

# NCP803

## Very Low Supply Current 3-Pin Microprocessor Reset Monitor

The NCP803 is a cost-effective system supervisor circuit designed to monitor  $V_{CC}$  in digital systems and provide a reset signal to the host processor when necessary. No external components are required.

The reset output is driven active within 10  $\mu$ sec of  $V_{CC}$  falling through the reset voltage threshold. Reset is maintained active for a minimum of 140 msec after  $V_{CC}$  rises above the reset threshold. The NCP803 has an open drain active-low  $\overline{\text{RESET}}$  output. The output of the NCP803 is guaranteed valid down to  $V_{CC} = 1.0$  V and is available in a SOT-23 package.

The NCP803 is optimized to reject fast transient glitches on the  $V_{CC}$  line. Low supply current of 1.0  $\mu$ A ( $V_{CC} = 3.2$  V) make this device suitable for battery powered applications.

### Features

- Precision  $V_{CC}$  Monitor for 2.5 V, 3.0 V, 3.3 V, and 5.0 V Supplies
- Precision Monitoring Voltages from 1.6 V to 4.9 V Available in 100 mV Steps
- 140 msec Guaranteed Minimum  $\overline{\text{RESET}}$  Output Duration
- $\overline{\text{RESET}}$  Output Guaranteed to  $V_{CC} = 1.0$  V
- Low 1.0  $\mu$ A Supply Current
- $V_{CC}$  Transient Immunity
- Small SOT-23 Package
- No External Components
- Wide Operating Temperature:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$

### Typical Applications

- Computers
- Embedded Systems
- Battery Powered Equipment
- Critical  $\mu$ P Power Supply Monitoring

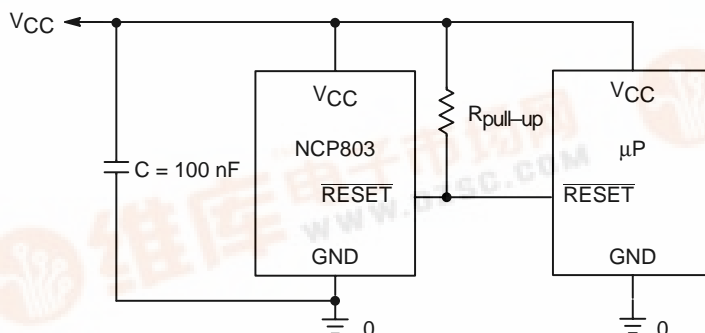


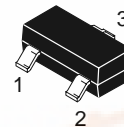
Figure 1. Typical Application Diagram



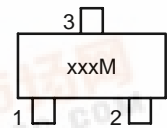
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### MARKING DIAGRAM

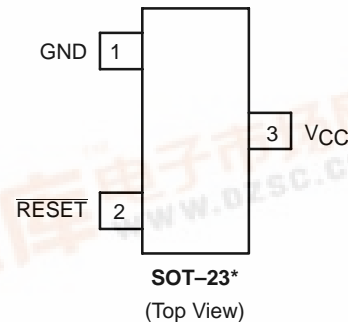


SOT-23  
(TO-236)  
CASE 318



xxx = Specific Device Code  
M = Monthly Date Code

### PIN CONFIGURATION



NOTE: \*SOT-23 is equivalent to JEDEC (TO-236)

### ORDERING INFORMATION

Device	Package	Shipping
NCP803SNxxxT1	SOT-23	3000/Tape & Reel

NOTE: The "xxx" denotes a suffix for  $V_{CC}$  voltage threshold options – see page 6 for more details.

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 6 of this data sheet.



# NCP803

## ABSOLUTE MAXIMUM RATINGS\* (Note 1)

Rating	Symbol	Value	Unit
Supply Voltage ( $V_{CC}$ to GND)	$V_{CC}$	6.0	V
RESET		-0.3 to ( $V_{CC} + 0.3$ )	V
Input Current, $V_{CC}$		20	mA
Output Current, RESET		20	mA
dV/dt ( $V_{CC}$ )		100	V/ $\mu$ sec
Thermal Resistance, Junction to Air	$R_{\theta JA}$	491	$^{\circ}\text{C/W}$
Operating Temperature Range	$T_A$	-40 to +105	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^{\circ}\text{C}$
Lead Temperature (Soldering, 10 Seconds)	$T_{sol}$	+260	$^{\circ}\text{C}$
Latch-up performance: Negative	$I_{Latch-up}$	150	mA

\*Maximum Ratings are those values beyond which damage to the device may occur.

