



LITEMAX SP1075E

Sunlight readable 10.4" LED B/L LCD

(Preliminary Specification 06/26/2008)

All information is subject to change without notice.

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RECORD OF REVISION

Version and Date	Page	Old Description	New Description	Remark
V0 06/02/08	ALL	-	Preliminary specification first issue	-
V1 06/26/08	18	-	Dimension modify	-

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GENERAL DESCRIPTION

OVERVIEW

This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit and power supply circuit and a backlight unit. Graphics and texts can be displayed on a 800×3×600 dots panel with 262,144 colors by using LVDS(Low Voltage Differential Signaling)system for interface and supplying +3.3V/5.0V DC supply voltage for TFT-LCD panel driving and supply voltage for backlight.

The TFT-LCD panel used for this module is a low-reflection and higher-color-saturation type.

Therefore, this module is also suitable for the multimedia use.

This module is super-high brightness (1000cd/m²) and high contrast (500:1).

This module is the type of wide viewingangle the viewing angle is 6 o'clock direction.

Backlight-driving DC/DC inverter is not built in this module.

FEATURES

- (1) Excellent brightness (1000 nits)
- (2) SVGA (800 x 600 pixels) resolution
- (3) 3.3V LVDS (Low Voltage Differential Signaling) interface with 1 pixel/clock
- (4) Wide operating temperature
- (5) Meet RoHS requirement
- (6) Replaceable LED light bar design

GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	211.2 (H) x 158.4 (V) (10.4" diagonal)	mm	-
Bezel Opening Area	214.6 (H) x 162.4 (V)	mm	
Pixel Number	800 x R.G.B. x 600	pixel	-
Pixel Pitch	0.264 (H) x 0.264 (V)	mm	-
Pixel Configuration	RGB vertical stripe	-	-
Display Colors	262,144 colors (64 gray scales per color)	color	-
Display Mode	Normally white	-	-
Surface Treatment	Anti-glare and Hard coating (3H)	-	-

MECHANICAL SPECIFICATIONS

Item		Min	Typ	Max	Unit	Note
Module Size	Horizontal(H)	246	246.5	247	mm	(1)
	Vertical(V)	178.9	179.4	179.9	mm	
	Depth(D)	-	-	15.5	mm	
Weight		-	600	650	g	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

ABSOLUTE MAXIMUM RATINGS

ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Condition	Max.	Unit	Remark
Input Voltage	VI ₁	Ta=25 °C	-0.3 to V _{cc} +0.3	V	V _{cc} <3.0V (1)
	VI ₂	Ta=25 °C	-0.3 to 3.3V	V	3.0V ≤ V _{cc} (1)
+3.3V/+5.0V Supply Voltage	V _{cc}	Ta=25 °C	0 to +6.0	V	-
Storage Temperature	T _{stg}	-	-30 to +80	°C	(2,3)
Operating Ambient Temperature	T _{opp}	Panel surface	-30 to +80	°C	(2,3,4,5)

[Note1] Pin name: VI₁ {RXIN_i/+(i=0,1,2) RXCLK IN-/+} VI₂ {R/L,U/D}

[Note2] Preserve it within this range.

[Note3] Humidity: Less the 95%RH at Ta ≤ 40 °C and

Maximum wet-bulb temperature must not exceed 39 °C at Ta > 40 °C,
with no condensation.

[Note4] Panel surface temperature when backlight lights (reference).

[Note5] The operating temperature only guarantees operation of the circuit. For contrast, speed response,
and other factors related to display quality, judgment is done using the ambient temperature Ta = +25 °C.

INPUT TERMINALS

TFT-LCD PANEL DRIVING

CN1 (LVDS signals , +3.3V / +5.0V DC power supply and Contorol signal)

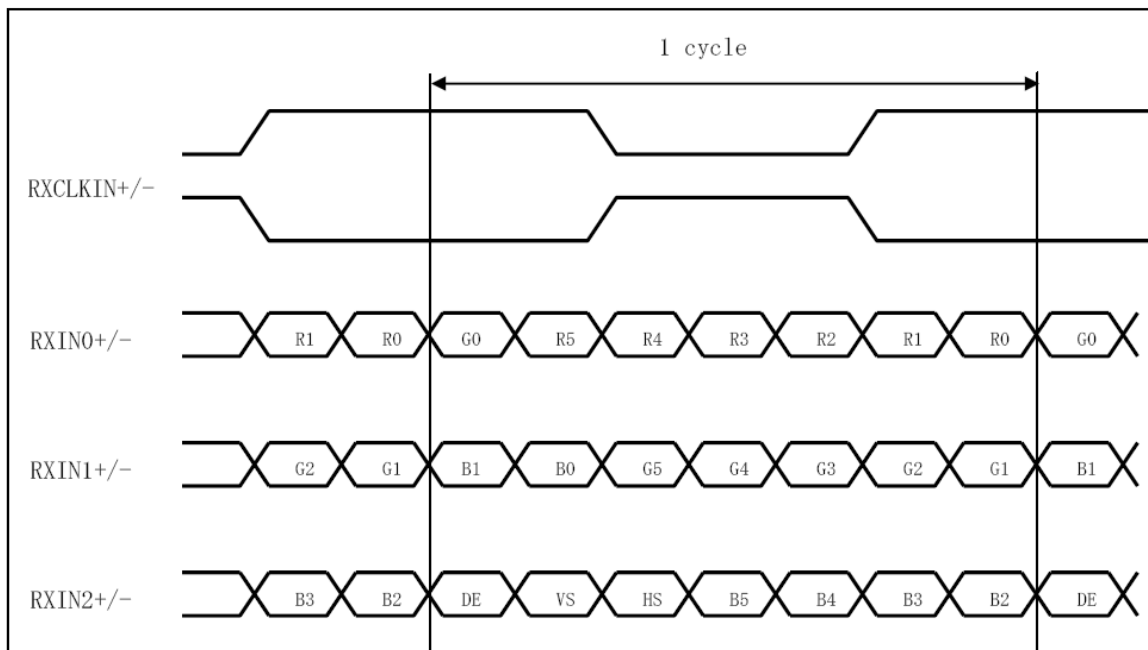
Corresponding connector:FI-SE20M (JAE) or FI-S20S (JAE)

