

Section 5

Directional Couplers

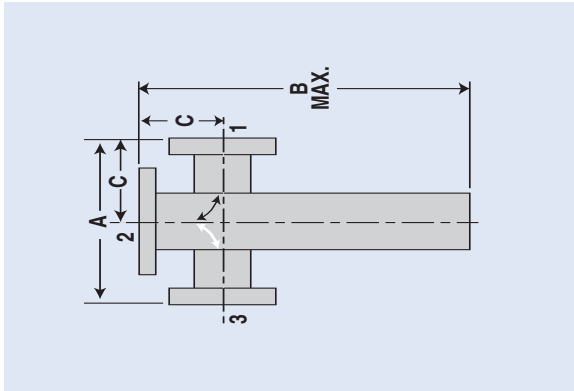


Introduction

At MDL, directional couplers have always received the engineering and manufacturing attention due a major component. A wide variety of types are offered, often tailored to specific applications. Included in the MDL line are cross-guide couplers with a coupling aperture design that is exclusive with MDL – broadwall, sidewall and branchguide couplers that were designed using our own computer program – waveguide loop couplers – a line of high directivity couplers featuring a minimum directivity of 45 dB over a full waveguide frequency band – and, the most recent addition, ridged waveguide couplers. Our experienced design group is also prepared to modify one of our standard models or design an entirely new coupler for your special applications.

Ordering Information*

Example: 90XT326-R-20P-1-A



MODEL NUMBER COUPLING DIRECTION PRESSURIZED TERMINAL FLANGES MATERIAL

90XT326-R-20P - 1 - A

Coupling Direction
Insert "R" for right-handed coupling.

Omit "R" for left-handed coupling.

Pressurized for 20PSIG.
Number indicates desired pressure

For non-pressurized, omit numerals and "P".

Flange Termination - 3 Flanges & Load

| Flange | Port 1 | Port 2 | Port 3 |
|--------|--------|--------|--------|
| 1 | Cover | Cover | Cover |
| 2 | Cover | Cover | Choke |
| 3 | Cover | Choke | Cover |
| 4 | Cover | Choke | Choke |
| 5 | Choke | Cover | Cover |
| 6 | Choke | Cover | Choke |
| 7 | Choke | Choke | Cover |
| 8 | Choke | Choke | Choke |

Flange Termination - 4 Flanges

| Flange | Port 1a | Port 2a | Port 1b | Port 2b |
|--------|---------|---------|---------|---------|
| 1 | Cover | Cover | Cover | Cover |
| 2 | Cover | Cover | Cover | Choke |
| 3 | Cover | Cover | Choke | Cover |
| 4 | Cover | Cover | Choke | Choke |
| 5 | Cover | Choke | Cover | Cover |
| 6 | Cover | Choke | Cover | Choke |
| 7 | Cover | Choke | Choke | Cover |
| 8 | Cover | Choke | Choke | Choke |
| 9 | Choke | Cover | Cover | Cover |
| 10 | Choke | Cover | Cover | Choke |
| 11 | Choke | Cover | Choke | Cover |
| 12 | Choke | Cover | Choke | Choke |
| 13 | Choke | Choke | Cover | Cover |
| 14 | Choke | Choke | Cover | Choke |
| 15 | Choke | Choke | Choke | Cover |
| 16 | Choke | Choke | Choke | Choke |

Material and Finish

| Code | Material | Finish |
|------|----------------|---|
| A | Aluminum Alloy | No Finish |
| B | Copper Alloy | No Finish |
| C | Aluminum Alloy | Chromated |
| D | Copper Alloy | Silver Plated |
| E | Aluminum Alloy | Chromated and Painted Blue |
| F | Copper Alloy | Silver Plated and Painted Blue |
| G | Copper Alloy | Cadmium Plated |
| H | Copper Alloy | Silver Plated and Rhodium flashed |
| L | Copper Alloy | Silver Plated, Rhodium flashed and Painted Blue |

Crossguide Couplers

MDL directional crossguide couplers, utilizing a new type of coupling aperture, exhibit high power-handling characteristics and are excellent for flat coupling over a given bandwidth. When calibrated, these couplers also perform efficiently as secondary standards for attenuating by known factors. MDL crossguide couplers are organized by WR number waveguide designations. For specific applications, MDL can design couplers to meet critical requirements for mean coupling values and directivity over limited bandwidths. Type "N" and "SMA" connectors can be supplied on the secondary arm output upon request overall dimensions remaining the same, or a standard AC adapter may be attached.

Either left or right directions of coupling are available. Left coupling will be supplied as standard, unless otherwise specified.

