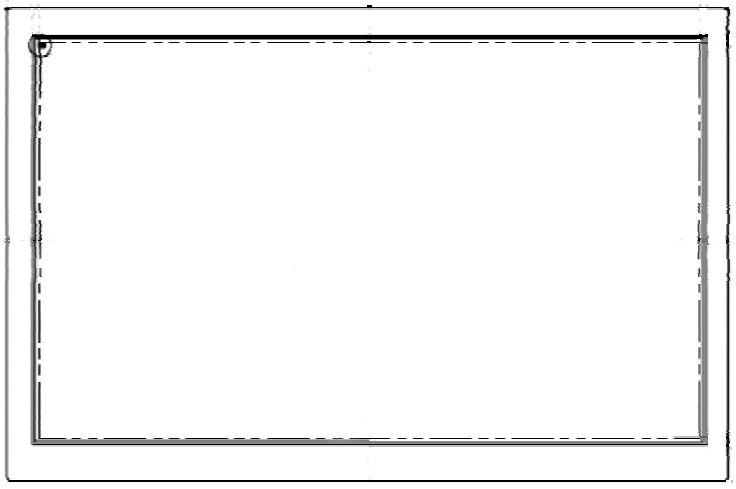
HANTRONIX

PRODUCT SPECIFICATION

HDA700L-L

7”, TFT WVGA (800X480) COLOR LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: ZW	REV.: 1.0	HDA700L-L	SHEET 1 OF 20 DATE: 19/7/10

Application

This specification is applied to the 7 inch WVGA 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 7"TFT-LCD panel, a driver circuit and backlight unit.

Features

- WVGA (800×480 pixels) resolution.
- LVDS Receiver 18 bit Interface
- Dot inversion mode with stripe type.

General Specifications

Item	Specifications	Unit
Screen Size	7 (Diagonal)	inch
Display Format	800RGB(H)×480(V)	dot
Active Area	152.4(H)×91.44(V)	mm
Dot Size	0.0635(H)×0.1905(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	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	166.6(W)×109.4(H)×10.0(D)	mm
LVDS Receiver IC	THine THC63LVDF84B	-
Weight	(165)	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) 85%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	4.0	V	-
LVDS Driver Output Voltage	-	-0.3	V_{CC} + 0.3	V	-

Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Current of Backlight Unit	I_B	-	250	mA	(1)
Voltage of Backlight Unit	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}	-	215	305	mA	(1)
Differential Input High Threshold Voltage	V_{TH}	-	-	100	mV	-
Differential Input Low Threshold Voltage	V_{TL}	-100	-	-	mV	-
Power Consumption	P_L	-	709.5	990	mW	(1)
VSYNC Frequency	F_V	-	60	-	Hz	-
DCLK Frequency	DCLK	-	33.26	-	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

8.2 Backlight Unit

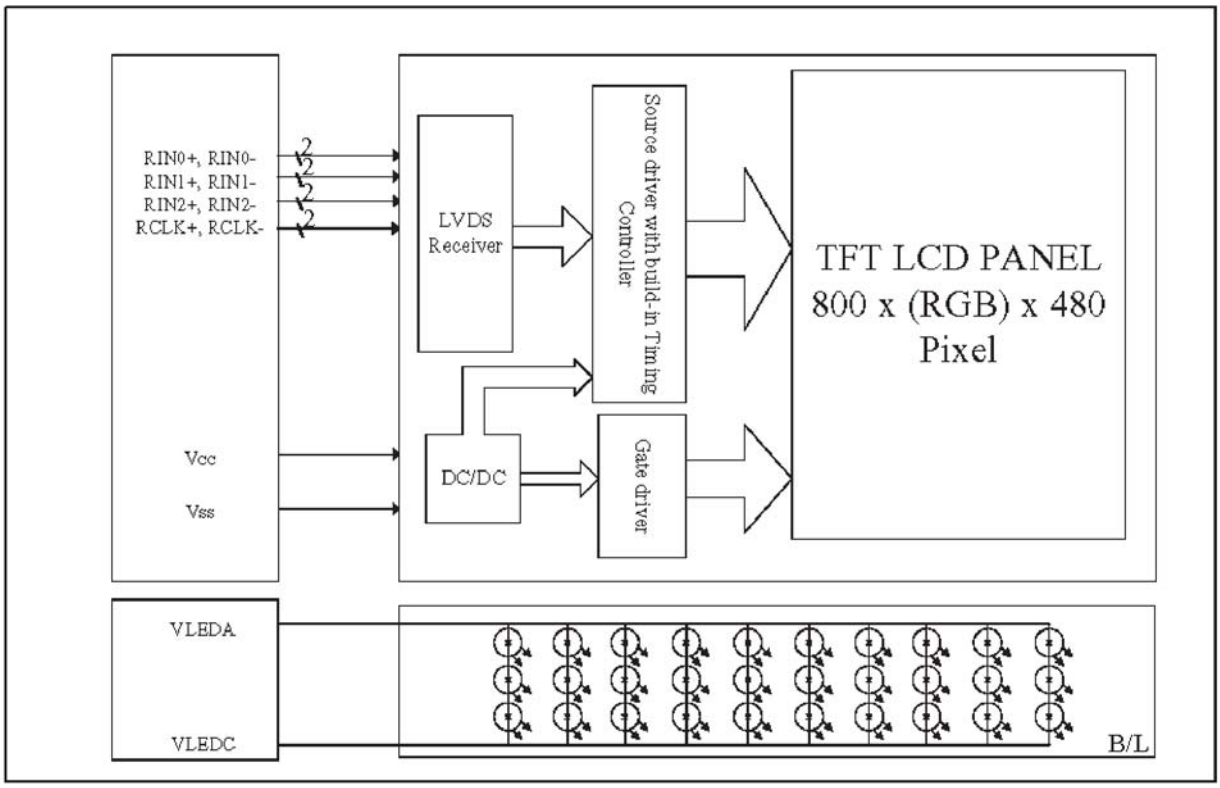
(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Current of Backlight Unit	I_B	-	200	-	mA	-
Voltage of Backlight Unit	V_B	-	9.9	-	V	I_B =200mA
Power Consumption	P_{BL}	-	(1.98)	-	W	I_B =200mA
LED Life Time(25℃)	-	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

