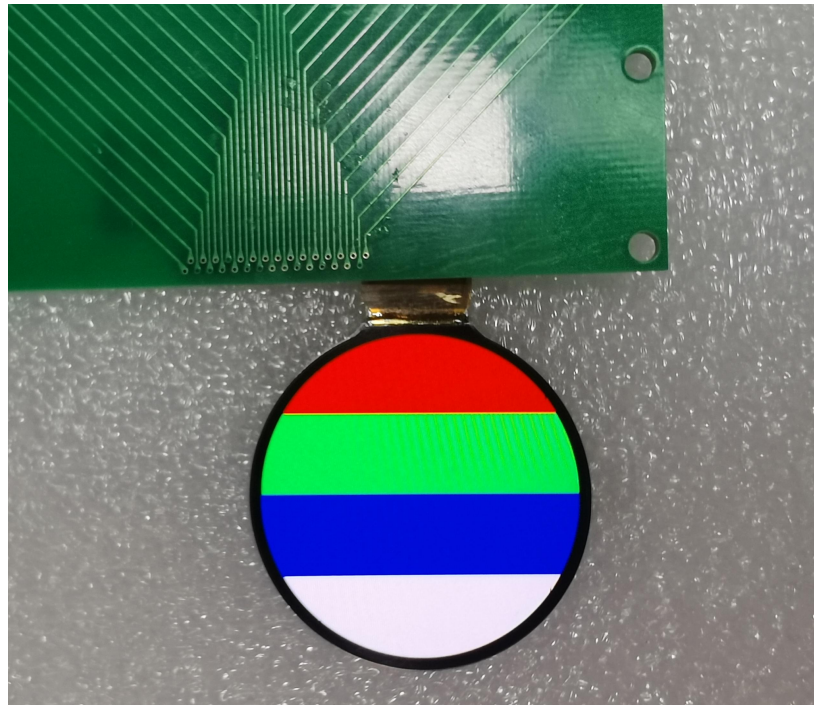


# DisplayModule



DM-OLEDC139-668

1.39" 454 × 454 AMOLED ROUND  
FULL COLOR NARROW MARGIN  
DISPLAY PANEL-MIPI

## CONTENTS

- 1 Revision History
- 2 Main Features
- 3 Pin Description
- 4 Mechanical Drawing
  - 4.1 Panel Mechanical Drawing
- 5 Optics & Electrical Characteristics
  - 5.1 Optical Characteristics
  - 5.2 Absolute Maximum Ratings
  - 5.3 DC Characteristics
    - 5.3.1 Typical Operating Conditions
- 6 Reliability
- 7 Warranty and Conditions

