



§ SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No LP104M2PB~~X~~-F~~X~~R

Description: 10.4" Digital TFT-LCD Module

SPEC No.: SAS-1211005

Version: 0.1

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※ This approval sheet contains 26 pages including the cover and appendix.

Customer: _____

Date: / / 13

APPROVED BY:

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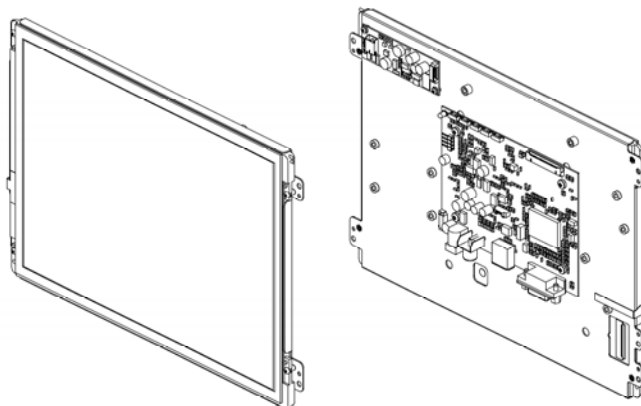
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FLAT DISPLAY TECHNOLOGY

10.4" Digital TFT-LCD Module



■ LP104M2PB~~x~~-F~~x~~R

1. General Description

1.1 Features

- 10.4" Digital TFT LCD
- Ultra Compact
- NTSC/PAL/SECAM Video Auto Switch
- Single Operation Voltage +12V
- CVBS / Analog RGB (PC Mode) Signal Input
- All Functions can be controlled by UART
- Support Touch Screen Function (Option)

1.2 Applications

- Portable product
- Industrial
- Hand-held
- Security
- Instrument Display
- Office Electronics

1.3 Application Precautions

Do not use the products herein for the following equipment which demands extremely high performance in terms of functionality, reliability, or accuracy.

- Aerospace equipment
- Communication equipment for trunk lines.
- Control equipment for the nuclear power industry.
- Medical equipment related to life support, etc.

The other application that demands high reliability and functionality should first contact a sales representative.

2. Contents

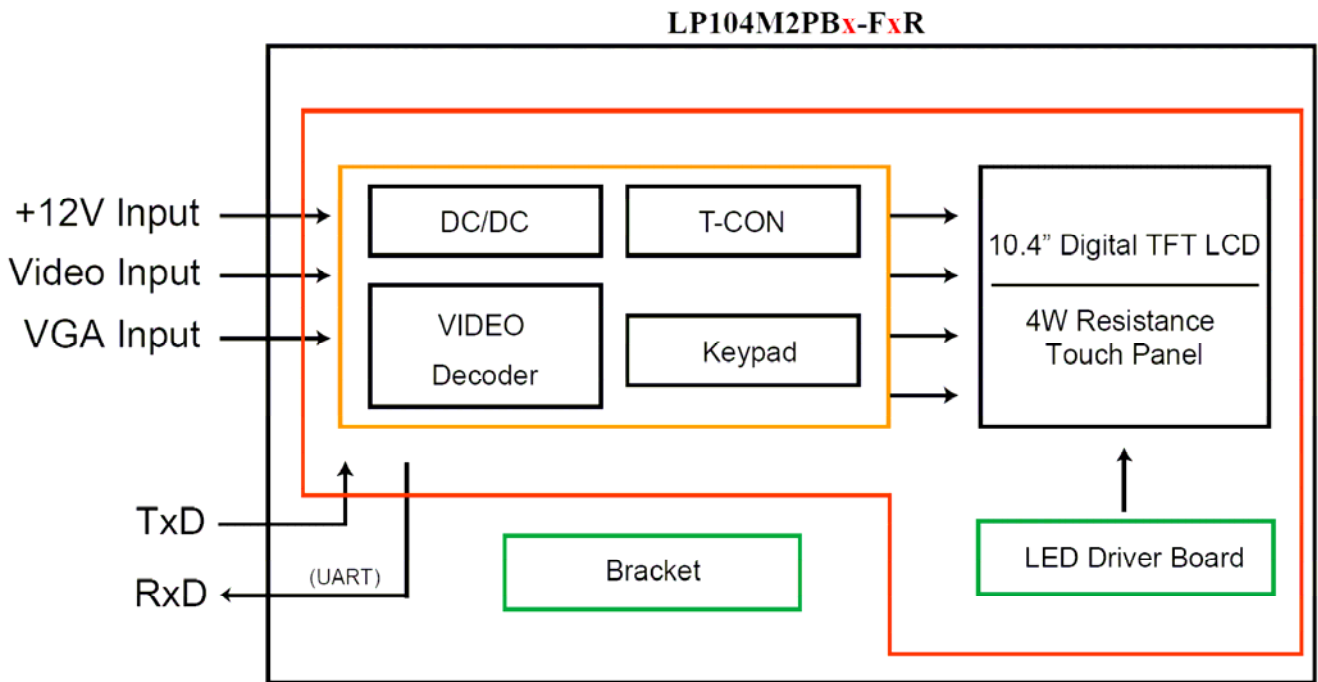
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Preliminary

3. Block Diagram

3.1 Block Diagram



4. TFT-LCD Information

4.1 TFT-LCD Mechanical Specifications

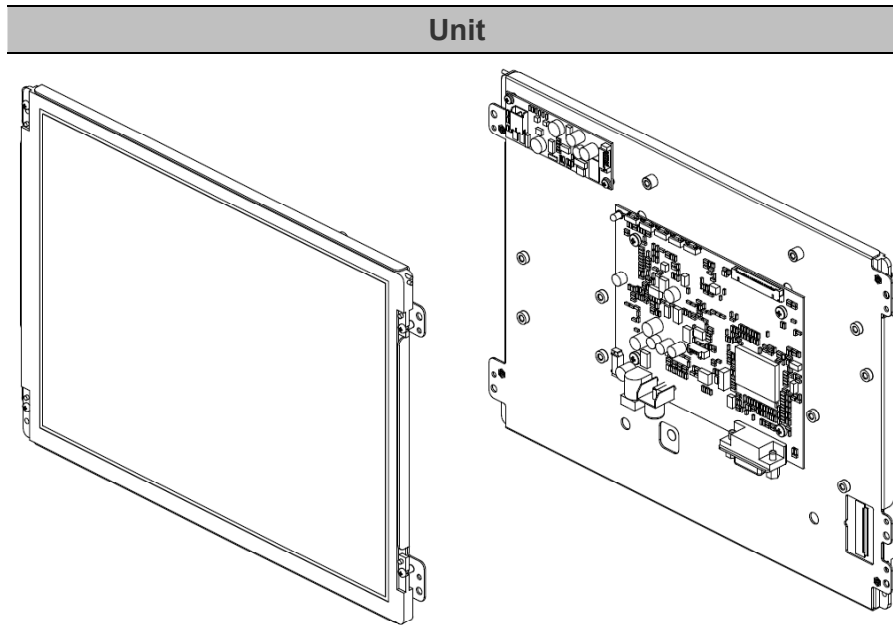
Parameter	Specifications	Unit
Screen Size	10.4 (diagonal)	inch
Display Format	800 x (R.G.B) x 600	dot
Active Area	211.2(H) x 158.4(V)	mm
Pixel Pitch	0.264 (H) x 0.264 (V)	mm
Pixel Configuration	Stripe	
Outline Dimension	236.0 (W) x 176.9 (H) x 5.6 (typ.) (D)	mm
Surface Treatment	Anti-Glare (3H)	
Weight	288±15	g

