TFT MODULE SPECIFICATION

RVT121HVDNWC00-B

MIPI DSI, IPS 12.1" LCD TFT DATASHEET

Rev.1.1

2025-02-04

ITEM	CONTENTS	UNIT
LCD Type	TFT/Transmissive/Normally Black/IPS	/
Size	12.1	Inch
Viewing Direction	Free	/
Outside Dimensions (W x H x D)	312.12 x 204.20 x 14.79	mm
Active Area (W x H)	261.12 x 163.20	mm
Pixel Pitch (W x H)	0.204 x 0.204	mm
Resolution	1280 x 800	/
Brightness	850	cd/m^2
Color Depth	16.7 M	/
Pixel Arrangement	RGB Vertical Stripe	/
Driver IC of Board	SN65DSI83	/
Interface	MIPI DSI	/
EEPROM Memory Size	2-Kbit	Mb
Host Connector	ZIF 34 pins, 0.5mm pitch, down-side contact	/
With/Without Touch	With Projected Capacitive Touch Panel	/
CTP Driver	ILI2511	/
Supply Voltage for Module	5.0	V
Bonding Technology	Optical Bonding	/
Weight	905	g

Note 1. RoHS compliant

Note 2. LCM weight tolerance: ± 5%.

1. REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2024-03-13	Initial release	
1.1	2025-02-04	Drawing Update	

2. CONTENTS

3. MODULE CLASSIFICATION INFORMATION

RV	T	121	H	V	D	N	W	C	00	B
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.

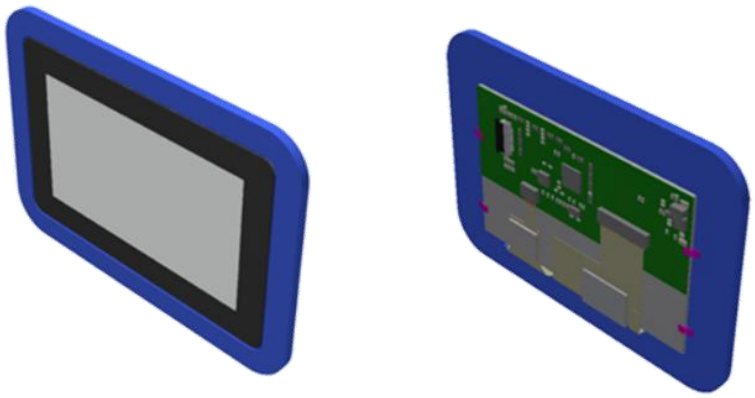
NO.	PARAMETER	SYMBOL
1.	BRAND	RV – Riverdi
2.	PRODUCT TYPE	T – TFT Standard
3.	DISPLAY SIZE	121 – 12.1”
4.	MODEL SERIAL NO.	H – High Brightness, IPS
5.	RESOLUTION	V – 1280 x 800 px
6.	INTERFACE	D – MIPI DSI
7.	FRAME	N – Without Mounting Metal Frame
8.	BACKLIGHT TYPE	W – LED White
9.	TOUCH PANEL	C – With Capacitive Touch Panel
10.	VERSION	00 – (00-99)
11.	BONDING TECHNOLOGY	B – Optical bonding

