

PRODUCT SPECIFICATION

TFT LCD MODULE

1. General Description

1.1 Description

this is a Transmissive type color active matrix liquid crystal display (LCD), which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT LCD panel, driver IC, FPC ,backlight and RTP unit .

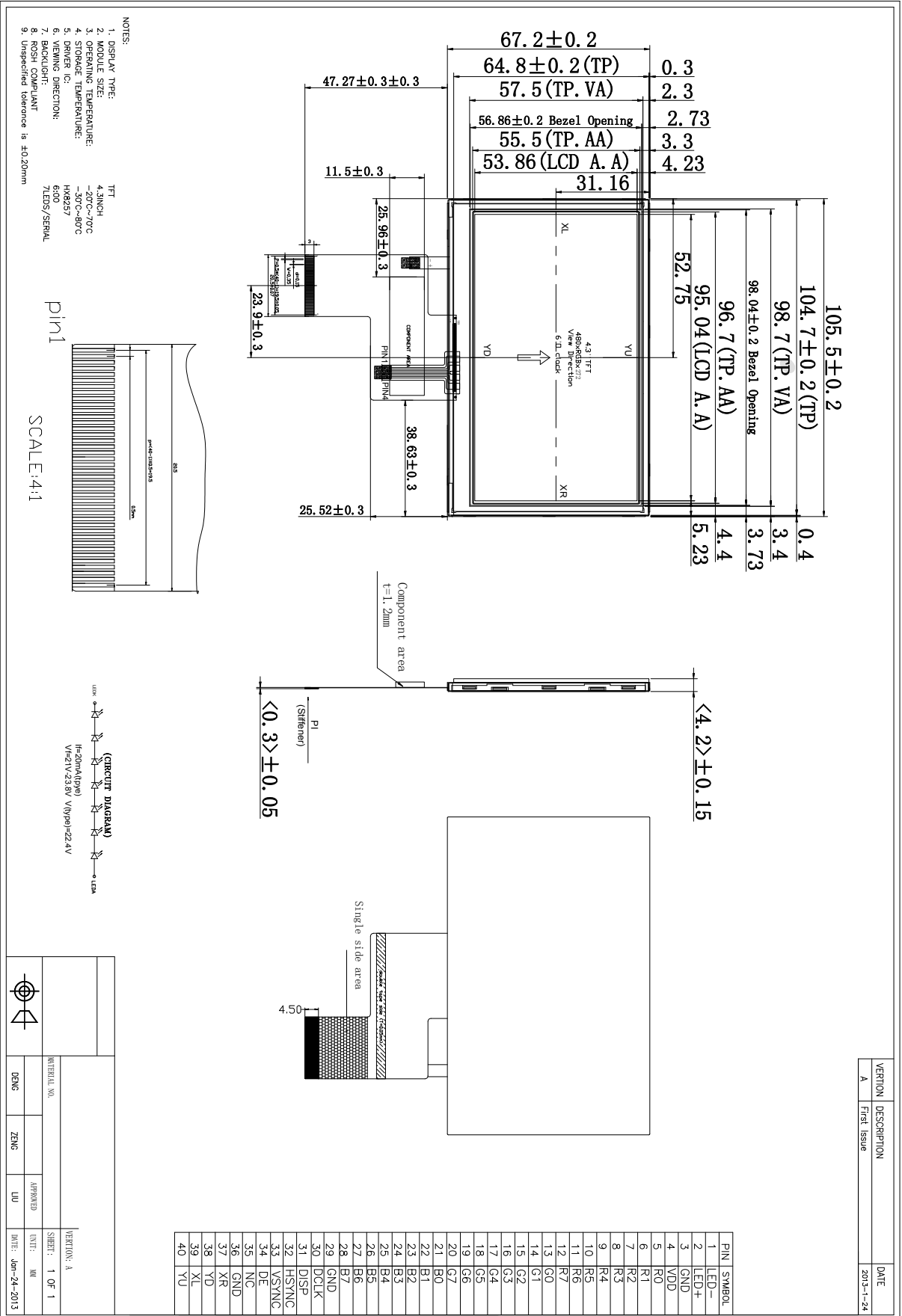
1.2 Application

PAD,PMP,MP4,DVB-S,GPS, Multimedia products,Portable Navigation and other electronic Products
Etc.

