



VARISCITE LTD

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## 7" TFT RGB DISPLAY WITH CAPACTIVE TOUCH

Variscite PN: VLCD-CAP-EDT

Display Model: EDT ETM070001ADH6



EXAMINED BY : <i>Yung Chang Hu</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-0007298
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CUSTOMER ACCEPTANCE SPECIFICATIONS		
<div style="border: 1px solid black; border-radius: 15px; padding: 20px; width: fit-content; margin: 0 auto;"> <p>MODEL NO. :</p> <p style="text-align: center;"><u>ETM070001ADH6</u></p> <p style="text-align: center;">(RoHS)</p> <p>FOR MESSRS :</p> <p style="text-align: center;">_____</p> </div>		
CUSTOMER'S APPROVAL		
DATE :		
_____		
BY :		
_____		

02101300-01-02



EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO.

ETM070001ADH6

VERSION

1

PAGE

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RECORDS OF REVISION

DOC. FIRST ISSUE

MAY.05, 2011

DATE	REVISED PAGE NO.	SUMMARY

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## 1. GENERAL SPECIFICATIONS

### 1.1 DATA SHEETS FOR LCD PANEL CONTROLLER/DRIVER PLEASE REFER TO :

HIMAX HX8262-A  
HIMAX HX8678-A

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

FOCALTECH FT5406

### 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)

## 2. MECHANICAL SPECIFICATIONS

### 2.1 TFT LCD MODULE MECHANICAL SPECIFICATIONS

- (1) DISPLAY SIZE ..... 7 inch
- (2) NUMBER OF DOTS ..... 800W \* (RGB) \* 480H DOTS
- (3) MODULE SIZE ..... 165W \* 104.44H \* 6.76D mm  
(WITHOUT FPC)
- (4) ACTIVE AREA ..... 152.4W \* 91.44H mm
- (5) DOT SIZE ..... 0.0635W \* 0.1905H mm
- (6) PIXEL SIZE ..... 0.1905W \* 0.1905H mm
- (7) LCD TYPE ..... TFT , TRANSMISSIVE, ANTE-GLARE
- (8) COLOR ..... 262K
- (9) VIEWING DIRECTION ..... 6 O'CLOCK
- (10) BACK LIGHT ..... LED , COLOR : WHITE
- (11) INTERFACE MODE ..... RGB(18BIT) PARALLEL  
(DE/SYNC MODE)

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## 2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

(1) TOUCH PANEL SIZE	-----	7.0 inch
(2) OUTER DIMENSION	-----	164W * 104H * 1.56D mm (WITHOUT FPC)
(3) EFFECTIVE AREA	-----	155W * 94.045H mm
(4) ACTIVE AREA	-----	154W * 93.05H mm
(5) INPUT TYPE	-----	MULTI TOUCH
(6) NUMBER OF TOUCH SENSOR	-----	28*16 SENSORS
(7) RESOLUTION	-----	1792 * 1024
(8) INTERFACE MODE	-----	I2C & SPI

### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 LCD MODULE ELECTRICAL ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER VOLTAGE	VCC	-0.5	+7	V	VSS=0
INPUT VOLTAGE	Vin	-0.3	VCC+0.3	V	
LED BACKLIGHT POWER DISSIPATION	PD	—	2592	mW	
LED BACKLIGHT POWER CURRENT	IF	—	240	mA	

#### 3.2 CAPACITIVE TOUCH PANEL ELECTRICAL ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY FOR DRIVER IC	VDD-VSS	-0.3	3.6	V	
DC INPUT VOLTAGE	VIN	-0.3	IOVCC+0.3	V	

NOTE (1) : TEST METHOD AND CONDITIONS :

CAPACITOR IS CHARGED UP TO 200 pF BY STATIC VOLTAGE, THEN  
CONNECT WITH DISPLAY MODULE INTERFACE PINS FOR DISCHARGE.

#### 3.3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

I T E M	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 <sup>2</sup> (0.25 G)	—	11.76 m/s <sup>2</sup> (1.2 G)	10~100Hz XYZ DIRECTIONS 1Hr. EACH
SHOCK	—	29.4 m/s <sup>2</sup> (3 G)	—	490 m/s <sup>2</sup> (50 G)	10 m SECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

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

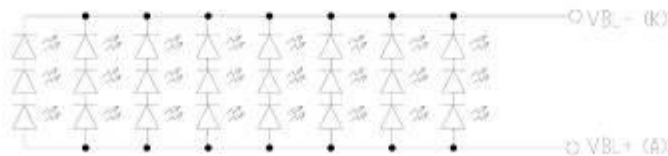


4. ELECTRICAL CHARACTERISTICS  
4.1 LCD MODULE ELECTRICAL CHARACTERISTICS

Ta = 25 °C

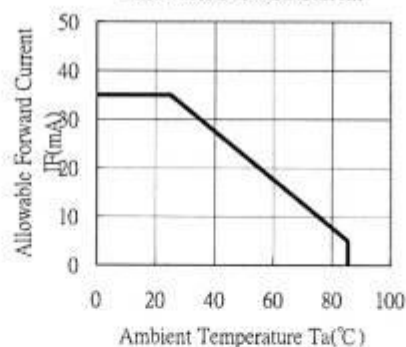
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VCC	—	3.2	3.3	3.6	V	VSS=0
POWER SUPPLY CURRENT FOR LCM	ICC	VCC = 3.3V	—	150	200	mA	VSS=0
LOW LEVEL INPUT VOLTAGE	VIL	—	0	—	0.2*VCC	V	
HIGH LEVEL INPUT VOLTAGE	VIH	—	0.8*VCC	—	VCC	V	
OUTPUT LOW VOLTAGE	VOL	IOL = 400µA	0	—	0.2*VCC	V	
OUTPUT HIGH VOLTAGE	VOH	IOH = -400µA	0.8*VCC	—	VCC	V	
FORWARD VOLTAGE	V <sub>F</sub>	I <sub>F</sub> = 160mA	9	9.9	10.8	V	NOTE (1)

NOTE (1) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



NOTE (2) : AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT. (PER. LED)

Ambient Temperature vs.  
Allowable Forward Current



4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

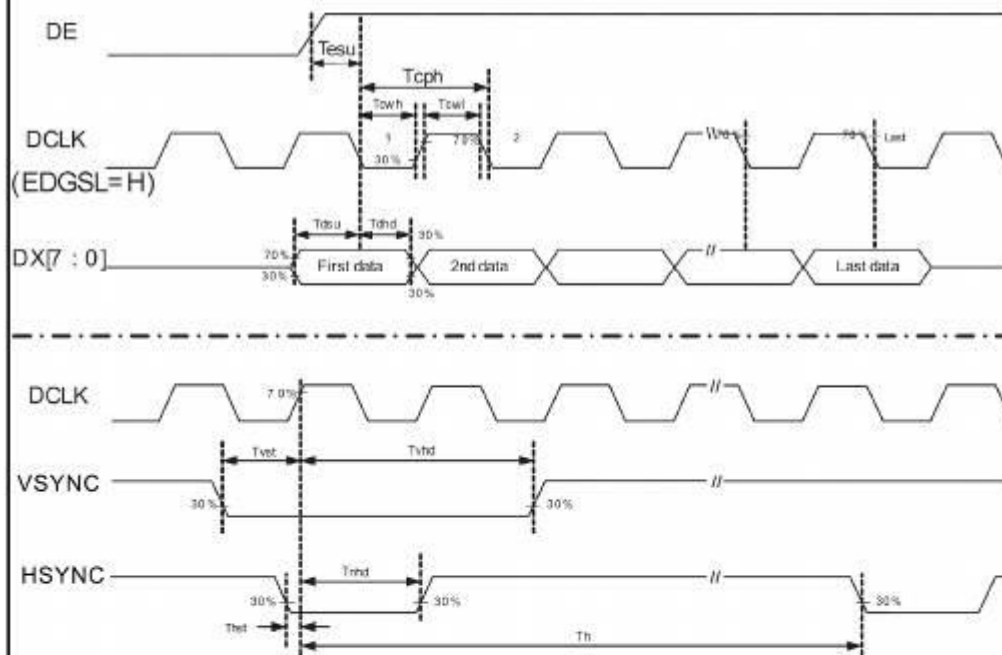
Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY FOR DRIVER	VDD-VSS1	—	2.8	3.3	3.6	V
INPUT HIGH-LEVEL VOLTAGE	VIH	—	0.7*IOVCC	—	IOVCC	V
INPUT LOW-LEVEL VOLTAGE	VIL	—	-0.3	—	0.3*IOVCC	V
OUTPUT HIGH-LEVEL VOLTAGE	VOH	IOH = -0.1mA	0.7*IOVCC	—	—	V
OUTPUT LOW-LEVEL VOLTAGE	VOL	IOH = 0.1mA	—	—	0.3*IOVCC	V
POWER SUPPLY CURRENT CONSUMPTION FOR OPERATION	IDD	VDD-VSS1=3.3V	—	(7.5)	(12)	mA
POWER SUPPLY CURRENT CONSUMPTION FOR SLEEP MODE	ISB	VDD-VSS1=3.3V	—	(50)	(100)	µA



