EXAMINED BY : Sam Chou	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0008516
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APPROVED BY : Chris Chu		TOTAL PAGE : 26
		VERSION : 1

CUSTOMER ACCEPTANCE SPECIFICATIONS

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MODEL NO. :

ETML104007DKA
(RoHS)

FOR MESSRS :

_____

CUSTOMER'S APPROVAL

DATE :

_____

BY :

_____

EMERGING DISPLAY TECHNOLOGIES CORPORATION	MODEL NO. ETML104007DKA	VERSION 1	PAGE 0-1
RECORDS OF REVISION	DOC . FIRST ISSUE SEP.11, 2017		

DATE	REVISED PAGE NO.	SUMMARY

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1. GENERAL SPECIFICATIONS

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

EETI EXC 3160

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)

2. MECHANICAL SPECIFICATIONS

2.1 TFT MODULE MECHANICAL SPECIFICATIONS

(1) DIAGONALS	----------	10.4 inch
(2) NUMBER OF DOTS	----------	1024W * (RGB) * 768H DOTS
(3) MODULE SIZE	----------	236W * 176.1H * 11.3D (MAX.) mm
(4) VIEWING AREA	----------	213.2W * 160.4H mm
(5) ACTIVE AREA	----------	211.2W * 158.4H mm
(6) DOT SIZE	----------	0.06875W * 0.20625H mm
(7) PIXEL SIZE	----------	0.20625W * 0.20625H mm
(8) LCD TYPE	----------	TFT , TRANSMISSIVE , ANTI-GLARE, NORMALLY BLACK
(9) COLOR	----------	16.2M
(10) VIEWING DIRECTION	----------	SUPER WIDE VIEW
(11) BACK LIGHT	----------	LED , COLOR : WHITE
(12) INTERFACE MODE	----------	LVDS

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2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

(1)	TOUCH PANEL SIZE	10.4 inch
(2)	OUTER DIMENSION	225W * 176.1H * 1.35D mm (WITHOUT FPC)
(3)	VIEWING AREA	214.2W * 161.4H mm
(4)	ACTIVE AREA	213.2W * 160.44H mm
(5)	INPUT TYPE	MULTI-TOUCH
(6)	NUMBER OF TOUCH SENSOR	43*33 SENSORS
(7)	INTERFACE MODE	USB
(8)	RESOLUTION	4096 * 4096

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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	-0.3	5.0	V	
STATIC ELECTRICITY	—	—	—	V	NOTE (1)

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

3.2 CAPACITIVE TOUCH PANEL ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY FOR INTERFACE	VDD1-VSS1	2.0	6.0	V	
POWER SUPPLY FOR DRIVER IC	VDD2-VSS1	-0.3	4.0	V	
INPUT I/O PIN VOLTAGE	VIN	VSS1-0.3	VDD2+0.3	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)
HUMIDITY	NOTE (3)		NOTE (3)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s^2 (0.25 G)	—	11.76 m/s^2 (1.2 G)	10~100Hz XYZ DIRECTIONS 1 HR EACH
SHOCK	—	29.4 m/s^2 (3 G)	—	490 m/s^2 (5 0 G)	10 ms XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1)：Ta AT -30°C：WILL BE 48HRS MAX.
80°C：WILL BE 168HRS MAX.

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

NOTE (3)：Ta ≤ 60°C：90%RH MAX (96HRS MAX).
Ta > 60°C：ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90%RH AT 60°C (96HRS MAX).

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4. ELECTRICAL CHARACTERISTICS

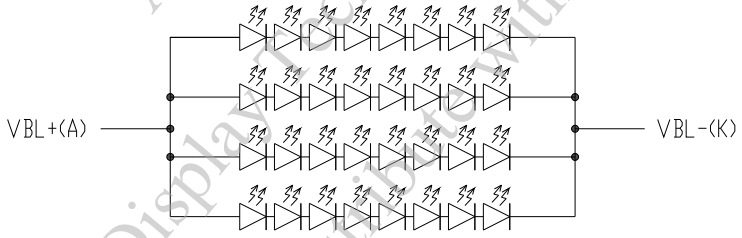
4.1 TFT MODULE ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.3	3.45	V	
POWER SUPPLY VOLTAGE FOR LED DRIVER	VLED-VLSS	—	11.7	12.0	12.3	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS=3.3V	—	400	500	mA	NOTE (1)
POWER SUPPLY CURRENT FOR LED DRIVER	IVLED	VLED-VLSS=12.0V	—	550	600	mA	
DIFFERENTIAL INPUT HIGH THRESHOLD VOLTAGE	VTH	VCM=1.2V	—	—	0.1	V	
DIFFERENTIAL INPUT LOW THRESHOLD VOLTAGE	VTL		-0.1	—	—	V	
INPUT CURRENT	IIN	—	-10	—	10	uA	
DIFFERENTIAL INPUT VOLTAGE	|VID|	—	0.1	—	0.6	V	
DIFFERENTIAL INPUT COMMON MODE VOLTAGE OFFSET	VCM	—	0.7	1.2	1.6	V	
POWER SUPPLY FOR LED BACKLIGHT	VF	IF=240mA	23.2	25.6	28.0	V	NOTE (2)
LED LIFE TIME	—	ILED=60mA (PER. LED)	70K	—	—	HOURS	NOTE (4) NOTE (5)

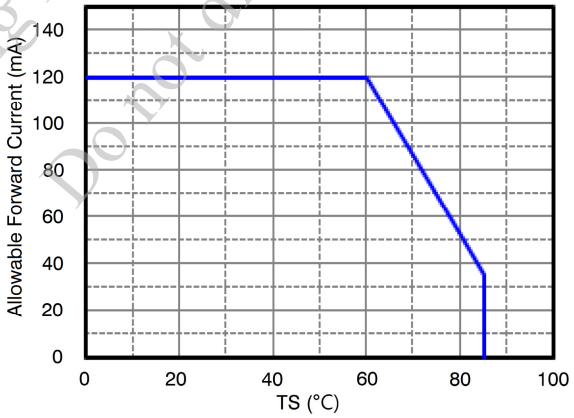
NOTE (1) : THE DISPLAY PATTERN IS ALL “WHITE” & 60Hz.

NOTE (2) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT

VF=VBL+(A)–VBL-(K)



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.

