IC for CMOS System Reset
Monolithic IC PST4X6MXXXN, PST4X6NXXXU Series

Outline

This system reset IC was developed using the CMOS process. Ultra-low current consumption of 0.5μA typ. has been realized through use of the CMOS process. Also, the built-in fixed delay timer provides accurate reset by detecting power supply voltage during power on and power interruptions.

Features

1 Detection voltage precision	±1.5%
2 Low current consumption	0.5μA
3 Hysteresis	6.3mV typ. (VTH ≤ 3.08V)
	9.5mV typ. (VTH ≥ 3.08V)
4 External capacitor for delay timer not needed. Built-in delay timer	185ms

5 Full rank variations available for detection voltage, package and output configurations.

6 Operating temperature range suitable for car devices -40~+105°C

Package

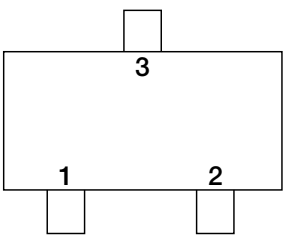
SOT-23 (PST4X6MXXXN Series)
SC-70 (PST4X6NXXXU Series)

Applications

1. Reset circuits in microcomputers, CPUs and MPUs.
2. Logic circuit reset circuits.
3. Battery voltage check
4. Switching circuits for back-up circuits.
5. Level detection circuits.
6. Mechanical reset circuits

Pin Assignment

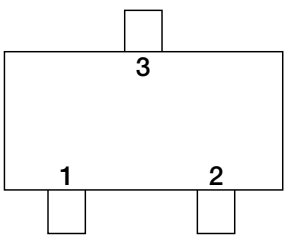
PST4□□M□□□N□



1	GND
2	$\overline{\text{RESET}}$ RESET
3	V_{DD}

SOT-23A

PST4□□N□□□U□



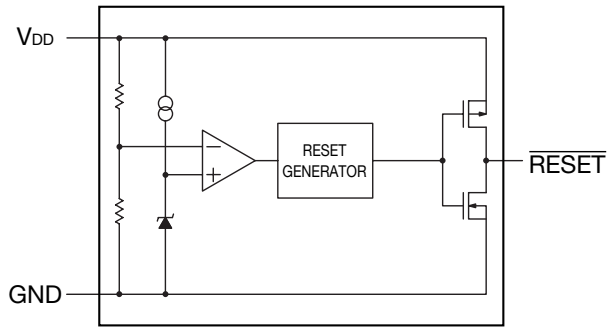
1	GND
2	$\overline{\text{RESET}}$ RESET
3	V_{DD}

