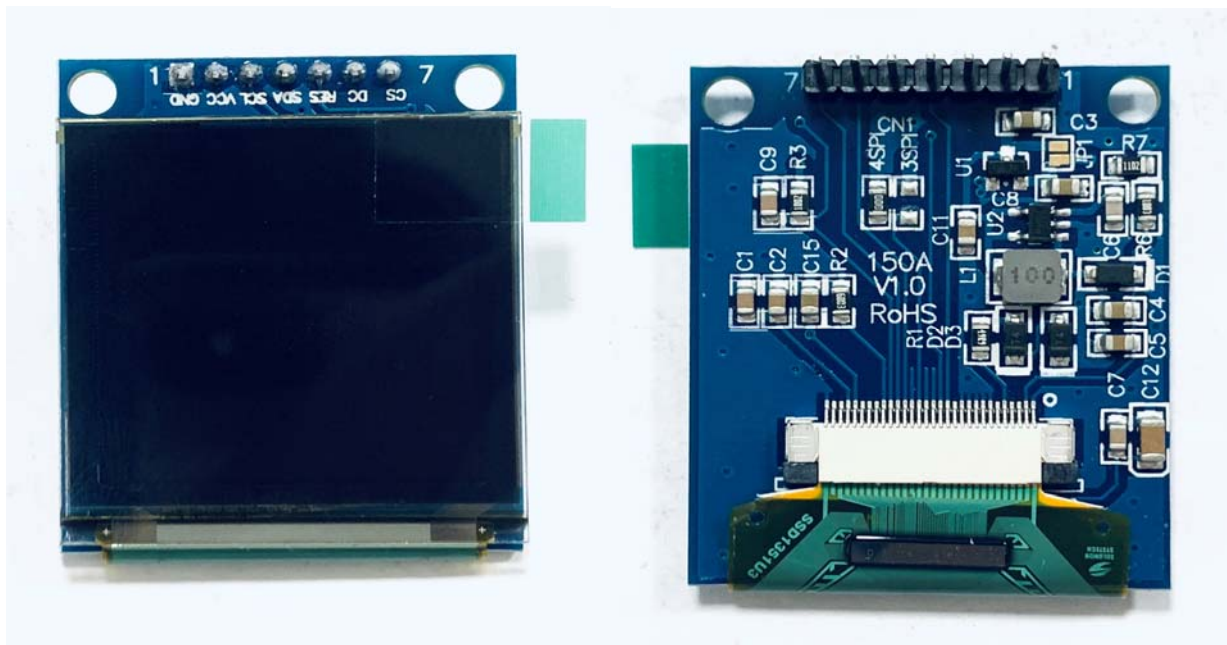

Dot matrix OLED display module Manual

LM150A-128128



1. FUNCTIONS & FEATURES

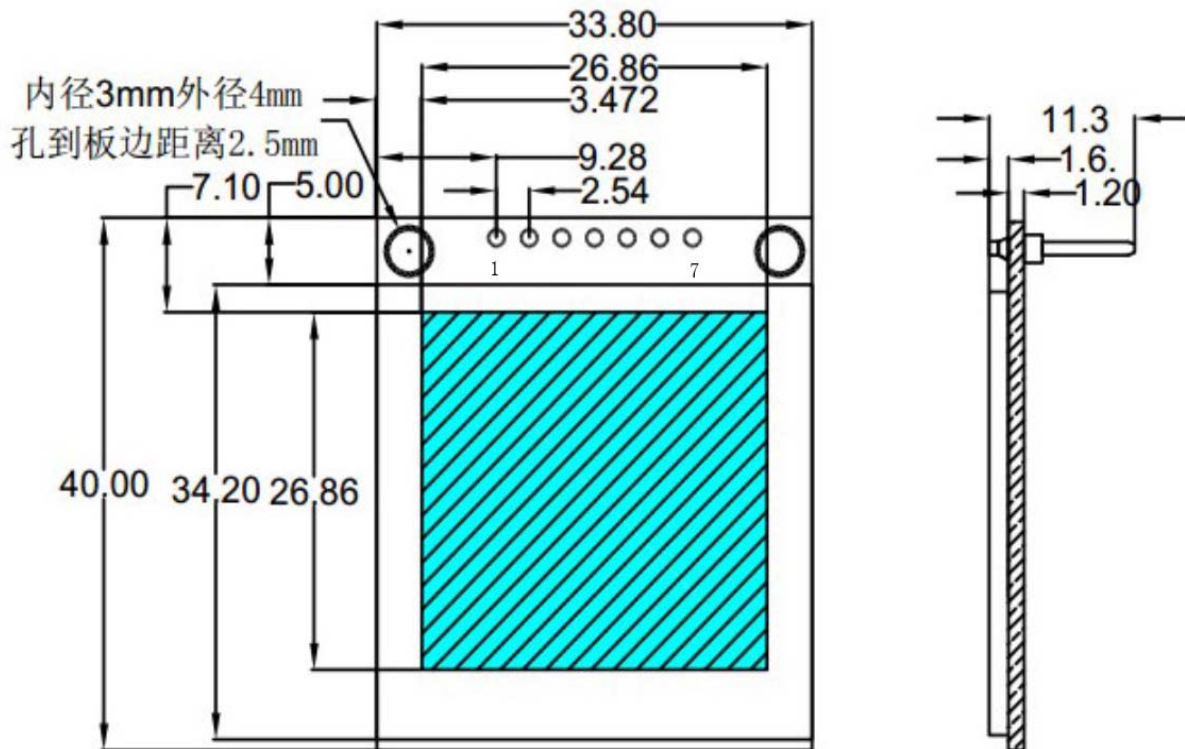
Features

- Display Mode: Passive Matrix
- Number of Pixels: 128×128 dots
- Display Color: 262144 colors (Maximum)
- Drive Duty: 1/128 Duty
- Driver IC: SSD1351
- Interface: SPI port

