MDT5000	800 x 480	24-Bit RGB Interface	TFT Module
Specification			
Version: 1		Date: 14/05/2018	
Revision			
1	12/06/2016	First issue.	

Display Features		
Display Size	5.0"	
Resolution	800 x 480	
Orientation	Landscape	
Appearance	RGB	
Logic Voltage	3.3V	
Interface	24-Bit RGB	
Brightness	600 cd/m^2	
Touchscreen	N/A	
Module Size	120.70 x 75.90 x 3.00 mm	
Operating Temperature	-20°C ~ +70°C	
Pinout	40 - Way FFC	Box Quantity / Weight / Display
Pitch	0.5mm	--- / ---

RoHS compliant

* - For full design functionality, please use this specification in conjunction with the ILI5960 specification. (Provided Separately)

Display Accessories	
Part Number	**Description**
MPBV6	40 Way FFC to cable and wires. Driven by any driver board that can be wired to a 1mm pitch SHDR-40V-S-B receptacle.

Optional Variants	
Appearances	**Voltage**
Resistive Touch Panel Capacitive Touch Panel	

General Specifications

Feature		Spec
Characteristics	Size	5.0inch
	Resolution	800(horizontal)*480(Vertical)
	Interface	RGB-24bit
	Connect type	Connector
	Color Depth	16.7M
	Technology type	a-Si
	Pixel pitch (mm)	0.045 x 0.135
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally White
	LCD Driver IC	ILI5960+ILI6122
	Viewing Direction	12 O'clock
	Gray Scale Inversion Direction	6 O'clock
Mechanical	LCM (W x H x D) (mm)	120.7*75.9*3
	Active Area(mm)	108 x 64.80
	With /Without TSP	Without
	Weight (g)	TBD
	LED Numbers	18LEDs

Note 1: Viewing direction is following the data which measured by optics equipment.
Note 2: Requirements on Environmental Protection: RoHS
Note 3: LCM weight tolerance: +/- 5%

Input/Output Terminals

No.	Symbol	Description
1	VBL-	Backlight LED Cathode
2	VBL+	Backlight LED Anode.
3	GND	System Ground
4	VCC	Power supply for logic operation
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	System Ground
30	CLK	Pixel clock signal
31	DISP	Display on/off control
32	HSYNC	Horizontal Sync signal
33	VSYNC	Vertical Sync signal
34	DEN	Data Enable
35	NC	No connect
36	GND	System Ground
37	XR(NC)	The right side signal of TP
38	YD(NC)	The down side signal of TP
39	XL(NC)	The left side signal of TP
40	YU(NC)	The up side signal of TP

Absolute Maximum Ratings

Item	Symbol	Values Min.	Values Max.	Unit	Remark
	DV_{DD}	-0.3	5	V	
	AV_{DD}	-0.5	13.5	V	
	V_{GH}	-0.3	42	V	
	V_{GL}	-20	0.3	V	
Power voltage	V_{GH}-V_{GL}	-	40	V	
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	
LED Reverse Voltage	V_R	-	3.3	V	Each LED Note 2
LED Forward Current	I_F	-	20	mA	Each LED

(Note 1)

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed.

Note 2: V_R Conditions: Zener Diode 20mA

Electrical Characteristics

Typical operation conditions

(Note 1)

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	DV_{DD}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	10.2	10.4	10.6	V	
	V_{GH}	15.3	16.0	16.7	V	
	V_{GL}	-6.7	-6.0	-5.3	V	
Input signal voltage	V_{COM}	3.09	4.09	5.09	V	Note 4
Input logic high voltage	V_{IH}	0.7 DV_{DD}	-	DV_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.3 DV_{DD}	V	

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: DCLK,HS,VS,RESET,U/D, L/R,DE,R0~R7,G0~G7,B0~B7,MODE,DITHB.
Note 4: Typical V_{COM} is only a reference value. It must be optimized according to each LCM. Please use VR and base on below application circuit.
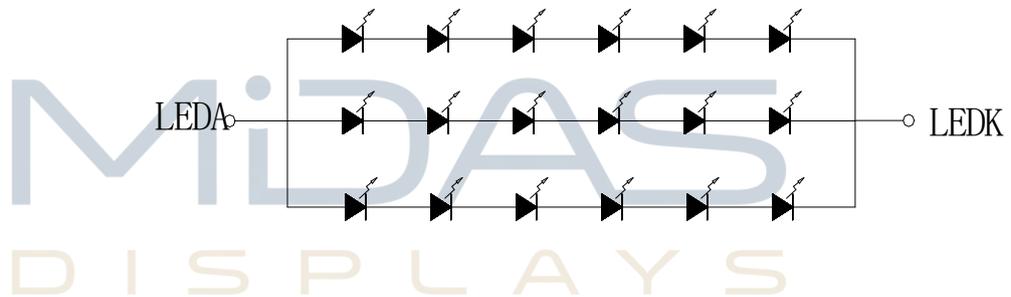
Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Current for Driver	I_{GH}	-	(0.50)	1	mA	V_{GH} =16.0V
	I_{GL}	-	(0.54)	1	mA	V_{GL} = -6.0V
	IDV_{DD}	-	(4.2)	10	mA	DV_{DD} =3.3V
	IAV_{DD}	-	(19)	50	mA	AV_{DD} =10.4V

