

**MODEL NO. :** TM070JDHP01-00**ISSUED DATE:** 2011-12-14**VERSION :** Ver. 1.3

☒ **Preliminary Specification**
☐ **Final Product Specification**

Customer :

Approved by	Notes

SHANGHAI AVIC Confirmed :

Prepared by	Checked by	Approved by
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This technical specification is subjected to change without notice

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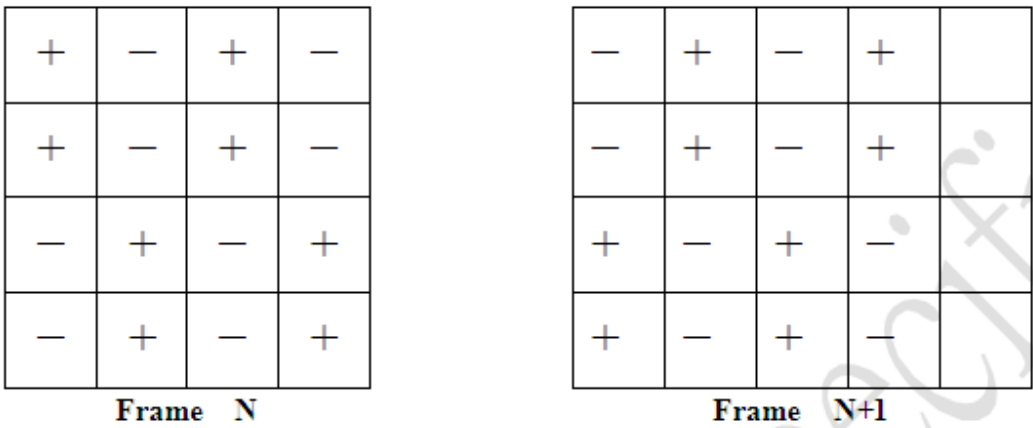


1. General Specifications

NO.	Item	Content	Unit	Mark
1	Size	6.95	inch	
2	Resolution	1280(RGB) x 800		
3	Interface	6/8 Bit LVDS		
4	Color Depth	262K/16.7M		
5	Technology Type	a-Si TFT-LCD		
6	Pixel Pitch (mm)	0.117(H) x 0.117 (V)	mm	
7	Pixel Configuration	R.G.B. Vertical Stripe		
8	Display Mode	SIP with Normally Black		
9	Surface Treatment(Up Polarizer)	AR		
10	Gray Scale Inversion Direction	80/80/80/80(Min)		CR>10
11	Panel (W x H x D) (mm)	156.5(W)x101.6(H)	mm	
12	LCM (W x H x D) (mm)	161.0 x 107.0 x 2.5(Type)	mm	Without PCB
13	Active Area(mm)	149.76(W)x93.60(H)		
14	With /Without TSP	Without TSP		
15	Weight (g)	85g(Type)		
16	LED Numbers	18LEDs		
17	TCON IC	HX8851		
18	NTSC	50%(Type)		
19	Contrast Ratio	800(Type)		600(Min)
20	Luminance	420(Type)	Lum	380(Min)
21	Pixel per inch	217		
22	Driver Inversion Type	1H2V		Note1:
23	Operating Temperature	-10~60	℃	
24	Storage Temperature	-20~70	℃	
25	Operating Ambient Humidity	10~90	%RH	
26	Storage Humidity	10~90	%RH	
27	Back Light Consumption	1.044(Type)	W	
28	LCM Consumption	2.0(Type)	W	

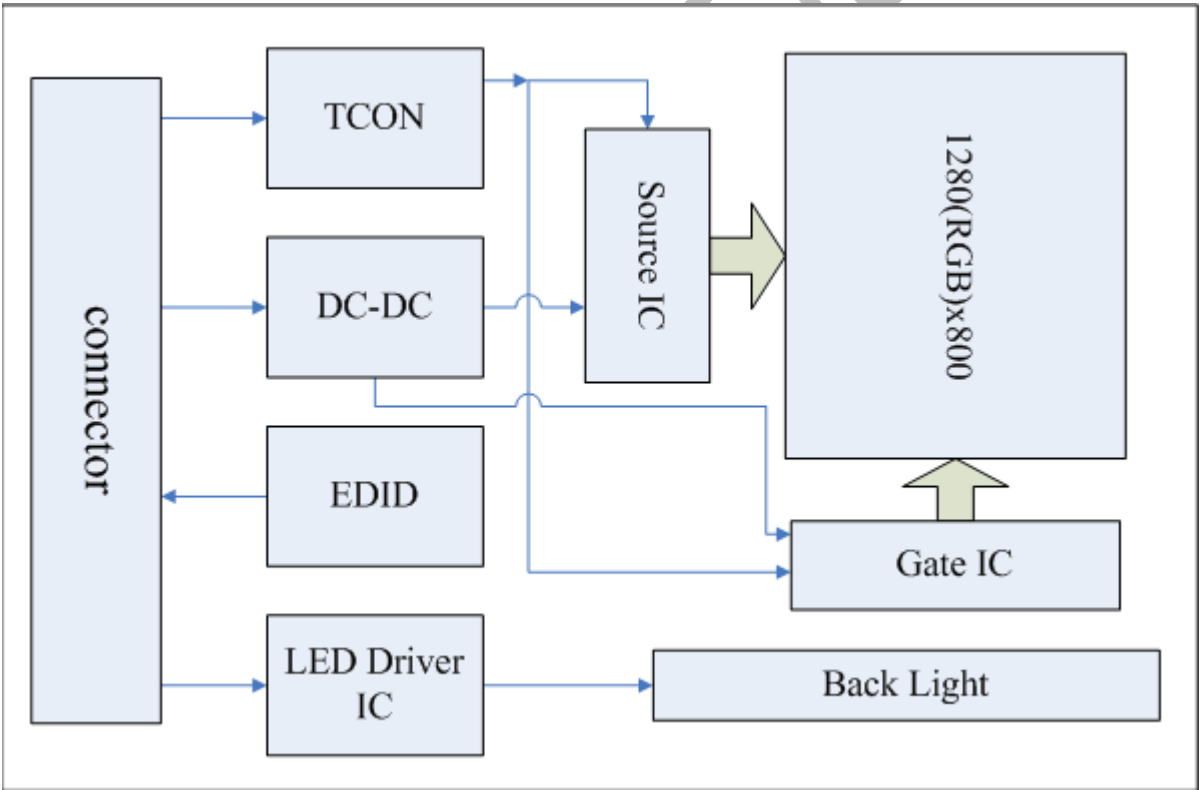


Note1:



