

EXAMINED BY :	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0007669
Lucica Lu		ISSUE : FEB.20, 2019
APPROVED BY:		TOTAL PAGE : 24
Vincent Wh		VERSION : 5

CUSTOMER	ACCEPTANCE	SPECIFICATIONS
<div style="text-align: center;"> <p>MODEL NO. :</p> <p><u>ET0700F9DM6</u></p> <p>(RoHS)</p> <p>FOR MESSRS :</p> <p>_____</p> </div>		
<p>CUSTOMER'S APPROVAL</p> <p>DATE : _____</p> <p>BY : _____</p>		

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO.

ET0700F9DM6

VERSION

5

PAGE

0-1

RECORDS OF REVISION

DOC . FIRST ISSUE

JAN.30, 2013

DATE

REVISED
PAGE
NO.

SUMMARY

FEB.25, 2013

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8. BLOCK DIAGRAM
ADD NOTE (2)

MAR.22, 2016

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2. MECHANICAL SPECIFICATIONS
(9)VIEWING DIRECTION : ADD (GRAY LEVEL INVERSION)

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3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS
ADD NOTE (1)

3

4. ELECTRICAL CHARACTERISTICS
POWER SUPPLY FOR LED BACKLIGHT : MIN.=9.0→8.4

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6.1 OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	REMARK
VIEWING ANGLE	θ_{xz}	$CR \geq 10$	$\theta_z = 0^\circ$	60	65	—	deg. NOTE (2) NOTE (3)
	θ_{yz}			60	65	—	
	θ_{zx}			65	70	—	
	θ_{zy}			65	70	—	
CONTRAST RATIO		$\theta_x = 0^\circ, \theta_y = 0^\circ$	300	350	—	—	NOTE (3)
COLOR OF CIE COORDINATE	WHITE	$\theta_x = 0^\circ, \theta_y = 0^\circ$ IF = 160 mA (NTSC : 45 %)		0.26	0.31	0.36	NOTE (5)
	Wx			0.29	0.34	0.39	
	Wy			0.51	0.56	0.61	
	RED			0.29	0.34	0.39	
	Rx			0.28	0.33	0.38	
	GREEN			0.53	0.58	0.63	
	Gx			0.10	0.15	0.20	
	Gy			0.07	0.12	0.17	
BLUE	Bx			—	—	—	
	By			—	—	—	

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	REMARK
VIEWING ANGLE	θ_{xz}	$CR \geq 10$	$\theta_z = 0^\circ$	65	70	—	deg. NOTE (2) NOTE (3)
	θ_{yz}			70	75	—	
	θ_{zx}			70	75	—	
	θ_{zy}			70	75	—	
CONTRAST RATIO		$\theta_x = 0^\circ, \theta_y = 0^\circ$	675	900	—	—	NOTE (3)
COLOR OF CIE COORDINATE	WHITE	$\theta_x = 0^\circ, \theta_y = 0^\circ$ IF = 160 mA (NTSC : 72 %)		0.255	0.305	0.355	NOTE (5)
	Wx			0.275	0.325	0.375	
	Wy			0.585	0.635	0.685	
	RED			0.295	0.345	0.395	
	Rx			0.265	0.315	0.365	
	GREEN			0.595	0.645	0.695	
	Gx			0.115	0.165	0.215	
	Gy			0.020	0.070	0.120	
BLUE	Bx			—	—	—	
	By			—	—	—	

JAN.09, 2017

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7. OUTLINE DIMENSIONS
MARK Δ : MODIFY PCB POSITION TOLERANCE

FEB.20, 2019

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1.1 DATA SHEETS FOR CONTROLLER/DRIVER PLEASE REFER TO :
HIMAX HX8678-A→ HIMAX HX8678-B

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1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER/DRIVER

PLEASE REFER TO :

HIMAX HX8262-A

HIMAX HX8678-B

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 ----- 7 inch
- (2) NUMBER OF DOTS ----- 800W * (RGB) * 480H DOTS
- (3) MODULE SIZE ----- 166W * 105.44H *9.85D(MAX.) mm
(WITHOUT FPC & LED BL'S CABLE)
- (4) ACTIVE AREA ----- 152.4W * 91.44H mm
- (5) DOT SIZE ----- 0.0635W * 0.1905H mm
- (6) PIXEL SIZE ----- 0.1905W * 0.1905H mm
- (7) LCD TYPE ----- TFT , TRANSMISSIVE,ANTI-GLARE
- (8) COLOR ----- 262K
- (9) VIEWING DIRECTION ----- 6 O'CLOCK (GRAY LEVEL INVERSION)
- (10) BACK LIGHT ----- LED , COLOR : WHITE
- (11) INTERFACE MODE ----- RGB 18BIT PARALLEL
(DE/SYNC MODE)

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.5	6.5	V	
INPUT VOLTAGE	VIN-VSS	- 0.3	VDD+0.3	V	
STATIC ELECTRICITY	—	—	—	V	NOTE(1)
LED BACKLIGHT POWER DISSIPATION	PD	—	2592	mW	
LED BACKLIGHT FORWARD CURRENT	IF	—	240	mA	

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

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	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	—	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 3HRS
SHOCK	—	29.4 m/s ² (3 G)	—	490 m/s ² (50 G)	10 ms XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) : Ta AT -30°C : WILL BE 48HRS MAX.
80°C : WILL BE 168HRS 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

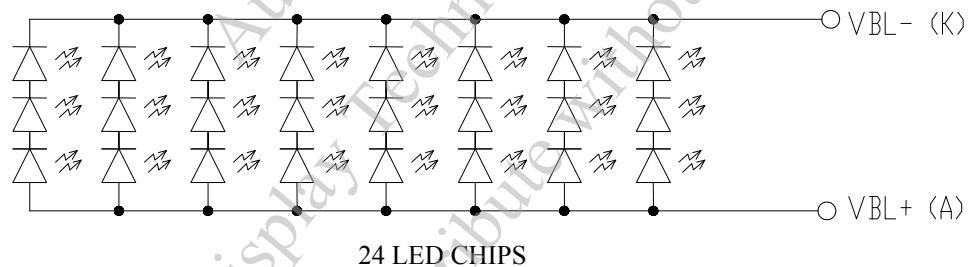
Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.2	3.3	3.6	V	
POWER SUPPLY VOLTAGE FOR LED DRIVER	VCC-VSS	—	2.5	3.3	3.6	V	
LOW LEVEL INPUT VOLTAGE	VIL	—	0	—	0.3*VDD	V	NOTE (1)
HIGH LEVEL INPUT VOLTAGE	VIH	—	0.7*VDD	—	VDD	V	NOTE (1)
POWER SUPPLY CURRENT	IDD	VDD-VSS = 3.3V	—	220	270	mA	NOTE (2)
POWER SUPPLY CURRENT FOR LED DRIVER	ICC	VCC-VSS=3.3V LED B/L=ON	—	600	780	mA	
POWER SUPPLY FOR LED BACKLIGHT	V _{BL+} - V _{BL-}	IF=160mA	8.4	9.9	10.8	V	NOTE (3)
LED LIFE TIME	—	—	30K	40K	—	HRS	

NOTE (1) : APPLIED TO TERMINALS B5~B0 , G5~G0 , R5~R0 , DCLK , HSYNC , VSYNC , ENB.

