



深圳市拓普微科技开发有限公司

SHENZHEN TOPWAY TECHNOLOGY CO., LTD.

LMT070DVHG01

LCD Module User Manual

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Rev.	Descriptions	Release Date
0.1	Preliminary release	2017-05-17

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1. General Specification

Feature		Spec
Display Spec.	Size	7.0 inch
	Resolution	1024 RGB (H)×600(V)
	Technology Type	a-si TFT
	Pixel Configuration	RGB stripe
	Pixel pitch(mm)	0.150×0.150
	Display Mode	Normally White
	Surface Treatment	Anti-Glare
	Viewing Direction	12 o'clock (*1)
	Gray Scale Inversion Direction	6 o'clock (*2)
Mechanical Characteristics	LCM (W x H x D) (mm)	LCM: 165.75 (W) ×105.39(H)×3.40(D)
		CTP+LCM: 171.50 (W) ×110.30(H)× 5.00(D)
	Active Area(mm)	TFT LCD: 153.6(H)×90.0(V)
		CTP: 157.00(H) x 92.80(V)
	CTP Touch Method	Bare finger
	Number of simultaneous touches	2 points multi-touch
	Minimum Touch Area	Φ6 mm
	Finger Touch Pitch	13mm
	CTP Structure	Glass Lens—Glass Sensor
	With /Without TSP	With TSP
	Matching Connection Type	FH12A-40S-0.5SH
	LED Numbers	18 LEDS
Electrical Characteristics	Weight (g)	171g
	Interface	LVDS
	Color Depth	16.7 M
	Driver IC	CTP: SSD2543QN4
		TFT: HX8282+HX8677

Note :

*1. For saturated color display content (eg. pure-red, pure-green, pure-blue, or pure-colors-combinations).

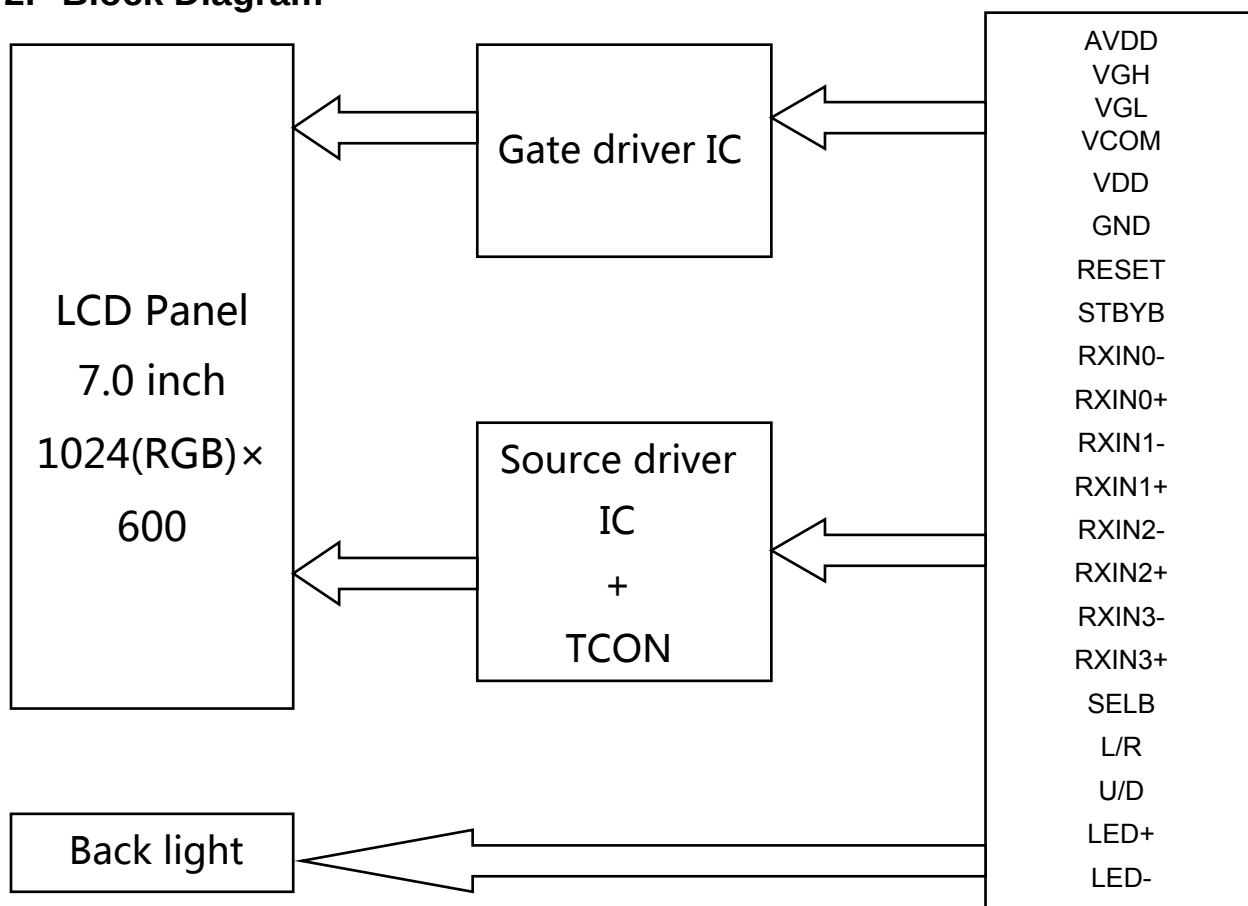
*2. For "color scales" display content.

