

HSMP-4810

Low inductance PIN attenuator diode

Description



Lifecycle status: **Active**



Features

The HSMP-481x family of PIN diodes offer a low inductance solution for low distortion attenuators. $C_t=0.35\text{pF}$, $R_s@100\text{mA}=2.5\text{Ohms}$, $\tau=1800\text{nSec}$, $F_c=88\text{kHz}$ $L<1\text{nH}$ from 500MHz to 3GHz

HSMP-381x, 481x

Surface Mount RF PIN

Low Distortion Attenuator Diodes



Data Sheet

Description/Applications

The HSMP-381x series is specifically designed for low distortion attenuator applications. The HSMP-481x products feature ultra low parasitic inductance in the SOT-23 and SOT-323 packages. They are specifically designed for use at frequencies which are much higher than the upper limit for conventional diodes.

A SPICE model is not available for PIN diodes as SPICE does not provide for a key PIN diode characteristic, carrier lifetime.

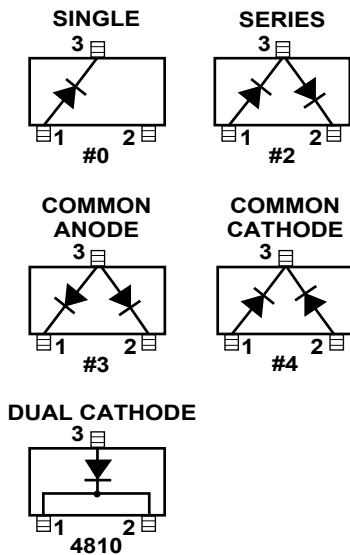
Features

- Diodes Optimized for:
 - Low Distortion Attenuating
 - Microwave Frequency Operation
- Surface Mount Packages
 - Single and Dual Versions
 - Tape and Reel Options Available
- Low Failure in Time (FIT) Rate^[1]

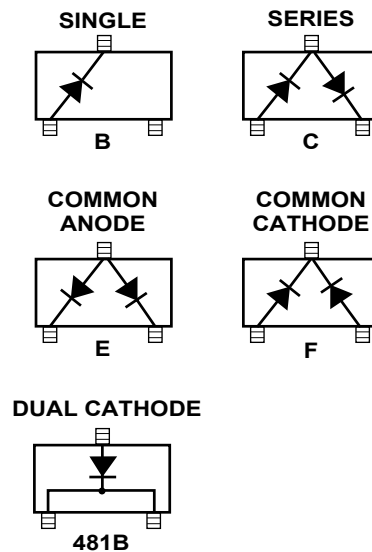
Note:

1. For more information see the Surface Mount PIN Reliability Data Sheet.

Package Lead Code Identification, SOT-23 (Top View)



Package Lead Code Identification, SOT-323 (Top View)



Absolute Maximum Ratings^[1] $T_c = +25^\circ\text{C}$

Symbol	Parameter	Unit	SOT-23	SOT-323
I_f	Forward Current (1 μs Pulse)	Amp	1	1
P_{IV}	Peak Inverse Voltage	V	Same as V_{BR}	Same as V_{BR}
T_j	Junction Temperature	$^\circ\text{C}$	150	150
T_{stg}	Storage Temperature	$^\circ\text{C}$	-65 to 150	-65 to 150
θ_{jc}	Thermal Resistance ^[2]	$^\circ\text{C}/\text{W}$	500	150

Notes:

1. Operation in excess of any one of these conditions may result in permanent damage to the device.
2. $T_c = +25^\circ\text{C}$, where T_c is defined to be the temperature at the package pins where contact is made to the circuit board.

