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LITEMAX SV1568

15" Sunlight Readable Smart Panel

Powered By Durapixel™ Technology

(1st Edition 6/ 12/ 2009)

All information is subject to change without notice.

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Record of Revision

Version and Date	Page	Old Description	New Description	Remark
2009/6/12	All		Preliminary Spec. (First Draft)	

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1.0 GENERAL DESCRIPTION

1.1 OVERVIEW

SV1568 is Litemax's first smart panel design which is composed of the amorphous silicon thin film transistor liquid crystal display (a-Si TFT LCD) panel structure with built-in LED driving board for driving the TFT (Thin Film Transistor) array and a backlight module and also equips with Litemax AD5621GA AD board mounting holes and its upgradeable capability.

The SV1568's a-Si TFT LCD panel structure is injected wide temperature liquid crystal material into a narrow gap between the TFT array glass substrate and a color-filter glass substrate. Color (Red, Green, Blue) data signals from a host system (e.g. PC, signal generator, etc.) are modulated into best form for active matrix system by a signal processing board, and sent to the driver LSIs which drive the individual TFT arrays. The TFT array as an electro-optical switch regulates the amount of transmitted light from the backlight assembly, when it is controlled by data signals. Color images are created by regulating the amount of transmitted light through the TFT array of red, green and blue dots. It has a 15 inch diagonally measured active display area with XGA solution (1024 horizontal by 768 vertical pixel array).

1.2 FEATURES

- 1,600 nits
- Long Life Time LED Backlight Powered by Durapixel™ Technology
- Wide viewing angle
- Wide operating temperature
- High response time: 8ms (typ.)
- High contrast ratio: 600:1 (typ.)
- XGA (1024 x 768 pixels) resolution
- LVDS interface (6 bit + FRC)
- High Performance Edge Light type backlight
- PSWG standard
- RoHs compliance
- TCO' 03 compliance

1.3 APPLICATION

- Outdoor Display
- Outdoor Digital Signage
- Quick Service Restaurant Display Product
- Transportation
- Gas Station Forecourt Displays

1.4 GENERAL SPECIFICATIONS

Size (inch)	15"
Model	DLF1568
Pixel Format (pixel)	1024 horiz. by 768 vert. pixels RGB stripe arrangement
Active Area (mm)	304.128 (W) x 228.096 (H) mm (typ.)
Pixel Pitch (mm)	0.297 (W) x 0.297 (H) mm
LCD Surface Treatment	Hard coating(3H), Anti-glare treatment of the front polarizer
Number of Colors	16,777,216 colors (6bit+FRC)
Viewing Angle (CR>10)	<ul style="list-style-type: none"> • Horizontal: 160° (typ.) • Vertical: 160° (typ.)
Luminance, White	1,600 cd/m2
Contrast Ratio	600:1
Response Time (ms)	8 ms
LED Lamp Life (hrs)	50K
Power Consumption (W)	<ul style="list-style-type: none"> • Backlight only: 15.6Watt (typ.) • Backlight+ LID : 18.4 Watt (typ.)
Supply Voltage (V)	3.3V
Storage Temp. (°C)	-30°~ 80°C
Operation Temp. (°C)	-20°C~ 60 °C
Outline Dimension	326.5 x 253.5 x 12.5 (mm)
Weight	1,000 g (Typ.),
Interface	LVDS

1.5 MECHANICAL SPECIFICATIONS

Mechanical specifications:

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	-	326.5	-	mm	(1)
	Vertical(V)	-	253.5	-	mm	
	Depth(D)	-	12.5	-	mm	(1)(2)
Weight		-	1,000	-	g	-

Note (1) Please refer to the detail drawings in Section 5.0 for more information of front and back outline dimensions. Note

(2) The depth is without connector.

2.0 ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Rating	Unit	Remarks
Power supply voltage	LCD panel signal board	VCC	-0.3 to +3.6	V	Ta = 25°C
Input voltage for signals	Display signals Note1	Vi	-0.3 to +3.6 and Vi < VCC + 0.3	V	Ta = 25°C
	Function signals Note2				
Operating temperature		TopF	(-20~60)	°C	Note3
Storage temperature		Tst	(-30~80)	°C	-
Relative humidity Note5		RH	(≤ 95)	%	Ta ≤ 40°C
			(≤ 80)	%	40 < Ta ≤ 70°C
Absolute humidity Note6		AH	(≤ 70) Note6	g/m ³	Ta > 70°C

Note1: Display signals are D0+/-, D1+/-, D2+/-, D3+/- and CK+/-.

Note2: Function signal is MSL.

