

Micro-Power Voltage Detectors with Manual Reset

General Description

The RT9816 is a micro-power voltage detector with deglitched manual reset input supervising the power supply voltage level for microprocessors (μ P) 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 3 μ A. The RT9816 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. To pull reset signal low manually, just pull the manual reset input (MR) below the specified V_{IL} level. RT9816 is provided in SC-82 package.

Ordering Information

RT9816	□	□	□	□
	Package Type			
	Y : SC-82			
	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 (RESET)			
	B = 55ms (RESET)			
	C = 220ms (RESET)			
	D = 450ms (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.

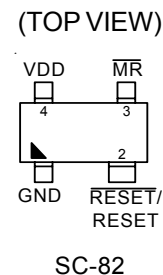
Features

- Internally Fixed Threshold 1.2V to 5V in 0.1V Step
- High Accuracy $\pm 1.5\%$
- Low Supply Current 3 μ A
- No External Components Required
- Quick Reset within 20 μ s
- Built-in Recovery Delay Include 0ms, 55ms, 220ms, 450ms Options
- 800ns Glitch Immunity of Manual Reset Input
- Low Functional Supply Voltage 0.9V
- N-Channel Open-Drain Output
- Small SC-82 Package
- RoHS Compliant and 100% Lead (Pb)-Free

Applications

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

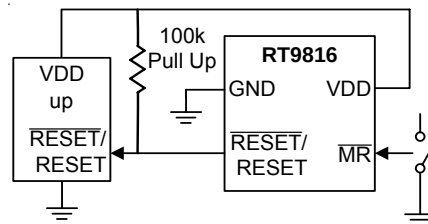
Pin Configurations



Marking Information

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

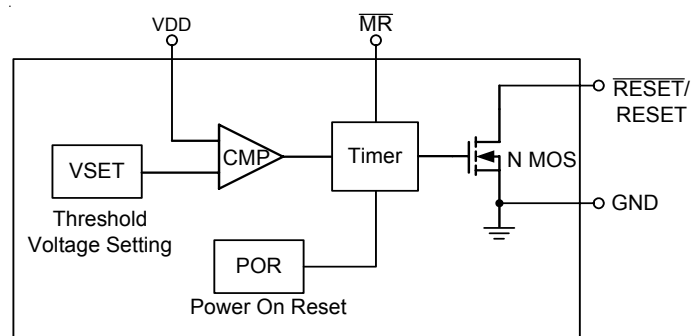
Typical Application Circuit



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.
$\overline{\text{MR}}$	Manual Reset.
VDD	Supply Voltage Input.

Function Block Diagram



Absolute Maximum Ratings (Note 1)

- Terminal Voltage (with Respect to GND)
 V_{DD} ----- -0.3V to 6.0V
- All Other Inputs ----- -0.3V to $V_{DD}+0.3V$
- Input Current, I_{VDD} ----- 20mA
- Power Dissipation, PD @ $T_A = 25^\circ C$
 SC-82 ----- 0.25W
- Package Thermal Resistance (Note 2)
 SC-82, θ_{JA} ----- 400°C
- Lead Temperature (Soldering, 10sec.) ----- 260°C
- Storage Temperature Range ----- -65°C to 125°C
- ESD Susceptibility (Note 3)
 HBM (Human Body Model) ----- 2kV

Recommended Operating Conditions (Note 4)

- Junction Temperature ----- -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 5.0	--	V
MR Input Threshold		V _{IL}	T _A = 27°C, V _{TH} > 1.2V	--	--	0.25V _{DD}	V
		V _{IH}	T _A = 27°C, V _{TH} > 1.2V	0.7V _{DD}	--	--	
MR Glitch Rejection				--	800	--	ns
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	RT9816A/E	t _{RP}	V _{DD} ≥ 1.02×V _{TH}	--	0	--	ms
	RT9816B/F			35	55	75	
	RT9816C/G			143	220	297	
	RT9816D/H			292	450	608	
RESET Output Voltage Low		V _{OL}	3 = V _{DD} < V _{TH} I _{SINK} >3.5mA	--	--	0.4	V
Hysteresis Width		V _{HYS}		--	0.01V _{TH}	--	V

