



§ SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No LP035V2P~~xx~~-F~~x~~R

Description: 3.5" Digital TFT-LCD Module

SPEC No.: SAS-1010004

Version: 1.8

Issue Date: July 4, 2014

※ This approval sheet contains 37 pages including the cover and appendix.

Customer:

APPROVED BY:

Date: / / 14

APPROVED BY:

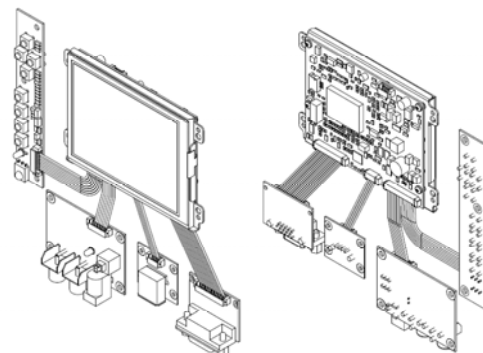
CHECKED BY:

DESIGNED BY:



FLAT DISPLAY TECHNOLOGY

3.5" Digital TFT-LCD Module



■ LP035V2Pxx-FxR

1. General Description

1.1 Features

- 3.5" Digital TFT LCD
- Ultra Compact
- DC/ DC & LED Backlight Driver & Video Decoder All In One
- NTSC / PAL / SECAM Video System Auto Switching
- 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

- Video Game Display
- Security
- Portable TV
- Office Electronics
- Industrial
- Instrument Display

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.

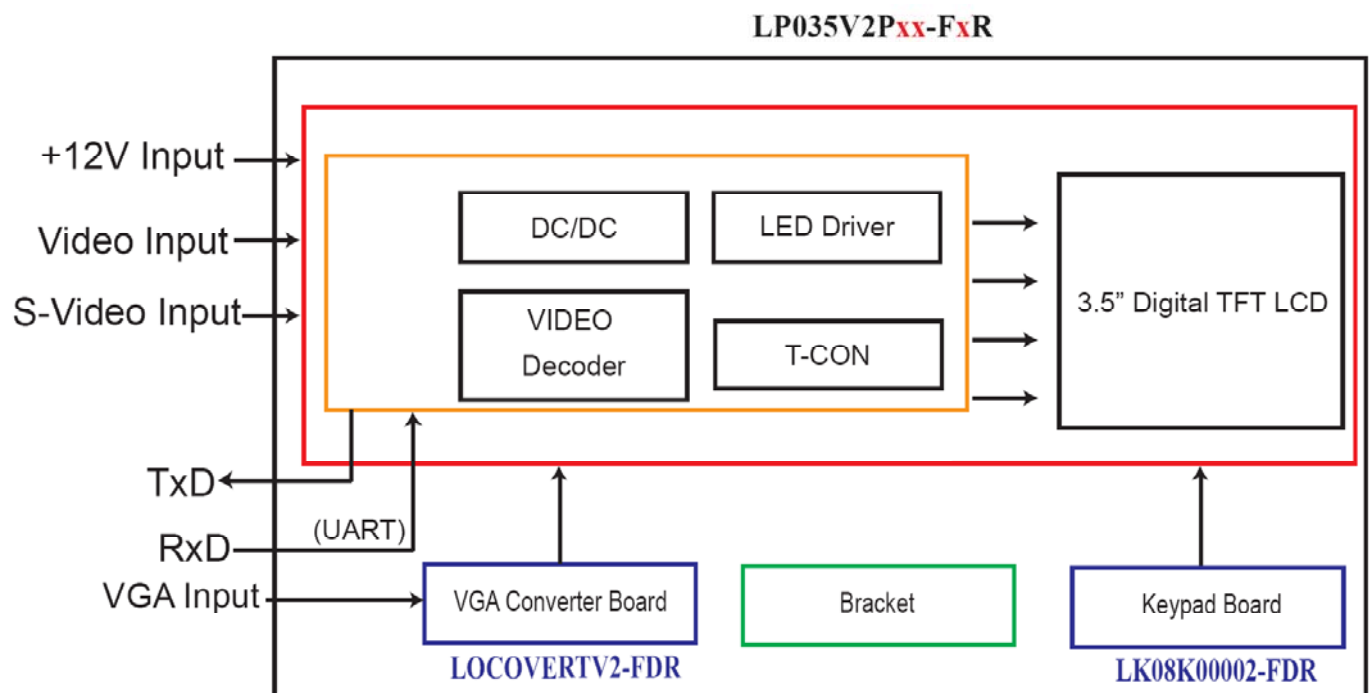
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3. Block Diagram

3.1 Block Diagram



4. TFT-LCD Information

4.1 TFT-LCD Mechanical Specifications

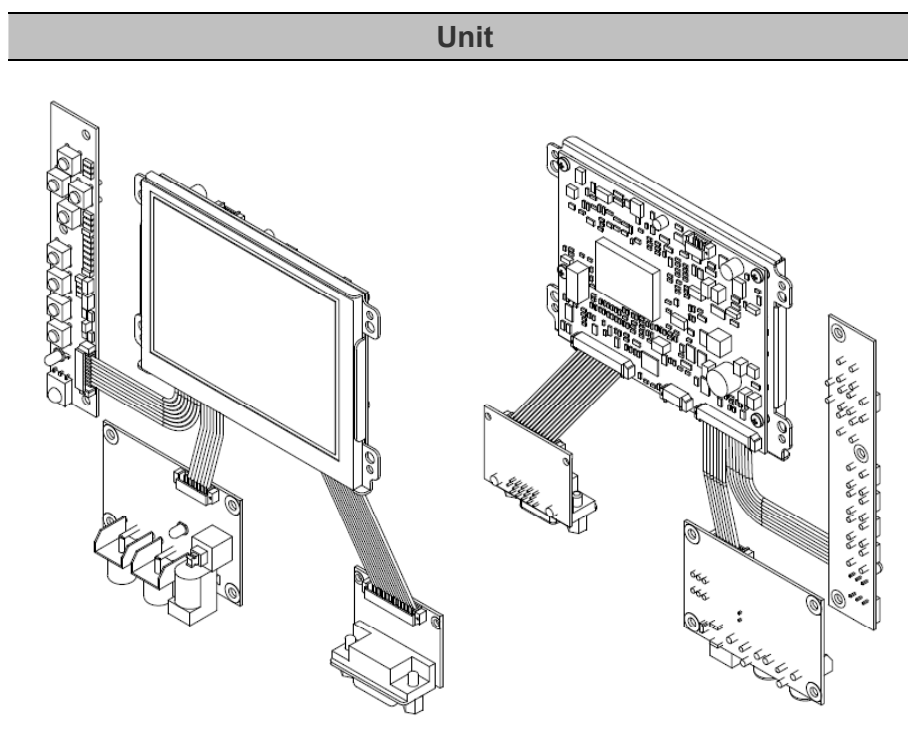
Parameter	Specifications	Unit
Screen Size	3.5(diagonal)	inch
Display Format	640 x (R.G.B) x 480	dot
Active Area	72 (H) x 52.56 (V)	mm
Pixel Pitch	0.1125 (H) x 0.1095 (V)	mm
Pixel Configuration	Stripe	
Outline Dimension	84.03 (W) x 65.24 (H) x 3.45 (D) (Typ.)	mm
Weight	40±5	g
Surface Treatment	Anti-Glare	

4.2 TFT-LCD Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Left	45	50	-	deg	
		Right	45	50	-	deg	
	Vertical	Top	10	15	-	deg	
		Bottom	30	35	-	deg	
Contrast Ratio	CR	At optimized Viewing angle	200	400	-		
Response time	Rise Fall	Tr	-	15	30	ms	
		Tf	-	25	50	ms	
Uniformity	U		70	75	-	%	
Brightness			400	450	-	Cd/m ²	
Brightness with TSP			320	360	-	Cd/m ²	
White Chromaticity	x		0.28	0.31	0.34		
	y		0.30	0.33	0.36		
LED Life Time		Ta=+25°C	-	30000	-	Hrs	

5.Order Information

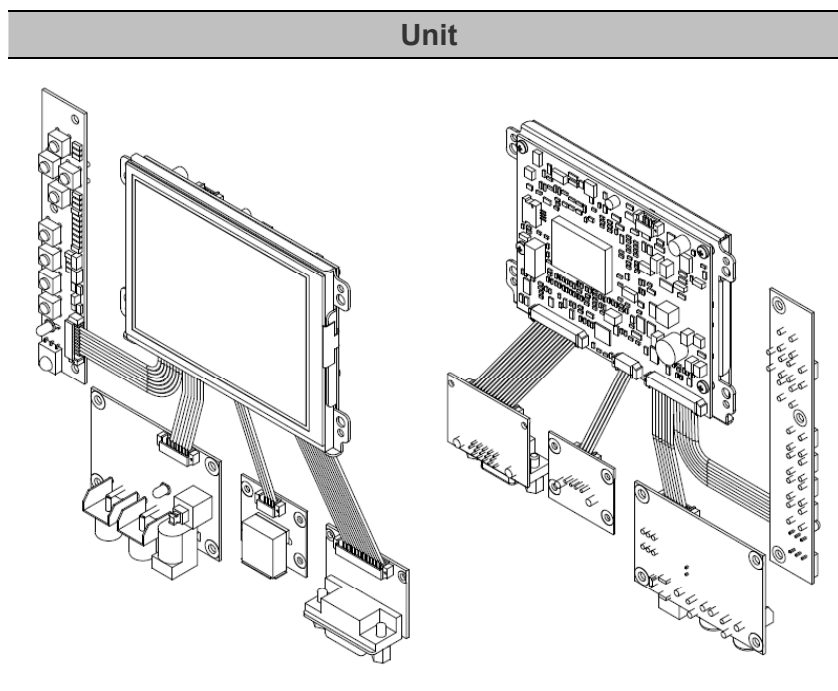
5.1 Unit (CVBS1/CVBS2/PC)



Parameter	LP035V2PB1-FHR	LP035V2PB1-FDR	Unit
CVBS	2	2	
VGA	D-Sub15	D-Sub15	
Key Board (LK08K00002-FDR)	⊙	⊙	
VGA Converter Board (LOCOVERTV2-FDR)	⊙	⊙	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	-	
Power Cord Plug Type A for USA (LAAC818000-FDR)	⊙	-	
Video Cable (LAVDO18000-FDR)	⊙	-	
VGA Cable (LAVGA16000-FDR)	⊙	-	

Note: 1.The assembling of panel and bracket is aimed for delivery, packaging and experient. If the demand of shockproof and longterm fix, pls have it into consideration of mechanism design.

