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.

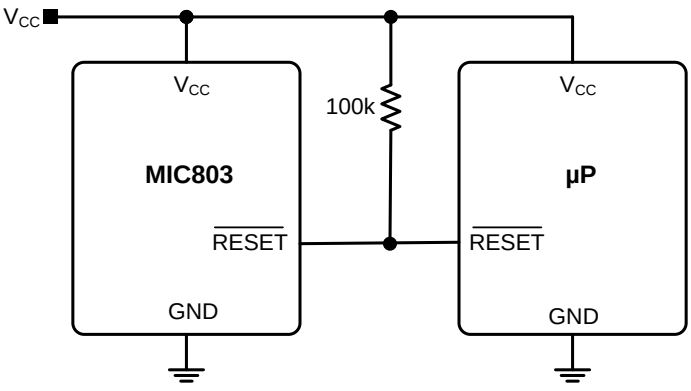
Features

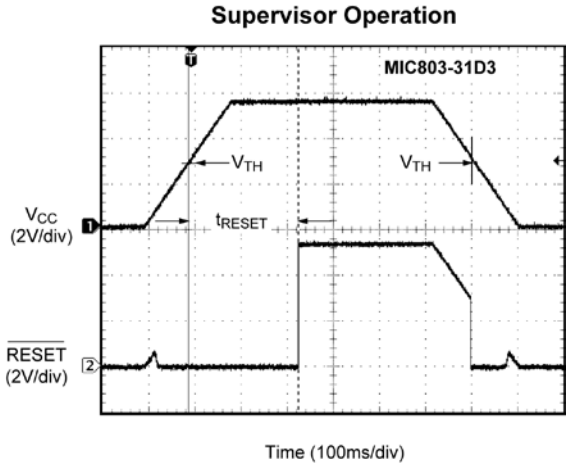
- 4.5µA supply current (typical) at 3.6V
- Open-drain /RESET output
- /RESET remains valid with V_{CC} as low as 1V
- 20ms, 140ms, or 1120ms (minimum) reset timeout options
- 2.63V to 4.63V preset voltage threshold options
- 2.5% voltage threshold accuracy over temperature
- 3-pin SC70-3 package (2.0mm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

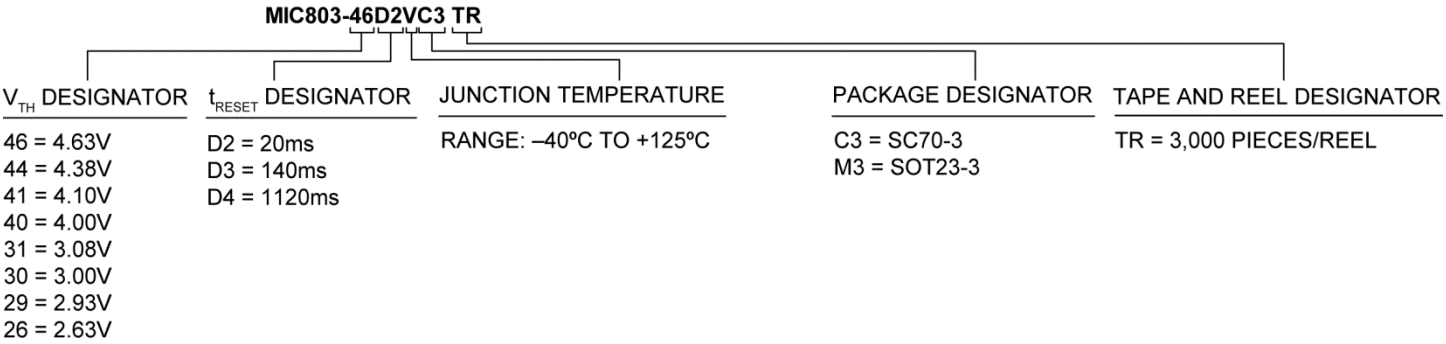
Note:

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.

