Same pattern
5. Same components

AA4.0	SAMPLE SELECTION FOR TESTS CONDUCTED AT MANUFACTURER AND UL
AA4.1	Standard Follow-Up Tests for Plastic Enclosures and Parts
AA4.1.1	Each Test Report indicates the plastics enclosures or parts that may require Follow-Up Service testing. The UL Representative shall consult Table AA2 to determine which tests are required.
AA4.1.2	With respect to Table AA2, Access to Molding Operation shall be determined in accordance with the following:
	A. UL is considered to have access to the plastic molding operation if the molding takes place in the end-product assembly location and the operation complies with the requirements below.
	B. The UL Representative shall have free, unannounced, and immediate access to the factory and the storage facility during all business hours of the factory or storage facility. The UL Representative shall also have access to the records required below.
	C. The manufacturer shall mark each enclosure, cartons containing enclosures, or a tag accompanying the enclosure in a manner such that the UL Representative can trace the origin of each enclosure to a specific batch.
	D. The manufacturer shall keep records for each batch of plastic enclosures molded, in accordance with the below requirements.
	E. The records shall be thorough, so that the UL Representative may determine the composition of the enclosure. The records shall be maintained for at least six months from the date of production, and shall be accurate. All of the following items are to be covered:
	1. The records shall indicate the base material. The manufacturer may not blend resins. <i>Exception: The manufacturer may blend resins provided it is specifically stated in the Procedure.</i>
	2. The records shall include the amount of regrind used. Thermoplastic regrind shall not exceed 25 percent by weight. UL does not authorize the use of thermoset regrind. <i>Exception: Thermoplastic regrind may exceed 25 percent provided it is specifically stated in the Procedure and does not exceed the percent stated in the Procedure.</i>
	3. The composition of the enclosures shall not include recycled plastics, color concentrates, flame retardants, or mold release lubricants. <i>Exception: One or more of the elements indicated in 3) may be included, provided the Procedure specifically acknowledges its use.</i>
AA4.1.3	Where testing is required, samples are to be selected no less than once per year in accordance with each Test Report. All samples are to be handled in accordance with the requirements of this section.
AA4.1.4	Enclosure samples shall be chosen in a manner such that each enclosure material in use by the manufacturer is represented by tests no less than once over a two-year period. Enclosure materials that are used infrequently (i.e. less than once in a two year period) shall be selected whenever they are used.

TABLE AA2
FOLLOW-UP TESTING FOR PLASTIC ENCLOSURES AND PARTS

Enclosure plastic	Molding location		
	Recognized Component molder or evaluated component molder other than Recognized ^a	Not evaluated molding	
		UL has access to molding operation ^b	UL does not have access to molding operation ^b
Recognized Component	No tests required	Annual Impact Test at Mfg. OR Annual ID Tests at UL ^{c, d}	Annual Impact and ID Tests at UL
Unlisted Component ^e	Annual Impact Test at Mfg. ^d AND Annual ID and Flame Tests at UL	Annual Impact Test at Mfg. ^d AND Annual ID and Flame Tests at UL	Bi-annual Impact and ID Tests at UL
<p>^a The reference to evaluated component molder other than Recognized is in regard to a molder of plastic fabricated parts which has been authorized by UL to mold plastic for the end-use product, but for which no Recognition has been established.</p> <p>^b Access to molding operation means the molding takes place in the end-product assembly location and the manufacturer follows the requirements in AA4.1.2.</p> <p>^c The manufacturer may elect either an Impact Test or ID Tests. The UL Representative shall act accordingly.</p> <p>^d If the manufacturer does not have the ability to perform the Impact Test in accordance with AA4.1.5, the required test samples are to be forwarded to UL for testing.</p> <p>^e The reference to Unlisted component plastic is in regard to a component plastic used in a Listed or Recognized product which is separately investigated in accordance with applicable requirements for the end-use product, and for which no coverage has been requested or established.</p>			

AA4.1.5	Impact Test at Manufacturer
AA4.1.5.1	Where indicated in Table AA2, the UL Representative shall conduct the Impact Test as part of the product inspection at the manufacturer's facility and shall determine if the manufacturer records the test data in compliance with the requirements of this document <i>Exception: As noted in Table AA2 footnote (d), the Impact Test shall be conducted at UL if the manufacturer does not have the ability to conduct the test.</i>
AA4.1.5.2	Each enclosure sample fabricated with the material specified in the Test Report shall be subjected to a single impact. The impact shall be directed onto the surface most likely to demonstrate a nonconformance when the Basis of Acceptability of AA4.1.5.3 is applied. The impact is to be produced by dropping a steel sphere 2 inches (50.8 mm) in diameter and weighing 1.18 pounds (0.536 kg mass) a height of 50.85 in. (129.2 cm). For surfaces other than the top of an enclosure the steel sphere is to be suspended by a cord and swung as a pendulum, dropping through the 50.85 in. (129.2 cm) vertical distance before striking the surface
AA4.1.5.3	Each sample shall withstand the impact of AA4.1.5.2 without being affected to the extent that: A. Uninsulated, live parts are accessible to contact, or B. The mechanical performance of the product is adversely affected so as to create a risk of injury to persons, or C. A condition is produced that can cause a risk of electric shock.
AA4.1.5.4	To determine compliance with AA4.1.5.3 (A), the UL Representative shall apply the articulate probe to verify that the probe cannot contact an uninsulated, live part. It is the manufacturer's

	responsibility to order and purchase the probe through UL's Corporate Standards Department, at the Northbrook Office.
AA4.1.5.5	To determine compliance with AA4.1.5.3 (B), the UL Representative shall give consideration to the functioning of safety devices and constructional features (such as thermostats, overload protective devices and strain relief). Cracking or denting of the enclosure shall not result in the exposure of moving parts that could cause a risk of injury to persons.
AA4.1.5.6	To determine compliance with AA4.1.5.3 (C), the product shall be subjected to a Dielectric Voltage-Withstand Test as described in AC2.3 without dielectric breakdown.
AA4.1.5.7	If the Impact Test sample produces any one of the conditions specified in AA4.1.5.3, the test is to be repeated on three previously untested samples from the same lot. The results are considered acceptable if all three samples comply with the requirements. If a nonconformance occurs on any one of the additional samples, then the lot shall be considered rejected.
AA4.1.6	ID and Flammability Tests
AA4.1.6.1	<p>Samples selected in accordance with Table AA2 shall be tagged with all the following information, and the manufacturer shall forward them to the Reviewing Office:</p> <ul style="list-style-type: none"> A. Material B. Manufacturer C. Model number D. Follow-Up Test(s) required E. Test parameters (if any)

PART AB**INSTRUCTIONS FOR FOLLOW-UP TESTS AT UL**

AB1.0	GENERAL
AB1.1	The samples forwarded by the UL Representative shall be subjected to the tests indicated on the sample tags in accordance with any indicated test specifics (e.g. oven temperature).
AB1.2	Unless otherwise notes, all references are to the Generic Inspection Instructions.

TABLE AB1
TEST PARAMETERS

Test	Method	Basis for Acceptability
Impact	AA4.1.5.2	AA4.1.5.3 – AA4.1.5.7
Identification		
Qualitative Infrared Analysis (IR)	UL 746A	Compare to original spectrum in Test Report
Differential Scanning Calorimetry (DSC)	UL 746A	Compare to original thermogram in Test Report
Thermogravimetry (TGA)	UL 746A	Compare to original thermogram in Test Report
Flammability		
3/4 Inch Flame	UL 746C	UL 746C
5 Inch Flame	UL 746C	UL 746C

PART AC**RESPONSIBILITIES AND REQUIREMENTS FOR MANUFACTURER**

AC1.0	MANUFACTURER'S RESPONSIBILITIES (INCLUDING BUT NOT LIMITED TO)
AC1.1	<u>Control of UL Mark</u> - Restrict the use of markings that reference UL (either directly or by use of the name, an abbreviation of it, or the UL symbol or Classification Mark, or indirectly by means of agreed-upon markings that are understood to indicate acceptance by UL) to those products that are found by the manufacturer's own inspection to comply with the Procedure description. Such restrictions apply to packaging, brochures or other means of advertising that reference UL. Use of such markings is further limited by the agreements that have been executed by the subscriber and UL. Markings shall be confined to the locations authorized in these Generic Inspection Instructions or in individual Test Reports.
AC1.2	<u>Access to Factory</u> - During hours in which the factory is in operation, provide the UL Representative with free access to any portion of the premises where the product or components thereof are being fabricated, processed, finished or stored, and to the test area assigned for the UL Representative's use. The UL Representative shall be permitted to inspect and subject to prescribed tests, prior to shipment, any product bearing or intended to bear markings referencing UL.
AC1.3	<u>Production-Line Tests</u> - Conduct the tests detailed in Part AC2.0.
AC1.4	<u>Required Records</u> - Maintain records of test performance. The records shall include the model or catalog designation of the product, the date of production, the tests performed, number of units tested, test results and action taken on rejections. Records for test performance shall be retained for six (6) months and shall be readily available for review by the UL Representative. <u>Exception</u> - Records of test results need not be maintained for 100% Production-Line Tests.
AC1.5	<u>Test Equipment and Personnel</u> - Provide, at a convenient location, all required test equipment and facilities and any required personnel for conducting all tests that are to be performed at the factory. These shall be available when needed so that the inspection work can proceed without undue delay.
AC1.6	<u>Test Equipment Calibration</u> - Determine that the test equipment is functioning properly daily, and have it calibrated at least annually, or whenever it has been subject to abuse (such as being dropped or struck with an object) or its accuracy is questionable. The test equipment and instruments shall be calibrated either by the manufacturer or by an outside laboratory. In either case, it shall be calibrated by comparison with a standard that is traceable to the applicable U.S. or foreign National Standard. A letter from the outside laboratory or from an off-site manufacturer's calibration lab stating that their lab standards are directly traceable to their country's National Standard and outlining their traceability pathway is considered adequate proof of traceability. For in-house calibrations, the Standard (weight and gauge blocks, etc.) used shall be calibrated every three years, or whenever the Standard has been subject to some form of abuse that may affect the Standard's fitness for use. The Standard shall be stored to protect it from damage or deterioration per the Standard manufacturer's recommendations. Records of the calibration of the test equipment and Standard(s) shall be maintained until the next required calibration is completed and recorded, and shall be readily available for review by the UL Representative.

AC2.0	REQUIREMENTS FOR PRODUCTION-LINE TESTS
AC2.1	The following Production-Line Tests shall be conducted on the products covered by this Procedure. During production, the test equipment shall be checked for proper operation at least once during each shift. When the tests are not performed concurrently, it is preferred that the Grounding Continuity Test be performed before either Dielectric Voltage-Withstand Test.
AC2.2	Production-Line Grounding Continuity Test
AC2.2.1	<p><u>General</u> - Except as may be noted under "Exceptions" in each Test Report, the manufacturer shall subject 100 percent of production of all of the following products to a routine Production-Line Grounding Continuity Test as described in section AC2.2.3:</p> <p>A. Products that are provided with a grounding type power supply cord, or B. Fixed products that are for permanent connection to the branch circuit.</p> <p>Exception: This test is not required for permanent connection to the branch circuit by fixed wiring if the design does not employ bonding jumpers or grounding wiring to remote units.</p>
AC2.2.2	<u>Test Equipment</u> - Any suitable continuity-indicating device (such as an ohmmeter, a battery and buzzer combination, or the like) may be used to determine compliance with the Grounding Continuity Test requirements.
AC2.2.3	<u>Method</u> - Continuity shall be determined between the grounding conductor of the attachment plug cap, and/or the designated main grounding point, and accessible dead-metal parts of the product, using the test equipment indicated above.
AC2.2.4	<u>Basis for Acceptability</u> - There shall be grounding continuity between the parts specified.
AC2.3	Production-Line Dielectric Voltage-Withstand Test
AC2.3.1	<u>General</u> - Except as may be noted under "Exceptions" in each Test Report, the manufacturer shall subject 100 percent of production of all products to a routine Production-Line Dielectric Voltage-Withstand Test as described in section AC2.3.3.
AC2.3.2	<p><u>Test Equipment</u> - The test equipment shall include a means of indicating the test potential, an audible or visual indicator of electrical breakdown, and either a manually operated reset device to restore the equipment after electrical breakdown or an automatic feature that rejects any unacceptable unit. If an ac test potential is applied, the test equipment shall also include a transformer having an essentially sinusoidal output.</p> <p>If the output of the test-equipment transformer is less than 500 volt-amperes, the equipment shall include a voltmeter in the output circuit to indicate the test potential directly.</p> <p>If the output of the test-equipment transformer is 500 volt-amperes or more, the test potential may be indicated (1) by a voltmeter in the primary circuit or in a tertiary-winding circuit, (2) by a selector switch marked to indicate the test potential, or (3), in the case of equipment having a single test-potential output, by a marking in a readily visible location to indicate the test potential. When marking is used without an indicating voltmeter, the equipment shall include a positive means, such as an indicator lamp, to indicate that the manually operated reset switch has been reset following a dielectric breakdown.</p> <p>Test equipment other than that described above may be used when it can be shown that UL has previously confirmed in writing that the equipment complies with the above requirements and is deemed suitable for use for this test.</p>
AC2.3.3	<p><u>Method</u> - Each product shall withstand without electrical breakdown, as a routine production-line test, the application of an ac potential at a frequency within the range of 40-70 Hz or DC potential between the primary wiring, including connected components, and accessible dead metal parts that are likely to become energized.</p> <p>The test potential shall be in accordance with Table AC1. The manufacturer's test conditions may be higher than those shown in Table AC1 when necessary to comply with other international</p>

	<p>product safety certifications. The test duration for the a.c. and d.c. tests shall be raised to its specified value within 5s and maintained for at least 2s. The test duration for impulse tests are a minimum of three pulses of each polarity at 1s minimum intervals.</p> <p>The product may be in a heated or unheated condition for the test.</p> <p>The test shall be conducted when the product is complete (fully assembled), and it is not intended that the product be unwired, modified, or disassembled for the test, unless otherwise permitted below:</p> <ul style="list-style-type: none">A. A part, such as a snap cover or a friction-fit knob, that would interfere with conducting the test need not be in place.B. The test may be conducted before final assembly if the test parameters represent that for the completed product. <p>During the test, the primary switch is to be in the on position, both sides of the primary circuit of the product are to be connected together and to one terminal of the test equipment, and the second test-equipment terminal is to be connected to accessible dead metal.</p> <p>Electromagnetic interference filter capacitors connected to the primary circuit shall not be disconnected during the test.</p>
AC2.3.4	<p><u>Basis for Acceptability</u> - All products shall withstand the applied potential without an indication of electrical breakdown.</p>

TABLE AC1
DIELECTRIC VOLTAGE-WITHSTAND TEST CONDITIONS

Table F.1 – Test voltages for ROUTINE TESTS of MAINS CIRCUITS

Nominal line- toneutral voltage of MAINS supply	OVERVOLTAGE CATEGORY II			OVERVOLTAGE CATEGORY III			OVERVOLTAGE CATEGORY IV		
	a.c. r.m.s. or d.c.	a.c.	d.c.	1,2/50 μ s Impulse	a.c.	d.c.	1,2/50 μ s Impulse	a.c.	d.c.
V	V r.m.s.	V	V peak	V r.m.s.	V	V peak	V r.m.s.	V	V peak
≤ 150	840	1 200	1 200	1 400	2 000	2 000	2 200	3 100	3 100
$>150 \leq 300$	1 400	2 000	2 000	2 200	3 100	3 100	3 300	4 700	4 700
$>300 \leq 600$	2 200	3 100	3 100	3 300	4 700	4 700	4 300	6 000	6 000
$>600 \leq 1\ 000$	3 300	4 700	4 700	4 300	6 000	6 000	5 300	7 500	7 500

PART AD**GENERAL TERMINOLOGY**

AD1.0	ABBREVIATIONS / DEFINITIONS	
AD1.1	IEC	Component provided with a testing agency's mark as indicated in Table II
AD1.2	PRI	Primary circuit (mains)
AD1.3	PWB	Printed wiring board
AD1.4	SEC	Secondary circuit
AD1.5	CN	Component provided with CSA or CUL Marking
AD1.6	LC	Supplied by source limited to the values specified Table 17 (see below)

Table 17 – Limits of maximum available current

Open-circuit output voltage (U or \hat{U})			Maximum available current
V			A
a.c. r.m.s.	d.c.	Peak ^a	a.c. r.m.s. or d.c.
$U \leq 2$	$U \leq 2$	$\hat{U} \leq 2,8$	50
$2 < U \leq 12,5$	$2 < U \leq 12,5$	$2,8 < \hat{U} \leq 17,6$	$100 / U$
$12,5 < U \leq 18,7$	$12,5 < U \leq 18,7$	$17,6 < \hat{U} \leq 26,4$	8
$18,7 < U \leq 30$	$18,7 < U \leq 60$	$26,4 < \hat{U} \leq 42,4$	$150 / U$

^a The peak value (\hat{U}) applies to non-sinusoidal a.c. and to d.c. with ripple exceeding 10 %, and is provided for convenience. The r.m.s. value of the maximum available current shall be determined as that value is related to heating.

