



RVT70HSLNWC00

IPS LVDS 7.0" LCD TFT Datasheet

Rev.1.0

2020-08-05

ITEM	CONTENTS	UNIT
LCD Type	TFT/Transmissive/Normally black/IPS	/
Size	7.0	Inch
Viewing Direction	Free	/
Outside Dimensions (W × H × D)	179.96 × 119.00 × 8.15	mm ³
Active Area (W × H)	154.21 × 85.92	mm ²
Pixel Pitch (W × H)	0.1506 × 0.1432	mm ²
Resolution	1024 (RGB) × 600	/
Brightness	800	cd/m ²
LCD Interface Type	LVDS	/
Color Depth	16.7 M	/
Pixel Arrangement	RGB Vertical Stripe	/
LCD Driver	EK79001HK+EK73215BCGA	/
With/Without Touch	With Projected Capacitive Touch Panel	/
CTP Driver	ILI2132A	/
Touch Interface	USB /I2C/Optional UART	/
Weight	223	g

Note 1: RoHS compliant

Note 2: LCM weight tolerance: ± 5%.

REVISION RECORD

REVNO.	REVDATE	CONTENTS	REMARKS
1.0	2020-08-05	Initial Release	

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1 MODULE CLASSIFICATION INFORMATION

RV	T	70	H	S	L	N	W	C	00
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

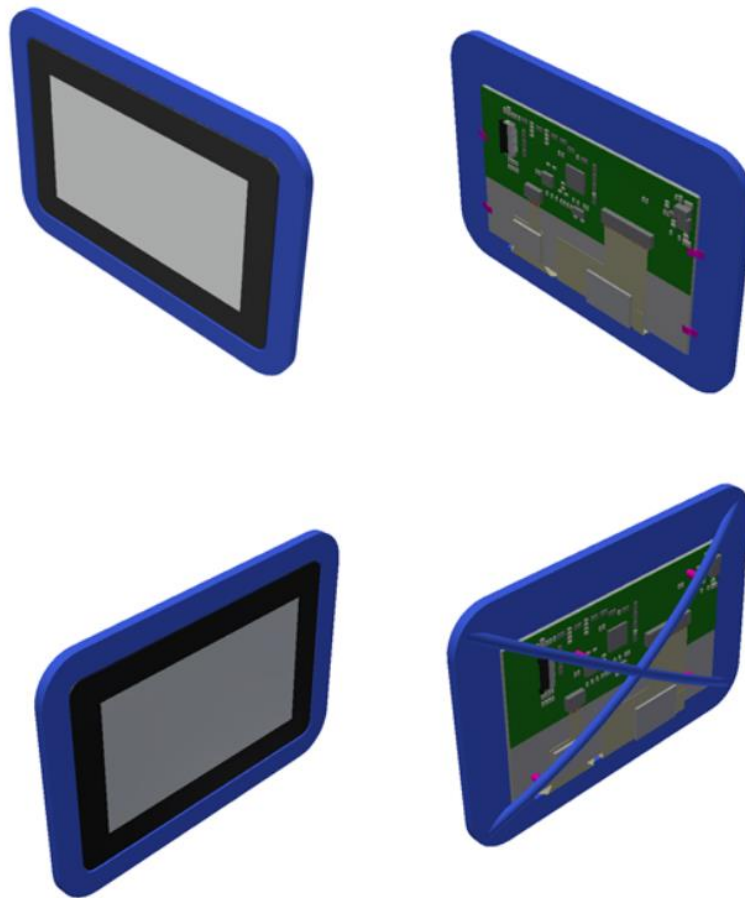
1.	BRAND	RV – Riverdi
2.	PRODUCT TYPE	T – TFT Standard
3.	DISPLAY SIZE	70 – 7.0”
4.	MODEL SERIAL NO.	H – High Brightness, IPS
5.	RESOLUTION	S – 1024 x 600 px
6.	INTERFACE	L– TFT LCD, LVDS
7.	FRAME	N – No Frame
8.	BACKLIGHT TYPE	W – LED White
9.	TOUCH PANEL	C – With Capacitive Touch Panel
10.	VERSION	00 – (00-99)

