

Description

The APX803/D is used for microprocessor (μ P) supervisory circuits to monitor the power supplies in μ P 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.

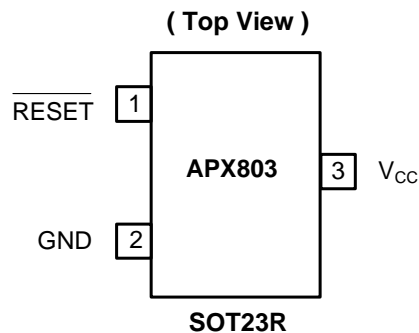
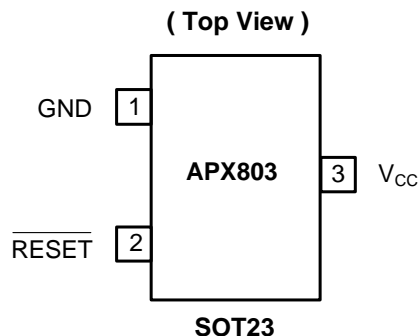
The APX803/D have an open collector active low $\overline{\text{RESET}}$ output and compliment Diodes APX809/10 which have push-pull output stages.. Low supply current makes the APX803/D ideal for use in portable equipment. The APX803/D are available in two pin out variants of the 3-pin SOT23 package.

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)
- 30 μ A Supply Current (Typ.)
- Guaranteed Reset Valid to $V_{CC} = +1V$
- No External Components
- SOT23 and SOT23R: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant (Note 1)

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.

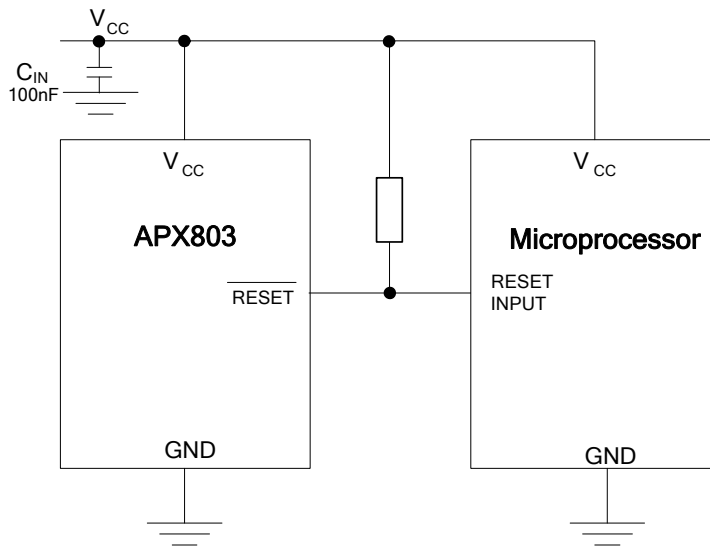
Pin Assignments



Applications

- Computers
- Controllers
- Intelligent Instruments
- Critical μ P and μ C Power Monitoring
- Portable/Battery Powered Equipment

