深圳市拓普微科技开发有限公司
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LMT080DIEFWU-AAN

LCD Module User Manual

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Date: 2017-12-07	Date:	Date:

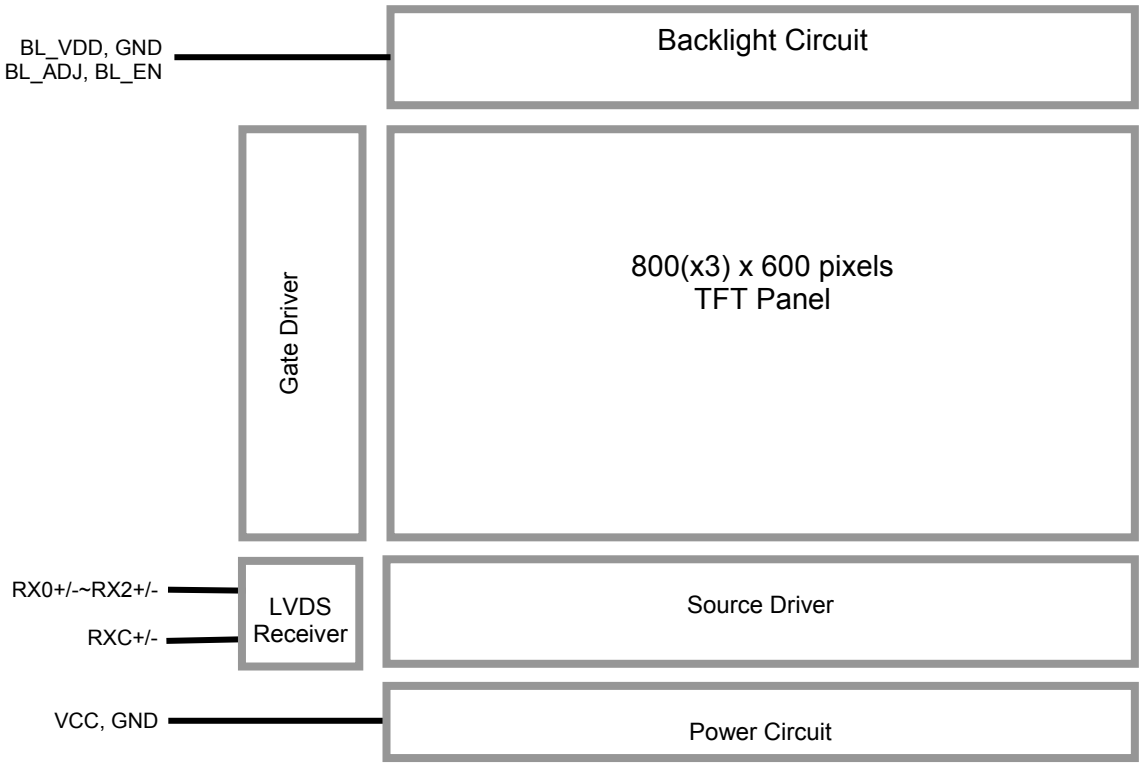
Rev.	Descriptions	Release Date
0.1	Preliminary release	2013-07-25
0.2	Typing correction on section 3.2	2013-08-03
0.3	Update K3 definition	2013-08-15
0.4	Update 6.3 Data Input Format , 7 Optical Characteristics	2017-08-08
0.5	Update section 1~3,5 and 6.1	2017-12-07

Table of Content

1. General Specification

Signal Interface :	LVDS (VESA 18 bit)
Display Technology :	a-Si TFT active matrix
Display Mode :	Transmissive / Normal White
Screen Size(Diagonal) :	8.0”
Outline Dimension :	196.0 x 143.9 x12.2 (mm) (see attached drawing for details)
Active Area :	162.0 x 121.5 (mm)
Number of dots :	800 x 3 (RGB) x 600
Pixel Pitch :	0.2025 x 0.2025 (mm)
Pixel Configuration :	RGB Stripe
Backlight :	LEDs
Surface Treatment :	Anti-Glare Surface
Viewing Direction :	6 o’clock(Gray scale Inversion)
Operating Temperature :	-20 ~ +70°C
Storage Temperature :	-30 ~ +80°C

