TC1270/TC1271

4-Pin μP Reset Monitors

Features

- Precision V_{CC} Monitor for 1.8V, 2.7V, 3.0V, 3.3V and 5.0V Nominal Supplies
- Manual Reset Input
- 140msec Minimum $\overline{\text{RESET}}$, RESET Output Duration
- $\overline{\text{RESET}}$ Output Valid to V_{CC} = 1.0V (TC1270)
- Low 7μA Supply Current
- V_{CC} Transient Immunity
- Small 4-Pin SOT-143 Package
- No External Components
- Replacement for MAX811/812 and Offers a Lower Threshold Voltage Option

Applications

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

Device Selection Table

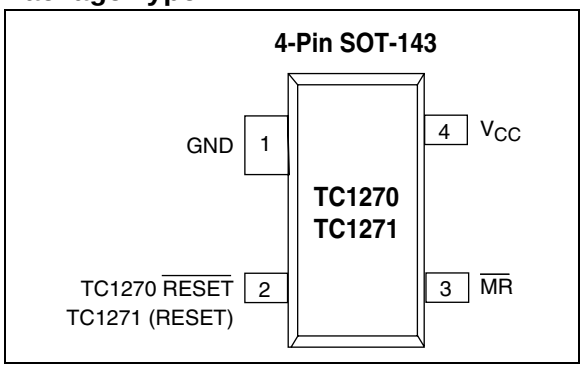
Part Number	Package	Temp. Range
TC1270xERC	4-Pin SOT-143	-40°C to +85°C
TC1271xERC	4-Pin SOT-143	-40°C to +85°C

NOTE: "x" denotes a suffix for VCC threshold (see table below)

Suffix*	Reset V_{CC} Threshold (V)
L	4.63
M	4.38
T	3.08
S	2.93
R	2.63
F	1.75

*Custom thresholds available, contact factory.

Package Type



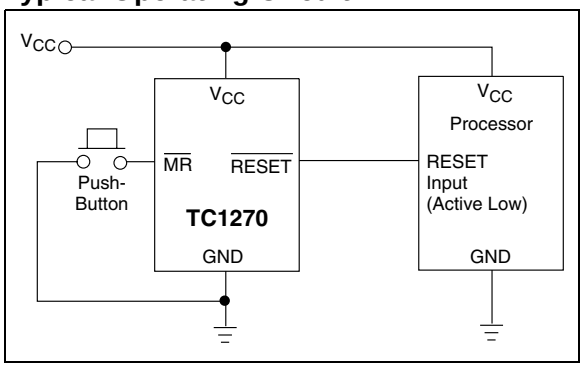
General Description

The TC1270 and TC1271 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 20μsec (4μsec for F version) of V_{CC} falling through the reset voltage threshold. RESET is maintained active for a minimum of 140msec after V_{CC} rises above the reset threshold. The TC1271 has an active-high RESET output while the TC1270 has an active-low $\overline{\text{RESET}}$ output. The output of the TC1270 is valid down to V_{CC} = 1V. Both devices are available in a 4-Pin SOT-143 package.

The TC1270/TC1271 devices are optimized to reject fast transient glitches on the V_{CC} line. Low supply current of 7μA (V_{CC} = 3.3V) makes these devices suitable for battery powered applications.

Typical Operating Circuit



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings*

Supply Voltage (V_{CC} to GND) .....+6.0V
$\overline{RESET}$, RESET..... -0.3V to (V_{CC} + 0.3V)
Input Current, V_{CC}.....20mA
Output Current, $\overline{RESET}$, RESET.....20mA
Operating Temperature Range.....-40°C to +85°C
Storage Temperature Range .....-65°C to +150°C

*Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operation sections of the specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

