晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR
LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	**AM-800600LTNQW-TDFH**
APPROVED BY	
DATE	

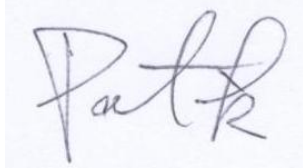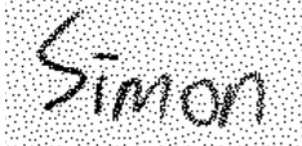☐Approved For Specifications

☐Approved For Specifications & Sample

AMPIRE CO., LTD.

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APPROVED BY	CHECKED BY	ORGANIZED BY
	Simon	

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2015/11/09	-	New Release	Emil
2016/1/15	-	Corrected the input power supply of VLED to 4.2V~6V.	Emil
2016/1/18	8,10	Corrected the input condition of LED driver circuit.	Emil

1. INSTRUCTION

Ampire 10.4" Display Module is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD panel and LED Backlight. This TFT-LCD has a high resolution (800(R.G.B) X 600) and can display up to 262,144 colors.

1.1 Features

(1) Construction: a-Si TFT-LCD with driving system, White LED Backlight, 4 Wire-Resister Touch Panel and LED Driver IC.

(2) LCD type : Transmissive , Normally White

(3) Number of the Colors : 262K colors (R,G,B 6 bit digital each)

(4) LVDS Interface.

(5) LCD Power Supply Voltage : 3.3V

(6) Build-in LED Driver IC (VLED=4.2V~6V).

(7) TAN capacitor should not be used.

(8) Part No. of LED driver C: G5968C.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	800RGB (W) x 600(H)	dots
Active area	211.2 (W) x 158.4(H)	mm
Pixel pitch	264 (W) x 264 (H)	um
Color configuration	R.G.B -stripe	
Overall dimension	236.0(W)x176.9(H)x12.82(D)	mm
Weight	430	g
Brightness	240	cd/m^2
Backlight unit	LED	
Display color	262,144	colors

3. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit
Power Voltage	VCC	-0.3	6	V
	VLED	-0.3	6	V
Temperature Range	Operation	-20	70	℃
	Storage	-30	80	℃

(1). All of the voltages listed above are with respective to GND =0V

(2). Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

4. OPTICAL CHARACTERISTICS

Item			Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Response Time			$T_r + T_f$	$\Theta=\Phi=0°$	-	25	50	ms	(1)
Contrast ratio			CR		300	400	-	-	(2)(3)
Viewing Angle	Vertical	ΘT		CR≧10	35	45	-	Deg.	(5)
		ΘB			55	65	-		
	Horizontal	ΘL			55	65	-		
		ΘR			55	65	-		
Luminance			L		200	240	-	cd/m²	(3)(6)(7)
Luminance Uniformity			ΔL		-	80	-	%	(4)
transmittance ratio of touch panel			-		80	-	-	%	
Chormaticity	Red	Rx		$\Theta=\Phi=0°$	0.550	0.600	0.650	-	
		Ry			0.296	0.364	0.396		
	Green	Gx			0.283	0.333	0.383		
		Gy			0.516	0.566	0.616		
	Blue	Bx			0.092	0.142	0.192		
		By			0.065	0.115	0.165		
	White	Wx			0.259	0.309	0.359		
		Wy			0.284	0.334	0.384		

NOTE :

● These items are measured by BM-5A(TOPCON) or CA-1000(MINOLTA) in the dark room (no ambient light) After 5 minutes operation, the optical properties are measured at the center point of the LCD screen.
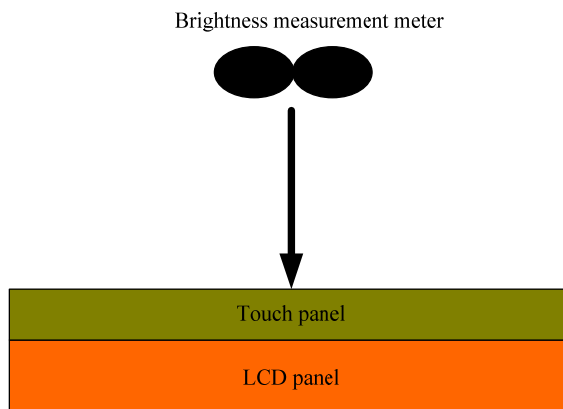
(1) Definition of Response Time (White-Black)
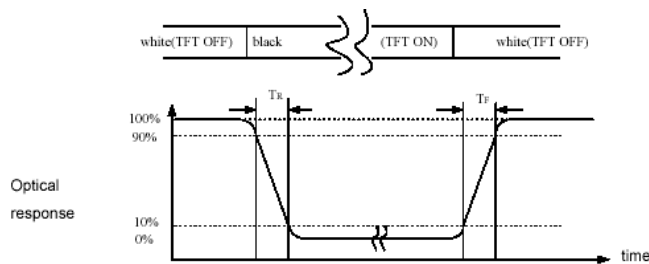
(2) Definition of Contrast Ratio

Contrast ratio is calculated with the following formula:

Contrast Ratio(CR)=(White)Luminance of ON ÷ (Black)Luminance of OFF

(3) Definition of Luminance:

Measure the luminance of white state at center point via touch panel.

Brightness measurement meter

Touch panel

LCD panel

(4)Definition of Luminance Uniformity:
Measured Maximum luminance [L(MAX)] and Minimum luminance[L(MIN)] on the 9 points.

Luminance Uniformity is calculated with the following formula:
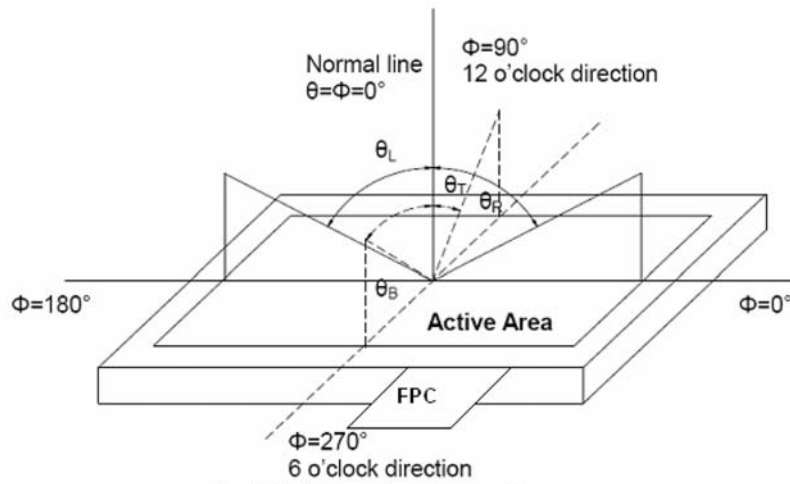**ΔL =[L(MIN)   / L (MAX)] X 100%**

