



RVT50HQLNWCA0 HB, IPS LVDS 5.0" LCD TFT DATASHEET

Rev.1.0
2022-11-23

ITEM	CONTENTS	UNIT
LCD Type	TFT/Transmissive/Normally black/IPS	/
Size	5.0	Inch
Viewing Direction	Free	/
Outside Dimensions (W x H x D)	120.70 x 75.80 x 5.40	mm
Active Area (W x H)	108.00 x 64.80	mm
Pixel Pitch (W x H)	0.135 x 0.135	mm
Resolution	800 x 480 (RGB)	/
Brightness	800	cd/m ²
LCD Interface Type	LVDS (6/8-bit)	/
Color Depth	16.7 M	/
Pixel Arrangement	RGB Vertical Stripe	/
LCD Driver	ST7262-G4	/
With/Without Touch	With Projected Capacitive Touch Panel	/
CTP Driver	ILI2132A	/
Touch Interface	USB /I2C/ Optional UART	/
LCD Input Voltage	3.3	V
Weight	TBD	g

Note 1. RoHS3 compliant

Note 2. LCM weight tolerance: $\pm 5\%$.



1. REVISION RECORD

REV NO.	REV DATE	CONTENTS	REMARKS
1.0	2022-11-23	Initial Release	



2. CONTENTS

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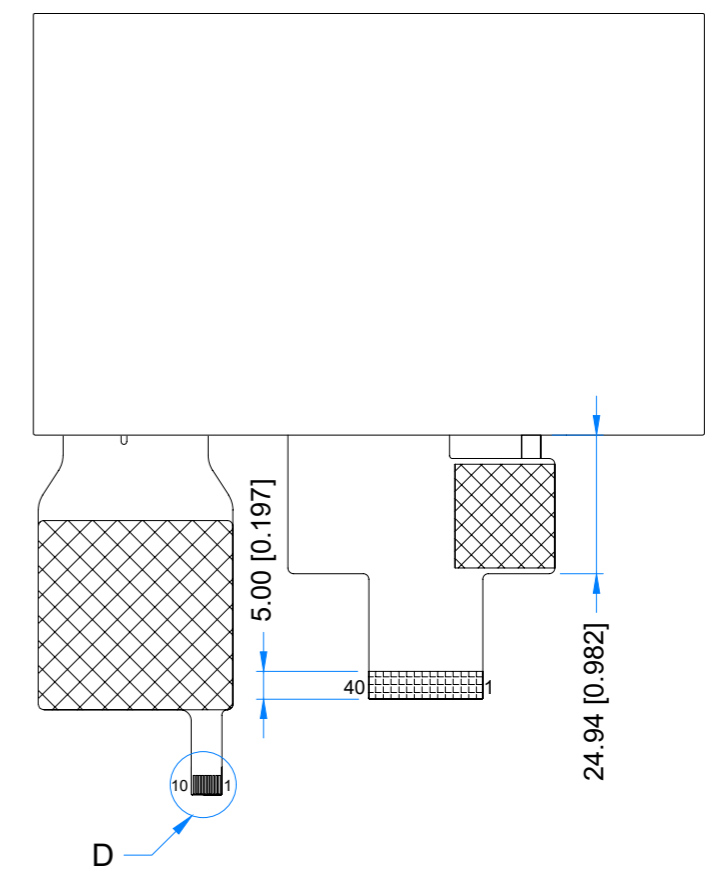
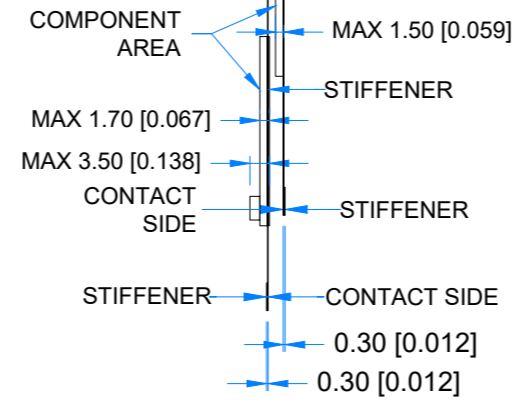
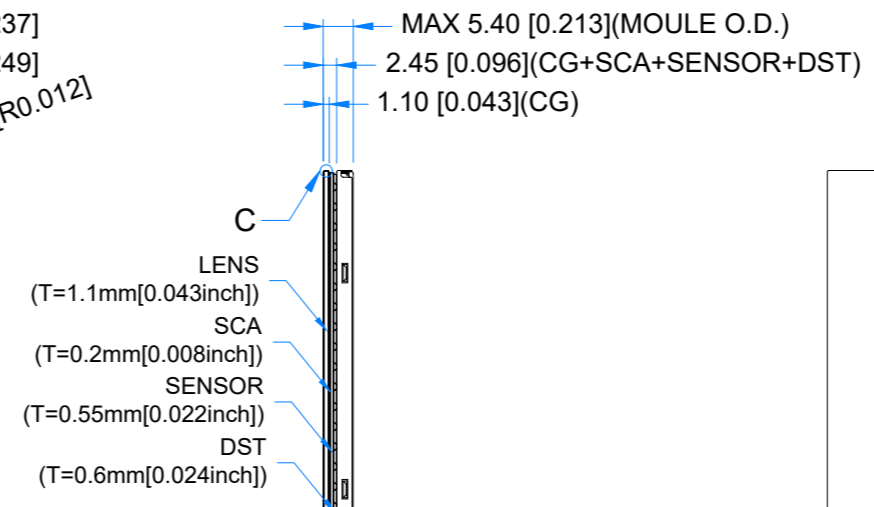
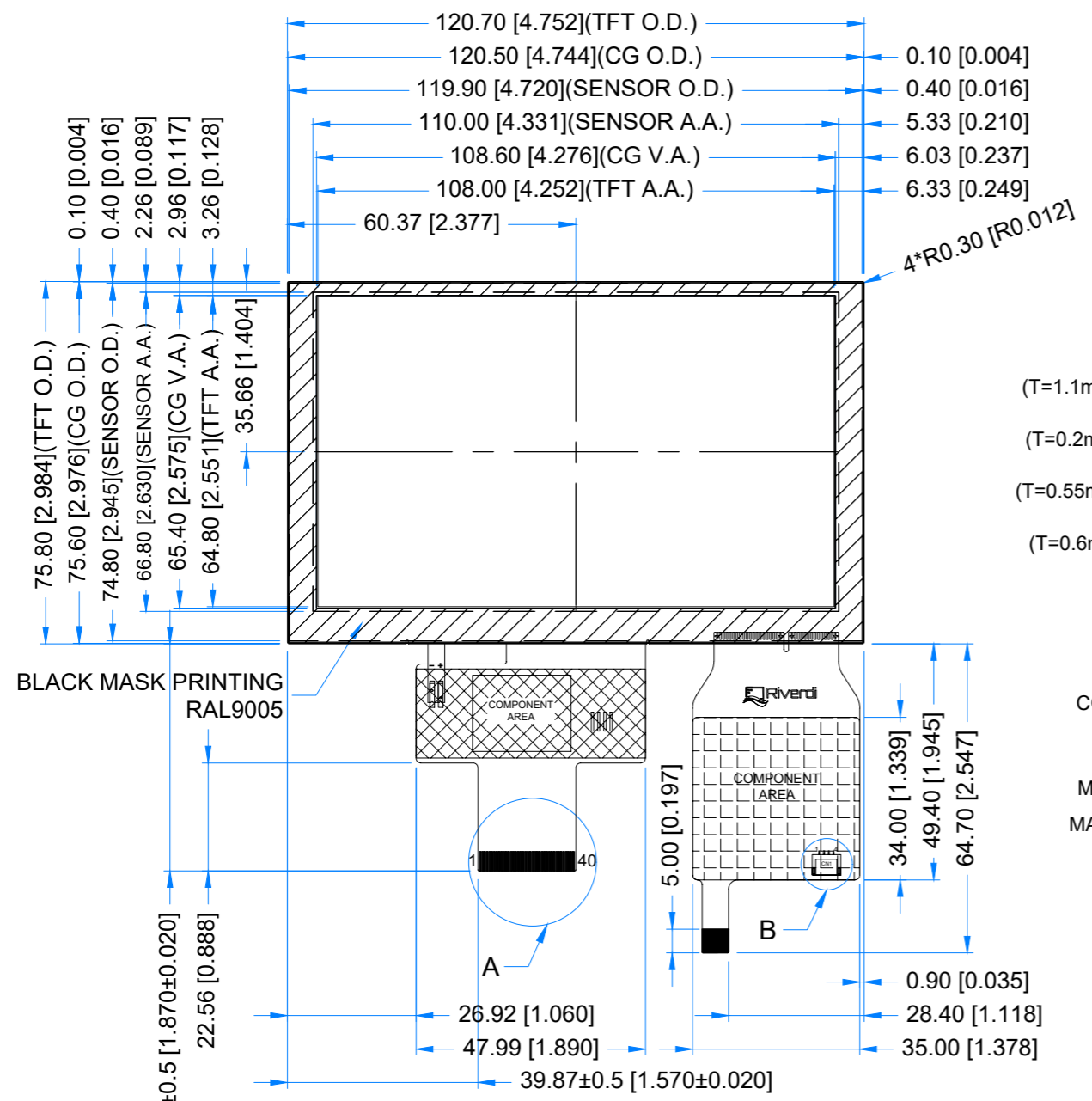


