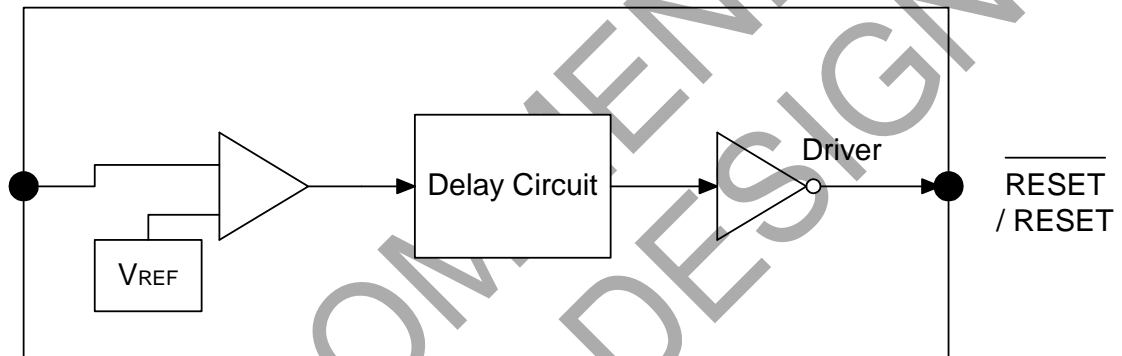


Pin Descriptions

Pin Name	Description
GND	Ground
$\overline{\text{RESET}}$ (RESET)	Reset Output Pin L: for APX809 H: for APX810
V _{CC}	Operating Voltage Input

Functional Block Diagram



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
ESD HBM	Human Body Model ESD Protection	5	kV
ESD MM	Machine Model ESD Protection	500	V
V _{CC}	Supply Voltage	-0.3 to +6.0	V
V _{RESET}	RESET, $\overline{\text{RESET}}$ (Push-pull)	-0.3 to (V _{CC} + 0.3)	V
I _{CC}	Input Current, V _{CC}	20	mA
I _O	Output Current, RESET, $\overline{\text{RESET}}$	20	mA
P _D	Continuous Power Dissipation (T _A = +70°C), De-rate 4mW/°C above +70°C	400	mW
T _{OP}	Operating Junction Temperature Range	-40 to +105	°C
T _{ST}	Storage Temperature Range	-65 to +150	°C