Block Diagram

TFT-LCD Module with Backlight Unit



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Input / Output Terminals Pin Assignment

TFT-LCD Module

Connector: HIROSE DF19K-20P-1H

Pin No.	Symbol	I/O	Description
1	V_{CC}	I	+3.3V power supply
2	V_{CC}	I	+3.3V power supply
3	V_{SS}	I	Ground
4	V_{SS}	I	Ground
5	RIN0-	I	Negative LVDS differential data input
6	RIN0+	I	Positive LVDS differential data input
7	V_{SS}	I	Ground
8	RIN1-	I	Negative LVDS differential data input
9	RIN1+	I	Positive LVDS differential data input
10	V_{SS}	I	Ground
11	RIN2-	I	Negative LVDS differential data input
12	RIN2+	I	Positive LVDS differential data input
13	V_{SS}	I	Ground
14	RCLK-	I	Negative LVDS differential clock input
15	RCLK+	I	Positive LVDS differential clock input
16	V_{SS}	I	Ground
17	NC	I	Not connection
18	NC	I	Not connection
19	V_{SS}	I	Ground
20	V_{SS}	I	Ground

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					
		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	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

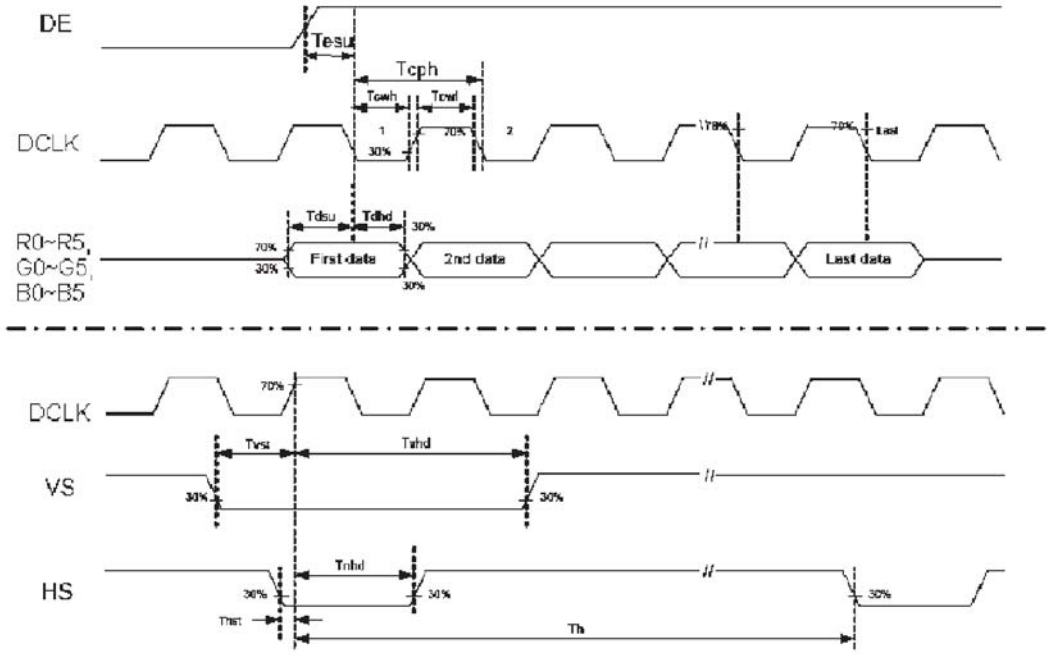
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	F_{CPH}	-	33.26	-	MHz
DCLK period	T_{CPH}	-	30.06	-	ns
DCLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH}+T_{DEL}$
Data setup time	T_{dsu}	6	-	-	ns
Data hold time	T_{dhd}	6	-	-	ns
DE setup time	T_{esu}	6	-	-	ns

