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<i>Chris Wu</i>		VERSION : P

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

ETML070017ADH6

(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO.	VERSION	PAGE
ETML070017ADH6	P	0-1

RECORDS OF REVISION	DOC . FIRST ISSUE	MAY.27, 2020
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DATE	REVISED PAGE NO.	SUMMARY
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1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER/DRIVER

PLEASE REFER TO :

EK9713B
EK73002AB2

1.2 APPLICATION NOTES 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) DISPLAY SIZE	-----	7 inch
(2) NUMBER OF DOTS	-----	800W * (RGB) * 480H DOTS
(3) MODULE SIZE	-----	164.9W * 100.3H * 12.0D(MAX.) mm (NOT INCLUDED FPC)
(4) VIEWING AREA	-----	156.08W * 88.53H mm
(5) ACTIVE AREA	-----	154.08W * 85.92H mm
(6) DOT SIZE	-----	0.0642W * 0.179H mm
(7) PIXEL SIZE	-----	0.1926W * 0.179H mm
(8) LCD TYPE	-----	TFT, TRANSMISSIVE, TN, ANTI-GLARE
(9) COLOR	-----	16.7M
(10) VIEWING DIRECTION	-----	6 O'CLOCK (GRAY LEVEL INVERSION)
(11) BACK LIGHT	-----	LED , COLOR : WHITE
(12) INTERFACE MODE	-----	RGB(24BIT) PARALLEL (SYNC / DE MODE)

2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

- (1) TOUCH PANEL SIZE ----- 7 inch
- (2) OUTER DIMENSION ----- 163.7W * 100.3H * 1.3D mm
(NOT INCLUDED FPC)
- (3) ACTIVE AREA ----- 155.6W * 91.01H mm
- (4) INPUT TYPE ----- MULTI-TOUCH
- (5) NUMBER OF TOUCH SENSOR ----- 28*16 SENSORS
- (6) INTERFACE MODE ----- I2C
- (7) RESOLUTION ----- 1792*1024

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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	5	V	—

3.2 CAPACITIVE TOUCH PANEL ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD1-VSS1	-0.2	4.0	V	
INPUT VOLTAGE	VIN	-0.2	4.0	V	

3.3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-20°C	70°C	-30°C	80°C	NOTE (1), (2), (3)
HUMIDITY	NOTE (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) : 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 ≤ 50°C : 85%RH MAX. (48HRS MAX).

Ta > 50°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 85%RH AT 50°C(48HRS MAX).

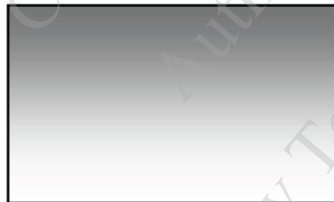
4. ELECTRICAL CHARACTERISTICS

4.1 LCD MODULE

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 VOLTAGE FOR LED DRIVER	VBL+ ⁻ VBL- ⁻	—	4.7	5	5.3	V	
LOGIC LOW INPUT VOLTAGE	VIL	—	VSS	—	0.3*VDD	V	
LOGIC HIGH INPUT VOLTAGE	VIH	—	0.7*VDD	—	VDD	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS = 3.3V	—	(100)	(150)	mA	NOTE (1)
POWER SUPPLY CURRENT FOR LED DRIVER	IBL	VBL+ ⁻ VBL- ⁻ =5V LED B/L=ON	—	(400)	(450)	mA	
POWER SUPPLY VOLTAGE FOR LED BACKLIGHT	VLED-VLSS	ILED=140mA	8.7	—	10.5	V	NOTE (2)
LED LIFE TIME	—	IF=20mA (PER LED)	30K	—	—	HRS	NOTE (3) NOTE (4)

NOTE (1) : TYP. SPECIFICATION : GRAY-LEVEL TEST PATTERN
MAX. SPECIFICATION : BLACK TEST PATTERN.

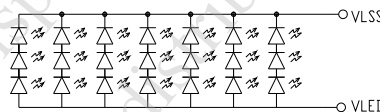


(a) GRAY-LEVEL PATTERN



(b) BLACK PATTERN

NOTE (2) : INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



NOTE (3) : CONDITIONS; Ta=25 °C, CONTINUOUS LIGHTING

NOTE (4) : DEFINITIONS OF LIFE TIME :

LCD LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

4.2 CTP MODULE

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	—	—	0.7*VDD1	—	V
LOGIC LOW INPUT VOLTAGE	VIL	—	—	0.3*VDD1	—	V
LOGIC HIGH OUTPUT VOLTAGE	VOH	IOH=10mA	VDD1-0.3	—	—	V
LOGIC LOW OUTPUT VOLTAGE	VOL	IOH=-10mA	—	—	VSS1+0.3	V
POWER SUPPLY CURRENT	IDD1	VDD1-VSS1 =3.30V	—	15	23	mA

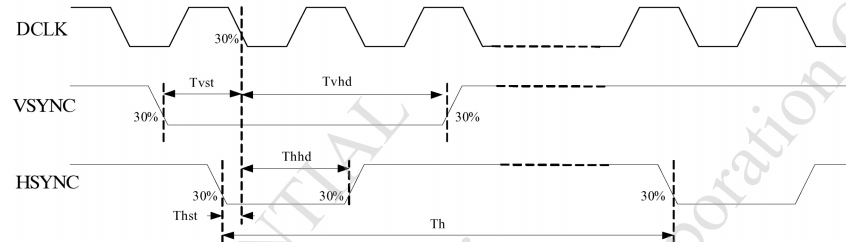
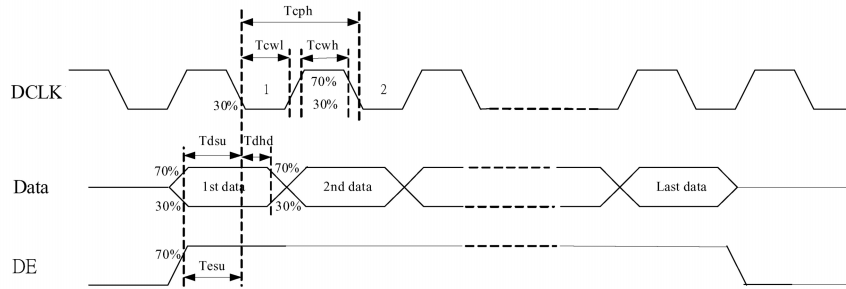
5. TIMING CHARACTERISTICS

5.1 FOR LCD MODULE

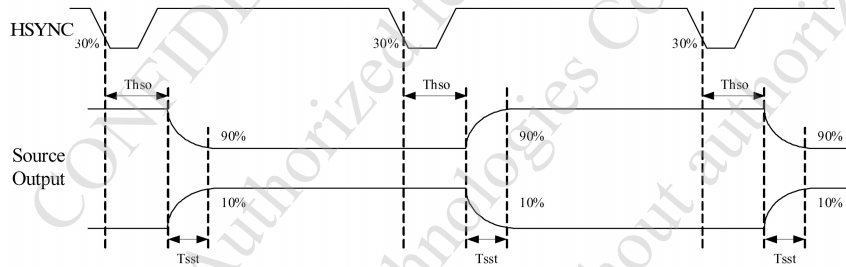
5.1.1 AC ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
VDD POWER ON SLEW RATE	T _{POR}	1	10	20	ms	FROM 0V to 90% VDD
RESET PULSE WIDTH	T _{RST}	1	2	5	ms	Clkin=40MHz
DCLK CYCLE TIME	Tcph	20	30	40	ns	
DCLK PULSE DUTY	Tcwh	40	50	60	%	
VSYNC SETUP TIME	Tvst	8	10	20	ns	
VSYNC HOLD TIME	Tvhd	8	96000	64000	ns	
HSYNC SETUP TIME	Thst	8	10	20	ns	
HSYNC HOLD TIME	Thhd	8	120	800	ns	
DATA SETUP TIME	Tdsu	8	10	20	ns	D[7:0], D1[7:0], D2[7:0] to Clkin
DATA HOLD TIME	Tdhd	8	15	20	ns	D[7:0], D1[7:0], D2[7:0] to Clkin
DE SETUP TIME	Tesu	8	15	20	ns	
DE HOLD TIME	Tehd	8	15	20	ns	
OUTPUT STABLE TIME	Tsst	—	—	6	us	10% TO 90% TARGET VOLTAGE. CL=120pF, R=10Kohm
DCLK CYCLE TIME	Tclk	20	30	40	ns	
DCLK PULSE DUTY	Tcwh	40	50	60	%	Tclk
TIME FROM HSYNC TO SOURCE OUTPUT	Thso	—	64	—	DCLK	

