EXAMINED BY： Dan Kao	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO. CAS-0009079
		ISSUE ：NOV.26, 2020
APPROVED BY: Justin Horng		TOTAL PAGE：24
		VERSION：2

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

ET070019ADM6

(RoHS)

FOR MESSRS :

_____

CUSTOMER'S APPROVAL

DATE：

_____

BY：

_____

EMERGING DISPLAY TECHNOLOGIES CORPORATION	MODEL NO.	VERSION	PAGE
	ET070019ADM6	2	0-1

RECORDS OF REVISION

DOC. FIRST ISSUE

SEP.25, 2020

DATE	REVISED PAGE NO.	SUMMARY
NOV.26, 2020	1	1.1 DATA SHEETS FOR CONTROLLER / DRIVER PLEASE REFER TO: EK9713→EK9713CA
	3	4. ELECTRICAL CHARACTERISTICS
	7	6.1 OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	TYP.	MAX.
POWER SUPPLY CURRENT	IAVDD	AVDD-VSS =10.4V	30	40
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=140mA	—	10.5

→

ITEM	SYMBOL	CONDITION	TYP.	MAX.
POWER SUPPLY CURRENT	IAVDD	AVDD-VSS =10.4V	20	30
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=140mA	9.6	10.5

ITEM	SYMBOL	CONDITION		MIN.	TYP.
VIEWING ANGLE	θ_{y+}	CR ≥ 10	θ_x=0°	40	50
	θ_{y-}			60	70

→

ITEM	SYMBOL	CONDITION		MIN.	TYP.
VIEWING ANGLE	θ_{y+}	CR ≥ 10	θ_x=0°	60	70
	θ_{y-}			50	60

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1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER / DRIVER PLEASE REFER TO：

EK9713CA

EK73002AB2

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) DISPLAY SIZE	7 inch
(2) NUMBER OF DOTS	800(RGB)W * 480H DOTS
(3) MODULE SIZE	164.9W * 100H * 5.88D mm (WITHOUT FPC)
(4) EFFECTIVE AREA	156.08W * 88.53H mm
(5) ACTIVE AREA	154.08W * 85.92H mm
(6) DOT SIZE	0.0642W * 0.179H mm
(7) PIXEL SIZE	0.1926W * 0.179H mm
(8) LCD TYPE	TFT, TN, TRANSMISSIVE, ANTE-GLARE
(9) COLOR	16.7M
(10) VIEWING DIRECTION	6 O'CLOCK (GRAY LEVEL INVERSION)
(11) BACK LIGHT	LED , COLOR : WHITE
(12) INTERFACE MODE	RGB(24BIT) PARALLEL (SYNC / DE MODE)

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.3	5	V	—
	AVDD	6.5	13.5	V	—
	VGH	-0.3	40	V	—
	VGL-VSS	VGL-20	0.3	V	—
	VGH-VGL	-0.3	40	V	—
POWER DISSIPATION FOR LED BACKLIGHT	PD	—	1470	mW	—
FORWARD CURRENT FOR LED BACKLIGHT	ILED	—	140	mA	(PER.LED)

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) , (3)
HUMIDITY	NOTE (3)		NOTE (3)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s^2 (0.25 G)	—	11.76 m/s^2 (1.2 G)	10~100 Hz XYZ DIRECTIONS 1 HR EACH
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)：THE ABSOLUTE MAXIMUM RATINGS OF THIS PRODUCT SHOULD NOT BE EXCEEDED AT ANY TIME. IF THESE RATINGS ARE EXCEEDED, THE PRODUCT'S PERFORMANCE IS NOT GUARANTEED AND THE PRODUCT MAY EXPERIENCE PERMANENT DAMAGE.

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

NOTE (3)：Ta ≤ 50°C：85%RH MAX. (48HRS MAX).

Ta > 50°C：ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 85%RH AT 50°C(48HRS MAX).

4. ELECTRICAL CHARACTERISTICS

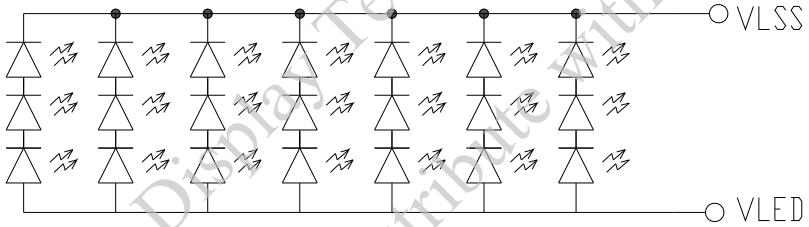
Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.3	3.45	V	
	AVDD	—	10.2	10.4	10.6	V	
	VGH	—	14.5	15	15.5	V	
	VGL	—	-10.5	-10	-9.5	V	
INPUT SIGNAL VOLTAGE	VCOM	—	3.54	4.04	4.54	V	
LOGIC LOW INPUT VOLTAGE	VIL	—	VSS	—	0.3*VDD	V	
LOGIC HIGH INPUT VOLTAGE	VIH	—	0.7*VDD	—	VDD	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS = 3.3V	—	10	15	mA	NOTE (1)
	IAVDD	AVDD-VSS =10.4V	—	20	30		
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=140mA	8.7	9.6	10.5	V	NOTE (2)
LED LIFE TIME	—	IF=20mA (PER LED)	30K	—	—	HRS	NOTE (3) NOTE (4)

NOTE (1)：MAX. SPECIFICATION：WHITE TEST PATTERN.

WHITE TEST PATTERN

NOTE (2)：INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



NOTE (3)：CONDITIONS; Ta=25 °C, CONTINUOUS LIGHTING

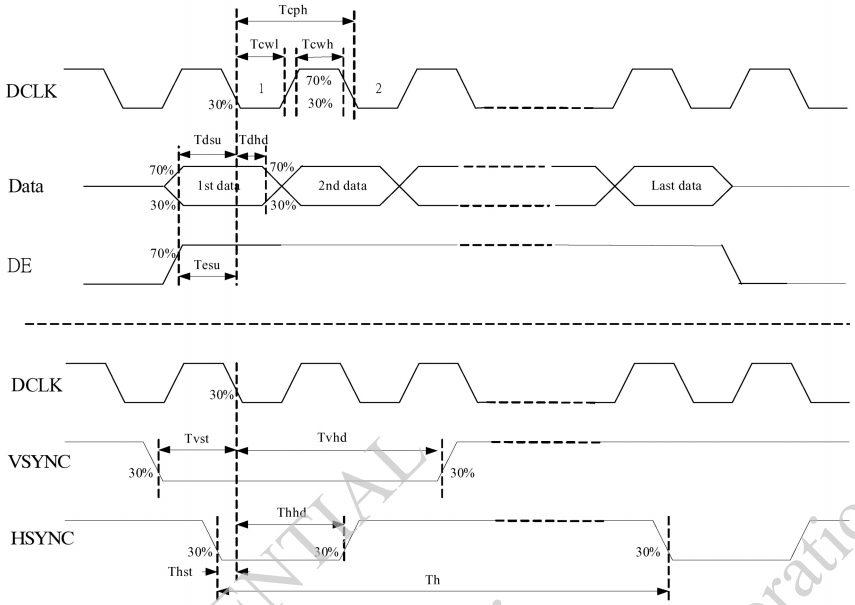
NOTE (4)：DEFINITIONS OF LIFE TIME：
LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