PART AE**GENERAL PRODUCT CONSTRUCTION REQUIREMENTS**

AE1.0	CONSTRUCTION DETAILS
AE1.1	Unless otherwise described or supplemented in individual Test Reports, the following requirements apply to all equipment included in this Procedure. It is the manufacturer's responsibility to assure the compliance of production with these requirements.
AE1.1.1	<u>Accessories Parts and Accessories</u> - Such items packaged with the product shall be specifically described in a Test Report.
AE1.1.2	<u>Adapters</u> – Three or two wire grounding type adapters shall not be furnished with the product unless specifically authorized by a Test Report.
AE1.1.3	Not Applicable
AE1.1.4	<u>Bonding</u> - Except where specifically noted in a Test Report, bonding of internal dead-metal parts to the enclosure for grounding purposes shall be accomplished by a positive means such as clamping, riveting, bolting or screwed connection. The bonding connection shall reliably penetrate any nonconductive coatings such as paint or vitreous enamel.
AE1.1.5	<u>Casualty Considerations</u> - Except as described, or as necessary for normal operation of the equipment, there shall be no sharp edges, burrs, points, or spikes inside or outside the device that may cause injury during use or during cleaning operations.
AE1.1.6	<u>Connectors</u> - Connectors shall be applied so as to ensure that all bare strands are contained and insulated.
AE1.1.7	<p><u>Grounding</u> - The following guidelines shall be observed:</p> <p>A. <u>Non-Detachable Cord Connected Appliance</u> - The equipment-grounding conductor of the flexible cord:</p> <ol style="list-style-type: none"> 1. Shall be connected to the grounding member of the attachment-plug cap. <p>Note: The grounding member of the attachment-plug shall be fixed in position with respect to the cap.</p> <ol style="list-style-type: none"> 2. Shall be conductively connected to all dead-metal parts of the product that are specified in the description as being connected to the grounding conductor. The grounding-conductor shall be connected by either (1) a screw or other reliable means which serves no other purpose and which is not liable to be removed during any servicing operation, or (2) a threaded grounding stud on which a closed ring connector secured to the ground conductor is the first conductor mounted and secured by a nut and split ring lockwasher. Solder alone shall not be used for securing this conductor. <p>Note: The screw or stud and nut shall: (1) be provided with a means to penetrate nonconductive coatings, such as paint or enamel; (2) be of a corrosion-resistant metal or shall be protected against corrosion; and (3) be marked on or adjacent with a grounding symbol or the IEC417 Grounding Symbol 5019 “⊕”. The installation instructions shall identify the meaning of the symbol.</p>

	<p>B. <u>Detachable Cord Connected Appliance</u> - Polarization shall be maintained through the load fitting of the cord (appliance coupler) and the mating connector (appliance inlet) on the product. The load fitting shall be a three wire ANSI configuration.</p> <p>Exception: The load fitting need not be an ANSI configuration provided it is wired as follows (the description applies when viewing the face of the connector on the product, with the center contact down):</p> <ol style="list-style-type: none"> 1. The right contact shall be connected to the grounded conductor (neutral) of the cord. 2. The center contact shall be connected to the grounding conductor of the cord. <p>C. <u>Permanently-Connected Products</u> - In a permanently connected product (1) all exposed metal parts, and (2) all dead-metal parts within the enclosure, which are specified in the description as being connected (see "Bonding") to the grounding conductor, shall be conductively connected to:</p> <ol style="list-style-type: none"> 1. The point of the enclosure at which the metal raceway of the power supply circuit will be connected, and 2. The equipment-grounding field-wiring terminal or lead. <p>The equipment-grounding terminal or grounding lead shall be connected to the frame or enclosure by a positive means, such as by a bolted or screwed connection. The grounding connection shall reliably penetrate nonconductive coatings, such as paint or vitreous enamel. The grounding point shall be so located that it is unlikely that the grounding means will be removed during normal servicing.</p> <p>A wire-binding screw intended for the connection of an equipment-grounding conductor shall be identified by the protective earth symbol. The head shall be either hexagonal shaped or slotted, or both. A pressure wire connector intended for connection of an equipment grounding conductor shall be identified by the protective earth symbol "⊕".</p> <p>The wire-binding screw or pressure wire connector shall be so located that it is unlikely to be removed during normal servicing of the unit.</p> <p>D. <u>Grounding Terminal</u>:- The grounding conductor shall be the first conductor terminated on a grounding terminal and secured by a separate nut. Other grounding conductors may be secured to this terminal if they are secured on top of the first nut by a second nut.</p>
AE1.1.8	<u>Indicators</u> - Indicator lights shall be clearly visible to the equipment operator.
AE1.1.9	<u>Internal Plastic Parts</u> - For each type of plastic material the manufacturer shall review the Recognized Component Directory and Supplement or UL Online Certification Directory (http://www.ul.com/database) in order to insure that the plastic material in question meets all the material characteristics specified (i.e. flammability rating, Relative Thermal Index (RTI), and color) at the thickness specified. Alternatively, a copy of the Plastic Manufacturer's Component Recognition Report or Recognition Card may be used as a traceability pathway only if these materials were issued after the latest publication of the Recognized Component Directory.
AE1.1.10	<u>Internal Wiring</u> - Conductors shall be routed away or protected from sharp edges and moving parts. Exception: LC that are reliably separated from PRI and SEC circuits need not be Recognized AWM.
AE1.1.11	<u>Lampholder Connections</u> - All screw shells of lampholders shall be connected to the same conductor of the supply circuit.
AE1.1.12	<p><u>Loose Strands</u> - Ends of stranded conductors shall have all strands contained to prevent contacting of, or reduction of spacing to, other live parts and dead metal. This can be accomplished by:</p> <ol style="list-style-type: none"> A. Tinning

	<p>B. Inserting properly into suitable wire connectors.</p> <p>C. Crimped connectors and/or eyelets with the crimp containing all strands</p> <p>D. Solder lugs.</p>
AE1.1.13	<u>Markings</u> - Required information shall be legibly marked on the product, in the manner and minimum height specified.
AE1.1.14	<u>Multiple Voltage</u> - Cord-connected multiple voltage products shall be provided with an attachment plug that is suitable for the voltage for which the product is set.
AE1.1.15	<p><u>Polarity</u> - An appliance intended for permanent connection to the source of supply and having an identified terminal or lead; and an appliance employing a power supply cord with a polarized attachment plug cap (excluding 250 volt, 2-pole and 250 volt, 3-pole, 3-phase), utilizing the components indicated, shall have the components wired as follows:</p> <p>A. <u>Lampholders and Receptacles</u> - The screw shell or identified terminal or lead of a lampholder and the identified terminal or lead of a receptacle, shall be connected to the identified grounded conductor or terminal within the product.</p> <p>B. <u>Switches (Single Pole)</u> - Unless otherwise specified in the Procedure, a manual single pole switch, and an automatic control with a marked "off" position, shall not be connected to the identified grounded conductor.</p>
AE1.1.16	<p><u>Power Supply Cords</u></p> <p>A. <u>Non-Detachable Power Supply Cord</u> – A non-detachable power supply cord as described in each Test Report <u>must</u> be provided and shipped with the unit in <u>all</u> cases. The power supply cord and any alternatives must be described in each Test Report. <u>Each conductor of a non-detachable power supply cord shall have only one color, except the conductor identified by a combination of green and yellow.</u></p> <p>B. <u>Detachable Power Supply Cord</u> – The detachable power supply cord as described in each Test Report may or may not be shipped with the unit. Follow the guidelines in Table AE1 to apply the alternatives under each of the situations described in the notes to Table AE1. Table AE1 also includes alternative detachable power supply cords that may be shipped with units intended for use outside the USA.</p>
AE1.1.17	<p><u>Printed Wiring Boards (PWBs)</u> - PWBs shall show no burning, bubbling or other visible evidence of damage to their conductors or substrate material as a result of the fabrication process.</p> <p>With respect to PWBs using Surface Mounted Technology (SMT), it is acceptable if the SMT assembly process is done at temperatures and times below the soldering limits. If the SMT assembly process is conducted on-site with temperatures/times in excess of soldering limits or if the process is conducted off-site and the temperatures/times cannot be verified, a visual inspection shall be conducted by the UL Representative.</p> <p>The PWBs shall be inspected by the manufacturer for mechanical damage or evidence of exposure to excessive temperatures that may have occurred during the soldering operation. If any nonconforming features (defined below) are found after visual inspection, the manufacturer shall reject the lot (as defined in Table AA1). Otherwise, the use of PWBs may continue without any interruption.</p> <p>The base material and the conductors shall be examined for nonconforming features as indicated below.</p> <p>A. Conductors, Terminal Pads, and Tabs</p> <ol style="list-style-type: none"> 1. Reduction in cross-section, such as scratches, nicks, pin holes, tearing. 2. Loosening or lifting of printed wiring conductor, pad, or tab from the base material.

	<ol style="list-style-type: none"> 3. Sections missing or damaged. 4. Blistering 5. Breaks <p>B. Base Material</p> <ol style="list-style-type: none"> 1. Warping 2. Cracking 3. Charring, blistering, or other heat damage due to solder process 4. Delamination
AE1.1.18	<p><u>Protection of Wiring</u> - All wire and wire insulation in the product shall be protected from damage. This is commonly achieved by securement, segregation, and routing to keep the wire away from parts or assemblies which can damage the wire or insulation. Internal wiring that might make contact with metal parts shall be protected from sharp metal edges. This can be accomplished by rounding or deburring the metal, using a Recognized Component bushing, or through other construction features described in the Test Report.</p> <p>If the wiring is located where it may be in proximity to combustible material, it shall be protected by the method(s) described in the individual Test Report.</p> <p>Conductors shall be examined for evidence of damage. Faulty practices which can cause damage to conductors and/or insulation include:</p> <ol style="list-style-type: none"> A. Improper application of crimped connectors, including but not limited to, use of crimping tool and dies not recommended by the manufacturer of the connector. B. Improper insulation removal. C. Overheating of conductor insulation because of routing or contact with hot surfaces during or after installation. D. Use of wire in which the insulation has been cut, cracked, crushed, abraded, etc. <p>Constructions which may cause damage to conductors and/or insulation include:</p> <ol style="list-style-type: none"> A. Moving parts such as rotating or reciprocating cams, shafts, and the like, as well as removable or sliding covers, hinged doors. B. Sharp edges and corners (including screw threads, burrs, points, stamped metal edges). C. Heat sources (including lamps, heating elements, etc.). D. Assemblies that clamp or squeeze wire insulation, unless described in the Test Report.

AE1.1.19	<p><u>Securement of Parts</u> - Screws or other fastenings used to mount or support small, fragile, insulating parts shall not be tight enough to cause cracking or breaking of these parts. Uninsulated live parts, components which support live parts, and dead metal parts, that are normally intended to remain stationary, shall be prevented from rotating or shifting if movement will result in twisting or stress of internal wiring or connections, or spacings being reduced below that specified in the Test Report. Similar parts that are normally intended to move or rotate shall be prevented from excessive movement if such movement will result in twisting or stress of internal wiring or connections, or spacings being reduced below that specified in the Test Report.</p> <p>A switch, lampholder, attachment plug receptacle, motor attachment plug cap, or other components subject to handling by the user shall be mounted securely and prevented from rotating.</p> <p>Exception: Based on engineering considerations certain constructions of securely mounted push button or plunger type switches, and lampholders of the type in which the lamp cannot be replaced (such as a neon pilot or indicator light in which the lamp is sealed in a non-removable jewel) may be excluded from the above. These constructions are described in the Procedure. However, in no case will nonconforming spacings be allowed.</p> <p>Some means commonly used to prevent rotation are:</p> <ul style="list-style-type: none"> A. Lock washer. B. Matched keying of the component and its mounting. C. Two or more fasteners (screws, rivets, pins, etc.). D. Strap, clip, or pin fitted into an adjacent part. E. Physical barrier (molded boss, side of enclosure, adjacent component, etc.) that bears against the component.
AE1.1.20	<p><u>Solder Connections</u> - All solder connections shall be made mechanically secure before soldering. Some typical examples of mechanical securement are:</p> <ul style="list-style-type: none"> A. Twisting wire around a solder post that has a change in dimension or restriction so unsoldered wire will not slip off post. B. Inserting wire through an opening, and bending over the free end.
AE1.1.21	<p><u>Strain Relief</u> - Strain Relief methods such as tying the supply cord into a knot or tying the ends of the cord with string shall not be used.</p>
AE1.1.22	<p><u>Usage Markings</u> - There shall be no marking in the instruction manual, or on the carton or package that is, or could be construed to be, in conflict with or an extension of the use covered in the Test Report.</p>
AE1.1.23	<p><u>Documentation</u> - Handling of hazardous substances and correct disposal procedure, field-installed devices, explanation of warning symbols.</p>
	<ul style="list-style-type: none"> A. Documentation such as an instruction manual shall be provided with these products. No attachments or accessories are mentioned in the instruction manual unless specifically mentioned in a particular section.
	<ul style="list-style-type: none"> B. For products where attachments are specifically mentioned in a particular section, which are packaged and sold separately, the instruction manual packaged with the basic appliance identifies each separately available attachment by attachment name and model number. In addition, the manual packaged with the attachment indicates by name and model number the basic appliance with which it is to be used.

