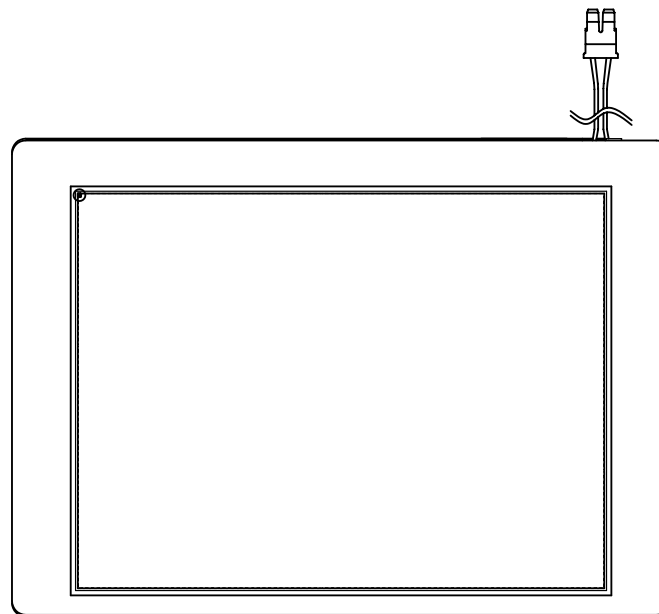




PRODUCT SPECIFICATION

HDA570V-V

VGA (640x480) ,TFT COLOR GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC.
10080 BUBB RD.
CUPERTINO, CA 95014

Q.A.:

ZW

REV:

3.0

HDA570V-V

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Application

This specification is applied to the 5.7 inch VGA supported TFT-LCD module, and can display true 262,144 colors(6 bit/ color). The module is designed for OA, Car TV application and other electronic products which require flat panel display of digital signal interface. This module is composed of a 5.7" TFT-LCD panel, a driver circuit and backlight unit.

Features

- VGA (640×480 pixels) resolution.
- Digital 18 bit parallel RGB.
- Dot inversion mode with stripe type.

General Specifications

Item	Specifications	Unit
Screen Size	5.7 (Diagonal)	inch
Display Format	640RGB(H)×480(V)	dot
Active Area	115.2(H)×86.4(V)	mm
Dot Size	0.060(H)×0.180(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Anti-Glare	-
Viewing Direction	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	144.0(W)×104.6(H)×13.0(D)	mm
Weight	(216)	g

Absolute Maximum Ratings

Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T _{ST}	-30	+80	°C	(1)
Operating Ambient Temperature	T _{OP}	-20	+70	°C	(1)

Note (1) Temperature and relative humidity range are shown in the figure below.

(a) 90%RH Max. ($T_a \leq 40^{\circ}\text{C}$).

(b) Wet-bulb temperature should be 39°C Max. ($T_a > 40^{\circ}\text{C}$).

(c) No condensation.

Electrical Absolute Ratings

TFT-LCD Module

($T_a = 25 \pm 2^{\circ}\text{C}$, GND=VSS=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	VCC	-0.3	4.3	V	-

Backlight Unit

($T_a = 25 \pm 2^{\circ}\text{C}$)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I _B	-	175	mA	(1)
Reverse voltage	V _R	-	15	V	(1)

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

Electrical Characteristics

TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	VCC	3.0	3.3	3.6	V	-
Input High Threshold Voltage	VIH	0.7VCC	-	VCC	V	-
Input Low Threshold Voltage	VIL	0	-	0.3VCC	V	-
Power Consumption	PL	-	(0.86)	-	W	(1)
Frame Frequency	FV	-	60	-	Hz	-
Dot Clock	DCLK	-	25.175	-	MHz	-

Note (1) The specified power consumption is under the conditions at VCC=3.3V,
FV=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray



Active Area

Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Current of Backlight Unit	IB	-	140	-	mA	-
Voltage of Backlight Unit	VB	-	9.9	-	V	IB=140mA
Power Consumption	PBL	-	(1.39)	-	W	IB=140mA
LED Life Time(25°C)	-	40000	50000	--	hr	(1)

Note (1) : LED life time is defined as under 25±2°C , when the average brightness
decrease to 50% of original brightness

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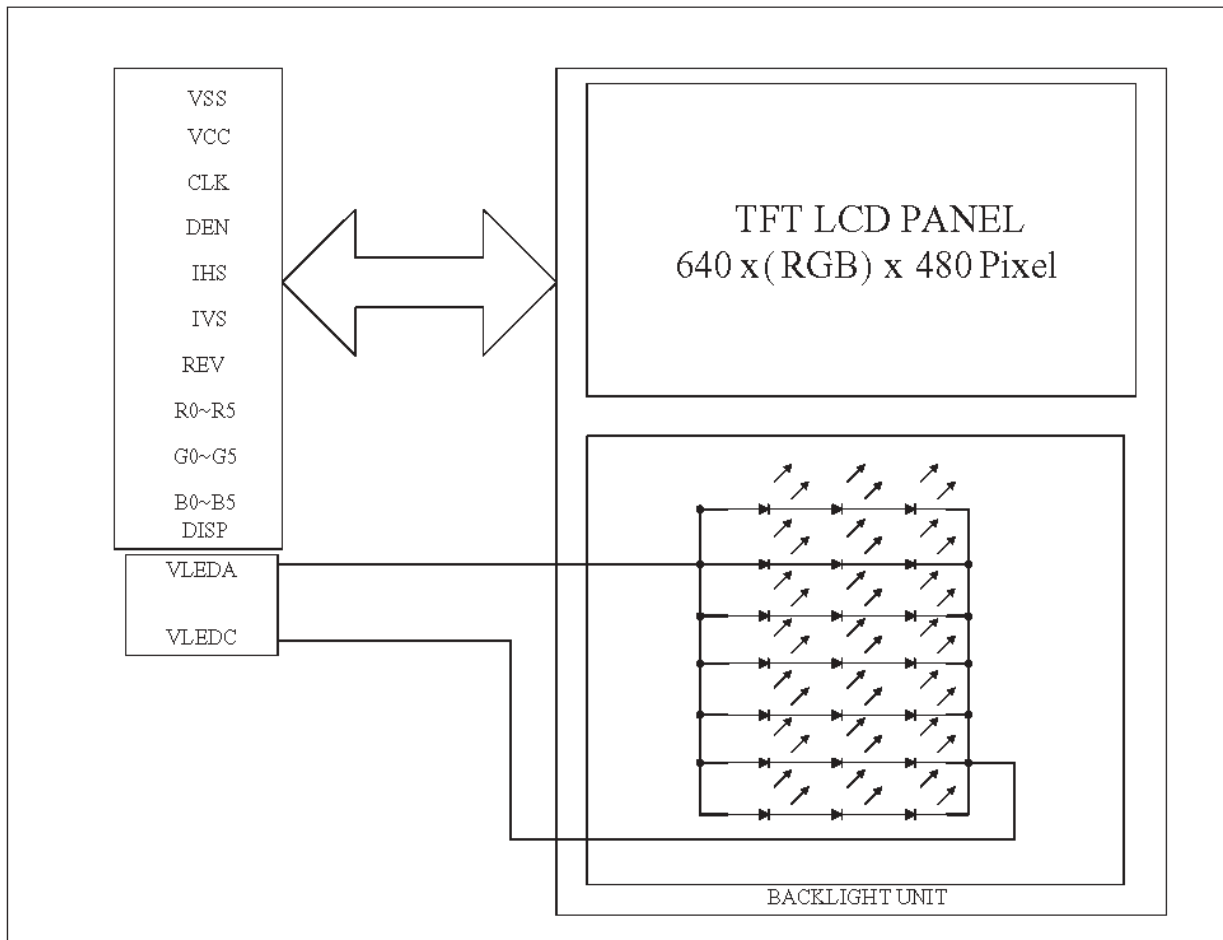
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Block Diagram