4. ASSEMBLY GUIDE

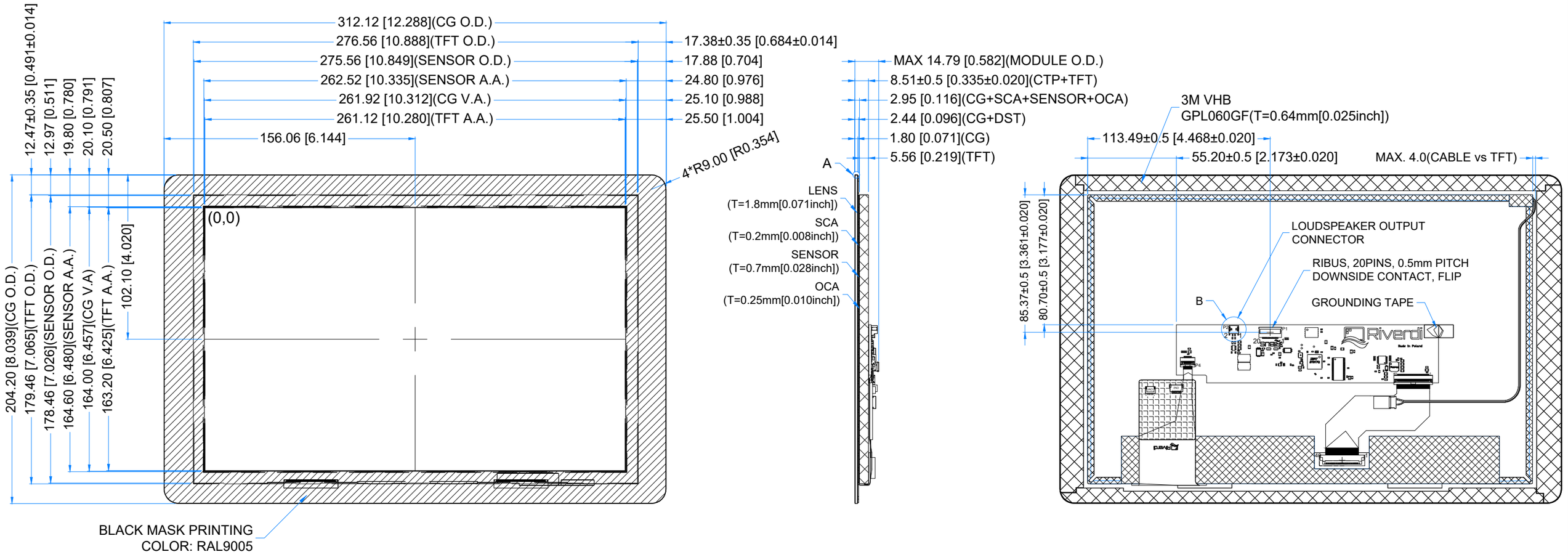
4.1 uxTouch ASSEMBLY

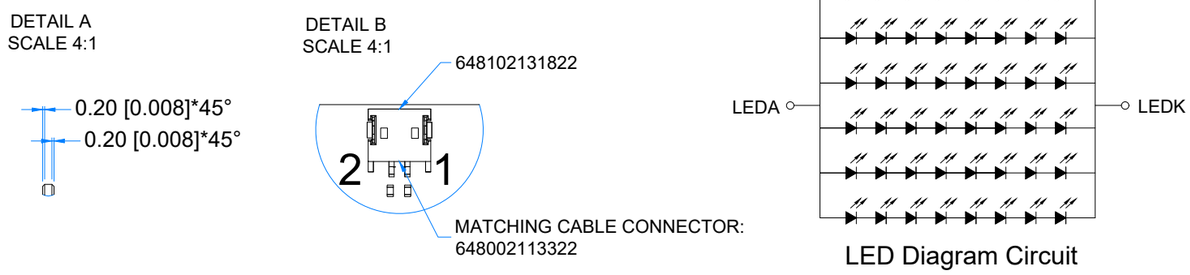
uxTouch are LCD TFT displays with specially designed projected capacitive touch panels. uxTouch display can be mounted without any additional holes in the housing. Our standard uxTouch displays include double-sided adhesive tape (DST) to stick TFT easily to the housing.
uxTouch models with double-side adhesive tape can be mounted by fastening the glass to the housing.

