

EXAMINED BY :  <i>Dan Kao</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-0009583
APPROVED BY:  <i>Justin Horng</i>		ISSUE : SEP.27, 2023
		TOTAL PAGE : 34
		VERSION : 1

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :  
  
ETML070013DBDHA  
(RoHS)  
  
FOR MESSRS :  
\_\_\_\_\_

CUSTOMER'S APPROVAL

DATE :

\_\_\_\_\_

BY :

\_\_\_\_\_

EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO.	VERSION	PAGE
ETML070013DBDHA	1	0-1

RECORDS OF REVISION	DOC . FIRST ISSUE	SEP.27, 2023
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DATE	REVISED PAGE NO.	SUMMARY

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1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER/DRIVER

PLEASE REFER TO :

H I M A X    H X 8 2 4 9 - A  
H I M A X    H X 8 6 7 8 - C

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

ILITEK ILI2118

1.3 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 ----- 7 inch
- (2) NUMBER OF DOTS ----- 800(RGB)W \* 480H DOTS
- (3) MODULE SIZE ----- 166W \* 105.51H \* 6.66D mm  
(NOT INCLUDED FPC)
- (4) VIEWING AREA ----- 154.4W \* 93.44H mm
- (5) ACTIVE AREA ----- 152.4W \* 91.44H mm
- (6) DOT SIZE ----- 0.0635W \* 0.1905H mm
- (7) PIXEL SIZE ----- 0.1905W \* 0.1905H mm
- (8) LCD TYPE ----- TFT , IPS ,TRANSMISSIVE ,  
NORMALLY BLACK
- (9) COLOR ----- 262K
- (10) VIEWING DIRECTION ----- SUPER WIDE VIEW
- (11) BACK LIGHT ----- LED , COLOR : WHITE
- (12) INTERFACE MODE ----- RGB(18BIT) PARALLEL  
(SYNC OR DE MODE)
- (13) WEIGHT ----- 215g

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## 2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

- (1) TOUCH PANEL SIZE ----- 7 inch
- (2) OUTER DIMENSION ----- 166W \* 105.51H \* 1.8D mm  
(NOT INCLUDED FPC)
- (3) ACTIVE AREA ----- 155 W \* 93.05H mm
- (4) INPUT TYPE ----- MULTI-TOUCH
- (5) NUMBER OF TOUCH SENSOR ----- 24\*14 SENSORS
- (6) INTERFACE MODE ----- I2C
- (7) RESOLUTION ----- 2048\*2048

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### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.3	+4.0	V	VSS=0
POWER DISSIPATION FOR LED BACKLIGHT	PD	—	6912	mW	
FORWARD CURRENT FOR LED BACKLIGHT	I <sub>LED</sub>	—	720	mA	

NOTE ( 1 ) : LCM SHOULD BE GROUNDED 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	3.6	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 )
HUMIDITY	NOTE ( 2 )		NOTE ( 2 )		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s <sup>2</sup> ( 0.25 G )	—	11.76 m/s <sup>2</sup> ( 1.2 G )	10~100 Hz XYZ DIRECTIONS 1 HR EACH
SHOCK	—	29.4 m/s <sup>2</sup> ( 3 G )	—	490 m/s <sup>2</sup> ( 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 ) : 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 ( 3 ) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE THIS PHENOMENON IS REVERSIBLE.

4. ELECTRICAL CHARACTERISTICS

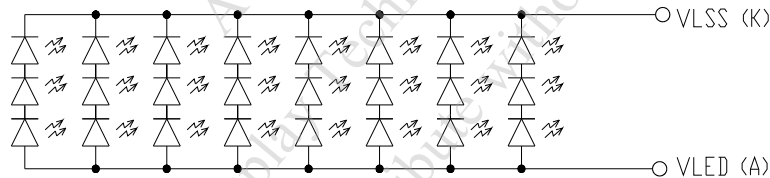
4.1 LCD MODUBLE ELECTRICAL CHARACTERISTICS

Ta = 25 °C

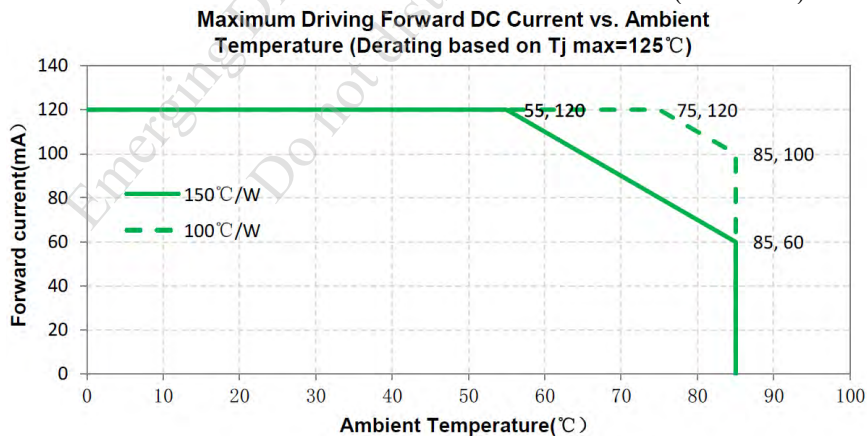
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.2	3.3	3.6	V	VSS=0
LOGIC HIGH INPUT VOLTAGE	VIH	—	0.7*VDD	—	VDD+0.3	V	
LOGIC LOW INPUT VOLTAGE	VIL	—	VSS-0.3	—	0.3*VDD	V	
LOGIC HIGH OUTPUT VOLTAGE	VOH	—	VDD-0.4	—	—	V	
LOGIC LOW OUTPUT VOLTAGE	VOL	—	VSS	—	VSS+0.4	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS = 3.3V	—	200	260	mA	NOTE (1)
POWER SUPPLY VOLTAGE FOR LED DRIVER	VLED-VLSS	I <sub>LED</sub> =240mA	8.1	8.7	9.6	V	NOTE (2)
LED LIFE TIME	—	I <sub>F</sub> =20mA (PER LED)	30K	—	—	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 FAILURE

- A. LCD LUMINANCE BECOMES HALF OF THE MINIMUM VALUE.
- B. LED DOESN'T LIGHT NORMALLY

4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE	VDD1-VSS1	—	3.15	3.30	3.45	V
LOGIC HIGH INPUT VOLTAGE	V <sub>IH</sub>	NOTE ( 1 )	1	—	VDD1	V
LOGIC LOW INPUT VOLTAGE	V <sub>IL</sub>	—	—	—	0.5	V
OUTPUT HIGH VOLTAGE	V <sub>OH</sub>	—	—	NOTE ( 2 )	—	V
OUTPUT LOW VOLTAGE	V <sub>OL</sub>	—	—	—	0.1	V
POWER SUPPLY CURRENT	IDD1	VDD1-VSS1=3.30V	—	30	40	mA

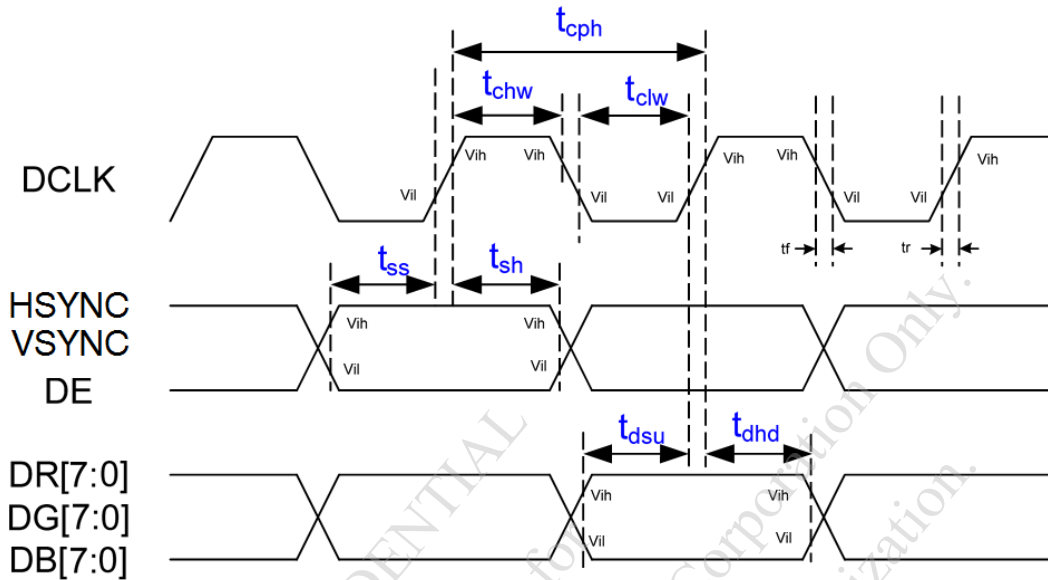
NOTE ( 1 ) : V<sub>IH</sub> INCLUDES PINS /RST, SDA, SCL, /INT

NOTE ( 2 ) : V<sub>OH</sub> IS FOR TP\_INT OUTPUT VOLTAGE LEVEL WHICH IS PROGRAMMABLE BY REGISTERS. TYPICAL VALUES ARE 1.2V/1.5V/1.8V/V<sub>VDD</sub>.

