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CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

ET070017DM6

(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

DOC . FIRST ISSUE

JAN.24, 2018

DATE

REVISED
PAGE
NO.

SUMMARY

APR.12, 2018

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4.1 LCD MODULE ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY CURRENT	IDVDD	DVDD-GND = 3.3V	—	(150)	(200)	mA	NOTE (1)
POWER SUPPLY CURRENT FOR LED DRIVER	I _{VLED}	VLED=5V LED B/L=ON	—	(450)	(500)	mA	
LED LIFE TIME	—	ILED=20mA (PER. LED)	20K	—	—	hrs	NOTE (2) NOTE (3)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY CURRENT	IDVDD	DVDD-GND = 3.3V	—	100	150	mA	NOTE (1)
POWER SUPPLY CURRENT FOR LED DRIVER	I _{VLED}	VLED=5V LED B/L=ON	—	400	450	mA	
LED LIFE TIME	—	ILED=20mA (PER. LED)	30K	—	—	hrs	NOTE (2) NOTE (3)

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7. OUTLINE DIMENSIONS

MARK Δ : MODIFY TFT C/N & PULL TAPE & COMPONENT AREA
DIMENSION

AUG.01, 2018

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6.1 OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE	θ_{x+}	CR \geq 10	θ_{x-0°	60	70	deg.	NOTE (2) NOTE (3)
	θ_{x-}			60	70		
	θ_{y+}			40	50		
	θ_{y-}			50	60		

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE	θ_{x+}	CR \geq 10	θ_{x-0°	40	50	deg.	NOTE (2) NOTE (3)
	θ_{x-}			50	60		
	θ_{y+}			60	70		
	θ_{y-}			60	70		

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1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR CONTROLLER / DRIVER PLEASE REFER TO :

SITRONIX ST5625CA
SITRONIX ST5091CA

1.2 MATERIAL SAFETY DESCRIPTION

ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS, INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING LEAD, MERCURY, CADMIUM, HEXAVALENT CHROMIUM, POLYBROMINATED BIPHENYLS (PBB) AND POLYBROMINATED DIPHENYL ETHERS (PBDE)

2. MECHANICAL SPECIFICATIONS

(1) DISPLAY SIZE -----	7 inch
(2) NUMBER OF DOTS -----	800W * (RGB) * 480H DOTS
(3) MODULE SIZE -----	164.9W * 100H * 10D(MAX) mm (WITHOUT FPC)
(4) EFFECTIVE AREA -----	155W * 89.1H mm
(5) ACTIVE AREA -----	153.60W * 86.64H mm
(6) DOT SIZE -----	0.064W * 0.1805H mm
(7) PIXEL SIZE -----	0.192W * 0.1805H mm
(8) LCD TYPE -----	TFT , TRANSMISSIVE, ANTE-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)

3. ABSOLUTE MAXIMUM RATINGS

3.1 LCD MODULE ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	DVDD	-0.5	5	V	—

3.2 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)	5~20Hz , 1HR 20~500Hz(20Hz) , 1HR 20~500Hz(500Hz) , 1HR X,Y,Z,TOTAL 3HRS
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 : 48HRS MAX.

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 ELECTRICAL CHARACTERISTICS

Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	DVDD	—	3.15	3.3	3.45	V	
POWER SUPPLY VOLTAGE FOR LED DRIVER	VLED	—	4.7	5	5.3	V	
LOW LEVEL INPUT VOLTAGE	VIL	—	GND	—	0.3*DVDD	V	
HIGH LEVEL INPUT VOLTAGE	VIH	—	0.7*DVDD	—	DVDD	V	
POWER SUPPLY CURRENT	IDVDD	DVDD-GND = 3.3V	—	100	150	mA	NOTE (1)
POWER SUPPLY CURRENT FOR LED DRIVER	I _{VLED}	VLED=5V LED B/L=ON	—	400	450	mA	
LED LIFE TIME	—	ILED=20mA (PER. LED)	30K	—	—	hrs	NOTE (2) NOTE (3)

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



(a) GRAY-LEVEL PATTERN



(b) BLACK PATTERN

NOTE (2) : CONDITIONS; TA=25 °C, CONTINUOUS LIGHTING

NOTE (3) : DEFINITIONS OF LIFE TIME :

LCD LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

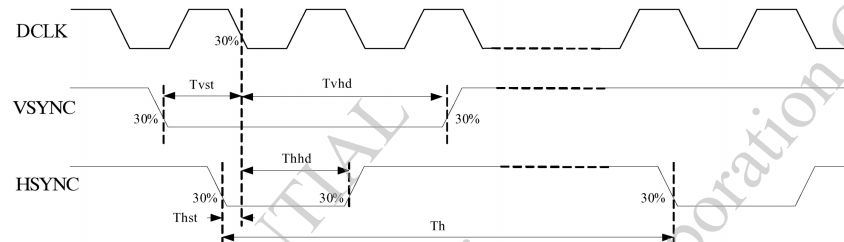
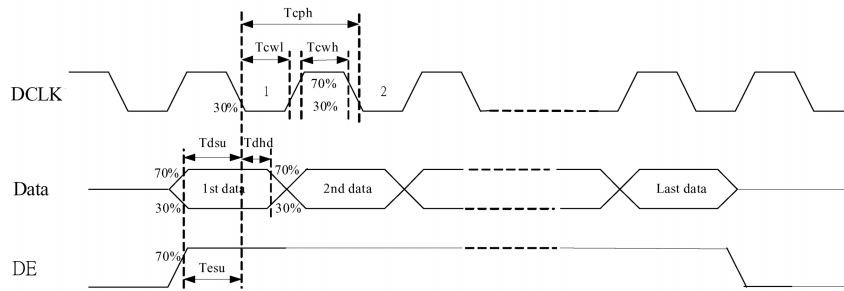
5. TIMING CHARACTERISTICS

5.1 LCD MODULE AC ELECTRICAL CHARACTERISTICS

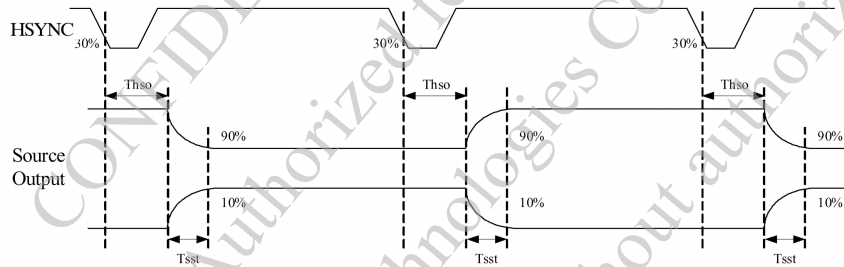
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
VDD POWER ON SLEW RATE	T _{POR}	—	—	20	ms	FROM 0V to 90% VDD
RESET PULSE WIDTH	T _{RST}	50	—	—	us	Clkin=50MHz
DCLK CYCLE TIME	T _{cph}	20	—	—	ns	
DCLK PULSE DUTY	T _{cwh}	40	50	60	%	
VSYNC SETUP TIME	T _{vst}	8	—	—	ns	
VSYNC HOLD TIME	T _{vhd}	8	—	—	ns	
HSYNC SETUP TIME	T _{hst}	8	—	—	ns	
HSYNC HOLD TIME	T _{hhd}	8	—	—	ns	
DATA SETUP TIME	T _{dsu}	8	—	—	ns	D[7:0], D1[7:0], D2[7:0] to Clkin
DATA HOLD TIME	T _{dhd}	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
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	

