

EXAMINED BY :  CC Chen	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-0008513
APPROVED BY:  Justin Horng		ISSUE : DEC.15, 2017
		TOTAL PAGE : 23
		VERSION : 2
<div>CUSTOMER                      ACCEPTANCE                      SPECIFICATIONS</div>		
<div style="text-align: center;"> <p>CONFIDENTIAL</p> <p>Authorized for Corporation Only.</p> <p>Do not distribute without authorization.</p> </div> <div style="border: 1px solid black; border-radius: 15px; padding: 20px; margin: 20px auto; width: 80%;"> <p>MODEL NO. :</p> <p style="text-align: center;"><u>ET039000DMA</u></p> <p style="text-align: center;">(GP)</p> <p>FOR MESSRS : _____</p> </div> <div style="margin-top: 40px;"> <p>CUSTOMER'S APPROVAL</p> <p>DATE : _____</p> <p>BY : _____</p> </div>		

EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO.

E T 0 3 9 0 0 0 D M A

VERSION

2

PAGE

0-1

RECORDS OF REVISION

DOC . FIRST ISSUE

SEP.04, 2017

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REVISED  
PAGE  
NO.

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ADD 10.2 RGB INPUT DATA AND THE DISPLAY COLOR

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## 1. GENERAL SPECIFICATIONS

### 1.1 DATA SHEETS NOTES FOR CONTROLLER/DRIVER PLEASE REFER TO :

ILITEK ILI6480G6

### 1.2 MATERIAL SAFETY DESCRIPTION

ASSEMBLIES SHALL COMPLY WITH EDT GREEN PRODUCT (GP) REQUIREMENTS, INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING LEAD, MERCURY, CADMIUM, HEXA VALENT CHROMIUM, POLYBROMINATED BIPHENYLS (PBB), POLYBROMINATED DIPHENYL ETHERS (PBDE), POLYCHLORINATED BIPHENYLS (PCB) CATEGORY, POLYCHLORINATED NAPHTHALENE (PCN) CATEGORY, POLYCHLORINATED TERPHENYLS (PCT) CATEGORY, CHLORINATED PARAFFINS (CP) CATEGORY, TRIBUTHYL TIN CATEGORY/ TRIPHENYL TIN CATEGORY, ASBESTOS, SPECIFIC AZO COMPOUNDS, FORMALDEHYDE, POLYVINYL CHLORIDE (PVC) AND PVC BLENDS, OTHER BROMINATED ORGANIC COMPOUNDS AND OTHER CHLORINATED ORGANIC COMPOUNDS.

## 2. MECHANICAL SPECIFICATIONS

- ( 1 ) DIAGONALS ----- 3.9 inch
- ( 2 ) NUMBER OF DOTS ----- 480W \* (BGR) \* 128H DOTS
- ( 3 ) MODULE SIZE ----- 105.5W \* 40.64H \* 2.95D mm  
(WITHOUT FPC)
- ( 4 ) EFFECTIVE AREA ----- 98.04W \* 28.34H mm
- ( 5 ) ACTIVE AREA ----- 95.04W \* 25.34H mm
- ( 6 ) DOT SIZE ----- 0.066W \* 0.198H mm
- ( 7 ) PIXEL PITCH ----- 0.198W \* 0.198H mm
- ( 8 ) LCD TYPE ----- TFT, TRANSMISSIVE, NORMALLY BLACK,  
ANTE-GLARE
- ( 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 VOLTAGE	VCC-VSS	-0.3	4.0	V	VSS=0
LED BACKLIGHT POWER DISSIPATION	PO	—	714	mW	
LED BACKLIGHT PEAK FORWARD CURRENT	IF	—	30	mA	

#### 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	—	3.92 m/s <sup>2</sup> ( 0.4 G )	—	19.6 m/s <sup>2</sup> ( 2.0 G )	10~55Hz X, Y, Z, EACH 2HRS
SHOCK	—	58.8 m/s <sup>2</sup> ( 6 G )	—	980 m/s <sup>2</sup> ( 100 G )	6 ms XYZ DIRECTIONS 3 TIMES EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE ( 1 ) : Ta AT -30°C : 48HRS MAX.

80°C : 48HRS MAX.

NOTE ( 2 ) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT  
TEMPERATURE THIS PHENOMENON IS REVERSIBLE.

NOTE ( 3 ) : Ta ≤ 60°C : 90%RH MAX. (48HRS MAX).

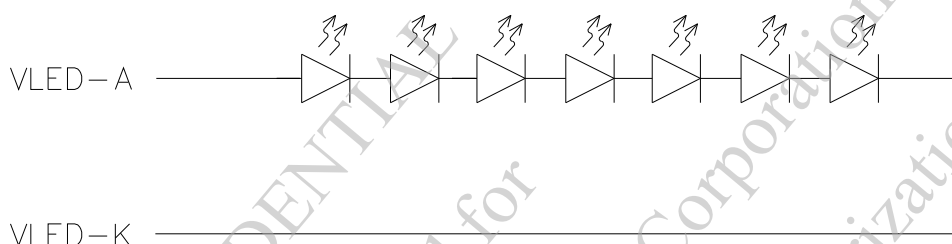
Ta > 60°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY  
OF 90%RH AT 60°C (48HRS MAX).

#### 4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY	VCC-VSS	—	3.0	3.3	3.6	V	
OPERATING CURRENT	ICC	—	—	22	27	mA	
INPUT LOW VOLTAGE	V <sub>IL</sub>	—	VSS	—	0.3*VCC	V	
INPUT HIGH VOLTAGE	V <sub>IH</sub>	—	0.7*VCC	—	VCC	V	
POWER SUPPLY FOR LED BACKLIGHT	VF	IF =20mA	18.9	21	23.8	V	NOTE ( 1 )
LED LIFE TIME	—	I <sub>LED</sub> =20mA (PER. LED)	30K	—	—	hrs	NOTE ( 2 ) NOTE ( 3 )