3. MODULE CLASSIFICATION INFORMATION

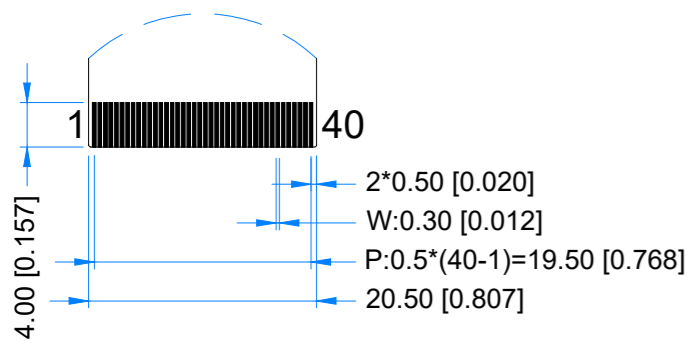
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1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

NO.	PARAMETER	SYMBOL
1.	BRAND	RV – Riverdi
2.	PRODUCT TYPE	T – TFT Standard
3.	DISPLAY SIZE	50 – 5.0"
4.	MODEL SERIAL NO.	H – High Brightness, IPS
5.	RESOLUTION	Q – 800 x 480 px
6.	INTERFACE	L – TFT LCD, LVDS
7.	FRAME	N – Without Mounting Metal Frame
8.	BACKLIGHT TYPE	W – LED White
9.	TOUCH PANEL	C – With Capacitive Touch Panel
10.	VERSION	A0 – aTouch

