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TO :

Date :

Preliminary Specification

P/N : TFD507MWQVGAHBE-01

MODEL NO.	VERSION	PAGE
TFD507MWQVGAHBE-01	1	0-1

RECORDS OF REVISION	DOC . FIRST ISSUE	JAN.31, 2007
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1. GENERAL SPECIFICATIONS

1.1 APPLICATION NOTES FOR CONTROLLER/DRIVER
PLEASE REFER TO :

H I M A X H X 8 2 1 8
H I M A X H X 8 6 1 5

1.2 MATERIAL SAFETY DESCRIPTION

ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS, INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING LEAD, MERCURY, CADMIUM, HEXAVALENT CHROMIUM, POLYBROMINATED BIPHENYLS (PBB) AND POLYBROMINATED DIPHENYL ETHERS (PBDE)

2. MECHANICAL SPECIFICATIONS

- (1) DISPLAY SIZE (inch) ----- 5.7"
- (2) NUMBER OF DOTS ----- 320W * (RGB) * 240H DOTS
- (3) EFFECTIVE AREA ----- 117.2W * 88.4H mm
- (4) MODULE SIZE ----- 124.7W * 100.0H *6.0D mm
- (5) ACTIVE AREA ----- 115.2W * 86.4H mm (LCD)
- (6) DOT SIZE ----- 0.12W * 0.36H mm
- (7) PIXEL SIZE ----- 0.36W * 0.36H mm
- (8) LCD TYPE ----- TFT , TRANSMISSIVE
- (9) COLOR ----- 16.7M (24BIT)
- (10) VIEWING DIRECTION ----- 6 O'CLOCK
- (11) BACK LIGHT ----- LED , COLOR : WHITE

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER VOLTAGE	VDD	-0.3	7.0	V	AVSS=0
	VCC	-0.3	7.0	V	VSS=0
	VGH	-0.3	32.0	V	VSS=0
	VGL	-22.0	+0.3	V	VSS=0
	VGH-VGL	-0.3	+45	V	VSS=0
INPUT SIGNAL VOLTAGE	Vi	- 0.3	VDD+0.3	V	
	VL	-0.3	VCC+0.3		
STATIC ELECTRICITY	—	—	—	V	NOTE (1)

NOTE (1) : LCM SHOULD BE GROUNDED DURING HANDING LCM.

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS .

I T E M	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	- 2 0 °C	7 0 °C	- 3 0 °C	8 0 °C	NOTE (2) , (3)
HUMIDITY	NOTE (4)		NOTE (4)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s ² (0.25 G)	—	11.76 m/s ² (1.2 G)	5~20Hz , 1HR 20~500Hz(20Hz) , 1HR 20~500Hz(500Hz) , 1HR X,Y,Z,TOTAL 3HR
SHOCK	—	29.4 m/s ² (3 G)	—	490 m/s ² (5 0 G)	10 m SECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -30°C : 48HR MAX .
80°C : 168HR MAX .

NOTE (3) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE
THIS PHENOMENON IS REVERSIBLE.

NOTE (4) : Ta ≤ 60°C : 90%RH MAX (96HRS MAX).
Ta > 60°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY
OF 90%RH AT 60°C(96HRS MAX).

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
DIGITAL POWER SUPPLY	VCC	—	3	3.3	3.6	V	
DIGITAL OPERATING CURRENT	ICC	H LEVEL	—	6	12	mA	
ANALOG POWER SUPPLY	VDD	L LEVEL	3.8	5	5.5	V	
ANALOG OPERATING CURRENT	IDD	—	—	8	15	mA	
GATE ON POWER	VGH	H LEVEL	—	15	—	V	
GATE OFF POWER	VGL	L LEVEL	—	-10	—	V	
GATE ON CURRENT	IGH	H LEVEL	—	0.04	0.08	mA	
GATE OFF CURRENT	IGL	L LEVEL	—	0.06	0.12	mA	
VCOM CURRENT	ICOM(RMS)	—	—	8	20	mArms	NOTE (2)
VCOM HIGH VOLTAGE	VCOMH	H LEVEL	2.3	2.8	3.2	V	NOTE (1)
VCOM LOW VOLTAGE	VCOML	L LEVEL	-1.7	-2.1	-2.5	V	NOTE (1)
FRAME FREQUENCY	fFRAME	—	—	60	90	Hz	
DOT DATA CLOCK	DCLK	—	—	—	6.4	MHz	

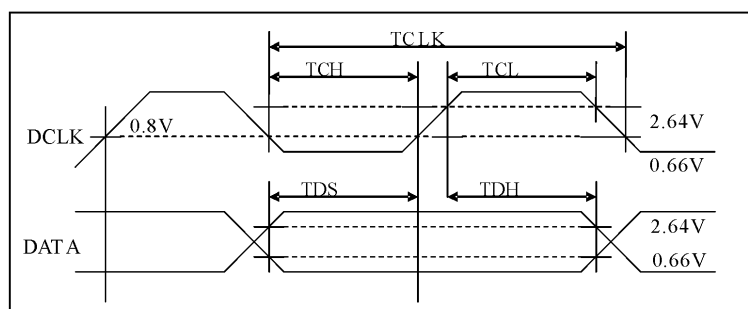
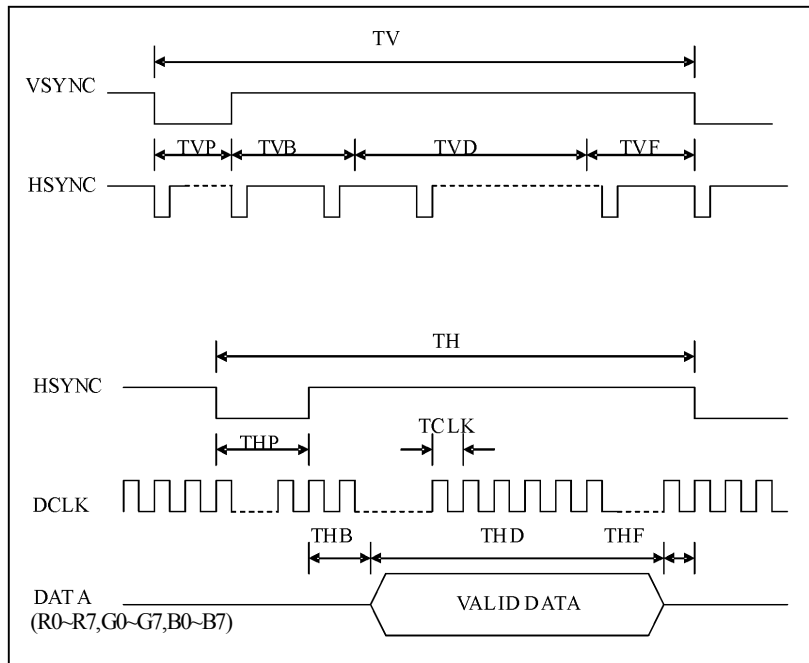
NOTE (1) : VCOMH & VCOML : ADJUST THE COLOR WITH GAMMA DATA.