1. This device series contains ESD protection and exceeds the following tests:

Human Body Model 4000 V per MIL-STD-883, Method 3015.

Machine Model Method 400 V.

2. The maximum package power dissipation limit must not be exceeded.

$$P_D = \frac{T_{J(max)} - T_A}{R_{\theta JA}} \quad \text{with } T_{J(max)} = 150^{\circ}\text{C}$$

## ELECTRICAL CHARACTERISTICS $T_A = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ unless otherwise noted. Typical values are at $T_A = +25^{\circ}\text{C}$ . (Note 3)

Characteristic	Symbol	Min	Typ	Max	Unit
$V_{CC}$ Range $T_A = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$		1.0 1.2	– –	5.5 5.5	V
Supply Current $V_{CC} = 3.3\text{ V}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = 85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ $V_{CC} = 5.5\text{ V}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = 85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$	$I_{CC}$	– – – –	0.5 – 0.8 –	1.2 2.0 1.8 2.5	$\mu\text{A}$
Reset Threshold (Note 4) NCP803SN308 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ NCP803SN293 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ NCP803SN263 $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $T_A = +85^{\circ}\text{C}$ to $+105^{\circ}\text{C}$	$V_{TH}$	3.04 3.00 2.92  2.89 2.85 2.78  2.59 2.55 2.50	3.08 – –  2.93 – –  2.63 – –	3.11 3.15 3.23  2.96 3.00 3.08  2.66 2.70 2.76	V

3. Production testing done at  $T_A = 25^{\circ}\text{C}$ , over temperature limits guaranteed by design.

4. Contact your ON Semiconductor sales representative for other threshold voltage options.

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**ELECTRICAL CHARACTERISTICS (continued)**  $T_A = -40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$  unless otherwise noted. Typical values are at  $T_A = +25^{\circ}\text{C}$ .  
(Note 5)

Characteristic	Symbol	Min	Typ	Max	Unit
Reset Temperature Coefficient		–	30	–	ppm/ $^{\circ}\text{C}$
$V_{CC}$ to Reset Delay $V_{CC} = V_{TH}$ to $(V_{TH} - 100\text{ mV})$		–	10	–	$\mu\text{sec}$
Reset Active Timeout Period		140	240	460	msec
$\overline{\text{RESET}}$ Output Voltage Low $V_{CC} = V_{TH} - 0.2\text{ V}$ $1.6\text{ V} \leq V_{TH} \leq 2.0\text{ V}$ , $I_{\text{SINK}} = 0.5\text{ mA}$ $2.1\text{ V} \leq V_{TH} \leq 4.0\text{ V}$ , $I_{\text{SINK}} = 1.2\text{ mA}$ $4.1\text{ V} \leq V_{TH} \leq 4.9\text{ V}$ , $I_{\text{SINK}} = 3.2\text{ mA}$	$V_{OL}$	–	–	0.3	V
$\overline{\text{RESET}}$ Leakage Current $V_{CC} > V_{TH}$ , $\overline{\text{RESET}}$ De-asserted	$I_{\text{LEAK}}$	–	–	1	$\mu\text{A}$

5. Production testing done at  $T_A = 25^{\circ}\text{C}$ , over temperature limits guaranteed by design.

### PIN DESCRIPTION

Pin No.	Symbol	Description
1	GND	Ground
2	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$ output remains low while $V_{CC}$ is below the reset voltage threshold, and for 240 msec (typ.) after $V_{CC}$ rises above reset threshold.
3	$V_{CC}$	Supply Voltage: C = 100 nF is recommended as a bypass capacitor between $V_{CC}$ and GND.

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## APPLICATIONS INFORMATION

### V<sub>CC</sub> Transient Rejection

The NCP803 provides accurate V<sub>CC</sub> monitoring and reset timing during power-up, power-down, and brownout/sag conditions, and rejects negative-going transients (glitches) on the power supply line. Figure 2 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive which lies **under** the curve will **not** generate a reset signal. Combinations above the curve are detected as a brownout or power-down. Typically, transient that goes 100 mV below the reset threshold and lasts 5 μs or less will not cause a reset pulse. Transient immunity can be improved by adding a capacitor in close proximity to the V<sub>CC</sub> pin.

