



§ SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No LP050N2Ixx-FxR

Description: 5" Digital TFT-LCD Module

SPEC No.: SAS-0902002

Version: 0.0

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※ This approval sheet contains 33 pages including the cover and appendix.

Customer:

Date: / / 09

APPROVED BY:

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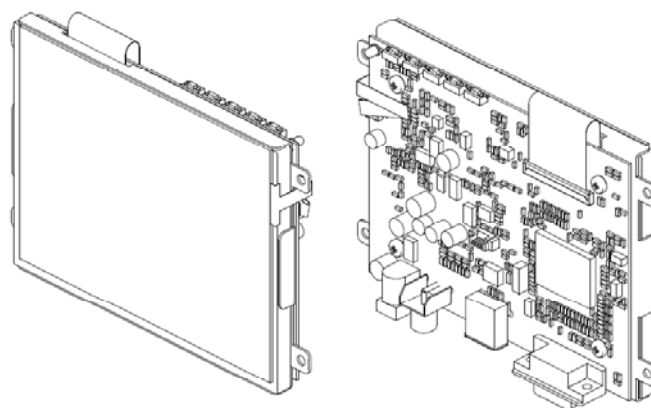
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5" Digital TFT-LCD Module

- LP050N2IU1-FXR
- LP050N2IC1-FxR
- LP050N2IVx-FxR
- LP050N2IBx-FxR



1. General Description

1.1 Features

- INNOLUX AT050TN22 V.1 Digital TFT LCD
- Ultra Compact
- NTSC/PAL/SECAM Video Auto Switch
- Single Operation Voltage +12V
- CVBS (Option) / Analog RGB (PC Mode) (Option) 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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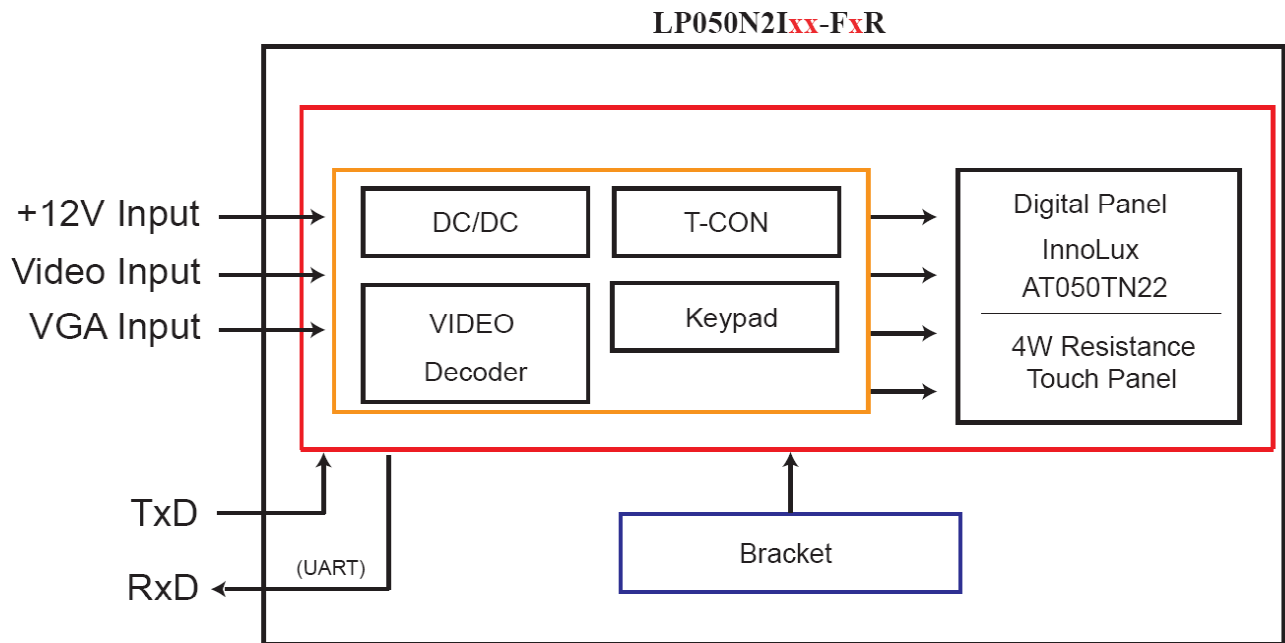
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3. Block Diagram

3.1 Block Diagram



Tent

4. TFT-LCD Information

4.1 TFT-LCD Mechanical Specifications

Parameter	Specifications	Unit
Screen Size	5 (diagonal)	inch
Display Format	640 x (R.G.B) x 480	dot
Active Area	101.568 (W) x 76.176 (H)	mm
Pixel Pitch	0.1587 (W) x 0.1587 (H)	mm
Pixel Configuration	Stripe	
Outline Dimension	117.65 (W) x 88.43 (H) x 5.7(D)	mm
Surface Treatment	Anti – Glare	
Weight	0.108 (Typ)	Kg
Display Mode	Normally White, Transmissive	

4.2 TFT-LCD Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Left	60	70	---	deg	
		Right	60	70	---		
	Vertical	Top	40	50	---	deg	
		Bottom	60	70	---	deg	
Contrast Ratio	CR	At optimized Viewing angle	400	500	---	---	
Response time	Rise Fall	Tr	---	10	20	ms	
		Tf	---	15	30	ms	
Uniformity	U		70	75	---	%	
Brightness	L		150	200	---	cd/m ²	
White Chromaticity	x	$\theta = 0^\circ$	0.26	0.31	0.36		
	y	$\theta = 0^\circ$	0.28	0.33	0.38		
LED Life Time		25°C	20000	---	---	Hr	

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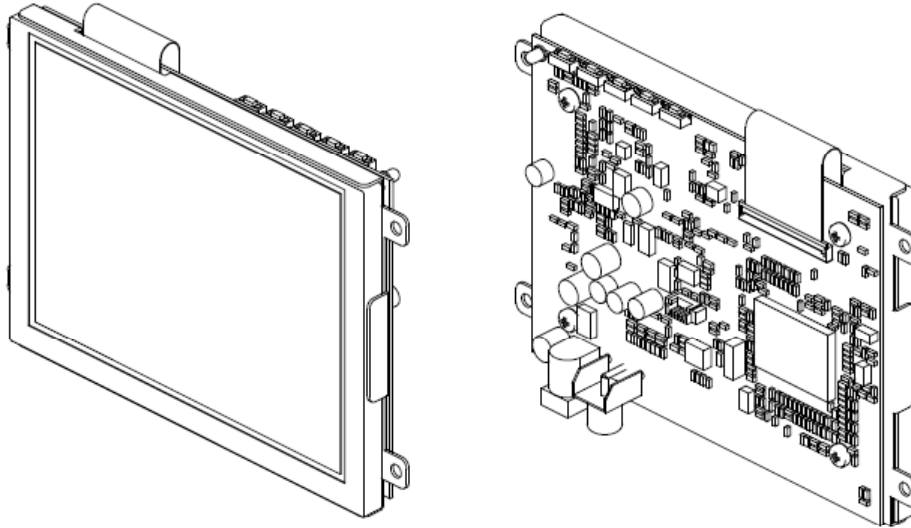
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5. Order Information

5.1 Unit (Video Only)

Unit



Parameter	LP050N2IV1-FBR	LP050N2IV1-FNR	Unit
CVBS (Video)	1	1	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	-	
Power Cord Plug Type B for USA (LAC818000-FDR)	⊙	-	
Video Cable (LAVDO18000-FDR)	⊙	-	

Note: 1. The tape in back of the bracket is to avoid the panel falling from the unit in delivery.
 2. It's just a temporary adhesion.

