

EXAMINED BY :	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0008755
Lucica Lu		ISSUE : APR.01, 2019
APPROVED BY:		TOTAL PAGE : 24
Vincent Wh		VERSION : 3

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :
ET050013DMA
 (RoHS)
 FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO.	VERSION	PAGE
ET050013DMA	3	0-1

RECORDS OF REVISION	DOC . FIRST ISSUE	JAN.31, 2019
---------------------	-------------------	--------------

DATE	REVISED PAGE NO.	SUMMARY
MAR.07, 2019	1	2. MECHANICAL SPECIFICATIONS (4) VIEWING AREA: 110W * 66.8H mm→109.8W * 66.6H mm
	9	7. OUTLINE DIMENSIONS MARK Δ : MODIFY FRAME OPENING & POLARIZER MODIFY FPC OUTLINE DIMENSION
APR.01, 2019	1	2. MECHANICAL SPECIFICATIONS (4) VIEWING AREA: 109.8W * 66.6H mm→110W * 66.8H mm
	9	7. OUTLINE DIMENSIONS MARK Δ : MODIFY POLARIZER AND ADD INSULATED TAPE & PULL TAPE

CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

TABLE OF CONTENTS

NO.	ITEM	PAGE
1.	GENERAL SPECIFICATIONS -----	1
2.	MECHANICAL SPECIFICATIONS -----	1
3.	ABSOLUTE MAXIMUM RATINGS -----	2
4.	ELECTRICAL CHARACTERISTICS -----	3
5.	TIMING CHARACTERISTICS -----	4 ~ 6
6.	OPTICAL CHARACTERISTICS -----	7, 8
7.	OUTLINE DIMENSIONS -----	9
8.	BLOCK DIAGRAM -----	10
9.	DETAIL DRAWING OF DOT MATRIX -----	11
10.	INTERFACE SIGNALS -----	12, 13
11.	POWER SUPPLY -----	14
12.	INSPECTION CRITERION -----	15 ~ 21
13.	RELIABILITY TEST -----	22
14.	PRECAUTION -----	23, 24

CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER/DRIVER

PLEASE REFER TO :

SITRONIX ST7262

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), BIS(2-ETHYLHEXYL) PHTHALATE (DEHP), BUTYL BENZYL PHTHALATE (BBP), DIBUTYL PHTHALATE (DBP), DIISOBUTYL PHTHALATE (DIBP).

2. MECHANICAL SPECIFICATIONS

(1) DIAGONALS	-----	5.0 inch
(2) NUMBER OF DOTS	-----	800W * (RGB) * 480H DOTS
(3) MODULE SIZE	-----	118.5W * 77.55H * 2.8D mm (WITHOUT FPC)
(4) VIEWING AREA	-----	110W * 66.8H mm
(5) ACTIVE AREA	-----	108W * 64.8H mm
(6) DOT SIZE	-----	0.045W * 0.135H mm
(7) PIXEL SIZE	-----	0.135W * 0.135H mm
(8) LCD TYPE	-----	TFT, TRANSMISSIVE, NORMALLY BLACK
(9) COLOR	-----	16.7M
(10) VIEWING DIRECTION	-----	SUPER WIDE VIEW
(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 .

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.3	4.0	V	
INPUT SIGNAL VOLTAGE	VIN-VSS	-0.3	4.0	V	
STATIC ELECTRICITY	—	—	—	V	NOTE (1)
FOG POWER DISSIPATION	PD_FOG	—	(0.345)	W	
LED BACKLIGHT POWER DISSIPATION	PD	—	(1687)	mW	
LED BACKLIGHT FORWARD CURRENT	IF	—	(70)	mA	
LED BACKLIGHT REVERSE VOLTAGE	VR	—	(35)	V	

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)	10~55Hz X,Y,Z, EACH 2HRS
SHOCK	—	29.4 m/s ² (3 G)	—	490 m/s ² (50 G)	6 ms XYZ DIRECTIONS 3 TIMES 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

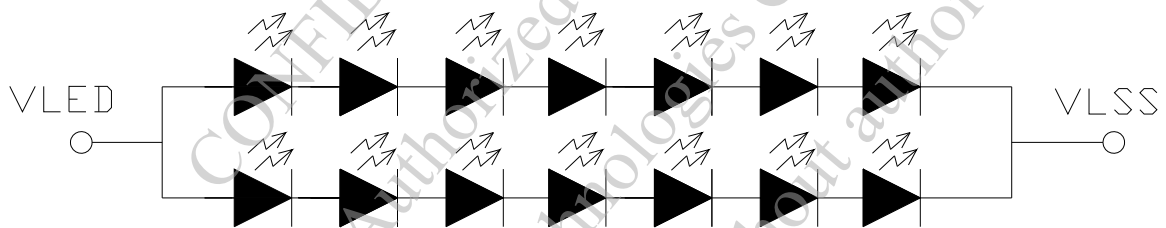
Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.30	3.45	V	
INPUT HIGH VOLTAGE	VIH	—	0.7*VDD	—	VDD	V	NOTE (1)
INPUT LOW VOLTAGE	VIL	—	VSS	—	0.3*VDD	V	NOTE (1)
OUTPUT HIGH VOLTAGE	VOH	—	VDD-0.4	—	VDD	V	NOTE (1)
OUTPUT LOW VOLTAGE	VOL	—	VSS	—	VSS+0.4	V	NOTE (1)
POWER SUPPLY CURRENT	IDD	—	—	(80)	(100)	mA	NOTE (2)
POWER SUPPLY FOR LED BACKLIGHT	VLED-VLSS	IF = 40mA	(18.5)	(23.1)	(24.1)	V	NOTE (3)
LED LIFE TIME	—	IF = 40mA	(30000)	(40000)	—	HOURS	NOTE (5) NOTE (6)

NOTE (1) : APPLIED TO TERMINALS, DR0~DR7, DG0~DG7, DB0~DB7, DCLK, STBYB, HSYNC, VSYNC, DE.

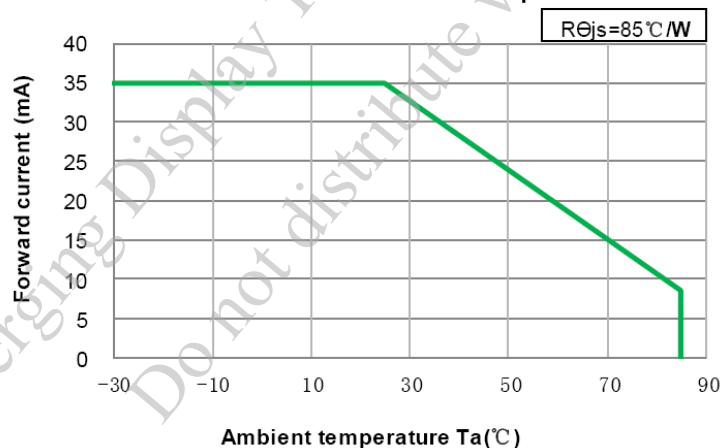
NOTE (2) : THE DISPLAY PATTERN IS ALL “WHITE”.

