FLAT DISPLAY TECHNOLOGY

This product is RoHS compliant

§ SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No:	Lx035XLPSx-FDR
Description:	3.5” Color TFT-LCD Interface Module
SPEC No.:	SAS-0705005
Version:	2.4
Issue Date:	May 05,2014

※ **This approval sheet contains 17 pages including the cover and appendix.**

Customer: **Date:** / / 14	**APPROVED BY:**

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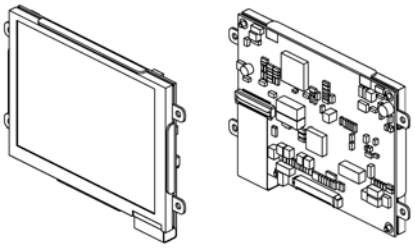
FLAT DISPLAY TECHNOLOGY

3.5” TFT-LCD Analog Interface Module



- **Lx035XLPS0- FDR**
- **Lx035XLPS1- FDR**
- **Lx035XLPS2- FDR**
- **Lx035XLPS3- FDR**

1. General Description

1.1 Features

- 3.5” Color TFT-LCD Panel
- Ultra Compact
- DC/DC, LED Driver ,Video Decoder All In One
- NTSC/PAL Video input Switch
- 4:3 Screen Mode
- Up/Down Reverse Screen
- Left/Right Reverse Screen
- Composite Video / RGB Mode Switchable
- Single Operation Voltage +12V
- Single Operation Voltage +5V

1.2 Applications

- Security
- Video Game
- Door Phone
- Video Phone
- Portable TV
- 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
- Communications 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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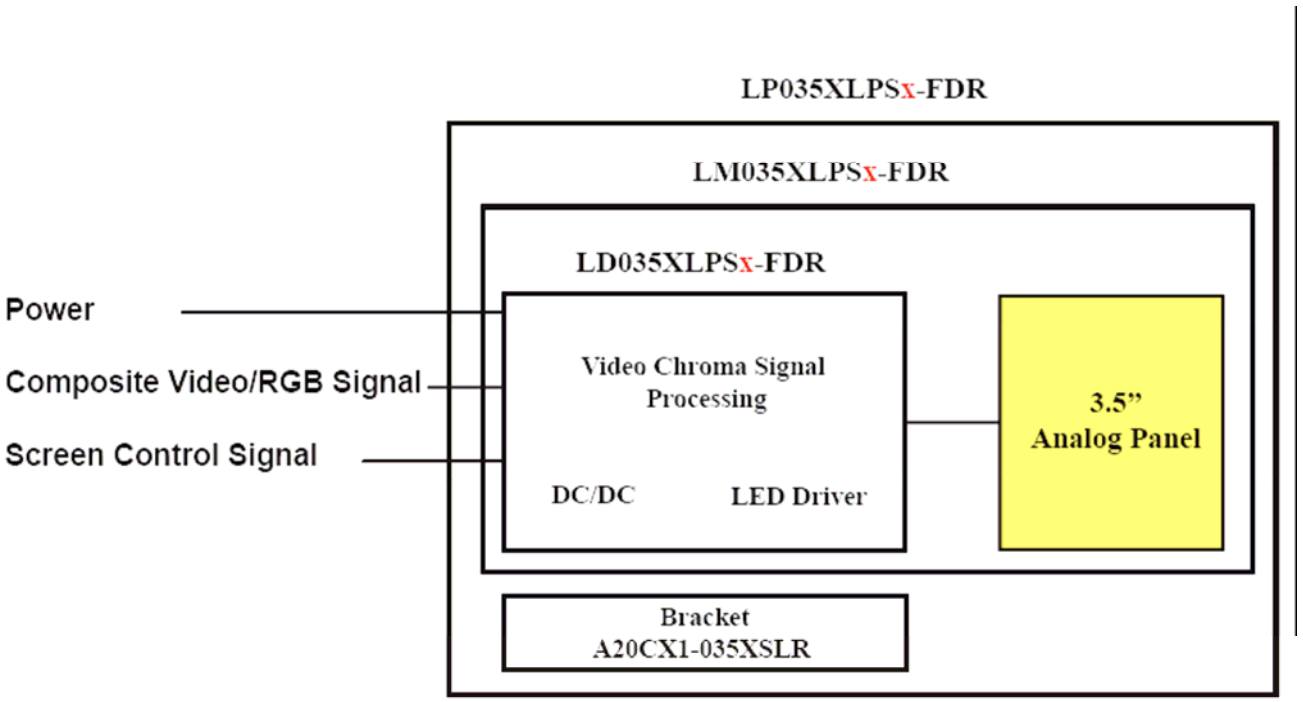
3. Block Diagram

