Description

The APX803/D is used for microprocessor (µP) supervisory circuits to monitor the power supplies in µP and digital systems. They provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V powered circuits.

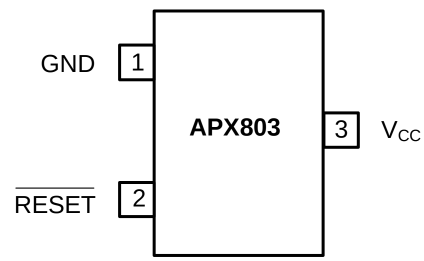
These circuits perform a single function: they assert a reset signal on power up and whenever the V_{CC} supply voltage declines below a preset threshold, keeping it asserted for a fixed period of time after V_{CC} has risen above the reset threshold. For the APX803D this period is a minimum of 1ms while for other APX803 variants it is at least 140ms. The reset comparator is designed to ignore fast transients on V_{CC}, and the outputs are guaranteed to be in the correct logic state for V_{CC} down to 1V.

The APX803 is available with different reset thresholds suitable for operation with a variety of supply voltages, however the APX803D is available with a 2.93V threshold voltage.

The APX803/D have an open collector active low $\overline{\text{RESET}}$ output and compliment Diodes APX809/10 which have push-pull output stages.. Low supply current makes the APX803/D ideal for use in portable equipment. The APX803/D are available in two pin out variants of the 3-pin SOT23 package.

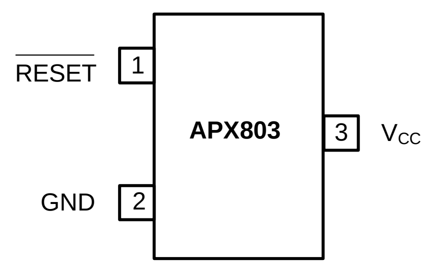
Pin Assignments

(Top View)



SOT23

(Top View)



SOT23R

Features

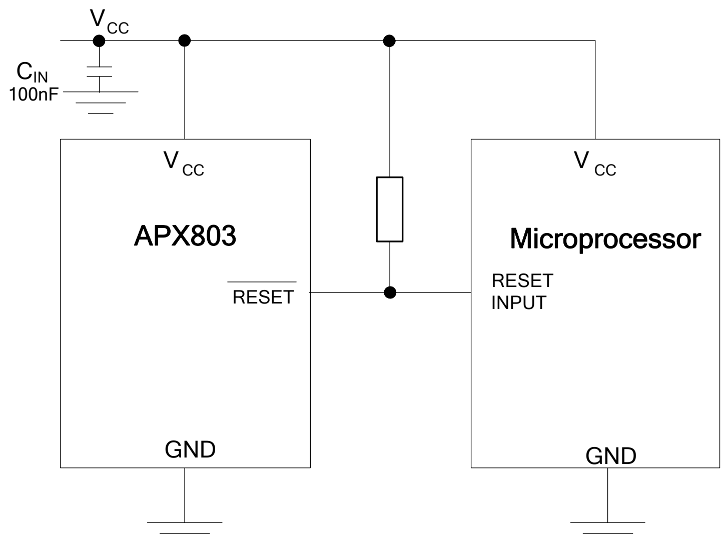
- Precision Monitoring of +2.5V, +3V, +3.3V, and +5V Power-Supply Voltages
- Fully Specified Over Temperature
- Open-drain $\overline{\text{RESET}}$ Active Low
- Power-On/power supply glitch Reset Pulse
  - APX803D 2ms (Typ)
  - APX803 200ms (Typ)
- 30µA Supply Current (Typ.)
- Guaranteed Reset Valid to VCC = +1V
- No External Components
- SOT23 and SOT23R: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

Applications

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

Notes: 1. EU Directive 2002/95/EC (RoHS). All applicable RoHS exemptions applied. Please visit our website at http://www.diodes.com/products/lead_free.html.

