EXAMINED BY : Lucica Lu	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0009567
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		VERSION : 3

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

ETML121025HUDYA

(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

DOC . FIRST ISSUE

AUG.16, 2023

DATE	REVISED PAGE NO.	SUMMARY
SEP.21, 2023	9	8.1 LCD MODULE 13.NC→CEC
	11	10.1 CN1(HDMI) NO.13, SYMBOL:NC→CEC, FUNCTION:NON CONNECTION→ CONSUMER ELECTRONICS CONTROL
OCT.17, 2023	9	8.1 LCD MODULE 13. CEC→NC
	11	10.1 CN1(HDMI) PIN NO. / SYMBOL / FUNCTION: 13 / CEC / CONSUMER ELECTRONICS CONTROL ↓ PIN NO. / SYMBOL / FUNCTION: 13 / NC / NON CONNECTION

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1. GENERAL SPECIFICATIONS

1.1 APPLICATION NOTES FOR CAPACITIVE TOUCH PANEL CONTROLLER/DRIVER PLEASE REFER TO：

TOUCHNETIX AX112A

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

2.1 LCD MODULE MECHANICAL SPECIFICATIONS

(1)	DISPLAY SIZE	12.1 inch
(2)	NUMBER OF DOTS	1280(BGR)W * 800H DOTS
(3)	MODULE SIZE	283W * 185.1H *21.6D(MAX.) mm (WITHOUT FPC)
(4)	VIEWING AREA	263.52W * 165.6H mm
(5)	ACTIVE AREA	261.12W * 163.2H mm
(6)	DOT SIZE	0.068W * 0.204H mm
(7)	PIXEL SIZE	0.204W * 0.204H mm
(8)	LCD TYPE	TFT , IPS , TRANSMISSIVE , NORMALLY BLACK
(9)	COLOR	16.7M
(10)	VIEWING DIRECTION	SUPER WIDE VIEW
(11)	BACK LIGHT	LED , COLOR : WHITE
(12)	INTERFACE MODE	HDMI 1.4
(13)	WEIGHT	TBD

2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

(1) TOUCH PANEL SIZE	----------	12.1 inch
(2) OUTER DIMENSION	----------	281W * 183.1H * 2.0D mm (WITHOUT FPC)
(3) ACTIVE AREA	----------	263.12W * 165.2H mm
(4) INPUT TYPE	----------	MULTI TOUCH
(5) NUMBER OF TOUCH SENSOR	----------	48*30 SENSORS
(6) RESOLUTION	----------	65536*65536
(7) INTERFACE MODE	----------	USB 2.0

3. ABSOLUTE MAXIMUM RATINGS

3.1 LCD MODULE ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	15.0	V	
STATIC ELECTRICITY	—	—	—	V	NOTE (1)

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

NOTE (2)：THE ABSOLUTE MAXIMUM RATING VALUES OF THIS PRODUCT ARE NOT ALLOWED TO BE EXCEEDED AT ANY TIMES. SHOULD A MODULE BE USED WITH ANY OF THE ABSOLUTE MAXIMUM RATINGS EXCEEDED, THE CHARACTERISTICS OF THE MODULE MAY NOT BE RECOVERED, OR IN AN EXTREME CASE, THE MODULE MAY BE PERMANENTLY DESTROYED.

3.2 CAPACITIVE TOUCH PANEL ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD1-VSS1	1.25	6	V	

3.3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-30°C	85°C	-40°C	85°C	NOTE (1) , (2) , (3) , (4)
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 ≤ 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.)

NOTE (4)：WHEN THE LCD MODULE IS OPERATED AT A HIGHER AMBIENT TEMPERATURE THAN 60°C, THE PWM DUTY CYCLE OF THE LED BACKLIGHT SHOULD BE ADJUSTED TO BE LESS THAN (TBD)%. IF THE MODULE IS OPERATED AT A HIGHER DUTY CYCLE THAN (TBD)%, THEN THERE IS A POSSIBILITY OF DISTORTION AND IRREGULARITY OF THE PICTURE DUE TO LIQUID CRYSTAL BEHAVIOR.

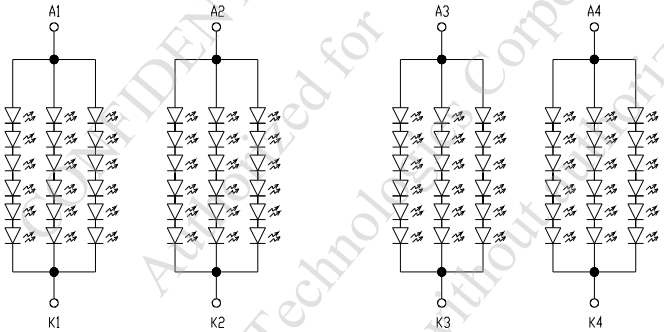
4. ELECTRICAL CHARACTERISTICS

4.1 LCD MODULE ELECTRICAL CHARACTERISTICS

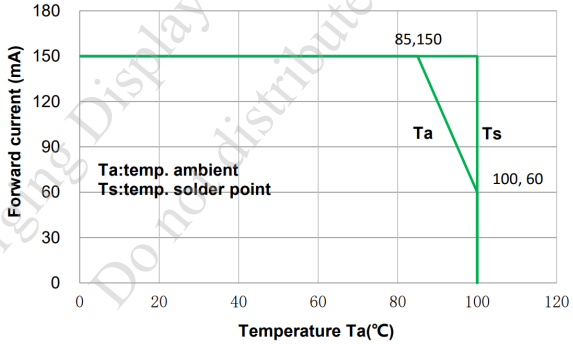
Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	11.5	12.0	12.5	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS = 12.0V	—	(TBD)	(TBD)	mA	NOTE (1)
LOGIC HIGH INPUT VOLTAGE FOR BL_EN, BL_PWM	VIH	—	1.6	—	—	V	
LOGIC LOW INPUT VOLTAGE FOR BL_EN, BL_PWM	VIL	—	—	—	0.8	V	
LED LIFE TIME	—	IF=68mA (PER LED)	50000	—	—	HRS	NOTE (4) NOTE (5)

NOTE (1) : THE DISPLAY PATTERN IS ALL “WHITE”.
NOTE (2) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT.



