MAX811, MAX812

4-Pin μP Reset Monitors

The MAX811 and MAX812 are cost–effective system supervisor circuits designed to monitor V_{CC} in digital systems and provide a reset signal to the host processor when necessary. A manual reset input is provided to override the reset monitor, and is suitable for use as a push–button reset. No external components are required.

The reset output is driven active within 20 μsec (4 μsec for F version) 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 MAX812 has an active–high RESET output while the MAX811 has an active–low $\overline{\text{RESET}}$ output. The output of the MAX811 is guaranteed valid down to V_{CC} = 1 V. Both devices are available in a 4–Pin SOT–143 package.

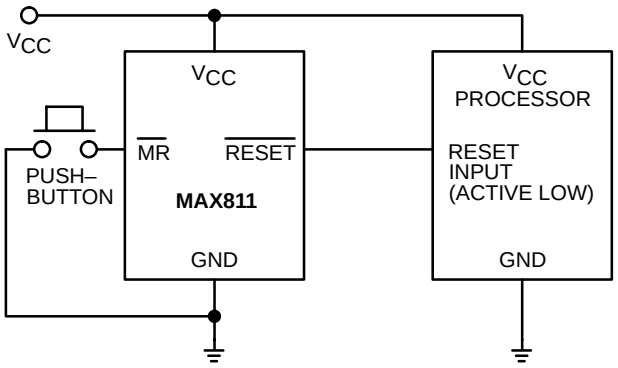
The MAX811/12 are optimized to reject fast transient glitches on the V_{CC} line. Low supply current of 7 μA (V_{CC} = 3.3 V) makes these devices suitable for battery powered applications.

Features

- Precision V_{CC} Monitor for 1.8 V, 2.7 V, 3.0 V, 3.3 V, 5.0 V Nominal Supplies
- Manual Reset Input
- 140 msec Guaranteed Minimum $\overline{\text{RESET}}$, RESET Output Duration
- $\overline{\text{RESET}}$ Output Guaranteed to V_{CC} = 1.0 V (MAX811)
- Low 7 μA Supply Current
- V_{CC} Transient Immunity
- Small SOT–143–4 Package
- No External Components

Typical Applications

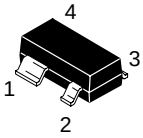
- Computers
- Embedded Systems
- Battery Powered Equipment
- Critical μP Power Supply Monitoring



Typical Operating Circuit

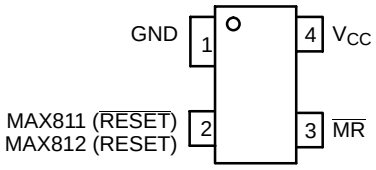
ON Semiconductor™

http://onsemi.com



SOT–143
CASE 318A

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

DEVICE MARKING INFORMATION

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

ABSOLUTE MAXIMUM RATINGS*

Rating	Symbol	Value	Unit
Supply Voltage (V_{CC} to GND)	–	+6.0	V
$\overline{RESET}$, RESET	–	–0.3 to (V_{CC} +0.3)	V
Input Current, V_{CC}	–	20	mA
Output Current, $\overline{RESET}$, RESET	–	20	mA
Operating Temperature Range	T_A	–40 to +85	°C
Storage Temperature Range	T_{stg}	–65 to +150	°C
Lead Temperature (Soldering, 10 sec)	–	+260	°C

*This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS (V_{CC} = 5 V for L/M versions, V_{CC} = 3.3 V for T/S versions, V_{CC} = 3 V for R version, V_{CC} = 2.0 V for F version. T_A = –40°C to +85°C unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1.)

