



MIC809/810

Microprocessor Reset Circuits

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 140ms after V_{CC} has risen above the designated reset threshold level. Having a push-pull output stage, the MIC809/810 does not require a pull-up resistor at the output. The MIC809/810 comes in a 3-pin SOT-23 and SC-70 package.

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

Datasheets and support documentation are available on Micrel's web site at: www.micrel.com.

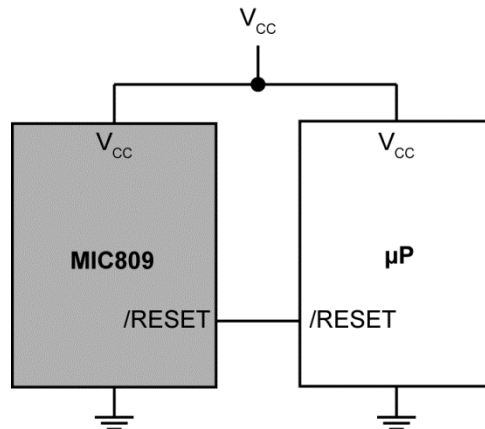
Features

- Precision voltage monitor for 3V, 3.3V, or 5V power supplies
- /RESET remains valid with V_{CC} as low as 1.4V for SOT-23 packaged part
- /RESET remains valid with V_{CC} as low as 1V for SC70-packaged part
- Typically less than 15 μ A supply current for SOT-23 packaged part
- 5 μ A (typical) supply current for SC70-packaged part
- 140ms (minimum) reset pulse widths available
- Available in 3-pin SOT-23 and SC-70 package

Applications

- Portable equipment
- Intelligent instruments
- Critical microprocessor power monitoring
- Printers/computers
- Controllers

Typical Application

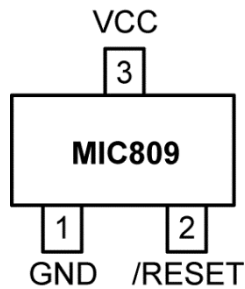


Ordering Information⁽¹⁾

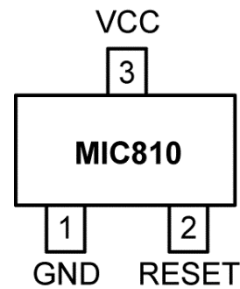
Part Number		Marking ⁽²⁾	Threshold Voltage (V)	Operating Temperature Range	Lead Finish
3-Pin SOT-23	3-Pin SC-70				
MIC809LUY	MIC809LYC3	<u>IL</u>	4.63	-40°C to +85°C	Pb-Free
MIC809MUJ	MIC809MYC3	<u>IM</u>	4.38	-40°C to +85°C	Pb-Free
MIC809JUY	MIC809JYC3	<u>IJ</u>	4.00	-40°C to +85°C	Pb-Free
MIC809TUY	MIC809TYC3	<u>IT</u>	3.08	-40°C to +85°C	Pb-Free
MIC809SUY	MIC809SYC3	<u>IS</u>	2.93	-40°C to +85°C	Pb-Free
MIC809RUY	MIC809RYC3	<u>IR</u>	2.63	-40°C to +85°C	Pb-Free
MIC810LUY	MIC810LYC3	<u>JL</u>	4.63	-40°C to +85°C	Pb-Free
MIC810MUJ	MIC810MYC3	<u>JM</u>	4.38	-40°C to +85°C	Pb-Free
MIC810JUY	MIC810JYC3	<u>JJ</u>	4.00	-40°C to +85°C	Pb-Free
MIC810TUY	MIC810TYC3	<u>JT</u>	3.08	-40°C to +85°C	Pb-Free
MIC810SUY	MIC810SYC3	<u>JS</u>	2.93	-40°C to +85°C	Pb-Free
MIC810RUY	MIC810RYC3	<u>JR</u>	2.63	-40°C to +85°C	Pb-Free

- Note:**
- All devices available in Tape and Reel only (Order entry PN, add TR, i.e., MIC809LUY TR). Standard/full reel quantity is 3,000 pieces. Reel diameter is 7in, hub diameter is 2in, and width is 8mm.
 - Underbar symbol () may not be to scale.

