HANTRONIX

PRODUCT SPECIFICATION

HDA1040ST

10.4”, TFT SVGA (800 X 600) COLOR LCD DISPLAY MODULE

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: Z.W.	REV.: 1.0	HDA1040ST	SHEET 1 OF 17 DATE: 4/13/10

10.4" Display Module is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device . This model is composed of a TFT-LCD panel , a driving circuit . This TFT-LCD has a high resolution (800(R.G.B) X 600) and can display up to 262,144 colors.

Features

(1) Construction : a-Si TFT-LCD with driving system, White LED Backlight.

(2) LCD type : Transmissive , Normally White

(3) Number of the Colors : 262K colors (R,G,B 6 bit digital each)

(4) LVDS Interface.

(5) LCD Power Supply Voltage: 3.3V single power input, built-in power supply circuit.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	800RGB (W) x 600(H)	dots
Active area	211.2 (W) x 158.4(H)	mm
Pixel pitch	88 (W) x 264 (H)	um
Color configuration	R.G.B -stripe	
Overall dimension	236.0(W)x176.9(H)x5.6(D)	mm
Weight	288	g
Backlight unit	LED	
Display color	262,144	colors

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Supply voltage range	VDD	-0.5	5	V	
Voltage range at any terminal	V_{IN}	-0.5	5	V	(1)
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tstg	-30	80	℃	

Note

(1): V_{IN} represents IN0±, IN1±, IN2±, CLK±

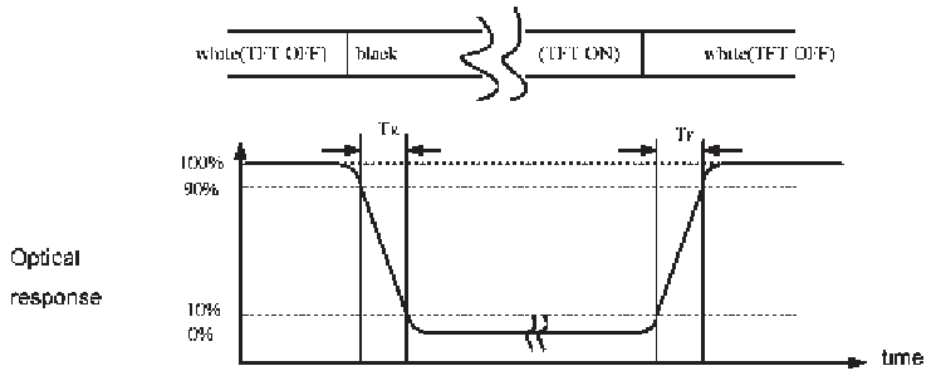
OPTICAL CHARACTERISTICS

Item		Symbol	Conditon	Min.	Typ.	Max.	Unit	Note
Response Time		$T_r + T_f$	Θ=Φ=0°	-	25	40	ms	(1)
Contrast ratio		CR		--	400	-	-	(2)(3)
Viewing Angle		ΘT	CR≧10	35	45	-	degree	(5)
		ΘB		55	65	-		
		ΘL		55	65	-		
		ΘR		55	65	-		
Luminance		L	Θ=Φ=0°	280	320	-	cd/m^2	(3)(4)
Luminance Uniformity		ΔL		70	80	-	%	(3)(4)
Color chromaticity	Red	Rx		0.550	0.600	0.650	-	
		Ry		0.296	0.346	0.396	-	
	Green	Gx		0.283	0.333	0.383	-	
		Gy		0.516	0.566	0.616	-	
	Blue	Bx		0.092	0.142	0.192	-	
		By		0.065	0.115	0.165	-	
	White	Wx		0.259	0.309	0.359	-	
		Wy		0.284	0.334	0.384	-	

NOTE :

- These items are measured by BM-5A(TOPCON) or CA-1000(MINOLTA) in the dark room (no ambient light)

(1) Definition of Response Time (White-Black)



(2) Definition of Contrast Ratio

Measure contrast ratio on the below 5 points(refer to figurel,#1~#5point) and take the average value

Contrast ratio is calculated with the following formula :

Contrast Ratio(CR)=(White)Luminance of ON ÷ (Black)Luminance of OFF

(3) Definition of Luminance :

Measure the luminance of white state at **center point**.

