


MDT0700BIS-RGB	800 x 480	RGB Interface	TFT Module
Specification			
Version: 2		Date: 10/12/2018	
Revision			
1	06/08/2018	First issue	
2	08/12/2018	ADD Power on/off Sequence	

Display Features			
Display Size	7.0"		
Resolution	800 x 480		
Orientation	Landscape		
Appearance	RGB		
Logic Voltage	3.3V		
Interface	RGB		
Brightness	400 cd/m ²		
Touchscreen	---		
Module Size	165.40 x 104.59 x 5.80mm		
Operating Temperature	-30°C ~ +85°C		
Pinout	40 way FFC		Box Quantity
Pitch	0.5mm	Weight / Display	
		---	---

* - For full design functionality, please use this specification in conjunction with the MD5004/MD5005 specification.(Provided Separately)

Display Accessories	
Part Number	Description

Optional Variants	
Appearances	Voltage



*** Description**

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 7.0'TFT-LCD contains 800X480 pixels, and can display up to 65K/262K/16.7M colors.

*** Features**

-Low Input Voltage: 3.3V(TYP)

-Display Colors of TFT LCD: 65K/262K/16.7M colors

Interface: 16/18/24Bit RGB Interface

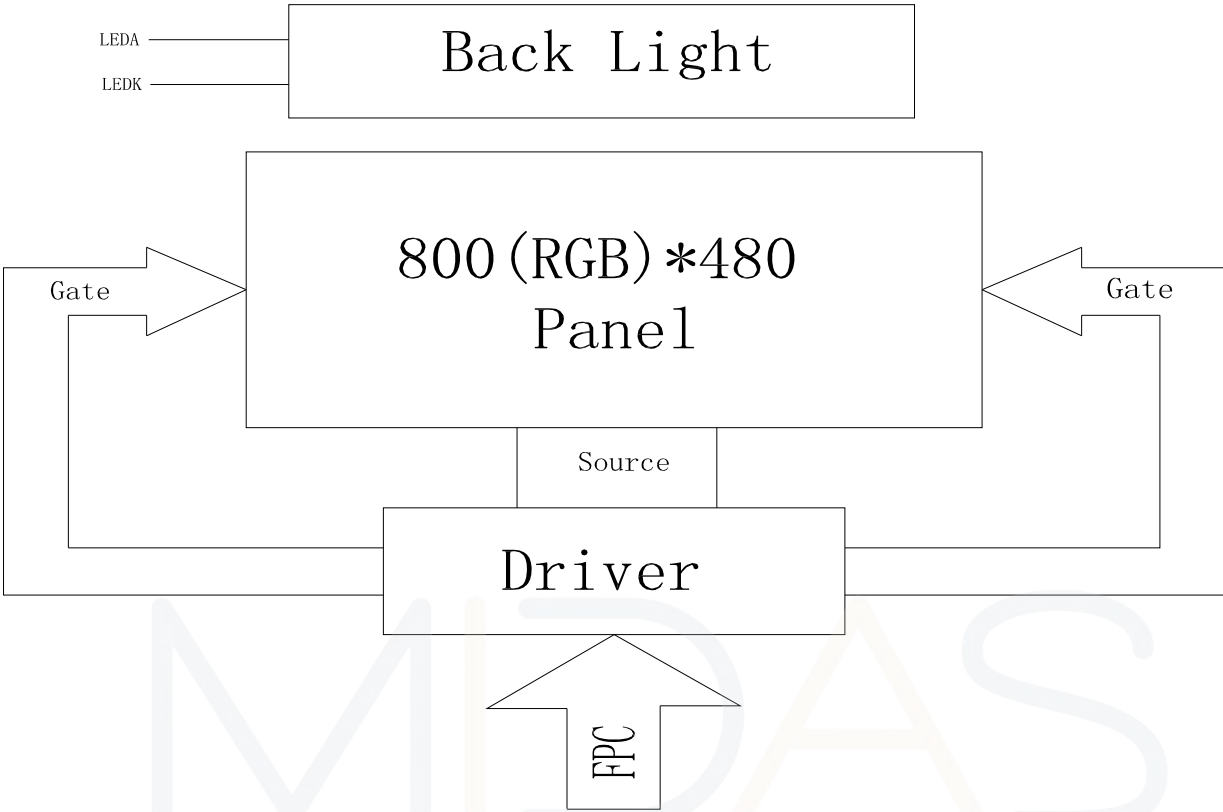
General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	152.40(H) *91.44(V) (7.0inch)	mm	-
Driver element	TFT active matrix	-	-
Display colors	65K/262K/16.7M	colors	-
Number of pixels	800(RGB)*480	dots	-
TFT Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.1905(H) x 0.1905 (V)	mm	-
Viewing angle	ALL	o'clock	-
TFT Controller IC	MD5004/MD5005	-	-
Display mode	Transmissive/Normally Black	-	-
Operating temperature	-30~+85	°C	-
Storage temperature	-40~+90	°C	-

*** Mechanical Information**

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)		165.40		mm	-
	Vertical(V)		104.59		mm	-
	Depth(D)		5.8		mm	-
Weight			124		g	-



