Micro-Power Voltage Detectors

General Description

The RT9818 is a micro-power voltage detector supervising the power supply voltage level for microprocessors (μP) or digital systems. It provides internally fixed threshold levels with 0.1V per step ranging from 1.2V to 5V, which covers most digital applications. It features low supply current of 3μA. The RT9818 performs supervisory function by sending out a reset signal whenever the V_{DD} voltage falls below a preset threshold level. This reset signal will last the whole period before V_{DD} recovering. Once V_{DD} recovered upcrossing the threshold level, the reset signal will be released after a certain delay time. RT9818 is provided in SC-82, SC-70-3, SOT-23-3, SOT-23-5 and SOT-89 packages.

Ordering Information

RT9818□-□□□□

Package Type
U3 : SC-70-3
V : SOT-23-3
VL : SOT-23-3 (L-Type)
B : SOT-23-5
X : SOT-89
Y : SC-82
YR : SC-82 (R-Type)

Lead Plating System
P : Pb Free
G : Green (Halogen Free and Pb Free)

Threshold Voltage
12 : 1.2V
13 : 1.3V
:
49 : 4.9V
50 : 5.0V

Reset Active Timeout Period
A = 0ms ($\overline{\text{RESET}}$)
B = 55ms ($\overline{\text{RESET}}$)
C = 220ms ($\overline{\text{RESET}}$)
D = 450ms ($\overline{\text{RESET}}$)
E = 0ms (RESET)
F = 55ms (RESET)
G = 220ms (RESET)
H = 450ms (RESET)

Note :

Richtek products are :

- RoHS compliant and compatible with the current requirements of IPC/JEDEC J-STD-020.
- Suitable for use in SnPb or Pb-free soldering processes.

Features

- **Internally Fixed Threshold 1.2V to 5V in 0.1V Step**
- **High Accuracy ±1.5%**
- **Low Supply Current 3μA**
- **No External Components Required**
- **Quick Reset within 20μs**
- **Built-In Recovery Delay Include 0ms, 55ms, 220ms, 450ms Options**
- **Low Functional Supply Voltage 0.9V**
- **N-Channel Open-Drain Output**
- **Small SC-82, SC-70-3, SOT-23-3, SOT-23-5, SOT-89 Packages**
- **RoHS Compliant and 100% Lead (Pb)-Free**

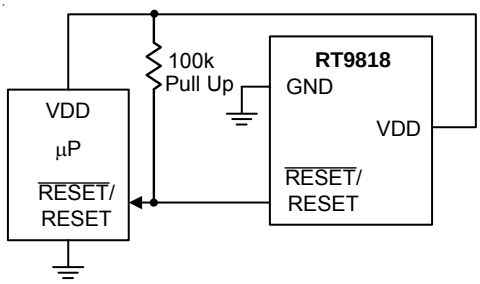
Applications

- Computers
- Controllers
- Intelligent Instruments
- Critical μP and μC Power Monitoring
- Portable/Battery-Powered Equipment

Marking Information

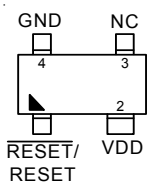
For marking information, contact our sales representative directly or through a Richtek distributor located in your area.

Typical Application Circuit

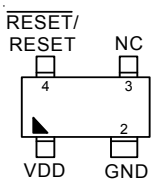


Pin Configuration

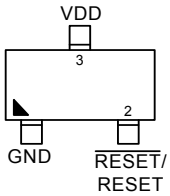
(TOP VIEW)



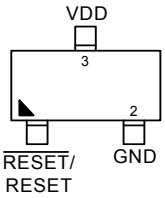
SC-82



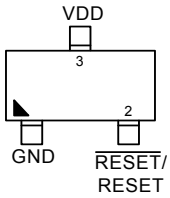
SC-82 (R-Type)



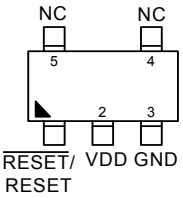
SC-70-3



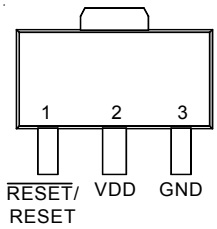
SOT-23-3



SOT-23-3 (L-Type)



