FLAT DISPLAY TECHNOLOGY

This product is RoHS compliant

§ SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No:	**LOF150X35x-00R**
Description:	**15” Digital TFT-LCD Module**
SPEC No.:	**SAS-1404007**
Version:	**1.0**
Issue Date:	**November 24, 2014**

※ This approval sheet contains 24 pages including the cover and appendix.

Customer: Date: / / 14	Approved By:

Approved By: _____ Checked By: _____ Designed By: _____

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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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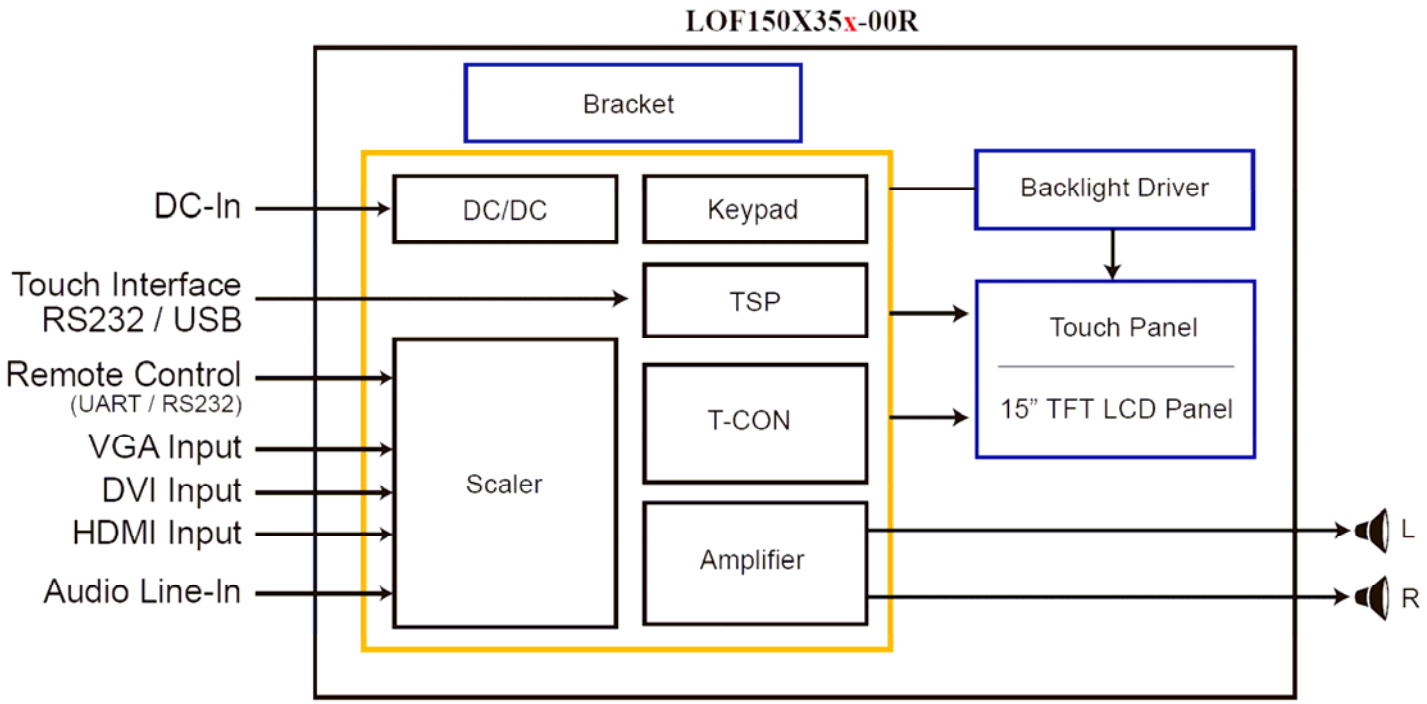
3. Specifications

LCD	
Panel Size	15”
Resolution (Pixels)	1024x768
Color	16.7M
Luminance w/o RTP	400 cd/㎡
Luminance (RTP)	320 cd/㎡
Luminance (PCT)	335 cd/㎡
Contrast Ratio	700
Viewing Angle	80 / 80 / 70 / 70
Backlight Life Time (LED)	50K (Min)
Power Requirement	
Power Input (DC Jack 2.1 φ)	+12 VDC
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@8Ω / 2W@4Ω
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℃
Storage Temp. w/o RTP	-30 ~ +70℃
Operating Temp. 5W RTP	-10 ~ +70℃
Storage Temp. 5W RTP	-30 ~ +70℃
Operating Temp. PCT	-20 ~ +70℃
Storage Temp. PCT	-20 ~ +70℃

4. Block Diagram



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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	CR >10	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/㎡	
Backlight Life Time (LED)			25℃	50000	---	---	Hrs	