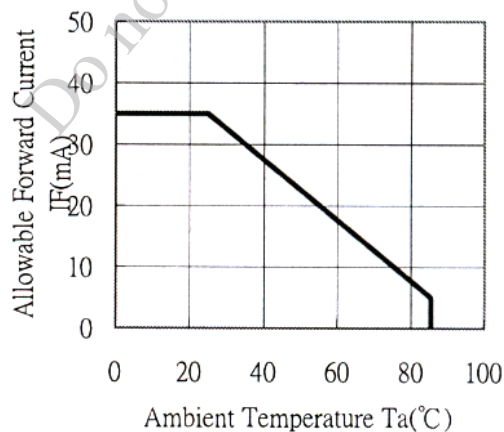
NOTE (2) : THE DISPLAY PATTERN IS ALL "WHITE".

NOTE (3) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



NOTE (4) : AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT. (PER. LED)

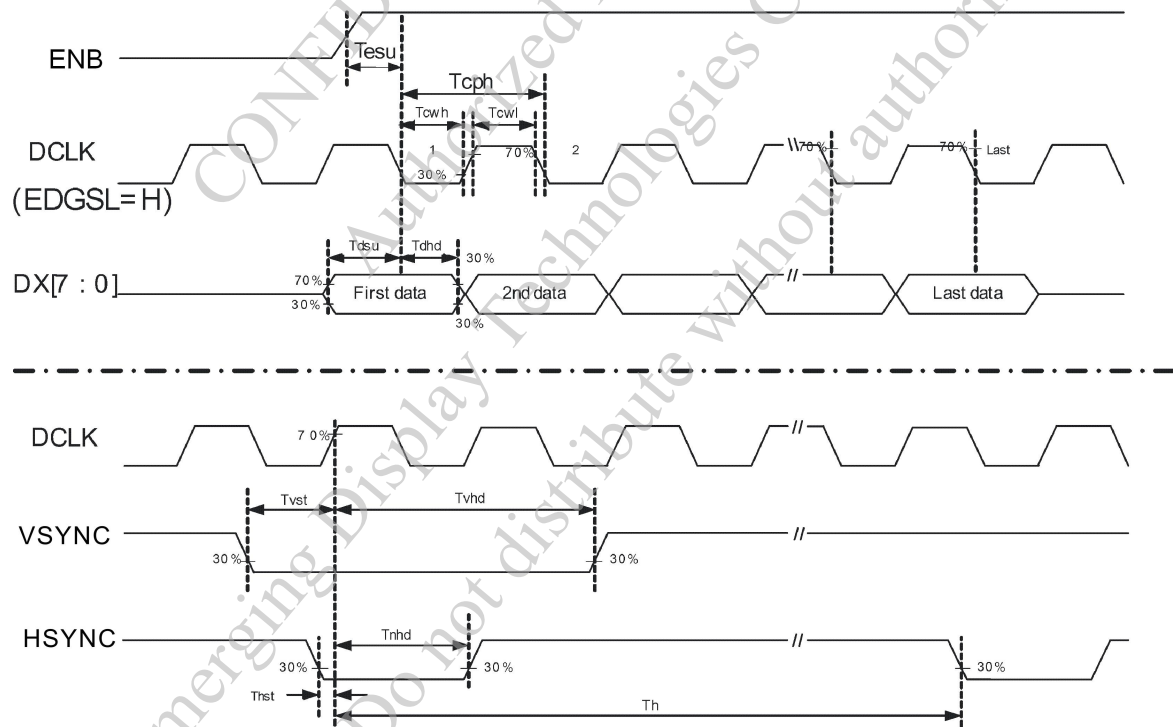
Ambient Temperature vs.
Allowable Forward Current



5. TIMING CHARACTERISTICS

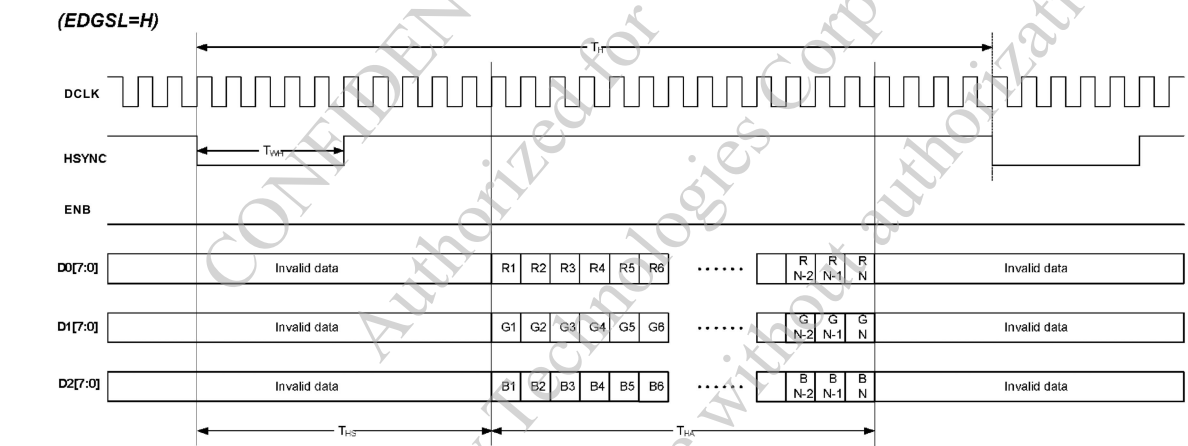
5.1 AC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
HSYNC SETUP TIME	T_{hst}	6	—	—	ns
HSYNC HOLD TIME	T_{hhd}	6	—	—	ns
VSYNC SETUP TIME	T_{vst}	6	—	—	ns
VSYNC HOLD TIME	T_{vhd}	6	—	—	ns
DATA SETUP TIME	T_{dsu}	6	—	—	ns
DATA HOLD TIME	T_{dhd}	6	—	—	ns
ENB SETUP TIME	T_{esu}	6	—	—	ns
SOURCE OUTPUT SETTLING TIME	T_{ST}	—	—	15	μ s
SOURCE OUTPUT LOADING R	R_{SL}	—	2	—	K ohm
SOURCE OUTPUT LOADING C	C_{SL}	—	60	—	pF