Block Diagram

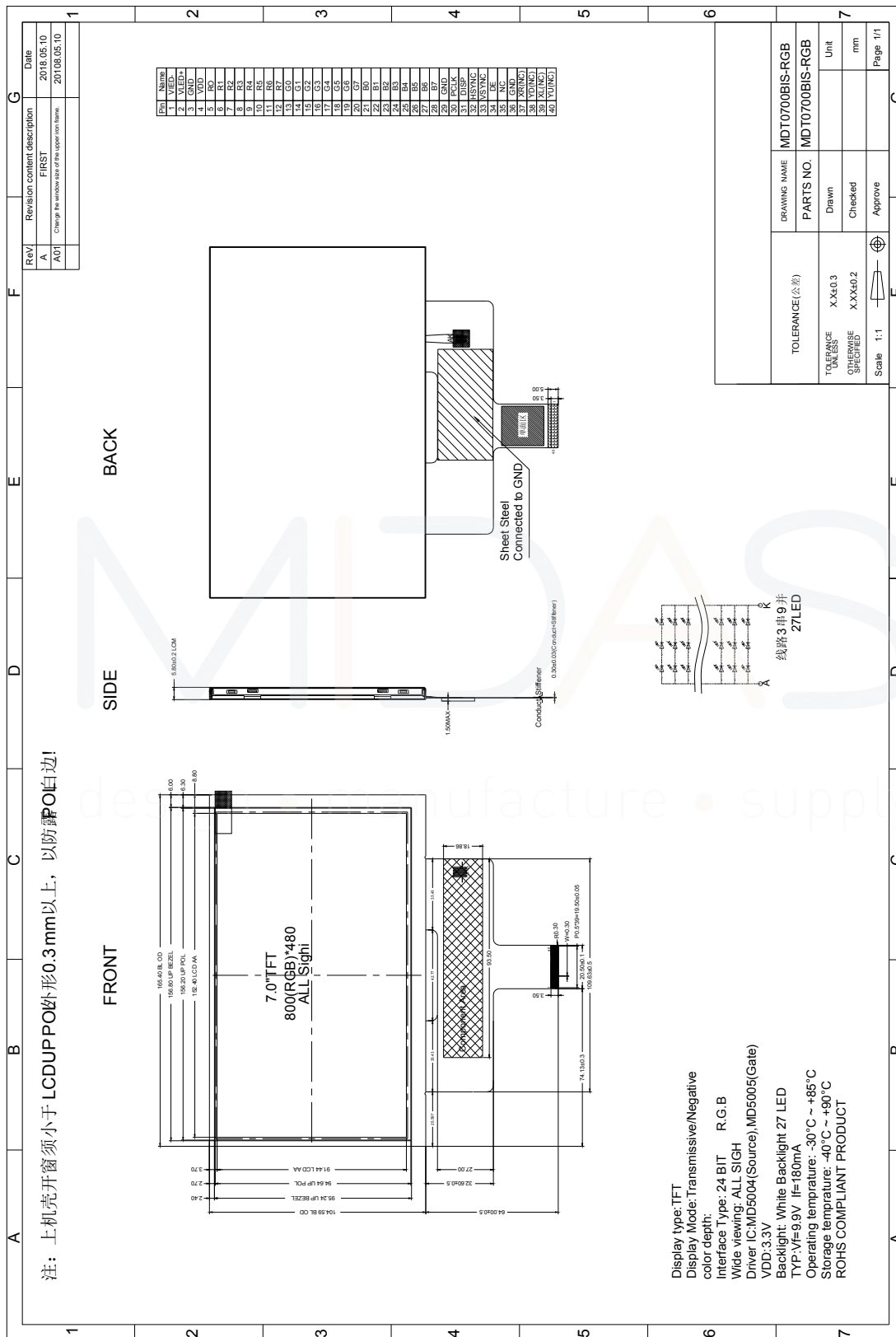


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Outline dimension



Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	LEDK	Cathode pin OF backlight	P
2	LEDA	Anode pin of backlight	P
3	GND	Ground.	P
4	VDD	Supply voltage (3.3V).	P
5	R0	Red data input.	I
6	R1	Red data input.	I
7	R2	Red data input.	I
8	R3	Red data input.	I
9	R4	Red data input.	I
10	R5	Red data input.	I
11	R6	Red data input.	I
12	R7	Red data input.	I
13	G0	Green data input.	I
14	G1	Green data input.	I
15	G2	Green data input.	I
16	G3	Green data input.	I
17	G4	Green data input.	I
18	G5	Green data input.	I
19	G6	Green data input.	I
20	G7	Green data input.	I
21	B0	Blue data input.	I
22	B1	Blue data input.	I
23	B2	Blue data input.	I
24	B3	Blue data input.	I
25	B4	Blue data input.	I



26	B5	Blue data input.	I
27	B6	Blue data input.	I
28	B7	Blue data input.	I
29	GND	Ground.	P
30	PCLK	Clock signal. Latching data at the rising edge	I
31	DISP	Standby setting for testing, it should be connected to VDDIO in normal operation mode. If connected to GND, the IC is in standby mode.	I
32	HSYNC	Horizontal Sync input. Negative polarity.	I
33	VSYNC	Vertical Sync input. Negative polarity.	I
34	DE	Data input Enable. Active High to enable the data input Bus under "DE Mode".	I
35	NC	Open pin.	/
36	GND	Ground.	P
37	XR(NC)	Touch panel Right Glass Terminal	
38	YD(NC)	Touch panel Bottom Film Terminal	
39	XL(NC)	Touch panel LIFT Glass Terminal	
40	YU(NC)	Touch panel Top Film Terminal	