Pin No.	Symbol	Function	Remark
1	V _{CC}	+3.3V / +5.0V power supply	
2	V _{CC}	+3.3V / +5.0V power supply	
3	GND		
4	GND		
5	RXIN0-	Differential data input, CH0 (negative)	LVDS signal
6	RXIN0+	Differential data input, CH0 (positive)	LVDS signal
7	GND		
8	RXIN1-	Differential data input, CH1 (negative)	LVDS signal
9	RXIN1+	Differential data input, CH1 (positive)	LVDS signal
10	GND		
11	RXIN2-	Differential data input, CH2 (negative)	LVDS signal
12	RXIN2+	Differential data input, CH2 (positive)	LVDS signal
13	GND		
14	RXCLK IN-	Differential clock input (negative)	LVDS signal
15	RXCLK IN+	Differential clock input (positive)	LVDS signal
16	GND		
17	R/L	Horizontal display mode select signal	[Note1]
18	U/D	Vertical display mode select signal	[Note2]
19	GND		
20	GND		

[Note] To obtain the proper relation between LVDS signals and actual digital data signals, the digital signals should be inputted into the transmitter as described in the nextsection, 4-2.

[Note] The shielding case is connected with signal GND.

[Note] Data Mapping



[Note 1],[Note 2]

R/L = High, U/D = Low



R/L = Low, U/D = Low



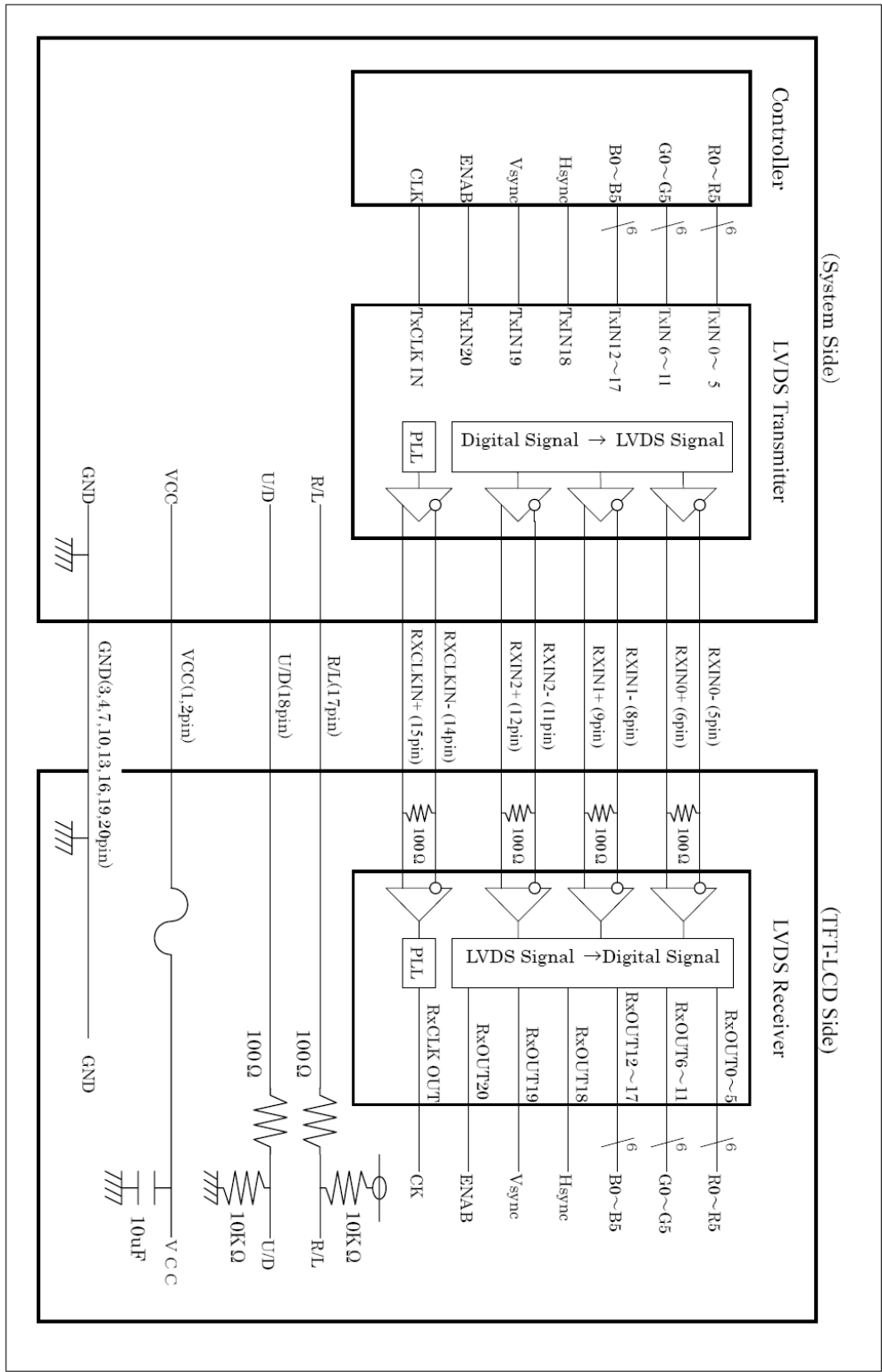
R/L = High, U/D = High



R/L = Low, U/D = High



INTERFACE BLOCK DIAGRAM



Using receiver : Single LVDS interface, which equals TH63LVD64A(T)Hine), contained in a control IC
Corresponding Transmitter : DS90C363, DS90C363 A, DS90C383, DS90C383A (National semiconductor),
TH63LVD63A, TH63LVD63A(T)Hine), SN75LVDS84(T)

BACKLIGHT

Pin	Symbol	Description	Color
1	+	Positive	Red
2	-	Negative	Black

Note (1) Connector Part No.: JST-EHR-2 or equivalent

Note (2) User's connector Part No.: JST-2B-EH or equivalent

