



§ SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No **LP065GVA~~xx~~-F~~x~~R**

Description: **6.5" Digital TFT-LCD Module**

SPEC No.: **SAS-1101001**

Version: **1.1**

Issue Date: **June 28, 2013**

※ This approval sheet contains 32 pages including the cover and appendix.

Customer:	APPROVED BY:
Date: / / 13	

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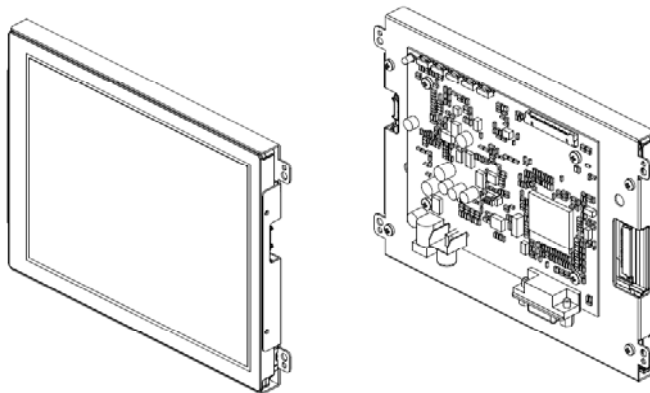
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DESIGNED BY:



FLAT DISPLAY TECHNOLOGY

6.5" Digital TFT-LCD Module



■ LP065GVA~~xx~~-F~~x~~R

1. General Description

1.1 Features

- AUO G065VN01_V2 Digital TFT LCD
- Ultra Compact
- NTSC/PAL/SECAM Video Auto Switch
- Single Operation Voltage +12V
- CVBS / S-Video (Option) / 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.

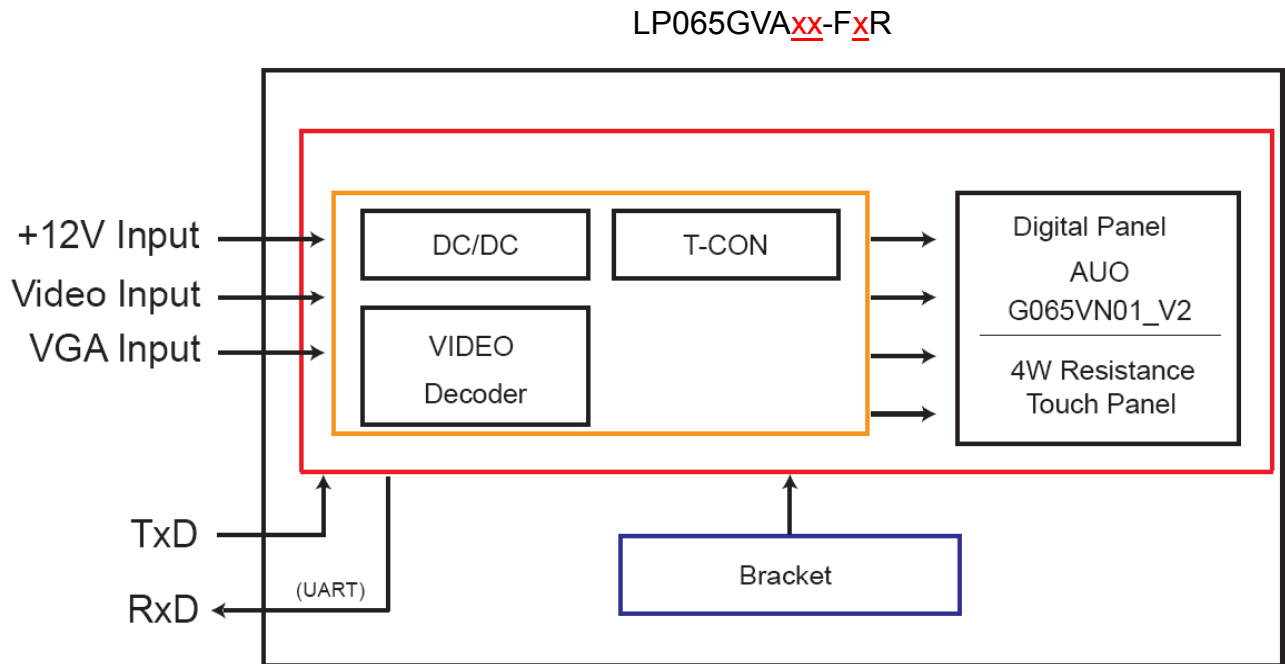
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3. Block Diagram

3.1 Block Diagram



4. TFT-LCD Information

4.1 TFT-LCD Mechanical Specifications

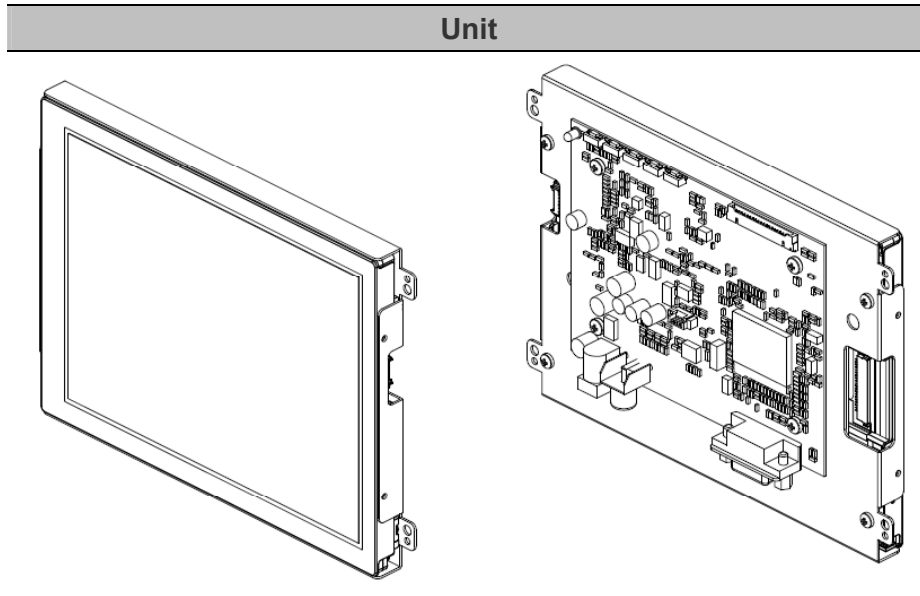
Parameter	Specifications	Unit
Screen Size	6.5 (diagonal)	inch
Display Format	640 x (R.G.B) x 480	dot
Active Area	132.48(H) x 99.36(V)	mm
Pixel Pitch	0.207 (H) x 0.207 (V)	mm
Pixel Configuration	Stripe	
Outline Dimension	153.0 (W) x 118.0 (H) x 10.9 (typ.) (D)	mm
Surface Treatment	Anti-glare and EWW	
Weight	170 (Typ)	g

4.2 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	60	70	-	deg	
		Bottom	60	70	-	deg	
Contrast Ratio	CR		400	600	-	---	
Response time	Rise Fall	Tr	-	15	20	ms	
		Tf	-	10	15	ms	
Uniformity	U		-	-	1.25	%	
Brightness		$\Theta = 0^\circ \varphi = 0$	600	800		Cd/m ²	
Brightness with TSP			480	640			
White Chromaticity	X		0.28	0.32	0.36	---	
	y		0.31	0.35	0.39	---	
LED Life Time			50000	-	-	hrs	

