MACP-09945-CH0670

Broadband CATV 17.5 dB Directional Coupler
5 to 1200 MHz

Rev. V3

Features
- Surface Mount
- Coupling 17.5dB Typical
- Excellent Temperature stability
- 260°C Reflow Compatible
- RoHS* Compliant, lead free
- Available on Tape and Reel.

Description
M/A-COM Technology Solutions MACP-09945-CH0670 is a low cost 17.5dB directional coupler designed in a low cost, surface mount package. Ideally suited for high volume CATV/Broadband applications. Suitable for use in 50 Ohm and 75 Ohm systems.

Note:
There is no orientation dot on the bottom of the PCB.

Pin Configuration

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Output</td>
</tr>
<tr>
<td>2</td>
<td>Not Connected (ground)</td>
</tr>
<tr>
<td>3</td>
<td>Isolated (external 75 Ohm Load)</td>
</tr>
<tr>
<td>4</td>
<td>Coupling</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>6</td>
<td>Input</td>
</tr>
</tbody>
</table>

Schematic

Ordering Information

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACP-009945-CH0670</td>
<td>900 piece reel</td>
</tr>
<tr>
<td>MACP-009945-CH06TB</td>
<td>Customer Test Board</td>
</tr>
</tbody>
</table>

**Broadband CATV 17.5 dB Directional Coupler**

5 to 1200 MHz

**Electrical Specifications:** $T_A = 25^\circ C$, $0$ dBm, $Z_0 = 75\Omega$, $P_{in} = 0$ dBm

* Monitored during production tune/test.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Units</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Line Loss (Pin 6-1) forward *</td>
<td>5 - 870 MHz</td>
<td>dB</td>
<td>-</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>870 - 1002 MHz</td>
<td>dB</td>
<td>-</td>
<td>1.0</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>1002 - 1200 MHz</td>
<td>dB</td>
<td>-</td>
<td>1.3</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Main Line Loss (Pin 3-4) Reverse *</td>
<td>5 - 870 MHz</td>
<td>dB</td>
<td>-</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>870 - 1002 MHz</td>
<td>dB</td>
<td>-</td>
<td>1.0</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>1002 - 1200 MHz</td>
<td>dB</td>
<td>-</td>
<td>1.3</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Coupling -17.5dB (Pin 6-4) Forward *</td>
<td>5 - 1002 MHz</td>
<td>dB</td>
<td>-</td>
<td>17.5</td>
<td>17.5</td>
</tr>
<tr>
<td>1002 - 1200 MHz</td>
<td>dB</td>
<td>-</td>
<td>±0.5</td>
<td>±1.0</td>
<td></td>
</tr>
<tr>
<td>Coupling -17.5dB (Pin 1-3) Reverse *</td>
<td>5 - 200 MHz</td>
<td>dB</td>
<td>-</td>
<td>17.5</td>
<td>17.5</td>
</tr>
<tr>
<td>200 - 500 MHz</td>
<td>dB</td>
<td>-</td>
<td>±0.7</td>
<td>±1.0</td>
<td></td>
</tr>
<tr>
<td>500 - 870 MHz</td>
<td>dB</td>
<td>-</td>
<td>18.5</td>
<td>18.5</td>
<td></td>
</tr>
<tr>
<td>870 - 1002 MHz</td>
<td>dB</td>
<td>-</td>
<td>±1.5</td>
<td>±1.5</td>
<td></td>
</tr>
<tr>
<td>1002 - 1200 MHz</td>
<td>dB</td>
<td>15.0</td>
<td>17.5</td>
<td>19.5</td>
<td></td>
</tr>
<tr>
<td>Input Return Loss (Pin 6) *</td>
<td>5 - 870 MHz</td>
<td>dB</td>
<td>22</td>
<td>27</td>
<td>-</td>
</tr>
<tr>
<td>870 - 1002 MHz</td>
<td>dB</td>
<td>20</td>
<td>26</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1002 - 1200 MHz</td>
<td>dB</td>
<td>16</td>
<td>24</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Output Return Loss (Pin 1) *</td>
<td>5 - 870 MHz</td>
<td>dB</td>
<td>22</td>
<td>33</td>
<td>-</td>
</tr>
<tr>
<td>870 - 1002 MHz</td>
<td>dB</td>
<td>18</td>
<td>33</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1002 - 1200 MHz</td>
<td>dB</td>
<td>15</td>
<td>21</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Coupling Return Loss (Pin 4) *</td>
<td>5 - 870 MHz</td>
<td>dB</td>
<td>22</td>
<td>28</td>
<td>-</td>
</tr>
<tr>
<td>870 - 1002 MHz</td>
<td>dB</td>
<td>20</td>
<td>23</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1002 - 1200 MHz</td>
<td>dB</td>
<td>18</td>
<td>23</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Directivity</td>
<td>5 - 870 MHz</td>
<td>dB</td>
<td>30</td>
<td>40</td>
<td>-</td>
</tr>
<tr>
<td>870 - 1002 MHz</td>
<td>dB</td>
<td>8</td>
<td>15</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1002 - 1200 MHz</td>
<td>dB</td>
<td>4</td>
<td>10</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Inductance @ 5 MHz (Pins 6-1 &amp; 4-3)</td>
<td>5 MHz</td>
<td>nH</td>
<td>240</td>
<td>245</td>
<td>260</td>
</tr>
</tbody>
</table>

