

GENERAL DESCRIPTION

The MAX803/MAX809/MAX810 are microprocessor (μ P) supervisory circuits used to monitor the power supplies in μ P and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V, or +2.5V powered circuits.

These circuits perform a single function: they assert a reset signal whenever the Vcc supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after Vcc has risen above the reset threshold. Reset thresholds suitable for operations with a variety of supply voltages are available.

The MAX803 has an open-drain output stage, while the MAX809/MAX810 have push-pull outputs. The MAX803's open-drain RESET output requires a pull-up resistor that can be connected to a voltage higher than Vcc. The MAX803/MAX809 have an active-low RESET output, while the MAX810 has an active-high RESET output. The reset comparator is designed to ignore fast transients on Vcc, and the outputs are guaranteed to be in the correct logic state for Vcc down to 1V.

Low supply current makes the MAX803/MAX809/MAX810 ideal for use in portable equipment. The MAX803 is available in a 3-pin SC70 package, and the MAX809/MAX810 are available in 3-pin SC70 or SOT23 packages.

Applications

- Computers
- Controllers
- Intelligent Instruments
- Critical μ P and μ C Power Monitoring
- Portable/Battery-Powered Equipment
- Automotive

Features

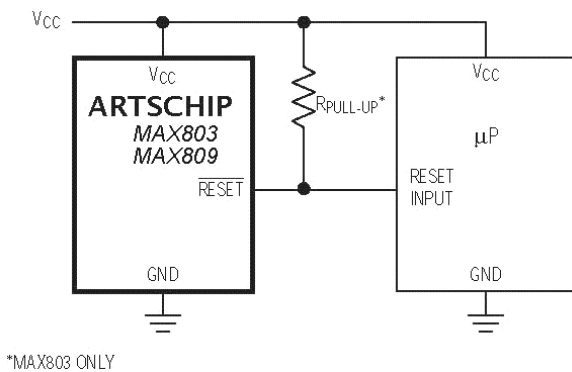
- Precision Monitoring of +2.5V, +3V, +3.3V, and +5V Power-Supply Voltages
- Fully Specified Over Temperature
- Available in Three Output Configurations
 - Open-Drain RESET Output (MAX803)
 - Push-Pull RESET Output (MAX809)
 - Push-Pull RESET Output (MAX810)
- 140ms min Power-On Reset Width
- 12 μ A Supply Current
- Guaranteed Reset Valid to Vcc=+1V
- Power Supply Transient Immunity
- No External Components
- 3-Pin SC70 and SOT23 Packages

Ordering Information

PART	TEMP.RANGE	PIN-PACKAGE
MAX803_EXR-T	-40 to +125	3 SC70-3
MAX803+EXR-T10	-40 to +125	3 SC70-3
MAX809_EXR-T	-40 to +125	3 SC70-3
MAX809_EXR-T10	-40 to +125	3 SC70-3
MAX809_EUR-T	-40 to +105	3 SOT23-3
MAX809_EUR-T10	-40 to +105	3 SOT23-3
MAX810_EXR-T	-40 to +125	3 SC70-3
MAX810_EXR-T10	-40 to +125	3 SC70-3
MAX810_EUR-T	-40 to +105	3 SOT23-3
MAX810_EUR-T10	-40 to +105	3 SOT23-3

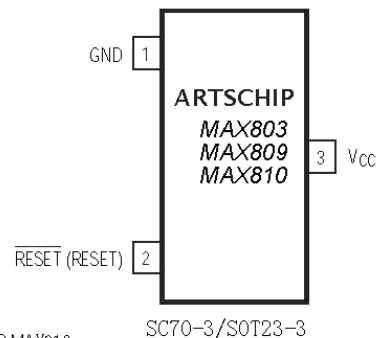
Note: These parts are offered in 2.5k or 10k reels, and must be ordered in 2.5k or 10k increments. Order MAX803_EXR for 2.5k reels and MAX803_EXR-T10 for 10k reels. Insert the desired suffix letter from the Selector Guide into the blank to complete the part number. All versions of these products may not be available at the time of announcement. Contact factory for availability.