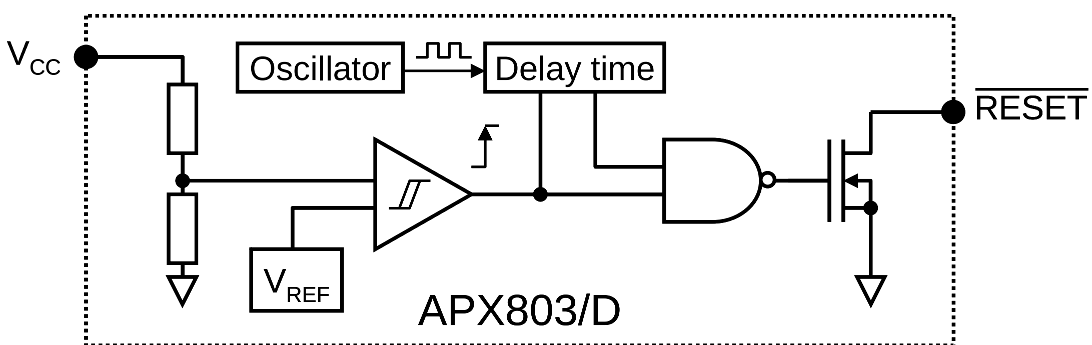
Typical Application Circuit



Pin Descriptions

Pin Name	Description
GND	Ground
$\overline{\text{RESET}}$	Reset Output Pin Active Low Open Drain
V_{CC}	Operating Voltage Input

Functional Block Diagram



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	kV
ESD MM	Machine Model ESD Protection	200	V
V_{CC}	Supply Voltage	-0.3 to +6.0	V
V_{RESET}	$\overline{\text{RESET}}$ (open drain)	-0.3 to 6	V
I_{CC}	Input Current, V_{CC}	20	mA
I_O	Output Current, $\overline{\text{RESET}}$	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
V_{RESET}	$\overline{\text{RESET}}$ output voltage	0	5.5	V
T_A	Operating Ambient Temperature Range	-40	85	°C
dV_{CC}/dt	V_{CC} Rate of rise (V_{CC} = 0~V_T)		100	V/µs

Electrical Characteristics (T_A = 25°C)

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
I_{CC}	Supply Current		V_{TH} + 0.2V		30	40	μA
V_{TH}	Reset Threshold	APX803-23	T_A = 25°C	2.21	2.25	2.30	V
		APX803-26		2.59	2.63	2.66	
		APX803-29		2.89	2.93	2.96	
		APX803D-29		2.89	2.93	2.96	
		APX803-31		3.04	3.08	3.13	
		APX803-40		3.94	4.00	4.06	
		APX803-44		4.31	4.38	4.45	
		APX803-46		4.56	4.63	4.70	
	Reset Threshold hysteresis		V_{TH-H} – V_{TH-L}		40		mV
	Reset Threshold Tempco				30		ppm/°C
t_S	V_{CC} to RESET delay		V_{CC} = V_{TH} to (V_{TH} – 100mV)		20		μs
t_{DELAY}	Reset Active Timeout Period	APX803-XX	T_A = 0°C to +85°C	140	200	280	ms
		APX803D-29		1		3.3	
V_{OL}	$\overline{RESET}$ Output Voltage Low		V_{CC} = V_{TH} -0.2, I_{SINK} = 1.2mA			0.3	V
			V_{CC} = V_{TH} -0.2, I_{SINK} = 3.5mA			0.4	
			V_{CC} > 1.0V, I_{SINK} = 50uA			0.3	
I_{OH}	$\overline{RESET}$ Output High leakage current		V_{CC} > V_{TH} +0.2			1	μA
θ_{JA}	Thermal Resistance Junction-to-Ambient		SOT23/SOT23R (Note 2)		201		°C/W
θ_{JC}	Thermal Resistance Junction-to-Case		SOT23/SOT23R (Note 2)		56		°C/W

Notes: 2. Test condition for SOT23 and SOT23R: Devices mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
3. Final datasheet limits to be determined by characterization and correlation.