Figure 1. General view of the module



Revision:	Changes:	Date:
1.0	Initial Case	2024.04.11
1.1	Changed the CG VA dimension	2025.02.04





LCD NOTES:
1. LCD TYPE: TRANSMISSIVE, NORMALLY BLACK, IPS
2. RESOLUTION: 1280x800
3. VIEWING ANGLE: FREE
4. SURFACE LUMINANCE: 850 cd/m^2
5. DRIVING IC ON THE BOARD: BT817Q
6. INTERFACE: SPI/QSPI
7. SUPPLY VOLTAGE FOR MODULE: 3.3 V
8. SUPPLY VOLTAGE FOR BACKLIGHT: 7.0 ÷ 14.0 V, BUILT-IN LED INVERTER

TP NOTES:
1. TP STRUCTURE: G+G
2. CG THICKNESS: 1.8mm[0.071inch]
3. SURFACE HARDNESS: 6H
4. DRIVER IC: ILI2511
5. INTERFACE: SPI/QSPI VIA RIBUS AND BT817Q

GENERAL NOTES:
1. OPTICAL BONDING BETWEEN TFT AND CTP
2. OPERATING TEMPERATURE: -20°C ~ 70°C
3. STORAGE TEMPERATURE: -30°C ~ 80°C
4. WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm[0.012inch]
5. RoHS3 COMPLIANT

PN: RVT121HVBNWC00-B				Riverdi
SN:				
DRAWN:	M.Suchocki	2025.02.04	1:2.35	
CHECKED:	M.Wierzbowski	2025.02.04	[mm]	
APPR:			ISO A3	P. 1 of 1

6. ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Supply Voltage for Module	V_{DD}	0	7.4	V	Note 1
Reference Voltage	V_{REF}	0	4.6	V	
PWM Input Voltage	V_{PWM}	-0.3	7.4		
Operating Temperature	T_{OP}	-20	70	°C	
Storage Temperature	T_{ST}	-30	80		
Storage Humidity (@ 25 ± 5°C)	H_{ST}	10	-	% RH	
Operating Ambient Humidity (@ 25 ± 5°C)	H_{OP}	10	-		

Note 1. Exceeding maximum values may cause improper operation or permanent damage to the unit.

7. ELECTRICAL CHARACTERISTICS

PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Supply Voltage for Module		V_{DD}	-	5.0	-	V	
Reference Voltage		V_{REF}	0	-	3.6		Note 1
Current drawn from V_{REF}		IV_{REF}	-	1.5	-	uA	V_{REF}=1.8V
Input High Voltage		V_{IH}	0.7V_{REF}	-	-	V	
Input Low Voltage		V_{IL}	0	-	0.3V_{REF}		
PWM Logic Input Voltage	High Voltage	V_{PWMH}	1.2	-	V_{DD}	V	Note 2
	Low Voltage	V_{PWML}	0	-	0.4		
PWM Frequency		F_{PWM}	200	-	1000	Hz	

Note 1. TYP of Reference Voltage is 1.8V or 3.3V which is dependent on the SBC.

Note 2. PWM input is independent of V_{REF}. Min of logic high level is 1.2V and max of logic low level is 0.4V.

Current drawn with 100% BL 195mA/22V.

Test condition:

1. Ambient temp 25 °C
2. PCAP is in active mode

8. BACKLIGHT ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Lifetime	-	-	50,000	-	hours	Note 1

Note 1. Operating life means the period in which the LED brightness goes down to 50% of the initial brightness. Typical operating lifetime is the estimated parameter.

9. ELECTRO-OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	RMK	NOTE
Response Time	Tr+Tf	θ=0° ⌀=0° Ta=25 °C	-	25	35	ms	FIG 2.	4
Contrast Ratio	Cr		800	1000	-	---	FIG 3.	1
Luminance Uniformity	δ WHITE		-	75	-	%		3
Surface Luminance	Lv		-	850	-	cd/m²		2
Viewing Angle Range	θ	⌀ = 90°	75	85	-	deg	FIG 4.	6
		⌀ = 270°	75	85	-	deg		
		⌀ = 0°	75	85	-	deg		
		⌀ = 180°	75	85	-	deg		
CIE (x, y) Chromaticity	Rx	θ=0° ⌀=0° Ta=25 °C	0.22	0.26	0.30	-	FIG 3.	5
	Ry		0.20	0.24	0.28	-		
	Gx		0.34	0.38	0.42	-		
	Gy		0.50	0.54	0.58	-		
	Bx		0.10	0.14	0.18	-		
	By		0.09	0.13	0.17	-		
	Wx		0.28	0.32	0.36	-		
	Wy		0.29	0.33	0.37	-		

Note 1. Contrast Ratio (CR) is defined mathematically as below, for more information see Figure 3.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

Note 2. Surface luminance is measured 500mm from the center point of the LCD surface with all pixels displaying white. For more information see Figure 3.

