MIC803

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

Features

- 4.5 µA Supply Current (Typical) at 3.6V
- Open-Drain /RESET Output
- /RESET Remains Valid with V_{CC} as Low as 1V
- 20 ms, 140 ms, or 1120 ms Minimum Reset Timeout Options
- 2.63V to 4.63V Preset Voltage Threshold Options
- 2.5% Voltage Threshold Accuracy over Temperature
- 3-Pin SC-70 Package (2.0 mm x 2.1 mm)
- 3-Pin SOT-23 Package (2.3 mm x 2.9 mm)
- –40°C to +125°C Junction Temperature Range

Applications

- Critical Microcomputer Power Monitoring
- Portable Equipment
- Solid State Drives
- Printers/Computers
- Embedded Controllers

General Description

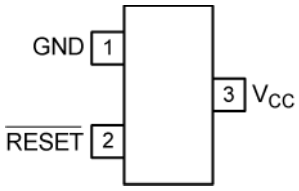
The MIC803 is a single-voltage supervisor with open-drain reset output that provides accurate power supply monitoring and reset generation in microprocessor-based systems. The function of the device is to assert a reset signal if the power supply voltage drops below the reset threshold voltage, and retain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

The MIC803 consumes only 4.5 µA of supply current and offers three reset delay periods of 20 ms, 140 ms, and 1120 ms (minimum).

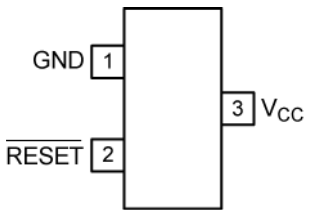
It features factory-programmed reset threshold levels from 2.63V to 4.63V to accommodate 3.0V, 3.3V, and 5.0V power supplies. It is available in the compact 3-pin SC-70 and SOT-23 packages.

Package Types

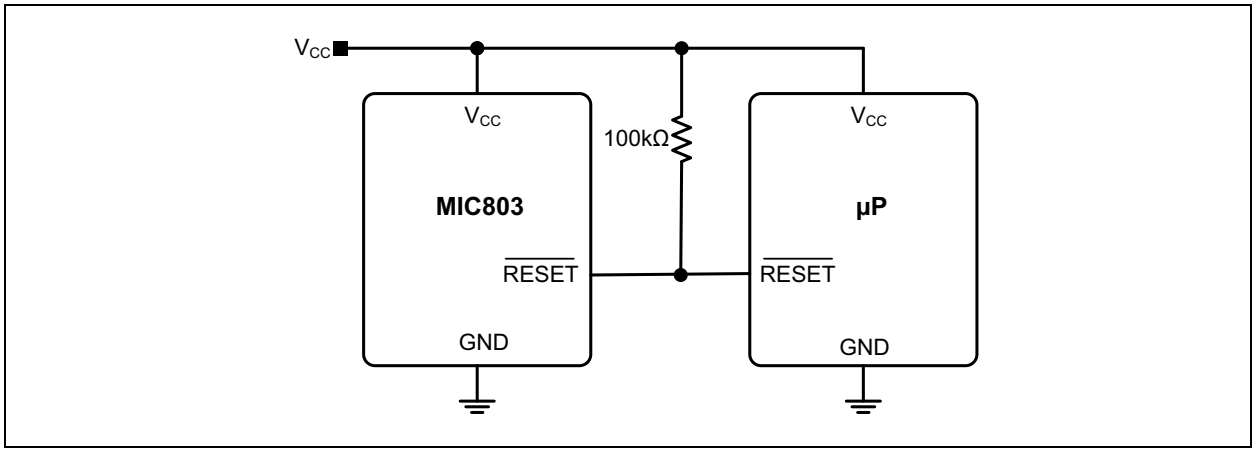
MIC803
3-Lead SC-70 (C3)
(Top View)