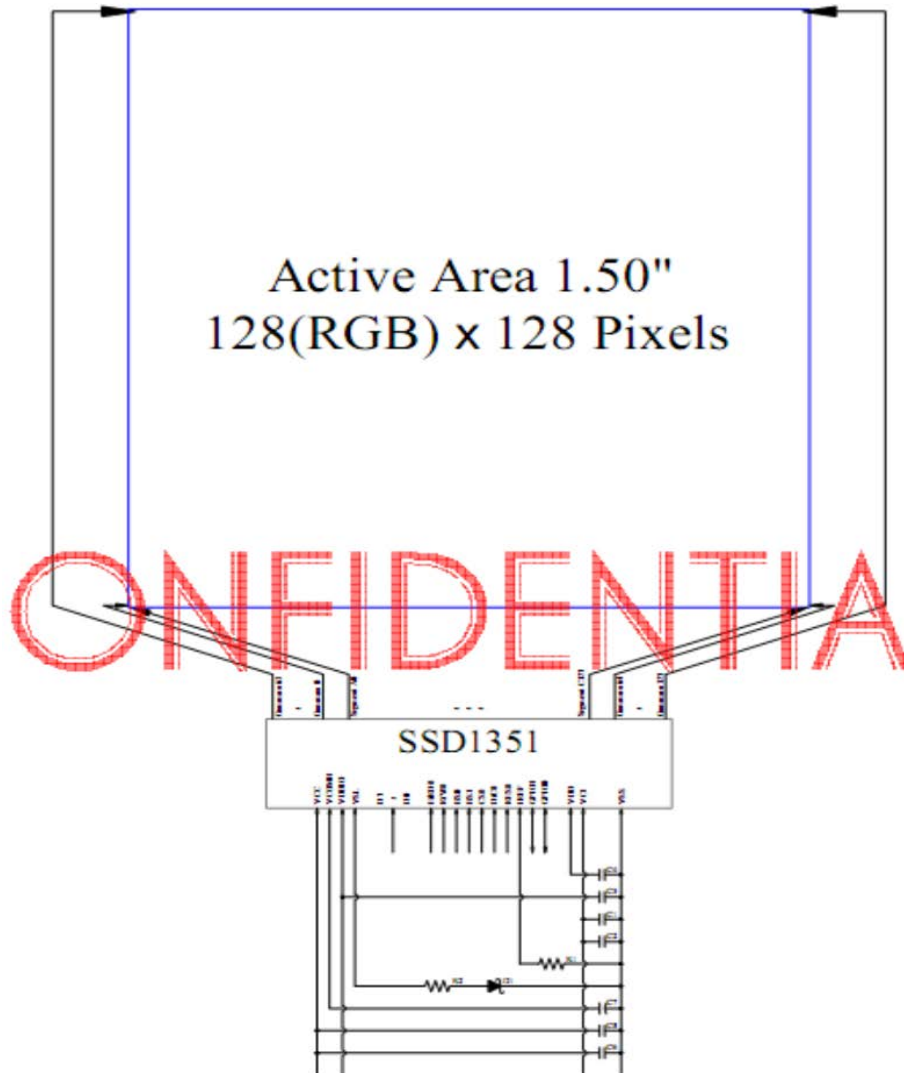
2. MECHANICAL SPECIFICATIONS

ITEM	SPECIFICATIONS	UNIT
Module Size	$33.8L \times 40.0W \times 3.4(MAX) H$	mm
View Area	28.855×28.865	mm
Effective Area	26.855×26.864	dots
Pixel Size	0.185×0.194	mm
Pixel Pitch	0.21×0.21	mm

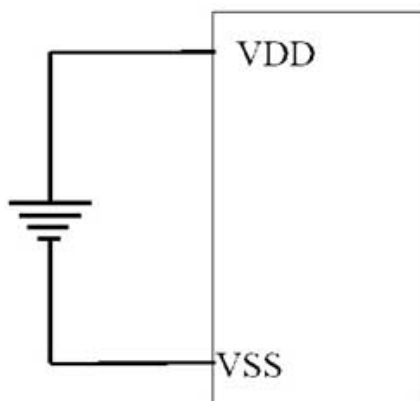
3. EXTERNAL DIMENSIONS (Unit: mm)



4. BLOCK DIAGRAM



5. POWER SUPPLY



6. PIN DESCRIPTION

ITEM	SYMBOL	LEVEL	FUNCTION
1	GND	0	Power Ground
2	VCC	+3.3V~5.0V	Power Supply For Logic
3	SCL	H/L	Serial Clock signal
4	SDA	H/L	Serial Data input signal
5	RES	H/L	Active LOW Reset signal.(RC Reset circuit on board.)
6	D/C	H/L	H: Data L: Command
7	/CS	L	Chip Select

7. ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Max	Unit	Notes
Supply Voltage for Operation	V_{CI}	-0.3	4	V	1, 2
Supply Voltage for Logic	V_{DD}	-0.5	2.75	V	1, 2
Supply Voltage for I/O Pins	V_{DDIO}	-0.5	V_{CI}	V	1, 2
Supply Voltage for Display	V_{CC}	-0.5	16	V	1, 2
Operating Temperature	T_{OP}	-30	70	°C	-
Storage Temperature	T_{STG}	-40	80	°C	-

Note 1: All the above voltages are on the basis of “VSS = 0V”.

