EXAMINED BY : Sam Chou	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0009769
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APPROVED BY: Elvis Wu		TOTAL PAGE : 28
		VERSION : 2

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

ETML101013DDRA

(RoHS)

FOR MESSRS :

_____

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CUSTOMER'S APPROVAL

DATE :

_____

BY :

_____

RECORDS OF REVISION

DOC . FIRST ISSUE

DEC.12, 2024

DATE	REVISED PAGE NO.	SUMMARY
FEB.04, 2025	4	4.1 TFT MODULE LED LIFE TIME: MIN.= 50000→30000

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1. GENERAL SPECIFICATIONS

1.1 DATA SHEET FOR TFT CONTROLLER/DRIVER
PLEASE REFER TO：

FITIPOWER EK79202B

1.2 DATA SHEET FOR CAPACITIVE TOUCH PANEL CONTROLLER/DRIVER
PLEASE REFER TO：

ILITEK ILI2132

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	10.1 inch
(2)	NUMBER OF DOTS	1280(RGB)W * 800H DOTS
(3)	MODULE SIZE	232.4W * 157.3H * 14D(MAX.) mm (NOT INCLUDED FPC)
(4)	VIEWING AREA	218.96W * 137.6H mm
(5)	ACTIVE AREA	216.96W * 135.6H mm
(6)	DOT SIZE	0.0565W * 0.1695H mm
(7)	PIXEL SIZE	0.1695W * 0.1695H mm
(8)	LCD TYPE	TFT , IPS , TRANSMISSIVE , NORMALLY BLACK
(9)	COLOR	16.7M
(10)	VIEWING DIRECTION	SUPER WIDE VIEW
(11)	BACKLIGHT	LED , COLOR : WHITE
(12)	INTERFACE MODE	LVDS (8BIT)
(13)	WEIGHT	435g

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2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

(1) TOUCH PANEL SIZE	----------	10.1 inch
(2) OUTER DIMENSION	----------	232.4W * 157.3H * 1.8D mm (NOT INCLUDED FPC)
(3) VIEWING ARER	----------	218.96W * 137.6H mm
(4) ACTIVE AREA	----------	217.96W * 136.6H mm
(5) INPUT TYPE	----------	MULTI-TOUCH
(6) NUMBER OF TOUCH SENSOR	----------	35*22 SENSORS
(7) RESOLUTION	----------	16384 * 9600
(8) INTERFACE MODE	----------	USB

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3. ABSOLUTE MAXIMUM RATINGS

3.1 TFT MODULE ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.5	4	V	
STATIC ELECTRICITY	—	—	—	V	NOTE (1)
POWER SUPPLY VOLTAGE FOR LED DRIVER	VBL+-VBL-	-0.3	27	V	

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	-0.3	5.5	V	

3.3 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), (4)
HUMIDITY	NOTE (3)		NOTE (3)		WITHOUT CONDENSATION
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) : WET BULB TEMPERATURE SHOULD BE LOWER THAN 57.8°C, AND NO CONDENSATION OF WATER.
BESIDES, PROTECT THE MODULE FROM STATIC ELECTRICITY.

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.

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4. ELECTRICAL CHARACTERISTICS

4.1 TFT MODULE

Ta=25±2°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.3	3.45	V	
LOGIC HIGH INPUT VOLTAGE	VIH	—	0.8VDD	—	VDD	V	
LOGIC LOW INPUT VOLTAGE	VIL	—	VSS	—	0.2VDD	V	
LOGIC HIGH OUTPUT VOLTAGE	VOH	—	0.8VDD	—	VDD	V	
LOGIC LOW OUTPUT VOLTAGE	VOL	—	VSS	—	0.2VDD	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS =3.3V	—	340	440	mA	NOTE (1)
POWER SUPPLY VOLTAGE FOR LED DRIVER	VBL+- VBL-	—	11.5	12.0	12.5	V	
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	
POWER SUPPLY CURRENT FOR LED DRIVER	IBL	VBL+-VBL- =12.0V LED B/L=ON PWM=100%	—	645	840	mA	
LED LIFE TIME	—	IF=75 mA (PER LED)	30000	—	—	HRS	NOTE (2) NOTE (3)

NOTE (1) : THE DISPLAY PATTERN IS ALL “WHITE”.
NOTE (2) : CONDITIONS; Ta=25 °C, CONTINUOUS LIGHTING
NOTE (3) : DEFINITIONS OF LIFE TIME :
LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

4.2 CTP MODULE

Ta=25±2°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE	VDD1-VSS1	—	4.75	5	5.25	V
POWER SUPPLY CURRENT	IDD1	VDD1-VSS1 =5.0V	—	85	110	mA

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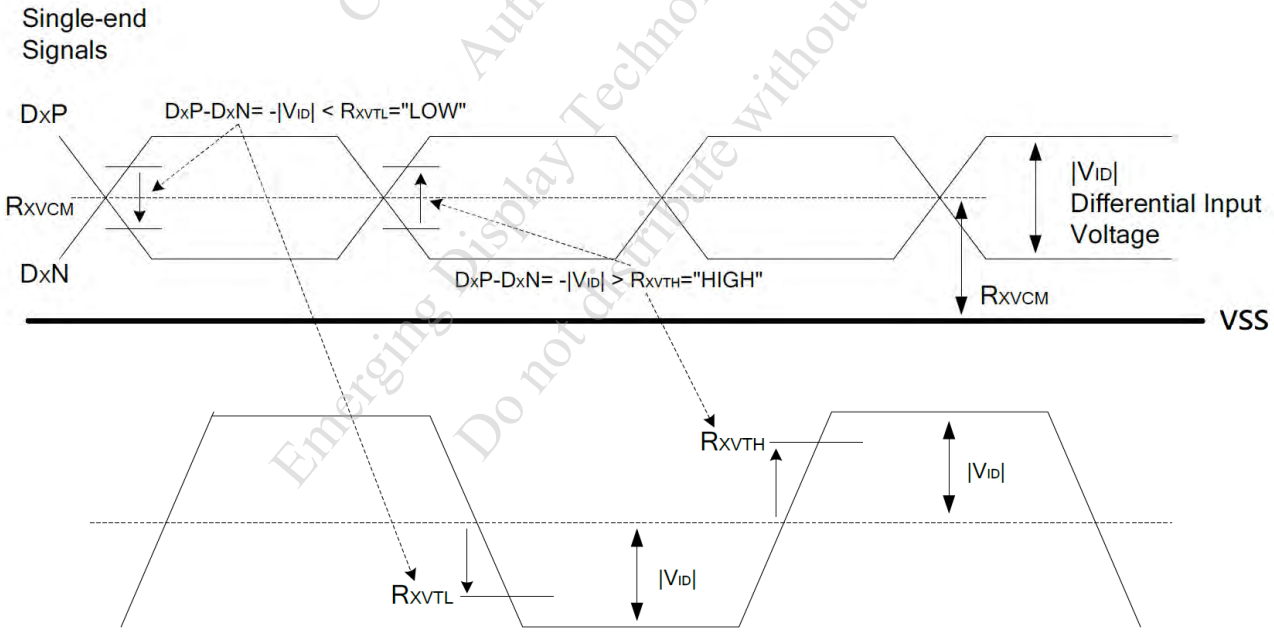
5. TIMING CHARACTERISTICS

