EXAMINED BY : Yung Chang Hu	EMERGING DISPLAY	FILE NO . CAS-51607
		ISSUE : DEC.27, 2007
APPROVED BY: David Chang	TECHNOLOGIES CORPORATION	TOTAL PAGE : 23
		VERSION : 5

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

ET057007DMU
(RoHS)

FOR MESSRS :

_____

CUSTOMER'S APPROVAL

DATE :

_____

BY :

_____

RECORDS OF REVISION

DOC . FIRST ISSUE

MAY.24, 2007

DATE	REVISED PAGE NO.	SUMMARY
JUN.12, 2007	3	4. ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
OUTPUT HIGH VOLTAGE	VOH	IOH = 400μA	0.8*VCC	—	VCC	V	

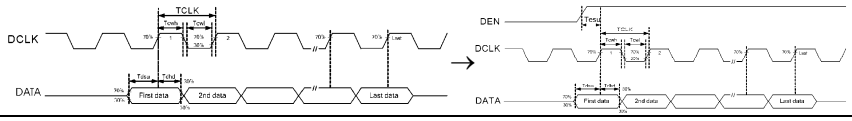
↓

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
OUTPUT HIGH VOLTAGE	VOH	IOH = -400μA	0.8*VCC	—	VCC	V	

	4	5.1 DIGITAL PARALLEL RGB INTERFACE

ADD:

SIGNAL	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DEN	SETUP TIME	Tesu	10	—	—	ns



	5~6	6. OPTICAL CHARACTERISTICS → OPTICAL CHARACTERISTICS (NOTE1)

I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
THE BRIGHTNESS OF MODULE		B	θx=0° , θy=0° IF = 40mA	400	450	—	cd/m2	—
COLOR OF CIE COORDINATE	WHITE	x	θx=0° , θy=0° IF = 40mA NTSC : 50 %	0.26	0.31	0.36	—	(5)
		y		0.30	0.35	0.40		
	RED	x		0.56	0.61	0.66	—	—
		y		0.31	0.36	0.41		

↓

I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
THE BRIGHTNESS OF MODULE		B	θx=0° , θy=0° IF = 40mA	400	450	—	cd/m2	(5)
COLOR OF CIE COORDINATE	WHITE	x	θx=0° , θy=0° IF = 40mA NTSC : 50 %	0.26	0.31	0.36	—	(6)
		y		0.30	0.35	0.40		
	RED	x		0.56	0.61	0.66	—	
		y		0.31	0.36	0.41		
	GREEN	x		0.28	0.33	0.38	—	
		y		0.51	0.56	0.61		
	BLUE	x		0.09	0.14	0.19	—	
		y		0.07	0.12	0.17		

NOTE (5) : THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED. → BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"

ADD NOTE (6) : THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED.

	10	10. INTERFACE SIGNAL

6	PWCTRL	I
7	LEDCTRL	I

	PWCTRL	LEDCTRL	REMARK
LOGIC LEVEL H = 3.3V L=0V	H	H	IF = 40mA
	H	L	IF = 40mA
	L	L	SHUTDOWN

* LEDCTRL : WHEN ELDCTRL IS BETWEEN 0 AND 3.3V , ILLNMINATION CAN BE ADJUSTED MANULLY VIA VOLTACE CONTROL.

↓

6	PWCTRL	I
7	LEDCTRL	I

	PWCTRL	LEDCTRL	REMARK
LOGIC LEVEL H = 3.3V L=0V	H	H	IF = 40mA
	H	L	IF = 0mA
	L	L	SHUTDOWN

* LEDCTRL : WHEN LEDCTRL IS BETWEEN 0 AND 3.3V , ILLUMINATION CAN BE ADJUSTED MANULLY VIA VOLTACE CONTROL.

JUL.18, 2007	2	3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

I T E M	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
VIBRATION	—	2.45 m/s² (0.25 G)	—	11.76 m/s² (1.2 G)	5~20Hz , 1HR 20~500Hz(20Hz) , 1HR 20~500Hz(500Hz) , 1HR X,Y,Z,TOTAL 3HR
SHOCK	—	29.4 m/s² (3 G)	—	490 m/s² (50 G)	10 m SECONDS XYZ DIRECTIONS 1 TIME EACH

↓

I T E M	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
VIBRATION	—	3.92 m/s² (0.4 G)	—	19.6 m/s² (2.0 G)	10~55Hz X,Y,Z,EACH 2HRS
SHOCK	—	58.8 m/s² (6 G)	—	980 m/s² (100 G)	6 m SECONDS XYZ DIRECTIONS 3 TIME EACH

RECORDS OF REVISION

DOC . FIRST ISSUE

MAY.24, 2007

DATE	REVISED PAGE NO.	SUMMARY
OCT.02, 2007	2	3 .1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER DISSIPATION	PD	—	1.28	W	
FORWARD CURRENT	IF	—	0.06	A	
REVERSE VOLTAGE	VR	—	45	V	

↓

PARAMETER	SYMBOL	MIN.	MAX	UNIT	REMARK
LED BACKLIGHT DISSIPATION	PD	—	1.28	W	
LED BACKLIGHT CURRENT	IF	—	0.06	A	
LED BACKLIGHT REVERSE VOLTAGE	VR	—	45	V	

	3	4 . ELECTRICAL CHARACTERISTICS

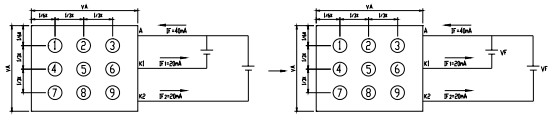
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
FRAME FREQUENCY	fFRAME	—	—	60	90	Hz	
FORWARD VOLTAGE	V_F	I_F=40mA	28	30	32	V	

↓

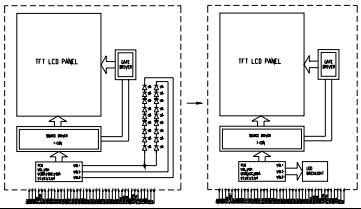
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
FRAME FREQUENCY	fFRAME	—	50	60	72	Hz	
FORWARD VOLTAGE	V_F	I_F=40mA	28	30	32	V	NOTE (1)

ADD NOTE (1)

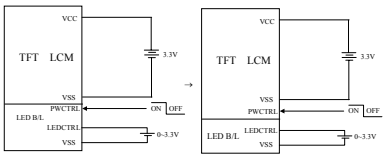
	4 , 5	5 . TIMING CHART UPDATE 5.1 DIGITAL PARALLEL RGB INTERFACE (SYNC MODE) ADD 5.2 DIGITAL PARALLEL RGB INTERFACE (DE MODE)
	7	6.2 THE TEST METHOD OF BRIGHTNESS AND UNIFORMITY



	9	8 . BLOCK DIAGRAM



	13	1 1 .1 POWER SUPPLY FOR LCM



DEC.27, 2007	1	2. MECHANICAL SPECIFICATIONS (1)DISPLAY SIZE (inch) : 5.7" → DIAGONALS : 5.7 inch (2) MODULE SIZE : 147.6W*100.0H*10.8D mm →147.6W*100.0H*10.8D (MAX.)mm (5) ACTIVE AREA : 115.2W * 86.4H mm (LCD) → 115.2W * 86.4H mm (9)COLOR : 16.7M (24BIT) → 16.7M, ADD (12) INTERFACE MODE
	3	4. ELECTRICAL CHARACTERISTICS LED LIFE TIME → LED CHIP LIFETIME FORWARD VOLTAGE → LED BACKLIGHT FORWARD VOLTAGE ADD NOTE (2) AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT (PER LED)
	6	6.1 OPTICAL CHARACTERISTICS

I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
RESPONSE TIME		t r (rise)	θx=0° , θy=0°	—	15	30	msec	(4)
		t f (fall)		—	35	50		
COLOR OF CIE COORDINATE	WHITE	x	θx=0° , θy=0° IF = 40mA NTSC : 50 %	0.26	0.31	0.36	—	(6)
		y		0.30	0.35	0.40		
	RED	x		0.56	0.61	0.66	—	
		y		0.31	0.36	0.41		
	GREEN	x		0.28	0.33	0.38	—	
		y		0.51	0.56	0.61		
	BLUE	x		0.09	0.14	0.19	—	
		y		0.07	0.12	0.17		
THE UNIFORMITY OF MODULE		—	—	75	80	—	%	—