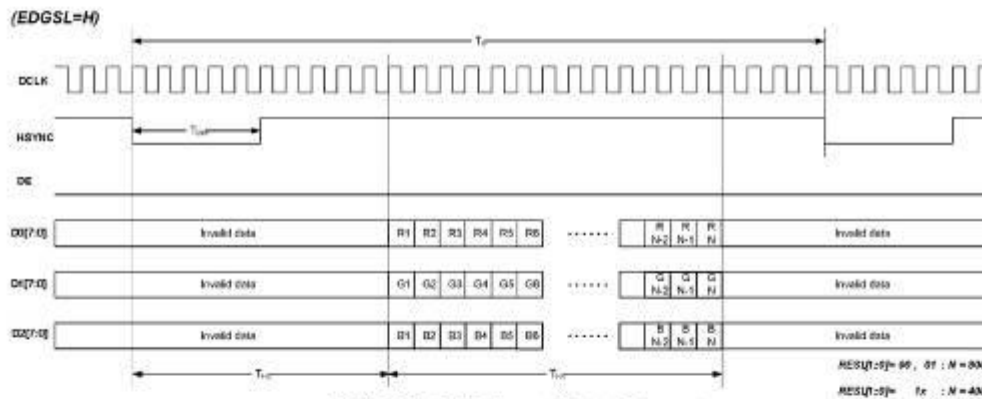
5. TIMING CHARACTERISTICS  
5.1 LCD MODULE AC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	SPEC			UNIT
		MIN.	TYP.	MAX.	
HSYNC SETUP TIME	$T_{hst}$	6	—	—	ns
HSYNC HOLD TIME	$T_{hhd}$	6	—	—	ns
VSYNC SETUP TIME	$T_{vst}$	6	—	—	ns
VSYNC HOLD TIME	$T_{vhd}$	6	—	—	ns
DATA SETUP TIME	$T_{dsu}$	6	—	—	ns
DATA HOLD TIME	$T_{dhd}$	6	—	—	ns
DE SETUP TIME	$T_{esu}$	6	—	—	ns
SOURCE OUTPUT SETTLING TIME	$T_{st}$	—	—	15	$\mu$ s
SOURCE OUTPUT LOADING R	$R_{sl}$	—	2	—	K ohm
SOURCE OUTPUT LOADING C	$C_{sl}$	—	60	—	pF

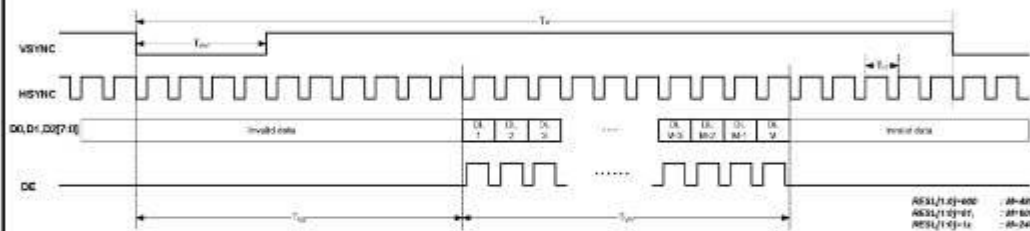


5.2 LCD MODULE SYNC MODE SIGNAL CHARACTERISTICS

PARAMETER	SYMBOL	SPEC			UNIT
		MIN.	TYP.	MAX.	
DCLK FREQUENCY	$F_{CPH}$	—	33.26	—	MHZ
DCLK PERIOD	$T_{CPH}$	—	30.06	—	ns
DCLK PULSE DUTY	$T_{CWH}$	40	50	60	%
HSYNC PERIOD	$T_H$	930	1056	1057	$T_{CPH}$
HSYNC PULSE WIDTH	$T_{WH}$	1	128	—	$T_{CPH}$
HSYNC -FIRST HORIZONTAL DATA TIME	$T_{HS}$	—	216	—	$T_{CPH}$
HSYNC ACTIVE TIME	$T_{HA}$	—	800	—	$T_{CPH}$
VSNC PERIOD	$T_V$	—	525	—	$T_H$
VSNC PULSE WIDTH	$T_{WV}$	1	2	—	$T_H$
VSNC -DE TIME	$T_{VS}$	—	35	—	$T_H$
VSNC ACTIVE TIME	$T_{VA}$	—	480	—	$T_H$



SYNC Mode Horizontal Data Format

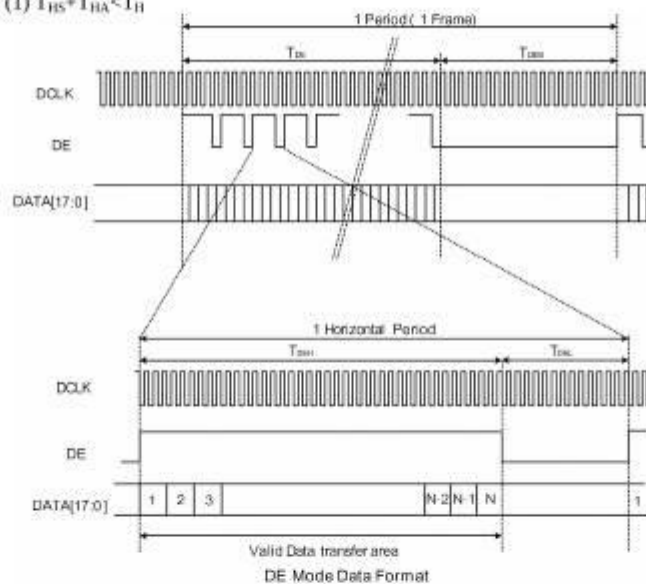


SYNC Mode Vertical Data Format

### 5.3 LCD MODULE DE MODE SIGNAL CHARACTERISTICS

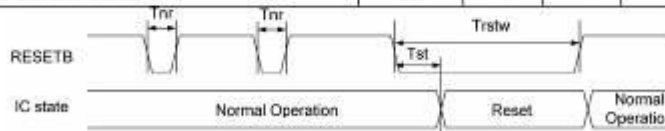
PARAMETER	SYMBOL	SPEC			UNIT
		MIN.	TYP.	MAX.	
DCLK FREQUENCY	$F_{CPH}$	—	33.26	—	MHz
DCLK PERIOD	$T_{CPH}$	—	30.06	—	ns
DCLK PULSE DUTY	$T_{CWH}$	40	50	60	%
DE PERIOD	$T_{DEH} + T_{DEL}$	1000	1056	1200	$T_{CPH}$
DE PULSE WIDTH	$T_{DEH}$	—	800	—	$T_{CPH}$
DE FRAME BLANKING	$T_{DEB}$	10	45	110	$T_{DEH} + T_{DEL}$
DE FRAME WIDTH	$T_{DE}$	—	480	—	$T_{DEH} + T_{DEL}$
OEV PULSE WIDTH	$T_{OEV}$	—	150	—	$T_{CPH}$
CKV PULSE WIDTH	$T_{CKV}$	—	133	—	$T_{CPH}$
DE(INTERNAL)-STV TIME	$T_1$	—	4	—	$T_{CPH}$
DE(INTERNAL)-CKV TIME	$T_2$	—	40	—	$T_{CPH}$
DE(INTERNAL)-OEV TIME	$T_3$	—	23	—	$T_{CPH}$
DE(INTERNAL)-POL TIME	$T_4$	—	157	—	$T_{CPH}$
STV PULSE WIDTH	—	—	1	—	$T_H$

