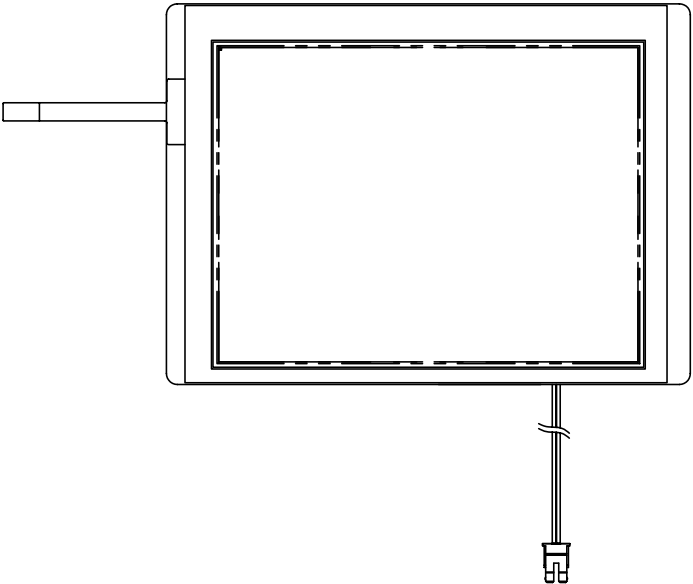




PRODUCT SPECIFICATION

HDA570ST-VH

QVGA , TFT COLOR GRAPHICS
LCD DISPLAY MODULE
HIGH BRIGHTNESS VERSION



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.:	REV:	HDA570ST-VH	SHEET 1 OF 18
	ZW	1.0		DATE: 7/15/08

Application

This specification is applied to the 5.7 inch QVGA 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 LED backlight unit and used as the input devices for general electric appliances via both finger and pen-entry.

Features

- QVGA (320×240 pixels) resolution.
- Digital 18 bit parallel RGB.
- Line inversion mode with stripe type.
- SYNC mode is supported for digital RGB input data format.
- Transparent Touch panel
 - 4-Wire
 - Analog Resistive

General Specifications

Item	Specifications	Unit
Screen Size	5.7 (Diagonal)	inch
Display Format	320RGB(H)×240(V)	dot
Active Area	115.2(H)×86.4(V)	mm
Dot Size	0.120(H)×0.360(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Anti-Glare and Hard Coating(3H)	-
Viewing Direction	12 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	144.0(W)×104.6(H)×14.5(D)	mm
Weight	(193)	g

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.:	REV.:	HDA570ST-VH	SHEET 2 OF 18
	Z.W.	1.0		DATE: 7/15/08

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. (Ta ≤ 40°C).
- (b) Wet-bulb temperature should be 39°C Max. (Ta > 40°C).
- (c) No condensation.

Electrical Absolute Ratings
TFT-LCD Module

(Ta=25±2°C, GND=V_{SS}=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	V _{CC}	-0.3	4.3	V	-

7.2.2 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I _B	-	250	mA	(1)
Reverse Voltage	V _B	-	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	V _{CC}	3.0	3.3	3.6	V	-
Power Supply Current	I _{CC}	-	(50)	70	mA	(1)
Input High Threshold Voltage	V _{IH}	0.7V _{CC}	-	V _{CC}	V	-
Input Low Threshold Voltage	V _{IL}	0	-	0.3V _{CC}	V	-
Power Consumption	P _L		(0.165)	0.231	W	(1)
Frame Frequency	F _V	-	60	-	Hz	-
Dot Clock	CLK	-	6.4	7	MHz	-

Note (1) The specified power consumption is under the conditions at V_{CC}=3.3V,
 F_V=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	I _B	-	200	-	mA	-
Voltage of Backlight Unit	V _B	-	10	-	V	I _B =200mA
Power Consumption	P _{BL}	-	2	-	W	I _B =200mA
LED Life Time(25°C)	-	40000	-	-	hr	(1)