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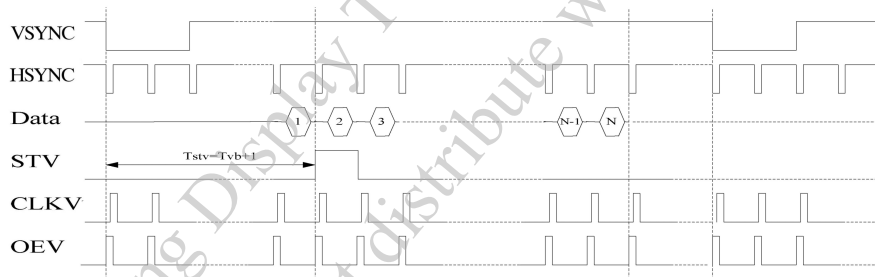
INPUT CLOCK AND DATA TIMING DIAGRAM



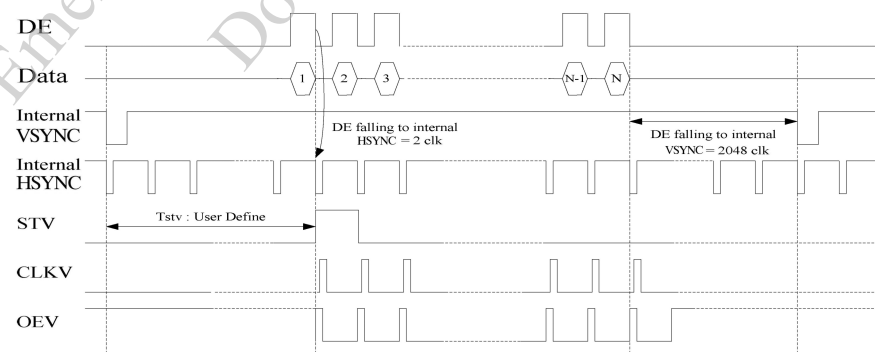
SOURCE OUTPUT TIMING DIAGRAM



VERTICAL TIMING DIAGRAM SYNC (TCON + SOURCE MODE)



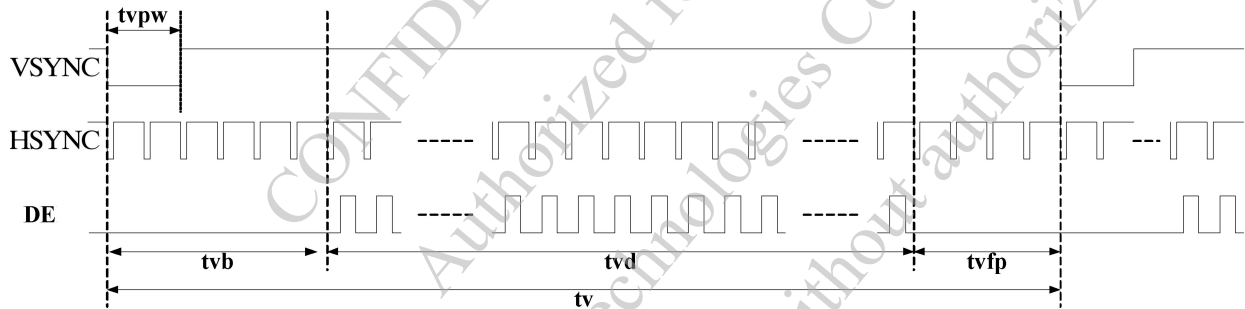
VERTICAL TIMING DIAGRAM DE (TCON + SOURCE MODE)



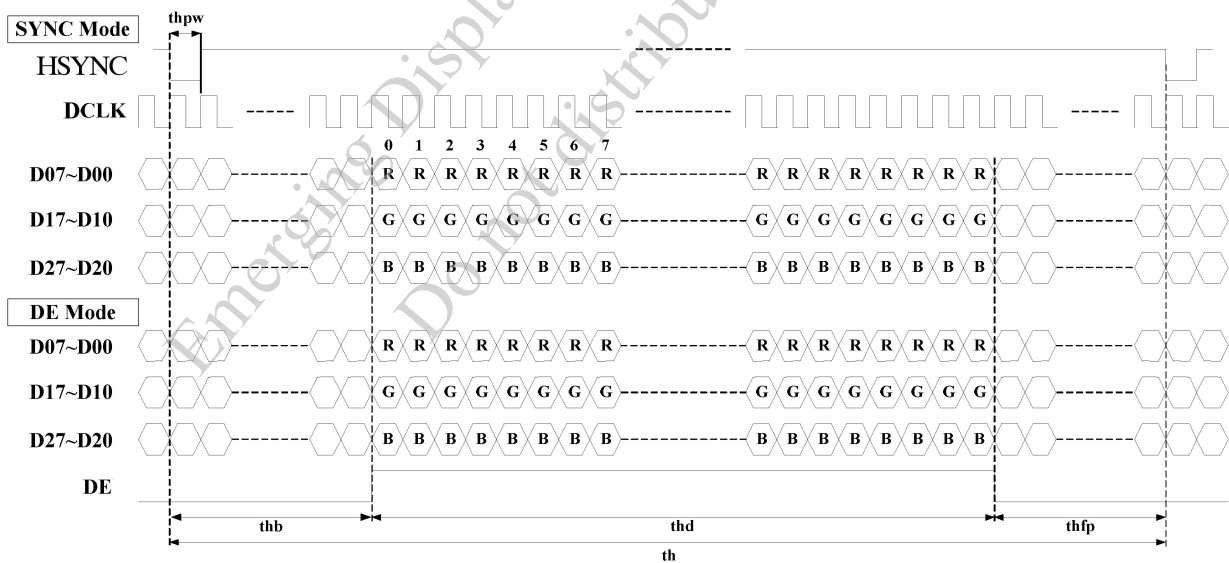
5.2 LCD MODULE TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
HORIZONTAL DISPLAY AREA	thd		800		DCLK
DCLK FREQUENCY	fclk	—	30	50	MHz
ONE HORIZONTAL LINE	th	889	928	1143	DCLK
HSYNC PULSE WIDTH	thpw	1	48	255	DCLK
HSYNC BACK PORCH (BLANKING)	thb		88		DCLK
HSYNC FRONT PORCH	thfb	1	40	255	DCLK
DE MODE BLANKING	th-thd	85	128	512	DCLK
VERTICAL DISPLAY AREA	tvd		480		H
VSYNC PERIOD TIME	tv	513	525	767	H
VSYNC PULSE WIDTH	tvpw	3	3	255	H
VSYNC BACK PORCH (BLANKING)	tvb		32		H
VSYNC FRONT PORCH	tvfb	1	13	255	H
DE MODE BLANKING	tv-tvd	4	45	255	H