Typical Performance Characteristics

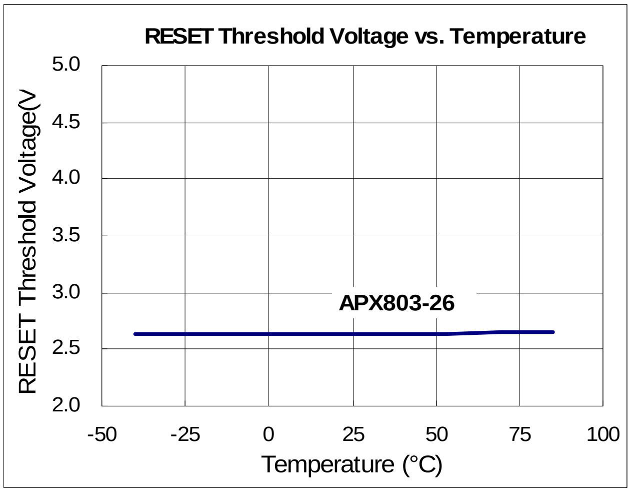


Figure 1

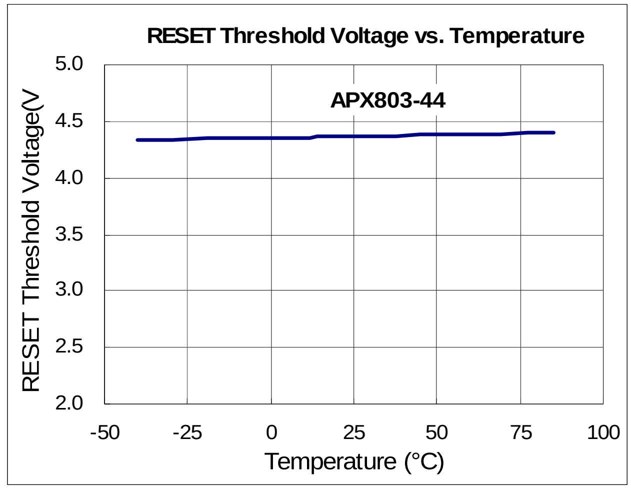


Figure 2

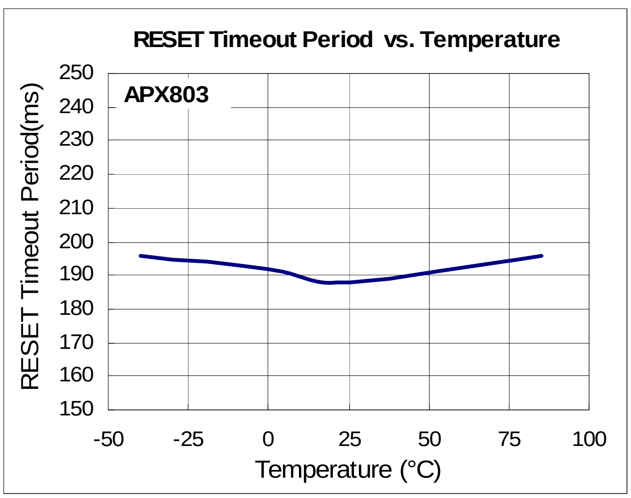


Figure 3

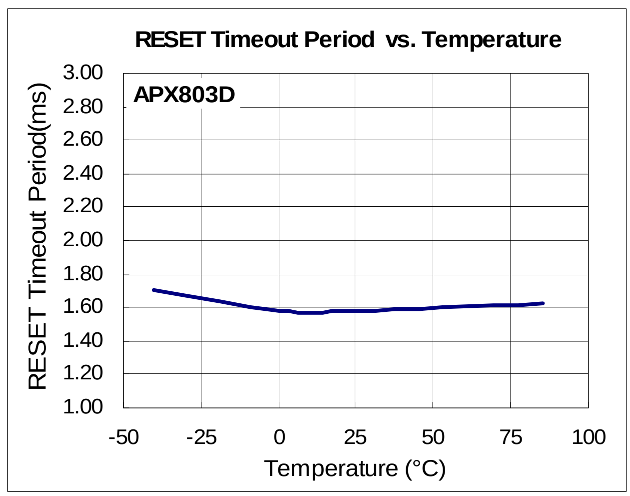


Figure 4

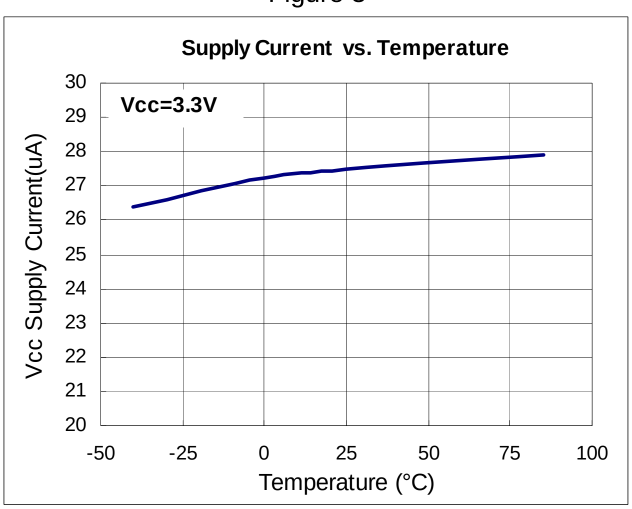


Figure 5

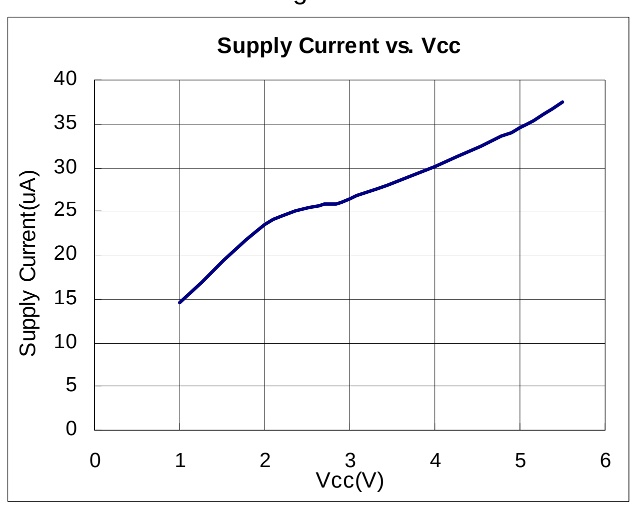


Figure 6

Typical Performance Characteristics (Continued)