NOTE (3) : AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT. (PER LED)



NOTE (4)：CONDITIONS; Ta=25 °C, CONTINUOUS LIGHTING
NOTE (5)：DEFINITIONS OF LIFE TIME：
LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

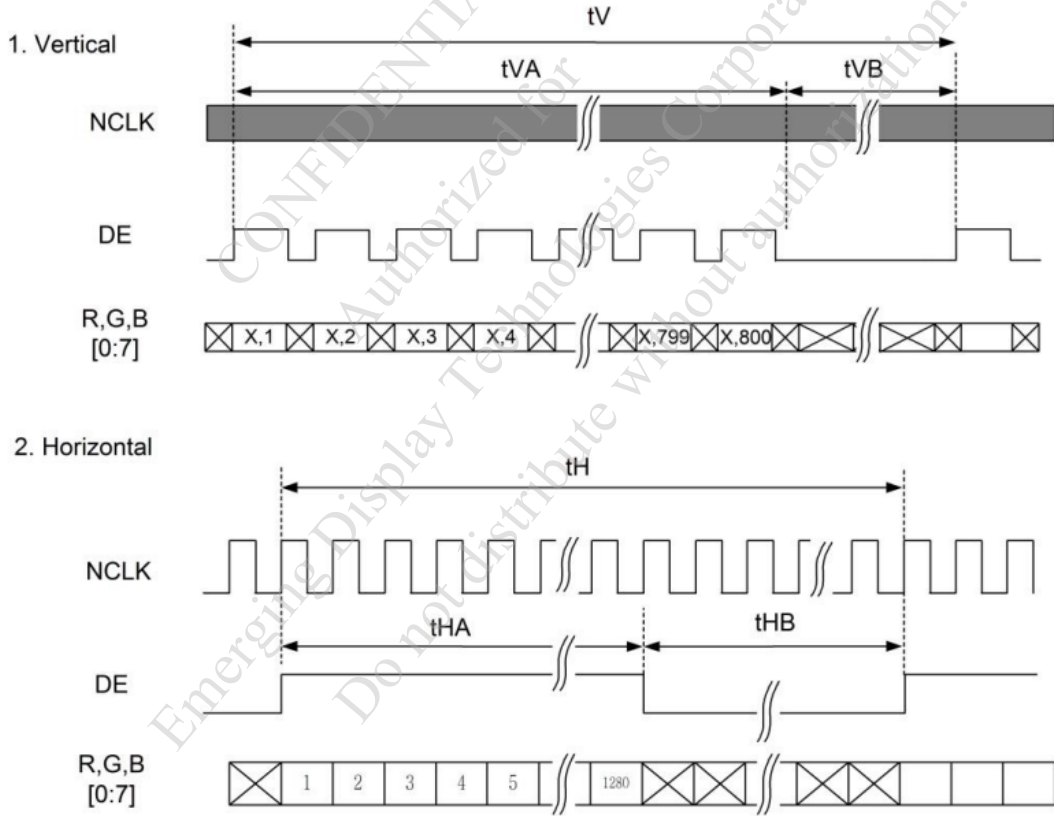
Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY FOR DRIVER	VDD1-VSS1	—	4.75	5.00	5.25	V
POWER SUPPLY CURRENT	IDD1	VDD1-VSS1 =5.00V	—	TBD	TBD	mA

5. TIMING CHARACTERISTICS

5.1 LVDS SIGNAL TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
FRAME RATE	—		60		Hz
HORIZONTAL DISPLAY TIME	tHA		1280		clock
HORIZONTAL BLANKING TIME	tHB	70	80	90	clock
HORIZONTAL TOTAL TIME	tH	1350	1360	1370	clock
VERTICAL DISPLAY TIME	tVA		800		line
VERTICAL BLANKING TIME	tVB	15	30	45	line
VERTICAL TOTAL TIME	tV	815	830	845	line
CLOCK RATE	$1/T_{CLOCK}$	66.015	67.728	69.459	MHz



NOTE (1) : ALL TIMING PARAMETERS SHOULD BE CONSTANT IN EACH FRAME.