SOT-23-5

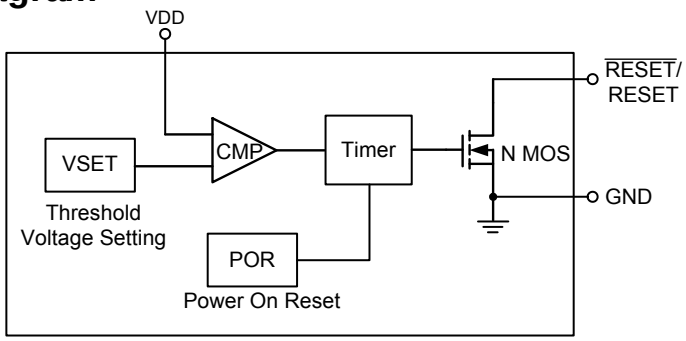


SOT-89

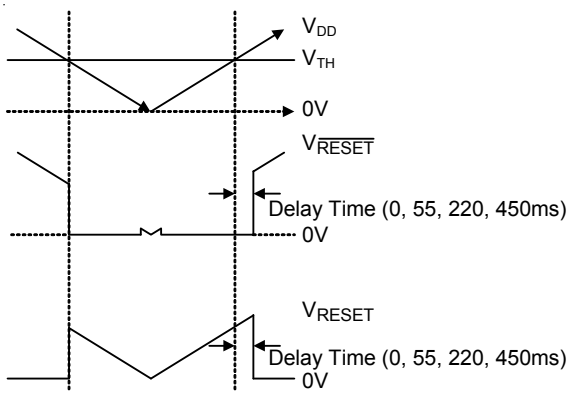
Functional Pin Description

Pin Name	Pin Function
GND	Ground.
$\overline{\text{RESET}}$	Active low open-drain reset output.
RESET	Active high open-drain reset output.
VDD	Power pin.

Functional Block Diagram



Timing Diagram



Absolute Maximum Ratings (Note 1)

- Terminal Voltage (with Respect to GND)
  V_{DD} ---------- –0.3V to 6V
- All Other Inputs ---------- –0.3V to 6V
- Input Current, I_{VDD} ---------- 20mA
- Power Dissipation, P_D @ T_A = 25°C
  SC-70 / SC-82 ---------- 0.25W
  SOT-23-3 ---------- 0.4W
  SOT-23-5 ---------- 0.4W
  SOT-89 ---------- 0.55W
- Package Thermal Resistance (Note 2)
  SC-70 / SC-82, θ_{JA} ---------- 400°C/W
  SOT-23-3, θ_{JA} ---------- 250°C/W
  SOT-23-5, θ_{JA} ---------- 250°C/W
  SOT-89, θ_{JA} ---------- 180°C/W
- Lead Temperature (Soldering, 10sec.) ---------- 260°C
- Storage Temperature Range ---------- –65°C to 150°C
- ESD Susceptibility (Note 3)
  HBM (Human Body Model) ---------- 2kV

Recommended Operating Conditions (Note 4)

- Junction Temperature Range ---------- –40°C to 125°C
- Ambient Temperature Range ---------- –40°C to 85°C

Electrical Characteristics

(V_{DD} = 3V, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Operating V_{DD} (V_{OUT}) Range		V_{DD}		0.9	–	6	V
Supply Current		I_{DD}	V_{TH} = 3V, V_{DD} = 4.5V, T_A = 27°C	--	3	8	μA
Reset Threshold		V_{TH}	T_A = 27°C	--	1.2 to 5	--	V
Threshold Voltage Accuracy		ΔV_{TH}	T_A = 27°C	–1.5	–	1.5	%
V_{DD} Drop to Reset Delay		t_{RD}	Drop = V_{TH} –125mV	--	20	--	μs
Reset Active Time Out Period	RT9818A/E	t_{RP}	$V_{DD} \geq 1.02 \times V_{TH}$	--	0	--	ms
	RT9818B/F			35	55	75	
	RT9818C/G			143	220	297	
	RT9818D/H			292	450	608	
RESET Output Voltage Low (Note 5)		V_{OL}	3 = V_{DD} < V_{TH} I_{SINK} > 3.5mA	--	–	0.4	V
Hysteresis Width		V_{HYS}		--	0.01V_{TH}	0.016V_{TH}	V

Note 1. Stresses beyond those listed “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 may affect device reliability.

Note 2. θ_{JA} is measured at T_A = 25°C on a low effective thermal conductivity single-layer test board per JEDEC 51-3.

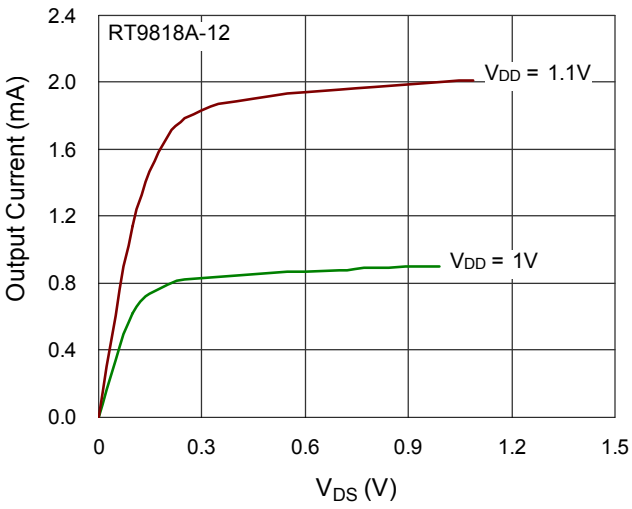
Note 3. Devices are ESD sensitive. Handling precaution is recommended.

Note 4. The device is not guaranteed to function outside its operating conditions.

