

VICTRONIX	Add:	Room 1405A, Building 1B, Hua qiang Idea Park, Guang Ming District, ShenZhen,China		
	Tel:	+86-755-33265935	Fax:	+86-755-33265935

SPECIFICATION

VXT350FLVH-01

☐ Preliminary Specification

☐ Final Specification



Customer:

Made By:

Checked By:

Approved By:

Quality:

Date:

Note:

Approved By:

Date:

Note:

Records of Revision

[illegible]

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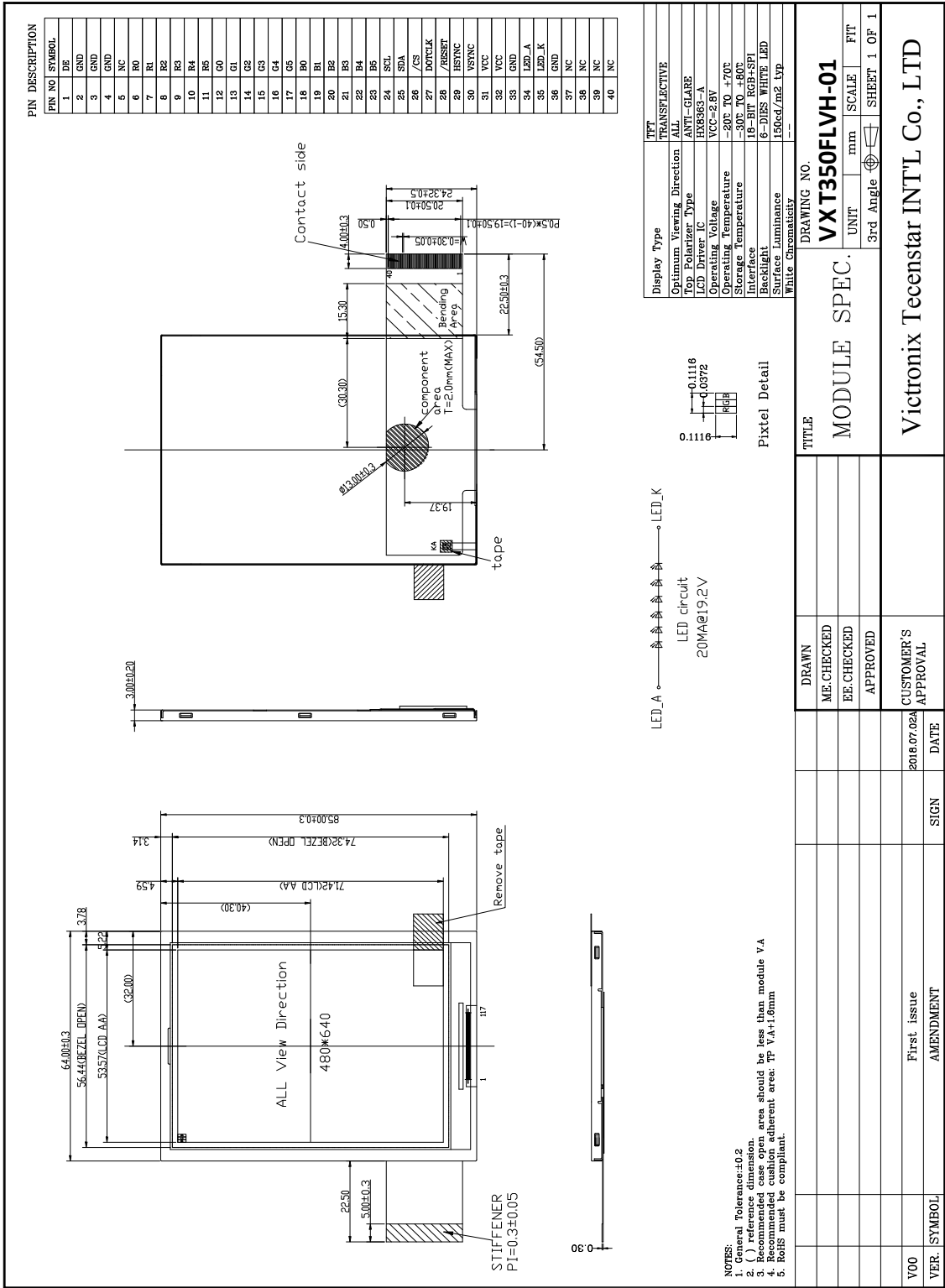
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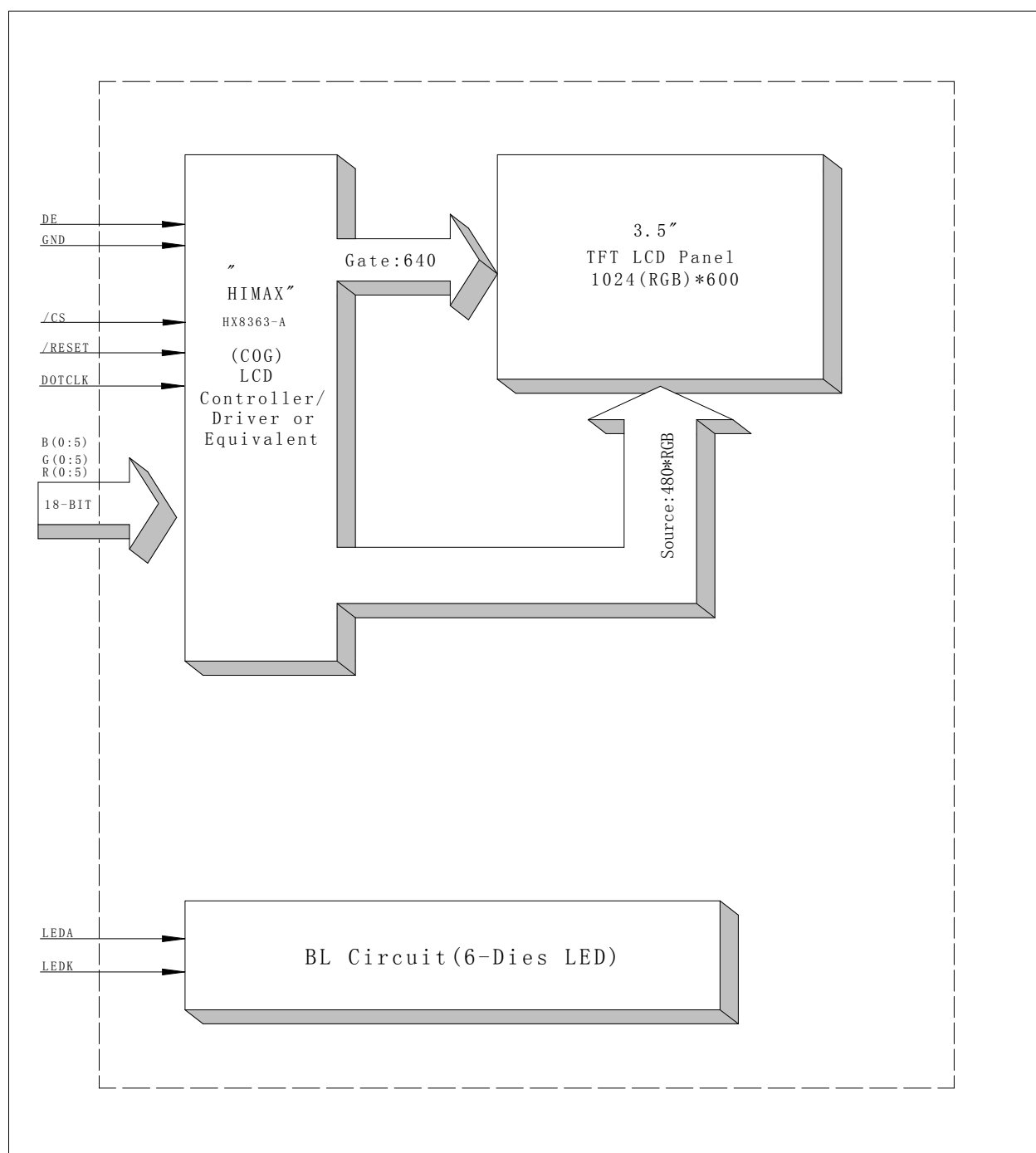
1. General Specification

