Datasheet
SHF BT45R
45 GHz Broadband Bias-Tee
Description

The SHF BT45R bias tee is the RoHS compliant successor of the SHF BT45. It outputs the superposition of the signals applied to the AC and to the DC port. Any existing DC content is blocked from its AC input while the DC input is practically only allowing transmission of pure DC⁷.

Based on SHF’s air line construction, it offers resonance-free transmission up to 45 GHz. In addition to the low insertion loss, all products have an extremely low group delay ripple.

Applications

- Optical Communications
- High-Speed Pulse Experiments
- Satellite Communications
- Research and Development
- Antenna Measurements
- Data Transmission

Configurations

- A - AC port: 2.92 mm male, AC+DC port: 2.92 mm female
- B - AC port: 2.92 mm female, AC+DC port: 2.92 mm male
- C - AC port: 2.92 mm male, AC+DC port: 2.92 mm male
- D - AC port: 2.92 mm female, AC+DC port: 2.92 mm female

One of above configurations has to be chosen. For more information, please be referred to the mechanical drawing on the last page of this data sheet. The DC-port is always SMA female.

Options

- HV100 - High Voltage (maximum DC voltage extended to 100 V)
- HV200 - High Voltage (maximum DC voltage extended to 200 V)
- HC600 - High Current (maximum DC current extended to 600 mA)
- HC1000 - High Current (maximum DC current extended to 1 A)
- HC2000 - High Current (maximum DC current extended to 2 A)
- HVC100/1000 - High Voltage & Current (maximum DC voltage extended to 100 V and maximum DC current extended to 1 A)

⁷ In case a low- and a high frequency signal should be combined a SHF Diplexer (essentially a bias tee with a certain bandwidth in the low frequency path) would be the right choice.
### Specifications - SHF BT45R

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absolute Maximum Ratings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum RF Input</td>
<td>dBm</td>
<td>$P_{in\ max}$</td>
<td></td>
<td></td>
<td>30</td>
<td>average power of a continuous (^2) signal, 50 (\Omega) load and (f \geq 2 \times f_{low})</td>
</tr>
<tr>
<td>Maximum DC Voltage</td>
<td>V</td>
<td>-16</td>
<td></td>
<td>16</td>
<td></td>
<td>difference between ports and between ports to ground</td>
</tr>
<tr>
<td>Maximum DC Current</td>
<td>mA</td>
<td>-400</td>
<td></td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case Temperature</td>
<td>°C</td>
<td>10</td>
<td>25</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Electrical Characteristics SHF BT45R without Option (At 25°C case temperature)

- **High Frequency 3 dB Point**: GHz $f_{HIGH}$ 45
- **Low Frequency 3 dB Point**: kHz $f_{LOW}$ 20
- **Insertion loss**: dB $S_{21}$ 1.5 < 40 GHz
- **Input Reflection**: dB $S_{11}$ -17 < 40 MHz, -15 < 15 GHz, -10 < 20 GHz
- **Isolation**: dB -40
- **DC Resistance**: Ω 3.5 DC to RF port

### Mechanical Characteristics

- **Connector**: Ω 50 2.92mm (K)
- **Dimensions**: mm please see page 5

In case an option is chosen the following variations to above specifications apply:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>No option</th>
<th>HV 100</th>
<th>HV 200</th>
<th>HC 600</th>
<th>HC 1000</th>
<th>HC 2000</th>
<th>HVC 100/1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum DC Voltage</td>
<td>V</td>
<td>-16…+16</td>
<td>-100…+100</td>
<td>-200…+200</td>
<td>-16…+16</td>
<td>-16…+16</td>
<td>-16…+16</td>
<td>-100…+100</td>
</tr>
<tr>
<td>Maximum DC Current</td>
<td>A</td>
<td>-0.4…+0.4</td>
<td>-0.4…+0.4</td>
<td>-0.4…+0.4</td>
<td>-0.6…+0.6</td>
<td>-1…+1</td>
<td>-2…+2</td>
<td>-1…+1</td>
</tr>
<tr>
<td>Max. Low Frequency 3 dB Point</td>
<td>MHz</td>
<td>0.02</td>
<td>0.4</td>
<td>2</td>
<td>0.02</td>
<td>300</td>
<td>1000</td>
<td>300</td>
</tr>
<tr>
<td>Typical DC Resistance</td>
<td>Ω</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

\(^2\) 30 dBm (1 W) equals 20 V peak to peak for continuous sinusoidal signals. A pulsed excitation with an average of 1 W and thus having significantly higher peaks is possible.

The maximum RF input power does not change in case a signal is applied to the DC port.

SHF reserves the right to change specifications and design without notice - SHF BT45R - V002 - Oct. 30, 2019
Typical S-Parameters for a BT45R without Option

Insertion loss

Input return loss

Group delay and phase response

Aperture of group delay measurement: 100MHz
All dimensions in mm