User Programmable Micro-Power Voltage Detectors

General Description

The RT9801 is a micro-power voltage detector supervising the power supply voltage level for microprocessors (μP) or digital systems. It provides user programmable threshold levels with 0.1V step ranging from 1.5V to 5V, which covers most digital applications. It features low supply current of 3μA. Selection of V_{TH} is easily achieved through 3 pins connected to GND, VDD or floating for different threshold voltage settings. Two versions of threshold voltages, 1.5V ~ 4V and 2.5V ~ 5V, which are programmed in factory are offered by customer demands.

The RT9801 performs supervisory function by sending out a reset signal whenever the VDD voltage falls below a preset threshold level. This reset signal will last the whole period before VDD recovering. Reset signal will release after VDD is recovered and lasts for the whole period of Reset Active Time-out period.

RT9801 is N-channel, open-drain output and provided in SOT-26 package.

Ordering Information

RT9801□ □ □

- Package Type
  E : SOT-26
- Operating temperature range
  C: Commercial standard
- Reset Threshold
  A : 2.5V~5V
  B : 1.5V~4V

Marking Information

Part Number	Marking
RT9801ACE	1J
RT9801BCE	1K

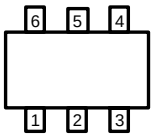
Features

- **User Programmable Threshold 1.5V to 5V in 0.1V Step with ±3% Accuracy**
- **Low Supply Current 3μA**
- **Quick Reset within 20μS**
- **Built-in Recovery Delay 200mS**
- **Low Functional Supply Voltage 0.9V**
- **Small SOT-26 Package**

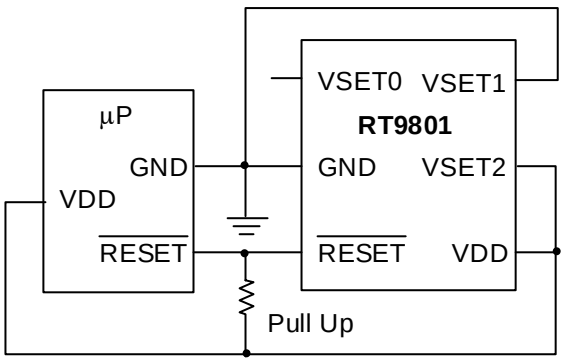
Applications

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

Pin Configurations

Part Number	Pin Configurations
RT9801□CE (Plastic SOT-26)	 TOP VIEW 1. VSET0 2. GND 3. RESET 4. VDD 5. VSET2 6. VSET1

Typical Application Circuit

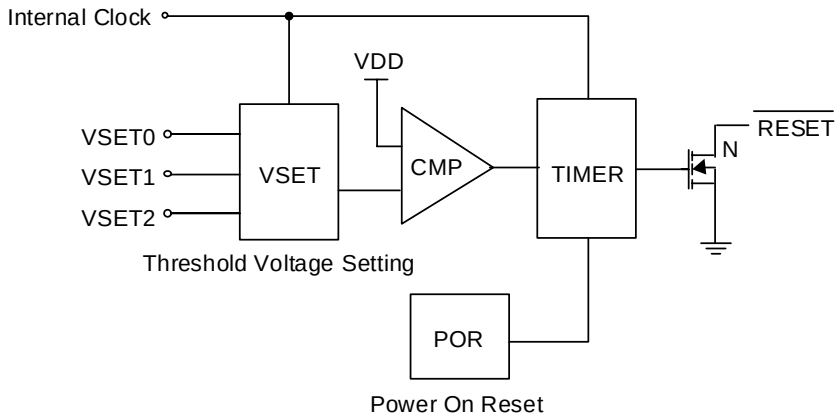


RT9801B V_{TH} = 2.5V in this example

Pin Description

Pin Name	Pin Function
VSET0	Threshold Voltage Selection Pin 1
GND	Ground Pin
$\overline{\text{RESET}}$	Reset Pulse Output, Negative Pulse
VDD	Power Pin
VSET1	Threshold Voltage Selection Pin 2
VSET2	Threshold Voltage Selection Pin 3

