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§ SPECIFICATION APPROVAL SHEET §

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

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

SPEC No.: **SAS-1404005**

Version: **1.2**

Issue Date: **March 18, 2021**

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

Customer:

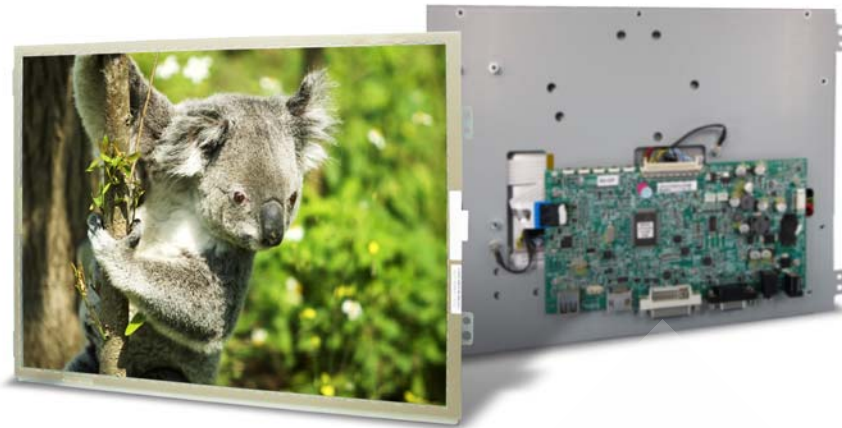
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Designed By:



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
- 5 Wires Resistive Touch Panel
- 5 Key Buttons Controls
- 9 Language OSD Menu
- 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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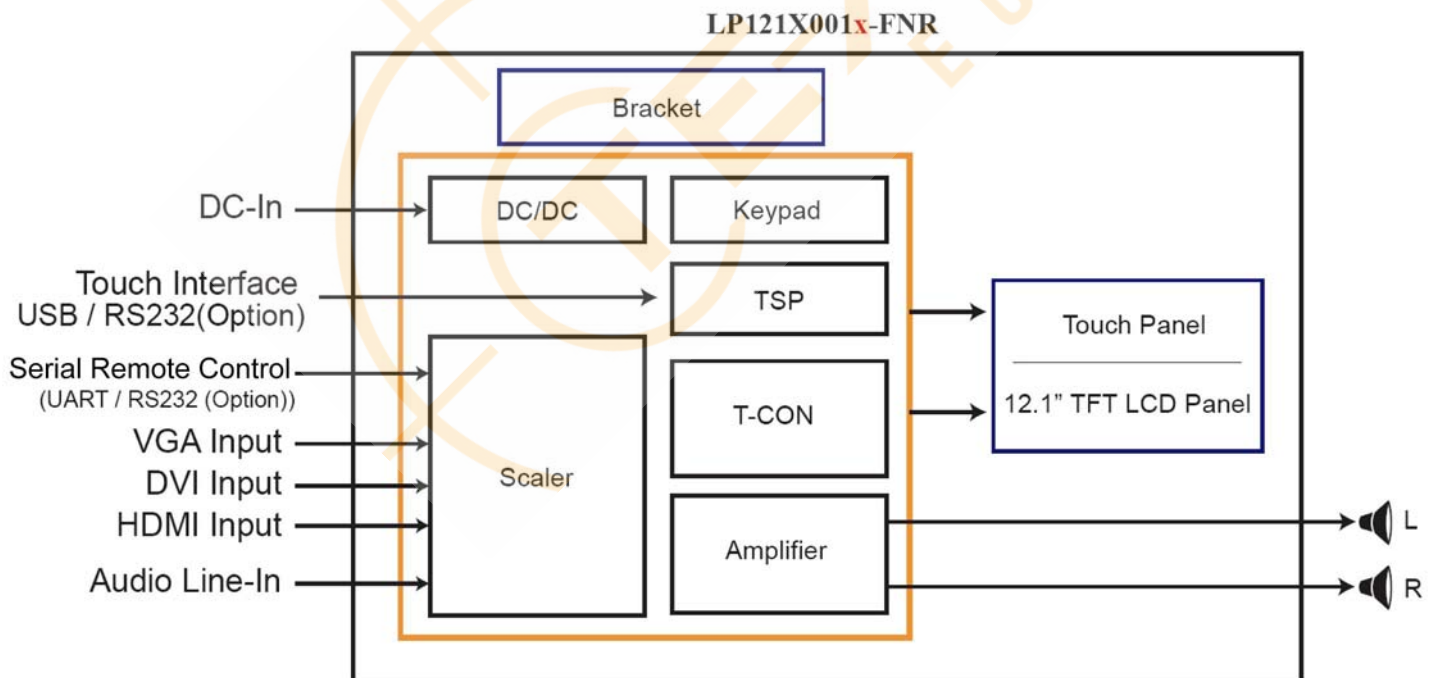


3. Specifications

LCD	
Panel Size	12.1"
Resolution (Pixels)	1024x768
Color	16.2M
Luminance without RTP	500 cd/m ²
Luminance (RTP)	400 cd/m ²
Contrast Ratio	1000
View Angle	89(L) / 89(R) / 89(T) / 89(B)
LED Life Time (Min.)	30K hours
Power Requirement	
Power Input (DC Jack 2.1 ϕ)	+12 Vdc
PowerConsumption@+12V	12 Watts (@Without Amplifier)
Touch Screen	
Resistive Type	USB / RS232 Interface
Resistive Type Support OS	Windows / Linux / Mac / QNX

Input Signal			
VGA		D-Sub15	
DVI		DVI-D	
HDMI		1.3a	
Audio			
Amplifier		1W@8Ω / 2W@4Ω	
Line-In		Stereo Input Phone Jack ϕ 3.5	
Controls			
Key		5 Buttons	
Serial Remote Control		UART / RS232 (Option)	
Environment			
Temperature Range		Without RTP	5W RTP
	Operating	-20 ~ +70℃	-10 ~ +70℃
	Storage	-30 ~ +70℃	-30 ~ +70℃
High Temperature & High Humidity (Non-condensing)	Operating	+40℃ / 90%	+40℃ / 90%

4. Block Diagram



5. Order Information

5.1 *Unit*

Item	LP121X0010-FNR	LP121X001U-FNR	LP121X001R-FNR	Unit	Remark
VGA	⊙	⊙	⊙		
DVI	⊙	⊙	⊙		
HDMI	⊙	⊙	⊙		
Touch Panel Type	-	5W Resistive	5W Resistive		
Touch Screen Interface	-	USB	RS232		
Audio Amplifier	⊙	⊙	⊙		
Audio Line-In	⊙	⊙	⊙		
5 Keys	⊙	⊙	⊙		
Serial Remote Control	UART	UART	UART		
Dimensions	278 x 205.8 x 30.1	278 x 205.8 x 32.35	278 x 205.8 x 32.35	mm	
Weight	933	1188	1188	g	±10%
Condition	Standard	Standard	Non-standard		

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.

