



§ SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No: **LP121X001x-FNR**

Description: **12.1" Digital TFT-LCD Module**

SPEC No.: **SAS-1404005**

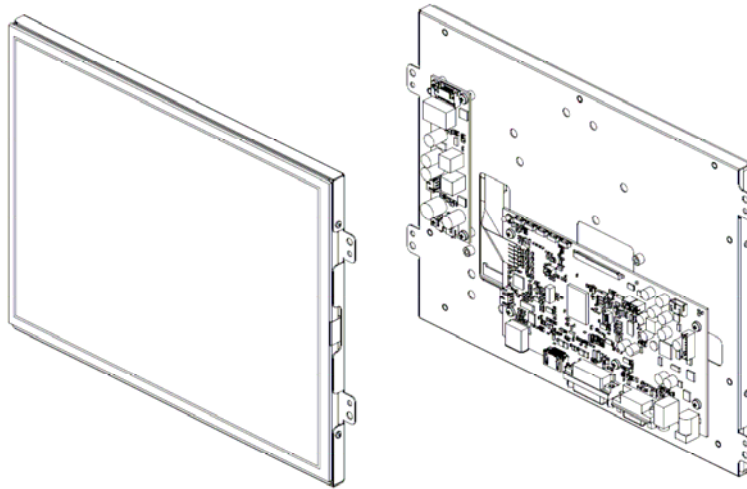
Version: **0.1**

Issue Date: **June 19, 2014**

※ This approval sheet contains 25 pages including the cover and appendix.

<p>Customer:</p> <p>Date: / / 14</p>	<p>Approved By:</p>
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Approved By: _____ Checked By: _____ Designed By: _____



1. General Description

1.1 Features

- 12.1" (1024x768) Digital TFT LCD
- Aspect Ratio: 4:3
- Input Signal VGA / DVI-D/ HDMI 1.3a
- Maximum Support Resolution 1920x1080
- Stereo Audio Amplifier, Output 2W@4Ω Speaker
- Audio Line-In / Line-Out (Optional)
- 5 Wires Resistive Touch Panel
- 5 Key Buttons Control
- UART / RS232 Serial Remote Control (Optional)
- 8 Language OSD Menu
- Light Sensor (Optional)
- LED Backlight
- Single Operation Voltage +12V

1.2 Applications

- Industrial
- Medical Environment
- Instrument Display
- Kiosk
- Security
- Signage
- Office Electronics
- Home Application
- Educate Application



2. Contents

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Preliminary

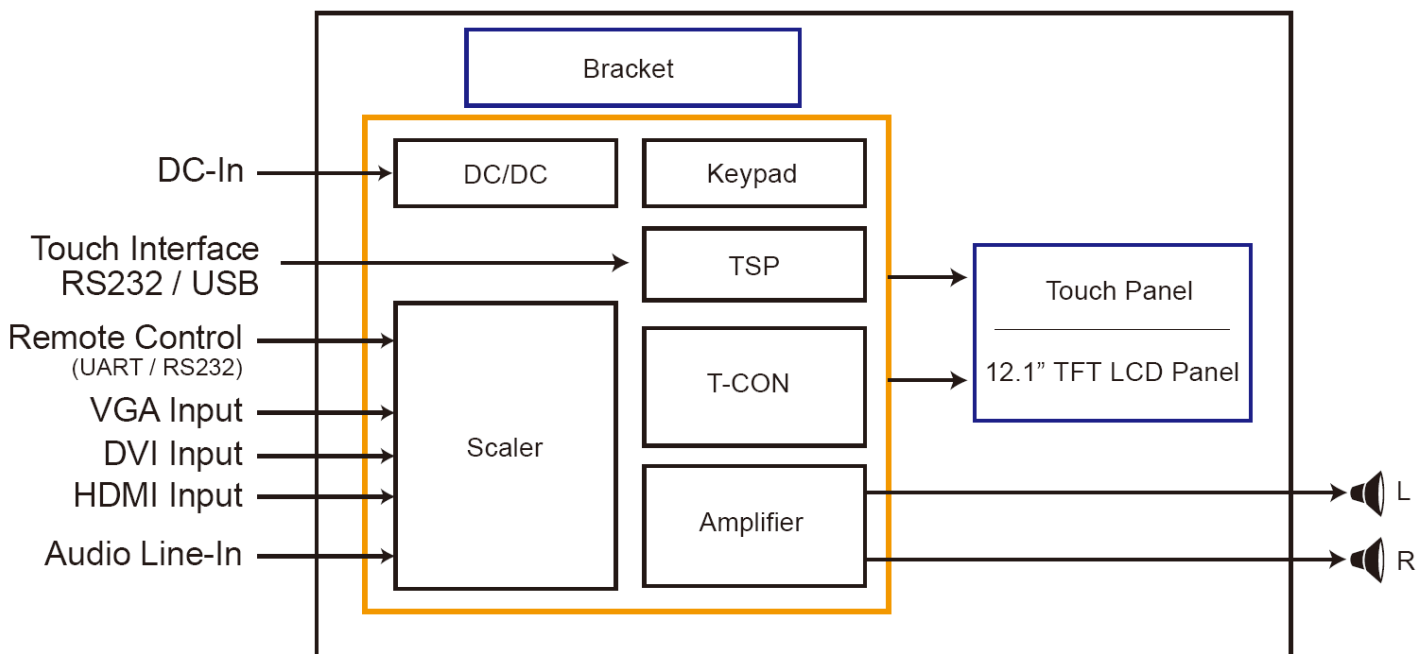
3. Specifications

LCD	
Panel Size	12.1"
Resolution (Pixels)	1024x768
Color	16.2M
Luminance w/o RTP	500 cd/m ²
Luminance (RTP)	420 cd/m ²
Luminance (PCT)	445 cd/m ²
Contrast Ratio	700
Viewing Angle	80 / 80 / 70 / 70
Backlight Life Time (LED)	30K (Min)
Power Requirement	
Power Input (DC Jack 2.1 ϕ)	+12 V _{DC}
PowerConsumption@+12V	10.1 Watts (@Without Amplifier)
Touch Screen	
Resistive Type	USB / RS232 Interface
Resistive Type Support OS	Windows / Linux / DOS / Mac / QNX
Projected Capacitive Touch	USB Interface (2 Points)
Projected Capacitive Touch Support OS	Windows / Android / Linux

Input Signal	
VGA	D-Sub15
DVI	DVI-D
HDMI	1.3a
Audio	
Amplifier	1W@8 Ω / 2W@4 Ω
Line-In	Stereo Input Phone Jack ϕ 3.5
Controls	
Key	5 Buttons
Serial Remote Control	UART / RS232 (Optional)
Environment	
Operating Temp. w/o RTP	-20 ~ +70 $^{\circ}$ C
Storage Temp. w/o RTP	-30 ~ +70 $^{\circ}$ C
Operating Temp. 5W RTP	-10 ~ +70 $^{\circ}$ C
Storage Temp. 5W RTP	-30 ~ +70 $^{\circ}$ C
Operating Temp. PCT	-20 ~ +70 $^{\circ}$ C
Storage Temp. PCT	-30 ~ +70 $^{\circ}$ C