Item	Contents	Unit
LCD TYPE	TFT/TRANSFLECTIVE	
MODULE SIZE (W*H*T)	64*85*3	MM
ACTIVE SIZE (W*H)	53.57*71.42	MM
PIXEL PITCH (W*H)	0.1116*0.1116	MM
NUMBER OF DOTS	480*640	
DRIVER IC	HX8363-A	
INTERFACE TYPE	18-BIT RGB+SPI	
TOP POLARIZER TYPE	ANTI-GLARE	
RECOMMEND VIEWING DIRECTION	ALL	O'CLOCK
GRAY SCALE INVERSION DIRECTION	-	O'CLOCK
BACKLIGHT TYPE	6-CHIP WHITE LED	
TOUCH PANEL TYPE	WITHOUT	

2. Mechanical Drawing



3. Block Diagram



4. Interface Pin Function

Pin No.	Symbol	Description
1	DE	Data enable
2	GND	Power ground
3	GND	Power ground
4	GND	Power ground
5	NC	NO connect
6	R0	Red data
7	R1	Red data
8	R2	Red data
9	R3	Red data
10	R4	Red data
11	R5	Red data
12	G0	Green data
13	G1	Green data
14	G2	Green data
15	G3	Green data
16	G4	Green data
17	G5	Green data
18	B0	Blue data
19	B1	Blue data
20	B2	Blue data
21	B3	Blue data
22	B4	Blue data
23	B5	Blue data
24	SCL	Serial clock input
25	SDA	Data output pin in serial interface
26	/CS	CS : Chip select pin
27	DOTCLK	Dot-clock signal and oscillator source
28	/RESET	System reset pin. - An active low pulse at this pin will reset the IC, Connect to VDDIO in normal operation
29	HSYNC	Horizontal sync signal
30	VSYNC	Vertical sync signal
31	VCC	Power supply
32	VCC	Power supply
33	GND	Power ground
34	LED_A	Anode of LED backlight
35	LED_K	Cathode of LED backlight
36	GND	Power ground
37	NC	NO connect
38	NC	NO connect

39	NC	NO connect
40	NC	NO connect

5. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	VCC	-0.3	4.5	V
Supply voltage for logic	VCC	-0.3	4.5	V
Supply current (One LED)	I _{LED}		30	mA
Operating temperature	T _{OP}	-20	+70	°C
Storage temperature	T _{ST}	-30	+80	°C

Note : The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

6. Electrical Characteristics

6.1 Input Power

Item	Symbol	Min	Typ.	Max	Unit	Applicable terminal
Supply Voltage for Analog	VCC	2.5	2.8	3.3	V	
Supply Voltage for Logic	VCC	2.5	2.8	3.3	V	
Input Voltage	V _{IL}	0	-	0.3VCC	V	
	V _{IH}	0.7 VCC	-	VCC		
Input leakage Current	I _{LKG}	-		-	μA	