5.2 *Customized*

Function	Item	Remark
Audio	Head Phone For HDMI (Output)	
Mechanical	Back Cover	
External Key	5 keys	
Serial Remote Control	RS232 (DB9)	
Power Input Connector	Terminal Socket 2P 5.08mm (Male)(on Module)	
	Terminal plug 2P 5.08mm (Female)(For Cable)	 Matching Terminal Socket

Note: Special order condition will apply to non-standard items and pls. contact salespersons in FDT.

6. 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. LAVGA18000-FDR



F. LAUSB18000-FDR



G. LACABLE045-FDR



H. LACABLE070-FDR



I. LAVCD00002-FDR

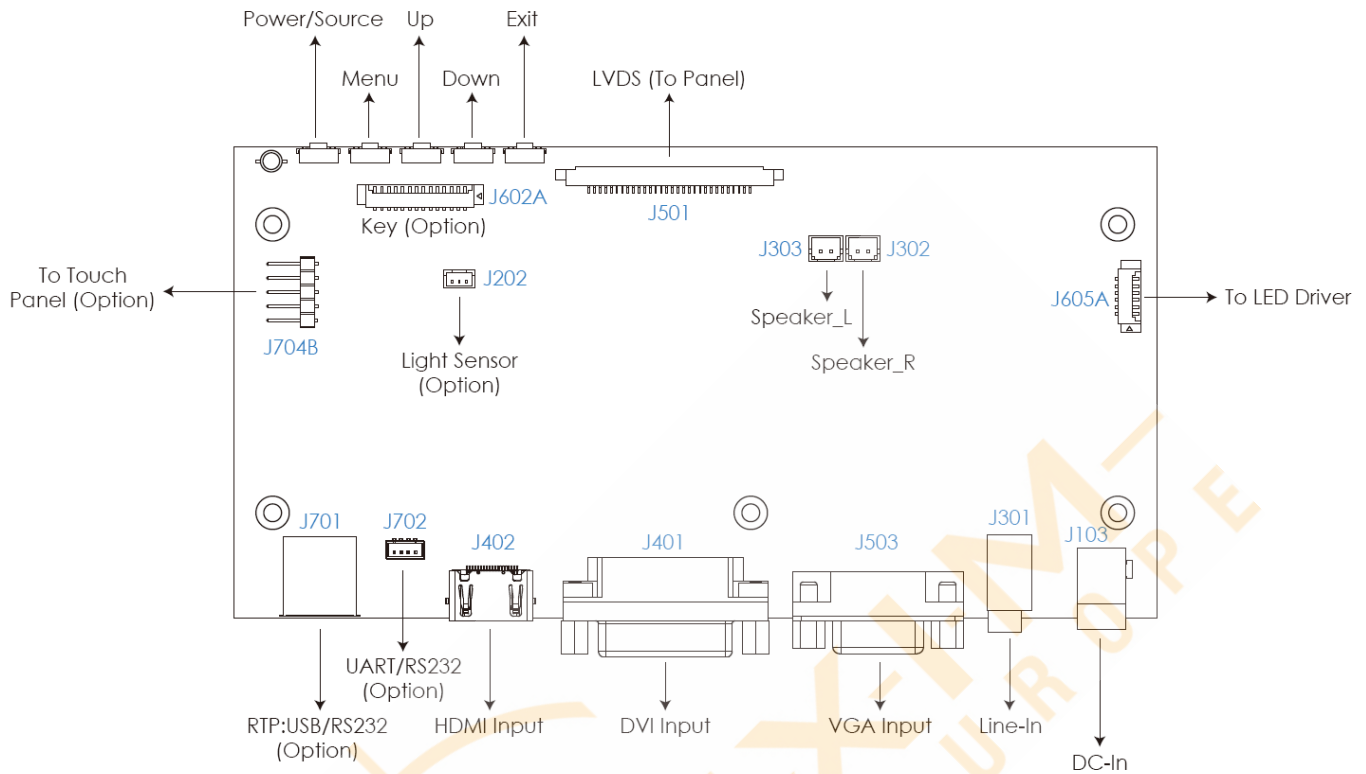


J. LASPKR0004-FDR

- 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:1800mm)
- D. DVI Cable (L:1800mm)
- E. VGA Cable (L:1800mm)
- F. USB Cable (L:1800mm)
- G. RS232 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)

7. Operation manual / Connection

7.1 Driver Board Manual



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	

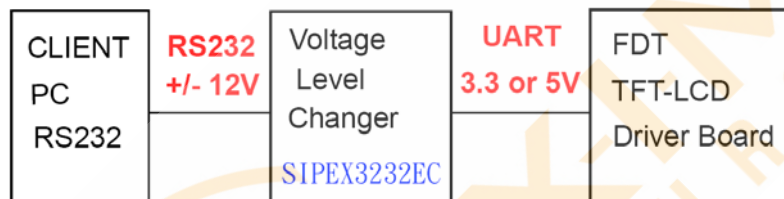
8.2 J702 : Pin Assignment of UART (Pitch 1.25mm 4Pin, Top Entry Type)

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

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

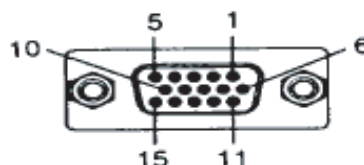
Pin No.	Symbol	I/O	Description	Remark
1	TX / RS232 TX (Option)	O	UART / RS232 (Option) Transmission Data	
2	RX / RS232 RX (Option)	I	UART / RS232 (Option) Receive Data	
3	GND	-	Ground	
4	+3.3Vdc	O	+3.3Vdc Output Voltage	

