

EXAMINED BY : <i>Yung Chang Hu</i>	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-51506
APPROVED BY: <i>David Chang</i>		ISSUE : SEP.18, 2007
		TOTAL PAGE : 24
		VERSION : 6

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

ET043000DM6
(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

DOC . FIRST ISSUE

NOV.16, 2006

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NOV.30,2006	2	3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS . DELETE :																																																																																																		
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3	4. ELECTRICAL CHARACTERISTICS
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PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY	VCC	---	2.25	2.5	2.75	V	
OPERATING CURRENT	I _{CC}	---	---	11.20	13.00	mA	
OPERATING CURRENT	I _{DD}	---	---	100	118	mA	

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY	VCC	---	2.25	2.5	2.75	V	
OPERATING CURRENT	I _{CC}	---	---	3.5	6	mA	
OPERATING CURRENT	I _{DD}	---	---	15	20	mA	
FORWARD VOLTAGE	V _F	I _F = 5mA	19.2	21.6	24.2	V	
LED LIFE TIME	---	---	10000	10000	---	h	

4	5.1 TIMING REQUIREMENT 1 DVDD=2.25V to 2.75V , DVSS=0V → VCC=2.25V to 3.6V , VSS=0V
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5	5.2 TIMING REQUIREMENT 2 DVDD=2.25V to 2.75V , DVSS=0V → VCC=2.25V to 3.6V , VSS=0V
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6, 7	6.1 OPTICAL CHARACTERISTICS
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Ta=25°C								Ta=25°C								
VIEWING ANGLE	θ	VIEWING ANGLE	θ	VIEWING ANGLE	θ	VIEWING ANGLE	θ	BRIGHTNESS	UNIT	REMARK	BRIGHTNESS	UNIT	REMARK	BRIGHTNESS	UNIT	REMARK
VIEWING ANGLE	0°	0°	0°	0°	0°	0°	0°	150	cd/m ²		150	cd/m ²		150	cd/m ²	
VIEWING ANGLE	10°	10°	10°	10°	10°	10°	10°	150	cd/m ²		150	cd/m ²		150	cd/m ²	
VIEWING ANGLE	30°	30°	30°	30°	30°	30°	30°	150	cd/m ²		150	cd/m ²		150	cd/m ²	
VIEWING ANGLE	60°	60°	60°	60°	60°	60°	60°	150	cd/m ²		150	cd/m ²		150	cd/m ²	
VIEWING ANGLE	90°	90°	90°	90°	90°	90°	90°	150	cd/m ²		150	cd/m ²		150	cd/m ²	
VIEWING ANGLE	120°	120°	120°	120°	120°	120°	120°	150	cd/m ²		150	cd/m ²		150	cd/m ²	
VIEWING ANGLE	150°	150°	150°	150°	150°	150°	150°	150	cd/m ²		150	cd/m ²		150	cd/m ²	

UPDATE NOTE (1) 、NOTE (2) 、NOTE (3) 、NOTE (4) 、NOTE (5)

6.2 THE BRIGHTNESS TEST METHOD
(21.6V) → 21.6V

6.3 THE CALCULATING METHOD OF UNIFORMITY

$$\frac{\text{MAX} - \text{MIN}}{\text{AVE}} \times 100\% \leq (30\%) \rightarrow$$

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

8	6.4 LED BACK-LIGHT UNIT DELETE ALL PAGE
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8, 9	7. OUTLINE DIMENSIONS MARK △ : MODIFY COMPONENT AREA NOT SPECIFIED TOLERANCE IS ±0.5mm → ±0.3mm
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12,13	10. INTERFACE SIGNALS
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PIN NO.	SYMBOL	FUNCTION
1	GND	(GND)(V)
2	GND	(GND)(V)
29	GND	(GND)(V)
37	NC	NC
38	TEST1	TEST1 (NOTE1)
39	TEST2	TEST2 (NOTE2)
40	TEST3	TEST3 (NOTE2)

PIN NO.	SYMBOL	FUNCTION
1	VSS	GROUND
2	VSS	GROUND
29	VSS	GROUND
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC

DELETE

NOTE1: PLEASE BE SURE TO SET 38PIN(TEST1) TO OPEN.

NOTE2: PLEASE BE SURE TO SET 39PIN(TEST2), 40PIN (TEST3) WITH GND.

14	11.1 POWER SUPPLY FOR LCM
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15~24	ADD 12. INSPECTION CRITERION
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7.	OUTLINE DIMENSIONS -----	8 , 9
8.	BLOCK DIAGRAM -----	10
9.	DETAIL DRAWING OF DOT MATRIX -----	11
10.	INTERFACE SIGNAL -----	12 , 13
11.	POWER SUPPLY -----	14
12.	INSPECTION CRITERION -----	15~24

1. GENERAL SPECIFICATIONS

1.1 APPLICATION NOTES FOR CONTROLLER/DRIVER
PLEASE REFER TO :

HIMAX HX8655
HIMAX HX8227

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 (inch) ----- 4.3"
- (2) NUMBER OF DOTS ----- 480W * (RGB) * 272H DOTS
- (3) MODULE SIZE ----- 105.5W * 67.2H *3.95D mm(WITHOUT FPC)
- (4) EFFECTIVE AREA ----- 97.1W * 55.9H mm
- (5) ACTIVE AREA ----- 95.04W * 53.856H mm (LCD)
- (6) DOT SIZE ----- 0.066W * 0.198H mm
- (7) PIXEL PITCH ----- 0.198W * 0.198H mm
- (8) LCD TYPE ----- TFT , TRANSMISSIVE
- (9) COLOR ----- 16.7M (24BIT)
- (10) VIEWING DIRECTION ----- 6 O'CLOCK
- (11) BACK LIGHT ----- LED , COLOR : WHITE

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER VOLTAGE	AVDD	-0.3	6.0	V	VSS=0
	VCC	-0.3	6.0	V	VSS=0
INPUT SIGNAL VOLTAGE	Vi	- 0.3	VCC+0.3	V	
POWER DISSIPATION	PD	—	0.71	W	
FORWARD CURRENT	IF	—	50	mA	

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS .

I T E M	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-25°C	70°C	-30°C	80°C	NOTE (1) , (2)
HUMIDITY	NOTE (3)		NOTE (3)		WITHOUT CONDENSATION
VIBRATION	—	3.92 m/s ² (0.4 G)	—	19.6 m/s ² (2.0 G)	10~55Hz X,Y,Z, EACH 2HRS
SHOCK	—	58.8 m/s ² (6 G)	—	980 m/s ² (100 G)	6 m SECONDS XYZ DIRECTIONS 3 TIMES EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) : Ta AT -30°C : 48HR MAX .
80°C : 168HR 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

Ta = 25 °C

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY	VCC	—	2.25	2.5	3.6	V	
OPERATING CURRENT	ICC	—	—	3.5	6	mA	
POWER SUPPLY	AVDD	—	4.8	5	5.2	V	
OPERATING CURRENT	IDD	—	—	15	20	mA	
INPUT LOW VOLTAGE	V _{IL}	—	0	—	0.3*VCC	V	NOTE (1)
INPUT HIGH VOLTAGE	V _{IH}	—	0.7*VCC	—	VCC	V	NOTE (1)
OUTPUT LOW VOLTAGE	V _{OL}	I _{OL} =1mA	VSS	—	VSS+0.4	V	NOTE (1)
OUTPUT HIGH VOLTAGE	V _{OH}	I _{OH} =-1mA	VCC-0.4	—	VCC	V	NOTE (1)
FORWARD VOLTAGE	VF	IF = 36mA	19.2	21.6	25.2	V	
LED LIFE TIME	—	—	30000	40000	—	hr	

NOTE (1) : CK , R0~R7 , G0~G7, B0~B7 , HS , VS , DISP .