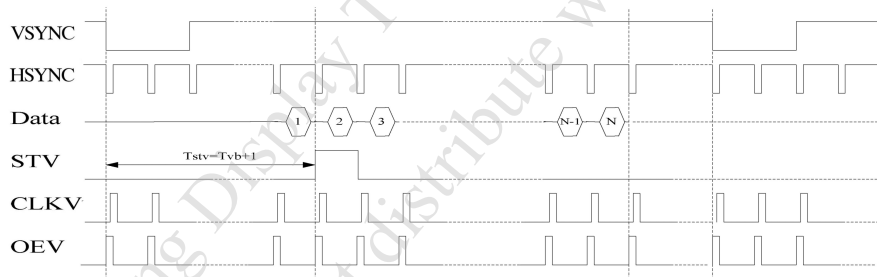
INPUT CLOCK AND DATA TIMING DIAGRAM



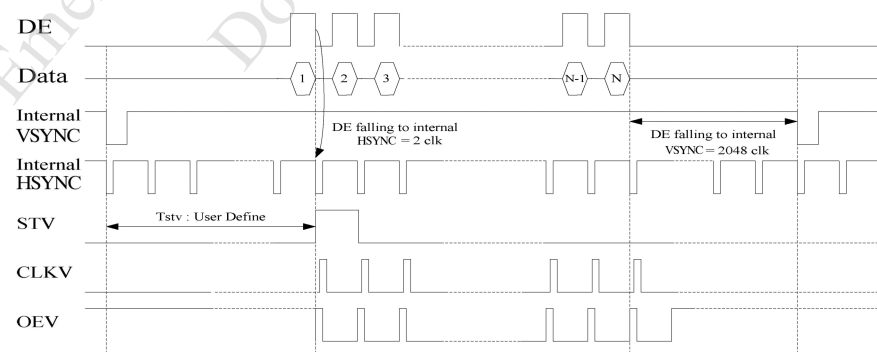
SOURCE OUTPUT TIMING DIAGRAM



VERTICAL TIMING DIAGRAM SYNC (TCON + SOURCE MODE)



VERTICAL TIMING DIAGRAM DE (TCON + SOURCE MODE)



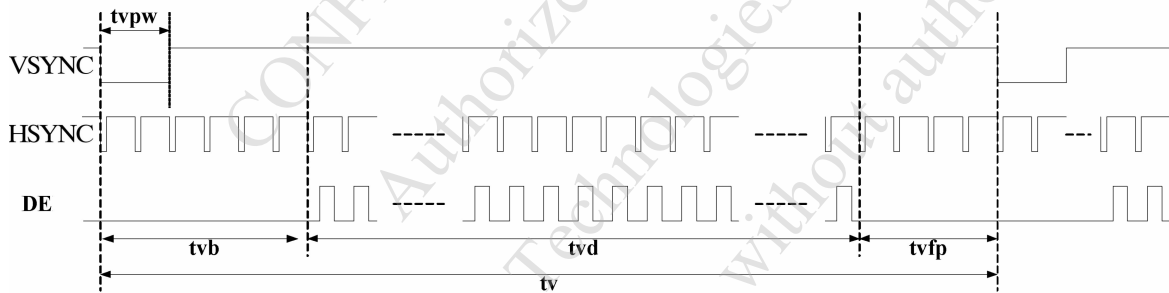
5.1.2 TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
HORIZONTAL DISPLAY AREA	thd	800			DCLK	
DCLK FREQUENCY	fclk	26.4	33.3	46.8	MHz	
ONE HORIZONTAL LINE	th	862	1056	1200	DCLK	
HSYNC PULSE WIDTH	thpw	1	6	40	DCLK	NOTE (1)
HSYNC BACK PORCH (BLANKING)	thb	46			DCLK	NOTE (1)
HSYNC FRONT PORCH	thfb	16	210	354	DCLK	
DE MODE BLANKING	th-thd	62	256	400	DCLK	
VERTICAL DISPLAY AREA	tvd	480			H	
VSYNC PERIOD TIME	tv	510	525	650	H	
VSYNC PULSE WIDTH	tvpw	1	3	20	H	NOTE (2)
VSYNC BACK PORCH (BLANKING)	tvb	23			H	NOTE (2)
VSYNC FRONT PORCH	tvfb	7	22	147	H	
DE MODE BLANKING	tv-tvd	30	45	170	H	

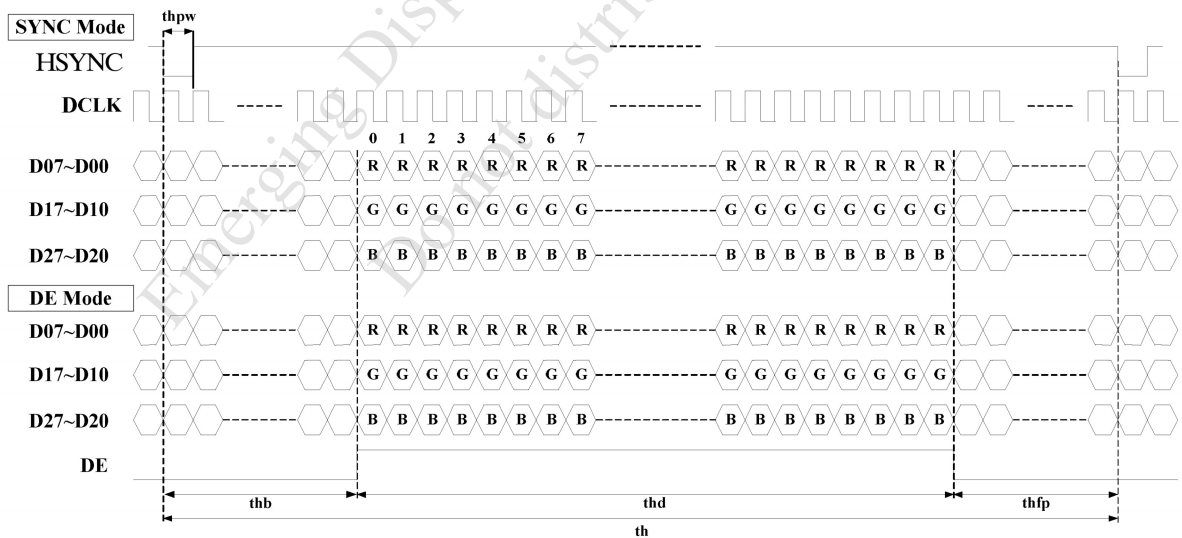
NOTE (1) : HS BLANKING HAS INCLUDED HS PULSE WIDTH.

NOTE (2) : VS BLANKING HAS INCLUDED VS PULSE WIDTH.

VERTICAL INPUT TIMING



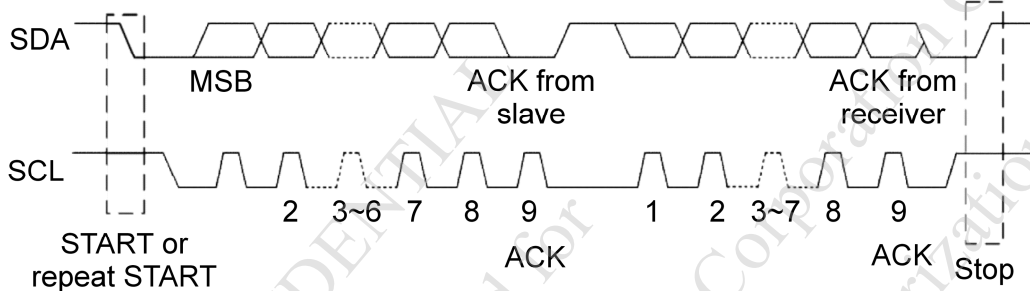
HORIZONTAL INPUT TIMING



5.2 FOR CTP MODULE

5.2.1 I2C INTERFACE TIMING CHARACTERISTICS

ITEM	MIN.	TYP.	MAX.	UNIT
SCL FREQUENCY	0	—	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



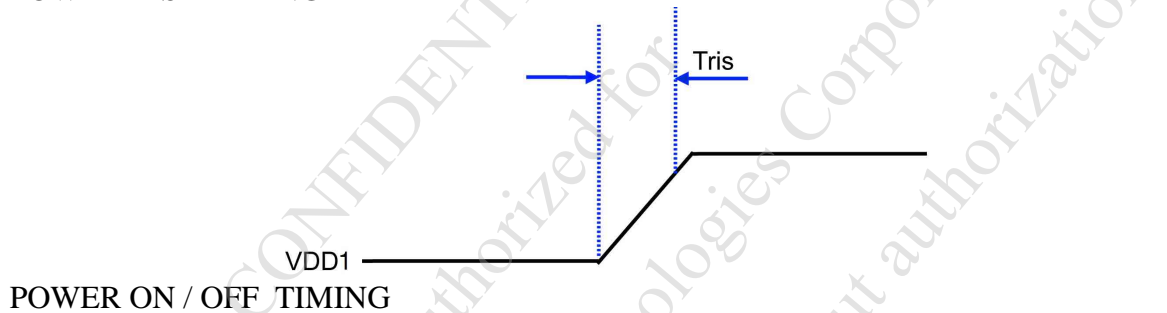
I2C SERIAL DATA TRANSFER FORMAT

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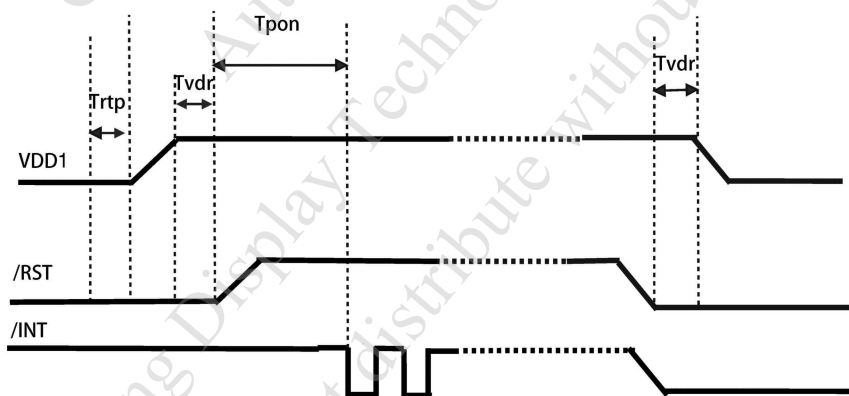
5.2.2 POWER SEQUENCE