VERTICAL INPUT TIMING



HORIZONTAL INPUT TIMING



6. OPTICAL CHARACTERISTICS (NOTE 1)

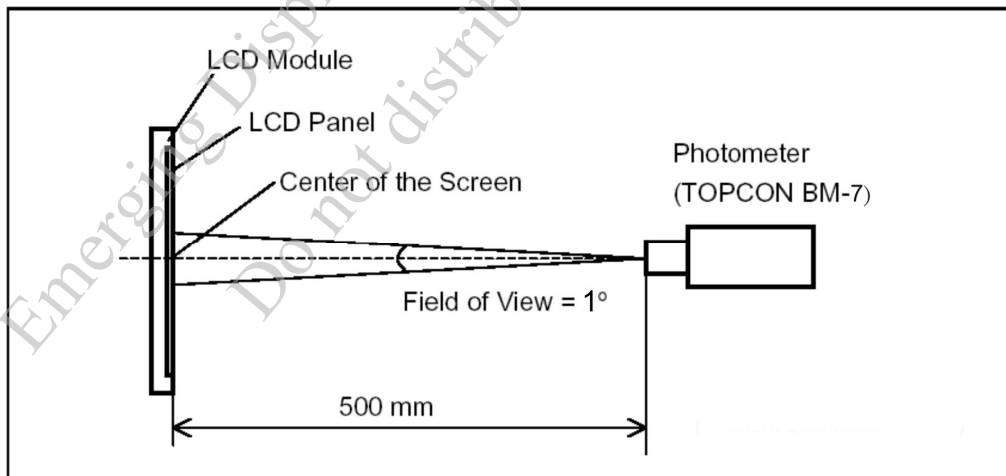
6.1 OPTICAL CHARACTERISTICS

Ta=25±2°C

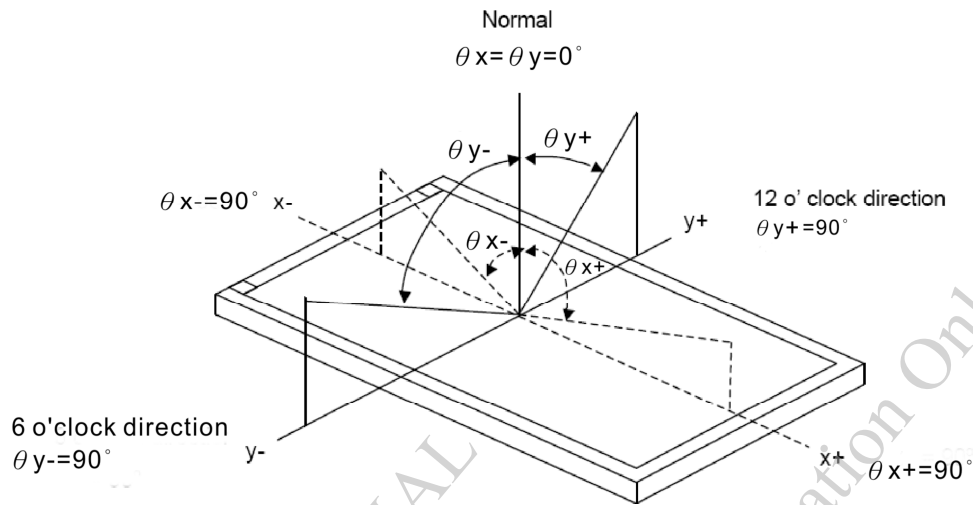
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE	θ_{y+}	CR ≥ 10	$\theta_x=0^\circ$	40	50	—	deg.	NOTE (2) NOTE (3)
	θ_{y-}			50	60	—		
	θ_{x+}		$\theta_y=0^\circ$	60	70	—		
	θ_{x-}			60	70	—		
CONTRAST RATIO	CR	$\theta_x=0^\circ, \theta_y=0^\circ$	400	500	—	—	NOTE (3)	
RESPONSE TIME	Tr + Tf	$\theta_x=0^\circ, \theta_y=0^\circ$	—	25	35	msec	NOTE (4)	
THE BRIGHTNESS OF MODULE	B	$\theta_x=0^\circ, \theta_y=0^\circ$ VLED-GND=5V	297	340	—	cd/m ²	NOTE (5)	
COLOR OF CIE COORDINATE	WHITE	Wx	$\theta_x=0^\circ, \theta_y=0^\circ$ VLED-GND=5V	0.26	0.31	0.36	—	NOTE (6)
		Wy		0.29	0.34	0.39		
	RED	Rx		0.57	0.62	0.67	—	
		Ry		0.32	0.37	0.42		
	GREEN	Gx		0.30	0.35	0.40	—	
		Gy		0.54	0.59	0.64		
	BLUE	Bx		0.11	0.16	0.21	—	
		By		0.07	0.12	0.17		
THE UNIFORMITY OF MODULE		$\theta_x=0^\circ, \theta_y=0^\circ$ VLED-GND=5V	70	75	—	%	NOTE (5)	

NOTE (1) : TEST EQUIPMENT SETUP :

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



NOTE (2) : DEFINITION OF VIEWING ANGLE :

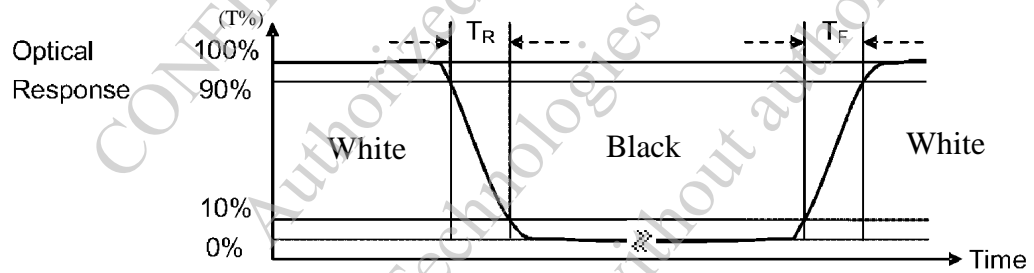


NOTE (3) : DEFINITION OF CONTRAST RATIO :

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

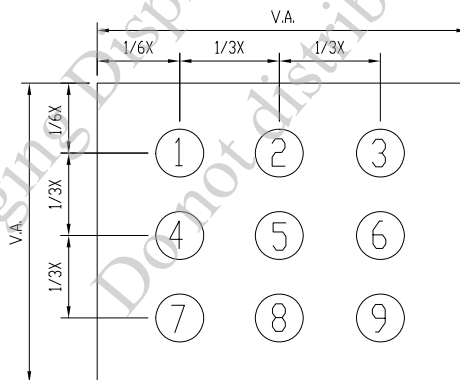
NOTE (4) : DEFINITION OF RESPONSE TIME : TR AND TF

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



NOTE (5) : THE 100% TRANSMISSION IS DEFINED AS THE TRANSMISSION OF LCD PANEL WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY OPENED.

