PRODUCT SPECIFICATION

CONTENTS

1.0 COMPOSITION

Display type: [320 (RGB) × 240 Dots, TFT-LCD Module]

View Direction: [12 O'clock]

Backlight :   [LED B/L White]

Driver IC: [S1D19122]

2.0 MECHANICAL SPECIFICATIONS

ITEM	STANDARD VALUES	UNITS
LCD type	2.5" TFT-LCD	
Pixel arrangement	320 (H) RGB × 240(V)	pixels
Display Color	65K	color
Module size	57.1(H)*62.83(V)*3.9(D)	mm
Active area	50.88 (H) *36.72 (V)	mm
Pixel pitch	0.053(H) mm x 0.153(V)mm	mm
Viewing direction	12	O'clock

3.0 DIMENSIONAL DIAGRAM

NOTES:
1.DISPLAY TYPE: TFT-LCD, TRANSMISSIVE, NORMAL WHITE
2.OPERATING TEMP: -20°C~70°C
3.STORAGE TEMP: -30°C~80°C
4.LCD DRIVER: S1D19122
5.VIEWING DIRECTION: 6 O'CLOCK
6.Backlight: WHITE LED 4-CHIP
7.GENERAL TOLERANCE: ±0.2

PRODUCT SPECIFICATION

4.0 LCM OPTICAL CHARACTERISTICS

ITEM			SYMBOL		CONDITIONS	MIN	TYP	MAX	UNITS
Viewing Angle	Hor.	θL			C/R ≧ 10 B/L On	-	45	-	Deg
		θR				-	45	-	
	Her.	φH				-	35	-	
		φL				-	15	-	
NTSC					60				%
Contrast Ratio			C/R			300	350	-	-
Transmittance			T%				6.5		%
Response Time	Rising: T$_R$		T$_R$+ T$_F$			-	25	40	ms
	Falling: T$_F$								
Color Chromaticity	White		x		φ = 0 θ = 0° Normal Viewing Angle B/L On	0.282	0.292	0.302	—
			y			0.318	0.328	0.338	
	Red		x			0.602	0.612	0.622	
			y			0.325	0.335	0.345	
	Green		x			0.302	0.312	0.322	
			y			0.600	0.605	0.610	
	Blue		x			0.135	0.140	0.145	
			y			0.063	0.068	0.071	
Luminance uniformity			£ WHITE			-	82.5	-	%
Surface Luminance			Lv			-	200	-	cd/m^2

PRODUCT SPECIFICATION

4.1   Contrast ratio Cr

Brightness

B_{ns}

B_s

Brightness of non-selected dot

Brightness of selected dot

Driving Voltage
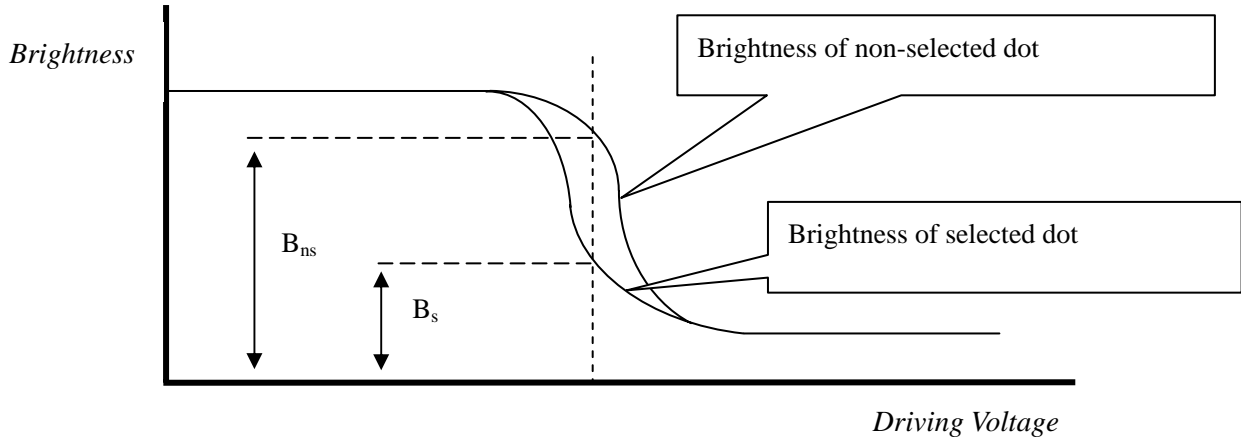
$$\text{Contrast Ratio: } C_r = B_{ns}/ B_s$$

