

EXAMINED BY :	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0009035
Lucica Lu		ISSUE : JUL.27, 2020
APPROVED BY:		TOTAL PAGE : 31
Vincent Uh		VERSION : 1

CUSTOMER	ACCEPTANCE	SPECIFICATIONS
MODEL NO. : <u>ETM070080EDH6</u> (RoHS) FOR MESSRS : _____		
CUSTOMER'S APPROVAL DATE : _____ BY : _____		

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO.

ETM070080EDH6

VERSION

1

PAGE

0-1

RECORDS OF REVISION

DOC . FIRST ISSUE

JUL.27, 2020

DATE

REVISED
PAGE
NO.

SUMMARY

CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

TABLE OF CONTENTS

NO.	ITEM	PAGE
1.	GENERAL SPECIFICATIONS -----	1
2.	MECHANICAL SPECIFICATIONS -----	1, 2
3.	ABSOLUTE MAXIMUM RATINGS -----	3
4.	ELECTRICAL CHARACTERISTICS -----	4, 5
5.	TIMING CHARACTERISTICS -----	6 ~ 10
6.	OPTICAL CHARACTERISTICS -----	11, 12
7.	OUTLINE DIMENSIONS -----	13
8.	BLOCK DIAGRAM -----	14
9.	DETAIL DRAWING OF DOT MATRIX -----	15
10.	INTERFACE SIGNALS -----	16, 17
11.	POWER SUPPLY -----	18
12.	CAPACITIVE TOUCH PANEL SPECIFICATION -----	19 ~ 22
13.	INSPECTION CRITERIA -----	23 ~ 28
14.	RELIABILITY TEST -----	29
15.	CAUTION -----	30, 31

1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR TFT MODULE CONTROLLER / DRIVER

PLEASE REFER TO :

HIMAX HX8262-A

HIMAX HX8678-A

1.2 DATA SHEET FOR CAPACITIVE TOUCH PANEL CONTROLLER/DRIVER

PLEASE REFER TO :

HYCON HY4614

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) DIAGONALS	-----	7 inch
(2) NUMBER OF DOTS	-----	800W * (RGB) * 480H DOTS
(3) MODULE SIZE	-----	166W * 105.44H *11.6D(MAX.) mm (WITHOUT FPC & LED BL'S CABLE)
(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 , TN , TRANSMISSIVE , ANTI-GLARE
(9) COLOR	-----	262K
(10) VIEWING DIRECTION	-----	6 O'CLOCK (GRAY LEVEL INVERSION)
(11) BACK LIGHT	-----	LED , COLOR : WHITE
(12) INTERFACE MODE	-----	RGB 18BIT PARALLEL (DE/SYNC MODE)

2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

- (1) TOUCH PANEL SIZE ----- 7.0 inch
- (2) OUTER DIMENSION ----- 164W * 104H * 1.4D mm
(WITHOUT FPC)
- (3) VIEWING 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

CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.5	6.5	V	
INPUT VOLTAGE	VIN-VSS	-0.3	VDD+0.3	V	
STATIC ELECTRICITY	—	—	—	V	NOTE(1)
POWER DISSIPATION FOR LED BACKLIGHT	PD	—	2592	mW	
FORWARD CURRENT FOR LED BACKLIGHT	ILED	—	240	mA	

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 DRIVER	VDD1-VSS1	-0.2	4.0	V	
INPUT VOLTAGE	VIN	-0.2	4.0	V	NOTE(1)

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 (3)		NOTE (3)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s ² (0.25 G)	—	11.76 m/s ² (1.2 G)	10~100 Hz XYZ DIRECTIONS 1 HR EACH
SHOCK	—	29.4 m/s ² (3 G)	—	490 m/s ² (50 G)	10ms XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) : THE ABSOLUTE MAXIMUM RATINGS OF THIS PRODUCT SHOULD NOT BE EXCEEDED AT ANY TIME. IF THESE RATINGS ARE EXCEEDED, THE PRODUCT'S PERFORMANCE IS NOT GUARANTEED AND THE PRODUCT MAY EXPERIENCE PERMANENT DAMAGE.

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

NOTE (3) : Ta ≤ 60°C : 90%RH MAX. (96HRS MAX).

Ta > 60°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90%RH AT 60°C (48HRS MAX).

4. ELECTRICAL CHARACTERISTICS

4.1 LCD MODULE ELECTRICAL CHARACTERISTICS

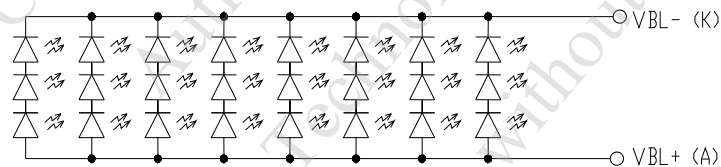
Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.2	3.3	3.6	V	
POWER SUPPLY VOLTAGE FOR LED DRIVER	VCC-VSS	—	2.5	3.3	3.6	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS= 3.3V	—	220	270	mA	NOTE (2)
POWER SUPPLY CURRENT FOR LED DRIVER	ICC	VCC-VSS=3.3V LED B/L=ON	—	600	780	mA	
LOW LEVEL INPUT VOLTAGE	VIL	—	0	—	0.3*VDD	V	NOTE (1)
HIGH LEVEL INPUT VOLTAGE	VIH	—	0.7*VDD	—	VDD	V	NOTE (1)
DIMMING CONTROL FOR LED BACKLIGHT	LEDCTRL-VSS	—	0	—	3	V	NOTE (3)
	PWM	1KHz	—	3.3	—	V	
LED LIFE TIME	—	IF=20mA (PER LED)	30K	40K	—	HRS	NOTE (5) NOTE (6)

NOTE (1) : APPLIED TO TERMINALS B5~B0 , G5~G0 , R5~R0 , DCLK , HSYNC , VSYNC , ENB , ROTATE.

NOTE (2) : THE DISPLAY PATTERN IS ALL “WHITE”.

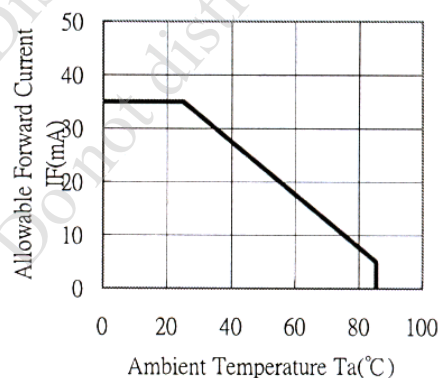
NOTE (3) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



24 LED CHIPS

NOTE (4) : AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT. (PER LED)

Ambient Temperature vs.
Allowable Forward Current



NOTE (5) : CONDITIONS: Ta=25 °C, CONTINUOUS LIGHTING

NOTE (6) : DEFINITIONS OF LIFE TIME :

LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

Ta=25°C

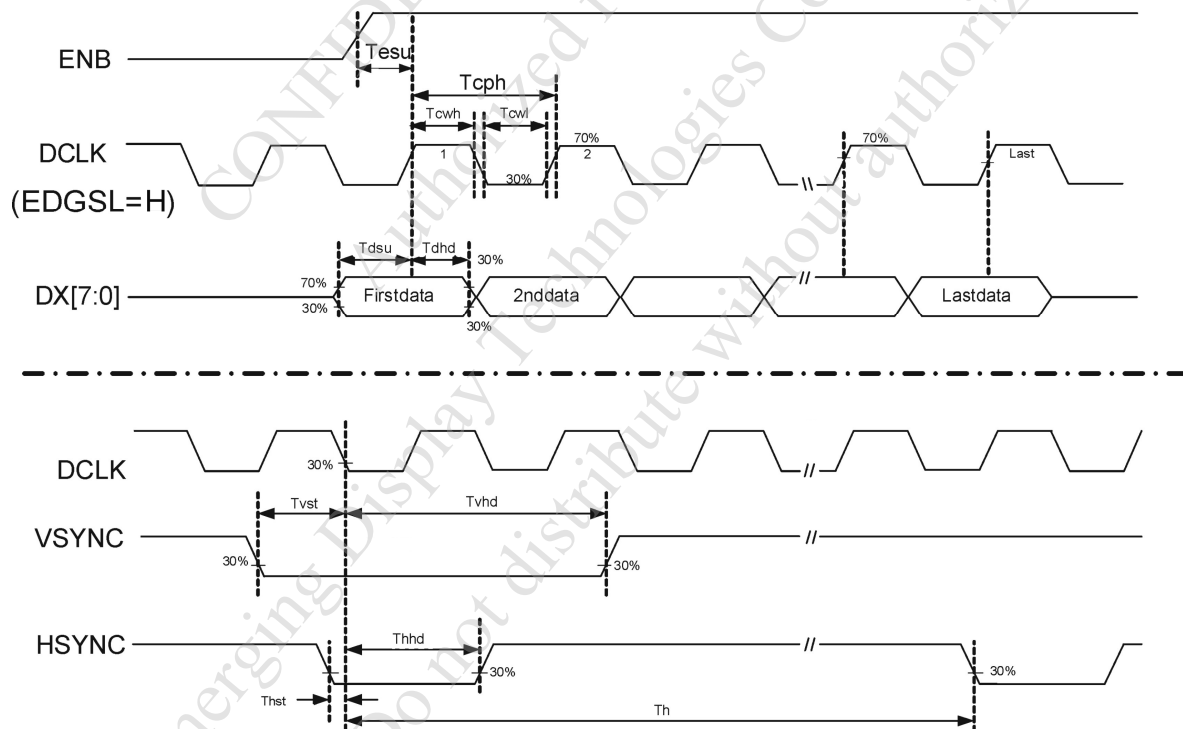
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY FOR DRIVER	VDD1-VSS1	—	2.8	3.3	3.6	V
INPUT HIGH LEVEL VOLTAGE	VIH	—	—	0.7*VDD1	—	V
INPUT LOW LEVEL VOLTAGE	VIL	—	—	0.3*VDD1	—	V
OUTPUT HIGHT LEVEL VOLTAGE	VOH	IOH=10mA	VDD1-0.3	—	—	V
OUTPUT LOW LEVEL VOLTAGE	VOL	IOH=-10mA	—	—	VSS1+0.3	V
POWER SUPPLY CURRENT CONSUMPTION FOR OPERATION	IDD1	VDD1-VSS1 =3.3V	—	10	15	mA