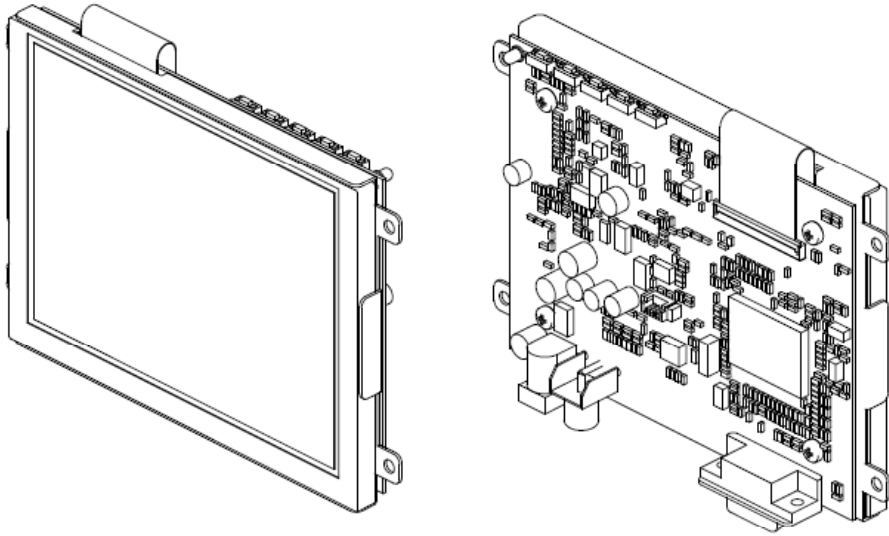
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5.2 Unit (Video +VGA)

Unit

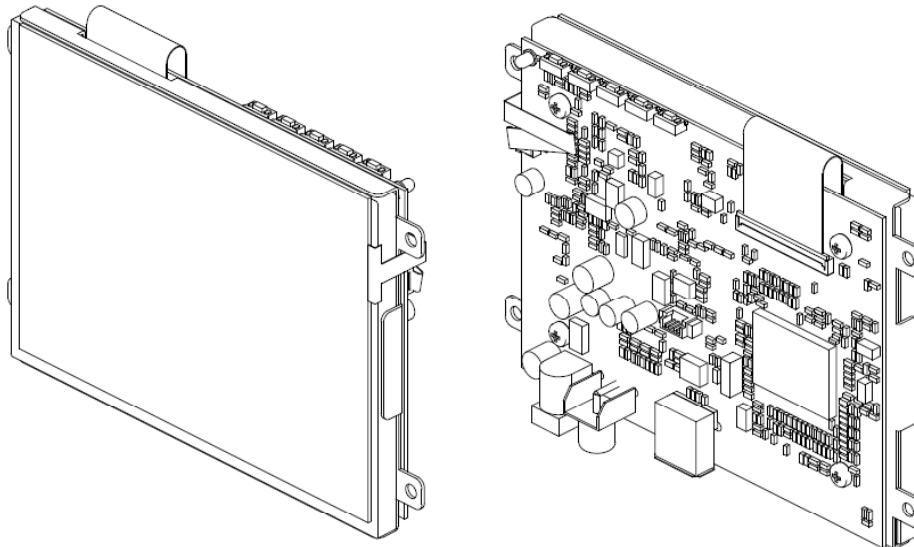


Parameter	LP050N2IB1-FBR	LP050N2IB1-FNR	Unit
CVBS (Video)	1	1	
VGA (D-Sub15 / 2.0mm 14Pin)	D-Sub15	D-Sub15	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	-	
Power Cord Plug Type B for USA (LAAC818000-FDR)	⊙	-	
Video Cable (LAVDO18000-FDR)	⊙	-	
VGA Cable (LAVGA16000-FDR)	⊙	-	

Note: 1. The tape in back of the bracket is to avoid the panel falling from the unit in delivery.
 2. It's just a temporary adhesion.

5.3 Unit (Video +Touch)

Unit



Parameter	LP050N2IV4-FBR	LP050N2IV5-FBR	LP050N2IV4-FNR	LP050N2IV5-FNR	Unit
CVBS (Video)	1	1	1	1	
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)	⊙	⊙	-	-	
USB Cable (LAUSB18000-FDR)	⊙	-	-	-	
RS-232 Cable (LARS218000-FDR)	-	⊙	-	-	
Touch Screen Driver CD Disk	⊙	⊙	-	-	

Note: 1. The tape in back of the bracket is to avoid the panel falling from the unit in delivery.

2. It's just a temporary adhesion.

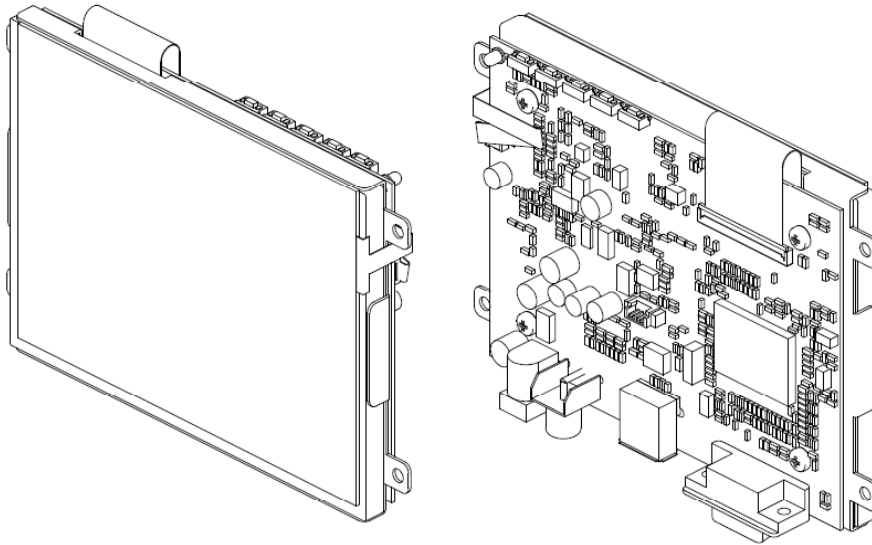
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5.4 Unit (Video +VGA +Touch)

Unit



Parameter	LP050N2IB4-FBR	LP050N2IB5-FBR	LP050N2IB4-FNR	LP050N2IB5-FNR	Unit
CVBS (Video)	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	⊙	⊙	-	-	

Note: 1. The tape in back of the bracket is to avoid the panel falling from the unit in delivery.

2. It's just a temporary adhesion.

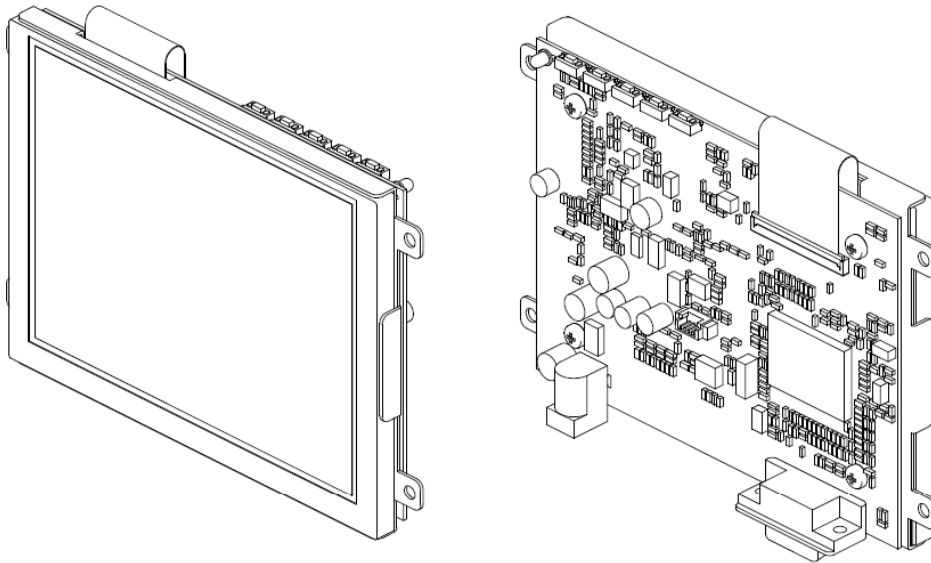
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5.5 Unit (VGA Only)