NOTE ( 1 ) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT

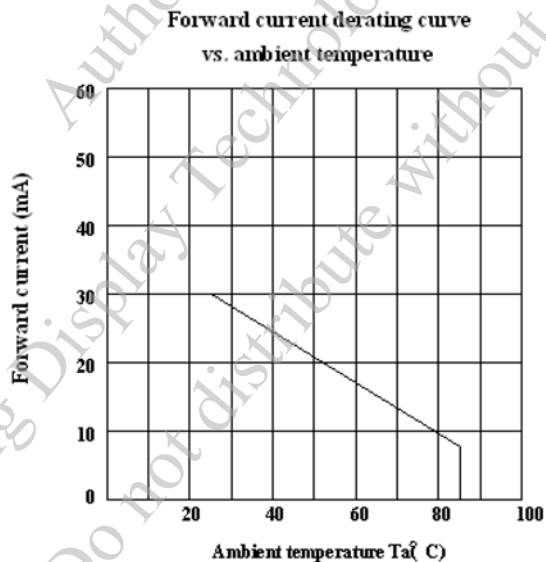


NOTE ( 2 ) : CONDITIONS ; TA=25°C, CONTINUOUS LIGHTING

NOTE ( 3 ) : DEFINITIONS OF FAILURE

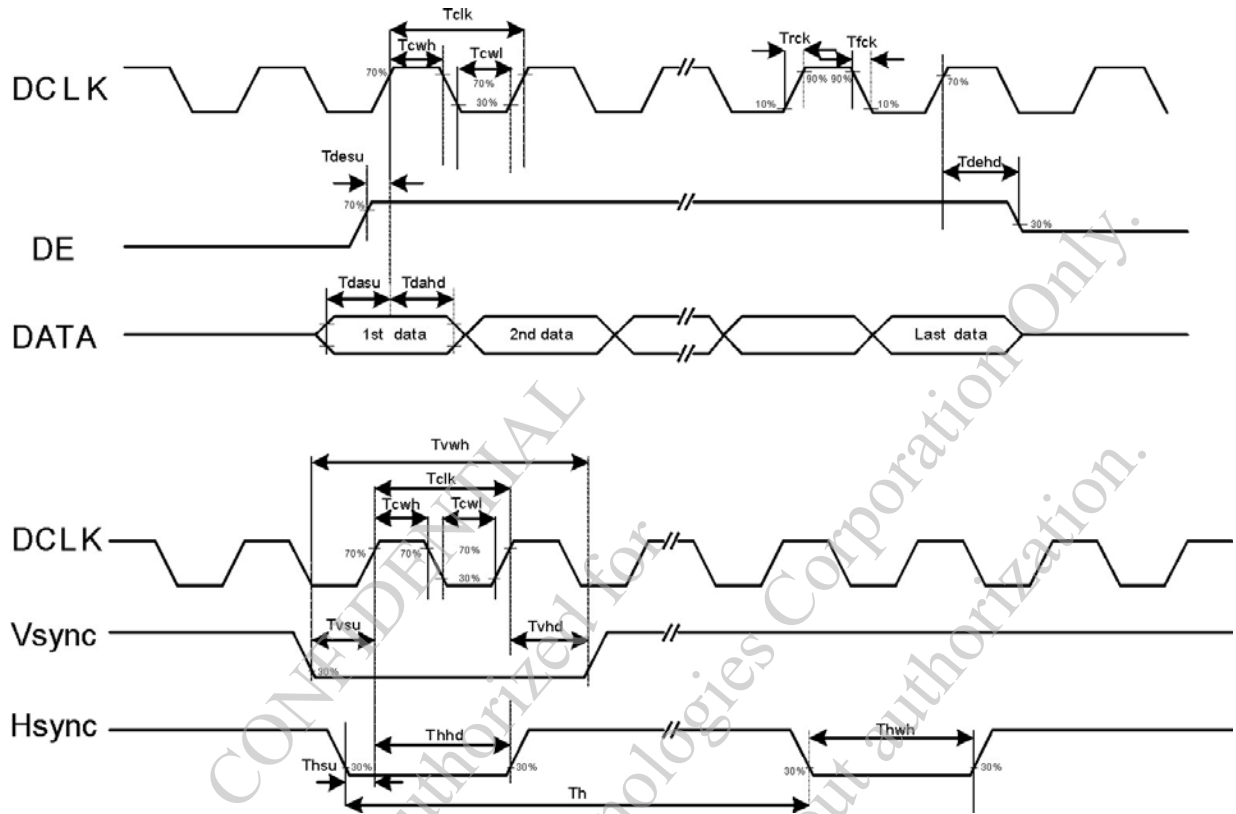
A. LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