2. Electrical Characteristics

2.1 Block Diagram



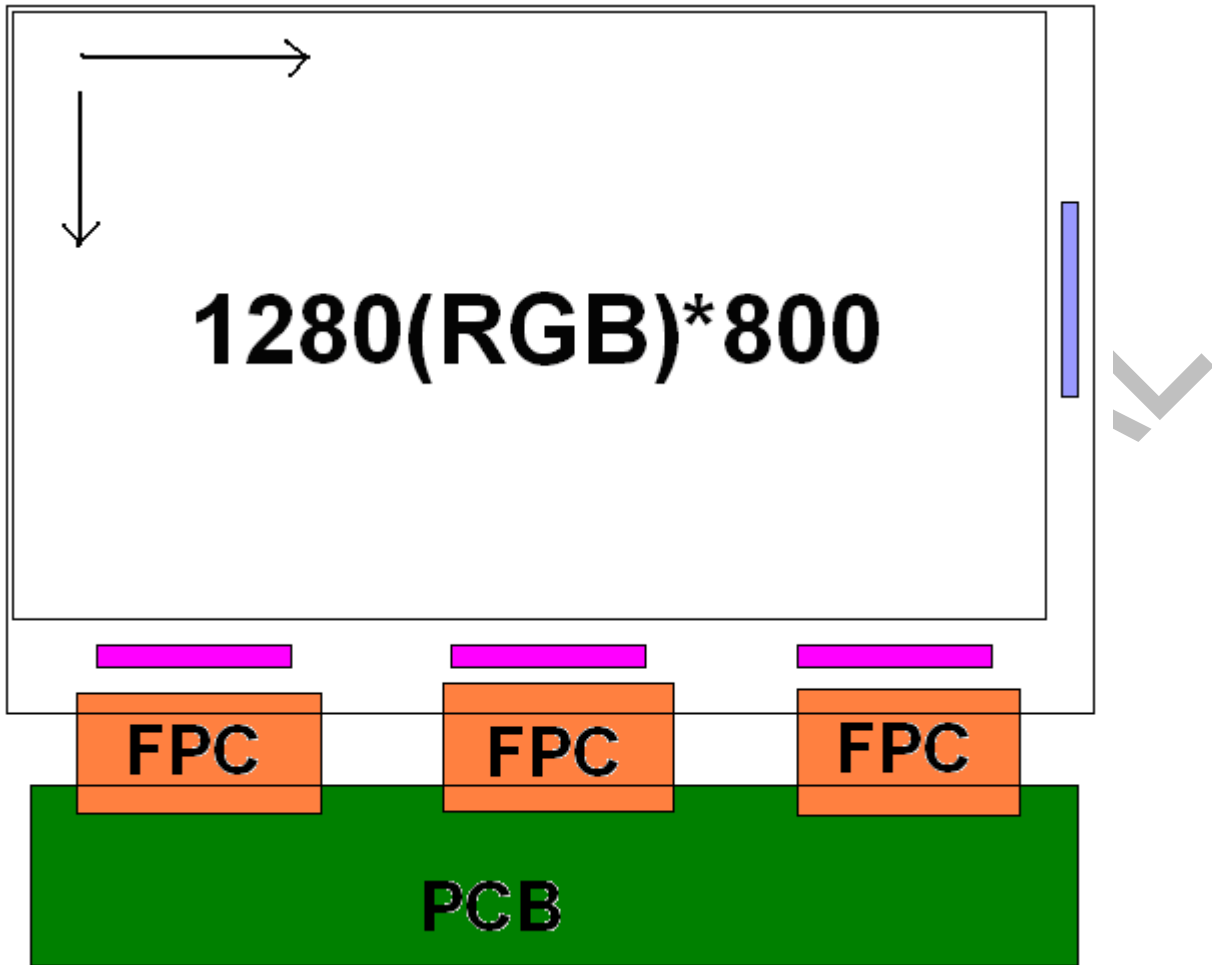


Figure 2. Panel Structure Diagram

2.2 Pin Assignment

NO.	Symbol	I/O	Description	Polarity	Comment
1	VCCS	P	Power Supply Type3.3V		
2	VCCS	P	Power Supply Type3.3V		
3	VEDID	P	DDC Power Type3.3V		
4	NC	-	No Connection		
5	CLKEDID	I	DDC Clock		
6	DATAEDID	I	DDC Data		
7	R _{XIN} 0-	I	LVDS Differential Data Input	Negative	R0~R5,G0
8	R _{XIN} 0+	I	LVDS Differential Data Input	Postive	
9	VSS	P	Ground		
10	R _{XIN} 1-	I	LVDS Differential Data Input	Negative	G1~G5,B0~B1

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11	R _{XIN1+}	I	LVDS Differential Data Input	Postive	
12	VSS	P	Ground		
13	R _{XIN2-}	I	LVDS Differential Data Input	Negative	B2~B5,HSYNC
14	R _{XIN2+}	I	LVDS Differential Data Input	Postive	VSYNC,DE
15	VSS	P	Ground		
16	R _{XCLK-}	I	LVDS Differential Clock Input	Negative	
17	R _{XCLK+}	I	LVDS Differential Clock Input	Postive	
18	VSS	P	Ground		
19	R _{XIN3-}	I	LVDS Differential Data Input	Negative	R6~R7,G6~G7, B6~B7
20	R _{XIN3+}	I	LVDS Differential Data Input	Postive	
21	VSS	P	Ground		
22	COLOR_EN	I	Color engine function selection.COLOR_EN=H:Enable color engine function; COLOR_EN=L or OPEN:Disable color engine function.		
23	NC	-	No Connection		
24	NC	P	No Connection		ID PIN
25	NC	-	No Connection		
26	NC	-	No Connection		
27	VSS	P	Ground		
28	H_Rev	-	Reverse Scanning Display in Horizontal		
29	V_Rev	-	Reverse Scanning Display in Vertical		
30	LED_GND	P	LED Ground		
31	LED_GND	P	LED Ground		
32	LED_GND	P	LED Ground		
33	NC	-	No Connection		
34	LED_PWM	I	PWM Control Signal of LED		Note1
35	LED_EN	I	Enable Control Signal of LED		Note2
36	CABC_EN	I	CABC Enable Control Input		Note3
37	LED_VCCS	P	LED Power Supply Type 12V		

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38	LED_VCCS	P	LED Power Supply Type 12V		
39	LED_VCCS	P	LED Power Supply Type 12V		

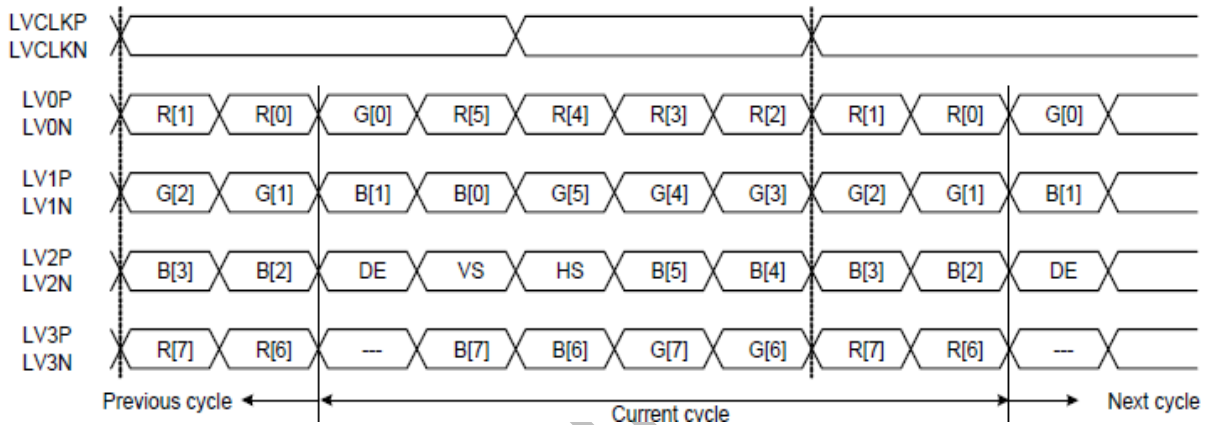
Connector:FCI 10064555-392120HLF

Note1:LED_PWM,Dimming Control Signal Input;

Note2:LED_EN, Chip Enable (Active High) for Boost Converter;

Note3:CABC_EN, CABC Function Enable Selection,CABC_EN=H,Enable CABC Function;
CABC_EN=L or OPEN,Disable CABC Function.