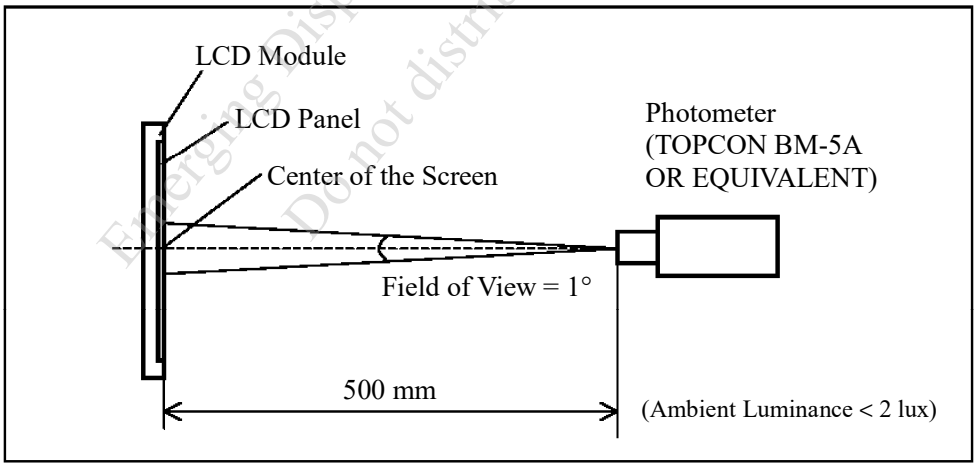
6. OPTICAL CHARACTERISTICS

6.1 OPTICAL CHARACTERISTICS

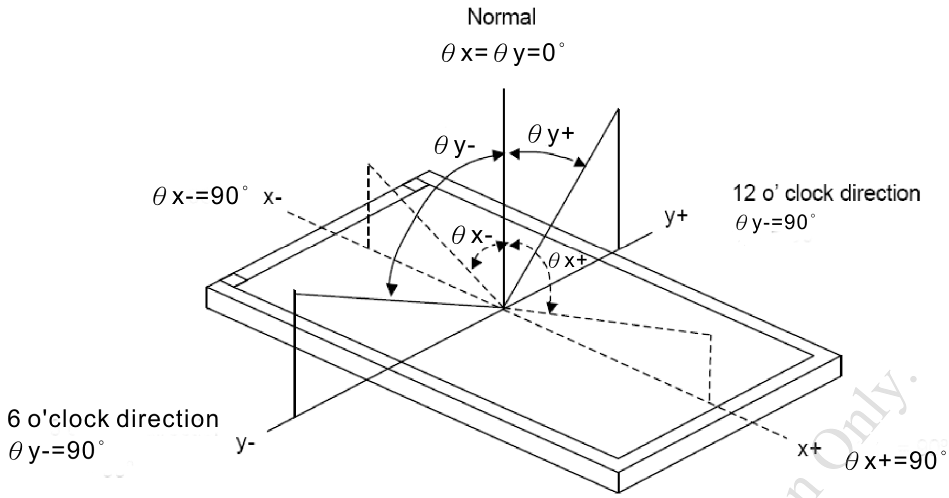
Ta = 25 ± 2 °C

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		θ_{y+}	CR ≥ 10	θ_x=0°	80	88	—	deg.	NOTE (2) NOTE (3)
		θ_{y-}			80	88	—		
		θ_{x+}		θ_y=0°	80	88	—		
		θ_{x-}			80	88	—		
CONTRAST RATIO (CENTER)		CR	θx=0° , θy=0°		(800)	(1000)	—	—	NOTE (3)
RESPONSE TIME		TR+TF			—	—	30	msec	NOTE (4)
COLOR CHROMATICITY (CENTER)	WHITE	Wx	θx=0°, θy=0° VDD-VSS=12.0V LED B/L=ON PWM=100%		(0.26)	(0.31)	(0.36)	—	NOTE (5)
		Wy			(0.30)	(0.35)	(0.40)		
	RED	Rx			(0.60)	(0.65)	(0.70)	—	
		Ry			(0.30)	(0.35)	(0.40)		
	GREEN	Gx			(0.28)	(0.33)	(0.38)	—	
		Gy			(0.57)	(0.62)	(0.67)		
	BLUE	Bx			(0.09)	(0.14)	(0.19)	—	
		By			(0.06)	(0.11)	(0.16)		
THE BRIGHTNESS OF MODULE (CENTER)		B			(1250)	(1350)	—	cd/m^2	NOTE (6)
THE UNIFORMITY OF MODULE		—			70	—	—	%	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.



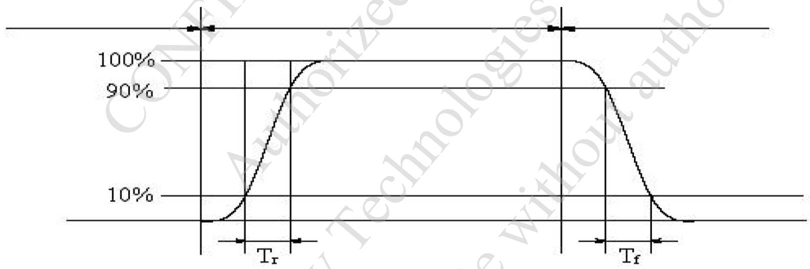
NOTE (2): DEFINITION OF VIEWING ANGLE :



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

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

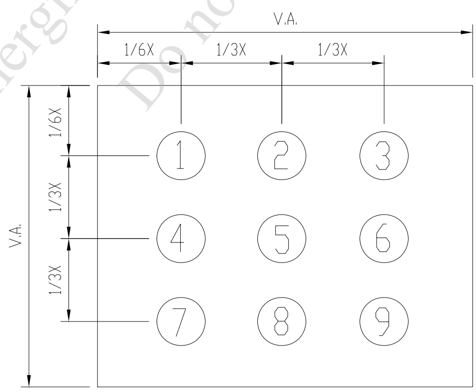
NOTE (4): DEFINITION OF RESPONSE TIME : T_r AND T_f
THE FIGURE BELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



