THE INFINITE POWER OF INNOVATION

SG3546

3.3V UNDERVOLTAGE SENSING CIRCUIT

PRODUCTION DATA SHEET

DESCRIPTION

The SG3546 is an undervoltage sensing circuit specifically designed for use as a reset controller in 3.3V microprocessor-based applications. Its micropower operation makes this device ideal for portable applications where extended battery life is required. The device offers a 1.2V temperature compensated bandgap reference, a precision comparator with hysteresis and a high-current open collector output. This device operates from 1 to 10V input supply and drains <10µA in the non-fault condition. The SG3546 is available in an 8-pin 150mil SOIC package or a 3-pin TO-92 package and is rated for an ambient temperature of 0°C to 70°C.

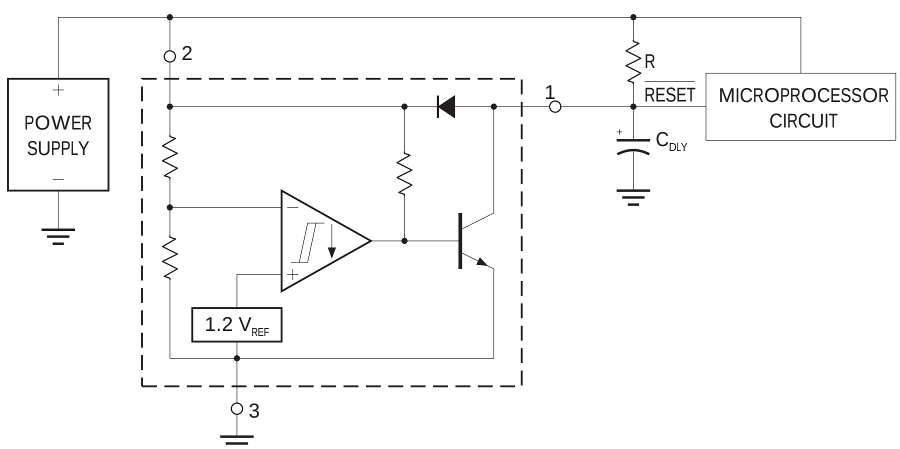
IMPORTANT: For the most current data, consult *MICROSEMI*'s website: **http://www.microsemi.com**

KEY FEATURES

- LOW STANDBY CURRENT
- INTERNAL VOLTAGE THRESHOLD AT 2.95V
- TEMPERATURE COMPENSATED BANDGAP REFERENCE
- PRECISION COMPARATOR WITH 40MV OF HYSTERESIS
- CLAMP DIODE FOR DISCHARGING DELAY CAPACITOR
- OUTPUT CURRENT SINK CAPABILITY (typ 5mA)
- 1-10V INPUT SUPPLY RANGE
- AVAILABLE IN 150MIL, 8-PIN SOIC AND 3-PIN TO-92 PACKAGES

PRODUCT HIGHLIGHT

LOW-VOLTAGE MICROPROCESSOR RESET



PACKAGE ORDER INFO

T_A (°C)	DM Plastic SOIC 8-Pin RoHS Compliant / Pb-free Transition DC: 0440	LP Plastic TO-92 3-Pin RoHS Compliant / Pb-free Transition DC: 0509
0 to 70	**SG3546DM**	**SG3546LP**

Note: Available in Tape & Reel. Append the letters "TR" to the part number. (i.e. LX3546DM-TR)

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3.3V Undervoltage Sensing Circuit

Production Data Sheet

ABSOLUTE MAXIMUM RATINGS (Note 1)

Input Supply Voltage (V_{IN}) .... -1V to 12V
$\overline{\text{RESET}}$ Output Voltage (V_{OUT}) .... -1V to 12V
Clamp Diode Forward Current 100mA
Operating Junction Temperature
  Plastic (DM - Package) .... 150°C
Storage Temperature Range .... -65°C to 150°C
Lead Temperature (Soldering, 10 seconds) .... 300°C
Peak Package Solder Reflow Temp. (40 second max. exposure)............260C (+0, -5)

Note 1. Values beyond which damage may occur. All voltages are specified with respect to ground, and all currents are positive into the specified terminal.

