



RVT50HQTNWN00

IPS RGB 5.0" LCD TFT Datasheet

Rev.1.0

2020-08-05

ITEM	CONTENTS	UNIT
LCD Type	TFT/Transmissive/Normally black/IPS	/
Size	5.0	Inch
Viewing Direction	Free	/
Outside Dimensions (W × H × D)	120.7 × 75.8 × 2.95	mm ³
Active Area (W × H)	108.0 × 64.8	mm ²
Pixel Pitch (W × H)	0.135 × 0.135	mm ²
Resolution	800 (RGB) × 480	/
Brightness	1000	cd/m ²
LCD Interface Type	RGB	/
Color Depth	16.7 M	/
Pixel Arrangement	RGB Vertical Stripe	/
LCD Driver	ST7262-G4	/
With/Without Touch	Without Touch Panel	/
Surface Treatment	Anti-Glare	/
LCD Input Voltage	3.3	V
Weight	50	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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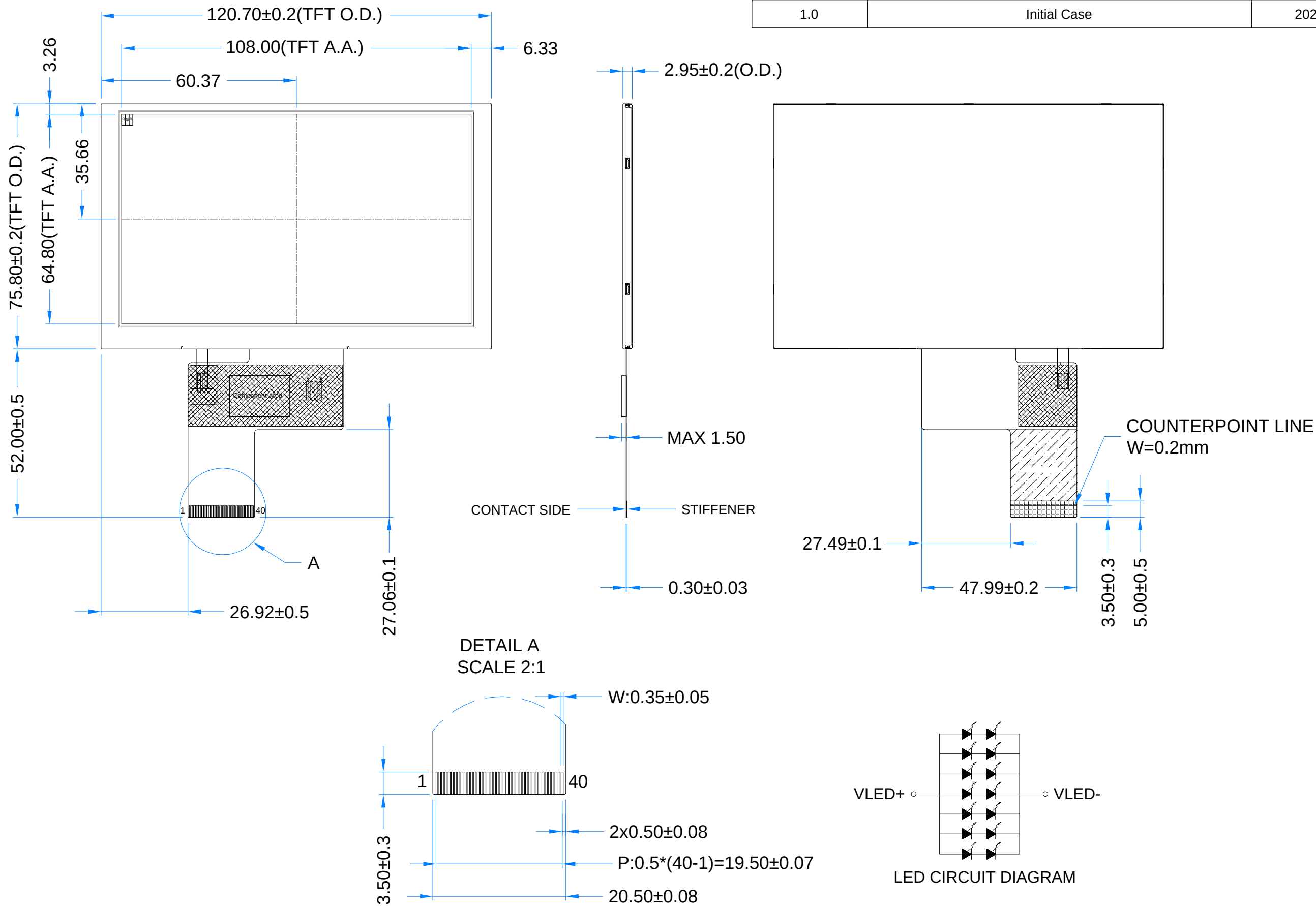
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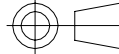
1 MODULE CLASSIFICATION INFORMATION

