



**HIGHNESS**<sup>TM</sup>

**HM101WX101HT** Rel.1

**10.1" Color TFT-LCD**

**Update Date**  
04<sup>th</sup> Nov 2020

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**HIGHNESS MICROELECTRONICS PVT. LTD**

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## 1. General Information LCM

ITEM	STANDARD VALUES	UNITS
LCD type	10.1" TFT	--
Dot arrangement	1280×3(RGB)×800	dots
Color filter array	RGB vertical stripe	--
Display mode	Normally Black	-
Viewing Direction	85/85/85/85	--
Module size	229.46(W)×149.10(H)×2.50(T)	mm
Active area	216.96(W)×135.60(H)	mm
Dot pitch	0.1695(W)×0.1695(H)	mm
Interface	LVDS Interface	--
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +80	°C
Weight	TBD	g



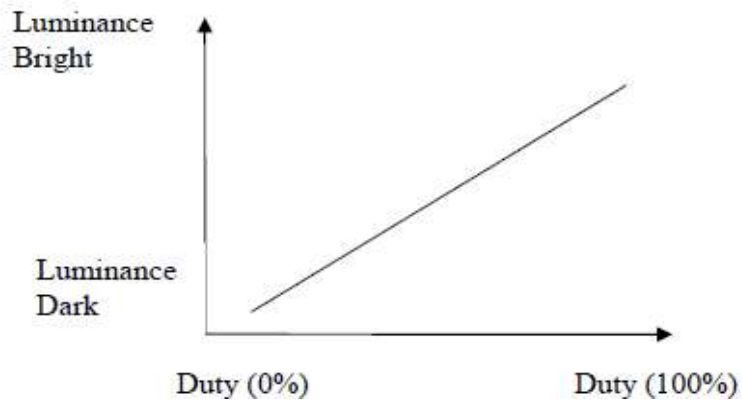
### 3. Interface Description

PIN	PIN NAME	DESCRIPTION	Remark
1	VCOM	Common Voltage	
2	VDD	Power Supply	
3	VDD		
4	NC		
5	NC	No connection	
6	NC		
7	GND		
8	Rxin0-	-LVDS Differential Data Input	R0~R5,G0
9	Rxin0+	+LVDS Differential Data Input	
10	GND	Ground	
11	Rxin1-	-LVDS Differential Data Input	G1~G5,B0, B1
12	Rxin1+	+LVDS Differential Data Input	
13	GND	Ground	
14	Rxin2-	-LVDS Differential Data Input	B2~B5,HS, VS,DE
15	Rxin2+	+LVDS Differential Data Input	
16	GND	Ground	
17	RxCLK-	-LVDS Differential Clock Input	LVDS CLK
18	RxCLK+	+LVDS Differential Clock Input	
19	GND	Ground	
20	Rxin3-	-LVDS Differential Data Input	R6,R7,G6,G7, B6,B7
21	Rxin3+	+LVDS Differential Data Input	
22	GND	Ground	
23	NC	No connection	
24	NC		
25	GND	Ground	
26	NC	No connection	
27	LED_PWM	CABC controller signal output for backlight	Note2
28	NC	No connection	
29	AVDD	Power for Analog Circuit	
30	GND	Ground	
31	LEDK	LED Cathode	
32	LEDK	LED Cathode	
33	NC	No connection	
34	NC		
35	VGL	Gate OFF Voltage	
36	NC	No connection	
37	CABC_EN	CABC Enable Input	Note1
38	VGH	Gate ON Voltage	
39	LEDA	LED Anode	
40	LEDA	LED Anode	

Note1: The setting of CABC function are as follows.

Pin	Enable	Disable
CABC_EN	High Voltage	Low Voltage or open

Note2: LED\_PWM is used to adjust backlight brightness.



