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MCOT096016C1V-YI 9		16 Yellow	OLED Module			
	Specification					
Versio	Version: 5 Date: 19/03/2018					
		Revision				
1 06/01/2017 First Release.						
2 13/09/2017		Modify Reliability Test Condition.				

Display	\bigcirc		
Resolution	96 x 16		
Appearance	Yellow on Black		
Logic Voltage	3V		RoHS
Interface	I ² C		compliant
Module Size	29.10 x 9.20 x 1.30 mm		-
Operating Temperature	-40°C ~ +80°C	Box Quantity	Weight / Display
Construction	COG		

* - For full design functionality, please use this specification in conjunction with the SSD1306BZ specification.(Provided Separately)

Display Accessories					
Part Number Description					

Optional Variants				
Appearance	Voltage			
White on Black Blue on Black				

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1.General Specification

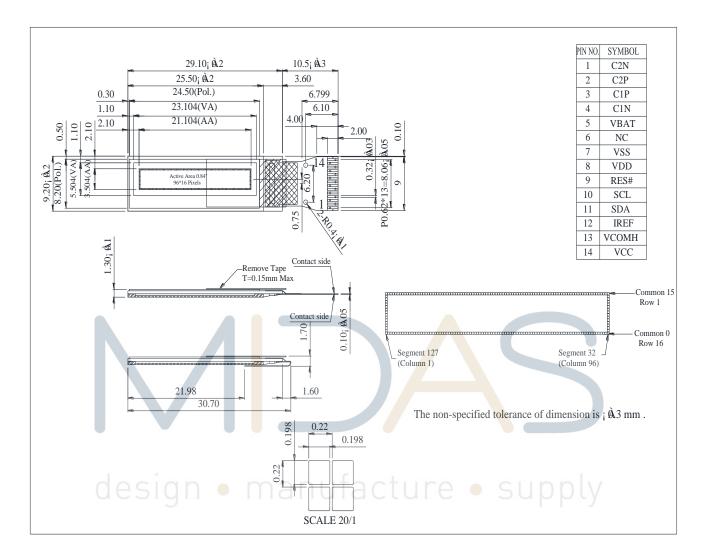
The Features is described as follow:

- Module dimension: 29.1 × 9.2 × 1.3 mm
- Active area: 21.104 × 3.504 mm
- Dot Matrix: 96 × 16
- Pixel size: 0.198 × 0.198 mm
- Pixel pitch: 0.220 × 0.220 mm
- Display Mode : Passive Matrix
- Duty: 1/16 Duty
- Display Color: Yellow
- IC: SSD1306BZ
- Interface: I2C
- Size: 0.84 inch



