TFT MODULE SPECIFICATION

RVT101HVLNWN00

IPS LVDS 10.1" LCD TFT DATASHEET

Rev.1.3
2023-01-19

ITEM	CONTENTS	UNIT
LCD Type	TFT/Transmissive/Normally Black/IPS	/
Size	10.1	Inch
Viewing Direction	Free	/
Outside Dimensions (W x H x D)	229.46 x 149.10 x 7.50	mm
Active Area (W x H)	216.96 x 135.60	mm
Pixel Pitch (W x H)	0.1695 x 0.1695	mm
Resolution	1280 x 800 (RGB)	/
Brightness	1000	cd/m^2
Color Depth	16.7 M	/
Pixel Arrangement	RGB Vertical Stripe	/
LCD Driver	EK79202B	/
Interface	LVDS	/
With/Without Touch	Without Touch Panel	/
Weight	260	g

Note 1. RoHS3 compliant

Note 2. LCM weight tolerance: ± 5%.

1. REVISION RECORD

<table>
<tr><th>REV NO.</th><th>REV DATE</th><th>CONTENTS</th><th>REMARKS</th></tr>
<tr><td>1.0</td><td>2020-10-22</td><td>Initial Release</td><td></td></tr>
<tr><td>1.1</td><td>2021-05-26</td><td>Modify Electrical Specification and power on/off sequence</td><td></td></tr>
<tr><td>1.2</td><td>2021-07-28</td><td>Updating new template

Correcting the Operating/standby current
From:
<table>
<tr><td>Operating Current</td><td>$I_{VDD=3.3V}$</td><td>-</td><td>15</td><td>20</td><td>mA</td></tr>
<tr><td>Standby Current</td><td>I_{ST}</td><td>-</td><td>-</td><td>250</td><td>uA</td></tr>
</table>
To:
<table>
<tr><td>Operating Current</td><td>$I_{VDD=3.3V}$</td><td>-</td><td>280</td><td>420</td><td>mA</td></tr>
<tr><td>Standby Current</td><td>I_{ST}</td><td>-</td><td>1.5</td><td>2.0</td><td>mA</td></tr>
</table>
</td><td></td></tr>
<tr><td>1.3</td><td>2023-01-19</td><td>Modify DE signal: Active High</td><td></td></tr>
</table>