NOTE (6) : (a) BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"
(b) THE TEST METHOD OF BRIGHTNESS AND UNIFORMITY



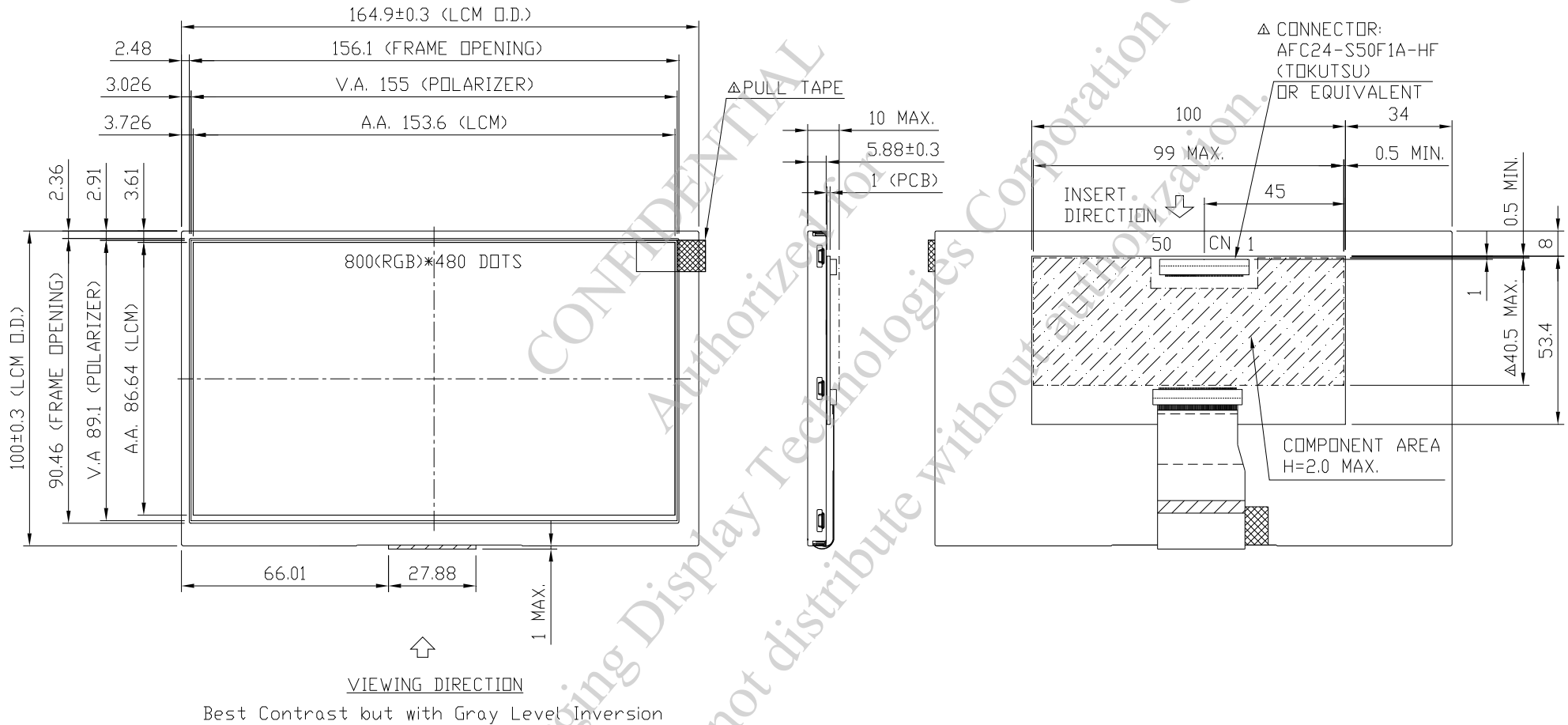
UNIT : mm

(c) THE CALCULATING METHOD OF UNIFORMITY

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

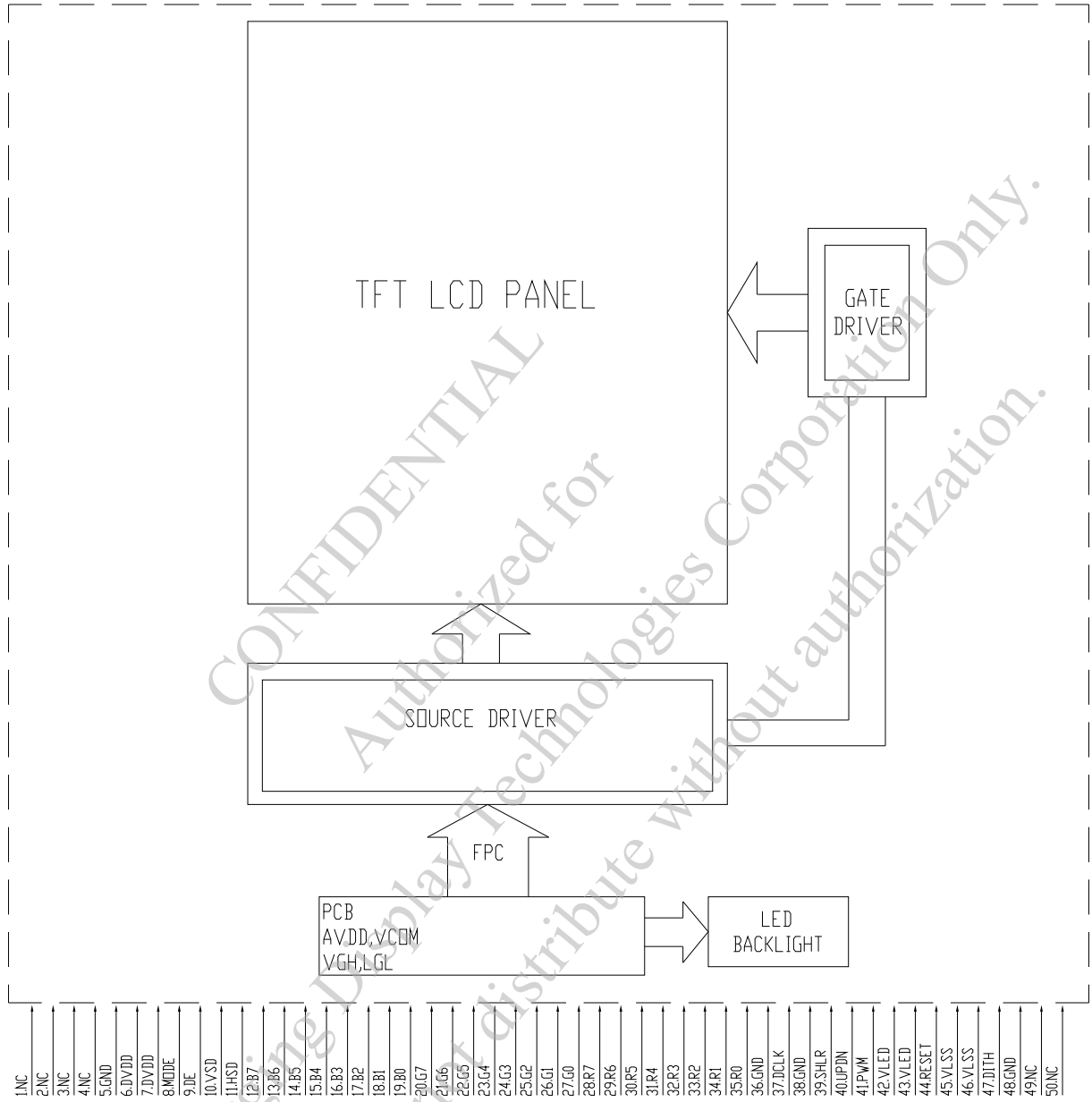
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7. OUTLINE DIMENSIONS