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

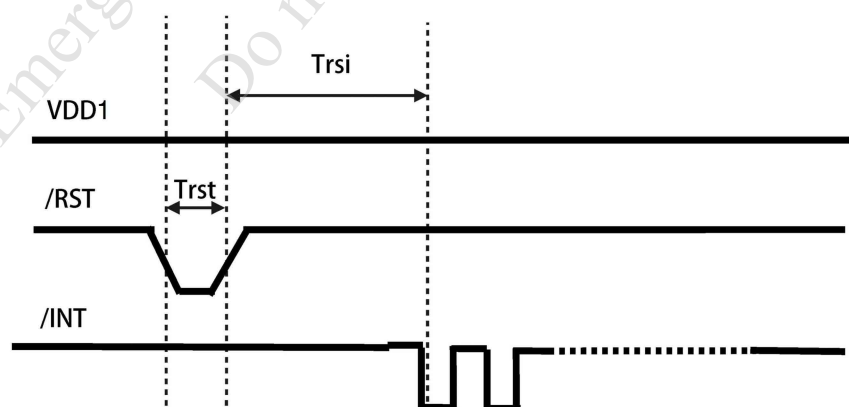
POWER RISE TIMING



POWER ON / OFF TIMING



RESET SEQUENCE



6. OPTICAL CHARACTERISTICS (NOTE 1)

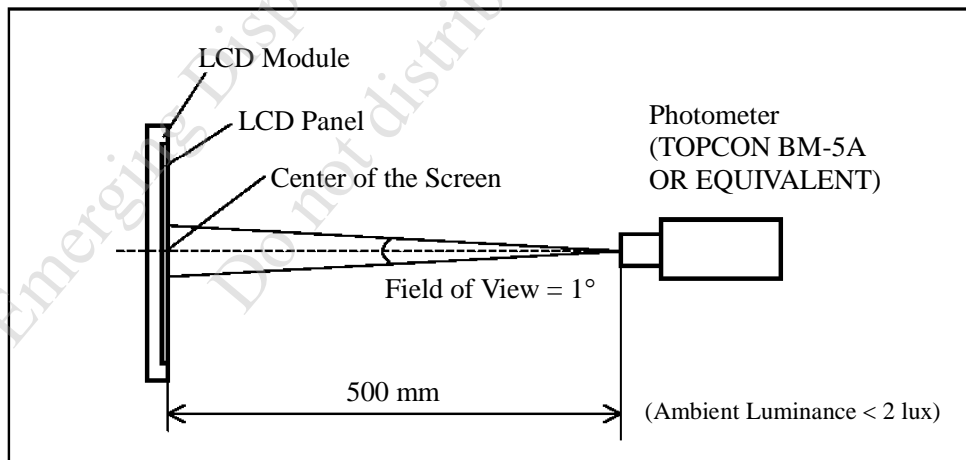
6.1 OPTICAL CHARACTERISTICS

Ta=25±2°C

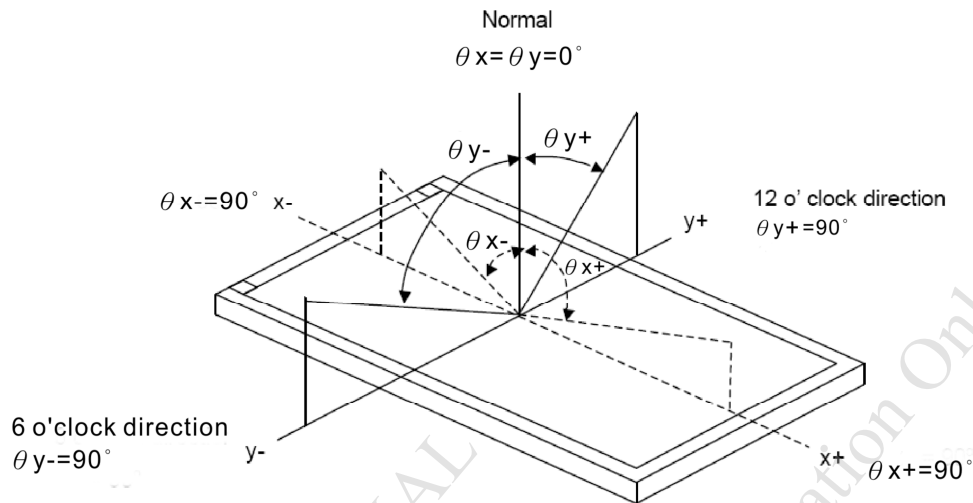
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE	θ_{y+}	CR ≥ 10	$\theta_x=0^\circ$	(40)	(50)	—	deg.	NOTE (2) NOTE (3)
	θ_{y-}			(60)	(70)	—		
	θ_{x+}		$\theta_y=0^\circ$	(60)	(70)	—		
	θ_{x-}			(60)	(70)	—		
CONTRAST RATIO (CENTER)	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	400	500	—	—	NOTE (3)	
RESPONSE TIME	Tr + Tf		—	25	50	msec	NOTE (4)	
COLOR CHROMATICITY (CENTER)	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VDD-VSS=3.3V VBL+—VBL-=5V	(0.26)	(0.31)	(0.36)	—	NOTE (5)
		Wy		(0.29)	(0.34)	(0.39)		
	RED	Rx		TBD	TBD	TBD	—	
		Ry		TBD	TBD	TBD		
	GREEN	Gx		TBD	TBD	TBD	—	
		Gy		TBD	TBD	TBD		
	BLUE	Bx		TBD	TBD	TBD	—	
		By		TBD	TBD	TBD		
THE BRIGHTNESS OF MODULE (CENTER)	B	$\theta_x=0^\circ, \theta_y=0^\circ$	(250)	(290)	—	cd/m ²	NOTE (6)	
THE UNIFORMITY OF MODULE	—	VBL+—VBL-=5V	70	75	—	%	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 :



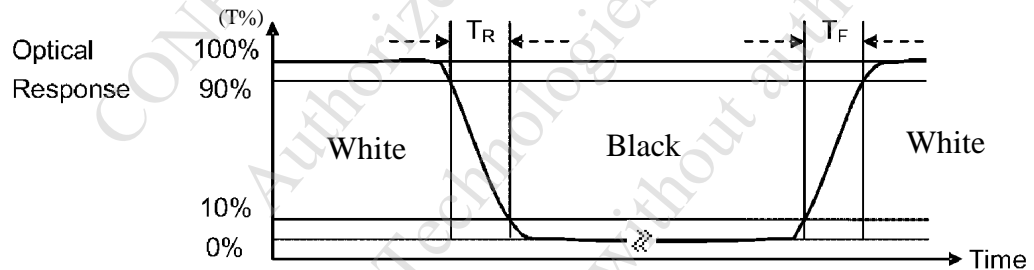
NOTE (3) : DEFINITION OF CONTRAST RATIO (CR) :

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.