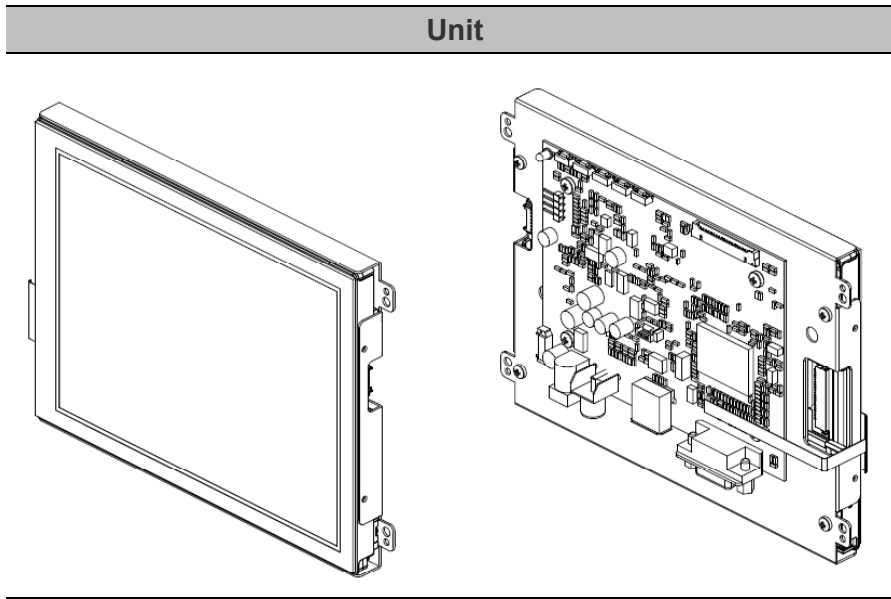
5. Order Information

5.1 Unit (CVBS/PC)



Parameter	LP065GVAB1-FBR	LP065GVAB1-FNR	Unit
CVBS	1	1	
VGA (D-Sub15 / 2.0mm 14Pin)	D-Sub15	D-Sub15	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	-	
Power Cord Plug Type B for USA (LAAC818000-FDR)	⊙	-	
Video Cable (LAVDO18000-FDR)	⊙	-	
VGA Cable (LAVGA16000-FDR)	⊙	-	

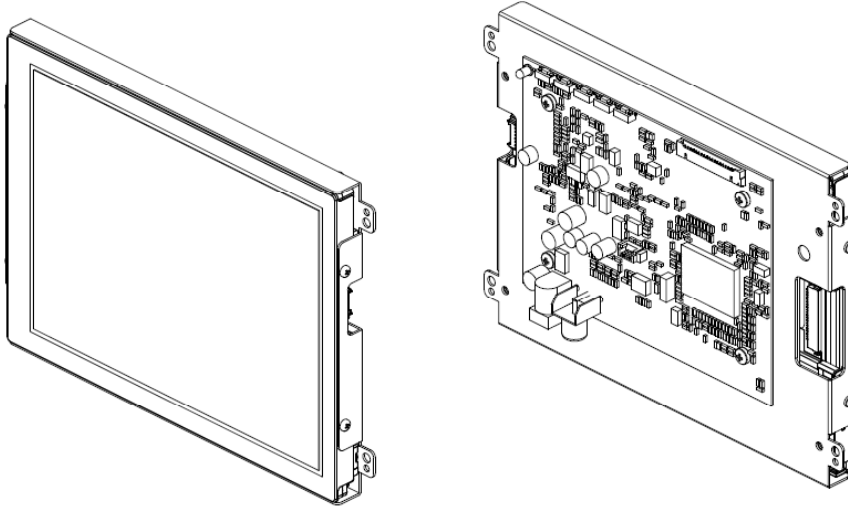
5.2 Unit (CVBS/PC/4W TSP)



Parameter	LP065GVAB4-FBR	LP065GVAB5-FBR	LP065GVAB4-FNR	LP065GVAB5-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	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	⊙	-	-	
Power Cord Plug Type B for USA (LAAC818000-FDR)	⊙	⊙	-	-	
Video Cable (LAVDO18000-FDR)	⊙	⊙	-	-	
VGA Cable (LAVGA16000-FDR)	⊙	⊙	-	-	
USB Cable (LAUSB18000-FDR)	⊙	-	-	-	
RS-232 Cable (LARS218000-FDR)	-	⊙	-	-	
Touch Screen Driver CD Disk	⊙	⊙	⊙	⊙	

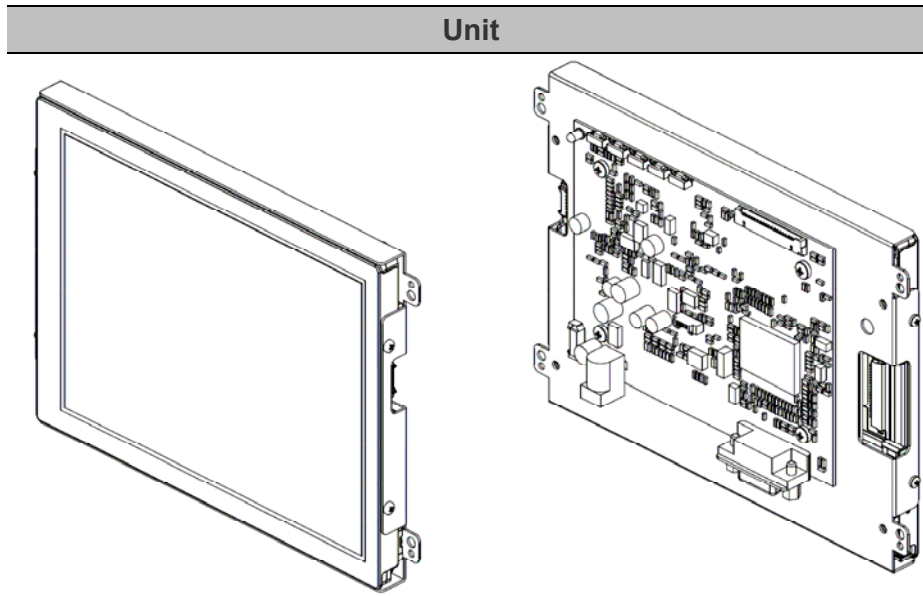
5.3 Unit (CVBS)

Unit



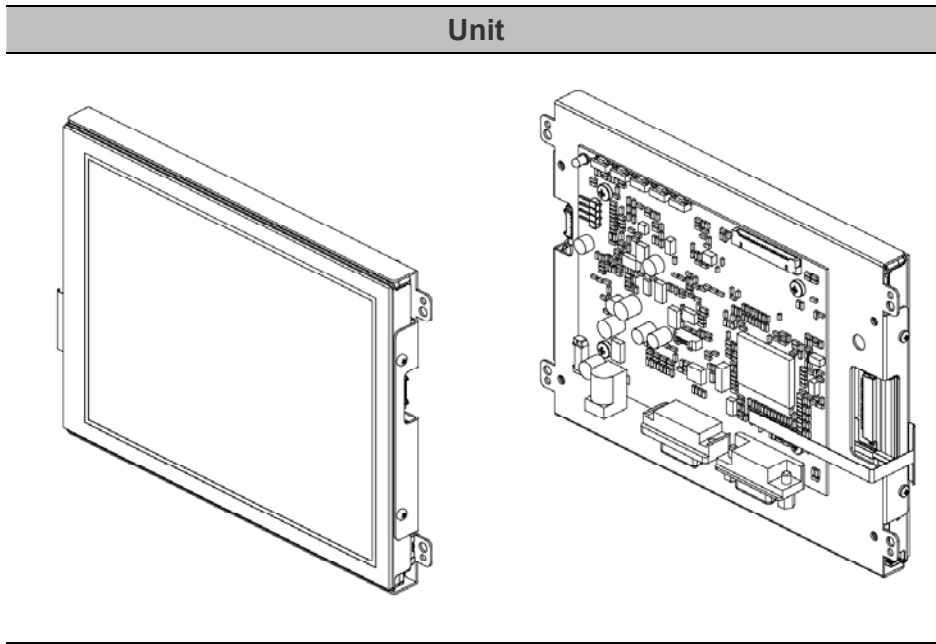
Parameter	LP065GVAV1-FBR	LP065GVAV1-FNR	Unit
CVBS	1	1	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	-	
Power Cord Plug Type B for USA (LAAC818000-FDR)	⊙	-	
Video Cable (LAVDO18000-FDR)	⊙	-	

