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Datasheet

SGD

GWIO88MNFJ1F0

SG-01-027

Thin-Film-Transistor LCD Module
Model: GWIO88MNFJ1F0

Acceptance

Solomon Goldentek Display Corp.

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Revise Records

Rev.	Date	Contents	Written	Approved
A	2022/11/9	Preliminary Specification	Alex	ken
B	2023/06/16	Modify the Reliability Condition	Alex	ken

Special Notes

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1 General Description and Features

GWIO88MNFJ1F0 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, back-light unit. Graphics and texts can be displayed with 480 (W) x RGB x 1920 (H) dots with 16.7M colors. The following table described the features of GWIO88MNFJ1F0.

1.1 LCD Module

Parameter	Value	Unit
LCD Mode	transmissive	-
Color	16.7M	-
Display Resolution	1920*3(RGB)*480	pixels
Outline Dimension	64.3(W) *231.3(H) *6.1(T)	mm
Active Area(A.A)	218.88*(W) *54.72(H)	mm
Pixel Arrangement	RGB-stripe	-
Viewing Direction	ALL	
Display Mode	Normally Black	
Touch Points	--	-
Surface Treatment	AG\AF\AR	
Back-light	White LED	-

2 Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	64.0	64.3	64.6	mm
	Vertical (V)	231.0	231.3	231.6	mm
	Depth (D)	—	6.1	—	mm
Weight		—	(110)	—	g

3 Electrical Specifications

3.1 Electrical Absolute Maximum Ratings

3.1.1 TFT-LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	V_{DD}	-0.5	4.0	V	
	V_{GH}	15	26	V	
	V_{GL}	-11.5	-4	V	
	AV_{DD}	7	12.5	V	
Logic Signal Input Level	V_{DD}	-0.5	4.0	V	

3.1.2 Backlight Unit

Item	Symbol	Typ.	Max.	Unit	Note
LED current	I_L	160	-	mA	(1) (2)(3)
LED voltage	V_L	17	20.4	V	(1) (2)(3)
LED reverse voltage	V_R	--	5	V	
LED forward current	I_F		20	mA	

Note:

(1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) Ta =25±2℃

(3) Test Condition: LED current 140 mA. The LED lifetime could be decreased if operating IL is larger than 140mA.

3.1.3 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-30	80	℃	
Storage Temperature	T_{stg}	-30	80	℃	

3.1.4 DC Electrical Characteristics of the TFT LCD

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3.0	3.3	3.6	V	
	VGH	17.0	18.0	19.0	V	
	VGL	-11	-10	-9	V	
	AVDD	11.8	12	12.2	V	
VCOM	VCOM	3.66	4.16	4.66	V	Note (1)
Input signal voltage	ViH	0.7 VDD	-	VDD	V	Note (2)
	ViL	0	-	0.3 VDD	V	
Current of power supply	IDD	-	35	-	mA	VDD =3.3V
	IADD	-	30	-	mA	AVDD=12V
	IGH	-	5	-	mA	VGH=18V
	IGL	-	-5	-	mA	VGL= -10V
	Ivcom	-	0.1	--	mA	Vcom= 4.16 V

Note (1): Please adjust VCOM to make the flicker level minimum.
Note (2) :RESET、STBYB

3.2 MIPI DC Characteristics

3.2.1 HS Receiver DC Specification

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Operation Voltage	VDD	1.5-10%	1.5	1.5+10%	mV	
Differential Input Voltage	|VID|	70	200	260	mV	
Common Mode Voltage	$V_{CMRX(DC)}$	70	-	330	mV	
Differential Input High Threshold Voltage	VTH	-	-	70	mV	
Differential Input Low Threshold Voltage	VTL	-70	-	-	mV	
Singled-ended input high voltage	V_{IHHS}	-	-	460	mV	
Singled-ended input low voltage	V_{ILHS}	-40	-	-	mV	
Singled-ended threshold for HS termination enable	$V_{TERM-EN}$	-	-	450	mV	
Differential input impedance	Z_{ID}	80	100	125	ohm	
Pin leakage current	I_{LEAK}	-10	-	10	uA	
Common-mode interference beyond 450MHz	$\Delta V_{CMRX(HF)}$	-	-	100	mV	
Common-mode interference 50MHz - 450MHz	$\Delta V_{CMRX(LF)}$	-50	-	50	mV	
Common-mode termination	C_{CM}	-	-	60	pF	
Embedded Termination	R_T	90	100	110	ohm	2bits RT_SEL[1: 0] for termination resistor selection 00 → 200ohm 10 , 01→ 150ohm 11 → 100ohm (default) 1bit ERMR_EN for termination resistor enable TERMR_EN=0, termr disable R=(OPEN) TERMR_EN=1, termr enable