NOTE (2) : THE DISPLAY PATTERN IS ALL “ OFF “ / “ ON”.

5. TIMING CHART

5.1 DIGITAL PARALLEL RGB INTERFACE

SIGNAL	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK	FREQUENCY	DCLK	—	6.4	—	MHz
	HIGH TIME	TCH	—	78	—	ns
	LOW TIME	TCL	—	78	—	ns
DATA	SETUP TIME	TDS	12	—	—	ns
	HOLD TIME	TDH	12	—	—	ns
HSYNC	PERIOD	TH	—	408	—	DCLK
	PULSE WIDTH	THP	—	30	—	DCLK
	BACK-PORCH	THB	—	38	—	DCLK
	DISPLAY PERIOD	THD	—	320	—	DCLK
	FRONT-PORCH	THF	—	20	—	DCLK
VSYNC	PERIOD	NTSC	—	262.5	—	TH
		PAL		312.5		
	PULSE WIDTH	TVP	1	3	5	TH
	BACK-PORCH	NTSC	—	15	—	TH
		PAL		23		
	DISPLAY PERIOD	TVD	—	240	—	TH
	FRONT-PORCH	NTSC	—	4.5	—	TH
PAL		46.5				



6. OPTICAL CHARACTERISTICS (NOTE 1)
6.1 OPTICAL CHARACTERISTICS

Ta = 25 ± 2 °C

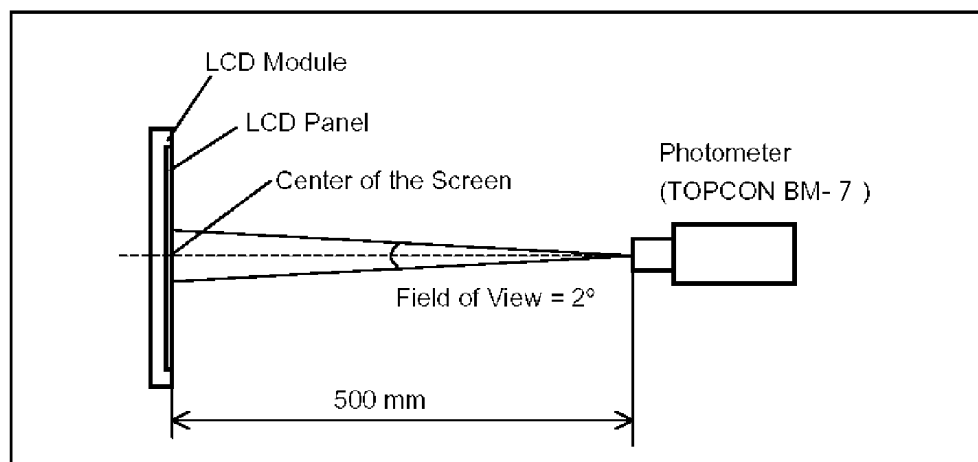
I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE		θ_{y+}	CR ≥ 10	55	62	—	deg .	(5)	
		θ_{y-}		$\theta_x=0^\circ$	60	67			—
		θ_{x+}		$\theta_y=0^\circ$	60	67			—
		θ_{x-}			60	67			—
CONTRAST RATIO		CR	$\theta_x=0^\circ, \theta_y=0^\circ$	200	300	—	—	(3)	
RESPONSE TIME		t r (rise)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	15	30	msec	(2)	
		t f (fall)		—	35	50			
THE BRIGHTNESS OF MODULE		B	$\theta_x=0^\circ, \theta_y=0^\circ$	(350)	(400)	—	cd/m ²	—	
COLOR OF CIE COORDINATE	WHITE	x	$\theta_x=0^\circ, \theta_y=0^\circ$	(0.26)	(0.31)	(0.36)	—	(4)	
		y		(0.29)	(0.34)	(0.39)			
	RED	x		(0.58)	(0.63)	(0.68)	—	—	
		y		(0.31)	(0.36)	(0.41)			
	GREEN	x		(0.26)	(0.31)	(0.36)	—	—	
		y		(0.51)	(0.56)	(0.61)			
	BLUE	x		(0.09)	(0.14)	(0.19)	—	—	
		y		(0.08)	(0.13)	(0.18)			
THE BRIGHTNESS OF UNIFORMITY		—	—	75	80	—	%	—	