Lv = Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)

Note 3. The uniformity in surface luminance δ WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the minimum luminance of 5 points luminance by maximum luminance of 5 points luminance. For more information see Figure 3.

$$\delta\ \text{WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

Note 4. Response time is the time required for the display to transition from white to black (Rise Time, Tr) and from black to white (Decay Time, Tf). For additional information see Figure 2. The test equipment is BM-7A.

Note 5. CIE (x, y) chromaticity, the x, y value is determined by measuring luminance at each test position 1 through 5, and then calculating the average value.

Note 6. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to LCD surface. For more information see Figure 4.

Note 7. Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80). For response time testing, the testing data is based on BM-7A. Instruments for Contrast Ratio, Surface Luminance, Luminance Uniformity, Chromaticity the test data is based on SR-3A.

Figure 2. The definition of response time

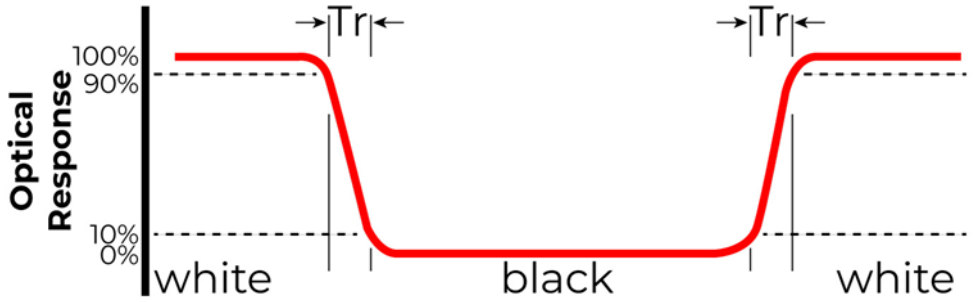
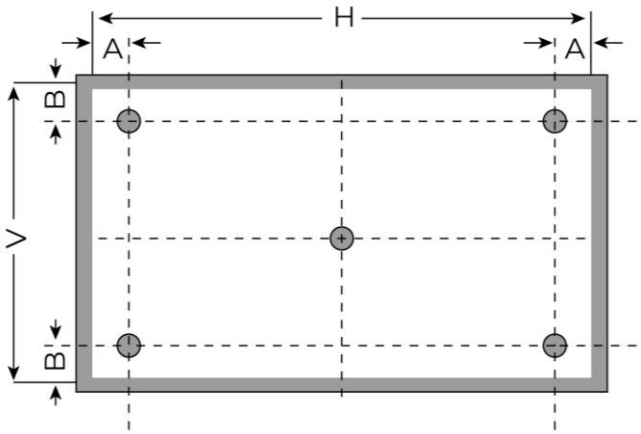


Figure 3. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity



A: 5mm

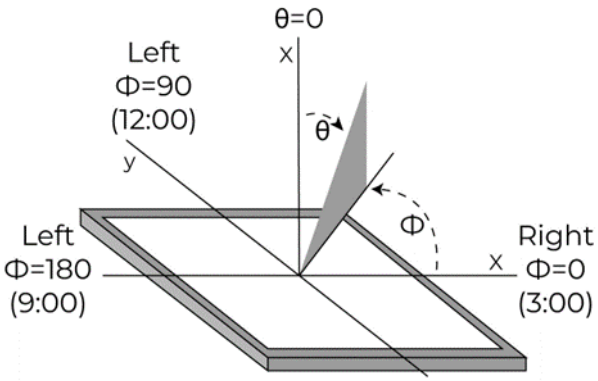
B: 5mm

H, V: Active Area

Light spot size Ø=5mm, 500mm distance from the LCD surface to detector lens.