4.2 TFT-LCD Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Left	60	70		deg	
		Right	60	70		deg	
	Vertical	Top	50	60	-	deg	
		Bottom	60	70	-	deg	
Contrast Ratio	CR		300	400	-	---	
Response time	Rise Fall	Tr	-	10	15	ms	
		Tf	-	15	25	ms	
Uniformity	U		70	80	-	%	
Brightness		$\Theta = 0^\circ \varphi = 0$	350	400		Cd/m ²	
White Chromaticity	X		0.259	0.309	0.359	---	
	y		0.284	0.334	0.384	---	
LED Life Time			10000	(20000)	-	hrs	Ta=25°C

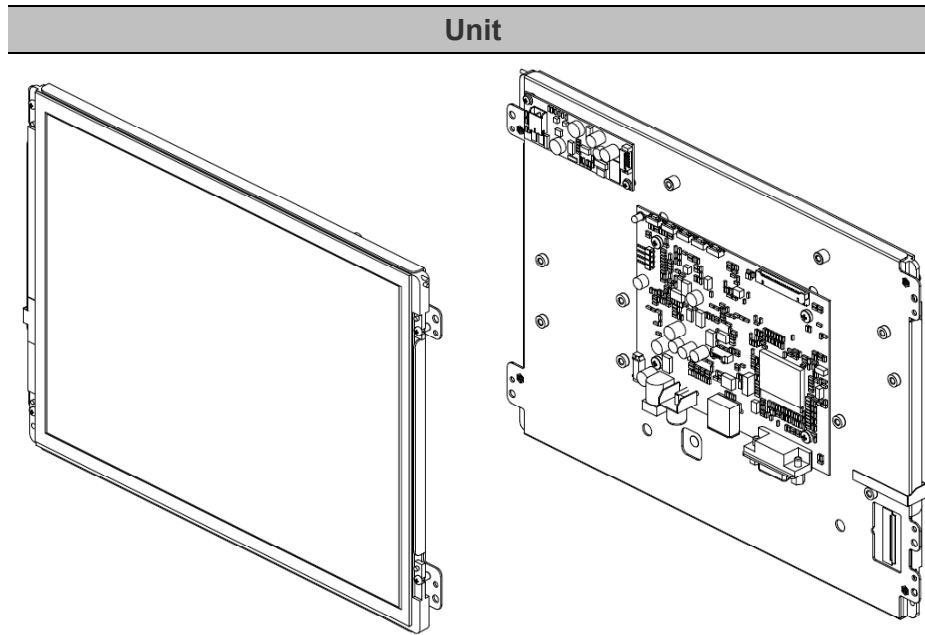
5. Order Information

5.1 Unit



Parameter	LP104M2PB1-FBR	LP104M2PB1-FNR	Unit
CVBS	1	1	
VGA (D-Sub15 / 2.0mm 14Pin)	D-Sub15	D-Sub15	
LVDS Cable (A24WC2-LK200KR)	⊙	⊙	
LED Driver Board	⊙	⊙	
AC to DC Adapter 12V/3A (LASTD12030-FDR)	⊙	-	
Power Cord Plug Type B for USA (LAACD18000-FDR)	⊙	-	
Video Cable (LAVDO18000-FDR)	⊙	-	
VGA Cable (LAVGA16000-FDR)	⊙	-	

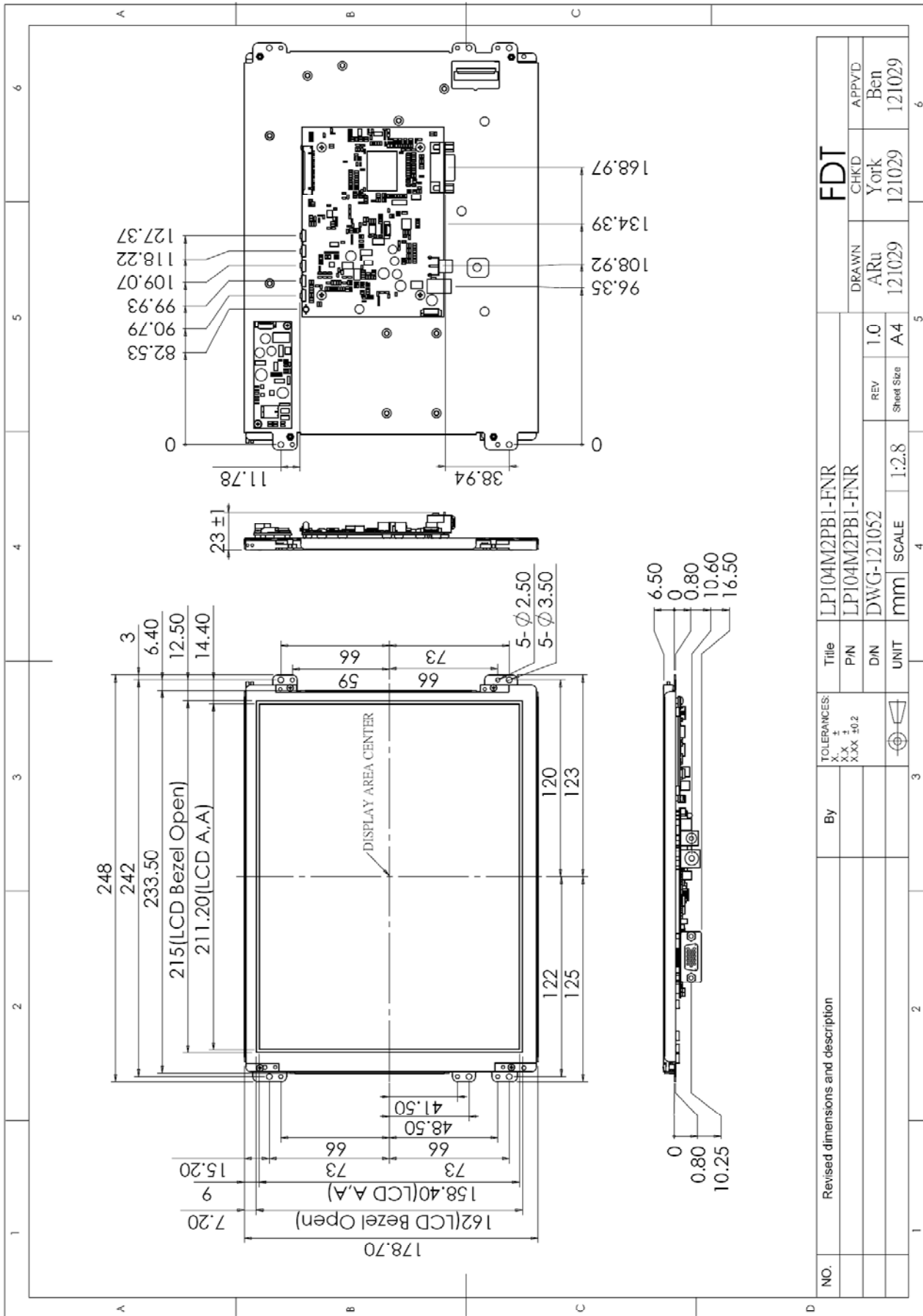
5.2 Unit (4W Touch)