5.1 LVDS DC ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	VALUES			UNIT	REMARK
		MIN.	TYP.	MAX.		
DIFFERENTIAL INPUT HIGH THRESHOLD VOLTAGE	R_{XVTH}	—	—	+0.1	V	R_{XVCM}=1.2V
DIFFERENTIAL INPUT LOW THRESHOLD VOLTAGE	R_{XVTL}	-0.1	—	—	V	
INPUT VOLTAGE RANGE (SINGLED-END)	R_{XVIN}	0.7	—	1.7	V	
DIFFERENTIAL INPUT COMMON MODE VOLTAGE	R_{XVCM}	1	1.2	1.4	V	$\|V_{ID}\|$=0.2
DIFFERENTIAL INPUT IMPEDANCE	Z_{ID}	80	100	125	ohm	
DIFFERENTIAL INPUT VOLTAGE	|VID|	0.2	—	0.6	V	
DIFFERENTIAL INPUT LEAKAGE CURRENT	I_{LCLVDS}	-10	—	+10	µA	
LVDS DIGITAL OPERATING CURRENT	I_{VDD}	—	15	20	mA	F_{DCLK}=80MHz, VDD=3.3V INPUT PATTERN: 55h->Aah->55h->Aah
LVDS DIGITAL STAND-BY CURRENT	I_{ST}	—	—	250	µA	CLOCK & ALL FUNCTIONS ARE STOPPED



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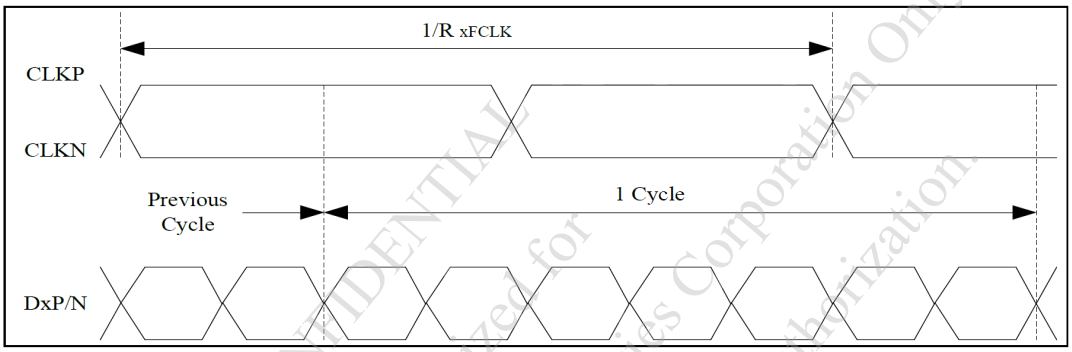
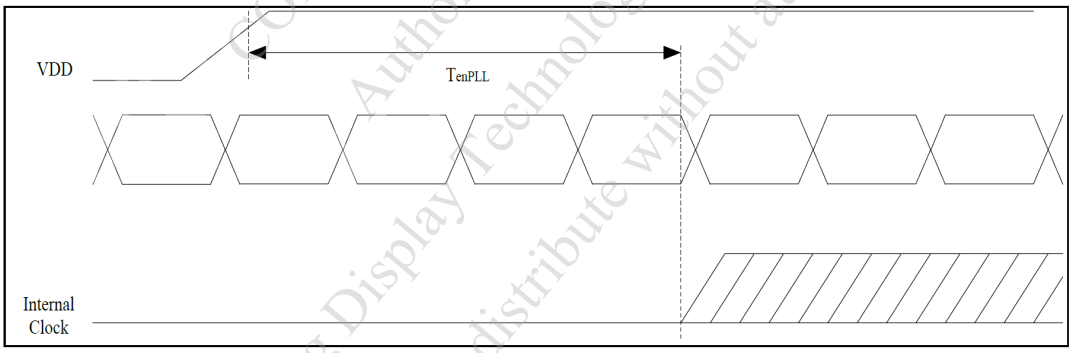
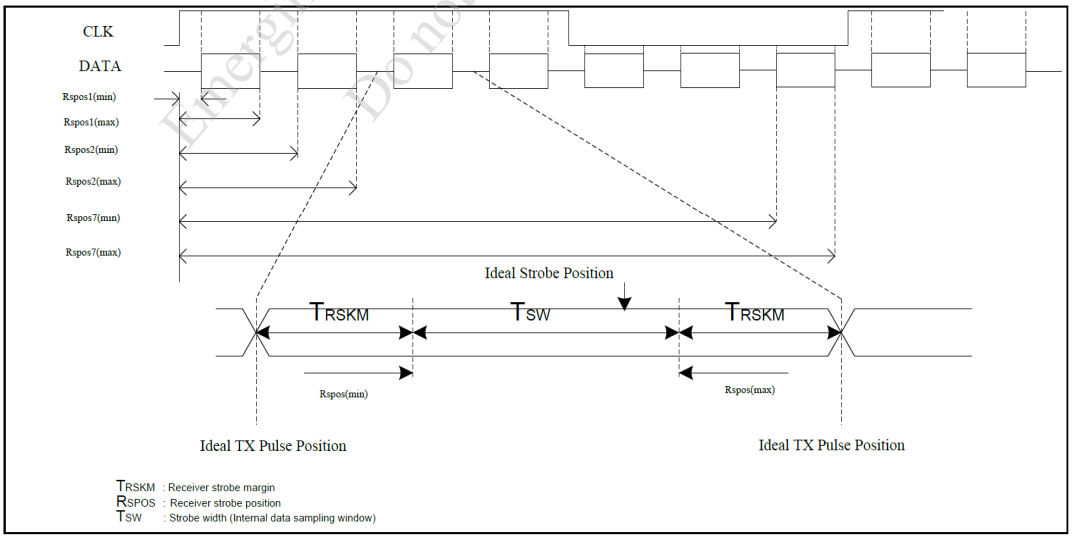
5.2 LVDS MODE AC ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	VALUES			UNIT	REMARK
		MIN.	TYP.	MAX.		
CLOCK FREQUENCY	R_{xFCLK}	30	—	TBD	MHz	REFER TO INPUT TIMING TABLE FOR EACH DISPLAY RESOLUTION
INPUT DATA SKEW MARGIN	T_{RSKM}	500	—	—	ps	
CLOCK HIGH TIME	T_{LVCH}	—	4/(7* R_{xFCLK})	—	ns	|VID| = 200mV R_{xVCM} = 1.2V R_{xFCLK} = 81MHz
CLOCK LOW TIME	T_{LVCL}	—	3/(7* R_{xFCLK})	—	ns	
PLL WAKE-UP TIME	T_{enPLL}	—		150	us	







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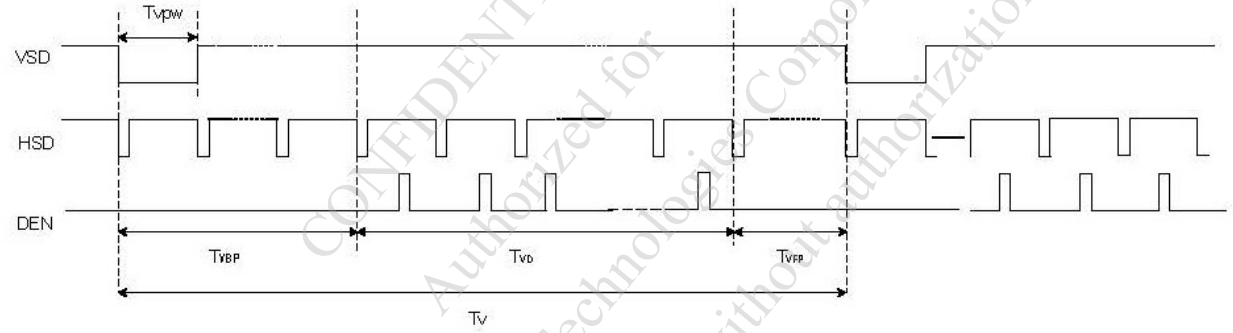
5.3 LVDS INTERFACE