## 1 Revision History

Date	Changes
2022-08-05	First release

## 2 Main Features

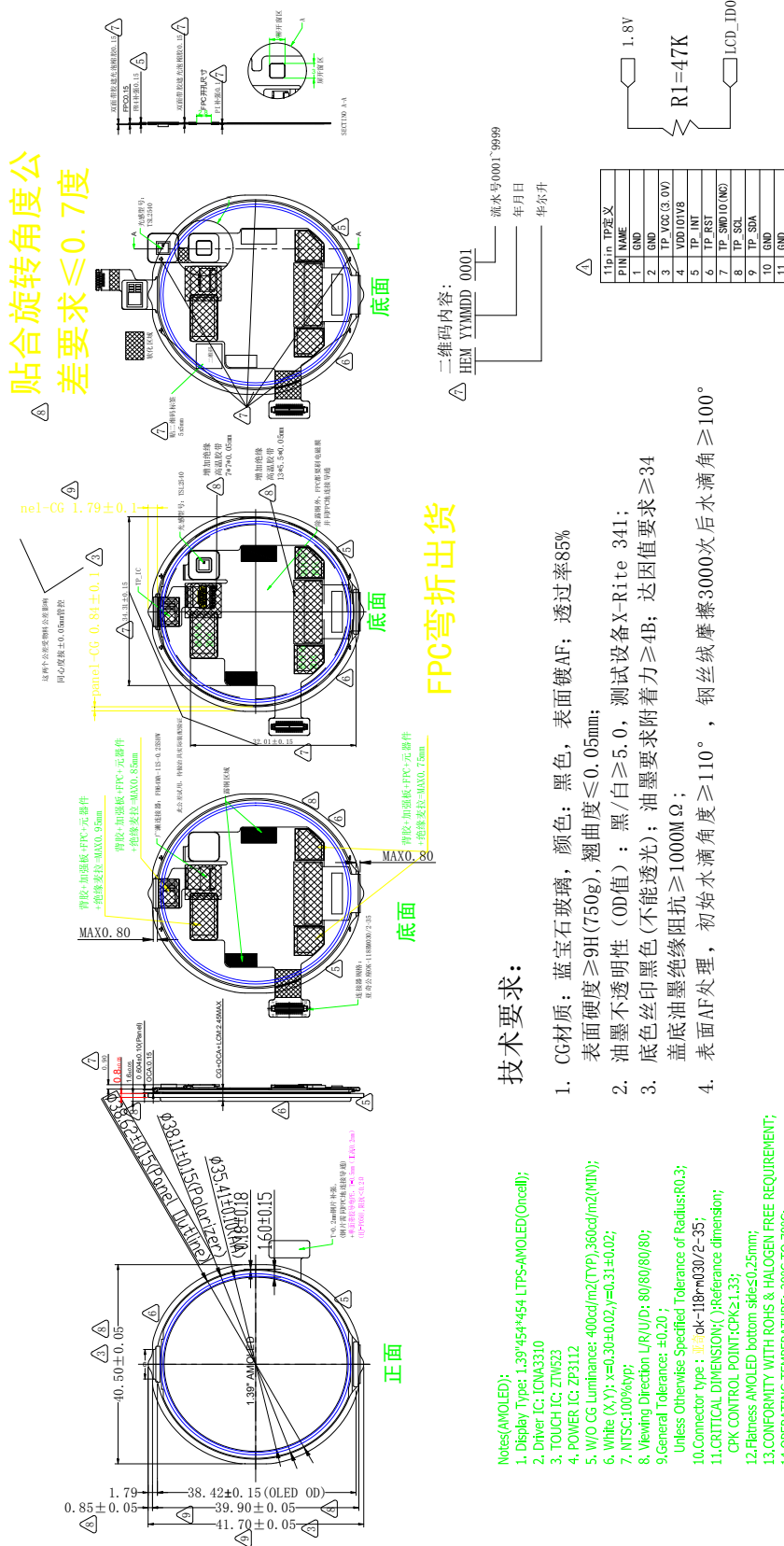
Item	Specification	Unit
Diagonal Size	1.39	inch
Display Mode	AMOLED	-
Piexl size	0.078*0.078	mm
Resolution	454 x 454	pixel
Controller IC	ICNA3310	
Touch IC	ZTW523	
LCD Interface	MIPI-1 lane	-
Touch Interface	I2C	
Viewing Direction	ALL	
Active Area	35.41 x 35.41	mm
Panel Dimension	40.3 x 41.8 x 2.45	mm
Weight	TBD	g

### 3 Pin Description

Pin No.	Symbol	Function Description
1	VCI_EN	VCI Power enable control pin
2	VPP(NC)	OTP Power Supply
3	TP_SDA	Touch panel I2C data
4	TP_SCL	Touch panel I2C clock
5	TP_SWDIO (NC)	--
6	TPRST	AMOLED positive power supply
7	TPINT	Driver analog power supply
8	TP_VCC(3.0V)	Touch panel power supply
9	GND	Ground
10	LCD_RST	LED reset
11	LCD_TE	Tearing effect signal
12	GND	Ground
13	ALS_SDA	ALS Serial Data Transport Interface
14	ALS_SCL	ALS Serial clock signal interface
15	ALS_INT	ALS interrupt output
16	ALS_VCC	ALS Power supply voltage
17	GND	Ground
18	GND	Ground
19	LCDID0	IDCheck
20	LCD_VDDIO(T P-1V8)	Powersupply1.8V
21	LCD_VDDIO(T P-1V8)	Powersupply1.8V
22	GND	Ground
23	MIPI_CLK_P	MIPI clock lane positive end input pin
24	MIPI_CLK_N	MIPI clock lane negative end output pin
25	GND	Ground
26	MIPI_D0_P	MIPI data0+
27	MIPI_D0_N	MIPI data0-
28	GND	Ground
29	NC	-
30	NC	-
31	VPH_PWR	Vbat, Power IC VIN
32	GND	Ground
33	GND	Ground
34	VPH_PWR	Vbat, Power IC VIN
35	VPH_PWR	Vbat, Power IC VIN
36	GND	Ground

