# OLED Rocker

# SmartSwitch

Toggles

Rockers

Pushbuttons

Illuminated PB

E Programmable

Keylocks

Rotaries

Slides

Tactiles

Tilt

Touch

Indicators

Accessories

Supplement

## DISTINCTIVE CHARACTERISTICS

- Organic LED technology in display rocker

- Multifunction programmable device: select with rocker, push for activation

- Replaces multiple switches and displays with one device in a small package

- Broad display aids in navigation, both forward and reverse and up and down, in structured menus

- Wide viewing angle of 180° and large 0.92" display with exceptional contrast

- Conforms to IP64 of IEC60529 Standards on panel surface; dust tight construction of switch prevents entry of dust and improves contact reliability

- Commands and data supplied via serial communications protocol (SPI)

- Long life OLED with 52,000 hours at 30% illumination

- High reliability and long mechanical and electrical life of one million actuations minimum

- Stylish black housing design with matte finish complements any application

Monochrome OLED featuring sharp contrast and high resolution with 96 x 64 pixels

Panel mount with easy, snap-in installation

Short 14.6mm (.575") behind-panel height for compact spaces

Actual Size
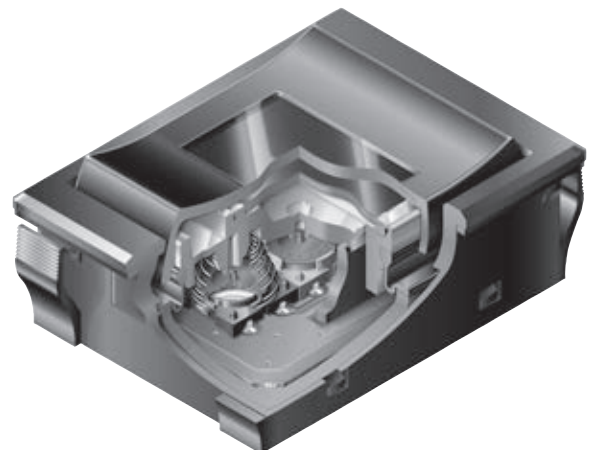
## SMARTSWITCH PART NUMBER & DESCRIPTION

| Part Number | Description |
|---|---|
| IS18WWC1W | **OLED Rocker Switch:** SP3T Switch<br>Rocker (ON) (ON) (ON)<br>Pushbutton Normally OFF |

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## SWITCH SPECIFICATIONS

| Circuit | Single Pole Three Throw (Momentary) | | | | | |
|---|---|---|---|---|---|---|
| | Top | | Center | | Bottom | |
| Contact Position | Normal | Down | Normal | Down | Normal | Down |
| | OFF | (ON) 9-12 | OFF | (ON) 10-12 | OFF | (ON) 11-12 |
| Electrical Capacity (Resistive Load) | 3VA maximum DC | | | | | |
| Contact Resistance | 200 milliohms maximum | | | | | |
| Insulation Resistance | 500 megohms minimum @ 250V DC | | | | | |
| Dielectric Strength | 250V AC for 1 minute minimum | | | | | |
| Electrostatic Resisting Pressure | 15kV minimum | | | | | |
| Mechanical Endurance | 1,000,000 operations minimum | | | | | |
| Electrical Endurance | 1,000,000 operations minimum | | | | | |
| Operating Force | 5±2 Newtons at center of cap; 3.7±1.7 Newtons at top and bottom | | | | | |
| Total Travel | 1.3±0.5mm (.051"±.020") at center of cap; 1.8±0.6mm (.071"±.024") at top and bottom | | | | | |

## OLED SPECIFICATIONS

### Characteristics of Display

| Display Device | Single color OLED display |
|---|---|
| Display Mode | Passive matrix |
| Pixel Format | 96 x 64 pixels (horizontal x vertical) |
| Pixel Size | 0.16mm x 0.177mm (horizontal x vertical) |
| Interface | Serial (SPI) interface |
| Color | White/Black (normally White) |
| Splash & Dust Proof | Conforms to IP64 of IEC60529 standards on panel surface |
| Operating Temperature Range | −20°C ~ +70°C (−4°F ~ +158°F) |
| Storage Temperature Range | −25°C ~ +80°C (−13°F ~ +176°F) |
| Operating Life Time (Display) | 52,000 hours (30% brightness); 15,600 hours (100% brightness) |