| W/G SIZE FREQ. RANGE (GHz) | MDL MODEL NUMBERS | STYLE NO. OF PORTS | MEAN COUPLING (dB) * | DIRECT- IVITY (dB MIN) | MAX . VSWR | MECHANICAL DIMENSIONS (INCHES) | | |
|--|-------------------------|-----------------------------|-------------------------------|------------------------------|---------------|--------------------------------------|------|------|
| | | | | | | A | B | C |
| WR28 26.50 GHz to 39.00 GHz | 28XT326 | 3 | 20 ¹ | 15 | 1.25 | 1.50 | 2.50 | .75 |
| | 28XT336 | | 30 ² | 20 | 1.10 | 1.50 | 2.50 | .75 |
| | 28XT346 | | 40 ³ | 20 | 1.10 | 1.50 | 2.50 | .75 |
| | 28XT426 | 4 | 20 ¹ | 20 | 1.25 | 1.50 | 1.50 | .75 |
| | 28XT436 | | 30 ² | 20 | 1.10 | 1.50 | 1.50 | .75 |
| 28XT446 | 40 ³ | 20 | 1.10 | 1.50 | 1.50 | .75 | | |
| WR42 18.00 GHz to 26.50 GHz | 42XT326 | 3 | 20 ⁴ | 20 | 1.25 | 2.00 | 3.50 | 1.00 |
| | 42XT336 | | 30 | 20 | 1.15 | 2.00 | 3.50 | 1.00 |
| | 42XT346 | | 40 | 20 | 1.10 | 2.00 | 3.50 | 1.00 |
| | 42XT356 | 4 | 50 | 20 | 1.08 | 2.00 | 3.50 | 1.00 |
| | 42XT366 | | 60 | 20 | 1.08 | 2.00 | 3.50 | 1.00 |
| | 42XT426 | | 20 ⁴ | 20 | 1.25 | 2.00 | 2.00 | 1.00 |
| | 42XT436 | | 30 | 20 | 1.15 | 2.00 | 2.00 | 1.00 |
| | 42XT446 | 40 | 20 | 1.10 | 2.00 | 2.00 | 1.00 | |
| | 42XT456 | 50 | 20 | 1.08 | 2.00 | 2.00 | 1.00 | |
| | 42XT466 | 60 | 20 | 1.08 | 2.00 | 2.00 | 1.00 | |
| WR51 15.00 GHz to 22.00 GHz | 51XT326 | 3 | 20 ⁴ | 20 | 1.25 | 2.25 | 4.00 | 1.12 |
| | 51XT336 | | 30 ⁵ | 20 | 1.15 | 2.25 | 4.00 | 1.12 |
| | 51XT346 | | 40 ⁵ | 20 | 1.10 | 2.25 | 4.00 | 1.12 |
| | 51XT356 | 4 | 50 | 20 | 1.08 | 2.25 | 4.00 | 1.12 |
| | 51XT366 | | 60 | 20 | 1.08 | 2.25 | 4.00 | 1.12 |
| | 51XT426 | | 20 ⁴ | 20 | 1.25 | 2.25 | 2.25 | 1.12 |
| | 51XT436 | | 30 ⁵ | 20 | 1.15 | 2.25 | 2.25 | 1.12 |
| | 51XT446 | | 40 ⁵ | 20 | 1.10 | 2.25 | 2.25 | 1.12 |
| 51XT456 | 50 | 20 | 1.08 | 2.25 | 2.25 | 1.12 | | |
| 51XT466 | 60 | 20 | 1.08 | 2.25 | 2.25 | 1.12 | | |
| WR62 12.40 GHz to 17.50 GHz | 62XT326 | 3 | 20 ⁴ | 20 | 1.25 | 2.25 | 4.00 | 1.12 |
| | 62XT336 | | 30 ⁴ | 20 | 1.15 | 2.25 | 4.00 | 1.12 |
| | 62XT346 | | 40 | 20 | 1.10 | 2.25 | 4.00 | 1.12 |
| | 62XT356 | 4 | 50 | 20 | 1.08 | 2.25 | 4.00 | 1.12 |
| | 62XT366 | | 60 | 20 | 1.08 | 2.25 | 4.00 | 1.12 |
| | 62XT426 | | 20 ⁴ | 20 | 1.25 | 2.25 | 2.25 | 1.12 |
| | 62XT436 | | 30 ⁴ | 20 | 1.15 | 2.25 | 2.25 | 1.12 |
| | 62XT446 | | 40 | 20 | 1.10 | 2.25 | 2.25 | 1.12 |
| | 62XT456 | | 50 | 20 | 1.08 | 2.25 | 2.25 | 1.12 |
| 62XT466 | 60 | 20 | 1.08 | 2.25 | 2.25 | 1.12 | | |