		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
RESPONSE TIME		T_R (rise)	θx=0° , θy=0°	—	15	30	msec	(4)
		T_F (fall)		—	35	50		
COLOR OF CIE COORDINATE	WHITE	W_X	θx=0° , θy=0° IF = 40mA NTSC : 50 %	0.26	0.31	0.36	—	(6)
		W_Y		0.30	0.35	0.40		
	RED	R_X		0.56	0.61	0.66	—	
		R_Y		0.31	0.36	0.41		
	GREEN	G_X		0.28	0.33	0.38	—	
		G_Y		0.51	0.56	0.61		
	BLUE	B_X		0.09	0.14	0.19	—	
		B_Y		0.07	0.12	0.17		
THE UNIFORMITY OF MODULE		—	IF = 40mA	75	80	—	%	—

RECORDS OF REVISION

DOC . FIRST ISSUE

MAY.24, 2007

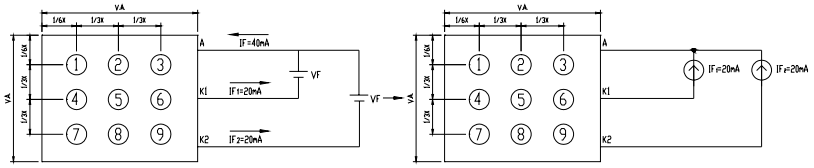
DATE	REVISED PAGE NO.	SUMMARY
DEC.27, 2007	7	6.2 THE TEST METHOD OF BRIGHTNESS AND UNIFORMITY  6.3 THE CALCULATING METHOD OF UNIFORMITY $\text{UNIFORMITY}:\left[1-\frac{\text{MAXIMUN BRIGHTESS - MINIMUN BRIGHTESS}}{\text{AVERAGE BRIGHTESS}}\right]\times 100\% \rightarrow$ $\text{UNIFORMITY}:\left[1-\frac{\text{MAXIMUM BRIGHTNESS - MINIMUM BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}}\right]\times 100\%$
	8	7. OUTLINE DIMENSIONS MARK △1 : K0 → K1, MODIFY PCB OUTLINE & ADDING DIMENSION
	16~20	12.3.2 MODULE DEFECTS CALSSIFICATION REVISING THE ENTIRE PAGE
	21	12.4 RELIABILITY TEST NO.5 ADD STORAGE NO.6 : 200 CYCLES OF OPERATION →10 CYCLES OF OPERATION -25°C FOR 30 MINUTES ~ +70°C FOR 30 MINUTES → -40°C FOR 30 MINUTES ~ +85°C FOR 30 MINUTES NO.7 : AIR DISCHARGE ± 4KV → AIR DISCHARGE ± 12KV CONTACT DISCHARGE ± 2KV → CONTACT DISCHARGE ± 8KV
	23	ADD 12.6.5 NOT ALLOWED TO INFLICT ANY EXTERNAL STRESS AND TO CAUSE ANY MECHANICAL INTERFERENCE ON THE BENDING AREA OF FPC DURING THE TAIL BENDING BACKWARDS!

TABLE OF CONTENTS

1. GENERAL SPECIFICATIONS

1 . 1 APPLICATION NOTES FOR CONTROLLER/DRIVER

PLEASE REFER TO :

H I M A X H X 8 2 5 0
H I M A X H X 8 6 7 8

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)	DIAGONALS	5.7 inch
(2)	NUMBER OF DOTS	640W * (RGB) * 480H DOTS
(3)	MODULE SIZE	147.6W * 100.0H *10.8D (MAX.) mm (WITHOUT FPC)
(4)	EFFECTIVE AREA	117.2W * 88.4H mm
(5)	ACTIVE AREA	115.2W * 86.4H mm
(6)	DOT SIZE	0.06W * 0.18H mm
(7)	PIXEL SIZE	0.18W * 0.18H mm
(8)	LCD TYPE	TFT , TRANSMISSIVE
(9)	COLOR	16.7M
(10)	VIEWING DIRECTION	12 O'CLOCK
(11)	BACK LIGHT	LED , COLOR : WHITE
(12)	INTERFACE MODE	RGB, 24 BIT, PARALLEL (DE/SYNC MODE)

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER VOLTAGE	VCC	-0.3	7.0	V	VSS=0
INPUT VOLTAGE	Vin	- 0.3	VCC+0.3	V	
LED BACKLIGHT DISSIPATION	PD	—	1.28	W	
LED BACKLIGHT CURRENT	IF	—	0.06	A	
LED BACKLIGHT REVERSE VOLTAGE	VR	—	45	V	

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

I T E M	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-20°C	70°C	-30°C	80°C	NOTE (1) , (2)
HUMIDITY	NOTE (3)		NOTE (3)		WITHOUT CONDENSATION
VIBRATION	—	3.92 m/s^2 (0.4 G)	—	19.6 m/s^2 (2.0 G)	10~55Hz X,Y,Z,EACH 2HRS
SHOCK	—	58.8 m/s^2 (6 G)	—	980 m/s^2 (100 G)	6 m SECONDS XYZ DIRECTIONS 3 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

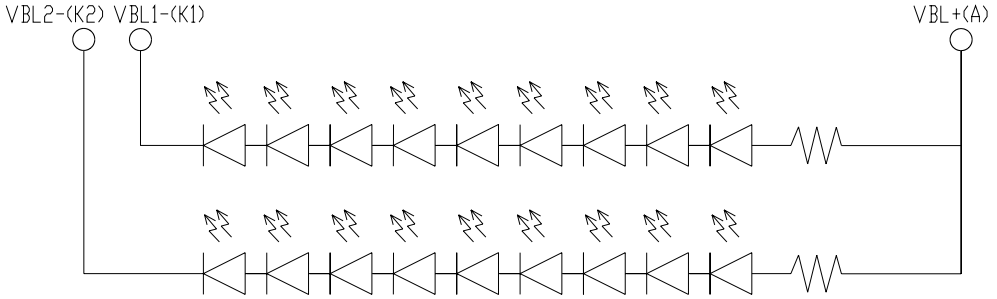
NOTE (1) : Ta AT -30°C : 48HR MAX .
80°C : 168HR MAX .
NOTE (2) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE THIS PHENOMENON IS REVERSIBLE.
NOTE (3) : Ta ≤ 60°C : 90%RH MAX (96HRS MAX).
Ta > 60°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90%RH AT 60°C(96HRS MAX).

4. ELECTRICAL CHARACTERISTICS

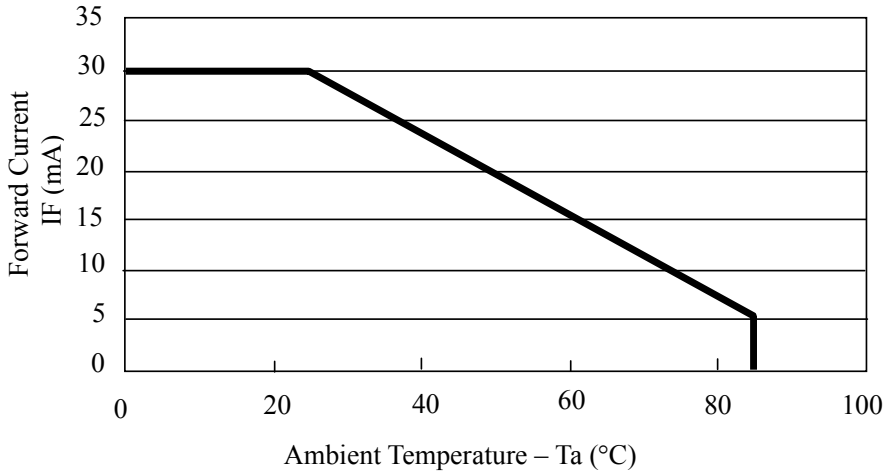
Ta = 25 °C

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY	VCC	—	2.7	3.3	3.6	V	
POWER SUPPLY CURRENT FOR LCM	ICC	VCC = 3.3V LED B/L = ON	—	510	600	mA	
LOW LEVEL INPUT VOLTAGE	VIL	—	0	—	0.3*VCC	V	
HIGH LEVEL INPUT VOLTAGE	VIH	—	0.7*VCC	—	VCC	V	
OUTPUT LOW VOLTAGE	VOL	IOL = 400μA	0	—	0.2*VCC	V	
OUTPUT HIGH VOLTAGE	VOH	IOH = -400μA	0.8*VCC	—	VCC	V	
FRAME FREQUENCY	fFRAME	—	50	60	72	Hz	
LED BACKLIGHT FORWARD VOLTAGE	V_F	I_F=40mA	28	30	32	V	NOTE(1)
LED CHIP LIFETIME	—	—	30000	40000	—	hr	

