



P-DUKE POWER

MAD50 Series

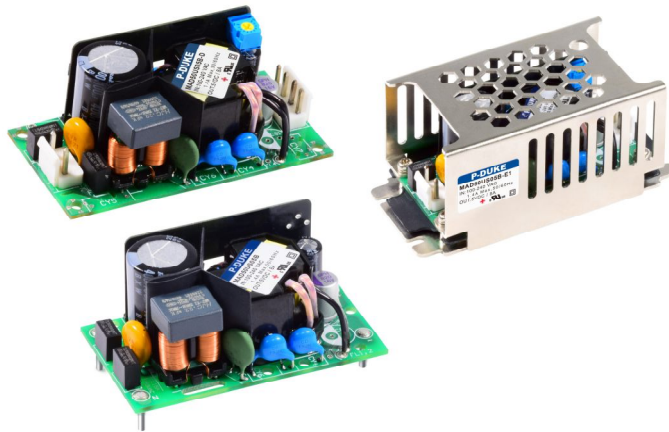
AC-DC POWER SUPPLIES
Up to 50 Watts

5
YEARS
WARRANTY

ROHS
COMPLIANT

REACH
COMPLIANT

+85°C
-40°C
AMBIENT TEMP.



Medical



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



PV



Railway



2
X
MOPP

PEAK
POWER

4000
VAC
Reinforced
Insulation

ADJ.
Output
Voltage

Internal
EN55032
Class
B

LOW
Leakage
Current

LOW
Standby
Power

Operating
Altitude
5000
meter

Protection
Class I
Class II

OCP

OVP

SCP

PART NUMBER STRUCTURE

MAD50	U	S	12	B	-	J	□
Series Name	Input Voltage (VAC)	Output Quantity	Output Voltage (VDC)	Protection Type		Connector Options	Package Options
	U: Universal 85 ~ 264	S: Single	05:5 7P5:7.5 09:9 12:12 15:15 18:18 24:24 36:36 48:48 53:53	A: CLASS I B: CLASS II		J: JST M: Molex T: Terminal Block D: Pin Type* *(Only for CLASS II)	□: Open type E1: Enclosed type

TECHNICAL SPECIFICATION All specifications are typical at 230VAC input, full load and 25°C unless otherwise noted

Model Number	Input Range	Output Voltage	Output Current Natural Convection	Max. Output Power	Input Power @No Load	Efficiency	Maximum Capacitor Load
	VAC	VDC	mA	W	mW	%	μF
MAD50US05B	85 ~ 264	5	8000	40	50	90.5	16000
MAD50US7P5B	85 ~ 264	7.5	6670	50	50	90.5	8900
MAD50US09B	85 ~ 264	9	5560	50	50	90.5	6200
MAD50US12B	85 ~ 264	12	4170	50	50	92.5	3500
MAD50US15B	85 ~ 264	15	3340	50	50	92.5	2300
MAD50US18B	85 ~ 264	18	2780	50	100	92.5	1600
MAD50US24B	85 ~ 264	24	2085	50	100	92.5	870
MAD50US36B	85 ~ 264	36	1390	50	100	91.5	390
MAD50US48B	85 ~ 264	48	1045	50	100	91.5	220
MAD50US53B	85 ~ 264	53	950	50	100	91.5	180

INPUT SPECIFICATIONS						
Parameter	Conditions	Min.	Typ.	Max.	Unit	
Operating input voltage range	AC input	85		264	VAC	
	DC input	120		370	VDC	
Input frequency	AC input	47		63	Hz	
Input current	100VAC and Full Load			1.4	A	
	240VAC and Full Load			0.8	A	
Leakage current	264VAC			100	μA	
Start up time				1000	ms	
Rise time			15		ms	
Hold up time	115VAC and Full Load		12		ms	
Input inrush current	230VAC		60		A	
Input protection	Internal fuse		T3.15A/250VAC			