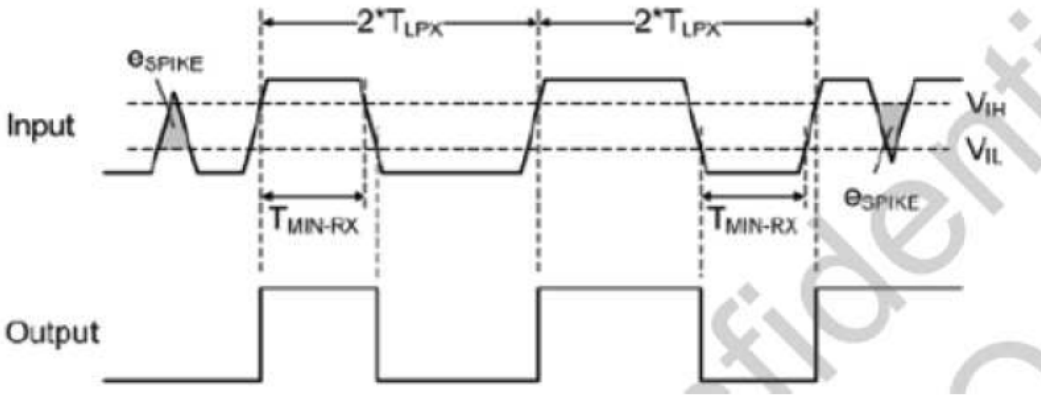
Note:

(1) Excluding possible additional RF interference of 100mV peak sine wave beyond 450MHz.

(2) This table value includes a ground difference of 50mV between the transmitter and the receiver, the static common-mode level tolerance and variations below 450MHz.

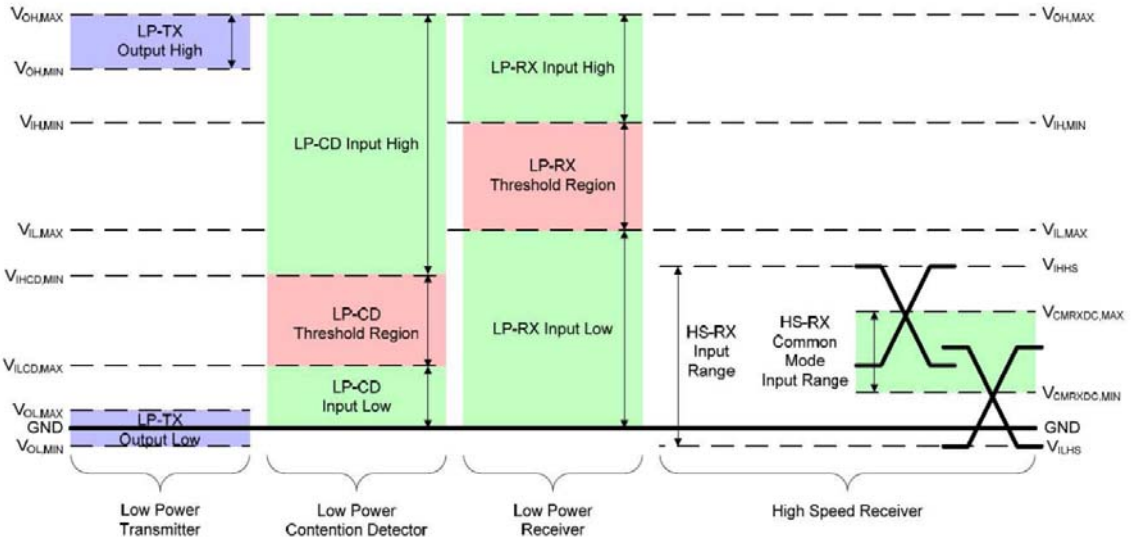
3.2.2 LP Receiver DC Specification

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Logic 1 input voltage	V_{IH}	880	-	-	mV	
Logic 0 input voltage, not in ULP State	V_{IL}	-	-	550	mV	
Input hysteresis	V_{HYST}	25	-	-	mV	



