



## § SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No: **LP150X501x-FNR**

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Description: **15" Digital TFT-LCD Module**

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SPEC No.: **SAS-1404009**

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Version: **0.1**

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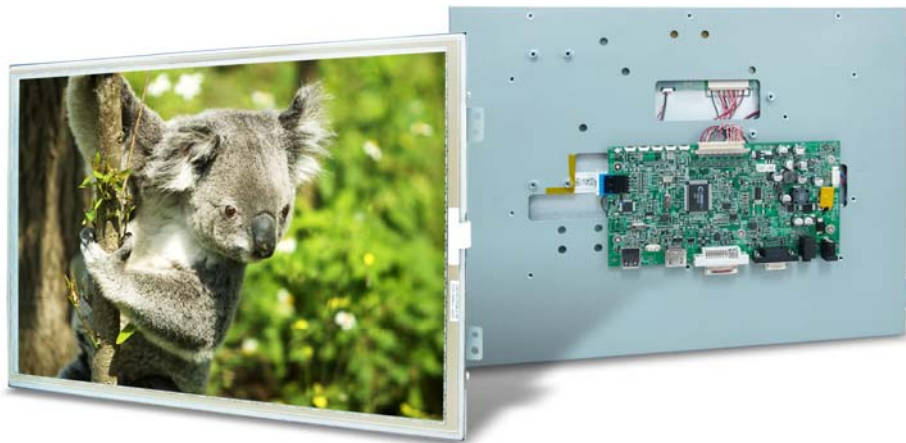
Issue Date: **June 19, 2014**

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※ 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

- 15" (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



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Preliminary

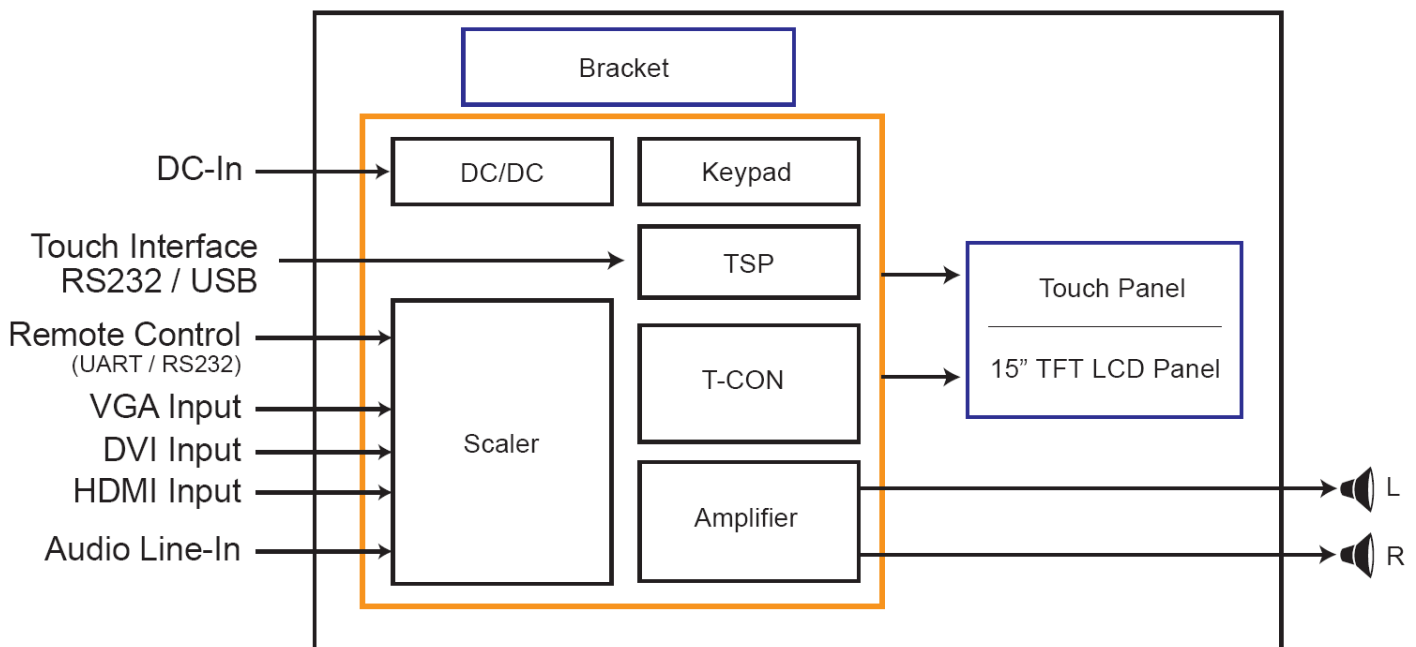
## 3. Specifications

LCD	
Panel Size	15"
Resolution (Pixels)	1024x768
Color	16.7M
Luminance w/o RTP	400 cd/m <sup>2</sup>
Luminance (RTP)	320 cd/m <sup>2</sup>
Luminance (PCT)	335 cd/m <sup>2</sup>
Contrast Ratio	700
Viewing Angle	80 / 80 / 70 / 70
Backlight Life Time (LED)	50K (Min)
Power Requirement	
Power Input (DC Jack 2.1 $\phi$ )	+12 V <sub>DC</sub>
PowerConsumption@+12V	11.4 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 $\Omega$ / 2W@4 $\Omega$
Line-In	Stereo Input Phone Jack $\phi$ 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	-40 ~ +85 $^{\circ}$ 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	-20 ~ +70 $^{\circ}$ C

