深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.：TST092MMDL-04

Version：V1.0

☐ APPROVAL FOR SPECIFICATION   ☐ APPROVAL FOR SAMPLE

For Customer's Acceptance：	
Approved by	Comment

Team Source Display：		
Presented by	Reviewed by	Organized by

Version No.	Date	Content	Remark
V1.0	2018-1-10	Initial Release	

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(1). General Feature

Item	Specification	Unit
Module Outline Dimension	239.63X70.3X6.20	mm
Active Screen Size(diagonal)	9.2	Inch
Active Area	226.56X56.64	mm
Resolution	1280RGB X 320	dot
Pixel Size	0.059X0.177	mm
Pixel Arrangement	R.G.B Vertical Stripe	/
Pixel Driving Element	a-Si	/
Viewing Direction	ALL	/
Gray Scale Inversion Direction	ALL	/
Weight (gram)	146	g
Suggested Driver IC	EK79202	/

(2). Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Conditions
Logic Supply Voltage	VDD	2.3	3.6	V	TA=25℃
Backlight input voltage	LEDA	28.0	34.0	V	
Operating Temperature	TOP	-30	80	℃	
Operating Humidity	HOP	-	90	%RH	
Storage Temperature	TST	-30	85	℃	
Storage Humidity	HST	-	90	%RH	

Note: The module may be destroyed and not be recovered while the absolute maximum rating values of this product have been exceeded

(3). Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is F62240-H1210B manufactured by Vigorconn.

Pin No.	Symbol	Description	Remarks
1	NC	Not connect	
2-3	VDD	Power supply 3.3V	
4	NC	Not connect	
5	RESET	Global reset pin.	Note 1
6	NC	Not connect	
7	GND	Ground	
8	R0-	LVDS differential data input	
9	R0+	LVDS differential data input	
10	GND	Ground	
11	R1-	LVDS differential data input	
12	R1+	LVDS differential data input	
13	GND	Ground	
14	R2-	LVDS differential data input	
15	R2+	LVDS differential data input	
16	GND	Ground	
17	CLK-	LVDS differential data input	
18	CLK+	LVDS differential data input	
19	GND	Ground	
20	R3-	LVDS differential data input	
21	R3+	LVDS differential data input	
22	GND	Ground	
23-24	NC	Not connect	
25	GND	Ground	
26-27	NC	Not connect	
28	LVFMT	VESA modes(H) ЈEIDA modes(L)	
29	NC	Not connect	
30	GND	Ground	
31-32	NC	Not connect	
33-38	NC	Not connect	
39-40	NC	Not connect	

Note 1.

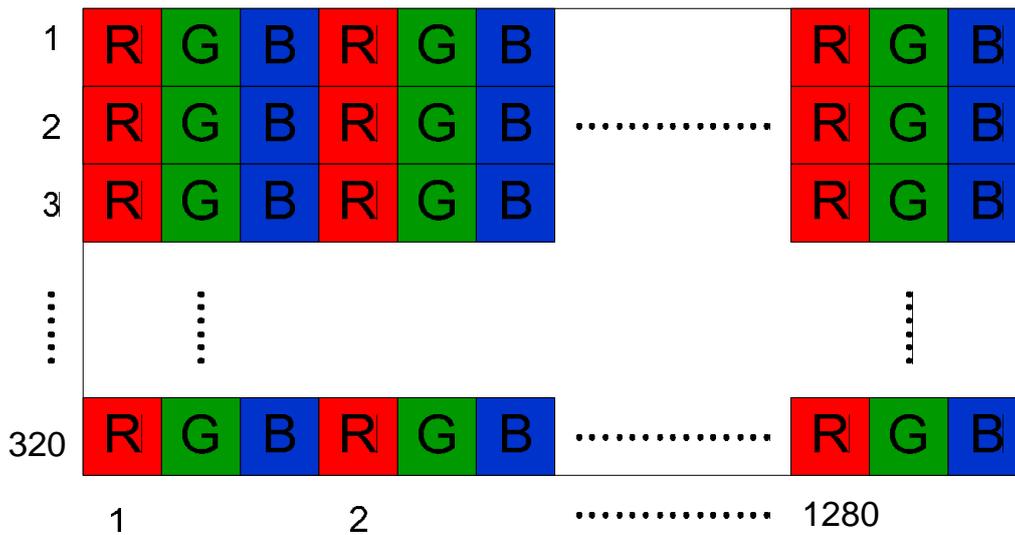| RESETB	Function
H	Normal operation
L	The controller is in reset state