#### 4. Absolute Maximum Ratings

(Note 1)

Item	Symbol	Min.	Max.	Unit	Remark
Digital Supply Voltage	VDD	-0.3	3.9	V	
Analog Supply Voltage	AVDD	-0.3	14	V	
Gate On Voltage	V <sub>GH</sub>	-0.3	42	V	
Gate Off Voltage	V <sub>GL</sub>	-19	0.3	V	
Gate On ~ Gate Off Voltage	V <sub>GH</sub> -V <sub>GL</sub>	12	40	V	
Operating Temperature	T <sub>OP</sub>	-20	70	°C	
Storage Temperature	T <sub>ST</sub>	-30	80	°C	
LED Reverse Voltage	V <sub>F</sub>	2.1	3.1	V	I <sub>F</sub> =20mA
LED Forward Current	I <sub>R</sub>	-	50	mA	V <sub>R</sub> =5V

#### Current Consumption

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
High Supply for Current	I <sub>GH</sub>	-	705	750	uA	V <sub>GH</sub> =22V
Low Supply for Current	I <sub>GL</sub>	-	705	750	uA	V <sub>GL</sub> = -7V
Logic Supply for Current	I <sub>VDD</sub>	-	95	120	mA	V <sub>DD</sub> =2.5V
Analog Supply for Current	I <sub>AVDD</sub>	-	45	70	mA	V <sub>AVDD</sub> =8.2V

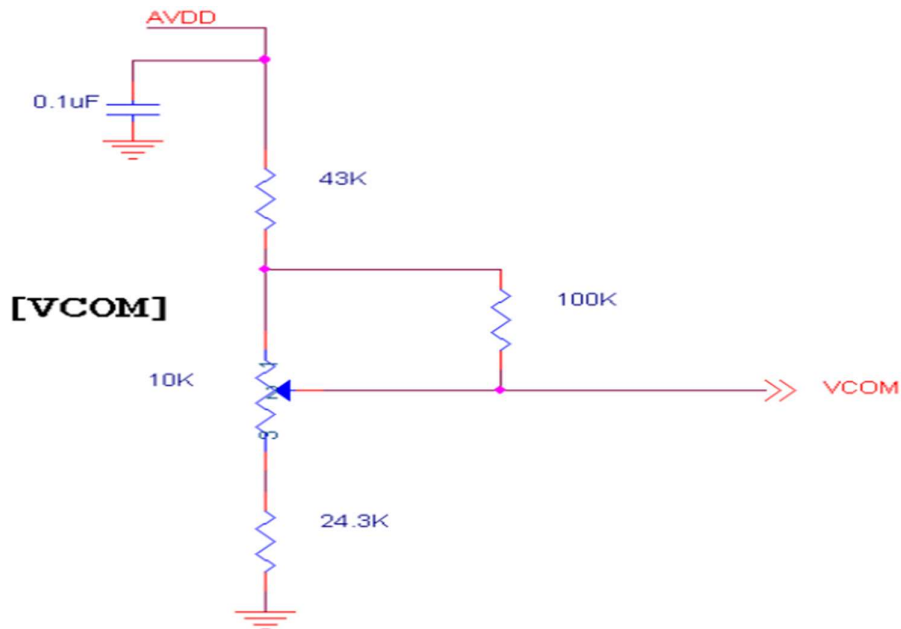
## 5. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Digital Supply Voltage	VDD	2.3	2.5	2.7	V	Note 1 ; Note 2
Analog Supply Voltage	AVDD	8.0	8.2	8.4	V	-
Gate On Voltage	V <sub>GH</sub>	21.7	22	22.3	V	Note 1
Gate Off Voltage	V <sub>GL</sub>	-7.3	-7.0	-6.7	V	Note 1
Input signal voltage	V <sub>COM</sub>	2.7	3.0	3.3	V	Note 4
Input logic high voltage	V <sub>IH</sub>	0.8VDD	-	3.6	V	Note 3
Input logic low voltage	V <sub>IL</sub>	GND	-	0.2DVDD	V	

Note 1: Be sure to apply VDD and V<sub>GL</sub> to the LCD first, AND THEN APPLY V<sub>GH</sub>

Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer's System board

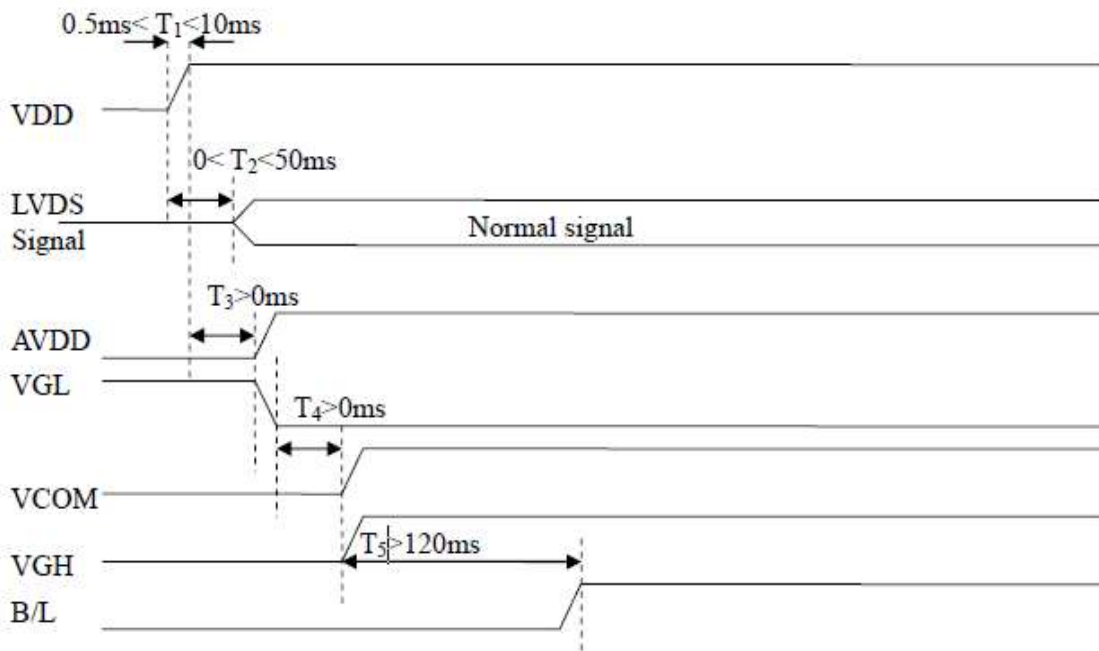
Note 4: Typical V<sub>COM</sub> is only a reference value, it must be optimized according to each LCM. Be sure to use VR.