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



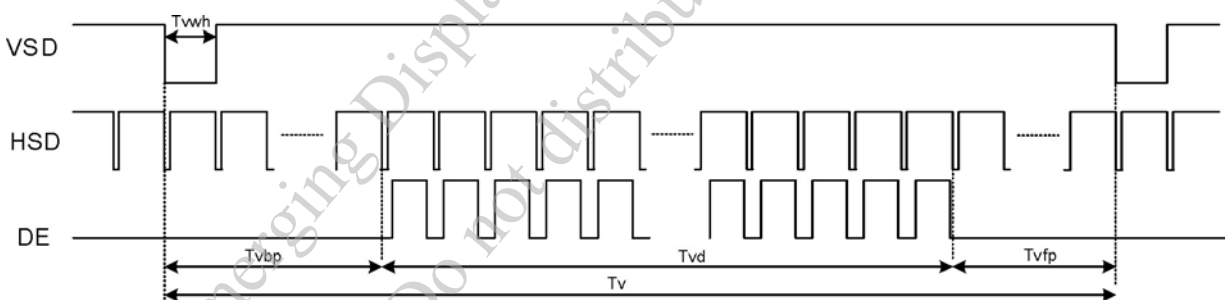
5. TIMING CHART

5.1 CLOCK AND DATA INPUT WAVEFORMS

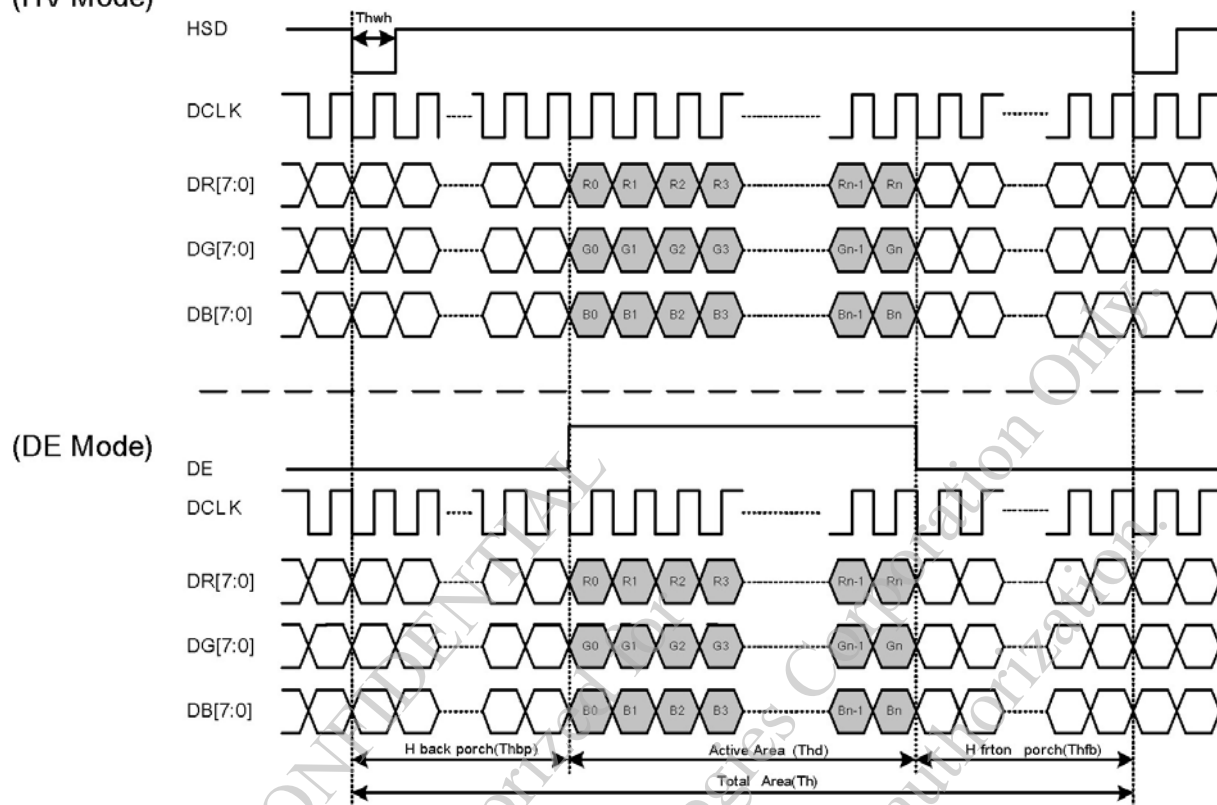


5.2 DATA INPUT FORMAT

VERTICAL INPUT TIMING



PARALLEL RGB MODE DATA FORMAT  
(HV Mode)



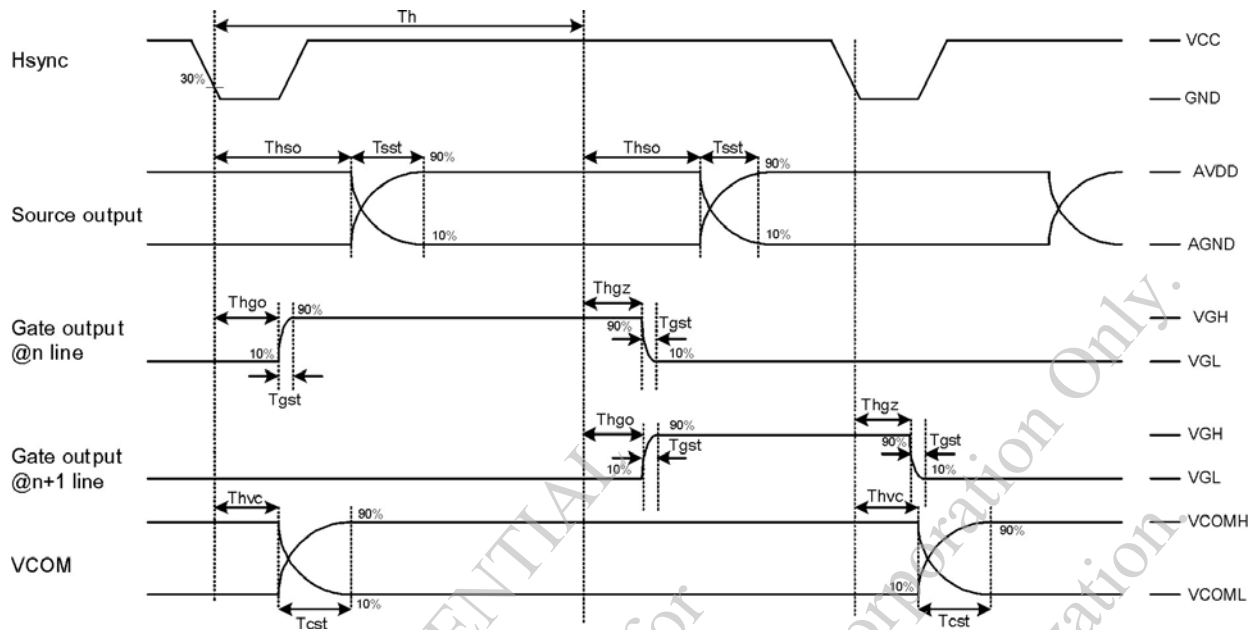
PARALLEL RGB INPUT TIMING TABLE

PARAMETER	SYMBOL	VALUE			UNIT
		MIN.	TYP.	MAX.	
DCLK FREQUENCY	fclk	5	9	12	MHz
VSD PERIOD TIME	Tv	277	288	400	H
VSD DISPLAY AREA	Tvd		272		H
VSD BACK PORCH	Tvb	3	8	31	H
VSD FRONT PORCH	Tvfp	2	8	93	H
HSD PERIOD TIME	Th	520	525	800	DCLK
HSD DISPLAY AREA	Thd		480		DCLK
HSD BACK PORCH	Thbp	36	40	255	DCLK
HSD FRONT PORCH	Thfp	4	5	65	DCLK