NOTE (3) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



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

Forward current VS. Ambient temperature



NOTE (5) : CONDITIONS; TA=25 °C, CONTINUOUS LIGHTING.

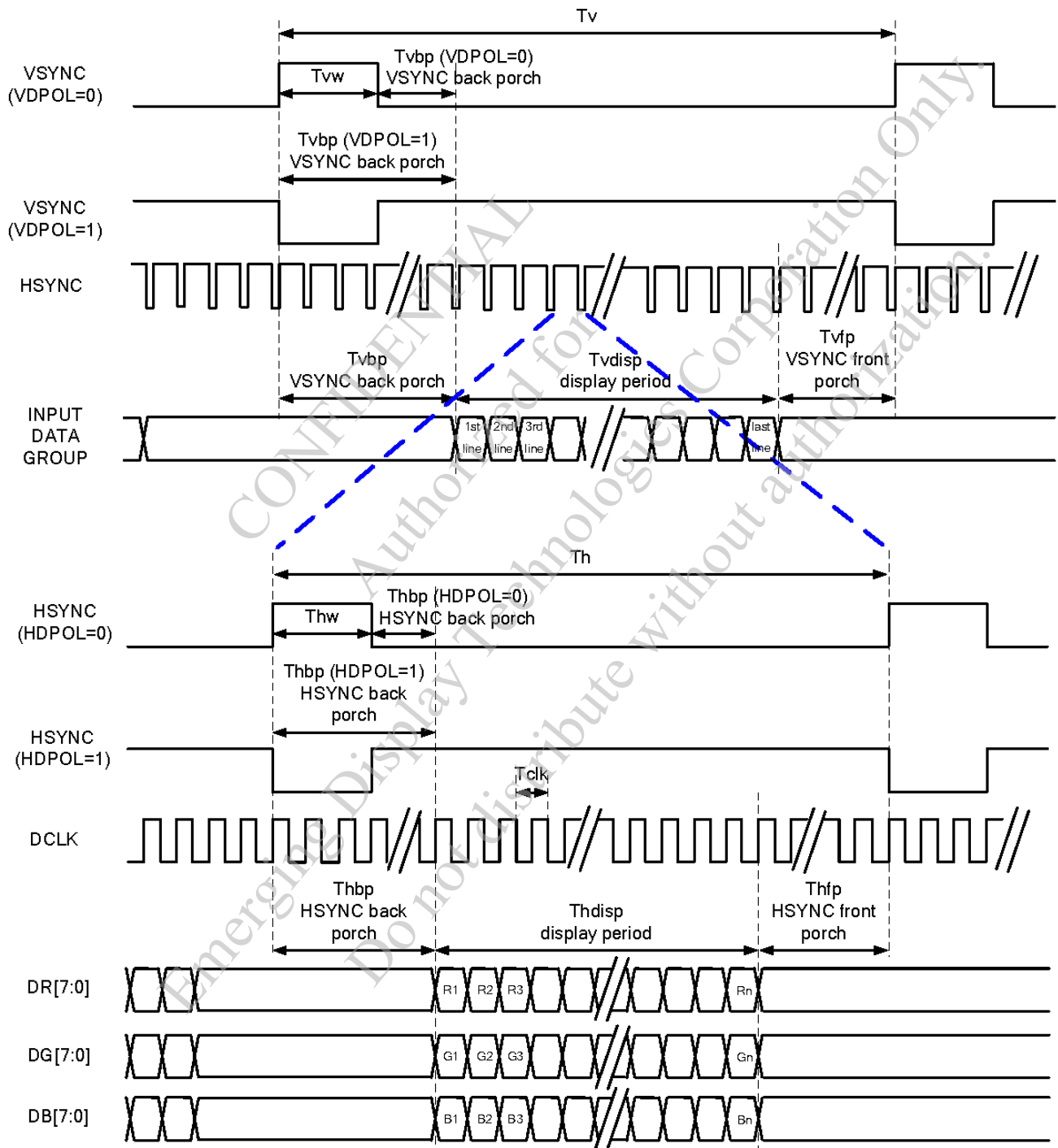
NOTE (6) : DEFINITIONS OF LIFE TIME :

LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

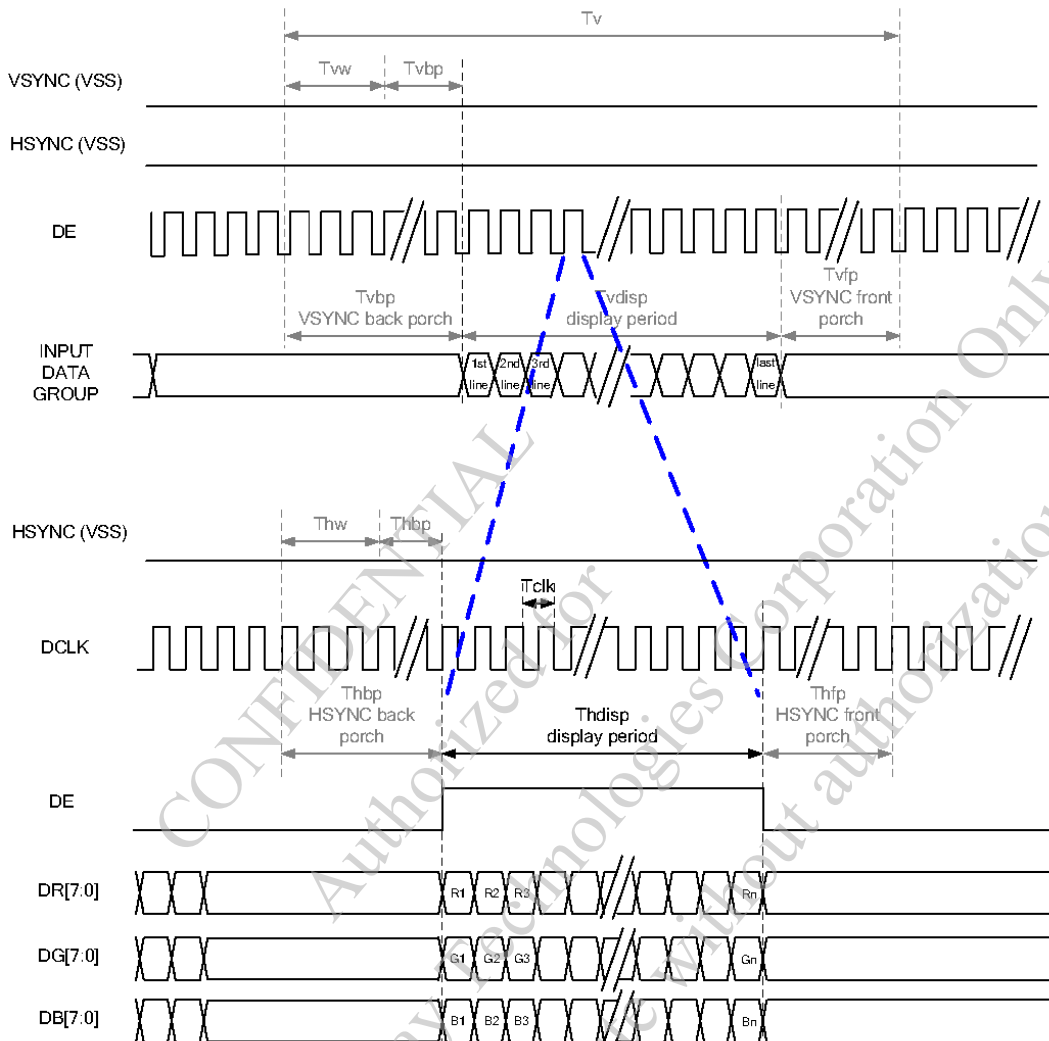
5. TIMING CHARACTERISTICS

5.1 LCD MODULE PARALLEL RGB INTERFACE

5.1.1 SYNC MODE



5.1.2 DE MODE



5.1.3 TIMING TABLE

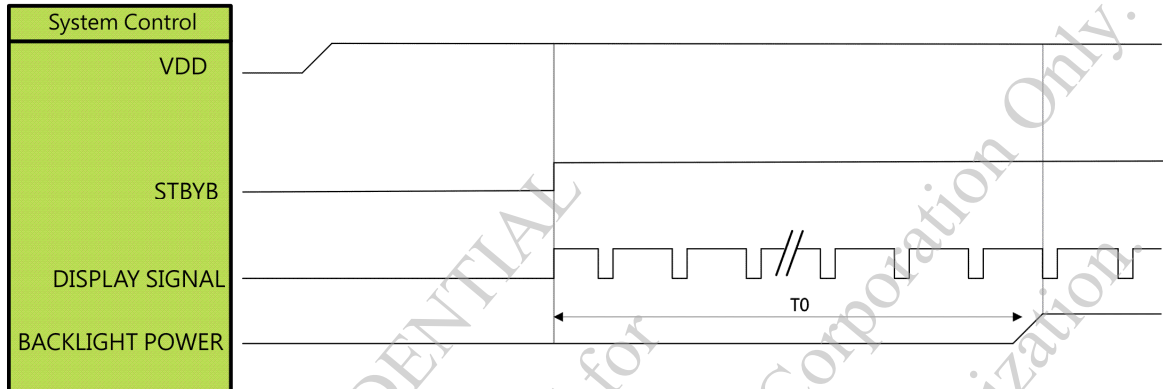
ITEM		SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY		Fclk	25	25	27	MHz
HSYNC	PERIOD TIME	Th	808	816	896	DCLK
	DISPLAY PERIOD	Thdisp	800	800	800	DCLK
	BACK PORCH	Thbp	4	8	48	DCLK
	FRONT PORCH	Thfp	4	8	48	DCLK
	PULSE WIDTH	Thw	2	4	6	DCLK
VSYNC	PERIOD TIME	Tv	488	496	504	HSYNC
	DISPLAY PERIOD	Tvdisp	480	480	480	HSYNC
	BACK PORCH	Tvbp	4	8	12	HSYNC
	FRONT PORCH	Tvfp	4	8	12	HSYNC
	PULSE WIDTH	Tvw	2	4	8	HSYNC

5.2 LCD MODULE POWER ON-OFF TIMING SEQUENCE

5.2.1 POWER ON SEQUENCE

SYMBOL	DESCRIPTION	MIN. TIME	UNIT
T0	DISPLAY SIGNAL OUTPUT TO BACKLIGHT POWER ON	250	ms

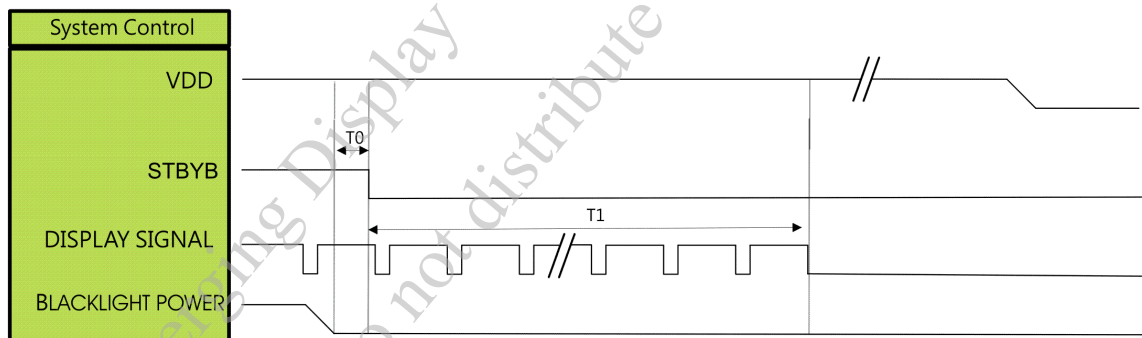
NOTE: RGB INTERFACE DISPLAY SIGNAL: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]



5.2.2 POWER OFF TIMING SEQUENCE

SYMBOL	DESCRIPTION	MIN. TIME	UNIT
T0	BACKLIGHT POWER OFF TO DISP="LOW"	5	ms
T2	DISP="LOW" TO IC INTERNAL VOLTAGE DISCHARGE COMPLETE	100	ms

NOTE: RGB INTERFACE DISPLAY SIGNAL: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]



