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§ **SPECIFICATION APPROVAL SHEET** §

Fdt Tech Module No	LT035V2xA0-FDR
Description:	3.5" Digital TFT-LCD Module
SPEC No.:	SAS-1101002
Version:	0.0
Issue Date:	January 24, 2011

※ This approval sheet contains 15 pages including the cover and appendix.

Customer:	APPROVED BY:
Date: / / 11	

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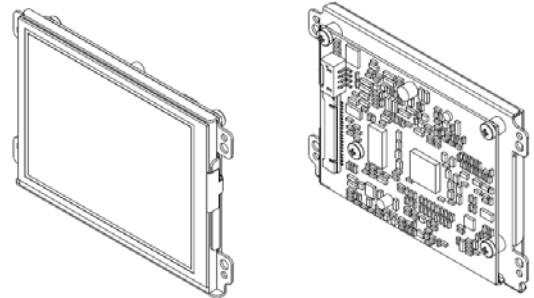
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3.5" Digital TFT-LCD Module



■ LT035V2xA0-FDR

1. General Descriptions

1.1 Features

- 18bits LVDS interface
- LED Backlight Circuit Operation Voltage: +3.3V

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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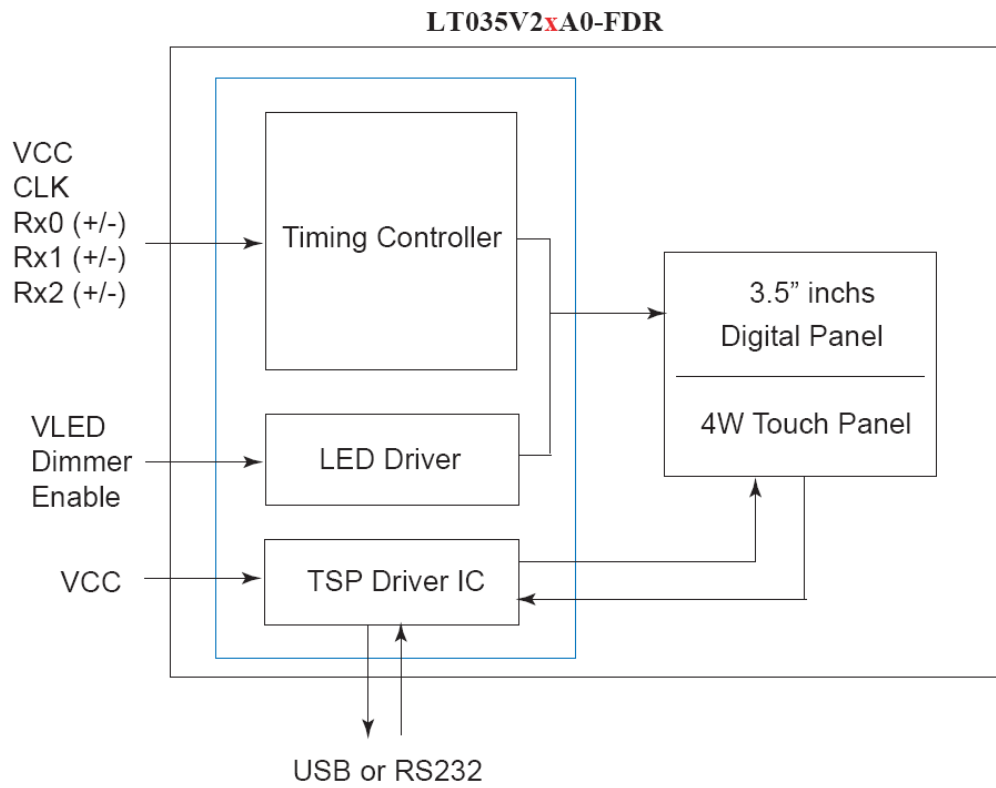


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3. Block Diagram

3.1 Block Diagram



FDT



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	
Weight	TBD	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 Without Tsp			200	250	-	Cd/m ²	
Brightness With Tsp			160	200	-	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	