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	320 x (RGB) x 234	dot
Active Area	71.6(H) x 52.65(V)	mm
Pixel Pitch	0.2235 (H) x 0.225 (V)	mm
Pixel Configuration	Delta	
Outline Dimension	83.5 (W) x 63.1 (H) x 3.6 (D)	mm
Weight	32±5	g
Surface Treatment	Anti-Glare	

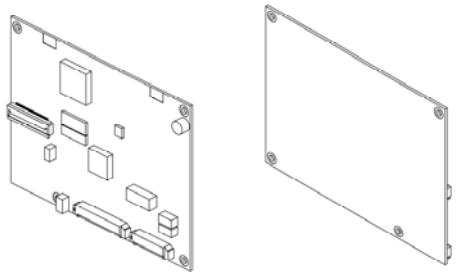
4.2 TFT-LCD Optical Characteristics

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Left	CR≧10	45	50	-	deg	
		Right		45	50	-	deg	
	Vertical	Top		10	15	-	deg	
		Bottom		30	35	-	deg	
Contrast Ratio		CR	At optimized Viewing angle	200	350	-		
Response time	Rise Fall	Tr	Θ = 0°	-	15	30	ms	
		Tf		-	25	50	ms	
Uniformity		U	9 point	70	75		%	
Brightness			Θ = 0°	200	250		Cd/㎡	
White Chromaticity		x	Θ = 0°	0.28	0.31	0.34		
		y	Θ = 0°	0.30	0.33	0.36		
LED Life Time			Ta=25°C, 20mA	-	30000	-	Hr	

5. Order Information

5.1 Driver Board

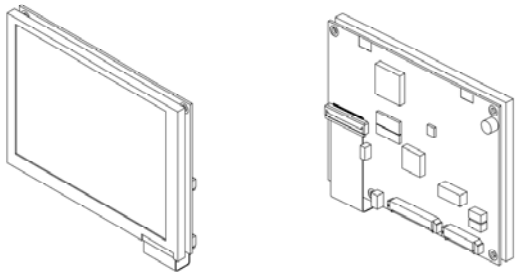
Driver Board



Order Part Number	NTSC/PAL	Master RGB Mode	Slave RGB Mode	Input +12V	Input +5V
LD035XLPS0-FDR	◎				◎
LD035XLPS1-FDR	◎			◎	
LD035XLPS2-FDR	◎	◎			◎
LD035XLPS3-FDR	◎	◎		◎	

5.2 Module

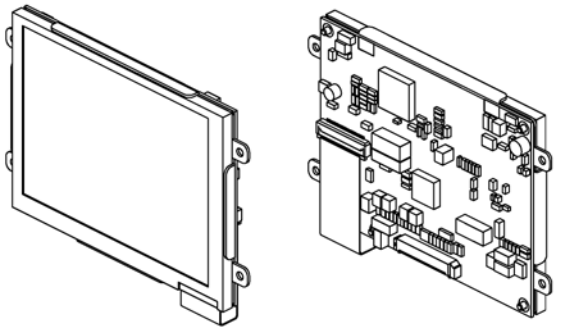
Module Board



Order Part Number	NTSC/PAL	Master RGB Mode	Slave RGB Mode	Input +12V	Input +5V
LM035XLPS0-FDR	◎				◎
LM035XLPS1-FDR	◎			◎	
LM035XLPS2-FDR	◎	◎			◎
LM035XLPS3-FDR	◎	◎		◎	

