Manuals+ — User Manuals Simplified.

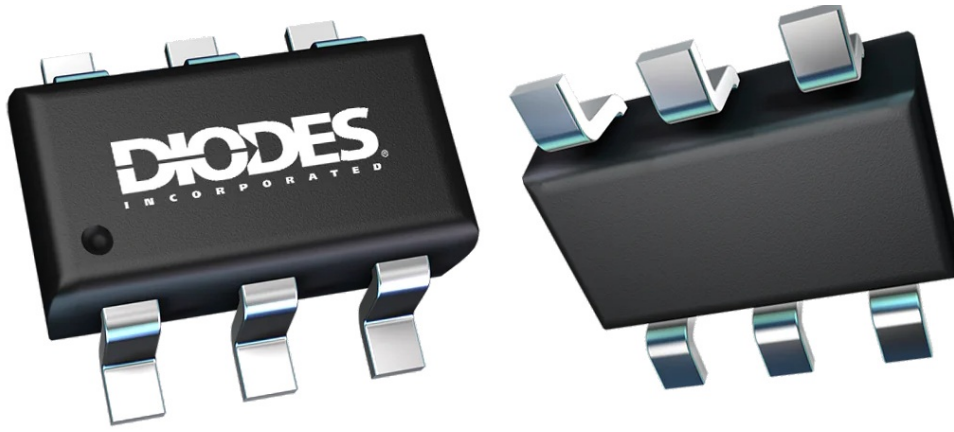# DIDES APX811/812 4-Pin Microprocessor Supervisor User Manual

Contents

SIDES

DIDES APX811/812 4-Pin Microprocessor Supervisor

Features

- Precision Monitor of(2.5V/3.0V/3.3V/5.0V) power supply voltage
- Full specified over temperature
- Manual reset input
- Available in four output configuration
- Push-pull RESET Active low(APX811)
- Push-pull RESET Active high(APX812)
- Power-on reset generator with fixed delay time 200ms
- SOT143: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/RoHS Compliant (Note 1)

General Description

The APX811/812 are used for microprocessor supervisory circuit to monitor the power supplies in These circuit perform a single function: they assert a reset signal whenever the Vcc supply voltage declines below a preset threshold, keeping it asserted for at least 240ms after Vcc has risen above the reset threshold. Reset thresholds suitable for operation with a variety of supply voltages are available. The APX811/812 have push-pull outputs. The APX811 has an active low RESET output, while the APX812 has an active high RESET output.
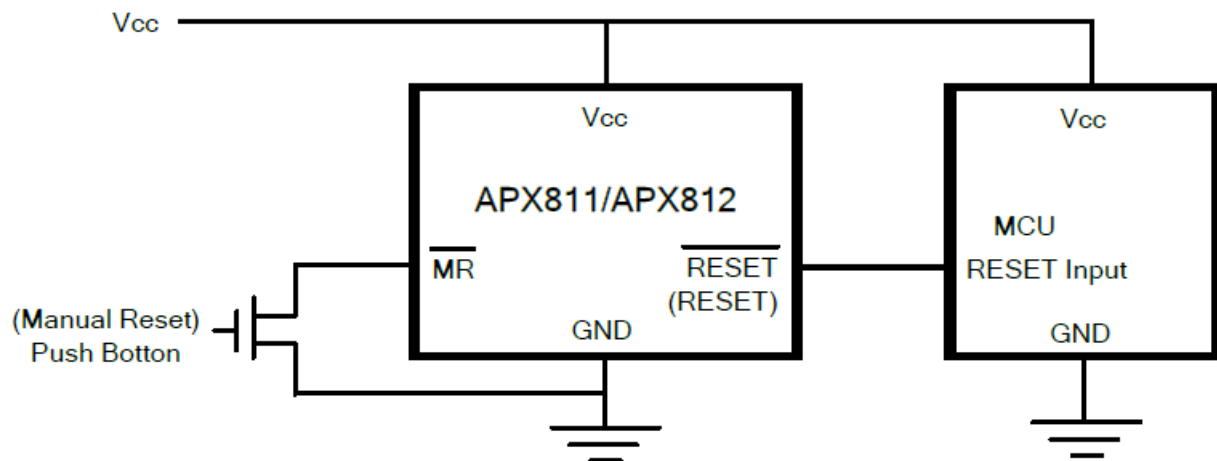
The APX811/812 devices incorporate a manual reset input, MR .
A low level at MR causes RESET to become active.
The APX811/2 are targeted at 2.5V, 3V, 3.3V and 5V powered systems and are available with different threshold voltages to meet the exact needs of the system. They are available in the space saving SOT143 package and operate over the whole industrial temperature range, -40 to 85°C.
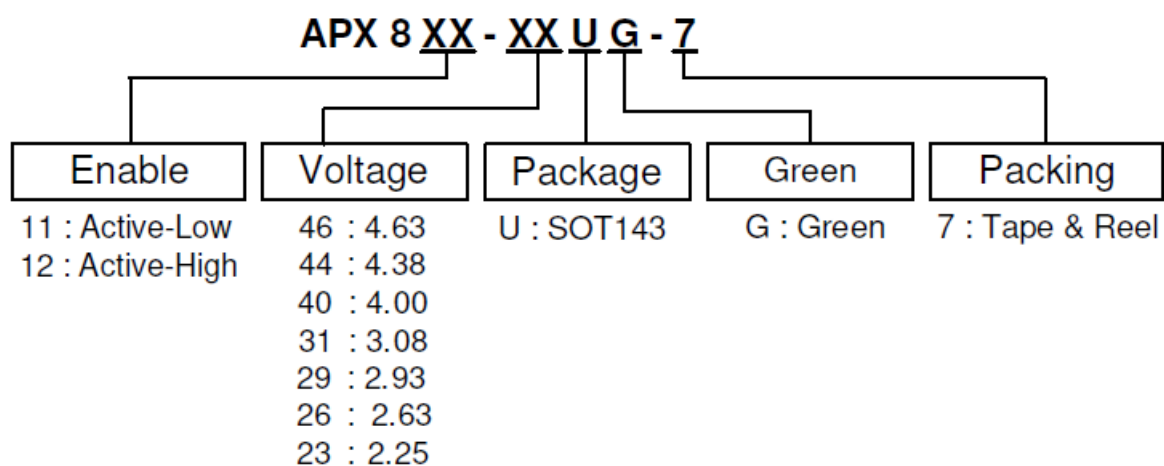
Applications