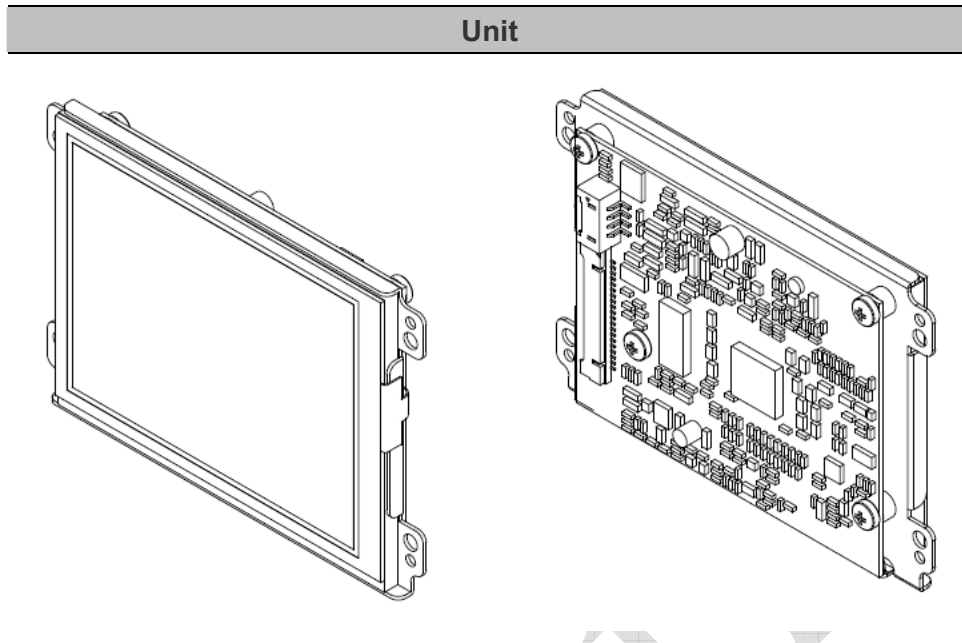
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5. Order Information

5.1 Unit



Parameter	LT035V20A0-FDR	LT035V21A0-FDR	LT035V22A0-FDR
Signal Input Connector	20 PIN	20 PIN	20 PIN
Touch Panel Type	-	4W Resistive	4W Resistive
Touch Screen Interface	-	USB	RS-232
Bracket	⊙	⊙	⊙