Note3: Measured at center of LCD panel surface (including self-heat)

Note4: Measured at center of LCD module's rear shield surface (including self-heat)

Note5: No condensation

3.0 ELECTRICAL CHARACTERISTICS

3.1 ELECTRICAL CHARACTERISTICS

(TBA)

Note

- 1 The specified current and power consumption are under the $V_{LCD}=12.0V$, $25 \pm 2^{\circ}C$, $f_v=60Hz$ condition whereas mosaic pattern (8 x 6) is displayed and f_v is the frame frequency.
- 2 The current is specified at the maximum current pattern.
- 3 The duration of rush current is about 2ms and rising time of power Input is 1ms(min.)

LCD panel signal processing board

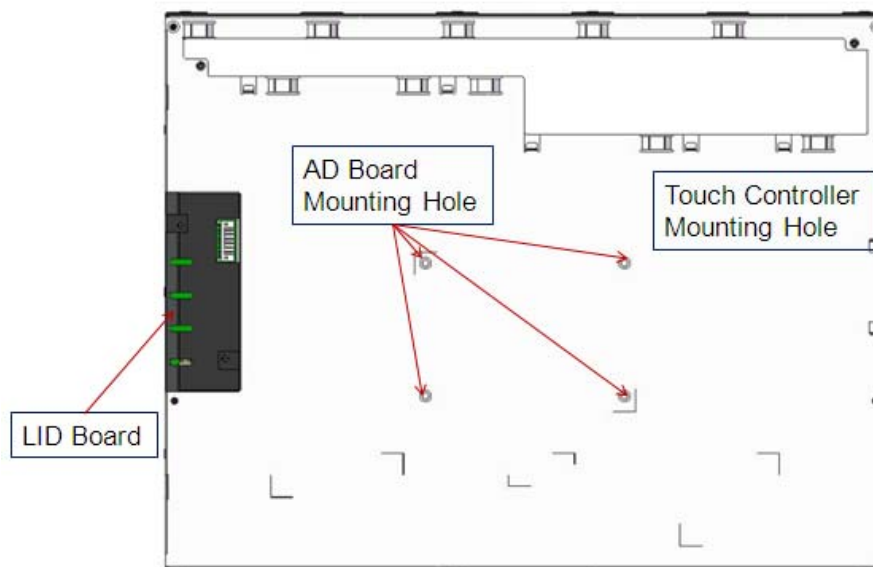
CN1 socket(Module side): DF-14H-20P-1.25H (Hirose Electric Co., Ltd.)

Adaptable plug: DF14-20S-1.25C (Hirose Electric Co., Ltd.)

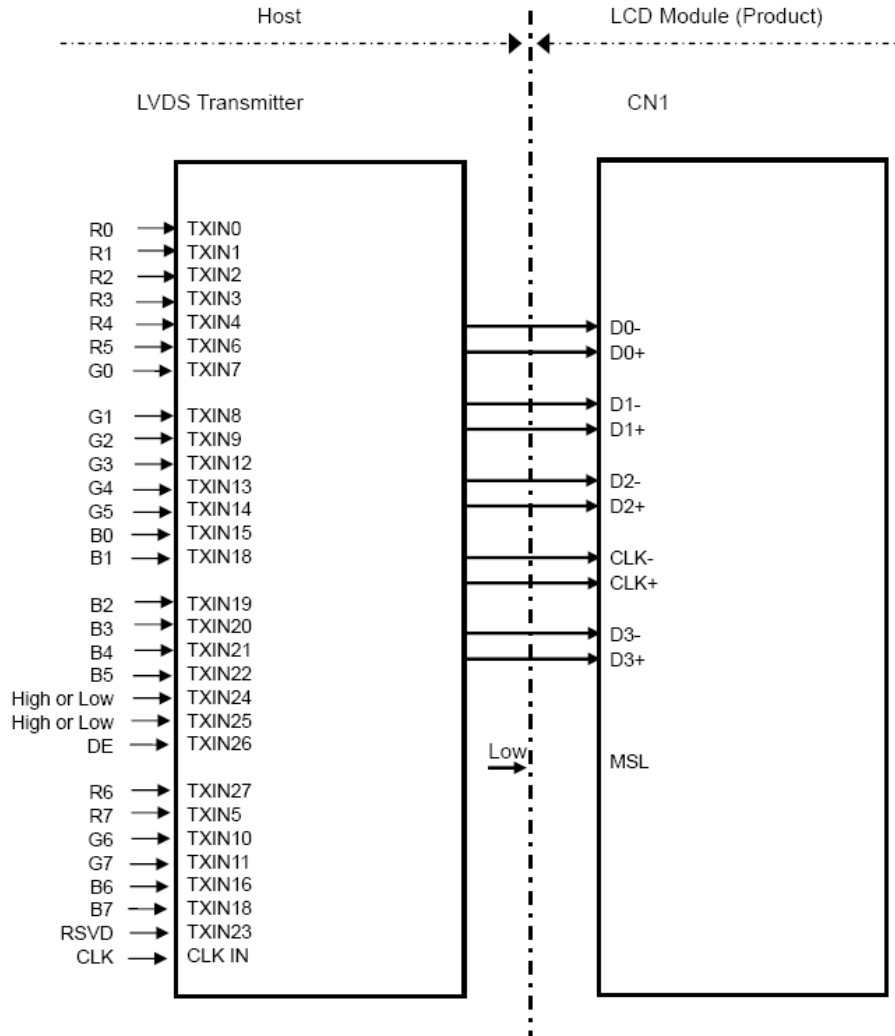
Pin No.	Symbol	Signal	Remarks
1	VCC	Power supply	-
2	VCC		
3	GND	Ground	-
4	GND		
5	D0-	Pixel data	Note2
6	D0+		
7	GND	Ground	-
8	D1-	Pixel data	Note2
9	D1+		
10	GND	Ground	-
11	D2-	Pixel data	Note2
12	D2+		
13	GND	Ground	-
14	CLK-	Pixel clock	Note2
15	CLK+		
16	GND	Ground	-
17	D3-	Pixel data	Note2
18	D3+		
19	GND	Ground	-
20	MSL	Selection of LVDS input Map	Low or Open: NOTE1