- Computers
- Controllers
- Intelligent It instruments
- Critical up and UC power Monitoring
- Portable/Battery powered Equipment
- Automotive
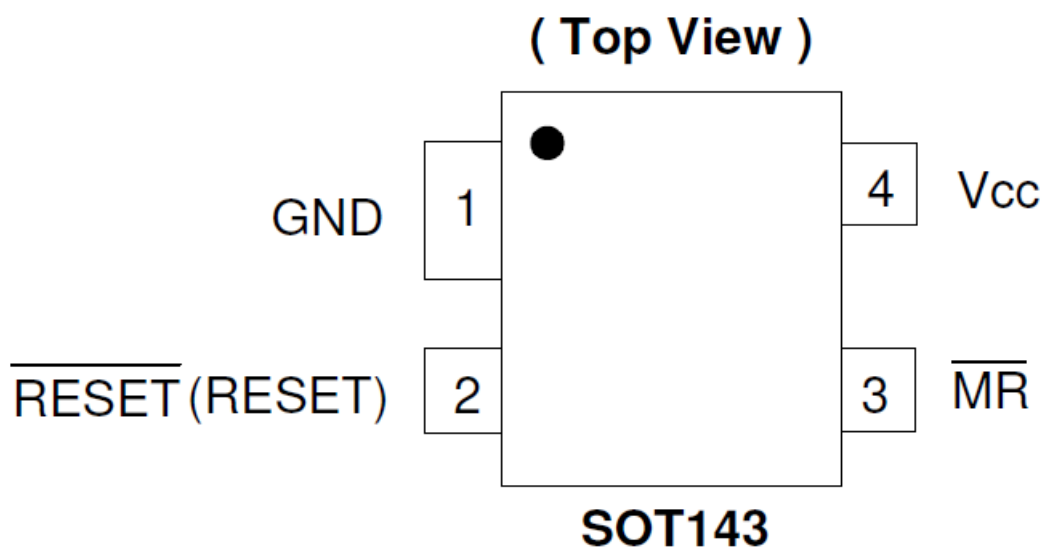
Typical Application Circuit

Ordering Information

Enable	Voltage	Package	Green	Packing
11 : Active-Low 12 : Active-High	46 : 4.63 44 : 4.38 40 : 4.00 31 : 3.08 29 : 2.93 26 : 2.63 23 : 2.25	U : SOT143	G : Green	7 : Tape & Reel

Device	Package Code	Packaging (Note 2)	7" Tape and Reel	
			Quantity	Part Number Suffix
APX811-XXUG-7	U	SOT143	3000/Tape & Reel	-7
APX812-XXUG-7	U	SOT143	3000/Tape & Reel	-7

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.
2. 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.