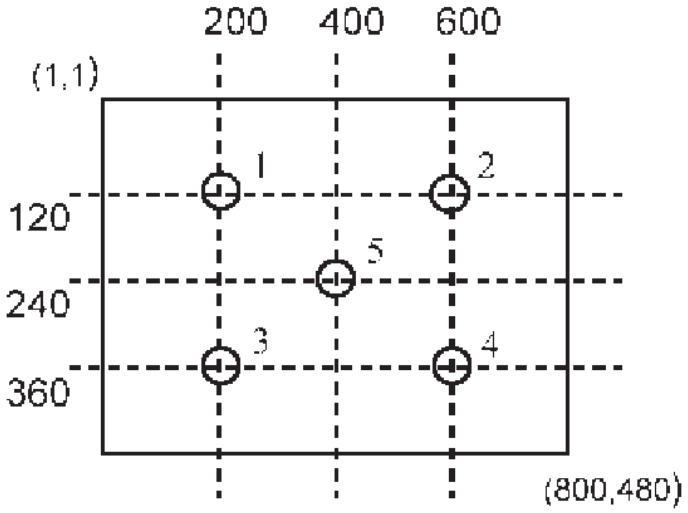


Fig.1 Measuring point

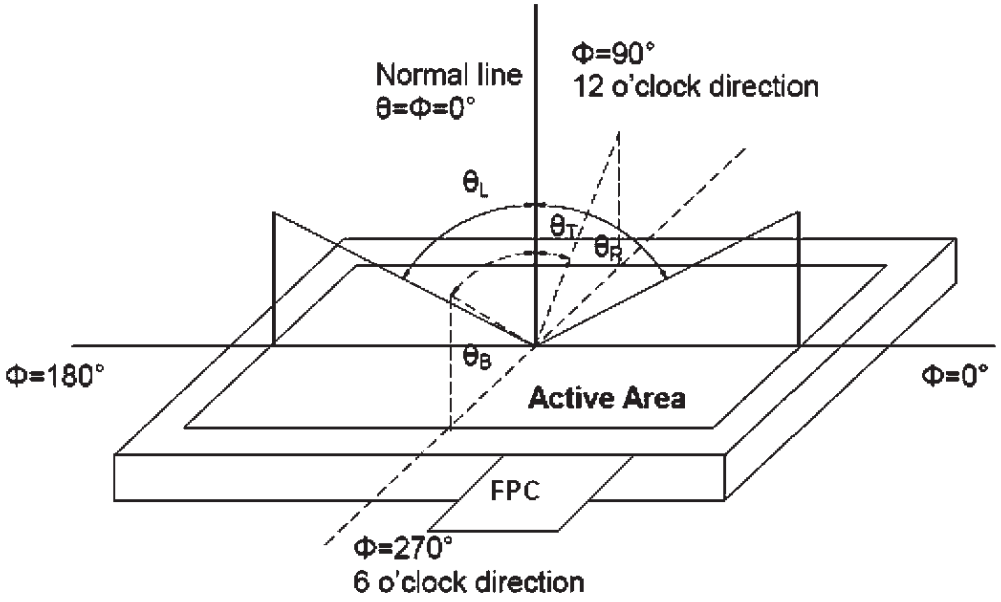
(4)Definition of Luminance Uniformity :

Measured Maximum luminance[L(MAX)] and Minimum luminance[L(MIN)] on the 5 points

Luminance Uniformity is calculated with the following formula :

ΔL =[L(MIN) / L (MAX)] X 100%

(5)Definition of Viewing Angle



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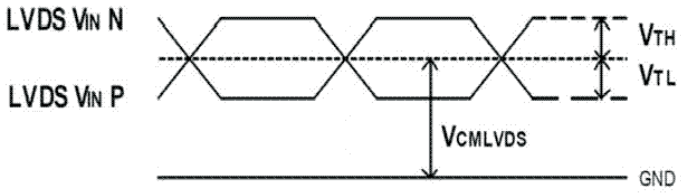
ELECTRICAL CHARACTERISTICS