6.2 Backlight Driving Conditions

Item	Symbol	Value			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V _F	16.8	19.2	20.4	V	I _L =20mA
Current for LED Backlight	I _L		20		mA	
Power Consumption	P		0.384		W	
LED Life Time		30,000	50,000		Hr	Note

Note: Brightness to be decreased to 50% of the initial value at ambient temperature TA=25℃

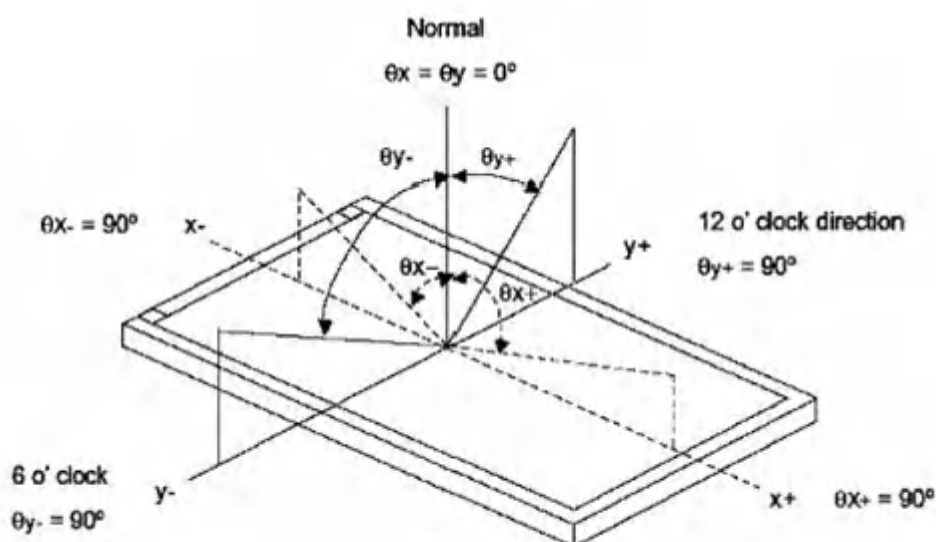
7. Optical Characteristics

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN	TYP.	MAX		
Luminance		L	$I_L = 20\text{mA}$	120	150	180	Cd/m^2	
Contrast Ratio		CR	$\theta = 0^\circ$		300			
Response Time		TON	25°C		30	50	ms	
		TOFF						
CIE Color Coordinate	Red	XR	Viewing normal angle	0.474	0.514	0.554		
		YR		0.301	0.341	0.381		
	Green	XG		0.293	0.334	0.374		
		YG		0.503	0.543	0.583		
	Blue	XB		0.114	0.154	0.194		
		YB		0.089	0.129	0.169		
	White	XW		0.258	0.298	0.338		
		YW		0.305	0.345	0.385		
Viewing Angle	Hor.	θ_{X+}	$\text{CR} \geq 10$	60	80		Degree	Gray scale inversion
		θ_{X-}		60	80			
	Ver.	θ_{Y+}		60	80			
		θ_{Y-}		60	80			
Uniformity	Un			80			%	

Reflective mode (Not driving the back light condition)

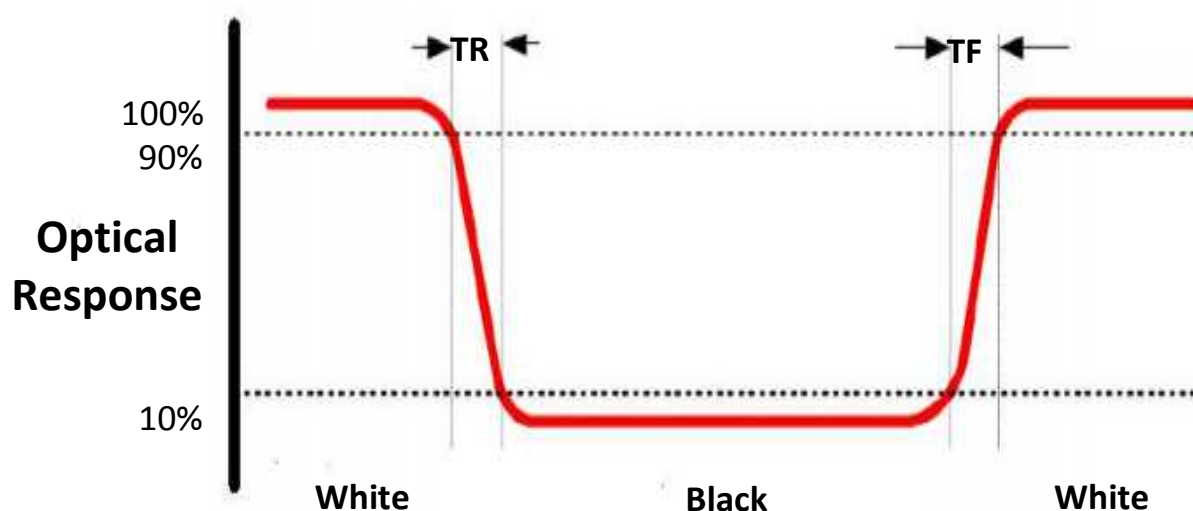
Item	Symbol	Specifications			Unit	Note
		Min.	Typ.	Max.		
Reflection Ratio (With Polarizer)	R ($\theta = \phi = 0^\circ$)	-	7	-	%	Here the data are design value.
Reflective Contrast Ratio	Cr ($\theta = 0^\circ$)	-	20	-		
Viewing angle ($Cr \geq 2$)*	Θ_{21}	-	45	-	deg	
	Θ_{22}	-	45	-		
	Θ_{12}	-	45	-		
	Θ_{11}	-	45	-		