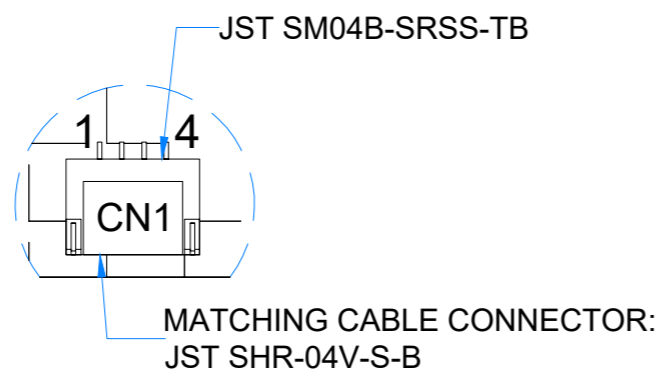
Revision:	Changes:	Date:
1.0	Initial Case	2022.09.21



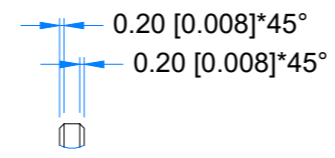
DETAIL A
SCALE 2:1



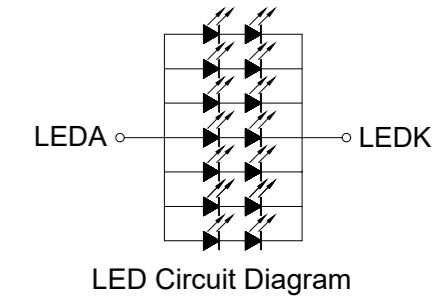
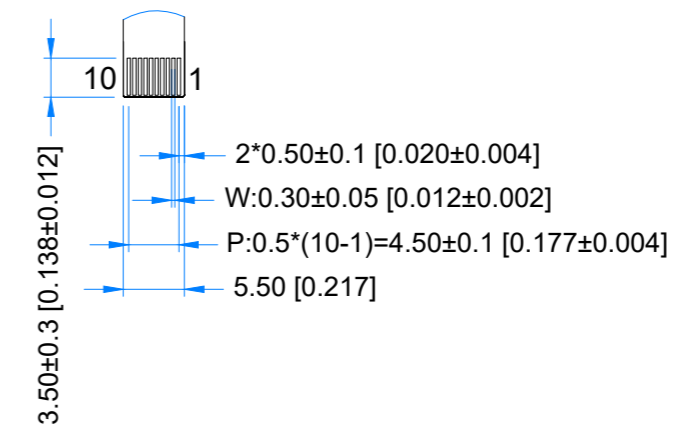
DETAIL B
SCALE 4:1



DETAIL C
SCALE 4:1



DETAIL D
SCALE 2:1



TFT NOTES:

1. DISPLAY TYPE: TRANSMISSIVE, NORMALLY BLACK,IPS
2. RESOLUTION: 800x480
3. VIEWING ANGLE: FREE
4. MODULE SURFACE LUMINANCE: 800cd/m²
5. DRIVER IC: ST7262-G4
6. BACKLIGHT: 14LEDS, V_f=12.0V, I_f=140mA

TP NOTES:

1. TP STRUCTURE: G+G
2. CG THICKNESS: 1.10mm [0.043inch]
3. DRIVER IC: ILI2132A
4. INTERFACE: USB; I2C; OPTIONAL UART
5. OPERATING VOLTAGE: 3.3V(I2C); 5.0V(USB)

GENERAL NOTES:

1. AIR BONDING BETWEEN TFT AND PCAP
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: RVT50HQLNWCA0			
SN:			
DRAWN: M.Natywa	2022.09.21	1:1.36	
CHECKED: Carol Gao	2022.09.27	[mm]	
APPR:		ISO A3	



5. ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Operating Ambient temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C
Operating Ambient Humidity	H_{OP}	10	90	% RH
Power for Circuit Driving	V_{DD}	-0.3	5	V
Backlight Forward Current	I_{LED}	-	25	mA

Note. The above are maximum values. If exceeded, they may cause permanent damage to the unit.

6. ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Power Supply for analog circuit	V_{DD}	3.0	3.3	3.6	V
Logic Input Voltage	Low Voltage	V_{IL}	0	$0.3V_{DD}$	
	High Voltage	V_{IH}	$0.7V_{DD}$	V_{DD}	
Logic Output Voltage	Low Voltage	V_{OL}	-	$GND+0.4$	
	High Voltage	V_{OH}	$V_{DD} - 0.4$	-	
Power Consumption	Black Mode	P_b	80	100	mA
	Standby Mode	P_w	40	50	μA

7. BACKLIGHT ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Backlight Driving Voltage	V_F	11.2	12.0	12.8	V	Notes 1, 2
Backlight Driving Current	I_F	-	140	-	mA	
Backlight Power Consumption	W_{BL}	-	1680	-	mW	
Backlight Lifetime	-	-	50,000	-	hours	Note 3

Note 1. Unless specified, the ambient temperature $T_a = 25^\circ\text{C}$

Note 2. The recommended operating conditions refer to a range in which operation of this product is guaranteed. The operation cannot be guaranteed if the absolute maximum values exceed.

Note 3. If LED is driven by high current, high ambient temperature and humidity condition, the lifetime of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating lifetime is estimated data.



8. ELECTRO-OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	RMK	NOTE
Response Time	Tr+Tf	$\theta=0^\circ$ $\varnothing=0^\circ$ Ta=25 °C	-	30	40	ms	FIG 1.	4, 7
Contrast Ratio	Cr		800	1000	-	---	FIG 2.	1, 7
Luminance Uniformity	δ WHITE		75	80	-	%		3, 7
Surface Luminance	Lv		-	800	-	cd/m ²		2, 7
Viewing Angle Range	θ	$\varnothing = 90^\circ$	-	80	-	deg	FIG 3.	6
		$\varnothing = 270^\circ$	-	80	-	deg		
		$\varnothing = 0^\circ$	-	80	-	deg		
		$\varnothing = 180^\circ$	-	80	-	deg		
CIE (x, y) Chromaticity	Rx	$\theta=0^\circ$ $\varnothing=0^\circ$ Ta=25 °C	0.575	0.615	0.655	-	FIG 2.	5, 7
	Ry		0.296	0.336	0.376	-		
	Gx		0.352	0.392	0.432	-		
	Gy		0.512	0.552	0.592	-		
	Bx		0.100	0.140	0.180	-		
	By		0.085	0.125	0.165	-		
	Wx		0.274	0.316	0.358	-		
	Wy		0.294	0.336	0.378	-		

Note 1. Contrast Ratio (CR) is defined mathematically as below, for more information see Figure 2.