2.3 LVDS Input Data Mapping



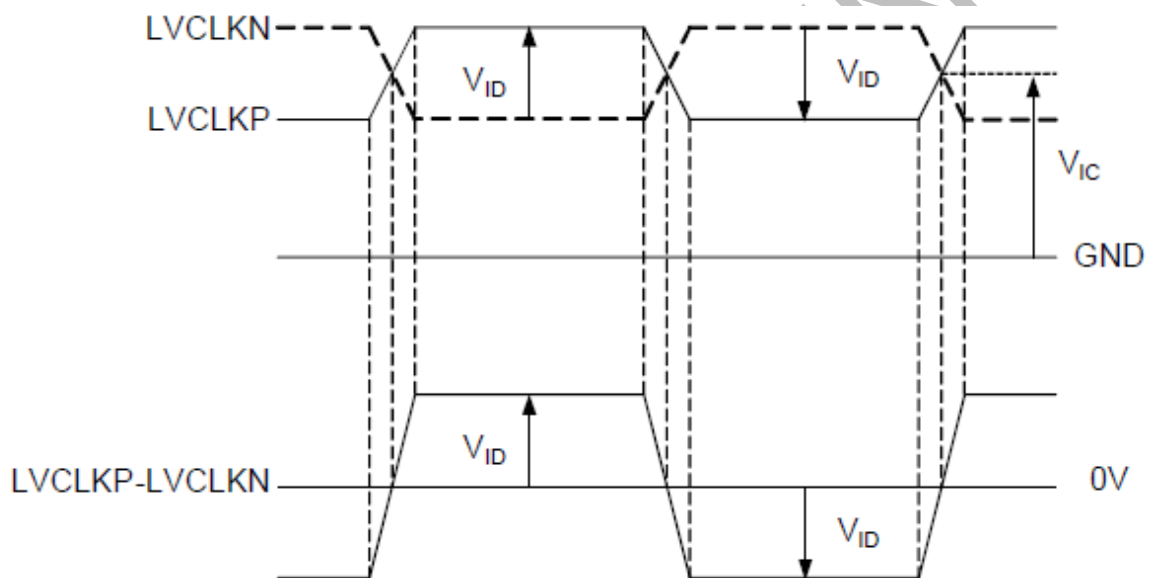
2.4 Electronic DC Characteristics

Item	Symbol	Values			Unit	Remark
		Min	Typ	max		
I/O Supply Voltage	VCC	3.0	3.3	3.6	V	
Analog Supply Voltage	VCC	3.0	3.3	3.6	V	
Input High Voltage	VIH	0.8*VCC	-	VCC	V	
Input Low Voltage	VIL	VSS	-	0.2*VCC	V	
Output High Voltage	VOH	0.8*VCC	-	VCC	V	
Output Low Voltage	VOL	VSS	-	0.2*VCC	V	
Frame Frequency	FFRAME		60		HZ	



Parameter	Symbol	Value			Unit	Note
		Min	Type	Max		
LVDS differential input high threshold	Vth(lvds)			+100	mV	Note 6 V _{cm} =1.2V
LVDS differential input low threshold	Vtl(lvds)	-100			mV	
LVDS common mode voltage	Vic	1.125		1.375	mV	
LVDS differential input voltage	Vid	100		600	mV	
LVDS terminating resistor	Rt		100		Ohm	

Note6: The parameters of LVDS signals are defined as the following figures.



2.5 Display Timing Specifications

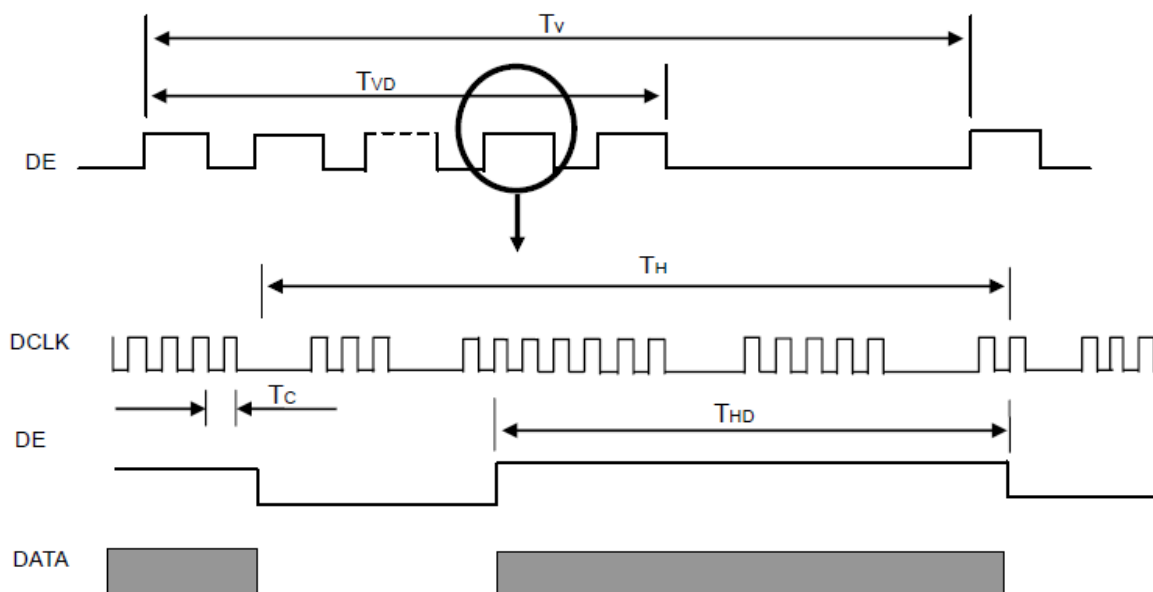
The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min	Type	Max	Unit	Note
DCLK	Frequency	1/TC	67.55	71.11	78.22	MHZ	Note7
DE	Vertical Total Time	TV	813	823	833	TH	
	Vertical Active Display Period	TVD		800		TH	
	Vertical Active Blanking Period	TVB	13	23	33	TH	
	Horizontal Total Time	TH	1410	1440	1470	TC	
	Horizontal Active Display Period	THD	-	1280	-	TC	



	Horizontal Active Blanking Period	THB	130	160	190	TC	
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Note7: Because this module is operated by DE only mode, HSYNC and VSYNC are ignored.