NOTE (1) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



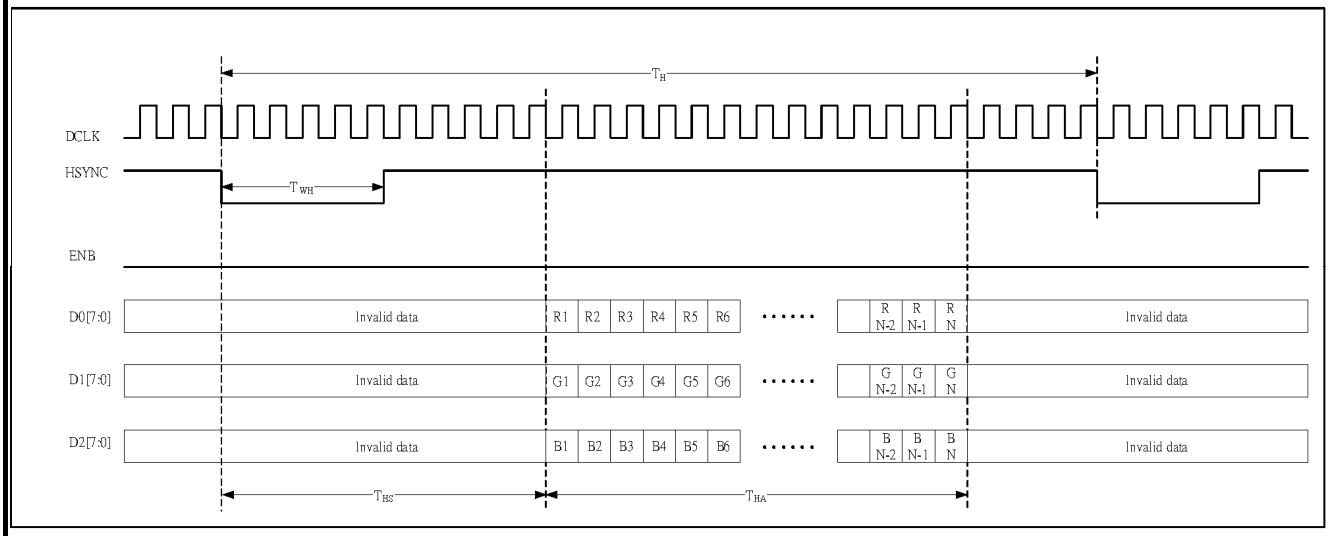
NOTE (2) : AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT. (PER LED)



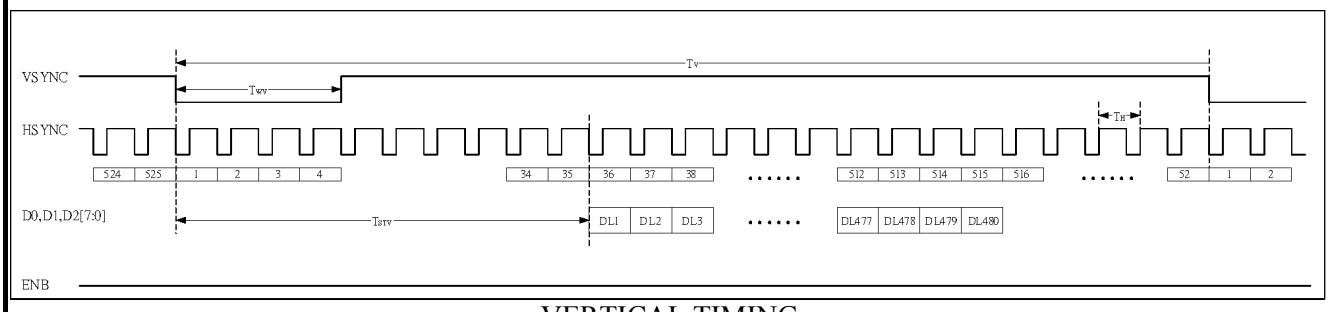
5 . TIMING CHART

5.1 DIGITAL PARALLEL RGB INTERFACE (SYNC MODE)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY	F_{CPH}	22.66	25.175	27.69	MHz
DCLK PERIOD	T_{CPH}	36.11	39.7	44.13	ns
DCLK PULSE DUTY	T_{CWH}	40	50	60	%
HSYNC PERIOD	T_H	750	800	850	T_{CPH}
HSYNC PULSE WIDTH	T_{WH}	5	30	—	T_{CPH}
HSYNC FIRST HORIZONTAL DATA TIME	T_{HS}	112	144	175	T_{CPH}
HORIZONTAL ACTIVE DATA AREA	T_{HA}	—	640	—	T_{CPH}
VSYNC PULSE WIDTH	T_{WV}	1	3	5	T_H
FIRST LINE DATA INPUT TIME	T_{STV}	—	35	—	T_H
VSYNC PERIOD	T_V	515	525	535	T_H



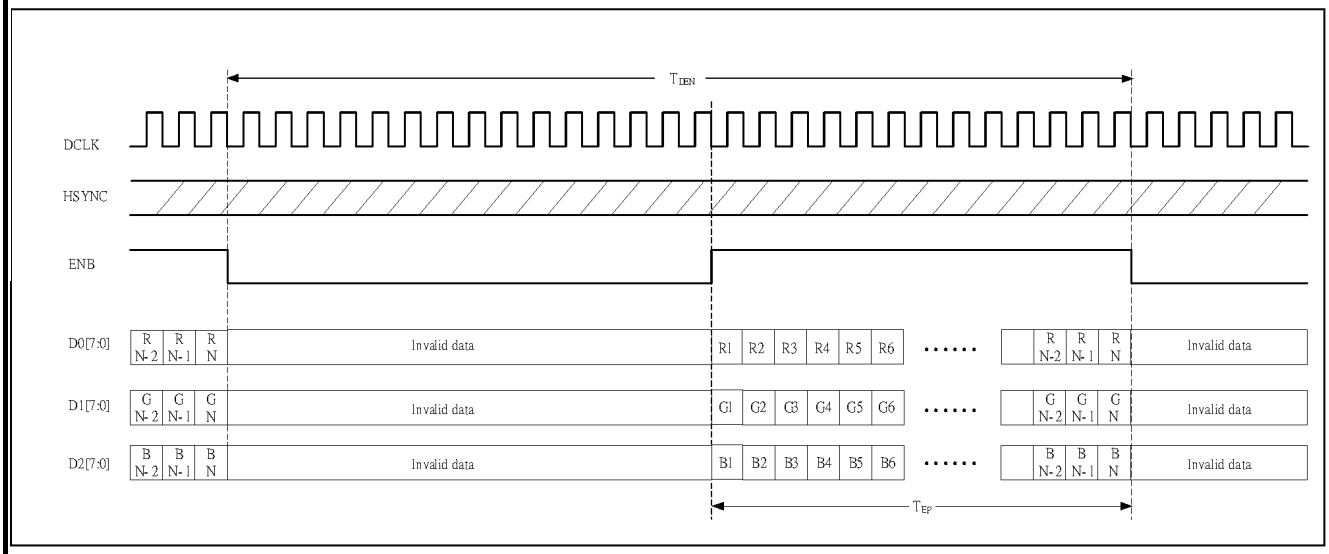
HORIZONTAL TIMING

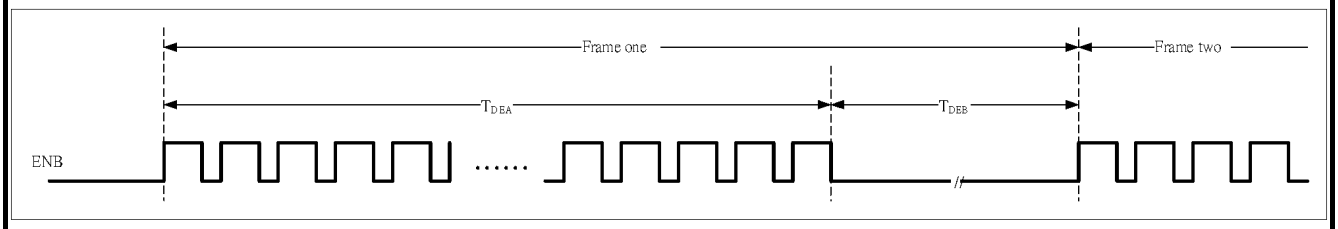


VERTICAL TIMING

5.2 DIGITAL PARALLEL RGB INTERFACE (DE MODE)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY	F_{CPH}	22.66	25.175	27.69	MHz
DCLK PERIOD	T_{CPH}	36.11	39.7	44.13	ns
DCLK PULSE DUTY	T_{CWH}	40	50	60	%
ENB PERIOD	T_{DEN}	750	800	850	T_{CPH}
ENB PULSE WIDTH	T_{EP}	—	640	—	T_{CPH}
ENB FRAME ACTIVE TIME	T_{DEA}	—	480	—	T_H
ENB FRAME BLANKING TIME	T_{DEB}	10	45	110	T_H