### Absolute Maximum Ratings (Temperature at 25°C)

| Items | Symbols | Ratings |
|---|---|---|
| Supply Voltage for Logic/Interface | VDDA | −0.3V to +3.6V |
| Supply Voltage for Drive | VAH | −0.3V to +18.0V |
| Input Voltage | Vin | −0.3V to VDDA +0.3V |

### Current Consumption
(Temperature at 25°C, VDDA = 2.8V, VAH = 15.0V)

| Items | Symbols | Min | Typical | Max |
|---|---|---|---|---|
| All-Pixels-On Mode *Drive System Power Current | $I_{H1}$ | — | 6.9mA | 8.3mA |
| All-Pixels-On Mode *Logic/IF System Power Current | $I_{DD1}$ | — | 0.3mA | 0.36mA |
| Sleep Mode **Drive System Power Current | $I_{H2}$ | — | — | 10μA |
| Sleep Mode **Logic/IF System Power Current | $I_{DD2}$ | — | — | 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 | VDDA | 2.7V | 2.8V | 2.9V |
| Supply Voltage for Drive | VAH | 14.5V | 15.0V | 15.5V |
| Input High Level Voltage | $V_{IH}$ | 0.75 x VDDA | — | VDDA |
| Input Low Level Voltage | $V_{IL}$ | 0.0 | — | 0.25V x VDDA |
| Input High Level Voltage (XRES only) | $V_{IH}$ | 0.80 x VDDA | — | VDDA |
| Input Low Level Voltage (XRES only) | $V_{IL}$ | 0.0 | — | 0.20V x VDDA |

### Optical Characteristics
(Temperature at 25°C, Initial Value: depends on initial setting)

| Items | | Minimum | Typical | Maximum |
|---|---|---|---|---|
| Brightness | | 75 cd/m² | 100 cd/m² | 125 cd/m² |
| Chromaticity | (x) | ***2 | 0.310 | ***2 |
| | (y) | ***2 | 0.330 | ***2 |
| Contrast | | 100 | — | — |

\*** Chromaticity range is the area of the ellipse. (See Chromaticity Diagram next page.) The ellipse passes through points A, B, C and D and designates the center of each side of the quadrangle.

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Supplement

E

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### Chromaticity Diagram

| Point | Chromaticity X | Chromaticity Y |
|-------|----------------|----------------|
| A | 0.3639 | 0.3535 |
| B | 0.3007 | 0.3552 |
| C | 0.2561 | 0.3105 |
| D | 0.3193 | 0.3088 |



## TIMING SPECIFICATIONS

### AC Characteristics
(Temperature at −20°C ~ +70°C), VDDA = 2.8V, VAH = 16V

| Items | Symbols | Minimum | Typical | Maximum |
|-------|---------|---------|---------|---------|
| Clock Cycle Time | $t_{cycle}$ | 100ns | — | — |
| A0 Setup Time | $t_{SWDS}$ | 65ns | — | — |
| A0 Hold Time | $t_{SWDH}$ | 35ns | — | — |
| $\overline{XCS}$ Setup Time | $t_{CWS}$ | 65ns | — | — |
| $\overline{XCS}$ Hold Time | $t_{CWH}$ | 35ns | — | — |
| High Level $\overline{XCS}$ Pulse Width | $t_{CSBH}$ | *30ns | — | — |
| Write Data Setup Time | $t_{WDTS}$ | 10ns | — | — |
| Write Data Hold Time | $t_{WDTH}$ | 30ns | — | — |
| SCL Low Time | $t_{SCLL}$ | 45ns | — | — |
| SCL High Time | $t_{SCLH}$ | 45ns | — | — |
| SCL Rise Time | $t_r$ | — | — | 15ns |
| SCL Fall Time | $t_f$ | — | — | 15ns |