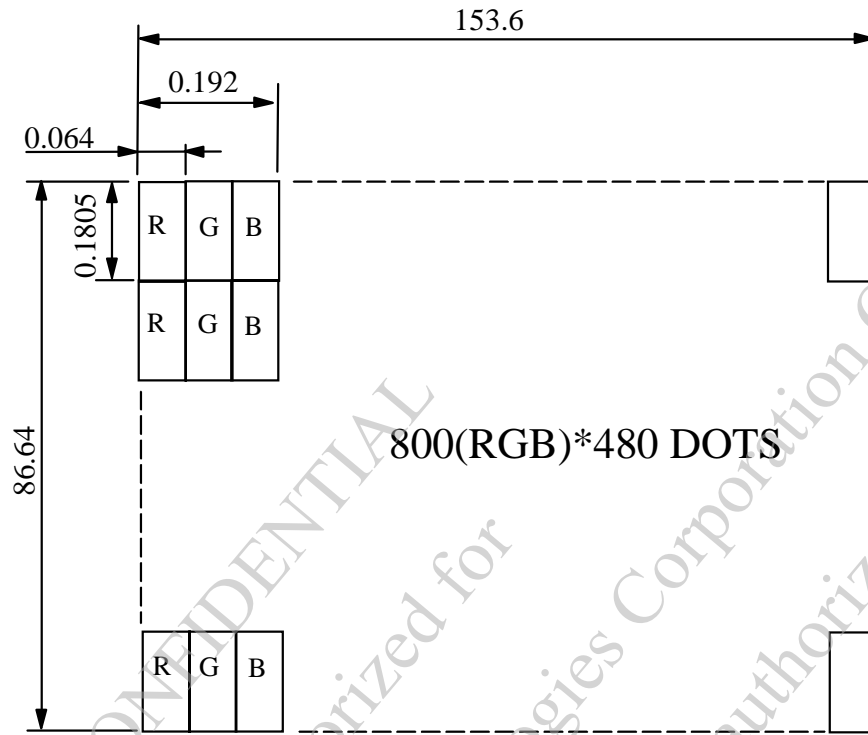


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5
NOTE: MARK△MODIFY (NUMBER NOTE MODIFY VERSION)

8. BLOCK DIAGRAM



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

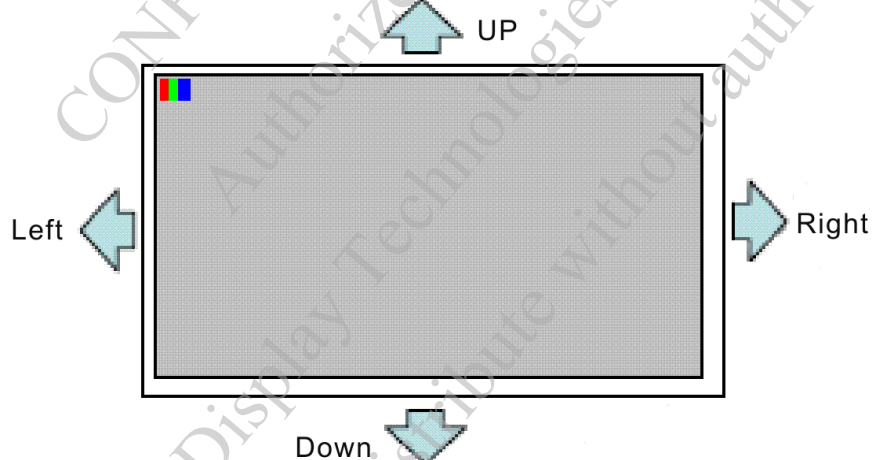
PIN NO.	SYMBOL	I/O/P	FUNCTION
1	NC	P	NO CONNECTION
2	NC	P	NO CONNECTION
3	NC	P	NO CONNECTION
4	NC	P	NO CONNECTION
5	GND	P	POWER GROUND
6	DVDD	P	POWER SUPPLY
7	DVDD	P	POWER SUPPLY
8	MODE	I	DE/SYNC MODE SELECT. NORMALLY PULL HIGH H: DE MODE. L: HSD/VSD MODE
9	DE	I	DATA INPUT ENABLE
10	VSD	I	VERTICAL SYNC 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	GND	P	POWER GROUND
37	DCLK	I	CLOCK INPUT
38	GND	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	VLED	P	POWER SUPPLY VOLTAGE FOR LED BACKLIGHT
43	VLED	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	VLSS	P	LED BACKLIGHT GROUND
46	VLSS	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	GND	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

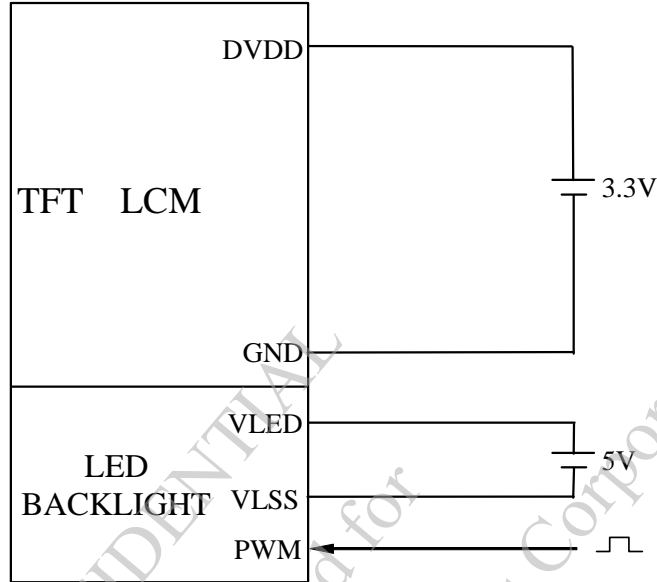
SHLR	UPDN	DATA SHIFTING
DVDD	GND	LEFT TO RIGHT, UP TO DOWN (DEFAULT)
GND	GND	RIGHT TO LEFT, UP TO DOWN
DVDD	DVDD	LEFT TO RIGHT, DOWN TO UP
GND	DVDD	RIGHT TO LEFT, DOWN TO UP