Recommended Operating Conditions

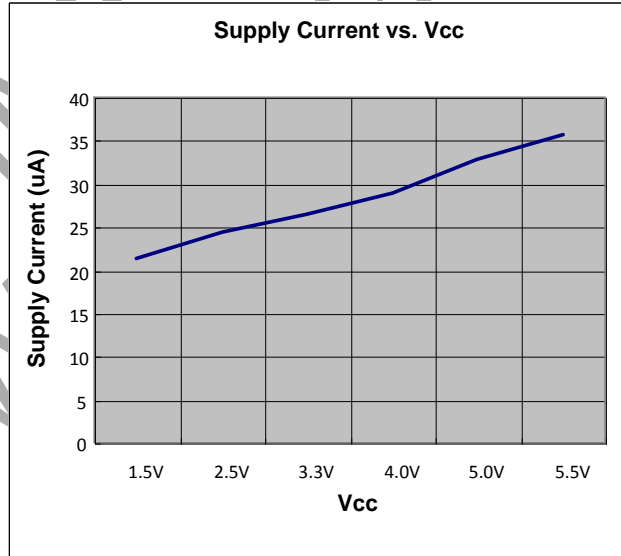
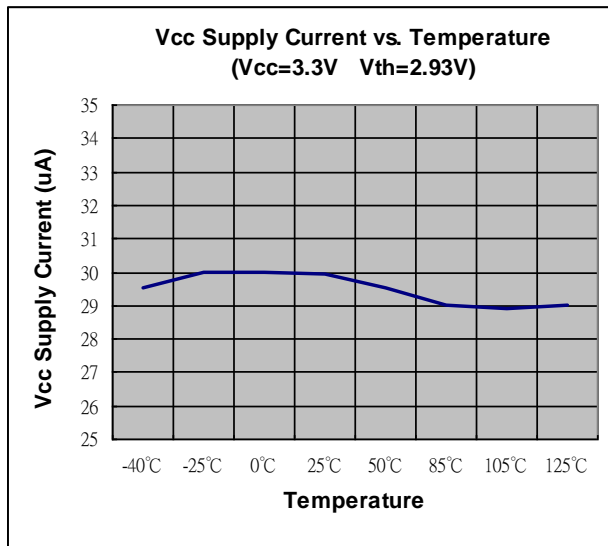
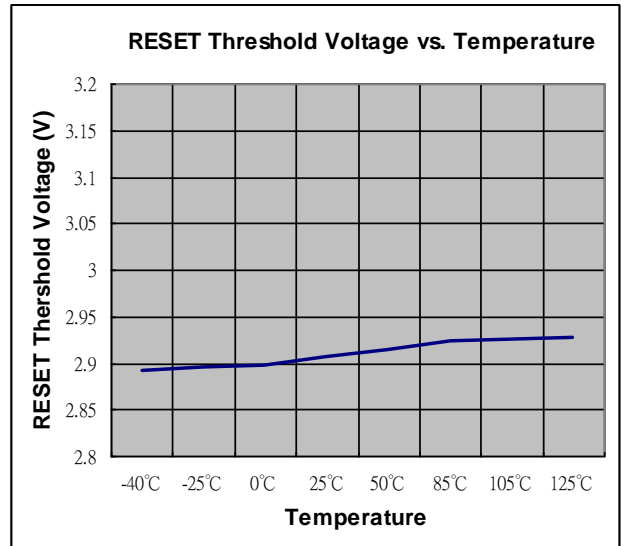
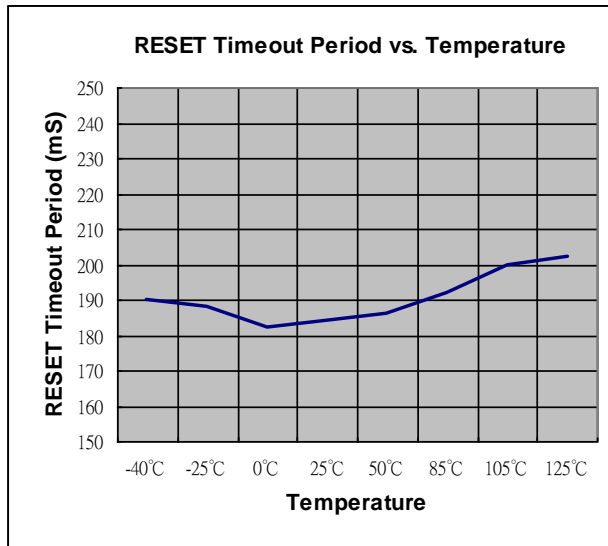
Symbol	Parameter	Min	Max	Unit
V _{CC}	Supply Voltage	1.1	5.5	V
V _{IN}	Input Voltage	0	(V _{CC} + 0.3)	V
T _A	Operating Ambient Temperature Range	-40	+85	°C
t _R	V _{CC} Rising Time (V _{CC} = 0 to V _T)	—	100	µs

Electrical Characteristics (@T_A = -40 to +85°C, unless otherwise note. Typical values are at T_A = +25°C.)