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



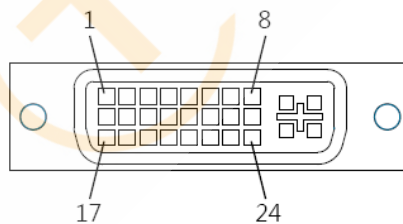
8.3 J503 : Pin Assignment of Analog RGB Input (D-Sub 15Pin)

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	



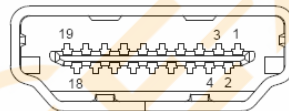
8.4 J401 : Pin Assignment of DVI-D (24 Pin)

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 Speaker 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 Speaker 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-	

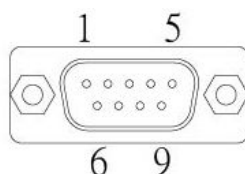
8.9 J701 : Pin Assignment of Touch USB (USB A Type - Female 2.0mm, Side Entry Type)(Option)

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

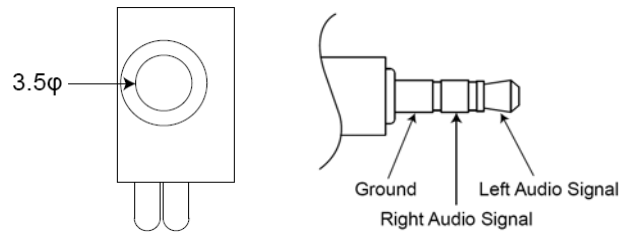


8.10 J705 : Pin Assignment of Touch RS232 (D-SUB 9 Male)(Option)

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/Ear Phone (Option) (Outside Diameter:3.5 ϕ Side 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. without RTP		-20	+70	°C	
Storage Temp. without RTP		-30	+70	°C	
Operating Temp. 5W RTP		-10	+70	°C	
Storage Temp. 5W RTP		-30	+70	°C	
High Temperature & High Humidity (Non-condensing) without RTP		-	+40 / 90	°C / %	
High Temperature & High Humidity (Non-condensing) 5W RTP		-	+40 / 90	°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	-	1000	-	mA	+12V
Power Consumption		I	-	12	-	W	±15% @Without Amplifier
Output Voltage	VDD	O	3.2	3.3	3.4	V	
Analog RGB Input Signal	Analog RGB in	RGB	I	0.7	-	Vp-p	@75Ω
DVI Input Signal			-	-	165	MHz	
HDMI Input Signal			-	-	165	MHz	

10.2 Support Display Mode Characteristics

Dots per inch	Standard	H	Unit	Polarity	V	Unit	Polarity	Note
640 × 480	VGA	31.5	KHz	Negative	59.9	Hz	Negative	
800 × 600	VESA	37.9	KHz	Positive	60.3	Hz	Positive	
1024 × 768	VESA	48.4	KHz	Negative	60	Hz	Negative	
1280 × 1024	VESA	64	KHz	Positive	60	Hz	Positive	
1600 × 1200	VESA	75	KHz	Positive	60	Hz	Positive	
1920 × 1080	VESA	67.5	KHz	Positive	60	Hz	Positive	

Note: Polarity & standard only for VGA mode

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		-	-	20	ms	

11.2 Optical Performance

Parameter	Specifications
Light Transmittance	80% ±2%
Haze	< 5%±3%

11.3 Mechanical Performance

Parameter	Specifications
Input Method	Stylus or Finger
Operating Force	≤ 80g (R8.0 Silicon Rubber)
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

Driver Vender : EETI (eGalax_eMPIA Technology Inc.)

OS	Version	Interface
Windows	Windows 7, 8, 8.1, 10	USB/RS232
	Windows Embedded 7, 8	
	Windows Embedded POSReady 2009 POSReady 7	
	Embedded Standard 7	
	Embedded Enterprise 7	
	Embedded 8 Standard	
	Embedded 8.1 Pro/ Embedded 8.1 Industry	
	Windows , XP, 2000	
	Windows XP Embedded	
Windows CE	Windows Embedded Compact 2013	USB/RS232
	Windows Embedded Compact 7	
	Windows CE 6.0	
	Windows CE.Net (4.x / 5.0)	
Linux	Kernel 2.6.24 Upward and 3.x.x / 4.x.x / 5.x.x (X86 / ARM / MIPS)	USB
	Kernel 2.6.23 Downward (X86)	
	Kernel 2.4.x (x86)	
Android	Android Version 2.3.x upwards (X86 / ARM / MIPS)	USB
Mac OS	Mac OS X 10.5.3 Leopard (Power PC)	USB
	Mac OS X 10.7.4 Earlier (32Bit / 64Bit) (Intel CPU)	
	Mac OS X 10.7.5 (32Bit / 64Bit) (Intel CPU)	
	Mac OS X 10.8.x Mountain Lion (Intel CPU)	
	Mac OS X 10.9.x Mavericks (Intel CPU)	
	Mac OS X 10.10.x Yosemite (Intel CPU)	
	Mac OS X 10.11 El Capitan (Intel CPU)	
	Mac OS 10.12 Sierra (Intel CPU)	
	Mac OS 10.13 High Sierra (Intel CPU)	
	Mac OS 10.14 Mojave (Intel CPU)	
	Mac OS 10.15 Catalina (Intel CPU)	
QNX	QNX Neutrino RTOS V6.5/6.4	USB/RS232
	QNX Neutrino RTOS V6.3	

Note: 1. Please refer to the FDT website for the driver installation and support operating system.

FDT website: <http://www.fdt.com.tw>

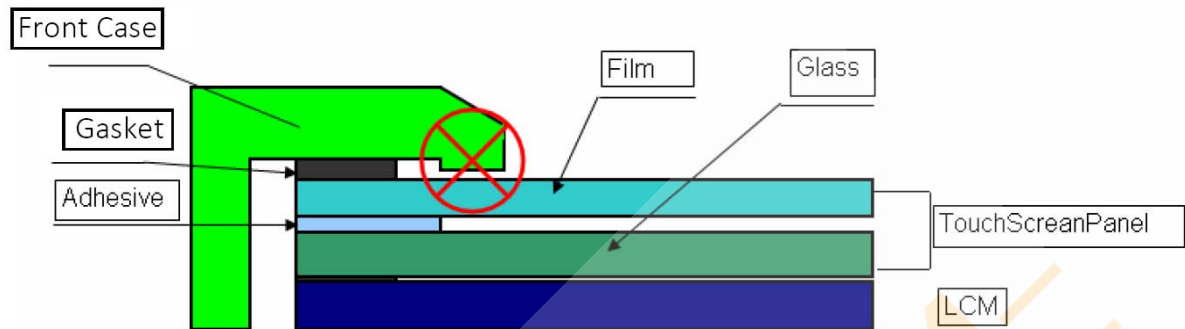
2. How to use Touch Driver, please refer to Readme of Touch Screen Driver CD Disk (LAVCD00002-FDR).