4. Block Diagram

LP121X001x-FNR





5. TFT-LCD Information

5.1 TFT-LCD Mechanical Specifications

Parameter	Specifications	Unit
Screen Size	12.1 (diagonal)	Inch
Display Format	1024 x (R.G.B) x 768	Dot
Active Area	245.76(H) x 184.32(V)	mm
Pixel Pitch	0.240(H) x 0.240(V)	mm
Pixel Arrangement	RGB vertical stripe	
Surface Treatment	Anti-Glare, Hard Coating (3H)	

5.2 TFT-LCD Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark	
Viewing Angle	Horizontal	Left	70	80	---	deg		
		Right	70	80	---	deg		
	Vertical	Top	CR >10	60	70	---	deg	
		Bottom	60	70	---	deg		
Contrast Ratio	CR	At optimized Viewing angle	500	700	---	---		
Luminance w/o RTP	L		400	500	---	cd/m ²		
Backlight Life Time (LED)		25°C	30000	---	---	Hrs		



6. Order Information

6.1 Unit

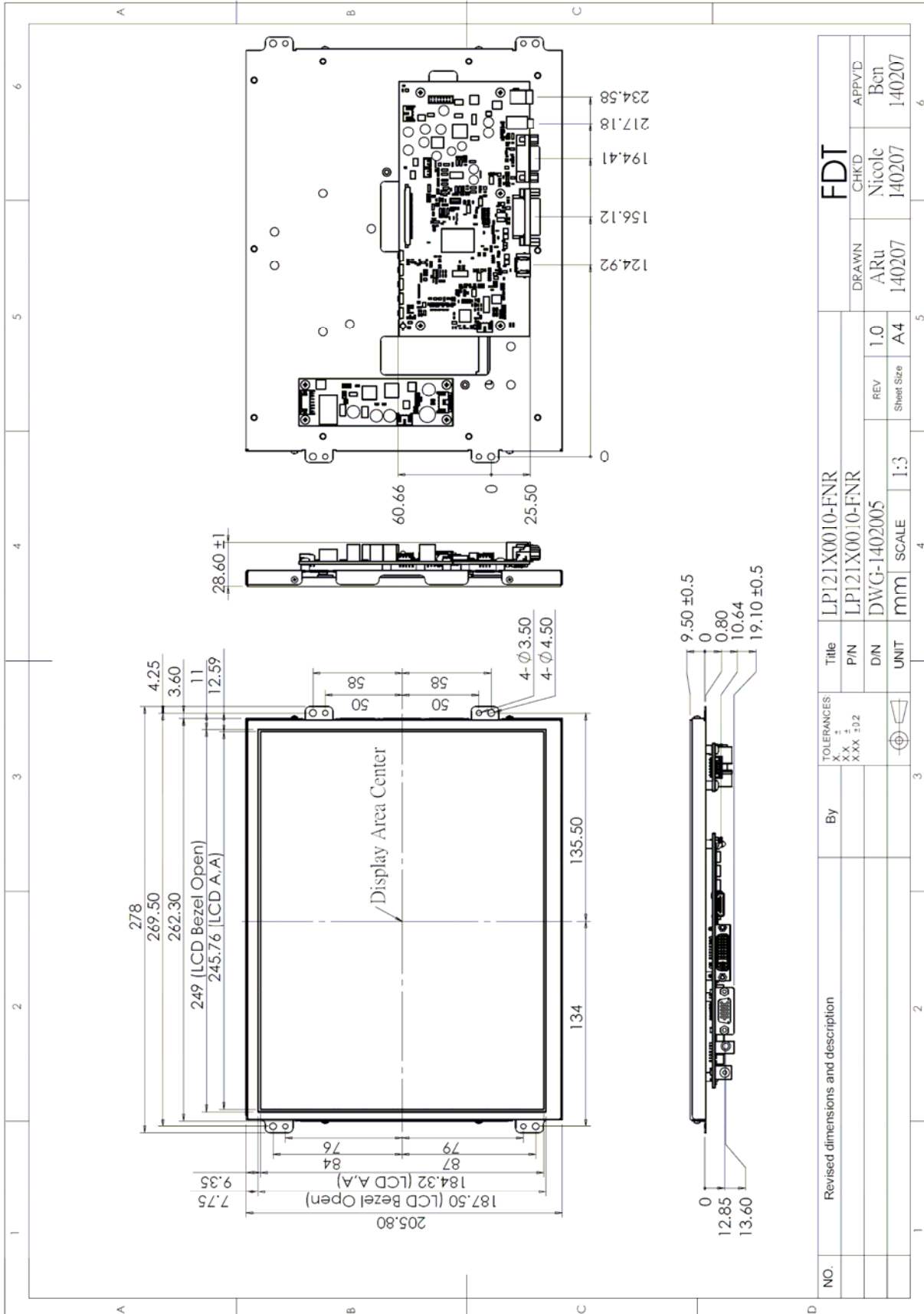
Parameter	LP121X0010-FNR	LP121X001U-FNR	LP121X001R-FNR
VGA	⊙	⊙	⊙
DVI	⊙	⊙	⊙
HDMI	⊙	⊙	⊙
Touch Panel Type	-	5W Resistive	5W Resistive
Touch Screen Interface	-	USB	RS232
Audio Amplifier	⊙	⊙	⊙
Audio Line-In	⊙	⊙	⊙
5 Keys	⊙	⊙	⊙
UART Remote Control	⊙	⊙	⊙

Note: 1.The assembling of panel and bracket is aimed for delivery, packaging and experiment. If the demand of shockproof and long-term fix, pls have it into consideration of mechanism design.

Optional Functions	
Parameter	<ul style="list-style-type: none"> - Audio Line-Out - RS232 Remote Control - Back Cover - External Key - Light Sensor - Accessories (Refer to Page 20)

