

EXAMINED BY :	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0008819
Sam Chou		ISSUE : JUN.10, 2020
APPROVED BY:		TOTAL PAGE : 32
<i>Chris Wu</i>		VERSION : 6

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :
ETML043011NDHA
 (RoHS)
 FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

DOC . FIRST ISSUE

MAY.09, 2019

RECORDS OF REVISION

DATE	REVISED PAGE NO.	SUMMARY																																																																																																																																																
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4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY FOR DRIVER	VDD-GND	---	3.15	3.30	3.45	V
INPUT HIGH LEVEL VOLTAGE	VIH	---	0.6*VDD	---	VDD+0.5	V
INPUT LOW LEVEL VOLTAGE	VIL	---	0	---	0.3*VDD	V
OUTPUT HIGH LEVEL VOLTAGE	VOH	IOH=8mA	0.7*VDD	---	---	V
OUTPUT LOW LEVEL VOLTAGE	VOL	IOL=10mA	---	---	0.3*VDD	V
POWER SUPPLY CURRENT CONSUMPTION FOR OPERATION	IDD	VDD-GND =3.30V	---	(75)	(120)	mA

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE	VDD1-VSS1	---	3.15	3.30	3.45	V
LOGIC HIGH INPUT VOLTAGE	VIH	---	0.6*VDD1	---	VDD1+0.5	V
LOGIC LOW INPUT VOLTAGE	VIL	---	0	---	0.3*VDD1	V
LOGIC HIGH OUTPUT VOLTAGE	VOH	IOH=8mA	0.7*VDD1	---	---	V
LOGIC LOW OUTPUT VOLTAGE	VOL	IOL=10mA	---	---	0.3*VDD1	V
POWER SUPPLY CURRENT	IDD1	VDD1-VSS1 =3.30V	---	85	120	mA

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5.1.1 AC ELECTRICAL CHARACTERISTICS &
5.1.2 PARALLEL 24-BIT RGB MODE & 5.1.3 TIMING CHARACTERISTIC
PARAMETER → ITEM

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5.2.2 POWER-ON SEQUENCE
VDD → VDD1

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6.1 OPTICAL CHARACTERISTICS

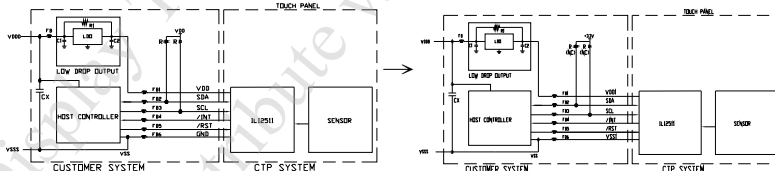
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
COLOR CHROMATICITY (CENTER)	WHITE	Wx	0.29	0.34	0.39	---	NOTE (5)
		Wy	0.30	0.35	0.40	---	
	RED	Rx	0.56	0.61	0.66	---	
	GREEN	Gx	0.34	0.39	0.44	---	
		Gy	0.10	0.15	0.20	---	
	BLUE	By	0.05	0.10	0.15	---	

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
COLOR CHROMATICITY (CENTER)	WHITE	Wx	0.25	0.30	0.35	---	NOTE (5)
		Wy	0.26	0.31	0.36	---	
	RED	Rx	0.54	0.59	0.64	---	
	GREEN	Gx	0.31	0.36	0.41	---	
		Gy	0.14	0.19	0.24	---	
	BLUE	By	0.04	0.09	0.14	---	

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8.1 TFT
MODIFY TFT BLOCK DIAGRAM

8.2 CTP



NOTE (1) : THE STANDARD IIC COMMUNICATION INTERFACE, SUPREME SCL CLOCK IS 400 KHZ, SLAVE ADDRESS CAN BE SET UP, SUPPORTS VDD LEVEL POWER, NEEDS PULL HIGH RESISTANCE AND WE RECOMMEND THE PULL HIGH RESISTANCE IS 2.0K OHM → THE STANDARD I2C COMMUNICATION INTERFACE, SUPREME SCL CLOCK IS 400 KHZ, SLAVE ADDRESS CAN BE SET UP, SUPPORTS VDD1 LEVEL POWER, RECOMMEND RESERVING PULL HIGH RESISTANCE FOR SPECIAL APPLICATION.

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MODEL NO.	VERSION	PAGE
ETML043011NDHA	6	0-4

RECORDS OF REVISION	DOC . FIRST ISSUE	MAY.09, 2019
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DATE	REVISED PAGE NO.	SUMMARY												
JAN.17, 2020	16	7. OUTLINE DIMENSIONS MARK Δ : REVISE DRAWING												
MAR.04, 2020	12	5.2.1 I2C INTERFACE TIMING CHARACTERISTICS <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>ITEM</td> <td>FAST MODE</td> <td>ITEM</td> <td>FAST MODE</td> </tr> <tr> <td></td> <td>UNIT</td> <td></td> <td>UNIT</td> </tr> <tr> <td>DATA HOLD TIME</td> <td>μs</td> <td>DATA HOLD TIME</td> <td>ns</td> </tr> </table>	ITEM	FAST MODE	ITEM	FAST MODE		UNIT		UNIT	DATA HOLD TIME	μ s	DATA HOLD TIME	ns
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	UNIT		UNIT											
DATA HOLD TIME	μ s	DATA HOLD TIME	ns											
JUN.10, 2020	11	5.1.5 POWER ON/OFF SEQUENCE STBYB \rightarrow DISP												
<p style="font-size: 2em; opacity: 0.3; transform: rotate(-45deg);">CONFIDENTIAL</p> <p style="font-size: 1.5em; opacity: 0.3; transform: rotate(-45deg);">Authorized for</p> <p style="font-size: 1.2em; opacity: 0.3; transform: rotate(-45deg);">Emerging Display Technologies Corporation Only.</p> <p style="font-size: 1.2em; opacity: 0.3; transform: rotate(-45deg);">Do not distribute without authorization.</p>														

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1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER/DRIVER

PLEASE REFER TO :

SITRONIX ST5625CA
SITRONIX ST5091CA

1.2 DATA SHEET FOR CAPACITIVE TOUCH PANEL CONTROLLER/DRIVER

PLEASE REFER TO :

ILITEK ILI2511

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	-----	4.3 inch
(2) NUMBER OF DOTS	-----	800W * (RGB) * 480H DOTS
(3) MODULE SIZE	-----	105.5W * 67.2H * 4.46D mm (NOT INCLUDED FPC)
(4) VIEWING AREA	-----	96.9W * 55.5H mm
(5) ACTIVE AREA	-----	95.04W * 53.856H mm
(6) DOT SIZE	-----	0.0396W * 0.1122H mm
(7) PIXEL PITCH	-----	0.1188W * 0.1122H mm
(8) LCD TYPE	-----	TFT, TRANSMISSIVE, NORMALLY BLACK, ANTI-GLARE
(9) COLOR	-----	16.7M
(10) VIEWING DIRECTION	-----	SUPER WIDE VIEW
(11) BACK LIGHT	-----	LED, COLOR : WHITE
(12) INTERFACE MODE	-----	RGB(24 BIT) PARALLEL (DE MODE)

2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

- (1) TOUCH PANEL SIZE ----- 4.3 inch
- (2) OUTER DIMENSION ----- 105.5W * 67.2H * 1.7D mm
(NOT INCLUDED FPC)
- (3) ACTIVE AREA ----- 96.04W * 54.86H mm
- (4) INPUT TYPE ----- MULTI TOUCH
- (5) NUMBER OF TOUCH SENSOR ----- 18*10 SENSORS
- (6) RESOLUTION ----- 16384 * 9600
- (7) INTERFACE MODE ----- I2C

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3. ABSOLUTE MAXIMUM RATINGS

3.1 LCD MODULE ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.3	4.6	V	VSS=0
POWER DISSIPATION FOR LED BACKLIGHT	PD	—	1224	mW	—
FORWARD CURRENT FOR LED BACKLIGHT	ILED	—	60	mA	—

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)
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)	10 ms 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 TFT MODULE ELECTRICAL CHARACTERISTICS

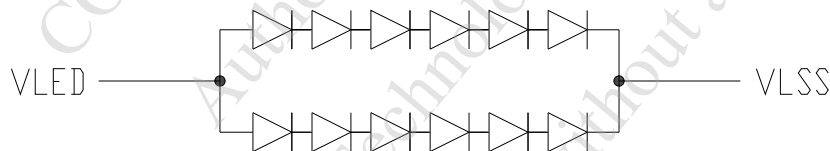
Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.3	3.45	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS =3.3V	—	190	250	mA	NOTE (1)
LOGIC HIGH INPUT VOLTAGE	VIH	—	0.7*VDD	—	VDD	V	NOTE (2)
LOGIC LOW INPUT VOLTAGE	VIL	—	VSS	—	0.3*VDD	V	NOTE (2)
LOGIC HIGH OUTPUT VOLTAGE	VOH	IOH= -1.0mA	VDD-0.4	—	VDD	V	
LOGIC LOW OUTPUT VOLTAGE	VOL	IOL= +1.0mA	VSS	—	VSS+0.4	V	
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=40mA	16.8	19.2	20.4	V	NOTE (3)
LED LIFE TIME	—	IF=20mA (PER LED)	30K	—	—	HRS	NOTE (4) NOTE (5)

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

NOTE (2) : APPLIED TO TERMINALS, R0~R7, G0~G7, B0~B7, CLK, DISP, HSD, VSD, DE.

