

MDT0400FIH-HDMI	480 x 480	HDMI Interface	TFT Module
Specification			
Version: 1		Date: 12/06/2020	
Revision			
1	10/06/2020	First issue	

Display Features			
Display Size	4.0"		
Resolution	480 x 480		
Orientation	Landscape		
Appearance	RGB		
Logic Voltage	2.8/3.3V		
Interface	HDMI		
Brightness	1000 cd/m ²		
Touchscreen	---		
Module Size	77.00 x 80.00 x 15.90mm		
Operating Temperature	-20°C ~ +70°C		
Pinout	---	Box Quantity	Weight / Display
Pitch	---	---	---

* - For full design functionality, please use this specification in conjunction with the ST7701S specification.(Provided Separately)

Display Accessories	
Part Number	Description

Optional Variants	
Appearances	Voltage

Scope

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel, driver circuit, HDMI PCBA and back-light unit. The resolution of a 4.0 " TFT-LCD contains 480x480 pixels, and can display up to 65K/262K/16.7M colors.

1. Basic Description

General Information	Items	Specifications	Unit	Note
		Main Panel		
	Display area(AA)	71.86(H)*70.18V) (4.0 inch)	mm	
	Driver element	TFT active matrix	-	
	Display colors	65K/262K/16.7M	colors	
	Number of pixels	480(RGB)*480	dots	
	Pixel arrangement	RGB vertical stripe	-	
	Pixel pitch	0.1497(H)*0.1462(V)	mm	
	Viewing angle	ALL	o'clock	
	Controller IC	ST7701S	-	
	Operating temperature	-20~+70	°C	
	Storage temperature	-30~+80	°C	
	LCM Luminance	1000 nits (Typ.)		
	Video Input	HDMI		
	HDMI it Firmware Version	MDT0400FIH-HDMI		



2. Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	77	-	mm	
	Vertical(V)	-	80	-	mm	
	Depth(D)	-	15.9	-	mm	
Weight		-	30	-	g	

3 Recommended Resolution

Recommended Resolution	480(RGB)*480 @55~60 Hz
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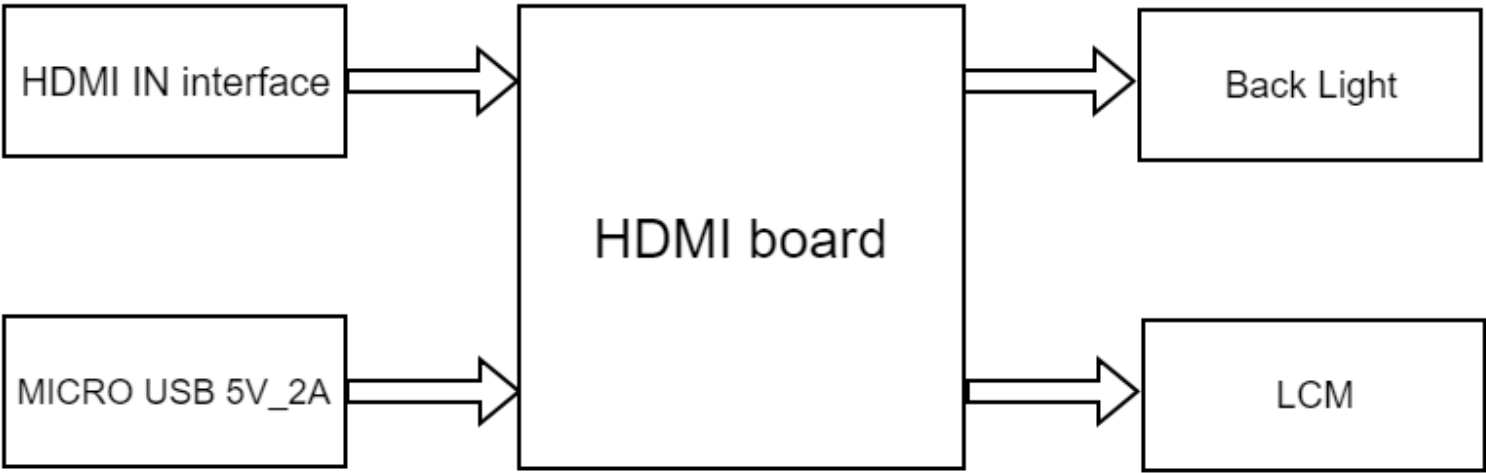
4 Plug & Play

