PIN Diode Limiter

Technical Data

5082-3071

Features
- High Power Handling Capability
  50 W Peak Pulse Power
- Low Intermodulation Products
  Typical 0.2 W Threshold
  Assures Wide Dynamic Linear Range
- Broad Bandwidth
  500 MHz to 10 GHz
- Low Insertion Loss
  Less than 1 dB in X-band
- Easy to Use
  Package Compatible with Stripline and Microstrip
- Negligible Spike Leakage

Description/ Applications
The HP 5082-3071 passive limiter chip is functionally integrated into a 50 Ω transmission line to provide a broadband, linear, low insertion loss transfer characteristic for small signal levels. At higher signal levels self-rectification reduces the diode resistance to provide limiting as shown in Figure 2. Limiter performance is practically independent of temperature over the rated temperature range.

Maximum Ratings
Junction Operating and Storage
- Temperature Range ..................................................-65°C to +125°C
- Power Dissipation[1] .................................................1.0 W
- Peak Incident Pulse Power[2] .................................50 W
- Peak Inverse Voltage ..............................................50 V
- Soldering Temperature .........................................230°C for 5 sec

Notes:
1. Device properly mounted in sufficient heat sink at $T_A = 25°C$, derate linearly to zero at maximum operating temperature.
2. $t_p = 1 \mu s$, $f = 10$ GHz, $D_u = 0.001$, $Z_o = 50 \Omega$, $T_A = 25°C$. 

Outline 61
The 5082-3071 limiter module is designed for applications in telecommunication equipment, ECM receivers, distance measuring equipment, radar receivers, telemetry equipment, and transponders operating anywhere in the frequency range from 500 MHz through 10 GHz. An external dc return is required for self bias operation. This dc return is often present in the existing circuit, i.e. inductively coupled antennas, or it can be provided by a $\lambda/4$ resonant shunt transmission line. Selection of a high characteristic impedance for the shunt transmission line affords broadband operation. Another easy to realize dc return consists of a small diameter wire connected at a right angle to the electric field in a microstrip or stripline circuit. A 10 mA forward current will actuate the PIN diode as a shunt switch providing approximately 20 dB of isolation.

**Mechanical Specifications**
The cover channel supplied with each diode should be used in balanced stripline circuits in order to provide good electrical continuity from the upper to the lower ground plane through the package base metal. Higher order modes will be excited if this cover is left off or if poor electrical contact is made to the ground plane.

The package transmission channel is filled with epoxy resin which combines a low expansion coefficient with high chemical stability. Outline 61 has a gold plated copper body with gold plated Kovar leads.

### Electrical Specifications at $T_A = 25^\circ C$

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package Outline</th>
<th>Heat Sink</th>
<th>Maximum Insertion Loss (dB)</th>
<th>Maximum SWR</th>
<th>Maximum RF Leakage Power (W)</th>
<th>Typical Recovery Time (ns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5082-3071</td>
<td>61</td>
<td>Cathode</td>
<td>1.2</td>
<td>2.0</td>
<td>1.0</td>
<td>100</td>
</tr>
</tbody>
</table>

Test Conditions

$P_{in} = 0 \, \text{dBm}$

$f = 9.4 \, \text{GHz}$

---

**Figure 1. Heat Sink Polarity.**

**Figure 2. Typical Pulse Limiting Characteristics.**

**Figure 3. Suggested Stripline Assembly.**