Contents

1 General Description

QD3503 is a transmissive type a-Si TFT-LCD (amorphous silicon thin film transistor liquid crystal display) module, which is composed of a TFT-LCD panel, a driver circuit a backlight unit, The panel size is3.5inch and thresolution is 320x480. High image quality a-Si TFT LCD module. Partial-screen display function is available. Sleep and Stand-by modes are available for power saving.

1.1 Features

No	Item	Specification	Remark
1	Display Mode	Normally Black	
2	Screen Size	3.5inch (diagonal)	
3	Resolution	320XRGBX480	
4	Color Number	262K	
5	Color Arrangement	RGB-stripe	
6	Driver IC	ILI9488	
7	Back Light	White LED*6	
8	Viewing Direction	12O'CLOCK	
9	Interface	SPI_RGB 兼容	
10	Surface Treatment	UV Cut	
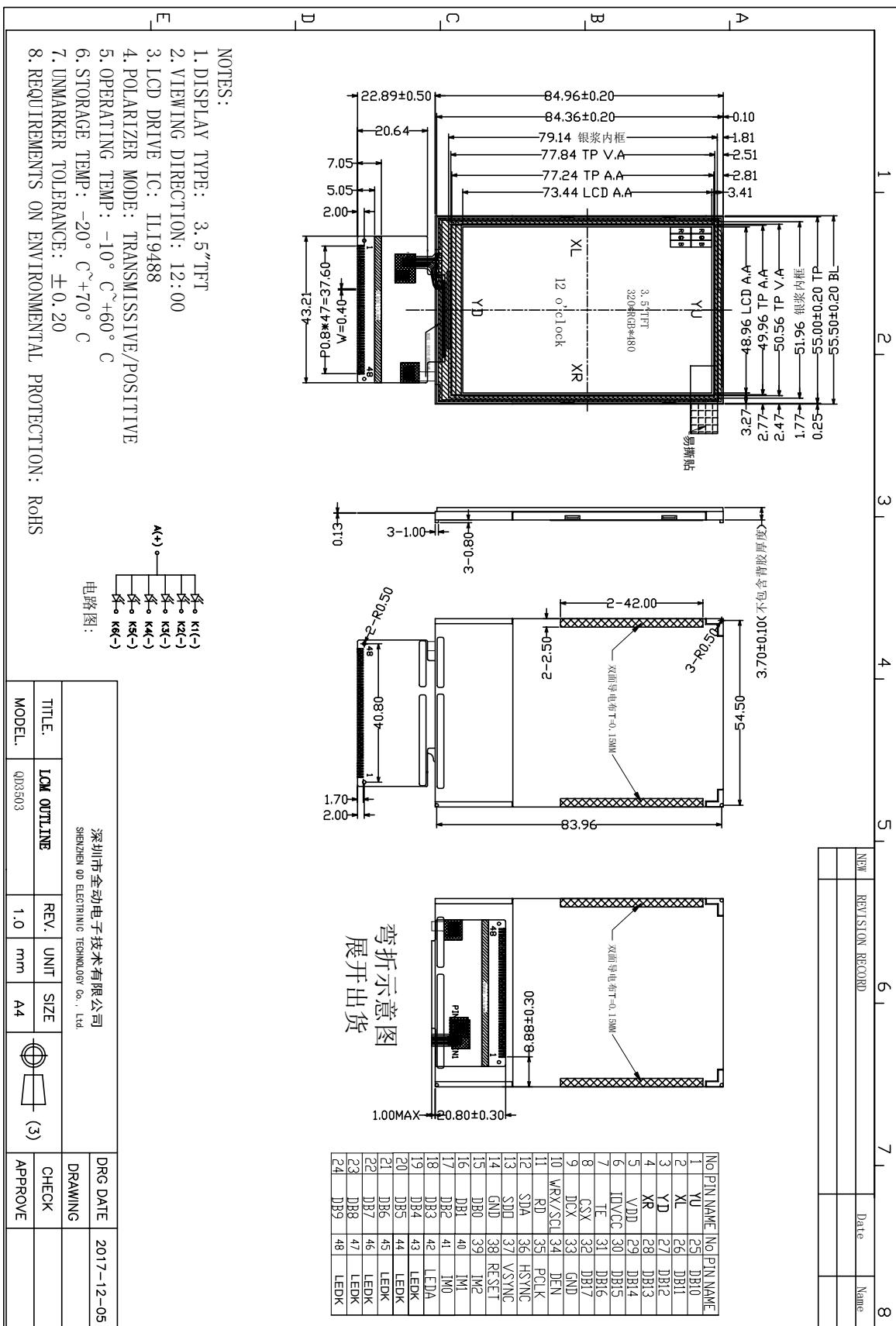
1.2 Application
◆ Mobile phone.
◆ Portable multimedia device.