DDC2B /VESA Standard

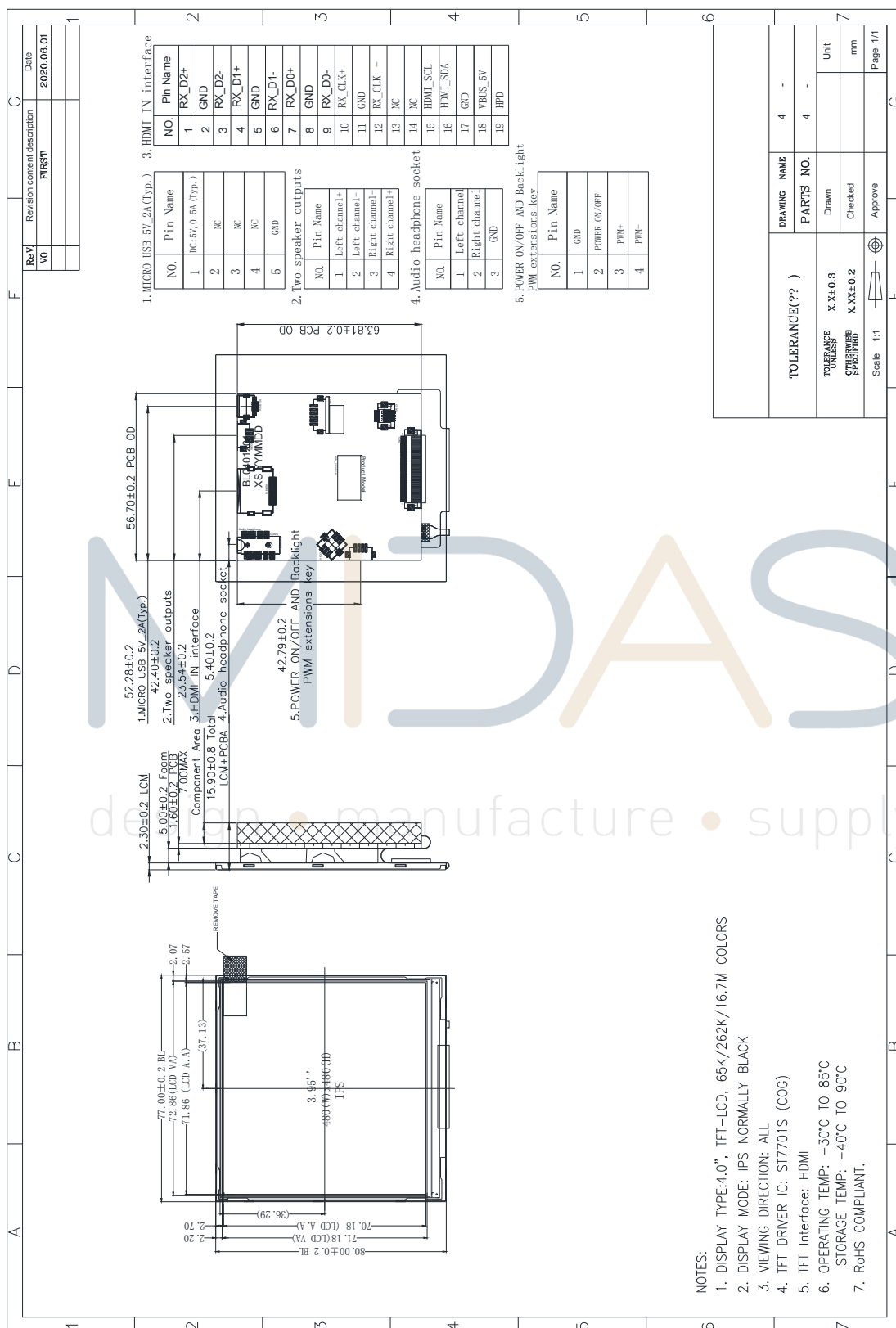
5 Power Supply Rating

Power Consumption	2.5W Watt (Typ.)
MICRO USB DC POWER	5V 2A(Typ.)