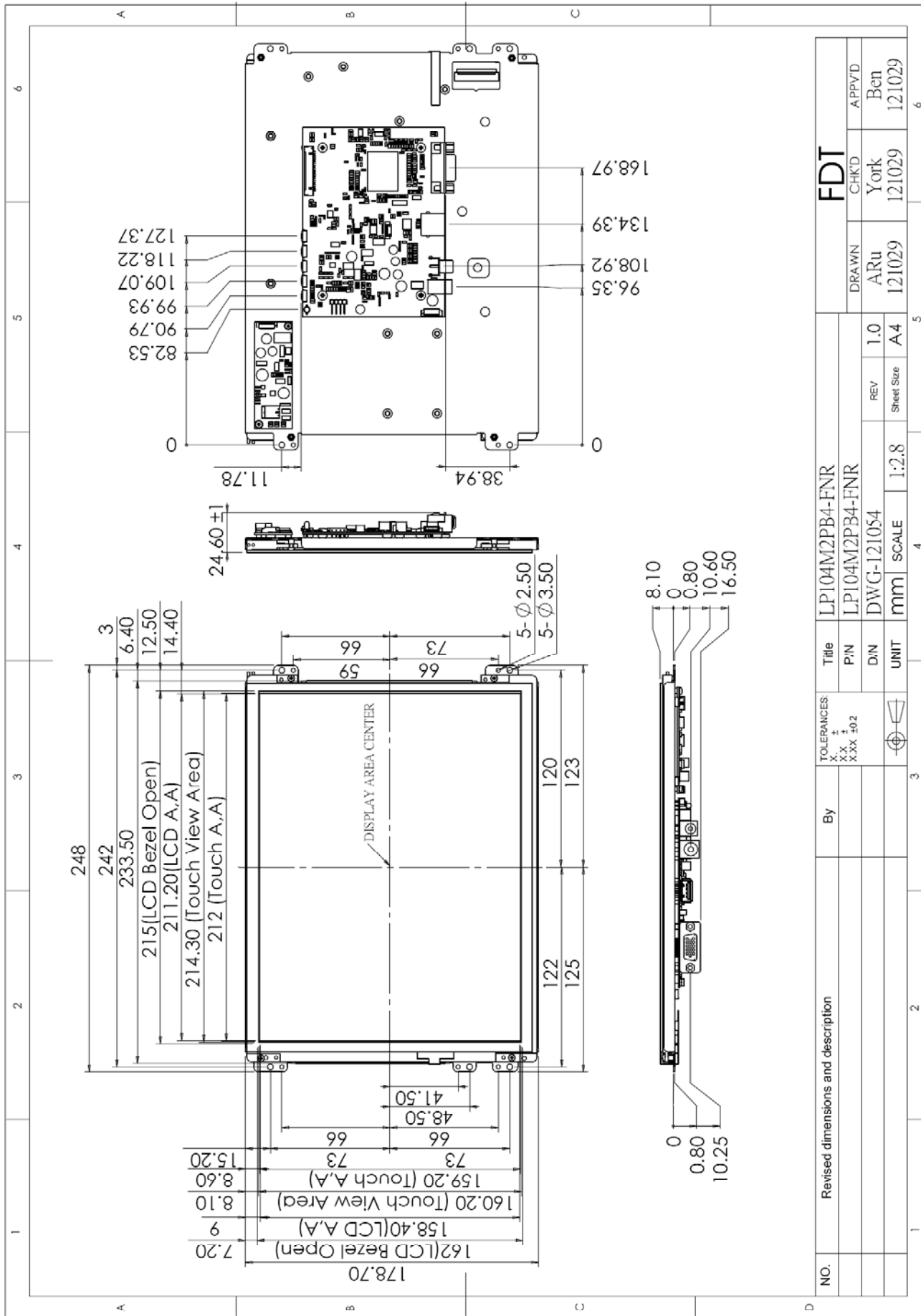
Parameter	LP104M2PB4-FBR	LP104M21PB5-FBR	LP104M2PB4-FNR	LP104M2PB5-FNR	Unit
CVBS	1	1	1	1	
VGA (D-Sub15 / 2.0mm 14Pin)	D-Sub15	D-Sub15	D-Sub15	D-Sub15	
Touch Panel Type	4W Resistive	4W Resistive	4W Resistive	4W Resistive	
Touch Screen Interface	USB	RS232	USB	RS232	
LVDS Cable (A24WC2-LK200KR)	⊙	⊙	⊙	⊙	
LED Driver Board	⊙	⊙	⊙	⊙	
AC to DC Adapter 12V/3A (LASTD12030-FDR)	⊙	⊙	-	-	
Power Cord Plug Type B for USA (LAACD18000-FDR)	⊙	⊙	-	-	
Video Cable (LAVDO18000-FDR)	⊙	⊙	-	-	
VGA Cable (LAVGA16000-FDR)	⊙	⊙	-	-	
USB Cable (LAUSB18000-FDR)	⊙	-	-	-	
RS-232 Cable (LARS218000-FDR)	-	⊙	-	-	
Touch Screen Driver CD Disk	⊙	⊙	⊙	⊙	

