



§ SPECIFICATION APPROVAL SHEET §

Fdt Tech Module No: Lx035XLPxx-FDR

Description: 3.5" Color TFT-LCD Interface Module

SPEC No.: SAS-0705005

Version: 2.1

Issue Date: August 12,2013

※ This approval sheet contains 19 pages including the cover and appendix.

Customer:	APPROVED BY:
Date: / / 13	

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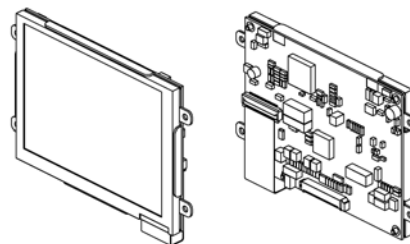
CHECKED BY:

DESIGNED BY:

FLAT DISPLAY TECHNOLOGY

3.5" TFT-LCD Analog Interface Module

- **Lx035XLP x0- FDR**
- **Lx035XLP x1- FDR**
- **Lx035XLP x2- FDR**
- **Lx035XLP x3- 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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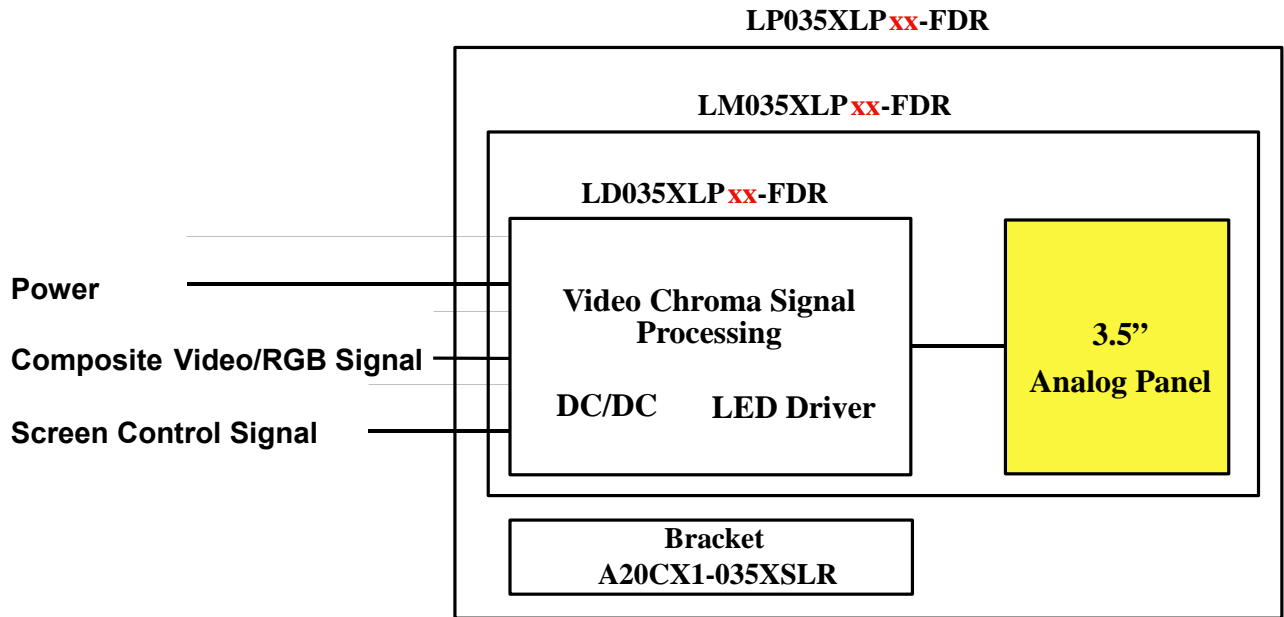