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

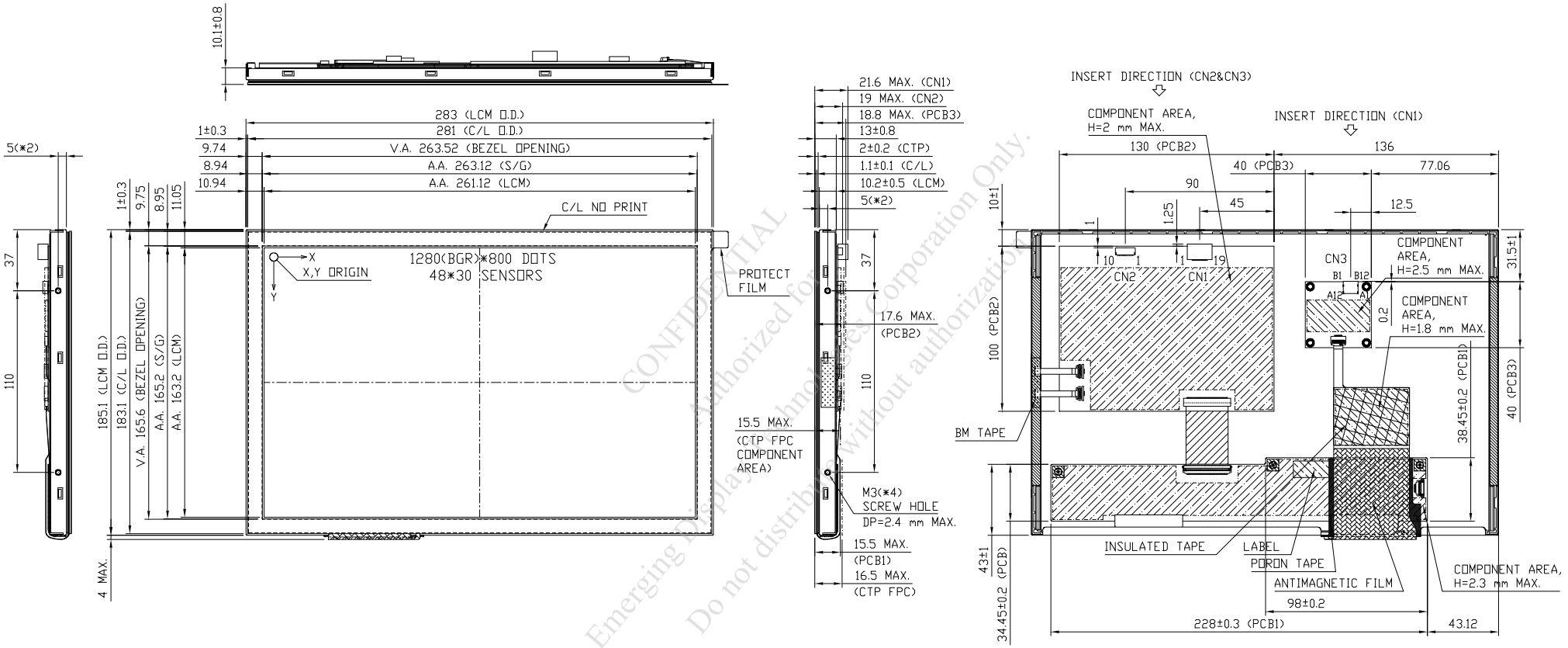


UNIT：mm

(b)THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

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

7. OUTLINE DIMENSIONS



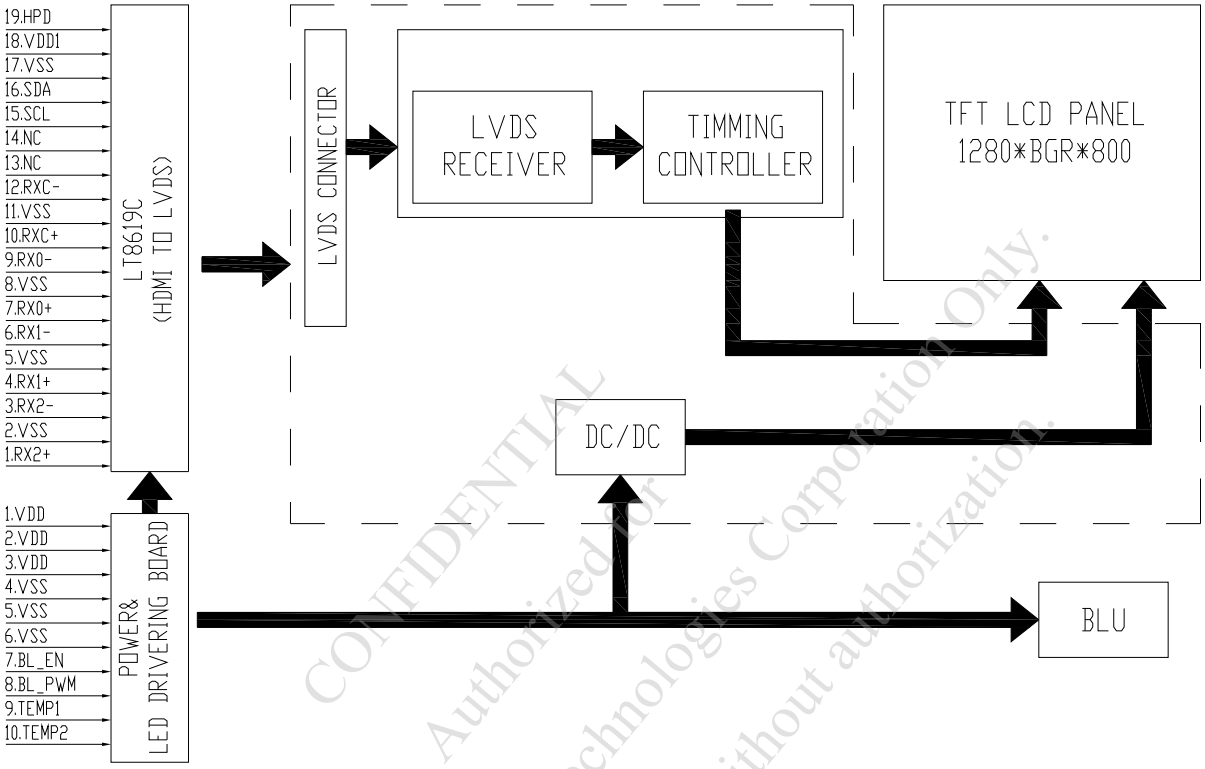
UNIT : mm
SCALE : NTS

THIRD ANGLE PROJECTION

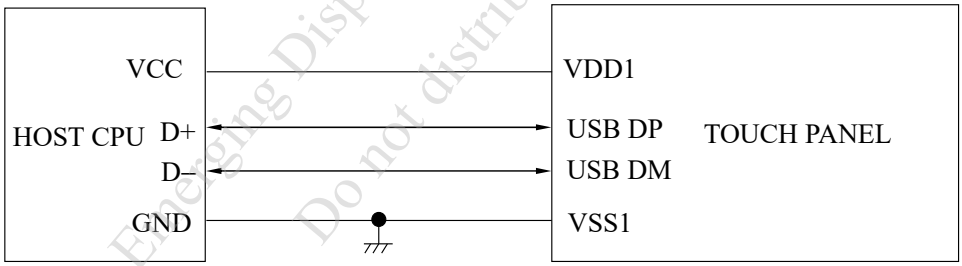
NOT SPECIFIED TOLERANCE IS ±0.5
NOTE :
1.C/L GLASS : SODA LIME, NON-STRENGTHEN, NO CHAMFERED EDGES.
2.CN1(HDMI) : TOKUTSU HHF-14A000-2SE OR EQUIVALENT.
3.CN2(B/L) : JST SM10B-SRSS-TB OR EQUIVALENT.
4.CN3(TYPE C) : SINGATRON 2UB1768-C00111F OR EQUIVALENT.

