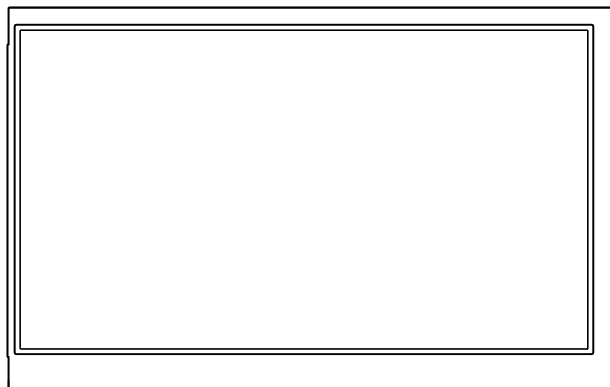




PRODUCT SPECIFICATION

HDA700L-3G

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



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-3G	SHEET 1 OF 22
				DATE: 7/7/10

1. General Description and Features

HDA700L-3G is a transmissive type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD module, a driver circuit and a LED Driver unit. Graphics and texts can be displayed on a WVGA 800 (W) x 3 x 480 (H) dots (16:9 aspect ratio) with 262,144 colors by supplying 18 bits data signal (6bits/each color).

1.1 Features

- Transmissive and back-light with 27 LEDs are available.
- TN (Twisted Nematic) mode.
- Digital RGB (6bits/color) data transfer.
- Data enable mode.
- Dot inverted function for reducing EMI.

1.2 LCD Module

Item	Specification	Unit
Screen Size	7.0 inches	Diagonal
Display Resolution	800 (H) x 480 (V)	Pixel
Active Area	153.6 (H) x 86.64 (V)	mm
Outline Dimension	165.00 (H) x 104.00 (V) x 5.4 (T)	mm
Display Mode	Normally white mode/ Transmissive	--
Pixel Arrangement	R,G,B Vertical Stripe	--
Pixel Size	192 x 180.5	um
Display Color	262K	--
Viewing Direction	6 o'clock	--
Input Interface	Digital RGB (6bits/color) Data Transfer	--

2. Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	165.00	--	mm	
	Vertical (V)	--	104.00	--	mm	
	Thickness (T)	--	5.4	--	mm	(1)
	Thickness (T)	--	6.9		mm	(2)
Weight		--	128	--	g	--

Note (1) Not Include Component . Refer to the Outline Dimension Drawing as attached.

(2) Include Component . Refer to the Outline Dimension Drawing as attached.

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-3G	SHEET 2 OF 22
				DATE: 7/7/10

3. Electrical Specifications

3.1 Absolute Max. Ratings

3.1.1 Absolute Ratings of Environment

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

(Ta=25±2°C, V_{SS}=GND=0)

Item	Symbol	Min.	Max.	Unit	Note
Storage temperature	T _{STG}	-30	80	°C	(1)
Operating temperature	T _{OPR}	-20	70	°C	(1,2,3)

Note (1) 95 % RH Max. (40 °C ≥ Ta). Maximum wet-bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.

Note (2) In case of below 0°, the response time of liquid crystal (LC) becomes slower and the color of panel becomes darker than normal one. Level of retardation depends on temperature, because of LC's character

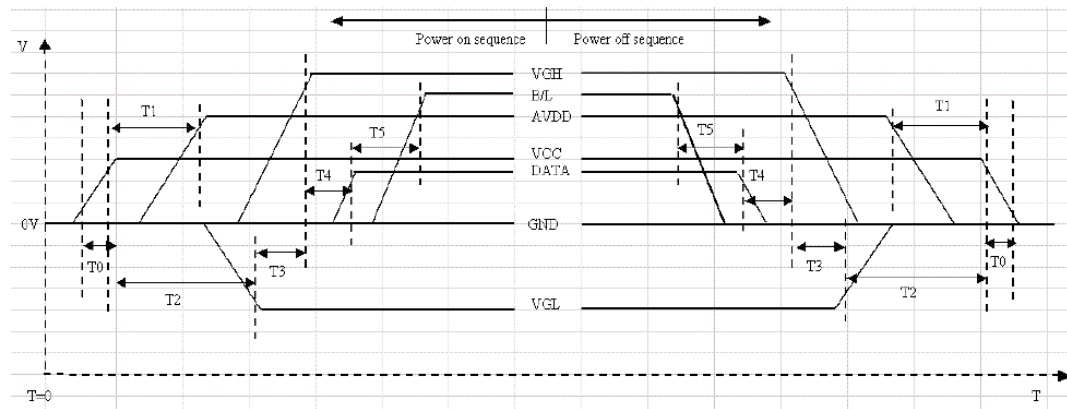
Note (3) Only operation is guarantied at operating temperature. Contrast, response time, another display quality are evaluated at +25°C.