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3. Block Diagram

3.1 Block Diagram



4. TFT-LCD Information

4.1 TFT-LCD Mechanical Specifications

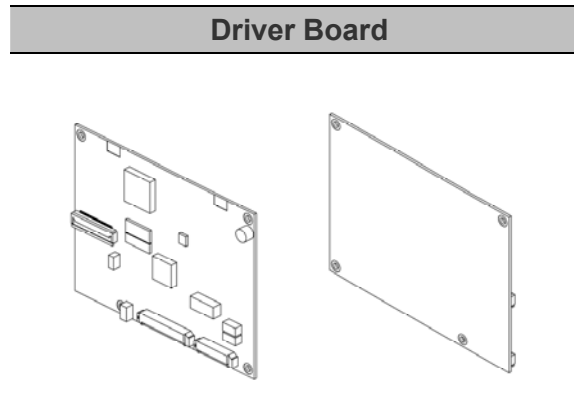
Parameter	Specifications	Unit
Screen Size	3.5(diagonal)	inch
Display Format	320 x (RGB) x 234	dot
Active Area	71.6(H) x 52.65(V)	mm
Pixel Pitch	0.2235 (H) x 0.225 (V)	mm
Pixel Configuration	Delta	
Outline Dimension	83.5 (W) x 63.1 (H) x 3.6 (D)	mm
Weight	32±5	g
Surface Treatment	Anti-Glare	

4.2 TFT-LCD Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Left	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	-	15	30	ms	
		Tf	$\theta = 0^\circ$	-	25	50	ms
Uniformity	U	9 point	70	75		%	
Brightness		$\theta = 0^\circ$	200	250		Cd/m ²	
White Chromaticity	x	$\theta = 0^\circ$	0.28	0.31	0.34		
	y	$\theta = 0^\circ$	0.30	0.33	0.36		
LED Life Time		Ta=25°C, 20mA -		30000	-	Hr	

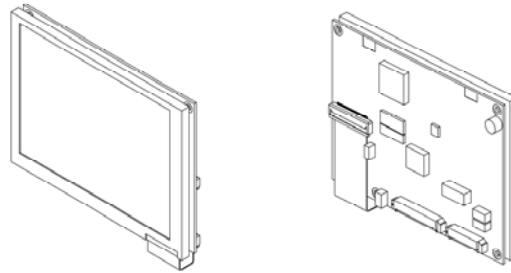
5. Order Information

5.1 Driver Board



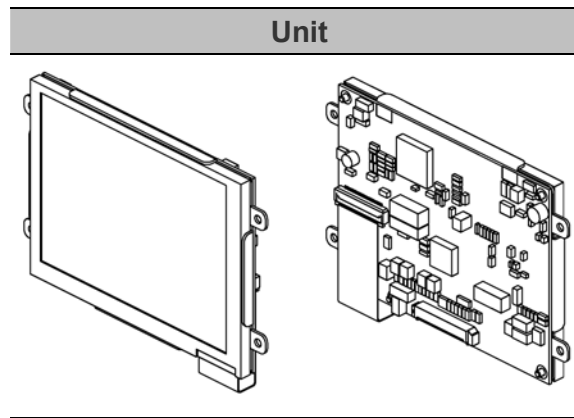
Order Part Number	NTSC	PAL	NTSC/PAL	Master RGB Mode	Slave RGB Mode	Input +12V	Input +5V
LD035XLPN0-FDR	⊙						⊙
LD035XLPP0-FDR		⊙					⊙
LD035XLPS0-FDR			⊙				⊙
LD035XLPN1-FDR	⊙					⊙	
LD035XLPP1-FDR		⊙				⊙	
LD035XLPS1-FDR			⊙			⊙	
LD035XLPN2-FDR	⊙			⊙			⊙
LD035XLPP2-FDR		⊙		⊙			⊙
LD035XLPS2-FDR			⊙	⊙			⊙
LD035XLPN3-FDR	⊙			⊙		⊙	
LD035XLPP3-FDR		⊙		⊙		⊙	
LD035XLPS3-FDR			⊙	⊙		⊙	