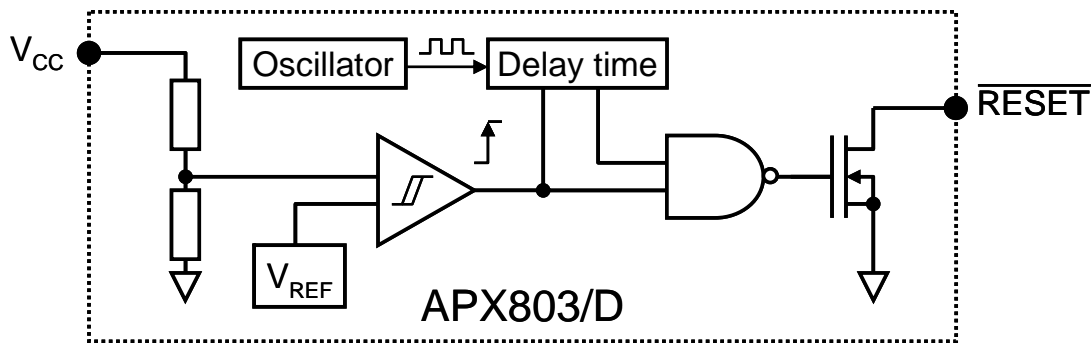
Typical Application Circuit



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{RESET} (open drain)	-0.3 to 6	V
I_{CC}	Input Current, V_{CC}	20	mA
I_o	Output Current, \overline{RESET}	20	mA
P_D	Continuous Power Dissipation ($T_A = +70^\circ\text{C}$), de-rate 4mW/ $^\circ\text{C}$ above +70 $^\circ\text{C}$	400	mW
T_{OP}	Operating Junction Temperature Range	-40 to +105	$^\circ\text{C}$
T_{ST}	Storage Temperature Range	-65 to +150	$^\circ\text{C}$

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{RESET} output voltage	0	5.5	V
T_A	Operating Ambient Temperature Range	-40	85	$^\circ\text{C}$
dV_{CC}/dt	V_{CC} Rate of rise ($V_{CC} = 0 \sim V_T$)		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}	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}	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