Note 2: When this module is used beyond the above absolute maximum ratings, permanent breakage of the module may occur. Also, for normal operations, it is desirable to use this module under the conditions according to Section 3. “Optics & Electrical Characteristics”. If this module is used beyond these conditions, malfunctioning of the module can occur and the reliability of the module may deteriorate.

Characteristics	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage for Operation	V_{CI}		2.4	2.8	3.5	V
Supply Voltage for Logic	V_{DD}		2.4	2.5	2.6	V
Supply Voltage for I/O Pins	V_{DDIO}		1.65	1.8	V_{CI}	V
Supply Voltage for Display	V_{CC}	Note 3	12.5	13	13.5	V
High Level Input	V_{IH}		$0.8 \times V_{DDIO}$	-	V_{DDIO}	V
Low Level Input	V_{IL}		0	-	$0.2 \times V_{DDIO}$	V
High Level Output	V_{OH}	$I_{out} = 100\mu A, 3.3MHz$	$0.9 \times V_{DDIO}$	-	V_{DDIO}	V
Low Level Output	V_{OL}	$I_{out} = 100\mu A, 3.3MHz$	0	-	$0.1 \times V_{DDIO}$	V
Operating Current for V_{CI}	I_{CI}		-	240	300	μA
Operating Current for V_{CC}	I_{CC}	Note 4	-	23.2	29.0	mA
		Note 5	-	33.4	41.8	mA
Sleep Mode Current for V_{CI}	$I_{CI, SLEEP}$		-	1	5	μA
Sleep Mode Current for V_{CC}	$I_{CC, SLEEP}$		-	1	5	μA