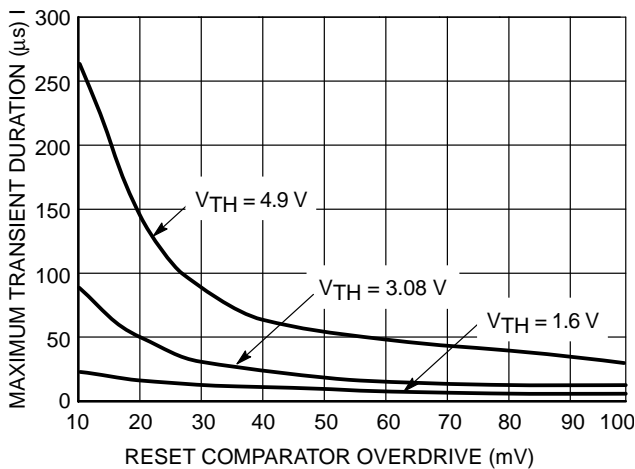
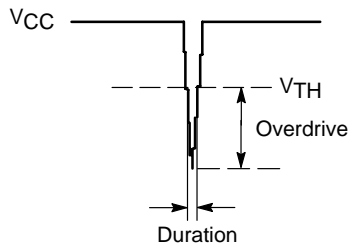


Figure 2. Maximum Transient Duration vs. Overdrive for Glitch Rejection at 25°C

### Processors With Bidirectional I/O Pins

Some μP's (such as Motorola 68HC11) have bi-directional reset pins which interface easily with the Open Drain RESET output of the NCP803. As shown in Figure 3, one can connect directly to the RESET output of the NCP803 to the RESET pin of the μP. The pull-up resistor avoids an undetermined voltage of the RESET pin.

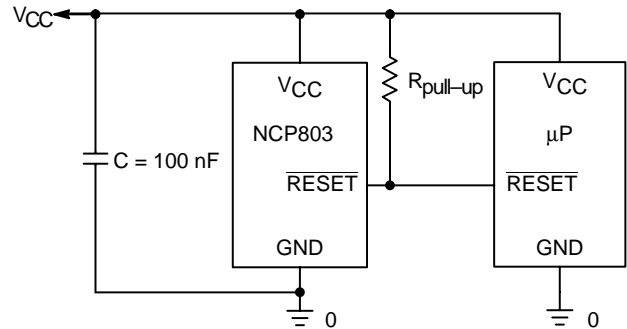


Figure 3. Interfacing to Bidirectional Reset I/O

### NCP803 RESET Output Allows Use With Two Power Supplies

In numerous applications the pull-up resistor placed on the RESET output is connected to the supply voltage monitored by the IC. Nevertheless, a different supply voltage can also power this output and so level-shift from the monitored supply to reset the μP. However, if the NCP803's supply goes below 1 V, the RESET output ability to sink current will decrease and the result is a high state on the pin even though the supply's IC is under the threshold level. This occurs at a V<sub>CC</sub> level that depends on the R<sub>pull-up</sub> value and the voltage to which it is connected.