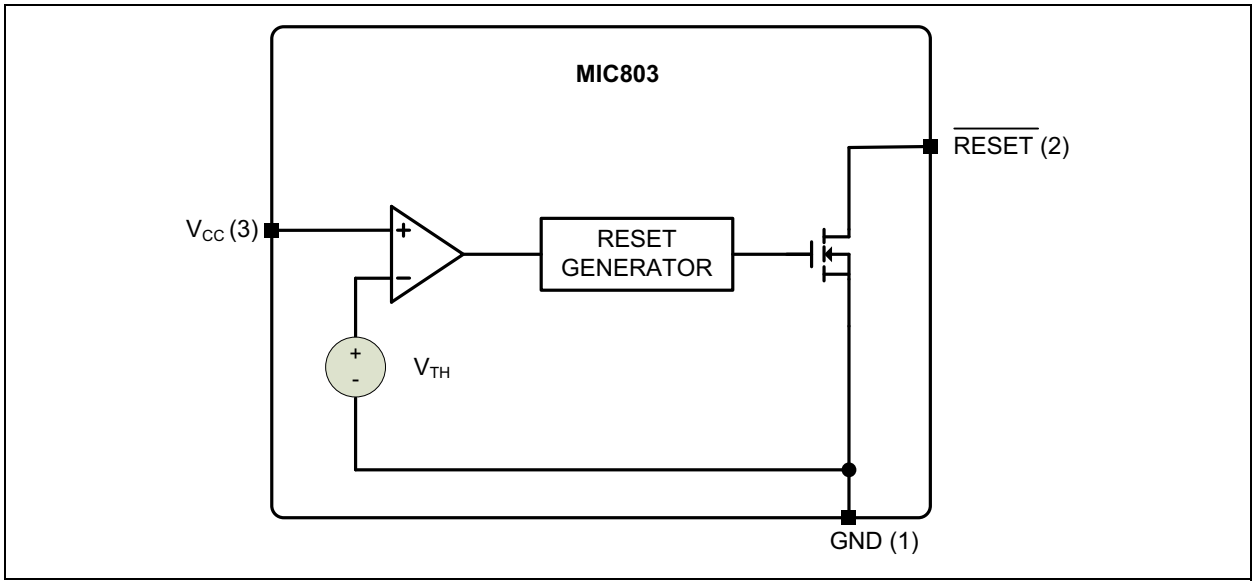
MIC803
3-Lead SOT-23 (M3)
(Top View)



Typical Application Circuit



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Supply Voltage (V_{CC}) ..... –0.3V to +6.0V
Reset Output (/RESET) ..... –0.3V to +6.0V
Input Current (V_{CC}) ..... 20 mA
Output Current (/RESET) ..... 20 mA
Rate of Rise (V_{CC}) 100V/µs
ESD Rating (Note 1) ..... 3 kV

Operating Ratings ‡

Supply Voltage (V_{CC}) ..... +1.0V to +5.5V
Reset Output Voltage (/RESET) ..... 0V to +5.5V

† Notice: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.
‡ Notice: The device is not guaranteed to function outside its operating rating.

Note 1: Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 kΩ in series with 100 pF.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: 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 valid for –40°C ≤ T_J ≤ +125°C; unless noted. (Note 1)

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

Note 1: Specification for packaged product only.

ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: 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 valid for –40°C ≤ T_J ≤ +125°C; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Reset Threshold	V_{TH}	3.89	4.00	4.10	V	MIC803-40, T_J = –40˚C to +85˚C
		3.80	—	4.20		MIC803-40, T_J = –40˚C to +125˚C
		3.00	3.08	3.15		MIC803-31, T_J = –40˚C to +85˚C
		2.95	—	3.21		MIC803-31, T_J = –40˚C to +125˚C
		2.93	3.00	3.08		MIC803-30, T_J = –40˚C to +85˚C
		2.90	—	3.11		MIC803-30, T_J = –40˚C to +125˚C
		2.82	2.93	3.00		MIC803-29, T_J = –40˚C to +85˚C
		2.81	—	3.05		MIC803-29, T_J = –40˚C to +125˚C
		2.55	2.63	2.70		MIC803-26, T_J = –40˚C to +85˚C
		2.50	—	2.76		MIC803-26, T_J = –40˚C to +125˚C
Reset Time						
V_{CC} to /RESET Delay	t_D	—	15	—	µs	V_{CC} = V_{TH} to (V_{TH} – 100 mV)
Reset Timeout Period	t_{RESET}	20	35	44	ms	D2, T_J = –40˚C to +85˚C
		16	—	48		D2, T_J = –40˚C to +125˚C
		140	230	360		D3, T_J = –40˚C to +85˚C
		112	—	420		D3, T_J = –40˚C to +125˚C
		1120	1800	2400		D4, T_J = –40˚C to +85˚C
		900	—	3200		D4, T_J = –40˚C to +125˚C
Reset Output						
/RESET Output Voltage	V_{OL}	—	—	**0.4**	V	V_{CC} ≥ 4.0V, I_{SINK} = 3.2 mA
		—	—	**0.3**		V_{CC} ≥ 2.5V, I_{SINK} = 1.2 mA
		—	—	**0.3**		V_{CC} ≥ 1.0V, I_{SINK} = 50 µA
/RESET Output Leakage	—	—	—	**1**	µA	V_{CC} > V_{TH}, /RESET deasserted