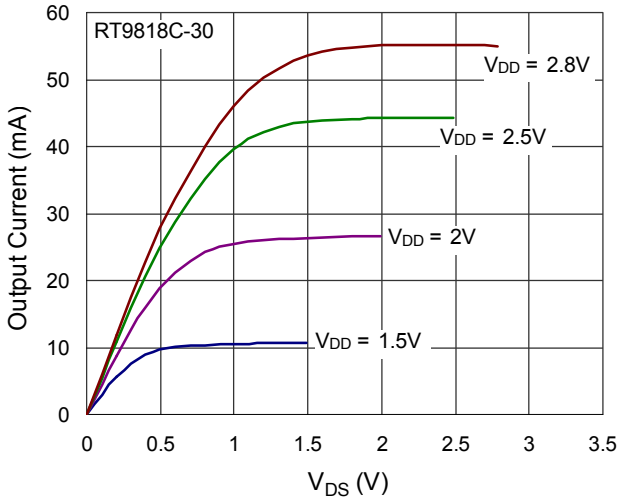
Note 5. The voltage V_{OL} can be calculated by $V_{OL} = V_{DD} - Ir * R$. Where R is the pull-up resistor and Ir is the current flowing through the pull-up resistor. For typical application (R=100kΩ), V_{OL} is less than 0.2V.