Driving Backlight

Item	Symbol	MIN	TYP	MAX	Unit	Remark
LED current	I_F	-	60	-	mA	
Power Consumption			-	-	mW	
LED Voltage	V_F	-	19.2	-	V	Note 1
LED Life Time	W_{BL}	25000			Hr	Note 2,3

Note 1 : There are 2 Groups LED

Note 2 : Ta = 25℃

Note 3 : Brightess to be decreased to 50% of the initial value

Interface Timing

Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as the diagram below.

a. Power on sequence:
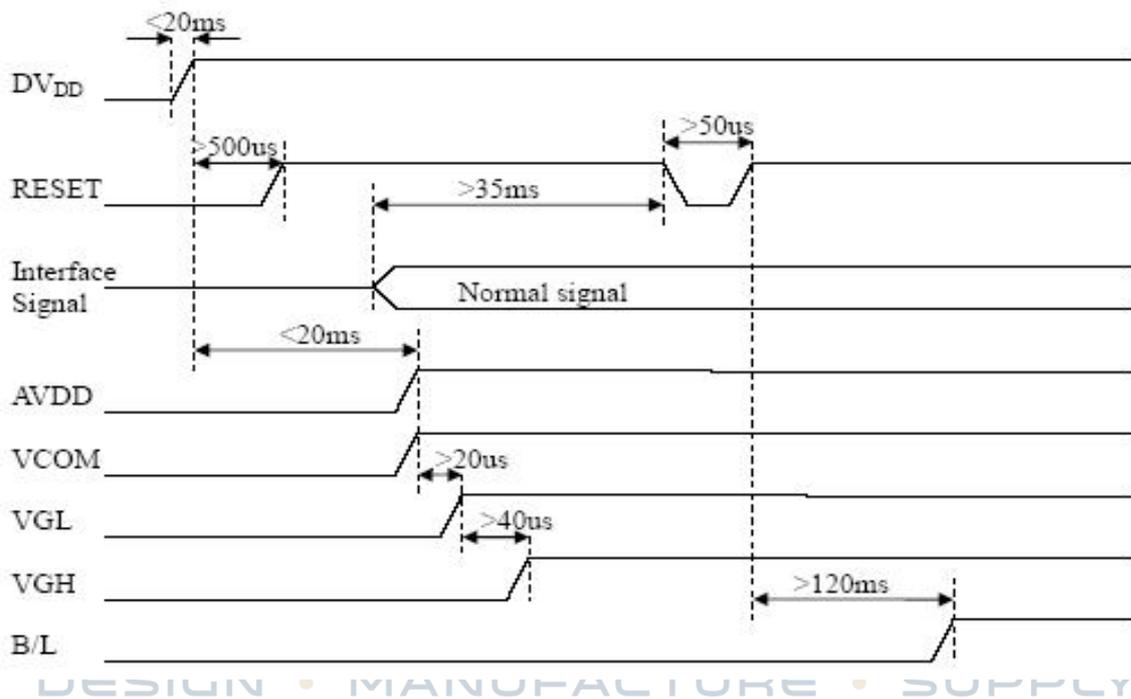
b. Power off sequence:
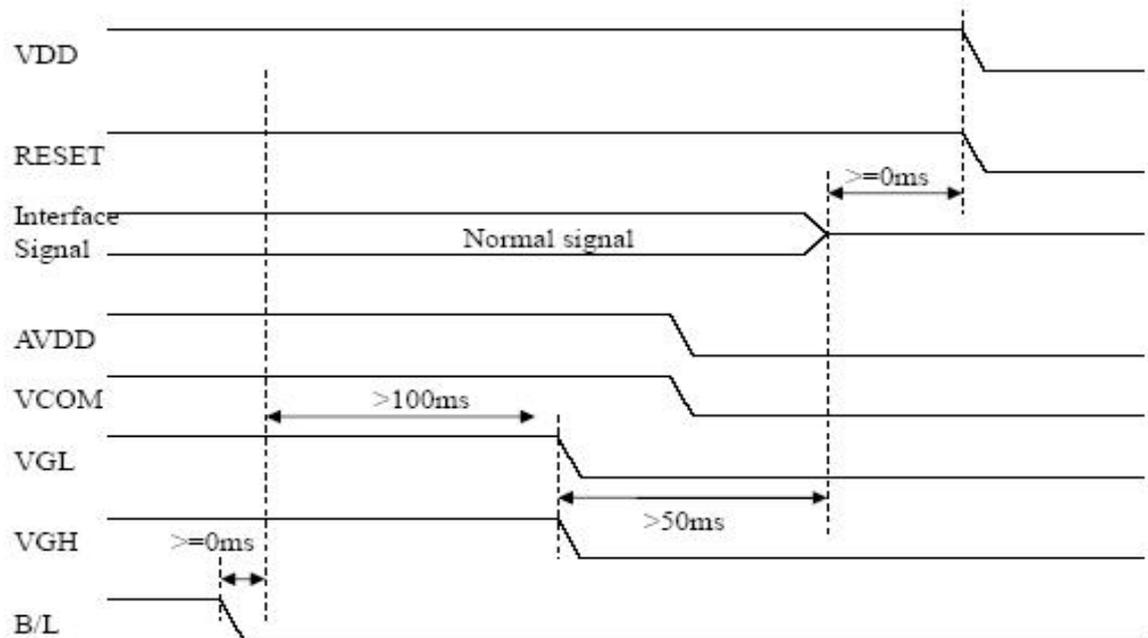
Timing Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	Thst	8	-	-	ns	
HS hold time	Thhd	8	-	-	ns	
VS setup time	Tvst	8	-	-	ns	
VS hold time	Tvhd	8	-	-	ns	
Data setup time	Tdsu	8	-	-	ns	
Data hole time	Tdhd	8	-	-	ns	
DE setup time	Tesu	8	-	-	ns	
DE hole time	Tehd	8	-	-	ns	
DV$_{DD}$ Power On Slew rate	TPOR	-	-	20	ms	From 0 to 90% DV$_{DD}$
RESET pulse width	TRst	1	-	-	ms	
DCLK cycle time	Tcoh	20	-	-	ns	
DCLK pulse duty	Tcwh	40	50	60	%	