2 Outline Dimension

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Parameter	Specifications	Unit
Outline dimensions	55.5 (W) x84.96(H) x3.7+-0.1(D) (LCM,no include FPC)	mm
Active area	48.96(W) x73.44(H)	mm
Resolution	320(H)RGBx 480(V) dots	-
Dot size	0.153(H) ×0.153	mm
Module brightness	300	cd/㎡

NOTES:
1. DISPLAY TYPE: 3.5"TFT
2. VIEWING DIRECTION: 12:00
3. LCD DRIVE IC: ILI9488
4. POLARIZER MODE: TRANSMISSIVE/POSITIVE
5. OPERATING TEMP: -10° C~+60° C
6. STORAGE TEMP: -20° C~+70° C
7. UNMARKER TOLERANCE: ±0.20
8. REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS

A(+)

电路图:

K1(-) K2(-)
K3(-) K4(-)
K5(-) K6(-)

22.89±0.50
20.64
7.05
5.05
2.00

84.96±0.20
84.36±0.20
0.10
79.14 银浆内框
1.81
77.84 TP V.A
2.51
77.24 TP A.A
2.81
73.44 LCD A.A
3.41

P0.8*47=37.60
0.40=0=M
43.21
48
1

XL
YU
YD
XR
12 o'clock
3.5"TFT
320*RGB*480

48.96 LCD A.A
49.96 TP A.A
50.56 TP V.A
51.96 银浆内框
55.00±0.20 TP
55.50±0.20 BL

3.27
2.77
2.47
1.77
0.25

易撕贴

10±3
3-1.00
3-0.80

3.70±0.10(不包含背胶厚度)

2-42.00
2-2.50
3-R0.50
2-R0.50
双面导电布T-0.15MM

54.50
40.80
1.70
2.00
83.96

弯折示意图
展开出货

8.88±0.30
双面导电布T-0.15MM
PIN1
48
1

1.00MAX 20.80±0.30

No	PIN NAME	No	PIN NAME
1	YU	25	DB10
2	XL	26	DB11
3	YD	27	DB12
4	XR	28	DB13
5	VDD	29	DB14
6	IOVCC	30	DB15
7	TE	31	DB16
8	CSX	32	DB17
9	DCX	33	GND
10	WRX/SCL	34	DEN
11	RD	35	PCLK
12	SDA	36	HSYNC
13	SDO	37	VSYNC
14	GND	38	RESET
15	DB0	39	IM2
16	DB1	40	IM1
17	DB2	41	IM0
18	DB3	42	LEDA
19	DB4	43	LEDK
20	DB5	44	LEDK
21	DB6	45	LEDK
22	DB7	46	LEDK
23	DB8	47	LEDK
24	DB9	48	LEDK

TITLE. LCM OUTLINE
MODEL. QD3503

深圳市全动电子技术有限公司
SHENZHEN QD ELECTRINIC TECHNOLOGY Co., Ltd.