Unit

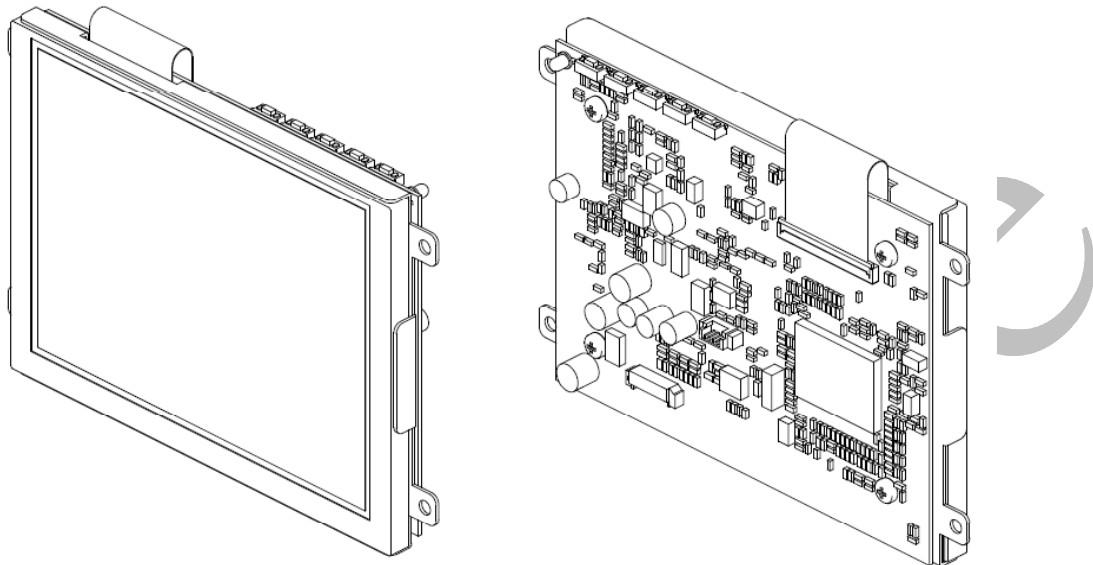


Parameter	LP050N2IC1-FBR	LP050N2IC1-FNR	Unit
VGA (D-Sub15 / 2.0mm 14Pin) (LASTD12025-FDR)	D-Sub15	D-Sub15	
AC to DC Adapter 12V/2.5A (LAC818000-FDR)	⊙	-	
Power Cord Plug Type B for USA (LAC818000-FDR)	⊙	-	
VGA Cable (LAVGA16000-FDR)	⊙	-	

Note: 1. The tape in back of the bracket is to avoid the panel falling from the unit in delivery.
 2. It's just a temporary adhesion.

5.6 Unit (Video Only- Pitch 1.25mm 8Pin, Side Entry Type)

Unit

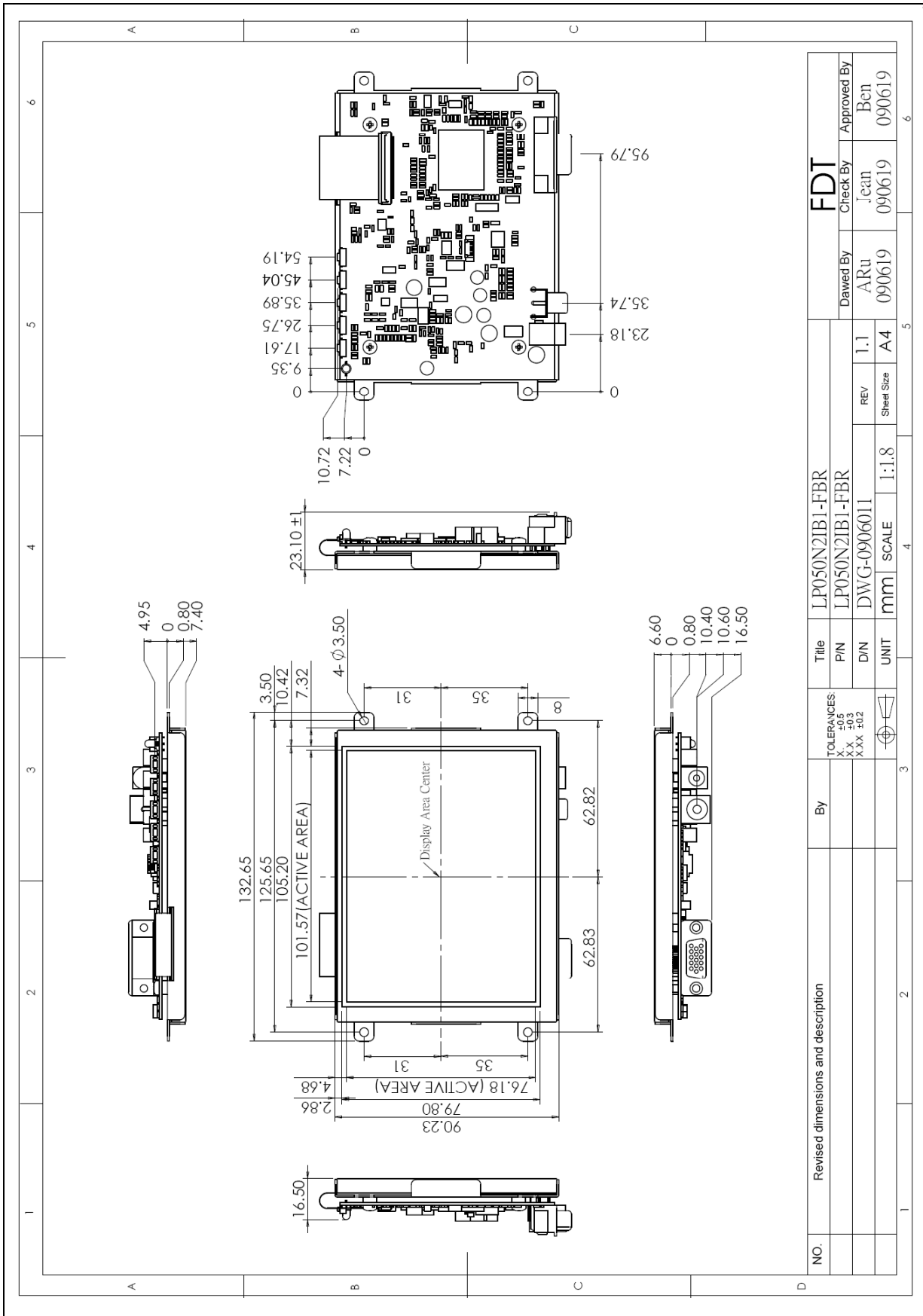


Parameter	LP050N2IU1-FXR	Unit
CVBS (Video)	1	
Connector	POWER & VIDEO Connection Type (Pitch 1.25mm 8Pin, Side Entry Type)	

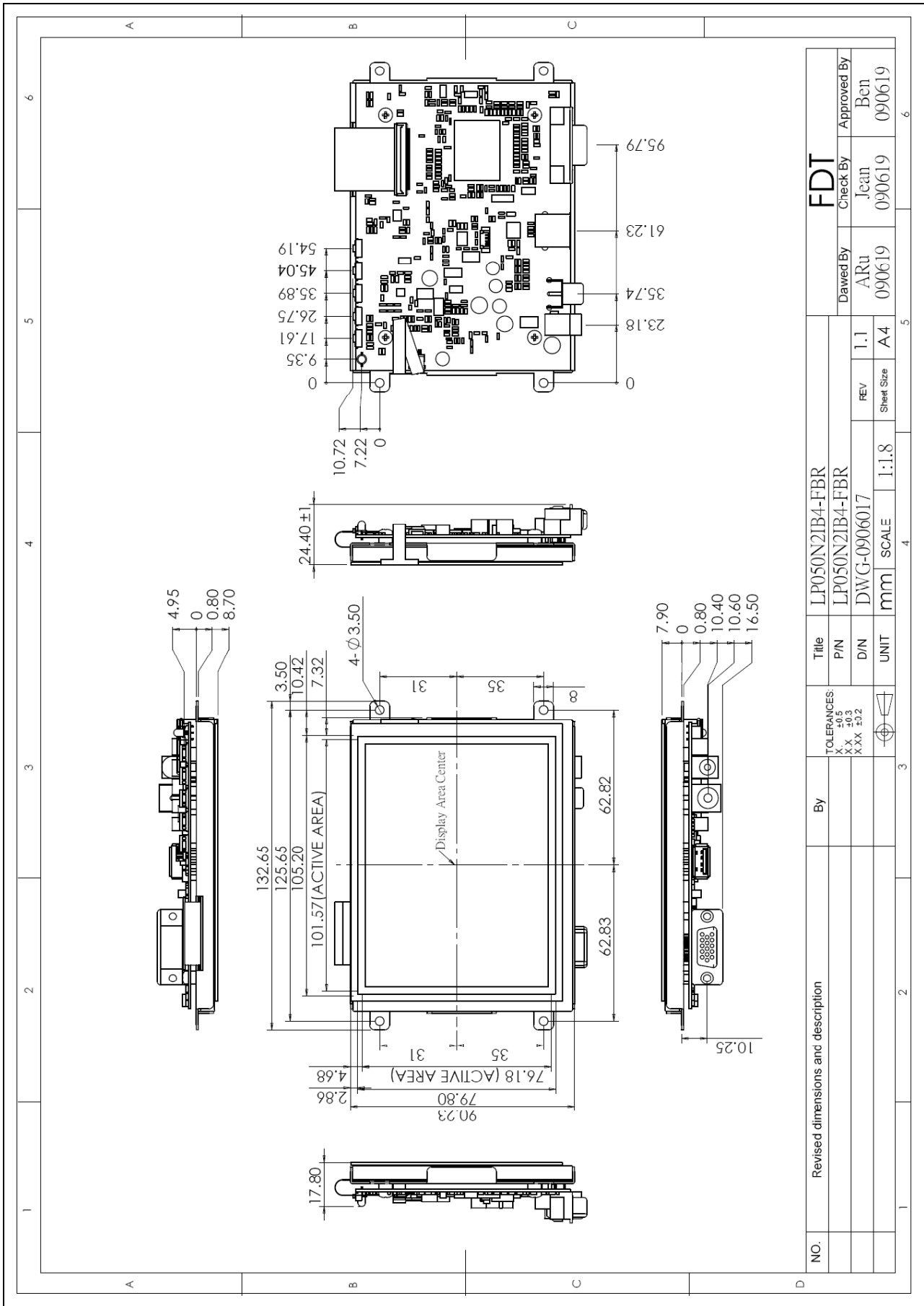
**Note: 1. The tape in back of the bracket is to avoid the panel falling from the unit in delivery.
2. It's just a temporary adhesion.**