NOTE (3) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT

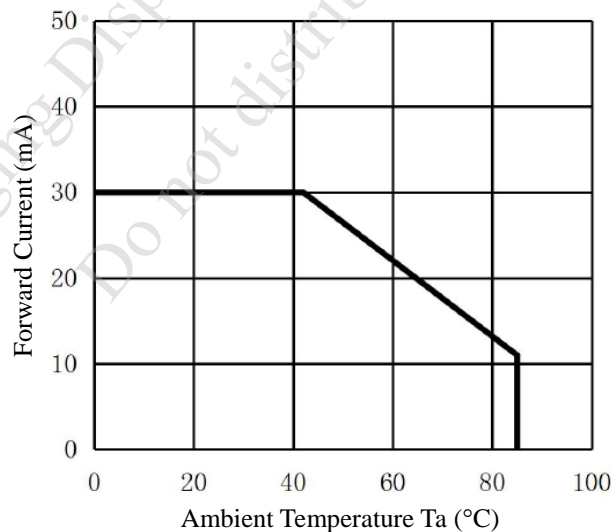


NOTE (4) : CONDITIONS; Ta=25 °C, CONTINUOUS LIGHTING

NOTE (5) : DEFINITIONS OF LIFE TIME :

LCM LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

NOTE (6) : AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT.(PER LED)



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	VIH	—	0.6*VDD1	—	VDD1+0.5	V
LOGIC LOW INPUT VOLTAGE	VIL	—	0	—	0.3*VDD1	V
LOGIC HIGH OUTPUT VOLTAGE	VOH	IOH=8mA	0.7*VDD1	—	—	V
LOGIC LOW OUTPUT VOLTAGE	VOL	IOL=10mA	—	—	0.3*VDD1	V
POWER SUPPLY CURRENT	IDD1	VDD1-VSS1 =3.30V	—	85	120	mA

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5. TIMING CHARACTERISTICS

5.1 LCD MODULE AC ELECTRICAL CHARACTERISTICS

5.1.1 AC ELECTRICAL CHARACTERISTICS

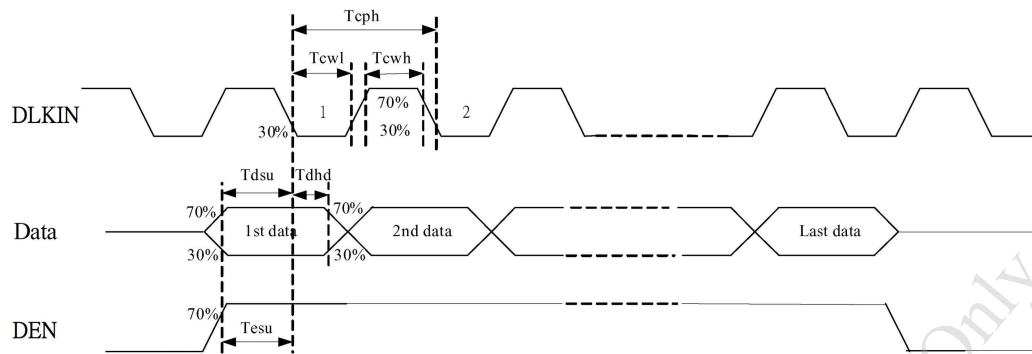
Ta = 25 °C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
VDD POWER ON SLEW RATE	T _{POR}	—	—	20	ms	FROM 0V TO 90% VDD
RSTB PULSE WIDTH	T _{RST}	50	—	—	us	CLKIN=50MHz
CLKIN CYCLE TIME	T _{cph}	20	—	—	ns	
CLKIN PULSE DUTY	T _{cwh}	40	50	60	%	
VSD SETUP TIME	T _{vst}	8	—	—	ns	
VSD HOLD TIME	T _{vhd}	8	—	—	ns	
HSD SETUP TIME	T _{hst}	8	—	—	ns	
HSD HOLD TIME	T _{hhd}	8	—	—	ns	
DATA SETUP TIME	T _{dsu}	8	—	—	ns	D[7:0], D1[7:0], D2[7:0] TO CLKIN
DATE HOLD TIME	T _{dhhd}	8	—	—	ns	D[7:0], D1[7:0], D2[7:0] TO CLKIN
DE SETUP TIME	T _{esu}	8	—	—	ns	
DE HOLD TIME	T _{ehd}	8	—	—	ns	
OUTPUT STABLE TIME	T _{sst}	—	—	6	us	10% TO 90% TARGET VOLTAGE. CL=120pF, R=10Kohm

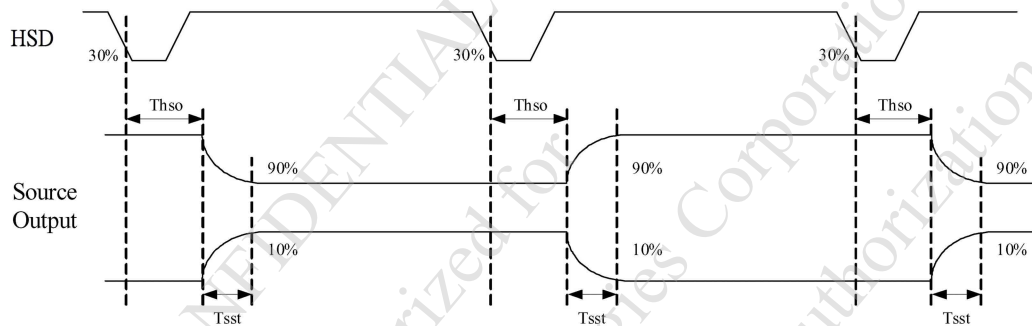
5.1.2 PARALLEL 24-BIT RGB MODE

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
DCLK FREQUENCY	F _{clk}	—	40	50	MHz	
DCLK CYCLE TIME	T _{clk}	20	25	—	ns	
DCLK PULSE DUTY	T _{cwh}	40	50	60	%	T _{clk}
TIME FROM HSYNC TO SOURCE OUTPUT	T _{hso}	—	64	—	DCLK	
TIME FROM HSD TO SOURCE OUTPUT	T _{hso}	—	64	—	CLKIN	
TIME FROM HSD TO LD	T _{hd}	—	64	—	CLKIN	
TIME FROM HSD TO STV	T _{hstv}	—	2	—	CLKIN	
TIME FROM HSD TO CKV	T _{hckv}	—	20	—	CLKIN	
TIME FROM HSD TO OEV	T _{hoev}	—	4	—	CLKIN	
LD PULSE WIDTH	T _{wld}	—	10	—	CLKIN	
CKV PULSE WIDTH	T _{wckv}	—	66	—	CLKIN	
OEV PULSE WIDTH	T _{woev}	—	74	—	CLKIN	

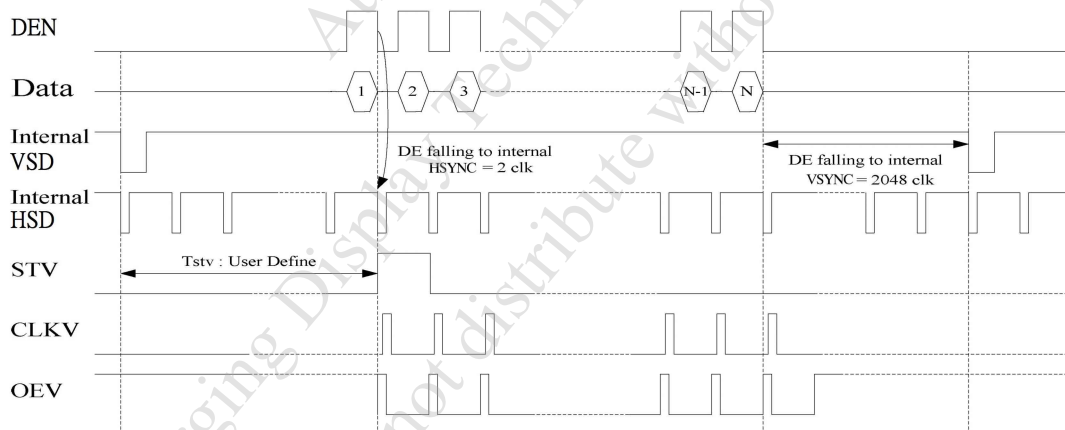
INPUT CLOCK AND DATA TIMING DIAGRAM



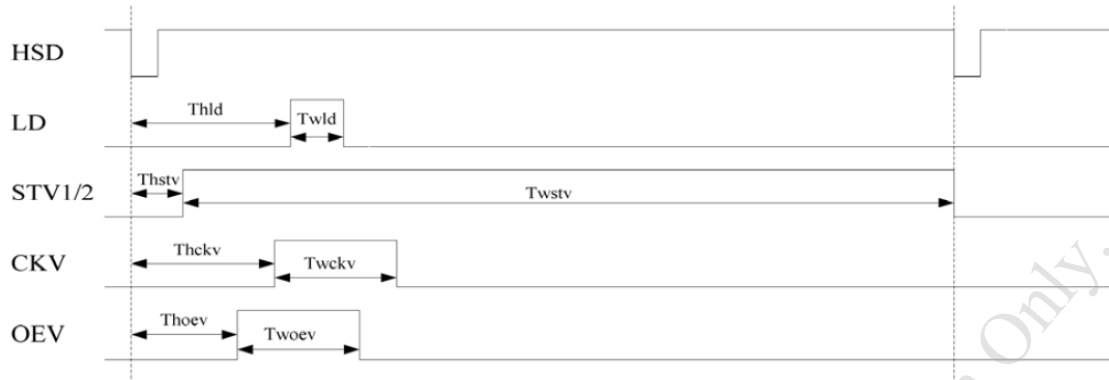
SOURCE OUTPUT TIMING DIAGRAM



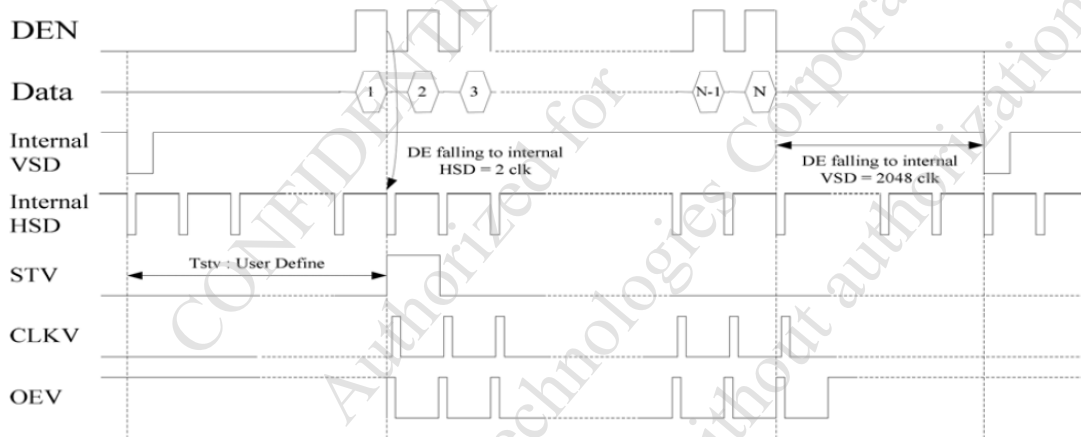
VERTICAL TIMING DIAGRAM DE (TCON + SOURCE MODE)