Suggest to connecting with an RC reset circuit for stability.

(4). Function Block Diagram
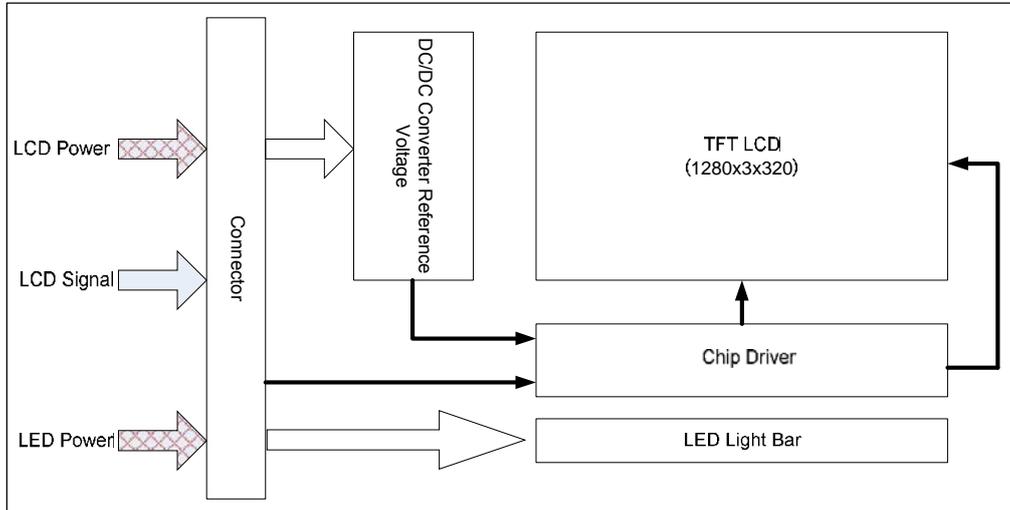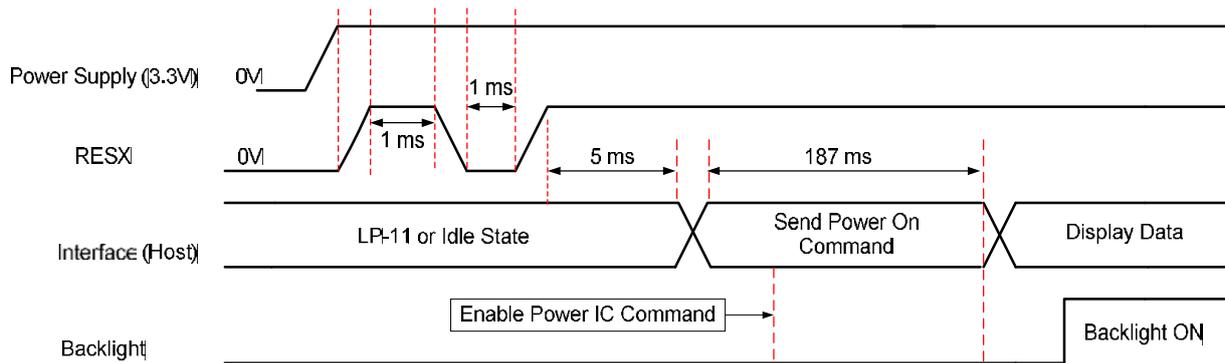

Pixel Format

:

(5). Operation Specification

5.1 General Input Condition

(T_A=25℃)

