

3-Pin, Ultra-Low-Power SC70/SOT23 Voltage Detectors

ABSOLUTE MAXIMUM RATINGS

Terminal Voltage (with respect to GND)

V _{CC}	-0.3V to +6V
OUT, $\overline{\text{OUT}}$ (push-pull)	-0.3V to (V _{CC} + 0.3V)
$\overline{\text{OUT}}$ (open-drain)	-0.3V to +6V
Input Current (V _{CC})	20mA
Output Current (OUT, $\overline{\text{OUT}}$)	20mA

Continuous Power Dissipation (T_A = +70°C)

3-Pin SC70 (derate 2.17mW/°C above +70°C)	174mW
3-Pin SOT23 (derate 4mW/°C above +70°C)	320mW
Operating Temperature Range	-40°C to +85°C
Storage Temperature Range	-65°C to +150°C
Junction Temperature	+150°C
Lead Temperature (soldering, 10s)	+300°C

Stresses beyond 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 beyond 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} = full range, T_A = -40°C to +85°C, unless otherwise noted. Typical values are at T_A = +25°C and V_{CC} = 3V.) (Note 1)

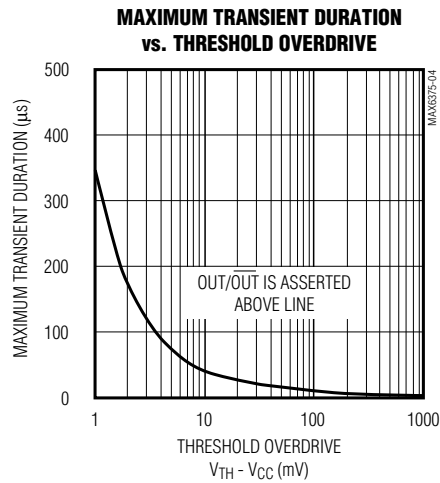
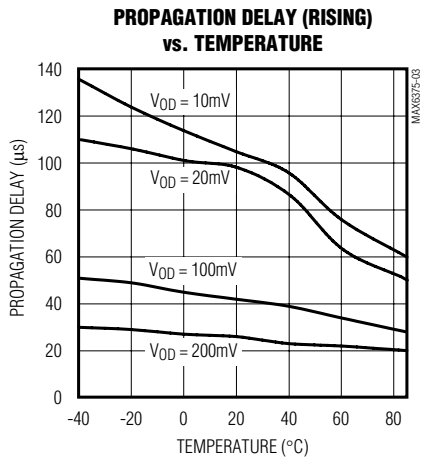
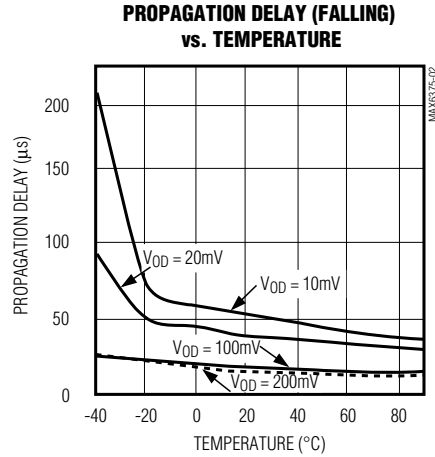
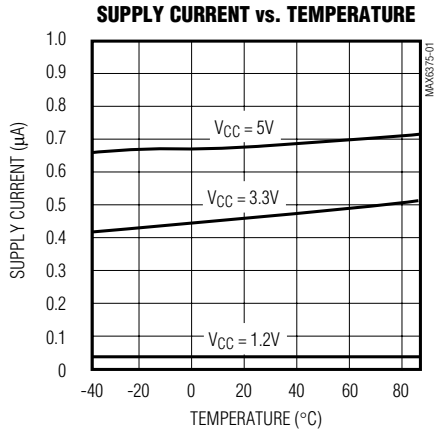
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
V _{CC} Operating Range		T _A = 0°C to +70°C	1.0		5.5	V
		T _A = -40°C to +85°C	1.2		5.5	
Supply Current	I _{CC}	MAX6375/76/77 only, V _{CC} = 3.0V for V _{TH} ≤ 2.93V, V _{CC} = 3.2V for V _{TH} > 2.93V, no load		0.5	1.0	μA
		V _{CC} = 5.5V, no load		1.0	1.75	
Voltage Threshold	V _{TH}	Table 1	T _A = +25°C	V _{TH} - 1.5% V _{TH} V _{TH} + 1.5%		V
			T _A = -40°C to +85°C	V _{TH} - 2.5% V _{TH} V _{TH} + 2.5%		
Voltage Threshold Tempco	ΔV _{TH} /°C			40		ppm/°C
Propagation Delay		V _{CC} = (V _{TH} + 100mV) to (V _{TH} - 100mV)		20		μs
		V _{CC} = (V _{TH} - 100mV) to (V _{TH} + 100mV)		42		
$\overline{\text{OUT}}$ Output Voltage (MAX6375/MAX6377/MAX6378/MAX6380)	V _{OL}	I _{SINK} = 1.6mA, V _{CC} > 2.1V, $\overline{\text{OUT}}$ asserted			0.3	V
		I _{SINK} = 100μA, V _{CC} ≥ 1.2V, $\overline{\text{OUT}}$ asserted			0.4	
$\overline{\text{OUT}}$ Output Voltage (MAX6375/MAX6377)	V _{OH}	I _{SOURCE} = 500μA, V _{CC} = 3.2V, MAX6375 only	0.8 × V _{CC}			V
		I _{SOURCE} = 800μA, V _{CC} = 4.5V, V _{TH} ≤ 4.38V	0.8 × V _{CC}			
		I _{SOURCE} = 800μA, V _{CC} = V _{TH(MAX)} , V _{TH} ≥ 4.5V	0.8 × V _{CC}			
OUT Output Voltage (MAX6376/MAX6379)	V _{OH}	I _{SOURCE} = 500μA, V _{CC} ≥ 2.1V, OUT asserted	0.8 × V _{CC}			V
		I _{SOURCE} = 50μA, V _{CC} ≥ 1.2V, OUT asserted	0.8 × V _{CC}			
	V _{OL}	I _{SINK} = 1.2mA, V _{CC} ≥ 3.2V, OUT not asserted, MAX6376 only			0.3	
		I _{SINK} = 3.2mA, V _{CC} ≥ 4.5V, OUT not asserted, V _{TH} ≤ 4.38V			0.4	
		I _{SINK} = 3.2mA, V _{CC} = V _{TH(MAX)} , V _{TH} ≥ 4.5V			0.4	
Voltage Threshold Hysteresis		MAX6375/MAX6376/MAX6377	6.3		mV	
		MAX6378/MAX6379/MAX6380	9.5			
Open-Drain $\overline{\text{OUT}}$ Output Leakage Current					0.1	μA