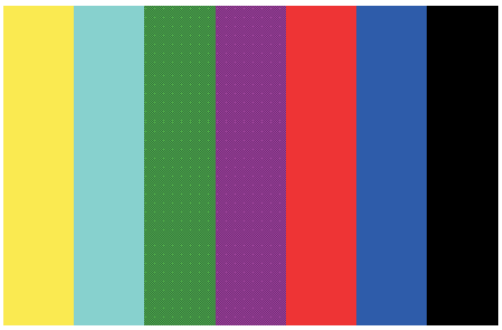
Item	Symbol	Min.	Typ.	Max	Unit	Remarks
LVDS Differential input high threshold	V_{TH}	-	-	100	mV	V_{CMLVDS}=1.2V
LVDS Differential input low Threshold	V_{TL}	-100	-	-	mV	
Differential input voltage	$\|V_{ID}\|$	0.1	-	0.6	V	
LVDS input common mode Voltage	V_{CMLVDS}	| VID | /2	-	1.4-($\|V_{ID}\|$/2)	V	
Input current	I_{IN}	-10	-	10	uA	
Supply Voltage	VDD	3.0	3.3	3.6	V	
Common Electrode Driving Signal	VCOM	-	4.36	-	V	Note1
Sync Frequency	FVD	-	60	70	Hz	
VDD Power Consumption	I_{DD}	-	260	380	mA	Note2



LVDS DC timing diagram

Note1: The value may be different for different LCM.

Note2: To test the current dissipation, using the "color bar" testing pattern shown as below:

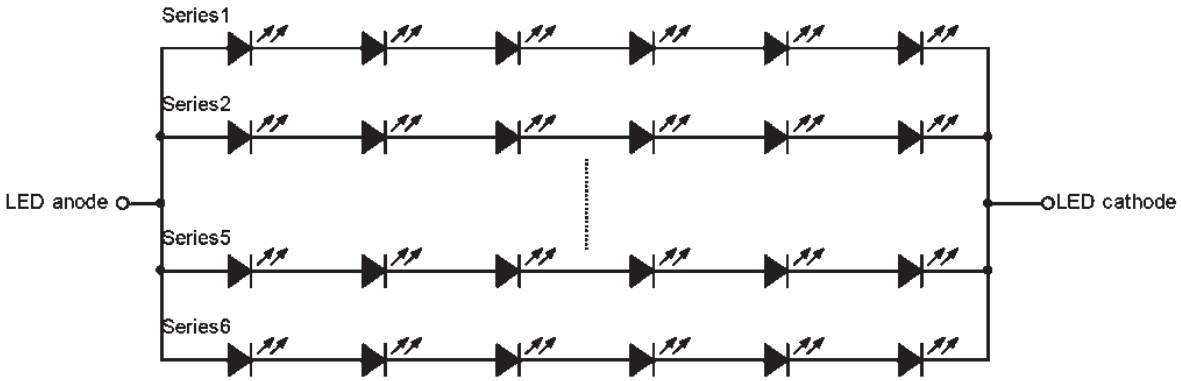


Current dissipation testing pattern

Backlight Driving Circuit

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Forward Current	I_F	-	120.0	-	0A	Note 1
Forward Voltage	V_F	-	19.2	-	V	Note 1
Backlight Power Consumption	W_{BL}	-	2304	-	mW	Note 1

Note 1: LED connection of backlight shown as below:



Note2: One LED: IF =120mA.

Note3: The Life of LED: 20,000hrs.

6-1 Touch Panel Electrical Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	340 ~ 1090 Ω
	Y Axis	180 ~ 470 Ω
Insulating Resistance	DC 25 V	More than 20MΩ
Linearity	--	±1.5 %
Pen writing Durability	Note a	100,000 times(min)
Input life by finger	Note b	1,000,000 times (min)

Note A .

Writing length 35 mm.

Writing speed: 300mm/sec.

