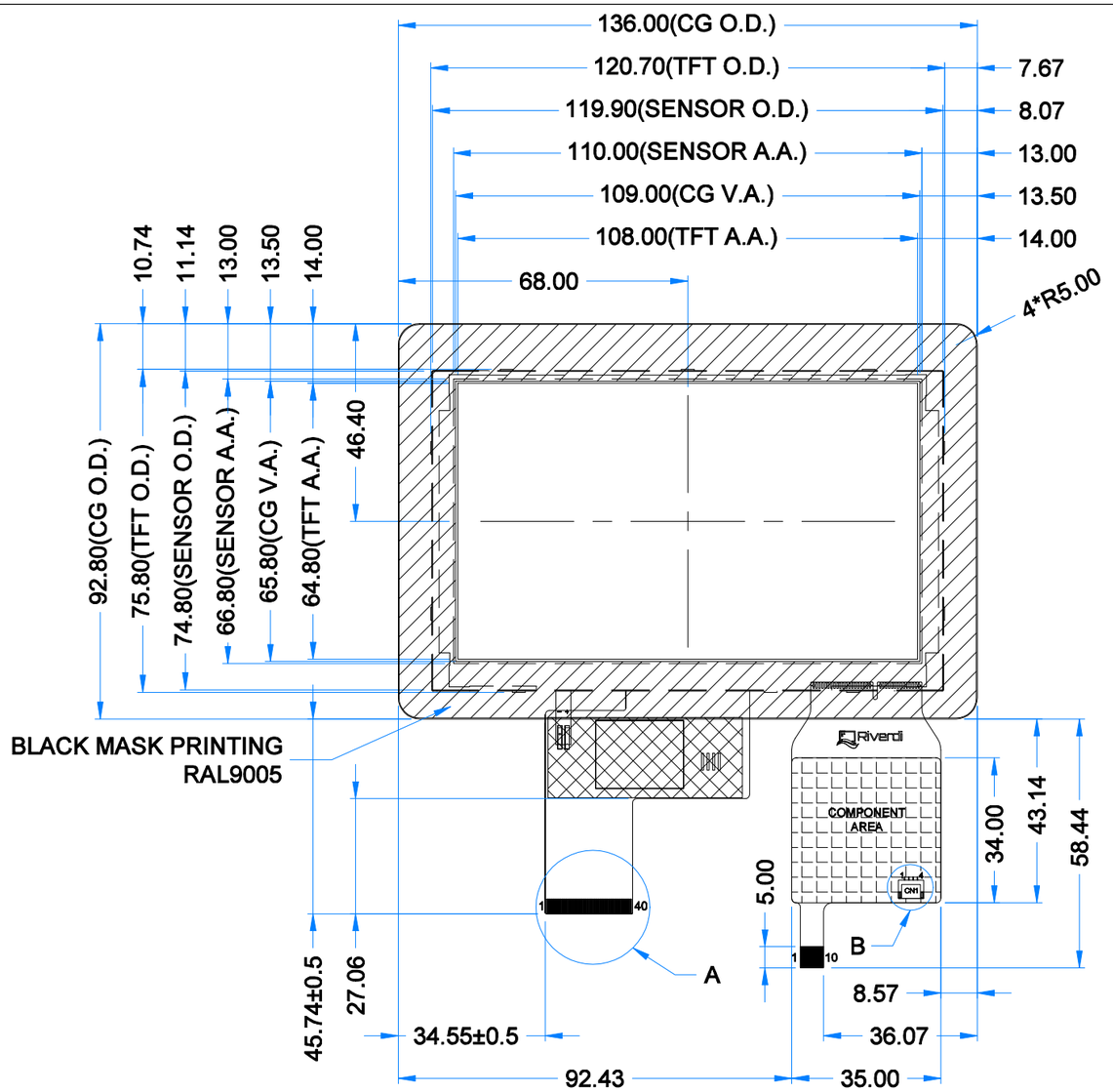
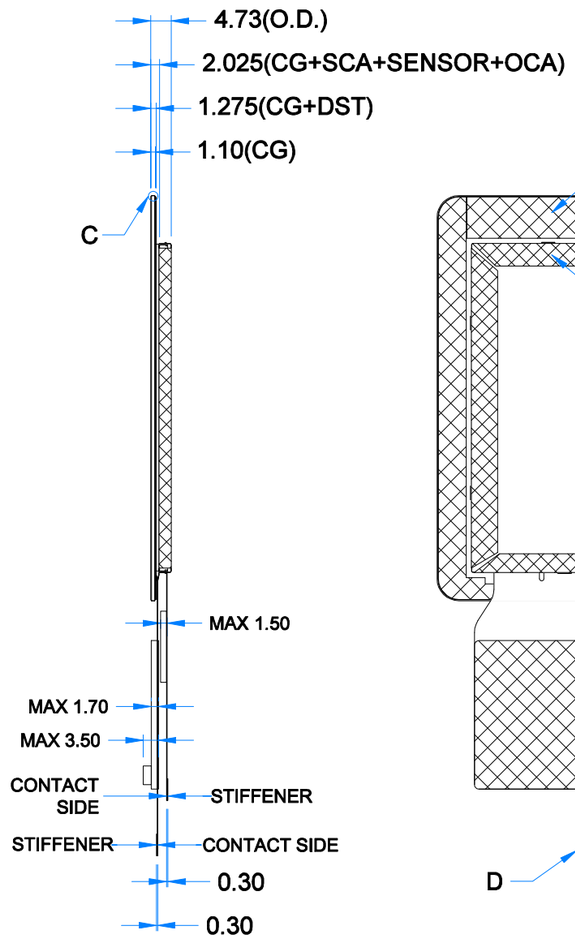
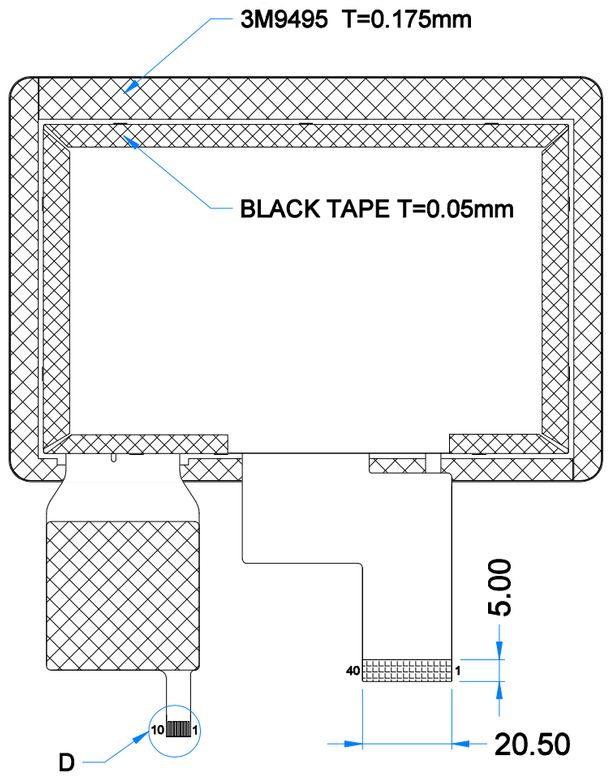
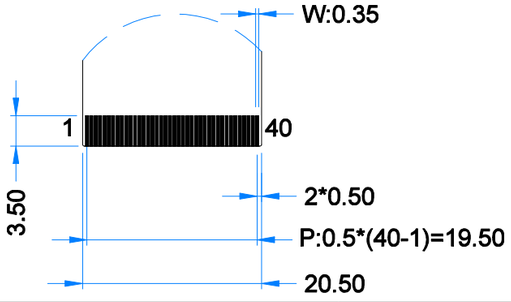
Revision:	Changes:	Date:
1.0	Initial Case	2020.08.10