Pin Assignments

(Top View)

GND 1 | 4 Vcc

$\overline{\text{RESET}}$ (RESET) 2 | 3 $\overline{\text{MR}}$

SOT143

Pin Descriptions

Pin Name	Description
GND	Ground
RESET (RESET)	Reset output Pin L: for APX811 H: for APX812
VCC	Operating Voltage Input
MR	Manual reset (Active Low)

Block Diagram
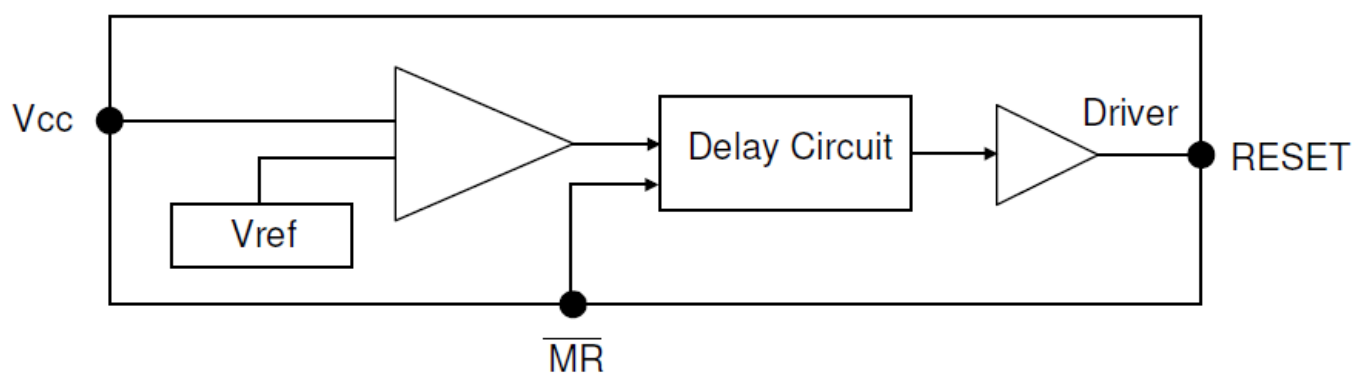
Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
ESD HBM	Human Body Model ESD protection	3	kV
ESD MM	Machine Model ESD Protection	500	V
VCC	Supply voltage	-0.3~7	V
VRESET	RESET	-0.3 to (Vcc+0.3)	V
ICC	Input Current, Vcc	20	mA
I_O	Output current	20	mA
P_D	Power dissipation	320	mW

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
VCC	Supply Voltage	1.1	5.5	V
VIN	Input Voltage	0	$(V_{CC}+0.3)$	V
T_A	Operating Ambient Temperature	-40	85	oC

Electrical Characteristics (TA = 25ºC)

TA= -40 to 85 oC unless otherwise note. Typical values are at TA=+25 oC.