Timing Diagram

Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	-	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	-	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

Data Input Format
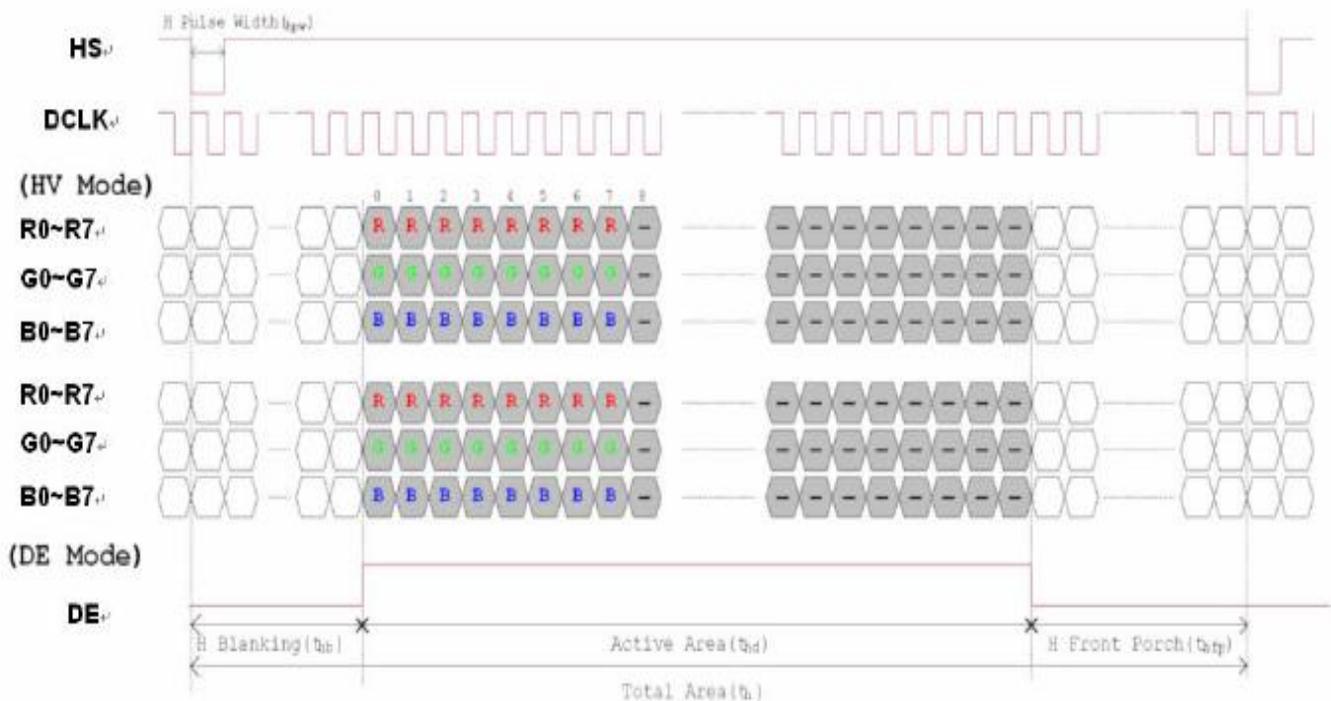
Figure 3. 1 Horizontal input timing diagram.
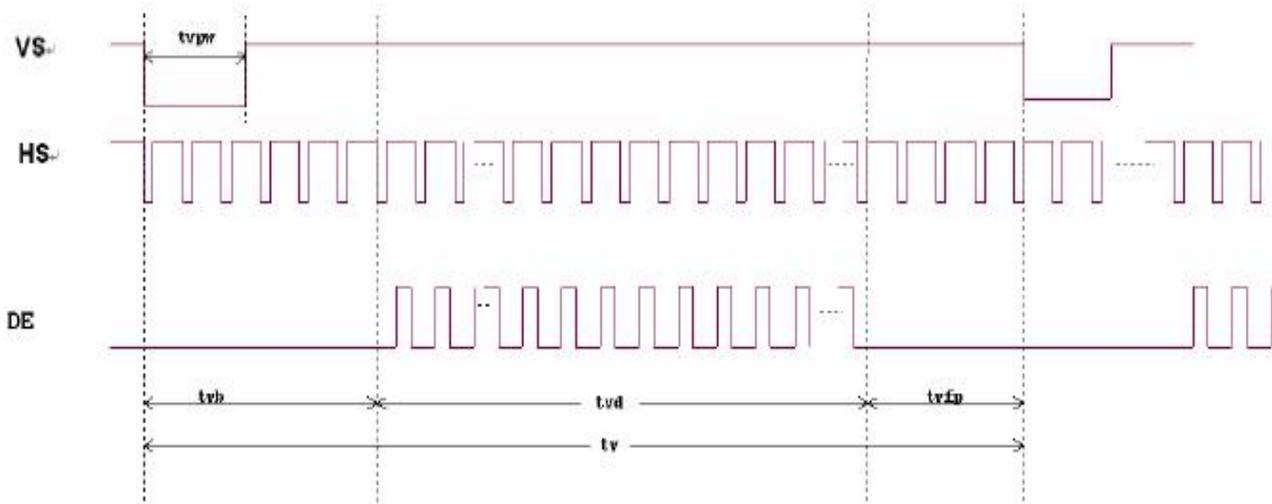
Figure 3. 2 Vertical input timing diagram.