	C. Documentation shall also include the complete electrical rating of the device as described in the electrical rating section of the Procedure; a description of all input/output connections; assembly, location and mounting requirements; supply connection and earthing requirements, ventilation requirements; identification of operating controls, instructions for cleaning, replacement of consumable materials, interconnecting accessories, indication of suitable accessories, instructions for use, technical specifications, name and address of manufacturer or supplier and as statement of range of environmental conditions as noted below.
	- Indoor use or outdoor use;
	- Altitude up to 2000 m or above 2000 m if specified by the manufacturer
	- Temperature 0 to 40°C, or outside this range if specified by the manufacturer.
	- Maximum relative humidity 80 percent for temperatures up to 31°C decreasing linearly to 50 percent relative humidity at 40°C;
	- Mains supply voltage fluctuations not to exceed ± 10 percent of the nominal voltage;
	- Temporary Overvoltages as stated by the manufacturer;
	- Transient overvoltages according to INSTALLATION CATEGORIES (OVERVOLTAGE CATEGORIES) I, II, III and IV. For mains supply the minimum and normal category is II;
	- POLLUTION DEGREE 1 2, 3 or 4.

TABLE AE1
DETACHABLE POWER SUPPLY CORD REQUIREMENTS

Detachable Power Supply Cord	
Provided	Not Provided
A or B	(C and D) or (C and E)
A. The power supply cord should be as described in the Test Report.	
B. The detachable power supply cord is either: <ol style="list-style-type: none"> 1. Certified by one of the agencies listed in Table AE3; or 2. Comprised of cordage marked with an agency marking per Table AE3 or marked per Table AE4. The fittings are to be marked with at least one of the agencies listed in Table AE3. Units provided with detachable power supply cords, which are certified by one of the agencies listed in Table AE3 or AE4, shall be considered to be intended for use outside of the USA.	
C. A marking must be provided adjacent to the appliance coupler or at an equivalent location either to inform the user on proper selection of the power supply cord or to see the instruction manual for this information. This marking may be in the form of a tag, nonpermanent label, or product insert that is provided on or packaged with the product so that the marking is visible at the time of installation.	
D. The marking (tag, label, or product insert) or instruction manual must contain complete instructions concerning selection of the power supply cord. It shall include either Option 1, 2, or 3 as follows: <ol style="list-style-type: none"> 1. Reference to a power supply cord must be as a UL Listed detachable power supply cord consisting of the specific configuration of appliance coupler, the cord type, and the electrical rating of the power supply cord as described in each Test Report. Refer to Table AE2 for equivalent cord types. 2. Reference to a power supply cord may be made to a Listed field installed accessory kit containing a suitable Listed power supply cord. Authorization for use of a Listed field installed accessory kit must be included in the individual Test Reports. 3. Reference to a power supply cord may be made to a cord that is not Listed and not intended for use in the United States or Canada. In this case, the manufacturer is to supply the UL Representative with information to verify that the referenced cord is certified or similarly appropriate for use in the destination country. 	
E. The reference to the power supply cord (see Note C) shall include instruction for selection of the proper power supply cord as described in Note B above.	

TABLE AE2
EQUIVALENT CORDS

Basis Cord Type	Equivalent Types
SP-2	SPE-2, SPT-2
SP-3	SPE-3, SPT-3
SV	SVE, SVO, SVOO, SVT, SVTO, SVTOO
SJ	SJE, SJO, SJOO, SJT, SJTO, SJTOO
S	SE, SO, SOO, ST, STO, STOO

TABLE AE3
CERTIFICATION MARKINGS





















Country	Cert. Agency	Mark	Country	Cert. Agency	Mark
Argentina	IRAM		Ireland	NSAI	
Australia	SAA		Italy	IMQ	
Austria	OVE		Japan	JET, JQA	
Belgium	CEBEC		Netherlands	KEMA	
Canada	CSA		Norway	NEMKO	
China	CCC		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA	
Germany	VDE			BSI	




TABLE AE4
HAR FLEXIBLE CORDS
APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

Approval Organization	Printed or Embossed Harmonization Marking (May be Located On Jacket or Insulation of Internal Wiring)		Alternative Marking Utilizing Black-Red Yellow Thread (Length of color Section, mm)		
Comite Electrotechnique Belge (CEBEC)	CEBEC	<HAR>	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prufstelle	<VDE>	<HAR>	30	10	10
Union technique de l'Electricite (UTE)	UTE	<HAR>	30	10	30
Instituto Italiano del Marchio di Qualita (IMQ)	IEMMEQU	<HAR>	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	<HAR>	10	10	30
N.V. KEMA	KEMA-KEUR	<HAR>	10	30	30
SEMKO AB Svenska Elektriska materielkontrollanstalter	SEMKO	<HAR>	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	<ÖVE>	<HAR>	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	<DEMKO>	<HAR>	30	10	30
National Standards Authority of Ireland (NSAI)	<NSAI>	<HAR>	30	30	50
Norges Elektriske Materielkontroll (NEMKO)	NEMKO	<HAR>	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	<UNED>	<HAR>	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	<HAR>	30	30	70
Instituto Portages da Qualidade (IPQ)	np	<HAR>	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	<HAR>	10	30	90
Elektriska Inspektoratet	SETI	<HAR>	10	30	90

PART AF
UL CERTIFICATION MARK

<i>Product Category:</i>	Programmable Controllers
<i>Product Category CCN:</i>	NRAQ / NRAQ7
<i>Product Identity:</i>	One of the following product identities appears on the product: Ind. Cont. Eq., Industrial Control Equipment, Prog. Cntrl., or Programmable Controller

UL Listing Mark

AF1.1	The Test Report covering each product must be consulted to determine which Listing Marks are authorized for use in conjunction with that product.
AF1.1.1	The following Listing Mark is authorized for use on products that are Listed only to the requirements for Canada: 
AF1.1.1	The following Listing Mark is authorized for use on products which are Listed only to the requirements for the United States: 
AF1.1.2	Either of the following Listing Marks is authorized for use on products that are Listed to the requirements of both the United States and Canada: 
AF1.2	The Listing Mark consists of several elements that are placed in close proximity to each other and shall appear on Listed products only.
AF1.2.1	Element 1 - UL Symbol. There is no required minimum height for the UL Symbol, as long as it is legible. The minimum height of the registered trademark symbol ® shall be 3/64 of an inch. When the overall diameter of the UL Symbol is less than 3/8 of an inch, the trademark symbol may be omitted if it is not legible to the naked eye. Information on downloading electronic versions or receiving camera-ready artwork of the UL Symbols may be obtained at www.ul.com .
AF1.2.2	Element 2 - The word "LISTED"
AF1.2.3	Element 3 - A product identity
AF1.2.3.1	<product identity details are provided above this table>
AF1.2.3.2	The product identity may be omitted if the Listing Mark is directly and permanently applied to the product by stamping, molding, ink-stamping, silk screening or similar process. The product identity may appear elsewhere on the product if the other three elements are part of the nameplate that includes the rating or the catalog or model designation.
AF1.2.4	Element 4 - A number represented above by XXXX is to be replaced with the Applicant's or Listee's file number or a control number.
AF1.3	A separable Listing Mark (not part of a nameplate and in the form of decals, stickers or labels) must include all elements.
AF1.4	The manufacturer may reproduce the Listing Mark or obtain it from a UL authorized supplier.

Description

UL TEST REPORT AND PROCEDURE

Standard:	UL 61010-1, 3rd Edition, May 11, 2012, Revised April 29, 2016 CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 2016
Certification Type:	Listing
CCN:	NRAQ / NRAQ7
Complementary CCNs:	
Product:	Open type, Industrial Ethernet Switch
Model:	IGS-150B
Rating:	Power input: redundant 12-48 Vdc, 0.29-0.09 A
Applicant Name and Address:	ORING INDUSTRIAL NETWORKING CORP 3F 542-2 ZHONGZHENG RD XINDIAN DISTRICT NEW TAIPEI CITY, 231, TAIWAN

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

The applicant is authorized to reproduce the referenced Test Report provided it is reproduced in its entirety.

UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability as applicable.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Prepared by: Hans Tu, Project handler Reviewed by: Michael Tseng, Project reviewer

Supporting Documentation

The following documents located at the beginning of this Procedure supplement the requirements of this Test Report:

A. Authorization - The Authorization page may include additional Factory Identification Code markings.

B. Generic Inspection Instructions -

- i. **Part AC** details important information which may be applicable to products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of this Test Report.
- ii. **Part AE** details any requirements which may be applicable to all products covered by this Procedure. Products described in this Test Report must comply with any applicable items listed unless otherwise stated in the body of each Test Report.
- iii. **Part AF** details the requirements for the UL Certification Mark which is not controlled by the technical standard used to investigate these products. Products are permitted to bear only the Certification Mark(s) corresponding to the countries for which it is certified, as indicated in each Test Report.

Product Description

IGS-150B is an open type Unmanaged Ethernet Switch, with 5 RJ-45 ports.

Refer to the Report Modifications page for any modifications made to this report.

Model Differences

N/A

Additional Information

None

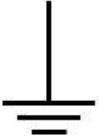

Technical Considerations

- The product was investigated to the following additional standards: UL 61010-2-201 (First Edition) dated 2017-02-20
CAN/CSA C22.2 No. 61010-2-201 dated 2014-02
- The following additional investigations were conducted: None
- The product was not investigated to the following standards or clauses: None
- The following accessories were investigated for use with the product: None
- No Other Considerations

Engineering Conditions of Acceptability

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- None

Markings and instructions	
Clause Title	Marking or Instruction Details
Company	Listee's or Recognized company's name, Trade name, Trademark or File
Manufacturers identification	Factory identification
Model identification	Model number
Functional earth terminal	
Reference to the Manual, Caution Symbol 14	 Marked on Label.

Special Instructions to UL Representative
None

Production-Line Testing Requirements			
Required	Test	Model/Part Exempt from Test	Additional Details
No	Grounding Continuity	All exempted	NA
No	Dielectric Strength	All exempted	NA
Solid-State Components			
The following solid-state components that can be disconnect from the remainder of the circuitry during either Dielectric Voltage Withstand Test:		Parts to be disconnected for test:	Specific Test:
		NA	NA

Sample and Test Specifics for Follow-Up Tests at UL			
The following tests shall be conducted in accordance with the Generic Inspection Instructions			
Plastic Enclosure or Part	Test	Sample(s)	Test Specifics
None	NA	NA	NA

TABLE: List of Critical Components

TABLE: List of critical components					
Component/ Part No.	Manufacturer/ Trademark	Type No./model No./	Technical data	Standard No. ¹	Required Mark(s) & Certificates of Conformity
Chassis	Interchangeable	Interchangeable	SECC. See Diagram Enclosure for dimension details.	-	-
Label	KOAN HAO TECHNOLOGY LTD	TKSMB75	Suitable for use on metal surface (SECC) and rated 100 °C. Used with suitable ink type if applicable.	UL 969, CSA-C22.2 No. 0.15	UL R/C (PGGU2), MH18636
(alternate)	Interchangeable	Interchangeable	Suitable for use on metal surface (SECC) and rated 100 °C. Used with suitable ink type if applicable.	UL 969, CSA-C22.2 No. 0.15	UL R/C (PGDQ2/8) or (PGJI2/8)
Printing Ink	Teikoku Printing Inks Mfg. Co., Ltd	611C	Suitable for use on metal surface (SECC) and rated 100 °C.	UL 969, CSA-C22.2 No. 0.15	-
(alternate)	Interchangeable	Interchangeable	Suitable for use on metal surface (SECC) and rated 100 °C.	UL 969, CSA-C22.2 No. 0.15	-
Socket, Terminal Block	DINKLE ENTERPRISE CO LTD	2EHDR-04P	Socket rated 300V, 15A, 105°C. Plastic part, rated V-2.	UL 1059, CSA-C22.2 No. 158	UL R/C (XCFR2/8), E102914
(alternate)	Interchangeable	Interchangeable	Any Socket rated min 300V, 15A, 105°C. Plastic part, rated V-2	UL 1059, CSA-C22.2 No. 158	UL R/C (XCFR2/8)
Plug, Terminal Block	DINKLE ENTERPRISE CO LTD	2ESDSR	Plug rated 300V, 10A, 105°C, FW=2, AWG=12-24. Plastic part, rated V-2. UG = B or D. Torque value 4.5 lb-in.	UL 1059, CSA-C22.2 No. 158	UL R/C (XCFR2/8), E102914
(alternate)	Interchangeable	Interchangeable	Any Plug rated min 300V, 10A, 105°C, FW=2, AWG=12-24 UG: B or D, Tq 4.5 lb-in. Plastic part, rated V-2. Same manufacturer as Terminal Block socket.	UL 1059, CSA-C22.2 No. 158	UL R/C (XCFR2/8)
RJ45 type Ethernet connector, external	Interchangeable	Interchangeable	Plastic part, rated V-2, 100°C or better.	UL 94, UL746B	UL R/C (QMFZ2)
Printed Wiring Boards	Interchangeable	Interchangeable	Rated 130°C, V-1 or better.	UL 796	UL R/C (ZPMV2/8)
Fuse F1	LITTELFUSE INC	0451002. MRL	Rated 125 Vdc 8A.	UL 248-14, CSA-C22.2 No. 248-14-00	UL R/C (JDYX2/8) E10480
Bridge Diodes D3, D7	Interchangeable	Interchangeable	Rated 800 V, 2A or better.	-	-
Choke (L8, L9)	Interchangeable	Interchangeable	Rated 125°C min.	-	-

Choke (L1, L2) on side board	Interchangeable	Interchangeable	Rated 125°C min.	-	-
Capacitor (C137) on main board	Interchangeable	Interchangeable	Rated 63V, 100uF, min. 105 °C.	-	-
Capacitor (C7) on side board	Interchangeable	Interchangeable	Rated 63V, 100uF, min. 105 °C.	-	-
Thermal Pad (near U2)	Interchangeable	Interchangeable	Thermal Conductivity : 3 W/mK, See Diagram Enclosure for dimension details.	--	--

Supplementary information:

The Test Laboratory has verified the component information.

- 1) Anything specified within brackets "()" is for reference purposes only and can be used to specify the UL Product Category CCN(s)/File Number if the component includes an UL Certification. This can be useful for the UL Follow-Up Service Inspection associated with the UL Mark; however if in brackets, should not be a required element of the UL Inspection.

----- END OF APPENDIX C -----

TEST RESULTS:

APPENDIX D: Test Datasheets Enclosures

The following tests have been performed as part of this report:

Standard	Clause No.	Test Name	Testing Location / Comments
IEC 61010-1:2010	4.4.1	Component Abnormal	Wendell Electrical Testing Lab
IEC 61010-1:2010	4.4.2.10	Cooling Abnormal Test	Wendell Electrical Testing Lab
IEC 61010-1:2010	5.1.3	Mains Supply	Wendell Electrical Testing Lab
IEC 61010-1:2010	10.1-10.4	Temperature Test	Wendell Electrical Testing Lab

NOTE: If testing location is blank then the test was performed at the Testing Laboratory as specified at the beginning of this report.

The following datasheet enclosures are provided in this section of the report. If blank, no separate enclosures are attached.