Symbol	Parameter	Test Conditions	Min	Typ.	Max	Unit
VCC	V$_{CC}$ Range		1.0		5.5	V
ICC	Supply Current	Vth + 0.2V		30	40	µA
Vth	Reset threshold	T$_A$ =25 ^{o}C.	2.22	2.25	2.28	V
			2.59	2.63	2.67	V
			2.89	2.93	2.98	V
			3.03	3.08	3.13	V
			3.94	4.00	4.06	V
			4.31	4.38	4.45	V
			4.56	4.63	4.70	V
t$_s$	Set-up Time	V$_{CC}$ = Vth to (Vth − 100mV)		20		µs
VOL	RESET Output Voltage Low (APX811)	V$_{CC}$ = Vth -0.2, I$_{SINK}$ = 1.2mA			0.3	V
		V$_{CC}$ = Vth -0.2, I$_{SINK}$ = 3.2mA			0.4	
		V$_{CC}$ > 1.0V, I$_{SINK}$ = 50uA			0.3	
VOH	RESET Output Voltage-High (APX811)	V$_{CC}$ > Vth +0.2, I$_{SOURCE}$ = 500uA	0.8V$_{CC}$			V
		V$_{CC}$ > Vth +0.2, I$_{SOURCE}$ = 800uA	V$_{CC}$ −1.5			
VOL	RESET Output Voltage-Low (APX812)	V$_{CC}$ = Vth +0.2, I$_{SINK}$ = 1.2mA			0.3	V
		V$_{CC}$ = Vth +0.2, I$_{SINK}$ = 3.2mA			0.4	
VOH	RESET Output Voltage-High (APX812)	1.8V < V$_{CC}$ < Vth -0.2, I$_{SOURCE}$ = 150uA	0.8 V$_{CC}$			V
θJA	Thermal Resistance Junction-to-Ambient	SOT143 (Note 3)		240		^{o}C/W
θJC	Thermal Resistance Junction-to-Case	SOT143 (Note 3)		71		^{o}C/W

Notes: 3. Test condition for SOT143: Device mounted on FR-4 substrate, 1″*1″, 2oz, copper, single-sided, PC boards.
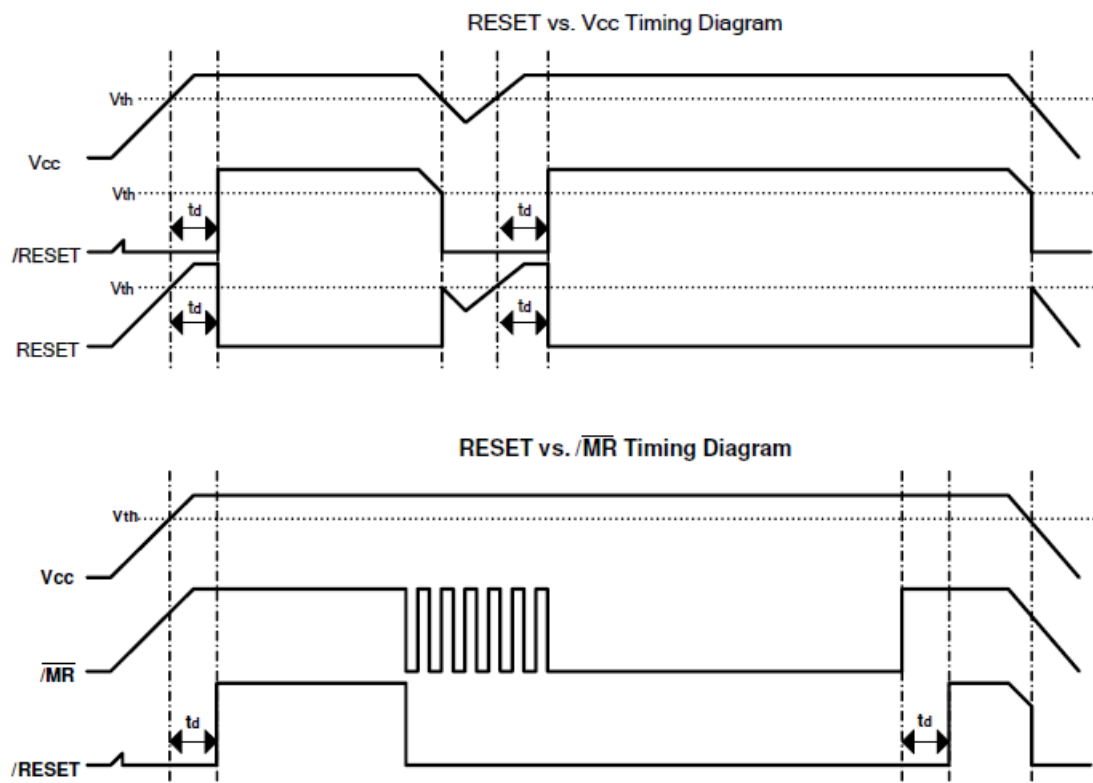
Timing requirements (TA=25oC)

Symbol	Parameter		Test Conditions	Min	Typ.	Max	Unit
t$_W$	Pulse Width	at MR	V$_{CC}$> Vth-+0.2V, V$_{IL}$=0.3 ´V$_{CC}$, V$_{IH}$=0.7 ´V$_{CC}$	100	–	–	ns