Typical Operating Circuit



Pin Configuration

TOP VIEW





**MAX803L/M/R/S/T/Z,
MAX809J/L/M/R/S/T/Z,MAX810L/M/R/S/T/Z
3-Pin Microprocessor Reset Circuits**

ABSOLUTE MAXIMUM RATINGS

Terminal Voltage (with respect to GND)	3-Pin SC70 (derate 2.17mW/ above +70).....174mW
Vcc.....-0.3V to +6.0V	3-Pin SOT23 (derate 4mW/ above +70).....320mW
RESET, RESET (push-pull).....-0.3V to (Vcc +0.3V)	Operating Temperature Range
RESET (open drain).....-0.3V to +6.0V	3-Pin SC70.....-40 to +125
Input Current, Vcc.....20mA	3-Pin SOT23.....-40 to +105
Output Current, RESET, RESET.....20mA	Storage Temperature Range.....-65 to +150
Rate of Rise, Vcc.....100V/μs	Lead Temperature (soldering, 10s).....+300
Continuous Power Dissipation (TA=+70)	

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 specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(Vcc=full range, TA=-40 to +105 (SOT23) or TA=-40 to +125 (SC70), unless otherwise noted. Typical values are at TA=+25 , Vcc=5V for L/M/J versions, Vcc=3.3V for T/S versions, Vcc =3V for R version, and Vcc=2.5V for Z version.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Vcc Range		TA=0 to +70	1.0		5.5	V	
		TA=-40 to +105 (MAX8_EUR)	1.2		5.5		
		TA=-40 to +125 (MAX8_EXR)	1.2		5.5		
Supply Current (SOT23)	Icc	TA=-40 to +85	Vcc<5.5V, MAX8_L/M		24	60	μA
			Vcc<3.6V, MAX8_R/S/T/Z		17	50	
		TA=+85 to +105	Vcc<5.5V, MAX8_L/M			100	
			Vcc<3.6V, MAX8_R/S/T/Z			100	
Supply Current (SC70)	Icc	TA=-40 to +85	Vcc<5.5V, MAX8_L/M		24	35	
			Vcc<3.6V, MAX8_R/S/T/Z		17	30	
		TA=+85 to +105	Vcc<5.5V, MAX8_L/M			60	
			Vcc<3.6V, MAX8_R/S/T/Z			60	
Reset Threshold (SOT only)		MAX8_L	TA=+25	4.56	4.63	4.70	V
			TA=-40 to +85	4.50		4.75	
			TA=-40 to +125	4.40		4.86	
		MAX8_M	TA=+25	4.31	4.38	4.45	
			TA=-40 to +85	4.25		4.50	
			TA=-40 to +125	4.16		4.56	
		MAX809J (SOT only)	TA=+25	3.93	4.00	4.06	
			TA=-40 to +85	3.89		4.10	
			TA=-40 to +125	3.80		4.20	
		MAX8_T	TA=+25	3.04	3.08	3.11	
			TA=-40 to +85	3.00		3.15	
			TA=-40 to +125	2.92		3.23	
		MAX8_S	TA=+25	2.89	2.93	2.96	
			TA=-40 to +85	2.85		3.00	
			TA=-40 to +125	2.78		3.08	
		MAX8_R	TA=+25	2.59	2.63	2.66	
			TA=-40 to +85	2.55		2.70	
			TA=-40 to +125	2.50		2.76	
		MAX8_L	TA=+25	4.56	4.63	4.70	
			TA=-40 to +85	4.50		4.75	
			TA=-40 to +125	4.44		4.82	



