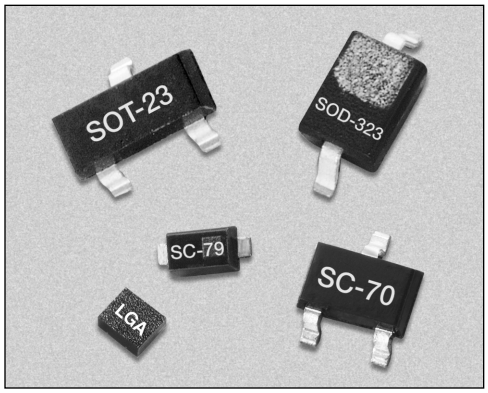
# Fast Switching Speed, Low Capacitance Plastic Packaged PIN Diodes

SKYWORKS

## SMP1340 Series

## Features

- Designed for Fast Speed Wireless Switch Applications
- 1.0 Ω Resistance, 0.3 pF Capacitance
- Available Lead (Pb)-Free MSL-1 @ 250°C per JEDEC J-STD-020
- Available in Tape and Reel Packaging




## Description

The SMP1340 series of plastic packaged, surface mountable PIN diodes are designed for high volume switch applications from 10 MHz to beyond 2 GHz. The short carrier lifetime of typically 100 nS, combined with its thin I region width of nominally 7 μm, results in a fast speed RF switching PIN diode. The RF performance of the SMP1340 series is assured by virtue of its low capacitance (0.3 pF) and low resistance (1.0 Ω at 10 mA).

The SMP1340-508 has been specifically designed for WLAN 802.11 a, b, and g applications.

**NEW** Lead (Pb)-Free "environmentally friendly" packaging available: Skyworks offers the SMP1340-079LF and SMP1340-508 Lead (Pb)-Free package as a green alternative.

## Absolute Maximum Ratings

| Characteristic | Value |
|---|---|
| Reverse Voltage ($V_R$) | 50 V |
| Power Dissipation @ 25°C Lead Temperature ($P_D$) | 250 mW |
| Storage Temperature ($T_{ST}$) | -65°C to +150°C |
| Operating Temperature ($T_{OP}$) | -65°C to +150°C |
| ESD Human Body Model | Class 1B |

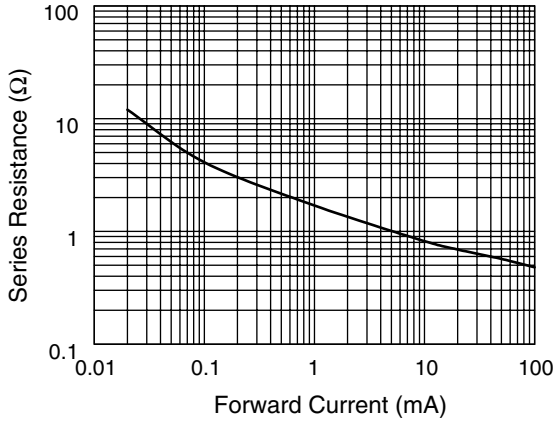
|  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| Single | Common Anode | Common Cathode | Series Pair | Single | Common Cathode | Single | Anti-Parallel |
| Marking: PS1 | Marking: PS9 | Marking: PS3 | Marking: PS2 | | Marking: PS3 | | Marking: X |
| SOT-23 | SOT-23 | SOT-23 | SOT-23 | SOD-323 | SC-70 | SC-79 | LGA |
| **SMP1340-001** | **SMP1340-003** | **SMP1340-004** | **SMP1340-005** | **SMP1340-011** | **SMP1340-074** | **SMP1340-079** | **SMP1340-508** |
| | | | | | | **SMP1340-079LF** | |
| $L_S$ = 1.5 nH | $L_S$ = 1.5 nH | $L_S$ = 1.5 nH | $L_S$ = 1.5 nH | $L_S$ = 1.5 nH | $L_S$ = 1.4 nH | $L_S$ = 0.7 nH | $L_S$ = 0.6 nH |

LF denotes Lead (Pb)-Free packaging.