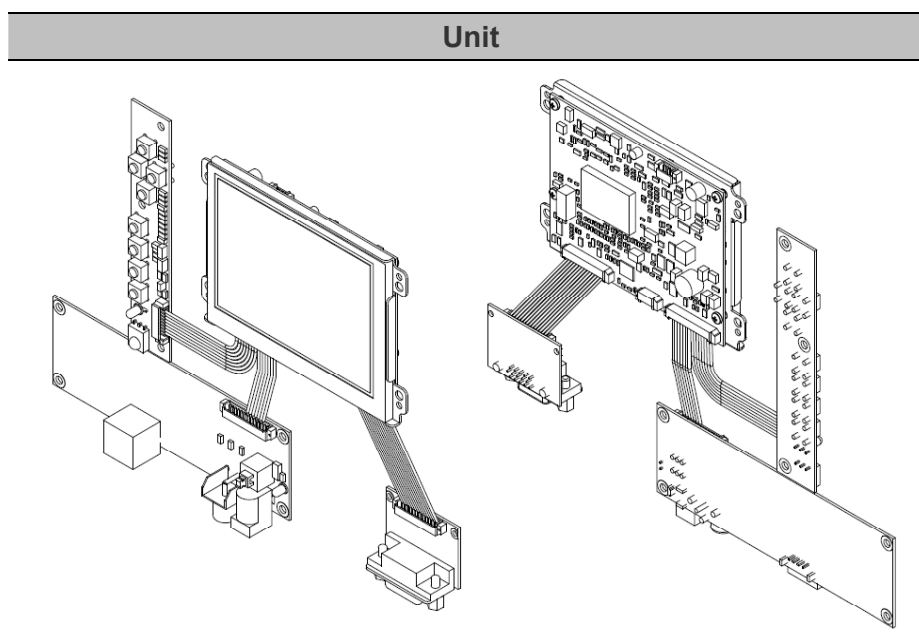
5.2 Unit (CVBS1/CVBS2/PC/4W TSP)



Parameter	LP035V2PB4-FHR	LP035V2PB5-FHR	LP035V2PB4-FDR	LP035V2PB5-FDR	Unit
CVBS	2	2	2	2	
VGA	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	
Key Board (LK08K00002-FDR)	⊙	⊙	⊙	⊙	
VGA Converter Board (LOCOVERTV2-FDR)	⊙	⊙	⊙	⊙	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	⊙	-	-	
Power Cord Plug Type A 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 assembling of panel and bracket is aimed for delivery, packaging and experient. If the demand of shockproof and longterm fix, pls have it into consideration of mechanism design.

5.3 Unit (CVBS/S-Video/PC)

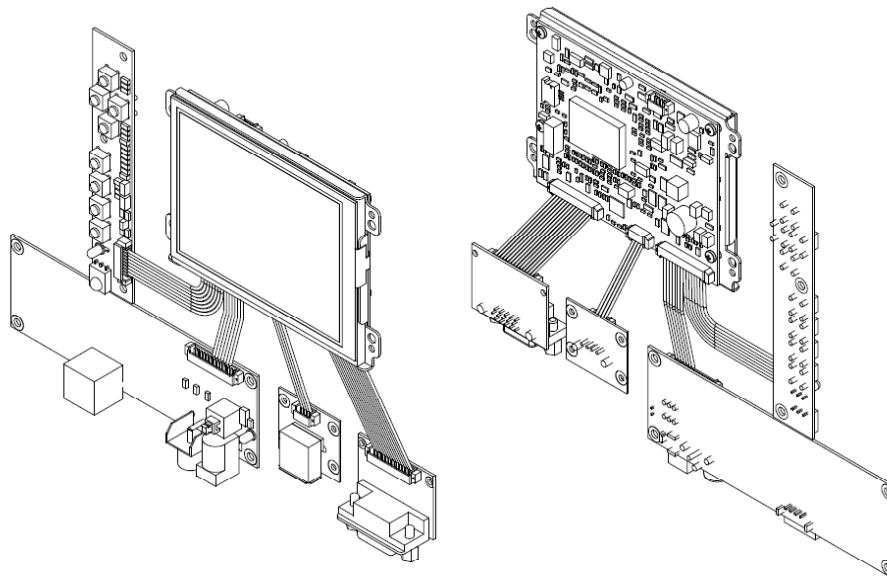


Parameter	LP035V2PT1-FHR	LP035V2PT1-FDR	Unit
CVBS	1	1	
S-Video	1	1	
VGA	D-Sub15	D-Sub15	
Key Board (LK08K00002-FDR)	⊙	⊙	
VGA Converter Board (LOCOVERTV2-FDR)	⊙	⊙	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	-	
Power Cord Plug Type A for USA (LAAC818000-FDR)	⊙	-	
Video Cable (LAVDO18000-FDR)	⊙	-	
S-Video Cable (LASVO18000-FDR)	⊙	-	
VGA Cable (LAVGA16000-FDR)	⊙	-	

Note: 1.The assembling of panel and bracket is aimed for delivery, packaging and experiment. If the demand of shockproof and longterm fix, pls have it into consideration of mechanism design.

5.4 Unit (CVBS/S-Video/PC/4W TSP)

Unit

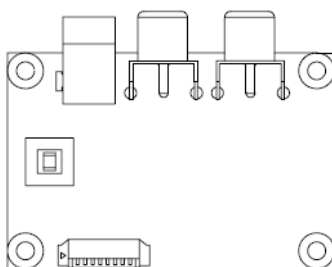


Parameter	LP035V2PT4-FHR	LP035V2PT5-FHR	LP035V2PT4-FDR	LP035V2PT5-FDR	Unit
CVBS	1	1	1	1	
S-Video	1	1	1	1	
VGA	D-Sub15	D-Sub15	D-Sub15	D-Sub15	
Touch Panel Type	4W Resistive	4W Resistive	4W Resistive	4W Resistive	
Touch Screen Interface	USB	RS232	USB	RS232	
Key Board (LK08K00002-FDR)	⊙	⊙	⊙	⊙	
VGA Converter Board (LOCOVERTV2-FDR)	⊙	⊙	⊙	⊙	
AC to DC Adapter 12V/2.5A (LASTD12025-FDR)	⊙	⊙	-	-	
Power Cord Plug Type A for USA (LAAC818000-FDR)	⊙	⊙	-	-	
Video Cable (LAVDO18000-FDR)	⊙	⊙	-	-	
S-Video Cable (LASVO18000-FDR)	⊙	⊙	-	-	
VGA Cable (LAVGA16000-FDR)	⊙	⊙	-	-	
USB Cable (LAUSB18000-FDR)	⊙	-	-	-	
RS-232 Cable (LARS218000-FDR)	-	⊙	-	-	
Touch Screen Driver CD Disk	⊙	⊙	⊙	⊙	

Note: 1.The assembling of panel and bracket is aimed for delivery, packaging and experient. If the demand of shockproof and longterm fix, pls have it into consideration of mechanism design.

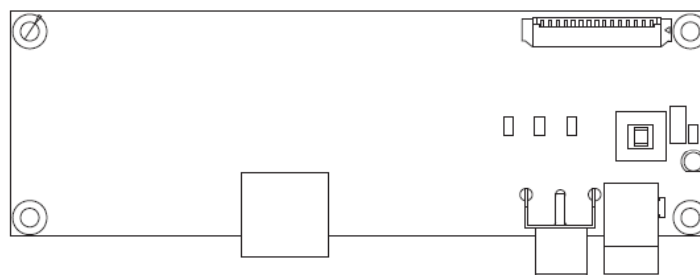
5.5 Demo Board (Option)

Demo Board



Order Part Number	Part Number	Remark
MDSM208001-FDR	Cable: 15P-9P-8P 1.25mm L:100mm	For LP035V2PB x -F x R

Demo Board

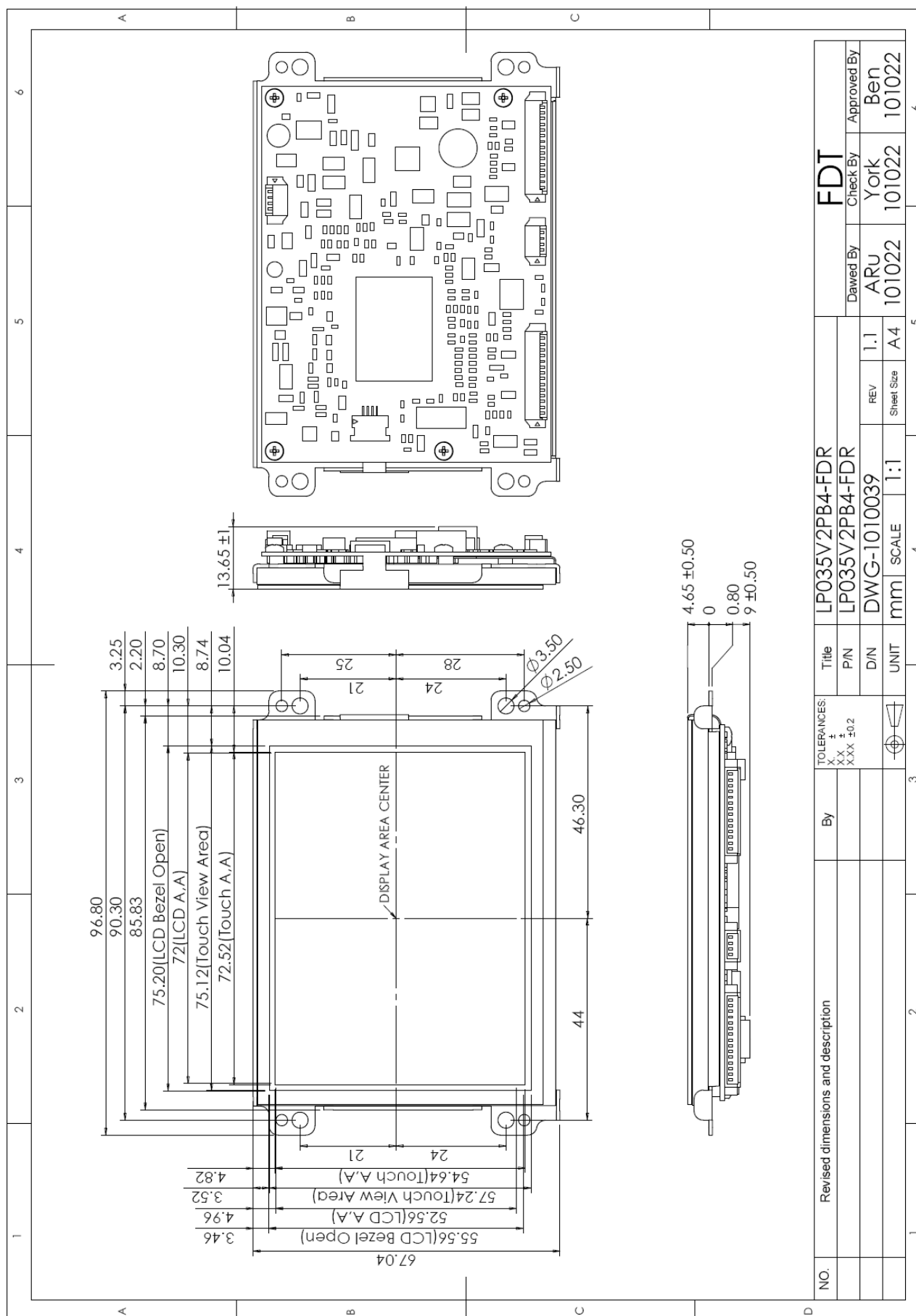


Order Part Number	Part Number	Remark
MDM20E1001-FDR	Cable: 15P-14P-9P 1.25mm L:100mm	For LP035V2PT x -F x R