THERMAL DATA

DM PACKAGE:

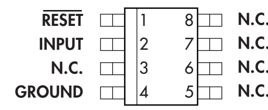
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	165°C/W

LP PACKAGE:

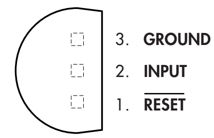
THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	156°C/W

Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.
The θ_{JA} numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

PACKAGE PIN OUTS



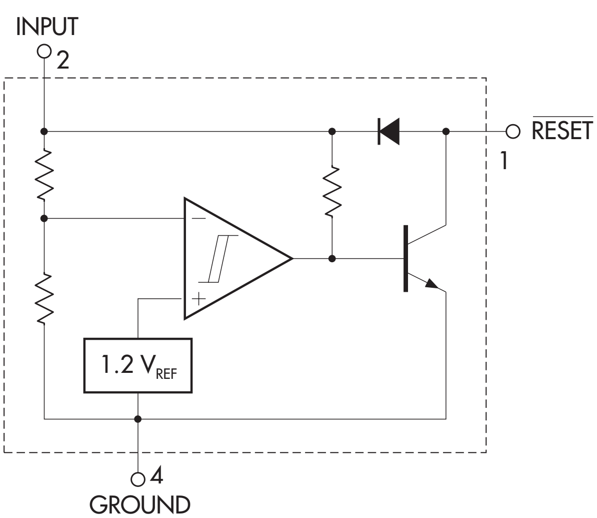
DM PACKAGE
(Top View)



LP PACKAGE
(Top View)

RoHS / Pb-free 100% Matte Tin Lead Finish

BLOCK DIAGRAM



RECOMMENDED OPERATING CONDITIONS (Note 2)

Parameter	Symbol	Recommended Operating Conditions Min.	Typ.	Max.	Units
Input Supply Voltage		1		10	V
RESET Output Voltage				10	V
Clamp Diode Forward Current				50	mA
Operating Ambient Temperature Range:					
SG3546	T_A	0		70	°C

Note 2. Range over which the device is guaranteed functional.

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply over the operating ambient temperatures of 0°C ≤ T_A ≤ 70°C for the SG3546. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter	Symbol	Test Conditions	SG3546 Min.	Typ.	Max.	Units
Total Device						
Operating Input Voltage Range	V_{IN}		1.0		10	V
Quiescent Input Current	I_{IN}	V_{IN} = 3.3V		10	20	µA
		V_{IN} = 10V		19	50	µA
Comparator Section						
Threshold Voltage						
High-State Output	V_{IH}	V_{IN} Increasing	2.75	2.81	3.0	V
Low-State Output	V_{IL}	V_{IN} Decreasing	2.75	2.86	3.0	V
Hysteresis	V_H			40		mV
RESET Output Section						
Output Sink Saturation	V_{OL}	V_{IN} = 2.6V, I_{SINK} = 1mA		0.05	0.40	V
		V_{IN} = 1.0V, I_{SINK} = 100µA		0.06	0.30	V
Output Sink Current	I_{SINK}	V_{IN} , RESET = 2.6V			20	mA
Output Off-State Leakage		V_{IN} , RESET = 3.6V			0.5	µA
		V_{IN} , RESET = 10V			2.0	µA
Clamp Diode Forward Voltage	V_F	Pin 1 to pin 2, (I_F = 5.0mA)	0.5		1.2	V