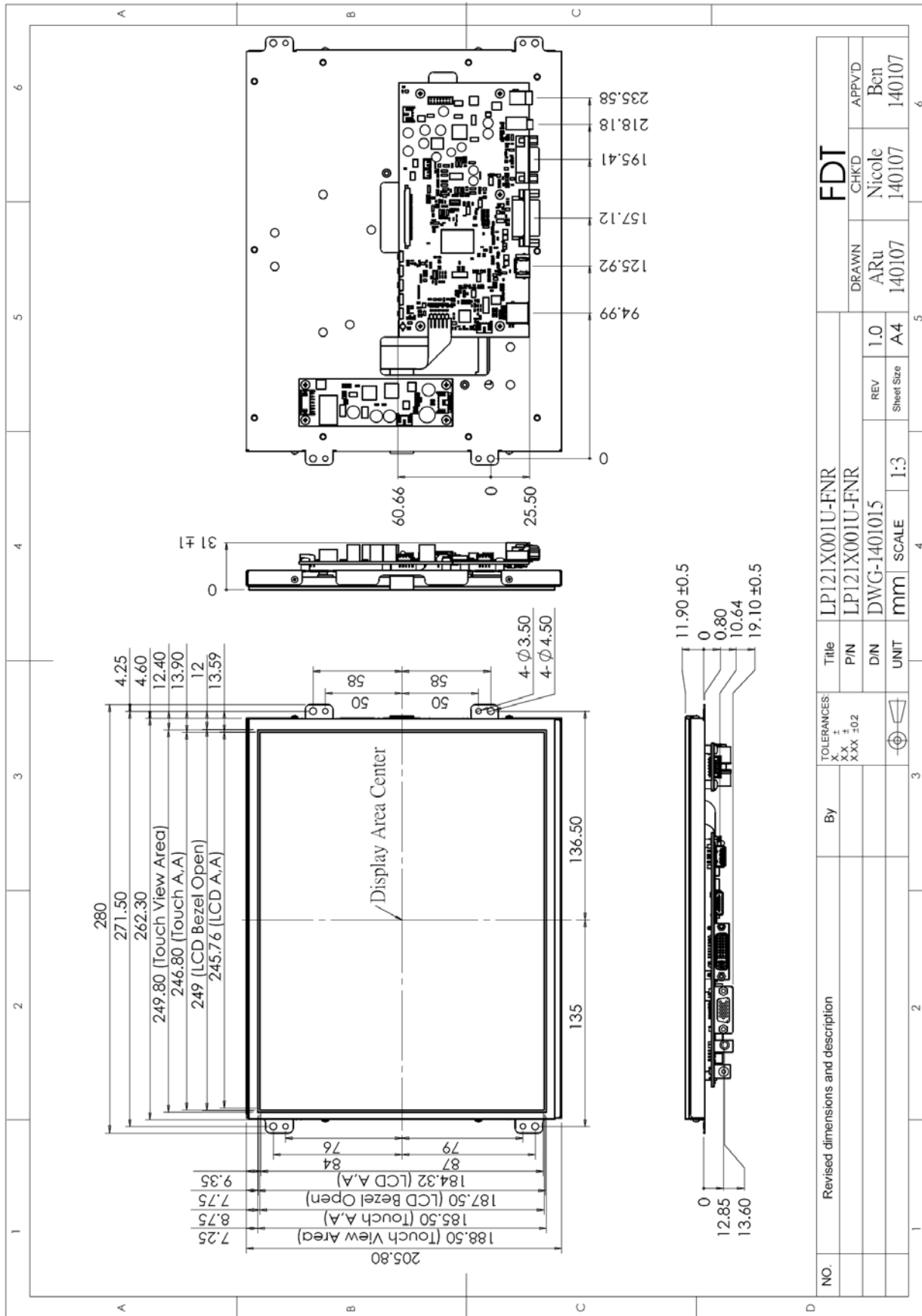
7. Dimension Information

7.1 Unit (LP121X0010-FNR)

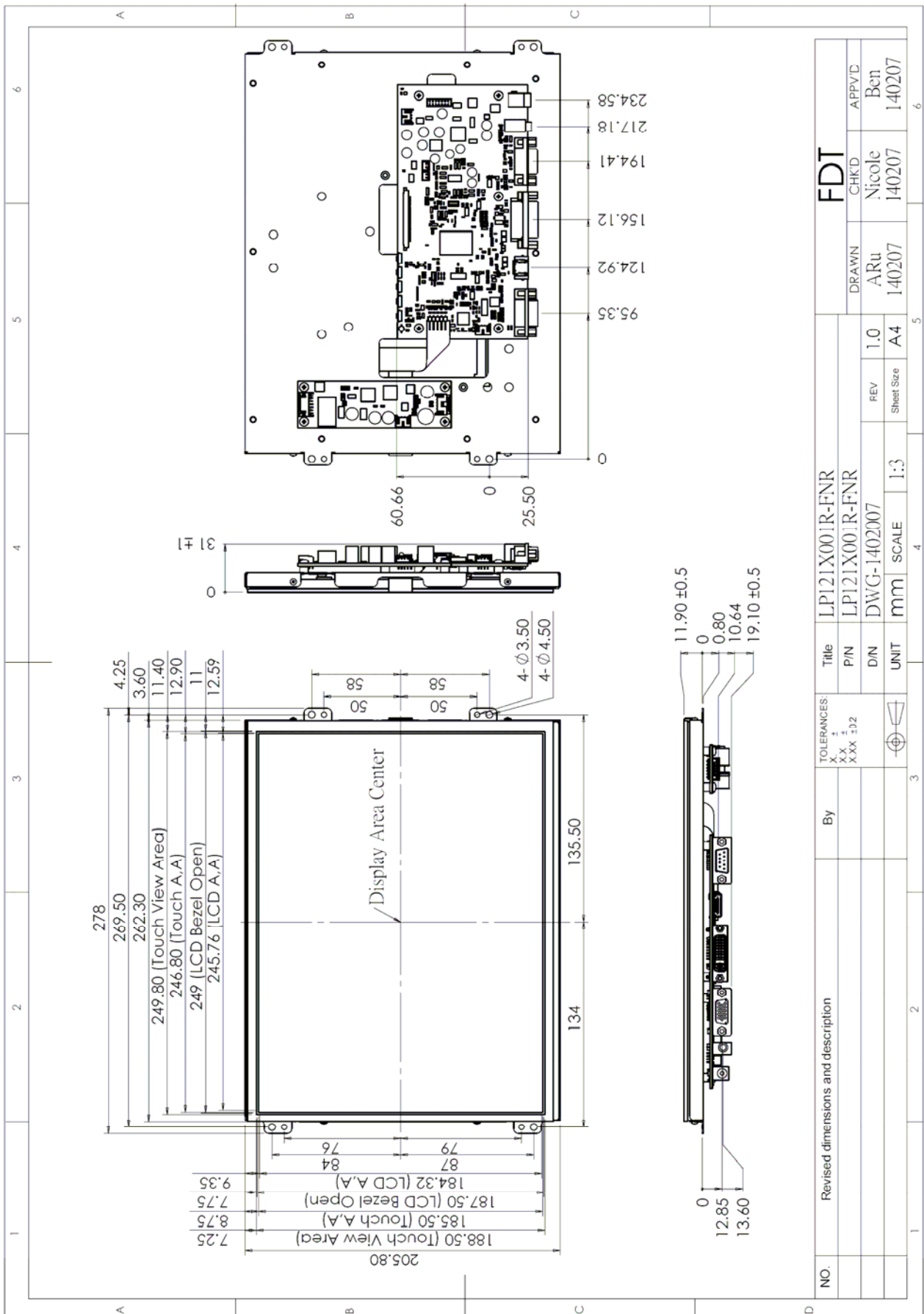


NO.	Revised dimensions and description	By	TOLERANCES	Title		FDT	
			X.X ±	LP121X0010-FNR	DRAWN	CHK'D	APP'VD
			X.X ±0.2	P/N	ARu	Nicole	Ben
			X.XX ±0.2	D/N	1402005	140207	140207
				UNIT	mm	REV	Sheet Size
				SCALE	1:3	A4	