6. Dimension Information

6.1 Unit (LP050N2IB1-FBR)



6.2 Unit (LP050N2IB4-FBR)

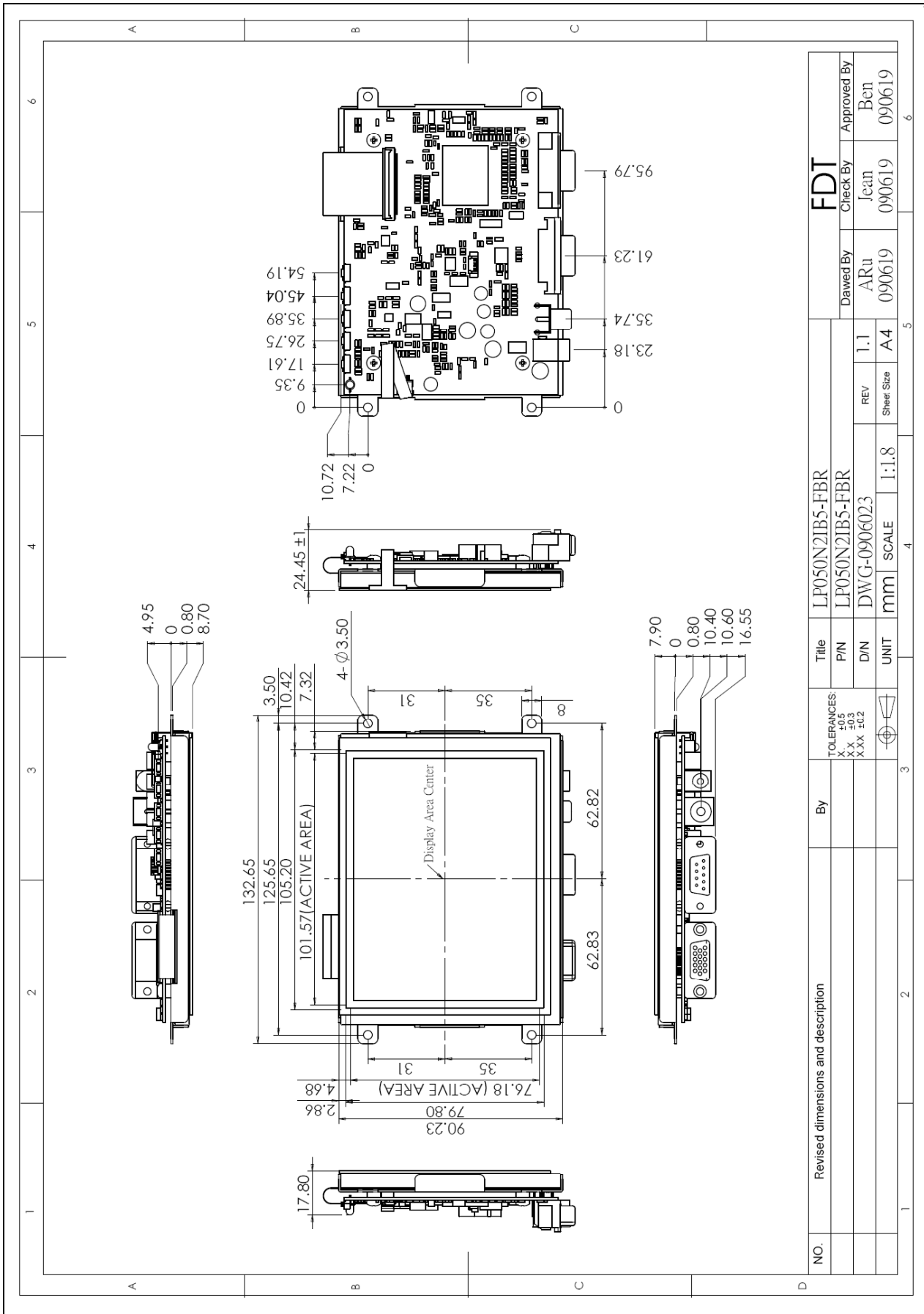


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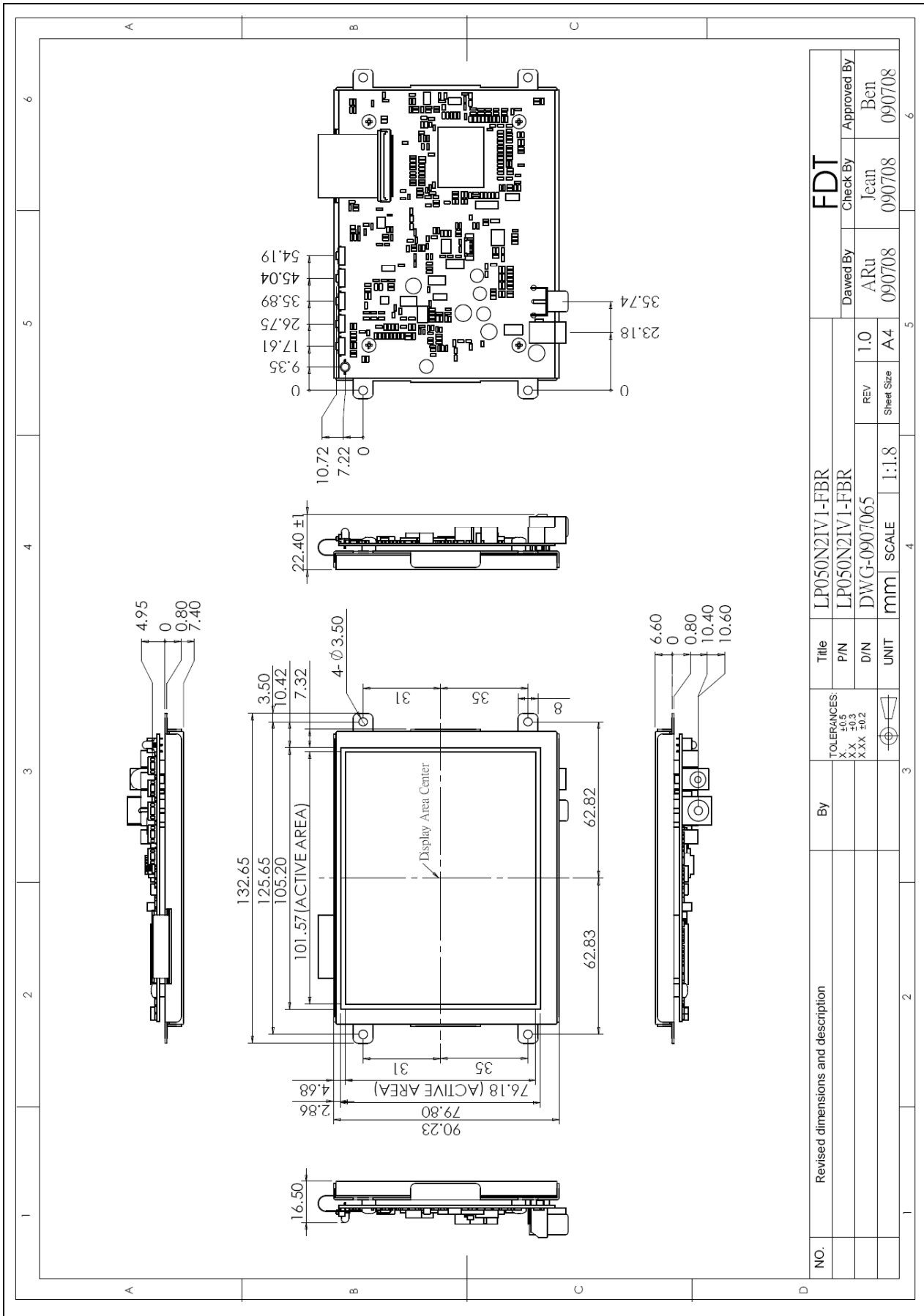
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6.3 Unit (LP050N21B5-FBR)