Measurement instrument is SR-3A

Figure 4. The definition of viewing angle



10. INTERFACES DESCRIPTION

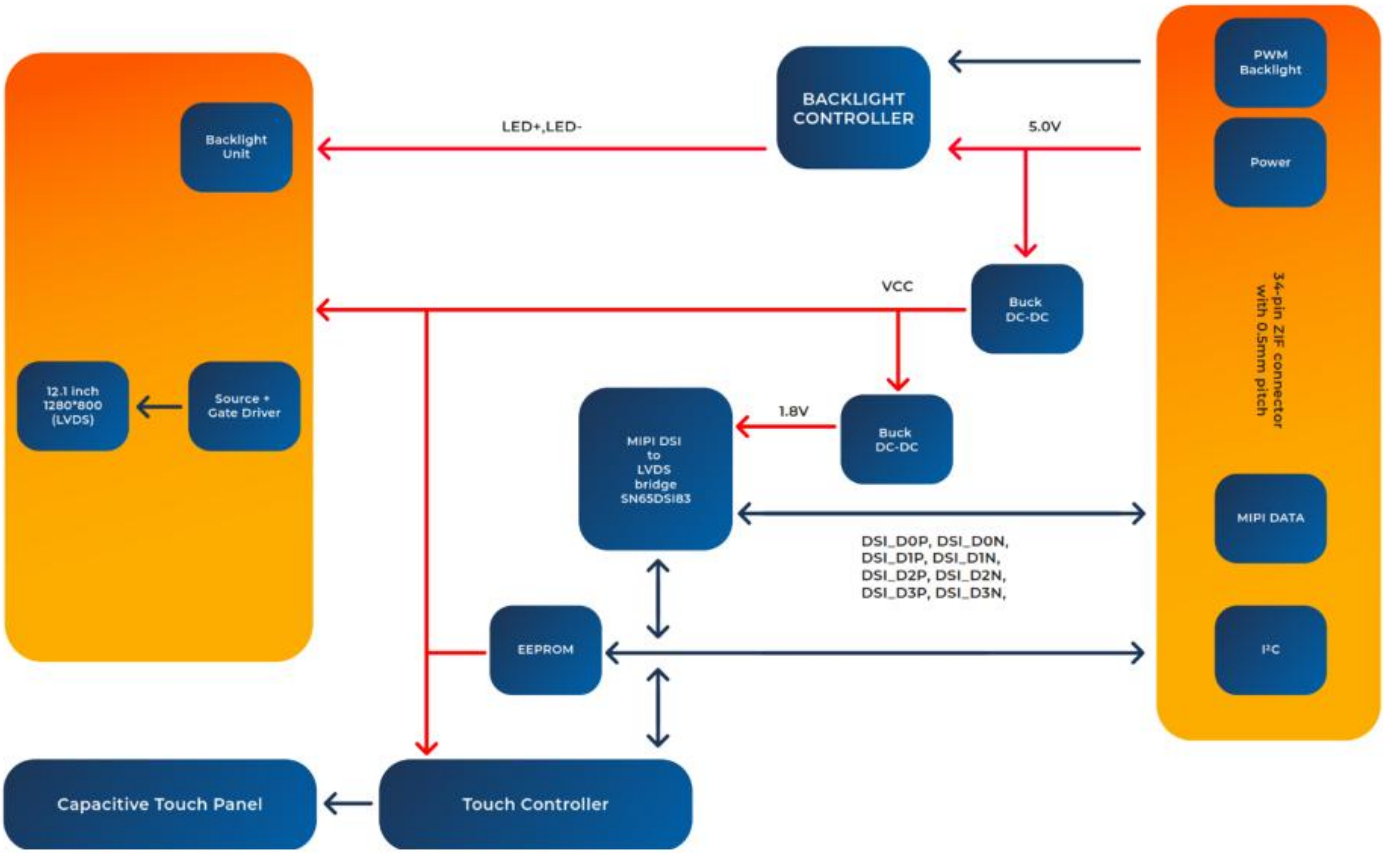
10.1 J1 connector

PIN NO.	CONNECTOR	I/O/P	DESCRIPTION	NOTE
1	GND	P	Ground	
2	DSI_D0P	I/O	MIPI DSI differential data pair. (Data lane 0)	
3	DSI_D0N	I/O		
4	GND	P	Ground	
5	DSI_D1P	I	MIPI DSI differential data pair. (Data lane 1)	
6	DSI_D1N	I		
7	GND	P	Ground	
8	DSI_CLKP	I	MIPI DSI differential clock pair	
9	DSI_CLKN	I		
10	GND	P	Ground	
11	DSI_D2P	I	MIPI DSI differential data pair. (Data lane 2)	
12	DSI_D2N	I		
13	GND	P	Ground	
14	DSI_D3P	I	MIPI DSI differential data pair. (Data lane 3)	
15	DSI_D3N	I		
16	GND	P	Ground	
17	PWR_DN	I	Power down (With locally generated reset after releasing power-down) Active Low, display is off when signal is low;	Note 2
18	PWM	I	Backlight brightness control	Note 3
19	INT	O	Touch panel Interrupt signal; Open-drain output, active low	Note 2
20	I2C_SCL	I	I2C clock signal	
21	I2C_SDA	I/O	I2C data signal	
22	RESET	I	Touch panel reset	
23	NC	/	No connection	
24	V_{REF}	P	Reference voltage	
25	NC	/	No connection	

26	5.0V	P	Power supply V_{DD}	
27				
28				
29				
30	GND	P	Ground	
31	NC	/	No connection	
32				
33				
34				

Note 1. Matched 34 pins, 0.5 mm pitch, 150mm long FFC accessory: FFC0534150.
Note 2. Internally pull-up with 15K resistor to V_{REF}.
