

ISL88001, ISL88002, ISL88003

Ultra Low Power 3 Ld Voltage Supervisors in SC-70 and SOT-23 Packages

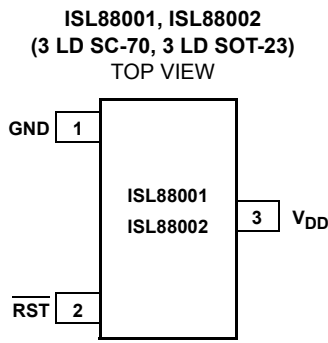
FN6174
Rev 2.00
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The ISL88001, ISL88002, ISL88003 supervisors are extremely low power 160nA voltage supervisors that help to monitor the power supply voltages in a wide variety of applications. By providing Power-On Reset and supply voltage supervision in small 3 Ld SC-70 and SOT-23 packages, the ISL88001, ISL88002, ISL88003 devices can help to lower system cost, reduce board space requirements and increase the reliability of systems.

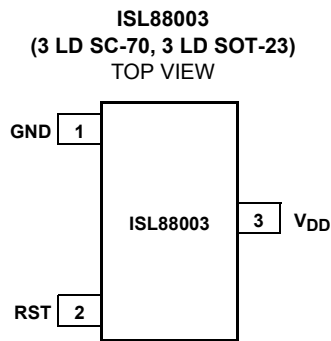
The most popular voltage trip points are available for standard power supplies from 1.8V to 5.0V (see "Ordering Information" on page 3). These reset threshold voltages are accurate to within $\pm 1.2\%$ and the reset signal is valid down to 1V. Active high and active low reset outputs are available in push-pull and open drain configurations (see "Functional Block Diagrams" on page 2).

The ISL88001, ISL88002, ISL88003 devices are specifically designed for low power consumption and high threshold accuracy, making them especially suitable for electronic devices and portable equipment.

Pinouts



ISL88001 has a push-pull $\overline{\text{RST}}$ output
ISL88002 has an open-drain $\overline{\text{RST}}$ output



ISL88003 has a push-pull RST output

Features

- Single Voltage Monitoring Supervisors
- Fixed-Voltage Options Allow Precise Monitoring of +1.8V, +2.5V, +3.0V, +3.3V and +5.0V Power Supplies
- Ultra Low 160nA Supply Current
- $\pm 1.2\%$ Voltage Threshold Accuracy
- 190ms Power-On Reset Timeout
- Reset Signal Valid Down to $V_{DD} = 1V$
- No External Components Necessary
- Immune to Power-Supply Transients
- Available in Small 3 Ld SC-70 and 3 Ld SOT-23 Pb-free Packages
- Pin Compatible with MAX803, MAX809, MAX810
- Pb-Free (RoHS Compliant)

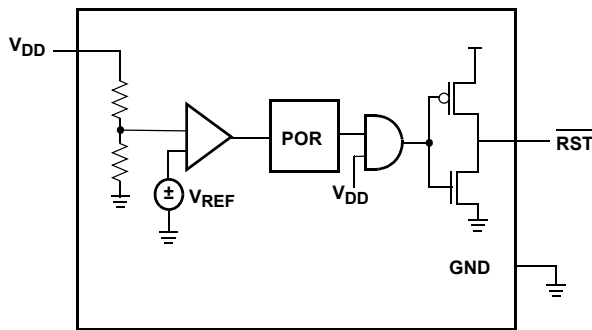
Applications

- Microprocessor/Microcontroller Systems
- Intelligent Instruments
- Controllers
- Computer Systems
- Portable/Battery-Powered Equipment
- PDA and Hand-Held PC Devices

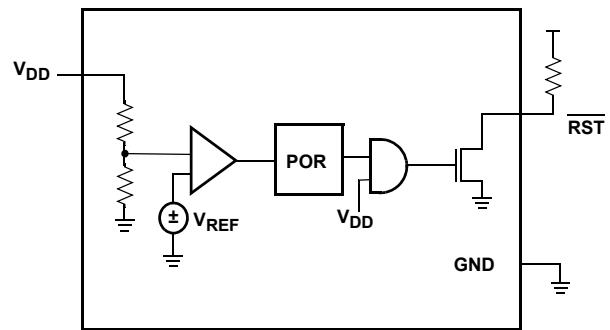
Pin Descriptions

| PIN | | PIN NAME | PIN FUNCTION |
|----------------------|----------|-------------------------|---|
| ISL88001 ISL88002 | ISL88003 | | |
| 1 | 1 | GND | Ground IC reference. |
| 2 | | $\overline{\text{RST}}$ | The $\overline{\text{RST}}$ pin is an active-low reset output that is pulled to GND (LOW) when reset is asserted. The ISL88001 is push-pull while the ISL88002 is open drain. |
| | 2 | RST | The RST pin is a push-pull active-high reset output that is pulled to V_{DD} (HIGH) when reset is asserted. |
| 3 | 3 | V_{DD} | Supply Voltage and Monitored Input. The V_{DD} pin is the IC power supply terminal and also the monitored input. |