3.1.2 Electrical Absolute Maximum Ratings

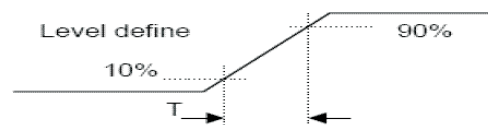
(V_{SS}=GND=0)

Parameter	Symbol	Min.	Max.	Unit	Remark
Power supply voltage	V _{CC}	-0.3	6.0	V	
Power supply voltage	V _{LED}	0	6.0	V	
Signal input voltage	R0-R5,G0-G5, B0-B5,DCLK,DE	-0.3	V _{CC} +0.3	V	--
Permissive input ripple voltage	V _{RF}	--	100	mVp-p	V _{CC} =+3.0V

Display On/Off Sequence :



Item	Min.	Typ.	Max.	Unit
T0	0.5	--	20	msec
T1	16			msec
T2	20			msec
T3	10			msec
T4	10		50	msec
T5	50			msec



Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

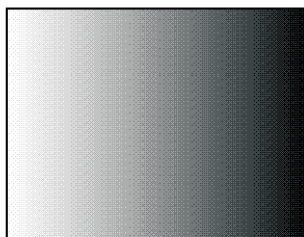
Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

3.1.3 DC Electrical Characteristics of the TFT LCD

(Ta=25±2°C, V_{SS}=GND=0)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply logic voltage		VCC	2.7	3.0	3.5	V	
Power supply LED voltage		VLED	4.5	5	5.5	V	
Input Voltage for logic	H Level	VIH	0.7×VCC	-	VCC	V	
	L Level	VIL	0	-	0.3×VCC	V	
Power Supply current		ICC	-	(170)	-	mA	Note 1
Power Supply current		ILED		(450)	(550)	mA	
LED Life time		-	(20000)	-	-	hr	Note 2