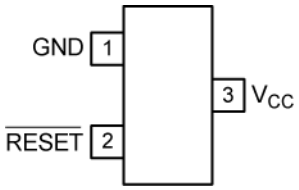
Ordering Information[1] (Continued)

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

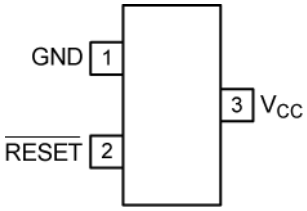
Part Numbering Convention



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 (θ_{JA}) .....260°C/W
3-Pin SOT-23 (θ_{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:

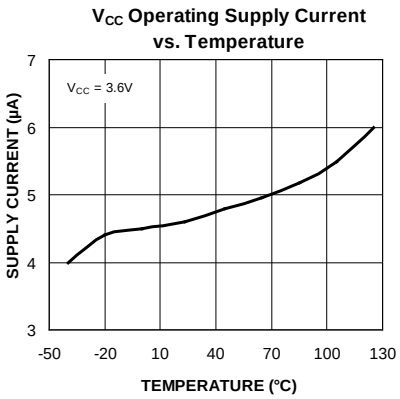
4. Exceeding the absolute maximum ratings may damage the device.
5. The device is not guaranteed to function outside its operating ratings.
6. Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5kΩ in series with 100pF.
7. Specification for packaged product only.

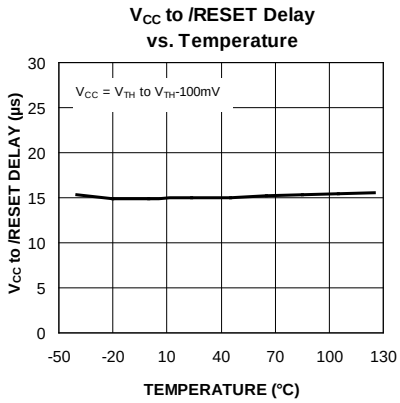
Electrical Characteristics[7] (Continued)

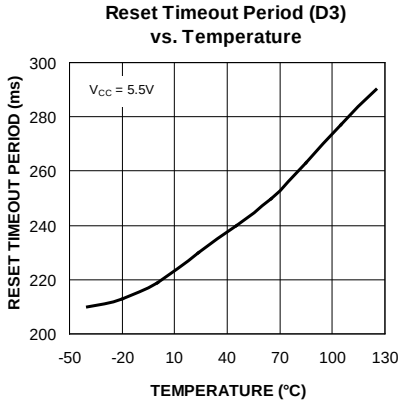
For typical values, V_{CC} = 5.0V for MIC803-46/44/41/40, V_{CC} = 3.3V for MIC803-31/30/29, V_{CC} = 3.0V for MIC803-26; T_J = 25°C, **Bold** values indicate –40°C ≤ T_J ≤ +125°C; unless noted.

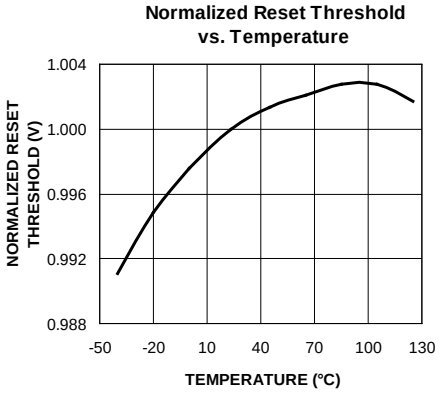
Parameter	Conditions		Min.	Typ.	Max.	Units
Voltage Threshold (Continued)						
Reset Threshold (V_{TH})	MIC803-30	T_J = –40˚C to +85˚C	2.93	3.00	3.08	V
		T_J = –40˚C to +125˚C	2.90		3.11	
	MIC803-29	T_J = –40˚C to +85˚C	2.82	2.93	3.00	
		T_J = –40˚C to +125˚C	2.81		3.05	
	MIC803-26	T_J = –40˚C to +85˚C	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