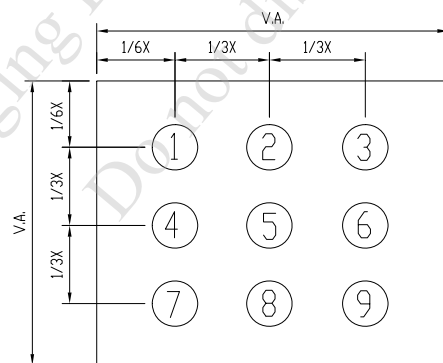
NOTE (5) : DEFINITION OF COLOR CHROMATICITY

(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

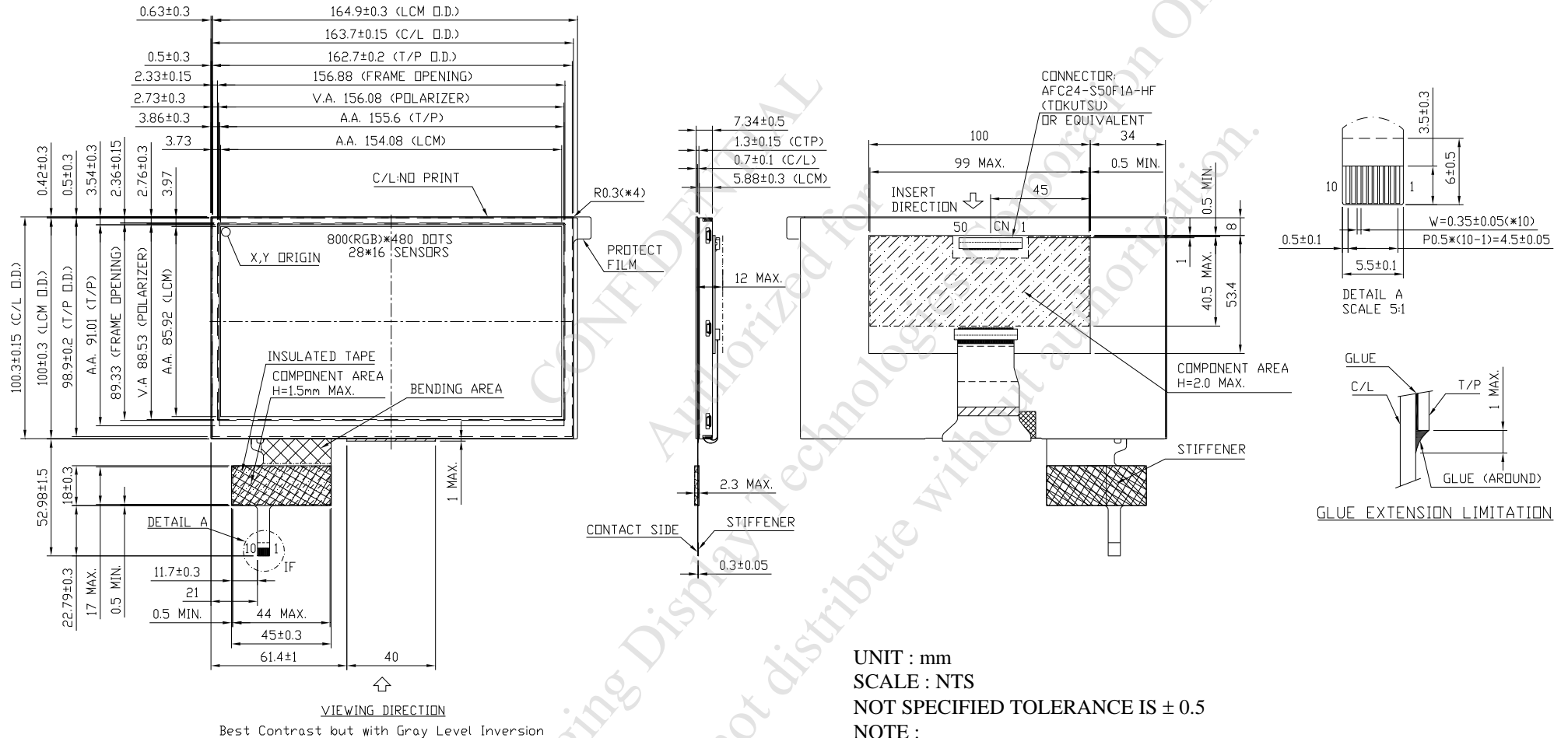


UNIT : mm

(b)THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

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

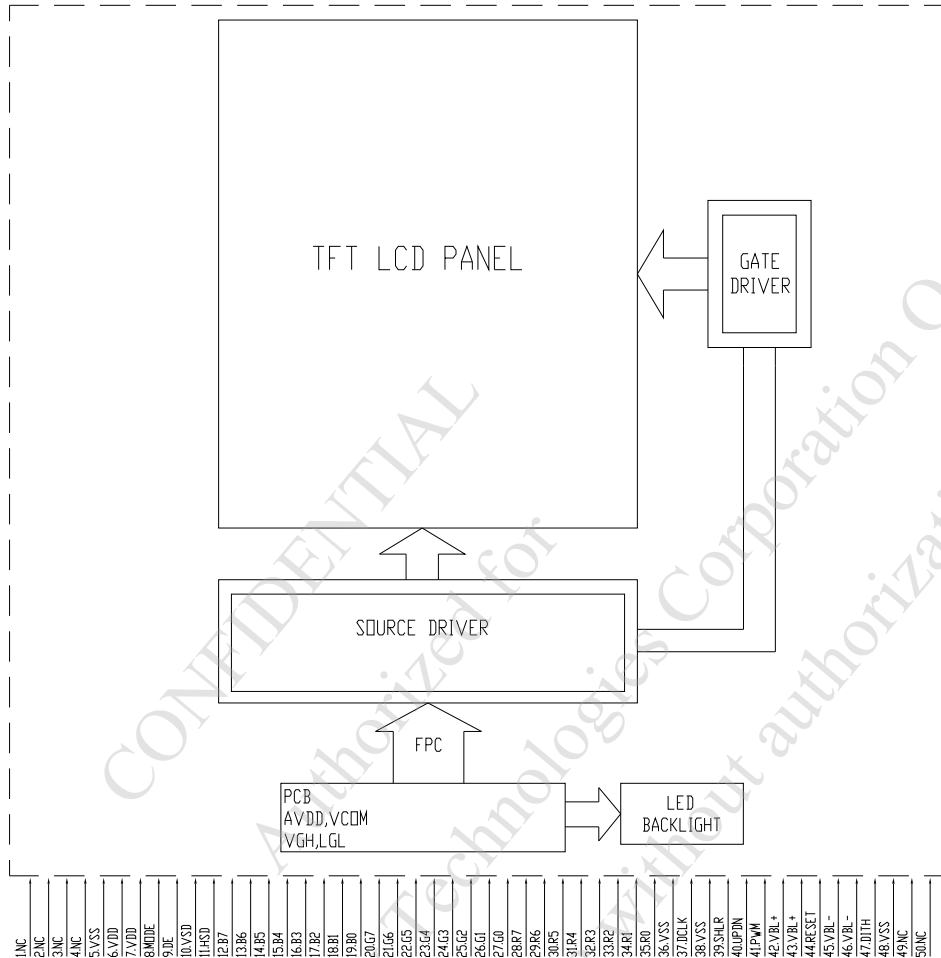
7. OUTLINE DIMENSIONS



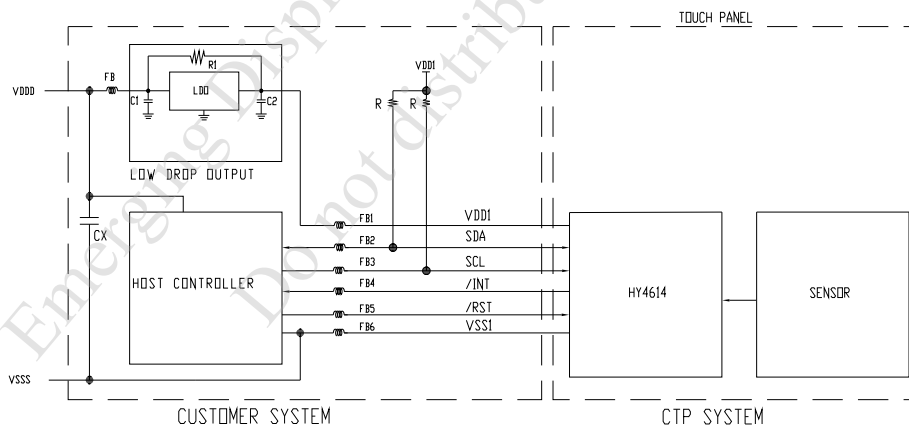
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5
NOTE :
C/L GLASS : SODA LIME , CHAMFERED EDGES
CTP RECOMMEND MATCH CONNECTOR KYOCERA : 04 6240 010 SERIES

8. BLOCK DIAGRAM

8.1 TFT



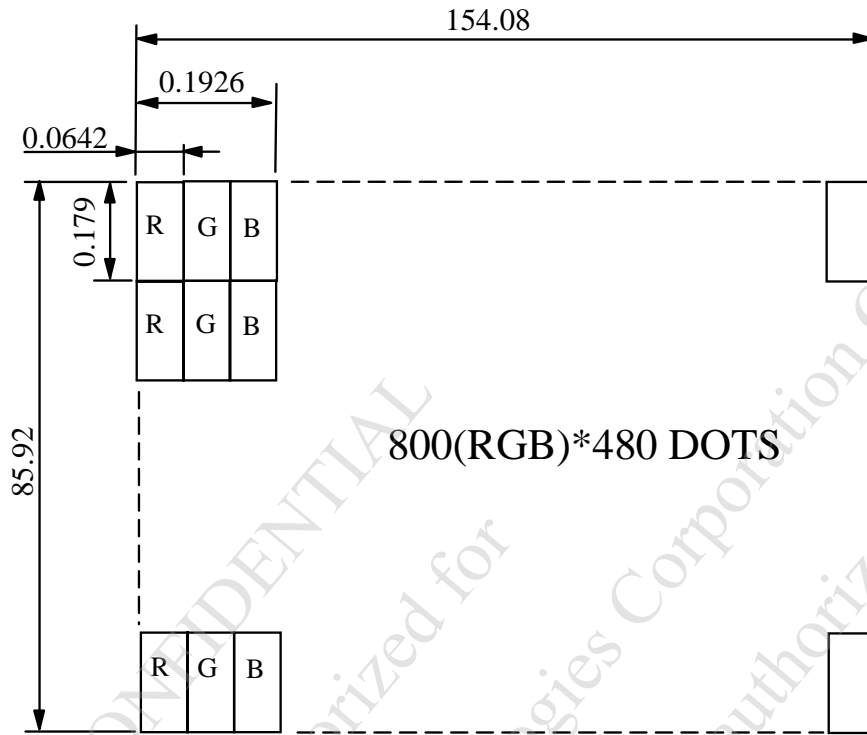
8.2 CTP



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.