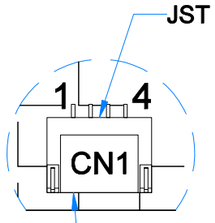




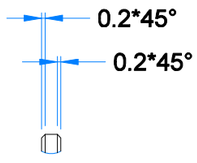
DETAIL A
SCALE 2:1



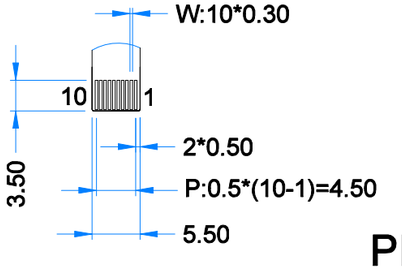
DETAIL B
SCALE 4:1

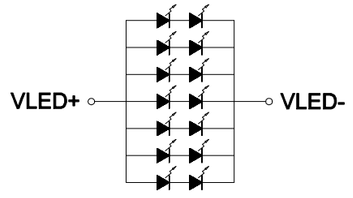


DETAIL C
SCALE 4:1



DETAIL D
SCALE 2:1





LED CIRCUIT DIAGRAM

PINOUT ON THE 2ND PAGE

TFT NOTES:
1. LCD TYPE: TRANSMISSIVE, NORMALLY BLACK, IPS
2. RESOLUTION: 800x480
3. VIEWING ANGLE: FREE
4. IC CONTROLLER: ST7262-G4
5. OPERATING VOLTAGE: 3.3V
6. BACKLIGHT: 14-LED WHITE, Vf =12.0V, If =140mA

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(I2C); 5.0V(USB)

GENERAL NOTES:
1. MODULE SURFACE LUMINANCE: 850 cd/m^2
2. OPERATING TEMPERATURE: -20°C ~ 70°C
3. STORAGE TEMPERATURE: -30°C ~ 80°C
4. WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm
5. RoHS COMPLIANT

PN: RVT50HQTNWC00-B			
SN:			
DRAWN: M.Natywa	2020.08.10	1:1.41	
CHECKED: Carol Gao		[mm]	
APPR:		ISO A3	P. 1 of 1

3 ABSOLUTE MAXIMUM RATINGS

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

Note. The following are maximum values. If exceeded it may cause operation or damage to the unit.