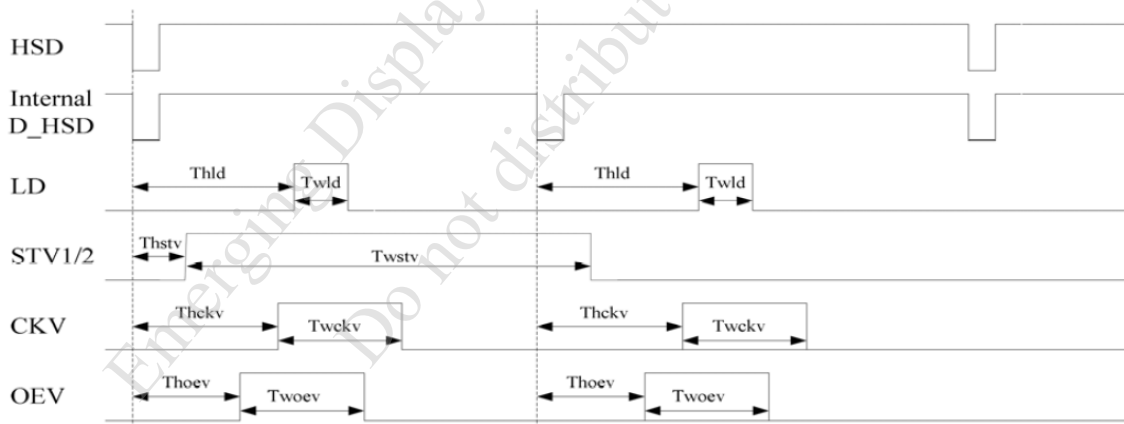
GATE OUTPUT TIMING DIAGRAM (TCON + SOURCE MODE)



VERTICAL TIMING DIAGRAM DE (DUAL GATE MODE)



GATE OUTPUT TIMING DIAGRAM (DUAL GATE MODE)



5.1.3 TIMING CHARACTERISTIC

HORIZONTAL INPUT TIMING

ITEM	SYMBOL	VALUE			UNIT
		MIN.	TYP.	MAX.	
HORIZONTAL DISPLAY AREA	thd	800			DCLK
DCLK FREQUENCY	fclk	—	30	50	MHZ
ONE HORIZONTAL LINE	th	889	928	1143	DCLK
HS PULSE WIDTH	thpw	1	48	255	DCLK
HS BACK PORCH (BLANKING)	thb	88			DCLK
HS FRONT PORCH	thfb	1	40	255	DCLK
DE MODE BLANKING	th-thd	85	128	512	DCLK

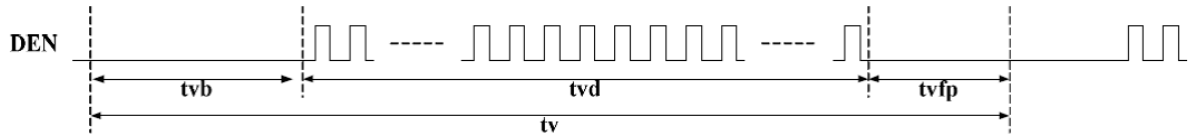
VERTICAL INPUT TIMING

ITEM	SYMBOL	VALUE			UNIT
		MIN.	TYP.	MAX.	
VERTICAL DISPLAY AREA	tvd	480			H
VS PERIOD TIME	tv	513	525	767	MHZ
VS PULSE WIDTH	tvpw	3	3	255	DCLK
VS BACK PORCH (BLANKING)	tvb	32			DCLK
VS FRONT PORCH	tvfb	1	13	255	DCLK
DE MODE BLANKING	tv-tvd	4	45	255	DCLK

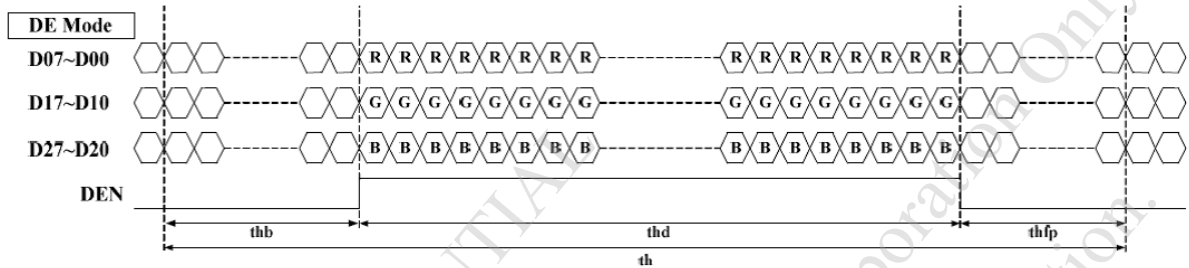
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5.1.4 DATA INPUT FORMAT

VERTICAL INPUT TIMING



HORIZONTAL INPUT TIMING

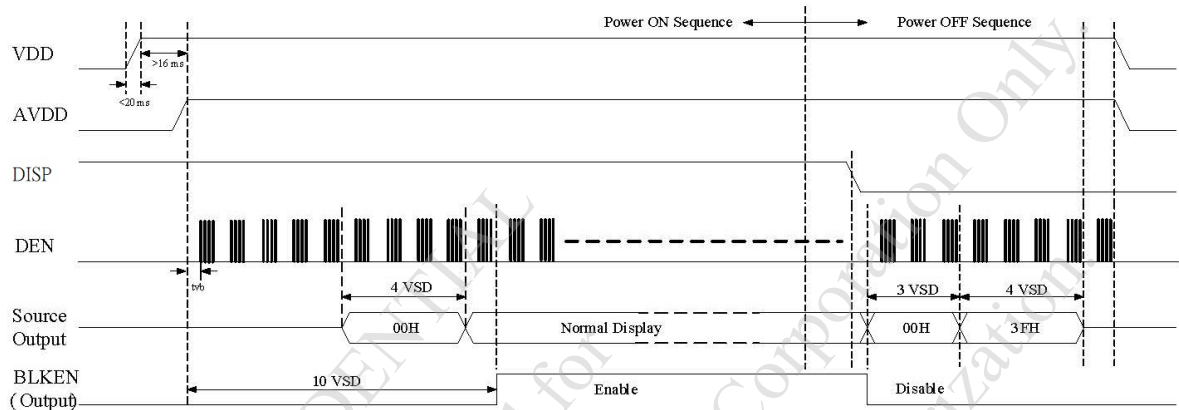


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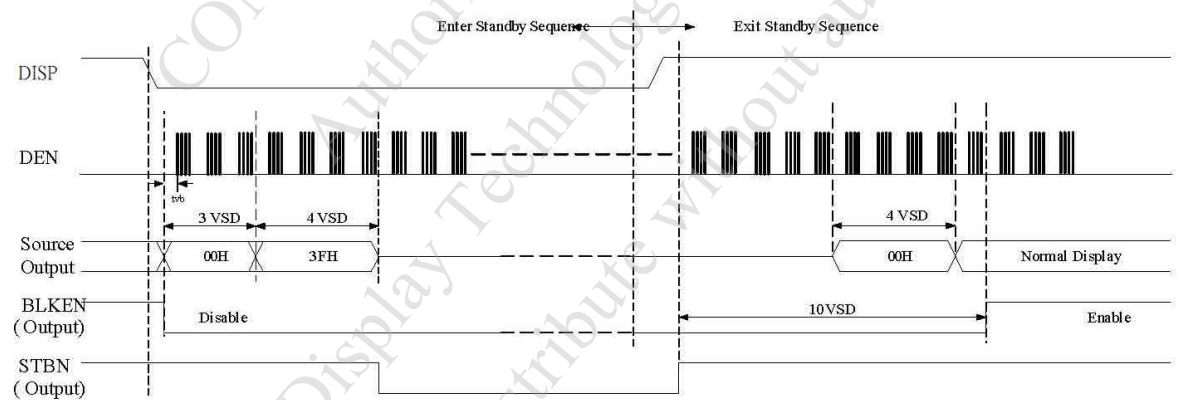
5.1.5 POWER ON/OFF SEQUENCE

IN ORDER TO PREVENT IC FROM POWER ON RESET FAIL, THE RISING TIME (TPOR) OF THE DIGITAL POWER SUPPLY VDD SHOULD BE MAINTAINED WITHIN THE GIVEN SPECIFICATIONS. REFER TO “AC CHARACTERISTICS” FOR MORE DETAIL ON TIMING.