ELECTRICAL CHARACTERISTICS

RECOMMENDED OPERATION CONDITION

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Current dissipation	V _{cc} =+3.3V	I _{cc}	-	300	450	mA	[Note1]
	V _{cc} =+5.0V	I _{cc}	-	200	300	mA	
Permissive input ripple voltage		VRP	-	-	100	mVp-p	
Input voltage range	LVDS signal	VL	0	-	2.4	V	[Note2]
Differential input threshold voltage	High	V _{TH}	-	-	V _{CM} +100	mV	V _{CM} =1.2V [Note3]
	Low	V _{TL}	V _{CM} -100	-	-	mV	
Input impedance (Differential input)		R _T	-	100	-	Ω	[Note2]
Input voltage	Low	V _{IL}	-	-	0.8	V	[Note4]
	High	V _{IH}	2.1	-	-		[Note5]
Input current1	Low(V _I =0V)	I _{OL1}	-800	-	-	uA	[Note4]
	High(V _I =V _{cc})	I _{OH1}	-10.0	-	10.0	uA	
Input current2	Low(V _I =0V)	I _{OL2}	-10.0	-	10.0	uA	[Note5]
	High(V _I =V _{cc})	I _{OH2}	-	-	800	uA	

[Note1] Typical current situation : 16-gray-bar pattern.

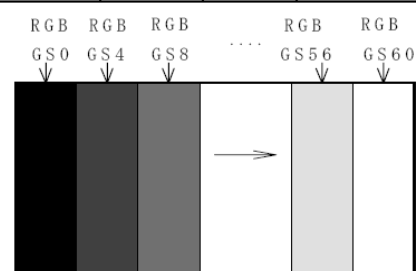
V_{cc}=+3.3V / +5.0V

[Note2] LVDS signals

[Note3] V_{CM} : Common mode voltage of LVDS driver.

[Note4] R/L

[Note5] U/D



TFT-LCD PANEL DRIVING

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage	Vcc	+3.0	+3.3/+5.0	+5.5	V	[Note1]
LVDS Signals	V _L	0		2.4	V	[Note2]
Input voltage	V _I	0		Vcc	V	[Note3]
Ambient temperature	Topa	-30		+80	°C	[Note4], [Note5]

[Note1]

Vcc-turn-on conditions

$$0 < t_1 \leq 15\text{ms}$$

$$0 < t_2 \leq 10\text{ms}$$

$$0 < t_3 \leq 100\text{ms}$$

$$0 < t_4 \leq 1\text{s}$$

$$t_5 > 200\text{ms}$$

Vcc-dip conditions

$$1) \quad 2.5\text{V} \leq V_{cc} < 3.0\text{V}$$

$$t_d \leq 10\text{ms}$$

$$2) \quad V_{cc} < 2.5\text{V}$$

Vcc-dip conditions should also follow the Vcc-turn-on conditions.