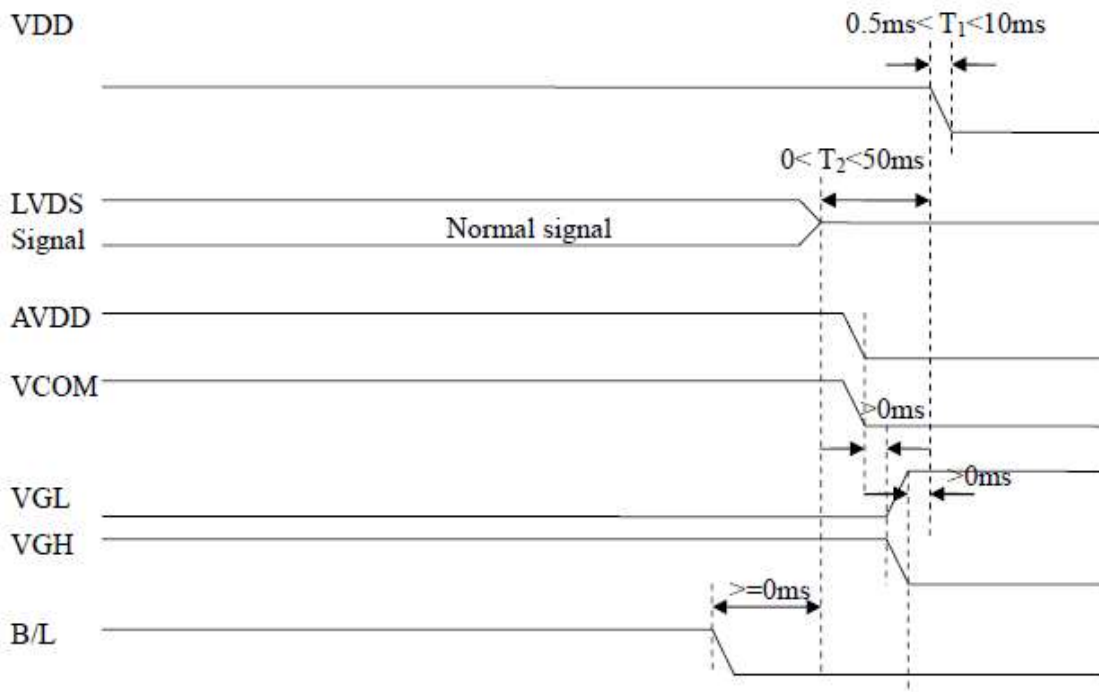
## 6. Timing Characteristics

### 6.1 Power Sequence

#### a. Power on:



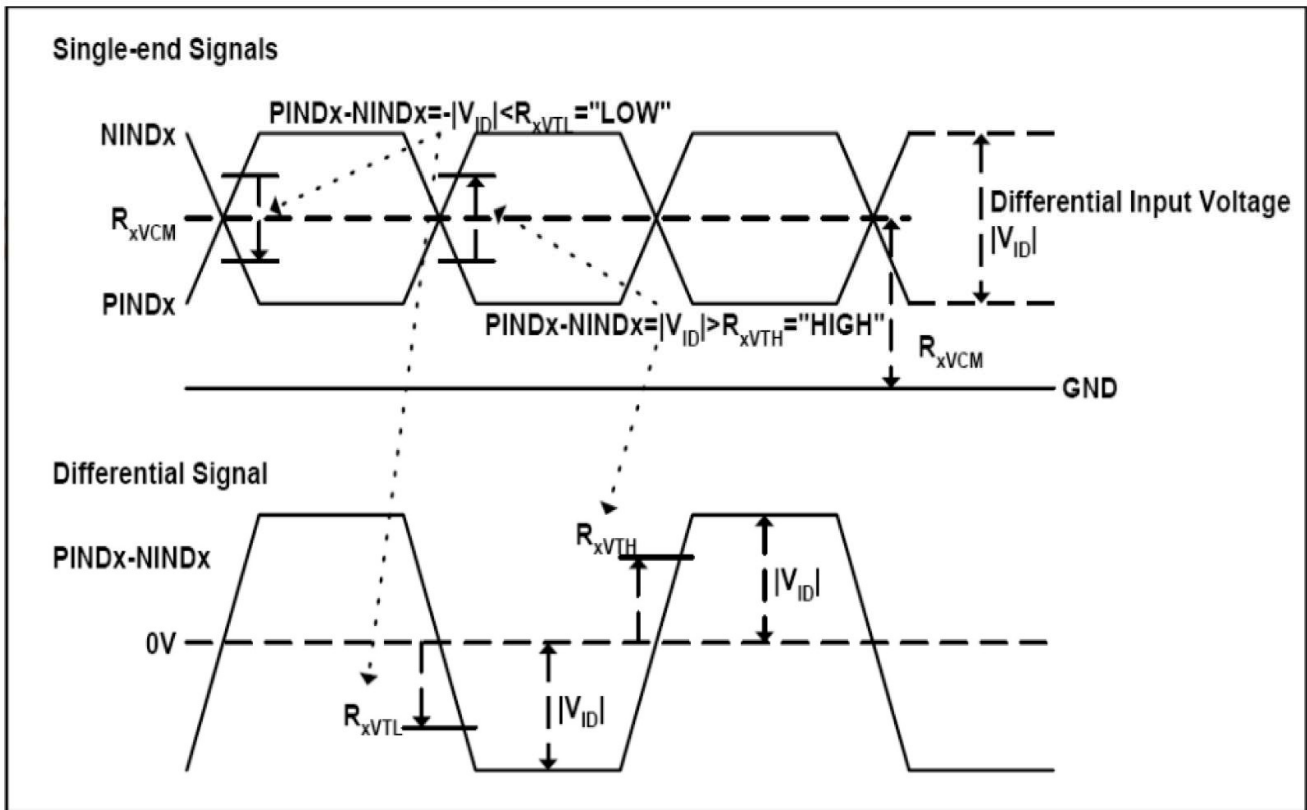
#### b. Power off:



## 6.2 LVDS Signal Timing Characteristics

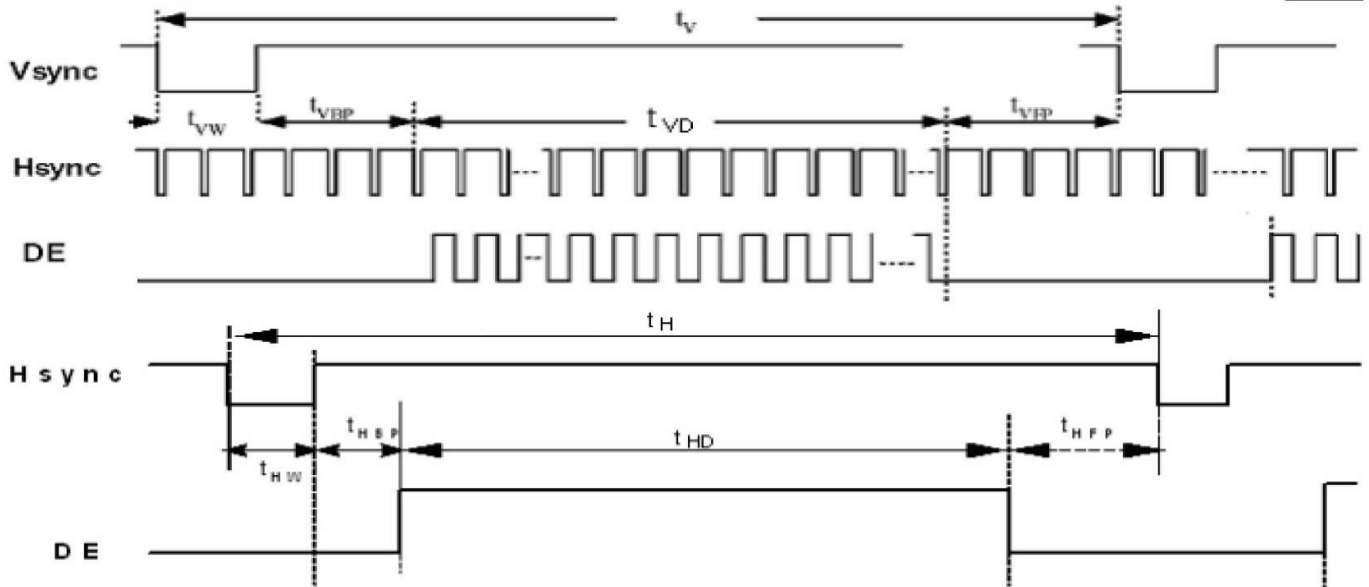
### 6.2.1 AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	$R_{xVTH}$	-	-	+100	mV	$R_{xVCM}=1.2V$
LVDS Differential input low Threshold voltage	$R_{xVTL}$	-100	-	-	mV	
LVDS Differential input common mode voltage	$R_{xVCM}$	0.7	-	1.6	V	
LVDS Differential voltage	$ V_{ID} $	200	-	600	mV	