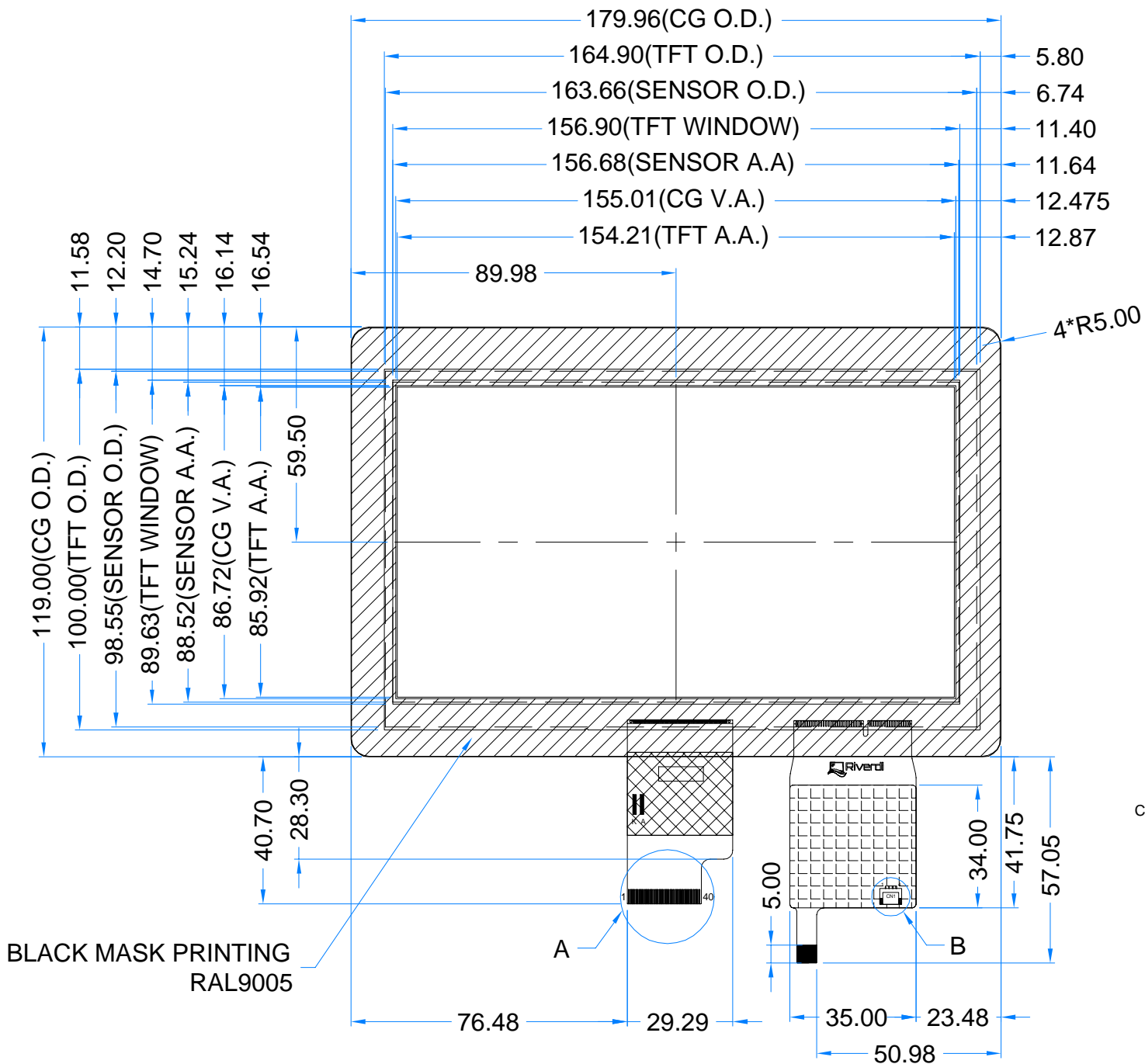
2 UxTOUCH ASSEMBLY

UxTouch are LCD TFT displays with specially designed projected capacitive touch panels. UxTouch display can be mounted without any holed in the housing. Our standard UxTouch displays include double-sided adhesive tape (DST) to stick TFT easily to the housing. Basic series include 4.3", 5.0" and 7.0" display sizes.

UxTouch models with double-side adhesive tape (PN with endings 00, 01, 03, 04) can be mounted by connecting the glass to the housing. Riverdi recommends to use support brackets assembled to display's back. An additional support will stiffen the whole structure and minimize the influence of external factors such as vibration. Figure 1 below show examples of using support elements.

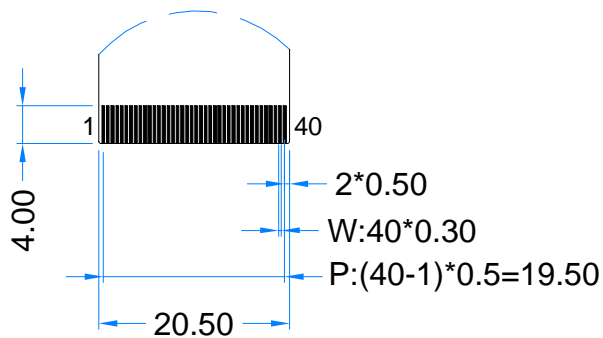
Figure 1. Example of using support brackets



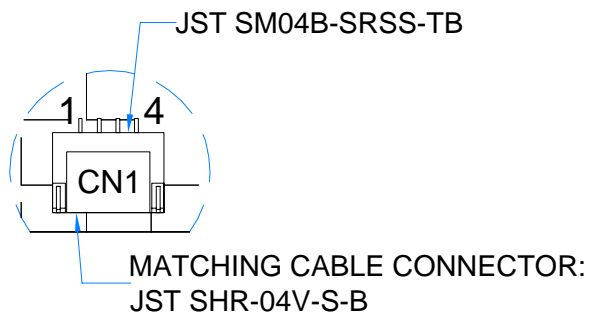


BLACK MASK PRINTING
RAL9005

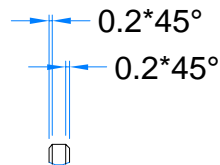
DETAIL A
SCALE 2:1



DETAIL B
SCALE 4:1



DETAIL C
SCALE 4:1



TFT NOTES:

1. LCD TYPE: TRANSMISSIVE, NORMALLY BLACK, IPS
2. RESOLUTION: 1024x600
3. VIEWING ANGLE: FREE
4. IC CONTROLLER: EK79001HK+EK73215BCGA
5. OPERATION VOLTAGE: 3.3V
6. BACKLIGHT: 27PCS LED, $V_f=9.6V$, $I_f=270mA$

TP NOTES:

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

GENERAL NOTES:

1. MODULE SURF...
2. OPERATING T...
3. STORAGE TEM...
4. WITHOUT INDI...
5. DIM ACCORDI...
5. RoHS COMPLI...

4 ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Power for Circuit Driving	VDD	-0.3	3.96	V
	AVDD	-0.5	14.85	V
	VGH	-0.3	40	V
	VGL	-20.0	0.3	V
Operating Temperature	T _{OP}	-20	70	°C
Storage Temperature	T _{ST}	-30	80	°C
Operating Humidity (@ 25 ± 5°C)	RH	10%	-	RH
Storage Humidity (@ 25 ± 5°C)	RH	10%	-	RH

5 ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Supply Voltage for Module	DVDD	3.0	3.3	3.6	V	
	VGH	17	18	19	V	
	VGL	-6.6	-6.0	-5.4	V	
	AVDD	9.4	9.6	9.8	V	
	VCOM	3.6	3.8	4.0	V	
Current of Power Supply	IDD	-	30	45	mA	DVDD = 3.3V
	IADD	-	35	45	mA	AVDD = 9.6V
	IGH	-	0.5	1	uA	VGH = 18V
	IGL	-	0.5	1	mA	VGL= -6V
Input Voltage ' H ' level	V _{IH}	0.7DVDD	-	DVDD	V	Note 1
Input Voltage ' L ' level	V _{IL}	0	-	0.3VDD	V	Note 1

Note 1. STHL, STHR, OEH,L/R, CPH1~CPH3, STVD, STVU, OEV, CKV, U/D.

6 BACKLIGHT DRIVING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Backlight Driving Voltage	V _F	9.0	9.6	10.2	V	
Backlight Driving Current	I _F	-	270	-	mA	
Backlight Power Consumption	W _{BL}	-	2592	-	mW	
Backlight Life Time	-	-	50,000	-	Hrs	Note 1

Note 1. If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

7 POWER CONSUMPTION

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	NOTE
Gate on Power Current	IVGH	VGH=18V	-	0.5	1	mA	Note 1
Gate off Power Current	IVGL	VGL=6 V	-	0.5	1	mA	
Digital Power Current	IDVDD	DVDD=3.3V	-	30	45	mA	
Analog Power Current	IADVDD	AVDD=9.6 V	-	35	45	mA	
Total Power Consumption	PC		-	447	604	mW	

Note. Typ. Specification: Gray-level test pattern; Max Specification: Black test pattern



256 gray pattern



black pattern

8 ELECTRO-OPTICAL CHARACTERISTICS

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25 °C. The values specified are at an approximate distance 500mm from the LCD surface at a viewing angle of Φ and θ equal to 0°.

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	REMARK	NOTE
Response Time	Tr+Tf	$\theta=0^\circ$ $\Phi=0^\circ$ Ta=25 °C	-	35	-	ms	FIG 2.	4
Contrast Ratio	Cr		-	800	-	---	FIG 3.	1
Luminance Uniformity	δ WHITE		-	75	-	%	FIG 3.	3
Surface Luminance	Lv		-	800	-	cd/m ²	FIG 3.	2
Viewing Angle Range	θ	$\Phi = 90^\circ$	-	85	-	deg	FIG 4.	6
		$\Phi = 270^\circ$	-	85	-	deg	FIG 4.	
		$\Phi = 0^\circ$	-	85	-	deg	FIG 4.	
		$\Phi = 180^\circ$	-	85	-	deg	FIG 4.	
CIE (x, y) Chromaticity	Red	x	0.578	0.618	0.658	FIG 3.	5	
		y	0.489	0.329	0.369			
	Green	x	0.376	0.416	0.456			
		y	0.493	0.533	0.573			
	Blue	x	0.071	0.111	0.151			
		y	0.108	0.148	0.188			
	White	x	0.270	0.310	0.350			
		y	0.290	0.330	0.370			

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 3.

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

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 maximum luminance of 5 points luminance by minimum 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, T_r) and from black to white (Decay Time, T_f). For additional information see Figure 2. The test equipment is Autronic-Melchers's ConoScope series.