Note1: See “**Connection between receiver and transmitter For LVDS**”.

Note2: Twist pair wires with 100Ω (Characteristic impedance) should be connected between LCD panel signal processing board and LVDS transmitter.



Connection between receiver and transmitter for LVDS



Note1: Recommended transmitter

See the data sheet for DS90C383 (National Semiconductor) .

Note2: LSB (Least Significant Bit) -R0,G0,B0 MSB (Most Significant Bit) -R7,G7,B7

3.3 COLOR INPUT DATA ASSIGNMENT

The brightness of each primary color (red, green, blue) is based on the 8bit gray scale data input for the color the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

Display colors		Data signal (0:Low level, 1:High Level)																							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
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
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	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
	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 grayscale	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
		0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dark	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑					:																			
	↓					:																			
	Bright	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	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 grayscale	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
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	↑					:																			
	↓					:																			
	Bright	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	
	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 grayscale	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
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	↑					:																			
	↓					:																			
	Bright	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	

3.4 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

(Note1)

Parameter		Symbol	min.	typ.	max.	Unit	Remarks	
CLK	Frequency	1/tc	60.0	65.0	70.0	MHz	15.384ns (typ.)	
	Duty	—	—			—	Note2	
	Rise time, Fall time	—	—			ns		
DATA	CLK-DATA	Setup time	—			ns	Note2	
		Hold time	—			ns		
	Rise time, Fall time	—	—			ns		
DE	Horizontal	Cycle	th	12.3	20.676	30.00	μs	48.363KHz(typ.) Note3/ Note4
				1050	1344	1800	CLK	
		Display period	thd	1024				—
	Vertical (One frame)	Cycle	tv	13.1	16.666	20.0	ms	60.0Hz (typ.)
				770	806	1334	H	
		Display period	tvd	768			H	
CLK-DE	Setup time	—	—			ns	Note2	
		—	—			ns		
	Rise time, Fall time	—	—			ns		

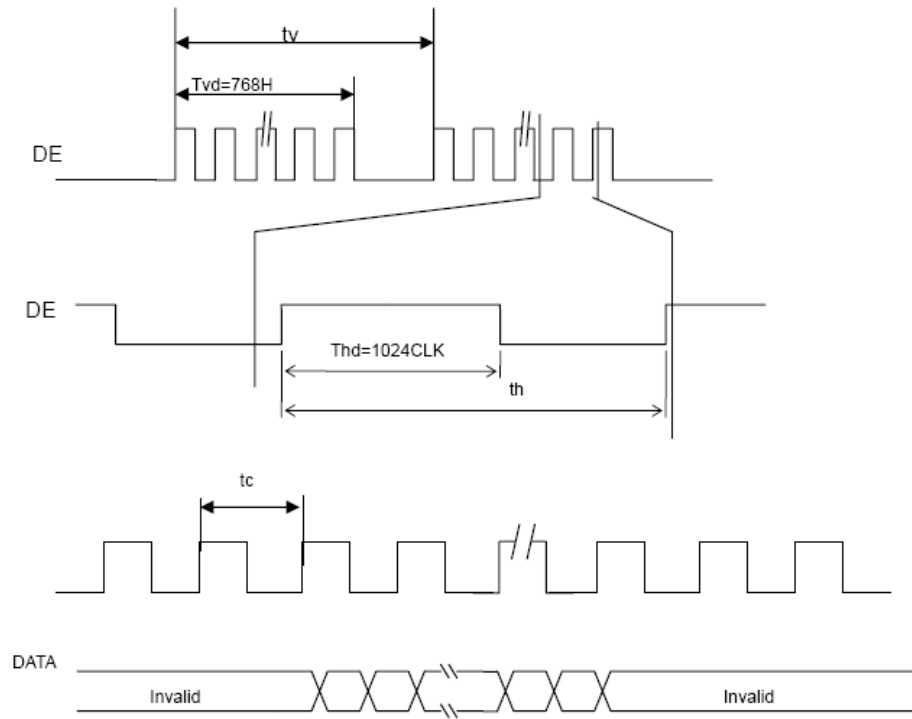
Note1: Definition of parameters is follows.

$$tc=1CLK, Th=1H$$

Note 2: See the data sheet of LVDS transmitter.