6.4 Unit (LP050N2IV1-FBR)

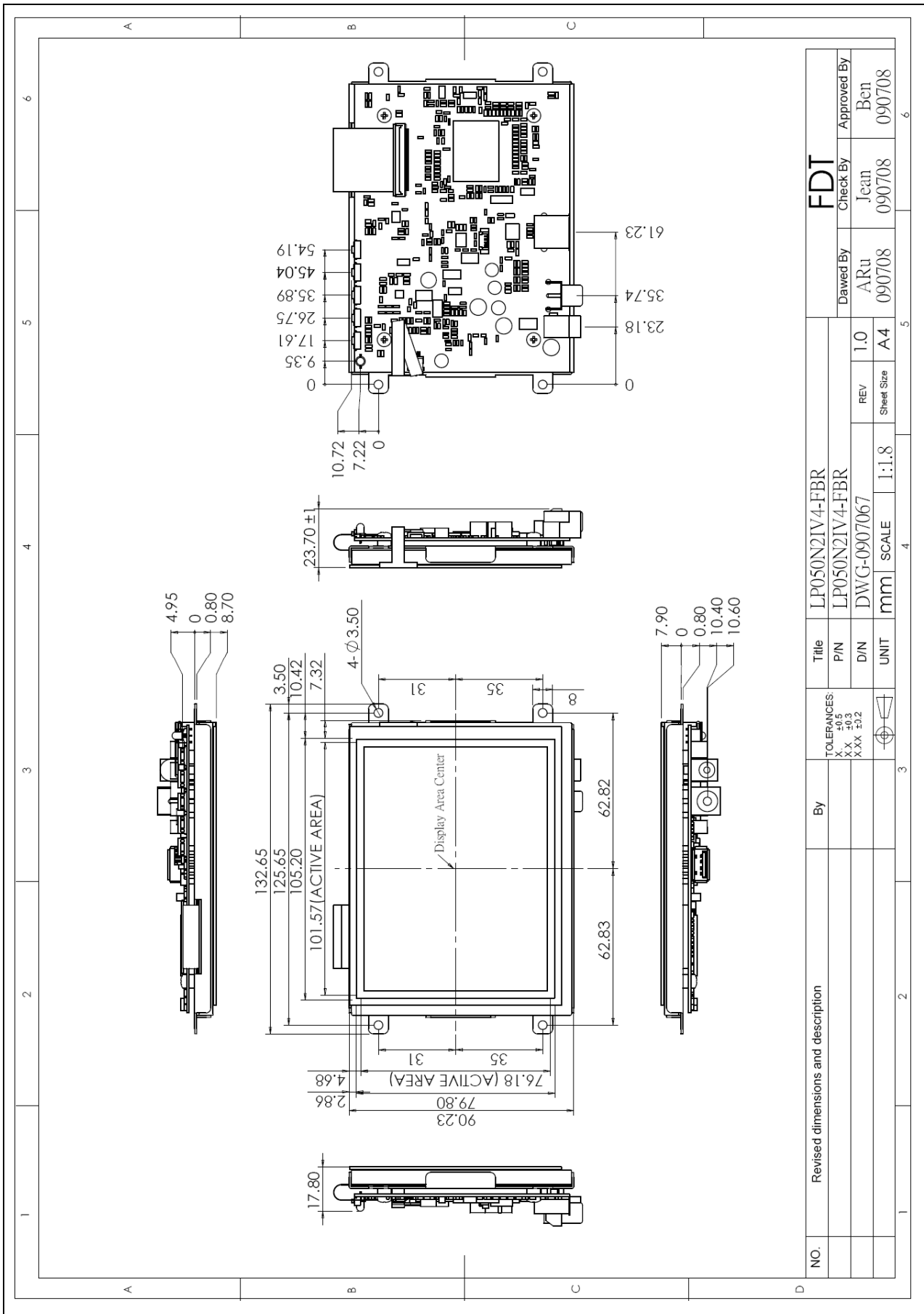


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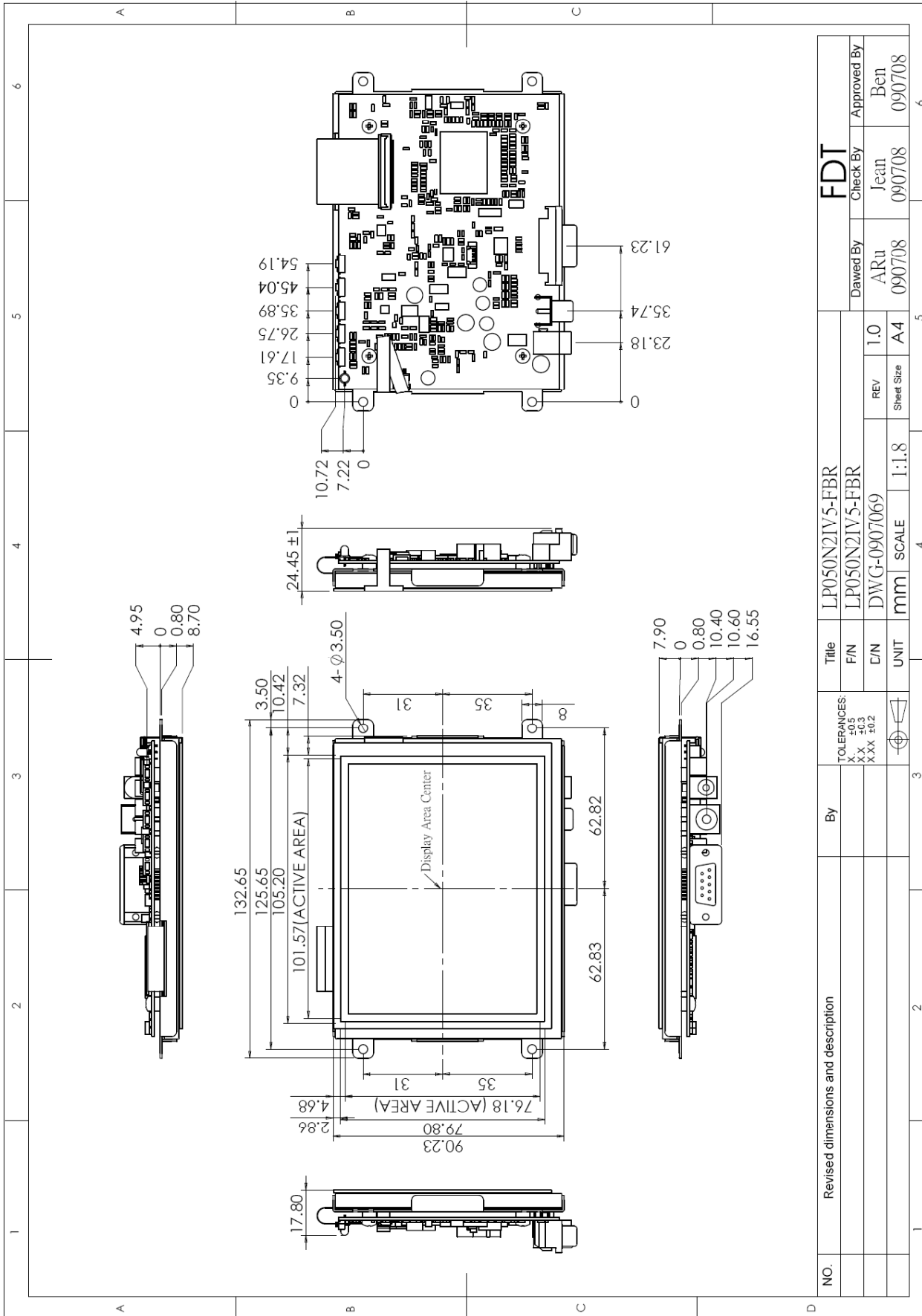
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6.5 Unit (LP050N2IV4-FBR)