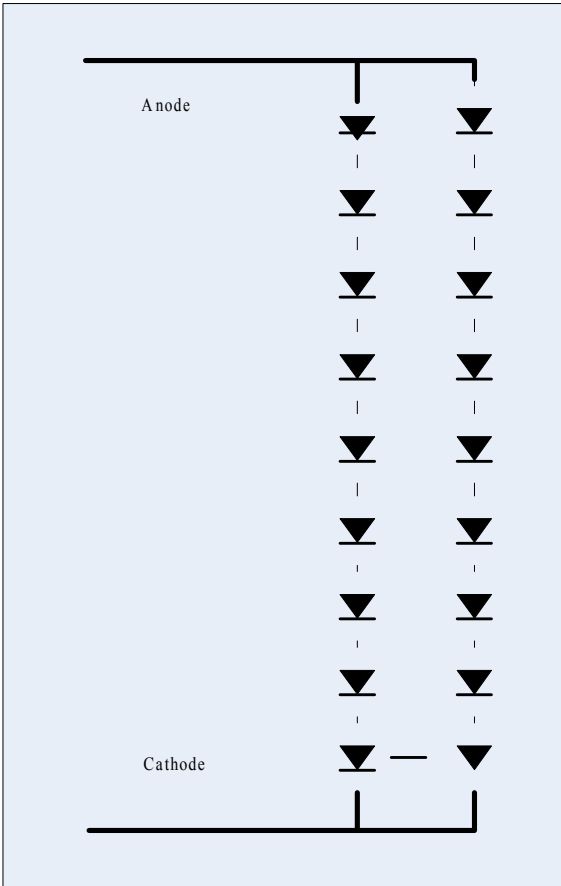
Input Signal Timing Diagram

2.6 Back Light

B/L consumption: $V_{ccs}=12V$, $T_a=25^{\circ}C$, $F_{pwm}=300Hz$, $Duty=100\%$

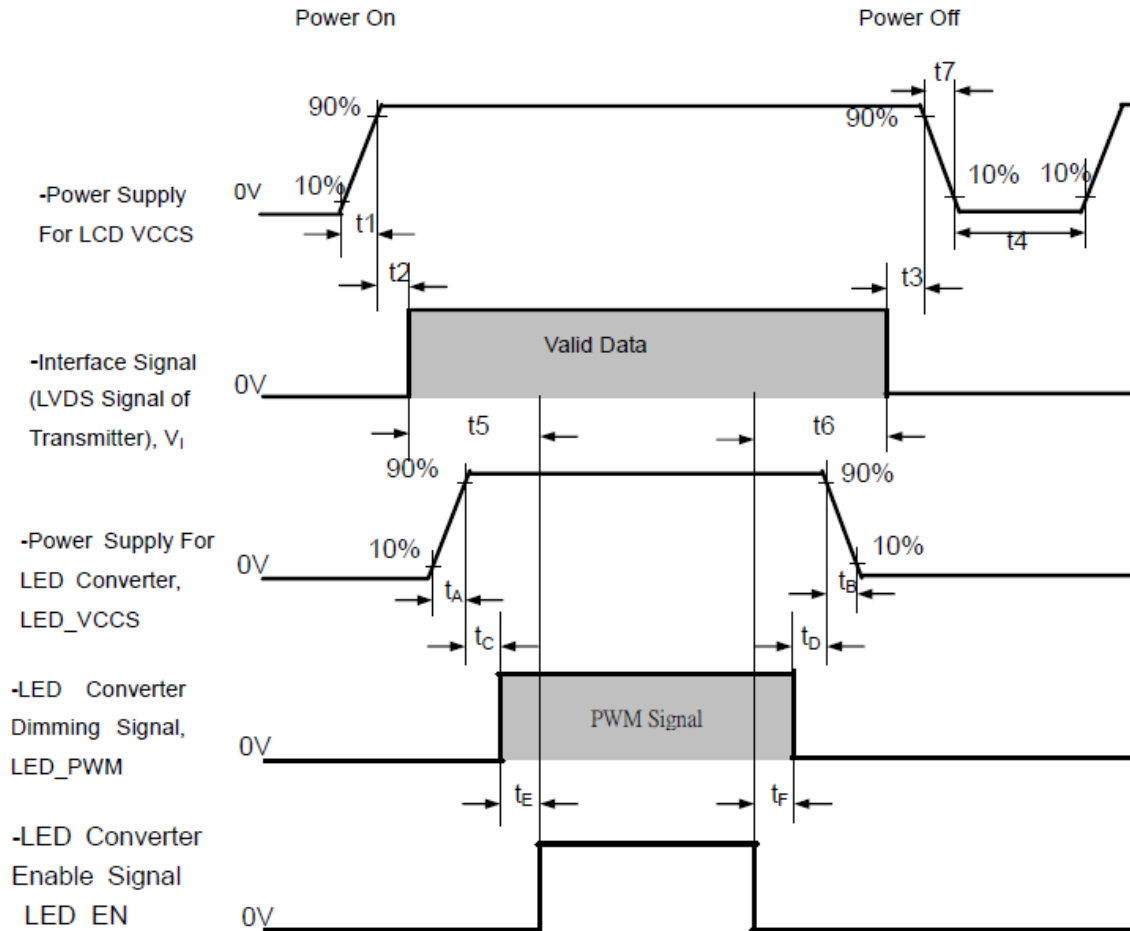
item	symbol	value			unit	remark
		min	type	max		
converter input power supply voltage	LED_VCCS	6.0	12	21	V	
converter inrush current	ILED _{rush}			1.5A	A	
EN control	ON	1.4	-	-	V	
	OFF	0		0.5	V	
PWM control	High	1.4	-	-	V	
	Low	0		0.5	V	
PWM Dimming		100.0	TBD	10K	HZ	
PWM Control Duty Ratio		10		100	%	
LED Light Bar Power supply voltage	VL	-	26.1	-	V	
LED Light Bar Power supply current	IL	-	40	-	mA	each serial 20mA
Power consumption		-	1.044	-	W	

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2.7 Power ON/OFF Sequence

Symbol	Value			Unit	Note
	Min.	Typ.	Max.		
t1	0.5	-	10	ms	Note8
t2	-	-	50	ms	
t3	-	-	50	ms	
t4	500	-	-	ms	
t5	200	-	-	ms	
t6	200	-	-	ms	
t7	0.5	-	10	ms	
tA	0.5	-	10	ms	
tB	-	-	10	ms	
tC	10	-	-	ms	
tD	10	-	-	ms	
tE	10	-	-	ms	
tF	10	-	-	ms	



Note8: Please don't plug or unplug the interface cable when system is turned on.
Please avoid floating state of the interface signal during signal invalid period.
It is recommended that the backlight power must be turned on after the power supply for LCD and the interface signal is valid.