Enclosures

<u>Supplement ID</u>	<u>Description</u>
Datasheets - (001)	Datasheet
Datasheets - (002)	Datasheet_(A1)

Datasheets - (001) Datasheet

Datasheets - (001) Datasheet

Project No. 4789176545
LABORATORY DATA PACKAGE

File E331061

Page 1

Number of pages in this package _____ [including additional pages _____]
(Fill in when using printed copy as record)

CLIENT INFORMATION	
Company Name	Oring Industrial Networking Corp
Address	3f 542-2 Zhongzheng Rd Xindian District New Taipei City, 231 Taiwan

AUDIT INFORMATION:			
Description of Tests	Per Standard No.	Edition	Revision Date
<input checked="" type="checkbox"/>	CSA C22.2 NO. 61010-1-12 (UL 61010-1:2010)	3 rd Edition (3 rd Edition)	2016-04-29 (2016-04-29)
<input type="checkbox"/>	UL 61010-1:2010 Amendment 1:2018 (MOD) to CAN/CSA No. 61010-1-12	3 rd Edition 3.1 Edition	2018-11-21 2018-11-21
<input checked="" type="checkbox"/>	UL 61010-2-201 CSA C22.2 NO. 61010-2-201:14	1 st edition 1 st edition	2017-02-20 2014-02
<input type="checkbox"/>	UL 61010-2-201 CSA C22.2 NO. 61010-2-201:18	2 nd edition 2 nd edition	2018-05-14 2018-02
<input type="checkbox"/>	UL 61010-2-030 CSA C22.2 NO. 61010-030-12	1 st edition 1 st edition	2016-09-16 2016-09-16
<input type="checkbox"/>	UL 61010-2-030 CSA C22.2 NO. 61010-2-030:18	2 nd Edition 2 nd Edition	2018-12-21 2018-12-21
<input type="checkbox"/>	IEC 61010-1:2010	3rd edition	2013-10
<input type="checkbox"/>	IEC61010-1:2010/AM1:2016	3.1 edition	2017-01
<input type="checkbox"/>	IEC 61010-2-201:2017	2 nd edition	2017-03
<input type="checkbox"/>	IEC 61010-2-201:2013	1 st edition	2013-02
<input type="checkbox"/>	IEC61010-2-030: 2010	1 st edition	2011-05
<input type="checkbox"/>	IEC61010-2-030: 2017	2 nd Edition	2017-01

Tests Conducted by¹

UL Staff conducting
or witnessing testing
(WTDP, CTF Stage 1 or 2 only)

UL Staff
supervising UL Staff in
training

Hans Tu / Michael Tseng

Authorized Signatory
(CTDP, TPTDP, TCP, PPP, CTF
Stage 3 or 4)

ULS-61010-NRAQ-DataSheet-2001
Form Page 1

Form Issued: 2017-04-18
Form Revised: 2019-07-16

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Only those products bearing the UL Mark should be considered as being covered by UL.

Datasheets - (001) DatasheetProject No. 4789176545
LABORATORY DATA PACKAGE

File E331061

Page 2

Printed Name	Signature. Include date for CTDP, TPTDP, TCP, PPP, CTF Stage 3 or 4
--------------	---

TESTS TO BE CONDUCTED:			
Test No.	Done ³	Test Name	<input checked="" type="checkbox"/> Comments/Parameters <input type="checkbox"/> Tests Conducted by ² <input type="checkbox"/> Link to separate data files ⁴
1	X	COMPONENT ABNORMAL (4.4.1):	Passed
2	X	COOLING ABNORMAL TEST (4.4.2.10)	Passed
3	X	MAINS SUPPLY (5.1.3):	Passed
4	X	TEMPERATURE TEST (10.1-10.4) (61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103)	Passed

Instructions -

- 1 - When all tests are conducted by one person, name can be inserted here instead of including name on each page containing data.
- 2 - When test conducted by more than one person, name of person conducting the test can be inserted next to the test name instead of including name on each page containing data. Test dates may be recorded here instead of entering test dates on the individual datasheet pages.
- 3 - Use of this field is optional and may be employed differently. If used to include a date instead of entering the testing date on the individual datasheet pages, the date shall be the date the test was conducted.
- 4 - Link to separate data files for a test can be inserted here. The link must be to a server that is accessible to UL staff, that provides for backup, required retention periods and a path, including file name, that does not change and result in a broken link. Not applicable to DAP.

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LABORATORY DATA PACKAGE

File E331061

Page 3

Special Instructions -

[] Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature, °C	Relative Humidity, %	Barometric Pressur
	±		mBar
60065	25 ± 10	Max 75	Not specified
60601-1	+10 to +40	30 to 75	700 to 1060 hPA
60950	Not specified	Not specified	Not specified
60950-1	Not specified	Not specified	Not specified
61010-1	+15 to +35	Max 75	75 to 106 kPa
61215	Not specified	Not specified	Not specified
61646	Not specified	Not specified	Not specified
61730	Not specified	Not specified	Not specified

[] No general environmental conditions are specified in the Standard(s) or have been identified that could affect the test results or measurements.

RISK ANALYSIS RELATED TO TESTING PERFORMANCE:

The following types of risks have been identified. Take necessary precautions. This list is not all inclusive.

<input type="checkbox"/> Electric shock	<input type="checkbox"/> Radiation
<input type="checkbox"/> Energy related hazards	<input type="checkbox"/> Chemical hazards
<input checked="" type="checkbox"/> Fire	<input type="checkbox"/> Noise
<input checked="" type="checkbox"/> Heat related hazards	<input type="checkbox"/> Vibration
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Other (Specify) __

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WITNESS TEST DATA PROGRAM (WTDP) INFORMATION:

Environment:	
Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025:2005 Clauses 5.3.1, 5.3.2, 5.3.3, 5.3.4)	<input checked="" type="checkbox"/> Yes [] No [] N/A
Personnel:	
Lab Management shall authorize personnel to operate particular types of equipment used in testing. (ISO/IEC 17025:2005 Clause 5.5.3)	<input checked="" type="checkbox"/> Yes [] No
Equipment:	
Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025:2005 Clauses 5.5.1, 5.5.2, 5.5.4, 5.5.5, 5.5.8)	<input checked="" type="checkbox"/> Yes [] No
Calibrations for testing equipment is traceable to SI Units. Refer to 00-OP-C0032 (Calibration Certificate Analysis). (ISO/IEC 17025:2005 Clause 5.6.2.2)	<input checked="" type="checkbox"/> Yes [] No
Critical Consumables:	
Critical consumables are compliant with test standard requirements. (ISO/IEC 17025:2005 Clause 4.6)	<input checked="" type="checkbox"/> Yes [] No [] N/A
Sample Identification:	
Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025:2005 Clause 5.8.2)	<input checked="" type="checkbox"/> Yes [] No
Additional Requirements:	

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<p>Testing at a third party laboratory selected by UL and not part of the Third Party Test Data Program requires a Mutual Nondisclosure (NDA) and Confidentiality Agreement, 00-LE-F0025, or alternate agreement form approved by UL's Legal Department to be stored and included with the Test Package.</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A</p>
<p>Summary: The test facility [was] [was not] deemed to have the environment and capabilities necessary to perform the tests included in this data package.</p>	

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[] The CAS Staff as indicated below, (a competent L1, L2 or L3 in a similar CCN/Standard for a similar test method) was utilized to conduct the witnessing of tests on behalf of the project handler. (Please complete the table below to document the rationale and approval.)

Name of UL Staff conducting WTDP	CCN/Standard to be witnessed	Test(s) to be witnessed	L1, L2 or L3 Competency	Similar CCN/Standard Competency

[] The Field Services Staff Member, as indicated below, (with a competent program competency as authorized by the FOM) was informed and utilized to conduct the witnessing of tests on behalf of the project handler. (Please complete the table below to document the information and approval.)

Name of UL Staff conducting WTDP	CCN/Standard to be witnessed	Test(s) to be witnessed	FOM Approver (name)

Datasheets - (001) Datasheet

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TEST LOCATION: (To be completed by Staff Conducting the Testing)					
<input type="checkbox"/> UL or Affiliate	<input checked="" type="checkbox"/> WTDP	<input type="checkbox"/> CTDP	<input type="checkbox"/> TPTDP	<input type="checkbox"/> TCP	<input type="checkbox"/> PPP
	<input type="checkbox"/> CTF	<input type="checkbox"/> CTF	<input type="checkbox"/> CTF	<input type="checkbox"/> CTF	
	Stage 1	Stage 2	Stage 3	Stage 4	
Company Name: Wendell Electrical Testing Lab					
Address: 5F., No. 4, Ln. 7, Baogao Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)					

TEST EQUIPMENT INFORMATION

~~UL test equipment information is recorded on Meter Use.~~

According to DAP's Programs Procedure (00-OP-S0854), Clause 12.9.9, If the client is a participant under one of the following programs (CTDP, TPTDP, PPP, or TCP) the collection of calibration certificates is not required.

Wendell Electrical Testing Lab is a participant of UL60950 TPTDP program. All Calibration information is recorded on the TPTDP audit report.

~~UL test equipment information is recorded on <<insert location and local laboratory equipment system identification.>>~~

Inst. ID No.	Instrument Type	Test Number +, Test Title or Conditioning	Function /Range	Last Cal. Date	Next Cal. Date
See next page for details.					

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+ - If Test Number is used, the Test Number must be identified on the data sheet pages or on the Data Sheet Package cover page.

The following additional information is required when using client's or rented equipment, or when a UL ID Number for an instrument number is not used. The Inst. ID No. below corresponds to the Inst. ID No. above.

Inst. ID No.	Make/Model/Serial Number/Asset No.
See below for details.	

See Table below



穩得電性測試實驗室

儀器編號 / Reg.	儀器名稱 / Equipment Name	型號 / Model No.	序號 / Series	規格 / Used Range	廠牌 / Brand Name	校驗日期 / Cal. Date	下次日期 / Next Date	校驗年距 / Cycle Cal.	校驗實驗室
CT-5-001	CALIPER 數字顯示游標卡尺	CD-6*CSX	11625431	0-150 mm	Mitutoyo	2019/7/31	2020/7/30	1年	宇正
CT-5-004.2	TEMPERATURE RECORDER 溫度記錄器	MX100	91PC36171	0-320 degree C	Yokogawa	2019/4/24	2020/4/23	1年	UL
CT-5-071	WEIGHT-SCALE 電子秤	LT150	1410275	0.5-150kg	IT	2018/11/29	2019/11/28	1年	UL
CT-5-072	CLOCK 時鐘	Quartz	-	fullrange	FRANCO	2019/8/8	2020/8/7	1年	UL
CT-5-076	HUMIDITY & TEMPERATURE CHAMBER 可程式恆溫試驗機	MHW406A	1031101	-40-100 degree C 0-95 RH%	TERCHY	2019/2/14	2020/2/13	1年	UL
CT-5-104-1	DC POWER SOURCE 直流電源供應器	PSW250-13.5	GER160682	DCV1-250V DCC0.3-13.5A	GW	2019/1/29	2020/1/28	1年	UL
CT-5-132	MEASURING TAPE 捲尺	D190	-	0-5M	-	2019/1/22	2022/1/21	3年	MTC
CT-8-001	Wrapping Tissue 包裝紙	ATP-01	-	12g/m ² - 30g/m ²	ED&O	2016/10/2	2023/10/1	Check before used	-
CT-8-002	Cheesecloth 紗布	ACC-01	-	36-44g/m ²	ED&O	2016/10/2	2023/10/1	Check before used	-

顧客名稱：穩得實業(股)公司 Customer	儀器名稱：螺絲扭力起子 Equipment
校正程序：OMPT-221 Calibration Procedure	廠牌/型號：TOHNICHI / 40FTD2-S Manufacturer / Model No.
校正日期：2018/12/27 Calibration Date	儀器序號：CT-5-011 / 412722C Serial No.

顧客地址：新北市新店區寶高路7巷4號5樓
 Address
 校正環境(Condition of Calibration)：溫度(Temperature)：(23 ± 2) °C 相對濕度(Relative Humidity)：(55 ± 15) %
 校正地點：新北市三重區光復路二段88巷20號

校正使用之標準器 (Standards Employed)			
儀器名稱 Equipment	廠牌/型號 Manufacturer / Model No.	識別號碼/追溯日期 I.D. No. / Source Date	有效日期 Due Date
Torque Transducer	CDI / TTPM-41-4 (950DT)	2018A020151 / TAF 1899 2018/04/13	2019/04/13

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TEST SAMPLE IDENTIFICATION:

The table below is provided to establish correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Card No.	Date Received	<input type="checkbox"/> Test No.+	Sample No.	Manufacturer, Product Identification and Ratings
-	-	1, 2, 3, 4	-	Oring Industrial Networking Corp IGS-150B, Dual 12-48 Vdc, 0.29-0.09 A Operating temperature: -40 to 75 degree C

+ - If Test Number is used, the Test Number or Numbers the sample was used in must be identified on the data sheet pages or on the Data Sheet Package cover page.

Sampling Procedure -

This document contains data or information using color and if printed, should be printed in color to retain legibility and the information represented by the color.

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 Tested by: Golden Chou Date 2019-10-29

COMPONENT ABNORMAL (4.4.1):

Test date: 2019-10-29

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012

METHOD

The indicated components were individually shorted or opened as outlined below.

RESULTS

4.4	TABLE: Testing in single FAULT CONDITION			Pass
Test subclause/ component	Fault No.	Fault description	Test duration (h:min:s)	Results
4.4.1	1	Short C137 (+ to -)	1 h	Component damaged, Choke (L8, L9) pin 3,4 open, tests were repeated 2 more times (totally 3 times) and get the same result. Remaining current: 0A
Supplementary information:				

The device ~~[withstood]~~ ~~[did not withstand]~~ a complete repeat of the Dielectric Withstand Test.
 The Limit Values for Accessible Parts Test was repeated ~~[with]~~ ~~[without]~~ acceptable results.

The branch circuit protection ~~[opened]~~ ~~[did not open]~~ during this test.

	Cheese Cloth	Tissue Paper
Charring	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Glowing	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Flaming	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Additional Comments		

Datasheets - (001) Datasheet

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 Tested by: Golden Chou Date 2019-10-29

COMPONENT ABNORMAL (4.4.1) (CONT'D):

Ambient Temperature, °C _____ Ambient Humidity, % _____ Ambient Pressure, mBar _____

Location	Temperature °C
Top	
Left Side	
Right Side	
Front	
Bottom	
Ambient	

~~[X] The temperatures on the easily touched outer surface of the enclosure and other specified parts [exceeded] [did not exceed] 105°C in an ambient of [] 40°C (65°C rise) [] _____°C (if above 40°C is specified by manufacturer).~~

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Tested by: Golden Chou Date 2019-10-29

COOLING ABNORMAL TEST (4.4.2.10) :

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012

COOLING ABNORMAL TEST (4.4.2.10) METHOD

The equipment cooling means was restricted as follows, one fault at a time:

The following ventilation openings with filters were closed.

A.	Blocked all ventilation holes
B.	
Test duration	At least 1 hour

The following motor driven fans were stopped.

A.	
B.	
Test duration	

Cooling by circulation of water or other coolant was stopped by the following means.

A.	
B.	
Test duration	

Loss of the following cooling liquid was simulated.