*3. Color tone may slightly change by Temperature and Driving Condition.

*4. Requirements on Environmental Protection: Q/S0002.

*5. LCM weight tolerance: ± 5%.

2. Block Diagram



3. Terminals Function

3.1 CN1 Input Terminal

Pin No.	Symbol	I/O	Function	Remark
1	VCOM	---	No connection	
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	---	No connection	
5	/RST	I	Global reset pin	Active Low to enter
6	/TBYB	I	Standby mode, Normally pulled high	/TBYB="1", Normal operation /TBYB="0", Timing controller, Source driver will turn off, all output are High-Z
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	-LVDS differential data input	
12	RXIN1+	I	+LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	-LVDS differential data input	
15	RXIN2+	I	+LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	-LVDS differential clock input	
18	RXCLKIN+	I	+LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	-LVDS differential data input	
21	RXIN3+	I	+LVDS differential data input	
22	GND	P	Ground	
23	NC	---	No connection	
24	NC/GND	---	No connection or connect Ground	
25	GND	P	Ground	
26	NC	---	No connection	
27	DIMO	O	Backlight CABC controller signal output	Normally Pull High
28	SELB	I	6bit/8bit mode select	*2
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	BLK	P	LED Cathode	
32	BLK	P	LED Cathode	
33	L/R	P	Horizontal inversion	
34	U/D	P	Vertical inversion	
35	VGL	---	Gate OFF Voltage	
36	CABCEN1	---	CABC H/W enable	*3
37	CABCEN2	P	CABC H/W enable	*3
38	VGH	P	Gate ON Voltage	
39	BLA	P	LED Anode	
40	BLA	P	LED Anode	

Note:

*1. Please add the FPC connector type and matched one if necessary

*2. If LVDS input data is 6 bits ,SELB must be set to High;
If LVDS input data is 8 bits ,SELB must be set to Low.

*3. When CABC_EN="00", CABC OFF;
 When CABC_EN="01", user interface image;
 When CABC_EN="10", still picture;
 When CABC_EN="11", moving image;
 When CABC off, don't connect DIMO, else connect it to backlight.

3.2 U/D L/R Function Description

Scan Control Input		Scanning Direction
UPDN	SHLR	
GND	VDD	Up to Down, Left to Right
VDD	GND	Down to Up, Right to Left
GND	GND	Up to Down, Right to Left
VDD	VDD	Down to Up, Left to Right

3.3 CN2 CTP Input Terminal

Pin No.	Pin Name	I/O	Descriptions
1	SCL	I	I ² C clock
2	SDA	I/O	I ² C data
5	ATTN	I	Discontinuity
7	VPP	P	Global reset pin
8	VDD	P	Power supply (3.3V)
3,4,6,9,10	GND	P	Ground (0V)

Note: The capacitance touch drive IC is SSD2543.