2.8 Power Consumption of TFT Panel

Power Supply: VCC=3.3V

Frame Frequency: $f_{FRAME} \geq 60\text{Hz}$ @ 25degC

Display Mode	Item	Symbol	Value			Unit	Remark
			Min	Typ	Max		
Display White	Current of VCC	Ivcc		TBD		mA	
Display Black	Current of VCC	Ivcc		TBD		mA	





4.0 Optical Specifications

Test condition : VCC=3.3V ,Ta=25°C

Item		Symbol	Condition	Value			Unit	Note
				Min	Typ	Max		
luminance		Bp	$\theta=0^{\circ}$ $\Phi=0^{\circ}$	380	420	-		Note 9
Uniformity		$\triangle$ Bp		75	80	-		Note 10
Viewing Angle	Left	θ L	$Cr\geq 10$	80	89	-		Note11
	Right	θ R		80	89	-		
	Top	ψ T		80	89	-		
	Bottom	ψ B		80	89	-		
Contrast Ratio		Cr	$\theta=0^{\circ}$ $\Phi=0^{\circ}$	600	800	-		Note12
Response Time		Tr+ Tf		- -	25	32		Note13
Color Coordinat e of CIE1931	Red	X	$\theta=0^{\circ}$ $\Phi=0^{\circ}$	TBD				Note14
		Y						
	Green	X						
		Y						
	Blue	X						
		Y						
	White	X		0.28	0.31	0.34		
		Y		0. 29	0.32	0.35		
NTSC Ratio		NTSC	CIE1931	45	50	-		Note15
Flicker		amount	-	-		-30	dB	Note16
Gamma		-	-	1.9	2.2	2.5		
Crosstalk		$\triangle$ CT	-	-	1.1	1.2		Note17

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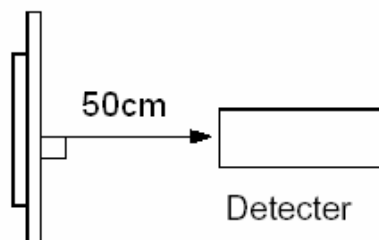


Transmittance	Tm			4		%	
Reflectance	Rf		NA	NA	NA		
Polarization Direction of Front Polarizer	PdF		89	90	91		Note18
Polarization Direction of Rear Polarizer	PdR		-1	0	1		

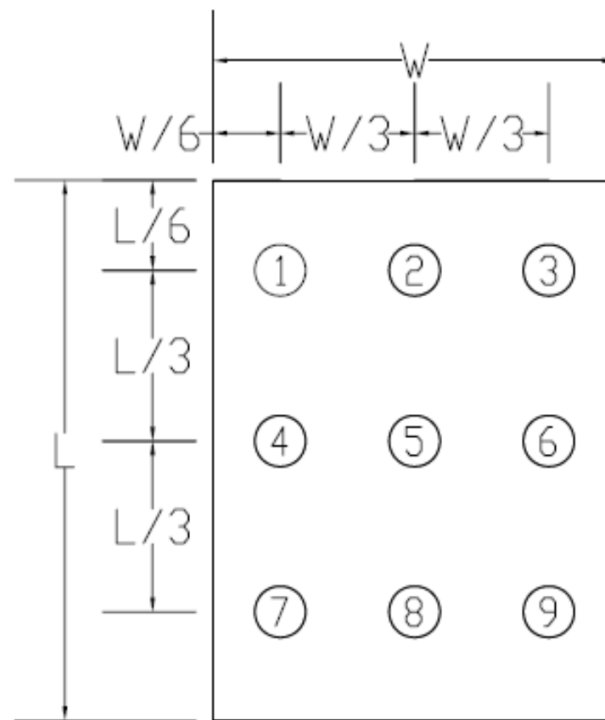
Note9: Luminance measurement

The test condition is at ILED=20mA and measured on the surface of LCD module at 25°C.

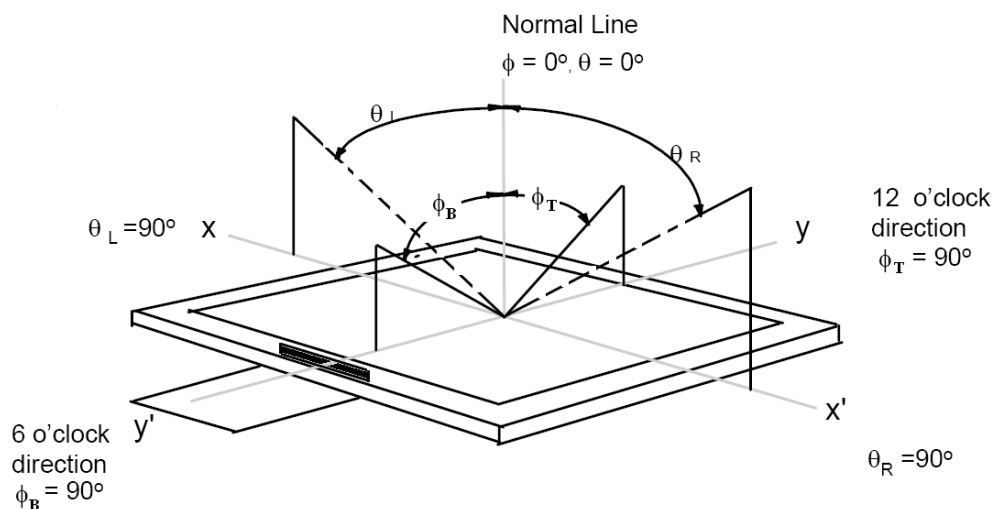
- The data are measured after LEDs are lighted on for more than 5 minutes and LCM displays are fully white. The brightness is the average value of 9 measured spots. Measurement equipment BM-5
- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25°C.
- Adjust operating voltage to get optimum contrast at the center of the display.
- Measured value at the center point of LCD panel must be after more than 5 minutes while backlight turning on.

**Note10: Uniformity**

- The test condition is at ILED=20mA and measured on the surface of LCD module at 25°C.
- Measurement equipment : BM-5
- The luminance uniformity is calculated by using following formula:
- $\Delta Bp = Bp(\text{Min.}) / Bp(\text{Max.}) \times 100 (\%)$
- Bp (Max.) = Maximum brightness in 9 measured spots
- Bp (Min.) = Minimum brightness in 9 measured spots.

