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# Datasheet

## SGD

**GWIO88MNFJ1F0**

SG-01-027

**Product Specification**



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Thin-Film-Transistor LCD Module  
Model: GWIO88MNFJ1F0

Acceptance

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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

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### 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)  $T_a = 25 \pm 2^\circ\text{C}$
- (3) Test Condition: LED current 140 mA. The LED lifetime could be decreased if operating  $I_L$  is larger than 140mA.

##### 3.1.3 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	$T_{opa}$	-30	80	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$	-30	80	$^\circ\text{C}$	

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### 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



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### 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 <sub>CMRX(DC)</sub>	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 <sub>IHHS</sub>	-	-	460	mV	
Singled-ended input low voltage	V <sub>ILHS</sub>	-40	-	-	mV	
Singled-ended threshold for HS termination enable	V <sub>TERM-EN</sub>	-	-	450	mV	
Differential input impedance	Z <sub>ID</sub>	80	100	125	ohm	
Pin leakage current	I <sub>LEAK</sub>	-10	-	10	uA	
Common-mode interference beyond 450MHz	ΔV <sub>CMRX(HF)</sub>	-	-	100	mV	
Common-mode interference 50MHz - 450MHz	ΔV <sub>CMRX(LF)</sub>	-50	-	50	mV	
Common-mode termination	C <sub>CM</sub>	-	-	60	pF	
Embedded Termination	R <sub>T</sub>	90	100	110	ohm	2bits RT_SEL[1: 0] for termination resistor selection 00 → 200ohm 10 , 01 → 150ohm 11 → 100ohm (default)  1bit ERM <sub>R</sub> _EN for termination resistor enable TERM <sub>R</sub> _EN=0, termr disable R=(OPEN) TERM <sub>R</sub> _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.

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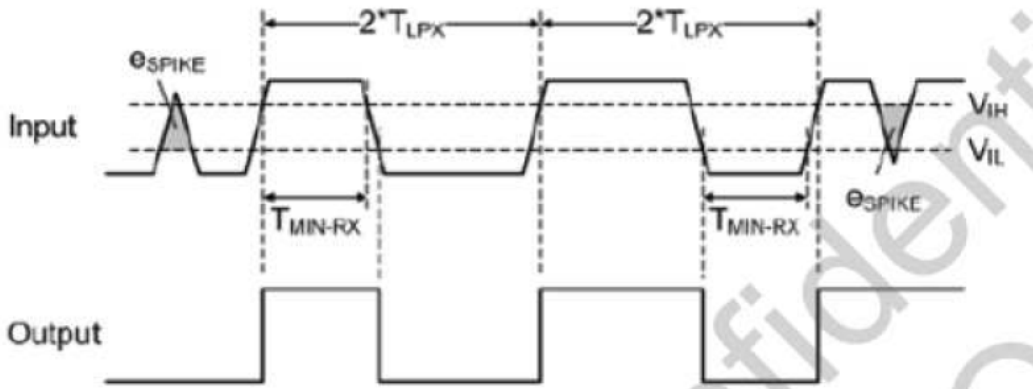
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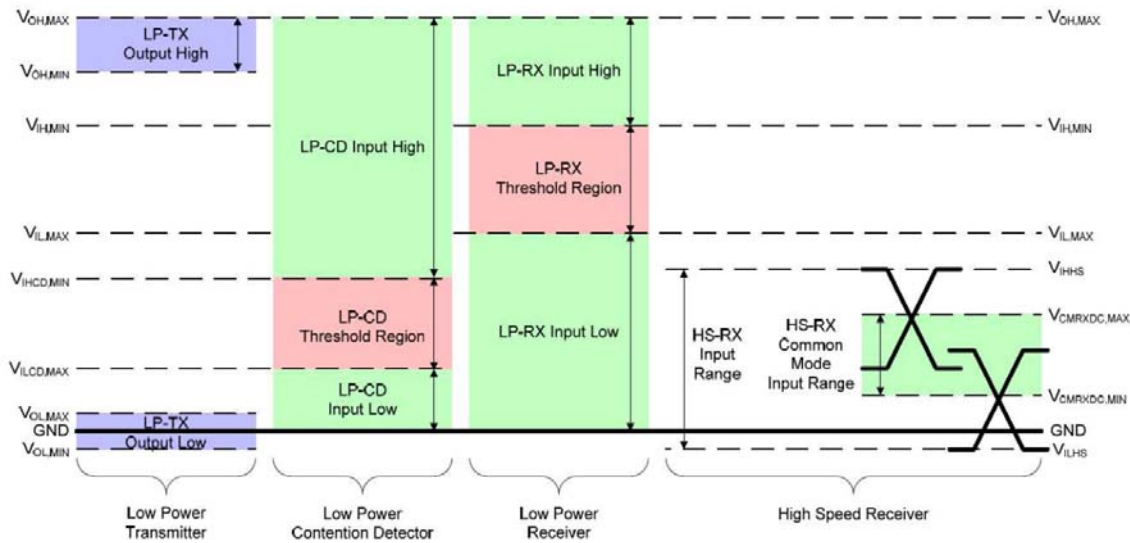
### 3.2.2 LP Receiver DC Specification