Note 3: Brightness (L_{br}) and Supply Voltage for Display (V_{CC}) are subject to the change of the panel characteristics and the customer's request.

Note 4: $V_{CI} = 2.8V$, $V_{CC} = 13V$, 50% Display Area Turn on.

Note 5: $V_{CI} = 2.8V$, $V_{CC} = 13V$, 100% Display Area Turn on.

8. Optical Characteristics

Characteristics	Symbol	Conditions	Min	Typ	Max	Unit
Brightness (White)	L_{br}	With Polarizer (Note 3)	70	90	-	cd/m^2
C.I.E. (White)	(x)	With Polarizer	0.26	0.30	0.34	
	(y)		0.29	0.33	0.37	
C.I.E. (Red)	(x)	With Polarizer	0.60	0.64	0.68	
	(y)		0.30	0.34	0.38	
C.I.E. (Green)	(x)	With Polarizer	0.27	0.31	0.35	
	(y)		0.58	0.62	0.66	
C.I.E. (Blue)	(x)	With Polarizer	0.10	0.14	0.18	
	(y)		0.12	0.16	0.20	
Dark Room Contrast	CR		-	>2000:1	-	
View Angle			>160	-	-	degree

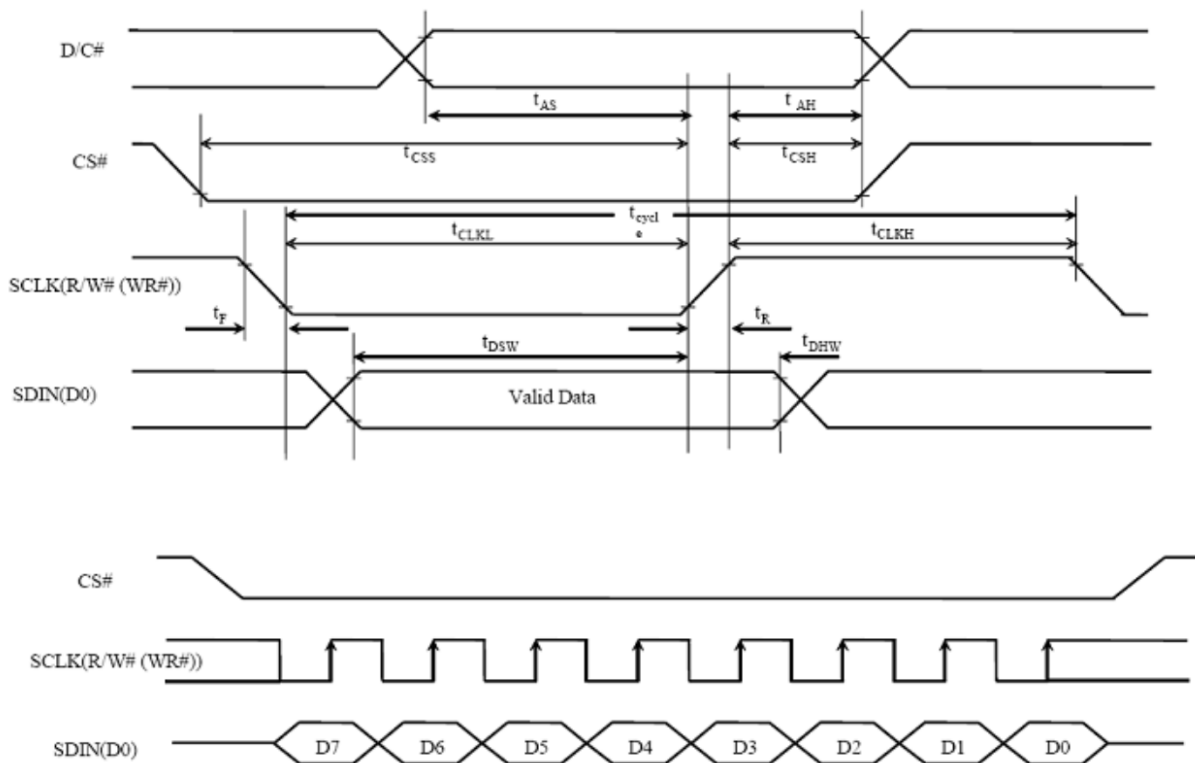
* Optical measurement taken at $V_{CI} = 2.8V$, $V_{CC} = 13V$.