LVDS INPUT TIMING TABLE (DE MODE)

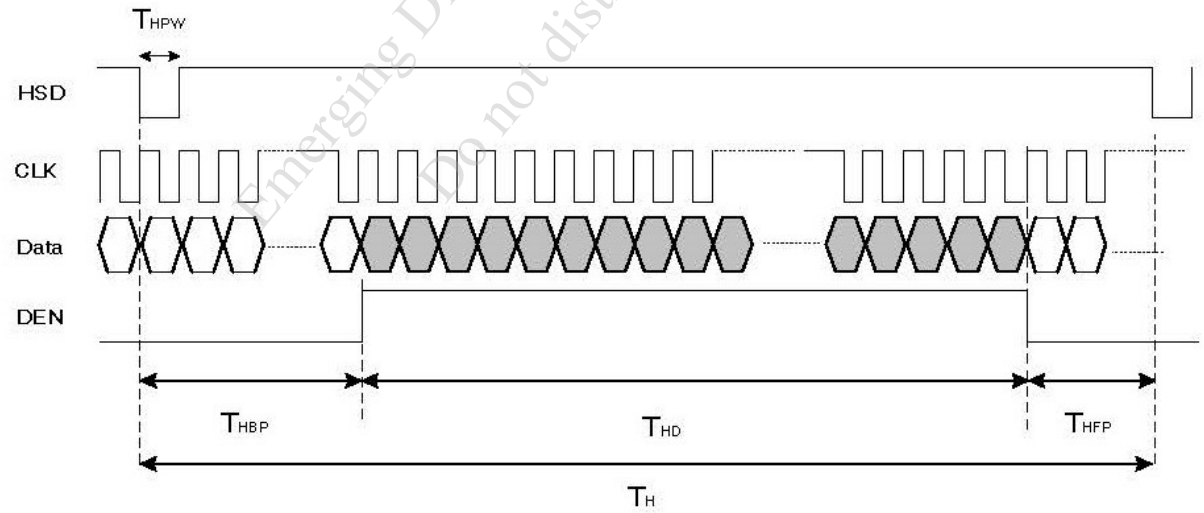
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY @FRAME RATE=60Hz (LVDS)	F_{DCLK}	68.2	72.4	78.5	MHz
HORIZONTAL DISPLAY AREA	T_{HD}		1280		DCLK
HSYNC PERIOD TIME	T_H	1380	1440	1500	DCLK
HSYNC BLANKING	$T_{HBP}+T_{HFP}$	100	160	220	DCLK
VERTICAL DISPLAY AREA	T_{VD}		800		H
VSYNC PERIOD TIME	T_V	824	838	872	H
VSYNC BLANKING	$T_{VBP}+T_{VFP}$	24	38	72	H

NOTE : TIMING SETTING BASE ON 60Hz, FREQUENCY CAN BE ADJUSTED ACCORDING TO NEEDS, AS LONG AS IT DOES NOT AFFECT THE DISPLAY.

Vertical timing



Horizontal timing



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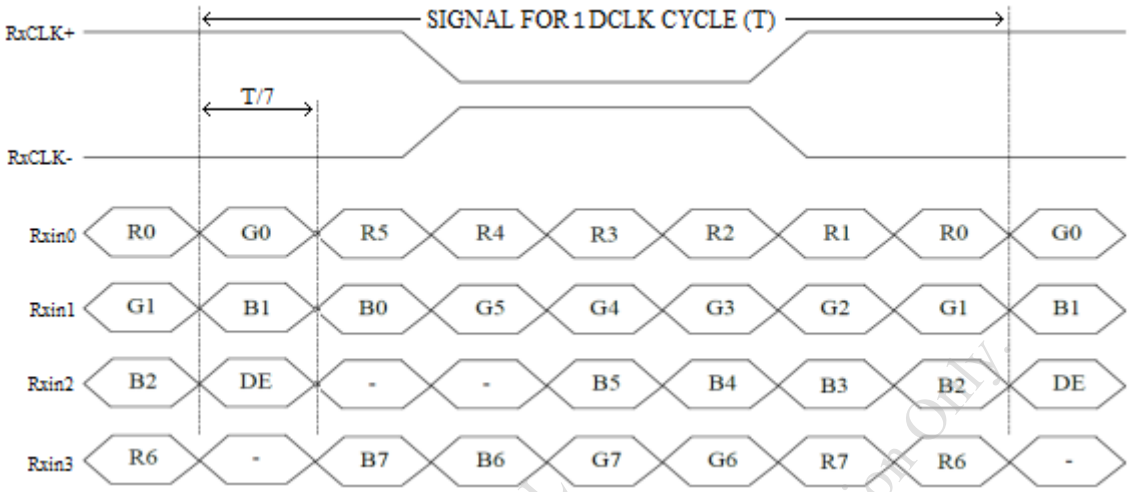
5.4 DATA INPUT FORMAT FOR LVDS



8BIT LVDS INPUT(VESA FORMAT)

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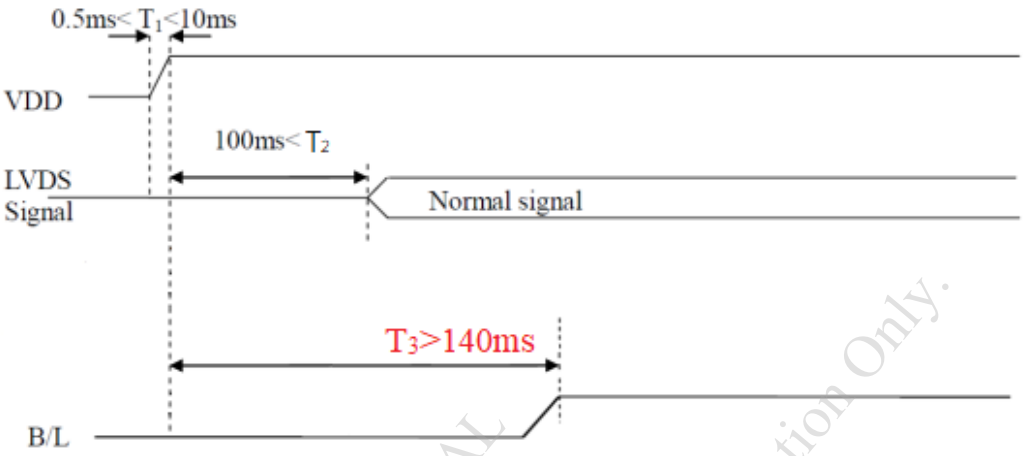
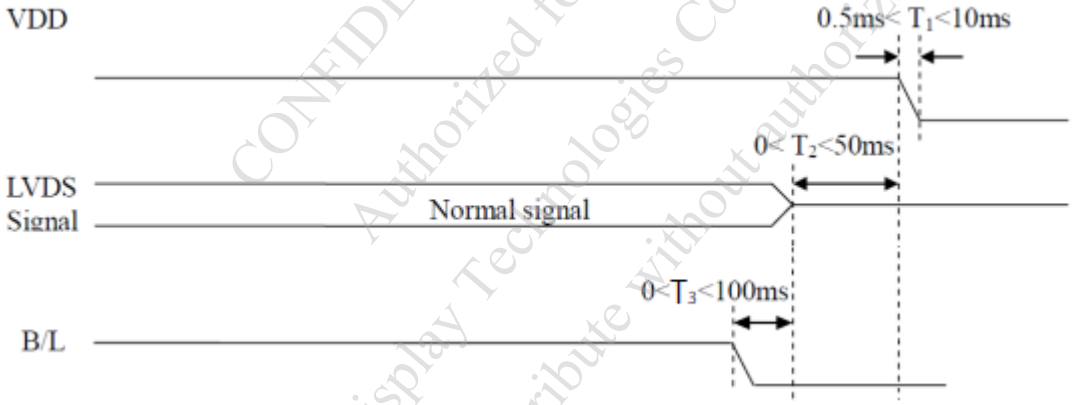
5.5 POWER ON/OFF SEQUENCE

