# MIC803

## 3-Pin Microprocessor Supervisor Circuit with Open-Drain Reset Output

## General Description

The MIC803 is a single-voltage supervisor with open-drain reset output that provides accurate power supply monitoring and reset generation in microprocessor-based systems. The function of the device is to assert a reset signal if the power supply voltage drops below the reset threshold voltage, and retain this reset for the reset timeout period once the power supply increases above the reset threshold voltage.

The MIC803 consumes only 4.5µA of supply current and offers three reset delay periods of 20ms, 140ms, and 1120ms (minimum). It features factory-programmed reset threshold levels from 2.63V to 4.63V to accommodate 3.0V, 3.3V, and 5.0V power supplies. It is available in the compact 3-pin SC-70 and SOT-23 packages.

Datasheets and support documentation are available on Micrel's web site at: www.micrel.com.

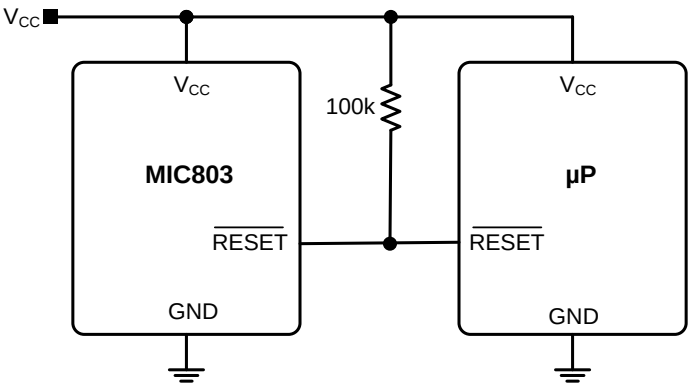
## Features

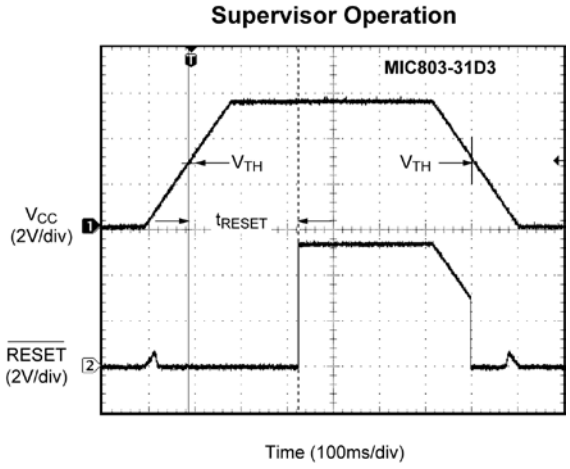
- 4.5µA supply current (typical) at 3.6V
- Open-drain /RESET output
- /RESET remains valid with $V_{CC}$ as low as 1V
- 20ms, 140ms, or 1120ms (minimum) reset timeout options
- 2.63V to 4.63V preset voltage threshold options
- 2.5% voltage threshold accuracy over temperature
- 3-pin SC70-3 package (2.0mm × 2.1mm)
- 3-pin SOT-23 package (2.3mm × 2.9mm)
- -40˚C to +125˚C junction temperature range

## Applications

- Critical microcomputer power monitoring
- Portable equipment
- Solid state drives
- Printers/computers
- Embedded controllers