Note 1: Definition of Viewing Angle θ_x and θ_y :



Note 2: Definition of contrast ratio CR:

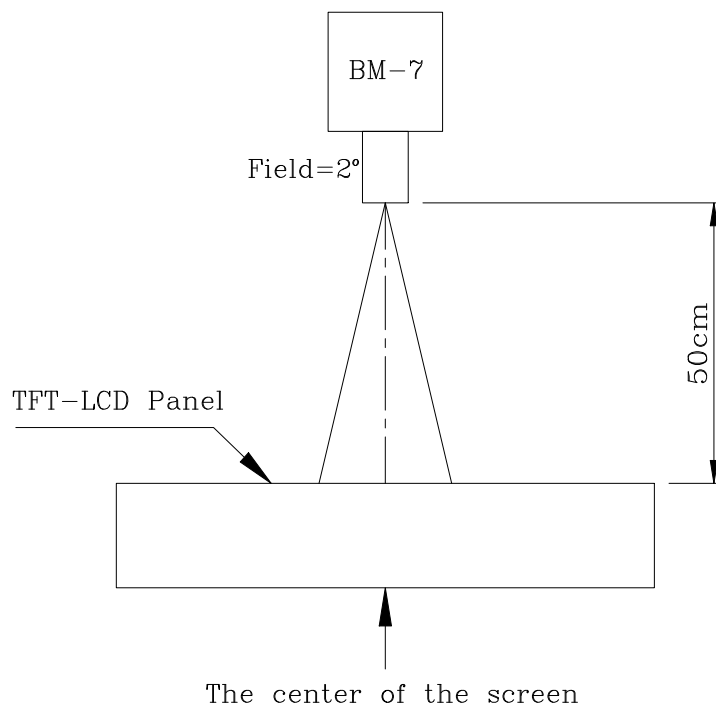
$$CR = \frac{\text{Luminance of white state}}{\text{Luminance of black state}}$$

Note 3: Definition of Response Time(T_r , T_f)

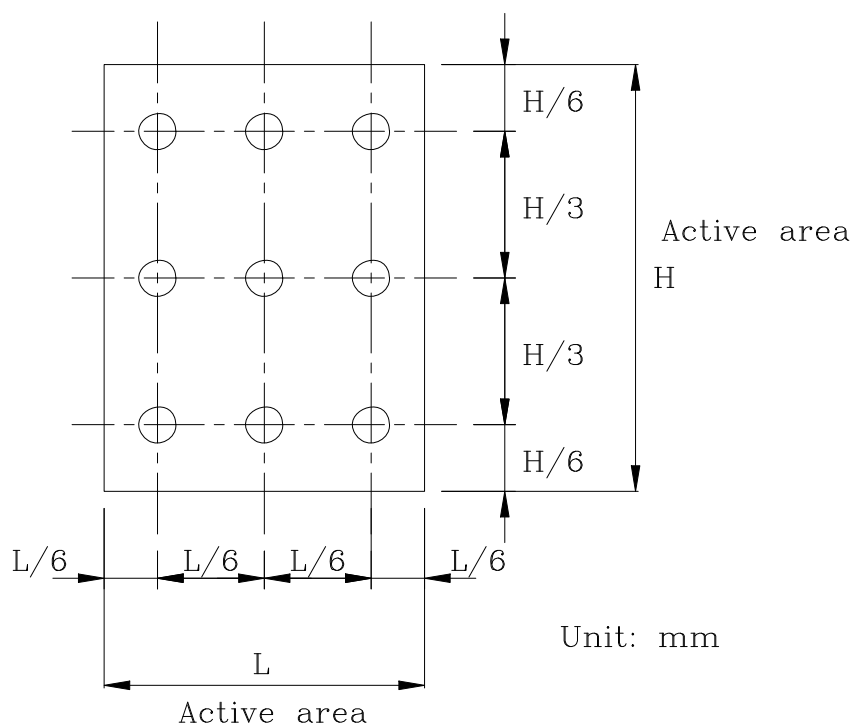
Note 4: Definition of Luminance

① The Brightness Test Equipment Setup

Field=2° (As measuring “black” image, field=2° is the best testing condition)



② The Brightness Test Point Setup



8. Timing Characteristics

8.1 RGB Interface Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical cycle	VP	-	806	-	810	Line
Vertical low pulse width	VS	-	2	-	4	Line
Vertical front porch	VFP	-	2	-	4	Line
Vertical back porch	VBP	-	2	-	4	Line
Vertical data start point	-	VS+VBP	4	-	8	Line
Vertical blanking period	VBL	VS+VBP+VFP	6	-	10	Line
Vertical active area	-	VDISP	-	800	-	Line
Vertical Refresh rate	VRR	-	50	-	70	Hz

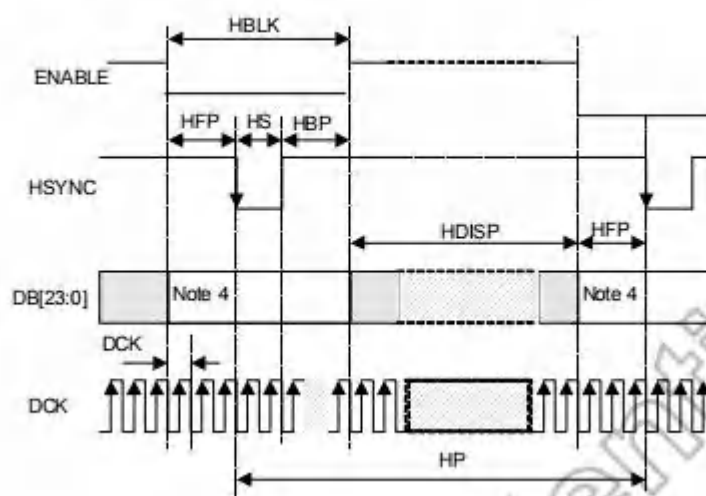
Note: (1) Signal rise and fall times are equal to or less than 20 ns.

