

## DISTINCTIVE CHARACTERISTICS

- Organic LED technology
- Life 30,000 hours @ 100cd/m<sup>2</sup> (based on 40% pixels on) or 60,000 hours @ 50cd/m<sup>2</sup> (based on 40% pixels on)
- Power consumption only 2.4mA (30% less than previous product)
- Range of 65,536 colors in 16 bit mode, 256 colors in 8 bit mode
- Full viewing angle of 180°
- Exceptional contrast: 50 times greater than LCD products
- Four times more enhanced resolution
- High resolution provides sharp, clear images of very small characters
- Operated by commands and data supplied via serial communications (SPI)
- Dust tight construction

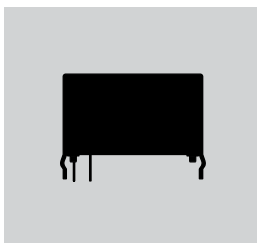


Viewing area: 12.9mm x 9.9mm (horizontal x vertical)

High resolution of 52RGB x 36 pixels

Bracket has crimped legs to ensure secure PC mounting and prevent dislodging during wave soldering

Actual Size





**DISPLAY PART NUMBER & DESCRIPTION**

Part Number	Display Description	OLED	Pixel Format
<b>ISC01P</b>	Straight PC Terminals	Color OLED Display Module 65,536 Colors	52RGB x 36 Pixels Horizontal x Vertical

**OLED SPECIFICATIONS**

**Characteristics of Display**

Display Device	Color OLED display module
Display Mode	Passive matrix
Viewing Area	12.9mm x 9.9mm (horizontal x vertical)
Pixel Format	52RGB x 36 pixels (horizontal x vertical)
Pixel Size	0.21mm x 0.22mm (horizontal x vertical)
Interface	Serial (SPI) interface
Number of Colors	65,536 Colors (16bit: R 5bit/G 6bit/B 5bit) or 256 Colors (8bit: R 2bit/G 3bit/B 3bit)
Operating Temperature Range	-20°C ~ +70°C (-4°F ~ +158°F)
Storage Temperature Range	-30°C ~ +80°C (-22°F ~ +176°F)
Operating Life (Display)	30,000 hours @ 100cd/m <sup>2</sup> (based on 40% pixels ON) 60,000 hours @ 50cd/m <sup>2</sup> (based on 40% pixels ON)

**Absolute Maximum Ratings**

Items	Symbols	Ratings
Supply Voltage for Logic/Interface	V <sub>DD</sub>	-0.3V to +4.0V
Supply Voltage for Drive	V <sub>CC</sub>	0.0V to +19.0V
Input Voltage	V <sub>I</sub>	-0.3V to V <sub>DD</sub> +0.3V

**Current Consumption**

(Temperature at 25°C, V<sub>DD</sub> = 2.8V, V<sub>CC</sub> = 16.0V)

Items	Symbols	Min	Typical	Max
All-Pixels-On Mode *Drive System Power Current	I <sub>CC1</sub>	—	2.4mA	2.9mA
All-Pixels-On Mode *Logic/IF System Power Current	I <sub>DD1</sub>	—	0.15mA	0.18mA
Sleep Mode **Drive System Power Current	I <sub>CC2</sub>	—	—	10µA
Sleep Mode **Logic/IF System Power Current	I <sub>DD2</sub>	—	—	10µA

\*All pixels shall be turned on with the maximum level gray scale  
\*\*All pixels shall be turned off (while chip is operating)

**Recommended Operating Conditions**

Items	Symbols	Minimum	Typical	Maximum
Supply Voltage for Logic/Interface	V <sub>DD</sub>	2.4V	2.8V	3.5V
Supply Voltage for Drive	V <sub>CC</sub>	15.0V	16.0V	17.0V
Input High Level Voltage	V <sub>IH</sub>	0.8 x V <sub>DD</sub>	—	—
Input Low Level Voltage	V <sub>IL</sub>	—	—	0.2 x V <sub>DD</sub>