Note 3.Backlight driver is TPS61500. PWM frequency range: 200Hz-1KHz.
0% PWM duty cycle corresponds to minimum brightness.
100% PWM duty cycle corresponds to maximum brightness.

11. DIAGRAM BLOCK



12. TFT TIMING CHARACTERISTICS

The TFT of the module applies Riverdi high brightness, IPS, 12.1" TFT: RVT121HVLNWC00-B

For detailed information of the display, please refer to datasheet of display.

12.1 Timing table

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Clock Frequency (Rate=60Hz (LVDS))	F_{DCLK}	66.3	72.4	78.9	MHz
HSYNC Period Time	T_H	1380	1440	1500	DCLK
Horizontal Display area	T_{HD}		1280		DCLK
Hsync Pulse Width	T_{HPW}	2	-	40	Tc
Hsync Back Porch (With pulse width)	T_{HBP}	88	88	88	DCLK
Hsync Front Porch	T_{HFP}	12	72	132	DCLK
VSYNC Period Time	T_V	824	838	872	H
Vertical Display area	T_{VD}		800		
Vsync Pulse Width	T_{VW}	2	-	20	
Vsync Back Porch (With pulse width)	T_{VBP}	23	23	23	
Vsync Front Porch	T_{VFP}	1	15	49	

13. CAPACITIVE TOUCH SCREEN PANEL SPECIFICATIONS

13.1 Mechanical characteristics

DESCRIPTION	SPECIFICATION	REMARK
Touch Panel Size	12.1 inch	uxTouch
Outline Dimension of CTP	275.56 mm x 178.46 mm	
Product Thickness	2.95 mm	
Glass Thickness	1.8 mm	
CTP View Area	260.52 mm x 162.60 mm	
Sensor Active Area	261.12 mm x 163.20 mm	
Surface Hardness	6H	