CONFIDENTIAL
Authorized for
Emerging Display Technologies Corporation Only.
Do not distribute without authorization.

5. TIMING CHARACTERISTICS

5.1 LCD MODULE AC ELECTRICAL CHARACTERISTICS

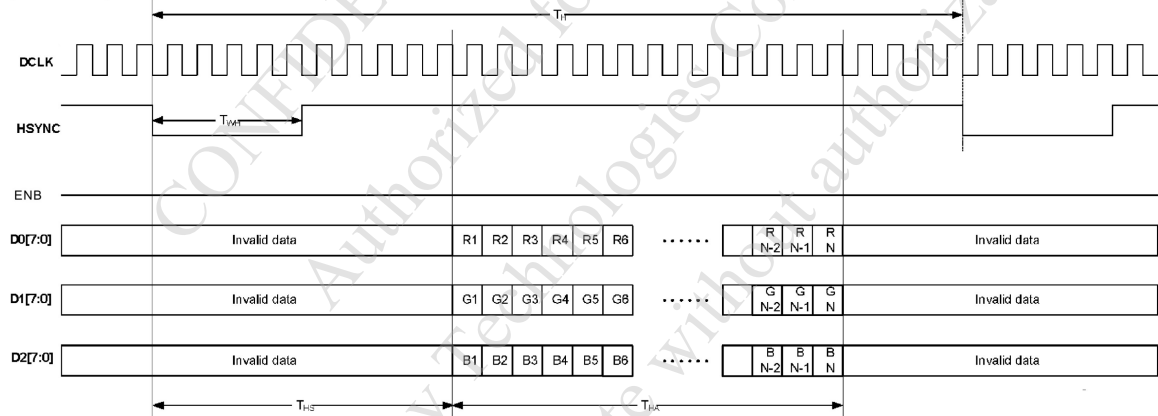
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
HSYNC SETUP TIME	T_{hst}	6	—	—	ns
HSYNC HOLD TIME	T_{hhd}	6	—	—	ns
VSYNC SETUP TIME	T_{vst}	6	—	—	ns
VSYNC HOLD TIME	T_{vhd}	6	—	—	ns
DATA SETUP TIME	T_{dsu}	6	—	—	ns
DATA HOLD TIME	T_{dhd}	6	—	—	ns
ENB SETUP TIME	T_{esu}	6	—	—	ns
SOURCE OUTPUT SETTLING TIME	T_{ST}	—	—	15	μ s
SOURCE OUTPUT LOADING R	R_{SL}	—	2	—	K ohm
SOURCE OUTPUT LOADING C	C_{SL}	—	60	—	pF



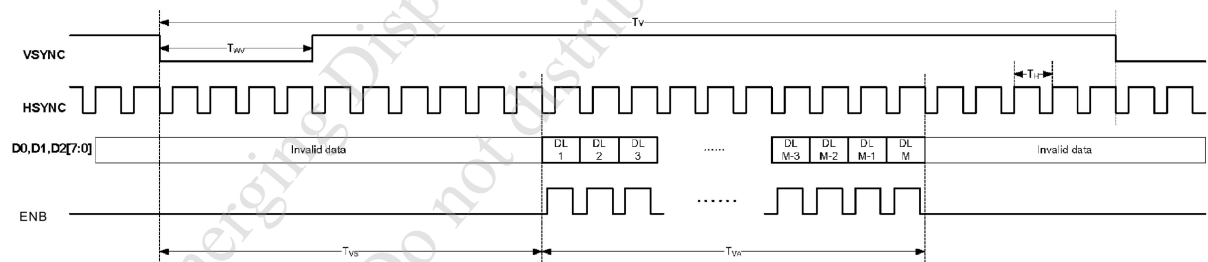
5.2 LCD MODULE SYNC MODE SIGNAL CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
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

(EDGSL=H)