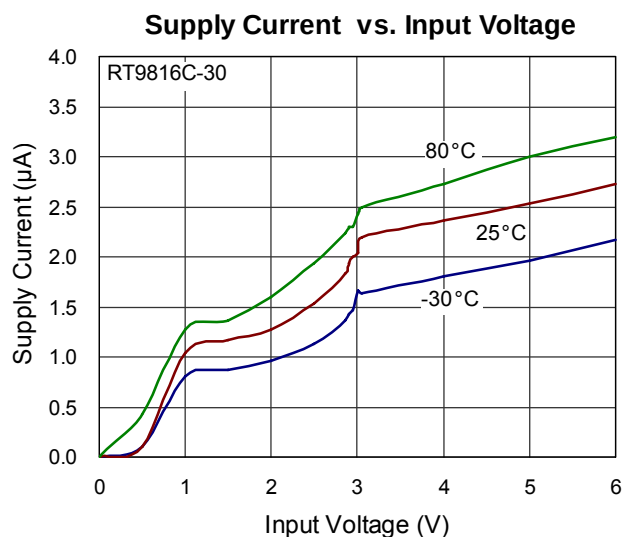
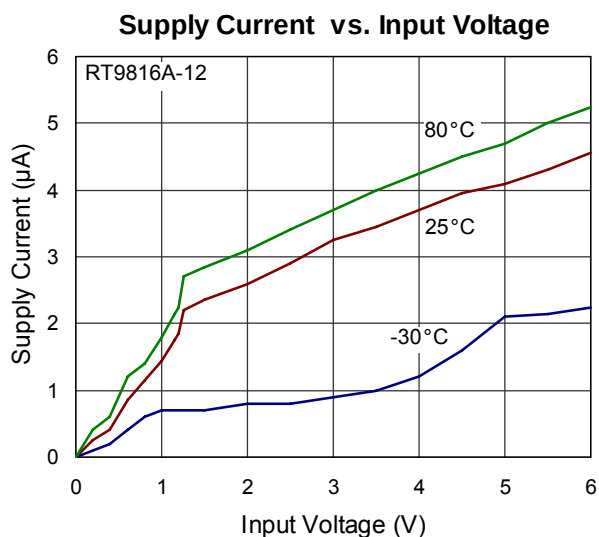
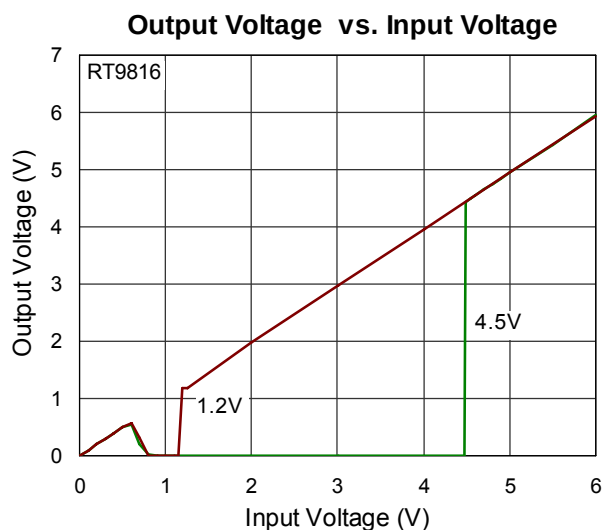
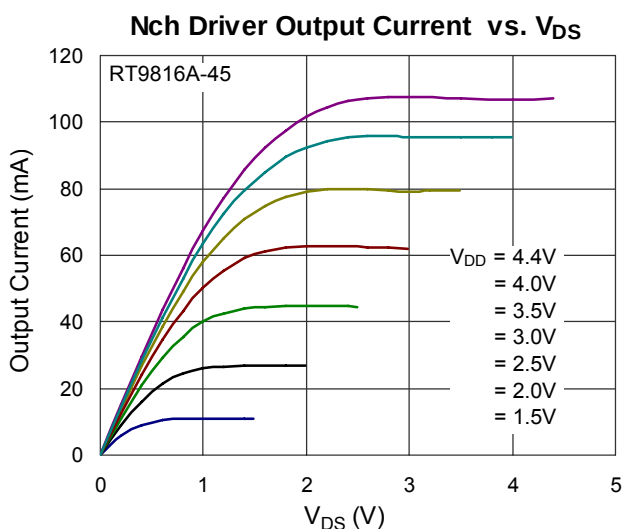
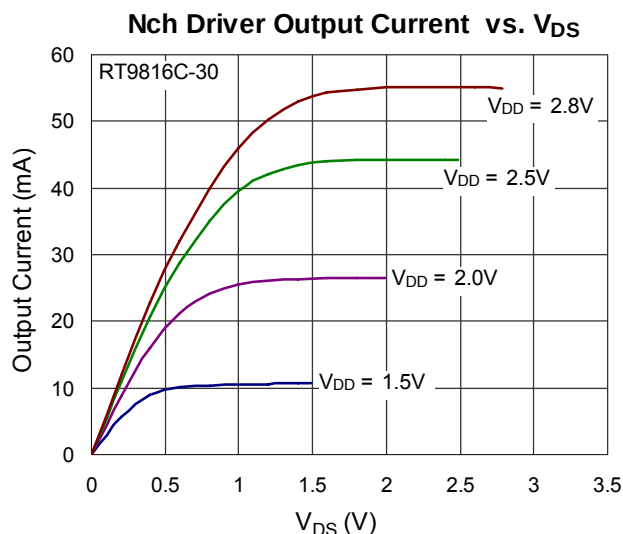
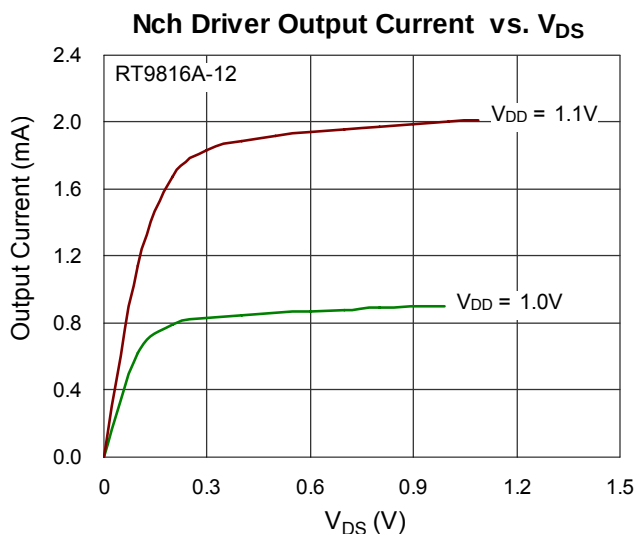
Note 1. Stresses beyond those listed “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions may affect device reliability.