**MAX803L/M/R/S/T/Z,
MAX809J/L/M/R/S/T/Z,MAX810L/M/R/S/T/Z
3-Pin Microprocessor Reset Circuits**

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC}=full range, T_A=-40 to +105 (SOT23) or T_A=-40 to +125 (SC70), unless otherwise noted. Typical values are at T_A=+25, V_{CC}=5V for L/M/J versions, V_{CC}=3.3V for T/S versions, V_{CC}=3V for R version, and V_{CC}=2.5V for Z version.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Reset Threshold (SC70 only)	V _{TH}	MAX8_M	T _A =+25	4.31	4.38	4.45	V
			T _A =-40 to +85	4.25		4.50	
			T _A =-40 to +125	4.20		4.56	
		MAX8_T	T _A =+25	3.04	3.08	3.11	
			T _A =-40 to +85	3.00		3.15	
			T _A =-40 to +125	2.95		3.21	
		MAX8_S	T _A =+25	2.89	2.93	2.96	
			T _A =-40 to +85	2.85		3.00	
			T _A =-40 to +125	2.81		3.05	
		MAX8_R	T _A =+25	2.59	2.63	2.66	
			T _A =-40 to +85	2.55		2.70	
			T _A =-40 to +125	2.52		2.74	
		MAX8_Z (SC70 only)	T _A =+25	2.28	2.32	2.35	
			T _A =-40 to +85	2.25		2.38	
			T _A =-40 to +125	2.22		2.42	
Reset Threshold Tempco				30		ppm/	
V _{CC} to Reset Delay (Note 2)		V _{CC} =V _{TH} to (V _{TH} -100mV)		20		μs	
Reset Active Timeout Period (SOT23)		T _A =-40 to +85	140	240	560	ms	
		T _A =+85 to +105	100		840		
Reset Active Timeout Period (SC70)		T _A =-40 to +85	140	240	460	ms	
		T _A =+85 to +125	100		840		
RESET Output Voltage Low (push-pull active low and open-drain active low, MAX 803 and MAX809)	V _{OL}	V _{CC} =V _{TH} min, I _{SINK} =1.2mA, MAX803R/S/T/Z, MAX809R/S/T/Z			0.3	V	
		V _{CC} =V _{TH} min, I _{SINK} =3.2mA, MAX803L/M, MAX809J/L/M			0.4		
		V _{CC} >1.0V, I _{SINK} =50μA			0.3		
RESET Output Voltage High (push-pull active low MAX809)	V _{OH}	V _{CC} =V _{TH} max, I _{SOURCE} =500μA, MAX803R/S/T/Z, MAX809R/S/T/Z	0.8V _{CC}			V	
		V _{CC} =V _{TH} max, I _{SOURCE} =800μA, MAX803R/S/T/Z, MAX809R/S/T/Z	V _{CC} -1.5				
RESET Output Voltage Low (push-pull active high, MAX810)	V _{OL}	V _{CC} =V _{TH} max, I _{SINK} =1.2mA, MAX810R/S/T/Z			0.3	V	
		V _{CC} =V _{TH} max, I _{SINK} =3.2mA, MAX810L/M			0.4		
RESET Output Voltage High (push-pull active high MAX810)	V _{OH}	1.8V < V _{CC} < V _{TH} min, I _{SOURCE} =150μA	0.8V _{CC}			V	
RESET Open-Drain Output Leakage Current (MAX803) (Note 3)		V _{CC} >V _{TH} , RESET deasserted			1	μA	

Note 1: Production testing done at T_A=+25; limits over temperature guaranteed by design only.

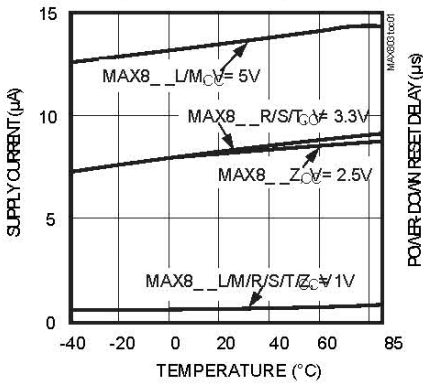
Note 2: RESET output for MAX803/MAX809; RESET output for MAX810.

Note 3: Guaranteed by design, not production tested.

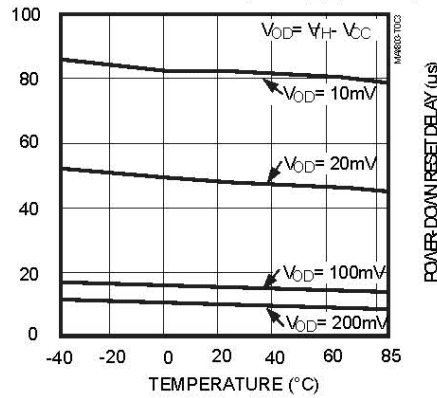
Typical Operating Characteristics

(Vcc=full range, T_A=-40 to +105, unless otherwise noted. Typical values are at T_A=+25, Vcc=+5V for L/M/J versions, Vcc=+3.3V for T/S versions, Vcc=+3V for R version, and Vcc=+2.5V for Z version.)