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. Viewing angle is the angle at which the contrast ratio is greater than 2. 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. For viewing angle and response time testing, the testing data is based on Autronic-Melchers's ConoScope series. Instruments for Contrast Ratio, Surface Luminance, Luminance Uniformity, CIE the test data is based on TOPCON's BM-5 photo detector.

Figure 2. The definition of response time

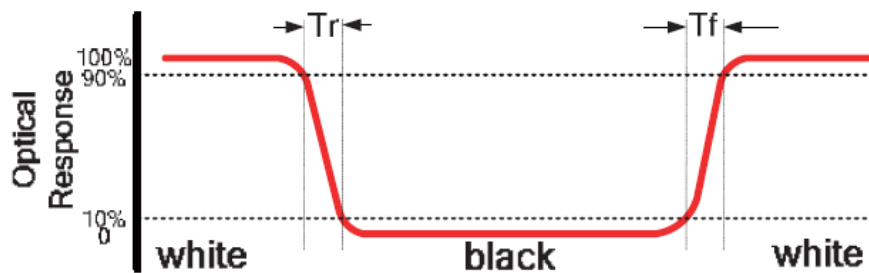


Figure 3. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

A : 5 mm
B : 5 mm
H, V : Active Area
Light spot size $\varnothing=5\text{mm}$, 500mm distance from the LCD surface to detector lens
measurement instrument is TOPCON's luminance meter BM-5

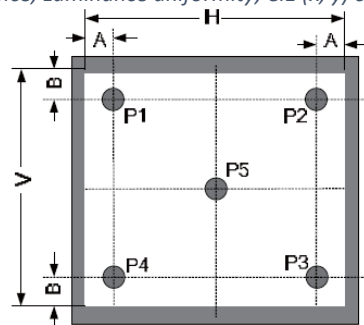
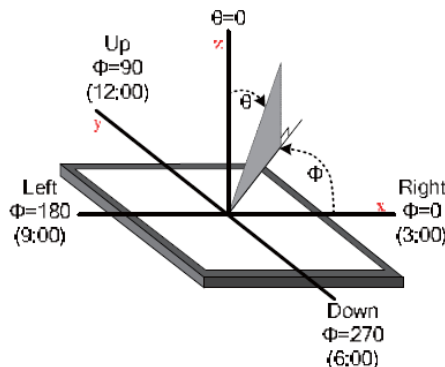
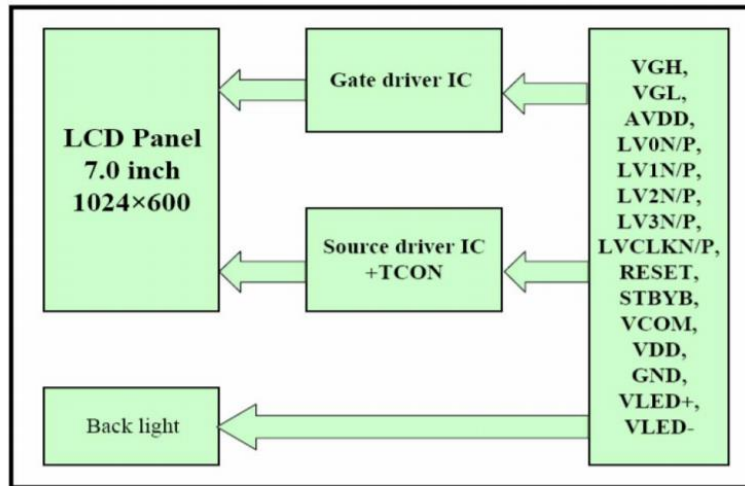


Figure 4. The definition of viewing angle



9 BLOCK DIAGRAM



10 INTERFACE DESCRIPTION

10.1 TFT assignment

PIN NO.	SYMBOL	I/O	DESCRIPTION	NOTE
1	VCOM	P	Common voltage	
2	VDD	P	Power voltage for digital circuit	
3	VDD	P	Power voltage for digital circuit	
4	NC	-	No connection	
5	RESET	I	Global reset pin	
6	STBYB	I	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0" timing controller, source driver will turn off, all output are High-Z.	
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	NC	-	No connection	
24	NC	-	No connection	

25	GND	P	Ground	
26	NC	-	No connection	
27	NC	-	No connection	
28	SELB	I	6-bit/8bit mode select	Note 1
29	AVDD	P	Power for analog circuit	
30	GND	P	Ground	
31	LED-	P	LED cathode	
32	LED-	P	LED cathode	
33	L/R	I	Horizontal inversion	Note 3,4
34	U/D	I	Vertical inversion	Note 3,4
35	VGL	P	Gate OFF voltage	
36	NC	-	No connection	
37	NC	-	No connection	
38	VGH	P	Gate ON voltage	
39	LED+	P	LED anode	
40	LED+	P	LED anode	

I: input, O:output, P:Power

Note 1. If LVDS input data is 6 bits, SELB must be set to High;
If LVDS input data is 8 bits, SELB must be set to Low.