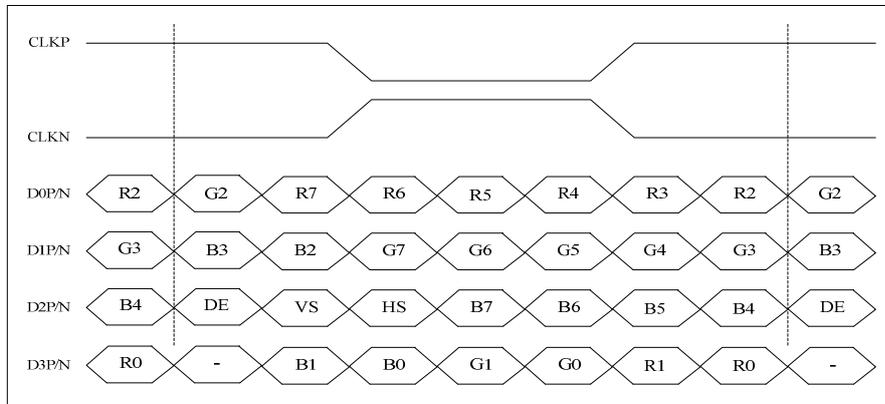| Item	Symbol	Values				Conditions
		Min.	Typ.	Max.	Unit	
Power supply voltage	V_{DD}	2.3	3.3	3.6	V	GND=0V
Backlight power voltage	LED+	28.0	32.0	34.0	V	
Power supply current	I_{VDD}	-	200	-	mA	VDD=3.3V
Backlight supply current	I_{LED}	-	360	-	mA	

5.2 Power Sequence

*Power on:

*Power off:
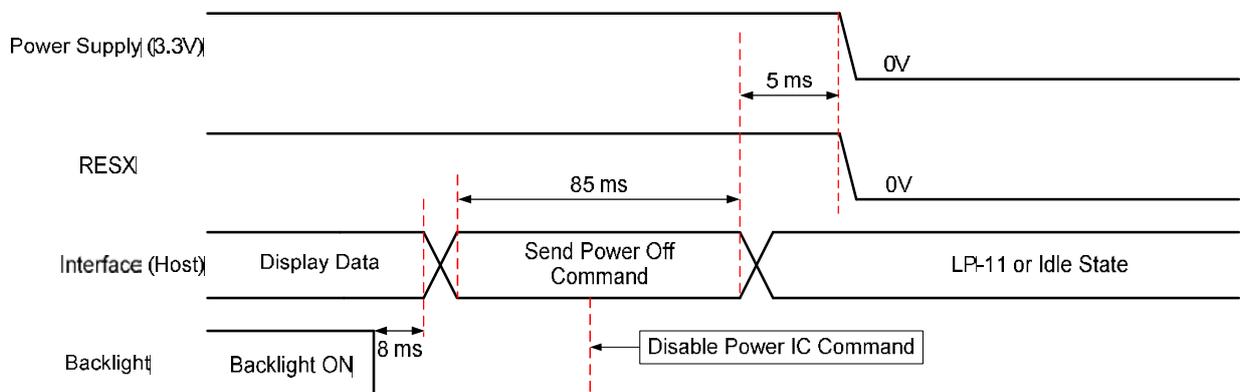
5.3 Input Data Characteristics

Data Mapping for JEIDA Format

LVDS DC electrical characteristics

(VDD=VDDIO=VDDIF=2.3 to 3.6V, VSS=VSSA=VSS_IF=0V, TA=-20 to +85℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	R_{XVTH}	+0.1	0.2	0.3	V	R_{XVCM}=1.2V
Differential input low threshold voltage	R_{XVTL}	-0.3	-0.2	-0.1	V	
Input voltage range (singled-end)	R_{XVIN}	0.7	-	1.7	V	
Differential input common mode voltage	R_{XVCM}	1	1.2	1.4	V	$|V_{ID}|$=0.2
Differential input impedance	Z_{ID}	80	100	125	ohm	
Differential input voltage	$|V_{ID}|$	0.2	-	0.6	V	
Differential input leakage current	I_{LCLVDS}	-10	-	+10	uA	
LVDS Digital Operating Current	I_{VDD}	-	15	20	mA	F_{DCLK}=80MHz,VDD=3.3V, Input pattern: 55h->Aah->55h->Aah
LVDS Digital Stand-by Current	I_{ST}	-	-	250	uA	Clock & all Functions are stopped