Characteristics	Test Conditions	Symbol	Min	Typ	Max	Unit
V_{CC} Range	–	V_{CC}	1.2	–	5.5	V
Supply Current	$V_{CC} > V_{TH}$, for L, M, R, S, T, F $V_{CC} < V_{TH}$, for L, M, R, S, T $V_{CC} < V_{TH}$, for F	I_{CC}	– – –	7.0 10 6.0	15 15 12	μA
Reset Threshold	MAX81_L: T_A = +25°C T_A = –40°C to +85°C MAX81_M: T_A = +25°C T_A = –40°C to +85°C MAX81_T: T_A = +25°C T_A = –40°C to +85°C MAX81_S: T_A = +25°C T_A = –40°C to +85°C MAX81_R: T_A = +25°C T_A = –40°C to +85°C MAX81_F: T_A = +25°C T_A = –40°C to +85°C	V_{TH}	4.54 4.50 4.30 4.25 3.03 3.00 2.88 2.85 2.58 2.55 1.71 1.70	4.63 – 4.38 – 3.08 – 2.93 – 2.63 – 1.75 –	4.72 4.75 4.46 4.50 3.14 3.15 2.98 3.00 2.68 2.70 1.79 1.80	V
Reset Threshold Tempco	–	–	–	30	–	ppm/°C
V_{CC} to Reset Delay	V_{CC} = V_{TH} to V_{TH} –125 mV; L, M, R, S, T, F	–	– –	20 5.0	– –	μsec
Reset Active Timeout Period	V_{CC} = $V_{TH(MAX)}$	t_{RP}	140	280	560	msec
MR Minimum Pulse Width	–	tMR	10	–	–	μsec
MR Glitch Immunity	–	–	–	0.1	–	μsec
MR to Reset Propagation Delay	–	t_{MD}	–	0.5	–	μsec
MR Input Threshold	$V_{CC} > V_{TH(MAX)}$, MAX81_L/M	V_{IH} V_{IL}	2.3 –	– –	– 0.8	V
–	$V_{CC} > V_{TH(MAX)}$, MAX81_R/S/T/F	V_{IH} V_{IL}	0.7 V_{CC} –	– –	– 0.15 V_{CC}	V
MR Pull–up Resistance	–	–	10	20	40	KΩ
RESET Output Voltage High (MAX812)	I_{SOURCE} = 150 μA; $V_{CC} \le V_{TH(MIN)}$	V_{OH}	0.8 V_{CC}	–	–	V

1. Production testing done at T_A = +25°C, over temperature limits guaranteed by design.

ELECTRICAL CHARACTERISTICS (continued) (V_{CC} = 5 V for L/M versions, V_{CC} = 3.3 V for T/S versions, V_{CC} = 3 V for R version, V_{CC} = 2.0 V for F version. T_A = –40°C to +85°C unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1.)

Characteristics	Symbol	Test Conditions	Min	Typ	Max	Unit
RESET Output Voltage Low (MAX812)	V_{OL}	MAX812F only, I_{SINK} = 500 μA, $V_{CC} = V_{TH(MAX)}$	–	–	0.2	V
		MAX812R/S/T only, I_{SINK} = 1.2 mA, $V_{CC} = V_{TH(MAX)}$	–	–	0.3	
		MAX812L/M only, I_{SINK} = 3.2 mA, $V_{CC} = V_{TH(MAX)}$	–	–	0.4	
$\overline{\text{RESET}}$ Output Voltage Low (MAX811)	V_{OL}	MAX811R/S/T only, I_{SINK} = 1.2 mA, $V_{CC} = V_{TH(MIN)}$	–	–	0.3	V
		MAX811F only, I_{SINK} = 500 μA, $V_{CC} = V_{TH(MIN)}$				
		MAX811L/M only, I_{SINK} = 3.2 mA, $V_{CC} = V_{TH(MIN)}$	–	–	0.4	
		I_{SINK} = 50 μA, V_{CC} > 1.0 V	–	–	TBD	
$\overline{\text{RESET}}$ Output Voltage High (MAX811)	V_{OH}	MAX811L/M only, I_{SOURCE} = 800 μA, $V_{CC} > V_{TH(MAX)}$	V_{CC} –1.5	–	–	V
		MAX811R/S/T/F only, I_{SOURCE} = 500 μA, $V_{CC} > V_{TH(MAX)}$	0.8 V_{CC}	–	–	

1. Production testing done at T_A = +25°C, over temperature limits guaranteed by design.
2. $\overline{\text{RESET}}$ output for MAX811, RESET output for MAX812.

PIN DESCRIPTION

Pin Number	Symbol	Description
1	GND	Ground
2	$\overline{\text{RESET}}$ (MAX811)	RESET output remains low while V_{CC} is below the reset voltage threshold, and for at least 140 msec min. after V_{CC} rises above reset threshold.
2	RESET (MAX812)	RESET output remains high while V_{CC} is below the reset voltage threshold, and for at least 140 msec min. after V_{CC} rises above reset threshold.
3	$\overline{\text{MR}}$	Manual Reset input generates a reset when $\overline{\text{MR}}$ is below V_{IL}.
4	V_{CC}	Supply voltage

APPLICATIONS INFORMATION

V_{CC} Transient Rejection

The MAX811/12 provides accurate V_{CC} 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 1 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive that lays **under** the curve will **not** generate a reset signal. Combinations above the curve are detected as a brownout or power–down. Transient immunity can be improved by adding a capacitor in close proximity to the V_{CC} pin of the MAX811/12.