TC1270/TC1271 ELECTRICAL SPECIFICATIONS

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

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{CC}	V_{CC} Range	1.2	—	5.5	V	
I_{CC}	Supply Current	— — —	7 10 6	15 15 12	µA	$V_{CC} > V_{TH}$, for L/M/R/S/T/F $V_{CC} < V_{TH}$, for L/M/R/S/T $V_{CC} < V_{TH}$, for F
V_{TH}	Reset Threshold	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	TC127_L; T_A = +25°C T_A = -40°C to +85°C TC127_M; T_A = +25°C T_A = -40°C to +85°C TC127_T; T_A = +25°C T_A = -40°C to +85°C TC127_S; T_A = +25°C T_A = -40°C to +85°C TC127_R; T_A = +25°C T_A = -40°C to +85°C TC127_F; T_A = +25°C T_A = -40°C to +85°C
	Reset Threshold Tempco	—	30	—	ppm/°C	
	V_{CC} to Reset Delay	— —	20 5	— —	µsec	V_{CC} = V_{TH} to V_{TH} – 125mV; L/M/R/S/T/F
t_{RP}	Reset Active Timeout Period	140	280	560	msec	V_{CC} = $V_{TH(MAX)}$
t_{MR}	$\overline{MR}$ Minimum Pulse Width	10	—	—	µsec	
	$\overline{MR}$ Glitch Immunity	—	0.1	—	µsec	
t_{MD}	$\overline{MR}$ to Reset Propagation Delay	—	0.5	—	µsec	
V_{IH} V_{IL}	$\overline{MR}$ Input Threshold	2.3 —	— —	— 0.8	V	$V_{CC} > V_{TH(MAX)}$, TC127_L/M
V_{IH} V_{IL}		0.7 V_{CC} —	— —	— 0.15 V_{CC}	V	$V_{CC} > V_{TH(MAX)}$, TC127_R/S/T/F
	$\overline{MR}$ Pull-up Resistance	10	20	40	kΩ	

Note 1: Production testing done at T_A = +25°C, over temperature limits ensured by design.
2: $\overline{RESET}$ output for TC1270, RESET output for TC1271.

TC1270/TC1271 ELECTRICAL SPECIFICATIONS (CONTINUED)

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

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{OH}	RESET Output Voltage High (TC1271)	0.8 V_{CC}	—	—	V	I_{SOURCE} = 150µA; $V_{CC} \leq V_{TH(MIN)}$
V_{OL}	RESET Output Voltage Low (TC1271)	—	—	0.2	V	TC1271F only, I_{SINK} = 500µA, $V_{CC} = V_{TH(MAX)}$
		—	—	0.3		TC1271R/S/T only, I_{SINK} = 1.2mA, $V_{CC} = V_{TH(MAX)}$
		—	—	0.4		TC1271L/M only, I_{SINK} = 3.2mA, $V_{CC} = V_{TH(MAX)}$
V_{OL}	$\overline{\text{RESET}}$ Output Voltage Low (TC1270)	—	—	0.3	V	TC1270R/S/T only, I_{SINK} = 1.2mA, $V_{CC} = V_{TH(MIN)}$
						TC1270F only: I_{SINK} = 500µA, $V_{CC} = V_{TH(MIN)}$
		—	—	0.4		TC1270L/M only, I_{SINK} = 3.2mA, $V_{CC} = V_{TH(MIN)}$
		—	—	TBD		I_{SINK} = 50µA, V_{CC} > 1.0V
V_{OH}	$\overline{\text{RESET}}$ Output Voltage High (TC1270)	V_{CC} – 1.5	—	—	V	TC1270L/M only, I_{SOURCE} = 800µA, $V_{CC} = V_{TH(MAX)}$
		0.8 V_{CC}	—	—		TC1270R/S/T/F only, I_{SOURCE} = 500µA, $V_{CC} = V_{TH(MAX)}$

Note 1: Production testing done at T_A = +25°C, over temperature limits ensured by design.
2: $\overline{\text{RESET}}$ output for TC1270, RESET output for TC1271.

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

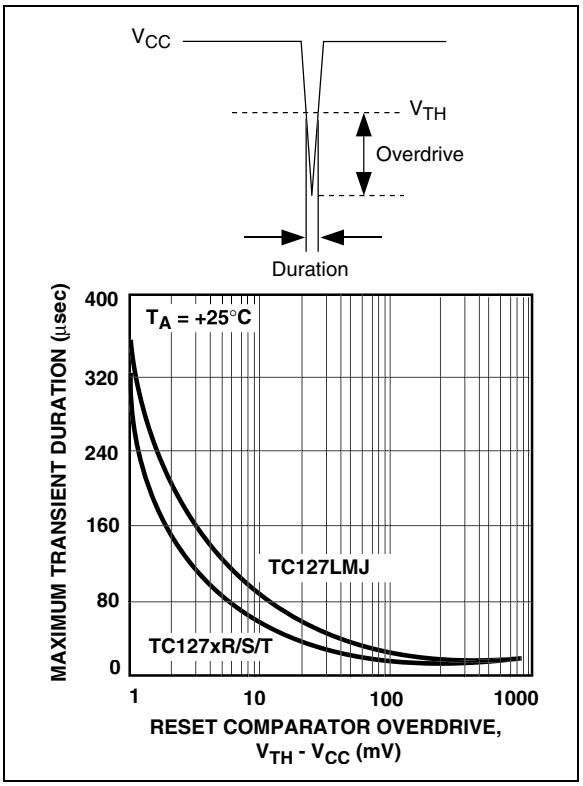
Pin No. (SOT-143-4)	Symbol	Description
1	GND	Ground.
2	$\overline{\text{RESET}}$ (TC1270)	$\overline{\text{RESET}}$ output remains low while V_{CC} is below the reset voltage threshold, and for at least 140msec min. after V_{CC} rises above reset threshold.
2	RESET (TC1271)	RESET output remains high while V_{CC} is below the reset voltage threshold, and for at least 140msec 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.