## Typical Application



## Ordering Information[1]

| Part Number | Marking[2] | Nominal $V_{TH}$ (V) | Minimum $t_{RESET}$[3] (ms) | Junction Temperature Range | Package |
|---|---|---|---|---|---|
| MIC803-46D2VC3 | AS | 4.63 | 20 | –40° to +125°C | SC70-3 |
| MIC803-44D2VC3 | AP | 4.38 | 20 | –40° to +125°C | SC70-3 |
| MIC803-41D2VC3 | AK | 4.10 | 20 | –40° to +125°C | SC70-3 |
| MIC803-40D2VC3 | A2 | 4.00 | 20 | –40° to +125°C | SC70-3 |
| MIC803-31D2VC3 | AG | 3.08 | 20 | –40° to +125°C | SC70-3 |
| MIC803-30D2VC3 | AV | 3.00 | 20 | –40° to +125°C | SC70-3 |
| MIC803-29D2VC3 | AD | 2.93 | 20 | –40° to +125°C | SC70-3 |
| MIC803-26D2VC3 | AA | 2.63 | 20 | –40° to +125°C | SC70-3 |
| MIC803-46D3VC3 | AT | 4.63 | 140 | –40° to +125°C | SC70-3 |
| MIC803-44D3VC3 | AQ | 4.38 | 140 | –40° to +125°C | SC70-3 |
| MIC803-41D3VC3 | AM | 4.10 | 140 | –40° to +125°C | SC70-3 |
| MIC803-40D3VC3 | A5 | 4.00 | 140 | –40° to +125°C | SC70-3 |
| MIC803-31D3VC3 | A4 | 3.08 | 140 | –40° to +125°C | SC70-3 |
| MIC803-30D3VC3 | AX | 3.00 | 140 | –40° to +125°C | SC70-3 |
| MIC803-29D3VC3 | AE | 2.93 | 140 | –40° to +125°C | SC70-3 |
| MIC803-26D3VC3 | AB | 2.63 | 140 | –40° to +125°C | SC70-3 |
| MIC803-46D4VC3 | AU | 4.63 | 1120 | –40° to +125°C | SC70-3 |
| MIC803-44D4VC3 | AR | 4.38 | 1120 | –40° to +125°C | SC70-3 |
| MIC803-41D4VC3 | AN | 4.10 | 1120 | –40° to +125°C | SC70-3 |
| MIC803-40D4VC3 | A6 | 4.00 | 1120 | –40° to +125°C | SC70-3 |
| MIC803-31D4VC3 | AJ | 3.08 | 1120 | –40° to +125°C | SC70-3 |
| MIC803-30D4VC3 | AZ | 3.00 | 1120 | –40° to +125°C | SC70-3 |
| MIC803-29D4VC3 | A3 | 2.93 | 1120 | –40° to +125°C | SC70-3 |
| MIC803-26D4VC3 | AC | 2.63 | 1120 | –40° to +125°C | SC70-3 |
| MIC803-46D2VM3 | AS | 4.63 | 20 | –40° to +125°C | SOT23-3 |
| MIC803-44D2VM3 | AP | 4.38 | 20 | –40° to +125°C | SOT23-3 |
| MIC803-41D2VM3 | AK | 4.10 | 20 | –40° to +125°C | SOT23-3 |
| MIC803-40D2VM3 | A2 | 4.00 | 20 | –40° to +125°C | SOT23-3 |
| MIC803-31D2VM3 | AG | 3.08 | 20 | –40° to +125°C | SOT23-3 |
| MIC803-30D2VM3 | AV | 3.00 | 20 | –40° to +125°C | SOT23-3 |
| MIC803-29D2VM3 | AD | 2.93 | 20 | –40° to +125°C | SOT23-3 |
| MIC803-26D2VM3 | AA | 2.63 | 20 | –40° to +125°C | SOT23-3 |
| MIC803-46D3VM3 | AT | 4.63 | 140 | –40° to +125°C | SOT23-3 |

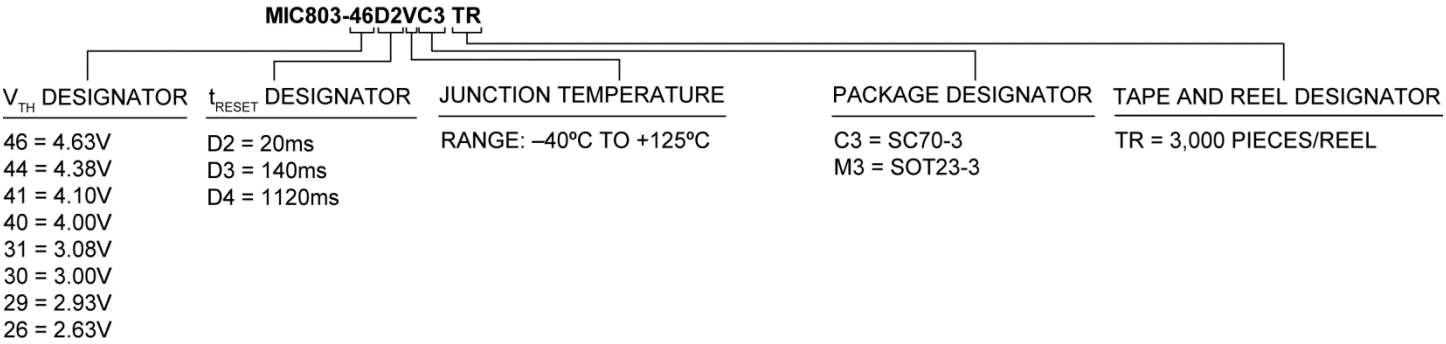
**Note:**

1. All devices available in tape and reel only. (Order entry PN, add TR. Example: MIC803-26D4VM3 TR)
   Standard/full reel quantity is 3,000 pieces.
   Reel diameter is 7 inches. Hub diameter is 2 inches. Width is 8mm.
2. Underbar symbol (_) may not be to scale.
3. –40° to +85°C temperature range.