Switching Characteristics (TA=25oC)

Symbol	Parameter		Test Conditions	Min	Typ.	Max	Unit
t_d	Delay Time	APX811/812	V_{CC}> Vth-+0.2V, See timing diagram	140	200	280	ms
tPHL	Propagation (Delay) Time, High-to-low-level Output	MR to RESET delay (APX811/812)	V_{CC}> Vth-+0.2V, V_{IL}=0.3 ´V_{CC}, V_{IH}=0.7 ´V_{CC}	–	–	0.1	µs
		V_{CC} to RESET delay	V_{IL}= Vth–0.2V, V_{IH}= Vth-+0.2V	–	–	25	µs
tPLH	Propagation (Delay) Time, Low-to-high-level Output	MR to RESET delay (APX811/812)	V_{CC}> Vth-+0.2V, V_{IL}=0.3 ´V_{CC}, V_{IH}=0.7 ´V_{CC}	–	–	0.1	µs
		V_{CC} to RESET delay (APX811/812)	V_{IL}= Vth–0.2V, V_{IH}= Vth-+0.2V	–	–	25	µs

Timing Diagram

RESET vs. Vcc Timing Diagram

RESET vs. /MR Timing Diagram

Typical Performance Characteristics

RESET Timeout Period vs. Temperature

RESET Threshold Voltage vs. Temperature

Vcc Supply Current vs. Temperature
(Vcc=3.3V   Vth=2.93V)

Supply Curreny vs. Vcc
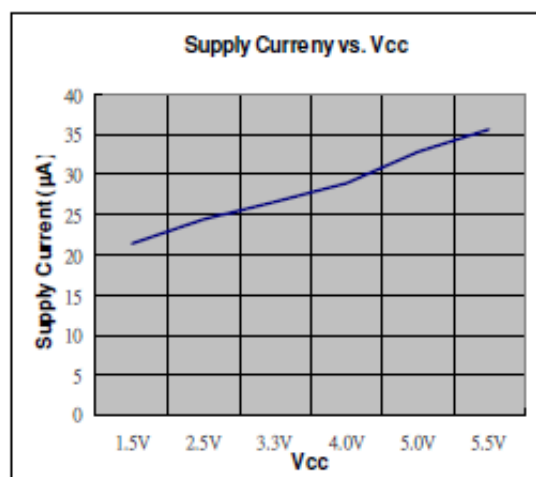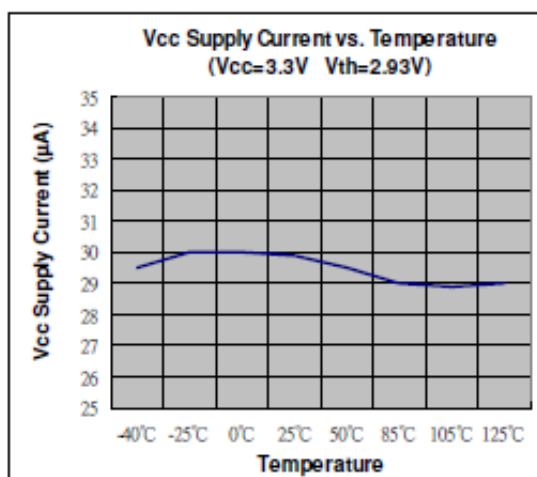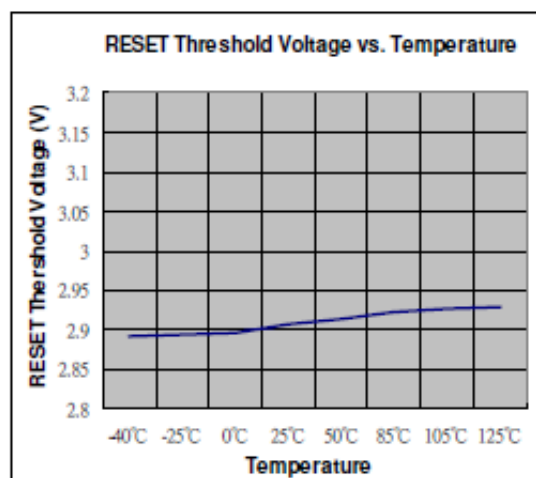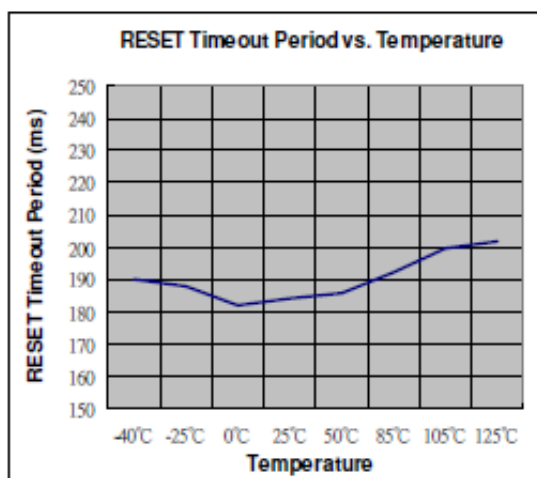
Application Information