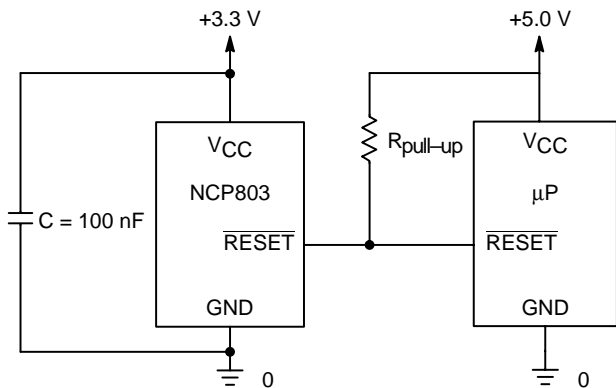


Figure 4. RESET Output with Two Power Supplies

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## TYPICAL CHARACTERISTICS

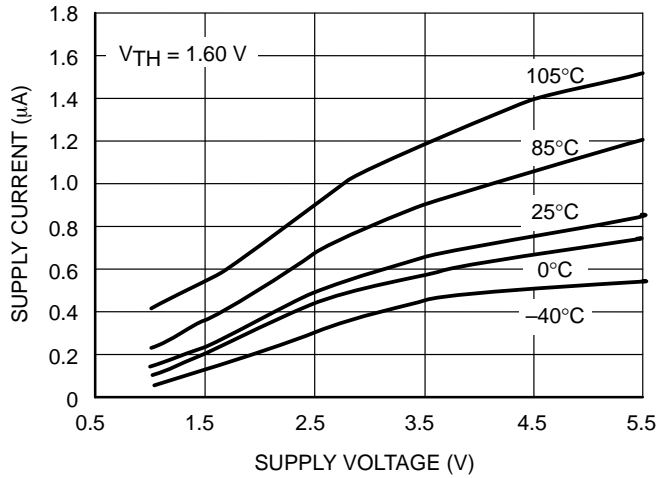


Figure 5. Supply Current vs. Supply Voltage

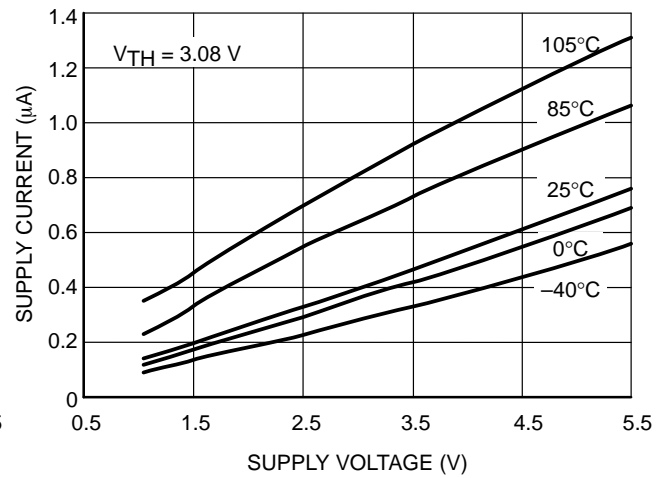


Figure 6. Supply Current vs. Supply Voltage

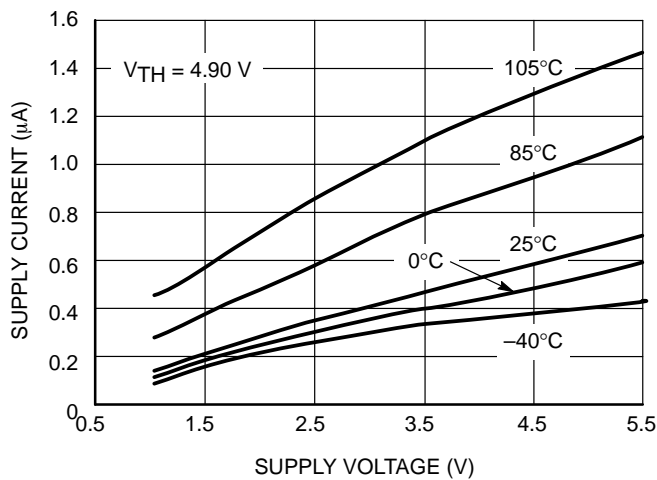


Figure 7. Supply Current vs. Supply Voltage

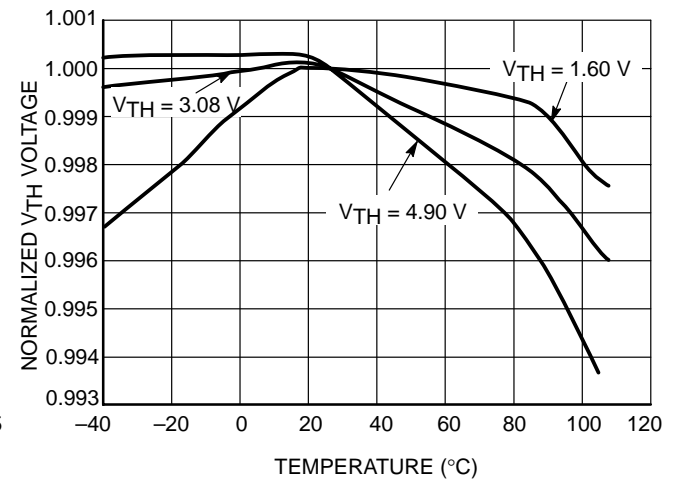


Figure 8. Normalized Reset Threshold Voltage vs. Temperature

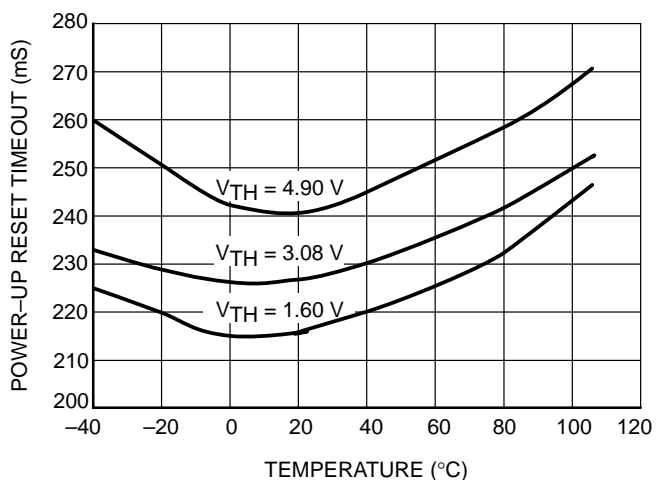


Figure 9. Power-up Reset Timeout vs. Temperature

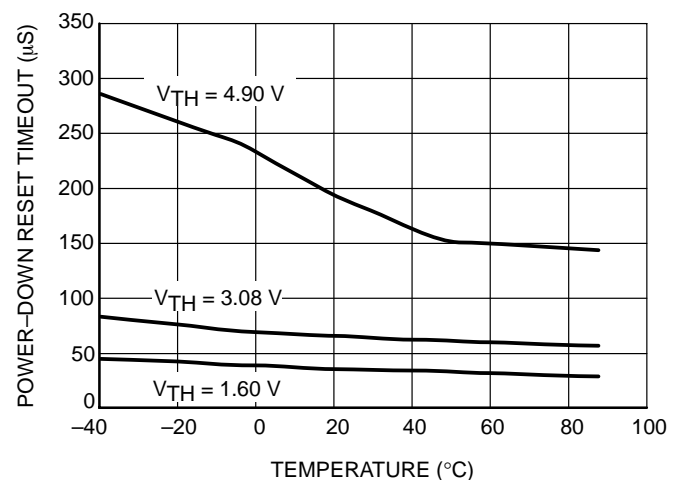
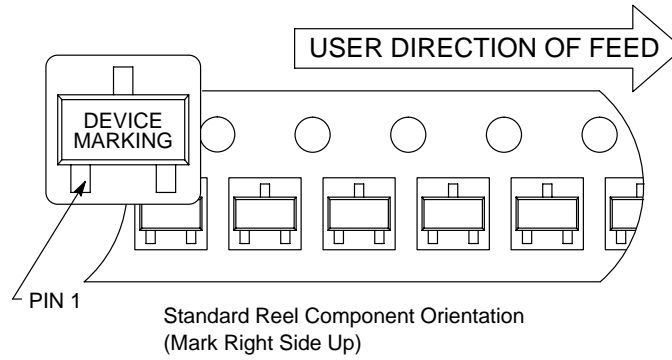


Figure 10. Power-down Reset Timeout vs. Temperature (Overdrive = 20 mV)

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## TAPING FORM