5.5.1 POWER ON SEQUENCE



5.5.2 POWER OFF SEQUENCE



NOTE : VGH VOLTAGE SHOULD BE POWERED OFF EARLIER THAN VGL OR POWERED OFF AT THE SAME TIME.

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6. OPTICAL CHARACTERISTICS

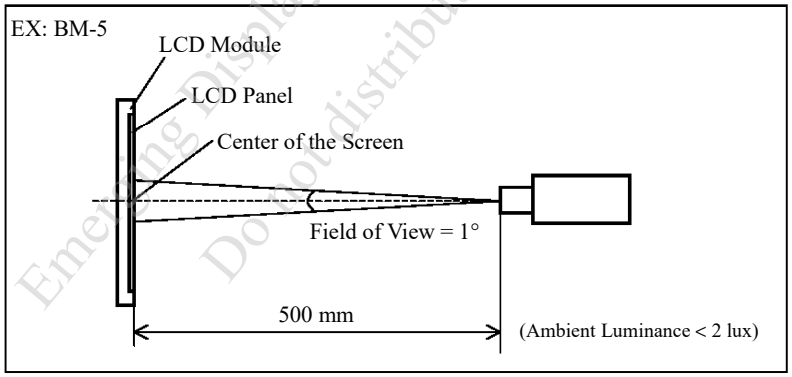
Ta = 25 ± 2 °C

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		θy+	CR≥10	θx=0°	75	85	—	deg	NOTE (2) NOTE (3)
		θy-			75	85	—	deg	
		θx+		θy=0°	75	85	—	deg	
		θx-			75	85	—	deg	
CONTRAST RATIO (CENTER)		CR	θx=0°, θy=0°		600	800	—	—	NOTE (3)
RESPONSE TIME		T_R(rise)+ T_F(fall)	θx=0°, θy=0°		—	25	50	msec	NOTE (4)
COLOR CHROMATICITY (CENTER)	WHITE	Wx	θx=0°, θy=0° VDD-VSS=3.3V VBL+-VBL-=12V LED B/L=ON PWM=100% NTSC=45%		0.26	0.31	0.36	—	NOTE (5)
		Wy			0.28	0.33	0.38		
	RED	Rx			0.54	0.59	0.64	—	
		Ry			0.31	0.36	0.41		
	GREEN	Gx			0.29	0.34	0.39	—	
		Gy			0.51	0.56	0.61		
	BLUE	Bx			0.11	0.16	0.21	—	
		By			0.08	0.13	0.18		
THE BRIGHTNESS OF MODULE(CENTER)		B	—		680	850	—	cd/m²	NOTE (6)
THE UNIFORMITY OF MODULE(9 POINTS)		—	—		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.

THE MEASUREMENT CRITERIA AND CONDITION FOR EITHER BM-5 OR CA-210 OR EQUIVALENT LUMINANCE METER IS BASED ON THE EQUIPMENT'S MANUAL.



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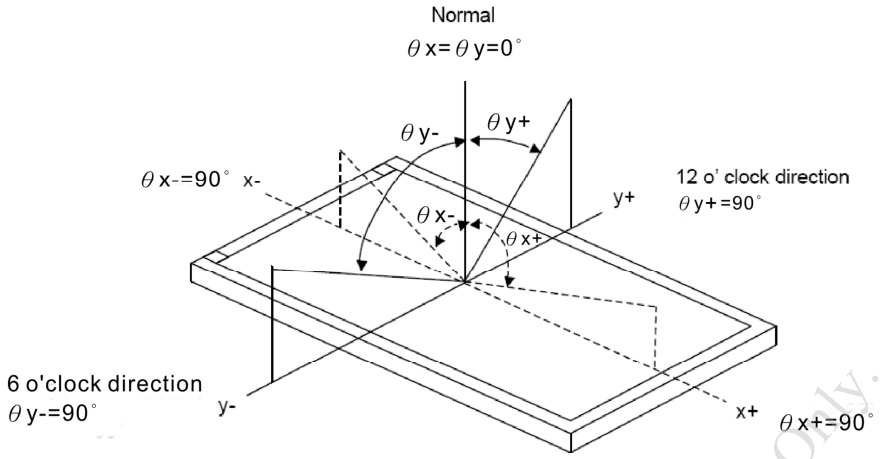
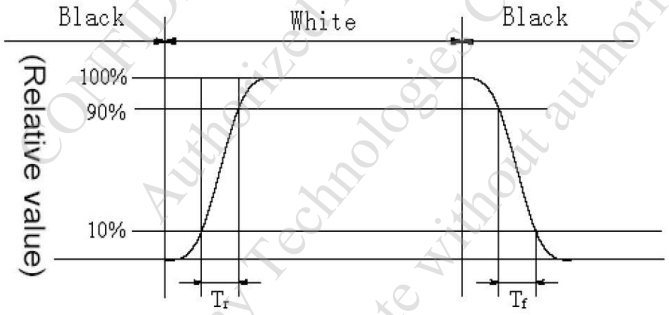
NOTE (2)：DEFINITION OF VIEWING ANGLE :



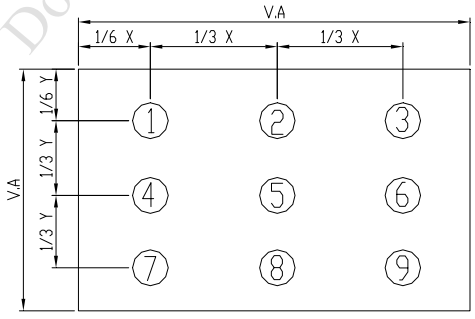
NOTE (3)：DEFINITION OF CONTRAST RATIO (CR) :
MEASURED AT THE CENTER POINT OF MODULE