REV.	1.0
UNIT	mm
SIZE	A4

DRG DATE	2017-12-05
DRAWING	
CHECK	
APPROVE	

NEW REVISION RECORD Date Name

3   Electrical Characteristics

3.1 TFT-LCD Module

Ta=25℃
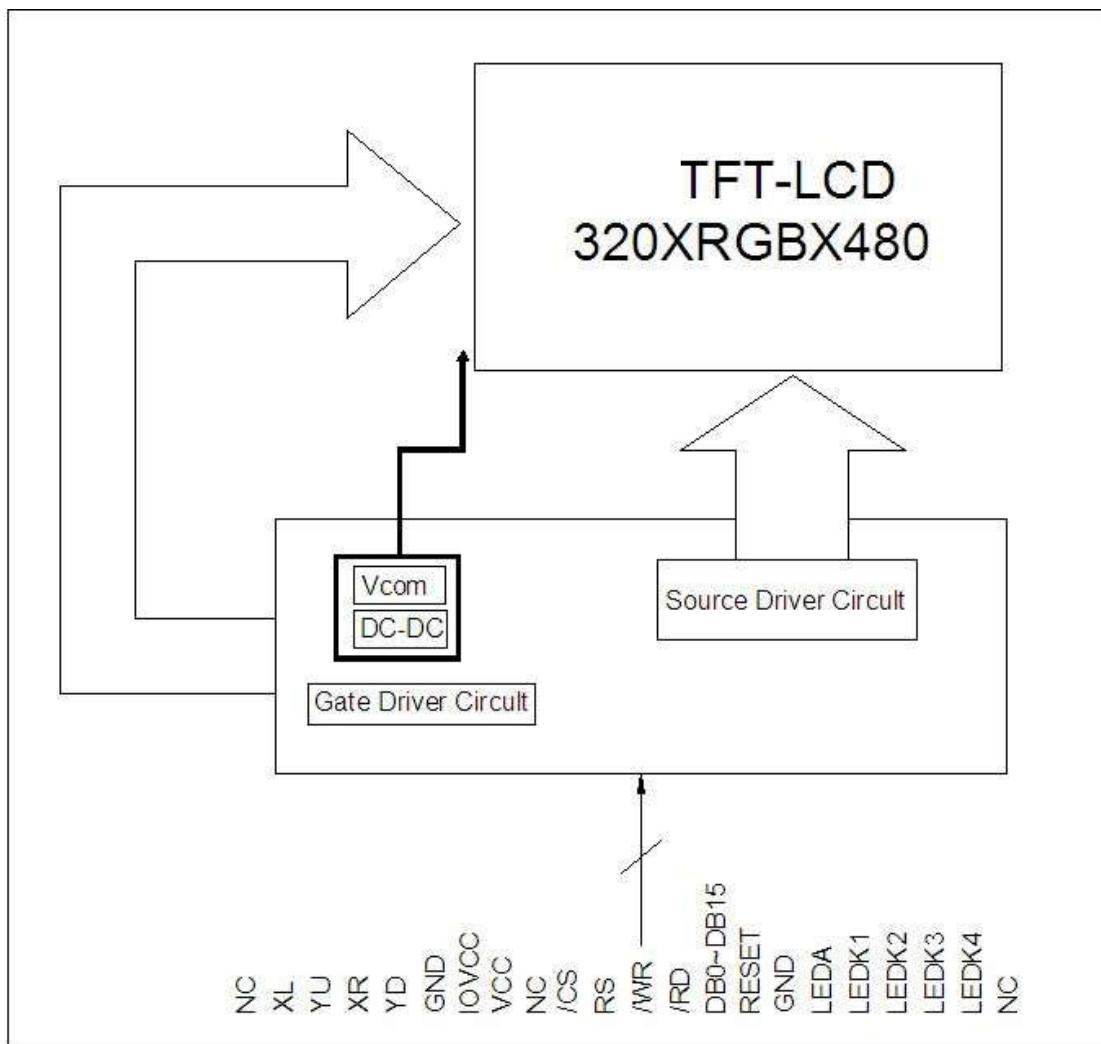
Item	Symbo	Value			Unit	Notes
		Min	Typ	Max		
Supply Voltage for logic	Vcc	2.5	2.8	3.3	V	
	Vci	2.5	2.8	3.3		
TFT Gate ON Voltage	VGH *	11.5		19	V	
TFT Gate OFF Voltage	VGL	-15.5		-7	V	
Operating temperature	Top	-20		+70	℃	
Storage temperature	Tst	-30		+80	℃	

3.2   Back-Light Unit

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Current	IF	--	90	120	mA	IF=120mA VF=3.2V
Forward voltage	VF	3.0x6	3.2	3.4	V	
Chroma	X	0.240		0.28		
	Y	0.250		0.29		
Brightness	L	4500			Cd/m2	
Uniformity	UBL	80			%	

- 12   LED

- The luminous intensity of LED is strongly dependent on the driving current.