**Optical Characteristics** (Temperature at 25°C, Initial Value: 87 x 0F)

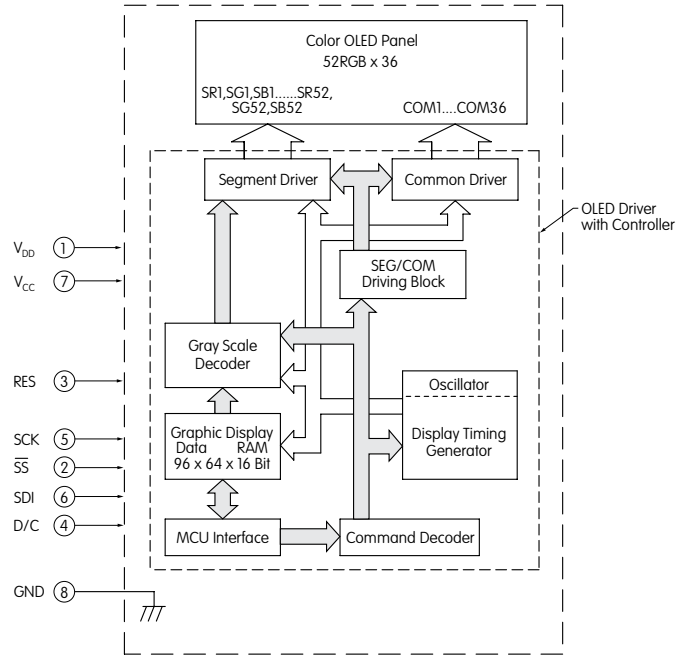
Items	Min	Typical	Max	Unit	Remarks
Luminosity	75	100	125	cd/m <sup>2</sup>	White (All pixels on)
White Color Coordinate	(x)	0.25	0.29	0.33	—
	(y)	0.31	0.36	0.41	—
Red Color Coordinate	(x)	0.63	0.67	0.71	—
	(y)	0.29	0.33	0.37	—
Green Color Coordinate	(x)	0.19	0.23	0.27	—
	(y)	0.60	0.64	0.68	—
Blue Color Coordinate	(x)	0.10	0.14	0.18	—
	(y)	0.14	0.20	0.26	—
Contrast Ratio	100	—	—	—	—

Toggles  
Rockers  
Pushbuttons  
Illuminated PB  
Programmable  
Keylocks  
Rotaries  
Slides  
Tactiles  
Tilt  
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Indicators  
Accessories  
Supplement

## DISPLAY BLOCK DIAGRAM & PIN CONFIGURATIONS

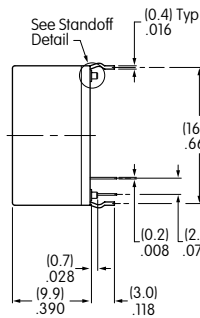
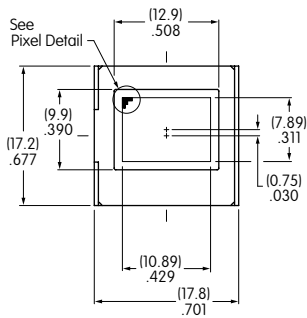


ISC01P

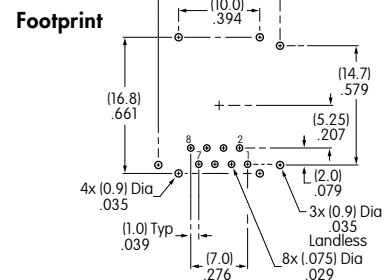
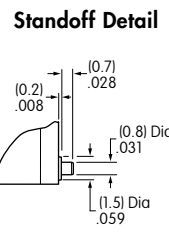
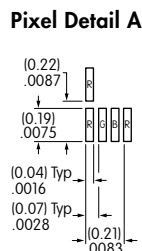
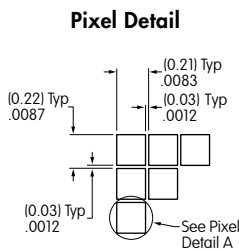
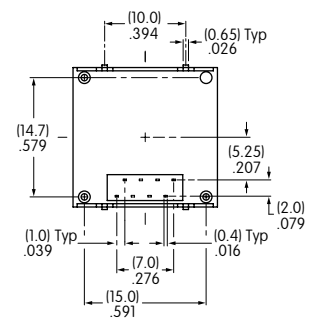


Pin No.	Symbol	Name	Function
①	V <sub>DD</sub>	Power	Power source for logic circuit
②	SS	Slave Select	Slave select for SPI. This line is active low.
③	RES	Reset	Reset signal input. When pin is low, initialization of chip is executed.
④	D/C	Data/Command	Data/Command Control. When pin is pulled low, data will be interpreted as Command; when pulled high, data will be interpreted as Data.
⑤	SCK	Serial Clock	Clock line for SPI that synchronizes command and data
⑥	SDI	Serial Data In	Data input line for SPI
⑦	V <sub>CC</sub>	Power	Power source for drive circuit
⑧	GND	Ground	Connect to Ground

## TYPICAL DISPLAY DIMENSIONS



Terminal numbers are not on the switch.