5.3 Unit

Unit

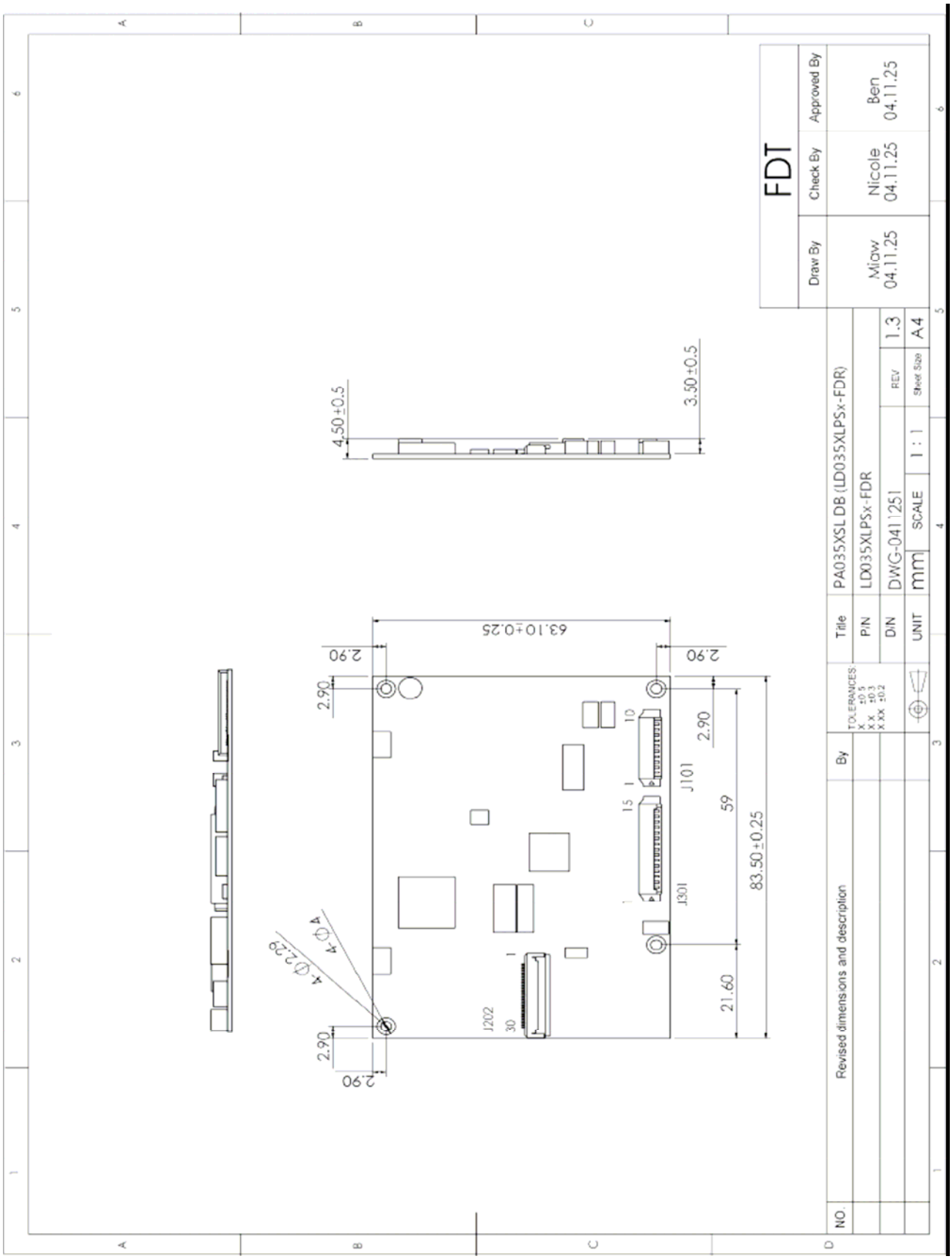


Order Part Number	NTSC/ PAL	Master RGB Mode	Slave RGB Mode	Input +12V	Input +5V	Bracket A20CX1-035XSLR
LP035XLPS0-FDR	◎				◎	◎
LP035XLPS1-FDR	◎			◎		◎
LP035XLPS2-FDR	◎	◎			◎	◎
LP035XLPS3-FDR	◎	◎		◎		◎