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

Note 2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see Figure 2.

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

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 2.

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

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 1. 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 make average value.

Note 6. For TFT module, viewing angle is the angle at which the contrast ratio is greater 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 3.

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.

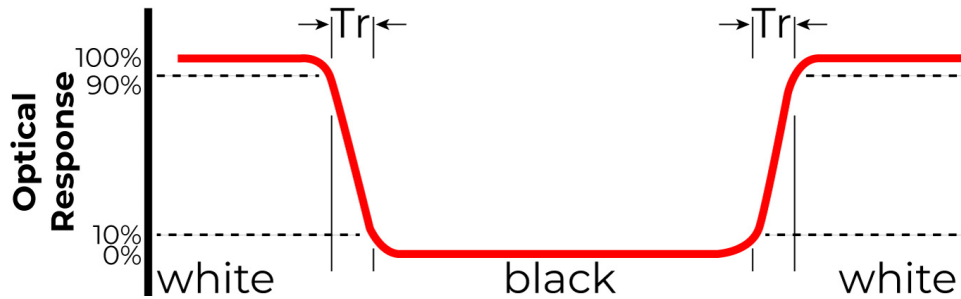


Figure 1. The definition of response time

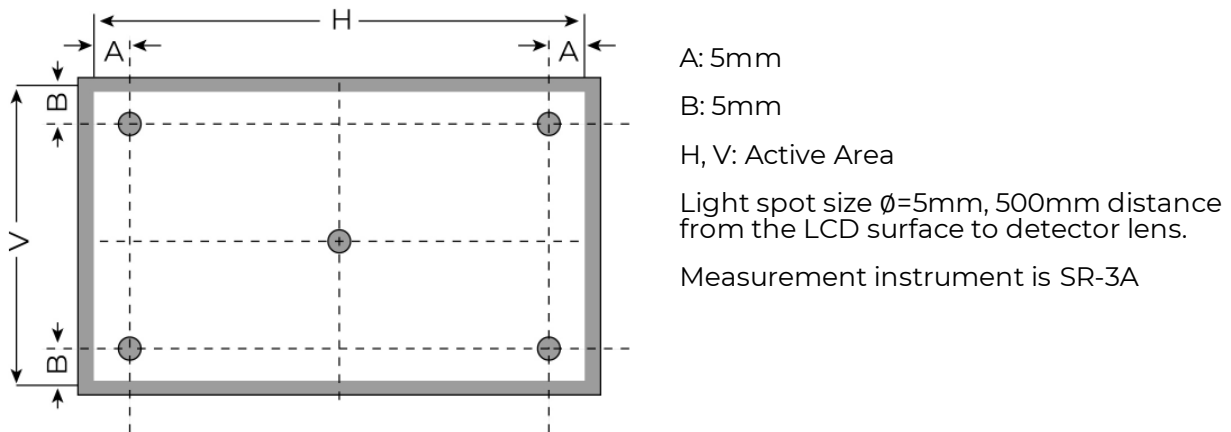


Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x,y) chromaticity

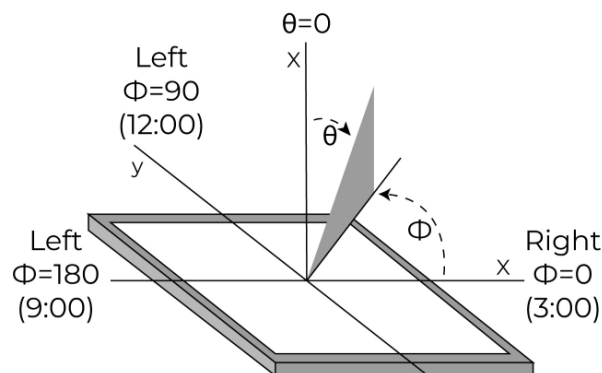
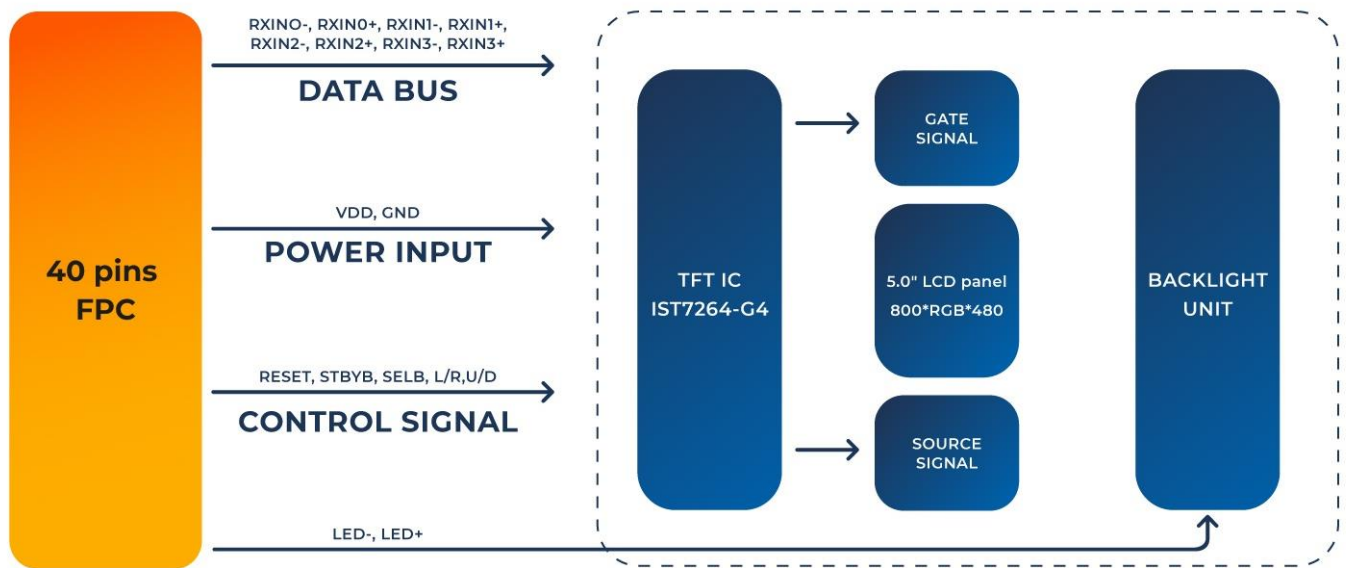


