

Microprocessor Reset Circuits

Features

- Precision Voltage Monitor for 3V, 3.3V, or 5V Power Supplies
- /RESET Remains Valid with V_{CC} as Low as 1.4V for the SOT-23
- /RESET Remains Valid with V_{CC} as Low as 1V for the SC-70
- Typically Less Than 15 μA Supply Current for the SOT-23
- 5 μA Typical Supply Current for the SC-70
- 140 ms Minimum Reset Pulse Width Available
- Available in 3-Lead SOT-23 and SC-70 Packages

Applications

- Portable Equipment
- Intelligent Instruments
- Critical Microprocessor Power Monitoring
- Printers/Computers
- Controllers

General Description

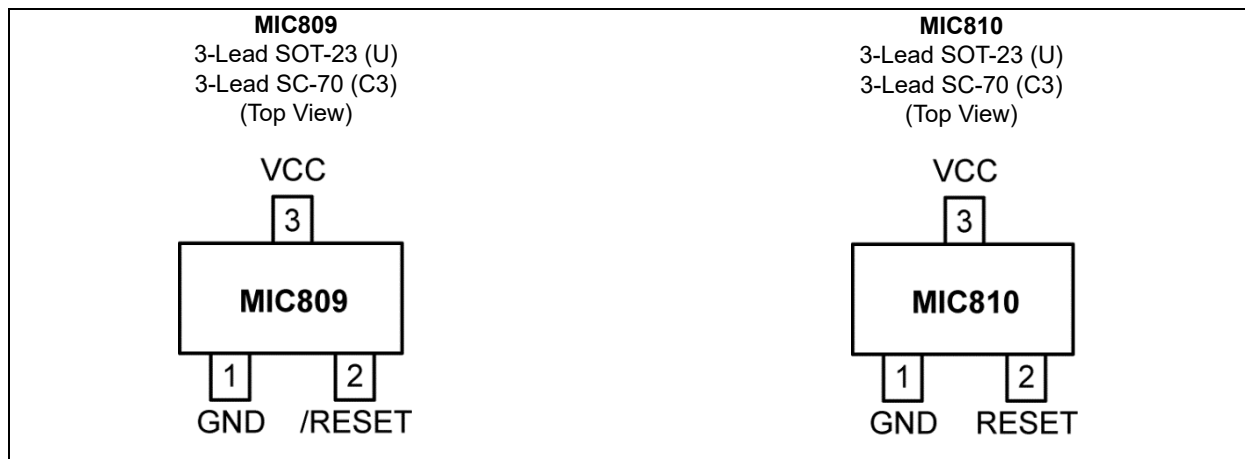
The MIC809 and MIC810 are inexpensive microprocessor supervisory circuits that monitor power supplies in microprocessor-based systems.

The function of these devices is to assert a reset if the power supply drops below a designated reset threshold level. Several different reset threshold levels are available to accommodate 3V, 3.3V, or 5V powered systems.

The MIC809 has an active-low /RESET output, while the MIC810 offers an active-high RESET output. The reset output is guaranteed to remain asserted for a minimum of 140 ms after V_{CC} has risen above the designated reset threshold level. Having a push-pull output stage, the MIC809/810 do not require a pull-up resistor at the output. The MIC809/810 come in a 3-lead SOT-23 and SC-70 package.

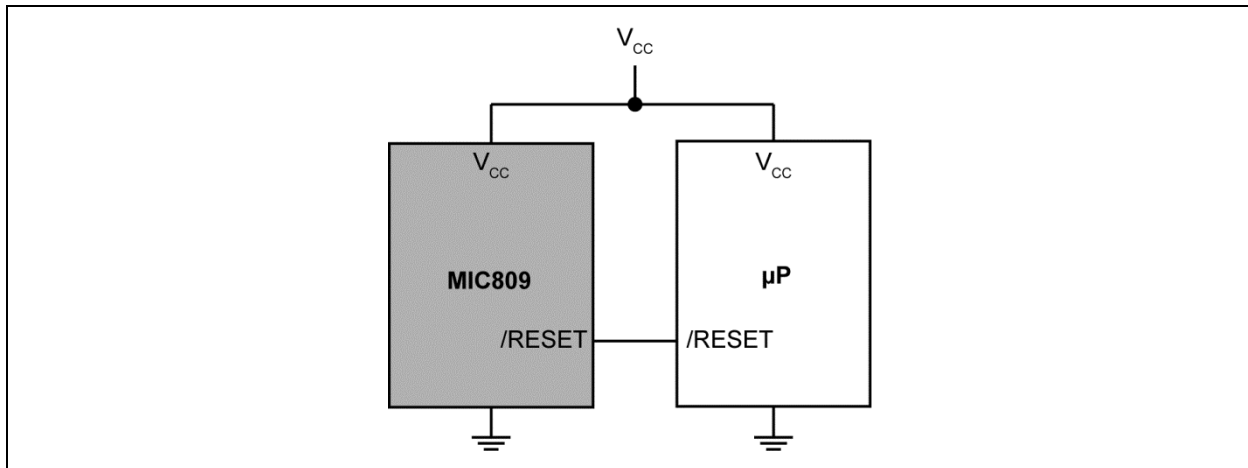
The MIC809 is also available with a shorter reset timeout (30 ms, minimum).