**Recommended Maximum Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF power</td>
<td>250mW</td>
</tr>
<tr>
<td>DC current</td>
<td>30mA</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to +85°C</td>
</tr>
</tbody>
</table>

**Application Circuit**

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Macom Technology Solutions

Broadband CATV 17.5 dB Directional Coupler
5 to 1200 MHz

Typical Performance Curves: \( T_A = 25^\circ \text{C}, \ 0 \text{dBm}, \ Z_0 = 75\Omega, \ P_{in} = 0 \text{dBm} \)

**Coupling Forward (Pin 6 to 4)**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Return Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>-17.0</td>
</tr>
<tr>
<td>204</td>
<td>-17.2</td>
</tr>
<tr>
<td>403</td>
<td>-17.4</td>
</tr>
<tr>
<td>602</td>
<td>-17.6</td>
</tr>
<tr>
<td>801</td>
<td>-17.8</td>
</tr>
<tr>
<td>1001</td>
<td>-18.0</td>
</tr>
<tr>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>

**Return Loss: Input (Pin 6)**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Return Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>-40</td>
</tr>
<tr>
<td>204</td>
<td>-35</td>
</tr>
<tr>
<td>403</td>
<td>-30</td>
</tr>
<tr>
<td>602</td>
<td>-25</td>
</tr>
<tr>
<td>801</td>
<td>-20</td>
</tr>
<tr>
<td>1001</td>
<td>-15</td>
</tr>
<tr>
<td>1200</td>
<td>-10</td>
</tr>
<tr>
<td>1400</td>
<td>-5</td>
</tr>
<tr>
<td>1600</td>
<td>0</td>
</tr>
</tbody>
</table>

**Main Line Loss Forward (Pin 6-1)**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Return Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>-0.0</td>
</tr>
<tr>
<td>204</td>
<td>-0.2</td>
</tr>
<tr>
<td>403</td>
<td>-0.4</td>
</tr>
<tr>
<td>602</td>
<td>-0.6</td>
</tr>
<tr>
<td>801</td>
<td>-0.8</td>
</tr>
<tr>
<td>1001</td>
<td>-1.0</td>
</tr>
<tr>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>

**Return Loss: Output (Pin 1)**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Return Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>-40</td>
</tr>
<tr>
<td>204</td>
<td>-35</td>
</tr>
<tr>
<td>403</td>
<td>-30</td>
</tr>
<tr>
<td>602</td>
<td>-25</td>
</tr>
<tr>
<td>801</td>
<td>-20</td>
</tr>
<tr>
<td>1001</td>
<td>-15</td>
</tr>
<tr>
<td>1200</td>
<td>-10</td>
</tr>
<tr>
<td>1400</td>
<td>-5</td>
</tr>
<tr>
<td>1600</td>
<td>0</td>
</tr>
</tbody>
</table>

**Main Line Loss Reverse (Pin 3-4)**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Return Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>-0.0</td>
</tr>
<tr>
<td>204</td>
<td>-0.2</td>
</tr>
<tr>
<td>403</td>
<td>-0.4</td>
</tr>
<tr>
<td>602</td>
<td>-0.6</td>
</tr>
<tr>
<td>801</td>
<td>-0.8</td>
</tr>
<tr>
<td>1001</td>
<td>-1.0</td>
</tr>
<tr>
<td>1200</td>
<td></td>
</tr>
</tbody>
</table>

**Return Loss: Coupled (Pin 4)**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Return Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>-40</td>
</tr>
<tr>
<td>204</td>
<td>-35</td>
</tr>
<tr>
<td>403</td>
<td>-30</td>
</tr>
<tr>
<td>602</td>
<td>-25</td>
</tr>
<tr>
<td>801</td>
<td>-20</td>
</tr>
<tr>
<td>1001</td>
<td>-15</td>
</tr>
<tr>
<td>1200</td>
<td>-10</td>
</tr>
<tr>
<td>1400</td>
<td>-5</td>
</tr>
<tr>
<td>1600</td>
<td>0</td>
</tr>
</tbody>
</table>

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