6 . OPTICAL CHARACTERISTICS (NOTE1)

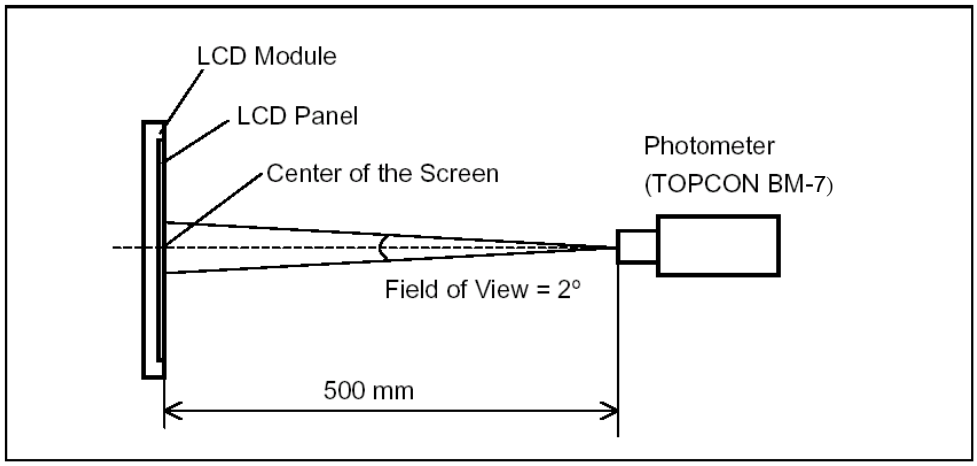
6.1 OPTICAL CHARACTERISTICS

Ta = 25 ± 2 °C

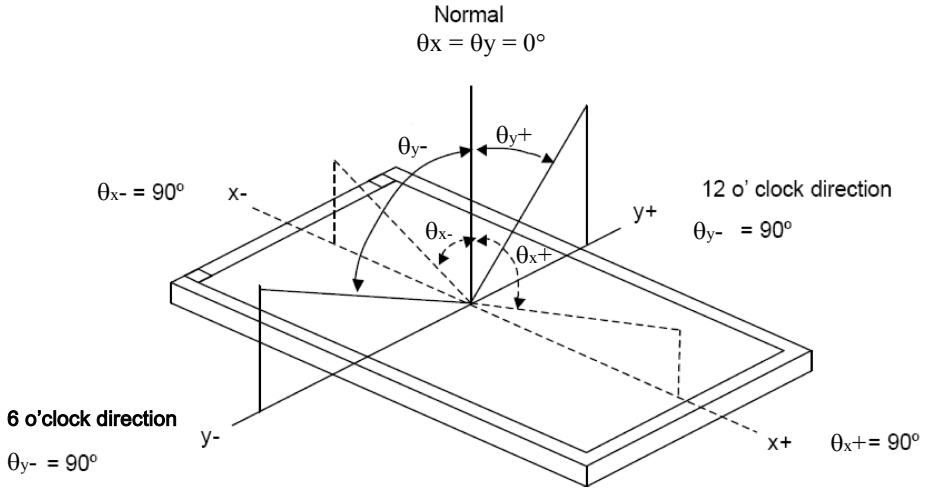
I T E M		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		θ_{y+}	CR ≥ 10	θ_x=0°	50	55	—	deg.	(2) (3)
		θ_{y-}			47	52	—		
		θ_{x+}		θ_y=0°	60	65	—		
		θ_{x-}			60	65	—		
CONTRAST RATIO		CR	θx=0° , θy=0°		300	350	—	—	(3)
RESPONSE TIME		T_R (rise)	θx=0° , θy=0°		—	15	30	msec	(4)
		T_F (fall)			—	35	50		
THE BRIGHTNESS OF MODULE		B	θx=0° , θy=0° IF = 40mA		400	450	—	cd/m^2	(5)
COLOR OF CIE COORDINATE	WHITE	W_X	θx=0° , θy=0° IF = 40mA NTSC : 50 %		0.26	0.31	0.36	—	(6)
		W_Y			0.30	0.35	0.40		
	RED	R_X			0.56	0.61	0.66	—	
		R_Y			0.31	0.36	0.41		
	GREEN	G_X			0.28	0.33	0.38	—	
		G_Y			0.51	0.56	0.61		
	BLUE	B_X			0.09	0.14	0.19	—	
		B_Y			0.07	0.12	0.17		
THE UNIFORMITY OF MODULE		—	IF = 40mA		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.



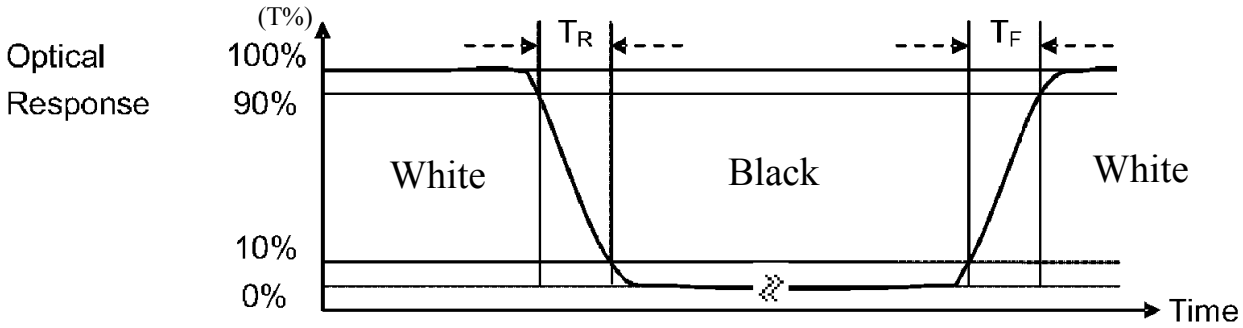
NOTE (2) : DEFINITION OF VIEWING ANGLE :



NOTE (3) : DEFINITION OF CONTRAST RATIO :

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

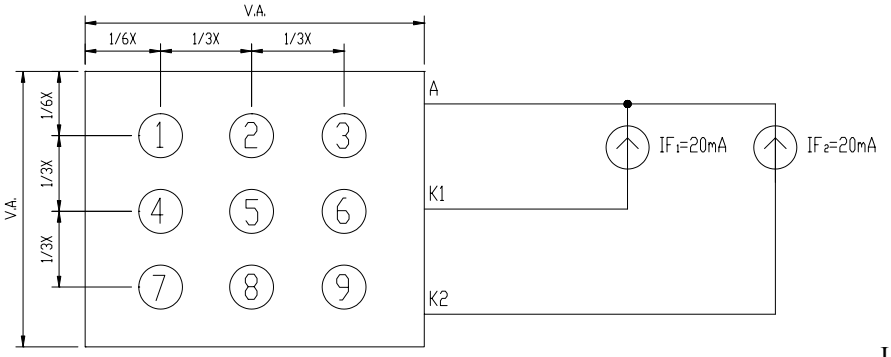
NOTE (4) : DEFINITION OF RESPONSE TIME : TR AND TF
THE FIGURE BVELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



NOTE (5) : BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"

NOTE (6) : THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED.