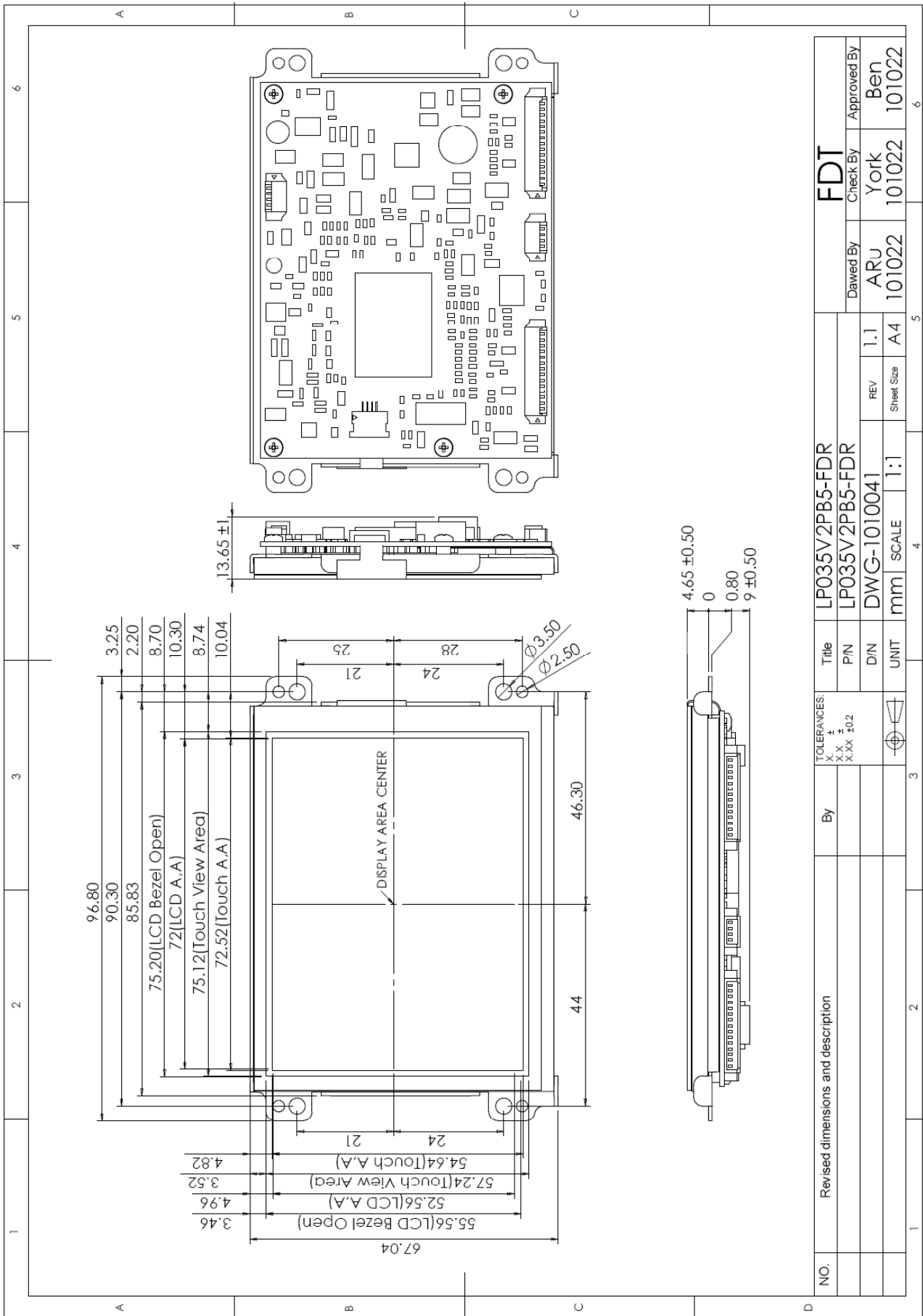
6.1 Unit (LP035V2PB1-FDR)



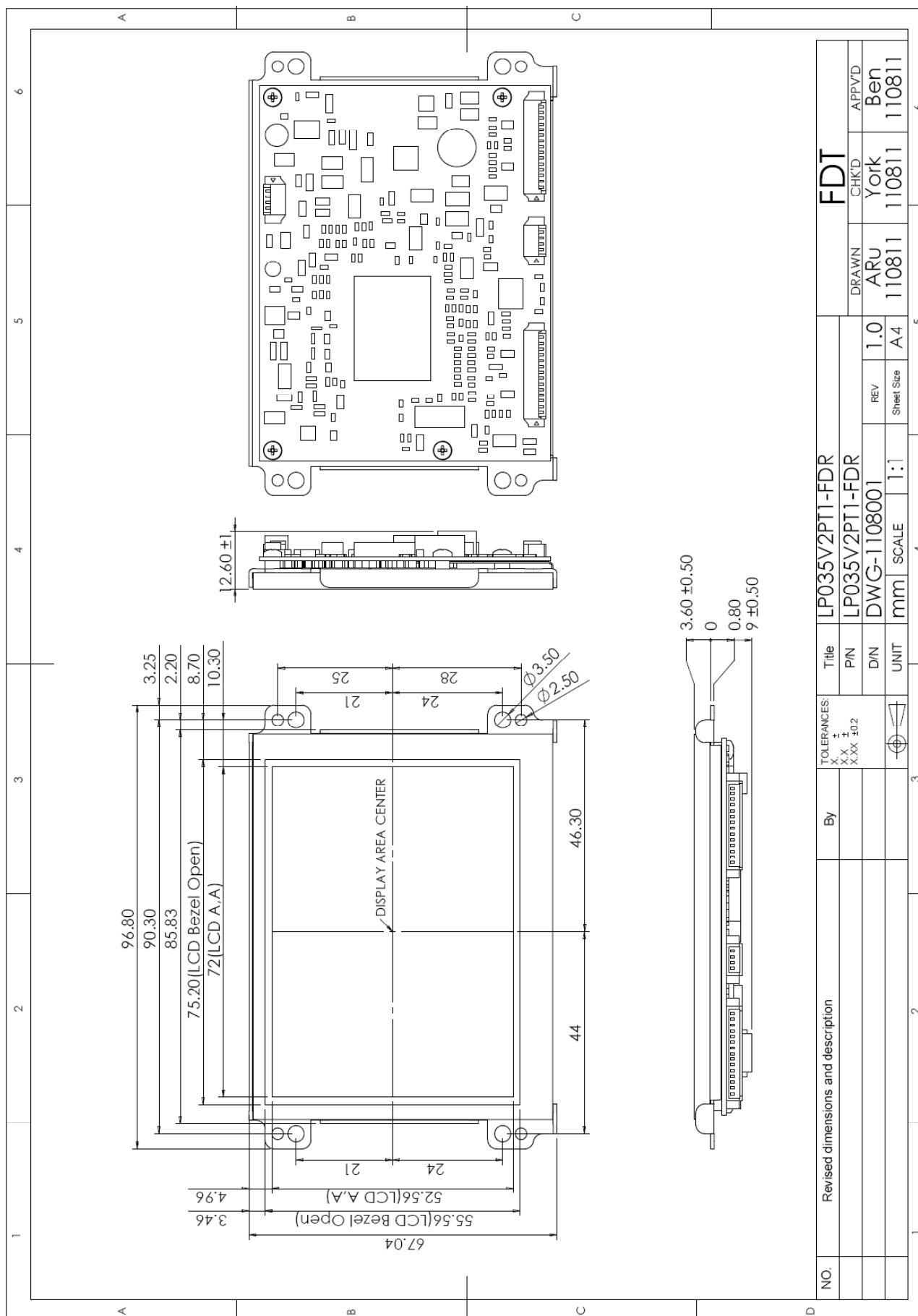
6.2 Unit (LP035V2PB4-FDR)



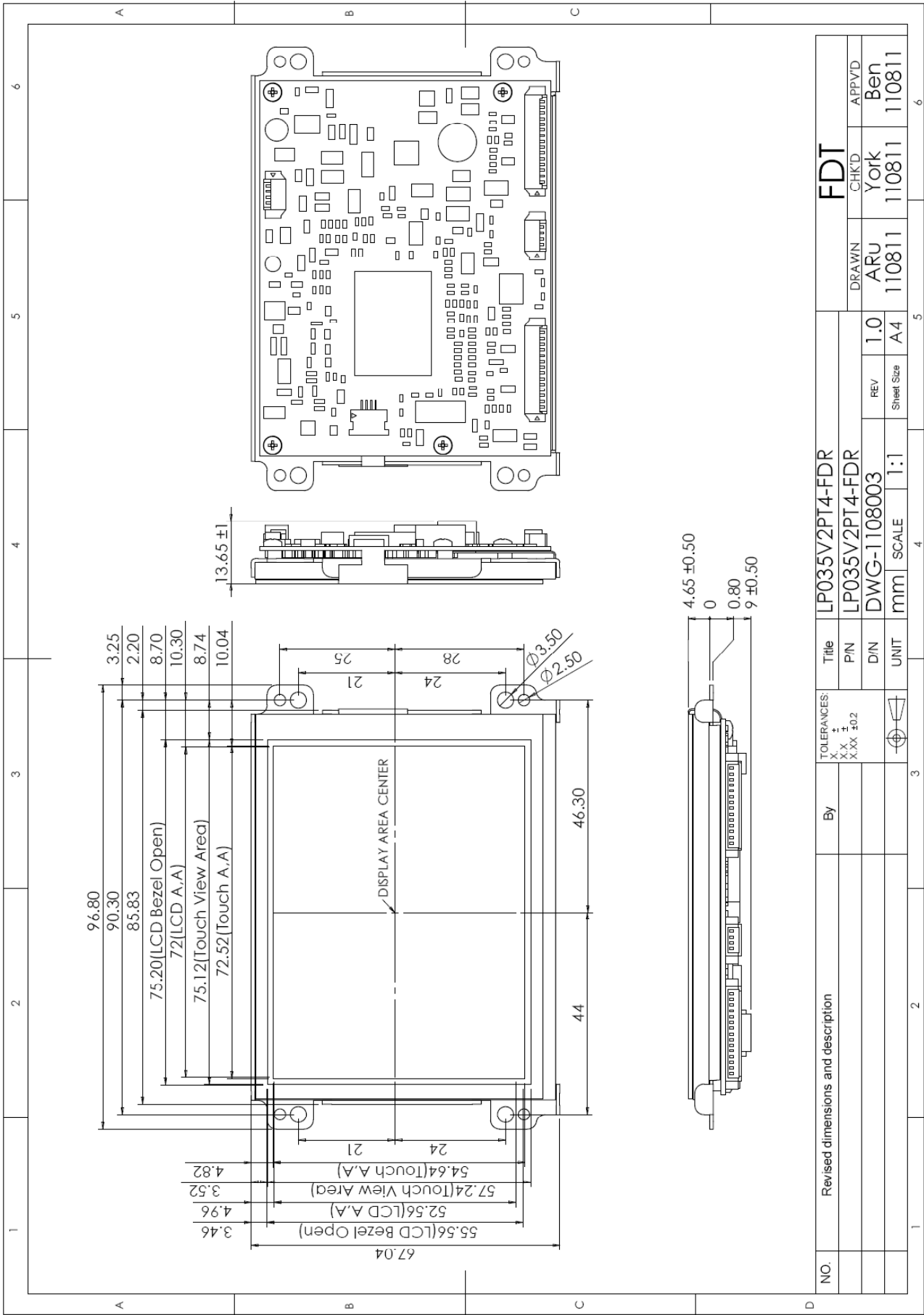
6.3 Unit (LP035V2PB5-FDR)



