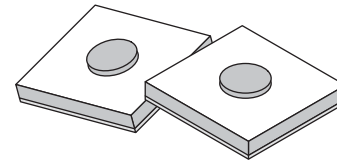


**DATA SHEET**

# APD Series: Silicon PIN Diode Chips

## Features

- Established Skyworks PIN diode process
- For switch and attenuator applications
- Low capacitance designs to 0.05 pF
- Voltage ratings to 100 V
- Chip size smaller than 15 mils square



## Description

Skyworks APD Series of silicon PIN diode chips are designed for use as switch and attenuator devices in high performance hybrid microwave integrated circuits. These PIN diode designs are useful over a wide range of frequencies from below 100 MHz to beyond 30 GHz. These devices utilize Skyworks well established silicon technology resulting in high resistivity and tightly controlled I region width PIN diodes. APD0505-00 through APD0810-000 are primarily designed for fast speed through moderate speed switch applications. They have low resistance and capacitance at zero bias and reverse bias. The thick I region APD2220-000 is primarily designed for low distortion attenuator applications.

## Absolute Maximum Ratings

| Characteristic        | Value                                       |
|-----------------------|---|
| Power dissipation     | $P_{diss} = \frac{175 - T_{amb}}{\theta} W$ |
| Operating temperature | -65 °C to +175 °C                           |
| Storage temperature   | -65 °C to +200 °C                           |

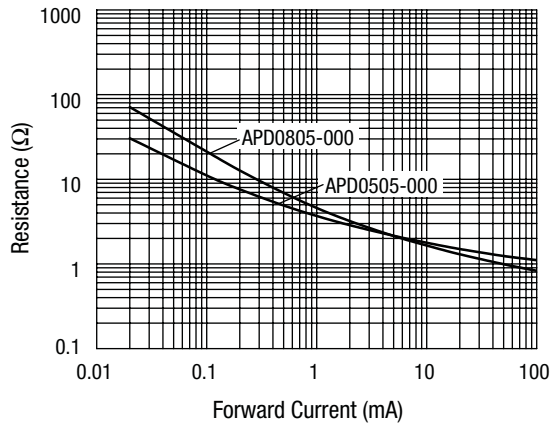
Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

**CAUTION:** 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. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.

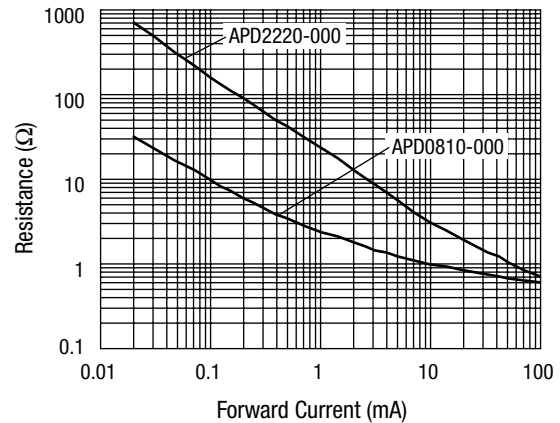
## Electrical Specifications at 25 °C

| Part Number                    | Capacitance<br>$V_R = 50 V$ ,<br>1 MHz<br>(pF) | Capacitance<br>$V_R = 0 V$ ,<br>1 MHz<br>(pF) | $R_S$<br>$I = 10 mA$ ,<br>500 MHz<br>( $\Omega$ ) | TL<br>$I = 10 mA$<br>(ns) | Voltage<br>Rating<br>$I_R = 10 \mu A$<br>(V) | I Region<br>( $\mu m$ ) | Thermal<br>Resistance<br>(°C/W) | Contact<br>Diameter<br>(Mils) | Outline<br>Drawing |
|--------------------------------|--|---|---|---------------------------|--|-------------------------|---------------------------------|-------------------------------|--------------------|
|                                | Max.   | Typ.  | Max.  | Typ.                      | Min.   | Nom.                    | Max.                            | Nom.                          |                    |
| <b>Switching Applications</b>  |  |   |   |                           |  |                         |                                 |                               |                    |
| APD0505-000                    | 0.05   | 0.10  | 2.0   | 20                        | 50   | 5                       | 100                             | 1.5                           | 150-806            |
| APD0510-000                    | 0.10   | 0.20  | 1.5   | 40                        | 50   | 5                       | 80                              | 2.5                           | 150-801            |
| APD0520-000                    | 0.20   | 0.25  | 1.0   | 50                        | 50   | 5                       | 80                              | 3.5                           | 150-801            |
| APD0805-000                    | 0.05   | 0.10  | 2.0   | 100                       | 100  | 8                       | 80                              | 2.0                           | 150-801            |
| APD0810-000                    | 0.10   | 0.15  | 1.5   | 160                       | 100  | 8                       | 60                              | 3.0                           | 150-801            |
| <b>Attenuator Applications</b> |  |   |   |                           |  |                         |                                 |                               |                    |
| APD2220-000                    | 0.20   | 0.20  | 4.0   | 700                       | 100  | 50                      | 80                              | 7.5                           | 149-815            |