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6. Order Information

6.1 Unit

Parameter	LOF150X350-00R	LOF150X35U-00R	LOF150X35R-00R
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	- Audio Line-Out - RS232 Remote Control - Light Sensor - Accessories (Option)

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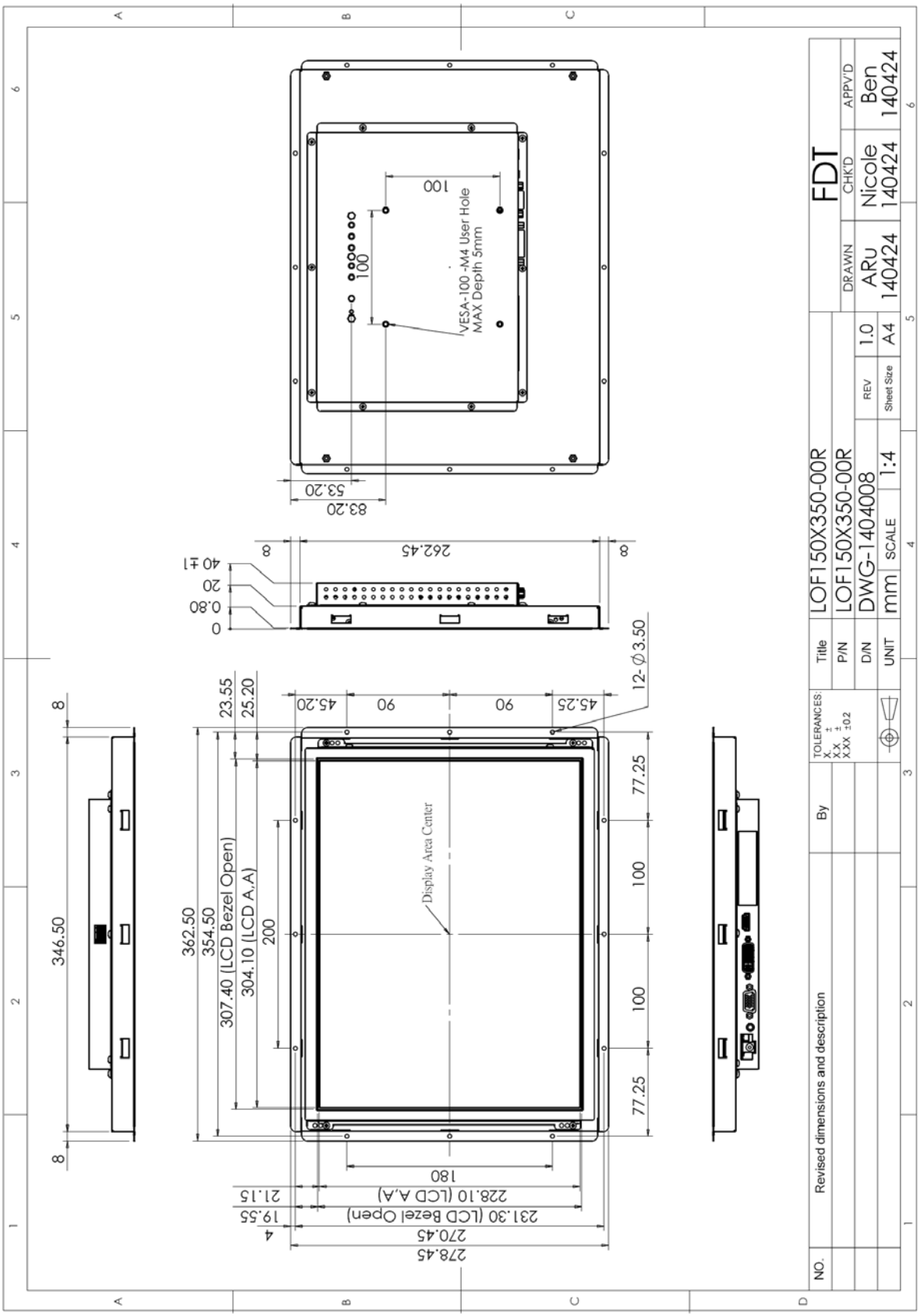
7. Dimension Information