7.2 Unit (LP121X001U-FNR)



7.3 Unit (LP121X001R-FNR)



NO.	Revised dimensions and description	By	TOLERANCES: X ⁺ XX [±] XXX ^{-0.2}	Title		FDT		
				LP121X001R-FNR	LP121X001R-FNR	DRAWN	CHKD	APPVD
				DIN	DWG-1402007	REV	1.0	Bcn
				UNIT	mm	SCALE	A4	140207
					1:3	Sheet Size	A4	140207

8. Pin Description

8.1 J103 : Pin Assignment of Power Input (DC-Jack Inside Diameter:2.1 ϕ Outside Diameter:5.5 ϕ Side Entry Type)

Pin No.	Symbol	I/O	Description	Remark
1	DC-In	I	+12Vdc Input Voltage	
2	GND	-	Power Ground	

8.2 J702 : Pin Assignment of UART (Pitch 1.25mm 4Pin, Top Entry Type)

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

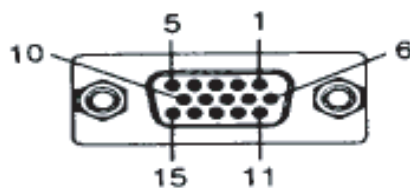
※ FDT Matching Connector Part No.: P24014 (STM) [Same as 51021-0400 (MOLEX)].

Pin No.	Symbol	I/O	Description	Remark
1	TX / RS232 TX (Option)	O	UART / RS232 (Option) Transmission Data	
2	RX / RS232 RX (Option)	I	UART / RS232 (Option) Receive Data	
3	GND	-	Ground	
4	+3.3Vdc	O	+3.3Vdc Output Voltage	

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

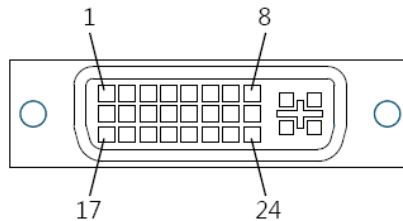
8.3 J503 : Pin Assignment of Analog RGB Input (D-Sub 15Pin)

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	GND	-	Ground	
5	VGA-Det	I	VGA Detect	
6	AGND	-	Analog Ground	
7	AGND	-	Analog Ground	
8	AGND	-	Analog Ground	
9	VGA5V	-	VGA +5Vdc Input	
10	GND	-	Ground	
11	GND	-	Ground	
12	VGA_SDA	-	DDC2 Data	
13	HS_IN	I	TTL Horizontal sync.	
14	VS_IN	I	TTL Vertical sync.	
15	VGA_SCL	-	DDC2 Clock	



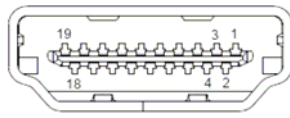
8.4 J401 : Pin Assignment of DVI-D (24 Pin)

Pin No.	Symbol	I/O	Description	Remark
1	DATA2-	I	Negative DVI Input for A Link Data Channel 2	
2	DATA2+	I	Positive DVI Input for A Link Data Channel 2	
3	GND	-	Ground	
4	NC	-	No Connection	
5	NC	-	No Connection	
6	DVI_SCL	I	DDC2 Clock	
7	DVI_SDA	I	DDC2 Data	
8	NC	-	No Connection	
9	DATA1-	I	Negative DVI Input for A Link Data Channel 1	
10	DATA1+	I	Positive DVI Input for A Link Data Channel 1	
11	GND	-	Ground	
12	NC	-	No Connection	
13	NC	-	No Connection	
14	DVI5V	I	DVI +5Vdc Input	
15	DET_DVI	I	DVI Detect	
16	DVI_HPD	-	Hot Plug Detect	
17	DATA0-	I	Negative DVI Input for A Link Data Channel 0	
18	DATA0+	I	Positive DVI Input for A Link Data Channel 0	
19	GND	-	Ground	
20	NC	-	No Connection	
21	NC	-	No Connection	
22	GND	-	Ground	
23	DCLK+	I	Positive DVI Input for A Link Clock Channel	
24	DCLK-	I	Negative DVI Input for A Link Clock Channel	



8.5 J402 : Pin Assignment of HDMI-A Type Input (HDMI 1.3a -19Pin Female)

Pin No.	Symbol	I/O	Description	Remark
1	DATA2+	I	Positive HDMI Input for B Link Data Channel 2	
2	DET_HDMI	-	HDMI Detect	
3	DATA2-	I	Negative HDMI Input for B Link Data Channel 2	
4	DATA1+	I	Positive HDMI Input for B Link Data Channel 1	
5	GND	-	Ground	
6	DATA1-	I	Negative HDMI Input for B Link Data Channel 1	
7	DATA0+	I	Positive HDMI Input for B Link Data Channel 0	
8	GND	-	Ground	
9	DATA0-	I	Negative HDMI Input for B Link Data Channel 0	
10	DCLK+	I	Positive HDMI Input for B Link Clock Channel	
11	GND	-	Ground	
12	DCLK-	I	Negative HDMI Input for B Link Clock Channel	
13	NC	-	No Connection	
14	NC	-	No Connection	
15	HDMI_SCL	I	DDC2 Clock	
16	HDMI_SDA	I	DDC2 Data	
17	GND	I	DDC/CEC Ground	
18	HDMI5V	I	HDMI +5Vdc Input	
19	HDMI_HPD	I	Hot Plug Detect	



8.6 J602A : Pin Assignment of Key Board (Pitch 1.25mm 12Pin , Side Entry Type)

※ FDT Connector Part No.: MS240112R (STM) [Same as 53261-1219 (MOLEX)] ;

※ FDT Matching Connector Part No.: P240112 (STM) [Same as 51021-1200 (MOLEX)].

Pin No.	Symbol	I/O	Description	Remark
1	-	-	Don't Connect	
2	SW5	I	EXIT	
3	SW4	I	DOWN	
4	SW3	I	UP	
5	SW2	I	MENU / S	
6	SW1	I	POWER / SOURCE	
7	GND	-	Ground	
8	VDDP	-	VDDP +3.3Vdc Output Voltage	
9	-	-	Don't Connect	
10	RED	O	Indicator red LED for power off control	
11	GREEN	O	Indicator green LED for power on control	
12	GND	-	Ground	

8.7 J303 : Pin Assignment of Spear Left (Pitch 2.0mm 2Pin , Top Entry Type)

※ FDT Connector Part No.: A2001WV2-2P(JWT) ;

※ FDT Matching Connector Part No.: A2001H02-2P(JWT) .

Pin No.	Symbol	I/O	Description	Remark
1	+LOUT	O	Left Speaker Out+	
2	-LOUT	O	Left Speaker Out -	

8.8 J302 : Pin Assignment of Spear Right (Pitch 2.0mm 2Pin , Top Entry Type)

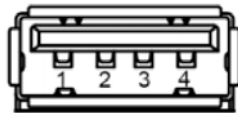
※ FDT Connector Part No.: A2001WV2-2P(JWT) ;

※ FDT Matching Connector Part No.: A2001H02-2P(JWT) .