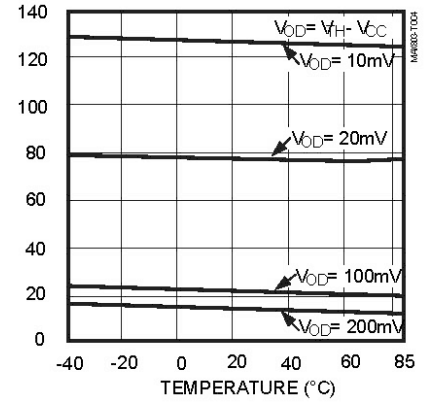
SUPPLY CURRENT vs. TEMPERATURE (SC70 PACKAGE, NO LOAD)



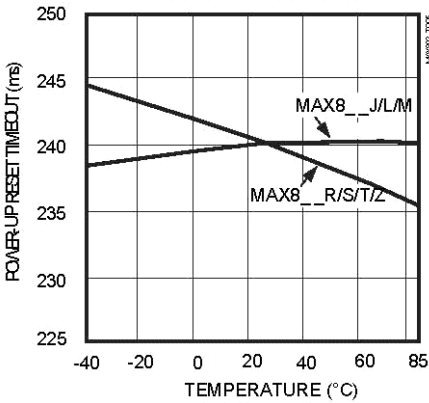
POWER-DOWN RESET DELAY vs. TEMPERATURE (MAX8_R/S/T/Z)



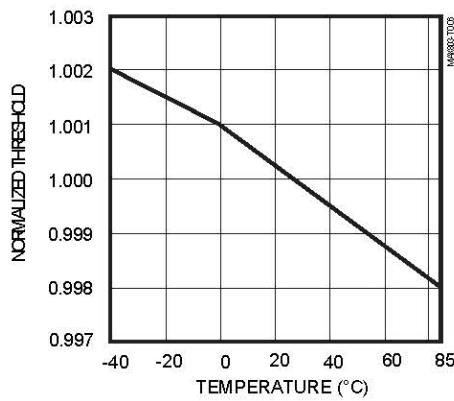
POWER-DOWN RESET DELAY vs. TEMPERATURE (MAX8_J/L/M)



POWER-UP RESET TIMEOUT vs. TEMPERATURE



NORMALIZED RESET THRESHOLD vs. TEMPERATURE





**MAX803L/M/R/S/T/Z,
MAX809J/L/M/R/S/T/Z,MAX810L/M/R/S/T/Z
3-Pin Microprocessor Reset Circuits**

Selector Guide

PART/SUFFIX	RESET THRESHOLD(V)	OUTPUT TYPE	TOP MARK	
			SOT	SC70
MAX803L	4.63	OPEN-DRAINRESET	---	AAZ
MAX803M	4.38	OPEN-DRAINRESET	---	ABA
MAX803T	3.08	OPEN-DRAINRESET	---	ABB
MAX803S	2.93	OPEN-DRAINRESET	---	ABC
MAX803R	2.63	OPEN-DRAINRESET	---	ABD
MAX803Z	2.32	OPEN-DRAINRESET	---	ABE
MAX809L	4.63	PUSH-PULLRESET	AAAA	AAN
MAX809M	4.38	PUSH-PULLRESET	ABAA	AAO
MAX809J	4.00	PUSH-PULLRESET	CWAA	---
MAX809T	3.08	PUSH-PULLRESET	ACAA	AAP
MAX809S	2.93	PUSH-PULLRESET	ADAA	AAQ
MAX809R	2.63	PUSH-PULLRESET	AFAA	AAR
MAX809Z	2.32	PUSH-PULLRESET	---	AAS
MAX810L	4.63	PUSH-PULLRESET	AGAA	AAT
MAX810M	4.38	PUSH-PULLRESET	AHAA	AAU
MAX810T	3.08	PUSH-PULLRESET	AJAA	AAV
MAX810S	2.93	PUSH-PULLRESET	AKAA	AAX
MAX810R	2.63	PUSH-PULLRESET	ALAA	AAW
MAX810Z	2.32	PUSH-PULLRESET	---	AAY

Detailed Description

A microprocessor's (μ P's) reset input starts the μ P in a known state. The MAX803/MAX809/MAX810 assert reset to prevent code-execution errors during power up, power-down, or brownout conditions. They assert a reset signal whenever the Vcc supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after Vcc has risen above the reset threshold. The MAX803 uses an open-drain output, and the MAX809/MAX810 have a push-pull output stage. Connect a pull-up resistor on the MAX803's RESET output to any supply between 0 and 6V.

Pin Description

PIN	NAME	FUNCTION
1	GND	Ground
2	RESET (MAX803/ MAX809)	RESET Output remains low while Vcc is below the reset threshold, and for at least 140ms after Vcc rises above the reset threshold
	RESET (MAX810)	RESET Output remains high while Vcc is below the reset threshold, and for at least 140ms after Vcc rises above the reset threshold.
3	Vcc	Supply Voltage (+5V, +3.3V, +3.0V, or +2.5V)

Applications Information

Negative-Going Vcc Transients In addition to issuing a reset to the μ P during power-up, power-down, and brownout conditions, the MAX803/MAX809/MAX810 are relatively immune to short-duration negative-going Vcc transients (glitches).

