Website:http://www.inanbo.com http://www.tftchina.com

SPECIFICATION OF TFT MODULE

FOR INANBO-T32C –V2

Remark:

Contents

Contents

Specification of INANBO-T32C-V2

1. General Description:

The INANBO-T32C-V2 model is a-si active matrix TFT display module without

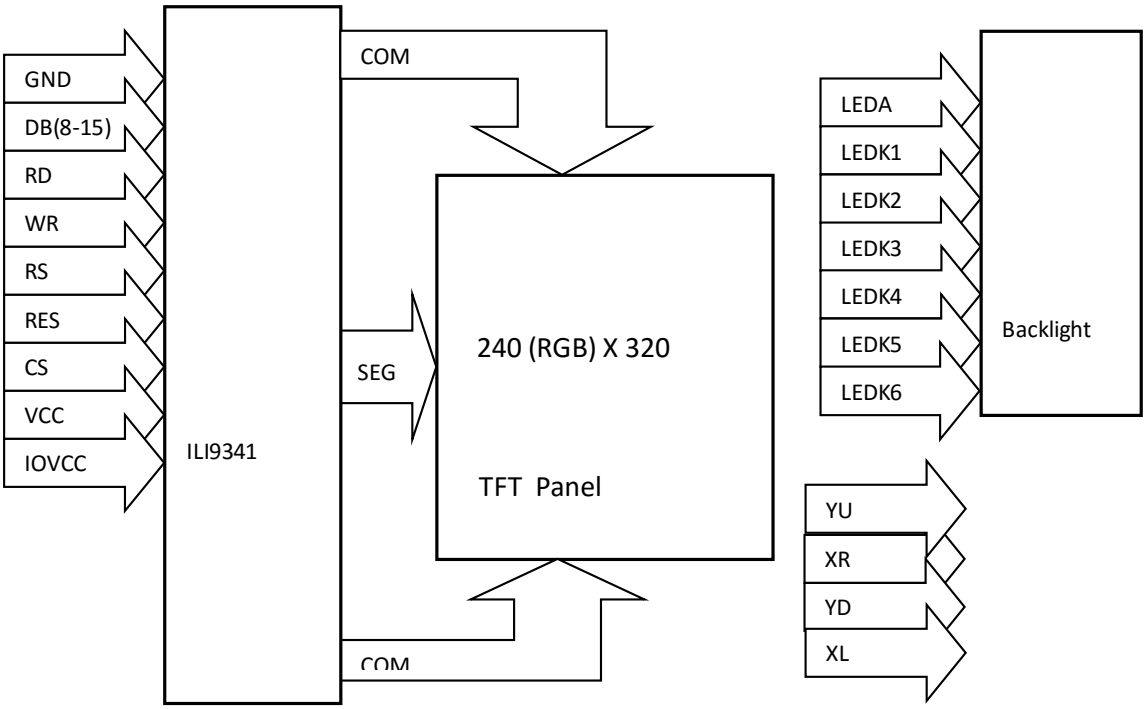
Touch panel. This module has 3.2inch diagonally measured active area with 240

Horizontal by 320 vertical pixel array and this module can display 262K color.