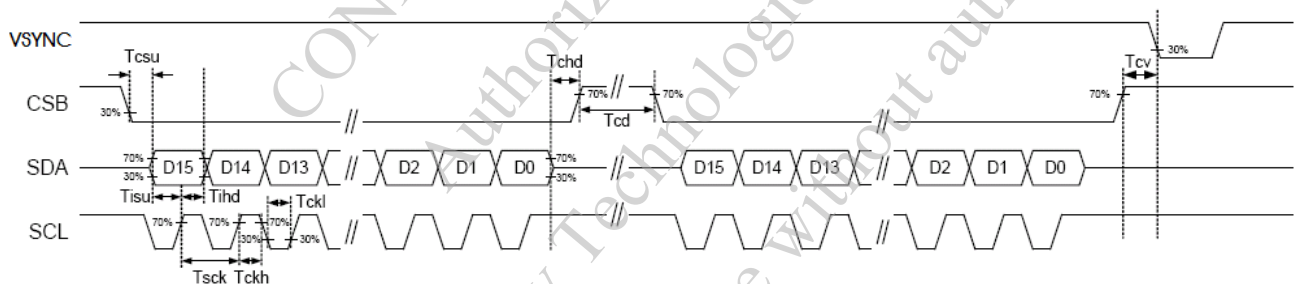
NOTE : SYNC MODE : VSYNC BACK PORCH=8 H  
HSYNC BACK PORCH=40 DCLK



### 5.3 OUTPUT TIMING DIAGRAM



### 5.4 3-WIR TIMING DIAGRAM



## 6. OPTICAL CHARACTERISTICS (NOTE 1)

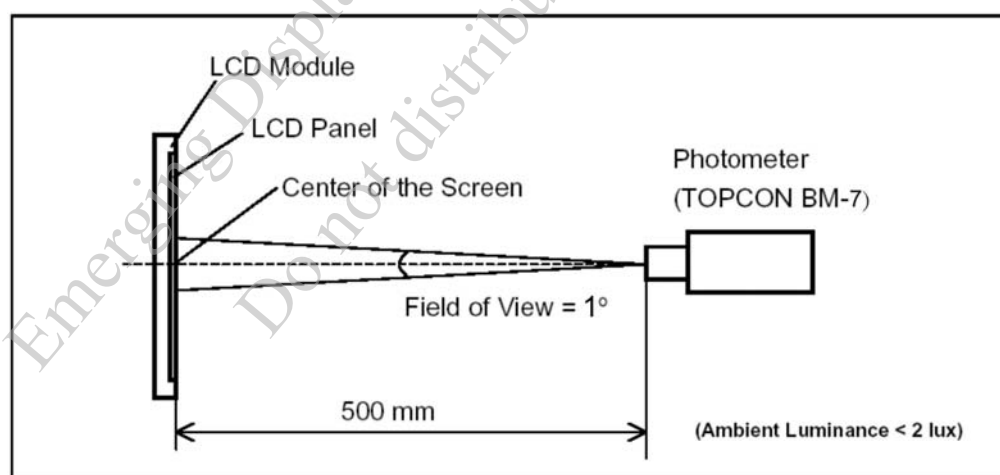
### 6.1 OPTICAL CHARACTERISTICS

Ta = 25°C

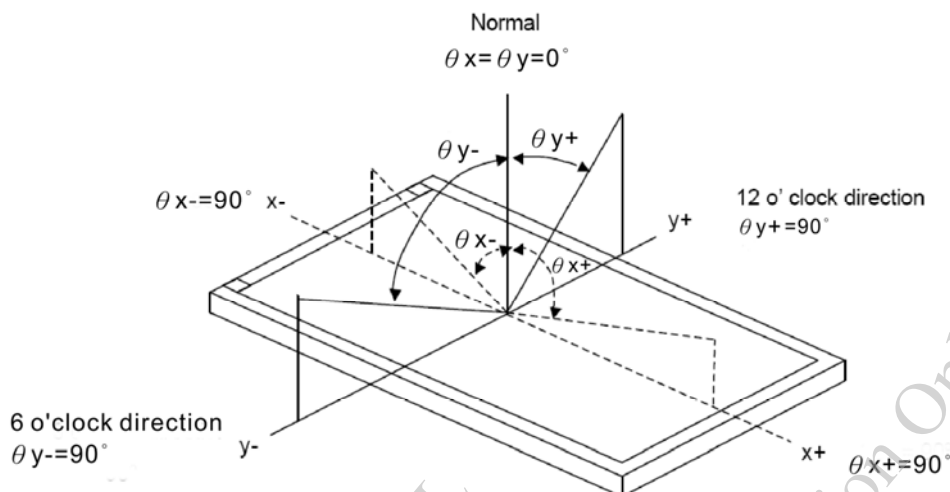
ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		$\theta_{y+}$	$CR \geq 10$	$\theta_x=0^\circ$	70	75	—	deg.	NOTE ( 2 ) NOTE ( 3 )
		$\theta_{y-}$			70	75	—		
		$\theta_{x+}$		$\theta_y=0^\circ$	70	75	—		
		$\theta_{x-}$			70	75	—		
CONTRAST RATIO		CR	$\theta_x=0^\circ, \theta_y=0^\circ$		400	500	—	—	NOTE ( 3 )
RESPONSE TIME		TR(t r+ t f)	$\theta_x=0^\circ, \theta_y=0^\circ$		—	30	50	msec	NOTE ( 4 )
THE BRIGHTNESS OF MODULE		B	$\theta_x=0^\circ, \theta_y=0^\circ$ IF =20mA		500	550	—	cd/m <sup>2</sup>	NOTE ( 5 )
COLOR OF CIE COORDINATE	WHITE	W <sub>x</sub>	$\theta_x=0^\circ, \theta_y=0^\circ$ IF =20mA NTSC : 60%	0.28	0.31	0.34	—	NOTE ( 6 )	
		W <sub>y</sub>		0.33	0.36	0.39			
	RED	R <sub>x</sub>		0.585	0.615	0.645	—		
		R <sub>y</sub>		0.33	0.36	0.39			
	GREEN	G <sub>x</sub>		0.31	0.34	0.37	—		
		G <sub>y</sub>		0.595	0.625	0.655			
	BLUE	B <sub>x</sub>		0.135	0.165	0.195	—		
		B <sub>y</sub>		0.07	0.1	0.13			
THE BRIGHTNESS OF UNIFORMITY		—	$\theta_x=0^\circ, \theta_y=0^\circ$ IF =20mA		75	80	—	%	NOTE ( 5 )

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 :

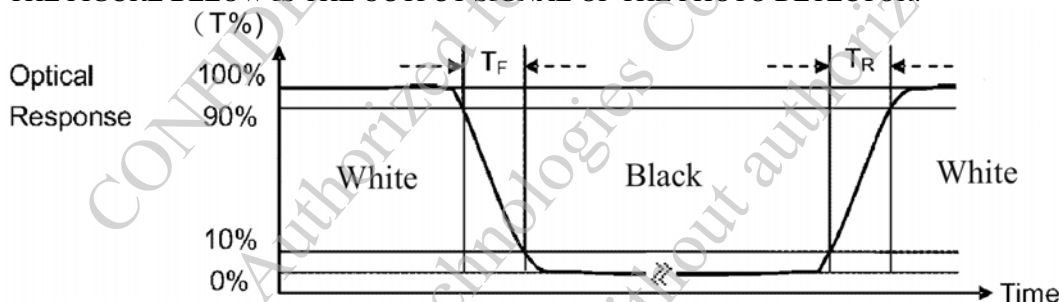


NOTE ( 3 ) : DEFINITION OF CONTRAST RATIO :

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

NOTE ( 4 ) : DEFINITION OF RESPONSE TIME : TR AND TF

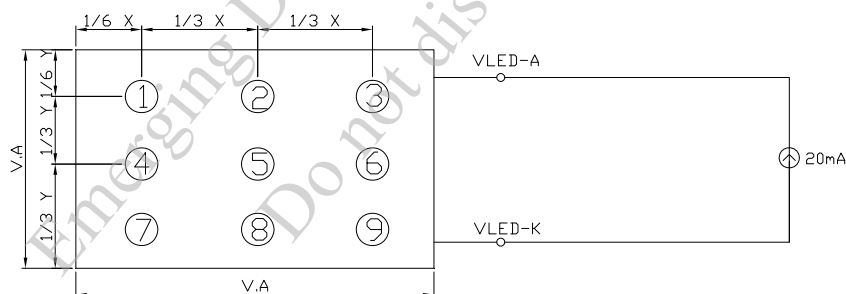
THE FIGURE BELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



NOTE ( 5 ) : MEASURED AT THE CENTER AREA OF THE PANEL WHEN ALL THE INPUT TERMINALS OF LCD PANEL IS ELECTRICALLY OPENED.