NOTE : (1)  $T_{HS} + T_{HA} < T_H$



### 5.4 LCD MODULE HARDWARE RESET TIMING

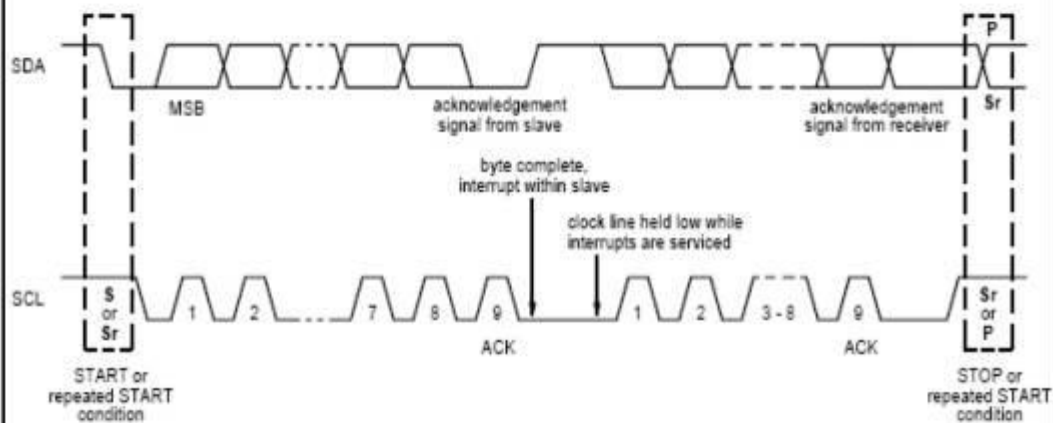
PARAMETER	SYMBOL	SPEC			UNIT
		MIN.	TYP.	MAX.	
RESETB LOW PULSE WIDTH	$Trstw$	10	—	—	$\mu s$
NEGATIVE NOISE PULSE WIDTH	$Tnr$	—	—	4	$\mu s$
RESET START TIME	$Tst$	4	—	—	$\mu s$



5.5 AC CHARACTERISTICS OF THE I2C SDA AND SCL PINS  
5.5.1 I2C INTERFACE TIMING CHARACTERISTICS

ITEM	MIN.	TYP.	MAX.	UNIT
SCL FREQUENCY	0	—	400	KHz
BUS FREE TIME BETWEEN A STOP AND START CONDITION	4.7	—	—	us
HOLD TIME (REPEATED) START CONDITION	4.0	—	—	us
DATA SETUP TIME	250	—	—	ns
SETUP TIME FOR A REPEATED START CONDITION	4.7	—	—	us
SETUP TIME FOR STOP CONDITION	4.0	—	—	us

5.5.2 I2C BUS TIMING

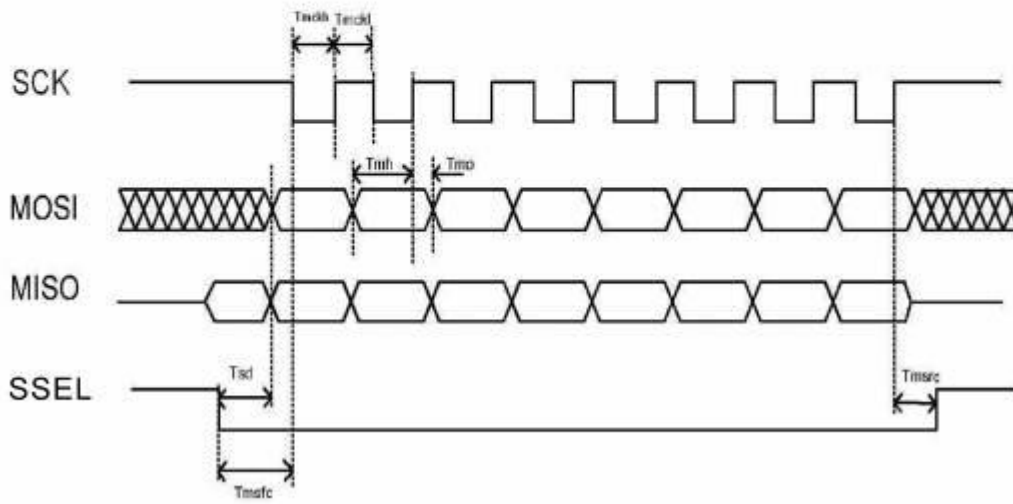


5.5.3 SPI INTERFACE TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
SCK HIGH TIME	$T_{mckh}$	$4 \times T_{sysclk}$	—	—	ns
SCK LOW TIME	$T_{mckl}$	$4 \times T_{sysclk}$	—	—	ns
SCK SHIFT EDGE TO MOSI DATA CHANGE	$T_{mo}$	0	—	—	ns
MOSI DATA VALID TO SCK SHIFT EDGE	$T_{mh}$	$3 \times T_{sysclk}$	—	—	ns
SSEL FALLING EDGE TO MOSI DATA VALID	$T_{sd}$	$4 \times T_{sysclk}$	—	—	ns
SSEL FALLING EDGE TO FIRST SCK EDGE	$T_{msfc}$	$(T_{mckh} + T_{mckl}) / 2$	—	—	ns
LAST SCK EDGE TO SSEL RISING EDGE	$T_{msrc}$	$(T_{mckh} + T_{mckl}) / 2$	—	—	ns

NOTE (1) :  $T_{sysclk}$  IS EQUAL TO ONE PERIOD OF THE DEVICE SYSTEM CLOCK(24MHz)

5.5.4 SPI TIMING



SPI master Timing PHASE=0, POLCK=1

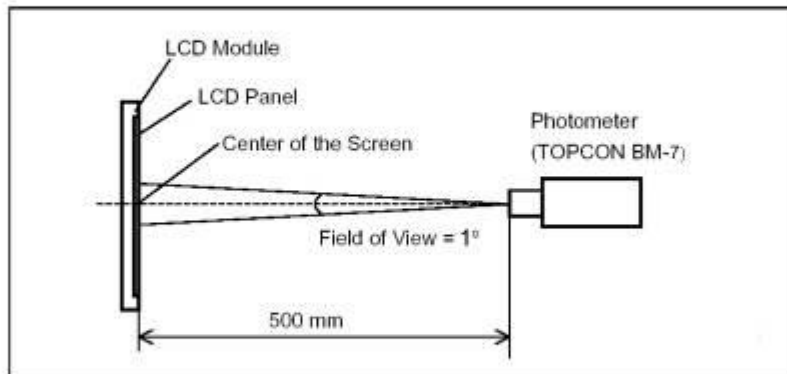
6. OPTICAL CHARACTERISTICS (NOTE1)  
6.1 OPTICAL CHARACTERISTICS

Ta = 25 ± 2 °C

I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE		$\theta_{y+}$	CR ≥ 10	60	65	—	deg.	(2)	
		$\theta_{y-}$		$\theta_x=0^\circ$	60	65			—
		$\theta_{x+}$		$\theta_y=0^\circ$	65	70			—
		$\theta_{x-}$			65	70			—
CONTRAST RATIO	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	300	350	—	—	(3)		
RESPONSE TIME		T <sub>R</sub> ( rise )	$\theta_x=0^\circ, \theta_y=0^\circ$	—	5	10	msec	(4)	
		T <sub>F</sub> ( fall )		—	15	20			
THE BRIGHTNESS OF MODULE	B	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 160mA	250	300	—	cd/m <sup>2</sup>	(5)		
COLOR OF CIE COORDINATE	WHITE	W <sub>x</sub>	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 160 mA NTSC : 45 %	0.26	0.31	0.36	—	(6)	
		W <sub>y</sub>		0.29	0.34	0.39			
	RED	R <sub>x</sub>		0.52	0.57	0.62	—		
		R <sub>y</sub>		0.30	0.35	0.40			
	GREEN	G <sub>x</sub>		0.29	0.34	0.39	—		
		G <sub>y</sub>		0.52	0.57	0.62			
	BLUE	B <sub>x</sub>		0.115	0.155	0.19	—		
		B <sub>y</sub>		0.085	0.12	0.165			
THE UNIFORMITY OF MODULE	—	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 160 mA	75	80	—	%	(5)		

NOTE (1) : TEST EQUIPMENT SETUP :

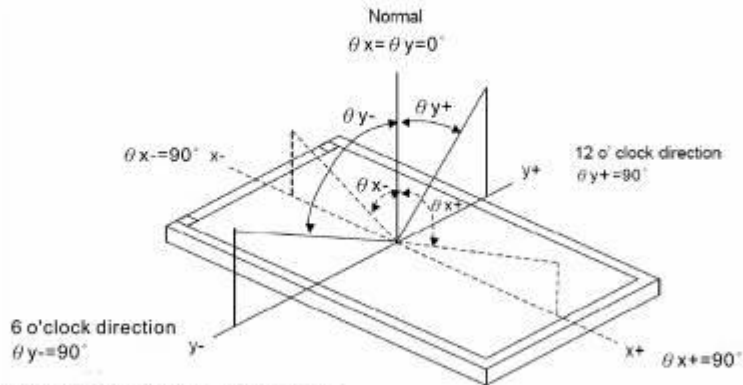
AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES. MEASUREMENT SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM. OPTICAL SPECIFICATIONS ARE MEASURED BY TOPCON BM-7 (FAST) WITH A VIEWING ANGLE OF 1° AT A DISTANCE OF 50cm AND NORMAL DIRECTION.