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

Transparent Touch panel

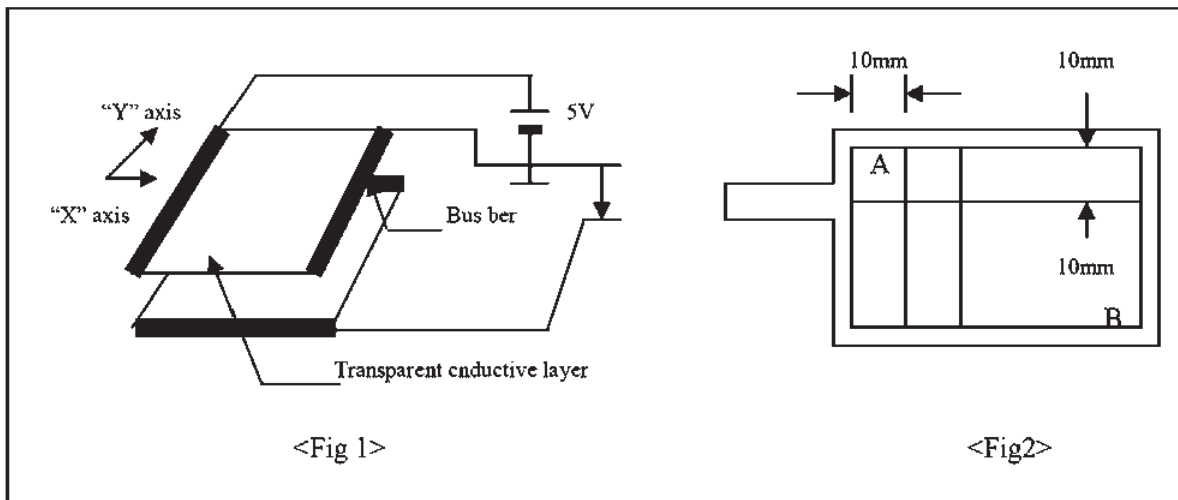
Electrical characteristics

Item	Value			Unit	Note	
	Min.	Typ.	Max.			
Operating Voltage	-	5	7	V	-	
Terminal Resistance	X-direction	290	-	880	Ω	At connector
	Y-direction	260	-	530	Ω	At connector
Insulation Resistance	$\geq 20M\Omega$				At DC25V	
Linearity	$\leq 1.5\%$				(1)	
Chatting	$\leq 10\text{ ms}$				At connector	

Note(1): How to measure the linearity

Definition of linearity :

In Fig. 1, when the DC 5V is applied to the "X" directional electrode and "Y" directional electrode of panel alternately, the voltage between the depressed point and the reference surface shall be the output voltage in X and Y surface (E_{ox} and E_{oy}). As shown in Fig. 2, measure the point on 10mm grid enclosed by the positions "A" and "B", which are located at the inside of visible area the specified distance away from the edge, has been depressed.



When the output voltage corresponding to every measurement position is plotted as shown in Fig. 3, the difference between the voltage enclosed by the positions "A" and "B" and the output voltage at the same position shall be " ΔE_x " (or " ΔE_y ") and the electric potential difference E_{AB} in X surface, " E_{ABx} " (or E_{AB} in Y surface, " E_{ABy} ") between "A" and "B" shall be defined as the linearity.

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1.0

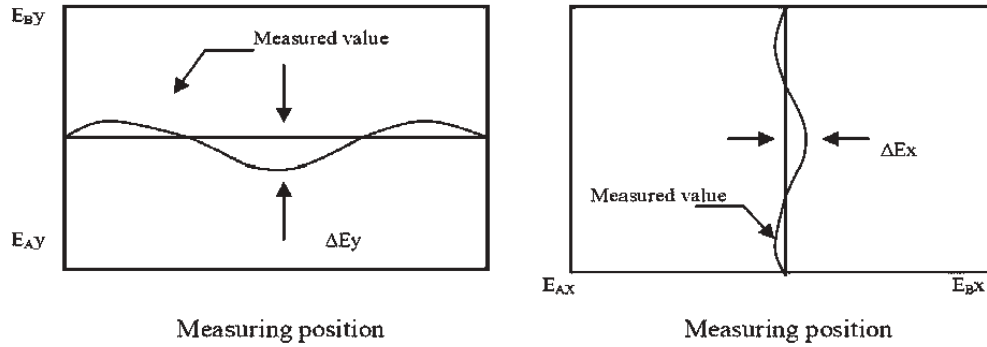
HDA570ST-VH

SHEET 5 OF 18

DATE: 7/15/08

Linearity of transparent table (X) = $(\Delta E_x / E_{ABx}) \times 100\%$

Linearity of transparent table (Y) = $(\Delta E_y / E_{ABY}) \times 100\%$



<Fig 3>

Measurement of linearity

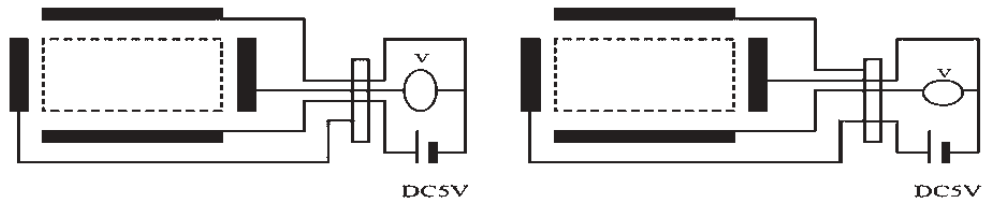
A measured value shall be a maximum value in absolute value tolerance when every nodal point on a grid shown in Fig. 5 has been pressed under wiring conditions described in Fig. 4.