6. OPTICAL CHARACTERISTICS

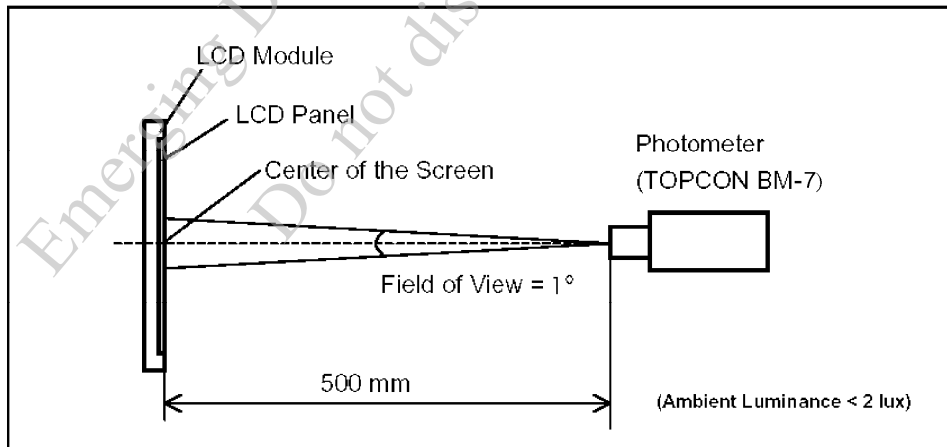
6.1 OPTICAL CHARACTERISTICS (NOTE 1)

Ta=25±2°C

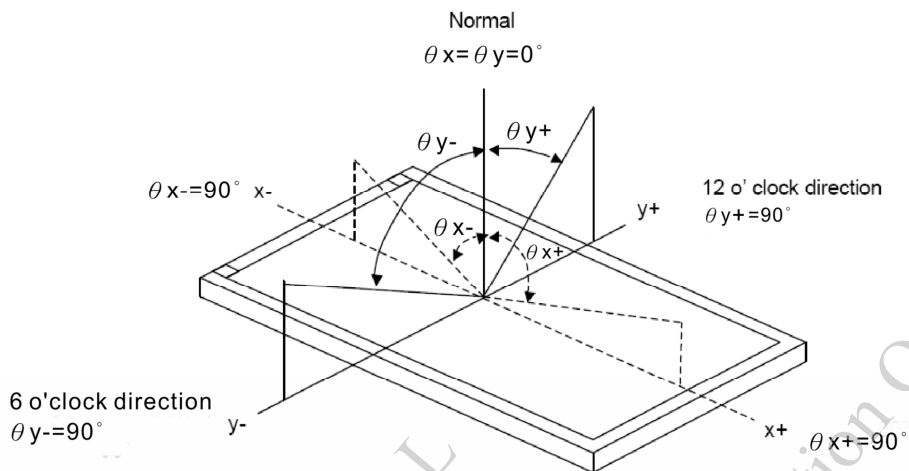
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE	θ_{y+}	CR ≥ 10	$\theta_x=0^\circ$	(70)	(80)	—	deg. NOTE (2) NOTE (3)	
	θ_{y-}			(70)	(80)	—		
	θ_{x+}	$\theta_y=0^\circ$	(70)	(80)	—			
	θ_{x-}		(70)	(80)	—			
CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	(800)	(1000)	—	—	NOTE (3)	
RESPONSE TIME	TR(rise)+TF(fall)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	(30)	(40)	msec	NOTE (4)	
COLOR OF CIE COORDINATE (CENTER)	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 40mA	(0.275)	(0.325)	(0.375)	—	NOTE (5)
		Wy		(0.298)	(0.348)	(0.398)		
	RED	Rx		(0.570)	(0.620)	(0.670)		
		Ry		(0.278)	(0.328)	(0.378)		
	GREEN	Gx		(0.284)	(0.334)	(0.384)		
		Gy		(0.494)	(0.544)	(0.594)		
	BLUE	Bx		(0.086)	(0.136)	(0.186)		
		By		(0.093)	(0.143)	(0.193)		
THE BRIGHTNESS OF MODULE (CENTER)	B	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 40mA	(450)	(500)	—	cd/m ²	NOTE (6)	
THE UNIFORMITY OF MODULE	—	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 40mA	(70)	—	—	%	NOTE (7)	

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 :



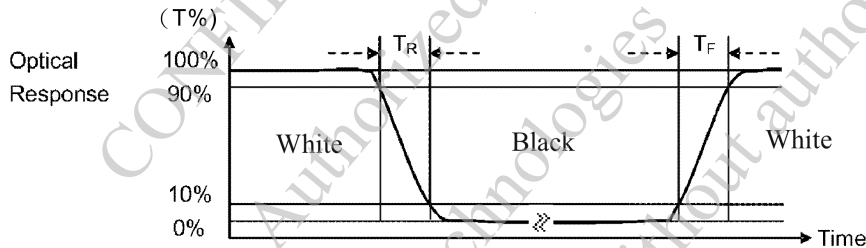
NOTE (3) : DEFINITION OF CONTRAST RATIO (CR) :

MEASURED AT THE CENTER POINT OF MODULE

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

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

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



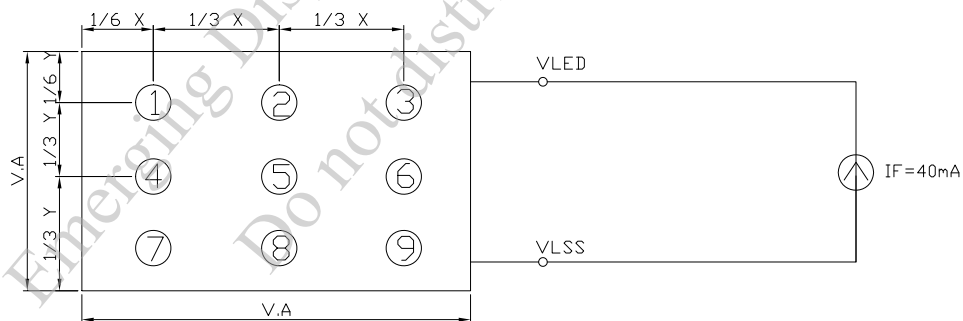
NOTE (5) : DEFINITION OF COLOR CHROMATICITY

(a)100% RGB PIXEL DATA TRANSMISSION WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY POWERED ON.

(b)MEASURED AT THE CENTER POINT OF MODULE

NOTE (6) : MEASURED THE BRIGHTNESS OF WHITE STATE AT CENTER POINT.