Figure 3. The definition of viewing angle

9. BLOCK DIAGRAM



10. INTERFACES DESCRIPTION

10.1 TFT assignment

Matched Riverdi ZIF connector: ZIF0540UH

PIN	SYMBOL	I/O	DESCRIPTION	NOTE
1	NC	-	No connection	
2, 3	VDD	P	Power voltage for digital circuit	
4	NC	-	No connection	
5	RESET	I	Global reset pin	
6	STBYB	I	Standby mode setting normally pulled high. STBYB=0: Standby mode STBYB=1: Normal mode	
7	GND	P	Ground	
8	RXIN0-	I	-LVDS differential data input	
9	RXIN0+	I	+LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	-LVDS differential data input	
12	RXIN1+	I	+LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	-LVDS differential data input	
15	RXIN2+	I	+LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	-LVDS differential clock input	
18	RXCLKIN+	I	+LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	-LVDS differential data input	
21	RXIN3+	I	+LVDS differential data input	
22	GND	P	Ground	
23, 24	NC	-	No connection	
25	GND	P	Ground	



26, 27	NC	-	No connection	
28	SELB	I	6-bit /8-bit mode select. Set 'LOW' for 6-bit data input mode, Set 'HIGH' for 8-bit data input mode (Default)	
29	NC	-	No connection	
30	GND	P	Ground	
31, 32	LED-	P	Backlight LED Cathode	
33	L/R	I	Horizontal inversion	Note 1
34	U/D	I	Vertical inversion	
35-38	NC	-	No connection	
39, 40	LED+	P	Backlight LED Anode	

Note 1. U/D L/R Function Description

SCAN CONTROL INPUT		SCANNING DIRECTION
U/D	L/R	
H (default)	H (default)	From up to down, from left to right
H	L	From up to down, from right to left
L	H	From down to up, from left to right
L	L	From down to up, from right to left

10.2 Touch panel assignment

Matched Riverdi ZIF connector: ZIF0510DH-CF25

PIN NO.	SYMBOL	DESCRIPTION	NOTE
1	USB_GND	USB_Ground	
2	USB_VDD	USB Power for CTP, 5.0V	Note 1
3	USB_D-	USB _Data Signal -	
4	USB_D+	USB _Data Signal +	
5	I2C_GND	I2C _Ground	
6	I2C_VDD	I2C _Power for CTP, 3.3 V	Note 1
7	I2C_RST	I2C _Reset Pin, Active low	Note 2
8	I2C_SCL	I2C _Clock Input	
9	I2C_INT	I2C _Interrupt Signal from CTP, Active low	
10	I2C_SDA	I2C _Data Signal	

Note 1. Please do not supply power to both USB_VDD and I2C_VDD at the same time, Otherwise, there is a risk that the LDO on the PCAP FPC will be destroyed.

Note 2. External pull-up resistors are required.

10.3 CON1 assignment

Matched PCAP USB programing cable accessory: RVA-PCAP-USB-CABLE

PIN NO.	SYMBOL	DESCRIPTION	NOTE
1	USB_VDD	USB_Power for CTP, DC 5.0V	Note 1
2	USB_D-	USB _Data Signal -	
3	USB_D+	USB _Data Signal +	
4	USB_GND	USB_Ground	



Note 1. If USD_VDD of CON1 is powered, please make sure to disconnect the PCAP FPC from the PCAP ZIF connector on your application.

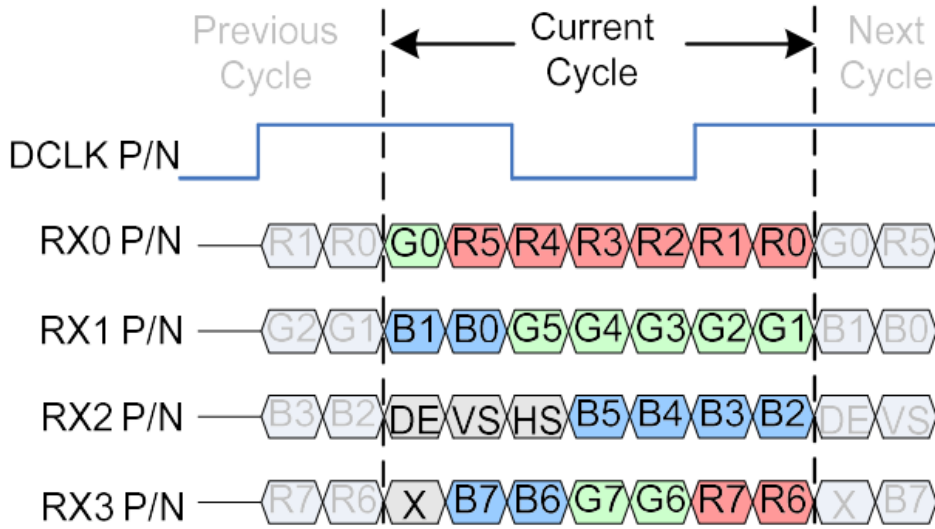
Otherwise, there is a risk that the LDO on the PCAP FPC will be destroyed.