## 4 Mechanical Drawing

### 4.1 Panel Mechanical Drawing



## 5 Optics & Electrical Characteristics

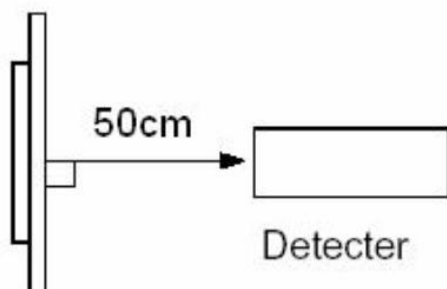
### 5.1 Optical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remark
View Angles TOP	⊕ U	80	85	-	°	CR >= 200 Note 3
View Angles Bottom	⊕ D	80	85	-	°	
View Angles Right	⊕ R	80	85	-	°	
View Angles Left	⊕ L	80	85	-	°	
C.I.E(Red)	(x) (y)	0.656 0.283	0.686 0.313	0.716 0.343	-	C.I.E.1931;
C.I.E(Green)	(x) (y)	0.195 0.685	0.235 0.725	0.275 0.765	-	
C.I.E(Blue)	(x) (y)	0.113 0.014	0.143 0.044	0.173 0.074	-	
C.I.E(White)	(x) (y)	0.28 0.29	0.30 0.31	0.32 0.33	-	
Luminance Uniformity		85	-	-	%	Note 2
Luminance		390	430	470	Cd/m <sup>2</sup>	Note 1
Contrast Ratio	@ 25°	5000	10000	-	-	Note 4
Gamma	γ	2.0	2.2	2.4	-	Note 6
Crosstalk	ΔCT	-	-	1.1	hrs	Note 7

#### Note1: Luminance measurement

The test condition is measured on the surface of AMOLED module at 25°C.

- Measurement equipment CS2000 or similar equipment(Field of view:1deg,Distance:50cm)•  
Measuring surroundings:Dark room.
- Measuring temperature:Ta=25°C.
- Adjust operating voltage to get optimum contrast at the center of the display.



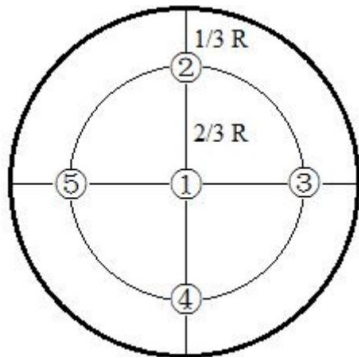
#### Note2: Uniformity

The luminance uniformity is calculated by using following formula:

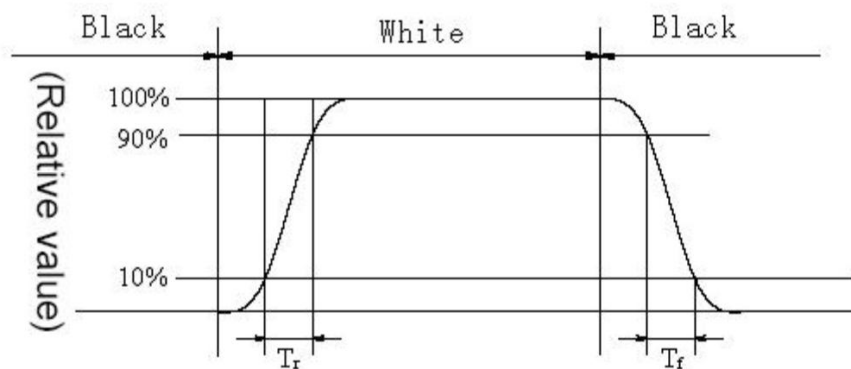
$$\Delta B_p = B_p(\text{Min.}) / B_p(\text{Max.}) \times 100(\%)$$

$B_p(\text{Max.})$  = Maximum brightness in 5 measured spots

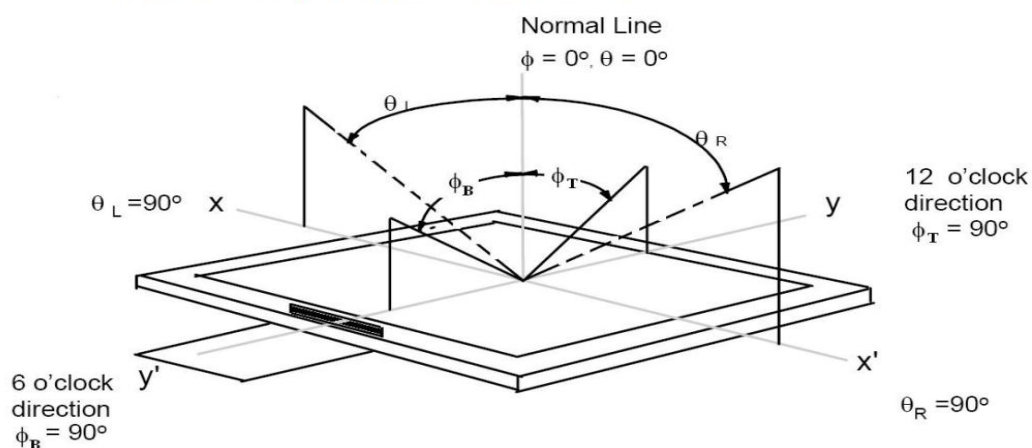
$B_p(\text{Min.})$  = Minimum brightness in 5 measured spots.