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4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

Ta=25°C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY FOR INTERFACE	VDD1-VSS1	—	4.7	5.0	5.3	V
POWER SUPPLY FOR DRIVER IC	VDD2-VSS1	—	3.0	3.3	3.6	V
INPUT HIGH LEVEL VOLTAGE	VIH	—	VDD2-0.8	—	—	V
INPUT LOW LEVEL VOLTAGE	VIL	—	—	—	0.8	V
OUTPUT HIGH LEVEL VOLTAGE	VOH	I=2 mA	VDD2-0.4	—	—	V
OUTPUT LOW LEVEL VOLTAGE	VOL	I=2 mA	—	—	0.4	V
POWER SUPPLY CURRENT	IDD1	VDD1-VSS1 =5.0V	—	70	100	mA

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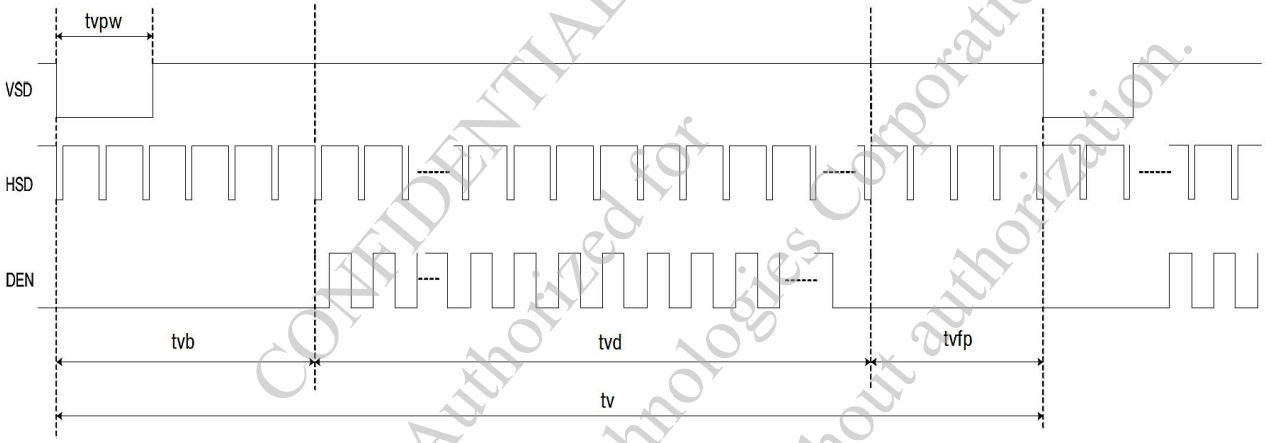
5. TIMING CHARACTERISTICS

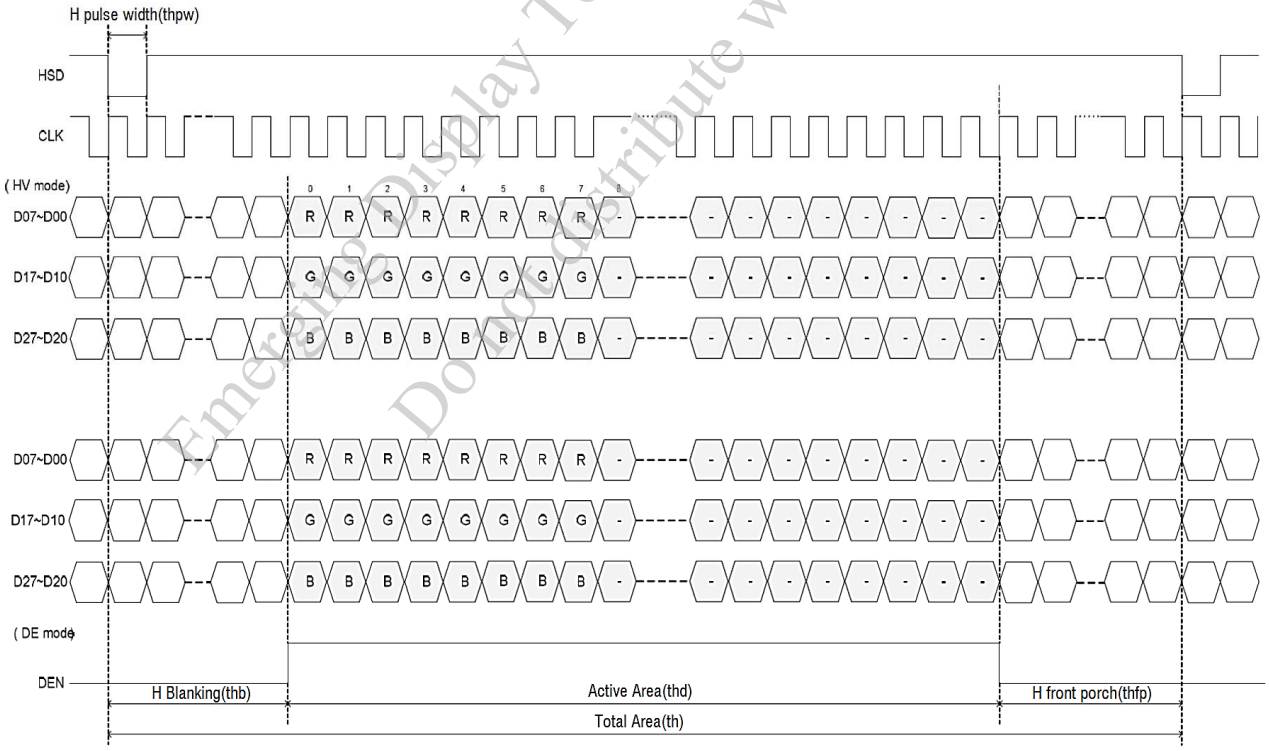
5.1 TFT MODULE TIMING CHARACTERISTICS (DE MODE)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
DCLK FREQUENCY	fclk	52	65	71	Mhz	FRAME RATE=60Hz
HORIZONTAL DISPLAY AREA	thd		1024		DCLK	
HSYNC PERIOD TIME	th	1114	1344	1400	DCLK	
HSYNC BLANKING	thb+thfp	90	320	376	DCLK	
VERTICAL DISPLAY AREA	tvd		768		H	
VSYNC PERIOD TIME	tv	778	806	845	H	
VSYNC BLANKING	tvb+tvfp	10	38	77	H	