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

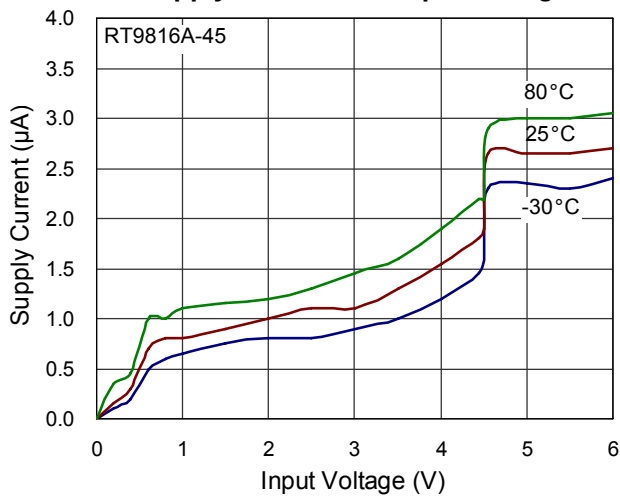
Note 3. Devices are ESD sensitive. Handling precaution is recommended.

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

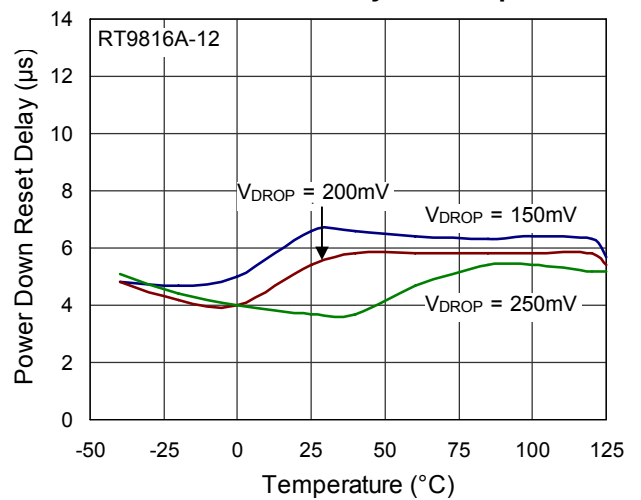
Typical Operating Characteristics



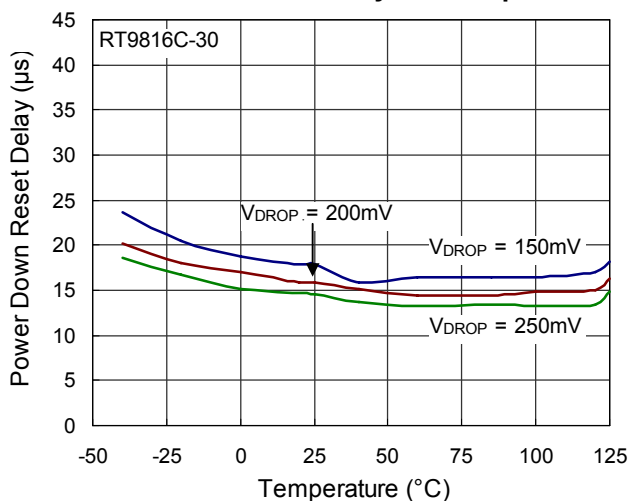
Supply Current vs. Input Voltage



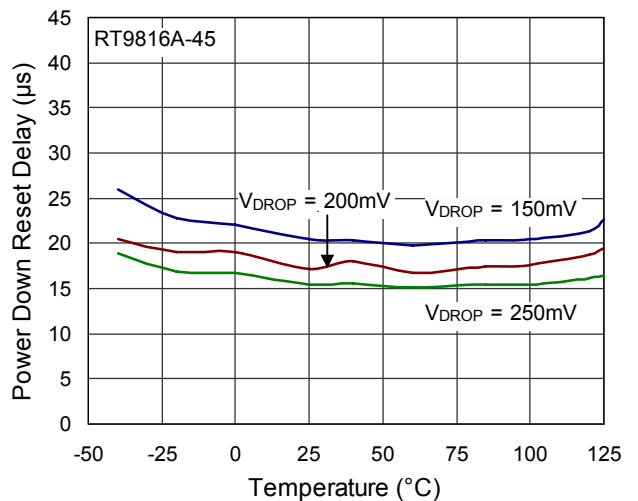
Power Down Reset Delay vs. Temperature