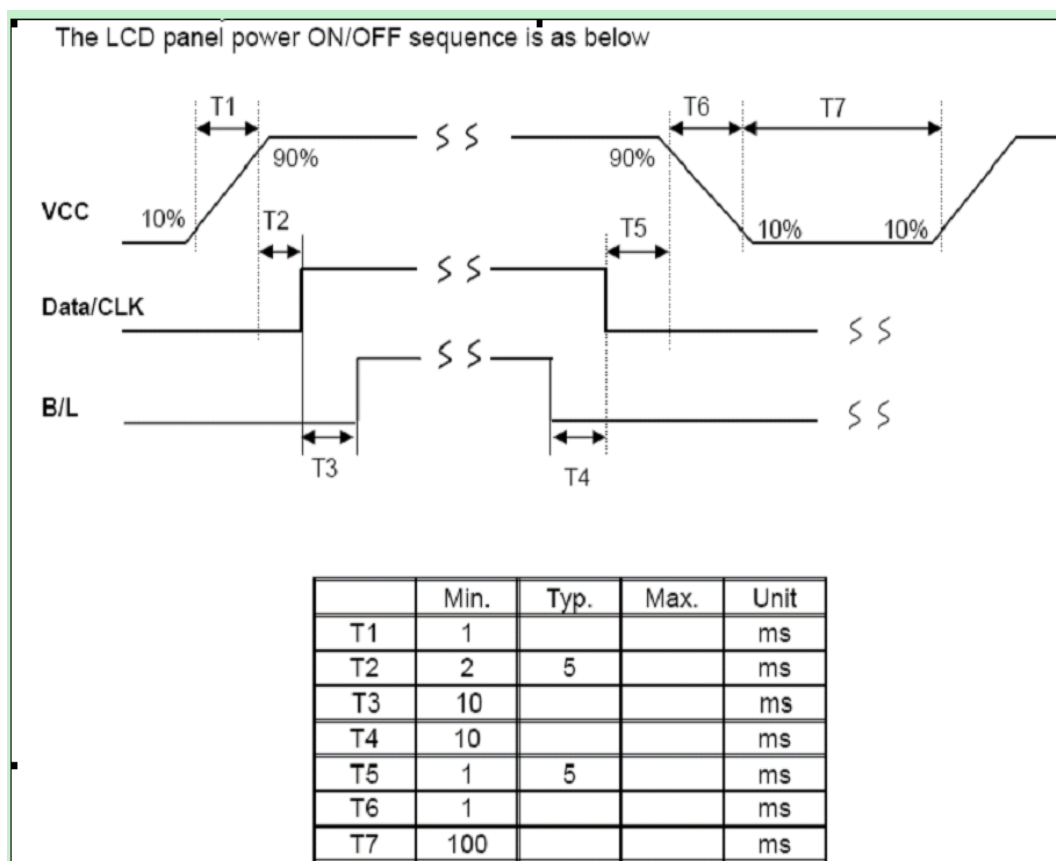(5)Definition of Viewing Angle

Fig. 1 Definition of viewing angle

(6)Following Luminance is brightness of LCD via Touch Panel on center point

(7)Rough image that show measurement of brightness of LCD via Touch Panel.

5. ELECTRICAL CHARACTERISTICS

5.1 TFT LCD Module voltage

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Voltage For LCD	V_{CC}	3.0	3.3	3.6	V	
Digital Supply current Consumption	IV_{CC}		290		mA	Black Pattern
Logic Input Voltage	VIH	VCC*0.7	--	VCC	V	
	VIL	0	--	VCC*0.3	V	

The LCD panel power ON/OFF sequence is as below

	Min.	Typ.	Max.	Unit
T1	1			ms
T2	2	5		ms
T3	10			ms
T4	10			ms
T5	1	5		ms
T6	1			ms
T7	100			ms

5.2 Backlight Driving Circuit

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Driver Power Voltage	V$_{LED}$	4.2	5	6	V	
LED Current	I$_{LED}$	--	90	--	mA	Note1
LED Life Time(MTBF)		30K	--	--	Hr	Note2
LED Driver Power Current	I$_{LED}$(VLED=5V)	-	500	--	mA	Ta=25℃
PWM Dimming DC active level	V$_{ADJH}$	1.5	-	6	V	
	V$_{ADJL}$	-	-	0.6	V	
PWM Dimming Freq.	F$_{ADJ}$	0.2		20	kHz	
EN Pin High Voltage	V$_{ADJH}$	1.4		--	V	
EN Pin Low Voltage	V$_{ADJL}$	--		0.8	V	

Note 1 : There are 6 Groups LED shown as below ,
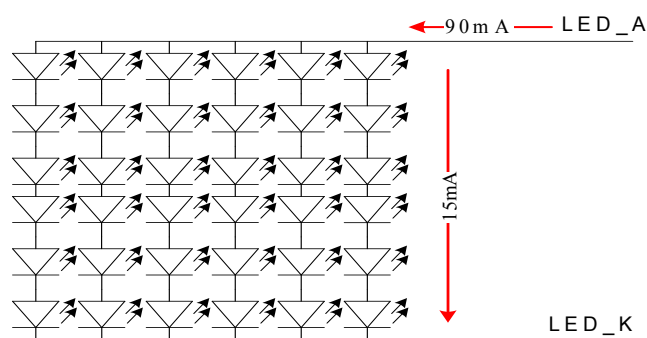
| Item	Symbol	Value			Unit
		Min.	Typ.	Max.	
Forward voltage of bare LED backlight	VBL	17.7	19.2	20.7	V
Forward current of bare LED backlight	IBL_total	-	90	120	mA
Forward current of one LED dice	IBL_each	-	15	20	mA
Switching frequency of LED driverIC	FBL_OSC	900	1000	1350	kHz

Note2 : Condition: Ta=25℃, continuous lighting

　　　Life time is estimated data.