3.2.3 Line Contention Detection

Parameter	Symbol	Rating			Unit	Note
		Min	Typ	Max		
Logic 1 contention threshold	V_{IHCD}	450	-	-	mV	
Logic 0 contention threshold	VILCD	-	-	200	mV	

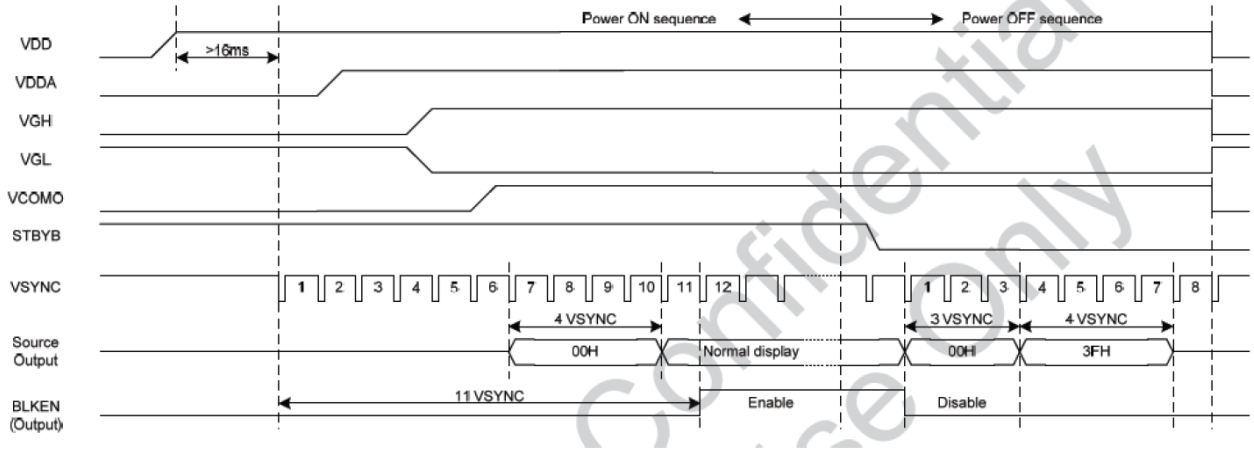


3.3 Interface Timing

Item	Symbol	Min.	Typ.	Max.	Unit
MIPI Video data rate(4 lane)	-	-	397.7	-	Mbps
PCLK Frequency	FPCLK	-	66.3	-	MHz
Horizontal Synchronization	Hsync	-	30	-	PCLK
Horizontal Back Porch	HBP	-	30	-	PCLK
Horizontal Front Porch	HFP	-	30	-	PCLK
Hsync+HBP+HFP	-	75	90	-	PCLK
HorizontalAddress(Display Area)	Hadr	-	480	-	PCLK
Horizontal cycle	-	555	570	-	PCLK
Vertical Synchronization	Vsync	-	6	-	Line
Vertical Back Porch	VBP	-	6	-	Line
Vertical Front Porch	VFP	-	6	-	Line
Vsync+VBP+VFP	-	15	18	-	Line
Vertical Address(Display Area)	Vadr	-	1920	-	Line
Vertical cycle	-	1935	1938	-	Line
Frame Rate	-	-	60	-	Hz

3.4 Power On / Off Sequence

Power-On/Off Timing Sequence:



3.5 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_F	--	160	--	mA	Ta=25℃
LED Voltage	V_F	2.95	--	3.55	Volt	Ta=25℃
LED Life-Time	N/A	--	30,000	--	Hour	Ta=25℃ I_F=20mA Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=140mA. The LED lifetime could be decreased if operating IL is larger than 140mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit

4 Optical Characteristics

4.1 Optical characteristic of the LCD

(Ta=25±2°C , VDD =3.3V, $I_{f=}$20mA)