5.4 Unit (PC)



Parameter	LP065GVAC1-FBR	LP065GVAC1-FNR	Unit
VGA (D-Sub15 / 2.0mm 14Pin)	D-Sub15	D-Sub15	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	-	
Power Cord Plug Type B for USA (LAAC818000-FDR)	⊙	-	
VGA Cable (LAVGA16000-FDR)	⊙	-	

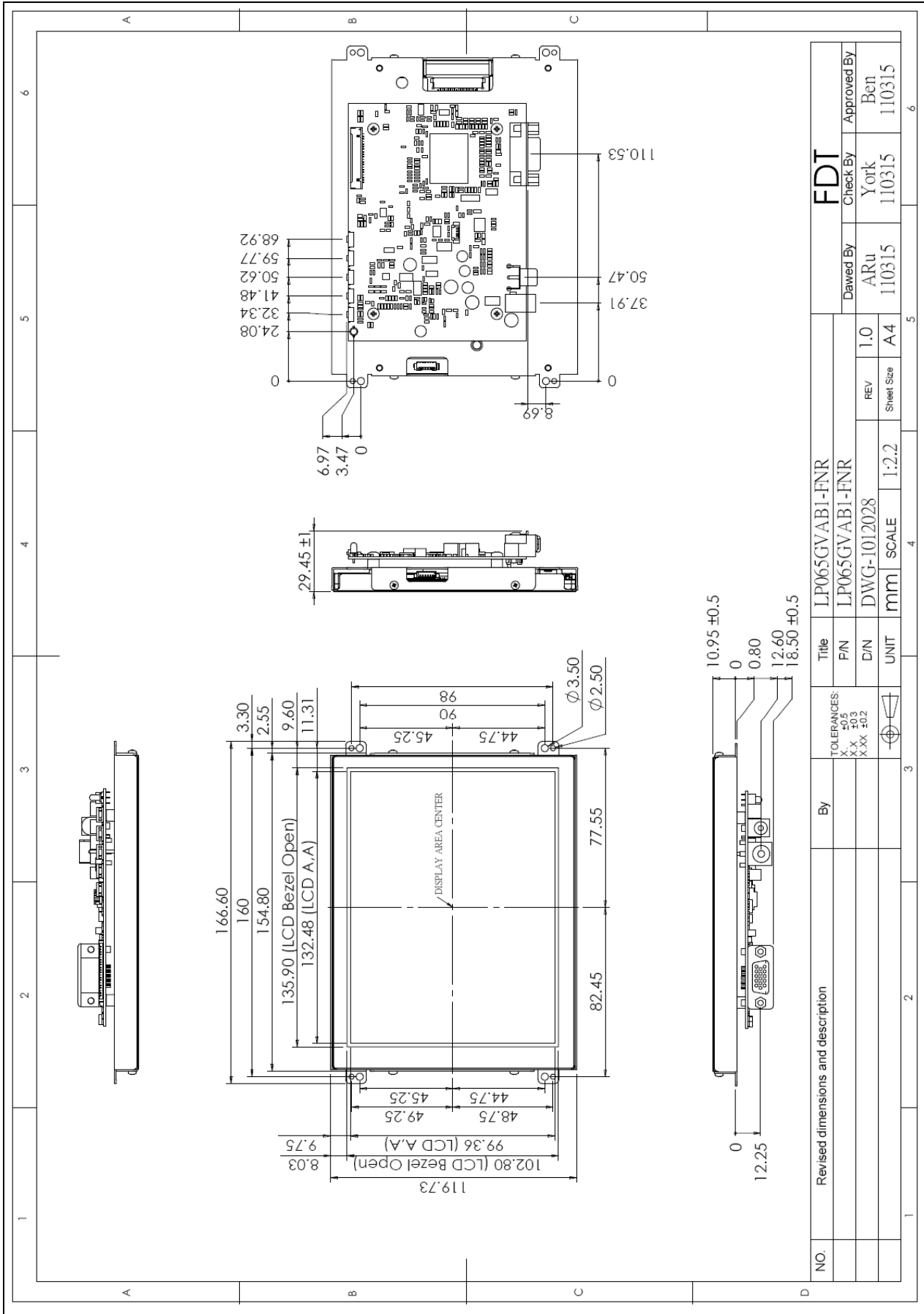
5.5 Unit (PC/4W TSP)



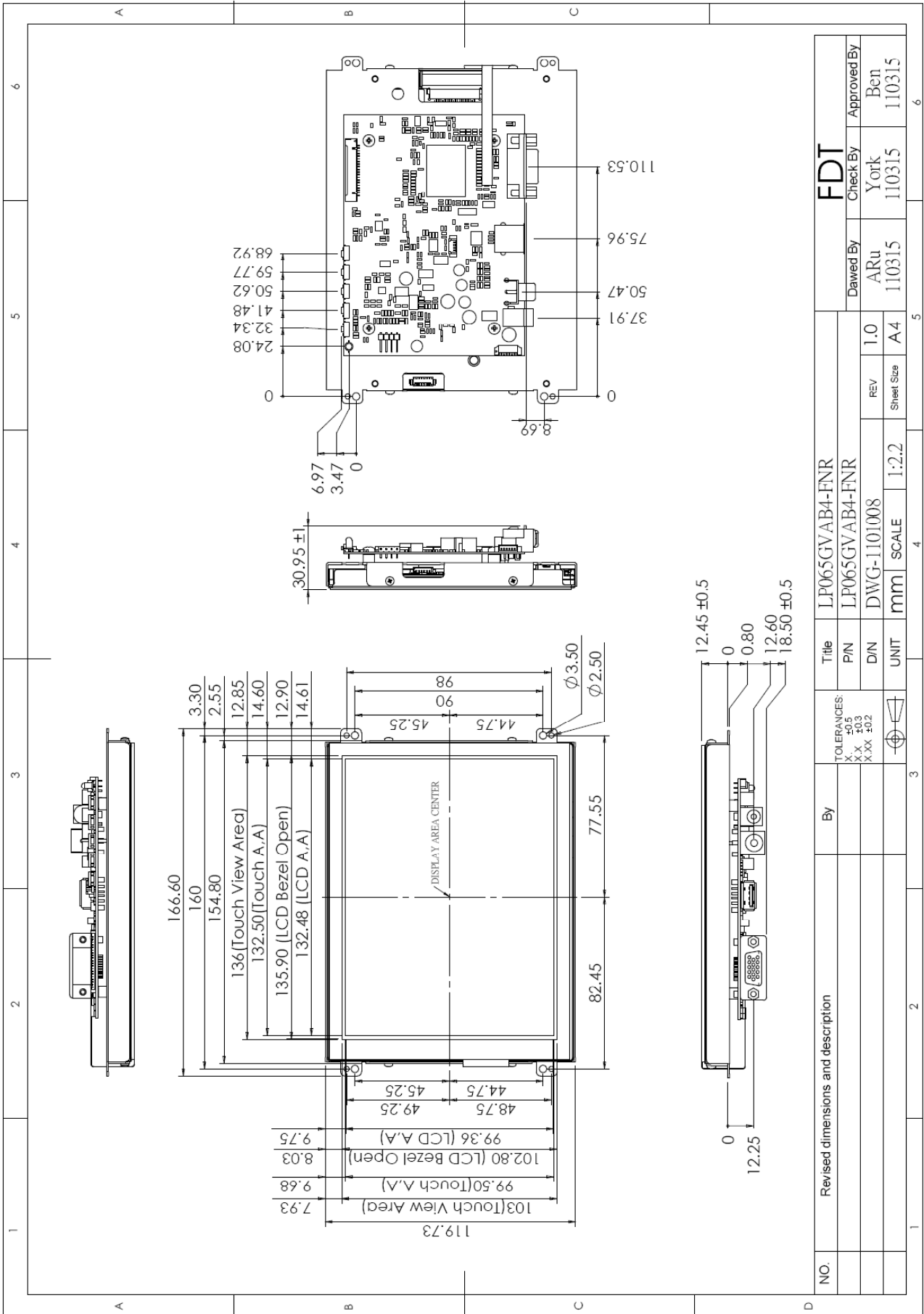
Parameter	LP065GVAC4-FBR	LP065GVAC5-FBR	LP065GVAC4-FNR	LP065GVAC5-FNR	Unit
VGA (D-Sub15 / 2.0mm 14Pin)	D-Sub15	D-Sub15	D-Sub15	D-Sub15	
Touch Panel Type	4W Resistive	4W Resistive	4W Resistive	4W Resistive	
Touch Screen Interface	USB	RS232	USB	RS232	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	⊙	-	-	
Power Cord Plug Type B for USA (LAAC818000-FDR)	⊙	⊙	-	-	
VGA Cable (LAVGA16000-FDR)	⊙	⊙	-	-	
USB Cable (LAUSB18000-FDR)	⊙	-	-	-	
RS-232 Cable (LARS218000-FDR)	-	⊙	-	-	
Touch Screen Driver CD Disk	⊙	⊙	⊙	⊙	