TFT-LCD Module with Backlight Unit



Input / Output Terminals Pin Assignment

TFT-LCD Module

Connector: CVILUX CF25331D0R0-05

Pin No.	Symbol	I/O	Description
1	VSS	I	Ground
2	CLK	I	Clock signal
3	IHS	I	Horizontal synchronous signal
4	IVS	I	Vertical synchronous signal
5	VSS	I	Ground
6	R0	I	RED data (LSB)
7	R1	I	RED data
8	R2	I	RED data
9	R3	I	RED data
10	R4	I	RED data
11	R5	I	RED data(MSB)
12	VSS	I	Ground
13	G0	I	GREEN data(LSB)
14	G1	I	GREEN data
15	G2	I	GREEN data
16	G3	I	GREEN data
17	G4	I	GREEN data
18	G5	I	GREEN data(MSB)
19	VSS	I	Ground
20	B0	I	Blue data(LSB)
21	B1	I	Blue data
22	B2	I	Blue data
23	B3	I	Blue data
24	B4	I	Blue data
25	B5	I	Blue data(MSB)
26	VSS	I	Ground
27	DEN	I	Input data enable control
28	VCC	I	+3.3V power supply
29	VCC	I	+3.3V power supply

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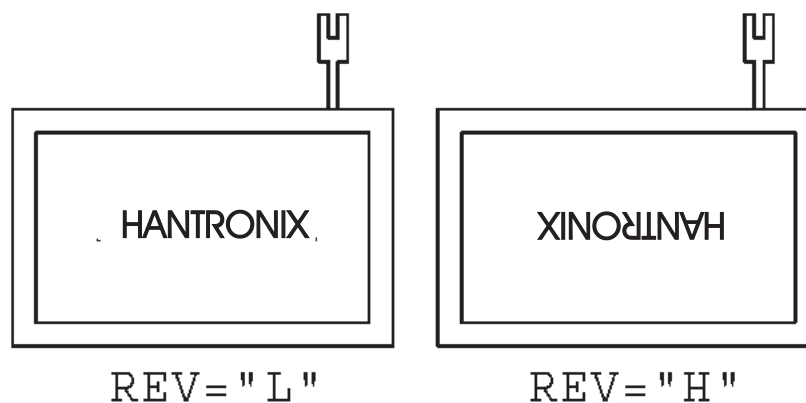
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Pin No.	Symbol	I/O	Description
30	REV	I	Selection signal for horizontal/ vertical scanning direction. Note (1)
31	VSS	I	Ground
32	NC	I	No connection
33	VSS	I	Ground

Note (1)



Backlight Unit

Connector: JST BHSR-02VS-1(N)

Pin No.	Symbol	I/O	Description	Wire Color
1	VLEDA	I	Backlight LED Anode.	Red
2	VLEDC	I	Backlight LED Cathode.	Black

Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 6 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

Color		Data Signal																	
		Red						Green						Blue					
		D05	D04	D03	D02	D01	D00	D15	D14	D13	D12	D11	D10	D25	D24	D23	D22	D21	D20
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	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
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	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	Red(0) / Dark	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	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	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	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	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	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

Interface Timing

Input Signal Characteristics

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
HS setup time	T_{hst}	10	-	-	ns
HS hold time	T_{hhd}	10	-	-	ns
VS setup time	T_{vst}	10	-	-	ns
VS hold time	T_{vhd}	10	-	-	ns
Data setup time	T_{dsu}	10	-	-	ns
Data hold time	T_{dhd}	10	-	-	ns
DEN setup time	T_{esu}	10	-	-	ns
VS falling to HS falling time on odd field @ RGB mode	T_{HV_O}	-4	0	+4	T_{CPH}
VS falling to HS falling time on even field @ RGB mode	T_{HV_E}	0.4	0.5	0.6	T_H