Shape of pen end : R0.8

Load : 250 g

Note B

By Silicon rubber tapping at same point

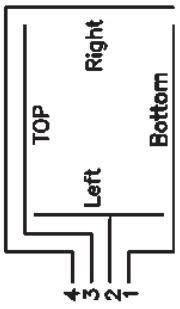
Shape of rubber end : R8

Load : 200g

Frequency : 5 Hz

Interface

No.	Symbol	Function
1	YB	Touch Panel Bottom Signal
2	XL	Touch Panel Left Signal
3	YT	Touch Panel Top Signal
4	XR	Touch Panel Right Signal



INTERFACE

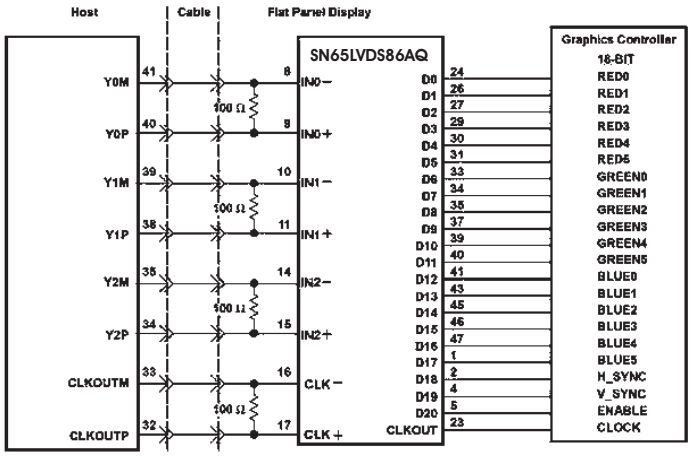
LVDS CN:

Matching connector of Hirose DF19K-20P-1H (56)

Pin no	Symbol	Function
1	VDD	POWER SUPPLY:3.3V
2	VDD	POWER SUPPLY:3.3V
3	Gnd	Power Ground
4	Gnd	Power Ground
5	IN0-	Transmission Data of Pixels
6	IN0+	Transmission Data of Pixels
7	Gnd	Power Ground
8	IN1-	Transmission Data of Pixels 1
9	IN1+	Transmission Data of Pixels 1
10	Gnd	Power Ground
11	IN2-	Transmission Data of Pixels 2
12	IN2+	Transmission Data of Pixels 2
13	Gnd	Power Ground
14	CLK-	Sampling Clock
15	CLK+	Sampling Clock
16	Gnd	Power Ground
17	NC	No Connect
18	NC	No Connect
19	Gnd	Power Ground
20	Gnd	Power Ground

Back Light Connector:

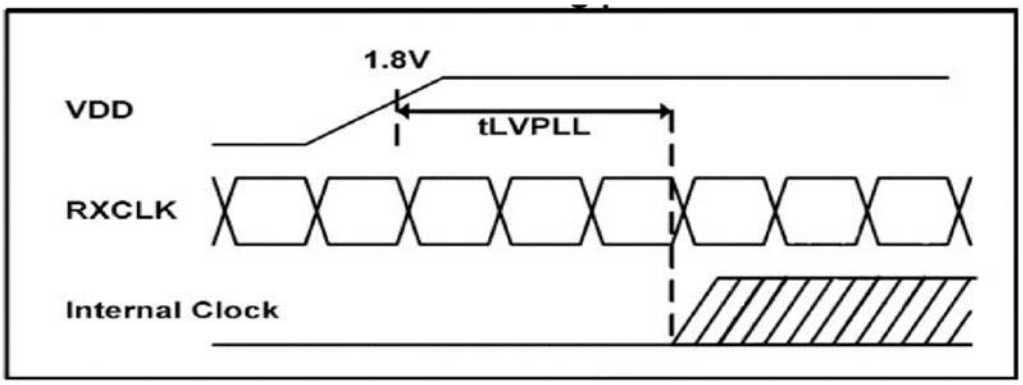
Pin no	Symbol	Function	Wire Color
1	LEDA	LED driving anode (high voltage)	Red
2	LEDK	LED driving cathode (low voltage)	White