* Requires more than 100ns after resetting software



## BLOCK DIAGRAM & PIN CONFIGURATIONS



**IS18WWC1W**
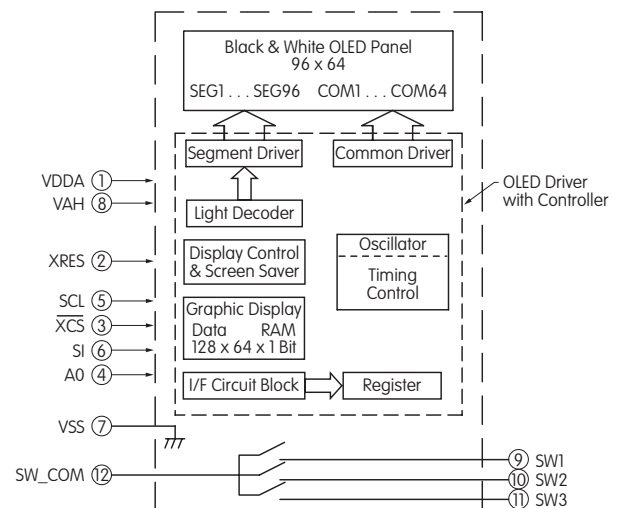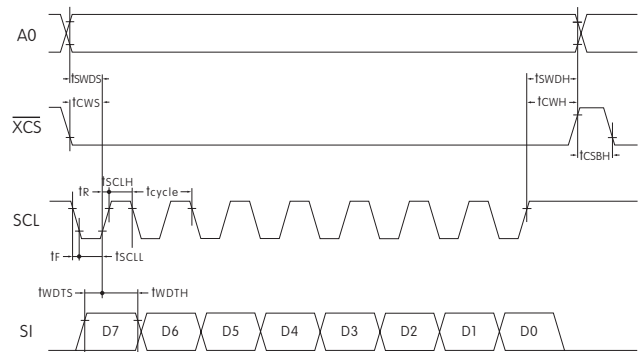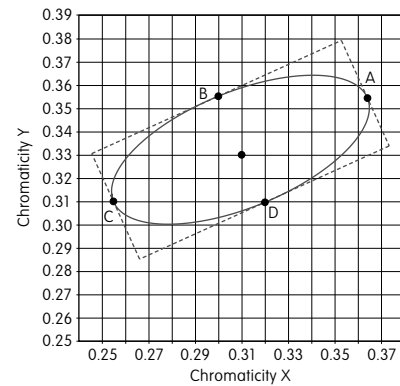


| Pin No. | Symbol | Name | Function |
|---------|--------|------|----------|
| 1 | VDDA | Logic Type Power Source | |
| 2 | XRES | Reset | Terminal to initialize IC built-in logic; initializes with low level |
| 3 | $\overline{XCS}$ | Chip Select | Slave select for SPI. This line is active low. |
| 4 | A0 | Address | Terminal to input control signals of command/parameter Set low at time of command input and high level at the time of parameter input. |
| 5 | SCL | Serial Clock | Read command/parameter at time of SCL signal standing up |
| 6 | SI | Serial Data Input | Terminal to input command/parameter by SPI |
| 7 | VSS | Ground | |
| 8 | VAH | Drive Type Power Source | |
| 9 | SW1 | Switch Terminal 1 | N/O |
| 10 | SW2 | Switch Terminal 2 | N/O |
| 11 | SW3 | Switch Terminal 3 | N/O |
| 12 | SW_COM | Switch Common Terminal | |

# SmartSwitch

## OLED Rocker

## SMARTSWITCH TYPICAL DIMENSIONS

See Pixel Detail

(21.8) .858
(19.16) .754
(38.8) 1.528
(50.7) 1.996
(13.22) .520
(15.3) .602
NKK P/N This Side
(30.6) 1.205
(37.9) 1.492