<Hitting conditions>

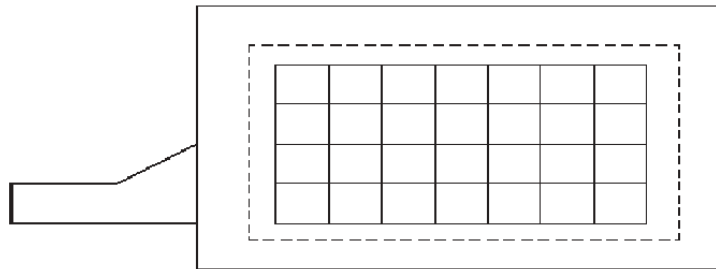
Load : 70 ~ 100g with R0.8 mm polyacetal stylus pen

Measuring area : 1.0mm inside the edge of touch panel active area

<Measuring circuit>



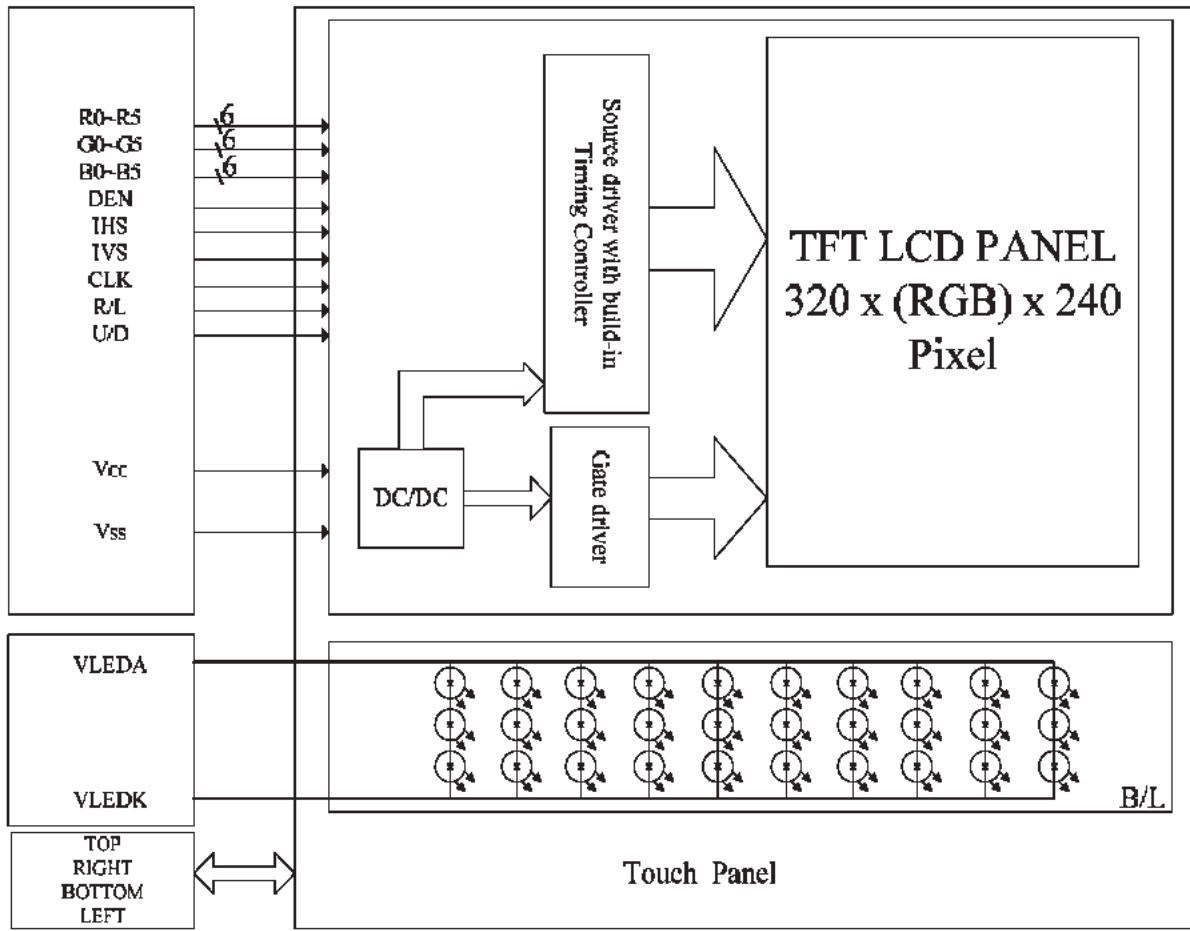
<Fig 4>



<Fig 5>

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.:	REV.:	HDA570ST-VH	SHEET 6 OF 18
	Z.W.	1.0		DATE: 7/15/08