[Note2] RXIN0-, RXIN0+, RXIN1-, RXIN1+, RXIN2-, RXIN2+, RXCLK IN-, RXCLK IN+

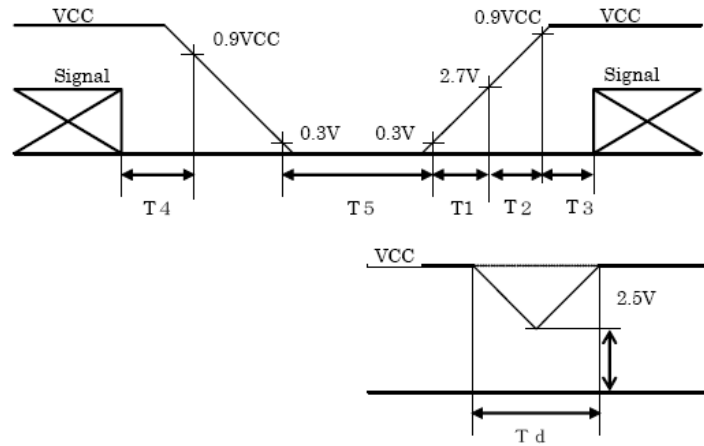
[Note3] R/L, U/D

[Note4] Humidity: 95%RH Max. at Ta ≤ 40°C.

Maximum wet-bulb temperature at 39°C or less at Ta > 40°C.

No condensation.

[Note5] Maximum value : Panel surface temperature



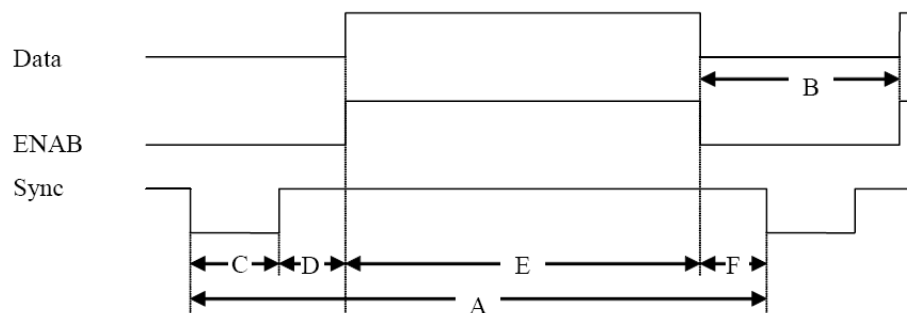
BACKLIGHT UNIT

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Input Voltage	V _L	-	23.1	25.2	V	IF=360mA
LED Current	I _L	-	360	-	mA	-
Power Consumption	P _L	-	8.316	-	W	-

TIMING CHARACTERISTICS OF INPUT SIGNALS

TIMING CHARACTERISTICS

(These are specified at the digital inputs/outputs of LVDS transmitter/receiver.)



(Vertical timing)

Item(symbol)	Min.	Typ.	Max.	Unit	備考
Vsync cycle (T_{VA})	-	17.6	-	ms	Negative
	628	666	798	line	
Blanking period (T_{VB})	28	66	-	line	
Vsync pulse width (T_{VC})	2	4	6	line	
Back porch (T_{VD})	23	23	23	line	
Vsync pulse width+Back porch ($T_{VC}+T_{VD}$)	25	27	29	line	
Active display area (T_{VE})	600	600	600	line	
Front porch (T_{VF})	3	39	-	line	

(Horizontal timing)

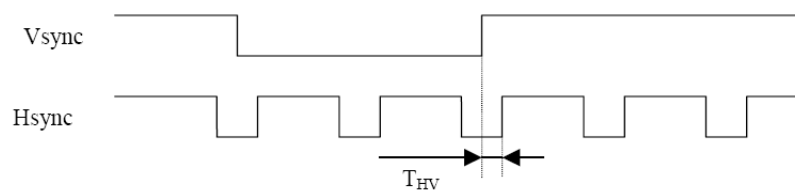
Item(symbol)	Min.	Typ.	Max.	Unit	Remark
Hsync cycle (T_{HA})	20.8	26.4	39.9	us	Negative
	832	1056	1395	clock	
Blanking period (T_{HB})	40	256	-	clock	
Hsync pulse width (T_{HC})	2	128	200	clock	
Back porch (T_{HD})	$928-T_{HA}$	88	$T_{HA}-752$	clock	
Active display area (T_{HE})	800	800	800	clock	
Front porch (T_{HF})	0	40	-	clock	

(Clock signal)

Item	Min.	Typ.	Max.	Unit	Remark
Frequency	35	40	42	MHz	[Note1]

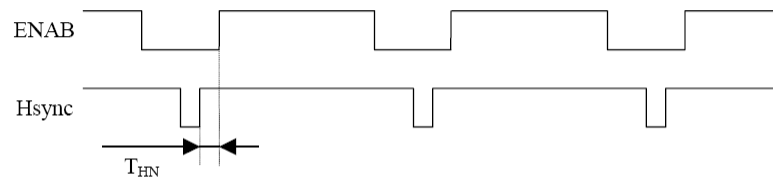
[Note1] In case of lower frequency, the deterioration of display quality, flicker etc., may be occurred.