The RESET input must be held at least 1ms after power is stable
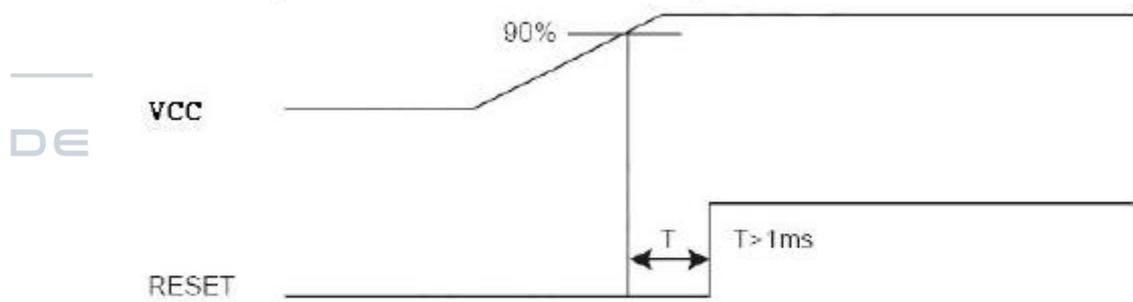
Reset timing

Optical Characteristics

Items		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angles		θ_T	Center CR≥10	40	50	-	Degree.	Note2
		θ_B		60	70	-		
		θ_L		60	70	-		
		θ_R		60	70	-		
Contrast Ratio		CR	$\Theta =0$	500	600	-	-	Note1, Note3
Response Time		T_{ON}	25°C	-	20	30	ms	Note1, Note4
		T_{OFF}		-	20	30		
Chromaticity	White	X_W	Backlight is on	0.324	0.326	0.328	-	Note1, Note5
		Y_W		0.364	0.366	0.368	-	
	Red	X_R		0.611	0.613	0.615	-	
		Y_R		0.333	0.335	0.337	-	
	Green	X_G		0.305	0.307	0.309	-	
		Y_G		0.558	0.560	0.562	-	
	Blue	X_B		0.133	0.135	0.137	-	
		Y_B		0.158	0.160	0.162	-	
Uniformity		U		80	-	-	%	Note1, Note6
NTSC					50		%	Note5
Luminance		L		-	600			Note1, Note7