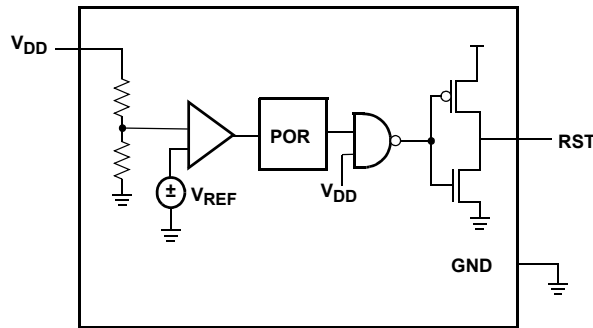
Functional Block Diagrams



ISL88001



ISL88002



ISL88003

Ordering Information

| PART NUMBER (Notes 1, 2, 3, 4) | PART MARKING (Bottom Brand) | RESET | NOMINAL V _{THVDD} (V) | TEMPERATURE RANGE (°C) | PACKAGE Tape and Reel (Pb-free) | PKG. DWG. # |
|-----------------------------------|-----------------------------------|-----------------------------|-----------------------------------|---------------------------|---------------------------------------|----------------|
| ISL88001IE46Z-T | 146 | Push-Pull \overline{RST} | 4.62 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IE44Z-T | 144 | Push-Pull \overline{RST} | 4.38 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IE31Z-T | 131 | Push-Pull \overline{RST} | 3.07 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IE29Z-T | 129 | Push-Pull \overline{RST} | 2.92 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IE26Z-T | 126 | Push-Pull \overline{RST} | 2.63 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IE23Z-T | 123 | Push-Pull \overline{RST} | 2.32 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IE22Z-T | 122 | Push-Pull \overline{RST} | 2.19 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IE17Z-T | 117 | Push-Pull \overline{RST} | 1.67 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IE16Z-T | 116 | Push-Pull \overline{RST} | 1.58 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88001IH46Z-T | 1H46 | Push-Pull \overline{RST} | 4.62 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001IH44Z-T | 1H44 | Push-Pull \overline{RST} | 4.38 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001IH31Z-T | 1H31 | Push-Pull \overline{RST} | 3.07 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001IH29Z-T | 1H29 | Push-Pull \overline{RST} | 2.92 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001IH26Z-T | 1H26 | Push-Pull \overline{RST} | 2.63 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001IH23Z-T | 1H23 | Push-Pull \overline{RST} | 2.32 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001IH22Z-T | 1H22 | Push-Pull \overline{RST} | 2.19 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001IH17Z-T | 1H17 | Push-Pull \overline{RST} | 1.67 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001IH16Z-T | 1H16 | Push-Pull \overline{RST} | 1.58 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IE46Z-T | 246 | Open Drain \overline{RST} | 4.62 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IE44Z-T | 244 | Open Drain \overline{RST} | 4.38 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IE31Z-T | 231 | Open Drain \overline{RST} | 3.07 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IE29Z-T | 229 | Open Drain \overline{RST} | 2.92 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IE26Z-T | 226 | Open Drain \overline{RST} | 2.63 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IE23Z-T | 223 | Open Drain \overline{RST} | 2.32 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IE22Z-T | 222 | Open Drain \overline{RST} | 2.19 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IE17Z-T | 217 | Open Drain \overline{RST} | 1.67 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IE16Z-T | 216 | Open Drain \overline{RST} | 1.58 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88002IH46Z-T | 2H46 | Open Drain \overline{RST} | 4.62 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IH44Z-T | 2H44 | Open Drain \overline{RST} | 4.38 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IH31Z-T | 2H31 | Open Drain \overline{RST} | 3.07 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IH29Z-T | 2H29 | Open Drain \overline{RST} | 2.92 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IH26Z-T | 2H26 | Open Drain \overline{RST} | 2.63 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IH23Z-T | 2H23 | Open Drain \overline{RST} | 2.32 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IH22Z-T | 2H22 | Open Drain \overline{RST} | 2.19 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IH17Z-T | 2H17 | Open Drain \overline{RST} | 1.67 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88002IH16Z-T | 2H16 | Open Drain \overline{RST} | 1.58 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IE46Z-T | 346 | Push-Pull RST | 4.62 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88003IE44Z-T | 344 | Push-Pull RST | 4.38 | -40 to +85 | 3 Ld SC-70 | P3.049 |

Ordering Information (Continued)

| PART NUMBER (Notes 1, 2, 3, 4) | PART MARKING (Bottom Brand) | RESET | NOMINAL V _{THVDD} (V) | TEMPERATURE RANGE (°C) | PACKAGE Tape and Reel (Pb-free) | PKG. DWG. # |
|-----------------------------------|---|---------------|-----------------------------------|---------------------------|---------------------------------------|----------------|
| ISL88003IE31Z-T | 331 | Push-Pull RST | 3.07 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88003IE29Z-T | 329 | Push-Pull RST | 2.92 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88003IE26Z-T | 326 | Push-Pull RST | 2.63 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88003IE23Z-T | 323 | Push-Pull RST | 2.32 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88003IE22Z-T | 322 | Push-Pull RST | 2.19 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88003IE17Z-T | 317 | Push-Pull RST | 1.67 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88003IE16Z-T | 316 | Push-Pull RST | 1.58 | -40 to +85 | 3 Ld SC-70 | P3.049 |
| ISL88003IH46Z-T | 3H46 | Push-Pull RST | 4.62 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IH44Z-T | 3H44 | Push-Pull RST | 4.38 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IH31Z-T | 3H31 | Push-Pull RST | 3.07 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IH29Z-T | 3H29 | Push-Pull RST | 2.92 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IH26Z-T | 3H26 | Push-Pull RST | 2.63 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IH23Z-T | 3H23 | Push-Pull RST | 2.32 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IH22Z-T | 3H22 | Push-Pull RST | 2.19 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IH17Z-T | 3H17 | Push-Pull RST | 1.67 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88003IH16Z-T | 3H16 | Push-Pull RST | 1.58 | -40 to +85 | 3 Ld SOT-23 | P3.064 |
| ISL88001/2/3EVAL1Z | Evaluation Platform for ISL88001, ISL88002 and ISL88003 | | | | | |