7.1 Unit (LOF150X350-00R)



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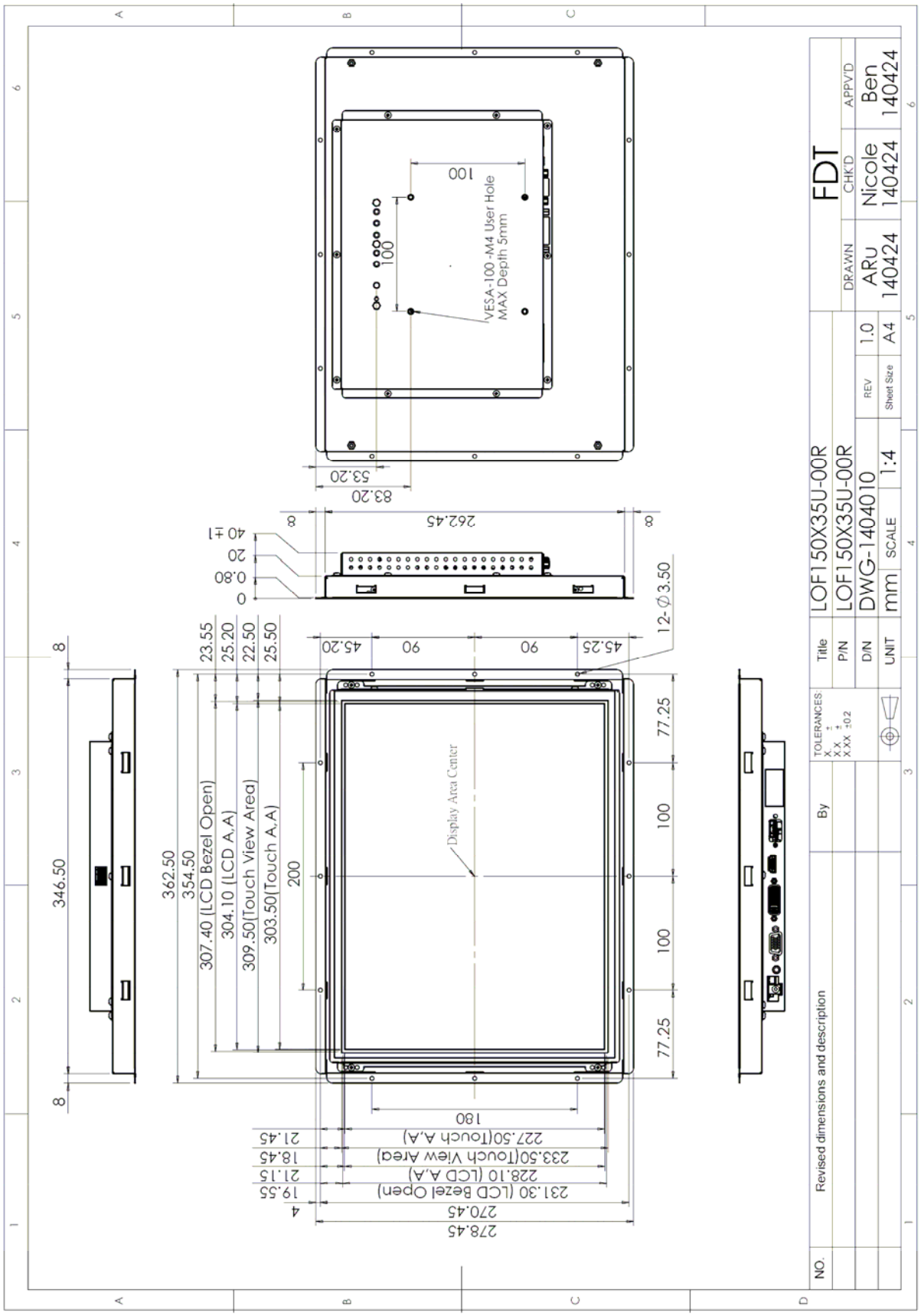
7.2 Unit (LOF150X35U-00R)



