DATA SHEET

PIN Diode Chips Supplied on Film Frame

Applications

- Switches
- Attenuators

Features

- Preferred device for module applications
- PIN diodes supplied are 100% tested, saw cut, and mounted on film frame
- Low cost

Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04–0074.

Description

The PIN diodes that comprise this family of diodes supplied on film frames are designed for high-volume applications from 10 MHz to over 3 GHz. This family contains three groups of PIN diodes:

1. Low-capacitance, low-resistance PIN diodes designed primarily for RF switching applications:
   - SMP1320-099
   - SMP1321-099
   - SMP1322-099
   - SMP1340-099
2. PIN diodes with mid-range I-layers and resistance designed for either RF switching or attenuator applications:
   - SMP1302-099
   - SMP1331-099
   - SMP1353-099
3. PIN diodes with thick I-layers designed for low-distortion RF variable attenuator applications:
   - SMP1304-099
   - SMP1307-099

These PIN diodes are provided as 100 percent tested, diced wafers mounted on film frames for optimal compatibility with high-volume pick-and-place assembly techniques.

Absolute maximum ratings are provided in Table 1. Electrical specifications are provided in Table 2. Chip dimensions are shown in Table 3. Typical performance characteristics are illustrated in Figures 1 through 5. Figure 6 describes the wafer film frame.

Table 1. PIN Diode Chips Absolute Maximum Ratings[1]

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	V_R		Voltage rating	V
Maximum junction temperature	T_J		+175	°C
Operating temperature	T_{OP}	–65	+150	°C
Storage temperature	T_{STG}	–65	+150	°C
Electrostatic discharge: Human Body Model (HBM), Class 1C	ESD		1000	V

[1] Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value.

***ESD HANDLING**: Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

Table 2. PIN Diode Chips Electrical Specifications[1]
(T_{OP} = 25 °C)

Part Number	I Region (μm) Nominal	Voltage Rating (V)	C_J (pF) V_R = 30 V, f = 1 MHz	Typ V_F (mV) @ I_F = 10 mA	Max R_S (Ω) I_F = 1 mA, f = 100 MHz	Max R_S (Ω) I_F = 10 mA, f = 100 MHz	Typ T_L (ns) I_F = 10 mA	Application
SMP1302-099	50	200	0.12 typ 0.15 max	800	13.5 min 17 typ 21.5 max	3	700	Switch and attenuator
SMP1304-099	100	200	0.07 typ 0.15 max	800	30 min 37 typ 50 max	7	1000	Attenuator
SMP1307-099	175	200	0.08 typ 0.20 max	850	60 min 75 typ 100 max	15	1500	Attenuator
SMP1320-099	7	50	0.12 typ 0.175 max	850	2 typ	0.9	400	Switch
SMP1321-099	12	100	0.07 typ 0.15 max	860	3 typ	2.0	400	Switch
SMP1322-099	7	50	0.66 typ 0.85 max	825	1.5	0.45 typ	400	Switch
SMP1331-099	30	200	0.13 typ 0.16 max	800	14.5	1.7 typ	600	Switch and attenuator
SMP1340-099	5	50	0.10 typ @ 10 V 0.15 max @ 10 V	880	1.7 typ	1.2	100	Switch
SMP1353-099	50	200	0.08 typ@ 20 V 0.13 max @ 20 V	850	15	2.8	2000	Switch and attenuator

[1] Performance is guaranteed only under the conditions listed in this table.
Reverse current is specified @ 10 μA maximum at the voltage rating. This voltage should not be exceeded.
The PIN diodes listed here are processed on 100 mm silicon wafers, 100% DC tested, saw cut, and shipped on 6-inch film frame hoops.
Electrical rejects are identified with black ink on the film frame.
Attenuators are 100% series resistance tested @ 1 mA/100 MHz.