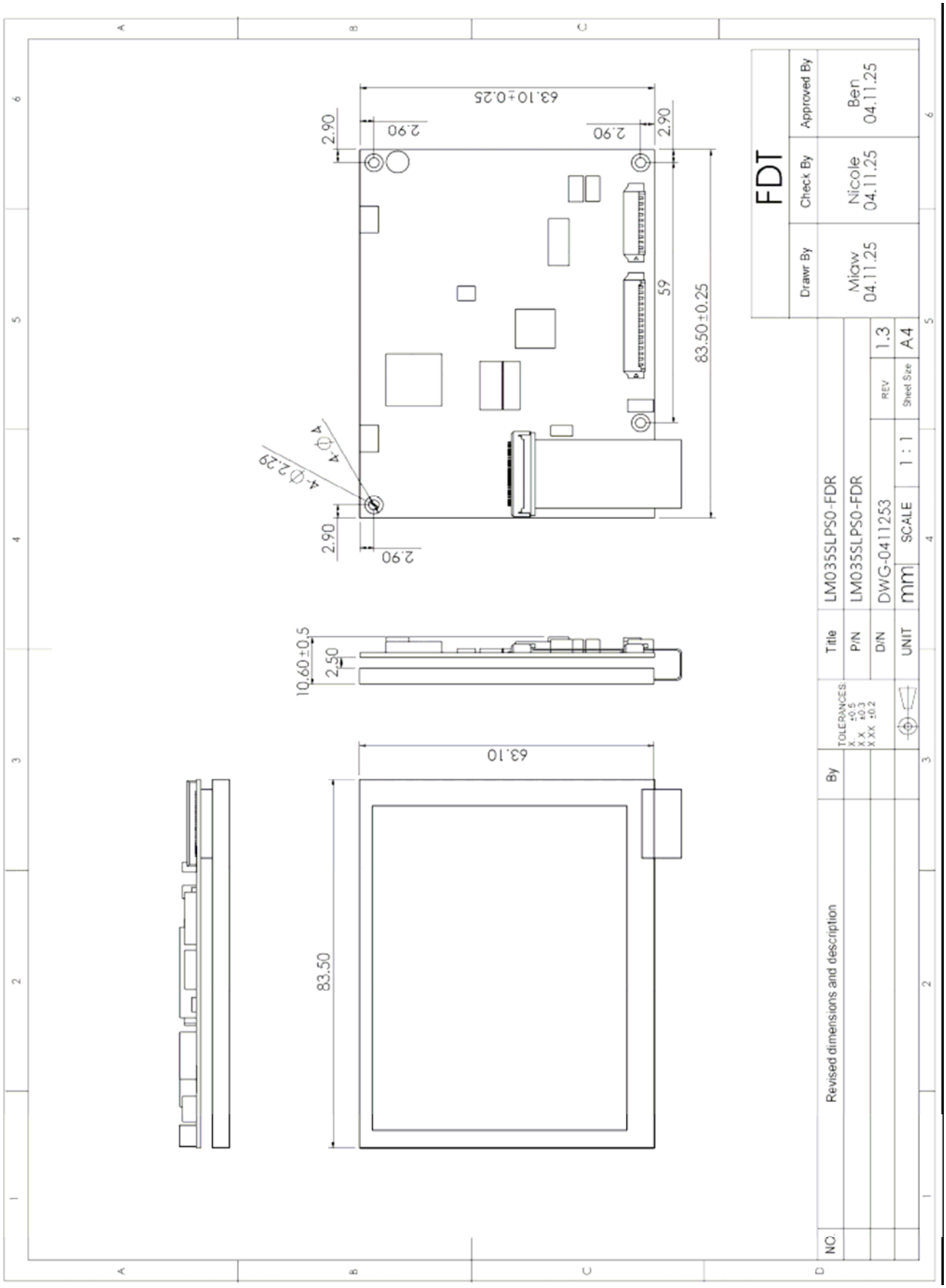
Note: The assembling of panel and bracket is aimed for delivery, packaging and experiment. If the demand of shockproof and long-term fix, pls. have it into consideration of mechanism design.