SYNC Mode Horizontal Data Format

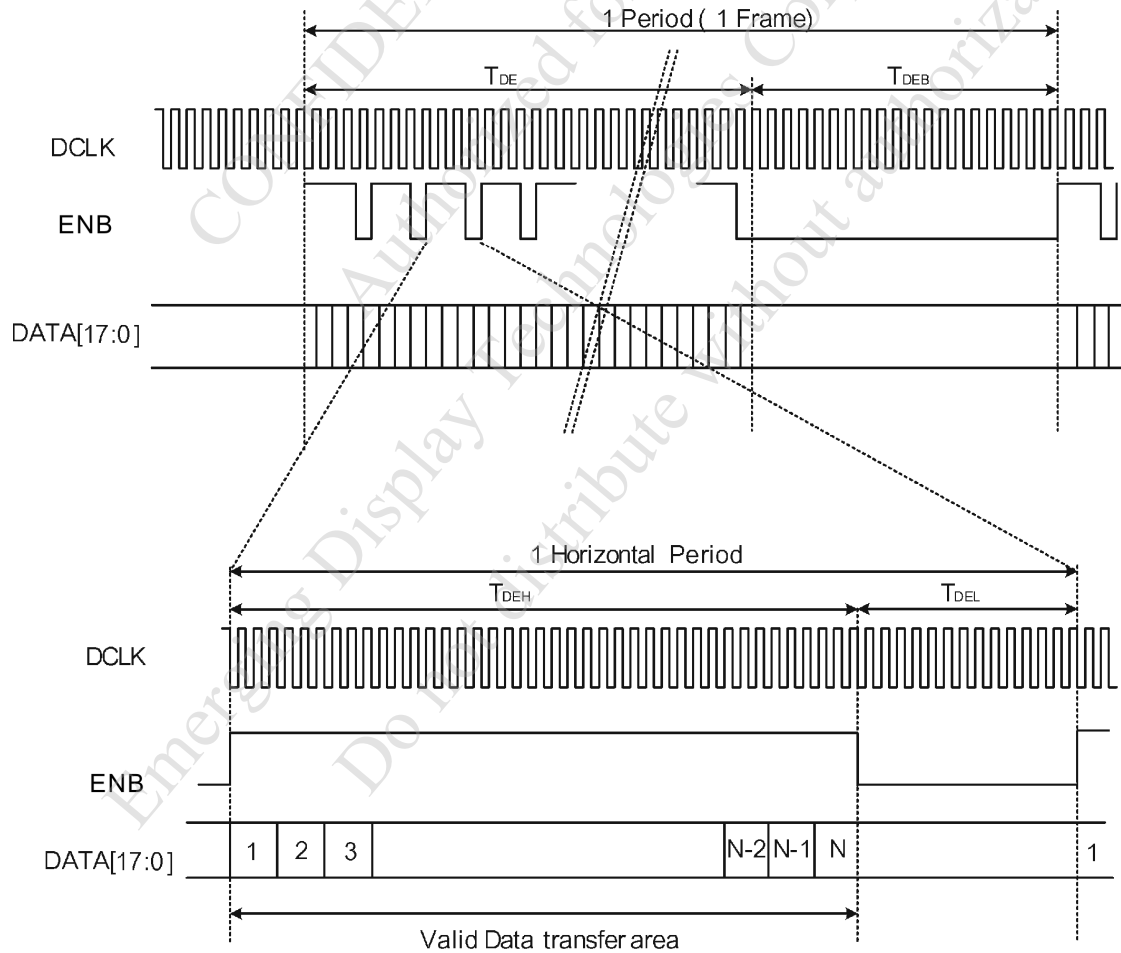


SYNC Mode Vertical Data Format

5.3 LCD MODULE DE MODE SIGNAL CHARACTERISTICS

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

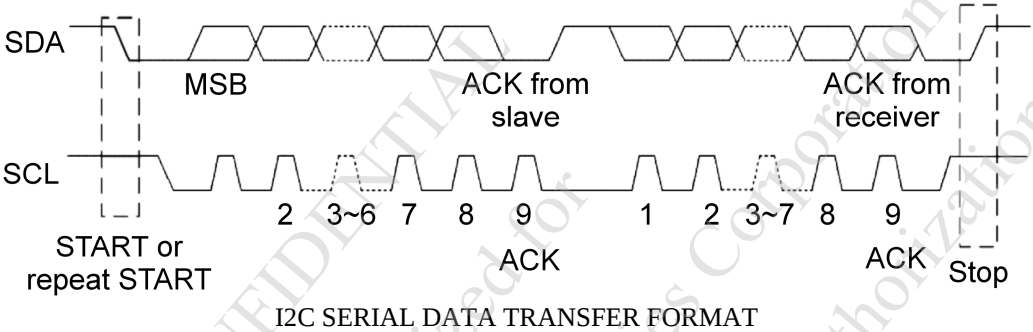
NOTE : (1) $T_{HS} + T_{HA} < T_H$



5.4 CAPACITIVE TOUCH PANEL I2C INTERFACE TIMING CHARACTERISTICS

5.4.1 I2C INTERFACE TIMING CHARACTERISTICS

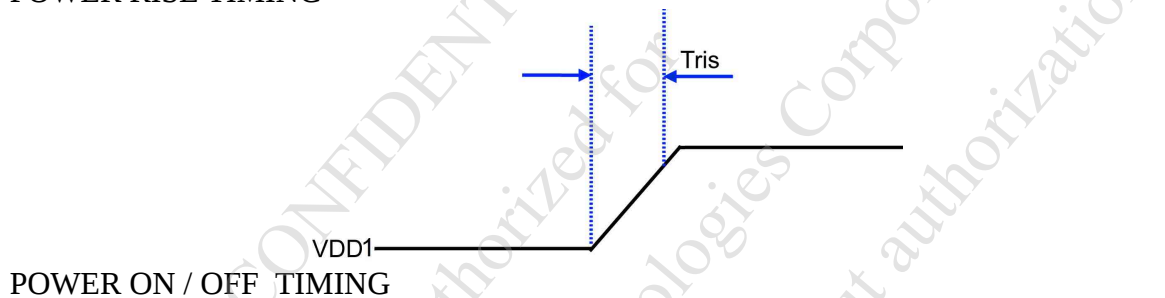
ITEM	MIN.	TYP.	MAX.	UNIT
SCL FREQUENCY	—	—	400	KHz
BUS FREE TIME BETWEEN A STOP AND START CONDITION	1.3	—	—	us
HOLD TIME (REPEATED) START CONDITION	0.6	—	—	us
DATA SETUP TIME	100	—	—	ns
SETUP TIME FOR A REPEATED START CONDITION	0.6	—	—	us
SETUP TIME FOR STOP CONDITION	0.6	—	—	us



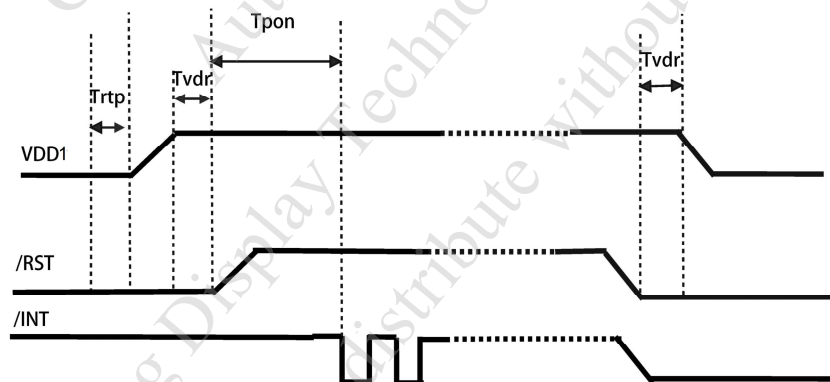
5.4.2 POWER SEQUENCE

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
RISE TIME FROM 0.1VDD1 TO 0.9VDD1	Tris	—	—	5	ms
TIME OF RESETTING TO BE LOW BEFORE POWERING ON	Trtp	100	—	—	us
TIME OF STARTING TO REPORT POINT AFTER POWERING ON	Tpon	200	—	—	ms
RESET TIME AFTER VDD1 POWERING ON	Tvdr	1	—	—	ms
TIME OF STARTING TO REPORT POINT AFTER RESETTING	Trsi	200	—	—	ms
RESET TIME	Trst	2	—	—	ms

