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## Low Power 5V $\mu$ P Reset Active LOW, Open - Drain Output

### General Description

The ASM1811 is a voltage supervisory device with a low-power, 5V  $\mu$ P Reset, active LOW, open-drain output. Maximum supply current over temperature is a low 20 $\mu$ A.

The ASM1811 generates an active LOW reset signal whenever the monitored supply is out of tolerance. A precision reference and comparator circuit monitor power supply ( $V_{CC}$ ) level. Tolerance level options are 5%, 10% and 15%. When an out-of-tolerance condition is detected, an internal power-fail signal is generated which forces an active LOW reset signal. After  $V_{CC}$  returns to an in-tolerance condition, the reset signal remains active for 150ms to allow the power supply and system microprocessor to stabilize.

The ASM1811 is designed with a open-drain output stage and operates over the extended industrial temperature range. Devices are available in low cost TO-92 and compact surface mount SOT-23 packages.

Other low power products in this family include the ASM1810/12/15/16/17, ASM1233D and ASM1233M.

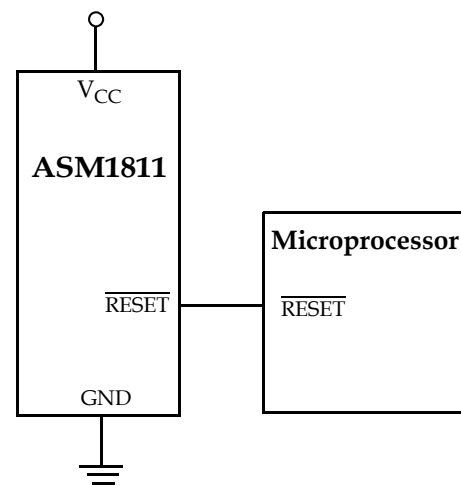
### Key Features

- Low Supply Current
  - 20  $\mu$ A maximum (5.5 V)
- Automatically restarts a microprocessor after power failure
- 150ms reset delay after  $V_{CC}$  returns to an in-tolerance condition
- Active LOW power-up reset
- Precision temperature-compensated voltage reference and comparator
- Eliminates external components
- Low cost TO-92 and compact surface mount SOT-23 packages
- Operating temperature -40°C to +85°C

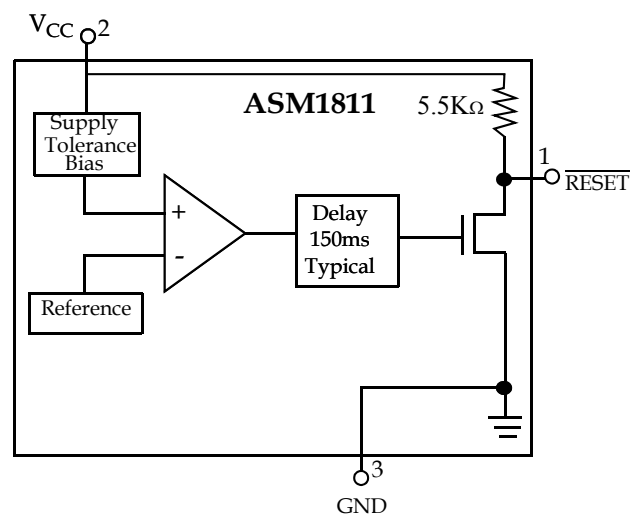
### Applications

- Set-top boxes
- Cellular phones
- PDAs
- Energy management systems
- Embedded control systems
- Printers
- Single board computers

### Typical Operating Circuit



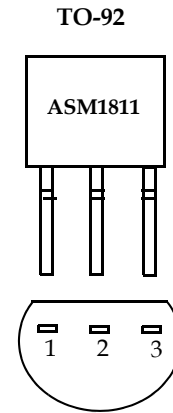
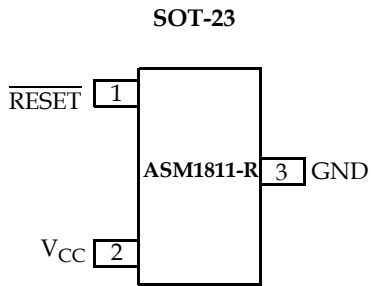
### Block Diagram