6.6 Unit (LP050N2IV5-FBR)

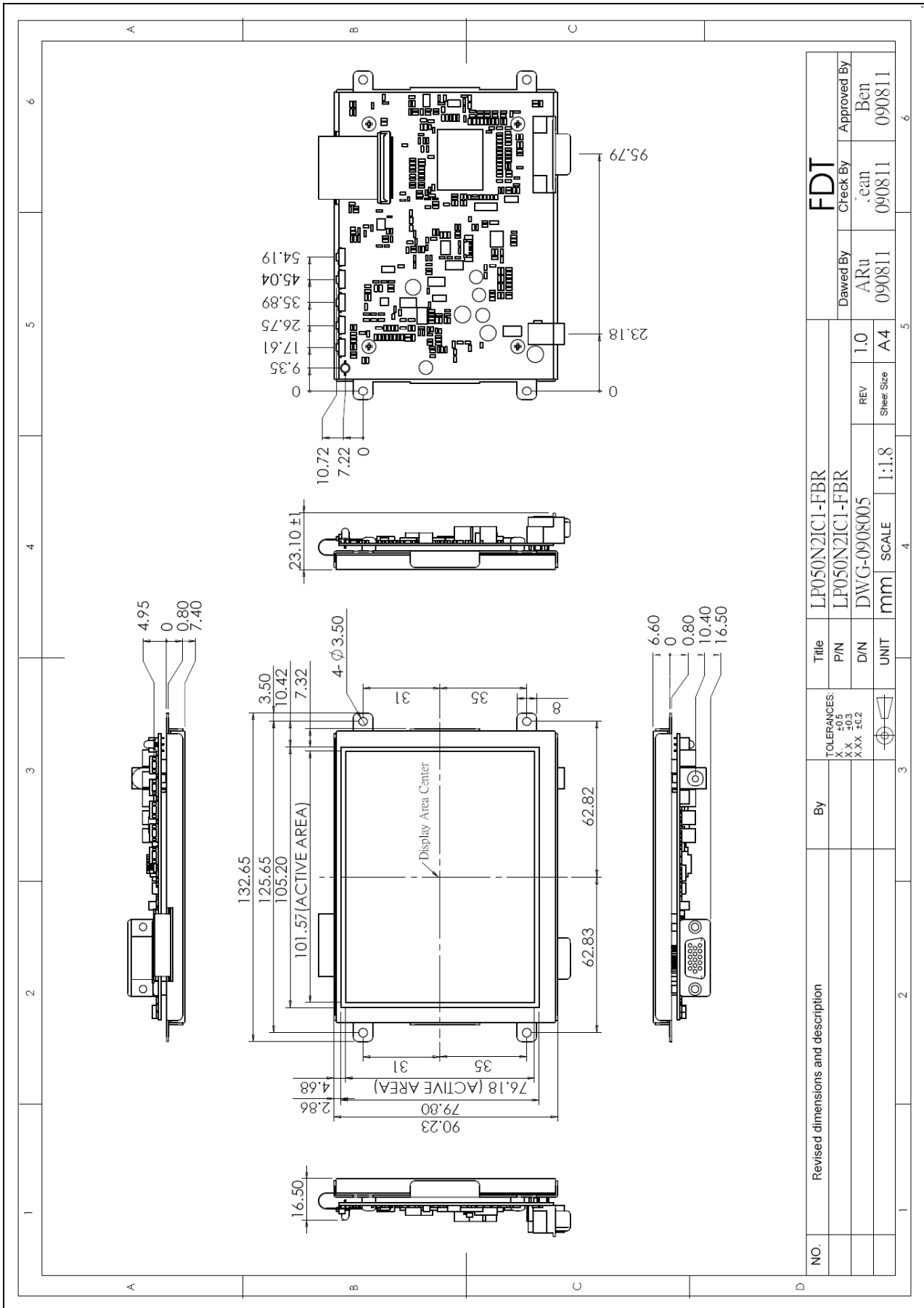


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6.7 Unit (LP050N21C1-FBR)

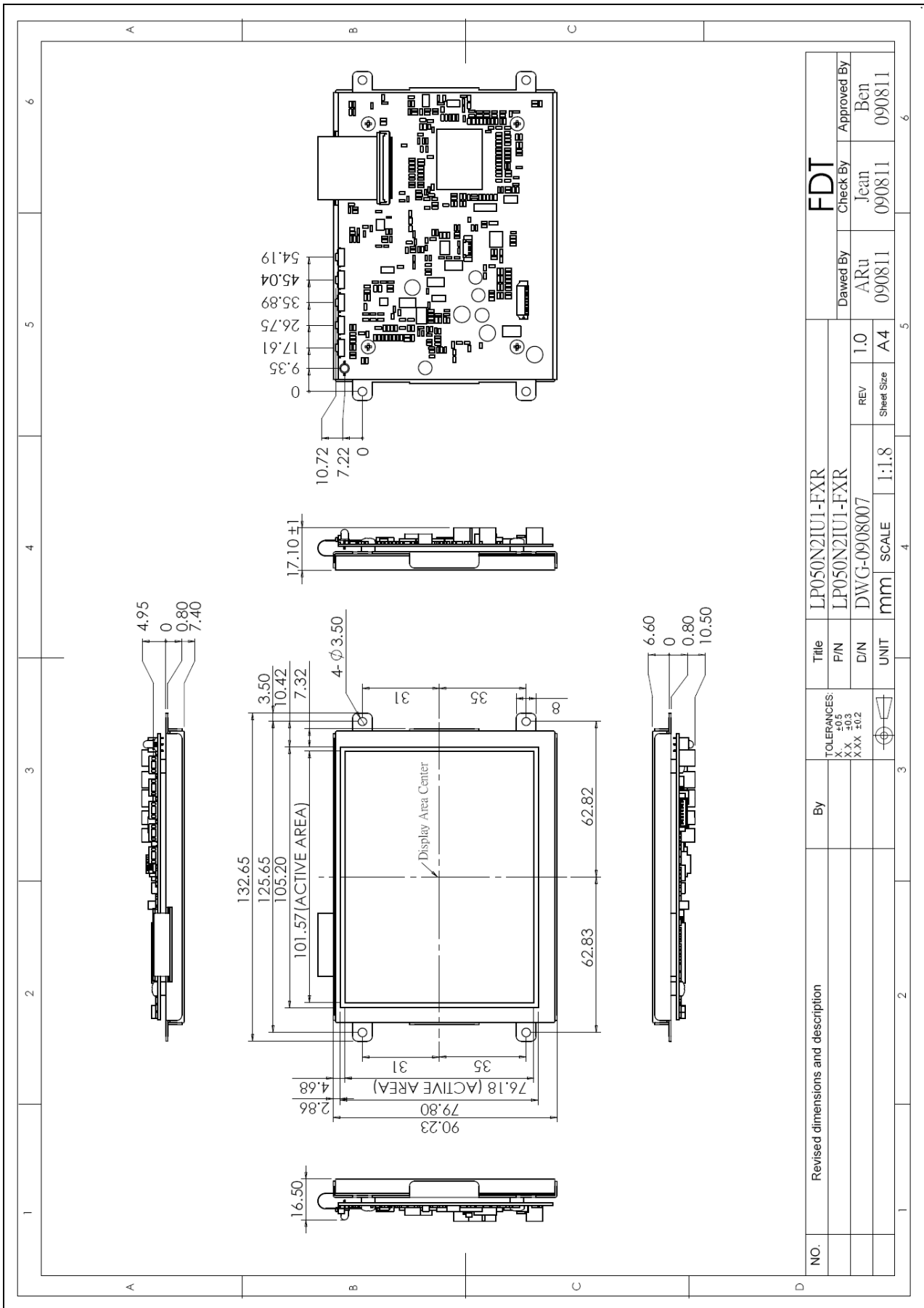


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6.7 Unit (LP050N2IU1-FXR)