Note 1: Specification for packaged product only.

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Maximum Junction Temperature	$T_{J(MAX)}$	—	—	+150	°C	—
Storage Temperature Range	T_S	–65	—	+150	°C	—
Lead Temperature	—	—	—	+260	°C	Soldering, 10 sec.
Junction Temperature Range	T_J	–40	—	+125	°C	Note 1
Package Thermal Resistance						
Thermal Resistance, SC-70, 3-Ld	θ_{JA}	—	260	—	°C/W	—
Thermal Resistance, SOT-23, 3-Ld	θ_{JA}	—	203	—	°C/W	—

Note 1: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +125°C rating. Sustained junction temperatures above +125°C can impact the device reliability.

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

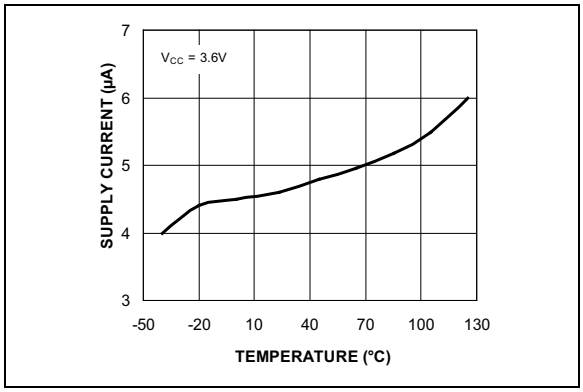


FIGURE 2-1: *V_{CC} Operating Supply Current vs. Temperature.*

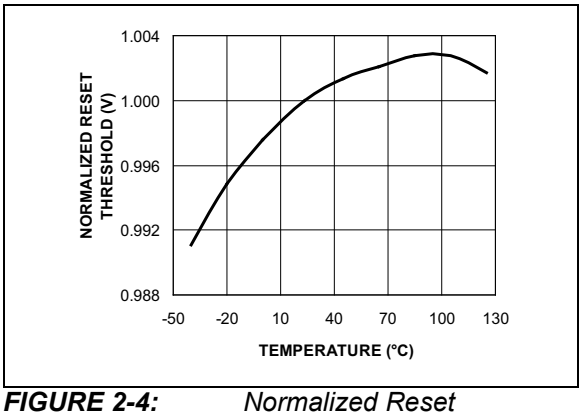


FIGURE 2-4: *Normalized Reset Threshold vs. Temperature.*

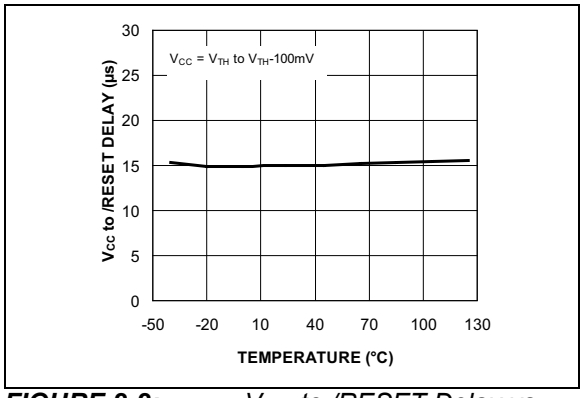


FIGURE 2-2: *V_{CC} to /RESET Delay vs. Temperature.*

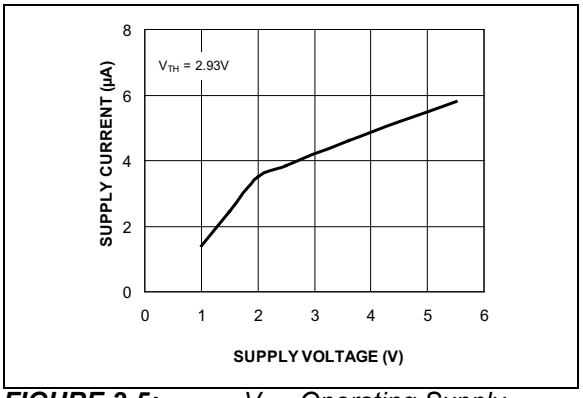


FIGURE 2-5: *V_{CC} Operating Supply Current vs. Supply Voltage.*

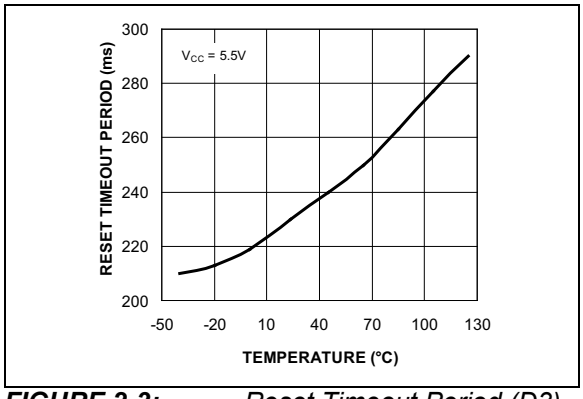


FIGURE 2-3: *Reset Timeout Period (D3) vs. Temperature.*

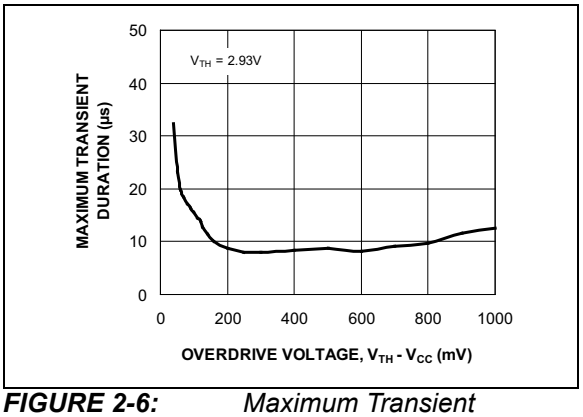


FIGURE 2-6: *Maximum Transient Duration vs. Overdrive.*

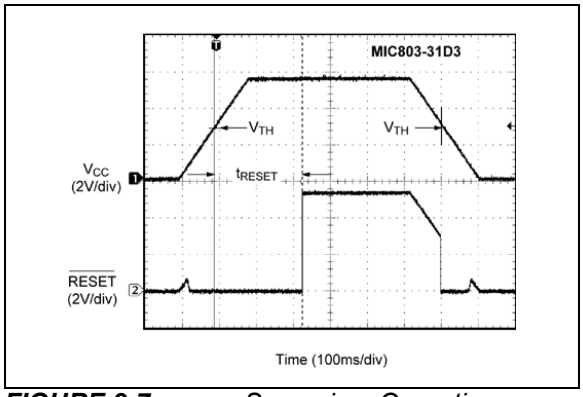
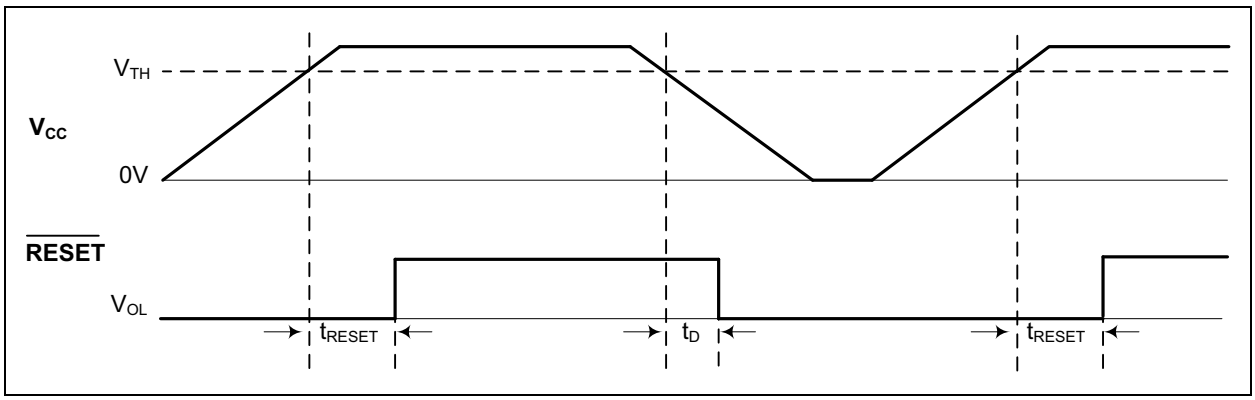