1.3 Features:

Features	Description	UNITS
LCD type	4.3'TFT	--
Dot arrangement	480 (RGB) × 272	dots
Driver IC	HX8257	--
Color Depth	16M	
Interface	RGB 24bit Interface	
View Direction	6 o'clock	
Module size	105.50(W) × 67.20 (H) × 4.20(T)	mm
Active area	95.04(W) × 53.86 (H)	mm
Dot pitch	0.198 (W) × 0.198 (H)	mm
Surface treatment	Anti-glare	
Back Light	7 White LEDs	--
With/Without TSP	With TSP	
Weight(g)	TBD	

2. External Dimensions



3. Interface Description

FPC Connector is used for the module electronics interface. The recommended model is FH19SC-40S-0.5SH manufactured by HIROSE.

Pin No.	Symbol	Functional	Remark
1	VLED-	Power for LED backlight cathode.	
2	VLED+	Power for LED backlight anode.	
3	GND	Power ground.	
4	VDD	Power voltage.	
5	R0	Red data(LSB).	
6	R1	Red data.	
7	R2	Red data.	
8	R3	Red data.	
9	R4	Red data.	
10	R5	Red data.	
11	R6	Red data.	
12	R7	Red data(MSB).	
13	G0	Green data(LSB).	
14	G1	Green data.	
15	G2	Green data.	
16	G3	Green data.	
17	G4	Green data.	
18	G5	Green data.	
19	G6	Green data.	
20	G7	Green data(MSB).	
21	B0	Blue data(LSB).	
22	B1	Blue data.	
23	B2	Blue data.	
24	B3	Blue data.	
25	B4	Blue data.	
26	B5	Blue data.	
27	B6	Blue data.	
28	B7	Blue data(MSB).	
29	GND	Power Ground.	
30	CLK	Pixel clock.	
31	DISP	Display on/off.	NOTE1
32	HSYNC	No Connector.	
33	VSYNC	No Connector.	
34	DE	Data Enable.	NOTE2
35	NC	No Connector.	
36	GND	Power Ground.	
37	XR	Touch panel pin for XR.	
38	YD	Touch panel pin for YD.	
39	XL	Touch panel pin for XL.	
40	YU	Touch panel pin for YU.	

Note1: During set to DISP=" H ", input data are valid. During set to DISP=" L ", input data are invalid and white display data is written to data register automatically.

Note2: DE=" H ": data can be access, DE=" L ": data cannot be access

4. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Condition
		Min.	Max.		
Power Voltage	VDD	0.3	5.0	V	
Logic Input Signal	VIN	-0.3	VDD+0.3	V	
Logic Output Signal	VOUT	-0.3	VDD+0.3	V	

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

5. Electrical Characteristics

5.1 Operating conditions:

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Supply	VDD	3.0	3.3	3.6	V	
Operating Current	IDD	-	15	-	mA	Black pattern
Frame frequency	Frame	-	60	90	Hz	
Dot Data Clock	DCLK	-	9.0	15	MHz	
Power Consumption	PLCD	-	49.5	-	mW	Black pattern