Test Conditions:
1. IF= 20mA(one channel),the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 5 minutes operation, the optical Properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

Item	Photo detector	Field
Contrast Ratio	BM-7A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	SR-3A	2°
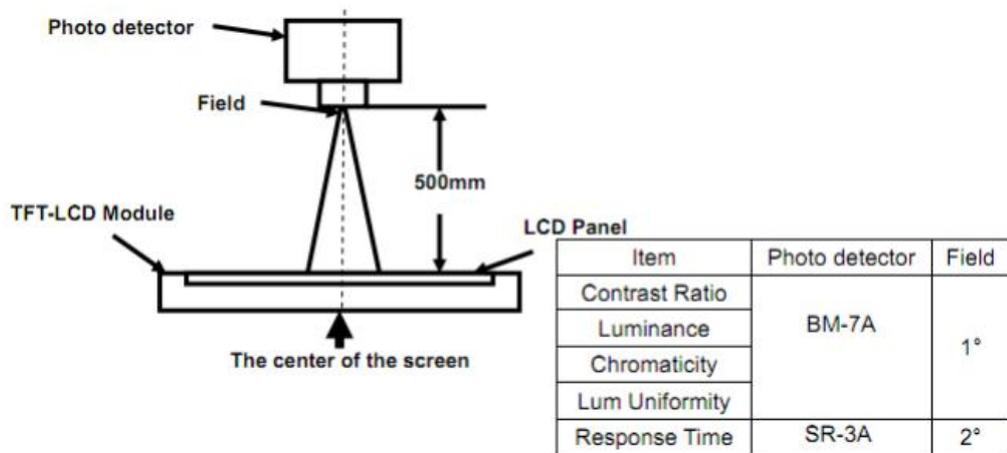
Note 2: Definition of viewing angle range and measurement system.
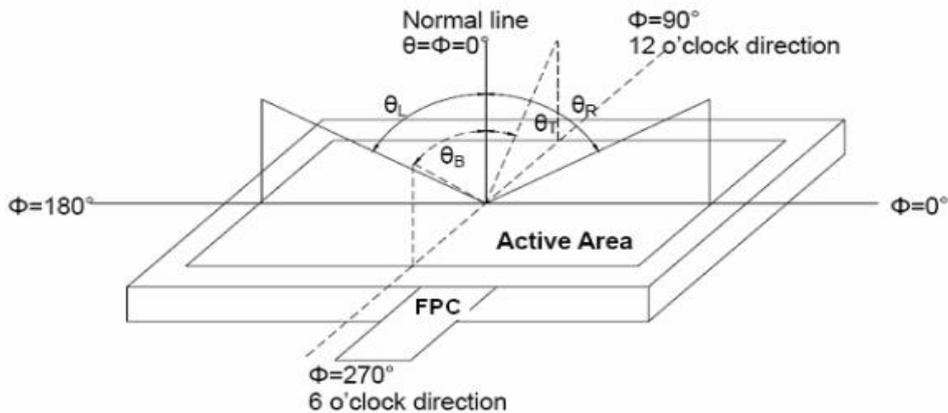Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