4 ELECTRICAL CHARACTERISTICS

PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT
Power Supply for Analog Circuit		VDD	3.0	3.3	3.6	V
Logic Input Voltage	Low Voltage	VIL	0	-	0.3VDD	V
	High Voltage	VIH	0.7VDD	-	VDD	V
Logic Output Voltage	Low Voltage	VOL	-	-	GND+0.4	V
	High Voltage	VOH	VDD - 0.4	-	-	V
Power Consumption	Black Mode	Pb	-	80	85	mA
	Standby Mode	Pw	-	40	50	uA

5 BACKLIGHT DRIVING CONDITIONS

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

Note 1. Unless specified, the ambient temperature Ta=25℃

Note 2. The recommended operating conditions refer to a range in which operation of this product is guaranteed. Should this range is exceeded, the operation cannot be guaranteed even if the values may be without the absolute maximum ratings.

Note 3. 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.

6 ELECTRO-OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	REMARK	NOTE
Response Time		Tr+Tf	θ=0° Ø=0° Ta=25 °C	-	30	-	ms	FIG 1.	4
Contrast Ratio		Cr		-	1000	-	---	FIG 2.	1
Luminance Uniformity		δ WHITE		-	75	-	%	FIG 2.	3
Surface Luminance		Lv		720	850	-	cd/m^2	FIG 2.	2
Viewing Angle Range		θ	Ø = 90°	-	80	-	deg	FIG 3.	6
			Ø = 270°	-	80	-	deg	FIG 3.	
			Ø = 0°	-	80	-	deg	FIG 3.	
			Ø = 180°	-	80	-	deg	FIG 3.	
CIE (x, y) Chromaticity	Red	x	θ=0° Ø=0° Ta=25 °C	0.575	0.615	0.655	FIG 2.		5
		y		0.296	0.336	0.376			
	Green	x		0.352	0.392	0.432			
		y		0.512	0.552	0.592			
	Blue	x		0.100	0.140	0.180			
		y		0.085	0.125	0.165			
	White	x		0.274	0.316	0.358			
		y		0.295	0.336	0.378			

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

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

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 maximum luminance of 5 points luminance by minimum 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 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 3.

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 1. The definition of response time