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A.	
B.	
Test duration	

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COOLING ABNORMAL TEST (4.4.2.10) (CONT'D):

Test date: 2019-10-29

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012

IGS-150B 48Vdc:

RESULTS

4.4	TABLE: Testing in single FAULT CONDITION FOR IGS-150B			Pass
Test subclause/ component	Fault No.	Fault description	Test duration (h:min:s)	Results
4.4.2.10	1	All ventilation holes blocked	01:19:50	Temperature stability.

~~The device [withstood] [did not withstand] a complete repeat of the Dielectric Withstand Test.~~

~~The Limit Values for Accessible Parts Test was repeated [with] [without] acceptable results.~~

Location	Temperature °C
Top	83.9
Left Side	85.2
Right Side	82.3
Front	82.4
Bottom	83.7
Ambient	77.1

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COOLING ABNORMAL TEST (4.4.2.10) (CONT'D):

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012

The temperatures on the easily touched outer surface of the enclosure and other specified parts [exceeded] [did not exceed] 105°C in an ambient of 40°C (65°C rise) _____°C (if above 40°C is specified by manufacturer).

The temperatures on the easily touched outer surface of the enclosure ~~[exceeded]~~ [did not exceed] the surface temperature limit 140°C in an ambient of 75°C (if the maximum rated ambient is above 40°C). Surface temperature limit in a single fault condition = (Maximum rated ambient temperature °C) - (40°C) + (105°C)

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~~COOLING ABNORMAL TEST (4.4.2.10) (CONT'D):~~

~~Ambient Temperature, °C _____ Ambient Humidity, % _____ Ambient Pressure, mBar _____~~

~~[] The temperature of the following transformer windings was recorded.~~

Transformer Designation	Max. Allowed Temperature, °C	Measured Temperature, °C	Ambient Temperature, °C

~~The temperatures on the windings of the transformers [exceeded] [did not exceed] the maximum allowed temperature in an ambient of [] 40°C (65°C rise) [] °C (if above 40°C is specified by manufacturer).~~

~~The branch circuit protection [opened] [did not open] during this test.~~

	Cheese Cloth	Tissue Paper
Charring	[]Yes []No	[]Yes []No
Glowing	[]Yes []No	[]Yes []No
Flaming	[]Yes []No	[]Yes []No
Additional Comments		

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MAINS SUPPLY (5.1.3):

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012

MAINS SUPPLY (5.1.3), METHOD

A sample of the unit was connected to a variable voltage and a variable frequency source of supply as noted below and operated until well heated under the conditions of operation noted below. The Input Current (and Power) were measured and recorded below.

Conditions of IGS-150B: Port1~4 looped back, Port 5 connects to laptop
Operation _____

Comment (-1 Aml): *If the input current varies during the normal operating cycle, the steady-state current is taken as the mean indication of the highest measured r.m.s. value during a 1 min (IEC) or 10s /UL/CSA) period of the normal operation cycle.*

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MAINS SUPPLY (5.1.3) (CONT'D):

Test date: 2019-10-29

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012

RESULTS

5.1.3c)	TABLE: Mains supply for IGS-150B					Pass
	Marked rating (V)	12-48 DC				-
	Phase	Single phase				-
	Frequency (Hz)	DC				-
	Current (A)	0.29-0.09 A				-
	Power (W)	N/A				-
	Power (VA)	N/A				-
Test No.	Voltage (V)	Frequency (Hz)	Current (A)	Power in (W)	Power in (VA)	Comments
1	12	DC	0.29	3.48	--	
2	48	DC	0.09	4.32	--	
Note: Measurements are only required for marked ratings.						
Supplementary information:						

The marked input current or power ~~[was]~~ [was not] less than 90 % of the maximum measured value.

Note: The marked input current or power shall NOT be less than 90 % of the maximum measured value.

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TEMPERATURE TEST (10.1-10.4)

(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103)

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012

TEMPERATURE TEST (10.1-10.4) METHOD

The device was tested under the maximum condition of normal load outlined below until steady state temperatures were obtained. Temperatures were measured by thermocouples and/or change of resistance as indicated.

The equipment was tested on a test corner consisting of two walls at right angles, a floor and if necessary a ceiling, all of plywood approximately 20 mm thick and painted mat black. The linear dimensions of the test corner were at least 15 percent greater than those of the device under test.

The equipment was positioned ~~from the walls, floor, or ceiling~~ as specified by the manufacturer:

IGS-150B

Input: 12-48 Vdc

Output: Port1~4 looped back, Port 5 connects to laptop

The equipment was placed as near to the walls as possible.

The equipment was mounted on one wall and as near to the other wall and to the floor or ceiling as was likely to occur in normal use.

The equipment was mounted to the ceiling and as near to the walls as was likely to occur in normal use.

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[] The equipment was built into an installation as noted in the installation instructions. Plywood painted mat black and approximately 10 mm thick when representing the walls of a cabinet, and 20 mm thick when representing the walls of a building, was employed.

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TEMPERATURE TEST (10.1-10.4)
(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103) (CONT'D):

Ambient Temperature, °C _____ Ambient Humidity, % _____ Ambient Pressure, mBar _____

[x] 61010-2-201 Ambient Testing:

[x] Vented equipment, cooled by natural air convection - the AMBIENT TEMPERATURE is the incoming air temperature at a point not more than 50 mm and not less than 25 mm away from the plane of the equipment's air flow entry point. See 61010-2-201, Figure 106. The point with the lowest temperature was used for the ambient temperature.

[] Non-vented equipment, cooled by natural air convection - the AMBIENT TEMPERATURE is the air temperature at a point not more than 50 mm and not less than 25 mm away from the equipment, on a horizontal plane located at the vertical mid-point of the equipment. See 61010-2-201, see Figure 107. The point with the lowest temperature was used for the ambient temperature.

[] a) Panel Mounted Equipment - Shall be mounted that the 2 Portions of the EUT (EUTa and EUTb) are subjected to their specific environments.

[] b) Panel Mounted Equipment - The total EUT (EUTa + EUTb) shall be mounted in a single environment, which shall be the higher rated temperature of the two, and the recorded temperatures of the lower rated temperature EUT portion are corrected by the difference between the EUT's maximum rated ambient temperature and the actual test ambient temperature.

EXAMPLE: If internal maximum rated ambient temperature = 60 °C and external maximum rated ambient temperature = 50 °C, the test shall be

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run with a test ambient temperature = 60 °C. Temperatures taken for external ambient would be corrected by -10 °C (50 °C - 60 °C).

[] c) Panel Mounted Equipment - The total EUT (EUTa + EUTb) shall be mounted in a single environment, which shall be the lower rated temperature of the two, and the recorded temperatures of the higher rated temperature EUT portion are corrected by the difference between the EUT's maximum rated ambient temperature and the actual test ambient temperature.

EXAMPLE: If internal maximum rated ambient temperature = 60 °C and external maximum rated ambient temperature = 50 °C, the test shall be run with a test ambient temperature = 50 °C. Temperatures taken for internal ambient would be corrected by +10 °C (60 °C - 50 °C).

[x] for -2-201 2nd Edition only: Temp test shall be conducted at the highest rated ambient specified by the customer but at least 40°C. Specified ambient: 75 °C.

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TEMPERATURE TEST (10.1-10.4)
(61010-2-201,2ND ED. 10.4.1.100-10.4.1.103) (CONT'D):

Ambient Temperature, °C _____ Ambient Humidity, % _____ Ambient Pressure, mBar _____

Condition of maximum normal load:

IGS-150B

Input: 12-48 Vdc, 0.29-0.09 A

Output: Port1~4 looped back, Port 5 connects to laptop

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TEMPERATURE TEST (10.1-10.4)

(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103) (CONT'D):

Test date: 2019-10-29

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012

IGS-150B:

RESULTS

10	TABLE: Temperature Measurements (Thermocouple method)			Pass
	Frequency (Hz)	DC		—
	Voltage (V)	12 Vdc		—
	Test room ambient temperature (t _a) (°C) :	75		—
	Test duration (h min)	At least 1 hour		—
Part / Location	t _m °C	t _c °C	t _{max} °C	Comments
SAT, Left side of the sample	75.7	75.7	75	
SAT, Right side of the sample	75.5	75.5	75	
SAT, Front side of the sample	75.4	75.4	75	
Enclosure left side	81.3	81.3	85	
Enclosure right side	78.6	78.6	85	
Enclosure front side	78.8	78.8	85	
Main board (IN+, IN-)				
Terminal block (J1)	84.4	84.4	105	Temperature of the TERMINALS exceeds 60°C, the temperature rating is provided on manual.
RJ45 Connector (U5) rear metal case	83.4	83.4	105	
C137 Body	88.7	88.7	105	
L8 body	93.9	93.9	125	

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Form Issued: 2017-04-18
 Form Revised: 2019-07-16

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10	TABLE: Temperature Measurements (Thermocouple method)			Pass
PCB near D3	98.0	98.0	130	
PCB near U2	95.3	95.3	130	
PCB near U3	94.6	94.6	130	
PCB near U8	84.4	84.4	130	
Side board				
Internal connector (J2)	92.0	92.0	105	
L1 Body	93.2	93.2	125	
L2 Body	93.6	93.6	125	
C17 Body	91.8	91.8	105	
PCB near Q1	89.3	89.3	130	
Supplementary information:				
Where: t_m = measured temperature				
t_c = t_m corrected ($t_m - t_a + 40$ °C or max. RATED ambient)				
t_{max} = maximum permitted temperature				
[x] 61010-2-201, 2 nd ed Ambient Temperature measurement:				
Location <u>Left side</u> Ambient <u>75.7</u> Distance from enclosure <u>25</u> mm				
Location <u>Right side</u> Ambient <u>75.5</u> Distance from enclosure <u>25</u> mm				
Location <u>Front side</u> Ambient <u>75.4</u> Distance from enclosure <u>25</u> mm				

The temperatures measured [did not] [~~did~~] exceed the limits in Table 19 and Table 20 at an ambient of 40° C

[] Indicate reason for test termination:

[x] Temperature stabilization determined by no change in temperature for 2 readings 60 minutes apart.

[] Test terminated because _____.

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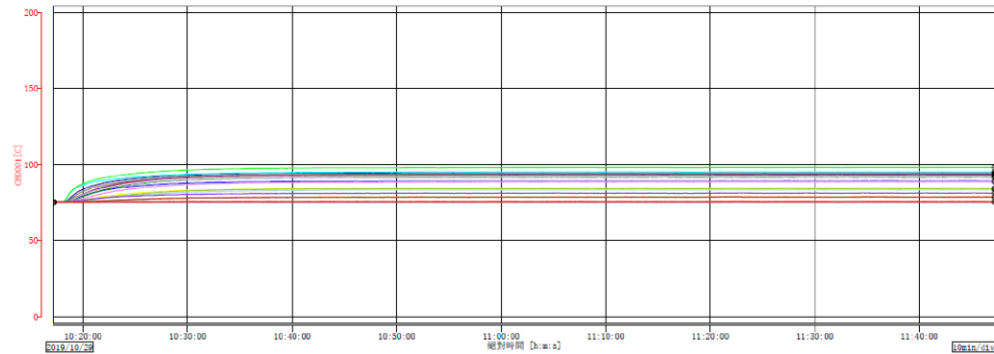
Example: Temperature Stabilization e.g. Temperature raise less than 2 degree C within 1 hour, (from 60601-1 and 60950, CTL DSH 335 (61010-1))

Note: If equipment is rated higher than 40° C the temperature may have to be repeated at this elevated temperature.

Note: 61010-2-201, 2nd ed - All testing to be conduct at rated ambient except for large equipment.

目前群組編號 : Group 01 列印範圍 : 2019/10/29 10:17:12.000 - 2019/10/29 11:47:12.000 (UTC+08:00) 1/1

Table with columns: 選擇通道, 運算區間, 最小, 最大, P-P, Mean, RMS. Rows list various channels (CH0001(C) to CH019(C)) and their corresponding statistical values.



Datasheets - (001) Datasheet

Project No. 4789176545 File E331061 Page _____
 Tested by: Golden Chou Date 2019-10-29

TEMPERATURE TEST (10.1-10.4)

(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103) (CONT'D):

Test date: 2019-10-29

Ambient Temperature, °C 24 Ambient Humidity, % 63 Ambient Pressure, mBar 1012**IGS-150B:**

RESULTS

10	TABLE: Temperature Measurements (Thermocouple method)			Pass
	Frequency (Hz)	DC		—
	Voltage (V)	48 Vdc		—
	Test room ambient temperature (t _a) (°C) :	75		—
	Test duration (h min)	At least 1 hour		—
Part / Location	t _m °C	t _c °C	t _{max} °C	Comments
SAT, Left side of the sample	75.9	75.9	75	
SAT, Right side of the sample	75.6	75.6	75	
SAT, Front side of the sample	75.6	75.6	75	
Enclosure left side	82.5	82.5	85	
Enclosure right side	79.8	79.8	85	
Enclosure front side	79.8	79.8	85	
Main board (IN+, IN-)				
Terminal block (J1)	86.6	86.6	105	Temperature of the TERMINALS exceeds 60°C, the temperature rating is provided on manual.
RJ45 Connector (U5) rear metal case	84.9	84.9	105	
C137 Body	94.1	94.1	105	

Datasheets - (001) Datasheet

Project No. 4789176545 File E331061 Page _____
 Tested by: Golden Chou Date 2019-10-29

10	TABLE: Temperature Measurements (Thermocouple method)	Pass		
L8 body	93.6	93.6	125	
PCB near D3	98.7	98.7	130	
PCB near U2	97.4	97.4	130	
PCB near U3	101.9	101.9	130	
PCB near U8	90.1	90.1	130	
Side board				
Internal connector (J2)	100.5	100.5	105	
L1 Body	110.0	110.0	125	
L2 Body	104.2	104.2	125	
C17 Body	101.8	101.8	105	
PCB near Q1	104.5	104.5	130	
Supplementary information:				
Where: t_m = measured temperature				
t_c = t_m corrected ($t_m - t_a + 40$ °C or max. RATED ambient)				
t_{max} = maximum permitted temperature				
[x] 61010-2-201, 2 nd ed Ambient Temperature measurement:				
Location ___ Left side ___ Ambient ___ 75.9 ___ Distance from enclosure ___ 25 ___ mm				
Location ___ Right side ___ Ambient ___ 75.6 ___ Distance from enclosure ___ 25 ___ mm				
Location ___ Front side ___ Ambient ___ 75.6 ___ Distance from enclosure ___ 25 ___ mm				

The temperatures measured [did not] [~~did~~] exceed the limits in Table 19 and Table 20 at an ambient of 40° C

[] Indicate reason for test termination:

[x] Temperature stabilization determined by no change in temperature for 2 readings ___ 60 ___ minutes apart.

[] Test terminated because _____.