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5. TIMING CHART

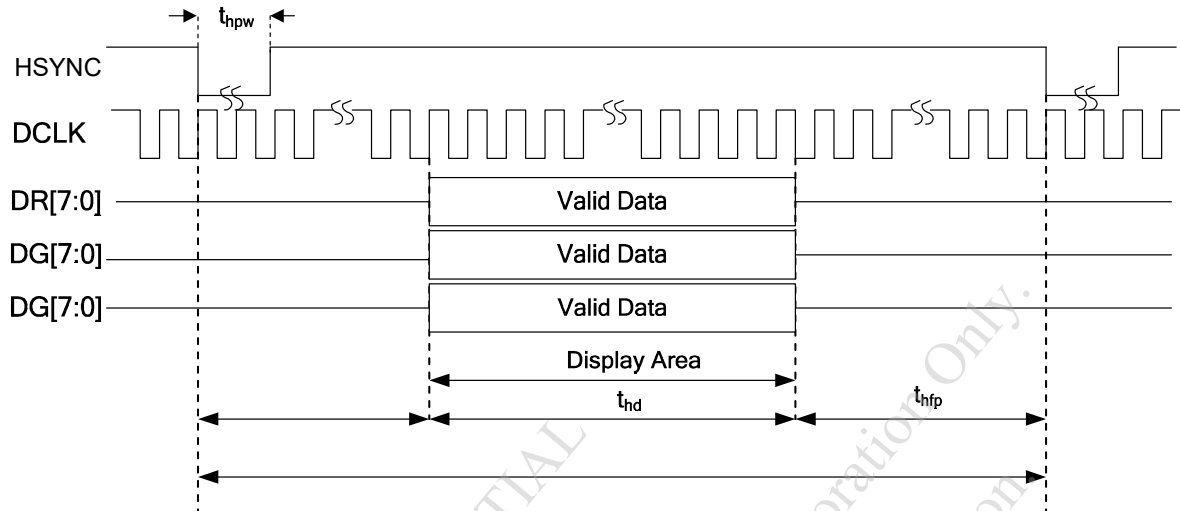
5.1 INPUT SIGNAL TIMING



ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK PERIOD	Tcph	16.8	—	—	ns
DCLK CLOCK HIGH WIDTH	Tchw	6	—	—	ns
DCLK CLOCK LOW WIDTH	Tclw	6	—	—	ns
VSYNC SETUP TIME	Tss	5	—	—	ns
VSYNC HOLD TIME	Tsh	5	—	—	ns
HSYNC SETUP TIME	Tss	5	—	—	ns
HSYNC HOLD TIME	Tsh	5	—	—	ns
DE SETUP TIME	Tss	5	—	—	ns
DE HOLD TIME	Tsh	5	—	—	ns
DATA SETUP TIME	Tdsu	5	—	—	ns
DATA HOLD TIME	Tdhd	5	—	—	ns
INPUT SIGNAL RISING TIME	Tr	—	—	10	ns
INPUT SIGNAL FALLING TIME	Tf	—	—	10	ns

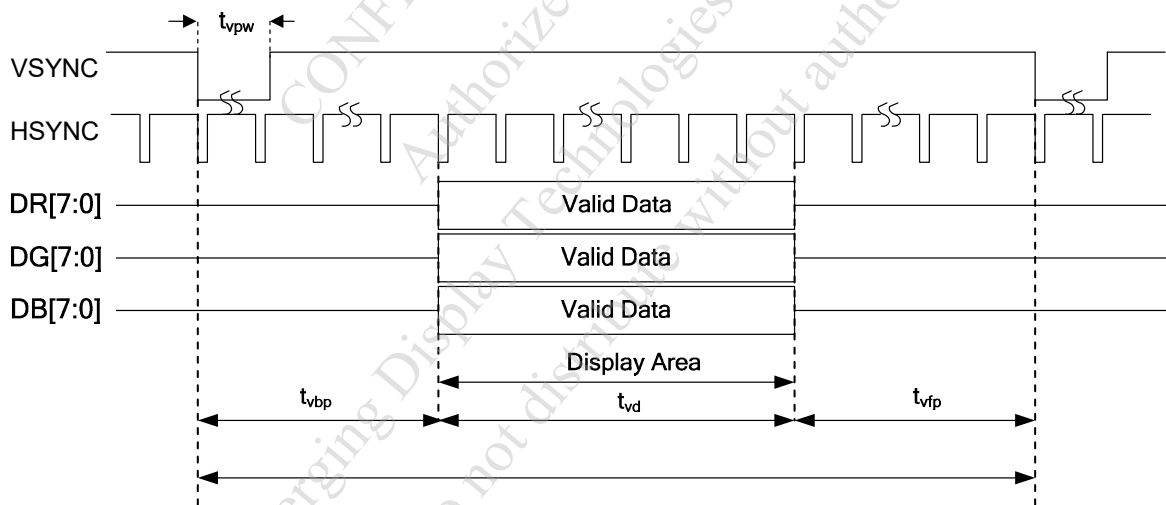
5.2 SYNC MODE SIGNAL CHARACTERISTICS

HORIZONTAL



HORIZONTAL INPUT TIMING AT SYNC MODE

VERTICAL

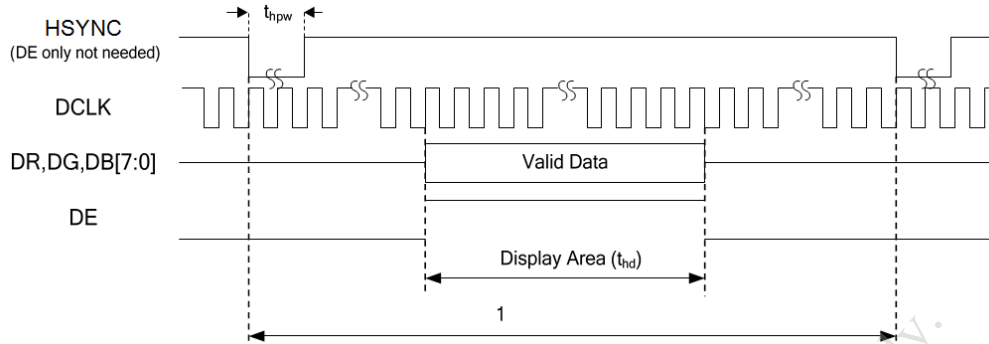


VERTICAL INPUT TIMING AT SYNC MODE

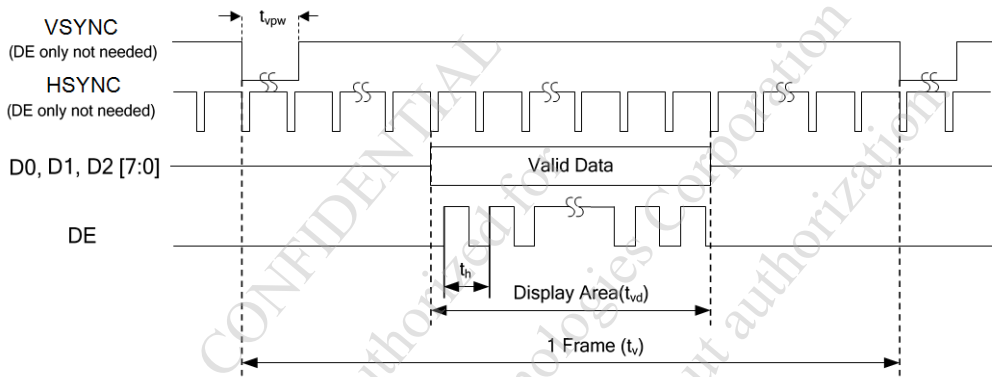
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY	$F_{DCLK}$	25.2	27.2	30.5	MHz
HORIZONTAL VALID DATA	$t_{hd}$	800			DCLK
HSYNC PULSE WIDTH	$t_{hpw}$	1	2	100	DCLK
HSYNC BACK PORCH	$t_{hbp}$	5	16	101	DCLK
HSYNC FRONT PORCH	$t_{hfp}$	19	44	115	DCLK
1 HORIZONTAL LINE	$t_h$	856	860	920	DCLK
VERTICAL VALID DATA	$t_{vd}$	480			H
VSYNC PULSE WIDTH	$t_{vpw}$	1	2	66	H
VSYNC BACK PORCH	$t_{vbp}$	5	5	67	H
VSYNC FRONT PORCH	$t_{vfp}$	5	43	67	H
1 VERTICAL FIELD	$t_v$	490	528	552	H

NOTE (1) : DCLK FREQUENCY MIN/MAX VALUE IS BASE ON FRAME RATE 60 Hz.

5.3 DE MODE SIGNAL CHARACTERISTICS



HORIZONTAL INPUT TIMING AT DE ONLY MODE

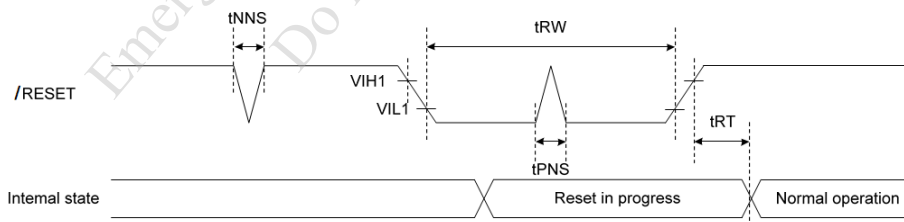


VERTICAL INPUT TIMING AT DE ONLY MODE

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY	$F_{DCLK}$	25.2	27.2	30.5	MHz
HORIZONTAL VALID DATA	$t_{hd}$	800			DCLK
1 HORIZONTAL LINE	$t_h$	856	860	920	DCLK
VERTICAL VALID DATA	$t_{vd}$	480			H
1 VERTICAL FIELD	$t_v$	490	528	552	H

NOTE (1) : DCLK FREQUENCY MIN/MAX VALUE IS BASE ON FRAME RATE 60 Hz.

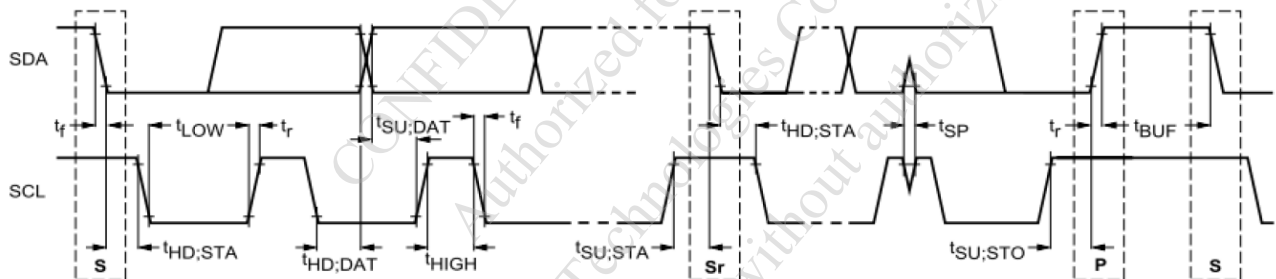
5.4 HARDWARE RESET TIMING



ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
RESET PULSE WIDTH	$t_{RW}$	10	—	—	$\mu s$
RESET COMPLETE TIME	$t_{RT}$	—	—	5	$\mu s$
POSITIVE SPIKE NOISE WIDTH	$t_{PNS}$	—	—	100	ns
NEGATIVE SPIKE NOISE WIDTH	$t_{NNS}$	—	—	100	ns