Note 1: Production tested at +25°C only. Overtemperature limits are guaranteed by design, not production tested.

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Typical Operating Characteristics

($V_{CC} = 5V$, $T_A = +25^\circ C$, unless otherwise noted.)



Pin Description

PIN				NAME	FUNCTION
MAX6375/MAX6377/ MAX6378/MAX6380		MAX6376/MAX6379			
SC70-3	SOT23-3	SC70-3	SOT23-3		
1	2	1	2	GND	Ground
2	1	—	—	\overline{OUT}	Active-Low Output. \overline{OUT} remains low while V_{CC} is below the threshold. \overline{OUT} is open-drain on the MAX6377/MAX6380 and push-pull on the MAX6375/MAX6378.
—	—	2	1	OUT	Active-High Output. OUT remains high while V_{CC} is below the threshold.
3	3	3	3	V_{CC}	Supply Voltage

MAX6375-MAX6380

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Applications Information

Interfacing to Different Logic Voltage Components

The MAX6377/MAX6380 have an active-low, open-drain output. This output structure sinks current when $\overline{\text{OUT}}$ is asserted. Connect a pullup resistor from $\overline{\text{OUT}}$ to any supply voltage up to 5.50V (Figure 1). Select a resistor value large enough to allow a valid logic low (see *Electrical Characteristics*), and small enough to register a logic high while supplying all input current and leakage paths connected to the $\overline{\text{OUT}}$ line.

Negative-Going V_{CC} Transients

These devices are relatively immune to short-duration, negative-going V_{CC} transients (glitches). The *Typical Operating Characteristics* show the Maximum Transient Duration vs. Threshold Overdrive graph, for which output pulses are not generated. The graph shows the maximum pulse width that a negative-going V_{CC} transient may typically have before the devices issue output signals. As the amplitude of the transient increases, the maximum-allowable pulse width decreases.