3.0 APPLICATIONS INFORMATION

3.1 V_{CC} Transient Rejection

The TC1270/TC1271 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 3-1 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 TC1270/TC1271.

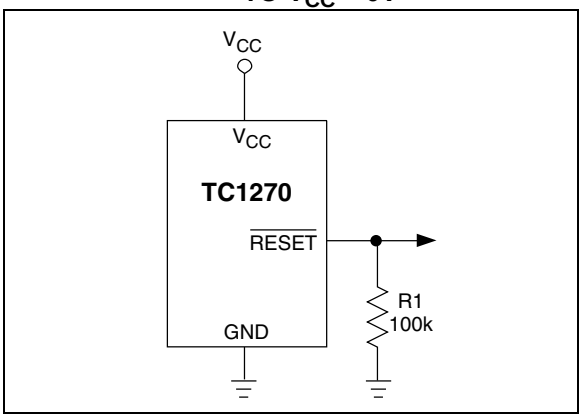
FIGURE 3-1: MAXIMUM TRANSIENT DURATION VS. OVERDRIVE FOR GLITCH REJECTION AT 25°C



3.2 RESET Signal Integrity During Power-Down

The TC1270 $\overline{\text{RESET}}$ output is valid to V_{CC} = 1.0V. 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 shut down well above this voltage. However, in situations where $\overline{\text{RESET}}$ must be maintained valid to V_{CC} = 0V, a pull-down resistor must be connected from $\overline{\text{RESET}}$ to ground to discharge stray capacitances and hold the output low (Figure 3-2). This resistor value, though not critical, should be chosen such that it does not appreciably load $\overline{\text{RESET}}$ under normal operation (100kΩ will be suitable for most applications). Similarly, a pull-up resistor to V_{CC} is required for the TC1271 to ensure a valid high $\overline{\text{RESET}}$ for V_{CC} below 1.1V.

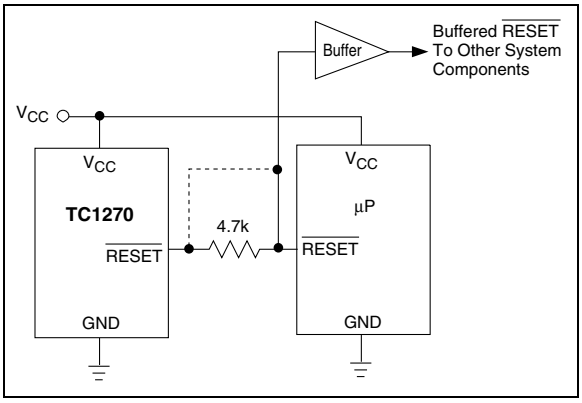
FIGURE 3-2: ENSURING $\overline{\text{RESET}}$ VALID TO V_{CC} = 0V



3.3 Processors With Bidirectional I/O Pins

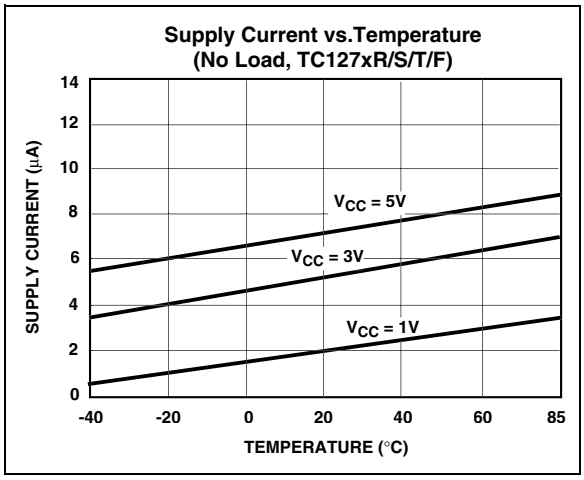
Some µP's (such as Motorola 68HC11) have bidirectional reset pins. Depending on the current drive capability of the processor pin, an indeterminate logic level may result if there is a logic conflict. This can be avoided by adding a 4.7 kΩ resistor in series with the output of the TC1270/TC1271 (Figure 3-3). 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.