Block Diagram



Input / Output Terminals Pin Assignment TFT-LCD Module

Connector: CVILUX CF25331D0R0-05

Pin No.	Symbol	I/O	Description
1	V _{SS}	I	Ground
2	CLK	I	Clock signal
3	IHS	I	Horizontal synchronous signal
4	IVS	I	Vertical synchronous signal
5	V _{SS}	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	V _{SS}	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	V _{SS}	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	V _{SS}	I	Ground
27	DEN	I	Input data enable control
28	V _{CC}	I	+3.3V power supply
29	V _{CC}	I	+3.3V power supply
30	R/L	I	Right-and-Left scan setting. ("L" : Normally , "H" : Right-and-Left reversal) .Note(1)

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.:	REV.:	HDA570ST-VH	SHEET 8 OF 18
	Z.W.	1.0		DATE: 7/15/08

Pin No.	Symbol	I/O	Description
31	U/D	I	Up/down scan setting. ("H": normal scan. "L": Up-and-Down reversal.) Note(1)
32	NC	I	No connection
33	V _{SS}	I	Ground

Note (1)



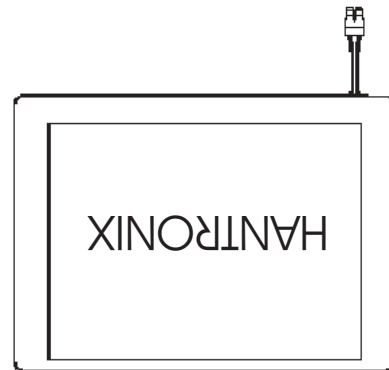
R/L=L,U/D=H



R/L=H,U/D=H



R/L=L,U/D=L



R/L=H,U/D=L

Backlight Unit

Connector: JST BHSR-02VS-1

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

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Q.A.:
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REV.:
1.0

HDA570ST-VH

SHEET 9 OF 18

DATE: 7/15/08

Transparent Touch Panel

Connector: CVILUX CF25041D0R0-10

Pin No.	Symbol
1	TOP
2	RIGHT
3	BOTTOM
4	LEFT

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					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
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	1	0	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

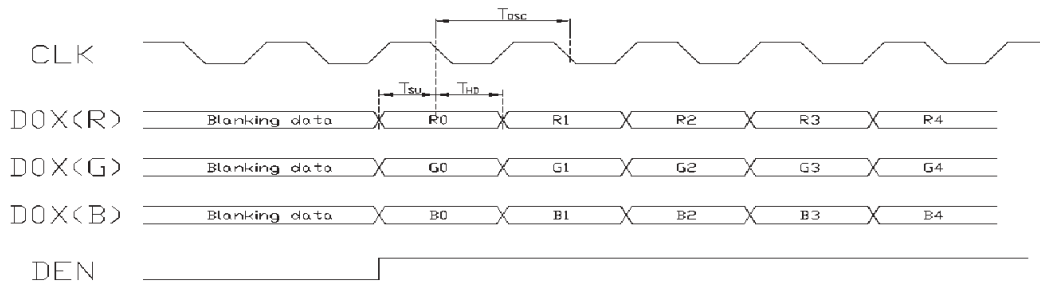
**Interface Timing
Input Signal Characteristics**

PARAMETER	Symbol	Min.	Typ.	Max.	Unit	
CLK period	T_{osc}	-	156	-	ns	
Data setup time	T_{su}	12	-	-	ns	
Data hold time	T_{hd}	12	-	-	ns	
IHS period	T_H	-	408	-	T_{osc}	
IHS pulse width	T_{HS}	5	30	-	T_{osc}	
IHS setup time	T_{Cr}	12	-	-	ns	
IHS hold time	T_{Cf}	12	-	-	ns	
IVS pulse width	T_{VS}	1	3	5	T_H	
IVS setup time	T_{Vr}	12	-	-	ns	
IVS hold time	T_{Vf}	12	-	-	μs	
IVS-DEN time	NTSC	T_{VSE}	-	18	-	T_H
	PAL	T_{VSE}	-	26	-	T_H
IHS-DEN time	T_{HE}	36	68	88	T_{osc}	
DEN pulse width	T_{EP}	-	320	-	T_{osc}	
DEN-STH time	T_{DES}	-	1	-	T_{osc}	
IVS period	NTSC	-	-	262.5	-	T_H
	PAL	-	-	312.5	-	T_H