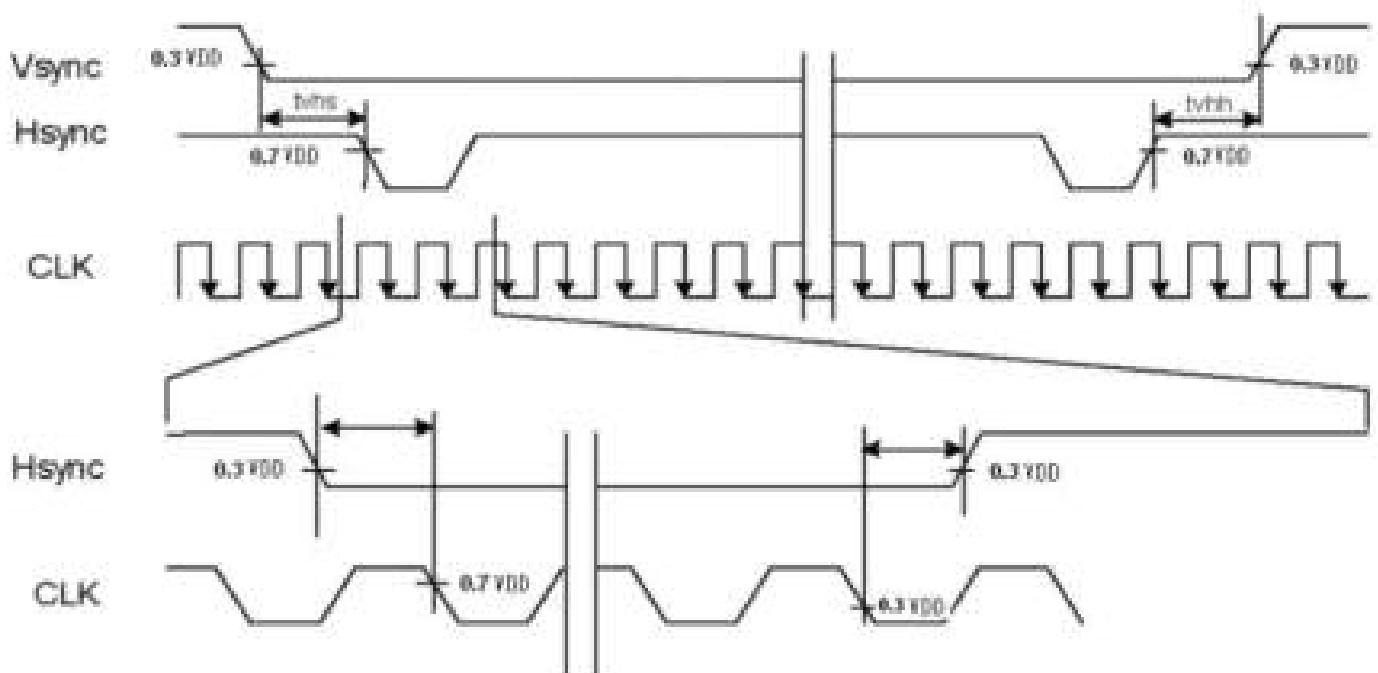
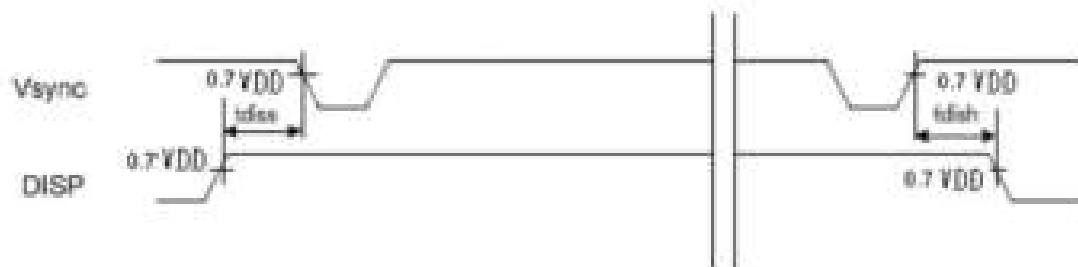
5.2 DC CHARACTERISTICS

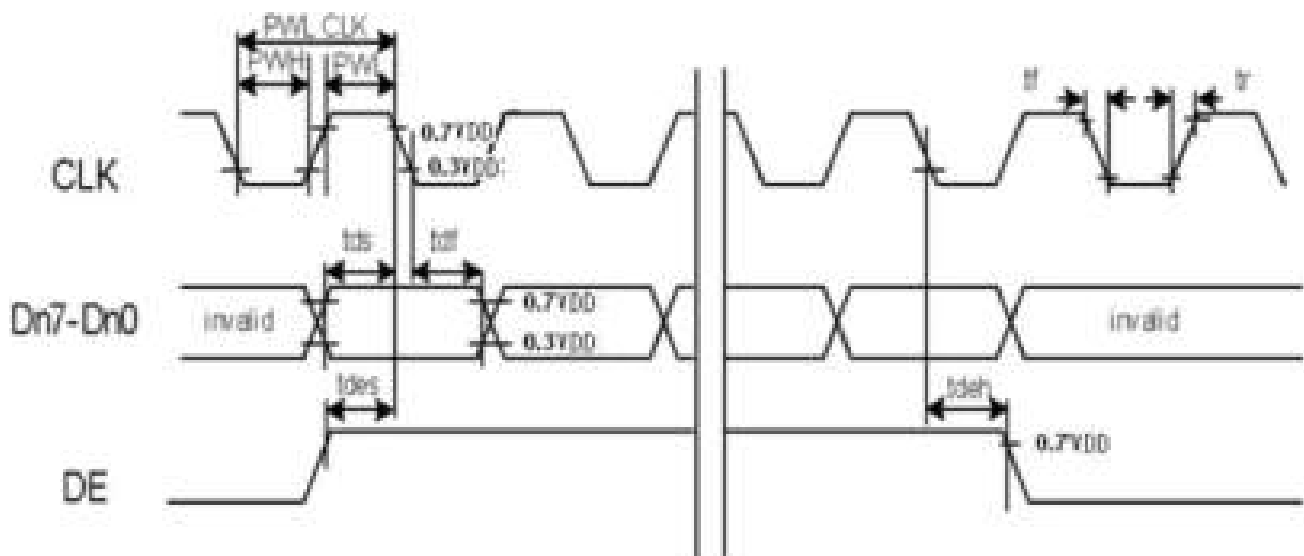
Parameter	Symbol	Rating			Unit	Condition
		Min.	Typ.	Max.		
Low level input voltage	V_L	0	-	$0.3 \cdot VDD$	V	
High level input voltage	V_{IH}	$0.7 \cdot VDD$	-	VDD	V	