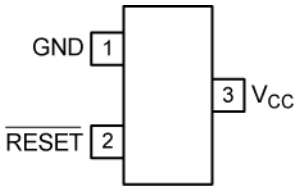
## Ordering Information[1] (Continued)

| Part Number | Marking[2] | Nominal $V_{TH}$ (V) | Minimum $t_{RESET}$[3] (ms) | Junction Temperature Range | Package |
|---|---|---|---|---|---|
| MIC803-44D3VM3 | AQ | 4.38 | 140 | –40° to +125°C | SOT23-3 |
| MIC803-41D3VM3 | AM | 4.10 | 140 | –40° to +125°C | SOT23-3 |
| MIC803-40D3VM3 | A5 | 4.00 | 140 | –40° to +125°C | SOT23-3 |
| MIC803-31D3VM3 | A4 | 3.08 | 140 | –40° to +125°C | SOT23-3 |
| MIC803-30D3VM3 | AX | 3.00 | 140 | –40° to +125°C | SOT23-3 |
| MIC803-29D3VM3 | AE | 2.93 | 140 | –40° to +125°C | SOT23-3 |
| MIC803-26D3VM3 | AB | 2.63 | 140 | –40° to +125°C | SOT23-3 |
| MIC803-46D4VM3 | AU | 4.63 | 1120 | –40° to +125°C | SOT23-3 |
| MIC803-44D4VM3 | AR | 4.38 | 1120 | –40° to +125°C | SOT23-3 |
| MIC803-41D4VM3 | AN | 4.10 | 1120 | –40° to +125°C | SOT23-3 |
| MIC803-40D4VM3 | A6 | 4.00 | 1120 | –40° to +125°C | SOT23-3 |
| MIC803-31D4VM3 | AJ | 3.08 | 1120 | –40° to +125°C | SOT23-3 |
| MIC803-30D4VM3 | AZ | 3.00 | 1120 | –40° to +125°C | SOT23-3 |
| MIC803-29D4VM3 | A3 | 2.93 | 1120 | –40° to +125°C | SOT23-3 |
| MIC803-26D4VM3 | AC | 2.63 | 1120 | –40° to +125°C | SOT23-3 |

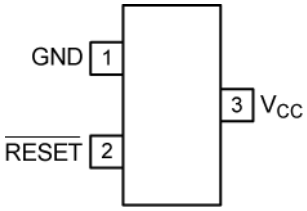
## Part Numbering Convention



## Pin Configuration




**3-Pin SC70**
**(Top View)**




**3-Pin SOT-23**
**(Top View)**

## Pin Description

| Pin Number | Pin Name | Pin Function |
|---|---|---|
| 1 | GND | Ground Pin. |
| 2 | /RESET | /RESET goes low if $V_{CC}$ falls below the reset threshold ($V_{TH}$), and remains asserted for one timeout period after $V_{CC}$ exceeds $V_{TH}$. |
| 3 | $V_{CC}$ | Power Supply Input and Monitored Voltage. |

## Absolute Maximum Ratings[4]

Supply Voltage ($V_{CC}$) ..... –0.3V to 6.0V
Reset Output (/RESET)..... –0.3V to 6.0V
Input Current ($V_{CC}$) .....20mA
Output Current (/RESET) .....20mA
Rate of Rise ($V_{CC}$) .....100V/µs
Junction Temperature ($T_J$)……...+150°C
Lead Temperature (soldering, 10s)..... 260°C
Storage Temperature ($T_S$).....–65°C to +150°C
ESD Rating[6].....3kV

## Operating Ratings[5]

Supply Voltage ($V_{CC}$)..... 1.0V to 5.5V
Reset Output Voltage (/RESET) ..... 0.0V to 5.5V
Junction Temperature ($T_J$) .....–40°C to +125°C
Junction Thermal Resistance
3-Pin SC70 ($\theta_{JA}$) .....260°C/W
3-Pin SOT-23 ($\theta_{JA}$).....203°C/W

## Electrical Characteristics[7]

For typical values, $V_{CC}$ = 5.0V for MIC803-46/44/41/40, $V_{CC}$ = 3.3V for MIC803-31/30/29, $V_{CC}$ = 3.0V for MIC803-26; $T_J$ = 25°C, **Bold** values indicate –40°C ≤ $T_J$ ≤ +125°C; unless noted.