6. Dimension Information

6.1 Unit (LP104M2PB1-FNR)



6.2 Unit (LP104M2PB4-FNR)

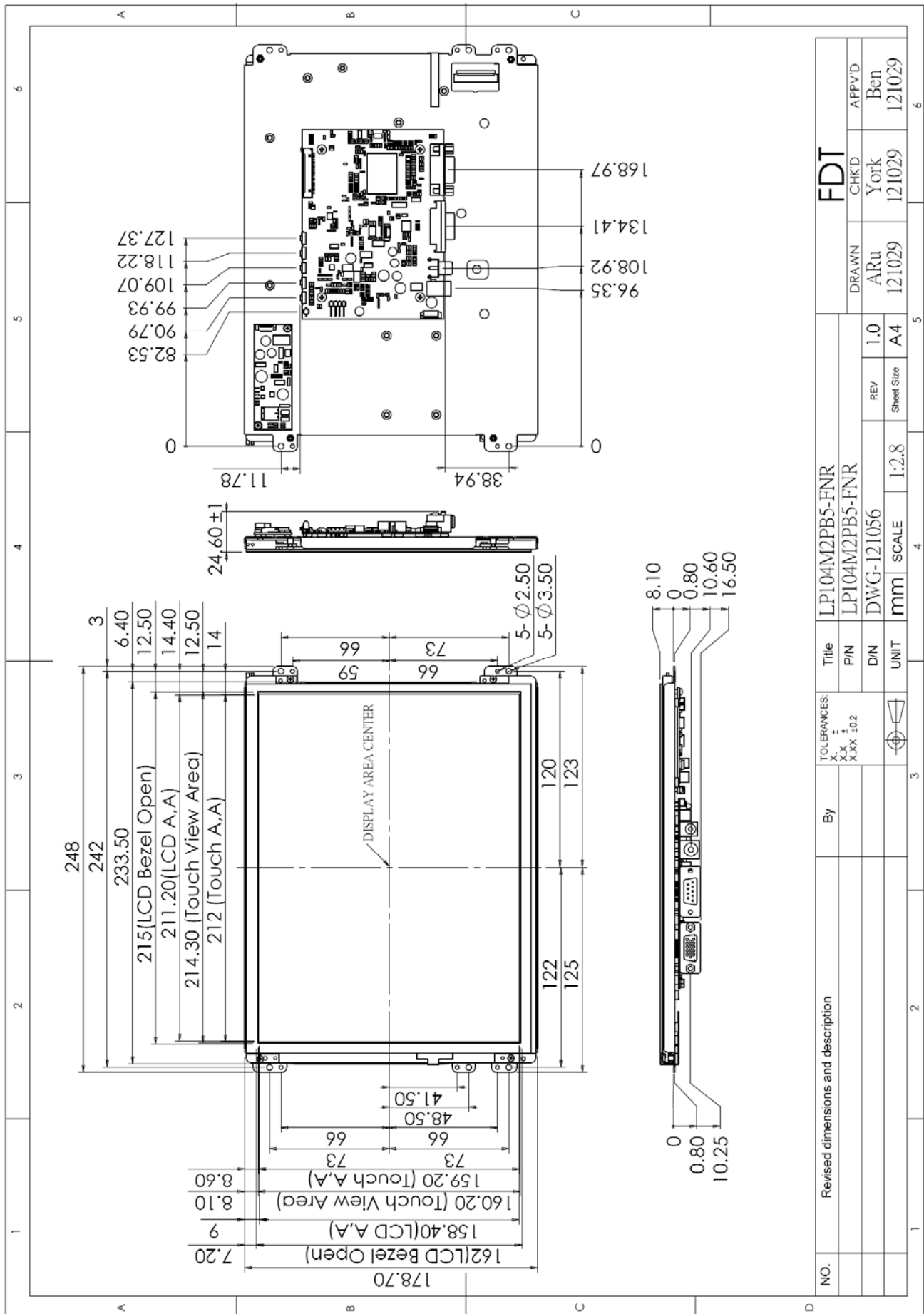


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■ LP104M2PBx-FxR V0.1



6.3 Unit (LP104M2PB5-FNR)



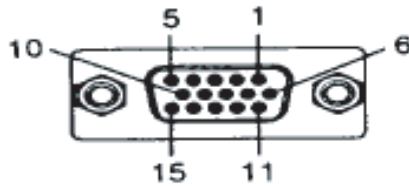
7. Pin Description

7.1 J302 : LCD Panel I/O Terminals (20 Pin LVDS Connector Pitch 1.25mm Side Entry Type)

Pin No	Symbol	I/O	Description	Remark
1	VDD	I	Power Supply	
2	VDD	I	Power Supply	
3	GND	-	Ground	
4	GND	-	Ground	
5	INO-	I	LVDS receiver signal channel 0	
6	INO+	I	LVDS receiver signal channel 0	
7	GND	-	Ground	
8	IN1-	I	LVDS receiver signal channel 1	
9	IN1+	I	LVDS receiver signal channel 1	
10	GND	-	Ground	
11	IN2-	I	LVDS receiver signal channel 2	
12	IN2+	I	LVDS receiver signal channel 2	
13	GND	-	Ground	
14	CLK-	I	LVDS receiver signal clock	
15	CLK+	I	LVDS receiver signal clock	
16	GND	-	Ground	
17	NC	-	No connection	
18	NC	-	No connection	
19	GND	-	Ground	
20	GND	-	Ground	

7.2 J101B : Pin Assignment of Analog RGB Input (D-Sub 15Pin)

Pin No	Symbol	I/O	Description	Remark
1	RI+	I	Analog Red Signal	
2	GI+	I	Analog Green Signal	
3	BI+	I	Analog Blue Signal	
4	NC	-	No Connection	
5	GND	-	Ground	
6	AGND	-	Analog Ground	
7	AGND	-	Analog Ground	
8	AGND	-	Analog Ground	
9	VGA5V	-	VGA +5V Input	
10	VGA-Det	I	VGA Detect	
11	NC	-	No Connection	
12	NC	-	No Connection	
13	HS_IN	I	TTL Horizontal sync	
14	VS_IN	I	TTL Vertical sync	
15	NC	-	No Connection	



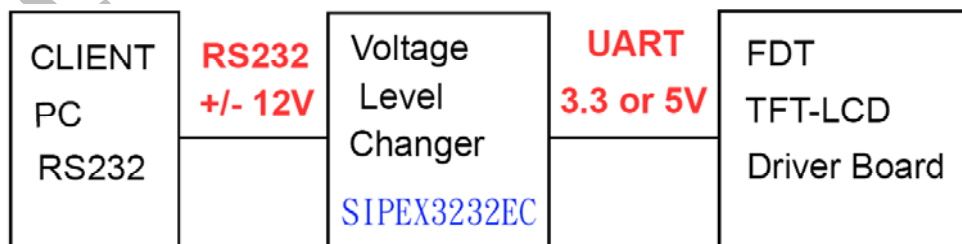
7.3 J101: Pin Assignment of UART (Pitch 1.25mm 4Pin, Top Entry Type)

※ FDT Connector Part No.: MS24014 (STM) [Same as 53398-0471 (MOLEX)] ;

※ FDT Matching Connector Part No.: P24014 (STM) [Same as 51021-0400 (MOLEX)].