SC-70A

Block Diagram

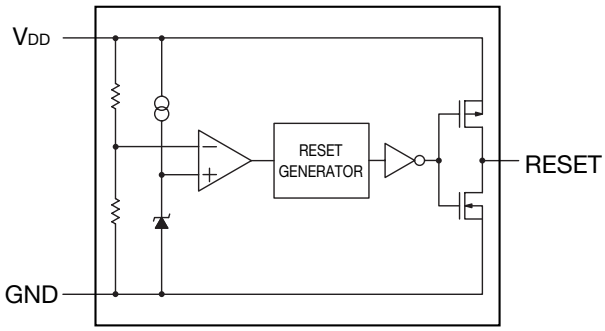
PST416M □□□N □

Push-Pull / Active-Low Output Type



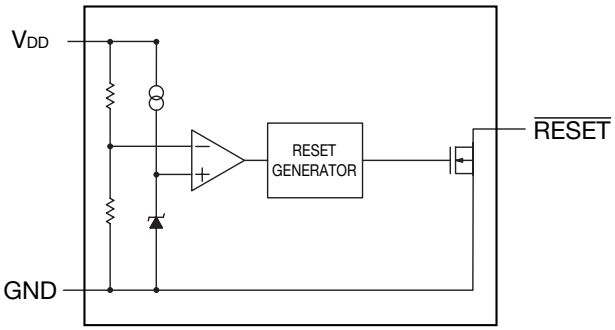
PST436M □□□N □

Push-Pull / Active-High Output Type



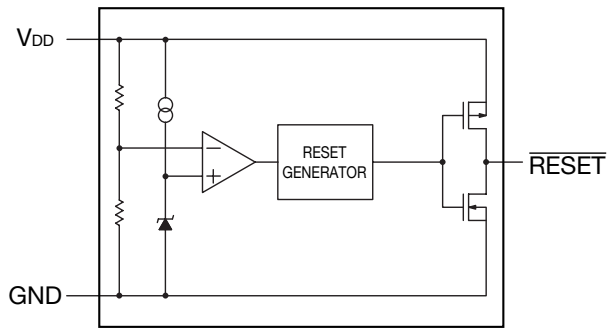
PST426M □□□N □

Open-Drain / Active-Low Output Type



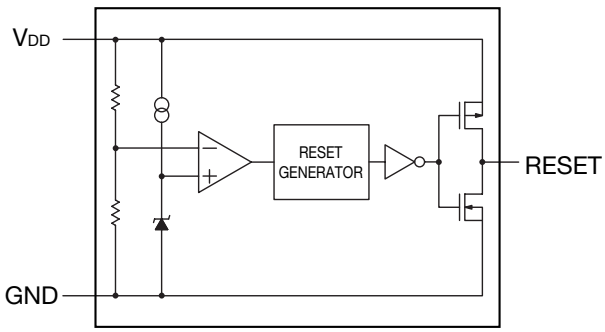
PST416N □□□U □

Push-Pull / Active-Low Output Type



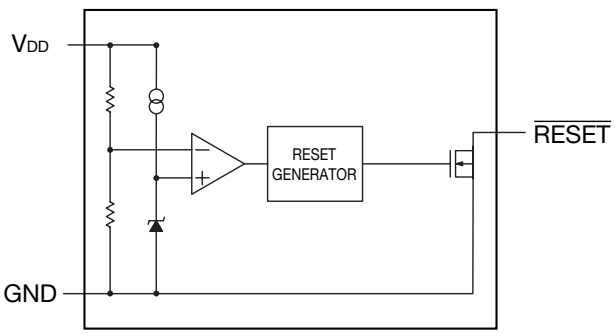
PST436N □□□U □

Push-Pull / Active-High Output Type



PST426N □□□U □

Open-Drain / Active-Low Output Type



Model Name

PST4 □ 6M □□□ N □
a b c

a		b	c
OUTPUT TYPE		V_{TH} RANK	Housing
1	Push-Pull Active-Low	220···V_{TH}=2.20V ～ ～ 463···V_{TH}=4.63V	R : Right Housing L : Left Housing
2	Open-Drain Active-Low		
3	Push-Pull Active-High		

PST4 □ 6N □□□ U □
a b c

a		b	c
OUTPUT TYPE		V_{TH} RANK	Housing
1	Push-Pull Active-Low	220···V_{TH}=2.20V ～ ～ 463···V_{TH}=4.63V	R : Right Housing L : Left Housing
2	Open-Drain Active-Low		
3	Push-Pull Active-High		

Pin Explanations

Pin No.	Pin Name	Function
1	GND	GND Pin
2	$\overline{\text{RESET}}$/RESET	Reset Signal Output Pin
3	V_{DD}	Power Supply Pin/Voltage Detect Pin

Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Operating Temperature	T_{OPR}	-40~+85	°C
Storage Temperature	T_{STG}	-60~+150	°C
Supply Voltage	V_{DD} max.	-0.3~+6.0	V
Output Voltage	RESET/$\overline{\text{RESET}}$	-0.3~(Vcc+0.3) (Push-Pull Type) -0.3~+6.0 (Open Drain Type)	V
Input Current (V_{DD})	I_{DD}	20	mA
Output Current	I_{OUT}	20	mA
Power Dissipation	P_D	150 (Alone)	mW

Recommended Operating Conditions

Item	Symbol	Rating	Unit
Operating Temperature	T_{OPR}	–40~+85	°C
Supply Voltage	V_{DD}	1.0~5.5 (Ta=0~+70°C) 1.2~5.5 (Ta=-40~+85°C)	V

Electrical Characteristics (V_{DD}=full range, Ta=-40~+85°C, Ta=+25°C, V_{DD}=3V.)