VERTICAL INPUT TIMING



HORIZONTAL INPUT TIMING



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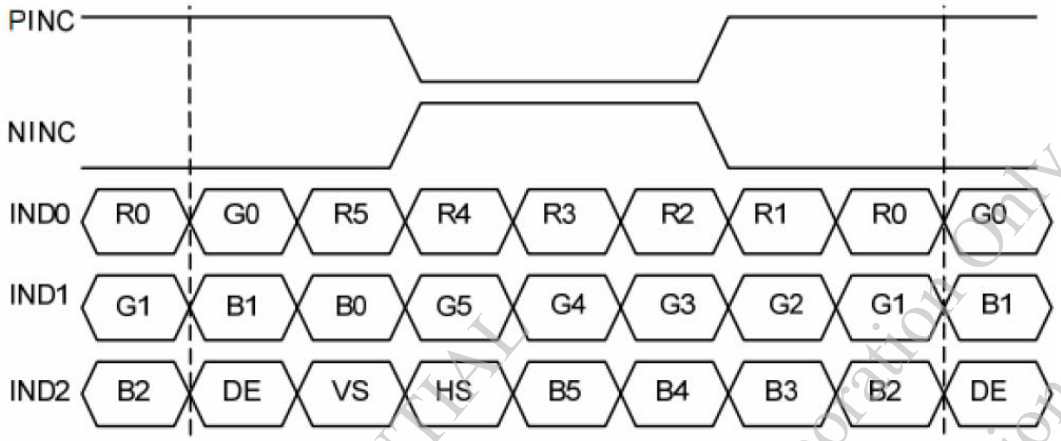
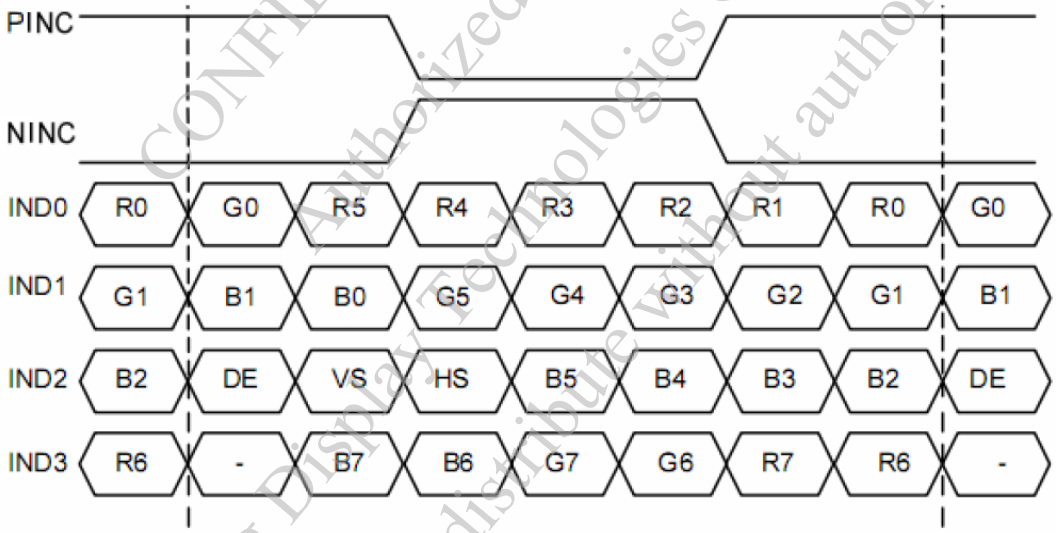
5.2 BIT LVDS INPUT

5.2.1 6BIT LVDS INPUT



5.2.2 8BIT LVDS INPUT



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5.3 RELATIONSHIP BETWEEN DISPLAYED COLOR AND INPUT

	Display	MSB R7 R6 R5 R4 R3 R2 R1 R0 LSB	MSB G7 G6 G5 G4 G3 G2 G1 G0 LSB	MSB B7 B6 B5 B4 B3 B2 B1 B0 LSB	Gray scale Level
Basic color	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	-
	Blue	L L L L L L L L	L L L L L L L L	H H H H H H H H	-
	Green	L L L L L L L L	H H H H H H H H	L L L L L L L L	-
	Light Blue	L L L L L L L L	H H H H H H H H	H H H H H H H H	-
	Red	H H H H H H H H	L L L L L L L L	L L L L L L L L	-
	Purple	H H H H H H H H	L L L L L L L L	H H H H H H H H	-
	Yellow	H H H H H H H H	H H H H H H H H	L L L L L L L L	-
	White	H H H H H H H H	H H H H H H H H	H H H H H H H H	-
Gray scale of Red	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	L0
	Dark ↑ ↓ Light	L L L L L L L H	L L L L L L L L	L L L L L L L L	L1
		L L L L L L H L	L L L L L L L L	L L L L L L L L	L2
		:	:	:	L3…L251
		H H H H H H L L	L L L L L L L L	L L L L L L L L	L252
		H H H H H H L H	L L L L L L L L	L L L L L L L L	L253
		H H H H H H H L	L L L L L L L L	L L L L L L L L	L254
	Red	H H H H H H H H	L L L L L L L L	L L L L L L L L	Red L255
Gray scale of Green	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	L0
	Dark ↑ ↓ Light	L L L L L L L L	L L L L L L L H	L L L L L L L L	L1
		L L L L L L L L	L L L L L L H L	L L L L L L L L	L2
		:	:	:	L3…L251
		L L L L L L L L	H H H H H H L L	L L L L L L L L	L252
		L L L L L L L L	H H H H H H L H	L L L L L L L L	L253
		L L L L L L L L	H H H H H H H L	L L L L L L L L	L254
	Green	L L L L L L L L	H H H H H H H H	L L L L L L L L	Green L255
Gray scale of Blue	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	L0
	Dark ↑ ↓ Light	L L L L L L L L	L L L L L L L L	L L L L L L L H	L1
		L L L L L L L L	L L L L L L L L	L L L L L L H L	L2
		:	:	:	L3…L251
		L L L L L L L L	L L L L L L L L	H H H H H H L L	L252
		L L L L L L L L	L L L L L L L L	H H H H H H L H	L253
		L L L L L L L L	L L L L L L L L	H H H H H H H L	L254
	Blue	L L L L L L L L	L L L L L L L L	H H H H H H H H	Blue L255
Gray scale of White & Black	Black	L L L L L L L L	L L L L L L L L	L L L L L L L L	L0
	Dark ↑ ↓ Light	L L L L L L L H	L L L L L L L H	L L L L L L L H	L1
		L L L L L L H L	L L L L L L H L	L L L L L L H L	L2
		:	:	:	L3…L251
		H H H H H H L L	H H H H H H L L	H H H H H H L L	L252
		H H H H H H L H	H H H H H H L H	H H H H H H L H	L253
		H H H H H H H L	H H H H H H H L	H H H H H H H L	L254
	White	H H H H H H H H	H H H H H H H H	H H H H H H H H	White L255

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6. OPTICAL CHARACTERISTICS (NOTE 1)