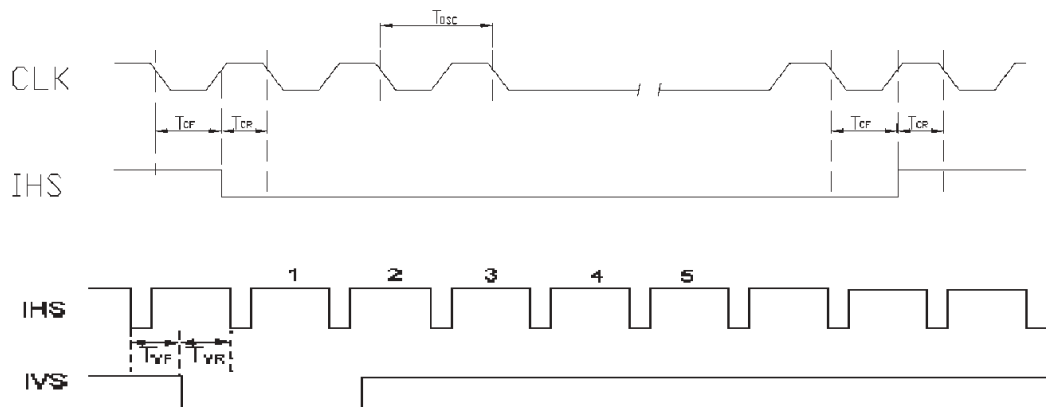
Note: When SYNC mode is used, 1st data start from 68th CLK after IHS falling.

Waveform

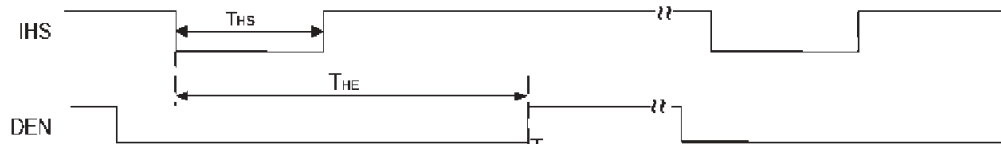
Clock and Data Waveform



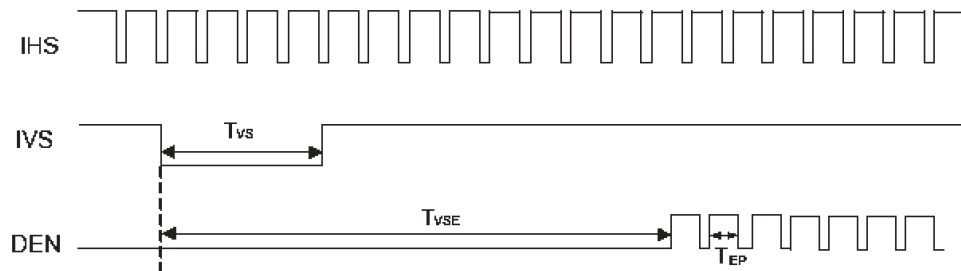
Clock and Sync waveforms



IHS and horizontal control timing waveforms



IHS and vertical control timing waveforms



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	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	300	(450)	-	-	(2)	
Response Time	T_R		-	15	-	ms	(3)	
	T_F		-	35	-	ms		
Luminance(Center)	Y		520	(560)	-	cd/m ²	(4)	
Brightness uniformity	BUNI		75	(80)	-	%	(5)	
Color Chromaticity	Red		Rx	(0.578)	(0.628)	(0.678)	-	(1),(4)
			Ry	(0.291)	(0.341)	(0.391)	-	
	Green		Gx	(0.265)	(0.315)	(0.365)	-	
			Gy	(0.530)	(0.580)	(0.630)	-	
	Blue		Bx	(0.087)	(0.137)	(0.187)	-	
		By	(0.065)	(0.115)	(0.165)	-		
	White	Wx	(0.270)	(0.320)	(0.370)	-		
		Wy	(0.316)	(0.366)	(0.416)	-		
Viewing Angle	Horizontal	θ_{x+}	55	(60)	-	deg.		
		θ_{x-}	55	(60)	-			
	Vertical	θ_{y+}	55	(60)	-			
		θ_{y-}	45	(50)	-			