(2) Input signals are measured by $0.30 \times VDD1$ for low state and $0.70 \times VDD1$ for high state

(3) Data lines can be set to "High" or "Low" during blanking time – Don't care.

(4) VRR must keep from 50Hz to 70Hz when adjust other items

Horizontal Timings for RGB I/F



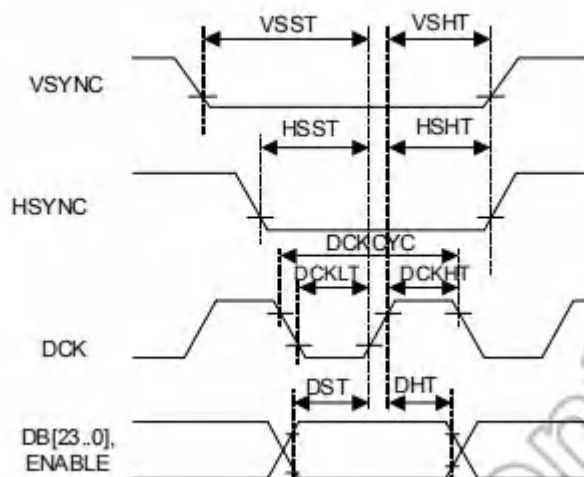
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS cycle	HP	Note ⁽³⁾	504	-	568	DCK
HS low pulse width	HS	-	5	-	78	DCK
Horizontal back porch	HBP	-	5	-	78	DCK
Horizontal front porch	HFP	-	5	-	78	DCK
Horizontal data start point	-	HS+HBP	19	-	83	DCK
			700	-	-	ns
Horizontal blanking period	HBLK	HS+HBP+HFP	24	-	88	DCK
Horizontal active area	HDISP	-	-	480	-	DCK
Pixel clock frequency When RGB I/F is running	DCK	VRR = Min. 50Hz - Max. 70Hz	21.6	-	34.3	MHz
			29.1	-	46.2	ns

Note: (1) Signal rise and fall times are equal to or less than 20 ns.
(2) Input signals are measured by 0.30 x VDD1 for low state and 0.70 x VDD1 for high state.
(3) HP is multiples of eight DCK.
(4) Data lines can be set to "High" or "Low" during blanking time - Don't care.
(5) VRR must keep from 50Hz to 70Hz when adjust other items.

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS cycle	HP	Note ⁽³⁾	504	-	568	DCK
HS low pulse width	HS	-	5	-	78	DCK
Horizontal back porch	HBP	-	5	-	78	DCK
Horizontal front porch	HFP	-	5	-	78	DCK
Horizontal data start point	-	HS+HBP	19	-	83	DCK
			700	-	-	ns
Horizontal blanking period	HBLK	HS+HBP+HFP	24	-	88	DCK
Horizontal active area	HDISP	-	-	480	-	DCK
Pixel clock frequency When RGB I/F is running	DCK	VRR = Min. 50Hz - Max. 70Hz	20.3	-	32.2	MHz
			31	-	49.2	ns

Note: (1) Signal rise and fall times are equal to or less than 20 ns.
(2) Input signals are measured by 0.30 x VDD1 for low state and 0.70 x VDD1 for high state.
(3) HP is multiples of eight DCK.
(4) Data lines can be set to "High" or "Low" during blanking time - Don't care.
(5) VRR must keep from 50Hz to 70Hz when adjust other items.

General Timings for RGB I/F



9. Standard Specification for Reliability

9.1 Standard Specification for Reliability of LCD Module

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	IEC60068-21:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB/2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-21:2007 GB/2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-21:2007 GB/2423.1-2008
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 20 Cycle	Start with cold temperature, End with high temperature, IEC60068-214:1984, GB/2423.22-2002
7	ESD	C=150pF,R=330Ω,5point/panel Air:±8Kv,5times; Contact:±4Kv,5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-42:2001 GB/T17626.2-2006
8	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z (6 hours for total)	IEC60068-2-6:1982 GB/T2423.101995
9	Mechanical Shock (Non Op)	Half Sine Wave60G 6ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height:80cm, 1corner,3 edges,6 surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Note1:Ts is the temperature of panel's surface.

Note2:Ta is the ambient temperature of samples.

9.2 Testing Conditions and Inspection Criteria

For the final test, the testing sample must be stored at room temperature for 24 hours. After the tests listed in Table 9.2, standard specifications for reliability will be executed in order to ensure stability.

No.	Item	Test Model	In section Criteria
01	Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
02	Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
03	Appearance	Visual inspection	Defect free.

9.3 MTBF

MTBF	Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature (25±5℃), normal humidity (50±10% RH), and in area not exposed to direct sun light.
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10. Specification of Quality Assurance

This standard of Quality Assurance confirms to the quality of LCD module products supplied by Tecenstar.

10.1 Quality Test

Before delivering, the supplier should conduct the following tests to confirm the quality of products.

- Electrical-Optical Characteristics: According to the individual specification to test the product.
- Appearance Characteristics: According to the individual specification to test the product.
- Reliability Characteristics: According to the definition of reliability on the specification for testing products.

10.2 Delivery Test

Before delivering, the supplier should conduct the delivery test.