## 4. Block Diagram

LP150X501x-FNR





## 5. TFT-LCD Information

### 5.1 TFT-LCD Mechanical Specifications

Parameter	Specifications	Unit
Screen Size	15 (diagonal)	Inch
Display Format	1024 x (R.G.B) x 768	Dot
Active Area	304.1(H) x 228.1(V)	mm
Pixel Pitch	0.297(H) x 0.297(V)	mm
Pixel Arrangement	RGB vertical stripe	
Surface Treatment	Anti-Glare, Haze=25%, 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	55	70	---	deg	
		Bottom	60	70	---	deg	
Contrast Ratio	CR	At optimized Viewing angle	450	700	---	---	
Luminance w/o RTP	L		300	400	---	cd/m <sup>2</sup>	
Backlight Life Time (LED)		25°C	50000	---	---	Hrs	



## 6. Order Information

### 6.1 Unit

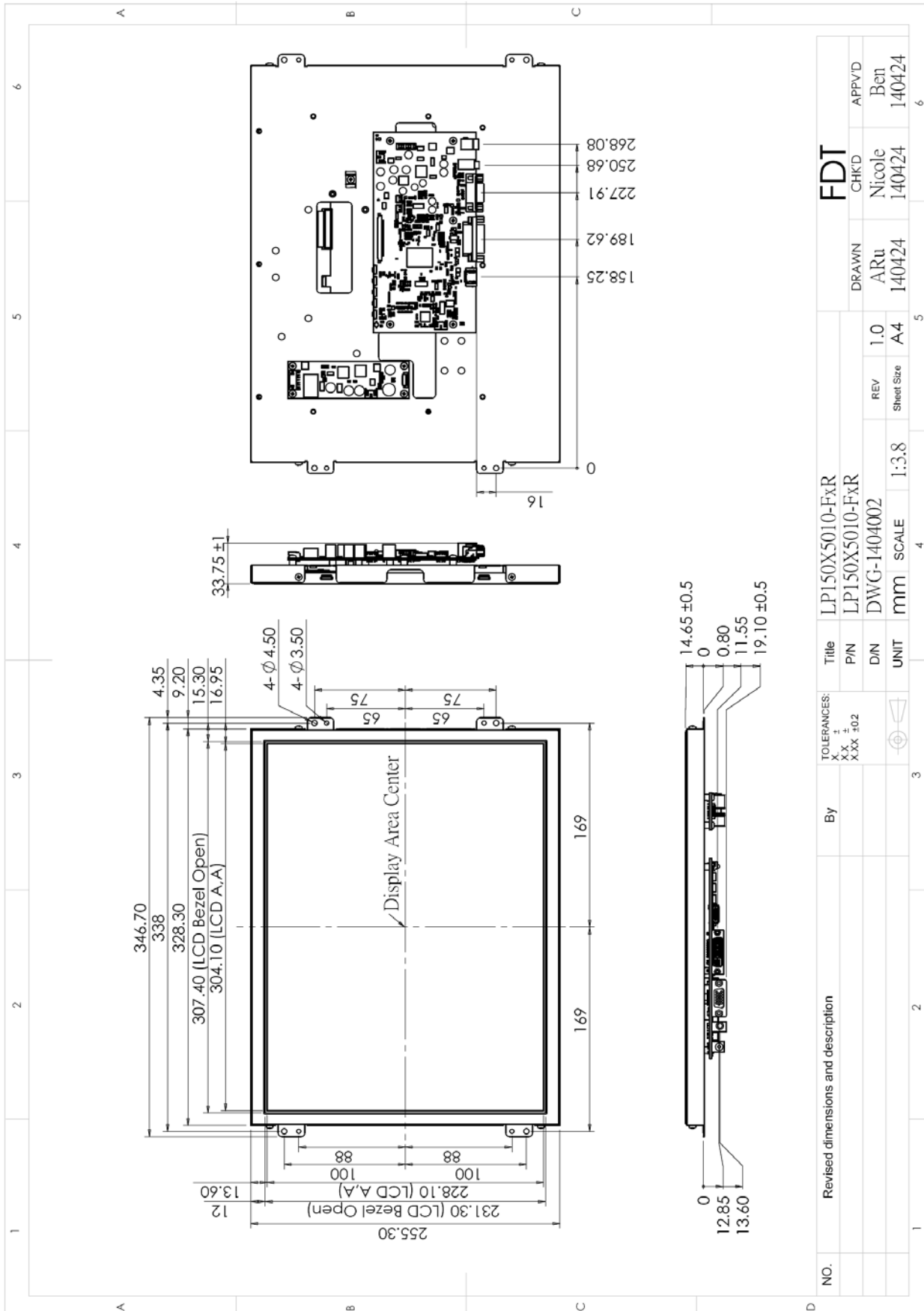
Parameter	LP150X5010-FNR	LP150X501U-FNR	LP150X501R-FNR
VGA	⊙	⊙	⊙
DVI	⊙	⊙	⊙
HDMI	⊙	⊙	⊙
Touch Panel Type	-	5W Resistive	5W Resistive
Touch Screen Interface	-	USB	RS232
Audio Amplifier	⊙	⊙	⊙
Audio Line-In	⊙	⊙	⊙
5 Keys	⊙	⊙	⊙
UART Remote Control	⊙	⊙	⊙