POWER-ON/OFF TIMING SEQUENCE



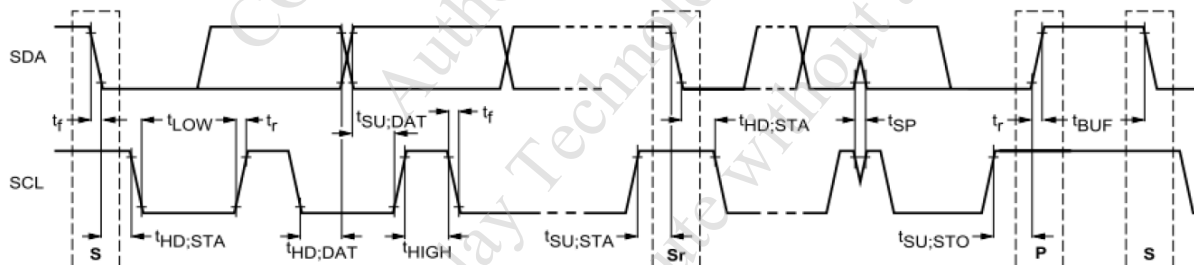
STANDBY MODE SEQUENCE



5.2 FOR CTP MODULE

5.2.1 I2C INTERFACE TIMING CHARACTERISTICS

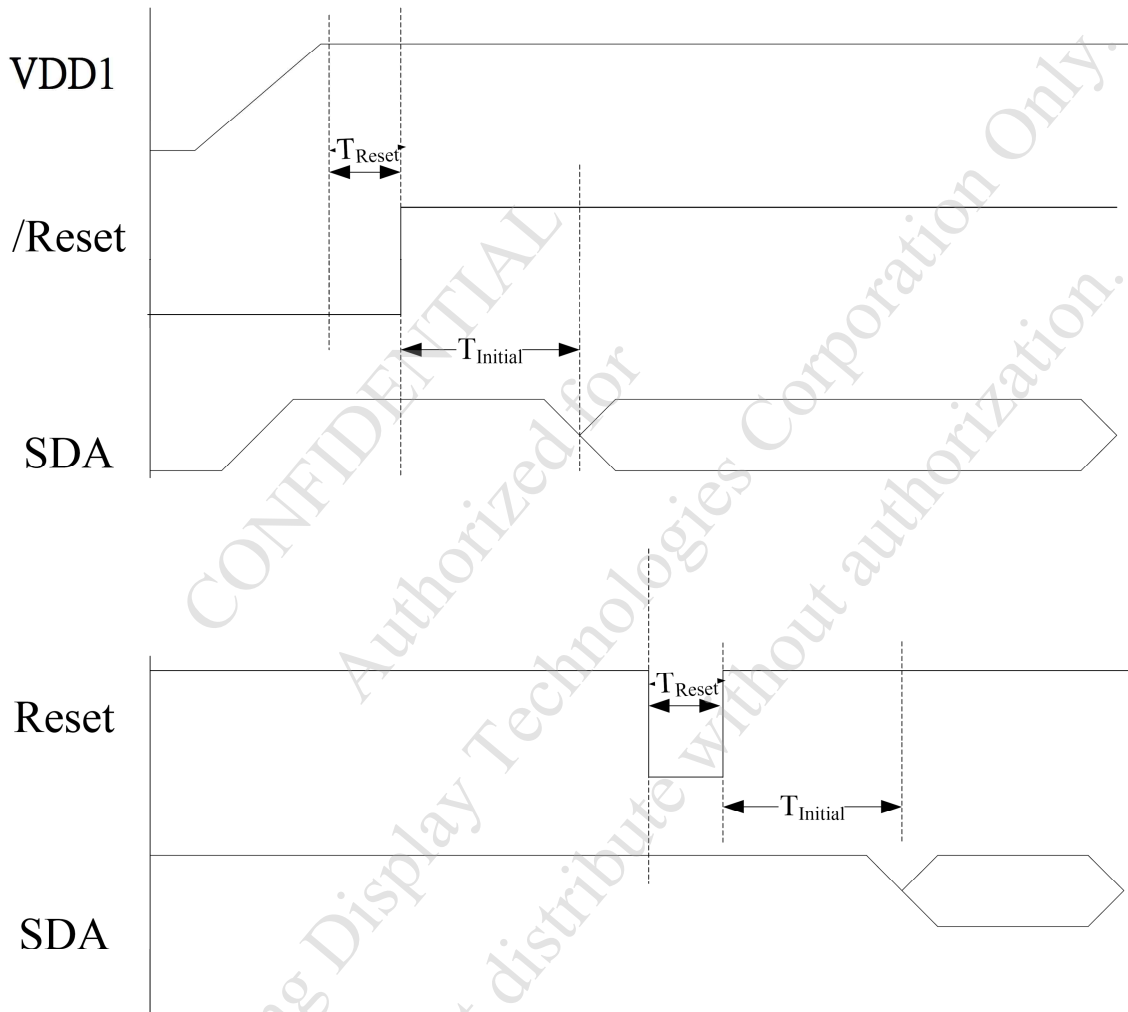
ITEM	SYMBOL	STANDARD MODE			FAST MODE		
		MIN.	MAX.	UNIT	MIN.	MAX.	UNIT
SCL CLOCK FREQUENCY	f_{SCL}	0	100	kHz	0	400	kHz
HOLD TIME (REPEATED) START CONDITION. AFTER THIS PERIOD, THE FIRST CLOCK PULSE IS GENERATED	$t_{HD:STA}$	4.0	—	μs	0.6	—	μs
LOW PERIOD OF THE SCL CLOCK	t_{LOW}	4.7	—	μs	1.3	—	μs
HIGH PERIOD OF THE SCL CLOCK	t_{HIGH}	4.0	—	μs	0.6	—	μs
SET-UP TIME FOR A REPEATED START CONDITION	$t_{SU:STA}$	4.7	—	μs	0.6	—	μs
DATA HOLD TIME	$t_{HD:DAT}$	300	—	μs	300	—	ns
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	—	μs	0.6	—	μs
BUS FREE TIME BETWEEN A STOP AND START CONDITION	t_{BUF}	4.7	—	μs	1.3	—	μs



THE TIMING OF I2C INTERFACE

5.2.2 POWER-ON SEQUENCE

ITEM	SYMBOL	MIN.	MAX.	UNIT
AFTER POWERING-ON OR RESETTING THE DEVICE, THE DEVICE NEEDS INITIAL TIME TO CONFIGURE THE SYSTEM.	$T_{Initial}$	—	100	ms
/RESET PIN LOW HOLD TIME	T_{Reset}	50	—	us



POWER UP SEQUENCE AND RESET DIAGRAM

6. OPTICAL CHARACTERISTICS

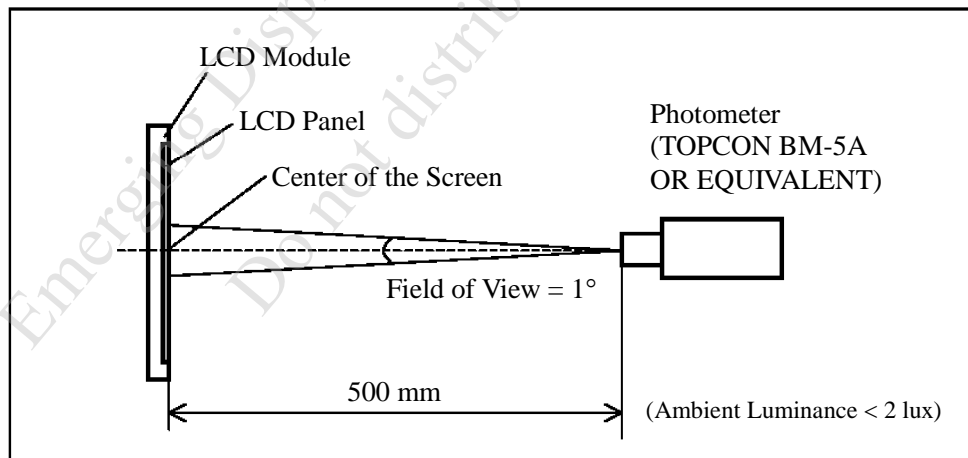
6.1 OPTICAL CHARACTERISTICS

Ta = 25°C

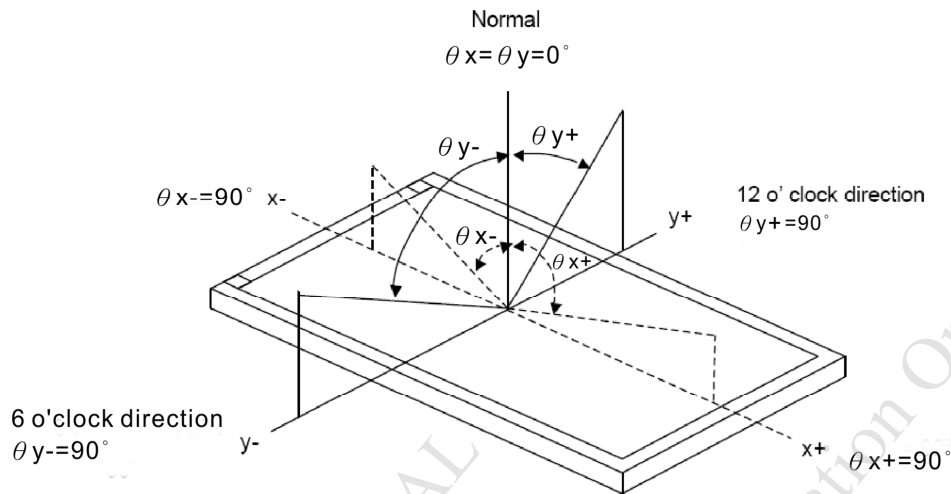
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE	θ_{y+}	CR ≥ 10	$\theta_x=0^\circ$	70	80	—	deg.	NOTE (2) NOTE (3)
	θ_{y-}			70	80	—		
	θ_{x+}		$\theta_y=0^\circ$	70	80	—		
	θ_{x-}			70	80	—		
CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	640	800	—	—	NOTE (3)	
RESPONSE TIME	tr (rise)+ tf (fall)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	30	40	msec	NOTE (4)	
COLOR CHROMATICITY (CENTER)	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.3V ILED = 40mA (NTSC : 50%)	0.25	0.30	0.35	—	NOTE (5)
		Wy		0.26	0.31	0.36		
	RED	Rx		0.54	0.59	0.64	—	
		Ry		0.30	0.35	0.40		
	GREEN	Gx		0.31	0.36	0.41	—	
		Gy		0.52	0.57	0.62		
	BLUE	Bx		0.14	0.19	0.24	—	
		By		0.04	0.09	0.14		
THE BRIGHTNESS OF MODULE (CENTER)	B		380	425	—	cd/m ²	NOTE (6)	
THE BRIGHTNESS OF UNIFORMITY	—		70	—	—	%	NOTE (7)	

NOTE (1) : TEST CONDITION :

AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES. MEASUREMENT SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM.