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	F_{CPH}	-	25.175	-	MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-DEN time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when $STHD[5:0]=00000$)

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The diagram shows the timing for the 7-bit data bus (DX[7:0]). The signals are DEN, CLK, and DX[7:0]. The data bus is divided into four segments: 'First data', '2nd data', and 'Last data'. The timing parameters are defined as follows:

- T_{csu} : Setup time for DEN before CLK.
- T_{cph} : Hold time for DEN after CLK.
- T_{cwh} : Setup time for CLK before data.
- T_{cwl} : Hold time for CLK after data.
- T_{dsu} : Setup time for data before CLK.
- T_{dhd} : Hold time for data after CLK.
- T_{vst} : Setup time for VS before HS.
- T_{vhd} : Hold time for VS after HS.
- T_{hst} : Setup time for HS before data.
- T_{hhd} : Hold time for HS after data.
- T_h : Hold time for data after HS.

Timing diagram for the 7-bit data bus (D0-D6) during a read operation. The diagram shows the relationship between the clock (CLK), high strobe (HS), data enable (DEN), and the data bus signals. The data bus is divided into three sections: D0[7:0], D1[7:0], and D2[7:0]. Each section shows 'Invalid data' during the setup time (TWH) before the high strobe (HS) goes high. After HS goes high, the data is valid for a hold time (THS) and then returns to invalid data after the total hold time (TFP). The data bus signals are labeled R1-R6, G1-G6, and B1-B6, with their respective read data (R N-2, R N-1, R N) and write data (G N-2, G N-1, G N, B N-2, B N-1, B N) shown.

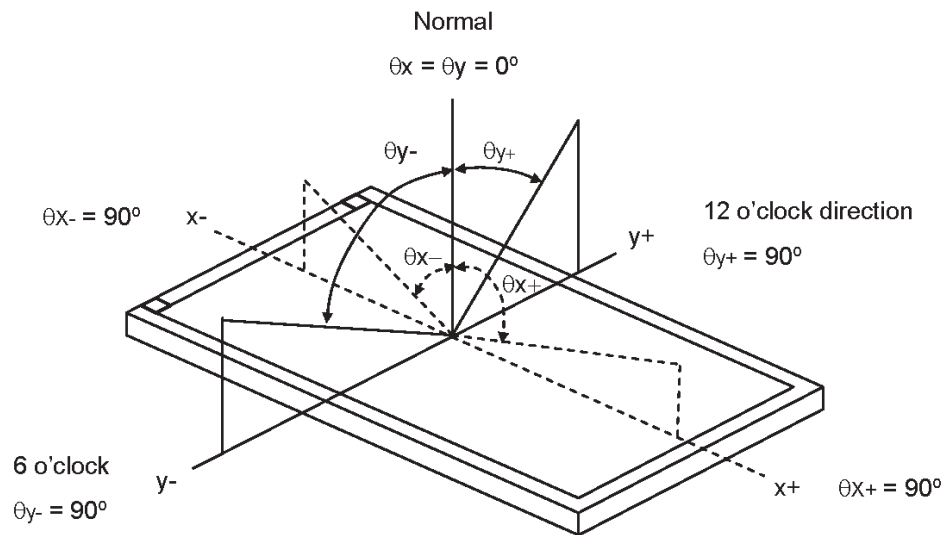
The diagram illustrates the timing of HS (Horizontal Sync) and VS (Vertical Sync) signals for ODD and EVEN fields. The top part shows the full field sequence, with HS and VS signals. The bottom part shows zoomed-in views of the HS and VS signals at the start of each field, with time intervals T_{HV_O} and T_{HV_E} indicated.

Optical Characteristics

The optical characteristics should be measured in a dark environment (≤ 1 lux) or equivalent state with the methods shown in Note (4).