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 TFT

PIN NO.	SYMBOL	I/O/P	FUNCTION
1	NC	P	NO CONNECTION
2	NC	P	NO CONNECTION
3	NC	P	NO CONNECTION
4	NC	P	NO CONNECTION
5	VSS	P	POWER GROUND
6	VDD	P	POWER SUPPLY
7	VDD	P	POWER SUPPLY
8	MODE	I	DE/SYNC MODE SELECT. NORMALLY PULL HIGH H: DE MODE. L: HSD/VSD MODE
9	DE	I	DATA INPUT ENABLE
10	VSD	I	VERTICAL SYNC INPUT. NEGATIVE POLARITY
11	HSD	I	HORIZONTAL SYNC INPUT. NEGATIVE POLARITY
12	B7	I	BLUE DATA(MSB)
13	B6	I	BLUE DATA
14	B5	I	BLUE DATA
15	B4	I	BLUE DATA
16	B3	I	BLUE DATA
17	B2	I	BLUE DATA
18	B1	I	BLUE DATA
19	B0	I	BLUE DATA(LSB)
20	G7	I	GREEN DATA(MSB)
21	G6	I	GREEN DATA
22	G5	I	GREEN DATA
23	G4	I	GREEN DATA
24	G3	I	GREEN DATA
25	G2	I	GREEN DATA
26	G1	I	GREEN DATA
27	G0	I	GREEN DATA(LSB)
28	R7	I	RED DATA(MSB)
29	R6	I	RED DATA
30	R5	I	RED DATA
31	R4	I	RED DATA
32	R3	I	RED DATA
33	R2	I	RED DATA
34	R1	I	RED DATA
35	R0	I	RED DATA(LSB)
36	VSS	P	POWER GROUND
37	DCLK	I	CLOCK INPUT
38	VSS	P	POWER GROUND
39	SHLR	I	LEFT OR RIGHT DISPLAY CONTROL
40	UPDN	I	UP / DOWN DISPLAY CONTROL
41	PWM	P	ADJUST FOR LED BRIGHTNESS
42	VBL+	P	POWER SUPPLY VOLTAGE FOR LED BACKLIGHT
43	VBL+	P	POWER SUPPLY VOLTAGE FOR LED BACKLIGHT

PIN NO.	SYMBOL	I/O/P	FUNCTION
44	RESET	I	GLOBAL RESET PIN. ACTIVE LOW TO ENTER RESET STATE. SUGGEST TO CONNECTING WITH AN RC RESET CIRCUIT FOR STABILITY. NORMALLY PULL HIGH. (R=10KΩ, C=1μF)
45	VBL-	P	LED BACKLIGHT GROUND
46	VBL-	P	LED BACKLIGHT GROUND
47	DITH	I	DITHERING SETTING DITH=" H " 6BIT RESOLUTION (LAST 2 BIT OF INPUT DATA TRUNCATED) DITH=" L " 8BIT RESOLUTION (DEFAULT SETTING)
48	VSS	P	POWER GROUND
49	NC	P	NO CONNECTION
50	NC	P	NO CONNECTION

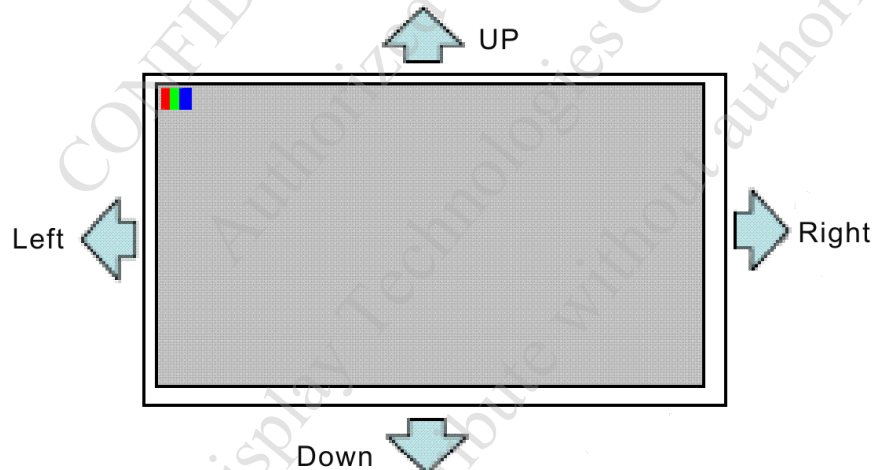
NOTE (1) : SHLR : LEFT OR RIGHT SETTING

UPDN : UP OR DOWN SETTING

SHLR	UPDN	DATA SHIFTING
VDD	VSS	LEFT TO RIGHT, UP TO DOWN (DEFAULT)
VSS	VSS	RIGHT TO LEFT, UP TO DOWN
VDD	VDD	LEFT TO RIGHT, DOWN TO UP
VSS	VDD	RIGHT TO LEFT, DOWN TO UP

NOTE (2) : DEFINITION OF SCANNING DIRECTION.

REFER TO THE FIGURE AS BELOW :

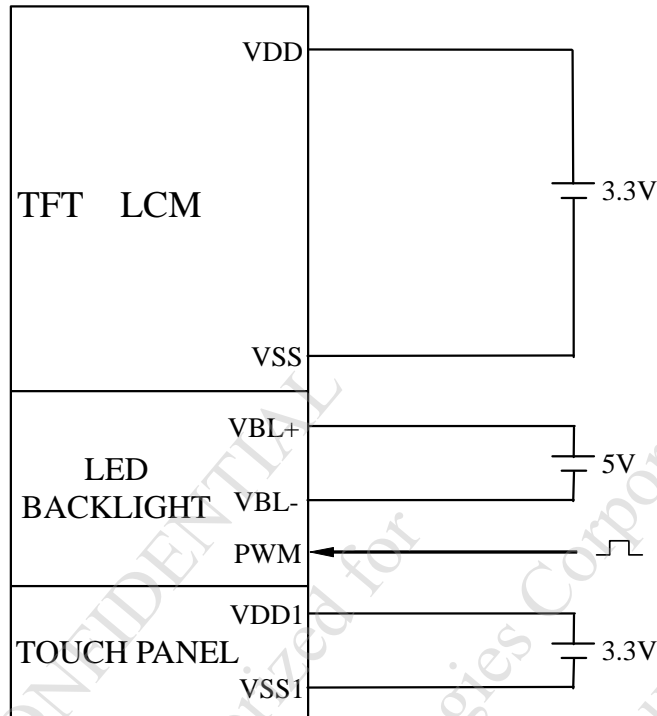


10.2 CTP

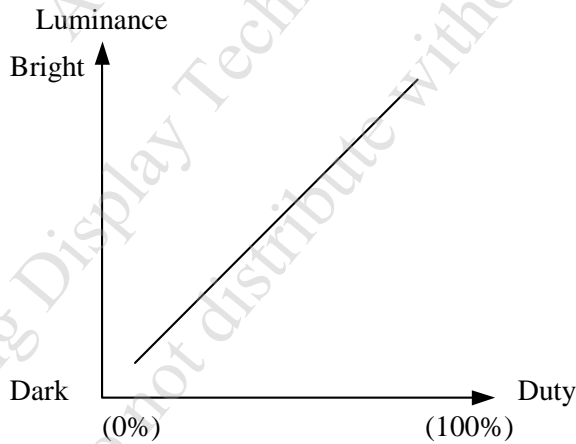
PIN NO.	SYMBOL	FUNCTION
1	VSS1	GROUND
2	VDD1	POWER SUPPLY VOLTAGE
3	SCL	I2C CLOCK INPUT
4	NC	NON CONNECTION
5	SDA	I2C DATA INPUT AND OUTPUT
6	NC	NON CONNECTION
7	/RST	EXTERNAL RESET, LOW IS ACTIVE
8	NC	NON CONNECTION
9	/INT	EXTERNAL INTERRUPT TO THE HOST
10	VSS1	GROUND

11. POWER SUPPLY

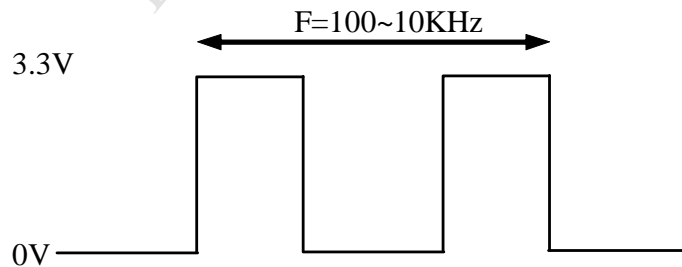
11.1 POWER SUPPLY FOR LCM



NOTE (1) : ADJUST THE PWM SIGNAL IN ORDER TO CONTROL LED BACKLIGHT'S BRIGHTNESS. THE HIGHER THE DUTY CYCLE, THE HIGHER THE BRIGHTNESS



NOTE (2) : PWM SIGNAL OPERATION FREQUENCY IS 100~10KHz.