LVDS Switching Characteristics

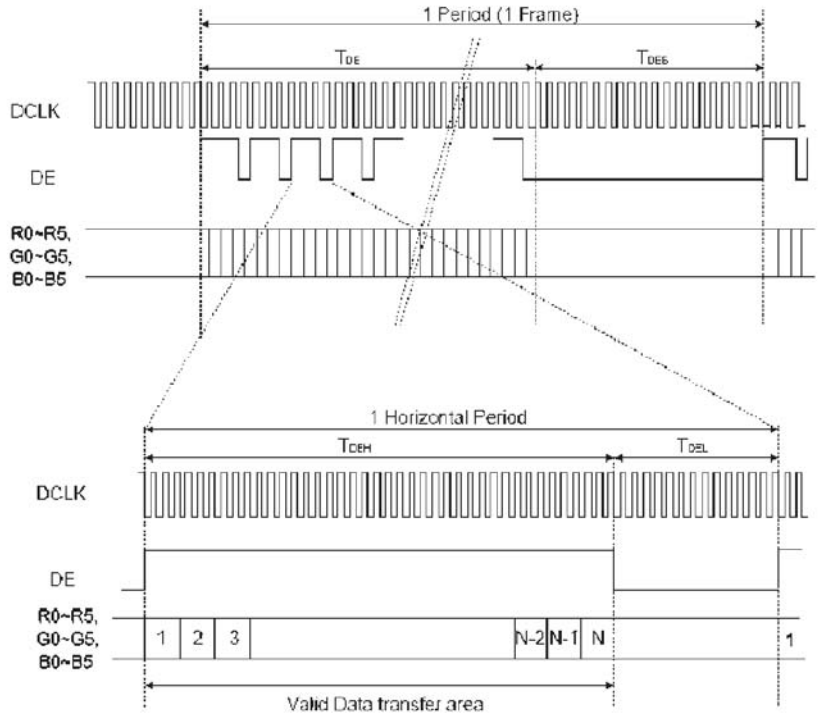
Symbol	Parameter		Min.	Typ.	Max.	Units
t_{RCP}	CLK OUT Period	VCC = 3.0 - 3.6V	11.76	T	50.0	ns
		VCC = 2.5 - 3.6V	14.28	T	50.0	ns
t_{RCH}	CLK OUT High Time			4T/7		ns
t_{RCL}	CLK OUT Low Time			3T/7		ns
t_{RCD}	RCLK +/- to CLK OUT Delay			5T/7		ns
t_{RS}	TTL Data Setup to CLK OUT		0.35T-0.3			ns
t_{RH}	TTL Data Hold from CKL OUT		0.45T-1.6			ns
t_{TLH}	TTL Low to High Transition Time			2.0	3.0	ns
t_{THL}	TTL High to Low Transition Time			1.8	3.0	ns
t_{RIP1}	Input Data Position0 (T = 11.76ns)		-0.4	0.0	0.4	ns
t_{RIP0}	Input Data Position1 (T = 11.76ns)		T/7-0.4	T/7	T/7+0.4	ns
t_{RIP6}	Input Data Position2 (T = 11.76ns)		2T/7-0.4	2T/7	2T/7+0.4	ns
t_{RIP5}	Input Data Position3 (T = 11.76ns)		3T/7-0.4	3T/7	3T/7+0.4	ns
t_{RIP4}	Input Data Position4 (T = 11.76ns)		4T/7-0.4	4T/7	4T/7+0.4	ns
t_{RIP3}	Input Data Position5 (T = 11.76ns)		5T/7-0.4	5T/7	5T/7+0.4	ns
t_{RIP2}	Input Data Position6 (T = 11.76ns)		6T/7-0.4	6T/7	6T/7+0.4	ns
t_{RPLL}	Phase Lock Loop Set				10.0	ms