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LCD Optical Characteristics

Optical specification

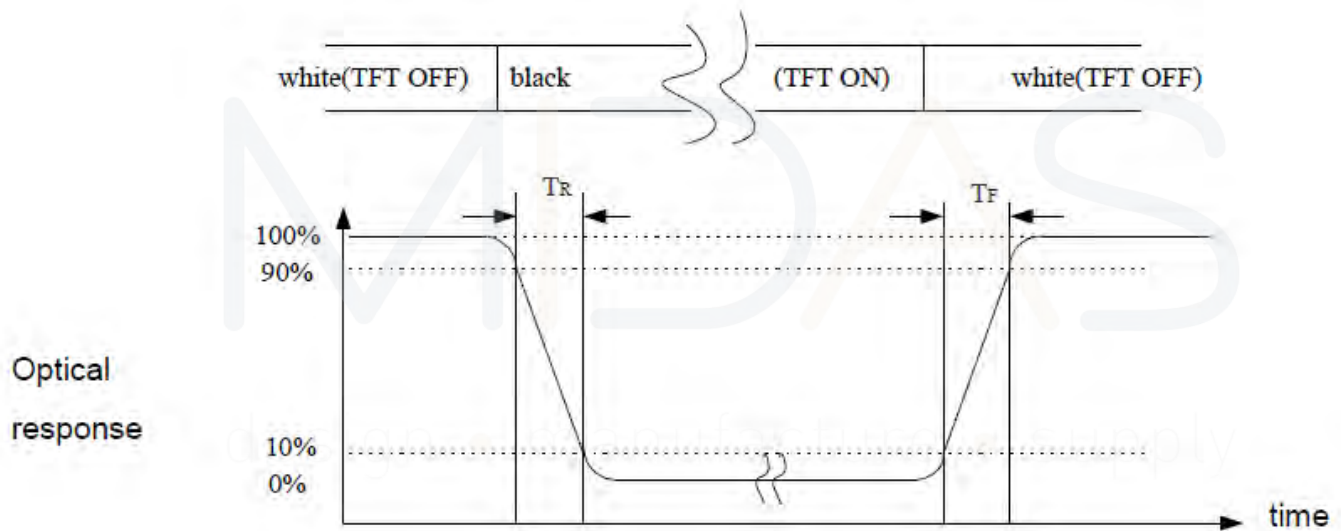
Item	Symbol	Condition	Min.	Typ.	Max.	Unit.	Note	
Contrast Ratio	CR	$\Theta=0$	--	1000	--		2	
Response time	Rising	T_{R+T_F}	Normal viewing angle	--	35	40	msec	3
	Falling			--				
Color gamut	S(%)		--	70	--	%		
Color Filter Chromaticity	White	W_X		0.267	0.307	0.347		
		W_Y		0.306	0.346	0.386		
	Red	R_X		0.599	0.639	0.679		
		R_Y		0.298	0.338	0.378		
	Green	G_X		0.287	0.327	0.367		
		G_Y		0.548	0.578	0.618		
	Blue	B_X		0.103	0.143	0.183		
		B_Y		0.027	0.067	0.107		
Viewing angle	Hor.	Θ_L	CR>10	--	85	--		
		Θ_R		--	85	--		
	Ver.	Θ_U		--	85	--		
		Θ_D		--	85	--		
Option View Direction	Free							



Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3) Definition of Response Time : Sum of T_R and T_F



Electrical Characteristics

Absolute Maximum Rating (Ta=25 VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	-0.3	4.0	V
Operating temperature	T _{OP}	-30	+85	°C
Storage temperature	T _{ST}	-40	+90	°C

NOTE: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
DC booster circuit current	IDD	--	120	--	mA	
Level input voltage	V _{IH}	0.7V _{DD}		VDD	V	
	V _{IL}	GND		0.3V _{DD}	V	
Level output voltage	V _{OH}	0.8V _{DD}		VDD	V	
	V _{OL}	GND		0.2V _{DD}	V	



LED Backlight Characteristics

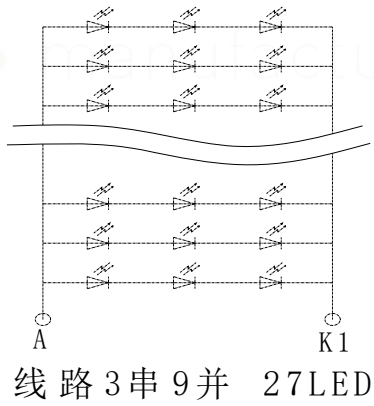
The back-light system is edge-lighting type with 27 chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	170	180	--	mA	
Forward Voltage	V_F	--	9.9	--	V	
LCM Luminance	L_v	350	400	--	cd/m ²	Note3
LED life time	Hr	50000	--	--	Hour	Note1,2
Uniformity	AVg	80	--	--	%	Note3