GRAPH / CURVE INDEX

Characteristic Curves

FIGURE INDEX

Application Circuits

CHARACTERISTIC CURVES

FIGURE 1. — COMPARATOR THRESHOLD VOLTAGE vs. TEMPERATURE

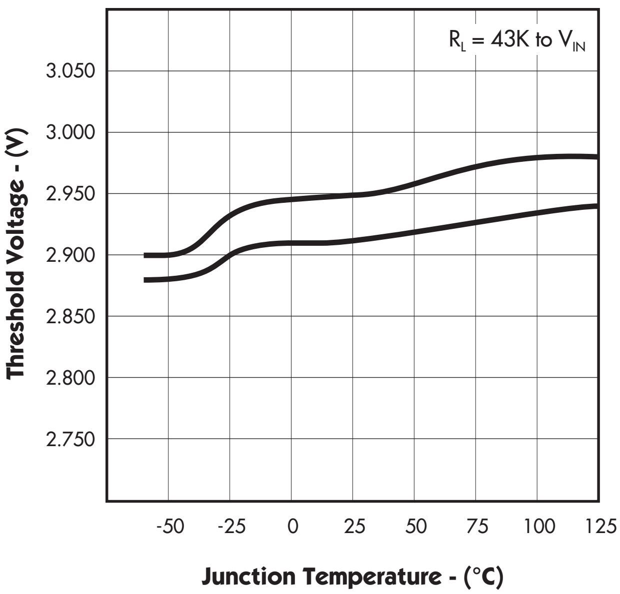


FIGURE 2. — RESET OUTPUT VOLTAGE vs. INPUT VOLTAGE

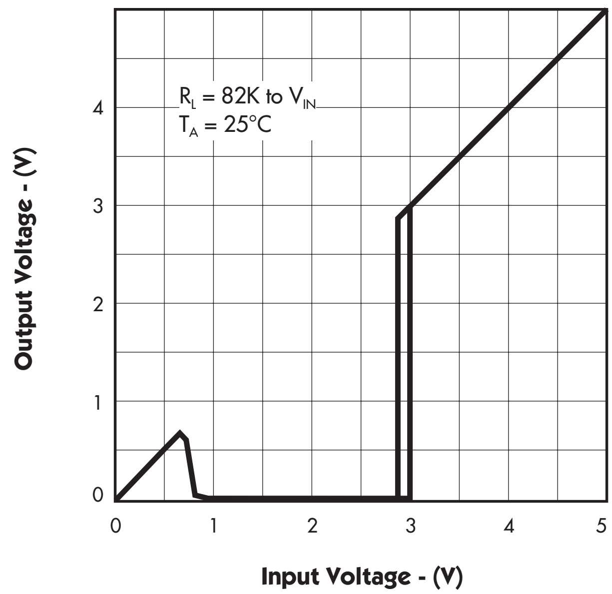


FIGURE 3. — RESET OUTPUT SATURATION vs. SINK CURRENT

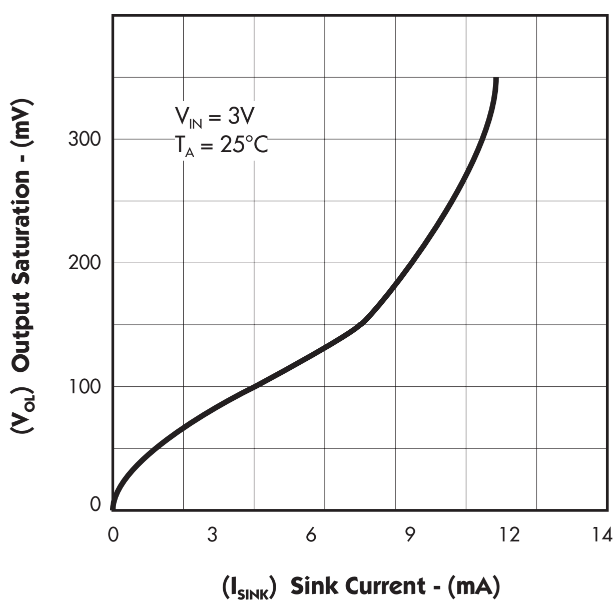
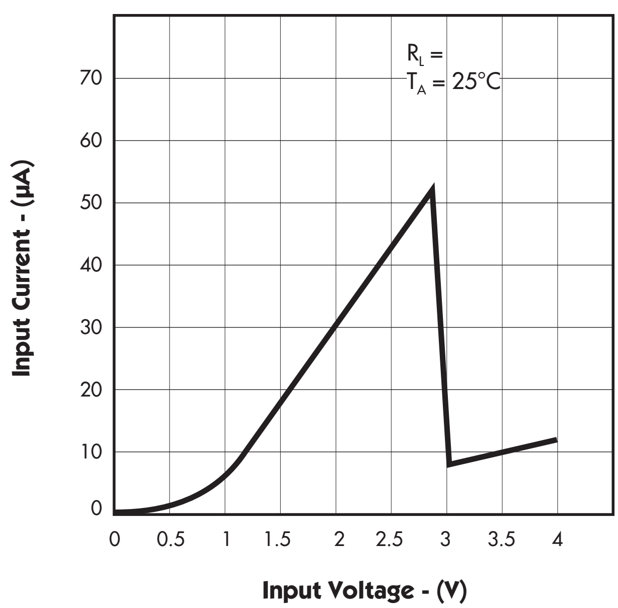
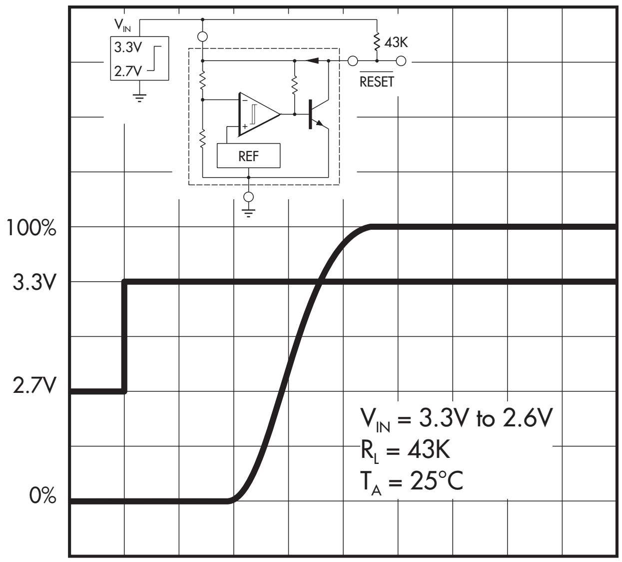