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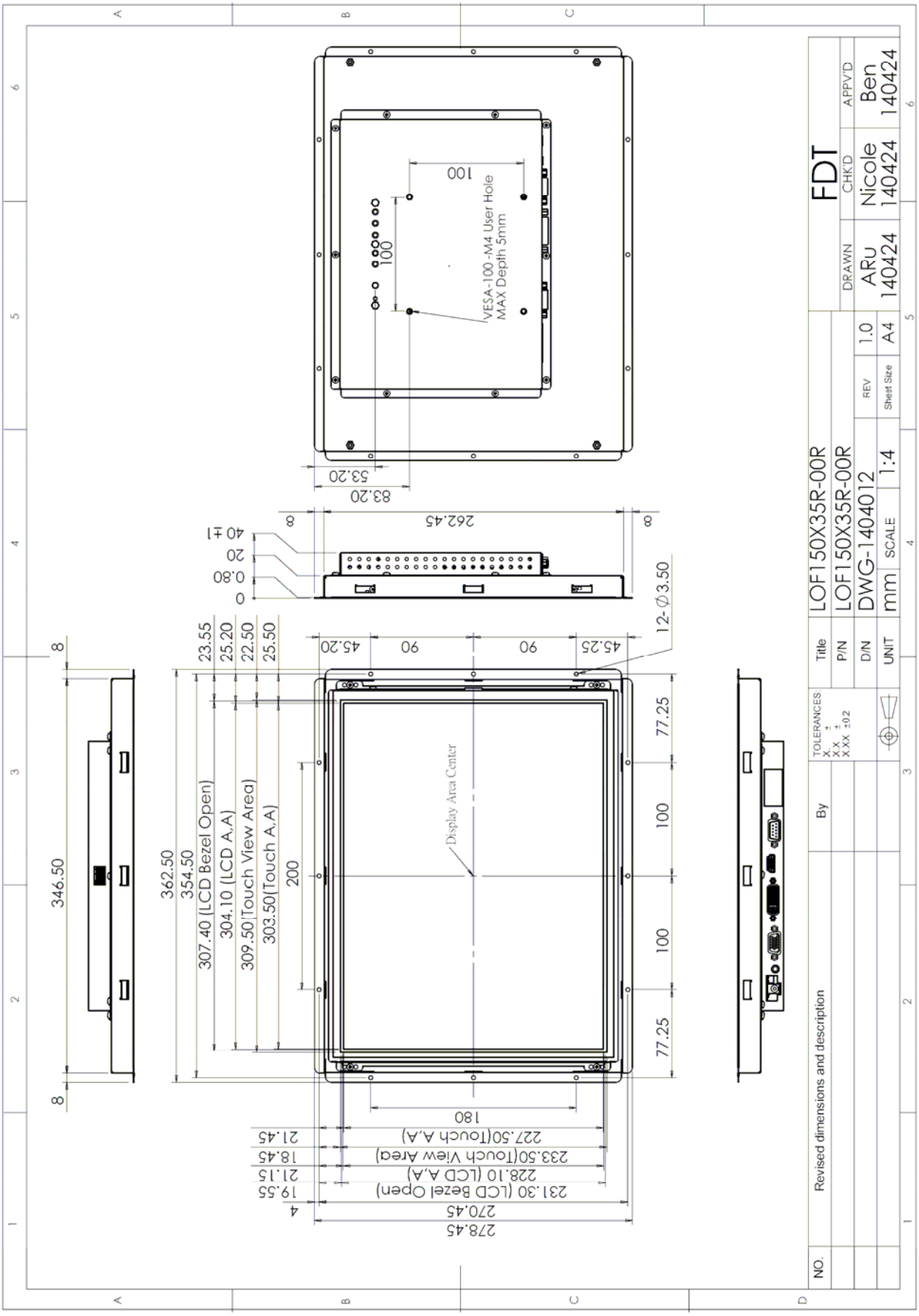
7.3 Unit (LOF150X35R-00R)



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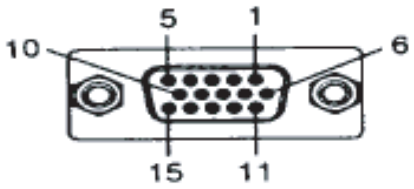
8. Pin Description

8.1 DC-In : 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	+12 Vdc Input Voltage	
2	GND	-	Power Ground	

8.2 VGA : 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 +5V 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	



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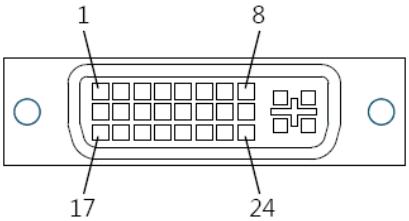
8.3 DVI：Pin Assignment of DVI-D (24 Pin)

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 +5V 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	



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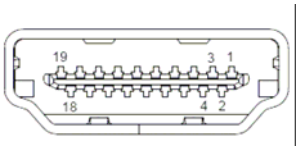
8.4 HDMI：Pin Assignment of HDMI-A Type Input (HDMI 1.3a -19Pin Female)

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 +5V Input	
19	HDMI_HPD	I	Hot Plug Detect	

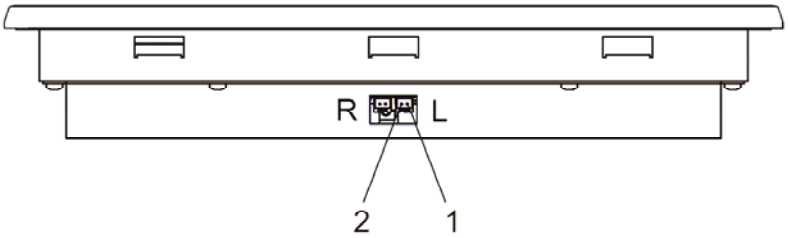


8.5 L：Pin Assignment of Spear Left (Pitch 2.0mm 2Pin , Top Entry Type)

※ **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 -	



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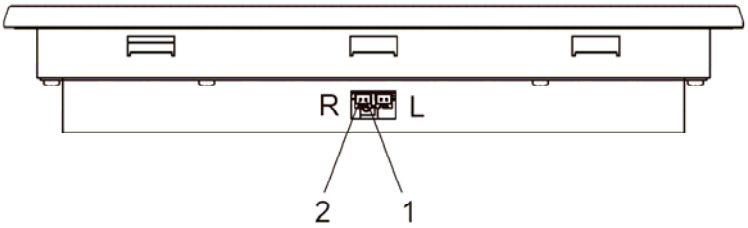
8.6 R : Pin Assignment of Spear Right (Pitch 2.0mm 2Pin , Top Entry Type)

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

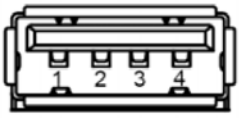
※ FDT Matching Connector Part No.: A2001H02-2P(JWT) .