2. Block Diagram



3. Terminal Function

3.1 LVDS Terminal (K2)

Pin No.	Pin Name	I/O	Descriptions
1	VCC	Power	Positive Power Supply (3.3V)
2	VCC	Power	Positive Power Supply (3.3V)
3	NC	-	NO connection
4	NC	-	NO connection
5	RX0-	Input	LVDS receiver negative signal channel 0
6	RX0+	Input	LVDS receiver positive signal channel 0
7	GND	Power	Power Supply GND (0V)
8	RX1-	Input	LVDS receiver negative signal channel 1
9	RX1+	Input	LVDS receiver positive signal channel 1
10	GND	Power	Power Supply GND (0V)
11	RX2-	Input	LVDS receiver negative signal channel 2
12	RX2+	Input	LVDS receiver positive signal channel 2
13	GND	Power	Power Supply GND (0V)
14	RXC-	Input	LVDS receiver negative signal clock
15	RXC+	Input	LVDS receiver positive signal clock
16	GND	Power	Power Supply GND (0V)
17	NC	-	NO connection
18	NC	-	NO connection
19	NC	-	NO connection
20	NC	-	NO connection

3.2 Backlight Input Terminal (K3)

Pin No.	Pin Name	I/O	Descriptions
1	GND	Power	Power Supply GND (0V)
2	GND		
3	BL_ADJ	Input	Backlight dimming control (*1, *2) PWM may be used to adjust the output brightness
4	BL_VDD	Power	Positive Power Supply(5V)
5	BL_VDD		
6	BL_EN	Input	Backlight driver enable (*1) BLON=Hi, Backlight Driving Booster enable BLON=Lo, Backlight Driving Booster disable

Note:
*1. With built in pull up resistor, it could leave open
*2. Recommended PWM Freq. = 3kHz (active high)

4. Absolute Maximum Ratings

Items	Symbol	Min.	TYP.	Max.	Unit	Condition
Power Supply Voltage	V_{CC}	-0.3	3.3	3.6	V	GND = 0V
Backlight Supply Voltage	BL_VDD	-0.3	5.0	6.0	V	GND = 0V
Operating Temperature	T_{OP}	-20	-	70	℃	No Condensation
Storage Temperature	T_{ST}	-30	-	80	℃	No Condensation

Cautions:
Any Stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

5. Electrical Characteristics

5.1 DC Characteristics

GND=0V, Vcc =3.3V, T_{OP} =25℃

Items	Symbol	MIN.	TYP.	MAX.	Unit	Applicable Pin
Operating Voltage	Vcc	3.0	3.3	3.6	V	Vcc
Operating Current	I_{Vcc}	180	200	350	mA	Vcc

5.2 LVDS Receiver DC Characteristics

GND=0V, Vcc =3.3V, T_{OP} =25℃

Items	Symbol	MIN.	TYP.	MAX.	Unit	Note
Differential Input High Threshold	V_{TH}	-	-	100	mV	V_{IC}=+1.2V
Differential Input Low Threshold	V_{TL}	-100	-	-	mV	RL=100Ω
Input Current	I_{IN}	-	-	+/-30	uA	V_{IN}=+2.4V/0V LVDS V_{cc}=3.6V

5.3 LED Backlight Circuit Characteristics

GND=0V, T_{OP}=25℃

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Note
Operating Voltage	BL_VDD	4.5	5.0	5.5	V	
Operating Current	I_{BL_VDD}	320	360	600	mA	
Input High Voltage	V_{IH}	3.0	-	BL_VDD	V	BL_ADJ,BL_EN
Input Low Voltage	V_{IL}	GND	-	0.3	V	BL_ADJ,BL_EN