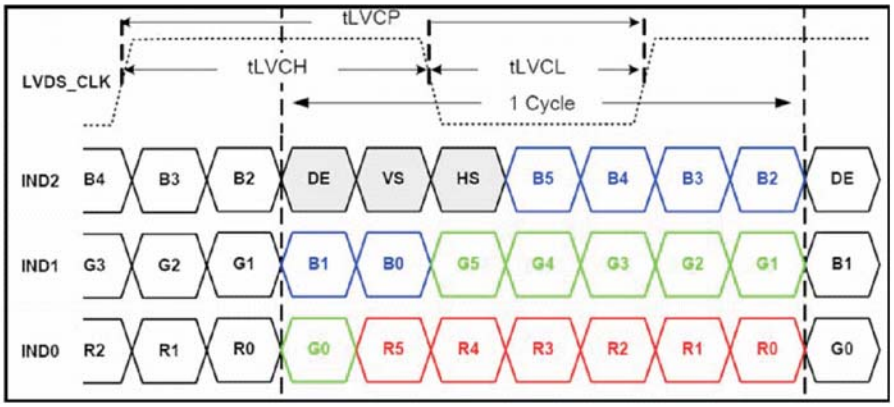


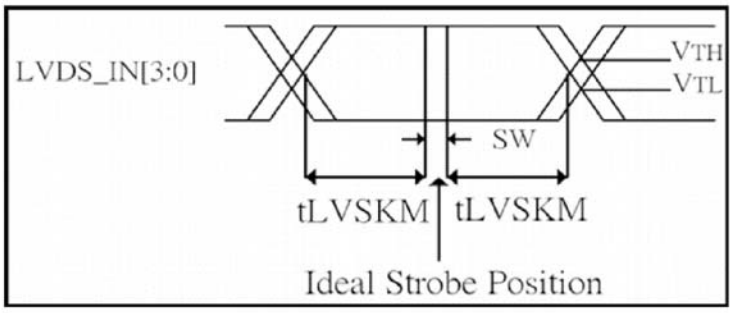
AC Timing characteristic of the LVDS

Timing Parameter:

Item	Symbol	Min	Typ	Max	Unit	Condition
Clock period	tLVCP	20.0	25	31.25	ns	
Clock high time	tLVCH	-	14.29	-	ns	
Clock low time	tLVCL	-	10.71	-	ns	
PLL wake-up time	tLVPLL	-	-	1	ms	
Input skew marign	tLVSKM	400	-	-	ps	f=85MHz



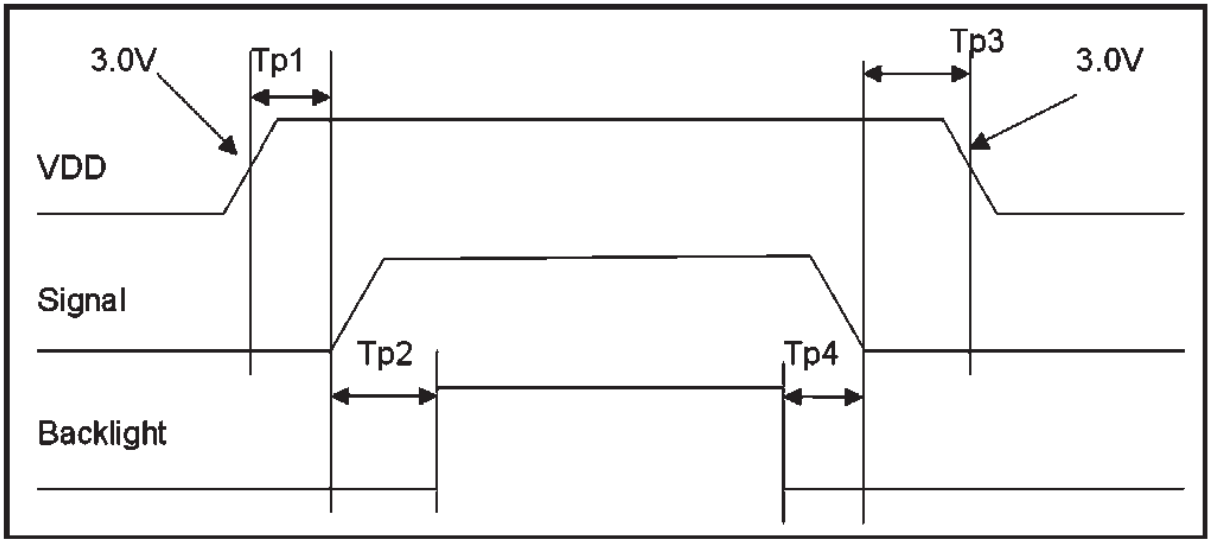




Setup and Hold time

Power On/Off Sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.0V to signal starting	Tp1	0	-	50	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD 3.0V	Tp3	0	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	