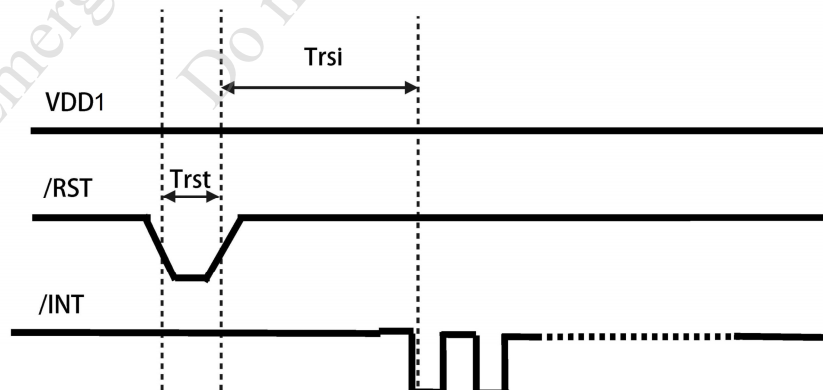
POWER RISE TIMING



POWER ON / OFF TIMING



RESET SEQUENCE



6. OPTICAL CHARACTERISTICS (NOTE 1)

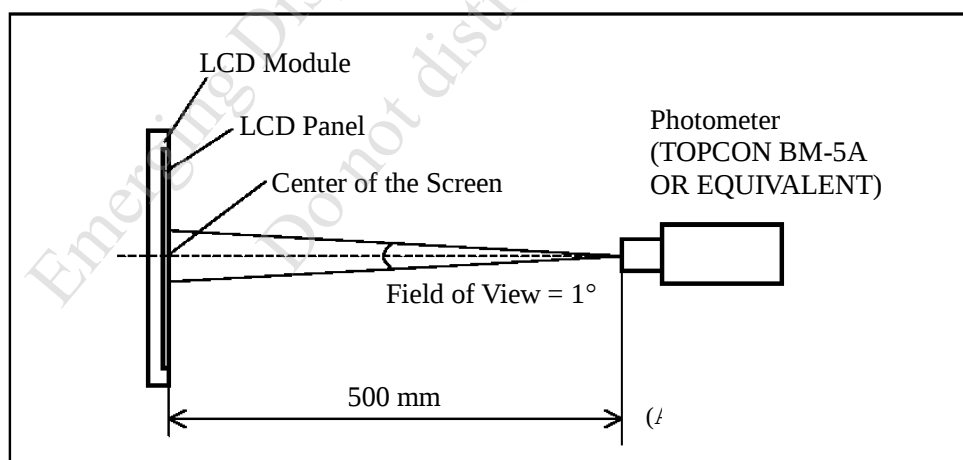
6.1 OPTICAL CHARACTERISTICS

Ta = 25 ± 2 °C

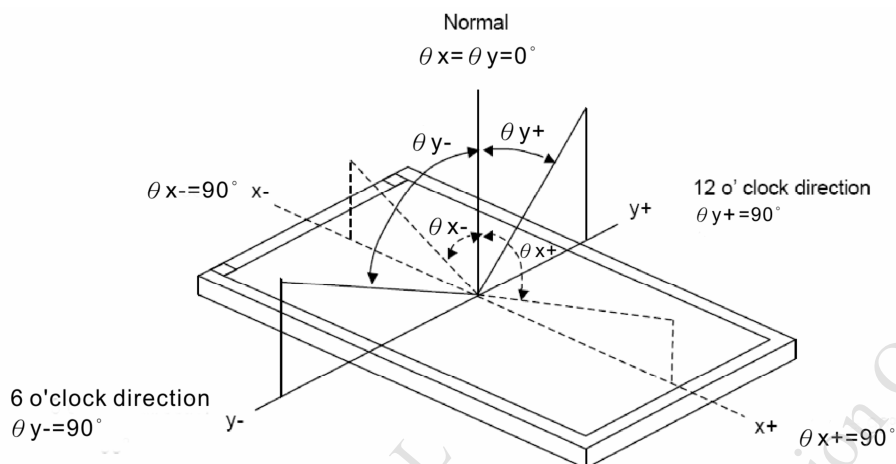
ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		θ_{y+}	$CR \geq 10$	$\theta_x=0^\circ$	65	70	—	deg.	NOTE (2) NOTE (3)
		θ_{y-}			70	75	—		
		θ_{x+}		$\theta_y=0^\circ$	70	75	—		
		θ_{x-}			70	75	—		
CONTRAST RATIO (CENTER)		CR	$\theta_x=0^\circ$, $\theta_y=0^\circ$		650	850	—	—	NOTE (3)
RESPONSE TIME		T_R (rise)	$\theta_x=0^\circ$, $\theta_y=0^\circ$		—	5	10	msec	NOTE (4)
		T_F (fall)			—	15	20		
COLOR CHROMATICITY (CENTER)	WHITE	W_x	$\theta_x=0^\circ$, $\theta_y=0^\circ$ IF = 160 mA (NTSC : 72 %)		0.270	0.320	0.370	—	NOTE (5)
		W_y			0.285	0.335	0.385		
	RED	R_x			0.580	0.630	0.680	—	
		R_y			0.305	0.355	0.405		
	GREEN	G_x			0.270	0.320	0.370	—	
		G_y			0.595	0.645	0.695		
	BLUE	B_x			0.115	0.165	0.215	—	
		B_y			0.005	0.055	0.105		
THE BRIGHTNESS OF MODULE (CENTER)		B	$\theta_x=0^\circ$, $\theta_y=0^\circ$ IF = 160mA		255	—	—	cd/m ²	NOTE (6)
THE UNIFORMITY OF MODULE		—			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 :



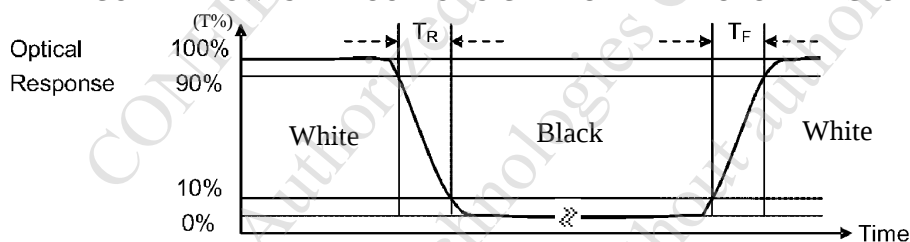
NOTE (3) : DEFINITION OF CONTRAST RATIO (CR) :

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.



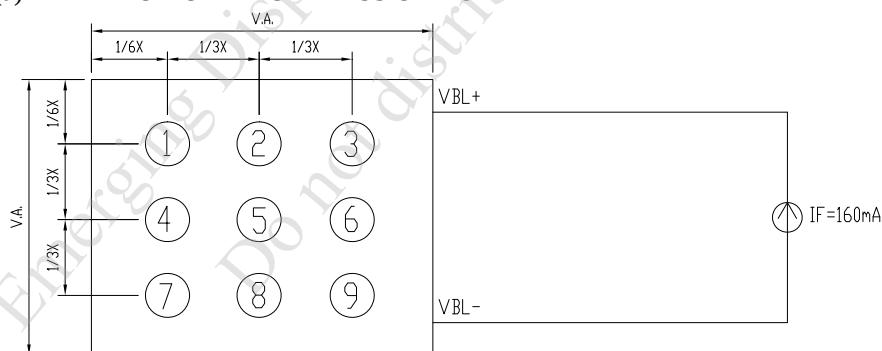
NOTE (5) : DEFINITION OF COLOR CHROMATICITY

(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

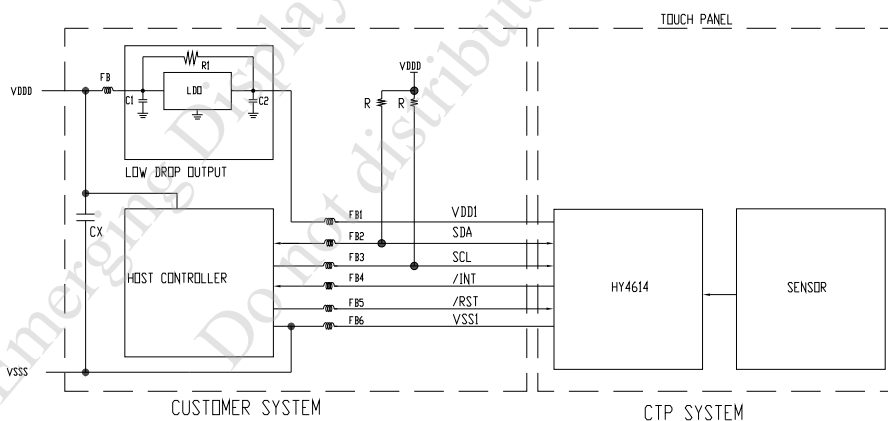
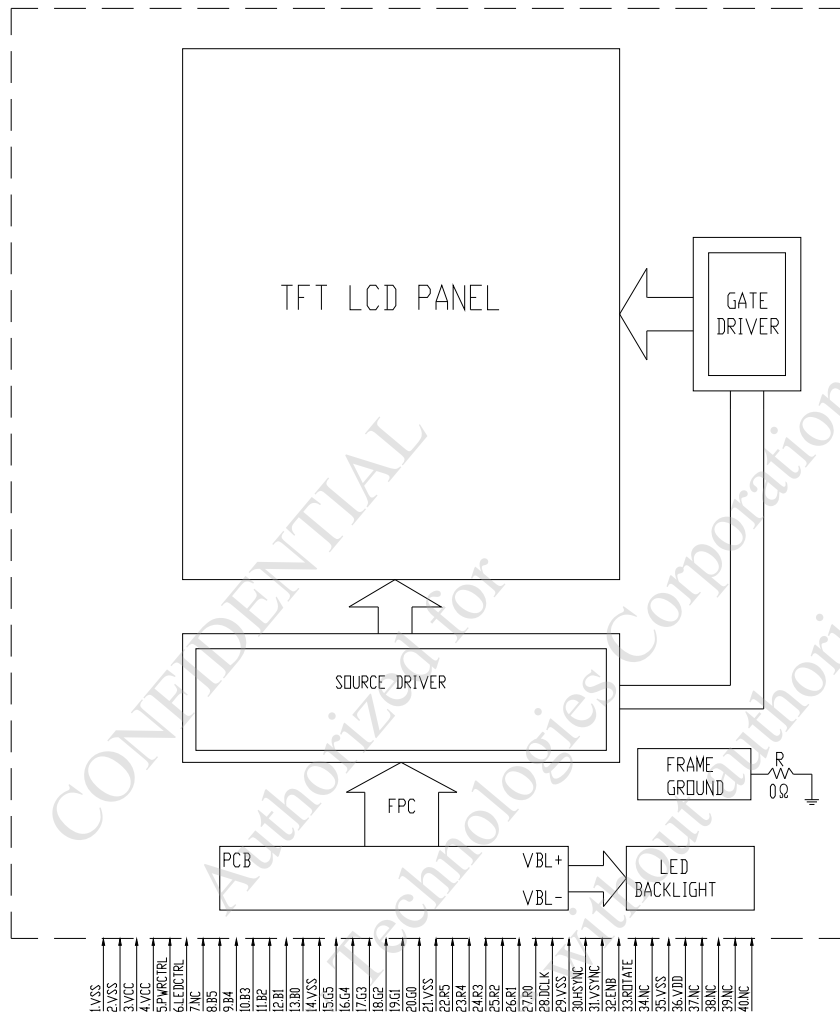