RV	T	50	H	Q	T	N	W	N	00
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

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	T– TFT LCD, RGB
7.	FRAME	N – No Frame
8.	BACKLIGHT TYPE	W – LED White
9.	TOUCH PANEL	N – No Touch Panel
10.	VERSION	00 – (00-99)

Revision:	Changes:	Date:
1.0	Initial Case	2020.06.18



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. SURFACE LUMINANCE: 1000 cd/m^2 7. BACKLIGHT: 14-LED WHITE, Vf =12.0 V, If =140 mA		GENERAL NOTES: 1. OPERATING TEMPERATURE: -20°C ~ 70°C 2. STORAGE TEMPERATURE: -30°C ~ 80°C 3. WITHOUT INDIVIDUAL TOLERANCE: ±0.2mm 4. RoHS COMPLIANT						
			PN: RVT50HQTNWN00					
			SN:					
			DRAWN: Mateusz Natywa			2020.06.18	1:1.19	
			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	V _{IL}	0	-	0.3VDD
	High Voltage	V _{IH}	0.7VDD	-	VDD
Logic Output Voltage	Low Voltage	V _{OL}	-	-	GND+0.4
	High Voltage	V _{OH}	VDD - 0.4	-	V
Power Consumption	Black Mode	P _b	80	85	mA
	Standby Mode	P _w	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°C.

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	$\theta=0^\circ$ $\phi=0^\circ$ $T_a=25^\circ\text{C}$	-	30	-	ms	FIG 1.	4
Contrast Ratio	Cr		-	1000	-	---	FIG 2.	1
Luminance Uniformity	δ WHITE		-	75	-	%	FIG 2.	3
Surface Luminance	Lv		900	1000	-	cd/m ²	FIG 2.	2
Viewing Angle Range	θ	$\phi = 90^\circ$	-	80	-	deg	FIG 3.	6
		$\phi = 270^\circ$	-	80	-	deg	FIG 3.	
		$\phi = 0^\circ$	-	80	-	deg	FIG 3.	
		$\phi = 180^\circ$	-	80	-	deg	FIG 3.	
CIE (x, y) Chromaticity	Red	x	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.

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

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 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