Single-end Signals
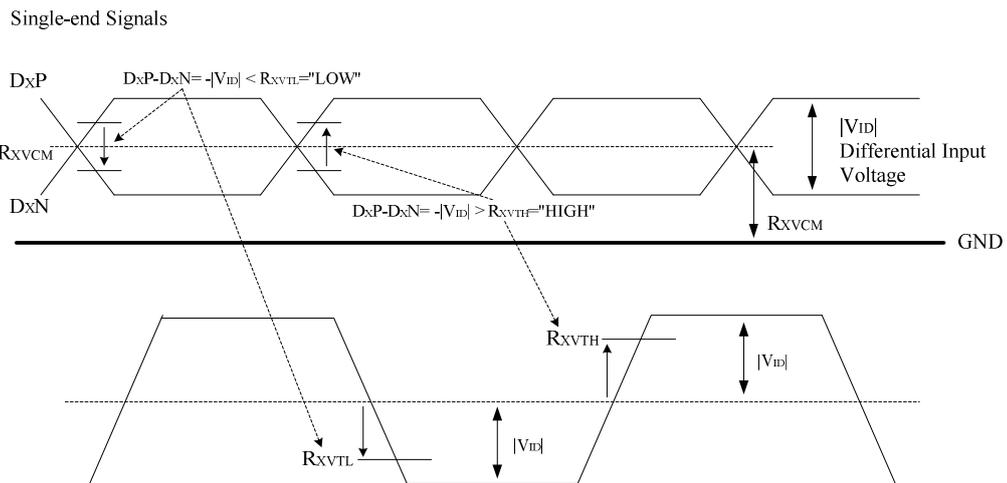
LVDS mode AC electrical characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	R_{xFCLK}	30	-	TBD	MHz	Refer to input timing table for each display resolution
Input data skew margin	T_{RSKM}	500	-	-	ps	|VID| = 200mV RxVCM = 1.2V RxFCLK = 81MHz
Clock high time	T_{LVCH}	-	4/(7* R_{xFCLK})	-	ns	
Clock low time	T_{LVCL}	-	3/(7* R_{xFCLK})	-	ns	
PLL wake-up time	T_{enPLL}	-	-	150	us	
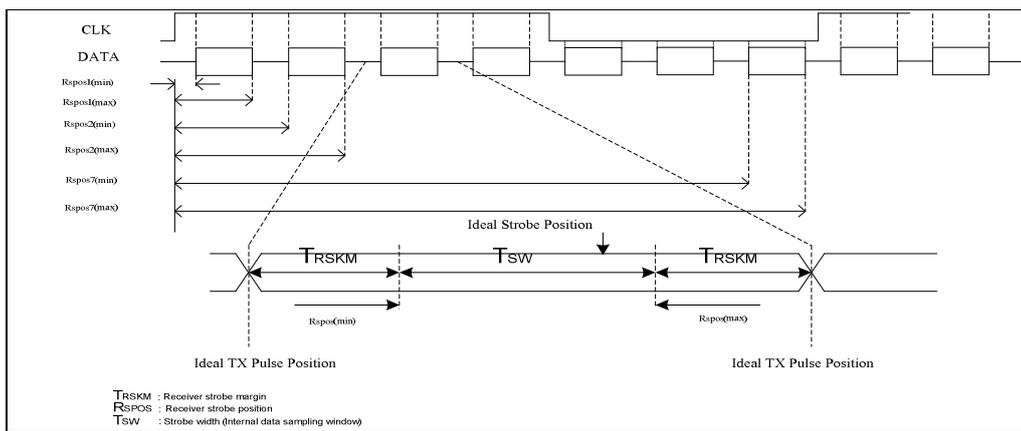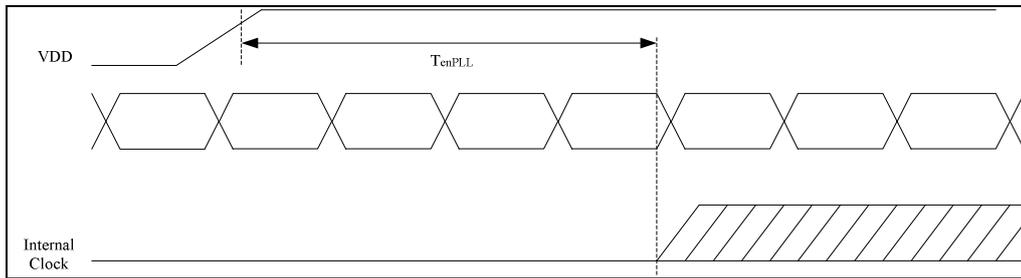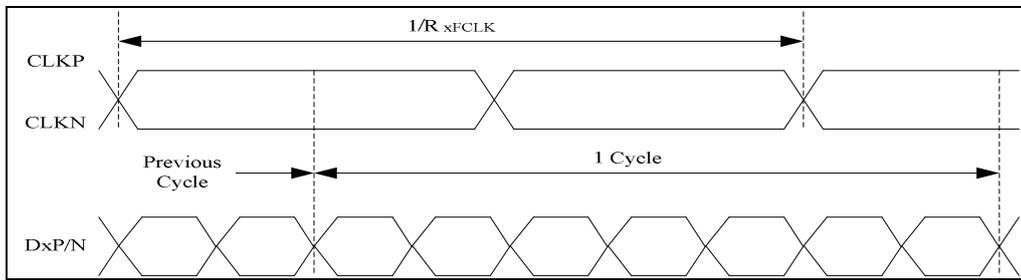
*Data Mapping