| Parameter | Conditions | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Power Supply Input** | | | | | | |
| Operating Voltage Range ($V_{CC}$) | $T_J$ = –40˚C to +85˚C | | 1.0 | | 5.5 | V |
| | $T_J$ = –40˚C to +125˚C | | 1.2 | | 5.5 | |
| Supply Current ($I_{CC}$) | $T_J$ = –40˚C to +85˚C | $V_{CC}$ = 5.5V, No Load | | 5.5 | 15 | µA |
| | | $V_{CC}$ = 3.6V, No Load | | 4.5 | 10 | |
| | $T_J$ = +85˚C to +125˚C | $V_{CC}$ = 5.5V, No Load | | | 18 | |
| | | $V_{CC}$ = 3.6V, No Load | | | 13 | |
| **Voltage Threshold** | | | | | | |
| Reset Threshold ($V_{TH}$) | MIC803-46 | $T_J$ = –40˚C to +85˚C | 4.50 | 4.63 | 4.75 | V |
| | | $T_J$ = –40˚C to +125˚C | 4.44 | | 4.82 | |
| | MIC803-44 | $T_J$ = –40˚C to +85˚C | 4.25 | 4.38 | 4.50 | |
| | | $T_J$ = –40˚C to +125˚C | 4.20 | | 4.56 | |
| | MIC803-41 | $T_J$ = –40˚C to +85˚C | 4.00 | 4.10 | 4.20 | |
| | | $T_J$ = -40˚C to +125˚C | 3.97 | | 4.24 | |
| | MIC803-40 | $T_J$ = –40˚C to +85˚C | 3.89 | 4.00 | 4.10 | |
| | | $T_J$ = –40˚C to +125˚C | 3.80 | | 4.20 | |
| | MIC803-31 | $T_J$ = –40˚C to +85˚C | 3.00 | 3.08 | 3.15 | |
| | | $T_J$ = –40˚C to +125˚C | 2.95 | | 3.21 | |

**Notes:**

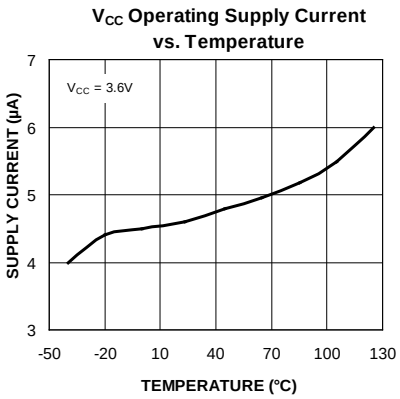
4. Exceeding the absolute maximum ratings may damage the device.
5. The device is not guaranteed to function outside its operating ratings.
6. Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5kΩ in series with 100pF.
7. Specification for packaged product only.

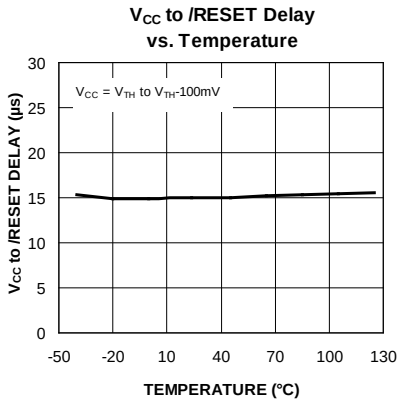
## Electrical Characteristics[7] (Continued)

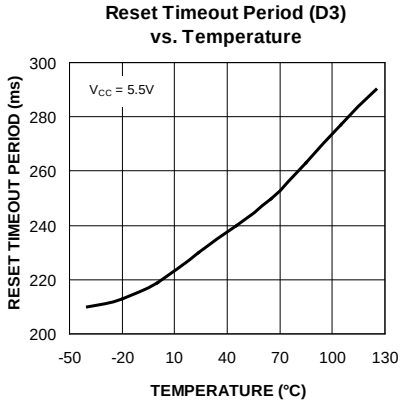
For typical values, $V_{CC}$ = 5.0V for MIC803-46/44/41/40, $V_{CC}$ = 3.3V for MIC803-31/30/29, $V_{CC}$ = 3.0V for MIC803-26; $T_J$ = 25°C, **Bold** values indicate –40°C ≤ $T_J$ ≤ +125°C; unless noted.