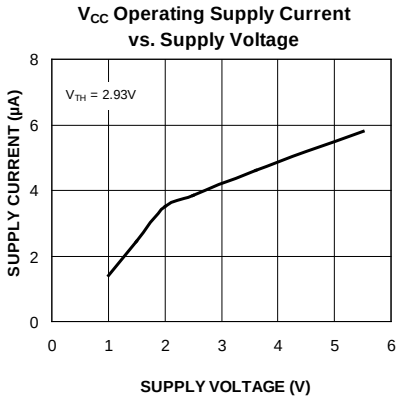
Typical Characteristics

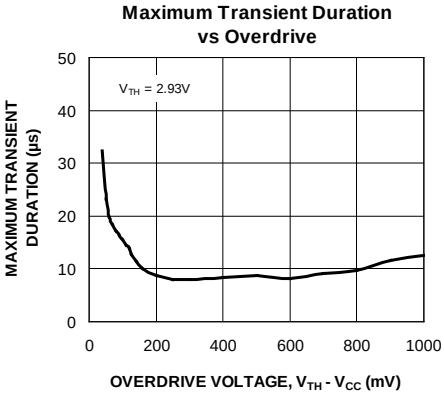




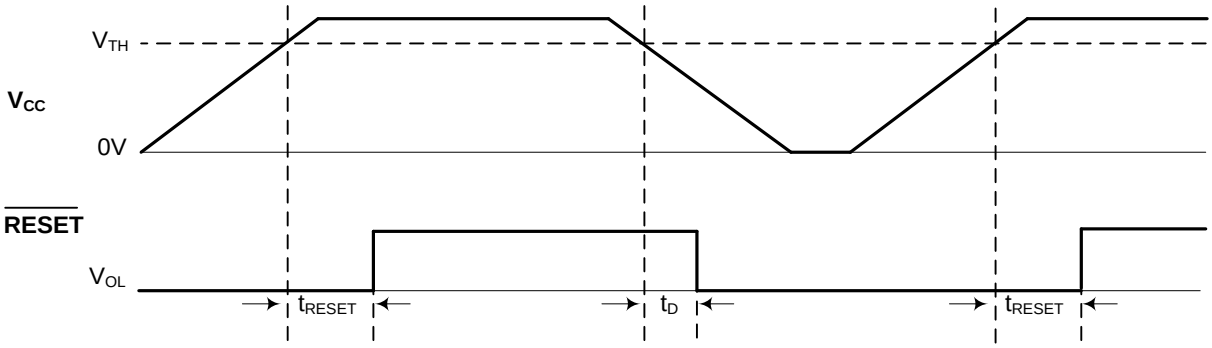




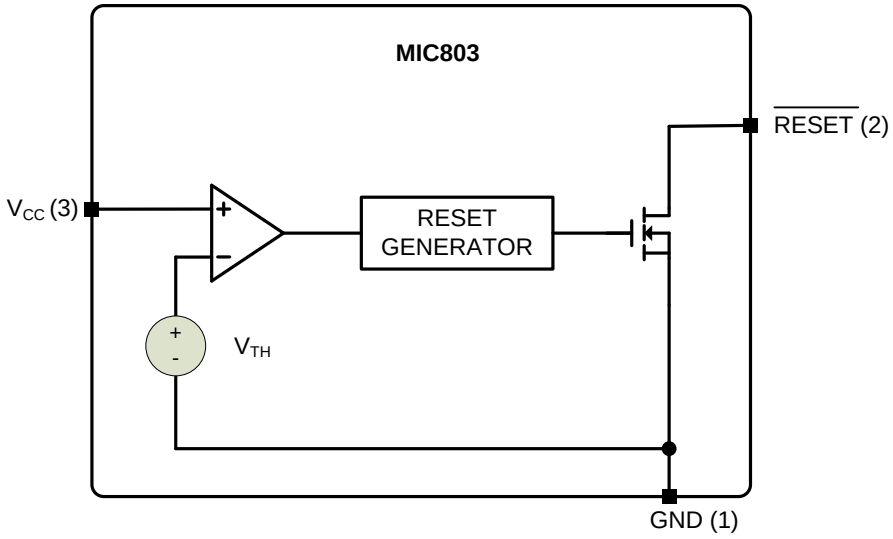




Timing Diagram



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.

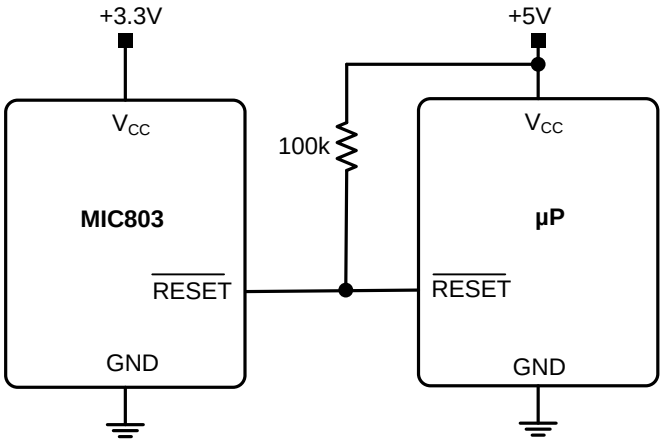


Figure 1. MIC803 Used in a Multiple Supply System

/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.