7. Pin Description

7.1 J302 : INNOLUX LCD Panel I/O Terminals (FPC 50 Pin Below Contact Type)

Pin No	Symbol	I/O	Description	Remark
1	VLED+	P	Power for LED backlight anode	
2	VLED+	P	Power for LED backlight anode	
3	VLED-	P	Power for LED backlight cathode	
4	VLED-	P	Power for LED backlight cathode	
5	GND	P	Power ground	
6	VCOM	I	VCOM input	
7	VDD	P	Digital power supply(+3.3V)	
8	MODE	I	DE or HV mode control	
9	DE	I	Data Enable	
10	VS	I	Vsync signal input	
11	HS	I	Hsync signal input	
12	B7	I	Blue data input (MSB)	
13	B6	I	Blue data input	
14	B5	I	Blue data input	
15	B4	I	Blue data input	
16	B3	I	Blue data input	
17	B2	I	Blue data input	
18	B1	I	Blue data input	
19	B0	I	Blue data input(LSB)	
20	G7	I	Green data input(MSB)	
21	G6	I	Green data input	
22	G5	I	Green data input	
23	G4	I	Green data input	
24	G3	I	Green data input	
25	G2	I	Green data input	
26	G1	I	Green data input	
27	G0	I	Green data input(LSB)	
28	R7	I	Red data input(MSB)	
29	R6	I	Red data input	
30	R5	I	Red data input	
31	R4	I	Red data input	
32	R3	I	Red data input	
33	R2	I	Red data input	
34	R1	I	Red data input	
35	R0	I	Red data input (LSB)	
36	GND	P	Power ground	
37	DCLK	I	Sample clock	

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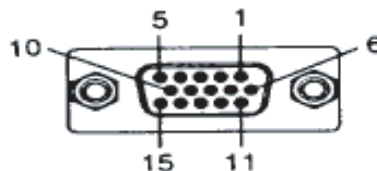
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38	GND	P	Power ground
39	L/R	I	Select left to right scanning direction
40	U/D	I	Select up or down scanning direction
41	VGH	I	Positive power for scan driver
42	VGL	I	Negative power for scan driver
43	AVDD	P	Power supply for analog circuit
44	RESET	I	Reset
45	POL	O	Polarity select for the line inversion control signal
46	VCOM	I	VCOM input
47	NC	-	No Connector
48	NC	-	No Connector
49	NC	-	No Connector
50	NC	-	No Connector

7.2 J101B : Pin Assignment of Analog RGB Input (D-Sub 15Pin)

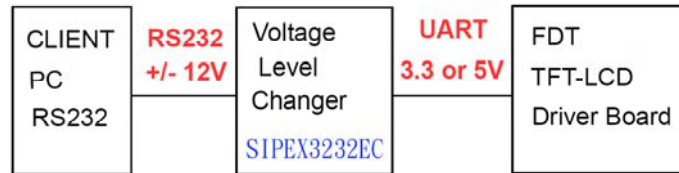
Pin No	Symbol	I/O	Description	Remark
1	RI+	I	Analog Red Signal	
2	GI+	I	Analog Green Signal	
3	BI+	I	Analog Blue Signal	
4	NC	-	No Connection	
5	GND	-	Ground	
6	AGND	-	Analog Ground	
7	AGND	-	Analog Ground	
8	AGND	-	Analog Ground	
9	NC	-	No Connection	
10	NC	-	No Connection	
11	NC	-	No Connection	
12	NC	-	No Connection	
13	HS_IN	I	TTL Horizontal sync	
14	VS_IN	I	TTL Vertical sync	
15	NC	-	No Connection	



7.3 J104: Pin Assignment of UART (Pitch 1.25mm 4Pin, Side Entry Type)

Pin No	Symbol	I/O	Description	Remark
1	TX	O	UART Transmission Data	
2	RX	I	UART Receive Data	
3	GND	-	Ground	
4	+5VA	O	+5V Output Voltage	

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



7.4 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	

7.5 RCA: 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	

7.6 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	

7.7 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	

7.8 J102A : Pin Assignment of Signal Input (Pitch 1.25mm 8Pin, Side Entry Type)

Pin No	Symbol	I/O	Description	Remark
1	VCC12V	I	+12V Input Voltage	
2	VCC12V	I	+12V Input Voltage	
3	GND	-	Ground	
4	GND	-	Ground	
5	VIDEO1	I	Video1 Input Signal	
6	GND	-	Ground For Video1	
7	VIDEO2	I	Video2 Input Signal (Option)	
8	GND	-	Ground For Video2	

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
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		-10	+60	°C	
Storage Temperature		-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	I	357	298	256	mA	
Power Consumption		I	3.57	3.577	3.584	W	
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	Hor.	Unit	Polarity	Ver.	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
Voltage for LED Backlight	VL	9.3	9.9	10.5	V	IL = 120mA, (±10%)
Current for LED Backlight	IL	108	120	132	mA	

9.4 Optics Sample Test Data

Parameter	White Window	Red	Green	Blue	Remark
S/N : 001 x	0.284	0.570	0.324	0.144	±15%
.y	0.299	0.331	0.599	0.094	
L(cd/m ²)	202.1				
TC(°K)	9150				

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

2.Video Pattern 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)

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10.4W Resistive Touch Panel Characteristics

10.1 Pin assignment (Pitch :1.0 mm)

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

10.2 Electrical Performance

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Terminal Resistance	X	90	-	820	Ω	
	Y	200	-	550	Ω	
Input Voltage	VT	-	-	5.0	V	
Linearity		-	-	1.5	%	
Insulation Impedance		20	-	-	M Ω	DC 25V
Response Time		-	-	10	ms	

10.3 Optical Performance

Parameter	Specifications
Transmittance	$\geq 82\%$ Typ.
Haze	8.0% Typ.

10.4 Mechanical Performance

Parameter	Specifications
Input Method	Finger or stylus pen
Operating Force	5gf~80gf
Surface Hardness	3H or more

10.5 Durability Performance

Parameter	Specifications
Pen Sliding Durability	≥ 30000 times, with R8.0 mm silicon rubber, 250g, 5Hz
Finger knocking Durability	≥ 1 Million times, with R0.8 mm polyacetal stylus, 250g, 210 mm / sec

10.6 Environmental

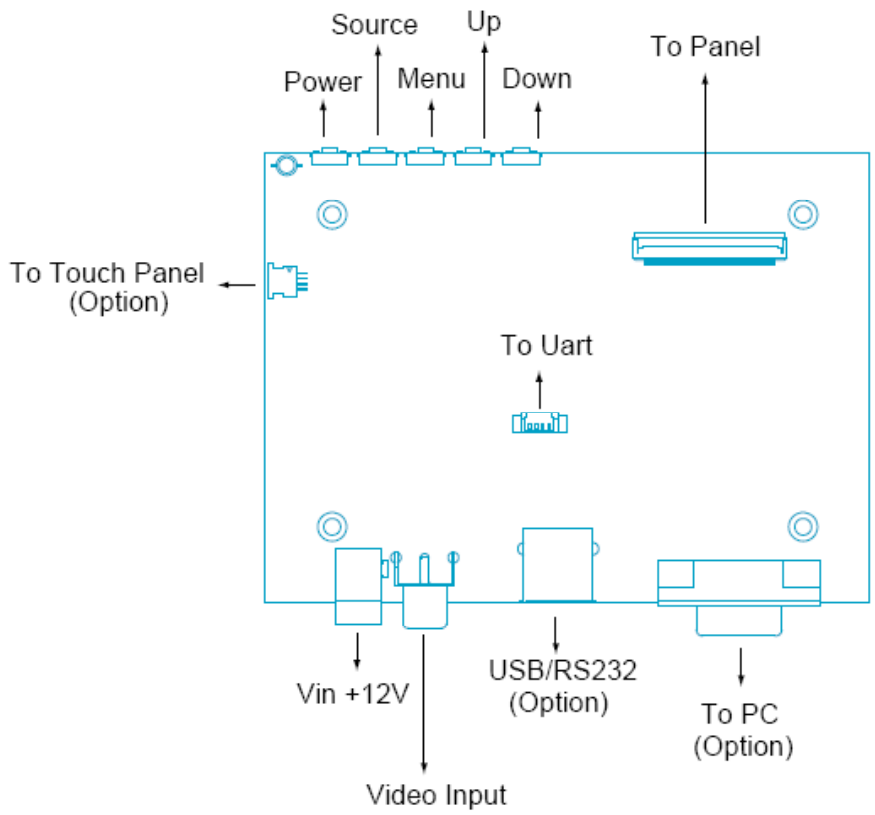
Parameter	Specifications
Operating Temp.	-20°C ~ 40°C (Except dew condensation)
Storage Temp.	-30°C ~ 60°C (Except dew condensation)
Operating Humidity (Non Condensing)	10% RH ~ 90%RH
Storage Humidity (Non Condensing)	10% RH ~ 90%RH

10.7 Reliability test procedure

Parameter	Specifications
High temperature storage test	80°C for 240 hours.
Low temperature storage test	-30°C for 240 hours.
Thermal Cycling	-30°C (0.5 hr each) ~ 80°C (0.5 hr each) for 10 cycles.
High temperature and high humidity	60°C, 90%RH for 240 hours.