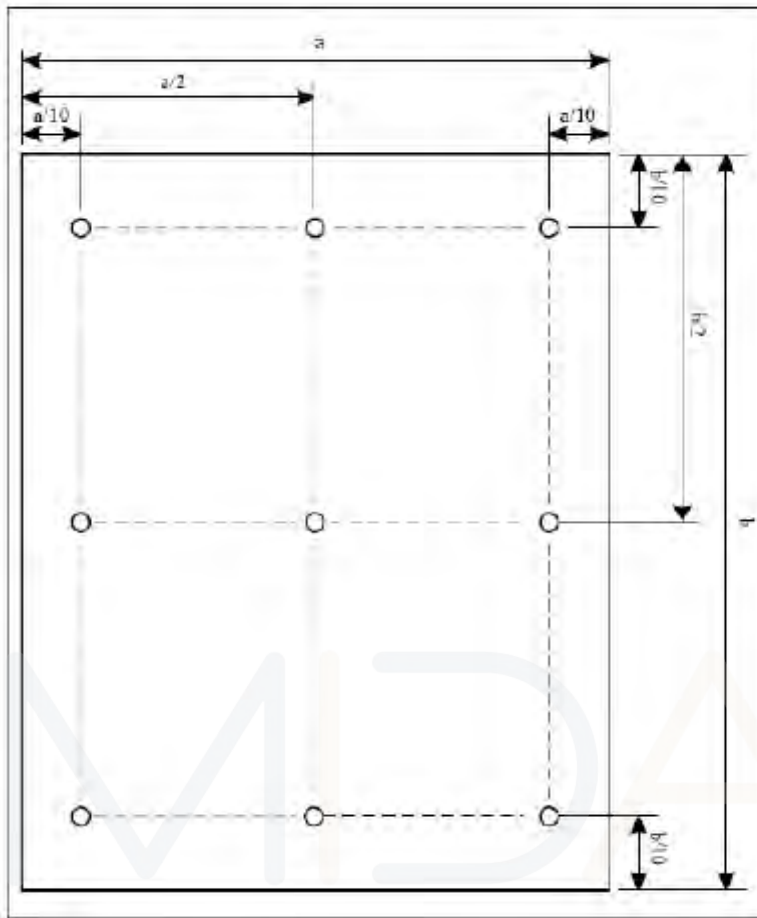
Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

$T_a=25\pm3\text{ }^\circ\text{C}$, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25\text{ }^\circ\text{C}$ and $I_L=180\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 180mA. The constant current driving method is suggested.



NOTE 3: Luminance Uniformity of these 9 points is defined as below:

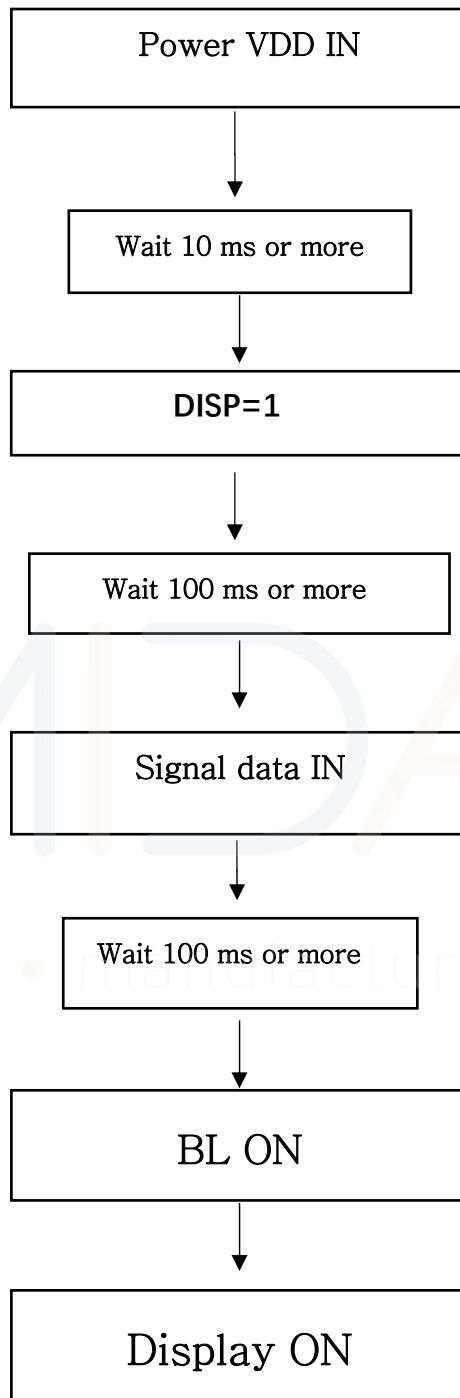


$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

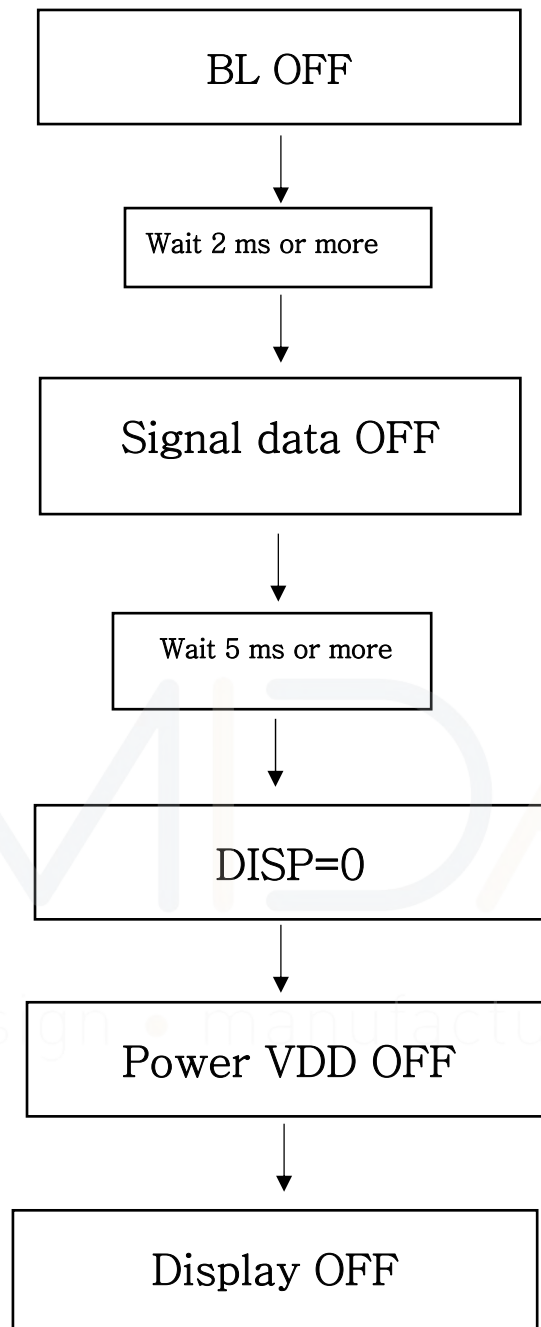
$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$