4. Absolute Maximum Ratings

AGND= GND=0V, Ta = 25℃

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	-0.3	5.0	V	
	AVDD	6.5	13.5	V	
	VGH	-0.3	20.0	V	
	VGL	-20.0	0.3	V	
Backlight Forward Current	I _{LED}	-	25	mA	For each LED
Operating Temperature	T _{OPR}	-20	70	℃	
Storage Temperature	T _{STG}	-30	80	℃	
Relative Humidity (*2)	RH	--	≤95	%	Ta≤40℃
		--	≤85	%	40℃ < Ta ≤ 50℃
		--	≤55	%	50℃ < Ta ≤ 60℃
		--	≤36	%	60℃ < Ta ≤ 70℃
		--	≤24	%	70℃ < Ta ≤ 80℃
Absolute Humidity	AH	--	≤70	g/m ³	Ta>70℃

Note:

*1.Input voltage include R0~R5, G0~G5, B0~B5, Dotclk, Hsync, Vsync, Enable, R/L, U/D.

*2.Ta means the ambient temperature;

It is necessary to limit the relative humidity to the specified temperature range;
Condensation on the module is not allowed.

5. Electrical Characteristics

5.1 Recommended Operating Condition

AGND=GND=0V, Ta = 25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Analog Supply Voltage	AVDD	10.7	11.0	11.3	V	
Gate On Voltage	VGH	15.7	16	16.3	V	
Gate Off Voltage	VGL	-7.1	-6.8	-6.5	V	

Note: The value is for design stage only.

5.2 Recommended Driving Condition for Backlight

Ta=25℃

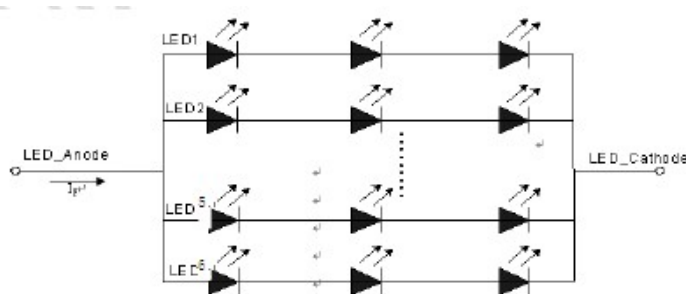
Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	I _F	-	120	-	mA	18 LEDs (3 LED Serial, 6 LED Parallel)
Forward Voltage	V _F	-	9.6	-	V	
Operating Life Time	-	15000	20000	-	Hrs	

Note:

*1. The LED driving condition is defined for each LED module (3 LED Serial, 6 LED Parallel). For each LED: I_F (1/6) = 20mA, V_F (1/3) = 3.3V.

*2. Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

*3. I_F is defined for one channel LED. Optical performance should be evaluated at Ta=25℃ only. 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.



*4. The LED driving condition is defined for each LED module.