4.2 Response times T_R and T_F

*Note (1)   Definition of Contrast Ratio (CR):

   The contrast ratio can be calculated by the following expression.
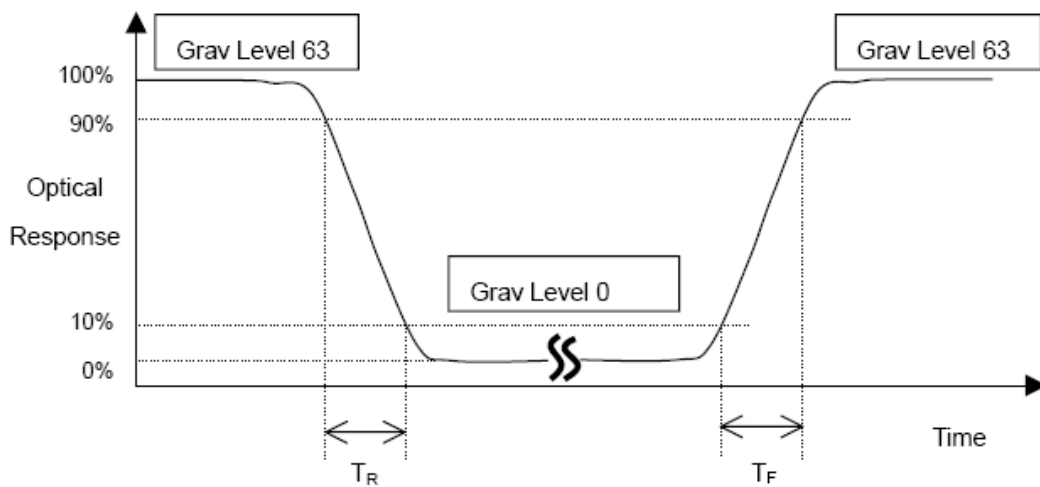
   Contrast Ratio (CR) = L63 / L0

   L63: Luminance of gray level 63
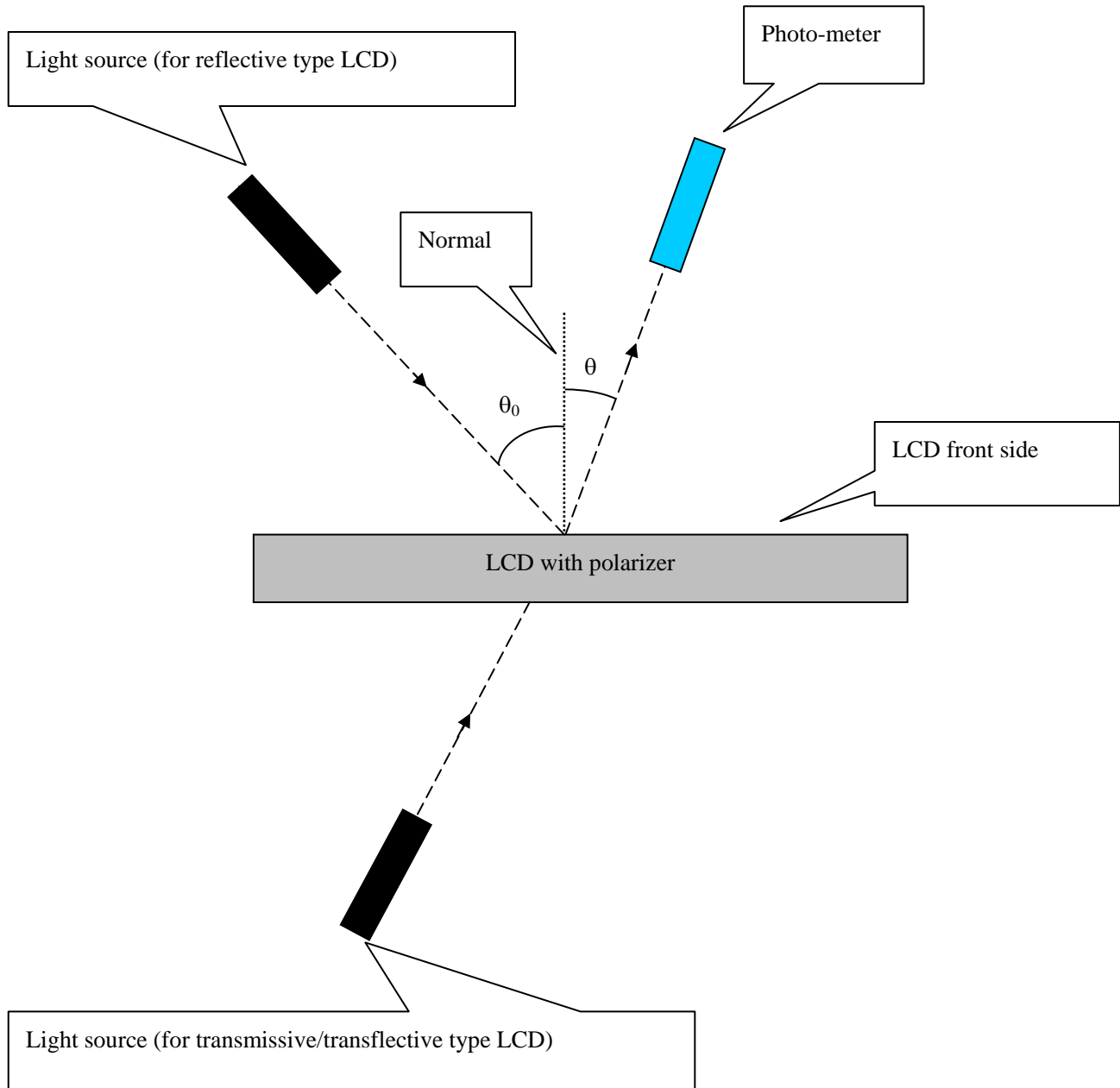
   L 0: Luminance of gray level 0