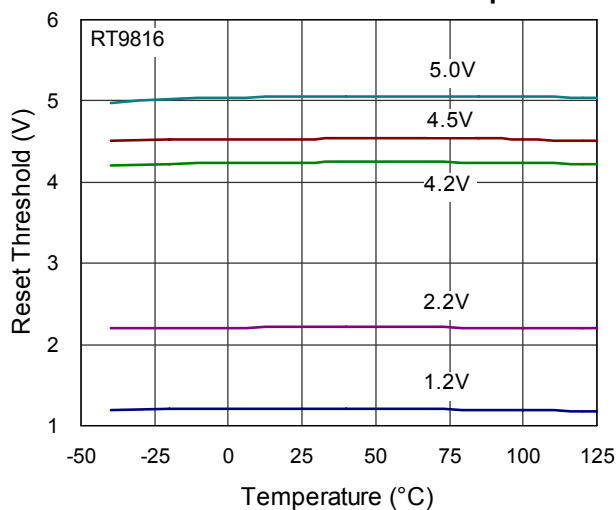
Power Down Reset Delay vs. Temperature



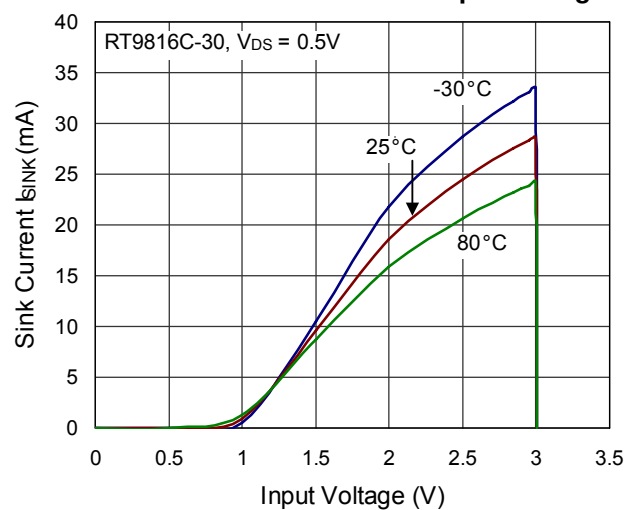
Power Down Reset Delay vs. Temperature



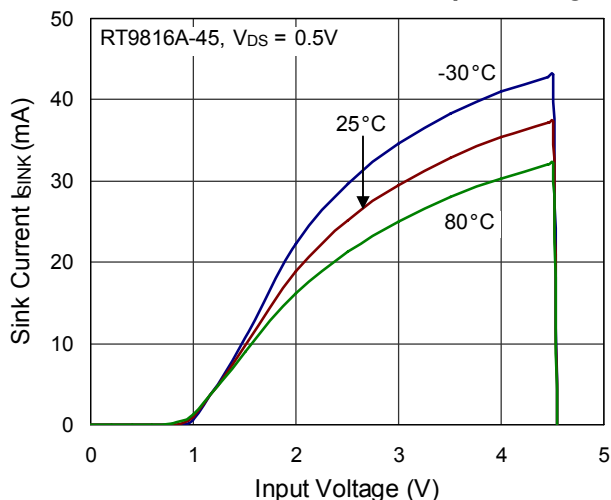
Reset Threshold Deviation vs. Temperature



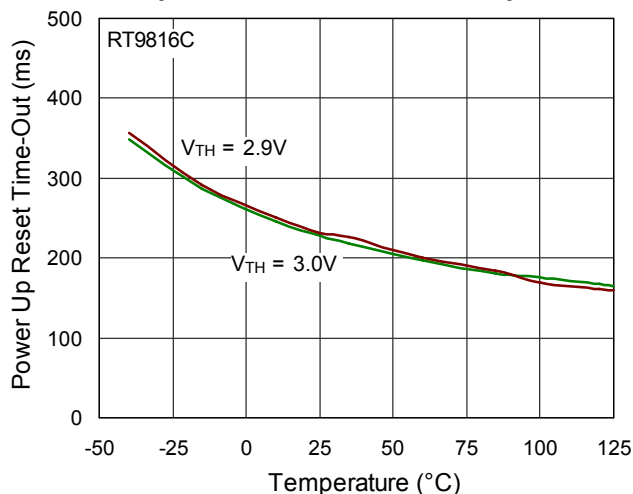
Nch Driver Sink Current vs. Input Voltage



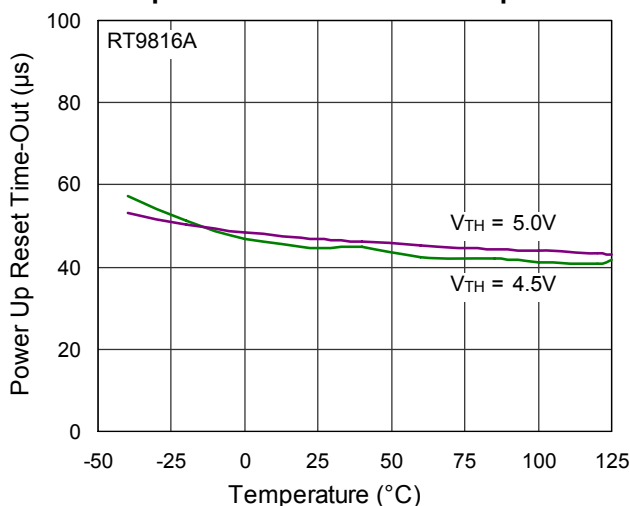
Nch Driver Sink Current vs. Input Voltage



