LCD TFT Module Specification

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RVT70AQLNWR00

LCD TFT Datasheet

Rev.1.2
2016-10-17

ITEM	CONTENTS	UNIT
LCD Type	TFT/Transmissive/Normally white	/
Size	7.0	Inch
Viewing Direction	12:00 (without image inversion)	O' Clock
Gray Scale Inversion Direction	6:00	O' Clock
LCM (W × H × D)	164.80 ×99.80×11.13	mm^3
Active Area (W × H)	154.08 × 85.92	mm^2
Dot Pitch (W × H)	0.1926 × 0.179	mm^2
Number of Dots	800 (RGB) × 480	/
Driver IC	GM8284DD	/
Backlight Type	21 LEDs	/
Surface Luminance	320	cd/m^2
Interface Type	LVDS	/
Color Depth	16.7M	/
Pixel Arrangement	RGB Vertical Stripe	/
Surface Treatment	Clear	
Input Voltage	3.3	V
With/Without TSP	Resistive Touch Panel	/
Weight	213.2	g

Note 1: RoHS compliant

Note 2: LCM weight tolerance: ± 5%.

REVISION RECORD

REVNO.	REVDATE	CONTENTS	REMARKS
1.0	2016-03-28	Initial Release	
1.1	2016-09-13	Updated Pinout	
1.2	2016-10-17	Updated Thickness	

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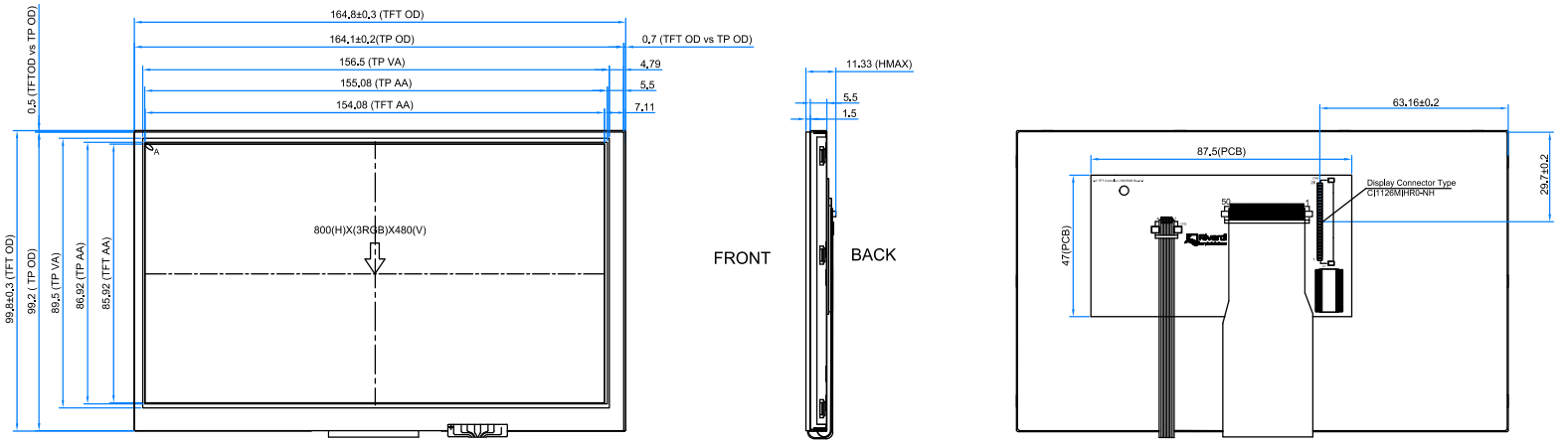
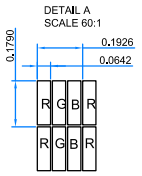
1 MODULE CLASSIFICATION INFORMATION