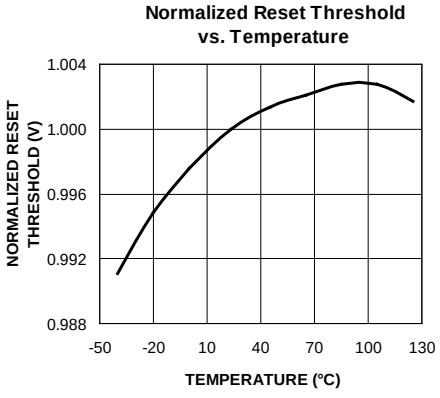
| Parameter | Conditions | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Voltage Threshold (Continued)** | | | | | | |
| Reset Threshold ($V_{TH}$) | MIC803-30 | $T_J$ = –40˚C to +85˚C | 2.93 | 3.00 | 3.08 | V |
| | | $T_J$ = –40˚C to +125˚C | 2.90 | | 3.11 | |
| | MIC803-29 | $T_J$ = –40˚C to +85˚C | 2.82 | 2.93 | 3.00 | |
| | | $T_J$ = –40˚C to +125˚C | 2.81 | | 3.05 | |
| | MIC803-26 | $T_J$ = –40˚C to +85˚C | 2.55 | 2.63 | 2.70 | |
| | | $T_J$ = –40˚C to +125˚C | 2.50 | | 2.76 | |
| **Reset Time** | | | | | | |
| $V_{CC}$ to /RESET Delay ($t_D$) | $V_{CC}$ = $V_{TH}$ to ($V_{TH}$ – 100mV) | | | 15 | | µs |
| Reset Timeout Period ($t_{RESET}$) | D2 | $T_J$ = –40˚C to +85˚C | 20 | 35 | 44 | ms |
| | | $T_J$ = –40˚C to +125˚C | 16 | | 48 | |
| | D3 | $T_J$ = –40˚C to +85˚C | 140 | 230 | 360 | |
| | | $T_J$ = –40˚C to +125˚C | 112 | | 420 | |
| | D4 | $T_J$ = –40˚C to +85˚C | 1120 | 1800 | 2400 | |
| | | $T_J$ = –40˚C to +125˚C | 900 | | 3200 | |
| **Reset Output** | | | | | | |
| /RESET Output Voltage ($V_{OL}$) | $V_{CC}$ ≥ 4.0V, $I_{SINK}$ = 3.2mA | | | | **0.4** | V |
| | $V_{CC}$ > 2.5V, $I_{SINK}$ = 1.2mA | | | | **0.3** | V |
| | $V_{CC}$ ≥ 1.0V, $I_{SINK}$ = 50µA | | | | **0.3** | V |
| /RESET Output Leakage | $V_{CC}$ > $V_{TH}$, /RESET Deasserted | | | | **1** | µA |