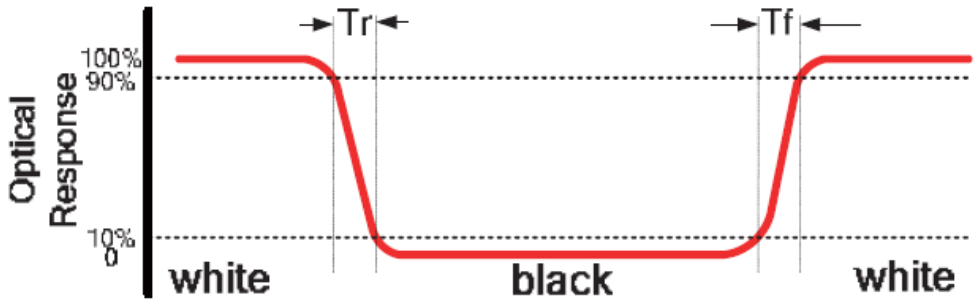


Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

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

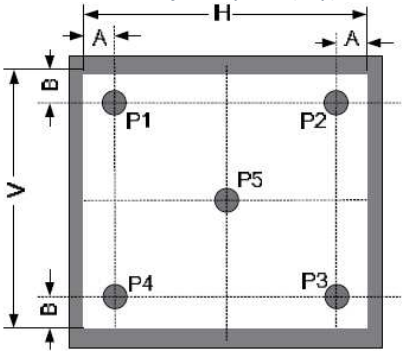
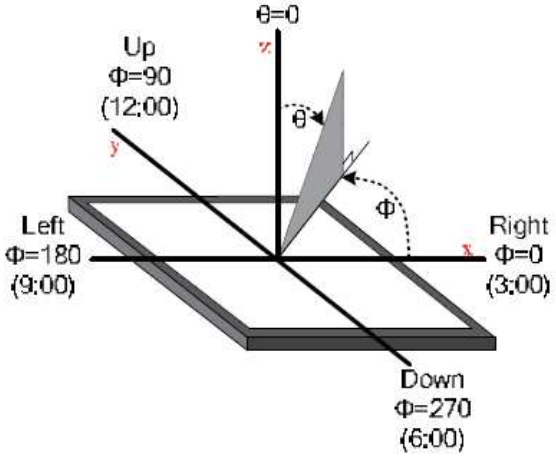
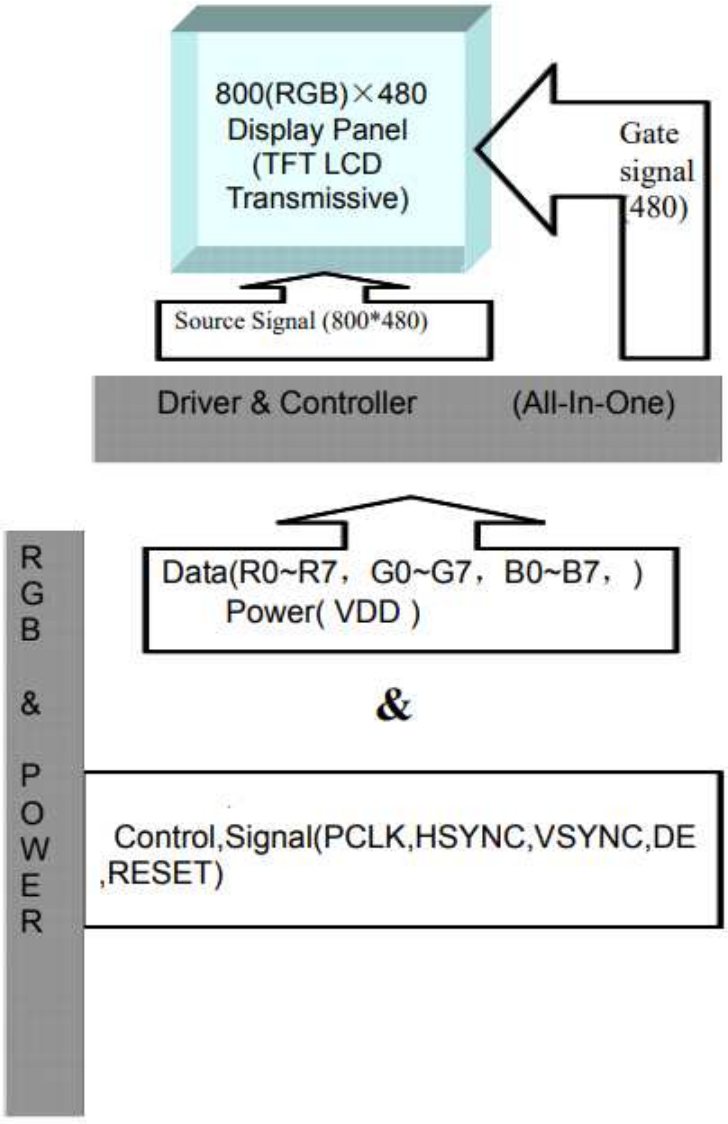


Figure 3.The definition of viewing angle



7 BLOCK DIAGRAM



8 INTERFACE DESCRIPTION

8.1 TFT assignment

PIN NO.	SYMBOL	DESCRIPTION
1	VLED-	Backlight Power Input PIN Cathode
2	VLED+	Backlight Power Input PIN Anode
3	GND	Ground
4	VDD	Power Supply Voltage
5-12	R0-R7	Red Data
13-20	G0-G7	Green Data
21-28	B0-B7	Blue Data
29	GND	Ground
30	DCLK	Clock for Input Data
31	DISP	Display on/off Control
32	HSYNC	Horizontal Synchronized Signal
33	VSYNC	Vertical Synchronized Signal
34	DE	Data Input Enable
35	NC	Not Connect
36	GND	Ground
37	NC/XR	No Connect
38	NC/YD	No Connect
39	NC/XL	No Connect
40	NC/YU	No Connect