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR		200	(350)	-	-	(2)
Response Time		T_R		-	15	-	ms	(3)
		T_F		-	35	-	ms	
Luminance(Center)		Y		300	(380)	-	cd/m ²	(4)
Brightness uniformity		BUNI		80	(85)	-	%	(5)
Color Chromaticity	Red	R _x	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	(0.565)	(0.615)	(0.665)	-	(1),(4)
		R _y		(0.302)	(0.352)	(0.402)	-	
	Green	G _x		(0.281)	(0.331)	(0.381)	-	
		G _y		(0.520)	(0.570)	(0.620)	-	
	Blue	B _x		(0.093)	(0.143)	(0.193)	-	
		B _y		(0.033)	(0.083)	(0.133)	-	
	White	W _x		(0.279)	(0.329)	(0.379)	-	
		W _y		(0.315)	(0.365)	(0.415)	-	
Viewing Angle	Horizontal	θ_{x+}	CR $\geq$ 10	(55)	(65)	-	deg.	
		θ_{x-}		(55)	(65)	-		
	Vertical	θ_{y+}		(55)	(60)	-		
		θ_{y-}		(55)	(70)	-		

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



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

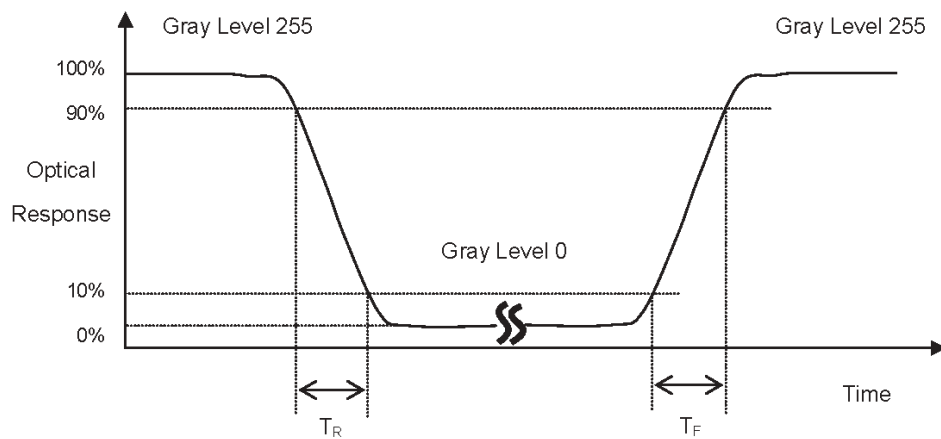
Measured at the center point of panel

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

L_{255} : Luminance of gray level 255

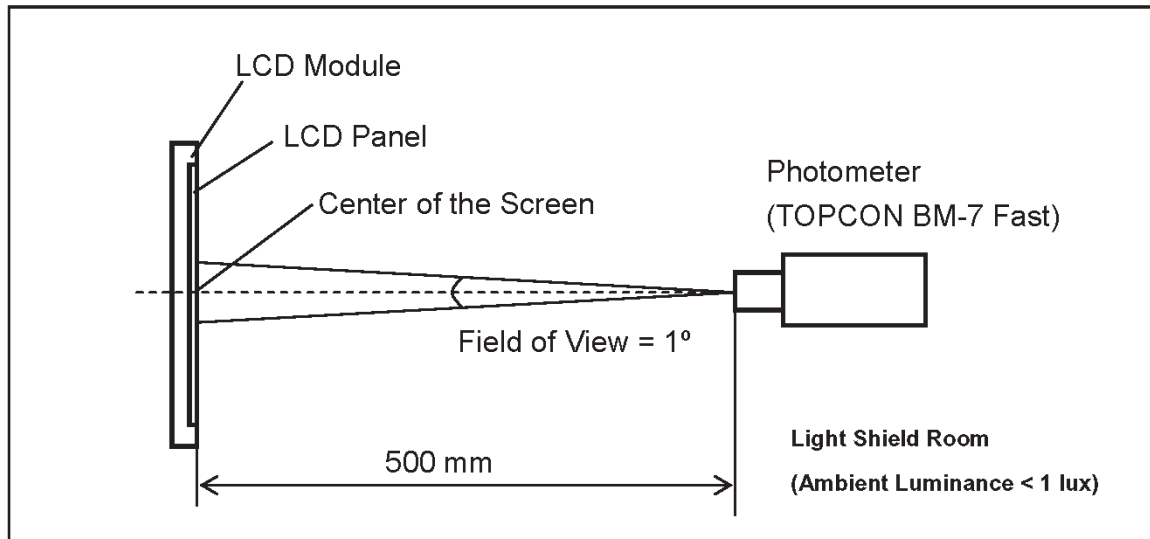
L_0 : Luminance of gray level 0.