6.2 THE TEST METHOD OF BRIGHTNESS AND UNIFORMITY

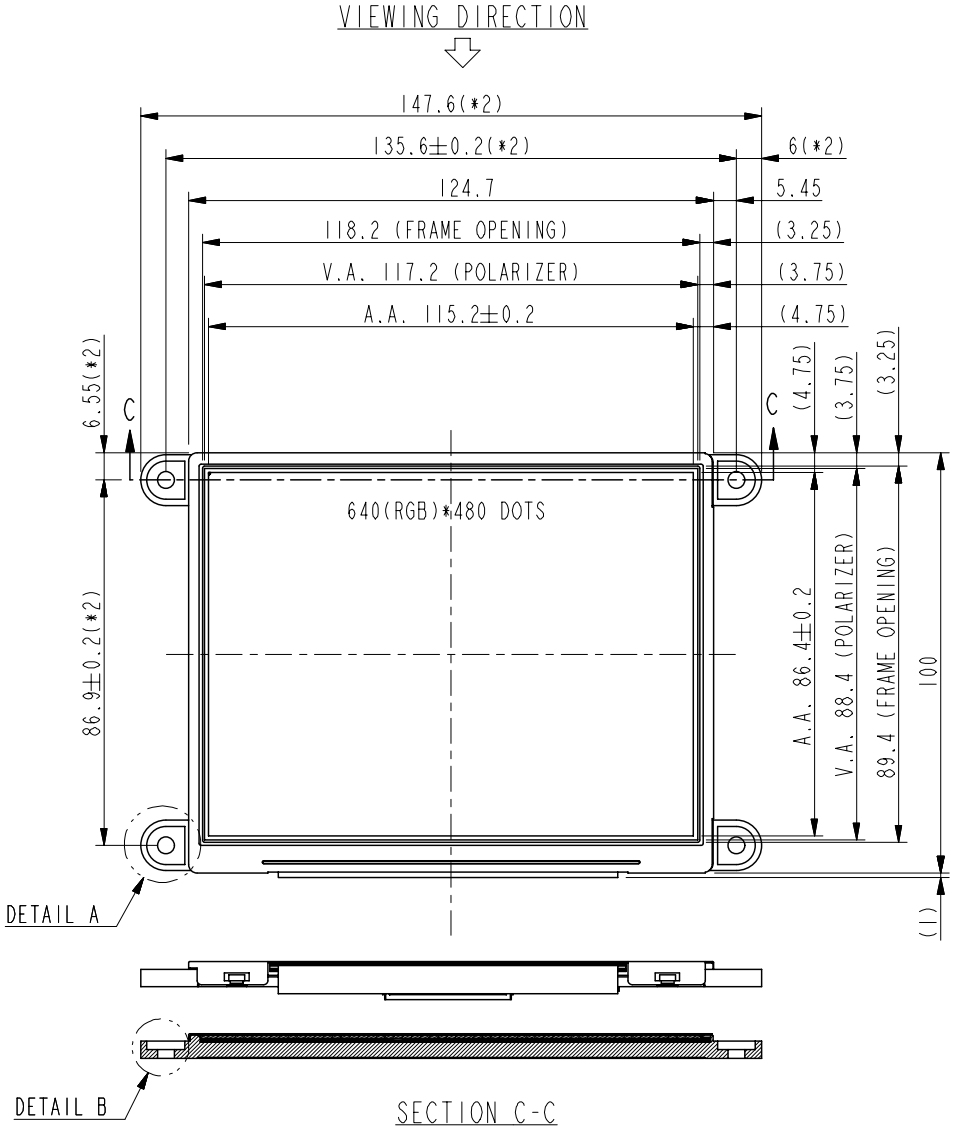


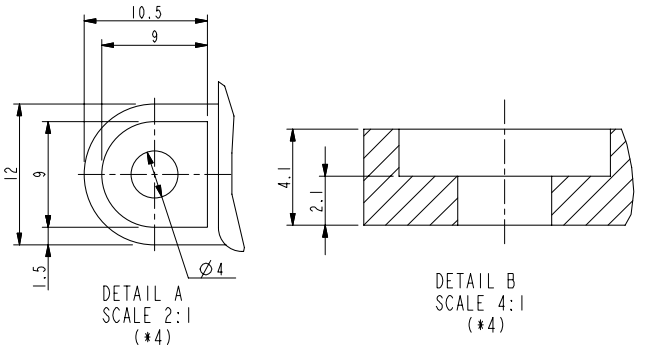
UNIT：mm

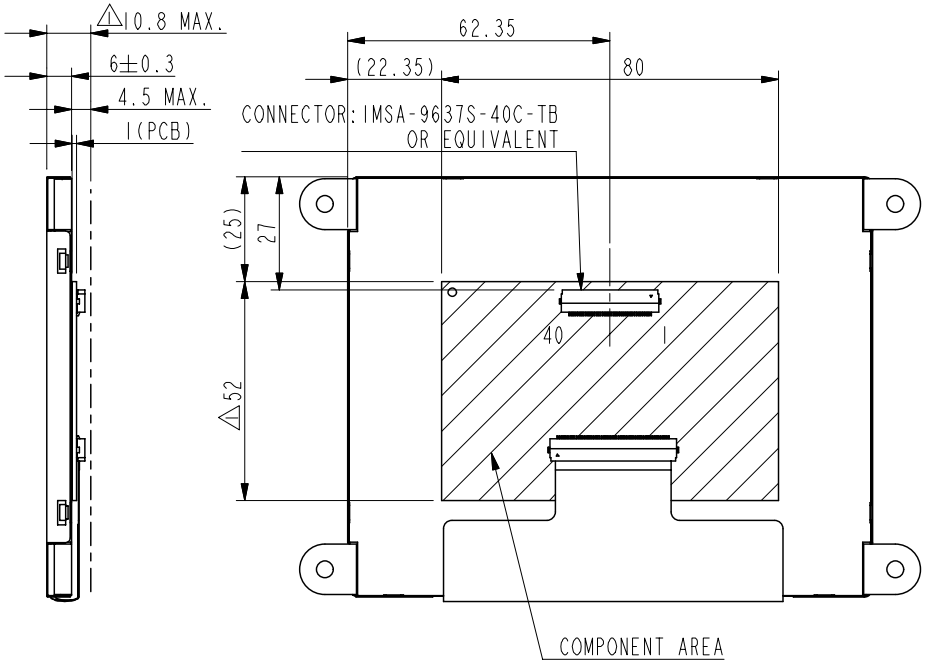
6.3 THE CALCULATING METHOD OF UNIFORMITY

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

7. OUTLINE DIMENSIONS

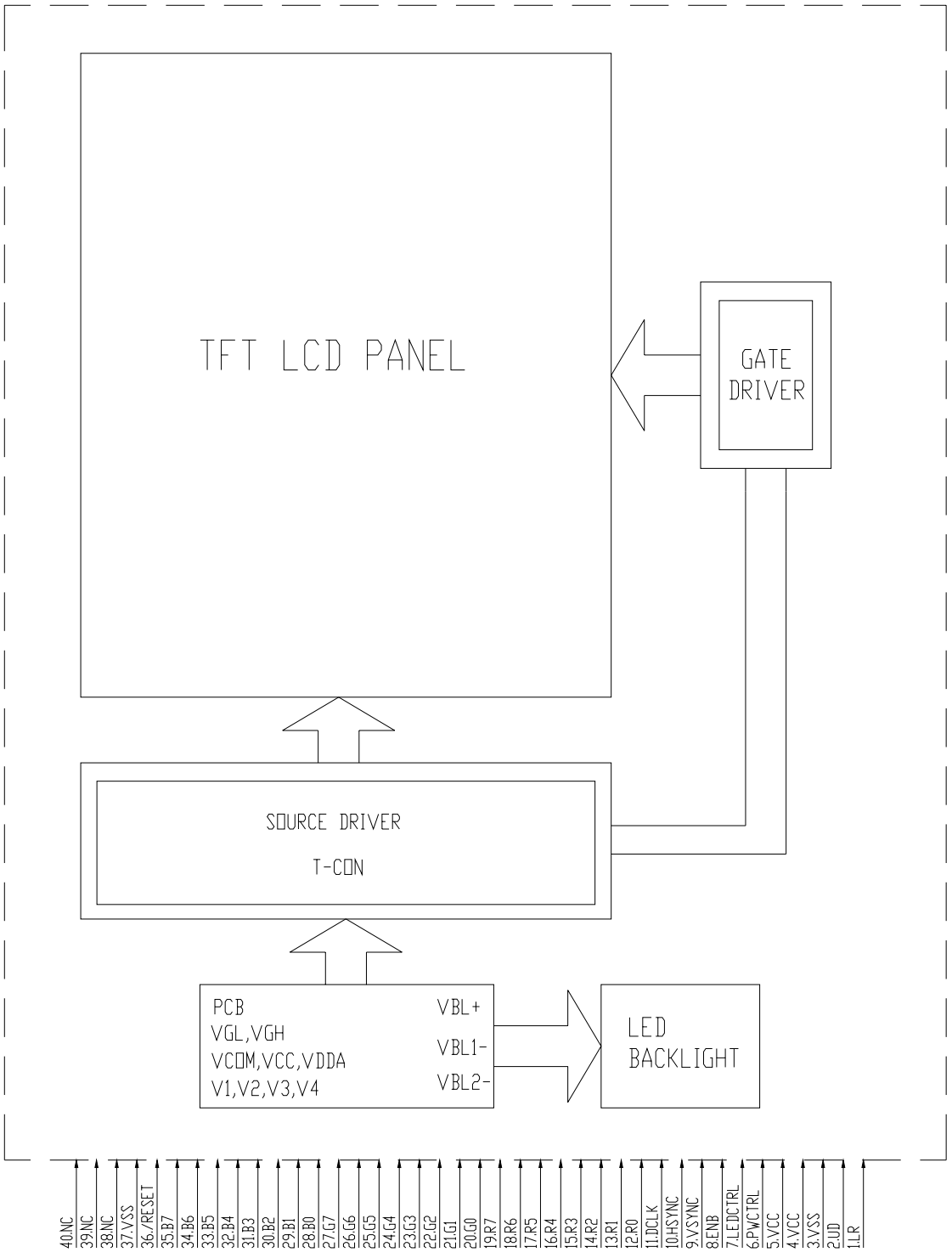




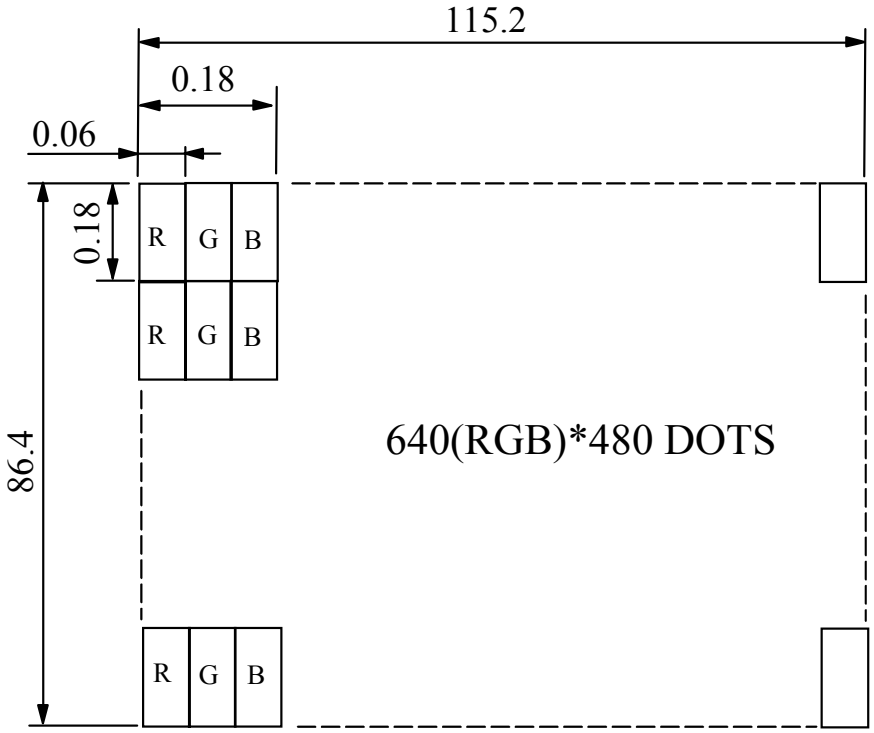


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5
NOTE : MARK △ MODIFY (NUMBER NOTE MODIFY

8 . BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

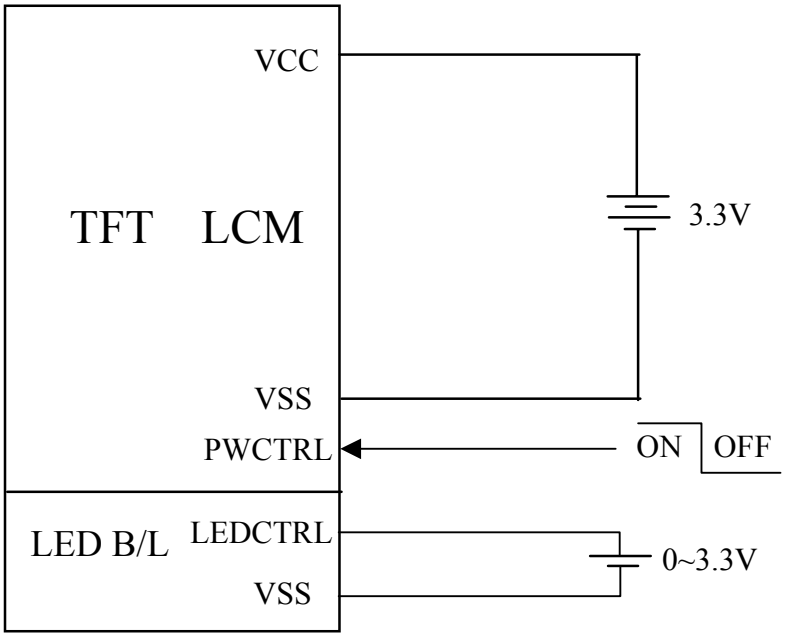
10 . INTERFACE SIGNALS

PIN NO	SYMBOL	I/O	FUNCTION
1	LR	I	LR=H:STH→S01→ ---- → S0960 → STHO LR=L:STH→S960→ ---- → S01 → STHO
2	UD	I	UP/DOWN SCAN SETTING UD=H, REVERSE SCAN UD=L, NORMAL SCAN
3	VSS	P	GROUND
4	VCC	P	POWER SUPPLY (3.3V)
5	VCC	P	POWER SUPPLY (3.3V)
6	PWCTRL	I	<table><tr><td></td><td>PWCTRL</td><td>LEDCTRL</td><td>REMARK</td></tr><tr><td rowspan="3">LOGIC LEVEL H = 3.3V L=0V</td><td>H</td><td>H</td><td>IF = 40mA</td></tr><tr><td>H</td><td>L</td><td>IF = 0mA</td></tr><tr><td>L</td><td>L</td><td>SHUTDOWN</td></tr></table>
7	LEDCTRL	I	* LEDCTRL : WHEN LEDCTRL IS BETWEEN 0 AND 3.3V , ILLUMINATION CAN BE ADJUSTED MANULLY VIA VOLTACE CONTROL.