6.4 Unit (LP035V2PT1-FDR)



6.5 Unit (LP035V2PT4-FDR)



FDT	
DRAWN	CHK'D
ARU	York
110811	110811
Ben	110811

REV	1.0
Sheet Size	A4

LP035V2PT4-FDR	mm	SCALE	1:1
LP035V2PT4-FDR	mm	SCALE	1:1
DWG-1108003	mm	SCALE	1:1

UNIT	mm
UNIT	mm
UNIT	mm

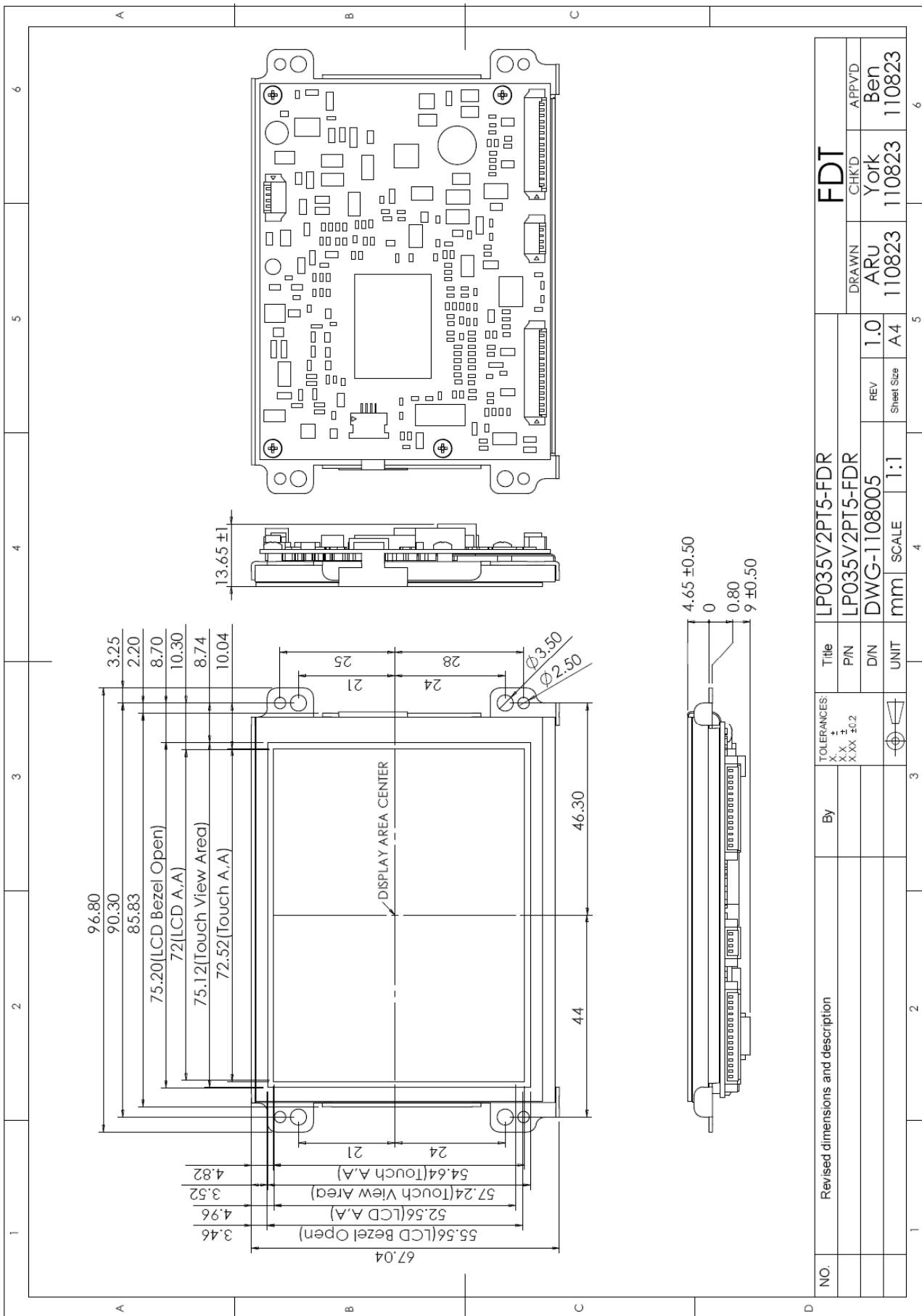
By	UNIT
By	UNIT
By	UNIT

Revised dimensions and description	UNIT
Revised dimensions and description	UNIT
Revised dimensions and description	UNIT

NO.	UNIT
NO.	UNIT
NO.	UNIT

NO.	UNIT
NO.	UNIT
NO.	UNIT

6.6 Unit (LP035V2PT5-FDR)



7.Pin Description

7.1 J105: LCD Panel I/O Terminal (FPC 0.5mm 50Pin, Up Contact Type)

Pin No	Symbol	I/O	Description	Remark
1	DIO1	I/O	Horizontal Start Pulse Signal Input Or Output 1	
2	VSS2	I	Ground	
3	VDD1	I	Power Supply	
4	CLK	I	Horizontal Shift Clock	
5	R/L	I	Left/Right Selection	
6	R0	I	Red Data (LSB)	
7	R1	I	Red Data	
8	R2	I	Red Data	
9	R3	I	Red Data	
10	R4	I	Red Data	
11	R5	I	Red Data (MSB)	
12	VSS2	I	Ground	
13	G0	I	Green Data (LSB)	
14	G1	I	Green Data	
15	G2	I	Green Data	
16	G3	I	Green Data	
17	G4	I	Green Data	
18	G5	I	Green Data (MSB)	
19	B0	I	Blue Data (LSB)	
20	B1	I	Blue Data	
21	B2	I	Blue Data	
22	B3	I	Blue Data	
23	B4	I	Blue Data	
24	B5	I	Blue Data (MSB)	
25	LD	I	Load Output Signal	
26	REV	I	Data Invert Control	
27	POL	I	Polarity Selection	
28	DIO2	I/O	Horizontal Start Pulse Signal Input Or Output	
29	VSS2	I	Ground	
30	V3	I	Gamma Voltage 3	
31	V5	I	Gamma Voltage 5	
32	V7	I	Gamma Voltage 7	
33	V8	I	Gamma Voltage 8	
34	V10	I	Gamma Voltage 10	
35	V12	I	Gamma Voltage 12	
36	VSS2	I	Ground	
37	VDD2	I	Voltage For Analog Circuit	

Pin No	Symbol	I/O	Description	Remark
38	VCOM	I	Common Voltage	
39	OE	I	Output Enable	
40	U/D	I	Up/Down Selection	
41	CKV	I	Vertical Shift Clock	
42	STVU	I/O	Vertical Shift Pulse Signal Input Or Output	
43	STVD	I/O	Vertical Shift Pulse Signal Input Or Output	
44	VGG	I	Gate On Voltage	
45	VSS1	I	Ground	
46	VCC	I	Voltage For Logic Circuit	
47	VEE	I	Gate Off Voltage	
48	VLED	-	Supply Voltage For LED Backlight	
49	GLD2	-	Ground For LED Backlight	
50	GLD1	-	Ground For LED Backlight	

7.2 J101: Pin Assignment of Signal Input (Pitch 1.25mm 15Pin, Side Entry Type)

※ FDT Connector Part No.: MS240115R (STM) [Same as 53261-1519 (MOLEX)];
FDT Matching Connector Part No.: P240115 (STM) [Same as 51021-1500 (MOLEX)].

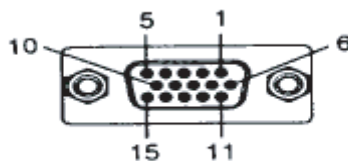
Pin No	Symbol	I/O	Description	Remark
1	DC-IN	-	DC Input Voltage	
2	GND_D	-	Power Ground	
3	GND_A	-	Signal Ground	
4	VIDEO1 / Y	I	VIDEO1 Signal Input Or Analog Luma Input of S-Video	
5	VIDEO2	I	VIDEO2 Signal Input	
6	GND_A	-	Signal Ground	
7	CA/B	I	Analog Chroma Input for S-Video	
8	GND_A	-	Signal Ground	
9	VDD	-	VDD Output Voltage	
10	KEY_ADC1	I	KEY ADC Input 1	
11	KEY_ADC0	I	KEY ADC Input 0	
12	LED_G	O	Index Green LED For Power On Control	
13	LED_R	O	Index Red LED For Power Off Control	
14	IR_DATA	I	Data of IR Receiver	
15	GND_A	-	Signal Ground	

7.3 J102: Pin Assignment of Analog RGB Input (Pitch 1.25mm 14Pin, Side Entry Type)

※ FDT Connector Part No.: MS240114R (STM) [Same as 53261-1419 (MOLEX)];

FDT Matching Connector Part No.: P240114 (STM) [Same as 51021-1400 (MOLEX)].