NOTE (2) : DEFINITION OF VIEWING ANGLE :



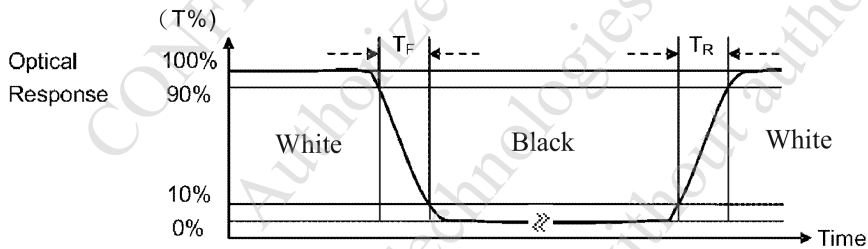
NOTE (3) : DEFINITION OF CONTRAST RATIO (CR) :

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.



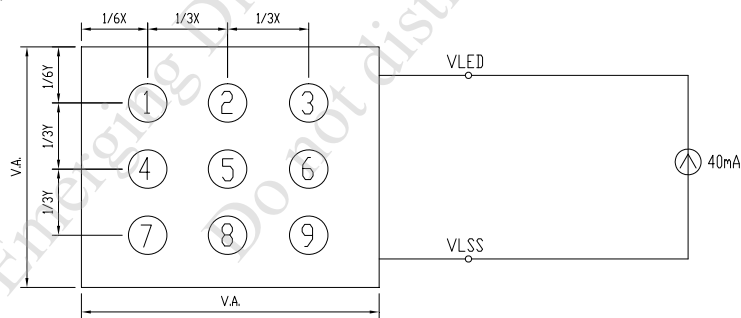
NOTE (5) : DEFINITION OF COLOR CHROMATICITY

(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

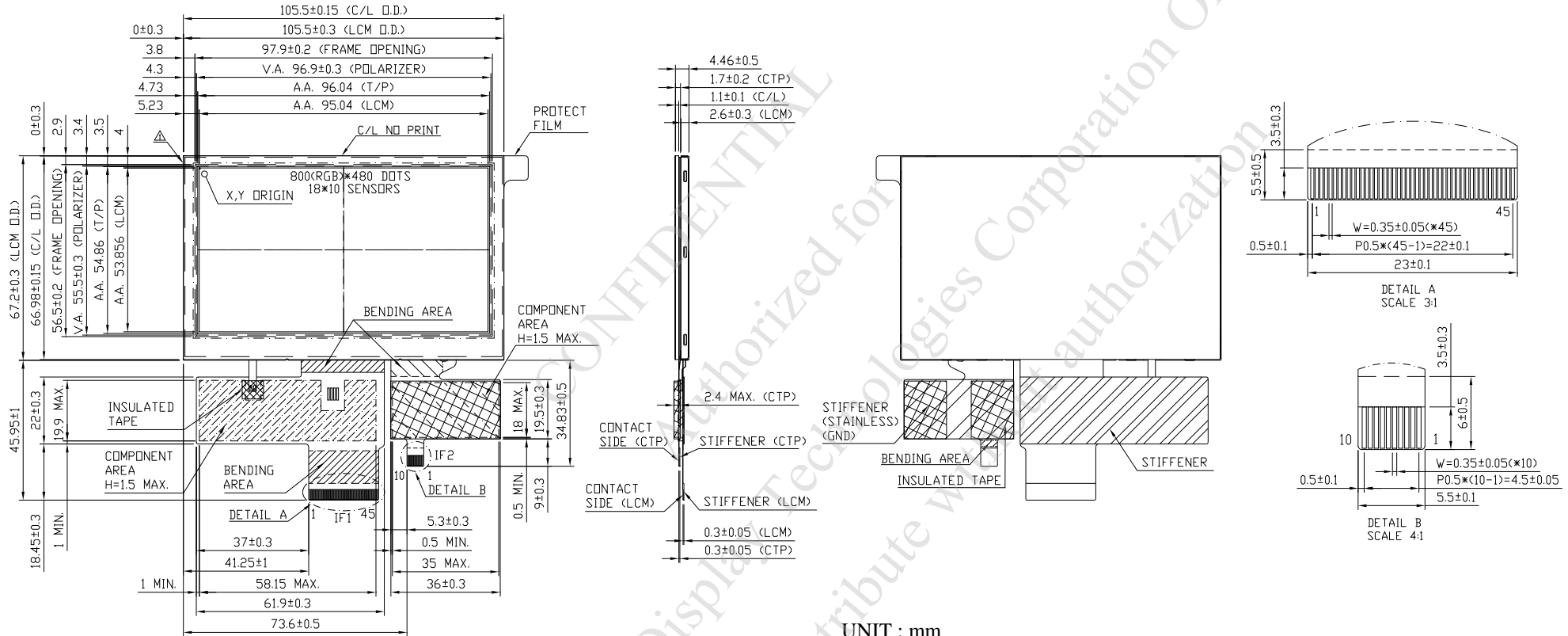


UNIT : mm

(b)THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

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

7. OUTLINE DIMENSIONS



UNIT : mm

SCALE : NTS

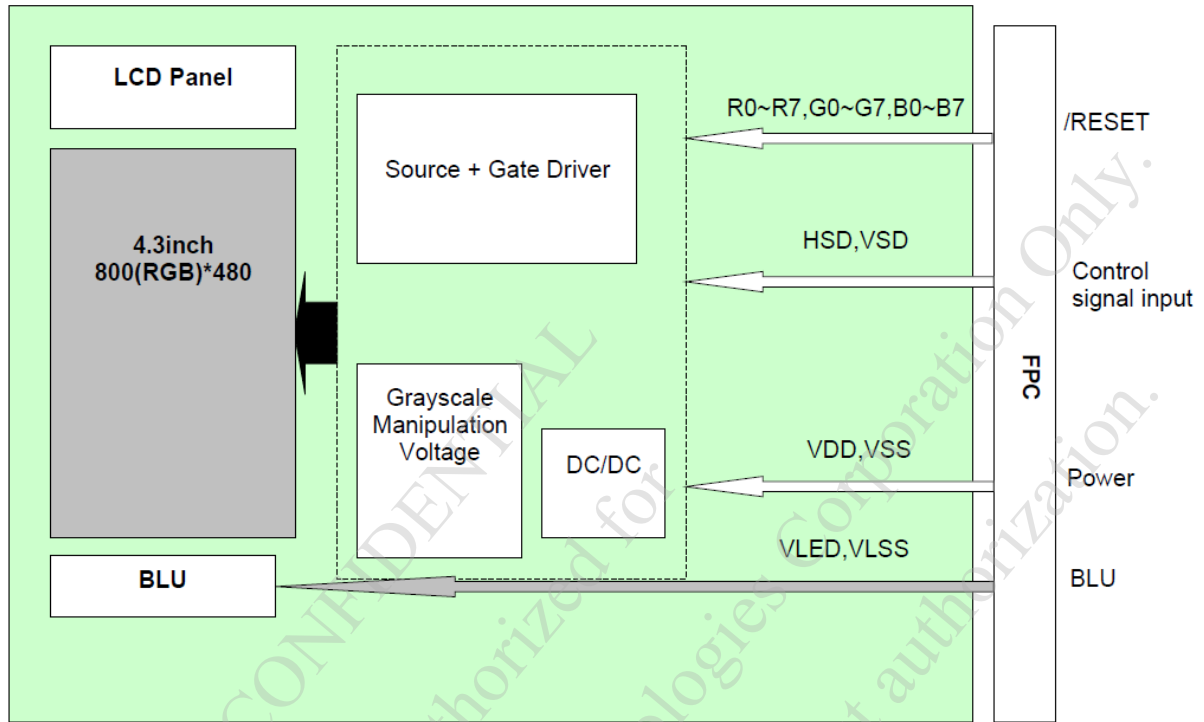
NOT SPECIFIED TOLERANCE IS ± 0.5 mm

NOTE :