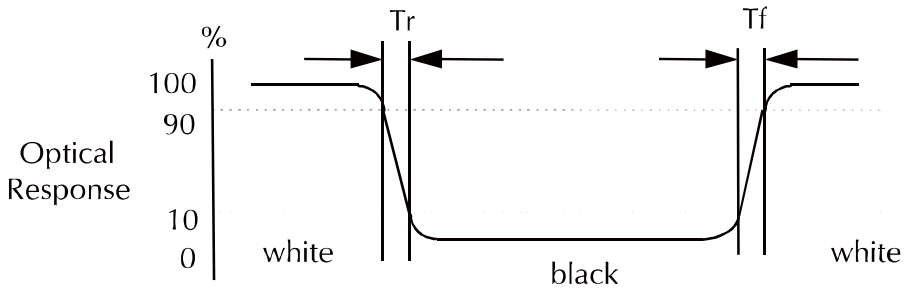
Item		Symbol	Condition	Min	Type	Max	Unit	Note
Brightness		--	--	800	1000	--	cd/m^2	--
Response time		T_R	θ=0°	--	15	20	ms	--
		T_F		--	15	20	ms	
Contrast ratio		CR	At optimized viewing angle	600	800	--	--	--
Color Chromaticity	Red	R_X	θ=0° Normal Viewing Angle	0.56	0.61	0.66	--	--
		R_Y		0.30	0.35	0.40		
	Green	G_X		0.26	0.31	0.36	--	
		G_Y		0.52	0.57	0.62		
	Blue	B_X		0.06	0.11	0.16	--	
		B_Y		0.08	0.13	0.18		
	White	Wx		0.25	0.30	0.35	--	
		Wy		0.31	0.36	0.41		
Viewing Angle (6H)	Hor.	θ_R	CR≥10	75	80		Degree	--
		θ_L		75	80			
	Ver.	θ_U		75	80			
		θ_D		75	80			

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”.

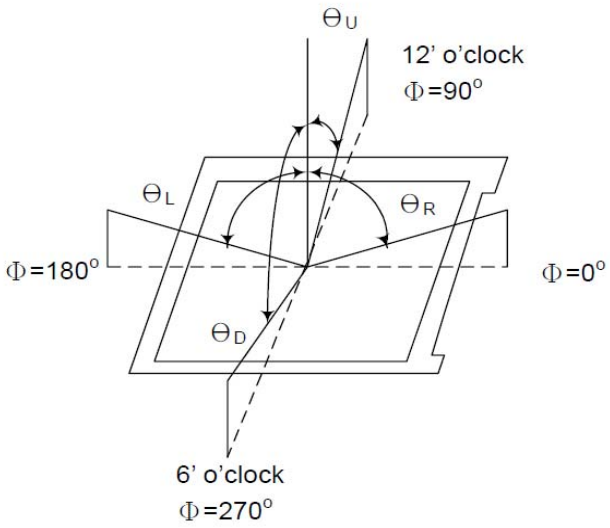


c. Definition of contrast ratio:

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

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

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

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

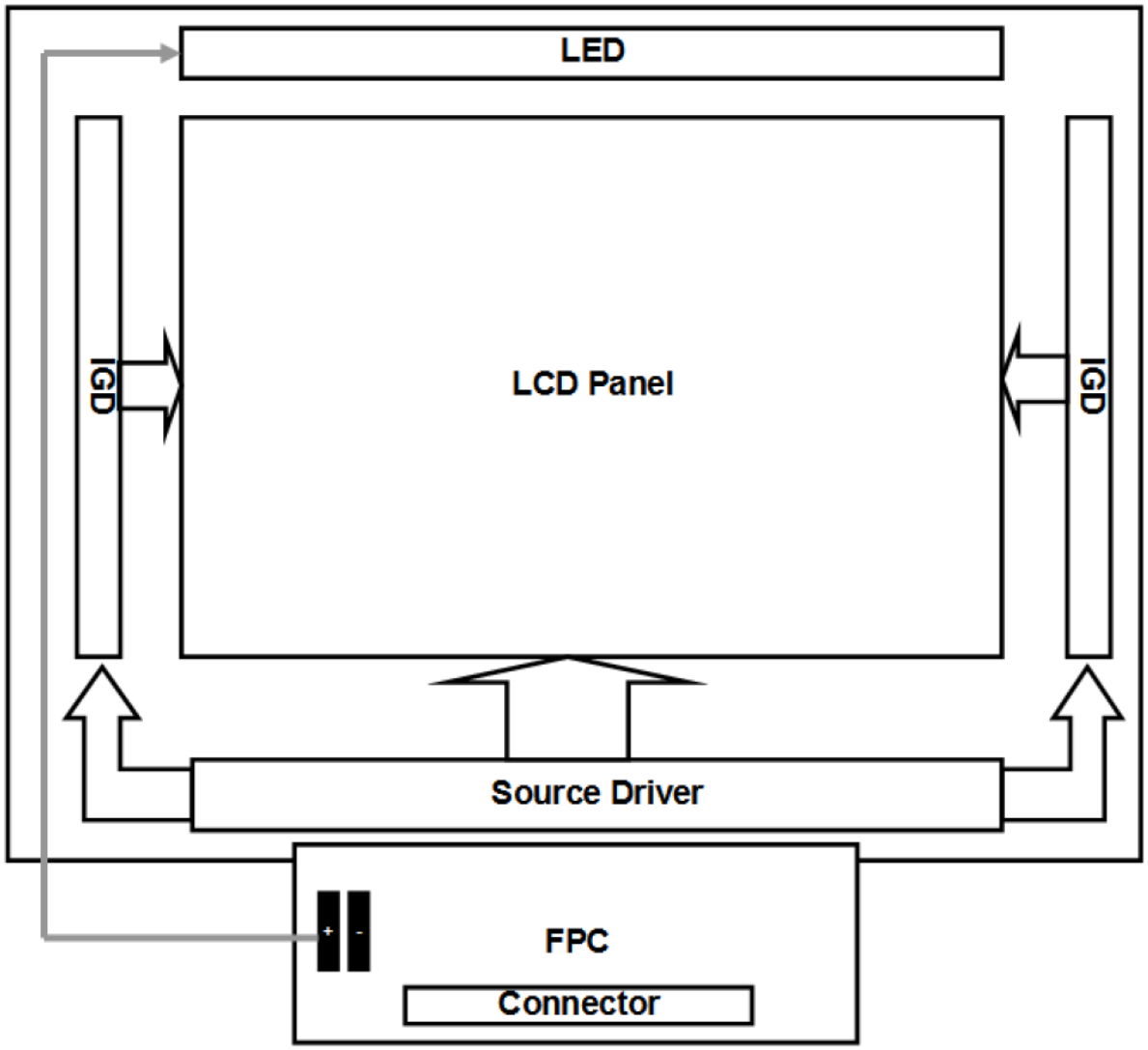
5 I/O Terminal

5.1 Pin Assignment

Pin No.	Symbol	I/O	Function
1	GND	P	Ground
2	NC	---	No connection
3	LED+	P	LED Anode
4	LED+	P	LED Anode
5	NC	---	No connection
6	LED-	P	LED Cathode
7	LED-	P	LED Cathode
8	NC	---	No connection
9	GND	P	Ground
10	NC	---	No connection
11	AVDD	P	Power supply for analog circuit
12	NC	---	No connection
13	VGH	P	Power supply for analog circuit
14	NC	---	No connection
15	VGL	P	Power supply for analog circuit
16	NC	---	No connection
17	GND	P	Ground
18	VCOM	P	Power supply for common voltage
19	GND	P	Ground
20	GND	P	Ground
21	RESET	I	Global reset
22	VDD	P	Power supply for digital circuits
23	STBYB	I	Standby mode
24	TP_Sync	O	Sync signal for touch panel
25	GND	P	Ground
26	D0P	I	MIPI Data Input Lane0 positive-end
27	D0N	I	MIPI Data Input Lane0 negtive-end
28	GND	P	Ground
29	D1P	I	MIPI Data Input Lane1 positive-end
30	D1N	I	MIPI Data Input Lane1 negtive-end
31	GND	P	Ground
32	CLKP	I	MIPI Clock Input positive-end
33	CLKN	I	MIPI Clock Input negtive-end
34	GND	P	Ground
35	D2P	I	MIPI Data Input Lane2 positive-end
36	D2N	I	MIPI Data Input Lane2 negtive-end
37	GND	P	Ground