5. TIMING CHARACTERISTICS

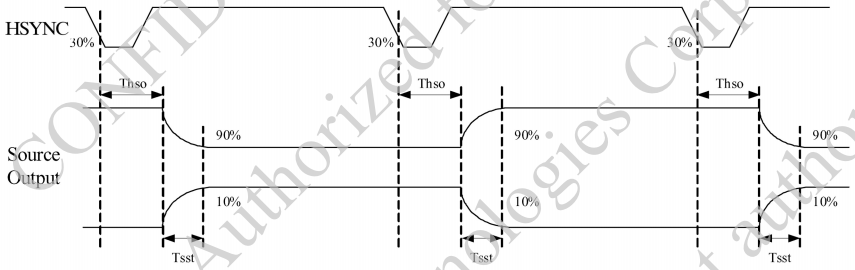
5.1 LCD MODULE AC ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
VDD POWER ON SLEW RATE	T_{POR}	1	10	20	ms	FROM 0V to 90% VDD
RESET PULSE WIDTH	T_{RST}	1	2	5	ms	Clkin=40MHz
DCLK CYCLE TIME	Tcph	20	30	40	ns	
DCLK PULSE DUTY	Tcwh	40	50	60	%	
VSYNC SETUP TIME	Tvst	8	10	20	ns	
VSYNC HOLD TIME	Tvhd	8	96000	64000	ns	
HSYNC SETUP TIME	Thst	8	10	20	ns	
HSYNC HOLD TIME	Thhd	8	120	800	ns	
DATA SETUP TIME	Tdsu	8	10	20	ns	D[7:0], D1[7:0], D2[7:0] to Clkin
DATA HOLD TIME	Tdhd	8	15	20	ns	D[7:0], D1[7:0], D2[7:0] to Clkin
DE SETUP TIME	Tesu	8	15	20	ns	
DE HOLD TIME	Tehd	8	15	20	ns	
OUTPUT STABLE TIME	Tsst	—	—	6	us	10% TO 90% TARGET VOLTAGE. CL=120pF, R=10Kohm
DCLK CYCLE TIME	Tclk	20	30	40	ns	
DCLK PULSE DUTY	Tcwh	40	50	60	%	Tclk
TIME FROM HSYNC TO SOURCE OUTPUT	Thso	—	64	—	DCLK	

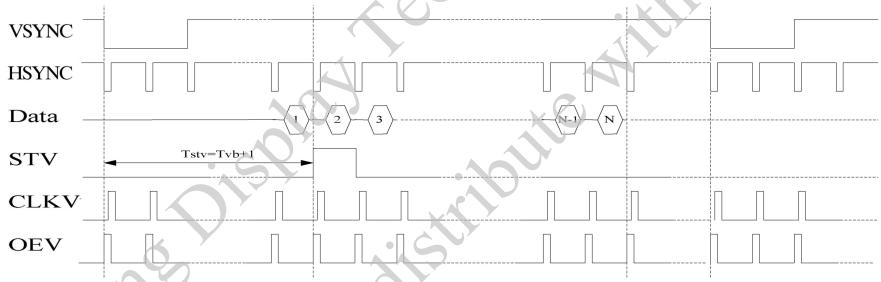
INPUT CLOCK AND DATA TIMING DIAGRAM



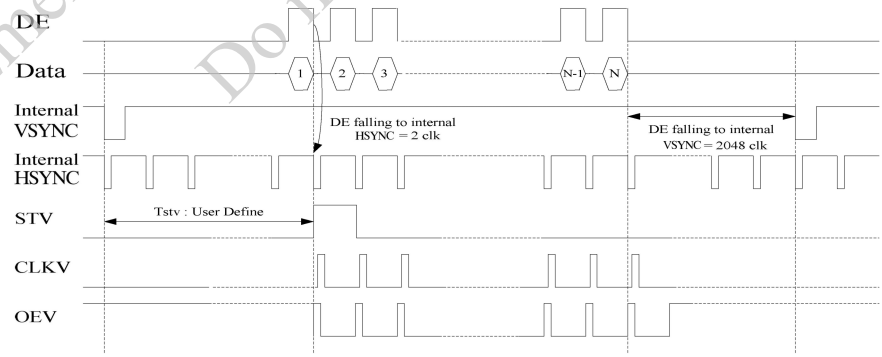
SOURCE OUTPUT TIMING DIAGRAM



VERTICAL TIMING DIAGRAM SYNC (TCON + SOURCE MODE)



VERTICAL TIMING DIAGRAM DE (TCON + SOURCE MODE)