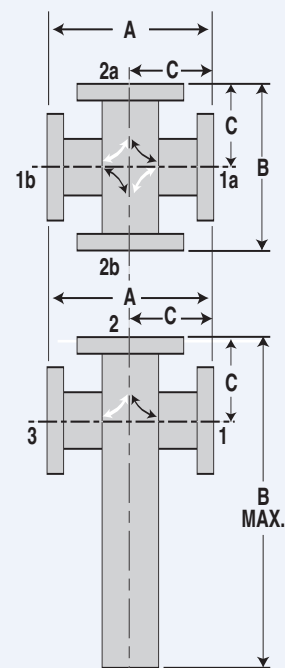
Notes: *Tolerance all values +/- 1.0dB

¹ Variation = +/- .3dB, 26.5GHz to 39GHz

² Variation = +/- 2.5dB, 26.5GHz to 40GHz

³ Variation = +/- 1.0dB, 26.5GHz to 40GHz

CROSSGUIDE COUPLERS



Right coupling indicated by white arrows
Left coupling indicated by black arrows

Variation

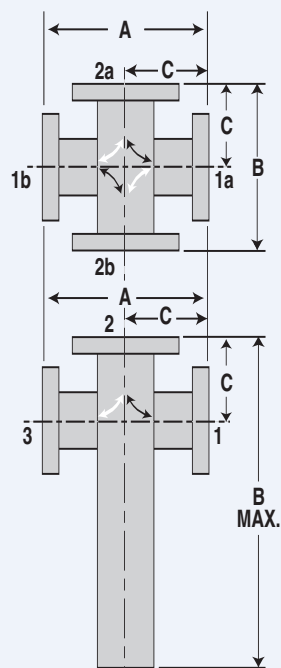
20 = +/- .5dB

30 = +/- .5dB

40 = +/- .4dB

50 = +/- .3dB

60 = +/- .3dB



Right coupling indicated by white arrows
Left coupling indicated by black arrows

Variation

20 = +/- .5dB

30 = +/- .5dB

40 = +/- .4dB

50 = +/- .3dB

60 = +/- .3dB

Crossguide Couplers

| W/G SIZE FREQ. RANGE (GHz) | MDL MODEL NUMBERS | STYLE NO. OF PORTS | MEAN COUPLING (dB) * | DIRECT- IVITY (dB MIN) | MAX. VSWR | MECHANICAL DIMENSIONS (INCHES) | | |
|--|-------------------------|-----------------------------|-------------------------------|------------------------------|--------------|--------------------------------------|------|------|
| | | | | | | A | B | C |
| WR75 10.00 GHz to 14.50 GHz | 75XT326 | 3 | 20 ⁴ | 20 | 1.25 | 2.50 | 5.25 | 1.25 |
| | 75XT336 | | 30 ⁴ | 20 | 1.15 | 2.50 | 5.25 | 1.25 |
| | 75XT346 | | 40 ⁶ | 20 | 1.10 | 2.50 | 5.25 | 1.25 |
| | 75XT356 | 4 | 50 | 20 | 1.08 | 2.50 | 5.25 | 1.25 |
| | 75XT366 | | 60 | 20 | 1.08 | 2.50 | 5.25 | 1.25 |
| | 75XT426 | | 20 ⁴ | 20 | 1.25 | 2.50 | 2.50 | 1.25 |
| | 75XT436 | | 30 ⁴ | 20 | 1.15 | 2.50 | 2.50 | 1.25 |
| | 75XT446 | 4 | 40 ⁶ | 20 | 1.10 | 2.50 | 2.50 | 1.25 |
| | 75XT456 | | 50 | 20 | 1.08 | 2.50 | 2.50 | 1.25 |
| | 75XT466 | | 60 | 20 | 1.08 | 2.50 | 2.50 | 1.25 |
| 75XT466 | 60 | | 20 | 1.08 | 2.50 | 2.50 | 1.25 | |
| WR90 8.20 GHz to 14.50 GHz | 90XT326 | 3 | 20 ⁵ | 20 | 1.15 | 2.63 | 5.81 | 1.31 |
| | 90XT336 | | 30 ⁵ | 20 | 1.10 | 2.63 | 5.81 | 1.31 |
| | 90XT346 | | 40 | 20 | 1.07 | 2.63 | 5.81 | 1.31 |
| | 90XT356 | 4 | 50 | 20 | 1.05 | 2.63 | 5.81 | 1.31 |
| | 90XT366 | | 60 | 20 | 1.05 | 2.63 | 5.81 | 1.31 |
| | 90XT426 | | 20 ⁵ | 20 | 1.15 | 2.63 | 2.63 | 1.31 |
| | 90XT436 | | 30 ⁵ | 20 | 1.10 | 2.63 | 2.63 | 1.31 |
| | 90XT446 | 4 | 40 | 20 | 1.07 | 2.63 | 2.63 | 1.31 |
| | 90XT456 | | 50 | 20 | 1.05 | 2.63 | 2.63 | 1.31 |
| | 90XT466 | | 60 | 20 | 1.05 | 2.63 | 2.63 | 1.31 |
| 90XT466 | 60 | | 20 | 1.05 | 2.63 | 2.63 | 1.31 | |
| WR102 7.00 GHz to 11.00 GHz | 102XT326 | 3 | 20 ⁹ | 20 ^{**} | 1.30 | 2.75 | 6.00 | 1.37 |
| | 102XT336 | | 30 ⁸ | 20 ^{**} | 1.15 | 2.75 | 6.00 | 1.37 |
| | 102XT346 | | 40 | 20 ^{**} | 1.10 | 2.75 | 6.00 | 1.37 |
| | 102XT356 | 4 | 50 | 20 ^{**} | 1.08 | 2.75 | 6.00 | 1.37 |
| | 102XT366 | | 60 | 20 ^{**} | 1.08 | 2.75 | 6.00 | 1.37 |
| | 102XT426 | | 20 ⁹ | 20 ^{**} | 1.30 | 2.75 | 2.75 | 1.37 |
| | 102XT436 | | 30 ⁸ | 20 ^{**} | 1.15 | 2.75 | 2.75 | 1.37 |
| | 102XT446 | 4 | 40 | 20 ^{**} | 1.10 | 2.75 | 2.75 | 1.37 |
| | 102XT456 | | 50 | 20 ^{**} | 1.08 | 2.75 | 2.75 | 1.37 |
| | 102XT466 | | 60 | 20 ^{**} | 1.08 | 2.75 | 2.75 | 1.37 |
| 102XT466 | 60 | | 20 ^{**} | 1.08 | 2.75 | 2.75 | 1.37 | |