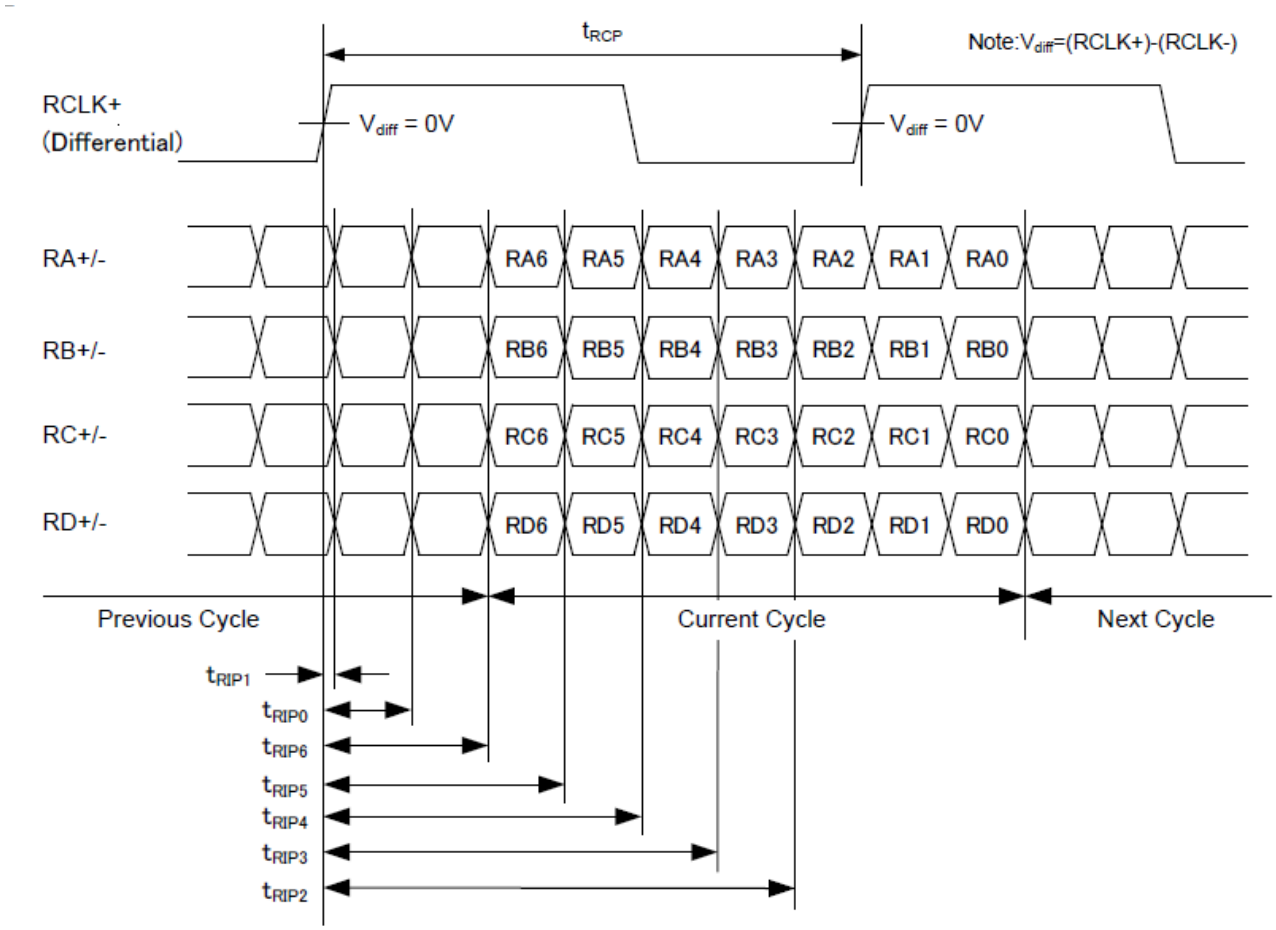
Cautions:
Exceeding the recommended driving current could cause substantial damage to the backlight and shorten its lifetime.
Note:
*1: BL_ADJ=Hi, BL_EN =Hi.
*2. Recommended BL_ADJ PWM Freq. is 3kHz.

