**TLCLPS28**

**28.5 GHz Linear Phase Shifter**

**Description**
TLC’s patented Linear Phase Shifter MMIC is a compact linear phase modulator with over 250 degrees of total phase shift range. This device finds applications in Ka-band communication systems.

**Features**
- 28.5 GHz Operation
- Low Insertion Loss
- Linear Phase Shift over 250°
- 0 to -11V Input Voltage
- Coplanar Waveguide Technology

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_G$</td>
<td>Negative Supply Voltage</td>
<td>-20 V</td>
</tr>
<tr>
<td>$I_G$</td>
<td>Negative Supply Current</td>
<td>2 mA</td>
</tr>
<tr>
<td>$T_C$</td>
<td>Operating Temperature</td>
<td>-50 to 130 °C</td>
</tr>
<tr>
<td>$T_{STG}$</td>
<td>Storage Temperature</td>
<td>-65 to 150 °C</td>
</tr>
</tbody>
</table>

**Performance Summary**

(At 25 °C, 50 ohm system)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (GHz)</td>
<td>28</td>
<td>28.5</td>
<td>29</td>
</tr>
<tr>
<td>Phase Shift (°)</td>
<td>200</td>
<td>250</td>
<td>280</td>
</tr>
<tr>
<td>Insertion Loss (dB)</td>
<td>5</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Gate Supply Voltage (V)</td>
<td>-1.5</td>
<td>-1</td>
<td>-0.5</td>
</tr>
</tbody>
</table>
Recommended Operating Procedure

1. Inject required signal
2. Increase $V_G$ to recommended voltage for desired phase shift.
3. Turn off in the following sequence:
   i. Turn off negative supply voltage (VG)
   ii. Turn off input frequency

Units: millimeters

- Bond Pad 1 (Input/Output) 0.1x0.1
- Bond Pad 2 (Input/Output) 0.1x0.1
- Bond Pad 3 (VG) 0.1x0.1
Note: Use one (1) 0.002” by 0.0005” gold ribbon or two (2) 0.0007” wire for bonding the RF input and output. Mount chip using silver epoxy (e.g. Epo-Tek H32C) or Gold-Tin (AuSn:80/20) solder. For best heat sinking, use either gold plated copper or composite matrix material, e.g. Thermocon.
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Performance Data

Phase vs Voltage

- Voltage (negative)
- Phase (degrees)

Frequency (GHz):
- 28.0
- 28.1
- 28.2
- 28.3
- 28.4
- 28.5
- 28.6
- 28.7
- 28.8
- 28.9
- 29.0

TLC reserves the right to change performance data and specifications without notice.