Notes: *Tolerance all values +/- 1.0dB

**15dB from 7.0 to 7.5GHz

⁴ Variation +/- .8dB

⁵ Variation +/- .6dB

⁶ Variation +/- .5dB

⁷ Variation +/- 1.5dB

⁸ Variation +/- 1.0dB

⁹ Variation +/- 1.4dB

Crossguide Couplers

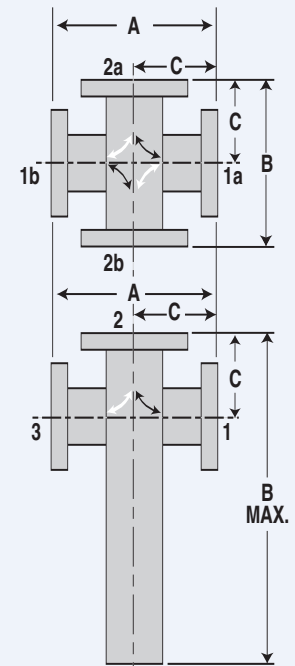
CROSSGUIDE COUPLERS

| W/G SIZE FREQ. RANGE (GHz) | MDL MODEL NUMBERS | STYLE NO. OF PORTS | MEAN COUPLING (dB) * | DIRECT- IVITY (dB MIN) | MAX. VSWR | MECHANICAL DIMENSIONS (INCHES) | | |
|--|-------------------------|-----------------------------|-------------------------------|------------------------------|--------------|--------------------------------------|------|------|
| | | | | | | A | B | C |
| WR112 7.00 GHz to 10.00 GHz | 112XT326 | 3 | 20 | 20 | 1.15 | 3.25 | 5.00 | 1.62 |
| | 112XT336 | | 30 | 20 | 1.10 | 3.25 | 5.00 | 1.62 |
| | 112XT346 | | 40 | 20 | 1.07 | 3.25 | 5.00 | 1.62 |
| | 112XT356 | | 50 | 20 | 1.05 | 3.25 | 5.00 | 1.62 |
| | 112XT366 | | 60 | 20 | 1.05 | 3.25 | 5.00 | 1.62 |
| | 112XT426 | 4 | 20 | 20 | 1.15 | 3.25 | 3.25 | 1.62 |
| | 112XT436 | | 30 | 20 | 1.10 | 3.25 | 3.25 | 1.62 |
| | 112XT446 | | 40 | 20 | 1.07 | 3.25 | 3.25 | 1.62 |
| | 112XT456 | | 50 | 20 | 1.05 | 3.25 | 3.25 | 1.62 |
| | 112XT466 | | 60 | 20 | 1.05 | 3.25 | 3.25 | 1.62 |
| WR137 5.40 GHz to 8.20 GHz | 137XT326 | 3 | 20 | 20 | 1.15 | 4.00 | 8.00 | 2.00 |
| | 137XT336 | | 30 | 20 | 1.10 | 4.00 | 8.00 | 2.00 |
| | 137XT346 | | 40 | 20 | 1.07 | 4.00 | 8.00 | 2.00 |
| | 137XT356 | | 50 | 20 | 1.05 | 4.00 | 8.00 | 2.00 |
| | 137XT366 | | 60 | 20 | 1.05 | 4.00 | 8.00 | 2.00 |
| | 137XT426 | 4 | 20 | 20 | 1.15 | 4.00 | 4.00 | 2.00 |
| | 137XT436 | | 30 | 20 | 1.10 | 4.00 | 4.00 | 2.00 |
| | 137XT446 | | 40 | 20 | 1.07 | 4.00 | 4.00 | 2.00 |
| | 137XT456 | | 50 | 20 | 1.05 | 4.00 | 4.00 | 2.00 |
| | 137XT466 | | 60 | 20 | 1.05 | 4.00 | 4.00 | 2.00 |
| WR159 4.90 GHz to 6.85 GHz | 159XT326 | 3 | 20 ⁷ | 20 | 1.25 | 4.50 | 9.50 | 2.25 |
| | 159XT336 | | 30 | 20 | 1.15 | 4.50 | 9.50 | 2.25 |
| | 159XT346 | | 40 ⁶ | 20 | 1.10 | 4.50 | 9.50 | 2.25 |
| | 159XT356 | | 50 | 20 | 1.08 | 4.50 | 9.50 | 2.25 |
| | 159XT366 | | 60 | 20 | 1.08 | 4.50 | 9.50 | 2.25 |
| | 159XT426 | 4 | 20 ⁷ | 20 | 1.25 | 4.50 | 4.50 | 2.25 |
| | 159XT436 | | 30 | 20 | 1.15 | 4.50 | 4.50 | 2.25 |
| | 159XT446 | | 40 ⁶ | 20 | 1.10 | 4.50 | 4.50 | 2.25 |
| | 159XT456 | | 50 | 20 | 1.08 | 4.50 | 4.50 | 2.25 |
| | 159XT466 | | 60 | 20 | 1.08 | 4.50 | 4.50 | 2.25 |