8. BLOCK DIAGRAM

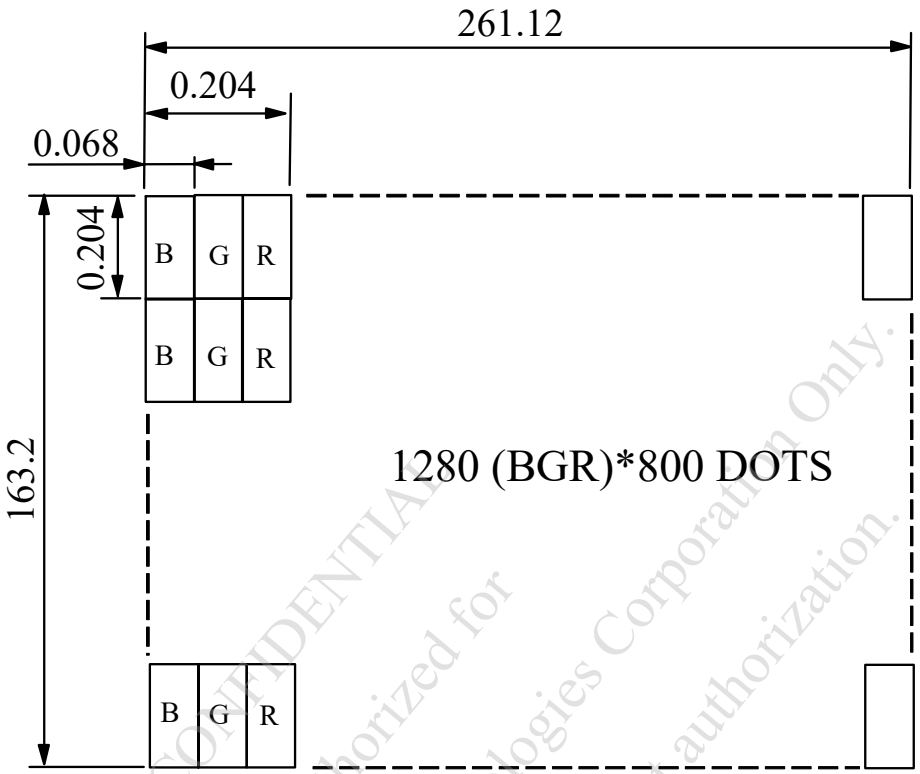
8.1 LCD MODULE



8.2 CTP MODULE



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

10.1 CN1(HDMI)

PIN NO.	SYMBOL	FUNCTION
1	RX2+	TMDS CHANNEL 2 DATA+
2	VSS	GROUND
3	RX2-	TMDS CHANNEL 2 DATA-
4	RX1+	TMDS CHANNEL 1 DATA+
5	VSS	GROUND
6	RX1-	TMDS CHANNEL 1 DATA-
7	RX0+	TMDS CHANNEL 0 DATA+
8	VSS	GROUND
9	RX0-	TMDS CHANNEL 0 DATA-
10	RXC+	TMDS CLOCK+
11	VSS	GROUND
12	RXC-	TMDS CLOCK-
13	NC	NON CONNECTION
14	NC	NON CONNECTION
15	SCL	DDC CLOCK
16	SDA	DDC DATA
17	VSS	GROUND
18	VDD1	POWER SUPPLY VOLTAGE FOR HDMI
19	HPD	HOT PLUG DETECT

10.2 CN2 (POWER&LED BACKLIGHT)

PIN NO.	SYMBOL	FUNCTION
1	VDD	POWER SUPPLY VOLTAGE
2	VDD	POWER SUPPLY VOLTAGE
3	VDD	POWER SUPPLY VOLTAGE
4	VSS	GROUND
5	VSS	GROUND
6	VSS	GROUND
7	BL_EN	BACKLIGHT LED ON/OFF CONTROL
8	BL_PWM	BACKLIGHT LED BRIGHTNESS CONTROL
9	TEMP1	TEMPERATURE SENSOR PIN1
10	TEMP2	TEMPERATURE SENSOR PIN2

NOTE (1)：TEMP1, TEMP2

THERMISTOR CHARACTERISTICS(EDT MATERIAL : TH20-3H103FT)

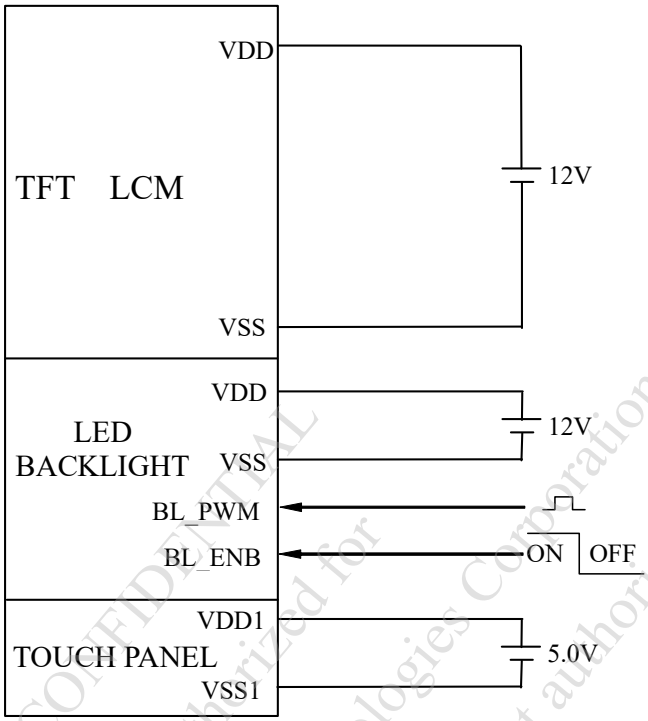
ITEM	SPECIFICATION	CONDITION
RESISTANCE	10K OHM ±1%	ZERO-POWER RESISTANCE AT 25°C
B-CONSTANT	3370K ±1%	B-VALUE BETWEEN 25 TO 50°C
MAXIMUM POWER DISSIPATION	500mW	AT 25°C
HEAT DISSIPATION	5.0mW/°C	
OPERATING TEMPERATURE RANGE	-40°C~125°C	
RoHS	COMPLIANT	