5.5 CAPACITIVE TOUCH PANEL I2C INTERFACE TIMING CHARACTERISTICS

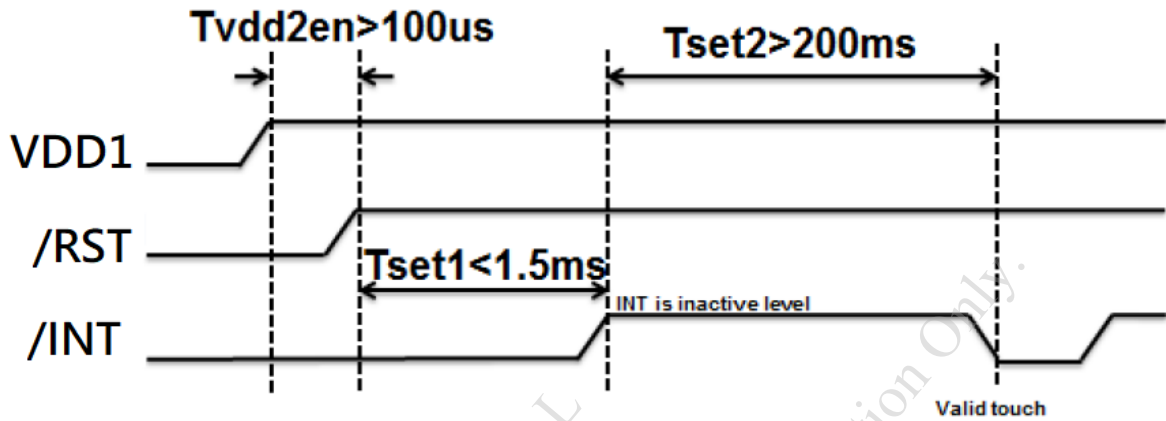
ITEM	SYMBOL	STANDARD MODE			FAST MODE		
		MIN.	MAX.	UNIT	MIN.	MAX.	UNIT
SCL CLOCK FREQUENCY	$f_{SCL}$	0	100	kHz	0	400	kHz
HOLD TIME (REPEATED) START CONDITION. AFTER THIS PERIOD, THE FIRST CLOCK PULSE IS GENERATED	$t_{HD;STA}$	4.0	—	$\mu s$	0.6	—	$\mu s$
LOW PERIOD OF THE SCL CLOCK	$t_{LOW}$	4.7	—	$\mu s$	1.3	—	$\mu s$
HIGH PERIOD OF THE SCL CLOCK	$t_{HIGH}$	4.0	—	$\mu s$	0.6	—	$\mu s$
SET-UP TIME FOR A REPEATED START CONDITION	$t_{SU;STA}$	4.7	—	$\mu s$	0.6	—	$\mu s$
DATA HOLD TIME	$t_{HD;DAT}$	5.0	—	$\mu s$	0	0.9	$\mu s$
DATA SET-UP TIME	$t_{SU;DAT}$	250	—	ns	100	—	ns
RISE TIME OF BOTH SDA AND SCL SIGNALS	$t_r$	—	1000	ns	—	300	ns
FALL TIME OF BOTH SDA AND SCL SIGNALS	$t_f$	—	300	ns	—	300	ns
SET-UP TIME FOR STOP CONDITION	$t_{SU;STO}$	4.0	—	$\mu s$	0.6	—	$\mu s$
BUS FREE TIME BETWEEN A STOP AND START CONDITION	$t_{BUF}$	4.7	—	$\mu s$	1.3	—	$\mu s$



THE TIMING OF I2C INTERFACE

## 5.6 CAPACITIVE TOUCH PANEL POWER SEQUENCE

### 5.6.1 POWER ON SEQUENCE

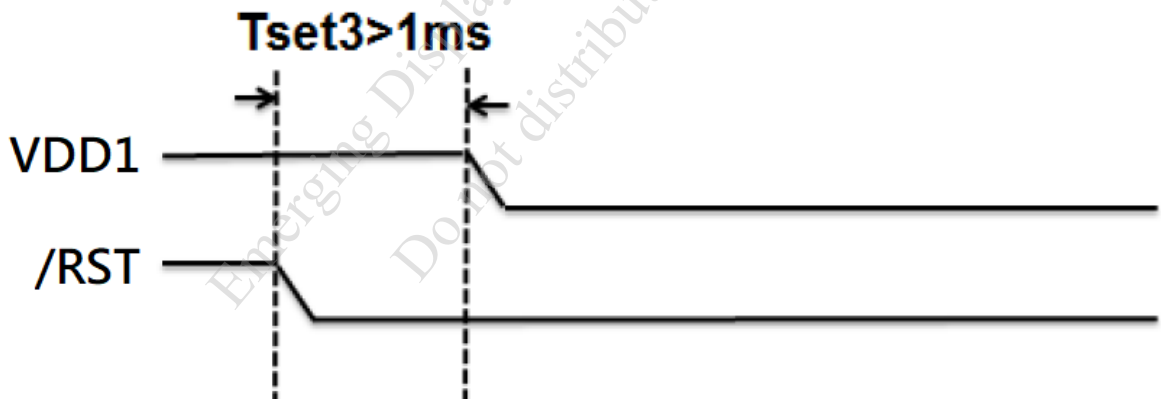


NOTE ( 1 ) : AFTER TP\_RST SET TO HIGH, TP\_INT REQUIRES  $T_{set1}$  TO SET TO INACTIVE STATE

NOTE ( 2 ) : THE TP\_INT PIN CAN BE DEFINED BY TOUCH FIRMWARE DESIGN. IT CAN BE ACTIVE HIGH OR ACTIVE LOW.

ITEM	STANDARD MODE		UNIT
	MIN.	MAX.	
$T_{set1}$	—	1.5	ms
$T_{set2}$	200	—	ms
$T_{vdd2en}$	100	—	us

### 5.6.2 POWER OFF SEQUENCE



ITEM	STANDARD MODE		UNIT
	MIN.	MAX.	
$T_{set3}$	1	—	ms

6. OPTICAL CHARACTERISTICS (NOTE 1)

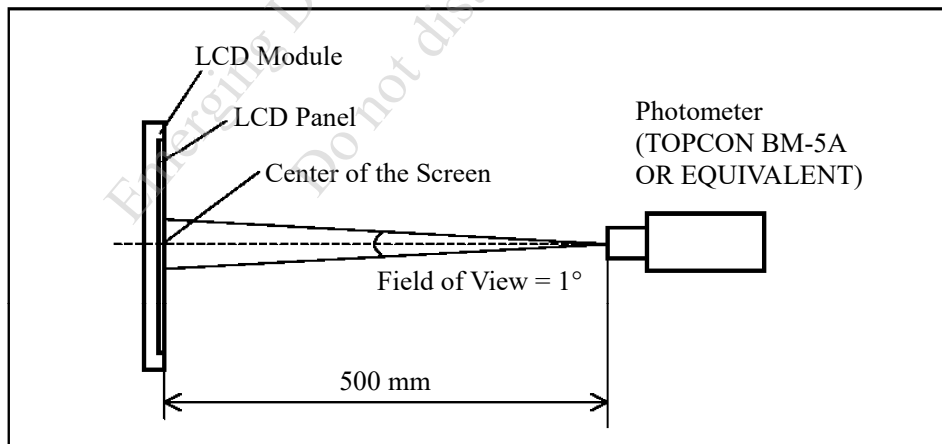
6.1 OPTICAL CHARACTERISTICS

Ta = 25 ± 2 °C

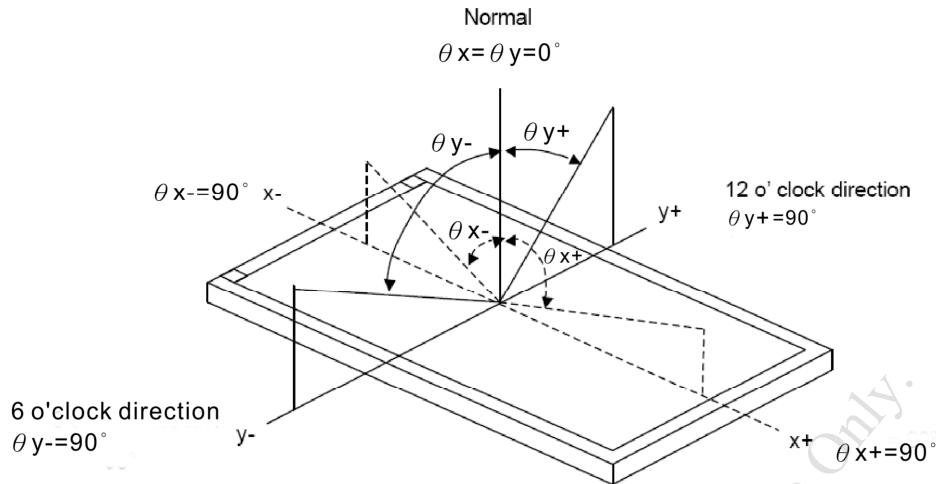
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE	$\theta_{y+}$	CR ≥ 10	70	80	—	deg.	NOTE (2) NOTE (3)	
	$\theta_{y-}$		$\theta_x=0^\circ$	70	80			—
	$\theta_{x+}$		$\theta_y=0^\circ$	70	80			—
	$\theta_{x-}$			70	80			—
CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	650	850	—	—	NOTE (3)	
RESPONSE TIME	T <sub>R</sub> (rise) + T <sub>F</sub> (fall)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	25	35	msec	NOTE (4)	
COLOR CHROMATICITY (CENTER)	WHITE	W <sub>x</sub>	$\theta_x=0^\circ, \theta_y=0^\circ$ I <sub>LED</sub> =240mA NTSC : 75 %	0.27	0.32	0.37	—	NOTE (5)
		W <sub>y</sub>		0.31	0.36	0.41		
	RED	R <sub>x</sub>		0.59	0.64	0.69	—	
		R <sub>y</sub>		0.29	0.34	0.39		
	GREEN	G <sub>x</sub>		0.27	0.32	0.37	—	
		G <sub>y</sub>		0.59	0.64	0.69		
	BLUE	B <sub>x</sub>		0.08	0.13	0.18	—	
		B <sub>y</sub>		0.02	0.07	0.12		
THE BRIGHTNESS OF MODULE (CENTER)	B	$\theta_x=0^\circ, \theta_y=0^\circ$	340	425	—	cd/m <sup>2</sup>	NOTE (6)	
THE UNIFORMITY OF MODULE	—	I <sub>LED</sub> =240mA	75	80	—	%	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 :



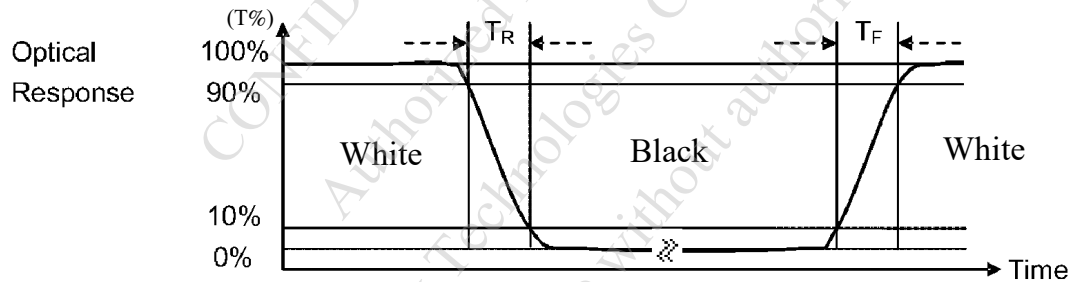
NOTE (3) : DEFINITION OF CONTRAST RATIO (CR) :

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.