- It is recommended the input of backlight to be constant current rather than constant voltage.

4 Block Diagram
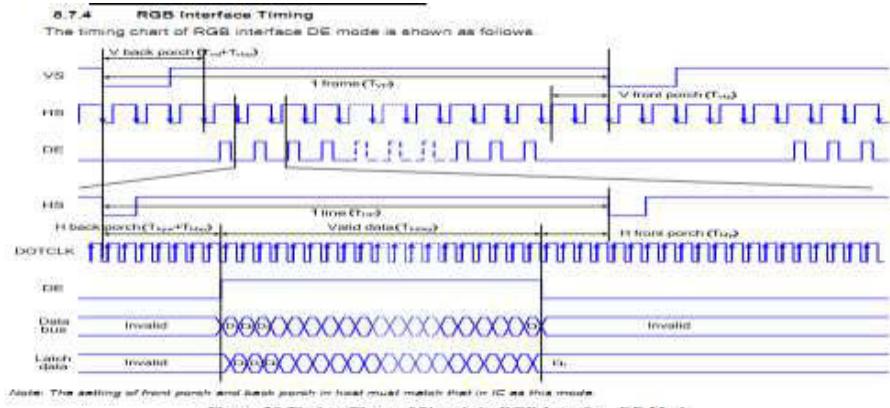
5 TFT-LCM Interface Specification

Pin No.	Symbol	Functional
1	YU	Y+
2	XL	X-
3	YD	X-
4	XR	X+
5	VCC	Power supply input for LCM:2.8V
6	IOVCC	Power supply input for LCM: 1.8V
7	TE	Serve as a TE (Tearing Effect) output signal
8	CS	Chip select input pin.
9	RS/A0	The SPI interface (DCX): The signal for command or
10	WR/SCL	A write strobe signal can be input via this pin and initiallizes a write Serial clock input for SPI interface
11	RD	A read strobe signal can be input via this pin and initiallizes a read
12	SDI	Serial data input/output bidirectional pin for SPI Interface
13	SDO	Serial data output pin used for the SPI Interface
14	GND	Power Ground
15~32	DB0~DB17	Data interface
33	GND	Power Ground
34	DEN	Data enable signal
35	PCLK	Dot clock signal for RGB interface operation
36	HSYNC	Horizontal sync
37	VSYNC	Vertical sync
38	RESET	Reset signal input Pin
39~41	IM2-IM0	The System interface mode select
42	LEDA	Power supply for backlight anode input terminal.
43~48	LED-K	Power supply for backlight cathode input terminal.