6. Dimension Information

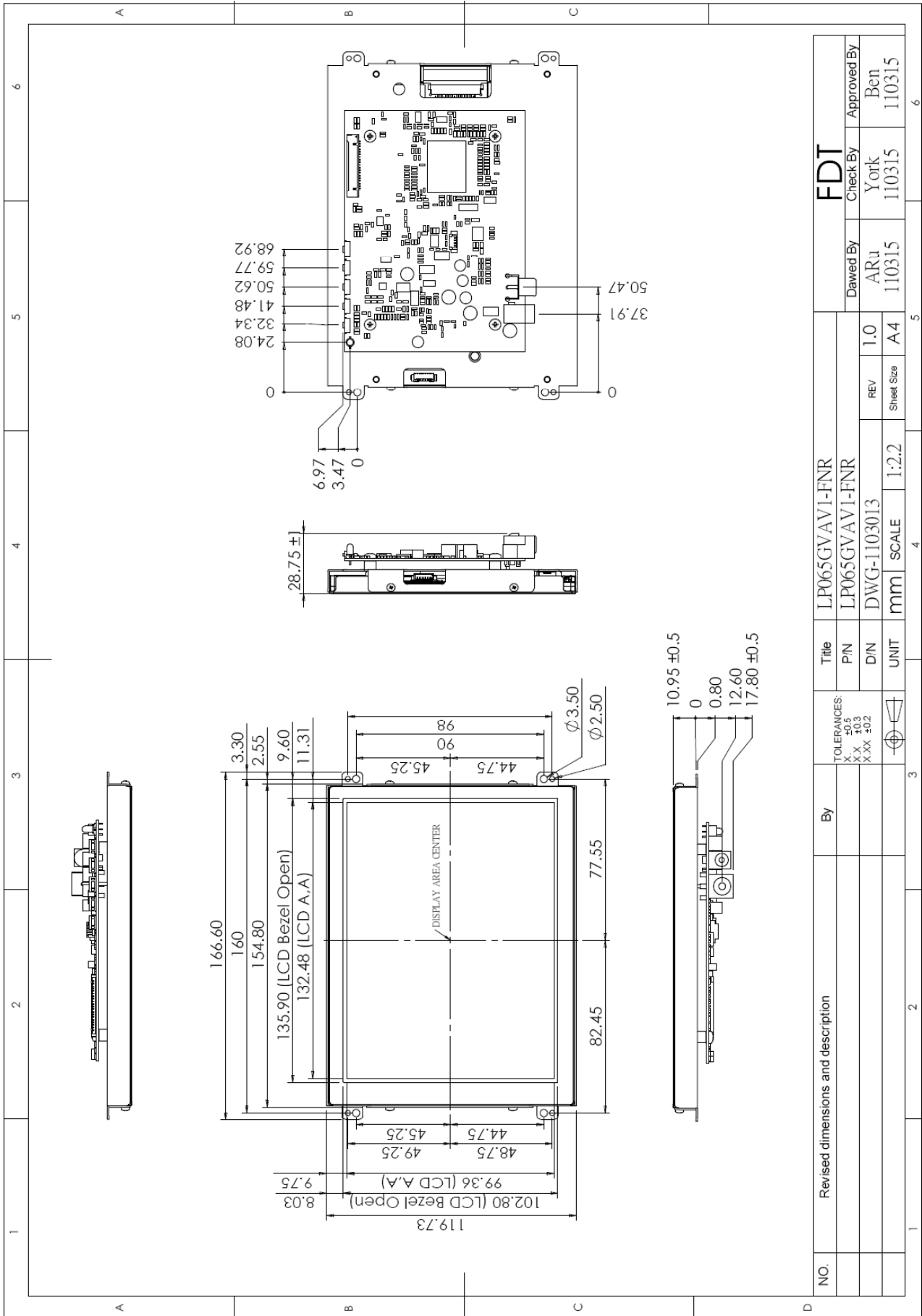
6.1 Unit (LP065GVAB1-FNR)



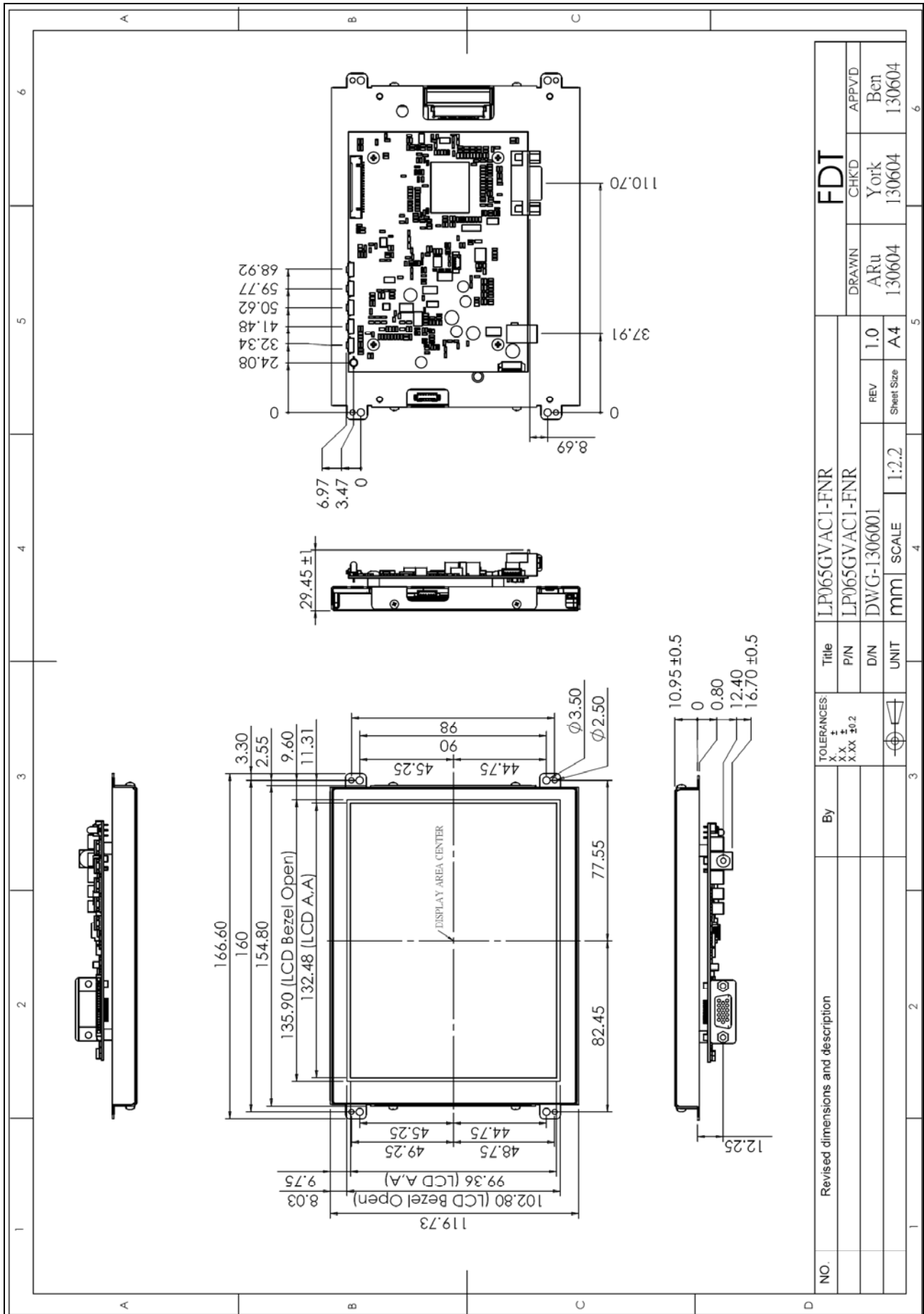
6.2 Unit (LP065GVAB4-FNR)