Pin Configuration



3-Pin MIC809 SOT-23
3-Pin MIC809 SC-70
(Top View)

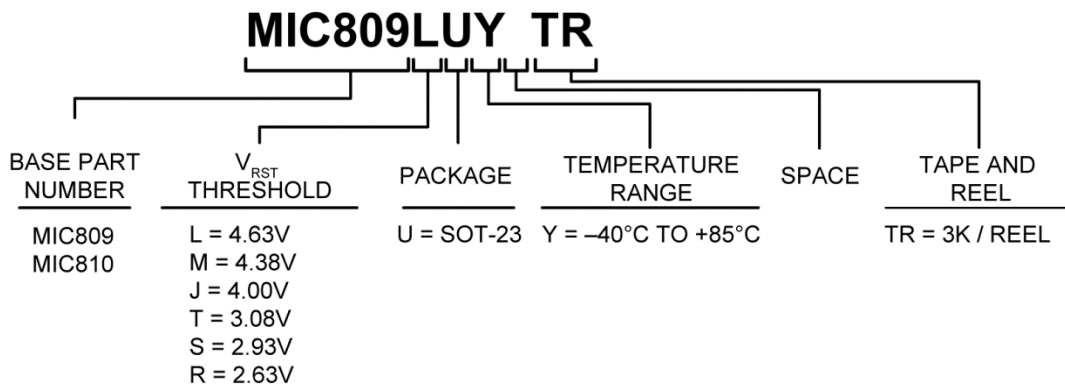


3-Pin MIC810 SOT-23
3-Pin MIC810 SC-70
(Top View)

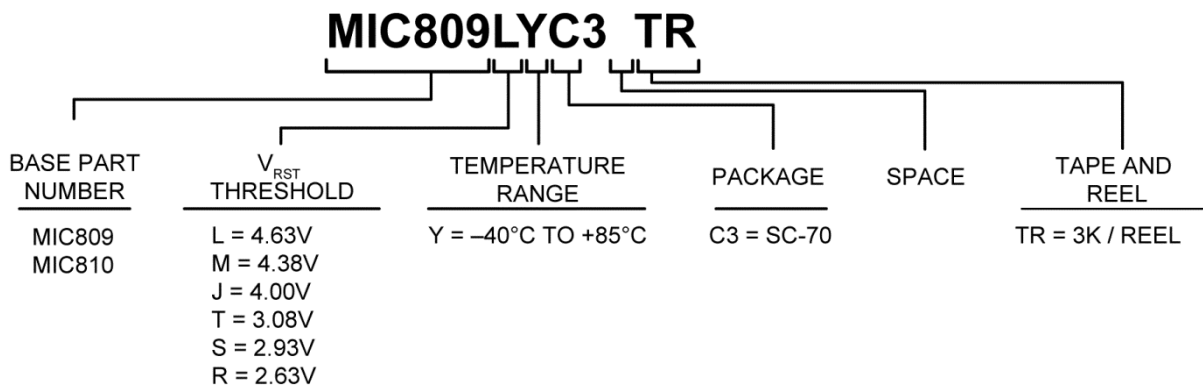
Pin Description

Pin Number MIC809	Pin Number MIC810	Pin Name	Pin Name
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 (140ms 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 (140ms, minimum) after V_{CC} exceeds the reset threshold.
3	3	VCC	Power Supply Input.

Part Numbering Conventions



MIC809 SOT-23



MIC809 SC-70

Absolute Maximum Ratings⁽³⁾

Terminal Voltage (V_{CC}).....	-0.3V to +6.0V
Input Current (V_{CC}).....	20mA
Output Current (/RESET, RESET).....	20mA
Lead Temperature (soldering, 10s).....	300°C
Storage Temperature (T_S).....	-65°C to 150°C
Rate-of-Rise (V_{CC}).....	100V/ μ s
ESD Rating ⁽⁵⁾	3kV (SC-70)

Operating Ratings⁽⁴⁾

Operating Temperature Range	
MIC809	-40°C to +85°C
MIC810	-40°C to +85°C
Power Dissipation ($T_A = +70^\circ\text{C}$).....	320mW