Typical Operating Characteristics

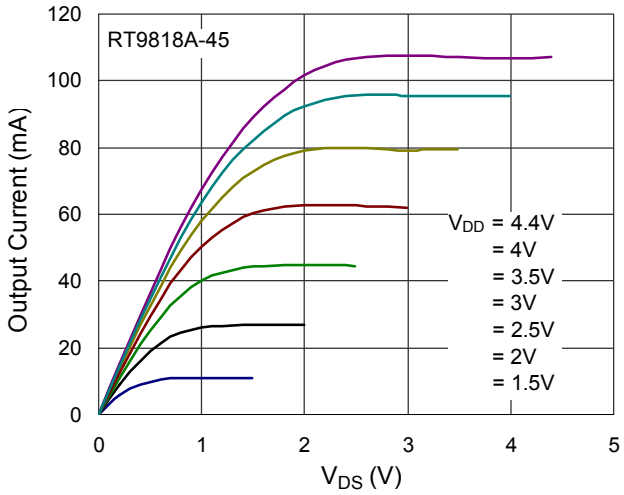
Nch Driver Output Current vs. V_{DS}



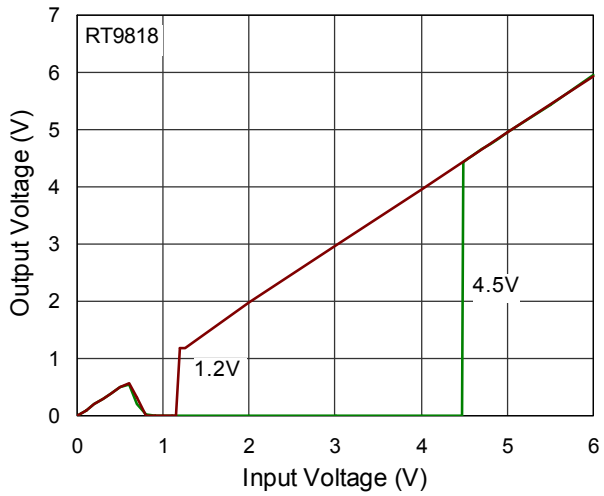
Nch Driver Output Current vs. V_{DS}



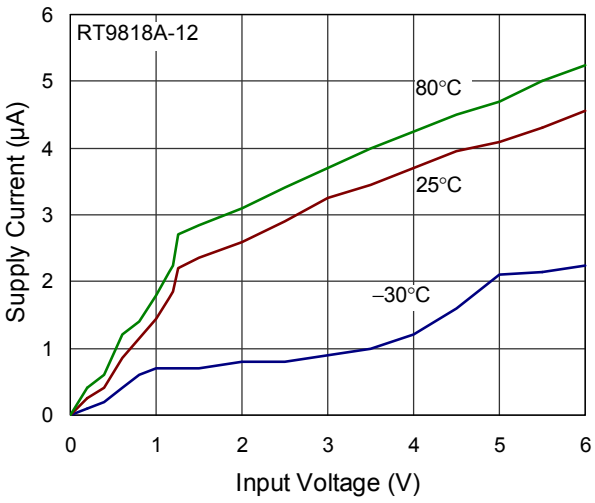
Nch Driver Output Current vs. V_{DS}



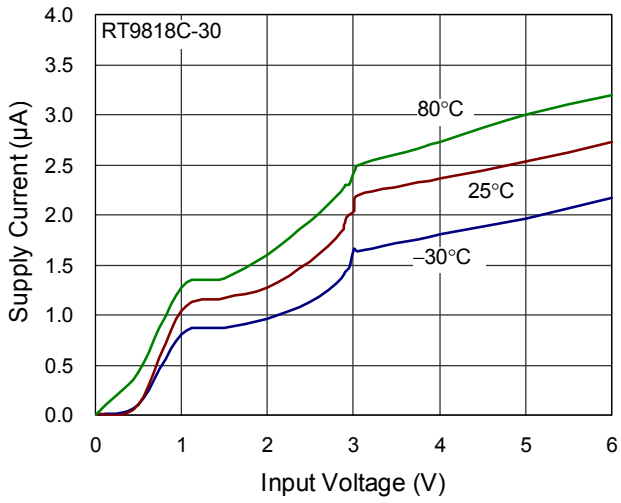
Output Voltage vs. Input Voltage



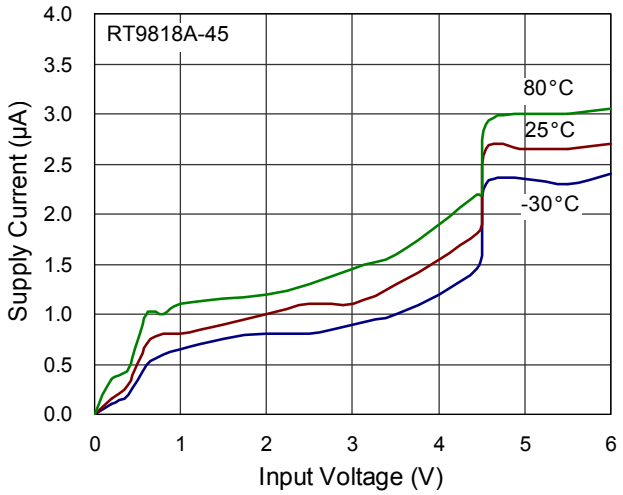
Supply Current vs. Input Voltage



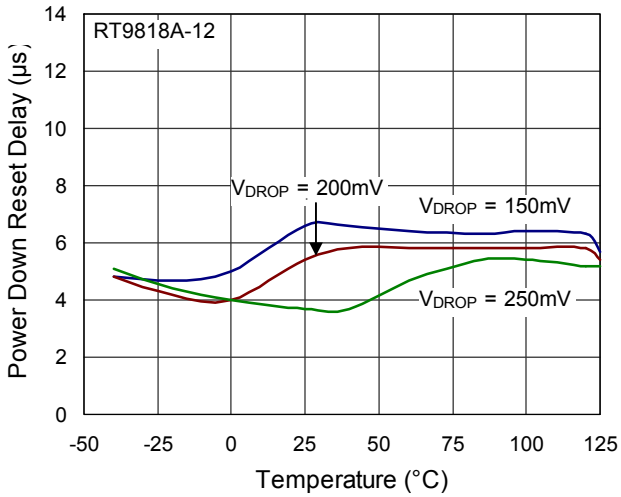
Supply Current vs. Input Voltage



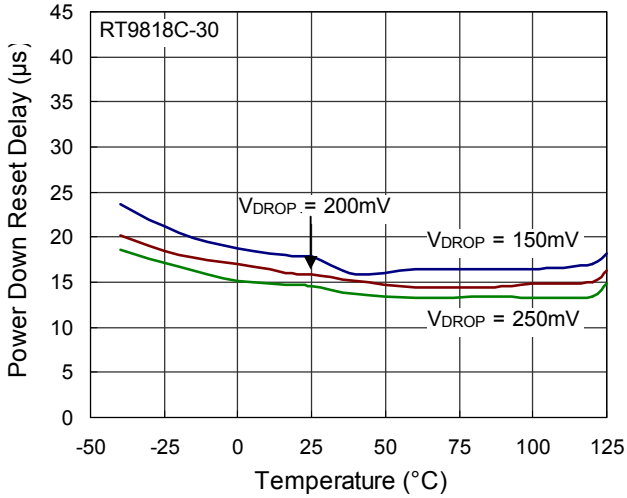