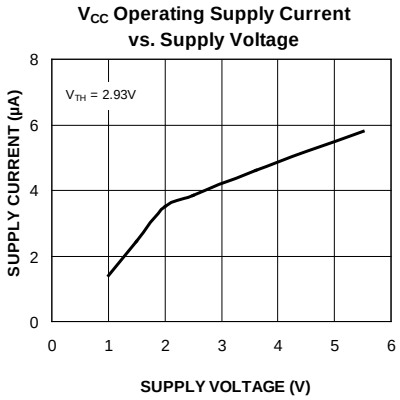
## Typical Characteristics

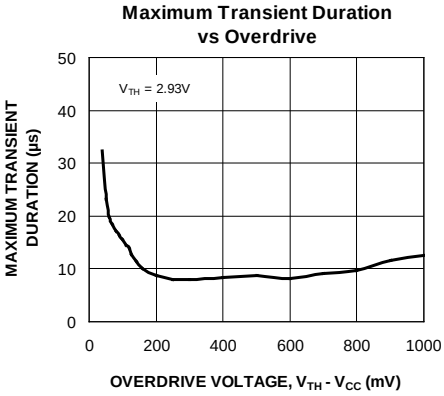


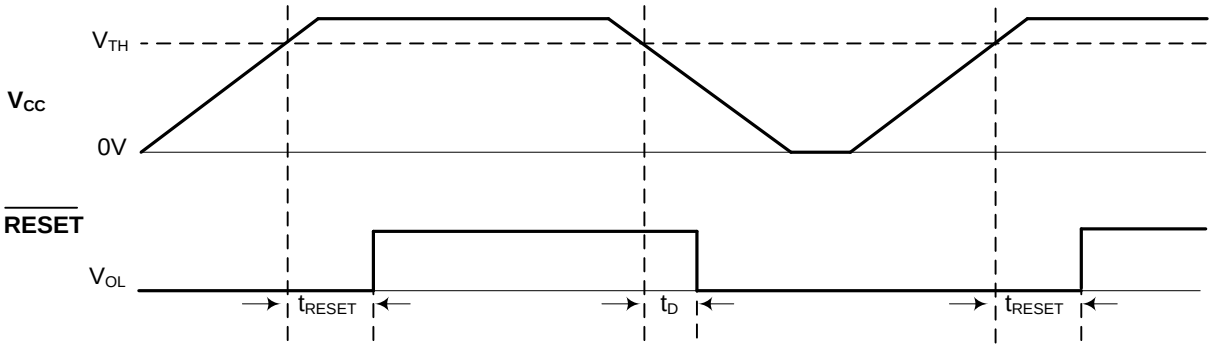



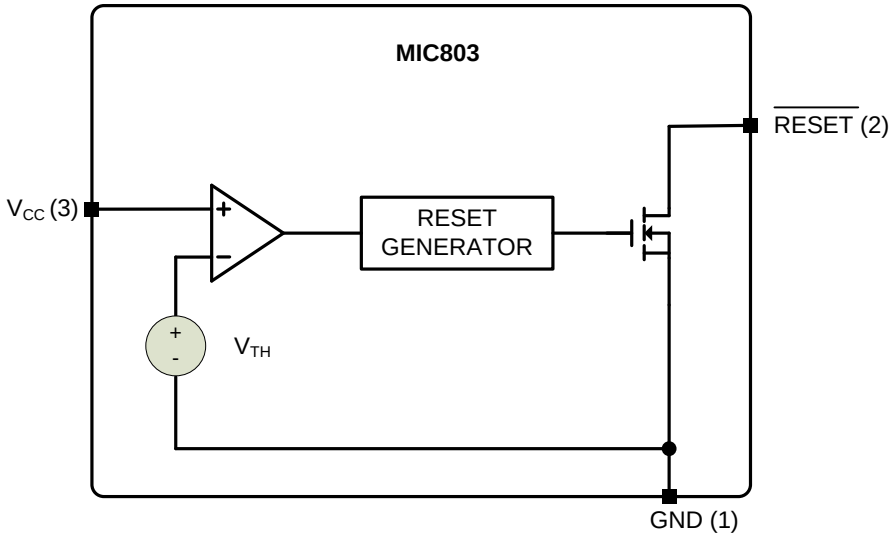



## Timing Diagram




## Functional Diagram



# Application Information

### Microprocessor Reset

The /RESET pin is asserted whenever $V_{CC}$ falls below the reset threshold voltage, $V_{TH}$. The /RESET pin remains asserted for the duration of the reset timeout period ($t_{RESET}$) after $V_{CC}$ has risen above the reset threshold voltage. The reset function ensures the microprocessor is properly reset and powers up in a known condition after a power failure. /RESET will remain valid with $V_{CC}$ as low as 1.0V.

The /RESET output is a simple open-drain N-channel MOSFET structure. A pull-up resistor must be used to pull this output up to some voltage. For most applications, this voltage will be the same power supply that supplies $V_{CC}$ to the MIC803. As shown in Figure 1, it is possible, however, to tie this resistor to some other voltage. This will allow the MIC803 to monitor one voltage while level-shifting the /RESET output to some other voltage. The pull-up voltage must be limited to 5.5V. The resistor must be small enough to supply current to the inputs and leakage paths that are driven by the /RESET output.

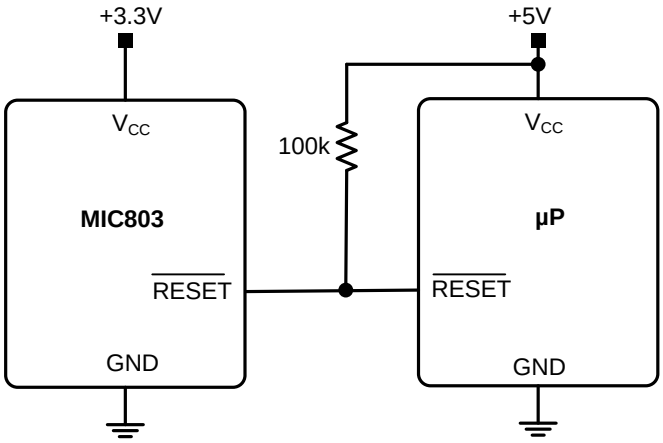



**Figure 1. MIC803 Used in a Multiple Supply System**

### /RESET Valid at Low Voltage

As $V_{CC}$ drops to 0V, the MIC803 will no longer be able to pull the /RESET output low, and the pull-up resistor will pull the output high. The value of the pull-up resistor and the voltage it is connected to will affect the point at which this happens.

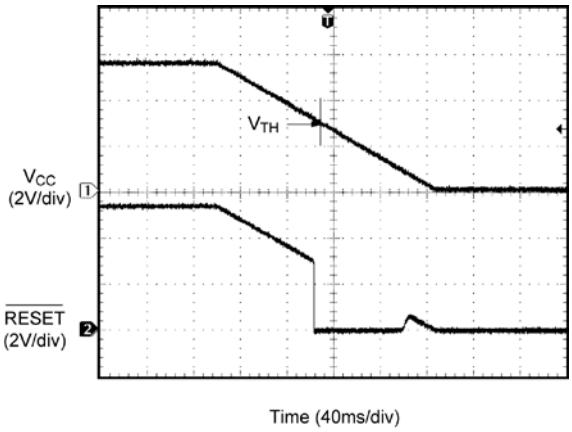



**Figure 2. /RESET at Falling $V_{CC}$**

### Wire ORing the /RESET Output

Since the /RESET output is open-drain, several reset sources can be wire-ORed, in parallel, to allow resets from multiple sources.