　　　Definitions of failure:

　　　1. LCM brightness becomes half of the minimum value.

　　　2. LED doesn't light normally.
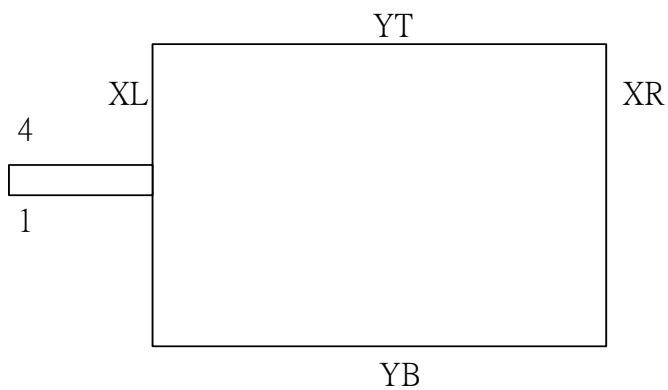
5.3 PWM Dimming Control
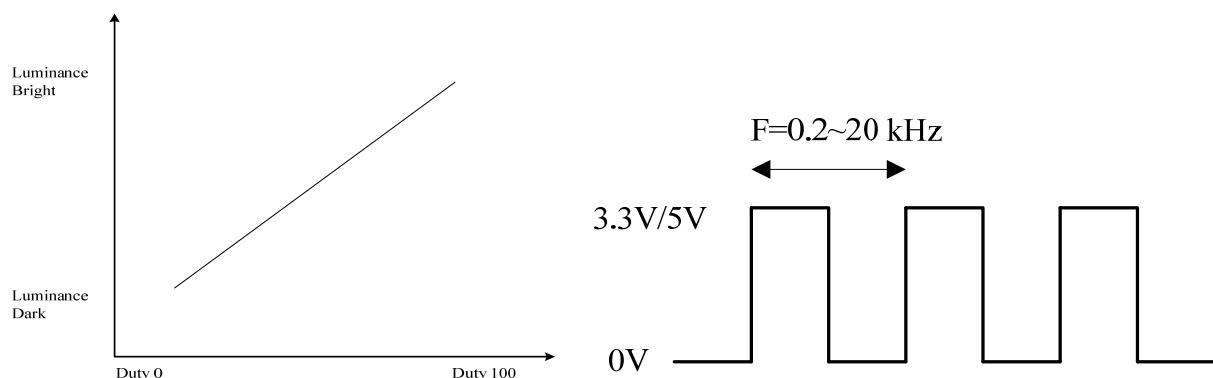
5.4 TOUCH PANEL ELECTRICAL SPECIFICATION

Interface

No.	Symbol	Function
1	YB	Touch Panel Bottom Signal in Y Axis
2	XL	Touch Panel Left Signal in X Axis
3	YT	Touch Panel Top Signal in Y Axis
4	XR	Touch Panel Right Signal in X Axis

For further more detail please refer the chapter 13.

6. INTERFACE

LVDS INTERFACE CN3: HRS DF19K-20P 1H

Pin No.	Symbol	I/O	Description	Note
1	VDD	P	Power supply for digital circuit (3.3V)	
2	VDD	P	Power supply for digital circuit (3.3V)	
3	GND	P	Power ground	
4	GND	P	Power ground	
5	IN0-	I	LVDS receiver negative signal channel 0	
6	IN0+	I	LVDS receiver positive signal channel 0	
7	GND	P	Power ground	
8	IN1-	I	LVDS receiver negative signal channel 1	
9	IN1+	I	LVDS receiver positive signal channel 1	
10	GND	P	Power ground	
11	IN2-	I	LVDS receiver negative signal channel 2	
12	IN2+	I	LVDS receiver positive signal channel 2	
13	GND	P	Power ground	
14	CLK-	I	LVDS receiver negative signal clock	
15	CLK+	I	LVDS receiver positive signal clock	
16	GND	P	Power ground	
17	NC	-	No connection	
18	NC	-	No connection	
19	GND	P	Power ground	
20	GND	P	Power ground	

CN2: JST SM04B-SRSS-TB (LF) (SN)

Pin No.	Symbol	I/O	Description	Note
1	VLED	P	Voltage for LED circuit (4.2V~6.0V)	
2	LED_EN	I	LED BLU ON/OFF	ACTIVE HIGH
3	GND	P	Power ground	
4	ADJ	I	Adjust the LED brightness by PWM	Note1

Note1:

$F=0.2\sim20$ kHz

4.2V/5V

0V
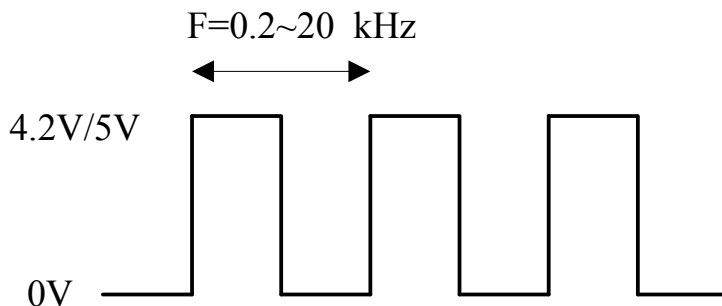
7. AC Timing characteristic

7-1 Timing Specification.

Item	Symbol	Min	Typ	Max	Unit	Condition
Clock period	tLVCP	20.0	25	31.25	ns	
Clock high time	tLVCH	-	14.29	-	ns	
Clock low time	tLVCL	-	10.71	-	ns	
PLL wake-up time	tLVPLL	-	-	1	ms	
Input skew margin	tLVSKM	400	-	-	ps	f=85MHz