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NOTE (2) : DEFINITION OF VIEWING ANGLE :

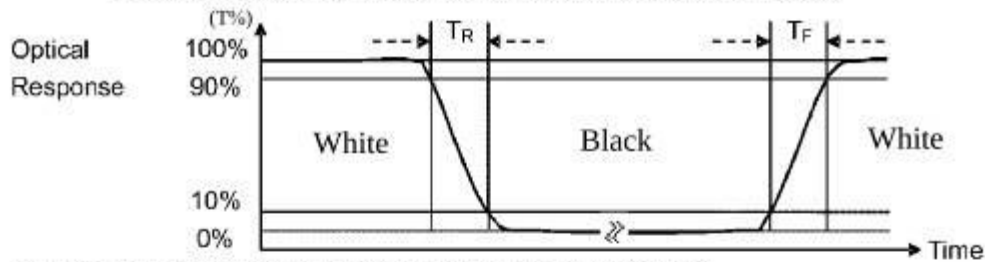


NOTE (3) : DEFINITION OF CONTRAST RATIO :

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

NOTE (4) : DEFINITION OF RESPONSE TIME : TR AND TF

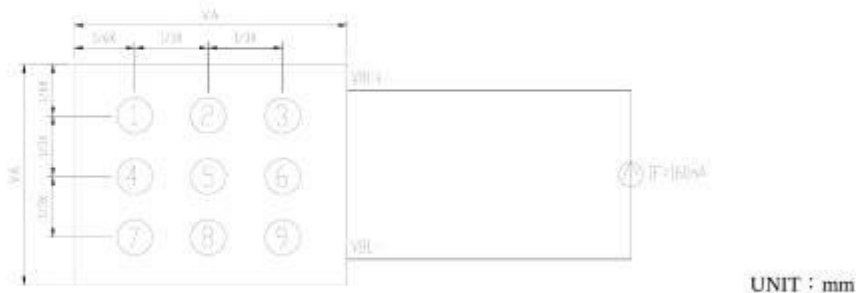
THE FIGURE BELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



NOTE (5) : BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"

NOTE (6) : THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED.

## 6.2 THE TEST METHOD OF BRIGHTNESS AND UNIFORMITY

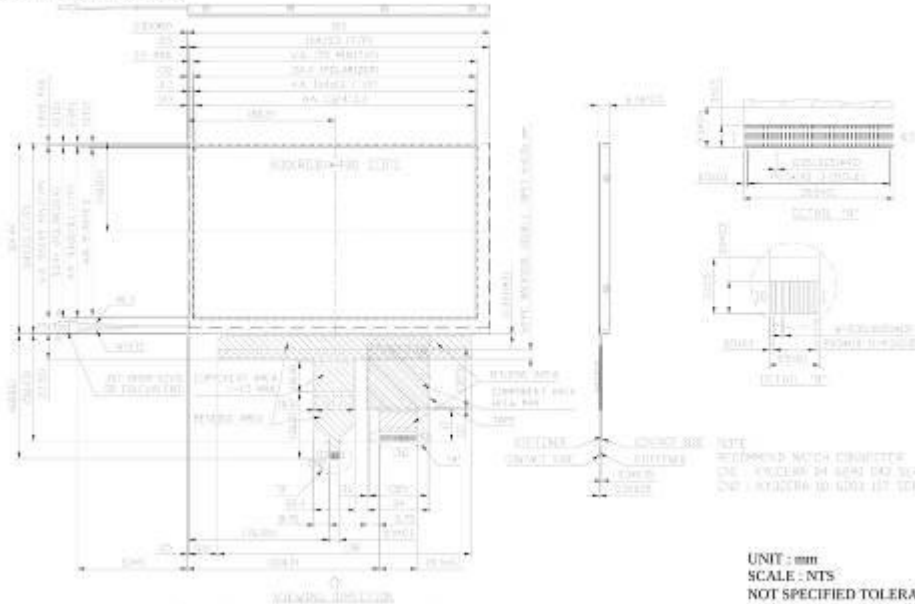


## 6.3 THE CALCULATING METHOD OF UNIFORMITY

$$\text{UNIFORMITY} = \left[ 1 - \frac{\text{MAXIMUM BRIGHTNESS} - \text{MINIMUM BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$

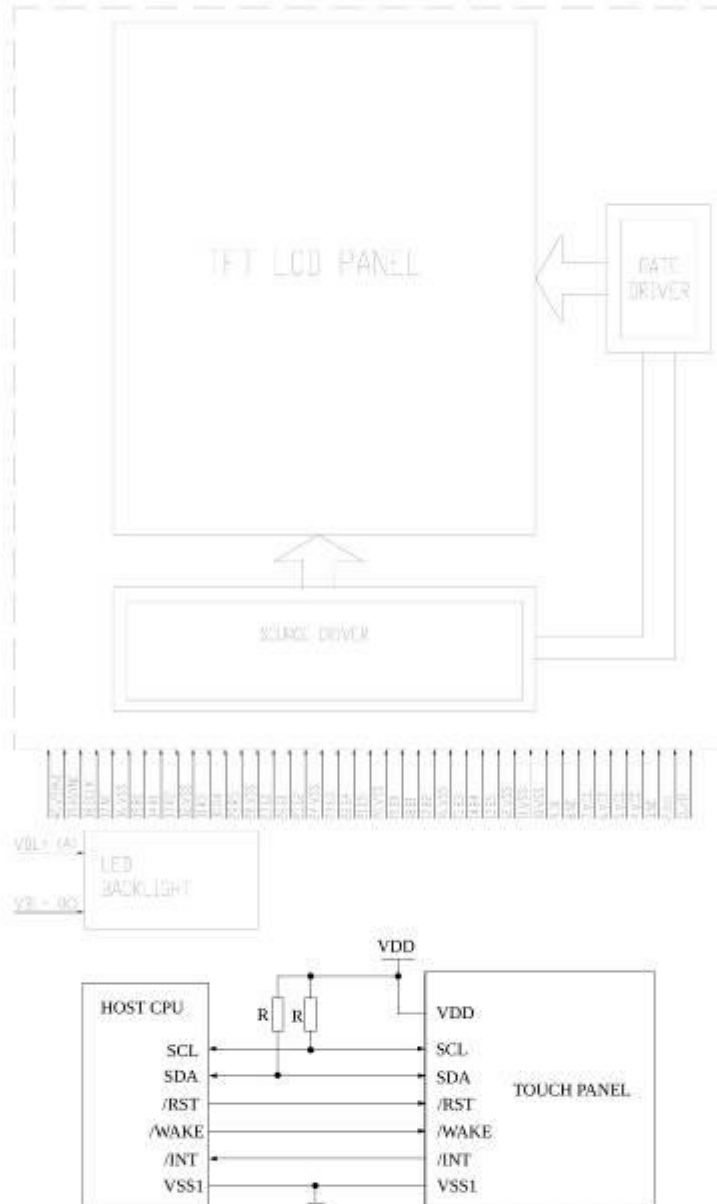


7. OUTLINE DIMENSIONS



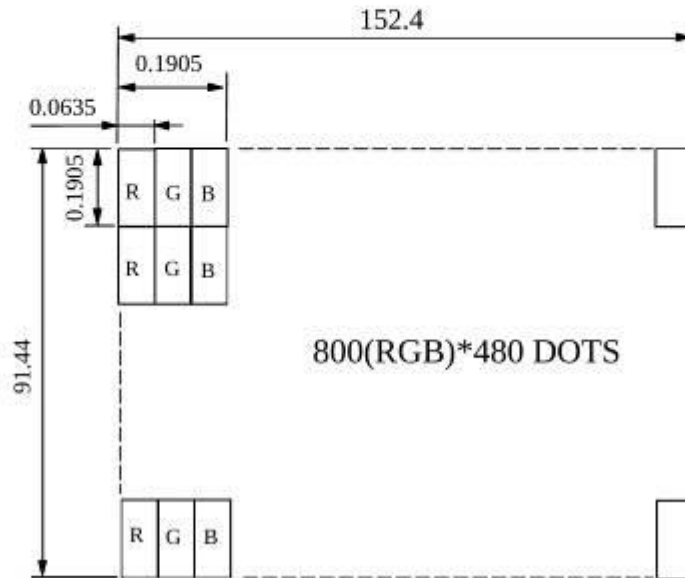
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## 8. BLOCK DIAGRAM



NOTE : 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.