QUALITY AND RELIABILITY

TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

SAMPLING PLAN

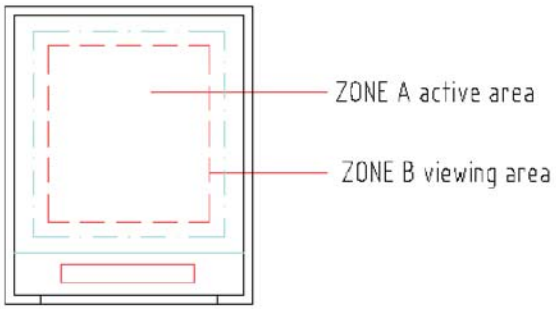
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

ACCEPTABLE QUALITY LEVEL

A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

APPEARANCE

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under florescent light. The inspection area of LCD panel shall be within the range of following limits.



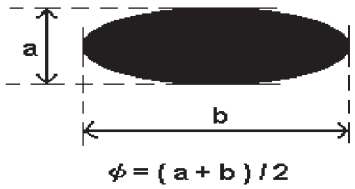
INCOMING INSPECTION STANDARD FOR TFT-LCD PANEL

DEFECT TYPE			LIMIT						Note
VISUAL DEFECT	INTERNAL	SPOT	$\varphi < 0.15$mm			Ignore			Note1
			0.15mm$\leqq \varphi \leqq$0.5mm			N$\leqq$4			
			0.5mm$< \varphi$			N=0			
		FIBER	0.03mm<W$\leqq$0.1mm, L$\leqq$ 5mm			N$\leqq$3			Note1
			1.0mm$<$ W, 1.5mm$<$ L			N=0			
		POLARIZER BUBBLE	$\varphi < 0.15$mm			Ignore			Note1
			0.15mm$\leqq \varphi \leqq$0.5mm			N$\leqq$2			
			0.5mm$< \varphi$			N=0			
		Mura	It' OK if mura is slight visible through 6%ND filter						
ELECTRICAL DEFECT	BRIGHT DOT		A Grade			B Grade			
			C Area	O Area	Total	C Area	O Area	Total	Note3
			N$\leqq$0	N$\leqq$2	N$\leqq$2	N$\leqq$2	N$\leqq$3	N$\leqq$5	Note2
	DARK DOT		N$\leqq$2	N$\leqq$3	N$\leqq$3	N$\leqq$3	N$\leqq$5	N$\leqq$8	
	TOTAL DOT		N$\leqq$4			N$\leqq$5	N$\leqq$6	N$\leqq$8	Note2
	TWO ADJACENT DOT		N$\leqq$0	N$\leqq$1 pair	N$\leqq$1 pair	N$\leqq$1 pair	N$\leqq$1 pair	N$\leqq$1 pair	Note4
	THREE OR MORE ADJACENT DOT		NOT ALLOWED						
	LINE DEFECT		NOT ALLOWED						

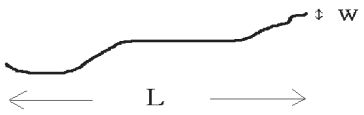
(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)