NOTE (7) : (a)DEFINITION OF BRIGHTNESS UNIFORMITY

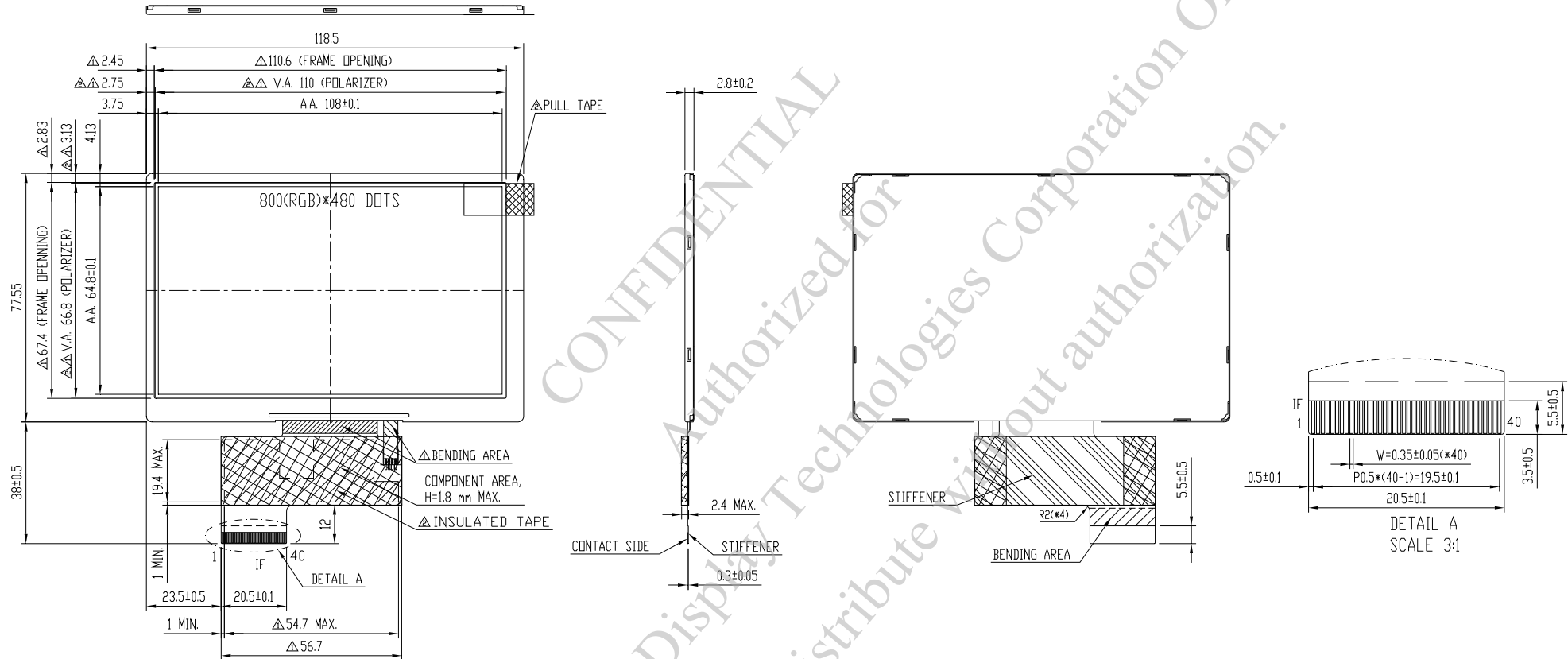


UNIT : mm

(b)THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

$$\text{UNIFORMITY} : \frac{\text{MINIMUM BRIGHTNESS}}{\text{MAXIMUM BRIGHTNESS}} * 100\%$$

7. OUTLINE DIMENSIONS

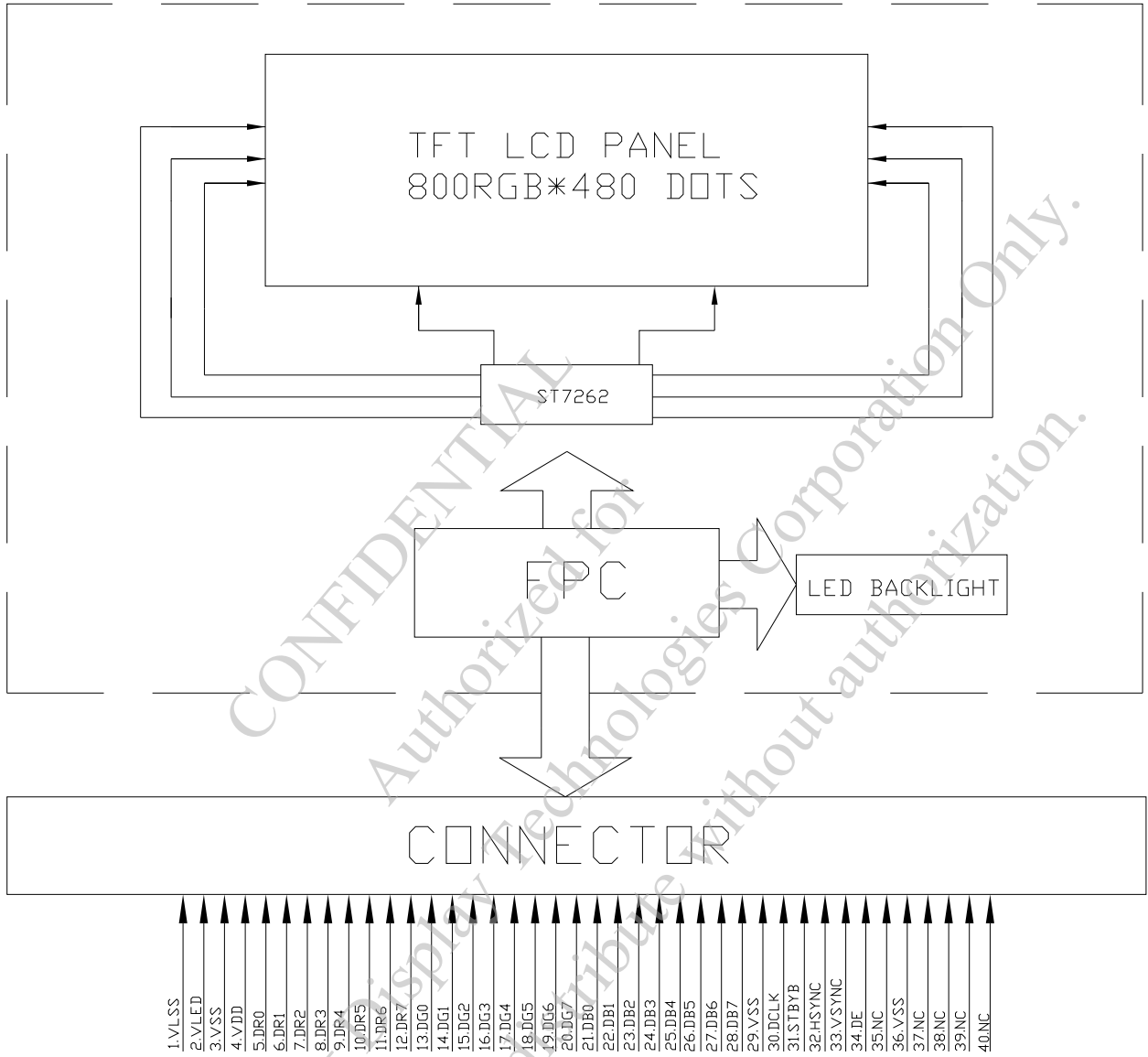


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.3 mm

NOTE :