NOTES:

- For non-standard voltage trip point versions between 1.5V and 5V in 100mV increments, please contact factory for availability.
- Add "-TK" suffix for 1000 piece Tape and Reel. Please refer to [TB347](#) for details on reel specifications.
- These Intersil Pb-free plastic packaged products employ special Pb-free material sets, molding compounds/die attach materials, and 100% matte tin plate plus anneal (e3 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations). Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J STD-020.
- For Moisture Sensitivity Level (MSL), please see device information page for [ISL88001](#), [ISL88002](#), [ISL88003](#). For more information on MSL please see techbrief [TB363](#).

Absolute Maximum Ratings

Voltage on Any Pin with respect to GND -0.3V to +6.5V
 DC Output Current 10mA

Recommended Operating Conditions

Temperature Range (Industrial) -40°C to +85°C

Thermal Information

Thermal Resistance (Typical, Note 5) θ_{JA} (°C/W)
 3 Lead SC-70 640
 3 Lead SOT-23 590
 Temperature Under Bias -40°C to +125°C
 Storage Temperature -65°C to +150°C
 Pb-Free Reflow Profile see link below
<http://www.intersil.com/pbfree/Pb-FreeReflow.asp>

CAUTION: Do not operate at or near the maximum ratings listed for extended periods of time. Exposure to such conditions may adversely impact product reliability and result in failures not covered by warranty.

NOTE:

5. θ_{JA} is measured with the component mounted on a high effective thermal conductivity test board in free air. See Tech Brief [TB379](#) for details.

Electrical Specifications Over the recommended operating conditions unless otherwise specified. **Boldface limits apply over the operating temperature range, -40°C to +85°C.**

| SYMBOL | PARAMETER | TEST CONDITIONS | MIN (Note 6) | TYP | MAX (Note 6) | UNITS |
|---|--|--|-----------------|-------|-----------------|-------|
| BIAS | | | | | | |
| V _{DD} | Supply Voltage Range | V _{THVDD} = 4.64V, 4.38V, 3.09V, 2.92V, 2.63V | 1.8 | | 5.5 | V |
| | | V _{THVDD} = 2.32V, 2.19V, 1.67V, 1.58V | 1.8 | | 2.75 | V |
| I _{DD} | Supply Current (RESET, $\overline{\text{RESET}}$ open) | V _{DD} = 5.0V, V _{THVDD} = 4.64V, 4.38V | | 215 | 400 | nA |
| | | V _{DD} = 3.3V, V _{THVDD} = 3.09V, 2.92V, 2.63V | | 200 | 350 | nA |
| | | V _{DD} = 2.5V, V _{THVDD} = 2.32V, 2.19V | | 175 | 325 | nA |
| | | V _{DD} = 1.8V, V _{THVDD} = 1.67V, 1.58V | | 160 | 300 | nA |
| VOLTAGE THRESHOLD | | | | | | |
| V _{THVDD} | Falling Fixed V _{DD} Voltage Trip Point | ISL88001, 88002, 88003lx 46 , T _A = +25°C | 4.570 | 4.625 | 4.681 | V |
| | | ISL88001, 88002, 88003lx 46 | 4.500 | | 4.750 | V |
| | | ISL88001, 88002, 88003lx 44 , T _A = +25°C | 4.327 | 4.380 | 4.433 | V |
| | | ISL88001, 88002, 88003lx 44 | 4.262 | | 4.498 | V |
| | | ISL88001, 88002, 88003lx 31 , T _A = +25°C | 3.038 | 3.075 | 3.112 | V |
| | | ISL88001, 88002, 88003lx 31 | 3.000 | | 3.150 | V |
| | | ISL88001, 88002, 88003lx 29 , T _A = +25°C | 2.890 | 2.925 | 2.960 | V |
| | | ISL88001, 88002, 88003lx 29 | 2.850 | | 3.000 | V |
| | | ISL88001, 88002, 88003lx 26 , T _A = +25°C | 2.598 | 2.630 | 2.662 | V |
| | | ISL88001, 88002, 88003lx 26 | 2.559 | | 2.701 | V |
| | | ISL88001, 88002, 88003lx 23 , T _A = +25°C | 2.292 | 2.320 | 2.348 | V |
| | | ISL88001, 88002, 88003lx 23 | 2.257 | | 2.383 | V |
| | | ISL88001, 88002, 88003lx 22 , T _A = +25°C | 2.164 | 2.190 | 2.216 | V |
| | | ISL88001, 88002, 88003lx 22 | 2.131 | | 2.249 | V |
| | | ISL88001, 88002, 88003lx 17 , T _A = +25°C | 1.650 | 1.670 | 1.690 | V |
| | | ISL88001, 88002, 88003lx 17 | 1.625 | | 1.715 | V |
| ISL88001, 88002, 88003lx 16 , T _A = +25°C | 1.561 | 1.580 | 1.599 | V | | |
| ISL88001, 88002, 88003lx 16 | 1.537 | | 1.623 | V | | |
| V _{THVDDHYST} | Hysteresis at V _{DD} Input | | | 1 | | % |
| T _{VTHVDD} | V _{THVDD} Temperature Coefficient | | | 0.48 | | mV/°C |