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**Pin Configuration**



**Pin Description**

| SOT-23 | TO-92 | Pin Name                  | Description             |
|--------|-------|---------------------------|-------------------------|
| Pin #  | Pin # |                           |                         |
| 1      | 1     | $\overline{\text{RESET}}$ | Active LOW reset output |
| 2      | 2     | $V_{CC}$                  | Power supply input      |
| 3      | 3     | GND                       | Ground                  |



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**Application Information**

**Operation - Power Monitor**

The ASM1811 detects out-of-tolerance power supply conditions. It resets a processor during power-up, power-down and issues a reset to the system processor when the monitored power supply voltage is below the reset threshold. When an out-of-tolerance  $V_{CC}$  voltage is detected, the  $\overline{\text{RESET}}$  signal is asserted. On power-up,  $\overline{\text{RESET}}$  is kept active (LOW) for approximately 150ms after the power supply voltage has reached the selected tolerance. This allows the power supply and microprocessor to stabilize before  $\overline{\text{RESET}}$  is released.

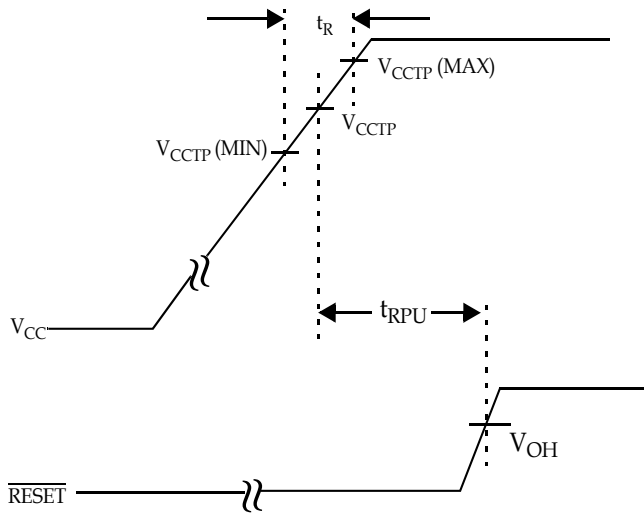


Figure 1: Timing Diagram: Power-Up

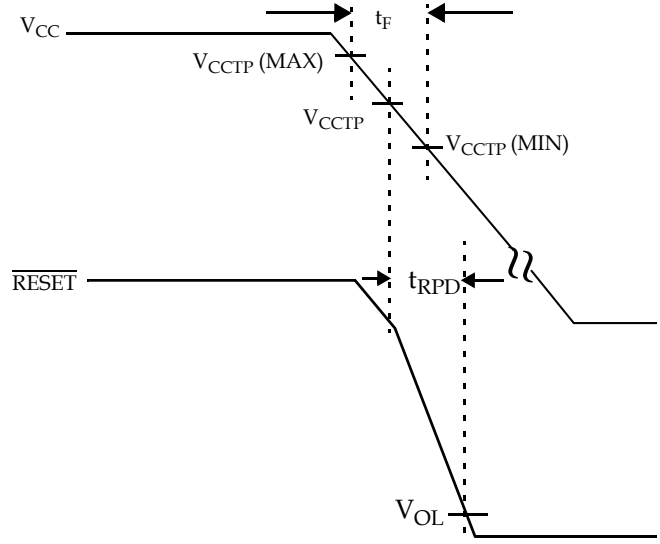


Figure 2: Timing Diagram: Power-Down



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### Absolute Maximum Ratings

| Parameter                          | Min  | Max            | Unit |
|------------------------------------|------|----------------|------|
| Voltage on $V_{CC}$                | -0.5 | 7              | V    |
| Voltage on $\overline{RESET}$      | -0.5 | $V_{CC} + 0.5$ | V    |
| Operating Temperature Range        | -40  | 85             | °C   |
| Soldering Temperature (for 10 sec) |      | 260            | °C   |
| Storage Temperature                | -55  | 125            | °C   |
| ESD rating                         |      |                |      |
|                                    | HBM  | 2              | KV   |
|                                    | MM   | 200            | V    |

NOTE: These are stress ratings only and functional use is not implied. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.