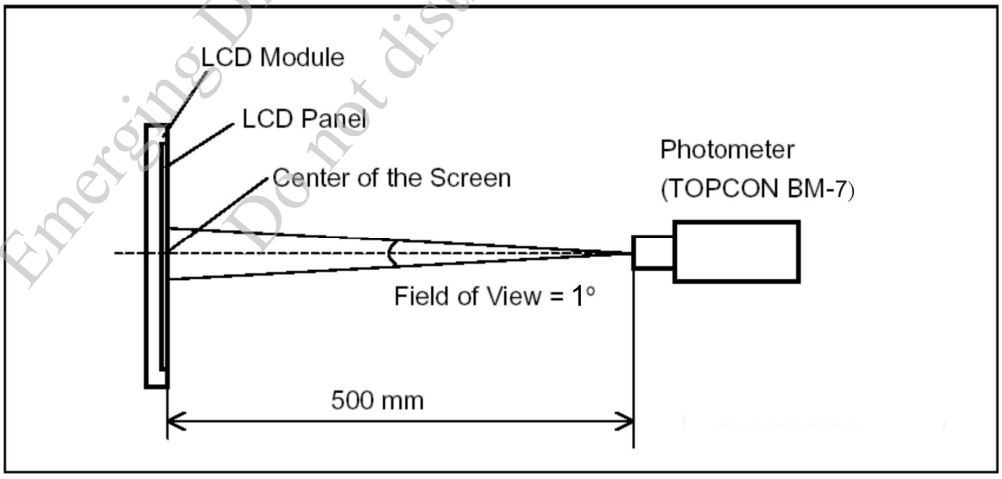
6.1 OPTICAL CHARACTERISTICS

Ta = 25 ± 2 °C

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		θ_{y+}	CR ≥ 10	θ_x=0°	80	85	—	deg.	NOTE (2) NOTE (3)
		θ_{y-}			80	85	—		
		θ_{x+}		θ_y=0°	80	85	—		
		θ_{x-}			80	85	—		
CONTRAST RATIO		CR	θx=0° , θy=0°		600	900	—	—	NOTE (3)
RESPONSE TIME		TR(rise)+TF(rise)	θx=0° , θy=0°		—	30	40	msec	NOTE (4)
COLOR OF CIE COORDINATE	WHITE	Wx	θx=0° , θy=0° VLED-VLSS=12.0V LED_PWM=DUTY 100%		0.25	0.30	0.35	—	NOTE (5)
		Wy			0.32	0.37	0.42		
	RED	Rx			0.59	0.64	0.69	—	
		Ry			0.31	0.36	0.41		
	GREEN	Gx			0.26	0.31	0.36	—	
		Gy			0.60	0.65	0.70		
	BLUE	Bx			0.11	0.16	0.21	—	
		By			0.05	0.10	0.15		
THE BRIGHTNESS OF MODULE		B	θx=0° , θy=0° VLED-VLSS=12.0V LED_PWM=DUTY 100%		680	850	—	cd/m^2	NOTE (6)
THE UNIFORMITY OF MODULE		—			70	—	—	%	

NOTE (1) : TEST EQUIPMENT SETUP :

AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES, THE MEASUREMENT SHOULD BE EXECUTED. MEASUREMENT SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM (AMBIENT LUMINANCE < 2LUX) OPTICAL SPECIFICATIONS ARE MEASURED BY TOPCON BM-7 (FAST) WITH A VIEWING ANGLE OF 1° AT A DISTANCE OF 50cm AND NORMAL DIRECTION.



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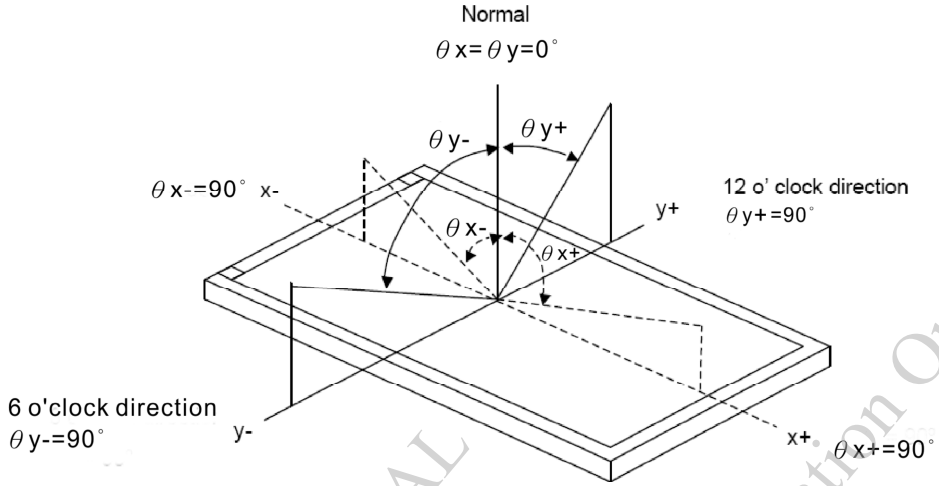
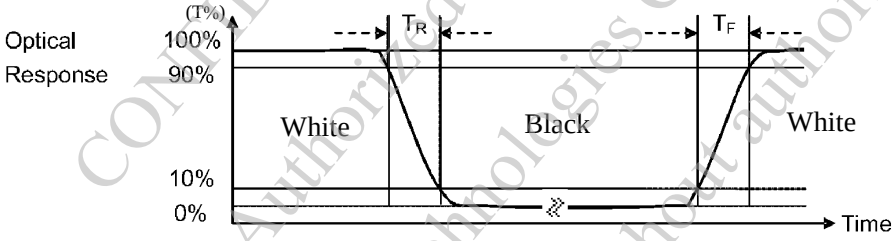
NOTE (2)：DEFINITION OF VIEWING ANGLE :



NOTE (3)：DEFINITION OF CONTRAST RATIO :

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

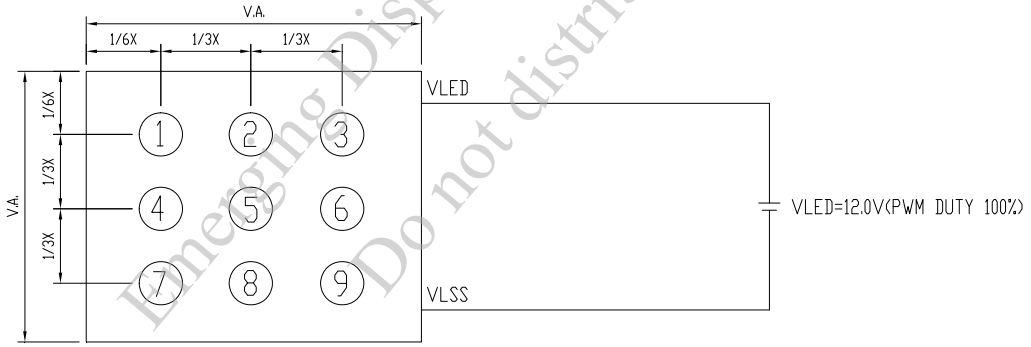
NOTE (4)：DEFINITION OF RESPONSE TIME : T_R AND T_F
THE FIGURE BELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



NOTE (5)：THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED.

NOTE (6)：BRIGHTNESS MEASURED WHEN LCD IS AT ”WHITE STATE”

