Synergy’s line of couplers consist of directional & bidirectional types with frequencies ranging from 10 KHz to 2.5 GHz. A bidirectional coupler is a 4 port device that produces two unequal amplitude outputs when a signal is fed through the input port and cancels the signal at the reverse coupled port. A directional coupler has the reverse coupled port internally terminated.

Couplers are categorized by the low signal level output. A 10 dB directional coupler will provide an output of 10 dB below the input signal level, and a "Main Line" signal level which has very little loss (0.46 dB theoretically). Listed below are the functional diagrams for both types.

**PARAMETER DEFINITIONS**

**Coupling**
Coupling is the attenuation in dB of a signal at a coupled port relative to the input port.

**Coupling Flatness**
Coupling flatness is the peak to peak variation in coupling over the specified frequency range.

**Insertion Loss**
Insertion loss is the unrecoverable power in dB dissipated within the circuit.

**Coupling Loss**
Theoretically, the RF power will split unevenly between the mainline and coupling port. Listed in Table 1 is the coupling loss for Synergy’s line of directional couplers.

**Mainline Loss**
Mainline loss is equal to insertion loss plus the coupling loss.

<table>
<thead>
<tr>
<th>Coupling Value</th>
<th>Coupling loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 dB</td>
<td>1.25 dB</td>
</tr>
<tr>
<td>10 dB</td>
<td>0.46 dB</td>
</tr>
<tr>
<td>15 dB</td>
<td>0.140 dB</td>
</tr>
<tr>
<td>20 dB</td>
<td>0.044 dB</td>
</tr>
</tbody>
</table>

**Directivity**
Directivity is a measure of the coupler’s ability to direct energy only to the desired port. Directivity is equal to the isolation value minus the coupling value.

**VSWR**
The voltage standing wave ratio is a term used to indicate how well the device is matched to the system impedance.