Pin No.	Symbol	I/O	Description	Remark
1	+ROUT	O	Right Speaker Out+	
2	-ROUT	O	Right Speaker Out-	

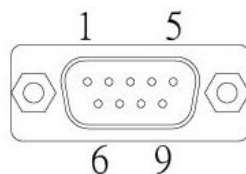
8.9 J701 : Pin Assignment of Touch USB (USB A Type - Female 2.0mm, Side Entry Type)(Option)

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

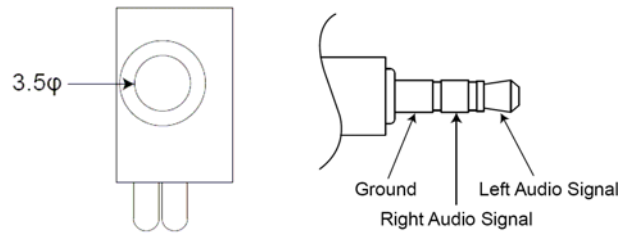


8.10 J705 : Pin Assignment of Touch RS232 (D-SUB 9 Male)(Option)

Pin No.	Symbol	I/O	Description	Remark
1	-	-	Don't Connect	
2	RXD	I	Receive Data	
3	TXD	O	Transmit Data	
4	-	-	Don't Connect	
5	GND	-	Ground	
6	NC	-	No Connection	
7	NC	-	No Connection	
8	-	-	Don't Connect	
9	-	-	Don't Connect	



8.11 J301 : Pin Assignment of Line-In/Out (Option) (Outside Diameter:3.5 φSide Entry Type)



9. Absolute Maximum Ratings

9.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Remark
Input Voltage	Vin	+11	+13.5	V	
Analog RGB Input Signal	Analog RGB in	0.5	2.0	Vp-p	
Digital Input Signal	TTL	0.3	3.6	V	
DVI Input Signal		-	165	MHz	
HDMI Input Signal		-	165	MHz	
Line-in			1.8	Vp-p	
Operating Temp. w/o TP		-20	+70	°C	
Storage Temp. w/o TP		-30	+70	°C	
Operating Temp. 5W RTP		-10	+70	°C	
Storage Temp. 5W RTP		-30	+70	°C	

10. Recommended Operating Conditions

10.1 Electrical Characteristics

Parameter	Symbol	I/O	Min	Typ	Max	Unit	Note
Input Voltage	DC-in	I	+11.5	+12	+13	V	
Total Current	I-in	I		841		mA	+12V
Power Consumption		I		10.1		W	@ Without Amplifier
Output Voltage	VDD	O	3.2	3.3	3.4	V	
Analog RGB Input Signal	Analog RGB in	RGB		0.7		Vp-p	@75Ω
DVI Input Signal					165	MHz	
HDMI Input Signal					165	MHz	

10.2 VGA Mode Characteristics

Dots per inch	H	Unit	Polarity	V	Unit	Polarity	Note
640 x 480	31.47	KHz	Positive	59.9	Hz	Positive	
800 x 600	37.88	KHz	Positive	60.3	Hz	Positive	
1024 x 768	48.36	KHz	Positive	60	Hz	Positive	
1280 x 1024	63.98	KHz	Positive	60	Hz	Positive	
1600 x 1200	75	KHz	Positive	60	Hz	Positive	
1920 x 1080	67.5	KHz	Positive	60	Hz	Positive	



11. 5W Resistive Touch Panel Characteristics

11.1 Electrical Performance

Parameter	Symbol	Min	Typ	Max	Unit	Note
Terminal Resistance	X	20		500	Ω	
	Y	20		500	Ω	
Linearity				1.5	%	
Insulation Impedance		20			MΩ	DC 25V
Response Time				15	ms	

11.2 Optical Performance

Parameter	Specifications
Light Transmittance	80% ±2%
Haze	< 9.5%±2%

11.3 Mechanical Performance

Parameter	Specifications
Input Method	Stylus or Finger
Operating Force	R0.8 Silicon Rubber, < 50gf
Surface Hardness	3H pencil, pressure 1N/45°

11.4 Durability Performance

Parameter	Specifications
Knock Test	10,000,000 times



11.5 Resistive Touch Panel Operation System Support

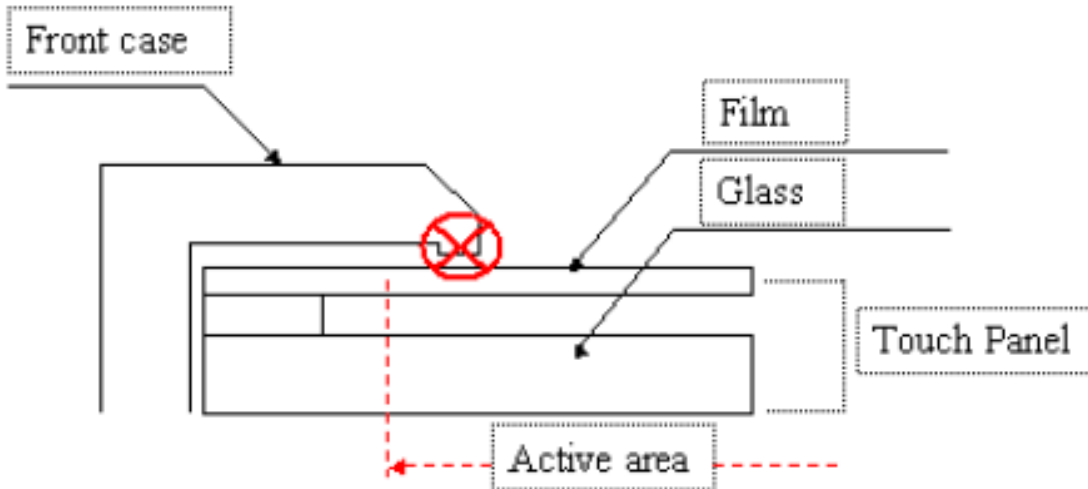
OS	Version	Interface	
Windows	Windows Vista, XP / 200, 9x / ME Windows Embedded Windows 7 Windows 8 / 8.1	RS232 / USB	
	Windows NT4	RS232	
	Linux	Kernel 2.4.x (x86 32bit) Kernel 2.6.x Upwards (x86 32 / 64bit) Kernel 2.6.24 Upwards (ARM , MIPS)	RS232 / USB
		Android 1.5 / 1.6 / 2.x / 4.x – Google	RS232 / USB
DOS	DOS	RS232	
Mac	Mac OS9, Mac OS X (IBM, Intel CPU)	USB	
QNX	QNX RTOS v6.3	RS232 / USB	