6 Description of Interface'Signal

6.1 RGB Interface Timing Charateristics

Figure 26 Timing Chart of Signals in RGB Interface DE Mode

6.2 DC Characteristics

7.2 DC Characteristics

Parameter	Symbol	Condition	Specification MIN.	Specification TYP.	Specification MAX.	Unit	Related Pins
Power & Operation Voltage							
System Voltage	VDD	Operating voltage	2.5	2.8	4.8	V	
Interface Operation Voltage	VDDI	I/O Supply Voltage	1.65	1.8	3.3	V	
Gate Driver High Voltage	VGH		11.5		18	V	Note 4
Gate Driver Low Voltage	VGL		-7.6		-12	V	
Gate Driver Supply Voltage		| VGH-VGL |	-		30	V	Note 5
Input / Output							
Logic-High Input Voltage	VIH		0.7VDDI		VDDI	V	Note 1
Logic-Low Input Voltage	VIL		VSS		0.3VDDI	V	Note 1
Logic-High Output Voltage	VOH	IOH = -1.0mA	0.8VDDI		VDDI	V	Note 1
Differential Input High Threshold Voltage	VIT+			0	50	mV	
Differential Input Low Threshold Voltage	VIT-		-50	0		mV	MIPI_CLK MIPI_Data
Single-ended Receiver Input Operation Voltage Range	VIR		0.5		1.2	V	
Logic-Low Output Voltage	VOL	IOL = +1.0mA	VSS		0.2VDDI	V	Note 1
Logic-High Input Current	IIH	VIN = VDDI			1	uA	Note 1
Logic-Low Input Current	IIL	VIN = VSS	-1			uA	Note 1
Input Leakage Current	IIL	IOH = -1.0mA	-0.1		0.1	uA	Note 1
VCOM Voltage							
VCOM amplitude	VCOM			VSS		V	
Source Driver							
Gamma Reference Voltage(Positive)	VAP		4.4		6.4	V	
Gamma Reference Voltage(Negative)	VAN		-2.6		-4.6	V	
Source Output Settling Time	Tr	Below with 99% precision			10	us	Note 2

Table 2 Basic DC Characteristics

6.3 AC Characteristics

7.5.4   RGB Interface Characteristics :
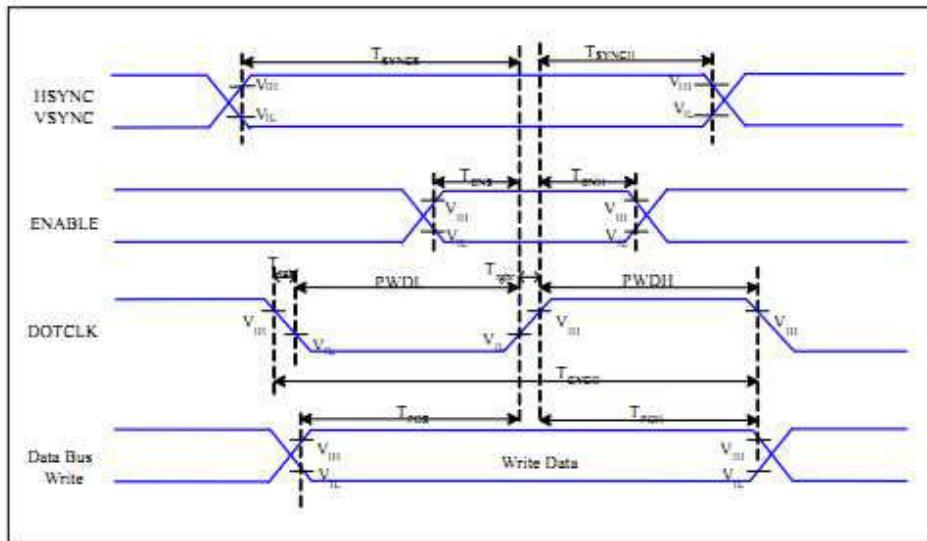
Figure 4 RGB Interface Timing Characteristics

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
HSYNC, VSYNC	Tsvncs	VSYNC, HSYNC Setup Time	5	-	ns	
ENABLE	TENs	Enable Setup Time	5	-	ns	
	TENH	Enable Hold Time	5	-	ns	
DOTCLK	PWDH	DOTCLK High-level Pulse Width	13	-	ns	
	PWDL	DOTCLK Low-level Pulse Width	13	-	ns	
	Tcvco	DOTCLK Cycle Time	28	-	ns	
	Trghr, Trghf	DOTCLK Rise/Fall time	-	15	ns	
DB	TPDS	PD Data Setup Time	5	-	ns	
	TPDH	PD Data Hold Time	5	-	ns	