(2) LITTLE BRIGHT DOT ACCEPTABLE UNDER 6 % ND-Filter

[Note1] W : Width[mm], L : Length[mm], N : Number, φ : Average Diameter

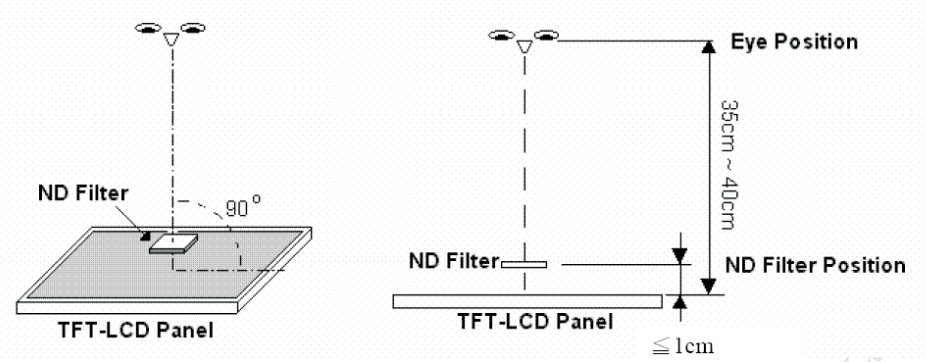


1. (White, black) Spot
2. Polarizer Bubble

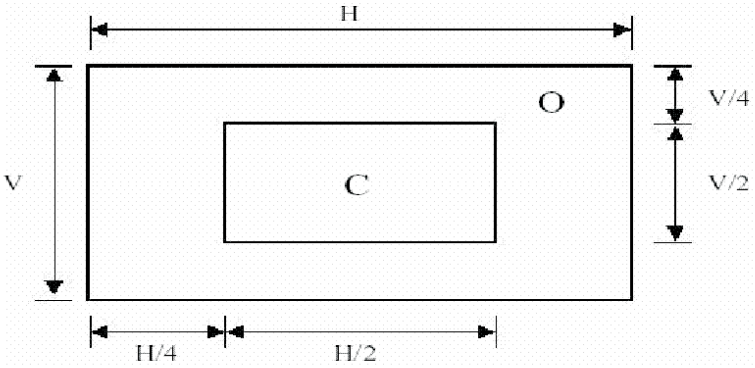


1. fiber

[Note2] Bright dot is defined through 6% transmission ND Filter as following.



[Note3]

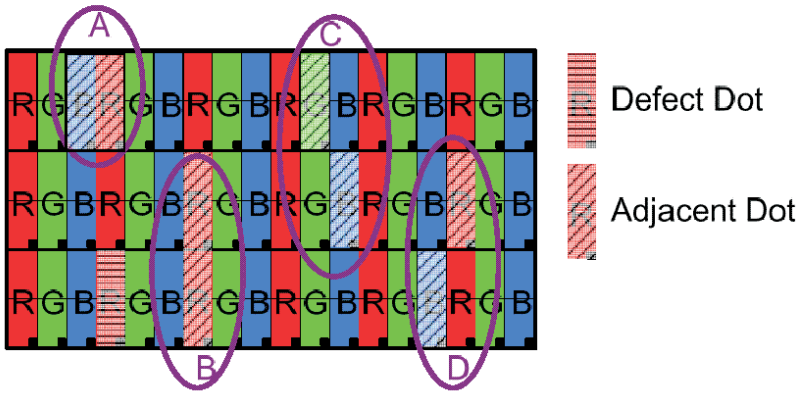


C Area: Center of display area

C Area: Outer of display area

[Note4]

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.



(1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

(2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

Reliability Test

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=96 hrs	
Low Temperature Operation	-20±3°C , t=96 hrs	
High Temperature Storage	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-30±3°C , t=96 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	60 °C, Humidity 90%, 96 hrs	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