(Hsync-Vsync Phase difference)



Item(symbol)	Min.	Typ.	Max.	Unit	Remark
Hsync-Vsync Phase difference (T_{HV})	1	-	$T_{HA}-T_{HC}$	clock	

(Hsync-ENAB Phase difference)



Item	Min.	Typ.	Max.	Unit	Remark
Hsync-ENAB Phase difference (T_{HN})	0	-	$T_{HA}-T_{HC}$ -800	clock	

DISPLY POSITION

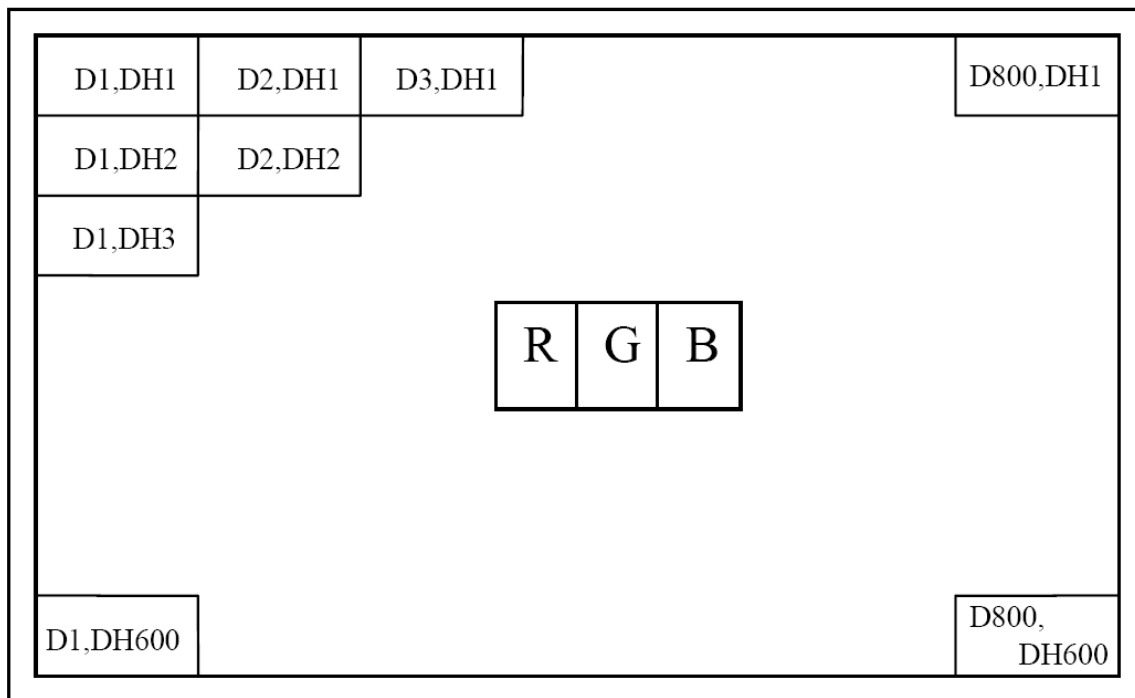
Item	Standards	Beginning	Ending	Unit	Remark
Horizontal	rising edge of ENAB	0	800	clock	
	rising edge of Hsync	88	888	clock	[Note1]
Vertical	rising edge of Vsync	23	623	line	

[Note1] In case that ENAB signal is fixed to low level. Do not keep ENAB signal high during operation.

INPUT DATA SIGNALS DISPLAY POSITION ON THE SCREEN

Display position of input data

(H , V)



INPUT SIGNALS, BASIC DISPLAY COLORS AND GRAY SCALE OF EACH COLOR

	Colors &		Data signal																	
	Gray scale	Gray Scale	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic Color	Black	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	—	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	—	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	—	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	—	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	—	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	—	1	1	1	1	1	1	1	1	1	1	1	1	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
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	⇩	⇩						⇩						⇩					
	⇩	⇩	⇩						⇩						⇩					
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	⇧	⇩	⇩						⇩						⇩					
	⇩	⇩	⇩						⇩						⇩					
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	⇩	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	⇧	⇩	⇩						⇩						⇩					
	⇩	⇩	⇩						⇩						⇩					
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	⇩	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 :Low level voltage, 1 : High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. According to the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

OPTICAL CHARACTERISTICS

TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Backlight Current	IL	360	mA