Preliminary

11.6 Resistive Touch Panel Integration Design Guide

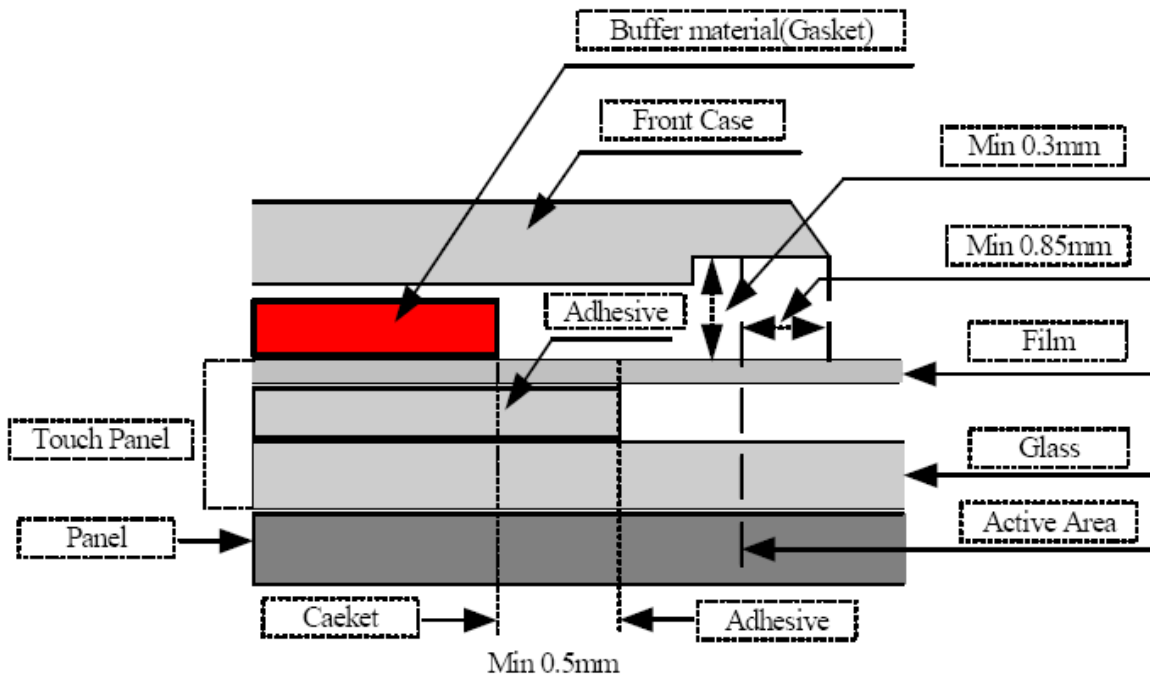
Avoid the design that Front-case overlap and press on the active area of the touch-panel.

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

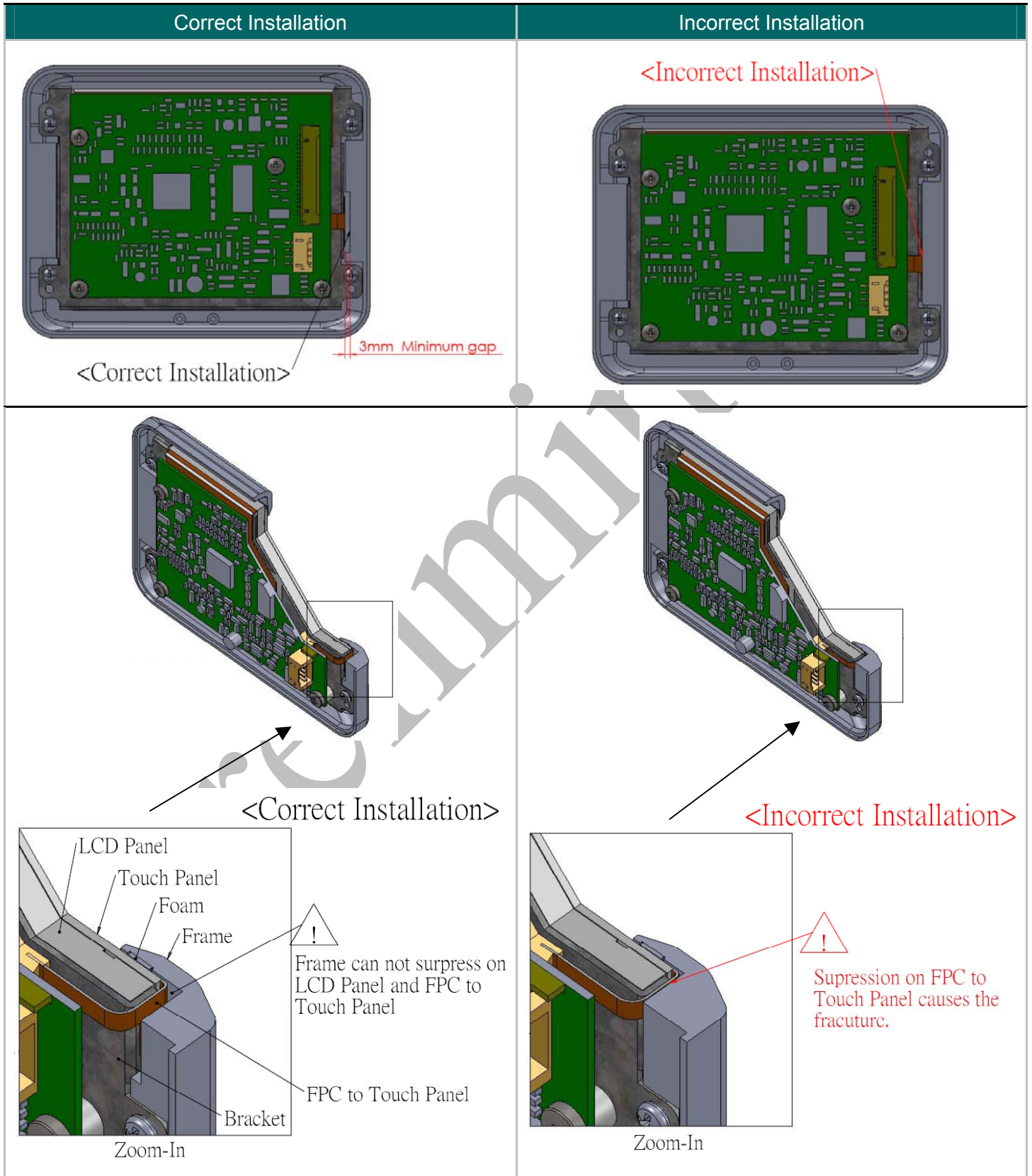


Use a buffer material (Gasket) between the touch-panel and front-case to protect damage and wrong operating.

Avoid the design that buffer material overlap and press on the inside of touch-panel viewing area.