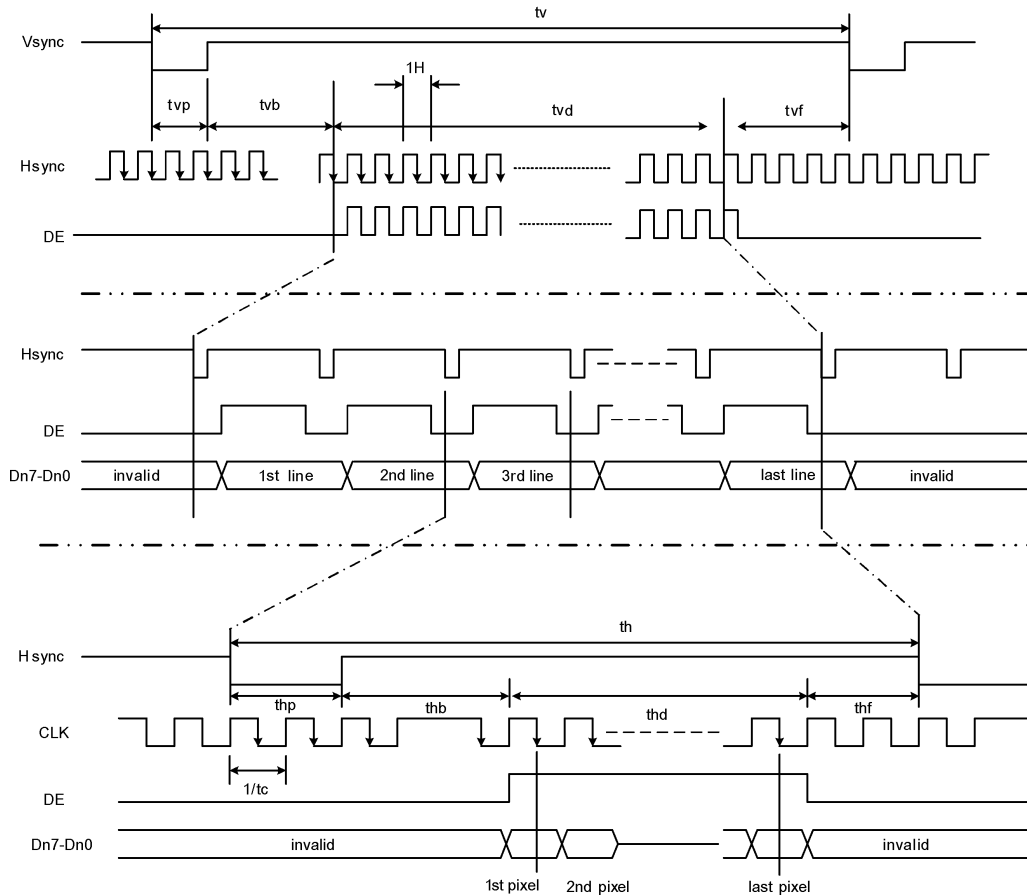
5. TIMING CHART
5.1 TIMING REQUIREMENT 1

480RGBx272, $T_A=25^\circ\text{C}$, $V_{CC}=2.25\text{V}$ to 3.6V , $V_{SS}=0\text{V}$

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
CLOCK CYCLE	$1/t_C$	—	9	15	MHz
HSYNC CYCLE	$1/f_H$	—	17.14	—	KHz
VSYNC CYCLE	$1/f_V$	—	59.94	—	Hz
HORIZONTAL SIGNAL					
HORIZONTAL CYCLE	th	—	525	—	CLK
HORIZONTAL DISPLAY PERIOD	thd	—	480	—	CLK
HORIZONTAL FRONT PORCH	thf	2	—	—	CLK
HORIZONTAL PULSE WIDTH	thp	2	41	—	CLK
HORIZONTAL BACK PORCH	thb	2	2	—	CLK
VERTICAL SIGNAL					
VERTICAL CYCLE	tv	—	286	—	H
VERTICAL DISPLAY PERIOD	Tvd	—	272	—	H
VERTICAL FRONT PORCH	Tvf	1	2	—	H
VERTICAL PULSE WIDTH	Tvp	1	10	—	H
VERTICAL BACK PORCH	tvb	1	2	—	H

NOTE :

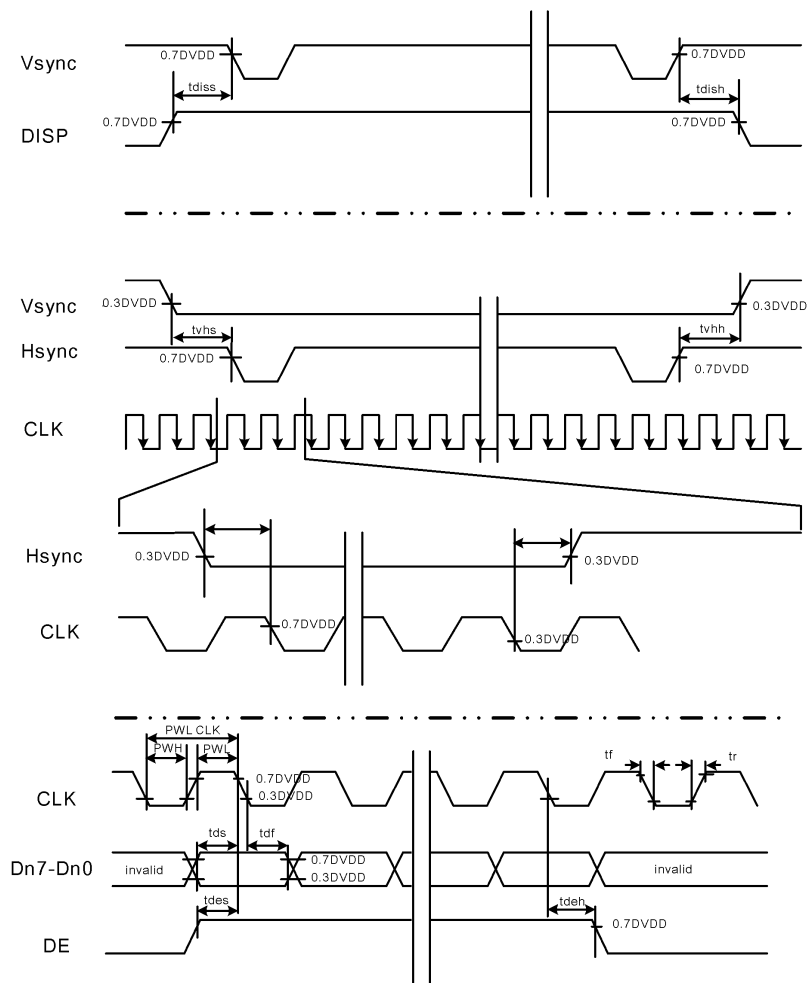
1. THD = 480CLK, THF=2CLK, THP=41CLK, THB=2CLK, THF + FHP + FTB > 44



5.2 TIMING REQUIREMENT 2

$T_A=25^{\circ}\text{C}$, $V_{CC}=2.25\text{V to }3.6\text{V}$, $V_{SS}=0\text{V}$, $t_r=t_f=2\text{ns}$