Pin No	Symbol	I/O	Description	Remark
1	VGA-Det	I	VGA Detect	
2	NC	-	No Connect	
3	NC	-	No Connect	
4	GND	-	Ground	
5	VGA5V	-	VGA +5V Input	
6	VS_IN	I	TTL Vertical sync.	
7	HS_IN	I	TTL Horizontal sync.	
8	AGND	-	Analog Ground	
9	RI+	I	Analog Red Signal	
10	AGND	-	Analog Ground	
11	GI+	I	Analog Green Signal	
12	AGND	-	Analog Ground	
13	BI+	I	Analog Blue Signal	
14	GND	-	Ground	



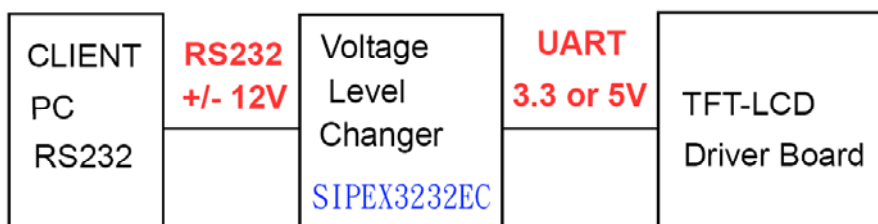
7.4 J301: Pin Assignment of UART (Pitch 1.25mm 4Pin, Side Entry Type)

※ FDT Connector Part No.: MS24014R (STM) [Same as 53261-0419 (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	+5VA	O	+5V Output Voltage	

Note: About UART command list please contact FDT sales.



7.5 J401B : Pin Assignment of Touch (Pitch 1.25mm 5Pin, Side Entry Type)(Option)

※ FDT Connector Part No.: MS24015R (STM) [Same as 53261-0519 (MOLEX)];

FDT Matching Connector Part No.: P24015 (STM) [Same as 51021-0500 (MOLEX)].

Pin No	Symbol	I/O	Description	Remark
1	VBUS	-	USB VCC	
2	D- / TXD	-	DATA (-) / Receive Data	
3	D+ / TXD	-	DATA (+) / Transmit Data	
4	DGND	-	Digital Ground	
5	NC	-	No Connect	

Note: For LP035V2Px4-FxR (USB) & LP035V2Px5-FxR (RS232)

8 Absolute Maximum Ratings

8.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Remark
Input Voltage	Vcc	+9	+15	V	
Digital Input Signal	TTL	0.3	3.6	V	
Operating Temperature		-20	+70	°C	
Storage Temperature		-20	+70	°C	
Operating Temperature With TSP		-10	+60	°C	
Storage Temperature With TSP		-20	+70	°C	

9. Recommended Operating Conditions

9.1 Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note
Input Voltage	Vin	+10	+12	+14	V	
Input Current Without TSP	Iin(+12V)		190		mA	±15%
Input Current With TSP	Iin(+12V)		200		mA	±15%
Output Voltage	VDD	+3.2	+3.3	3.4	V	I=10mA
Digital Input Signal	TTL		3.3			
Power Consumption Without TSP			2.28		W	@+12v
Power Consumption With TSP			2.4		W	@+12v
Signal input Voltage	Video in		1		Vp-p	@75Ω
VGA Input Format			640*480			

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 LED Backlight Data

Parameter	Symbol	Min	Type	Max	Unit	Remark
Supply Voltage For LED Backlight	VLED	-	-	11.4	Vrms	
Supply Current For LED Backlight	ILED	-	20	-	mA	
Backlight Power Consumption	PLED	-	-	456	mW	

10.4W Resistive Touch Panel Characteristics

10.1 Mechanical Performance

Parameter	Specifications
Input Method	Finger or stylus pen
Operating Force	Max: 50gf
Surface Hardness	3H or more

10.2 Pin assignment (Pitch: 1.0 mm)

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

10.3 Electrical Performance

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Terminal Resistance	X	200	-	900	Ω	
	Y	200	-	900	Ω	
Input Voltage	VT	3	-	7.0	V	
Linearity		-	-	1.5	%	
Insulation Impedance		20	-	-	MΩ	DC 25V

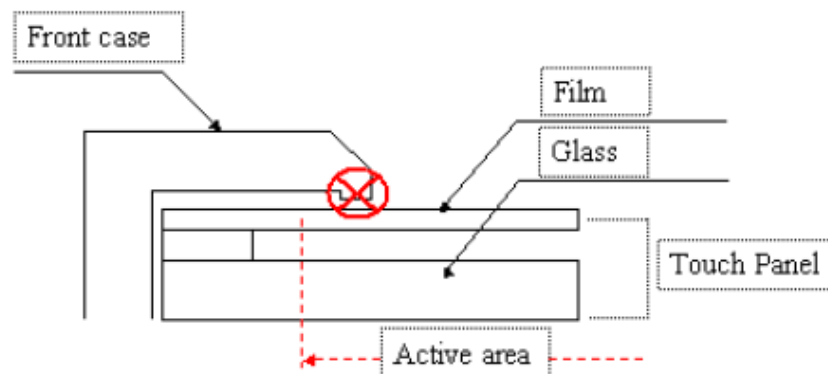
10.4 Optical Performance

Parameter	Specifications
Transmittance	$\geq 80\%$ Typ.

10.5 Touch Screen Integration Design Guide

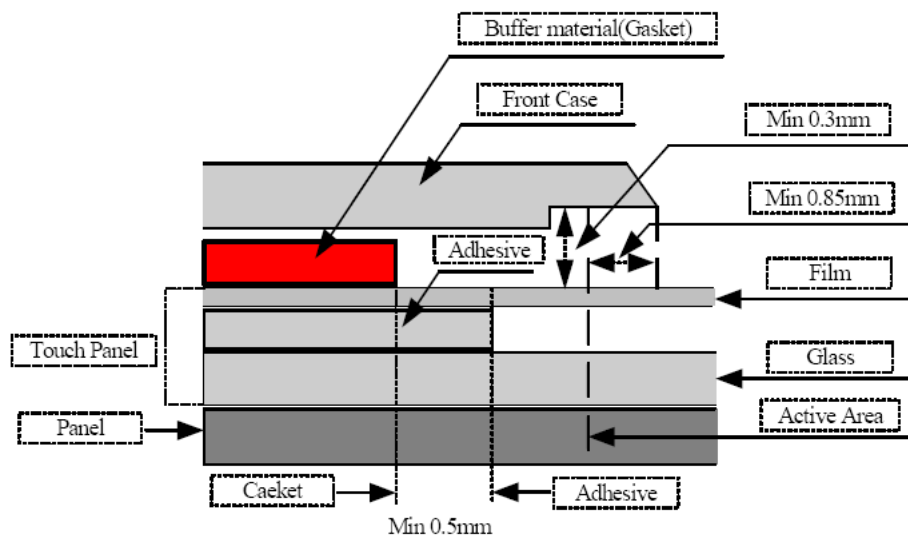
Avoid the design that Front-case overlap and press on the active area of the touch-panel.

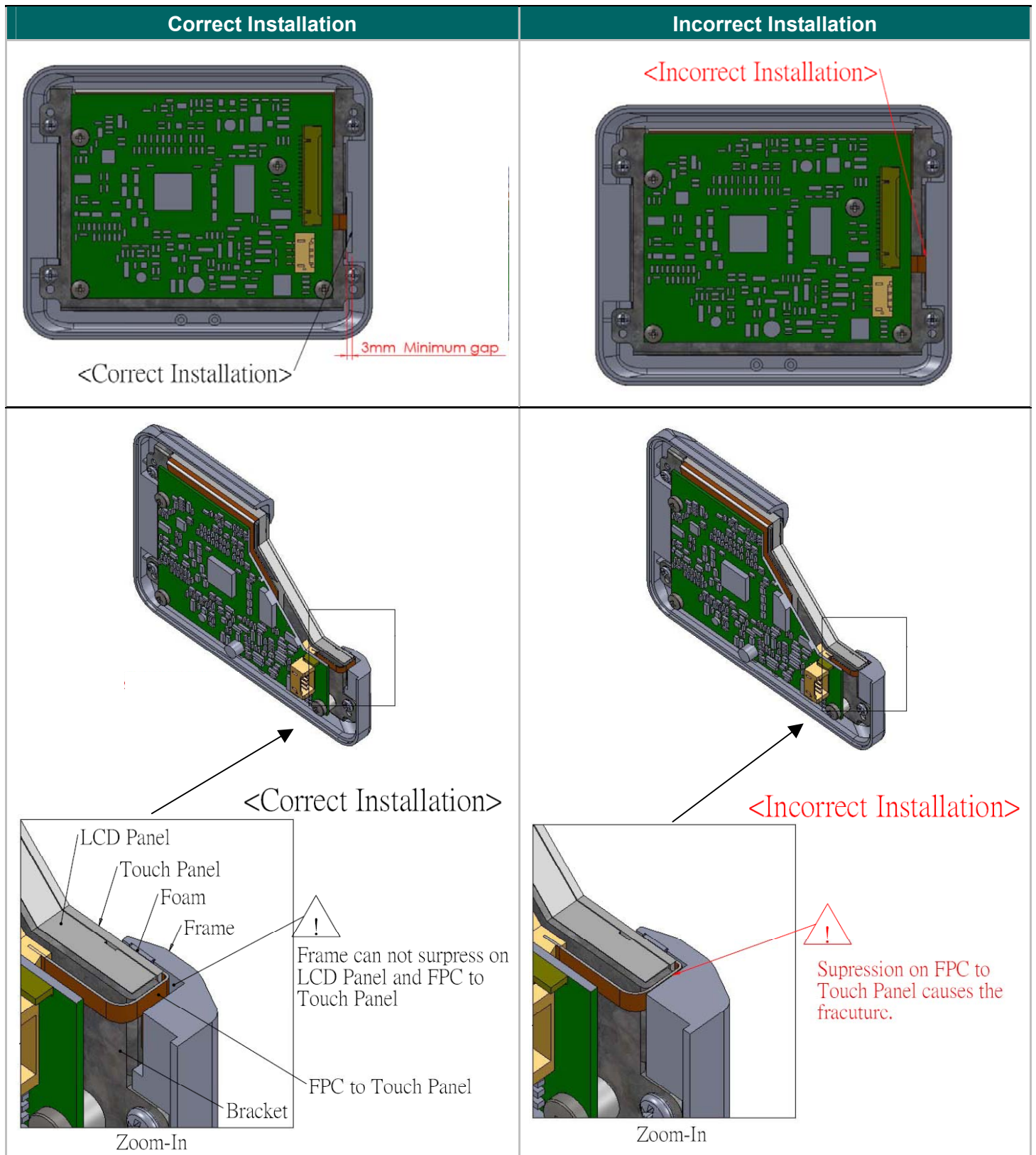
Give enough gap (over 0.5mm at compressed) between the front case and touch-panel to protect wrong operating.