Electrical Characteristics⁽⁶⁾

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 indicate -40°C to $\leq T_A \leq +85^\circ\text{C}$; unless otherwise noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{CC}	Operating Voltage Range	$T_A = 0^\circ\text{C}$ to 70°C (SOT-23)	1.4		5.5	V
		$T_A = -40^\circ\text{C}$ to 85°C (SOT-23)	1.6		5.5	V
		$T_A = -40^\circ\text{C}$ to 85°C (SC70)	1		5.5	V
I_{CC}	Supply Current	MIC809L/M/J, MIC810L/M/J (SOT-23)		9	15	μA
		MIC809L/M/J, MIC810L/M/J (SC-70)		5	15	
		$V_{CC} < 3.6\text{V}$, MIC809R/S/T, MIC810R/S/T (SOT-23)		6	10	
		$V_{CC} < 3.6\text{V}$, MIC809R/S/T, MIC810R/S/T (SC-70)		5	10	
V_{TH}	Reset Voltage Threshold	MIC809L, MIC810L	4.50	4.63	4.75	V
		MIC809M, MIC810M	4.25	4.38	4.50	
		MIC809J, MIC810J	3.89	4.00	4.10	
		MIC809T, MIC810T	3.00	3.08	3.15	
		MIC809S, MIC810S	2.85	2.93	3.00	
		MIC809R, MIC810R	2.55	2.63	2.70	
t_{RST}	Reset Timeout Period		140	240	560	ms
V_{OH}	/RESET Output Voltage (MIC809)	$I_{SOURCE} = 800\mu\text{A}$, MIC809L/M/J	$V_{CC} - 1.5\text{V}$			V
		$I_{SOURCE} = 500\mu\text{A}$, MIC809R/S/T	$0.8 \times V_{CC}$			

Notes:

- Exceeding the absolute maximum ratings may damage the device.
- The device is not guaranteed to function outside its operating ratings.
- Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5k Ω in series with 100pF.
- Specification for packaged product only.

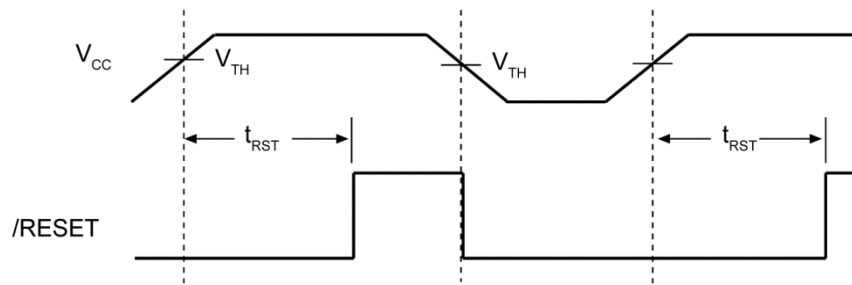
Electrical Characteristics⁽⁶⁾ (Continued)

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 indicate $-40^\circ C$ to $\leq T_A \leq +85^\circ C$; unless otherwise noted.

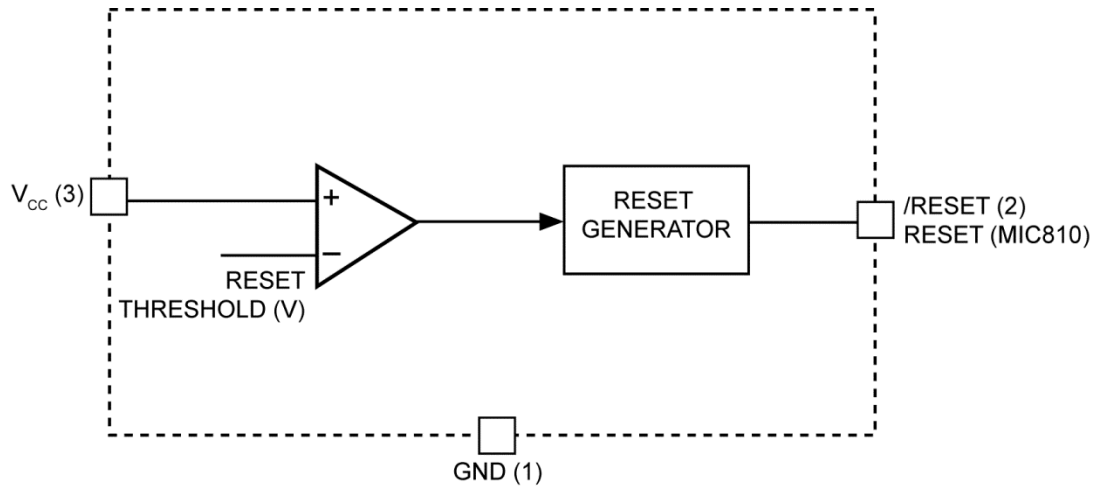
Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{OL}	/RESET Output Voltage (MIC809)	$V_{CC} = V_{TH}$ (minimum), $I_{SINK} = 3.2mA$, MIC809L/M/J			0.4	V
		$V_{CC} = V_{TH}$ (minimum), $I_{SINK} = 1.2mA$, MIC809R/S/T			0.3	
		$V_{CC} > 1.4V$, $I_{SINK} = 50\mu A$, $T_A = 0^\circ C$ to $+70^\circ C$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