Notes: *Tolerance all values +/- 1.0dB

⁶ Variation +/- .5dB

⁷ Variation +/- 1.5dB



Right coupling indicated by white arrows
Left coupling indicated by black arrows

Variation

20 = +/- .5dB

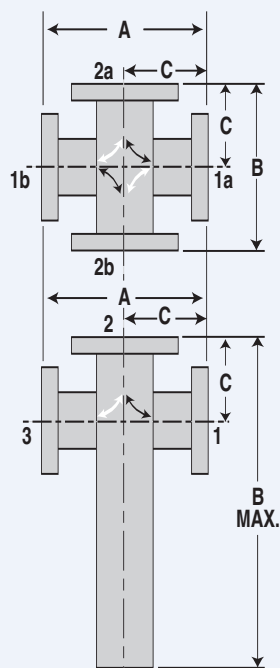
30 = +/- .5dB

40 = +/- .4dB

50 = +/- .3dB

60 = +/- .3dB

Crossguide Couplers



Right coupling indicated by white arrows
Left coupling indicated by black arrows

Variation

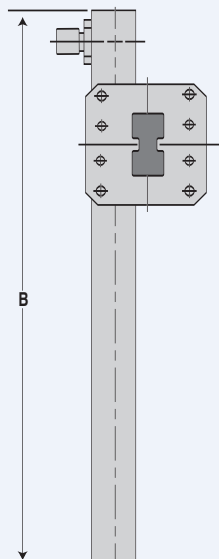
20 = +/- .5dB

30 = +/- .5dB

40 = +/- .4dB

50 = +/- .3dB

60 = +/- .3dB



| W/G SIZE FREQ. RANGE (GHz) | MDL MODEL NUMBERS | STYLE NO. OF PORTS | MEAN COUPLING (dB) * | DIRECT- IVITY (dB MIN) | MAX. VSWR | MECHANICAL DIMENSIONS (INCHES) | | | |
|---|-------------------------|-----------------------------|-------------------------------|------------------------------|--------------|--------------------------------------|-------|------|------|
| | | | | | | A | B | C | |
| WR187 3.95 GHz to 5.85 GHz | 187XT326 | 3 | 20 | 20 | 1.15 | 5.00 | 10.00 | 2.50 | |
| | 187XT336 | | 30 | 20 | 1.10 | 5.00 | 10.00 | 2.50 | |
| | 187XT346 | | 40 | 20 | 1.07 | 5.00 | 10.00 | 2.50 | |
| | 187XT356 | | 50 | 20 | 1.05 | 5.00 | 10.00 | 2.50 | |
| | 187XT366 | | 60 | 20 | 1.05 | 5.00 | 10.00 | 2.50 | |
| | 187XT426 | | 4 | 20 | 20 | 1.15 | 5.00 | 5.00 | 2.50 |
| | 187XT436 | | | 30 | 20 | 1.10 | 5.00 | 5.00 | 2.50 |
| | 187XT446 | | | 40 | 20 | 1.07 | 5.00 | 5.00 | 2.50 |
| 187XT456 | 50 | 20 | | 1.05 | 5.00 | 5.00 | 2.50 | | |
| 187XT466 | 60 | 20 | 1.05 | 5.00 | 5.00 | 2.50 | | | |
| WR229 3.30 GHz to 4.90 GHz | 229XT326 | 3 | 20 ⁴ | 20 | 1.15 | 7.00 | 12.00 | 3.50 | |
| | 229XT336 | | 30 ⁴ | 20 | 1.10 | 7.00 | 12.00 | 3.50 | |
| | 229XT346 | | 40 ⁶ | 20 | 1.07 | 7.00 | 12.00 | 3.50 | |
| | 229XT356 | | 50 | 20 | 1.05 | 7.00 | 12.00 | 3.50 | |
| | 229XT366 | | 60 | 20 | 1.05 | 7.00 | 12.00 | 3.50 | |
| | 229XT426 | | 4 | 20 ⁴ | 20 | 1.15 | 7.00 | 7.00 | 3.50 |
| | 229XT436 | | | 30 ⁴ | 20 | 1.10 | 7.00 | 7.00 | 3.50 |
| | 229XT446 | | | 40 ⁶ | 20 | 1.07 | 7.00 | 7.00 | 3.50 |
| 229XT456 | 50 | 20 | | 1.05 | 7.00 | 7.00 | 3.50 | | |
| 229XT466 | 60 | 20 | 1.05 | 7.00 | 7.00 | 3.50 | | | |
| WR284 2.60 GHz to 3.95 GHz | 284XT326 | 3 | 20 ⁵ | 20 | 1.15 | 8.00 | 13.00 | 4.00 | |
| | 284XT336 | | 30 ⁵ | 20 | 1.10 | 8.00 | 13.00 | 4.00 | |
| | 284XT346 | | 40 | 20 | 1.07 | 8.00 | 13.00 | 4.00 | |
| | 284XT356 | | 50 | 20 | 1.05 | 8.00 | 13.00 | 4.00 | |
| | 284XT366 | | 60 | 20 | 1.05 | 8.00 | 13.00 | 4.00 | |
| | 284XT426 | | 4 | 20 ⁵ | 20 | 1.15 | 8.00 | 8.00 | 4.00 |
| | 284XT436 | | | 30 ⁵ | 20 | 1.10 | 8.00 | 8.00 | 4.00 |
| | 284XT446 | | | 40 | 20 | 1.07 | 8.00 | 8.00 | 4.00 |
| | 284XT456 | | | 50 | 20 | 1.05 | 8.00 | 8.00 | 4.00 |
| | 284XT466 | | | 60 | 20 | 1.05 | 8.00 | 8.00 | 4.00 |

| W/G SIZE FREQ. RANGE (GHz) | MDL MODEL NUMBERS | STYLE NO. OF PORTS | MEAN COUPLING (dB) * | DIRECT- IVITY (dB MIN) | MAX. VSWR | MECHANICAL DIMENSIONS (INCHES) | | |
|--|-------------------------|-----------------------------|-------------------------------|------------------------------|--------------|--------------------------------------|------|------|
| | | | | | | A | B | C |
| WRD-750 8.00-16.00 | D750XT346 | 3 | 40 | 15 | 1.05 | 2.50 | 6.00 | 1.25 |
| | D750XT356 | | 50 | 15 | 1.05 | 2.50 | 6.00 | 1.25 |
| WRD-475 5.00-9.50 | D475XT346 | 3 | 40 | 15 | 1.05 | 4.50 | 8.50 | 2.25 |
| | D475XT356 | | 50 | 15 | 1.05 | 4.50 | 8.50 | 2.25 |