11. TIMING CHARACTERISTICS

11.1 System bus timing for LVDS interface

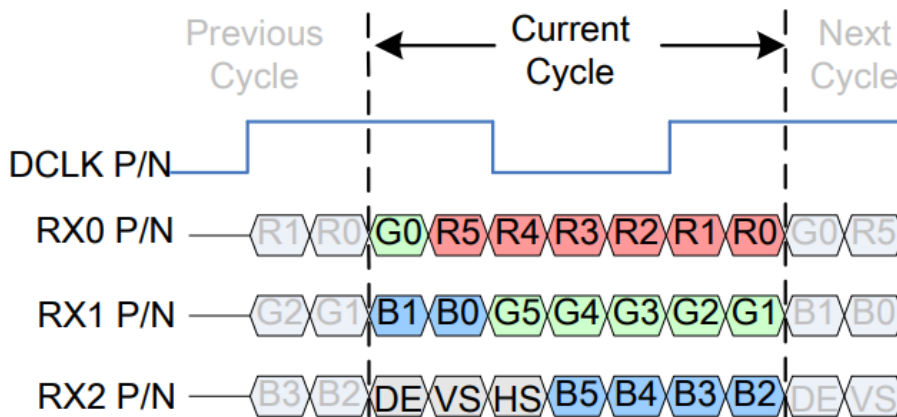
11.1.1 4Lane VESA Data Format Color Bit Map

8-bit LVDS input mode, SELB='H'



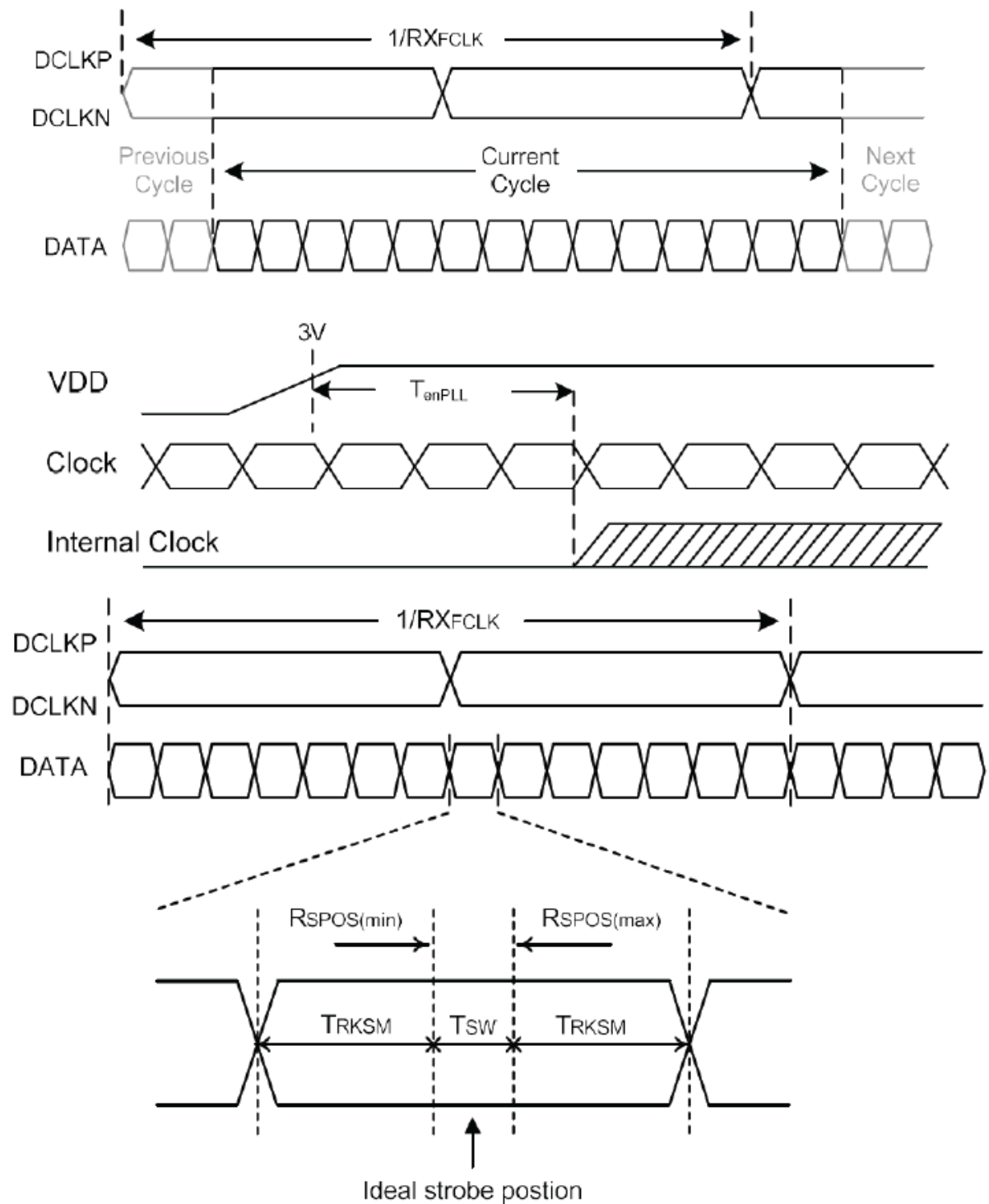
11.1.2 3Lane VESA Data Format Color Bit Map