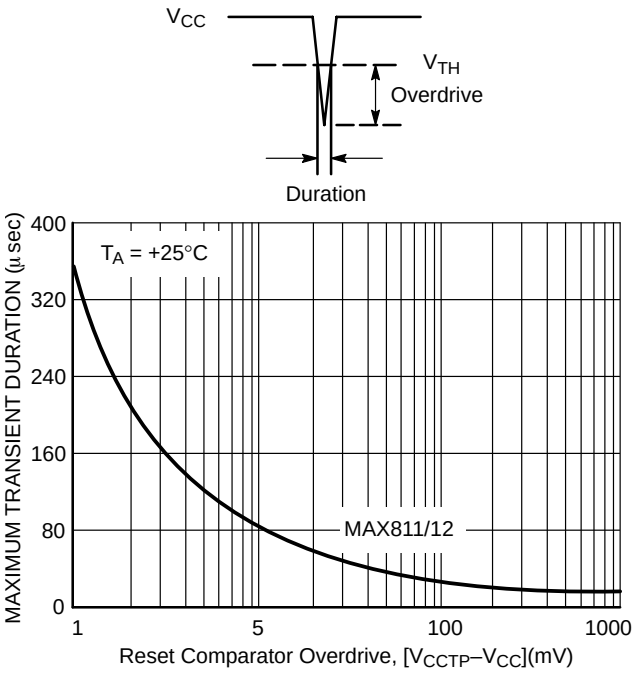


Figure 1. Maximum Transient Duration vs. Overdrive for Glitch Rejection at 25°C

RESET Signal Integrity During Power–Down

The MAX811 $\overline{\text{RESET}}$ output is valid to V_{CC} = 1.0 V. Below this voltage the output becomes an "open circuit'' and does not sink current. This means CMOS logic inputs to the μP will be floating at an undetermined voltage. Most digital systems are completely shutdown well above this voltage. However, in situations where $\overline{\text{RESET}}$ must be maintained valid to V_{CC} = 0 V, a pull–down resistor must be connected from $\overline{\text{RESET}}$ to ground to discharge stray capacitances and hold the output low (Figure 2). This resistor value, though not critical, should be chosen such that it does not appreciably load $\overline{\text{RESET}}$ under normal operation (100 kΩ will be suitable for most applications). Similarly, a pull–up resistor to V_{CC} is required for the MAX812 to ensure a valid high $\overline{\text{RESET}}$ for V_{CC} below 1.1 V.

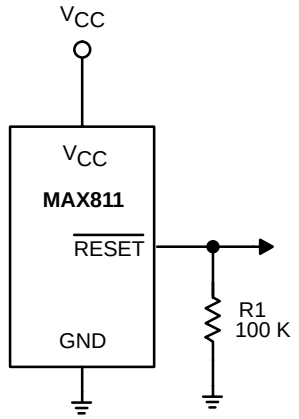


Figure 2. Ensuring $\overline{\text{RESET}}$ Valid to V_{CC} = 0 V

Processors with Bidirectional I/O Pins

Some μP's (such as Motorola's 68HC11) have bi–directional reset pins. Depending on the current drive capability of the processor pin, an indeterminate logic level may result if there is a logic conflict. This can be avoided by adding a 4.7 kΩ resistor in series with the output of the MAX811/12 (Figure 3). If there are other components in the system which require a reset signal, they should be buffered so as not to load the reset line. If the other components are required to follow the reset I/O of the μP, the buffer should be connected as shown with the solid line.