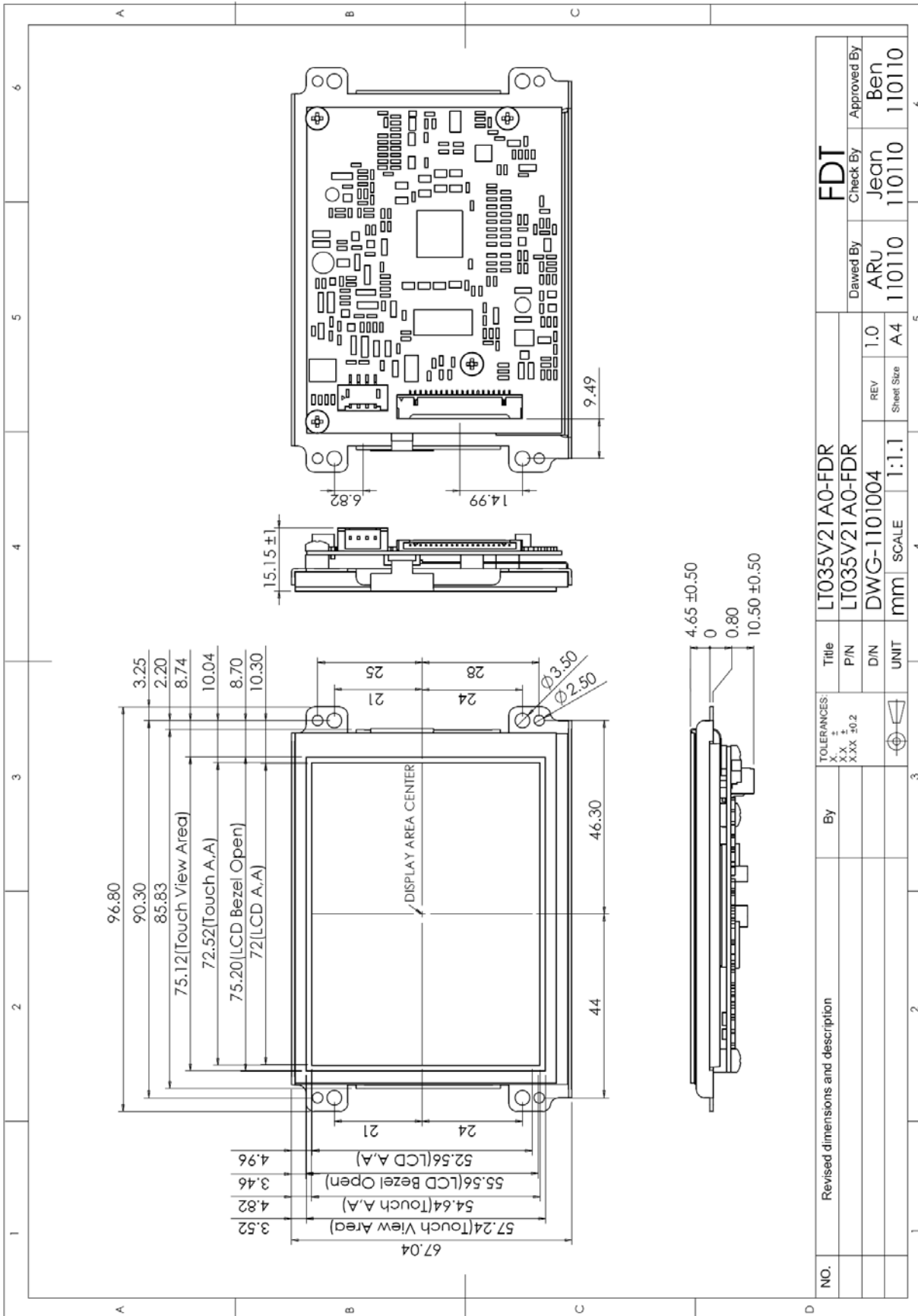
**Note: 1. The tape in back of the bracket is to avoid the panel falling from the unit in delivery.
2. It's just a temporary adhesion.**

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6.2 Unit (LP035V21A0-FDR)