Waveform

Clock and data input waveforms

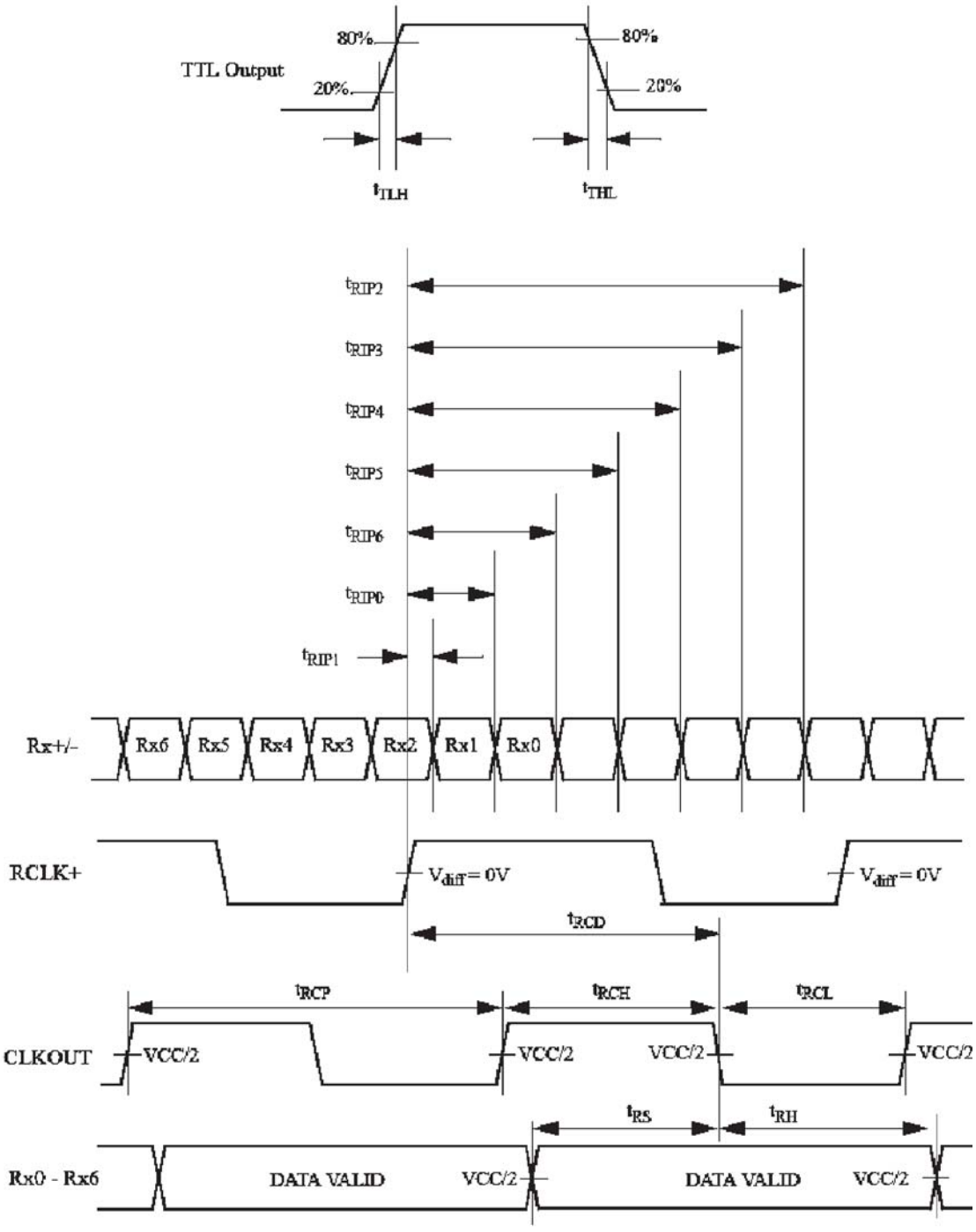


Data input format



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-L	SHEET 10 OF 20 DATE: 19/7/10

LVDS AC Timing



Note:
1) Vdiff = (RA+) - (RA-), ... (RCLK+) - (RCLK-)

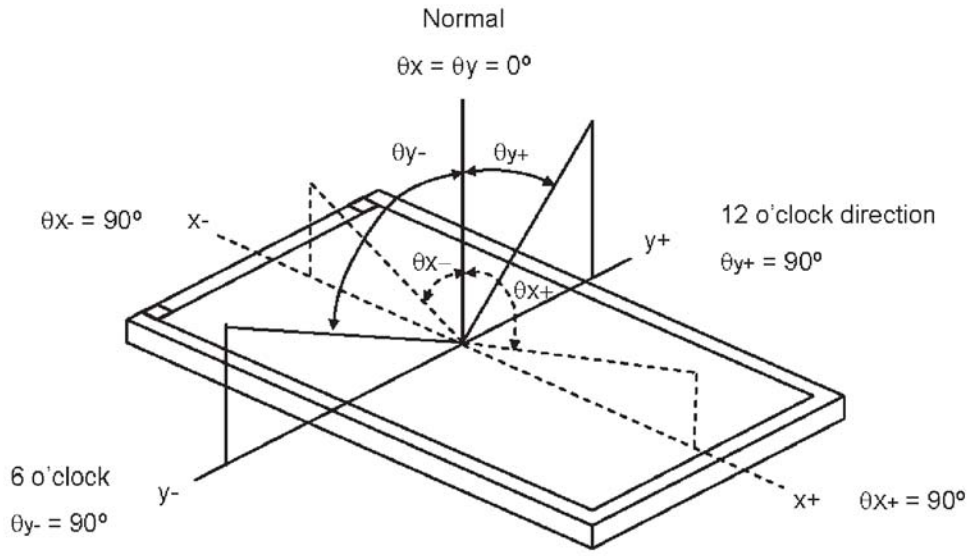
HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-L	SHEET 11 OF 20 DATE: 19/7/10