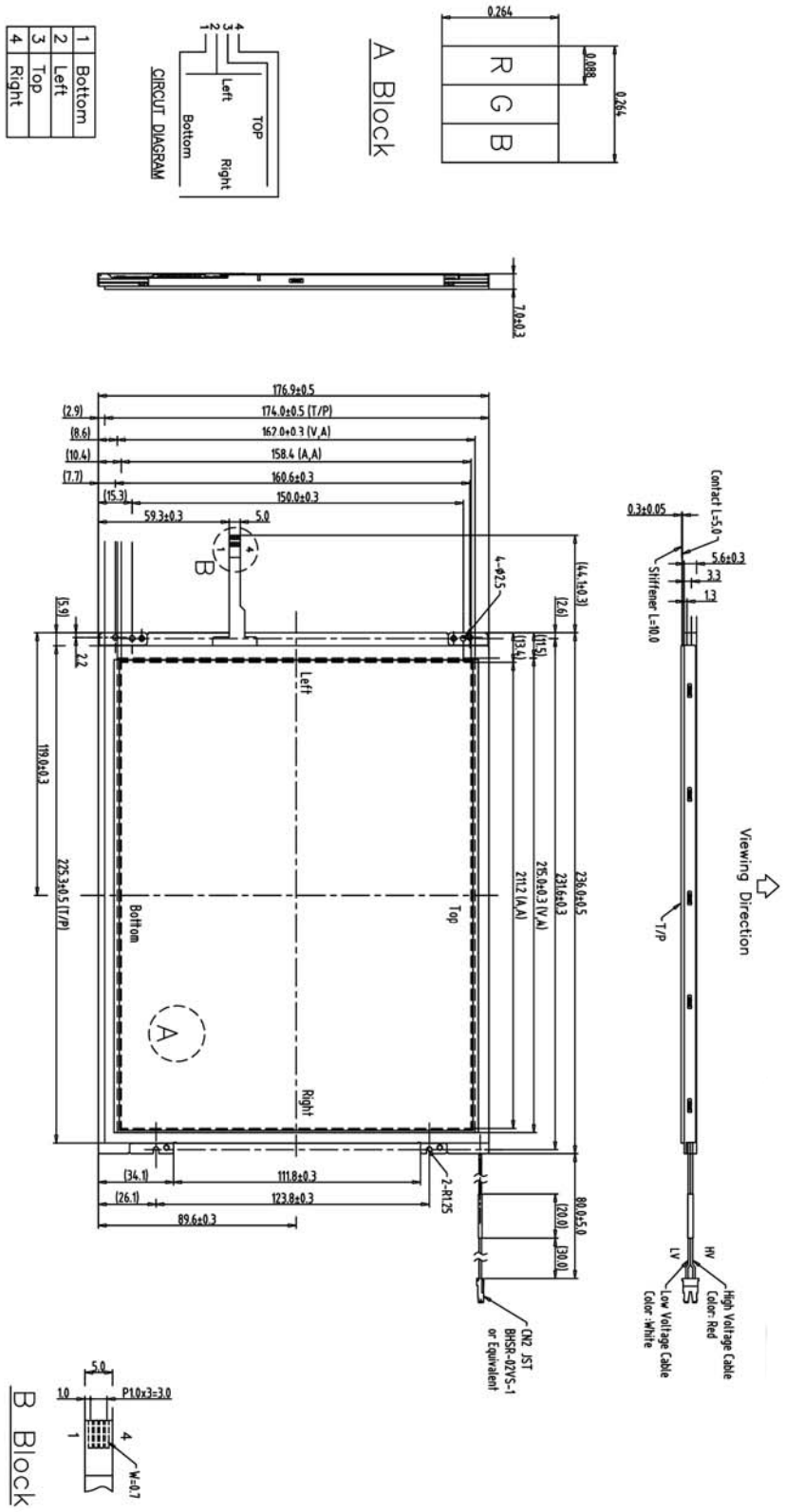
Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

Definitions of life end point :

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

Note:
1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.



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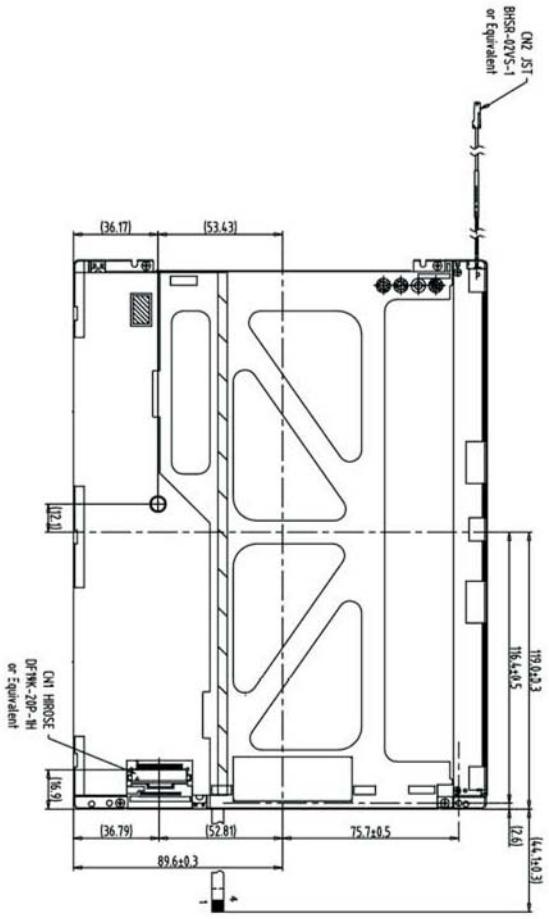
Note:
1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.

CN2

1	VL1
2	VL2

CN1

1	VDD	11	IN2−
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK−
5	IN0−	15	CLK+
6	IN0+	16	GND
7	GND	17	NC.
8	IN1−	18	NC.
9	IN1+	19	GND
10	GND	20	GND



Back View

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