FIGURE 4. — INPUT CURRENT vs. INPUT VOLTAGE



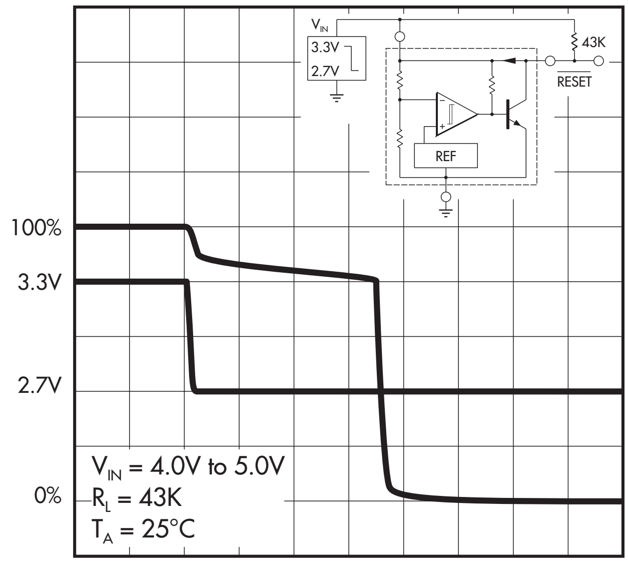
CHARACTERISTIC CURVES

FIGURE 5. — $\overline{\text{RESET}}$ DELAY TIME (LOW TO HIGH)



2µs/DIV.

FIGURE 6. — $\overline{\text{RESET}}$ DELAY TIME (HIGH TO LOW)



0.5µs/DIV.

TYPICAL APPLICATION CIRCUITS

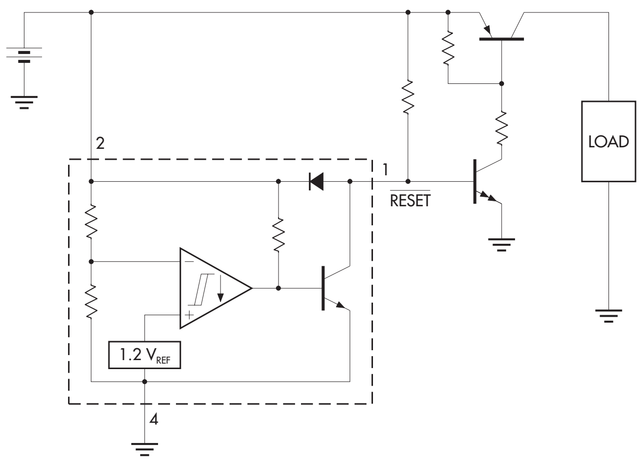
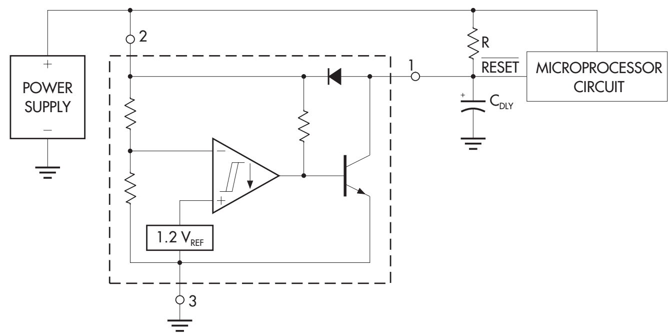


FIGURE 7. — SWITCHING THE LOAD OFF WHEN BATTERY VOLTAGE REACHES BELOW V_{TH}



A time-delayed reset can be accomplished with the addition of C_{DLY}. For systems with extremely fast power supply rise times (< 500ns), it is recommended that the RC_{DLY} time constant be greater than 5.0µs. $V_{TH(MPU)}$ is the microprocessor reset input threshold.

$$t_{DLY} = R\,C_{DLY}\,\ln\left[\frac{1}{1-\frac{V_{TH(MPU)}}{V_{IN}}}\right]$$

FIGURE 8. — LOW VOLTAGE MICROPROCESSOR RESET

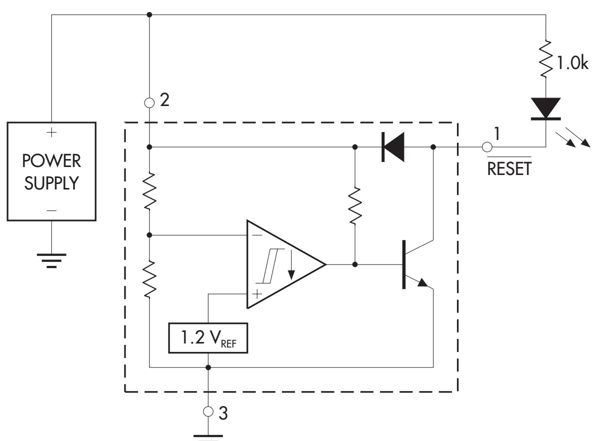


FIGURE 9. — VOLTAGE MONITOR