6-bit LVDS input mode, SELB='L'





11.1.3 LVDS Input Timing



R_{RKSM} : Receiver strobe margin

R_{SPOS} : Receiver strobe position

T_{SW} : Strobe width (internal DATA sampling window)



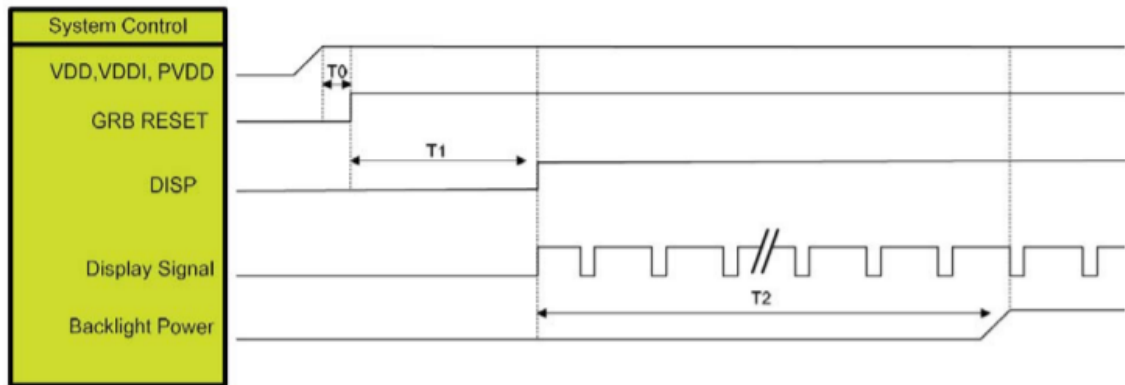
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Clock Frequency	RX _{FCLK}	23	25	27	MHz
Input Data Skew Margin	T _{RKSM}	400	-	-	ps
Clock High Time	T _{LVGH}	4/(7 x RXfclk)			ns
Clock Low Time	T _{LVGL}	3/(7 x RXfclk)			ns
PLL Wake-up Time	T _{enPLL}	-	-	150	μs
LVDS Spread Spectrum Clocking (SSC) Tolerance of LVDS Receiver					
Modulation Frequency	SSC _{MF}	-	-	100	KHz
Modulation Rate	SSC _{MR}	-	-	±3	%

11.2 Timing Table

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
DCLK Frequency	Fclk	23	25	27	MHz
HSYNC	Period Time	Th	816	896	DCLK
	Display Period	Thdisp	800		
	H _{sync} Back Porch	Thbp	8	48	
	H _{sync} Front Porch	Thfp	8	48	
	H _{sync} Pulse Width	Thw	4	8	
VSYNC	Period Time	Tv	496	504	HSYNC
	Display Period	Tvdisp	480		
	V _{sync} Back Porch	Tvbp	8	12	
	V _{sync} Front Porch	Tvfp	8	12	
	V _{sync} Pulse Width	Tvw	4	8	

11.3 Power ON/OFF sequence

11.3.1 Power On sequence

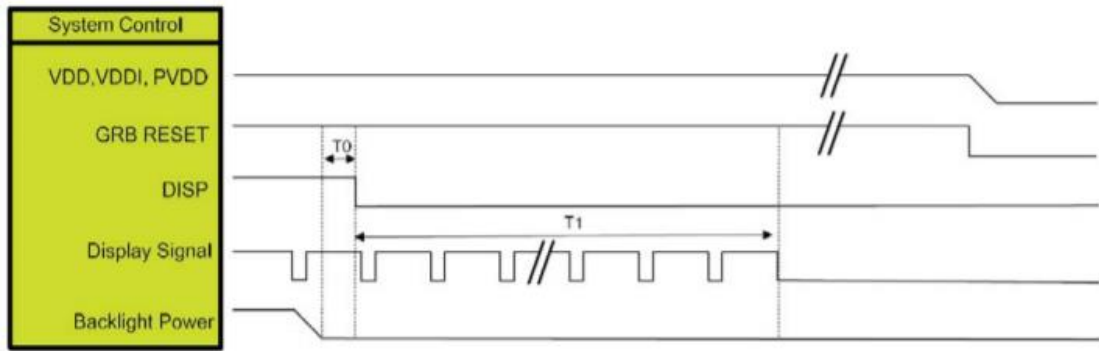


SYMBOL	DESCRIPTION	MIN. TIME	UNIT
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET=" High" to DISP=" High"	10	
T2	Display Signal output to Backlight Power on	250	

Note. LVDS interface Display signal: DCLK P/N; RX [3:0] P/N.



11.3.2 Power Off sequence



SYMBOL	DESCRIPTION	MIN. TIME	UNIT
T0	Backlight Power off to DISP="Low"	5	ms
T1	DISP="Low" to IC internal voltage discharge complete	100	

Note. LVDS interface Display signal: DCLK P/N; RX [3:0] P/N.