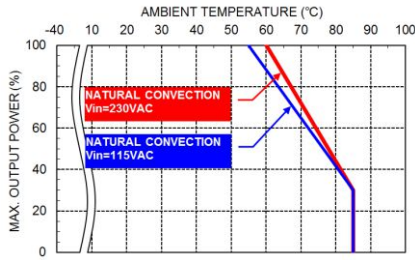
OUTPUT SPECIFICATIONS						
Parameter	Conditions	Min.	Typ.	Max.	Unit	
Output power	Full Load				40	Watts
					50	
Output peak power	Peak power				56	Watts
					65	
					70	
	Peak power time			5	s	
	Peak power duty			20	%	
Average operation power (% of Full Load)			70	%		
Initial set voltage accuracy	230VAC and Full Load	-1.0		+1.0	%	
Line regulation	Low Line to High Line at Full Load	-0.2		+0.2	%	
Load regulation	No Load to Full Load				5Vout	%
					Others	
	10% Load to 90% Load					
					5Vout	%
					Others	
Voltage adjustability	Single output				5Vout, 7.5Vout, 9Vout,	%
					Others	
Minimum load					0	%
Ripple and noise	Measured by 20MHz bandwidth With a 10μF/25V 1206 X7R MLCC				75	mVp-p
					5Vout, 7.5Vout, 9Vout	
					12Vout, 15Vout, 18Vout	
					100	
	With a 1μF/50V 1206 X7R MLCC				100	%
					24Vout, 36Vout	
	With a 0.1μF/100V 1206 X7R MLCC				100	
Temperature coefficient					-0.02	+0.02 %/°C
Transient response	Load step from 50 ~ 75% change at 2.5A/μs	Peak deviation			3	%Vout
					Recovery time	
Over voltage protection	% of Vout(nom); Latch mode				115	135 %
Over load protection	% of Iout rated; Hiccup mode				165	%
Short circuit protection					Continuous, automatics recovery	

GENERAL SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute (2MOPP insulation)	Input to Output	4000			VAC
		Input (Output) to F.G.	2500			
Isolation resistance	500VDC		0.1			GΩ
Switching frequency	230VAC	5Vout	70		95	kHz
		7.5Vout	95		120	
		Others	110		135	
Safety approvals (Pending)			IEC/ EN/ ANSI/AAMI ES 60601-1 IEC/ EN/ UL 62368-1			
Weight		Open type				78g (2.75oz)
		Enclosed type				175g(6.18oz)
		Pin type				75g(2.65oz)
MTBF	MIL-HDBK-217F, Full load					1.487 x 10 ⁶ hrs

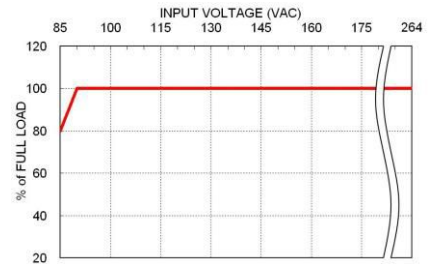
ENVIRONMENTAL SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Natural convection	With derating	-40		+85	°C
Storage temperature range			-40		+85	°C
Operating altitude					5000	m
Shock						IEC60068-2-27
Vibration						IEC60068-2-6
Relative humidity	Non-condensing					5% to 95% RH

EMC SPECIFICATIONS			
Parameter	Conditions		Level
EMI	EN55011, EN55032, EN60601-1-2 and FCC Part 18 / 15		Conducted
	External components may be required for class I application.		Radiated
			Class B Class B
Harmonic currents	EN61000-3-2	Full Load	Class A
Voltage flicker	EN61000-3-3		
EMS	EN55035 and EN60601-1-2		
ESD	EN61000-4-2		
Radiated immunity	EN61000-4-3	20 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV	Perf. Criteria A
Surge	EN61000-4-5	DM ± 1kV and CM ± 2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	20 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	10 A/m	Perf. Criteria A
Dip and interruptions	EN61000-4-11		