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



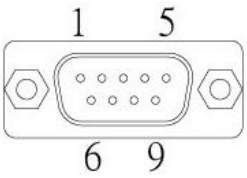
8.7 USB Port：Pin Assignment of Touch USB (USB A Type - Female 2.0mm, Side Entry Type)(Option)

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



8.8 RS232：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	



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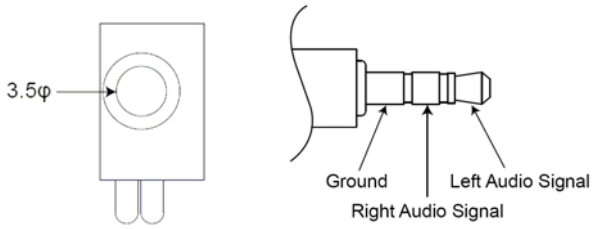
8.9 Line-In：Pin Assignment of Line-In/Out (Option) (Outside Diameter:3.5 ∅Side Entry Type)



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. w/o TP		-20	+70	℃	
Storage Temp. w/o TP		-30	+70	℃	
Operating Temp. 5W RTP		-10	+70	℃	
Storage Temp. 5W RTP		-30	+70	℃	

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	I		0.7		Vp-p	@75Ω
DVI Input Signal						165	MHz	
HDMI Input Signal						165	MHz	

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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 × 1024	63.98	KHz	Positive	60	Hz	Positive	
1600 × 1200	75	KHz	Positive	60	Hz	Positive	
1920 × 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

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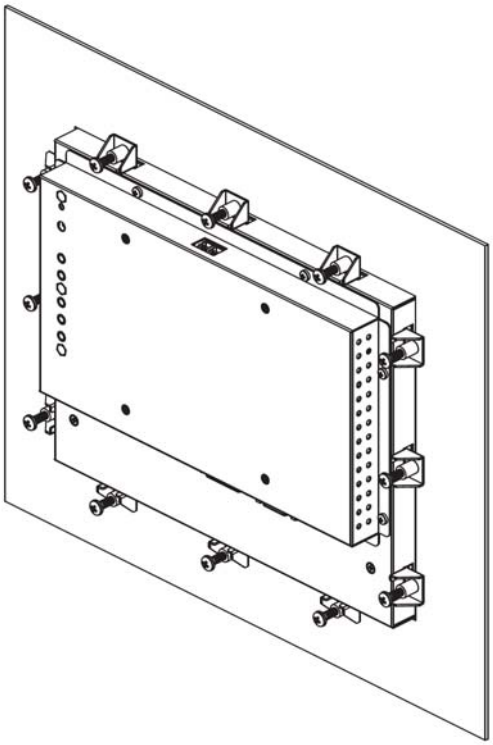
11.5 Resistive Touch Panel Operation System Support

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

11.6 Panel Mount Installation (Mount Clamp and Screw)



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12. Installing the Monitor

12.1 Power cable connection:

Connect the power cord to the AC outlet, and connect the power to the monitor through the AC/DC adapter.

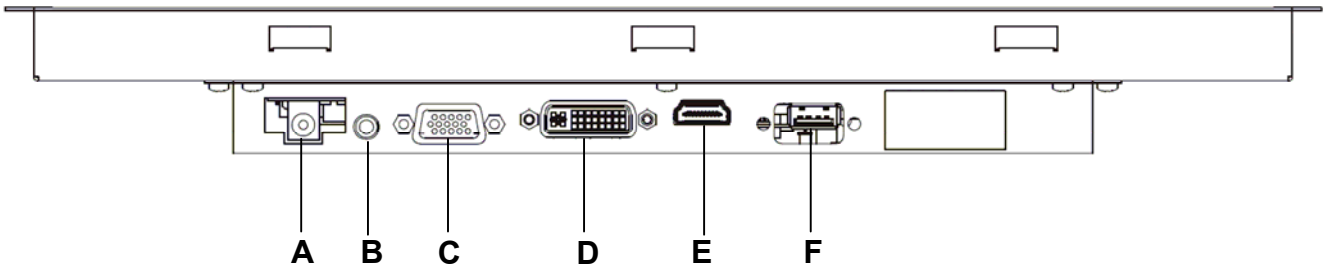
12.2 VGA signal cable connection:

Plug one end of the 15-pin signal cable to the VGA connector at the rear of the PC system and the other end to the Open Frame monitor.