Power on/off Sequence
Display ON Sequence



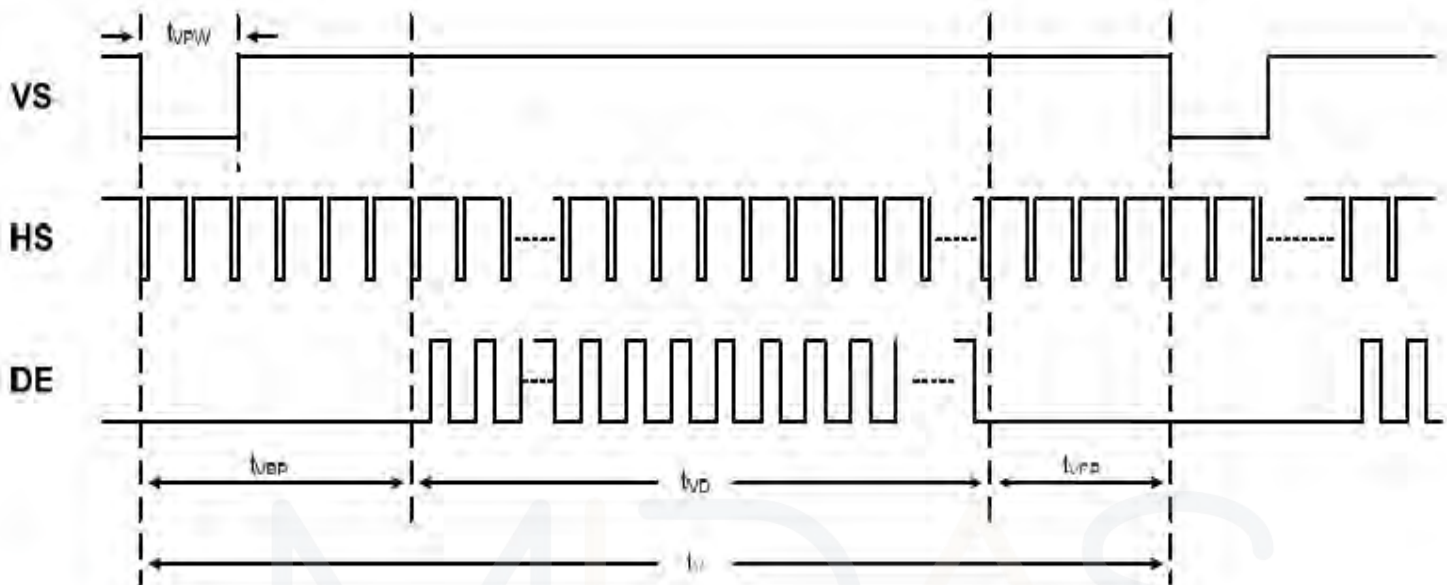
Display OFF Sequence



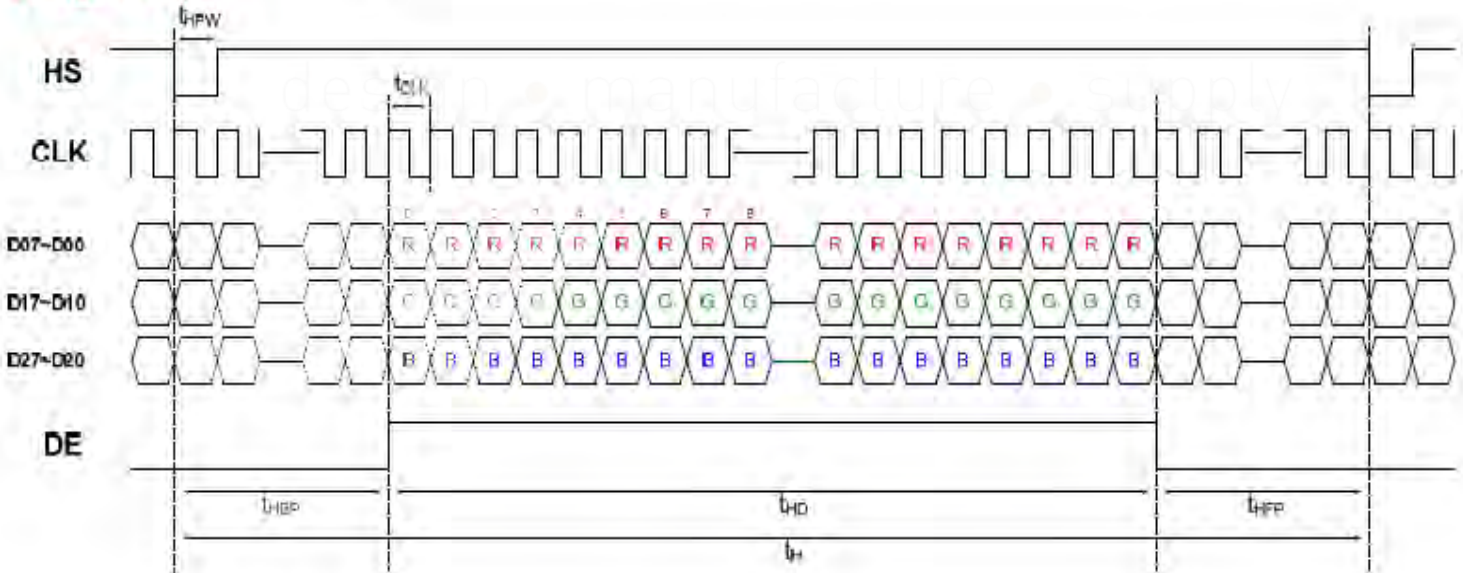
AC Characteristic

Input signal timing

Vertical input timing



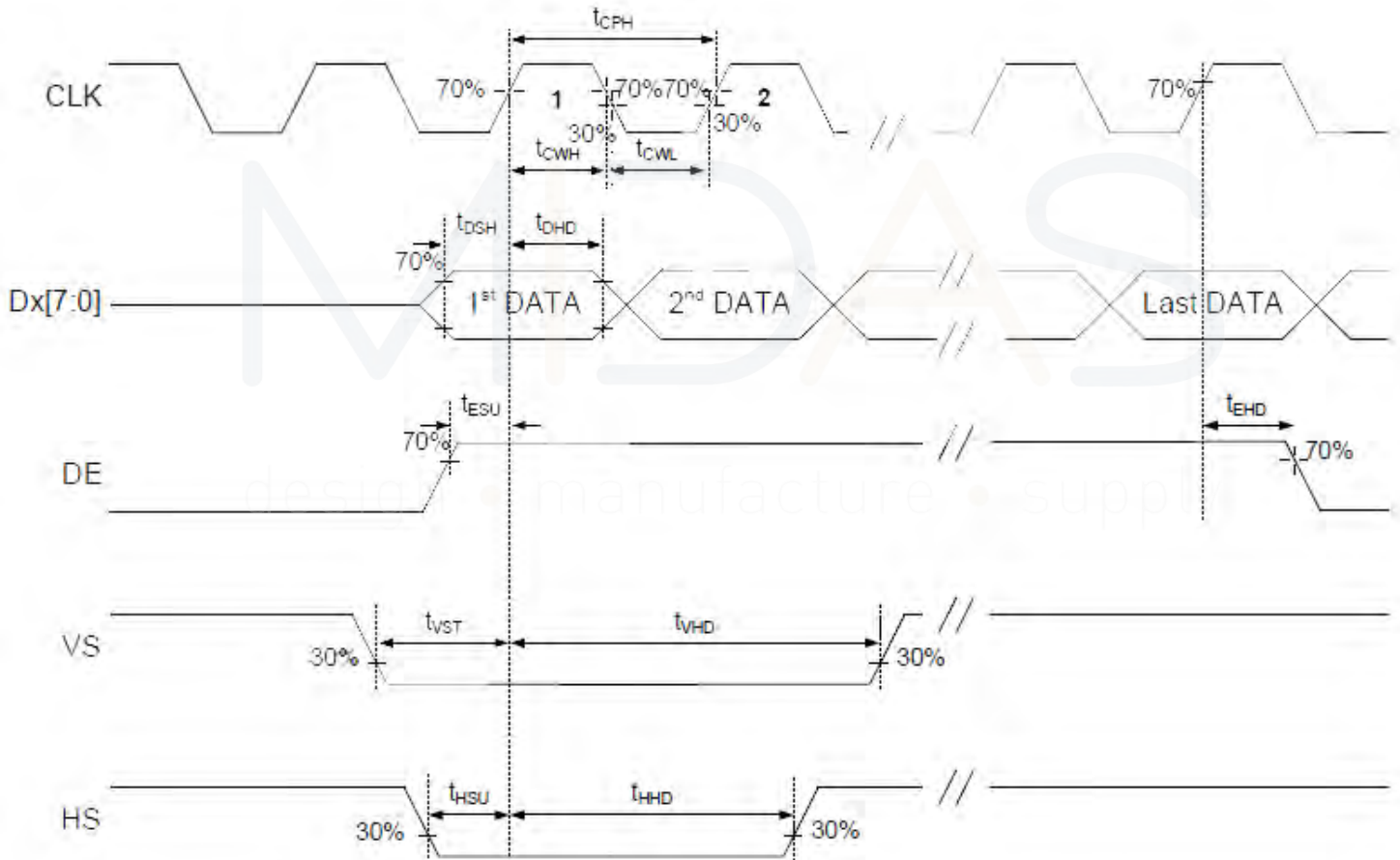
Horizontal input timing (CLK_POL=L)