Block Diagram



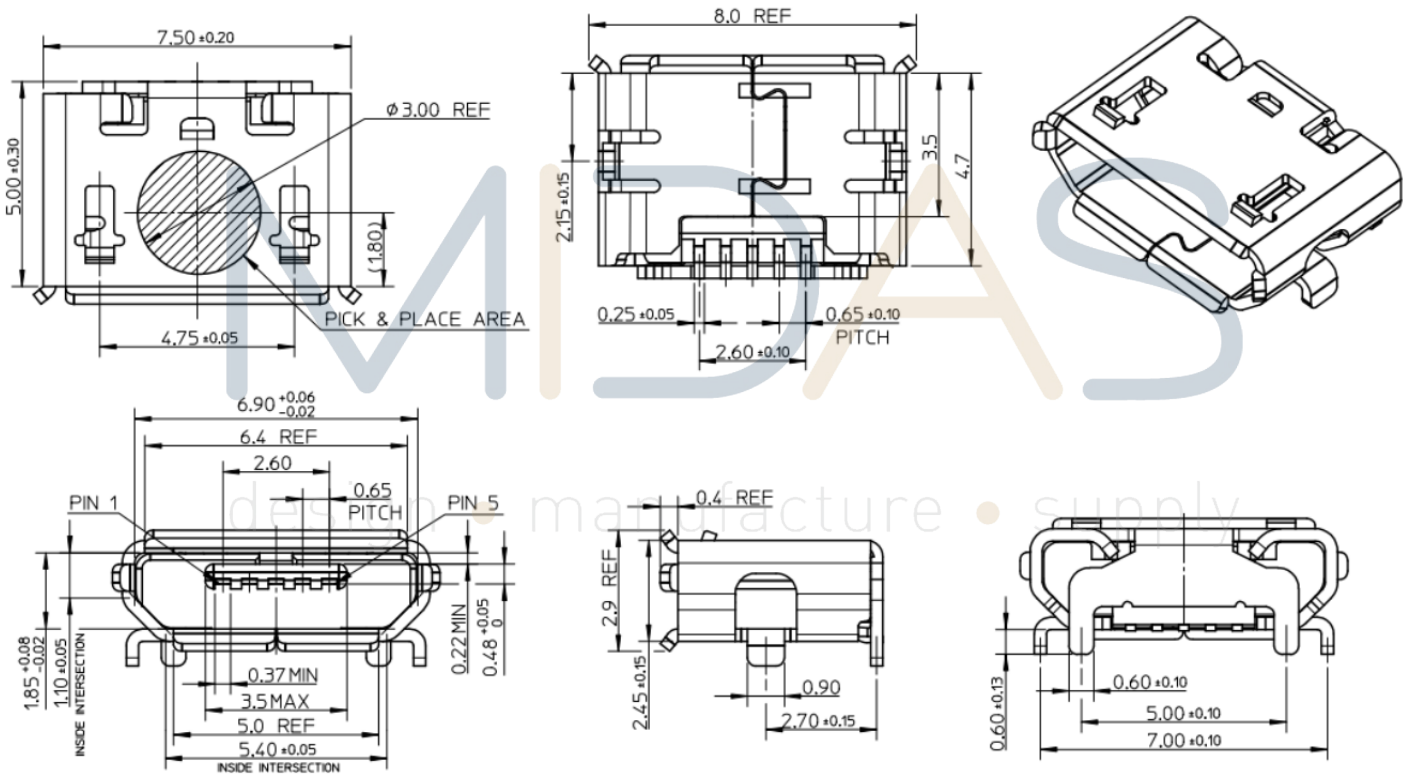
Outline Dimension



Input Terminal Pin Assignment

MICRO USB 5V_2A(Typ.) PIN Definition & Signal Connector

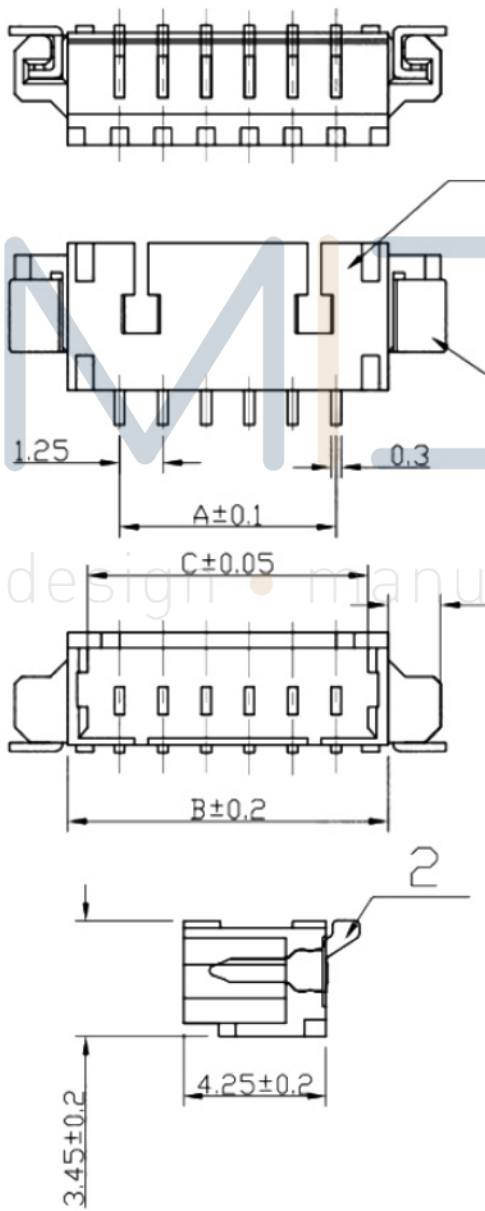
NO.	SYMBOL	DISCRIPTION	I/O
1	DC:5V,2A(Typ.)	Supply voltage(5.0V,2A Typ.).	P
2	NC	No Connection.	I/O
3	NC	No Connection.	I/O
4	NC	No Connection.	I
5	GND	Ground.	P



Two speaker outputs PIN Define & Input Signal Connector

note: SMT PH2.0mm spacing connector 4p

NO.	SYMBOL	DISCRIPTION
1	Left channel+	Audio output left channel
2	Left channel-	
3	Right channel-	Audio output right channel
4	Right channel+	