2. General Feature:

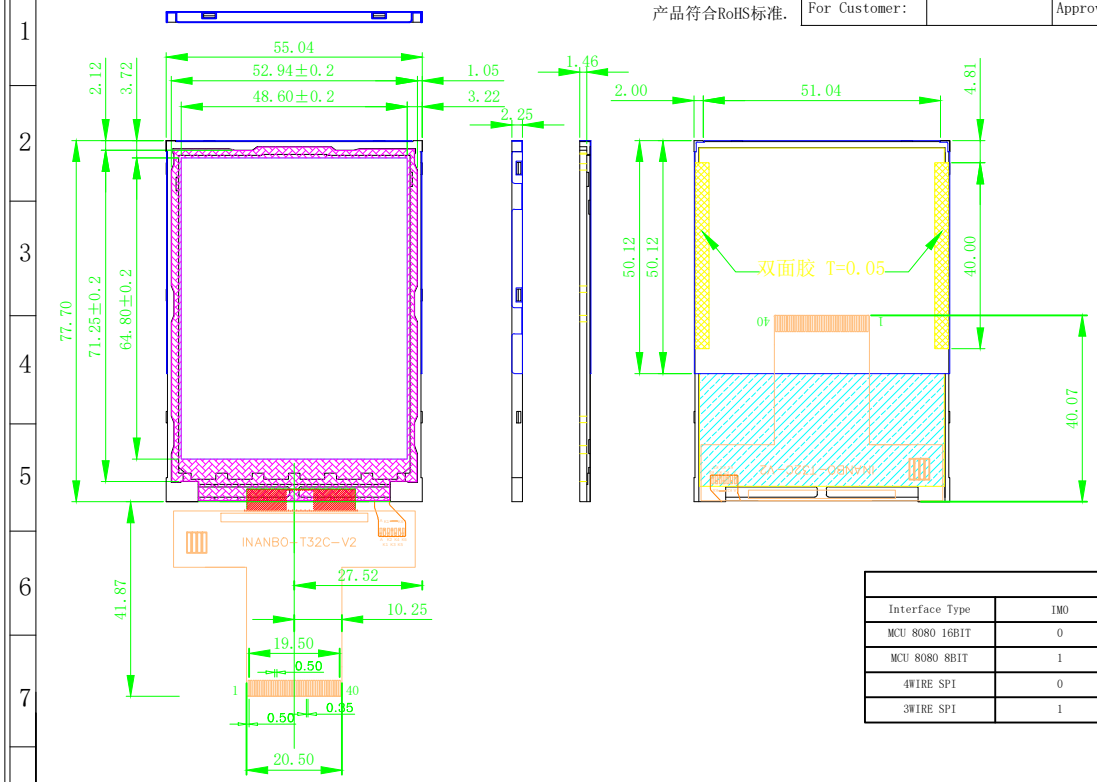
Item	Contents	Unit
LCD Type	TFT transmissive, Normally white	/
Viewing direction	12 O'clock	O'clock
Outline dimensions	53.64（W）X77.5(H)X3.5(T)	mm
Active area	47.88(W) x63.84(H)	mm
Number of Pixels	240(H) x (R.G.B.) x320(W)	Dot
Driver IC	ILI9341	/
Colors	262K	K
Backlight type	LED	/
TP	NC	/
Interface Type	8080 system 16bit parallel	/
Weight	T.B.D.	g

3. Block diagram



产品符合RoHS标准.

For Customer:		Approval Date:		Approved by:	

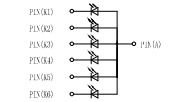


No:	PIN NAME	No:	PIN NAME
1	XL	21	DB4
2	YU	22	DB5
3	XR	23	DB6
4	YD	24	DB7
5	GND	25	DB8
6	IOVCC	26	DB9
7	VCC	27	DB10
8	FMARK NC	28	DB11
9	CS/SPI-CS	29	DB12
10	SCL/SPI-RS	30	DB13
11	WR/A0(4LINE)	31	DB14
12	RD	32	DB15
13	SPI-SDI/SDA	33	LED-A
14	SPI-SDO	34	LED-K
15	RESET	35	LED-K
16	GND	36	LED-K
17	DB0	37	GND
18	DB1	38	IM0
19	DB2	39	IM1
20	DB3	40	IM2

CONFIGURATION INTERFACE				
Interface Type	IM0	IM1	IM2	Remark
MCU 8080 16BIT	0	0	0	
MCU 8080 8BIT	1	0	0	
4WIRE SPI	0	1	1	9, 10, 11, 13, 14, 15
3WIRE SPI	1	0	1	9, 10, 13, 14, 15

PARAMETER	TEST CONDITIONS	MIN	Typ	MAX	UNIT
FORWARD VOLTAGE	TEMPERATURE = +25° C FORWARD CURRENT=120mA	3.0	3.2	3.4	V
PEAK WAVE LENGTH	FORWARD CURRENT=120mA	–	–	–	
LUMINANCE(平均和中心亮度)	FORWARD CURRENT=120mA	3500	–	–	cd/m2
COLOUR COORDINATE X	FORWARD CURRENT=120mA	0.26	–	0.31	nm
COLOUR COORDINATE Y	FORWARD CURRENT=120mA	0.26	–	0.31	
Uniformity(均匀度)	FORWARD CURRENT=120mA	80	–		%

LED CIRCUIT: B/L CIRCUIT DIAGRAM



If=90mA(Constant current) Vf=3.3V(TYP)