Supply Current vs. Input Voltage



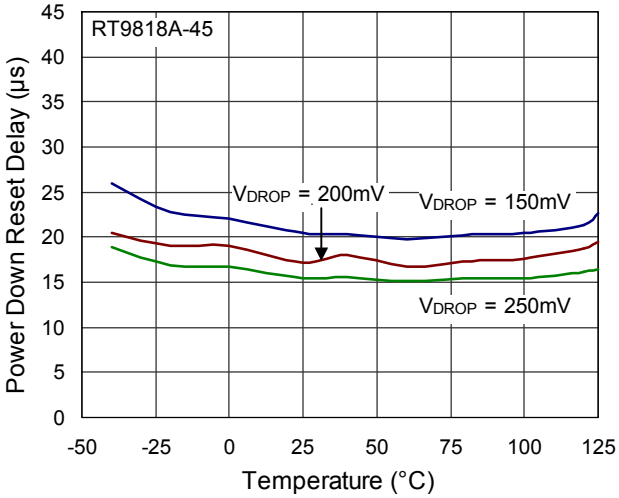
Power Down Reset Delay vs. Temperature



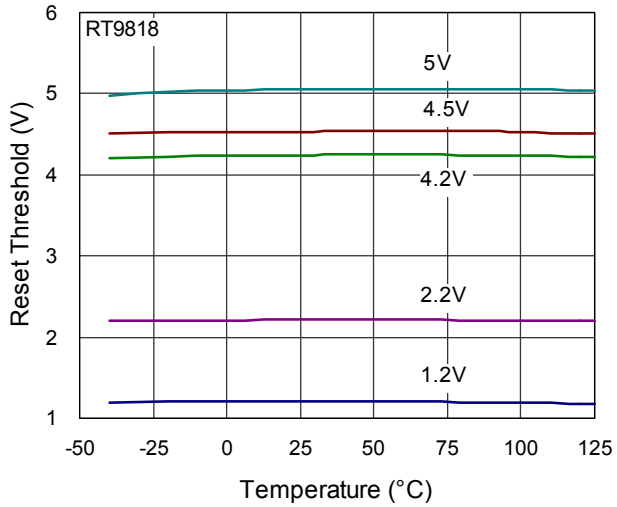
Power Down Reset Delay vs. Temperature



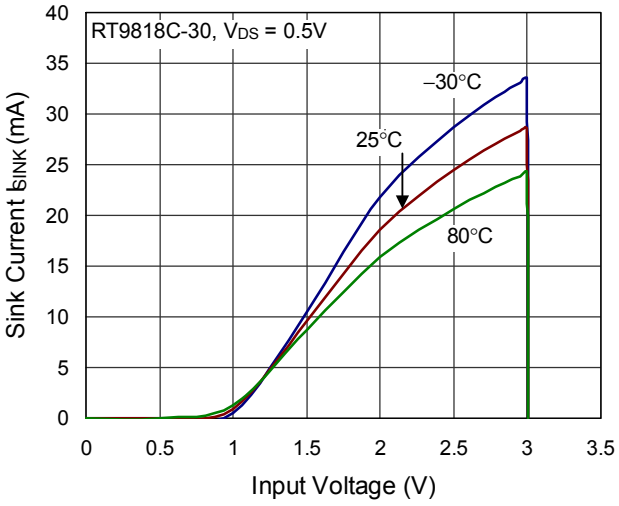
Power Down Reset Delay vs. Temperature



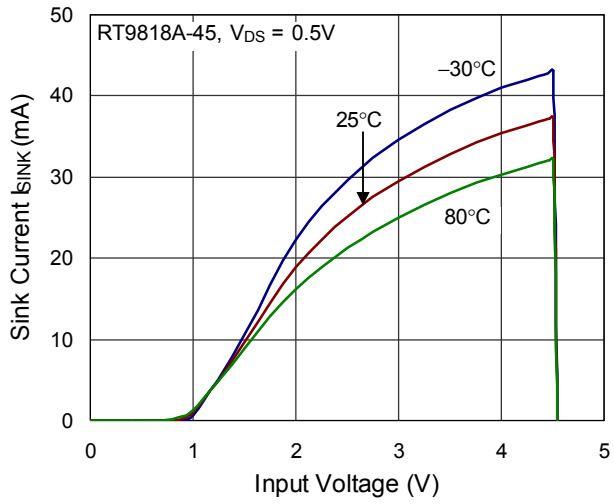
Reset Threshold Deviation vs. Temperature



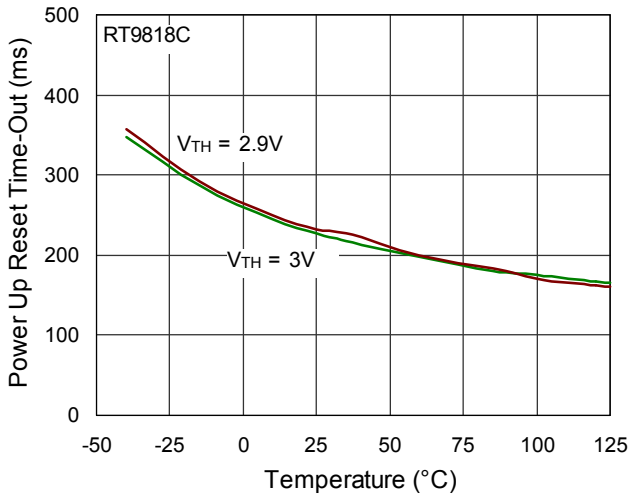
Nch Driver Sink Current vs. Input Voltage



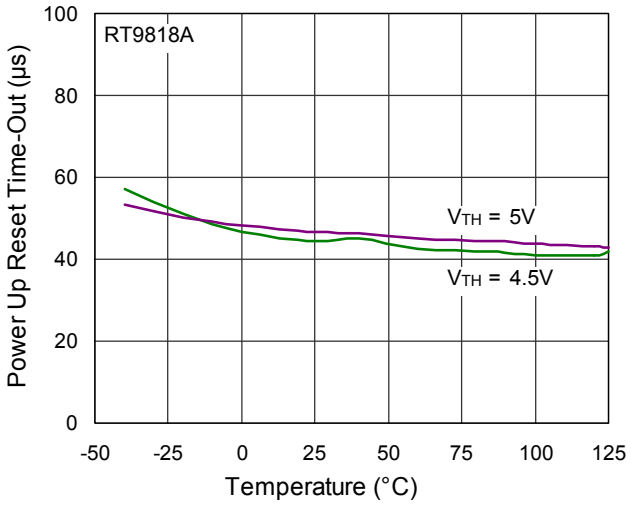
Nch Driver Sink Current vs. Input Voltage