9. COMMAND TABLE

Serial Interface Timing Characteristics: (4-wire SPI)

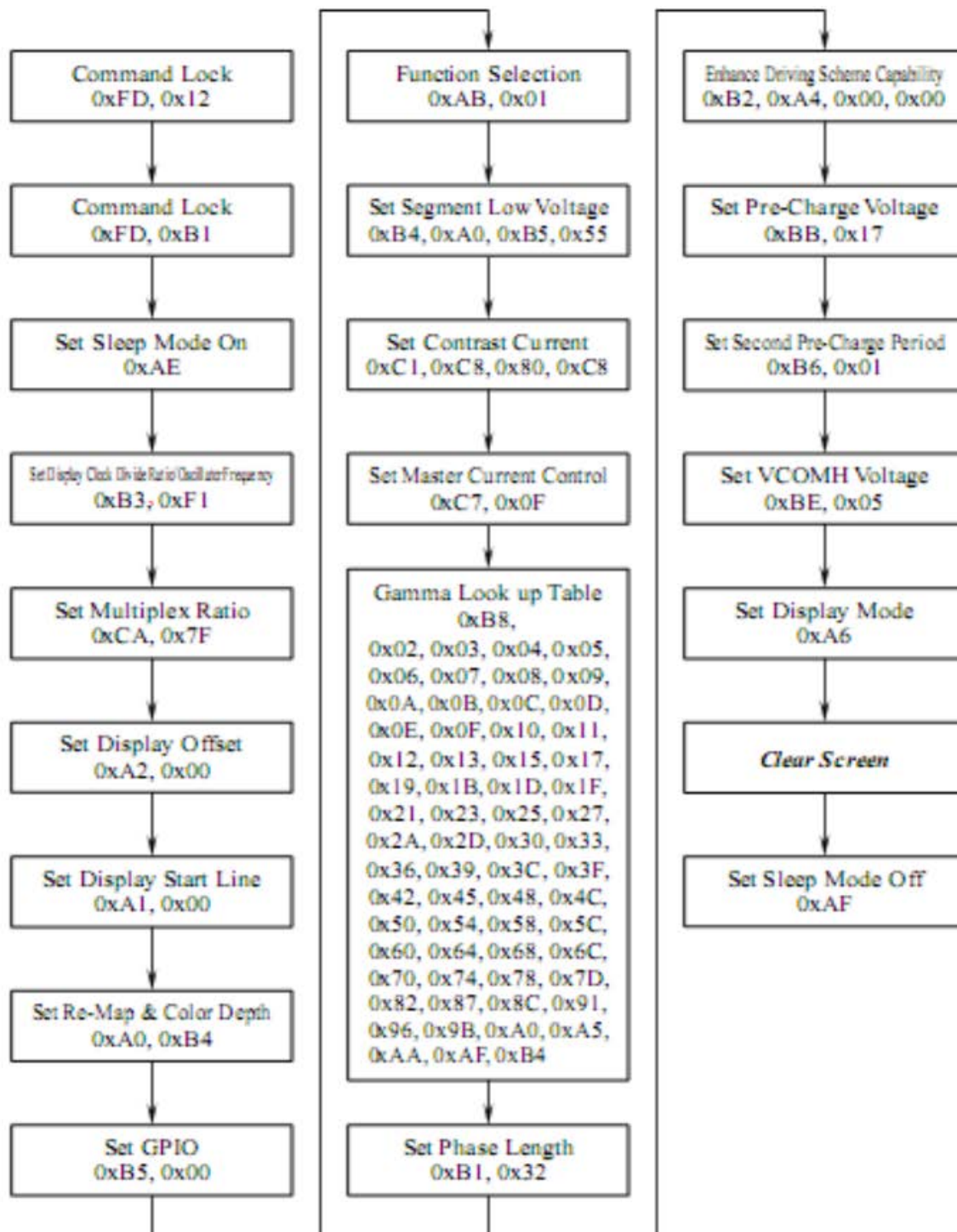
Symbol	Description	Min	Max	Unit
t_{cycle}	Clock Cycle Time	50	-	ns
t_{AS}	Address Setup Time	15	-	ns
t_{AH}	Address Hold Time	15	-	ns
t_{CSS}	Chip Select Setup Time	20	-	ns
t_{CSH}	Chip Select Hold Time	10	-	ns
t_{DSW}	Write Data Setup Time	15	-	ns
t_{DHW}	Write Data Hold Time	15	-	ns
t_{CLKL}	Clock Low Time	20	-	ns
t_{CLKH}	Clock High Time	20	-	ns
t_{R}	Rise Time	-	15	ns
t_{F}	Fall Time	-	15	ns