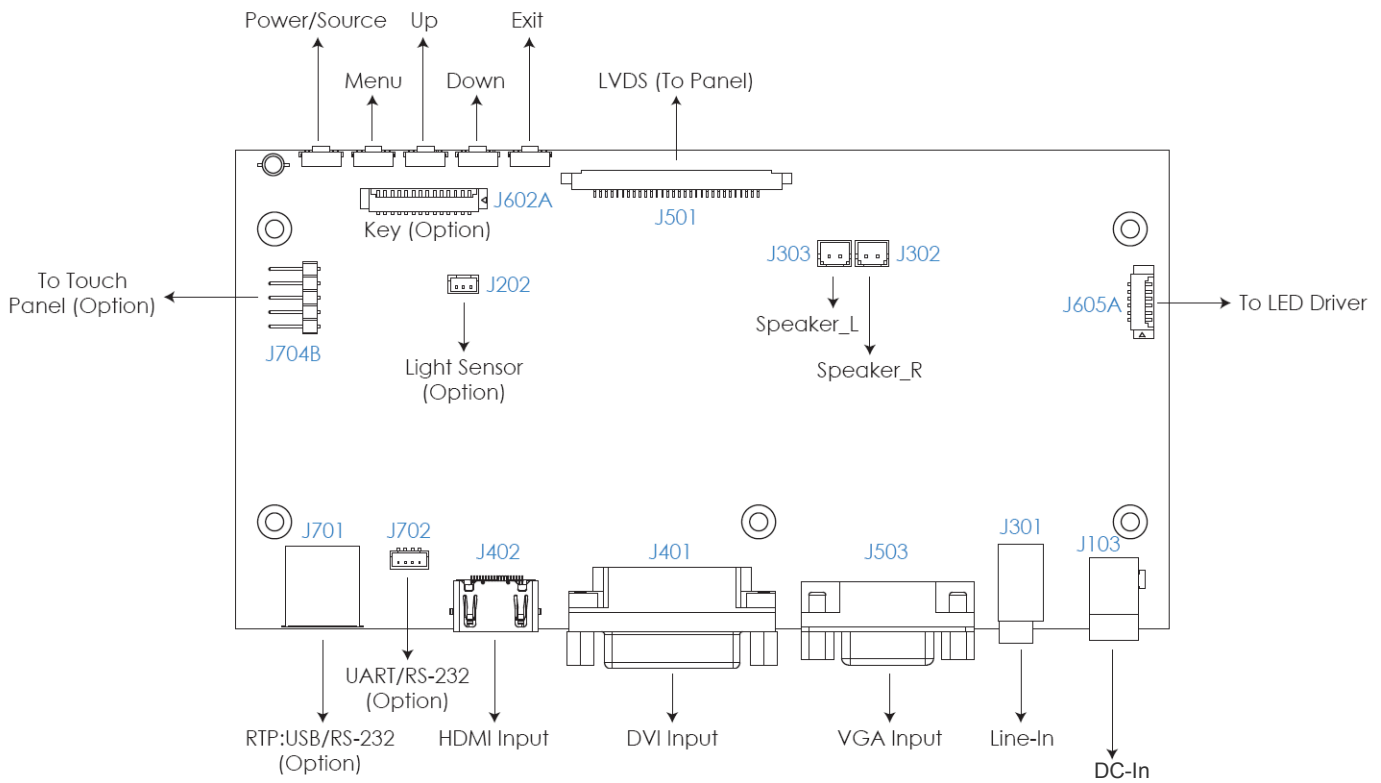


11.7 Mechanical Design Notice For Resistive Touch Panel



12. Operation manual / Connection

12.1 Driver Board Manual



Pre-release

13. Accessories (Option)

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



A. LASTD12033-FDR



B. LAACD18000-FDR



C. LACABLE068-FDR



D. LACABLE069-FDR



E. LAVGA16000-FDR



F. LAUSB18000-FDR



G. LACABLE045-FDR



H. LACABLE070-FDR



I. LAVCD00002-FDR

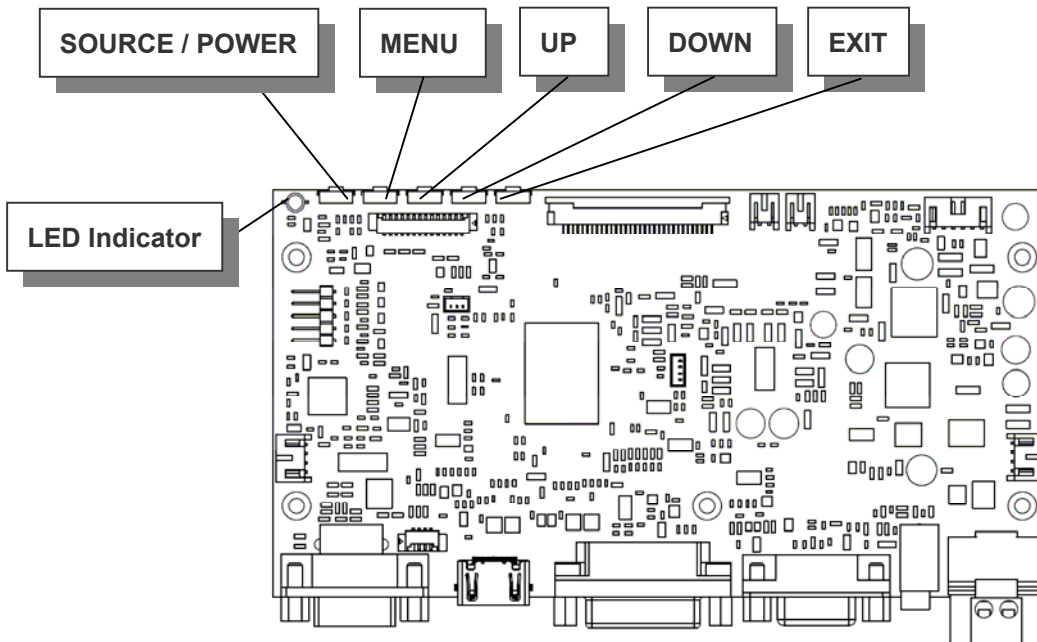


J. LASPKR0004-FDR

- A. AC to DC Adapter (L:1500mm,100-240V_{AC} 50-60Hz to +12V_{DC} @ 3.3A, ϕ 2.1)
- B. Power Cord (L:1800mm, Plug Type B for USA)
- C. HDMI Cable (L:2000mm)
- D. DVI Cable (L:1800mm)
- E. VGA Cable (L:1600mm)
- F. USB Cable (L:1800mm)
- G. RS-232 Cable (L:1800mm, Null Modem)
- H. AUDIO Cable (L:1800mm)
- I. Touch Screen Driver CD Disk / User Manual
- J. Speaker (2.5W @ 4 Ω L:400mm *2 Pieces)