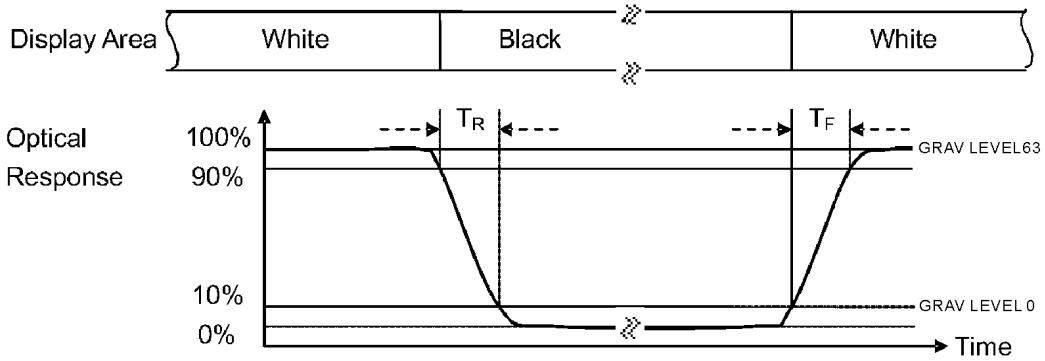
NOTE (1) : TEST EQUIPMENT SETUP :

AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES , THE MEASUREMENT SHOULD BE EXECUTED. MEASUREMENT SHOULD BE EXECUTED IN A STABLE , WINDLESS , AND DARK ROOM. OPTICAL SPECIFICATIONS ARE MEASURED BY TOPCON BM-7(FAST) WITH A VIEWING ANGLE OF 2° AT A DISTANCE OF 50cm AND NORMAL DIRECTION.

NOTE (2) : DEFINITION OF RESPONSE TIME : TR AND TF

THE FIGURE BVELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.





NOTE (3) : DEFINITION OF CONTRAST RATIO :

$$\text{CONTRAST RATIO(CR)} = \frac{\text{BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"}}{\text{BRIGHTNESS MEASURED WHEN LCD IS AT "BLACK STATE"}}$$

WHIT $V_i = V_{i50\%} \pm 1.5V$

BLACK $V_i = V_{i50\%} \mu 2.0V$

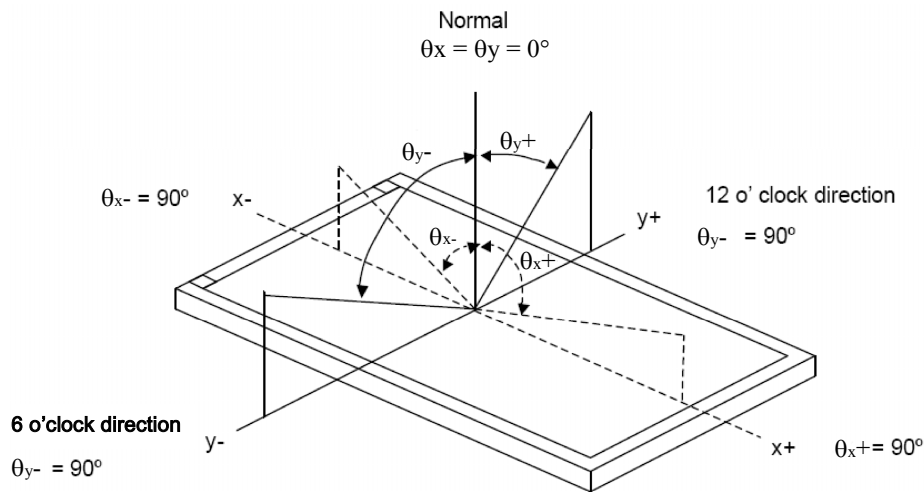
“±” MEANS THAT THE ANALOG INPUT SIGNAL SWINGS IN PHASE WITH VCOM SIGNAL.

“μ” MEANS THAT THE ANALOG INPUT SIGNAL SWINGS OUT OF PHASE WITH VCOM SIGNAL.

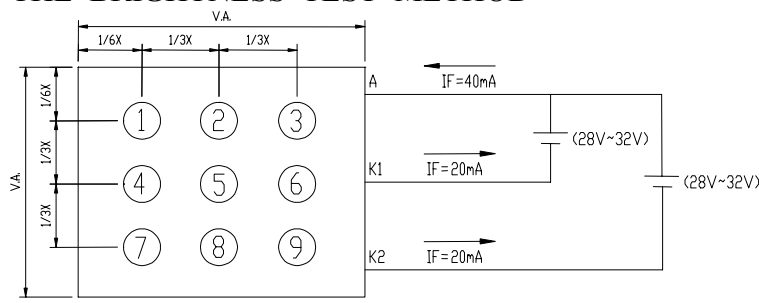
$V_{i50\%}$: THE ANALOG INPUT VOLTAGE WHEN TRANSMISSION IS 50%

NOTE (4) : THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED.

NOTE (5) : DEFINITION OF VIEWING ANGLE :



6.2 THE BRIGHTNESS TEST METHOD



$I_F = 40\text{mA}$

ADD POWER (+28V~32V) TO LED , A , K PIN TEST POINT ARE ① ~ ⑨

6.3 THE BRIGHTNESS UNIFORMITY CALCULATE METHOD

$$\text{UNIFORMITY} : \left[1 - \frac{\text{MAXIMUN BRIGHTNESS} - \text{MINIMUN BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$

6.4 LED BACK-LIGHT UNIT

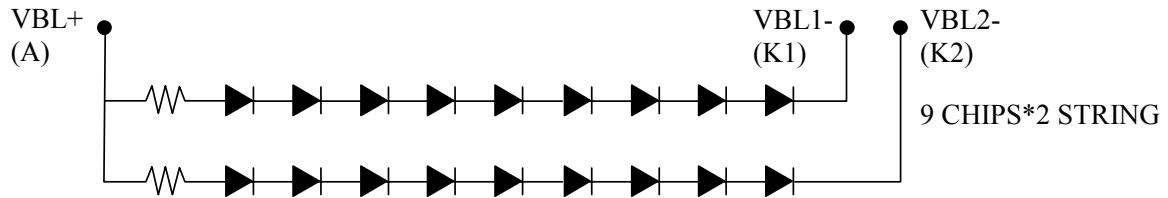
6.4.1 ELECTRICAL / OPTICAL CHARACTERISTICS AT Ta=25°C

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
AVERAGE LUMINOUS INTENSITUY	I_v	(6000)	(6500)	—	cd/m ²	I _F =40mA/BACK LIGHT
FORWARD VOLTAGE	V_F	(28)	(30)	(32)	V	I _F =40mA
LED LIFE TIME		30000	40000	—	hr	Ta=25°