NOTES:
1. IC:ILI9341 SPI/MCU8BIT/MCU16BIT.
2. DIRECT VIEWING:6.
3. GPIO VOLTAGE:2.8~3.3V BL VOLTAGE:3.3.
4. The measurement instrument is BM-7 luminance Colorimeter.
   The height of measuring is 500 mm.The aperture is 1° field.
5. All radii without dimension R0.3 .
6. Operating Temp.: -20° C--70° C;Storage Temp.: -30° C--80° C

深圳是艾蓝博显电子技术有限公司
ShenZhen iNanbo Technology Co., Ltd

REV	DATE	DESCRIPTION	REVISER
△			
△			

VIEW DIRECTION	SCALE	PAGE	DATE	Customer Model NO. (客户料号)	EDITION
	1:1	1/1	14.7.15		B

APPROVAL	CHECK	DESIGN	Drawing NO:	JWT. MODEL NO.	EDITION
					B

4. Interface signals

Pin No.	Symbol	Description
1	XL	Touch panel output
2	YU	
3	XR	
4	YD	
5	GND	ground
6	IOVCC	Logic power, provide with 1.8~3.3v
7	VCC	Power supply,provide with 2.8v
8	Fmark	Tearing effect out pin synchronize MPU to frame writing.
9	CS	Chip select signal
10	RS	Register select signal;serial interface clocksignal input.
11	WR	Write execution control pin, serial interface register select signal.
12	RD	Read execution control pin
13	SDI	Serial data input signal
14	SDO	Serial data output signal
15	RESET	Reset input when low.
16	GND	ground
17~32	DB0~DB15	Data bus
33	LED-A	Anode for led backlighting
34	LED-K1	Cathode for led backlighting 6 pcs led
35	LED-K2	
36	LED-K3	
37	GND	
38	IM3	Select interface mode
39	IM2	
40	IM1	

5. ELECTRICAL CHARACTERISTICS:

DC CHARACTERISTICS

Parameter	Symbol	Min	TYP	Max	Unit

Supply voltage	VCC-VSS	2.7	2.8	2.9	V
Input Current	Idd		TBD	TBD	mA
Input voltage H level	VIH	0.8Vcc	Vcc	Vcc	V
Input voltage L level	VIL	0	0	0.2Vcc	V
Output voltage H level	VOH	0.8Vcc	Vcc	Vcc	V
Output voltage L level	VOL	0	0	0.2Vcc	V

Backlight CHARACTERISTICS (IF = 75)

Parameter	Symbol	Min	TYP	Max	Unit
Forward voltage	Vf	3.0	3.2	3.4	V
Luminance(white display)	Lv	-	-	-	Cd/㎡
Brightness uniformity(white display)	Bu	80			%
Number of LED			5		piece
Connection mode			Parallel		

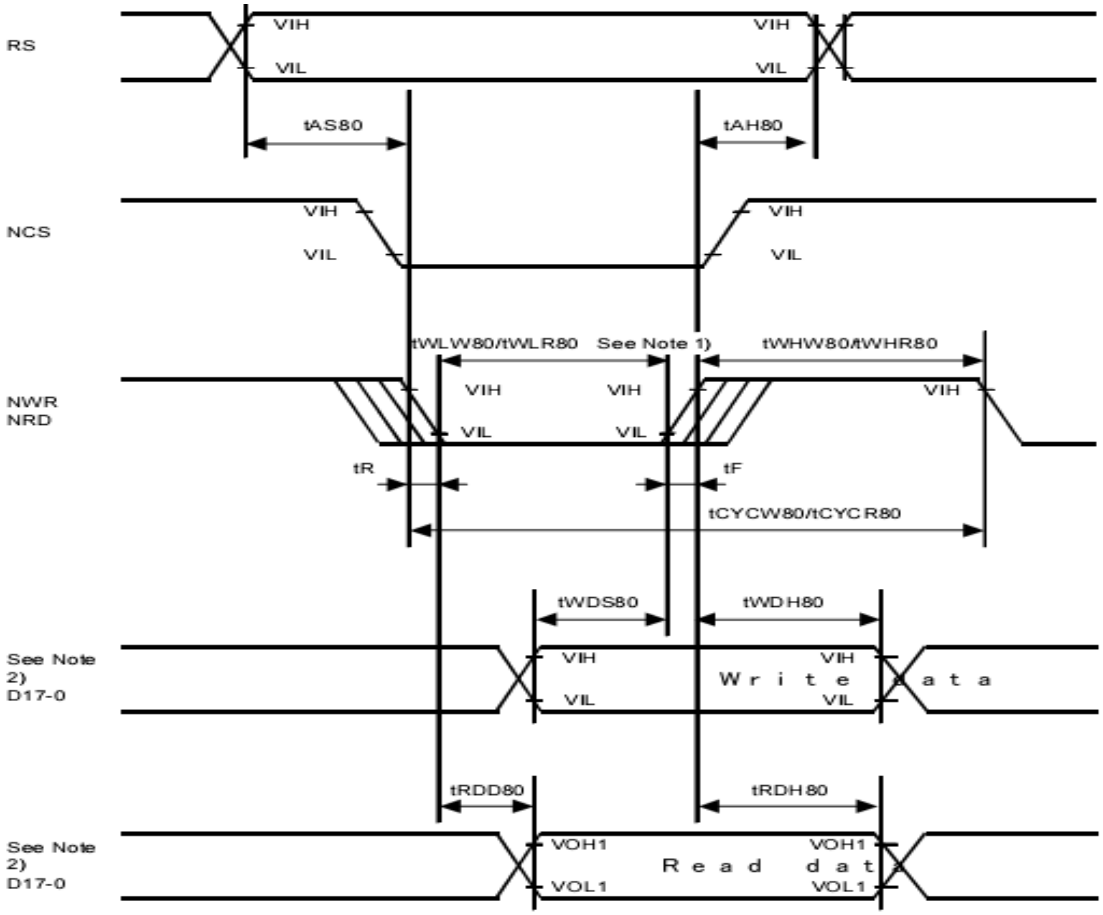
6. ABSOLUTE MAXIMUM RATINGS:

Parameter	Symbol	Min	Max	Unit
Supply voltage	VCC	-0.3	3.3	V
Input	Vin	-0.3	Vcc+0.3	V
Operating temperature	Top	-10	60	°C
Storage temperature	Tst	-20	70	°C
Humidity	RH	-	90%(Max60°C)	Dot
Backlight Current	IBL	-	15	mA(each Led)

7. Timing Characteristics

7.1 80-system bus interface operation

Ta = -20 °C to +70 °C, VCC = 2.80V, GND=0V.



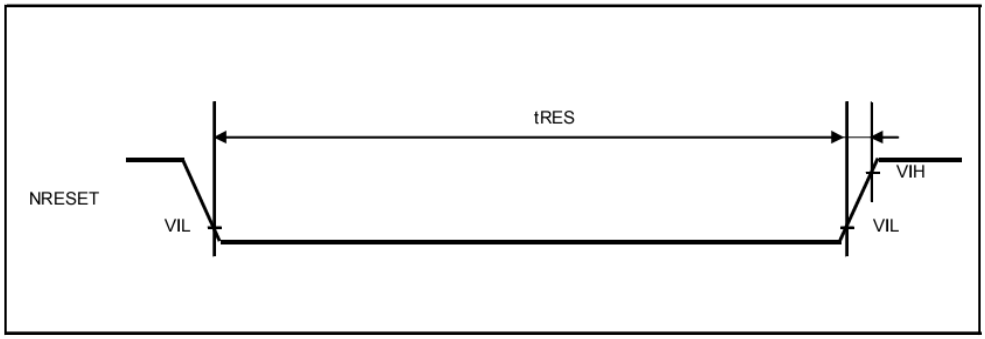
Note 1) PWLW and PWLR are defined by the overlap period when NCS is "Low" and NWR or NRD is "Low".
Note 2) Unused data innput pins must be fixed at either "IOVCC" or "GND".

Figure 3: 80-system bus interface operation

Item		Symbol	Unit	Min	Typ	Max
Cycle time	Write	tCYCW80	ns	100 *1	-	-
	Read	tCYCR80		500	-	-
Pulse width low	Write	tWLW80	ns	40	-	-
Read "Low" level pulse width	Read	tWLR80		250	-	-
Pulse width high	Write	tWHW80	ns	40	-	-
Read "High" level pulse width	Read	tWHR80		200	-	-
Pulse rise/fall time		tR, tF	ns	-	-	25
RW,RS and CSB setup time		tAS80	ns	10	-	-
RW,RS and CSB hold time		tAH80		0	-	-
			ns	2	-	-
Write data setup time		tWOS80	ns	60	-	-
Write data hold time		tWDH80	ns	15	-	-
Read data delay time		tRDD80	ns	-	-	200
Read data hold time		tRDH80	ns	5	-	-

Note *1) If you set the horizontal dot's number "odd", the Min of tCYCW will be 200nS

7.2 Resetting



Item	Symbol	Unit	Min	Typ	Max
NRESET "Low" level width	tRES	μs	1	-	-
NRESET rise time	trRES	ns	-	-	10

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℃. The values specified are at an approximate distance 50cm from the TFT-LCD surface at a viewing angle of Φ and θ equal to 0°.