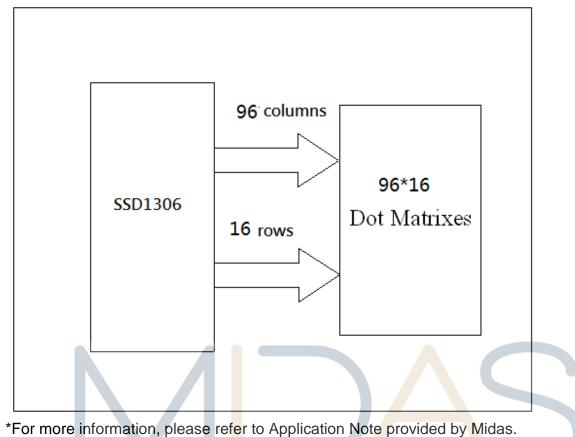
3.Interface Pin Function

No.	Symbol	Function
1	C2N	Positivo Torminal of the Elving Inverting Capacitor Negative Torminal of the
2	C2P	Positive Terminal of the Flying Inverting Capacitor Negative Terminal of the Flying Boost Capacitor The charge-pump capacitors are required between
3	C1P	the terminals. They must be floated when the converter is not used.
4	C1N	
5	VBAT	Power Supply for DC/DC Converter Circuit This is the power supply pin for the internal buffer of the DC/DC voltage converter. It must be connected to external source when the converter is used. It should be connected to VDD when the converter is not used.
6	NC	No connection
7	VSS	Ground of Logic Circuit This is a ground pin. It acts as a reference for the logic pins. It must be connected to external ground.
8	VDD	Power Supply for Logic This is a voltage supply pin. It must be connected to external source.
9	RES#	Power Reset for Controller and Driver This pin is reset signal input. When the pin is low, initialization of the chip is executed.
10	SCL	I2C mode is se <mark>le</mark> cted, D2, D1 should b <mark>e t</mark> ied to <mark>ge</mark> ther and serve as SDAout,
11	SDA	SDAin in applic <mark>a</mark> tion and D0 is the se <mark>rial clock inp</mark> ut, SCL.
12	IREF	Current Reference for Brightness Adjustment This pin is segment current reference pin. A resistor should be connected between this pin and VSS. Set the current lower than 12.5µA.
13	VCOMH	Voltage Output High Level for COM Signal This pin is the input pin for the voltage output high level for COM signals. A capacitor should be connected between this pin and VSS.
14	VCC	Power Supply for OEL Panel This is the most positive voltage supply pin of the chip. A stabilization capacitor should be connected between this pin and VSS when the converter is used. It must be connected to external source when the converter is not used.



Contour Drawing & Block Diagram

FUNCTION BLOCK DIAGRAM



5.Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Supply Voltage for Logic	VDD	0	4	V	1,2
Supply Voltage for Display	VCC	0	16	V	1,2
Operating Temperature	TOP	-40	+70	°C	—
Storage Temperature	TSTG	-40	+85	°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 6."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.

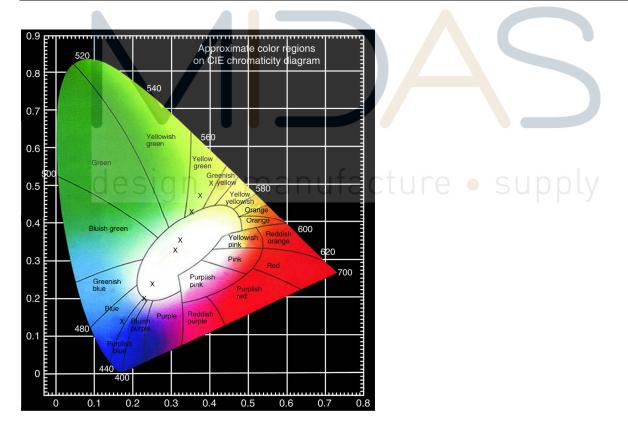


6.Electrical Characteristics

Item	Symbol	Condition	Min	Тур	Мах	Unit
Supply Voltage for Logic	VDD	—	2.8	3.0	3.3	V
Supply Voltage for Display (Supplied Externally)	VCC		7.0	7.5	7.8	V
Charge Pump Regulator Supply Voltage	VBAT	_	3.3	_	4.2	V
Charge Pump Output Voltage for Display (Generated by Internal DC/DC)	Charge Pump VCC	_	7.0	7.5	7.8	V
Input High Volt.	VIH	_	0.8×VDD	_	VDD	V
Input Low Volt.	VIL	—	0	_	0.2×VDD	V
Output High Volt.	VOH	_	0.9×VDD	7	VDD	V
Output Low Volt.	VOL	-	0		0.1×VDD	V
50% Check Board operating Current (VCC Supplied Externally)	ICC		_	7	15	mA
50% Check Board operating Current (VCC Generated by Internal DC/DC)	IBAT	_	_	15	30	mA

7.Optical Characteristics

Item	Symbol	Condition	Min	Тур	Max	Unit
View Angle	(V)θ	—	160			deg
view Angle	(H)φ	—	160	_	_	deg
Contrast Ratio	CR	Dark	2000:1	_	_	—
Response Time	T rise	—	_	10		μs
	T fall	—	_	10		μs
Display with 50% check Board Brightness			120	150	_	
CIEx(Yellow)		x,y(CIE1931)	0.45	0.47	0.49	—
CIEy(Yellow)		x,y(CIE1931)	0.48	0.50	0.52	_



8.OLED Lifetime

ITEM	Conditions	Min	Тур	Remark
Operating Life Time	Ta=25°C / Initial 50% check board brightness 100cd/ m ²	50,000 Hrs	-	Note

Notes:

- 1. Life time is defined the amount of time when the luminance has decayed to <50% of the initial value.
- 2. This analysis method uses life data obtained under accelerated conditions to extrapolate an estimated probability density function (*pdf*) for the product under normal use conditions.
- 3. Screen saving mode will extend OLED lifetime.