(35.1) 1.382
(46.7) 1.839
(0.8) .031
(2.0) .079
(5.6) .220
(14.6) .575

(35.4) 1.394
(34.9) 1.374

(48.6) 1.913
(35.4) 1.394

### Pixel Detail

(0.16) Typ .0063
(0.04) Typ .0016
(0.177) Typ .0070
(0.03) Typ .0012
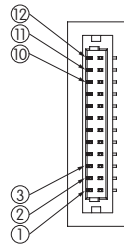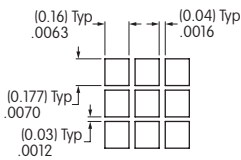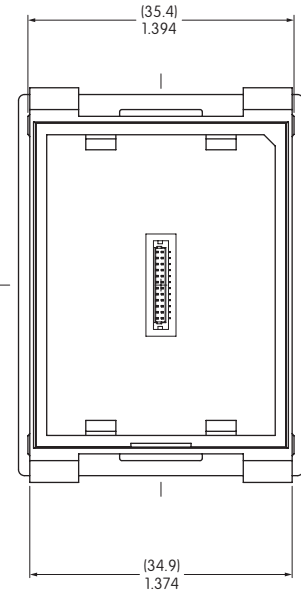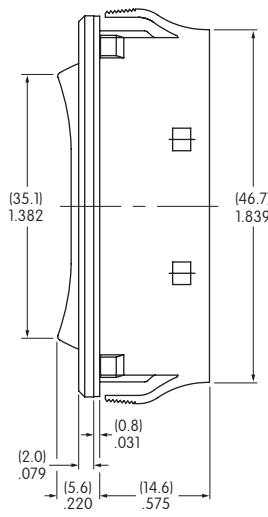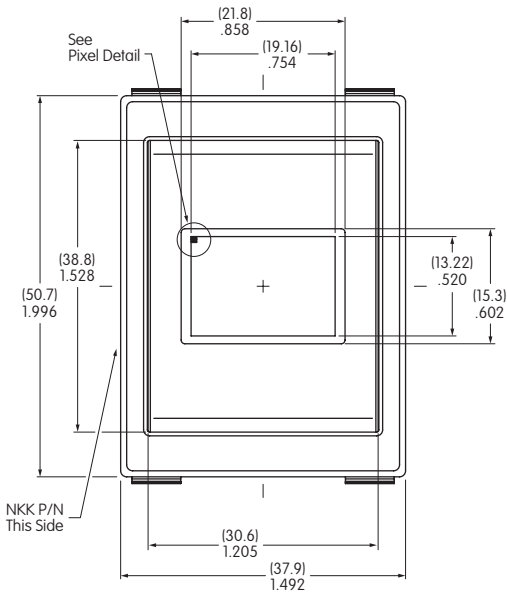
### Terminal Connector Detail

12 11 10 ... 3 2 1

### Panel Thickness Range

.039 ~ .157"
(1.0mm ~ 4.0mm)

## STATE TRANSITION

**State 0**
Power OFF
(VAH, VDDA OFF)

⑦: Power OFF
②: Power OFF
⑧: Initialization
①: Power ON, Initialization

**State 3**
Power Saver Mode

⑥: VAH ON
⑤: VAH OFF

**State 1**
Display OFF
(Sleep Mode)

③: Display ON
④: Display OFF

**State 2**
Display ON

⑨: Changing the Display          ⑨: Changing the Display          ⑨: Changing the Display
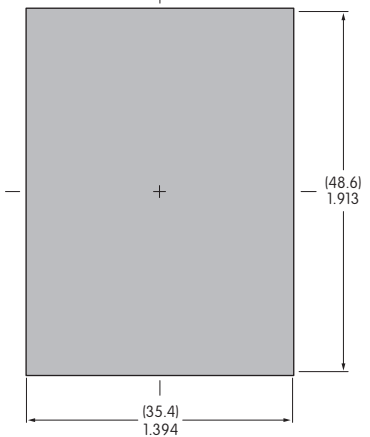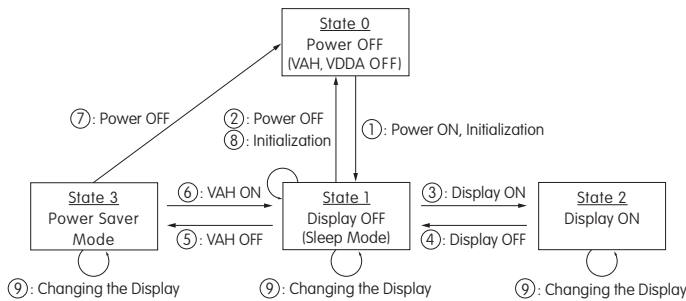
| State Number | State | Display | Sleep | VAH | VDDA | Changing the Display |
|---|---|---|---|---|---|---|
| 0 | Power OFF | OFF | — | OFF | OFF | Disable |
| 1 | Display OFF | OFF | ON | ON | ON | Enable |
| 2 | Display ON | ON | OFF | ON | ON | Enable |
| 3 | Power Saver | OFF | ON | OFF | ON | Enable |