Parameter	Symbol	Rating			Unit	Note
		Rating				
		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	$V_{ILCD}$	-	-	200	mV	




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### 3.3 Interface Timing

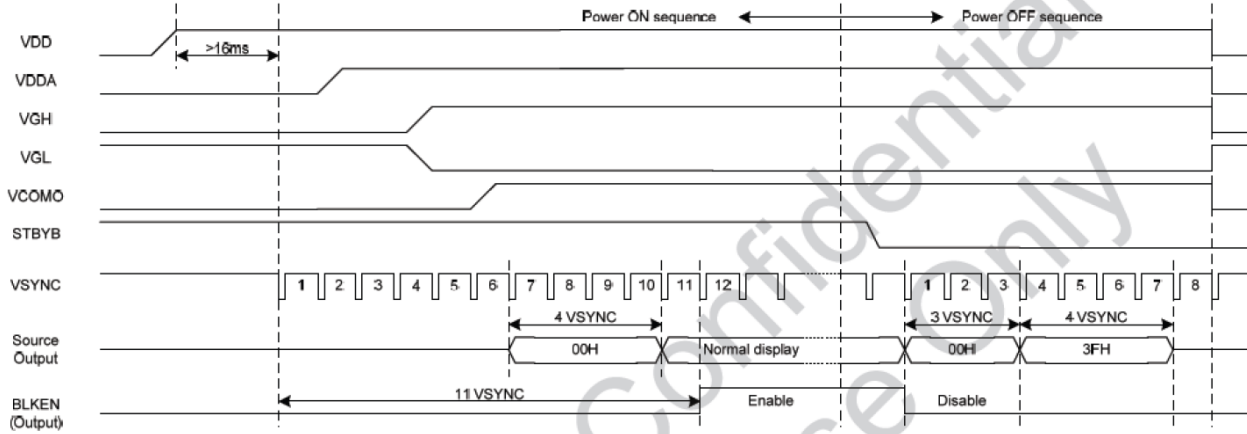
Item	Symbol	Min.	Typ.	Max.	Unit
MIPI Video data rate(4 lane)	-	-	397.7	-	Mbps
PCLK Frequency	FPCLK	-	66.3	-	MHz
Horizontal Synchronization	Hsync	-	30	-	PCLK
Horizontal Back Porch	HBP	-	30	-	PCLK
Horizontal Front Porch	HFP	-	30	-	PCLK
Hsync+HBP+HFP	-	75	90	-	PCLK
Horizontal Address(Display Area)	Hadr	-	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