- Test method: According to MIL-STD105E.General Inspection Level II take a single Time.
- The defects classify of AQL as following:
Major defect: AQL = 0.65
Minor defect: AQL = 1.5
Total defects: AQL = 1.5

10.3 Non-conforming Analysis & Deal With Manners

10.3.1 Non-conforming Analysis

- Purchaser should provide the data detail of non-conforming sample and the non-conforming.
- After receiving the data detail from purchaser, the analysis of non-conforming should be finished within two weeks.
- If the analysis can't be finished on time, supplier must notice purchaser 3 days in advance.

10.3.2 Disposition of non-conforming

- If any product defect be found during assembling, supplier must change the good for every defect after confirmation.
- Both supplier and customer should analyze the reason and discuss the disposition of non-conforming when the reason of nonconforming is not sure.

10.4 Agreement items

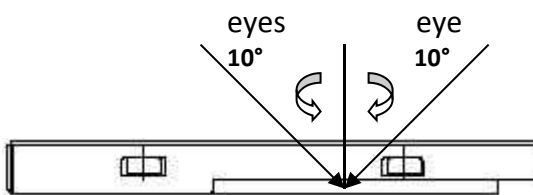
Both parties should negotiate together when the following problems happen.

- There is any problem of standard of quality assurance, and both sides should agree that it must be modified.
- There is any argument item which does not record in the standard of quality assurance.
- Any other special problem.

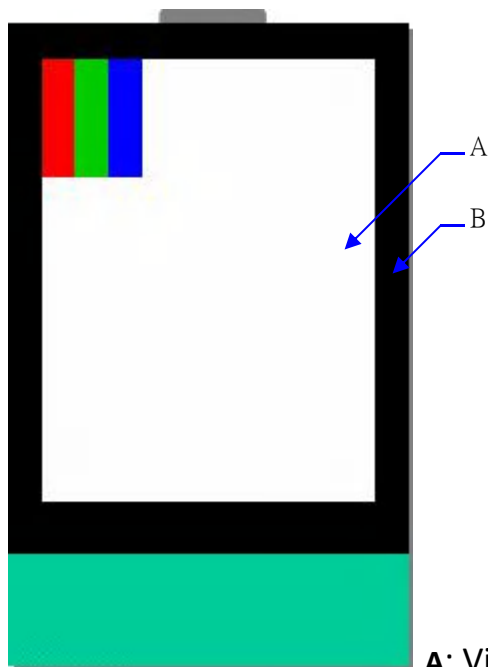
10.5 Standard of The Product Appearance Test

10.5.1 Manner of appearance test

- The test must be under 20W × 2 or 40W fluorescent light, and the distance of view must be at 30±5cm.
- When test the model of transmissive product must add the reflective plate.
- The test direction is base on around 10° of vertical line.
- Temperature: 25±5℃ Humidity: 60±10%RH



- Definition of area:

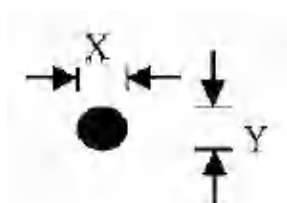
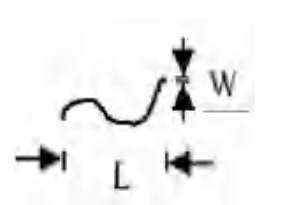


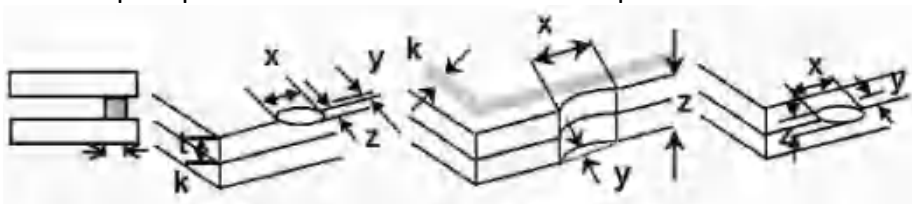
A: Viewing area B: Outside viewing area

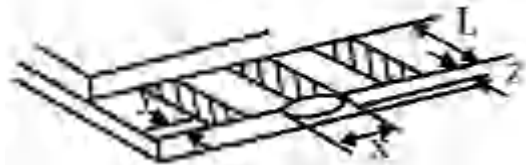
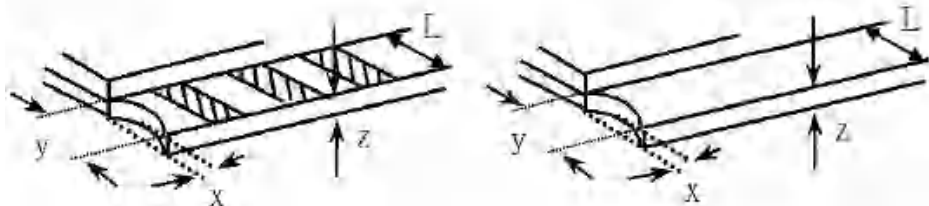
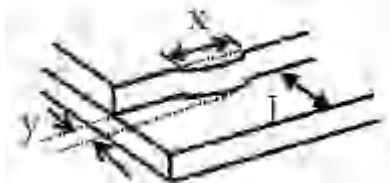
10.5.2 Basic principle

- When the standard can not be described, AQL will be applied.
- The sample of the lowest acceptable quality level must be negotiated by both supplier and customer when any dispute happened.
- New item must be added on time when it is necessary.