Notes: *Tolerance all values +/- 1.0dB

⁴ Variation +/- .8dB

⁵ Variation +/- .6dB

Loop Couplers

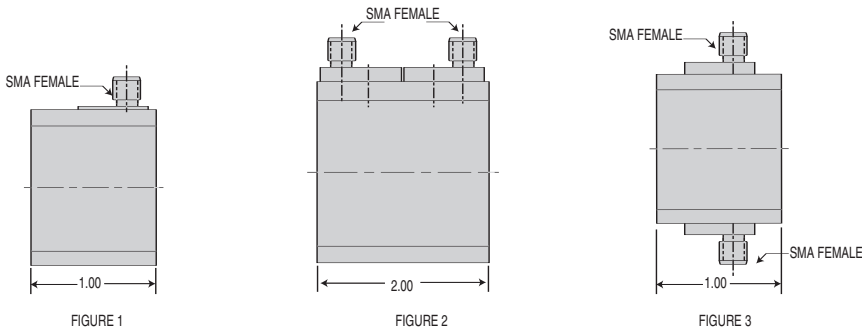
MDL waveguide loop coupler cover the frequency spectrum from WR90 to WR2100, and are widely used in RF circuits requiring directional power injection or extraction.

These units are available as uni- or bi-directional couplers. Modifications to the standard designs are available on request.

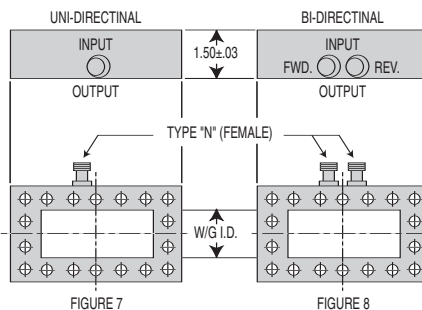
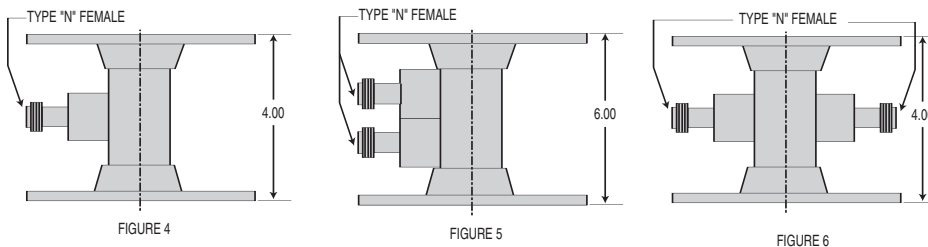
| W/G SIZE | FREQ. RANGE (GHz) | MIN COUPLING VALUE (dB) | WITH BI-DIRECTIONAL CONNECTORS | | | | | |
|----------|-------------------|-------------------------|---------------------------------------|-----------------|---------------------------|-------|---------|-------|
| | | | WITH UNI-DIRECTIONAL CONNECTORS (FIG) | SAME SIDE (FIG) | ONE TOP/ ONE BOTTOM (FIG) | (FIG) | (FIG) | (FIG) |
| WR90 | 8.20-12.40 | 20 to 70 | 90LT16 | 1* | 90LT26 | 2* | 90LT36 | 3* |
| WR112 | 7.05-10.00 | 25 to 70 | 112LT16 | 1* | 112LT26 | 2* | 112LT36 | 3* |
| WR137 | 5.85-8.20 | 30 to 70 | 137LT16 | 4 | 137LT26 | 5 | 137LT36 | 6 |
| WR159 | 4.90-7.05 | 30 to 70 | 159LT16 | 4 | 159LT26 | 5 | 159LT36 | 6 |
| WR187 | 3.95-5.85 | 30 to 70 | 187LT16 | 4 | 187LT26 | 5 | 187LT36 | 6 |
| WR229 | 3.30-4.90 | 35 to 70 | 229LT16 | 4 | 229LT26 | 5 | 229LT36 | 6 |
| WR284 | 2.60-3.95 | 35 to 70 | 284LT16 | 4 | 284LT26 | 5 | 284LT36 | 6 |
| WR430 | 1.70-2.60 | 40 to 70 | 430LT16 | 7 | 430LT26 | 8 | | |
| | | | | 4 | 430LT46 | 5 | 430LT56 | 6 |
| WR650 | 1.12-1.70 | 40 to 70 | 650LT16 | 7 | 650LT26 | 8 | | |
| | | | | 4 | 650LT46 | 5 | 650LT56 | 6 |

ELECTRICAL DATA

Frequency: Bandwidth to be specified.
 Coupling Value: To be specified.
 Coupling Sensitivity: Approximately +/- 1dB for 20% bandwidth.
 Directivity: 25dB for 2% of the waveguide band
 20dB for 20% of the waveguide band
 15dB for coupling values < 30dB for 20% of the waveguide band.
 VSWR: Main arm: 1.05 max. typical for coupling values greater than 30dB.
 Power: The main arm will handle approximately 90% of waveguide rating. The internal load in the loop will handle 5 watts average power at 25°C.
 Output Connectors: WR90 to 112 SMA female
 WR137 to 2100 type "N" female.