5.3 Power Consumption

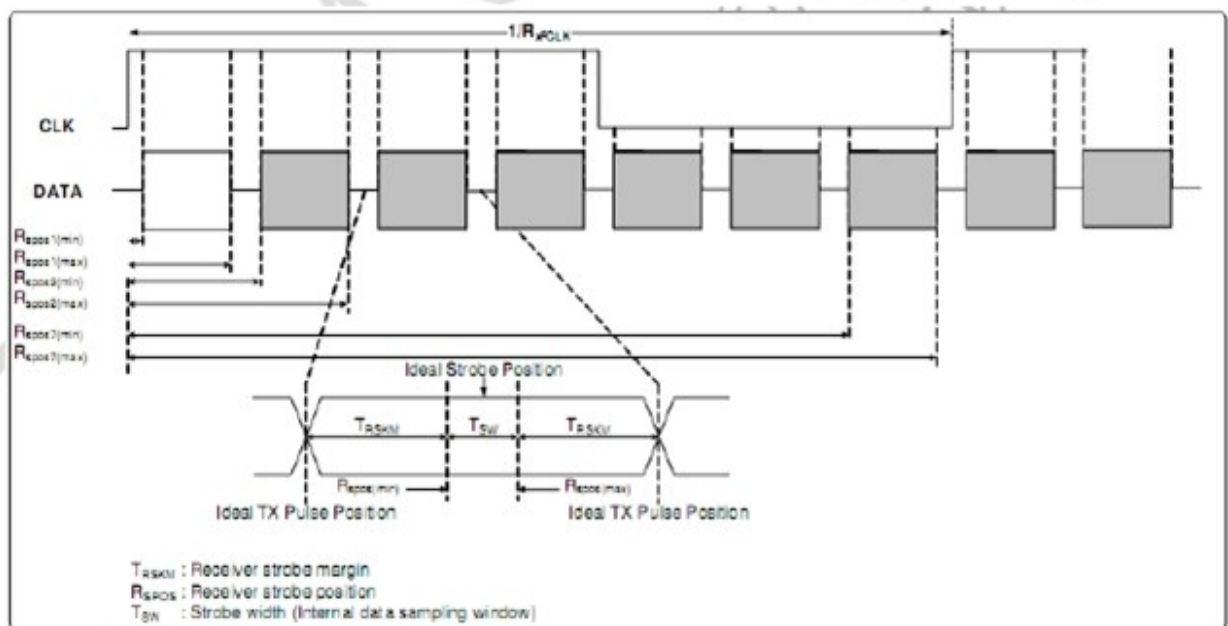
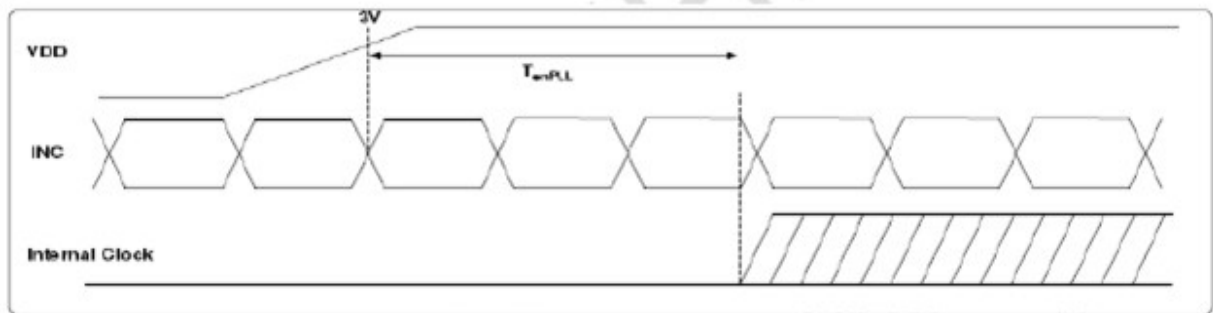
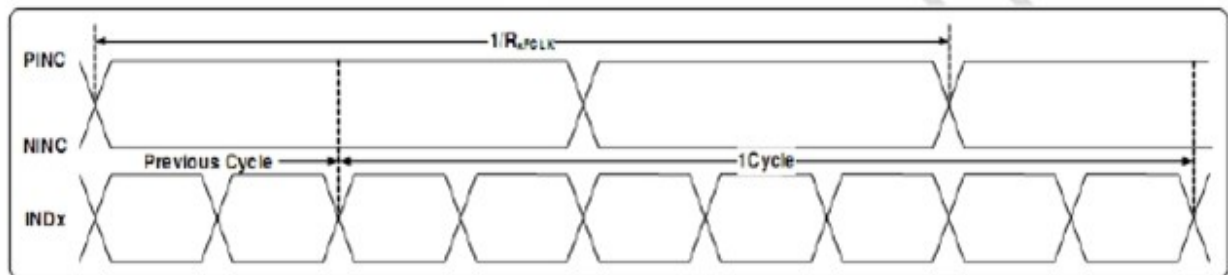
AGND=GND=0V, Ta = 25°C

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Digital Supply Current	I _{VDD}	VDD=3.3 V	-	TBD	TBD	mA	
Analog Supply Current	I _{AVDD}	AVDD=11.0 V	-	TBD	TBD	mA	
Gate On Current	I _{VGH}	VGH=16.0 V	-	TBD	TBD	mA	
Gate Off Current	I _{VGL}	VGL=-6.8 V	-	TBD	TBD	mA	
Power Consumption	Panel&Gamma		-	TBD	TBD	mW	
	Backlight		-	1188		W	
	Total		-	TBD		W	