### Electrical Characteristics

Unless otherwise noted,  $V_{CC} = 1.2V$  to  $5.5V$  and specifications are over the operating temperature range of  $-40^{\circ}C$  to  $+85^{\circ}C$ . All voltages are referenced to ground

| Parameter   | Symbol      | Conditions                                       | Min  | Typ  | Max  | Unit      |
|---|-------------|--|------|------|------|-----------|
| Supply Voltage  | $V_{CC}$    |  | 1.2  |      | 5.5  | V         |
| Operating Current   | $I_{CC}$    | $V_{CC} < 5.5V$ , $\overline{RESET}$ output open |      | 8    | 20   | $\mu A$   |
| $V_{CC}$ Trip Point (ASM1811R-5)                              | $V_{CCTP}$  |  | 4.50 | 4.62 | 4.75 | V         |
| $V_{CC}$ Trip Point (ASM1811R-10)                             | $V_{CCTP}$  |  | 4.25 | 4.35 | 4.49 | V         |
| $V_{CC}$ Trip Point (ASM1811R-15)                             | $V_{CCTP}$  |  | 4.00 | 4.13 | 4.24 | V         |
| Internal Pull-up Resistor                                     | $R_P$       |  | 3.5  | 5.5  | 7.5  | $k\Omega$ |
| Output Capacitance  | $C_{OUT}$   |  |      |      | 10   | pF        |
| RESET Active Time   | $t_{RESET}$ |  | 100  | 150  | 250  | ms        |
| $V_{CC}$ Detect to $\overline{RESET}$ Low                     | $t_{RPD}$   |  |      | 2    | 5    | $\mu s$   |
| $V_{CC}$ Slew Rate<br>( $V_{CCTP}$ (MAX) to $V_{CCTP}$ (MIN)) | $t_F$       |  | 300  |      |      | $\mu s$   |
| $V_{CC}$ Slew Rate<br>( $V_{CCTP}$ (MIN) to $V_{CCTP}$ (MAX)) | $t_R$       |  | 0    |      |      | ns        |
| $V_{CC}$ Detect to $\overline{RESET}$ High                    | $t_{RPU}$   | $t_r = 5\mu s$                                   | 100  | 150  | 300  | ms        |

Note: The  $t_F$  value is for reference in defining values for  $t_{RPD}$  and should not be considered for proper operation or use.



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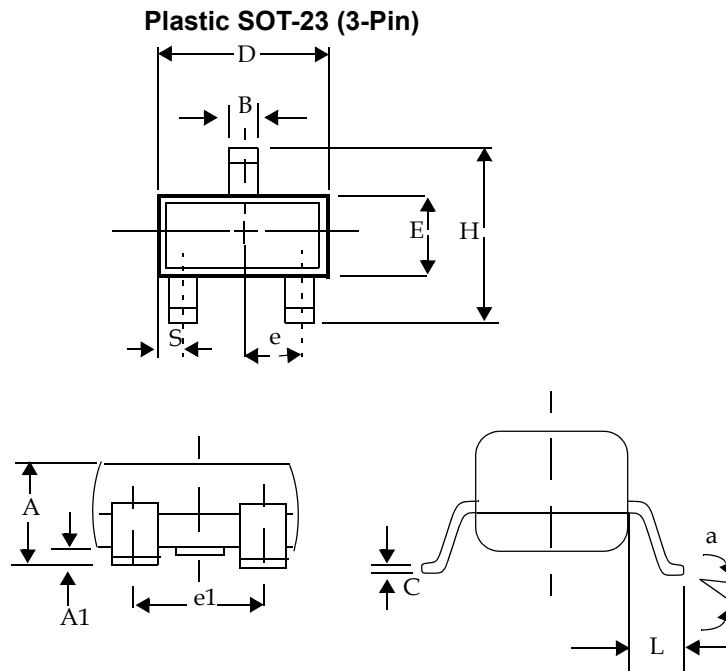
## Family Selection Guide