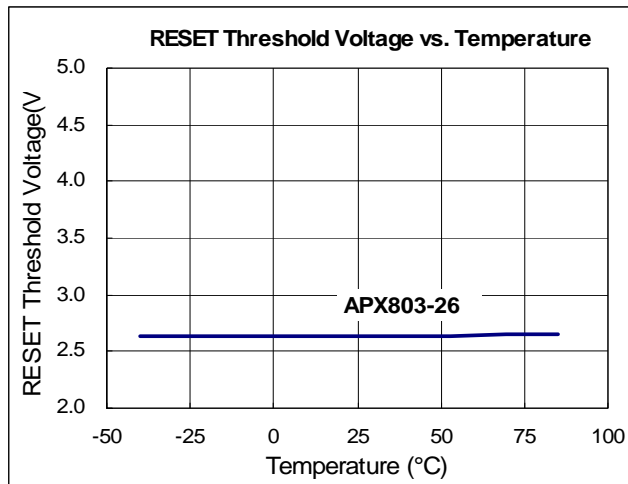


Figure 1

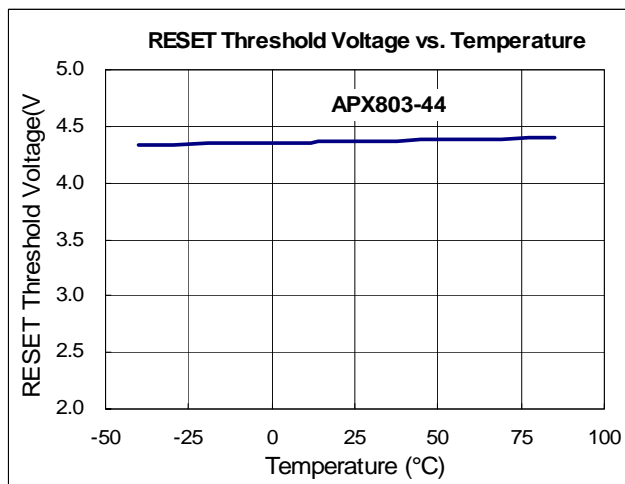


Figure 2

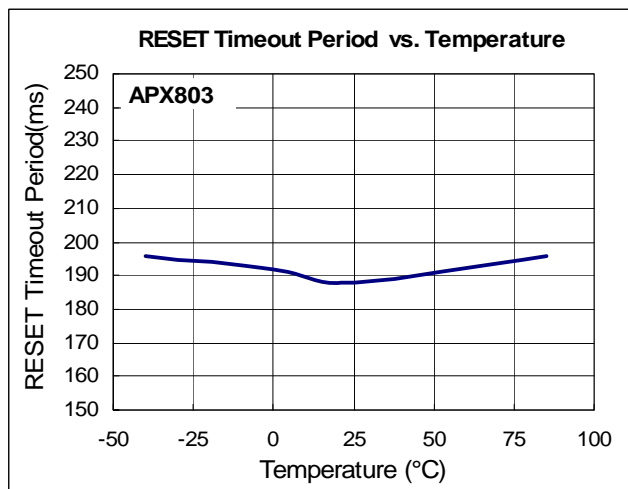


Figure 3

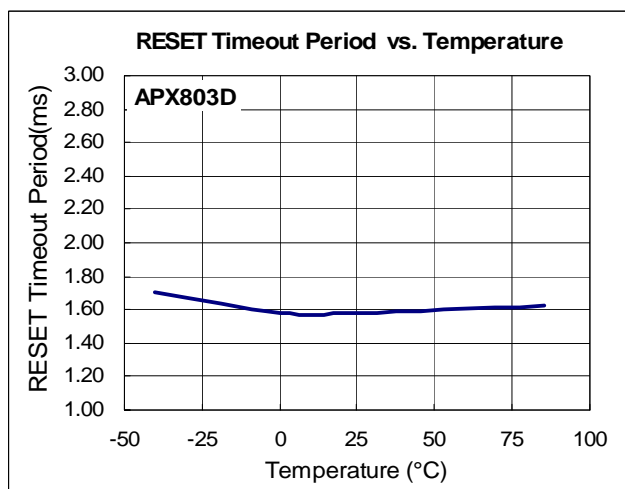


Figure 4

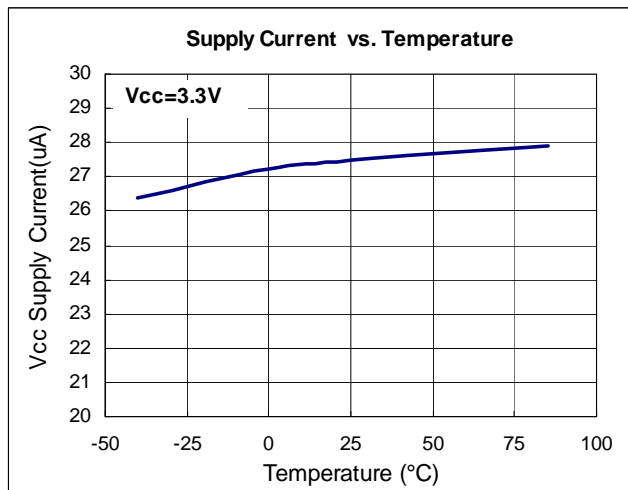


Figure 5

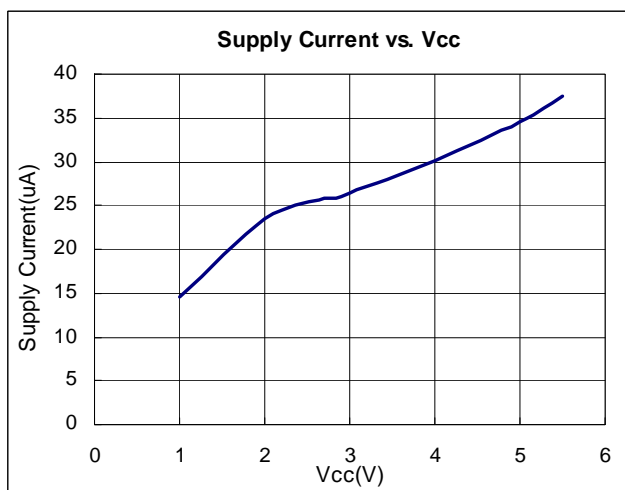


Figure 6

Typical Performance Characteristics (Continued)