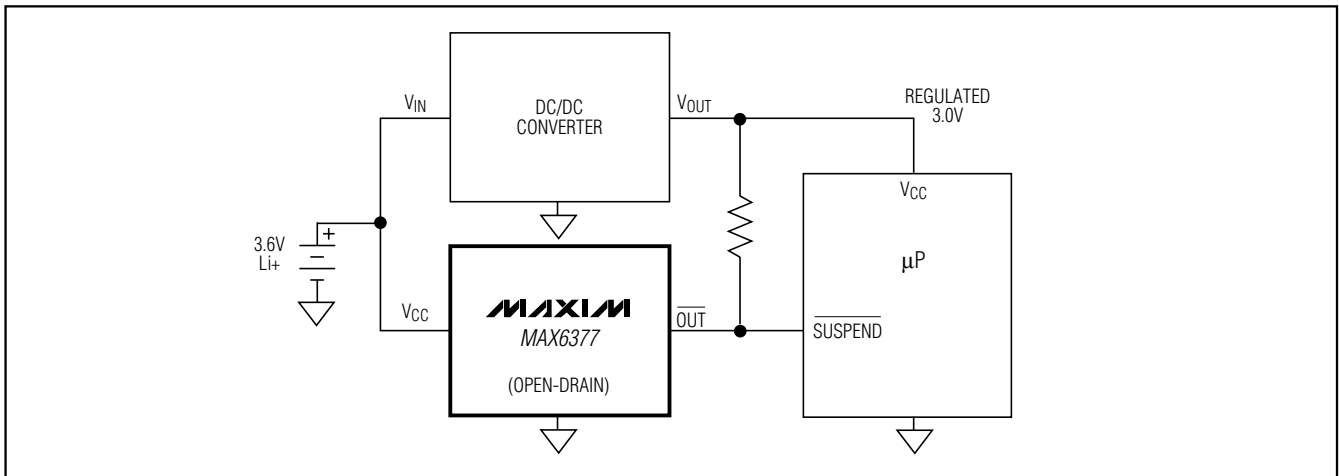


Figure 1. Interfacing to Different Logic Voltage Components

Table 1. Factory-Trimmed Reset Thresholds‡

PART	SUFFIX	RESET THRESHOLD VOLTAGE, V _{TH} (V)				
		T _A = +25°C			T _A = -40°C TO +85°C	
		MIN	TYP	MAX	MIN	MAX
MAX6375_R	22	2.167	2.200	2.233	2.145	2.250
	23	2.285	2.320	2.355	2.262	2.375
	24	2.364	2.400	2.436	2.340	2.460
MAX6376_R	25	2.462	2.500	2.537	2.437	2.562
	26	2.591	2.630	2.669	2.564	2.696
MAX6377_R	27	2.660	2.700	2.741	2.633	2.768
	28	2.758	2.800	2.842	2.730	2.870
	29	2.886	2.930	2.974	2.857	3.000
	30	2.955	3.000	3.045	2.925	3.075
	31	3.034	3.080	3.126	3.003	3.150

‡Factory-trimmed reset thresholds are available in approximately 100mV increments with a 1.5% room-temperature variance.

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MAX6375-MAX6380

Table 1. Factory-Trimmed Reset Thresholds[‡] (continued)

PART	SUFFIX	RESET THRESHOLD VOLTAGE, V _{TH} (V)				
		T _A = +25°C			T _A = -40°C TO +85°C	
		MIN	TYP	MAX	MIN	MAX
MAX6378_R	33	3.250	3.300	3.350	3.217	3.383
	34	3.349	3.400	3.451	3.315	3.485
	35	3.447	3.500	3.552	3.412	3.587
	36	3.546	3.600	3.654	3.510	3.690
	37	3.644	3.700	3.755	3.607	3.792
MAX6379_R	38	3.743	3.800	3.857	3.705	3.895
	39	3.841	3.900	3.958	3.802	3.997
MAX6380_R	40	3.940	4.000	4.060	3.900	4.100
	41	4.038	4.100	4.161	3.997	4.202
	42	4.137	4.200	4.263	4.095	4.305
	43	4.235	4.300	4.364	4.192	4.407
	44	4.314	4.380	4.446	4.270	4.489
	45	4.432	4.500	4.567	4.387	4.612
	46	4.560	4.630	4.699	4.514	4.746

[‡]Factory-trimmed reset thresholds are available in approximately 100mV increments with a 1.5% room-temperature variance.