Flange faces equivalent to STD cover flange except tapped holes.



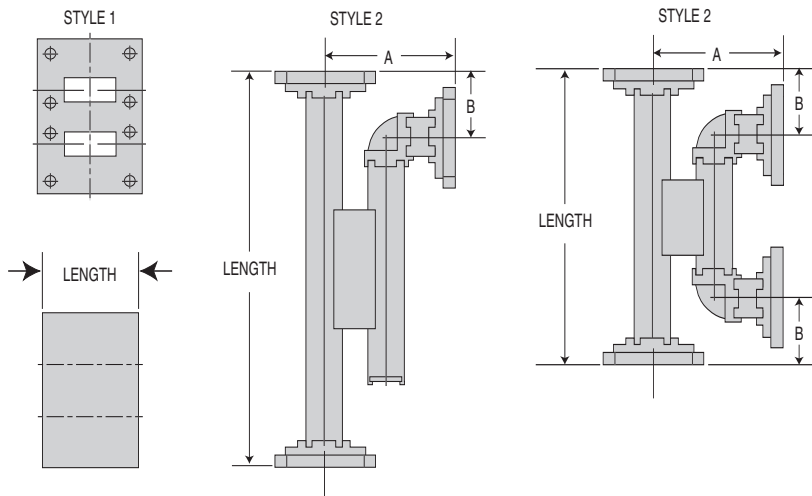
Branch Guide Couplers

These waveguide directional couplers offer characteristics which cannot be met by cross-guide, multi-aperture or slot type couplers, especially in the 6-12dB coupling range. They are of very short length and can handle almost full waveguide peak-pulse power capacity. Full waveguide band-widths may be specified: but for flat coupling, the bandwidth should be limited to approximately 10 percent.

Computer aided design for specified parameters enables MDL to reduce design and manufacturing time and assure optimum performance. Mean coupling can be held to a tighter tolerance than for other types of couplers. Directivity is 20dB min. Repeatability in production is facilitated by new manufacturing techniques.

| W/G SIZE | FREQ. RANGE (GHz) | MDL MODEL NO. | | | MEAN COUPLING- (dB) | VAR. FROM MEAN COUPLING (dB) | MECHANICAL DIMENSIONS | | | | |
|----------|-------------------|---------------|----------|----------|---------------------|------------------------------|-----------------------|----------------|---------|------|------|
| | | STYLE 1 | STYLE 2 | STYLE 3 | | | STYLE 1 | LENGTH STYLE 2 | STYLE 3 | A | B |
| WR62 | 15.50-18.00 | 62CB16 | 62CB316 | 62CB416 | 3.0±.3 | ±.2 | 2.00 | 5.65 | 4.43 | 1.20 | .81 |
| | | 62CB36 | 62CB336 | 62CB436 | 6.0±.4 | ±.2 | 2.00 | 5.65 | 4.43 | 1.20 | .81 |
| | | 62CB56 | 62CB356 | 62CB456 | 10.0±.5 | ±.2 | 2.00 | 5.65 | 4.43 | 1.20 | .81 |
| WR90 | 8.50-9.60 | 90CB16 | 90CB316 | 90CB416 | 3.0±.3 | ±.3 | 2.50 | 6.00 | 5.00 | 2.00 | .80 |
| | | 90CB36 | 90CB336 | 90CB436 | 6.0±.4 | ±.3 | 2.50 | 6.00 | 5.00 | 2.00 | .80 |
| | | 90CB56 | 90CB356 | 90CB456 | 10.0±.5 | ±.3 | 2.50 | 6.00 | 5.00 | 2.00 | .80 |
| WR112 | 7.50-8.50 | 112CB16 | 112CB316 | 112CB416 | 3.0±.3 | ±.2 | 3.00 | 8.00 | 6.00 | 2.50 | 1.19 |
| | | 112CB36 | 112CB336 | 112CB436 | 6.0±.4 | ±.2 | 3.00 | 8.00 | 6.00 | 2.50 | 1.19 |
| | | 112CB56 | 112CB356 | 112CB456 | 10.0±.5 | ±.2 | 3.00 | 8.00 | 6.00 | 2.50 | 1.19 |
| WR137 | 5.90-6.60 | 137CB16 | 137CB316 | 137CB416 | 3.0±.3 | ±.2 | 4.00 | 11.00 | 8.00 | 3.00 | 1.75 |
| | | 137CB36 | 137CB336 | 137CB436 | 6.0±.4 | ±.2 | 4.00 | 11.00 | 8.00 | 3.00 | 1.75 |
| | | 137CB56 | 137CB356 | 137CB456 | 10.0±.5 | ±.2 | 4.00 | 11.00 | 8.00 | 3.00 | 1.75 |
| WR159 | 5.00-5.90 | 159CB16 | 159CB316 | 159CB416 | 3.0±.3 | ±.4 | 4.50 | 12.00 | 10.00 | 3.25 | 1.50 |
| | | 159CB36 | 159CB336 | 159CB436 | 6.0±.4 | ±.5 | 4.50 | 12.00 | 10.00 | 3.25 | 1.50 |
| | | 159CB56 | 159CB356 | 159CB456 | 10.0±.5 | ±.4 | 4.50 | 12.00 | 10.00 | 3.25 | 1.50 |
| WR187 | 5.30-6.10 | 187CB16 | 187CB316 | 187CB416 | 3.0±.3 | ±.2 | 5.00 | 14.00 | 12.00 | 3.25 | 2.32 |
| | | 187CB36 | 187CB336 | 187CB436 | 6.0±.4 | ±.2 | 5.00 | 14.00 | 12.00 | 3.25 | 2.32 |
| | | 187CB56 | 187CB356 | 187CB456 | 10.0±.5 | ±.2 | 5.00 | 14.00 | 12.00 | 3.25 | 2.32 |
| WR229 | 3.70-4.20 | 229CB16 | 229CB316 | 229CB416 | 3.0±.3 | ±.2 | 6.10 | 18.00 | 12.00 | 3.50 | 1.50 |
| | | 229CB36 | 229CB336 | 229CB436 | 6.0±.4 | ±.3 | 6.10 | 18.00 | 12.00 | 3.50 | 1.50 |
| | | 229CB56 | 229CB356 | 229CB456 | 10.0±.5 | ±.2 | 6.10 | 18.00 | 12.00 | 3.50 | 1.50 |
| WR284 | 2.70-3.05 | 284CB16 | 284CB316 | 284CB416 | 3.0±.3 | ±.3 | 8.00 | 24.00 | 12.35 | 5.00 | 2.60 |
| | | 284CB36 | 284CB336 | 284CB436 | 6.0±.4 | ±.3 | 8.00 | 24.00 | 12.35 | 5.00 | 2.60 |
| | | 284CB56 | 284CB356 | 284CB456 | 10.0±.5 | ±.3 | 8.00 | 24.00 | 12.35 | 5.00 | 2.60 |