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"> <li>- Audio Line-Out</li> <li>- RS232 Remote Control</li> <li>- Light Sensor</li> <li>- Accessories (Refer to Page 20)</li> </ul>

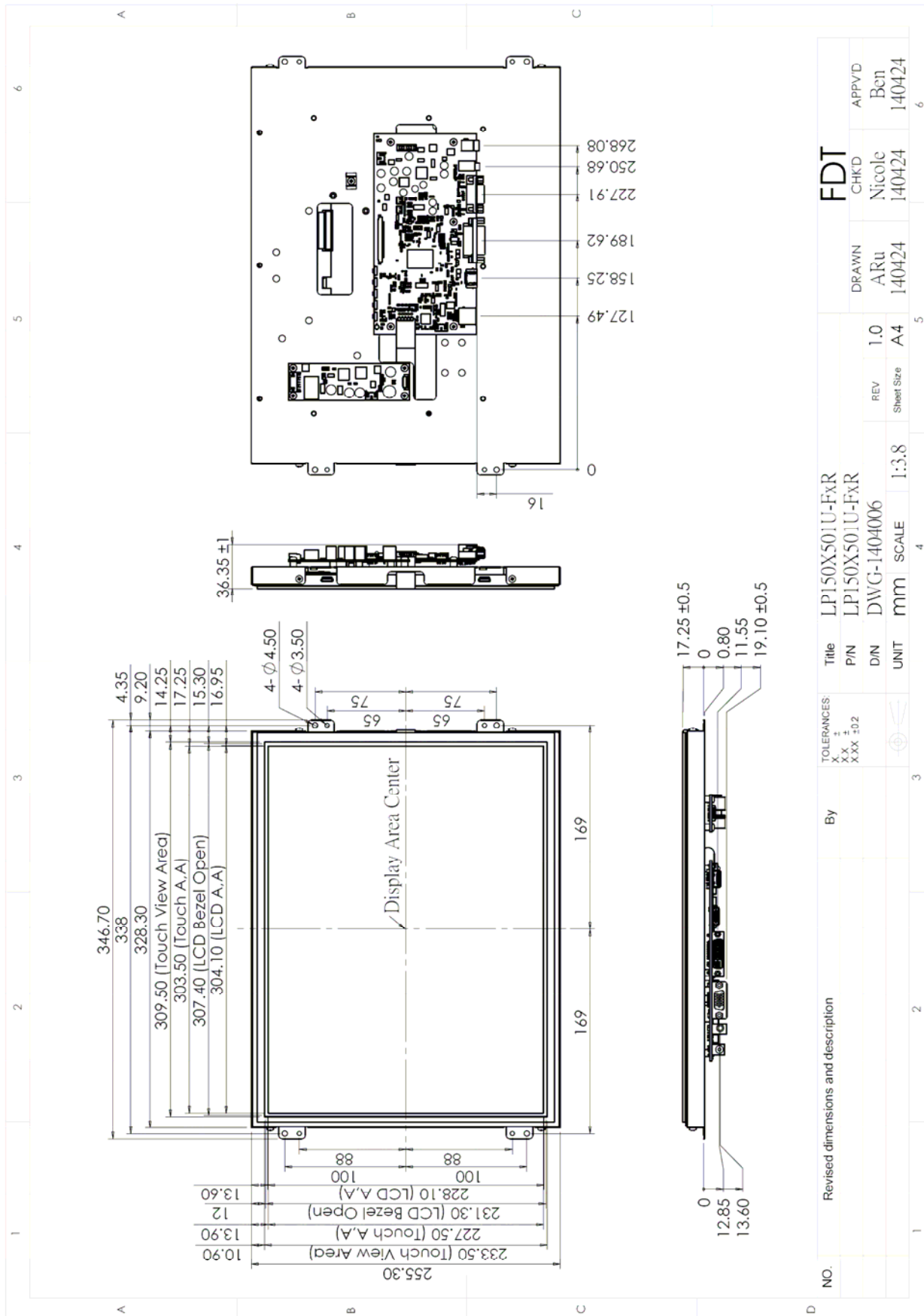
## 7. Dimension Information

### 7.1 Unit (LP150X5010-FNR)

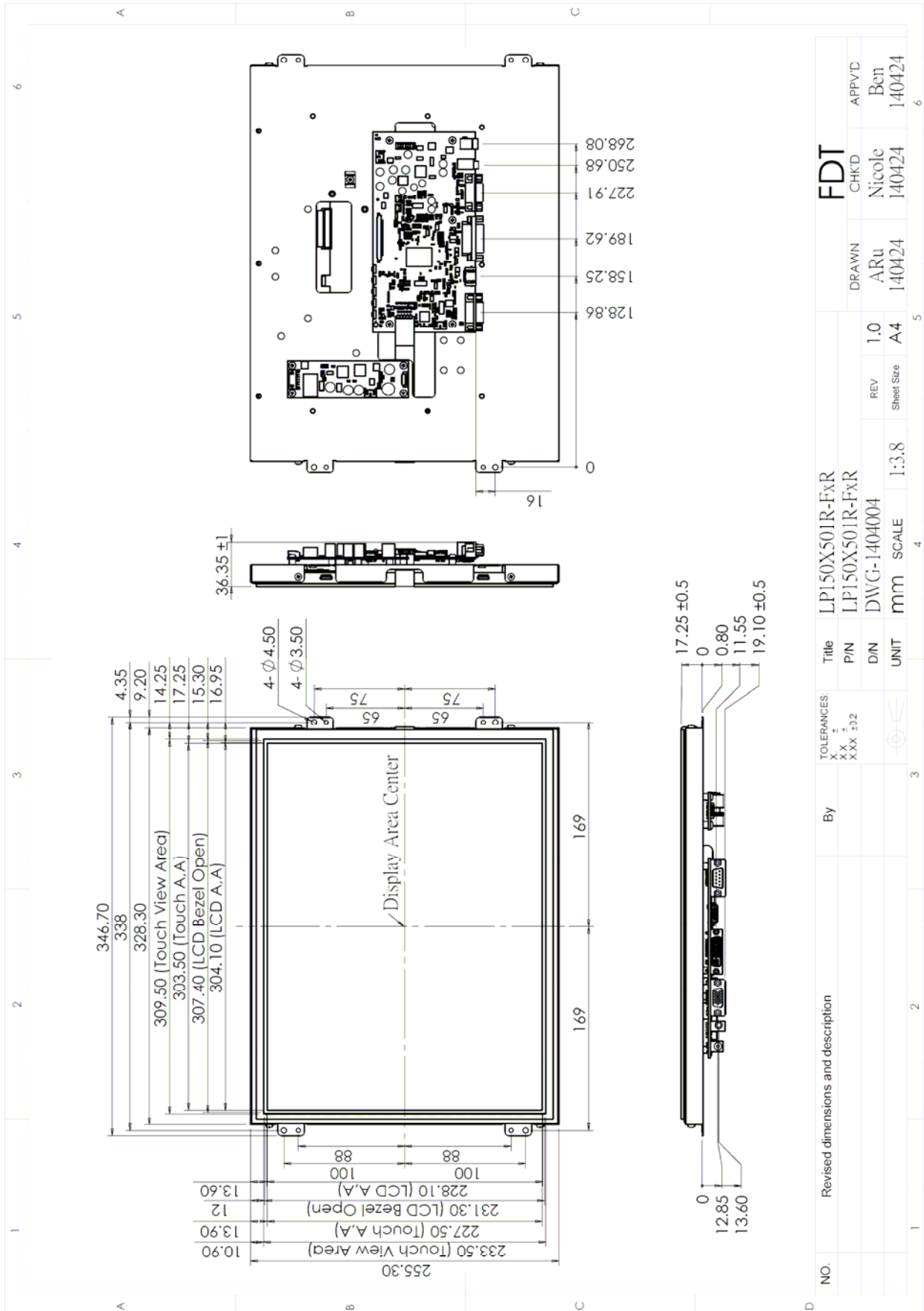




7.2 Unit (LP150X501U-FNR)



**7.3 Unit (LP150X501R-FNR)**



## 8. Pin Description

### 8.1 J103 : Pin Assignment of Power Input (DC-Jack Inside Diameter:2.1 $\phi$ Outside Diameter:5.5 $\phi$ 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)];

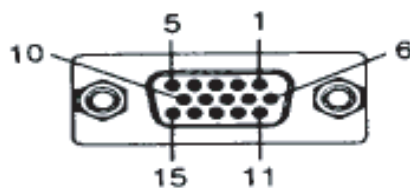
※ FDT Matching Connector Part No.: P24014 (STM) [Same as 51021-0400 (MOLEX)].

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.**

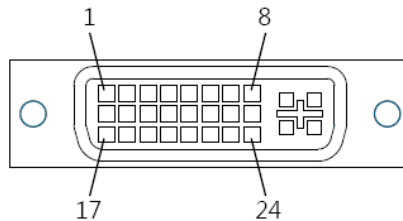
### 8.3 J503 : Pin Assignment of Analog RGB Input ( D-Sub 15Pin)

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	



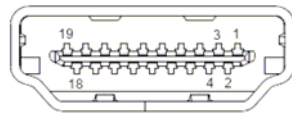
## 8.4 J401 : Pin Assignment of DVI-D (24 Pin)

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)**

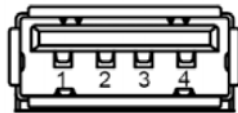
※ FDT Connector Part No.: A2001WV2-2P(JWT) ;

※ 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-	

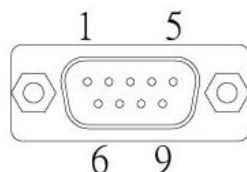
**8.9 J701 : Pin Assignment of Touch USB (USB A Type - Female 2.0mm, Side Entry Type)(Option)**