6. Size Information

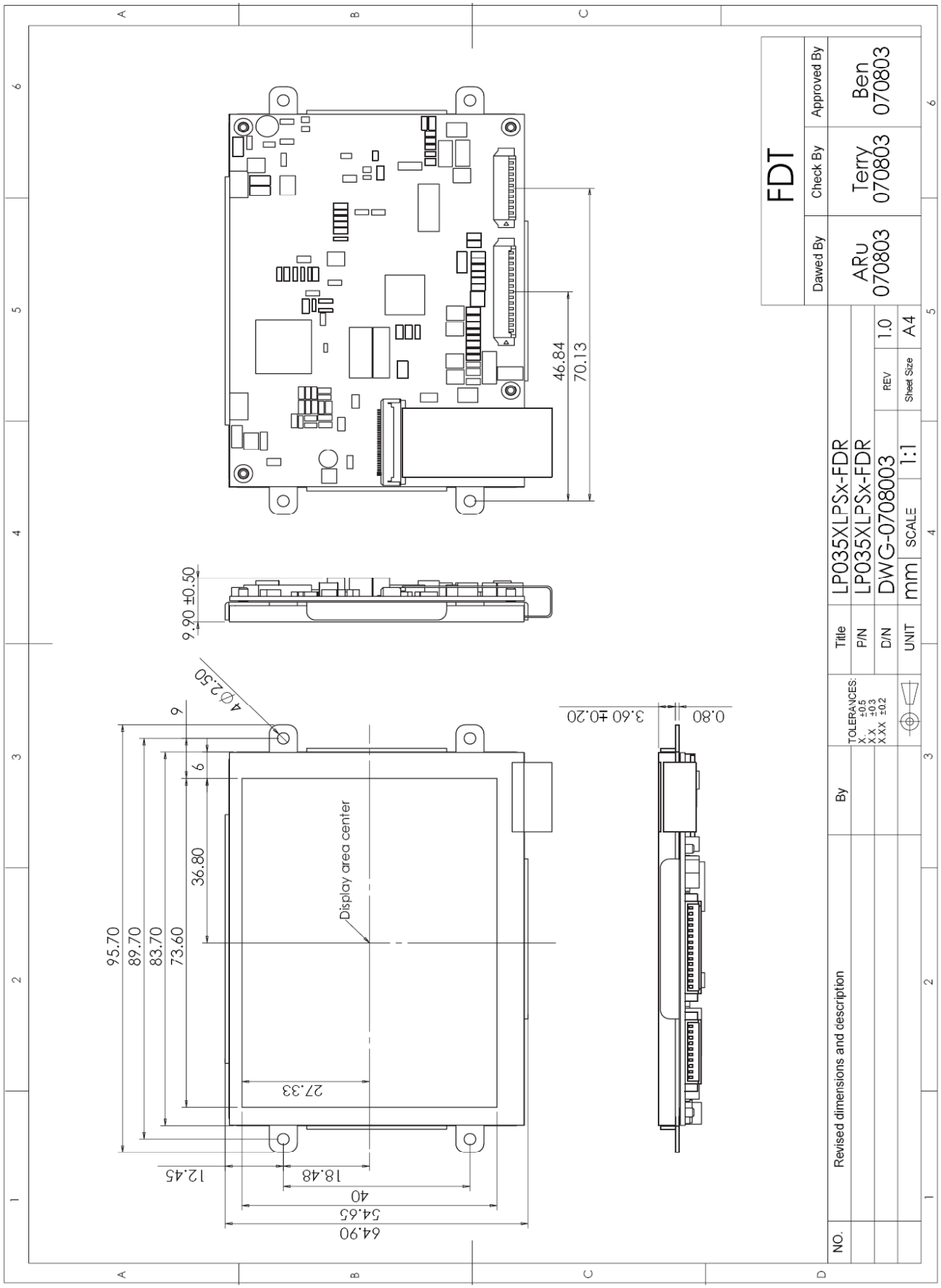
6.1 Driver Board



6.2 Module



6.3 Unit



7. Pin Description

7.1 J202 ：LCD Panel I/O Terminals(FPC 30 Pin Pitch 0.5mm Below Contact Type)

Pin No	Symbol	I/O	Description	Remark
1	STH1	I/O	Start Pulse For Source Driver	
2	AV_{SS}	I	Analog Ground For Source Driver	
3	AV_{DD}	I	Analog Power Input For Source Driver	
4	V_B	I	Video Input B	
5	V_G	I	Video Input G	
6	V_R	I	Video Input R	
7	V_{SS}	I	Digital Ground	
8	V_{DD}	I	Digital Power Input	
9	CPH1	I	Sampling And Shift Clock For Source Driver	
10	CPH2	I	Sampling And Shift Clock For Source Driver	
11	CPH3	I	Sampling And Shift Clock For Source Driver	
12	STH2	I/O	Start Pulse for Source Driver	
13	Q2H	I	Video Input Rotation Control	
14	INH	I	Output Enable For Source Driver	
15	R/L	I	Left/Right Control For Source Driver	
16	V_{COM}	I	Common Electrode Voltage	
17	XOE	I	Output Enable For Gate Driver	
18	CPV	I	Clock Input For Gate Driver	
19	U/D	I	Up / Down Control For Gate Driver	
20	DIO2	I/O	Vertical Start Pulse	
21	DIO1	I/O	Vertical Start Pulse	
22	V_{GL}	I	Gate Off Voltage (Alternative Every 1-H)	
23	NC	-	No Connection	
24	V_{SS}	I	Ground	
25	V_{CC}	I	Logic Power For Gate Driver	
26	V_{GH}	I	Gate On Voltage	
27	NC	-	No Connection	
28	GLED2	I	Supply Current For LED	
29	GLED3	I	Supply Current For LED	
30	VLED	I	Supply Voltage For LED	

7.2 J301 ：Pin Assignment Of Signal Input (Pitch 1.25mm 15P ,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	Vin	I	+ 12V / + 5V Voltage Power supply	
2	GND	-	Power Ground	
3	GND	-	Power Ground	
4	GND	-	Signal Ground	
5	Video in	I	Video input(1Vp-p/75Ω)	