FIGURE 2-7: *Supervisor Operation.*

Timing Diagram



3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

TABLE 3-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	GND	Ground.
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.

4.0 APPLICATION INFORMATION

4.1 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 4-1, 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.

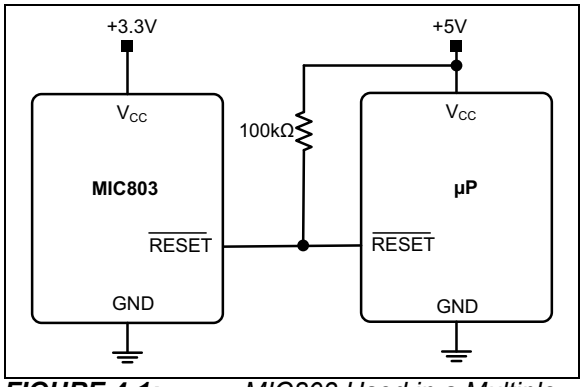


FIGURE 4-1: *MIC803 Used in a Multiple Supply System.*

4.2 /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.

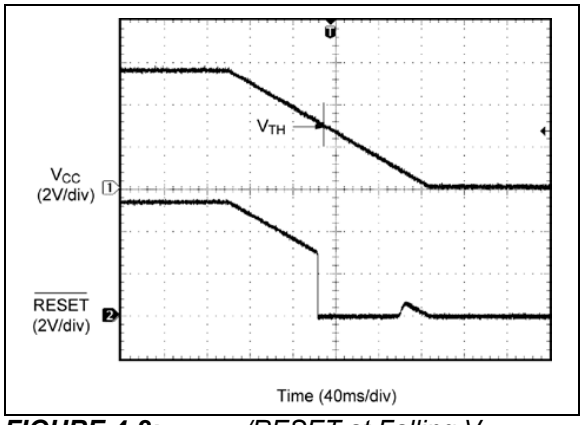


FIGURE 4-2: */RESET at Falling V_{CC}.*

4.3 Wire ORing the /RESET Output

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

4.4 V_{CC} Transients

The MIC803 is relatively immune to negative-going VCC glitches below the reset threshold (see Figure 2-6). As shown in Figure 4-3, the overdrive voltage is the difference between the threshold voltage and the minimum point of the V_{CC} glitch. Typically, an overdrive of 100 mV with duration of 15 µs or less will not cause a reset. If additional transient immunity is needed, a 0.1 µF bypass capacitor can be placed as close as possible to the MIC803 on the V_{CC} pin.