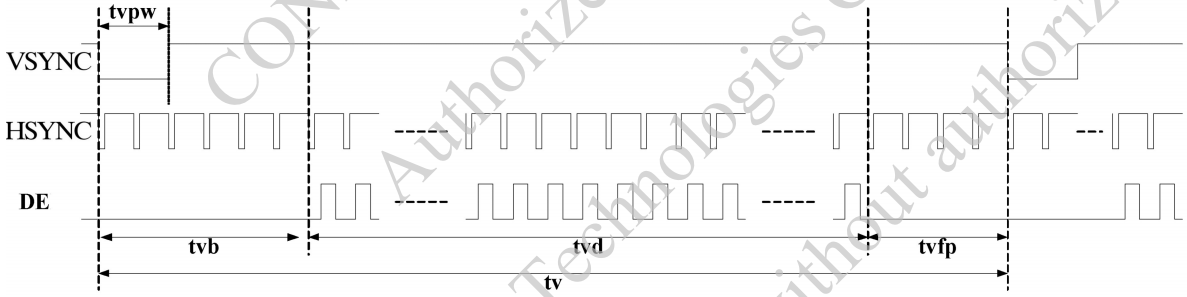


5.2 LCD MODULE TIMING CHARACTERISTICS

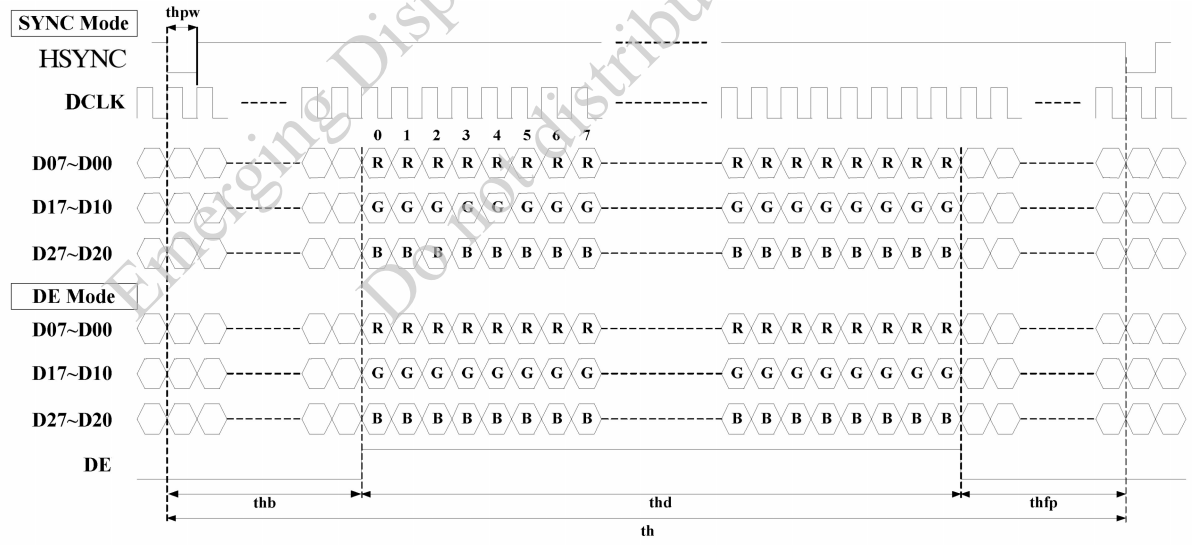
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
HORIZONTAL DISPLAY AREA	thd		800		DCLK	
DCLK FREQUENCY	fclk	26.4	33.3	46.8	MH_Z	
ONE HORIZONTAL LINE	th	862	1056	1200	DCLK	
HSYNC PULSE WIDTH	thpw	1	6	40	DCLK	NOTE (1)
HSYNC BACK PORCH (BLANKING)	thb		46		DCLK	NOTE (1)
HSYNC FRONT PORCH	thfb	16	210	354	DCLK	
DE MODE BLANKING	th-thd	62	256	400	DCLK	
VERTICAL DISPLAY AREA	tvd		480		H	
VSYNC PERIOD TIME	tv	510	525	650	H	
VSYNC PULSE WIDTH	tvpw	1	3	20	H	NOTE (2)
VSYNC BACK PORCH (BLANKING)	tvb		23		H	NOTE (2)
VSYNC FRONT PORCH	tvfb	7	22	147	H	
DE MODE BLANKING	tv-tvd	30	45	170	H	

NOTE (1)：HS BLANKING HAS INCLUDED HS PULSE WIDTH.
NOTE (2)：VS BLANKING HAS INCLUDED VS PULSE WIDTH.

VERTICAL INPUT TIMING



HORIZONTAL INPUT TIMING



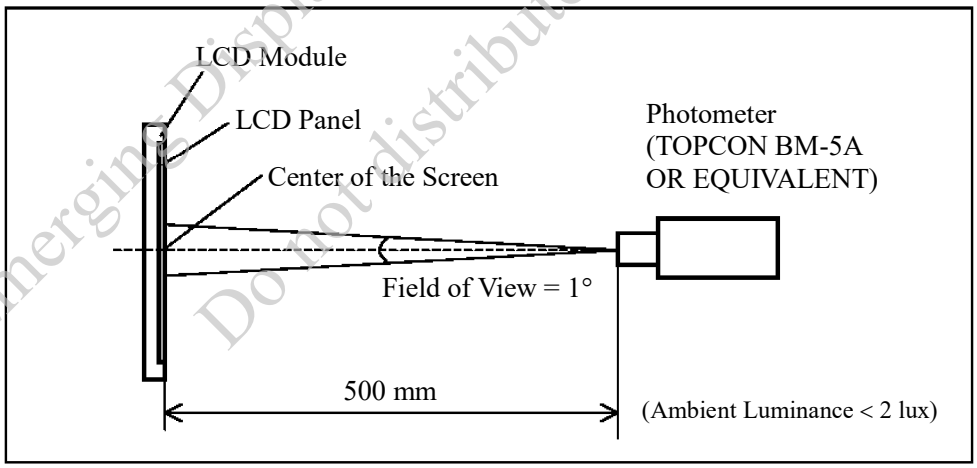
6. OPTICAL CHARACTERISTICS (NOTE 1)

6.1 OPTICAL CHARACTERISTICS

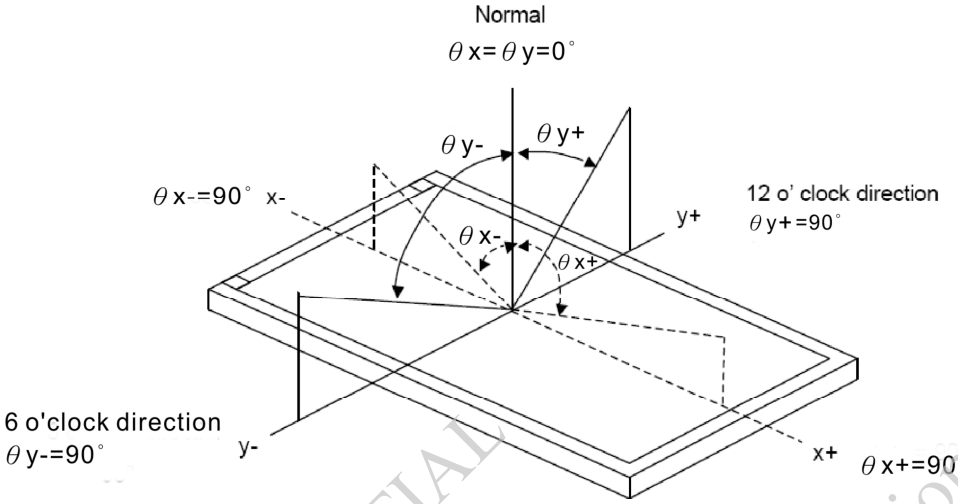
Ta = 25 ± 2 °C

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		θ_{y+}	CR ≥ 10	θ_x=0°	60	70	—	deg.	NOTE (2) NOTE (3)
		θ_{y-}			50	60	—		
		θ_{x+}		θ_y=0°	60	70	—		
		θ_{x-}			60	70	—		
CONTRAST RATIO (CENTER)		CR	θx=0° , θy=0°		400	500	—	—	NOTE (3)
RESPONSE TIME		Tr + Tf			—	25	50	msec	NOTE (4)
COLOR CHROMATICITY (CENTER)	WHITE	Wx	θx=0° , θy=0° ILED=140mA		0.25	0.30	0.35	—	NOTE (5)
		Wy			0.28	0.33	0.38		
	RED	Rx			0.50	0.55	0.60	—	
		RY			0.28	0.33	0.38		
	GREEN	Gx			0.29	0.34	0.39	—	
		Gy			0.55	0.6	0.65		
	BLUE	Bx			0.10	0.15	0.20	—	
		By			0.03	0.08	0.13		
THE BRIGHTNESS OF MODULE (CENTER)		B	θx=0° , θy=0° ILED=140mA		297	340	—	cd/m^2	NOTE (6)
THE UNIFORMITY OF MODULE		—			70	75	—	%	NOTE (7)

NOTE (1)：TEST CONDITION：
AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES. MEASUREMENT SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM.