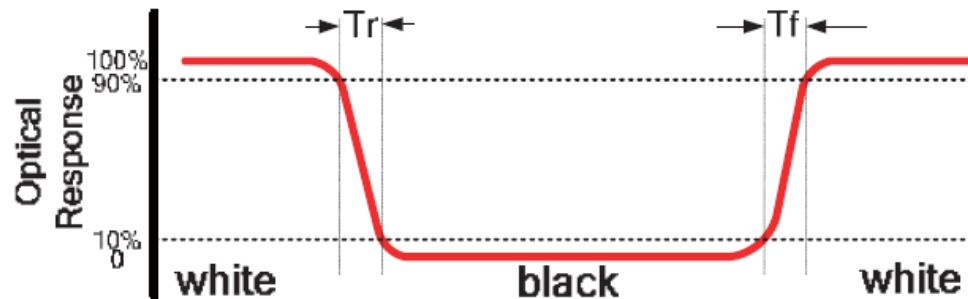


Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

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

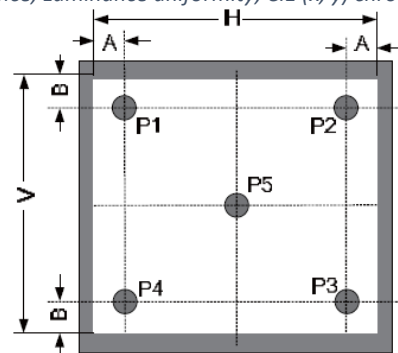
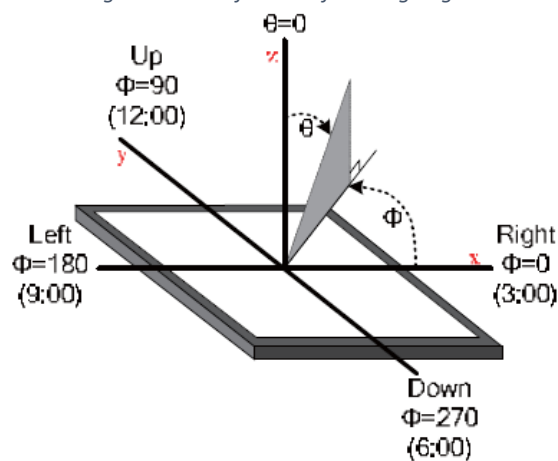
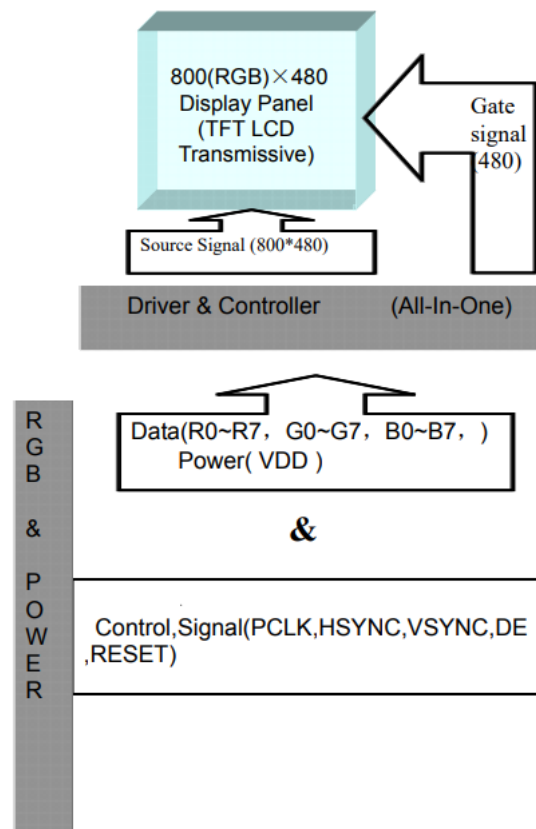