Note1: fv =60Hz , Ta=25°C , Display pattern : 64 Gray pattern



Note2: The environmental conducted under ambient air flow ,at Ta=25±2°C,60%RH±5%

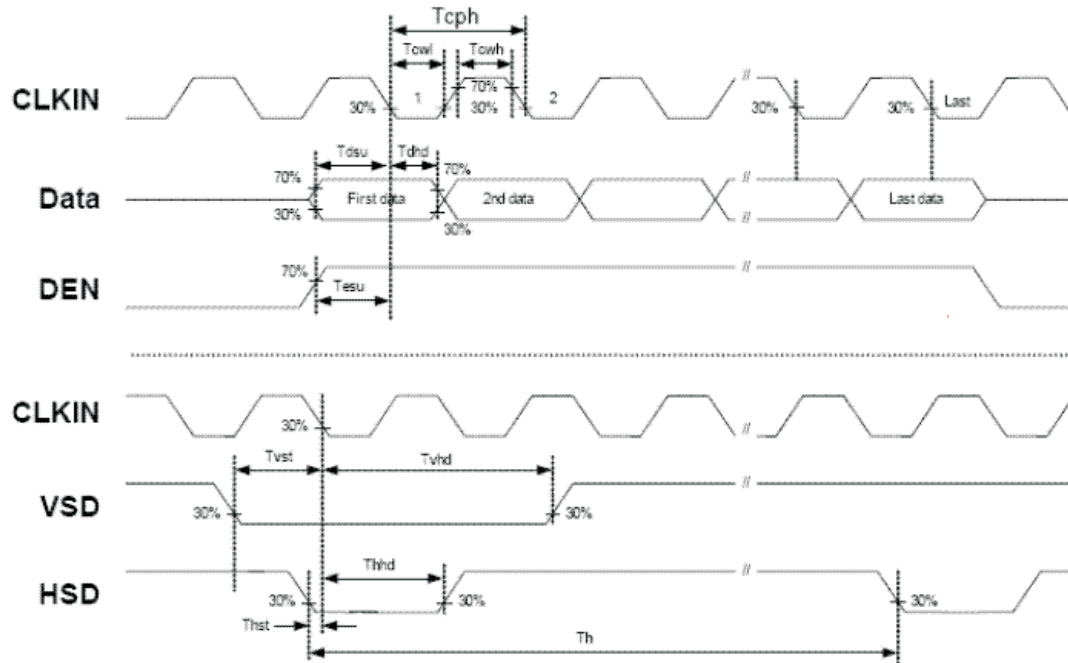
3.2 AC Timing Characteristic of The LCD

3.2.1 Timing Condition (DE only mode)

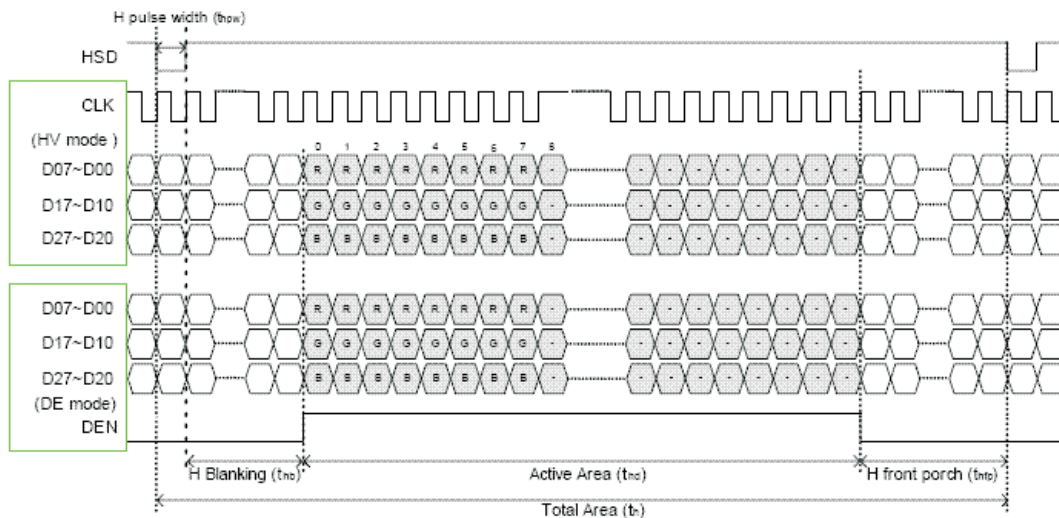
Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK	DCLK cycle time	T_{cph}	25	-	-	ns	
	DCLK Frequency	f_{clk}	-	30	40	MHz	
	DCLK High plus width	T_{cwh}	40	50	60	%	
Horizontal	HSD setup time	T_{hst}	8	-	-	ns	
	HSD hold time	T_{hhd}	8	-	-	ns	
	Horizontal display area	t_{hd}	-	800	-	Tcph	
	HSD period time	t_h	-	928	-	Tcph	
	HSD pulse width	t_{hpw}	1	48	-	Tcph	
	HSD back porch	t_{hb}	-	40	-	Tcph	
	HSD front porch	t_{hfp}	-	40	-	Tcph	
Vertical	VSD setup time	T_{vst}	8	-	-	ns	
	VSD hold time	T_{vhd}	8	-	-	ns	
	Vertical display area	t_{vd}	-	480	-	th	
	VSD period time	t_v	-	525	-	th	
	VSD pulse width	t_{vpw}	-	3	-	th	
	VSD back porch	t_{vb}	-	29	-	th	
	VSD front porch	t_{vfp}	-	13	-	th	
DE	DE setup time	T_{esu}	8	-	-	ns	
	DE hold time	T_{ehd}	8	-	-	ns	
DATA	Data setup time	T_{dsu}	8	-	-	ns	
	Data hold time	T_{dhd}	8	-	-	ns	

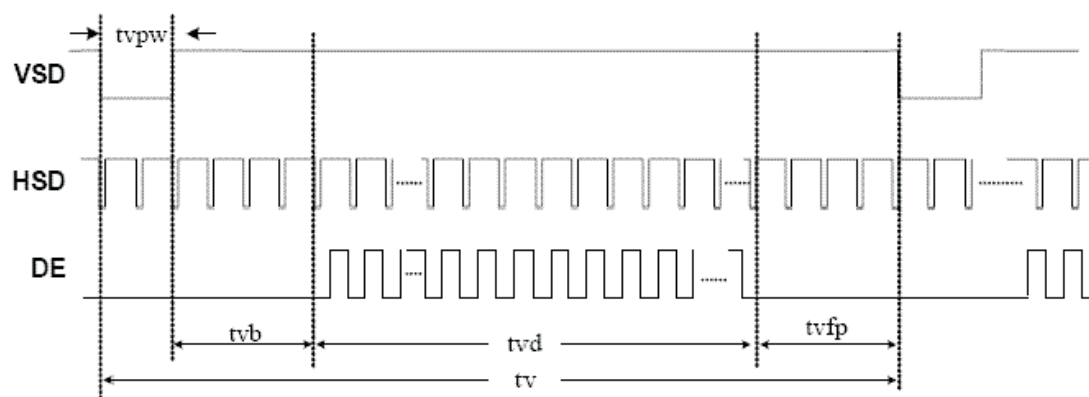
3.2.2 Timing Characteristic

3.2.2.1 DE and RGB Input Timing



Sampling clock timing





Vertical timing

4. Optical Characteristics

4.1 Optical characteristic of the LCD

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods.

Measuring equipment: BM-7A

Item		Symbol	Condition	Min	Type	Max	Unit	Note
Brightness		B		(280)	(350)	--	cd/m ²	
Response time		T _r	$\theta=0^\circ$	-	5	7	ms	.
		T _f		--	20	28	ms	
Contrast ratio		CR	At optimized viewing angle	(400)	(500)	--	--	
Color Gamut		NTSC %	--	--	(45)	--	%	
Luminance Uniformity		ΔL		70	80		%	
Color Chromaticity (CIE 1931)	White	W _x	$\theta=0^\circ$ Normal Viewing Angle	(0.280)	(0.310)	(0.340)	--	BM-7A
		W _y		(0.330)	(0.360)	(0.390)		
Viewing Angle (6H)	Hor.	θ_R	CR $\geq$ 10	60	70	--	Degree	
		θ_L		60	70	--		
	Ver.	θ_U		40	50	--		
		θ_D		50	60	--		

HDA700LT-3G -Touch Screen Ver.