9. DETAIL DRAWING OF DOT MATRIX



UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.1$   
DOTS MATRIX TOLERANCE IS  $\pm 0.01$

10. INTERFACE SIGNALS

10.1 CN1 INTERFACE

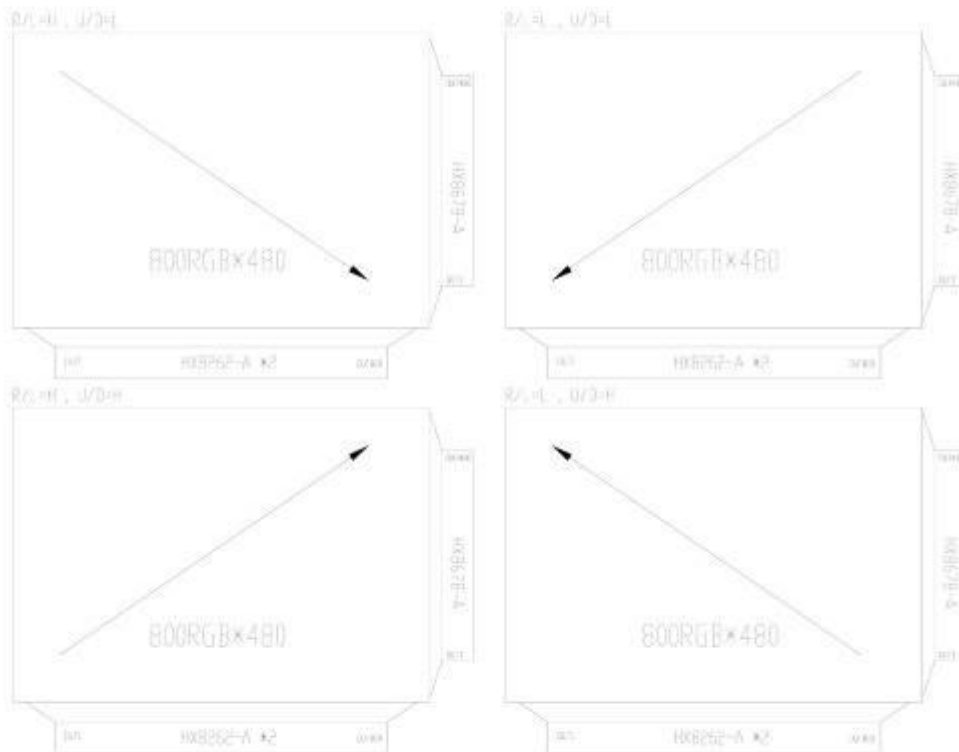
PIN NO	SYMBOL	I/O	FUNCTION
1	U/D	I	U/D=H:OUT1→OUT2→-----→OUT480 U/D=L:OUT480→-----→OUT2→OUT1
2	R/L	I	R/L=H:OUT1→OUT2→-----→OUT800 R/L=L:OUT800→-----→OUT2→OUT1
3	NC	—	NC
4	VCC	P	POWER SUPPLY (3.3V)
5	VCC	P	POWER SUPPLY (3.3V)
6	VCC	P	POWER SUPPLY (3.3V)
7	VCC	P	POWER SUPPLY (3.3V)
8	NC	—	NC
9	DE	I	DATA ENABLE INPUT
10	VSS	P	GROUND
11	VSS	P	GROUND
12	VSS	P	GROUND
13	B5	I	BLUE DATA BIT5
14	B4	I	BLUE DATA BIT4
15	B3	I	BLUE DATA BIT3
16	VSS	P	GROUND
17	B2	I	BLUE DATA BIT2
18	B1	I	BLUE DATA BIT1
19	B0	I	BLUE DATA BIT0
20	VSS	P	GROUND
21	G5	I	GREEN DATA BIT 5
22	G4	I	GREEN DATA BIT 4
23	G3	I	GREEN DATA BIT 3
24	VSS	P	GROUND
25	G2	I	GREEN DATA BIT 2
26	G1	I	GREEN DATA BIT 1
27	G0	I	GREEN DATA BIT 0
28	VSS	P	GROUND
29	R5	I	RED DATA BIT 5
30	R4	I	RED DATA BIT 4
31	R3	I	RED DATA BIT 3
32	VSS	P	GROUND
33	R2	I	RED DATA BIT 2
34	R1	I	RED DATA BIT 1
35	R0	I	RED DATA BIT 0
36	VSS	P	GROUND
37	NC	—	NC

PIN NO	SYMBOL	I/O	FUNCTION
38	DCLK	I	DOT DATA COLOCK
39	HSYNC	I	HORIZONTAL SYNC INPUT
40	VSYNC	I	VERTICAL SYNC INPUT

### 10.2 CN3 INTERFACE

PIN NO	SYMBOL	FUNCTION
1	VBL+(A)	POWER SUPPLY FOR LED BACKLIGHT (ANODE)
2	VBL-(K)	POWER SUPPLY FOR LED BACKLIGHT (CATHODE)

### 10.3 SELECTION OF SCANNING MODE

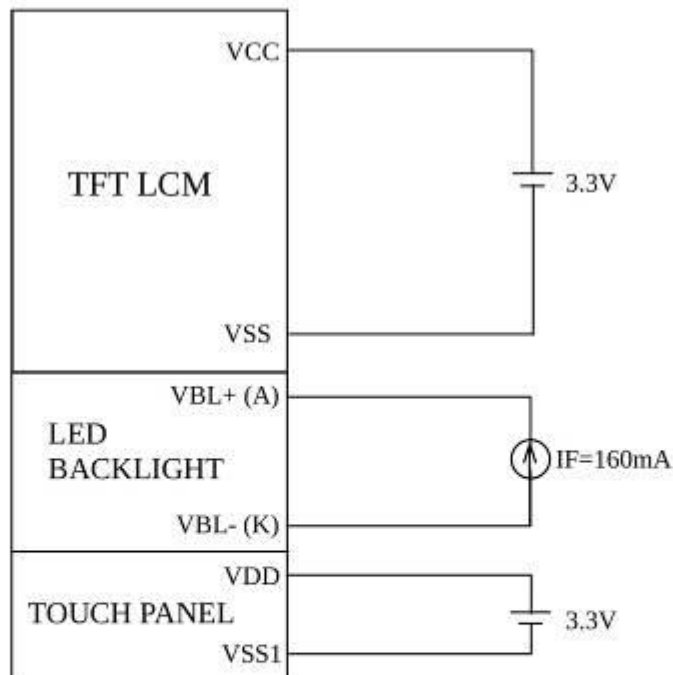


#### 10.4 CN2 T/P SIGNAL INTERFACES

PIN NO.	SYMBOL	FUNCTION
1	VSS1	GROUND
2	VDD	POWER SUPPLY VOLTAGE
3	SCL (SSEL)	I2C CLOCK INPUT (ACTIVE LOW SELECT SIGNAL)
4	NC (SCK)	NC (SERIAL DATA CLOCK)
5	SDA (MOSI)	I2C DATA INPUT AND OUTPUT (DATA LINE FROM MASTER TO SLAVE)
6	NC (MISO)	NC (DATA LINE FROM SLAVE TO MASTER)
7	/RST	EXTERNAL RESET, LOW IS ACTIVE
8	/WAKE	EXTERNAL INTERRUPT FROM THE HOST
9	/INT	EXTERNAL INTERRUPT TO THE HOST
10	VSS1	GROUND

#### 11. POWER SUPPLY

##### 11.1 POWER SUPPLY FOR LCM



02101300-01-02

12. CAPACITIVE TOUCH PANEL SPECIFICATION

12.1 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	7H (min)

12.2 PROTOCOL

12.2.1 I2C READ



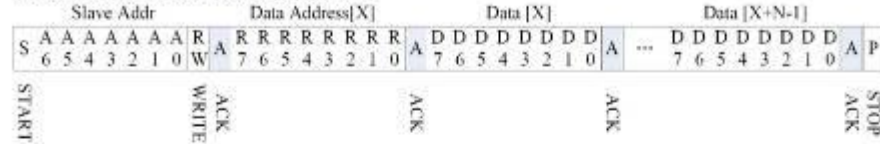
CHARACTER	DESCRIPTION
S	I2C START OR I2C RESTART
A[6:0]	SLAVE ADDRESS
R/W	"1"=READ ; "0"=WRITE
A	ACK SIGNAL
P	STOP SIGNAL (STOP SIGNAL IS OPTIONAL, RESTART SIGNAL IS ALSO OK FOR NEXT PACKET)

SLAVE ADDRESS=0x38

12.2.2 INTERRUPT SIGNAL FROM CTPM TO HOST

AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA. HERE IS THE TIMING TO GET TOUCH DATA

WRITE N BYTES TO I2C SLAVE



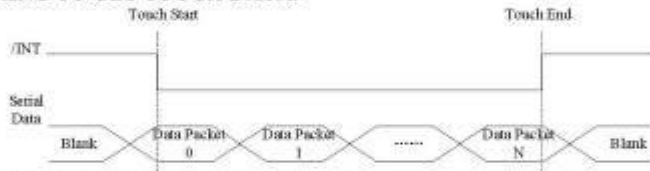
READ X BYTES FROM I2C SLAVE





### 12.2.3 INTERRUPT SIGNAL FROM CTPM TO HOST

AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA. HERE IS THE TIMING TO GET TOUCH DATA.