8	ENB	I	DATA ENABLE INPUT
9	VSYNC	I	VERTICAL SYNC INPUT
10	HSYNC	I	HORIZONTAL SYNC INPUT
11	DCLK	I	DOT DATA COLOCK
12	R0	I	RED DATA BIT 0
13	R1	I	RED DATA BIT 1
14	R2	I	RED DATA BIT 2
15	R3	I	RED DATA BIT 3
16	R4	I	RED DATA BIT 4
17	R5	I	RED DATA BIT 5
18	R6	I	RED DATA BIT 6
19	R7	I	RED DATA BIT 7
20	G0	I	GREEN DATA BIT 0
21	G1	I	GREEN DATA BIT 1
22	G2	I	GREEN DATA BIT 2
23	G3	I	GREEN DATA BIT 3
24	G4	I	GREEN DATA BIT 4
25	G5	I	GREEN DATA BIT 5
26	G6	I	GREEN DATA BIT 6
27	G7	I	GREEN DATA BIT 7
28	B0	I	BLUE DATA BIT 0
29	B1	I	BLUE DATA BIT 1

PIN NO	SYMBOL	I/O	FUNCTION
30	B2	I	BLUE DATA BIT 2
31	B3	I	BLUE DATA BIT 3
32	B4	I	BLUE DATA BIT 4
33	B5	I	BLUE DATA BIT 5
34	B6	I	BLUE DATA BIT 6
35	B7	I	BLUE DATA BIT 7
36	/RESET	I	HARDWARE RESET
37	VSS	P	GROUND
38	NC	—	NC
39	NC	—	NC
40	NC	—	NC

11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



1 2 . INSPECTION CRITERION

12.1 APPLICATION

THIS INSPECTION STANDARD IS TO BE APPLIED TO THE LCD MODULE DELIVERED FROM EMERGING DISPLAY TECHNOLOGIES CORP.(E.D.T) TO CUSTOMERS

12.2 INSPECTION CONDITIONS

12.2.1 (1)OBSERVATION DISTANCE : 35cm±5cm

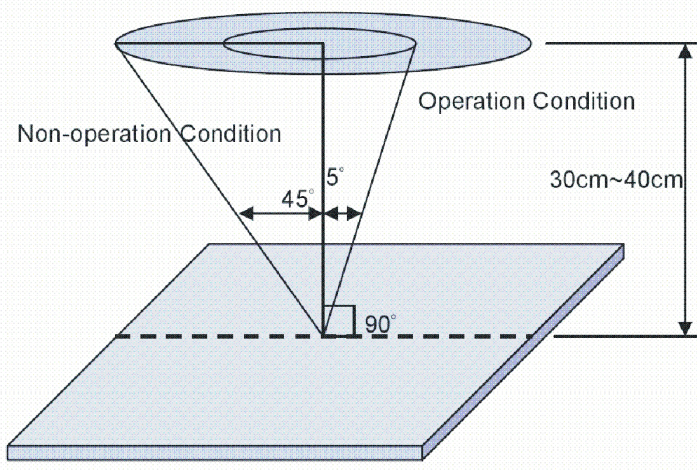
(2)VIEW ANGLE :