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 BRIGHTNESS TEST METHOD

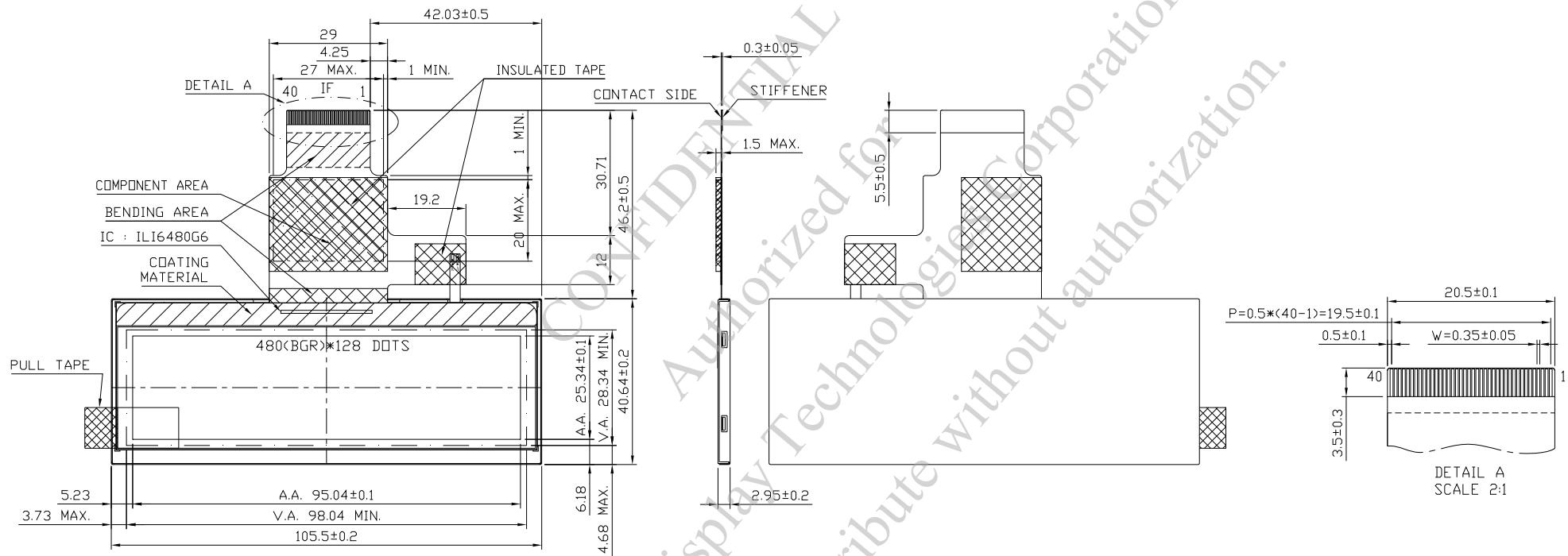


UNIT : mm

## 6.3 THE BRIGHTNESS UNIFORMITY CALCULATE METHOD

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

## 7. OUTLINE DIMENSIONS



UNIT : mm

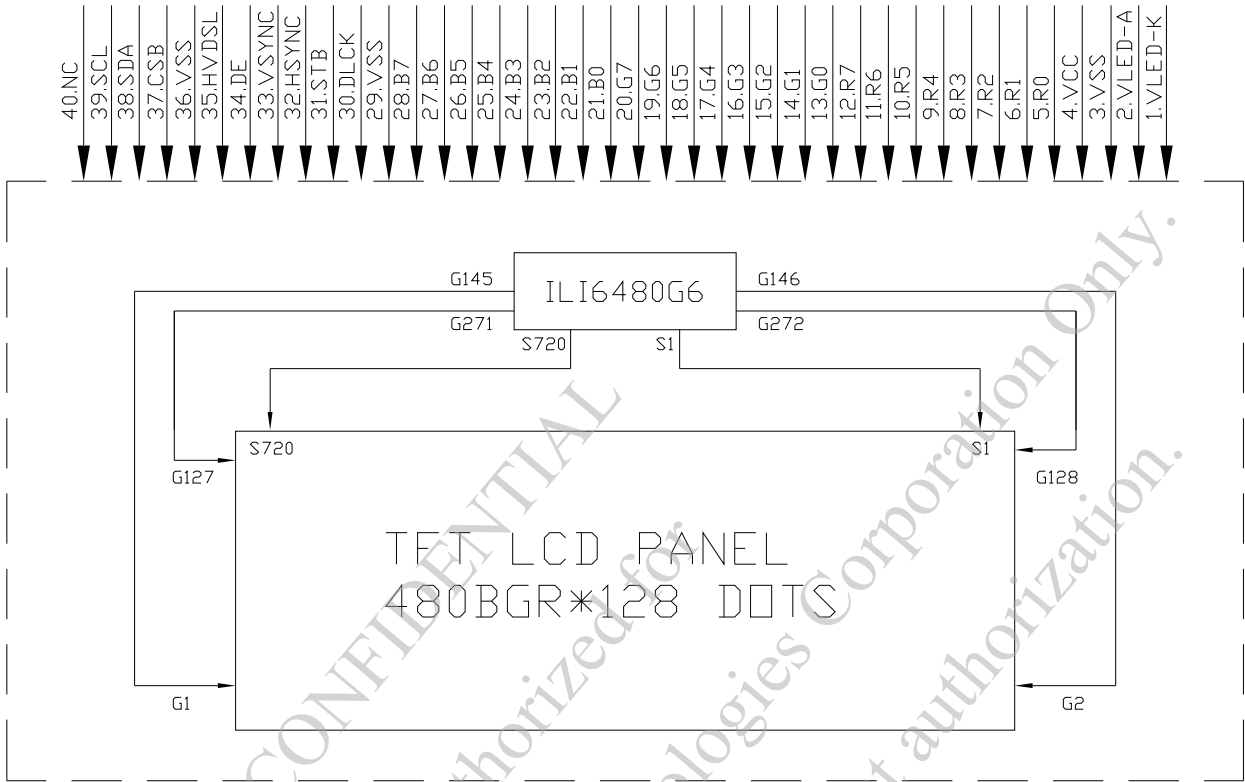
SCALE : NTS

NOT SPECIFIED TOLERANCE IS ±0.3mm

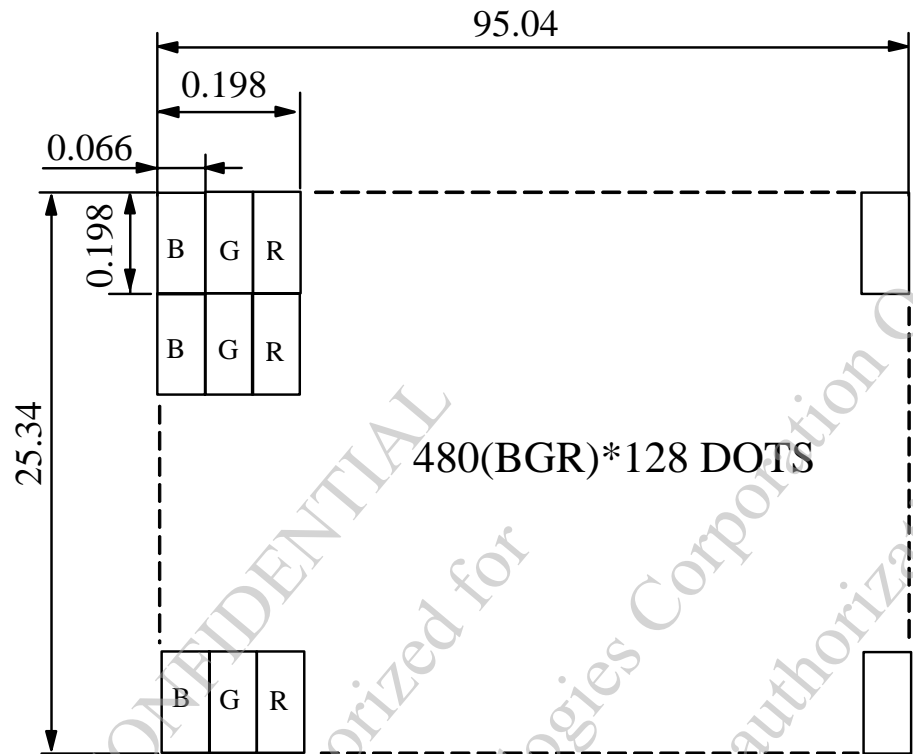
NOTE :

RECOMMEND MATCH CONNECTOR IF: KYOCERA 04 6240 040 SERIES

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.1$   
DOTS MATRIX TOLERANCE IS  $\pm 0.01$

## 10. INTERFACE SIGNALS

### 10.1 LCM INTERFACE

PIN NO.	SYMBOL	I/O/P	FUNCTION
1	VLED-K	P	POWER SUPPLY FOR LED (CATHODE)
2	VLED-A	P	POWER SUPPLY FOR LED (ANODE)
3	VSS	P	POWER GROUND
4	VCC	P	POWER VOLTAGE
5	R0	P	RED DATA (LSB)
6	R1	I	RED DATA
7	R2	I	RED DATA
8	R3	I	RED DATA
9	R4	I	RED DATA
10	R5	I	RED DATA
11	R6	I	RED DATA
12	R7	I	RED DATA (MSB)