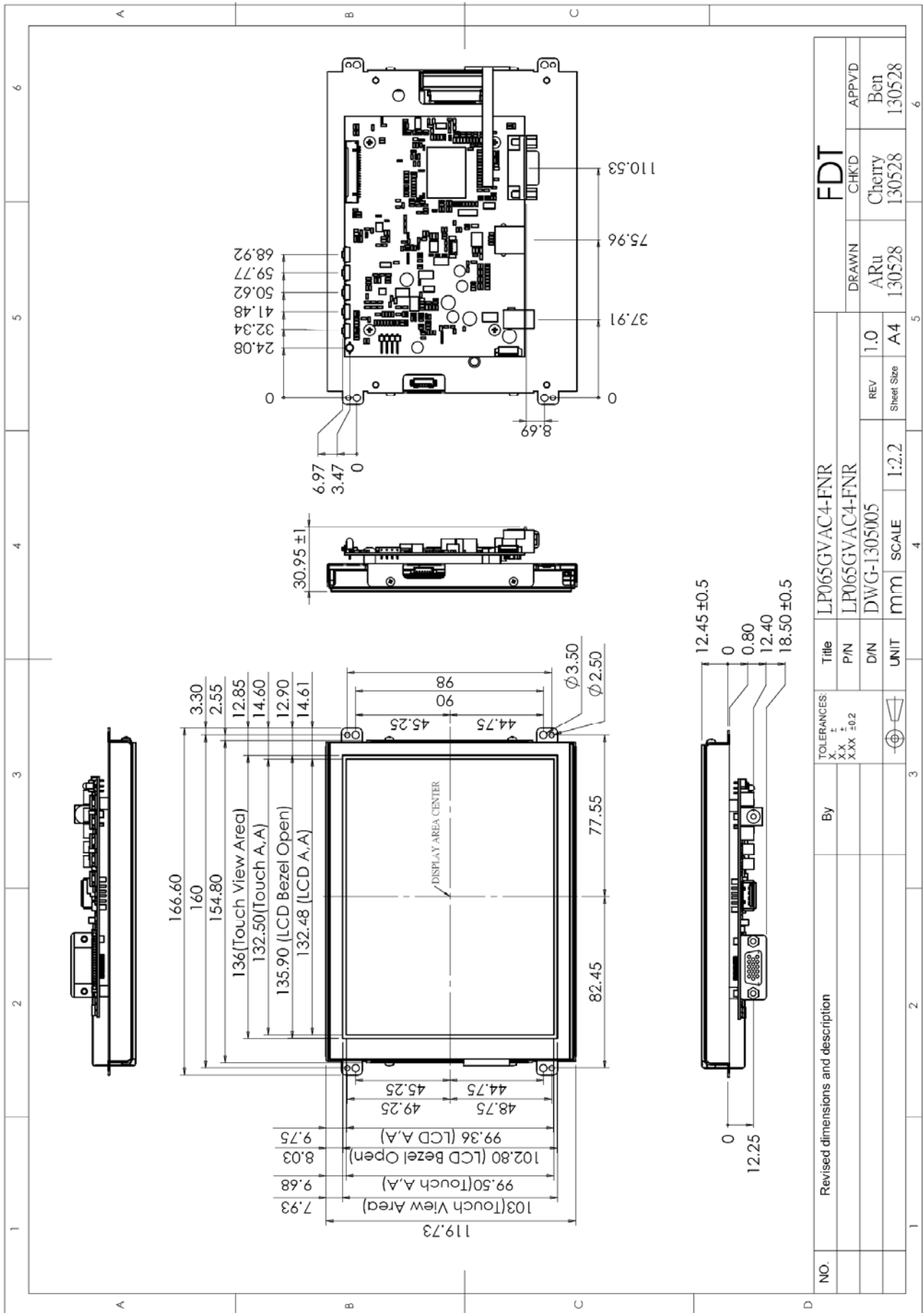
6.4 Unit (LP065GVAV1-FNR)



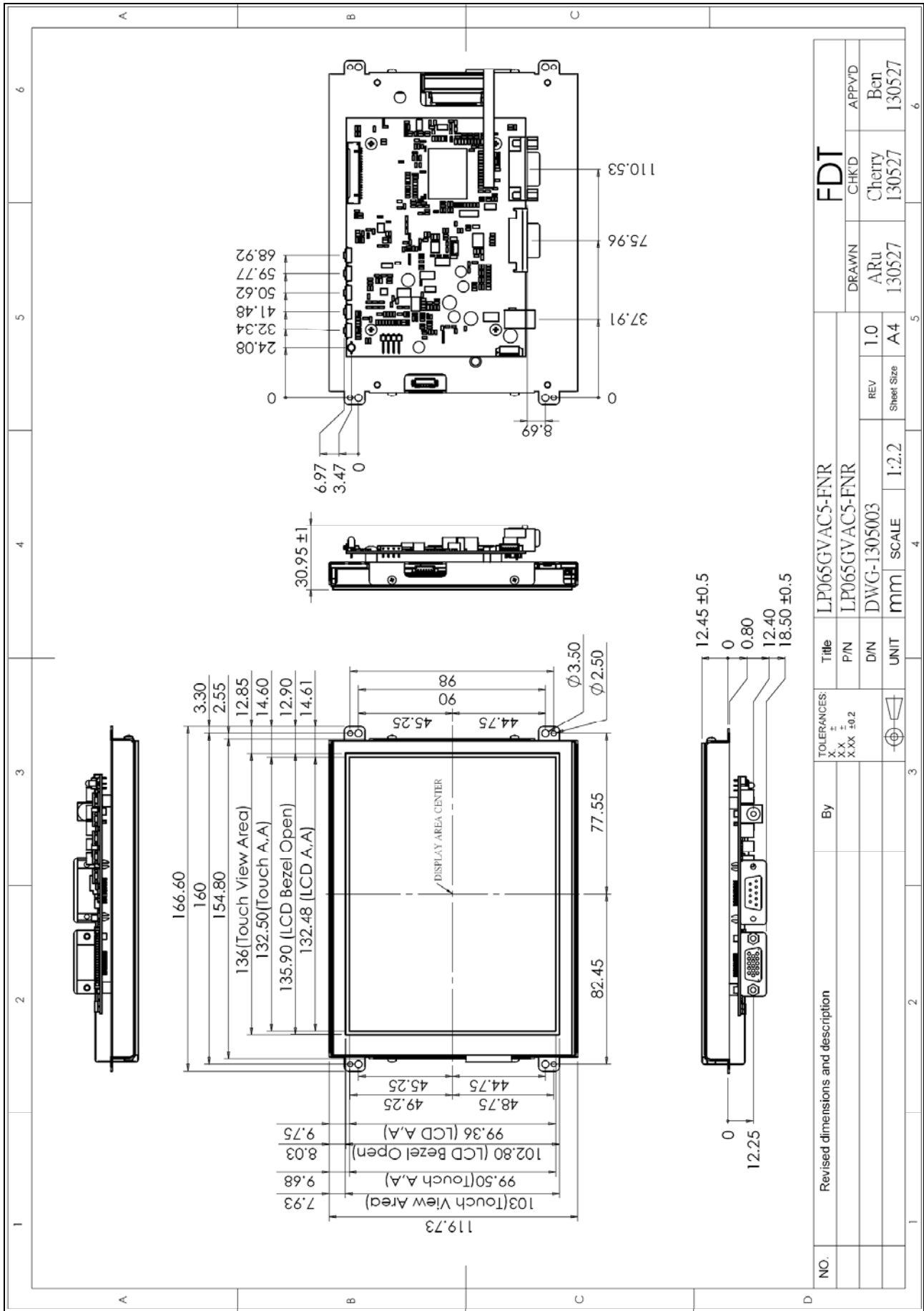
6.5 Unit (LP065GVAC1-FNR)