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### 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	$T_a=25^\circ\text{C}$
LED Voltage	$V_F$	2.95	--	3.55	Volt	$T_a=25^\circ\text{C}$
LED Life-Time	N/A	--	30,000	--	Hour	$T_a=25^\circ\text{C}$ $I_F=20\text{mA}$ Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition:  $T_a=25\pm 3^\circ\text{C}$ , typical  $I_L$  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  $T_a=25^\circ\text{C}$  and  $I_L=140\text{mA}$ . The LED lifetime could be decreased if operating  $I_L$  is larger than 140mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit

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### 4 Optical Characteristics

#### 4.1 Optical characteristic of the LCD

(Ta=25±2°C , VDD =3.3V, I<sub>f</sub>=20mA)

Item		Symbol	Condition	Min	Type	Max	Unit	Note
Brightness		--	--	800	1000	--	cd/m <sup>2</sup>	--
Response time		T <sub>R</sub>	θ=0°	--	15	20	ms	--
		T <sub>F</sub>		--	15	20	ms	
Contrast ratio		CR	At optimized viewing angle	600	800	--	--	--
Color Chromaticity	Red	R <sub>X</sub>	θ=0° Normal Viewing Angle	0.56	0.61	0.66	--	--
		R <sub>Y</sub>		0.30	0.35	0.40		
	Green	G <sub>X</sub>		0.26	0.31	0.36	--	
		G <sub>Y</sub>		0.52	0.57	0.62		
	Blue	B <sub>X</sub>		0.06	0.11	0.16	--	
		B <sub>Y</sub>		0.08	0.13	0.18		
	White	W <sub>X</sub>		0.25	0.30	0.35	--	
		W <sub>Y</sub>		0.31	0.36	0.41		
Viewing Angle (6H)	Hor.	θ <sub>R</sub>	CR≥10	75	80		Degree	--
		θ <sub>L</sub>		75	80			
	Ver.	θ <sub>U</sub>		75	80			
		θ <sub>D</sub>		75	80			

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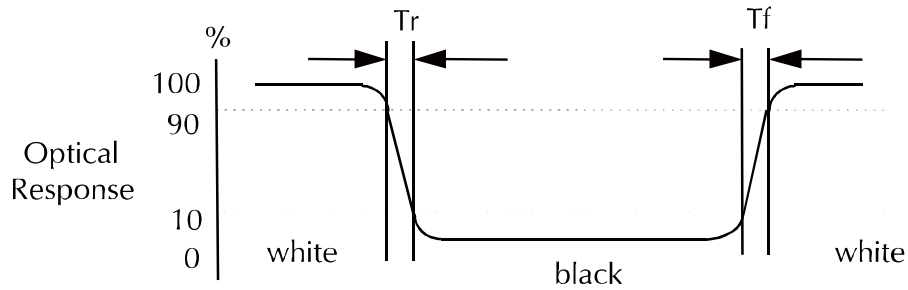
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a. Test equipment setup

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:

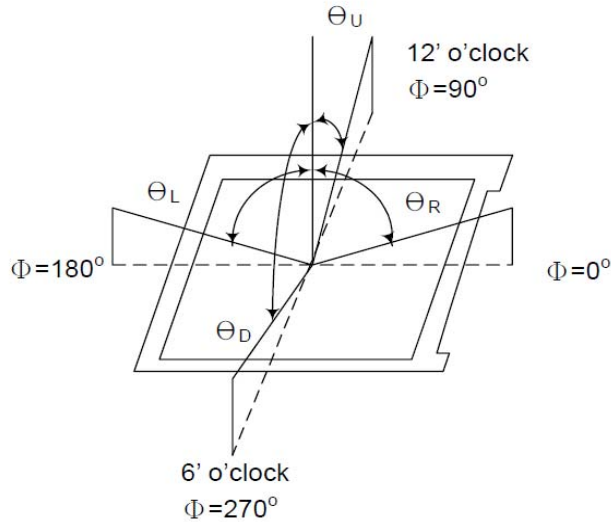
$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

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

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e. View Angle




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

Light Source of Back-Light Unit	LED Type
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g. Definition of White Uniformity