Electrical Specifications $T_c = +25^\circ\text{C}$ (Each Diode)

Conventional Diodes

Part Number HSMP-	Package Marking Code	Lead Code	Configuration	Minimum Breakdown Voltage V_{BR} (V)	Maximum Total Capacitance C_T (pF)	Minimum Resistance at $I_F = 0.01\text{mA}$, R_H (Ω)	Maximum Resistance at $I_F = 20\text{mA}$, R_L (Ω)	Maximum Resistance at $I_F = 100\text{mA}$, R_T (Ω)	Resistance at $I_F = 1\text{mA}$, R_M (Ω)
3810	E0	0	Single	100	0.35	1500	10	3.0	48 to 70
3812	E2	2	Series						
3813	E3	3	Common Anode						
3814	E4	4	Common Cathode						
381B	E0	B	Single						
381C	E2	C	Series						
381E	E3	E	Common Anode						
381F	E4	F	Common Cathode						
Test Conditions				$V_R = V_{BR}$ Measure $I_R \leq 10\mu\text{A}$	$V_R = 50\text{V}$ $f = 1\text{MHz}$	$I_F = 0.01\text{mA}$ $f = 100\text{MHz}$	$I_F = 20\text{mA}$ $f = 100\text{MHz}$	$I_F = 100\text{mA}$ $f = 100\text{MHz}$	$I_F = 1\text{mA}$ $f = 100\text{MHz}$

High Frequency (Low Inductance, 500 MHz – 3 GHz) PIN Diodes

Part Number HSMP-	Package Marking Code	Lead Code	Configuration	Minimum Breakdown Voltage V_{BR} (V)	Maximum Series Resistance R_S (Ω)	Series Resistance $I_F = 1\text{mA}$, R_M (Ω)	Typical Total Capacitance C_T (pF)	Maximum Total Capacitance C_T (pF)	Typical Total Inductance L_T (nH)
4810	EB	B	Dual Cathode	100	3	48 - 70	0.35	0.4	1
481B	EB	B	Dual Cathode						
Test Conditions				$V_R = V_{BR}$ Measure $I_R \leq 10\mu\text{A}$	$I_F = 100\text{mA}$ $f = 100\text{MHz}$	$I_F = 1\text{mA}$ $f = 100\text{MHz}$	$V_R = 50\text{V}$ $f = 1\text{MHz}$	$V_R = 50\text{V}$ $f = 1\text{MHz}$	$f = 500\text{MHz}$ - 3GHz

Assembly Information

SOT-323 PCB Footprint

A recommended PCB pad layout for the miniature SOT-323 (SC-70) package is shown in Figure 12 (dimensions are in inches). This layout provides ample allowance for package placement by automated assembly equipment without adding parasitics that could impair the performance.

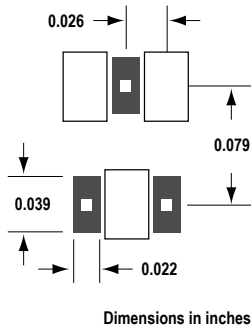


Figure 12. Recommended PCB Pad Layout for Avago's SC70 3L/SOT-323 Products.

SOT-23 PCB Footprint

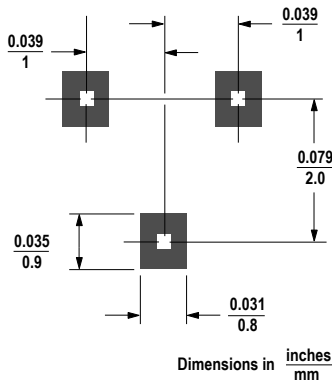


Figure 13. Recommended PCB Pad Layout for Avago's SOT-23 Products.

SMT Assembly

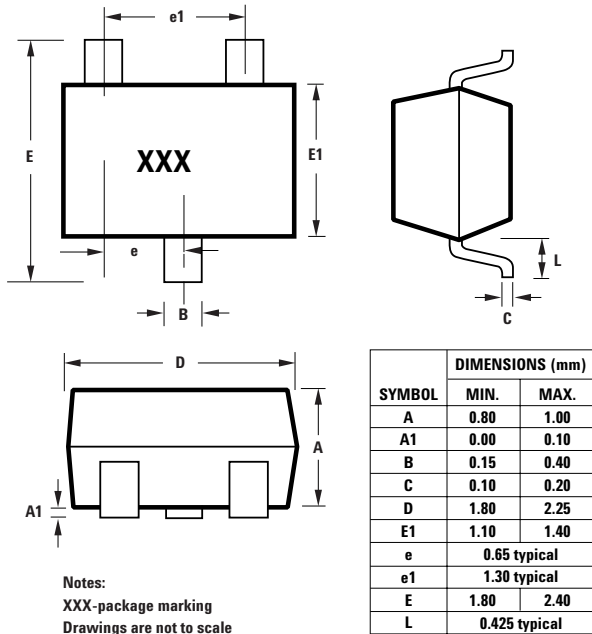
Reliable assembly of surface mount components is a complex process that involves many material, process, and equipment factors, including: method of heating (e.g., IR or vapor phase reflow, wave soldering, etc.) circuit board material, conductor thickness and pattern, type of solder alloy, and the thermal conductivity and thermal mass of components. Components with a low mass, such as the SOT-323/-23 package, will reach solder reflow temperatures faster than those with a greater mass.