9.Reliability

Content of Reliability Test

Environmenta	l Test		
Test Item	Content of Test	Test Condition	Applicable Standard
High Temperature storage	Endurance test applying the high storage temperature for a long time.	85°C 240hrs	
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-40°C 240hrs	
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 240hrs	
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-40°C 240hrs	
High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	60°С,90%RH 240hrs	
High Temperature/ Humidity Operation	Endurance test ap <mark>ply</mark> ing the high temperature and high humidity Operation for a long time.	60°С,90%RH 120hrs	
Temperature Cycle	Endurance test applying the low and high temperature cycle. -40°C 25°C 80°C 30min 5min 30min 1 cycle	-40°C⁄80°C 30 cycles	supply
Mechanical Tes	st		
Vibration test	Endurance test applying the vibration during transportation and using.	Frequency:10~55Hz amplitude:1.5mm Time:0.5hrs/axis Test axis:X,Y,Z	
Others			
Static electricity test	Endurance test applying the electric stress to the terminal.	Air Discharge model ±4kv,10 times	

*** Supply voltage for OLED system =Operating voltage at 25 $^\circ\!\mathrm{C}$

Test and measurement conditions

- 1. All measurements shall not be started until the specimens attain to temperature stability. After the completion of the described reliability test, the samples were left at room temperature for 2 hrs prior to conducting the failure test at 23±5°C; 55±15% RH.
- 2. All-pixels-on is used as operation test pattern.
- 3. The degradation of Polarizer are ignored for High Temperature storage, High Temperature/ Humidity Storage, Temperature Cycle

Evaluation criteria

- 1. The function test is OK.
- 2. No observable defects.
- 3. Luminance: > 50% of initial value.
- 4. Current consumption: within ± 50% of initial value.

APPENDIX:

RESIDUE IMAGE

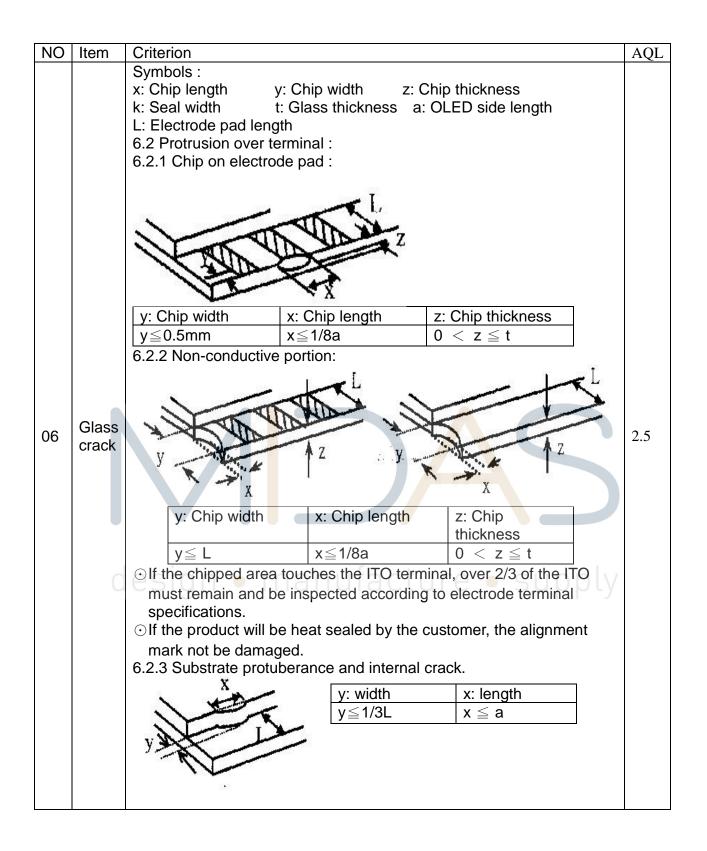
Because the pixels are lighted in different time, the luminance of active pixels may reduce or differ from inactive pixels. Therefore, the residue image will occur. To avoid the residue image, every pixel needs to be lighted up uniformly.