UNIT : mm

(b) THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

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

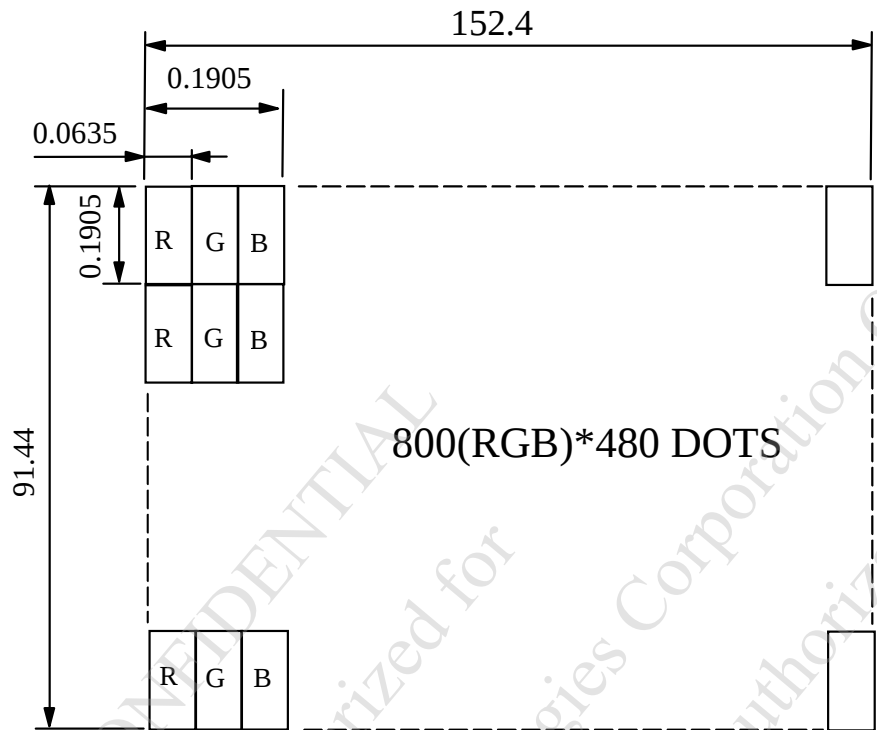
8. BLOCK DIAGRAM



NOTE (1) : THE STANDARD IIC COMMUNICATION INTERFACE, SUPREME SCL CLOCK IS 400 KHz, SLAVE ADDRESS CAN BE SET UP, SUPPORTS VDD1 LEVEL POWER, NEEDS PULL HIGH RESISTANCE AND WE RECOMMEND THE PULL HIGH RESISTANCE IS 2.0K OHM.

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 μ F OR 10 μ F

9. DETAIL DRAWING OF DOT MATRIX



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

10. INTERFACE SIGNALS

10.1 IF1

PIN NO.	SYMBOL	I/O/P	FUNCTION										
1	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)										
2	VSS	P											
3	VCC	P	POWER SUPPLY FOR LED DRIVER CIRCUIT										
4	VCC	P	POWER SUPPLY FOR LED DRIVER CIRCUIT										
5	PWCTRL	I	<table><tr><td rowspan="2">LOGIC LEVEL H=3.3V L=0V</td><td>PWCTRL</td><td>REMARK</td></tr><tr><td>H</td><td>POWER ON</td></tr><tr><td></td><td>L</td><td>SHUTDOWN</td></tr></table>			LOGIC LEVEL H=3.3V L=0V	PWCTRL	REMARK	H	POWER ON		L	SHUTDOWN
			LOGIC LEVEL H=3.3V L=0V	PWCTRL	REMARK								
				H	POWER ON								
	L	SHUTDOWN											
6	LEDCTRL	I	BRIGHTNESS CONTROL FOR LED BACKLIGHT : POWER SUPPLY 0~3V OR PWM SIGNAL										
7	NC	—	NON CONNECTION										
8	B5	I	BLUE DATA BIT 5										
9	B4	I	BLUE DATA BIT 4										
10	B3	I	BLUE DATA BIT 3										
11	B2	I	BLUE DATA BIT 2										
12	B1	I	BLUE DATA BIT 1										
13	B0	I	BLUE DATA BIT 0										
14	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)										
15	G5	I	GREEN DATA BIT 5										
16	G4	I	GREEN DATA BIT 4										
17	G3	I	GREEN DATA BIT 3										
18	G2	I	GREEN DATA BIT 2										
19	G1	I	GREEN DATA BIT 1										
20	G0	I	GREEN DATA BIT 0										
21	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)										
22	R5	I	RED DATA BIT 5										
23	R4	I	RED DATA BIT 4										
24	R3	I	RED DATA BIT 3										
25	R2	I	RED DATA BIT 2										
26	R1	I	RED DATA BIT 1										
27	R0	I	RED DATA BIT 0										
28	DCLK	I	DOT DATA CLOCK										
29	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)										

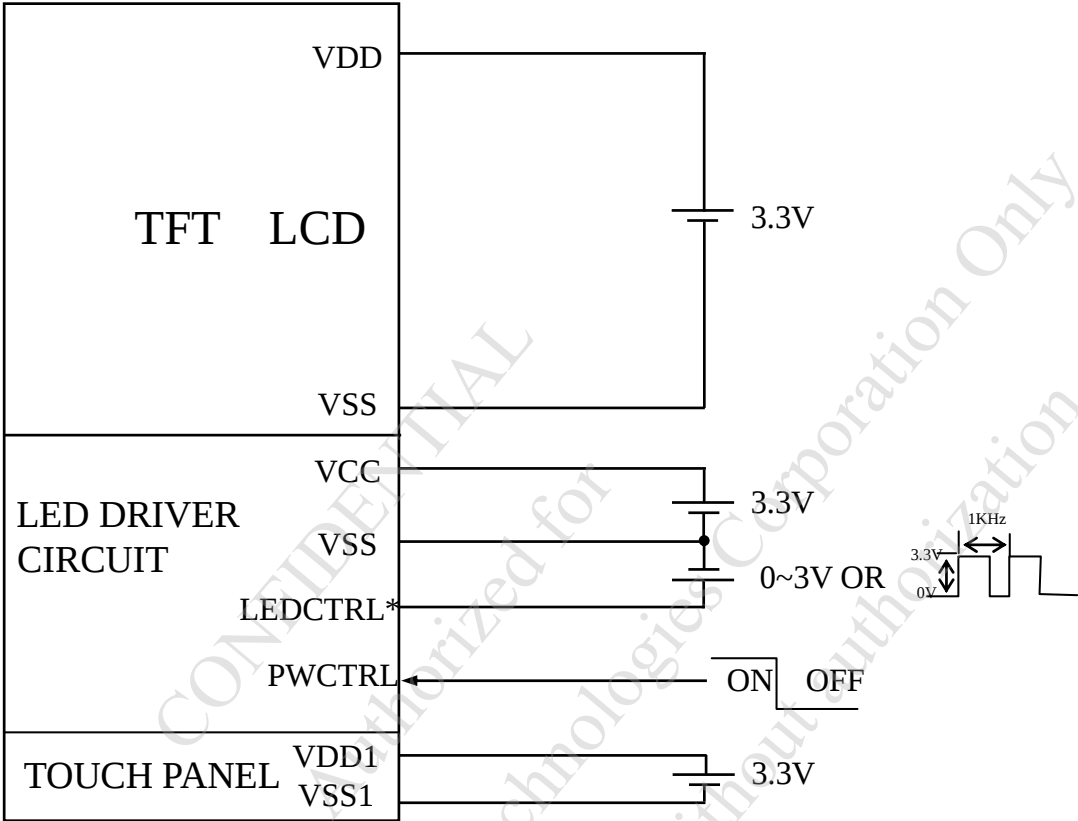
PIN NO.	SYMBOL	I/O/P	FUNCTION
30	HSYNC	I	HORIZONTAL SYNC INPUT. INTERNALLY PULL HIGH.
31	VSYNC	I	VERTICAL SYNC INPUT. INTERNALLY PULL HIGH.
32	ENB	I	DATA ENABLE INPUT. INTERNALLY PULL LOW.
33	ROTATE	I	WHEN ROTATE="H" THEN UD="H" LEVEL : OUT1→480 LR="L" LEVEL : OUT800→1 WHEN ROTATE="L" THEN UD="L" LEVEL : OUT480→1 (DEFAULT) LR="H" LEVEL : OUT1→800 (DEFAULT)
34	NC	—	NON CONNECTION
35	VSS	P	GROUND (VSS IS CONNECTED TO METAL HOUSING WITH CONDUCTIVE TAPE)
36	VDD	P	POWER SUPPLY VOLTAGE
37	NC	—	NON CONNECTION
38	NC	—	NON CONNECTION
39	NC	—	NON CONNECTION
40	NC	—	NON CONNECTION