Figure 1 shows typical transient duration vs. reset comparator overdrive, for which the MAX803/MAX809/MAX810 do not generate a reset pulse. The graph was generated using a negative-going pulse applies to Vcc, starting 0.5V above the actual reset threshold and ending below it by the magnitude indicated (reset comparator overdrive). The graph indicates the maximum pulse width a negative-going Vcc transient can have without causing a reset pulse. As the magnitude of the transient increases (goes farther below the reset threshold), the maximum allowable pulse width decreases. Typically, for the MAX8_L and MAX8_M, the maximum allowable pulse width decreases. Typically, for the MAX8_L and MAX8_M, a Vcc transient that goes 100mV below the reset threshold and lasts 20 μ s or less will not cause a reset pulse. A 0.1 μ F bypass capacitor mounted as close as possible to the Vcc pin provides additional transient immunity.

Ensuring a Valid Reset Output Down to Vcc=0

When Vcc falls below 1V, the MAX809 RESET output no longer sinks current—it becomes an open circuit. Therefore, high-impedance CMOS logic inputs connected to RESET can drift to undetermined voltages. This presents no problem in most applications since most μ P and other circuitry is inoperative with Vcc below 1V. However, in applications where RESET must be valid down to 0V, adding a pull-down resistor to RESET causes any stray leakage currents to flow to ground, holding RESET low (Figure 2). R1's value is not critical; 100k Ω is large enough not to load RESET and small enough to pull RESET to ground.

A 100k Ω pull-up resistor to Vcc is also recommended for the MAX810 if RESET is required to remain valid for Vcc<1V.

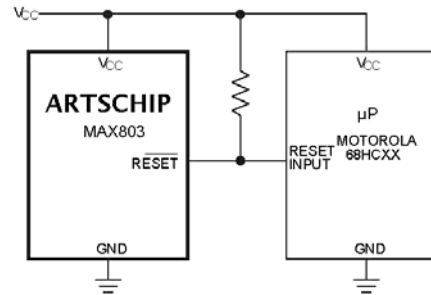
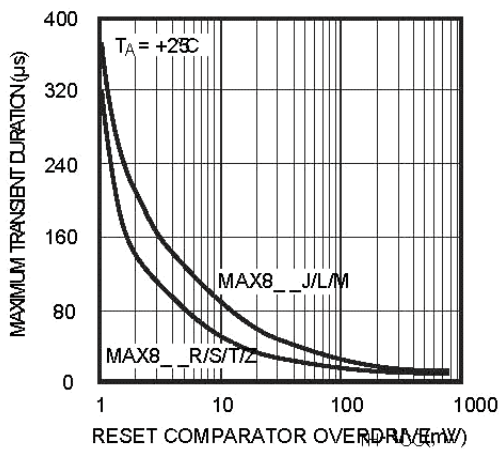


Figure 3. Interfacing to μ Ps with Bidirectional Reset I/O

Interfacing to μ Ps with Bidirectional Reset Pins

Since the RESET output on the MAX803 is open drain, this device interfaces easily with μ Ps that have bidirectional reset pins, such as the Motorola 68HC11. Connecting the μ P supervisor's RESET output directly to the microcontroller's (μ C's) RESET pin with a single pull-up resistor allows either device to assert reset (Figure 3).

MAX803 Open-Drain RESET Output Allows Use with Multiple Supplies

Generally, the pull-up connected to the MAX803 will connect to the supply voltage that is being monitored at the IC's Vcc pin. However, some systems may use the open-drain output to level-shift from the monitored supply to reset circuitry powered by some other supply (Figure 4). Note that as the MAX803's Vcc decreases below 1V, so does the IC's ability to sink current at RESET. Also, with any pull-up, RESET will be pulled high as Vcc decays toward 0. The voltage where this occurs depends on the pull-up resistor value and the voltage to which it is connected.

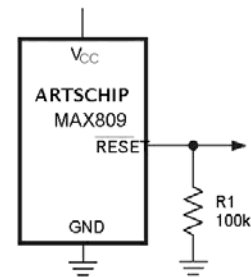


Figure 2. RESET Valid to Vcc=Ground Circuit

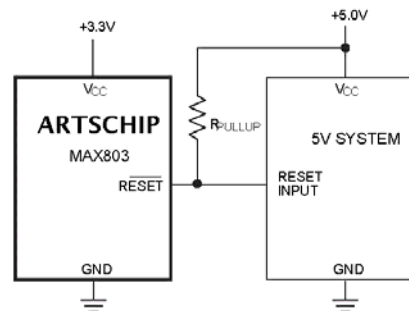


Figure 4. MAX803 Open-Drain RESET Output Allows Use with Multiple Supplies.