Table 7 18/16 Bits RGB Interface Timing Characteristics

6.4 Reset Timing

7.5.6 Reset Timing:
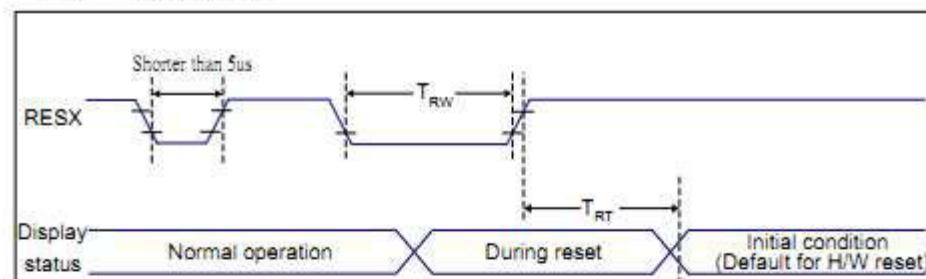
Figure 10 Reset Timing

VDDI=1.8,VDD=2.8, AGND=DGND=0V, Ta=25 ℃

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120(Note 1, 6, 7)	ms

Table 10 Reset Timing
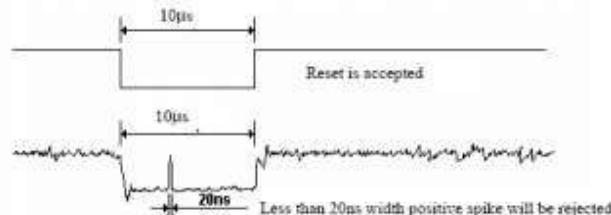
Notes:

1. The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (tRT) within 5 ms after a rising edge of RESX.

2. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than 5us	Reset Rejected
Longer than 9us	Reset
Between 5us and 9us	Reset starts

3. During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

4. Spike Rejection also applies during a valid reset pulse as shown below:
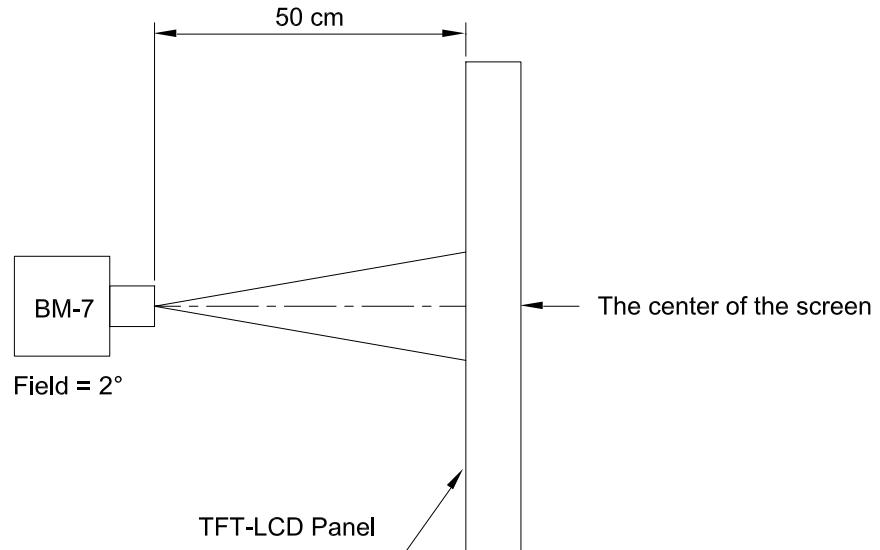
5. When Reset applied during Sleep In Mode.

6. When Reset applied during Sleep Out Mode.

7. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

7. Optical Specification

Note 1: The brightness test equipment setup
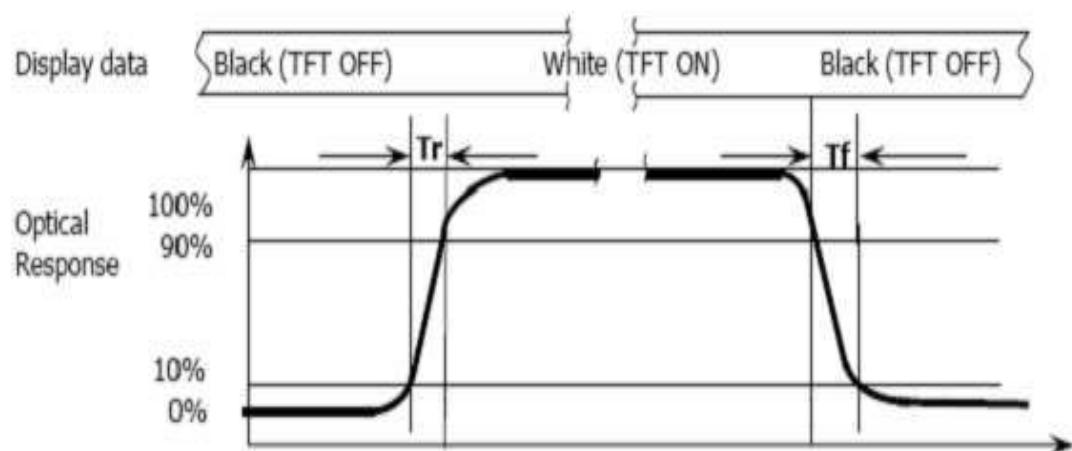
I_B=60mA, Field=2° (As measuring "black" image, field=2° is the best testing condition.)