6.6 Unit (LP065GVAC4-FNR)



6.7 Unit (LP065GVAC5-FNR)



7. Pin Description

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

※ FDT Connector Part No.: MS240420G (STM) [Same as FI-SEB20P-HF13E (JAE)];

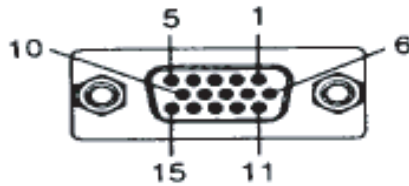
FDT Matching Connector Part No.: P240420 (STM) [Same as FI-S20S (JAE)].

Pin No	Symbol	I/O	Description	Remark
1	VDD	I	Power supply, 3.3V (typical)	
2	VDD	I	Power supply, 3.3V (typical)	
3	GND	-	Ground	
4	SEL68	I	Selection for either 6bit or 8bit LVDS input: SEL68 = "Low" or "NC", accepts 6bit LVDS data input; SEL68 = "High", accepts 8bit LVDS data input.	
5	RxIN1-	I	Negative LVDS differential input (R0-R5, G0)	
6	RxIN1+	I	Positive LVDS differential input (R0-R5, G0)	
7	GND	-	Ground	
8	RxIN2-	I	Negative LVDS differential input (G1-G5, B0-B1)	
9	RxIN2+	I	Positive LVDS differential input (G1-G5, B0-B1)	
10	GND	-	Ground	
11	RxIN3-	I	Negative LVDS differential input (B2-B5, DE)	
12	RxIN3+	I	Positive LVDS differential input (B2-B5, DE)	
13	GND	-	Ground	
14	RxCLKIN-	I	Negative LVDS differential clock input	
15	RxCLKIN+	I	Positive LVDS differential clock input	
16	GND	-	Ground	
17	U/D	I	Vertical Reverse ("Low" or NC: Normal, "High": Reverse)	
18	R/L	I	Horizontal Reverse ("Low" or NC: Normal, "High": Reverse)	
19	RxIN4-	I	Negative LVDS differential input (R6-R7, G6-G7, B6-B7) NC for 6bit LVDS input.	
20	RxIN4+	I	RxIN4+ Positive LVDS differential input (R6-R7, G6-G7, B6-B7) NC for 6bit LVDS input	

Note: "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connection".

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	



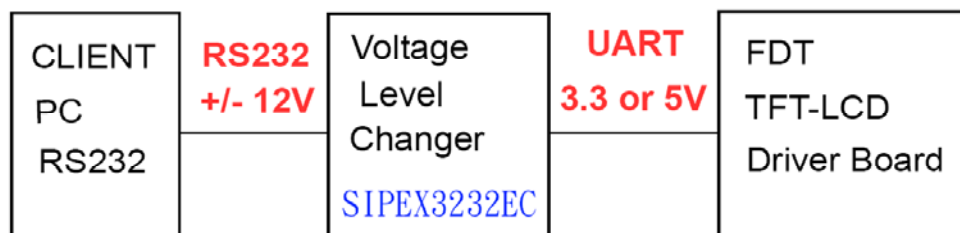
7.3 J101: Pin Assignment of UART (Pitch 1.25mm 4Pin, Top Entry Type)

※ 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 J601: Pin Assignment of Signal Input (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	VLED	-	+12V Input Voltage	
2	VLED	-	+12V Input Voltage	
3	PWM DIM	I	1~100%	
4	LED On/Off	I	3.3V-On; 0V/NC-Off	
5	GND_D	-	Ground	
6	GND_D	-	Ground	

7.5 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	

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

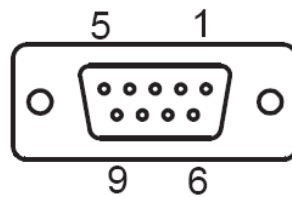
Pin No	Symbol	I/O	Description	Remark
1	Video	I	Video Input	
2	AGND	-	Analog Ground	

7.7 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	Vin	+9	+15	V	
Video Input Signal	Video in	0.5	2.0	Vp-p	@75Ω
S-Video Input Signal	S-Video in	0.5	2.0	Vp-p	@75Ω
Analog RGB Input Signal	Analog RGB in	0.5	2.0	Vp-p	@75Ω
Digital Input Signal	TTL	+0.3	+3.6	V	
Operating Temperature		-20	+70	°C	
Storage Temperature		-20	+70	°C	
Operating Temperature With TSP		-20	+70	°C	
Storage Temperature With TSP		-20	+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	-	-	-	mA	±15%
Total Current with TSP	Iin (+12V)	I	-	484	-	mA	±15%
Power Consumption with TSP		I	-	5.8	-	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 I		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	9	12	20	V	
Supply current of LED backlight	IL		250		mA	

9.4 Sample Test Data with TSP (Video in)

Parameter	White Window	Red	Green	Blue	Remark
S/N : 001 x	0.300	0.602	0.322	0.145	
.y	0.332	0.373	0.612	0.106	±15%
L(cd/m ²)	461.4				
TC(°K)	7161				

NOTE : 1. Luminance Meter : BM-7 FAST(TOPCON)

2. Patrn Generator: FLUKE PM54200

3. Measurement Distance : 500mm±50mm

4. TOPCON BM-7 Luminance Meter 2° filed of view is used in the testing

(After 10min ~20min operation)

10. 4W Resistance Touch Panel Characteristics

10.1 Mechanical Performance

Parameter	Specifications
Input Method	Finger or stylus pen
Operating Force	$\leq 40\text{g} \sim 110\text{g}$
Surface Hardness	$\geq 3\text{H}$

10.2 Durability Performance

Parameter	Specifications
Expected Life Performance	Operation tested to greater than 1 million touches in one location without failure, with a head of R6.5 and hardness Hs 60 stylus.

10.3 Pin assignment (Pitch :1.0 mm)

Pin No	Symbol	Description	Remark
1	Y1	Upper electrode Y (Upper side)	
2	X2	Lower electrode X (Right side)	
3	Y2	Upper electrode Y (Down side)	
4	X1	Lower electrode X (Left side)	

10.4 Electrical Performance

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Loop Resistance	X	200	-	900	Ω	
	Y	200	-	900	Ω	
Linearity		-	-	1.5	%	
Insulation Impedance		20	-	-	M Ω	DC 25V
Response Time		-	-	10	ms	

10.5 Optical Performance

Parameter	Specifications
Transparency	$\geq 80\%$ (Inside of guaranteed active area)
Haze	Anti-Newton $\leq 10\%$

10.6 Environmental

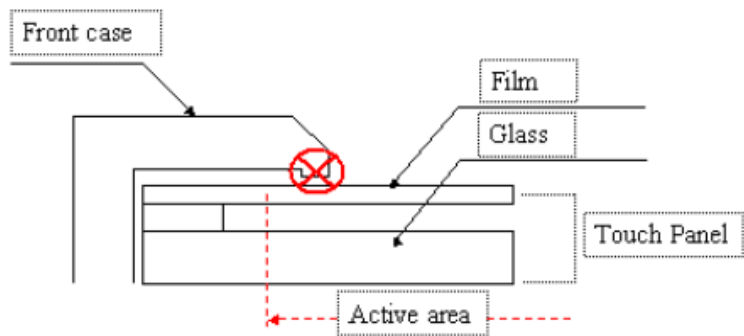
Parameter	Specifications
Operating Temp.	-25°C~75°C (Except dew condensation)
Storage Temp.	-30°C~80°C (Except dew condensation)
Operating Humidity (Non Condensing)	20% RH~ 80%RH
Storage Humidity (Non Condensing)	10% RH~ 90%RH