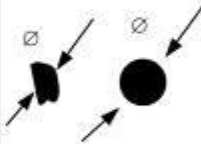
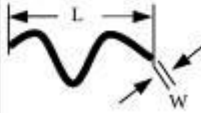
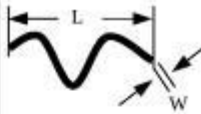
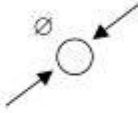

#### TOUCH DATA READ PROTOCOL

NAME	VALUE	DESCRIPTION
START CH	0xF9	START COMMAND FOR CTPM TOUCH DATA PACKET, HOST MUST SEND CTPM A START CH COMMAND BEFORE READ TOUCH DATA
1st READ BYTE ~ LAST READ BYTE		TOUCH DATA PACKET SENT BY CTPM, EACH BYTE HAS 8-BIT DATA, A TOUCH DATA PACKET CONSISTS OF N BYTE.

A DATA PACKET STARTS WITH A HEADER AND ENDS WITH CRC CODE. AS FOR 5 POINTS DATA PACKET, THE LENGTH OF THE PACKET IS ALWAYS 26 BYTES IN SPITE OF ACTUAL TOUCH POINTS.

NAME	LENGTH (BYTE)	VALUE	DESCRIPTION
HEAD	2	0xAAAA	HEADER OF TOUCH DATA
BYTE0	1	0b00xx_xxxx	THE PACKET LENGTH WHICH STORES IN THE LOWER 6 BIT, 26 HERE.
BYTE1	1	0b0000_xxxx	ACTUAL TOUCH POINTS WHICH STORES IN THE LOWER 4 BIT.
BYTE2	1	0x00	RESERVED.
X1	2	0x0XXX	HORIZONTAL COORDINATE OF TOUCH POINT 1(12 BIT), CORRESPONDING TO THE HORIZONTAL CORRDNATE OF DISPLAY SCREEN.
Y1	2	0x0XXX	VERTICAL COORDINATE OF TOUCH POINT 1(12 BIT), CORRESPONDING TO THE HORIZONTAL CORRDNATE OF DISPLAY SCREEN.
X2	2	0x0XXX	HORIZONTAL COORDINATE OF TOUCH POINT 2
Y2	2	0x0XXX	VERTICAL COORDINATE OF TOUCH POINT 2
X3	2	0x0XXX	HORIZONTAL COORDINATE OF TOUCH POINT 3
Y3	2	0x0XXX	VERTICAL COORDINATE OF TOUCH POINT 3
X4	2	0x0XXX	HORIZONTAL COORDINATE OF TOUCH POINT 4
Y4	2	0x0XXX	VERTICAL COORDINATE OF TOUCH POINT 4
X5	2	0x0XXX	HORIZONTAL COORDINATE OF TOUCH POINT 5
Y5	2	0x0XXX	VERTICAL COORDINATE OF TOUCH POINT 5
CRC	1	0xXXX	CRC CODE FOR PREVIOUS N-1 DATA, FOR THE DATA VALIDATION. CRC CODE IS EQUAL TO THE XOR RESULT OF PREVIOUS 25 BYTE.

12.6 INSPECTION STANDARDS

INSPECTION ITEMS	CRITERIA	REMARK										
BLACK/WHITE SPOT	THE FOLLOWING BLACK/WHITE SPOT ARE WITHIN THE VIEWING AREA. AVERAGE DIAMETER : D (mm)											
	<table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>D≤0.1mm</td> <td>IGNORE</td> </tr> <tr> <td>0.1mm&lt;D≤0.3mm</td> <td>5</td> </tr> <tr> <td>0.3mm&lt;D≤0.5mm</td> <td>5</td> </tr> <tr> <td>D&gt;0.5 mm</td> <td>0</td> </tr> </tbody> </table>		SIZE D	PERMISSIBLE NO.	D≤0.1mm	IGNORE	0.1mm<D≤0.3mm	5	0.3mm<D≤0.5mm	5	D>0.5 mm	0
	SIZE D		PERMISSIBLE NO.									
	D≤0.1mm		IGNORE									
0.1mm<D≤0.3mm	5											
0.3mm<D≤0.5mm	5											
D>0.5 mm	0											
NOTE (1) : THE DISTANCE BETWEEN DOT EDFFECTS SHOULD BE MORE THAN 10mm APART.												
SCRATCH	THE FOLLOWING BLACK LINE, WHITE LINE IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGH : L (mm)											
	<table border="1"> <thead> <tr> <th>SIZE W &amp; L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>W≤0.05mm</td> <td>IGNORE</td> </tr> <tr> <td>0.05mm&lt;W≤0.07mm, L≤5mm</td> <td>1</td> </tr> <tr> <td>W&gt;0.07mm</td> <td>0</td> </tr> </tbody> </table>		SIZE W & L	PERMISSIBLE NO.	W≤0.05mm	IGNORE	0.05mm<W≤0.07mm, L≤5mm	1	W>0.07mm	0		
	SIZE W & L		PERMISSIBLE NO.									
	W≤0.05mm		IGNORE									
0.05mm<W≤0.07mm, L≤5mm	1											
W>0.07mm	0											
LINEAR TYPE / FOREIGN FIBER	THE FOLLOWING BLACK LINE, WHITE LINE IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGH : L (mm)											
	<table border="1"> <thead> <tr> <th>SIZE W &amp; L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>W≤0.05mm</td> <td>IGNORE</td> </tr> <tr> <td>0.05mm&lt;W≤0.07mm, L≤5mm</td> <td>1</td> </tr> <tr> <td>W&gt;0.07mm</td> <td>0</td> </tr> </tbody> </table>		SIZE W & L	PERMISSIBLE NO.	W≤0.05mm	IGNORE	0.05mm<W≤0.07mm, L≤5mm	1	W>0.07mm	0		
	SIZE W & L		PERMISSIBLE NO.									
	W≤0.05mm		IGNORE									
0.05mm<W≤0.07mm, L≤5mm	1											
W>0.07mm	0											
BUBBLE / DENT	BUBBLES WITHIN VIEWING AREA. AVERAGE DIAMETER : D (mm)											
	<table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>W≤0.2mm</td> <td>IGNORE</td> </tr> <tr> <td>0.2mm&lt;W≤0.3mm</td> <td>3</td> </tr> <tr> <td>0.3mm&lt;W≤0.5mm</td> <td>1</td> </tr> <tr> <td>W&gt;0.5mm</td> <td>0</td> </tr> </tbody> </table>		SIZE D	PERMISSIBLE NO.	W≤0.2mm	IGNORE	0.2mm<W≤0.3mm	3	0.3mm<W≤0.5mm	1	W>0.5mm	0
	SIZE D		PERMISSIBLE NO.									
	W≤0.2mm		IGNORE									
0.2mm<W≤0.3mm	3											
0.3mm<W≤0.5mm	1											
W>0.5mm	0											
CHIP DAMAGE ON GLASS	CORNER											
	EDGE											

NOTE:

- FOR ANY SPOTS OR LINES, WHICH ARE NOT OBSERVED UNDER APPROPRIATE PANEL OPERATING CONDITION ARE DEEMED ACCEPTABLE.
- THE FOREIGN MATERIALS THAT CAN BE BLOWN OUT BY AIR AND REMOVED BY WET CLEANING ARE NOT REGARDED AS DEFECTS.