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

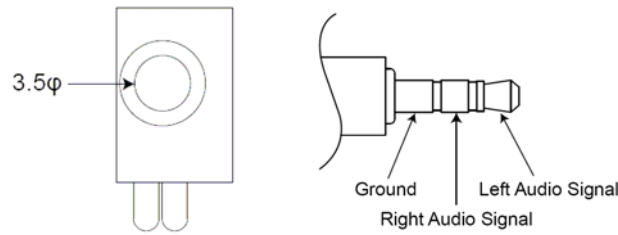


**8.10 J705 : Pin Assignment of Touch RS232 (D-SUB 9 Male)(Option)**

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		950		mA	+12V
Power Consumption		I		11.4		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	$\Omega$	
	Y	20		500	$\Omega$	
Linearity				1.5	%	
Insulation Impedance		20			M $\Omega$	DC 25V
Response Time				15	ms	

### 11.2 Optical Performance

Parameter	Specifications
Light Transmittance	80% $\pm$ 2%
Haze	< 9.5% $\pm$ 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**

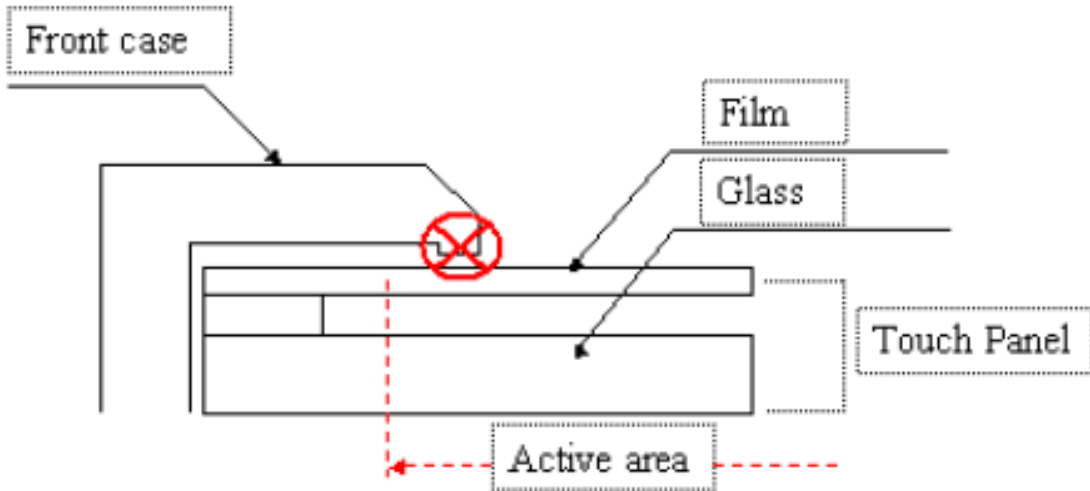
OS	Version	Interface	
<b>Windows</b>	Windows Vista, XP / 200, 9x / ME Windows Embedded Windows 7 Windows 8 / 8.1	RS232 / USB	
	Windows NT4	RS232	
	<b>Linux</b>	Kernel 2.4.x (x86 32bit) Kernel 2.6.x Upwards (x86 32 / 64bit ) Kernel 2.6.24 Upwards (ARM , MIPS)	RS232 / USB
		Android 1.5 / 1.6 / 2.x / 4.x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

Preliminary

## 11.6 Resistive Touch Panel Integration Design Guide

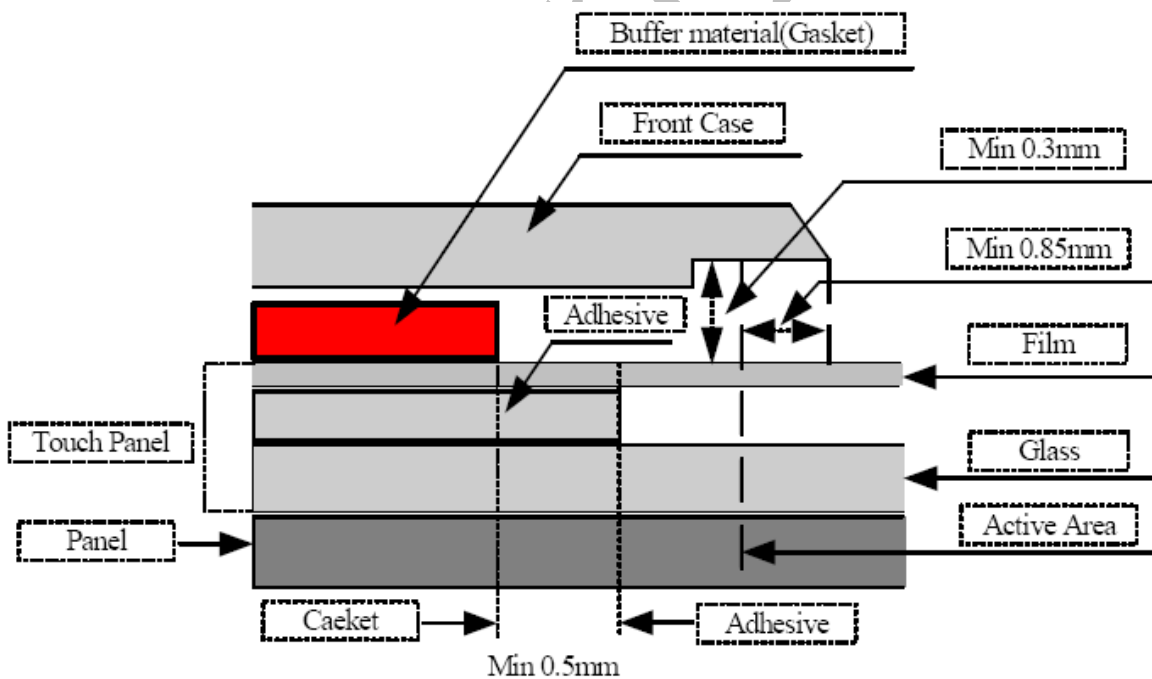
Avoid the design that Front-case overlap and press on the active area of the touch-panel.