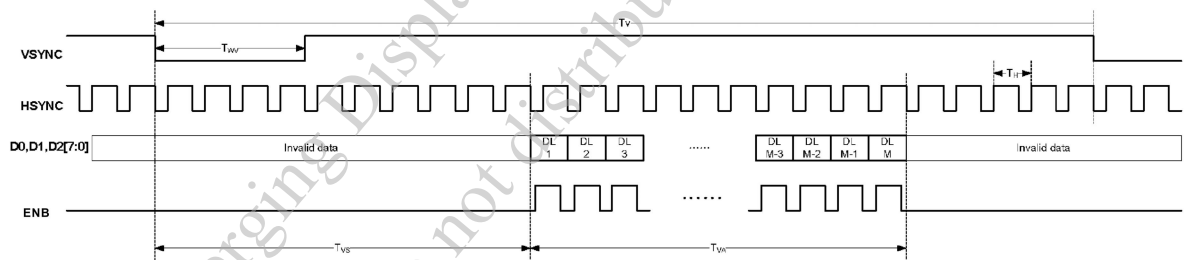


5.2 SYNC MODE SIGNAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY	F_{CPH}	—	33.26	—	MHz
DCLK PERIOD	T_{CPH}	—	30.06	—	ns
DCLK PULSE DUTY	T_{CWH}	40	50	60	%
HSYNC PERIOD	T_H	930	1056	1057	T_{CPH}
HSYNC PULSE WIDTH	T_{WH}	1	128	—	T_{CPH}
HSYNC -FIRST HORIZONTAL DATA TIME	T_{HS}	—	216	—	T_{CPH}
HSYNC ACTIVE TIME	T_{HA}	—	800	—	T_{CPH}
VSYNC PERIOD	T_V	—	525	—	T_H
VSYNC PULSE WIDTH	T_{WV}	1	2	—	T_H
VSYNC -DE TIME	T_{VS}	—	35	—	T_H
VSYNC ACTIVE TIME	T_{VA}	—	480	—	T_H



SYNC Mode Horizontal Data Format

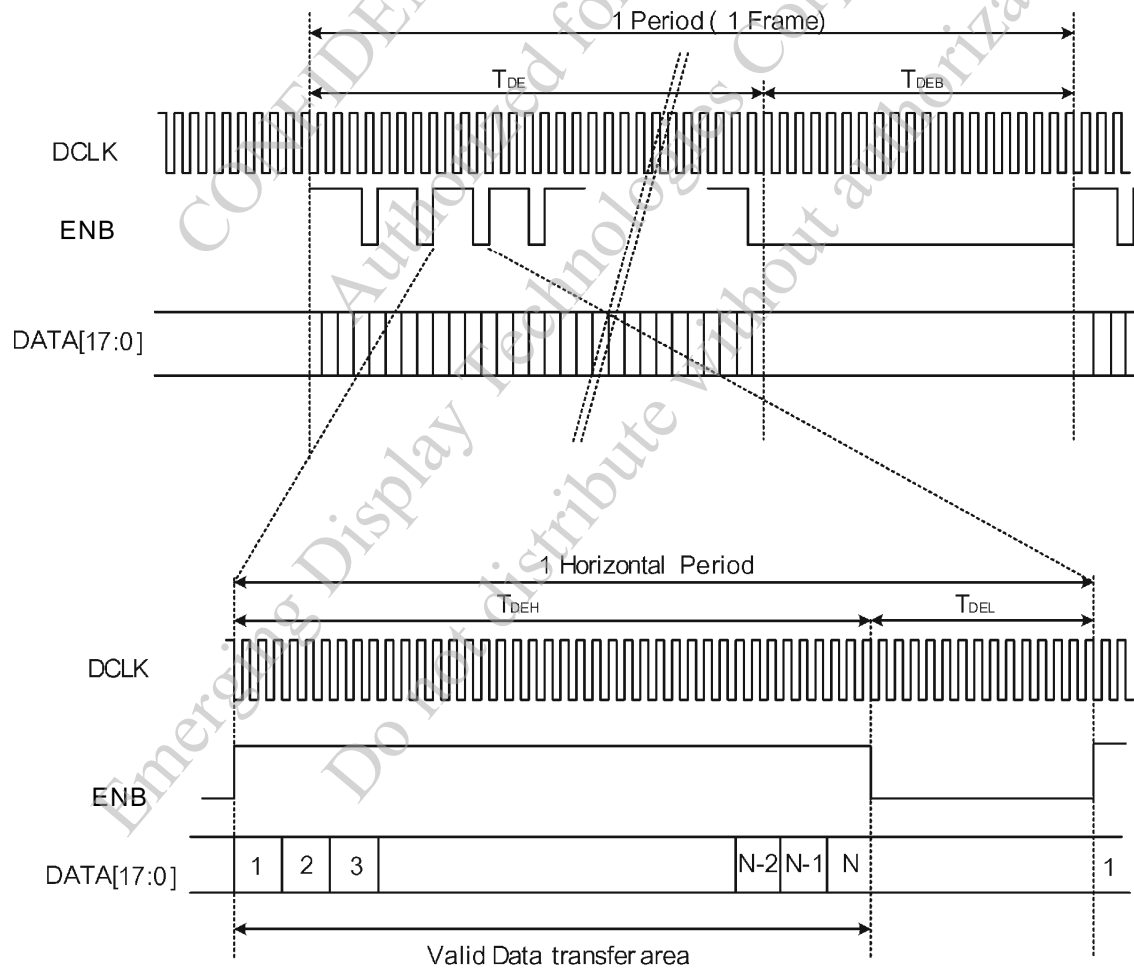


SYNC Mode Vertical Data Format

5.3 DE MODE SIGNAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY	F_{CPH}	—	33.26	—	MHz
DCLK PERIOD	T_{CPH}	—	30.06	—	ns
DCLK PULSE DUTY	T_{CWH}	40	50	60	%
ENB PERIOD	$T_{DEH} + T_{DEL}$	1000	1056	1200	T_{CPH}
ENB PULSE WIDTH	T_{DEH}	—	800	—	T_{CPH}
ENB FRAME BLANKING	T_{DEB}	10	45	110	$T_{DEH} + T_{DEL}$
ENB FRAME WIDTH	T_{DE}	—	480	—	$T_{DEH} + T_{DEL}$
OEV PULSE WIDTH	T_{OEV}	—	150	—	T_{CPH}
CKV PULSE WIDTH	T_{CKV}	—	133	—	T_{CPH}
ENB(INTERNAL)-STV TIME	T_1	—	4	—	T_{CPH}
ENB(INTERNAL)-CKV TIME	T_2	—	40	—	T_{CPH}
ENB(INTERNAL)-OEV TIME	T_3	—	23	—	T_{CPH}
ENB(INTERNAL)-POL TIME	T_4	—	157	—	T_{CPH}
STV PULSE WIDTH	—	—	1	—	T_H