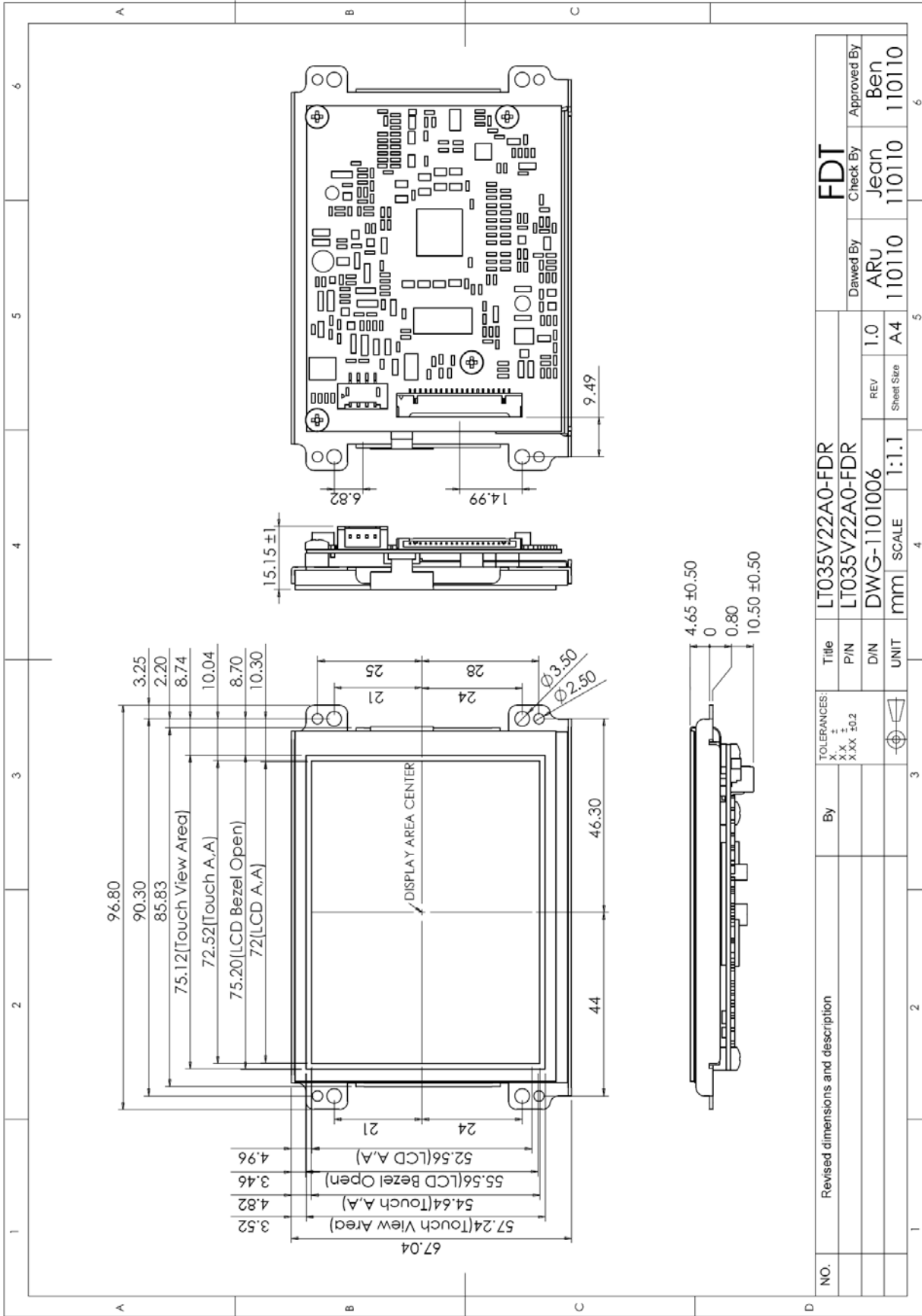


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6.3 Unit (LP035V22A0-FDR)



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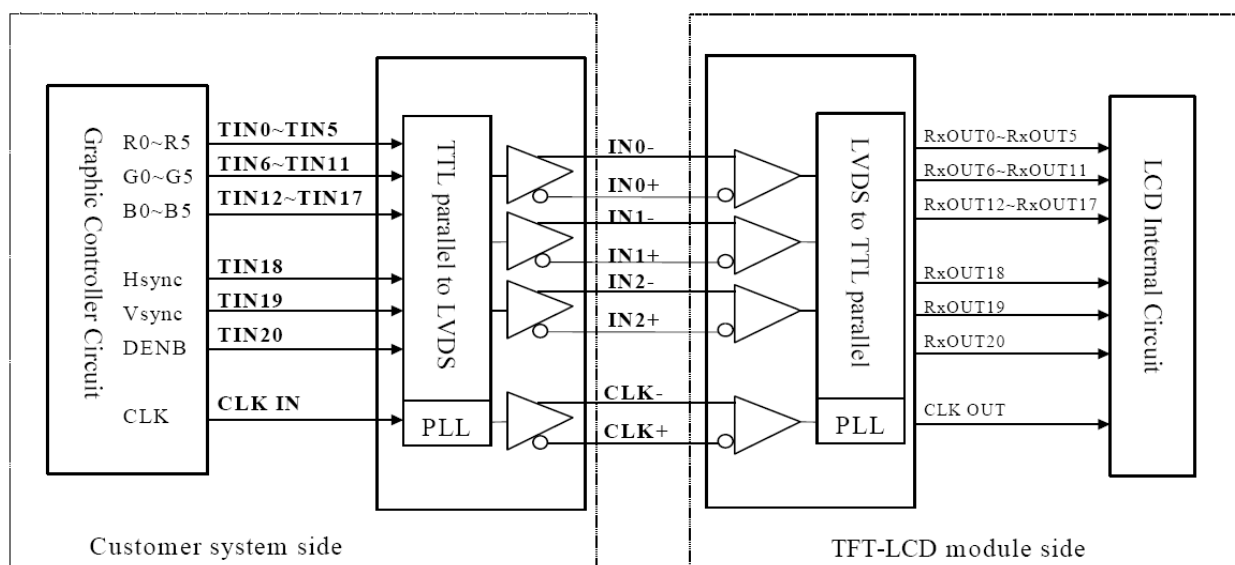
7. Pin Description