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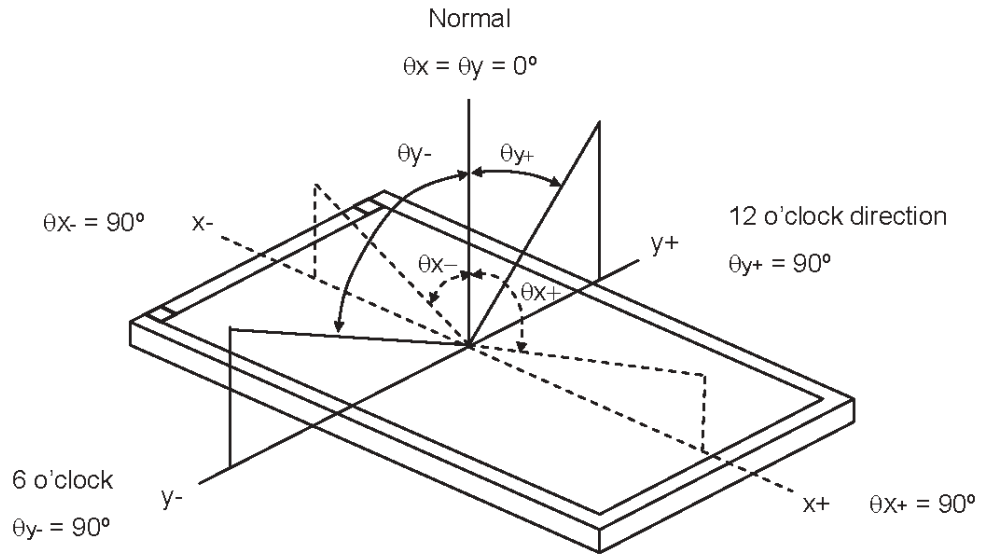
REV.:
1.0

HDA570ST-VH

SHEET 13 OF 18

DATE: 7/15/08

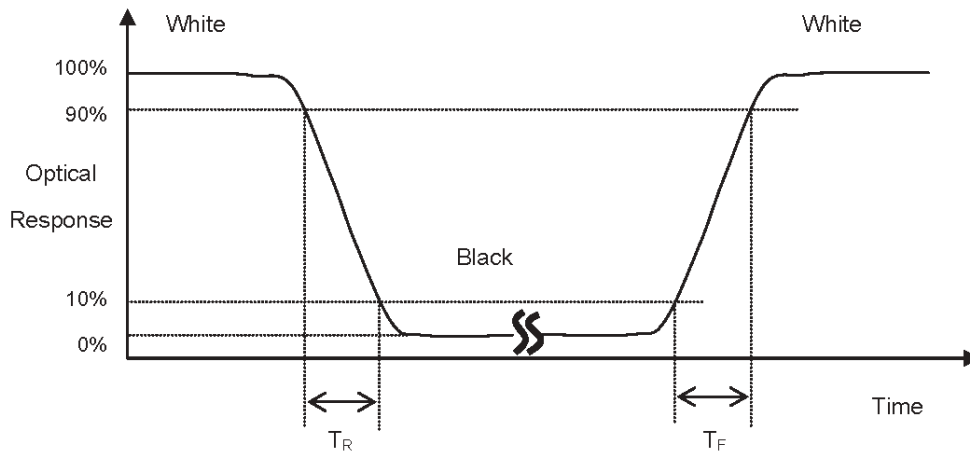
Note (1) Definition of Viewing Angle (θ_x, θ_y):



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

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

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



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Q.A.:
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REV.:
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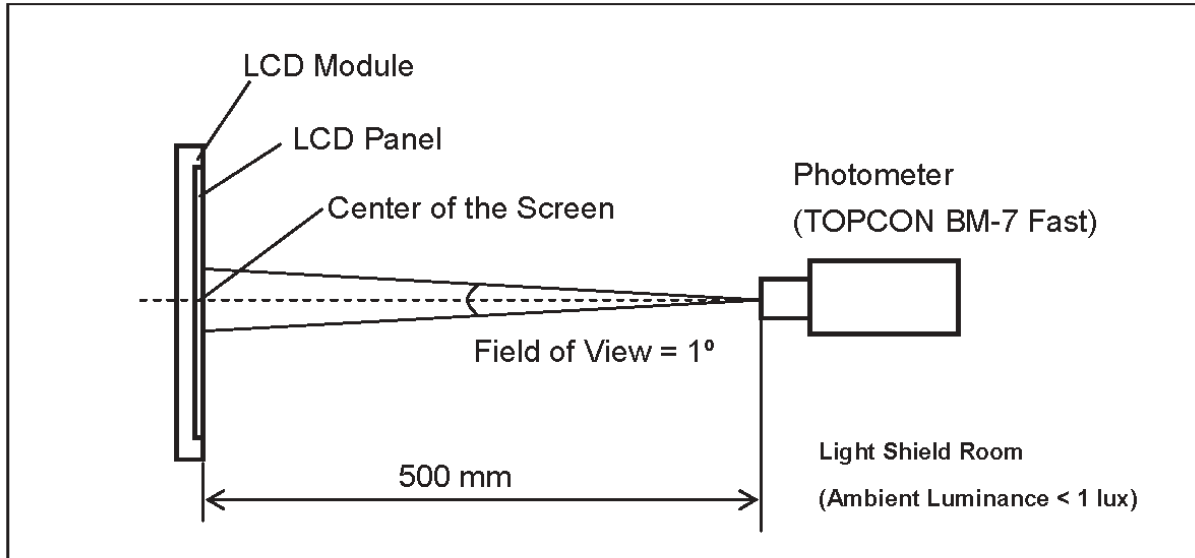
HDA570ST-VH