NOTE : (1) $T_{HS} + T_{HA} < T_H$



6. OPTICAL CHARACTERISTICS (NOTE1)

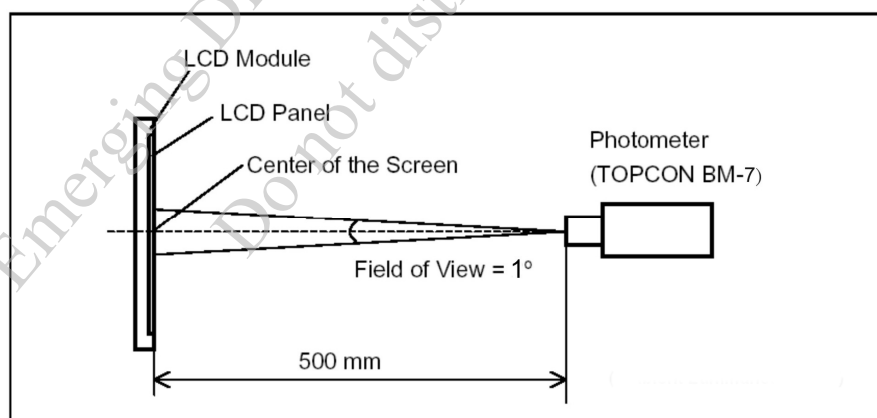
6.1 OPTICAL CHARACTERISTICS

$T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$

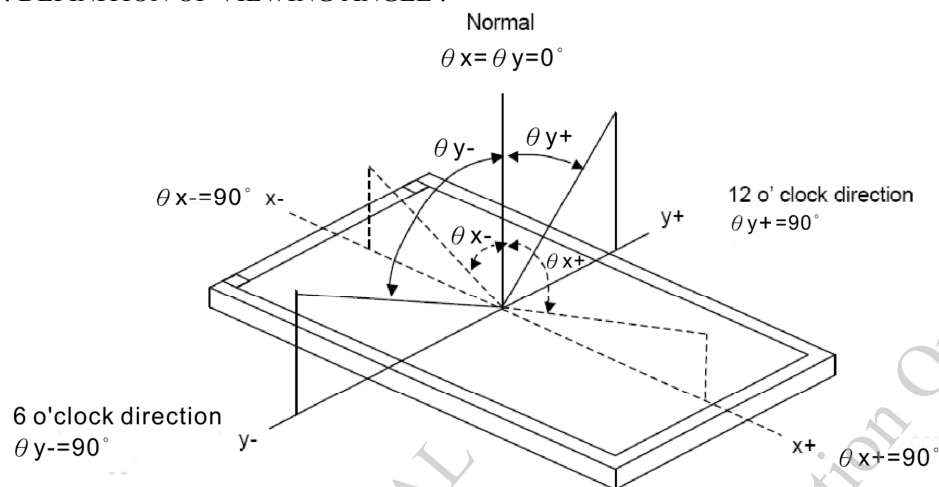
ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		θ_{y+}	$CR \geq 10$	$\theta_x=0^{\circ}$	65	70	—	d e g .	NOTE (2) NOTE (3)
		θ_{y-}			70	75	—		
		θ_{x+}		$\theta_y=0^{\circ}$	70	75	—		
		θ_{x-}			70	75	—		
CONTRAST RATIO		CR	$\theta_x=0^{\circ}, \theta_y=0^{\circ}$		675	900	—	—	NOTE (3)
RESPONSE TIME		T_R (rise)	$\theta_x=0^{\circ}, \theta_y=0^{\circ}$		—	5	10	—	NOTE (4)
		T_F (fall)			—	15	20		
COLOR OF CIE COORDINATE	WHITE	W_x	$\theta_x=0^{\circ}, \theta_y=0^{\circ}$ IF = 160 mA (NTSC : 72 %)		0.255	0.305	0.355	—	NOTE (5)
		W_y			0.275	0.325	0.375		
	RED	R_x			0.585	0.635	0.685	—	
		R_y			0.295	0.345	0.395		
	GREEN	G_x			0.265	0.315	0.365	—	
		G_y			0.595	0.645	0.695		
	BLUE	B_x			0.115	0.165	0.215	—	
		B_y			0.020	0.070	0.120		
THE BRIGHTNESS OF MODULE		B	$\theta_x=0^{\circ}, \theta_y=0^{\circ}$ IF = 160mA		350	400	—	cd/m ²	NOTE (6)
THE UNIFORMITY OF MODULE		—			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 1° AT A DISTANCE OF 50cm AND NORMAL DIRECTION.



NOTE (2) : DEFINITION OF VIEWING ANGLE :

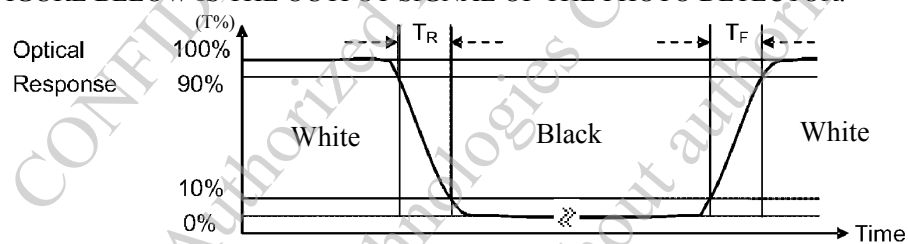


NOTE (3) : DEFINITION OF CONTRAST RATIO :

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

NOTE (4) : DEFINITION OF RESPONSE TIME : T_R AND T_F

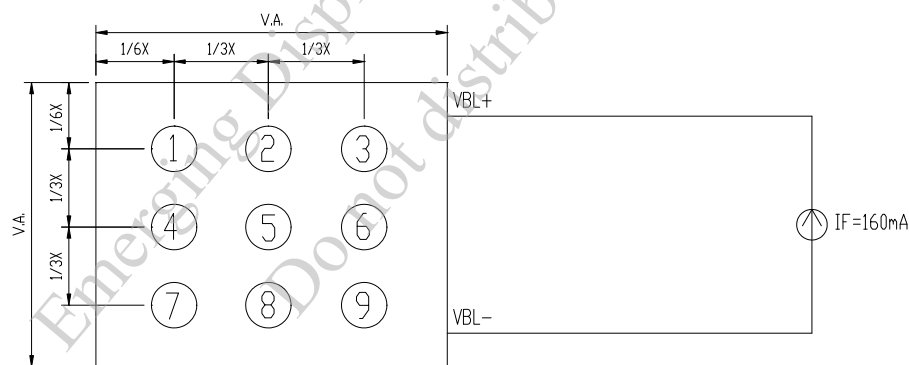
THE FIGURE BELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



NOTE (5) : THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED.

NOTE (6) : BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"