12. CAPACITIVE TOUCH PANEL SPECIFICATION

12.1 OPTICAL CHARACTERISTICS

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

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

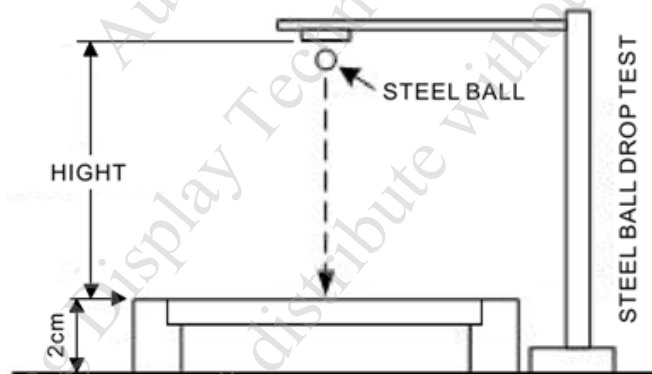
12.2 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	7H (min)

12.3 DURABILITY

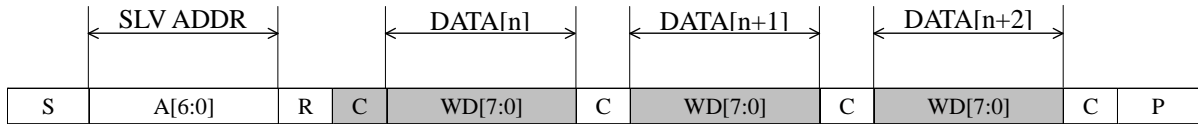
USING STEEL BALL AND FALLING ON TOUCH PANEL SURFACE, FROM THE HEIGHT MUST PASS BELOW CONDITIONS :

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



12.4 PROTOCOL

12.4.1 I2C READ

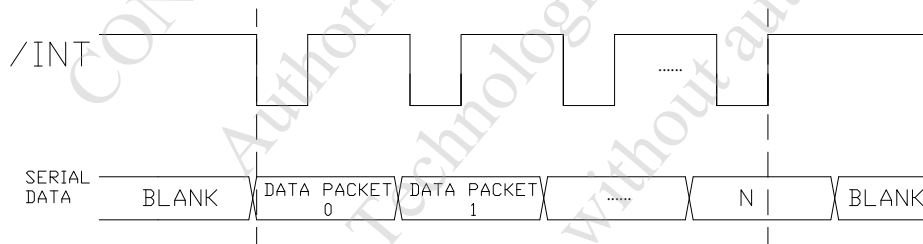


CHARACTER	DESCRIPTION
S	I2C START OR I2C RESTART
A[6:0]	SLAVE ADDRESS, THE VALUE CAN BE CUSTOMIZED
R	OPERATOR BYTE, SHOULD BE 1'b1, STANDS FOR READ
C	ACK SIGNAL
P	STOP SIGNAL (STOP SIGNAL IS OPTIONAL, RESTART SIGNAL IS ALSO OK FOR NEXT PACKET)

SLAVE ADDRESS=0x38

12.4.2 INTERRUPT SIGNAL FOR CTPM TO HOST

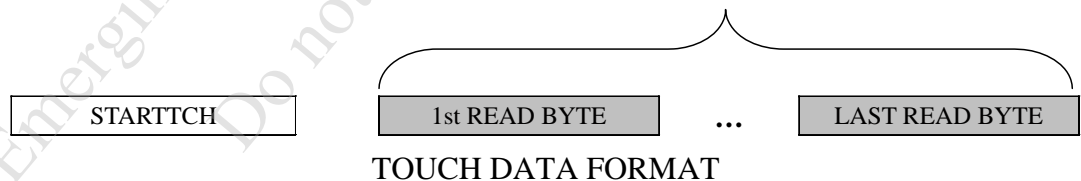
AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA. HERE IS THE TIMING TO GET TOUCH DATA



12.4.3 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 PACKET



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

TOUCH_n_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

TOUCH_n_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

TOUCH_n_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

TOUCH_n_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

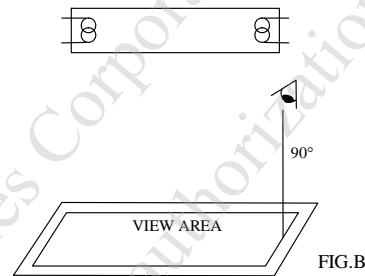
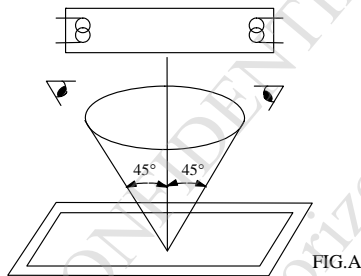
13.2 INSPECTION CONDITIONS

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		15 secs

13.2.3 INSPECTION LOT

QUANTITY PER DELIVERY LOT FOR EACH MODEL

13.2.4 INSPECTION METHOD

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

(a)APPLICABLE STANDARD :

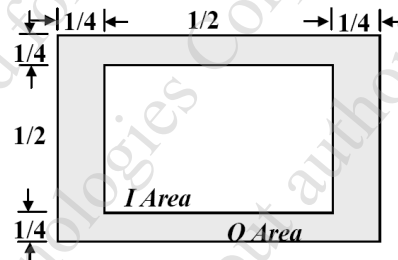
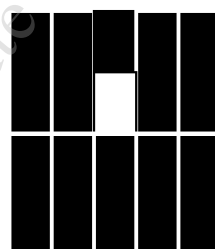
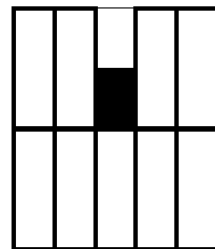
ANSI/ ASQ Z1.4 NORMAL INSPECTION LEVEL II


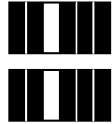
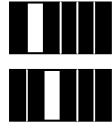

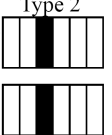
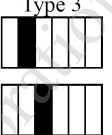


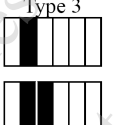
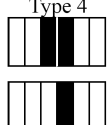
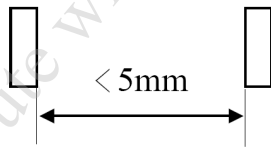
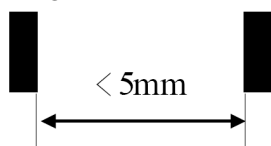
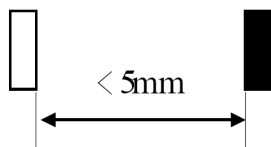
(b)AQL : MAJOR DEFECT : AQL 0.65

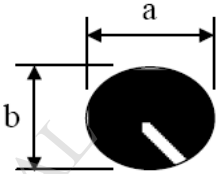
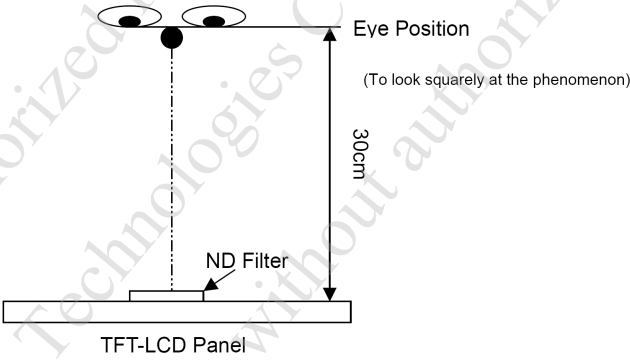
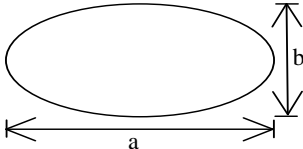
MINOR DEFECT : AQL 1.0

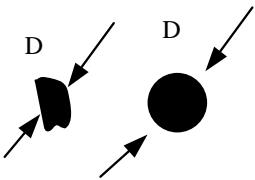
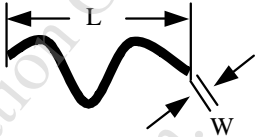
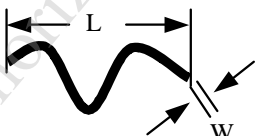
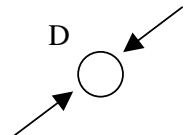
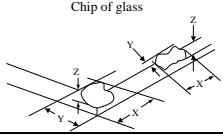
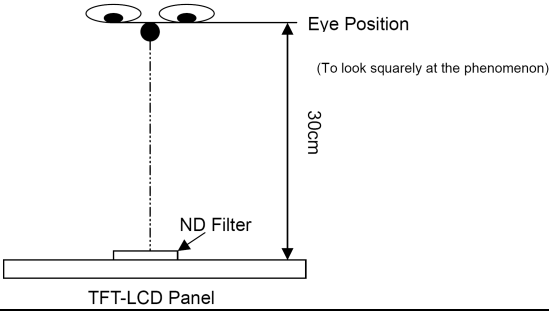
13.3 DEFECTS CLASSIFICATION