6. AC Characteristics

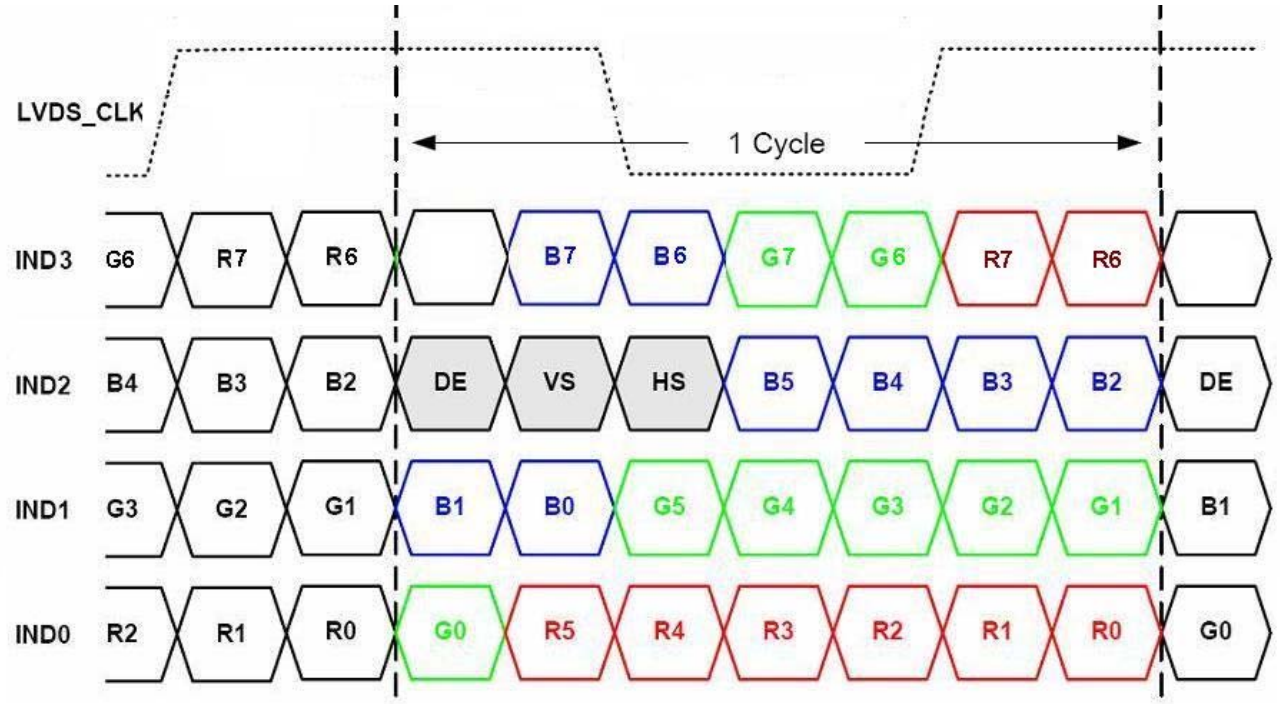
6.1 Timing Conditions

GND=0V, Vcc =3.3V, T_{OP} =25℃

Symbol	Parameter		MIN.	TYP.	MAX.	Unit
t_{RCP}	RCLK and CLKOUT Transition Time		8.92	T	125	ns
t_{SK}	LVDS Receiver Skew Margin	PCLK=65MHZ	-0.55	-	0.55	ns
		PCLK=112MHZ	-0.25	-	0.25	ns
t_{RIP1}	LVDS Input Data Position 0		$-t_{SK}$	0.0	$+t_{SK}$	ns
t_{RIP0}	LVDS Input Data Position 1		T/7-t_{SK}	T/7	T/7+t_{SK}	ns
t_{RIP6}	LVDS Input Data Position 2		2T/7-t_{SK}	2T/7	2T/7+t_{SK}	ns
t_{RIP5}	LVDS Input Data Position 3		3T/7-t_{SK}	3T/7	3T/7+t_{SK}	ns
t_{RIP4}	LVDS Input Data Position 4		4T/7-t_{SK}	4T/7	4T/7+t_{SK}	ns
t_{RIP3}	LVDS Input Data Position 5		5T/7-t_{SK}	5T/7	5T/7+t_{SK}	ns
t_{RIP2}	LVDS Input Data Position 6		6T/7-t_{SK}	6T/7	6T/7+t_{SK}	ns