10.Inspection specification

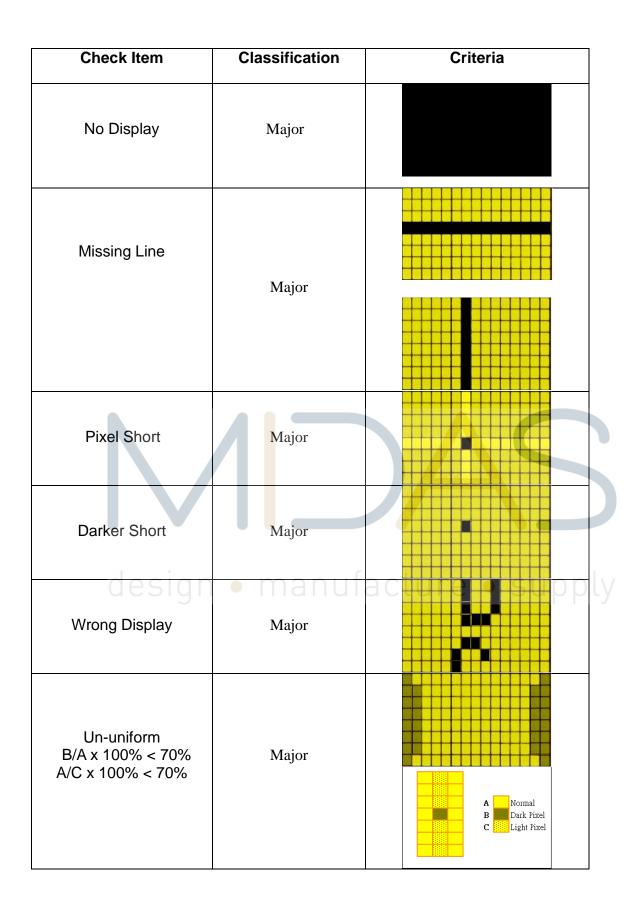
NO	Item	Criterion			AQL
01	Electrical Testing	 1.1 Missing vertical, horizontal segment, segment contrast defect. 1.2 Missing character, dot or icon. 1.3 Display malfunction. 1.4 No function or no display. 1.5 Current consumption exceeds product specifications. 1.6 OLED viewing angle defect. 1.7 Mixed product types. 1.8 Contrast defect. 			
02	Black or white spots on OLED (display only)	2.1 White and black spots three white or black spots2.2 Densely spaced: No m 3mm.	present.		2.5
03	OLED black spots, white spots, contamina tion (non-displ ay)	3.1 Round type : As following drawing $\Phi = (x + y) / 2$	SIZE $\Phi \le 0.10$ 0.10 < $\Phi \le 0.20$ 0.20 < $\Phi \le 0.25$ $0.25 < \Phi$	Acceptable Q TY Accept no dense 2 1	2.5
		3.2 Line type : (As followin \downarrow w \downarrow w \downarrow L $\stackrel{\text{Length}}{=}$ $L \leq 3.0$ $L \leq 2.5$ 	g drawing) Width W \leq 0.02 0.02 < W \leq 0.03 0.03 < W \leq 0.05 0.05 < W	Acceptable Q TY Accept no dense 2 As round type	2.5
04	Polarizer bubbles	If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.	Size Φ $\Phi \le 0.20$ $0.20 < \Phi \le 0.50$ $0.50 < \Phi \le 1.00$ $1.00 < \Phi$ Total Q TY	Acceptable Q TY Accept no dense 3 2 0 3	2.5