6. Timing Characteristics.

6.1 AC Timing Characteristics

Parameter	Symbol	Spec.			Unit
		Min	Typ	Max	
DISP setup time	t_{dss}	10			ns
DISP hold time	t_{dsh}	10			ns
Clock period	$PW_{CLK}^{(2)}$	66.7	-	-	ns
Clock pulse high period	$PWH^{(2)}$	26.7	-	-	ns
Clock pulse low period	$PWL^{(2)}$	26.7	-	-	ns
Hsync setup time	t_{hs}	10	-	-	n
Hsync hold time	t_{hh}	10	-	-	
Data setup time	t_{ds}	10	-		ns
Data hold time	t_{dh}	10	-		ns
DE setup time	t_{des}	10	-		ns
DE hold time	t_{deh}	10			ns
Vsync setup time	t_{vhs}	10		-	ns
Vsync hold time	t_{vhh}	10		-	ns





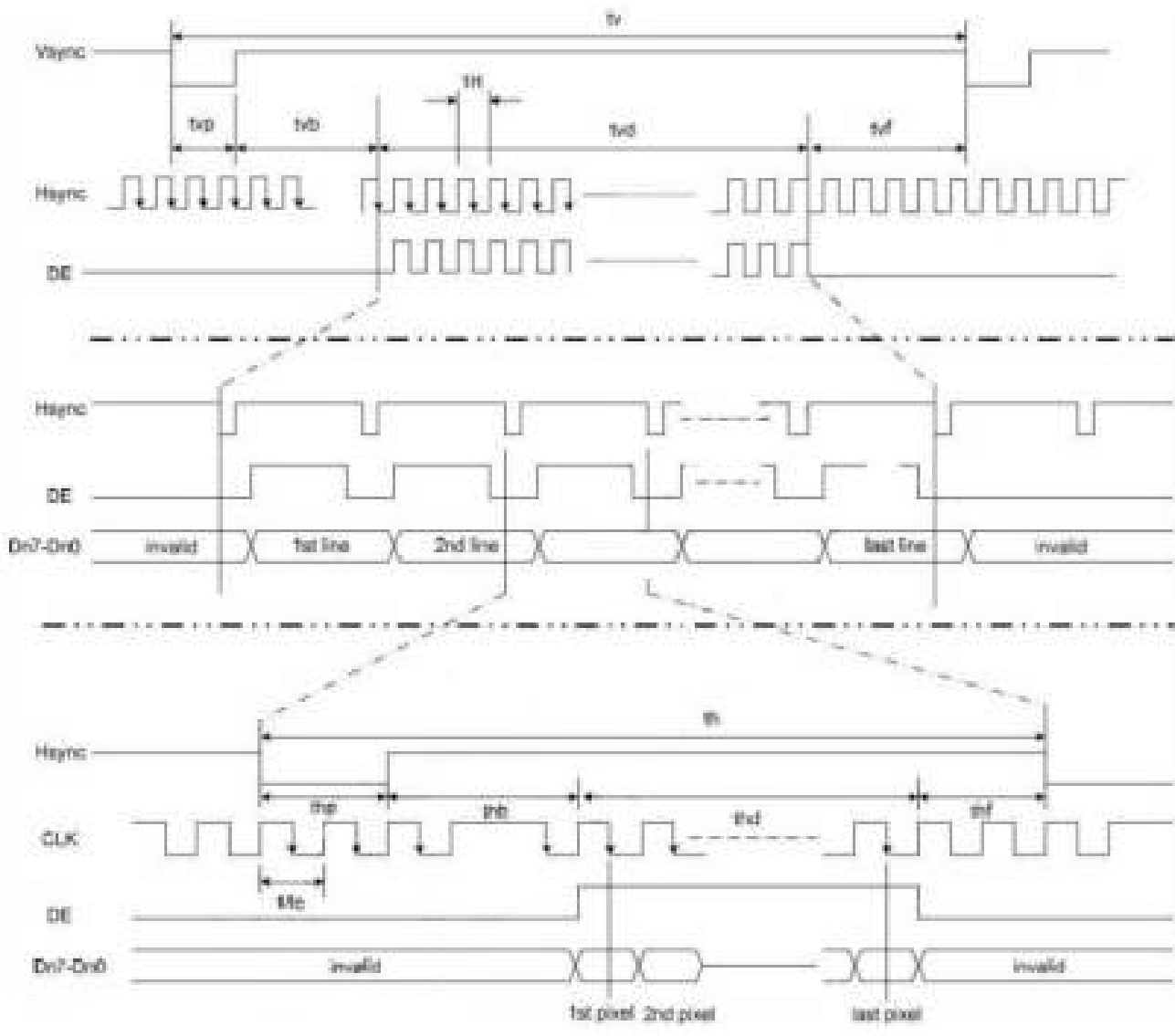
6.2 DC Timing Characteristics.