SHEET 14 OF 18

DATE: 7/15/08

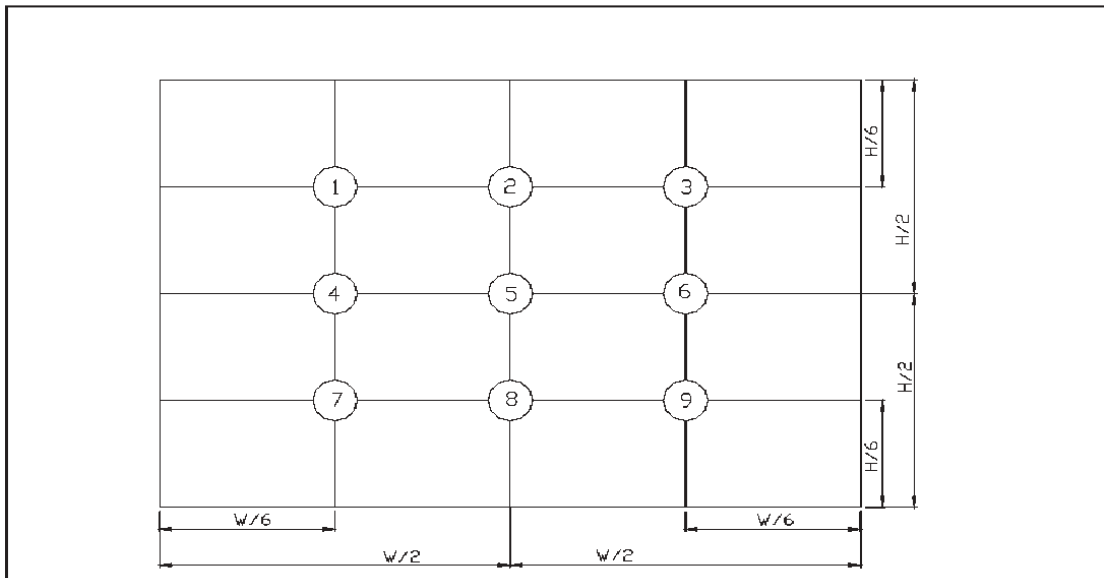
Note (4) Measurement Set-Up:

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%



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.:	REV.:	HDA570ST-VH	SHEET 15 OF 18
	Z.W.	1.0		DATE: 7/15/08

Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T _a = 80°C 240 hours	-
2	Low Temperature Storage Test	T _a = -30°C 240 hours	-
3	High Temperature Operation Test	T _a = 70°C 240 hours	-
4	Low Temperature Operation Test	T _a = -20°C 240 hours	-
5	High Temperature and High Humidity Operation Test	T _a =60°C 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 (non-operating)	-20°C (30min) ~ 70°C (30min), 100 cycles	-
10	Drop Test(with Carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	-

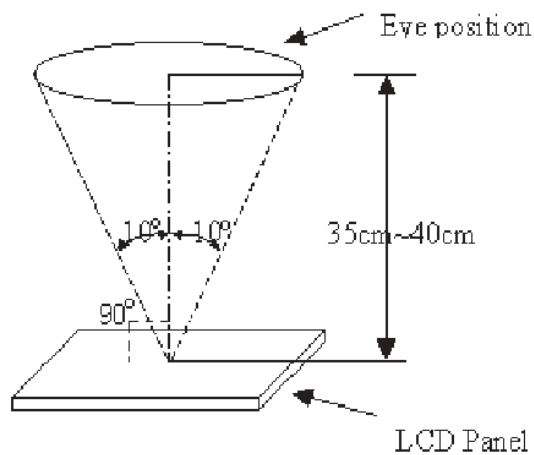
HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.:	REV.:	HDA570ST-VH	SHEET 16 OF 18
	Z.W.	1.0		DATE: 7/15/08

Incoming Inspection Standards

The environmental condition of inspection

The environmental condition and visual inspection shall be conducted as below.