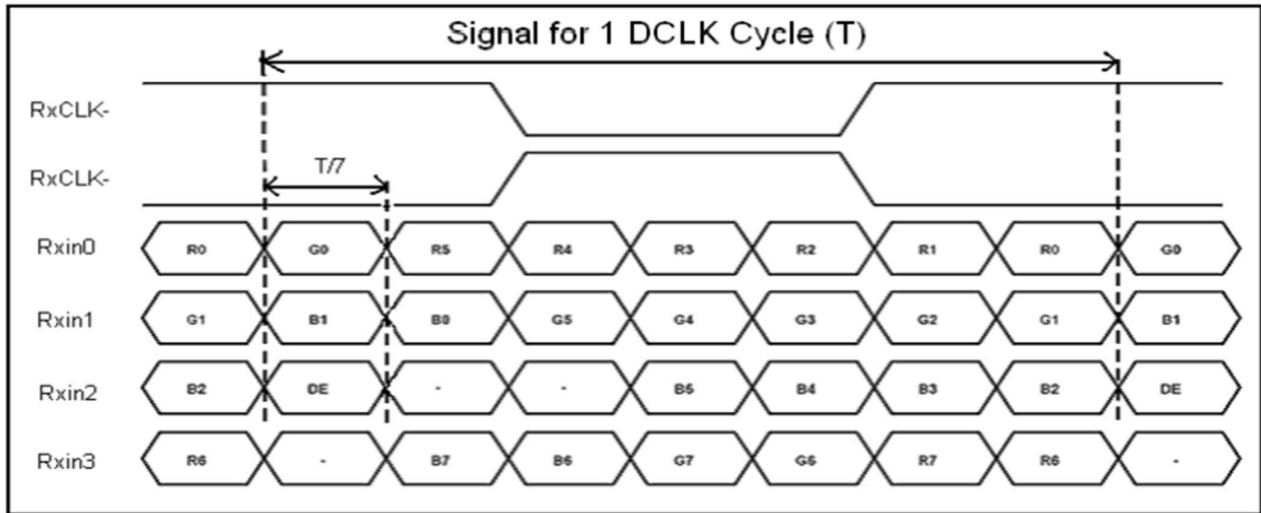


## 6.2.2 Timing Table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	(68.9)	71.1	(73.4)	MHz	Frame rate =60Hz
Horizontal display area	tHD	1280			Tc	
HS period time	tH	(1410)	1440	(1470)	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	(60)	160	(190)	Tc	
Vertical display area	tVD	800			tH	
VS period time	tV	(815)	823	(833)	tH	
VS Width +Back Porch +Front Porch	tVW+ tVBP +tVFP	(15)	23	(33)	tH	



### 6.2.3 LVDS Data Input Format



## 7. Backlight Characteristic

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	$V_L$	8.1	(8.8)	9.3	V	Note 1
Current for LED backlight	$I_L$	180	200	220	mA	
LED life time	-	15000		-	Hr	Note 2

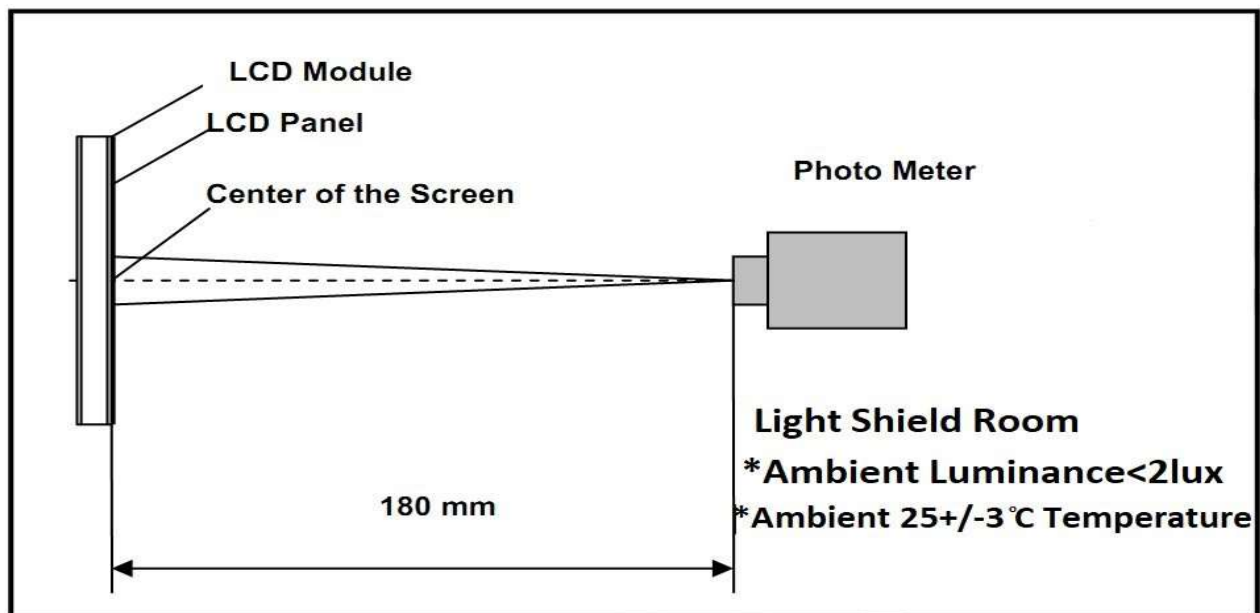
Note 1: The LED Supply Voltage is defined by the number of LED at  $T_a=25^{\circ}\text{C}$  and  $I_L=200\text{mA}$