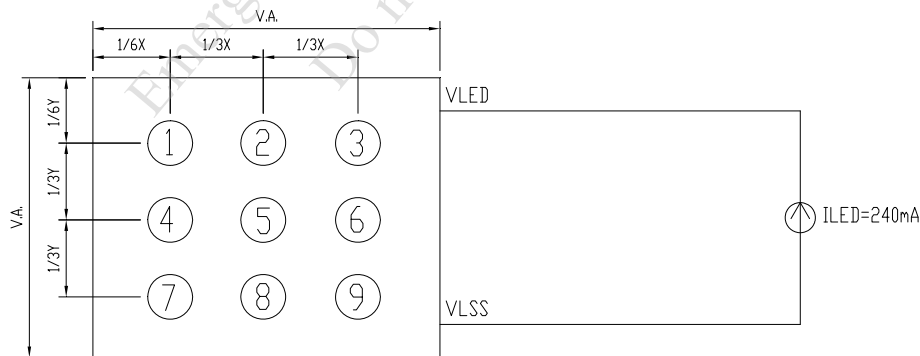
NOTE (5) : DEFINITION OF COLOR CHROMATICITY

(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

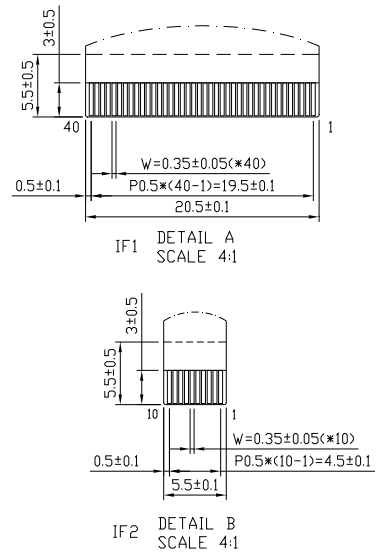
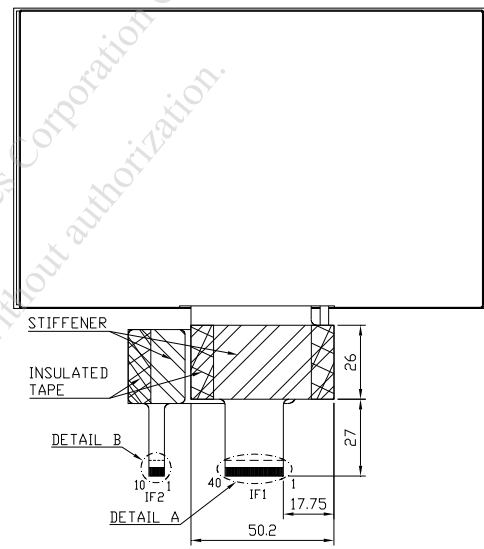
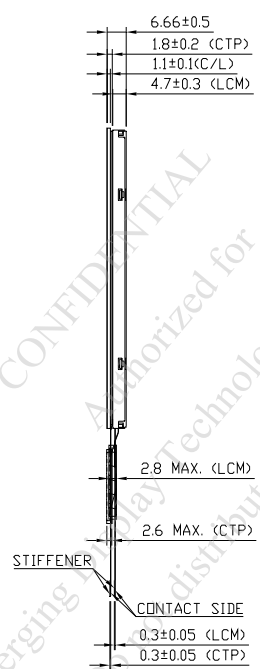
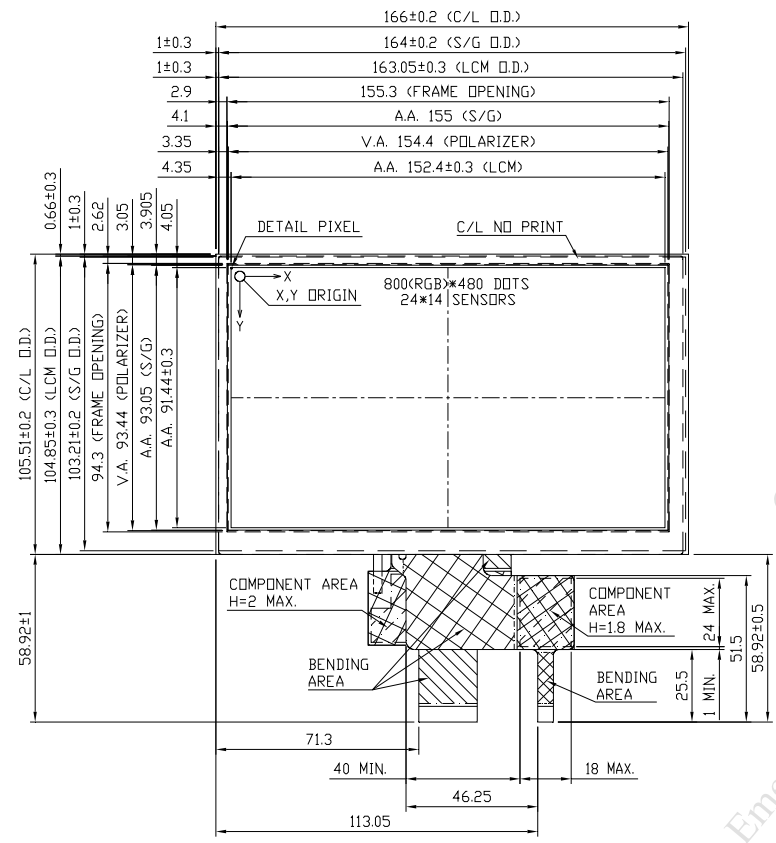


UNIT : mm

(b) THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

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

7. OUTLINE DIMENSIONS



UNIT : mm  
SCALE : NTS

THIRD ANGLE PROJECTION

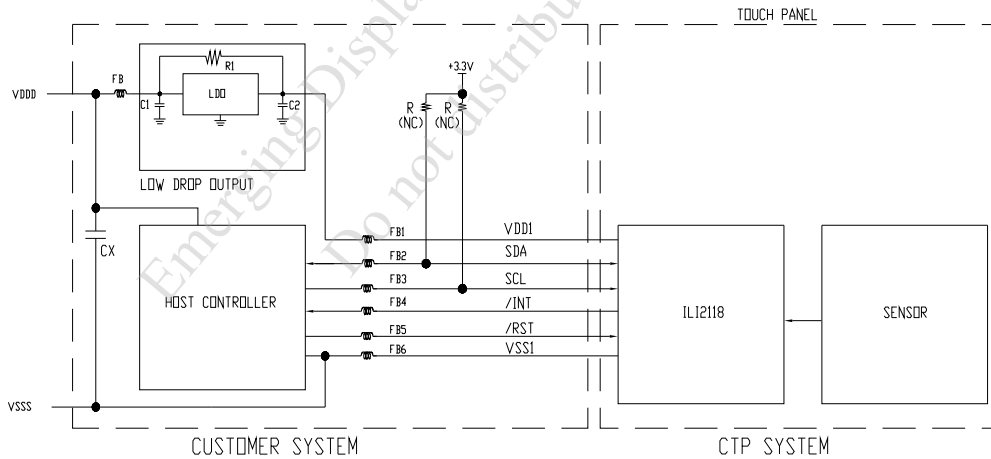
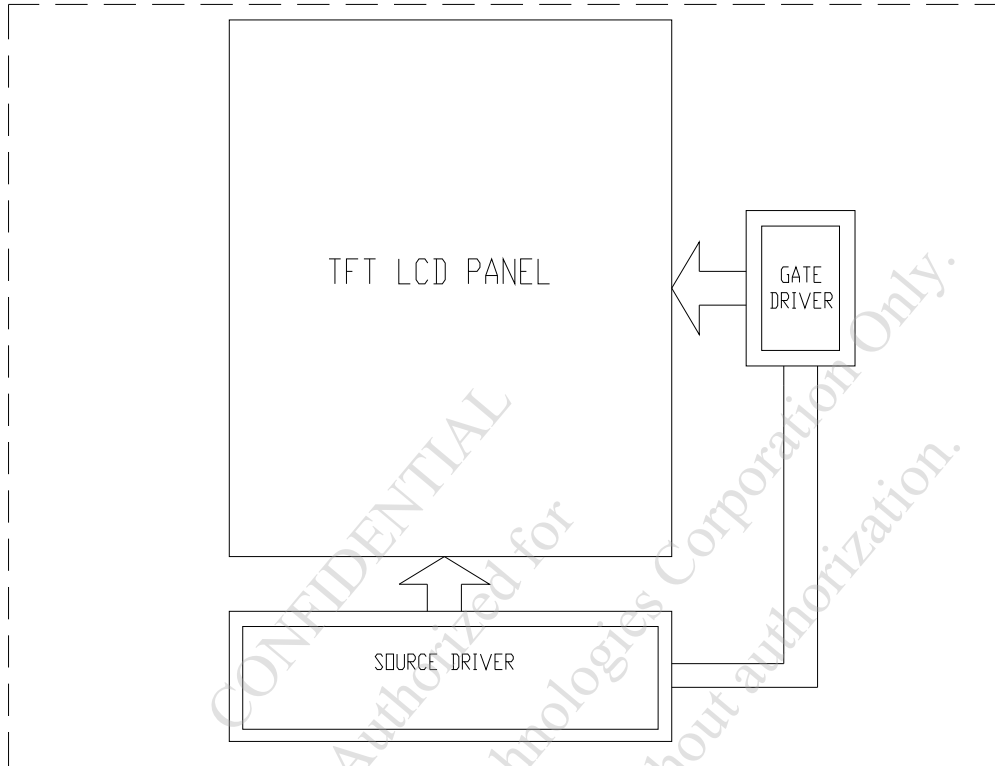
NOT SPECIFIED TOLERANCE IS ± 0.5mm

NOTE:

1. C/L GLASS : SODA LIME , NON-STRENGTHEN.
2. IF1: RECOMMEND MATCH CONNECTOR KYOCERA : 04 6240 040 SERIES.  
IF2: RECOMMEND MATCH CONNECTOR KYOCERA : 04 6240 010 SERIES.
3. FPC BENDING RADIUS SHOULD BE MORE THAN 1.0 mm.