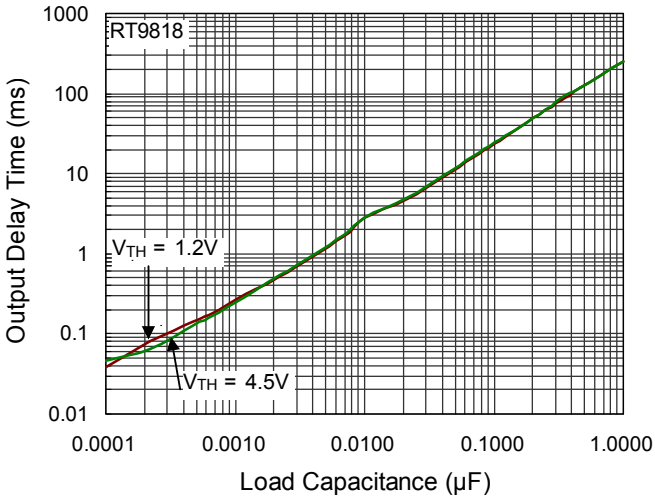
Power Up Reset Time-Out vs. Temperature



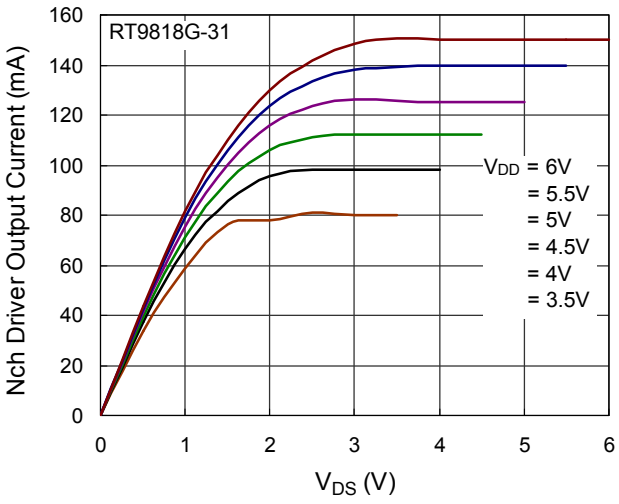
Power Up Reset Time-Out vs. Temperature



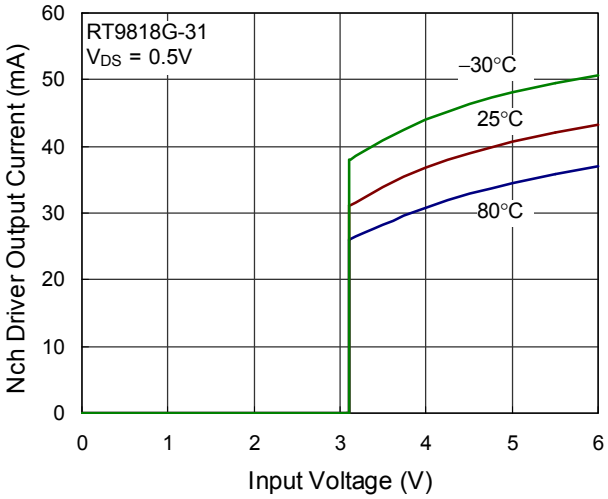
Output Delay Time vs. Load Capacitance



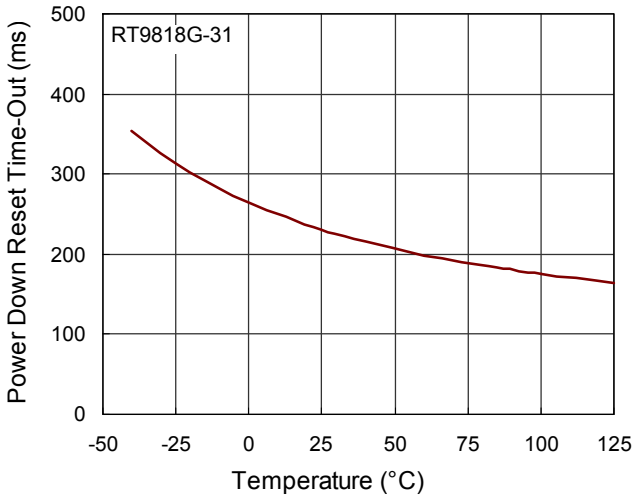
Nch Driver Output Current vs. V_{DS}



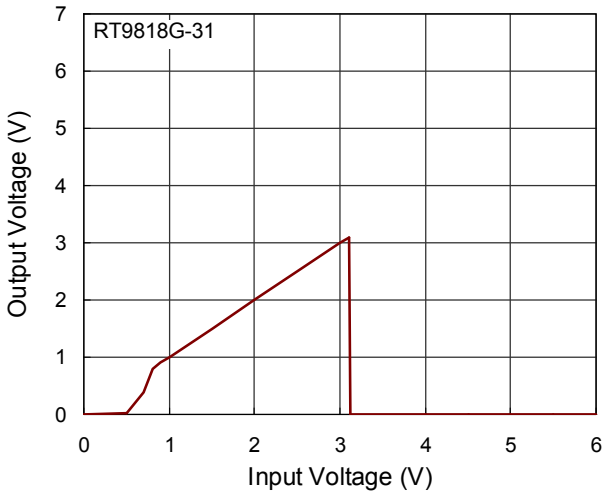
Nch Driver Output Current vs. Input Voltage