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



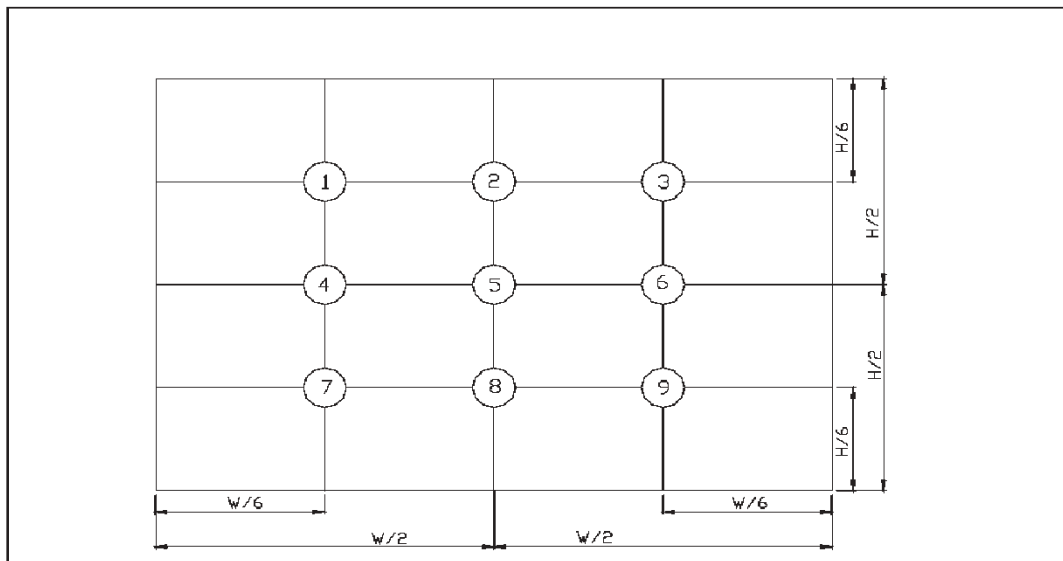
Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (5) Definition of brightness uniformity

Brightness uniformity=(Min Luminance of 9 points)/(Max Luminance of 9 points)×100%



(単位 : mm)

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Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T _a = 80℃ 240 hours	-
2	Low Temperature Storage Test	T _a = -30℃ 240 hours	-
3	High Temperature Operation Test	T _a = 70℃ 240 hours	-
4	Low Temperature Operation Test	T _a = -20℃ 240 hours	-
5	High Temperature and High Humidity Operation Test	T _a =60℃ 90%RH 240 hours	-
6	Electro Static Discharge Test (non-operating)	-Panel Surface/Top Case : 150pF, 330Ω Air: ±15kV, Contact: ±8kV	-
7	Mechanical Shock Test (non-operating)	Half sine wave, 80G, 11ms 3 times shock of each six surfaces	-
8	Vibration Test (non-operating)	Sine wave, 10 ~ 55 ~ 10Hz, 3 axis, 2 hours/axis	-
9	Thermal Shock Test	-20℃ (1h) ~ 70℃, 200 cycles, 30min 30min	-
10	Drop Test(with Carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	-