### 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 : 35cm±5cm

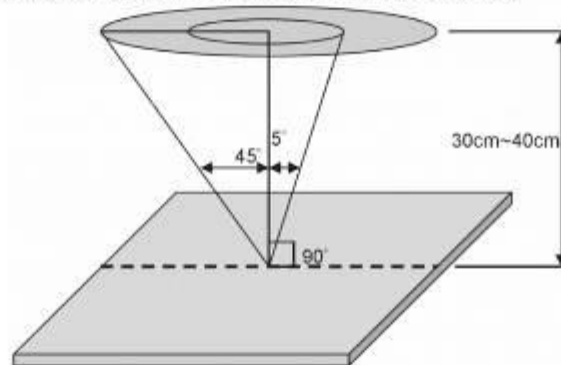
(2)VIEW ANGLE :

NON-OPERATION CONDITION : ±5°

(PERPENDICULAR TO LCD PANEL SURFACE)

OPERATION CONDITION : ±45°

(PERPENDICULAR TO LCD PANEL SURFACE)



#### 13.2.2 ENVIRONMENT CONDITIONS :

AMBIENT TEMPERATURE		20°C~25°C
AMBIENT HUMIDITY		65±20%RH
AMBIENT ILLUMINATION	COSMETIC INSPECTION	MORE THAN 600Lux
	FUNCTIONAL INSPECTION	300~500 Lux

#### 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 : MIL-STD-105E

NORMAL INSPECTION, SINGLE SAMPLING  
LEVEL II

(b)AQL : MAJOR DEFECT : AQL 0.65

MINOR DEFECT : AQL 1.0

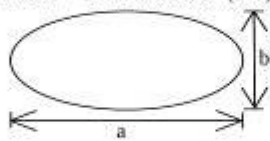
13.3 INSPECTION STANDARDS

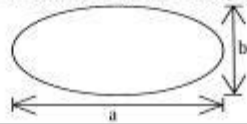
13.3.1 VISUAL DEFECTS CLASSIFICATION

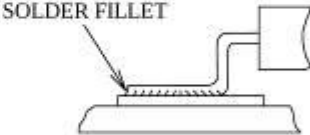
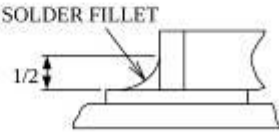
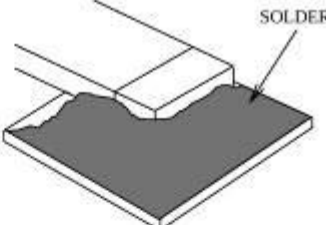
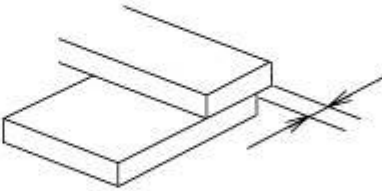
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> <li>• DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS</li> <li>EX: DISCONNECTION, SHORT CIRCUIT ETC</li> </ul>	0.65
	2.BACKLIGHT	<ul style="list-style-type: none"> <li>• NO LIGHT</li> <li>• FLICKERING AND OTHER ABNORMAL ILLUMINATION</li> </ul>	
	3.DIMENSIONS	<ul style="list-style-type: none"> <li>• SUBJECT TO INDIVIDUAL ACCEPTANCE SPECIFICATIONS</li> </ul>	
MINOR DEFECT	1.DISPLAY ZONE	<ul style="list-style-type: none"> <li>• BLACK/WHITE SPOT</li> <li>• BUBBLES ON POLARIZER</li> <li>• NEWTON RING</li> <li>• BLACK/WHITE LINE</li> <li>• SCRATCH</li> <li>• CONTAMINATION</li> <li>• LEVER 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>	



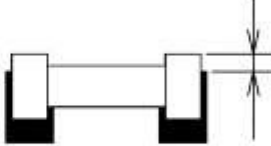
13.3.2 MODULE DEFECTS CALSSIFICATION

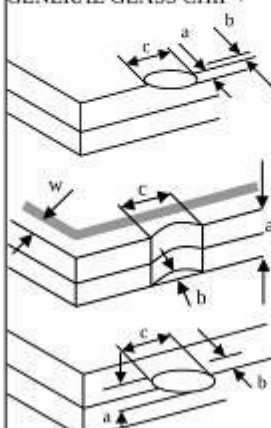
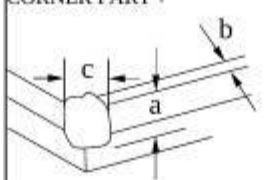
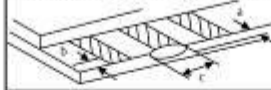
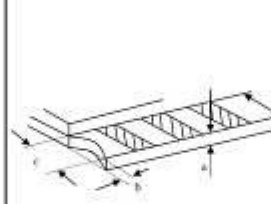
NO.	ITEM	CRITERIA												
1.	DISPLAY ON INSPECTION	(1)INCORRECT PATTERN (2)MISSING SEGMENT (3)DIM SEGMENT (4)OPERATING VOLTAGE BEYOND SPEC												
2.	OVERALL DIMENSIONS	(1)OVERALL DIMENSION BEYOND SPEC												
3.	DOT DEFECT	(1) INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS. (2) <table border="1"> <thead> <tr> <th>ITEMS</th> <th>ACCEPTABLE COUNT</th> </tr> </thead> <tbody> <tr> <td>BRIGHT DOT</td> <td><math>N \leq 3</math></td> </tr> <tr> <td>DARK DOT</td> <td><math>N \leq 5</math></td> </tr> <tr> <td>TOAL BRIGHT AND DARK DOTS</td> <td><math>N \leq 5</math></td> </tr> </tbody> </table> <p>NOTE : 1. THE DEFINITION OF DOT : THE SIZE OF A DEFECTIVE DOT OVER 1/2 OF WHOLE DOT IS REGARDED AS ONE DEFECTUVE DOT. 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.</p>	ITEMS	ACCEPTABLE COUNT	BRIGHT DOT	$N \leq 3$	DARK DOT	$N \leq 5$	TOAL BRIGHT AND DARK DOTS	$N \leq 5$				
ITEMS	ACCEPTABLE COUNT													
BRIGHT DOT	$N \leq 3$													
DARK DOT	$N \leq 5$													
TOAL BRIGHT AND DARK DOTS	$N \leq 5$													
4.	FOREIGN BLACK/WHITE/ BRIGHT LINE/ SCRATCH OF VIEWING AREA	<table border="1"> <thead> <tr> <th>LENGTH : L</th> <th>WIDTH : W</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td><math>L \leq 0.3</math></td> <td><math>W \leq 0.05</math></td> <td>IGNORE</td> </tr> <tr> <td><math>0.3 &lt; L \leq 2.5</math></td> <td><math>0.05 &lt; W \leq 0.1</math></td> <td>4</td> </tr> <tr> <td><math>2.5 &lt; L</math></td> <td><math>0.1 &lt; W</math></td> <td>NONE</td> </tr> </tbody> </table> <p>WIDTH : W mm, LENGH : L mm</p>	LENGTH : L	WIDTH : W	PERMISSIBLE NO.	$L \leq 0.3$	$W \leq 0.05$	IGNORE	$0.3 < L \leq 2.5$	$0.05 < W \leq 0.1$	4	$2.5 < L$	$0.1 < W$	NONE
LENGTH : L	WIDTH : W	PERMISSIBLE NO.												
$L \leq 0.3$	$W \leq 0.05$	IGNORE												
$0.3 < L \leq 2.5$	$0.05 < W \leq 0.1$	4												
$2.5 < L$	$0.1 < W$	NONE												
5.	FOREIGN MATTER \ BLACK SPOTS \ WHITE SPOTS \ DENT (INCLUDING LIGHT LEAKAGE DUE TO POLARIZING PLATES PINHOLES, ETC.)	<table border="1"> <thead> <tr> <th>AVERAGE DIAMETER (mm): D</th> <th>NUMBER OF PIECES PERMITTED</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 0.5</math></td> <td>4</td> </tr> <tr> <td><math>0.5 &lt; D</math></td> <td>NONE</td> </tr> </tbody> </table> <p>NOTE : DIAMETER <math>D=(a+b)/2</math></p> 	AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED	$D \leq 0.15$	IGNORE	$0.15 < D \leq 0.5$	4	$0.5 < D$	NONE				
AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED													
$D \leq 0.15$	IGNORE													
$0.15 < D \leq 0.5$	4													
$0.5 < D$	NONE													

NO.	ITEM	CRITERIA		
		AVERAGE DIAMETER (mm) : D	NUMBER OF PIECES PERMITTED	
6.	BUBBLES OF POLARIZER DIRT/CF FAIL SURFACE STAINS	BUBBLE ON THE POLARIZER	$D \leq 0.25$	IGNORE
			$0.25 < D \leq 0.5$	$N \leq 5$
			$0.5 < D$	NOTE
		SURFACE STATUS	$D < 0.1 \text{ mm}$	IGNORE
			$0.1 < D \leq 0.3 \text{ mm}$	$N \leq 3$
		CF FAIL / SPOT	$D < 0.1 \text{ mm}$	IGNORE
$0.1 < D \leq 0.3 \text{ mm}$	$N \leq 3$			
		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 EXTRANEIOUS 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 		
7.	LINE DEFECT ON DISPLAY	OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOW		
8.	MURA ON DISPLAY	IT'S OK IF MURA IS SLIGHT VISIBLE THROUG 6% ND FILTER		
9.	UNEVEN COLOR SPREAD, COLORATION	(1)TO BE DETERMINED BASED UPON THE STANDARD SAMPLE.		
10.	BEZEL APPEARANCE	(1)BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION. (2)BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.		
11.	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.		