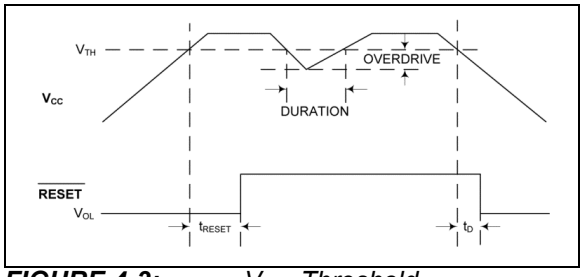
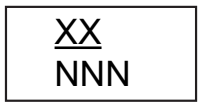


FIGURE 4-3: *V_{CC} Threshold.*

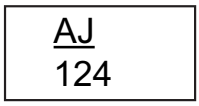
5.0 PACKAGING INFORMATION

5.1 Package Marking Information

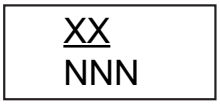
3-Lead SC-70*



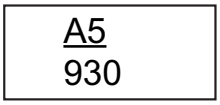
Example



3-Lead SOT-23*



Example



Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.	
	Underbar (_) and/or Overbar (¯) symbol may not be to scale.	

For a full list of MIC803 Marking Codes, please see the next page. For a full breakdown of part numbers and their options, see the Product Identification System.

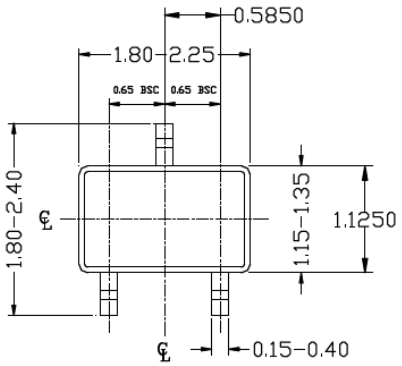
TABLE 5-1: MARKING CODES

SC-70 Part Number	Marking Code	Nominal V_{TH}	Min. t_{RESET}	SOT-23 Part Number	Marking Code	Nominal V_{TH}	Min. t_{RESET}
MIC803-46D2VC3	AS	4.63V	20 ms	MIC803-46D2VM3	AS	4.63V	20 ms
MIC803-44D2VC3	AP	4.38V	20 ms	MIC803-44D2VM3	AP	4.38V	20 ms
MIC803-41D2VC3	AK	4.10V	20 ms	MIC803-41D2VM3	AK	4.10V	20 ms
MIC803-40D2VC3	A2	4.00V	20 ms	MIC803-40D2VM3	A2	4.00V	20 ms
MIC803-31D2VC3	AG	3.08V	20 ms	MIC803-31D2VM3	AG	3.08V	20 ms
MIC803-30D2VC3	AV	3.00V	20 ms	MIC803-30D2VM3	AV	3.00V	20 ms
MIC803-29D2VC3	AD	2.93V	20 ms	MIC803-29D2VM3	AD	2.93V	20 ms
MIC803-26D2VC3	AA	2.63V	20 ms	MIC803-26D2VM3	AA	2.63V	20 ms
MIC803-46D3VC3	AT	4.63V	140 ms	MIC803-46D3VM3	AT	4.63V	140 ms
MIC803-44D3VC3	AQ	4.38V	140 ms	MIC803-44D3VM3	AQ	4.38V	140 ms
MIC803-41D3VC3	AM	4.10V	140 ms	MIC803-41D3VM3	AM	4.10V	140 ms
MIC803-40D3VC3	A5	4.00V	140 ms	MIC803-40D3VM3	A5	4.00V	140 ms
MIC803-31D3VC3	A4	3.08V	140 ms	MIC803-31D3VM3	A4	3.08V	140 ms
MIC803-30D3VC3	AX	3.00V	140 ms	MIC803-30D3VM3	AX	3.00V	140 ms
MIC803-29D3VC3	AE	2.93V	140 ms	MIC803-29D3VM3	AE	2.93V	140 ms
MIC803-26D3VC3	AB	2.63V	140 ms	MIC803-26D3VM3	AB	2.63V	140 ms
MIC803-46D4VC3	AU	4.63V	1120 ms	MIC803-46D4VM3	AU	4.63V	1120 ms
MIC803-44D4VC3	AR	4.38V	1120 ms	MIC803-44D4VM3	AR	4.38V	1120 ms
MIC803-41D4VC3	AN	4.10V	1120 ms	MIC803-41D4VM3	AN	4.10V	1120 ms
MIC803-40D4VC3	A6	4.00V	1120 ms	MIC803-40D4VM3	A6	4.00V	1120 ms
MIC803-31D4VC3	AJ	3.08V	1120 ms	MIC803-31D4VM3	AJ	3.08V	1120 ms
MIC803-30D4VC3	AZ	3.00V	1120 ms	MIC803-30D4VM3	AZ	3.00V	1120 ms
MIC803-29D4VC3	A3	2.93V	1120 ms	MIC803-29D4VM3	A3	2.93V	1120 ms
MIC803-26D4VC3	AC	2.63V	1120 ms	MIC803-26D4VM3	AC	2.63V	1120 ms