Pin No	Symbol	I/O	Description	Remark
1	TX	O	UART Transmission Data	
2	RX	I	UART Receive Data	
3	GND	-	Ground	
4	+3.3VA	O	+3.3V Output Voltage	

Note: All Functions can be controlled by UART , About UART command list please contact FDT sales.



7.4 DC JACK: Pin Assignment of Power Input (Inside Diameter:2.1 ϕ Outside Diameter:5.5 ϕ Side Entry Type)

Pin No	Symbol	I/O	Description	Remark
1	VIN	I	+12V Input Voltage	
2	GND	-	Power Ground	

7.5 RCA JACK: Pin Assignment of Video Input (RCA JACK Yellow, Side Entry Type)

Pin No	Symbol	I/O	Description	Remark
1	Video	I	Video Input	
2	AGND	-	Analog Ground	

7.6 J601: Pin Assignment of Inverter (Pitch 1.25mm 6Pin, Side Entry Type)

※ FDT Connector Part No.: MS24016R (STM) [Same as 53261-0619 (MOLEX)] ;

※ FDT Matching Connector Part No.: P24016 (STM) [Same as 51021-0600 (MOLEX)].

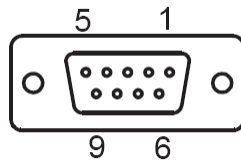
Pin No	Symbol	I/O	Description	Remark
1	DC-IN	O	Inverter Power (+12V)	
2	DC-IN	O	Inverter Power (+12V)	
3	DIMMER	O	Backlight Brightness Adjust (0~3.3V)	
4	NC	-	No Connection	
5	GND	-	Power Ground	
6	GND	-	Power Ground	

7.7 J401B : Pin Assignment of Touch USB (USBA-Female 2.0mm, Side Entry Type)(Option)

Pin No	Symbol	I/O	Description	Remark
1	DGND	-	Digital Ground	
2	D+	-	DATA (+)	
3	D-	-	DATA (-)	
4	VBUS	-	USB VCC	

7.8 J401C : Pin Assignment of Touch RS232 (D-SUB 9 FEMALE)(Option)

Pin No	Symbol	I/O	Description	Remark
1	NC	-	No Connection	
2	TXD	-	Transmit Data	
3	RXD	-	Receive Data	
4	NC	-	No Connection	
5	GND	-	Ground	
6	NC	-	No Connection	
7	NC	-	No Connection	
8	NC	-	No Connection	
9	NC	-	No Connection	



8. Absolute Maximum Ratings

8.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Remark
Input Voltage	V _{in}	+9	+15	V	
Video Input Signal	Video in	0.5	2.0	V _{p-p}	@75Ω
Analog RGB Input Signal	Analog RGB in	0.5	2.0	V _{p-p}	@75Ω
Digital Input Signal	TTL	+0.3	+3.6	V	
Operating Temperature		-20	+70	°C	
Storage Temperature		-30	+80	°C	
Operating Temperature with TSP		-5	+60	°C	
Storage Temperature with TSP		-30	+70	°C	

9. Recommended Operating Conditions

9.1 Electrical Characteristics

Parameter	Symbol	I/O	Min	Typ	Max	Unit	Note
Input Voltage	Vin	I	+10	+12	+14	V	
Total Current	Iin (+12V)	I	-	510	-	mA	±15%
Power Consumption		I	-	6.12	-	W	@+12V
Output Voltage	VDD	O	+3.2	+3.3	+3.4	V	I=10mA
Video Input Signal	Video in	I		1.0		Vp-p	@75Ω
Analog RGB Input Signal	Analog RGB in	RGB		0.7		Vp-p	@75Ω

9.2 VGA Mode Characteristics

Dots per inch	H	Unit	Polarity	V	Unit	Polarity	Note
640*480	31.469	KHz	Negative	59.941	Hz	Negative	
800*600	37.879	KHz	Positive	60.317	Hz	Positive	
1024*768	48.363	KHz	Negative	60.004	Hz	Negative	

9.3 Panel Backlight Data

Parameter	Symbol	Min	Typ	Max	Unit	Note
Supply voltage of LED backlight	VL	17.7	-	20.7	Vrms	IL=20mA x6 = 120mA,
Supply current of LED backlight	IL	-	120	-	mA	(±10%)

10. 4W Resistance Touch Panel Characteristics

10.1 Pin assignment (Pitch :2.54 mm)

Pin No	Symbol	Description	Remark
1	RT	Right & Top electrode	
2	RL	Right & Lower electrode	
3	SG	Signal Ground	
4	LT	Left & Top electrode	
5	LL	Left & Lower electrode	

10.2 Electrical Performance

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Loop Resistance	X	20	-	500	Ω	
	Y	20	-	500	Ω	
Linearity		-	-	1.5	%	
Insulation Impedance		20	-	-	M Ω	DC 25V
Response Time		-	-	15	ms	

10.3 Optical Performance

Parameter	Specifications
Transparency	$\geq 80\%$
Haze	$9.5\% \pm 2\%$

10.4 Mechanical Performance

Parameter	Specifications
Input Method	Finger or stylus pen
Operating Force	$\leq 50\text{gf}$
Surface Hardness	$\geq 3\text{H}$