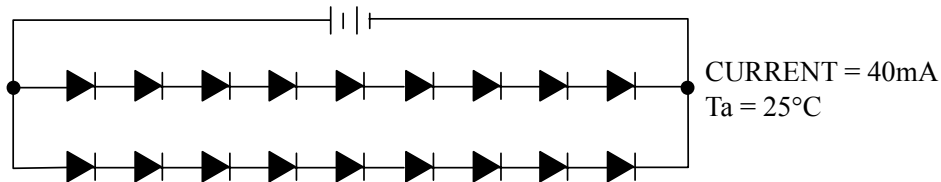
6.4.2 ABSOLUTE MAXIMUM RATINGS AT Ta=25°C

PARAMETER	SYMBOL	SPECIFICATION	UNIT	REMARK
POWER DISSIPATION	PAD	(1.28)	W	(1)
FORWARD CURRENT	IAF	(0.06)	A	(1)
REVERSE VOLTAGE	VR	(45)	V	(1)

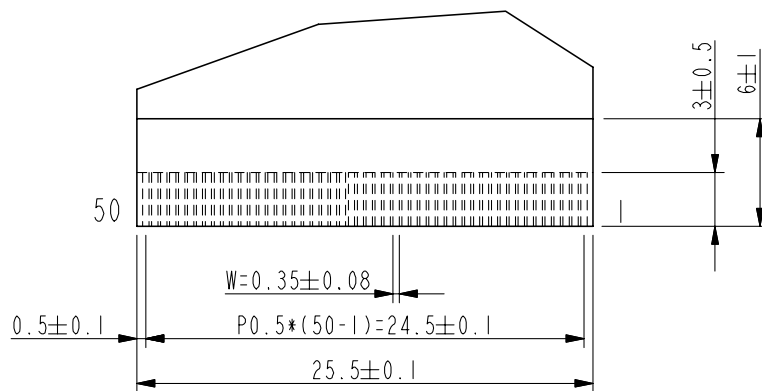
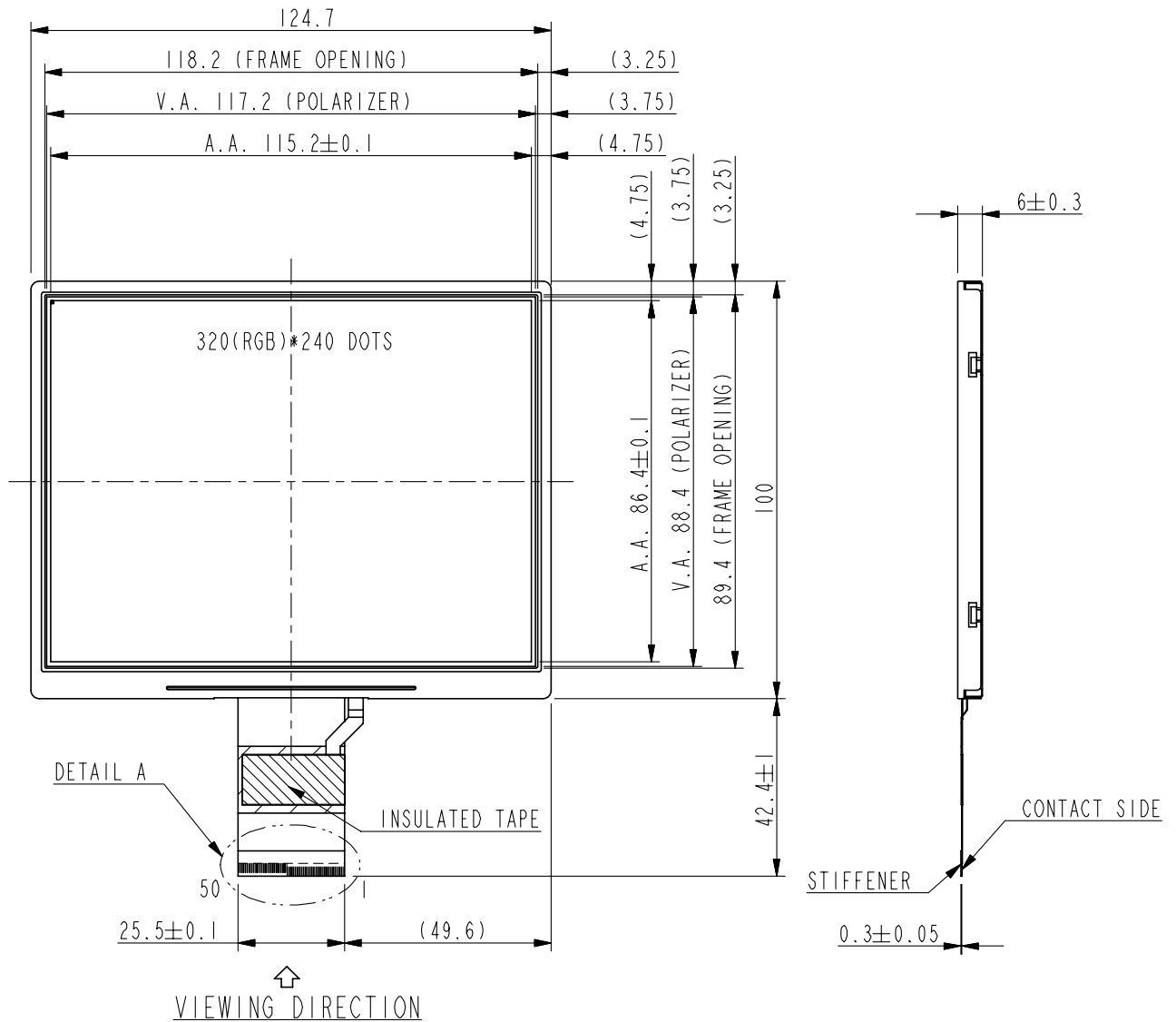
NOTE (1) : INTERNAL CIRCUIT DIAGRAM