|	INPUT DATA	R7 MSB	R6	R5	R4	R3	R2	R1	R0 LSB	G7 MSB	G6	G5	G4	G3	G2	G1	G0 LSB	B7 MSB	B6	B5	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(254	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

5.4 Timing requirements for RESET

When RESETB of the reset pin equals to Low, it will be in the condition of reset.
When it is in the condition of reset, it will make the device recover the initial set.

However, in order to avoid the reset noise cause reset, there is a mechanism to judge about whether the reset is needed or not.

The closed interval of Low can be shown as the following.

(Test condition: VDDIO=2.3V~3.6V, VSS=0V, T$_A$=-20 ~+85)

Parameter	Symbol	Conditions	Spec.			Unit
			Min.	Typ.	Max	
Reset low pulse width	Trst		20	-	-	µs
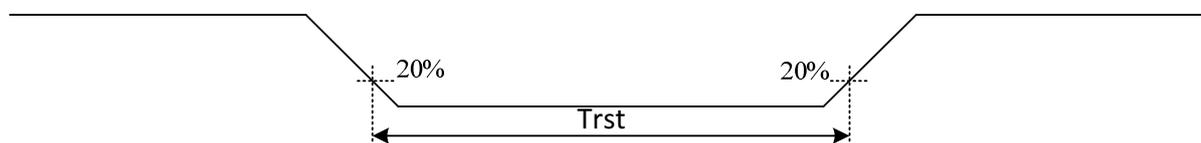
5.5 Back-Light Unit

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED backlight	LEDA	28.0	32.0	34.0	V	Note 1
Current for LED backlight	I$_{LED}$	---	360	---	mA	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I$_{LED}$ =360mA.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I$_{LED}$ =360mA. The LED lifetime could be decreased if operating I$_{LED}$ is lager than 360mA.