**Note 11: The definition of Viewing Angle**

Refer to the graph below marked by θ and ϕ

**Note 12: The definition of Contrast Ratio** (Test LCM using BM-5):

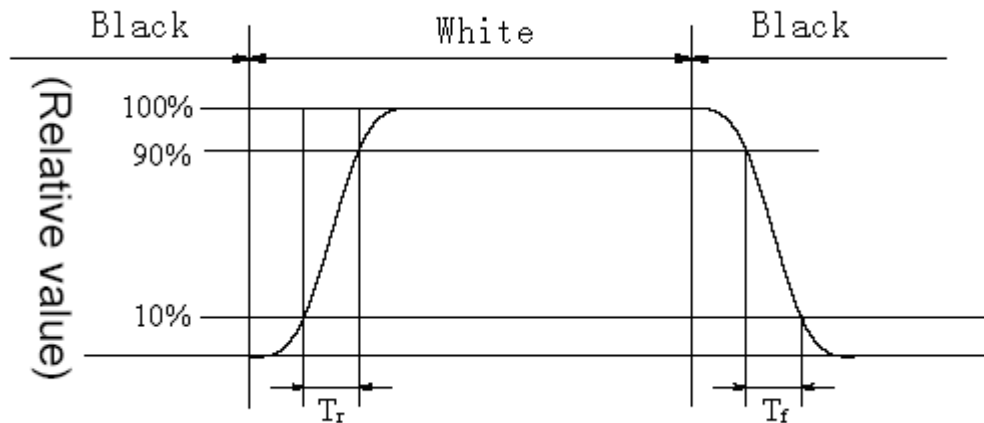
$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)



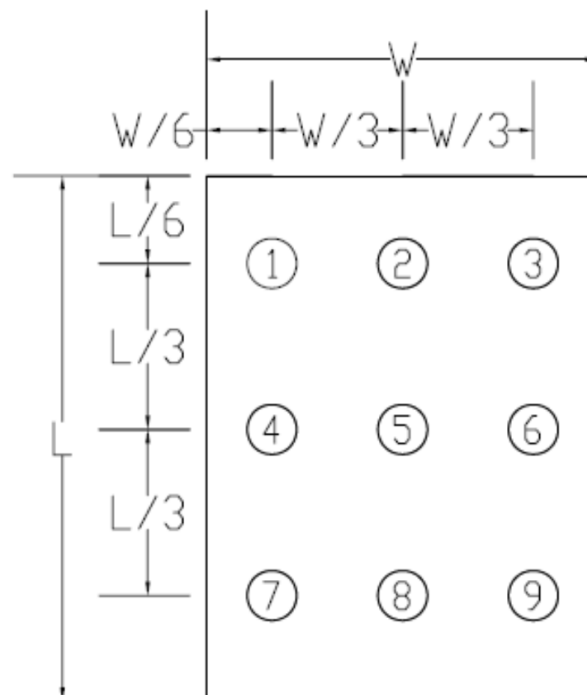
Note 13: Definition of Response time. (Test LCD using TRD-100):

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(Voltage falling time) and from “white” to “black”(Voltage rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



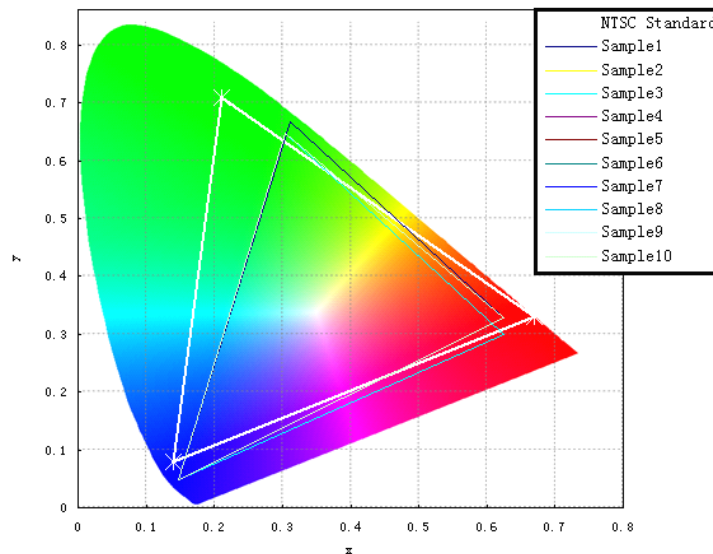
Note 14: Color Coordinates of CIE 1931

- The test condition is at ILED=20mA and measured on the surface of LCD module at 25°C.
- Measurement equipment : SR-3A
- The Color Coordinate (CIE 1931) is the average measurement of the 9 places on the display shown in below figure

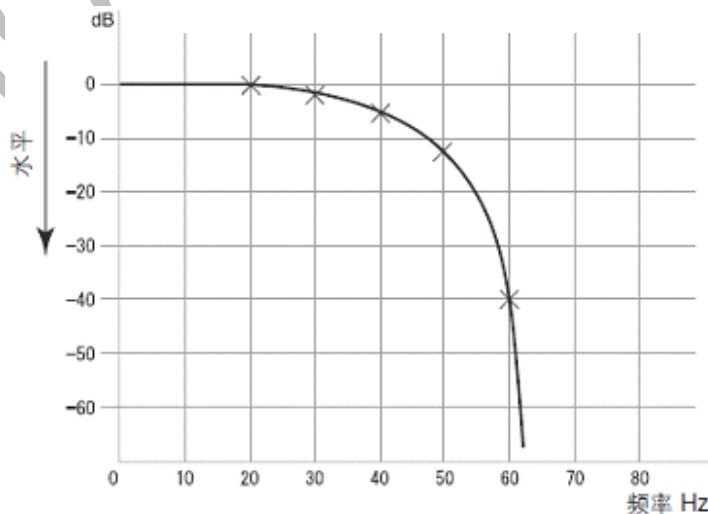


**Note 15: Definition of Color of CIE Coordinate and NTSC Ratio.**

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

**Note 16: Flicker**

- Measurement equipment :CA-210
- Measuring temperature: Ta=25℃.
- Test method: Contrast method
- Test pattern : 2H1V Flicker test Pattern
- Frame Frequency Requirement before test : The LCD must be tuned to more than 65HZ before measurement .
- At 60HZ, Flicker amount less than -30[dB].
- Flicker amount = $10 \times \log(P_x/P_0)$ [dB]

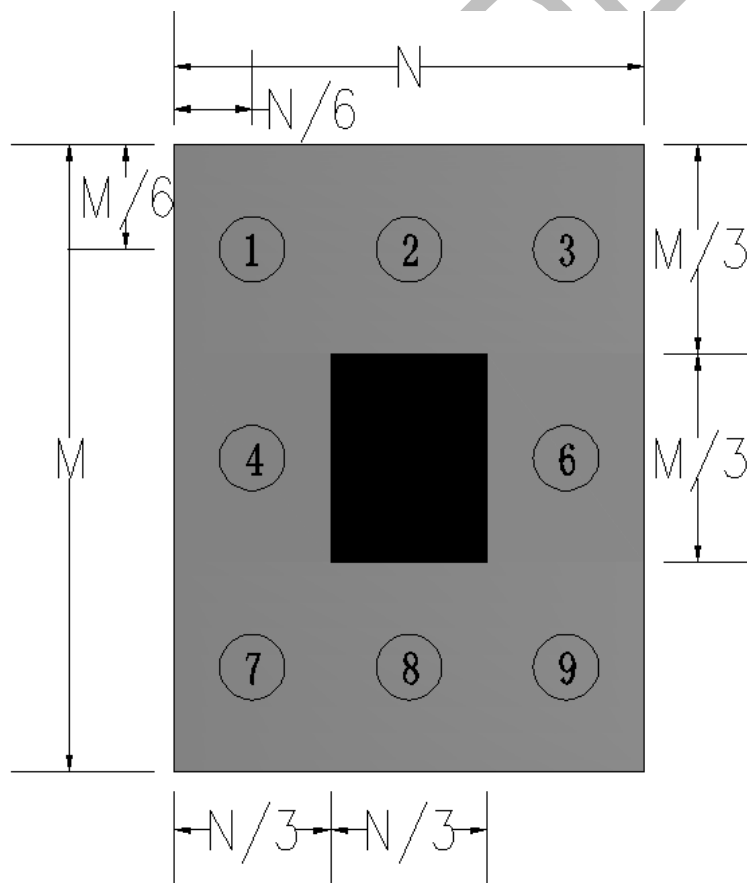


**Note 17: Crosstalk**

- There should be no visible cross-talk in normal direction of the display when the "Cross-talk Test Pattern" below are loaded.
- Measurement equipment : BM-5
- The point should be marked is, the background of Cross-talk Test Pattern-"gray " are defined as middle gray scale . For example, RGB 24bit "gray" defined as below:

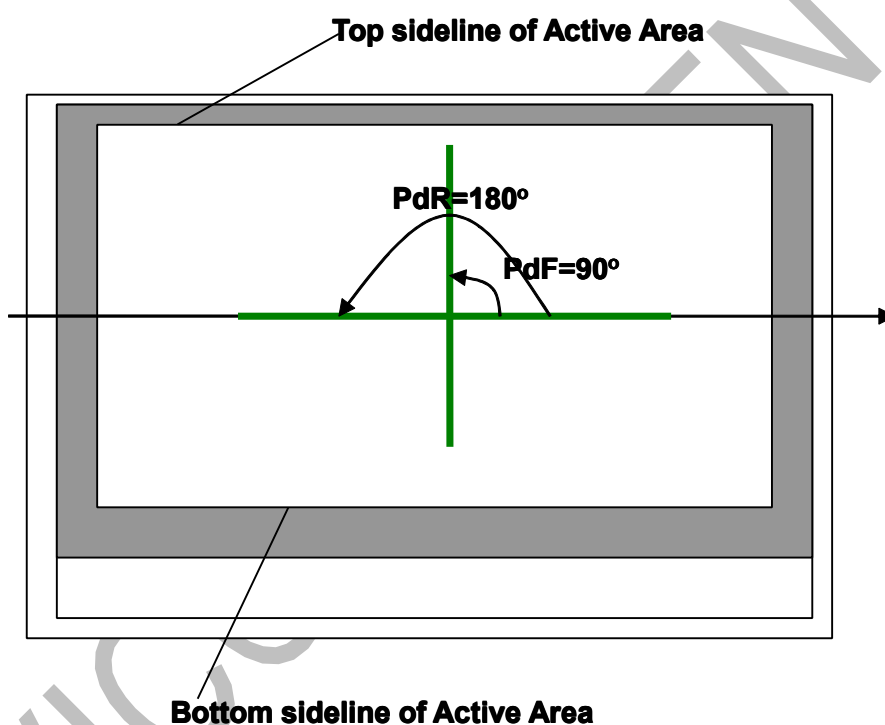
R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

- $\Delta B_{pn} = B_{pn}(\text{gray}) / B_{pn}(\text{white})$
- Which n means the dot No. In the Cross-talk Test Pattern ;
- B_{pn} (gray) means the brightness of the No.n spots in Cross-talk Test Pattern;
- B_{pn} (white) means the brightness of the No.n spots in Full white Test Pattern;
- $\Delta B_p(\text{Max.}) = \text{Maximum value in } \Delta B_{p1} \sim \Delta B_{p9}, \text{ except the No. 5 spot.}$
- $\Delta B_p(\text{Min.}) = \text{Minimum value in } \Delta B_{p1} \sim \Delta B_{p9}, \text{ except the No.5 spot.}$
- $\Delta CT = \Delta B_p(\text{Max.}) / \Delta B_p(\text{Min.})$.
- ΔCT must be less than 1.10

**Cross-talk Test Pattern**

**Note 18: Polarization Direction Definition**

- Viewing direction is normal user viewing direction which is vertical to the display surface.
- The polarizer which is closer to viewer is defined as Front Polarizer
- The polarizer which is on the rear side of viewer is defined as Rear Polarizer
- The X axis is defined as parallel line to top&bottom sidelines of the Active Area
- PdF which is marked in blue arrow is polarization degree of Front polarizer
- PdB which is marked in red arrow is polarization degree of Back polarizer
- The polarization degree parameter must be indicated in range of 0deg to 180deg according to above definition.

**5.0 Reliability Test Items**

No.	Test Items	Conditions	Remark
1	High Temperature Storage	Ta=70℃, 240Hrs	IEC60068-2-1-2007 GB2423-2-2008
2	Low Temperature Storage	Ta=-20℃, 240Hrs	IEC60068-2-1-2007 GB2423-2-2008
3	High Temperature Operation	Ta=60℃, 240Hrs	IEC60068-2-1-2007 GB2423-2-2008

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4	Low Temperature Operation	Ta=-10℃, 240Hrs	IEC60068-2-1-2007 GB2423-2-2008
5	Storage at High Temperature and Humidity	Ta=60℃.90%RH max 240Hours	IEC60068-2-1-2007 GB2423-2-2008
6	Thermal Shock (non-operation)	20℃ 30min~+70℃ 30min Change time min 20Cycle	Start with cold temperature,End with high temperature IEC60068-2-14-1984 GB2423-22-2002
7	ESD	C=150pF,R=330Ω,5Point/Panel Air discharge:+8KV,5times Contact discharge:+4KV,5times (Environment:15~35℃,30%~60%RH ,86Kpa~106Kpa)	IEC61000-4-2-2001 GB/T17626.2-2006
8	Vibration Test	Frequency range:10~55HZ Stroke:1.5mm Sweep:10HZ~55HZ~10HZ 2hours for each direction of X,Y,Z (6hours for total)	IEC60068-2-6-1982 GB/T2423-10-1995
9	Shock(non-operation)	60G 6ms X,Y,Z 3times,for each direction	IEC60068-2-27-1987 GB/T2423-5-1995
10	Package Drop Test	Height 80cm, 1 corner,3 edges ,6 surfaces	IEC60068-2-23-1987 GB/T2423-8-1995

6.0 Packing and Marking

TBD

7.0 Appendix EDID Data Structure

The EDID(Extended Display Identification Data) data formats are to support displays as defined in the VESA Plug & Display and FPD standards.