Function Block Diagram



Absolute Maximum Ratings

- Terminal Voltage (with Respect to GND)
  - VDD ---------- -0.3V to 6.0V
  - All Other Inputs ---------- -0.3V to VDD+0.3V
- Input Current, VDD ---------- 20mA
- Continuous Power Dissipation, P_D @ T_A = 25°C
  - SOT-26 ---------- 0.25W
- Operating Junction Temperature Range ---------- -40°C ~ 125°C
- Storage Temperature Range ---------- -65°C ~ 125°C
- Package Thermal Resistance
  - SOT-26, θ_{JA} ---------- 250°C /W
- Lead Temperature (Soldering, 5sec.) ---------- 260°C

Electrical Characteristics

(VDD = 3V, unless specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating VDD (V_{OUT}) Range	V_{DD}		0.9	--	6	V
Supply Current	I_{DD}	V_{DD} = 1.5V ~ 3.5V, I_{OUT} = 0	--	--	3	μA
		V_{DD} = 3.5V ~ 5V, I_{OUT} = 0	--	--	3.3	
Reset Threshold	V_{TH}	T_A = 27°C	--	Note1	--	V
Threshold Voltage Accuracy	ΔV_{TH}	T_A = 27°C	--	--	3	%
V_{CC} Drop to Reset Delay	t_{RD}	Drop = -125mV	--	--	20	μS
Reset Active Time Out Period	t_{RP}	$V_{DD} \geq 1.02 \times V_{TH}$, Programmable	--	200	--	mS
VSET Pin Input Threshold	V_{IL}	T_A = 27°C	--	$0.15V_{DD}$	--	V
	V_{IH}	T_A = 27°C	--	$0.85V_{DD}$	--	
$\overline{RESET}$ Output Voltage	V_{OL}	$V_{DD} < V_{TH}$, I_{SINK} = 3.5mA	--	0.4	--	V

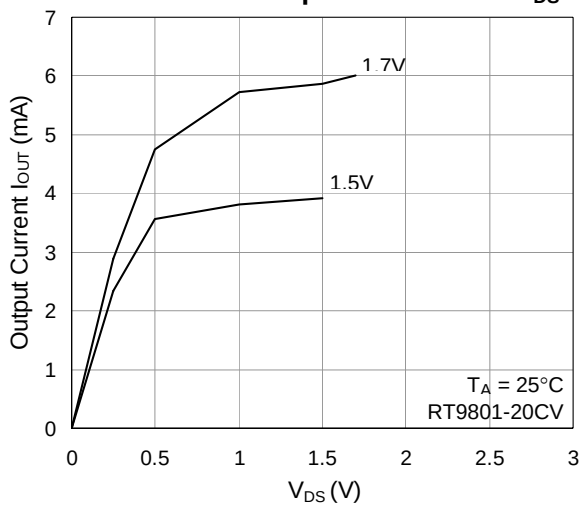
Note 1: Pin Conditions for Programmable Threshold Voltage Setting

RT9801A	RT9801B	Vset0 input	Vset1 input	Vset2 input
5	4	V_{DD}	V_{DD}	V_{DD}
4.9	3.9	V_{DD}	V_{DD}	floating
4.8	3.8	V_{DD}	V_{DD}	GND
4.7	3.7	V_{DD}	floating	V_{DD}
4.6	3.6	V_{DD}	floating	floating
4.5	3.5	V_{DD}	floating	GND
4.4	3.4	V_{DD}	GND	V_{DD}
4.3	3.3	V_{DD}	GND	floating
4.2	3.2	V_{DD}	GND	GND
4.1	3.1	floating	V_{DD}	V_{DD}
4	3	floating	V_{DD}	floating
3.9	2.9	floating	V_{DD}	GND
3.8	2.8	floating	floating	V_{DD}
3.7	2.7	floating	floating	floating
3.6	2.6	floating	floating	GND
3.5	2.5	floating	GND	V_{DD}
3.4	2.4	floating	GND	floating
3.3	2.3	floating	GND	GND
3.2	2.2	GND	V_{DD}	V_{DD}
3.1	2.1	GND	V_{DD}	floating
3	2	GND	V_{DD}	GND
2.9	1.9	GND	floating	V_{DD}
2.8	1.8	GND	floating	floating
2.7	1.7	GND	floating	GND
2.6	1.6	GND	GND	V_{DD}
2.5	1.5	GND	GND	floating