6.2 THE TEST METHOD OF BRIGHTNESS AND UNIFORMITY



UNIT：mm

6.3 THE CALCULATING METHOD OF UNIFORMITY

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

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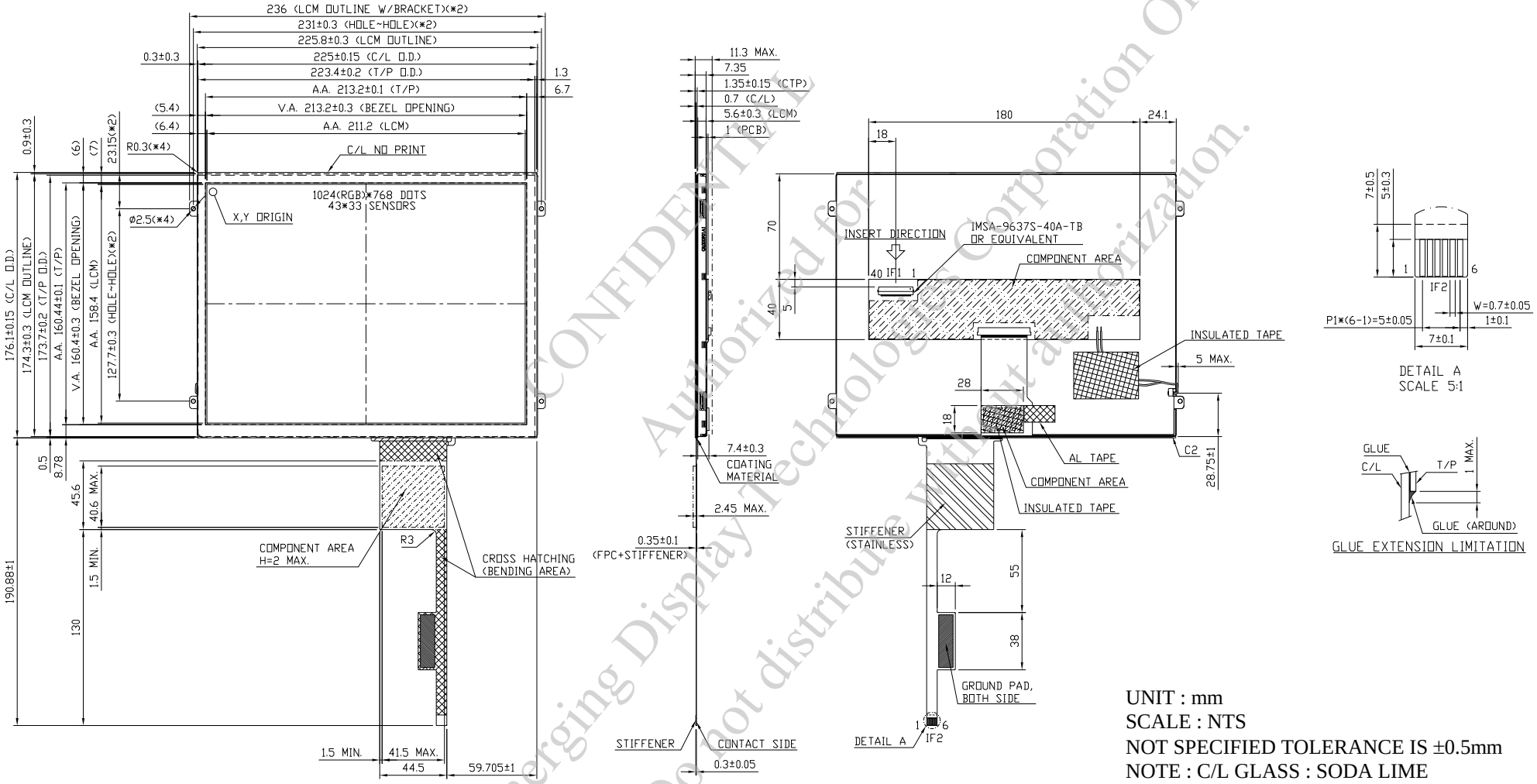
7. OUTLINE DIMENSIONS



UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ±0.5mm
NOTE : C/L GLASS : SODA LIME

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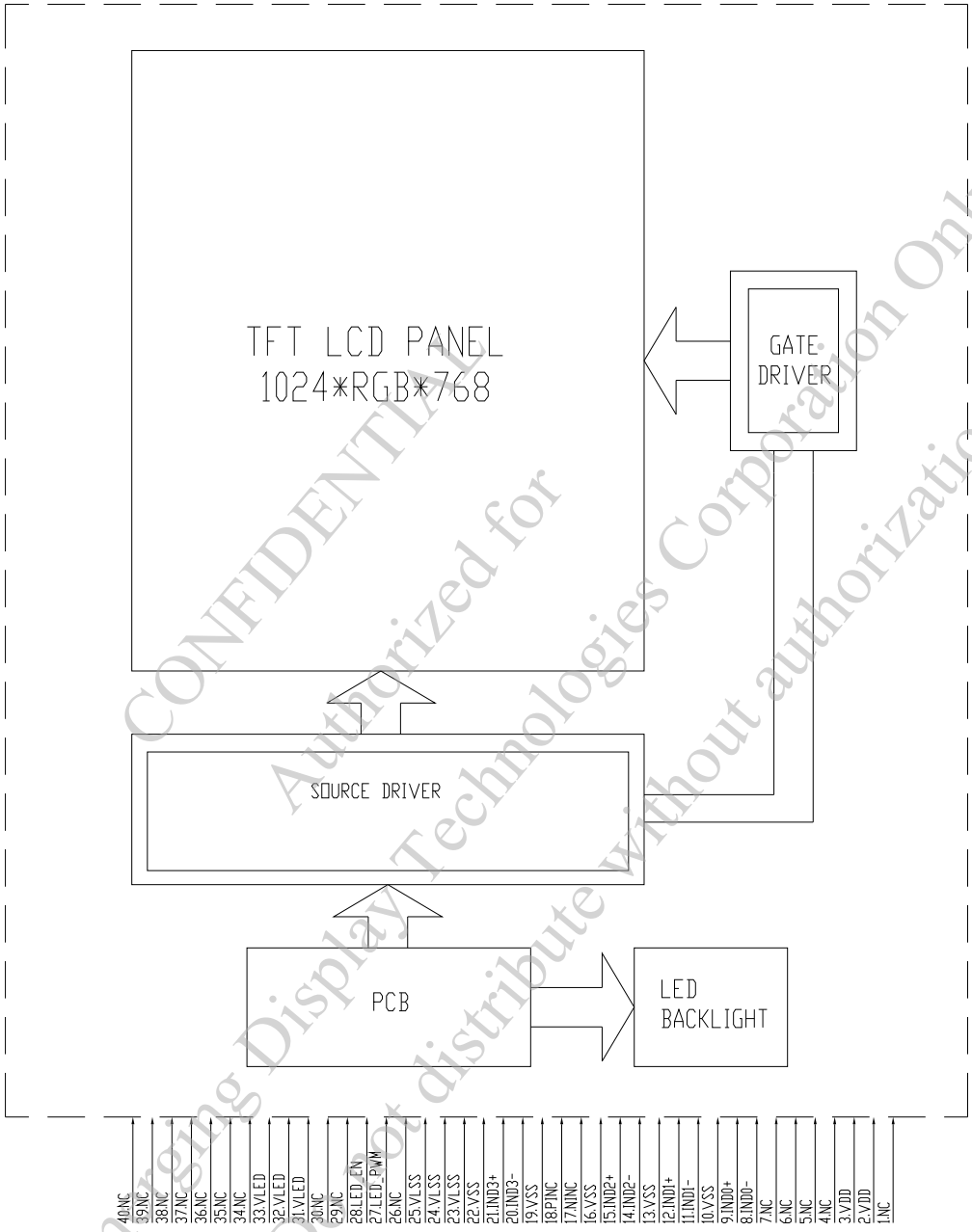
8. BLOCK DIAGRAM