Signal	Item	Symbol	Min	Typ	Max	Unit	Note
Dclk	Frequency	DCLK	-	9.0	12	MHZ	
Hsync	Period	TH	-	525	-	DCLK	(1)
	Pulse Width	Thp	2	41	-	DCLK	(2)
	Back-Porch	Thb	2	-	-	DCLK	(2)
	Display Period	Thd	-	480	-	DCLK	
	Front-Porch	Thf	2	-	-	DCLK	(2)
Vsync	Period	Tv	-	286	-	TH	
	Pulse Width	Tvp	1	10	-	TH	
	Back-Porch	Tvb	1	2	-	TH	
	Display Period	Tvd	-	272		TH	
	Front-Porch	Tvf	1		-	TH	

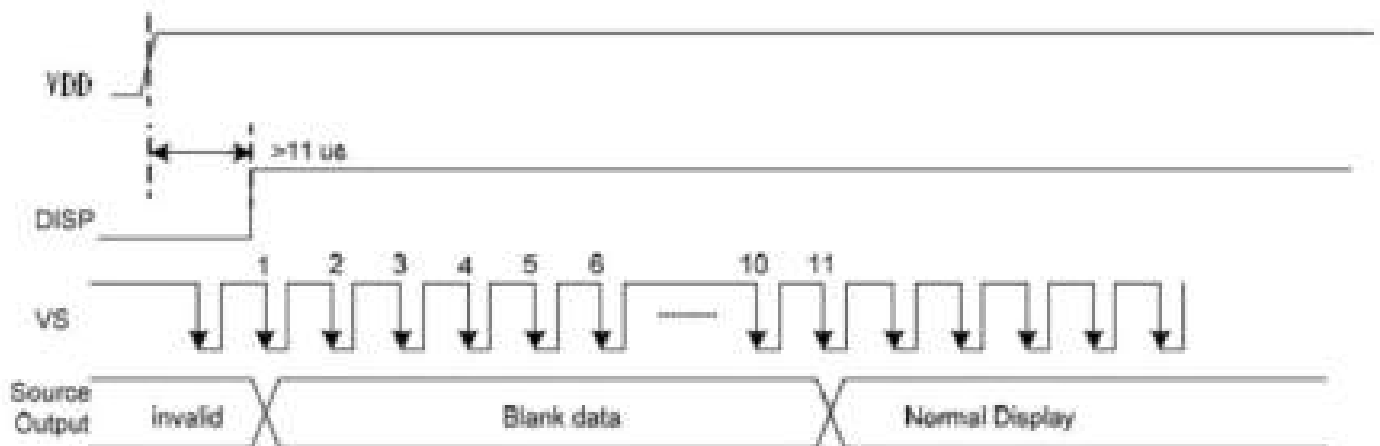
Note1: Thd=480 DCLK, Thf=2 DCLK, Thp= 41
525 DCLK= 480 + 2 + 41 + 2 (DCLK)