Measurement condition: Refer to next pages (C-light source, Halogen Lamp)

(Ta=25 ±2℃,VDD=2.8V,IB=15mA)

Item		Symbol	Condition	Min	Typ	Max	Unit
Contrast ratio (Center point)		C/R	Note1 B/L On	450	500	-	-
Response Time	Rising: Tr	Tr		-	2	4	msec
	Falling:Tf	Tf		-	6	12	
Color Chromaticity (CIE 1931)	White	Wx		0. 283	0. 303	0. 323	-
		Wy		0. 305	0. 325	0. 345	
	Red	Rx		0. 606	0. 626	0. 646	
		Ry		0. 314	0. 334	0. 354	
	Green	Gx		0. 257	0. 277	0. 297	
		Gy		0. 529	0. 549	0. 569	
	Blue	Bx		0. 122	0. 142	0. 162	
		By		0. 102	0. 122	0. 142	
Viewing angle	Hor	θ L1	C/R≥ 10 B/L On	35	45	-	Deg.
		θ R1		35	45	-	
	Ver	øU1		35	45	-	
		øD1		10	20	-	

Notes : 1. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the center point across the TFT-LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.

3. Response time is the time required for the display to transition from white to black(Rise Time, Tr) and from black to white(Falling Time, Tf). For additional information see FIG 3.

4. Viewing angle is the angle at which 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 TFT-LCD surface. For more information see FIG 5.