Module Board



Order Part Number	NTSC	PAL	NTSC/PAL	Master RGB Mode	Slave RGB Mode	Input +12V	Input +5V
LM035XLPN0-FDR	⊙						⊙
LM035XLPP0-FDR		⊙					⊙
LM035XLPS0-FDR			⊙				⊙
LM035XLPN1-FDR	⊙					⊙	
LM035XLPP1-FDR		⊙				⊙	
LM035XLPS1-FDR			⊙			⊙	
LM035XLPN2-FDR	⊙			⊙			⊙
LM035XLPP2-FDR		⊙		⊙			⊙
LM035XLPS2-FDR			⊙	⊙			⊙
LM035XLPN3-FDR	⊙			⊙		⊙	
LM035XLPP3-FDR		⊙		⊙		⊙	
LM035XLPS3-FDR			⊙	⊙		⊙	

5.3 Unit

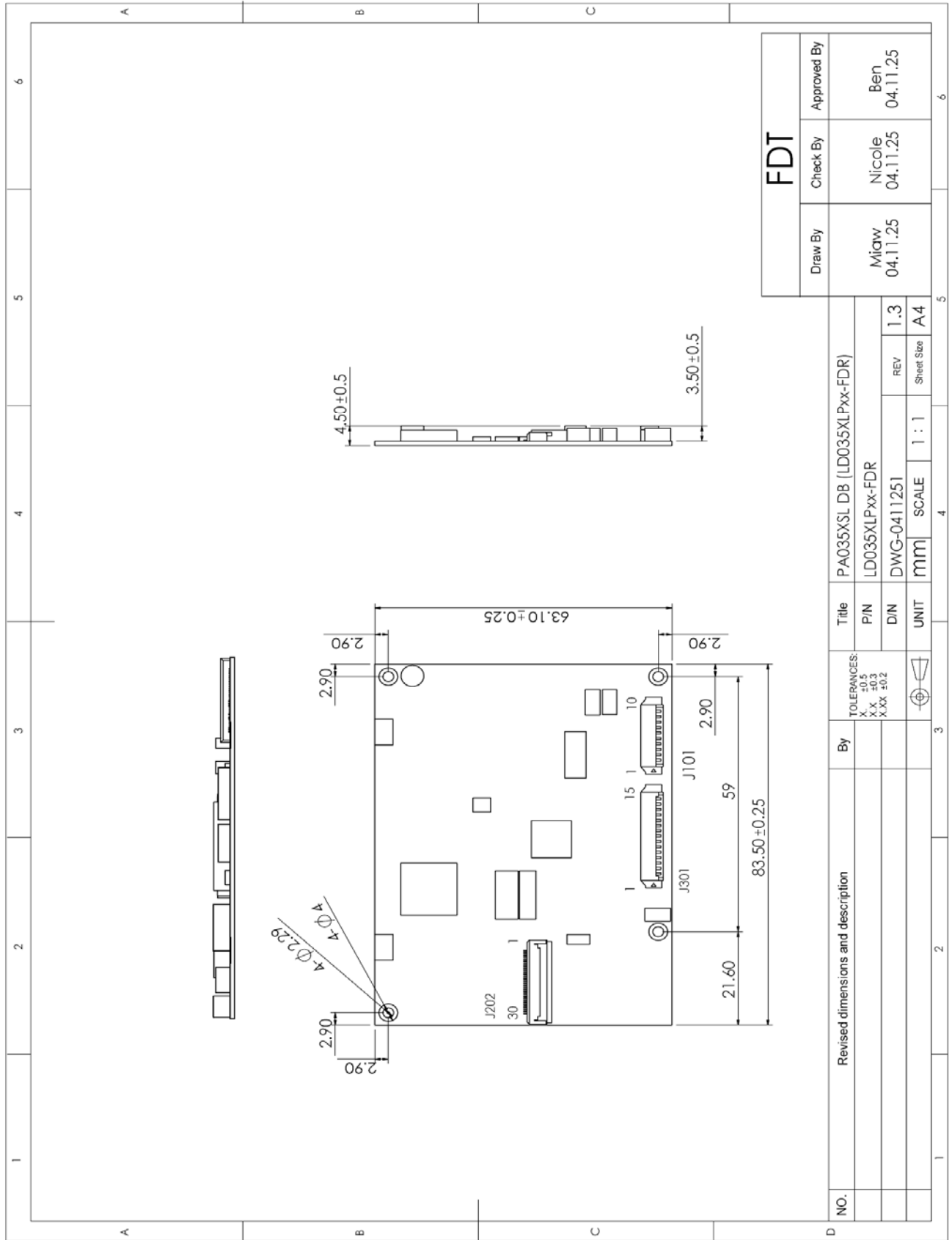


Order Part Number	NTSC	PAL	NTSC/ PAL	Master RGB Mode	Slave RGB Mode	Input +12V	Input +5V	Bracket A20CX1-035XSLR
LP035XLPN0-FDR	⊙						⊙	⊙
LP035XLPP0-FDR		⊙					⊙	⊙
LP035XLPS0-FDR			⊙				⊙	⊙
LP035XLPN1-FDR	⊙					⊙		⊙
LP035XLPP1-FDR		⊙				⊙		⊙
LP035XLPS1-FDR			⊙			⊙		⊙
LP035XLPN2-FDR	⊙			⊙			⊙	⊙
LP035XLPP2-FDR		⊙		⊙			⊙	⊙
LP035XLPS2-FDR			⊙	⊙			⊙	⊙
LP035XLPN3-FDR	⊙			⊙		⊙		⊙
LP035XLPP3-FDR		⊙		⊙		⊙		⊙
LP035XLPS3-FDR			⊙	⊙		⊙		⊙