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original Brightness at  $T_a=25^{\circ}\text{C}$  and  $I_L=200\text{mA}$ . The LED life time could be decreased if operating  $I_L$  is larger than 200mA

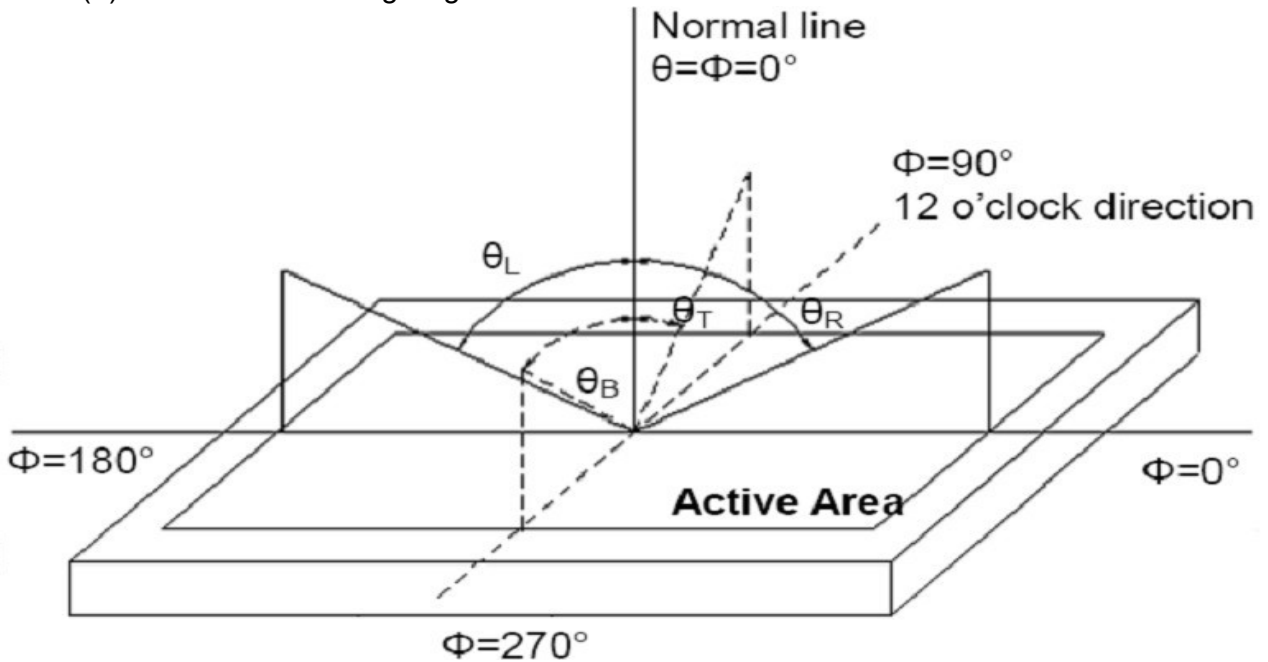
## 8. Optical Characteristics

Item	Conditions	Min.	Typ.	Max.	Unit	Note	
Viewing Angle (CR>10)	Horizontal	$\theta_L$	75	85	-	degree	(1),(2),(6)
		$\theta_R$	75	85	-		
	Vertical	$\theta_T$	75	85	-		
		$\theta_B$	75	85	-		
Contrast Ratio	Center	600	800	-	-	(1),(3),(6)	
LCM Luminance	Center point	300	350	-	Cd/m <sup>2</sup>		
Response Time	Rising	-	10	20	ms	(1),(4),(6)	
	Falling	-	15	30			
CF Color Chromaticity (CIE1931)	Red x	Typ. -0.05	0.5778	Typ. +0.05	-	(1), (6)	
	Red y		0.3362		-		
	Green x		0.3162		-		
	Green y		0.5920		-		
	Blue x		0.1495		-		
	Blue y		0.1120		-		
	White x		0.2858		-		
	White y		0.3351		-		
Luminance uniformity	Y <sub>U</sub>	75	80	-	%	(1)	

Note (1) Measurement Setup: The LCD module should be stabilized at given temp. 25°C for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.