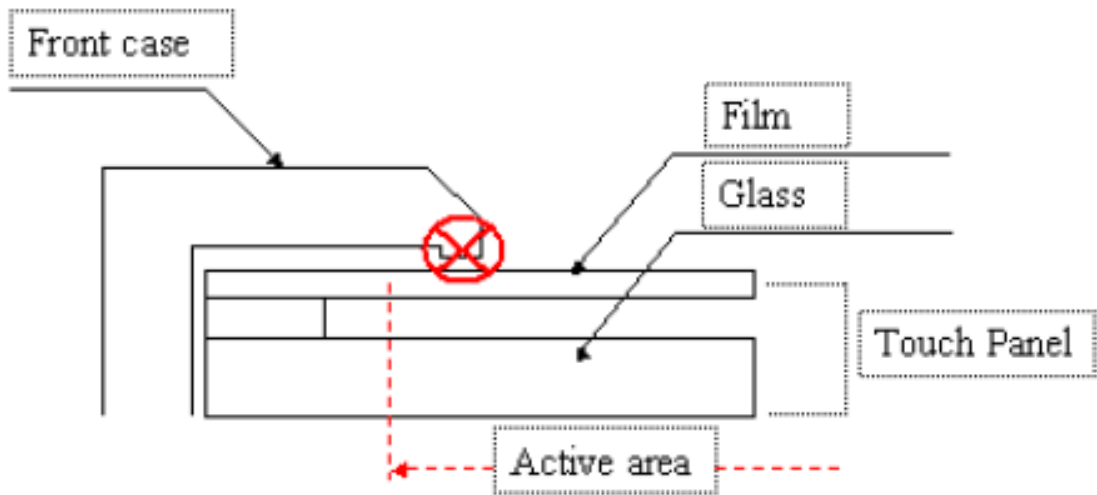
10.5 Durability Performance

Parameter	Specifications
Knock Test	10,000,000 times

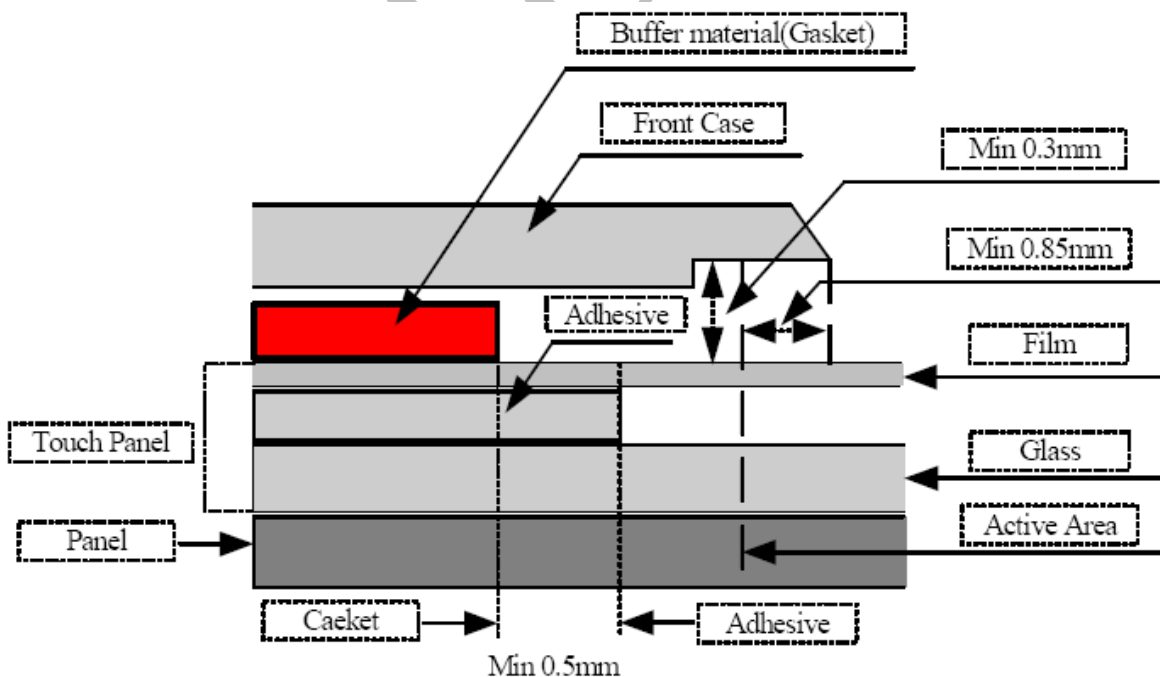
10.6 Touch Screen Integration Design Guide

Avoid the design that Front-case overlap and press on the active area of the touch-panel.

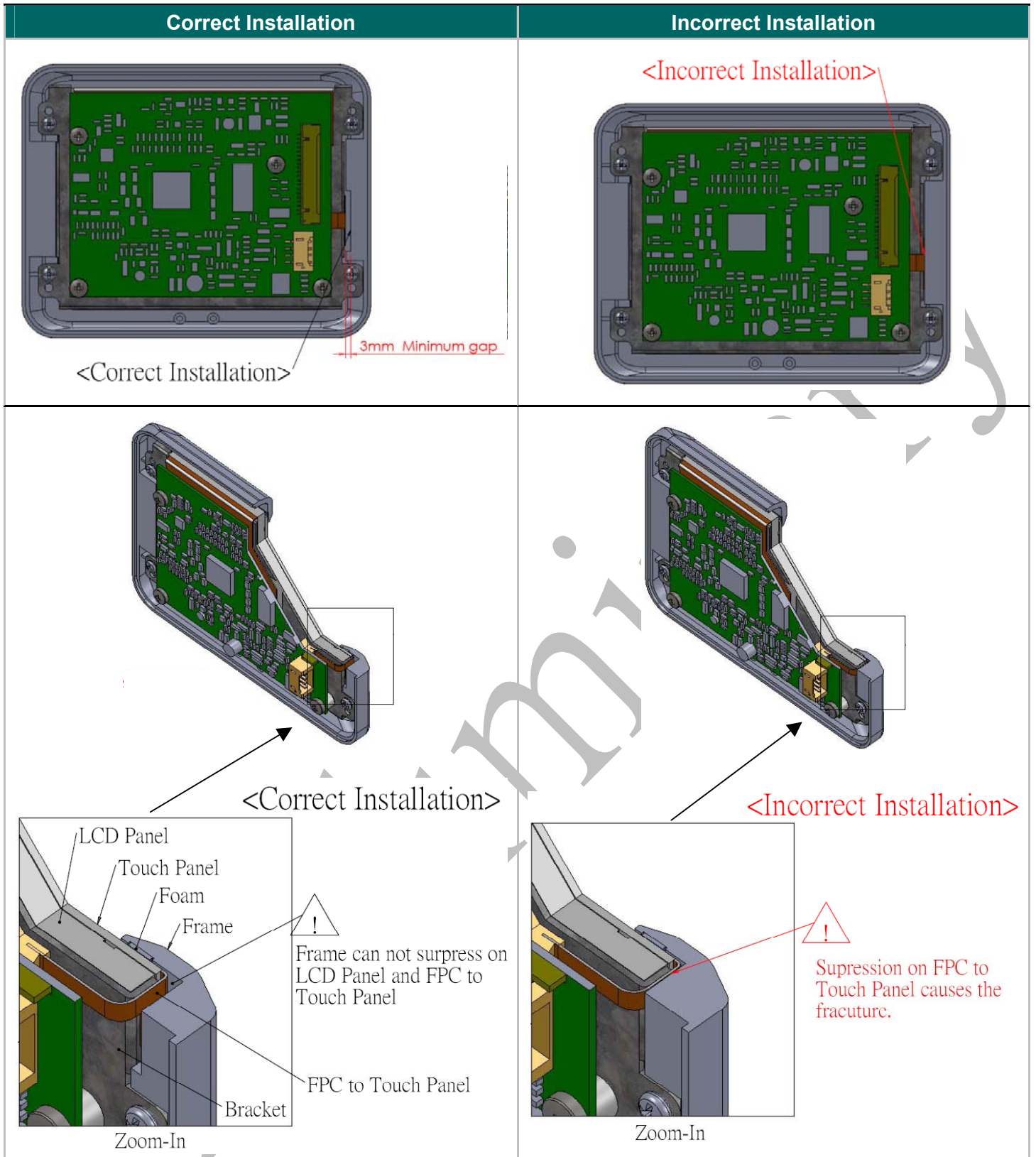
Give enough gap (over 0.5mm at compressed) between the front case and touch-panel to protect wrong operating.