4. Optical Characteristics

4.1 Optical characteristic of the LCD

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods.

Measuring equipment: BM-7A

Item		Symbol	Condition	Min	Type	Max	Unit	Note
Brightness		B		(220)	(250)	--	cd/m ²	
Response time		T _r	$\theta=0^{\circ}$	-	5	7	ms	.
		T _f		--	20	28	ms	
Contrast ratio		CR	At optimized viewing angle	(400)	(500)	--	--	
Color Gamut		NTSC %	--	--	(45)	--	%	
Luminance Uniformity		Δ L		70	80		%	
Color temperature		K		6500	7000	7500		
Color Chromaticity (CIE 1931)	White	W _x	$\theta=0^{\circ}$ Normal Viewing Angle	(0.280)	(0.310)	(0.340)	--	BM-7A
		W _y		(0.330)	(0.360)	(0.390)		
Viewing Angle (6H)	Hor.	θ_R	CR $\geq$ 10	60	70	--	Degree	
		θ_L		60	70	--		
	Ver.	θ_U		40	50	--		
		θ_D		50	60	--		

HDA700L-3GH - High Brightness Ver.

Optical Characteristics

Optical characteristic of the LCD

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods.

Measuring equipment: BM-7A

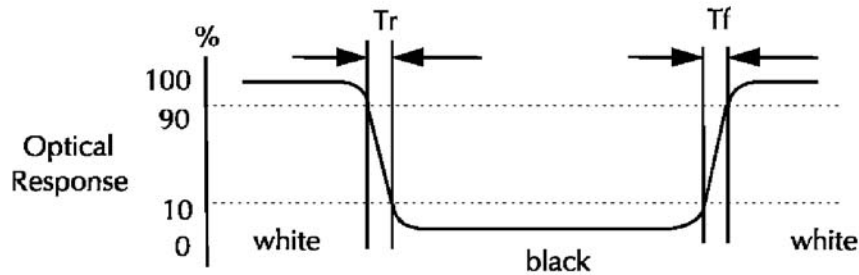
Item		Symbol	Condition	Min	Type	Max	Unit	Note
Brightness		B		(500)	(550)	--	cd/m ²	
Response time		T _r	θ=0°	-	5	7	ms	
		T _f		--	20	28	ms	
Contrast ratio		CR	At optimized viewing angle	(400)	(500)	--	--	
Color Gamut		NTSC %	--	--	(45)	--	%	
Luminance Uniformity		Δ L		70	80		%	
Color Chromaticity (CIE 1931)	White	W _x	θ=0° Normal Viewing Angle	(0.280)	(0.310)	(0.340)	--	BM-7A
		W _y		(0.330)	(0.360)	(0.390)		
Viewing Angle (6H)	Hor.	θ _R	CR≥10	60	70	--	Degree	
		θ _L		60	70	--		
	Ver.	θ _U		40	50	--		
		θ _D		50	60	--		

a. Test equipment setup

After stabilizing and leaving the panel alone shall be warmed up for the stable operation of LCM, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7(fast) with a viewing angle of 2° at a distance of 50cm and normal direction.

b. Definition of response time: Tr and Tf

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



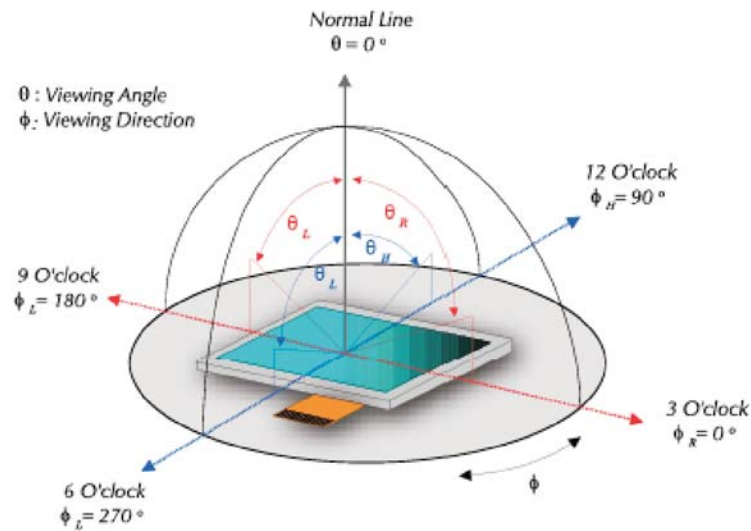
c. Definition of contrast ratio:

$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

d. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-3G	SHEET 12 OF 22 DATE: 7/7/10
--	-------------------	------------------	------------	------------------------------------

e. View Angle



f. Definition of Luminance of White: Luminance of white at the center points

Light Source of Back-Light Unit	LED Type
---------------------------------	----------

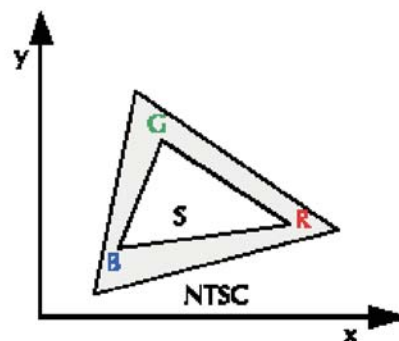
g. Definition of White Uniformity

$$\text{White Uniformity} = \frac{\text{Min. luminance of white among 9-points}}{\text{Max. luminance of white among 9-points}} \times 100\%$$

h. The definition of Color Gamut -Color Chromaticity CIE 1931

Color coordinate of white & red, green, blue at center point.