6.2 THE TEST METHOD OF BRIGHTNESS AND UNIFORMITY

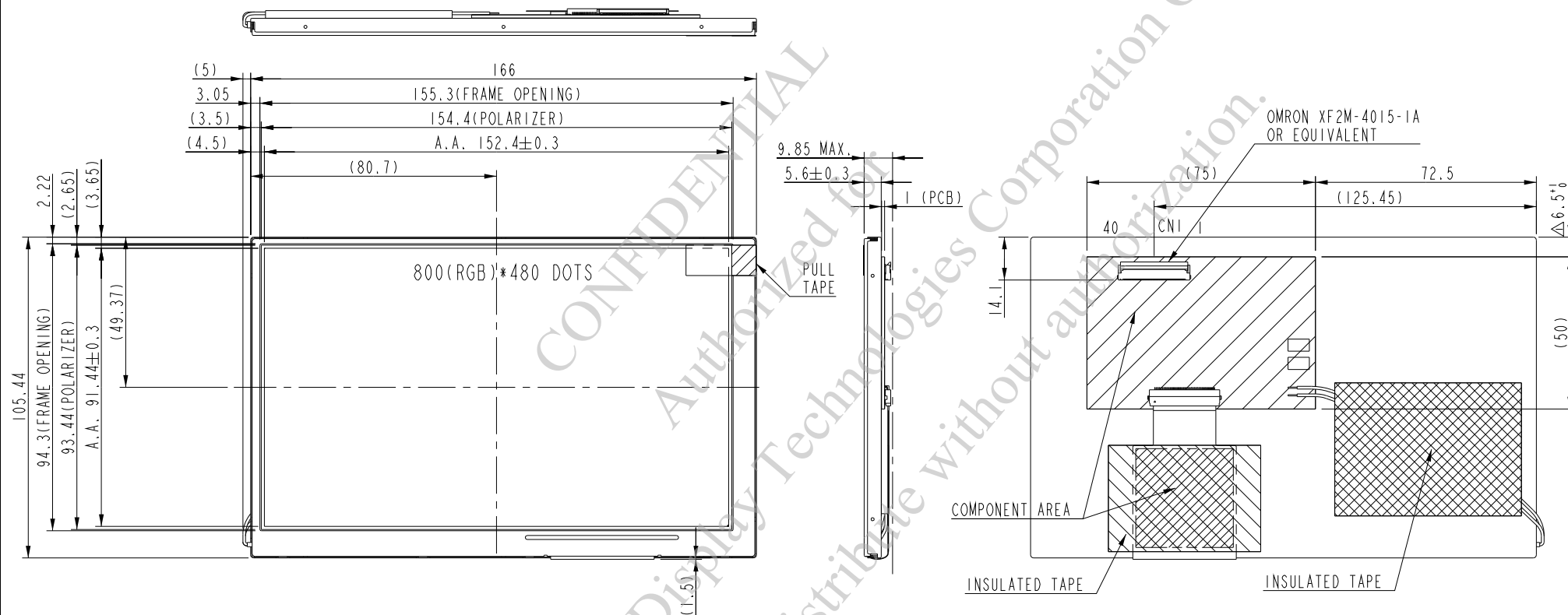


UNIT : mm

6.3 THE CALCULATING METHOD OF UNIFORMITY

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

7. OUTLINE DIMENSIONS



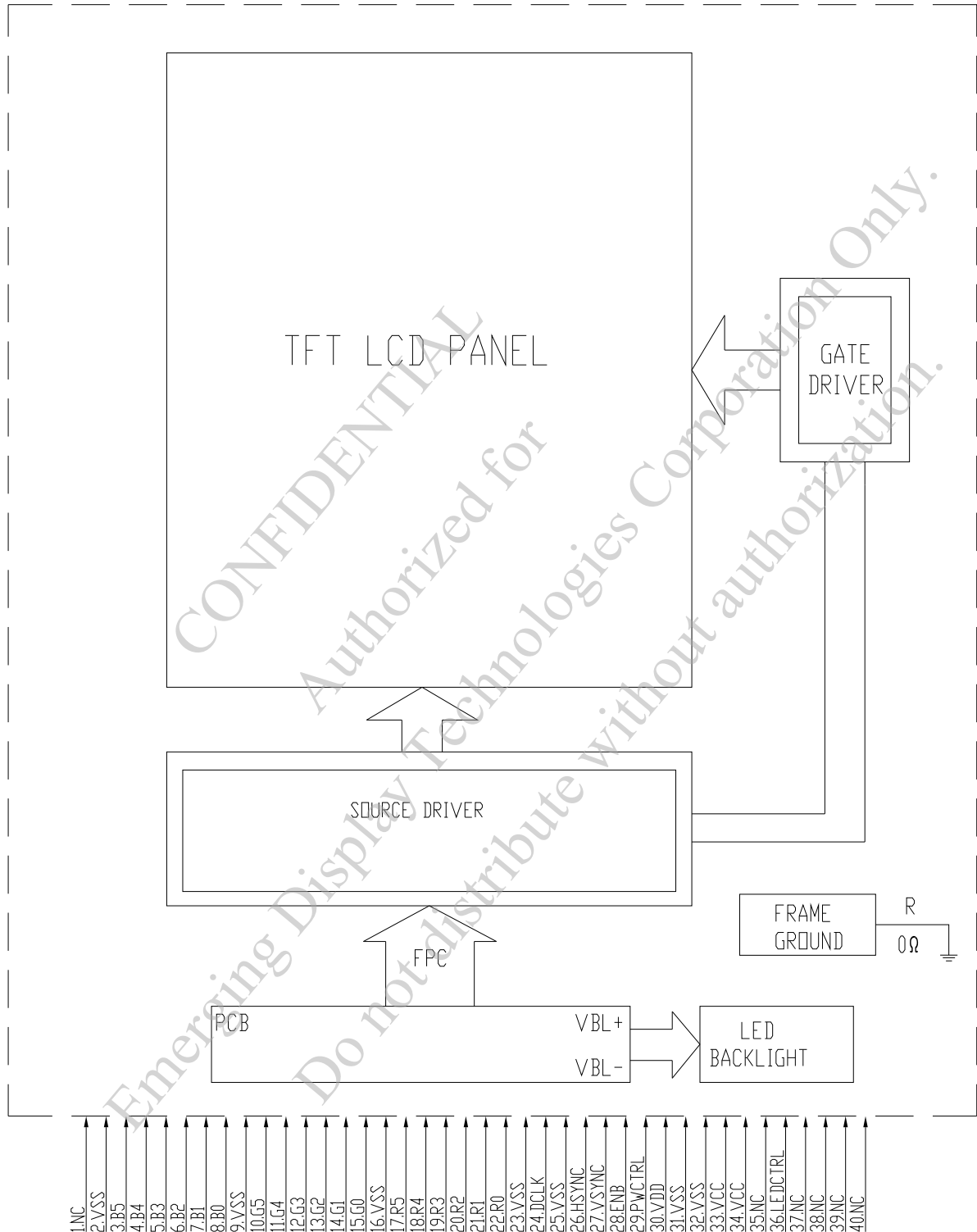
UNIT : mm

SCALE : NTS

NOT SPECIFIED TOLERANCE IS ± 0.5

NOTE : MARK Δ MODIFY (NUMBER NOTE MODIFY VERSION)