- (1) Ambient temperature $25 \pm 5^\circ\text{C}$
- (2) Humidity: $60 \pm 5\%$ RH
- (3) Viewing distance is approximately 35 ~ 40 cm
- (4) Viewing angle is normal to the LCD panel as Fig_1(10°)
- (5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection

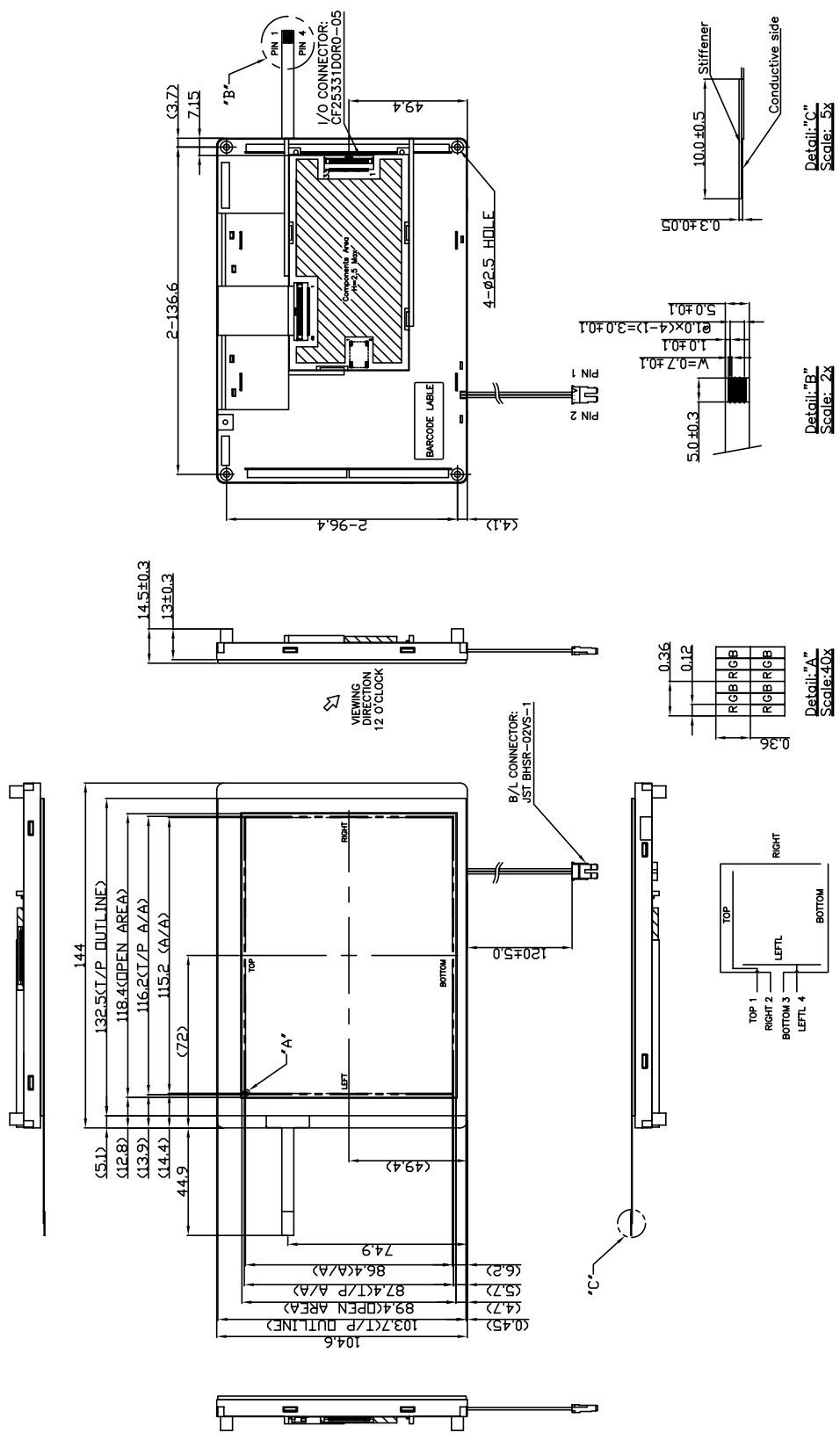


Fig_1

18.2 The defects classify of AQL as following:

Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.:	REV.:	HDA570ST-VH	SHEET 17 OF 18
	Z.W.	1.0		DATE: 7/15/08



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

Q.A.:
 Z.W.

REV.:
 1.0

HDA570ST-VH

SHEET 18 OF 18
 DATE: 7/15/08