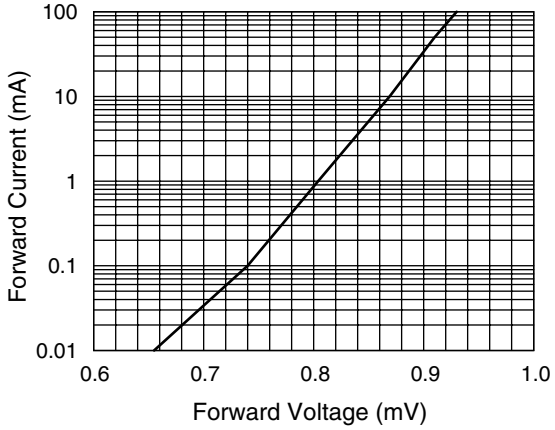
## Electrical Specifications at 25°C

| Parameter | Condition | Typ. | Max. | Unit |
|---|---|---|---|---|
| Reverse Current ($I_R$) | $V_R$ = 50 V | | 10 | µA |
| Capacitance ($C_T$) | F = 1 MHz, V = 5 V | 0.21 | 0.30 | pF |
| Resistance ($R_S$) | F = 100 MHz, I = 1 mA | 1.7 | | Ω |
| Resistance ($R_S$) | F = 100 MHz, I = 5 mA | 1.0 | 2.0 | Ω |
| Resistance ($R_S$) | F = 100 MHz, I = 10 mA | 0.85 | 1.2 | Ω |
| Forward Voltage ($V_F$) | IF = 10 mA | 0.85 | | V |
| Carrier Lifetime (TI) | IF = 10 mA | 100 | | nS |
| I Region Width | | 7 | | µm |