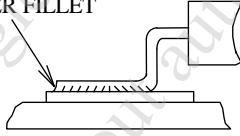
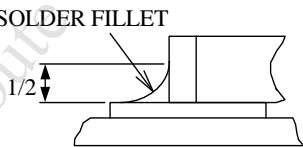
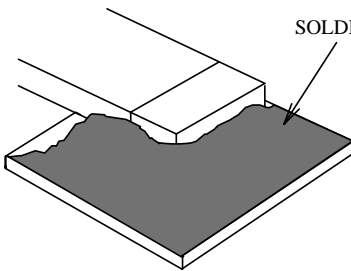
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> • DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC 	0.65
	2.CTP FUNCTION	<ul style="list-style-type: none"> • NO FUNCTION • BROKEN LINE • 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 	

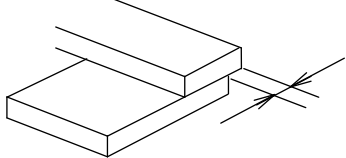
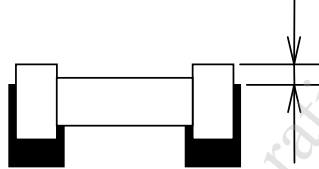
NO.	ITEM	CRITERIA																																	
1	DISPLAY ON INSPECTION	1. INCORRECT PATTERN 2. MISSING SEGMENT 3. DIM SEGMENT 4. OPERATING VOLTAGE BEYOND SPEC																																	
2	OVERALL DIMENSIONS	1. OVERALL DIMENSION BEYOND SPEC																																	
3	DOT DEFECT	1. INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS. 2. <table border="1" data-bbox="590 582 1436 862"> <thead> <tr> <th data-bbox="590 582 1252 616">DEFECT TYPE</th> <th colspan="2" data-bbox="1252 582 1436 616">CRITERIA</th> </tr> </thead> <tbody> <tr> <td data-bbox="590 616 1252 638">AREA (NOTE 1)</td> <td data-bbox="1252 616 1332 638">I</td> <td data-bbox="1332 616 1436 638">O</td> </tr> <tr> <td data-bbox="590 638 1252 660">BRIGHT DOTS (NOTE 2)</td> <td data-bbox="1252 638 1332 660">N ≤ 0</td> <td data-bbox="1332 638 1436 660">N ≤ 1</td> </tr> <tr> <td data-bbox="590 660 1252 683">DARK DOTS (NOTE 3)</td> <td data-bbox="1252 660 1332 683">N ≤ 2</td> <td data-bbox="1332 660 1436 683">N ≤ 2</td> </tr> <tr> <td data-bbox="590 683 1252 705">BRIGHT DOT- 2 ADJACENT (NOTE 4)</td> <td colspan="2" data-bbox="1252 683 1436 705">N ≤ 0</td> </tr> <tr> <td data-bbox="590 705 1252 728">DARK DOTS- 2 ADJACENT (NOTE 5)</td> <td colspan="2" data-bbox="1252 705 1436 728">N ≤ 0</td> </tr> <tr> <td data-bbox="590 728 1252 750">DARK OR BRIGHT DOTS- 3 AND MORE ADJACENT(NOTE 5)</td> <td colspan="2" data-bbox="1252 728 1436 750">N ≤ 0</td> </tr> <tr> <td data-bbox="590 750 1252 772">TOTAL BRIGHT AND DARK DOTS (NOTE6)</td> <td colspan="2" data-bbox="1252 750 1436 772">N ≤ 3</td> </tr> <tr> <td data-bbox="590 772 1252 795">MINIMUM DISTANCE BETWEEN BRIGHT DOTS (NOTE7)</td> <td colspan="2" data-bbox="1252 772 1436 795">5 mm</td> </tr> <tr> <td data-bbox="590 795 1252 817">MINIMUM DISTANCE BETWEEN DARK DOTS (NOTE7)</td> <td colspan="2" data-bbox="1252 795 1436 817">5 mm</td> </tr> <tr> <td data-bbox="590 817 1252 840">MINIMUM DISTANCE BETWEEN DARK AND BRIGHT DOTS (NOTE7)</td> <td colspan="2" data-bbox="1252 817 1436 840">5 mm</td> </tr> </tbody> </table> <p data-bbox="590 873 686 907">NOTE :</p> <p data-bbox="590 907 901 940">(1)DEFINITION OF AREA</p>  <p data-bbox="590 1243 1069 1276">(2)BRIGHT DOT DEFECT DEFINITION</p> <p data-bbox="630 1276 1412 1332">-BRIGHT AREA IS MORE THAN 50% OF ONE DOT. ALL BRIGHT DOT DEFECT MUST BE VISIBLE THROUGH 5% ND FILTER.</p>  <p data-bbox="590 1624 1045 1657">(3)DARK DOT DEFECT DEFINITION</p> <p data-bbox="630 1657 1460 1713">-DARK AREA IS MORE THAN 50% OF ONE DOT . ALL BRIGHT DOT DEFECT MUST BE VISIBLE THROUGH 5% ND FILTER.</p> 	DEFECT TYPE	CRITERIA		AREA (NOTE 1)	I	O	BRIGHT DOTS (NOTE 2)	N ≤ 0	N ≤ 1	DARK DOTS (NOTE 3)	N ≤ 2	N ≤ 2	BRIGHT DOT- 2 ADJACENT (NOTE 4)	N ≤ 0		DARK DOTS- 2 ADJACENT (NOTE 5)	N ≤ 0		DARK OR BRIGHT DOTS- 3 AND MORE ADJACENT(NOTE 5)	N ≤ 0		TOTAL BRIGHT AND DARK DOTS (NOTE6)	N ≤ 3		MINIMUM DISTANCE BETWEEN BRIGHT DOTS (NOTE7)	5 mm		MINIMUM DISTANCE BETWEEN DARK DOTS (NOTE7)	5 mm		MINIMUM DISTANCE BETWEEN DARK AND BRIGHT DOTS (NOTE7)	5 mm	
DEFECT TYPE	CRITERIA																																		
AREA (NOTE 1)	I	O																																	
BRIGHT DOTS (NOTE 2)	N ≤ 0	N ≤ 1																																	
DARK DOTS (NOTE 3)	N ≤ 2	N ≤ 2																																	
BRIGHT DOT- 2 ADJACENT (NOTE 4)	N ≤ 0																																		
DARK DOTS- 2 ADJACENT (NOTE 5)	N ≤ 0																																		
DARK OR BRIGHT DOTS- 3 AND MORE ADJACENT(NOTE 5)	N ≤ 0																																		
TOTAL BRIGHT AND DARK DOTS (NOTE6)	N ≤ 3																																		
MINIMUM DISTANCE BETWEEN BRIGHT DOTS (NOTE7)	5 mm																																		
MINIMUM DISTANCE BETWEEN DARK DOTS (NOTE7)	5 mm																																		
MINIMUM DISTANCE BETWEEN DARK AND BRIGHT DOTS (NOTE7)	5 mm																																		

NO.	ITEM	CRITERIA
3	DOT DEFECT	<p>(4) BRIGHT DOT DEFECT DESCRIPTION - TWO ADJACENT</p> <p style="text-align: center;">Type 1</p>    <p>(5) DARK DOT DEFECT DESCRIPTION - TWO ADJACENT</p> <p style="text-align: center;">Type 1</p>  <p style="text-align: center;">Type 2</p>  <p style="text-align: center;">Type 3</p>  <p>(6) DARK DOT DEFECT DESCRIPTION - THREE ADJACENT</p> <p style="text-align: center;">Type 1</p>  <p style="text-align: center;">Type 2</p>  <p style="text-align: center;">Type 3</p>  <p style="text-align: center;">Type 4</p>  <p>(7) MINIMUM DISTANCE BETWEEN DOT DEFECTS BRIGHT DOT TO BRIGHT DOT</p>  <p style="text-align: center;">NG</p> <p>DARK DOT TO DARK DOT</p>  <p style="text-align: center;">NG</p> <p>BRIGHT DOT TO DARK DOT</p>  <p style="text-align: center;">NG</p>