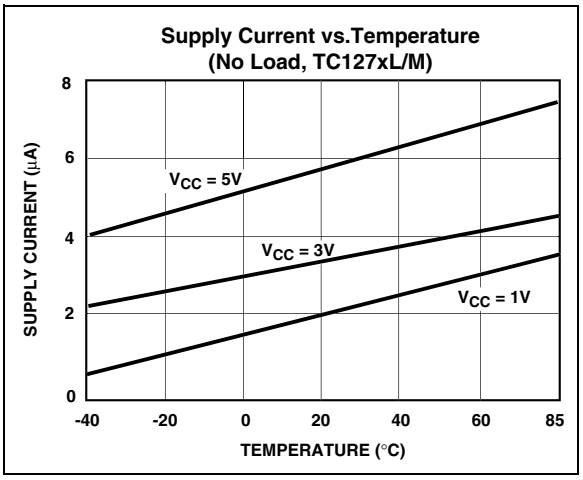
FIGURE 3-3: INTERFACING TO BIDIRECTIONAL RESET I/O

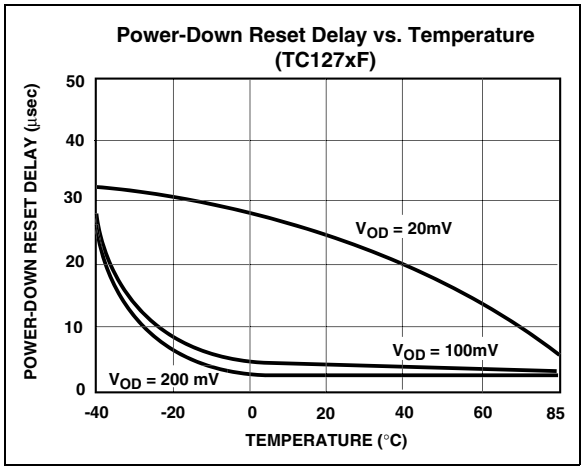


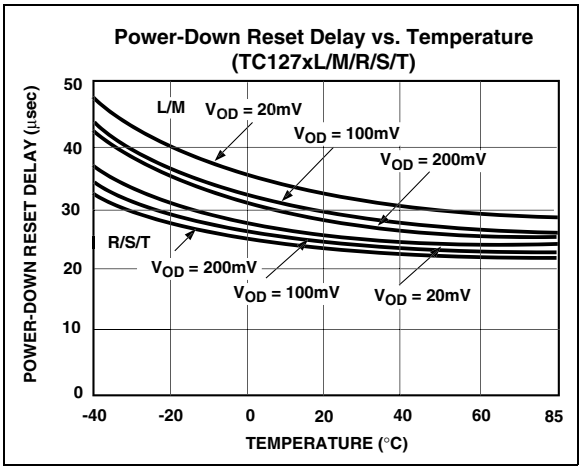
4.0 TYPICAL CHARACTERISTICS

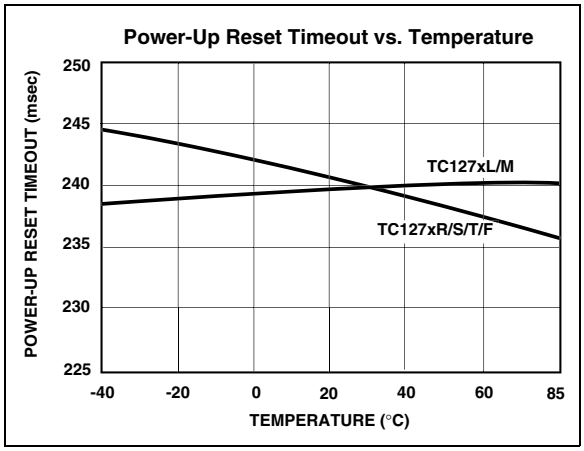
Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside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