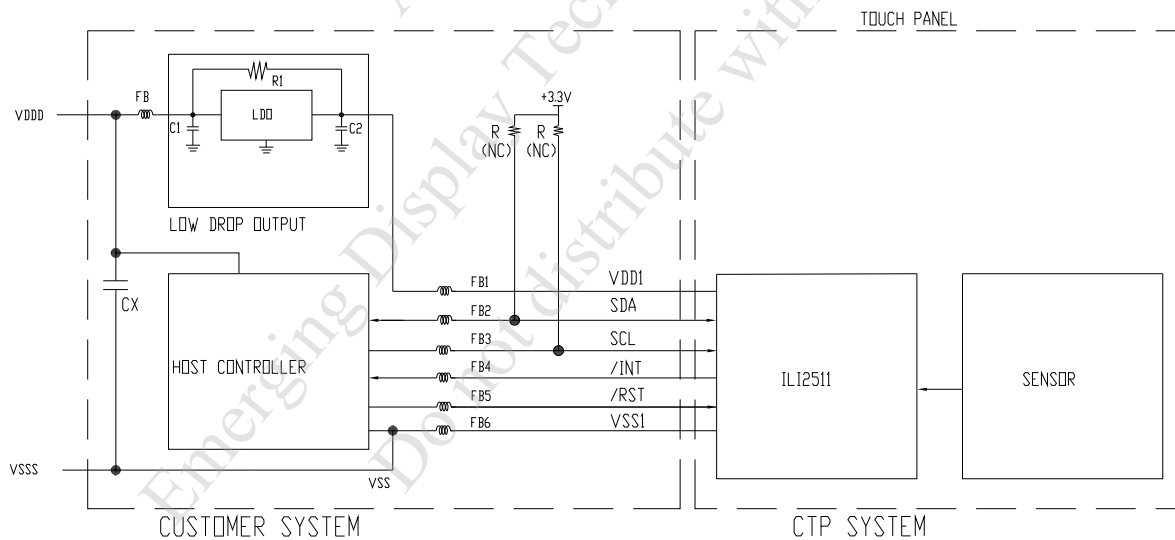
- 1.LCM RECOMMEND MATCH CONNECTOR KYOCERA : 04 6240 045 SERIES
- 2.CTP RECOMMEND MATCH CONNECTOR KYOCERA : 04 6240 010 SERIES
- 3.C/L GLASS : SODA LIME
- 4.MARK Δ MODIFY (NUMBER NOTE MODIFY VERSION)

8. BLOCK DIAGRAM

8.1 TFT



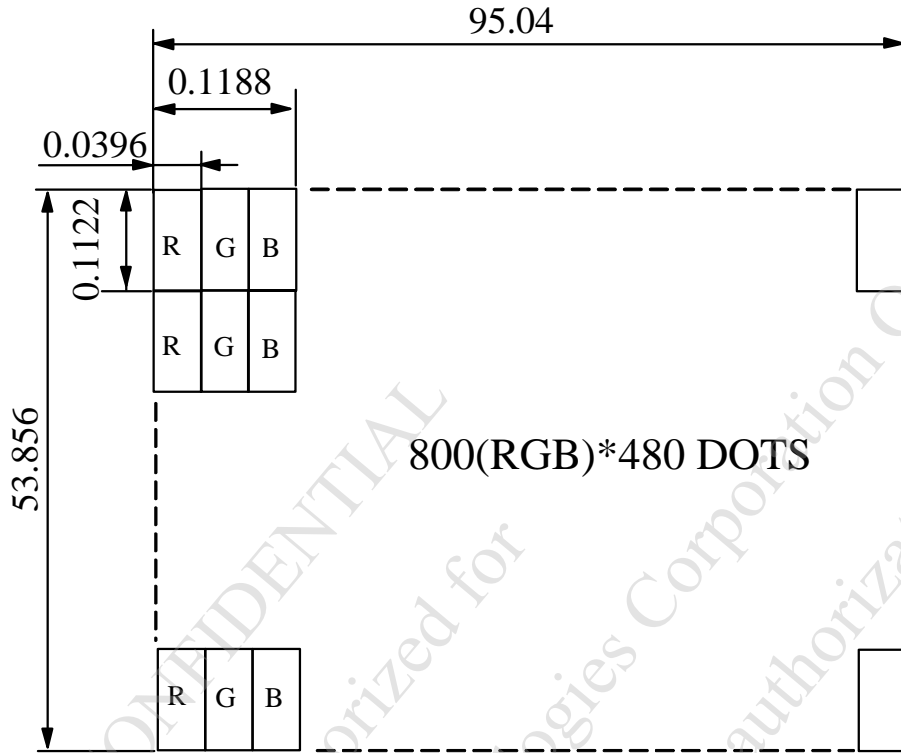
8.2 CTP



NOTE (1) : THE STANDARD I2C COMMUNICATION INTERFACE, SUPREME SCL CLOCK IS 400 KHZ, SLAVE ADDRESS CAN BE SET UP, SUPPORTS VDD1 LEVEL POWER, RECOMMEND RESERVING PULL HIGH RESISTANCE FOR SPECIAL APPLICATION.

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

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10. INTERFACE SIGNALS

10.1 LCD MODULE

PIN NO.	SYMBOL	FUNCTION
1	VSS	GROUND
2	VSS	GROUND
3	VDD	+3.3V POWER SOURCE
4	VDD	+3.3V POWER SOURCE
5	R0	RED DATA SIGNAL (LSB)
6	R1	RED DATA SIGNAL
7	R2	RED DATA SIGNAL
8	R3	RED DATA SIGNAL
9	R4	RED DATA SIGNAL
10	R5	RED DATA SIGNAL
11	R6	RED DATA SIGNAL
12	R7	RED DATA SIGNAL (MSB)
13	G0	GREEN DATA SIGNAL (LSB)
14	G1	GREEN DATA SIGNAL
15	G2	GREEN DATA SIGNAL
16	G3	GREEN DATA SIGNAL
17	G4	GREEN DATA SIGNAL
18	G5	GREEN DATA SIGNAL
19	G6	GREEN DATA SIGNAL
20	G7	GREEN DATA SIGNAL (MSB)
21	B0	BLUE DATA SIGNAL (LSB)
22	B1	BLUE DATA SIGNAL
23	B2	BLUE DATA SIGNAL
24	B3	BLUE DATA SIGNAL
25	B4	BLUE DATA SIGNAL
26	B5	BLUE DATA SIGNAL
27	B6	BLUE DATA SIGNAL
28	B7	BLUE DATA SIGNAL (MSB)
29	VSS	GROUND
30	CLK	CLOCK SIGNAL; LATCHING DATA AT THE FALLING EDGE
31	DISP	DISPLAY CONTROL / STANDBY MODE SELECTION. DISP = "LOW" : STANDBY; (DEFAULT) DISP = "HIGH" : NORMAL DISPLAY
32	HSD	HORIZONTAL SYNC SIGNAL; NEGATIVE POLARITY

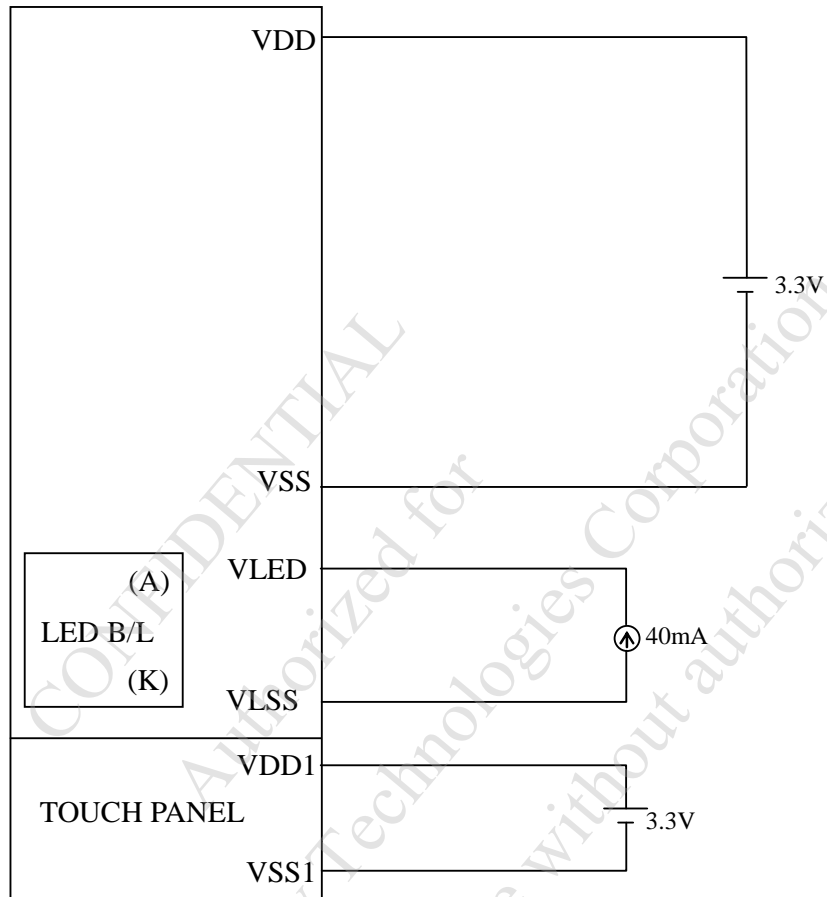
PIN NO.	SYMBOL	FUNCTION																								
33	VSD	VERTICAL SYNC SIGNAL; NEGATIVE POLARITY																								
34	DE	DATA INPUT ENABLE. ACTIVE HIGH TO ENABLE THE DATA INPUT.																								
35	CSX	COLOR ENHANCE FUNCTION CONTROL:																								
		<table border="1"> <thead> <tr> <th>CSX</th> <th>DBC[M][1]</th> <th>DBC[M][0]</th> <th>COLOR FUNCTION</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>X</td> <td>X</td> <td>CE DISABLE</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>CE SETTING 0 (STRONG)</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>CE SETTING 1 (MIDDLE)</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>CE SETTING 2 (WEAKEST)</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>CE SETTING 3 (WEAK) [DEFAULT]</td> </tr> </tbody> </table>	CSX	DBC[M][1]	DBC[M][0]	COLOR FUNCTION	X	X	X	CE DISABLE	1	0	0	CE SETTING 0 (STRONG)	1	0	1	CE SETTING 1 (MIDDLE)	1	1	0	CE SETTING 2 (WEAKEST)	1	1	1	CE SETTING 3 (WEAK) [DEFAULT]
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36	NC	NC																								
37	NC	NC (RESERVED FOR TOUCH PANEL, YU)																								
38	NC	NC (RESERVED FOR TOUCH PANEL, XL)																								
39	NC	NC (RESERVED FOR TOUCH PANEL, YD)																								
40	NC	NC (RESERVED FOR TOUCH PANEL, XR)																								
41	VSS	GROUND																								
42	VLSS	LED POWER SOURCE INPUT TERMINAL (CATHODE SIDE)																								
43	VLED	LED POWER SOURCE INPUT TERMINAL (ANODE SIDE)																								
44	DBC[M](0)	COLOR ENHANCE FUNCTION CONTROL:																								
		<table border="1"> <thead> <tr> <th>CSX</th> <th>DBC[M][1]</th> <th>DBC[M][0]</th> <th>COLOR FUNCTION</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>X</td> <td>X</td> <td>CE DISABLE</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>CE SETTING 0 (STRONG)</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>CE SETTING 1 (MIDDLE)</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>CE SETTING 2 (WEAKEST)</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>CE SETTING 3 (WEAK) [DEFAULT]</td> </tr> </tbody> </table>	CSX	DBC[M][1]	DBC[M][0]	COLOR FUNCTION	X	X	X	CE DISABLE	1	0	0	CE SETTING 0 (STRONG)	1	0	1	CE SETTING 1 (MIDDLE)	1	1	0	CE SETTING 2 (WEAKEST)	1	1	1	CE SETTING 3 (WEAK) [DEFAULT]
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1	1	0	CE SETTING 2 (WEAKEST)																							
1	1	1	CE SETTING 3 (WEAK) [DEFAULT]																							