8.1 TFT



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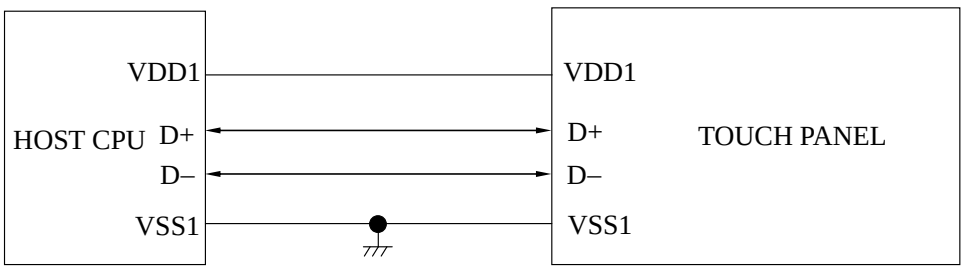
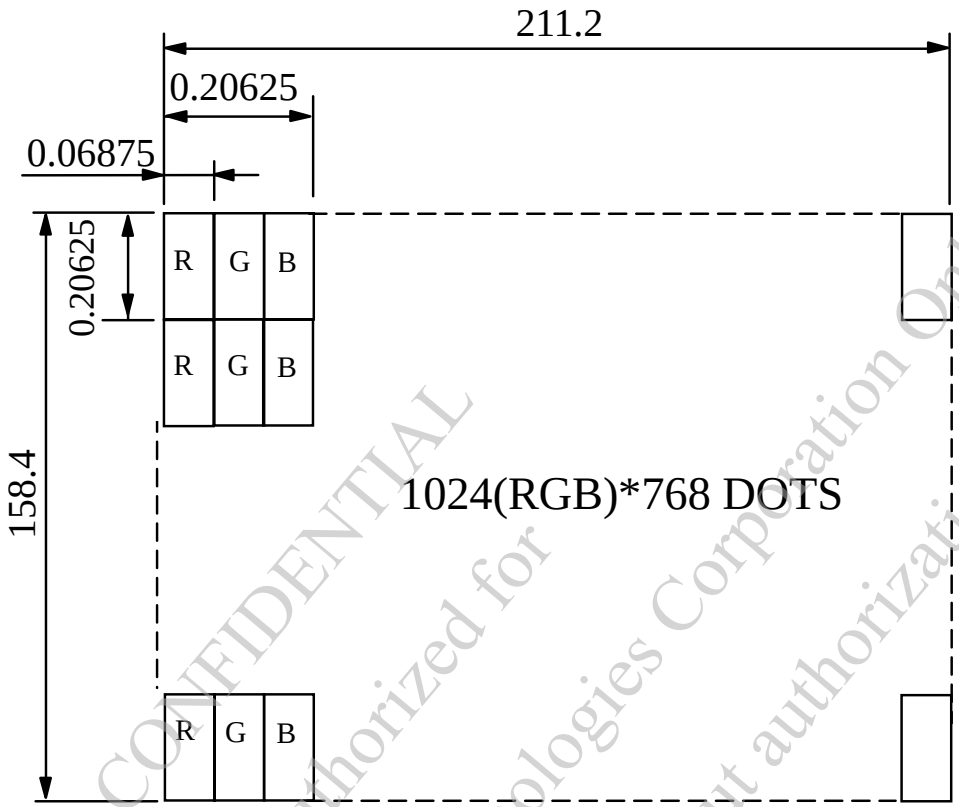
8.2 CTP



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

PIN NO.	SYMBOL	FUNCTION
1	NC	NON CONNECTION
2	VDD	POWER SUPPLY VOLTAGE
3	VDD	POWER SUPPLY VOLTAGE
4	NC	NON CONNECTION
5	NC	NON CONNECTION
6	NC	NON CONNECTION
7	NC	NON CONNECTION
8	IND0–	LVDS SIGNAL (–) — CHANNEL 0 (R0~R5,G0)
9	IND0+	LVDS SIGNAL (+) — CHANNEL 0 (R0~R5,G0)
10	VSS	GROUND
11	IND1–	LVDS SIGNAL (–) — CHANNEL 1 (G1~G5,B0~B1)
12	IND1+	LVDS SIGNAL (+) — CHANNEL 1 (G1~G5,B0~B1)
13	VSS	GROUND
14	IND2–	LVDS SIGNAL (–) — CHANNEL 2 (B2~B5,VS,HS,DE)
15	IND2+	LVDS SIGNAL (+) — CHANNEL 2 (B2~B5,VS,HS,DE)
16	VSS	GROUND
17	NINC	LVDS CLOCK SIGNAL (–)
18	PINC	LVDS CLOCK SIGNAL (+)
19	VSS	GROUND
20	IND3–	LVDS SIGNAL (–) — CHANNEL 3 (R6,R7,G6,G7,B6,B7)
21	IND3+	LVDS SIGNAL (+) — CHANNEL 3 (R6,R7,G6,G7,B6,B7)
22	VSS	GROUND
23	VLSS	POWER SUPPLY VOLTAGE FOR LED DRIVER
24	VLSS	POWER SUPPLY VOLTAGE FOR LED DRIVER
25	VLSS	POWER SUPPLY VOLTAGE FOR LED DRIVER
26	NC	NON CONNECTION
27	LED_PWM	PWM INPUT SIGNAL FOR LED DRIVER
28	LED_EN	LED ENABLE PIN
29	NC	NON CONNECTION
30	NC	NON CONNECTION
31	VLED	POWER SUPPLY VOLTAGE FOR LED DRIVER
32	VLED	POWER SUPPLY VOLTAGE FOR LED DRIVER
33	VLED	POWER SUPPLY VOLTAGE FOR LED DRIVER
34	NC	NON CONNECTION
35	NC	NON CONNECTION
36	NC	NON CONNECTION
37	NC	NON CONNECTION
38	NC	NON CONNECTION
39	NC	NON CONNECTION
40	NC	NON CONNECTION

10.2 CTP

PIN NO.	SYMBOL	FUNCTION
1	VDD1	POWER SUPPLY VOLTAGE
2	NC	NON CONNECTION
3	VSS1	GROUND
4	D+	USB D+
5	D-	USB D–
6	VSS1	GROUND

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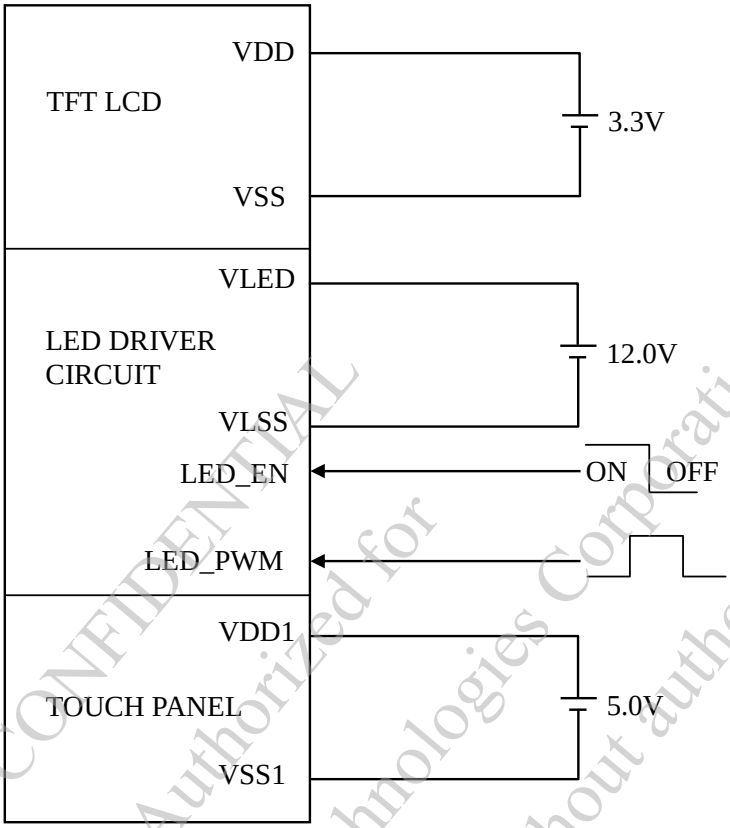
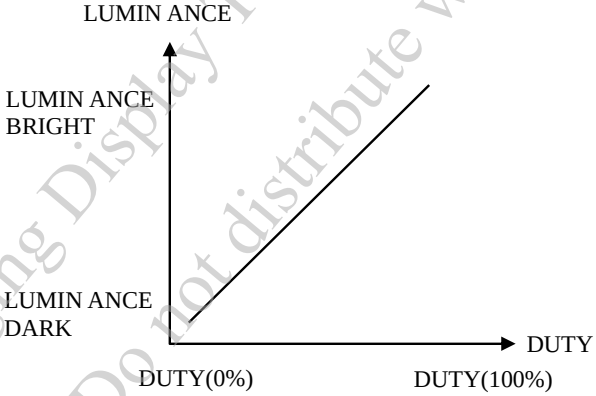
11. POWER SUPPLY