12. CAPACITIVE TOUCH SCREEN SPECIFICATIONS

12.1 Mechanical characteristics

DESCRIPTION	SPECIFICATION	REMARK
Touch Panel Size	5.0 inch	aTouch
Outline Dimension of CTP	120.50 mm x 75.60 mm	
Product Thickness	2.45 mm	
Glass Thickness	1.1 mm	
CTP View Area	108.60 mm x 65.40 mm	
Sensor Active Area	110.00 mm x 66.80 mm	
Structure type	Glass + Glass	
Surface Hardness	7H	

12.2 Electrical characteristics

DESCRIPTION	SPECIFICATION	
Power Consumption (IDD)	Active Mode	90 mA
	Sleep Mode	10 mA
Linearity	+/- 1.5mm	
Controller	ILI2132A	
Resolution	800 x 480	

13. INSPECTION

Standard acceptance/rejection criteria for TFT module

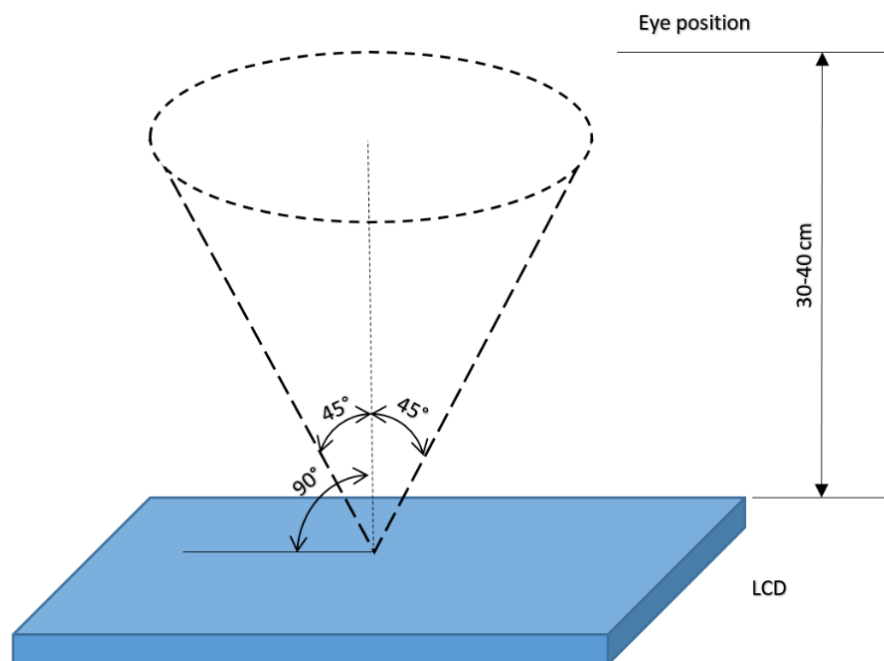
13.1 Inspection condition

Ambient conditions:

- Temperature: $25 \pm 2^{\circ}\text{C}$
- Humidity: $(60 \pm 10) \%RH$
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

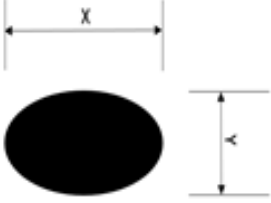
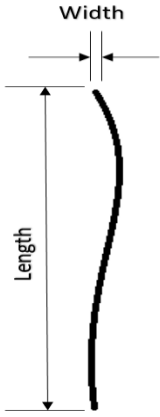
Viewing distance: $35 \pm 5\text{cm}$ between inspector bare eye and LCD.

Viewing Angle: U/D: $45^{\circ}/45^{\circ}$, L/R: $45^{\circ}/45^{\circ}$





13.2 Inspection standard

ITEM		CRITERION		
Black spots, white spots, light leakage, Foreign Particle (round Type)	 $D=(x+y)/2$ Spots density: 10 mm	3.5" ≤ Size ≤ 5"		
		Average Diameter	Qualified Qty	
		D ≤ 0.15 mm	Ignored	
		0.15 mm < D ≤ 0.3 mm	N≤3	
		0.3mm < D	Not allowed	
LCD black spots, white spots, light leakage (line Type)	 Spots density: 10 mm	3.5" ≤ Size ≤ 5"		
		Length	Width	Qualified Qty
		-	W ≤ 0.03	Ignored
		L ≤ 3.0	0.03 < W ≤ 0.05	2
		L ≤ 3.0	0.05 < W ≤ 0.1	1
		3.0 < L	0.1 < W	Not allowed
Bright/Dark Dots	3.5" ≤ Size ≤ 5"			
	Item	Qualified Qty		
	Bright dots	N ≤ 1		
	Dark dots	N ≤ 2		
Total Bright and Dark Dots		N ≤ 3		
Clear spots	Size ≤ 5"			
	Average Diameter	Qualified Qty		
	D < 0.2 mm	Ignored		
	0.2 mm < D < 0.3 mm	3		
	0.3 mm < D < 0.5 mm	2		
	0.5 mm < D	0		
Spots density: 10 mm				
Polarizer bubbles	3.5" ≤ Size ≤ 5"			
	Average Diameter	Qualified Qty		
	D ≤ 0.2 mm	Ignored		
	0.2 mm < D ≤ 0.3 mm	2		
	0.2 mm < D ≤ 0.5 mm	1		
	0.5 mm < D	0		
Total Q'ty		3		



Touch panel spots	Size ≤ 5"		
	Average Diameter		Qualified Qty
	D < 0.2 mm		Ignored
	0.2 mm < D < 0.4 mm		5
	0.4 mm < D < 0.5 mm		2
0.5 mm < D		0	
Touch panel white line scratch	Size ≤ 5"		
	Length	Width	Qualified Qty
	-	W < 0.02	Ignored
	L < 3.0	0.02 < W < 0.05	2
	L < 5.0	0.05 < W < 0.08	2
-	0.08 < W	0	

14. 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°C, 90%RH, 120Hrs	
6	Thermal Cycling Test (No operation)	-20°C for 30min, 70°C 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	
9	Electrostatic Discharge	±2KV, Human Body Mode, 100pF/1500Ω	

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

Note 2. The device is kept at room temperature for 2 hours prior to starting the test.



15. LEGAL INFORMATION

CE marking is usually obligatory only for a complete end product. Riverdi display modules are semi-finished goods which are used as inputs to become part of the finished products.

Therefore, Riverdi display modules are not CE marked.

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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