Table 2. Device Marking Codes and Minimum Order Increments

PART	TOP MARK (SC70)	TOP MARK (SOT23)	ORDER INCREMENT (k)
MAX6375_R22-T	ADH	FZHD	2.5
MAX6375_R23-T	ADI	FZHE	2.5
MAX6375_R24-T	—	—	10
MAX6375_R25-T	—	—	10
MAX6375_R26-T	ACZ	FZHC	2.5
MAX6375_R27-T	—	—	10
MAX6375_R28-T	—	—	10
MAX6375_R29-T	ADJ	FZHF	2.5
MAX6375_R30-T	—	—	10
MAX6375_R31-T	ADK	FZHG	2.5
MAX6376_R22-T	ADL	FZHH	2.5
MAX6376_R23-T	ADM	FZHI	2.5
MAX6376_R24-T	—	—	10
MAX6376_R25-T	—	—	10
MAX6376_R26-T	ADN	FZHJ	2.5
MAX6376_R27-T	—	—	10
MAX6376_R28-T	—	—	10
MAX6376_R29-T	ADA	FZHK	2.5

PART	TOP MARK (SC70)	TOP MARK (SOT23)	ORDER INCREMENT (k)
MAX6376_R30-T	—	—	10
MAX6376_R31-T	ADO	FZHL	2.5
MAX6377_R22-T	ADP	FZHM	2.5
MAX6377_R23-T	ADB	FZHN	2.5
MAX6377_R24-T	—	—	10
MAX6377_R25-T	—	—	10
MAX6377_R26-T	ACQ	FZHO	2.5
MAX6377_R27-T	—	—	10
MAX6377_R28-T	—	—	10
MAX6377_R29-T	ADC	FZHP	2.5
MAX6377_R30-T	—	—	10
MAX6377_R31-T	ADR	FZHQ	2.5
MAX6378_R33-T	—	—	10
MAX6378_R34-T	—	—	10
MAX6378_R35-T	—	—	10
MAX6378_R36-T	—	—	10
MAX6378_R37-T	—	—	10
MAX6378_R38-T	—	—	10

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Table 2. Device Marking Codes and Minimum Order Increments (continued)

PART	TOP MARK (SC70)	TOP MARK (SOT23)	ORDER INCREMENT (k)
MAX6378_R39-T	—	—	10
MAX6378_R40-T	—	—	10
MAX6378_R41-T	—	—	10
MAX6378_R42-T	—	—	10
MAX6378_R43-T	—	—	10
MAX6378_R44-T	ADS	FZHU	2.5
MAX6378_R45-T	—	—	10
MAX6378_R46-T	ADD	FZHV	2.5
MAX6379_R33-T	—	—	10
MAX6379_R34-T	—	—	10
MAX6379_R35-T	—	—	10
MAX6379_R36-T	—	—	10
MAX6379_R37-T	—	—	10
MAX6379_R38-T	—	—	10
MAX6379_R39-T	—	—	10
MAX6379_R40-T	—	—	10
MAX6379_R41-T	—	—	10
MAX6379_R42-T	—	—	10

PART	TOP MARK (SC70)	TOP MARK (SOT23)	ORDER INCREMENT (k)
MAX6379_R43-T	—	—	10
MAX6379_R44-T	ADE	FZHW	2.5
MAX6379_R45-T	—	—	10
MAX6379_R46-T	ADT	FZHX	2.5
MAX6380_R33-T	—	—	10
MAX6380_R34-T	—	—	10
MAX6380_R35-T	—	—	10
MAX6380_R36-T	—	—	10
MAX6380_R37-T	—	—	10
MAX6380_R38-T	—	—	10
MAX6380_R39-T	—	—	10
MAX6380_R40-T	—	—	10
MAX6380_R41-T	—	—	10
MAX6380_R42-T	—	—	10
MAX6380_R43-T	—	—	10
MAX6380_R44-T	ADU	FZHY	2.5
MAX6380_R45-T	—	—	10
MAX6380_R46-T	ADF	FZHZ	2.5

Selector Guide (Standard Versions**)

PART	NOMINAL V _{TH} (V)
MAX63_ _ _ R46-T	4.63
MAX63_ _ _ R44-T	4.38
MAX63_ _ _ R31-T	3.08
MAX63_ _ _ R29-T	2.93
MAX63_ _ _ R26-T	2.63
MAX63_ _ _ R23-T	2.32
MAX63_ _ _ R22-T	2.20

**Sample stock is generally held on all standard versions. Contact factory for availability of nonstandard versions.

Chip Information

TRANSISTOR COUNT: 419

Ordering Information (continued)