Table 5.1 timing parameter
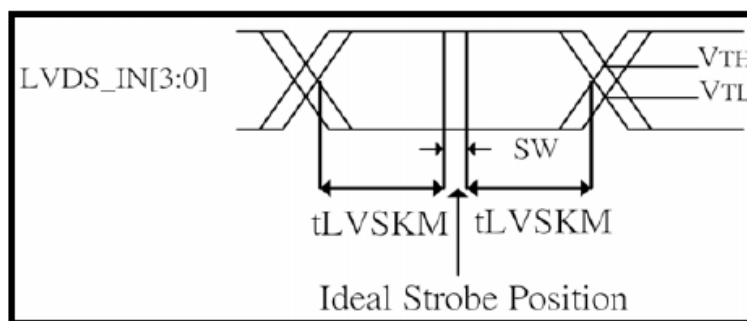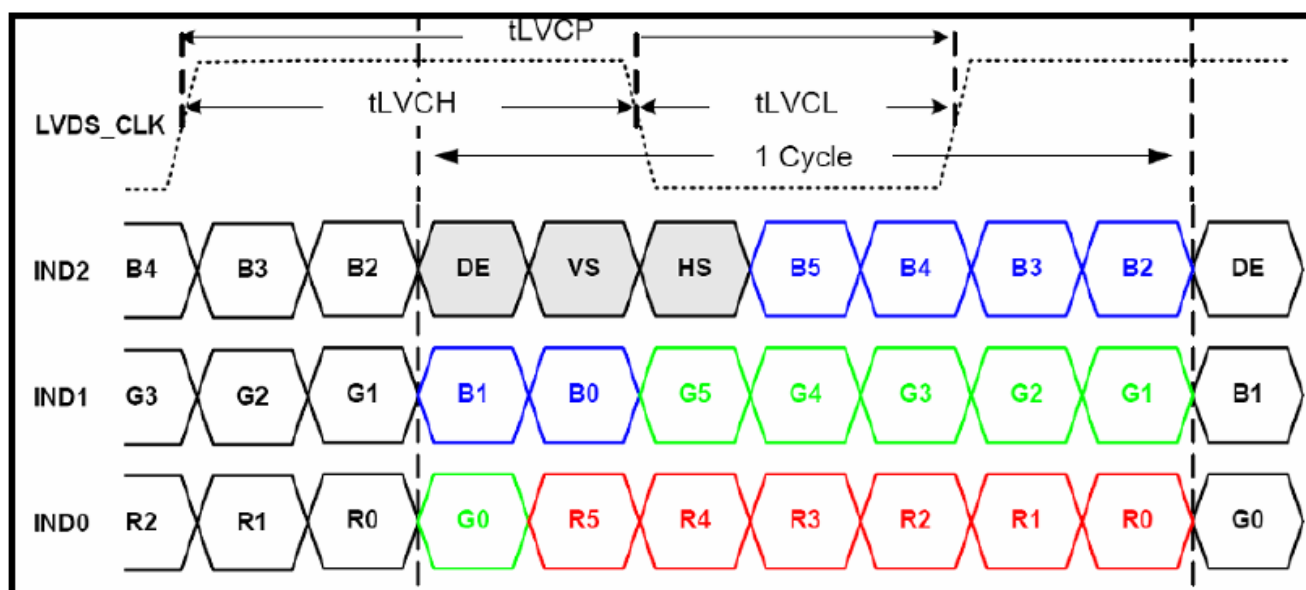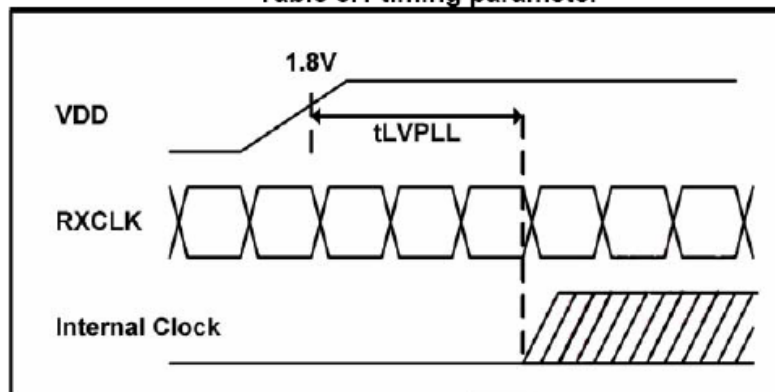
7-2 Recommended Input Timing of LVDS transmitter

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Dclk frequency		1/Tclk	32	40	50	MHz	
Horizontal section	Horizontal total	Th	866	1056	1064	Tclk	
	Horizontal blanking	Thb	66	256	264	Tclk	
	Valid Data Width	Thd	800	800	800	Tclk	
Vertical section	Frame rate	-	-	60	70	Hz	
	Vertical total	Tv	604	628	800	Th	
	Vertical blanking	Tvb	4	28	200	Th	
	Valid Data Width	Tvd	600	600	600	Th	

Note: DE signal is necessary.

Input Timing Control Conditions
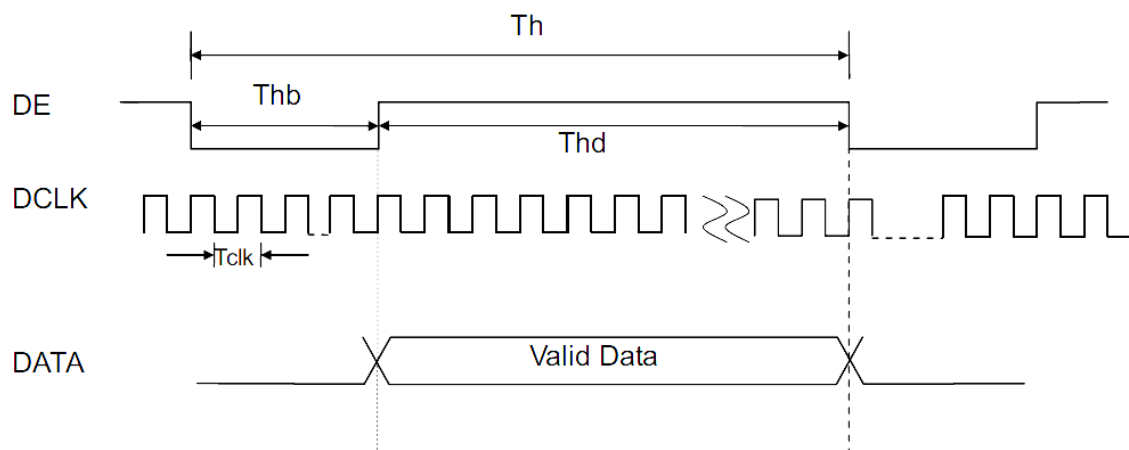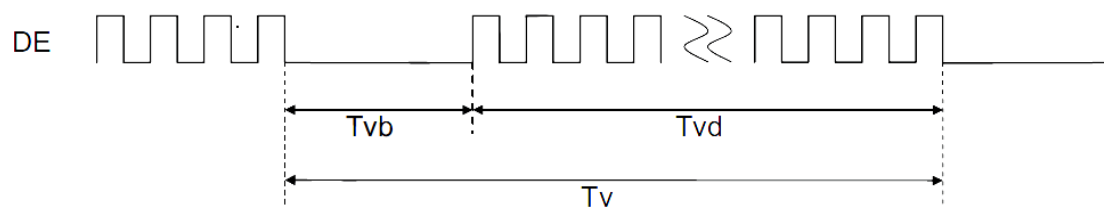
7-3 Power ON/OFF Sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.0V to signal starting	Tp1	0	-	50	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD 3.0V	Tp3	0	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	
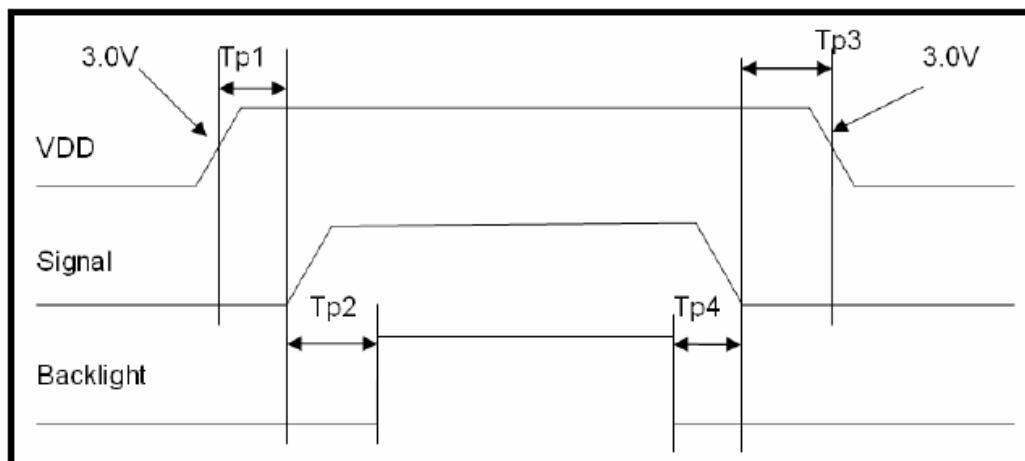
8. Date Code Label and Backlight Driving Board assemble