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	θ_X=0°, θ_Y =0° Viewing Normal Angle	150	(250)	-	-	(2)
Response Time		T_R		-	5	10	ms	(3)
		T_F		-	15	20	ms	
Luminance(Center)		Y		450	(500)	-	cd/m^2	(4)
Brightness uniformity		BUNI		70	(75)	-	%	(5)
Color Chromaticity	Red	Rx		0.530	0.580	0.630	-	(1),(4)
		Ry		0.310	0.360	0.410	-	
	Green	Gx		0.300	0.350	0.400	-	
		Gy		0.530	0.580	0.630	-	
	Blue	Bx		0.100	0.150	0.200	-	
		By		0.090	0.140	0.190	-	
	White	Wx		0.270	0.320	0.370	-	
		Wy		0.300	0.350	0.400	-	
Viewing Angle	Horizontal	θ_X+	CR≥10	55	(65)	-	deg.	
		θ_X-		55	(65)	-		
	Vertical	θ_Y+		45	(55)	-		
		θ_Y-		55	(65)	-		

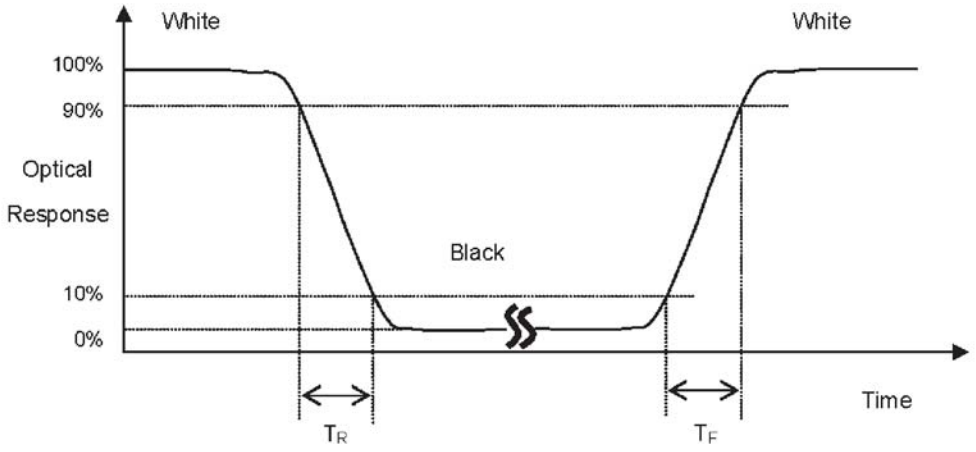
Note (1) Definition of Viewing Angle (θx, θy):



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

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

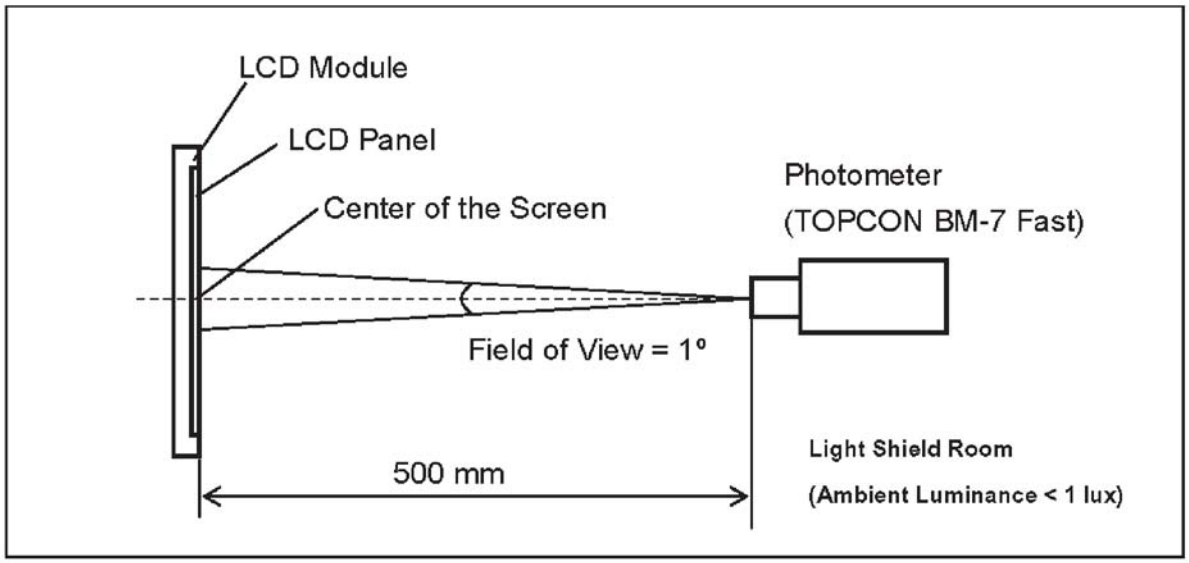
Note (3) Definition of Response Time (T_R, T_F):