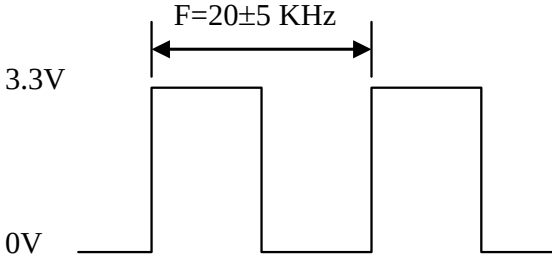
11.1 POWER SUPPLY FOR LCM



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=0~3.3V，OPERATION FREQUENCY：20±5KHz



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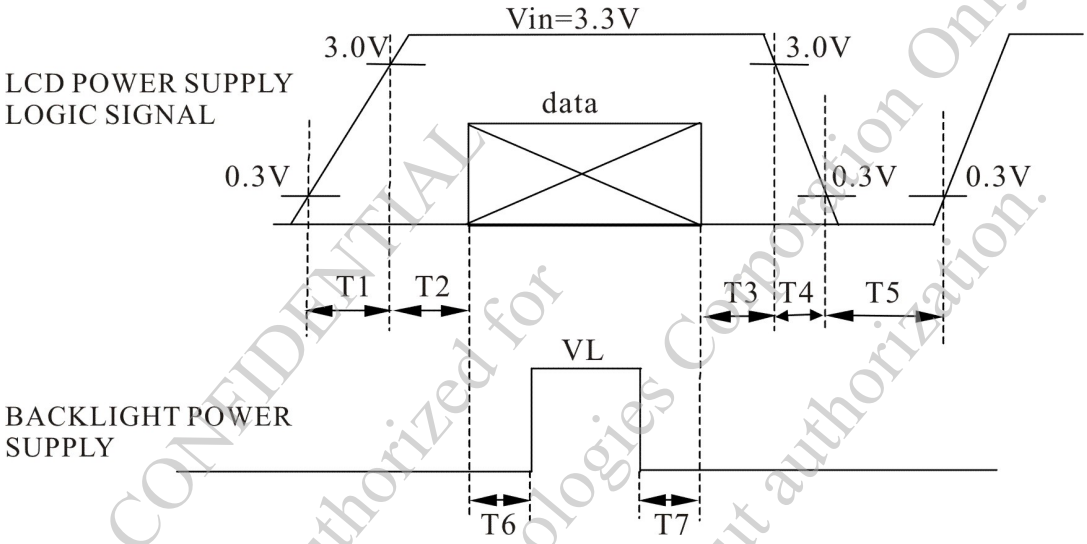
11.2 POWER、SIGNAL SEQUENCE

0.5<t1≤10ms 200ms≤t5
0<t2≤50ms 200ms≤t6
0<t3≤50ms 200ms≤t7
0<t4≤10ms



DATA : RGB DATA , DCLK , DENA

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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.

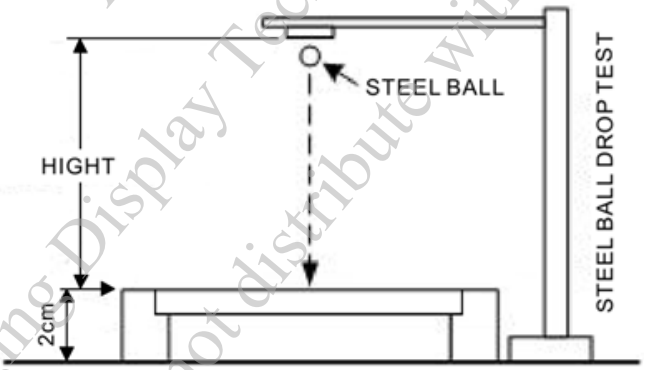
12.2 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	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



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13. INSPECTION CRITERION

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

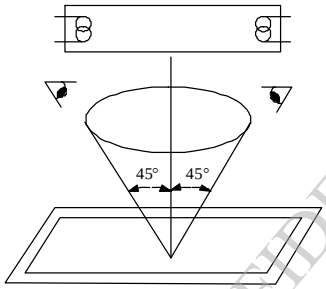
13.2 INSPECTION CONDITIONS

13.2.1 (1)OBSERVATION DISTANCE：35±5cm

(2)VIEW ANGLE：±45°

PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN 45°



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

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 A SAMPLING INSPECTION SHALL BE MADE ACCORDING TO THE FOLLOWING PROVISIONS TO JUDGE THE ACCEPTABILITY

(a)APPLICABLE STANDARD：

MIL-STD-105E LEVEL II

NORMAL INSPECTION, SINGLE SAMPLING

(b)AQL：MAJOR DEFECT：AQL 0.65

MINOR DEFECT：AQL 1.0

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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	1.0
	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	

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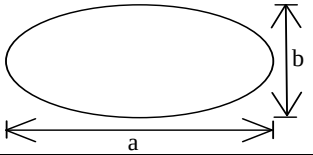
13.3.2 MODULE DEFECTS CLASSIFICATION

<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 colspan="2">ITEM</th><th>ACCEPTABLE COUNT</th></tr>
<tr><td rowspan="3">BRIGHT DOT</td><td>RANDOM</td><td>N ≤ 3</td></tr>
<tr><td>2 DOTS ADJACENT (PAIR)</td><td>N ≤ 1</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 ≤ 1</td></tr>
<tr><td>3 DOTS ADJACENT OR MORE</td><td>N = 0</td></tr>
<tr><td colspan="2">TOTAL BRIGHT AND DARK DOT</td><td>N ≤ 5</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 POLARIZER</td><td>D ≤ 0.25</td><td>IGNORE</td></tr>
<tr><td>0.25 < D ≤ 0.5</td><td>N ≤ 5</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
<tr><td rowspan="2">SURFACE STAINS / DIRT ON POLARIZER</td><td>D < 0.15</td><td>IGNORE</td></tr>
<tr><td>0.15 < D ≤ 0.5</td><td>N ≤ 6</td></tr>
<tr><td rowspan="2">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>
</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>