Package Types

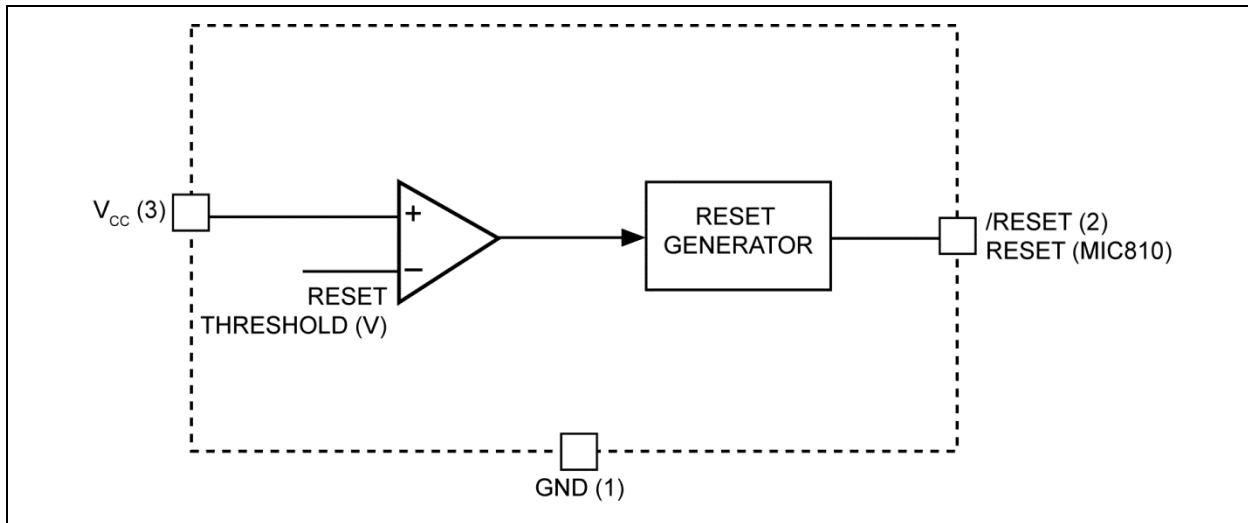


MIC809/MIC810

Typical Application Circuit



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Terminal Voltage (V_{CC}).....	-0.3V to +6.0V
Input Current (V_{CC} , /MR).....	20 mA
Output Current (/RESET, RESET)	20 mA
Rate of Rise (V_{CC})	100V/ μ s
ESD Rating, SC-70 (Note 1)	3 kV

Operating Ratings ‡

Power Dissipation ($T_A = +70^{\circ}\text{C}$).....	320 mW
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† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ **Notice:** The device is not guaranteed to function outside its operating rating.