Electrical Specifications Over the recommended operating conditions unless otherwise specified. (Continued) **Boldface limits apply over the operating temperature range, -40°C to +85°C.**

| SYMBOL | PARAMETER | TEST CONDITIONS | MIN (Note 6) | TYP | MAX (Note 6) | UNITS |
|----------------------|---|---|-----------------------------|-----------------------|--------------|-------|
| RESET / RESET | | | | | | |
| V _{OL} | Reset Output Voltage Low | V _{DD} < V _{THVDD} , for ISL88001 | | 0.2 | 0.40 | V |
| | | V _{DD} < V _{THVDD} , Sinking 0.5mA for ISL88002 | | 0.2 | 0.40 | V |
| | | V _{DD} > V _{THVDD} , for ISL88003 | | 0.2 | 0.40 | V |
| V _{OH} | Reset Output Voltage High | V _{DD} > V _{THVDD} , for ISL88001 | V_{DD} - 0.4 | V _{DD} - 0.2 | | V |
| | | V _{DD} > V _{THVDD} , Sourcing 0.5mA, ISL88002 | | V _{DD} - 0.2 | | V |
| | | V _{DD} < V _{THVDD} , for ISL88003 | V_{DD} - 0.4 | V _{DD} - 0.2 | | V |
| t _{RPD} | V _{TH} to Reset Asserted Delay | | | 15 | | μs |
| t _{POR} | POR Timeout Delay | | 140 | 200 | 260 | ms |
| C _{LOAD} | Load Capacitance on Reset Pin | | | 5 | | pF |

NOTE:

- 6. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified. Temperature limits established by characterization and are not production tested.

Pin Descriptions

RST

The ISL88003 push-pull RST output is set to V_{DD} (HIGH) whenever the device is first powered up or V_{DD} falls below its respective minimum voltage sense level.

\overline{RST}

The \overline{RST} output functions identically to the complementary RST output. On the ISL88001, this is a push-pull output. On the ISL88002, it is an open drain output that is pulled to GND (LOW) when reset is asserted. Suggested pull-up \overline{RST} resistor values are in the range of 5kΩ to 100kΩ.

V_{DD}

The V_{DD} pin is the power supply terminal. The voltage at this pin is compared against an internal factory-programmed voltage trip point, V_{THVDD}. A reset is first asserted when the device is initially powered up to ensure that the power supply has stabilized. Thereafter, reset is again asserted whenever V_{DD} falls below V_{THVDD}. The device is designed with hysteresis to help prevent chattering due to noise.

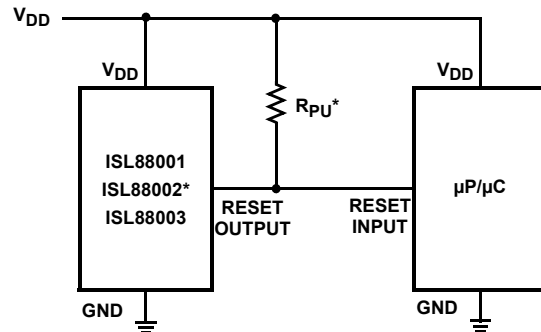
Principles of Operation

The ISL88001, ISL88002, ISL88003 devices provide a low power, high accuracy solution for those voltage monitoring applications needing supply voltage supervision with power reset control. By integrating these features into small 3 Ld SC-70 and 3 Ld SOT-23 packages and consuming as little as 160nA of supply current, these devices can lower system cost and reduce board space requirements.

Low Voltage Monitoring

During normal operation, the ISL88001, ISL88002, ISL88003 devices monitor the voltage level of V_{DD}. The device asserts a

reset signal (\overline{RST} = LOW or RST = HIGH) to a μP/μC if this voltage is less than the preset voltage trip point. The reset signal prevents system operation during a power failure or brownout condition. This reset signal remains asserted until V_{DD} exceeds the voltage threshold setting for the reset time delay period t_{POR}. See Figure 2.



*Necessary for ISL88002

FIGURE 1. TYPICAL APPLICATION DIAGRAM

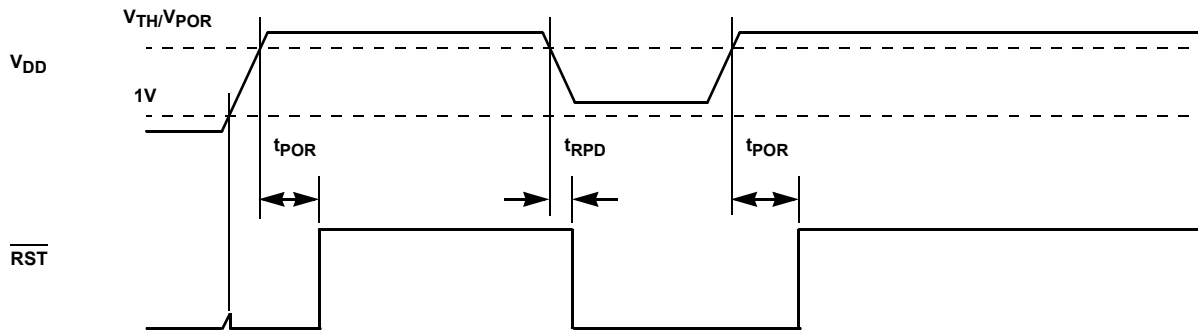


FIGURE 2. VOLTAGE MONITORING TIMING DIAGRAM

Power-On Reset (POR)

Applying power to the ISL88001, ISL88002, ISL88003 activates a POR circuit, which asserts reset once $V_{DD} = 1V$. (i.e. \overline{RST} goes LOW). This provides several benefits:

- It prevents the system microprocessor from starting to operate with insufficient voltage.
- It prevents the processor from operating prior to stabilization of the oscillator.
- It ensures that the monitored device is held out of operation until internal registers are properly loaded.
- It allows time for an FPGA to download its configuration prior to initialization of the circuit.