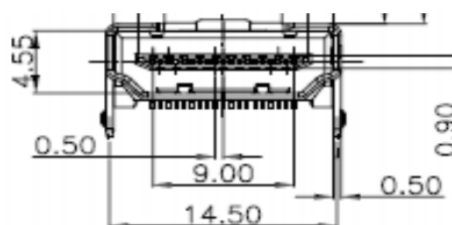
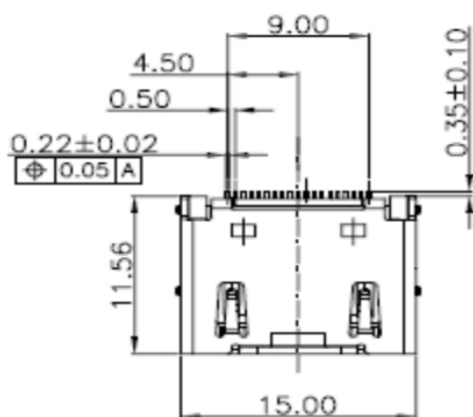


N	A	B	C
2	1.25	4.25	3.20
3	2.50	5.50	4.45
4	3.75	6.75	5.70
5	5.00	8.00	6.95
6	6.25	9.25	8.20
7	7.50	10.50	9.45
8	8.75	11.75	10.7
9	10.00	13.00	11.95
10	11.25	14.25	13.20
11	12.50	15.50	14.45
12	13.75	16.75	15.70
13	15.00	18.00	16.95
14	16.25	19.25	18.20
15	17.50	20.50	19.45
16	18.75	21.75	20.70
17	20.00	23.00	21.95
18	21.25	24.25	23.20
19	22.50	25.50	24.45
20	23.75	26.75	25.70
21	25.00	28.00	26.95
22	26.25	29.25	28.20
23	27.50	30.50	29.45
24	28.75	31.75	30.70
25	30.00	33.00	31.95

HDMI PIN Defintion & Signal Connector

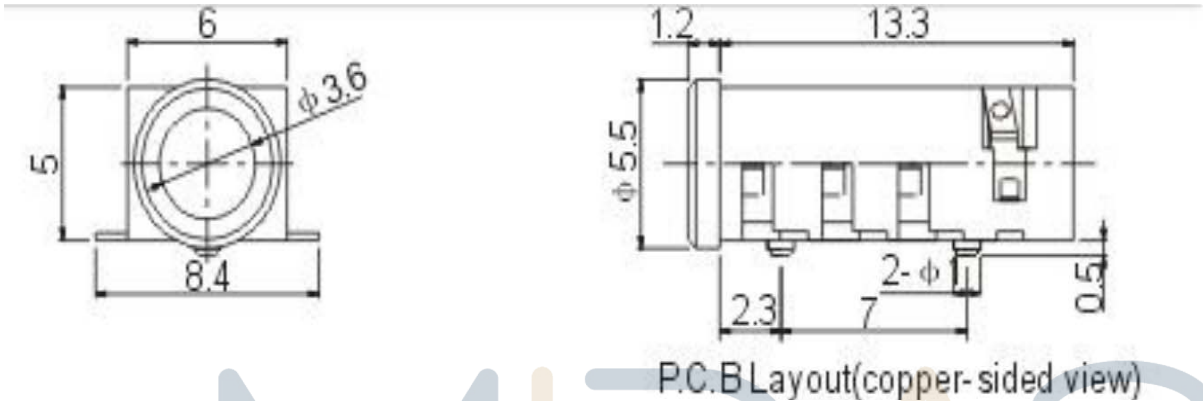
NO.	SYMBOL	DISCRIPTION	I/O
1	RX_D2+	HDMI Receiver channel 2 positive analog input.	I
2	GND	Ground.	P
3	RX_D2-	HDMI Receiver channel 2 negative analog input.	I
4	RX_D1+	HDMI Receiver channel 1 positive analog input.	I
5	GND	Ground.	P
6	RX_D1-	HDMI Receiver channel 1 negative analog input.	I
7	RX_D0+	HDMI Receiver channel 0 positive analog input.	I
8	GND	Ground.	P
9	RX_D0-	HDMI Receiver channel 0 negative analog input.	I
10	RX_CLK+	HDMI Receiver clock positive analog input.	I
11	GND	Ground.	P
12	RX_CLK-	HDMI Receiver clock negative analog input.	I
13	NC	No connect	
14	NC	No connect	
15	HDMI_SCL	HDMI Receiver DDC data channel.	I/O
16	HDMI_SDA	HDMI Receiver DDC clock channel.	I
17	GND	Ground.	P
18	HDMI_5V	HDMI Supply voltage (5.0V).	P
19	HPD	HDMI Receiver hot plug detect output	O

Note : HDMI Connector Dimension:



Audio headphone socket PIN Define & Input Signal Connector

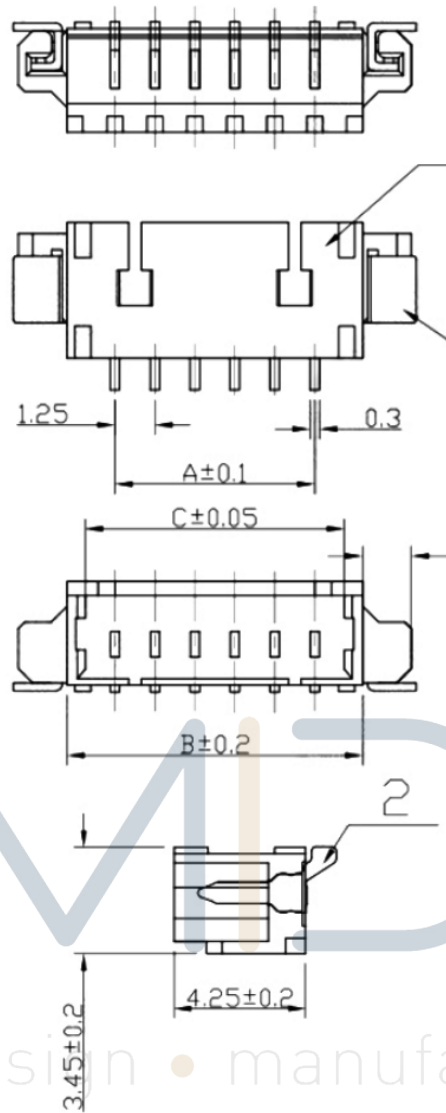
NO.	SYMBOL	DISCRIPTION
1	Left channel	Audio output left channel
2	Right channel	Audio output right channel
3	GND	Ground
4	GND	Ground



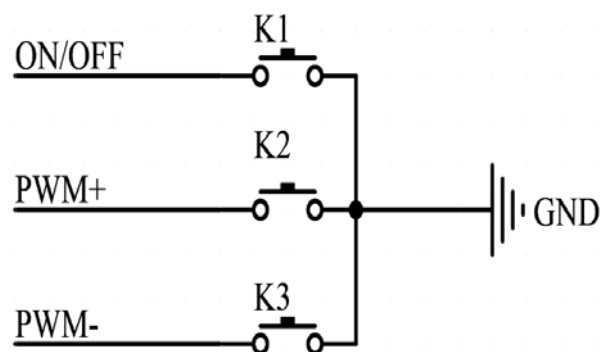
POWER ON/OFF AND Backlight PWM extensions key PIN Definition & Signal Connector

note: SMT PH2.0mm spacing connector 4p

NO.	SYMBOL	DISCRIPTION
1	GND	Ground
2	POWER ON/OFF	ON/OFF KEY
3	PWM+	When the PWM+ button is pressed, the brightness of the backlight will increase by 1 level until the maximum brightness reaches 9 level.
4	PWM-	When PWM- button is pressed, the backlight brightness will decrease by 1 level until the minimum brightness reaches 0 level.



N	A	B	C
2	1.25	4.25	3.20
3	2.50	5.50	4.45
4	3.75	6.75	5.70
5	5.00	8.00	6.95
6	6.25	9.25	8.20
7	7.50	10.50	9.45
8	8.75	11.75	10.7
9	10.00	13.00	11.95
10	11.25	14.25	13.20
11	12.50	15.50	14.45
12	13.75	16.75	15.70
13	15.00	18.00	16.95
14	16.25	19.25	18.20
15	17.50	20.50	19.45
16	18.75	21.75	20.70
17	20.00	23.00	21.95
18	21.25	24.25	23.20
19	22.50	25.50	24.45
20	23.75	26.75	25.70
21	25.00	28.00	26.95
22	26.25	29.25	28.20
23	27.50	30.50	29.45
24	28.75	31.75	30.70
25	30.00	33.00	31.95



Operating Instructions:

- 1. This product supports the following operating systems: Windows 7/8/10,, Andriod.
- 2. Connect the HDMI cable to Windows 7/8/10 or Andriod.
- 3. Connect the micro USB DC POWER.

LCD Optical Characteristics

1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$ Normal viewing angle	640	800	--		*(1)(2)
Response time	Rising	T_{R+T_F}		--	25	35	msec	*(1)(3)
	Falling							
Uniformity		S(%)		55	60	--	%	*
Color Filter Chromaticity	White	W_X		0.269	0.309	0.349		CA-310 Test
		W_Y		0.310	0.350	0.390		
	Red	R_X		0.571	0.611	0.651		
		R_Y		0.323	0.363	0.403		
	Green	G_X		0.277	0.317	0.357		
		G_Y		0.530	0.570	0.610		
	Blue	B_X		0.110	0.150	0.190		
		B_Y		0.060	0.100	0.140		
Viewing angle	Hor.	Θ_L	CR>10	70	80	--		*(1)(4)
		Θ_R		70	80	--		
	Ver.	Θ_U		70	80	--		
		Θ_D		70	80	--		

*The data comes from the LCD specification.