Note 1: Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 k Ω in series with 100 pF.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: For typical values, $V_{CC} = 5\text{V}$ for MIC8__L/M/J, $V_{CC} = 3.3\text{V}$ for MIC8__S/T, $V_{CC} = 3\text{V}$ for MIC8__R; $T_A = +25^{\circ}\text{C}$, **bold** values valid for -40°C to $\leq T_A \leq +85^{\circ}\text{C}$; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Operating Voltage Range	V_{CC}	1.4	—	5.5	V	$T_A = 0^{\circ}\text{C}$ to 70°C (SOT-23)
		1.6	—	5.5		$T_A = -40^{\circ}\text{C}$ to 85°C (SOT-23)
		1.0	—	5.5		$T_A = -40^{\circ}\text{C}$ to 85°C (SC-70)
Supply Current	I_{CC}	—	9	15	μA	MIC809L/M/J, MIC810L/M/J (SOT-23)
		—	5	15		MIC809L/M/J, MIC810L/M/J (SC-70)
		—	6	10		$V_{CC} < 3.6\text{V}$, MIC809R/S/T, MIC810R/S/T (SOT-23)
		—	5	10		$V_{CC} < 3.6\text{V}$, MIC809R/S/T, MIC810R/S/T (SC-70)
Reset Voltage Threshold	V_{TH}	4.50	4.63	4.75	V	MIC809L, MIC810L
		4.25	4.38	4.50		MIC809M, MIC810M
		3.89	4.00	4.10		MIC809J, MIC810J
		3.00	3.08	3.15		MIC809T, MIC810T
		2.85	2.93	3.00		MIC809S, MIC810S
		2.55	2.63	2.70		MIC809R, MIC810R
Reset Timeout Period	t_{RST}	140	240	560	ms	—
/RESET Output Voltage (MIC809)	V_{OH}	$V_{CC} - 1.5\text{V}$	—	—	V	$I_{SOURCE} = 800 \mu\text{A}$, MIC809L/M/J
		$0.8 \times V_{CC}$	—	—		$I_{SOURCE} = 500 \mu\text{A}$, MIC809R/S/T

Note 1: Specification for packaged product only.

MIC809/MIC810

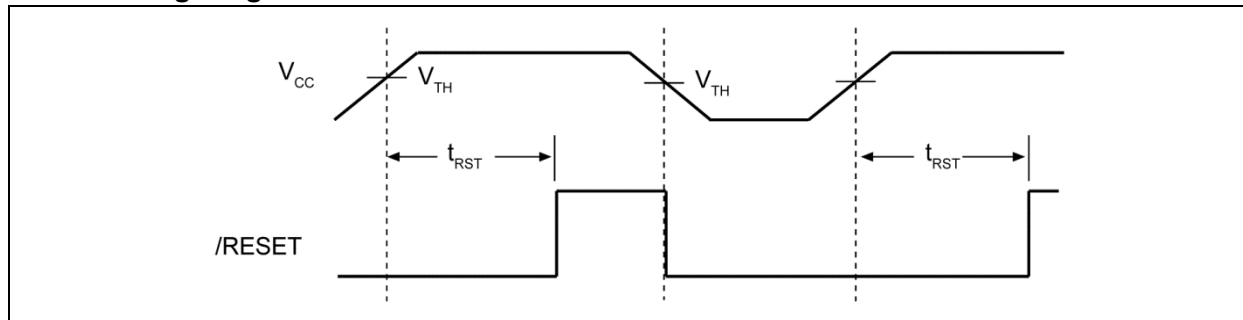
ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: For typical values, $V_{CC} = 5V$ for MIC8__L/M/J, $V_{CC} = 3.3V$ for MIC8__S/T, $V_{CC} = 3V$ for MIC8__R; $T_A = +25^{\circ}C$, **bold** values valid for $-40^{\circ}C$ to $\leq T_A \leq +85^{\circ}C$; unless noted. ([Note 1](#))

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
/RESET Output Voltage (MIC809)	V_{OL}	—	—	0.4	V	$V_{CC} = V_{TH}$ (minimum), $I_{SINK} = 3.2$ mA, MIC809L/M/J
		—	—	0.3		$V_{CC} = V_{TH}$ (minimum), $I_{SINK} = 1.2$ mA, MIC809R/S/T
		—	—	0.3		$V_{CC} > 1.4V$, $I_{SINK} = 50$ μA , $T_A = 0^{\circ}C$ to $+70^{\circ}C$
		—	—	0.3		$V_{CC} = 1V$, $I_{SINK} = 50$ μA , $T_A = -40^{\circ}C$ to $+85^{\circ}C$ (SC-70)
		—	—	0.3		$V_{CC} > 1.6V$, $I_{SINK} = 50$ μA , $T_A = -40^{\circ}C$ to $+85^{\circ}C$
RESET Output Voltage (MIC810)	V_{OH}	$0.8 \times V_{CC}$	—	—	V	$1.8V < V_{CC} < V_{TH}$ (minimum), $I_{SOURCE} = 150$ μA
RESET Output Voltage (MIC810)	V_{OL}	—	—	0.4	V	$I_{SINK} = 3.2$ mA, MIC810L/M/J
		—	—	0.3		$I_{SINK} = 1.2$ mA, MIC810R/S/T

Note 1: Specification for packaged product only.

Reset Timing Diagram



TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Temperature Range	T_A	-40	—	+85	$^{\circ}C$	Note 1
Storage Temperature Range	T_S	-65	—	+150	$^{\circ}C$	—
Lead Temperature	—	—	—	+300	$^{\circ}C$	Soldering, 10 sec.