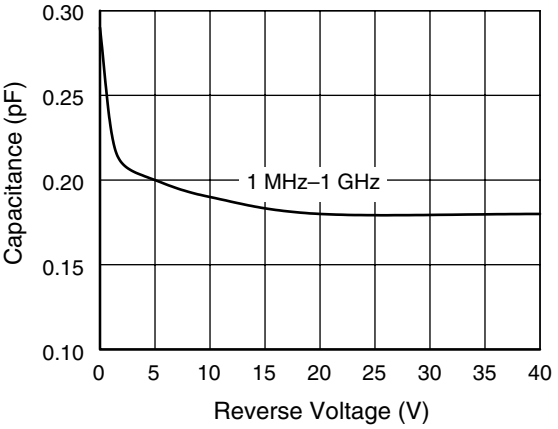
## Typical Performance Data



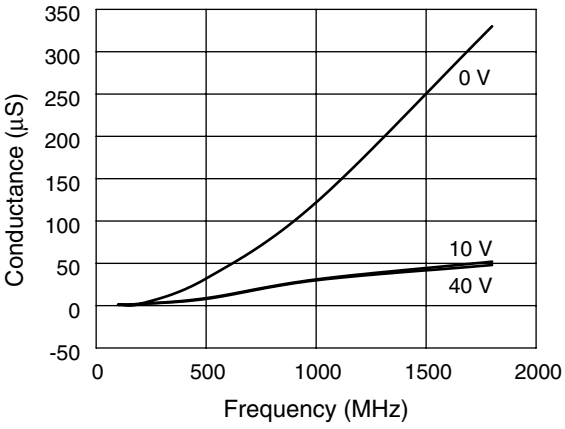

**Series Resistance vs. Current @ 100 MHz**




**DC Characteristic**




**Capacitance vs. Reverse Voltage**

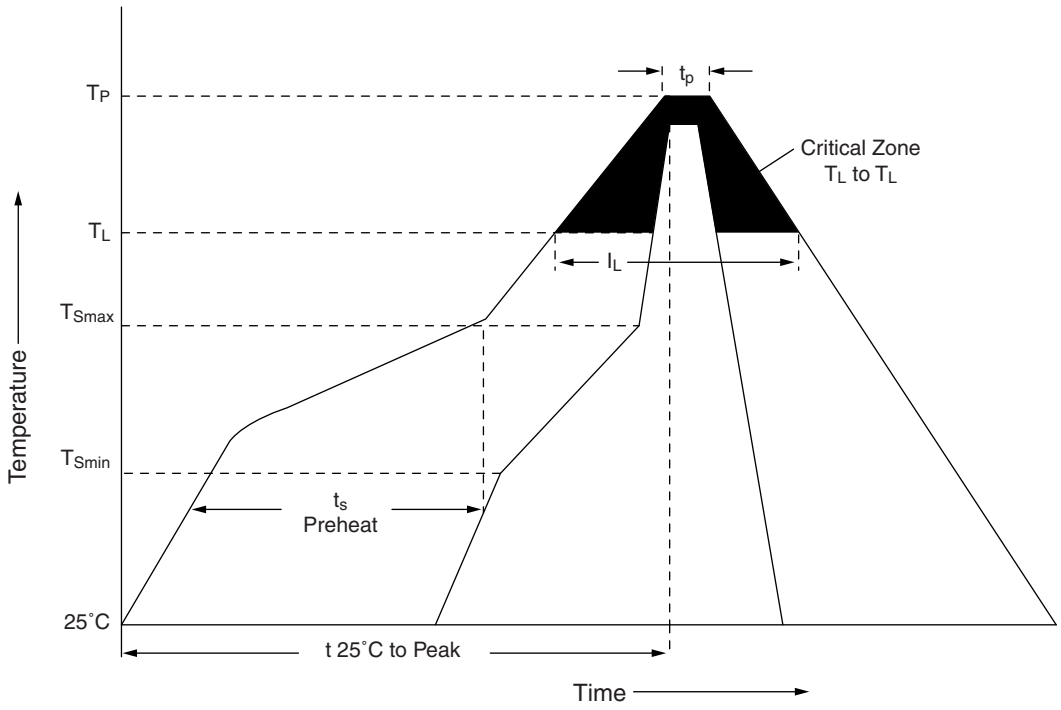



**Conductance vs. Frequency and Reverse Voltage**

## Recommended Solder Reflow Profiles

| Profile Feature | SnPb Eutectic Assembly | Lead (Pb)-Free Assembly 100% Sn |
|---|---|---|
| Average Ramp-Up Rate ($T_L$ to $T_P$) | 3°C/Second Max. | 3°C/Second Max. |
| Preheat<br>Temperature Min. ($T_{Smin}$)<br>Temperature Max. ($T_{Smax}$)<br>Time (Min. to Max.) (ts) | <br>100°C<br>150°C<br>60–120 Seconds | <br>150°C<br>200°C<br>60–80 Seconds |
| $T_{Smax}$ to $T_L$<br>Ramp-up Rate | <br>— | <br>3°C/Second Max. |
| Time Maintained Above:<br>Temperature ($T_L$)<br>Time ($t_L$) | <br>183°C<br>60–150 Seconds | <br>217°C<br>60–150 Seconds |
| Peak Temperature ($T_P$) | 240 +0/-5°C | 250 +0/-5°C |
| Time Within 5°C of Actual Peak Temperature (tp) | 10–30 Seconds | 20–40 Seconds |
| Ramp-Down Rate | 6°C/Second Max. | 6°C/Second Max. |
| Time 25°C to Peak Temperature | 6 Minutes Max. | 8 Minutes Max. |

All temperatures refer to the topside of the package, measured on the package body surface.
Reference JEDEC J-STD-020B.