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

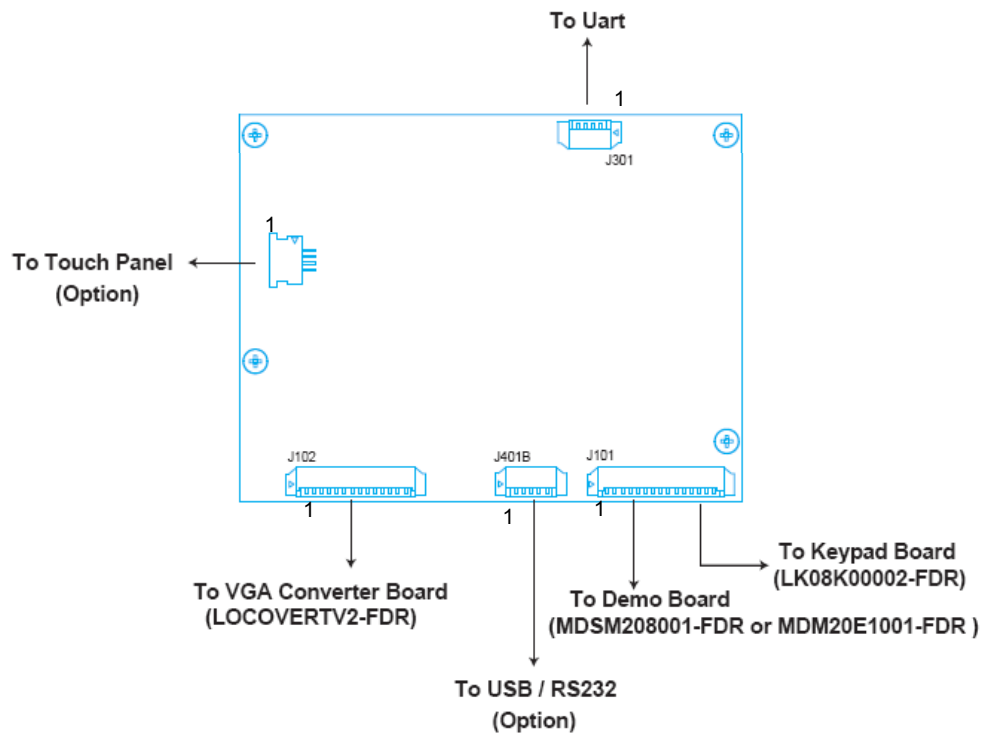
Avoid the design that buffer material overlap and press on the inside of touch-panel viewing area.



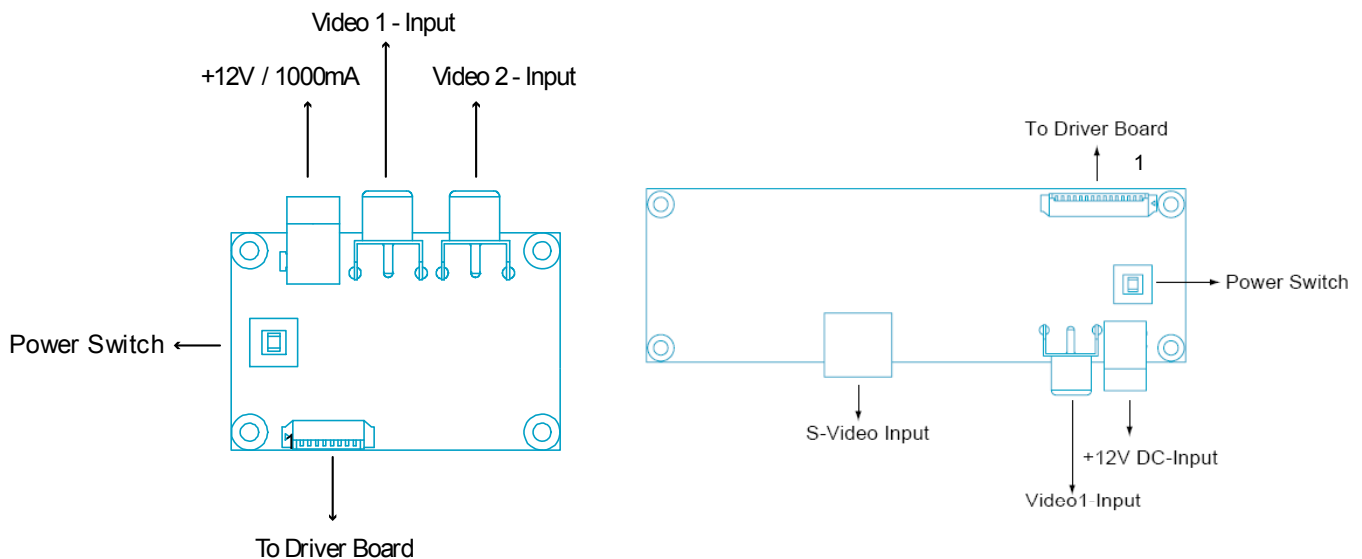


11. Operation Manual / Connection

11.1 Driver Board Manual



11.2 Demo Board Manual (Option)



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. LASVO18000-FDR



E. LAVGA16000-FDR



F. LAUSB18000-FDR



G. LARS218000-FDR



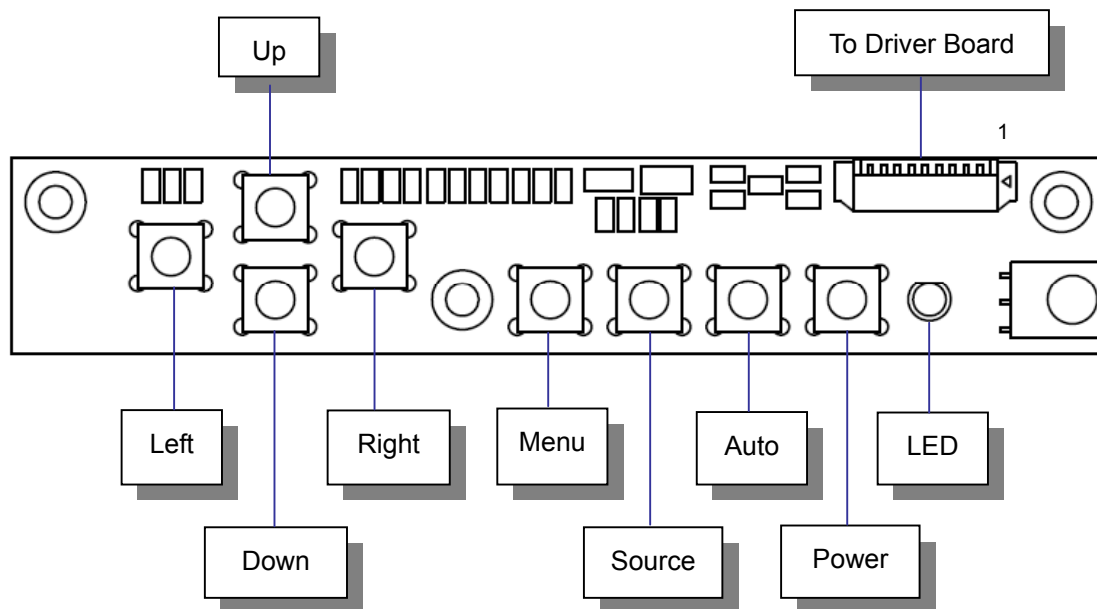
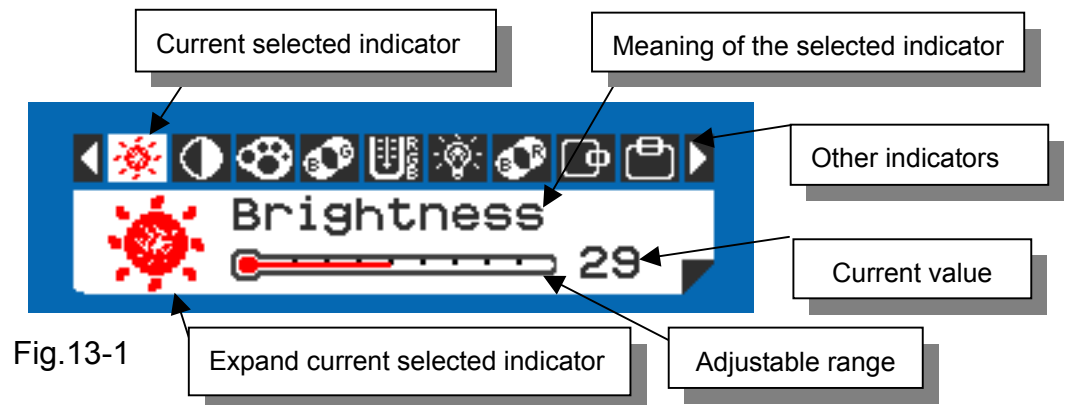
H. Touch Screen Driver CD Disk

- A. AC to DC Adapter (100-240VAC 50-60Hz to +12VDC @ 2.5A)
- B. Power Cord (L: 1800mm, Plug Type A for USA)
- C. Video Cable (L: 1800mm)
- D. S-Video Cable (L: 1800mm)
- E. VGA Cable (L: 1600mm)
- F. USB Cable (L: 1800mm)
- G. RS-232 Cable (L: 1800mm)
- H. 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 :

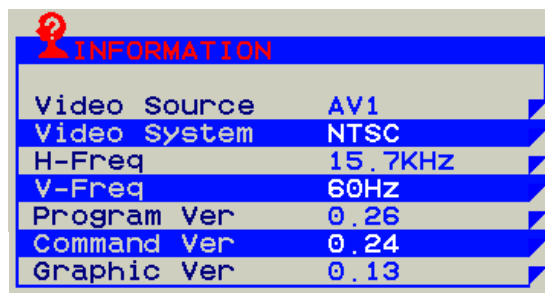
1. To navigate the menu, press [MENU]. (Fig.13-1)
2. The indicator lighting up in white color is the selected adjustment item.
3. To Next Item of the menu, press [UP] / [DOWN] again.
4. The operations below are only available when "Menu" is started.
5. Press [LEFT] / [RIGHT] to adjust the value of the selected item.

Overview of the menu :

Firmware Version must be $\geq$ VER 0.26

Indicator	Meaning	Adjustable range	For	Remark
	Brightness	0 ~ 64	AV / S-Video / VGA	Adjust-Bar
	Contrast	0 ~ 64	AV / S-Video / VGA	Adjust-Bar
	Color	0 ~ 64	AV / S-Video	Adjust-Bar
	Tint	0 ~ 32	AV / S-Video	Adjust-Bar
	Sharpness	0 ~ 16	AV / S-Video	Adjust-Bar
	Dimmer	0 ~ 9	AV / S-Video / VGA	
	Color Tone	Normal / Warm / Cool	AV / S-Video / VGA	
	Mirror	OFF / ON	AV / S-Video / VGA	
	Flip	OFF / ON	AV / S-Video / VGA	
	H-Position	-25 ~ +25	AV / S-Video / VGA	Balance-Bar
	V-Position	-10 ~ +10	AV / S-Video / VGA	Balance-Bar
	Auto		VGA	
	Scan	Over Scan / Under Scan	AV / S-Video	
	Information		AV / S-Video / VGA	Fig.13-2
	Setup		AV / S-Video / VGA	Fig.13-3
	Factory Set		AV / S-Video / VGA	
	Exit		AV / S-Video / 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.