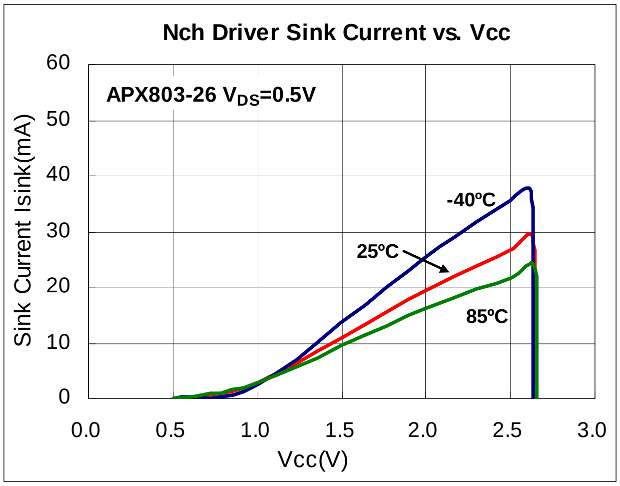


Figure 7

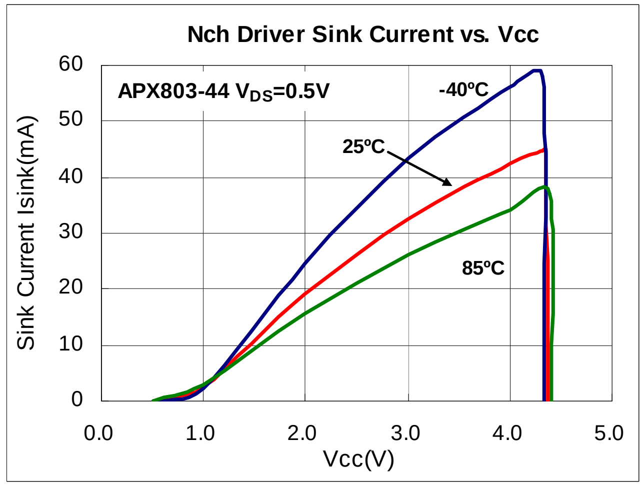


Figure 8

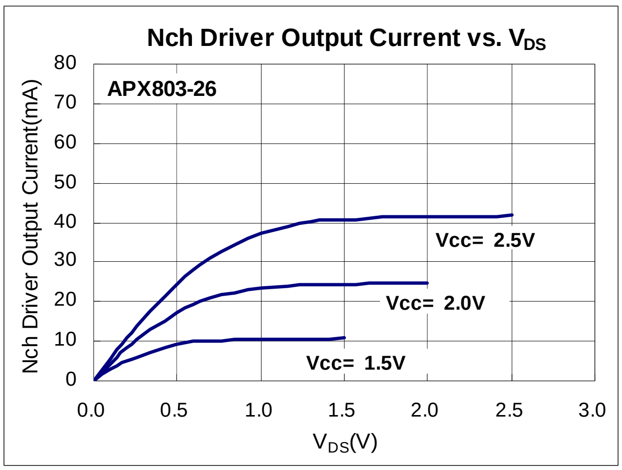


Figure 9

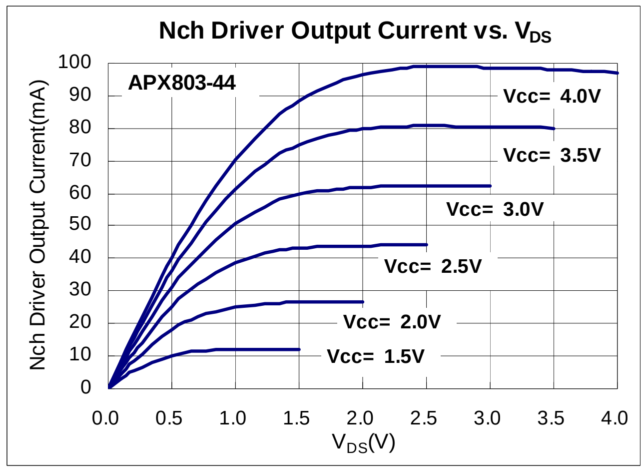
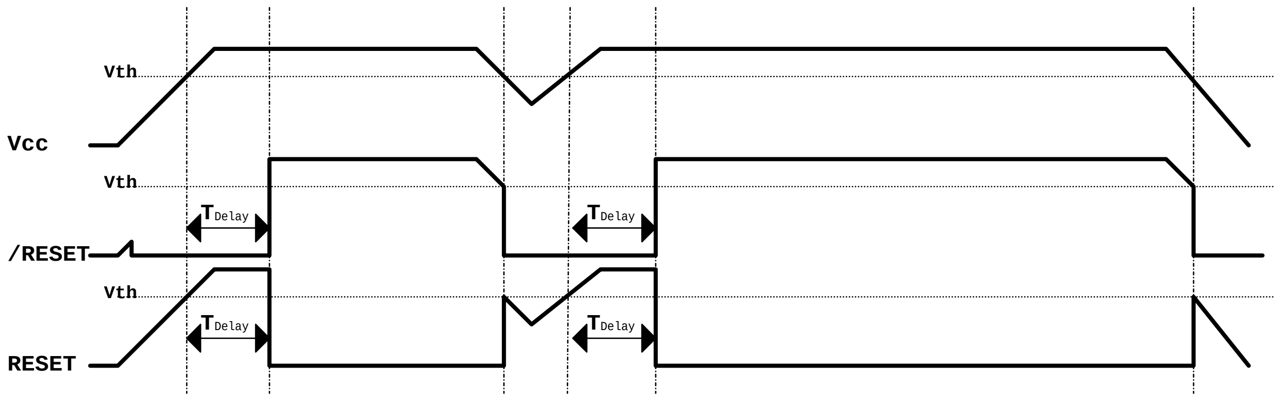


Figure 10

Timing Diagram



Functional Description

Microprocessors (µPs) and microcontrollers (µC) have a reset input to ensure that it starts up in a known state. The APX803/D drive the µP's reset input 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 and keep it asserted for a fixed period of time after V_{CC} has risen above the reset threshold. For the APX803D this period is a minimum of 1ms while for other APX803 variants it is at least 140ms. The APX803/D have an open-drain output stage.

Ensuring a Valid Reset Output Down to V_{CC} = 0

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

When V_{CC} falls below 1V, the APX803/D $\overline{\text{RESET}}$ output no longer sinks current — it becomes an open circuit. Therefore, high-impedance CMOS logic inputs connected to $\overline{\text{RESET}}$ 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.

Interfacing to µP with Bidirectional Reset Pins

Since the RESET output on the APX803/D is open drain, this device interfaces easily with µP/µC that have bidirectional reset pins, such as the Motorola 68HC11. Connecting the µP supervisor's RESET output directly to the microcontroller's (µC's) RESET pin with a single pull-up resistor allows either device to assert reset.

Supervising and monitoring Multiple Supplies

Generally, the pull-up resistor connected to the APX803/D will connect to the supply voltage that is being monitored at the IC's V_{CC} pin. However, some systems may use the APX803/D open-drain output to level-shift from the monitored supply to reset the µP powered by a different supply voltage or monitor multiple supplies that will be fed into 1 µC/µP reset input.