Parallel RGB Interface Timing Characteristics

(VDD=VDD_LVDS=3.0~3.6V, GND=GND_LVDS=0V, TA=20~85°C)

Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
CLK cycle time	t_{CPH}	16.7			ns	
CLK pulse high duty	t_{CWH}	40	50	60	%	
CLK pulse low duty	t_{CWL}	40	50	60	%	
VS setup time	t_{VST}	4	-	-	ns	
VS hold time	t_{VHD}	2	-	-	ns	
HS setup time	t_{HST}	4	-	-	ns	
HS hold time	t_{HHD}	2	-	-	ns	
Data setup time	t_{DSH}	4	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to CLK
Date hold time	t_{DHD}	2	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to CLK
DE setup time	t_{ESU}	4	-	-	ns	
DE hold time	t_{EHD}	2	-	-	ns	



Note: Upper timing diagram CLK_POL=H, DE_POL=L, VS_POL=L, HS_POL=L



Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
CLK frequency	t _{CLK}	25.9	27.6	48.7	Mhz	
Horizontal blanking time	t _{HBT}	90	110	304	t _{CLK}	t _{HBP} + t _{HFP}
Horizontal back porch	t _{HBP}	5	5	304- t _{HFP}	t _{CLK}	
Horizontal display area	t _{HD}	800	800	800	t _{CLK}	
Horizontal front porch	t _{HFP}	85	105	299	t _{CLK}	
Horizontal period	t _H	890	910	1104	t _{CLK}	
Horizontal pulse width	t _{HPW}	1	1	256	t _{CLK}	
Vertical blanking time	t _{VBT}	5	26	255	t _H	t _{VBP} + t _{VFP}
Vertical back porch	t _{VBP}	2	2	255- t _{VFP}	t _H	
Vertical display area	t _{VD}	480	480	480	t _H	
Vertical front porch	t _{VFP}	3	24	253	t _H	
Vertical period	t _V	485	506	735	t _H	
Vertical pulse width	t _{VPW}	1	1	128	t _H	

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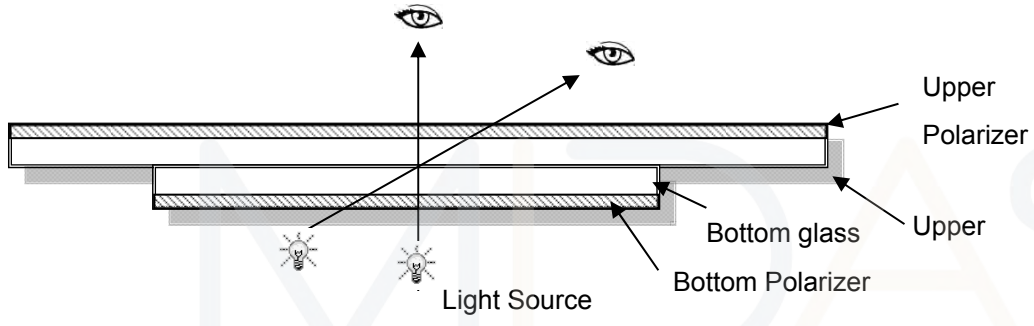
LCD Module Out-Going Quality Level

VISUAL & FUNCTION INSPECTION STANDARD

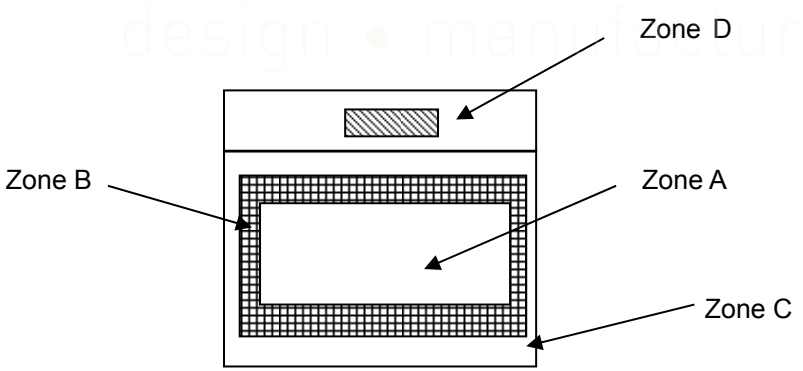
Inspection conditions

Inspection performed under the following conditions is recommended.