NOTE (2) : DEFINITION OF SCANNING DIRECTION.
REFER TO THE FIGURE AS BELOW :

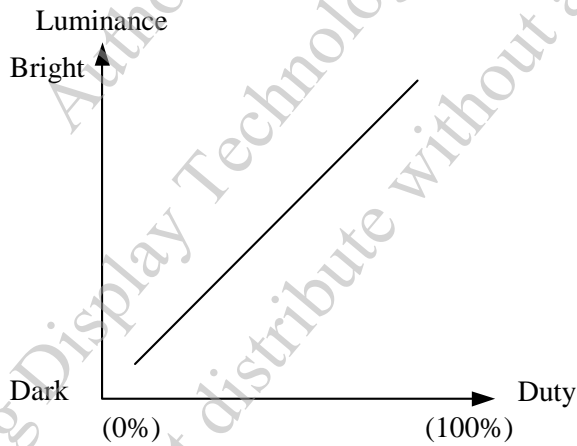


11. POWER SUPPLY

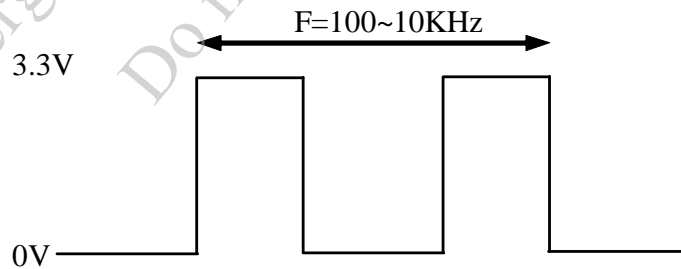
11.1 POWER SUPPLY FOR LCM



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. INSPECTION CRITERION

12.1 APPLICATION

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

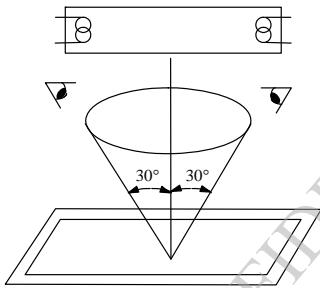
12.2 INSPECTION CONDITIONS

12.2.1 (1)OBSERVATION DISTANCE : 45±5cm

(2)VIEW ANGLE : ±30°

PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN 30°



LINE OF SIGHT FOR INSPECTION SHALL BE WITHIN THE HALF SECTION OF THE VIEWING CONE GENERATED BY LINE SEGMENT 30° WITH RESPECTS TO THE VERTICAL AXIS FROM CENTER VERTEX OF LCD, THE CONE AXIS MUST BE PERPENDICULAR NORMAL TO LCD SURFACE AND PASSES THROUGH THE FLUORESCENT LAMP.

12.2.2 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

12.2.3 INSPECTION LOT

QUANTITY PER DELIVERY LOT FOR EACH MODEL

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

(a)APPLICABLE STANDARD :

MIL-STD-105E LEVEL II

NORMAL INSPECTION, SINGLE SAMPLING

(b)AQL : MAJOR DEFECT : AQL 0.65

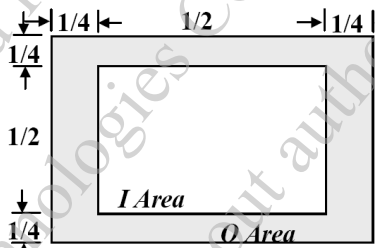
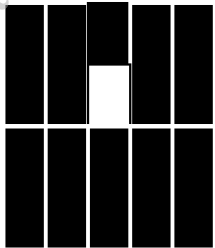
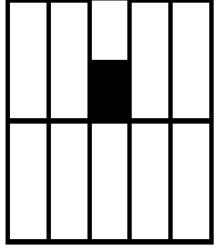
MINOR DEFECT : AQL 1.0


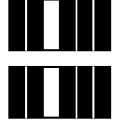
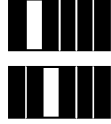

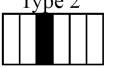





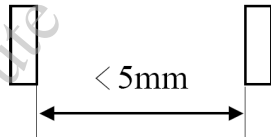
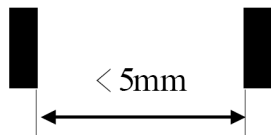
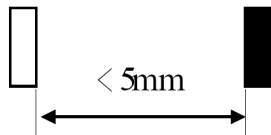
12.3 INSPECTION STANDARDS

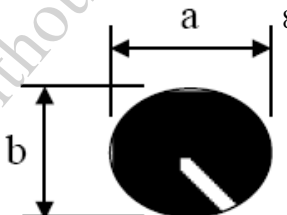
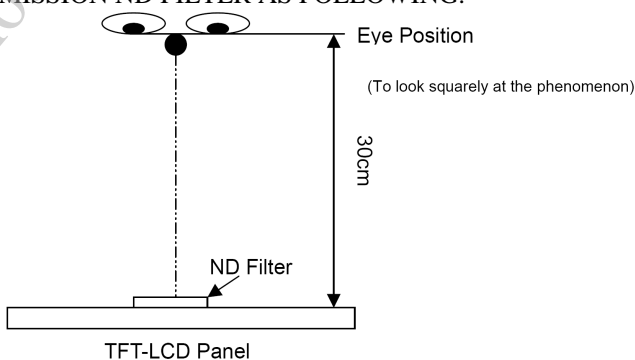
12.3.1 VISUAL DEFECTS CLASSIFICATION

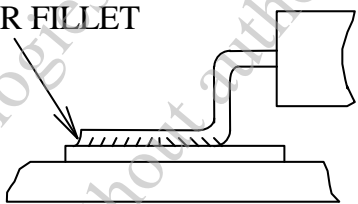
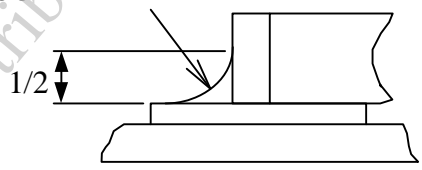
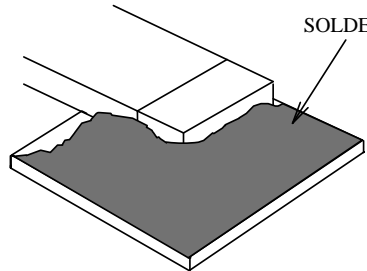
TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	<ul style="list-style-type: none"> • DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC 	0.65
	2.BACKLIGHT	<ul style="list-style-type: none"> • NO LIGHT • FLICKERING AND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