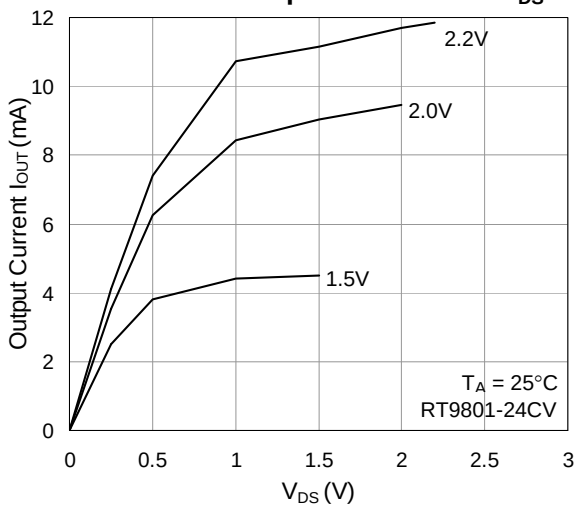
V_{DD}: bond to V_{DD}; 0: bond to GND; f: no bonding

Typical Operating Characteristics

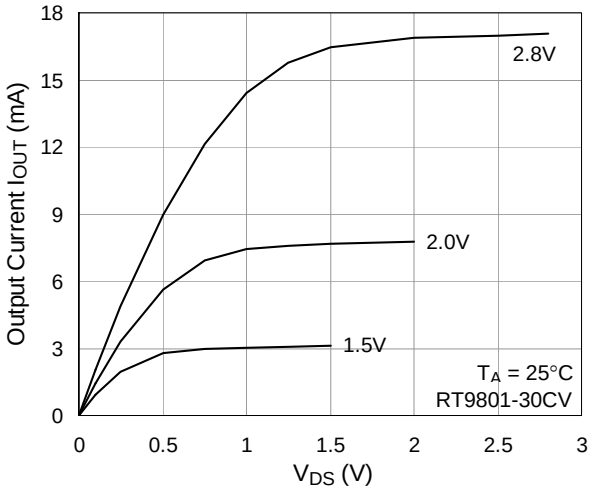
Nch Driver Output Current vs. V_{DS}



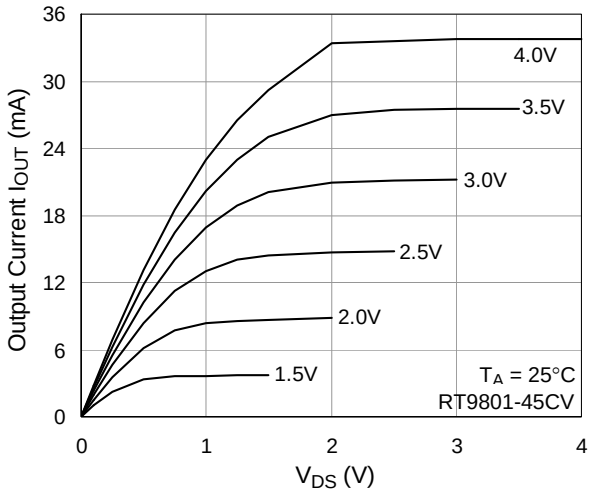
Nch Driver Output Current vs. V_{DS}



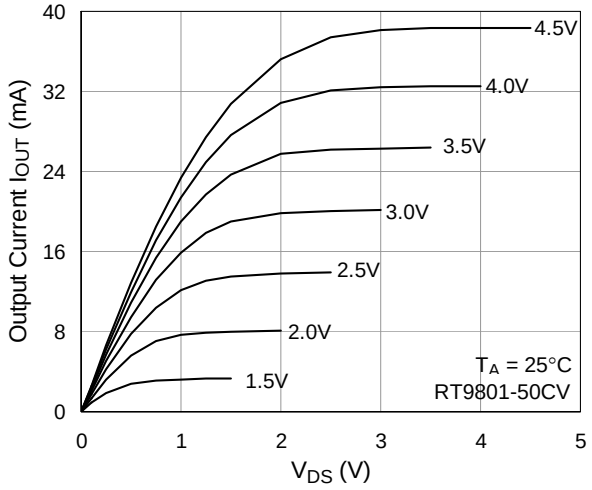
Nch Driver Output Current vs. V_{DS}