Note 1: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A , T_J , θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum $+85^{\circ}C$ rating. Sustained junction temperatures above $+85^{\circ}C$ can impact the device reliability.

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 2-1](#).

TABLE 2-1: PIN FUNCTION TABLE

Pin Number MIC809	Pin Number MIC810	Pin Name	Description
1	1	GND	IC Ground Pin.
2	N/A	/RESET	/RESET goes low if V_{CC} falls below the reset threshold and remains asserted for one reset timeout period (140 ms min.) after V_{CC} exceeds the reset threshold.
N/A	2	RESET	RESET goes high if V_{CC} falls below the reset threshold and remains asserted for one reset timeout period (140 ms min.) after V_{CC} exceeds the reset threshold.
3	3	VCC	Power Supply Input.

MIC809/MIC810

3.0 APPLICATION INFORMATION

3.1 Microprocessor Reset

The /RESET (or RESET) pin is asserted whenever V_{CC} falls below the reset threshold voltage. The /RESET pin remains asserted for a period of 140 ms after V_{CC} has risen above the reset threshold voltage. The reset function ensures that the microprocessor is properly reset and powers up in a known condition after a power failure. /RESET will remain valid with V_{CC} as low as 1.4V for the SOT-23 package and as low as 1V for the SC-70 package.

3.2 V_{CC} Transients

The MIC809/810 are relatively immune to negative-going V_{CC} glitches below the reset threshold. Typically, a negative-going transient 125 mV below the reset threshold with a duration of 2 μ s or less (SC-70 package) will not cause a reset.

If additional transient immunity is needed, a 0.1 μ F bypass capacitor can be placed as close as possible to the MIC809/MIC810 on the VCC pin.

3.3 Interfacing to Bidirectional Reset Pins

The MIC809/810 can interface with microprocessors with bidirectional reset pins by connecting a 4.7 k Ω resistor in series with the MIC809/810 output and the microprocessor reset pin.

3.4 /RESET Valid at Low Voltage

A resistor can be added from the /RESET pin to ground to ensure the /RESET output remains low with V_{CC} down to 0V. A 100 k Ω resistor connected from the /RESET to ground is recommended. The value of the resistor should be small enough to pull-down any stray leakage currents and large enough not to load the reset output.

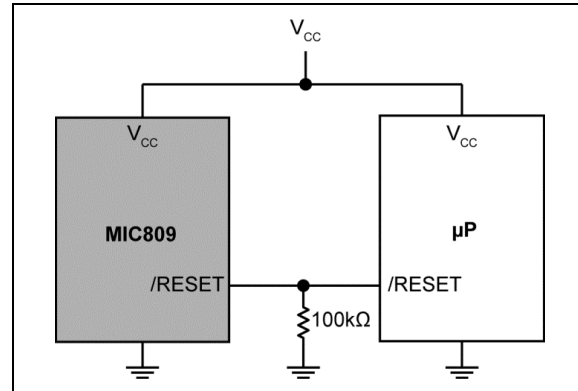


FIGURE 3-1: Reset Valid to $V_{CC} = 0V$.

4.0 PACKAGING INFORMATION

4.1 Package Marking Information

3-Lead SOT-23* (Front)	Example	3-Lead SOT-23* (Back)	Example
<u>XX</u>	<u>IR</u>	MNNN	4R1S
3-Lead SC-70* (Front)	Example	3-Lead SC-70* (Back)	Example
<u>XX</u>	<u>JT</u>	NNN	JA9

Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.
	•, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