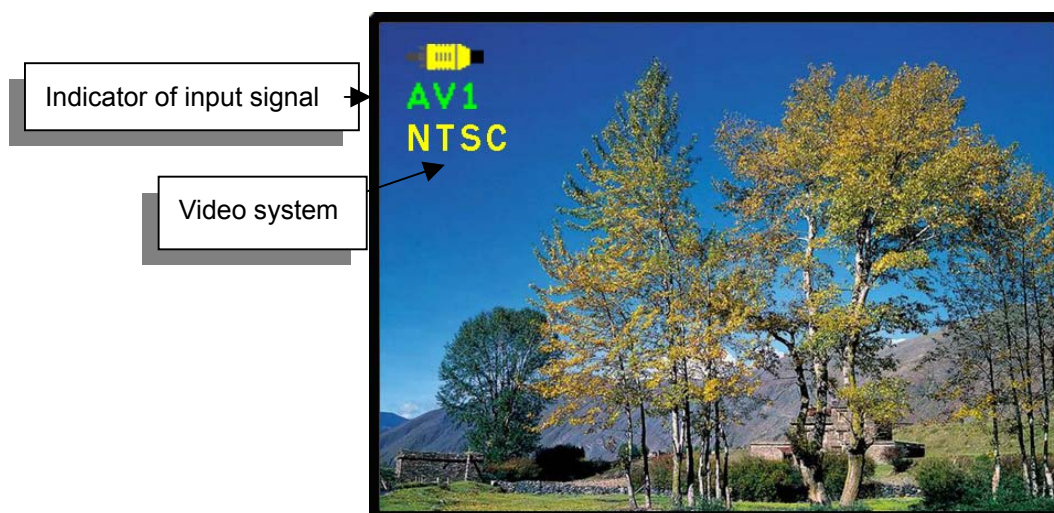


Fig.13-4

[Power] : Monitor power on / off

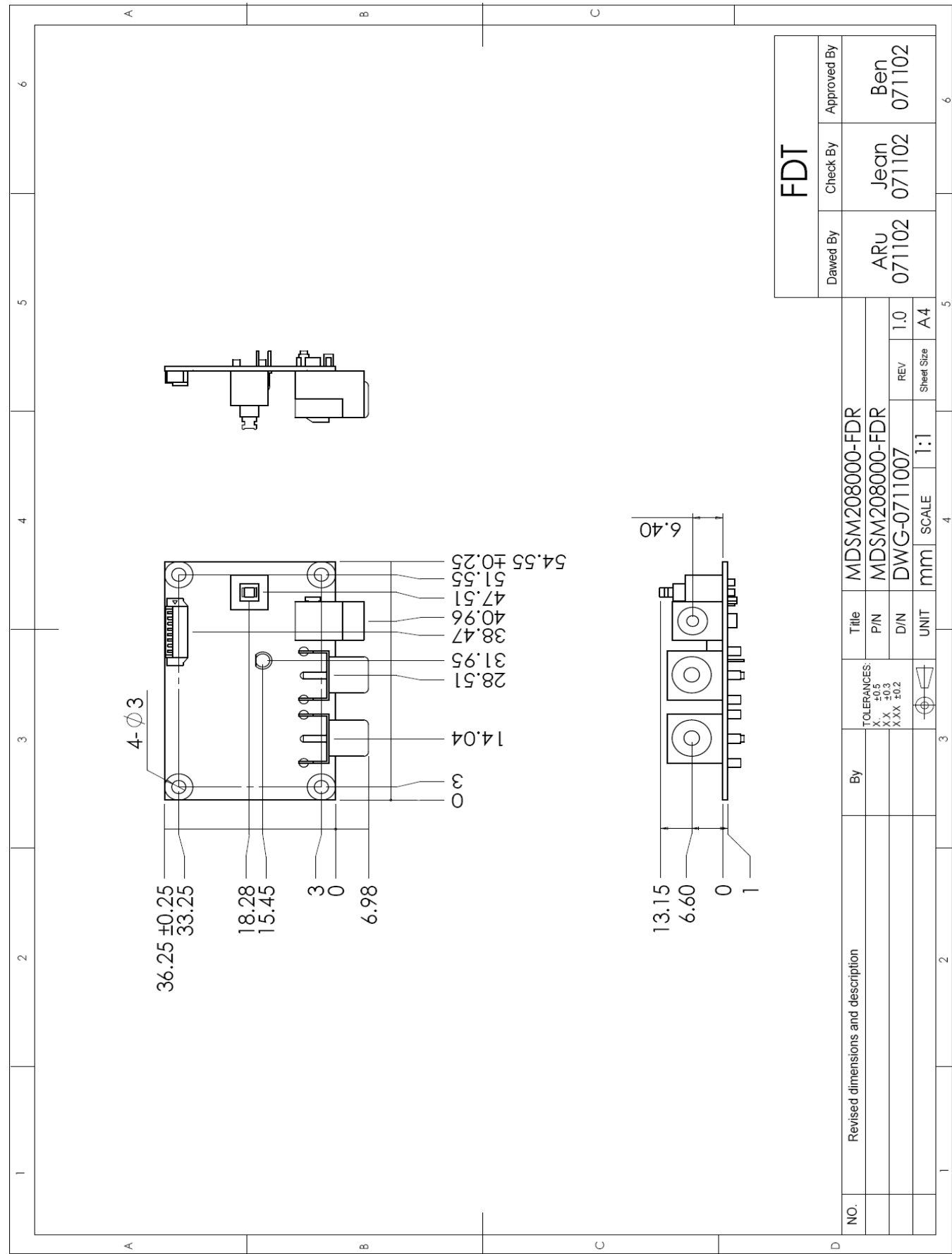
[Source] : Input signal switch

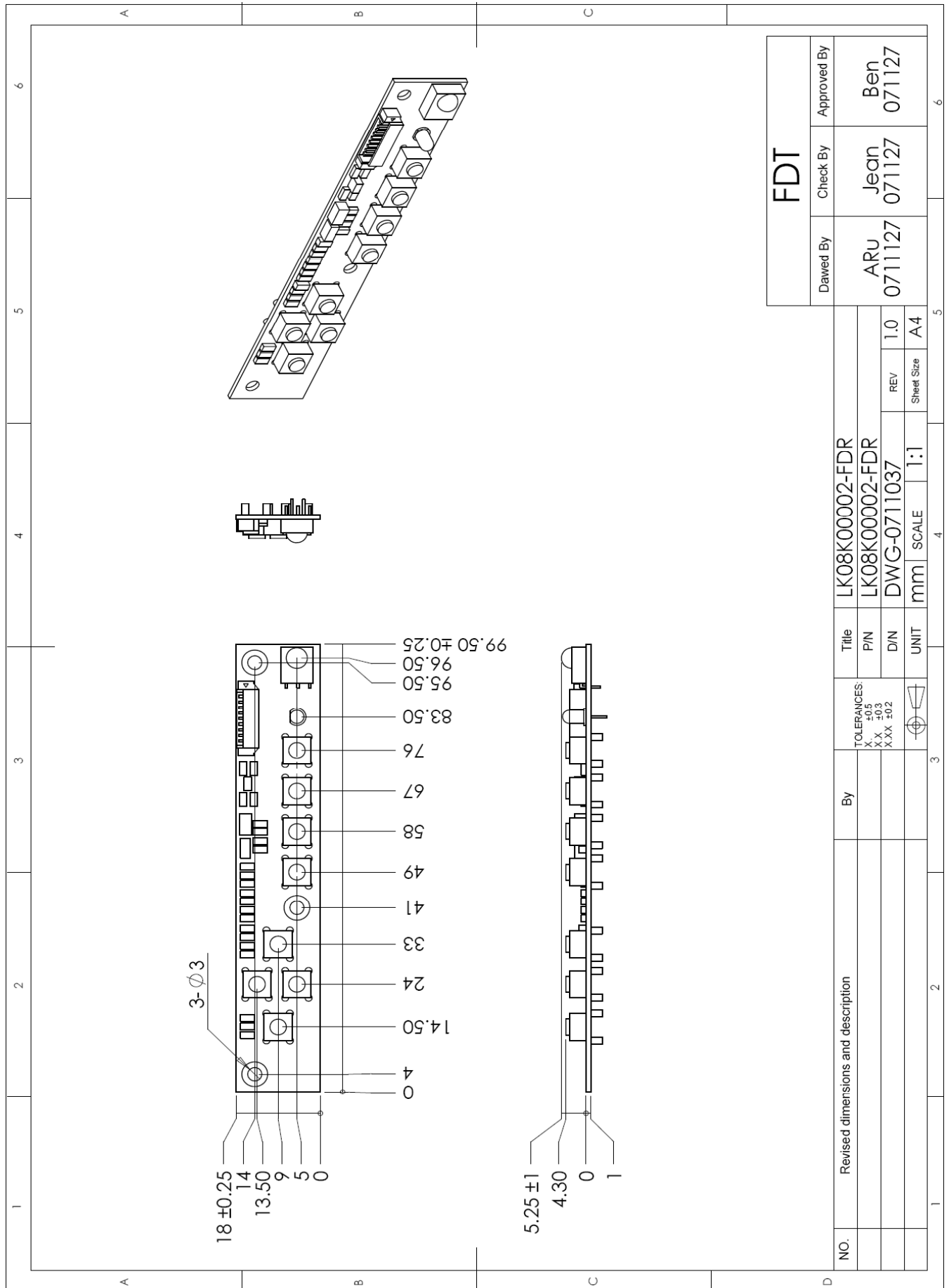
Overview of input signals :