**Note 5: Definition of Response time.**

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 3: The definition of Viewing Angle**

Refer to the graph below marked by  $\theta$  and  $\Phi$


**Note 4: The definition of Contrast Ratio:**

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

**Note 6: Gamma curve**

The whole curve's tolerance must control within +/-0.3, test the gray scale below:

8, 16, 25, 33, 41, 49, 58, 66, 74, 82, 90, 99, 107, 115, 123, 132, 140, 148, 156, 165, 173, 181, 189, 197, 206, 214, 222, 230, 239, 255

**Note 7: Crosstalk**

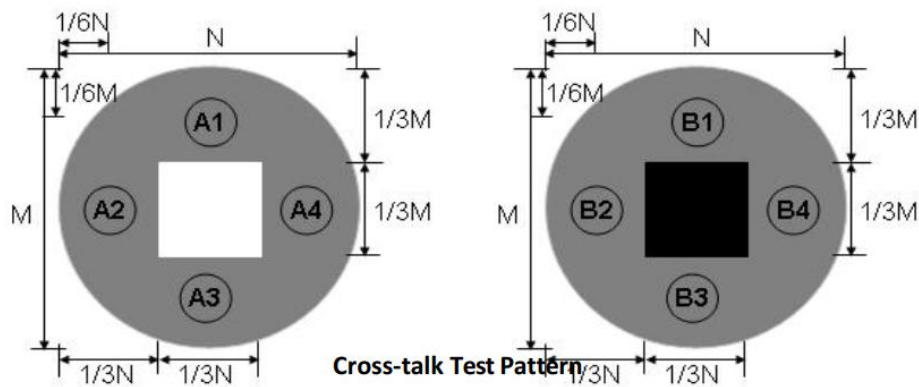
There should be no visible cross-talk in normal direction of the display when the two "Cross-talk Test Patterns" below are loaded.

$\Delta Bp$  (Max.) = Maximum value in  $\Delta Bp1 \sim \Delta Bp4$ .

$\Delta Bp$  (Min.) = Minimum value in  $\Delta Bp1 \sim \Delta Bp4$ .

$\Delta CT = \Delta Bp$  (Max.) /  $\Delta Bp$  (Min.).

$\Delta CT$  must be less than 1.10





## 5.2 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Analog Supply Voltage	V <sub>CI</sub>	-0.3	3.6	V
Operating temperature	T <sub>op</sub>	-20	60	°C
Storage temperature	T <sub>st</sub>	-30	70	°C

## 5.3 DC Characteristics

### 5.3.1 Typical Operating Conditions

Item	Symbol	Min	Typ.	Max	Unit	Remark
Analog Supply Voltage	V <sub>CI</sub>	2.7	3.3	3.6	V	
Digital Supply Voltage	VDDIO	1.65	1.8	1.95	V	
AMOLED Power Supply	Vbat	2.5	3.8	5.5	V	
Input Current	Ivddio	-	5.2	6.25	mA	Note1
	Ivbat	-	56	67.2	mA	
	Itpvcc	-	6.85	8.2	mA	
10% Pixel On full white 40nit	Vbat	-	9.9	-	mA	Note1
	VDDIO	-	3.6	-	mA	
Sleep current	Ivddio	-	36.5	-	uA	Note2
	Ivbat	-	254	-	uA	
	Itpvcc	-	10	-	uA	
Low Level Input Voltage	V <sub>IL</sub>	0	-	0.3 x IOVDD	V	
High Level Input Voltage	V <sub>IH</sub>	0.7 x VDDI	-	VDD	V	
Low Level Output Voltage	V <sub>OL</sub>	0	-	0.2 x IOVDD	V	
High Level Output Voltage	V <sub>OH</sub>	0.8 x VDDI	-	VDDI	V	

**Note1:** Full white display 430nits, 60Hz, V<sub>CI</sub>=3.3V, ELVDD=+3.3V, ELVSS=-3.3V, Vbat current includes VCI current.

**Note2:** Command 0x28, 0x10, V<sub>CI</sub>=3.3V, VDDIO=1.8V, ELVDD, ELVSS=0V

## 6 Reliability

Test Item	Content of Test	Test Condition	Note
High Temperature Storage	Endurance test applying the high storage temperature for a long time.	70°C 240hrs	2
Low Temperature Storage	Endurance test applying the high storage temperature for a long time.	-30°C 100hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	60°C 240hrs	-
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20 °C 240hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max, for 96hrs under no-load condition excluding the polarizer. Then taking it out and drying it at normal temperature.	60°C,90%RH 240hrs	1,2
Thermal Shock Resistance	The sample should be allowed stand the following 10 cycles of operation	-40°C/70°C 100cycles	-

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal. Temperature and humidity after remove from the rest chamber.

## 7 Warranty and Conditions

<http://www.displaymodule.com/pages/faq> HYPERLINK

"http://www.displaymodule.com/pages/faq"