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

6. Size Information

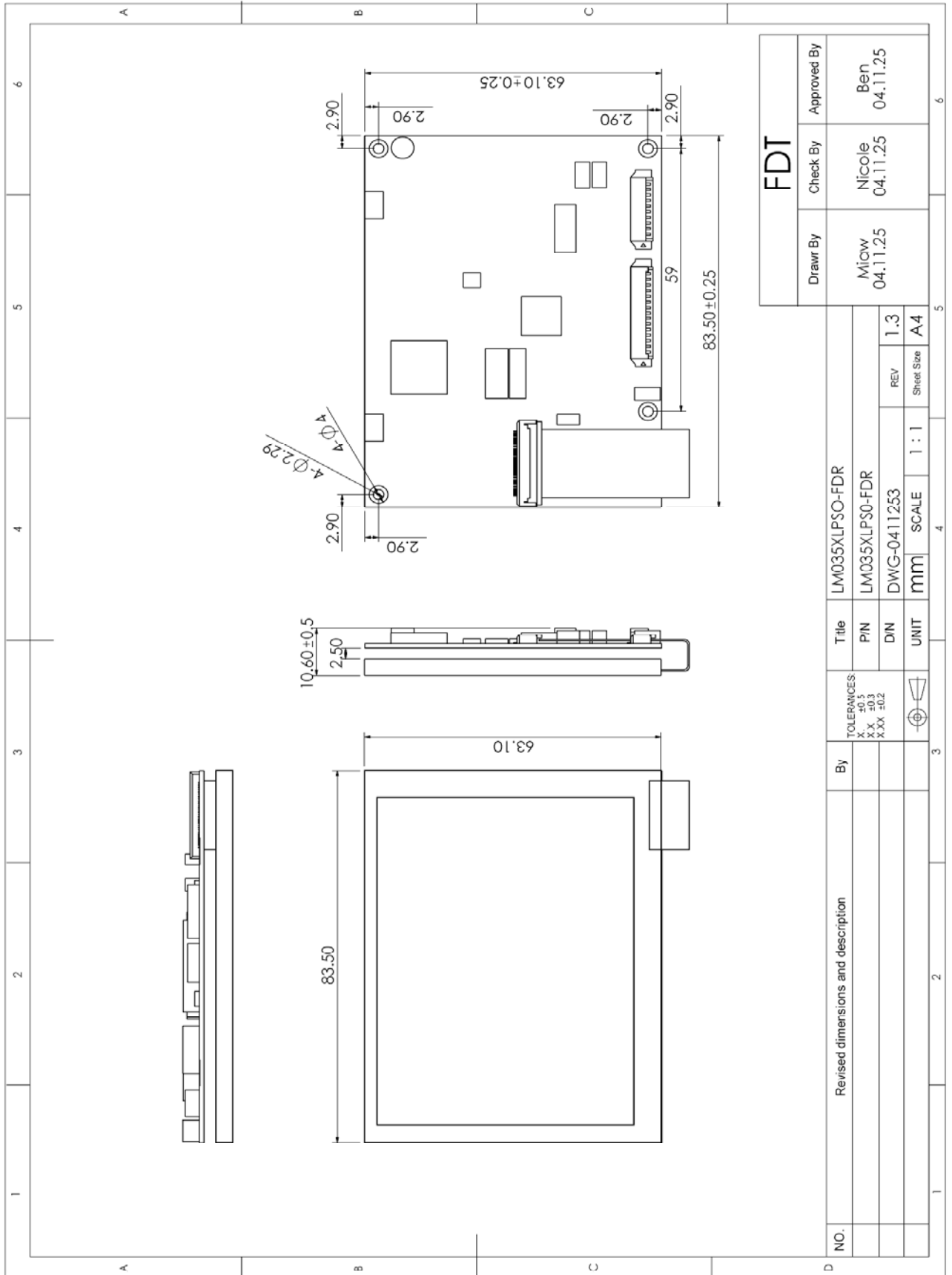