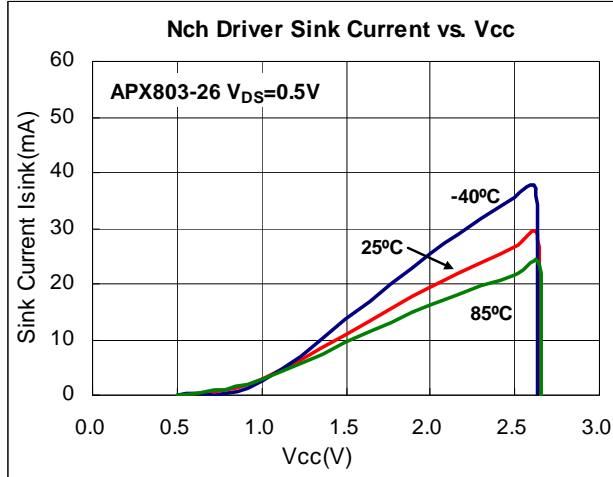


Figure 7

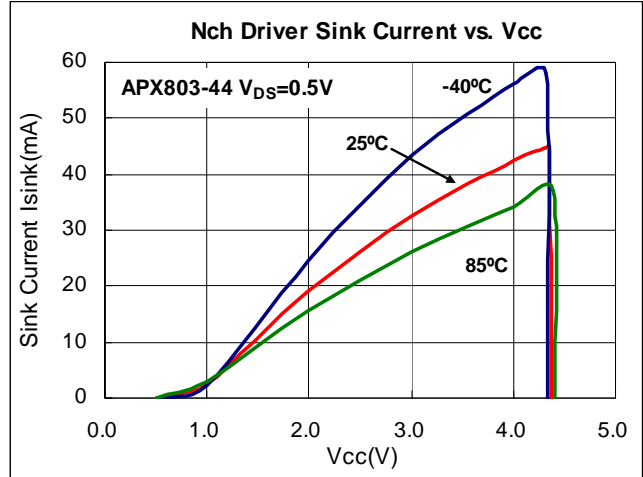


Figure 8

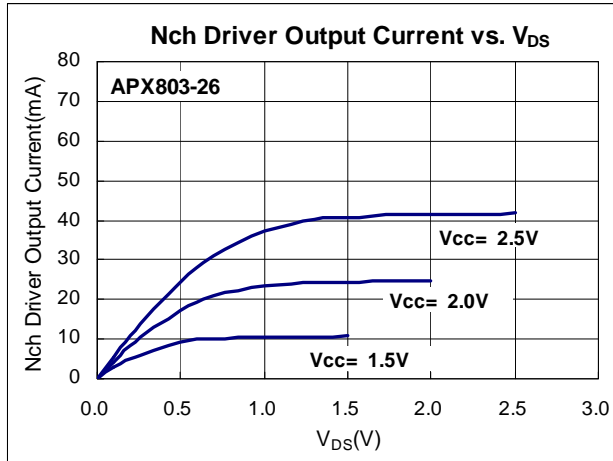


Figure 9

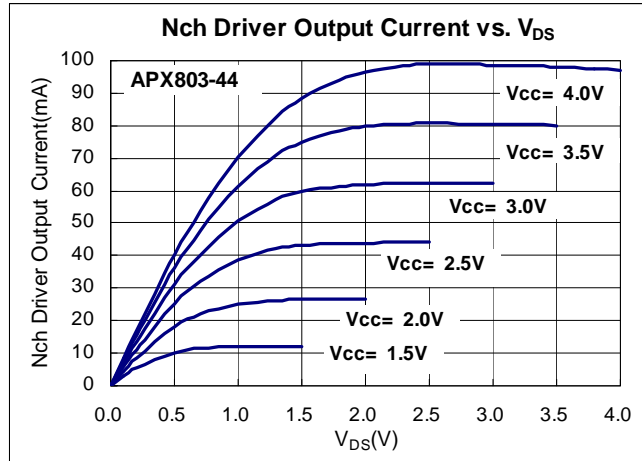
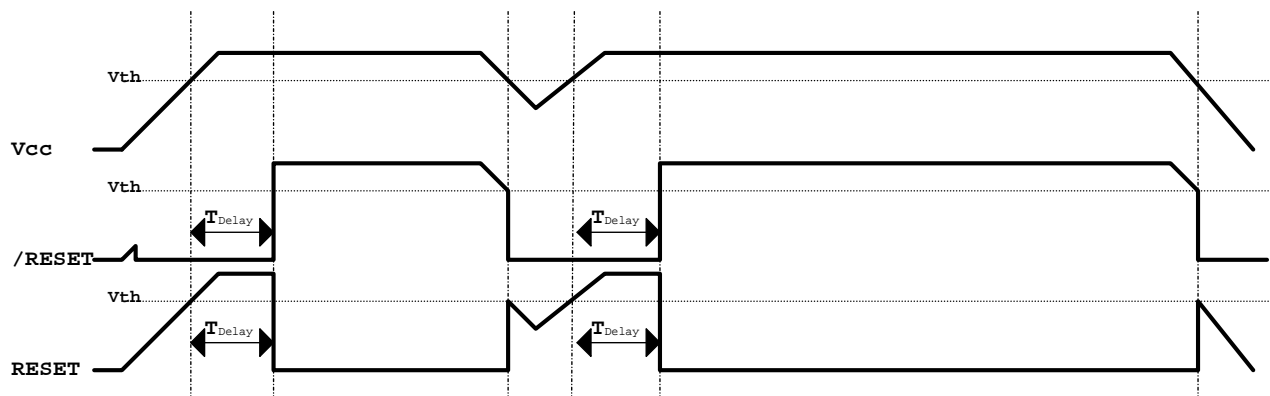


Figure 10

Timing Diagram



Functional Description

Microprocessors (μP s) 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 APX803/D 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{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 APX803/D \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.