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

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

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

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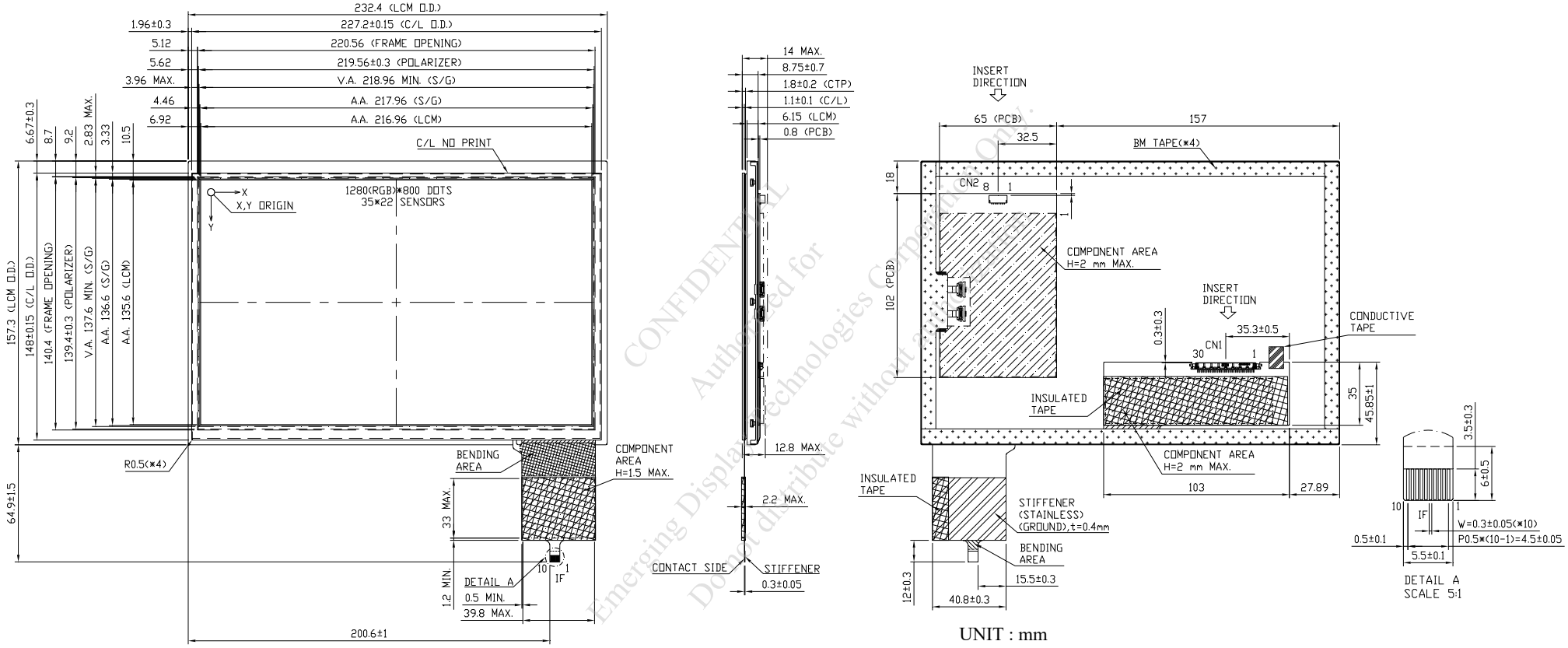
7. OUTLINE DIMENSIONS



UNIT : mm
SCALE : NTS
THIRD ANGLE PROJECTION

NOT SPECIFIED TOLERANCE IS ± 0.5
NOTE :
1.C/L GLASS : SODA LIME, NON-STRENGTHEN, CHAMFERED EDGES.
2.CN1: STM MSBKT2407P30HB OR EQUIVALENT.
3.CN2: JST SM08B-SRSS-TB OR EQUIVALENT.
4.FPC BENDING RADIUS SHOULD BE MORE THAN 1.0 mm.

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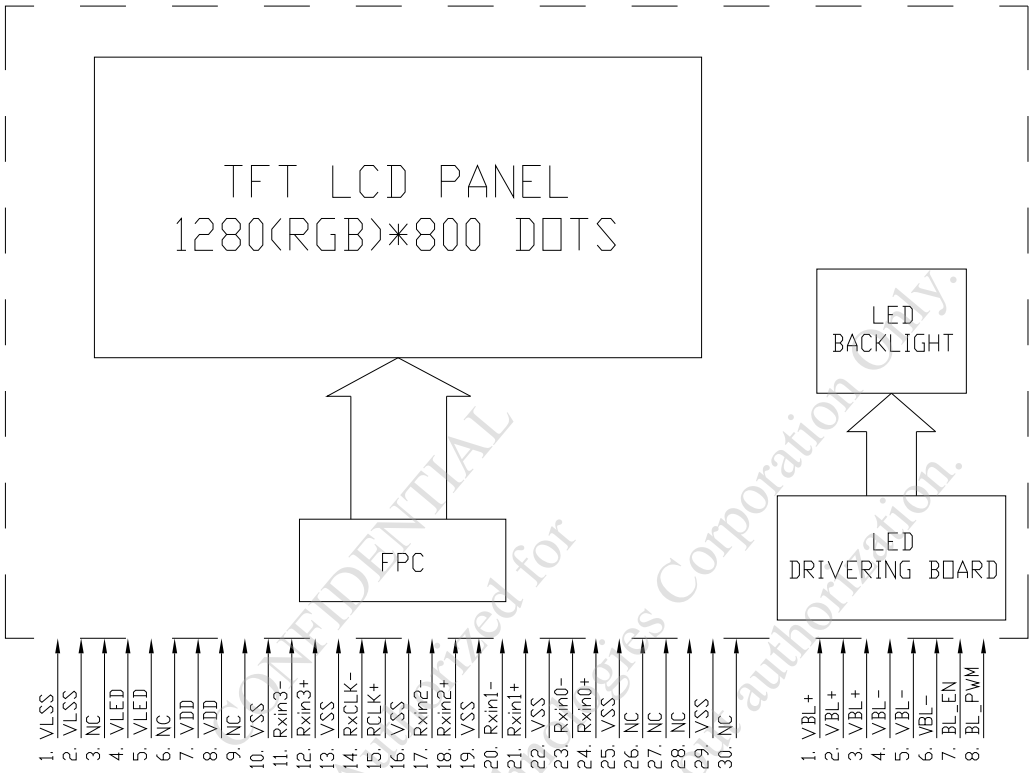
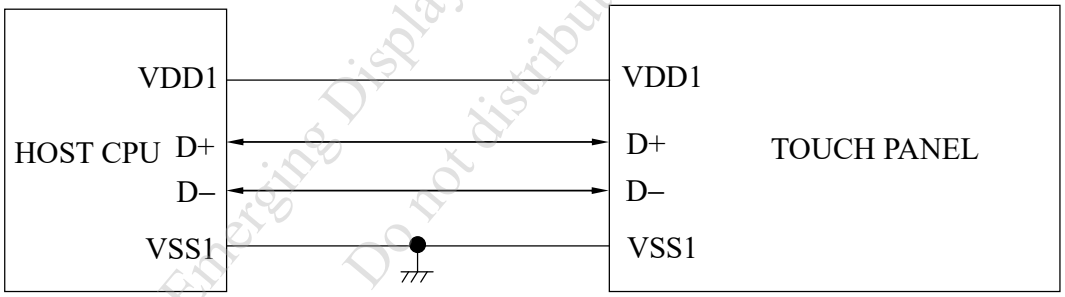
8. BLOCK DIAGRAM