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Form Issued: 2017-04-18
Form Revised: 2019-07-16

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Datasheets - (001) Datasheet

Project No. 4789176545 File E331061 Page _____
 Tested by: Golden Chou Date 2019-10-29

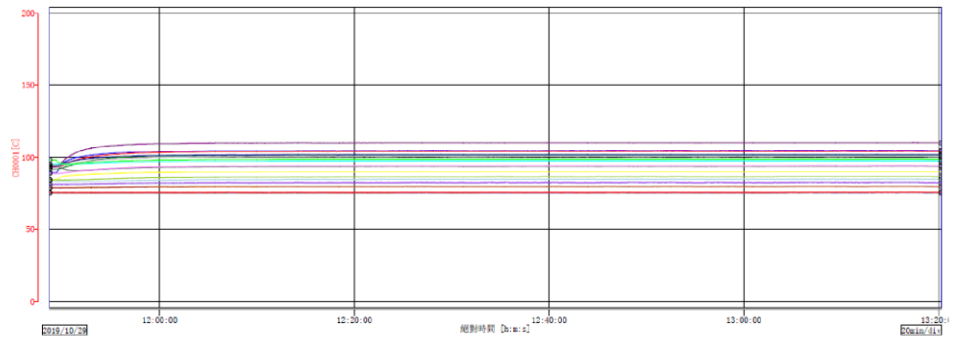
Example: Temperature Stabilization e.g. Temperature raise less than 2 degree C within 1 hour, (from 60601-1 and 60950, CTL DSH 335 (61010-1))

Note: If equipment is rated higher than 40° C the temperature may have to be repeated at this elevated temperature.

Note: 61010-2-201, 2nd ed - All testing to be conduct at rated ambient except for large equipment.

目錄群組編號 : Group 01 : 2019/10/29 11:40:42.000 ~ 2019/10/29 13:20:16.000 (UTC+08:00) 1/1
 列印範圍

選擇項目	11330	17230	2019/10/29 12:10:42.000 ~ 2019/10/29 13:20:16.000			
	最小	最大	P-P	Mean	RMS	
CR6001-C0	75.3	75.9	0.6	75.5	75.5	
CR6002-C0	75.3	75.9	0.6	75.5	75.5	
CR6003-C0	75.2	75.8	0.6	75.4	75.4	
CR6004-C0	82.1	82.5	0.4	82.3	82.3	
CR6005-C0	79.6	79.8	0.2	79.6	79.6	
CR6006-C0	79.4	79.3	0.1	79.6	79.6	
CR6007-C0	88.3	88.5	0.3	88.5	88.5	
CR6008-C0	84.5	84.9	0.4	84.7	84.7	
CR6009-C0	93.9	94.1	0.2	94.0	94.0	
CR6010-C0	92.4	92.6	0.2	92.5	92.5	
CR6011-C0	90.5	90.7	0.2	90.6	90.6	
CR6012-C0	97.2	97.4	0.2	97.4	97.4	
CR6013-C0	101.7	101.9	0.2	101.8	101.8	
CR6014-C0	99.9	99.1	0.2	99.0	99.0	
CR6015-C0	100.3	100.3	0.0	100.3	100.3	
CR6016-C0	109.7	110.0	0.3	109.9	109.9	
CR6017-C0	104.0	104.2	0.2	104.1	104.1	
CR6018-C0	104.2	104.3	0.1	104.3	104.3	
CR6019-C0	104.3	104.5	0.2	104.4	104.4	



Datasheets - (001) Datasheet

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 Tested by: Golden Chou Date 2019-10-29

Table 19 – Surface temperature limits in NORMAL CONDITION

Part	Limit °C
1 Outer surface of ENCLOSURE (unintentional contact)	
a) metal, uncoated or anodized	65
b) metal, coated (paint, non metallic)	80
c) plastics	85
d) glass and ceramics	80
e) small areas (<2 cm ²) that are not likely to be touched in NORMAL USE	100
2 Knobs and handles (NORMAL USE contact)	
a) metal	55
b) plastics	70
c) glass and ceramics	65
d) non-metallic parts that in NORMAL USE are held only for short periods (1 s – 4 s)	70
NOTE EN 563 gives information about the effect of the duration of contact.	

Table 20 – Maximum temperatures for insulation material of windings

Class of insulation (see IEC 60085)	NORMAL CONDITION °C	SINGLE FAULT CONDITION °C
Class A	105	150
Class B	130	175
Class E	120	165
Class F	155	190
Class H	180	210

Datasheets - (001) Datasheet

Project No. 4789176545 File E331061 Page _____
 Tested by: Golden Chou Date 2019-10-29

TEMPERATURE TEST 10.4) (61010 2 201,2nd ed.
 (10.1 10.4.1.100-
 10.4.1.103)
 (CONT'D):

TABLE 19 - 61010-2-201

Part	ENCLOSED EQUIPMENT °C	OPEN EQUIPMENT °C
1 Outer surface of ENCLOSURE or barrier (unintentional contact)	65	70
a) metal uncoated or anodized	80	85
b) metal coated (paint, non-metallic)	85	85
c) plastics	80	85
d) glass and ceramics	100	100
e) small areas (2 cm ²) that are not likely to be touched in NORMAL USE		
2 Knobs and handles (NORMAL USE contact)		
a) metal	55	55
b) plastics	70	70
c) glass and ceramics	65	70
d) non-metallic parts that in NORMAL USE are held only for short periods (1 s-4 s)	70	85
NOTE 1 NORMAL USE contact could be surfaces touched by an OPERATOR in NORMAL USE or by SERVICE PERSONNEL.		
NOTE 2 This table is based on IEC Guide 117:2010.		

Datasheets - (001) Datasheet

Project No. 4789176545 File E331061 Page _____
 Tested by: Golden Chou Date 2019-10-29

~~TEMPERATURE TEST (10.1-10.4)~~
~~(61010-2-201,2ND ED. 10.4.1.100-10.4.1.103) (CONT'D)~~

Ambient Temperature, °C _____ Ambient Humidity, % _____ Ambient Pressure, mBar _____

~~CHANGE-OF-RESISTANCE CALCULATIONS~~

~~FORMULA: $\Delta T = \frac{(R_{warm} - R_{cold}) (K + t_1)}{R_{cold}} (t_2 - t_1)$~~

- ~~Where: ΔT is the temperature rise of the coil.
 R_{warm} is the hot resistance of the coil.
 R_{cold} is the cold resistance of the coil.
 K is 234.5 for copper and 225.0 for aluminum.
 t_1 is the room ambient when the cold measurements were made.
 t_2 is the room ambient when the hot measurements were made.~~

10.2		TABLE: Temperature of windings (Resistance method)					
Frequency (Hz)						-	
Voltage (V)						-	
Test room ambient temperature (t_{a1}/t_{a2}) (°C)						-	
Test duration (h min)						-	
Part / Designation	R_{cold} (Ω)	R_{warm} (Ω)	Current (A)	t_c (K)	t_c^* (°C)	t_{max} (°C)	Comments

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Datasheets - (001) Datasheet

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Tested by: Golden Chou Date 2019-10-29

Supplementary information:

$$t_e = t_x \text{ corrected } (t_e = t_x - (t_{a2} - t_{a1}) + [40 \text{ }^\circ\text{C or max RATED ambient}])$$

Datasheets - (001) Datasheet

Project No. 4789176545 File E331061 Page _____
Tested by: Golden Chou Date 2019-10-29

END OF DATASHEET PACKAGE. THIS PAGE INTENTIONALLY LEFT BLANK

Datasheets - (002) Datasheet_(A1)

Datasheets - (002) Datasheet_(A1)

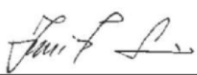
Project No. 4790635467
LABORATORY DATA PACKAGE

File E331061

Page 1 of 34

Number of pages in this package _____ [including additional pages _____]
(Fill in when using printed copy as record)

CLIENT INFORMATION	
Company Name	Oring Industrial Networking Corp
Address	3f 542-2 Zhongzheng Rd Xindian District New Taipei City, 231 Taiwan

AUDIT INFORMATION:			
Description of Tests	Per Standard No.	Edition	Revision Date
<input checked="" type="checkbox"/>	CSA C22.2 NO. 61010-1-12 (UL 61010-1:2010)	3 rd Edition (3 rd Edition)	2016-04-29 (2016-04-29)
<input type="checkbox"/>	UL 61010-1:2010 Amendment 1:2018 (MOD) to CAN/CSA No. 61010-1-12	3 rd Edition 3.1 Edition	2018-11-21 2018-11-21
<input checked="" type="checkbox"/>	UL 61010-2-201 CSA C22.2 NO. 61010-2-201:14	1 st edition 1 st edition	2017-02-20 2014-02
<input type="checkbox"/>	UL 61010-2-201 CSA C22.2 NO. 61010-2-201:18	2 nd edition 2 nd edition	2018-05-14 2018-02
<input type="checkbox"/>	UL 61010-2-030 CSA C22.2 NO. 61010-030-12	1 st edition 1 st edition	2016-09-16 2016-09-16
<input type="checkbox"/>	UL 61010-2-030 CSA C22.2 NO. 61010-2-030:18	2 nd Edition 2 nd Edition	2018-12-21 2018-12-21
<input type="checkbox"/>	IEC 61010-1:2010	3rd edition	2013-10
<input type="checkbox"/>	IEC61010-1:2010/AM1:2016	3.1 edition	2017-01
<input type="checkbox"/>	IEC 61010-2-201:2017	2 nd edition	2017-03
<input type="checkbox"/>	IEC 61010-2-201:2013	1 st edition	2013-02
<input type="checkbox"/>	IEC61010-2-030: 2010	1 st edition	2011-05
<input type="checkbox"/>	IEC61010-2-030: 2017	2 nd Edition	2017-01
<input checked="" type="checkbox"/> Tests Conducted by ¹ Eddie Lee			
<input type="checkbox"/> UL Staff conducting or witnessing testing (WTDP, CTF Stage 1 or 2 only) <input type="checkbox"/> UL Staff supervising UL Staff in training			
<input checked="" type="checkbox"/> Authorized Signatory (CTDP, TPTDP, TCP, PPE, CTF Stage 3 or 4)		 _____ Printed Name	
		Signature. Include date for CTDP, TPTDP, TCP, PPE, CTF Stage 3 or 4	

ULS-61010-NRAQ-DataSheet-2002
Form Page 1

Form Issued: 2017-04-18
Form Revised: 2020-09-29

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Datasheets - (002) Datasheet (A1)Project No. 4790635467
LABORATORY DATA PACKAGE

File E331061

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TESTS TO BE CONDUCTED:			
Test No.	Done ³	Test Name	<input checked="" type="checkbox"/> Comments/Parameters <input type="checkbox"/> Tests Conducted by ² <input type="checkbox"/> Link to separate data files ⁴
1	X	COOLING ABNORMAL TEST (4.4.2.10)	Pass, 2022-08-10
2	X	MAINS SUPPLY (5.1.3):	Pass, 2022-08-10
3	X	TEMPERATURE TEST (10.1-10.4) (61010-2-201,2ND ED. 10.4.1.100-10.4.1.103)	Pass, 2022-08-10

Instructions -

- 1 - When all tests are conducted by one person, name can be inserted here instead of including name on each page containing data.
- 2 - When test conducted by more than one person, name of person conducting the test can be inserted next to the test name instead of including name on each page containing data. Test dates may be recorded here instead of entering test dates on the individual datasheet pages.
- 3 - Use of this field is optional and may be employed differently. If used to include a date instead of entering the testing date on the individual datasheet pages, the date shall be the date the test was conducted.
- 4 - Link to separate data files for a test can be inserted here. The link must be to a server that is accessible to UL staff, that provides for backup, required retention periods and a path, including file name, that does not change and result in a broken link. Not applicable to DAP.

ULS-61010-NRAQ-DataSheet-2002
Form Page 2Form Issued: 2017-04-18
Form Revised: 2020-09-29

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Datasheets - (002) Datasheet (A1)Project No. 4790635467
LABORATORY DATA PACKAGE

File E331061

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Special Instructions -

[X] Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be recorded at the time the test is conducted.

Standard	Ambient Temperature,	Relative Humidity, %	Barometric Pressur
	°C		mBar
	±	±	±
60065	25 ± 10	Max 75	Not specified
60601-1	+10 to +40	30 to 75	700 to 1060 hPa
60950	Not specified	Not specified	Not specified
60950-1	Not specified	Not specified	Not specified
61010-1	+15 to +35	Max 75	75 to 106 kPa
61215	Not specified	Not specified	Not specified
61646	Not specified	Not specified	Not specified
61730	Not specified	Not specified	Not specified

No general environmental conditions are specified in the Standard(s) or have been identified that could affect the test results or measurements.

RISK ANALYSIS RELATED TO TESTING PERFORMANCE:

The following types of risks have been identified. Take necessary precautions. This list is not all inclusive.

<input type="checkbox"/> Electric shock	<input type="checkbox"/> Radiation
<input type="checkbox"/> Energy related hazards	<input type="checkbox"/> Chemical hazards
<input type="checkbox"/> Fire	<input type="checkbox"/> Noise
<input checked="" type="checkbox"/> Heat related hazards	<input type="checkbox"/> Vibration
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Other (Specify)___

Datasheets - (002) Datasheet (A1)

Project No. 4790635467 File E331061 Page 4 of 34
 Tested by: Eddie Lee Date See page2

~~WITNESS TEST DATA PROGRAM (WTDP) INFORMATION:~~

Environment:	
Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025:2005 Clauses 5.3.1, 5.3.2, 5.3.3, 5.3.4)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Personnel:	
Lab Management shall authorize personnel to operate particular types of equipment used in testing. (ISO/IEC 17025:2005 Clause 5.5.3)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Equipment:	
Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025:2005 Clauses 5.5.1, 5.5.2, 5.5.4, 5.5.5, 5.5.8)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Calibrations for testing equipment is traceable to SI Units. Refer to 00-OP-C0032 (Calibration Certificate Analysis). (ISO/IEC 17025:2005 Clause 5.6.2.2)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Critical Consumables:	
Critical consumables are compliant with test standard requirements. (ISO/IEC 17025:2005 Clause 4.6)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Sample Identification:	
Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025:2005 Clause 5.8.2)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Additional Requirements:	

Datasheets - (002) Datasheet (A1)

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 Tested by: Eddie Lee Date See page2

Testing at a third party laboratory selected by UL and not part of the Third Party Test Data Program requires a Mutual Nondisclosure (NDA) and Confidentiality Agreement, 00-LE-F0025, or alternate agreement form approved by UL's Legal Department to be stored and included with the Test Package.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Summary:	
The test facility [was] [was not] deemed to have the environment and capabilities necessary to perform the tests included in this data package.	

Datasheets - (002) Datasheet (A1)

Project No. 4790635467 File E331061 Page 6 of 34
 Tested by: Eddie Lee Date See page2

~~[] The CAS Staff as indicated below, (a competent L1, L2 or L3 in a similar CCN/Standard for a similar test method) was utilized to conduct the witnessing of tests on behalf of the project handler. (Please complete the table below to document the rationale and approval.)~~

Name of UL Staff conducting WTDP	CCN/Standard to be witnessed	Test(s) to be witnessed	L1, L2 or L3 Competency	Similar-CCN/Standard-Competency

~~[] The Field Services Staff Member, as indicated below, (with a competent program competency as authorized by the FOM) was informed and utilized to conduct the witnessing of tests on behalf of the project handler. (Please complete the table below to document the information and approval.)~~

Name of UL Staff conducting WTDP	CCN/Standard to be witnessed	Test(s) to be witnessed	FOM Approver (name)

Datasheets - (002) Datasheet (A1)

Project No. 4790635467 File E331061 Page 7 of 34
 Tested by: Eddie Lee Date See page2

TEST LOCATION: (To be completed by Staff Conducting the Testing)					
<input type="checkbox"/> UL or Affiliate	<input type="checkbox"/> WTDP	<input type="checkbox"/> CTDP	<input checked="" type="checkbox"/> TPTDP	<input type="checkbox"/> TCP	<input type="checkbox"/> PPP
	<input type="checkbox"/> CTF	<input type="checkbox"/> CTF	<input type="checkbox"/> CTF	<input type="checkbox"/> CTF	
	Stage 1	Stage 2	Stage 3	Stage 4	
Company Name: Wendell Electrical Testing Co Ltd.					
Address: 3F., No. 6, Alley. 6, Lane. 235, Baoqiao Rd., Xindian District, New Taipei City 231028, (Taiwan), Chinese Taipei					

TEST EQUIPMENT INFORMATION

According to DAP's Programs Procedure (00-OP-S0854), Clause 12.9.9, If the client is a participant under one of the following programs (~~CTDP~~, TPTDP, PPP, or TCP) the collection of calibration certificates is not required.