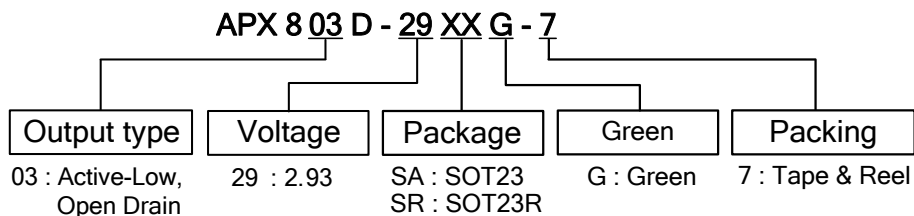
Interfacing to μP with Bidirectional Reset Pins

Since the $RESET$ output on the APX803/D is open drain, this device interfaces easily with $\mu P/\mu C$ 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 $\mu C/\mu P$ reset input.

Ordering Information



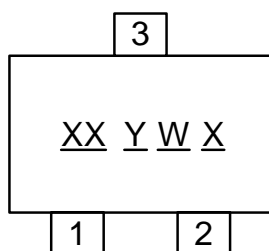
Device	Package Code	Packaging (Note 4)	7" Tape and Reel	
			Quantity	Part Number Suffix
APX803-XXSAG-7	SA	SOT23	3000/Tape & Reel	-7
APX803-XXSRG-7	SR	SOT23R	3000/Tape & Reel	-7
APX803D-29SAG-7	SA	SOT23	3000/Tape & Reel	-7
APX803D-29SRG-7	SR	SOT23R	3000/Tape & Reel	-7

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)

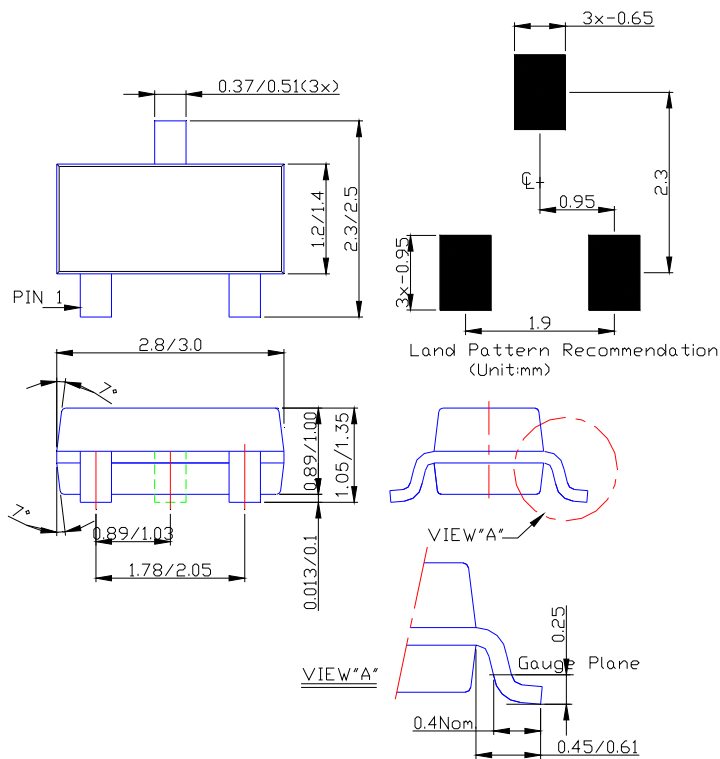


XX : Identification code
Y : Year 0~9
W : Week : A~Z : 1~26 week;
a~z : 27~52 week; z represents
52 and 53 week
X : A~Z : Green

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>

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