RV	T	70	A	Q	L	N	W	R	00
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

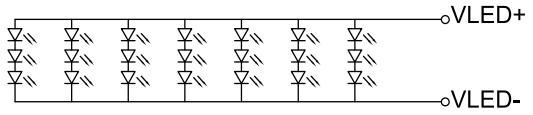
1.	**BRAND**	**RV** – Riverdi
2.	**PRODUCT TYPE**	**T – TFT Standard** **F** – TFT Custom
3.	**DISPLAY SIZE**	**35** – 3.5” **43** – 4.3” **50** – 5.0” **70 – 7.0”**
4.	**MODEL SERIAL NO.**	**A**(A-Z)
5.	**RESOLUTION**	**Q – 800x480 px**
6.	**INTERFACE**	**T** – TFT LCD, RGB **L – TFT LCD, LVDS** **S** – TFT + Controller SSD1963 **F** – TFT + Controller FT813
7.	**FRAME**	**N – No Frame** **F** – Mounting Frame
8.	**BACKLIGHT TYPE**	**W** – LED White
9.	**TOUCH PANEL**	**N** – No Touch Panel **R – Resistive Touch Panel** **C** – Capacitive Touch Panel
10.	**VERSION**	**00** (00-99)

PIN	DESC
1	GND
2	RXCLK+
3	RXCLK-
4	GND
5	RXC0+
6	RXC0-
7	GND
8	RXC1+
9	RXC1-
10	GND
11	RXC2+
12	RXC2-
13	VDD
14	RXC3+
15	RXC3-
16	VDD
17	RESET
18	BLGND
19	BLGND
20	BLVDD
21	BLVDD
22	BELENA
23	XL
24	YD
25	XR
26	YU





Internal Backlight LED Circuit



NOTES:
1. DISPLAY TYPE: LVDS, TFT, TRANSMISSIVE, NORMALLY WHITE
2. 7.0 INCH PROJECTIVE RESISTIVE TOUCH PANEL.
3. OPERATION VOLTAGE: VDD=3.3V
4. VIEWING DIRECTION: 12 O'CLOCK
5. LED BACKLIGHT: 21-LED WHITE, BUILT-IN INVERTER
6. IC CONTROLLER: GM8284DD
7. OPERATING TEMP.: -20°C ~ 70°C
8. STORAGE TEMP.: -30°C ~ 80°C
9. SURFACE LUMINANCE: 320 cd/m^2
10. GENERAL TOLERANCE: ±0.2
11. RoHS COMPLIANT
12.PLUG CONNECTOR: CI1126S0000.

Ver.	DESCRIPTION	DATE
1.1	Updated Pinout	2016.09.13
1.0	Initial case	2016.01.08

CUSTOMER		DATE	2016.09.13
DRAWN	SCALE 1:1	TITLE	RVT70AQLNWR00
DFTG CHK	UNIT mm		
ENGR CHK		MODEL	
APPROVAL		DWG NO	Rev.1.0
		PAGE	1/1

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3 ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage For Logic	VDD	-0.3	4.0	V
Input Voltage For Logic	VIN	-0.3	3.8	V
Input Voltage For LED Inverter	BLVDD	-0.3	7.0	V
Operating Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C
Humidity	RH	-	90% (Max 60°C)	RH

4 ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Supply Voltage For Module	VDD	-	3.3	-	V
Input Voltage for LED Inverter	BLVDD	2.8	5.0	5.5	V
Input Current (Exclude LED Backlight)	IDD	-	TBD	-	mA
LED Backlight Current	$IDD_{backlight}$ (@ 5V)	-	450	540	mA
Input Voltage ' H ' level	V_{IH}	0.7VDD	-	VDD	V
Input Voltage ' L ' level	V_{IL}	0	-	0.2VDD	V
LED Life Time	-	30000	50000	-	Hrs

Note: The LED life time is defined as the module brightness decrease to 50% original brightness at Ta=25°C

5 ELECTRO-OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	REMARK	NOTE
Response Time		Tr+Tf	θ=0°	-	20	35	ms	FIG 1.	4
Contrast Ratio		Cr	Ø=0°	400	500	-	---	FIG 2.	1
Luminance Uniformity		δ WHITE	Ta=25	70	75	-	%	FIG 2.	3
Surface Luminance		Lv		-	320	-	cd/m^2	FIG 2.	2
Viewing Angle Range		θ	Ø = 90°	40	50	-	deg	FIG 3.	6
			Ø = 270°	60	70	-	deg	FIG 3.	
			Ø = 0°	60	70	-	deg	FIG 3.	
			Ø = 180°	60	70	-	deg	FIG 3.	
CIE (x, y) Chromaticity	Red	x	θ=0° Ø=0° Ta=25	-	-	-	FIG 2.		5
		y		-	-	-			
	Green	x		-	-	-			
		y		-	-	-			
	Blue	x		-	-	-			
		y		-	-	-			
	White	x		-	0.280	-			
		y		-	0.310	-			