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DISP SETUP TIME	t_{diss}	10	—	—	ns
DISP HOLD TIME	t_{dish}	10	—	—	ns
CLOCK PERIOD	PW_{CLK}^{*1}	66.7	—	—	ns
CLOCK PULSE HIGH PERIOD	PWH^{*1}	26.7	—	—	ns
CLOCK PULSE LOW PERIOD	PWL^{*1}	26.7	—	—	ns
HSYNC SETUP TIME	t_{hs}	10	—	—	ns
HSYNC HOLD TIME	t_{hh}	10	—	—	ns
DATA SETUP TIME	t_{ds}	10	—	—	ns
DATA HOLD TIME	t_{dh}	10	—	—	ns
DE SETUP TIME	t_{des}	10	—	—	ns
DE HOLD TIME	t_{deh}	10	—	—	ns
VSYNC SETUP TIME	t_{vhs}	10	—	—	ns
VSYNC HOLD TIME	t_{vhh}	10	—	—	ns



NOTE :

1. PARALLEL INTERFACE , MAXIMUM CLOCK FREQUENCY IS 15MHz.
2. t_r , t_f IS DEFINED 10% TO 90% OF SIGNAL AMPLITUDE.

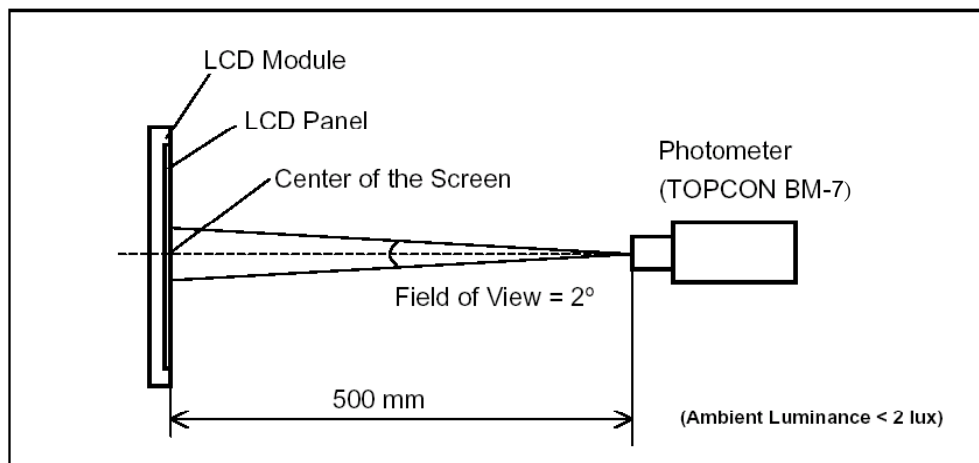
6. OPTICAL CHARACTERISTICS (NOTE 1)
6.1 OPTICAL CHARACTERISTICS

Ta = 25°C

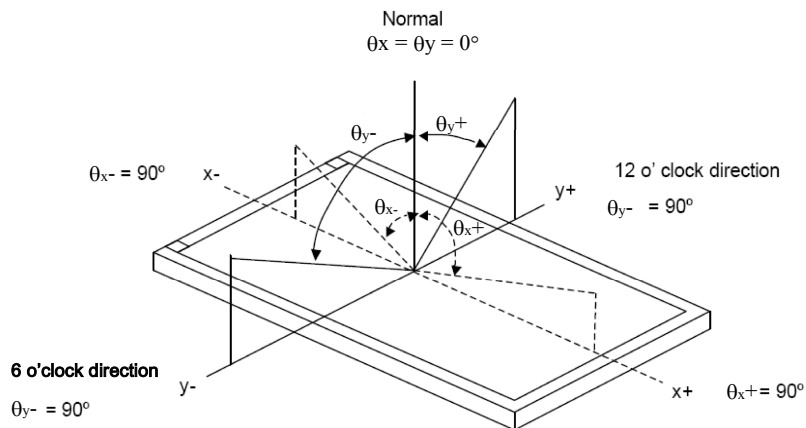
I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK	
VIEWING ANGLE		θ_{y+}	CR ≥ 10	40	45	—	deg.	(2) (3)	
		θ_{y-}		$\theta_x=0^\circ$	70	75			—
		θ_{x+}		$\theta_y=0^\circ$	70	75			—
		θ_{x-}			70	75			—
CONTRAST RATIO		CR	$\theta_x=0^\circ, \theta_y=0^\circ$	300	400	—	—	(3)	
RESPONSE TIME		t r (rise)	$\theta_x=0^\circ, \theta_y=0^\circ$	—	15	20	msec	(4)	
		t f (fall)		—	35	50			
THE BRIGHTNESS OF MODULE		B	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 36mA	400	500	—	cd/m ²	—	
COLOR OF CIE COORDINATE	WHITE	x	$\theta_x=0^\circ, \theta_y=0^\circ$ IF = 36mA NTSC : 55%	0.26	0.31	0.36	—	(5)	
		y		0.29	0.34	0.39			
	RED	x		0.56	0.61	0.66	—	—	
		y		0.30	0.35	0.40			
	GREEN	x		0.29	0.34	0.39	—	—	
		y		0.53	0.58	0.63			
	BLUE	x		0.09	0.14	0.19	—	—	
		y		0.05	0.10	0.15			
THE BRIGHTNESS OF UNIFORMITY		—	—	70	75	—	%	—	

NOTE (1) : TEST EQUIPMENT SETUP :

AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES , THE MEASUREMENT SHOULD BE EXECUTED. 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 2° AT A DISTANCE OF 50cm AND NORMAL DIRECTION.



NOTE (2) : DEFINITION OF VIEWING ANGLE :

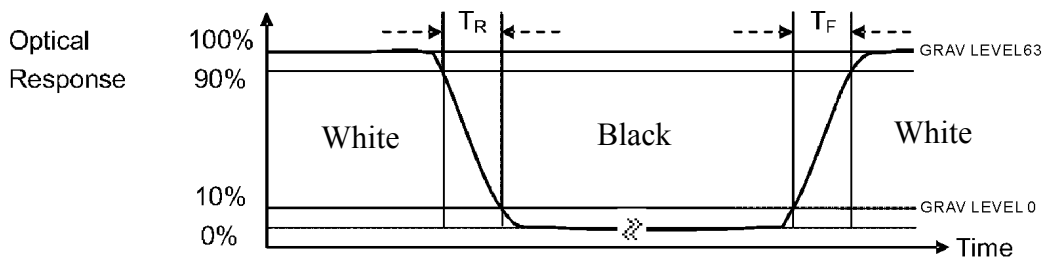


NOTE (3) : DEFINITION OF CONTRAST RATIO :

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

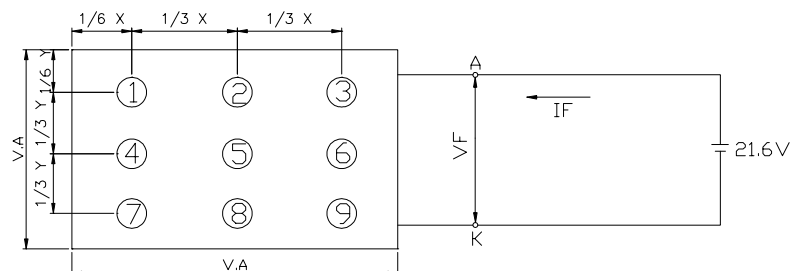
NOTE (4) : DEFINITION OF RESPONSE TIME : TR AND TF

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



NOTE (5) : MEASURED AT THE CENTER AREA OF THE PANEL WHEN ALL THE INPUT TERMINALS OF LCD PANEL ARE ELECTRICALLY OPENED.