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-L	SHEET 13 OF 20 DATE: 19/7/10

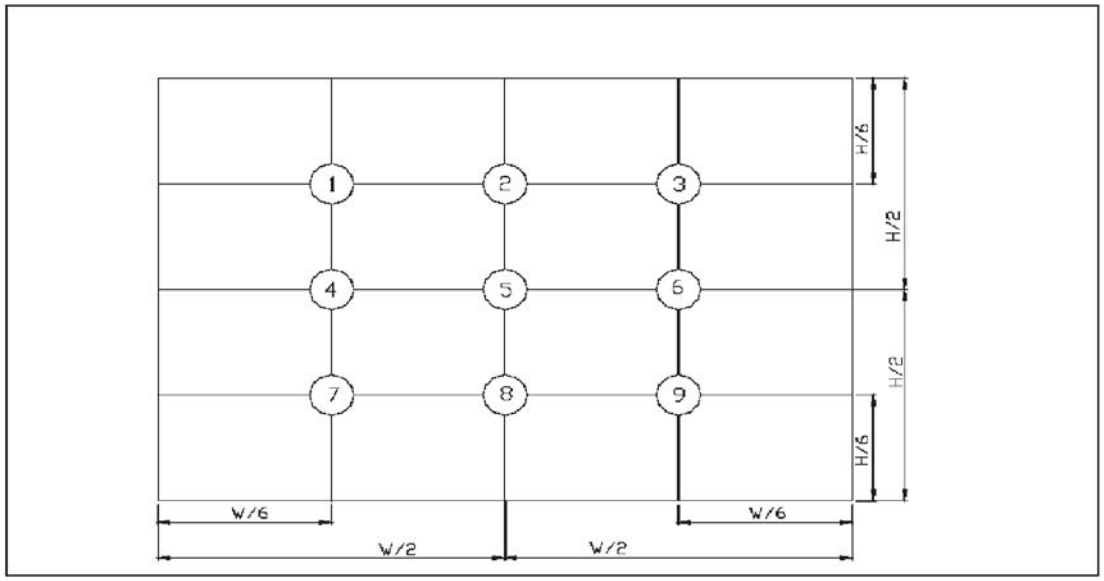
Note (4) Measurement Set-Up:

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%



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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 (non-operating)	-20℃(30min) ~ 70℃(30min), 100 cycles	-
10	Drop Test(with Carton)	Height: 80cm 1 corner, 3 edges, 6 surfaces	-

Incoming Inspection Standards

The environmental condition of inspection

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

(1) Ambient temperature 25 ± 5℃

(2) Humidity: 60 ± 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

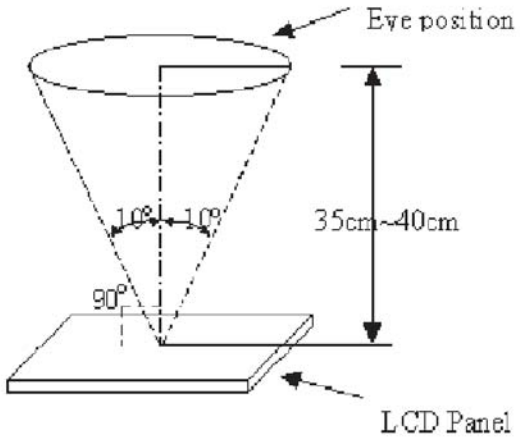


Fig _ 1

The defects classify of AQL as following:

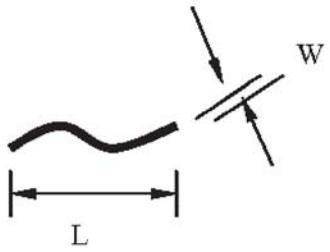
Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.