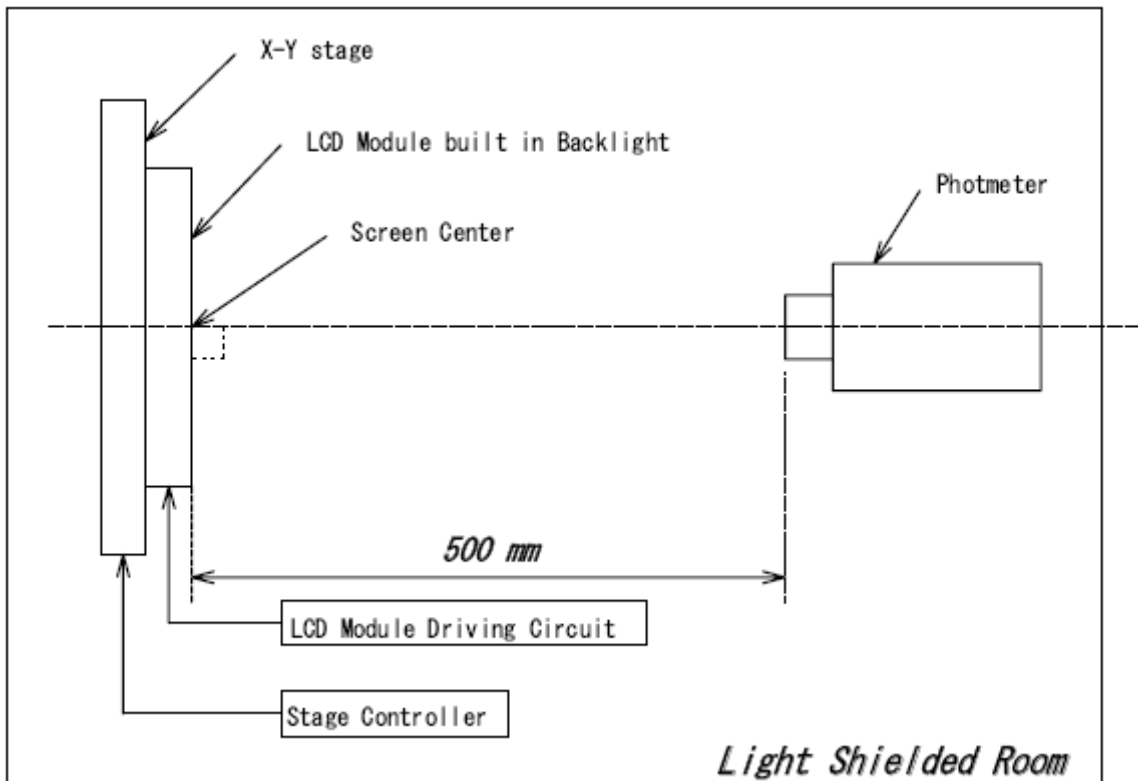
OPTICAL SPECIFICATIONS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	300	500	-	-	
Response Time		τ_r		-	10	-	ms	
		τ_d		-	25	-	ms	
Luminance of White		L _{Ave}		900	1100	-	cd/m ²	
Luminance Uniformity		L _{UNF}		80	-	-	%	
Color Chromaticity	Red	R _x		Typ. 0.05	0.55	Typ.+ 0.05	-	
		R _y			0.33		-	
	Green	G _x			0.31		-	
		G _y			0.59		-	
	Blue	B _x			0.14		-	
		B _y			0.13		-	
	White	W _x			0.31		-	
		W _y			0.34		-	
Viewing Angle	Horizontal	θ_{x+}	CR≥10	60	70	-	Deg.	
		θ_{x-}		60	70	-		
	Vertical	θ_{y+}		35	50	-		
		θ_{y-}		55	60	-		

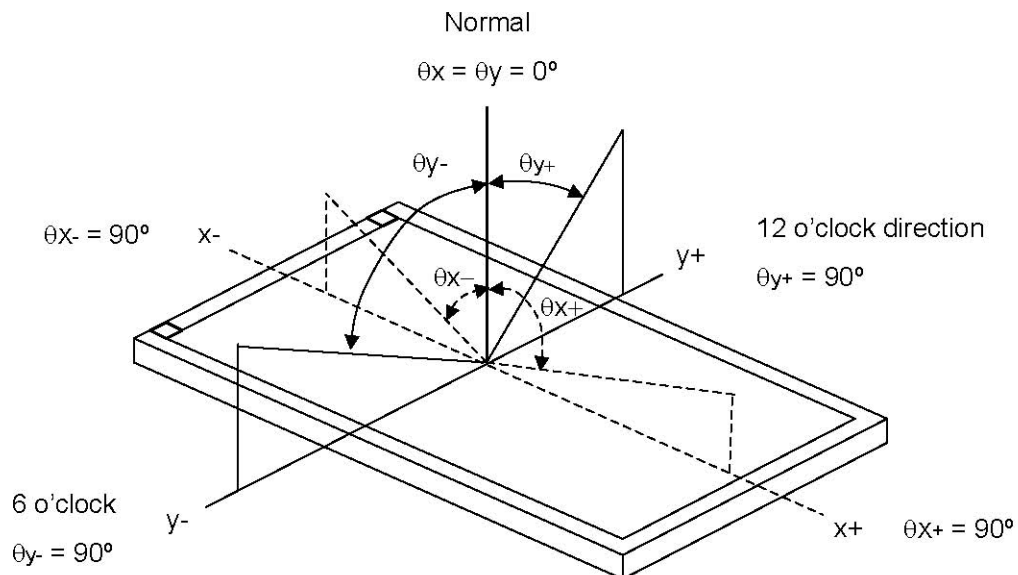
Note 1) Refer to Measuring Method".