FIG. 1 Optical Characteristic Measurement Equipment and Method

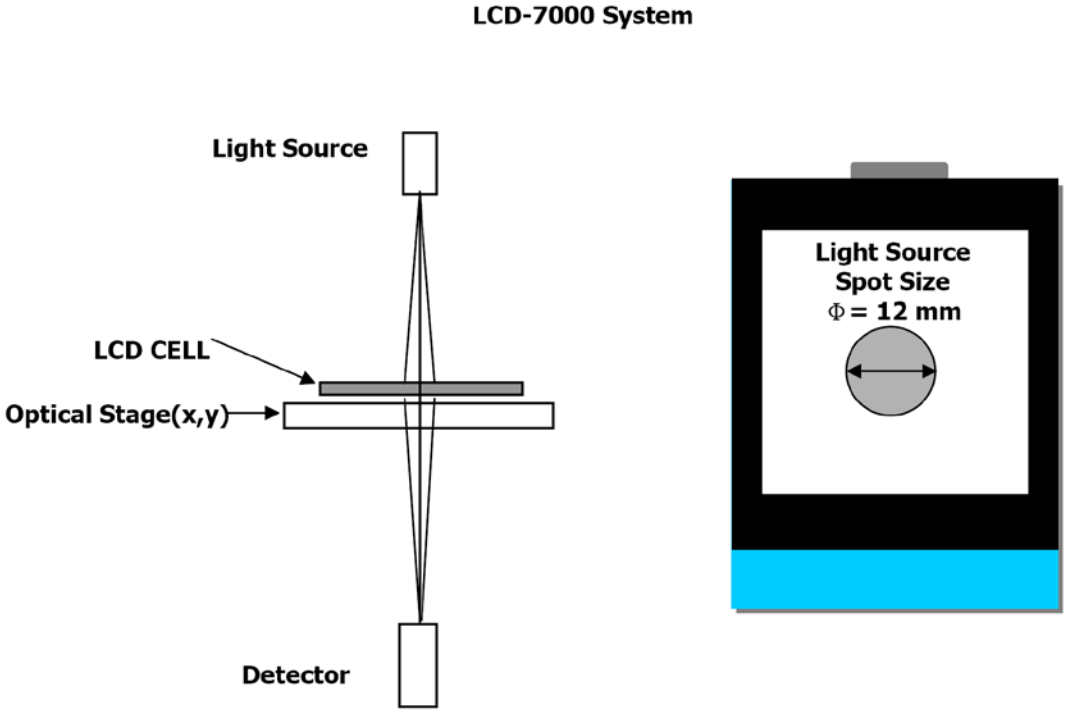


FIG. 2 The definition of Vth and Vsat

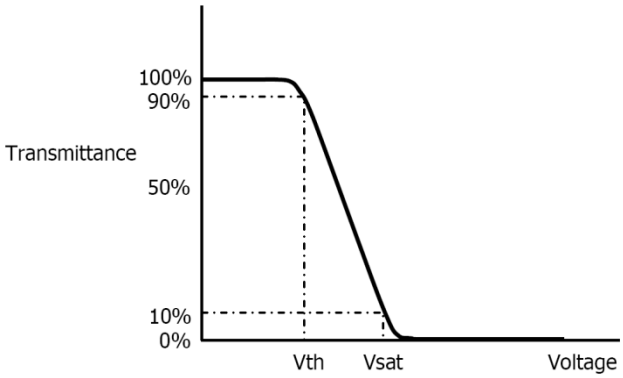
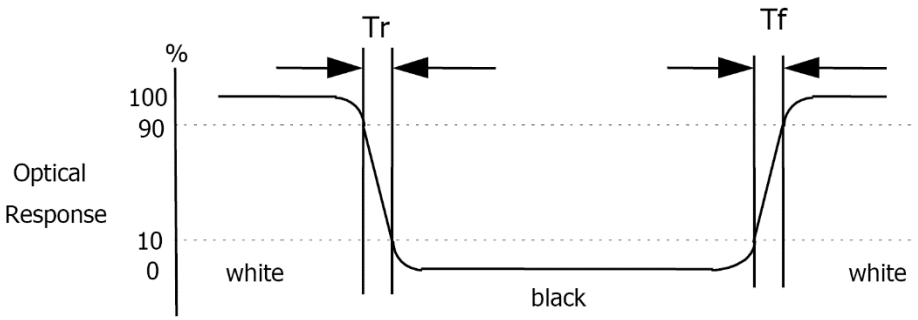


FIG. 3 The definition of Response Time

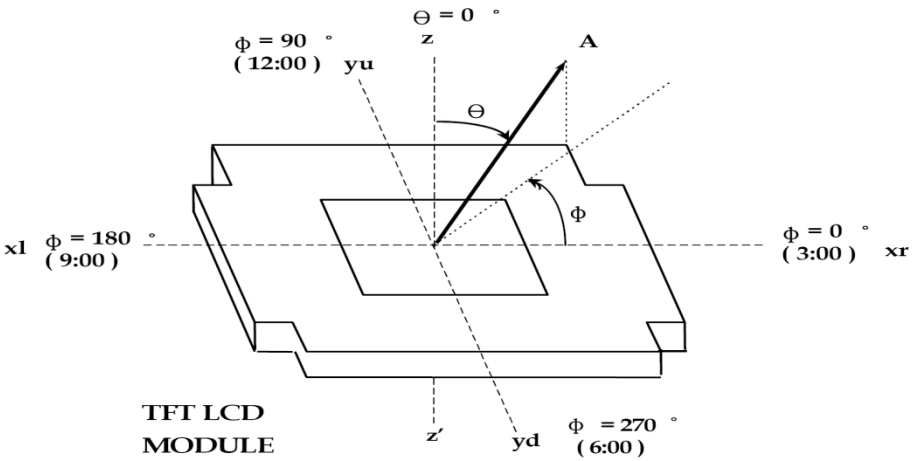
The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".



* Voltage conditions for Response time
  Vgate : 19V DC
  Vdata : 0V~3.3V DC
  Vcom : 0V (Ground)

FIG. 4 The definition of viewing angle

<dimension of viewing angle range>



9. APPLICATION CIRCUIT

Please consult our technical department for detail information

10. INITIAL CODE

Pls consult our technical department for detail information

11. RELIABILITY TEST

11.1 Environment test

Test Item	Test Condition	Inspection after test
High Temperature Storage	70 °C 48hr	Inspection after 2~4hr storage at room temperature, the samples shall be free from defects: 1. Air bubble in the LCD 2.Sealleak. 3.Non-display 4.Glass crack 5.Missing segments; 6.Current Idd is twice higher than initial value. 7.Structure distortion
Low Temperature Storage	-20°C 48hr	
HighTemperature Operating	60°C 48 hr	
Low Temperature Operating	-10°C 48hr	
Temperature Cycle	-20°C→ 25°C →80°C →25°C (30min) (5min) (30min) (5min) 20 cycles	
Damp Proof Test	50°C 90%RH / 120hr	
Vibration Test	Frequency: 10Hz ~ 55Hz ~ 10Hz Amplitude: 1.5mm Z direction for total 3hr (Packing condition)	
Dropping Test	Drop to the ground from 1m height, one time , every side of carton (Packing condition)	
ESD Test	Voltage: ±6Kv / R:330 ohm /C:150pf /Air discharge,10time	