38	D3P	I	MIPI Data Input Lane3 positive-end
39	D3N	I	MIPI Data Input Lane3 negtive-end
40	GND	P	Ground

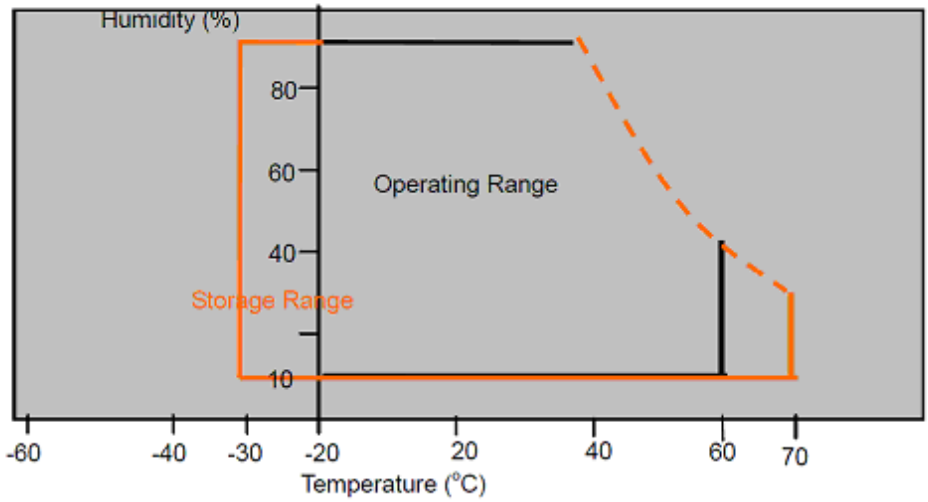
5.2 Block Diagram



6 Reliability Condition

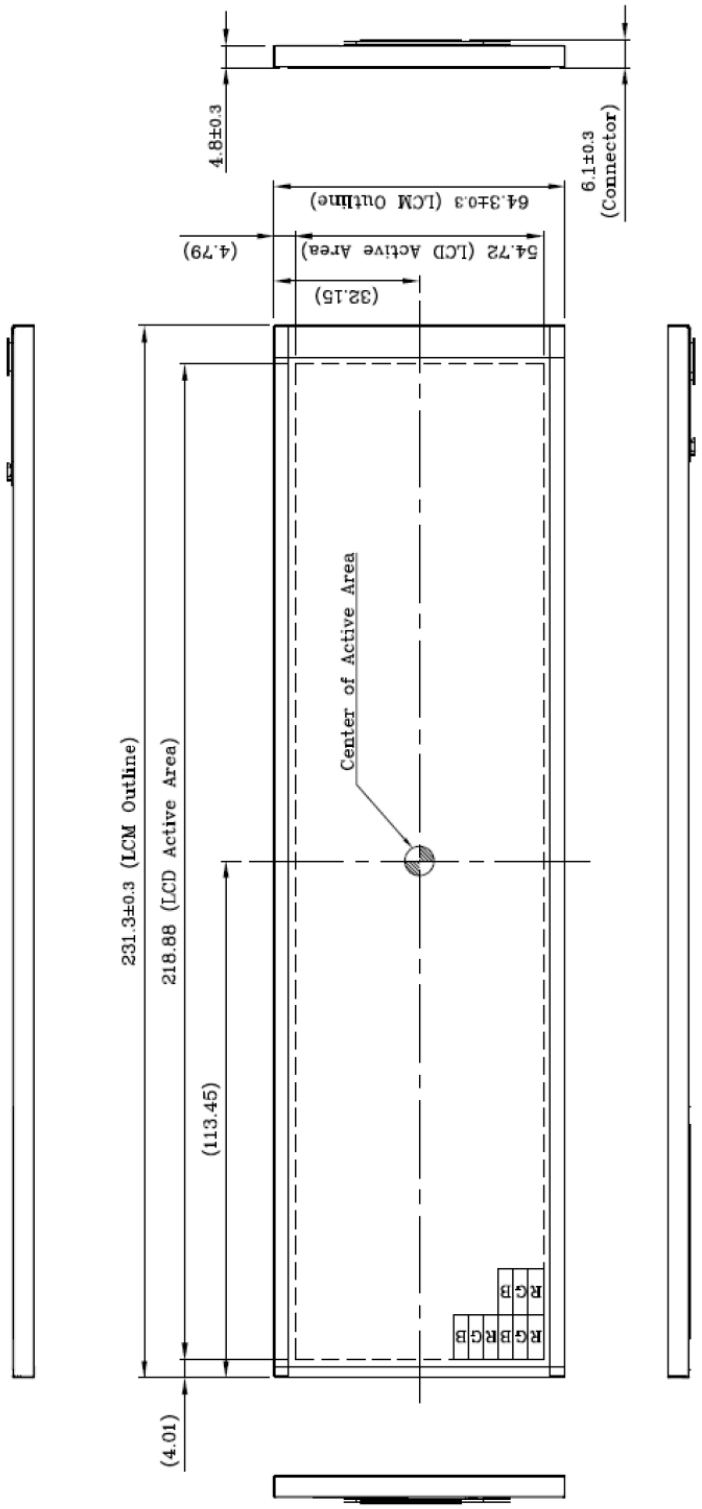
No.	Item	Conditions	F
1	High Temperature Storage	Ta=+80°C, 240hrs	
2	Low Temperature Storage	Ta=-30°C, 240hrs	
3	High Temperature Operation	Ta=+80°C, 240hrs	
4	Low Temperature Operation	Ta=-30°C, 240hrs	
5	Thermal Cycling Test (non operation)	-20°C(30min)→+70°C(30min),100 cycles	
6	Vibration	Sine Wave 1.5G, 5~500Hz, XYZ 30min/each direction	
7	Shock	Half-Sine, 200G, 2ms, ±XYZ, 1time	