Color Gamut : NTSC(%) = (RGB Triangle Area / NTSC Triangle Area) x 100



5. I/O Terminal

5.1 Pin Assignment

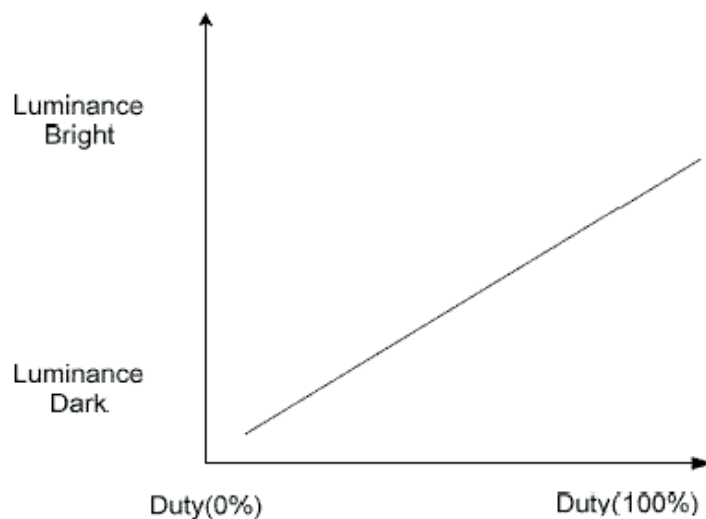
Pin No.	Symbol	I/O	Function	Remark
1	GND	P	Ground	
2	GND	P	Ground	
3	ADJ	I	Brightness control for LED B/L	Note 3
4	VLED	P	Power Supply for LED Driver	
5	VLED	P	Power Supply for LED Driver	
6	VLED	P	Power Supply for LED Driver	
7	VCC	P	Power Supply for system	
8	VCC	P	Power Supply for system	
9	DE	I	Data Enable Timing Signal	
10	GND	P	Ground	
11	GND	P	Ground	
12	GND	P	Ground	
13	B5	I	Blue data signal (MSB)	
14	B4	I	Blue data signal	
15	B3	I	Blue data signal	
16	GND	P	Ground	
17	B2	I	Blue data signal	
18	B1	I	Blue data signal	
19	B0	I	Blue data signal (LSB)	
20	GND	P	Ground	
21	G5	I	Green data signal (MSB)	
22	G4	I	Green data signal	
23	G3	I	Green data signal	
24	GND	P	Ground	
25	G2	I	Green data signal	
26	G1	I	Green data signal	
27	G0	I	Green data signal (LSB)	
28	GND	P	Ground	
29	R5	I	Red data signal (MSB)	
30	R4	I	Red data signal	
31	R3	I	Red data signal	
32	GND	P	Ground	
33	R2	I	Red data signal	
34	R1	I	Red data signal	

35	R0	I	Red data signal (LSB)	
36	GND	P	Ground	
37	GND	P	Ground	
38	DCLK	I	Data Clock	
39	GND	P	Ground	
40	GND	P	Ground	

I: Input, O: Output, P: Power

Remarks:

- 1) NC Pin must be retained; this pin can't contact GND or other signal.
- 2) GND Pin must ground contact, can not be floating.
- 3) Connector Part No: FH19-40S-0.5SH or equivalent.
- 4) PWM : 3.3V; 20KHz, Duty 0% → Dark • Duty 100→Full Light.