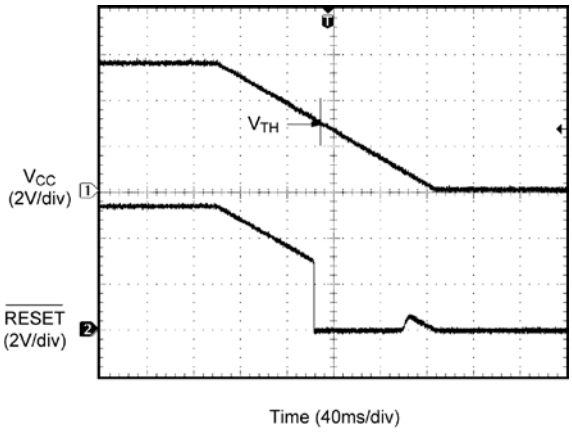


Figure 2. /RESET at Falling V_{CC}

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.

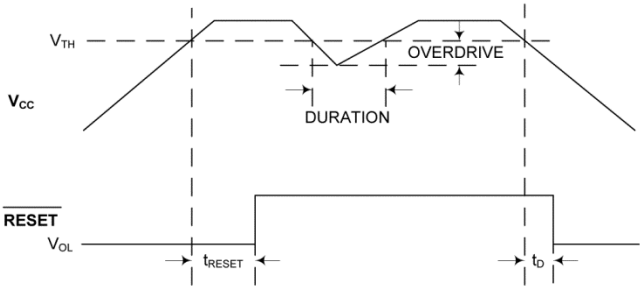
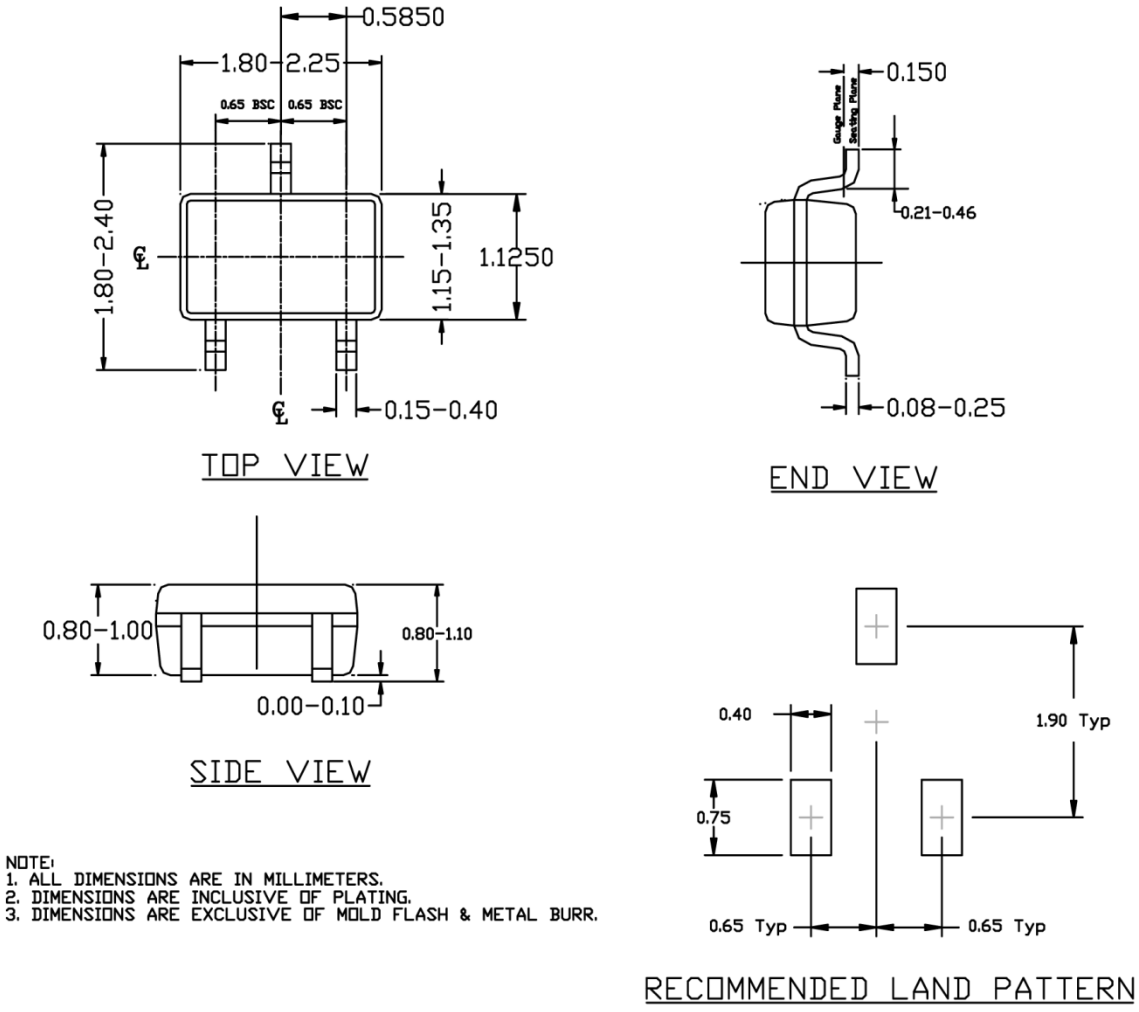