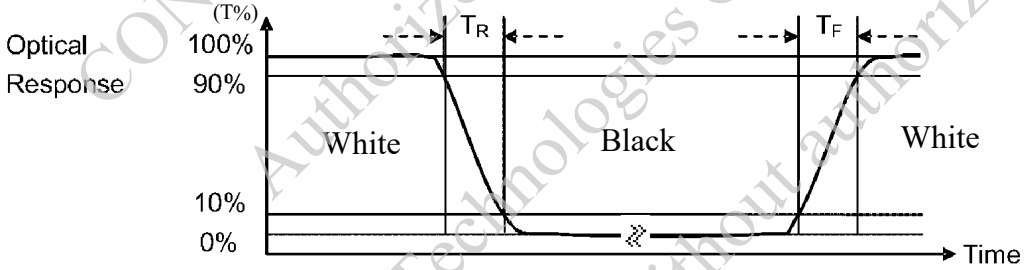
NOTE (2)：DEFINITION OF VIEWING ANGLE：



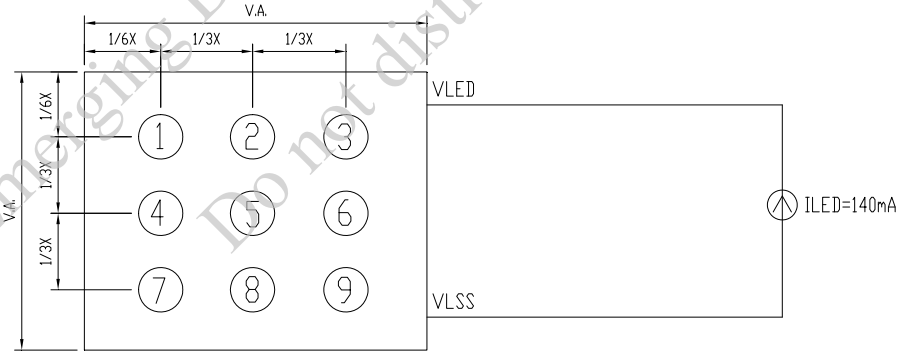
NOTE (3)：DEFINITION OF CONTRAST RATIO (CR) :
MEASURED AT THE CENTER POINT OF MODULE

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

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

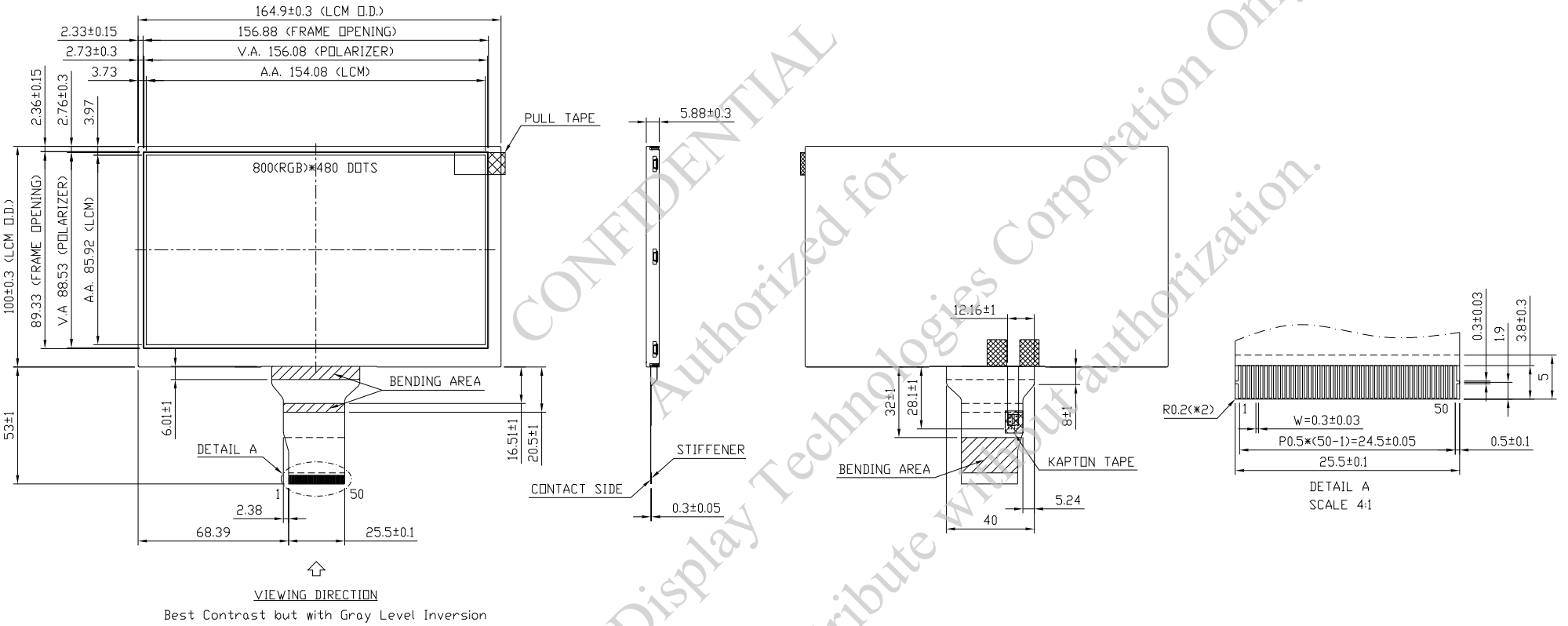


UNIT：mm

(b)THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

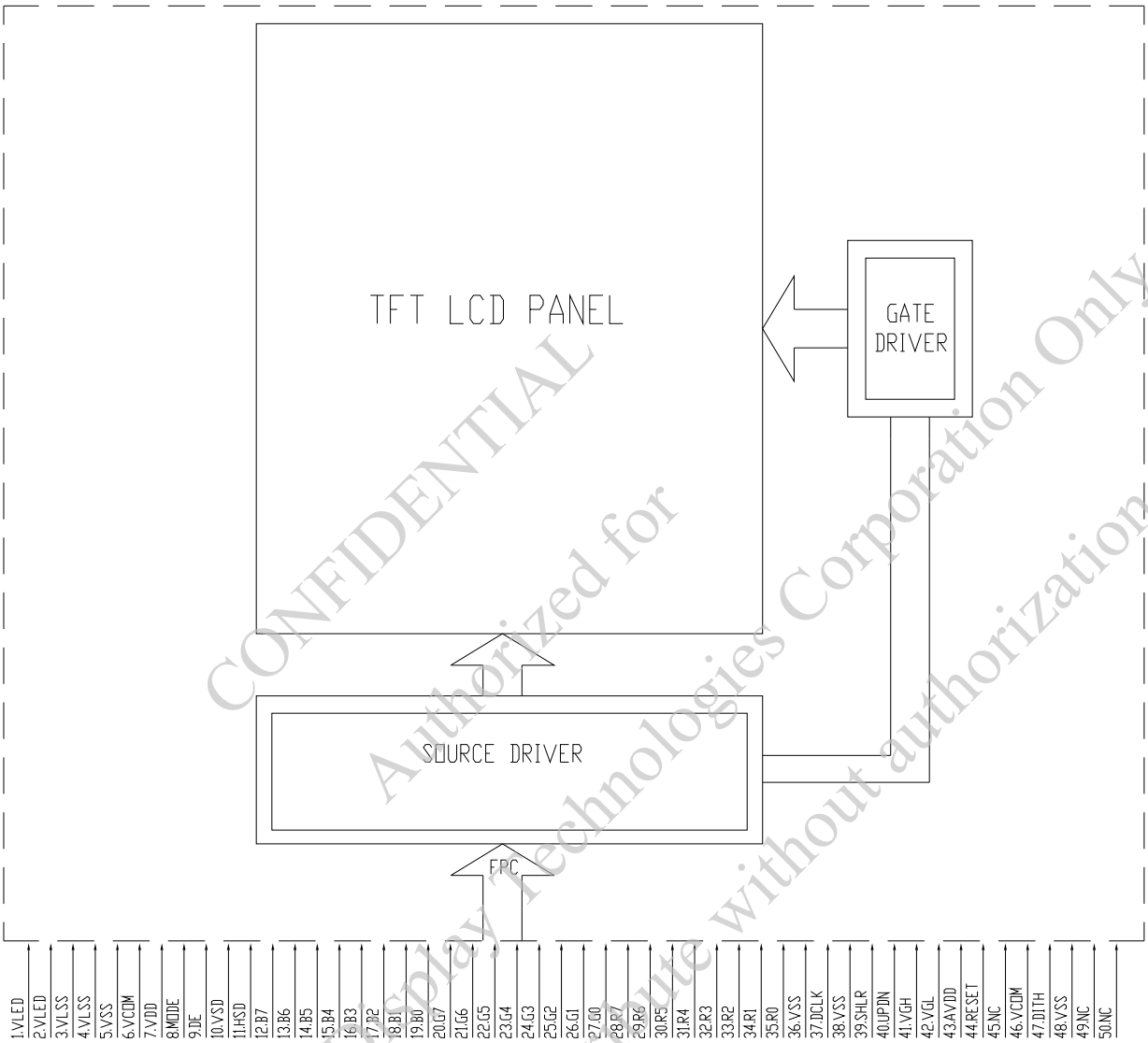
$$\text{UNIFORMITY} : \frac{\text{MINIMUM BRIGHTNESS}}{\text{MAXIMUM BRIGHTNESS}} * 100\%$$