NO	Item	Criterion	AQL
05	Scratches	Follow NO.3 OLED black spots, white spots, contamination	
05	Scratches	Follow NO.3 OLED black spots, white spots, contamination Symbols Define: x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: OLED side length L: Electrode pad length: 6.1 General glass chip : 6.1.1 Chip on panel surface and crack between panels:	
06	Chipped glass	z: Chip thicknessy: Chip widthx: Chip length $Z \leq 1/2t$ Not over viewing $x \leq 1/8a$ $1/2t < z \leq 2t$ Not exceed $1/3k$ $x \leq 1/8a$ \odot If there are 2 or more chips, x is total length of each chip.	2.5
	des	6.1.2 Corner crack:	
		z: Chip thickness y: Chip width x: Chip length	
		$Z \leq 1/2t$ Not over viewing $x \leq 1/8a$ area	
		$1/2t < z \le 2t$ Not exceed 1/3k $x \le 1/8a$	
		\odot If there are 2 or more chips, x is the total length of each chip.	



NO	Item	Criterion	AQL
07	Cracked glass	The OLED with extensive crack is not acceptable.	2.5
08	Backlight elements	 8.1 Illumination source flickers when lit. 8.2 Spots or scratched that appear when lit must be judged. Using OLED spot, lines and contamination standards. 8.3 Backlight doesn't light or color wrong. 	0.65 2.5 0.65
09	Bezel	9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination.9.2 Bezel must comply with job specifications.	2.5 0.65
10	PCB、COB	 10.1 COB seal may not have pinholes larger than 0.2mm or contamination. 10.2 COB seal surface may not have pinholes through to the IC. 10.3 The height of the COB should not exceed the height indicated in the assembly diagram. 10.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places. 10.5 No oxidation or contamination PCB terminals. 10.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts. 10.7 The jumper on the PCB should conform to the product characteristic chart. 10.8 If solder gets on bezel tab pads, OLED pad, zebra pad or screw hold pad, make sure it is smoothed down. 	 2.5 2.5 2.5 2.5 0.65 0.65 2.5
11	Soldering	 11.1 No un-melted solder paste may be present on the PCB. 11.2 No cold solder joints, missing solder connections, oxidation or icicle. 11.3 No residue or solder balls on PCB. 11.4 No short circuits in components on PCB. 	2.5 2.5 2.5 0.65

NO	Item	Criterion	AQL
12	General appearance	12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP.	2.5
		12.2 No cracks on interface pin (OLB) of TCP.	0.65
		12.3 No contamination, solder residue or solder balls on product.	2.5 2.5
		12.4 The IC on the TCP may not be damaged, circuits.	2.5
		12.5 The uppermost edge of the protective strip on the	
		interface pin must be present or look as if it cause the interface pin to sever.	2.5
		12.6 The residual rosin or tin oil of soldering (component or	2.5
		chip component) is not burned into brown or black color.	0.65
		12.7 Sealant on top of the ITO circuit has not hardened.	0.65
		12.8 Pin type must match type in specification sheet.	0.65
		12.9 OLED pin loose or missing pins.	
		12.10 Product packaging must the same as specified on packaging specification sheet.	0.65
		12.11 Product dimension and structure must conform to	
		product specification sheet.	



11.Precautions in use of OLED Modules

- (1) Avoid applying excessive shocks to module or making any alterations or modifications to it.
- (2) Don't make extra holes on the printed circuit board, modify its shape or change the components of OLED display module.
- (3) Don't disassemble the OLED display module.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't drop, bend or twist OLED display module.
- (6) Soldering: only to the I/O terminals.
- (7) Storage: please storage in anti-static electricity container and clean environment.
- (8) It's pretty common to use "Screen Saver" to extend the lifetime and Don't use fix information for long time in real application.
- (9) Don't use fixed information in OLED panel for long time, that will extend "screen burn" effect time..
- (10) Midas has the right to change the passive components, including R2and R3 adjust resistors. (Resistors, capacitors and other passive components will have different appearance and color caused by the different supplier.)