6.1 Driver Board



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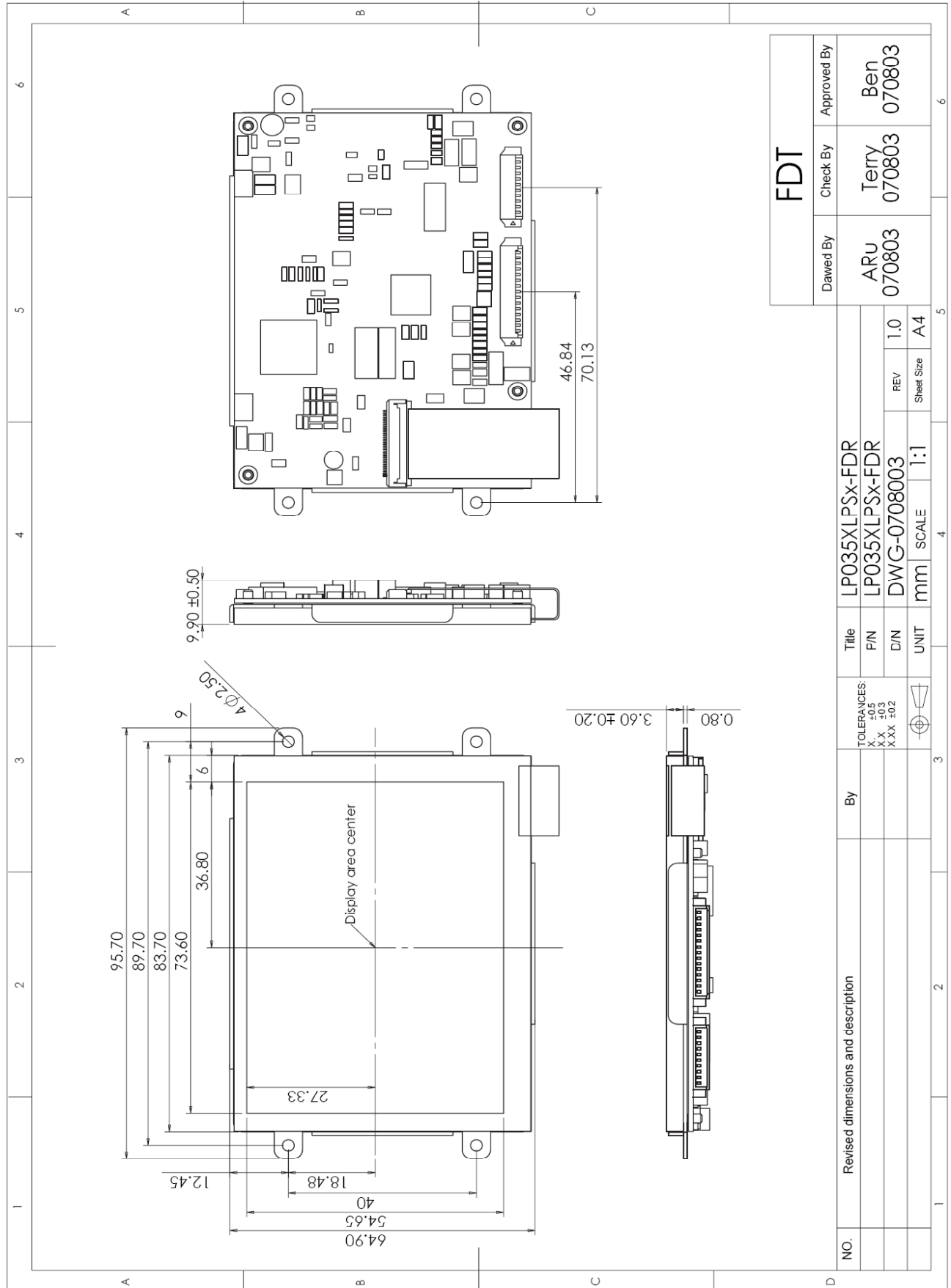
6.2 Module