hb=2 DCLK

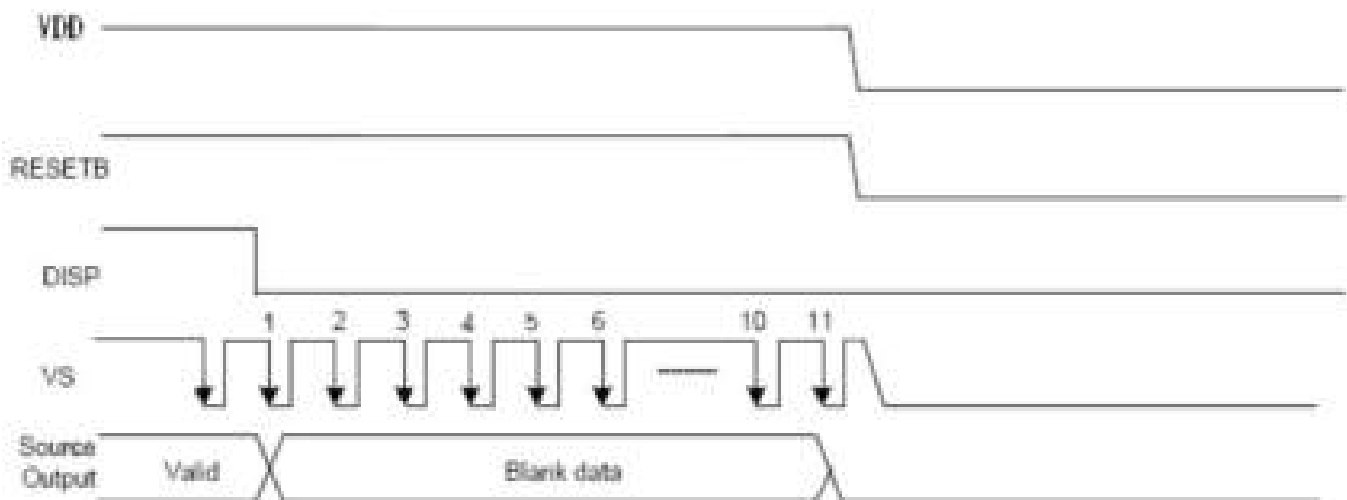
Note2: Thf+ Thp+ Thb >44



6.3 Power sequence

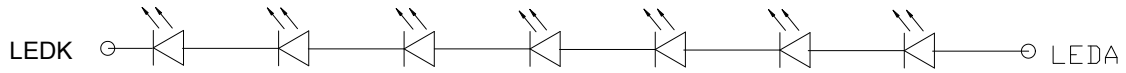


Power On Sequence



Power Off Sequence

7.Backlight Characteristics.