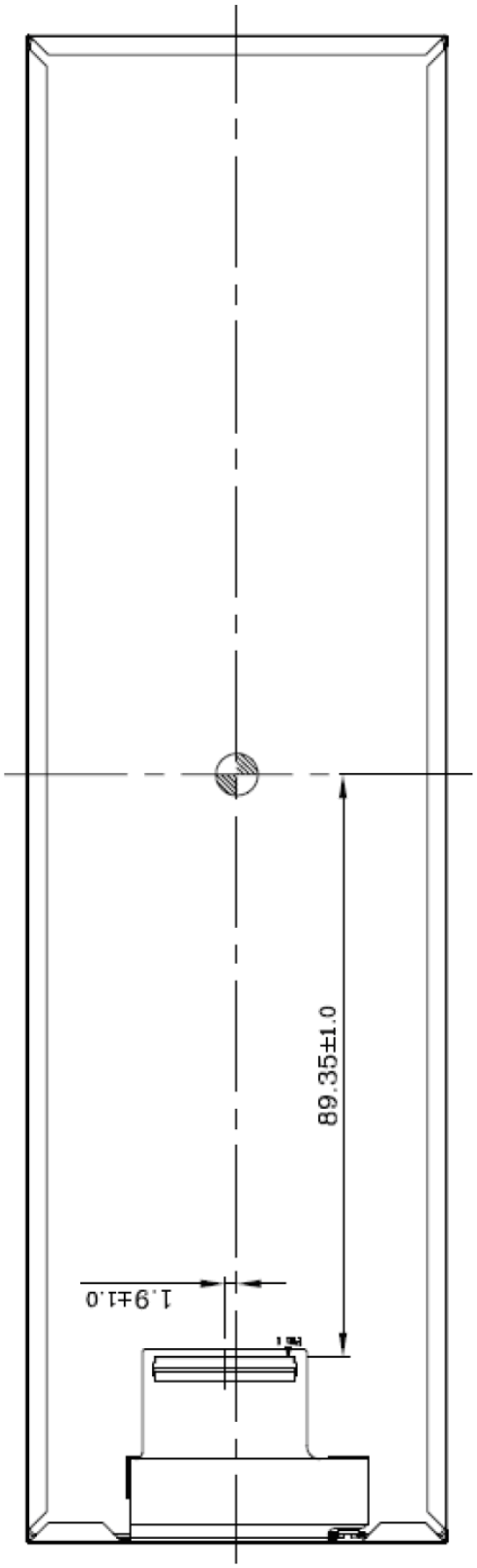
Note: There is no display function NG issue occurred, all the cosmetic specification is judged before th reliability stress.



Note .Max wet bulb temp.=39°C

7 Dimensional Outlines




89.35±1.0
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