Figure 3. The definition of viewing angle



7 BLOCK DIAGRAM



8 INTERFACE DESCRIPTION

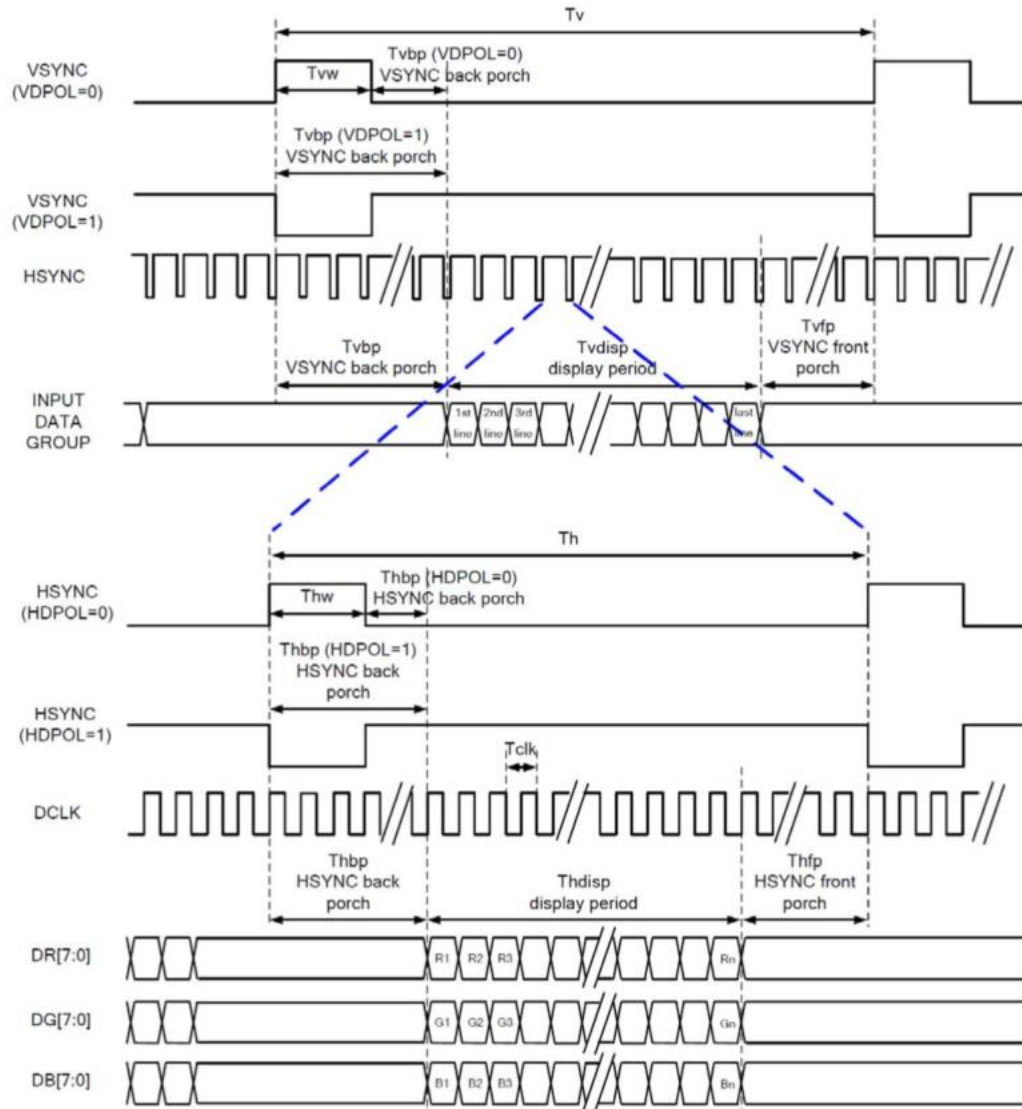
8.1 TFT assignment

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	VSNC	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

