4DOLED-282815 OLED Display

The 4DOLED-282815 is a 1.5" 128x128 pixel resolution 262K colour Passive Matrix OLED display. This OLED is the same display used in the microOLED range of modules. It allows a very cost effective means of adding a full colour small display to any product or your next microcontroller project.

- 128 x 128 1.5" 262K true to life colours
- SSD1351 Driver IC (Data Sheet available)
- 30 pins on LCD FPC, 0.5mm pitch
- Dimensions: 36mm x 36mm x 1.6mm
- 2.4 to 3.6 Volts supply, nominal 3.3 Volts
- No backlighting

Display Specifications

1) Display Mode : Passive Matrix
2) Display Color : 262,144 Colors (Maximum)
3) Drive Duty : 1/128 Duty

Mechanical Specifications

1) Outline Drawing : According to the annexed outline drawing
2) Number of Pixels : 128 (RGB) ´ 128
3) Panel Size : 33.80 ´ 34.00 ´ 1.60 (mm) including "Anti-Glare Polarizer"
4) Active Area : 26.855 ´ 26.864 (mm)
5) Pixel Pitch : 0.07 ´ 0.21 (mm)
6) Pixel Size : 0.045 ´ 0.194 (mm)
7) Weight : 3.75 (g) ± 10%

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage for Operation	VCI	-0.3	4	V
Supply Voltage for Logic	VDD	-0.5	2.75	V
Supply Voltage for I/O Pins	VDDIO	-0.5	VCI	V
Supply Voltage for Display	VCC	-0.5	16	V
Operating Temperature	TOP	-40	70	°C
Storage Temperature	TSTG	-40	85	°C
Life Time (90 cd/m2)		10,000	-	hour
Life Time (70 cd/m2)		13,500	-	hour
Life Time (50 cd/m2)		20,000	-	hour

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.

Note 3: The defined temperature ranges do not include the polarizer. The maximum withstood temperature of the polarizer should be 80°C.

Note 4: VCC = 13.0V, Ta = 25°C, 50% Checkerboard. Software configuration follows Section 4.4 Initialization. End of lifetime is specified as 50% of initial brightness reached. The average operating lifetime at room temperature is estimated by the accelerated operation at high temperature conditions.

Optics Characteristics

Characteristics	Symbol	Conditions	Min	Typ	Max	Unit
Brightness	Lbr	Note 5	70	90	-	cd/m^2
C.I.E. (White)	(x) (y)	C.I.E. 1931	0.26 0.29	0.30 0.33	0.34 0.37	
C.I.E. (Red)	(x) (y)	C.I.E. 1931	0.60 0.30	0.64 0.34	0.68 0.38	
C.I.E. (Green)	(x) (y)	C.I.E. 1931	0.27 0.58	0.31 0.62	0.35 0.66	
C.I.E. (Blue)	(x) (y)	C.I.E. 1931	0.10 0.12	0.14 0.16	0.18 0.20	
Dark Room Contrast	CR		-	>10,000:1	-	
Viewing Angle			-	Free	-	degree

* Optical measurement taken at VCI = 2.8V, VCC = 13.0V

DC Characteristics

Characteristics	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage for Operation	VCI		2.4	2.8	3.5	V
Supply Voltage for Logic	VDD		2.4	2.5	2.6	V
Supply Voltage for I/O Pins	VDDIO		1.65	1.8	VCI	
Supply Voltage for Display	VCC	Note 5	12.5	13.0	13.5	
High Level Input	VIH		0.8´VDDIO	-	VDDIO	V
Low Level Input	VIL		0	-	0.2´VDDIO	V
High Level Output	VOH	Iout = 100µA, 3.3MHz	0.9´VDDIO	-	VDDIO	V
Low Level Output	VOL	Iout = 100µA, 3.3MHz	0	-	0.1´VDDIO	V
Operating Current for VCI	ICI		-	240	300	µA
Operating Current for VCC	ICC	Note 6 Note 7 Note 8	 - -	13.3 23.2 33.4	17.0 29.0 42.0	mA
Sleep Mode Current for VCI	ICI, SLEEP		-	2	10	µA
Sleep Mode Current for VCC	ICC, SLEEP		-	2	10	µA

Note 5: Brightness (Lbr) and Supply Voltage for Display (VCC) are subject to the change of the panel characteristics and the customer's request.

Note 6: VCI = 2.8V, VCC = 13.0V, 30% Display Area Turn on.

Note 7: VCI = 2.8V, VCC = 13.0V, 50% Display Area Turn on.

Note 8: VCI = 2.8V, VCC = 13.0V, 100% Display Area Turn on.

AC Characteristics

Symbol	Description	Min	Max	Unit
tcycle	Clock Cycle Time	300	-	ns
tAS	Address Setup Time	10	-	ns
tAH	Address Hold Time	0	-	ns
tDSW	Write Data Setup Time	40	-	ns
tDHW	Write Data Hold Time	7	-	ns
tDHR	Read Data Hold Time	20	-	ns
tOH	Output Disable Time	-	70	ns
tACC	Access Time	-	140	ns
PWCSL	Chip Select Low Pulse Width (Read) Chip Select Low Pulse Width (Write)	120 60	-	ns
PWCSH	Chip Select High Pulse Width (Read) Chip Select High Pulse Width (Write)	60 60	-	ns
tR	Rise Time	-	15	ns
tF	Fall Time	-	15	ns

* (VCI - VSS = 2.4V to 3.5V, VDDIO - VSS = 1.65V to VCI, Ta = 25°C)

Functional Specification

Commands

Refer to the Technical Manual for the SSD1351

Power down and Power up Sequence

To protect OEL panel and extend the panel life time, the driver IC power up/down routine should include a delay period between high voltage and low voltage power sources during turn on/off. It gives the OEL panel enough time to complete the action of charge and discharge before/after the operation.

Power up Sequence

1. Power up VCI / VDDIO
2. Send Display off command
3. Initialization
4. Clear Screen
5. Power up VCC
6. Delay 200ms (When VCC is stable)
7. Send Display on command

Power down Sequence

1. Send Display off command
2. Power down VCC
3. Delay 100ms(When VCC is reach 0 and panel is completely discharges)
4. Power down VCI / VDDIO

Note 9

1) Since an ESD protection circuit is connected between VCI, VDDIO and VCC inside the driver IC, VCC becomes lower than VCI whenever VDD, VDDIO is ON and VCC is OFF.
2) VCC should be kept float (disable) when it is OFF.
3) Power Pins (VDD, VDDIO, VCC) can never be pulled to ground under any circumstance.
4) VCI, VDDIO should not be power down before VCC power down.

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