8. BLOCK DIAGRAM

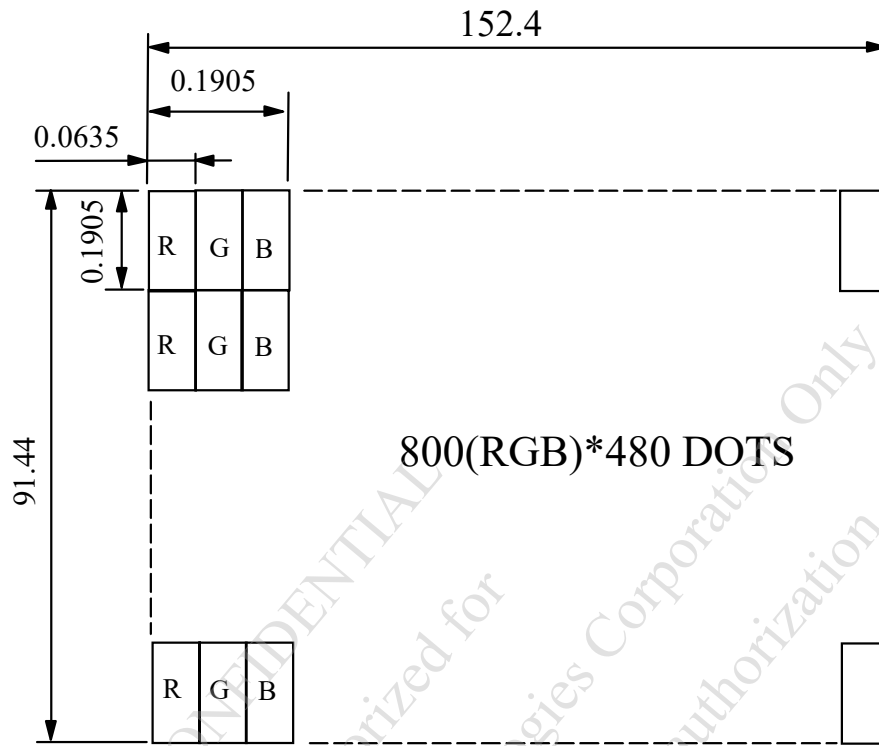
8.1 TFT



NOTE ( 1 ) : VALUE OF PULL-UP RESISTORS(R) DEPENDS ON CLOCK SPEED , NUMBER OF CHIPS ON THE I2C BUS AND NOISE LEVEL. LOW SPEED 4.7K TO 10K OR HIGHER, HIGH SPEED 1K TO 4.7K OR HIGHER. SIGNALS SHOULD BE MEASURED WITH AN OSCILLOSCOPE TO VERIFY WAVEFORM AND HIGH / LOW LEVELS.

NOTE ( 2 ) : POWER SUPPLY SHALL BE CLEAN AND NOISE FREE. ADDITIONAL FILTERING OR A SEPARATE LDO (LOW DROP OUT) REGULATOR CAN BE REQUIRED. C1 AND C2 CAPACITORS RECOMMENDATION : 4.7 $\mu$ F OR 10  $\mu$ F

9. DETAIL DRAWING OF DOT MATRIX



UNIT : mm

SCALE : NTS

NOT SPECIFIED TOLERANCE IS  $\pm 0.1$

DOTS MATRIX TOLERANCE IS  $\pm 0.01$

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## 10. INTERFACE SIGNALS

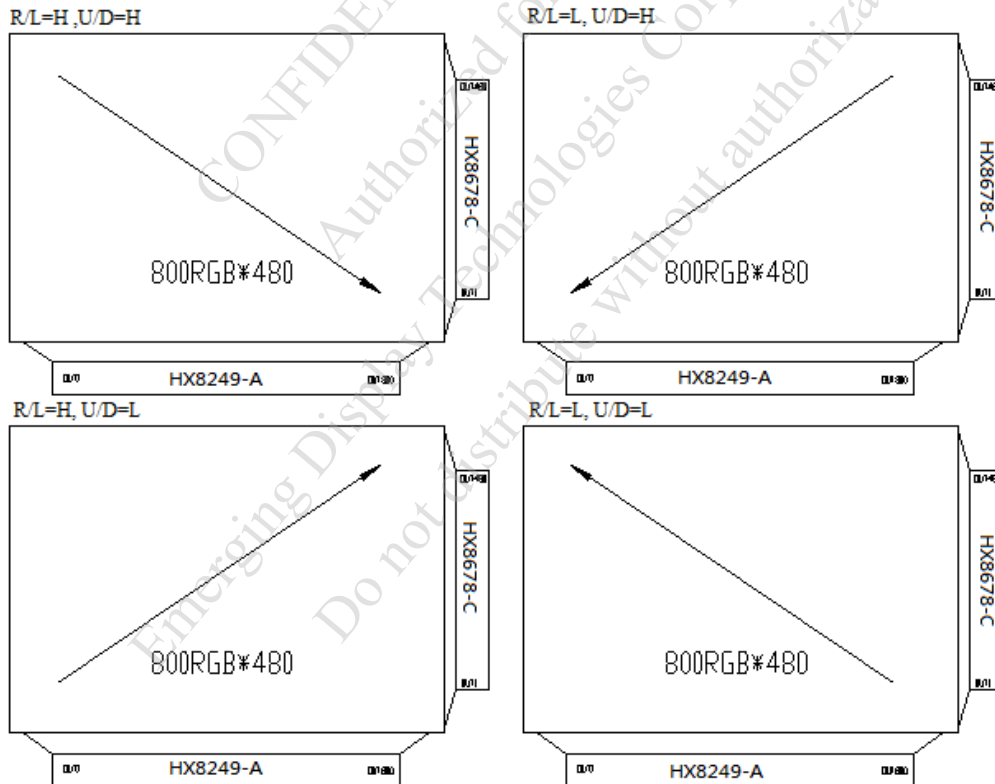
### 10.1 IN1 INTERFACE

PIN NO.	SYMBOL	FUNCTION
1	VLED	LED BACKLIGHT ANDDE
2	VLSS	LED BACKLIGHT CATHODE
3	U/D	U/D=H:OUT1→OUT2→-----→OUT480 U/D=L:OUT480→-----→OUT2→OUT1
4	R/L	R/L= H:OUT1→OUT2→-----→OUT800 R/L=L:OUT800→-----→OUT2→OUT1
5	NC	NC
6	VDD	POWER SUPPLY ( 3.3V)
7	VDD	POWER SUPPLY ( 3.3V)
8	VDD	POWER SUPPLY ( 3.3V)
9	NC	NC
10	DE	DATA ENABLE INPUT
11	VSS	GROUND
12	VSS	GROUND
13	B5	BLUE DATA BIT5
14	B4	BLUE DATA BIT4
15	B3	BLUE DATA BIT3
16	VSS	GROUND
17	B2	BLUE DATA BIT2
18	B1	BLUE DATA BIT1
19	B0	BLUE DATA BIT0
20	VSS	GROUND
21	G5	GREEN DATA BIT 5
22	G4	GREEN DATA BIT 4
23	G3	GREEN DATA BIT 3
24	VSS	GROUND
25	G2	GREEN DATA BIT 2
26	G1	GREEN DATA BIT 1
27	G0	GREEN DATA BIT 0
28	VSS	GROUND
29	R5	RED DATA BIT 5
30	R4	RED DATA BIT 4
31	R3	RED DATA BIT 3
32	VSS	GROUND
33	R2	RED DATA BIT 2
34	R1	RED DATA BIT 1
35	R0	RED DATA BIT 0
36	VSS	GROUND
37	MODE	INPUT TIMING MODE, H : SYNC MODE ; L : DE MODE
38	DCLK	DOT DATA COLOCK
39	HSYNC	HORIZONTAL SYNC
40	VSYNC	VERTICAL SYNC

10.2 IF2 INTERFACE

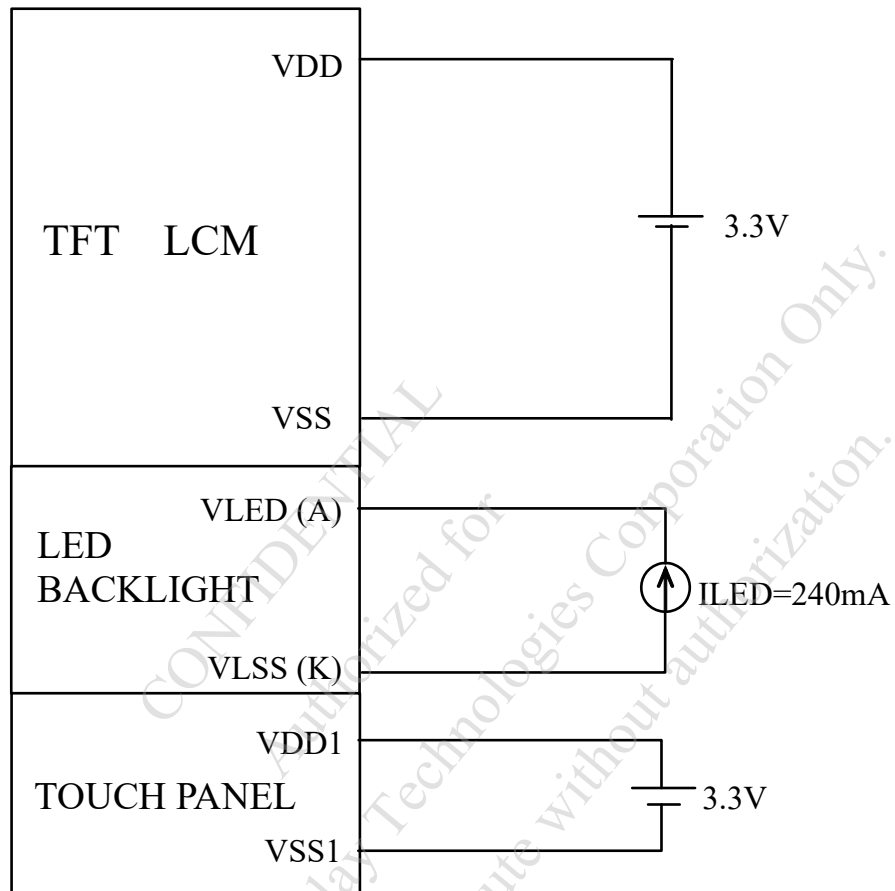
PIN NO.	SYMBOL	FUNCTION
1	VSS1	GROUND
2	/RST	EXTERNAL RESET, LOW IS ACTIVE (+3.3V LEVEL)
3	/INT	EXTERNAL INTERRUPT TO THE HOST (+3.3V LEVEL)
4	SCL	I2C CLOCK INPUT (+3.3V LEVEL)
5	SDA	I2C DATA INPUT AND OUTPUT (+3.3V LEVEL)
6	VDD1	POWER SUPPLY VOLTAGE (+3.3V)
7	NC	NON CONNECTION
8	NC	NON CONNECTION
9	NC	NON CONNECTION
10	NC	NON CONNECTION