6.2 THE BRIGHTNESS TEST METHOD



UNIT : mm

IF=36mA

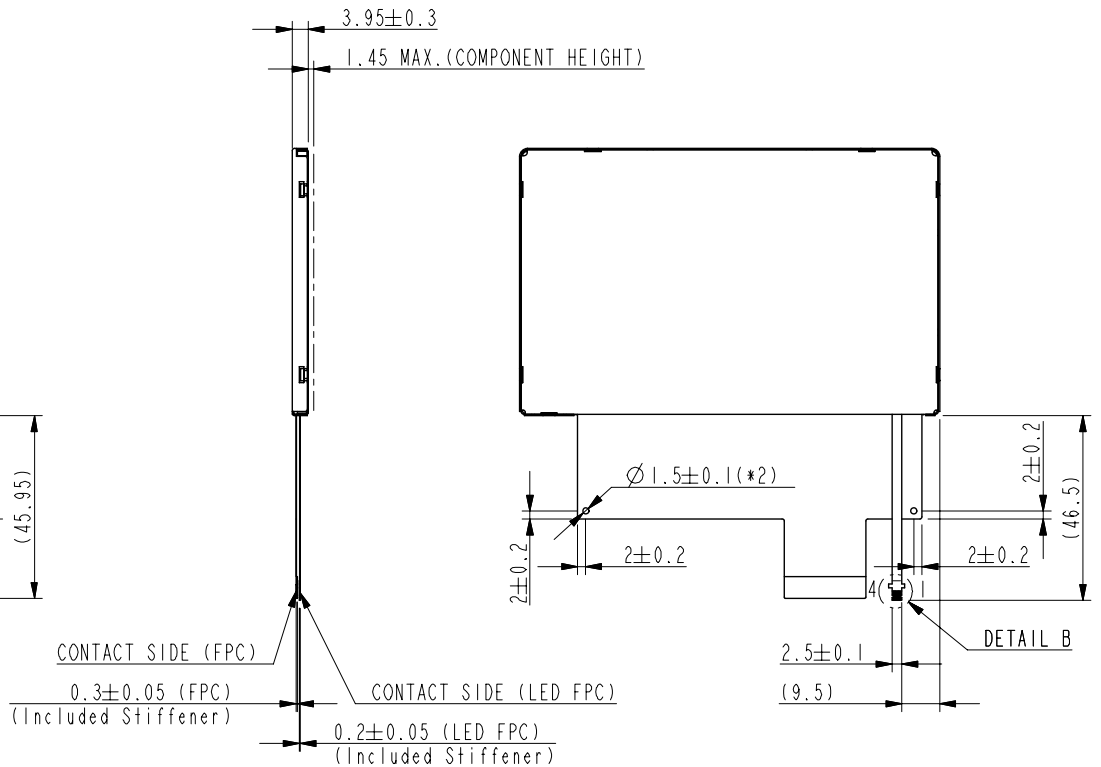
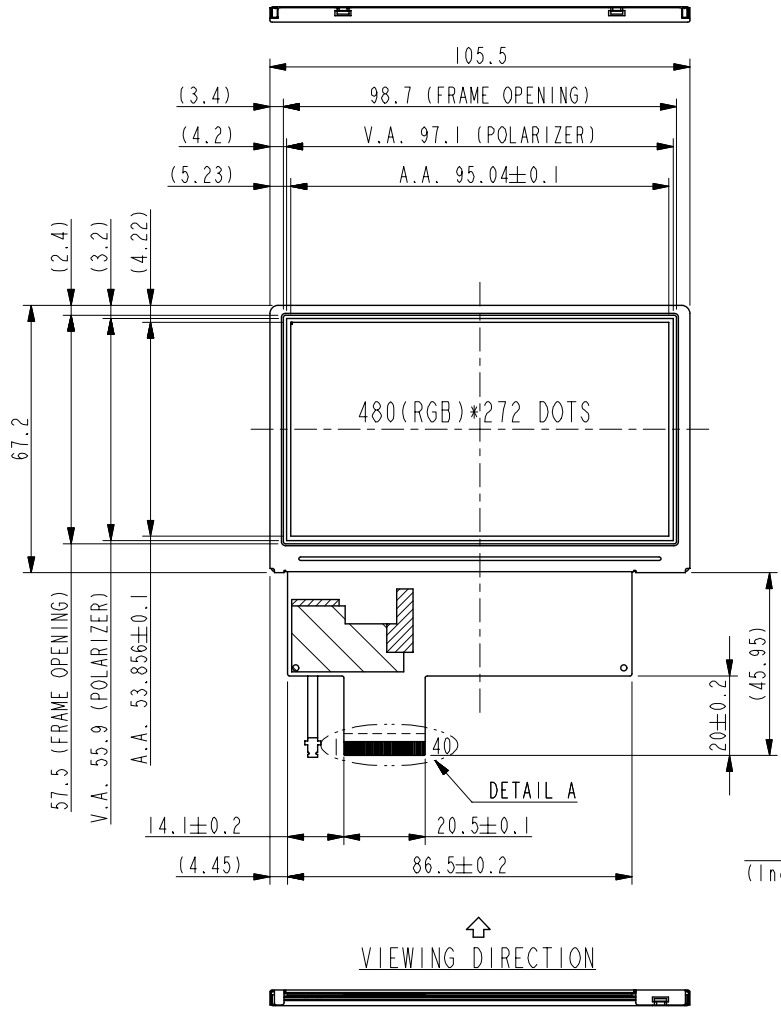
ADD POWER TO LED , A , K PIN TEST POINT ARE ① ~ ⑨

6.3 THE BRIGHTNESS UNIFORMITY CALCULATE METHOD

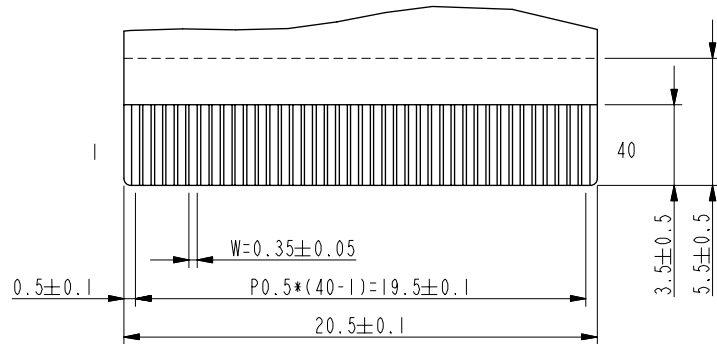
$$\text{UNIFORMITY} = \left[1 - \frac{\text{MAXIMUN BRIGHTNESS} - \text{MINIMUN BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$

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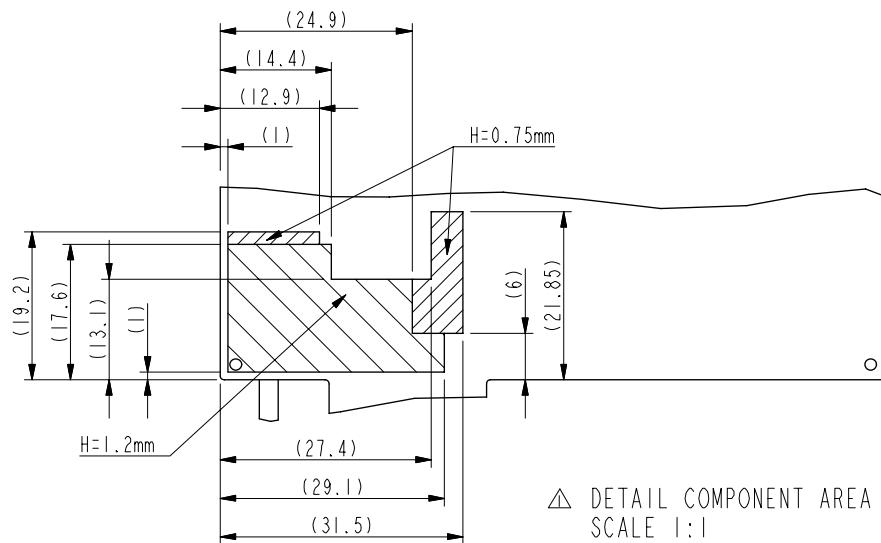
7. OUTLINE DIMENSIONS