Note 3: Both of "time" and "CLK number" of the "th" must keep the Minimum value of specifications.

Note 4: "th" must keep the fluctuation within ± 1 CLK, because of avoidance of image sticking.



4.0 OPTICAL CHARACTERISTICS

4.1 TEST CONDITIONS

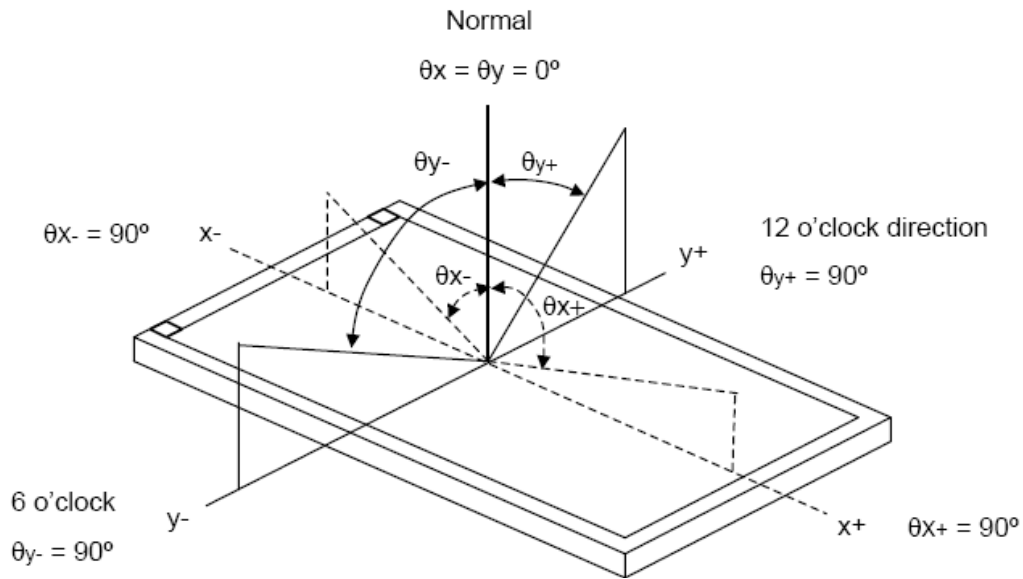
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V _{DD}	23	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Current	I _L	680	mA
LED Working Frequency	F _L		KHz
LED Driver Board	Litemax		

The measurement methods of optical characteristics are shown in optical Specifications. The following items should be measured under the test conditions described in Section 4.1

4.2 OPTICAL SPECIFICATIONS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast Ratio	CR	White/Black at center R=0, L=0, U=0, D=0	400	600	-	-	(2)	
Response Time	T _{ON}	White to black	-	2	4	ms	(3)	
	T _{OFF}	Black to white	-	6	8	ms		
Luminance of White	L _{Ave}	White at center R=0, L=0, U=0, D=0	-	1,600	-	cd/m ²	(4)	
Luminance uniformity	ΔW		-	1.2	1.3	-	(7)	
Chromaticity	Red	R _x	X coordinate	0.60	0.63	0.66	-	
		R _y	Y coordinate	0.31	0.34	0.37	-	
	Green	G _x	X coordinate	0.27	0.30	0.33	-	
		G _y	Y coordinate	0.54	0.57	0.60	-	
	Blue	B _x	X coordinate	0.11	0.14	0.17	-	
		B _y	Y coordinate	0.07	0.10	0.13	-	
White	W _x	X coordinate	0.283	0.313	0.343	-		
	W _y	Y coordinate	0.299	0.329	0.359	-		
Viewing Angle	Right	θ _R	θ _U =0°, θ _D =0°,CR=10	70	80	-	Deg.	(1)
	Left	θ _L	θ _U =0°, θ _D =0°,CR=10	70	80			
	Up	θ _U	θ _U =0°, θ _D =0°,CR=10	70	80			
	Down	θ _D	θ _U =0°, θ _D =0°,CR=10	70	80			

Note (1) Definition of Viewing Angle (θ_x, θ_y):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