3. Please refer to the FDT website for the latest driver version and support operating system.

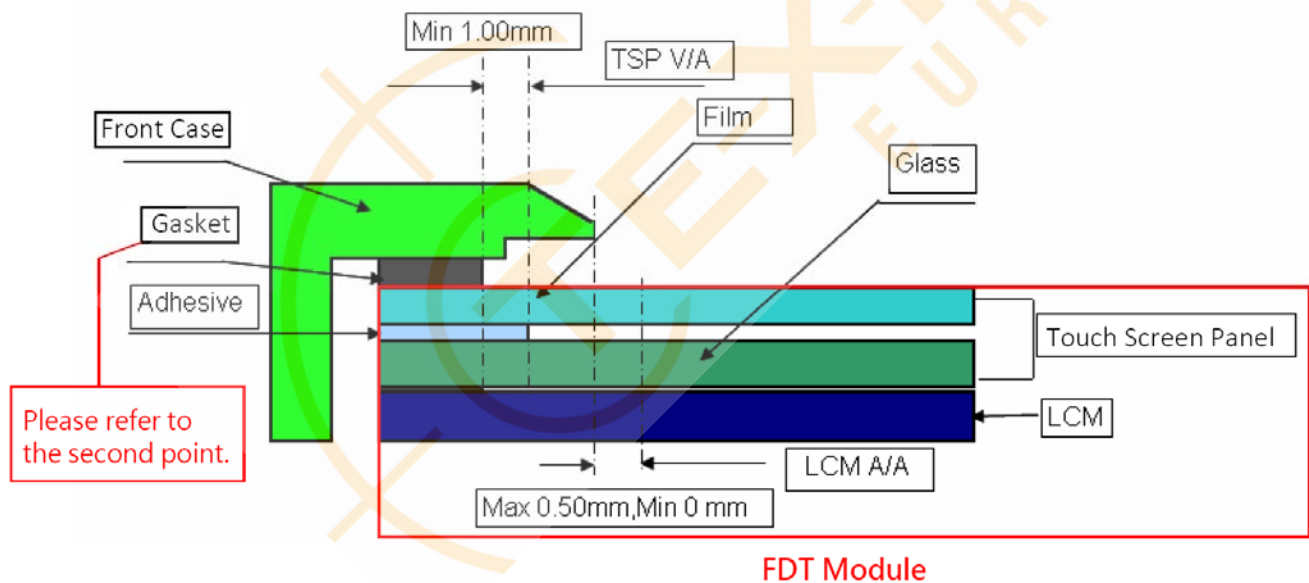
11.6 Resistive Touch Panel Integration Design Guide

Front case design follow as below

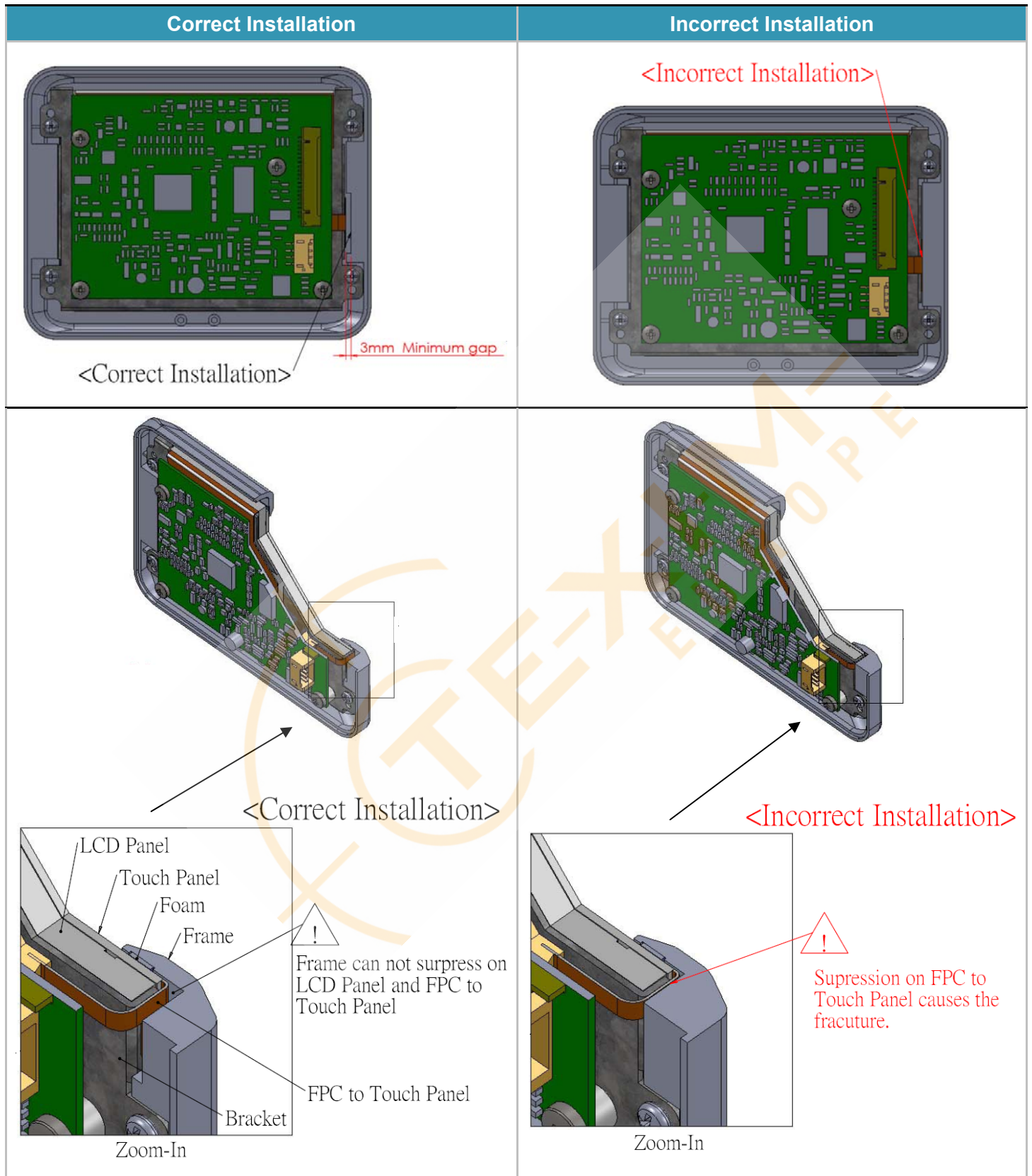
1. Avoid the design that front case overlap and press on the active area of the LCM.
2. Give enough gap(over 0.5mm at compressed) between the front case and TSP to protect wrong operating.