- Temperature : $25 \pm 5^{\circ}\text{C}$
- Humidity : $65\% \pm 10\% \text{RH}$
- Viewing Angle : Normal viewing Angle.
- Illumination: Single fluorescent lamp (300 to 700Lux)
- Viewing distance: 30-50cm



Definition



- Zone A : Effective Viewing Area(Character or Digit can be seen)
- Zone B : Viewing Area except Zone A
- Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)
- Zone D : IC Bonding Area

Note:As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer



Sampling Plan

According to GB/T 2828.1-2003 ; , normal inspection, Class II

AQL:

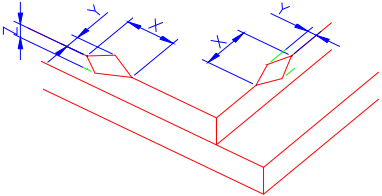
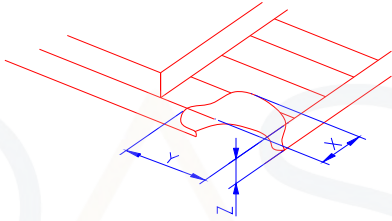
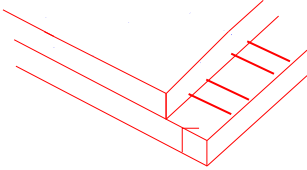
Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

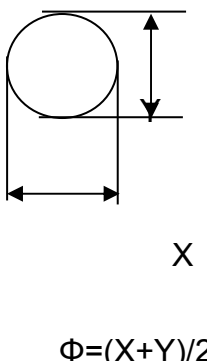
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot Line defect	Light dot, Dim spot, Polarizer Bubble ; Polarizer accidented spot.	
6	Soldering appearance	Good soldering , Peeling off is not allowed.	
7	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	



Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	 <table border="1" data-bbox="756 665 1455 813"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td><Inner border line of the seal</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
X	Y	Z						
≤3.0mm	<Inner border line of the seal	≤T						
	(2)LCD corner broken	 <table border="1" data-bbox="834 1120 1374 1220"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td>≤L</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						
	(3) LCD crack	 <p style="text-align: center;">Crack Not allowed</p>						



2.0	Spot defect	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)																							
		<table border="1"> <thead> <tr> <th rowspan="2">Zone Size (mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.10$</td> <td colspan="3">Ignore</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.25$</td> <td colspan="3">4(distance $\geq 10\text{mm}$)</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.35$</td> <td colspan="3">3</td> </tr> <tr> <td>$\Phi > 0.4$</td> <td colspan="3">0</td> </tr> </tbody> </table>	Zone Size (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.10$	Ignore			$0.10 < \Phi \leq 0.25$	4(distance $\geq 10\text{mm}$)			$0.25 < \Phi \leq 0.35$	3			$\Phi > 0.4$	0		
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	② Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot)																								
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3.0	Line defect (LCD/TP /Polarizer backlight black/white line, scratch, stain)	Width(mm)	Length(m)	Acceptable Qty		
				A	B	C
		$\Phi \leq 0.05$	Ignore	Ignore		
		$0.05 < W \leq 0.06$	$L \leq 5.0$	$N \leq 3$		
		$0.07 < W \leq 0.08$	$L \leq 4.0$	$N \leq 2$		
	$0.08 < W$	Define as spot defect				
4.0	Electronic Components SMT	Not allow missing parts, solderless connection, cold solder joint, mismatch, The positive and negative polarity opposite				
5.0	Display color & Brightness	<p>1. Color: Measuring the color coordinates, The measurement standard according to the datasheet or samples.</p> <p>2. Brightness: Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.</p>				
6.0	LCD Mura	By 5% ND filter invisible.				

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed



Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	85℃,96H	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-30℃, 96HR	
High Temperature Storage	90℃, 96HR	
Low Temperature Storage	-40℃, 96HR	
High Temperature & High Humidity Storage	+60℃, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-40℃,30 min ↔ 90℃,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 5 times; (Environment: 15℃~35℃, 30%~60%).	
Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80cm(MEDIUM BOX)	

Remark:

- 1.The test samples should be applied to only one test item.
- 2.Sample size for each test item is 5~10pcs.
- 3.For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.
- 4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
- 5.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.



Cautions and Handling Precautions

Handling and Operating the Module

- (1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
- (2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
- (4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static; it may cause damage to the CMOS ICs.
- (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.
- (11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (12) Pins of I/F connector shall not be touched directly with bare hands.
- (13) Do not connect, disconnect the module in the "Power ON" condition.
- (14) Power supply should always be turned on/off by the item 6.1 Power On Sequence & 6.2 Power Off Sequence

Storage and Transportation.

- (1) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%
- (2) Do not store the TFT-LCD module in direct sunlight.
- (3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
- (4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
- (5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