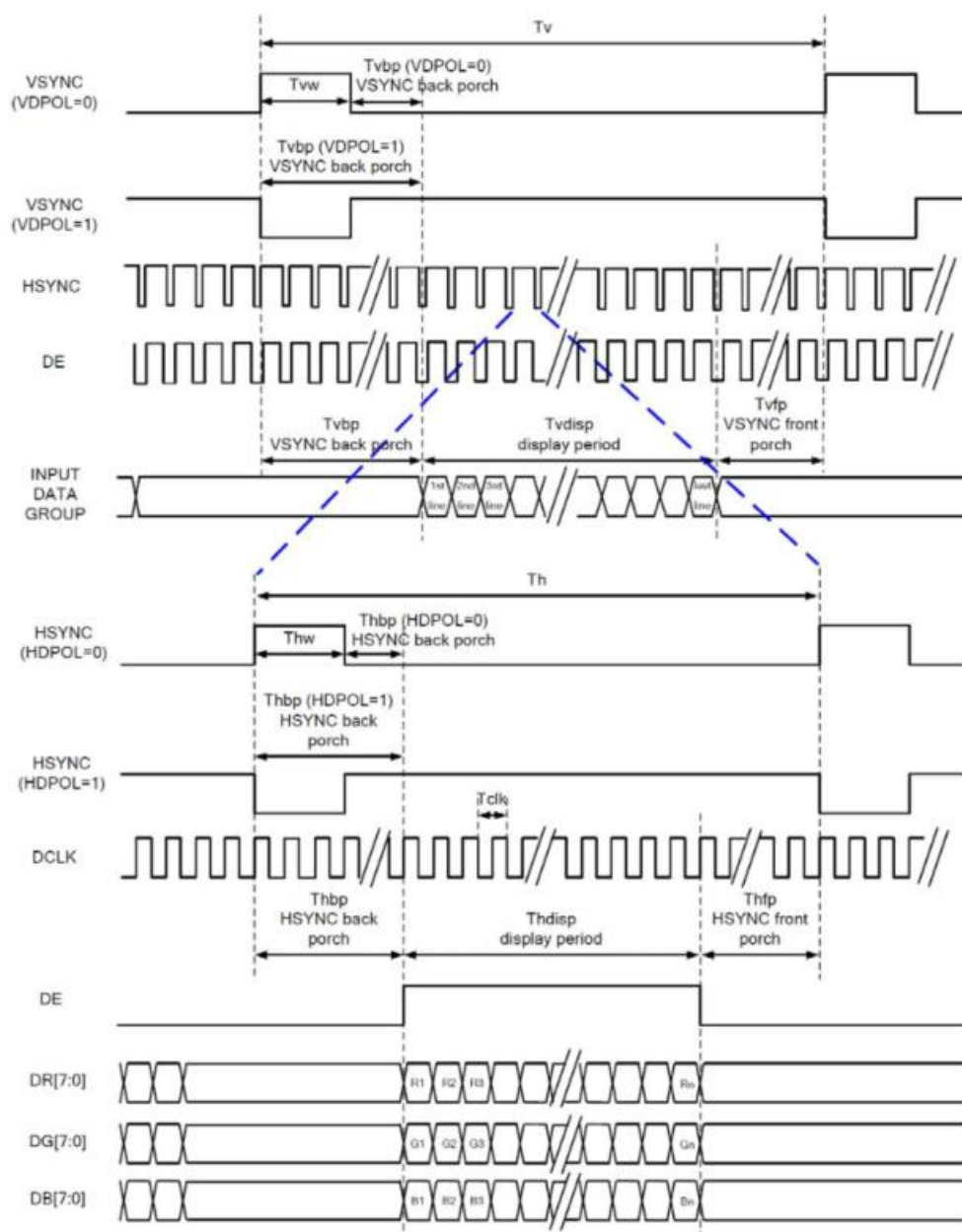
9 TIMING CHARACTERISTICS

9.1 System bus timing for RGB interface

9.1.1 SYNC Mode



9.1.2 SYNC-DE Mode



The diagram illustrates the timing relationships for a video signal. It shows the following signals and their timing parameters:

- VSYNC (VSS):** The vertical sync signal. Its timing is defined by T_{vw} (vertical sync width) and T_{vp} (vertical sync period). The total vertical sync period is T_v .
- HSYNC (VSS):** The horizontal sync signal. Its timing is defined by T_{hw} (horizontal sync width) and T_{hb} (horizontal sync back porch).
- DE (Data Enable):** The data enable signal, which is active during the display period.
- INPUT DATA GROUP:** The input data group, which is active during the display period. It includes the first line, second line, and last line.
- HSYNC (VSS):** The horizontal sync signal, which is active during the display period.
- DCLK (Data Clock):** The data clock signal, which is active during the display period.
- DE (Data Enable):** The data enable signal, which is active during the display period.
- DR[7:0], DG[7:0], DB[7:0]:** The data signals (Red, Green, Blue) which are active during the display period.

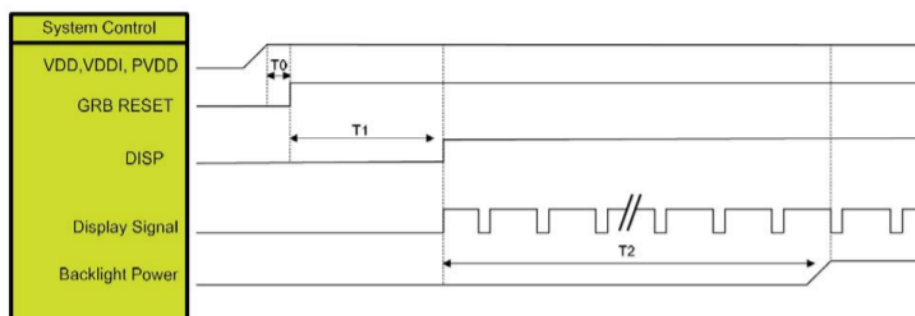
The diagram also shows the timing of the display period, including the back porch and front porch intervals. The back porch interval is labeled T_{vbp} (VSYNC back porch) and T_{hbp} (HSYNC back porch). The front porch interval is labeled T_{vfp} (VSYNC front porch) and T_{hfp} (HSYNC front porch). The display period is labeled T_{vdisp} (VSYNC display period) and T_{hdisp} (HSYNC display period). The clock period is labeled T_{clk} .