8.1 Date Code Label

AM800600LT
NQW-TDFH
15.09
D90000

← AMPIRE Part Number: **AM800600LTNQW-TDFH**

← Date code: **15:** 2015 year.　　**09:** 9th week

← Production Lot Number : **D90000**

8.2 Backlight Driving Board assemble
　　a. adhesive location:
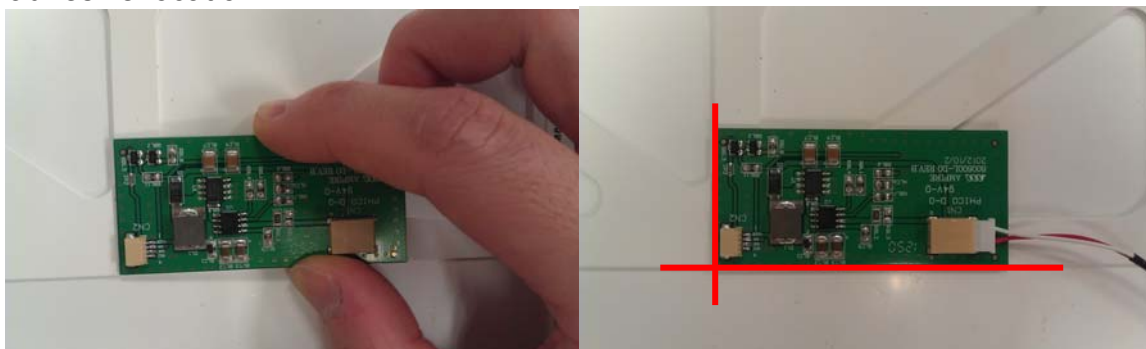
　　b. We use adhesive tape to fix the LED driving PCB on backside of LCM.

　　c. Clean up surface before bonding adhesive tape.

9.Reliability Test

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240 hrs	
Low Temperature Operation	-20±3°C , t=240 hrs	
High Temperature Storage	80±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	60 °C, Humidity 90%, 96 hrs	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions
(15-35°C , 45-65%RH).

10. USE PRECAUTIONS

10.1 Handling precautions

1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.

2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzene and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.

3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.

4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

10.2 Installing precautions

1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. 1MΩ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.

2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.

3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.

4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

10.3 Storage precautions

1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.

2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.

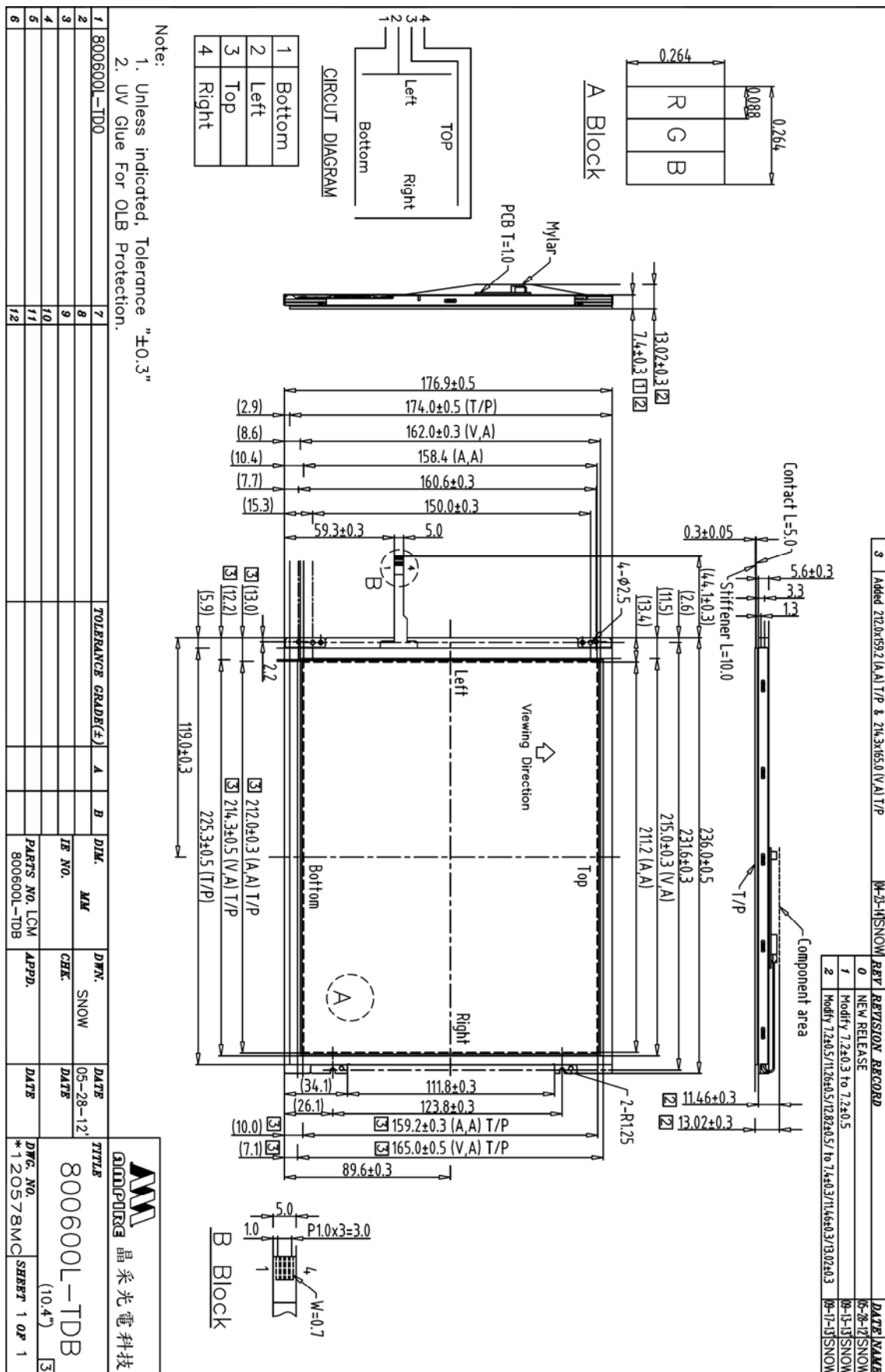3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

10.4 Operating precautions

1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.

2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.

3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC dive voltage.

4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.