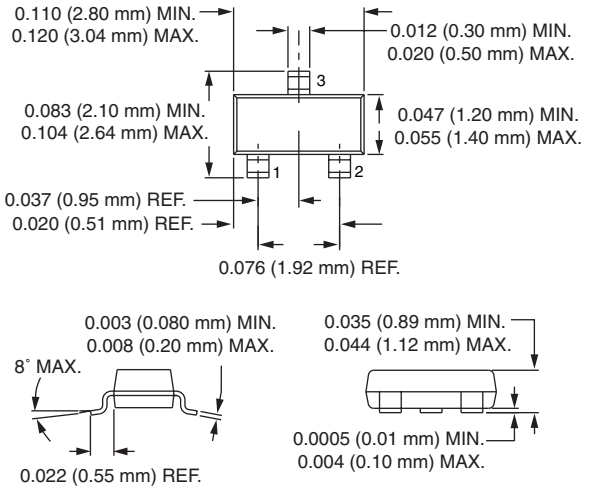



Reference JEDEC J-STD-020

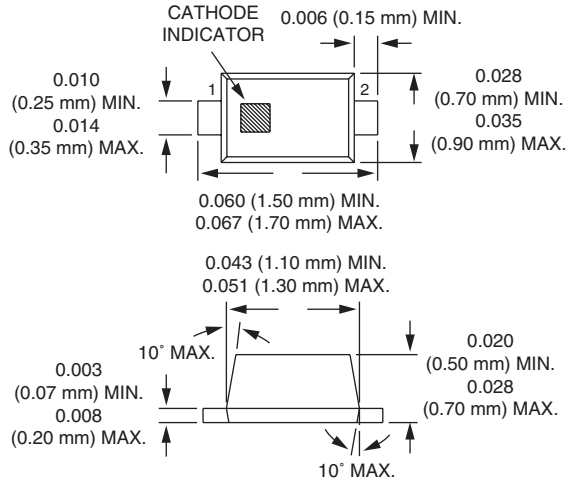
## Resistance vs. Temperature @ 500 MHz

| $I_F$ (mA) | R -55°C (Ω) | R -40°C (Ω) | R -15°C (Ω) | R +25°C (Ω) | R +65°C (Ω) | R +85°C (Ω) | R +100°C (Ω) |
|---|---|---|---|---|---|---|---|
| 0.02 | 9.92 | 9.68 | 9.30 | 8.95 | 8.95 | 9.01 | 9.12 |
| 0.10 | 3.90 | 3.86 | 3.79 | 3.80 | 3.85 | 3.94 | 4.03 |
| 0.30 | 2.32 | 2.33 | 2.30 | 2.33 | 2.35 | 2.43 | 2.49 |
| 0.50 | 1.91 | 1.93 | 1.90 | 1.92 | 1.92 | 1.99 | 2.05 |
| 1.00 | 1.54 | 1.55 | 1.52 | 1.53 | 1.50 | 1.56 | 1.61 |
| 10.00 | 0.95 | 0.96 | 0.91 | 0.90 | 0.82 | 0.85 | 0.89 |
| 20.00 | 0.86 | 0.87 | 0.82 | 0.81 | 0.73 | 0.75 | 0.79 |
| 100.00 | 0.72 | 0.73 | 0.70 | 0.68 | 0.59 | 0.62 | 0.65 |

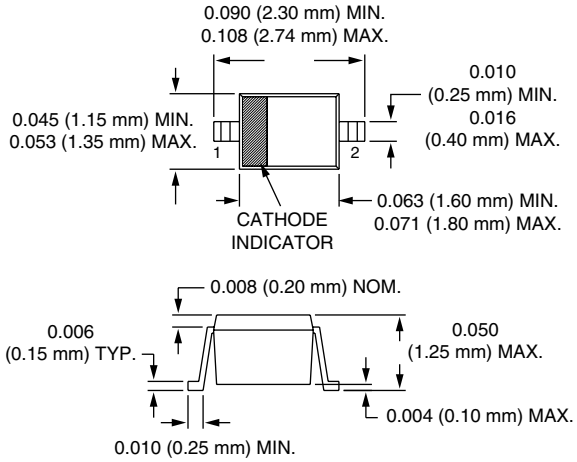
## SOT-23



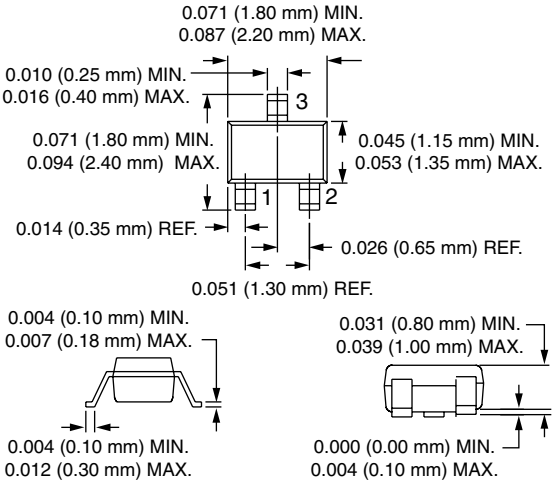

## SC-79




## SOD-323




## SC-70




## LGA