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 the 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

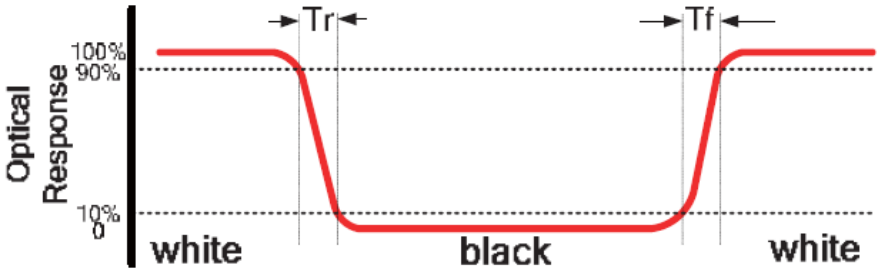
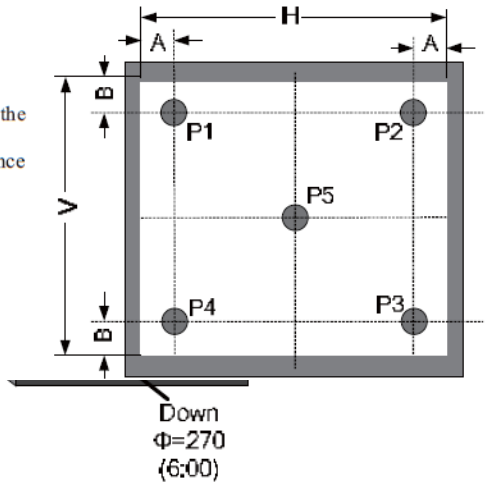


Figure 2.Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

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



6 INTERFACE DESCRIPTION

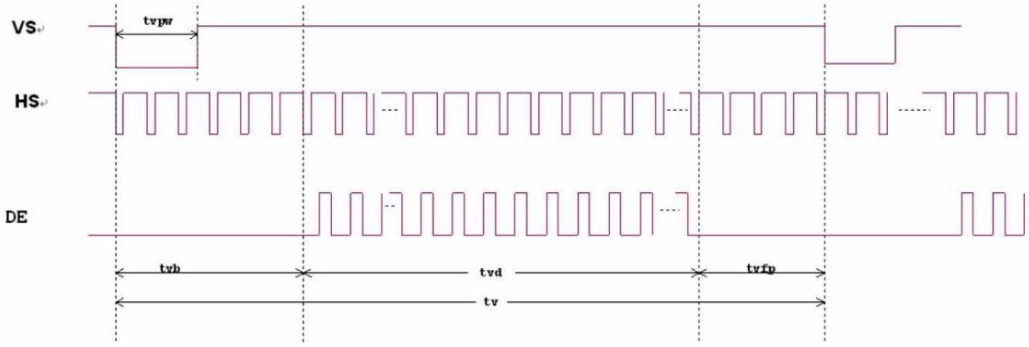
PIN NO.	SYMBOL	DESCRIPTION
1	GND	Power Ground
2	RXCLK+	LVDS Clock Output Signal +
3	RXCLK-	LVDS Clock Output Signal -
4	GND	Power Ground
5	RXC0+	LVDS Channel 0 Input Signal +
6	RXC0-	LVDS Channel 0 Input Signal -
7	GND	Power Ground
8	RXC1+	Channel 1 Input Signal +
9	RXC1-	Channel 1 Input Signal -
10	GND	Power Ground
11	RXC2+	LVDS Channel 2 Input Signal +
12	RXC2-	LVDS Channel 2 Input Signal -
13	VDD	Power Supply: +3.3V
14	RXC3+	LVDS Channel 3 Input Signal +
15	RXC3-	LVDS Channel 3 Input Signal -
16	VDD	Power Supply: +3.3V
17	RESET	Global Reset Pin
18	BLGND	Backlight Ground
19	BLGND	Backlight Ground
20	BLVDD	Backlight Supply Voltage
21	BLVDD	Backlight Supply Voltage
22	BELENA	Enable Signal Control System
23	XL	X-Right
24	YD	Y-Bottom
25	XR	X-Left
26	YU	Y-Up