Secure the connectors with the screws on the cable connector at both ends.

12.3 Switch on the power:

Switch on the power switch on the rear cover of the Open Frame Monitor.



A. DC-In (+12V_{DC} The DC jack core is positive)
B. Line-In : Phone Jack ϕ 3.5
C. VGA D-sub 15 (Female)
D. DVI
E. HDMI
F. RS232 / USB Port (For Touch Controller)

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13. Accessories (Option)

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

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 @ 4Ω L:400mm *2 Pieces)
K. Mount Clamp and Screw *12 Pieces

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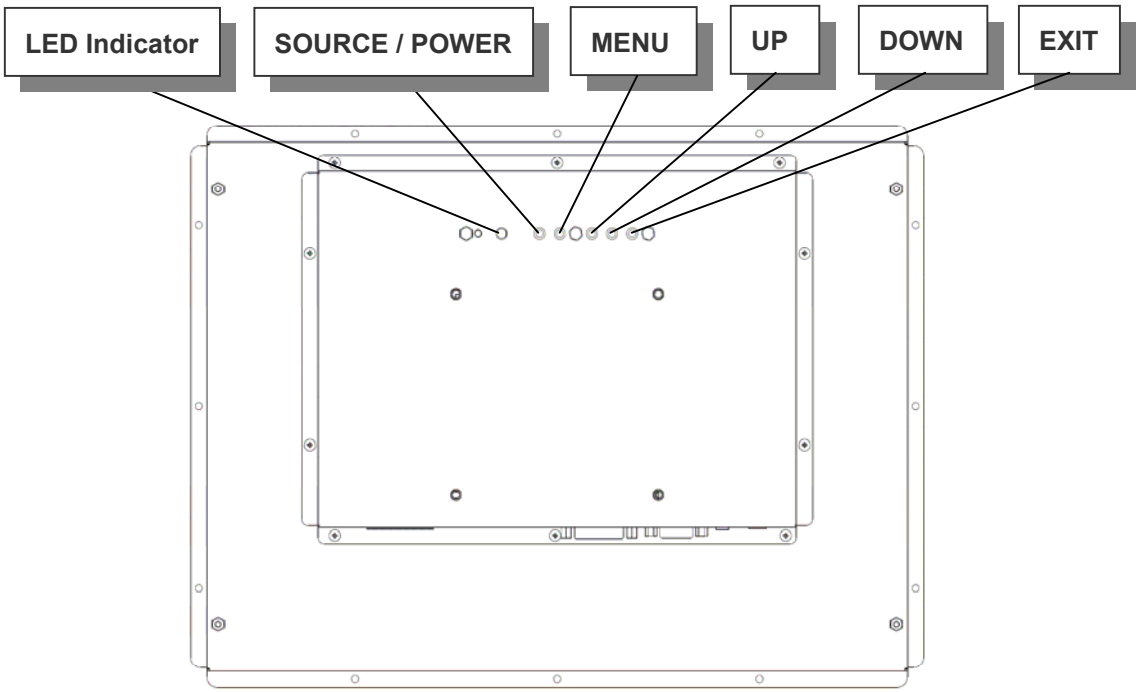
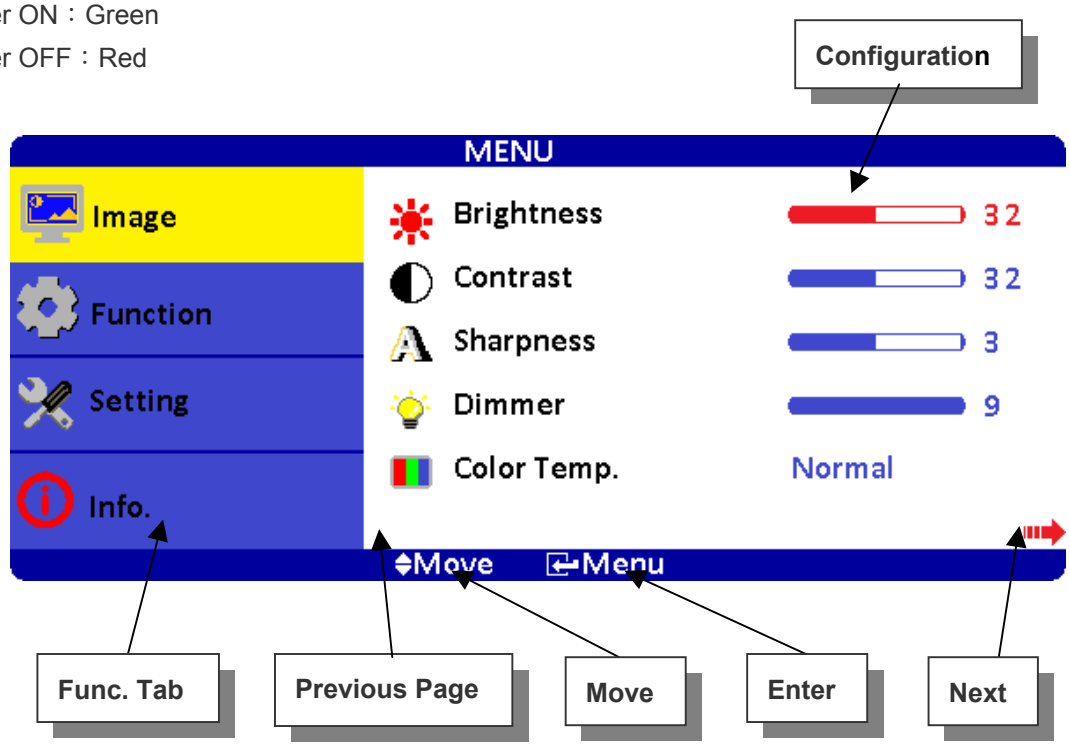
14. Key Function by OSD