   CR = CR (10)

   CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

*Note (2)   Definition of Response Time (T_R, T_F):

Grav Level 63

100%

90%

Optical
Response

Grav Level 0

10%

0%

Grav Level 63

T_R

T_F

Time

PRODUCT SPECIFICATION

4.3 θ and φ

PRODUCT SPECIFICATION

4.4   Optical measurement system

Light source (for reflective type LCD)

Photo-meter

Normal

θ

θ$_0$

LCD front side

LCD with polarizer

Light source (for transmissive/transflective type LCD)

PRODUCT SPECIFICATION

5.0 ELECTRICAL SPECIFICATIONS

5.1 TFT-LCD Module Characteristics

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Power-supply Voltage	V_{DD}	T_a = 25 °C	2.50	2.80	3.3	
DC/DC Super Voltage	V_{CI}	T_a = 25 °C	2.50	2.80	3.3	V
Input Voltage	V_{IH}	H level	$0.8 \times V_{DD}$	—	V_{DD}	
	V_{IL}	L level	V_{SS}	—	$0.2 \times V_{DD}$	
Supply Current For Logic	I_{DD}	V_{DD}= 3.3V	—	5.0	—	mA
LCD Frame Frequency	FLM	—	—	60	—	Hz

5.2 Backlight Characteristics

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Forward voltage	VF		—	3.2	—	V
Uniformity	AVG	IF=80mA	83	—	—	%
Luminance	Lv		4200	—	—	Cd/m2

PRODUCT SPECIFICATION

6.0 TERMINAL FUNCTIONS

| Pin No	Symbol	Function
1	GND	Ground(0V)
2~3	VDD	Power supply for logic circuits(2.8V)
4	/CS	Chip select input pins Data / Instruction I/O is enabled only when /CS is "L".
5	RS	Command / Data select. "H" : Data; "L" : Command.
6	/WR	Write signal input pin,Active "L".
7	/RD	Read signal input pin, Active " L
8	/LCDRESET	Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied.
9~24	DBD0~ DBD15	Data0~ Data15 (Parallel interface 16bit for 80Series MPU)
25	ID	LCM-ID For Customer
26	Y-	Touch Panel Top Signal In Module
27	X-	Touch Panel Left Signal In Module
28	Y+	Touch Panel Bottom Signal In Module
29	X+	Touch Panel Right Signal In Module
30	LED-1	LED Cathode 1
31	LED-2	LED Cathode 2
32	LED-3	LED Cathode 3
33	LED-4	LED Cathode 4
34	NC	DUMMY
35	LED-A	LED Anode
36	LED-A	LED Anode
37	GND	Ground(0V)