10.3 CN3(USB 2.0)

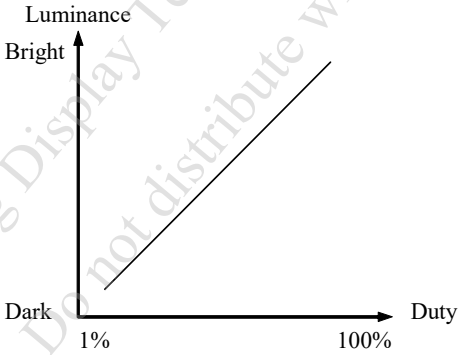
PIN NO.	SYMBOL	FUNCTION
A1	VSS1	GROUND
A2	NC	NON CONNECTION
A3	NC	NON CONNECTION
A4	VDD1	POWER SUPPLY VOLTAGE FOR TFT
A5	NC	NON CONNECTION
A6	USB DP	USB D+
A7	USB DM	USB D-
A8	NC	NON CONNECTION
A9	VDD1	POWER SUPPLY VOLTAGE FOR TFT
A10	NC	NON CONNECTION
A11	NC	NON CONNECTION
A12	VSS1	GROUND
B1	VSS1	GROUND
B2	NC	NON CONNECTION
B3	NC	NON CONNECTION
B4	VDD1	POWER SUPPLY VOLTAGE FOR TFT
B5	NC	NON CONNECTION
B6	USB DP	USB D+
B7	USB DM	USB D-
B8	NC	NON CONNECTION
B9	VDD1	POWER SUPPLY VOLTAGE FOR TFT
B10	NC	NON CONNECTION
B11	NC	NON CONNECTION
B12	VSS1	GROUND

11. POWER SUPPLY

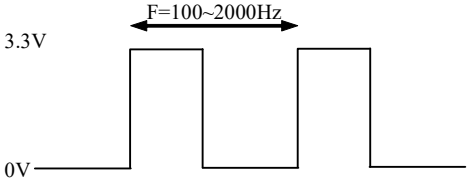
11.1 POWER SUPPLY FOR LCM



NOTE (1)：ADJUST THE PWM SIGNAL IN ORDER TO CONTROL LED BACKLIGHT'S BRIGHTNESS. THE HIGHER THE DUTY CYCLE, THE HIGHER THE BRIGHTNESS



NOTE (2)：PWM SIGNAL OPERATION FREQUENCY IS 100~2000Hz AND DIMMING DUTY.



PWM Dimming Frequency[Hz]	Dimming Duty	
	Min[%]	Max[%]
$100 < F_{DIM} < 200$	0.1	100
$200 < F_{DIM} < 500$	0.4	100
$500 < F_{DIM} < 1K$	0.8	100
$1K < F_{DIM} < 2K$	1.5	100

12. CAPACITIVE TOUCH PANEL SPECIFICATION

12.1 OPTICAL CHARACTERISTICS

ITEM	CONDITION	MIN.	TYP.	MAX.	UNIT
TRANSPARENCY NOTE (1)	Ta = 25°C λ=550 nm	(85)	—	—	%

NOTE (1) : OPTICAL MEASUREMENT SHOULD BE EXECUTED AFTER PANEL IS SECURED. MEASUREMENT PROCESS SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM.
OPTICAL SPECIFICATIONS SHOULD BE MEASURED BY SPECTROPHOTOMETER.

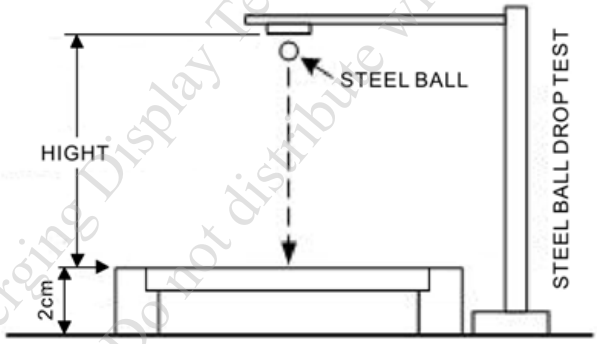
12.2 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	(7)H (MIN.)

12.3 DURABILITY

USING STEEL BALL AND FALLING ON TOUCH PANEL SURFACE, FROM THE HEIGHT MUST PASS BELOW CONDITIONS：

ITEM	CONDITION	INSPECTION METHOD	DESCRIPTION
STEEL BALL DROP TEST	WEIGHT：67g HEIGHT OF FALL：30 cm	VISUAL INSPECTION	SIGN OF FRACTURE OR DAMAGE IS NOT ACCEPTABLE 3 TIME/ 1 POINTS, 25°C (CENTER POINT)



13. INSPECTION CRITERIA

13.1 APPLICATION

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

13.2 INSPECTION CONDITIONS

13.2.1 (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°

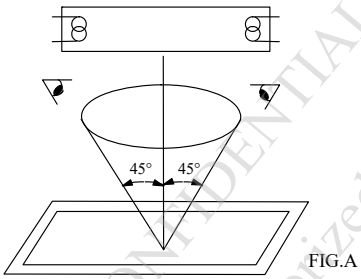


FIG.A

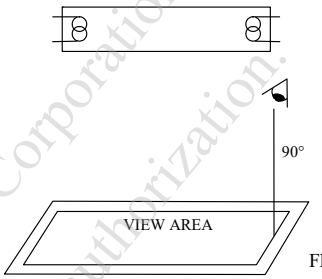


FIG.B

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.