13.2 Electrical characteristics

DESCRIPTION	SPECIFICATION	REMARK
Linearity	+/- 1.5mm	
Controller	ILI2511	
Resolution	1280 x 800	

14. INSPECTION

Standard acceptance/rejection criteria for TFT module

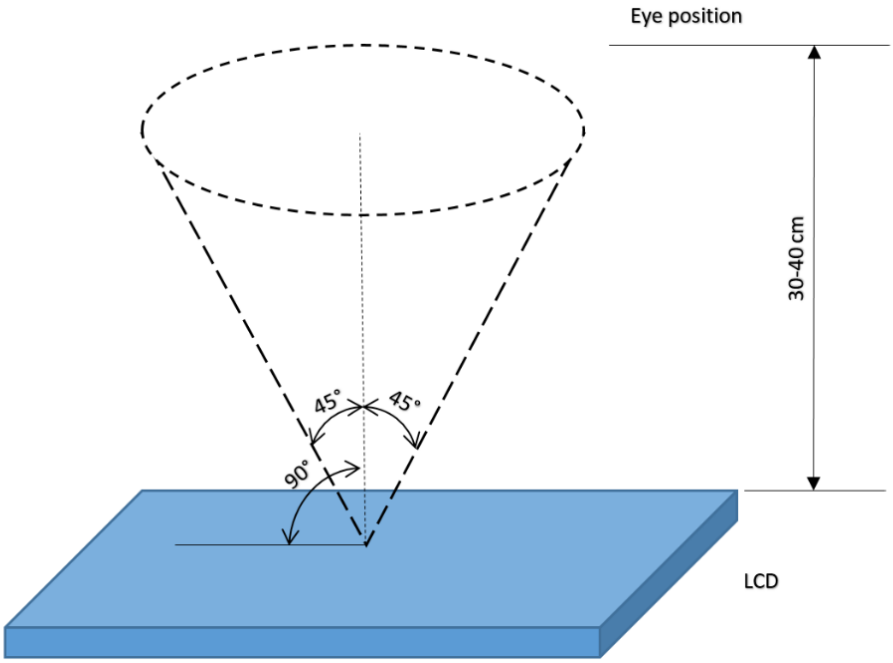
14.1 Inspection condition

Ambient conditions:

- Temperature: 25 ± 2°C
- Humidity: (60 ± 10) %RH
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

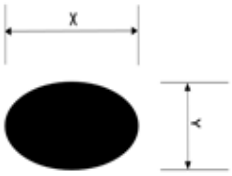
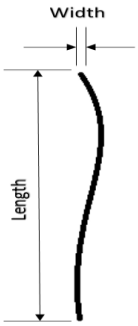
Viewing distance: 35 ± 5cm between inspector bare eye and LCD.

Viewing Angle: U/D: 45°/45°, L/R: 45°/45°



14.2 Inspection standard

The LCD TFT has zero bad pixels. Please refer the item “Bright/Dark dots ”.

