The Waveguide Solution offers a range of Low Power Fixed and Infinitely Variable Attenuators as well as the range of Laboratory Standard Precision Variable Attenuators. All items are of compact design and are manufactured from Brass as standard although Copper and Aluminium versions are available upon request. The FA and VA series of attenuators are manufactured to the highest quality standards. Attenuators are manufactured with the full range of International Flange Styles as shown in The Waveguide Solution Flange Catalogue and can be offered with alternative plated finishes on request. All The Waveguide Solution Attenuators are offered with attractive, hardwearing, epoxy paint finish.

The Waveguide Solution facility is approved to ISO 9001: 2000.
The Waveguide Solution has developed and manufactured an extensive range of Waveguide Attenuators. These are Low Power Fixed Attenuators, Low Power Variable Attenuators and a range of Precision Variable Attenuators.

### Fixed Low Power attenuators

All of the standard fixed attenuators listed are manufactured from selected waveguide tube. The attenuating element is manufactured from a metallised glass fibre reinforced PTFE, resistive card vane or an absorptive composite material. The vane version is supported in the waveguide using two metal rods and is accurately positioned to give a desired value between 0 and 40dB as required. The composite absorber is positioned and glued into the tube (the attenuation is based on the length of the absorber). In order to offer the optimum performance and cost, TWS offers 2 different models for each frequency range.

### Variable Attenuators

Based upon the same construction as the Low Power Fixed Attenuators, the metallised glass fibre reinforced PTFE resistive card vane is positioned in the Waveguide using a backlash free, spring controlled piston, precisely fitted in a machined housing to give a high degree of mechanical stability. The attenuation is varied by means of a knurled finger-control knob, and a locking screw is provided for repetitive measurements, or, in the case of the variable precision devices, the attenuation is varied by means of a standard micrometer drive.

For the WG22 version, a guillotine principle is used for the vane insertion into the broadwall of the waveguide. Movement of the vane is achieved by the means of an eccentric cam attached to the control knob.

### Standard Rectangular

**Specification:**
- Material: Brass
- Finish: Blue Paint, Silver Plated Flanges
- Full Band Flatness: Nominal 10% of attenuator value*

*Better flatness value can be achieved for narrow band application.

**Attenuation Fixed according to customer requirements at any value within the overall attenuation range.

***For 3 Digit Rectangular Flange part number, refer to the TWS Flange catalogue, or consult the factory.

### Attenuation calibration accuracy better than ±0.35 dB at the centre frequency

**Ordering:** when ordering, please state the attenuation value and frequency.
**FIXED ATTENUATOR (Range 0-40 dB)**

**Double Ridge**

**Specification:**
- **Material:** Aluminium Alloy
- **Finish:** Blue Paint, Iridited / Chromated Flanges
- **Full Band Flatness:** Contact factory for details

<table>
<thead>
<tr>
<th>Operating Frequency Band (GHz)</th>
<th>Waveguide Designation</th>
<th>TWS PART NUMBER</th>
<th>Max V.S.W.R.</th>
<th>Max Power Watts C.W.</th>
<th>Overall Length “A” (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.5 – 18.0</td>
<td>WRD650 D28</td>
<td>FA 650 –CQH- (<strong>.<em>.</em>).A-(</strong>)</td>
<td>1.15</td>
<td>0.7</td>
<td>152</td>
</tr>
<tr>
<td>7.5 – 18.0</td>
<td>WRD750 D24</td>
<td>FA 750 –CQH- (<strong>.<em>.</em>).A-(</strong>)</td>
<td>1.15</td>
<td>0.7</td>
<td>152</td>
</tr>
<tr>
<td>18.0 – 40.0</td>
<td>WRD180 C24</td>
<td>FA 180 –CQH- (<strong>.<em>.</em>).A-(</strong>)</td>
<td>1.25</td>
<td>0.5</td>
<td>51</td>
</tr>
</tbody>
</table>

**Attenuation calibration accuracy better than ±0.6 db at the centre frequency**

++ Please contact factory for availability

**Ordering:** When ordering please state the attenuation value and operating frequency range

**VARIABLE ATTENUATOR (Range 0-40 dB)**

**Standard Rectangular**

**Specification:**
- **Material:** Brass
- **Finish:** Blue Paint, Silver Plated Flanges
- **Attenuation Elements:** Resistive Card
- **Insertion Loss:** Less than 0.3 dB
- **Full Band Flatness:** Contact factory for details