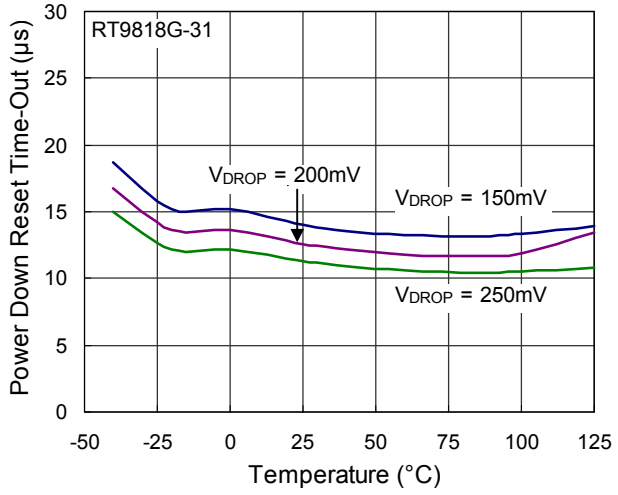
Power Down Reset Time-Out vs. Temperature



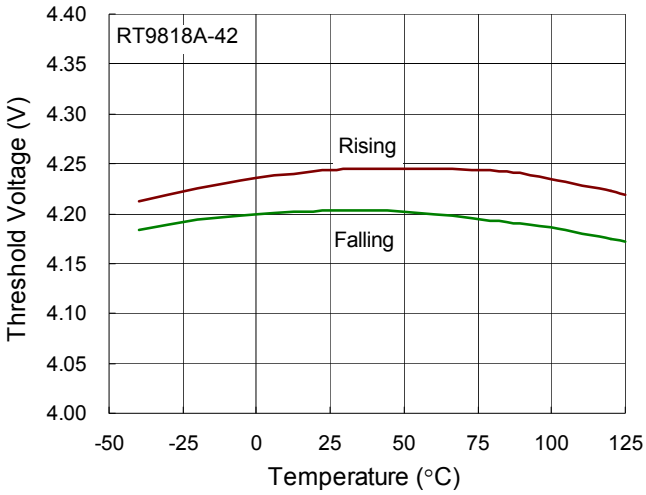
Output Voltage vs. Input Voltage



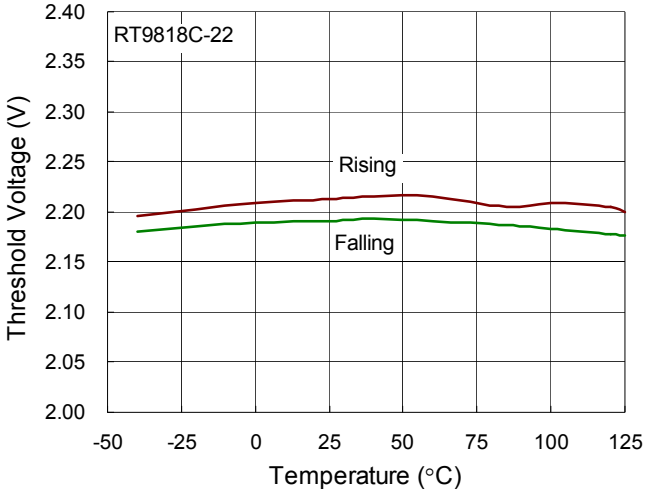
Power Down Reset Time-Out vs. Temperature



Threshold Voltage vs. Temperature



Threshold Voltage vs. Temperature



Application Information

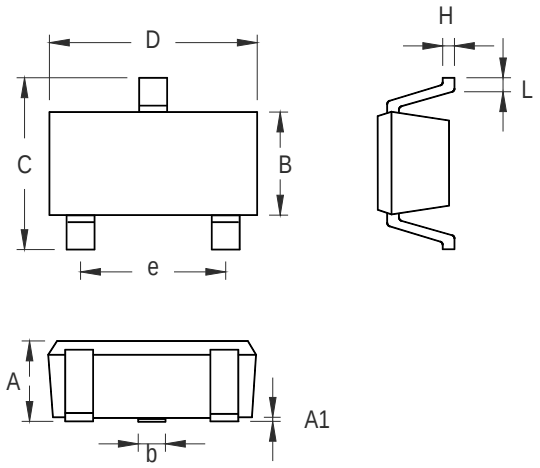
Multiple Supplies

Mainly, the pull-up connected to the RT9818 will connect to the supply voltage that is being monitored at the IC's VDD 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.