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

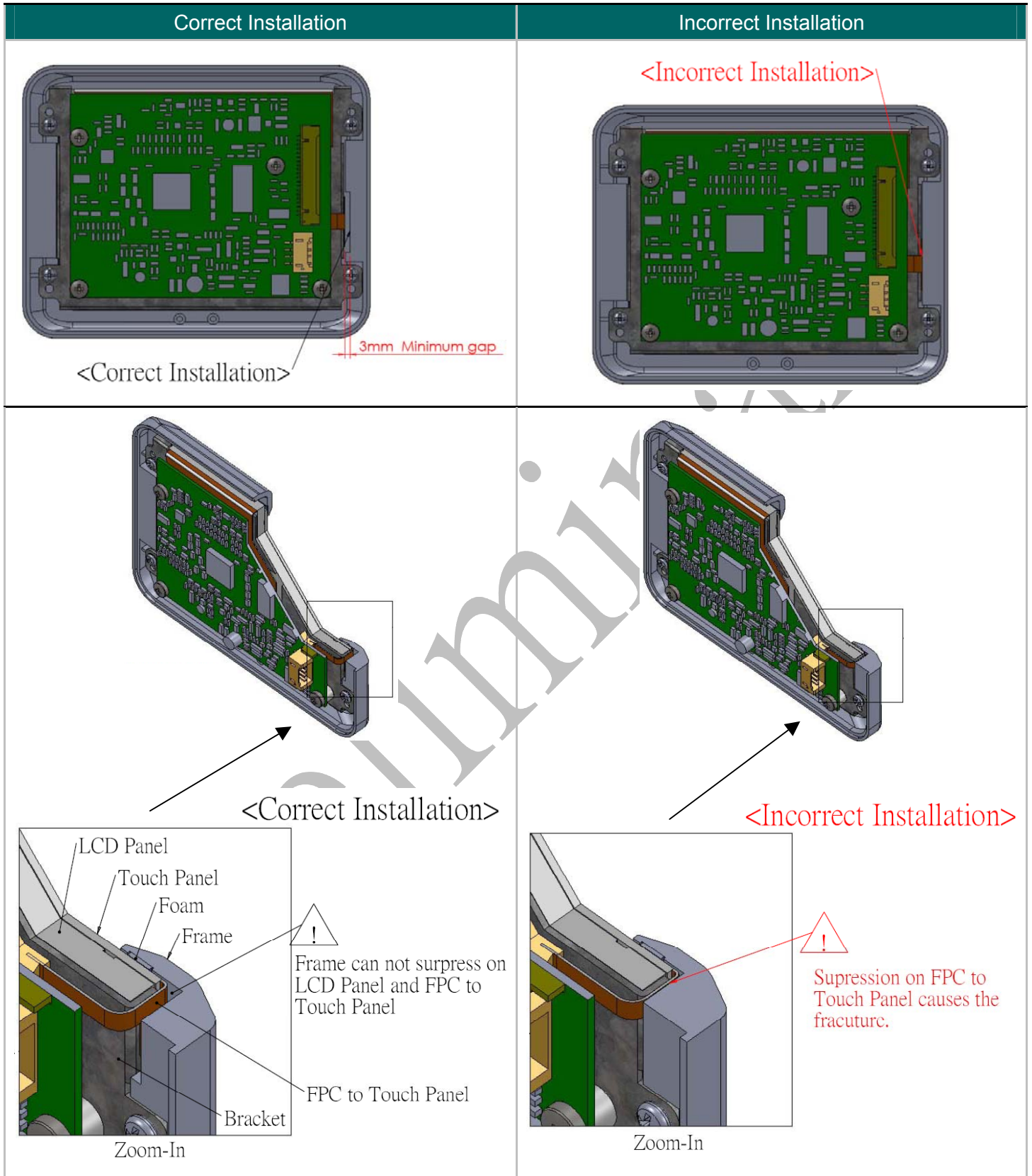


Use a buffer material (Gasket) between the touch-panel and front-case to protect damage and wrong operating.