<table>
<thead>
<tr>
<th>Operating Frequency Band (GHz)</th>
<th>Waveguide Designation</th>
<th>TWS PART NUMBER</th>
<th>Max V.S.W.R.</th>
<th>Max Power Watts C.W.</th>
<th>Overall Length “A” (mm)</th>
<th>Dim “B” (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+2.60 – 3.95</td>
<td>VA 10 –SQB- (**.<em>.</em>).B</td>
<td>1.10</td>
<td>4</td>
<td>330</td>
<td>178</td>
<td></td>
</tr>
<tr>
<td>3.30 – 4.90</td>
<td>VA 11A –SQB- (**.<em>.</em>).B</td>
<td>1.10</td>
<td>4</td>
<td>406</td>
<td>171</td>
<td></td>
</tr>
<tr>
<td>3.95 – 5.85</td>
<td>VA 12 –SQB- (**.<em>.</em>).B</td>
<td>1.12</td>
<td>4</td>
<td>305</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>+4.90 – 7.05</td>
<td>VA 13 –SQB- (**.<em>.</em>).B</td>
<td>1.12</td>
<td>3</td>
<td>279</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>5.85 – 8.20</td>
<td>VA 14 –SQB- (**.<em>.</em>).B</td>
<td>1.12</td>
<td>2</td>
<td>241</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>7.05 – 10.0</td>
<td>VA 15 –SQB- (**.<em>.</em>).B</td>
<td>1.13</td>
<td>1</td>
<td>203</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>8.20 – 12.40</td>
<td>VA 16 –SQB- (**.<em>.</em>).B</td>
<td>1.13</td>
<td>1</td>
<td>152</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>10.0 – 15.0</td>
<td>VA 17 –SQB- (**.<em>.</em>).B</td>
<td>1.14</td>
<td>1</td>
<td>152</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td>12.4 – 18.0</td>
<td>VA 18 –SQB- (**.<em>.</em>).B</td>
<td>1.14</td>
<td>0.7</td>
<td>127</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>15.0 – 22.0</td>
<td>VA 19 –SQB- (**.<em>.</em>).B</td>
<td>1.15</td>
<td>0.7</td>
<td>127</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>18.0 – 26.5</td>
<td>VA 20 –SQB- (**.<em>.</em>).B</td>
<td>1.15</td>
<td>0.5</td>
<td>102</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>26.5 – 40.0</td>
<td>VA 22 –SQB- (**.<em>.</em>).B</td>
<td>1.20</td>
<td>0.5</td>
<td>51</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

*** For 3 Digit Rectangular Flange part number, refer to the TWS Flange catalogue, or consult the factory.

**Attenuation calibration accuracy better than ±0.35 dB at the centre frequency**

++ Please contact factory for availability
**VARIABLE PRECISION ATTENUATOR (Range 0-40 dB)**

**Standard Rectangular**

Specification:
- Material: Brass
- Finish: Blue Paint, Silver Plated Flanges
- Attenuation Elements: Resistive Card
- V.S.W.R.: Better than 1.25 dB
- Insertion Loss: Less than 0.2 dB
- Resetting Accuracy: ±0.01 dB
- Flatness: Contact factory for details

<table>
<thead>
<tr>
<th>Operating Frequency Band (GHz)</th>
<th>Waveguide Designation</th>
<th>TWS PART NUMBER</th>
<th>Max Power Watts C.W.</th>
<th>Micro-meter Resolution dBs/div Average</th>
<th>Overall Length “A” (mm)</th>
<th>Dim “B” (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>++2.60 – 3.95</td>
<td>10</td>
<td>32</td>
<td>284</td>
<td>VA 10 – PQB- (<strong>-</strong>*)-B</td>
<td>4</td>
<td>0.01</td>
</tr>
<tr>
<td>3.30 – 4.90</td>
<td>11A</td>
<td>40</td>
<td>229</td>
<td>VA 11A – PQB- (<strong>-</strong>*)-B</td>
<td>4</td>
<td>0.02</td>
</tr>
<tr>
<td>3.95 – 5.85</td>
<td>12</td>
<td>48</td>
<td>187</td>
<td>VA 12 – PQB- (<strong>-</strong>*)-B</td>
<td>4</td>
<td>0.02</td>
</tr>
<tr>
<td>++4.90 – 7.05</td>
<td>13</td>
<td>58</td>
<td>159</td>
<td>VA 13 – PQB- (<strong>-</strong>*)-B</td>
<td>3</td>
<td>0.02</td>
</tr>
<tr>
<td>5.85 – 8.20</td>
<td>14</td>
<td>70</td>
<td>137</td>
<td>VA 14 – PQB- (<strong>-</strong>*)-B</td>
<td>2</td>
<td>0.03</td>
</tr>
<tr>
<td>7.05 – 10.0</td>
<td>15</td>
<td>84</td>
<td>112</td>
<td>VA 15 – PQB- (<strong>-</strong>*)-B</td>
<td>1</td>
<td>0.04</td>
</tr>
<tr>
<td>8.20 – 12.40</td>
<td>16</td>
<td>100</td>
<td>90</td>
<td>VA 16 – PQB- (<strong>-</strong>*)-B</td>
<td>1</td>
<td>0.05</td>
</tr>
<tr>
<td>10.0 – 15.0</td>
<td>17</td>
<td>120</td>
<td>75</td>
<td>VA 17 – PQB- (<strong>-</strong>*)-B</td>
<td>1</td>
<td>0.05</td>
</tr>
<tr>
<td>12.4 – 18.0</td>
<td>18</td>
<td>140</td>
<td>62</td>
<td>VA 18 – PQB- (<strong>-</strong>*)-B</td>
<td>0.7</td>
<td>0.07</td>
</tr>
<tr>
<td>18.0 – 26.5</td>
<td>20</td>
<td>220</td>
<td>42</td>
<td>VA 20 – PQB- (<strong>-</strong>*)-B</td>
<td>0.5</td>
<td>0.10</td>
</tr>
<tr>
<td>26.5 – 40.0</td>
<td>22</td>
<td>320</td>
<td>28</td>
<td>VA 22 – PQB- (<strong>-</strong>*)-B</td>
<td>0.2</td>
<td>0.07</td>
</tr>
</tbody>
</table>