10.3 SELECTION OF SCANNING MODE



## 11. POWER SUPPLY

### 11.1 POWER SUPPLY FOR LCM



## 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.

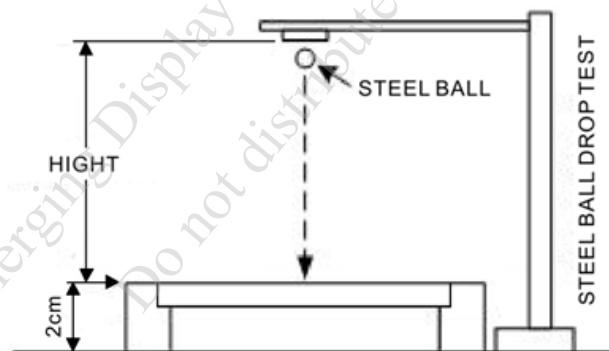
### 12.2 HARDNESS

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 TIME/ 1 POINTS, 25°C (CENTER POINT)



12.4 I2C INTERFACE DATA STRUCTURE

DEVICE ADDRESS

THE DEVICE ADDRESSES ARE 7-BINARY BITS LONG AND ARE CONVENTIONALLY EXPRESSED AS 4 BITS FOLLOWED BY 3 BITS FOLLOWED BY THE LETTER 'b', 0100 110b. THESE ADDRESSES OCCUPY THE HIGH SEVEN BITS OF AN EIGHT-BIT FIELD ON THE BUS.

MSB	LSB
0 1 0 0 1 1 0	0/1
Device Address	R/W

7-BIT DEVICE ADDRESS:  
0x26

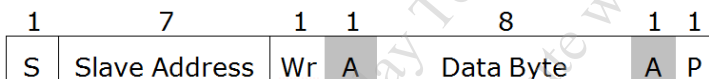
8-BIT DEVICE READ  
ADDRESS:0x4D

8-BIT DEVICE WRITE  
ADDRESS:0x4c

I2C DEVICE ADDRESS

DATA TRANSFER

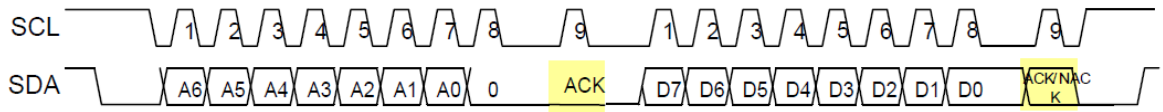
DATA IS TRANSFERRED OVER THE I<sup>2</sup>C BUS WITH 8-BIT ADDRESS AND 8-BIT DATA. THE RELATED PROTOCOL AND TIMING DIAGRAMS ARE SHOWN AS BELOW.



- S START CONDITION
  - Sr REPEATED START CONDITION
  - Rd READ (BIT VALUE OF 1)
  - Wr WRITE (BIT VALUE OF 0)
  - A ACKNOWLEDGE (THIS BIT POSITION MAY BE '0' FOR AN ACK OR '1' FOR A NACK)
  - P STOP CONDITION
- |     |                 |
|-----|-----------------|
|     | MASTER-TO-SLAVE |
|     | SLAVE-TO-MASTER |
| --- | CONTINUE        |

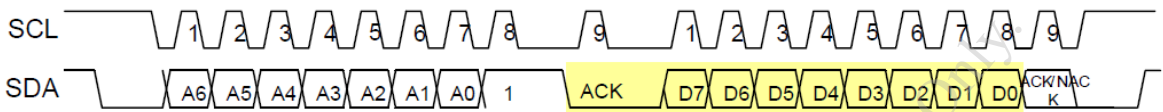
GENERIC TRANSACTION DIAGRAM

I2C WRITE TIMING



=> slave to master

I2C READ TIMING

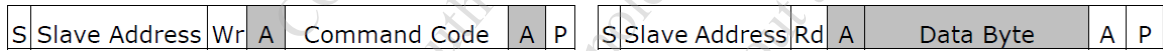


=> slave to master

BYTE WRITE

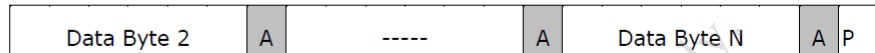
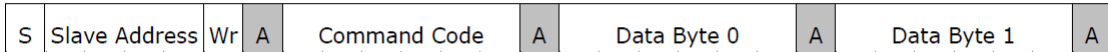
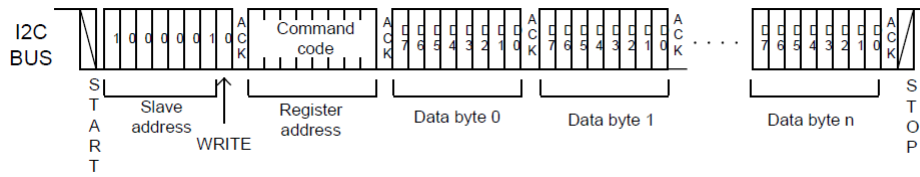


BYTE READ

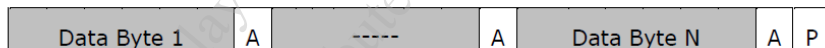
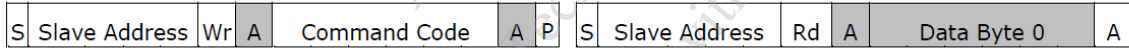
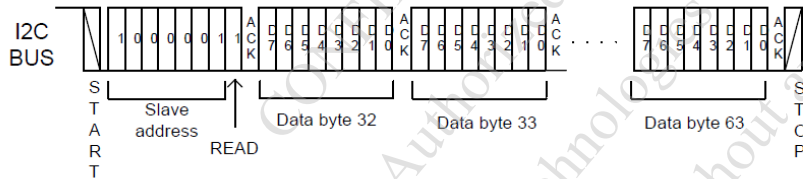
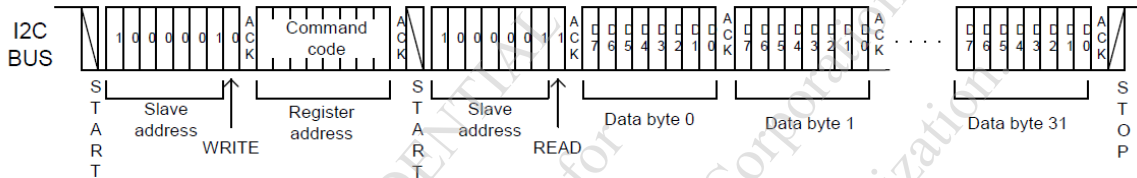


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MULTI-BYTE WRITE



MULTI-BYTE READ



CONFIDENTIAL  
 Emerging Display Technologies Corporation Only  
 Do not distribute without authorization

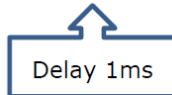
## 12.5 COMMUNICATION PROTOCOL

### COMMAND LIST

NAME	DESCRIPTION
READ FIRMWARE INFORMATION	READ FIRMWARE INFORMATION

NOTICE: AFTER HOST WRITES OR READ I2C COMMAND PLEASE DELAY 1ms.

S	Slave Address	Wr	A	Data Byte	A	P	S	Slave Address	Wr	A	Data Byte	A
---	---------------	----	---	-----------	---	---	---	---------------	----	---	-----------	---



## 12.6 PROTOCOL DATA FORMAT

### READ FIRMWARE INFORMATION

THE HOST SENDS I2C “MULTI-BYTE READ” FORMAT WITH COMMAND CODE “0x03” TO READ TOUCH FIRMWARE INFORMATION.

THE TOUCH DEVICE RESPONDS DATA WITH FOLLOWING DATA FORMAT.

BYTE	NAME OF BYTES	DESCRIPTION
0	Par 0	VENDER_ID
1	Par 1	RESERVED
2	Par 2	FIRMWARE VERSION: Par_2.Par_3
3	Par 3	
4	Par 4	RESERVED
5	Par 5	
6	Par 6	
7	Par 7	

## 12.7 DATA REPORT

ILI2117A/ILI2118A USE INTERRUPT PIN TO SIGNAL THE HOST WHEN DETECTING TOUCH EVENTS ON THE SENSOR. WHEN A FINGER TOUCHES ON THE SENSOR SURFACE, THE TP\_INT PIN WILL BE ACTIVE HIGH. THE WILL BE ENABLED AFTER EN PIN PULL HIGH 300ms

THE TP\_INT PIN CAN BE DEFINED BY TOUCH FIRMWARE DESIGN. IT CAN BE ACTIVE HIGH OR ACTIVE LOW.

### REPORT FORMAT

THE HOST SENDS I2C “MULTI-BYTE READ” FORMAT AFTER TOUCH DEVICE ISSUES INT TO READ TOUCH REPORTED DATA. THE TOUCH RESOLUTION IS 2048 X 2048.

THE TOUCH DEVICE RESPONDS DATA WITH THE FOLLOWING DATA FORMAT. TOUCH COORDINATE DATA IS 0xFF, IT MEANS THERE IS NO TOUCH.