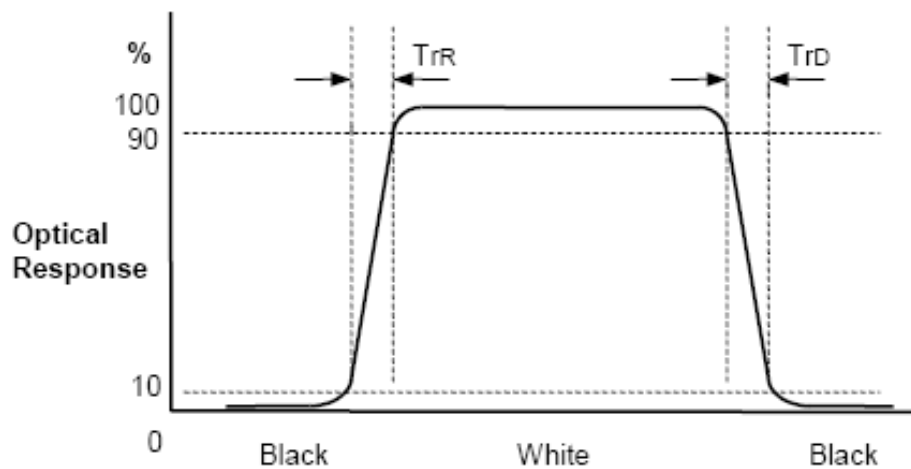
L_{255} : Luminance of gray level 255

L_0 : Luminance of gray level 0

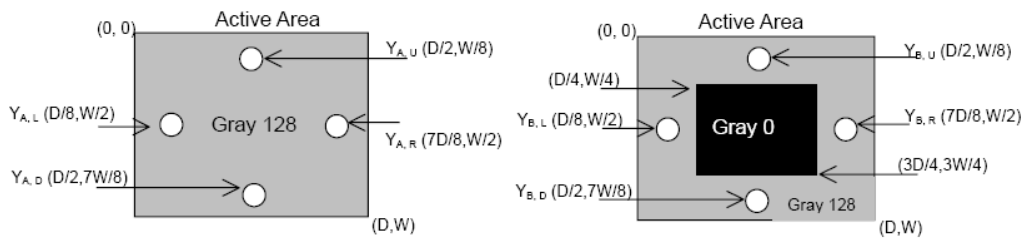
$$CR = CR(1)$$

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

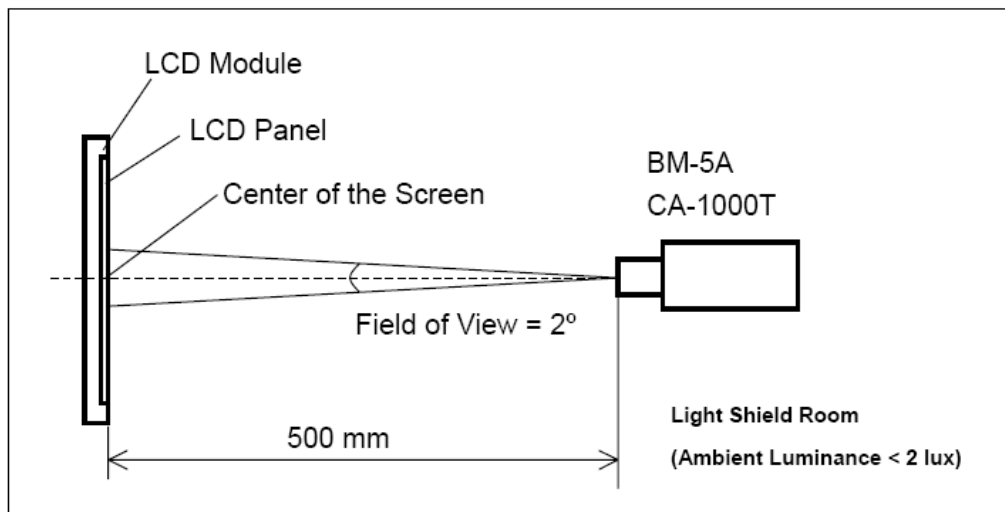
Note (3) Definition of Response Time (T_R, T_F):



- Note (4) Definition of Luminance of White (L_{AVE}):
 Measure the luminance of gray level 255 at center point
 $L_{AVE} = L$ (5)
 $L(x)$ is corresponding to the luminance of the point X at Figure in Note (7).
- Note (5) Definition of Cross Talk (CT):
 $CT = |Y_B - Y_A| / Y_A \times 100$ (%)
 Where:
 Y_A = Luminance of measured location without gray level 0 pattern (cd/m²)
 Y_B = Luminance of measured location with gray level 0 pattern (cd/m²)