The reset signal remains asserted until V_{DD} rises above the minimum voltage sense level for time period t_{POR} . This ensures that the V_{DD} voltage has stabilized.

Optional V_{DD} de-coupling capacitance can be added to filter transients if needed.

See Figures 13 and 14 illustrating the available evaluation platform, ISL88001/2/3EVAL1Z. This evaluation board is shipped with the many released variants loosely packed and the 4.6V threshold variants mounted for immediate evaluation.

Parametric Performance

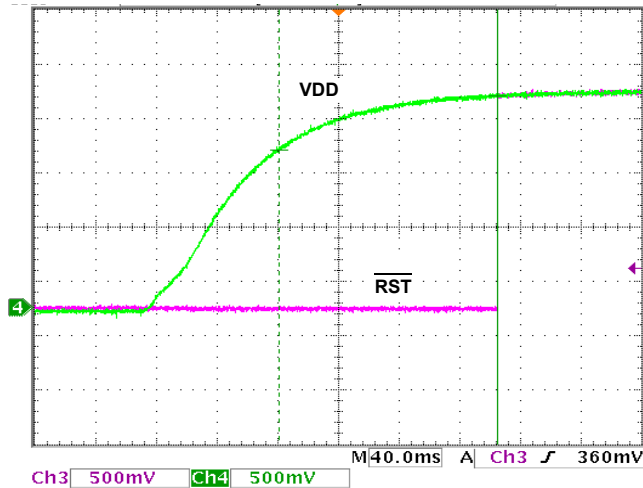


FIGURE 3. ISL88001 \overline{RST} t_{POR} ~144ms

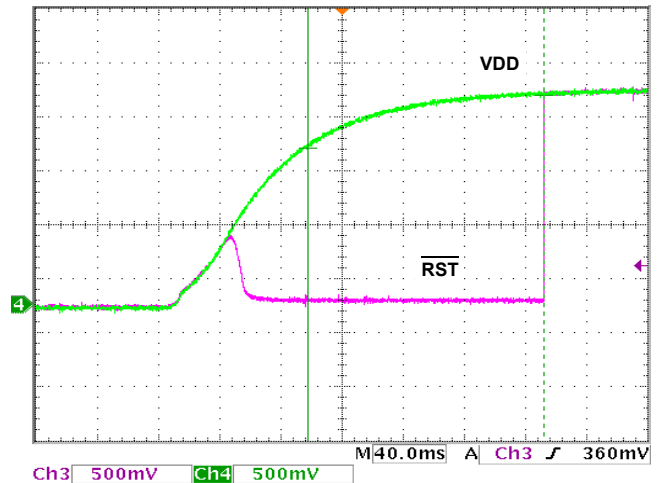


FIGURE 4. ISL88002 \overline{RST} t_{POR} ~155ms, $R_{PU} = 5k\Omega$

Parametric Performance (Continued)