Byte#(decimal)	Byte#(hex)	Field Name and Comments	Value#(hex)	Value#(binary)
0	0	Header	00	00000000
1	1	Header	FF	11111111
2	2	Header	FF	11111111
3	3	Header	FF	11111111

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4	4	Header	FF	11111111
5	5	Header	FF	11111111
6	6	Header	FF	11111111
7	7	Header	00	11111111
8	8	EISA ID manufacture name("TMS")	51	01010001
9	9	EISA ID manufacture name(Compressed ASCII)	B3	10110011
10	A	ID product code(TM070JDHP01)	01	00000001
11	B	ID product code(hex LSB first TM070JDHP01)	07	00000111
12	C	ID S/N (fixed "0")	00	00000000
13	D	ID S/N (fixed "0")	00	00000000
14	E	ID S/N (fixed "0")	00	00000000
15	F	ID S/N (fixed "0")	00	00000000
16	10	Week of manufacture(fixed week code) 22W	16	00010110
17	11	Year of manufacture(fixed year code) 2011	15	00010101
18	12	EDID strcuture version #("1")	01	00000001
19	13	EDID version #("3")	03	00000011
20	14	Video I/P definition("digital")	80	10000000
21	15	Max H image size("150mm")	96	10010110
22	16	Max V image size("94mm")	5E	01011110
23	17	Display Gamma(Gamma=2.2)	78	01111000
24	18	Feature support("Active off,RGB Color")	0A	00001010
25	19	Rx1,Rx0,Ry1,Ry0,Gx1,Gx0,Gy1,Gy0	04	00000100
26	1A	Bx1,Bx0,By1,By0,Wx1,Wx0,Wy1,Wy0	7C	01111100
27	1B	Rx=0.629	A1	10100001
28	1C	Ry=0.348	59	01011001
29	1D	Gx=0.333	55	01010101
30	1E	Gy=0.602	9A	10011010
31	1F	Bx=0.153	27	00100111
32	20	By=0.089	16	00010110
33	21	Wx=0.304	4D	01001101
34	22	Wy=0.328	54	01010100
35	23	Established timings 1	00	00000000
36	24	Established timings 2	00	00000000
37	25	Manufacturer's reserved timings	00	00000000
38	26	Standard timing ID #1	81	10000001
39	27	Standard timing ID #1	00	00000000
40	28	Standard timing ID #2	01	00000001



41	29	Standard timing ID #2	01	00000001
42	2A	Standard timing ID #3	01	00000001
43	2B	Standard timing ID #3	01	00000001
44	2C	Standard timing ID #4	01	00000001
45	2D	Standard timing ID #4	01	00000001
46	2E	Standard timing ID #5	01	00000001
47	2F	Standard timing ID #5	01	00000001
48	30	Standard timing ID #6	01	00000001
49	31	Standard timing ID #6	01	00000001
50	32	Standard timing ID #7	01	00000001
51	33	Standard timing ID #7	01	00000001
52	34	Standard timing ID #8	01	00000001
53	35	Standard timing ID #8	01	00000001
54	36	Detailed timing description # 1 Pixel clock('71.11MHZ",According to VESA CVT Rev1.1)	C7	11000111
55	37	#1 Pixel clock(hex LSB first)	1B	00011011
56	38	#1 H active("1280")	00	00000000
57	39	#1 H blank("160")	A0	10100000
58	3A	#1 H active:H blank("1280:160")	50	01010000
59	3B	#1 V active("800")	20	00100000
60	3C	#1 V blank("23")	17	00010111
61	3D	#1 V active:V blank("800:23")	30	00110000
62	3E	#1 H SYNO OFFSET("48")	30	00110000
63	3F	#1 H syno pulse width("32")	20	00100000
64	40	#1 V syno offset : V syno pulse width("3:6")	36	00110110
65	41	#1 H syno offset: H syno pulse width:V sync offset:V sync width("48:32:3:6")	00	00000000
66	42	#1 H image size("150mm")	96	10010110
67	43	#1 V image size("94mm")	5E	01011110
68	44	#1 H image size:V image size("150:94")	00	00000000
69	45	#1 H boarder("0")	00	00000000
70	46	#1 V boarder("0")	00	00000000
71	47	#1 Non-interlaced.Normal,no stereo, separate sync,H/V pol Negatives	18	00011000
72	48	Detailed timing description # 2 Pixel clock('47.41MHZ",According to VESA CVT Rev1.1)	85	10000101
73	49	#2 Pixel clock(hex LSB first)	12	00010010
74	4A	#2 H active("1280")	00	00000000
75	4B	#2 H blank("160")	A0	10100000

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76	4C	#2 H active:H blank("1280:160")	50	01010000
77	4D	#2 V active("800")	20	00100000
78	4E	#2 V blank("23")	17	00010111
79	4F	#2 V active:V blank("800:23")	30	00110000
80	50	#2 H sync offset("48")	30	00110000
81	51	#2 H sync pulse width("32")	20	00100000
82	52	#2 V sync offset:V sync pulse width("3:6")	36	00110110
83	53	#2 H sync offset:H sync pulse width: V sync offset:V sync width("48:32:3:6")	00	00000000
84	54	#2 H image size("150mm")	96	10010110
85	55	#2 V image size("94mm")	5E	01011110
86	56	#2 H image size:V image size("150:94")	00	00000000
87	57	#2 H boarder("0")	00	00000000
88	58	#2 V boarder("0")	00	00000000
89	59	#2 Non-interlaced,Normal,no stereo, Separate sync,H/V pol Negatives	18	00011000
90	5A	Detailed timing description #3	00	00000000
91	5B	#3 Flag	00	00000000
92	5C	#3 Reserved	00	00000000
93	5D	#3 FE(hex)defines ASCII string(Vendor"TMS",ASCII)	FE	11111110
94	5E	#3 Flag	00	00000000
95	5F	#3 1st character of string("T")	54	01010100
96	60	#3 2nd character of string("M")	4D	01001101
97	61	#3 3rd character of string("S")	53	01010011
98	62	#3 New line character indicates end of ASCII string	0A	00001010
99	63	#3 Padding with "Blank"character	0A	00001010
100	64	#3 Padding with "Blank"character	0A	00001010
101	65	#3 Padding with "Blank"character	0A	00001010
102	66	#3 Padding with "Blank"character	0A	00001010
103	67	#3 Padding with "Blank"character	0A	00001010
104	68	#3 Padding with "Blank"character	0A	00001010
105	69	#3 Padding with "Blank"character	0A	00001010
106	6A	#3 Padding with "Blank"character	0A	00001010
107	6B	#3 Padding with "Blank"character	0A	00001010
108	6C	detailed timing description #4	00	00000000
109	6D	#4 Flag	00	00000000
110	6E	#4 Reserved	00	00000000
111	6F	#4 FE(hex)defines ASCII string (Model Name"N070ICG-LD1",ASCII)	FE	11111110

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112	70	#4 Flag	00	00000000
113	71	#4 1st character of name("T")	54	01010100
114	72	#4 2st character of name("M")	4D	01001101
115	73	#4 3st character of name("O")	30	00110000
116	74	#4 4st character of name("7")	37	00110111
117	75	#4 5st character of name("O")	30	00110000
118	76	#4 6st character of name("J")	4A	01001010
119	77	#4 7st character of name("D")	44	01000100
120	78	#4 8st character of name("H")	48	01001000
121	79	#4 9st character of name("P")	50	01010000
122	7A	#4 Ast character of name("O")	30	00110000
123	7B	#4 Bst character of name("I")	31	00110001
124	7C	#4 New line character indicates end of ASCII string	0A	00001010
125	7D	#4 Padding with "Blank"character	0A	00001010
126	7E	Extension flag	00	00000000
127	7F	Checksum	0D	00001101