3. Use a buffer material(Gasket) between the TSP and front case to protect damage and wrong operating.
4. Avoid the design that buffer material overlap and press on the inside of TSP view area.

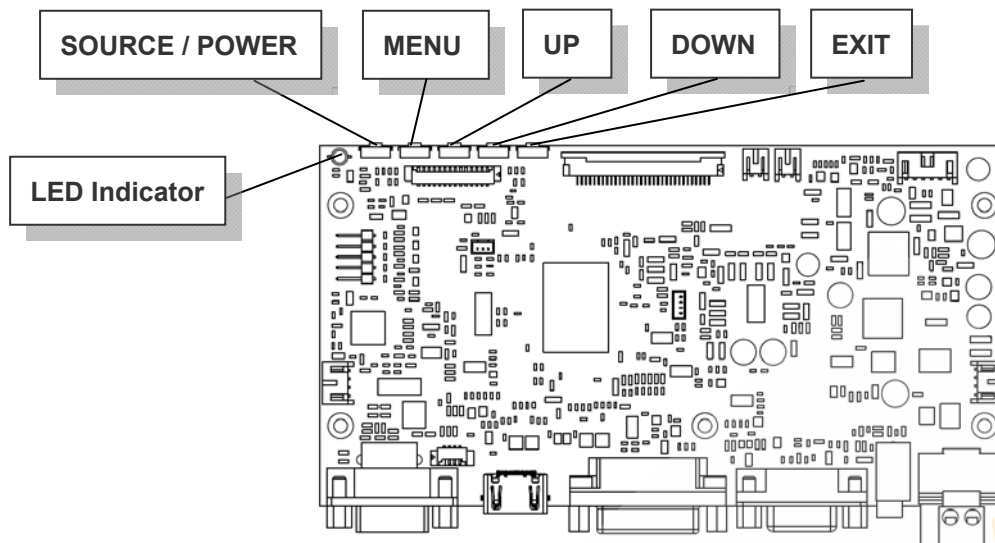


11.7 Mechanical Design Notice For Resistive Touch Panel



12. Key Function by OSD

12.1 Menu Operation

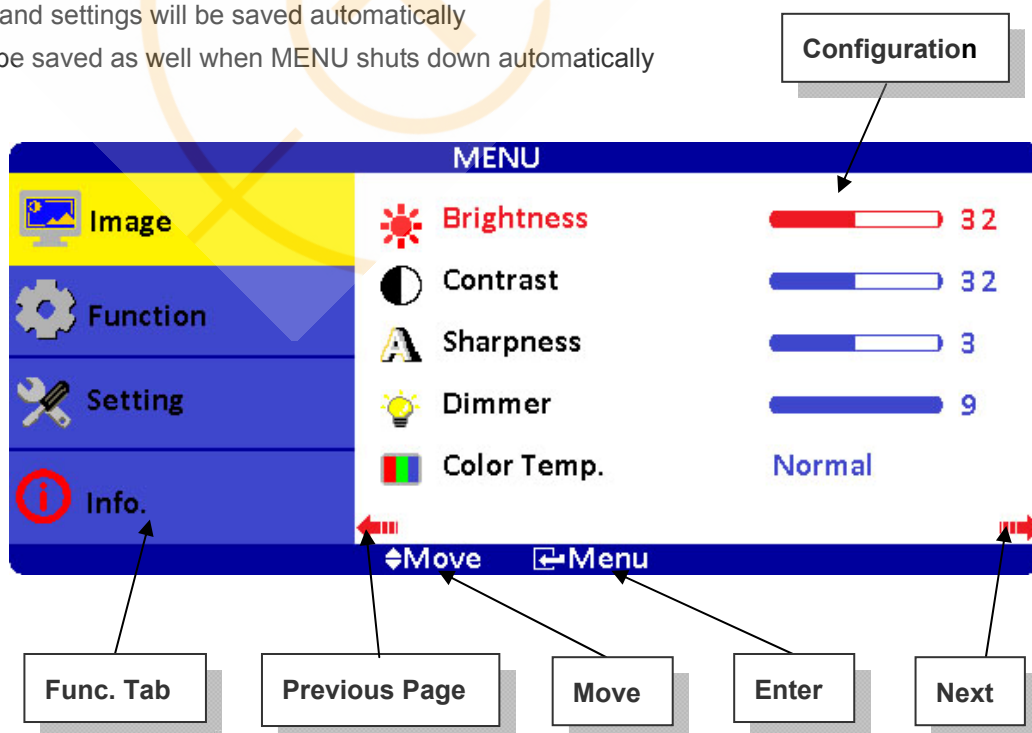


OSD ICON Instructions :

1. POWER : Power On/Off (※Press for 3 secs to turn off)
2. MENU / ENTER : (After turning on MENU, only ENTER is available)
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
 - Waiting : Flickering Green
 - Power ON : Green
 - Power OFF : Red

Save OSD Setting:

1. EXIT MENU and settings will be saved automatically
2. Settings will be saved as well when MENU shuts down automatically



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	Function	Default	Status	Description	Remark
	Show Status	Information of input source	On	On	Show input source	
				Off	Hide input source	
	Blue Screen	Select blue/ black screen when no input signal is detected.	On	On	Show blue screen when no input.	
				Off	Show black screen when no input.	
	Auto Power On	Modules turns on automatically without power key input.	On	On	Auto	
				Off	Manual	
				Auto Save	Power off , the last state	
	Detect Source	Auto detect input source.	On	On	Auto-detect signal source	
				Off	Manual switch signal source	
	Auto Power Saving	Modules go standby when no input source is detected.	Off	6s / 15s / 30s	Go standby by settings when no input	LED indicator: Flickering Green
				Off	Show no signal when no input	LED indicator: Green