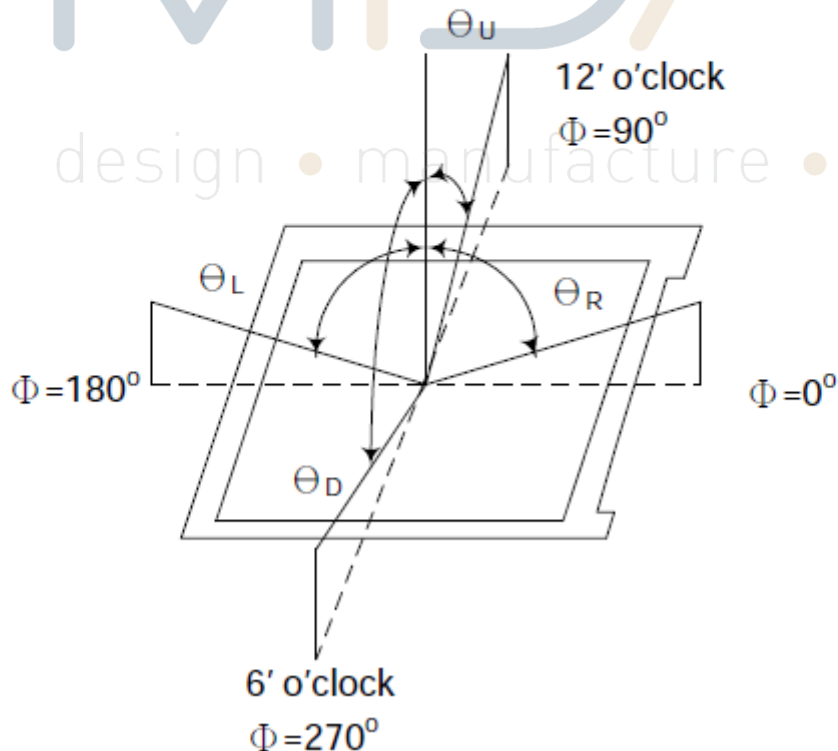
2 Measuring Condition

- Measuring surrounding: dark room
- Ambient temperature: $25 \pm 2^{\circ}\text{C}$
- 15min. warm-up time.

Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

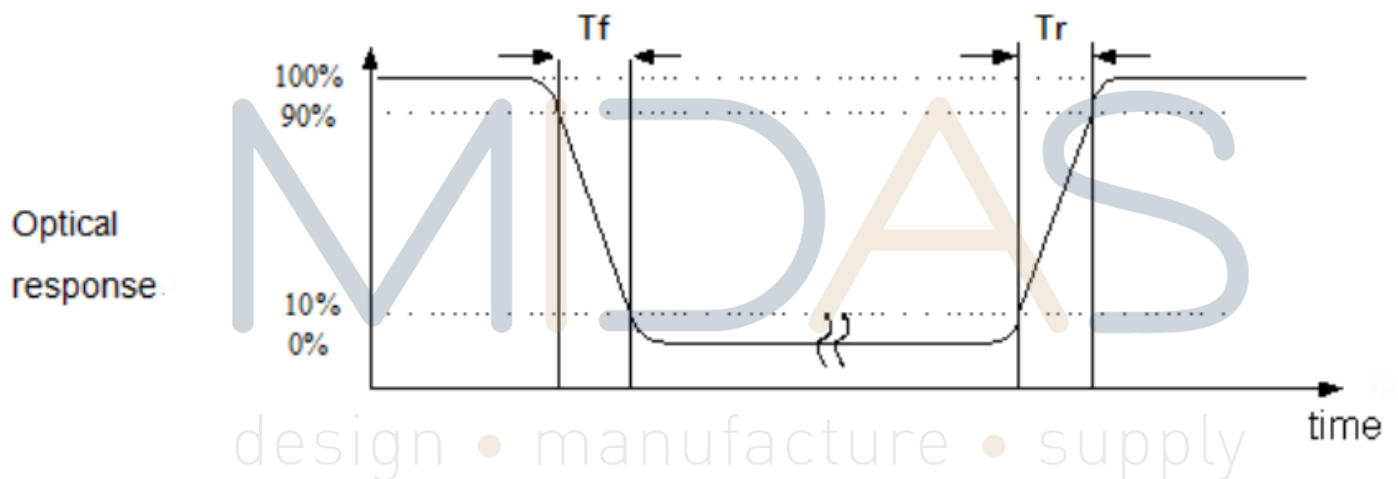
Note (1) Definition of Viewing Angle:



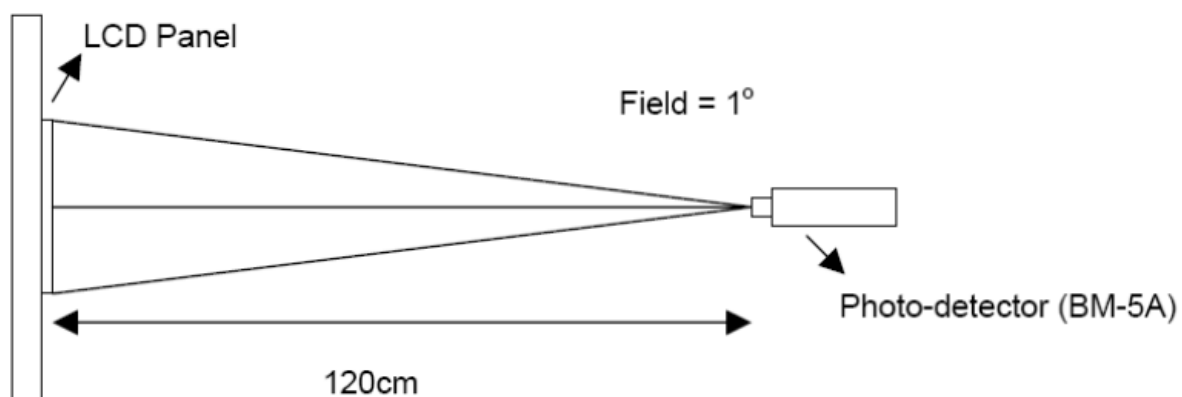
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