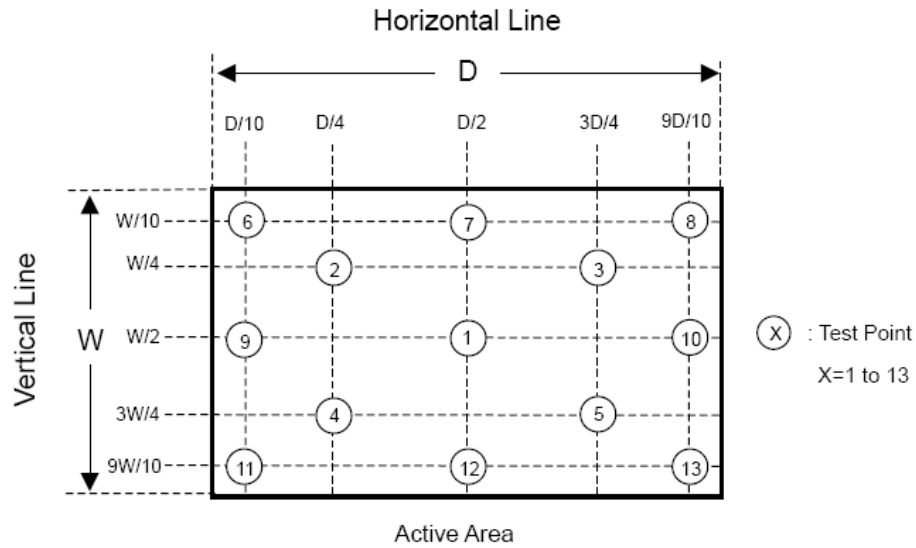


Note (6) Measurement Setup: The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



Note (7) Definition of luminance measured points: Measure the luminance of gray level 255 at point L(1) Definition of White Variation (δW): Measure the luminance of gray level 255 at 9 points

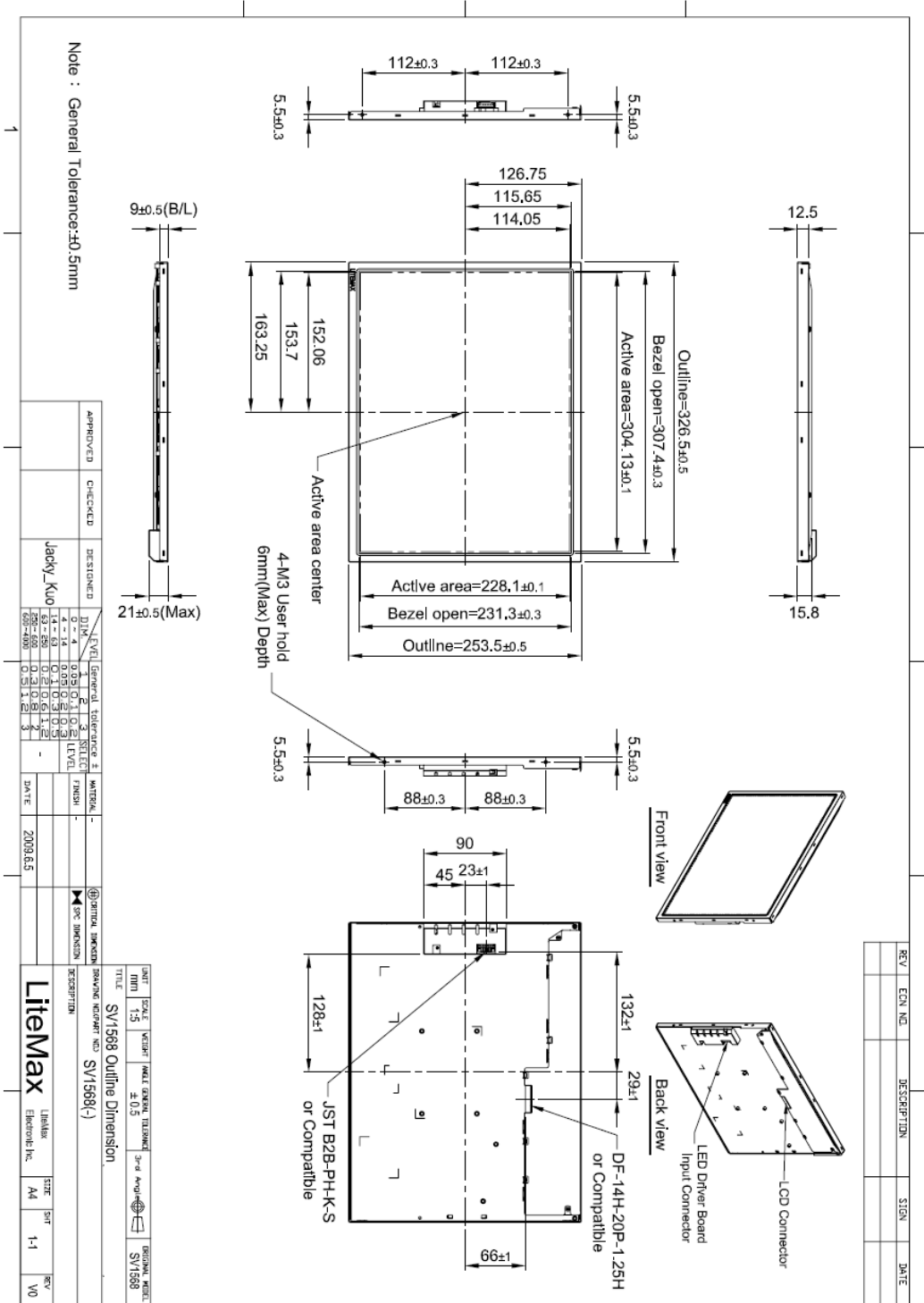
$$\delta W = \frac{\text{Maximum [L (1), L (6), L (7), L (8), L (9), L (10), L (11), L (12), L (13)]}}{\text{Minimum [L (1), L (6), L (7), L (8), L (9), L (10), L (11), L (12), L (13)]}}$$