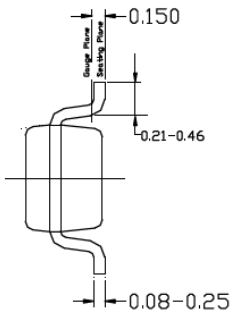
3-Lead SC-70 Package Outline and Recommended Land Pattern

TITLE
3 LEAD SC70 PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

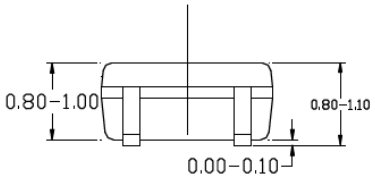
DRAWING #	SC70-3LD-PL-1	**UNIT**	MM
Lead Frame	Copper	**Lead Finish**	Matte Tin



TOP VIEW

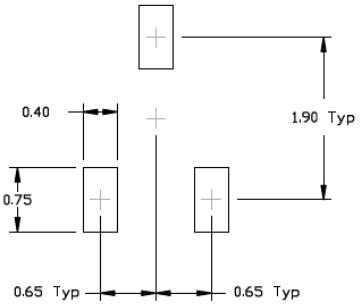


END VIEW



SIDE VIEW

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONS ARE INCLUSIVE OF PLATING.
3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR.



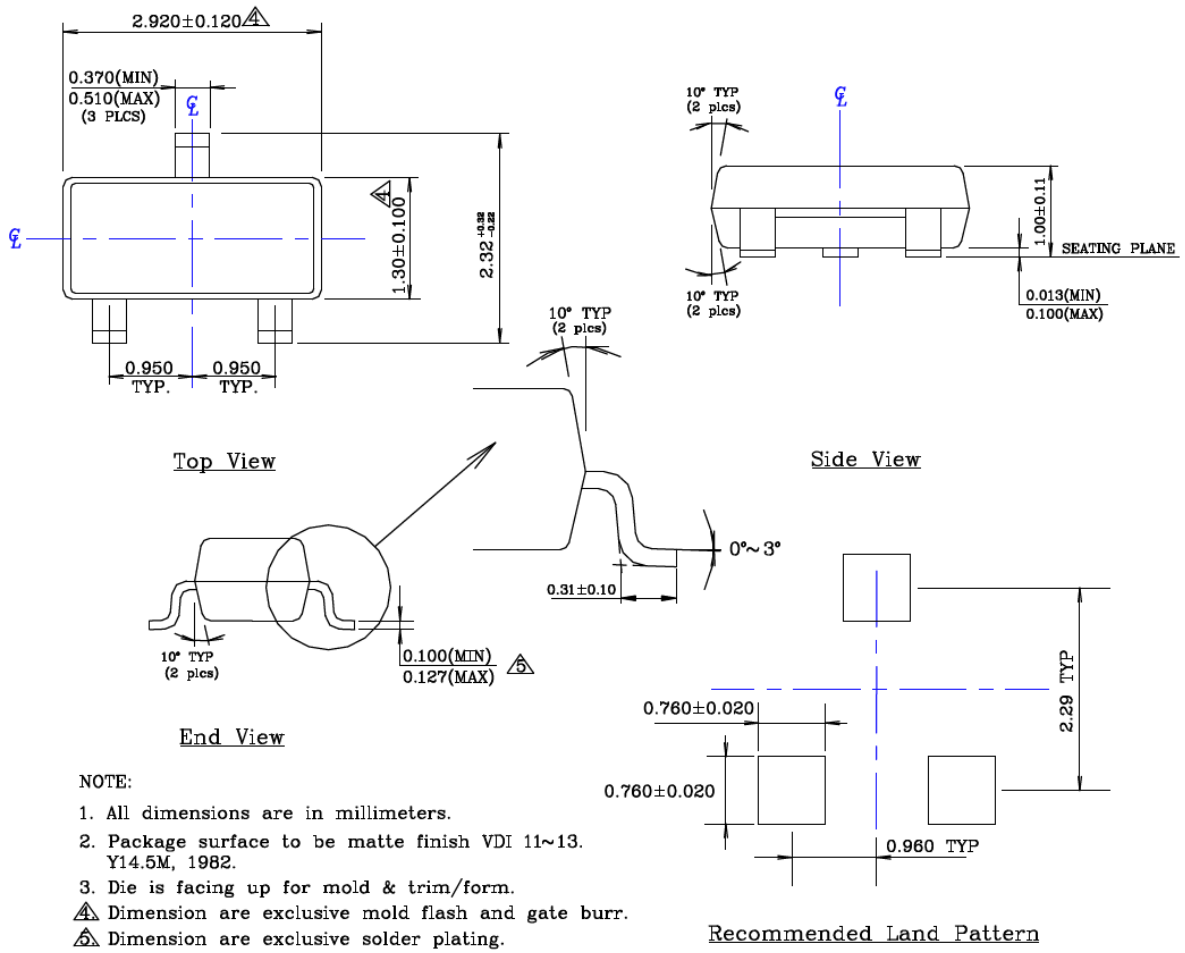
RECOMMENDED LAND PATTERN

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

3-Lead SOT-23 Package Outline and Recommended Land Pattern

TITLE
3 LEAD SOT23 PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	SOT23-3LD-PL-1	UNIT	MM



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.

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (December 2020)

- Converted Micrel document MIC803 to Microchip data sheet template DS20006456A.
- Minor grammatical text changes throughout.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

Device	-XX	XX	X	XX	-XX
Part No.	Nominal V_{TH}	Min. Reset Time	Temp. Range	Package	Media Type

Device:	MIC803:	3-Pin Microprocessor Supervisor Circuit with Open-Drain Reset Output	
Nominal V_{TH}:	26	=	2.63V
	29	=	2.93V
	30	=	3.00V
	31	=	3.08V
	40	=	4.00V
	41	=	4.10V
	44	=	4.38V