PRODUCT SPECIFICATION

7.0 BLOCK DIAGRAM

7.1 TFT-LCD Module (Interface Structure)
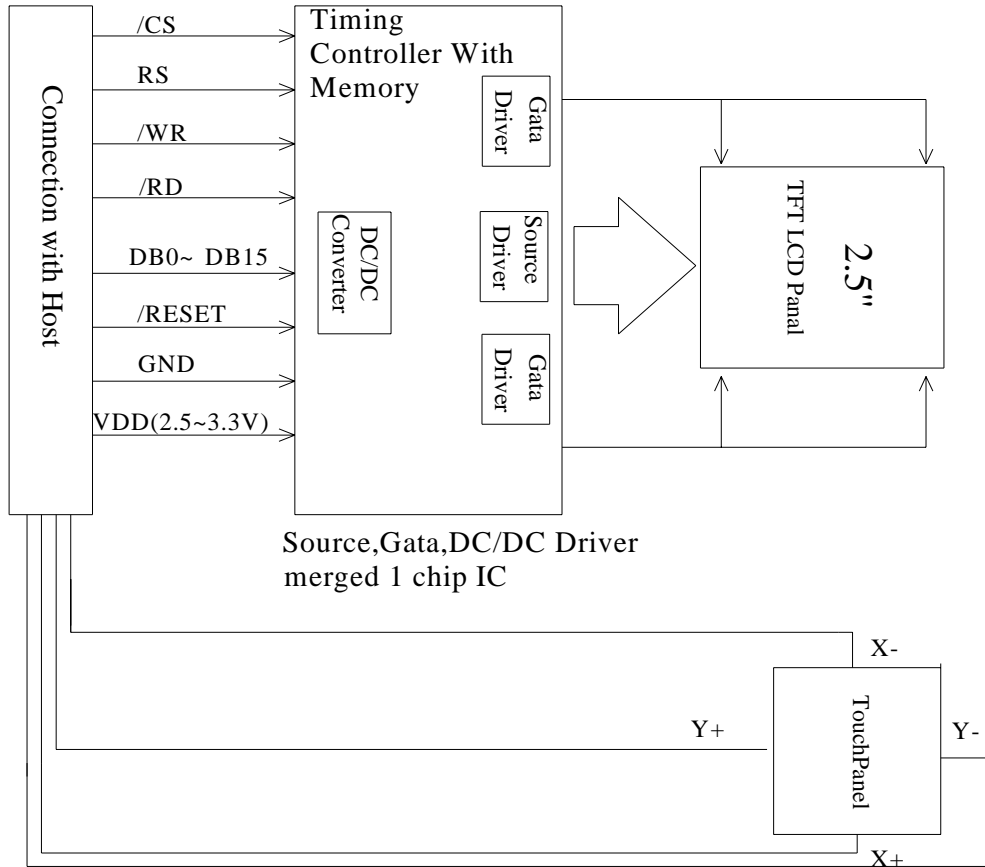
7.2 Back-light Unit
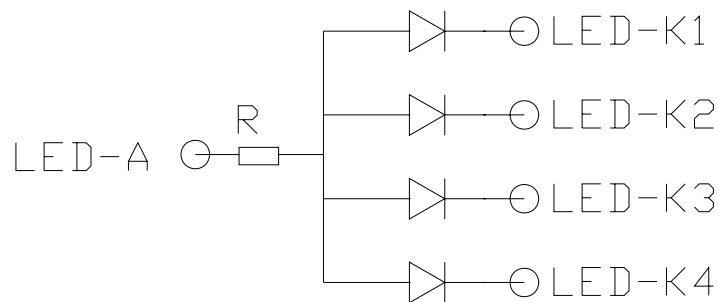
LED CIRCUIT DIAGRAM:

8.0 MAXIMUM ABSOLUTE VALUES

ITEM	SYMBOL	STANDARD	UNITS
Supply Voltage for Logic	V_{DD}	2.5 to 3.3	V
DC/DC Converter Power	V_{CI}	2.5 to 3.3	V
LCD Power Supply Voltage	V_{LCD}	0.3 to +25	
Operating temperature	T_{OP}	-20 to +70	℃
Storage temperature	T_{ST}	-30 to +80	

9.0 RELIABILITY

ITEM	CONDITIONS	CRITERIA
High temperature operation	70°C±2°C for120 hours	
Low temperature operation	-20 °C±2°C for 120 hours	
Damp Proof Test	50 °C±5°C, 90 % RH for 120 hours	
High temperature storage	80 °C±2°C for 200 hours	♦ No defect in cosmetic and operational functions.
Low temperature storage	-30 °C±2°C for 200 hours	
Temperature cycling	-20 °C±2°C (30 min) ↓↑ 25 °C±2°C (5 min) ↓↑ 70 °C±2°C (30 min) **CYCLES: 10**	♦ Total current consumption below double of initial value.
Vibration Test	Frequency: 10Hz ~55Hz~10Hz Amplitude: 1.5mm Each Direction (X, Y, Z): 3hours (Packing condition)	

10.0 PRECAUTIONS

10.1 Static charge

Since this LCD module contains CMOS LSIs that are sensitive to static charge, care must be taken when handling it.