Note 4: Definition of Response time
The response time is defined as the LCD optical switching time interval
Between "White" state and "Black" state.　Rise time (TON) is the time between
Photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is
The time between photo detector output intensity changed from 10% to 90%
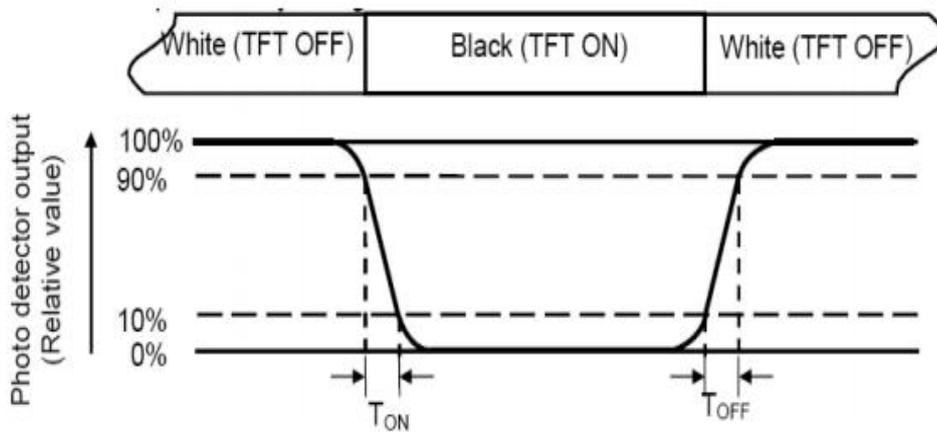
Note 5: Definition of color chromaticity (CIE1931)
      Color coordinates measured at center point of LCD.
Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the Center of each measuring area
Luminance Uniformity (U) = Lmin/ Lmax X100%
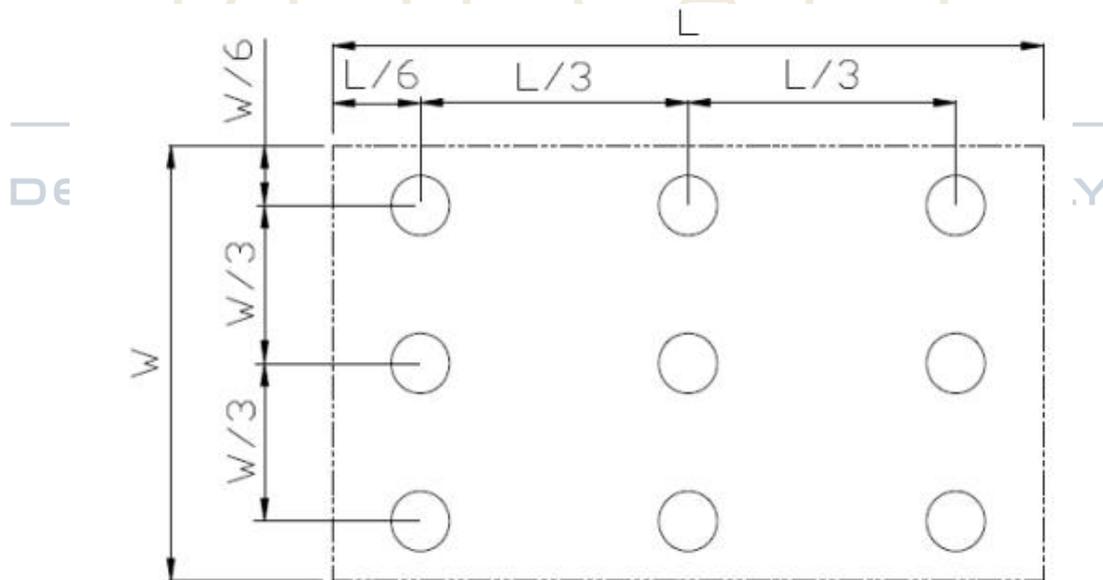L-------Active area length W----- Active area width

Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.
Note 7: Definition of Luminance:
Measure the luminance of white state at center point.
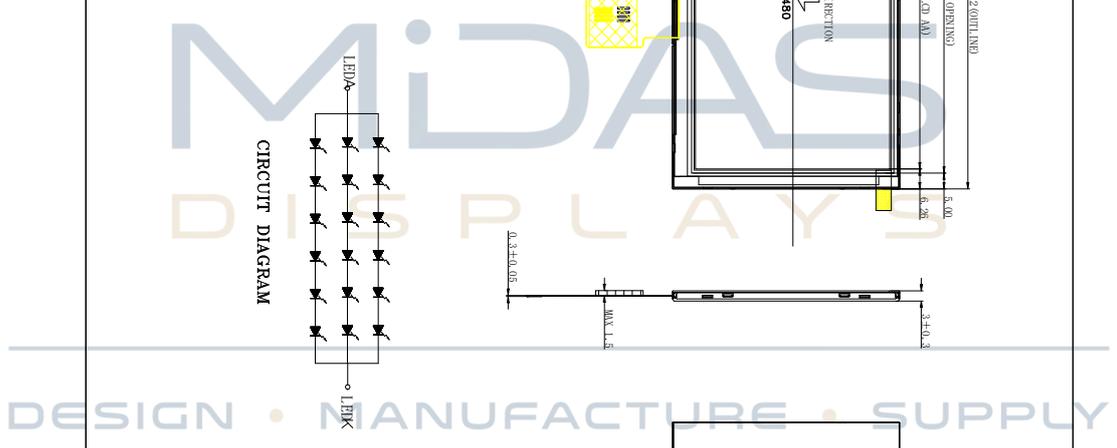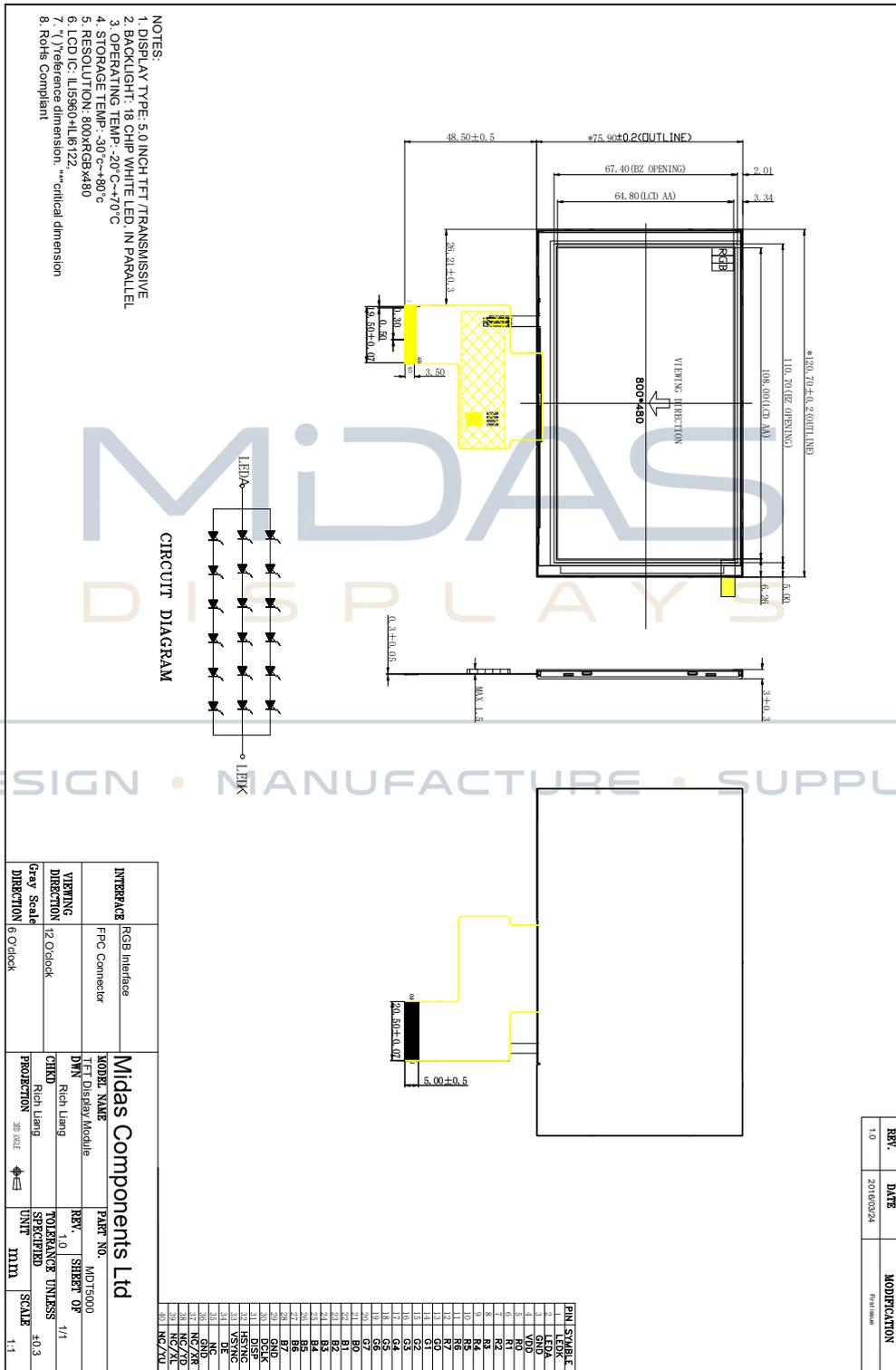
8 Environmental / Reliability Tests

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +70℃, 240hrs	Note 1 IEC60068-2-2, GB2423. 2-89
2	Low Temperature Operation	Ta= -20℃, 240hrs	Note 2 IEC60068-2-1 GB2423.1-89
3	High Temperature Storage	Ta= +80℃, 240hrs	IEC60068-2-2 GB2423. 2-89
4	Low Temperature Storage	Ta= -30℃, 240hrs	IEC60068-2-1 GB/T2423.1-89
5	High Temperature & Humidity Storage	Ta= +60℃, 90% RH max, 160 hours	IEC60068-2-3 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min ~ +80℃ 30 min Change time: 5min, 30 Cycle	Start with cold temperature, end with high temperature IEC60068-2-14, GB2423.22-87
7	Electro Static Discharge (Operation)	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5 times; (Environment: 15℃ ~ 35℃, 30% ~ 60%, 86Kpa ~ 106Kpa)	IEC61000-4-2 GB/T17626.2-1998
8	Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)	IEC60068-2-6 GB/T2423.5-1995
9	Shock (Non-operation)	60G 6ms, ± X, ±Y , ± Z 3 times for each direction	IEC60068-2-27 GB/T2423.5-1995
10	Package Drop Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/T2423.8-1995

Note: 1. T_S is the temperature of panel's surface.