5) Make certain that each signal noise level is within the standard (L level: 0.2Vdd or less and H level: 0.8Vdd or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.

6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.

7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.

8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

10.5   Other

1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.

2) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown or the drive is interrupted and left for a while. But this is not a problem on reliability.

3) AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

11. OUTLINE DIMENSION

CN2

1	VLED
2	LED_EN
3	GND
4	ADJ

CN3

1	VDD	11	IN2-
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK-
5	IN0-	15	CLK+
6	IN0+	16	GND
7	GND	17	NC.
8	IN1-	18	NC.
9	IN1+	19	GND
10	GND	20	GND
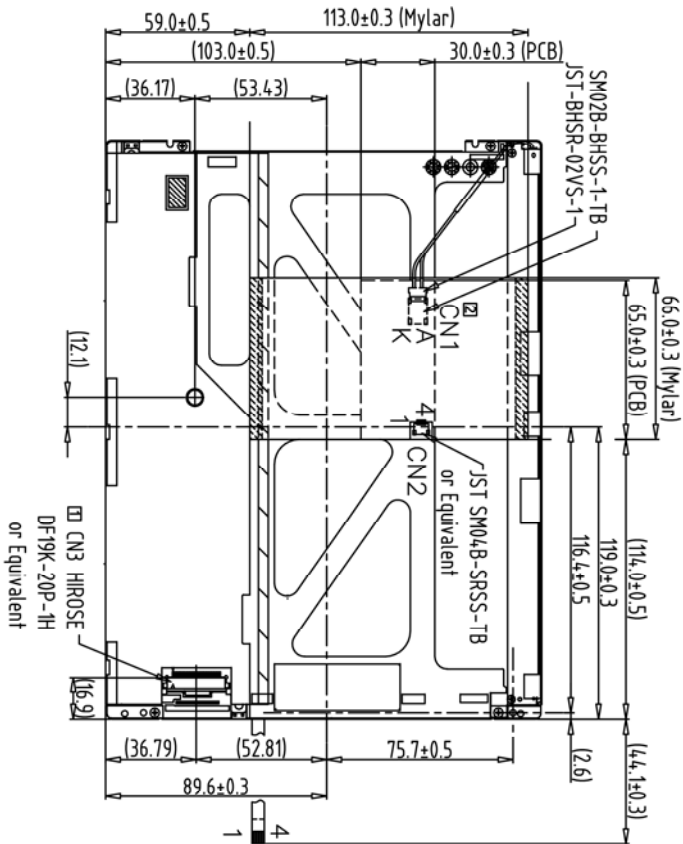
Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.

Back View

SM02B-BHSS-1-TB
JST-BHSR-02VS-1

CN1

JST SM04B-SRSS-TB
or Equivalent

CN2

CN3 HIROSE
DF19K-20P-1H
or Equivalent

59.0±0.5
113.0±0.3 (Mylar)
(103.0±0.5)
30.0±0.3 (PCB)
(36.17)
(53.43)
66.0±0.3 (Mylar)
65.0±0.3 (PCB)
(114.0±0.5)
116.4±0.5
119.0±0.3
(12.1)
(2.6)
(44.1±0.3)
(36.79)
(52.81)
75.7±0.5
89.6±0.3
(16.9)

		TOLERANCE GRADE(±)	A	B	DIM.	MM	DMN.	CHK.	APPD.	DATE
1	800600L-TD0	7								
2		8			IE NO.		SNOW			05-28-12'
3		9								
4		10			PARTS NO. LCM-1					
5		11			800600L-TDB					
6		12								

TOLERANCE GRADE(±)

DIM. MM

DMN. SNOW
DATE 05-28-12'
CHK.
APPD.
DATE

REV	REVISION RECORD	DATE/NAME
0	NEW RELEASE	05-28-12/SNOW
1	Rename CN1 to CN3	01-19-12/SNOW
2	Added CN1	07-24-12/SNOW

TITLE 800600L-TDB (10.4")

DWG. NO. *120579MA

SHEET 1 OF 1

AMPIRE 晶采光電科技

12. Packing

Note:
1. Bag = 1 PCS LCM
2. Carton= 1x 25 = 25 PCS LCM

CTN NO.
MADE IN TAIWAN

ITEM NO:
LCD MODULE
Q.TY: 25 PCS
N.W: 11 KGS
G.W: 13.5 KGS

Size: L x W x H
(527.0x364.0x248.0mm)
Tolerance±10.0

Carton

TOLERANCE GRADE(±)

	A	B	DIM.	MM	DMN.	APPD.	DATE
			IB NO.		CHK.		DATE 07-24-13
					SNOW		DATE
PARTS NO. Packing							
800600L-TDB							

REV	REVISION RECORD		DATE NAME
0	NEW RELEASE		07-24-13 SNOW

AMPIRE 晶采光電科技

TITLE
800600L-TDB
(10.4")

DWG. NO.
*130751SA

SHEET 1 OF 1

1 2 3 4 5 6 7 8 9 10 11 12

13. TOUCH PANEL SPECIFICATION

13-1 Defines of words

Words	Defines
Guaranteed active area	Area to be guaranteed all characteristics stated on this spec.
Boundary line of top enclosure	Recommended boundary line of top enclosure.
View (transparent) area	View area which is inside adhesive zone or electrode pattern. Top enclosure must not be fixed bye this area.
Touch undetected	Area to protect miss-input when top enclosure edge touches the touch panel.

13-2 Characteristics

13-2-1 Optical characteristics

ITEM	SPECIFICATION	REMARKS
TRANSPARENCY	82.5% (Typ.) (Inside of guaranteed active area)	JIS K-7105
HAZE	8±4% (Typ.) Surface : Anti-glare	JIS K-7105

13-2-2 Optical characteristics

ITEM	SPECIFICATION	REMARKS
Operation temperature	-20℃～70℃	Max.wetTemp.is38℃ (no condensation)
Storage temperature	-30℃～80℃	
Operation Humid.	20％～90％ RH	
Storage Humid.	10％～90％ RH	

13-2-3 Mechanical characteristics

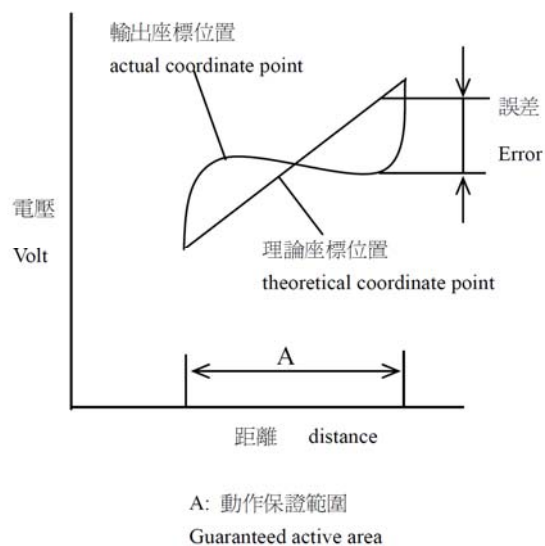| ITEM	SPECIFICATION		REMARKS
Hardness of surface	Pencil hardness 3H.		JIS K-5400
FPC strength	5N (min.)		Peeling upward by 90°
Operation force	Pen		Within" guaranteed active area" ,but not on the age and Dot-Spacer.
	Finger	Max: 80 gf	