10.2 Power on sequence

1. Input signals should not be applied to the LCD module before the logic system voltage has reached the specified voltage. If the above sequence is not kept the LCD module might be permanently damaged.
2. When connecting the power supply, connect the LCD bias voltage *after* connecting the logic system voltage.
3. When disconnecting the power supply, disconnect the logic system voltage *after* the LCD bias voltage.
4. It is recommended to connect a serial resistor   or fuse to the LCD bias power supply of the system, as a current limiter. The value of the resistor depends on the kind of LCD used, but is typically 50 ~ 100 Ω.

10.3 Operation

1. It is essential to drive the LCD within the specified voltage limits, since a higher driving voltage than allowed causes a shorter LCD lifetime. Under these circumstances, electrochemical reactions will result in undesirable deterioration of the LCD.
2. The response time of the LC fluid is considerably longer at low temperatures than in the normal operating temperature range. On the other hand, the LCD will show a dark blue color at high temperatures. Those phenomena do not indicate a malfunction or defect of the LCD. Back at normal temperatures, the LCD will return to its original behavior.
3. If the display area is pressed hard during operation, some abnormal display patterns might appear. However, the display will resume normal operation after turning the module off and on.
4. Moisture on the terminals could cause an electrochemical reaction resulting in an open terminal connection. If the environmental temperature is higher than 40℃, it is required that the relative humidity is 50% or less.

10.4 Packaging

1. Do not leave the product in a place of high humidity for a long period. For storage in a location where the temperature is 35℃ or higher, special care to protect the product from high humidity is required. A combination of high temperature and high humidity may cause polarization degradation and damage as well. Please keep the temperature and humidity within the specified range for storing.
2. Since LCD panels tend to be easily damaged, they should be handled with full care. Avoid any contact with materials that have a hardness of more than 2H.
3. Adhesives used for adhering upper/lower polarizers and aluminum plates are made of organic substances that will deteriorate by chemical reactions with for example chemicals such as acetone,

toluene, ethanol, and isopropylalcohol. Please prevent the use of these chemicals and contact us when it is necessary for you to use other chemicals.

4. Immediately wipe off saliva or water drops from the display area with an absorbent cotton cloth, without scrubbing it. If adhered for a long period, such particles might cause deformation or faded color.

5. Moisture deposited on the display surface and contact terminals due to low temperatures will be a cause for polarizer damage, stains, and dirt. Before use, such panels should be slowly warmed up to a temperature that is higher than room temperature.

6. Touching the display area and contact terminals with bare hands is harmful to polarizer and may lead to poor insulation at the terminals.

7. The glass is fragile and can be cracked or chipped easily by handling, in particular on near its edge. Please prevent sudden shocks or exposing the glass to other sorts of stress.

10.5 Long-term storage

For long-term storage the following methods are highly recommended:

1. Store the product in a polyethylene bag with a sealed opening to prevent fresh air entering from the outside. Placing it with a desiccant is not necessary.

2. Store the product in a dark place, with the temperature in the range from 0 ℃ to 35 ℃.

3. Keep the sensitive polarizer surface of the LCD panels clear of any contact. We recommend using the container that was used by SPACE DISPLAY to deliver the products.

10.6 Cleaning of the product

To clean the product make sure to use absorbent cotton cloth or other soft material like chamois. Make sure to rub it gently, and do not use chemicals when cleaning.

11.0 FINAL REMARKS

1. The above specifications are the binding criteria for SPACE DISPLAY Technology's outgoing quality inspection.

2. The customer is kindly requested to inform SPACE DISPLAY Technolongy as soon as possible on any questions, remarks, and disagreements regarding these specifications.

3. SPACE DISPLAY is not responsible for damage to its products due to neglect of the precautions as described in the previous chapter.

PRODUCT SPECIFICATION

RECORDE OF REVISIONS

VERSION NO.	REVISION DATE	PAGE	DESCRIPTION
V1.0	05/19/2007	ALL	NEW