10.2 CTP MODULE

PIN NO.	SYMBOL	FUNCTION
1	VSS1	GROUND
2	/RST	EXTERNAL RESET, LOW IS ACTIVE (+3.3V)
3	/INT	EXTERNAL INTERRUPT TO THE HOST (+3.3V)
4	SCL	I2C CLOCK INPUT (+3.3V)
5	SDA	I2C DATA INPUT AND OUTPUT (+3.3V)
6	VDD1	POWER SUPPLY VOLTAGE (+3.3V)
7	NC	THE PIN WAS RESERVED FOR USB VDD (+5.0V)
8	NC	THE PIN WAS RESERVED FOR USB D-
9	NC	THE PIN WAS RESERVED FOR USB D+
10	NC	THE PIN WAS RESERVED FOR USB GND

11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



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12. CAPACITIVE TOUCH PANEL SPECIFICATION

12.1 OPTICAL CHARACTERISTICS

ITEM	CONDITION	MIN.	TYP.	MAX.	UNIT
TRANSPARENCY NOTE (1)	Ta = 25°C λ =550 nm	85	—	—	%

NOTE (1) : OPTICAL MEASUREMENT SHOULD BE EXECUTED AFTER PANEL IS SECURED. MEASUREMENT PROCESS SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM. OPTICAL SPECIFICATIONS SHOULD BE MEASURED BY SPECTROPHOTOMETER.

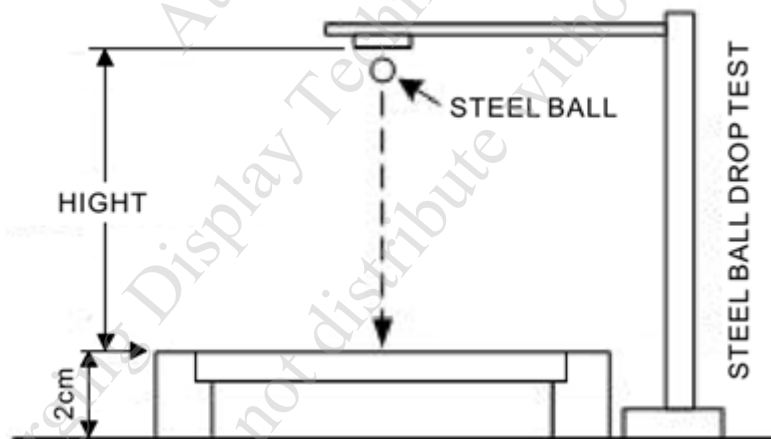
12.2 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	7H (MIN.)

12.3 DURABILITY

USING STEEL BALL AND FALLING ON TOUCH PANEL SURFACE, FROM THE HEIGHT MUST PASS BELOW CONDITIONS :

ITEM	CONDITION	INSPECTION METHOD	DESCRIPTION
STEEL BALL DROP TEST	WEIGHT : 67g HEIGHT OF FALL : 30 cm	VISUAL INSPECTION	SIGN OF FRACTURE OR DAMAGE IS NOT ACCEPTABLE 3 TIMES/ 1 POINTS(CENTER), 25°C



12.4 SOFTWARE PROTOCOL

CMD CODE	NAME	SET/GET	B7	B6	B5	B4	B3	B2	B1	B0	
0x10	TOUCH REPORTED NUMBER	GET	THE NUMBERS OF THE TOUCH INFORMATION REPORT								
0x11	TOUCH INFORMATION REPORT	GET	TOUCH STATUS	0	REPORTED_ID						
			X POSITION (BIT 15:8) OF THE FINGER								
			X POSITION (BIT 7:0) OF THE FINGER								
			Y POSITION (BIT 15:8) OF THE FINGER								
0x11	TOUCH KEY REPORT	GET	TOUCH STATUS	1	REPORTED_ID						
			TOUCH KEY ID								
			0x00								
			0xFF								
0x20	PANEL INFORMATION	GET	THE MAXIMUM X COORDINATE (BIT 15:8)								
			THE MAXIMUM Y COORDINATE (BIT 7:0)								
			THE MAXIMUM Y COORDINATE (BIT 15:8)								
			THE CHANNEL NUMBERS OF X DIRECTION								
			THE CHANNEL NUMBERS OF Y DIRECTION								
			THE MAXIMUM REPORT POINTS								
			THE CHANNEL NUMBERS OF TOUCHKEY								
			FOR TOUCH KEY APPLICATION (MAXIMUM SUPPORTS 31 TOUCH KEY) BYTE 8 : THE TOUCH KEY NUMBER (<32) BYTE 9: 0xFF								
0x30	ENTER SLEEP MODE	SET	--								
0x40	FIRMWARE VERSION	GET	CHIP ID CODE								
			MAJOR FIRMWARE VERSION								
			MINOR FIRMWARE VERSION								
			RELEASE FIRMWARE VERSION								
			FOR CUSTOMER FIRMWARE VERSION								
			FOR CUSTOMER FIRMWARE VERSION								
			FOR CUSTOMER FIRMWARE VERSION								
0x42	PROTOCOL VERSION	GET	MAJOR PROTOCOL VERSION : 0X02								
			MINOR PROTOCOL VERSION : XX								
			RELEASE PROTOCOL VERSION : XX								

13. INSPECTION CRITERIA

13.1 APPLICATION

THIS INSPECTION STANDARD IS TO BE APPLIED TO THE LCD MODULE DELIVERED FROM EMERGING DISPLAY TECHNOLOGIES CORP.(E.D.T) TO CUSTOMERS

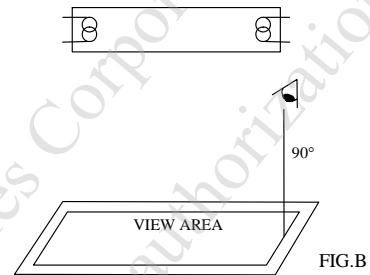
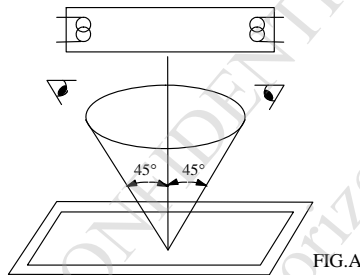
13.2 INSPECTION CONDITIONS

13.2.1 (1)OBSERVATION DISTANCE : 45±5cm

(2)VIEWING ANGLE : ±45°

±45° (FOR SECTION WITHIN VIEWING AREA), REFER TO FIG.A
90° (FOR SECTION OUTSIDE OF VIEWING AREA), REF TO FIG.B
PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN 45°



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

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

13.2.2 ENVIRONMENT CONDITIONS :

AMBIENT TEMPERATURE		25±5°C
AMBIENT HUMIDITY		65 ± 20%RH
AMBIENT ILLUMINATION	COSMETIC INSPECTION	600~800 lux
	FUNCTIONAL INSPECTION	300~500 lux
INSPECTION TIME		10 secs

13.2.3 INSPECTION LOT

QUANTITY PER DELIVERY LOT FOR EACH MODEL

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

(a)APPLICABLE STANDARD :

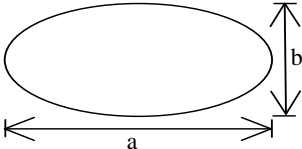
ANSI/ ASQ Z1.4 NORMAL INSPECTION LEVEL II