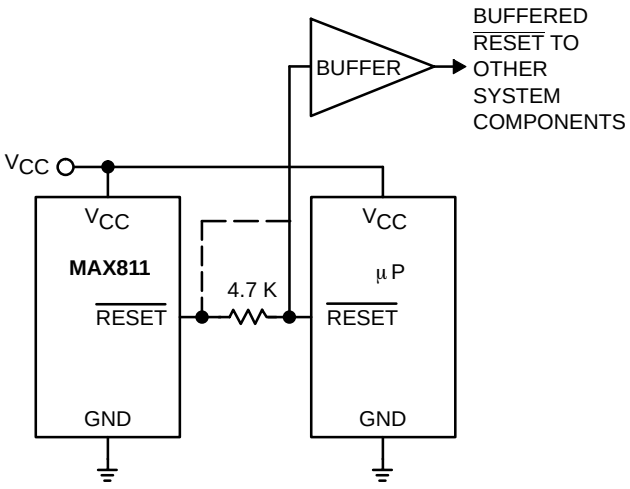


Figure 3. Interfacing to Bidirectional Reset I/O

TYPICAL CHARACTERISTICS

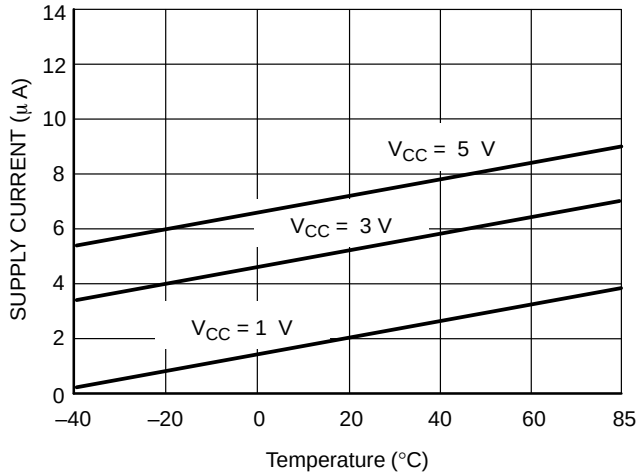


Figure 4. Supply Current vs. Temperature (No Load, MAX81xR/S/T/F)

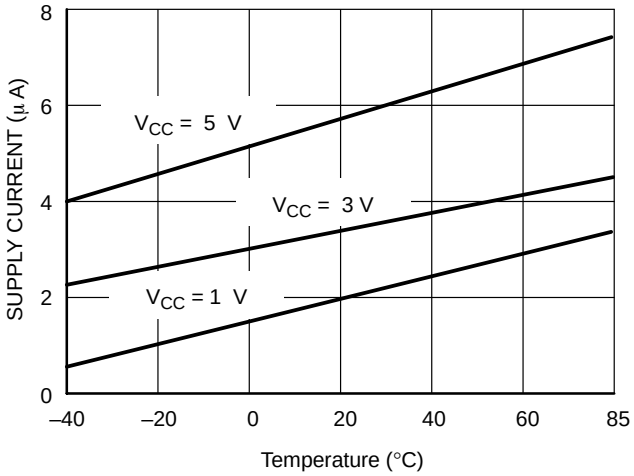


Figure 5. Supply Current vs. Temperature (No Load, MAX81xL/M)

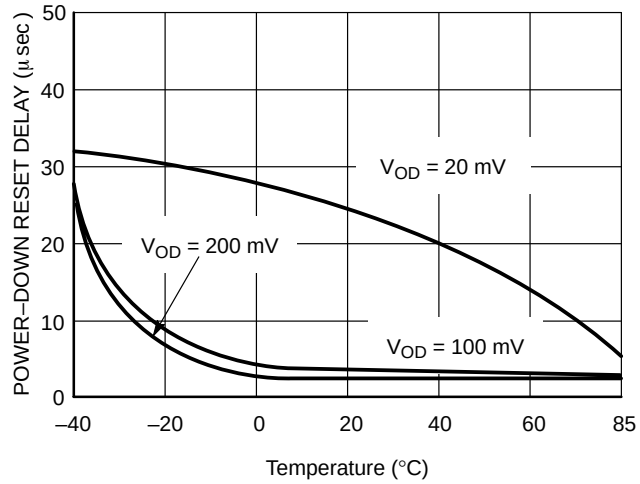


Figure 6. Power–Down Reset Delay vs. Temperature (MAX81xF)

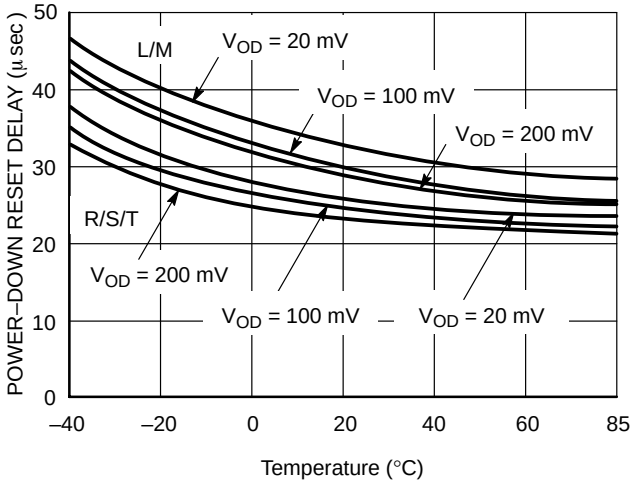


Figure 7. Power–Down Reset Delay vs. Temperature (MAX81xL/M/R/S/T)