14.1 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
   - 6.1 Waiting：Flickering Green
   - 6.2 Power ON：Green
   - 6.3 Power OFF：Red



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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	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.

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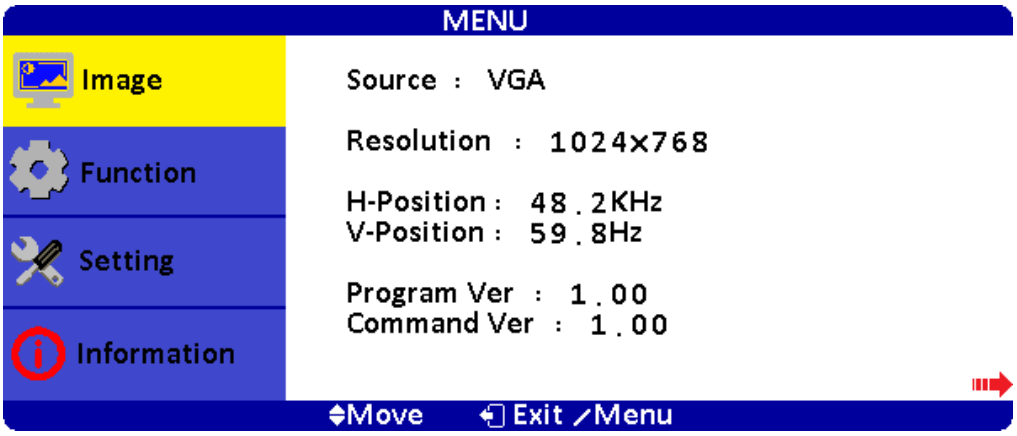
Setting

Indicator	Meaning	Default	Adjustable range	Remark
	Source	VGA	VGA / DVI / HDMI	Reset won't restore to default setting
	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 won't restore to default setting
	Reset			Restore to default
	Exit			

Info.