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



Note (4) Definition of optical measurement setup



Electrical Characteristics:

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

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VCI	-0.3	4.6	V
Digital interface supple Voltage	IOVCC	-0.3	3.3	V
Operating temperature	T _{OP}	-20	+70	°C
Storage temperature	T _{ST}	-30	+80	°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.

2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VCI	2.5	2.8/3.3	3.6	V	
Digital interface supple Voltage	IOVCC	1.65	1.8	3.3	V	
Normal mode Current consumption	IDD	--	30	--	mA	
Level input voltage	V _{IH}	0.7IOVCC		IOVCC	V	
	V _{IL}	GND		0.3IOVCC	V	
Level output voltage	V _{OH}	0.8IOVCC		IOVCC	V	
	V _{OL}	GND		0.2IOVCC	V	



LCD Module Out-Going Quality Level

1 VISUAL & FUNCTION INSPECTION STANDARD

.1 Inspection conditions

Inspection performed under the following conditions is recommended.

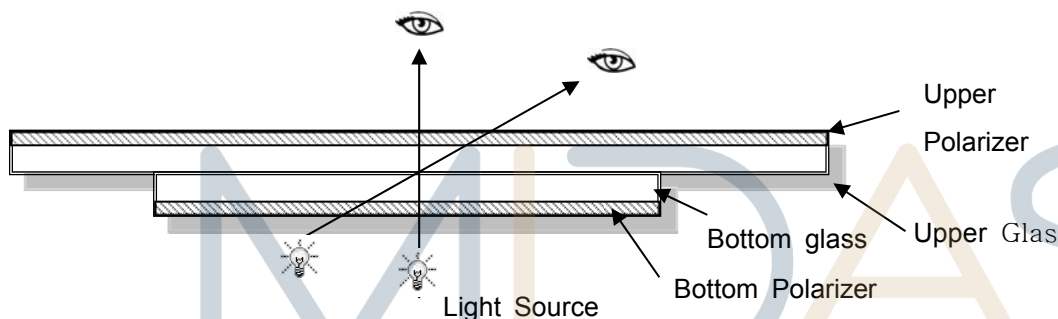
Temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $65\% \pm 10\% \text{RH}$

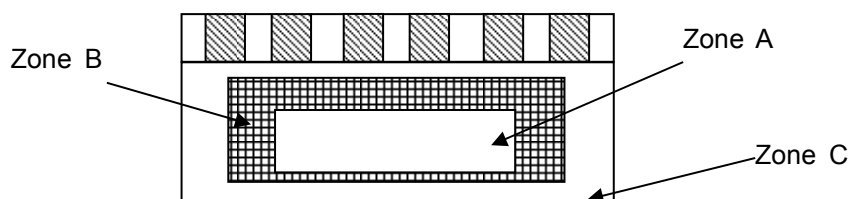
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance: 30-50cm



1.2 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 .)

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.



1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class II

AQL:

Major defect	Minor defect
0.65	1.5

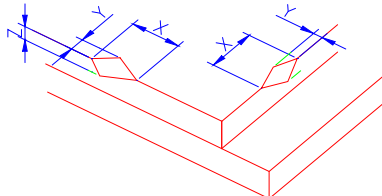
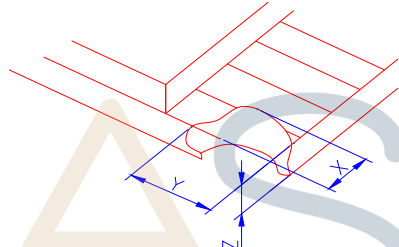
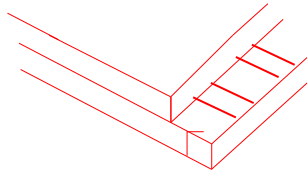
LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

N o	Items to be insp ected	Criteria	Classification of de fects
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 drawi ng is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appeara nce	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

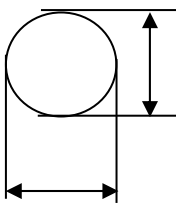
design • manufacture • supply



1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken	(1) The edge of LCD broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></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					
NOTE: X: Length Y: Width Z: Height L: Length of I TO, T: Height of L CD	(2)LCD corner broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						
	(3) LCD crack	 Crack Not allowed						