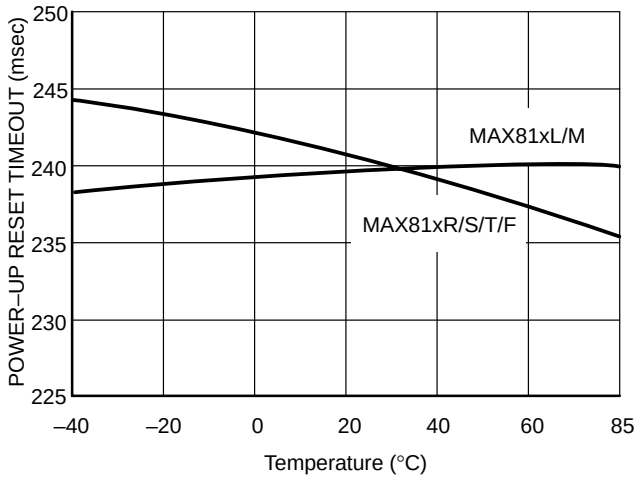


Figure 8. Power–Up Reset Timeout vs. Temperature

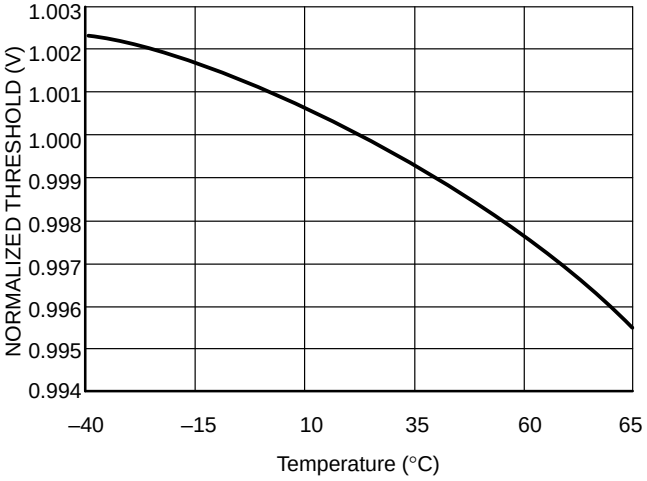
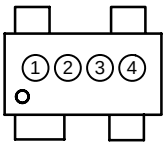


Figure 9. Normalized Reset Threshold vs. Temperature

MARKING DIAGRAM



(1) and (2) = Part Number Code and Temperature Range (two–digit code)
(3) = Year and Quarter Code
(4) = Lot ID Number

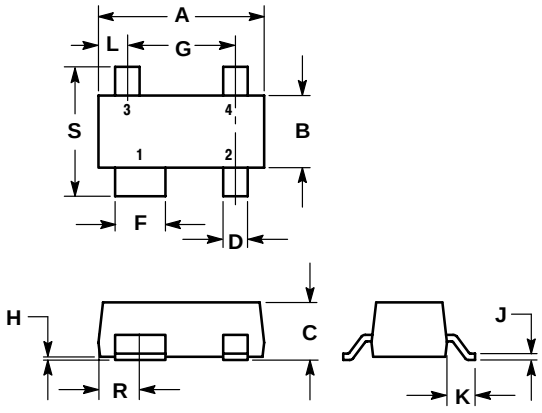
ORDERING INFORMATION

Device	Threshold Voltage	Marking (1) and (2)	Package (Qty/Reel)
MAX811LEUS–T*	4.63	S1	3000 Units Tape and Reel
MAX811MEUS–T*	4.38	S2	
MAX811TEUS–T	3.08	S3	
MAX811SEUS–T*	2.93	S4	
MAX811REUS–T*	2.63	S5	
MAX811FEUS–T	1.75	S7	
MAX812LEUS–T*	4.63	T1	
MAX812MEUS–T*	4.38	T2	
MAX812TEUS–T	3.08	T3	
MAX812SEUS–T*	2.93	T4	
MAX812REUS–T*	2.63	T5	
MAX812FEUS–T	1.75	T7	

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

PACKAGE DIMENSIONS

SOT–143
CASE 318A–05
ISSUE R



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	2.80	3.04	0.110	0.120
B	1.20	1.39	0.047	0.055
C	0.84	1.14	0.033	0.045
D	0.39	0.50	0.015	0.020
F	0.79	0.93	0.031	0.037
G	1.78	2.03	0.070	0.080
H	0.013	0.10	0.0005	0.004
J	0.08	0.15	0.003	0.006
K	0.46	0.60	0.018	0.024
L	0.445	0.60	0.0175	0.024
R	0.72	0.83	0.028	0.033
S	2.11	2.48	0.083	0.098

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