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%

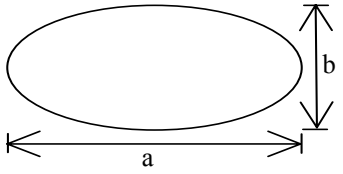
MINOR DEFECT : AQL 1.0%

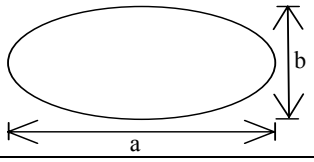
12.3 INSPECTION STANDARDS

12.3.1 VISUAL DEFECTS CLASSIFICATION

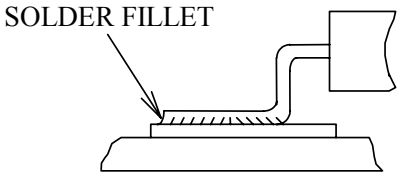
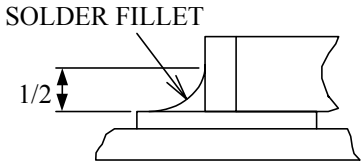
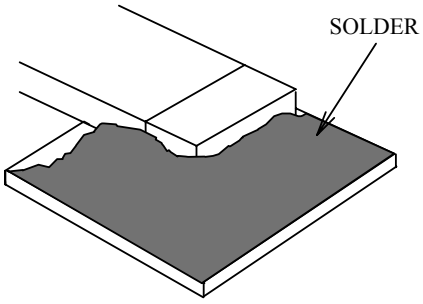
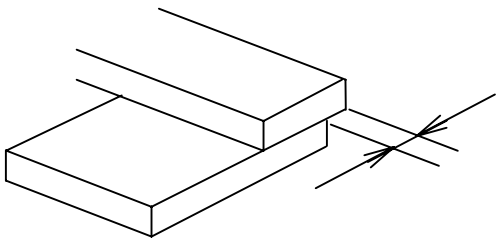
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	• DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC	0.65
	2.BACKLIGHT	• NO LIGHT • FLICKERING AND OTHER ABNORMAL ILLUMINATION	
	3.DIMENSIONS	• SUBJECT TO INDIVIDUAL ACCEPTANCE SPECIFICATIONS	
MINOR DEFECT	1.DISPLAY ZONE	• BLACK/WHITE SPOT • BUBBLES ON POLARIZER • NEWTON RING • BLACK/WHITE LINE • SCRATCH • CONTAMINATION • LEVER COLOR SPREED	1.0
	2.BEZEL ZONE	• STAINS • SCRATCHES • FOREIGN MATTER	
	3.SOLDERING	• INSUFFICIENT SOLDER • SOLDERED IN INCORRECT POSITION • CONVEX SOLDERING SPOT • SOLDER BALLS • SOLDER SCRAPS	
	4.DISPLAY ON (ALL ON)	• LIGHT LINE	

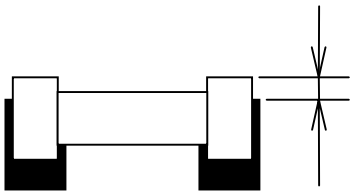
13.3.2 MODULE DEFECTS CALSSIFICATION

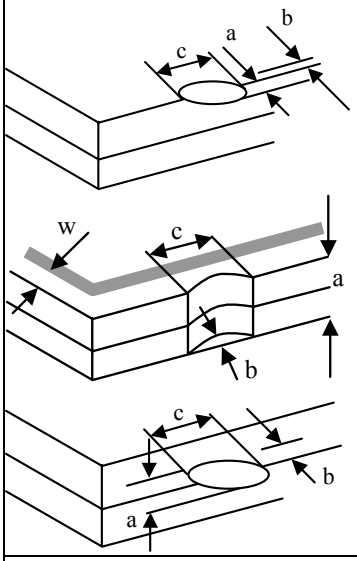
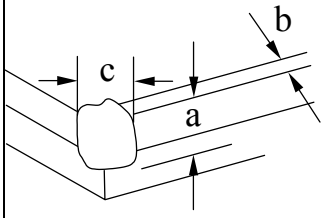
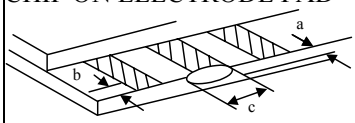
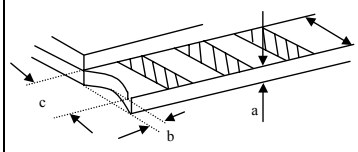
<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>1.</td><td>DISPLAY ON INSPECTION</td><td>(1)INCORRECT PATTERN
(2)MISSING SEGMENT
(3)DIM SEGMENT
(4)OPERATING VOLTAGE BEYOND SPEC</td></tr>
<tr><td>2.</td><td>OVERALL DIMENSIONS</td><td>(1)OVERALL DIMENSION BEYOND SPEC</td></tr>
<tr><td>3.</td><td>DOT DEFECT</td><td>(1) INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS.
(2)
<table>
<tr><th>ITEMS</th><th>ACCEPTABLE COUNT</th></tr>
<tr><td>BRIGHT DOT</td><td>N ≤ 2</td></tr>
<tr><td>DARK DOT</td><td>N ≤ 3</td></tr>
<tr><td>TOAL BRIGHT AND DARK DOTS</td><td>N ≤ 4</td></tr>
</table>
NOTE：
1. THE DEFINITION OF DOT：
THE SIZE OF A DEFECTIVE DOT OVER 1/2 OF WHOLE DOT IS REGARDED AS ONE DEFECTIVE DOT.
2. BRIGHT DOT：
DOTS APPEAR BRIGHT AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER BLACK PATTERN.
3. DARK DOT：
DOTS APPEAR DARK AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER PURE RED, GREEN, BLUE PICTURE.</td></tr>
<tr><td>4.</td><td>FOREIGN BLACK/WHITE/ BRIGHT LINE/ SCRATCH OF VIEWING AREA</td><td>
<table>
<tr><th>LENGTH：L</th><th>WIDTH：W</th><th>PERMISSIBLE NO.</th></tr>
<tr><td>L ≤ 0.3</td><td>W ≤ 0.05</td><td>IGNORE</td></tr>
<tr><td>0.3 < L ≤ 2.5</td><td>0.05 < W ≤ 0.1</td><td>4</td></tr>
<tr><td>2.5 < L</td><td>0.1 < W</td><td>NONE</td></tr>
</table>
WIDTH：W mm, LENGH： L mm</td></tr>
<tr><td>5.</td><td>FOREIGN MATTER \ BLACK SPOTS \ WHITE SPOTS \ DENT (INCLUDING LIGHT LEAKAGE DUE TO POLARIZING PLATES PINHOLES, ETC.)</td><td>
<table>
<tr><th>AVERAGE DIAMETER (mm): D</th><th>NUMBER OF PIECES PERMITTED</th></tr>
<tr><td>D ≤ 0.15</td><td>IGNORE</td></tr>
<tr><td>0.15 < D ≤ 0.5</td><td>4</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
</table>
NOTE ：DIAMETER D=(a+b)/2
 
</td></tr>
</table>

<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>6.</td><td>BUBBLES OF POLARIZER /DIRT/CF FAIL /SURFACE STAINS</td><td>
<table>
<tr><th></th><th>AVERAGE DIAMETER (mm)：D</th><th>NUMBER OF PIECES PERMITTED</th></tr>
<tr><td rowspan="3">BUBBLE ON THE POLARIZER</td><td>D ≤ 0.25</td><td>IGNORE</td></tr>
<tr><td>0.25 < D ≤ 0.5</td><td>N ≤ 5</td></tr>
<tr><td>0.5 < D</td><td>NOTE</td></tr>
<tr><td rowspan="2">SURFACE STATUS</td><td>D < 0.1 mm</td><td>IGNORE</td></tr>
<tr><td>0.1 < D ≤ 0.3mm</td><td>N ≤ 3</td></tr>
<tr><td rowspan="2">CF FAIL / SPOT</td><td>D < 0.1 mm</td><td>IGNORE</td></tr>
<tr><td>0.1 < D ≤ 0.3mm</td><td>N ≤ 3</td></tr>
</table>
NOTE : (1)POLARIZER BUBBLE IS DEFINED AS THE BUBBLE APPEARS ON ACTIVE DISPLAY AREA. THE DEFECT OF POLARIZER BUBBLE SHALL BE IGNORED IF THE POLARIZER BUBBLE APPEARS ON THE OUTSIDE OF ACTIVE DISPLAY AREA.
(2)THE EXTRANEOUS SUBSTANCE IS DEFINED AS IT CAN BE OBSERVED WHEN THE MODULE IS POWER ON.
(3)THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING.
AVERAGE DIAMETER (D)=(a+b)/2
 