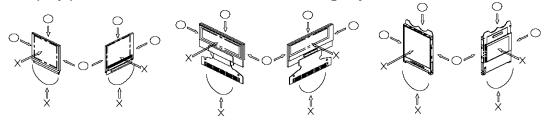
(11) Midas have the right to change the PCB Rev. (In order to satisfy the supplying stability, management optimization and the best product performance...etc, under the premise of not affecting the electrical characteristics and external dimensions, Midas have the right to modify the version.)

11.1 Handling Precautions

- (1) Since the display panel is being made of glass, do not apply mechanical impacts such us dropping from a high position.
- (2) If the display panel is broken by some accident and the internal organic substance leaks out, be careful not to inhale nor lick the organic substance.
- (3) If pressure is applied to the display surface or its neighborhood of the OLED display module, the cell structure may be damaged and be careful not to apply pressure to these sections.
- (4) The polarizer covering the surface of the OLED display module is soft and easily scratched. Please be careful when handling the OLED display module.
- (5) When the surface of the polarizer of the OLED display module has soil, clean the surface. It takes advantage of by using following adhesion tape.
- * Scotch Mending Tape No. 810 or an equivalent

Never try to breathe upon the soiled surface nor wipe the surface using cloth containing solvent Also, pay attention that the following liquid and solvent may spoil the polarizer: * Water

- * Ketone
- * Aromatic Solvents
- (6) Hold OLED display module very carefully when placing OLED display module into the System housing. Do not apply excessive stress or pressure to OLED display module. And, do not over bend the film with electrode pattern layouts. These stresses will influence the display performance. Also, secure sufficient rigidity for the outer cases.



- (7) Do not apply stress to the LSI chips and the surrounding molded sections.
- (8) Do not disassemble nor modify the OLED display module.
- (9) Do not apply input signals while the logic power is off.
- (10) Pay sufficient attention to the working environments when handing OLED display modules to prevent occurrence of element breakage accidents by static electricity.
- * Be sure to make human body grounding when handling OLED display modules.
- * Be sure to ground tools to use or assembly such as soldering irons.
- * To suppress generation of static electricity, avoid carrying out assembly work under dry environments.
- * Protective film is being applied to the surface of the display panel of the OLED display module. Be careful since static electricity may be generated when exfoliating the protective film.
- (11) Protection film is being applied to the surface of the display panel and removes the protection film before assembling it. At this time, if the OLED display module has been stored surface of the display panel after removed of the film. In such case, remove the residue material by the method introduced in the above Section 5.
- (12) If electric current is applied when the OLED display module is being dewed or when it is placed under high humidity environments, the electrodes may be corroded and be careful to avoid the above.

11.2 Storage Precautions

- (1) When storing OLED display modules, put them in static electricity preventive bags avoiding exposure to direct sun light nor to lights of fluorescent lamps. And, also, avoiding high temperature and high humidity environment or low temperature (less than 0°C) environments.(We recommend you to store these modules in the packaged state when they were shipped from Midas. At that time, be careful not to let water drops adhere to the packages or bags nor let dewing occur with them.
- (2) If electric current is applied when water drops are adhering to the surface of the OLED display module, when the OLED display module is being dewed or when it is placed under high humidity environments, the electrodes may be corroded and be careful about the above.

11.3 Designing Precautions

- (1) The absolute maximum ratings are the ratings which cannot be exceeded for OLED display module, and if these values are exceeded, panel damage may be happen.
- (2) To prevent occurrence of malfunctioning by noise, pay attention to satisfy the VIL and VIH specifications and, at the same time, to make the signal line cable as short as possible.
- (3) We recommend you to install excess current preventive unit (fuses, etc.) to the power circuit (VDD). (Recommend value: 0.5A)

(4) Pay sufficient attention to avoid occurrence of mutual noise interference with the neighboring devices.

- (5) As for EMI, take necessary measures on the equipment side basically.
- (6) When fastening the OLED display module, fasten the external plastic housing section.
- (7) If power supply to the OLED display module is forcibly shut down by such errors as taking out the main battery while the OLED display panel is in operation, we cannot guarantee the quality of this OLED display module. Connection (contact) to any other potential than the above may lead to rupture of the IC.