7 LCD TIMING CHARACTERISTICS

7.1 Clock and data input time diagram

Figure 4. Horizontal input timing diagram

Figure 5. Vertical input timing diagram



7.2 Parallel RGB input timing table

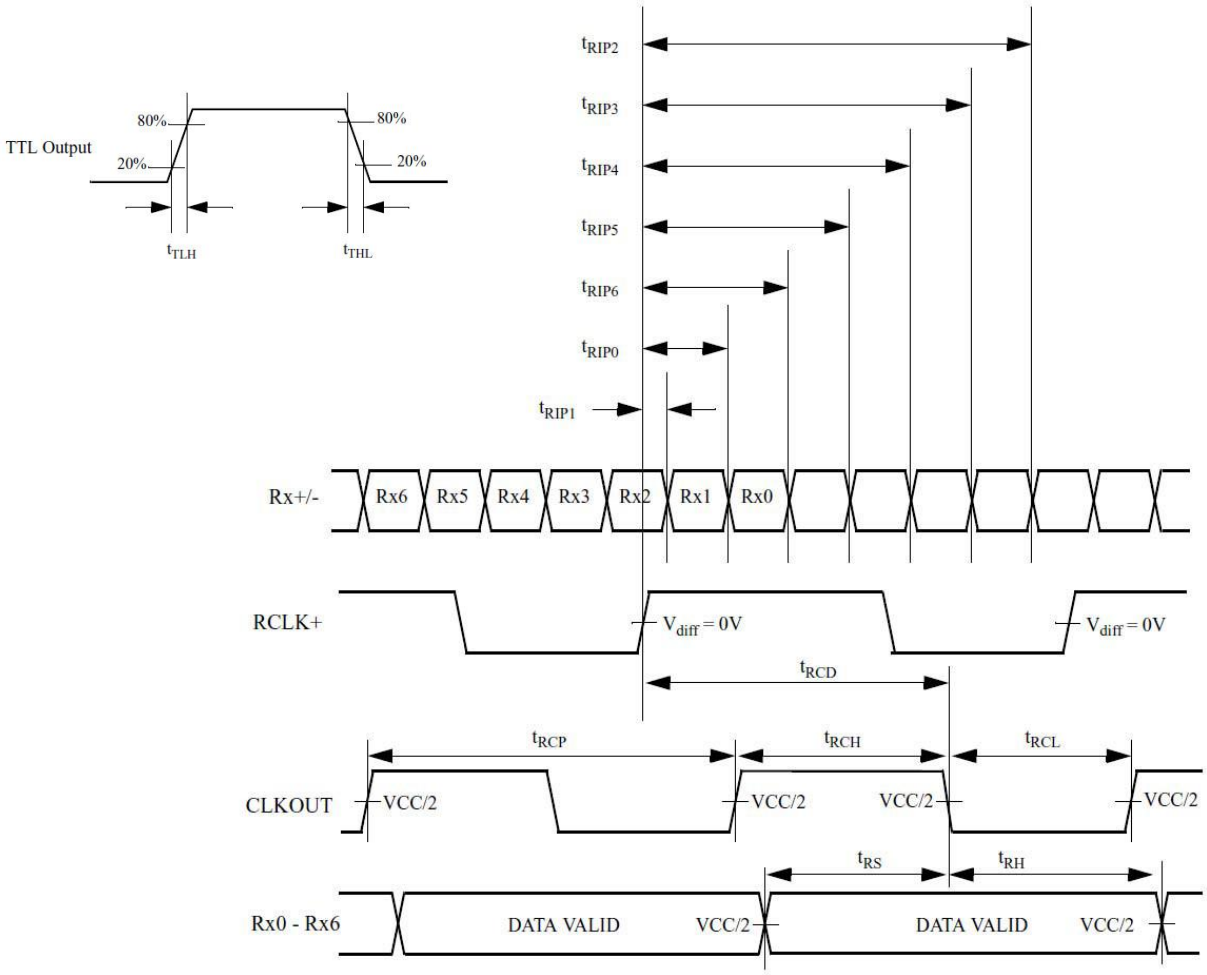
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
DCLK Frequency	Fclk	26.4	33.3	46.8	MHz
VSD Period Time	tv	510	525	650	TH
VSD Display Area	tvd		480		TH
VSD Blanking	tvb		23		TH
VSD Front Porch	tvfp	7	22	147	TH
VSD Pulse Width	tvpw	1	-	20	TH
HSD Pulse Width	thpw	1	-	40	DCLK
HSD Period Time	th	862	1056	1200	DCLK
HSD Display Area	thd		800		DCLK
HSD Blanking	thb		46		DCLK
HSD Front Porch	thfp	16	210	354	DCLK