<table>
<tr><th>ITEM</th><th colspan="4">CRITERION</th></tr>
<tr><td rowspan="5">Black spots, white spots, light leakage, Foreign Particle (round Type)</td><td rowspan="5"> 
D=(x+y)/2
Spots density: 10 mm</td><td colspan="3">Size =12.1”</td></tr>
<tr><td colspan="2">Average Diameter</td><td>Qualified Qty</td></tr>
<tr><td colspan="2">D ≤ 0.2 mm</td><td>Ignored</td></tr>
<tr><td colspan="2">0.2 mm < D ≤ 0.3 mm</td><td>N≤5</td></tr>
<tr><td colspan="2">0.5mm < D</td><td>Not allowed</td></tr>
<tr><td rowspan="5">LCD black spots, white spots, light leakage (line Type)</td><td rowspan="5"> 
Spots density: 10 mm</td><td colspan="3">Size =10.1”</td></tr>
<tr><td>Length</td><td>Width</td><td>Qualified Qty</td></tr>
<tr><td>-</td><td>W ≤ 0.05</td><td>Ignored</td></tr>
<tr><td>L ≤ 5.0</td><td>0.05< W ≤ 0.1</td><td>N ≤ 3</td></tr>
<tr><td>5.0 < L</td><td>0.10< W
5.0 < L</td><td>N = 0</td></tr>
<tr><td rowspan="6">Bright/Dark Dots</td><td colspan="4">Size = 12.1”</td></tr>
<tr><td colspan="2">Item</td><td colspan="2">Qualified Qty</td></tr>
<tr><td colspan="2">Bright dots</td><td colspan="2">0</td></tr>
<tr><td colspan="2">Dark dots</td><td colspan="2">0</td></tr>
<tr><td colspan="2">Cluster Bright Dots or Dark Dots</td><td colspan="2">0</td></tr>
<tr><td colspan="2">Total Bright and Dark Dots</td><td colspan="2">0</td></tr>
<tr><td rowspan="7">Clear spots</td><td colspan="4">Size = 12.1”</td></tr>
<tr><td colspan="2">Average Diameter</td><td colspan="2">Qualified Qty</td></tr>
<tr><td colspan="2">D < 0.2 mm</td><td colspan="2">Ignored</td></tr>
<tr><td colspan="2">0.2 mm < D < 0.3 mm</td><td colspan="2">4</td></tr>
<tr><td colspan="2">0.3 mm < D < 0.5 mm</td><td colspan="2">2</td></tr>
<tr><td colspan="2">0.5 mm < D</td><td colspan="2">0</td></tr>
<tr><td colspan="4">Spots density: 10 mm</td></tr>
<tr><td rowspan="5">Touch panel spot</td><td colspan="4">Size = 12.1”</td></tr>
<tr><td colspan="2">Average Diameter</td><td colspan="2">Qualified Qty</td></tr>
<tr><td colspan="2">D < 0.25 mm</td><td colspan="2">Ignored</td></tr>
<tr><td colspan="2">0.25 mm < D < 0.5 mm</td><td colspan="2">N≤5</td></tr>
<tr><td colspan="2">0.5 mm < D</td><td colspan="2">0</td></tr>
<tr><td rowspan="5">Touch panel White line Scratch</td><td colspan="4">Size ≥ 5"</td></tr>
<tr><td>Length</td><td>Width</td><td colspan="2">Qualified Qty</td></tr>
<tr><td>-</td><td>W < 0.03</td><td colspan="2">Ignored</td></tr>
<tr><td>L < 5.0</td><td>0.03 < W < 0.05</td><td colspan="2">N≤5</td></tr>
<tr><td>-</td><td>0.05 < W</td><td colspan="2">0</td></tr>
</table>

15. RELIABILITY TEST

NO.	TEST ITEM	TEST CONDITION	NOTE
1	High Temperature Storage	80°C/120 hours	Note 1
2	Low Temperature Storage	-30°C/120 hours	
3	High Temperature Operating	70 °C /120 hours	
4	Low Temperature Operating	-20°C/120 hours	
5	High Temperature and High Humidity	Humidity 40℃, 90%RH, 120Hrs	
6	Thermal Cycling Test (No operation)	-20℃ for 30min, 70℃ for 30 min. 100 cycles. Then test at room temperature after 1 hour	Note 2
7	Vibration Test	Frequency: 10 ÷ 55 Hz. Stroke: 1.5 mm. Sweep: 10Hz ÷ 55Hz ÷ 10 Hz. 2 hours for each direction of X, Y, Z (Total 6 hours)	
8	Package Drop Test	Height: 60 cm 1 corner, 3 edges, 6 surfaces	

Note 1. Sample quantity for each test item is 5 ÷ 10 pcs.

Note 2. Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

16.LEGAL INFORMATION

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Riverdi grants the guarantee for the proper operation of the goods for a period of 12 months from the date of possession of the goods. If in a consequence of this guaranteed execution the customer has received the defects-free item as replacement for the defective item, the effectiveness period of this guarantee shall start anew from the moment the customer receives the defects-free item.

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