Table 3. PIN Diode Chip Dimensions

Part Number	Quantity of Good Diodes Per Wafer		Chip Size (In)	Chip Height (In)	Anode Contact (In)
	Minimum	Nominal			
SMP1302-099	40000	46000	0.0135 ± 0.001	0.005 ± 0.001	0.0085 ± 0.0005
SMP1304-099	40000	46000	0.0135 ± 0.001	0.009 ± 0.001	0.0085 ± 0.0005
SMP1307-099	20000	25000	0.0185 ± 0.001	0.009 ± 0.001	0.0110 ± 0.0005
SMP1320-099	40000	46000	0.0135 ± 0.001	0.005 ± 0.001	0.0030 ± 0.0003
SMP1321-099	40000	46000	0.0135 ± 0.001	0.005 ± 0.001	0.0030 ± 0.0003
SMP1322-099	40000	46000	0.0135 ± 0.001	0.005 ± 0.001	0.0075 ± 0.0005
SMP1331-099	40000	46000	0.0135 ± 0.001	0.005 ± 0.001	0.0075 ± 0.0005
SMP1340-099	65000	72000	0.0105 ± 0.001	0.005 ± 0.001	0.0029 ± 0.0003
SMP1353-099	65000	72000	0.0105 ± 0.001	0.005 ± 0.001	0.0070 ± 0.0005

Typical Performance Characteristics
(T_{OP} = 25 °C)