7. OUTLINE DIMENSIONS

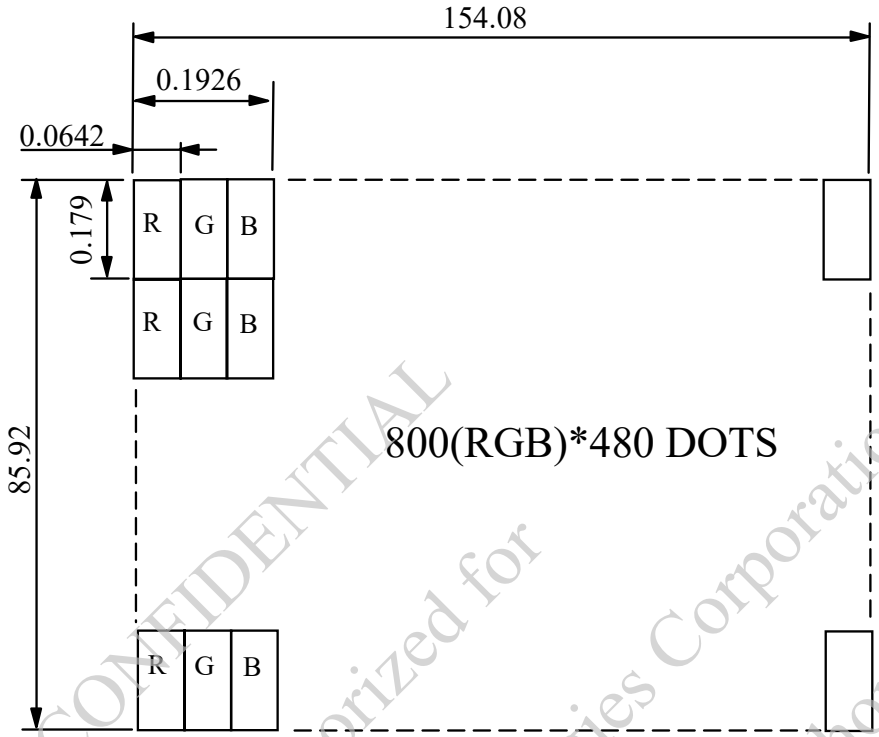


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5
NOTE :
RECOMMEND MATCH CONNECTOR KYOCERA : 04 6240 050 SERIES

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

10. INTERFACE SIGNALS

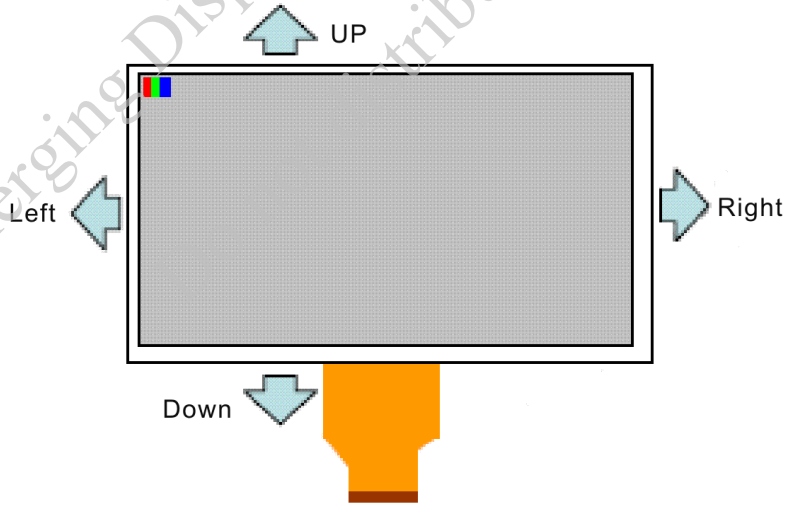
PIN NO.	SYMBOL	I/O/P	FUNCTION
1	VLED	P	POWER FOR LED BACKLIGHT (ANODE)
2	VLED	P	POWER FOR LED BACKLIGHT (ANODE)
3	VLSS	P	POWER FOR LED BACKLIGHT (CATHODE)
4	VLSS	P	POWER FOR LED BACKLIGHT (CATHODE)
5	VSS	P	POWER GROUND
6	VCOM	I	COMMON VOLTAGE
7	VDD	P	DIGITAL POWER
8	MODE	I	DE/SYNC MODE SELECT. NORMALLY PULL HIGH H: DE MODE. L: HSD/VSD MODE
9	DE	I	DATA INPUT ENABLE
10	VSD	I	VERTICAL SYNC INPUT. NEGATIVE POLARITY
11	HSD	I	HORIZONTAL SYNC INPUT. NEGATIVE POLARITY
12	B7	I	BLUE DATA(MSB)
13	B6	I	BLUE DATA
14	B5	I	BLUE DATA
15	B4	I	BLUE DATA
16	B3	I	BLUE DATA
17	B2	I	BLUE DATA
18	B1	I	BLUE DATA
19	B0	I	BLUE DATA(LSB)
20	G7	I	GREEN DATA(MSB)
21	G6	I	GREEN DATA
22	G5	I	GREEN DATA
23	G4	I	GREEN DATA
24	G3	I	GREEN DATA
25	G2	I	GREEN DATA
26	G1	I	GREEN DATA
27	G0	I	GREEN DATA(LSB)
28	R7	I	RED DATA(MSB)
29	R6	I	RED DATA
30	R5	I	RED DATA
31	R4	I	RED DATA
32	R3	I	RED DATA
33	R2	I	RED DATA
34	R1	I	RED DATA
35	R0	I	RED DATA(LSB)