Benefits of Highly Accurate

Reset Threshold

Most μ P supervisor ICs have reset threshold voltages between 5% and 10% below the value of nominal supply voltages. This ensures a reset will not occur within 5% of the nominal supply, but will occur when the supply is 10% below nominal.

When using ICs rated at only the nominal supply $\pm 5\%$, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset may or may not be asserted.

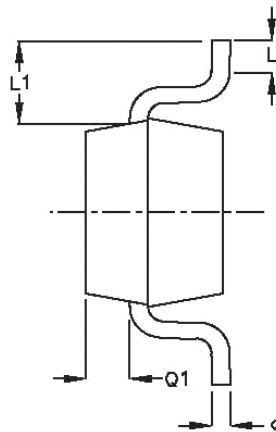
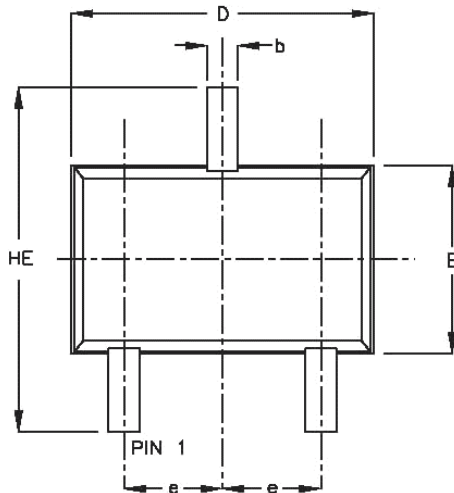
The MAX8_L/T/Z use highly accurate circuitry to ensure that reset is asserted close to the 5% limit, and long before the supply has declined to 10% below nominal.

Chip Information

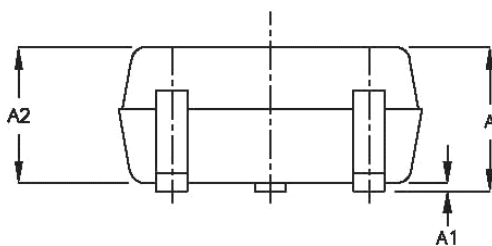
TRANSISTOR COUNT:275 (SOT23)

380(SC70)

Package Information



SYMBOL	MIN	MAX
e	0.65	BSC
D	1.80	2.20
b	0.25	0.40
E	1.15	1.35
HE	1.80	2.40
Q1	0.10	0.40
A2	0.80	1.00
A1	0.00	0.10
A	0.80	1.10
c	0.10	0.18
L	0.10	0.30
L1	0.425	TYP.

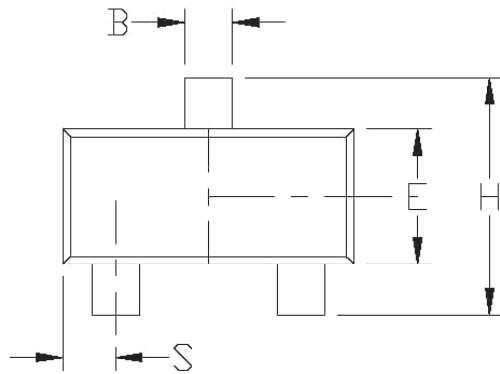


NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. DIMENSIONS ARE INCLUSIVE OF PLATING
3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR
4. ALL SPECIFICATIONS COMPLY TO EIAJ SC70
5. COPLANARITY 4 MILS. MAX.

NOTES:

1. D&E DO NOT INCLUDE MOLD FLASH.
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006")
3. CONTROLLING DIMENSION: MILLIMETER



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.031	0.047	0.787	1.194
A1	0.001	0.005	0.025	0.127
B	0.014	0.022	0.356	0.559
C	0.0034	0.006	0.086	0.152
D	0.105	0.120	2.667	3.048
E	0.047	0.055	1.194	1.397
e	0.070	0.080	1.778	2.032
H	0.082	0.098	2.083	2.489
L	0.004	0.012	0.102	0.305
S	0.017	0.022	0.432	0.559
α	0°	8°	0°	8°