6. Timing Chart

6.1 AC Electrical Characteristics

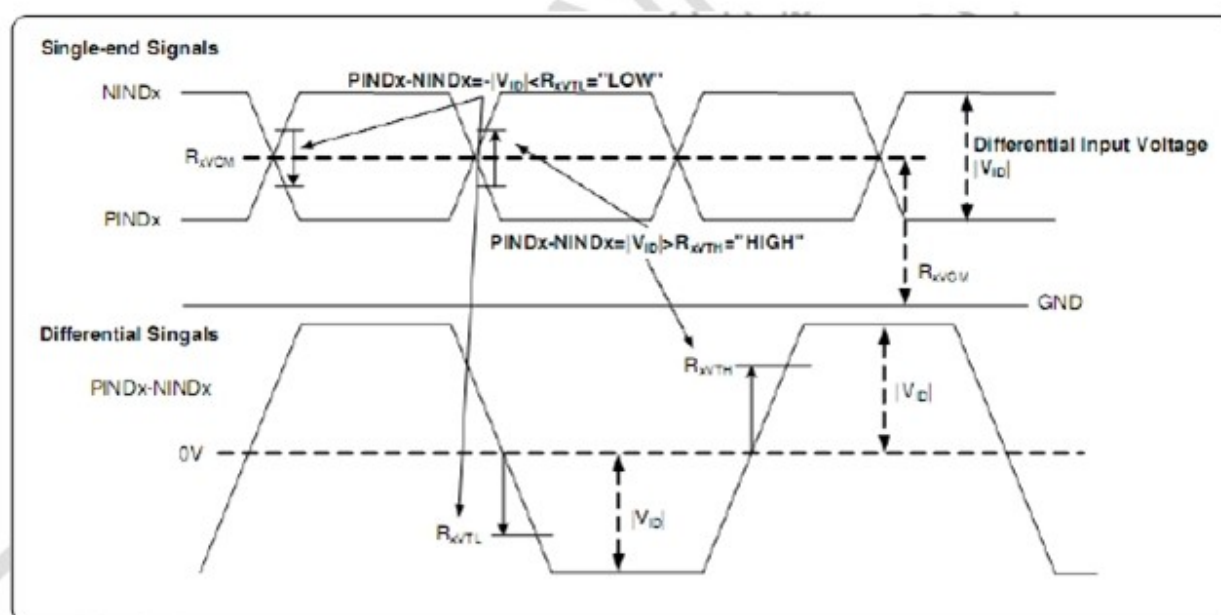
Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Clock Frequency	R_{xCLK}	40.8	51.2	71	MHz	
Input data skew margin	T_{RSKM}	500	–	–	ps	
Clock high time	T_{LVCH}	–	$4/(7 * R_{xCLK})$	–	ns	
Clock low time	T_{LVCL}	–	$3/(7 * R_{xCLK})$	–	ns	
PLL wake-up time	T_{enPLL}	–	–	150	us	