Use a buffer material (Gasket) between the touch-panel and front-case to protect damage and wrong operating. Avoid the design that buffer material overlap and press on the inside of touch-panel viewing area.

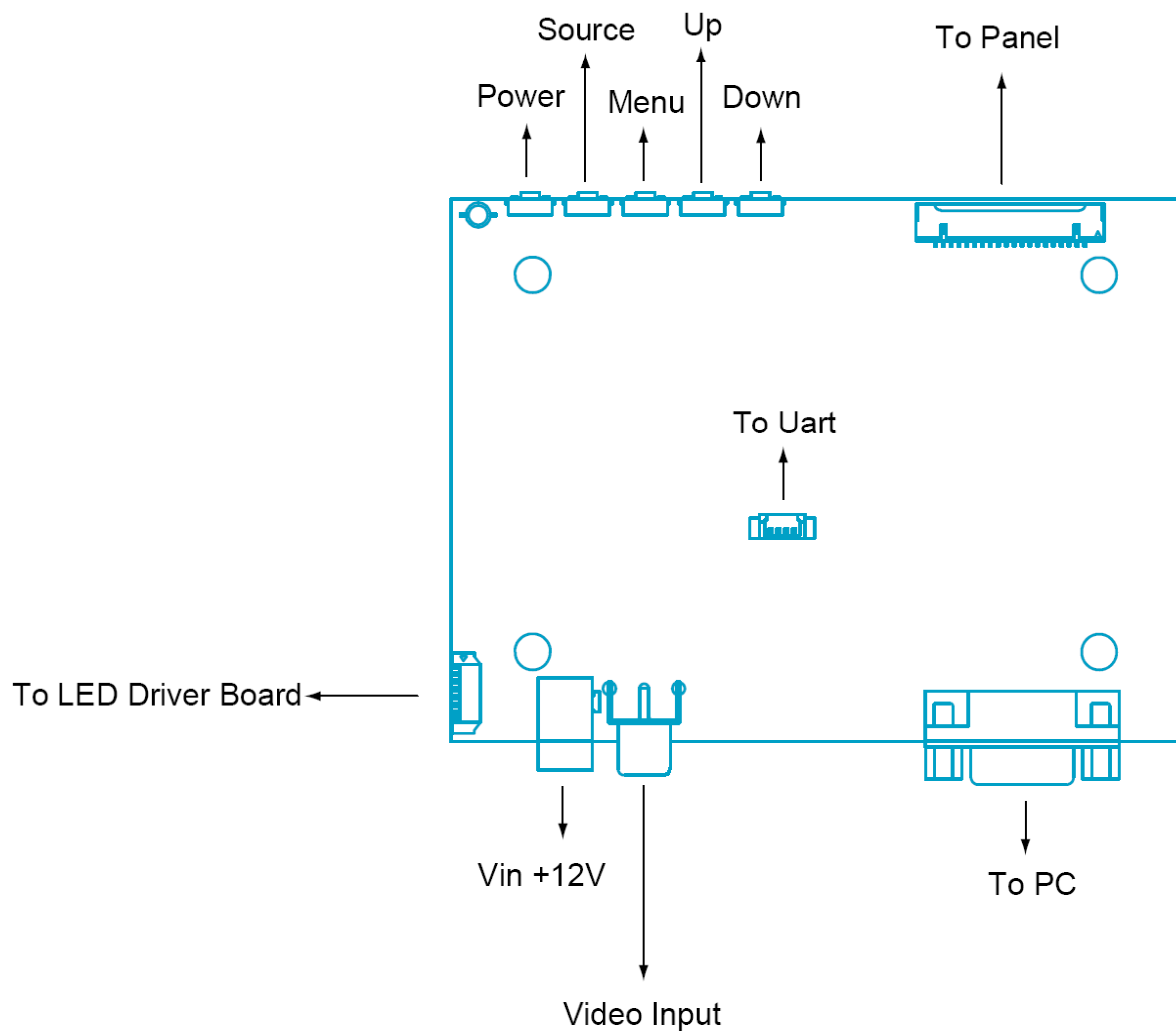


10.7 Mechanical Design Notice For Touch Panel



11. Operation manual / Connection

11.1 Driver Board Manual



12. Packing List

Before you begin installing the KIT, please make sure that the following materials have been shipped:



A. LASTD12030-FDR



B. LAACD18000-FDR



C. LAVDO18000-FDR



D. LAVGA16000-FDR



E. LAUSB18000-FDR



F. LARS218000-FDR



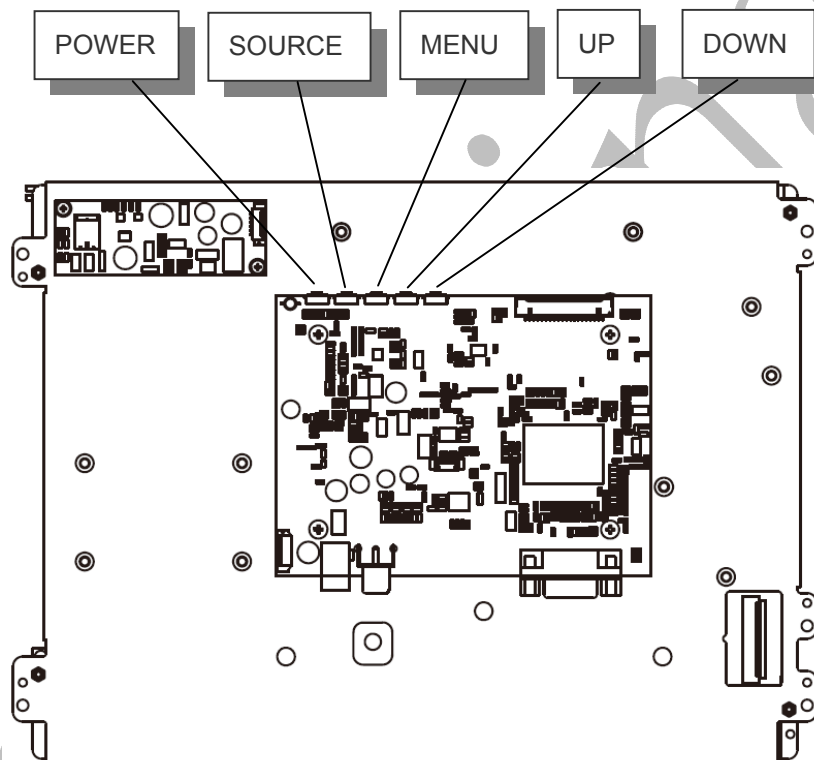
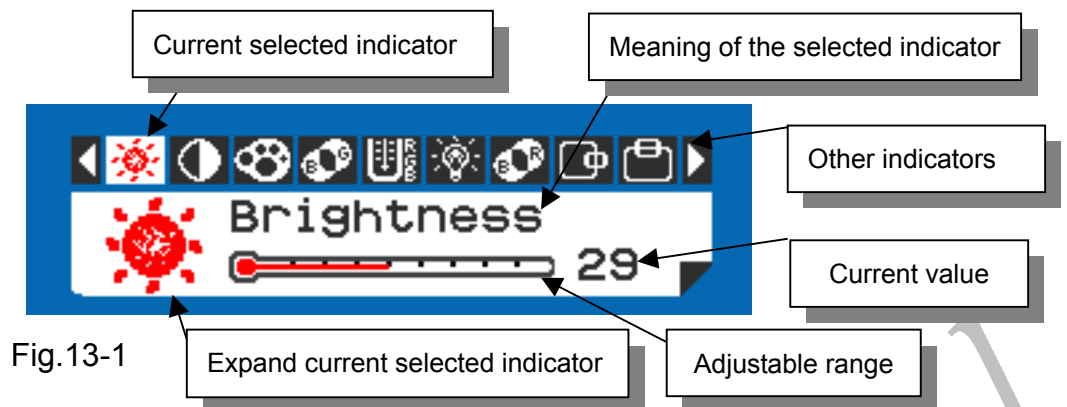
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- A. AC to DC Adapter (L:1500mm, 100-240VAC 50-60Hz to +12VDC @ 3A)
- B. Power Cord (L:1800mm, Plug Type B for USA)
- C. Video Cable (L:1800mm)
- D. VGA Cable (L:1600mm)
- E. USB Cable (L:1800mm)
- F. RS-232 Cable (L:1800mm)

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

13. Key Function by OSD

13.1 Menu Operation


















Operations of key board :

1. To navigate the menu, press [MENU]. (Fig.13-1)
2. The indicator lighting up in white color is the selected adjustment item.
3. To Next Item of the menu, press [MENU] again.
4. The operations below are only available when "Menu" is started.
5. Press [UP] / [DOWN] to adjust the value of the selected item.

Overview of the menu :

Firmware must be \geq VER 0.26

Indicator	Meaning	Adjustable range	For	Remark
	Brightness	0 ~ 64	AV / VGA	Adjust-Bar
	Contrast	0 ~ 64	AV / VGA	Adjust-Bar
	Color	0 ~ 64	AV	Adjust-Bar
	Tint	0 ~ 32	AV	Adjust-Bar
	Sharpness	0 ~ 16	AV	Adjust-Bar
	Dimmer	0 ~ 9	AV / VGA	
	Color Tone	Normal / Warm / Cool	AV / VGA	
	H-Position	-25 ~ +25	AV / VGA	Balance-Bar
	V-Position	-10 ~ +10	AV / VGA	Balance-Bar
	Auto		VGA	
	Scan	Over Scan / Under Scan	AV	
	Information		AV / VGA	Fig.12-2
	Setup		AV / VGA	Fig.12-3
	Factory Set		AV / VGA	
	Exit		AV / VGA	

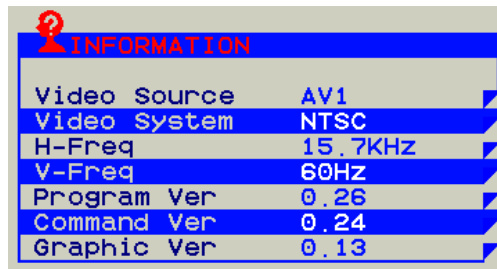








Fig.13-2

Setup Menu :



Fig.13-3

Indicator	Meaning	Adjustable range	Function	Remark
	Show Status	ON / OFF	Show signal status.	ON: Show OFF: Hidden
	Blue Screen	ON / OFF	If loss signal will put on the blue or black screen.	ON: Blue OFF: Black
	Auto Power On	ON / OFF	Power input module will be auto turn on.	ON: Auto OFF: Manual
	Auto Saving	OFF / 3s / 5s / 15s / 30s	If signal lost over setting times will be power off.	ON: Auto OFF: Normal
	Detect Source	ON / OFF	Auto detection which source is existence and change.	ON: Auto OFF: Normal
	Return			

Note : VGA only type don't have Detect Source function.

13.2 Operations

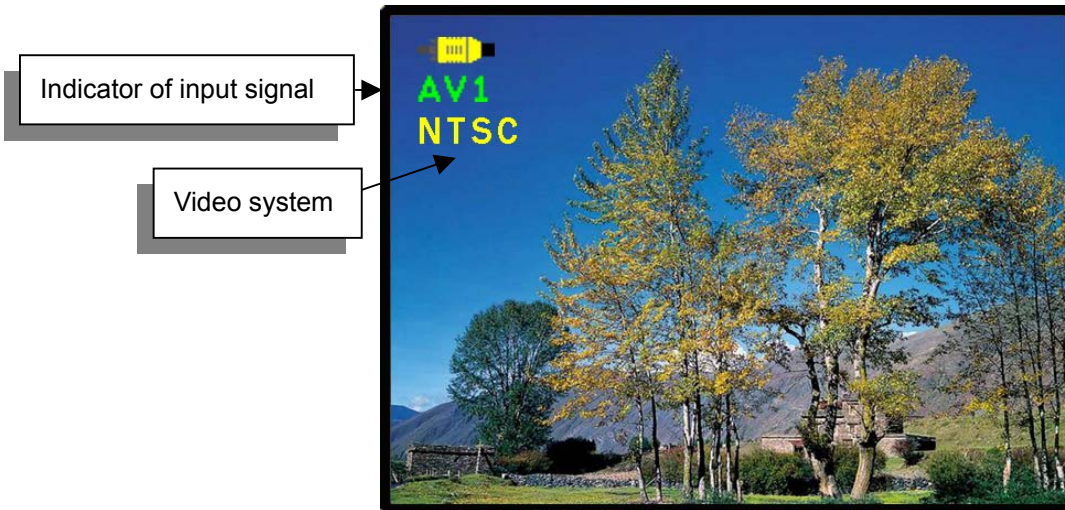




Fig.13-4

[Power] : Monitor power on / off

[Source] : Input signal switch

Overview of input signals :

Indicator	Input signal	Interface	Video system
	AV1	Composite	NTSC / PAL / SECAM
	VGA	Analog RGB	640x480_60 / 800x600_60 / 1024x768_60

14. Accessory

14.1 LED Driver Board