Item	Symbo	Test Conditions	Min.	Typ.	Max.	Unit	Circuit
Supply Current	I_{DD}	V_{TH} ≦ 3.08V only, V_{DD}=3.0V for V_{TH} > 2.93V	–	0.5	1.0	µA	2
		V_{DD}=3.2V for V_{TH} > 2.93, no load					
		V_{DD}=5.5V, no load	–	1.0	1.75		
Reset Threshold	V_{TH}	Ta=+25°C	V_{TH}-1.5%	V_{TH}	V_{TH}+1.5%	V	1
		Ta=–40~+85°C	V_{TH}-2.5%	V_{TH}	V_{TH}+2.5%		
Reset Threshold Temp. Coefficient	⊿V_{TH}/°C		–	30	–	ppm/°C	1
V_{DD} to Reset Delay	T_{RD}	V_{DD}=V_{TH}~(V_{TH}–100mV) ⋆2	–	20	–	µs	5
Reset Active Timeout Period	T_{RP}		100	185	280	ms	5
$\overline{\text{RESET}}$ Output Voltage (PST416M/PST426M, PST416N/PST426N)	V_{OL}	I_{SINK}=1.6mA, V_{DD} > 2.1V	–	–	0.3	V	4
		I_{SINK}=100µA,V_{DD} ≧ 1.2V	–	–	0.4		
$\overline{\text{RESET}}$ Output Voltage (PST416M, PST416N)	V_{OH}	I_{SOURCE}=500µA, V_{DD}=3.2V	0.8×V_{DD}	–	–	V	3
		I_{SOURCE}=800µA, V_{DD}=4.5V, V_{TH} ≦ 4.38V	0.8×V_{DD}	–	–		
		I_{SOURCE}=800µA, V_{DD}=V_{TH} max., V_{TH} ≧ 4.5V	0.8×V_{DD}	–	–		
RESET Output Voltage (PST436M, PST436N)	V_{OH}	I_{SOURCE}=500µA, V_{DD} ≧ 2.1V	0.8×V_{DD}	–	–	V	3
		I_{SOURCE}=50µA, V_{DD} ≧ 1.2V	0.8×V_{DD}	–	–		
	V_{OL}	I_{SINK}=1.2mA, V_{DD} ≧ 3.2V	–	–	0.3	V	4
		I_{SINK}=3.2mA, V_{DD} ≧ 4.5V, V_{TH} ≦ 4.38V	–	–	0.4		
		I_{SINK}=3.2mA, V_{DD}=V_{TH} max., V_{TH} ≧ 4.5V	–	–	0.4		
Hysteresis Voltage		V_{TH} ≦ 3.08V	–	6.3	–	mV	1
		V_{TH} ≧ 3.30V	–	9.5	–		
Output Leakage Current (PST426M, PST426N)			–	–	0.1	µA	–

Note : ⋆1 This device is tested at Ta=25℃, over temperature limits guaranteed by design only.
Note : ⋆2 The parameter is guaranteed by design.