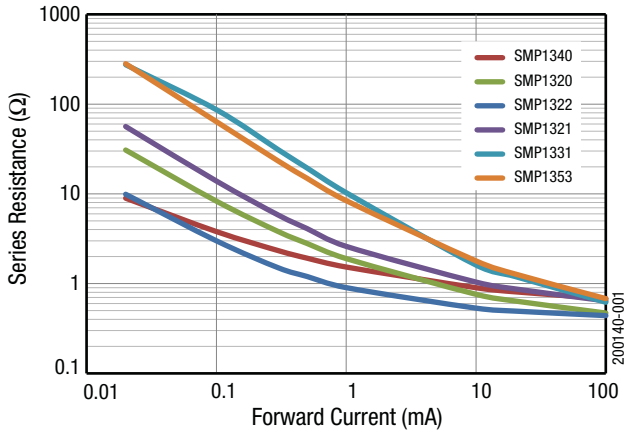


Figure 1. Series Resistance vs Forward Current @ 1 MHz

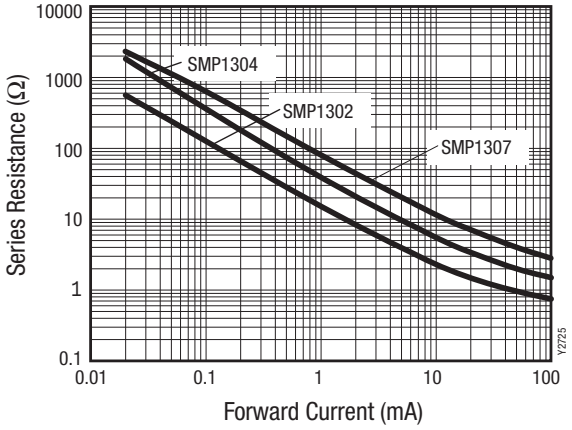


Figure 2. Series Resistance vs Forward Current @ 100 MHz

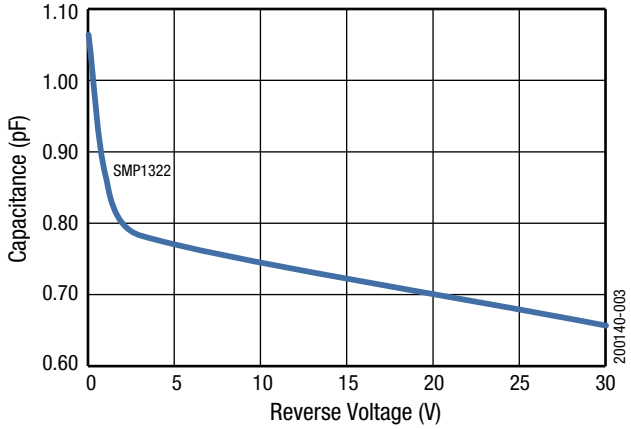


Figure 3. Capacitance vs Reverse Voltage @ 1 MHz

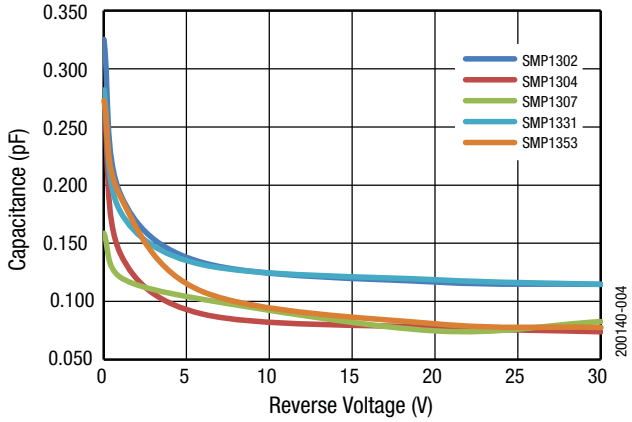


Figure 4. Capacitance vs Reverse Voltage @ 1 MHz

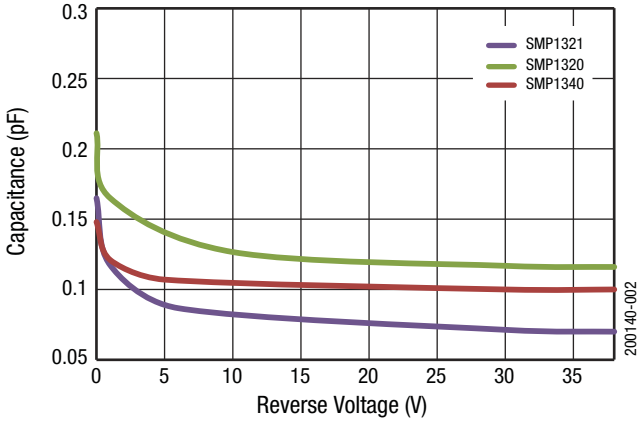
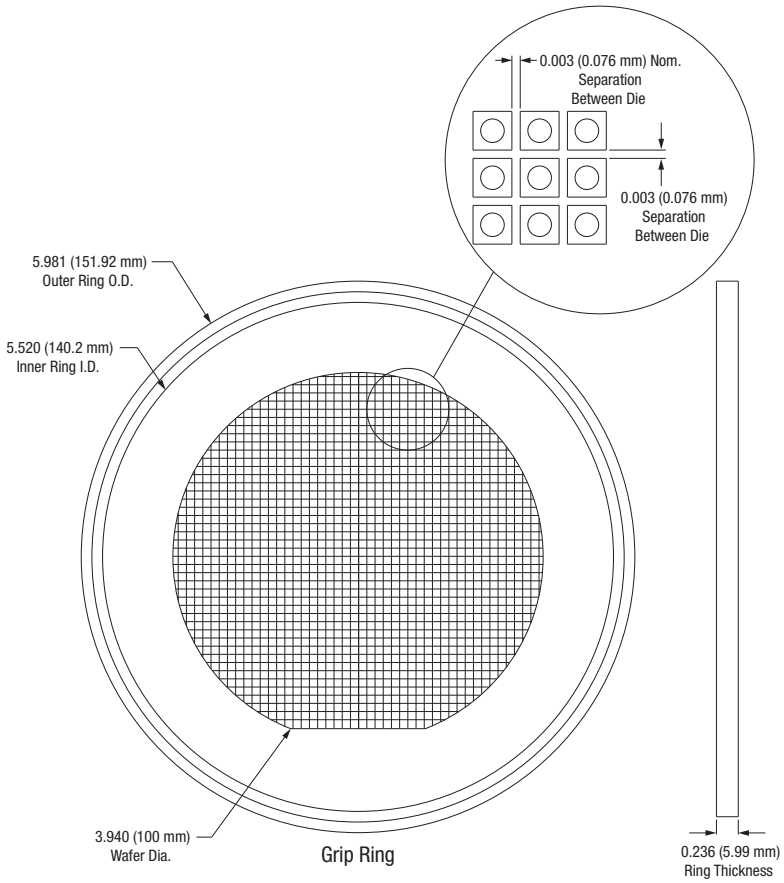


Figure 5. Capacitance vs Reverse Voltage @ 1 MHz



- Wafer on nitto tape
- Color: light blue
- Thickness: 2.2 to 3.0 mils
- Tensile strength: 6.6 lbs (in width)
- Ring material: plastic

Figure 6. Wafer Film Frame Description