BYTE	NAME OF BYTES	DESCRIPTION	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
0	Packet ID	0x5A								
1	X0 HIGH COORDINATE Y00 HIGH COORDINATE	X00[11:8] Y00[11:8]	X00[11:8]=Bit[7:4] Y00[11:8]=Bit[3:0]							
2	X00 LOW COORDINATE	X00[7:0]								
3	Y00 LOW COORDINATE	Y00[7:0]								
4	RESERVED	RESERVED								
5	X01 HIGH COORDINATE Y01 HIGH COORDINATE	X01[11:8] Y01[11:8]	X01[11:8]=Bit[7:4] Y01[11:8]=Bit[3:0]							
6	X01 LOW COORDINATE	X01[7:0]								
7	Y01 LOW COORDINATE	Y01[7:0]								
8	RESERVED	RESERVED								
9	X02 HIGH COORDINATE Y02 HIGH COORDINATE	X02[11:8] Y02[11:8]	X02[11:8]=Bit[7:4] Y02[11:8]=Bit[3:0]							
10	X02 LOW COORDINATE	X02[7:0]								
11	Y02 LOW COORDINATE	Y02[7:0]								
12	RESERVED	RESERVED								
13	X03 HIGH COORDINATE Y03 HIGH COORDINATE	X03[11:8] Y03[11:8]	X03[11:8]=Bit[7:4] Y03[11:8]=Bit[3:0]							
14	X03 LOW COORDINATE	X03[7:0]								
15	Y03 LOW COORDINATE	Y03[7:0]								

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 :  $45\pm 5\text{cm}$

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

$\pm 45^\circ$  (FOR SECTION WITHIN VIEWING AREA), REFER TO FIG.A  
 $90^\circ$  (FOR SECTION OUTSIDE OF VIEWING AREA), REF TO FIG.B  
PERPENDICULAR TO MODULE SURFACE

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

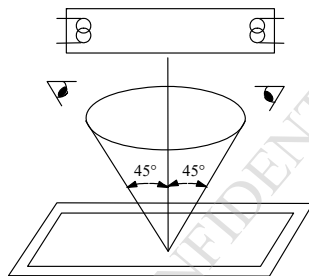


FIG.A

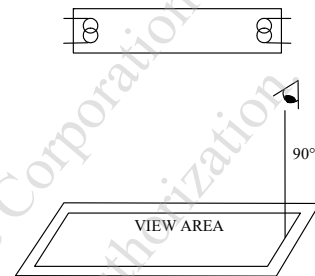


FIG.B

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  $45^\circ$  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  $90^\circ$  WITH RESPECT TO THE VERTICAL AXIS FROM EDGE OF VIEWING AREA.

13.2.2 ENVIRONMENT CONDITIONS :

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

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 :

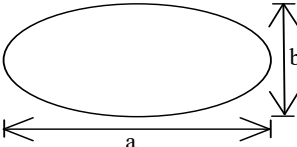
ANSI/ ASQ Z1.4 NORMAL INSPECTION LEVEL II

(b)AQL : MAJOR DEFECT : AQL 0.65

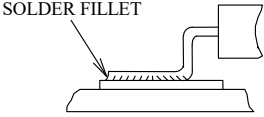
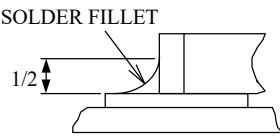
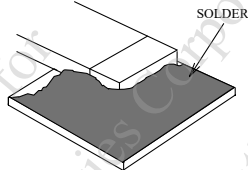
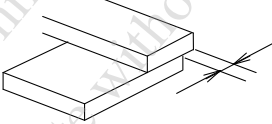
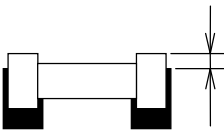
MINOR DEFECT : AQL 1.0

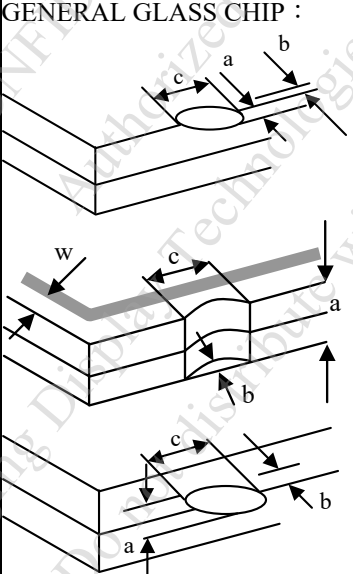
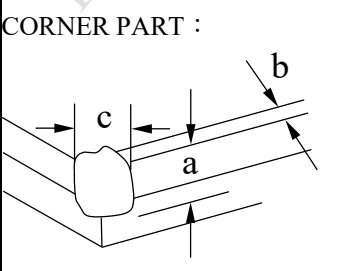
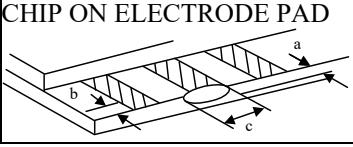
13.3 DEFECTS CLASSIFICATION

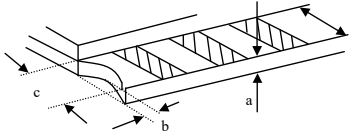
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> <li>• DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS</li> <li>EX: DISCONNECTION, SHORT CIRCUIT ETC</li> </ul>	0.65
	2.CTP FUNCTION	<ul style="list-style-type: none"> 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

NO.	ITEM	CRITERIA																								
1	DISPLAY ON INSPECTION	1. INCORRECT PATTERN 2. MISSING SEGMENT 3. DIM SEGMENT 4. OPERATING VOLTAGE BEYOND SPEC																								
2	OVERALL DIMENSIONS	1. OVERALL DIMENSION BEYOND SPEC																								
3	DOT DEFECT	<p>1. INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS.</p> <p>2.</p> <table border="1"> <thead> <tr> <th colspan="2">ITEM</th> <th>ACCEPTABLE COUNT</th> </tr> </thead> <tbody> <tr> <td rowspan="3">BRIGHT DOT</td> <td>RANDOM</td> <td>N = 3</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 ≤ 5</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 colspan="2">TOTAL BRIGHT AND DARK DOT</td> <td>N ≤ 5</td> </tr> </tbody> </table> <p>NOTE :</p> <p>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</p> <p>2. BRIGHT DOT : DOTS APPEAR BRIGHT AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER BLACK PATTERN.</p> <p>3. DARK DOT : DOTS APPEAR DARK AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER PURE RED, GREEN, BLUE PICTURE.</p>	ITEM		ACCEPTABLE COUNT	BRIGHT DOT	RANDOM	N = 3	2 DOTS ADJACENT (PAIR)	N = 0	3 DOTS ADJACENT OR MORE	N = 0	DARK DOT	RANDOM	N ≤ 5	2 DOTS ADJACENT (PAIR)	N = 0	3 DOTS ADJACENT OR MORE	N = 0	TOTAL BRIGHT AND DARK DOT		N ≤ 5				
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	3 DOTS ADJACENT OR MORE	N = 0																								
TOTAL BRIGHT AND DARK DOT		N ≤ 5																								
4	BUBBLES OF POLARIZER /DIRT/CF FAIL /SURFACE STAINS	<table border="1"> <thead> <tr> <th></th> <th>AVERAGE DIAMETER (mm) : D</th> <th>NUMBER OF PIECES PERMITTED</th> </tr> </thead> <tbody> <tr> <td rowspan="3">BUBBLE ON THE POLARIZER</td> <td>D ≤ 0.15</td> <td>IGNORE</td> </tr> <tr> <td>0.15 &lt; D ≤ 0.5</td> <td>N ≤ 4</td> </tr> <tr> <td>0.5 &lt; D</td> <td>NONE</td> </tr> <tr> <td rowspan="3">SURFACE STAINS</td> <td>D ≤ 0.15</td> <td>IGNORE</td> </tr> <tr> <td>0.15 &lt; D ≤ 0.5</td> <td>N ≤ 4</td> </tr> <tr> <td>0.5 &lt; D</td> <td>NONE</td> </tr> <tr> <td rowspan="3">CF FAIL / SPOT</td> <td>D ≤ 0.15</td> <td>IGNORE</td> </tr> <tr> <td>0.15 &lt; D ≤ 0.5</td> <td>N ≤ 4</td> </tr> <tr> <td>0.5 &lt; D</td> <td>NONE</td> </tr> </tbody> </table> <p>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.</p> <p>2.THE EXTRANEIOUS SUBSTANCE IS DEFINED AS IT CAN BE OBSERVED WHEN THE MODULE IS POWER ON.</p> <p>3.THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING.</p> <p>AVERAGE DIAMETER (D)=(a+b)/2</p> 		AVERAGE DIAMETER (mm) : D	NUMBER OF PIECES PERMITTED	BUBBLE ON THE POLARIZER	D ≤ 0.15	IGNORE	0.15 < D ≤ 0.5	N ≤ 4	0.5 < D	NONE	SURFACE STAINS	D ≤ 0.15	IGNORE	0.15 < D ≤ 0.5	N ≤ 4	0.5 < D	NONE	CF FAIL / SPOT	D ≤ 0.15	IGNORE	0.15 < D ≤ 0.5	N ≤ 4	0.5 < D	NONE
	AVERAGE DIAMETER (mm) : D	NUMBER OF PIECES PERMITTED																								
BUBBLE ON THE POLARIZER	D ≤ 0.15	IGNORE																								
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	0.5 < D	NONE																								