After ramping up from room temperature, the circuit board with components attached to it (held in place with solder paste) passes through one or more preheat zones. The preheat zones increase the temperature of the board and components to prevent thermal shock and begin evaporating solvents from the solder paste. The reflow zone briefly elevates the temperature sufficiently to produce a reflow of the solder.

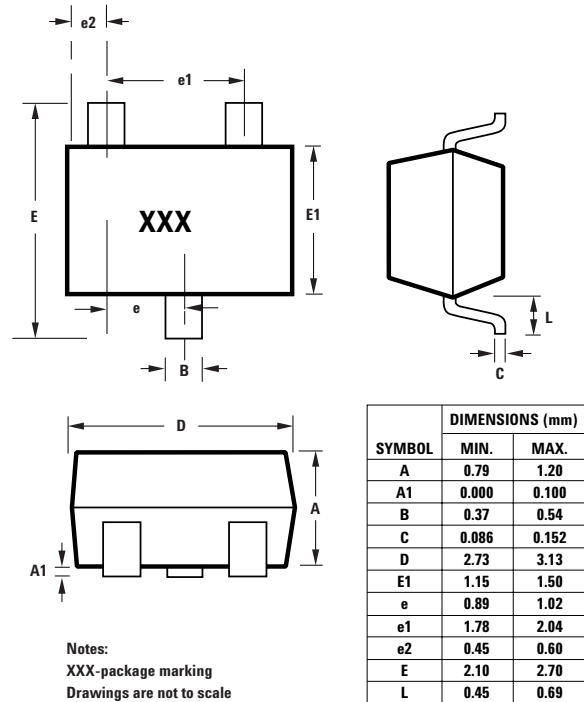
The rates of change of temperature for the ramp-up and cool-down zones are chosen to be low enough to not cause deformation of the board or damage to components due to thermal shock. The maximum temperature in the reflow zone (T_{MAX}) should not exceed 260°C.

These parameters are typical for a surface mount assembly process for Avago diodes. As a general guideline, the circuit board and components should be exposed only to the minimum temperatures and times necessary to achieve a uniform reflow of solder.

Package Dimensions Outline SOT-323 (SC-70)



Outline 23 (SOT-23)

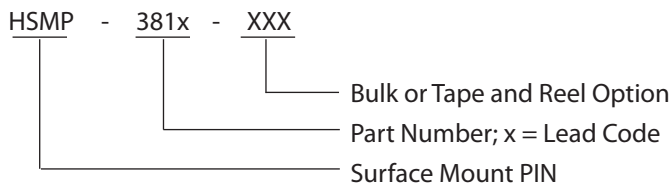


Package Characteristics

Lead Material Copper (SOT-323); Alloy 42 (SOT-23)
 Lead Finish Tin 100% (Lead-free option)
 Maximum Soldering Temperature 260°C for 5 seconds
 Minimum Lead Strength 2 pounds pull
 Typical Package Inductance 2 nH
 Typical Package Capacitance 0.08 pF (opposite leads)

Ordering Information

Specify part number followed by option. For example:



Option Descriptions

- BLKG = Bulk, 100 pcs. per antistatic bag
- TR1G = Tape and Reel, 3000 devices per 7" reel
- TR2G = Tape and Reel, 10,000 devices per 13" reel

Tape and Reeling conforms to Electronic Industries RS-481, "Taping of Surface Mounted Components for Automated Placement."