	Auto Sleep	Modules go off when set timing is out.	Off	15M / 30M / 60M	Go off by time setting	LED indicator: Red Press Power Key back to life.
				Off	Turn off sleep mode	
	Exit					

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



Setting

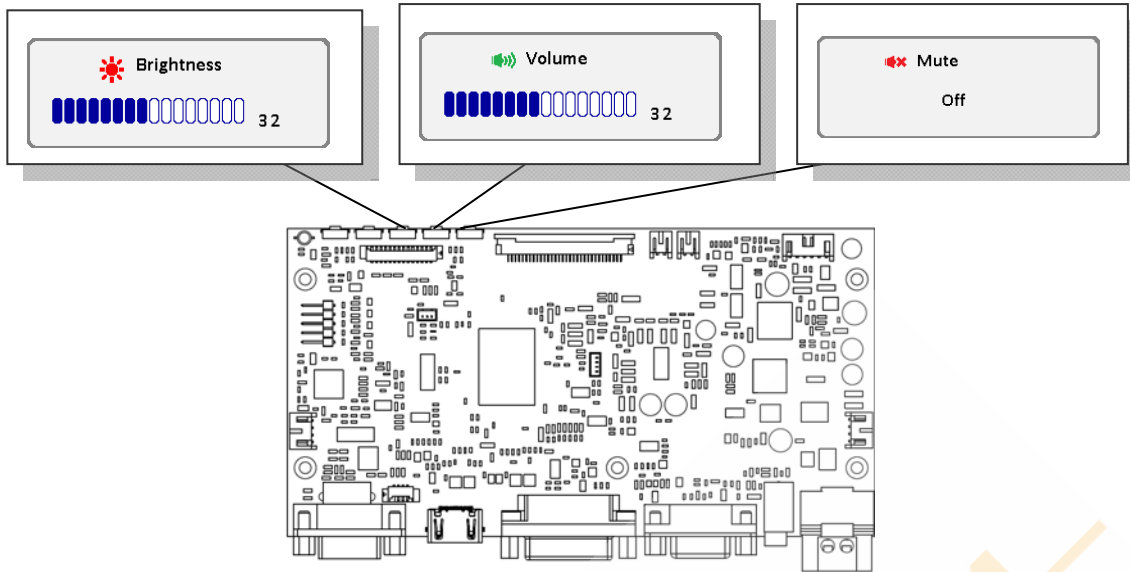
Indicator	Meaning	Default	Adjustable range	Remark
	Source	VGA	VGA / DVI / HDMI	
	Volume	32	0~63	
	Mute	Off	On / Off	On : Mute · Off : Sound
	Mirror	Off	On / Off	Left-Right Reversal
	Flip	Off	On / Off	Upside Down
	Language	English	English / 中文 / 日本語 / 한국의 / Française / Deutsch / Italiano / Española /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



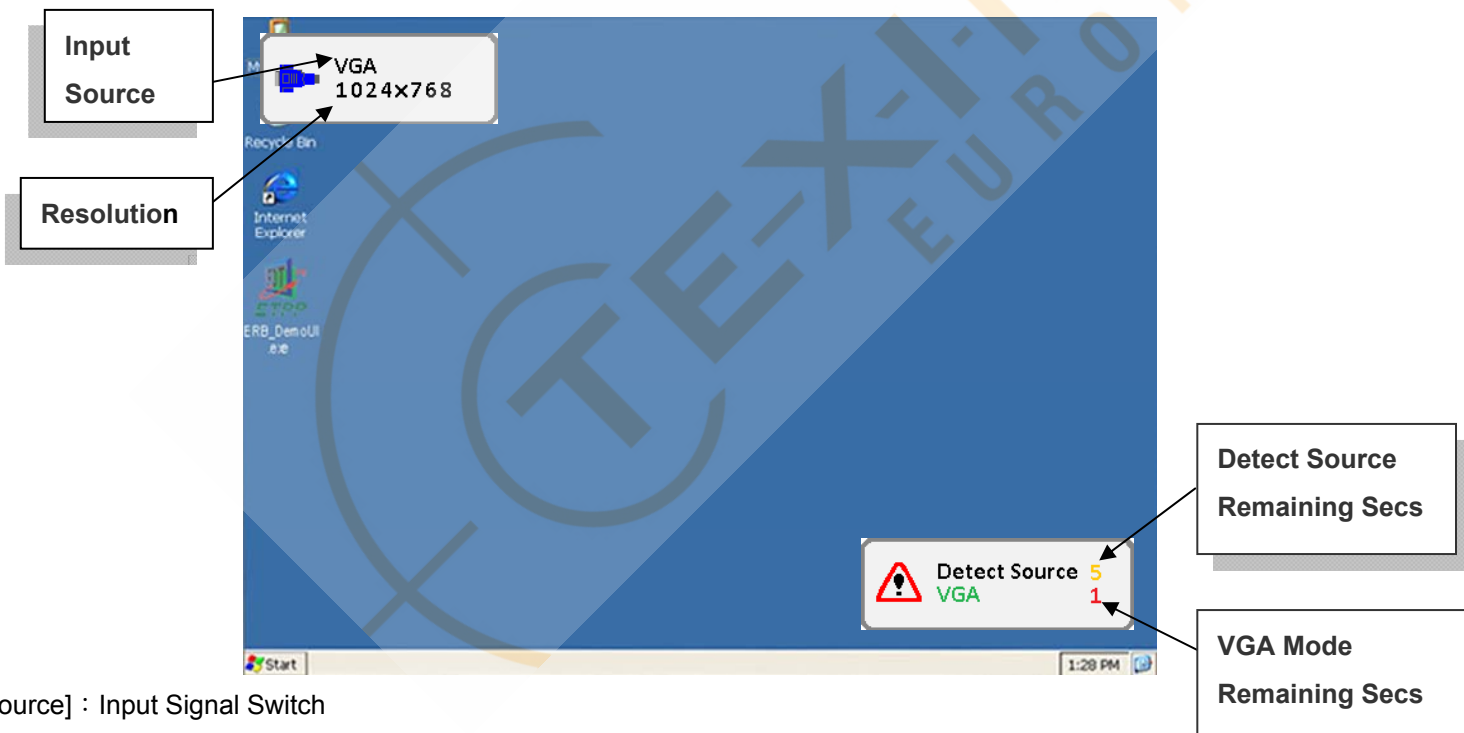
Info.