6	+5V	O	Voltage DC Output	Note1
7	Bright	I	Brightness control	
8	Contrast	I	Contrast control	
9	Color	I	Color control	
10	Tint	I	Tint control	Note2
11	NTSC/PAL	O	System Auto detect output	Note3
12	LRC	I	Screen Left / Right reverse	Note4
13	UDC	I	Screen Up / Down reverse	Note4
14	Dimmer	I	Backlight brightness control	
15	Enable	I	Backlight On/Off	Note5

Note1 : The +5V power supply external control circuit.(Max. output is 10mA)

Note2 : The TINT is only operating in NTSC system.

Note3 : The output High level for NTSC mode and Low level for PAL mode.

Note4 : Default +5V or floating is normal scanning and 0V is for reversed scanning.

Note5 : The floating or 5V is backlight on and 0V is backlight off.

7.3 J101 ：Pin Assignment Of RGB Mode (Pitch 1.25mm 10P ,Side Entry Type) (option)

※ **FDT Connector Part No.: MS240110R (STM) [Same as 53261-1019 (MOLEX)] ;**

※ **FDT Matching Connector Part No.: P240110 (STM) [Same as 51021-1000 (MOLEX)].**

Pin No	Symbol	I/O	Description	Remark
1	EXT.R	I	External R Signal Input (0.7Vp-p/75Ω)	
2	EXT.G	I	External G Signal Input (0.7Vp-p/75Ω)	
3	EXT.B	I	External B Signal Input (0.7Vp-p/75Ω)	
4	EXT-SW	I	Switch Video (Low)/R.G.B (High) Mode	Note1
5	CSYI	I	Composite Sync.Input	Note2
6	INT-VIDEO-CSY	O	Internal Composite Sync. Output	Note3
7	HSY	O	Horizontal Sync. Output	Note4
8	VSY	O	Vertical Sync. Output	Note4
9	GND	-	Ground	
10	SVHS-C	I	Chroma Signal Input	Note5

➢**This function is only for LD035XLPS2-FDR and LM035XLPS3-FDR.**

Note1 : EXT-SW is High for external R.G.B. input(15.75Khz),Low is Composite video input

Note2 : CSYI must be positive sync. signal input.