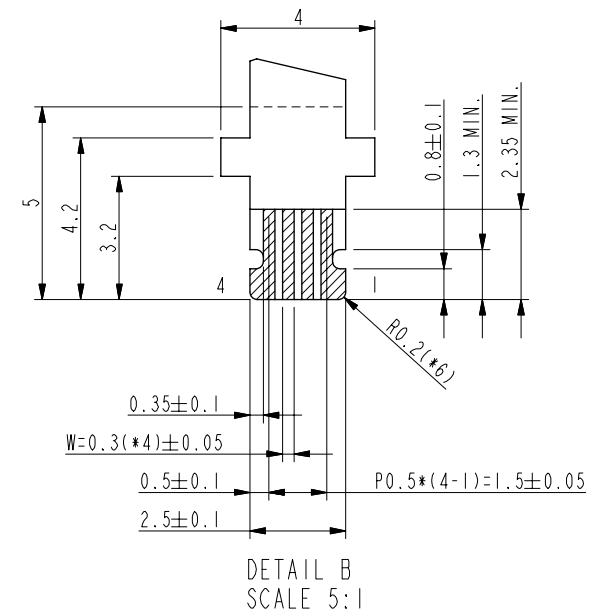
UNIT : mm
 SCALE : NTS
 NOT SPECIFIED TOLERANCE IS ±0.3mm
 NOTE : MARK △ MODIFY (NUMBER NOTE MODIFY VERSION)



DETAIL A
SCALE 3:1



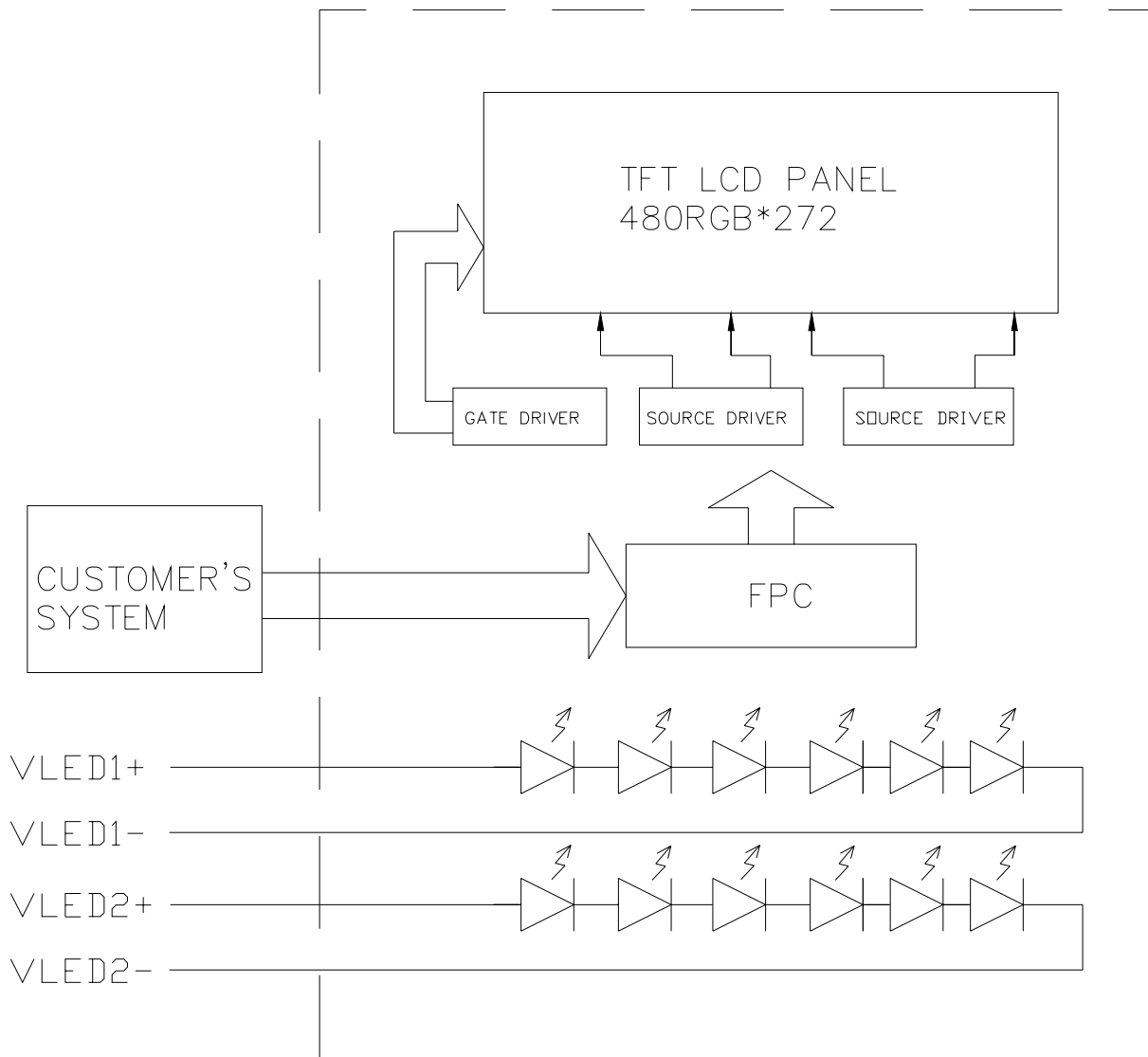
△ DETAIL COMPONENT AREA
SCALE 1:1



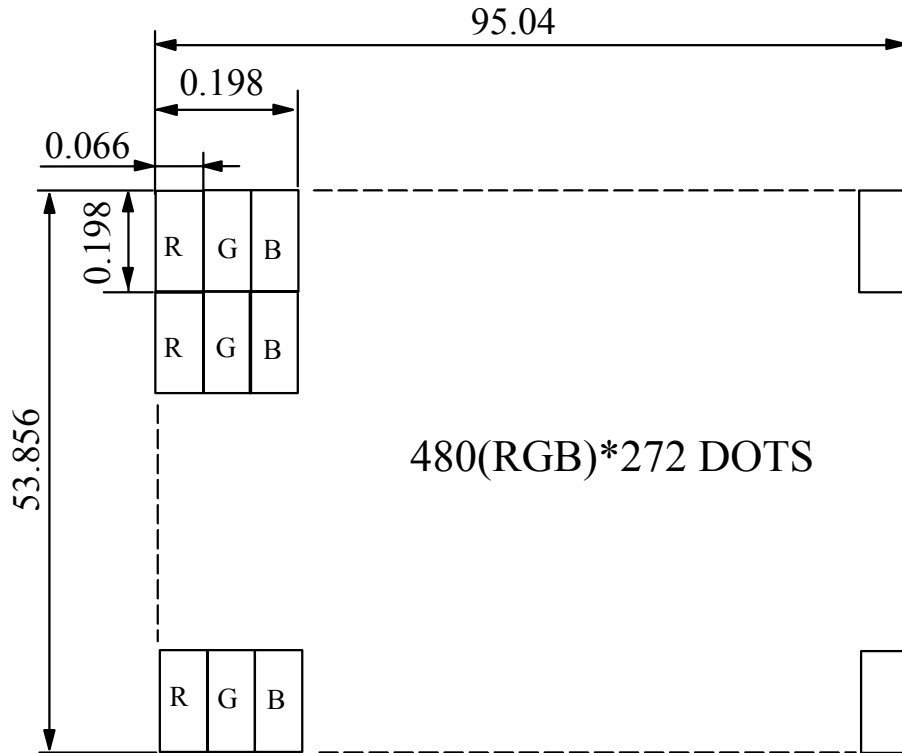
DETAIL B
SCALE 5:1

LED CONNECTOR : Recommend Kyocera-elco 6298 type
(upper side connector)