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

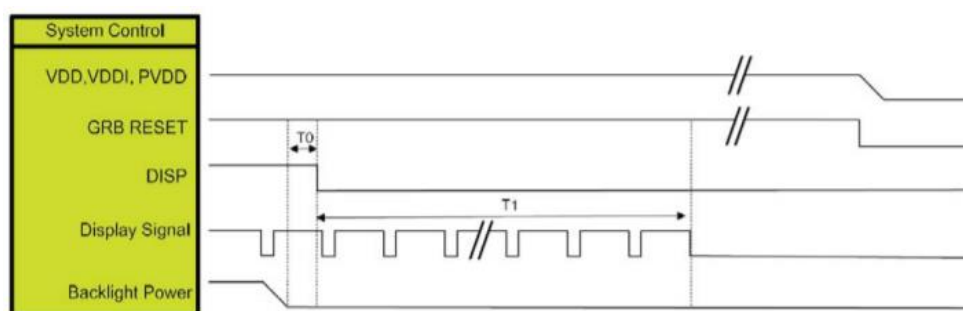
9.3.1 Power On sequence



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 INSPECTION

Standard acceptance/rejection criteria for TFT module.

10.1 Inspection condition

Ambient conditions:

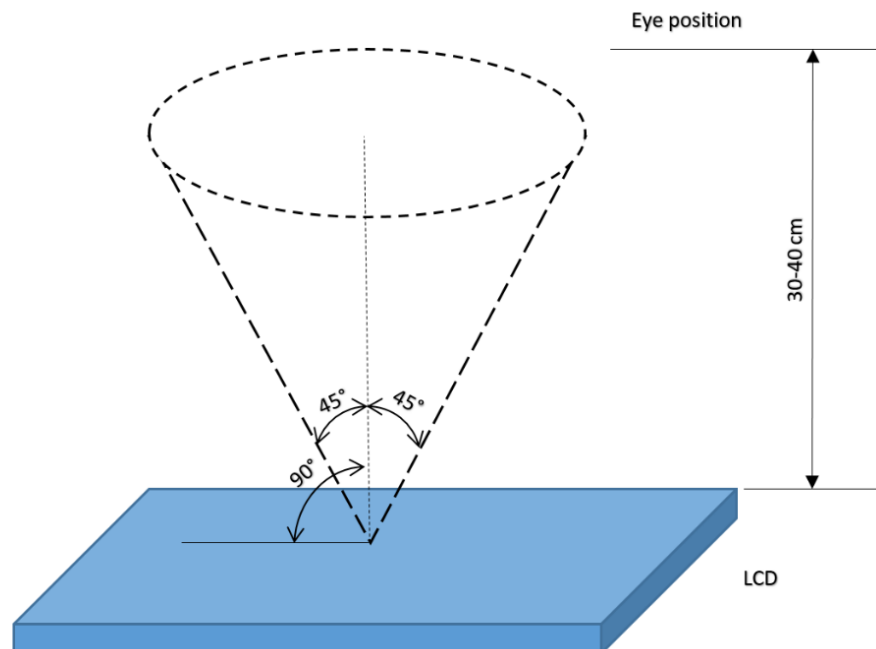
- Temperature: $25 \pm 2^{\circ}\text{C}$
- Humidity: $(60 \pm 10)\% \text{RH}$
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

Viewing distance:

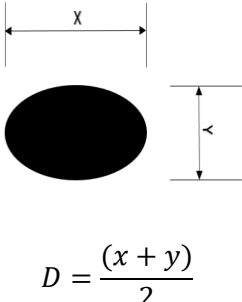
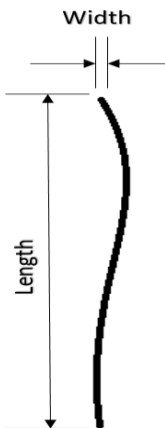
$35 \pm 5 \text{cm}$ between inspector bare eye and LCD.