NO.	ITEM	CRITERIA											
5	BLACK/WHITE SPOT CIRCULAR TYPE	<p>THE FOLLOWING BLACK/WHITE SPOT ARE WITHIN THE VIEWING AREA. AVERAGE DIAMETER : D (mm)</p> <table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.15</math></td> <td>IGNORE</td> </tr> <tr> <td><math>0.15 &lt; D \leq 0.3</math></td> <td>5</td> </tr> <tr> <td><math>0.3 &lt; D \leq 0.5</math></td> <td>5</td> </tr> <tr> <td><math>D &gt; 0.5</math></td> <td>0</td> </tr> </tbody> </table> <p>NOTE ( 1 ) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</p>	SIZE D	PERMISSIBLE NO.	$D \leq 0.15$	IGNORE	$0.15 < D \leq 0.3$	5	$0.3 < D \leq 0.5$	5	$D > 0.5$	0	
SIZE D	PERMISSIBLE NO.												
$D \leq 0.15$	IGNORE												
$0.15 < D \leq 0.3$	5												
$0.3 < D \leq 0.5$	5												
$D > 0.5$	0												
6	SCRATCH	<p>THE FOLLOWING SCRATCH IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGTH : L (mm)</p> <table border="1"> <thead> <tr> <th>SIZE W &amp; L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td><math>W \leq 0.05</math></td> <td>IGNORE</td> </tr> <tr> <td><math>0.05 &lt; W \leq 0.08, L \leq 8</math></td> <td>3</td> </tr> <tr> <td><math>0.08 &lt; W \leq 0.1, L \leq 5</math></td> <td>2</td> </tr> <tr> <td><math>W &gt; 0.1</math></td> <td>0</td> </tr> </tbody> </table> <p>NOTE ( 1 ) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</p>	SIZE W & L	PERMISSIBLE NO.	$W \leq 0.05$	IGNORE	$0.05 < W \leq 0.08, L \leq 8$	3	$0.08 < W \leq 0.1, L \leq 5$	2	$W > 0.1$	0	
SIZE W & L	PERMISSIBLE NO.												
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$0.05 < W \leq 0.08, L \leq 8$	3												
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$W > 0.1$	0												
7	BLACK / WHITE LINE LINEAR TYPE / FOREIGN FIBER	<p>THE FOLLOWING BLACK LINE, WHITE LINE IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGTH : L (mm)</p> <table border="1"> <thead> <tr> <th>SIZE W &amp; L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td><math>W \leq 0.05</math></td> <td>IGNORE</td> </tr> <tr> <td><math>0.05 &lt; W \leq 0.08, L \leq 8</math></td> <td>3</td> </tr> <tr> <td><math>0.08 &lt; W \leq 0.1, L \leq 5</math></td> <td>2</td> </tr> <tr> <td><math>W &gt; 0.1</math></td> <td>0</td> </tr> </tbody> </table> <p>NOTE ( 1 ) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</p>	SIZE W & L	PERMISSIBLE NO.	$W \leq 0.05$	IGNORE	$0.05 < W \leq 0.08, L \leq 8$	3	$0.08 < W \leq 0.1, L \leq 5$	2	$W > 0.1$	0	
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$0.05 < W \leq 0.08, L \leq 8$	3												
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$W > 0.1$	0												
8	BUBBLE / DENT FOR OPTICAL BONDING	<p>BUBBLES WITHIN VIEWING AREA. AVERAGE DIAMETER : D (mm)</p> <table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.2</math></td> <td>IGNORE</td> </tr> <tr> <td><math>0.2 &lt; D \leq 0.3</math></td> <td>3</td> </tr> <tr> <td><math>0.3 &lt; D \leq 0.5</math></td> <td>2</td> </tr> <tr> <td><math>D &gt; 0.5</math></td> <td>0</td> </tr> </tbody> </table> <p>NOTE ( 1 ) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</p>	SIZE D	PERMISSIBLE NO.	$D \leq 0.2$	IGNORE	$0.2 < D \leq 0.3$	3	$0.3 < D \leq 0.5$	2	$D > 0.5$	0	
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9	CHIPPING	<table border="1"> <tr> <td>CORNER</td> <td><math>X \leq 3 \text{ mm} , Y \leq 3 \text{ mm} \cdot Z \leq t</math> (t : THICKNESS)</td> </tr> <tr> <td>EDGE</td> <td><math>X \leq 6 \text{ mm} , Y \leq 1 \text{ mm} , Z &lt; t</math> (t : THICKNESS)</td> </tr> </table>	CORNER	$X \leq 3 \text{ mm} , Y \leq 3 \text{ mm} \cdot Z \leq t$ (t : THICKNESS)	EDGE	$X \leq 6 \text{ mm} , Y \leq 1 \text{ mm} , Z < t$ (t : THICKNESS)	<p>Chip of glass</p>						
CORNER	$X \leq 3 \text{ mm} , Y \leq 3 \text{ mm} \cdot Z \leq t$ (t : THICKNESS)												
EDGE	$X \leq 6 \text{ mm} , Y \leq 1 \text{ mm} , Z < t$ (t : THICKNESS)												
10	CRACKED GLASS	NOT ACCEPTABLE											
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	<p>1. BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION.</p> <p>2. BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.</p>											

NO.	ITEM	CRITERIA
15	SOLDERING	<p>1. NO SOLDERING FOUND ON THE SPECIFIED PLACE</p> <p>2. INSUFFICIENT SOLDER</p> <p>(a) LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD</p>  <p>(b) CHIP COMPONENT · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING</p>  <p>· SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED</p>  <p>3. PARTS ALIGNMENT</p> <p>(a) LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE</p>  <p>(b) CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE</p>  <p>4. NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB.</p> <p>5. NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE.</p> <p>6. NO RESIDUE OR SOLDER BALLS ON PCB.</p> <p>7. NO SHORT CIRCUITS IN COMPONENTS ON PCB.</p>
16	BACKLIGHT	<p>1. NO LIGHT</p> <p>2. FLICKERING AND OTHER ABNORMAL ILLUMINATION</p> <p>3. SPOTS OR SCRATCHES THAT APPEAR WHEN LIT MUST BE JUDGED USING LCD SPOT, LINES AND CONTAMINATION STANDARDS.</p> <p>4. BACKLIGHT DOESN'T LIGHT OR COLOR IS WRONG.</p>

NO.	ITEM	CRITERIA																								
17	GENERAL APPEARANCE	<ol style="list-style-type: none"> <li>1. NO OXIDATION, CONTAMINATION, CURVES OR, BENDS ON INTERFACE PIN (OLB) OF TCP.</li> <li>2. NO CRACKS ON INTERFACE PIN (OLB) OF TCP.</li> <li>3. NO CONTAMINATION, SOLDER RESIDUE OR SOLDER BALLS ON PRODUCT.</li> <li>4. THE IC ON THE TCP MAY NOT BE DAMAGED, CIRCUITS.</li> <li>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.</li> <li>6. THE RESIDUAL ROSIN OR TIN OIL OF SOLDERING (COMPONENT OR CHIP COMPONENT) IS NOT BURNED INTO BROWN OR BLACK COLOR.</li> <li>7. SEALANT ON TOP OF THE ITO CIRCUIT HAS NOT HARDENED.</li> <li>8. PIN TYPE MUST MATCH TYPE IN SPECIFICATION SHEET.</li> <li>9. LCD PIN LOOSE OR MISSING PINS.</li> <li>10. PRODUCT PACKAGING MUST BE THE SAME AS SPECIFIED ON PACKAGING SPECIFICATION SHEET.</li> <li>11. PRODUCT DIMENSION AND STRUCTURE MUST CONFORM TO PRODUCT SPECIFICATION SHEET.</li> <li>12. THE APPEARANCE OF HEAT SEAL SHOULD NOT ADMIT ANY DIRT AND BREAK.</li> </ol>																								
18	CRACKED GLASS	<p>THE LCD WITH EXTENSIVE CRACK IS NOT ACCEPTABLE</p> <p><b>GENERAL GLASS CHIP :</b></p>  <table border="1" data-bbox="933 1019 1460 1097"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td><math>\leq t/2</math></td> <td>&lt; VIEWING AREA</td> <td><math>\leq 1/8X</math></td> </tr> <tr> <td><math>t/2 &gt; , \leq 2t</math></td> <td><math>\leq W/2</math></td> <td><math>\leq 1/8X</math></td> </tr> </tbody> </table> <p>*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE X = LCD SIDE LENGTH t = GLASS THICKNESS</p> <p><b>CORNER PART :</b></p>  <table border="1" data-bbox="933 1601 1460 1680"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td><math>\leq t/2</math></td> <td>&lt; VIEWING AREA</td> <td><math>\leq 1/8X</math></td> </tr> <tr> <td><math>&gt; t/2 , \leq 2t</math></td> <td><math>\leq W/2</math></td> <td><math>\leq 1/8X</math></td> </tr> </tbody> </table> <p>*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE X = LCD SIDE LENGTH t = GLASS THICKNESS</p> <p><b>CHIP ON ELECTRODE PAD</b></p>  <table border="1" data-bbox="933 1881 1460 1926"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td><math>\leq t</math></td> <td><math>\leq 0.5\text{mm}</math></td> <td><math>\leq 1/8X</math></td> </tr> </tbody> </table> <p>*X=LCD SIDE WIDTH t=GLASS THICKNESS</p>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$	$t/2 > , \leq 2t$	$\leq W/2$	$\leq 1/8X$	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$	$> t/2 , \leq 2t$	$\leq W/2$	$\leq 1/8X$	a	b	c	$\leq t$	$\leq 0.5\text{mm}$	$\leq 1/8X$
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NO.	ITEM		CRITERIA		
			a	b	c
18	CRACKED GLASS		$\leq t$	$\leq 1/8X$	$\leq L$
<p>*X=LCD SIDE WIDTH t = GLASS THICKNESS L=ELECTRODE PAD LENGTH</p> <p>①IF GLASS CHIPPING THE ITO TERMINAL, OVER 2/3 OF THE ITO MUST REMAIN AND BE, INSPECTED ACCORDING TO ELECTRODE TERMINAL SPECIFICATIONS</p> <p>②IF THE PRODUCT WILL BE HEAT SEALED BY THE CUSTOMER, THE ALIGNMENT MARK MUST NOT BE DAMAGED</p>					

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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 TEMP / HUMIDITY TEST (STORAGE)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 60°C, 90% RH 240 hrs
6	THERMAL SHOCK TEST (NOT OPERATED)	<p>THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION:</p>
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	<p>AIR DISCHARGE ± 12KV CONTACT DISCHARGE ± 8KV ACCORDING TO IEC-61000-4-2</p>

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

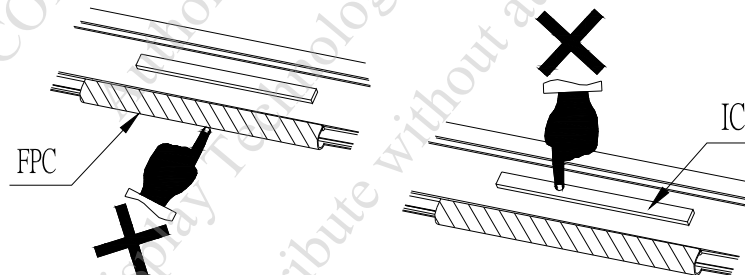
NOTE (2) : TESTING CONDITIONS AND INSPECTION CRITERIA

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 NOTICE

- 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.