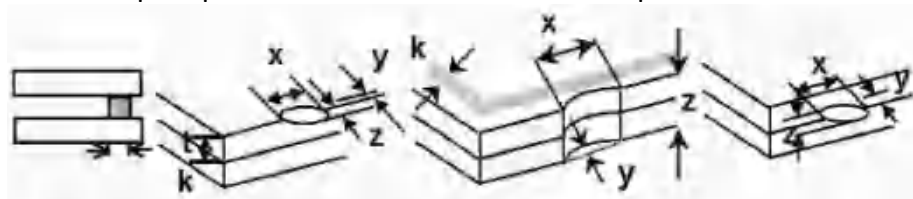
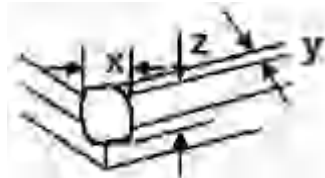
10.6 Inspection Specification

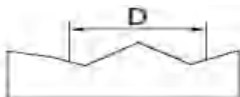
NO.	Item	Criterion	AQL												
01	Electrical Testing	1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 LCD viewing angle defect. 1.7 Mixed product types. 1.8 Flicker	0.65												
02	Black or White spots or Bright spots or Color spots on LCD (Display only)	2.1 White and black or color spots on display < 0.25mm, no more than one spots. 2.2 Densely spaced: No more than three spots within 3mm.	1.5												
03	LCD and Touch Panel black spots, white spots, contamination (non – display)	3.1 Round type: As following drawing $\Phi = (X+Y) / 2$  <table> <tr> <th>Size(mm)</th> <th>Acceptable Q'ty</th> </tr> <tr> <td>$\Phi \leq 0.10$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.10 < \Phi \leq 0.20$</td> <td>1</td> </tr> <tr> <td>$0.20 < \Phi \leq 0.25$</td> <td>1</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.30$</td> <td>1</td> </tr> <tr> <td>$0.30 < \Phi$</td> <td>0</td> </tr> </table> * Densely spaced: No more than two spots within 3mm.	Size(mm)	Acceptable Q'ty	$\Phi \leq 0.10$	Accept no dense	$0.10 < \Phi \leq 0.20$	1	$0.20 < \Phi \leq 0.25$	1	$0.25 < \Phi \leq 0.30$	1	$0.30 < \Phi$	0	1.5
		Size(mm)	Acceptable Q'ty												
$\Phi \leq 0.10$	Accept no dense														
$0.10 < \Phi \leq 0.20$	1														
$0.20 < \Phi \leq 0.25$	1														
$0.25 < \Phi \leq 0.30$	1														
$0.30 < \Phi$	0														
3.2 Line type: (As following drawing)  <table> <tr> <th>Length(mm)</th> <th>Width(mm)</th> <th>Acceptable Q'ty</th> </tr> <tr> <td>---</td> <td>$W \leq 0.02$</td> <td>Accept no dense</td> </tr> <tr> <td>$L < 2.5$</td> <td>$W < 0.08$</td> <td>1</td> </tr> <tr> <td>---</td> <td>$0.08 \leq W$</td> <td>Rejection</td> </tr> </table> * Densely spaced: No more than two lines within 3mm.	Length(mm)	Width(mm)	Acceptable Q'ty	---	$W \leq 0.02$	Accept no dense	$L < 2.5$	$W < 0.08$	1	---	$0.08 \leq W$	Rejection			
Length(mm)	Width(mm)	Acceptable Q'ty													
---	$W \leq 0.02$	Accept no dense													
$L < 2.5$	$W < 0.08$	1													
---	$0.08 \leq W$	Rejection													

NO.	Item	Criterion			AQL
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction	Size Φ (mm)	Acceptable Q'ty	1.5
			$\Phi \leq 0.30$	Accept no dense	
			$0.30 < \Phi \leq 0.50$	0	
			$0.50 < \Phi \leq 1.00$	0	
			$1.00 < \Phi$	0	
			Total Q'ty	0	
05	Scratches	Follow NO.3 -2 Line Type.			
06	Chipped glass	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length 6.1 General glass chip: 6.1.1 Chip on panel surface and crack between panels:			1.5
					
		z: Chip thickness	y: Chip width	x: Chip length	
		$z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	
		$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	
		⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 6.1.2 Corner crack:			
					
		z: Chip thickness	y: Chip width	x: Chip length	
		$z \leq 1/2t$	Not over viewing area	$x \leq 1/8a$	
		$1/2t < z \leq 2t$	Not exceed 1/3k	$x \leq 1/8a$	
		⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip			

NO.	Item	Criterion	AQL																
07	Glass crack	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length 7.2 Protrusion over terminal: 7.2.1 Chip on electrode pad:  <table> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq 0.5\text{mm}$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> 7.2.2 Non-conductive portion:  <table> <tr> <td>y: Chip width</td> <td>x: Chip length</td> <td>z: Chip thickness</td> </tr> <tr> <td>$y \leq L$</td> <td>$x \leq 1/8a$</td> <td>$0 < z \leq t$</td> </tr> </table> ⊙ If there chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. ⊙ If the product will be heat sealed by the customer, the alignment mark must not be damaged. 7.2.3 Substrate protuberance and internal crack  <table> <tr> <td>y: width</td> <td>x: length</td> </tr> <tr> <td>$y \leq 1/3L$</td> <td>$X \leq a$</td> </tr> </table>	y: Chip width	x: Chip length	z: Chip thickness	$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$	y: Chip width	x: Chip length	z: Chip thickness	$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$	y: width	x: length	$y \leq 1/3L$	$X \leq a$	1.5
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq 0.5\text{mm}$	$x \leq 1/8a$	$0 < z \leq t$																	
y: Chip width	x: Chip length	z: Chip thickness																	
$y \leq L$	$x \leq 1/8a$	$0 < z \leq t$																	
y: width	x: length																		
$y \leq 1/3L$	$X \leq a$																		