8.2 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

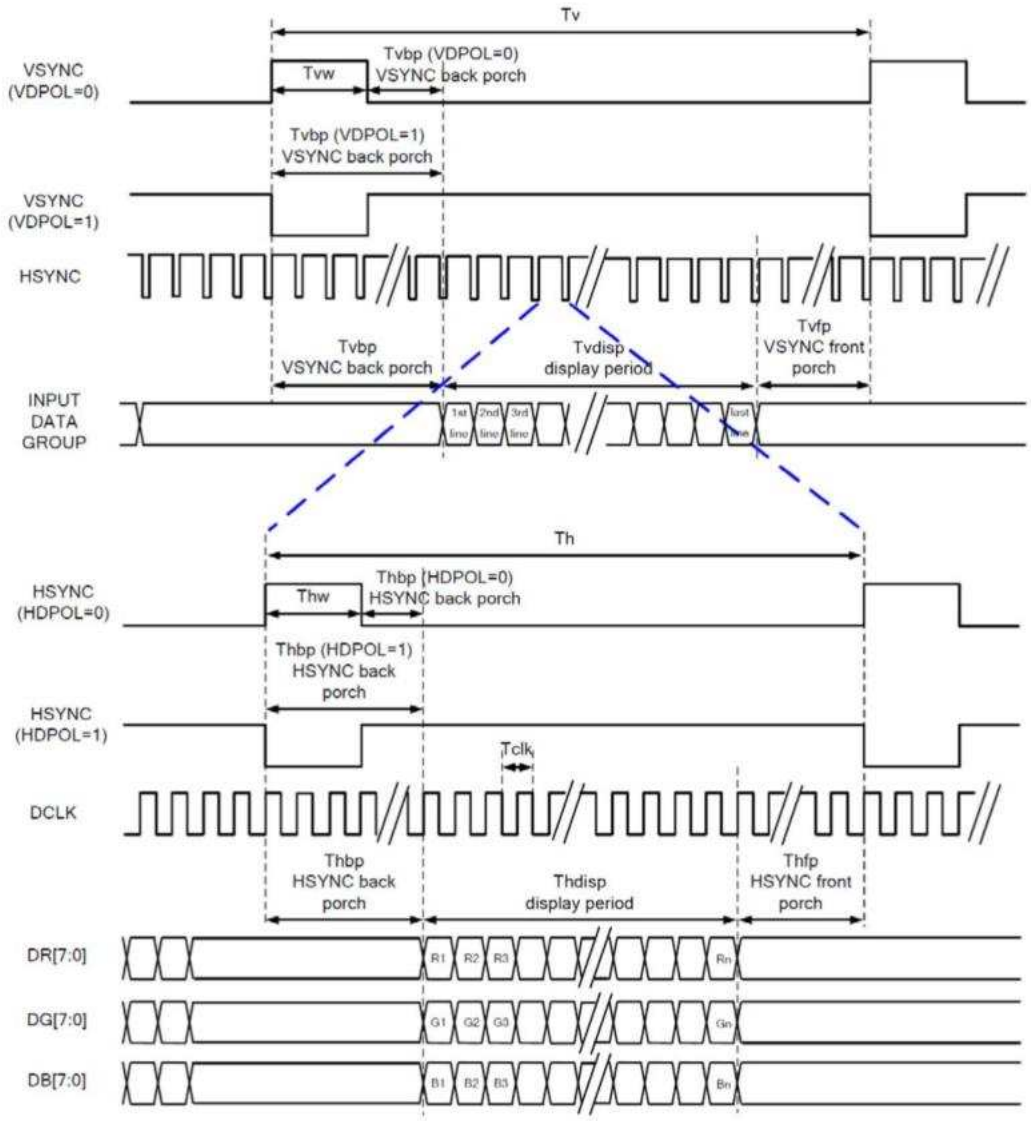
8.3 CON1 assignment

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

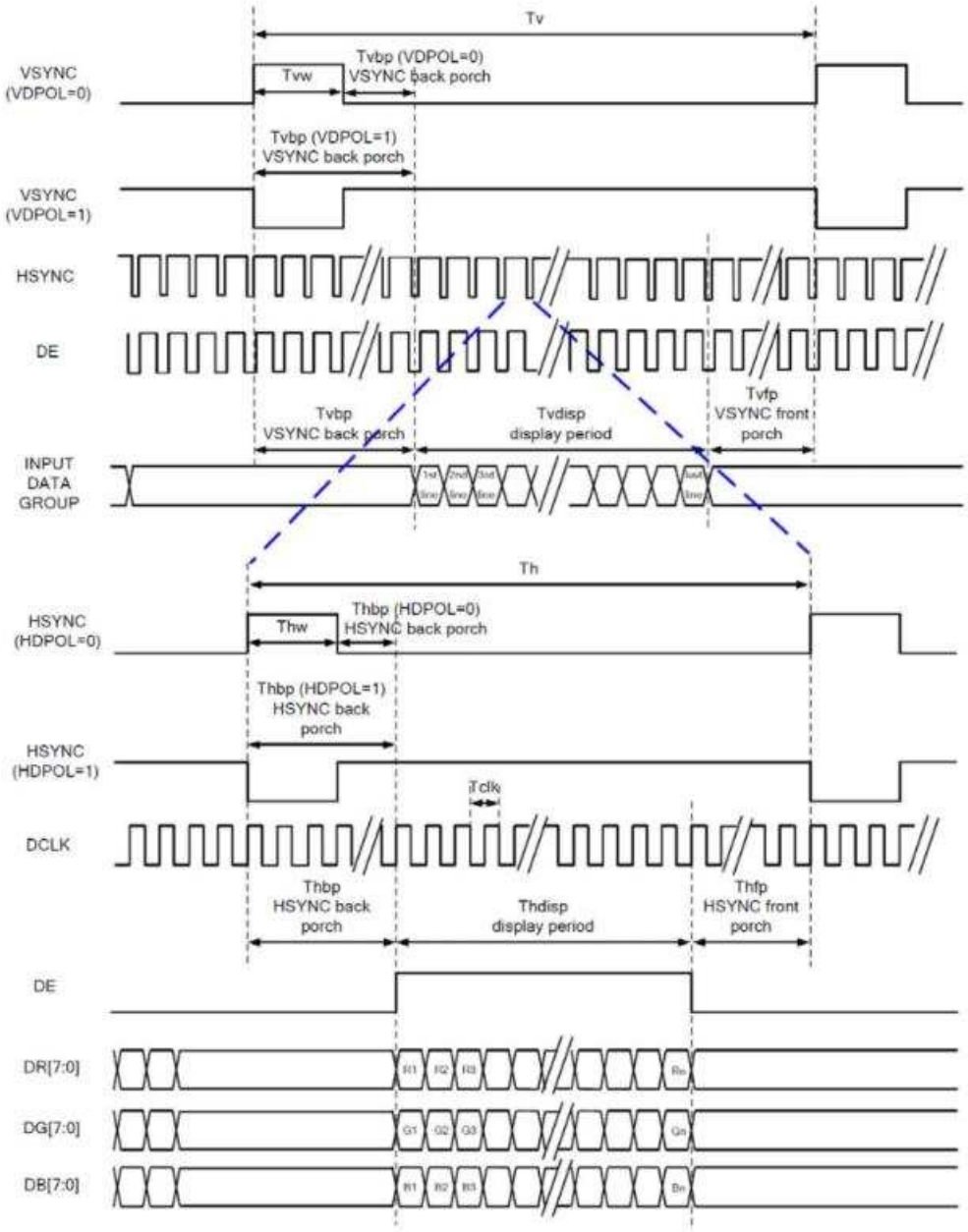
9 TIMING CHARACTERISTICS

9.1 System bus timing for RGB interface

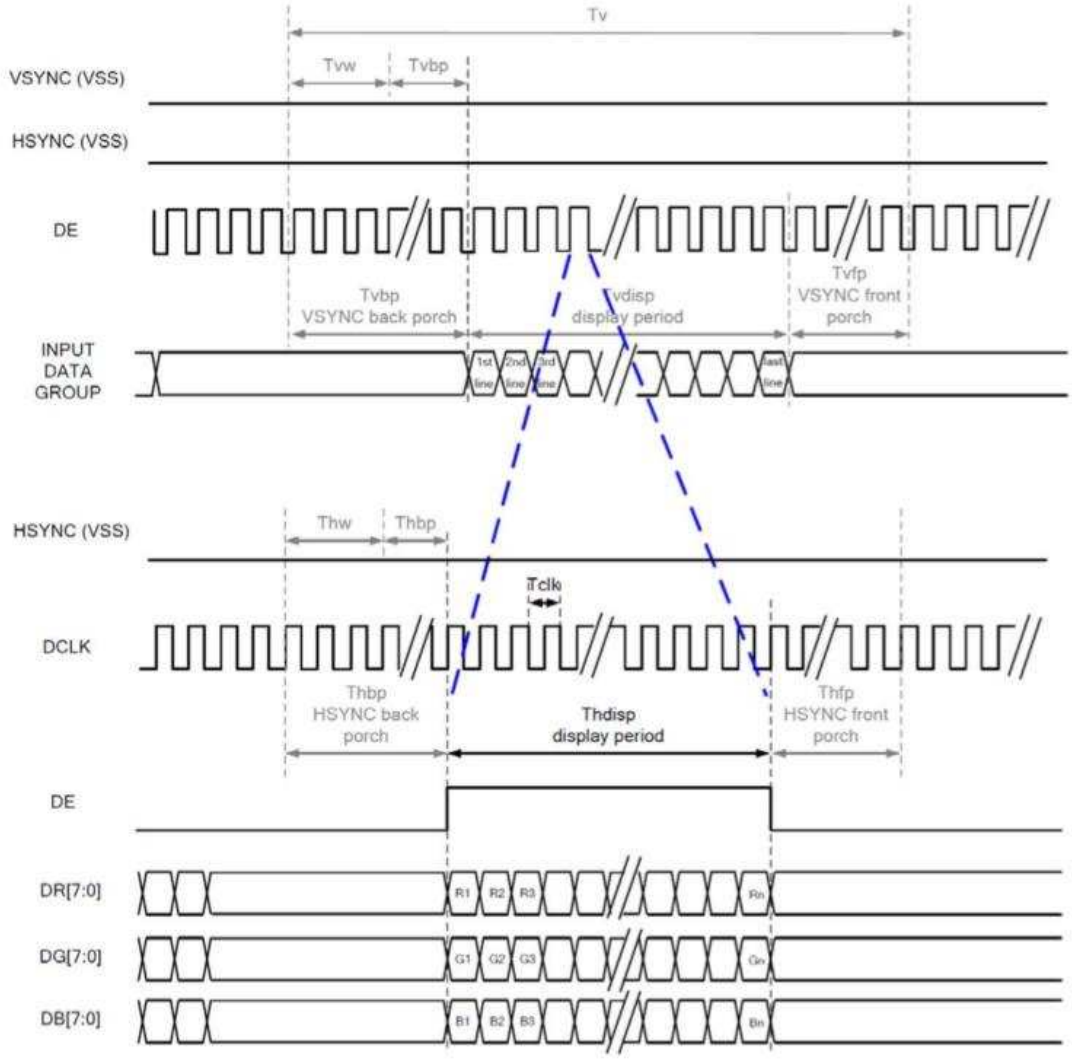
9.1.1 SYNC Mode



9.1.2 SYNC-DE Mode



9.1.3 DE Mode



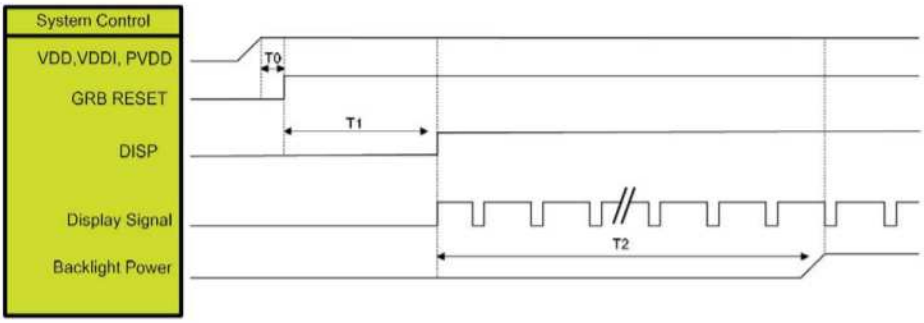
9.2 Parallel 24-bit RGB input timing table

Parallel 24-bit RGB input Timing (PVDD=VDD=VDDI=3.3V,AGND=0V,Ta=25 °C)

PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT
DCLK Frequency		Fclk	23	25	27	MHz
HSYNC	Period Time	Th	808	816	896	DCLK
	Display Period	Thdisp		800		DCLK
	H_{sync} Back Porch	Thbp	4	8	48	DCLK