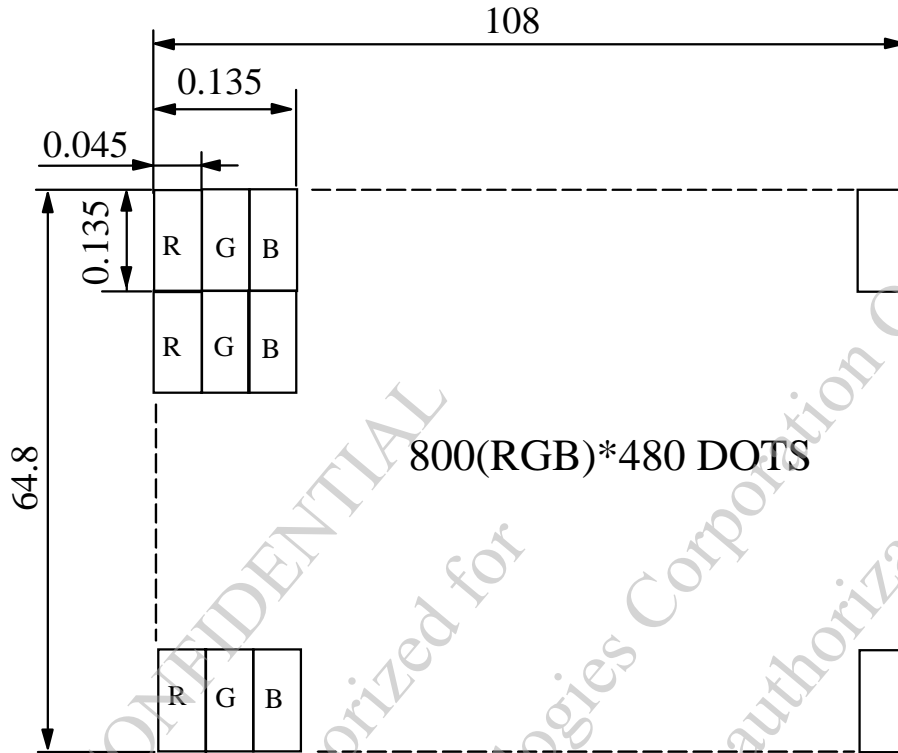
- 1.RECOMMEND MATCH CONNECTOR KYOCERA:04 6240 040 SERIES
- 2.MARK Δ MODIFY (NUMBER NOTE MODIFY VERSION)

8. BLOCK DIAGRAM



CONFIDENTIAL
 Authorized for Emerging Display Technologies Corporation Only.
 Do not distribute without authorization.

9. DETAIL DRAWING OF DOT MATRIX



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

CONFIDENTIAL
Authorized for Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

10. INTERFACE SIGNALS

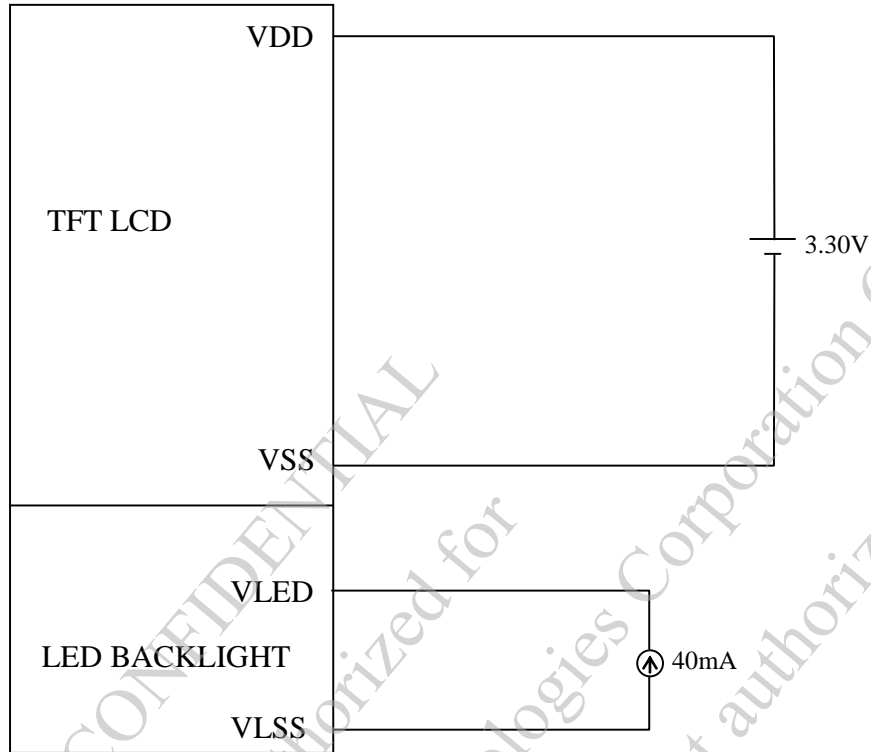
PIN NO.	SYMBOL	FUNCTION
1	VLSS	POWER SUPPLY FOR LED BACKLIGHT (CATHODE SIDE)
2	VLED	POWER SUPPLY FOR LED BACKLIGHT (ANODE SIDE)
3	VSS	GROUND
4	VDD	POWER SUPPLY VOLTAGE
5	DR0	DISPLAY DATA (R) DR0 LSB DR7 MSB
6	DR1	
7	DR2	
8	DR3	
9	DR4	
10	DR5	
11	DR6	
12	DR7	
13	DG0	DISPLAY DATA (G) DG0 LSB DG7 MSB
14	DG1	
15	DG2	
16	DG3	
17	DG4	
18	DG5	
19	DG6	
20	DG7	
21	DB0	DISPLAY DATA (B) DB0 LSB DB7 MSB
22	DB1	
23	DB2	
24	DB3	
25	DB4	
26	DB5	
27	DB6	
28	DB7	
29	VSS	GROUND
30	DCLK	CLOCK SIGNAL FOR DATA LATCHING AND INTERNAL COUNTER OF THE TIMING CONTROLLER
31	STBYB	STANDBY MODE CONTROL SIGNAL LO: TCON AND SOURCE DRIVER ARE OFF HI : ALL THE FUNCTIONS ARE ON

PIN NO.	SYMBOL	FUNCTION
32	HSYNC	HORIZONTAL SYNC SIGNAL
33	VSYNC	VERTICAL SYNC SIGNAL
34	DE	INPUT DATA ENABLE CONTROL, WHEN DE MODE, ACTIVE HIGH TO ENABLE DATA INPUT, NORMALLY PULL LOW
35	NC	NON CONNECTION
36	VSS	GROUND
37	NC	NON CONNECTION
38	NC	NON CONNECTION
39	NC	NON CONNECTION
40	NC	NON CONNECTION

CONFIDENTIAL
 Authorized for
 Emerging Display Technologies Corporation Only.
 Do not distribute without authorization.