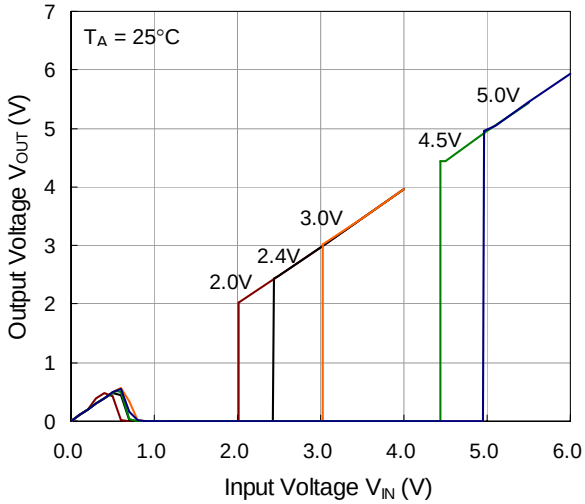
Nch Driver Output Current vs. V_{DS}



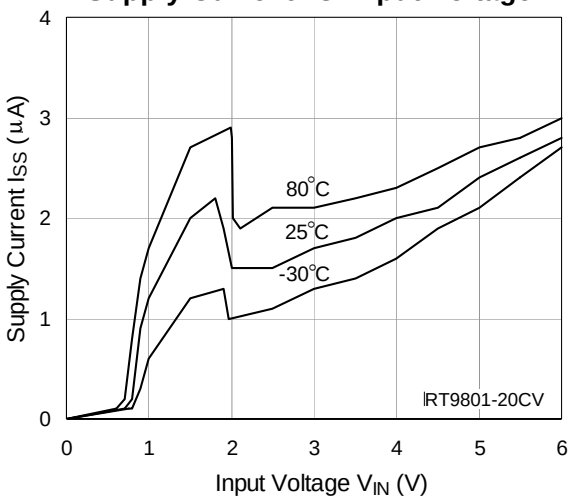
Nch Driver output Current vs. V_{DS}



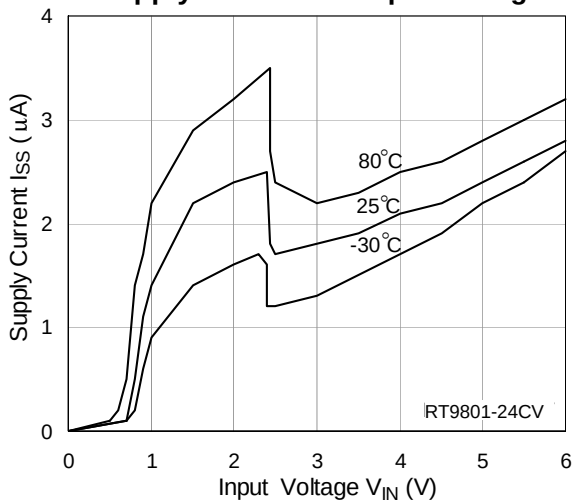
Output Voltage vs. Input Voltage



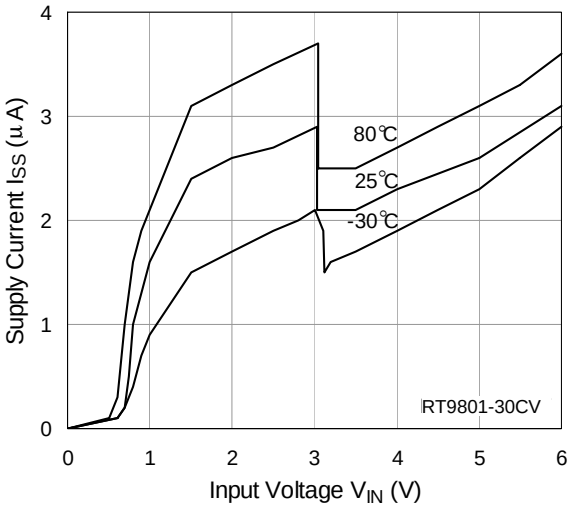
Supply Current vs. Input Voltage



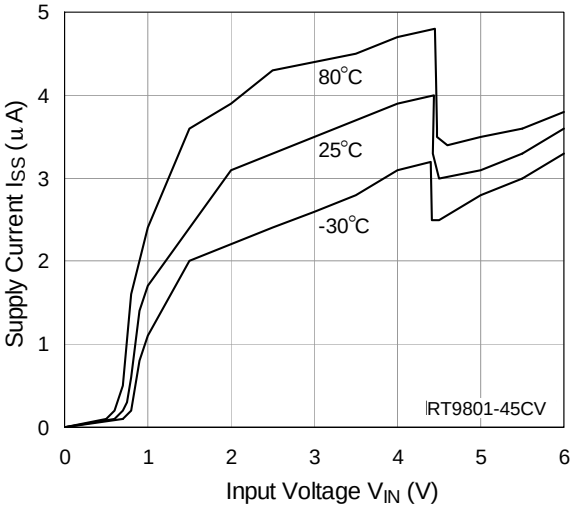