HDA700LT-3G

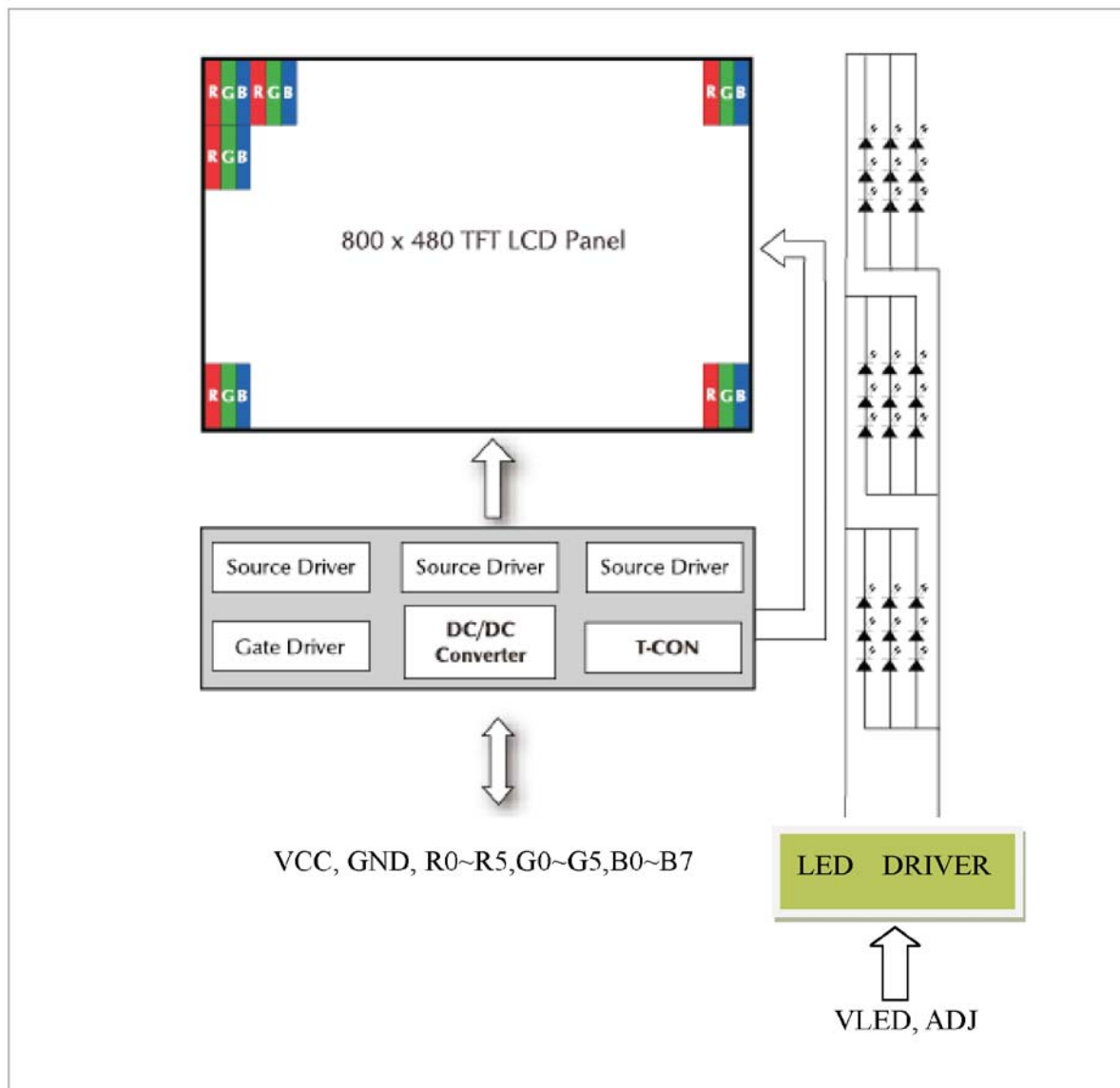
5.3 Touch Panel Unit

Pin No.	Symbol	Function	Remark
1	Y2	Touch Panel Up	
2	X2	Touch Panel Right	
3	Y1	Touch Panel Down	
4	X1	Touch Panel Left	

Notes: Connector Part No: CVILUX CF25041D0R0-10 or equivalent.

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-3G	SHEET 15 OF 22
				DATE: 7/7/10

5.2 Block Diagram



6. Displayed Color and Input Data

		Color & Gray Scale	Data Signal																	
			R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	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
		Red(0)	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	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	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
Red		Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Red(62)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		Red(61)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Red(31)	0	1	1	1	1	1	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	0
		Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green		Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Green(62)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
		Green(61)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Green(1)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
		Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue		Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
		Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
		Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
		Blue(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. With the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

HDA700LT-3G

Touch Screen Panel Specifications

Touch Panel

Electrical Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Linearity	-1.5	-	1.5	%	Analog X and Y directions
Terminal resistance	200	-	400	Ω	Y(Glass side)
	200	-	800	Ω	X(Film side)
Insulation resistance	20	-	-	M Ω	DC 25V
Voltage	3.0	5.0	7.0	V	DC
Response time	-	15	-	ms	
Transparency	-	80	-	%	Non-glare

Caution (1) : Do not operate it with a thing except a polyacetal pen (tip R0.8mm or less) or a finger, especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

7.1.2 Mechanical & Reliability Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Activation force	60	80	100	g	(1)
Hitting Durability	1,000,000	-	-	times	(2)
Sliding Durability	100,000			times	
Surface hardness	3	-	-	H	JIS K5400

Note (1) Input : Finger or polyacetal pen 0.8R

Note (2) Pit 1,000,000 times on the Film with a R8.0 (Hardness 60°) silicon rubber.