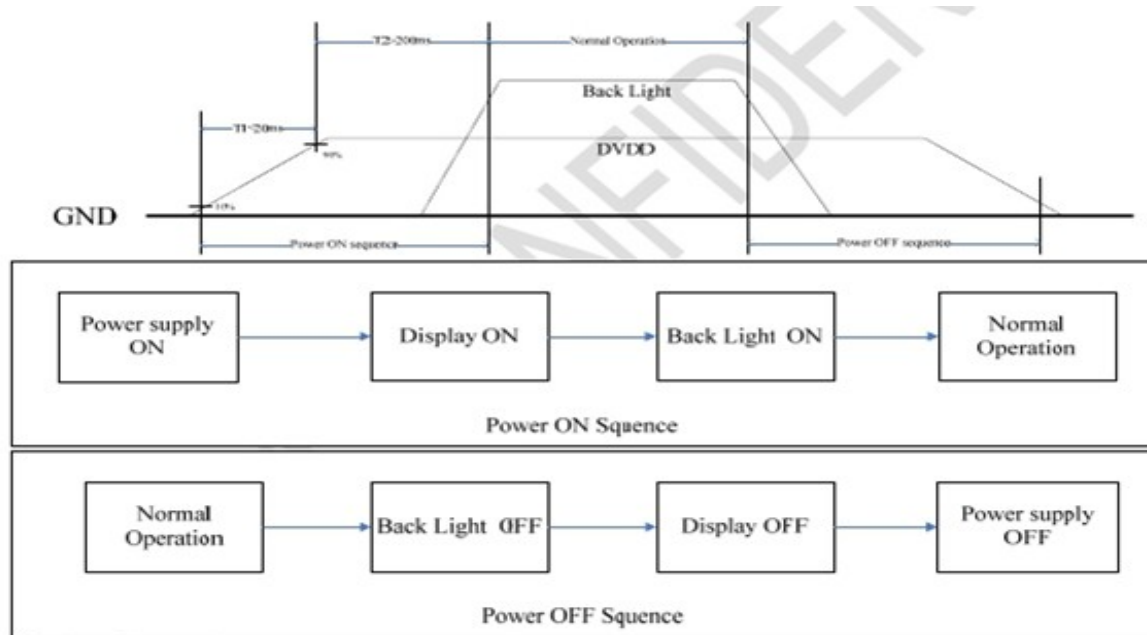
6.2 DC Electrical Characteristics

VDD=3.3V, AVDD=11V, AGND=GND=0V, Ta=25°C

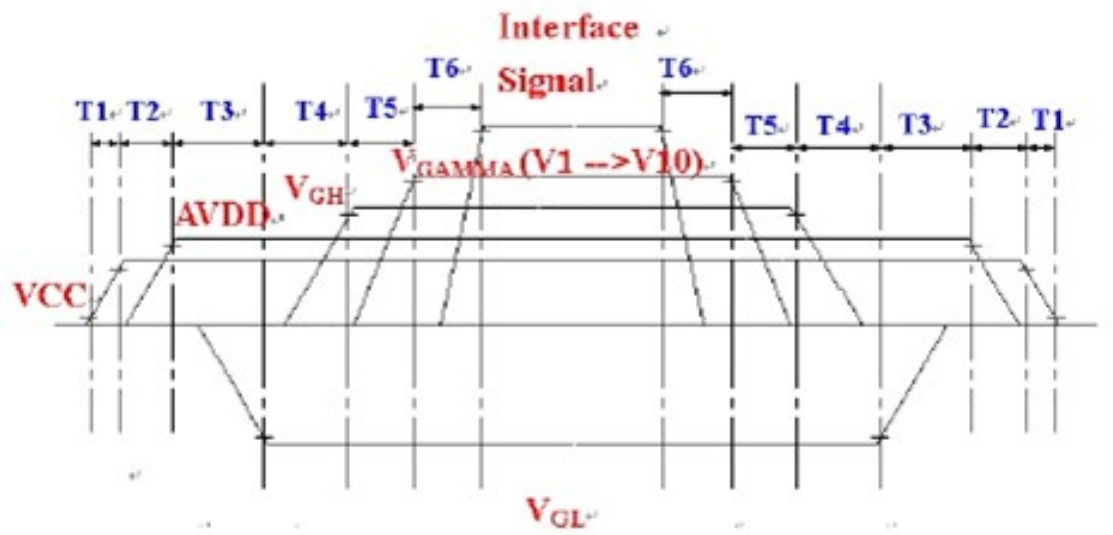
Parameter	Symbol	Min	Typ	Max	Unit	Remark
Differential input high Threshold voltage	RxVTH	–	–	+0.1	V	
Differential input Low Threshold voltage	RxVTL	-0.1	–	–	V	
Input voltage range	RxVIN	0	–	VDD-1.2+ V _{ID} /2	V	
Differential input common Mode voltage	RxVCM	V _{ID} /2	–	VDD-1.2	V	
Differential input voltage	V _{ID}	0.2	v	0.6	V	
Differential input leakage Current	RV _{XIIZ}	-10	v	+10	uA	
LVDS Digital Operating Current	I _{ddlvs}	–	(15)	(30)	mA	Fclk=65MHz,VDD=3.3V
LVDS Digital Stand-by Current	I _{stlvs}	–	(10)	(50)	uA	Clock & all functions are stopped



6.6 POWER ON/OFF SEQUENCE



6.7 System power ON/OFF sequence



	Min.	Typ.	Max.	Unit
T1	-	-	20	ms
T2	16	-	-	ms
T3	> 0			ms
T4	> 0			ms
T5	> 0			ms
T6	> 0			ms

7. Optical Characteristics

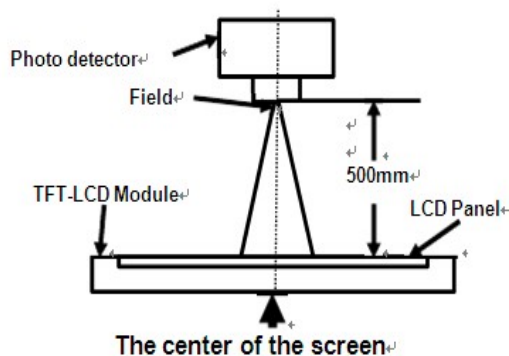
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	60	70	-	Degree	Note2,3
		θB		65	75	-		
		θL		65	75	-		
		θR		65	75	-		
Contrast Ratio		CR	θ=0°	400	500	-		Note 3
Response Time		T _{ON}	25℃	-	20	30	ms	Note 4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.256	0.306	0.356		Note 1,5
		y		0.277	0.327	0.377		
	Red	x		0.537	0.587	0.637		Note 1,5
		y		0.298	0.348	0.398		
	Green	x		0.290	0.340	0.390		Note 1,5
		y		0.534	0.584	0.634		
	Blue	x		0.103	0.153	0.203		Note 1,5
		y		0.059	0.109	0.159		
Uniformity		U		70	75		%	Note 6
NTSC				45	50		%	Note 5
Luminance		L		230	270		cd/m ²	Note 7