NO.	ITEM	CRITERIA				
3	DOT DEFECT	<p>(8) a. EVERY DOT HEREIN MEANS SUB-PIXEL (EACH RED, GREEN, BLUE COLOR). b. DAMAGED LESS THAN HALF SIZE OF SUB-PIXEL IS NOT COUNTED AS DEFECT. c. EXTRANEIOUS SUBSTANCES WHICH CAN BE WIPED OUT ARE NOT CONSIDERED AS DEFECT. d. DEFECTS WHICH IS ON THE BLACK MATRIX (OUTSIDE OF ACTIVE AREA) ARE NOT CONSIDERED AS DEFECT.</p> <p>(9) "AVERAGE DIAMETER" DESCRIPTION AVERAGE DIAMETER=(a+b)/2</p>  <p>THE DEFECT THAT ARE NOT DEFINED ABOVE AND CONSIDERED TO BE PROBLEM SHALL BE REVIEWED AND DISCUSSED BY BOTH PARTIES.</p> <p>(10) BRIGHT DOT, MURA AND LEAK ARE DEFINED THROUGH TRANSMISSION ND FILTER AS FOLLOWING.</p>  <p>(11) IT DOESN'T MATTER WHETHER SILICON OR EGC IS USED FOR FRAME SPREAD, THIS PRODUCT IS ALWAYS RELIABLE.</p>				
4	BUBBLES / PEELING ON POLARIZER	<table border="1" data-bbox="582 1406 1343 1505"> <thead> <tr> <th>DEFECT TYPE</th> <th>CRITERIA</th> </tr> </thead> <tbody> <tr> <td>BUBBLE/ PEELING</td> <td>1. BM: NO COUNT 2. PIXEL AREA 0.15mm≤D<0.5mm,N≤4</td> </tr> </tbody> </table> <p>NOTE :</p> <p>(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. THE EXTRANEIOUS SUBSTANCE IS DEFINED AS IT CAN BE OBSERVED WHEN THE MODULE IS POWER ON.</p> <p>(2) THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING. AVERAGE DIAMETER (D)=(a+b)/2</p> 	DEFECT TYPE	CRITERIA	BUBBLE/ PEELING	1. BM: NO COUNT 2. PIXEL AREA 0.15mm≤D<0.5mm,N≤4
DEFECT TYPE	CRITERIA					
BUBBLE/ PEELING	1. BM: NO COUNT 2. PIXEL AREA 0.15mm≤D<0.5mm,N≤4					

NO.	ITEM	CRITERIA											
5	BLACK/WHITE SPOT CIRCULAR TYPE	<p>THE FOLLOWING BLACK/WHITE SPOT ARE WITHIN THE VIEWING AREA. AVERAGE DIAMETER : D (mm)</p> <table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.15$</td> <td>IGNORE</td> </tr> <tr> <td>$0.15 < D \leq 0.3$</td> <td>5</td> </tr> <tr> <td>$0.3 < D \leq 0.5$</td> <td>5</td> </tr> <tr> <td>$D > 0.5$</td> <td>0</td> </tr> </tbody> </table> <p>NOTE (1) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART. NOTE (2) : VISIBLE UNDER 5% ND FILTER</p> 		SIZE D	PERMISSIBLE NO.	$D \leq 0.15$	IGNORE	$0.15 < D \leq 0.3$	5	$0.3 < D \leq 0.5$	5	$D > 0.5$	0
SIZE D	PERMISSIBLE NO.												
$D \leq 0.15$	IGNORE												
$0.15 < D \leq 0.3$	5												
$0.3 < D \leq 0.5$	5												
$D > 0.5$	0												
6	SCRATCH	<p>THE FOLLOWING SCRATCH IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGTH : L (mm)</p> <table border="1"> <thead> <tr> <th>SIZE W & L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.1$</td> <td>IGNORE</td> </tr> <tr> <td>$0.1 < W \leq 0.2, L \leq 5$</td> <td>5</td> </tr> <tr> <td>$W > 0.2$</td> <td>0</td> </tr> </tbody> </table> <p>NOTE (1) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART. NOTE (2) : VISIBLE UNDER 5% ND FILTER</p> 		SIZE W & L	PERMISSIBLE NO.	$W \leq 0.1$	IGNORE	$0.1 < W \leq 0.2, L \leq 5$	5	$W > 0.2$	0		
SIZE W & L	PERMISSIBLE NO.												
$W \leq 0.1$	IGNORE												
$0.1 < W \leq 0.2, L \leq 5$	5												
$W > 0.2$	0												
7	BLACK / WHITE LINE LINEAR TYPE / FOREIGN FIBER	<p>THE FOLLOWING BLACK LINE, WHITE LINE IS WITHIN THE VIEWING AREA. WIDTH : W (mm) , LENGTH : L (mm)</p> <table border="1"> <thead> <tr> <th>SIZE W & L</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.1$</td> <td>IGNORE</td> </tr> <tr> <td>$0.1 < W \leq 0.2, L \leq 5$</td> <td>5</td> </tr> <tr> <td>$W > 0.2$</td> <td>0</td> </tr> </tbody> </table> <p>NOTE (1) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART. NOTE (2) : VISIBLE UNDER 5% ND FILTER</p> 		SIZE W & L	PERMISSIBLE NO.	$W \leq 0.1$	IGNORE	$0.1 < W \leq 0.2, L \leq 5$	5	$W > 0.2$	0		
SIZE W & L	PERMISSIBLE NO.												
$W \leq 0.1$	IGNORE												
$0.1 < W \leq 0.2, L \leq 5$	5												
$W > 0.2$	0												
8	BUBBLE / DENT FOR OPTICAL BONDING	<p>BUBBLES WITHIN VIEWING AREA. AVERAGE DIAMETER : D (mm)</p> <table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.2$</td> <td>IGNORE</td> </tr> <tr> <td>$0.2 < D \leq 0.3$</td> <td>3</td> </tr> <tr> <td>$0.3 < D \leq 0.5$</td> <td>2</td> </tr> <tr> <td>$D > 0.5$</td> <td>0</td> </tr> </tbody> </table> <p>NOTE (1) : THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.</p> 		SIZE D	PERMISSIBLE NO.	$D \leq 0.2$	IGNORE	$0.2 < D \leq 0.3$	3	$0.3 < D \leq 0.5$	2	$D > 0.5$	0
SIZE D	PERMISSIBLE NO.												
$D \leq 0.2$	IGNORE												
$0.2 < D \leq 0.3$	3												
$0.3 < D \leq 0.5$	2												
$D > 0.5$	0												
9	CHIPPING	<table border="1"> <tr> <td>CORNER</td> <td>$X \leq 3\text{mm} \cdot Y \leq 3\text{mm} \cdot Z \leq t$ (t : THICKNESS)</td> </tr> <tr> <td>EDGE</td> <td>$X \leq 6\text{mm} \cdot Y \leq 1\text{mm} \cdot Z < t$ (t : THICKNESS)</td> </tr> </table>	CORNER	$X \leq 3\text{mm} \cdot Y \leq 3\text{mm} \cdot Z \leq t$ (t : THICKNESS)	EDGE	$X \leq 6\text{mm} \cdot Y \leq 1\text{mm} \cdot Z < t$ (t : THICKNESS)							
CORNER	$X \leq 3\text{mm} \cdot Y \leq 3\text{mm} \cdot Z \leq t$ (t : THICKNESS)												
EDGE	$X \leq 6\text{mm} \cdot Y \leq 1\text{mm} \cdot Z < t$ (t : THICKNESS)												
10	CRACKED GLASS	NOT ACCEPTABLE											
11	LINE DEFECT ON DISPLAY	OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOWED.											
12	MURA & LEAK ON DISPLAY	<p>IT'S ACCEPTABLE, IF MURA AND LEAK IS SLIGHT VISIBLE THROUGH 5% ND FILTER.</p> 											

NO.	ITEM	CRITERIA
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.
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	<p>3. PARTS ALIGNMENT</p> <p>(a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE</p>  <p>(b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE</p>  <p>4. NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB. 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. 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 168 HRS
2	LOW TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -20°C FOR 168 HRS
3	HIGH TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +80°C FOR 168 HRS
4	LOW TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 168 HRS
5	HIGH TEMPERATURE /HUMIDITY TEST STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 50°C, 85% RH 168 HRS
6	THERMAL SHOCK (NOT OPERATED)	THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 1 CYCLES OF OPERATION:
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	AIR DISCHARGE ± 8KV CONTACT DISCHARGE ± 4KV 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

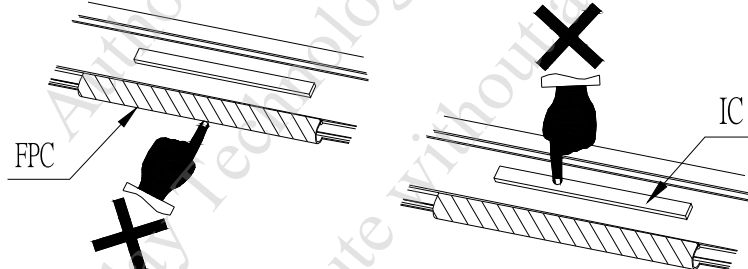
FOR THE FINAL TEST THE TESTING SAMPLE MUST BE STORED AT ROOM TEMPERATURE FOR 24 HOURS, AFTER THE TESTS LISTED IN TABLE 14.1, STANDARD SPECIFICATIONS FOR RELIABILITY HAVE BEEN EXECUTED IN ORDER TO ENSURE STABILITY.

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.