Supply Current vs. Input Voltage



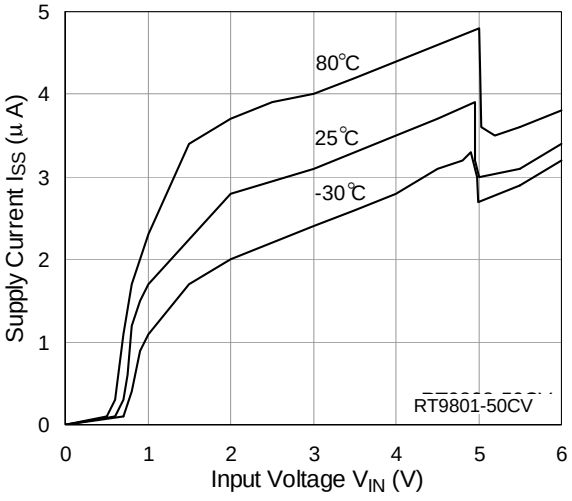
Supply Current vs. Input Voltage



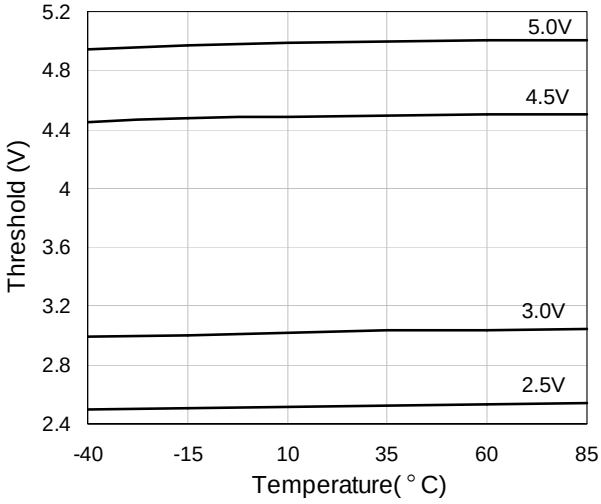
Supply Current vs. Input Voltage



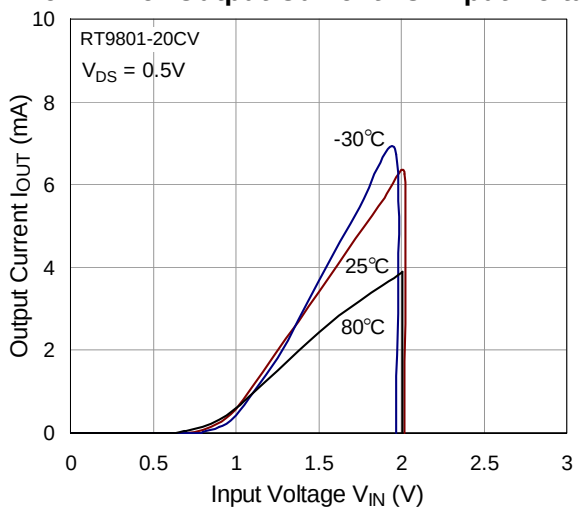
Supply Current vs. Input Voltage



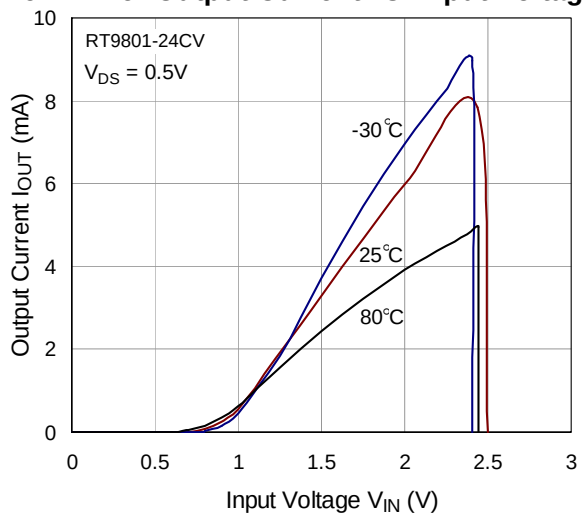
Reset Threshold Deviation vs. Temp.