### Component Taping Orientation for 3L SOT-23 (JEDEC-236) Devices



**Tape & Reel Specifications Table**

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-23	8 mm	4 mm	3000	7 inches

## MARKING AND THRESHOLD INFORMATION

ON Semiconductor Part #	V <sub>TH</sub> *	Marking (Note 6)
NCP803SN263T1	2.63	SQCM
NCP803SN293T1	2.93	SQDM
NCP803SN308T1	3.08	SQEM

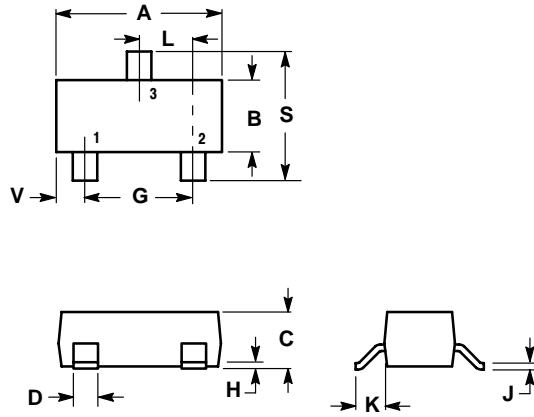
\*Contact your ON Semiconductor sales representative for other threshold voltage options.

6. M = Monthly Date Code

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## PACKAGE DIMENSIONS

**SOT-23**  
PLASTIC PACKAGE (TO-236)  
CASE 318-08  
ISSUE AH




### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-03 AND -07 OBSOLETE, NEW STANDARD 318-08.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

## NCP803

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