Electrical Characteristics

Reset Threshold List

Model	Reset Threshold (V)					Reset Threshold Hysteresis (mV)
	Ta=+25°C			Ta=−40~+85°C		Ta=−40~+85°C
	Min.	Typ.	Max.	Min.	Max.	Typ.
PST4□□M220N□	2.167	2.200	2.233	2.145	2.250	6.3
PST4□□M232N□	2.285	2.320	2.355	2.262	2.375	
PST4□□M240N□	2.364	2.400	2.436	2.340	2.460	
PST4□□M250N□	2.462	2.500	2.537	2.437	2.562	
PST4□□M263N□	2.591	2.630	2.669	2.564	2.696	
PST4□□M270N□	2.660	2.700	2.741	2.633	2.768	
PST4□□M280N□	2.758	2.800	2.842	2.730	2.870	
PST4□□M293N□	2.886	2.930	2.974	2.857	3.000	
PST4□□M300N□	2.955	3.000	3.045	2.925	3.075	
PST4□□M308N□	3.034	3.080	3.126	3.003	3.150	
PST4□□M330N□	3.250	3.300	3.350	3.217	3.383	9.5
PST4□□M340N□	3.349	3.400	3.451	3.315	3.485	
PST4□□M350N□	3.447	3.500	3.552	3.412	3.587	
PST4□□M360N□	3.546	3.600	3.654	3.510	3.690	
PST4□□M370N□	3.644	3.700	3.755	3.607	3.792	
PST4□□M380N□	3.743	3.800	3.857	3.705	3.895	
PST4□□M390N□	3.841	3.900	3.958	3.802	3.997	
PST4□□M400N□	3.940	4.000	4.060	3.900	4.100	
PST4□□M410N□	4.038	4.100	4.161	3.997	4.202	
PST4□□M420N□	4.137	4.200	4.263	4.095	4.305	
PST4□□M430N□	4.235	4.300	4.364	4.192	4.407	
PST4□□M438N□	4.314	4.380	4.446	4.270	4.489	
PST4□□M450N□	4.432	4.500	4.567	4.387	4.612	
PST4□□M463N□	4.560	4.630	4.699	4.514	4.746	
PST4□□M220N□	2.167	2.200	2.233	2.145	2.250	6.3
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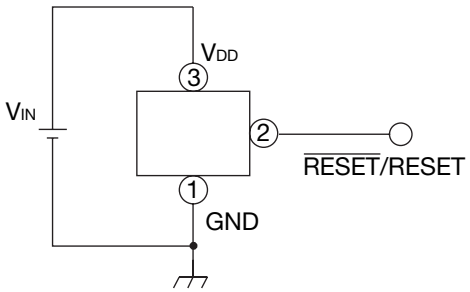
Measuring Circuit

(1)



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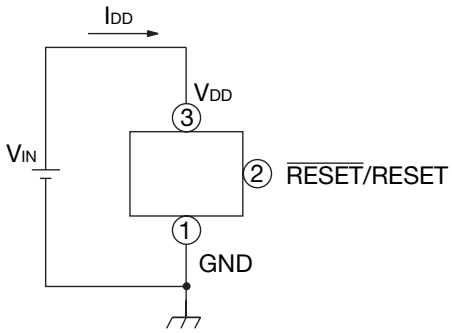

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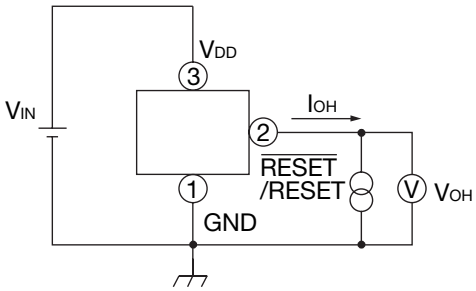

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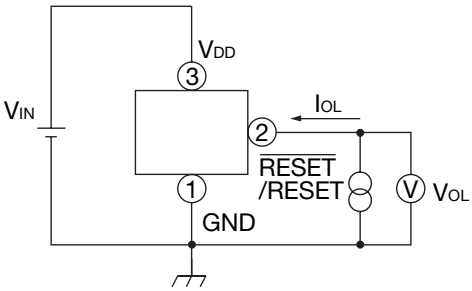

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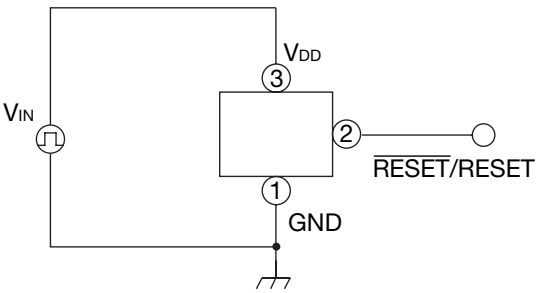
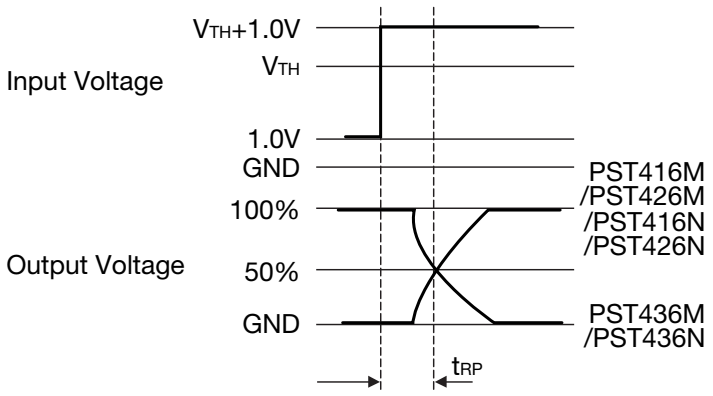
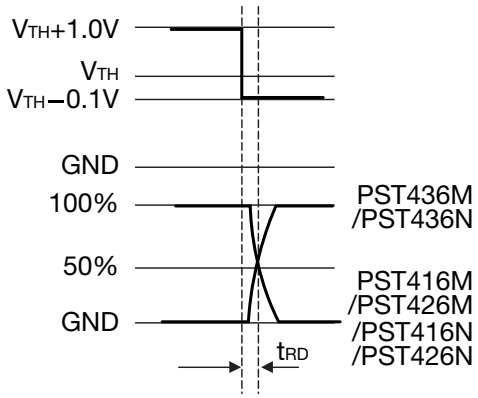