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



480(RGB)*272 DOTS

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

10. INTERFACE SIGNALS

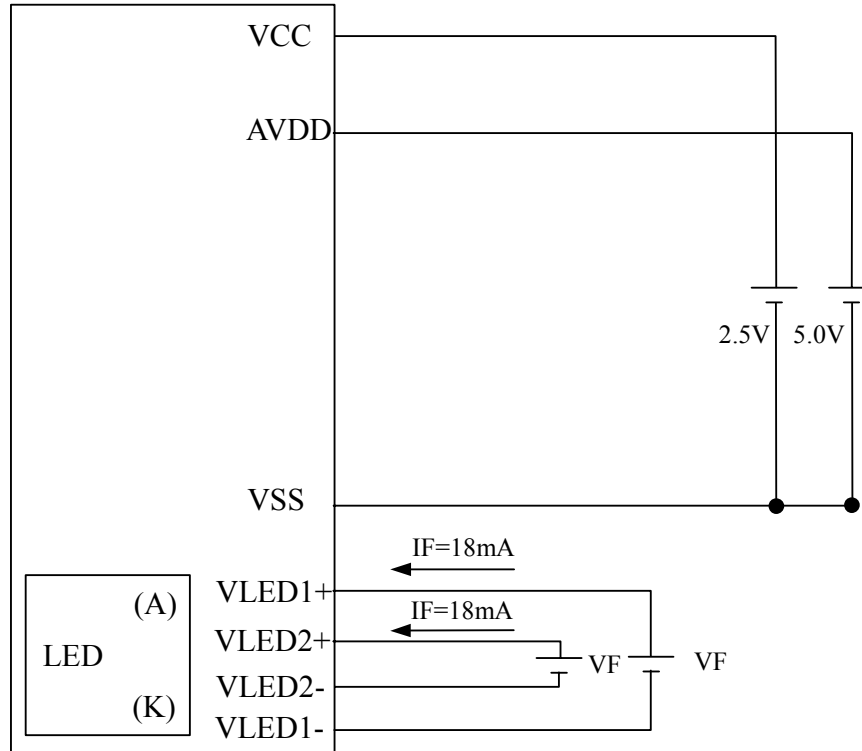
PIN NO	SYMBOL	FUNCTION
1	VSS	GROUND
2	VSS	GROUND
3	VCC	+2.5V POWER SOURCE
4	VCC	+2.5V POWER SOURCE
5	R0	RED DATA SIGNAL (LSB)
6	R1	RED DATA SIGNAL
7	R2	RED DATA SIGNAL
8	R3	RED DATA SIGNAL
9	R4	RED DATA SIGNAL
10	R5	RED DATA SIGNAL
11	R6	RED DATA SIGNAL
12	R7	RED DATA SIGNAL(MSB)
13	G0	GREEN DATA SIGNAL (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 SINGAL(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
29	VSS	GROUND
30	CK	CLOCK SIGNAL TO SAMPLE EACH DATE
31	DISP	DISPLAY ON/OFF SINGAL
32	HS	HORIZONTAL SYNCHRONIZING SIGNAL
33	VS	VERTICAL SYNCHRONIZING SIGNAL
34	DE	INPUT DATA ENABLE CONTROL.INTERNALLY PULLED LOW

PIN NO	SYMBOL	FUNCTION
35	AVDD	+5V ANALOG POWER SOURCE
36	AVDD	+5V ANALOG POWER SOURCE
37	NC	NC
38	NC	NC
39	NC	NC
40	NC	NC

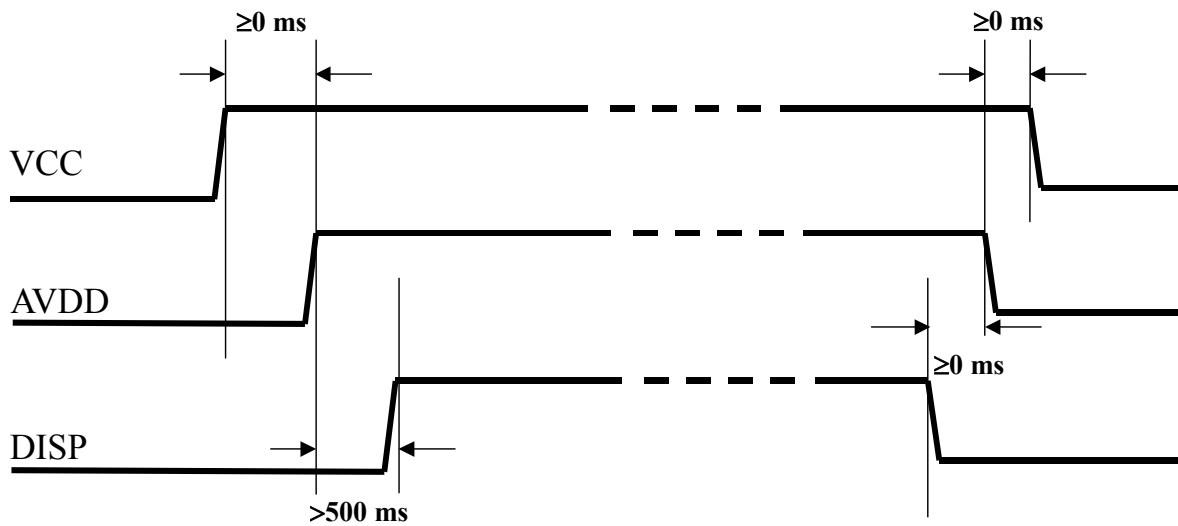
10.1 LED B/L INTERFACE

PIN NO	SYMBOL	FUNCTION
1	VLED1-	LED POWER SOURCE INPUT TERMINAL (CATHODE SIDE)
2	VLED2-	LED POWER SOURCE INPUT TERMINAL (CATHODE SIDE)
3	VLED2+	LED POWER SOURCE INPUT TERMINAL (ANODE SIDE)
4	VLED1+	LED POWER SOURCE INPUT TERMINAL (ANODE SIDE)

11. POWER SUPPLY
11.1 POWER SUPPLY FOR LCM



11.2 POWER SEQUENCE



1 2 . 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

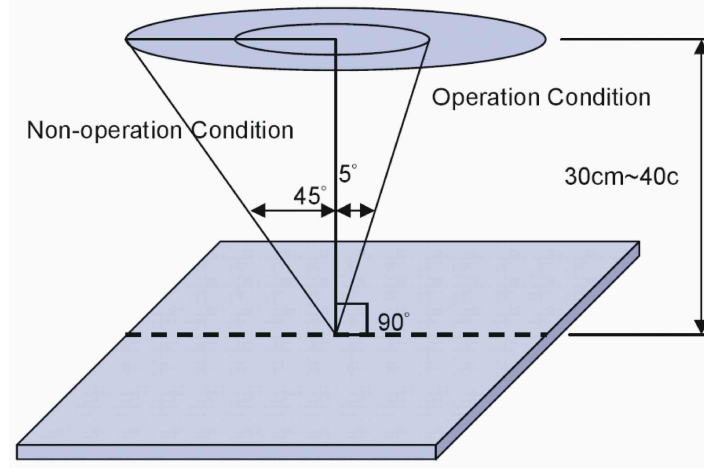
12.2 INSPECTION CONDITIONS

12.2.1 (1)Observation Distance : 35cm±5cm

(2)View Angle :