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■ Lx035XLPxx-FDR V2.1 

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 0V is backlight on and 5V 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	VSX	O	Vertical Sync. Output	Note4
9	GND	-	Ground	
10	SVHS-C	I	Chroma Signal Input	Note5

➤This function is only for LD035XLPx2-FDR and LM035XLPx3-FDR.

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

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 VSX 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	Lx035XLPx1-FDR Lx035XLPx3-FDR
Input Voltage	Vin (+5V)	+4	+6	V	Lx035XLPx0-FDR Lx035XLPx2-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	°C	
Operation Temperature		-20	+70	°C	

9. Recommended operating conditions

9.1 Electrical Characteristics

Parameter	Symbol	I/O	Min	Typ	Max	Unit	Remark
Input Voltage	V _{in}	I	+10	+12	+14	V	Lx035XLPx1-FDR Lx035XLPx3-FDR
Total Current	I _{in} (+12V)	I		173		mA	±15%
Power Consumption		I		2.076		W	@+12V
Input Voltage	V _{in}	I	+4	+5	+6	V	Lx035XLPx0-FDR Lx035XLPx2-FDR
Total Current	I _{in} (+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	I _L =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	I _L =21.1mA
Supply Current Of LED Backlight	I _L	-	21.1	-	mA	

Note : Ta=+25°C @+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

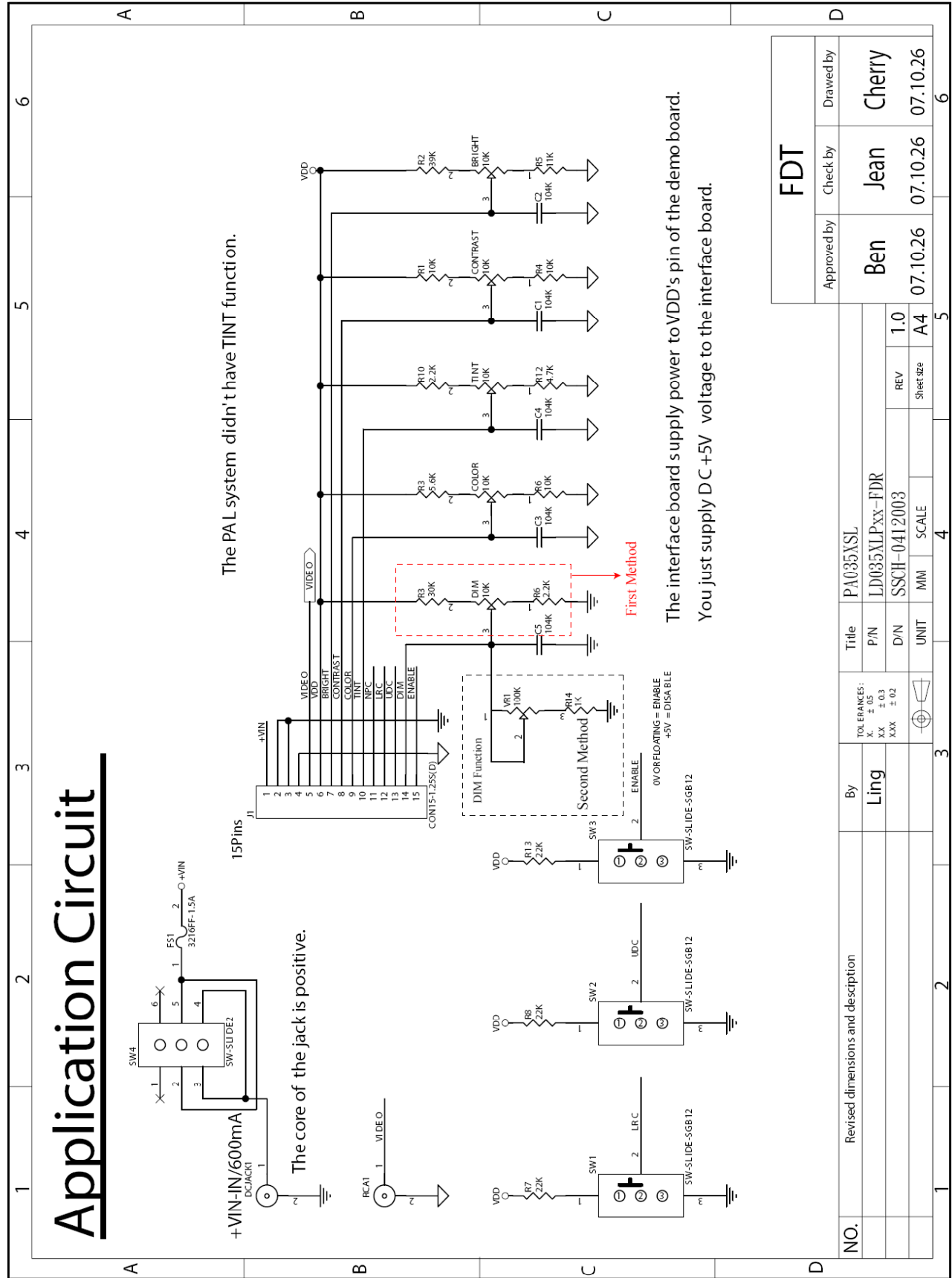
3. Measurement Distance : 500mm±50mm