PIN NO.	SYMBOL	I/O/P	FUNCTION
36	VSS	P	POWER GROUND
37	DCLK	I	CLOCK INPUT
38	VSS	P	POWER GROUND
39	SHLR	I	LEFT OR RIGHT DISPLAY CONTROL
40	UPDN	I	UP / DOWN DISPLAY CONTROL
41	VGH	P	POSITIVE POWER FOR TFT
42	VGL	P	NEGATIVE POWER FOR TFT
43	AVDD	P	ANALOG POWER
44	RESET	I	GLOBAL RESET PIN. ACTIVE LOW TO ENTER RESET STATE. SUGGEST TO CONNECTING WITH AN RC RESET CIRCUIT FOR STABILITY. NORMALLY PULL HIGH. (R=10KΩ，C=1μF)
45	NC	P	NO CONNECTION
46	VCOM	I	COMMON VOLTAGE
47	DITH	I	DITHERING SETTING DITH=" H " 6BIT RESOLUTION (LAST 2 BIT OF INPUT DATA TRUNCATED) DITH=" L " 8BIT RESOLUTION (DEFAULT SETTING)
48	VSS	P	POWER GROUND
49	NC	P	NO CONNECTION
50	NC	P	NO CONNECTION

NOTE (1)：SHLR：LEFT OR RIGHT SETTING
UPDN：UP OR DOWN SETTING

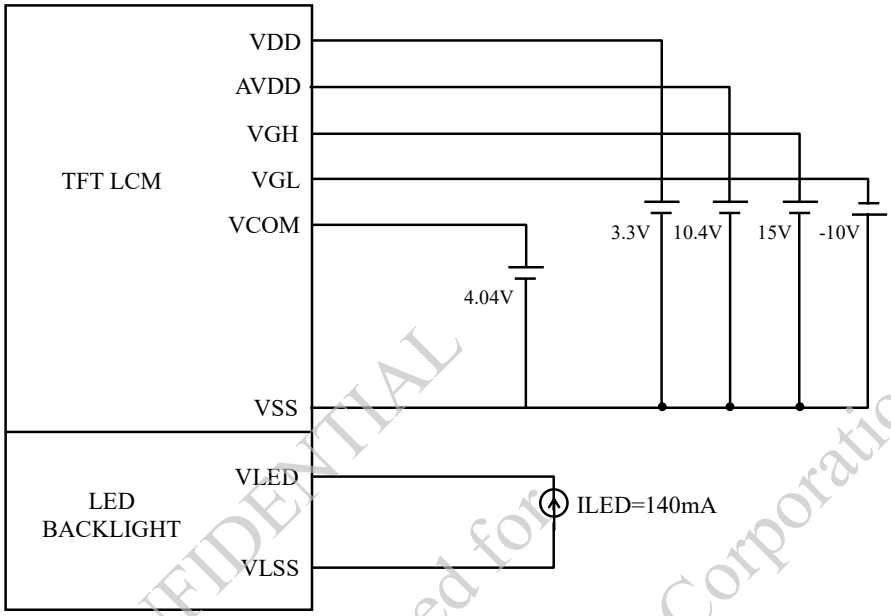
SHLR	UPDN	DATA SHIFTING
VDD	VSS	LEFT TO RIGHT, UP TO DOWN (DEFAULT)
VSS	VSS	RIGHT TO LEFT, UP TO DOWN
VDD	VDD	LEFT TO RIGHT, DOWN TO UP
VSS	VDD	RIGHT TO LEFT, DOWN TO UP

NOTE (2)：DEFINITION OF SCANNING DIRECTION.
REFER TO THE FIGURE AS BELOW：



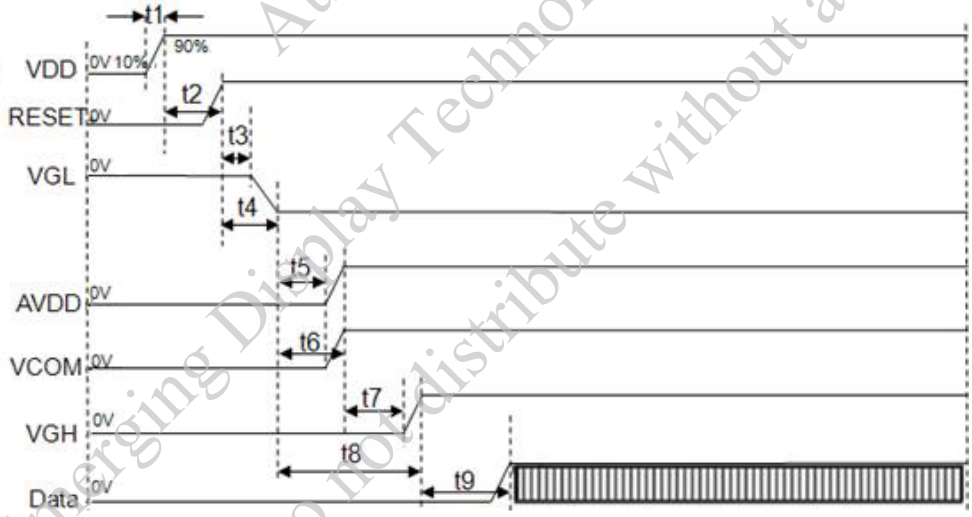
11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



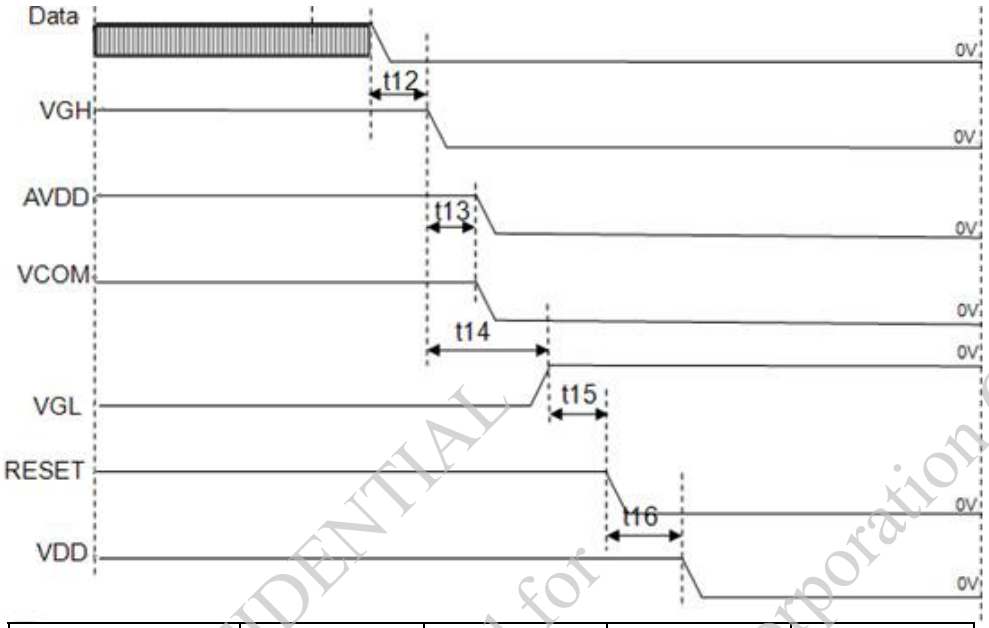
11.2 POWER SIGNAL SEQUENCE

a. POWER ON：



SYMBOL	MIN.	TYP.	MAX.	UNIT
t1	0.5	5	20	ms
t2	1	1	1.5	ms
t3	10	15	20	ms
t4	20	22	24	ms
t5	1	2	3	ms
t6	5	6	7	ms
t7	1.5	2	4	ms
t8	10	12	15	ms
t9	10	15	20	ms