Non-operation Condition : ±5°(perpendicular to LCD panel surface)

Operation Condition : ±45° (perpendicular to LCD panel surface)



12.2.2 Environment Conditions :

Ambient Temperature		20°C~25°C
Ambient Humidity		65±20%RH
Ambient Illumination	Cosmetic Inspection	More than 600Lux
	Functional Inspection	300~500 Lux

12.2.3 Inspection lot

Quantity per delivery lot for each model

12.2.4 Inspection method

A sampling inspection shall be made according to the following provisions to judge The acceptability

(a)Applicable standard : MIL-STD-105E

Normal inspection , single sampling

Level II

(b)AQL : Major defect : AQL 0.65%

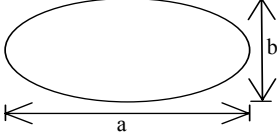
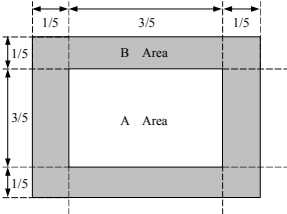
Minor defect : AQL 1.0%

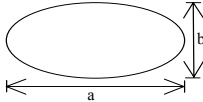
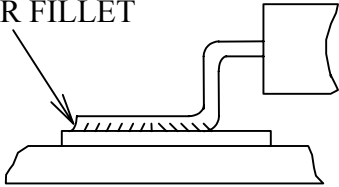
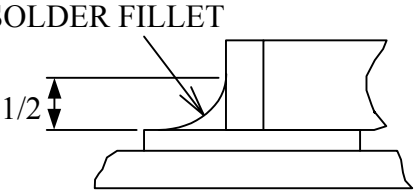
12.3 INSPECTION STANDARDS

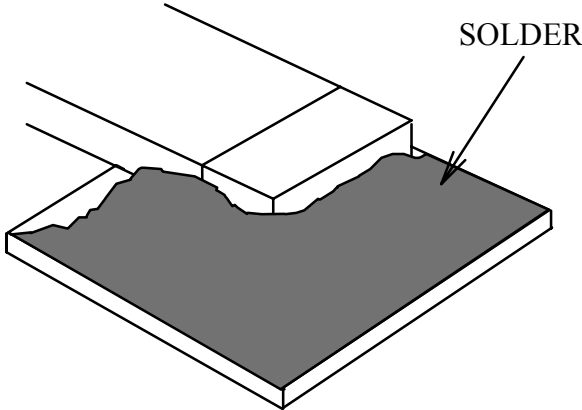
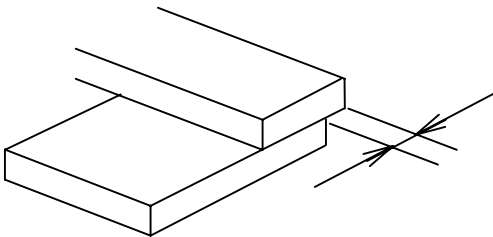
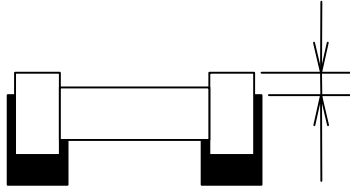
12.3.1 VISUAL DEFECTS CLASSIFICATION

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 SPREED 	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 	

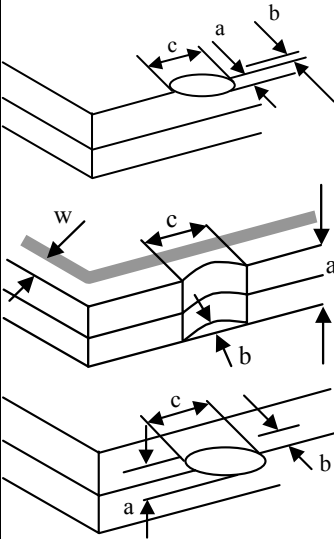
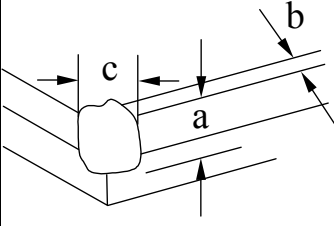
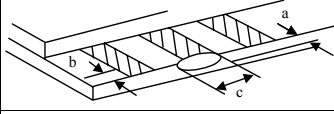
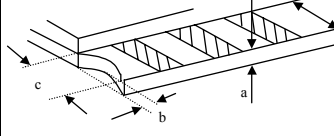
12.3.2 MODULE DEFECTS CALSSIFICATION

NO.	ITEM	CRITERIA																				
1.	DISPLAY ON INSPECTION	(1)INCORRECT PATTERN (2)MISSING SEGMENT (3)DIM SEGMENT (4)OPERATING VOLTAGE BEYOND SPEC																				
2.	OVERALL DIMENSIONS	(1)OVERALL DIMENSION BEYOND SPEC																				
3.	BLACK SPOTS, FOREIGN MATTER, AND WHITE SPOTS (INCLUDING LIGHT LEAKAGE DUE TO POLARIZING PLATES PINHOLES, ETC.)	<p>(1) SPOTS</p> <table border="1"> <thead> <tr> <th>AVERAGE DIAMETER (mm): D</th> <th>NUMBER OF PIECES PERMITTED</th> <th>MINIMUM SPACE</th> </tr> </thead> <tbody> <tr> <td>D≤0.2</td> <td>IGNORE</td> <td>—</td> </tr> <tr> <td>0.2<D≤0.4</td> <td>5</td> <td>10 mm</td> </tr> <tr> <td>0.4<D</td> <td>0</td> <td></td> </tr> </tbody> </table> <p>NUMBER OF TOTAL PIECES IS TO BE SET WITHIN 5 PIECES. NOTE : THAT WHEN THERE ARE 2 PIECES OR MORE, THEY ARE NOT TO BE CONSIDERED AS CONCENTRATED.</p> <p>(2) BLURRY SPOTS (WHEN FULLY POWERED-ON)</p> <table border="1"> <thead> <tr> <th>AVERAGE DIAMETER (mm): D</th> <th>NUMBER OF PIECES PERMITTED</th> </tr> </thead> <tbody> <tr> <td>D≤0.3</td> <td>IGNORE</td> </tr> <tr> <td>0.3<D≤0.75</td> <td>5</td> </tr> <tr> <td>0.75<D</td> <td>0</td> </tr> </tbody> </table> <p>Note : Diameter D=(a+b)/2</p>  <p>NUMBER OF TOTAL PIECES IS TO BE SET WITHIN 5 PIECES. NOTE : THAT WHEN THERE ARE 2 PIECES OR MORE, THEY ARE NOT TO BE CONSIDERED AS CONCENTRATED.</p>	AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED	MINIMUM SPACE	D≤0.2	IGNORE	—	0.2<D≤0.4	5	10 mm	0.4<D	0		AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED	D≤0.3	IGNORE	0.3<D≤0.75	5	0.75<D	0
AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED	MINIMUM SPACE																				
D≤0.2	IGNORE	—																				
0.2<D≤0.4	5	10 mm																				
0.4<D	0																					
AVERAGE DIAMETER (mm): D	NUMBER OF PIECES PERMITTED																					
D≤0.3	IGNORE																					
0.3<D≤0.75	5																					
0.75<D	0																					
4.	BLACK LINE WHITE LINE NON-DISPLAY	(1)THE BLACK LINE, WHITE LINE ARE WITHIN THE VIEWING AREA. IT IS NOT ALLOW.																				
5.	BLACK LINE WHITE LINE ON-DISPLAY	<p>(1) THE FOLLOWING BLACK LINE , WHITE LINE ARE WITHIN THE VIEWING AREA. WIDTH :Wmm , LENGH :Lmm</p> <table border="1"> <thead> <tr> <th>LENGTH : L</th> <th>WIDTH : W</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>L ≤ 0.5</td> <td>W ≤ 0.1</td> <td>IGNORE</td> </tr> <tr> <td>0.5 < L ≤ 2.5</td> <td>0.1 < W ≤ 0.3</td> <td>4</td> </tr> <tr> <td>2.5 < L</td> <td>0.3 ≤ W</td> <td>NONE</td> </tr> </tbody> </table>	LENGTH : L	WIDTH : W	PERMISSIBLE NO.	L ≤ 0.5	W ≤ 0.1	IGNORE	0.5 < L ≤ 2.5	0.1 < W ≤ 0.3	4	2.5 < L	0.3 ≤ W	NONE								
LENGTH : L	WIDTH : W	PERMISSIBLE NO.																				
L ≤ 0.5	W ≤ 0.1	IGNORE																				
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2.5 < L	0.3 ≤ W	NONE																				
6.	SCRATCHES AND DENT ON GLASS POLARIZER	(1) PLS REFER TO THE ABOVE NO.3 AND 4 TO DETERMINE SCRATCHES AND DENT ON POLARIZER OR GLASS																				
7.	DOT DEFECT ON DISPLAY	<p>Judgment Criteria</p> <table border="1"> <thead> <tr> <th>Area</th> <th>Bright Dot</th> <th>Dark Dot</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>3</td> <td>3</td> <td>4</td> </tr> <tr> <td>B</td> <td>5</td> <td>5</td> <td>5</td> </tr> </tbody> </table> <p>(1)It is defined as Point Defect if defect area>0.5dot (2)It is ignored if defect area≤0.5dot (3)Weak point defect will be defined as Bright Dot if it can be observed through ND filter 6% (4)The distance between 2 dot defect≥5mm (5)Not Allowed Joint point defect</p> <p>Note : A/B Area Definition</p> 	Area	Bright Dot	Dark Dot	Total	A	3	3	4	B	5	5	5								
Area	Bright Dot	Dark Dot	Total																			
A	3	3	4																			
B	5	5	5																			