13.2.2 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

13.2.3 INSPECTION LOT

QUANTITY PER DELIVERY LOT FOR EACH MODEL

13.2.4 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

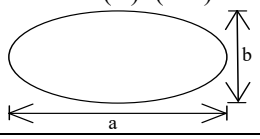
MINOR DEFECT：AQL 1.0

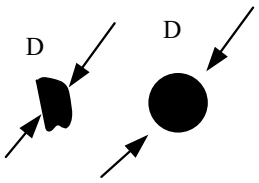
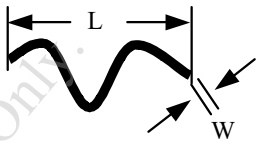
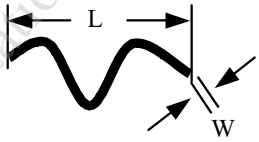
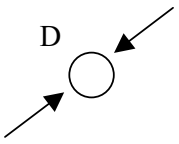
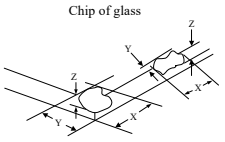
13.3 INSPECTION STANDARDS

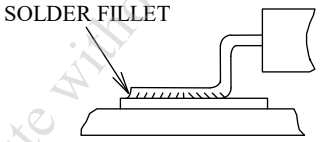
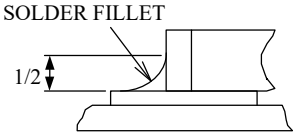
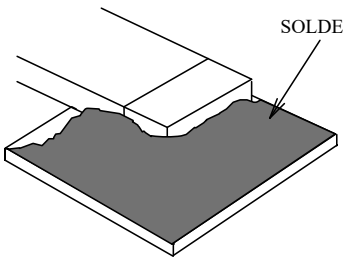
13.3.1 VISUAL DEFECTS CLASSIFICATION

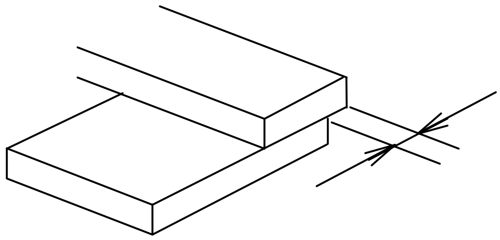
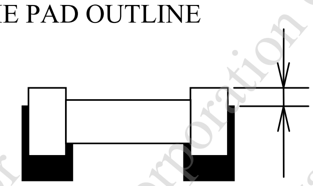
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	• DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC	0.65
	2.CTP FUNCTION	• NO FUNCTION • BROKEN LINE • FALSE TOUCH	
	3.BACKLIGHT	• NO LIGHT • FLICKERING AND OTHER ABNORMAL ILLUMINATION	
	4.DIMENSIONS	• SUBJECT TO INDIVIDUAL ACCEPTANCE SPECIFICATIONS	
MINOR DEFECT	1.DISPLAY ZONE	• BLACK/WHITE SPOT • BUBBLES ON POLARIZER • NEWTON RING • BLACK/WHITE LINE • SCRATCH • CONTAMINATION • LEVER COLOR 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	

13.3.2 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>ITEMS</th><th>ACCEPTABLE COUNT</th></tr>
<tr><td>BRIGHT DOT</td><td>N ≤ 1</td></tr>
<tr><td>DARK DOT</td><td>N ≤ 4</td></tr>
<tr><td>TOTAL BRIGHT AND DARK DOTS</td><td>N ≤ 4</td></tr>
</table>
NOTE：
(1)THE DEFINITION OF DOT：
THE SIZE OF A DEFECTIVE DOT OVER 1/2 OF WHOLE DOT IS REGARDED AS ONE DEFECTIVE DOT.
(2)BRIGHT DOT：
DOTS APPEAR BRIGHT AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER BLACK PATTERN.
THE BRIGHT DOT DEFECT MUST BE VISIBLE THROUGH 5% ND FILTER.
(3)DARK DOT：
DOTS APPEAR DARK AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER PURE RED, GREEN, BLUE PICTURE.</td></tr>
<tr><td>4</td><td>BUBBLES ON POLARIZER /SURFACE STAINS /DIRT/CF FAIL/SPOT</td><td>
<table>
<tr><th></th><th>AVERAGE DIAMETER (mm)：D</th><th>NUMBER OF PIECES PERMITTED</th></tr>
<tr><td rowspan="3">BUBBLE ON THE POLARIZER</td><td>D ≤ 0.25</td><td>IGNORE</td></tr>
<tr><td>0.25 < D ≤ 0.5</td><td>5</td></tr>
<tr><td>D > 0.5</td><td>0</td></tr>
<tr><td rowspan="3">POLARIZER SCRATCH</td><td>W < 0.05</td><td>IGNORE</td></tr>
<tr><td>0.05 < W ≤ 0.2,
1.0 < L ≤ 5</td><td>4</td></tr>
<tr><td>W > 0.2 ,L >5</td><td>0</td></tr>
<tr><td rowspan="3">CF FAIL / SPOT</td><td>D < 0.25</td><td>IGNORE</td></tr>
<tr><td>0.25 < D ≤ 0.5</td><td>4</td></tr>
<tr><td>D > 0.5</td><td>0</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>
</table>