Inspection Parameters

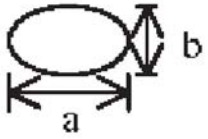
<table>
<tr><th colspan="2">Item</th><th colspan="4">Specification/Description</th><th>Note</th></tr>
<tr><td rowspan="2">Display</td><td rowspan="2">Function</td><td colspan="4">No Display</td><td>-</td></tr>
<tr><td colspan="4">Malfunction</td><td>-</td></tr>
<tr><td rowspan="8">Operating</td><td>Contrast ratio</td><td colspan="4">Out of Spec</td><td>-</td></tr>
<tr><td>Line defect</td><td colspan="4">No obvious Vertical and Horizontal line defect in bright , dark and colored.</td><td>-</td></tr>
<tr><td rowspan="6">Point Defect (red,green,blue,dark, white)</td><td rowspan="2">Item</td><td colspan="3">Acceptable number</td><td rowspan="6">Note: 1、4、5、6</td></tr>
<tr><td>A</td><td>B</td><td>Total</td></tr>
<tr><td>BRIGHT DOT</td><td>N≦3</td><td>N≦3</td><td rowspan="3">N≦8</td></tr>
<tr><td>DARK DOT</td><td>N≦5</td><td>N≦6</td></tr>
<tr><td>TOTAL DOT</td><td>N≦5</td><td>N≦6</td></tr>
<tr><td>TWO ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
<tr><td>THREE OR MORE ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
<tr><td rowspan="3">External Inspection (non-operating)</td><td>Scratch on the polarizer</td><td colspan="4"><table><tr><td>L(mm)</td><td>W(mm)</td><td>Acceptable number</td></tr><tr><td>L≦2.5</td><td>W≦0.1</td><td>4</td></tr><tr><td>L＞2.5</td><td>W＞0.1</td><td>0</td></tr></table></td><td>Note:2</td></tr>
<tr><td>Dent or bubble on the polarizer</td><td colspan="4"><table><tr><td>Dimension(mm)</td><td>Acceptable number</td></tr><tr><td>D≦0.5</td><td>4</td></tr><tr><td>D≦0.15</td><td>Disregard</td></tr></table></td><td>Note:3</td></tr>
<tr><td>Foreign material on the polarizer</td><td colspan="4"><table><tr><td>Dimension(mm)</td><td>Acceptable number</td></tr><tr><td>D≦0.5</td><td>4</td></tr><tr><td>D≦0.15</td><td>Disregard</td></tr></table></td><td>Note:3</td></tr>
</table>

Note1. The definition of dot defect : The dot defect was judged after repair and the size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

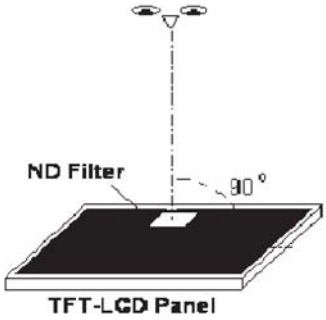
Note2.

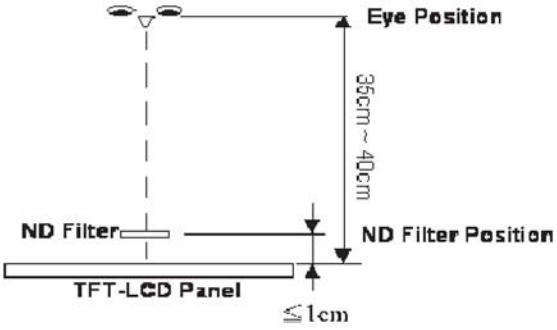


Note3. D：Diameter D=(a+b)/2



Note4. Bright dot is defined through 6% transmission ND Filter as following.