Note3 : If EXT-SW is low the INT-VIDEO-CSY switch to CSYI.

CSYI is composite sync of RGB mode when EXT-SW is high.

Note4 : HSY and VSY is negative sync. Signal output for On Screen Display(OSD).

CSYI connect with INT-VIDEO-CSY when external RGB signal synchronize video sync.

Note5 : SVHS-C is option

This is optional . If you use S-Video function.

Please contact FDT to modify some components of the interface board.

8. Absolute Maximum Ratings

8.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Remark
Input Voltage	Vin (+12V)	+8	+16	V	Lx035XLPS1-FDR Lx035XLPS3-FDR
Input Voltage	Vin (+5V)	+4	+6	V	Lx035XLPS0-FDR Lx035XLPS2-FDR
Video Input Signal	Video in	0.5	2.0	Vp-p	@75Ω
Digital Input Signal	TTL	+0.3	+5.3	V	
Storage Temperature		-30	+80	℃	
Operation Temperature		-20	+70	℃	

9. Recommended operating conditions

9.1 Electrical Characteristics

Parameter	Symbol	I/O	Min	Typ	Max	Unit	Remark
Input Voltage	Vin	I	+10	+12	+14	V	Lx035XLPS1-FDR Lx035XLPS3-FDR
Total Current	Iin (+12V)	I		173		mA	±15%
Power Consumption		I		2.076		W	@+12V
Input Voltage	Vin	I	+4	+5	+6	V	Lx035XLPS0-FDR Lx035XLPS2-FDR
Total Current	Iin (+5V)	I		400		mA	±15%
Power Consumption		I		2		W	@+5V
Video Input Signal	Video in	I		1.0		Vp-p	@75Ω
Output Voltage	+5V	O		+5V		V	
Brightness Adjust	Bright	I	+1.13	+1.3	+1.43	V	
Contrast Adjust	Contrast	I	+2.08	+2.53	+2.95	V	
Color Adjust	Color	I	+2.3	+2.88	+3.56	V	
Tint Adjust	Tint (NTSC only)	I	+1.5	+3.11	+4.6	V	
Video Auto Detect	NTSC / PAL	O		TTL		V	
Screen Reverse	Left / Right	I		TTL		V	
Screen Reverse	Up / Down	I		TTL		V	
Dimmer Adjust	Dimmer	I	0	-	+1.2	V	
Enable Backlight	Enable		0		+5	V	

9.2 LED Backlight Data

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage Of LED Backlight	V_{LED}	9	9.6	11.4	V	IL＝20mA
Supply Current Of LED Backlight	I_{LED1} I_{LED2}	-	20	-	mA	
Backlight Power Consumption	P_{LED}	360	384	456	mW	

9.3 LED Driver Test Data

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage Of LED Backlight	V_L	-	10.1	-	V	IL＝21.1mA
Supply Current Of LED Backlight	I_L	-	21.1	-	mA	

Note :Ta=+25℃ @+5V

9.4 Sample Test Data

Parameter	White Window	Red	Green	Blue	Remark
S/N：001 x	0.307	0.530	0.338	0.151	
y	0.329	0.340	0.542	0.128	
L	387.8(cd/m^2)	-	-	-	±15%
TC	6832(°K)	-	-	-	

Notes: 1. Luminance：BM-7 FAST(TOPCON)