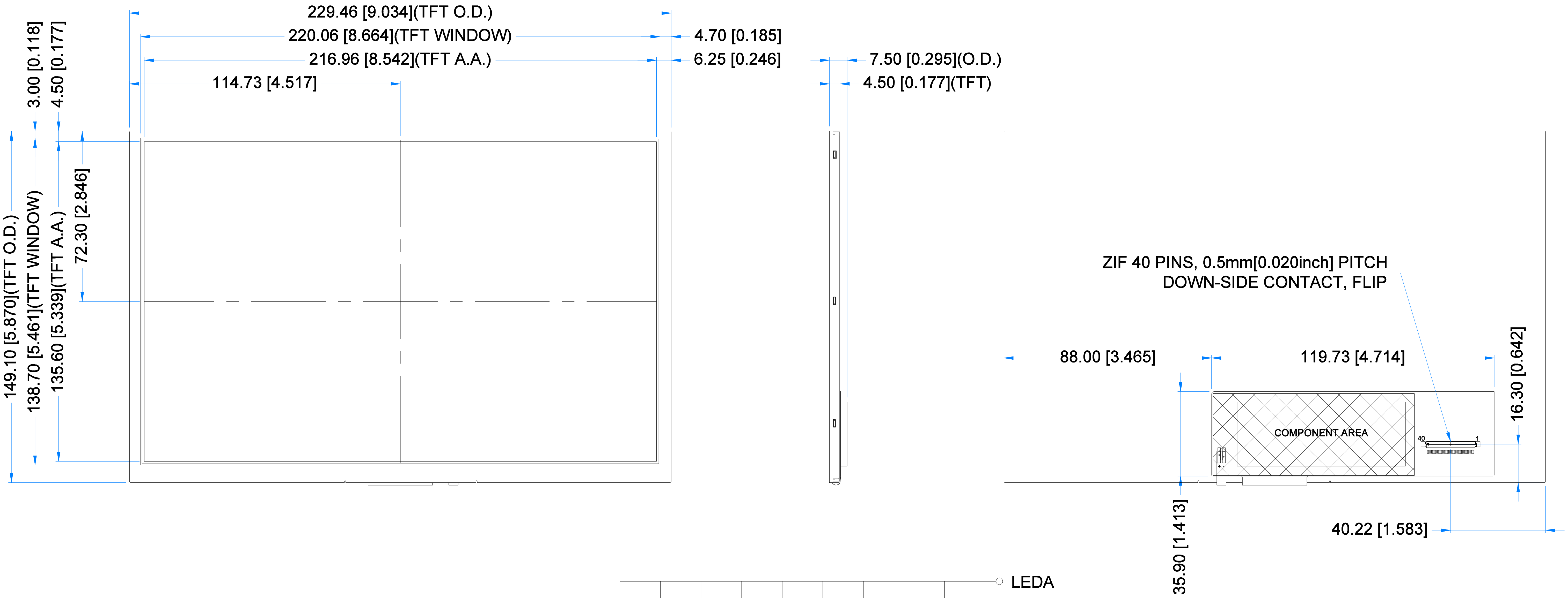
2. CONTENTS

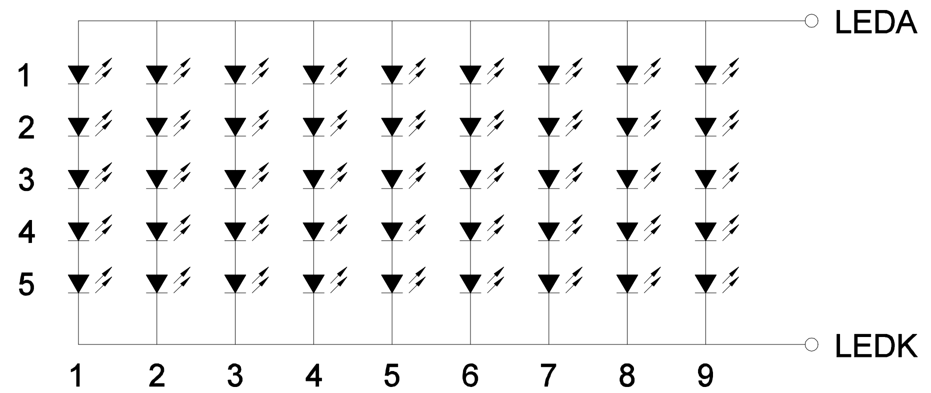
3. MODULE CLASSIFICATION INFORMATION

RV	T	101	H	V	L	N	W	N	00
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	101 – 10.1”
4.	MODEL SERIAL NO.	H – High Brightness, IPS
5.	RESOLUTION	V – 1280 x 800 px
6.	INTERFACE	L – TFT LCD, LVDS
7.	FRAME	N – Without Mounting Metal Frame
8.	BACKLIGHT TYPE	W – LED White
9.	TOUCH PANEL	N – Without Touch Panel
10.	VERSION	00 – (00-99)

Revision:	Changes:	Date:
1.0	Initial Case	2020.09.08
1.1	Dimensions Overhaul	2021.06.23





LED Diagram Circuit

TFT NOTES:

1. LCD TYPE: TRANSMISSIVE, NORMALLY BLACK, IPS
2. RESOLUTION: 1280x800
3. VIEWING ANGLE: FREE
4. DRIVING VOLTAGE: 3.3V
5. SURFACE LUMINANCE: 1000cd/m^2
6. BACKLIGHT: 45 LEDS, V_f=16.0V(TYP.), I_f=360mA
7. ZERO BAD PIXEL