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

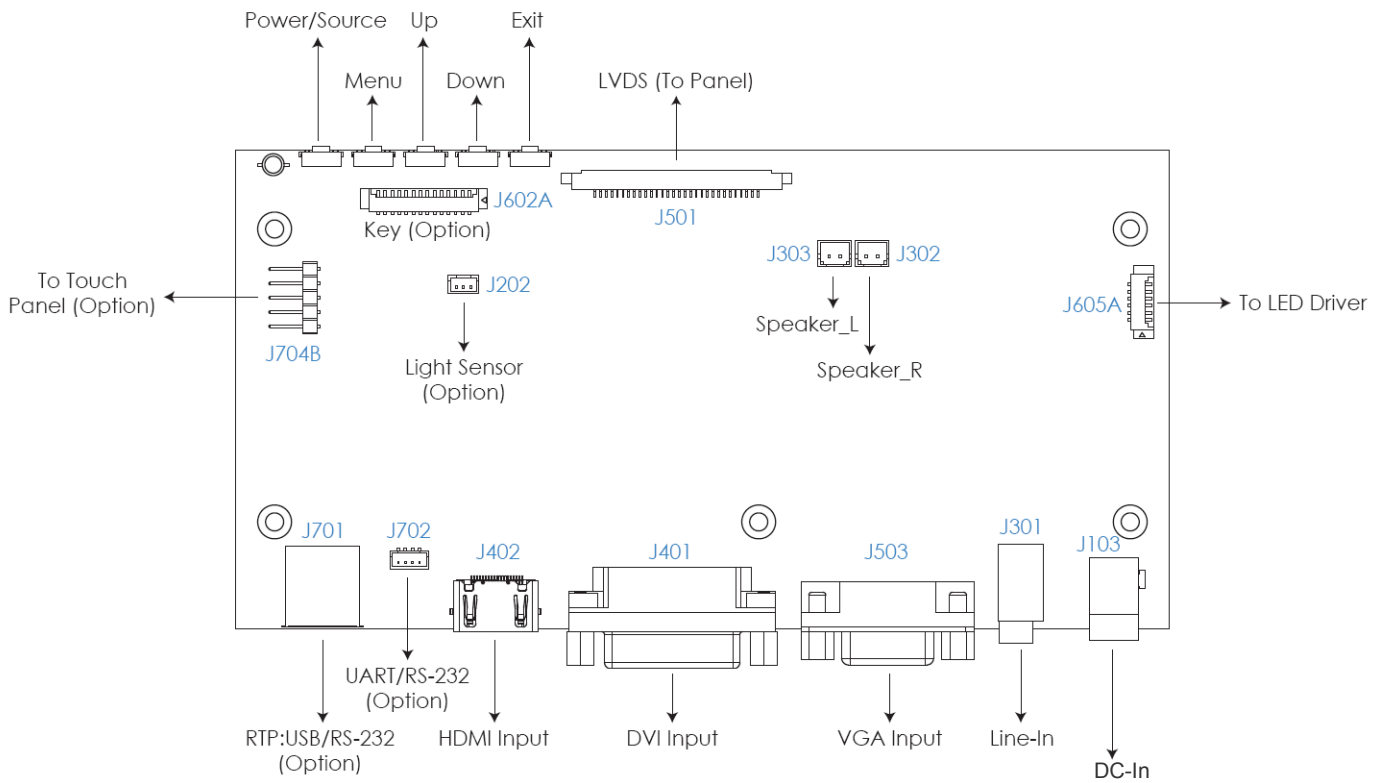


## 11.7 Mechanical Design Notice For Resistive Touch Panel



## 12. Operation manual / Connection

### 12.1 Driver Board Manual



## 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

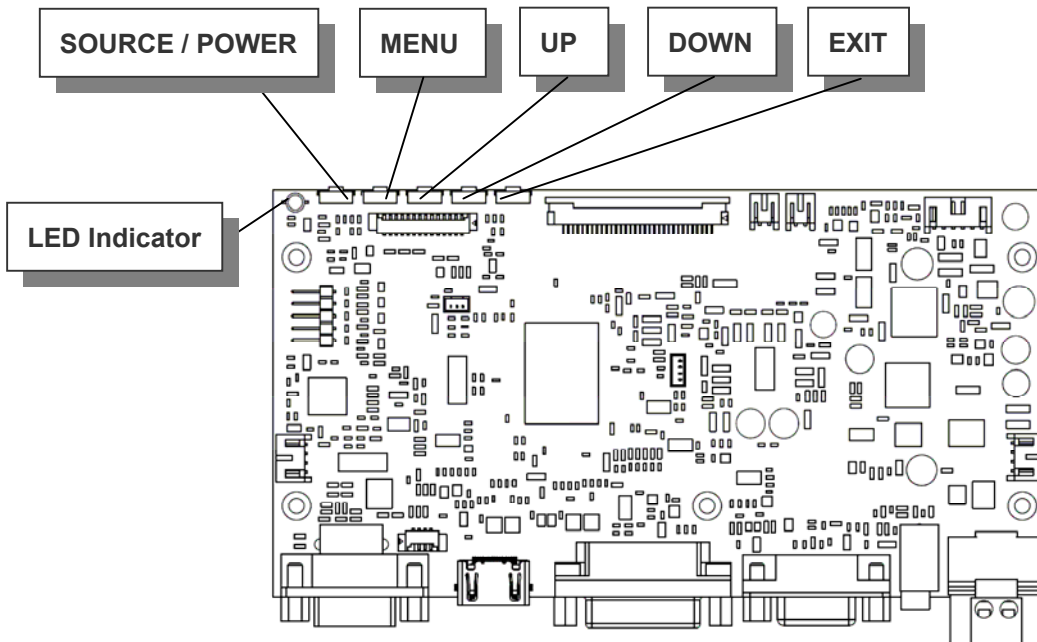


J. LASPKR0004-FDR

- A. AC to DC Adapter (L:1500mm,100-240V<sub>AC</sub> 50-60Hz to +12V<sub>DC</sub> @ 3.3A,  $\phi$  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 $\Omega$  L:400mm \*2 Pieces)