2. Pattern Generator : FLUKE PM54200

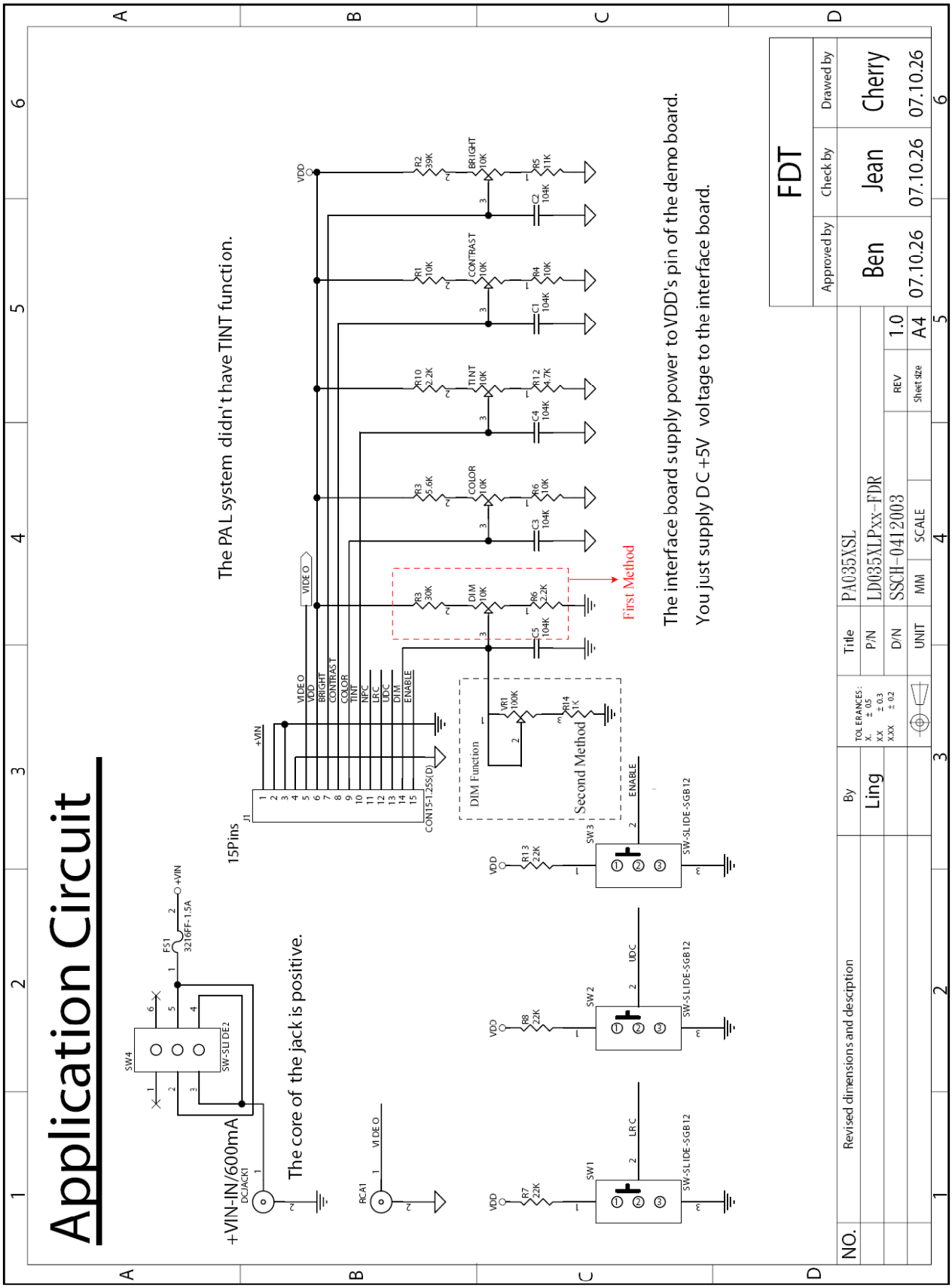
3. Measurement Distance：500mm±50mm

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

(After 10min ~20min Operation)

10. Application Circuit

10.1 Application Circuit



11. R.G.B Function Application Block

11.1 R.G.B Function Application Block