50 cm

BM-7

Field = 2°

The center of the screen

TFT-LCD Panel
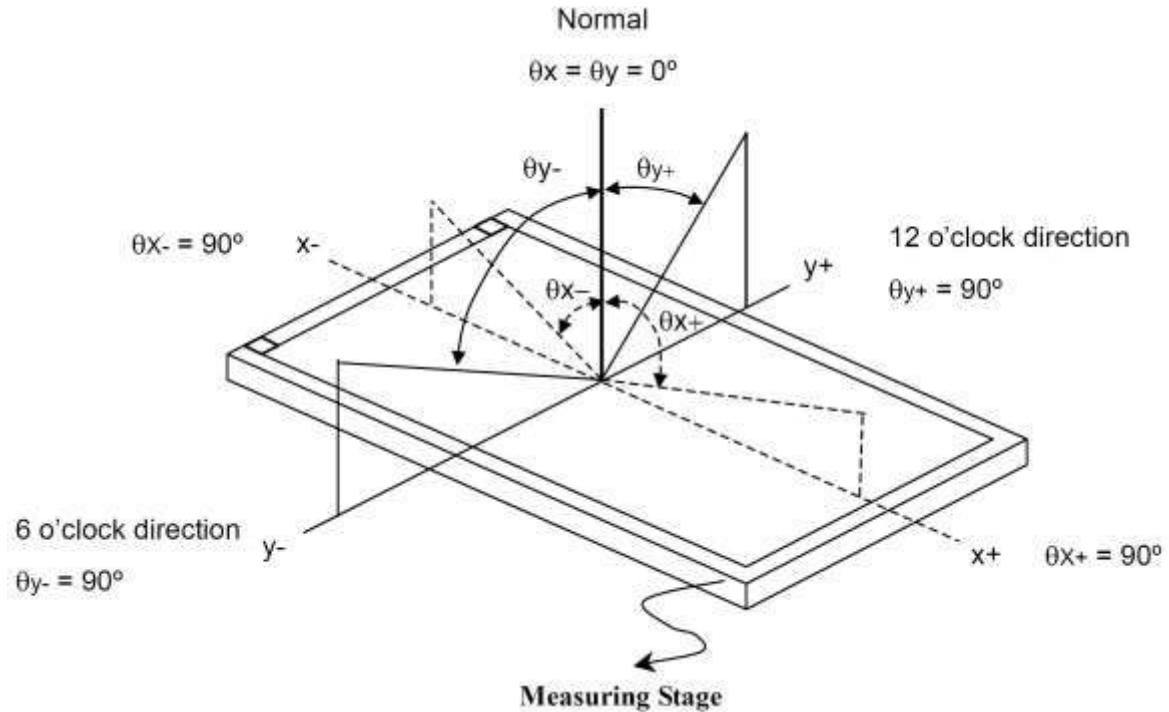
Note 2: Definition of contrast ratio (**C.R**)

$$C.R = \frac{\text{Brightness When LCD is at "White" State}}{\text{Brightness When LCD is at "Black" State}}$$
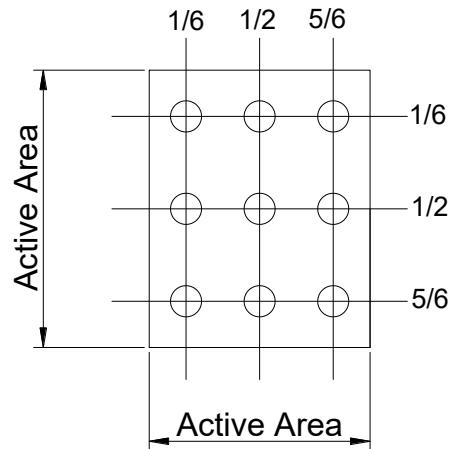
Note 3: Definition of response time