13-2-4 Electrical characteristics

ITEM	SPECIFICATION	REMARKS
Rated Voltage	DC 7V max.	
Resistance	X axis：200Ω～1000Ω(Glass)	At connector
	Y axis：100Ω～800Ω(Film)	
Linearity	±2.0% max「initial value」 ±3.5% max「after environmental & lift test」	Refer Note-1
Chattering	20ms Max	At connector
Insulation Resistance	10MΩ min(DC 25V)	

Note-1

Measurement condition of Linearity

Difference between actual voltage & theoretical voltage is an error at any points. Linearity is the value max. Error voltage divided by voltage difference on active area.
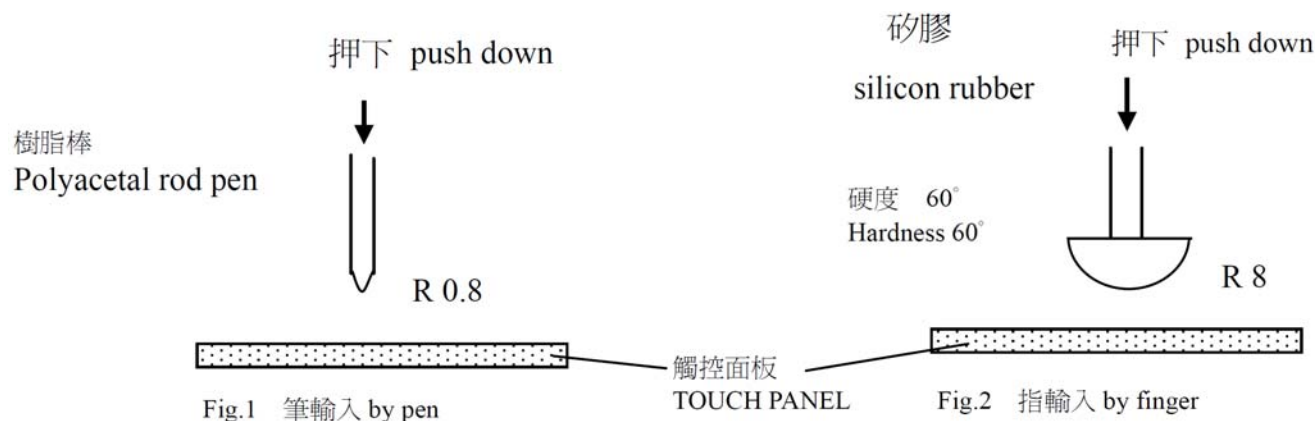
輸出座標位置
actual coordinate point

誤差
Error

電壓
Volt

理論座標位置
theoretical coordinate point

A

距離　distance

A: 動作保證範圍
Guaranteed active area

13-3 life test condition

13-3-1 Mechanical characteristics

ITEM	SPECIFICATION	REMARKS
Notes life	10^5 words min	Within "guaranteed active area"
Input life	10^6 times min	Within "guaranteed active area"

※Measurement condition of operation force

Resistance between X & Y axis must be equal or lower than 2kΩ　（Ron ≦ 2kΩ）。

押下　push down

樹脂棒
Polyacetal rod pen

R 0.8

矽膠
silicon rubber

硬度　60°
Hardness 60°

押下　push down

R 8

觸控面板
TOUCH PANEL

Fig.1　筆輸入 by pen

Fig.2　指輸入 by finger

※Notes life test condition (by pen)

Notes area for pen notes life test is 10×9mm. Size of word is 7.5×6.75mm.

Word is any A.B.C….. word. Center of each word is changed at random in notes area.

● Shape of pen end：R 0.8 (Refer fig.2)

● Materials of pen：Polyacetal

● Load：250g

【judge base 】

Operation force, Insulation resistance & Resistance stated before as 13-2-3 and 13-2-4 must be within spec.

動作保證範圍　Guaranteed active area

筆寫範圍
Note area

9

10
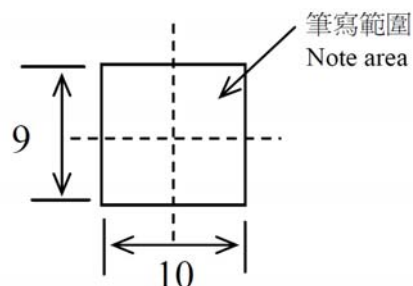
※Input life test condition (by finger)

By silicon rubber tapping at same point.

● Sharp of rubber end ：R8 硬度 Hardness 60°(Refer fig.2)

● Load ：200g

● frequency ： 5Hz

【judge base 】

Operation force, Insulation resistance & Resistance stated before as 13-2-3 and 13-2-4 must be within spec.

13-3-2 Environmental test condition

ITEM	SPECIFICATION	REMARKS
High temperature storage	70℃，240 hr	
Low temperature storage	-30℃，240 hr	
High humidity Operation	40℃，95% RH，240 hr at DC5V	
Temperature Cycling	-25℃ ~ +65℃ (0.5hr each), 50cycles	

13-4 Attention

1. Since Touch Panel is consist of glass, please be careful your hands to be injured during handling. You must wear gloves during handling.

2. Do not strike touch panel.

3. Do not lift touch panel by cable (FPC).

4. Excessive force onto the film surface is prohibited.

(Ex. Don't transfer the panel from film surface with vacuum)

5. Please use dry cloth or soft cloth with neutral detergent (after wring dry) or one with ethanol at cleaning. Do not use any organic solvent, acid or alkali solution.