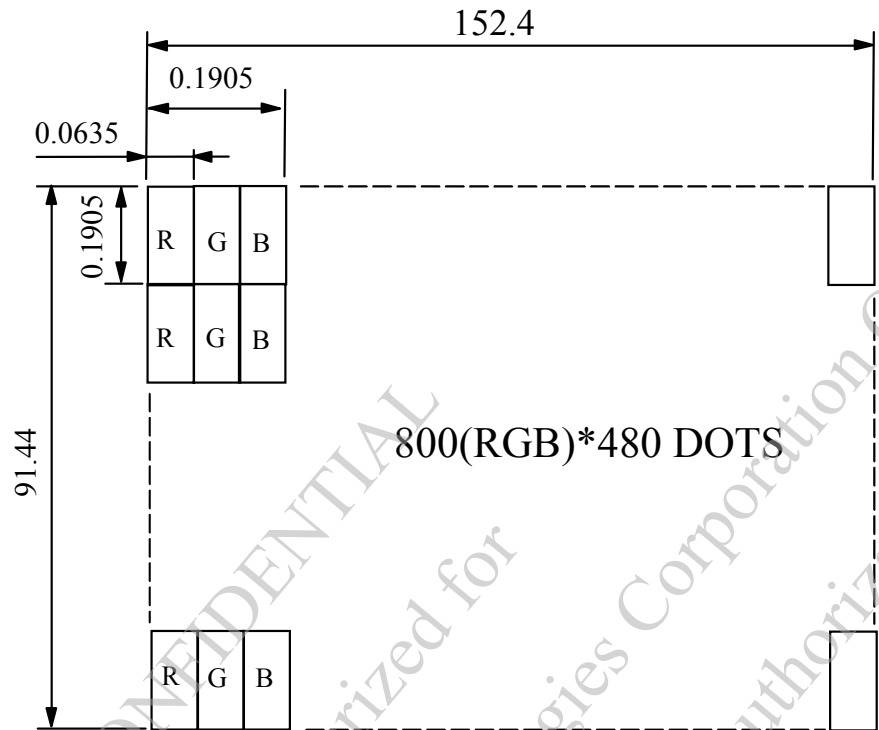
8. BLOCK DIAGRAM



NOTE (1) : UD = "H" LEVEL : OUT1→480 ; LR = "H" LEVEL : OUT1→800(DEFAULT)
"L" LEVEL : OUT480→1 (DEFAULT) "L" LEVEL : OUT800→1

NOTE (2) : PR6=0Ω, PIC1 IS LEFT EMPTY

9. DETAIL DRAWING OF DOT MATRIX



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

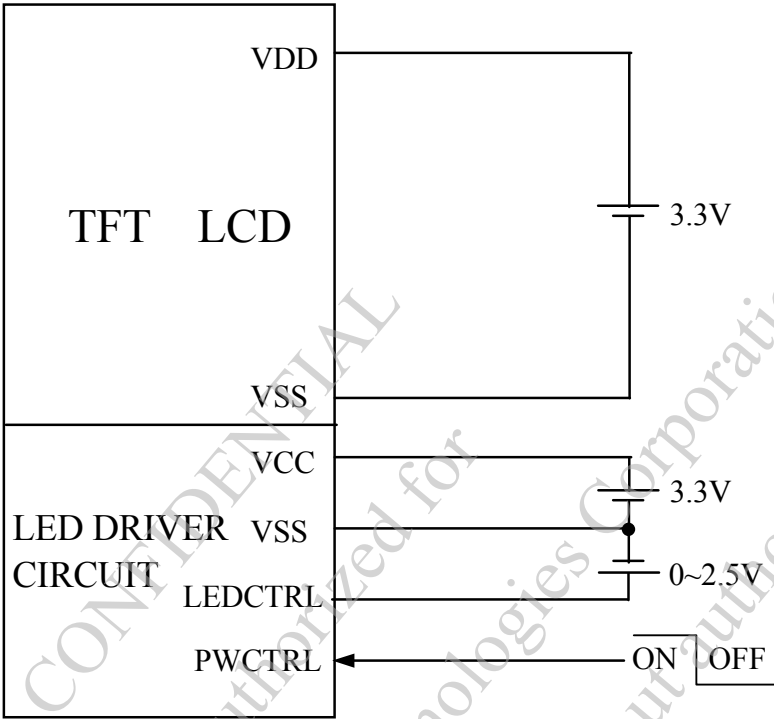
10. INTERFACE SIGNALS

PIN NO.	SYMBOL	I/O/P	FUNCTION
1	NC	—	NON CONNECTION
2	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)
3	B5	I	BLUE DATA BIT 5
4	B4	I	BLUE DATA BIT 4
5	B3	I	BLUE DATA BIT 3
6	B2	I	BLUE DATA BIT 2
7	B1	I	BLUE DATA BIT 1
8	B0	I	BLUE DATA BIT 0
9	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)
10	G5	I	GREEN DATA BIT 5
11	G4	I	GREEN DATA BIT 4
12	G3	I	GREEN DATA BIT 3
13	G2	I	GREEN DATA BIT 2
14	G1	I	GREEN DATA BIT 1
15	G0	I	GREEN DATA BIT 0
16	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)
17	R5	I	RED DATA BIT 5
18	R4	I	RED DATA BIT 4
19	R3	I	RED DATA BIT 3
20	R2	I	RED DATA BIT 2
21	R1	I	RED DATA BIT 1
22	R0	I	RED DATA BIT 0
23	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)
24	DCLK	I	DOT DATA CLOCK
25	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)
26	HSYNC	I	HORIZONTAL SYNC INPUT. INTERNALLY PULL HIGH.
27	VSNC	I	VERTICAL SYNC INPUT. INTERNALLY PULL HIGH.
28	ENB	I	INPUT DATA ENABLE CONTROL. INTERNALLY PULLED LOW.

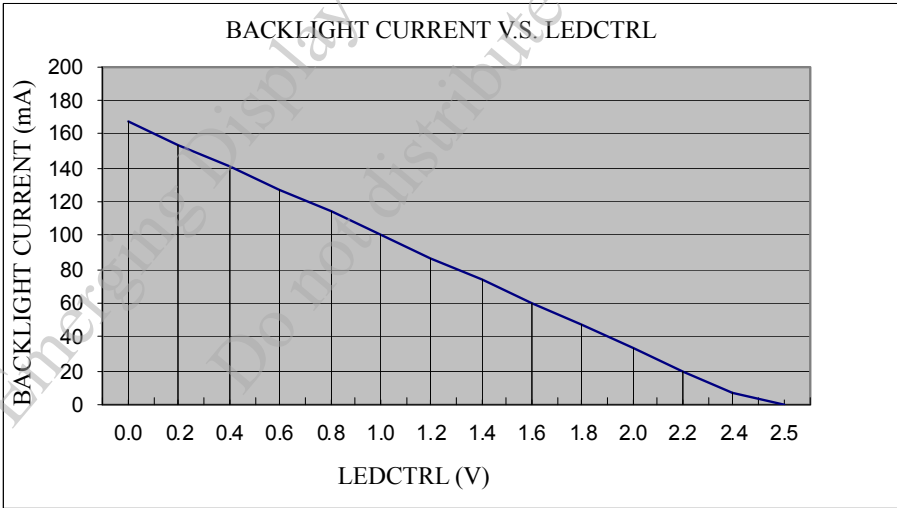
PIN NO.	SYMBOL	I/O/P	FUNCTION		
29	PWCTRL	I		PWCTRL	REMARK
			LOGIC LEVEL H=3.3V L=0V	H	POWER ON
				L	SHUTDOWN
			WHEN INTERNAL LED DRIVER : JP7 1-2(DEFAULT) WHEN EXTERNAL LED DRIVER : JP7 2-3		
30	VDD	P	POWER SUPPLY VOLTAGE		
31	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)		
32	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)		
33	VCC	P	POWER SUPPLY FOR LED DRIVER CIRCUIT		
34	VCC	P	POWER SUPPLY FOR LED DRIVER CIRCUIT		
35	NC	—	NON CONNECTION (USING INTERNAL LED DRIVER) OR ANODE (USING EXTERNAL LED DRIVER) WHEN INTERNAL LED DRIVER : JP4 1-2 (DEFAULT) WHEN EXTERNAL LED DRIVER : JP4 2-3		
36	LEDCTRL	I	BRIGHTNESS CONTROL FOR LED BACKLIGHT ; LEDCTRL (USING INTERNAL LED DRIVER) OR CATHODE (USING EXTERNAL LED DRIVER) WHEN INTERNAL LED DRIVER : JP5 1-2 (DEFAULT) JP6 1-2 CONNECT(DEFAULT) WHEN EXTERNAL LED DRIVER : JP5 2-3 JP6 NON CONNECTION		
37	NC	—	NON CONNECTION		
38	NC	—	NON CONNECTION		
39	NC	—	NON CONNECTION		
40	NC	—	NON CONNECTION		