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



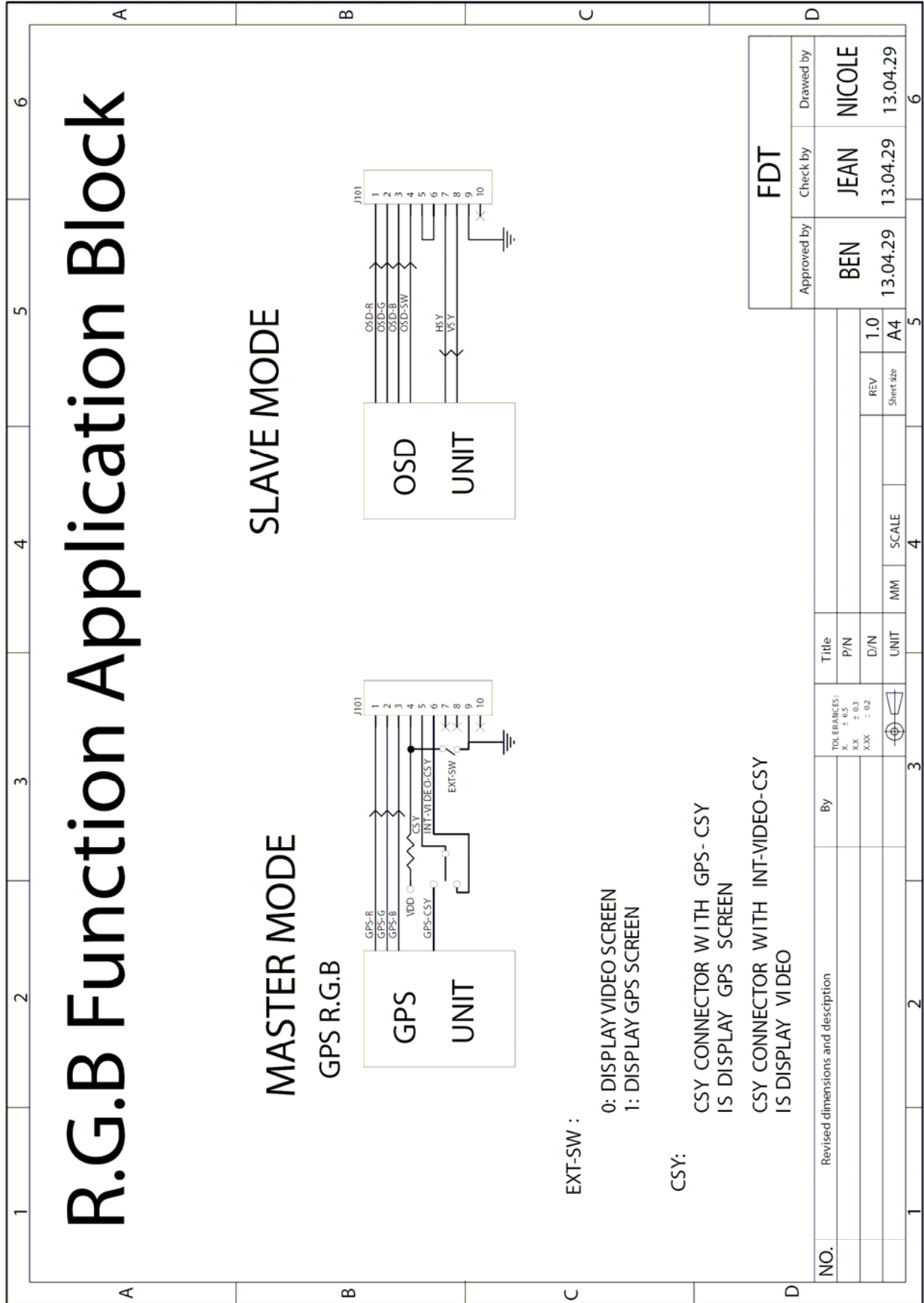
Approved by		Ben		Jean		Cherry	
		07.10.26		07.10.26		07.10.26	
Checked by		Ben		Jean		Cherry	
Drawn by		Ben		Jean		Cherry	

Title		PA035XSL	
P/N		LD035XLPxx-FDR	
D/N		SSCH-0412003	
UNIT		MM SCALE	
REV		1.0	
Sheet size		A4	

NO.	Revised dimensions and description		By		Ling	
	TOLERANCES: XX ± 0.5 XX ± 0.3 XXX ± 0.2		Title		PA035XSL	
0V OR FLOATING = ENABLE +5V = DISABLE		P/N		LD035XLPxx-FDR		
SW1 - LRC		D/N		SSCH-0412003		
SW2 - UDC		UNIT		MM SCALE		
SW3 - ENABLE		REV		1.0		
SW4 - DIM		Sheet size		A4		

11. R.G.B Function Application Block

11.1 R.G.B Function Application Block



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