Display data   Black (TFT OFF)   White (TFT ON)   Black (TFT OFF)

Tr   Tf

Optical Response   100%   90%   10%   0%

Note 4: Definition of viewing angle

Note 5: Definition of uniformity (**Un**)
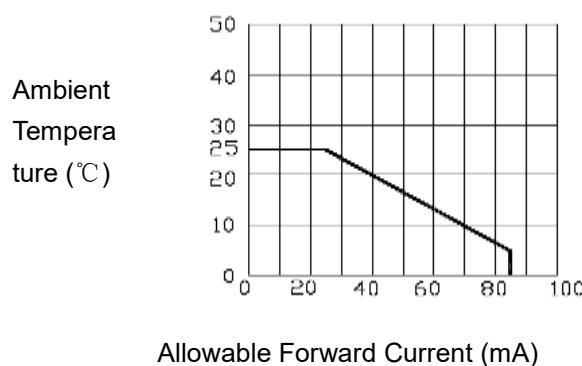
$$Un = \frac{Bmin}{Bmax} \times 100\%$$

8   Environment Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Remark
Operation temperature range	Top	-20	70	℃	Ambient
Storage temperature range	Tst	-30	80	℃	Ambient

● Corrosive gas environment is not acceptable.

● TFT-LCD color will change slightly depending on environment temperature. This phenomenon is reversible. Current reduction rate of LED backlight is according to the graph indicated below:

Ambient Temperature (℃)

Allowable Forward Current (mA)

9   Reliability Test Items
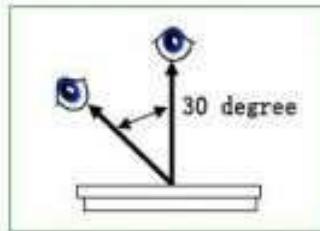
Test Item	Test Condition
High Temperature Operation	70℃ for 24 hours
Low Temperature Operation	-20℃ for 24 hours
High Temperature Storage	70℃ for 24 hours
Low Temperature Storage	-40℃ for 24 hours
High Temperature Operation Humidity Operation	50℃, 95%RH for 48 hours
Thermal Shock	-30°storage one hour,rise to 70° within 15s,high temperature one hour, drop to 30° within 15s, circulate ten repeatedly
Vibration Test (No Operation)	Frequency: 10~55Hz Amplitude:1.0mm Sweep Time: 11min Test Period: 6 Cycles for each direction of X, Y, Z
Static electricity test	Touch 6KV,air touch 10KV

10 Inspection Standard

This standard apply to TFT module specification.

1. Inspection condition:

   Under daylight lamp 20~40W, product distance inspector'eye 30cm.incline degree 30° .

2. Inspection standard

NO.	Item	Inspection standard		Rate
2.1	Dot	Case of Dot defect is below ① Bright Dot (whit spot) : "0" ② Dark Dot (black spot) : "0" (In case of Dark Dot on Main TFT LCD) - NG if there's full Dot defect. - Damaged less than the size of sub-pixel is not counted as defect - Dots darker than the size of sub-pixel are not defined as bright dot defect		minor
		size (mm) \ area	Acceptable number	
		Φ≤0.10	ignore	
		0.10<Φ≤0.15	3	
		0.15<Φ≤0.20	2	
		0.25<Φ≤0.25	1	
		0.25<Φ	0	
2.2	line	Size (mm)	Acceptable number	
		ignore | W≤0.03	ignore	
		L≤4.0 | 0.03<W≤0.04	2	
		L≤4.0 | 0.04<W≤0.05	1	
		0.05<W	Treat with dot non-conformance	