13	G0	I	GREEN DATA (LSB)
14	G1	I	GREEN DATA
15	G2	I	GREEN DATA
16	G3	I	GREEN DATA
17	G4	I	GREEN DATA
18	G5	I	GREEN DATA
19	G6	I	GREEN DATA
20	G7	I	GREEN DATA (MSB)
21	B0	I	BLUE DATA (LSB)
22	B1	I	BLUE DATA
23	B2	I	BLUE DATA
24	B3	I	BLUE DATA
25	B4	I	BLUE DATA
26	B5	I	BLUE DATA
27	B6	I	BLUE DATA
28	B7	I	BLUE DATA (MSB)
29	VSS	P	POWER GROUND
30	DCLK	I	DOT DATA CLOCK
31	STB	I	STANDBY MODE WHEN STB : "H" , NORMAL OPERATION WHEN STB : "L" , STANDBY MODE
32	HSYNC	I	HORIZONTAL SYNC SIGNAL
33	VSYNC	I	VERTICAL SYNC SIGNAL
34	DE	I	DATA ENABLE
35	HVDSL	I	HV MODE OR DE MODE CONTROL SIGNAL HVDSL="H" : SET UNDER HV MODE, VSYNC AND HSYNC SIGNALS HAVE TO PROVIDE BY SYSTEM. HVDSL="L" : SET UNDER DE MODE, DE SIGNAL HAVE TO PROVIDE BY SYSTEM.
36	VSS	P	POWER GROUND
37	CSB	I	THIS PIN ACT AS 3-WIRE "CSB" PIN
38	SDA	I	THIS PIN ACT AS 3-WIRE "SDA" PIN
39	SCL	I	THIS PIN ACT AS 3-WIRE "SCL" PIN
40	NC	—	NO CONNECT