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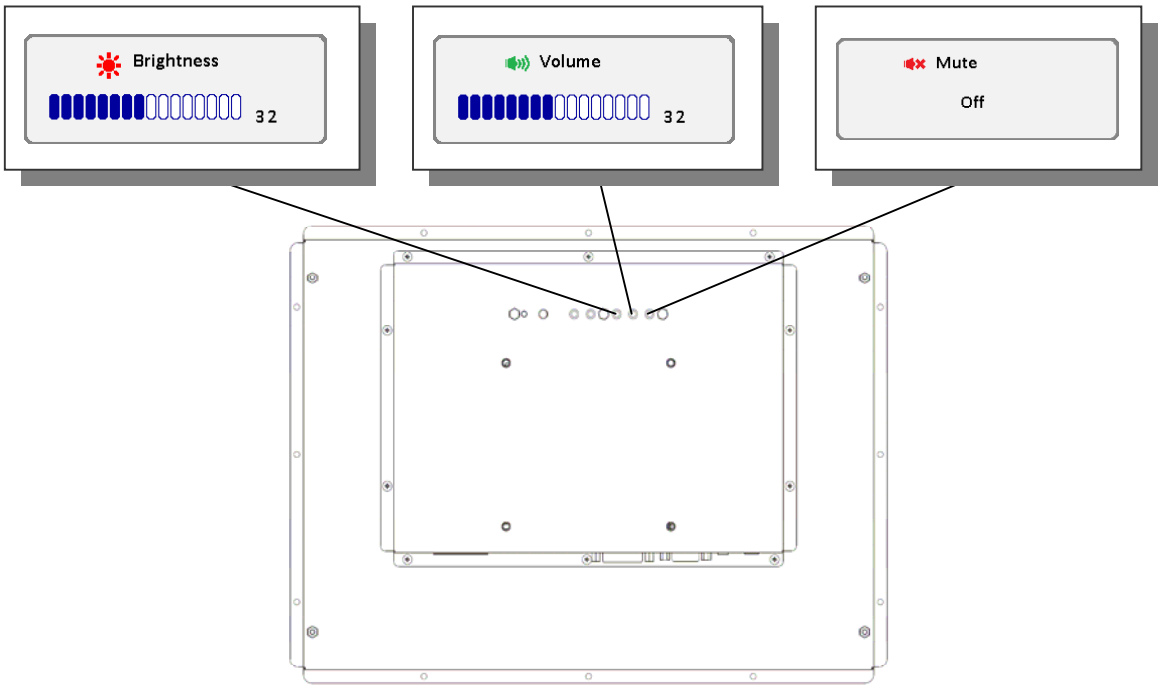
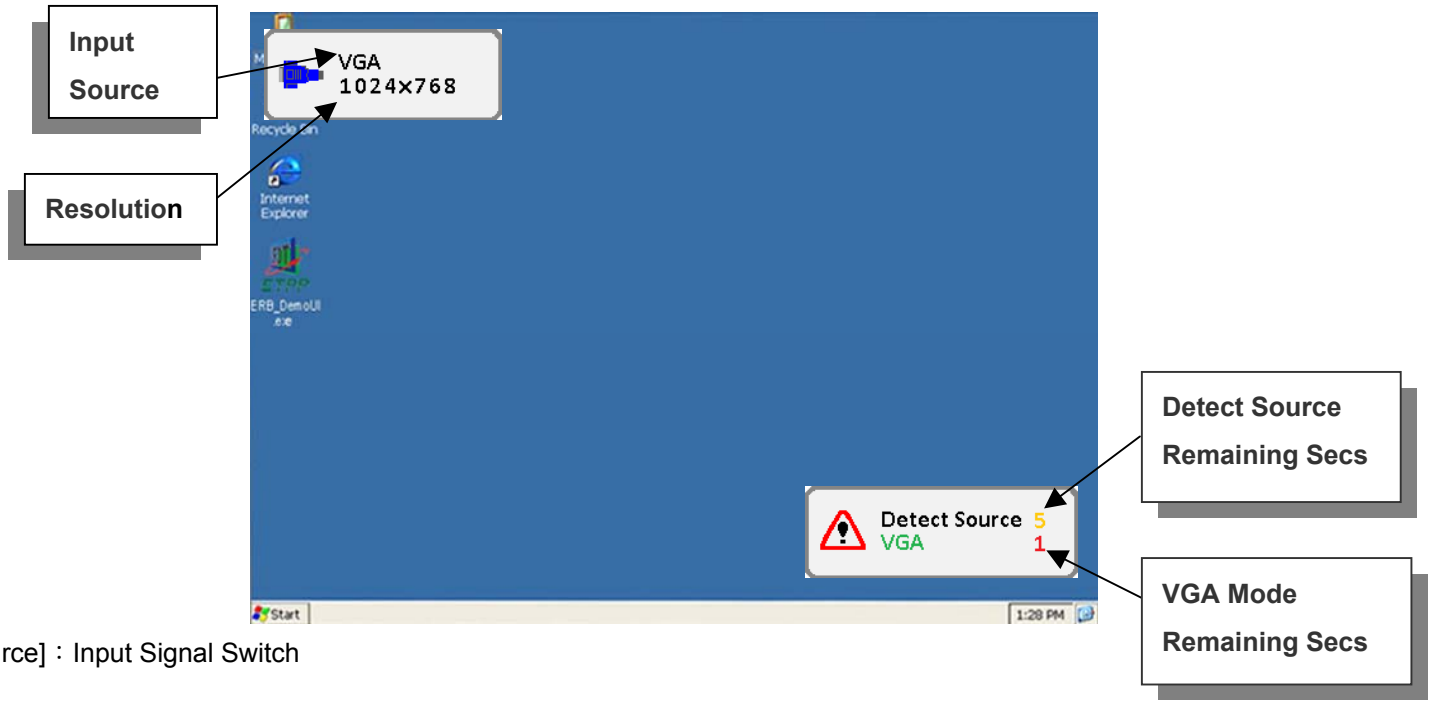
Hot Key When OSD Menu is Off：



Information of Input Source and Functionality：



[Source]：Input Signal Switch

Overview of Input Signals：

Indicator	Interface
	VGA
	DVI
	HDMI

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15. Revision History

15.1 Record of Revision

NO	Date	Description	Page	Note
1.0	November 24, 2014	· First draft	23	

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