b. POWER OFF：



SYMBOL	MIN.	TYP.	MAX.	UNIT
t12	10	15	20	ms
t13	5	6	7	ms
t14	10	12	15	ms
t15	20	22	24	ms
t16	1	1.5	3	ms

12. INSPECTION CRITERIA

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°

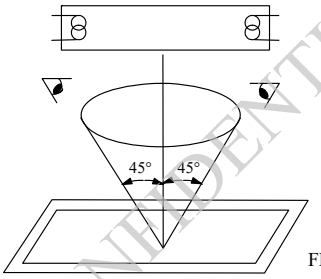


FIG.A

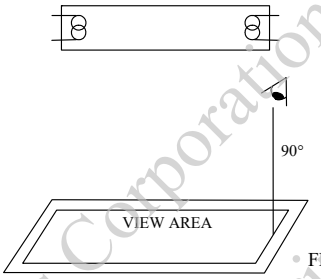


FIG.B

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 RESPECT 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 RESPECT 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		15 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

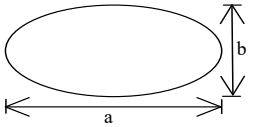
MINOR DEFECT：AQL 1.0

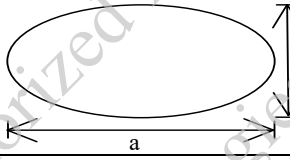
12.3 INSPECTION STANDARDS

12.3.1 VISUAL DEFECTS CLASSIFICATION

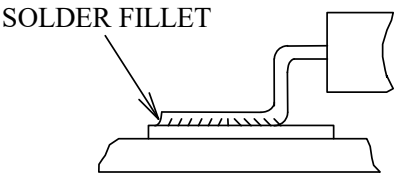
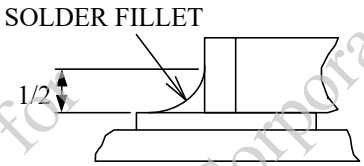
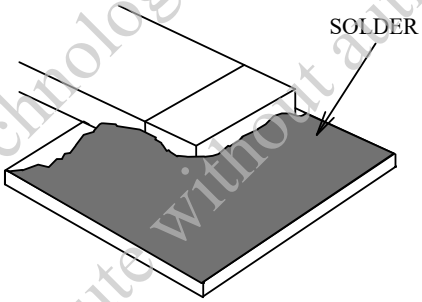
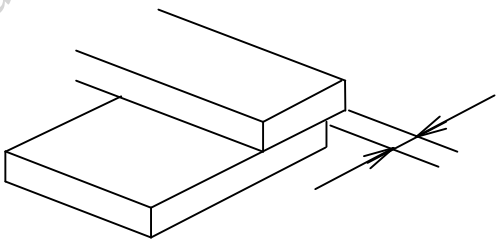
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	• DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC	0.65
	2.BACKLIGHT	• NO LIGHT • FLICKERING AND OTHER ABNORMAL ILLUMINATION	
	3.DIMENSIONS	• SUBJECT TO INDIVIDUAL ACCEPTANCE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

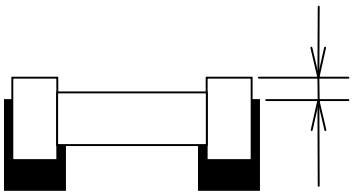
12.3.2 MODULE DEFECTS CLASSIFICATION

<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>1</td><td>DISPLAY ON INSPECTION</td><td>(1)INCORRECT PATTERN
(2)MISSING SEGMENT
(3)DIM SEGMENT
(4)OPERATING VOLTAGE BEYOND SPEC</td></tr>
<tr><td>2</td><td>OVERALL DIMENSIONS</td><td>(1)OVERALL DIMENSION BEYOND SPEC</td></tr>
<tr><td>3</td><td>DOT DEFECT</td><td>(1)INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS.
(2)
<table>
<tr><th colspan="2">DEFECT TYPE</th><th>CRITERIA</th></tr>
<tr><td rowspan="3">BRIGHT DOT</td><td>RANDOM</td><td>N ≤ 3</td></tr>
<tr><td>2 DOTS ADJACENT</td><td>N ≤ 0</td></tr>
<tr><td>3 DOTS ADJACENT</td><td>N ≤ 0</td></tr>
<tr><td rowspan="3">DARK DOT</td><td>RANDOM</td><td>N ≤ 4</td></tr>
<tr><td>2 DOTS ADJACENT</td><td>N ≤ 0</td></tr>
<tr><td>3 DOTS ADJACENT</td><td>N ≤ 0</td></tr>
<tr><td colspan="2">TOTAL BRIGHT AND DARK DOT</td><td>N ≤ 6</td></tr>
<tr><td>DISTANCE</td><td>MINIMUM DISTANCE BETWEEN DARK DOTS
MINIMUM DISTANCE BETWEEN DARK AND BRIGHT DOT.</td><td>5 mm</td></tr>
</table>
NOTE：
1. DEFINITION OF DOT DEFECT INDUCED FROM THE PANEL INSIDE
(A) BRIGHT DOT：DOTS APPEAR BRIGHT AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER BLACK PATTERN.
(B) DARK DOT：DOTS APPEAR DARK AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER PURE RED, GREEN, BLUE PICTURE.
(C) 2 DOT ADJACENT = 1 PAIR = 2 DOTS
PICTURE:
 