### Power ON/OFF Sequence

Initialization Setting

| State 0 | Power ON | State 1 (—State 3) — State 2 | Power OFF | State 0 |

VDDA  2.5V  0V  — Waiting time for oscillation stability (about 1.1ms)  2.5V
Reset low pulse width Trw (minimum 1µs)
Reset low pulse width Trw (minimum 1µs)
XRES  "L"  (VDDA x 0.2)V  (VDDA x 0.8)V
Minimum 0µs  — Completion time of reset Tr (minimum 0.1µs)
Waiting time to stabilize VAH voltage: 1ms (reference)
VAH Level
Waiting time to stabilize VAH voltage: 1s (reference)
VAH  0V  Minimum 0µs
XCS  "L"  0µs min  "H" or "L"  0µs min
A0  "L"  "H" or "L"
SCL/SI  "Hi-z"  "H" or "L"

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## STATE TRANSITION (CONTINUED)

| State Transition | Transition | | Reference or Setting Procedure |
|---|---|---|---|
| ① | Power ON | | Refer to "Power ON/OFF Sequence"  → Refer to "Initialization Setting" |
| ② | Power OFF | | Refer to "Power ON/OFF Sequence" |
| ③ | Display ON | | Refer to "Display ON/OFF Sequence" |
| ④ | Display OFF | | |
| ⑤ | VAH OFF | | Wait until VAH becomes stable |
| ⑥ | VAH ON | | |
| ⑦ | Power OFF | | Refer to "Power ON/OFF Sequence" |
| ⑧ | Initialization | | Refer to "Initialization Setting" |
| ⑨ | Display Change | Image Rewriting | 96 x 64 Image Data Sending |
| | | Display Settings | Dimmer/Screen Saver/Indication 180° Reversal |

Display ON/OFF Sequence

| State 2 | Display OFF | State 1 | VAH OFF | State 3 | VAH ON | State 1 | Display ON | State 2 |

VDDA — 2.8V

Display — ON — OFF — Minimum 10ms — Minimum 0μs

Standby — OFF — ON — Waiting time to stabilize VAH voltage: 1ms (Reference) — Minimum 0μs

VAH — 15V — 0V — Minimum 0μs — Minimum 0μs

## INITIALIZITION SETTING

| Command Name | Command Address | Parameter (1 or 2Byte) | Remarks |
|---|---|---|---|
| Software Reset | 01 | | |
| Dot Matrix Display ON/OFF | 02 | 00 | Note 1 |
| Read/Write Operation Wetting | 07 | 00 | Note 1 |
| Display Direction Set Command | 09 | 00 | Note 1 |
| Reserved 1 | 10 | 03 | Note 2 |
| Reserved 2 | 12 | 63 | Note 2 |
| Reserved 3 | 13 | 00 | Note 2 |
| Dot Matrix Display Standby ON/OFF | 14 | 00 | |
| Reserved 4 | 16 | 00 | Note 2 |
| Reserved 5 | 17 | 00 | Notes 1 & 2 |
| Reserved 6 | 18 | 09 | Note 2 |
| Reserved 7 | 1A | 04 | Notes 1 & 2 |
| Reserved 8 | 1C | 00 | Notes 1 & 2 |
| Graphic Memory Writing Direction | 1D | 00 | Note 1 |
| Setting Column Output Range | 30 | 005F | Note 1 |
| Setting Row Output Range | 32 | 003F | Note 1 |
| X Axis Reading/Writing Start Point | 34 | 00 | Note 1 |
| X Axis Reading/Writing End Point | 35 | 0B | Note 1 |
| Y Axis Reading/WritingStart Point | 36 | 00 | Note 1 |
| Y Axis Reading/Writing End Point | 37 | 3F | Note 1 |