Ordering Information

APX 8 03 - XX XX G - 7

Output type	Voltage	Package	Green	Packing
03 : Active-Low, Open Drain	46 : 4.63 44 : 4.38 40 : 4.00 31 : 3.08 29 : 2.93 26 : 2.63 23 : 2.25	SA : SOT23 SR : SOT23R	G : Green	7 : Tape & Reel

APX 8 03 D - 29 XX G - 7

Output type	Voltage	Package	Green	Packing
03 : Active-Low, Open Drain	29 : 2.93	SA : SOT23 SR : SOT23R	G : Green	7 : Tape & Reel

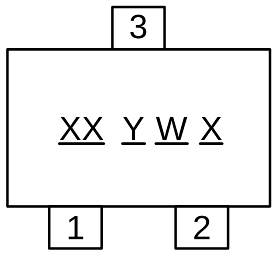
Device	Package Code	Packaging (Note 4)	7” Tape and Reel	
			Quantity	Part Number Suffix
APX803-XXSAG-7	SA	SOT23	3000/Tape & Reel	-7
APX803-XXSRG-7	SR	SOT23R	3000/Tape & Reel	-7
APX803D-29SAG-7	SA	SOT23	3000/Tape & Reel	-7
APX803D-29SRG-7	SR	SOT23R	3000/Tape & Reel	-7

Notes: 4. Pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.

Marking Information

(1) SOT23 and SOT23R

(Top View)

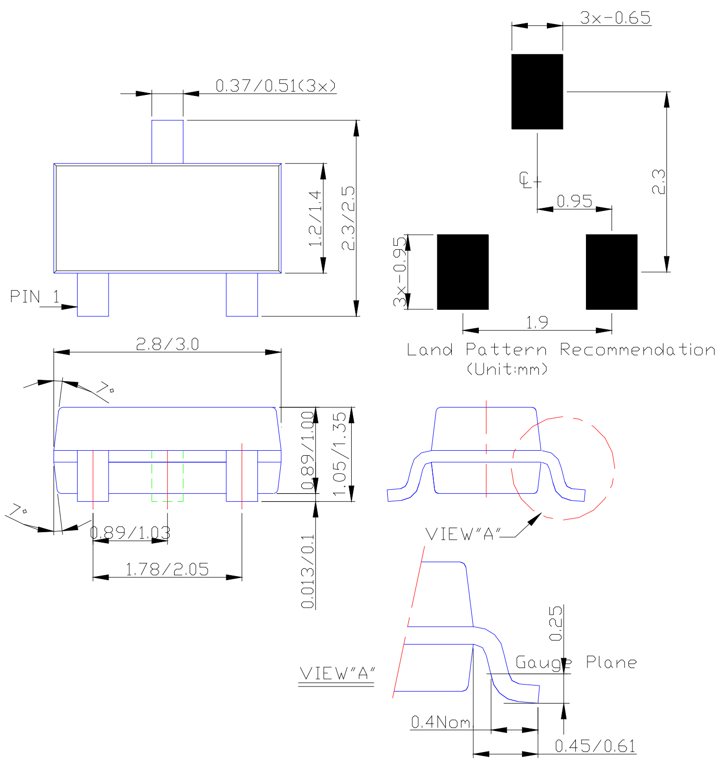


XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Green

Device	Package	Identification Code
APX803-46SA	SOT23	V3
APX803-44SA	SOT23	V4
APX803-40SA	SOT23	V5
APX803-31SA	SOT23	V6
APX803-29SA	SOT23	V7
APX803-26SA	SOT23	V8
APX803-23SA	SOT23	V9
APX803-46SR	SOT23R	S3
APX803-44SR	SOT23R	S4
APX803-40SR	SOT23R	S5
APX803-31SR	SOT23R	S6
APX803-29SR	SOT23R	S7
APX803-26SR	SOT23R	S8
APX803-23SR	SOT23R	S9
APX803D-29SA	SOT23	VN
APX803D-29SR	SOT23R	SN

Package Outline Dimensions (All Dimensions in mm)

(1) Package Type: SOT23 and SOT23R



Notes: 5. Package outline dimensions as shown on Diodes Inc. package outline dimensions document AP02002, which can be found on our website at http://www.diodes.com/datasheets/ap02002.pdf

IMPORTANT NOTICE

LIFE SUPPORT

www.diodes.com