NOTE (2) : TESTING CIRRCUIT



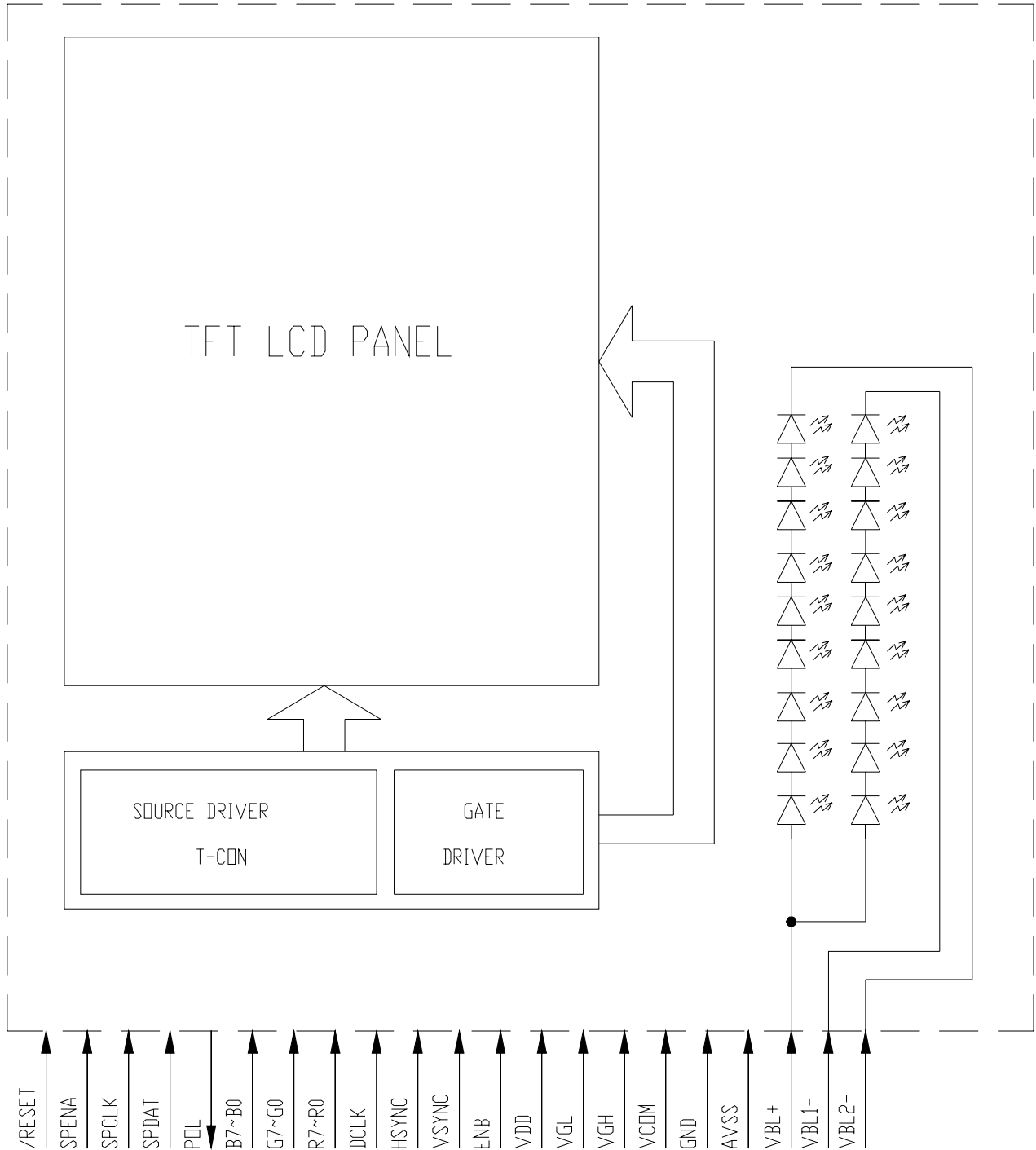
7. OUTLINE DIMENSIONS



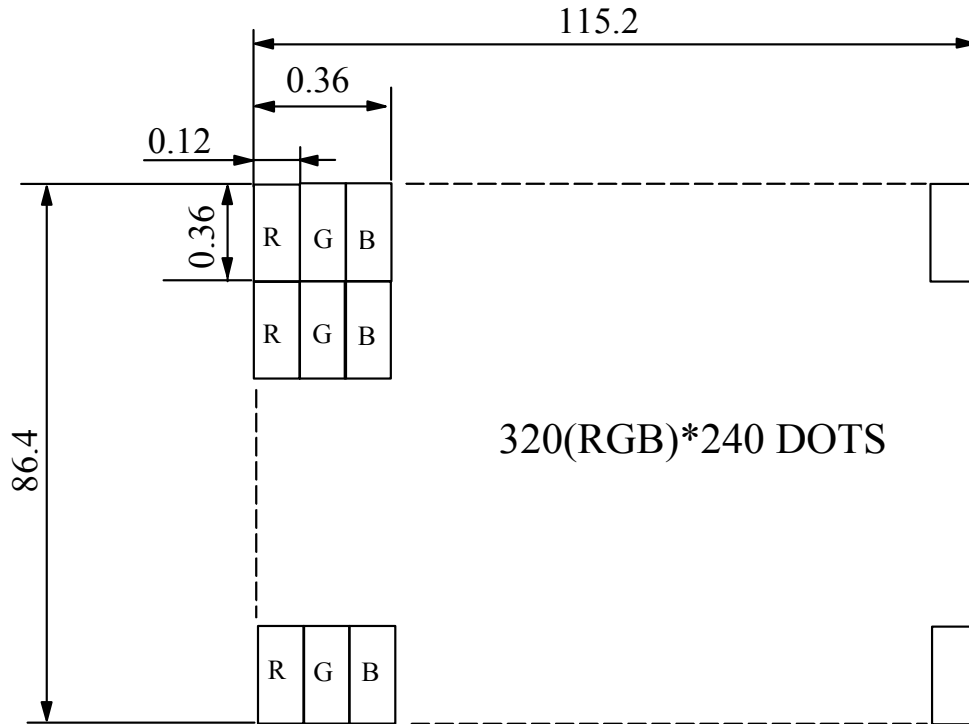
DETAIL A
SCALE 2:1

UNIT : mm
 SCALE : NTS
 NOT SPECIFIED LENGTH TOLERANCE IS ± 0.5

8. BLOCK DIMENSION



9. DETAIL DRAWING OF DOT MATRIX



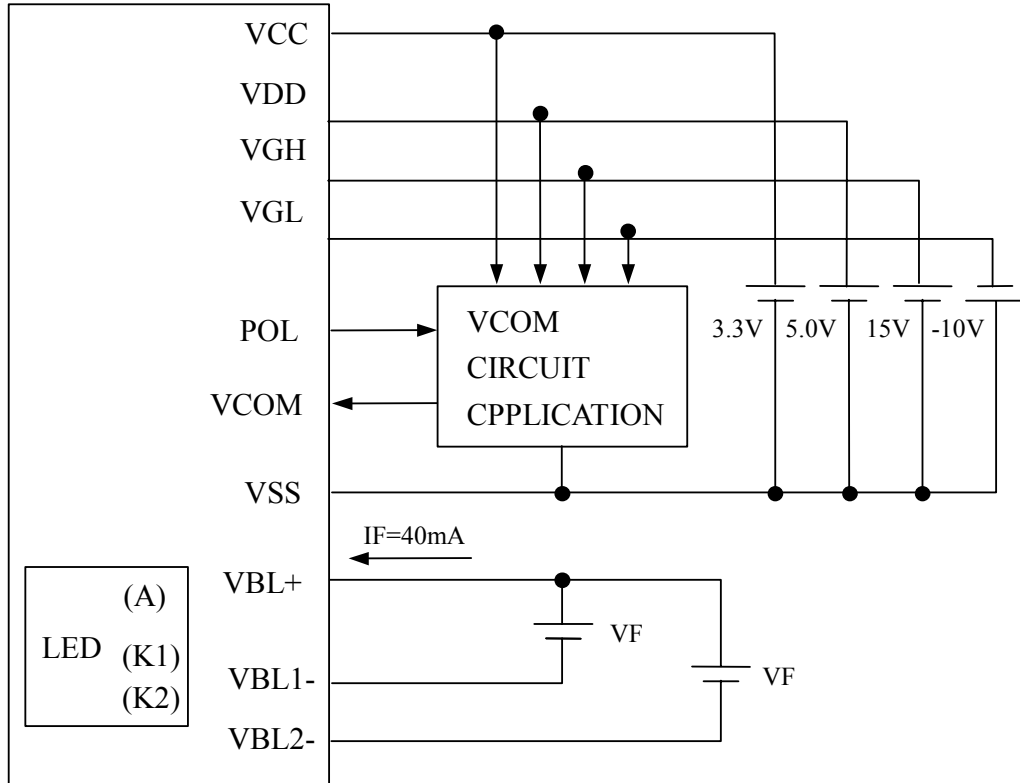
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1
DOTS MATRIX TOLERANCE IS ± 0.01

10. INTERFACE SIGNALS

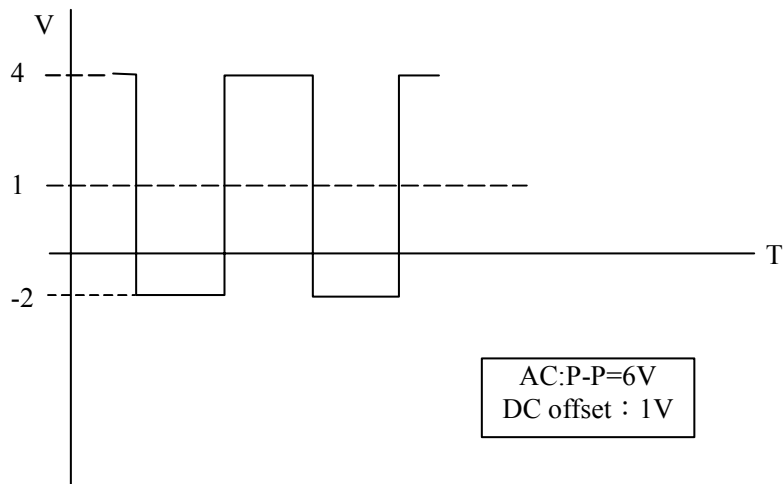
PIN NO	SYMBOL	I/O	FUNCTION
1	VBL2-	P	BACKLIGHT LED GROUND (K2)
2	VBL1-	P	BACKLIGHT LED GROUND (K1)
3	VBL+	P	BACKLIGHT LED POWER (A)
4	VBL+	P	BACKLIGHT LED POWER (A)
5	NC	—	NOT USE
6	/RESET	I	HARDWARE RESET
7	SPENA	I	SPI INTERFACE DATA ENABLE SIGNAL