UL test equipment information is recorded on Meter Use.

UL test equipment information is recorded on <<insert location and local laboratory equipment system identification.>>

Inst. ID No.	Instrument Type	Test Number +, Test Title or Conditioning	Function /Range	Last Cal. Date	Next Cal. Date
See next page for details.					

+ - If Test Number is used, the Test Number must be identified on the data sheet pages or on the Data Sheet Package cover page.

The following additional information is required when using client's or rented equipment, or when a UL ID Number for an instrument number is not used. The Inst. ID No. below corresponds to the Inst. ID No. above.

Inst. ID No.	Make/Model/Serial Number/Asset No.
See next page for details.	

Datasheets - (002) Datasheet (A1)

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 Tested by: Eddie Lee Date See page2



穩得電性測試實驗室

儀器編號 / Reg.	儀器名稱 / Equipment Name	型號 / Model No.	序號 / Series	規格 / Used Range	廠牌 / Brand Name	校驗日期 / Cal. Date	下次日期 / Next Date	校驗周期 / Cycle Cal.
CT-5-001	CALIPER 數字顯示游標卡尺	CD-6°CSX	11625431	0-150 mm	Mitsutoyo	2022/7/28	2023/7/27	1年
CT-5-004-1	TEMPERATURE RECORDER 溫度記錄器	MX100	91PC28170	0-220 degree C	Yokogawa	2022/3/1	2023/2/28	1年
CT-5-011	TORQUE DRIVER 扭矩扭力扳手	40TDS-5	412725C	0-40kgf·cm	Takachi	2022/1/21	2023/1/20	1年
CT-5-051	DIGITAL MULTIMETER 數字多量錶	BM869	144442008	AC/DC 50 mV-1000V DCC 0.1-10 A	BRIMEN	2022/8/10	2023/8/9	1年
CT-5-104-1	DC POWER SOURCE 直流電源供應器	P5W250-12.5	6ER26062	DCV 1-250V DCC 0.1-13.5A	GW	2022/3/7	2023/3/6	1年
CT-5-148	DC POWER SOURCE 直流電源供應器	P5W250-13.5	0EU113178	DCV 1-250V DCC 0.1-13.5A	GW	2022/8/5	2023/8/4	1年
CT-5-162	HUMIDITY & TEMPERATURE CHAMBER 溫濕度溫濕控制箱	GTH-300-40-3SP-SD	MAA3006-014	-40-100 degree C 10-98 RH%	旺季	2021/8/5	2023/8/4	1年
CT-5-167	CLOCK 時鐘	CL-195	1952020	full range	Kinyo	2022/8/6	2023/8/5	1年
CT-8-001	Wrapping Tissue 保鮮紙	ATP-01	-	approximately 18g/m ²	ED&D	2016/10/2	2023/10/1	Check before used
CT-8-002	Cheesecloth 紗布	-	-	approximately 36g/m ²	ED&D	2016/10/2	2023/10/1	Check before used
CT-8-005	Thermocouple 熱電阻	TT-J-30-SLE	-	0-250 degree, 30 AWG, J type	OMEGA	2020/2/4	-	-

Datasheets - (002) Datasheet (A1)

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 Tested by: Eddie Lee Date See page2

TEST SAMPLE IDENTIFICATION:

The table below is provided to establish correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

Sample Card No.	Date Received	[] Test No.+	Sample No.	Manufacturer, Product Identification and Ratings
WL22G0404	2022-07-20	2	WL22 G040 4- 001	Oring Industrial Networking Corp Industrial Networking Corp IGS-150B, 12-48Vdc, 0.29-0.09A

+ - If Test Number is used, the Test Number or Numbers the sample was used in must be identified on the data sheet pages or on the Data Sheet Package cover page.

~~[] Sampling Procedure~~

~~[] This document contains data or information using color and if printed, should be printed in color to retain legibility and the information represented by the color.~~

Datasheets - (002) Datasheet (A1)

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 Tested by: Eddie Lee Date See page2

COOLING ABNORMAL TEST (4.4.2.10):

Ambient Temperature, °C -- Ambient Humidity, % -- Ambient Pressure, mBar --

COOLING ABNORMAL TEST (4.4.2.10) METHOD

The equipment cooling means was restricted as follows, one fault at a time:

The following ventilation openings with filters were closed.

A.	Blocked all ventilation holes
B.	
Test duration	At least 1 hour

The following motor driven fans were stopped.

A.	
B.	
Test duration	

Cooling by circulation of water or other coolant was stopped by the following means.

A.	
B.	
Test duration	

Loss of the following cooling liquid was simulated.

Datasheets - (002) Datasheet (A1)

Project No. 4790635467 File E331061 Page 11 of 34
Tested by: Eddie Lee Date See page2

A.	
B.	
Test duration	

Datasheets - (002) Datasheet (A1)

Project No. 4790635467 File E331061 Page 12 of 34
 Tested by: Eddie Lee Date See page2

COOLING ABNORMAL TEST (4.4.2.10) (CONT'D):

Ambient Temperature, °C 23 Ambient Humidity, % 53 Ambient Pressure, mBar 1005

RESULTS

4.4	TABLE: Testing in single FAULT CONDITION			Pass
Test subclause/ component	Fault No.	Fault description	Test duration (h:min:s)	Results
4.4.2.10	1	All ventilation holes blocked	01:20:42	Unit operated normally and temperature stable, no hazards.
Note: PWR1 supplied by 48Vdc. Sample ID: WL22G0404-001 Test Date: 2022-8-10				

~~The device [withstood] [did not withstand] a complete repeat of the Dielectric Withstand Test.~~

~~The Limit Values for Accessible Parts Test was repeated [with] [without] acceptable results. See "Limit Values for Accessible Parts" test for specific values and test results.~~

Location	Temperature °C
Top	-
Left Side	81.6
Right Side	79.5
Front	80.0
Bottom	-

Datasheets - (002) Datasheet (A1)

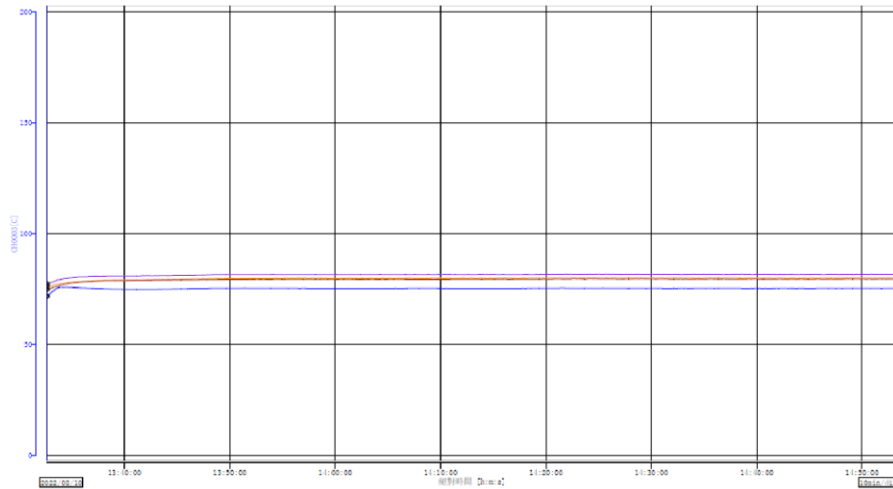
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-	-
Ambient	75 (Actual ambient 75.3°C)

[X] The temperatures on the easily touched outer surface of the enclosure and other specified parts ~~[exceeded]~~ [did not exceed] ~~[]~~ 105°C **[X]** ~~140~~ °C in an ambient of ~~[]~~ 40°C (65°C rise) **[X]** ~~75~~ °C (if above 40°C is specified by manufacturer, 65°C rise).

日誌詳細情報 : 2020-09-10 13:32:30.000 - 2020-09-10 11:53:20.000 (UTC+08:00) 1/1

温度位置	最小	最大	T-R	Mean	Max
000001°C	75.0	75.3	0.3	75.2	75.3
000002°C	75.2	75.6	0.3	75.3	75.3
000003°C	75.2	75.3	0.3	75.3	75.3
000004°C	75.4	75.5	0.1	75.3	75.3



Thermal Couple location
1. Ambient
2. Left Side
3. Right Side
4. Front Side

Datasheets - (002) Datasheet (A1)

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COOLING ABNORMAL TEST (4.4.2.10) (CONT'D):

Ambient Temperature, °C -- Ambient Humidity, % -- Ambient Pressure, mBar --

~~[] The temperature of the following transformer windings was recorded.~~

Transformer- Designation	Max. Allowed- Temperature, °C	Measured- Temperature, °C	Ambient- Temperature, °C

~~The temperatures on the windings of the transformers [exceeded] [did not exceed] the maximum allowed temperature in an ambient of [] 40°C (65°C rise) [] °C (if above 40°C is specified by manufacturer).~~

The branch circuit protection ~~opened~~ [did not open] during this test.

	Cheese Cloth	Tissue Paper
Charring	[]Yes [X]No	[]Yes [X]No
Glowing	[]Yes [X]No	[]Yes [X]No
Flaming	[]Yes [X]No	[]Yes [X]No
Additional Comments		

Datasheets - (002) Datasheet (A1)

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MAINS SUPPLY (5.1.3):

Ambient Temperature, °C -- Ambient Humidity, % -- Ambient Pressure, mBar --

METHOD

A sample of the unit was connected to a variable voltage and a variable frequency source of supply as noted below and operated until well heated under the conditions of operation noted below. The Input Current (and Power) were measured and recorded below.

Conditions of Input supply connects to V1+/V1-, 12-48VDC; 0.29-0.09A
Operation Port 1~4 looped back, port 5 connects to laptop

Comment (-1 AML): *If the input current varies during the normal operating cycle, the steady-state current is taken as the mean indication of the highest measured r.m.s. value during a 1 min (IEC) or 10s /UL/CSA) period of the normal operation cycle.*

Datasheets - (002) Datasheet (A1)

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MAINS SUPPLY (5.1.3) (CONT'D):

Ambient Temperature, °C 23 Ambient Humidity, % 53 Ambient Pressure, mBar 1005

RESULTS

5.1.3c)	TABLE: Mains supply for IGS-150B					Pass
	Marked rating (V)	12-48Vdc				-
	Phase	DC				-
	Frequency (Hz).....	DC				-
	Current (A).....	0.29-0.09A				-
	Power (W).....	N/A				-
	Power (VA).....	N/A				-
Test No.	Voltage (V)	Frequency (Hz)	Current (A)	Power in (W)	Power in (VA)	Comments
[Case 1]	--	--	--	--	--	--
1	12	DC	0.31	3.72	--	Single Power(PWR2)
2	48	DC	0.08	3.84	--	Single Power(PWR2)
[Case 2]	--	--	--	--	--	--
1	12	DC	0.10/0.22	1.20/2.64	--	PWR1/PWR2
2	48	DC	0.04/0.06	1.92/2.88	--	PWR1/PWR2
Note: Measurements are only required for marked ratings.						
Supplementary information:						
Note:						
Two power input test condition,						
[Case 1] Only PWR2 was connected to power, and						
[Case 2] Both PWR1 and PWR2 were connected to two individual power supply.						
Test Date: 2022-8-10						
Sample ID: WL22G0404-001						

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The marked input current or power ~~was~~ [was not] less than 90 % of the maximum measured value.

Note: The marked input current or power shall NOT be less than 90 % of the maximum measured value.

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MAINS SUPPLY (5.1.3) (CONT'D):

Ambient Temperature, °C 22 Ambient Humidity, % 50 Ambient Pressure, mBar 1003

TEMPERATURE TEST (10.1-10.4)

(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103)

Ambient Temperature, °C -- Ambient Humidity, % -- Ambient Pressure, mBar --

METHOD

The device was tested under the maximum condition of normal load outlined below until steady state temperatures were obtained. Temperatures were measured by thermocouples and/or change of resistance as indicated.

The equipment was tested on a test corner consisting of two walls at right angles, a floor and if necessary a ceiling, all of plywood approximately 20 mm thick and painted mat black. The linear dimensions of the test corner were at least 15 percent greater than those of the device under test.

The equipment was positioned ~~from the walls, floor, or ceiling~~ as specified by the manufacturer:

IES-150B

Input: 12-48Vdc; 24 V ac (with redundant power connected)

Output: Port 1~4 looped back, port 5 connects to laptop

The equipment was placed as near to the walls as possible.

The equipment was mounted on one wall and as near to the other wall and to the floor or ceiling as was likely to occur in normal use.

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[] The equipment was mounted to the ceiling and as near to the walls as was likely to occur in normal use.

[] The equipment was built into an installation as noted in the installation instructions. Plywood painted mat black and approximately 10 mm thick when representing the walls of a cabinet, and 20 mm thick when representing the walls of a building, was employed.

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TEMPERATURE TEST (10.1-10.4)

(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103) (CONT'D):

Ambient Temperature, °C -- Ambient Humidity, % -- Ambient Pressure, mBar --

[X] 61010-2-201 Ambient Testing:

[x] Vented equipment, cooled by natural air convection - the AMBIENT TEMPERATURE is the incoming air temperature at a point not more than 50 mm and not less than 25 mm away from the plane of the equipment's air flow entry point. See 61010-2-201, Figure 106. The point with the lowest temperature was used for the ambient temperature.

[] Non-vented equipment, cooled by natural air convection - the AMBIENT TEMPERATURE is the air temperature at a point not more than 50 mm and not less than 25 mm away from the equipment, on a horizontal plane located at the vertical mid-point of the equipment. See 61010-2-201, see Figure 107. The point with the lowest temperature was used for the ambient temperature.

[] a) Panel Mounted Equipment - Shall be mounted that the 2 Portions of the EUT (EUTa and EUTb) are subjected to their specific environments.

[] b) Panel Mounted Equipment - The total EUT (EUTa + EUTb) shall be mounted in a single environment, which shall be the higher rated temperature of the two, and the recorded temperatures of the lower rated temperature EUT portion are corrected by the difference between the EUT's maximum rated ambient temperature and the actual test ambient temperature.

EXAMPLE: If internal maximum rated ambient temperature = 60 °C and external maximum rated ambient temperature = 50 °C, the test shall be run with a test ambient temperature = 60 °C. Temperatures taken for

Datasheets - (002) Datasheet (A1)

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external ambient would be corrected by $-10\text{ }^{\circ}\text{C}$ ($50\text{ }^{\circ}\text{C} - 60\text{ }^{\circ}\text{C}$).