Viewing Angle:

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



10.2 Inspection standard

Item	Criterion																																	
Black spots, white spots, light leakage, Foreign Particle (round Type)	 $D = \frac{(x + y)}{2}$ *Spots density: 10 mm <table><tr><th colspan="2">3.5" ≤ Size ≤ 5"</th></tr><tr><th>Average Diameter</th><th>Qualified Qty</th></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><th>Average Diameter</th><th>Qualified Qty</th></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></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													
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0.5mm < D	Not allowed																																	
LCD black spots, white spots, light leakage (line Type)	 *Spots density: 10 mm <table><tr><th colspan="3">3.5" ≤ Size ≤ 5"</th></tr><tr><th>Length/mm</th><th>Width/mm</th><th>Qualified Qty</th></tr><tr><td>-</td><td>W≤ 0.03</td><td>Ignored</td></tr><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><tr><td>3.0 < L</td><td>0.1< W</td><td>Not allowed</td></tr></table><table><tr><th colspan="3">Size =7"</th></tr><tr><th>Length</th><th>Width</th><th>Qualified Qty</th></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>3</td></tr><tr><td>5.0 < L</td><td>0.10< W</td><td>Not allowed</td></tr></table>	3.5" ≤ Size ≤ 5"			Length/mm	Width/mm	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	Size =7"			Length	Width	Qualified Qty	-	W ≤ 0.05	Ignored	L ≤ 5.0	0.05< W ≤ 0.1	3	5.0 < L	0.10< W	Not allowed
3.5" ≤ Size ≤ 5"																																		
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3.0 < L	0.1< W	Not allowed																																
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-	W ≤ 0.05	Ignored																																
L ≤ 5.0	0.05< W ≤ 0.1	3																																
5.0 < L	0.10< W	Not allowed																																
Bright/Dark Dots	<table><tr><th colspan="2">3.5" ≤ Size ≤ 5"</th></tr><tr><th>item</th><th>Qualified Qty</th></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></table><table><tr><th colspan="2">Size =7"</th></tr><tr><th>item</th><th>Qualified Qty</th></tr><tr><td>Bright Dots</td><td>N≤2</td></tr><tr><td>Dark Dots</td><td>N≤3</td></tr><tr><td>Total Bright and Dark Dots</td><td>N≤4</td></tr></table>	3.5" ≤ Size ≤ 5"		item	Qualified Qty	Bright Dots	N≤1	Dark Dots	N≤2	Total Bright and Dark Dots	N≤3	Size =7"		item	Qualified Qty	Bright Dots	N≤2	Dark Dots	N≤3	Total Bright and Dark Dots	N≤4													
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item	Qualified Qty																																	
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Dark Dots	N≤3																																	
Total Bright and Dark Dots	N≤4																																	

Item	Criterion														
Clear spots	<table><tr><th colspan="2">Size < 5"</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>3</td></tr><tr><td>0.3 mm < D < 0.5 mm</td><td>2</td></tr><tr><td>0.5 mm < D</td><td>0</td></tr></table>	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	3													
	0.3 mm < D < 0.5 mm	2													
	0.5 mm < D	0													
	<table><tr><th colspan="2">Size >= 5"</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>4</td></tr><tr><td>0.3 mm < D < 0.5 mm</td><td>2</td></tr><tr><td>0.5 mm < D</td><td>0</td></tr></table>	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		
	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	<table><tr><th colspan="2">3.5" ≤ Size ≤ 5"</th></tr><tr><td>Average Diameter</td><td>Qualified Qty</td></tr><tr><td>D ≤ 0.2 mm</td><td>Ignored</td></tr><tr><td>0.2 mm < D ≤ 0.3 mm</td><td>2</td></tr><tr><td>0.3 mm < D ≤ 0.5mm</td><td>1</td></tr><tr><td>0.5 mm < D</td><td>0</td></tr><tr><td>Total Q'ty</td><td>3</td></tr></table>	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 ≤ 0.5mm	1	0.5 mm < D	0	Total Q'ty	3
	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 ≤ 0.5mm	1													
	0.5 mm < D	0													
	Total Q'ty	3													
	<table><tr><th colspan="2">Size >= 5"</th></tr><tr><td>Average Diameter</td><td>Qualified Qty</td></tr><tr><td>D<0.25 mm</td><td>Ignored</td></tr><tr><td>0.25 mm < D < 0.5 mm</td><td>3</td></tr><tr><td>0.5 mm < D</td><td>0</td></tr></table>	Size >= 5"		Average Diameter	Qualified Qty	D<0.25 mm	Ignored	0.25 mm < D < 0.5 mm	3	0.5 mm < D	0				
	Size >= 5"														
	Average Diameter	Qualified Qty													
	D<0.25 mm	Ignored													
	0.25 mm < D < 0.5 mm	3													
	0.5 mm < D	0													

11 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.

12 LEGAL INFORMATION

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