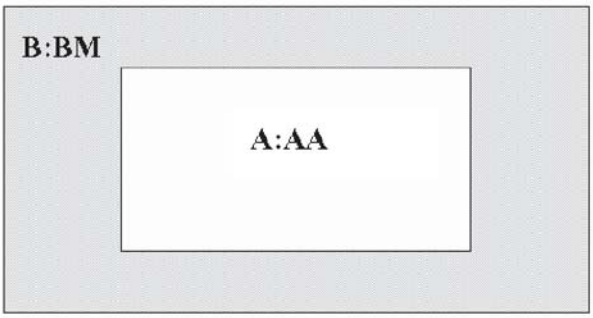




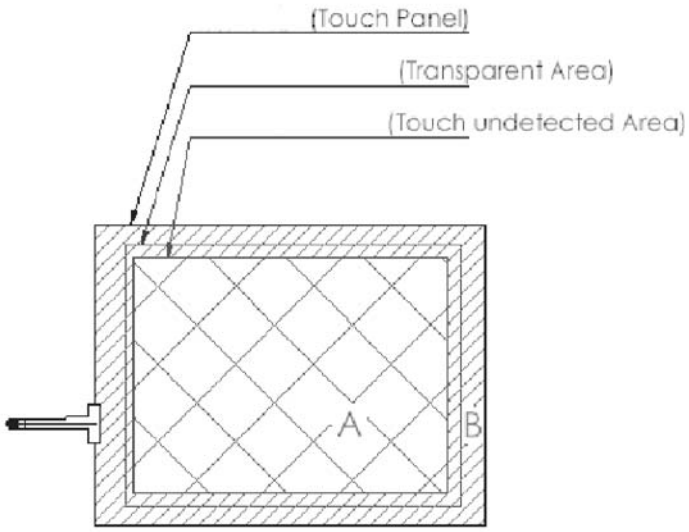
Note5. ADJACENT DOT

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-L	SHEET 18 OF 20 DATE: 19/7/10

Note6.



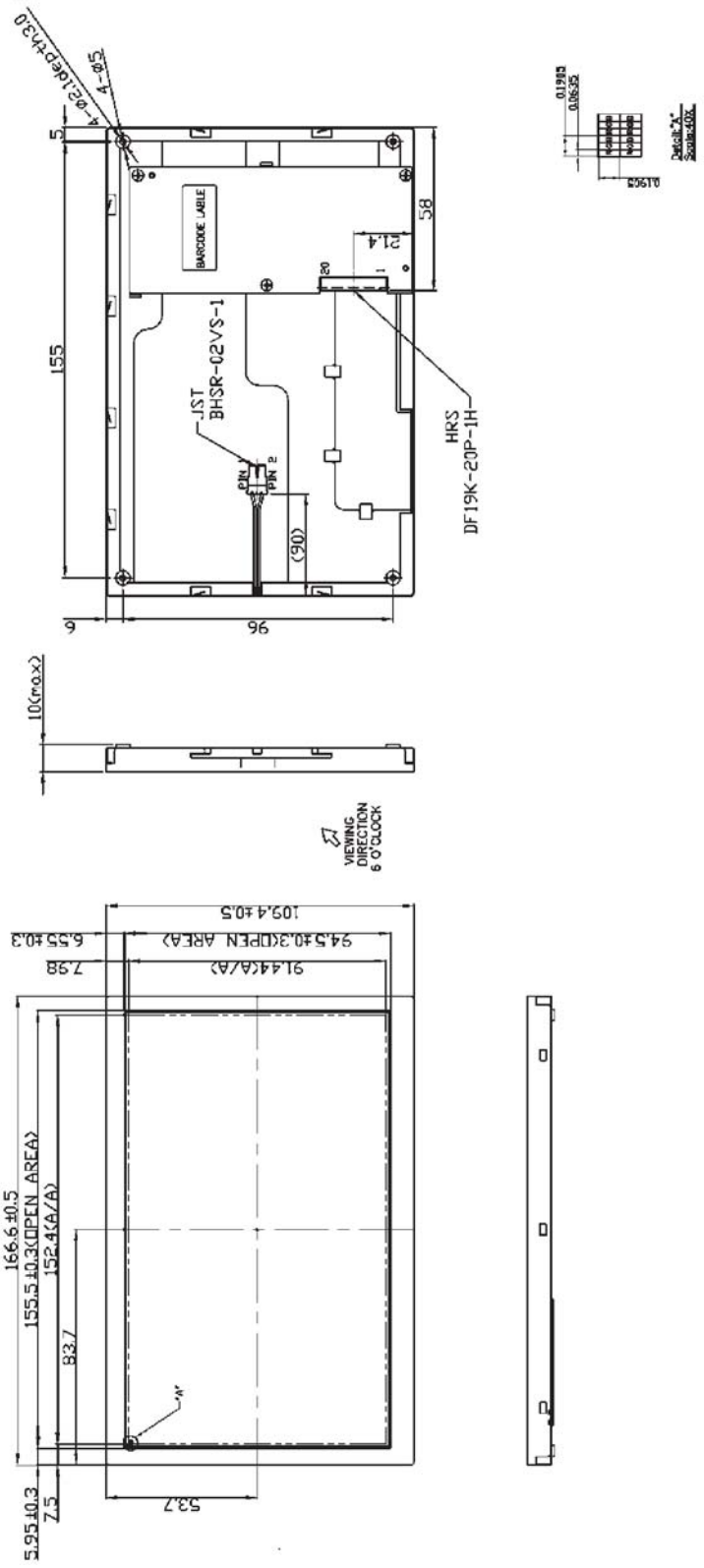
Note7.



A area : Without any defect point effect on normal operation.

B area : None-specify

Outline Drawing



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