Timing Diagram



Reset Timing Diagram

Functional Diagram



Application Information

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 140ms after V_{CC} has risen above the reset threshold voltage. The reset function ensures 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 (1V for SC-70 package).

V_{CC} Transients

The MIC809/810 are relatively immune to negative-going V_{CC} glitches below the reset threshold. Typically, a negative-going transient 125mV below the reset threshold with duration of 2 μ s or less (SC70 package) will not cause a reset.

Interfacing to Bidirectional Reset Pins

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

/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 100k Ω resistor connected from the /RESET to ground is recommended. The resistor should be small enough to pull-down any stray leakage currents and large enough not to load the reset output (Figure 1).

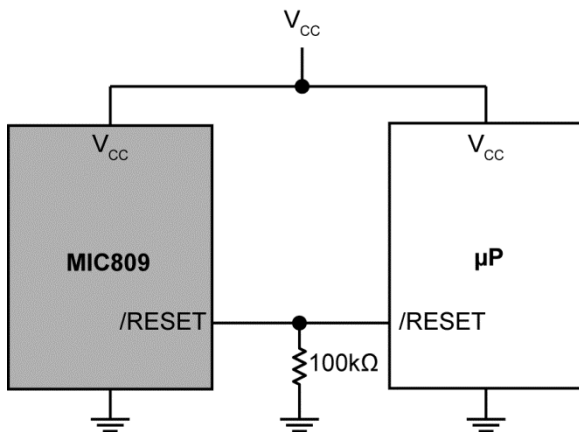
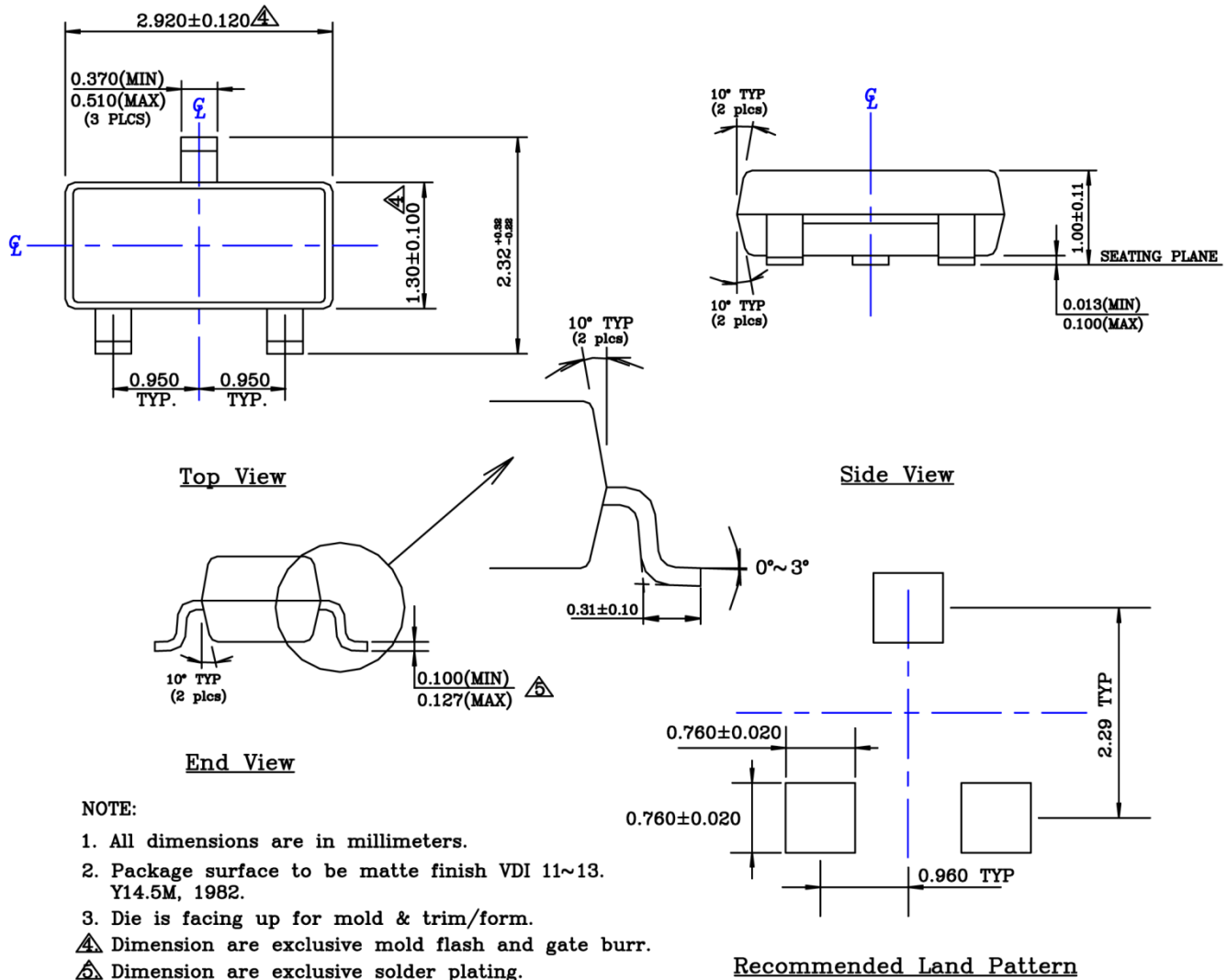