5.6 Input Signal Timing

Parameter		Symbol	Value			Unit
			Min.	Typ.	Max.	
DCLK frequency @Frame rate=60Hz (LVDS)		F_{DCLK}	66.3	72.4	78.9	MHz
HSYNC period time		T_H	1380	1460	1500	DCLK
Horizontal display area		T_{HD}		1280		DCLK
HSYNC pulse width	Min.	T_{HPW}		2		
	Typ.			20		
	Max.			40		
HSYNC back porch(with pulse width)		T_{HBP}	80	80	80	DCLK
HSYNC front porch		T_{HFP}	12	80	148	DCLK
VSYNC period time		T_V	346	360	374	H
Vertical display area		T_{VD}		320		H
VSYNC pulse width	Min.	T_{VPW}		2		H
	Typ.			2		H
	Max.			20		
VSYNC back porch(with pulse width)		T_{VBP}	19	19	19	H
VSYNC front porch		T_{VFP}	1	19	37	H

Note : Blanking setting must be even numbers.

(6). Optical Specification

Item	Symbol	Values			Unit	Conditions
		Min.	Typ.	Max.		
View angle(CR≥10)	θL	80.0	85.0	-	degree	Note 1
	θR	80.0	85.0	-		
	θT	80.0	85.0	-		
	θB	80.0	85.0	-		
Response time	$T_{on} + T_{off}$	-	30	35	ms	Note 1
Contrast ratio	CR	800	1000	-		
Color chromaticity	Wx	0.274	0.314	0.354		
	Wy	0.284	0.324	0.364		
Luminance	L	3000	3500	-	cd/m²	BL=300mA
Luminance uniformity	YU	75	-	-	%	Note 2
Response time	$T_{on} + T_{off}$	-	450	-	ms	-30℃

Note 1:
*View angle definition
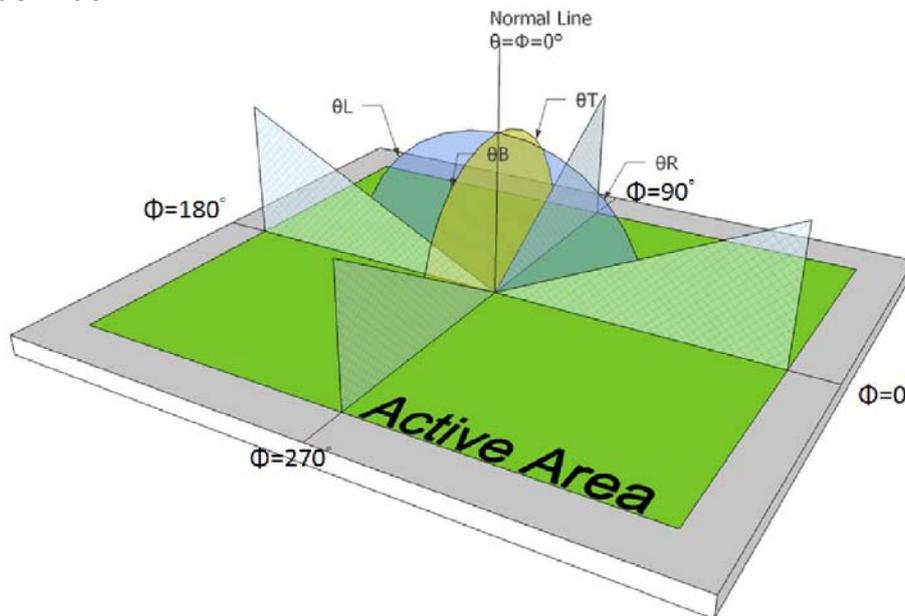
*Measurement system
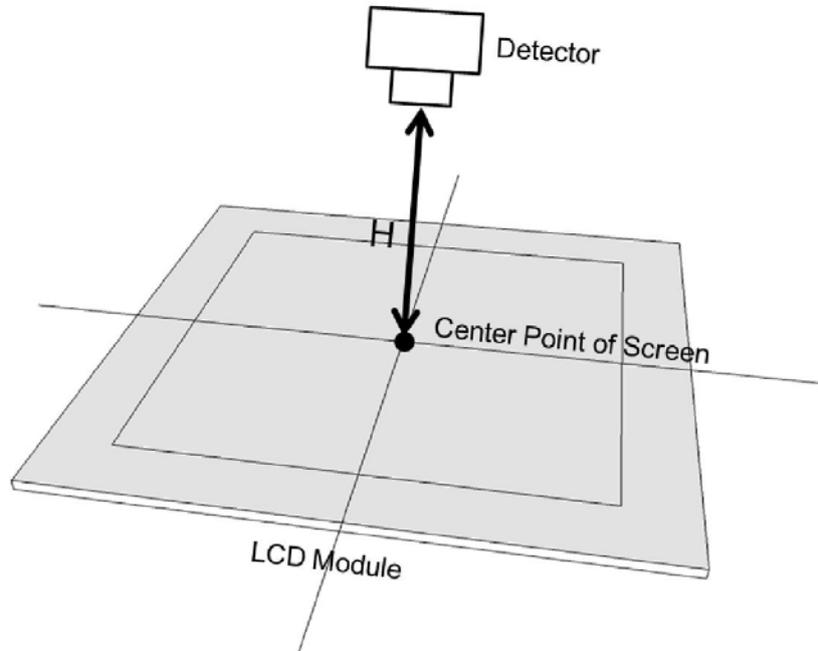
The module should be measured in dark room after 30 minutes operation and focus on center point of the LCD.

