FEATURES

- <-1db insertion loss 8.6 GHz
- <2:1 VSWR to 8.4 GHz
- 16-32g operating spring force
- $Z_0 = 39.3 \, \Omega$
- <42 ps risetime
- 45 milliohms
- 2.6 Amps max drive current

GENERAL DESCRIPTION

The D4697 series spring probes from Signal Integrity Inc. are designed to meet the rigorous test probe bandwidth of the wireless and RF test markets as well as very fast rise times in test applications for telecommunication and broadband data communications system-on-a-chip devices. The risetime requirements for these devices are usually well below 150 picoseconds. Along with speed and accuracy, these probes are designed for testing very fine pitch to 0.8mm, well suited to the packaging constraints driven by the consumer wireless market.

The high bandwidth of these probes provides very low insertion loss up to 8.6GHz. These probes will provide transparent operation on Bluetooth, 802.11b and 3G wireless protocol devices as well as exceed the test probe demands of proprietary microwave communications devices and systems.

With an impulse risetime of less than 42 ps and a propagation delay of 40.9ps, the AC performance of the D4697 probe is transparent for test applications and interconnections solutions that operate in high speed CMOS, SiGe and GaAs technologies.

<table>
<thead>
<tr>
<th>SERIES D4697 MODELS: ORDERING INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>D4697-C3</td>
</tr>
<tr>
<td>D4697-D4</td>
</tr>
<tr>
<td>D4697-G7</td>
</tr>
</tbody>
</table>
**FUNCTIONAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model</th>
<th>D4697-B2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corner</td>
</tr>
<tr>
<td>TDT Risetime thru 50Ω</td>
<td>38</td>
</tr>
<tr>
<td>TDR Risetime open circuit</td>
<td>34</td>
</tr>
<tr>
<td>TDR Risetime short circuit</td>
<td>126</td>
</tr>
<tr>
<td>Signal Delay into 50Ω</td>
<td>42.2</td>
</tr>
<tr>
<td>Insertion Loss &lt;1db</td>
<td>11.2</td>
</tr>
<tr>
<td>Insertion Loss &lt;3db</td>
<td>26.3</td>
</tr>
<tr>
<td>VSWR &lt;2:1</td>
<td>11.4</td>
</tr>
</tbody>
</table>

**Equivalent Circuit Parameters**

<table>
<thead>
<tr>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin Inductance</td>
<td>2.01</td>
<td>nH</td>
<td></td>
</tr>
<tr>
<td>Pin Capacitance</td>
<td>.984</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Mutual Inductance</td>
<td>.304</td>
<td>nH</td>
<td></td>
</tr>
<tr>
<td>Mutual Capacitance</td>
<td>.067</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Transmission Line</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zo</td>
<td>39.3</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>Tl</td>
<td>40.9</td>
<td>ps</td>
<td></td>
</tr>
</tbody>
</table>

**MAXIMUM DC CURRENT**

<table>
<thead>
<tr>
<th>DUTY CYCLE</th>
<th>DC</th>
<th>50%</th>
<th>25%</th>
<th>10%</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMPS</td>
<td>2.67</td>
<td>3.74</td>
<td>4.72</td>
<td>5.84</td>
<td>6.94</td>
</tr>
</tbody>
</table>
EQUIVALENT CIRCUITS / SPICE MODELS

Figure 5: Pi Equivalent, Valid to >5 GHz

<table>
<thead>
<tr>
<th>Site</th>
<th>Cg = C1 + C2</th>
<th>L1</th>
<th>R4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corner</td>
<td>0.736 pF</td>
<td>2.76 nH</td>
<td>800 Ω</td>
</tr>
<tr>
<td>Edge</td>
<td>0.861 pF</td>
<td>2.30 nH</td>
<td>600 Ω</td>
</tr>
<tr>
<td>Field</td>
<td>0.984 pF</td>
<td>2.01 nH</td>
<td>500 Ω</td>
</tr>
<tr>
<td>Diagonal</td>
<td>0.984 pF</td>
<td>2.01 nH</td>
<td>500 Ω</td>
</tr>
</tbody>
</table>