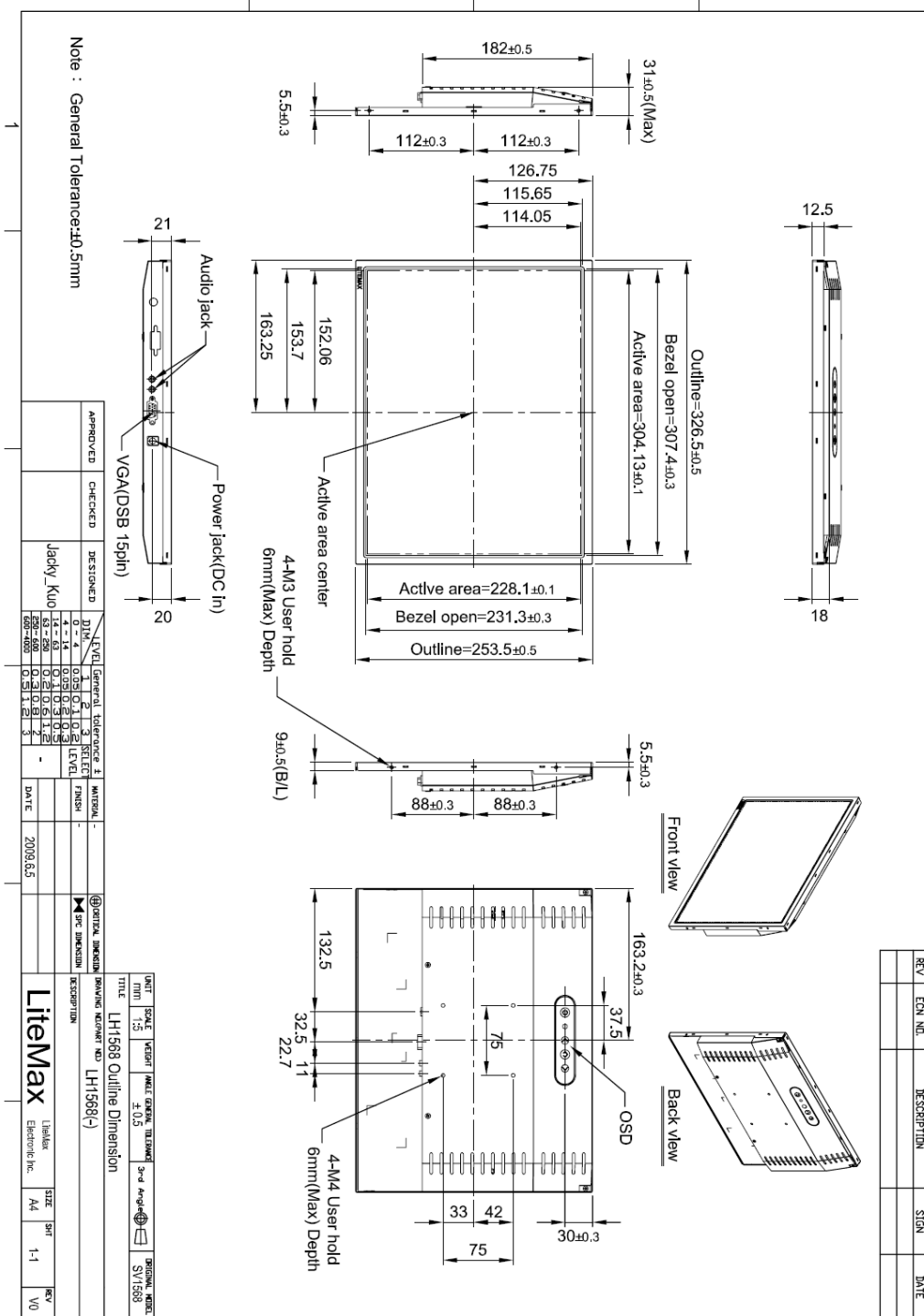
Note (8) TN type has Gray scale inversion occurs at θ_y : -40°