## 10.2 RGB INPUT DATA AND THE DISPLAY COLOR

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

INPUT RGB DATA: 0xFFFFF DISPLAY COLOR: BLACK



R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

INPUT RGB DATA: 0x00000 DISPLAY COLOR: WHITE

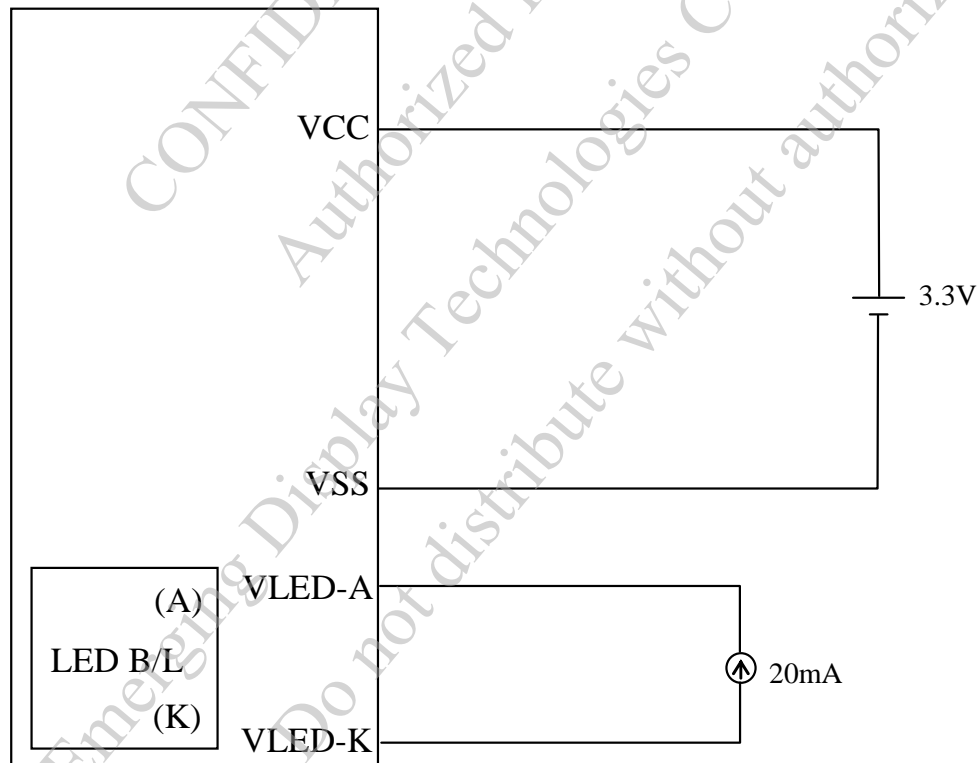


DISPLAY COLOR

PLEASE NOTE THAT THE DISPLAY COLOR IS INVERTED COMPARED TO NORMAL RGB DATA, THUS THE SOFTWARE OR GRAPHIC CONTROLLER IN THE FRONT END HAVE TO CORRECT IT TO MAKE THE DISPLAY IMAGE COLOR CORRECT.

## 11. POWER SUPPLY

### 11.1 POWER SUPPLY FOR LCM





## 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

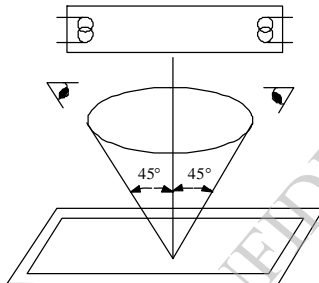
### 12.2 INSPECTION CONDITIONS

12.2.1 (1)OBSERVATION DISTANCE :  $35 \pm 5\text{cm}$

(2)VIEW ANGLE :  $\pm 45^\circ$

PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN  $45^\circ$



LINE OF SIGHT FOR INSPECTION SHALL BE WITHIN THE HALF SECTION OF THE VIEWING CONE GENERATED BY LINE SEGMENT  $45^\circ$  WITH RESPECTS TO THE VERTICAL AXIS FROM CENTER VERTEX OF LCD, THE CONE AXIS MUST BE PERPENDICULAR NORMAL TO LCD SURFACE AND PASSES THROUGH THE FLUORESCENT LAMP.

### 12.2.2 ENVIRONMENT CONDITIONS :

AMBIENT TEMPERATURE		$25 \pm 5^\circ\text{C}$
AMBIENT HUMIDITY		$65 \pm 20\% \text{RH}$
AMBIENT ILLUMINATION	COSMETIC INSPECTION	600~800 lux
	FUNCTIONAL INSPECTION	300~500 lux
INSPECTION TIME		15 secs (MAX.)

### 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

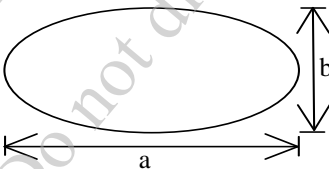
MINOR DEFECT : AQL 1.0

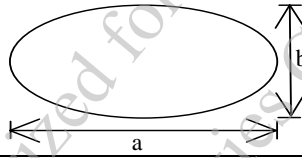
### 12.3 INSPECTION STANDARDS

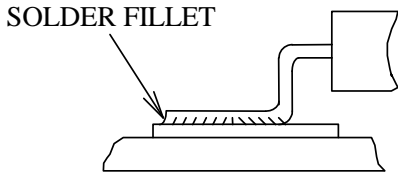
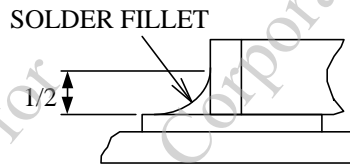
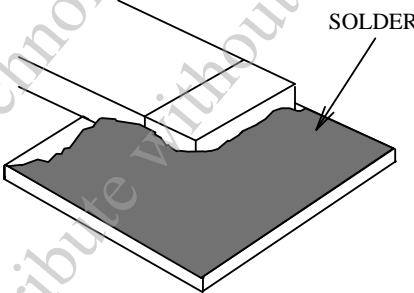
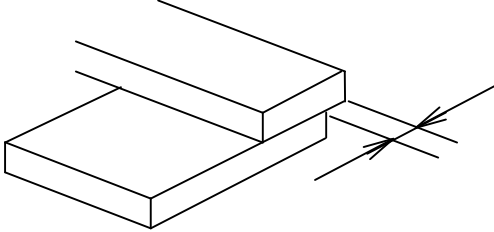
#### 12.3.1 VISUAL DEFECTS CLASSIFICATION

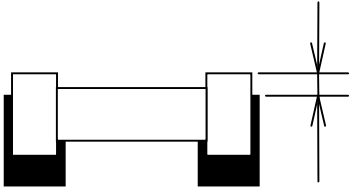
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> <li>• DEFECT TO MISS SPECIFIED DISPLAY FUNCTION , FOR ALL AND SPECIFIED DOTS</li> <li>EX: DISCONNECTION , SHORT CIRCUIT ETC</li> </ul>	0.65
	2.BACKLIGHT	<ul style="list-style-type: none"> <li>•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