</td></tr>
<tr><td>7.</td><td>LINE DEFECT ON DISPLAY</td><td>OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOW</td></tr>
<tr><td>8.</td><td>MURA ON DISPLAY</td><td>IT’S OK IF MURA IS SLIGHT VISIBLE THROUNG 6% ND FILTER</td></tr>
<tr><td>9.</td><td>UNEVEN COLOR SPREAD, COLORATION</td><td>(1)TO BE DETERMINED BASED UPON THE STANDARD SAMPLE.</td></tr>
<tr><td>10.</td><td>BEZEL APPEARANCE</td><td>(1)BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION.
(2)BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.</td></tr>
<tr><td>11</td><td>PCB</td><td>(1)THERE MAY NOT BE MORE THAN 2mm OF SEALANT OUTSIDE THE SEAL AREA ON THE PCB, AND THERE SHOULD BE NO MORE THAN THREE PLACES.
(2)NO OXIDATION OR CONTAMINATION PCB TERMINALS.
(3)PARTS ON PCB MUST BE THE SAME AS ON THE PRODUCTION CHARACTERISTIC CHART.
THERE SHOULD BE NO WRONG PARTS, MISSING PARTS OR EXCESS PARTS.
(4)THE JUMPER ON THE PCB SHOULD CONFORM TO THE PRODUCT CHARACTERISTIC CHART.
(5)IF SOLDER GETS ON BEZEL TAB PADS, LED PAD, ZEBRA PAD OR SCREW HOLD PAD, MAKE SURE IT IS SMOOTHED DOWN.</td></tr>
</table>

NO.	ITEM	CRITERIA
12.	SOLDERING	(1)NO SOLDERING FOUND ON THE SPECIFIED PLACE (2)INSUFFICENT SOLDER (a)LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD  (b)CHIP COMPONENT · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING  • SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED  (3)PARTS ALIGMENT (a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE 

NO.	ITEM	CRITERIA
12.	SOLDERING	(b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE  (4)NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB. (5)NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE. (6)NO RESIDUE OR SOLDER BALLS ON PCB. (7)NO SHORT CIRCUITS IN COMPONENTS ON PCB.
13.	BACKLIGHT	(1)NO LIGHT (2)FLICKERING AND OTHER ABNORMAL ILLUMINATION (3)SPOTS OR SCRATCHES THAT APPEAR WHEN LIT MUST BE JUDGED USING LCD SPOT, LINES AND CONTAMINATION STANDARDS. (4)BACKLIGHT DOESN'T LIGHT OR COLOR IS WRONG.
14.	GENERAL APPEARANCE	(1)NO OXIDATION, CONTAMINATION, CURVES OR, BENDS ON INTERFACE PIN (OLB) OF TCP. (2)NO CRACKS ON INTERFACE PIN (OLB) OF TCP. (3)NO CONTAMINATION, SOLDER RESIDUE OR SOLDER BALLS ON PRODUCT. (4)THE IC ON THE TCP MAY NOT BE DAMAGED, CIRCUITS. (5)THE UPPERMOST EDGE OF THE PROTECTIVE STRIP ON THE INTERFACE PIN MUST BE PRESENT OR LOOK AS IF IT CAUSE THE INTERFACE PIN TO SEVER. (6)THE RESIDUAL ROSIN OR TIN OIL OF SOLDERING (COMPONENT OR CHIP COMPONENT) IS NOT BURNED INTO BROWN OR BLACK COLOR. (7)SEALANT ON TOP OF THE ITO CIRCUIT HAS NOT HARDENED. (8)PIN TYPE MUST MATCH TYPE IN SPECIFICATION SHEET. (9)LCD PIN LOOSE OR MISSING PINS. (10)PRODUCT PACKAGING MUST THE SAME AS SPECIFIED ON PACKAGING SPECIFICATION SHEET. (11)PRODUCT DIMENSION AND STRUCTURE MUST CONFORM TO PRODUCT SPECIFICATION SHEET. (12)THE APPEARANCE OF HEAT SEAL SHOULD NOT ADMIT ANY DIRT AND BREAK.

<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td rowspan="4">15.</td><td rowspan="4">CRACKED GLASS</td><td colspan="2">THE LCD WITH EXTENSIVE CRACK IS NOT ACCEPTABLE</td></tr>
<tr><td>GENERAL GLASS CHIP：
 
</td><td>
<table>
<tr><th>a</th><th>b</th><th>c</th></tr>
<tr><td>≤ t/2</td><td>< VIEWING AREA</td><td>≤ 1/8X</td></tr>
<tr><td>t/2 > , ≤ 2t</td><td>≤ W/2</td><td>≤ 1/8X</td></tr>
</table>
*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE
X = LCD SIDE LENGTH
t = GLASS THICKNESS</td></tr>
<tr><td>CORNER PART：
 
</td><td>
<table>
<tr><th>a</th><th>b</th><th>c</th></tr>
<tr><td>≤ t/2</td><td>< VIEWING AREA</td><td>≤ 1/8X</td></tr>
<tr><td>> t/2 , ≤ 2t</td><td>≤ W/2</td><td>≤ 1/8X</td></tr>
</table>
*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE
X = LCD SIDE LENGTH
t = GLASS THICKNESS</td></tr>
<tr><td>CHIP ON ELECTRODE PAD
 
</td><td>
<table>
<tr><th>a</th><th>b</th><th>c</th></tr>
<tr><td>≤ t</td><td>≤ 0.5mm</td><td>≤ 1/8X</td></tr>
</table>
* X=LCD SIDE WIDTH
t =GLASS THICKNESS</td></tr>
<tr><td> 
</td><td>
<table>
<tr><th>a</th><th>b</th><th>c</th></tr>
<tr><td>≤ t</td><td>≤ 1/8X</td><td>≤ L</td></tr>
</table>
*X=LCD SIDE WIDTH
t = GLASS THICKNESS
L=ELECTRODE PAD LENGTH
①IF GLASS CHIPPING THE ITO TERMINAL, OVER 2/3 OF THE ITO MUST REMAIN AND BE, INSPECTED ACCORDING TO ELECTRODE TERMINAL SPECIFICATIONS
②IF THE PRODUCT WILL BE HEAT SEALED BY THE CUSTOMER, THE ALIGNMENT MARK MUST NOT BE DEMAGED</td></tr>
</table>

12.4 RELIABILITY TEST

12.4.1 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 STORAGE	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 10 CYCLES OF OPERATION: -40°C FOR 30 MINUTES ~ +85°C FOR 30 MINUTES
7	ESD (ELECTROSTATIC DISCHARGE)	AIR DISCHARGE ± 12KV CONTACT DISCHARGE ± 8KV

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.

12.5 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 12.5, 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

12.6 OPERATION

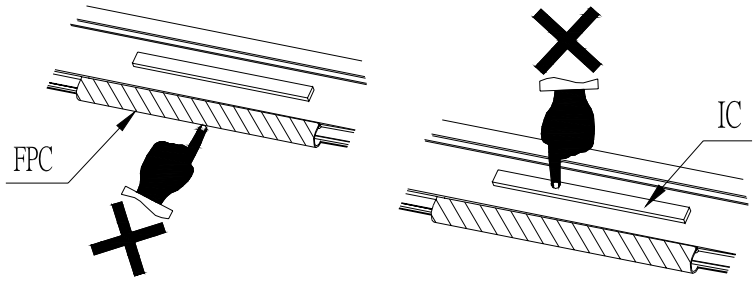
12.6.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .

12.6.2 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 .

12.6.3 ADJUST THE LC DRIVING VOLTAGE TO OBTAIN THE OPTIMUM CONTRAST .

12.6.4 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 .

12.6.5 NOT ALLOWED TO INFLICT ANY EXTERNAL STRESS AND TO CAUSE ANY MECHANICAL INTERFERENCE ON THE BENDING AREA OF FPC DURING THE TAIL BENDING BACKWARDS!
DO NOT STRESS FPC AND IC ON THE MODULE!



12.7 NOTICE

12.7.1 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 .

12.7.2 DO NOT DISASSEMBLE . EDT SHALL NOT BE HELD RESPONSIBLE IF THE MODULE IS DISASSEMBLED AND UPON THE REASSEMBLY THE MODULE FAILED .

12.7.3 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 PERSONNAL SHOULD BE OF STATIC-PROTECTED MATERIAL .

12.7.4 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 .

12.7.5 DON’T GIVE EXTERNAL SHOCK.

12.7.6 DON’T APPLY EXCESSIVE FORCE ON THE SURFACE.

12.7.7 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.

12.7.8 DON’T OPERATE IT ABOVE THE ABSOLUTE MAXIMUM RATING.

12.7.9 STORAGE IN A CLEAN ENVIRONMENT, FREE FROM DUST, ACTIVE GAS, AND SOLVENT.

12.7.10 STORE WITHOUT ANY PHYSICAL LOAD.

12.7.11 REWIRING: NO MORE THAN 3 TIMES.