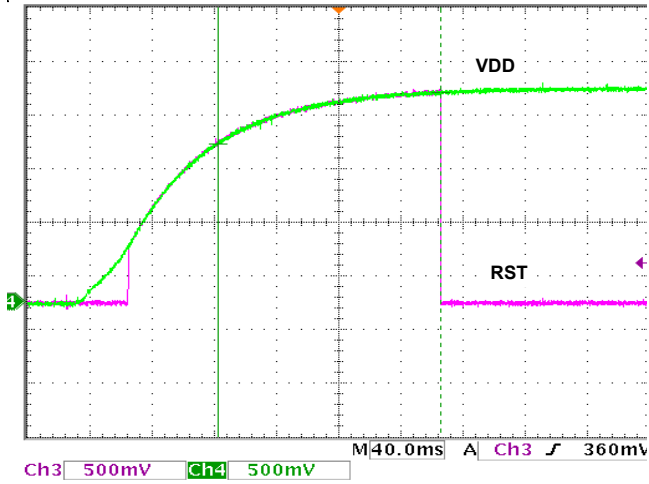


FIGURE 5. ISL88003 RST t_{POR} ~145ms

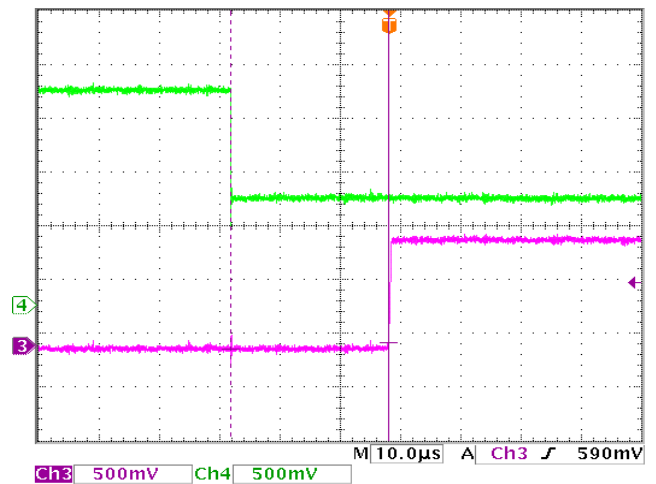


FIGURE 6. ISL88003 t_{PRD} ~26µs

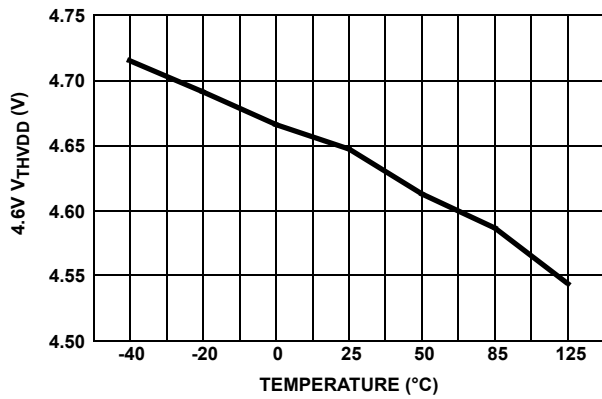


FIGURE 7. ISL8800x 4.6V V_{THVDD} vs TEMPERATURE

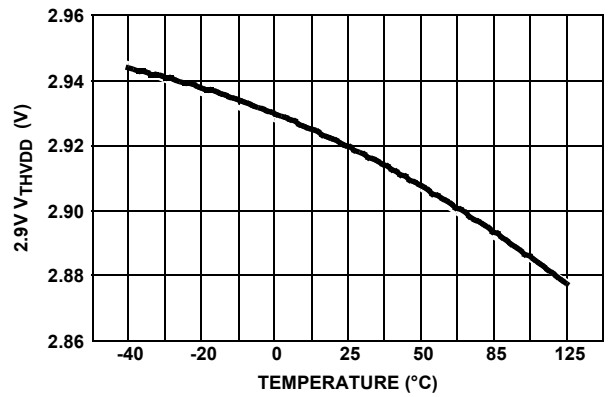


FIGURE 8. ISL8800x 2.9V V_{THVDD} vs TEMPERATURE

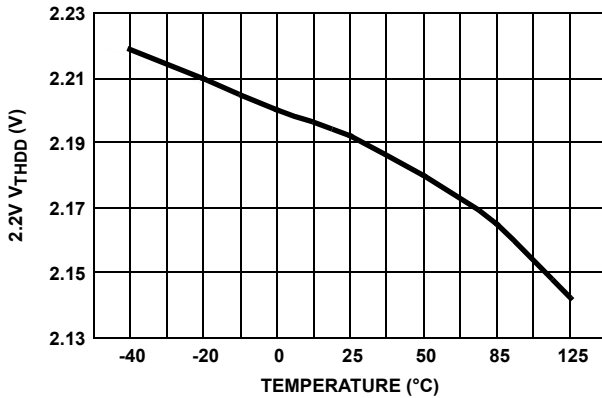


FIGURE 9. ISL8800x 2.2V V_{THVDD} vs TEMPERATURE

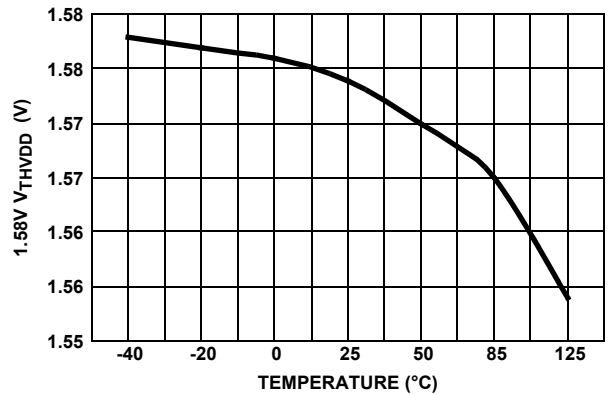


FIGURE 10. ISL8800x 1.58V V_{THVDD} vs TEMPERATURE

Parametric Performance (Continued)