10.2 IF2

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

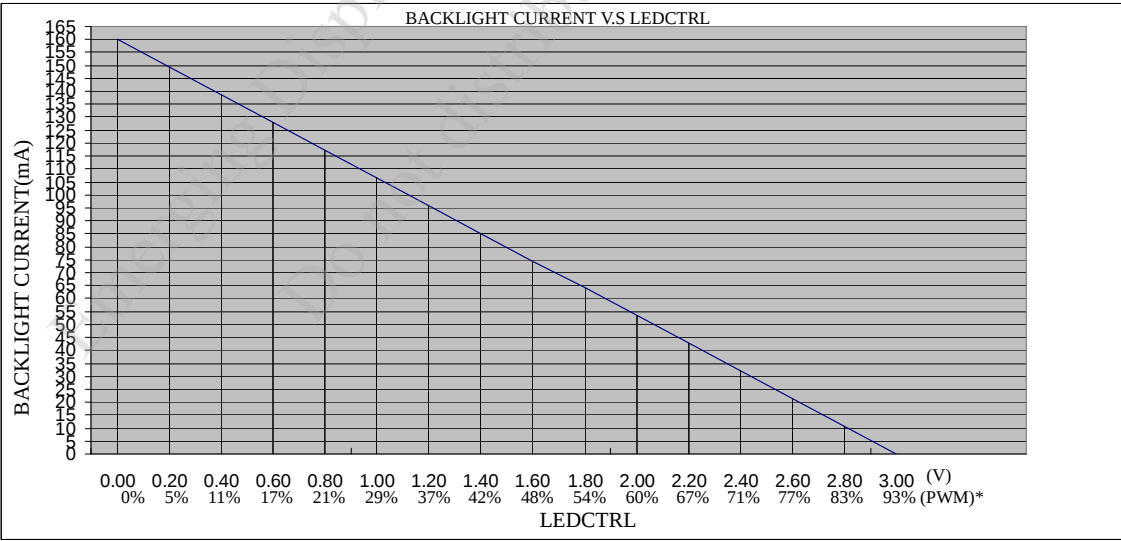
11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



* THE LEDCTRL CAN ALTERNATIVELY BE USED WITH A PWM, MINIMUM 1KHz FREQUENCY.

11.2 THE BRIGHTNESS CONTROLLED BY BACKLIGHT CURRENT OF LEDCTRL



*PWM IS BASED ON A 0~3.3V PWM SIGNAL RUNNING AT 1KHz

12. CAPACITIVE TOUCH PANEL SPECIFICATION

12.1 OPTICAL CHARACTERISTICS

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

NOTE (1) : OPTICAL MEASUREMENT SHOULD BE EXECUTED AFTER PANEL IS SECURED.

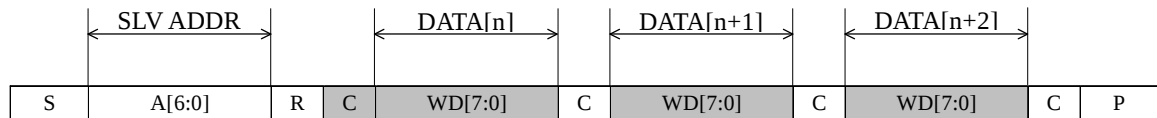
MEASUREMENT PROCESS SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM. OPTICAL SPECIFICATIONS SHOULD BE MEASURED BY SPECTROPHOTOMETER.

12.2 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	7H (MIN.)

12.3 PROTOCOL

12.3.1 I2C READ



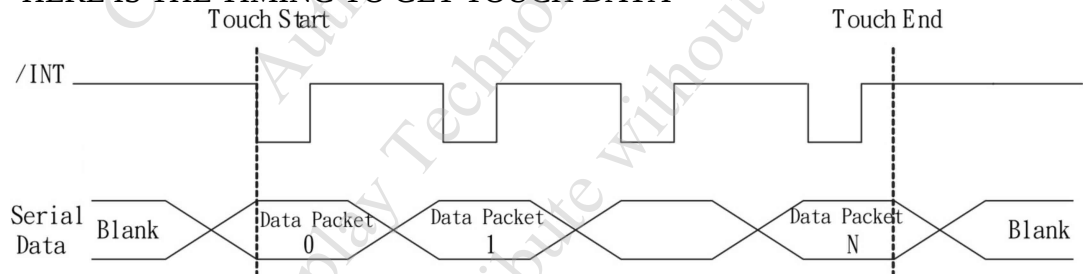
CHARACTER	DESCRIPTION
S	I2C START OR I2C RESTART
A[6:0]	SLAVE ADDRESS, THE VALUE CAN BE CUSTOMIZED
R	OPERATOR BYTE, SHOULD BE 1'b1, STANDS FOR READ
C	ACK SIGNAL
P	STOP SIGNAL (STOP SIGNAL IS OPTIONAL, RESTART SIGNAL IS ALSO OK FOR NEXT PACKET)

SLAVE ADDRESS=0x38

12.3.2 INTERRUPT SIGNAL FOR CTPM TO HOST

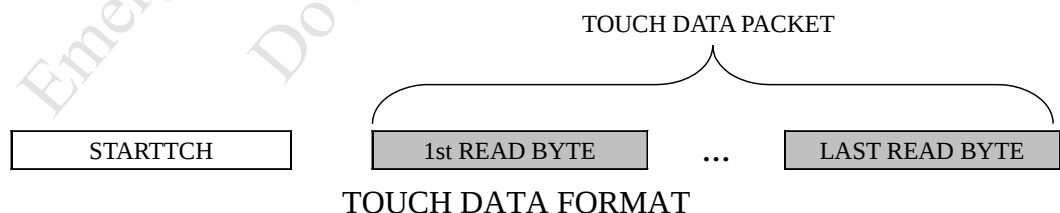
AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA.

HERE IS THE TIMING TO GET TOUCH DATA



12.3.3 READ TOUCH DATA PACKET

WE DEFINED A CTPM PERIOD AS EACH CAPACITANCE DATA GATHERING AND DATA PROCESS, IN EACH CTPM, IF THERE IS A TOUCH DETECTS, THERE WILL WE A FAME OF TOUCH DATA. HOST CAN GET THE SPECIFIED FORMAT TOUCH DATA BY SERIAL DATA INTERFACE.



TOUCH DATA READ PROTOCOL

IN THIS MODE THE CTP IS FULLY FUNCTIONAL AS A TOUCH SCREEN CONTROLLER. READ AND WRITE ACCESS ADDRESS IS JUST LOGICAL ADDRESS WHICH IS NOT ENFORCED BY HARDWARE OR FIRMWARE. HERE IS THE OPERATING MODE REGISTER MAP.

ADDRESS	NAME	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0	HOST ACCESS
02h	TD_STATUS					NUMBER OF TOUCH POINTS[3:0]				R
03h	TOUCH1_XH	1 st EVENT FLAG				1 st TOUCH X POSITION[11:8]				R
04h	TOUCH1_XL	1 st TOUCH X POSITION[7:0]								R
05h	TOUCH1_YH	1 st TOUCH ID[3:0]				1 st TOUCH Y POSITION[11:8]				R
06h	TOUCH1_YL	1 st TOUCH Y POSITION[7:0]								R
07h										
08h										
09h	TOUCH2_XH	2 nd EVENT FLAG				2 nd TOUCH X POSITION[11:8]				R
0Ah	TOUCH2_XL	2 nd TOUCH X POSITION[7:0]								R
0Bh	TOUCH2_YH	2 nd TOUCH ID[3:0]				2 nd TOUCH Y POSITION[11:8]				R
0Ch	TOUCH2_YL	2 nd TOUCH Y POSITION[7:0]								R
0Dh										R
0Eh										R
0Fh	TOUCH3_XH	3 rd EVENT FLAG				3 rd TOUCH X POSITION[11:8]				R
10h	TOUCH3_XL	3 rd TOUCH X POSITION[7:0]								R
11h	TOUCH3_YH	3 rd TOUCH ID[3:0]				3 rd TOUCH Y POSITION[11:8]				R
12h	TOUCH3_YL	3 rd TOUCH Y POSITION[7:0]								R
13h										R
14h										R
15h	TOUCH4_XH	4 th EVENT FLAG				4 th TOUCH X POSITION[11:8]				R
16h	TOUCH4_XL	4 th TOUCH X POSITION[7:0]								R
17h	TOUCH4_YH	4 th TOUCH ID[3:0]				4 th TOUCH Y POSITION[11:8]				R
18h	TOUCH4_YL	4 th TOUCH Y POSITION[7:0]								R
19h										R
1Ah										R
1Bh	TOUCH5_XH	5 th EVENT FLAG				5 th TOUCH X POSITION[11:8]				R
1Ch	TOUCH5_XL	5 th TOUCH X POSITION[7:0]								R
1Dh	TOUCH5_YH	5 th TOUCH ID[3:0]				5 th TOUCH Y POSITION[11:8]				R
1Eh	TOUCH5_YL	5 th TOUCH Y POSITION[7:0]								R
1Fh										R
20h										R
A6h	ID G FIRMID	FIRMWARE ID								R

TD_STATUS

THIS REGISTER IS THE TOUCH DATA STATUS REGISTER.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
02h	3:0	NUMBER OF TOUCH POINTS [3:0]	HOW MANY POINTS DETECTED. 1-5 IS VALID.
	7:4	NONE	NONE

TOUCHn_XH (n:1-5)

THIS REGISTER DESCRIBES MSB OF THE X COORDINATE OF THE NTH TOUCH POINT AND THE CORRESPONDING EVENT FLAG.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
03h ~ 1Bh	7:6	EVENT FLAG	00b: PUT DOWN 01b: PUT UP 10b: CONTACT 11b: RESERVED
	5:4	NONE	RESERVED
	3:0	TOUCH X POSITION [11:8]	MSB OF TOUCH X POSITION IN PIXELS

TOUCHn_XL (n:1-5)

THIS REGISTER DESCRIBES LSB OF THE X COORDINATE OF THE NTH TOUCH POINT.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
04h ~ 1Ch	7:0	TOUCH X POSITION [7:0]	LSB OF THE TOUCH X POSITION IN PIXELS

TOUCHn_YH (n:1-5)

THIS REGISTER DESCRIBES MSB OF THE Y COORDINATE OF THE NTH TOUCH POINT AND CORRESPONDING TOUCH ID.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
05h ~ 1Dh	7:4	TOUCH ID [3:0]	TOUCH ID OF TOUCH POINT
	3:0	TOUCH X POSITION [11:8]	MSB OF TOUCH Y POSITION IN PIXELS

TOUCHn_YL (n:1-5)

THIS REGISTER DESCRIBES LSB OF THE Y COORDINATE OF THE NTH TOUCH POINT.

