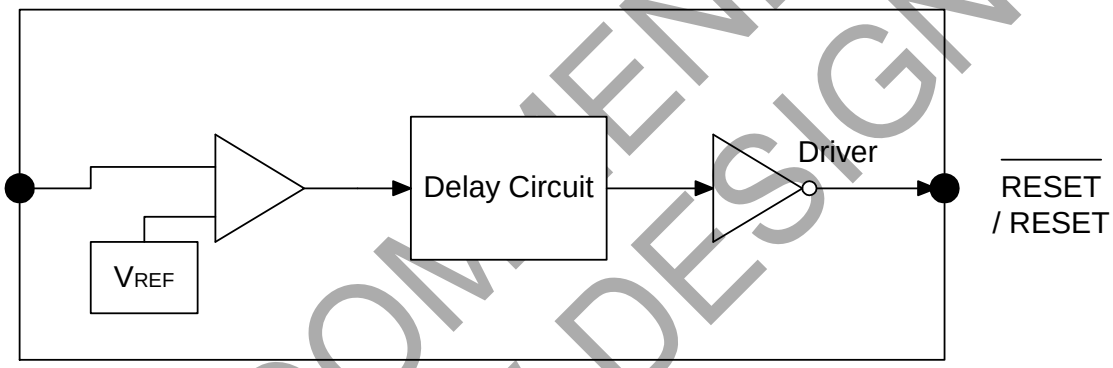
Pin Descriptions

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

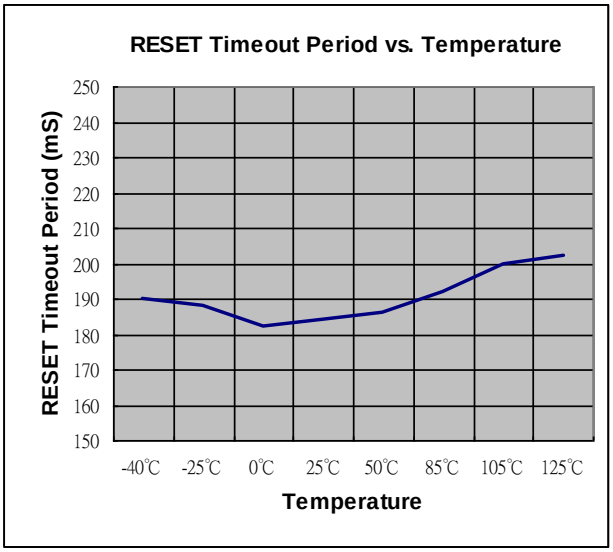
Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	1.1	5.5	V
V_{IN}	Input Voltage	0	(V_{CC} + 0.3)	V
T_A	Operating Ambient Temperature Range	-40	+85	°C
t_R	V_{CC} Rising Time (V_{CC} = 0 to V_T)	—	100	µs

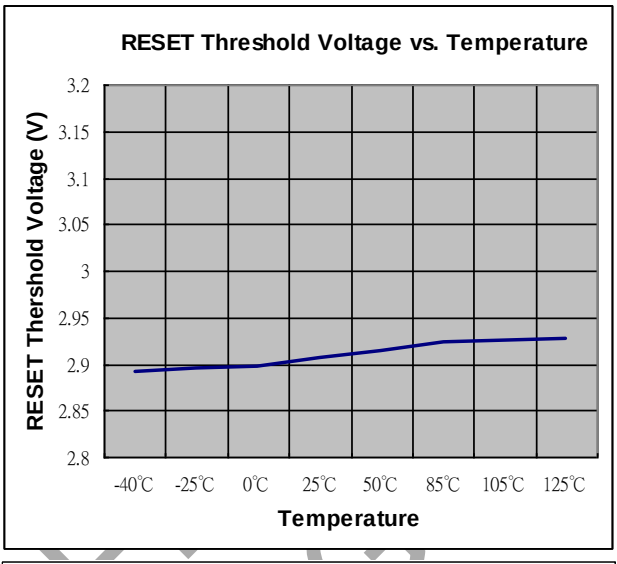
Electrical Characteristics (@T_A = -40 to +85°C, unless otherwise note. Typical values are at T_A = +25°C.)