Benefits of Highly Accurate Reset Threshold

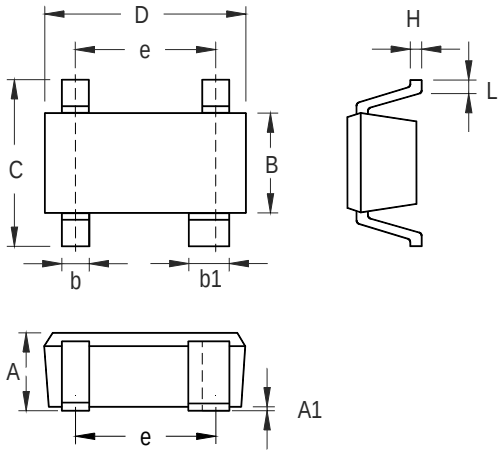
Most μP supervisor ICs have reset threshold voltages between 1% and 1.5% below the value of nominal supply voltages. This ensures a reset will not occur within 1% of the nominal supply, but will occur when the supply is 1.5% below nominal.

Outline Dimension



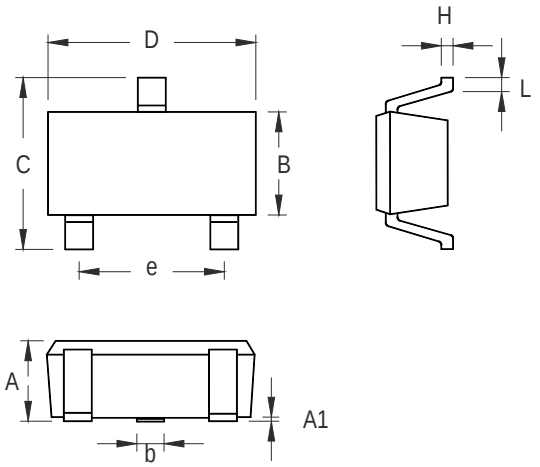
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.100	0.031	0.044
A1	0.000	0.100	0.000	0.004
B	1.150	1.350	0.045	0.054
b	0.150	0.400	0.006	0.016
C	1.800	2.450	0.071	0.096
D	1.800	2.250	0.071	0.089
e	1.300		0.051	
H	0.080	0.260	0.003	0.010
L	0.210	0.460	0.008	0.018

SC-70-3 Surface Mount Package



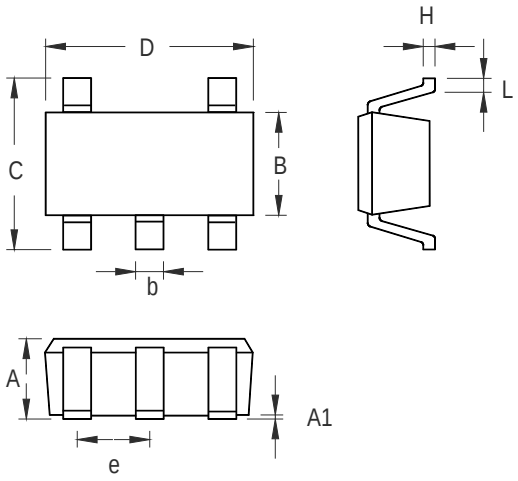
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
B	1.150	1.350	0.045	0.053
b	0.150	0.400	0.006	0.016
b1	0.350	0.500	0.014	0.020
C	1.800	2.450	0.071	0.096
D	1.800	2.200	0.071	0.087
e	1.300		0.051	
H	0.080	0.260	0.003	0.010
L	0.200	0.460	0.008	0.018

SC-82 Surface Mount Package



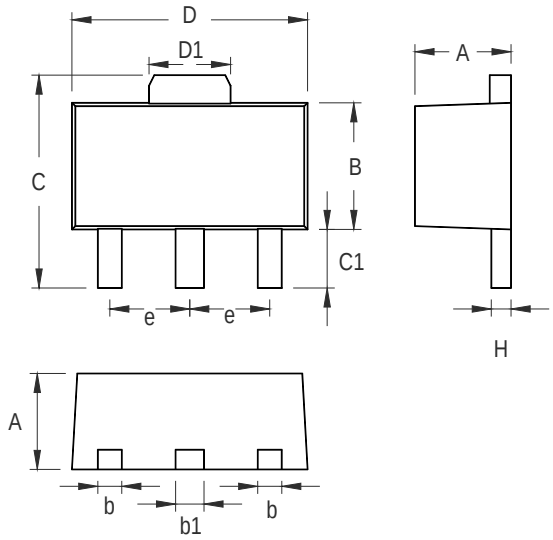
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.508	0.014	0.020
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	1.803	2.007	0.071	0.079
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024

SOT-23-3 Surface Mount Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.559	0.014	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024

SOT-23-5 Surface Mount Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.397	1.600	0.055	0.063
b	0.356	0.483	0.014	0.019
B	2.388	2.591	0.094	0.102
b1	0.406	0.533	0.016	0.021
C	3.937	4.242	0.155	0.167
C1	0.787	1.194	0.031	0.047
D	4.394	4.597	0.173	0.181
D1	1.397	1.753	0.055	0.069
e	1.448	1.549	0.057	0.061
H	0.356	0.432	0.014	0.017