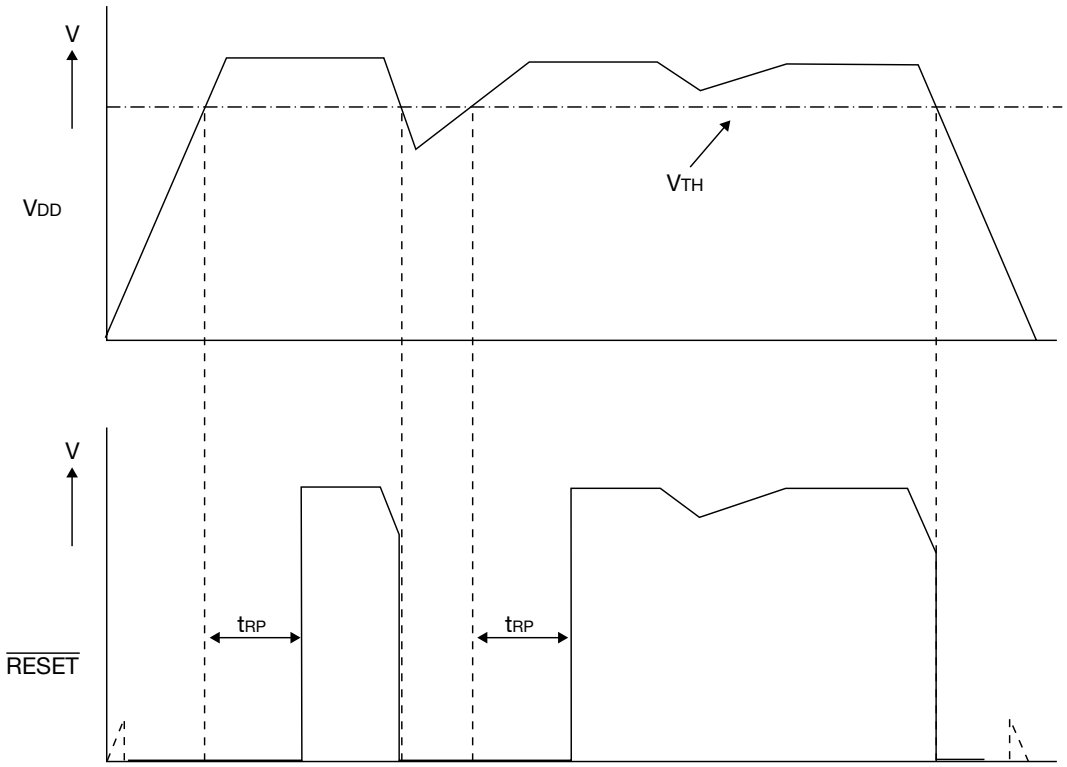
Reset Active Timeout period



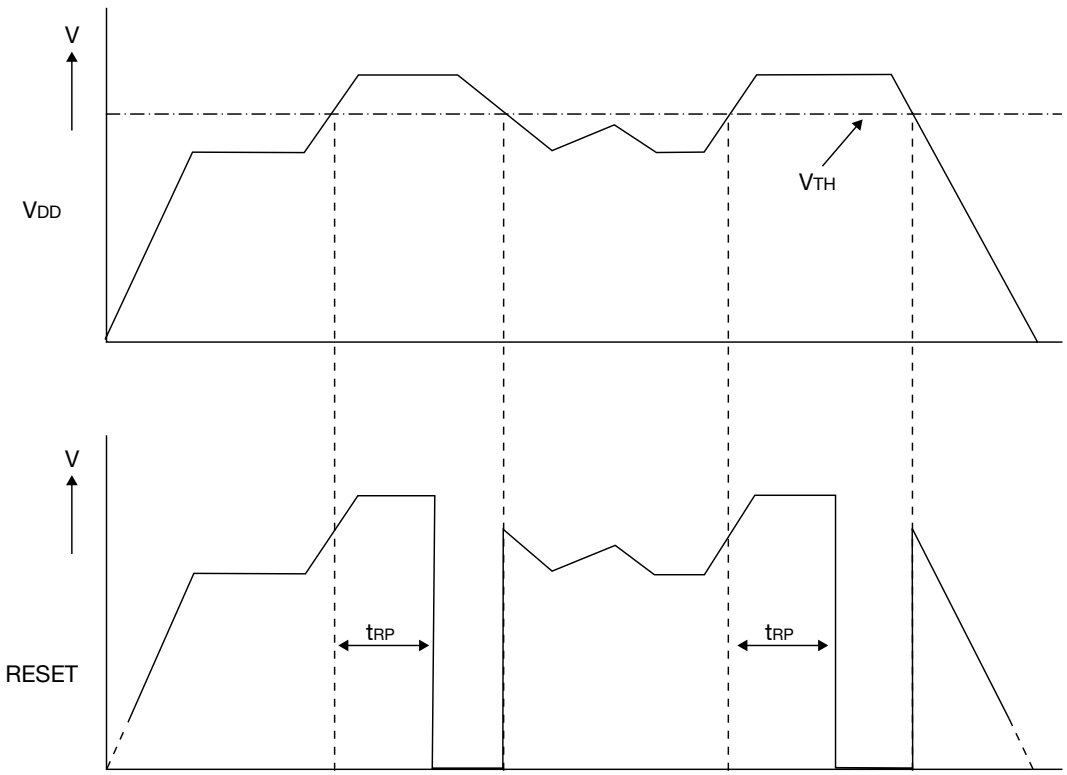
VDD to Reset Delay

Timing Chart

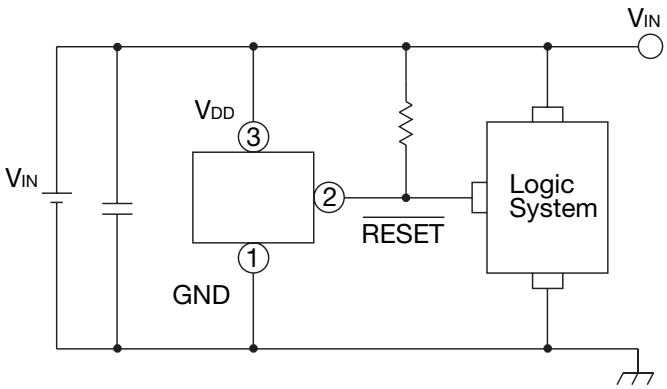
PST416M/PST426M, PST416N/PST426N Active-Low Output Type

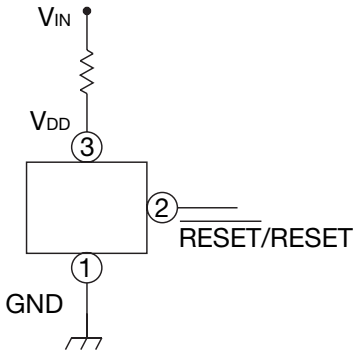


PST436M, PST436N Active-High Output Type



Application Circuits





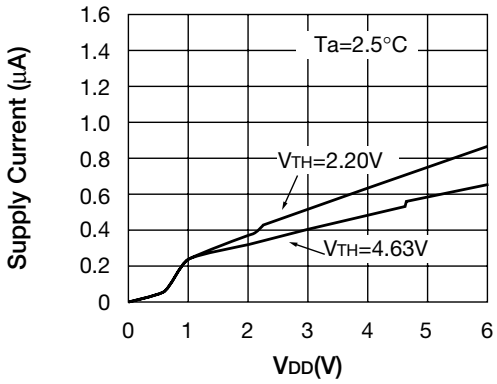
Please note that there is any possibility of circuit oscillation when resistance put in the line V_{IN}.