| Part #   | RESET Voltage (V)   | RESET Time (ms) | Output Stage | RESET Polarity |
|----------|---------------------|-----------------|--------------|----------------|
| ASM1810  | 4.620, 4.370, 4.120 | 150             | Push-Pull    | LOW            |
| ASM1811  | 4.620, 4.350, 4.130 | 150             | Open-Drain   | LOW            |
| ASM1812  | 4.620, 4.350, 4.130 | 150             | Push-Pull    | HIGH           |
| ASM1815  | 3.060, 2.880, 2.550 | 150             | Push-Pull    | LOW            |
| ASM1816  | 3.060, 2.880, 2.550 | 150             | Open-Drain   | LOW            |
| ASM1817  | 3.060, 2.880, 2.550 | 150             | Push-Pull    | HIGH           |
| ASM1233D | 4.625, 4.375, 4.125 | 350             | Open-Drain   | LOW            |
| ASM1233M | 4.625, 4.375, 2.720 | 350             | Open-Drain   | LOW            |



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Package Dimension

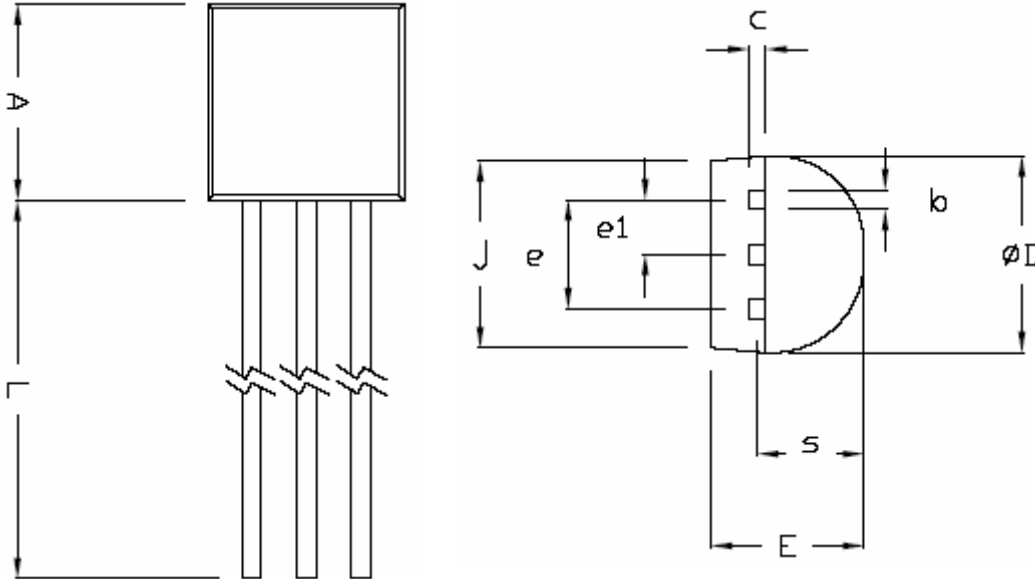


|                               | Inches    |       | Millimeters |      |
|-------------------------------|-----------|-------|-------------|------|
|                               | Min       | Max   | Min         | Max  |
| <b>Plastic SOT-23 (3-Pin)</b> |           |       |             |      |
| A                             | 0.030     | 0.046 | 0.75        | 1.17 |
| A1                            | 0.002     | 0.006 | 0.05        | 0.15 |
| B                             | 0.012     | 0.020 | 0.30        | 0.50 |
| C                             | 0.003     | 0.008 | 0.08        | 0.20 |
| D                             | 0.110     | 0.120 | 2.80        | 3.04 |
| E                             | 0.047     | 0.055 | 1.20        | 1.40 |
| e                             | 0.037 BSC |       | 0.95 BSC    |      |
| e1                            | 0.075 BSC |       | 1.9 BSC     |      |
| H                             | 0.083     | 0.104 | 2.10        | 2.64 |
| L                             | 0.016     | 0.024 | 0.40        | 0.60 |
| a                             | 0°        | 8°    | 0°          | 8°   |
| S                             | NA        |       | NA          |      |