Note 2. When CABC_EN = "00", CABC OFF.
When CABC_EN = "01", user interface image.
When CABC_EN = "10", still picture.
When CABC_EN = "11", moving image.
When CABC off, don't connect DIMO, else connect it to backlight.

Note 3. When L/R = "0", set right to left scan direction.
When L/R = "1", set left to right scan direction.
When U/D = "0", set top to bottom scan direction.

Note 4. U/D R/L Function Description

SETTING OF SCAN CONTROL INPUT		SCANNING DIRECTION
U/D	L/R	
GND	DVDD	Up to down, left to right
DVDD	GND	Down to up, right to left
GND	GND	Up to down, right to left
DVDD	DVDD	Down to up, left to right

10.2 Touch panel assignment

PIN NO.	SYMBOL	DESCRIPTION
1	USB_GND	USB_Ground
2	USB_VDD	USB_Power for CTP, DC 5.0 V
3	USB_D-	USB_Data Signal -
4	USB_D+	USB_Data Signal +
5	I2C_GND	I2C_Ground
6	I2C_VDD	I2C_Power For CTP, DC 3.3 V
7	I2C_RST	I2C_Reset Pin
8	I2C_SCL	I2C_Clock Input
9	I2C_INT	I2C_Interrupt Signal from CTP
10	I2C_SDA/TXD	I2C_Data Signal

10.3 CON1 assignment

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

11 TIMING CHARACTERISTICS

11.1 Parallel RGB timing characteristic

11.1.1 DE MODE

PARAMETER	SYMBOL	VALUE			UNIT
		MIN.	TYP.	MAX.	
DCLK frequency (Frame rate 60Hz)	fclk	40.8	51.2	67.2	MHz
Horizontal display area	thd	1024			DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd	600			H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	85	200	H

11.1.2 HV MODE – Horizontal input timing

PARAMETER	SYMBOL	VALUE			UNIT
		MIN.	TYP.	MAX.	
Horizontal display area	thd	1024			DCLK
DCLK frequency (frame rate 60Hz)	fclk	44.9	51.2	63	MHz
1 Horizontal Line	th	1200	1344	1400	DCLK
HSYNC pulse width	thpw	1	-	140	DCLK
HSYNC back porch	thbp	160	160	160	DCLK
HSYNC front porch	thfp	16	160	216	DCLK

11.1.3 HV MODE – Vertical Input Timing

PARAMETER	SYMBOL	VALUE			UNIT
		MIN.	TYP.	MAX.	
Vertical display area	tvd	600			H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	-	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tVfp	1	12	127	H

11.1.4 Data input format

Figure 4. 6-bit LVDS Input Timing chart

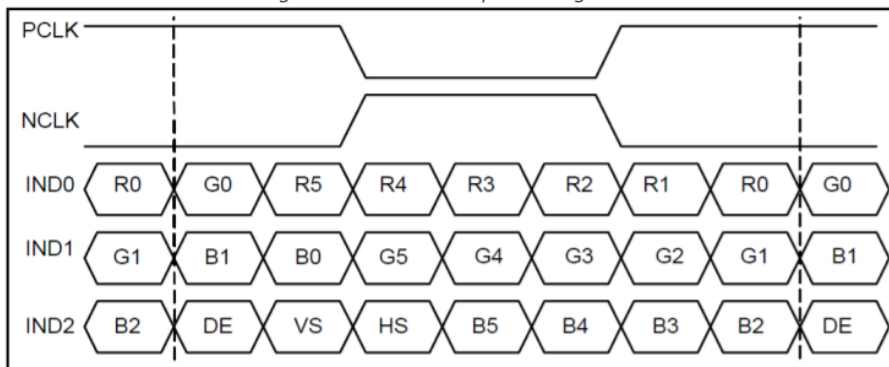
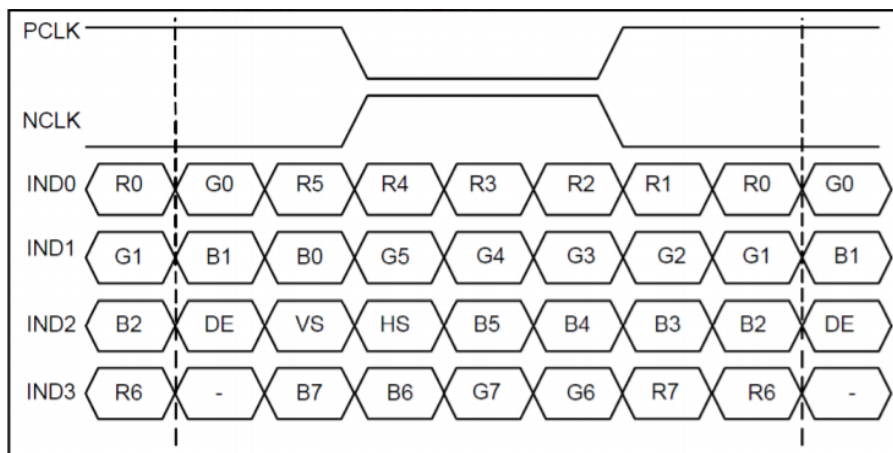
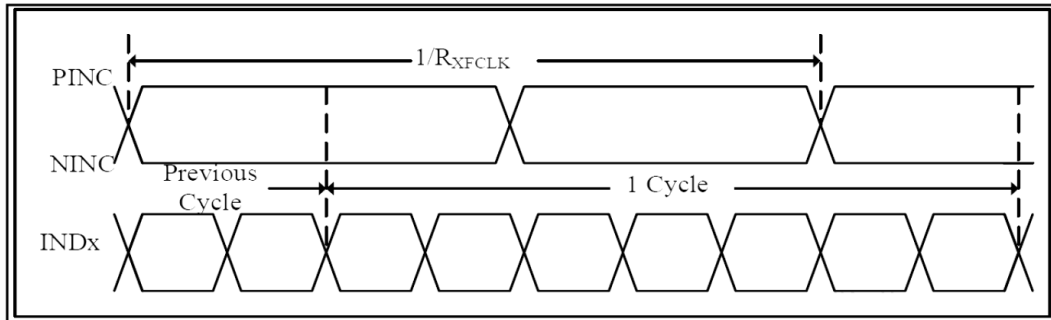