We shall not be liable for any trouble or damage caused by using this circuit.

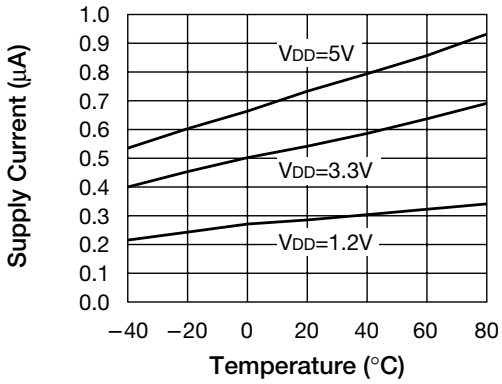
In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, MITSUMI shall not be liable for any such problem, nor grant a license therefore.

Characteristics

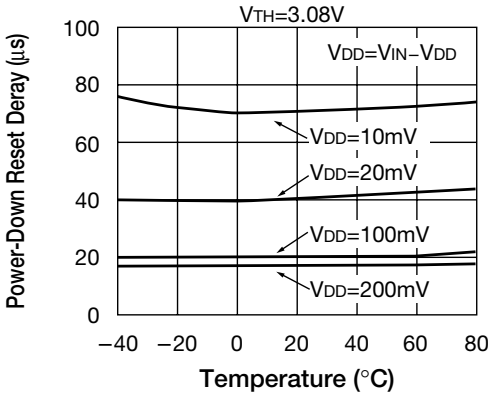
Supply Current



Supply current vs Temperature



Power-down Reset Timeout vs Temperature



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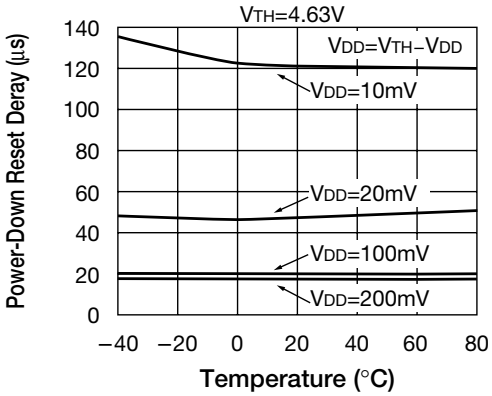
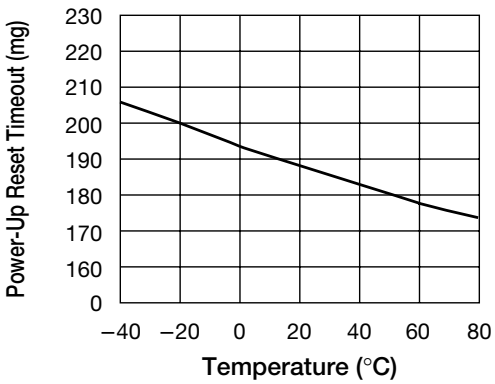
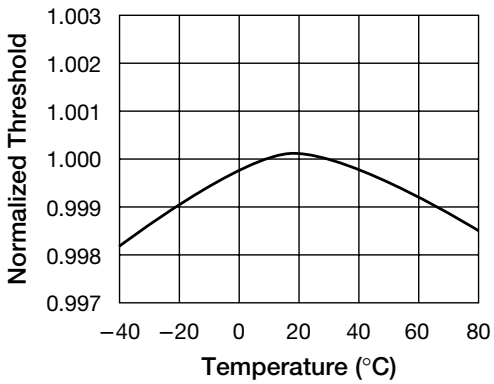


Power-up Reset Timeout vs Temperature



Normalized Threshold vs Temperature



Maximum Transient Duration vs Reset Comparator Overdrive