GENERAL NOTES:

1. OPERATING TEMPERATURE: -20°C ~ 70°C
2. STORAGE TEMPERATURE: -30°C ~ 80°C
3. WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm[0.012inch]
4. RoHS COMPLIANT

PN: RVT101HVLNWN00			
SN:			
DRAWN: M.Natywa	2021.06.23	1:1.66	
CHECKED: K.Brodacka	2021.07.07	[mm]	
APPR:		ISO A3	P. 1 of 1

5. ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage for Module	VDD	-0.3	3.9	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	

Note 1. The absolute maximum rating values must not be exceeded at any times. The module MUST NOT be used when any of the absolute maximum ratings is exceeded.

The characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6. ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage	V_{DD}	2.6	3.3	3.6	V
Operating Current	$I_{VDD=3.3V}$	-	280	420	mA
Standby Current	I_{ST}	-	1.5	2.0	mA

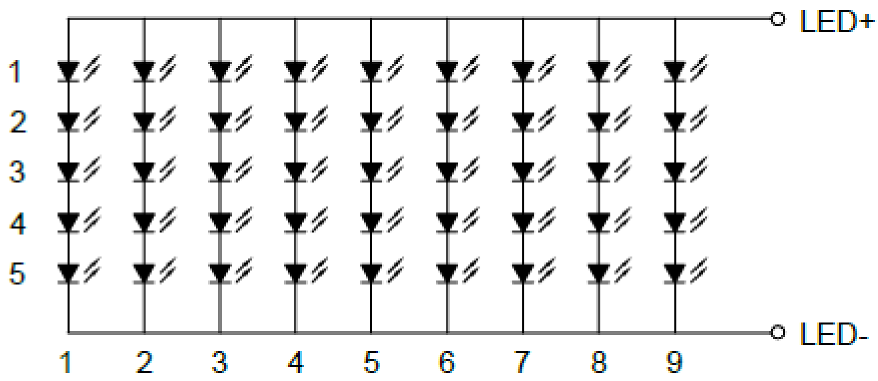
7. BACKLIGHT ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Backlight Driving Voltage	V_F	15.0	16.0	17.0	V	
Backlight Driving Current	I_F	315	360	405	mA	
Backlight Power Consumption	W_{BL}	-	5760	-	mW	
LED Lifetime	-	-	50,000	-	hours	Note 1

Note 1. Each LED: I_F =40 mA, V_F=3.2 ±0.2V.

Note 2. Optical performance should be evaluated at T_a=25 °C only.

Note 3. 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.



LED Diagram Circuit

8. 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 1.	4
Contrast Ratio	Cr		800	1000	-	---	FIG 2.	1
Luminance Uniformity	δ WHITE		-	75	-	%		3
Surface Luminance	Lv		-	1000	-	cd/m²		2
Viewing Angle Range	θ	⌀ = 90°	75	85	-	deg	FIG 3.	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 2.	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 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 = 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 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 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

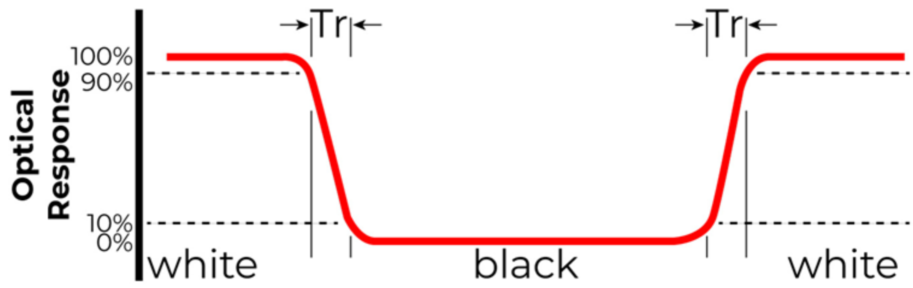
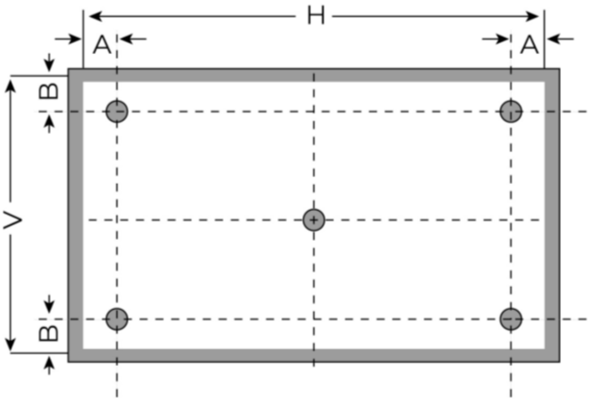


Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity



A: 5mm

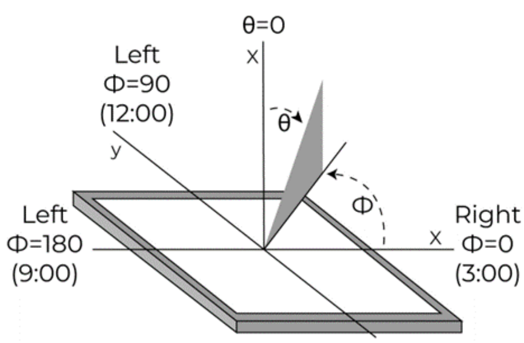
B: 5mm

H, V: Active Area

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

Measurement instrument is TOPCON'S luminance meter BM-5

Figure 3. The definition of viewing angle



9. INTERFACES DESCRIPTION

9.1 TFT assignment

Matched Riverdi ZIF connector: ZIF0540DH-CF25

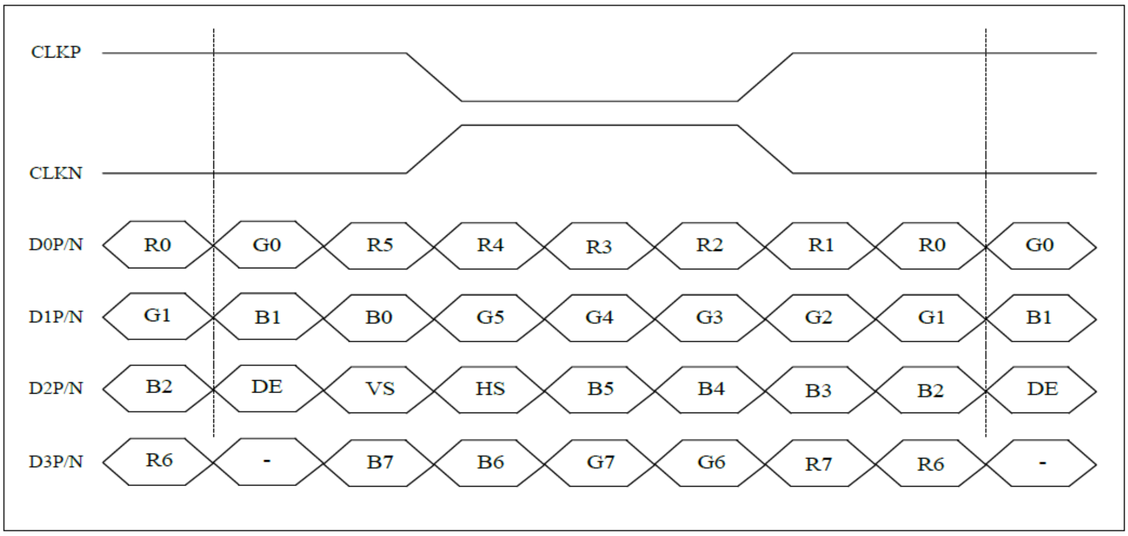
PIN NO.	SYMBOL	I/O	DESCRIPTION
1	NC	-	No Connection
2	V_{DD}	P	Power Supply, 3.3V
3	V_{DD}	P	Power Supply, 3.3V
4-6	NC	-	No Connection
7	GND	P	Ground
8	Rxin0-	I	-LVDS Differential Data Input
9	Rxin0+	I	+LVDS Differential Data Input
10	GND	P	Ground
11	Rxin1-	I	-LVDS Differential Data Input
12	Rxin1+	I	+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	RxCLK-	I	-LVDS Differential Data Input
18	RxCLK+	I	+LVDS Differential Data Input
19	GND	P	Ground
20	Rxin3-	I	-LVDS Differential Data Input
21	Rxin3+	I	+LVDS Differential Data Input
22	GND	P	Ground
23	NC	-	No Connection
24	NC	-	No Connection
25	GND	P	Ground
26-29	NC	-	No Connection
30	GND	P	Ground
31	LED-	P	LED Cathode
32	LED-	P	LED Cathode
33	NC	-	No Connection
34	NC	-	No Connection
35	NC	-	No Connection
36	NC	-	No Connection
37	NC	-	No Connection
38	NC	-	No Connection
39	LED+	P	LED Anode
40	LED+	P	LED Anode