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
06h ~ 1Eh	7:0	TOUCH X POSITION [7:0]	LSB OF THE TOUCH Y POSITION IN PIXELS

ID_G_FIRMWARE_ID

THIS REGISTER DESCRIBES THE FIRMWARE ID OF THE APPLICATION

ADDRESS	BIT ADDRESS	REGISTER NAME	DESCRIPTION
A6h	7:0	ID_G_FIRMWARE_ID	FIRMWARE VERSION

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

12.2.1 (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° (FOR SECTION OUTSIDE OF VIEWING AREA), REF TO FIG.B
PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN 45°

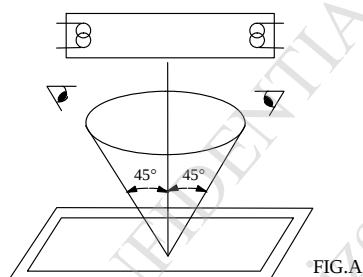


FIG.A

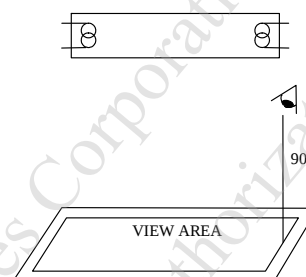


FIG.B

THE INSPECTION CRITERIA IS ACCORDING TO LINE OF SIGHT. INSPECTION SHALL BE MADE WITHIN THE HALF SECTION OF THE VIEWING CONE GENERATED BY LINE SEGMENT OF 45° WITH RESPECT TO THE VERTICAL AXIS FROM CENTER VERTEX OF LCD, THE FLUORESCENT LAMP AND THE CONE AXIS MUST BE PERPENDICULAR TO THE LCD SURFACE.

IF THE DEFECTS ARE OUTSIDE OF VIEWING AREA, IT SHALL BE INSPECTED BY 90° WITH RESPECT TO THE VERTICAL AXIS FROM EDGE OF VIEWING AREA.

13.2.2 ENVIRONMENT CONDITIONS :

AMBIENT TEMPERATURE		$25 \pm 5^\circ\text{C}$
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 :

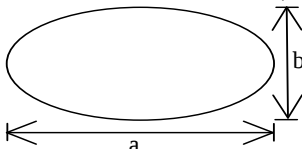
ANSI/ ASQ Z1.4 NORMAL INSPECTION LEVEL II

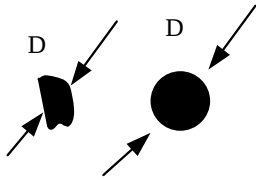
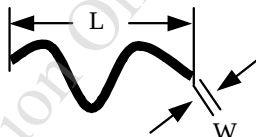
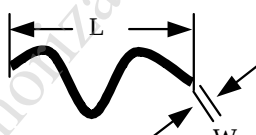
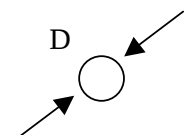
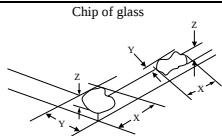
(b)AQL : MAJOR DEFECT : AQL 0.65

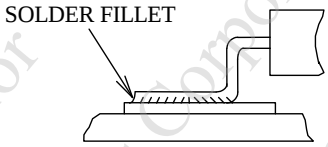
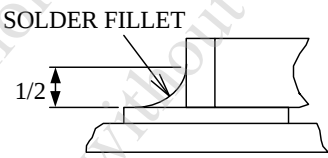
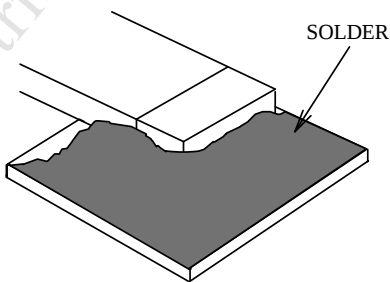
MINOR DEFECT : AQL 1.0

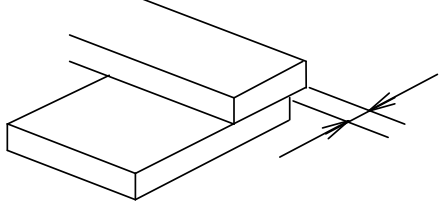
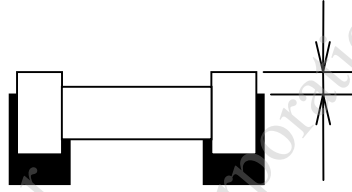
13.3 DEFECTS CLASSIFICATION

TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	• 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	

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><tr><th>ITEMS</th><th>ACCEPTABLE COUNT</th></tr><tr><td>BRIGHT DOT</td><td>$N \leq 4$</td></tr><tr><td>DARK DOT</td><td>$N \leq 5$</td></tr><tr><td>TOTAL BRIGHT AND DARK DOTS</td><td>$N \leq 5$</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. (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.	ITEMS	ACCEPTABLE COUNT	BRIGHT DOT	$N \leq 4$	DARK DOT	$N \leq 5$	TOTAL BRIGHT AND DARK DOTS	$N \leq 5$																
ITEMS	ACCEPTABLE COUNT																									
BRIGHT DOT	$N \leq 4$																									
DARK DOT	$N \leq 5$																									
TOTAL BRIGHT AND DARK DOTS	$N \leq 5$																									
4	BUBBLES ON POLARIZER /SURFACE STAINS /DIRT/CF FAIL/SPOT	<table><tr><td></td><td>AVERAGE DIAMETER (mm) : D</td><td>PERMISSIBLE NO.</td></tr><tr><td rowspan="3">BUBBLE ON POLARIZER</td><td>$D \leq 0.25$</td><td>IGNORE</td></tr><tr><td>$0.25 < D \leq 0.5$</td><td>$N \leq 5$</td></tr><tr><td>$0.5 < D$</td><td>0</td></tr><tr><td rowspan="3">SURFACE STAINS / DIRT ON POLARIZER</td><td>$D < 0.1$</td><td>IGNORE</td></tr><tr><td>$0.1 < D \leq 0.3$</td><td>$N \leq 3$</td></tr><tr><td>$0.3 < D$</td><td>0</td></tr><tr><td rowspan="3">CF FAIL / SPOT</td><td>$D < 0.1$</td><td>IGNORE</td></tr><tr><td>$0.1 < D \leq 0.3$</td><td>$N \leq 3$</td></tr><tr><td>$0.3 < D$</td><td>0</td></tr></table> NOTE : (1)POLARIZER BUBBLE IS DEFINED AS THE BUBBLE APPEARS ON ACTIVE DISPLAY AREA. THE DEFECT OF POLARIZER BUBBLE SHALL BE IGNORED IF THE POLARIZER BUBBLE APPEARS ON THE OUTSIDE OF ACTIVE DISPLAY AREA. (2)THE 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 		AVERAGE DIAMETER (mm) : D	PERMISSIBLE NO.	BUBBLE ON POLARIZER	$D \leq 0.25$	IGNORE	$0.25 < D \leq 0.5$	$N \leq 5$	$0.5 < D$	0	SURFACE STAINS / DIRT ON POLARIZER	$D < 0.1$	IGNORE	$0.1 < D \leq 0.3$	$N \leq 3$	$0.3 < D$	0	CF FAIL / SPOT	$D < 0.1$	IGNORE	$0.1 < D \leq 0.3$	$N \leq 3$	$0.3 < D$	0
	AVERAGE DIAMETER (mm) : D	PERMISSIBLE NO.																								
BUBBLE ON POLARIZER	$D \leq 0.25$	IGNORE																								
	$0.25 < D \leq 0.5$	$N \leq 5$																								
	$0.5 < D$	0																								
SURFACE STAINS / DIRT ON POLARIZER	$D < 0.1$	IGNORE																								
	$0.1 < D \leq 0.3$	$N \leq 3$																								
	$0.3 < D$	0																								
CF FAIL / SPOT	$D < 0.1$	IGNORE																								
	$0.1 < D \leq 0.3$	$N \leq 3$																								
	$0.3 < D$	0																								