Remark:

- The test samples is ok before test and should be applied to only one test item.
- Sample qty for each test item is 3~5pcs.
- For Damp Proof Test, pure water(resistance>10Mohm)should be used.
- In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part. Using ionizer(an antistatic blower) is recommended at working area in order to reduce electro-static voltage. When removing protection film from LCM panel, peel off the tag slowly(recommended more than one second)while blowing with ionizer toward the peeling face to minimize ESD which may damage electrical circuit.

- EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and fluorescence EL has.
- Please use automatic switch menu or roll menu test mode when test operating mode.

11.2 Touch panel test

Test tool: pen tip R0.8mm & R8mm

Test Item	Test Condition	Judge standard
Hitting durability	300,000 times min at the same point Load: 150gf Hitting speed: 2times/sec Electric load: None	1) No glass break or glass crack after test 2) Resistance: X-axis: 200-900 ohm Y-axis: 200-900 ohm Insulation: >20M ohm
Pen sliding durability	50,000 times min Load:150gf Sliding speed 2 times/sec Electric load: None	
Globule striking	Globule fall off once from 30cm height Globule is a steel globe and its diameter is 9mm Electric load: None	

11.3 Ultraviolet radiation irradiation test

After ultraviolet irradiation, samples have no deterioration of display quality.

12. Quality Guaranty

12.1 Manufacture assurance

Item		100% test	Sampling	Reliability test
Raw material			O	O
LCM finished goods	Electrical function	O	O	O
	Appearance	O	O	O
	Physical characteristics		O	O
	Environmental condition		O	O

12.2 Inspection environment condition

12.2.1 Temperature and humidity：Room temperature(23±5℃)/ less than 70％ RH.

12.2.2 Vision inspection distance：30cm at the upright direction

12.2.3 Inspection method：

12.2.3.1 The appearance inspection should be performed under a daylight lamp (Power of 40W/ Distance of 1.5m will be a standard at any disputation)

12.3.2.2 During the electrical functional test and the screen defect inspection， the LCD should light electrically and the environment light should be avoided with a lens hood or the test is performed under a dark condition

12.3 Sample plan：GB/T2828-03(Ⅱ) AQL=1.0

12.4 Dimension measurement

11.4.1 Sample size：5pcs per shipment lot

11.4.2 Criterion：Verify the important dimensions according to the appropriate drawing if needed and
should reject the dimensions that are out of the tolerance.

12.5 Appearance inspection

12.5.1 General Parts:

Item	Criterion	Remark
1.FPCA	The criterion for chip component solder point: IPC-A-610C CLASS 2 on general occasion。	Vision Inspection / Microscope
2.Back light	2.1 Defect of no light is unaccepted。 2.2 The brightness (test with BM-7 equipment) and power consume must meet SPEC	
3.Bezel	Any damage, distortion and other solder spark on the	

	bezel surface is unaccepted。	
4.FPC	4.1 Criterion for bending and crease As picture 22, “a” is the angle composed of the extended lines of the crease .This angle must be morte than 90 degree. 4.2 The area of crack, damage, foreign material and air bubble is not allowed to be more than 1/5 of that of the enhancing film, 4.3 Golden finger should not be scraped obviously; Any stain and foreign on the finger is unaccepted.	Vision inspectio Picture 22 Microscope
5.LCD screen	5.1 A protect plaster should be stuck to the screen based on the SPEC. 5.2 Any dust, finger mark, stain or other foreign material on the screen surface which can not be got rid of with soft cloth or air gun is unaccepted. 5.3 Defect of no display is unaccepted. 5.4 Defect of lack of line or cross-talk is unaccepted. 5.5 Abnormal chroma, brightness and contrast (compared with golden Sample and SPEC parameter) are unaccepted 5.6 Uneven back light (compared with golden	Vision inspection

	Sample) or dark area is unaccepted. 5.7 Response time of menu change must meet SPEC. 5.8The LCD screen shift amount should not be more than 0.2mm based on the SPEC. 5.9The criterion should be loosened in judging of the defect in the area out of V.A.	