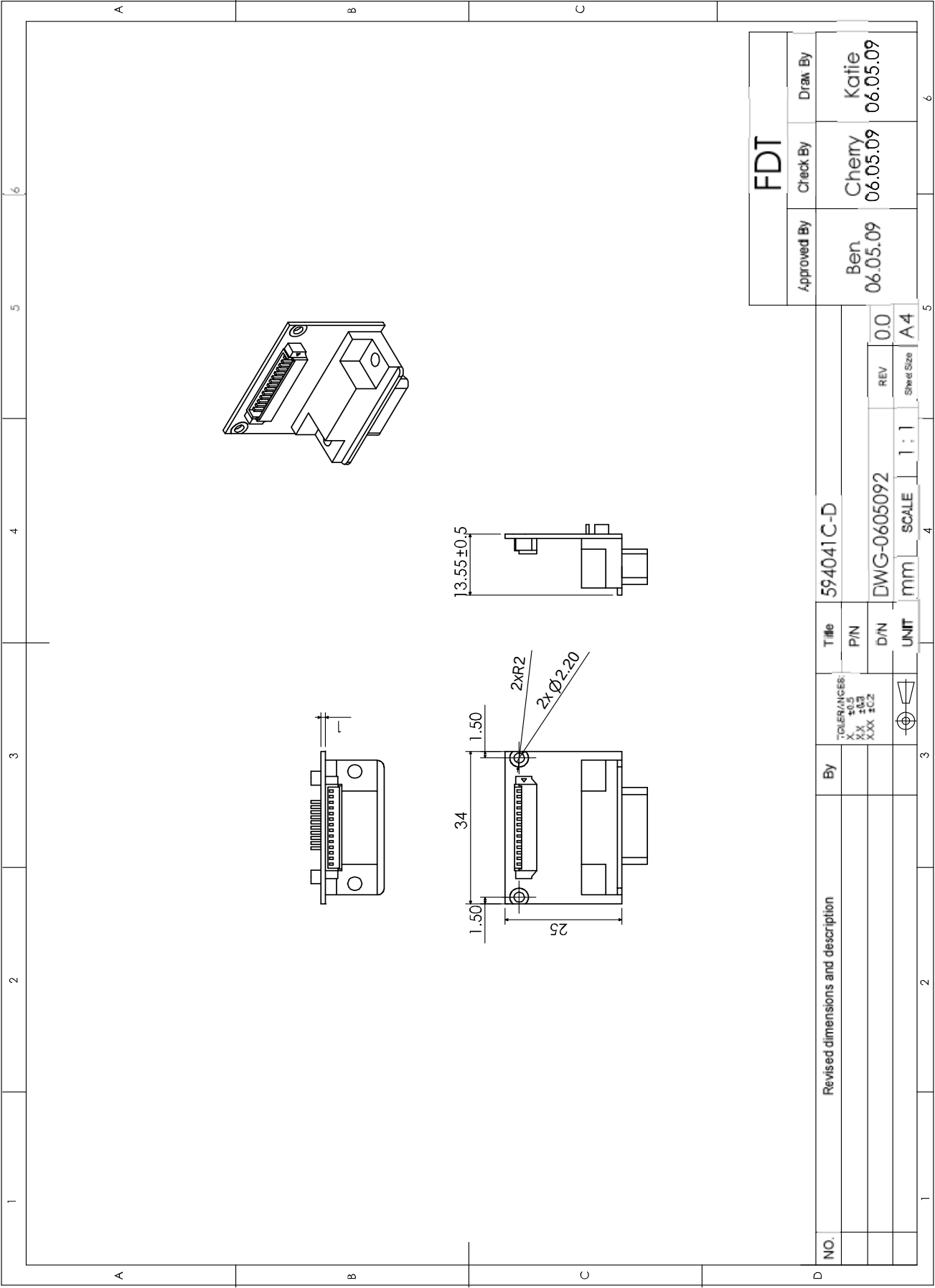
Indicator	Input signal	Interface	Video system
	AV1	Composite	NTSC / PAL / SECAM
	AV2	Composite	NTSC / PAL / SECAM
	S-Video1	Y/C	NTSC / PAL / SECAM
	VGA	Analog RGB	640x480_60 / 800x600_60 / 1024x768_60

15. Accessory

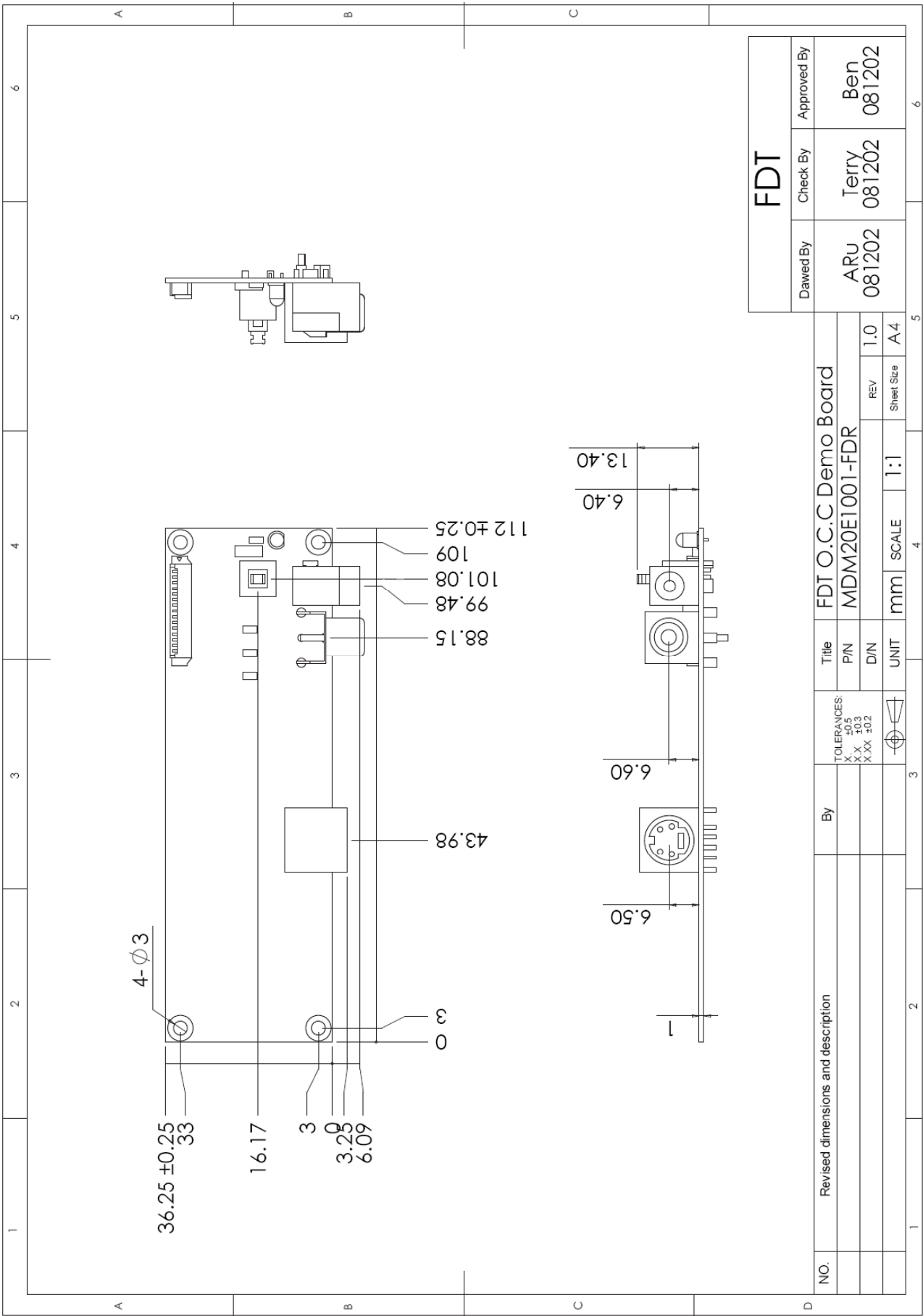
15.1 MDSM208001-FDR (Option)



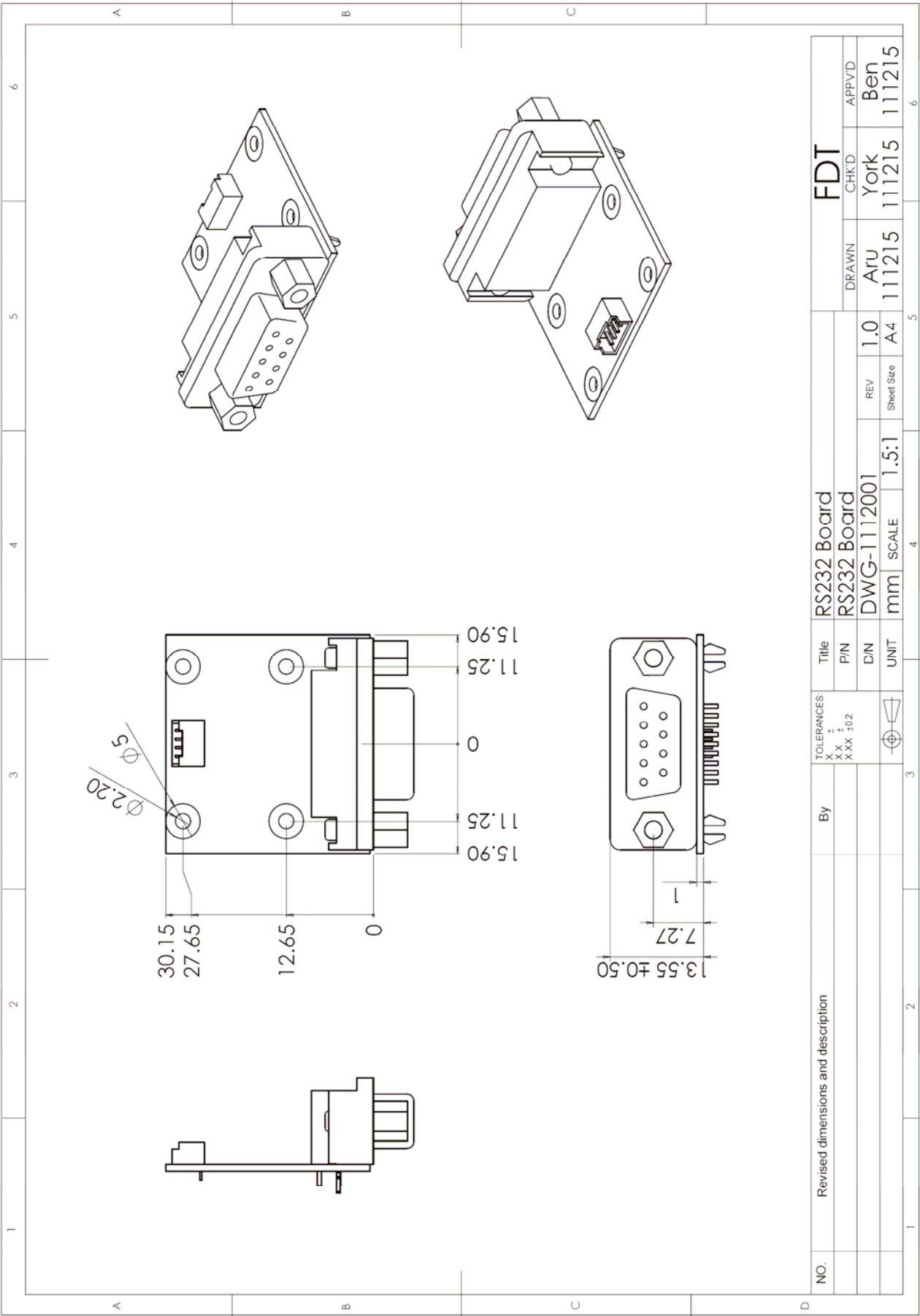




15.4 MDM20E1001-FDR (Option)



15.5 RS232 Board (Option)



15.6 USB Board (Option)