NO.	ITEM	CRITERIA											
5	BLACK/WHITE SPOT CIRCULAR TYPE	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≤0.1</td><td>IGNORE</td></tr><tr><td>0.1<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.	SIZE D	PERMISSIBLE NO.	D≤0.1	IGNORE	0.1<D≤0.3	5	0.3<D≤0.5	5	D>0.5	0	
SIZE D	PERMISSIBLE NO.												
D≤0.1	IGNORE												
0.1<D≤0.3	5												
0.3<D≤0.5	5												
D>0.5	0												
6	SCRATCH	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>2</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.	SIZE W & L	PERMISSIBLE NO.	W≤0.05	IGNORE	0.05<W≤0.08, L≤8	3	0.08<W≤0.1, L≤5	2	W>0.1	0	
SIZE W & L	PERMISSIBLE NO.												
W≤0.05	IGNORE												
0.05<W≤0.08, L≤8	3												
0.08<W≤0.1, L≤5	2												
W>0.1	0												
7	BLACK / WHITE LINE LINEAR TYPE / FOREIGN FIBER	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>2</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.	SIZE W & L	PERMISSIBLE NO.	W≤0.05	IGNORE	0.05<W≤0.08, L≤8	3	0.08<W≤0.1, L≤5	2	W>0.1	0	
SIZE W & L	PERMISSIBLE NO.												
W≤0.05	IGNORE												
0.05<W≤0.08, L≤8	3												
0.08<W≤0.1, L≤5	2												
W>0.1	0												
8	BUBBLE / DENT FOR OPTICAL BONDING	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.	SIZE D	PERMISSIBLE NO.	D≤0.2	IGNORE	0.2<D≤0.3	3	0.3<D≤0.5	2	D>0.5	0	
SIZE D	PERMISSIBLE NO.												
D≤0.2	IGNORE												
0.2<D≤0.3	3												
0.3<D≤0.5	2												
D>0.5	0												
9	CHIPPING	<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>	CORNER	X ≤ 3mm 、 Y ≤ 3mm 、 Z ≤ t (t : THICKNESS)	EDGE	X ≤ 6mm , Y ≤ 1mm , Z < t (t : THICKNESS)							
CORNER	X ≤ 3mm 、 Y ≤ 3mm 、 Z ≤ t (t : THICKNESS)												
EDGE	X ≤ 6mm , Y ≤ 1mm , 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 ACCEPTABLE, IF MURA IS SLIGHT VISIBLE THROUGH 6% ND FILTER.											
13	UNEVEN COLOR SPREAD, COLORATION	TO BE DETERMINED BASED UPON THE LIMITED SAMPLE.											
14	BEZEL APPEARANCE	1. BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION. 2. BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.											

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 

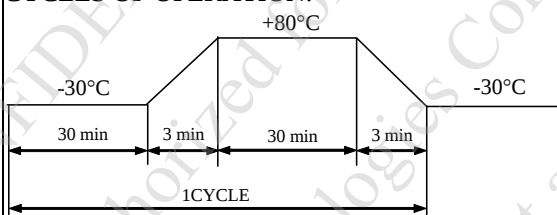
NO.	ITEM	CRITERIA
16	SOLDERING	3. PARTS ALIGNMENT (a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE  (b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE  4. NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB. 5. NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE. 6. NO RESIDUE OR SOLDER BALLS ON PCB. 7. NO SHORT CIRCUITS IN COMPONENTS ON PCB.
17	BACKLIGHT	1. NO LIGHT 2. FLICKERING AND OTHER ABNORMAL ILLUMINATION 3. SPOTS OR SCRATCHES THAT APPEAR WHEN LIT MUST BE JUDGED USING LCD SPOT, LINES AND CONTAMINATION STANDARDS. 4. BACKLIGHT DOESN'T LIGHT OR COLOR IS WRONG.
18	GENERAL APPEARANCE	1. NO OXIDATION, CONTAMINATION, CURVES OR, BENDS ON INTERFACE PIN (OLB) OF TCP. 2. NO CRACKS ON INTERFACE PIN (OLB) OF TCP. 3. NO CONTAMINATION, SOLDER RESIDUE OR SOLDER BALLS ON PRODUCT. 4. THE IC ON THE TCP MAY NOT BE DAMAGED, CIRCUITS. 5. THE UPPERMOST EDGE OF THE PROTECTIVE STRIP ON THE INTERFACE PIN MUST BE PRESENT OR LOOK AS IF IT CAUSE THE INTERFACE PIN TO SEVER. 6. THE RESIDUAL ROSIN OR TIN OIL OF SOLDERING (COMPONENT OR CHIP COMPONENT) IS NOT BURNED INTO BROWN OR BLACK COLOR. 7. SEALANT ON TOP OF THE ITO CIRCUIT HAS NOT HARDENED. 8. PIN TYPE MUST MATCH TYPE IN SPECIFICATION SHEET. 9. LCD PIN LOOSE OR MISSING PINS. 10. PRODUCT PACKAGING MUST BE THE SAME AS SPECIFIED ON PACKAGING SPECIFICATION SHEET. 11. PRODUCT DIMENSION AND STRUCTURE MUST CONFORM TO PRODUCT SPECIFICATION SHEET. 12. THE APPEARANCE OF HEAT SEAL SHOULD NOT ADMIT ANY DIRT AND BREAK.

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.

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 TEMP 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 $\pm 12\text{KV}$ CONTACT DISCHARGE $\pm 8\text{KV}$ (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

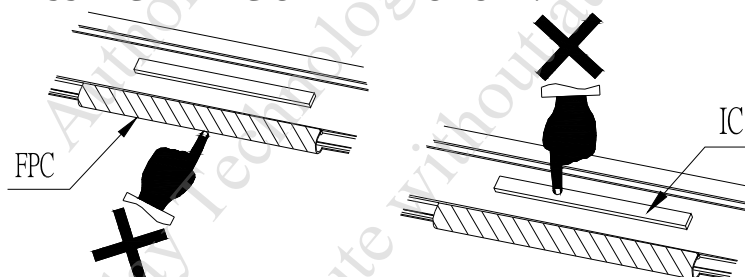
FOR THE FINAL TEST THE TESTING SAMPLE MUST BE STORED AT ROOM TEMPERATURE FOR 24 HOURS, AFTER THE TESTS LISTED IN TABLE 14.1, STANDARD SPECIFICATIONS FOR RELIABILITY HAVE BEEN EXECUTED IN ORDER TO ENSURE STABILITY.

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

15. CAUTION

15.1 OPERATION

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



15.2 HANDLING

- 15.2.1 USE A GROUNDED SOLDERING IRON WHEN SOLDERING CONNECTOR I/O TERMINALS . FOR SOLDERING OR REPAIRING, TAKE PRECAUTION AGAINST THE TEMPERATURE OF THE SOLDERING IRON AND THE SOLDERING TIME TO PREVENT PEELING OFF THE THROUGH-HOLE-PAD .
- 15.2.2 DO NOT DISASSEMBLE . EDT SHALL NOT BE HELD RESPONSIBLE IF THE MODULE IS DISASSEMBLED AND UPON THE REASSEMBLY THE MODULE FAILED .
- 15.2.3 DO NOT CHARGE STATIC ELECTRICITY , AS THE CIRCUIT OF THIS MODULE CONTAINS CMOS LSIS. A WORKMAN'S BODY SHOULD ALWAYS BE STATIC-PROTECTED BY USE OF AN ESD STRAP. WORKING CLOTHES FOR SUCH PERSONNEL SHOULD BE OF STATIC-PROTECTED MATERIAL .
- 15.2.4 ALWAYS GROUND THE ELECTRICALLY-POWERED DRIVER BEFORE USING IT TO INSTALL THE LCD MODULE. WHILE CLEANING THE WORK STATION BY VACUUM CLEANER, DO NOT BRING THE SUCKING MOUTH NEAR THE MODULE ; STATIC ELECTRICITY OF THE ELECTRICALLY-POWERED DRIVER OR THE VACUUM CLEANER MAY DESTROY THE MODULE .
- 15.2.5 DON'T GIVE EXTERNAL SHOCK.
- 15.2.6 DON'T APPLY EXCESSIVE FORCE ON THE SURFACE.
- 15.2.7 LIQUID 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.