	46	=	4.63V
Minimum Reset Time:	D2	=	20 ms
	D3	=	140 ms
	D4	=	1120 ms
Temperature Range:	V	=	–40°C to +125°C
Package:	C3	=	3-Lead SC-70
	M3	=	3-Lead SOT-23
Media Type:	TR	=	3,000/Reel

Examples:

a) MIC803-26D2VC3-TR: MIC803, 2.63V Nominal V_{TH}, 20 ms Min. Reset Time, –40°C to +125°C Temp. Range, 3-Lead SC-70, 3,000/Reel

b) MIC803-31D3VM3-TR: MIC803, 3.08V Nominal V_{TH}, 140 ms Min. Reset Time, –40°C to +125°C Temp. Range, 3-Lead SOT-23, 3,000/Reel

c) MIC803-44D4VC3-TR: MIC803, 4.38V Nominal V_{TH}, 1120 ms Min. Reset Time, –40°C to +125°C Temp. Range, 3-Lead SC-70, 3,000/Reel

d) MIC803-46D2VM3-TR: MIC803, 4.63V Nominal V_{TH}, 20 ms Min. Reset Time, –40°C to +125°C Temp. Range, 3-Lead SOT-23, 3,000/Reel

e) MIC803-29D3VC3-TR: MIC803, 2.93V Nominal V_{TH}, 140 ms Min. Reset Time, –40°C to +125°C Temp. Range, 3-Lead SC-70, 3,000/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods being used in attempts to breach the code protection features of the Microchip devices. We believe that these methods require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Attempts to breach these code protection features, most likely, cannot be accomplished without violating Microchip's intellectual property rights.
- Microchip is willing to work with any customer who is concerned about the integrity of its code.
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