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

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### 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 negative-end
28	GND	P	Ground
29	D1P	I	MIPI Data Input Lane1 positive-end
30	D1N	I	MIPI Data Input Lane1 negative-end
31	GND	P	Ground
32	CLKP	I	MIPI Clock Input positive-end
33	CLKN	I	MIPI Clock Input negative-end
34	GND	P	Ground
35	D2P	I	MIPI Data Input Lane2 positive-end
36	D2N	I	MIPI Data Input Lane2 negative-end
37	GND	P	Ground




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



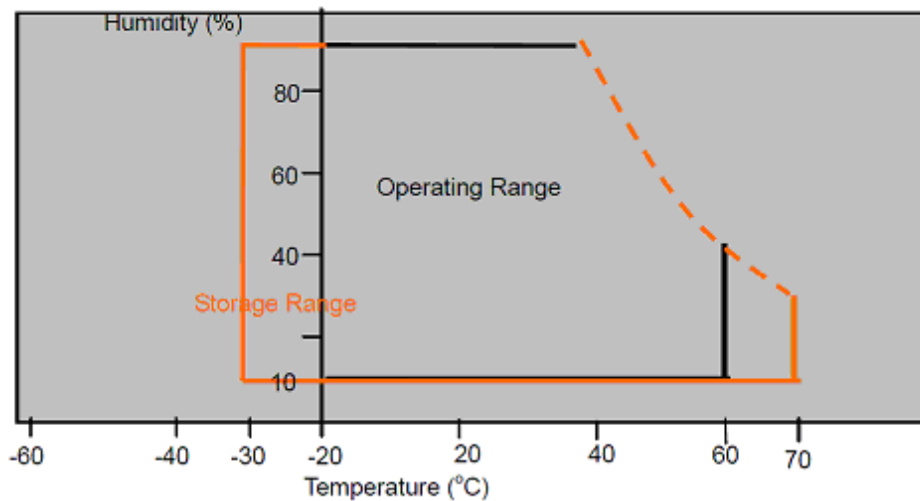
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### 6 Reliability Condition

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 the reliability stress.



**Note** .Max wet bulb temp.=39°C

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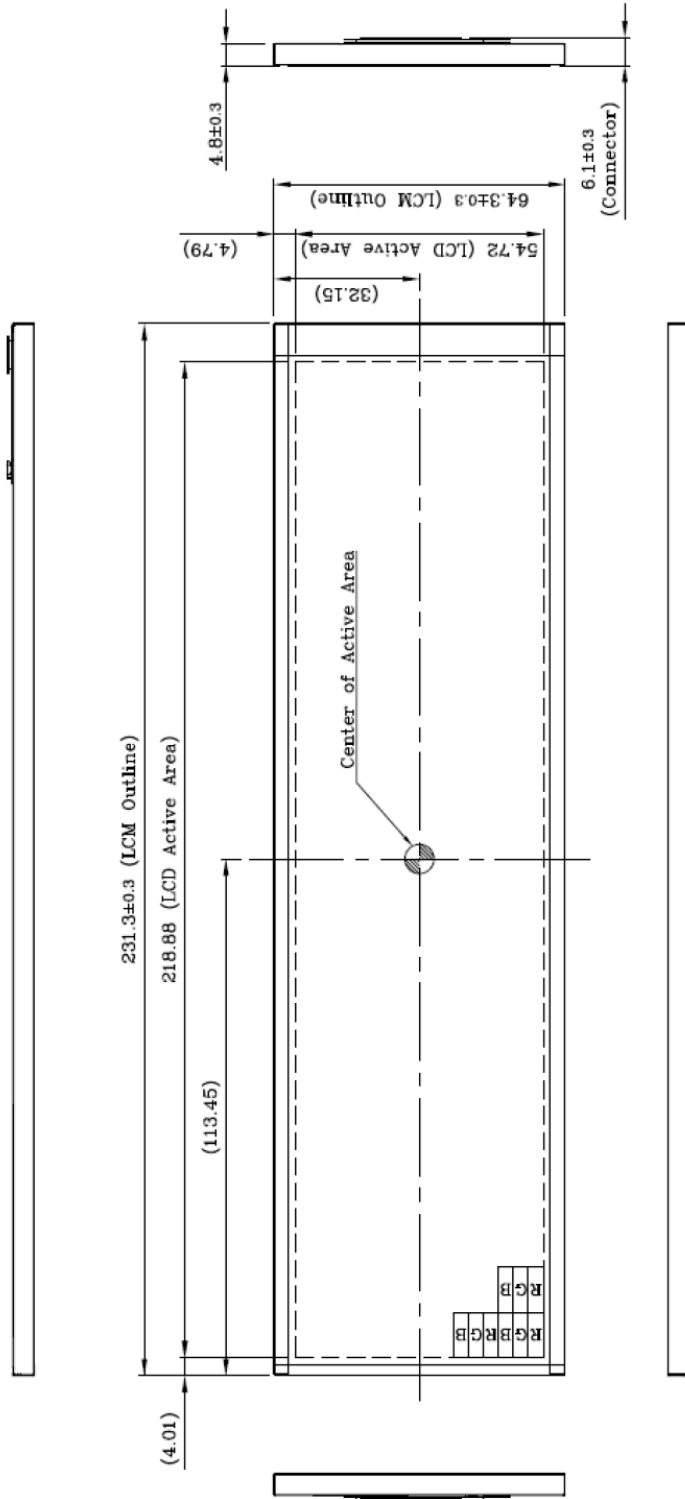
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### 7 Dimensional Outlines