5.0 TECHNICAL DRAWING

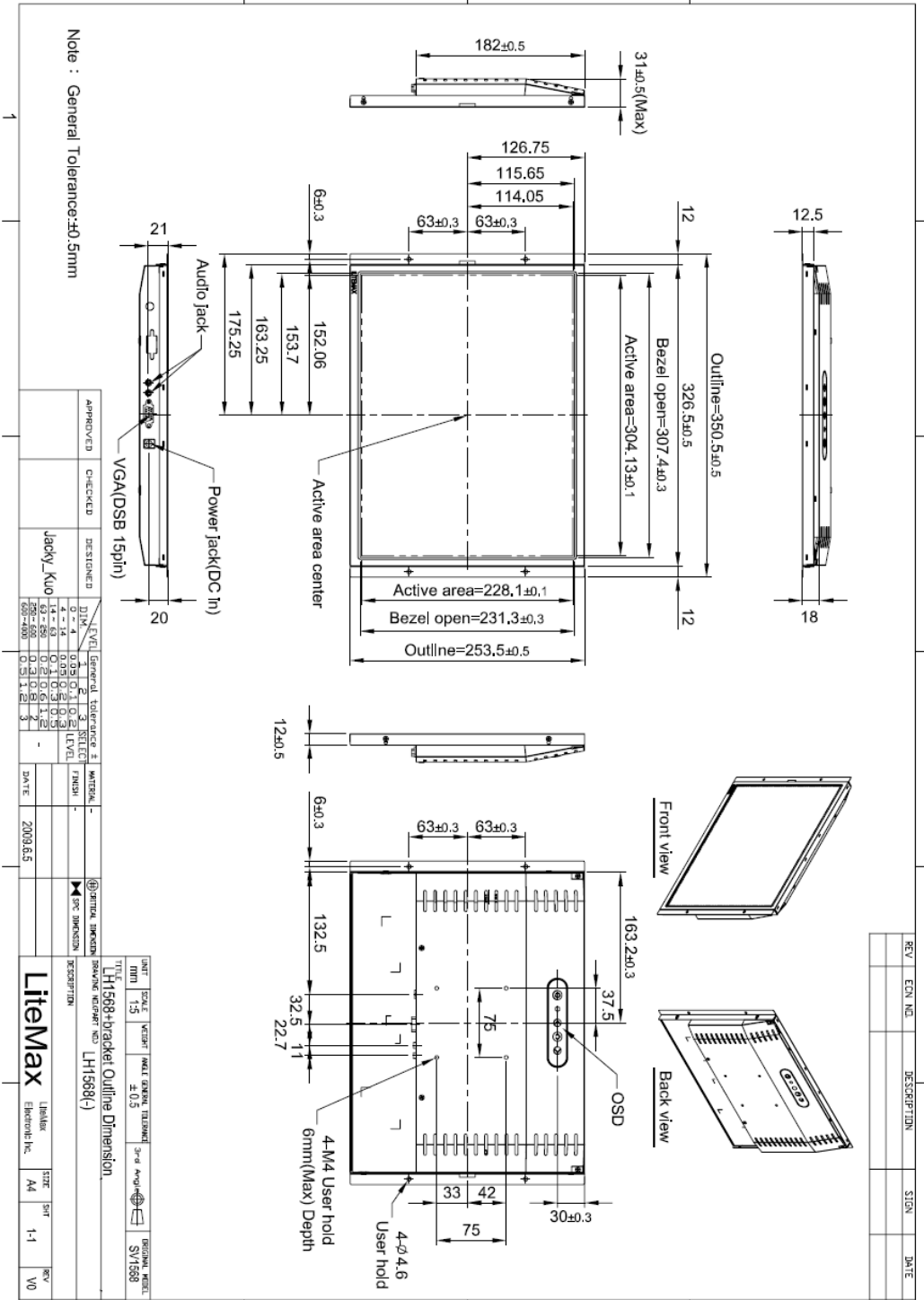
DLF1568-ENN-A01 ME Drawing



SLD1568-ENB-A01 ME Drawing



SLO1568-ENB-A01 ME Drawing



Note : General Tolerance:±0.5mm

APPROVED	CHECKED	DESIGNED	DRAWN	DATE	SCALE	UNIT	DESCRIPTION
		Jacky_Kuo		2008.6.5	1:1	mm	LHI588-Hyacket Outline Dimension

GENERAL TOLERANCE	FINISH	DATE
0 - 4	0.1	2008.6.5
4 - 14	0.15	
14 - 30	0.2	
30 - 60	0.25	
60 - 120	0.3	
120 - 250	0.4	
250 - 500	0.5	

REV	ENR. NO.	DESCRIPTION	SIGN	DATE

6.0 PRECAUTIONS

6.1 HANDLING PRECAUTIONS

- (1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
- (2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
- (3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
- (5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
- (6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
- (9) Do not disassemble the module.
- (10) Do not pull or fold the lamp wire.
- (11) Pins of I/F connector should not be touched directly with bare hands.

6.2 STORAGE PRECAUTIONS

- (1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
- (3) It may reduce the display quality if the ambient temperature is lower than 10 °C. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

6.3 OPERATION PRECAUTIONS

- (1) Do not pull the I/F connector in or out while the module is operating.
- (2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.