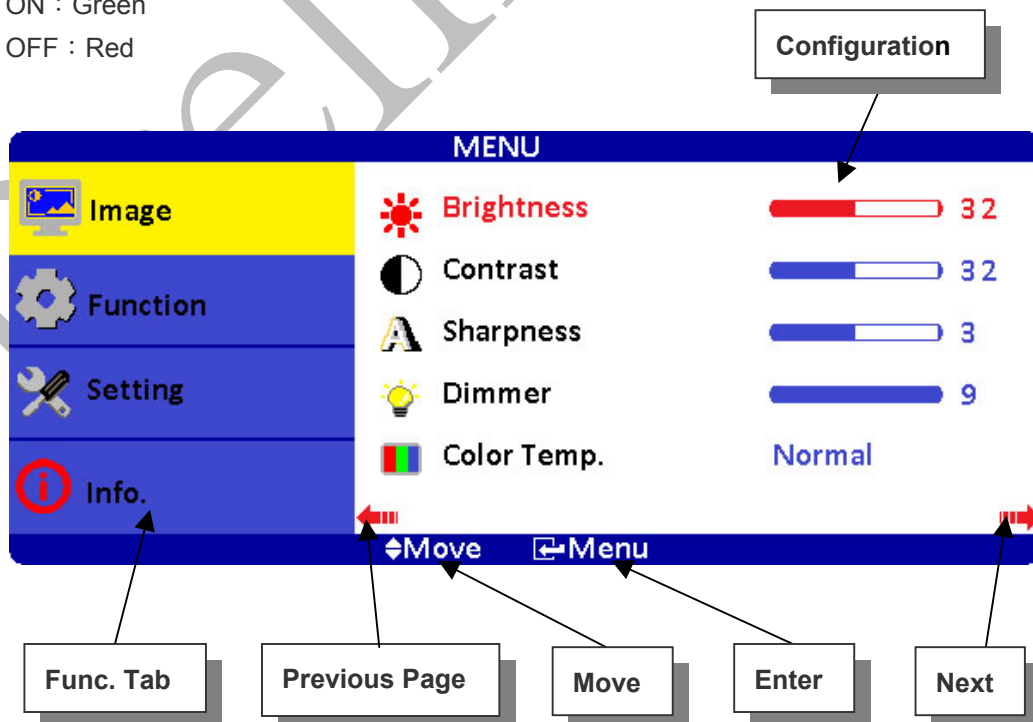
## 14. Key Function by OSD

### 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
	Reverse	Off	On / Off	
	Language	English	English / 中文 / 日本語 / 한국의 / Française / Deutsch / Italiano / Española / Português	
	Reset			Restore to default
	Exit			



## Info.

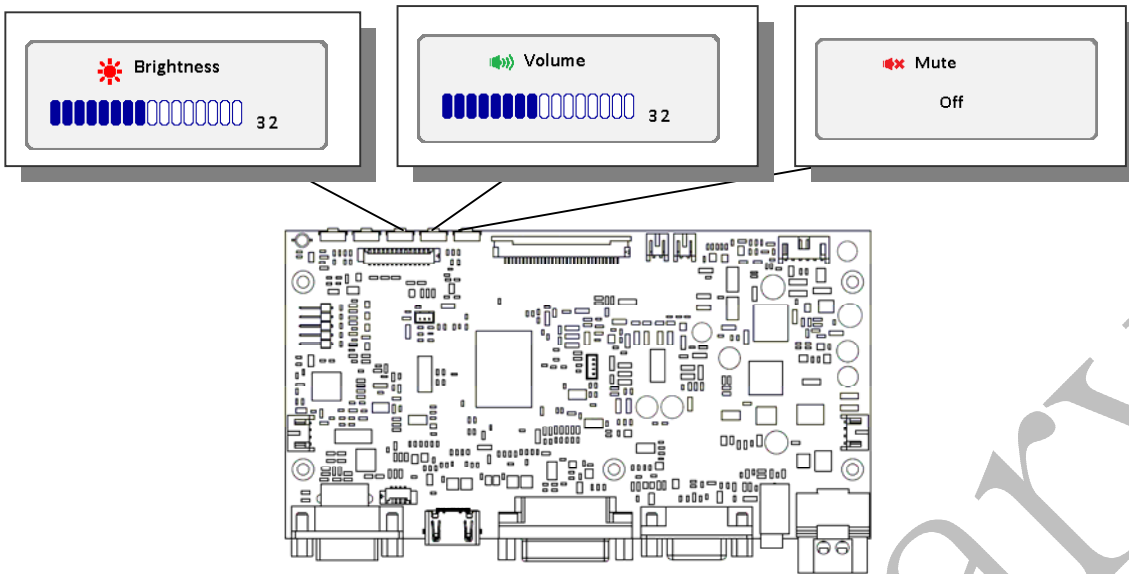
**MENU**

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 :

[Source] : Input Signal Switch

## Overview of Input Signals :

Indicator	Interface
	VGA
	DVI
	HDMI