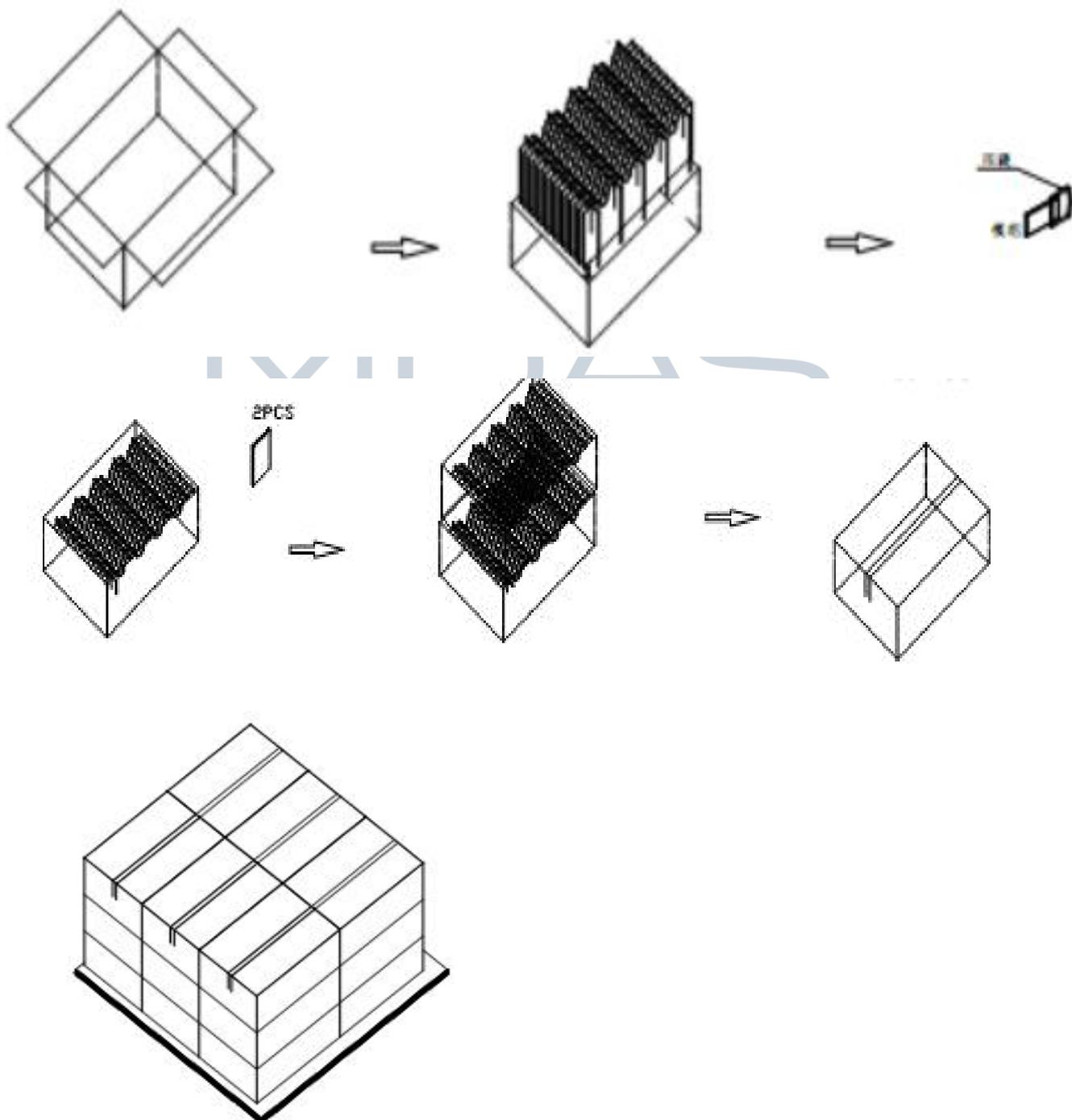   2. Ta is the ambient temperature of sample.

9 . Mechanical Drawing

1 0.Packing

Packing Method

11. Precautions for Use of LCD modules

11.1 Handling Precautions

11.1.1. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

11.1.2. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure   not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

11.1.3. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

11.1.4. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

11.1.5. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

－ Isopropyl alcohol
－ Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

Water ； Ketene ； Aromatic solvents

11.1.6. Do not attempt to disassemble the LCD Module.

11.1.7. If the logic circuit power is off, do not apply the input signals.

11.1.8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

11.1.8.1. Be sure to ground the body when handling the LCD Modules.

11.1.8.2. Tools required for assembly, such as soldering irons, must be properly ground.

11.1.8.3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

11.1.8.4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage Precautions

11.2.1. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

11.2.2. The LCD modules should be stored under the storage temperature range If the LCD modules will be stored   for a long time, the recommend condition is:

Temperature : 0℃ ～ 40℃   Relatively humidity: ≤80%

11.2.3.   The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.