8 LVDS SWITCHING CHARACTERISTICS

8.1 LVD Timing Condition

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
CLK OUT Period	tRCP	11.76	30.06(T)	50.0	ns
CLK OUT High Time	tRCH	-	4T/7	-	ns
CLK OUT Low Time	tRCL	-	3T/7	-	ns
RCLK+/- to CLK OUT Delay	tRCD	-	5T/7	-	ns
TTL Data Setup to CLK OUT	tRS	0.35T-0.3	-	-	ns
TTL Data Hold from CLK OUT	tRH	0.45T-1.6	-	-	ns
TTL Low to High Transition Time	tTLH	-	2.0	3.0	ns
TTL Low to Low Transition Time	tTHL	-	1.8	3.0	ns
Input Data Position0 (T=11.76ns)	tRIP1	-0.4	0.0	0.4	ns
Input Data Position0 (T=11.76ns)	tRIP0	T/7-0.4	T/7	T/7+0.4	ns
Input Data Position0 (T=11.76ns)	tRIP6	2T/7-0.4	2T/7	2T/7+0.4	ns
Input Data Position0 (T=11.76ns)	tRIP5	3T/7-0.4	3T/7	3T/7+0.4	ns
Input Data Position0 (T=11.76ns)	tRIP4	4T/7-0.4	4T/7	4T/7+0.4	ns
Input Data Position0 (T=11.76ns)	tRIP3	5T/7-0.4	5T/7	5T/7+0.4	ns
Input Data Position0 (T=11.76ns)	tRIP2	6T/7-0.4	6T/7	6T/7+0.4	ns
Phase Lock Loop Set	tRPLL	-	-	10	ms

8.2 LVDS AC Timing Characteristic



9 TOUCH SCREEN PANEL SPECIFICATIONS

9.1 Electrical characteristics

ITEM	VALUE			UNIT	REMARK
	Min.	Typ.	Max.		
Linearity	-3.0	-	3.0	%	Analog X and Y directions
Terminal Resistance	440	-	1100	Ω	X
	100	-	420	Ω	Y
Insulation Resistance	25	-	-	MΩ	DC 25V
Voltage	-	-	10	V	DC
Chattering	-	-	10	ms	100kΩ pull-up
Transparency	78	-	-	%	JIS K7105

Note: Avoid operating with hard or sharp material such as a ball point pen or a mechanical pencil except a polyacetal pen (tip R 0.8mm or less) or a finger.

9.2 Mechanical characteristics

ITEM	VALUE			UNIT	REMARK
	Min.	Typ.	Max.		
Activation Force	20	-	100	gf	
Durability-Surface Scratching	Write 100,000	-	-	characters	
Durability-Surface Pitting	1,000 000	-	-	touches	
Surface Hardness	3	-	-	H	JIS K5400

10 INSPECTION

Standard acceptance/rejection criteria for TFT module.

10.1 Inspection condition

Ambient conditions:

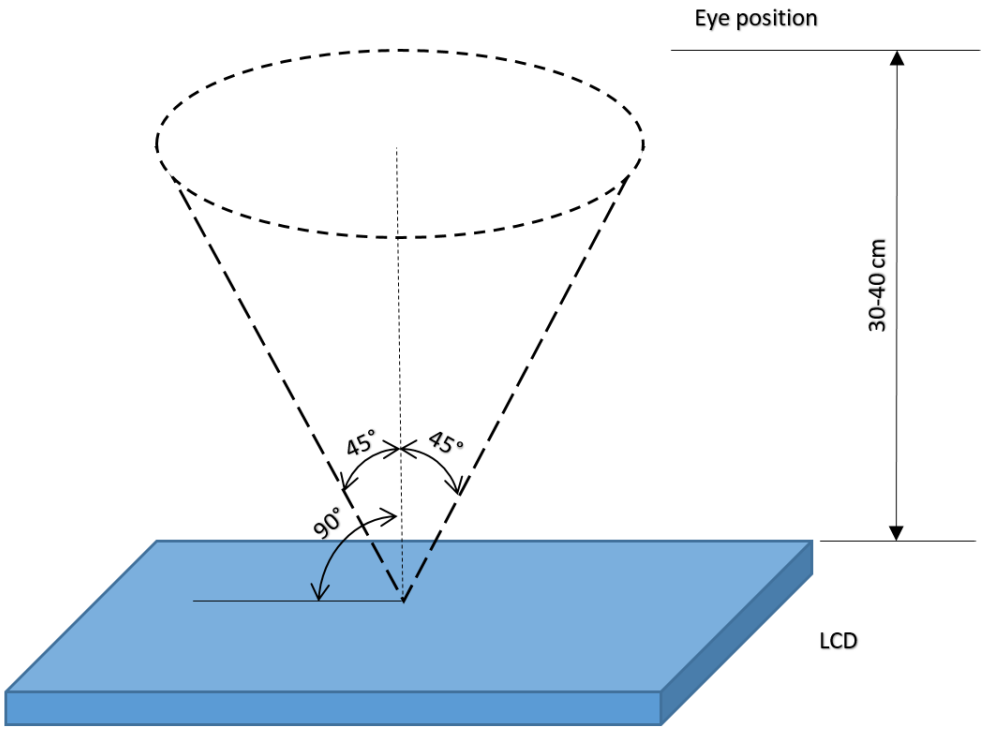
- Temperature: 25±°C
- Humidity: (60±10) %RH
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

Viewing distance:

35±5cm between inspector bare eye and LCD.

Viewing Angle:

U/D: 45°/45°, L/R 45°/45°



10.2 Inspection standard

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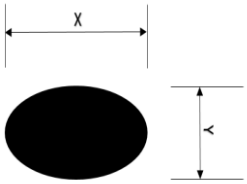

$$D = \frac{(x + y)}{2}$$
*Spots density: 10 mm
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<tr><td>Average Diameter</td><td>Qualified Qty</td></tr>
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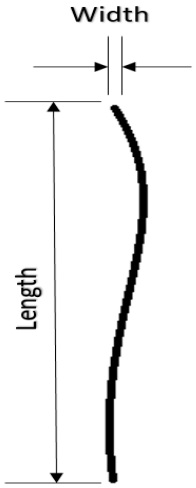
<tr><td>LCD black spots, white spots, light leakage (line Type)</td><td>


*Spots density: 10 mm
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<tr><td>L < 2.5</td><td>0.05 < W <0.08</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>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>
</table>
<table>
<tr><th colspan="3">Size >= 5”</th></tr>
<tr><td>Length</td><td>Width</td><td>Qualified Qty</td></tr>
<tr><td>-</td><td>W< 0.03</td><td>Ignored</td></tr>
<tr><td>L < 5.0</td><td>0.03 < W <0.05</td><td>2</td></tr>
<tr><td>-</td><td>0.05 < W</td><td>0</td></tr>
</table>
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11 RELIABILITY TEST

NO.	TEST ITEM	TEST CONDITION
1	High Temperature Storage	80±2°C/240hours
2	Low Temperature Storage	-30±2°C/240hours
3	High Temperature Operating	70±2°C/240hours
4	Low Temperature Operating	-20±2°C/240hours
5	Temperature Cycle	-30±2°C~25~80±2°C × 20 cycles (30min.) (5min.) (30min.)
6	Damp Proof Test	60°C ±5°C × 90%RH/240hours
7	Vibration Test	Frequency 10Hz~55Hz Amplitude of vibration: 1.5mm Sweep: 10Hz~55Hz~10Hz X, Y, Z 2 hours for each direction.
8	Package Vibration Test	Random vibration :0.15G*G/HZ from 5-200HZ, -6dB/Octave from 200-500HZ of 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	± 2KV, Human body mode,100pF/1500Ω
11	Mechanical Shock	100G 6ms, X, Y, Z 3 times for each direction

12 LEGAL INFORMATION

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