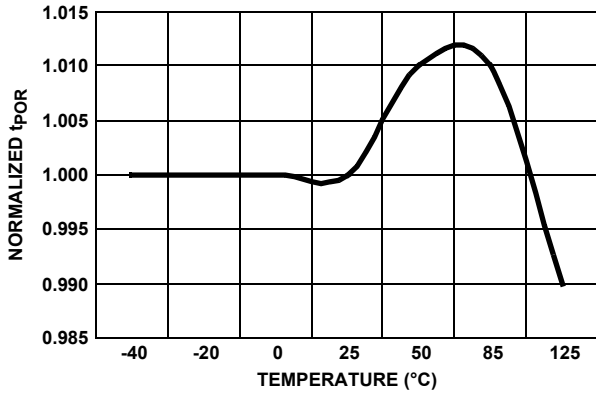


FIGURE 11. ISL8800x NORMALIZED +25°C t_{POR} vs TEMPERATURE

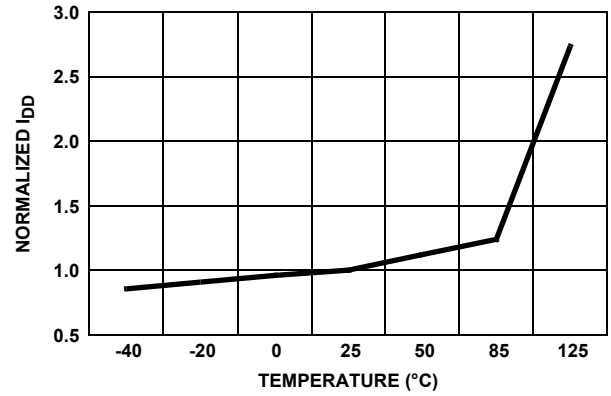


FIGURE 12. ISL8800x NORMALIZED +25°C I_{DD} vs TEMPERATURE

ISL88001/2/3EVAL1Z Evaluation Platform

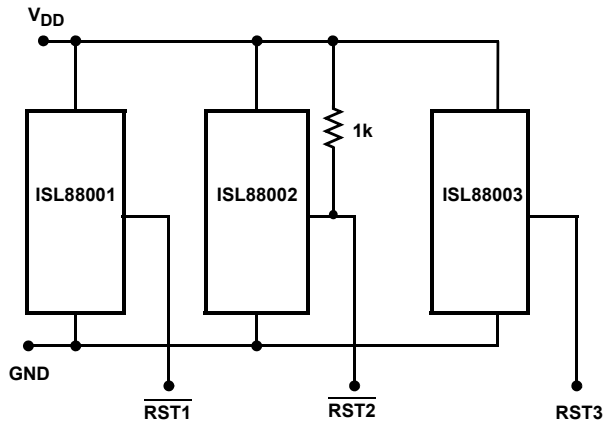


FIGURE 13. ISL88001/2/3EVAL1Z SCHEMATIC

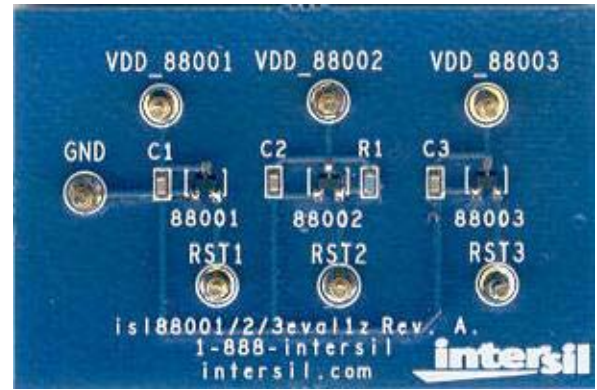
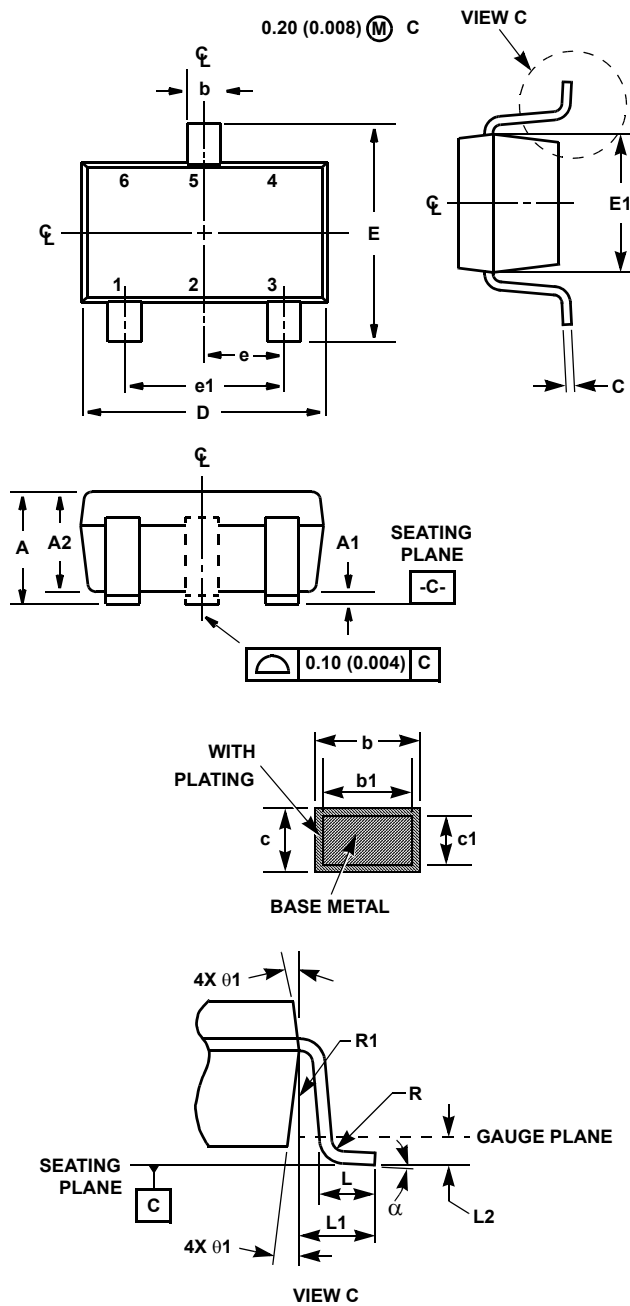


FIGURE 14. ISL88001/2/3EVAL1Z PHOTOGRAPH

Small Outline Transistor Plastic Packages (SC70-3)



P3.049

3 LEAD SMALL OUTLINE TRANSISTOR PLASTIC PACKAGE

| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------|------------|-------|-------------|------|-------|
| | MIN | MAX | MIN | MAX | |
| A | 0.031 | 0.043 | 0.80 | 1.10 | - |
| A1 | 0.000 | 0.004 | 0.00 | 0.10 | - |
| A2 | 0.031 | 0.039 | 0.80 | 1.00 | - |
| b | 0.009 | 0.016 | 0.25 | 0.40 | - |
| b1 | 0.009 | 0.014 | 0.25 | 0.35 | - |
| c | 0.004 | 0.007 | 0.10 | 0.18 | 6 |
| c1 | 0.004 | 0.007 | 0.10 | 0.16 | 6 |
| D | 0.071 | 0.087 | 1.80 | 2.20 | 3 |
| E | 0.071 | 0.094 | 1.80 | 2.40 | - |
| E1 | 0.045 | 0.053 | 1.15 | 1.35 | 3 |
| e | 0.0256 Ref | | 0.65 Ref | | - |
| e1 | 0.0512 Ref | | 1.30 Ref | | - |
| L | 0.010 | 0.018 | 0.26 | 0.46 | 4 |
| L1 | 0.017 Ref. | | 0.420 Ref. | | - |
| L2 | 0.006 BSC | | 0.15 BSC | | - |
| α | 0° | 8° | 0° | 8° | - |
| N | 3 | | 3 | | 5 |
| R | 0.004 | - | 0.10 | - | - |
| R1 | 0.004 | 0.010 | 0.15 | 0.25 | - |