Figure 3. V_{CC} Threshold

Package Information and Recommended Landing Pattern[8]

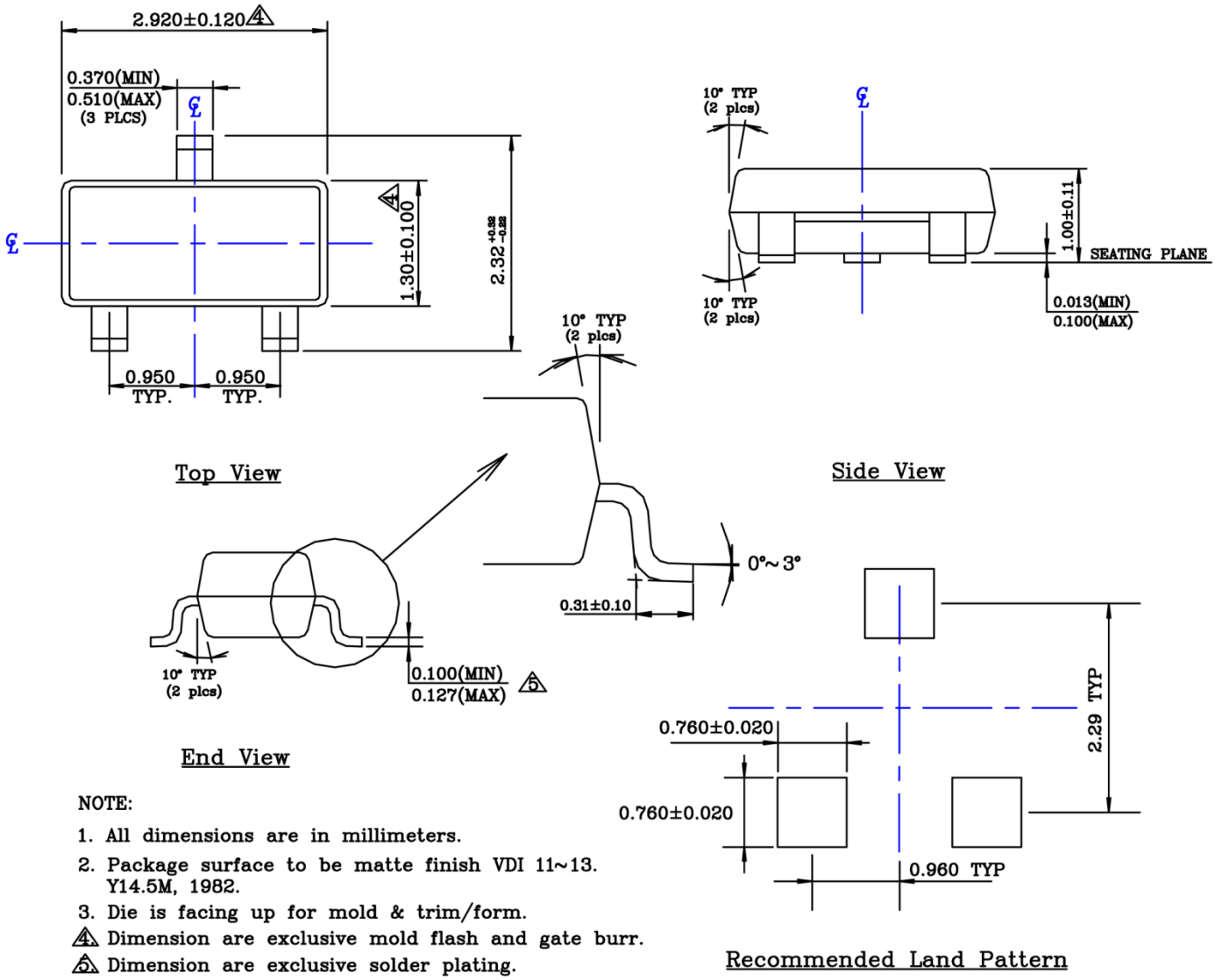


3-Pin SC70 (MM)

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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