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To-92 (3-Pin)



|              | Dimensions in Inches |       | Dimensions in Millimeters |       |
|--------------|----------------------|-------|---------------------------|-------|
|              | Min                  | Max   | Min                       | Max   |
| <b>TO-92</b> |                      |       |                           |       |
| A            | 0.175                | 0.185 | 4.445                     | 4.699 |
| b            | 0.016                | 0.020 | 0.406                     | 0.508 |
| C            | 0.014                | 0.016 | 0.356                     | 0.406 |
| $\phi D$     | 0.175                | 0.185 | 4.445                     | 4.699 |
| E            | 0.138                | 0.144 | 3.505                     | 3.658 |
| e            | 0.098                | 0.102 | 2.489                     | 2.591 |
| e1           | 0.045                | 0.055 | 1.143                     | 1.397 |
| j            | 0.168                | 0.174 | 4.269                     | 4.420 |
| L            | 0.500                | 0.585 | 12.7                      | 14.86 |
| s            | 0.095                | 0.099 | 2.413                     | 2.515 |



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## Ordering Information

| Device Summary  |                          |                     |                 |                            |                |                |                 |
|---|--------------------------|---------------------|-----------------|----------------------------|----------------|----------------|-----------------|
| Part *** Number   | RESET Output Voltage (V) | RESET Tolerance (%) | RESET Time (ms) | Open-Drain ** Output Stage | SOT-23 Package | RESET Polarity | Package Marking |
| <b>TIN - LEAD DEVICES</b>                                     |                          |                     |                 |                            |                |                |                 |
| ASM1811R-5  | 4.62                     | 5                   | 150             | ◆                          | ◆              | LOW            | RDLL            |
| ASM1811R-10   | 4.35                     | 10                  | 150             | ◆                          | ◆              | LOW            | RELL            |
| ASM1811R-15   | 4.13                     | 15                  | 150             | ◆                          | ◆              | LOW            | RFL             |
| <b>LEAD FREE DEVICES</b>                                      |                          |                     |                 |                            |                |                |                 |
| ASM1811R-5F   | 4.62                     | 5                   | 150             | ◆                          | ◆              | LOW            | KDLL            |
| ASM1811R-10F  | 4.35                     | 10                  | 150             | ◆                          | ◆              | LOW            | KELL            |
| ASM1811R-15F  | 4.13                     | 15                  | 150             | ◆                          | ◆              | LOW            | KFL             |
| Part *** Number   | RESET Output Voltage (V) | RESET Tolerance (%) | RESET Time (ms) | Open-Drain ** Output Stage | TO-92 Package  | RESET Polarity | Package Marking |
| <b>TIN - LEAD DEVICES</b>                                     |                          |                     |                 |                            |                |                |                 |
| ASM1811-5   | 4.62                     | 5                   | 150             | ◆                          | ◆              | LOW            | ASM1811-5       |
| ASM1811-10  | 4.35                     | 10                  | 150             | ◆                          | ◆              | LOW            | ASM1811-10      |
| ASM1811-15  | 4.13                     | 15                  | 150             | ◆                          | ◆              | LOW            | ASM1811-15      |
| <b>LEAD FREE DEVICES</b>                                      |                          |                     |                 |                            |                |                |                 |
| ASM1811-5F  | 4.62                     | 5                   | 150             | ◆                          | ◆              | LOW            | ASM1811-5F      |
| ASM1811-10F   | 4.35                     | 10                  | 150             | ◆                          | ◆              | LOW            | ASM1811-10F     |
| ASM1811-15F   | 4.13                     | 15                  | 150             | ◆                          | ◆              | LOW            | ASM1811-15F     |
| ** Internal 5.5kΩ resistor pull-up                            |                          |                     |                 |                            |                |                |                 |
| ** *Add /T to Part Number for Tape and Reel (i.e ASM18xx-x/T) |                          |                     |                 |                            |                |                |                 |
| LL- Lot Code  |                          |                     |                 |                            |                |                |                 |





**ASM1811**



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