	H_{sync} Front Porch	Thfp	4	8	48	DCLK
	H_{sync} Pluse Width	Thw	2	4	8	DCLK
VSYNC	Period Time	Tv	488	496	504	HSYNC
	Display Period	Tvdisp		480		HSYNC
	V_{sync} Back Porch	Tvbp	4	8	12	HSYNC
	V_{sync} Front Porch	Tvfp	4	8	12	HSYNC
	V_{sync} Pluse Width	Tvw	2	4	8	HSYNC

9.3 Power ON/OFF sequence

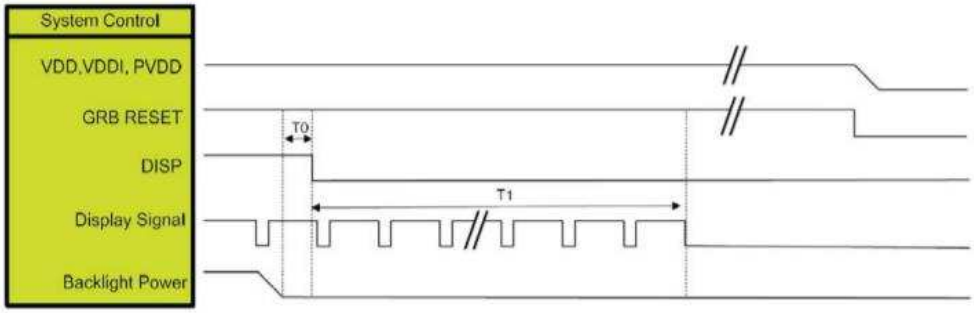
9.3.1 Power On sequence



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

Note. RGB interface display signal: DCLK, VSYNC, HSYNC, DE, DR[7:0], DB[7:0].

9.3.2 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	ms

Note. RGB interface display signal: DCLK, VSYNC, HSYNC, DE, DR[7:0], DB[7:0]

10 CAPACITIVE TOUCH SCREEN PANEL SPECIFICATIONS

10.1 Mechanical characteristics

DESCRIPTION	SPECIFICATION	REMARK
Touch Panel Size	5.0 inch	UxTouch
Outline Dimension of CTP	136.00 mm x 92.80 mm	UxTouch
Product Thickness	2.45 mm	UxTouch
Glass Thickness	1.1 mm	UxTouch
CTP View Area	109.00 mm x 65.80 mm	UxTouch
Sensor Active Area	110.00 mm x 66.80 mm	UxTouch
Structure type	Glass + Glass	UxTouch
Surface Hardness	6H	UxTouch

10.2 Electrical characteristics

DESCRIPTION		SPECIFICATION
Operating Voltage		DC 5.0 V (USB)
		DC 3.3 V (I^2C)
Power Consumption (IDD)	Active Mode	90 mA
	Sleep Mode	10 mA
Interface		USB / I^2C/Optional UART
Linearity		+/-1.5mm
Controller		ILI2132A
I2C address		0X82
Resolution		800 x 480

11 INSPECTION

Standard acceptance/rejection criteria for TFT module.