### $V_{CC}$ Transients

The MIC803 is relatively immune to negative-going $V_{CC}$ glitches below the reset threshold (see *Typical Characteristics*, graph titled "Maximum Transient Duration vs. Overdrive"). As shown in Figure 3, the overdrive voltage is the difference between the threshold voltage and the minimum point of the $V_{CC}$ glitch. Typically, an overdrive of 100mV, with duration of 15µs or less will not cause a reset. If additional transient immunity is needed, a 0.1µF bypass capacitor can be placed as close as possible to the MIC803 on the VCC pin.

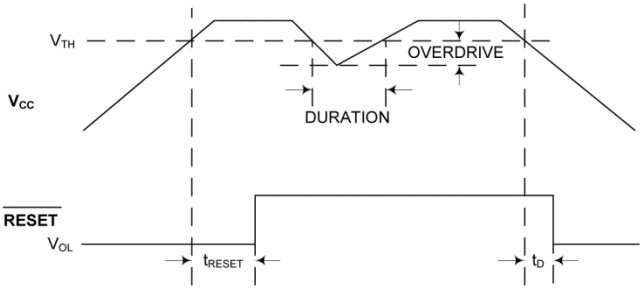
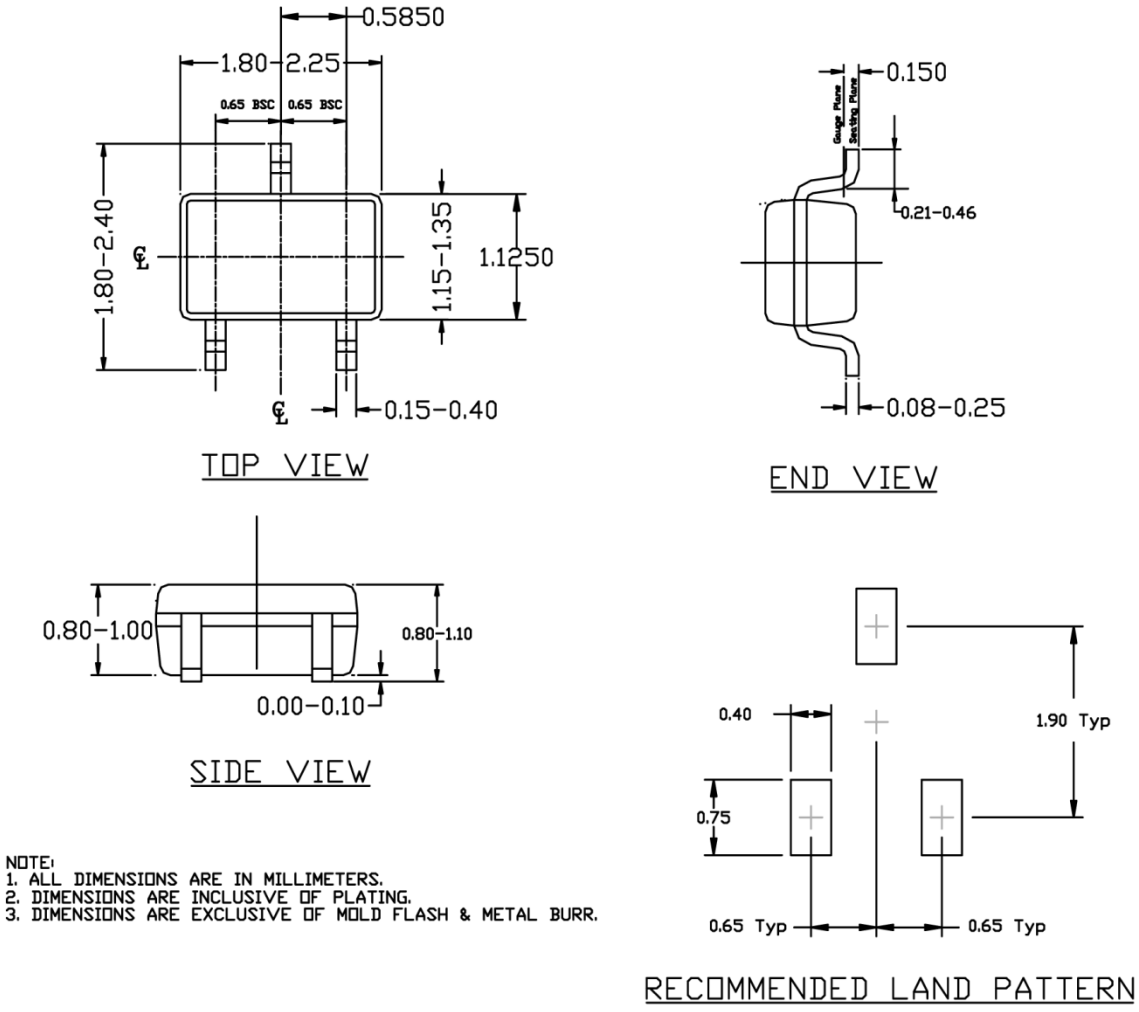