7.1 J101 : LVDS I/O Terminals (Pitch 1.25mm 20Pin, Side Entry Type)

※ Connector Part No.: FI-SEB20P-HF13E (JAE) or MS240420G (STM) ; Matching Connector Part No.: FI-S20S (JAE) or P240420 (STM)

Pin No	Symbol	I/O	Description	Remark
1	VCC	I	Power Supply (3.3 V)	
2	VCC	I	Power Supply (3.3 V)	
3	GND	P	Ground	
4	GND	P	Ground	
5	RX0-	I	Differential Data Input, CH0 (Negative)	R0 ~ R5, G0
6	RX0+	I	Differential Data Input, CH0 (Positive)	
7	GND	P	Ground	
8	RX1-	I	Differential Data Input, CH1 (Negative)	G1 ~ G5, B0, B1
9	RX1+	I	Differential Data Input , CH1 (Positive)	
10	GND	P	Ground	
11	RX2-	I	Differential Data Input , CH2 (Negative)	B2 ~ B5, DE, Hsync, Vsync
12	RX2+	I	Differential Data Input , CH2 (Positive)	
13	GND	P	Ground	
14	CLK-	I	Differential Clock Input (Negative)	LVDS Level Clock
15	CLK+	I	Differential Clock Input (Positive)	
16	GND	P	Ground	
17	ENABLE	O	Enable For LED Backlight	
18	DIMMER	O	Backlight Brightness Adjust	
19	GND	P	Ground	
20	GND	P	Ground	

LVDS Interface Block Diagram



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7.2 J301: Pin Assignment of Touch USB (Pitch 2.0mm 4Pin, Side Entry Type)

※ Connector Part No.: S4B-PH-SM4 (JST) or MS24264R (STM); Matching Connector Part No.: PHR-4 (JST) or P24264 (STM)

Pin No	Symbol	I/O	Description	Remark
1	VBUS	-	USB VCC	
2	D-	-	DATA (-)	
3	D+	-	DATA (+)	
4	DGND	-	Digital Ground	

Note: For LT035V21A0-FDR

7.3 J301: Pin Assignment of Touch RS232 (Pitch 2.0mm 4Pin, Side Entry Type)

※ Connector Part No.: S4B-PH-SM4 (JST) or MS24264R (STM); Matching Connector Part No.: PHR-4 (JST) or P24264 (STM)

Pin No	Symbol	I/O	Description	Remark
1	NC	-	No Connection	
2	RXD	-	Receive Data	
3	TXD	-	Transmit Data	
4	DGND	-	Digital Ground	

Note: For LT035V22A0-FDR

8. Absolute Maximum Ratings

8.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Remark
Input Voltage	Vcc	+3	+3.6	V	
Digital Input Signal	TTL	Vcc-0.5	Vcc+0.5	V	
Operating Temperature Without Tsp		-20	+70	°C	
Operating Temperature With Tsp		-10	+60	°C	
Storage Temperature Without Tsp		-30	+70	°C	
Storage Temperature With Tsp		-20	+70	°C	

9. Recommended Operating Conditions

9.1 Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note	Remark
Input Voltage	Vcc	+3.1	+3.3	+3.5	V		
Total Current Without Tsp	Icc	-	-	-	mA		@+3.3V
Total Current With Tsp	Icc	-	-	-	mA		@+3.3V
Digital Input Signal	TTL	Vcc-0.3	Vcc	Vcc+0.3	V		
Dimmer Adjust	Dimmer	0(Dark)	-	+3.3(Bright)	V	Floating: 1/2 VCC	Positive
Enable Backlight	Enable	0	-	+3.3	V		1: Enable 0: Disable

10. Interface Timing

10.1 Timing Parameters

※ Electrical Characteristics (VCC=3.3V, Ta=25°C)