***For 3 Digit Rectangular Flange part number, refer to the TWS Flange catalogue, or consult the factory.

**CALIBRATION**

**CALIBRATION ACCURACY**

<table>
<thead>
<tr>
<th>3 Frequencies in Band</th>
<th>0 – 10 dB ± 0.07 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 dB Steps to 10 dB</td>
<td>10 – 20 dB ± 0.1 dB</td>
</tr>
<tr>
<td>2 dB Steps to 20 dB</td>
<td>20 – 30 dB ± 0.2 dB</td>
</tr>
<tr>
<td>5 dB Steps to 40 dB</td>
<td>30 – 40 dB ± 0.25 dB</td>
</tr>
</tbody>
</table>

++ Please contact factory for availability
### Ordering Information

<table>
<thead>
<tr>
<th>FA 16</th>
<th>S</th>
<th>Q</th>
<th>B</th>
<th>402</th>
<th>402</th>
<th>B</th>
<th>10</th>
</tr>
</thead>
</table>

- **ATTENUATION VALUE**
  - 0 to 40 dB
  - Eg. 10 = 10 dB
  - NOT APPLICABLE TO VARIABLE ATTENUATORS

- **MATERIAL**
  - A = ALUMINIUM (STANDARD FOR DOUBLE RIDGE WAVEGUIDE)
  - B = BRASS (STANDARD FOR RECTANGULAR WAVEGUIDE)

- **FLANGE Y**
  - SELECT THE REQUIRED FLANGE BY SELECTING THE LAST 3 DIGITS OF THE TWS FLANGE PART No.
  - Eg. 402 = UBR FLANGE

- **FLANGE X**
  - SELECT THE REQUIRED FLANGE BY SELECTING THE LAST 3 DIGITS OF THE TWS FLANGE PART No.
  - Eg. 402 = UBR FLANGE

- **FINISH**
  - Z = UNPLATED (NON-STANDARD OPTIONAL FOR BRASS)
  - H = CHROMATE
  - F = IRIDITE
  - A = TIN (OPTIONAL FOR BRASS)
  - B = SILVER (STANDARD)

- **PAINT**
  - Q = TWS BLUE (STANDARD)
  - B = BLACK (OPTIONAL)
  - G = GREY (OPTIONAL)

- **TYPE**
  - P = PRECISION, CALIBRATED (VARIABLE ATTENUATOR ONLY)
  - S = STANDARD

- **WAVEGUIDE SIZE**
  - USE THE BRITISH WG SIZE FOR RECTANGULAR WAVEGUIDE or THE MIL SPEC. WRD SIZE FOR DOUBLE RIDGE WAVEGUIDE
  - Eg. 16 = WAVEGUIDE SIZE WG16
  - 750 = WRD750

- **PRODUCT CODE**
  - FA = FIXED ATTENUATOR
  - VA = VARIABLE ATTENUATOR

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**Notes:**

1) The flange should match the material of the device to remain standard

For assistance selecting RoHS compliant options please contact the factory

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**The Waveguide Solution Limited**

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www.waveguidesolution.co.uk

Specifications shown or data provided in this document are offered as a guide only. Components may be modified to suit the mechanical or electrical parameters requested, or may be optimized to suit the operating frequency range. Frequency range of operation shall be advised when ordering.

Information provided in this brochure is for reference only. Dimensions or specifications are typical values. All designs, specifications and availabilities of products and services presented in this document may be subject to change without notice. For confirmation of details please contact your agent or manufacturer. Issue 1.0e.