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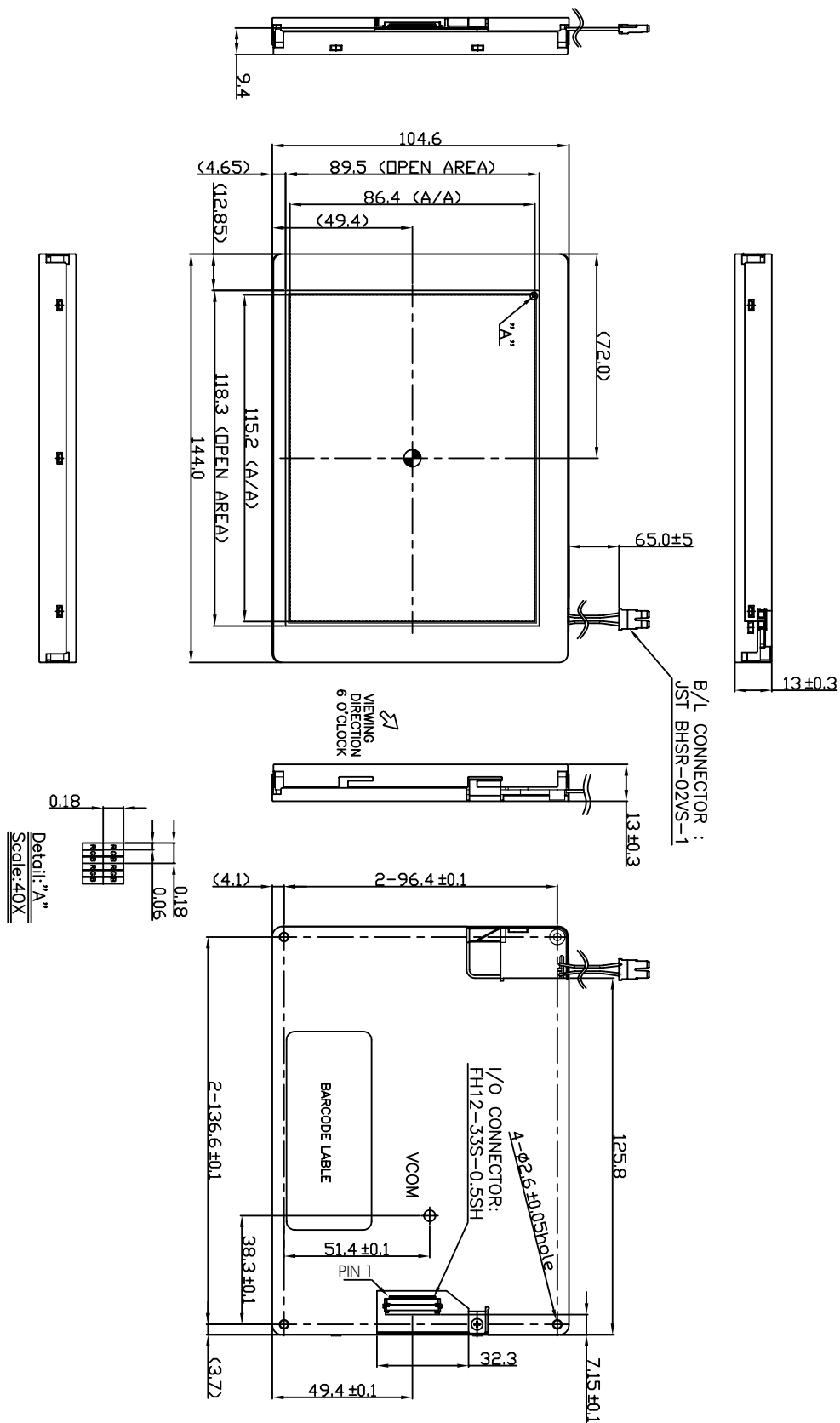
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