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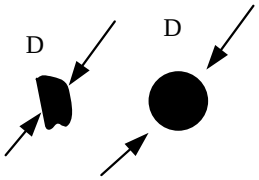
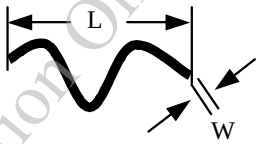
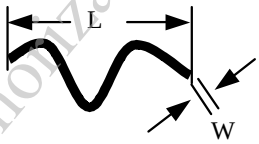
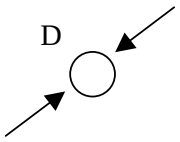
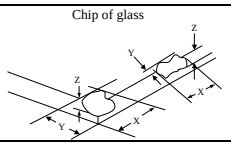
<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>5</td><td>BLACK/WHITE SPOT CIRCULAR TYPE</td><td>THE FOLLOWING BLACK/WHITE SPOT ARE WITHIN THE VIEWING AREA. AVERAGE DIAMETER：D (mm)
<table>
<tr><th>SIZE D</th><th>PERMISSIBLE NO.</th></tr>
<tr><td>D≤0.15</td><td>IGNORE</td></tr>
<tr><td>0.15<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></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≤0.05</td><td>IGNORE</td></tr>
<tr><td>0.05<W≤0.08, L≤8</td><td>3</td></tr>
<tr><td>0.08<W≤0.1, L≤5</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></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≤0.05</td><td>IGNORE</td></tr>
<tr><td>0.05<W≤0.08, L≤8</td><td>3</td></tr>
<tr><td>0.08<W≤0.1, L≤5</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></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></tr>
<tr><td>9</td><td>CHIPPING</td><td colspan="2">
<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></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">IT’S ACCEPTABLE, IF MURA IS SLIGHT 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 LIMITED 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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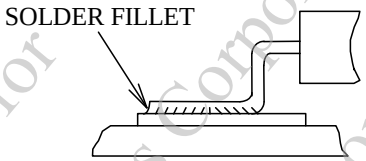
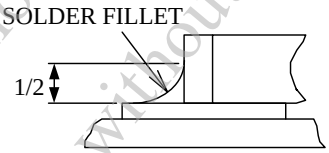
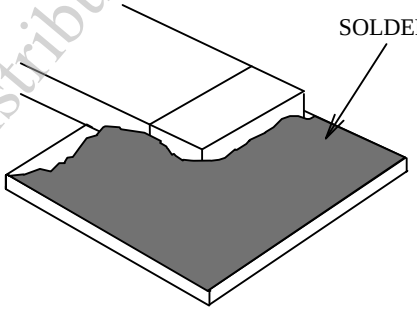
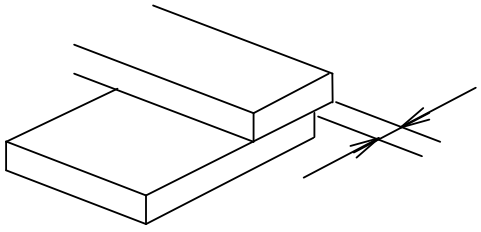
NO.	ITEM	CRITERIA
15	PCB	1. THERE MAY NOT BE MORE THAN 2mm OF SEALANT OUTSIDE THE SEAL AREA ON THE PCB, AND THERE SHOULD BE NO MORE THAN THREE PLACES. 2. NO OXIDATION OR CONTAMINATION ON PCB TERMINALS. 3. PARTS ON PCB MUST BE THE SAME AS ON THE PRODUCTION CHARACTERISTIC CHART. THERE SHOULD BE NO WRONG 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  3. PARTS ALIGNMENT (a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE 

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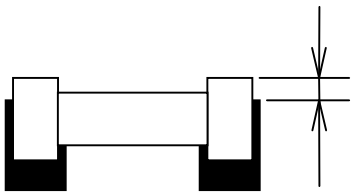
NO.	ITEM	CRITERIA
16	SOLDERING	(b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE  4. NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB. 5. NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE. 6. NO RESIDUE OR SOLDER BALLS ON PCB. 7. NO SHORT CIRCUITS IN COMPONENTS ON PCB.
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.

NOTE：

1.FOR ANY SPOTS OR LINES, WHICH ARE NOT OBSERVED UNDER APPROPRIATE PANEL OPERATING CONDITION ARE DEEMED ACCEPTABLE.

2.THE FOREIGN MATERIALS THAT CAN BE BLOWN OUT BY AIR AND REMOVED BY WET CLEANING ARE NOT REGARDED AS DEFECTS.

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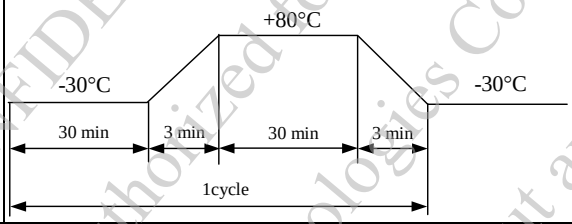
14. RELIABILITY TEST

14.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE

NO.	ITEM	DESCRIPTION
1	HIGH TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +70°C FOR 240 HRS
2	LOW TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -20°C FOR 240 HRS
3	HIGH TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +80°C FOR 240 HRS
4	LOW TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 240 HRS
5	HIGH TEMPERATURE /HUMIDITY TEST STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 60°C, 90% RH 240 HRS
6	THERMAL SHOCK (NOT OPERATED)	THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION: 
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	AIR DISCHARGE ± 12KV CONTACT DISCHARGE ± 8KV ACCORDING TO IEC-61000-4-2

NOTE (1)：THE TEST SAMPLES HAVE RECOVERY TIME FOR 2 HOURS AT ROOM TEMPERATURE BEFORE THE FUNCTION CHECK. IN THE STANDARD CONDITIONS, THERE IS NO DISPLAY FUNCTION FAILURE ISSUE OCCURRED.

14.2 TESTING CONDITIONS AND INSPECTION CRITERIA

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

NO.	ITEM	TEST MODEL	INSPECTION CRITERIA
1	CURRENT CONSUMPTION	REFER TO SPECIFICATION	THE CURRENT CONSUMPTION SHOULD CONFORM TO THE PRODUCT SPECIFICATION.
2	CONTRAST	REFER TO SPECIFICATION	AFTER THE TESTS HAVE BEEN EXECUTED, THE CONTRAST MUST BE LARGER THAN HALF OF ITS INITIAL VALUE PRIOR TO THE TESTS.
3	APPEARANCE	VISUAL INSPECTION	DEFECT FREE

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15. PRECAUTION

15.1 OPERATION

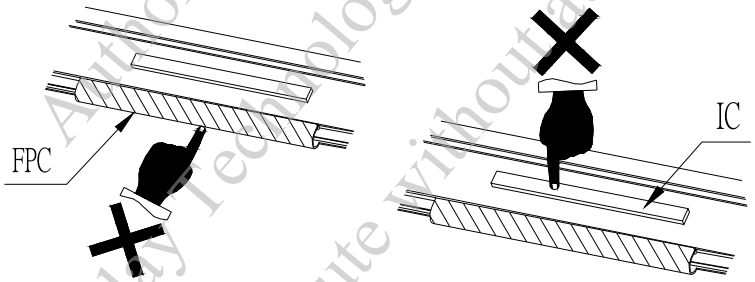
15.1.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .

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 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 CRISTAL 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.

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