PART*	TEMP RANGE	PIN-PACKAGE
MAX6377UR _ _ -T	-40°C to +85°C	3 SOT23-3
MAX6377XR _ _ -T	-40°C to +85°C	3 SC70-3
MAX6378UR _ _ -T	-40°C to +85°C	3 SOT23-3
MAX6378XR _ _ -T	-40°C to +85°C	3 SC70-3
MAX6379UR _ _ -T	-40°C to +85°C	3 SOT23-3
MAX6379XR _ _ -T	-40°C to +85°C	3 SC70-3
MAX6380UR _ _ -T	-40°C to +85°C	3 SOT23-3
MAX6380XR _ _ -T	-40°C to +85°C	3 SC70-3

*The MAX6375/MAX6376/MAX6377 are available in factory-preset thresholds from 2.20V to 3.08V, in approximately 0.1V increments. The MAX6378/MAX6379/MAX6380 are available in factory-preset thresholds from 3.30V to 4.63V, in approximately 0.1V increments. Choose the desired threshold suffix from Table 1 and insert it in the blank spaces following R. There are 21 standard versions, with a required order increment of 2500 pieces. Sample stock is generally held on the standard versions only (see the Selector Guide). The required order increment is 10,000 pieces for non-standard versions (Table 2). Contact factory for availability. All devices available in tape-and-reel only. Devices are available in both leaded and lead-free packaging. Specify lead-free by replacing "-T" with "+T" when ordering.

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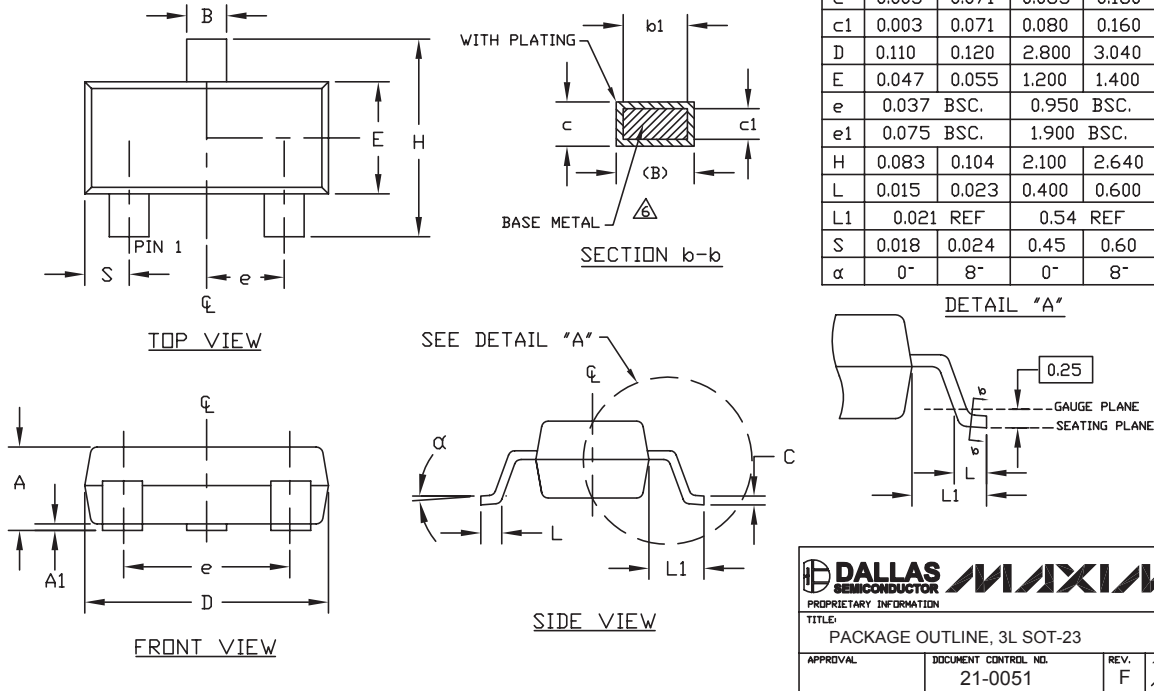
Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to www.maxim-ic.com/packages.)

MAX6375-MAX6380

NOTES:

1. D&E DO NOT INCLUDE MOLD FLASH.
 2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006").
 3. CONTROLLING DIMENSION: MILLIMETERS.
 4. REFERENCE JEDEC TO236-VARIATION AB.
 5. LEADS TO BE COPLANAR WITHIN 0.10mm.
- △ DIMENSIONS MEASURED AT FLAT SECTION OF LEAD BETWEEN 0.08mm AND 0.15mm FROM LEAD TIP.



SOT23 LEPS

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

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