11.1 Inspection condition

Ambient conditions:

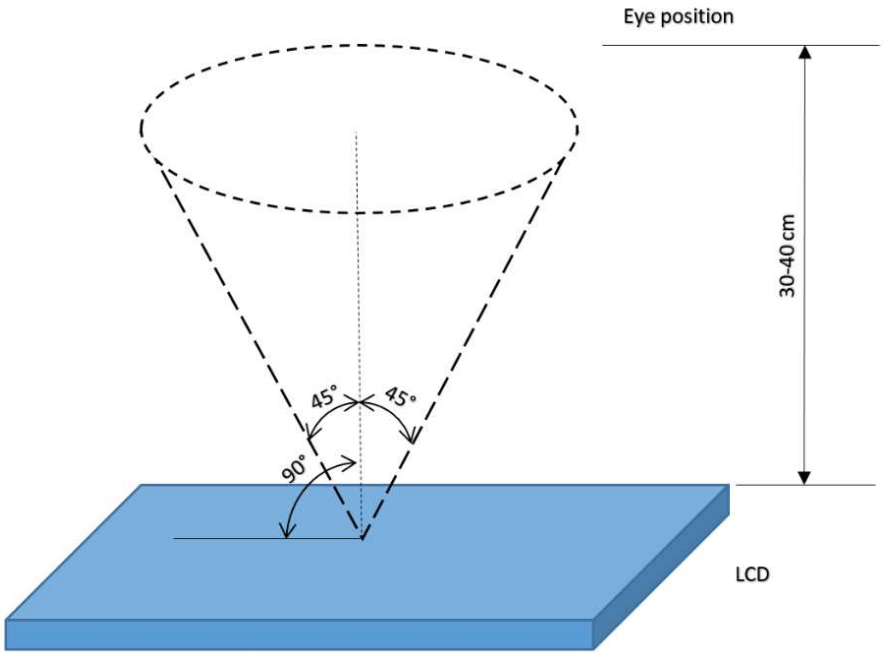
- Temperature: 25±2°C
- Humidity: (60±10)%RH
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

Viewing distance:

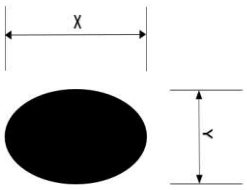
35±5cm between inspector bare eye and LCD.

Viewing Angle:

U/D: 45°/45°, L/R 45°/45°



11.2 Inspection standard

<table>
<tr><th>Item</th><th>Criterion</th></tr>
<tr><td>Black spots, white spots, light leakage, Foreign Particle (round Type)</td><td>


$$D = \frac{(x+y)}{2}$$
*Spots density: 10 mm
<table>
<tr><th colspan="2">3.5” ≤ Size ≤ 5”</th></tr>
<tr><td>Average Diameter</td><td>Qualified Qty</td></tr>
<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>
</table>
<table>
<tr><th colspan="2">Size =7”</th></tr>
<tr><td>Average Diameter</td><td>Qualified Qty</td></tr>
<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>
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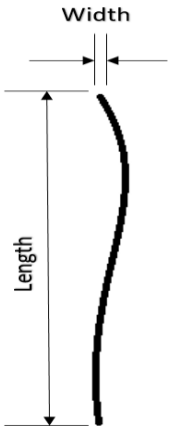
</td></tr>
<tr><td>LCD black spots, white spots, light leakage (line Type)</td><td>


*Spots density: 10 mm
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<tr><td>L ≤ 3.0</td><td>0.03< W ≤ 0.05</td><td>2</td></tr>
<tr><td>L ≤ 3.0</td><td>0.05 < W ≤ 0.1</td><td>1</td></tr>
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<tr><td>Bright/Dark Dots</td><td>
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<tr><td>item</td><td>Qualified Qty</td></tr>
<tr><td>Bright Dots</td><td>N≤1</td></tr>
<tr><td>Dark Dots</td><td>N≤2</td></tr>
<tr><td>Total Bright and Dark Dots</td><td>N≤3</td></tr>
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<tr><th>Item</th><th>Criterion</th></tr>
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<tr><td>D<0.2 mm</td><td>Ignored</td></tr>
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*Spots density: 10 mm
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<tr><td>Polarizer bubbles</td><td>
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<tr><td>Touch panel White line Scratch</td><td>
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<tr><td>-</td><td>W< 0.02</td><td>Ignored</td></tr>
<tr><td>L < 3.0</td><td>0.02 < W <0.05</td><td rowspan="2">2</td></tr>
<tr><td>L < 2.5</td><td>0.05 < W <0.08</td></tr>
<tr><td>-</td><td>0.08 < W</td><td>0</td></tr>
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12 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℃, 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
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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