Note 1. I: input, P:Power

10. TIMING CHARACTERISTICS

10.1 LVDS interface characteristic

VESA Format: 8-bit LVDS input, (LVBIT=H, LVFMT=H)



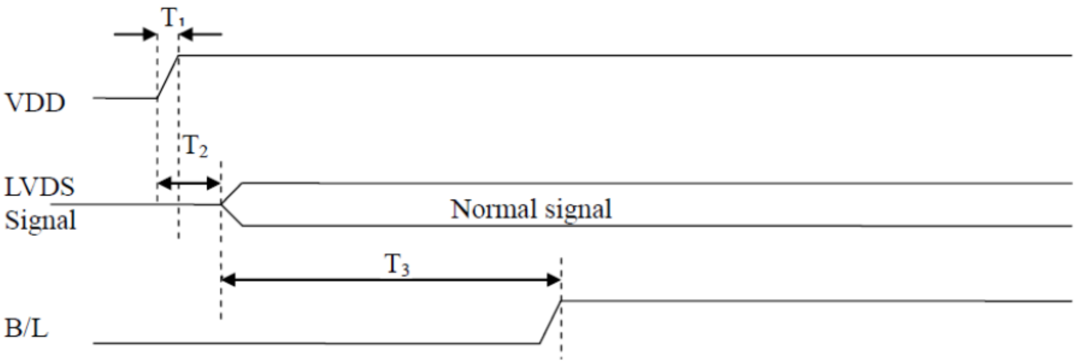
Note 1: Control signals DE: Active High VS HS: Active Low

10.2 Timing table

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Clock Frequency (Rate=60Hz (LVDS))	FDCLK	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}	1	-	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	
Vertical Display area	T_{VD}		800		H
Vsync pulse Width	T_{VW}	1	-	20	
Vsync Back Porch (With pulse width)	T_{VBP}	23	23	23	
Vsync Front Porch	T_{VFP}	1	15	49	