A microprocessor's (μP's) reset input starts the μP in a known state. The APX811/812 asserts reset to prevent code-execution errors during power-up, power-down, or brownout conditions. They assert a reset signal whenever the VCC supply voltage declines below a preset threshold or the MR pin is brought low, keeping it asserted for at least 240ms after VCC has risen above the reset threshold. The APX811/812 have a push-pull output stage. The APX811/812 reset output is guaranteed to be logic low for the APX811 and high the APX812 for VCC > 1V. Once VCC exceeds the reset threshold, an internal timer keeps RESET output low (and RESET high for the APX812) for the reset timeout period. After this interval, the APX811's RESET output goes high (APX812's RESET output goes low). If a brownout condition occurs (VCC dips below the reset threshold), the APX811's RESET output goes low (APX812's RESET output goes high). Any time VCC goes below the reset threshold, the internal timer resets to zero, and RESET goes low (RESET goes high). The internal timer starts after VCC returns above the reset threshold, and RESET remains low (RESET remains high) for the reset timeout period.

Ensuring a Valid Reset Output Down to VCC = 0
When VCC falls below 1V, the APX811 RESET no longer sinks current—— it becomes an open circuit. Therefore, high-impedance CMOS logic inputs connected to RESET can drift to undetermined voltages. This presents no problem in most applications since most
μP and other circuitry is inoperative with VCC below 1V. However, in applications where RESET must be valid down to 0V, adding a pull down resistor to RESET causes any stray leakage currents to flow to ground, holding RESET low. R1's value is not critical; 100k is
large enough not to load RESET and small enough to pull RESET to ground.
For the APX812 if RESET is required to remain valid for VCC < 1V then a 100kΩ pull-up resistor between RESET and VCC is recommended.

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.
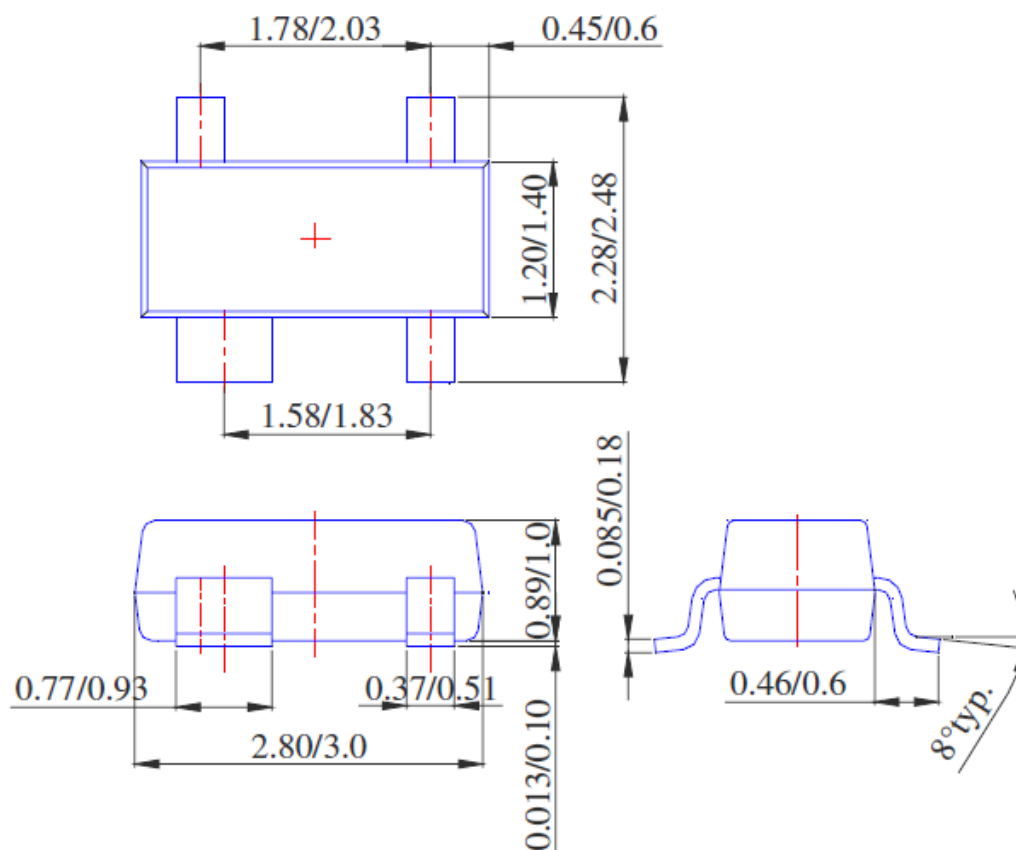
Marking Information