- Force : Force : 200g
- Frequency : 2 times/sec

7. Reliability Condition

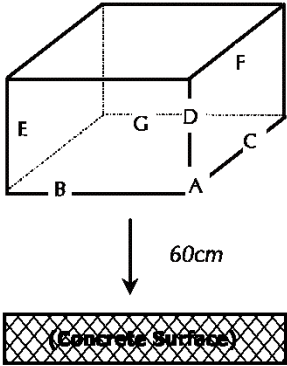
No change on display and in operation under the following test condition.

Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature: $20 \pm 5^\circ\text{C}$.

Humidity: $65 \pm 5\%\text{RH}$.

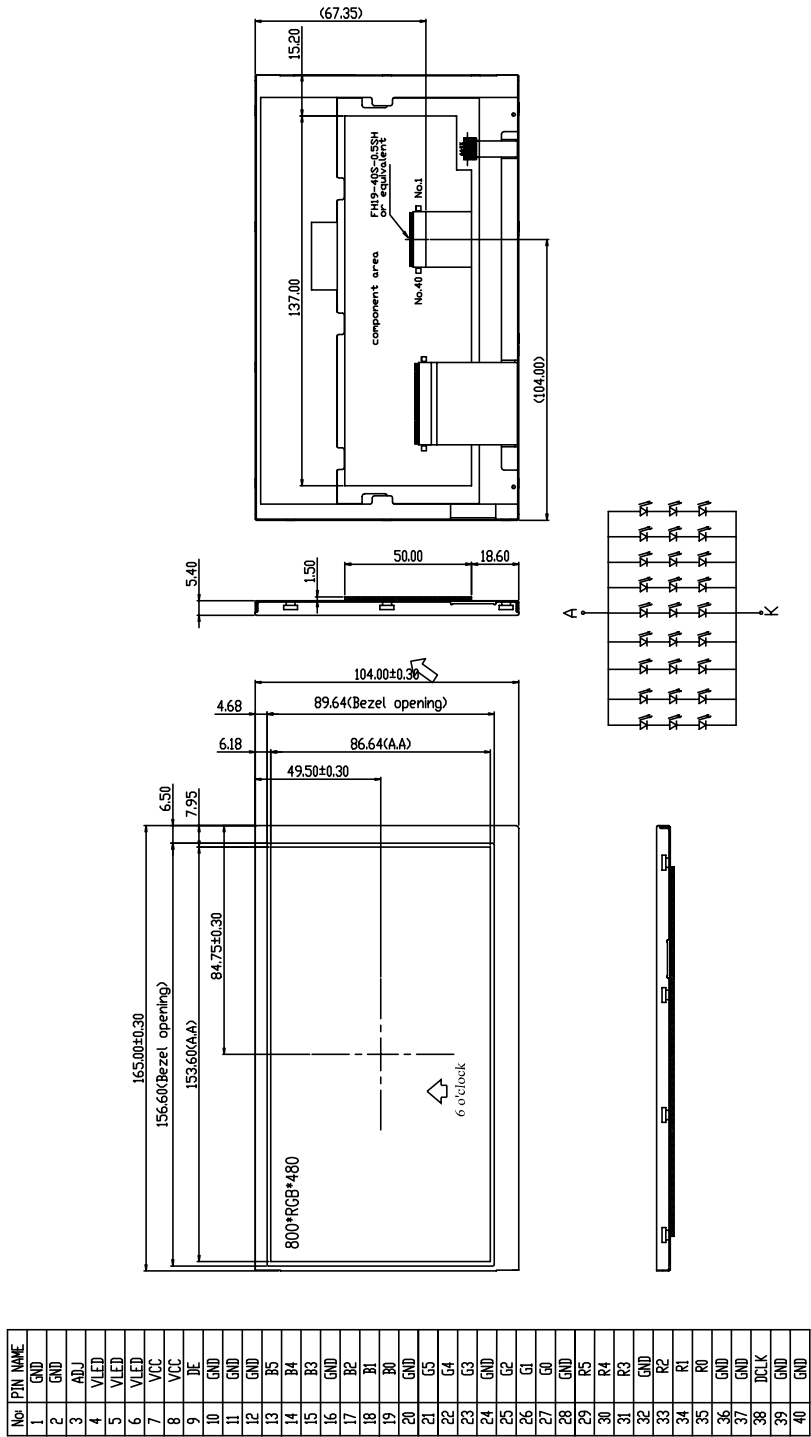
Tests will be not conducted under functioning state.

No.	Parameter	Condition	Notes
1	High Temperature Operating	$70^\circ\text{C} \pm 2^\circ\text{C}$, 240hrs (Operation state).	
2	Low Temperature Operating	$-20^\circ\text{C} \pm 2^\circ\text{C}$, 240hrs (Operation state).	1
3	High Temperature Storage	$80^\circ\text{C} \pm 2^\circ\text{C}$, 240hrs.	2
4	Low Temperature Storage	$-30^\circ\text{C} \pm 2^\circ\text{C}$, 240hrs.	1,2
5	High Temperature and High Humidity Operation Test	$60^\circ\text{C} \pm 2^\circ\text{C}$, 90%, 240hrs.	1,2
6	Vibration Test	Total fixed amplitude: 1.5mm. Vibration Frequency: 10~55Hz. One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes.	3
7.	Drop Test	To be measured after dropping from 60cm high on the concrete surface in packing state.  <i>Dropping method corner dropping:</i> <i>A corner: Once edge dropping.</i> <i>B, C, D edge: Once face dropping.</i> <i>E, F, G face: Once.</i>	

- Notes:
1. No dew condensation to be observed.
 2. The function test shall be conducted after 4 hours storage at the normal temperature and humidity after removed from the test chamber.
 3. Vibration test will be conducted to the product itself without putting I in a container.