NO.	ITEM	CRITERIA								
8	LINE DEFECT ON DISPLAY	OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOW								
9	MURA ON DISPLAY	IT'S OK IF MURA IS SLIGHT VISIBLE THROUNG 6% ND FILTER								
10	CF FAIL/SPOT ON DISPLAY	(1)THE FOLLOWING CF FAIL , SPOT ARE WITHIN THE VIEWING AREA								
		<table border="1"> <thead> <tr> <th>SIZE D</th> <th>PERMISSIBLE NO.</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.15\text{mm}$</td> <td>IGNORED</td> </tr> <tr> <td>$0.15\text{mm} < D \leq 0.2\text{mm}$</td> <td>$N \leq 2$</td> </tr> <tr> <td>$D > 0.2\text{mm}$</td> <td>NOT ALLOWED</td> </tr> </tbody> </table>	SIZE D	PERMISSIBLE NO.	$D \leq 0.15\text{mm}$	IGNORED	$0.15\text{mm} < D \leq 0.2\text{mm}$	$N \leq 2$	$D > 0.2\text{mm}$	NOT ALLOWED
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$0.15\text{mm} < D \leq 0.2\text{mm}$	$N \leq 2$									
$D > 0.2\text{mm}$	NOT ALLOWED									
Note : Diameter $D=(a+b)/2$										
										
11	UNEVEN COLOR SPREAD , COLORATION	(1)TO BE DETERMINED BASED UPON THE STANDARD SAMPLE.								
12	BEZEL APPEARANCE	(1)BEZEL MAY NOT HAVE RUST, E DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION. (2)BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.								
13	SOLDERING	(1)NO SOLDERING FOUND ON THE SPECIFIED PLACE (2)INSUFFICIENT SOLDER								
		<p>(a)LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD</p>  <p>(b)CHIP COMPONENT · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING</p> 								

NO.	ITEM	CRITERIA
13.	SOLDERING	<ul style="list-style-type: none"> • SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED  <p>(3)PARTS ALIGMENT</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> 

NO.	ITEM	CRITERIA
13.	SOLDERING	<p>(4)NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB.</p> <p>(5)NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE.</p> <p>(6)NO RESIDUE OR SOLDER BALLS ON PCB.</p> <p>(7)NO SHORT CIRCUITS IN COMPONENTS ON PCB.</p>
14.	BACKLIGHT	<p>(1)NO LIGHT</p> <p>(2)FLICKERING AND OTHER ABNORMAL ILLUMINATION</p> <p>(3)SPOTS OR SCRATCHES THAT APPEAR WHEN LIT MUST BE JUDGED USING LCD SPOT, LINES AND CONTAMINATION STANDARDS.</p> <p>(4)BACKLIGHT DOESN'T LIGHT OR COLOR IS WRONG.</p>
15.	GENERAL APPEARANCE	<p>(1)NO OXIDATION,CONTAMINATION, URVES OR,BENDS ON INTERFACE PIN (OLB) OF TCP.</p> <p>(2)NO CRACKS ON INTERFACE PIN (OLB) OF TCP.</p> <p>(3)NO CONTAMINATION, SOLDER RESIDUE OR SOLDER BALLS ON PRODUCT.</p> <p>(4)THE IC ON THE TCP MAY NOT BE DAMAGED, CIRCUITS.</p> <p>(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.</p> <p>(6)THE RESIDUAL ROSIN OR TIN OIL OF SOLDERING (COMPONENT OR CHIP COMPONENT) IS NOT BURNED INTO BROWN OR BLACK COLOR.</p> <p>(7)SEALANT ON TOP OF THE ITO CIRCUIT HAS NOT HARDENED.</p> <p>(8)PIN TYPE MUST MATCH TYPE IN SPECIFICATION SHEET.</p> <p>(9)LCD PIN LOOSE OR MISSING PINS.</p> <p>(10)PRODUCT PACKAGING MUST THE SAME AS SPECIFIED ON PACKAGING SPECIFICATION SHEET.</p> <p>(11)PRODUCT DIMENSION AND STRUCTURE MUST CONFORM TO PRODUCT SPECIFICATION SHEET.</p> <p>(12)THE APPEARANCE OF HEAT SEAL SHOULD NOT ADMIT ANY DIRT AND BREAK.</p>

NO.	ITEM	CRITERIA									
16.	CRACKED GLASS	<p>THE LCD WITH EXTENSIVE CRACK IS NOT ACCEPTABLE</p> <p>General glass chip :</p>  <table border="1"> <thead> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>$\leq t/2$</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"> <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"> <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"> <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 240 hrs
2	Low temperature operation	The sample should be allowed to stand at -20°C for 240 hrs
3	High temperature storage	The sample should be allowed to stand at +80°C for 240 hrs
4	Low temperature storage	The sample should be allowed to stand at -30°C for 240 hrs
5	High temp / humidity test	The sample should be allowed to stand at 60°C , 90% RH 240 hrs
6	Thermal shock (not operated)	The sample should be allowed to stand the following 200 cycles of operation: -30°C for 30 minutes ~ +80°C for 30 minutes
7	ESD (Electrostatic Discharge)	AIR DISCHARGE ± 4KV CONTACT DISCHARGE ± 2KV

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 .

12.7 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 .