**Figure 3. $V_{CC}$ Threshold**

## Package Information and Recommended Landing Pattern[8]

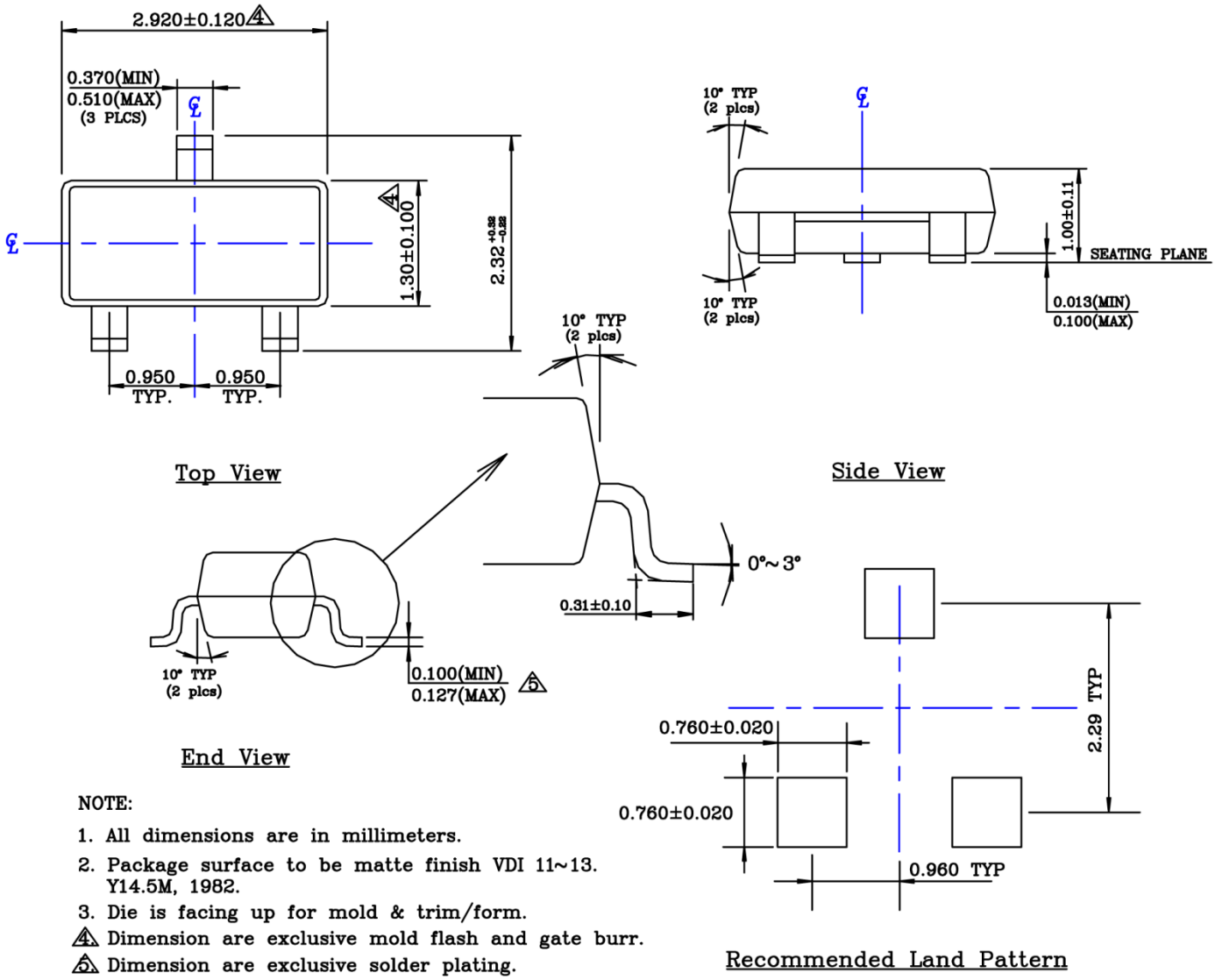



**3-Pin SC70 (MM)**

**Note:**

8. Package information is correct as of the publication date. For updates and most current information, go to www.micrel.com.

## Package Information and Recommended Landing Pattern[8]




NOTE:

1. All dimensions are in millimeters.
2. Package surface to be matte finish VDI 11~13. Y14.5M, 1982.
3. Die is facing up for mold & trim/form.

4 Dimension are exclusive mold flash and gate burr.

5 Dimension are exclusive solder plating.

**3-Pin SOT-23 (MM)**

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