### 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><math>N \leq 2</math></td></tr><tr><td>DARK DOT</td><td><math>N \leq 3</math></td></tr><tr><td>TOTAL BRIGHT AND DARK DOTS</td><td><math>N \leq 4</math></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.	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><tr><th>LENGTH : L</th><th>WIDTH : W</th><th>PERMISSIBLE NO.</th></tr><tr><td><math>L \leq 2</math></td><td><math>W \leq 0.05</math></td><td>IGNORE</td></tr><tr><td><math>2 &lt; L \leq 4</math></td><td><math>0.05 &lt; W \leq 0.1</math></td><td>3</td></tr><tr><td><math>4 &lt; L</math></td><td><math>0.1 \leq W</math></td><td>NONE</td></tr></table> WIDTH : W mm, LENGTH : L mm	LENGTH : L	WIDTH : W	PERMISSIBLE NO.	$L \leq 2$	$W \leq 0.05$	IGNORE	$2 < L \leq 4$	$0.05 < W \leq 0.1$	3	$4 < L$	$0.1 \leq W$	NONE
LENGTH : L	WIDTH : W	PERMISSIBLE NO.												
$L \leq 2$	$W \leq 0.05$	IGNORE												
$2 < L \leq 4$	$0.05 < W \leq 0.1$	3												
$4 < L$	$0.1 \leq W$	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><math>D \leq 0.15</math></td><td>IGNORE</td></tr><tr><td><math>0.15 &lt; D \leq 0.4</math></td><td>3</td></tr><tr><td><math>0.4 &lt; D</math></td><td>NONE</td></tr></table> NOTE : DIAMETER $D=(a+b)/2$ 	AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED	$D \leq 0.15$	IGNORE	$0.15 < D \leq 0.4$	3	$0.4 < D$	NONE				
AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED													
$D \leq 0.15$	IGNORE													
$0.15 < D \leq 0.4$	3													
$0.4 < D$	NONE													

NO.	ITEM	CRITERIA		
6	BUBBLES OF POLARIZER /DIRT/CF FAIL /SURFACE STAINS		AVERAGE DIAMETER (mm) : D	NUMBER OF PIECES PERMITTED
		BUBBLE ON THE POLARIZER	D ≤ 0.25	IGNORE
			0.25 < D ≤ 0.5	N ≤ 4
			0.5 < D	NONE
		SURFACE STAINS	D < 0.1	IGNORE
			0.1 < D ≤ 0.3	N ≤ 3
		CF FAIL / SPOT	D < 0.1	IGNORE
			0.1 < D ≤ 0.3	N ≤ 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 2% 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 HAVE 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.		

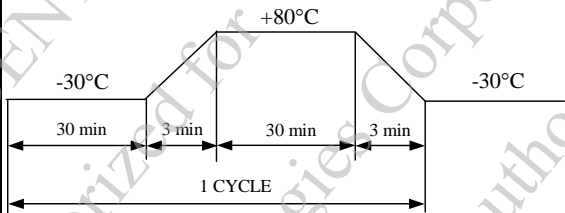
NO.	ITEM	CRITERIA
12	SOLDERING	<p>(1)NO SOLDERING FOUND ON THE SPECIFIED PLACE (2)INSUFFICIENT SOLDER</p> <p>(a)LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD</p>  <p>(b)CHIP COMPONENT · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING</p>  <p>· SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED</p>  <p>(3)PARTS ALIGNMENT (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><tr><td>a</td><td>b</td><td>c</td></tr><tr><td><math>\leq t/2</math></td><td>&lt; VIEWING AREA</td><td><math>\leq 1/8X</math></td></tr><tr><td><math>t/2 &gt; , \leq 2t</math></td><td><math>\leq W/2</math></td><td><math>\leq 1/8X</math></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><td>a</td><td>b</td><td>c</td></tr><tr><td><math>\leq t/2</math></td><td>&lt; VIEWING AREA</td><td><math>\leq 1/8X</math></td></tr><tr><td><math>&gt; t/2 , \leq 2t</math></td><td><math>\leq W/2</math></td><td><math>\leq 1/8X</math></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><td>a</td><td>b</td><td>c</td></tr><tr><td><math>\leq t</math></td><td><math>\leq 0.5\text{mm}</math></td><td><math>\leq 1/8X</math></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><td>a</td><td>b</td><td>c</td></tr><tr><td><math>\leq t</math></td><td><math>\leq 1/8X</math></td><td><math>\leq L</math></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											
$\leq t$	$\leq 1/8X$	$\leq L$											

### 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)	<p>THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION:</p> 
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	<p>AIR DISCHARGE <math>\pm 12KV</math>  CONTACT DISCHARGE <math>\pm 8KV</math>  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 FAILURE ISSUE OCCURRED.

#### 13.2 TESTING CONDITIONS AND INSPECTION CRITERIA

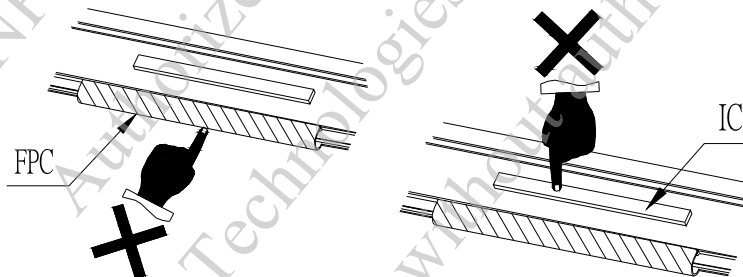
FOR THE FINAL TEST THE TESTING SAMPLE MUST BE STORED AT ROOM TEMPERATURE FOR 24 HOURS, AFTER THE TESTS LISTED IN TABLE 14.1, STANDARD SPECIFICATIONS FOR RELIABILITY HAVE BEEN EXECUTED IN ORDER TO ENSURE STABILITY.

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



### 13.3 OPERATION

- 13.3.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .
- 13.3.2 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.
- 13.3.3 ADJUST THE LC DRIVING VOLTAGE TO OBTAIN THE OPTIMUM CONTRAST .
- 13.3.4 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.
- 13.3.5 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!



#### 13.4 NOTICE

- 13.4.1 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 .
- 13.4.2 DO NOT DISASSEMBLE . EDT SHALL NOT BE HELD RESPONSIBLE IF THE MODULE IS DISASSEMBLED AND UPON THE REASSEMBLY THE MODULE FAILED.
- 13.4.3 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.
- 13.4.4 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.
- 13.4.5 DON'T GIVE EXTERNAL SHOCK.
- 13.4.6 DON'T APPLY EXCESSIVE FORCE ON THE SURFACE.
- 13.4.7 LIQUID IN LCD IS HAZARDOUS SUBSTANCE. MUST NOT LICK AND SWALLOW.  
WHEN THE LIQUID IS ATTACHED TO YOUR, SKIN, CLOTH ETC. WASH IT OUT THOROUGHLY AND IMMEDIATELY.
- 13.4.8 DON'T OPERATE IT ABOVE THE ABSOLUTE MAXIMUM RATING.
- 13.4.9 STORAGE IN A CLEAN ENVIRONMENT, FREE FROM DUST, ACTIVE GAS AND SOLVENT.
- 13.4.10 STORE WITHOUT ANY PHYSICAL LOAD.
- 13.4.11 REWIRING: NO MORE THAN 3 TIMES.