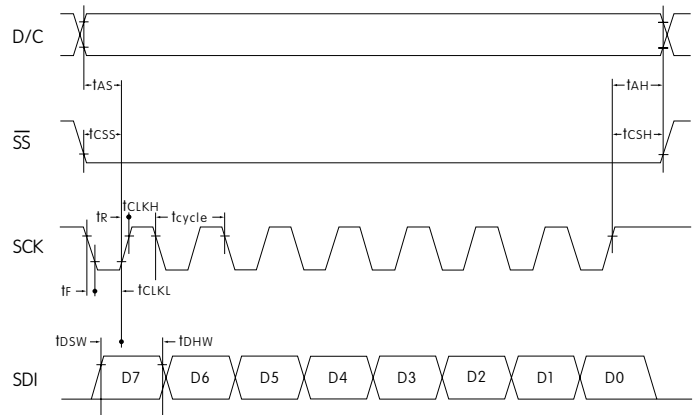


Toggles  
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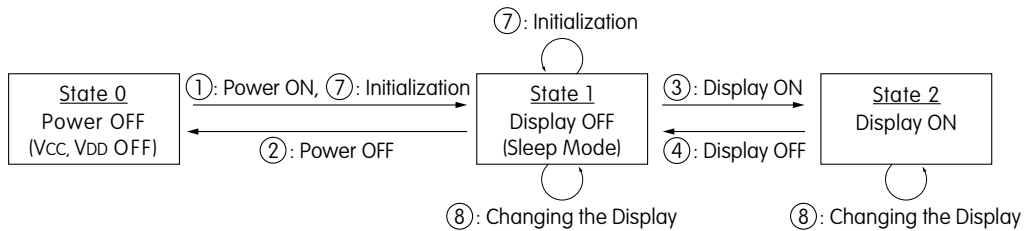
**TIMING SPECIFICATIONS FOR SWITCH & DISPLAY**

**AC Characteristics** (Temperature at 25°C),  $V_{DD} = 2.4V \sim 3.5V$

Items	Symbols	Minimum	Typical	Maximum
Clock Cycle Time	$t_{cycle}$	150ns	—	—
D/C Setup Time	$t_{AS}$	40ns	—	—
D/C Hold Time	$t_{AH}$	40ns	—	—
$\overline{SS}$ Setup Time	$t_{CSS}$	75ns	—	—
$\overline{SS}$ Hold Time	$t_{CSH}$	60ns	—	—
Write Data Setup Time	$t_{DSW}$	40ns	—	—
Write Data Hold Time	$t_{DHW}$	40ns	—	—
SCK Low Time	$t_{CLKL}$	75ns	—	—
SCK High Time	$t_{CLKH}$	75ns	—	—
SCK Rise Time	$t_R$	—	—	15ns
SCK Fall Time	$t_F$	—	—	15ns



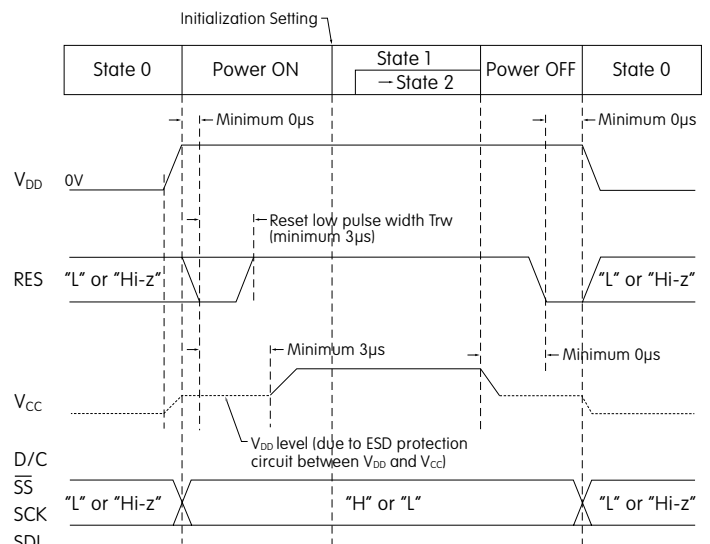
**STATE TRANSITION**



State Number	State	Display	Sleep	$V_{CC}$	$V_{DD}$	Changing the Display
0	Power OFF	OFF	—	OFF	OFF	Disable
1	Display OFF	OFF	ON	ON	ON	Enable
2	Display ON	ON	OFF	ON	ON	Enable