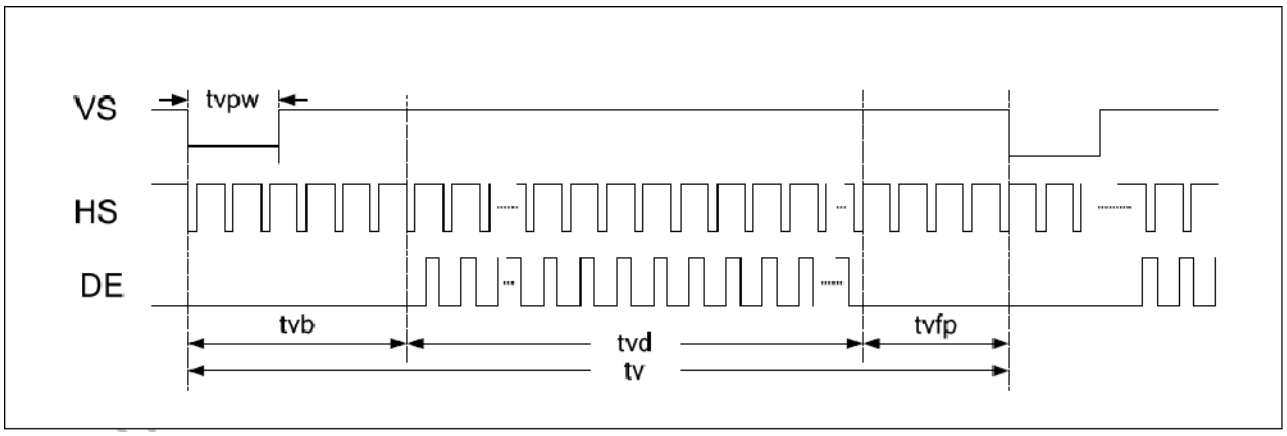
6.2 LVDS Timing Diagram



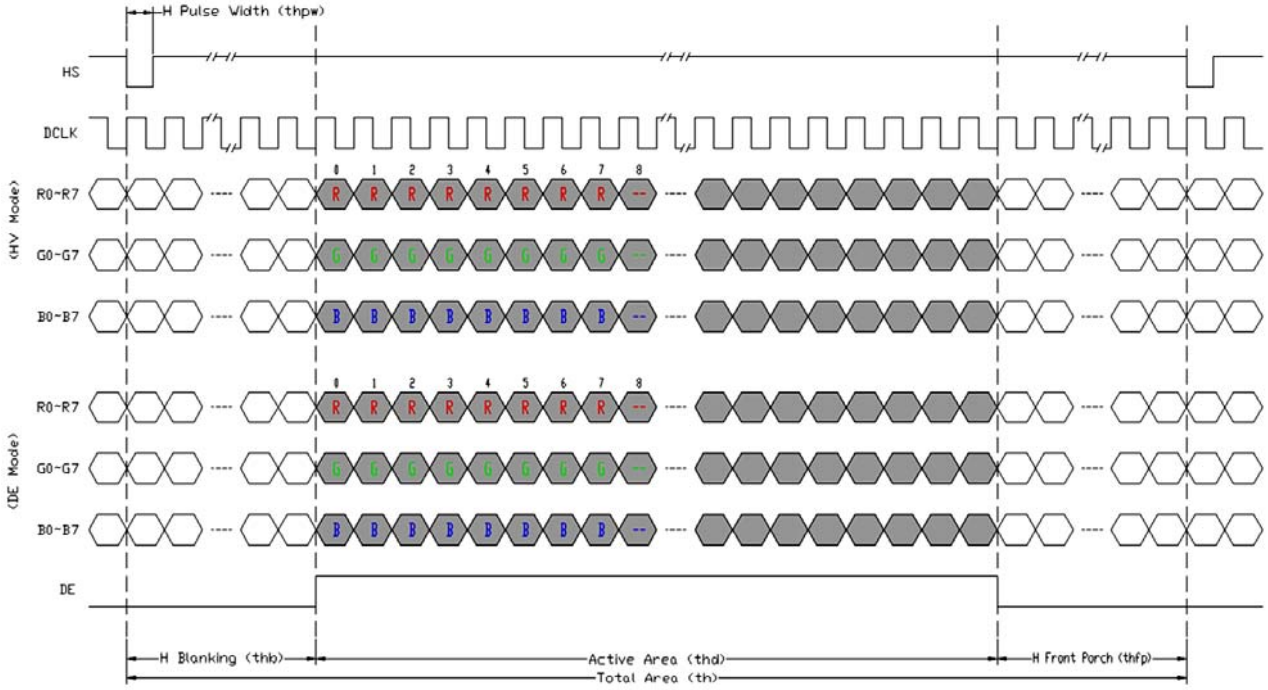
6.3 Data Input Format

Item	Symbol	MIN.	TYP.	MAX.	Unit	Remark
DCLK	Fclk	34.5	39.6	50.4	MHZ	
	tclk	-	25.3	-	ns	
HSD	th	900	1000	1200	tclk	
	thd	-	800	-	tclk	
	thpw	1	-	40	tclk	
	thb	-	88	-	tclk	
	thfp	12	112	312	tclk	
VSD	tv	640	660	700	th	
	tvd	-	600	-	th	
	tvpw	1	-	20	th	
	tvb	-	39	-	th	
	tvfp	1	21	61	th	

Note:
*1. LVDS signal should carry SYNC mode signals .



Vertical input timing Diagram



Horizontal input timing Diagram

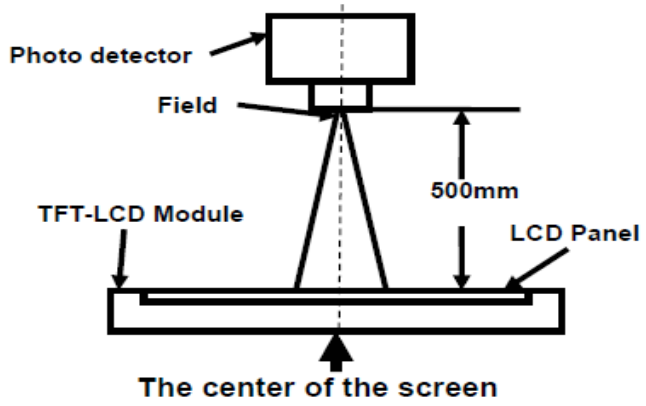
7. Optical Characteristics

Test Conditions:
1. The test systems refer to Note 1 and Note 2.

GND=0V, Vcc =3.3V, T_{OP} =25℃

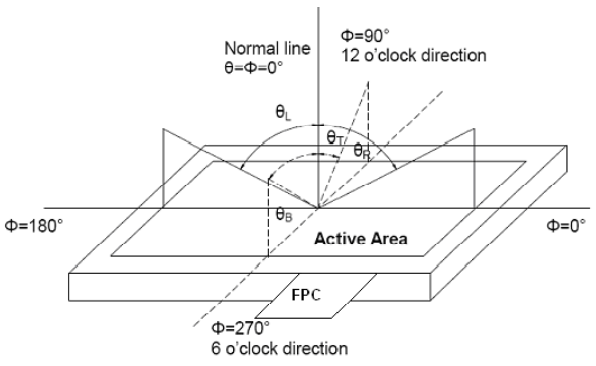
Item		Symbol	Condition	MIN.	TYP.	MAX.	UNIT	Note.
Viewing angle (CR≥10)		θ_L	9 o'clock	60	70	-	degree	Note 2
		θ_R	3 o'clock	60	70	-		
		θ_T	12 o'clock	50	60	-		
		θ_B	6 o'clock	60	70	-		
Response Time		T_f	25℃	-	25	30	msec	Note 1 Note 4
		T_r					msec	
Contrast ratio		CR	θ=0°	600	800	-	-	Note 1,3
Color chromaticlty	White	X	Backlight is on	0.253	0.303	0.353		Note 1 Note 5
		Y		0.257	0.307	0.357		
	Red	X		0.525	0.575	0.625		
		Y		0.296	0.346	0.396		
	Green	X		0.298	0.348	0.398		
		Y		0.527	0.577	0.627		
	Blue	X		0.101	0.151	0.201		
		Y		0.031	0.081	0.131		
Luminance		L		200	250	-	cd/m^2	Note 1,6
Luminance uniformity		Y_U		70	75	-	%	Note 1,7

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. All input terminals LCD panel must be ground when measuring the center area of the panel.