MENU	
Image	Source : VGA
Function	Resolution : 1024×768
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 :



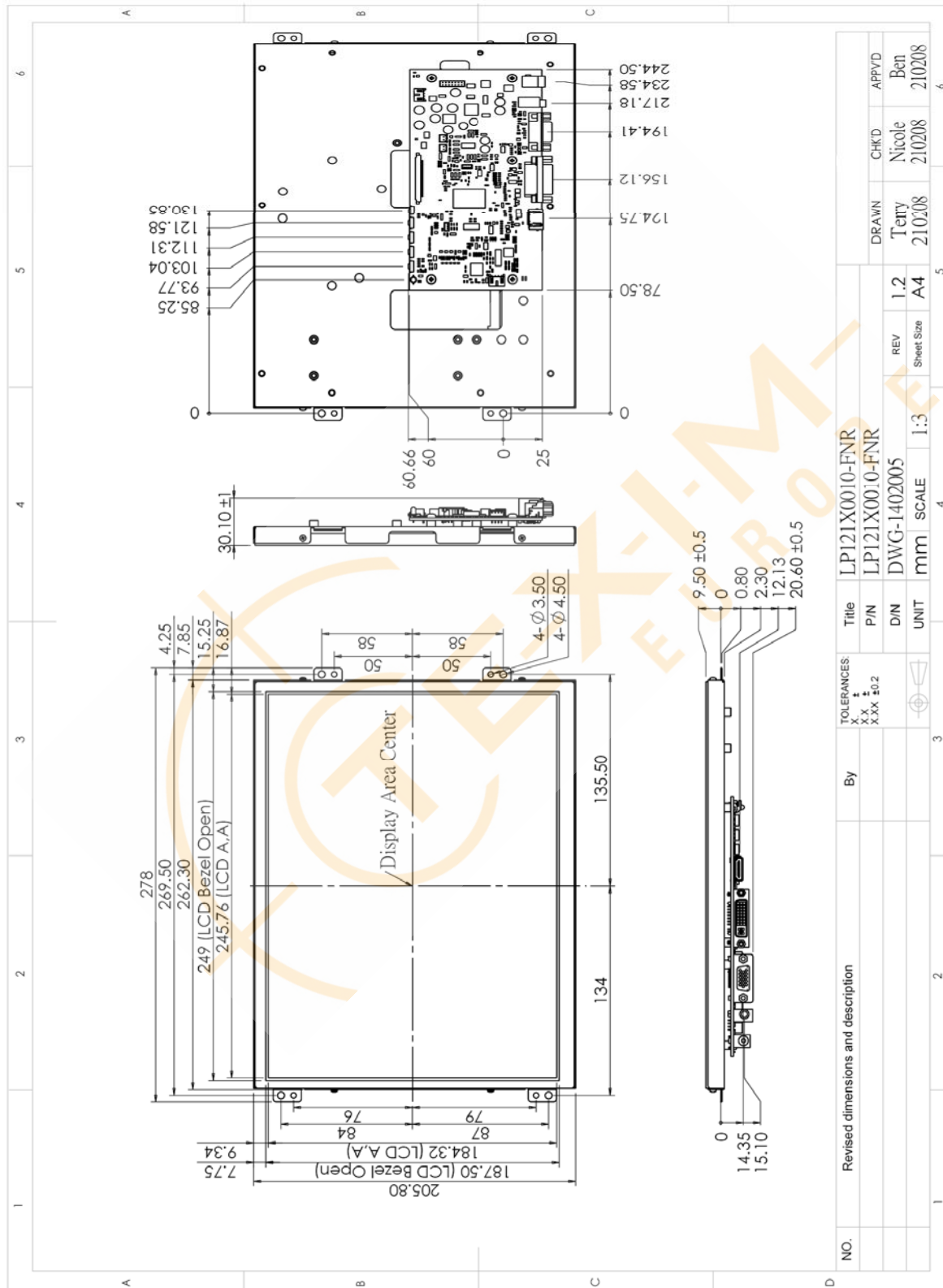
[Source] : Input Signal Switch

Overview of Input Signals :