* ($V_{\text{DD}} - V_{\text{SS}} = 2.4\text{V to } 2.6\text{V}$, $V_{\text{DDIO}} = 1.65\text{V}$, $V_{\text{CI}} = 2.8\text{V}$, $T_{\text{a}} = 25^{\circ}\text{C}$)



For detailed instruction information, see SSD1351 datasheet .

10 . Actual Application Example



If the noise is accidentally occurred at the displaying window during the operation, please reset the display in order to recover the display function.

11. Reset Circuit

When RES# input is low, the chip is initialized with the following status:

1. Display is OFF
2. 128(RGB)×128 Display Mode
3. Normal segment and display data column and row address mapping (SEG0 mapped to column address 00h and COM0 mapped to row address 00h)
4. Display start line is set at display RAM address 0
5. Column address counter is set at 0
6. Normal scan direction of the COM outputs
7. Command A2h, B1h, B3h, BBh, BEh are locked by command FDh

12. DESIGN AND HANDLING PRECAUTION

1.. The OLED panel is made by glass. Any mechanical shock (eg. Dropping from high place) will damage the OLED module. Do not add excessive force on the surface of the display, which may cause the Display color change abnormally.

2.. The polarizer on the OLED is easily get scratched. If possible, do not remove the OLED protective film until the last step of installation.

3..Never attempt to disassemble or rework the OLED module.

4..Only Clean the OLED with Isopropyl Alcohol or Ethyl Alcohol. Other solvents (eg. water) may damage the OLED.

5.. When mounting the OLED module, make sure that it is free from twisting, warping and distortion.

6.. Ensure to provide enough space(with cushion) between case and OLED panel to prevent external force adding on it, or it may cause damage to the OLED or degrade the display result

7.. Only hold the OLED module by its side. Never hold OLED module by add force on the heat seal or TAB.

8.. Never add force to component of the OLED module. It may cause invisible damage or degrade of the reliability.

9..OLED module could be easily damaged by static electricity. Be careful to maintain an optimum anti-static work environment to protect the OLED module.

10..When peeling of the protective film from OLED, static charge may cause abnormal display pattern. It is normal and will resume to normal in a short while.

11..Take care and prevent get hurt by the OLED panel edge.

12..Never operate the OLED module exceed the absolute maximum ratings.

13..Keep the signal line as short as possible to prevent noisy signal applying to OLED module.

14.. Never apply signal to the OLED module without power supply.

15..IC chip (eg. TAB or COG) is sensitive to the light. Strong lighting environment could possibly cause malfunction. Light sealing structure casing is recommend.

16.. OLED module reliability may be reduced by temperature shock.

17.. When storing the OLED module, avoid exposure to the direct sunlight, high humidity, high temperature or low temperature. They may damage or degrade the OLED module