[] c) Panel Mounted Equipment - The total EUT (EUTa + EUTb) shall be mounted in a single environment, which shall be the lower rated temperature of the two, and the recorded temperatures of the higher rated temperature EUT portion are corrected by the difference between the EUT's maximum rated ambient temperature and the actual test ambient temperature.

EXAMPLE: If internal maximum rated ambient temperature = $60\text{ }^{\circ}\text{C}$ and external maximum rated ambient temperature = $50\text{ }^{\circ}\text{C}$, the test shall be run with a test ambient temperature = $50\text{ }^{\circ}\text{C}$. Temperatures taken for internal ambient would be corrected by $+10\text{ }^{\circ}\text{C}$ ($60\text{ }^{\circ}\text{C} - 50\text{ }^{\circ}\text{C}$).

[x] for -2-201 2nd Edition only: Temp test shall be conducted at the highest rated ambient specified by the customer but at least $40\text{ }^{\circ}\text{C}$.
Specified ambient: 75 $^{\circ}\text{C}$.

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TEMPERATURE TEST (10.1-10.4)
(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103) (CONT'D):

Ambient Temperature, °C -- Ambient Humidity, % -- Ambient Pressure, mBar --

Condition of maximum normal load:

Input: 12-48Vdc (PWR-2)

Output: Port 1~4 looped back, port 5 connects to laptop

Firmware edition: V1.0

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TEMPERATURE TEST (10.1-10.4)

(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103) (CONT'D):

Ambient Temperature, °C 23 Ambient Humidity, % 53 Ambient Pressure, mBar 1005

RESULTS

Part / Location	t _m °C	t _c °C	t _{max} °C	Comments
10 TABLE: Temperature Measurements (Thermocouple method) Pass				
Frequency (Hz)	DC			-
Voltage (V)	12Vdc/Single Input, PWR2			-
Test room ambient temperature (t _a) (°C) :	75			-
Test duration (h min)	1hr34min			-
Part / Location	t _m °C	t _c °C	t _{max} °C	Comments
SAT, Left side of the sample	75.4	--	75	25 mm ~50 mm away from sample
SAT, Right side of the sample	75.7	--	75	25 mm ~50 mm away from sample
SAT, Front side of the sample	75.1	--	75	25 mm ~50 mm away from sample
Enclosure left side	80.7	--	85	
Enclosure right side	78.5	--	85	
Enclosure front side	79.3	--	85	
Main board:				
Terminal block (J1)	84.7	--	60/105	Temperature of the TERMINALS exceeds 60°C, the temperature rating is provided on manual.
RJ45 connector (U5) rear metal case	85.1	--	105	
C137 body	89.0	--	105	
L8 body	96.1	--	125	

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10	TABLE: Temperature Measurements (Thermocouple method)			Pass
PCB near D3	98.5	--	130	
PCB near U2	95.2	--	130	
PCB near U3	99.2	--	130	
PCB near U8	96.6	--	130	
Side board:				
Internal connector (J2)	97.0	--	--	
L1 body	102.0	--	125	
L3 body	96.7	--	125	
C2 body	98.7	--	125	
PWB near U1	84.1	--	130	
Supplementary information:				
Where: t_m = measured temperature				
t_c = t_m corrected ($t_m - t_a + 40$ °C or max. RATED ambient)				
t_{max} = maximum permitted temperature				
[X] 61010-2-201, 2 nd ed Ambient Temperature measurement:				
Location <u>Left side</u> Ambient <u>75.4</u> Distance from enclosure <u>35</u> mm				
Location <u>Right side</u> Ambient <u>75.7</u> Distance from enclosure <u>35</u> mm				
Location <u>Front side</u> Ambient <u>75.1</u> Distance from enclosure <u>35</u> mm				

The temperatures measured [did not] [~~did~~] exceed the limits in Table 19 and Table 20 at an ambient of 40° C

[] Indicate reason for test termination:

[X] Temperature stabilization determined by no change in temperature for 2 readings 60 minutes apart.

[] Test terminated because _____.

Datasheets - (002) Datasheet (A1)

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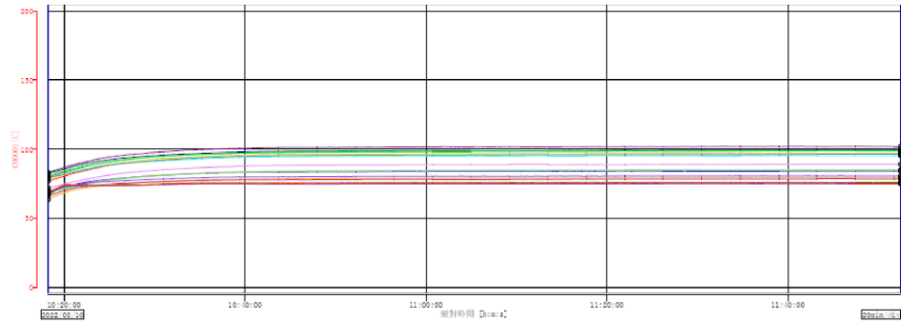
Example: Temperature Stabilization e.g. Temperature raise less than 2 degree C
within 1 hour, (from 60601-1 and 60950, CTL DSH 335 (61010-1))

Note: If equipment is rated higher than 40° C the temperature may have to be
repeated at this elevated temperature.

Note: 61010-2-201, 2nd ed - All testing to be conduct at rated ambient except for
large equipment.

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Table with columns: 溫度名稱, 單位, 溫度, P-F, 溫度, 單位. It lists various temperature points and their corresponding values and units.



12Vdc/Single Input, PWR2

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Datasheets - (002) Datasheet (A1)

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TEMPERATURE TEST (10.1-10.4)

(61010-2-201, 2ND ED. 10.4.1.100-10.4.1.103) (CONT'D):

Ambient Temperature, °C 23 Ambient Humidity, % 53 Ambient Pressure, mBar 1005

RESULTS

Part / Location	t _m °C	t _c °C	t _{max} °C	Comments
10 TABLE: Temperature Measurements (Thermocouple method) Pass				
Frequency (Hz)	DC			-
Voltage (V)	48Vdc/Single Input, PWR2			-
Test room ambient temperature (t _a) (°C) :	75			-
Test duration (h min)	1hr19min			-
SAT, Left side of the sample	75.6	--	75	25 mm ~50 mm away from sample
SAT, Right side of the sample	76.0	--	75	25 mm ~50 mm away from sample
SAT, Front side of the sample	75.3	--	75	25 mm ~50 mm away from sample
Enclosure left side	81.4	--	85	
Enclosure right side	79.2	--	85	
Enclosure front side	79.7	--	85	
Cable (near terminal)	76.2	--	105	
Main board				
Terminal block (J1)	86.6	--	60/105	Temperature of the TERMINALS exceeds 60°C, the temperature rating is provided on manual.
RJ45 connector (U5) rear metal case	85.9	--	105	
C137 body	92.5	--	105	

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10	TABLE: Temperature Measurements (Thermocouple method)			Pass
L8 body	93.7	--	125	
PCB near D3	98.8	--	130	
PCB near U2	96.2	--	130	
PCB near U3	101.8	--	130	
PCB near U8	101.0	--	130	
Side board				
Internal connector (J2)	102.5	--	--	
L1 body	117.6	--	125	
L3 body	102.7	--	125	
C2 body	107.9	--	125	
PWB near U1	88.4	--	130	
Supplementary information:				
Where: t_m = measured temperature				
t_c = t_m corrected ($t_m - t_a + 40$ °C or max. RATED ambient)				
t_{max} = maximum permitted temperature				
[X] 61010-2-201, 2 nd ed Ambient Temperature measurement:				
Location <u>Left side</u> Ambient <u>75.6</u> Distance from enclosure <u>35</u> mm				
Location <u>Right side</u> Ambient <u>76.0</u> Distance from enclosure <u>35</u> mm				
Location <u>Front side</u> Ambient <u>75.3</u> Distance from enclosure <u>35</u> mm				

The temperatures measured [did not] [~~did~~] exceed the limits in Table 19 and Table 20 at an ambient of 40° C

[] Indicate reason for test termination:

[X] Temperature stabilization determined by no change in temperature for 2 readings 60 minutes apart.

[] Test terminated because _____.

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Example: Temperature Stabilization e.g. Temperature raise less than 2 degree C
within 1 hour, (from 60601-1 and 60950, CTL DSH 335 (61010-1))

Note: If equipment is rated higher than 40° C the temperature may have to be
repeated at this elevated temperature.

Note: 61010-2-201, 2nd ed - All testing to be conduct at rated ambient except for
large equipment.

Datasheets - (002) Datasheet (A1)

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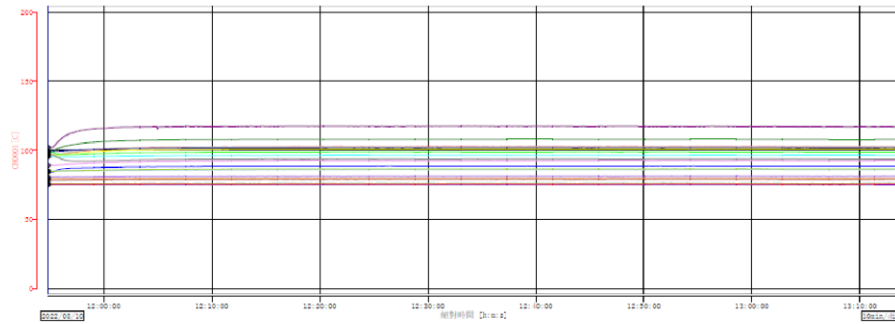
Tested by: Eddie Lee

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計算時間 : 2022/03/10 11:51:50.000 - 2022/03/10 13:13:41.000 (UTC+08:00)

列幅範囲 : 1227.0

項目	最小	最大	P-P	規格	規格
CH0001-C	75.3	75.6	0.3	75.1	75.1
CH0002-C	75.0	75.0	0.1	75.3	75.3
CH0003-C	75.0	75.3	0.3	75.1	75.1
CH0004-C	75.1	75.1	0.3	75.2	75.2
CH0005-C	75.8	75.2	0.3	75.0	75.0
CH0006-C	75.3	75.7	0.1	75.5	75.5
CH0007-C	75.3	75.5	0.3	75.2	75.2
CH0008-C	75.7	75.9	0.2	75.5	75.5
CH0009-C	80.3	80.3	0.2	80.1	80.1
CH0010-C	80.3	80.7	0.2	80.3	80.3
CH0011-C	80.7	80.0	0.1	80.0	80.0
CH0012-C	85.0	85.2	0.2	85.1	85.1
CH0013-C	100.5	100.0	0.3	100.7	100.7
CH0014-C	100.2	100.0	0.2	100.9	100.9
CH0015-C	100.2	100.5	0.3	100.1	100.1
CH0016-C	110.9	117.5	0.7	117.3	117.3
CH0017-C	100.1	100.7	0.3	100.5	100.5
CH0018-C	107.2	107.9	0.1	107.9	107.9
CH0019-C	88.2	88.1	0.2	88.3	88.3



48Vdc/Single Input, PWR2

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Table 19 – Surface temperature limits in NORMAL CONDITION

Part	Limit °C
1 Outer surface of ENCLOSURE (unintentional contact)	
a) metal, uncoated or anodized	65
b) metal, coated (paint, non metallic)	80
c) plastics	85
d) glass and ceramics	80
e) small areas (<2 cm ²) that are not likely to be touched in NORMAL USE	100
2 Knobs and handles (NORMAL USE contact)	
a) metal	55
b) plastics	70
c) glass and ceramics	65
d) non-metallic parts that in NORMAL USE are held only for short periods (1 s – 4 s)	70
NOTE EN 563 gives information about the effect of the duration of contact.	

Table 20 – Maximum temperatures for insulation material of windings

Class of insulation (see IEC 60085)	NORMAL CONDITION °C	SINGLE FAULT CONDITION °C
Class A	105	150
Class B	130	175
Class E	120	165
Class F	155	190
Class H	180	210

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TABLE 19 - 61010-2-201

Part	ENCLOSED EQUIPMENT °C	OPEN EQUIPMENT °C
1 Outer surface of ENCLOSURE or barrier (unintentional contact)	65	70
a) metal uncoated or anodized	80	85
b) metal coated (paint, non-metallic)	85	85
c) plastics	80	85
d) glass and ceramics	100	100
e) small areas (2 cm ²) that are not likely to be touched in NORMAL USE		
2 Knobs and handles (NORMAL USE contact)		
a) metal	55	55
b) plastics	70	70
c) glass and ceramics	65	70
d) non-metallic parts that in NORMAL USE are held only for short periods (1 s-4 s)	70	85
NOTE 1 NORMAL USE contact could be surfaces touched by an OPERATOR in NORMAL USE or by SERVICE PERSONNEL.		
NOTE 2 This table is based on IEC Guide 117:2010.		

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~~TEMPERATURE TEST (10.1-10.4)
 (61010-2-201,2ND ED. 10.4.1.100-10.4.1.103) (CONT'D)~~

Ambient Temperature, °C _____ Ambient Humidity, % _____ Ambient Pressure, mBar _____

~~CHANGE-OF-RESISTANCE CALCULATIONS~~

~~FORMULA: $\Delta T = \frac{(R_{warm} - R_{cold}) (K + t_1) - (t_2 - t_1)}{R_{cold}}$~~

- ~~Where: ΔT is the temperature rise of the coil.
 R_{warm} is the hot resistance of the coil.
 R_{cold} is the cold resistance of the coil.
 K is 234.5 for copper and 225.0 for aluminum.
 T_1 is the room ambient when the cold measurements were made.
 T_2 is the room ambient when the hot measurements were made.~~

10.2		TABLE: Temperature of windings (Resistance method)					
Frequency (Hz)						-	
Voltage (V)						-	
Test room ambient temperature (t_{a1}/t_{a2}) (°C)						-	
Test duration (h min)						-	
Part / Designation	R_{cold} (Ω)	R_{warm} (Ω)	Current (A)	t_c (K)	t_c^* (°C)	t_{max} (°C)	Comments

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Supplementary information:

$$t_c = t_x \text{ corrected } (t_c = t_x - (t_{a2} - t_{a1}) + [40 \text{ }^\circ\text{C or max RATED ambient}])$$

CERTIFICATE OF COMPLIANCE

Certificate Number 2019-11-20; 2022-11-24 (A1)-E331061
Report Reference E331061-D1009-1/A1/C0-UL
Date 2019-11-20; 2022-11-24 (A1)

Issued to: ORING INDUSTRIAL NETWORKING CORP
Applicant Company: 3F 542-2 ZHONGZHENG RD XINDIAN DISTRICT
NEW TAIPEI CITY, 231 TAIWAN

Listed Company: Same as Applicant

This is to certify that representative samples of Open type, Industrial Ethernet Switch
IGS-150B

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 61010-1, 3rd Edition, May 11, 2012, Revised April 29, 2016
CAN/CSA-C22.2 No. 61010-1-12, 3rd Edition, Revision dated April 2016

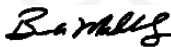
Additional Standards: UL 61010-2-201 (First Edition) dated 2017-02-20
CAN/CSA C22.2 No. 61010-2-201 dated 2014-02

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information.

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Bruce Mahrenholz, Director North American Certification Program

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