8.1 TFT



8.2 CTP



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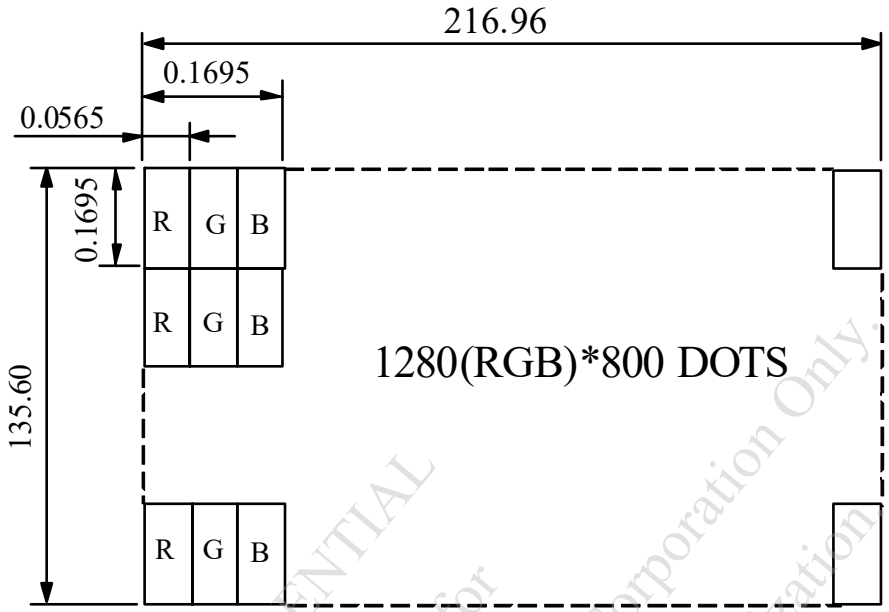
9. DETAIL DRAWING OF DOT MATRIX



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

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10. INTERFACE SIGNALS

10.1 TFT MODULE INTERFACE (CN1)

PIN NO.	SYMBOL	FUNCTION
1	NC	NON CONNECTION
2	NC	NON CONNECTION
3	NC	NON CONNECTION
4	NC	NON CONNECTION
5	NC	NON CONNECTION
6	NC	NON CONNECTION
7	VDD	POWER SUPPLY VOLTAGE
8	VDD	POWER SUPPLY VOLTAGE
9	NC	NON CONNECTION
10	VSS	GROUND
11	Rxin3-	-LVDS DIFFERENTIAL DATA INPUT (R6, R7, G6, G7, B6, B7)
12	Rxin3+	+LVDS DIFFERENTIAL DATA INPUT (R6, R7, G6, G7, B6, B7)
13	VSS	GROUND
14	RxCLK-	-LVDS DIFFERENTIAL CLOCK INPUT(LVDS CLK)
15	RCLK+	+LVDS DIFFERENTIAL CLOCK INPUT(LVDS CLK)
16	VSS	GROUND
17	Rxin2-	-LVDS DIFFERENTIAL DATA INPUT (B2-B5, HSYNC, VSYNC, DE)
18	Rxin2+	+LVDS DIFFERENTIAL DATA INPUT (B2-B5, HSYNC, VSYNC, DE)
19	VSS	GROUND
20	Rxin1-	-LVDS DIFFERENTIAL DATA INPUT(G1~G5, B0,B1)
21	Rxin1+	+LVDS DIFFERENTIAL DATA INPUT(G1~G5, B0,B1)
22	VSS	GROUND
23	Rxin0-	-LVDS DIFFERENTIAL DATA INPUT(R0-R5, G0)
24	Rxin0+	+LVDS DIFFERENTIAL DATA INPUT(R0-R5, G0)
25	VSS	GROUND
26	NC	NON CONNECTION. RESERVED FOR OTP_SDA
27	NC	NON CONNECTION. RESERVED FOR OTP_SCL
28	NC	NON CONNECTION. RESERVED FOR OTP_CSB
29	VSS	GROUND
30	NC	NON CONNECTION

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10.2 LED BACKLIGHT (CN2)

PIN NO.	SYMBOL	FUNCTION
1	VBL+	POWER SUPPLY VOLTAGE FOR LED DRIVER(+)
2	VBL+	POWER SUPPLY VOLTAGE FOR LED DRIVER(+)
3	VBL+	POWER SUPPLY VOLTAGE FOR LED DRIVER(+)
4	VBL-	POWER SUPPLY VOLTAGE FOR LED DRIVER(-)
5	VBL-	POWER SUPPLY VOLTAGE FOR LED DRIVER(-)
6	VBL-	POWER SUPPLY VOLTAGE FOR LED DRIVER(-)
7	BL_EN	BACKLIGHT LED ON/OFF CONTROL
8	BL_PWM	BACKLIGHT LED BRIGHTNESS CONTROL

10.3 TOUCH PANEL INTERFACE (IF)

PIN NO.	SYMBOL	FUNCTION
1	NC	THE PIN WAS RESERVED FOR I2C VSS1
2	NC	THE PIN WAS RESERVED FOR I2C /RST
3	NC	THE PIN WAS RESERVED FOR I2C /INT
4	NC	THE PIN WAS RESERVED FOR I2C SCL
5	NC	THE PIN WAS RESERVED FOR I2C SDA
6	NC	THE PIN WAS RESERVED FOR I2C VCC(+3.3V)
7	VDD1	POWER SUPPLY VOLTAGE(+5.0V)
8	D–	USB D–
9	D+	USB D+
10	VSS1	GROUND

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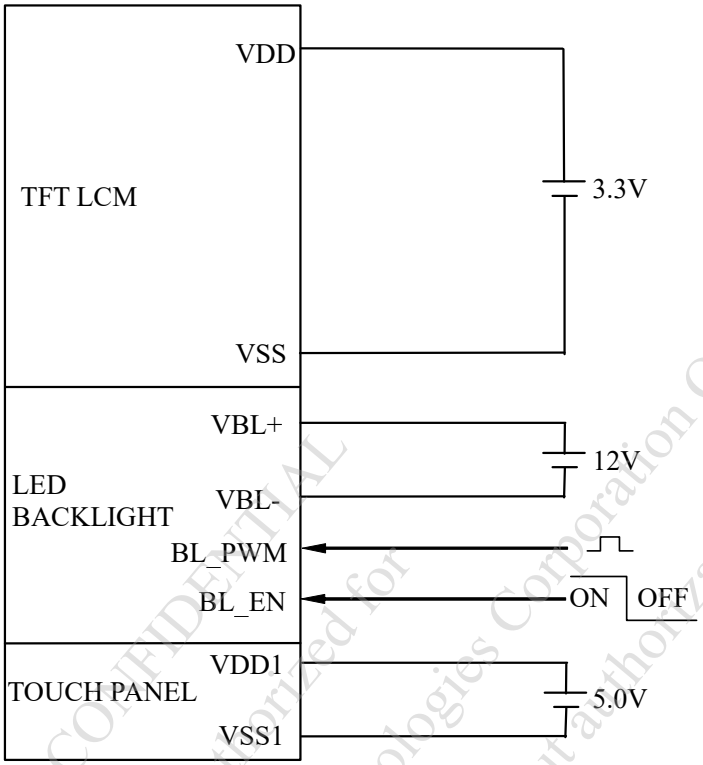
11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



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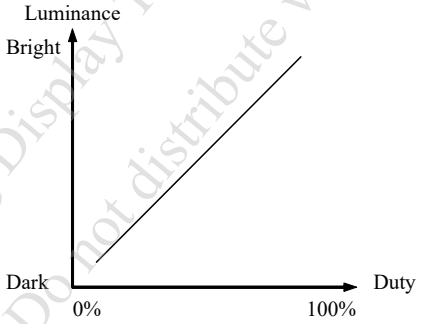
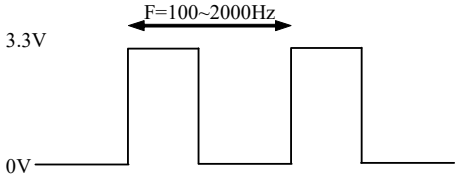
NOTE (1)：ADJUST THE PWM SIGNAL IN ORDER TO CONTROL LED BACKLIGHT'S BRIGHTNESS. THE HIGHER THE DUTY CYCLE, THE HIGHER THE BRIGHTNESS



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
$200 < F_{DIM} < 1K$	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 = 550nm	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.