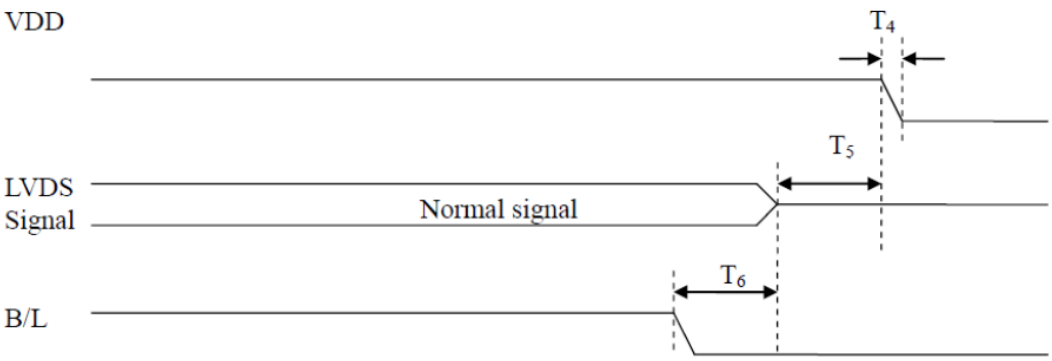
10.3 Power ON/OFF sequence

10.3.1 Power on sequence



PARAMETER	VALUE			UNIT
	MIN.	TYP.	MAX.	
T1	0.5	2	10	ms
T2	0	5	50	
T3	130	136	210	

10.3.2 Power off sequence



PARAMETER	VALUE			UNIT
	MIN.	TYP.	MAX.	
T4	0.5	2	10	ms
T5	0	7	50	
T6	0	2	100	

11. INSPECTION

Standard acceptance/rejection criteria for TFT module

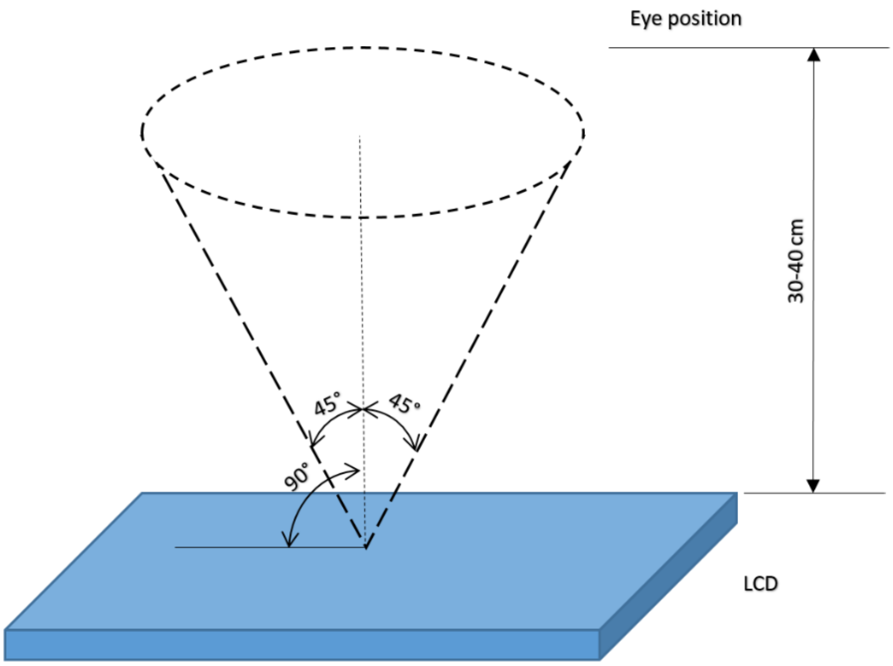
11.1 Inspection condition

Ambient conditions:

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

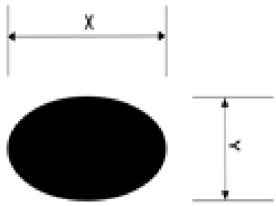
Viewing distance: 35 ± 5cm between inspector bare eye and LCD.

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



11.2 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 = 10.1”</td></tr>
<tr><td>Average Diameter</td><td colspan="2">Qualified Qty</td></tr>
<tr><td>D ≤ 0.2 mm</td><td colspan="2">Ignored</td></tr>
<tr><td>0.2 mm < D ≤ 0.3 mm</td><td colspan="2">N≤4</td></tr>
<tr><td>0.5mm < D</td><td colspan="2">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>Not allowed</td></tr>
<tr><td rowspan="6">Bright/Dark Dots</td><td colspan="4">Size = 10.1</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 ≥ 5.0”</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>
</table>

12. 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.

13. LEGAL INFORMATION

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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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