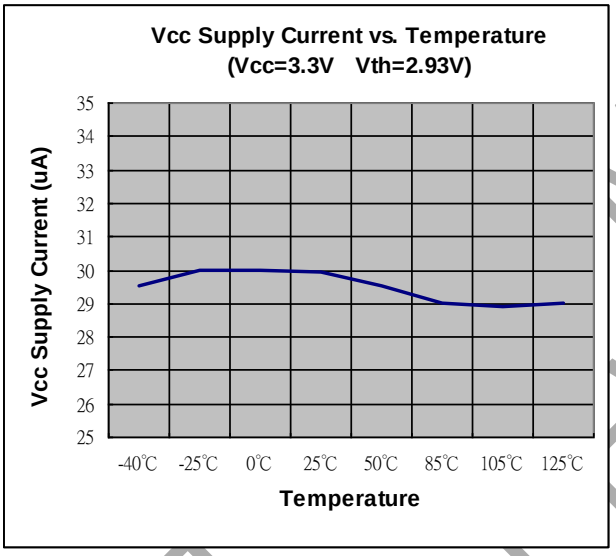
Symbol	Parameter		Test Conditions	Min	Typ	Max	Unit
V_{CC}	V_{CC} Range		T_A = 0°C to +70°C	1.0	—	5.5	V
I_{CC}	Supply Current		V_{TH} + 0.2V	—	30	40	µA
V_{TH}	Reset Threshold	APX809/810-23	T_A = 0°C to +85°C	2.21	2.25	2.30	V
		APX809/810-26		2.59	2.63	2.69	
		APX809/810-29		2.88	2.93	3.00	
		APX809/810-31		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	
		APX809/810-23	T_A = -40°C to +85°C	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}	$\overline{RESET}$ 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}	$\overline{RESET}$ 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

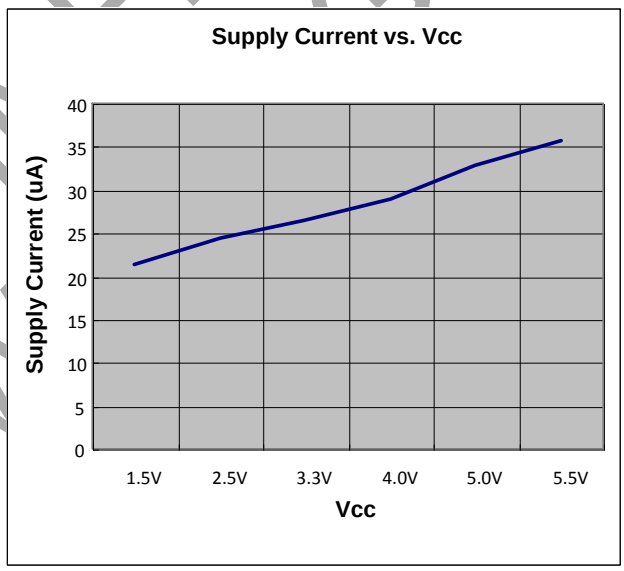
Note: 4. Test condition for SOT23: Devices mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