State Transition	Transition	Index
①	Power ON	Refer to "Power ON/OFF Sequence"
②	Power OFF	
③	Display ON	
④	Display OFF	
⑦	Initialization	Initialize Setting of Command/Data
⑧	Image Rewriting	Send Display Data
	Display Settings	Dimmer, Scroll, etc.

**Power ON/OFF Sequence**



Note: Refer to Application Notes on web site.

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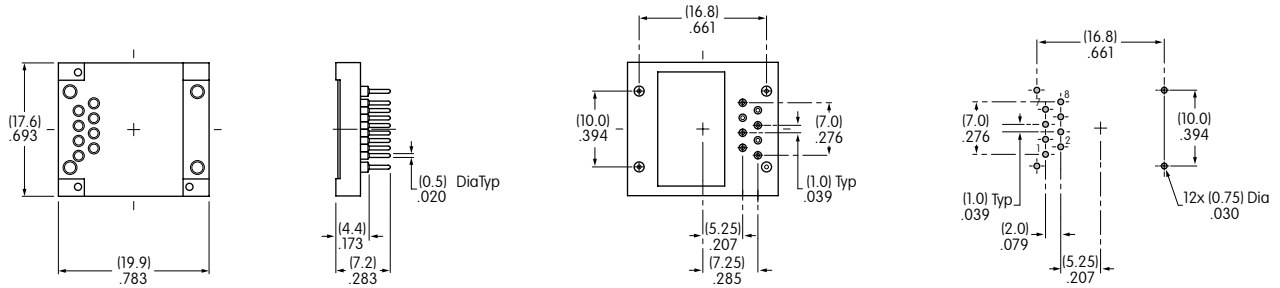
### OPTIONAL ACCESSORIES

#### AT9704-085M Socket for OLED Display ← **NEW**

Materials:

Base - Glass Fiber Reinforced PBT  
 Terminals - Brass/Beryllium Copper

- The socket permits the OLED SMARTDISPLAY™ to be plugged in after automated processing.
- Use of the socket enables easy field replacement of the device.



Toggle

Rockers

Pushbuttons

Illuminated PB

Programmable **E**

Keylocks

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**PRECAUTIONS FOR HANDLING & STORAGE OF OLED DEVICES**



**Handling**

1. The IS Series OLED devices are electrostatic sensitive. To avoid damage to IC, do not touch terminals unless properly isolated from static electricity.
2. Signal input under conditions not recommended may cause damage to the OLED unit or deterioration of the display. Follow directions regarding supply sequences of power and signal voltages.
3. If the OLED panel is broken, avoid touching the contents. Wash off any contact to the skin or clothing.
4. Limit operating force to switch keytop to 100.0N maximum, as excessive pressure may damage the OLED.
5. For OLED display, it is necessary for bracket legs to be Grounded.
6. Recommended soldering time and temperature limits for OLED switch or display:  
 Wave Soldering: see Profile A in Supplement section.  
 Manual Soldering: see Profile A in Supplement section.  
 Avoid temperatures exceeding 80°C at the OLED.
7. The IS series OLED devices are not process sealed.
8. Pixels acquire diminished brightness over time and use, and those most frequently habituated have greater reduction of brightness than those less used. To minimize this difference, operate OLED unit so that all pixels are used as consistently as possible.
9. For switch, clean cap surface with dry cloth. If further cleaning is needed, wipe with dampened cloth using neutral cleanser and dry with clean cloth. Do not use organic solvent. For display, avoid contact with any flux or detergent. If any liquids spill on display surface, immediately wipe with soft absorbent cloth.

**Storage**

1. Store in original container and away from direct sunlight.
2. Keep away from static electricity.
3. Avoid extreme temperatures, high humidity, gaseous substances, and all forms of chemical contamination.

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