Rev. 0 11/06

NOTES:

1. Dimensioning and tolerances per ASME Y14.5M-1994.
2. Package conforms to EIAJ SC70 and JEDEC MO-203AA.
3. Dimensions D and $E1$ are exclusive of mold flash, protrusions, or gate burrs.
4. Footlength L measured at reference to gauge plane.
5. "N" is the number of terminal positions.
6. These Dimensions apply to the flat section of the lead between 0.08mm and 0.15mm from the lead tip.
7. Controlling dimension: MILLIMETER. Converted inch dimensions are for reference only.

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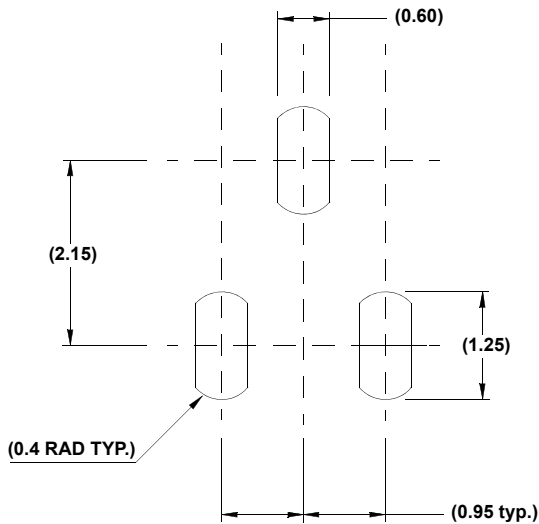
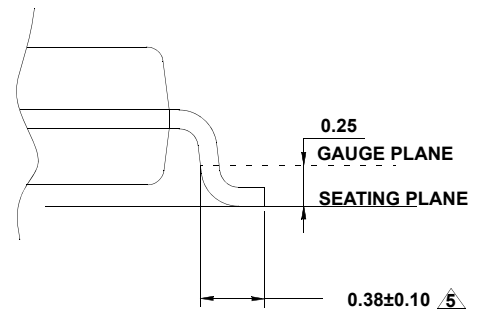
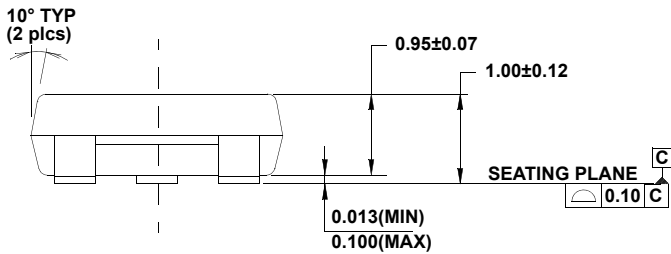
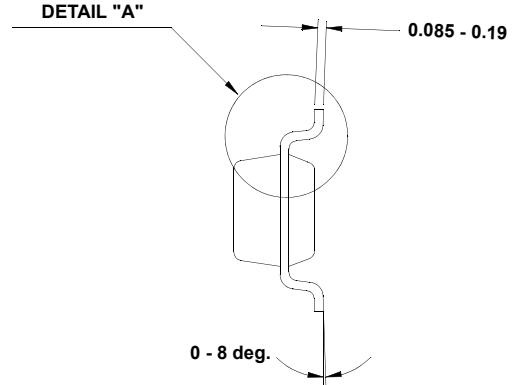
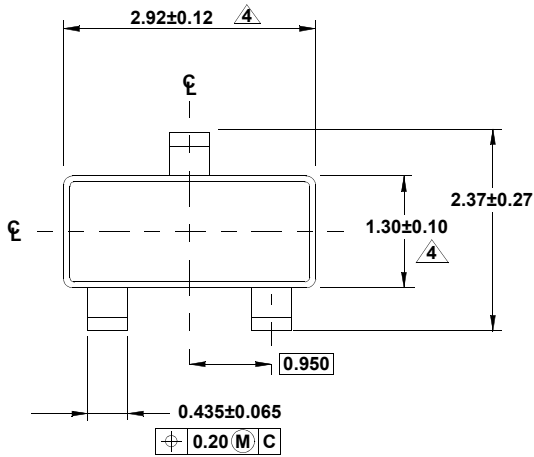
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Package Outline Drawing

P3.064

3 LEAD SMALL OUTLINE TRANSISTOR PLASTIC PACKAGE (SOT23-3)

Rev 3, 3/12



NOTES:

1. Dimensions are in millimeters. Dimensions in () for Reference Only.
2. Dimensioning and tolerancing conform to AMSEY14.5m-1994.
3. Reference JEDEC TO-236.
4. Dimension does not include interlead flash or protrusions. Interlead flash or protrusions shall not exceed 0.25mm per side.
5. Footlength is measured at reference to gauge plane.