11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



11.2 THE BRIGHTNESS CONTROLLED BY BACKLIGHT CURRENT OF LEDCTRL.



12. 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 : $35\pm 5\text{cm}$

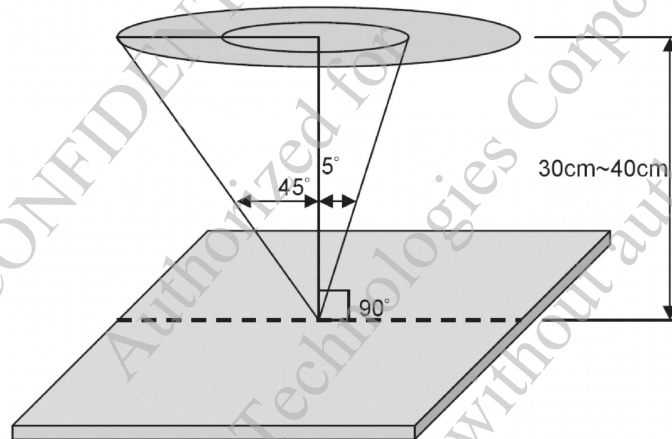
(2)VIEW ANGLE :

NON-OPERATION CONDITION : $\pm 5^\circ$

(PERPENDICULAR TO LCD PANEL SURFACE)

OPERATION CONDITION : $\pm 45^\circ$

(PERPENDICULAR TO LCD PANEL SURFACE)



12.2.2 ENVIRONMENT CONDITIONS :

AMBIENT TEMPERATURE		$25\pm 5^\circ\text{C}$
AMBIENT HUMIDITY		$65\pm 20\%\text{RH}$
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

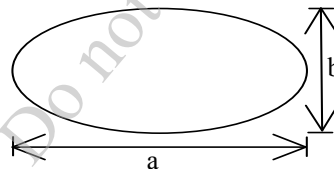
MINOR DEFECT : AQL 1.0

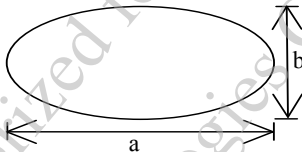
12.3 INSPECTION STANDARDS

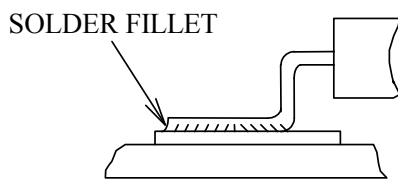
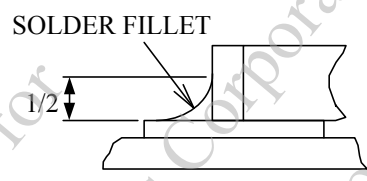
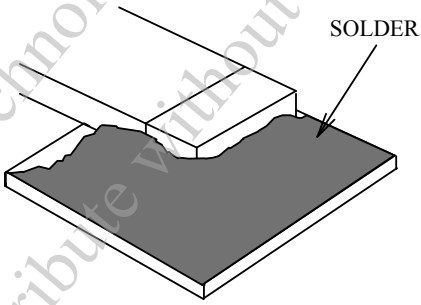
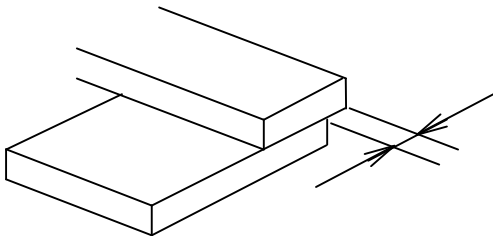
12.3.1 VISUAL DEFECTS CLASSIFICATION

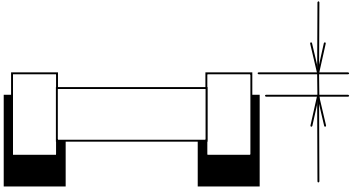
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> • DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC 	0.65
	2.BACKLIGHT	<ul style="list-style-type: none"> • NO LIGHT • FLICKERING AND OTHER ABNORMAL ILLUMINATION 	
	3.DIMENSIONS	<ul style="list-style-type: none"> • SUBJECT TO INDIVIDUAL ACCEPTANCE SPECIFICATIONS 	
MINOR DEFECT	1.DISPLAY ZONE	<ul style="list-style-type: none"> • BLACK/WHITE SPOT • BUBBLES ON POLARIZER • NEWTON RING • BLACK/WHITE LINE • SCRATCH • CONTAMINATION • UNEVEN COLOR SPREAD 	1.0
	2.BEZEL ZONE	<ul style="list-style-type: none"> • STAINS • SCRATCHES • FOREIGN MATTER 	
	3.SOLDERING	<ul style="list-style-type: none"> • INSUFFICIENT SOLDER • SOLDERED IN INCORRECT POSITION • CONVEX SOLDERING SPOT • SOLDER BALLS • SOLDER SCRAPS 	
	4.DISPLAY ON (ALL ON)	<ul style="list-style-type: none"> • LIGHT LINE 	

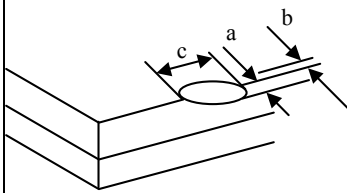
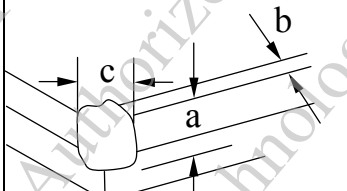
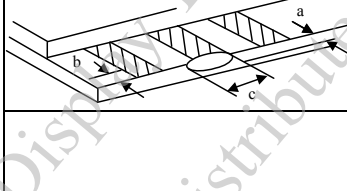
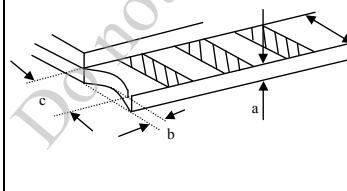
12.3.2 MODULE DEFECTS CLASSIFICATION