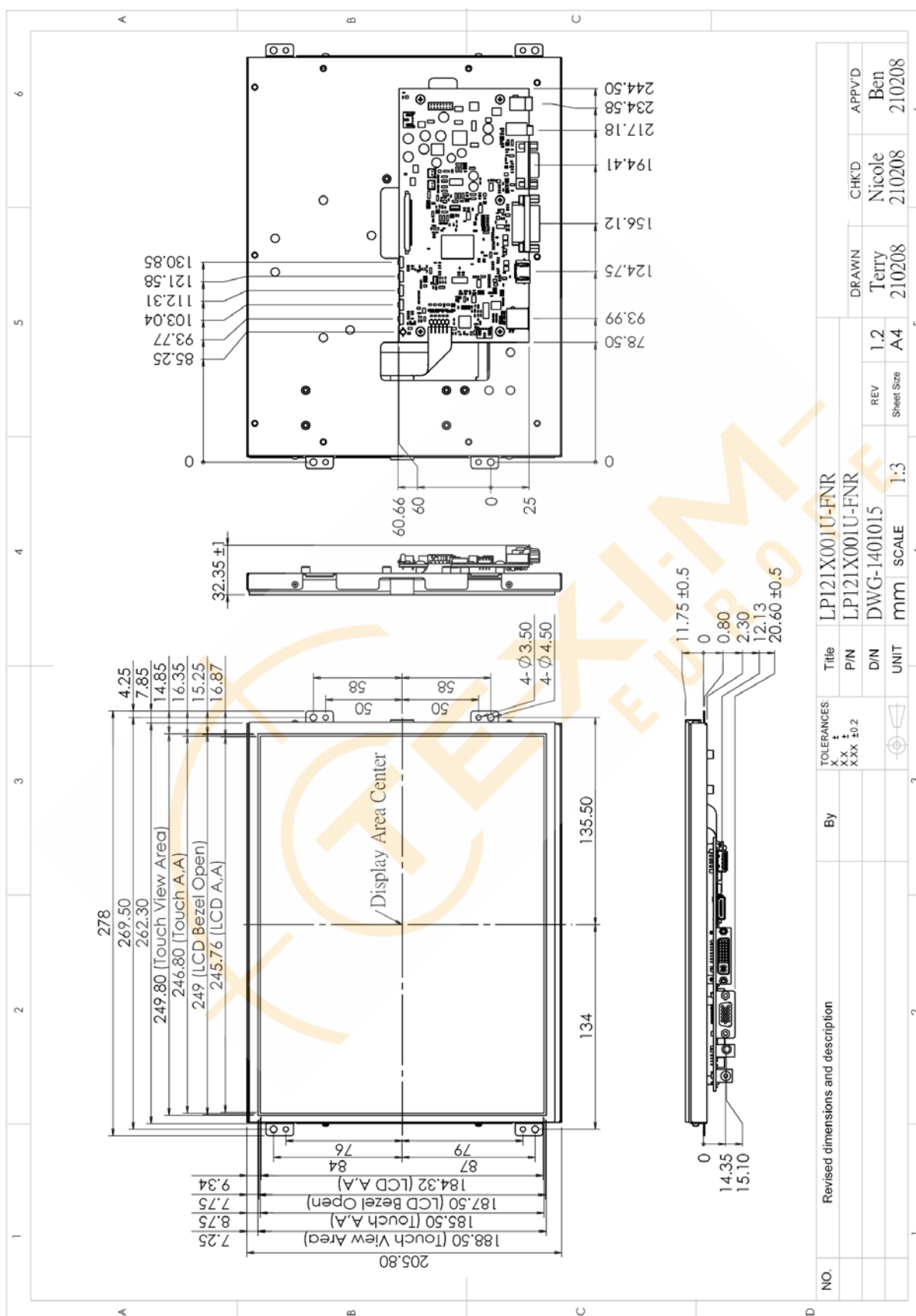
Indicator	Interface
	VGA
	DVI
	HDMI

13. Dimension Information

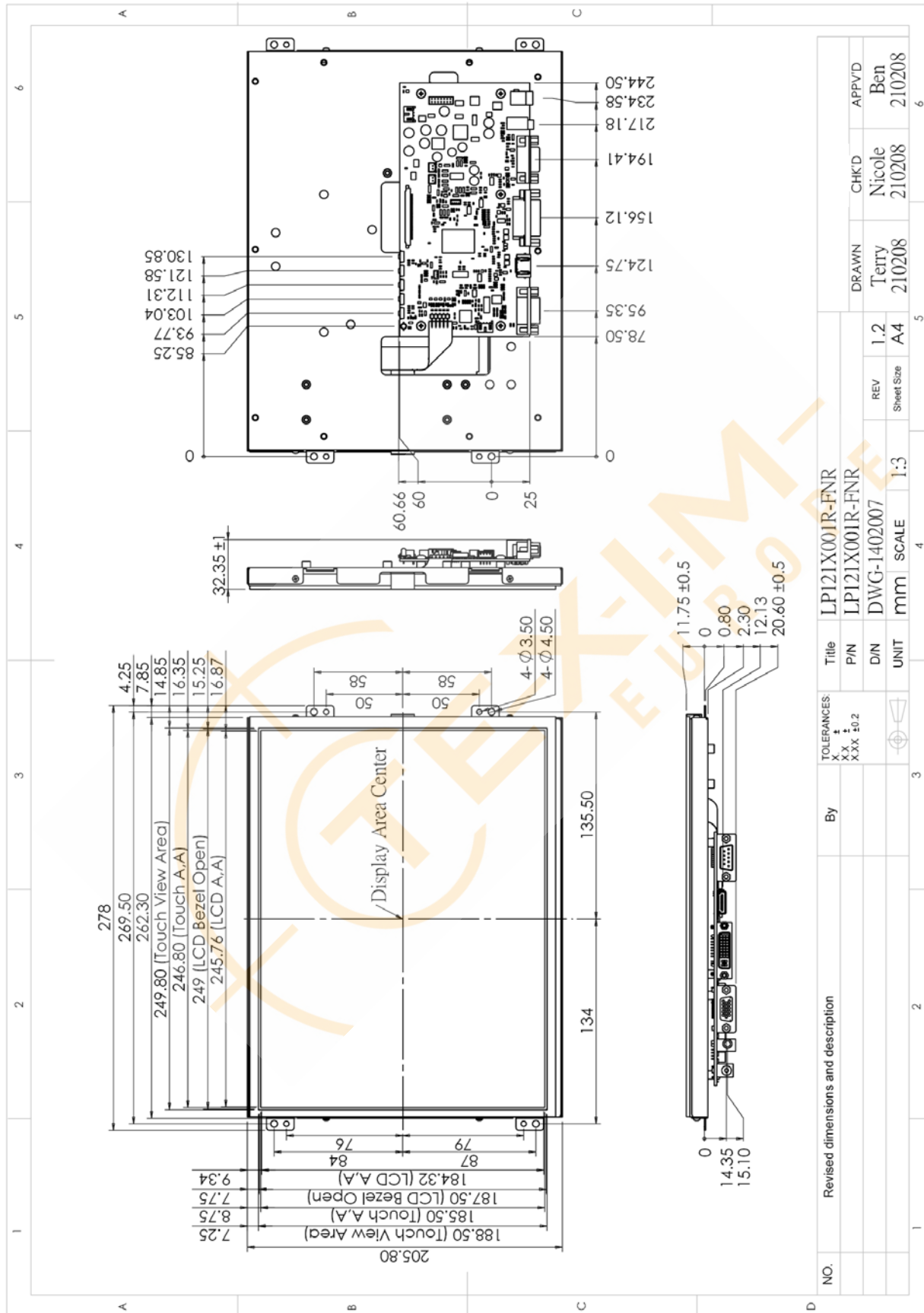
13.1 Unit (LP121X0010-FNR)



13.2 Unit (LP121X001U-FNR)



13.3 Unit (LP121X001R-FNR)



14. Appendix

14.1 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)	

14.2 TFT-LCD Optical Characteristics

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Left	CR >10	85	89	---	deg	
		Right		85	89	---	deg	
	Vertical	Top		85	89	---	deg	
		Bottom		85	89	---	deg	
Contrast Ratio		CR	At optimized Viewing angle	700	1000	---	---	
Luminance without RTP		L		400	500	---	cd/m ²	
LED Life Time			25℃	30000	---	---	hours	Note

Note: The "LED Life Time" is defined as the module brightness decrease to 50% original.

15. Revision History

15.1 Record of Revision

[illegible]

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