8	SPCLK	I	SPI INTERFACE DATA CLOCK
9	SPDAT	I	SPI INTERFACE DATA
10	POL	O	POLARITY SIGNAL CONNECT TO VCOM DRIVING CIRCUIT
11	B7	I	BLUE DATA BIT 7
12	B6	I	BLUE DATA BIT 6
13	B5	I	BLUE DATA BIT 5
14	B4	I	BLUE DATA BIT 4
15	B3	I	BLUE DATA BIT 3
16	B2	I	BLUE DATA BIT 2
17	B1	I	BLUE DATA BIT 1
18	B0	I	BLUE DATA BIT 0
19	G7	I	GREEN DATA BIT 7
20	G6	I	GREEN DATA BIT 6
21	G5	I	GREEN DATA BIT 5
22	G4	I	GREEN DATA BIT 4
23	G3	I	GREEN DATA BIT 3
24	G2	I	GREEN DATA BIT 2
25	G1	I	GREEN DATA BIT 1
26	G0	I	GREEN DATA BIT 0
27	R7	I	RED DATA BIT 7
28	R6	I	RED DATA BIT 6
29	R5	I	RED DATA BIT 5
30	R4	I	RED DATA BIT 4
31	R3	I	RED DATA BIT 3
32	R2	I	RED DATA BIT 2
33	R1	I	RED DATA BIT 1
34	R0	I	RED DATA BIT 0