Test Conditions:

1. IF= 120 mA, VF=9.6 V and the ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

Note 1: Definition of optical measurement system.

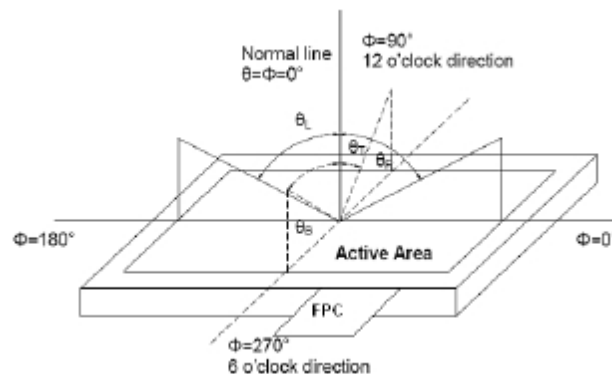
The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

Note 2: Definition of viewing angle and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

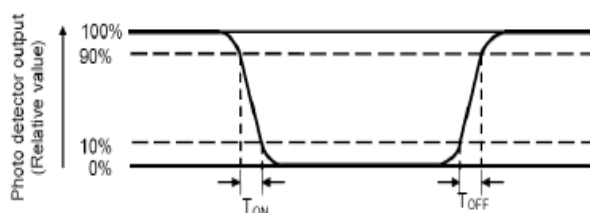
"White state ": The state is that the LCD should drive by voltage of white.

"Black state": The state is that the LCD should drive by voltage of black.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.

White (TFT off) | Black (TFT on) | White (TFT off)



Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas as below. Every measuring point is placed at the center of each measuring area.

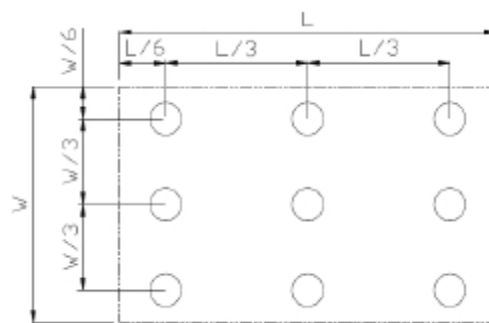
Luminance Uniformity (U) = L_{min} / L_{max}

L_{max} : The measured Maximum luminance of all measurement position.

L_{min} : The measured Minimum luminance of all measurement position.

L-----Active area length

W----- Active area width



Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

8. Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts = +70℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max, 240 hours	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, IEC60068-2-14:1984, G B2423.22-2002
7	ESD	C=150pF, R=330Ω, 5point/panel Air: ±8Kv, 5times; Contact: ±4Kv, 5times (Environment: 15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2:2001 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/T2423.10—1995
9	Mechanical Shock (Non OP)	Half Sine Wave 60G 6ms, ±X, ±Y, ±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height: 60cm, 1corner, 3edges, 6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

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

Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

9. Precautions for Use of LCD Modules

9.1 Handling Precautions

- a. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- b. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- c. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- d. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- e. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
 - Isopropyl alcohol — Ethyl alcoholSolvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
 - Water — Ketone — Aromatic solvents
- f. Do not attempt to disassemble the LCD Module.
- g. If the logic circuit power is off, do not apply the input signals.
- h. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 1. Be sure to ground the body when handling the LCD Modules.
 2. Tools required for assembly, such as soldering irons, must be properly ground.
 3. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 4. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

9.2 Storage precautions

- a. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- b. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:
Temperature : 0°C ~ 40°C Relatively humidity: ≤80%
- c. The LCD modules should be stored in the room without acid, alkali and harmful gas.

9.3 Transportation Precautions

- a. The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.