(b)AQL : MAJOR DEFECT : AQL 0.65

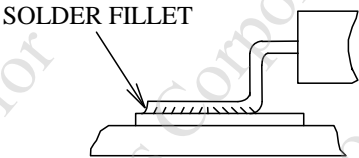
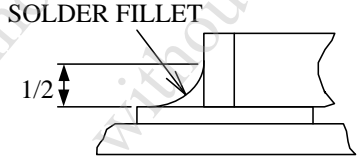
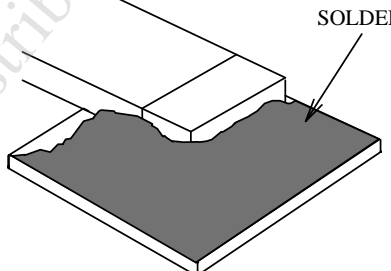
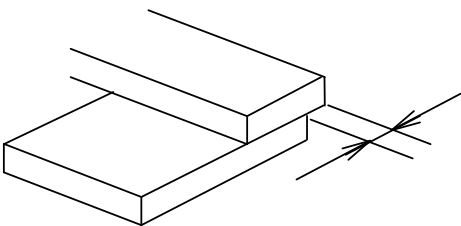
MINOR DEFECT : AQL 1.0

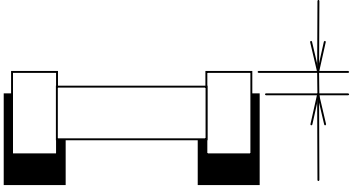
13.3 DEFECTS CLASSIFICATION

TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> • DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC 	0.65
	2.CTP FUNCTION	<ul style="list-style-type: none"> • NO FUNCTION • BROKEN LINE • FALSE TOUCH 	
	3.BACKLIGHT	<ul style="list-style-type: none"> • NO LIGHT • FLICKERING AND OTHER ABNORMAL ILLUMINATION 	
	4.DIMENSIONS	<ul style="list-style-type: none"> • SUBJECT TO INDIVIDUAL ACCEPTANCE SPECIFICATIONS 	
MINOR DEFECT	1.DISPLAY ZONE (VIEWING AREA)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • STAINS • SCRATCHES • FOREIGN MATTER 	
	3.SOLDERING	<ul style="list-style-type: none"> • INSUFFICIENT SOLDER • SOLDERED IN INCORRECT POSITION • CONVEX SOLDERING SPOT • SOLDER BALLS • SOLDER SCRAPS 	
	4.DISPLAY ON (ALL ON)	<ul style="list-style-type: none"> • 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	<p>1. INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS.</p> <p>2.</p> <table border="1"> <thead> <tr> <th>ITEMS</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>BRIGHT DOT</td> <td>$N \leq 2$</td> </tr> <tr> <td>DARK DOT</td> <td>$N \leq 3$</td> </tr> <tr> <td>TOTAL BRIGHT AND DARK DOTS</td> <td>$N \leq 4$</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.</p> <p>(2)BRIGHT DOT : DOTS APPEAR BRIGHT AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER BLACK PATTERN. THE BRIGHT DOT DEFECT MUST BE VISIBLE THROUGH 5% ND FILTER.</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>	ITEMS	PERMISSIBLE NO.	BRIGHT DOT	$N \leq 2$	DARK DOT	$N \leq 3$	TOTAL BRIGHT AND DARK DOTS	$N \leq 4$																
ITEMS	PERMISSIBLE NO.																									
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4	BUBBLES ON POLARIZER /SURFACE STAINS /DIRT/CF FAIL/SPOT	<table border="1"> <thead> <tr> <th></th> <th>AVERAGE DIAMETER (mm) : D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <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>NONE</td> </tr> <tr> <td rowspan="3">SURFACE STAINS / DIRT ON POLARIZER</td> <td>$D < 0.25$</td> <td>IGNORE</td> </tr> <tr> <td>$0.25 < D \leq 0.4$</td> <td>$N \leq 3$</td> </tr> <tr> <td>$D > 0.4$</td> <td>NONE</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>$D > 0.3$</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. AVERAGE DIAMETER (D)=(a+b)/2</p> 		AVERAGE DIAMETER (mm) : D	PERMISSIBLE NO.	BUBBLE ON POLARIZER	$D \leq 0.25$	IGNORE	$0.25 < D \leq 0.5$	$N \leq 5$	$0.5 < D$	NONE	SURFACE STAINS / DIRT ON POLARIZER	$D < 0.25$	IGNORE	$0.25 < D \leq 0.4$	$N \leq 3$	$D > 0.4$	NONE	CF FAIL / SPOT	$D < 0.1$	IGNORE	$0.1 < D \leq 0.3$	$N \leq 3$	$D > 0.3$	NONE
	AVERAGE DIAMETER (mm) : D	PERMISSIBLE NO.																								
BUBBLE ON POLARIZER	$D \leq 0.25$	IGNORE																								
	$0.25 < D \leq 0.5$	$N \leq 5$																								
	$0.5 < D$	NONE																								
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	$D > 0.4$	NONE																								
CF FAIL / SPOT	$D < 0.1$	IGNORE																								
	$0.1 < D \leq 0.3$	$N \leq 3$																								
	$D > 0.3$	NONE																								

NO.	ITEM	CRITERIA												
5	BLACK/WHITE SPOT CIRCULAR TYPE	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≤0.15</td> <td>IGNORE</td> </tr> <tr> <td>0.15<D≤0.3</td> <td>4</td> </tr> <tr> <td>0.3<D≤0.5</td> <td>2</td> </tr> <tr> <td>D>0.5</td> <td>0</td> </tr> </tbody> </table> NOTE (1) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.		SIZE D	PERMISSIBLE NO.	D≤0.15	IGNORE	0.15<D≤0.3	4	0.3<D≤0.5	2	D>0.5	0	
SIZE D	PERMISSIBLE NO.													
D≤0.15	IGNORE													
0.15<D≤0.3	4													
0.3<D≤0.5	2													
D>0.5	0													
6	SCRATCH	THE FOLLOWING SCRATCH IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGTH : L (mm) <table border="1"> <thead> <tr> <th>SIZE W & L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>W≤0.07</td> <td>IGNORE</td> </tr> <tr> <td>0.07<W≤0.1, L≤8</td> <td>3</td> </tr> <tr> <td>0.07<W≤0.1, 8<L≤10</td> <td>3</td> </tr> <tr> <td>W>0.1</td> <td>0</td> </tr> </tbody> </table> NOTE (1) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 5mm APART.		SIZE W & L	PERMISSIBLE NO.	W≤0.07	IGNORE	0.07<W≤0.1, L≤8	3	0.07<W≤0.1, 8<L≤10	3	W>0.1	0	
SIZE W & L	PERMISSIBLE NO.													
W≤0.07	IGNORE													
0.07<W≤0.1, L≤8	3													
0.07<W≤0.1, 8<L≤10	3													
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 border="1"> <thead> <tr> <th>SIZE W & L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>W≤0.07</td> <td>IGNORE</td> </tr> <tr> <td>0.07<W≤0.1, L≤8</td> <td>3</td> </tr> <tr> <td>0.07<W≤0.1, 8<L≤10</td> <td>2</td> </tr> <tr> <td>W>0.1</td> <td>0</td> </tr> </tbody> </table> NOTE (1) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 5mm APART.		SIZE W & L	PERMISSIBLE NO.	W≤0.07	IGNORE	0.07<W≤0.1, L≤8	3	0.07<W≤0.1, 8<L≤10	2	W>0.1	0	
SIZE W & L	PERMISSIBLE NO.													
W≤0.07	IGNORE													
0.07<W≤0.1, L≤8	3													
0.07<W≤0.1, 8<L≤10	2													
W>0.1	0													
8	BUBBLE / DENT FOR OPTICAL BONDING	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>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> </tbody> </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 border="1"> <tbody> <tr> <td>CORNER</td> <td>$X + Y \leq 4\text{mm} \cdot Z \leq t$ (t : THICKNESS)</td> </tr> <tr> <td>EDGE</td> <td>$X \leq 6\text{mm} , Y \leq 1\text{mm} , Z < t$ (t : THICKNESS)</td> </tr> </tbody> </table>	CORNER	$X + Y \leq 4\text{mm} \cdot Z \leq t$ (t : THICKNESS)	EDGE	$X \leq 6\text{mm} , Y \leq 1\text{mm} , Z < t$ (t : THICKNESS)								
CORNER	$X + Y \leq 4\text{mm} \cdot Z \leq t$ (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 ACCEPTABLE, 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	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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. NO SOLDERING FOUND ON THE SPECIFIED PLACE 2. INSUFFICIENT SOLDER <ol style="list-style-type: none"> (a)LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD  (b)CHIP COMPONENT <ul style="list-style-type: none"> · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING  · SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED  3. PARTS ALIGNMENT <ol style="list-style-type: none"> (a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE 

NO.	ITEM	CRITERIA
16	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>
17	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>
18	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 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.</p>

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.

14.2 TESTING CONDITIONS AND INSPECTION CRITERIA

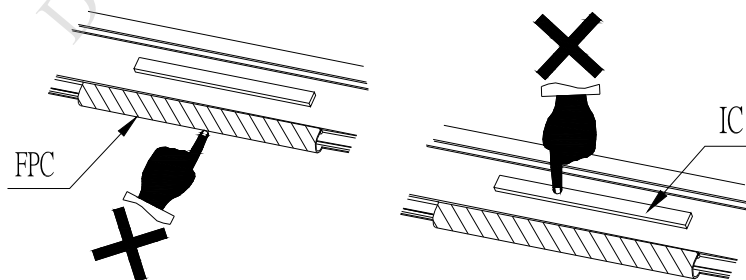
FOR THE FINAL TEST THE TESTING SAMPLE MUST BE STORED AT ROOM TEMPERATURE FOR 24 HOURS, AFTER THE TESTS LISTED IN TABLE 14.1, STANDARD SPECIFICATIONS FOR RELIABILITY HAVE BEEN EXECUTED IN ORDER TO ENSURE STABILITY.

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 CRYSTAL 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.