(1)Luminance: Detector:BM-5A, H:500mm
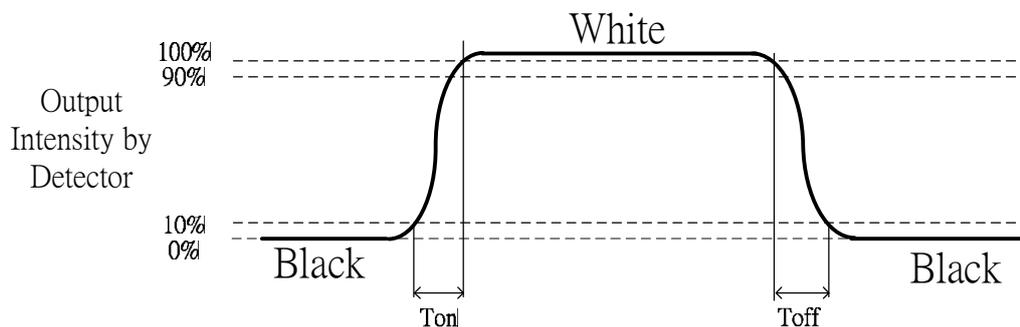
(2)Response time: Detector: BM-7
T_{on}: time between intensity 10% to 90%
T_{off}: time between intensity 90% to 10%

Note 2:
*Lum. Uniformity Definition
Measure the Lum. of gray level 63 at 9 points
YU = (Min. brightness of point 1~9/Max. brightness of point 1~9)*100%
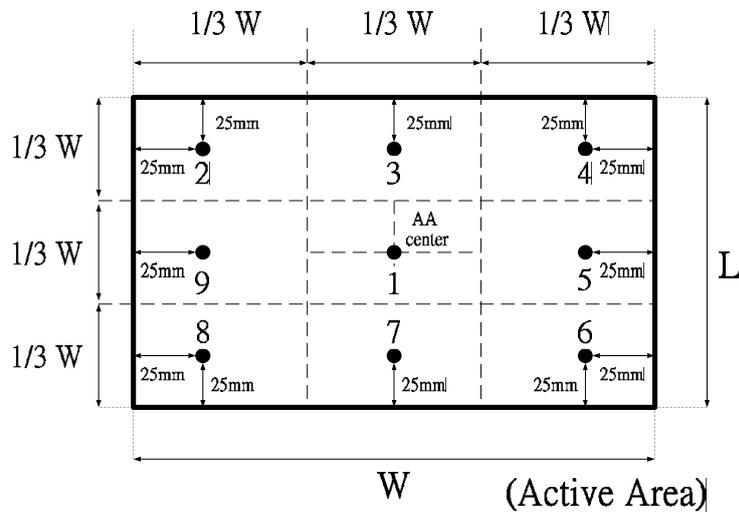
(7). Reliability Test Items