Figure 1. Reset Valid to $V_{CC} = 0V$

Package Information and Recommended Landing Patterns⁽⁷⁾



NOTE:

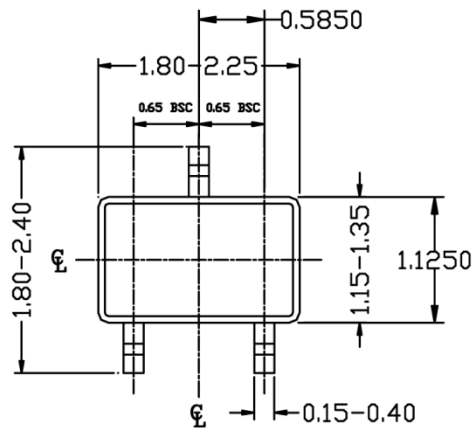
1. All dimensions are in millimeters.
 2. Package surface to be matte finish VDI 11~13. Y14.5M, 1982.
 3. Die is facing up for mold & trim/form.
- \triangle Dimension are exclusive mold flash and gate burr.
 \triangle Dimension are exclusive solder plating.

3-Pin SOT-23 (U)

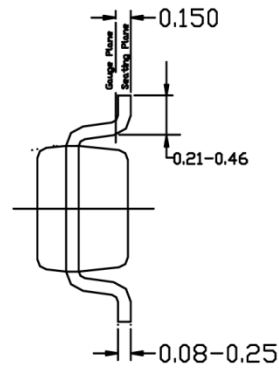
Note:

7. Package information is correct as of the publication date. For updates and most current information, go to www.micrel.com.

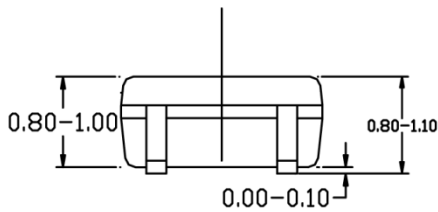
Package Information and Recommended Landing Patterns⁽⁷⁾ (Continued)



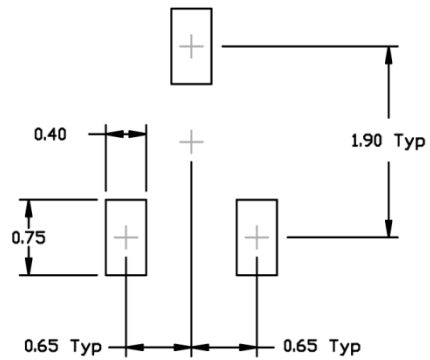
TOP VIEW



END VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN

- NOTE:
 1. ALL DIMENSIONS ARE IN MILLIMETERS.
 2. DIMENSIONS ARE INCLUSIVE OF PLATING.
 3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR.

3-Pin SC-70 (C3)

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