(1) SOT143

(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
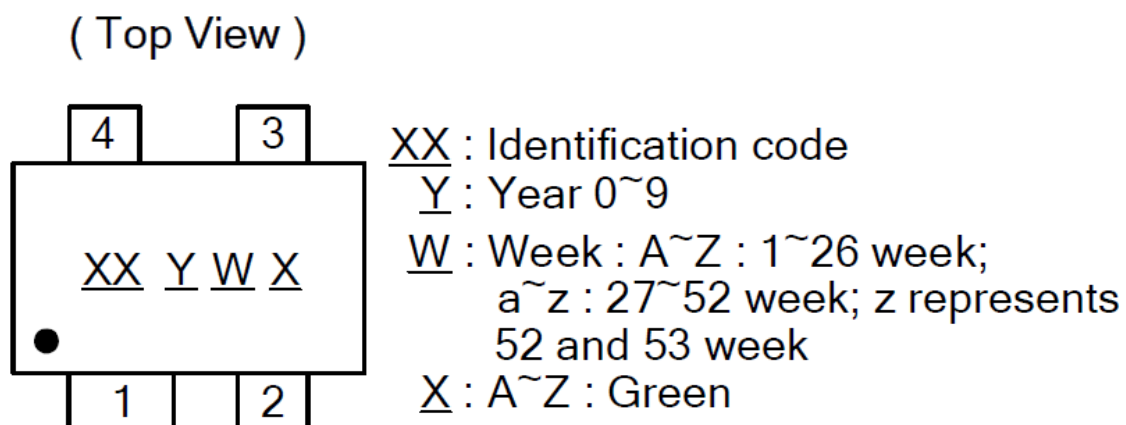
Device	Package	Identification Code
APX811-46U	SOT143	C2
APX811-44U	SOT143	C3
APX811-40U	SOT143	C4
APX811-31U	SOT143	C5
APX811-29U	SOT143	C6
APX811-26U	SOT143	C7
APX811-23U	SOT143	C8
APX812-46U	SOT143	C9
APX812-44U	SOT143	CA
APX812-40U	SOT143	CB
APX812-31U	SOT143	CC
APX812-29U	SOT143	CD
APX812-26U	SOT143	CE
APX812-23U	SOT143	CF

Package Information (All Dimensions in mm)

(1) Package Type: SOT143

APX811/812 Rev. 2
DS31960
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Documents / Resources
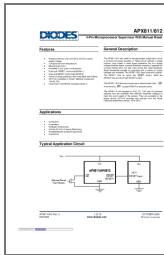
DIDES APX811/812 4-Pin Microprocessor Supervisor [pdf] User Manual
APX811 812 4-Pin Microprocessor Supervisor, APX811, APX812, APX811 4-Pin Microprocessor Supervisor, APX812 4-Pin Microprocessor Supervisor, 4-Pin Microprocessor Supervisor, 4-Pin Supervisor, Microprocessor Supervisor, Supervisor

References

- **Diodes Incorporated - Analog, Discrete, Logic, Mixed-Signal**