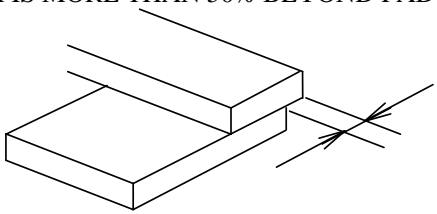
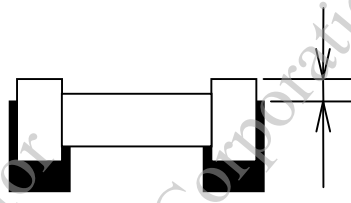
12.3.2 MODULE DEFECTS CLASSIFICATION

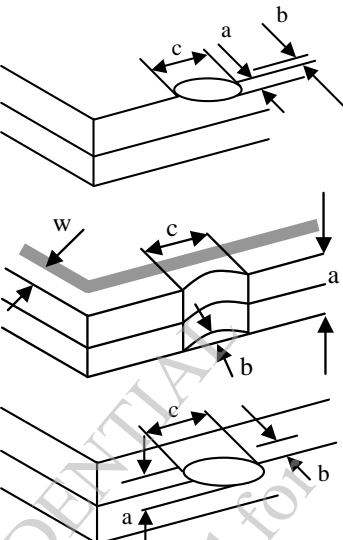
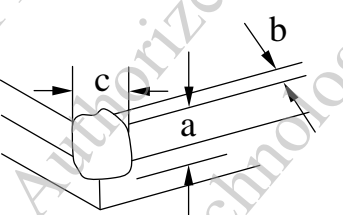
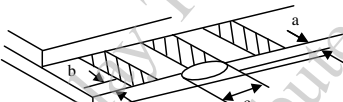
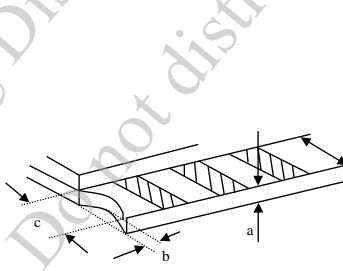
NO.	ITEM	CRITERIA																																	
1.	DISPLAY ON INSPECTION	(1)INCORRECT PATTERN (2)MISSING SEGMENT (3)DIM SEGMENT (4)OPERATING VOLTAGE BEYOND SPEC																																	
2.	OVERALL DIMENSIONS	OVERALL DIMENSION BEYOND SPEC																																	
3.	ELECTRICAL DEFECT	<table border="1" data-bbox="582 604 1449 896"> <thead> <tr> <th data-bbox="582 604 1257 638">DEFECT TYPE</th> <th colspan="2" data-bbox="1257 604 1449 638">CRITERIA</th> </tr> </thead> <tbody> <tr> <td data-bbox="582 638 1257 660">AREA (NOTE 1)</td> <td data-bbox="1257 638 1332 660">I</td> <td data-bbox="1332 638 1449 660">O</td> </tr> <tr> <td data-bbox="582 660 1257 683">BRIGHT DOTS (NOTE 2)</td> <td data-bbox="1257 660 1332 683">N ≤ 0</td> <td data-bbox="1332 660 1449 683">N ≤ 1</td> </tr> <tr> <td data-bbox="582 683 1257 705">DARK DOTS (NOTE 3)</td> <td data-bbox="1257 683 1332 705">N ≤ 2</td> <td data-bbox="1332 683 1449 705">N ≤ 2</td> </tr> <tr> <td data-bbox="582 705 1257 728">BRIGHT DOT- 2 ADJACENT (NOTE 4)</td> <td colspan="2" data-bbox="1257 705 1449 728">N ≤ 0</td> </tr> <tr> <td data-bbox="582 728 1257 750">DARK DOTS- 2 ADJACENT (NOTE 5)</td> <td colspan="2" data-bbox="1257 728 1449 750">N ≤ 0</td> </tr> <tr> <td data-bbox="582 750 1257 772">DARK OR BRIGHT DOTS- 3 AND MORE ADJACENT(NOTE 5)</td> <td colspan="2" data-bbox="1257 750 1449 772">N ≤ 0</td> </tr> <tr> <td data-bbox="582 772 1257 795">TOTAL BRIGHT AND DARK DOTS (NOTE6)</td> <td colspan="2" data-bbox="1257 772 1449 795">N ≤ 3</td> </tr> <tr> <td data-bbox="582 795 1257 817">MINIMUM DISTANCE BETWEEN BRIGHT DOTS (NOTE7)</td> <td colspan="2" data-bbox="1257 795 1449 817">5 mm</td> </tr> <tr> <td data-bbox="582 817 1257 840">MINIMUM DISTANCE BETWEEN DARK DOTS (NOTE7)</td> <td colspan="2" data-bbox="1257 817 1449 840">5 mm</td> </tr> <tr> <td data-bbox="582 840 1257 862">MINIMUM DISTANCE BETWEEN DARK AND BRIGHT DOTS (NOTE7)</td> <td colspan="2" data-bbox="1257 840 1449 862">5 mm</td> </tr> </tbody> </table> <p data-bbox="582 907 670 929">NOTE :</p> <p data-bbox="582 940 885 974">1. DEFINITION OF AREA</p>  <p data-bbox="582 1276 1045 1310">2. BRIGHT DOT DEFECT DEFINITION</p> <p data-bbox="606 1310 1444 1377">BRIGHT AREA IS MORE THAN 50% OF ONE DOT .ALL BRIGHT DOT DEFECT MUST BE VISIBLE THROUGH 5% ND FILTER.</p>  <p data-bbox="582 1657 1021 1691">3. DARK DOT DEFECT DEFINITION</p> <p data-bbox="606 1691 1444 1758">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	
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NO.	ITEM	CRITERIA
3.	ELECTRICAL DEFECT	<p>4. BRIGHT DOT DEFECT DESCRIPTION TWO ADJACENT</p>    <p>5. DARK DOT DEFECT DESCRIPTION TWO ADJACENT</p>    <p>6. DARK DOT DEFECT DESCRIPTION THREE ADJACENT</p>     <p>7. MINIMUM DISTANCE BETWEEN DOT DEFECTS</p> <p>BRIGHT DOT TO BRIGHT DOT</p>  <p>DARK DOT TO DARK DOT</p>  <p>BRIGHT DOT TO DARK DOT</p> 