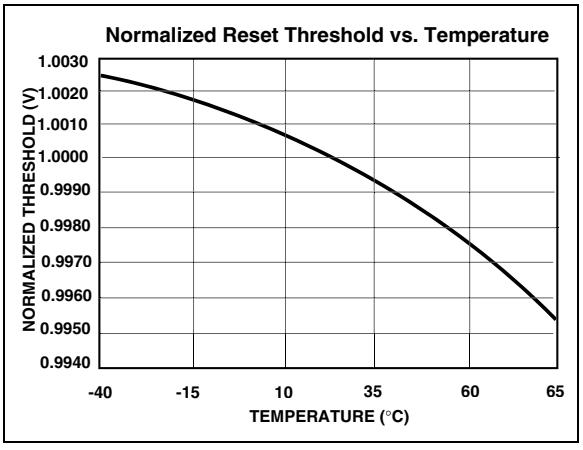






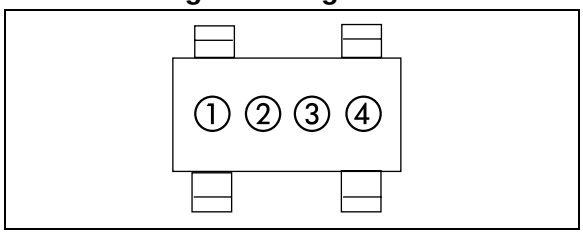






5.0 PACKAGING INFORMATION

5.1 Package Marking Information



① & ② = part number code + temperature range (two-digit code)

Part Number	(V)	Code
TC1270LERC	4.63	S1
TC1270MERC	4.38	S2
TC1270TERC	3.08	S3
TC1270SERC	2.93	S4
TC1270RERC	2.63	S5
TC1270FERC	1.75	S7

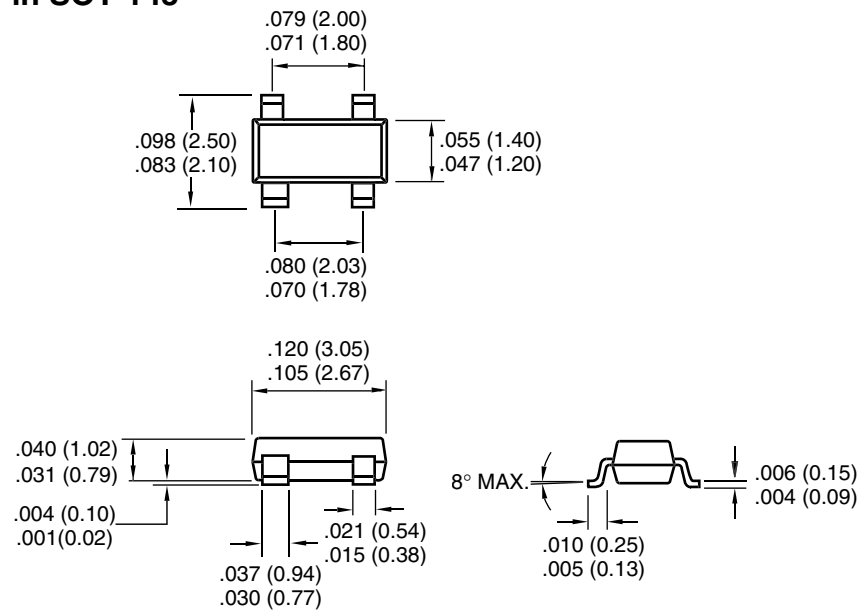
Part Number	(V)	Code
TC1271LERC	4.63	T1
TC1271MERC	4.38	T2
TC1271TERC	3.08	T3
TC1271SERC	2.93	T4
TC1271RERC	2.63	T5
TC1271FERC	1.75	T7

③ represents year and quarter code

④ represents production lot ID code

5.2 Package Dimensions

4-Pin SOT-143



Dimensions: inches (mm)

NOTES:

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Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

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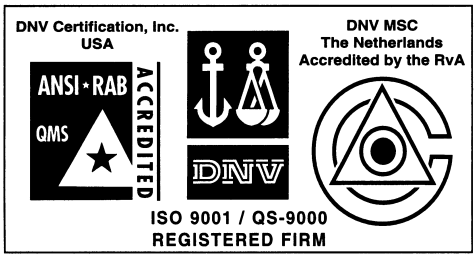

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