6. Do not stack the touch panels together. Do not put heavy objects on touch panels.

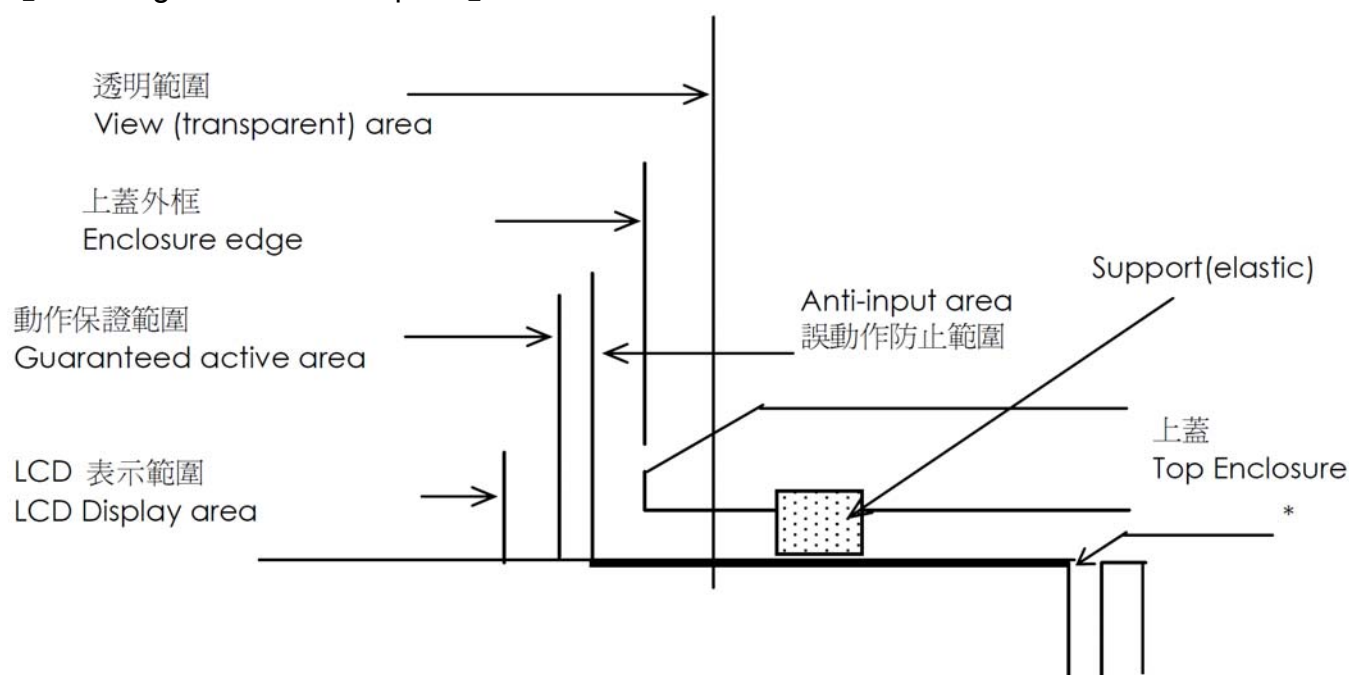7. Do not bend the cable (FPC) of touch panel to prevent the circuit broken.

Please don't use following method for inserting into FPC tail to connector.

指 Finger

插入 Insert

Connector

補強板 Stiffener Board
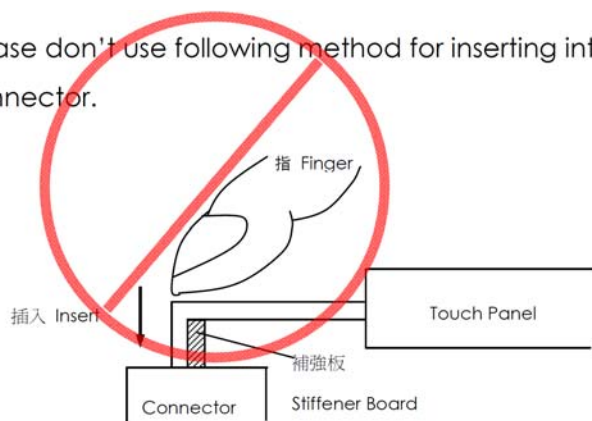
Touch Panel

8. Please pay attention for the matters stated below at mounting design of touch panel & enclosure:

a. Enclosure support to fix touch panel must be out of view (transparent) area. (Do not design enclosure presses the view area to protect from miss input)

b. The enclosure edge must be between view area & guaranteed active area. (Enclosure edge must not touch the view area)

c. Elastic materials are recommended as a support to fix touch panel.

d. Do not use an adhesive tape to bond the top surface (film side) of touch panel with enclosure.

e. The corners and edges of touch panel (fig.*) may be conductive. Do not touch it with metallic components after mounting.

f. Special design is required for water resistance.

g. Cleaning touch panel by Air gun, pressure below 2kg/cm^2 is suggested. To prevent FPC to be peeled off, air blowing to the FPC is avoided from glass side.
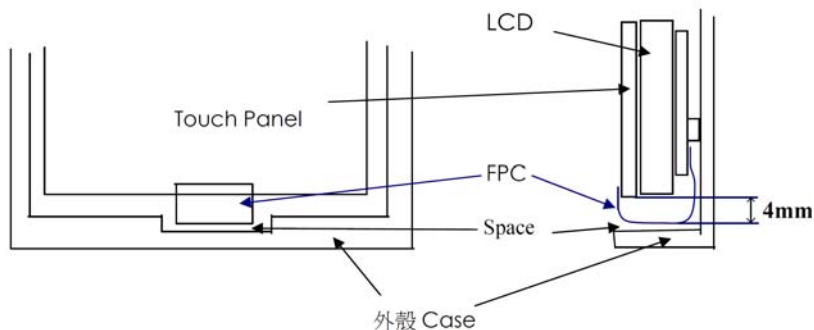
【Mounting condition example 1】

透明範圍
View (transparent) area

上蓋外框
Enclosure edge

動作保證範圍
Guaranteed active area

LCD 表示範圍
LCD Display area

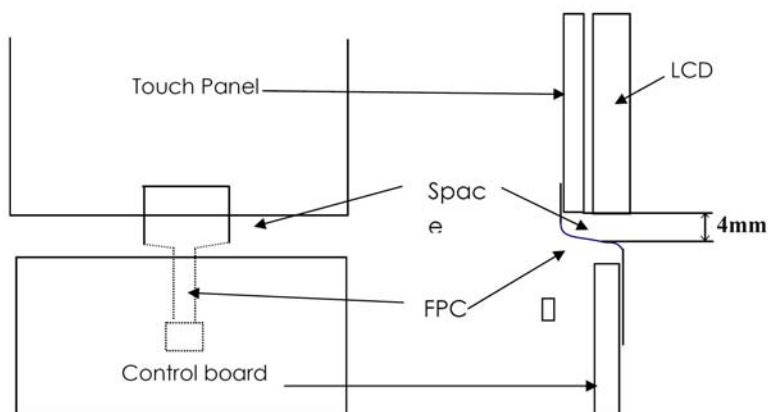Anti-input area
誤動作防止範圍

Support(elastic)

上蓋
Top Enclosure

*

h. The mounting structure must has a reserved space for the FPC tail and never touch or squeeze the FPC by case or another components preventing FPC to peel off. Assembly space is recommended at least 4mm. Refer to mounting condition example 2 & 3.

【Mounting condition example 2】

【Mounting condition example 3】

i. Avoid operating or writing on VA/Anti-Input Area ,to prevent ITO cracking. That will make a Linearity NG.