NO.	ITEM	CRITERIA		
		DEFECT TYPE	CRITERIA	
4.	VISUAL DEFECT	FOREIGN MATERIAL	CIRCULAR FOREIGN MATERIAL : DARK/ BRIGHT SPOT	VISIBLE UNDER : ND5% 1.D≤0.15mm : NO COUNT 2.0.15mm<D≤0.5mm, N≤4 3.D>0.5mm : NOT ALLOWABLE
			LINEAR FOREIGN MATERIAL : BRIGHT OR DARK LINE	INVISIBLE UNDER ND5% 0.1mm<W≤0.5mm, 0.3mm<L≤1.5mm,N≤4 VISIBLE UNDER ND5% 0.05mm≤W≤0.1mm, 0.3mm≤L≤0.7mm,N≤4
		POLARIZER	LINEAR SCRATCH	1. BM: NO COUNT 2. PIXEL AREA 0.05mm≤W≤0.2mm, 1.0mm≤L≤5.0mm,N≤4
			BUBBLE/ PEELING	1. BM: NO COUNT 2. PIXEL AREA 0.15mm≤D<0.5mm,N≤4
		MURA & LEAK		ND5%
		<p>NOTE :</p> <p>1. 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>2. "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>3. BRIGHT DOT, MURA AND LEAK ARE DEFINED THROUGH TRANSMISSION ND FILTER AS FOLLOWING.</p>  <p>4. IT DOESN'T MATTER WHETHER SILICON OR EGC IS USED FOR FRAME SPREAD, THIS PRODUCT IS ALWAYS RELIABLE.</p>		

NO.	ITEM	CRITERIA
5.	UNEVEN COLOR SPREAD, COLORATION	(1)TO BE DETERMINED BASED UPON THE STANDARD SAMPLE.
6.	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.
7.	PCB	(1)THERE MAY NOT BE MORE THAN 2mm OF SEALANT OUTSIDE THE SEAL AREA ON THE PCB, AND THERE SHOULD BE NO MORE THAN THREE PLACES. (2)NO OXIDATION OR CONTAMINATION PCB TERMINALS. (3)PARTS ON PCB MUST BE THE SAME AS ON THE PRODUCTION CHARACTERISTIC CHART. THERE SHOULD BE NO WRONG PARTS, MISSING PARTS OR EXCESS PARTS. (4)THE JUMPER ON THE PCB SHOULD CONFORM TO THE PRODUCT CHARACTERISTIC CHART. (5)IF SOLDER GETS ON BEZEL TAB PADS, LED PAD, ZEBRA PAD OR SCREW HOLD PAD, MAKE SURE IT IS SMOOTHED DOWN.
8.	SOLDERING	<p>(1)NO SOLDERING FOUND ON THE SPECIFIED PLACE (2)INSUFFICIENT SOLDER</p> <p>(a)LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD</p> <p style="text-align: center;">SOLDER FILLET</p>  <p>(b)CHIP COMPONENT · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING</p> <p style="text-align: center;">SOLDER FILLET</p>  <p>· SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED</p> 

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

NO.	ITEM	CRITERIA									
11.	CRACKED GLASS	<p>THE LCD WITH EXTENSIVE CRACK IS NOT ACCEPTABLE</p>									
	<p>GENERAL GLASS CHIP :</p> 	<table border="1" data-bbox="933 414 1452 504"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t/2$</td> <td>< VIEWING AREA</td> <td>$\leq 1/8X$</td> </tr> <tr> <td>$t/2 > , \leq 2t$</td> <td>$\leq W/2$</td> <td>$\leq 1/8X$</td> </tr> </tbody> </table> <p>*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE X = LCD SIDE LENGTH t = GLASS THICKNESS</p>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$	$t/2 > , \leq 2t$	$\leq W/2$	$\leq 1/8X$
	a	b	c								
	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$								
	$t/2 > , \leq 2t$	$\leq W/2$	$\leq 1/8X$								
<p>CORNER PART :</p> 	<table border="1" data-bbox="933 996 1452 1086"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t/2$</td> <td>< VIEWING AREA</td> <td>$\leq 1/8X$</td> </tr> <tr> <td>$> t/2 , \leq 2t$</td> <td>$\leq W/2$</td> <td>$\leq 1/8X$</td> </tr> </tbody> </table> <p>*W=DISTANCE BETWEEN SEALANT AREA AND LCD PANEL EDGE X = LCD SIDE LENGTH t = GLASS THICKNESS</p>	a	b	c	$\leq t/2$	< VIEWING AREA	$\leq 1/8X$	$> t/2 , \leq 2t$	$\leq W/2$	$\leq 1/8X$	
a	b	c									
$\leq t/2$	< VIEWING AREA	$\leq 1/8X$									
$> t/2 , \leq 2t$	$\leq W/2$	$\leq 1/8X$									
<p>CHIP ON ELECTRODE PAD</p> 	<table border="1" data-bbox="933 1265 1452 1332"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t$</td> <td>$\leq 0.5\text{mm}$</td> <td>$\leq 1/8X$</td> </tr> </tbody> </table> <p>* X=LCD SIDE WIDTH t=GLASS THICKNESS</p>	a	b	c	$\leq t$	$\leq 0.5\text{mm}$	$\leq 1/8X$				
a	b	c									
$\leq t$	$\leq 0.5\text{mm}$	$\leq 1/8X$									
	<table border="1" data-bbox="933 1422 1452 1489"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t$</td> <td>$\leq 1/8X$</td> <td>$\leq L$</td> </tr> </tbody> </table> <p>*X=LCD SIDE WIDTH t = GLASS THICKNESS L=ELECTRODE PAD LENGTH</p> <p>①IF GLASS CHIPPING THE ITO TERMINAL, OVER 2/3 OF THE ITO MUST REMAIN AND BE, INSPECTED ACCORDING TO ELECTRODE TERMINAL SPECIFICATIONS</p> <p>②IF THE PRODUCT WILL BE HEAT SEALED BY THE CUSTOMER, THE ALIGNMENT MARK MUST NOT BE DAMAGED</p>	a	b	c	$\leq t$	$\leq 1/8X$	$\leq L$				
a	b	c									
$\leq t$	$\leq 1/8X$	$\leq L$									

12.4 RELIABILITY TEST

12.4.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE

NO.	ITEM	DESCRIPTION
1	HIGH TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +70°C FOR 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)	<p>THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 1 CYCLES OF OPERATION :</p>
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	<p>AIR DISCHARGE ± 8KV CONTACT DISCHARGE ± 4KV ACCORDING TO IEC-61000-4-2</p>

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

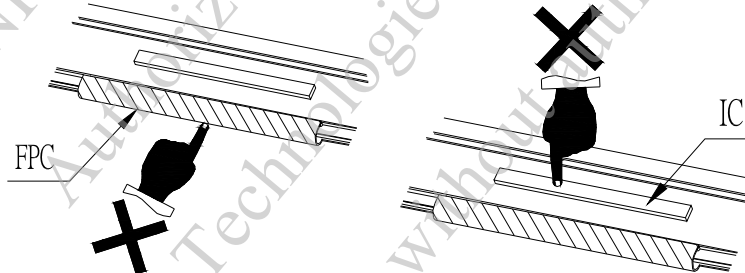
12.5 TESTING CONDITIONS AND INSPECTION CRITERIA

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

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

12.6 OPERATION

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



12.7 NOTICE

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