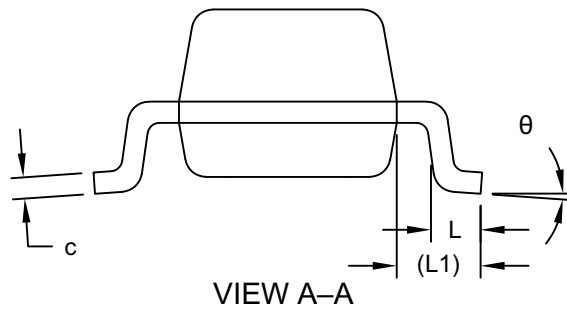
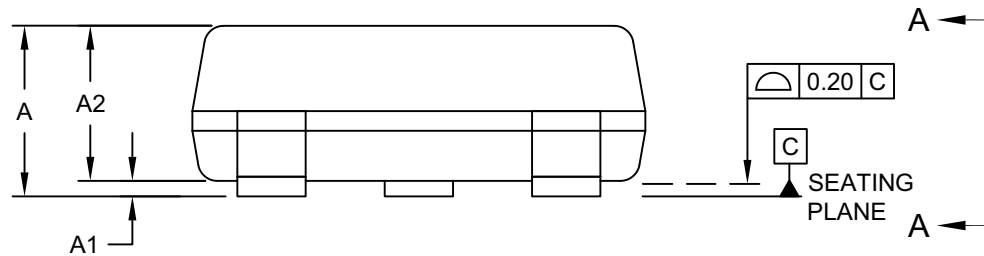
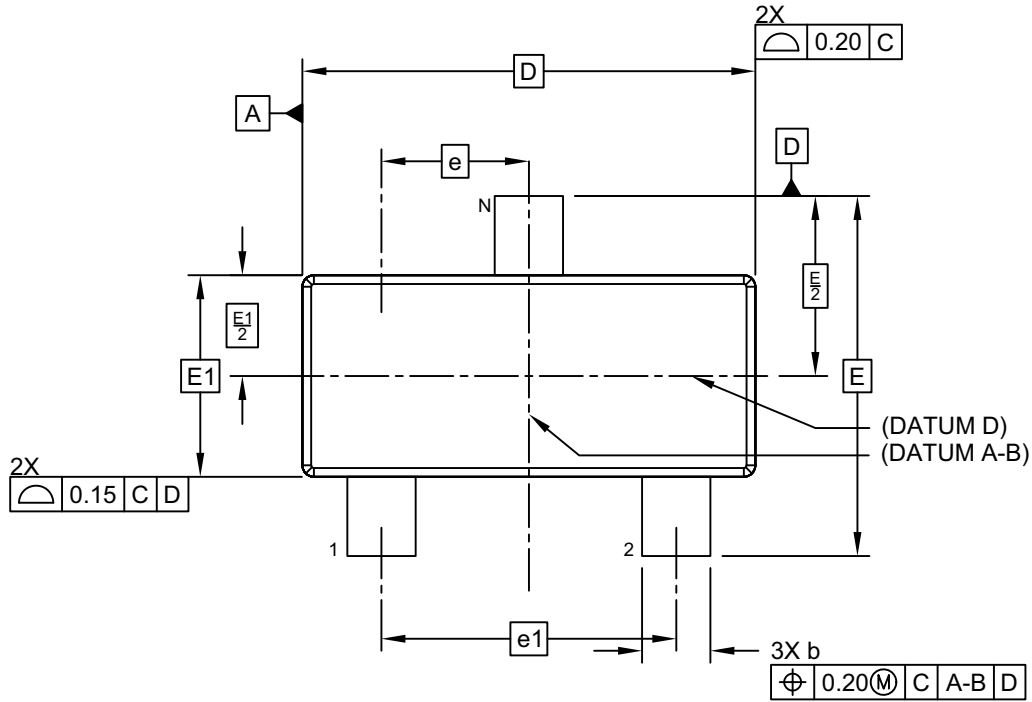
Underbar () and/or Overbar ([~]) symbol may not be to scale.

TABLE 4-1: MARKING CODES

SOT-23 Part Number	SC-70 Part Number	Marking Code	Threshold Voltage
MIC809LUY	MIC809LYC3	<u>IL</u>	4.63V
MIC809MUY	MIC809MYC3	<u>IM</u>	4.38V
MIC809JUY	MIC809JYC3	<u>IJ</u>	4.00V
MIC809TUY	MIC809TYC3	<u>IT</u>	3.08V
MIC809SUY	MIC809SYC3	<u>IS</u>	2.93V
MIC809RUY	MIC809RYC3	<u>IR</u>	2.63V
MIC810LUY	MIC810LYC3	<u>JL</u>	4.63V
MIC810MUY	MIC810MYC3	<u>JM</u>	4.38V
MIC810JUY	MIC810JYC3	<u>JJ</u>	4.00V
MIC810TUY	MIC810TYC3	<u>JT</u>	3.08V
MIC810SUY	MIC810SYC3	<u>JS</u>	2.93V
MIC810RUY	MIC810RYC3	<u>JR</u>	2.63V

3-Lead Plastic Small Outline Transistor (D7A) [SOT23] Micrel Legacy Package SOT-023-03L

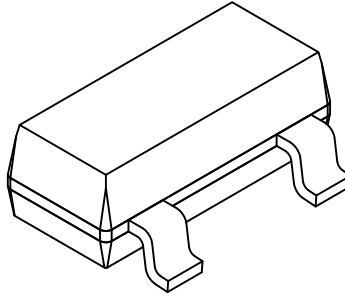
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-1139 Rev A Sheet 1 of 2