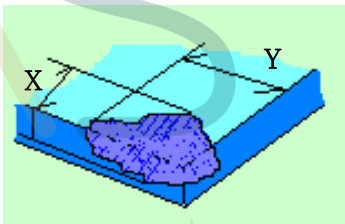
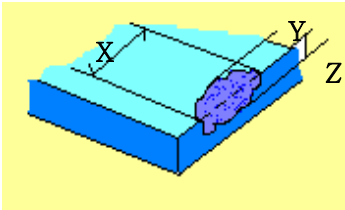
Number	Items	Criteria (mm)																									
2.0	Spot defect  Y X Φ=(X+Y)/2	① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)																									
		<table><tr><th rowspan="2">Zone Size (mm)</th><th colspan="3">Accep</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>Φ≤0.30</td><td colspan="2">Ignore</td><td rowspan="4">Ignor</td></tr><tr><td>0.20<Φ≤0.3</td><td colspan="2">3(distance ≥ 10mm)</td></tr><tr><td>0.25<Φ≤0.35</td><td colspan="2">2</td></tr><tr><td>Φ > 0.4</td><td colspan="2">0</td></tr></table>	Zone Size (mm)	Accep			A	B	C	Φ≤0.30	Ignore		Ignor	0.20<Φ≤0.3	3(distance ≥ 10mm)		0.25<Φ≤0.35	2		Φ > 0.4	0						
		Zone Size (mm)		Accep																							
			A	B	C																						
		Φ≤0.30	Ignore		Ignor																						
		0.20<Φ≤0.3	3(distance ≥ 10mm)																								
		0.25<Φ≤0.35	2																								
		Φ > 0.4	0																								
		②Dim spot (LCD/TP/Polarizer dim dot, light leakage、 dark spot)																									
		<table><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><tr><td>Φ≤0.3</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>0.2<Φ≤0.3</td><td colspan="2">3(distance ≥ 10mm)</td></tr><tr><td>0.25<Φ≤0.35</td><td colspan="2">2</td></tr><tr><td>Φ > 0.4</td><td colspan="2">0</td></tr></table>	Zone Size (mm)	Acceptable Qty			A	B	C	Φ≤0.3	Ignore		Ignore	0.2<Φ≤0.3	3(distance ≥ 10mm)		0.25<Φ≤0.35	2		Φ > 0.4	0						
		Zone Size (mm)		Acceptable Qty																							
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		Φ≤0.3	Ignore		Ignore																						
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Zone Size (mm)		Acceptable Qty																									
	A	B	C																								
Φ≤0.3	Ignore		Ignore																								
0.25<Φ≤0.5	2(distance ≥ 10mm)																										
Φ>0.5	0																										
Line defect (LCD/TP /Polarizer black/white line, scratch, stain)	<table><tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>Φ≤0.05</td><td>Igno</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>0.04<W≤0.07</td><td>L≤3.0</td><td colspan="2">N≤2</td></tr><tr><td>0.06<W≤0.09</td><td>L≤2.0</td><td colspan="2">N≤2</td></tr><tr><td>0.09<W</td><td colspan="3">Define as spot defect</td><td></td></tr></table>	Width(mm)	Length(mm)	Acceptable Qty			A	B	C	Φ≤0.05	Igno	Ignore		Ignore	0.04<W≤0.07	L≤3.0	N≤2		0.06<W≤0.09	L≤2.0	N≤2		0.09<W	Define as spot defect			
Width(mm)	Length(mm)			Acceptable Qty																							
		A	B	C																							
Φ≤0.05	Igno	Ignore		Ignore																							
0.04<W≤0.07	L≤3.0	N≤2																									
0.06<W≤0.09	L≤2.0	N≤2																									
0.09<W	Define as spot defect																										

3.0	Polarizer Bubble	Zone Size (mm) Acceptable Qty A B C			
		Ignore		Ignore	
		3(distance ≥ 10			
		2			
		0			

4.0	SMT	According to IPC-A-610C class II standard . Function defect and missing part are major defect ,the others are minor defect.
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			</		



5.0	TP Related	Newton Ring	Newton Ring area>1/3 TP are a NG Newton Ring area≤1/3 TP are a OK	1规律性 2非规律性 似牛顿环					
	TP corner broken X : length Y : width Z : height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤3.0mm</td><td>Y≤3.0mm</td><td>Z<LCD thi ckness</td></tr></table> * Circuitry broken is not allowe d.	X	Y	Z	X≤3.0mm	Y≤3.0mm	Z<LCD thi ckness	Z 
X	Y	Z							
X≤3.0mm	Y≤3.0mm	Z<LCD thi ckness							
	TP edge br oken X : length Y : width Z : height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤6.0mm</td><td>Y≤2.0mm</td><td>Z<LCD thicknes</td></tr></table> * Circuitry broken is not allowe d.	X	Y	Z	X≤6.0mm	Y≤2.0mm	Z<LCD thicknes	
X	Y	Z							
X≤6.0mm	Y≤2.0mm	Z<LCD thicknes							

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 Results

Item	Condition	Inspection after test
High Temperature Operating	70°C,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	-20°C, 96HR	
High Temperature Storage	80°C, 96HR	
Low Temperature Storage	-30°C, 96HR	
High Temperature & High Humidity Operating	+60°C, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30°C,30 min ↔ 80°C,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 5 times; (Environment: 15°C~35°C, 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

1 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

2 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.