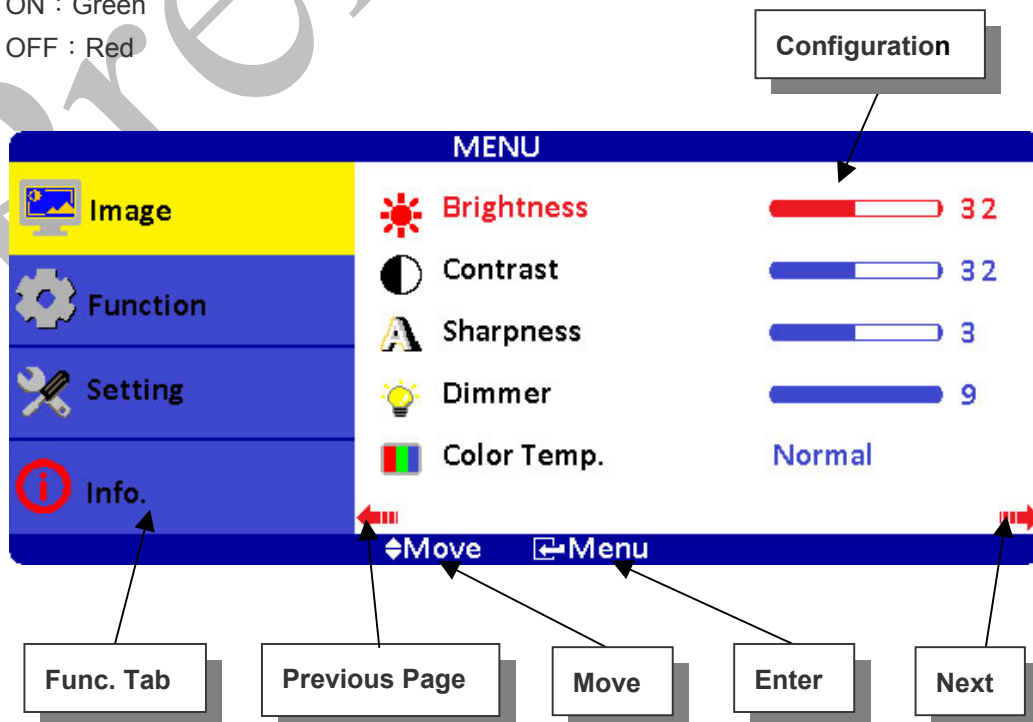
14. Key Function by OSD

14.1 Menu Operation



OSD ICON Instructions :

1. SOURCE / POWER : Input Source Switch / Power On/Off (※Press for 3 secs to turn off)
2. MENU : Enter
3. UP : Move Upward / Increase Value / Option-Switch
4. DOWN : Move Downward / Decrease Value / Option-Switch
5. EXIT : Return to Previous Page
6. LED Indicator
 - 6.1 Waiting : Flickering Green
 - 6.2 Power ON : Green
 - 6.3 Power OFF : Red



Overview of the Menu :



Image

Indicator	Meaning	Default	Adjustable range	Remark
	Brightness	32	0~63	Adjust-Bar
	Contrast	32	0~63	Adjust-Bar
	Sharpness	3	1~5	Adjust-Bar
	Dimmer	15	0~15	Adjust-Bar
	Color Temp.	Normal	Normal / Warm / Cool	
	H-Position	0	-25~+25	VGA only
	V-Position	0	-25~+25	VGA only
	Clock	0	-25~+25	VGA only
	Phase	32	0~63	VGA only
	Auto	By different resolution		VGA only
	Exit			



Function

ICON	Meaning	Default	Adjustable range	Function	Remark
	Show Status	On	On / Off	Information of input source	ON: Show ; OFF: Hidden
	Blue Screen	On	On / Off	No signal input shows blue or black screen.	ON: Blue ; OFF: Black
	Auto Power On	On	On / Off	Modules turns on automatically w/o power input.	ON: Auto ; OFF: Manual
	Detect Source	On	On / Off	Auto detect input source.	ON: Auto ; OFF: Normal
	Auto Power Saving	Off	6s / 15s / 30s / Off	Modules go ready when no input source is detected.	ON: Auto ; OFF: Normal
	Auto Sleep	Off	15M / 30M / 60M / Off	Modules go sleep when set timing is out.	ON: Auto ; OFF: Normal
	Exit				

Note : After configuration is set, RESET won't restore to default setting.



Setting

Indicator	Meaning	Default	Adjustable range	Remark
	Source	VGA	VGA / DVI / HDMI	
	Volume	32	0~63	
	Mute	Off	On / Off	On : Mute · Off : Sound
	Mirror	Off	On / Off	Left-Right Reversal
	Flip	Off	On / Off	Upside Down
	Language	English	English / 中文 / 日本語 / 한국의 / Française / Deutsch / Italiano / Española / Português	
	Reset			Restore to default
	Exit			



Info.

MENU

Image

Source : VGA

Function

Resolution : 1024x768

Setting

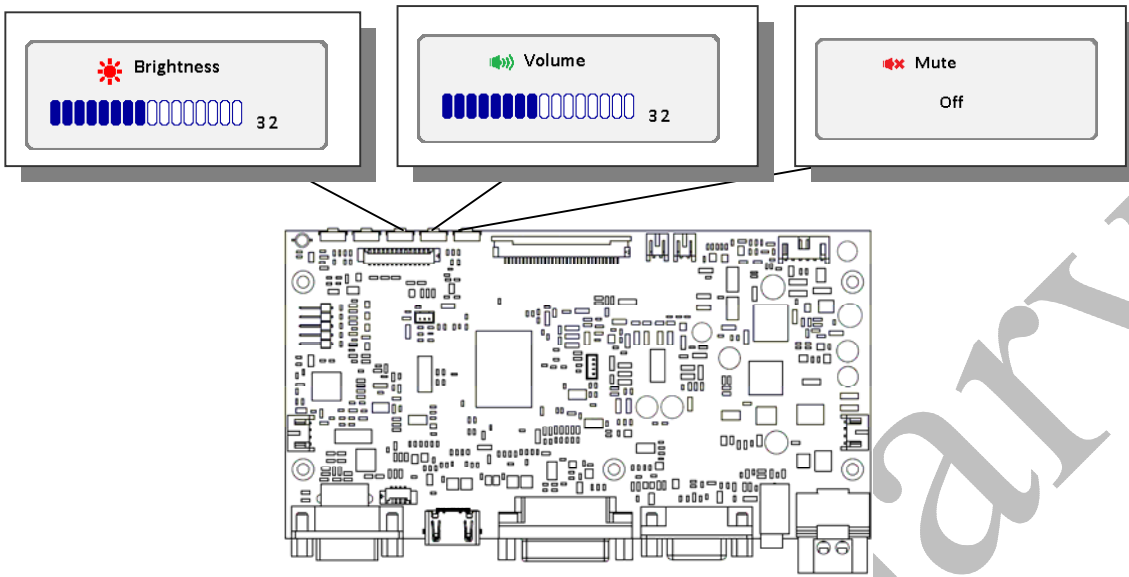
H-Position : 48.2KHz
V-Position : 59.8Hz

Information

Program Ver : 1.00
Command Ver : 1.00

◀ Move ▶ Exit / Menu

Hot Key When OSD Menu is Off :



Information of Input Source and Functionality :

The screenshot shows a Windows desktop with the following callouts:

- Input Source:** Points to the 'VGA' icon in the system tray, which also displays '1024x768'.
- Resolution:** Points to the '1024x768' text in the system tray.
- Detect Source Remaining Secs:** Points to the '5' in the 'Detect Source 5' timer.
- VGA Mode Remaining Secs:** Points to the '1' in the 'VGA 1' timer.

[Source] : Input Signal Switch

Overview of Input Signals :

Indicator	Interface
	VGA
	DVI
	HDMI