Figure 5. 8-bit LVDS Input Timing chart

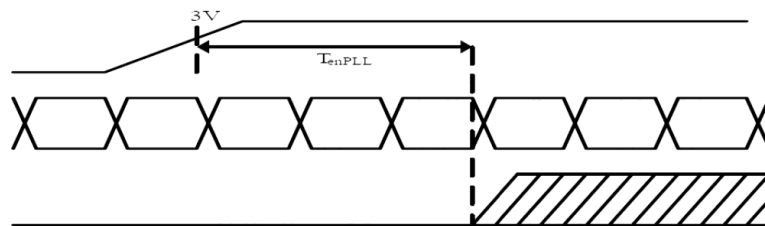


11.2 AC characteristics

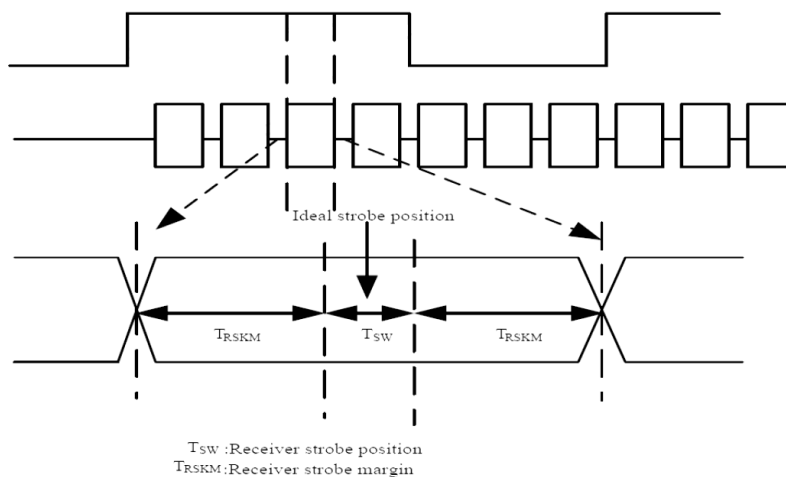
PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Clock Frequency	RxFCLK		20	-	71	MHz
Input Data Skew Margin	TRSKM	VID =400mV RxVCM=1.2V RxFCLK=71MHz	500	-	-	ps
Clock High Time	TLVCH	-	-	$4/(7 \cdot RxFCLK)$	20	ns
Clock Low Time	TLVCL	-	-	$3/(7 \cdot RxFCLK)$	23	ns
PLL wake-up-time	TenPLL	-	-	-	150	us



LVDS timing(1)



LVDS timing(2)