3-Lead Plastic Small Outline Transistor (D7A) [SOT23] Micrel Legacy Package SOT-023-03L

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Terminals	N	3		
Pitch	e	0.95 BSC		
Outside Lead Pitch	e1	1.90 BSC		
Overall Height	A	0.89	1.00	1.12
Standoff	A1	0.013	—	0.10
Molded Package Thickness	A2	0.88	0.95	1.02
Overall Length	D	2.90 BSC		
Overall Width	E	2.32 BSC		
Molded Package Width	E1	1.30 BSC		
Terminal Width	b	0.37	—	0.51
Terminal Thickness	c	0.08	—	0.20
Terminal Length	L	0.21	0.31	0.41
Footprint	L1	0.54 REF		
Foot Angle	θ	0°	—	8°

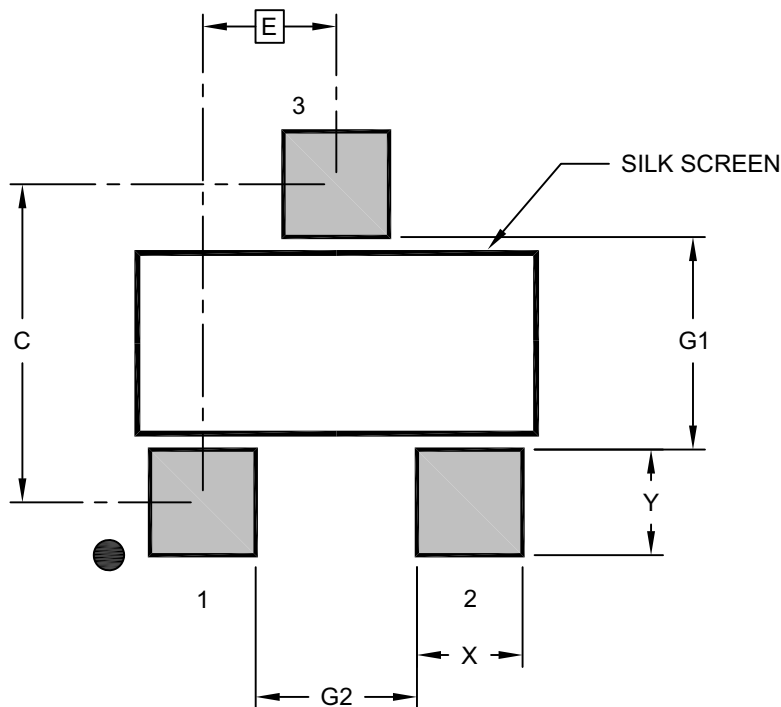
Notes:

1. Dimension D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25mm per side
2. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1139 Rev A Sheet 2 of 2

3-Lead Plastic Small Outline Transistor (D7A) [SOT23]
Micrel Legacy Package SOT-023-03L