NO.	ITEM	CRITERIA
12.	SOLDERING	<p>(1)NO SOLDERING FOUND ON THE SPECIFIED PLACE (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>  <ul style="list-style-type: none"> <li>SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED</li> </ul>  <p>(3)PARTS ALIGMENT (a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE</p> 

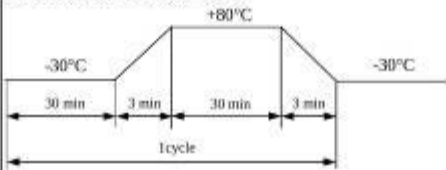


NO.	ITEM	CRITERIA
12.	SOLDERING	<p>(b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE</p>  <p>(4)NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB.            (5)NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE.            (6)NO RESIDUE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

NO.	ITEM	CRITERIA									
15.	CRACKED GLASS	<p>THE LCD WITH EXTENSIVE CRACK IS NOT ACCEPTABLE</p> <p>GENERAL GLASS CHIP :</p>  <table border="1"> <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; a \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>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1.8X$	$t/2 > a \leq 2t$	$\leq W/2$	$\leq 1.8X$
		a	b	c							
		$\leq t/2$	< VIEWING AREA	$\leq 1.8X$							
		$t/2 > a \leq 2t$	$\leq W/2$	$\leq 1.8X$							
<p>CORNER PART :</p>  <table border="1"> <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; a \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>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1.8X$	$t/2 > a \leq 2t$	$\leq W/2$	$\leq 1.8X$		
a	b	c									
$\leq t/2$	< VIEWING AREA	$\leq 1.8X$									
$t/2 > a \leq 2t$	$\leq W/2$	$\leq 1.8X$									
<p>CHIP ON ELECTRODE PAD</p>  <table border="1"> <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	$\leq t$	$\leq 0.5\text{mm}$	$\leq 1.8X$					
a	b	c									
$\leq t$	$\leq 0.5\text{mm}$	$\leq 1.8X$									
 <table border="1"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td><math>\leq t</math></td> <td><math>\leq 1.8X</math></td> <td><math>\leq L</math></td> </tr> </tbody> </table> <p>*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</p>	a	b	c	$\leq t$	$\leq 1.8X$	$\leq L$					
a	b	c									
$\leq t$	$\leq 1.8X$	$\leq L$									

### 13.4 RELIABILITY TEST

#### 13.4.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE

NO	ITEM	DESCRIPTION
1	HIGH TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +70°C FOR 240 hrs
2	LOW TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -20°C FOR 240 hrs
3	HIGH TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +80°C FOR 240 hrs
4	LOW TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 240 hrs
5	HIGH TEMP / HUMIDITY TEST (STORAGE)	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 60°C, 90% RH 240 hrs
6	THERMAL SHOCK (NOT OPERATED)	<p>THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION:</p> 
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 FUNCTIONING ISSUE OCCURRED.

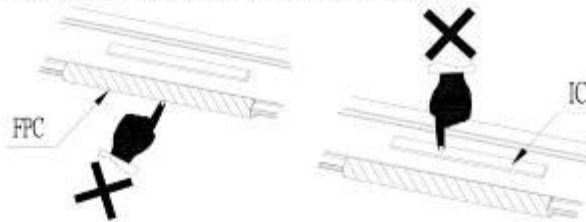
### 13.5 TESTING CONDITIONS AND INSPECTION CRITERIA

FOR THE FINAL TEST THE TESTING SAMPLE MUST BE STORED AT ROOM TEMPERATURE FOR 24 HOURS, AFTER THE TESTS LISTED IN TABLE 12.5, STANDARD SPECIFICATIONS FOR RELIABILITY HAVE BEEN EXECUTED IN ORDER TO ENSURE STABILITY.

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

## 13.6 OPERATION

- 13.6.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .
- 13.6.2 USE THE MODULE WITHIN SPECIFIED TEMPERATURE ; LOWER TEMPERATURE CAUSES THE RETARDATION OF BLINKING SPEED OF THE DISPLAY ; HIGHER TEMPERATURE MAKES OVERALL DISPLAY DISCOLOR. WHEN THE TEMPERATURE RETURNS TO NORMALITY, THE DISPLAY WILL OPERATE NORMALLY .
- 13.6.3 ADJUST THE LC DRIVING VOLTAGE TO OBTAIN THE OPTIMUM CONTRAST.
- 13.6.4 POWER ON SEQUENCE INPUT SIGNALS SHOULD NOT BE SUPPLIED TO LCD MODULE BEFORE POWER SUPPLY VOLTAGE IS APPLIED AND REACHES THE SPECIFIED VALUE .  
IF ABOVE SEQUENCE IS NOT FOLLOWED , CMOS LSIS OF LCD MODULES MAY BE DAMAGED DUE TO LATCH - UP PROBLEM .
- 13.6.5 NOT ALLOWED TO INFLICT ANY EXTERNAL STRESS AND TO CAUSE ANY MECHANICAL INTERFERENCE ON THE BENDING AREA OF FPC DURING THE TAIL BENDING BACKWARDS!  
DO NOT STRESS FPC AND IC ON THE MODULE!





13.7 NOTICE

- 13.7.1 USE A GROUNDED SOLDERING IRON WHEN SOLDERING CONNECTOR I/O TERMINALS . FOR SOLDERING OR REPAIRING, TAKE PRECAUTION AGAINST THE TEMPERATURE OF THE SOLDERING IRON AND THE SOLDERING TIME TO PREVENT PEELING OFF THETHROUGH-HOLE-PAD .
- 13.7.2 DO NOT DISASSEMBLE . EDT SHALL NOT BE HELD RESPONSIBLE IF THE MODULE IS DISASSEMBLED AND UPON THE REASSEMBLY THE MODULE FAILED .
- 13.7.3 DO NOT CHARGE STATIC ELECTRICITY , AS THE CIRCUIT OF THIS MODULE CONTAINS CMOS LSIS. A WORKMAN'S BODY SHOULD ALWAYS BE STATIC-PROTECTED BY USE OF AN ESD STRAP. WORKING CLOTHES FOR SUCH PERSONNEL SHOULD BE OF STATIC-PROTECTED MATERIAL .
- 13.7.4 ALWAYS GROUND THE ELECTRICALLY-POWERED DRIVER BEFORE USING IT TO INSTALL THE LCD MODULE. WHILE CLEANING THE WORK STATION BY VACUUM CLEANER, DO NOT BRING THE SUCKING MOUTH NEAR THE MODULE ; STATIC ELECTRICITY OF THE ELECTRICALLY-POWERED DRIVER OR THE VACUUM CLEANER MAY DESTROY THE MODULE .
- 13.7.5 DON'T GIVE EXTERNAL SHOCK.
- 13.7.6 DON'T APPLY EXCESSIVE FORCE ON THE SURFACE.
- 13.7.7 LIQUID IN LCD IS HAZARDOUS SUBSTANCE. MUST NOT LICK AND SWALLOW.  
WHEN THE LIQUID IS ATTACH TO YOUR, SKIN, CLOTH ETC. WASH IT OUT THOROUGHLY AND IMMEDIATELY.
- 13.7.8 DON'T OPERATE IT ABOVE THE ABSOLUTE MAXIMUM RATING.
- 13.7.9 STORAGE IN A CLEAN ENVIRONMENT, FREE FROM DUST, ACTIVE GAS, AND SOLVENT.
- 13.7.10 STORE WITHOUT ANY PHYSICAL LOAD.
- 13.7.11 REWIRING: NO MORE THAN 3 TIMES.