Performance Characteristics

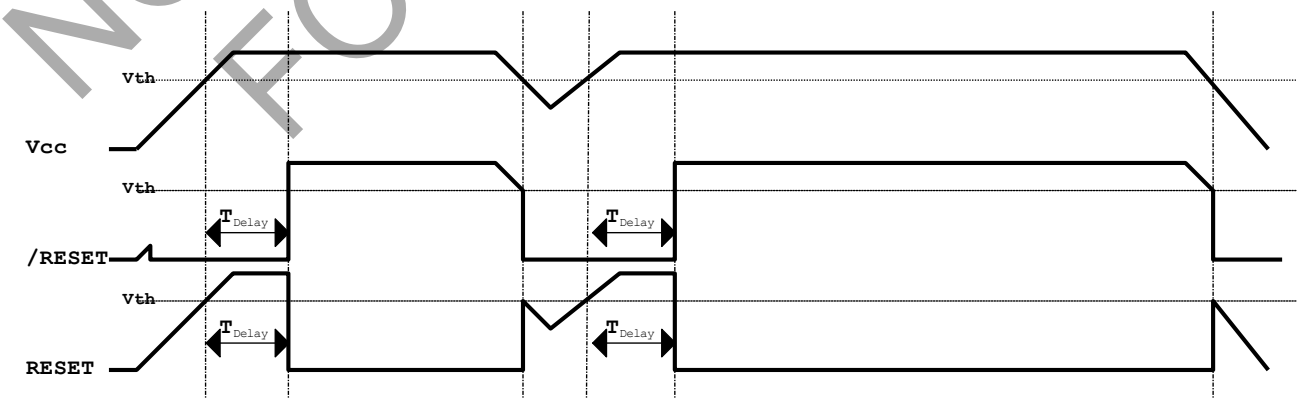








Timing Diagram



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 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 ±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

APX 8 XX - XX XX G - 7

Enable	Voltage	Package	Green	Packing
09 : Active-Low 10 : Active-High	46 : 4.63 44 : 4.38 40 : 4.00 31 : 3.08 29 : 2.93 26 : 2.63 23 : 2.25	SA/SR : SOT23	G : Green	7 : Tape & Reel

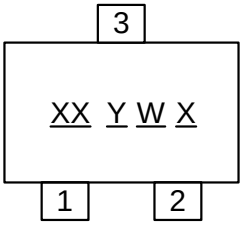
Part Number	Package Code	Packaging (Note 5)	7" Tape and Reel	
			Quantity	Part Number Suffix
APX809-XXSAG-7	SA	SOT23	3000/Tape & Reel	-7
APX810-XXSAG-7	SA	SOT23	3000/Tape & Reel	-7
APX809-XXSRG-7	SR	SOT23	3000/Tape & Reel	-7
APX810-XXSRG-7	SR	SOT23	3000/Tape & Reel	-7

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)



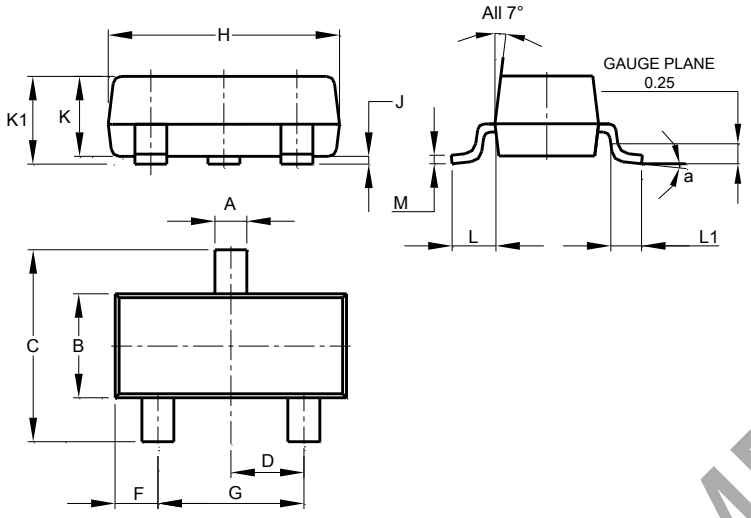
XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Green

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

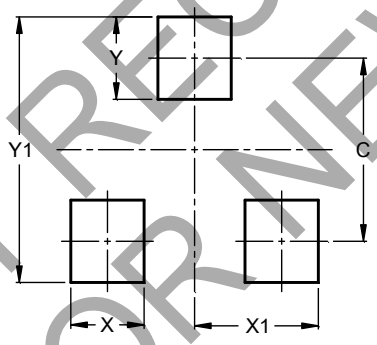


SOT23			
Dim	**Min**	**Max**	**Typ**
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

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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