### Typical Performance Data



Resistance vs. Forward Current @ 1 GHz



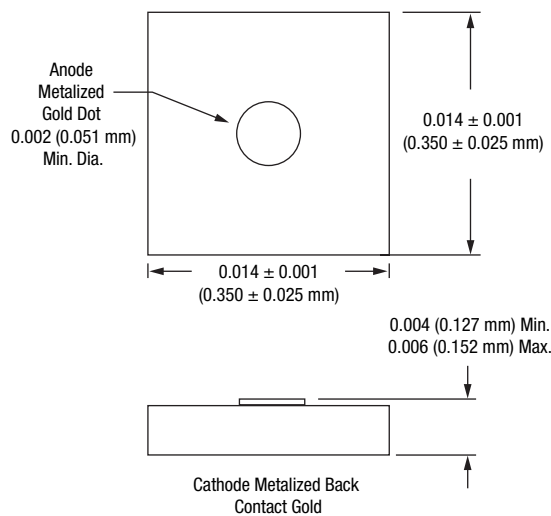
Resistance vs. Forward Current @ 1 GHz

### SPICE Model Parameters

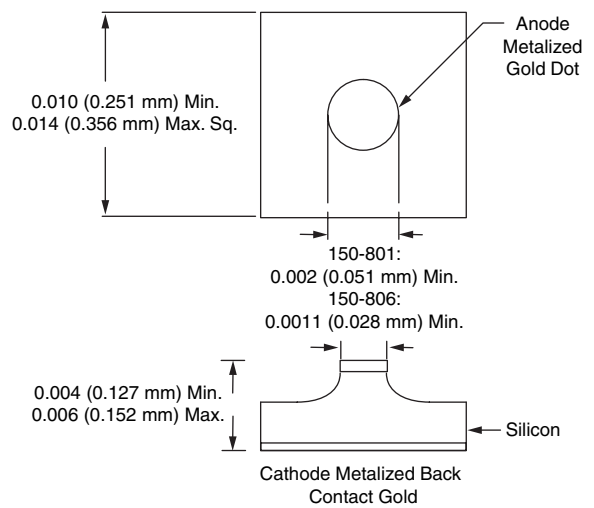
| Description           | Symbol | APD0505-000 | APD0510-000 | APD0805-000 | APD0810-000 | APD2220-000 | Unit |
|-----------------------|--------|-------------|-------------|-------------|-------------|-------------|------|
| Saturation current    | IS     | 6.40E-14    | 5.50E-17    | 1.20E-11    | 1.50E-12    | 2.00E-09    | A    |
| Series resistance     | RS     | 0.25        | 0.50        | 1.00        | 0.30        | 0.20        | Ω    |
| Emission coefficient  | N      | 1.40        | 1.02        | 1.70        | 1.48        | 1.90        |      |
| Reverse breakdown     | BV     | 50.00       | 50.00       | 100.00      | 100.00      | 200.00      | V    |
| Current at BV         | IBV    | 10E-06      | 10E-06      | 10E-06      | 10E-06      | 10E-06      | A    |
| Zero bias capacitance | CJO    | 0.12E-12    | 0.18E-12    | 0.13E-12    | 0.16E-12    | 0.2E-12     | F    |
| Junction potential    | VJ     | 1.00        | 1.00        | 1.00        | 1.00        | 1.00        | V    |
| Grading coefficient   | M      | 0.50        | 0.50        | 0.50        | 0.50        | 0.50        |      |
| Transit time          | TT     | 20E-9       | 40E-9       | 50E-9       | 160E-9      | 300E-9      | s    |

### Outline Drawings

#### 149-815



#### 150 Series



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