Item	Condition
High Temperature Storage	85℃ 240hrs
Low Temperature Storage	-30℃ 240hrs
High Temperature Operation	80℃ 240hrs BL ILED<200mA
Low Temperature Operation	-30℃ 240hrs
Operation High Temperature/Humidity	+60℃, 90%RH 96 hrs
Thermal Shock(Storage)	-30℃/30 min ~ +80℃/30 min ,100 cycles
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)
Mechanical Shock	100G, 6ms,±X, ±Y, ±Z 3 times for each direction
Package Vibration Test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 2 hours for each direction of X. Y. Z. (6 hours for total)
Package Drop Test	Height:80 cm 1 corner, 3 edges, 6 surfaces
Electro Static Discharge	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV Class B(EN 61000-4-2)

8).Outline Dimension

NOTES:
1.DISPLAY TYPE: TFT-LCD, TRANSMISSIVE, NORMAL BLACK
2.OPERATING TEMP: -30°C~80°C
3.STORAGE TEMP: -30°C~85°C
4.VIEWING DIRECTION: ALL
5.BACK LIGHT:
  VF:28 V(Min);32V(Typ);34V(Max); IF:360mA(Typ).
6.Luminous instensity:
  Module:3000cd/m²(Min),3500cd/m²(Typ).
7.GENERAL TOLERANCE: ±0.2

NTC 电路图

LED 电路图

REV	DESCRIPTION	DATE
0	First issue	

Detail A Scale 4:1

正面

背面

PIN1   PIN10

40

4.1(PI补强粘合区域)

6(PI补强不粘合区域)

*238.63±0.20
(226.56)AA
*233.47 (LCD)
(2.58)
(6.04)

(8.71)
(1.11)
(56.64)AA
*66.34 (LCD)
*69.50±0.20

*6.20±0.20
(8.55含元器件高度)

42.56
33.42
173.99
116.3
29.71
18.58
64.24

*0.3±0.03
*2.5±0.20
*0.5±0.07
*4.5±0.03
*5.5±0.05
0.2±0.10

BL	PIN	
1	LED+	
2	LED+	
3	NC	
4	NC	
5	LED-	
6	LED-	
7	LED-	
8	LED-	
9	NTC+	
10	NTC-	

PIN	NAME	PIN	NAME
1	NC	21	R3+
2	VDD	22	GND
3	VDD	23	NC
4	NC	24	NC
5	RESET	25	GND
6	NC	26	NC
7	GND	27	LED_PWM(NC)
8	GND	28	LP/PWM
9	RO-	29	AVDD(NC)
10	GND	30	GND
11	R1-	31	NC
12	R1+	32	NC
13	GND	33	NC
14	R2-	34	NC
15	R2+	35	NC
16	GND	36	NC
17	CLK-	37	GND(NC)
18	CLK+	38	VGH(NC)
19	GND	39	NC
20	R3-	40	NC

NOTES:
1.DISPLAY TYPE: TFT-LCD, TRANSMISSIVE, NORMAL BLACK
2.OPERATING TEMP: -30℃~80℃
3.STORAGE TEMP: -30℃~85℃
4.VIEWING DIRECTION: ALL
5.BACK LIGHT:
　VF:28 V(Min);32V(Typ);34V(Max); IF:360mA(Typ)
6.Luminous instensity:
　Module:3000cd/m²(Min),3500 cd/m²(Typ).
7.GENERAL TOLERANCE: ±0.2

NTC 电路图

LED 电路图

正面

背面

Detail A Scale 4:1

PIN1
PIN10

(9).Package

TBD