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



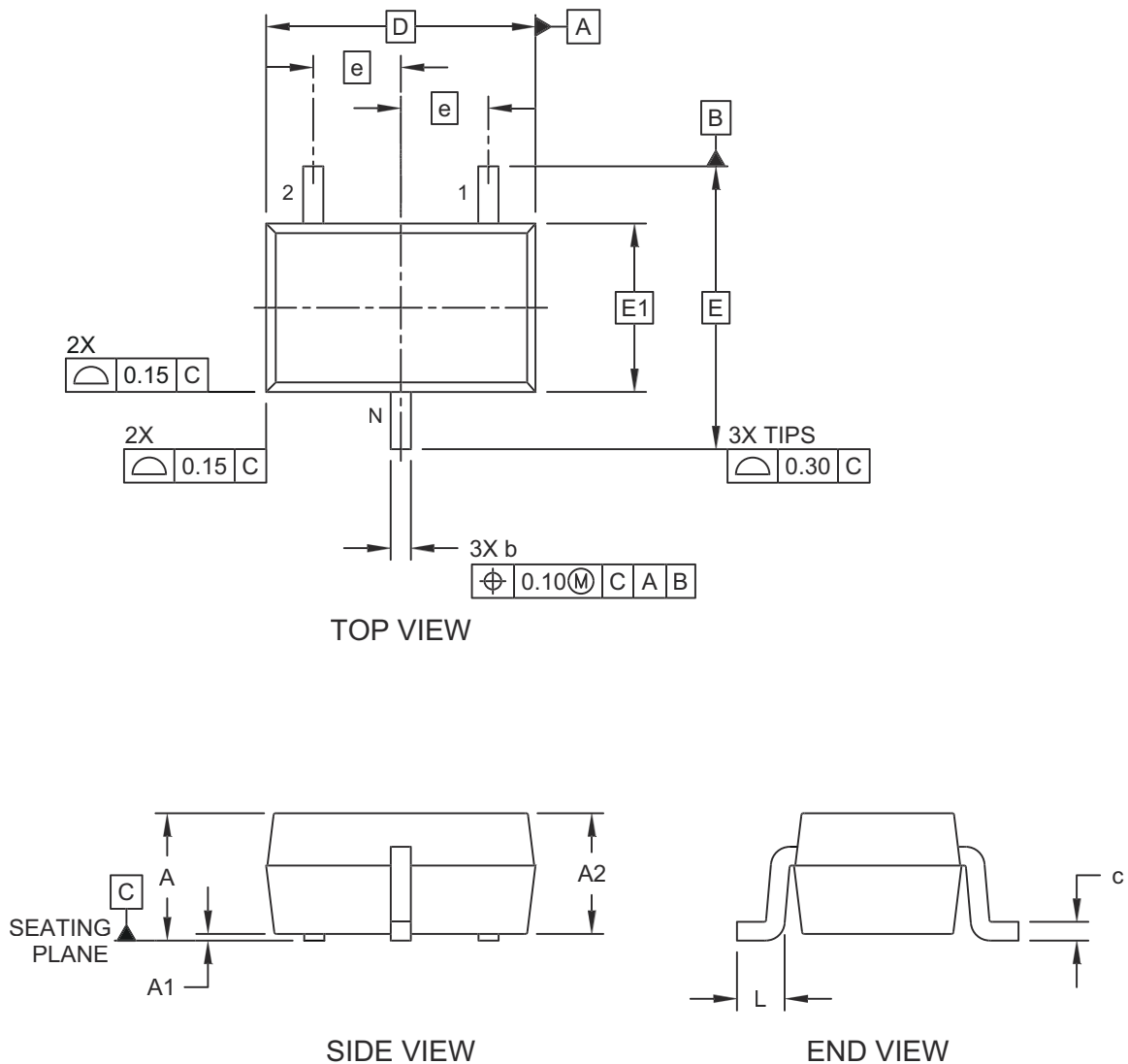
RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.96 BSC		
Contact Pad Spacing	C		2.29	
Contact Pad Width (X3)	X			0.78
Contact Pad Length (X3)	Y			0.78
Contact Pad to Center Pad (X3)	G1	1.53		
Contact Pad to Contact Pad (X1)	G2	1.16		

- Notes:
1. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

3-Lead Plastic Small Outline Transistor (D2A) [SC70]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

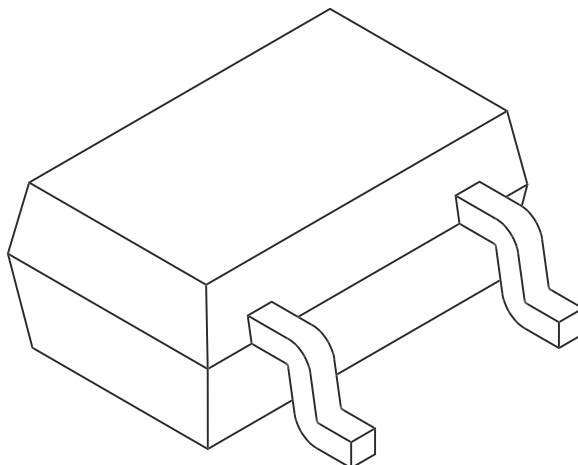


Microchip Technology Drawing C04-00060 [D2A] Rev F Sheet 1 of 2

MIC809/MIC810

3-Lead Plastic Small Outline Transistor (D2A) [SC70]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	3		
Pitch	e	0.65 BSC		
Overall Height	A	0.80	-	1.10
Standoff	A1	0.00	-	0.10
Molded Package Thickness	A2	0.80	-	1.00
Overall Length	D	2.00 BSC		
Exposed Pad Length	D2	2.50	2.60	2.70
Overall Width	E	2.10 BSC		
Exposed Pad Width	E1	1.25 BSC		
Terminal Width	b	0.15	-	0.40
Terminal Length	L	0.10	0.20	0.46
Lead Thickness	c	0.08	-	0.26