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

NO.	ITEM	CRITERIA																				
6	BUBBLES OF POLARIZER /DIRT/CF FAIL /SURFACE STAINS	<table><tr><td></td><td>AVERAGE DIAMETER (mm) : D</td><td>NUMBER OF PIECES PERMITTED</td></tr><tr><td rowspan="3">BUBBLE ON THE POLARIZER</td><td>$D \leq 0.25$</td><td>IGNORE</td></tr><tr><td>$0.25 < D \leq 0.5$</td><td>$N \leq 5$</td></tr><tr><td>$0.5 < D$</td><td>NONE</td></tr><tr><td rowspan="2">SURFACE STAINS</td><td>$D < 0.1$</td><td>IGNORE</td></tr><tr><td>$0.1 < D \leq 0.3$</td><td>$N \leq 3$</td></tr><tr><td rowspan="2">CF FAIL / SPOT</td><td>$D < 0.1$</td><td>IGNORE</td></tr><tr><td>$0.1 < D \leq 0.3$</td><td>$N \leq 3$</td></tr></table>		AVERAGE DIAMETER (mm) : D	NUMBER OF PIECES PERMITTED	BUBBLE ON THE POLARIZER	$D \leq 0.25$	IGNORE	$0.25 < D \leq 0.5$	$N \leq 5$	$0.5 < D$	NONE	SURFACE STAINS	$D < 0.1$	IGNORE	$0.1 < D \leq 0.3$	$N \leq 3$	CF FAIL / SPOT	$D < 0.1$	IGNORE	$0.1 < D \leq 0.3$	$N \leq 3$
			AVERAGE DIAMETER (mm) : D	NUMBER OF PIECES PERMITTED																		
		BUBBLE ON THE POLARIZER	$D \leq 0.25$	IGNORE																		
			$0.25 < D \leq 0.5$	$N \leq 5$																		
			$0.5 < D$	NONE																		
		SURFACE STAINS	$D < 0.1$	IGNORE																		
			$0.1 < D \leq 0.3$	$N \leq 3$																		
		CF FAIL / SPOT	$D < 0.1$	IGNORE																		
			$0.1 < D \leq 0.3$	$N \leq 3$																		
		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 EXTRANEIOUS 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																				
																						
7	LINE DEFECT ON DISPLAY	OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOWED																				
8	MURA ON DISPLAY	IT'S OK IF MURA IS SLIGHT VISIBLE THROUGH 6% ND FILTER																				
9	UNEVEN COLOR SPREAD, COLORATION	(1)TO BE DETERMINED BASED UPON THE STANDARD SAMPLE.																				
10	BEZEL APPEARANCE	(1)BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION. (2)BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.																				
11	PCB	(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.																				

NO.	ITEM	CRITERIA
12	SOLDERING	<p>(1)NO SOLDERING FOUND ON THE SPECIFIED PLACE</p> <p>(2)INSUFFICIENT SOLDER</p> <p>(a)LSI, IC</p> <p>A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD</p>  <p>(b)CHIP COMPONENT</p> <ul style="list-style-type: none"> · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING  <ul style="list-style-type: none"> · SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED  <p>(3)PARTS ALIGNMENT</p> <p>(a)LSI, IC</p> <p>LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE</p> 

NO.	ITEM	CRITERIA
12	SOLDERING	<p>(b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE</p>  <p>(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.</p>
13	BACKLIGHT	<p>(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.</p>
14	GENERAL APPEARANCE	<p>(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.</p>

NO.	ITEM	CRITERIA									
15	CRACKED GLASS	THE LCD WITH EXTENSIVE CRACK IS NOT ACCEPTABLE									
		GENERAL GLASS CHIP :  <table><tr><th>a</th><th>b</th><th>c</th></tr><tr><td>$\leq t/2$</td><td>< VIEWING AREA</td><td>$\leq 1/8X$</td></tr><tr><td>$t/2 > , \leq 2t$</td><td>$\leq W/2$</td><td>$\leq 1/8X$</td></tr></table> <p>*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE X = LCD SIDE LENGTH t = GLASS THICKNESS</p>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$	$t/2 > , \leq 2t$	$\leq W/2$	$\leq 1/8X$
		a	b	c							
		$\leq t/2$	< VIEWING AREA	$\leq 1/8X$							
$t/2 > , \leq 2t$	$\leq W/2$	$\leq 1/8X$									
CORNER PART :  <table><tr><th>a</th><th>b</th><th>c</th></tr><tr><td>$\leq t/2$</td><td>< VIEWING AREA</td><td>$\leq 1/8X$</td></tr><tr><td>$> t/2 , \leq 2t$</td><td>$\leq W/2$</td><td>$\leq 1/8X$</td></tr></table> <p>*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE X = LCD SIDE LENGTH t = GLASS THICKNESS</p>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$	$> t/2 , \leq 2t$	$\leq W/2$	$\leq 1/8X$		
a	b	c									
$\leq t/2$	< VIEWING AREA	$\leq 1/8X$									
$> t/2 , \leq 2t$	$\leq W/2$	$\leq 1/8X$									
CHIP ON ELECTRODE PAD  <table><tr><th>a</th><th>b</th><th>c</th></tr><tr><td>$\leq t$</td><td>$\leq 0.5\text{mm}$</td><td>$\leq 1/8X$</td></tr></table> <p>* X=LCD SIDE WIDTH t=GLASS THICKNESS</p>	a	b	c	$\leq t$	$\leq 0.5\text{mm}$	$\leq 1/8X$					
a	b	c									
$\leq t$	$\leq 0.5\text{mm}$	$\leq 1/8X$									
 <table><tr><th>a</th><th>b</th><th>c</th></tr><tr><td>$\leq t$</td><td>$\leq 1/8X$</td><td>$\leq L$</td></tr></table> <p>*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 DAMAGED</p>	a	b	c	$\leq t$	$\leq 1/8X$	$\leq L$					
a	b	c									
$\leq t$	$\leq 1/8X$	$\leq L$									

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 TEMPERATURE /HUMIDITY TEST STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 60°C, 90% RH 240 HRS
6	THERMAL SHOCK (NOT OPERATED)	<p>THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION:</p>
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	<p>AIR DISCHARGE $\pm 12\text{KV}$ CONTACT DISCHARGE $\pm 8\text{KV}$ (ACCORDING TO IEC-61000-4-2)</p>

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.

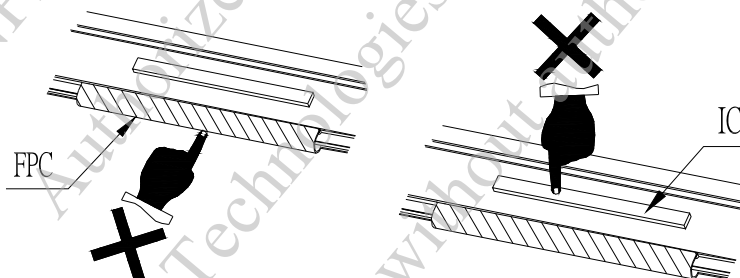
12.5 TESTING CONDITIONS AND INSPECTION CRITERIA

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 INFLECT 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 PERSONNEL 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.