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA700L-3G	SHEET 19 OF 22
				DATE: 7/7/10

HDA700L-3G



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

Q.A.:
Z.W.

REV.:
1.0

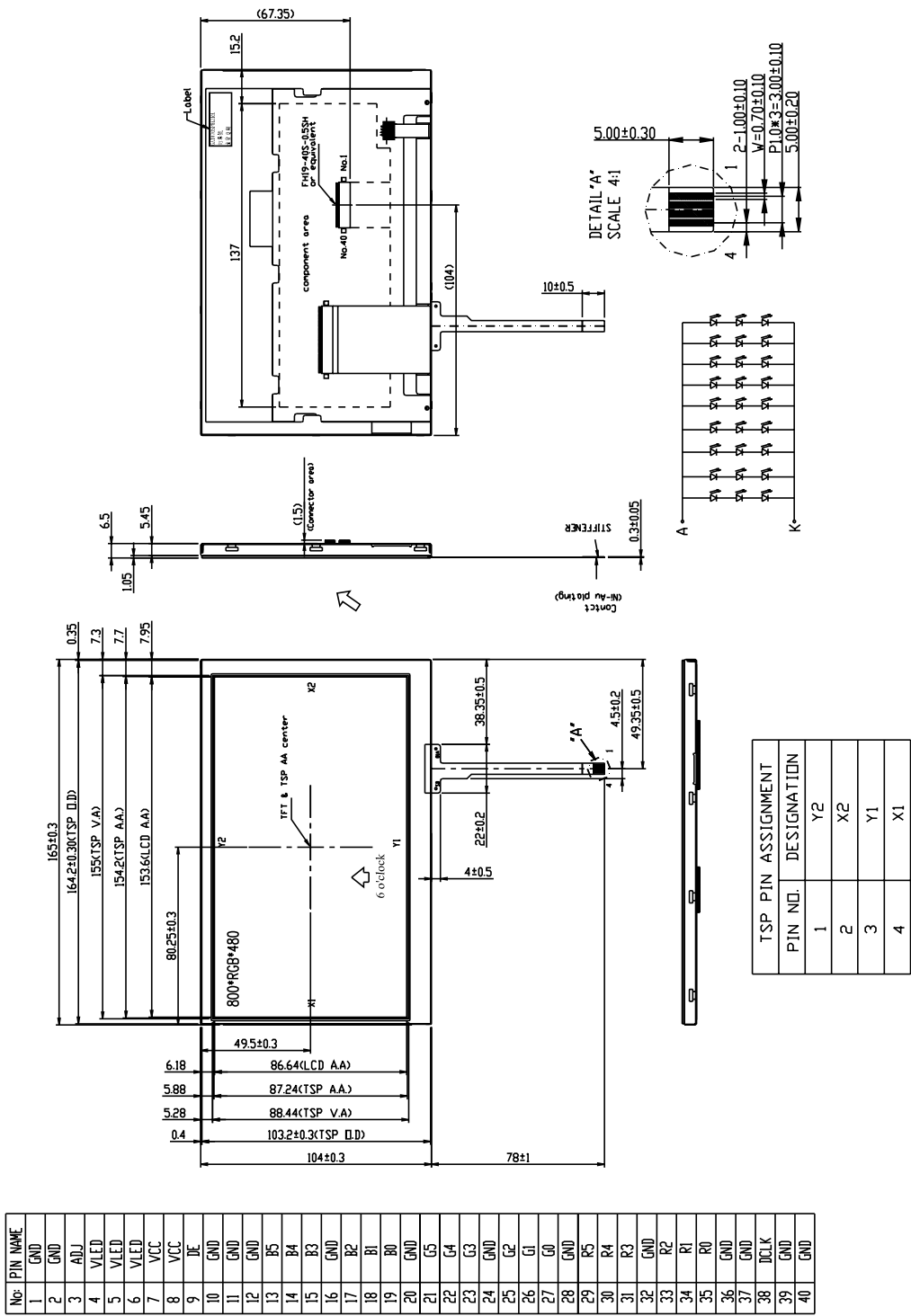
HDA700L-3G

SHEET 20 OF 22
DATE: 7/7/10

HDA700LT-3G

With TOUCH SCREEN

TOUCH SCREEN CONNECTOR : KYOCERA-ELCO 046227004100829+



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

Q.A.:
Z.W.

REV:
1.0

HDA700L-3G

SHEET 21 OF 22
DATE: 7/7/10

HDA700L-3GH