10.7 Reliability test procedure

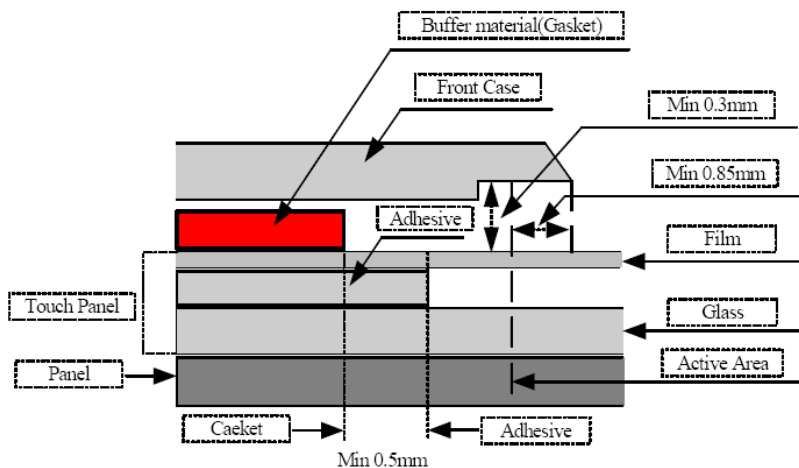
Parameter	Specifications
High temperature storage test	70°C for 240 hours.
Low temperature storage test	-40°C for 240 hours.
Thermal Cycling	-40°C (1 hr each)~70°C (1 hr each) for 10 cycles.
High temperature and high humidity	35°C, 90%RH for 240 hours.

10.8 Touch Screen Integration Design Guide

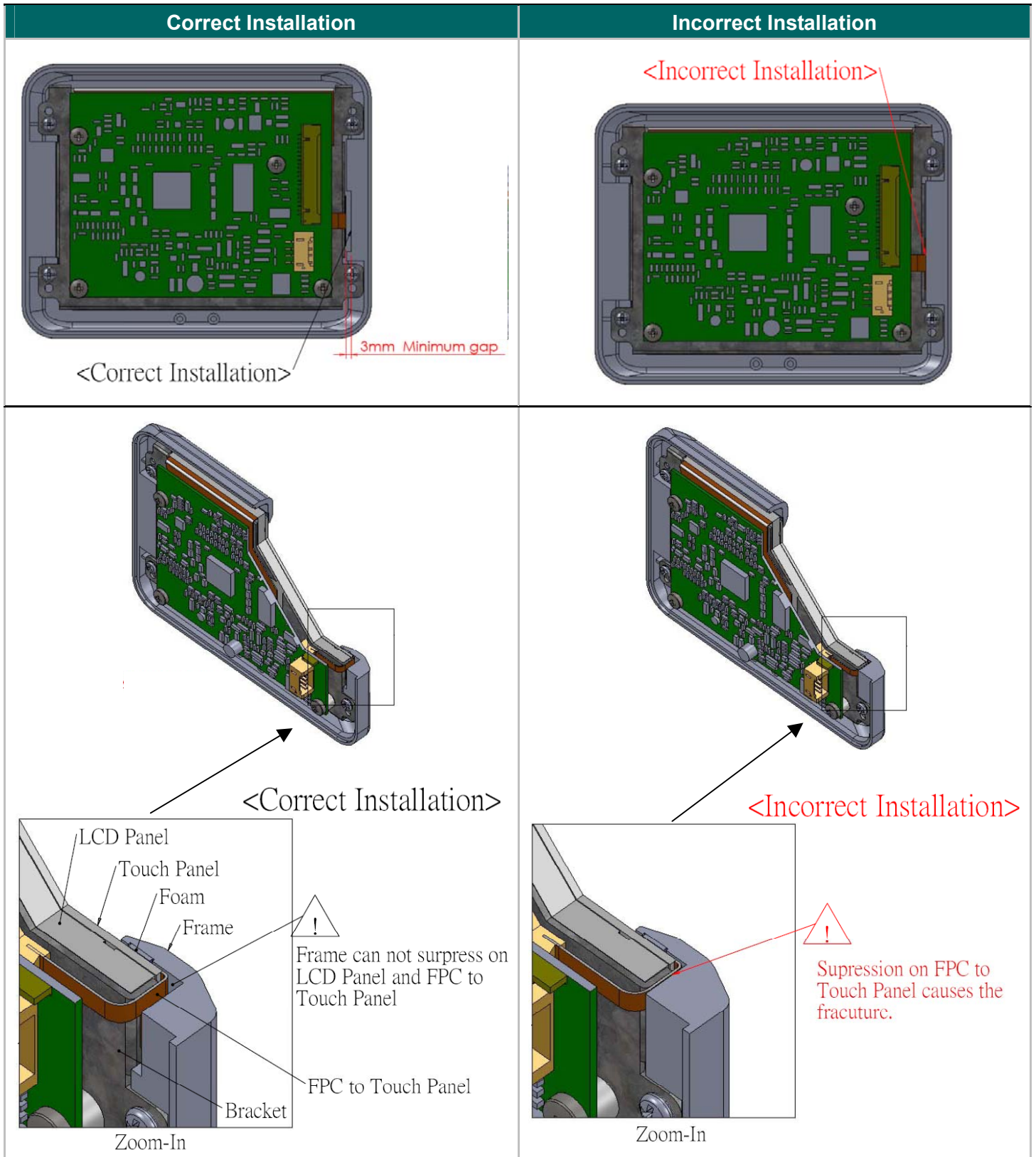
Avoid the design that Front-case overlap and press on the active area of the touch-panel.
 Give enough gap (over 0.5mm at compressed) between the front case and touch-panel to protect wrong operating.



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.