PIN NO	SYMBOL	I/O	FUNCTION
35	DCLK	I	DOT DATA COLCK
36	HSYNC	I	HORIZONTAL SYNC INPUT
37	VSYNC	I	VERTICAL SYNC INPUT
38	ENB	I	DATA ENABLE INPUT
39	VDD	P	ANALOG POWER
40	VDD	P	ANALOG POWER
41	VCC	P	DIGITAL POWER
42	VCC	P	DIGITAL POWER
43	NC	—	NOT USE
44	VGL	P	GATE OFF POWER
45	NC	—	NOT USE
46	VGH	P	GATE ON POWER
47	NC	I	NOT USE
48	VCOM	P	DRIVING INPUT
49	GND	P	GROUND
50	AVSS	P	GROUND

1 1 . POWER SUPPLY
 1 1 .1 POWER SUPPLY FOR LCM

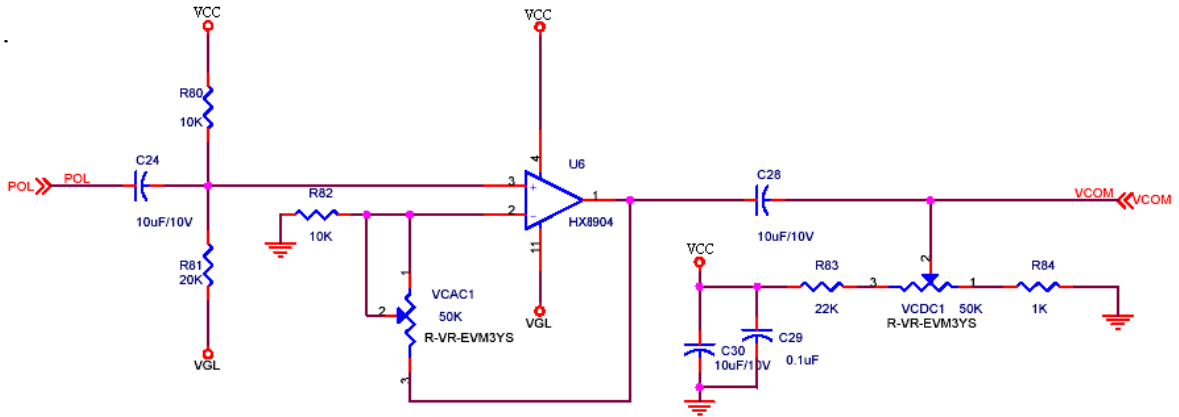


NOTE : VCOM AC WAVEFORM

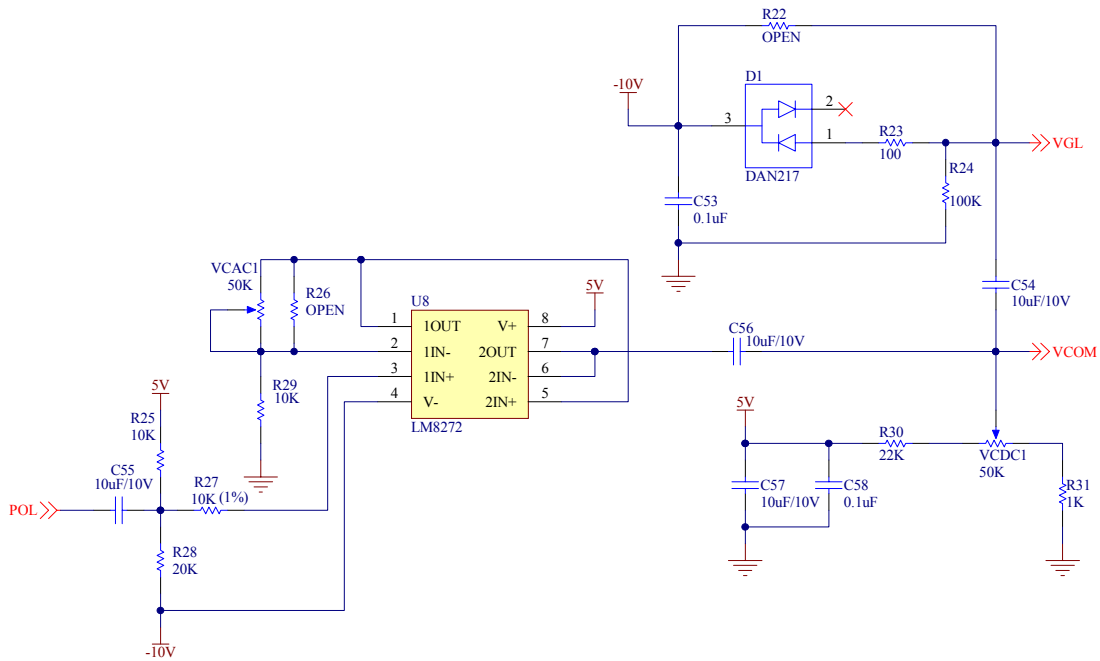


VCOM CIRCUIT REFERENCE :

1.

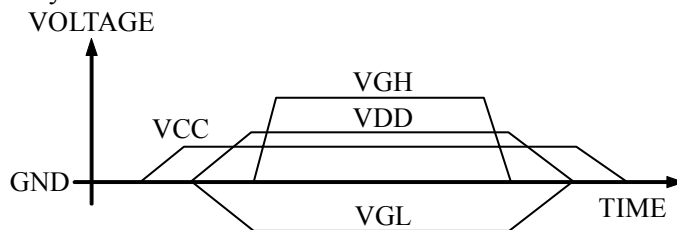


2.