Figure 6: Transmission Line Model
Valid <14.9 GHz

<table>
<thead>
<tr>
<th>Site</th>
<th>Zo</th>
<th>L</th>
<th>R4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corner</td>
<td>61.3 Ω</td>
<td>45.12 ps</td>
<td>1200 Ω</td>
</tr>
<tr>
<td>Edge</td>
<td>51.7 Ω</td>
<td>44.47 ps</td>
<td>900 Ω</td>
</tr>
<tr>
<td>Field</td>
<td>45.2 Ω</td>
<td>44.51 ps</td>
<td>800 Ω</td>
</tr>
</tbody>
</table>

Figure 7: Lumped, Mutual Elements

<table>
<thead>
<tr>
<th>Site</th>
<th>C1,2,3,4</th>
<th>Cm1, Cm2</th>
<th>L1, L2</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corner</td>
<td>0.230</td>
<td>0.138 pF</td>
<td>2.76</td>
<td>0.583 nH</td>
</tr>
<tr>
<td>Edge</td>
<td>0.330</td>
<td>0.101 pF</td>
<td>2.30</td>
<td>0.471 nH</td>
</tr>
<tr>
<td>Field</td>
<td>0.425</td>
<td>0.067 pF</td>
<td>2.01</td>
<td>0.304 nH</td>
</tr>
<tr>
<td>Diagonal</td>
<td>0.478</td>
<td>0.014 pF</td>
<td>2.01</td>
<td>0.098 nH</td>
</tr>
</tbody>
</table>

Figure 8: Transmission Line Equivalent for Crosstalk

<table>
<thead>
<tr>
<th></th>
<th>Z0</th>
<th>LeL</th>
<th>k</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>39.3</td>
<td>ps</td>
<td>0.15</td>
<td>11.2 GHz</td>
</tr>
<tr>
<td>Probe Series</td>
<td>Initial Length</td>
<td>Operating Position</td>
<td>Spring Force</td>
<td>Self Inductance</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------</td>
<td>--------------------</td>
<td>-------------</td>
<td>----------------</td>
</tr>
<tr>
<td>D4525</td>
<td>0.087&quot;</td>
<td>2.21</td>
<td>0.071&quot;</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>0.092&quot;</td>
<td>2.33</td>
<td>0.071&quot;</td>
<td>1.80</td>
</tr>
<tr>
<td>D4595</td>
<td>0.154&quot;</td>
<td>3.91</td>
<td>0.128&quot;</td>
<td>3.25</td>
</tr>
<tr>
<td>D4601</td>
<td>0.214&quot;</td>
<td>5.43</td>
<td>0.186&quot;</td>
<td>4.72</td>
</tr>
<tr>
<td>D4603</td>
<td>0.209&quot;</td>
<td>5.30</td>
<td>0.181&quot;</td>
<td>4.59</td>
</tr>
<tr>
<td>D4613</td>
<td>0.249&quot;</td>
<td>6.32</td>
<td>0.213-.216&quot;</td>
<td>5.49</td>
</tr>
<tr>
<td>D4623</td>
<td>0.289&quot;</td>
<td>7.33</td>
<td>0.253&quot;</td>
<td>6.43</td>
</tr>
<tr>
<td>D4823</td>
<td>0.289&quot;</td>
<td>7.33</td>
<td>0.253&quot;</td>
<td>6.43</td>
</tr>
<tr>
<td>D4693</td>
<td>0.185&quot;</td>
<td>4.71</td>
<td>0.157&quot;</td>
<td>4.00</td>
</tr>
<tr>
<td>D4694</td>
<td>0.185&quot;</td>
<td>4.71</td>
<td>0.157&quot;</td>
<td>4.00</td>
</tr>
<tr>
<td>D4697</td>
<td>0.339&quot;</td>
<td>8.61</td>
<td>0.295&quot;</td>
<td>7.50</td>
</tr>
</tbody>
</table>

**MECHANICAL DIMENSIONS**

**INCHES [MM]**

---

Signal Integrity, Inc.
104 County Street, Ste. 210, Attleboro, MA 02703
Tel: 1-508-226-6480  Fax: 1-508-226-6488  Internet: www.signalin.com

Signal Integrity makes no representation that the use of its products described herein, or the use of other technical information contained herein, will not infringe on existing or future patent rights. The descriptions contained herein do not imply the granting of licenses to make, use, or sell equipment constructed in accordance therewith. Specifications are subject to change without notice.