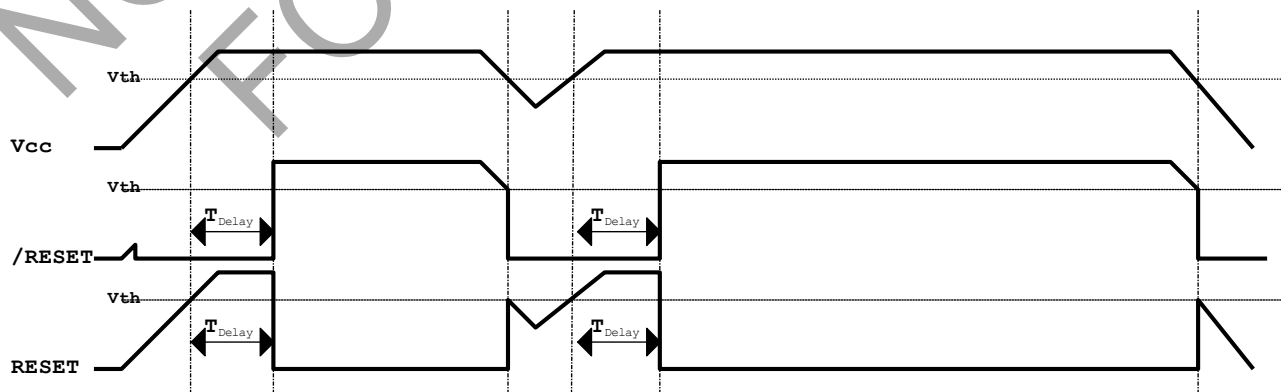
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit	
V _{CC}	V _{CC} Range	T _A = 0°C to +70°C	1.0	—	5.5	V	
I _{CC}	Supply Current	V _{TH} + 0.2V	—	30	40	µA	
V _{TH}	Reset Threshold	T _A = 0°C to +85°C	APX809/810-23	2.21	2.25	2.30	V
			APX809/810-26	2.59	2.63	2.69	
			APX809/810-29	2.88	2.93	3.00	
			APX809/810-31	3.02	3.08	3.15	
			APX809/810-40	3.93	4.00	4.08	
			APX809/810-44	4.31	4.38	4.47	
			APX809/810-46	4.56	4.63	4.72	
		T _A = -40°C to +85°C	APX809/810-23	2.20	2.25	2.30	V
			APX809/810-26	2.57	2.63	2.69	
			APX809/810-29	2.86	2.93	3.00	
			APX809/810-31	3.00	3.08	3.15	
			APX809/810-40	3.92	4.00	4.08	
			APX809/810-44	4.29	4.38	4.47	
			APX809/810-46	4.54	4.63	4.72	
	Reset Threshold Tempco	—	—	30	—	ppm/°C	
t _S	Set-up Time	V _{CC} = V _{TH} to (V _{TH} - 100mV)	—	20	—	µs	
t _{DELAY}	Reset Active Timeout Period	T _A = 0°C to +85°C	140	200	280	ms	
V _{OL}	RESET Output Voltage Low (APX809)	V _{CC} = V _{TH} - 0.2, I _{SINK} = 1.2mA	—	—	0.3	V	
		V _{CC} = V _{TH} - 0.2, I _{SINK} = 3.2mA	—	—	0.4		
		V _{CC} > 1.0V, I _{SINK} = 50µA	—	—	0.3		
V _{OH}	RESET Output Voltage-High (APX809)	V _{CC} > V _{TH} + 0.2, I _{SOURCE} = 500µA	0.8V _{CC}	—	—	V	
		V _{CC} > V _{TH} + 0.2, I _{SOURCE} = 800µA	V _{CC} - 1.5	—	—		
V _{OL}	RESET Output Voltage-Low (APX810)	V _{CC} = V _{TH} + 0.2, I _{SINK} = 1.2mA	—	—	0.3	V	
		V _{CC} = V _{TH} + 0.2, I _{SINK} = 3.2mA	—	—	0.4		
V _{OH}	RESET Output Voltage-High (APX810)	1.8V < V _{CC} < V _{TH} - 0.2, I _{SOURCE} = 150µA	0.8V _{CC}	—	—	V	
θ _{JA}	Thermal Resistance Junction-to-Ambient	SOT23 (Note 4)	—	201	—	°C/W	
θ _{JC}	Thermal Resistance Junction-to-Case	SOT23 (Note 4)	—	56	—	°C/W	

Note: 4. Test condition for SOT23: Devices mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

Performance Characteristics



Timing Diagram



Functional Description

A microprocessor's (μP 's) reset input starts the μP in a known state. The APX809/810 assert reset to prevent code-execution errors during power-up, power-down, or brownout conditions. They assert a reset signal whenever the V_{CC} supply voltage declines below a preset threshold, keeping it asserted for at least 240ms after V_{CC} has risen above the reset threshold. The APX809/810 have a push-pull output stage.

Ensuring a Valid Reset Output

Down to $V_{CC} = 0$

\overline{RESET} is guaranteed to be a logic low for $V_{CC} > 1V$. Once V_{CC} exceeds the reset threshold, an internal timer keeps \overline{RESET} low for the reset timeout period; after this interval, \overline{RESET} goes high. If a brownout condition occurs (V_{CC} dips below the \overline{RESET} reset threshold), \overline{RESET} goes low. Any time V_{CC} goes below the reset threshold, the internal timer resets to zero, and \overline{RESET} goes low. The internal timer starts after V_{CC} returns above the reset threshold, and \overline{RESET} remains low for the reset timeout period.

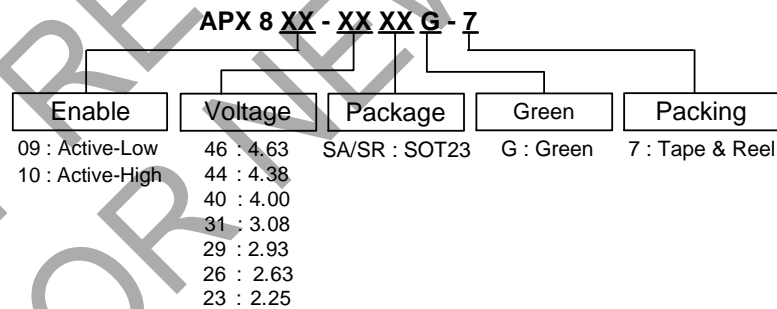
When V_{CC} falls below 1V, the APX809 \overline{RESET} output no longer sinks current — it becomes an open circuit. Therefore, high-impedance CMOS logic inputs connected to \overline{RESET} can drift to undetermined voltages.