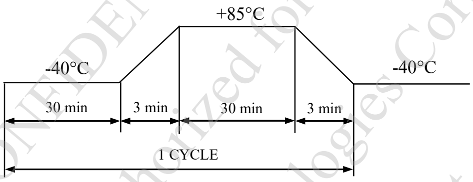
<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>5</td><td>BLACK/WHITE SPOT/DENT CIRCULAR TYPE</td><td>THE FOLLOWING BLACK/WHITE SPOT ARE WITHIN THE VIEWING AREA. AVERAGE DIAMETER：D (mm)
<table><tr><th>SIZE D</th><th>PERMISSIBLE NO.</th></tr><tr><td>D≤0.2</td><td>IGNORE</td></tr><tr><td>0.2<D≤0.3</td><td>5</td></tr><tr><td>0.3<D≤0.5</td><td>5</td></tr><tr><td>D>0.5</td><td>0</td></tr></table>NOTE (1)：THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</td><td> 
</td></tr>
<tr><td>6</td><td>SCRATCH</td><td>THE FOLLOWING SCRATCH IS WITHIN THE VIEWING AREA. WIDTH：W (mm) , LENGTH : L (mm)
<table><tr><th>SIZE W & L</th><th>PERMISSIBLE NO.</th></tr><tr><td>W≤0.07</td><td>IGNORE</td></tr><tr><td>0.07≤W≤0.1, L≤8</td><td>4</td></tr><tr><td>0.07≤W≤0.1, 8<L≤10</td><td>3</td></tr><tr><td>W>0.1</td><td>0</td></tr></table>NOTE (1)：THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</td><td> 
</td></tr>
<tr><td>7</td><td>BLACK / WHITE LINE LINEAR TYPE / FOREIGN FIBER</td><td>THE FOLLOWING BLACK LINE, WHITE LINE IS WITHIN THE VIEWING AREA. WIDTH：W (mm) , LENGTH : L (mm)
<table><tr><th>SIZE W & L</th><th>PERMISSIBLE NO.</th></tr><tr><td>W≤0.07</td><td>IGNORE</td></tr><tr><td>0.07≤W≤0.1, L≤8</td><td>4</td></tr><tr><td>0.07≤W≤0.1, 8<L≤10</td><td>3</td></tr><tr><td>W>0.1</td><td>0</td></tr></table>NOTE (1)：THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</td><td> 
</td></tr>
<tr><td>8</td><td>BUBBLE / DENT FOR OPTICAL BONDING</td><td>BUBBLES WITHIN VIEWING AREA.
AVERAGE DIAMETER：D (mm)
<table><tr><th>SIZE D</th><th>PERMISSIBLE NO.</th></tr><tr><td>D≤0.2</td><td>IGNORE</td></tr><tr><td>0.2<D≤0.3</td><td>3</td></tr><tr><td>0.3<D≤0.5</td><td>2</td></tr><tr><td>D>0.5</td><td>0</td></tr></table>NOTE (1)：THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</td><td> 
</td></tr>
<tr><td>9</td><td>CHIPPING</td><td><table><tr><td>CORNER</td><td>X ≤ 3mm、Y ≤ 3mm、Z < t
(t : THICKNESS)</td></tr><tr><td>EDGE</td><td>X ≤ 6mm , Y ≤ 1mm , Z < t
(t : THICKNESS)</td></tr></table></td><td> 
</td></tr>
<tr><td>10</td><td>CRACKED GLASS</td><td>NOT ACCEPTABLE</td><td></td></tr>
</table>

NO.	ITEM	CRITERIA
11	LINE DEFECT ON DISPLAY	OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOWED
12	MURA ON DISPLAY	IT'S OK IF MURA IS SLIGHT VISIBLE THROUGH 5% ND FILTER
13	UNEVEN COLOR SPREAD, COLORATION	TO BE DETERMINED BASED UPON THE LIMITED SAMPLE.
14	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.
15	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.
16	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 

NO.	ITEM	CRITERIA
16	SOLDERING	(3)PARTS ALIGNMENT (a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE  (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.
17	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.
18	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 BE 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.

14. RELIABILITY TEST

14.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE

NO.	ITEM	DESCRIPTION
1	HIGH TEMPERATURE TEST (OPERATION)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +85°C FOR 240 HRS
2	LOW TEMPERATURE TEST (OPERATION)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 240 HRS
3	HIGH TEMPERATURE TEST (STORAGE)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +85°C FOR 240 HRS
4	LOW TEMPERATURE TEST (STORAGE)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -40°C FOR 240 HRS
5	HIGH TEMPERATURE /HUMIDITY TEST 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.

NOTE (2) : WHEN THE LCD MODULE IS OPERATED AT A HIGHER AMBIENT TEMPERATURE THAN 60°C, THE PWM DUTY CYCLE OF THE LED BACKLIGHT SHOULD BE ADJUSTED TO BE LESS THAN (TBD)%. IF THE MODULE IS OPERATED AT A HIGHER DUTY CYCLE THAN (TBD)%,THEN THERE IS A POSSIBILITY OF DISTORTION AND IRREGULARITY OF THE PICTURE DUE TO LIQUID CRYSTAL BEHAVIOR.

NOTE (3) : TESTING CONDITIONS AND INSPECTION CRITERIA

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

15. CAUTION

15.1 OPERATION

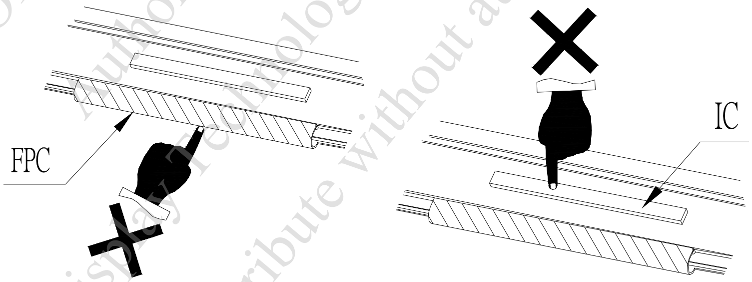
15.1.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .

15.1.2 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.

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

15.1.4 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.

15.1.5 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!



15.2 HANDLING

15.2.1 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.

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

15.2.3 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.

15.2.4 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.

15.2.5 DON’T GIVE EXTERNAL SHOCK.

15.2.6 DON’T APPLY EXCESSIVE FORCE ON THE SURFACE.

15.2.7 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.

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

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

15.2.10 STORE WITHOUT ANY PHYSICAL LOAD.

15.2.11 REWIRING: NO MORE THAN 3 TIMES.