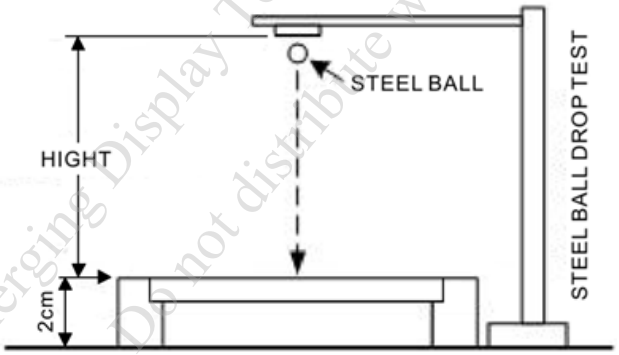
12.2 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	7H (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 TIMES/ 1 POINTS, 25°C(CENTER POINT)



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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°

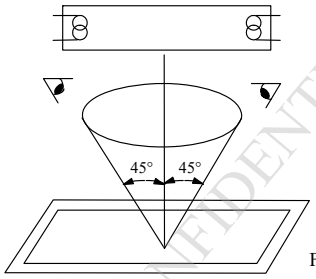

FIG.A

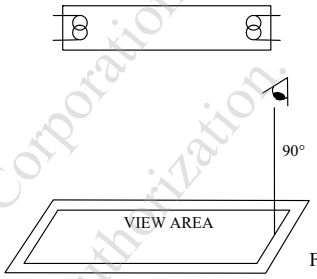

FIG.B

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 II

(b)AQL：MAJOR DEFECT：AQL 0.65

MINOR DEFECT：AQL 1.5

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13.3 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 (VIEWING AREA)	• BLACK/WHITE SPOT / CIRCULAR TYPE • BUBBLES ON POLARIZER • NEWTON RING • BLACK/WHITE LINE / LINEAR TYPE • SCRATCH • CONTAMINATION • UNEVEN COLOR SPREAD	1.5
	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	

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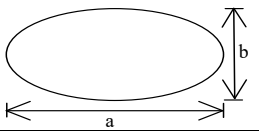
<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>1</td><td>DISPLAY ON INSPECTION</td><td>1. INCORRECT PATTERN
2. MISSING SEGMENT
3. DIM SEGMENT
4. OPERATING VOLTAGE BEYOND SPEC</td></tr>
<tr><td>2</td><td>OVERALL DIMENSIONS</td><td>1. OVERALL DIMENSION BEYOND SPEC</td></tr>
<tr><td>3</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></th><th>ACCEPTABLE COUNT</th></tr>
<tr><td rowspan="3">BRIGHT DOT</td><td>RANDOM</td><td>N≤1</td></tr>
<tr><td>2 DOTS ADJACENT (PAIR)</td><td>N=0</td></tr>
<tr><td>3 DOTS ADJACENT OR MORE</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 (PAIR)</td><td>N=0</td></tr>
<tr><td>3 DOTS ADJACENT OR MORE</td><td>N=0</td></tr>
<tr><td rowspan="2">DISTANCE</td><td>MINIMUM DISTANCE BETWEEN BRIGHT DOT</td><td>—</td></tr>
<tr><td>MINIMUM DISTANCE BETWEEN DARK DOTS</td><td>L≥15mm</td></tr>
<tr><td colspan="2">TOTAL BRIGHT AND DARK DOT</td><td>N≤5</td></tr>
<tr><td colspan="2">MICRO BRIGHT DOT</td><td>N=0</td></tr>
<tr><td colspan="2">SMALL BRIGHT DOT</td><td>(1)N≤4
(2)N≤3 WITHIN 20mm DIAMETER AREA</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.
THE BRIGHT DOT DEFECT MOST BE VISIBLE THROUGH A 5% ND FILTER
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.</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 ≤ 0.3</td><td>IGNORE</td></tr>
<tr><td>0.3 < D ≤ 0.5</td><td>N ≤ 5</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
<tr><td rowspan="3">SURFACE STAINS</td><td>D ≤ 0.1</td><td>IGNORE</td></tr>
<tr><td>0.1 < D ≤ 0.5</td><td>N ≤ 6</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
<tr><td rowspan="3">SCRATCHES</td><td>W ≤ 0.05</td><td>IGNORE</td></tr>
<tr><td>0.05 < W ≤ 0.1 , 2 < L ≤ 5</td><td>N ≤ 4</td></tr>
<tr><td>0.1 < W</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.
THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING.
AVERAGE DIAMETER (D)=(a+b)/2
 
</td></tr>
</table>

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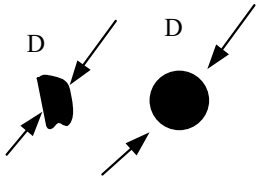
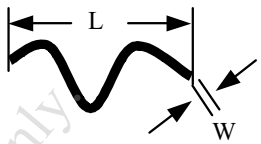
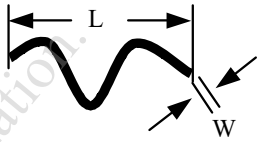
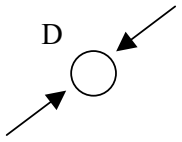
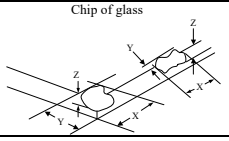
<table>
<tr><th>NO.</th><th>ITEM</th><th colspan="2">CRITERIA</th></tr>
<tr><td>5</td><td>BLACK/WHITE SPOT CIRCULAR TYPE</td><td>THE FOLLOWING BLACK/WHITE SPOT ARE WITHIN THE VIEWING AREA. AVERAGE DIAMETER：D (mm)
<table><tr><th>SIZE D</th><th>PERMISSIBLE NO.</th></tr><tr><td>D≤0.3</td><td>IGNORE</td></tr><tr><td>0.3<D≤0.5</td><td>6</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≤10</td><td>6</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≤10</td><td>6</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≤0.3</td><td>IGNORE</td></tr><tr><td>0.3<D≤0.5</td><td>6</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 colspan="2">NOT ACCEPTABLE</td></tr>
<tr><td>11</td><td>LINE DEFECT ON DISPLAY</td><td colspan="2">OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOWED</td></tr>
<tr><td>12</td><td>MURA ON DISPLAY</td><td colspan="2">MURA NOT VISIBLE THROUGH 5% ND FILTER</td></tr>
<tr><td>13</td><td>UNEVEN COLOR SPREAD, COLORATION</td><td colspan="2">TO BE DETERMINED BASED UPON THE STANDARD SAMPLE.</td></tr>
<tr><td>14</td><td>BEZEL APPEARANCE</td><td colspan="2">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>
</table>