Note (2) Definition of Viewing Angle



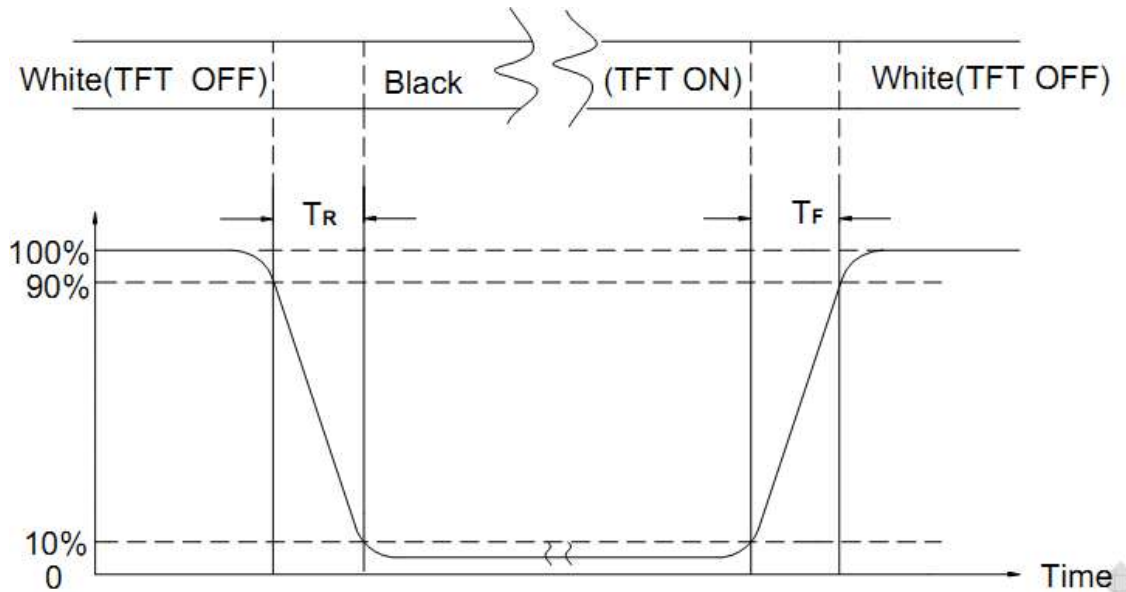
Note (3) Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

$L_{63}$ : Luminance of gray level 63,  $L_0$ : Luminance of gray level 0

Note (4) Definition of response time



Note (5) Definition of Transmittance (Module is without signal input)

$$\text{Transmittance} = \text{Center Luminance of LCD} / \text{Center Luminance of Back Light} \times 100\%$$

Note (6) Definition of color chromaticity (CIE1931)

Color coordinates measured at the center point of LCD

## 9. Reliability Test Conditions and Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	80°C±2°C×200Hours	Inspection after 2~4hours storage at room temperature, the samples should be free from defects: 1, Air bubble in the LCD. 2, Seal leak. 3, Non-display. 4, Missing segments. 5, Glass crack. 6, Current IDD is twice higher than initial value. 7, The surface shall be free from damage. 8, The electric characteristic requirements shall be satisfied.
②	Low Temperature Storage	-30°C±2°C×200Hours	
③	High Temperature Operating	70°C±2°C×120Hours	
④	Low Temperature Operating	-20°C±2°C×120Hours	
⑤	Temperature Cycle(Storage)	-20°C ↔ 25°C ↔ 70°C (30min) ← (5min) → (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50°C±5°C×90%RH×120Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (packing condition test will be tested by a carton)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (packing condition test will be tested by a carton)	
⑨	ESD Test	Voltage:±8KV,R:330Ω,C:150PF,Air Mode,10times	

10. Display Label