11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

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

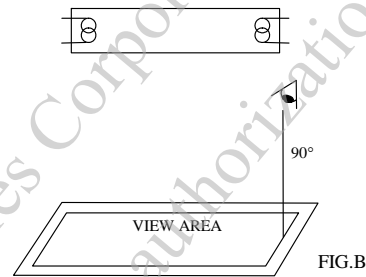
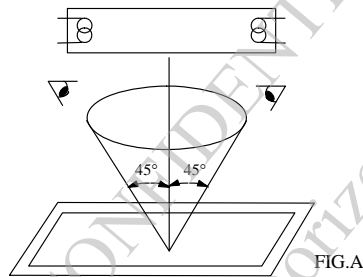
12.2 INSPECTION CONDITIONS

12.2.1 (1)OBSERVATION DISTANCE : 45±5cm

(2)VIEWING ANGLE : ±45°

±45° (FOR SECTION WITHIN VIEWING AREA), REFER TO FIG.A
90° (FOR SECTION OUTSIDE OF VIEWING AREA), REF TO FIG.B
PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN 45°



THE INSPECTION CRITERIA IS ACCORDING TO LINE OF SIGHT. INSPECTION SHALL BE MADE WITHIN THE HALF SECTION OF THE VIEWING CONE GENERATED BY LINE SEGMENT OF 45° WITH RESPECTS TO THE VERTICAL AXIS FROM CENTER VERTEX OF LCD, THE FLUORESCENT LAMP AND THE CONE AXIS MUST BE PERPENDICULAR TO THE LCD SURFACE.

IF THE DEFECTS ARE OUTSIDE OF VIEWING AREA, IT SHALL BE INSPECTED BY 90° WITH RESPECTS TO THE VERTICAL AXIS FROM EDGE OF VIEWING AREA.

12.2.2 ENVIRONMENT CONDITIONS :

AMBIENT TEMPERATURE		25±5°C
AMBIENT HUMIDITY		65 ± 20%RH
AMBIENT ILLUMINATION	COSMETIC INSPECTION	600~800 lux
	FUNCTIONAL INSPECTION	300~500 lux
INSPECTION TIME		10 secs

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 :

ANSI/ ASQ Z1.4 NORMAL INSPECTION LEVEL II

(b)AQL : MAJOR DEFECT : AQL 0.65

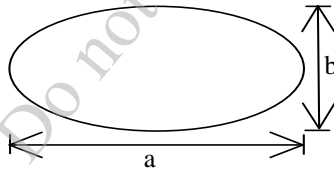
MINOR DEFECT : AQL 1.0

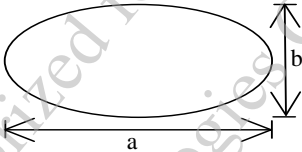
12.3 INSPECTION STANDARDS

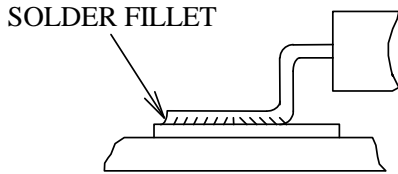
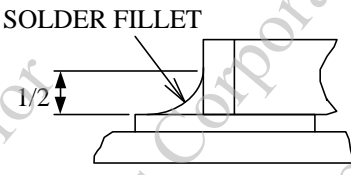
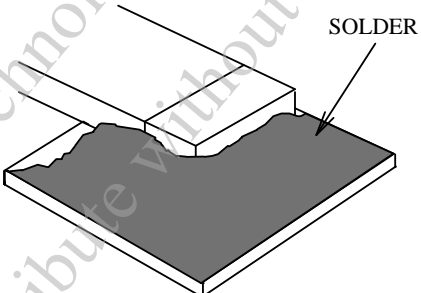
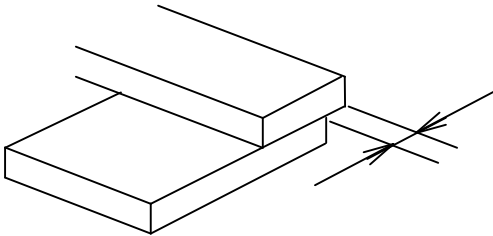
12.3.1 VISUAL DEFECTS CLASSIFICATION

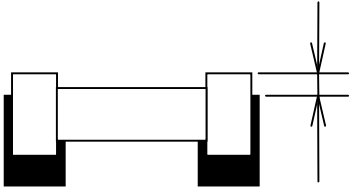
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> • DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC 	0.65
	2.BACKLIGHT	<ul style="list-style-type: none"> • NO LIGHT • FLICKERING AND 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 	

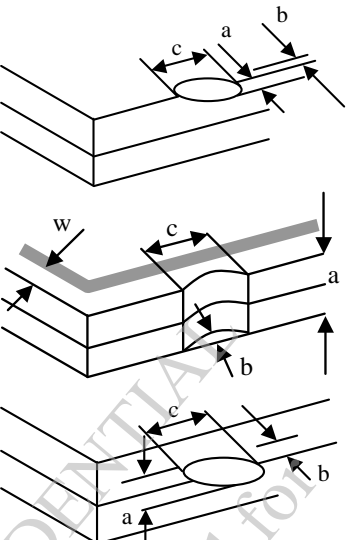
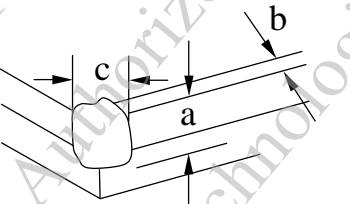
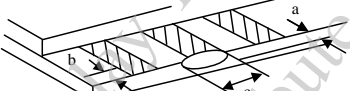
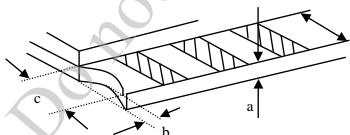
12.3.2 MODULE DEFECTS CLASSIFICATION