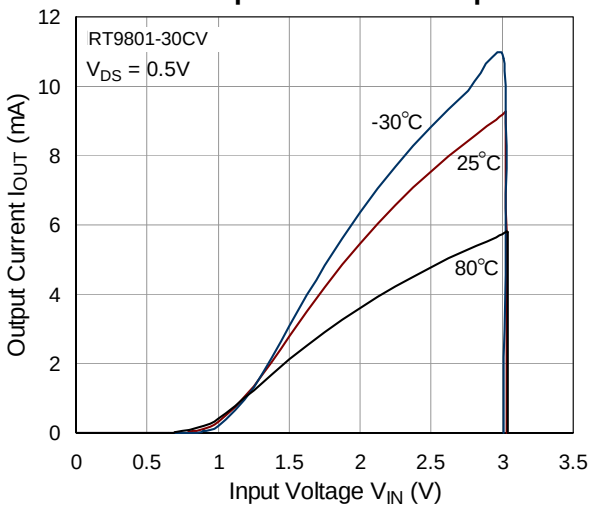
Nch Driver Output Current vs. Input Voltage



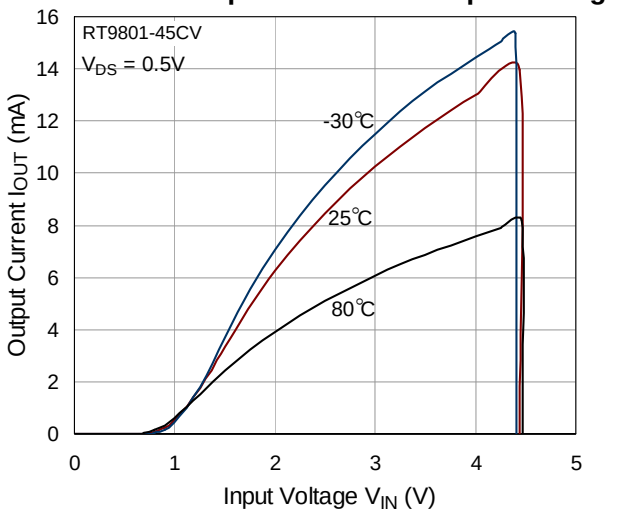
Nch Driver Output Current vs. Input Voltage



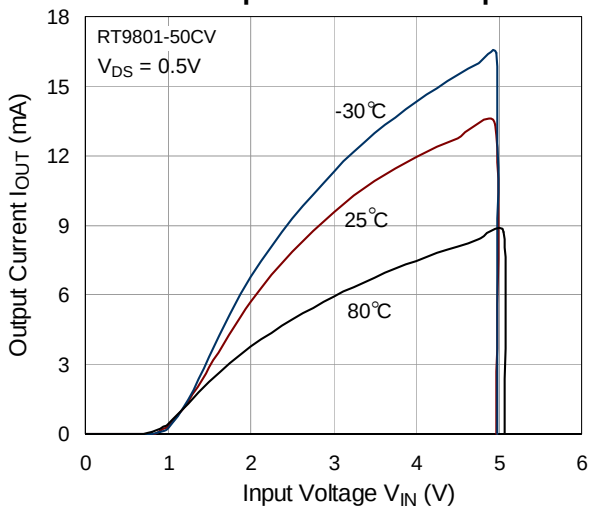
Nch Driver Output Current vs. Input Voltage



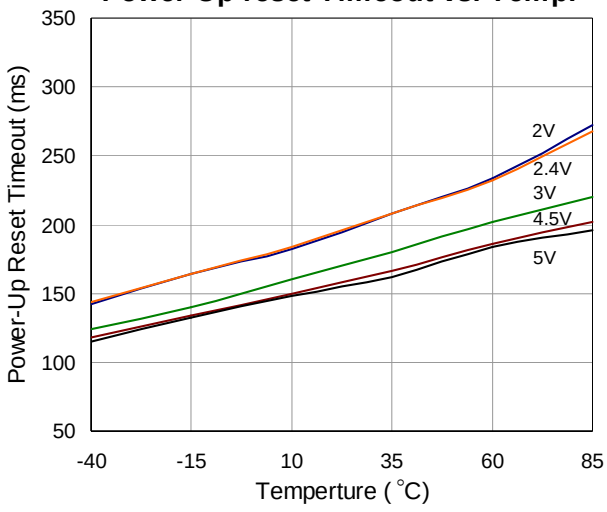
Nch Driver Output Current vs. Input Voltage