2 dot adjacent　2 dot adjacent　2 dot adjacent (vertical)　2 dot adjacent (slant)</td></tr>
<tr><td>4</td><td>FOREIGN BLACK/WHITE/ BRIGHT LINE/ OF VIEWING AREA</td><td>
<table>
<tr><th>LENGTH：L</th><th>WIDTH：W</th><th>PERMISSIBLE NO.</th></tr>
<tr><td>—</td><td>W ≤ 0.07</td><td>IGNORE</td></tr>
<tr><td>L ≤ 5.0</td><td>0.07 < W ≤ 0.2</td><td>4</td></tr>
<tr><td>5.0 < L</td><td>0.2 < W</td><td>NONE</td></tr>
</table>
WIDTH：W mm, LENGTH： L mm</td></tr>
<tr><td>5</td><td>POLARIZER SCRATCHES</td><td>
<table>
<tr><th>LENGTH：L</th><th>WIDTH：W</th><th>PERMISSIBLE NO.</th></tr>
<tr><td>—</td><td>W ≤ 0.05</td><td>IGNORE</td></tr>
<tr><td>L ≤ 5.0</td><td>0.05 < W ≤ 0.2</td><td>4</td></tr>
<tr><td>5.0 < L</td><td>0.2 < W</td><td>NONE</td></tr>
</table>
WIDTH：W mm, LENGTH： L mm</td></tr>
<tr><td>6</td><td>FOREIGN MATTER \ BLACK SPOTS \ WHITE SPOTS \ DENT (INCLUDING LIGHT LEAKAGE DUE TO POLARIZING PLATES PINHOLES, ETC.)</td><td>
<table>
<tr><th>AVERAGE DIAMETER (mm): D</th><th>NUMBER OF PIECES PERMITTED</th></tr>
<tr><td>D ≤ 0.3</td><td>IGNORE</td></tr>
<tr><td>0.3 < D ≤ 0.5</td><td>4</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
</table>
NOTE ：DIAMETER D=(a+b)/2
 
</td></tr>
</table>

<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>7</td><td>BUBBLES OF POLARIZER /DIRT/CF FAIL /SURFACE STAINS</td><td>
<table>
<tr><th></th><th>AVERAGE DIAMETER (mm)：D</th><th>NUMBER OF PIECES PERMITTED</th></tr>
<tr><td rowspan="3">BUBBLE ON THE POLARIZER</td><td>D ≤ 0.15</td><td>IGNORE</td></tr>
<tr><td>0.15 < D ≤ 0.5</td><td>N ≤ 4</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
<tr><td rowspan="3">SURFACE STAINS</td><td>D ≤ 0.15</td><td>IGNORE</td></tr>
<tr><td>0.15 < D ≤ 0.5</td><td>N ≤ 4</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
<tr><td rowspan="3">CF FAIL / SPOT</td><td>D ≤ 0.15</td><td>IGNORE</td></tr>
<tr><td>0.15 < D ≤ 0.5</td><td>N ≤ 4</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
</table>
NOTE : (1)POLARIZER BUBBLE IS DEFINED AS THE BUBBLE APPEARS ON ACTIVE DISPLAY AREA. THE DEFECT OF POLARIZER BUBBLE SHALL BE IGNORED IF THE POLARIZER BUBBLE APPEARS ON THE OUTSIDE OF ACTIVE DISPLAY AREA.
(2)THE EXTRANEOUS SUBSTANCE IS DEFINED AS IT CAN BE OBSERVED WHEN THE MODULE IS POWER ON.
(3)THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING.
AVERAGE DIAMETER (D)=(a+b)/2
 

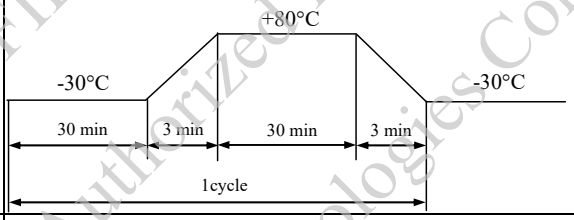
</td></tr>
<tr><td>8</td><td>LINE DEFECT ON DISPLAY</td><td>OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOWED</td></tr>
<tr><td>9</td><td>MURA ON DISPLAY</td><td>NOT VISIBLE THROUGH 5% ND FILTER OR JUDGED BY LIMIT SAMPLE IF NECESSARY.</td></tr>
<tr><td>10</td><td>UNEVEN COLOR SPREAD, COLORATION</td><td>(1)TO BE DETERMINED BASED UPON THE STANDARD SAMPLE.</td></tr>
<tr><td>11</td><td>BEZEL APPEARANCE</td><td>(1)BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION.
(2)BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.</td></tr>
<tr><td>12</td><td>PCB</td><td>(1)THERE MAY NOT BE MORE THAN 2mm OF SEALANT OUTSIDE THE SEAL AREA ON THE PCB, AND THERE SHOULD BE NO MORE THAN THREE PLACES.
(2)NO OXIDATION OR CONTAMINATION PCB TERMINALS.
(3)PARTS ON PCB MUST BE THE SAME AS ON THE PRODUCTION CHARACTERISTIC CHART.
THERE SHOULD BE NO WRONG PARTS, MISSING PARTS OR EXCESS PARTS.
(4)THE JUMPER ON THE PCB SHOULD CONFORM TO THE PRODUCT CHARACTERISTIC CHART.
(5)IF SOLDER GETS ON BEZEL TAB PADS, LED PAD, ZEBRA PAD OR SCREW HOLD PAD; MAKE SURE IT IS SMOOTHED DOWN.</td></tr>
</table>

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

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

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 50°C, 85% 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 ± 8KV CONTACT DISCHARGE ± 4KV 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.

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

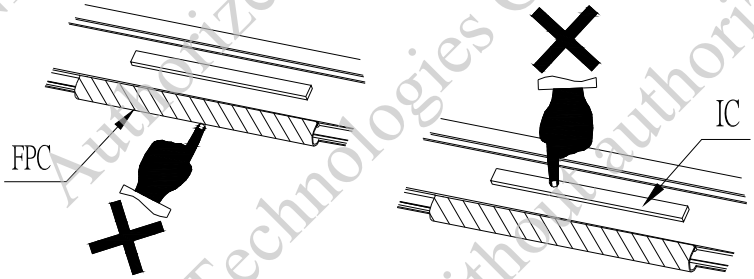
12.6.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THEMAIN SYSTEM WHILE POWER IS BEING SUPPLIED .

12.6.2 USE THE MODULE WITHIN SPECIFIED TEMPERATURE ; LOWER TEMPERATURE CAUSES THE RETARDATION OF BLINKING SPEED OF THE DISPLAY ; HIGHER TEMPERATURE MAKES OVERALL DISPLAY DISCOLOR. WHEN THE TEMPERATURE RETURNS TO NORMALITY, THE DISPLAY WILL OPERATE NORMALLY .

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

12.6.4 POWER ON SEQUENCE INPUT SIGNALS SHOULD NOT BE SUPPLIED TO LCD MODULE BEFORE POWER SUPPLY VOLTAGE IS APPLIED AND REACHES THE SPECIFIED VALUE .
IF ABOVE SEQUENCE IS NOT FOLLOWED , CMOS LSIS OF LCD MODULES MAY BE DAMAGED DUE TO LATCH - UP PROBLEM .

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



12.7 NOTICE

12.7.1 USE A GROUNDED SOLDERING IRON WHEN SOLDERING CONNECTOR I/O TERMINALS . FOR SOLDERING OR REPAIRING, TAKE PRECAUTION AGAINST THE TEMPERATURE OF THE SOLDERING IRON AND THE SOLDERING TIME TO PREVENT PEELING OFF THE THROUGH-HOLE-PAD .

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

12.7.3 DO NOT CHARGE STATIC ELECTRICITY , AS THE CIRCUIT OF THIS MODULE CONTAINS CMOS LSIS. A WORKMAN'S BODY SHOULD ALWAYS BE STATIC-PROTECTED BY USE OF AN ESD STRAP. WORKING CLOTHES FOR SUCH 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.