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 border="1" style="margin-left: 20px;"> <thead> <tr> <th>ITEMS</th> <th>ACCEPTABLE COUNT</th> </tr> </thead> <tbody> <tr> <td>BRIGHT DOT</td> <td>$N \leq 2$</td> </tr> <tr> <td>DARK DOT</td> <td>$N \leq 3$</td> </tr> <tr> <td>TOTAL BRIGHT AND DARK DOTS</td> <td>$N \leq 4$</td> </tr> </tbody> </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	$N \leq 2$	DARK DOT	$N \leq 3$	TOTAL BRIGHT AND DARK DOTS	$N \leq 4$				
ITEMS	ACCEPTABLE COUNT													
BRIGHT DOT	$N \leq 2$													
DARK DOT	$N \leq 3$													
TOTAL BRIGHT AND DARK DOTS	$N \leq 4$													
4.	FOREIGN BLACK/WHITE/ BRIGHT LINE/ SCRATCH OF VIEWING AREA	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th>LENGTH : L</th> <th>WIDTH : W</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <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> </tbody> </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 border="1" style="margin-left: 20px;"> <thead> <tr> <th>AVERAGE DIAMETER (mm): D</th> <th>NUMBER OF PIECES PERMITTED</th> </tr> </thead> <tbody> <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> </tbody> </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		
			AVERAGE DIAMETER (mm) : D	NUMBER OF PIECES PERMITTED
6.	BUBBLES OF POLARIZER /DIRT/CF FAIL /SURFACE STAINS	BUBBLE ON THE POLARIZER	$D \leq 0.25$	LGNORE
			$0.25 < D \leq 0.5$	$N \leq 5$
			$0.5 < D$	NONE
		SURFACE STAINS	$D < 0.1$	IGNORE
			$0.1 < D \leq 0.3$	$N \leq 3$
		CF FAIL / SPOT	$D < 0.1$	IGNORE
$0.1 < D \leq 0.3$	$N \leq 3$			
		<p>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.</p> <p>(2)THE EXTRANEIOUS SUBSTANCE IS DEFINED AS IT CAN BE OBSERVED WHEN THE MODULE IS POWER ON.</p> <p>(3)THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING.</p> <p>AVERAGE DIAMETER (D)=(a+b)/2</p> 		
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	<p>(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.</p> <p>(2)NO OXIDATION OR CONTAMINATION PCB TERMINALS.</p> <p>(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.</p> <p>(4)THE JUMPER ON THE PCB SHOULD CONFORM TO THE PRODUCT CHARACTERISTIC CHART.</p> <p>(5)IF SOLDER GETS ON BEZEL TAB PADS, LED PAD, ZEBRA PAD OR SCREW HOLD PAD; MAKE SURE IT IS SMOOTHED DOWN.</p>		

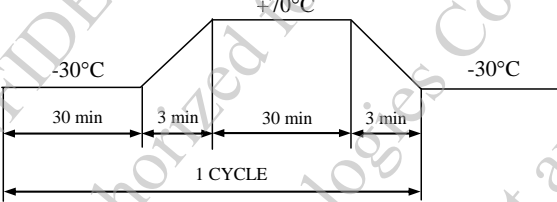
NO.	ITEM	CRITERIA
12.	SOLDERING	<p>(1) NO SOLDERING FOUND ON THE SPECIFIED PLACE</p> <p>(2) INSUFFICIENT SOLDER</p> <p>(a) LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD</p>  <p>(b) CHIP COMPONENT • SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING</p>  <p>• SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED</p>  <p>(3) PARTS ALIGNMENT</p> <p>(a) LSI, IC 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 border="1" data-bbox="933 421 1455 497"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <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> </tbody> </table> <p data-bbox="933 504 1316 660">*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 border="1" data-bbox="933 1003 1455 1079"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <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> </tbody> </table> <p data-bbox="933 1086 1316 1243">*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 border="1" data-bbox="933 1281 1455 1335"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t$</td> <td>$\leq 0.5\text{mm}$</td> <td>$\leq 1/8X$</td> </tr> </tbody> </table> <p data-bbox="933 1339 1236 1400">* 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 border="1" data-bbox="933 1438 1455 1491"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t$</td> <td>$\leq 1/8X$</td> <td>$\leq L$</td> </tr> </tbody> </table> <p data-bbox="933 1496 1463 1870">*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									
$\leq t$	$\leq 1/8X$	$\leq L$									

13. RELIABILITY TEST

13.1 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)	THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION: 
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	AIR DISCHARGE ± 12KV CONTACT DISCHARGE ± 8KV (ACCORDING TO IEC-61000-4-2)

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.

13.2 TESTING CONDITIONS AND INSPECTION CRITERIA

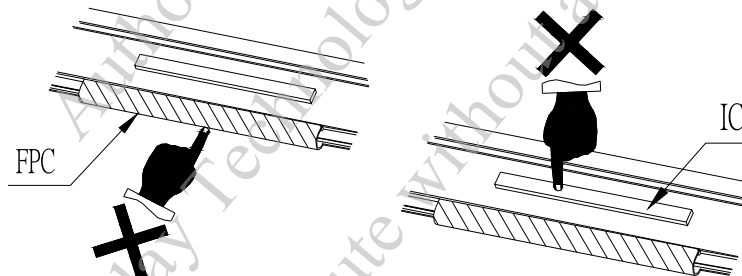
FOR THE FINAL TEST THE TESTING SAMPLE MUST BE STORED AT ROOM TEMPERATURE FOR 24 HOURS, AFTER THE TESTS LISTED IN TABLE 13.2, STANDARD SPECIFICATIONS FOR RELIABILITY HAVE BEEN EXECUTED IN ORDER TO ENSURE STABILITY.

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

14. PRECAUTION

14.1 OPERATION

- 14.1.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .
- 14.1.2 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.
- 14.1.3 ADJUST THE LC DRIVING VOLTAGE TO OBTAIN THE OPTIMUM CONTRAST .
- 14.1.4 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.
- 14.1.5 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!



14.2 NOTICE

- 14.2.1 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 .
- 14.2.2 DO NOT DISASSEMBLE . EDT SHALL NOT BE HELD RESPONSIBLE IF THE MODULE IS DISASSEMBLED AND UPON THE REASSEMBLY THE MODULE FAILED.
- 14.2.3 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.
- 14.2.4 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.
- 14.2.5 DON'T GIVE EXTERNAL SHOCK.
- 14.2.6 DON'T APPLY EXCESSIVE FORCE ON THE SURFACE.
- 14.2.7 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.
- 14.2.8 DON'T OPERATE IT ABOVE THE ABSOLUTE MAXIMUM RATING.
- 14.2.9 STORAGE IN A CLEAN ENVIRONMENT, FREE FROM DUST, ACTIVE GAS, AND SOLVENT.
- 14.2.10 STORE WITHOUT ANY PHYSICAL LOAD.
- 14.2.11 REWIRING: NO MORE THAN 3 TIMES.