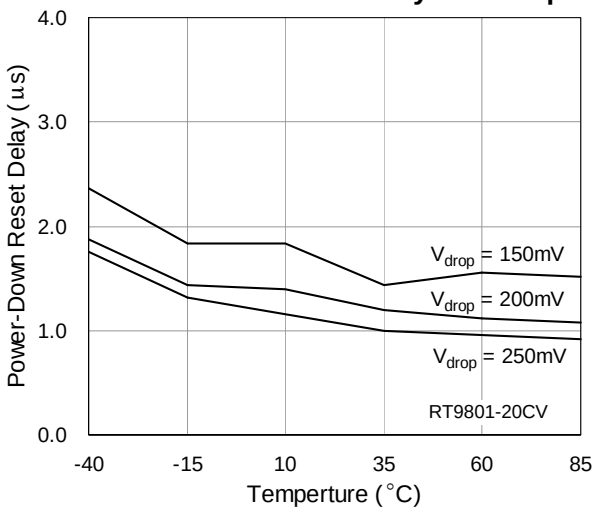
Nch Driver Output Current vs. Input Voltage



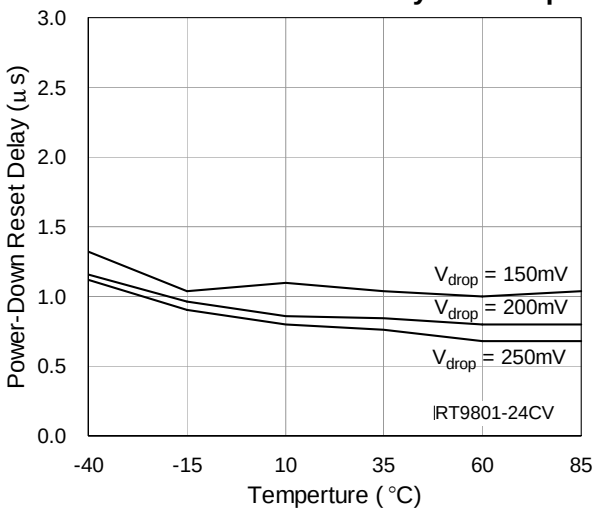
Power-Up reset Timeout vs. Temp.



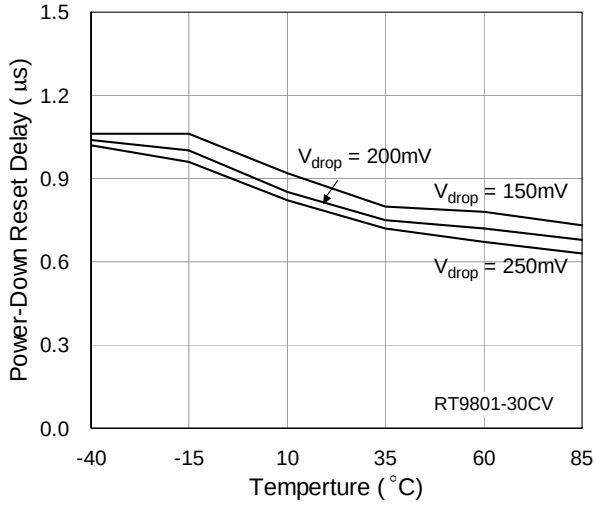
Power-Down Reset Delay vs. Temp.



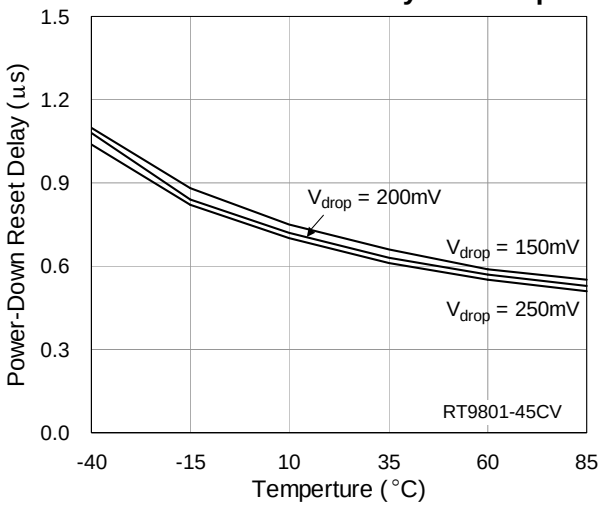
Power-Down Reset Delay vs. Temp.