NO.	Item	Criterion	AQL
08	Cracked glass	No crack is allowed.	1.5
09	Backlight elements	9.1 Illumination source flickers when lit. 9.2 Spots or scratches that appear when lit must be judged. Using LCD spot, lines and contamination standards. 9.3 Backlight doesn't light or color is wrong.	1.5 1.5 0.65
10	Bezel	No scratches with W>0.1 and Length>2.5mm.	1.5
11	PCB、COB	11.1 COB seal may not have pinholes larger than 0.2mm or contamination. 11.2 COB seal surface may not have pinholes through to the IC. 11.3 The height of the COB should not exceed the height indicated in the assembly diagram. 11.4 There may not be more than 2mm of sealant outside the seal area on PCB. And there should be no more than three places. 11.5 Parts on PCB must be the same as on the production characteristic chart, There should be no wrong parts, missing parts or excess parts. 11.6 The jumper on the PCB should conform to the product characteristic chart.	1.5 1.5 1.5 1.5 0.65 0.65
12	FPC	FPC damage per IPC guidelines.(IPC-A-610) Nicks or damage along the edges of the flexible printed circuitry and cutouts,providing the penetration does not exceed 50% of the distance from the edge to the nearest conductor to 2.5mm[0.1in], Whichever is less.	1.5
13	Soldering	13.1 No cold solder joints, missing solder connections, oxidation or icicle. 13.2 No short circuits in components on PCB or FPC. 13.3 Soldering per IPC guidelines.(IPC-A-610)	1.5 0.65

NO.	Item	Criterion	AQL												
14	Touch Panel Chipped glass	Symbols: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Touch Panel Total thickness a: LCD side length L: Electrode pad length 14.1 General glass chip: 14.1.1 Chip on panel surface and crack between panels:  <table> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$z \leq t$</td> <td>$\leq 1/2 k$ and not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> </table> ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip 14.1.2 Corner crack:  <table> <tr> <td>z: Chip thickness</td> <td>y: Chip width</td> <td>x: Chip length</td> </tr> <tr> <td>$z \leq t$</td> <td>$\leq 1/2 k$ and not over viewing area</td> <td>$x \leq 1/8a$</td> </tr> </table> ⊙ Unit: mm ⊙ If there are 2 or more chips, x is the total length of each chip	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	z: Chip thickness	y: Chip width	x: Chip length	$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$	1.5
z: Chip thickness	y: Chip width	x: Chip length													
$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$													
z: Chip thickness	y: Chip width	x: Chip length													
$z \leq t$	$\leq 1/2 k$ and not over viewing area	$x \leq 1/8a$													

NO.	Item	Criterion	AQL										
15	Touch Panel(Fish eye、dent and bubble on film)	<table> <tr> <th>SIZE(mm)</th> <th>Acceptable Q'ty</th> </tr> <tr> <td>$\Phi \leq 0.2$</td> <td>Accept no dense</td> </tr> <tr> <td>$0.2 < D \leq 0.4$</td> <td>5</td> </tr> <tr> <td>$0.4 < D \leq 0.5$</td> <td>2</td> </tr> <tr> <td>$0.5 < D$</td> <td>0</td> </tr> </table>  	SIZE(mm)	Acceptable Q'ty	$\Phi \leq 0.2$	Accept no dense	$0.2 < D \leq 0.4$	5	$0.4 < D \leq 0.5$	2	$0.5 < D$	0	1.5
SIZE(mm)	Acceptable Q'ty												
$\Phi \leq 0.2$	Accept no dense												
$0.2 < D \leq 0.4$	5												
$0.4 < D \leq 0.5$	2												
$0.5 < D$	0												
16	Touch Panel Newton ring	Newton ring dimension $\leq 1/2$ touch panel area and not affect font and line distortion($\leq 2.5\%$) , it is acceptable.	1.5										
17	Touch Panel Linearity	Less than 1.5% is acceptable.	1.5										
18	LCD Ripple	Touch the touch panel , can not see the LCD ripple. Pen: R 1.0mm silicon rubber. Operation Force: 80g	1.5										
19	General appearance	19.1 Pin type must match type in specification sheet. 19.2 LCD pin loose or missing pins. 19.3 Product packaging must the same as specified on packaging specification sheet. 19.4 Product dimension and structure must conform to product specification sheet. 19.5 Product packaging shall be by trays sized to protect TFT and FPC cable. 19.6 Cable shall not be bent during transportation. 19.7 Top tray must be empty.	0.65 0.65 0.65 0.65										

11. Handling Precaution

11.1 Handling of LCM

- Avoid external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance, do not lick or swallow. When the liquid is attaching to your hand, skin, cloth, etc., wash it thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.
- The operators should wear protections whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.
- The modules should be kept in antistatic bags or other containers resistant to static for storage.
- The module is coated with a film to protect the display surface, be careful when peeling off this protective film since static electricity may be generated.

11.2 Storage

- Store it in an ambient temperature of $25\pm 10^{\circ}\text{C}$, and in a relative humidity of $50\pm 10\%\text{RH}$. Don't expose to sunlight or fluorescent light.
- Store it in a clean environment, free from dust, active gas, and solvent.
- Store it in anti-static electricity container.
- Store it without any physical load.

11.3 Soldering

- Use only soldering irons with proper grounding and no leakage.
- Iron: no higher than $280\pm 10^{\circ}\text{C}$ and less than 3 sec during hand soldering.
- Rewiring: no more than 2 times.

12. Packing Method

-----TBD