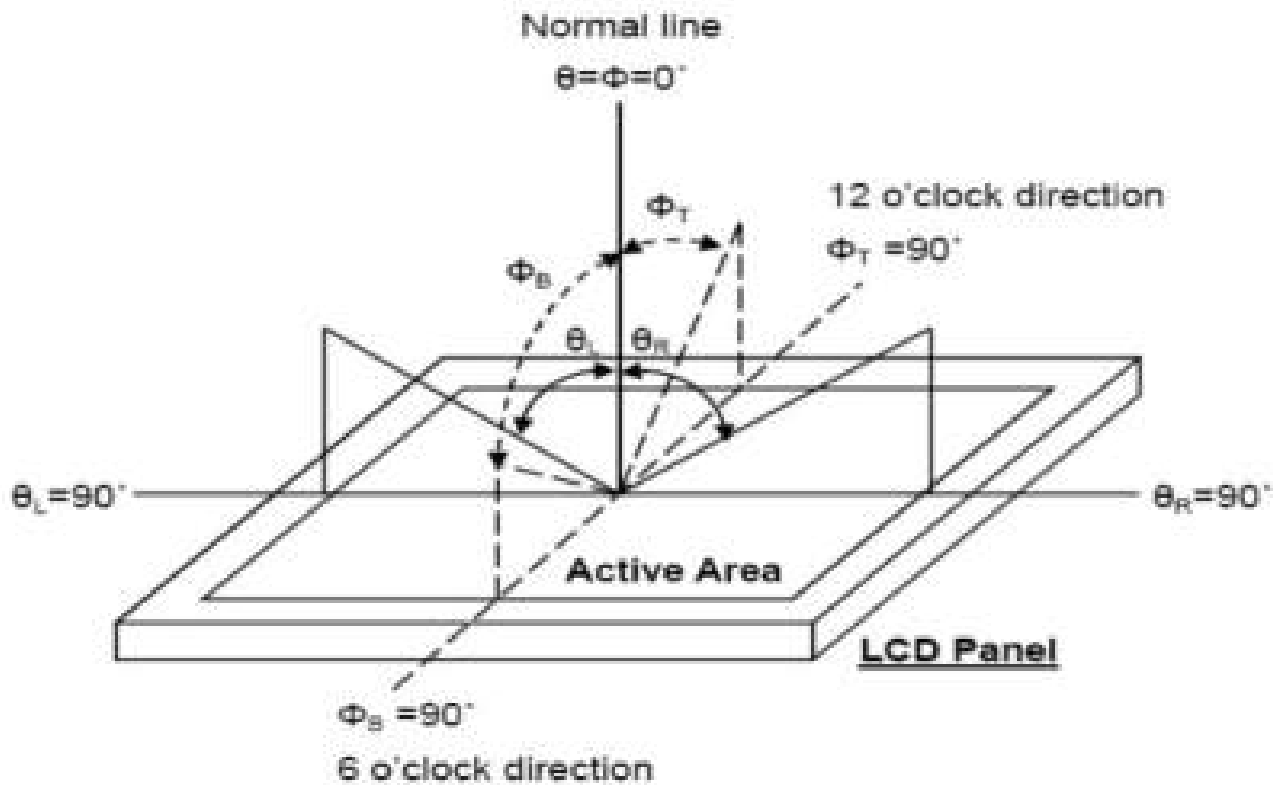


Item	Sy mb ol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	Vf	20.5	22.4	23.5	V	If=20 mA	-
Supply Current	If	-	20	-	mA	-	-
Reverse Voltage	Vr	-	-	5	V	10uA	
Power dissipation	Pd	-	448	-	mW	-	
Luminous Intensity for LCM		220	250	280	Cd/m2	If=20 mA	
Uniformity for LCM	-	80	-	-	%	If=20 mA	
Life Time	-	50000	-	-	Hr	If=20 mA	-
Backlight Color	White						

8.Optical Characteristics

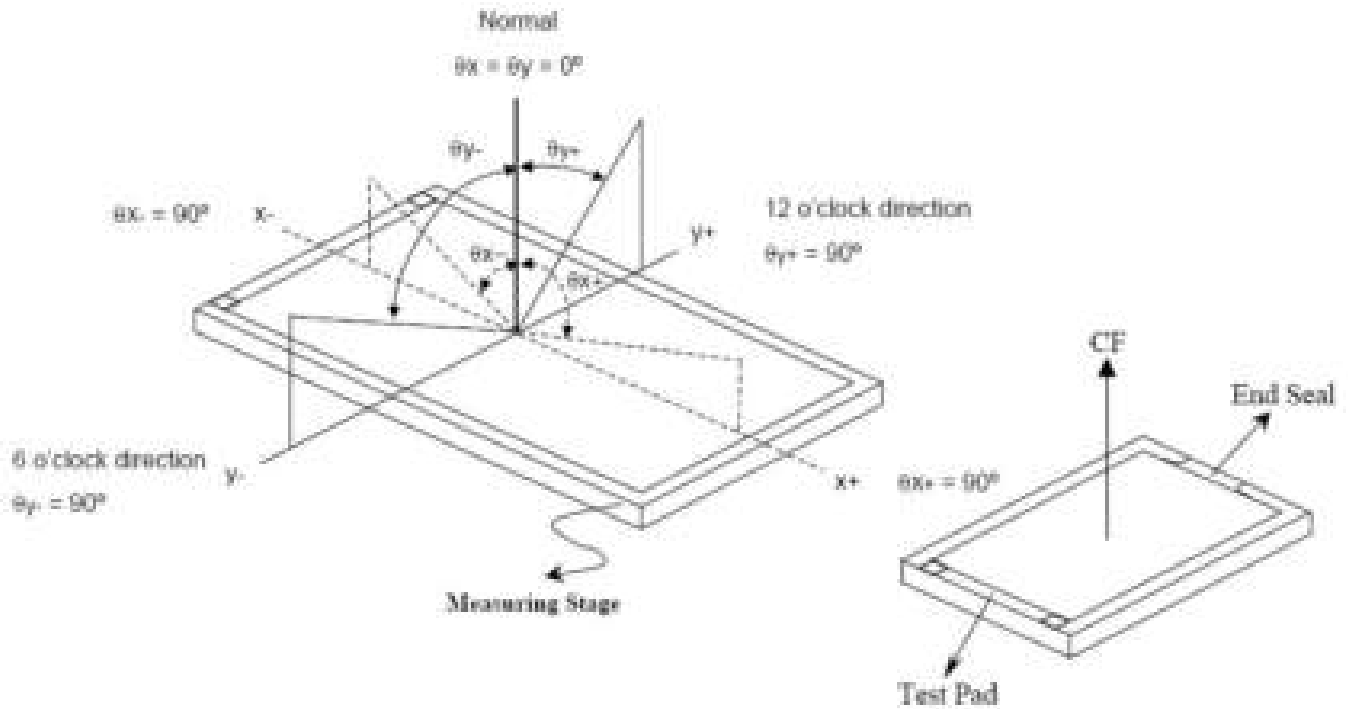
Item	Symbol	Condition	Min	Typ	Max	Unit	Note	
Response time	TR	$\Theta=0$	-	15	-	ms	(3)(5)	
	TF		-	15	-	ms		
Contrast ratio	CR	At optimized viewing angle	450	550	-	-	(4)	
Color Chromaticity	White	Wx	$\Theta=0$	0.26	0.31	0.36	-	(2)(6)
		Wy		0.28	0.33	0.38		
Viewing Angle	Hor.	Θ_R	$CR \geq 10$	60	70	-	-	(1)
		Θ_L		60	70	-		
	Ver.	φ_H		40	50	-		
		φ_L		60	70	-		
Uniformity			75	80		%	(8)	