This presents no problem in most applications since most μP and other circuitry is inoperative with V_{CC} below 1V. However, in applications where \overline{RESET} must be valid down to 0V, adding a pull down resistor to \overline{RESET} causes any stray leakage currents to flow to ground, holding \overline{RESET} low. R1's value is not critical; 100k are large enough not to load \overline{RESET} and small enough to pull \overline{RESET} to ground. For the APX810 if \overline{RESET} is required to remain valid for $V_{CC} < 1V$.

Benefits of Highly Accurate Reset Threshold

Most μP supervisor ICs has reset threshold voltages between 5% and 10% below the value of nominal supply voltages. This ensures a reset will not occur within 5% of the nominal supply, but will occur when the supply is 10% below nominal. When using ICs rated at only the nominal supply $\pm 5\%$, this leaves a zone of uncertainty where the supply is between 5% and 10% low, and where the reset may or may not be asserted.

Ordering Information



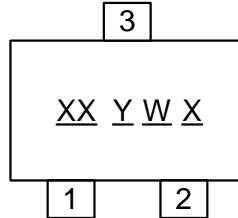
Part Number	Package Code	Packaging (Note 5)	7" Tape and Reel	
			Quantity	Part Number Suffix
APX809-XXSAG-7	SA	SOT23	3000/Tape & Reel	-7
APX810-XXSAG-7	SA	SOT23	3000/Tape & Reel	-7
APX809-XXSRG-7	SR	SOT23	3000/Tape & Reel	-7
APX810-XXSRG-7	SR	SOT23	3000/Tape & Reel	-7

Note: 5. Pad layout as shown in Diodes Incorporated's package outline PDFs, which can be found on our website at <http://www.diodes.com/package-outlines.html>.

Marking Information

(1) SOT23

(Top View)



XX : Identification code

Y : Year 0~9

W : Week : A~Z : 1~26 week;
 a~z : 27~52 week; z represents
 52 and 53 week

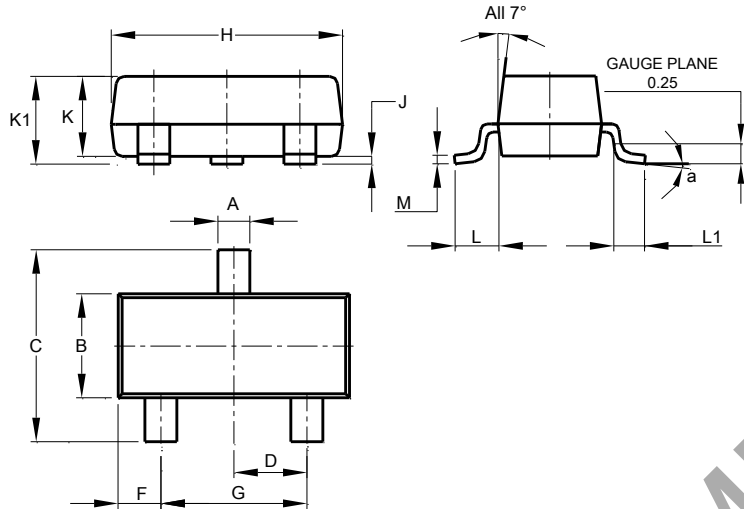
X : A~Z : Green

Device	Package	Identification Code
APX809-46SA	SOT23	X2
APX809-44SA	SOT23	X3
APX809-40SA	SOT23	X4
APX809-31SA	SOT23	X5
APX809-29SA	SOT23	X6
APX809-26SA	SOT23	X7
APX809-23SA	SOT23	X8
APX810-46SA	SOT23	XA
APX810-44SA	SOT23	XB
APX810-40SA	SOT23	XC
APX810-31SA	SOT23	XD
APX810-29SA	SOT23	XE
APX810-26SA	SOT23	XF
APX810-23SA	SOT23	XG
APX809-46SR	SOT23	Y2
APX809-44SR	SOT23	Y3
APX809-40SR	SOT23	Y4
APX809-31SR	SOT23	Y5
APX809-29SR	SOT23	Y6
APX809-26SR	SOT23	Y7
APX809-23SR	SOT23	Y8
APX810-46SR	SOT23	YA
APX810-44SR	SOT23	YB
APX810-40SR	SOT23	YC
APX810-31SR	SOT23	YD
APX810-29SR	SOT23	YE
APX810-26SR	SOT23	YF
APX810-23SR	SOT23	YG

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23

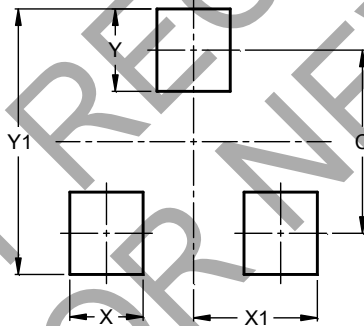


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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