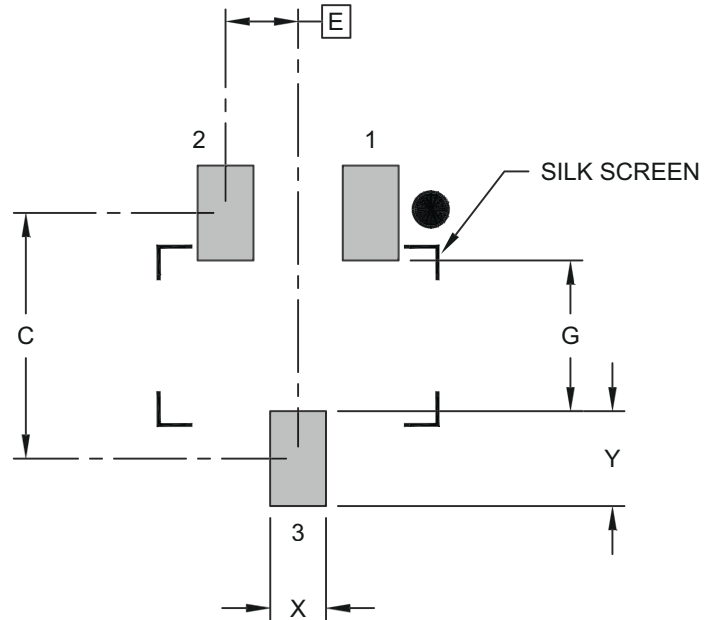
Notes:

- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
- Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. The theoretically exact value is shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-00060 [D2A] Rev F Sheet 2 of 2

3-Lead Plastic Small Outline Transistor (D2A) [SC70]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Contact Pitch	E	0.65 BSC		
Contact Pad Spacing	C		2.20	
Contact Pad Width	X			0.50
Contact Pad Length	Y			0.85
Distance Between Pads	G	1.25		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. The theoretically exact value is shown without tolerances.

Microchip Technology Drawing No. C04-02060 [D2A] Rev F

APPENDIX A: REVISION HISTORY

Revision B (July 2026)

- Updated [Section 3.2 “VCC Transients”](#).
- Updated the package outline drawings in [Section 4.0 “Packaging Information”](#).

Revision A (August 2022)

- Converted Micrel document MIC809/MIC810 to Microchip data sheet template DS20006707A.
- Minor grammatical text changes throughout.

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

MIC809LUY-TR

DEVICE

MIC809: Microprocessor Reset
Circuit with Active-Low /RESET
MIC810: Microprocessor Reset
Circuit with Active-High RESET

THRESHOLD
VOLTAGE

R = 2.63V
S = 2.93V
T = 3.08V
J = 4.00V
M = 4.38V
L = 4.63V

PACKAGE

U = 3-Lead
SOT-23

TEMP. RANGE

Y = -40°C to +85°C

MEDIA TYPE

TR = 3,000/Reel

MIC810LYC3-TR

DEVICE

MIC809: Microprocessor Reset
Circuit with Active-Low /RESET
MIC810: Microprocessor Reset
Circuit with Active-High RESET

THRESHOLD
VOLTAGE

R = 2.63V
S = 2.93V
T = 3.08V
J = 4.00V
M = 4.38V
L = 4.63V

TEMP.
RANGE

Y = -40°C to +85°C

PACKAGE

C3 = 4-Lead
SC-70

MEDIA TYPE

TR = 3,000/Reel

Examples:

a) MIC809RUY-TR: MIC809, 2.63V Threshold Voltage, 3-Lead SOT-23, -40°C to +85°C Temp. Range, 3,000/Reel

b) MIC809JYC3-TR: MIC809, 4.00V Threshold Voltage, 3-Lead SC-70, -40°C to +85°C Temp. Range, 3,000/Reel

c) MIC809TUY-TR: MIC809, 3.08V Threshold Voltage, 3-Lead SOT-23, -40°C to +85°C Temp. Range, Range, 3,000/Reel

d) MIC810SYC3-TR: MIC810, 2.93V Threshold Voltage, 3-Lead SC-70, -40°C to +85°C Temp. Range, 3,000/Reel

e) MIC810LUY-TR: MIC810, 4.63V Threshold Voltage, 3-Lead SOT-23, -40°C to +85°C Temp. Range, 3,000/Reel

f) MIC810MYC3-TR: MIC810, 4.38V Threshold Voltage, 3-Lead SC-70, -40°C to +85°C Temp. Range, 3,000/Reel

Note 1:

Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

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