Note 1: Definition of viewing angle range



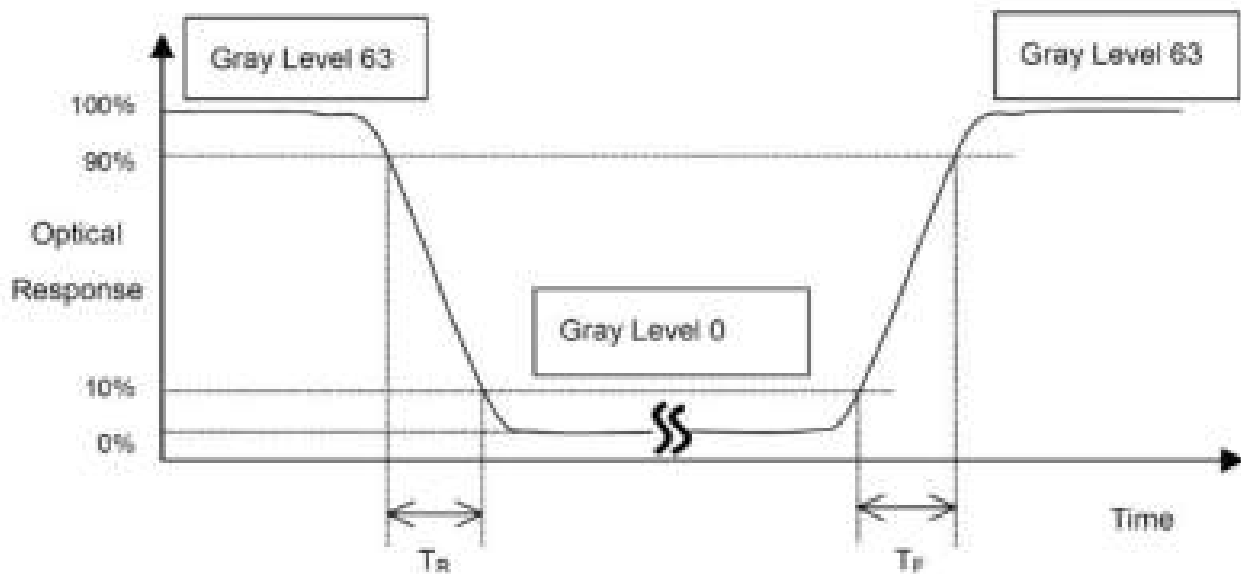
Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 luminance meter 1.0° field of view at a distance of 50cm and normal direction.



Note 3: Definition of Response time:

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



Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

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

Note 5: White Vi = $V_{i50} \pm 1.5V$

Black Vi = $V_{i50} \pm 2.0V$

"±" means that the analog input signal swings in phase with VCOM signal.

"±" means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

$$\text{Note 8 : Uniformity (U)} = \frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$$

9. RELIABILITY

No.	Test Item	Test Condition	Remark
1	High Temperature Storage	+80°C± 2°C, 96 hrs	Note
2	Low Temperature Storage	-30°C± 2°C, 96 hrs	Note
3	High Temperature Operation	+70°C± 2°C, 96 hrs	Note
4	Low Temperature Operation	+20°C± 2°C, 96 hrs	Note
5	High Temperature & High Humidity Storage Test	+50°C± 5°C, 90%R.H, 96 hours	Note
6	Temperature Cycle (non operation)	-30°C ← +25°C → +80°C (30mins ← 5mins → 30mins) 10 Cycles	Note
7	Electronic Static Discharge	Air Discharge: 2KV to with 5 times	Discharge for each polarity Mode of Operation: Single Discharge, successive discharge at least 1 sec
		Ambiance: 15°C~35°C, 30%~60%R.H Resistance(Rd): 330Ω ±10% Capacitance(Cs + Cd): 150pF±10%	
8	Vibration (Packaged)	Frequency range: 10Hz ~ 55 Hz Amplitude: 1.5mm Direction of X.Y. Z for 3 Hrs in total	
9	Drop Test (Packaged)	Height: 80cm, Time: 1 1 corner, 3 edged, 6 surfaces	