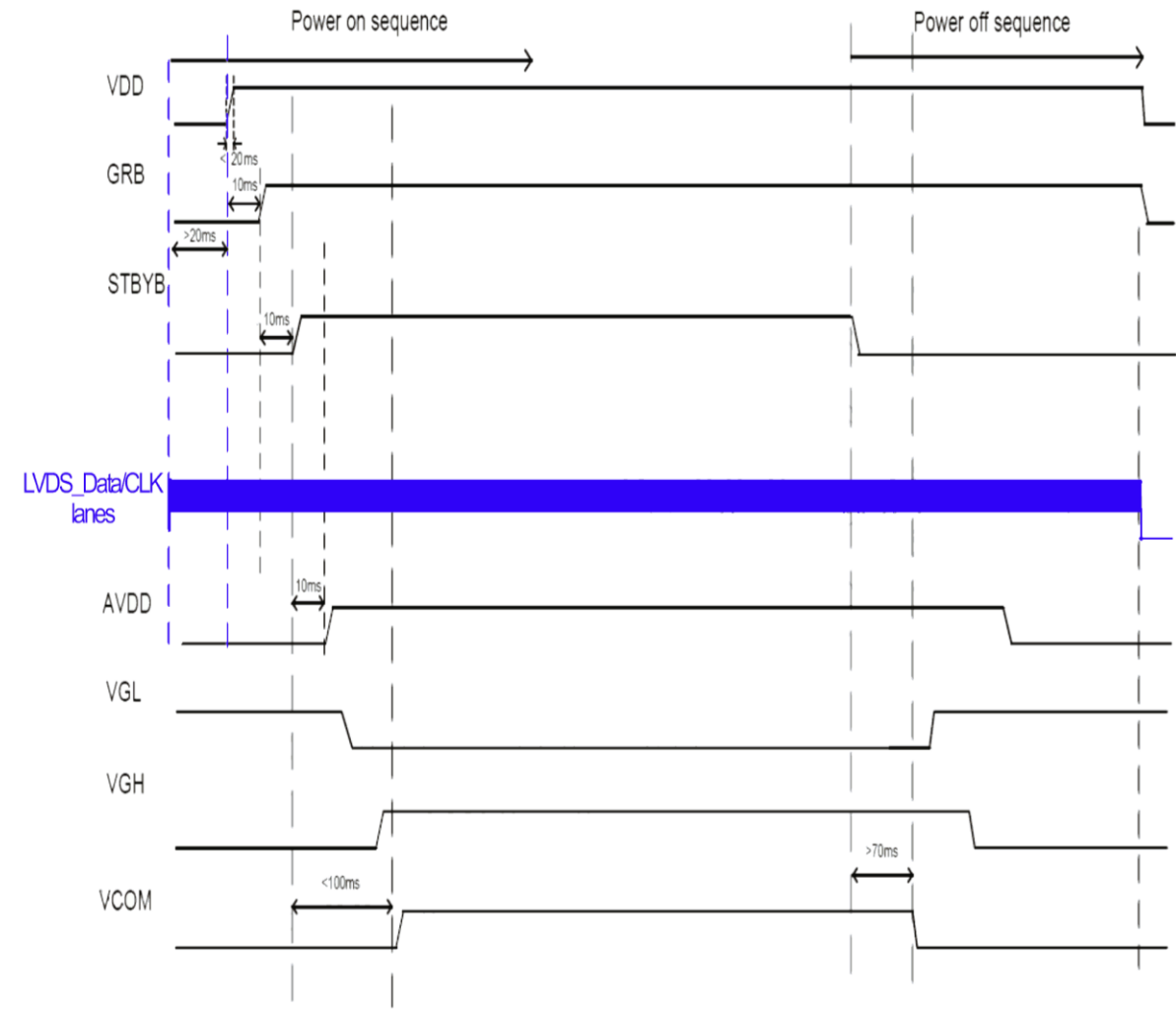


LVDS timing(3)

11.3 Power ON/OFF sequence

In order to prevent IC from power on reset fail, the rising time (TROP) of the digital power supply VDD should be maintained with the given specifications. Refer to “AC Characteristics” for more detail on timing.

There is another paragraph of sub-function description.



12 CAPACITIVE TOUCH SCREEN PANEL SPECIFICATIONS

12.1 Mechanical characteristics

DESCRIPTION	SPECIFICATION	REMARK
Touch Panel Size	7.0 inch	UxTouch
Outline Dimension of CTP	179.96 mm x 119.00 mm	UxTouch
Product Thickness	2.45 mm	UxTouch
Glass Thickness	1.1 mm	UxTouch
CTP View Area	155.01 mm x 86.72 mm	UxTouch
Sensor Active Area	156.08 mm x 88.52 mm	UxTouch
Structure type	Glass + Glass	UxTouch
Surface Hardness	6H	UxTouch

12.2 Electrical characteristics

DESCRIPTION	SPECIFICATION	
Operating Voltage	DC 5.0 V (USB)	
	DC 3.3 V (I ² C)	
Power Consumption (IDD)	Active Mode	90 mA
	Sleep Mode	10 mA
Interface	USB / I ² C /Optional UART	
Linearity	+/-1.5mm	
Controller	ILI2132A	
I2C address	0X82	
Resolution	1024 x 600	

13 INSPECTION

Standard acceptance/rejection criteria for TFT module.