MEASURING METHOD

MEASURING SYSTEM



- (1) The measurement point is the center of the active area except the measurement of Luminance Uniformity.
- (2) Photometer : BM-7
- (3) Definition of φ and θ :



MEASURING METHODS

Luminance:

The luminance of the center on a white raster (gray scale level L63) shall be measured.
Measurement shall be executed 5 minutes after the LED light bar is lit up.

Contrast Ratio:

The contrast ratio can be calculated by the following expression.

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

L63 : Luminance on the white raster (gray scale level L63)

L 0 : Luminance on the black raster (gray scale level L0)

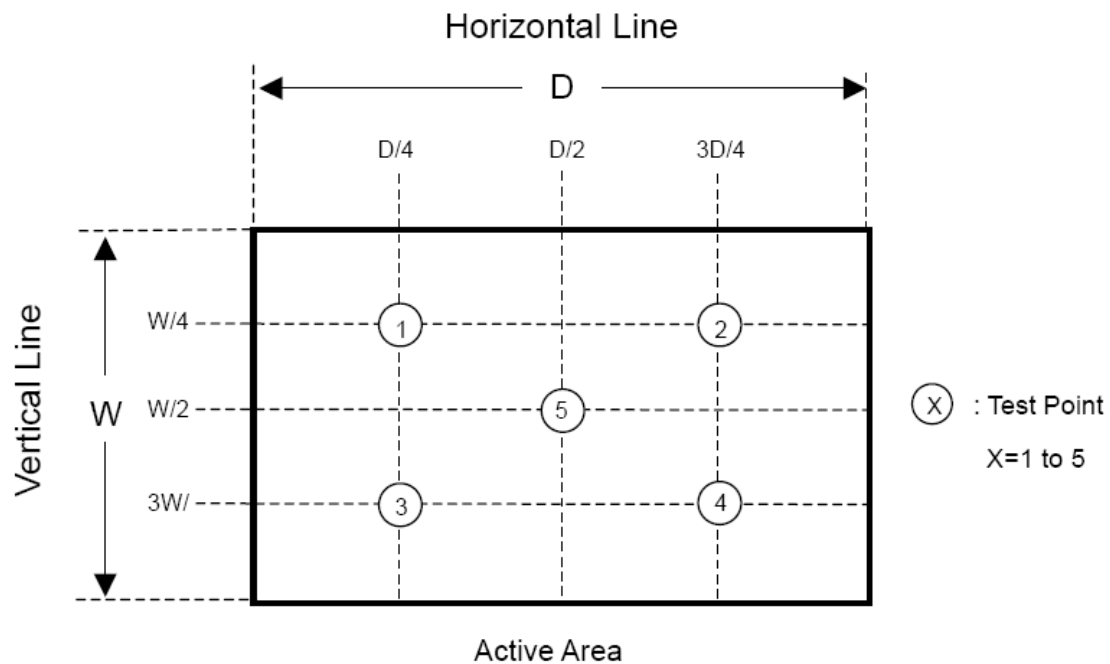
Viewing Angle:

Viewing angle is defined as the angles(T,I), in which specified contrast ratio can be obtained.
(Refer to Measuring Method (3) for the axes.)

(4) Luminance Uniformity:

The Luminance should be measured at 5 positions on white raster(gray scale level L63).
Uniformity can be calculated by the following expression.

$$\text{Luminance Uniformity} = \frac{\text{Minimum Luminance}}{\text{Maximum Luminance}} \times 100\%$$

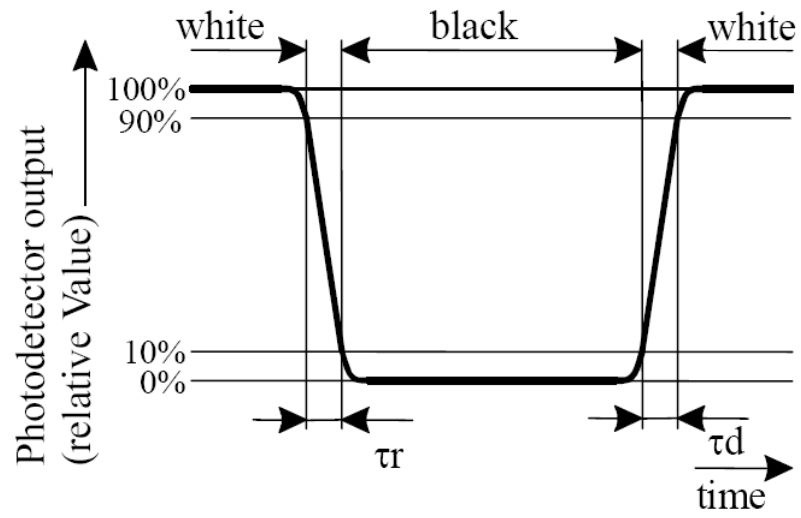


(5) Chromaticity:

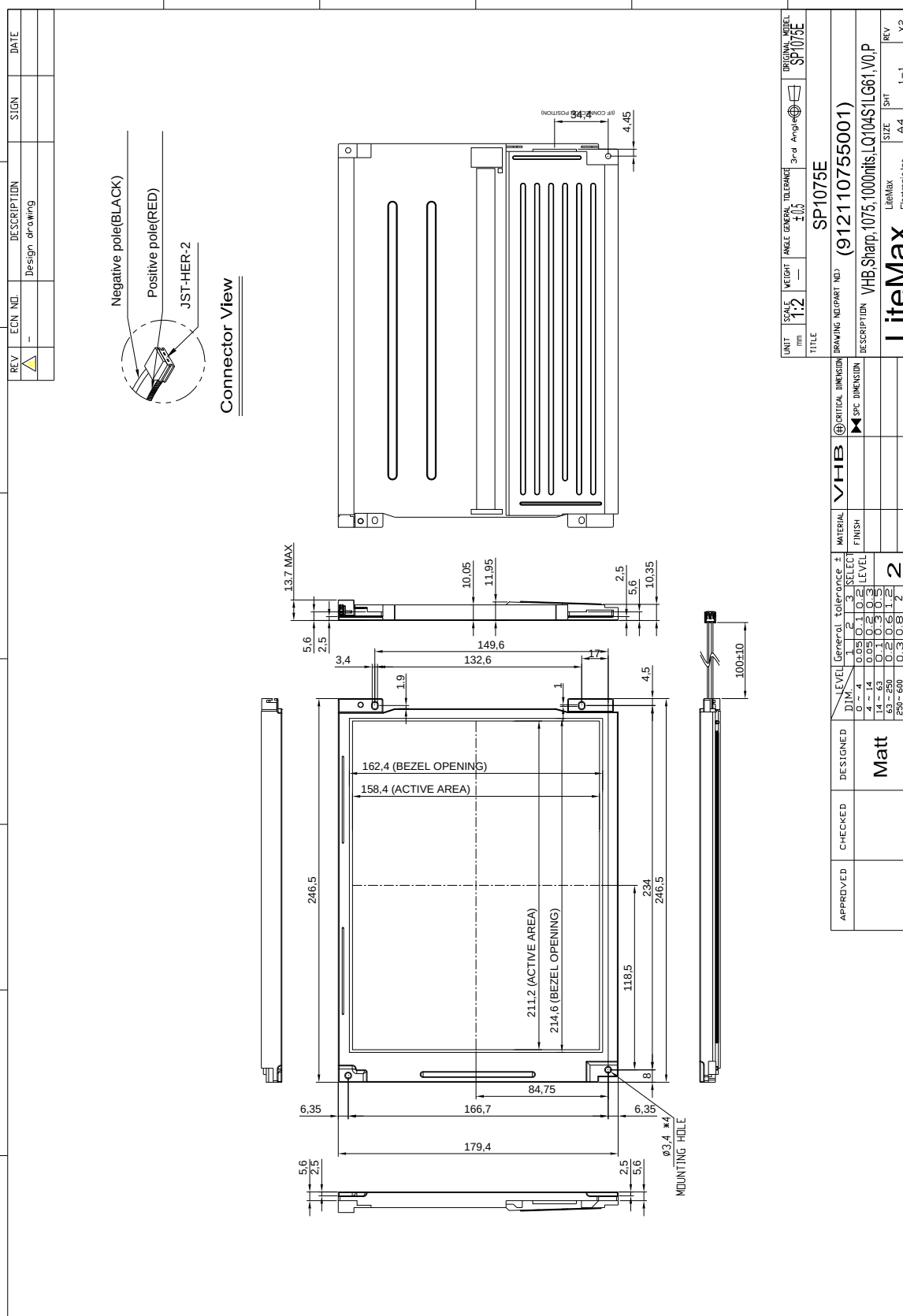
The values(x,y) of chromaticity coordinates should be measured for the White, Red, Green and Blue Raster(gray scale level L63) each with a photometer.

(6) Response Time:

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.



DIMENSIONAL OUTLINE



PRECAUTIONS

ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) It is recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) Do not apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.
- (4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.
- (5) Do not plug in or pull out the I/F connector while the module is in operation.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) Moisture can easily penetrate into LCD module and may cause the damage during operation.
- (9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD modules in the specified storage conditions.
- (10) When ambient temperature is lower than 10°C, the display quality might be reduced. For example, the response time will become slow.
- (11) When operation temperature is too high, it will affect the LED life time. We suggest to add the heat dispersion design for whole backlight module.

SAFETY PRECAUTIONS

- (1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (2) After the module's end of life, it is not harmful in case of normal operation and storage.