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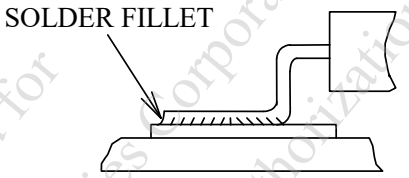
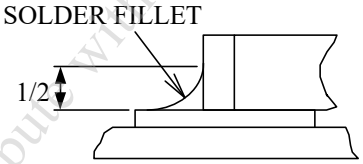
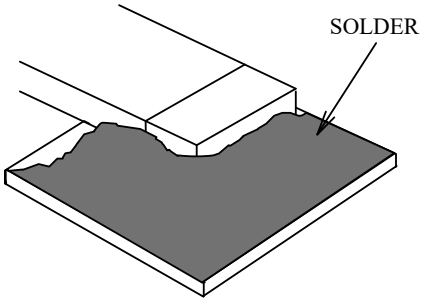
NO.	ITEM	CRITERIA
15	PCB	1. THERE MAY NOT BE MORE THAN 2mm OF SEALANT OUTSIDE THE SEAL AREA ON THE PCB, AND THERE SHOULD BE NO MORE THAN THREE PLACES. 2. NO OXIDATION OR CONTAMINATION PCB TERMINALS. 3. PARTS ON PCB MUST BE THE SAME AS ON THE PRODUCTION CHARACTERISTIC CHART. THERE SHOULD BE NO WRONG PARTS, 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 

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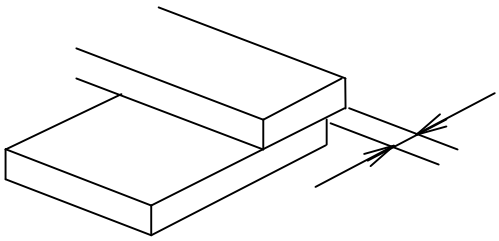
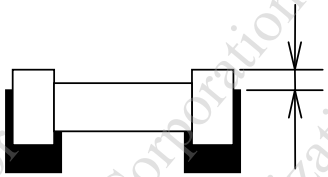
NO.	ITEM	CRITERIA
16	SOLDERING	3. PARTS ALIGNMENT (a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE  (b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE  4. NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB. 5. NO COLD SOLDER JOINTS, MISSING SOLDER 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.

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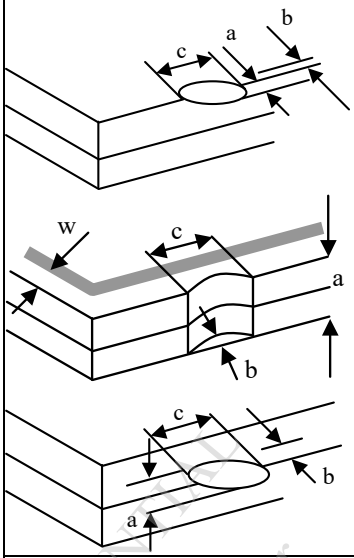
NO.	ITEM	CRITERIA
19	CRACKED GLASS	THE LCD WITH EXTENSIVE CRACK IS NOT ACCEPTABLE

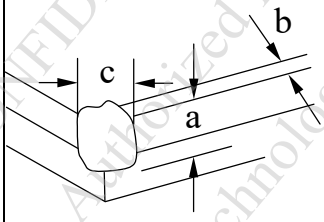
GENERAL GLASS CHIP：



a	b	c
≤ t/2	< VIEWING AREA	≤ 1/8X
t/2 > , ≤ 2t	≤ W/2	≤ 1/8X

*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE
X = LCD SIDE LENGTH
t = GLASS THICKNESS

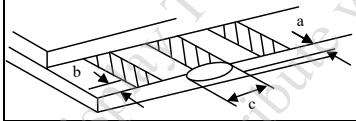
CORNER PART：



a	b	c
≤ t/2	< VIEWING AREA	≤ 1/8X
> t/2 , ≤ 2t	≤ W/2	≤ 1/8X

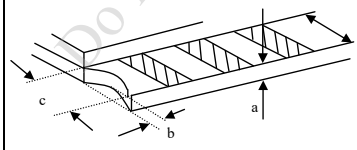
*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE
X = LCD SIDE LENGTH
t = GLASS THICKNESS

CHIP ON ELECTRODE PAD



a	b	c
≤ t	≤ 0.5mm	≤ 1/8X

* X=LCD SIDE WIDTH
t =GLASS THICKNESS



a	b	c
≤ t	≤ 1/8X	≤ L

*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

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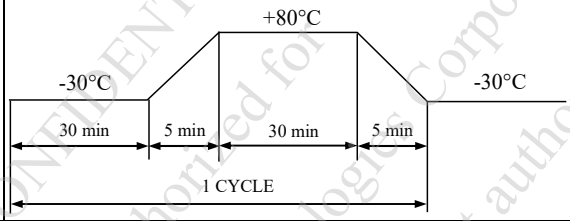
14. RELIABILITY TEST

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 +70°C FOR 240 HRS
2	LOW TEMPERATURE TEST (OPERATION)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -20°C FOR 240 HRS
3	HIGH TEMPERATURE TEST (STORAGE)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +80°C FOR 240 HRS
4	LOW TEMPERATURE TEST (STORAGE)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 240 HRS
5	HIGH TEMPERATURE / HUMIDITY TEST (OPERATION)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 60°C, 90% RH 240 HRS
6	THERMAL SHOCK TEST (NOT OPERATED)	THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION: 
7	VIBRATION (NOT OPERATED)	11.76 m/s^2(1.2G), 10~100 Hz XYZ DIRECTIONS, 1 HR EACH
8	SHOCK (NOT OPERATED)	490.0 m/s^2(50G), 10 ms XYZ DIRECTIONS, 1 TIME EACH
9	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) : THERE IS NO DISPLAY FUNCTION NG ISSUE OCCURRED, ALL THE COSMETIC SPECIFICATION IS JUDGED BEFORE THE RELIABILITY STRESS.

NOTE (3) : THE MODULE SHOULDN'T BE TESTED MORE THAN ONE CONDITION, AND ALL THE TEST CONDITIONS ARE INDEPENDENT.

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.

NOTE (5) : 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

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15. CAUTION

15.1 OPERATION

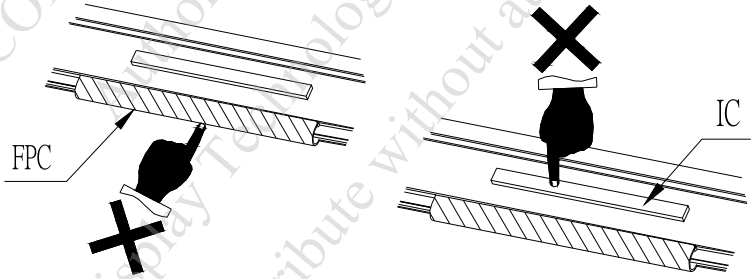
15.1.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .

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!



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15.2 STORAGE

15.2.1 STORE THE MODULE IN A DARK ROOM OR KEEP IN ORIGINAL PACKAGE WHERE MUST KEEP AT 25±10℃ AND 65%RH OR LESS.

15.2.2 DO NOT STORE THE MODULE IN SURROUNDINGS CONTAINING ORGANIC SOLVENT OR CORROSIVE GAS.

15.2.3 STORE THE MODULE IN AN ANTI-ELECTROSTATIC CONTAINER OR BAG.

15.3 NOTICE

15.3.1 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 .

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

15.3.3 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.

15.3.4 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.

15.3.5 DON’T GIVE EXTERNAL SHOCK.

15.3.6 DON’T APPLY EXCESSIVE FORCE ON THE SURFACE.

15.3.7 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.

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

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

15.3.10 STORE WITHOUT ANY PHYSICAL LOAD.

15.3.11 REWIRING: NO MORE THAN 3 TIMES.

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