11. Operation manual

11.1 Driver Board Manual



FDT

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 (100-240VAC 50-60Hz to +12VDC @ 2.5A)
- B. Power Cord (Plug Type B for USA)
- C. Video Cable
- D. VGA Cable
- E. USB Cable
- F. RS-232 Cable
- G. Touch Screen Driver CD Disk / User Manual

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

FLAT DISPLAY TECHNOLOGY

■ LP050N2lxx-FxR V0.0



13. Key Function by OSD

13.1 Menu Operation

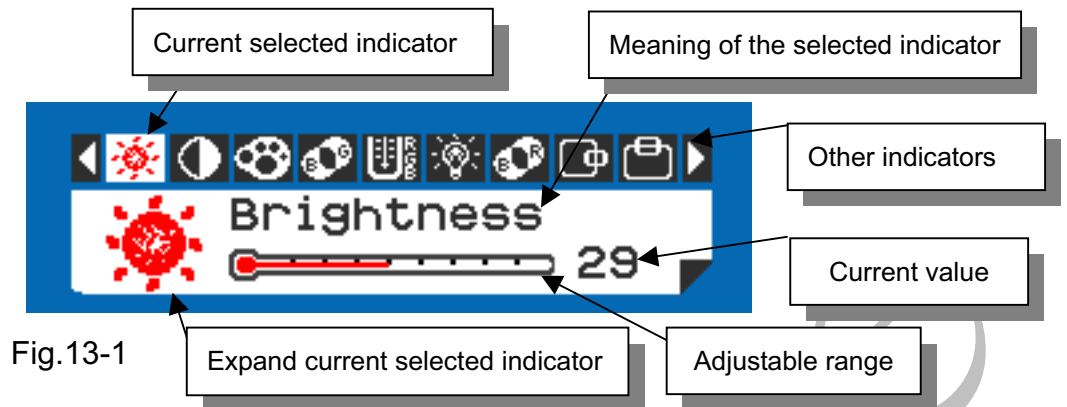
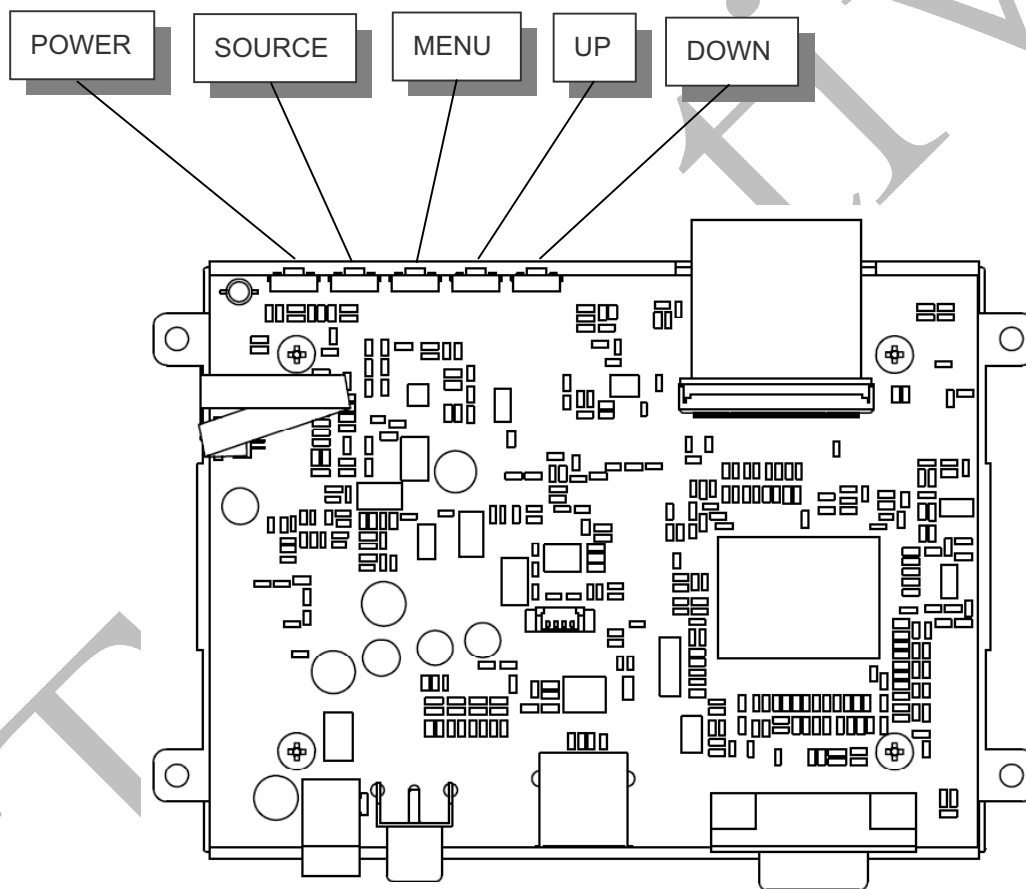


Fig.13-1



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.


















FLAT DISPLAY TECHNOLOGY

■ LP050N2Ixx-FxR V0.0



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	

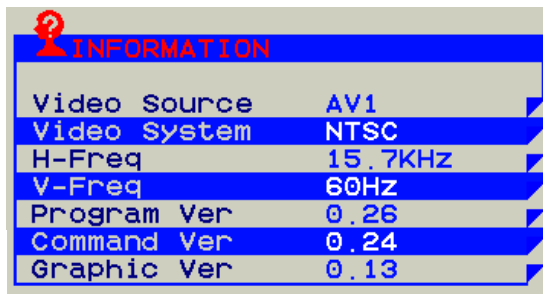








Fig.13-2

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

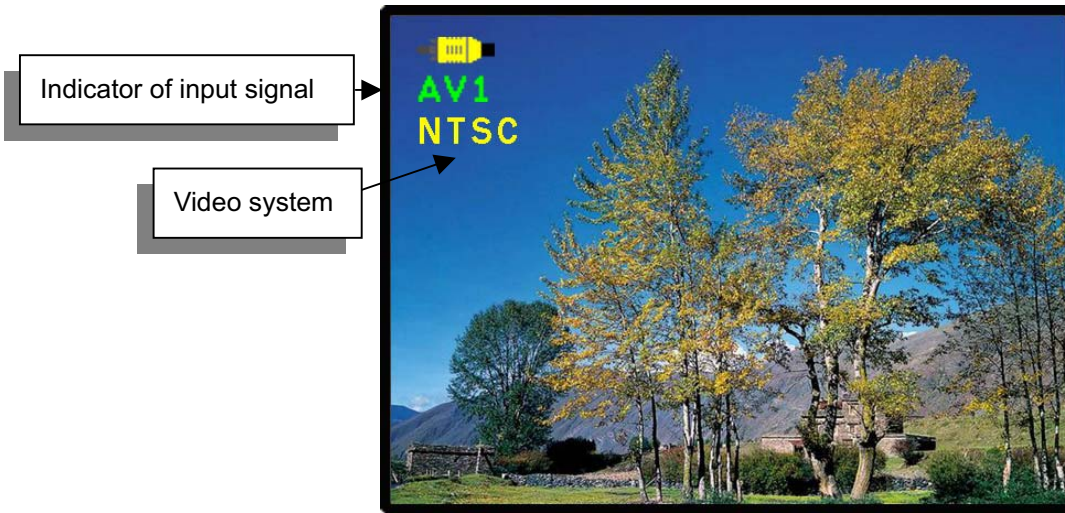



Fig.13-4

[Power] : Monitor power on / off

[Source] : Input signal switch

Overview of input signals :

Indicator	Input signal	Interface	Video system
	VGA	Analog RGB	640x480_60 / 800x600_60 / 1024x768_60