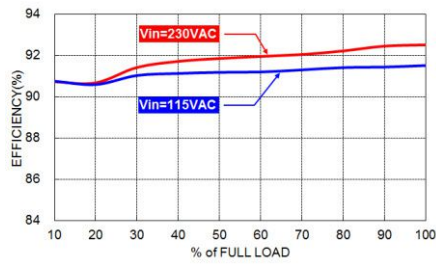
CHARACTERISTIC CURVE



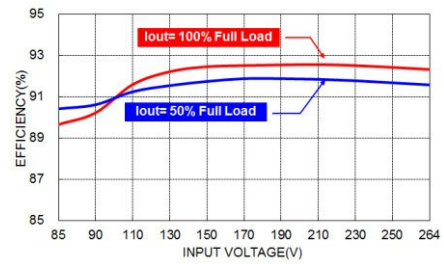
Derating Curve vs. Ambient Temperature



Derating Curve vs. Input Voltage



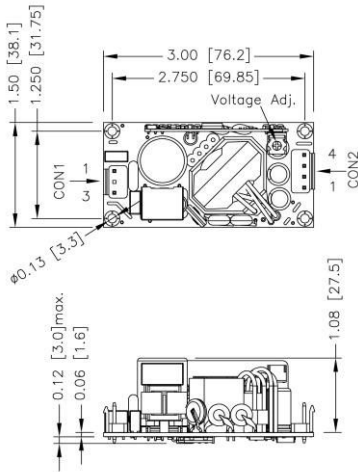
MAD50US12 Efficiency VS Output Load



MAD50US12 Efficiency vs. Input Voltage

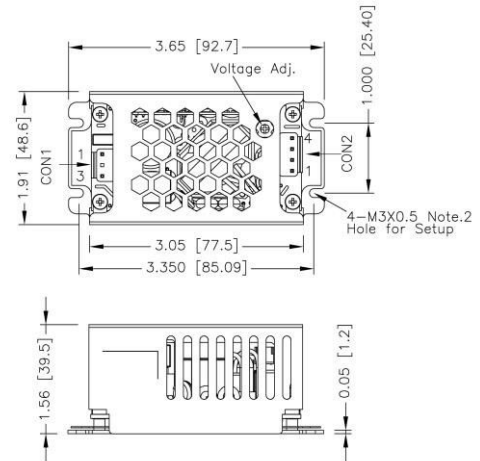
MECHANICAL DRAWING

MAD Open type



FRONT VIEW

MAD -E1 Enclosed type



BOTTOM VIEW

1.All dimensions in inch [mm]

Tolerance : x.xx±0.02 [x.x±0.5]

x.xxx±0.01 [x.xx±0.25]

2.The screw locked torque: MAX 3.4Kgf-cm/0.33N-m

3.The screws holes can be considered as PE connection for CLASS I application.

1.All dimensions in inch [mm]

Tolerance : x.xx±0.02 [x.x±0.5]

x.xxx±0.01 [x.xx±0.25]

2.The screw locked torque: MAX 4.2Kgf-cm/0.41N-m

CONNECTORS CONNECTIONS

CON1 – Input Connector	
Pin Number	AC Input
Pin 1	Line
Pin 3	Neutral

CON2 – Output Connector	
Pin 1,2	-Vout
Pin 3,4	+Vout

CONNECTOR OPTIONS

-J

JST Type

Mates with housing

CON1: **VHR-3N**

CON2: **VHR-4N**



Crimp terminals

CON1: **SVH-21T-P1.1**

CON2: **SVH-21T-P1.1**

-M

Molex Type

Mates with housing

CON1: **09-50-8031**

CON2: **09-50-8041**



Crimp terminals

CON1: **SD-2478**

CON2: **SD-2478**

-T

Terminal Block

Mates with

Screw locked torque

MAX 2Kgf.cm/0.2N.m

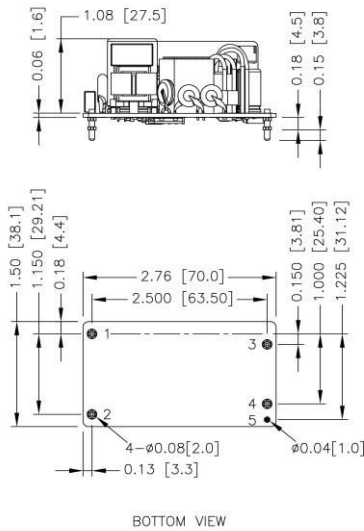


Wire dimension range

26 ~ 18AWG

MECHANICAL DRAWING

MAD -D Pin type



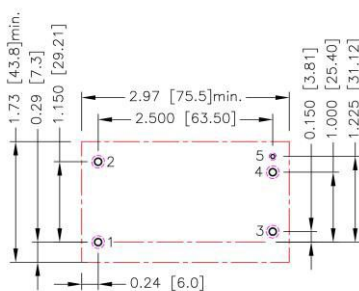
PIN CONNECTION

PIN	DEFINE
1	Neutral
2	Line
3	-Vout
4	+Vout
5	Trim

- All dimensions in inch [mm]
Tolerance :x.xx \pm 0.02 [x.x \pm 0.5]
x.xxx \pm 0.01 [x.xx \pm 0.25]
- Pin dimension tolerance \pm 0.004[0.10]

RECOMMENDED PAD LAYOUT

MAD -D Pin type



- All dimensions in inch[mm]
Pad size(lead free recommended)
Through hole 5: ϕ 0.051[1.30]
Through hole 1.2.3.4: ϕ 0.091[2.30]
Top view pad 5: ϕ 0.064[1.63]
Top view pad 1.2.3.4: ϕ 0.113[2.88]
Bottom view pad 5: ϕ 0.102[2.60]
Bottom view pad 1.2.3.4: ϕ 0.181[4.60]