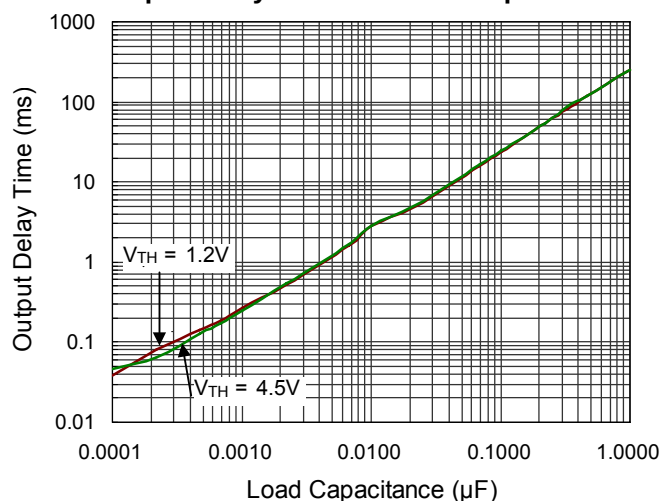
Power Up Reset Time-Out vs. Temperature



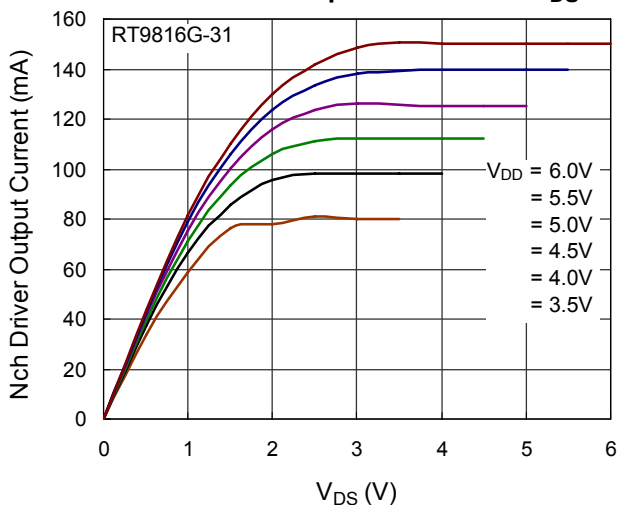
Power Up Reset Time-Out vs. Temperature



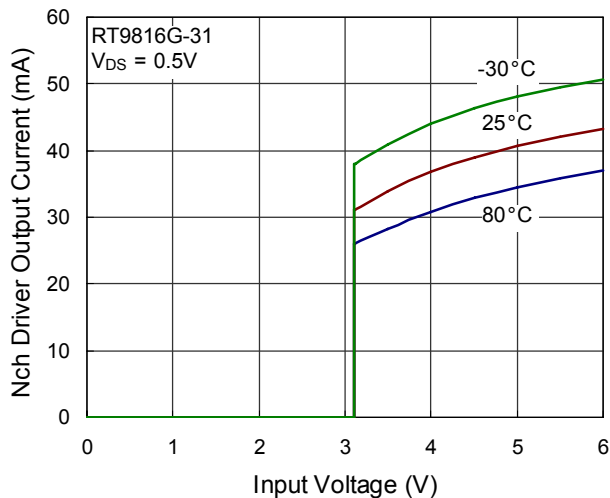
Output Delay Time vs. Load Capacitance



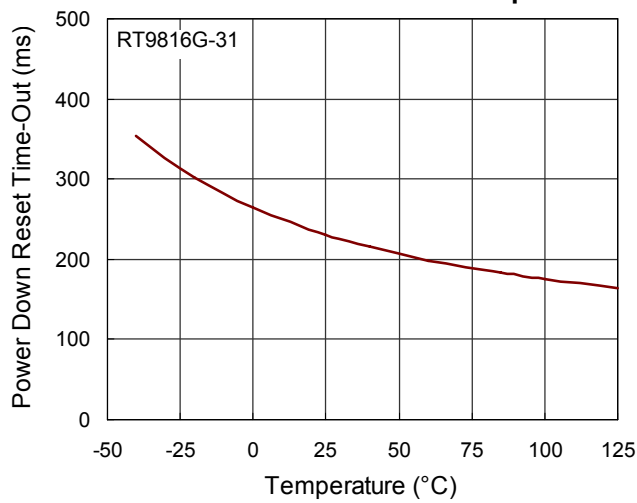
Nch Driver Output Current vs. V_{DS}



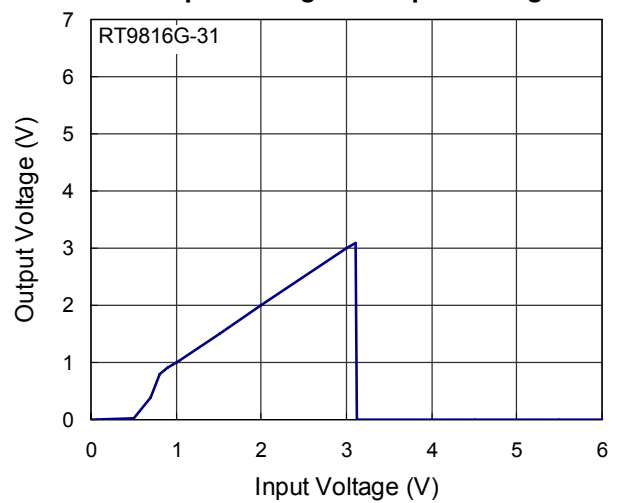
Nch Driver Output Current vs. Input Voltage



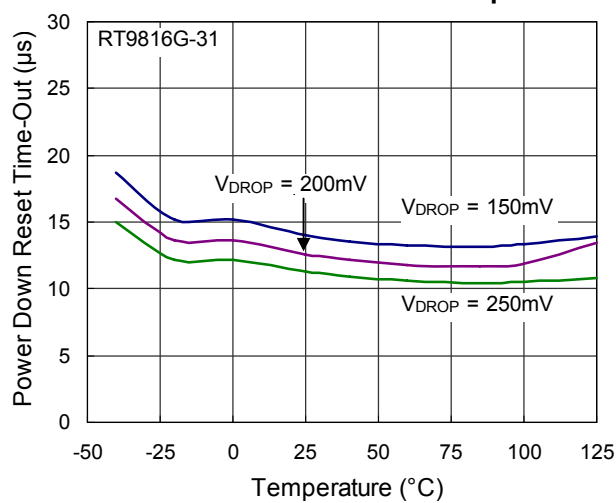
Power Down Reset Time-Out vs. Temperature



Output Voltage vs. Input Voltage



Power Down Reset Time-Out vs. Temperature



Application Information

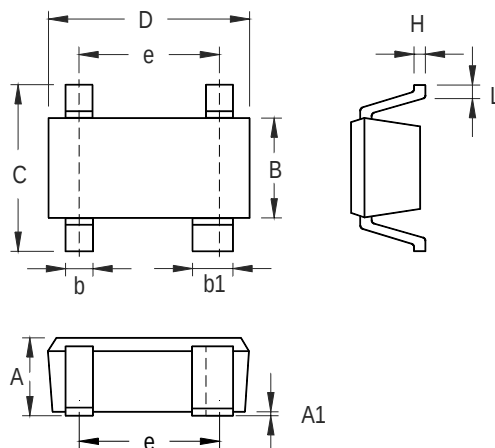
Multiple Supplies

Mainly, the pull-up connected to the RT9816 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.

Benefits of Highly Accurate Reset Threshold

Most μ P 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	0.043
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

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