13.1 Inspection condition

Ambient conditions:

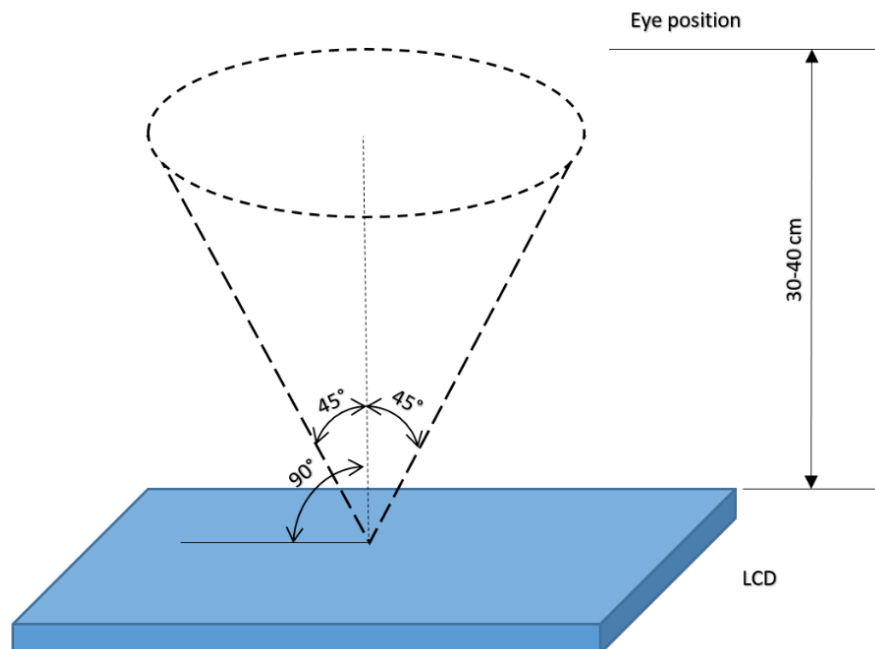
- Temperature: $25\pm 2^{\circ}\text{C}$
- Humidity: $(60\pm 10)\%RH$
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

Viewing distance:

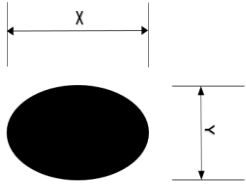
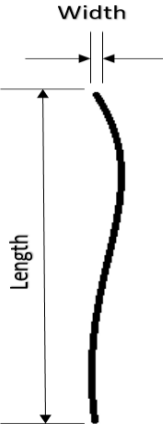
$35\pm 5\text{cm}$ between inspector bare eye and LCD.

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)	 $D = \frac{(x + y)}{2}$ <p>*Spots density: 10 mm</p> <table border="1"> <thead> <tr> <th colspan="2">3.5" ≤ Size ≤ 5"</th> </tr> <tr> <th>Average Diameter</th> <th>Qualified Qty</th> </tr> </thead> <tbody> <tr> <td>D ≤ 0.15 mm</td> <td>Ignored</td> </tr> <tr> <td>0.15 mm < D ≤ 0.30 mm</td> <td>N≤3</td> </tr> <tr> <td>0.3mm < D</td> <td>Not allowed</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Size =7"</th> </tr> <tr> <th>Average Diameter</th> <th>Qualified Qty</th> </tr> </thead> <tbody> <tr> <td>D ≤ 0.2 mm</td> <td>Ignored</td> </tr> <tr> <td>0.2 mm < D ≤ 0.3 mm</td> <td>N≤3</td> </tr> <tr> <td>0.5mm < D</td> <td>Not allowed</td> </tr> </tbody> </table>	3.5" ≤ Size ≤ 5"		Average Diameter	Qualified Qty	D ≤ 0.15 mm	Ignored	0.15 mm < D ≤ 0.30 mm	N≤3	0.3mm < D	Not allowed	Size =7"		Average Diameter	Qualified Qty	D ≤ 0.2 mm	Ignored	0.2 mm < D ≤ 0.3 mm	N≤3	0.5mm < D	Not allowed													
3.5" ≤ Size ≤ 5"																																		
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Item	Criterion		
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	
	Size >= 5"		
	Average Diameter	Qualified Qty	
	D < 0.2 mm	Ignored	
	0.2 mm < D < 0.3 mm	4	
	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	
0.3 mm < D ≤ 0.5 mm		1	
0.5 mm < D		0	
Total Q'ty		3	
Size >= 5"			
Average Diameter		Qualified Qty	
D < 0.25 mm		Ignored	
0.25 mm < D < 0.5 mm		3	
0.5 mm < D		0	
Touch panel spot		Size >= 5"	
		Average Diameter	Qualified Qty
	D < 0.25 mm	Ignored	
	0.25 mm < D < 0.5 mm	4	
	0.5 mm < D	0	
Touch panel White line Scratch	Size >= 5"		
	Length	Width	Qualified Qty
	-	W < 0.03	Ignored
	L < 5.0	0.03 < W < 0.05	2
	-	0.05 < W	0

14 RELIABILITY TEST

NO.	TEST ITEM	TEST CONDITION
1	High Temperature Storage	80°C/120 hours
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
7	Damp Proof Test	40°C, 90%RH/120 hours
8	Vibration Test	Frequency :10~55 HZ; Stroke :1.5mm; Sweep:10HZ~55HZ~10HZ; 2 hours for each direction of X, Y, Z(6 hours for total)
9	Package Drop Test	Height: 60 cm 1 corner,3 edges,6 surfaces
10	ESD Test	Air: ±2 KV , Human Body Mode, 100 pF /1500 Ω

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.

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