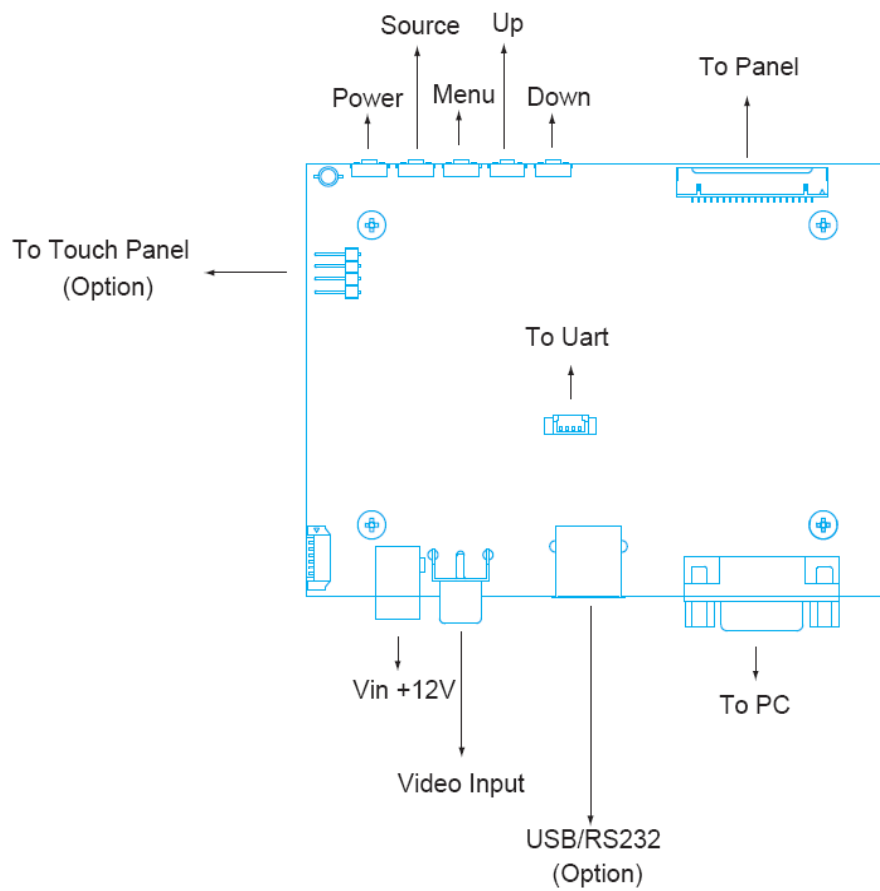


10.9 Mechanical Design Notice For Touch Panel



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. LASTD12025-FDR



B. LAAC818000-FDR



C. LAVDO18000-FDR



D. LAVGA16000-FDR



E. LAUSB18000-FDR



F. LARS218000-FDR



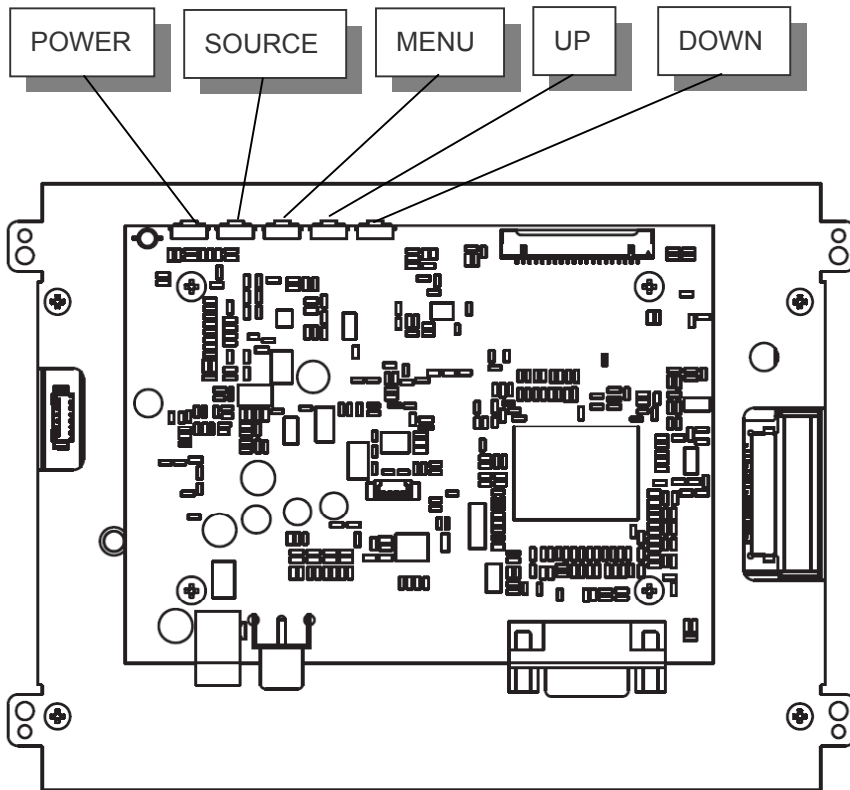
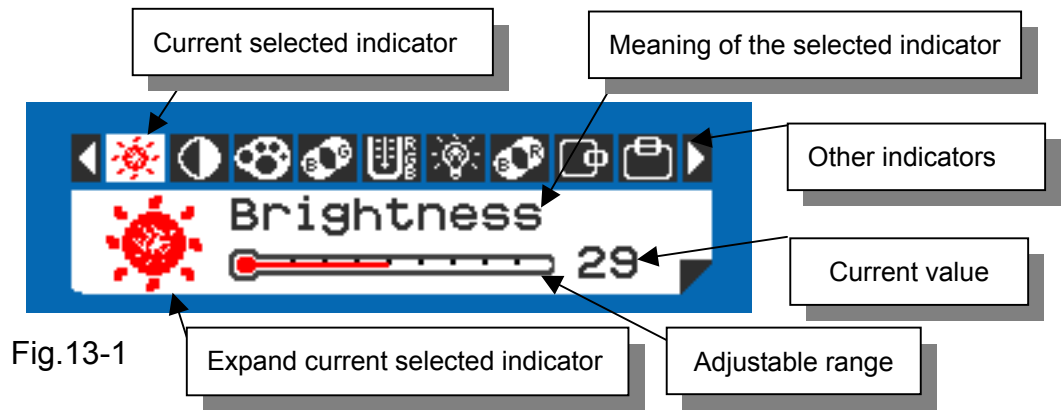
G.

- A. AC to DC Adapter (L: 1500mm, 100-240VAC 50-60Hz to +12VDC @ 2.5A)
- 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)
- G. Touch Screen Driver CD Disk / User Manual

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


















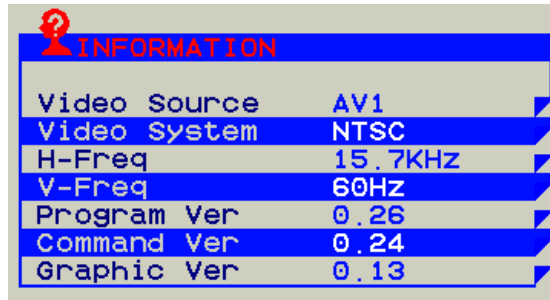
Indicator	Meaning	Adjustable range	For	Remark
	Brightness	0 ~ 64	AV / VGA	Adjust-Bar
	Contrast	0 ~ 64	AV / VGA	Adjust-Bar
	Color	0 ~ 64	AV	Adjust-Bar
	Tint	0 ~ 32	AV	Adjust-Bar
	Sharpness	0 ~ 16	AV	Adjust-Bar
	Dimmer	0 ~ 9	AV / VGA	
	Color Tone	Normal / Warm / Cool	AV / VGA	
	Mirror	OFF / ON	AV / VGA	
	Flip	OFF / ON	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.13-2
	Setup		AV / VGA	Fig.13-3
	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

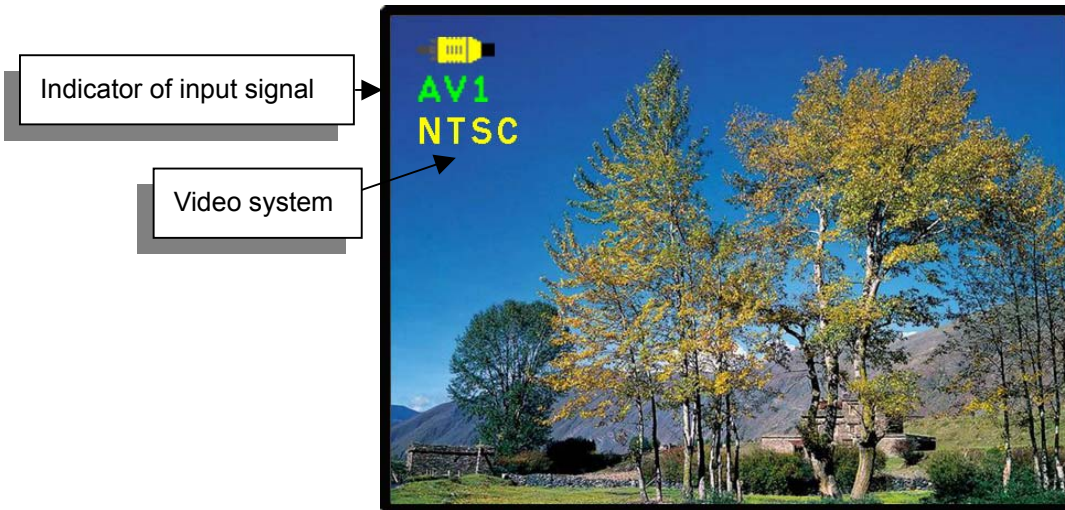




Fig.13-4

[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