1 1 .2 POWER SEQUENCE

The LCD panel adopts high voltage driver ICs, so it could be permanently damaged if a wrong power on/off sequence is used. When powering on the LCD, VCC should go up firstly, and then turn on VGL and VDD, and finally VGH. Turn off the LCD panel with reversed order or shut off all the power supplies simultaneously.



12 . SPECIFICATION OF AUDACITY ASSURANCE

12.1 APPLICATION

This inspection standard is to be applied to the LCD module delivered from factory to customers.

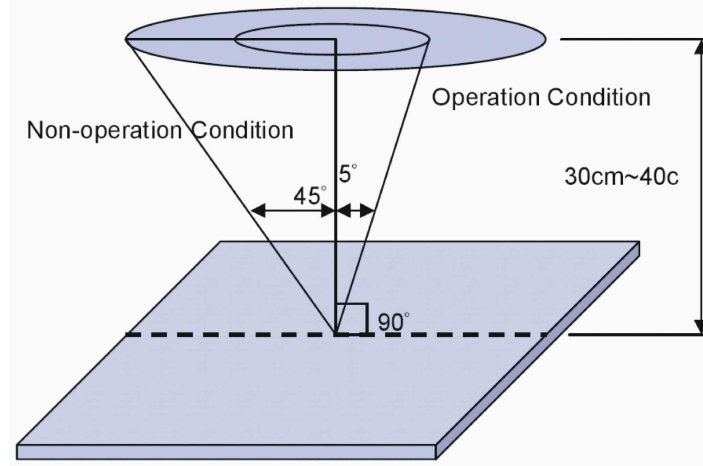
12.2 INSPECTION CONDITIONS

12.2.1 (1)Observation Distance : 35cm±5cm

(2)View Angle :

Non-operation Condition : ±5°(perpendicular to LCD panel surface)

Operation Condition : ±45° (perpendicular to LCD panel surface)



12.2.2 Environment Conditions :

Ambient Temperature		20°C~25°C
Ambient Humidity		65±20%RH
Ambient Illumination	Cosmetic Inspection	More than 600Lux
	Functional Inspection	300~500 Lux

12.2.3 Inspection lot

Quantity per delivery lot for each model

12.2.4 Inspection method

A sampling inspection shall be made according to the following provisions to judge The acceptability

(a)Applicable standard : MIL-STD-105E

Normal inspection , single sampling

Level II

(b)AQL : Major defect : AQL 0.65%

Minor defect : AQL 1.0%

12.3 RELIABILITY TEST

12.3.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE

NO	ITEM	DESCRIPTION
1	High temperature operation	The sample should be allowed to stand at +70°C for 240 hrs
2	Low temperature operation	The sample should be allowed to stand at -20°C for 240 hrs
3	High temperature storage	The sample should be allowed to stand at +80°C for 240 hrs
4	Low temperature storage	The sample should be allowed to stand at -30°C for 240 hrs
5	High temp / humidity test	The sample should be allowed to stand at 60°C , 90% RH 240 hrs
6	Thermal shock (not operated)	The sample should be allowed to stand the following 200 cycles of operation: -25°C for 30 minutes ~ +70°C for 30 minutes
7	ESD (Electrostatic Discharge)	AIR DISCHARGE ± 10KV CONTACT DISCHARGE ± 5.5KV

NOTE (1) : THE TEST SAMPLES HAVE RECOVERY TIME FOR 2 HOURS AT ROOM TEMPERATURE BEFORE THE FUNCTION CHECK. IN THE STANDARD CONDITIONS , THERE IS NO DISPLAY FUNCTION NG ISSUE OCCURRED.

12.4 TESTING CONDITIONS AND INSPECTION CRITERIA

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in table 12.4 , standard specifications for reliability have been executed in order to ensure stability .

NO	ITEM	TEST MODEL	INSPECTION CRITERIA
1	Current consumption	Refer To Specification	The current consumption should conform to the product specification.
2	Contrast	Refer TO Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
3	Appearance	Visual inspection	Defect free

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12.5 OPERATION

- 12.5.1 Do not connect or disconnect modules to or from the main system while power is being supplied .
- 12.5.2 Use the module within specified temperature ; lower temperature causes the retardation of blinking speed of the display ; higher temperature makes overall display discolor . When the temperature returns to normality , the display will operate normally .
- 12.5.3 Adjust the LC driving voltage to obtain the optimum contrast .
- 12.5.4 Power On Sequence input signals should not be supplied to LCD module before power supply voltage is applied and reaches the specified value . If above sequence is not followed , CMOS LSIs of LCD modules may be damaged due to latch - up problem .

12.6 NOTICE

- 12.6.1 Use a grounded soldering iron when soldering connector I/O terminals . For soldering or repairing , take precaution against the temperature of the soldering iron and the soldering time to prevent peeling off the through-hole-pad .
- 12.6.2 Do not disassemble . We shall not be held responsible if the module is disassembled and upon the reassembly the module failed .
- 12.6.3 Do not charge static electricity , as the circuit of this module contains CMOS LSIs. A workman's body should always be static-protected by use of an ESD STRAP . Working clothes for such personnel should be of static-protected material .
- 12.6.4 Always ground the electrically-powered driver before using it to install the LCD module. While cleaning the work station by vacuum cleaner, do not bring the sucking mouth near the module ; static electricity of the electrically-powered driver or the vacuum cleaner may destroy the module .
- 12.6.5 Don't give external shock.
- 12.6.6 Don't apply excessive force on the surface.
- 12.6.7 Liquid in LCD is hazardous substance. Must not lick and swallow. When the liquid is attach to your, skin, cloth etc. Wash it out thoroughly and immediately.
- 12.6.8 Don't operate it above the absolute maximum rating.
- 12.6.9 Storage in a clean environment, free from dust, active gas, and solvent.
- 12.6.10 Store without any physical load.
- 12.6.11 Rewiring: no more than 3 times .