Parameter	Symbol	Min	Typ	Max	Unit
CLK Frequency	Fclk	-	20	40	MHz
CLK Pulse Width	TCPH	25	40	-	ns
Data Set-up Time	Tsu	4	-	-	ns
Data Hold Time	Thd	2	-	-	ns
Propagation Delay of DIO2/1	Tphl	6	10	15	ns
Time That The Last Data to LD Tld 1	Tld 1	1	-	-	TCPH
Pulse width of LD	Twld 2	2	-	-	TCPH
Time That LD to DIO1/2	Tlds	5	-	-	TCPH
POL Set-up Time	Tpsu	6	-	-	ns
POL Hold Time	Tphd	6	-	-	ns
OE Pulse Width	TOEV	1	-	-	μs
CKV Pulse Width	TCKV	500	-	-	ns
STV Set-up Time	TSUV	400	-	-	ns
STV Hold Time	THDV	400	-	-	ns
Horizontal Display Period	THDP	-	640	-	TCPH
Horizontal Period Timing Range	THP	-	800	-	TCPH
Horizontal Lines Per Field	TV	520	525	640	THP
Vertical Display Timing Range	TDV	-	480	-	THP

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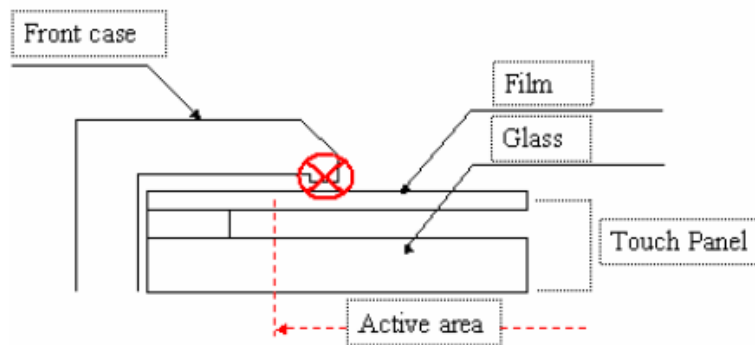


11.4W Resistive Touch Panel Characteristics

11.1 Touch Screen Integration Design Guide

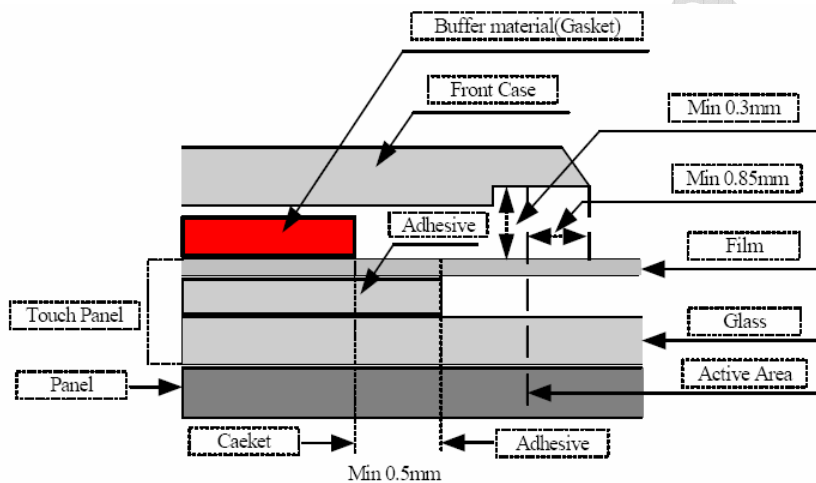
Avoid the design that Front-case overlap and press on the active area of the touch-panel.

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.



11.2 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	-	-	M Ω	DC 25V

11.3 Optical Performance

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

11.4 Mechanical Performance

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

11.5 Environmental

Parameter	Specifications
Operating Temp.	-10°C~60°C (Except dew condensation)
Storage Temp.	-20°C~70°C (Except dew condensation)

11.6 Reliability test procedure

Parameter	Specifications
High temperature storage test	70°C for 240 hours.
Low temperature storage test	-20°C for 240 hours.
Thermal Cycling	-20°C (0.5 hr each)~70°C 85%RH (0.5 hr each) for 20 cycles.
High temperature and high humidity	40°C, 90%RH for 240 hours.

12. Operation Manual

12.1 Driver Board Manual