Item	Photo detector	Field
Contrast Ratio	BM-5A	1°
Luminance		
Lum Uniformity		
Chromaticity	SR-3A	
Response Time	TRD100	-

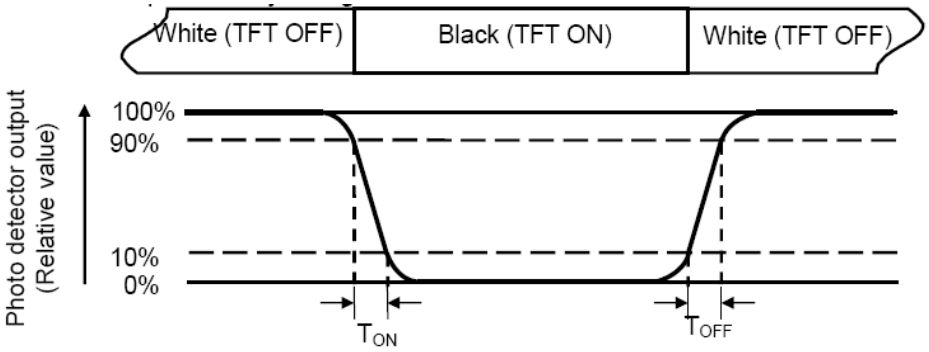
Note 2: Definition of viewing angle range



Note 3: Definition of contrast ratio

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

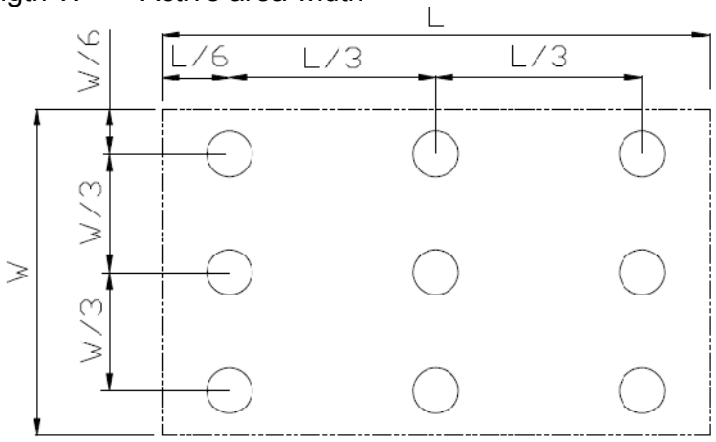
Note 4: Definition of Response time
The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



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 (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax
L-------Active area length W----- Active area width



Lmax: The measured Maximum luminance of all measurement position.
Lmin: The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

8. Precautions of using LCD Modules

Mounting

- Mounting must use holes arranged in four corners or four sides.
- The mounting structure so provide even force on to LCD module. Uneven force (ex. Twisted stress) should not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- It is suggested to attach a transparent protective plate to the surface in order to protect the polarizer. It should have sufficient strength in order to the resist external force.
- The housing should adopt radiation structure to satisfy the temperature specification.
- Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. Never rub with dust clothes with chemical treatment. Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics deteriorate the polarizer.)
- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer

Operating

- The spike noise causes the mis-operation of circuits. It should be within the ±200mV level (Over and under shoot voltage)
- Response time depends on the temperature.(In lower temperature, it becomes longer.)
- Brightness depends on the temperature. (In lower temperature, it becomes lower.) And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
- Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- When fixed patterns are displayed for a long time, remnant image is likely to occur.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference

Electrostatic Discharge Control

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

Strong Light Exposure

Strong light exposure causes degradation of polarizer and color filter.

Storage

When storing modules as spares for a long time, the following precautions are necessary.

- Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
- The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

Protection Film

- When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
- The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt tore main on the polarizer. Please carefully peel off the protection film without rubbing it against the polarizer.
- When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.
- You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

Transportation

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