| Command Name | Command Address | Parameter (1 or 2Byte) | Remarks |
|---|---|---|---|
| X Axis Reading Start Address | 38 | 00 | Note 1 |
| Y Axis Reading Start Address | 39 | 00 | Note 1 |
| Reserved 9 | 48 | 03 | Note 2 |
| Screen Saver Event Timer Setting Command | C3 | 00 | Note 1 |
| Screen Saver Event Timer Setting Command | C4 | 00 | Note 1 |
| One Time, Repeat or Direction Setting for Screen Saver | CC | 00 | Note 1 |
| Start/Stop Setting for Screen Saver | CD | 00 | Note 1 |
| System Clock Division Ratio Setting | D0 | 80 | Note 2 |
| Setting the STBY Pin | D2 | 00 | Notes 1 & 2 |
| DACA Setting | D4 | 00 | Note 2 |
| DACB Setting | D5 | 00 | Note 2 |
| DACC Setting | D6 | 00 | Note 2 |
| DACD Setting | D7 | 00 | Note 2 |
| Reserved 10 | D9 | 00 | Notes 1 & 2 |
| Dimmer Setting | DB | 0F | Note 1 |
| Reserved 11 | DD | 88 | Note 2 |
| Image Writing | 08 | Image data | |
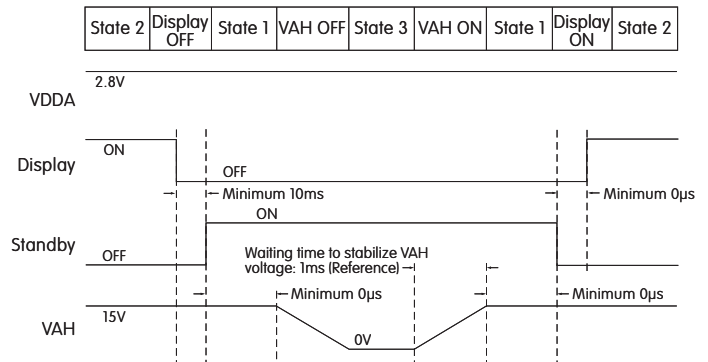
Notes: 1. Same as default value

2. Do not change setting value

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2. Do not change setting value

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## ACCESSORIES

### AT715 Cable for Connection

(500.0) $^{+50.0}_{-0.0}$
19.685
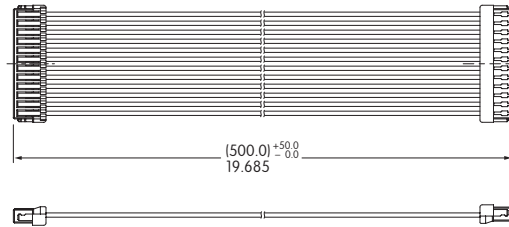
## PRECAUTIONS FOR HANDLING & STORAGE OF OLED ROCKERS

### Handling

**ATTENTION**
ELECTROSTATIC
SENSITIVE DEVICES

1. OLED devices are electrostatic sensitive.

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 in case of contact to the skin or clothing.

4. Limit operating force to 100.0N maximum, as excessive pressure may damage the display.

5. Under certain actuation conditions, one side of the rocker and the center switch can both send actuation signals.

6. 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.

7. Clean actuator 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.

### 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.

### Panel Mounting

Incorrect          Correct

- Before snapping a switch into the panel, align the gasket evenly under the bezel of the switch.

- When mounting into a panel, apply equal pressure to sides of bezel and insert parallel to the panel.

Gasket position must be even with no gaps beneath bezel    Gasket secure and flush against bezel

- After mounting, be sure there are no gaps between switch and panel. Lightly push into panel.

- After installing into panel, do not apply excessive force.

- After panel installation and wiring is completed, do not apply force horizontally or vertically from behind panel.

- Behind the panel, cut area should be squared. If front of panel is painted, do not allow any paint to collect in corners of cutout to prevent level mounting.

Clean Edges

- Avoid reinstalling a switch once it has been mounted into panel. This may cause deterioration of panel sealability.

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