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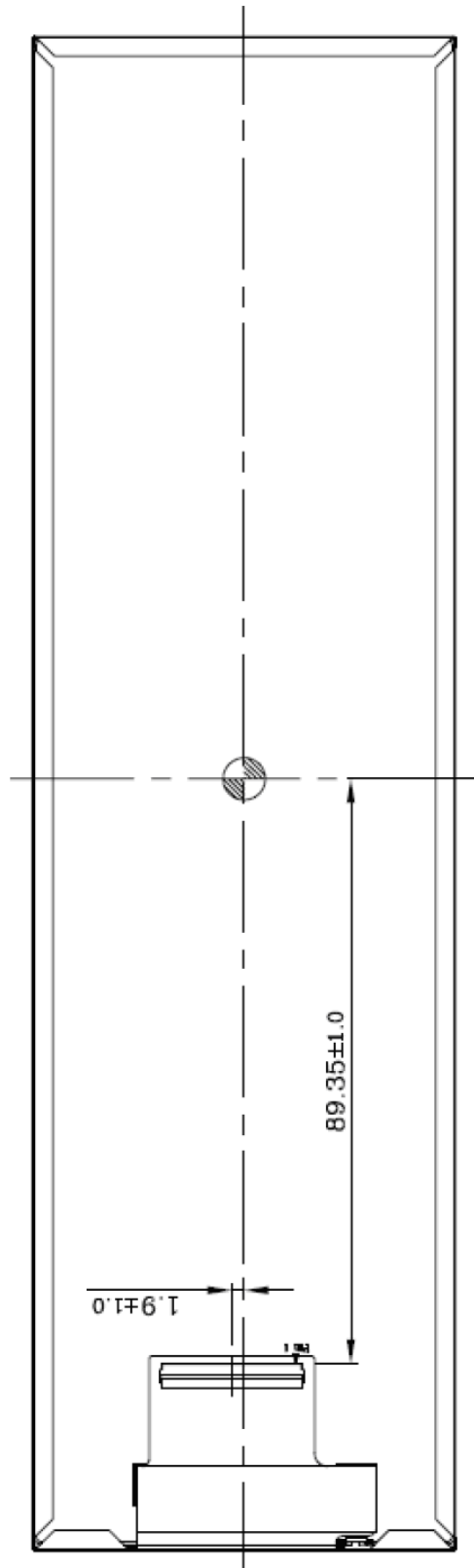
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