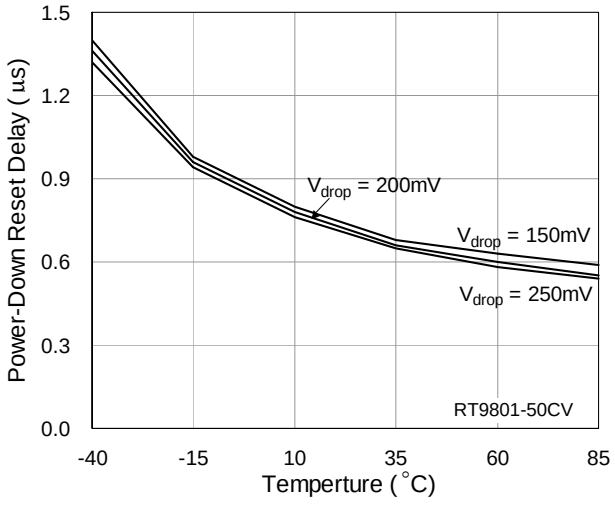
Power-Down Reset Delay vs. Temp.



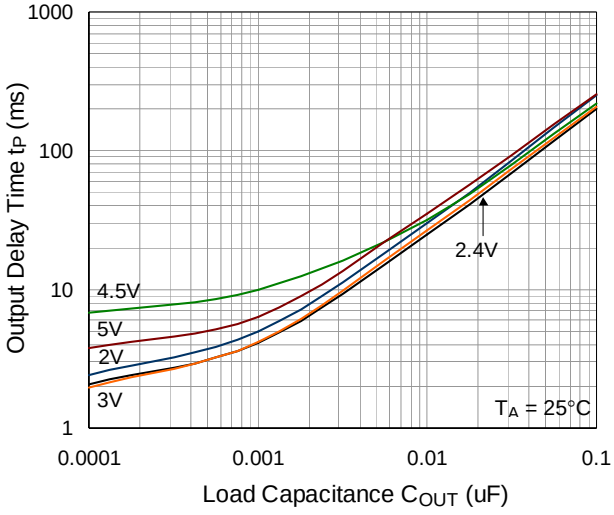
Power-Down Reset Delay vs. Temp.



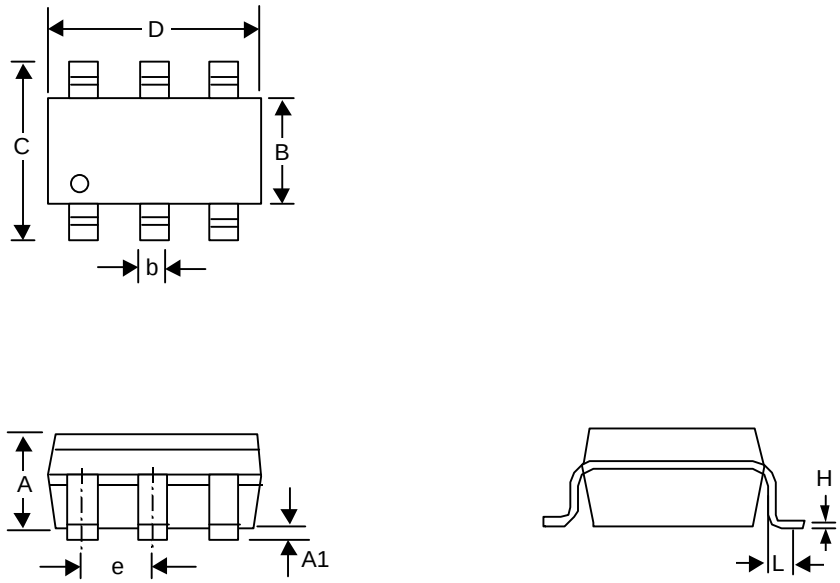
Power-Down Reset Delay vs. Temp.



Output Delay Time vs. Load Capacitance



Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	--	0.152	--	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	0.102	0.254	0.004	0.010
L	0.356	0.610	0.014	0.024

SOT- 26 Surface Mount Package

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