*Cross-guide couplers are available for loose coupling values only, and multi-aperture couplers are too lengthy for tight couplings. Short slot couplers, while capable of handling high power are usually available only in the 3.5 dB range. With reduced bandwidths the directivity can be greater than 30 dB.



Broadwall couplers

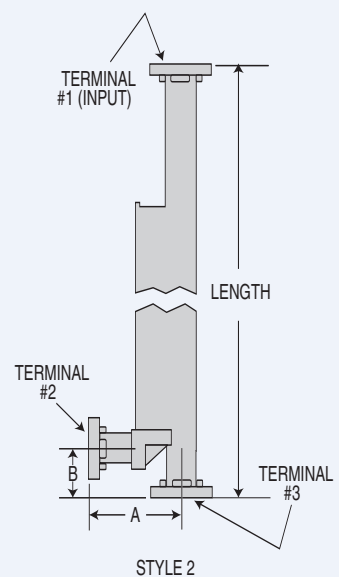
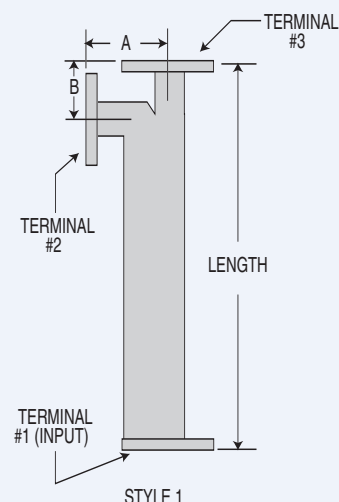
BROADWALL

| W/G SIZE FREQ. RANGE (GHz) | MDL MODEL NUMBERS | MEAN COUPLING (dB) * | VAR. FROM MEAN COUPLING vs FREQ. (dB) | DIRECT- IVITY (dB min) | STYLE * | MECHANICAL DIMENSIONS (INCHES) | | | INPUT TERMINAL FLANGES EQUIVALENT TO |
|--|-------------------------|-------------------------------|---|------------------------------|------------|--------------------------------------|---|---|--|
| | | | | | | LGT. | A | B | |

Multihole

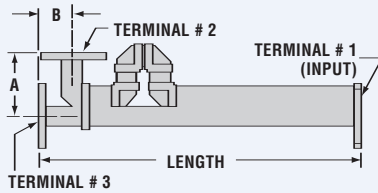
| | | | | | | | | | |
|---------------------|------------|----|------|----|---|-------|------|------|--|
| WR51 15.00-22.00 | 51CT16-1 | 3 | ±0.5 | 30 | 1 | 6.00 | 1.14 | 0.81 | 51FA52 (1.13 x 1.31 cover flange with four 0.144 dia. holes.) |
| | 51CT26-1 | 6 | ±0.5 | 30 | 1 | 5.62 | 1.14 | 0.81 | |
| | 51CT36-1 | 10 | ±0.5 | 30 | 1 | 5.25 | 1.14 | 0.81 | |
| | 51CT46-1 | 20 | ±0.5 | 30 | 1 | 4.87 | 1.14 | 0.81 | |
| | 51CT56-1 | 30 | ±0.5 | 30 | 1 | 4.87 | 1.14 | 0.81 | |
| WR62 12.40-18.00 | 62CT16-1 | 3 | ±0.5 | 30 | 1 | 7.00 | 1.20 | 0.81 | UG419/U UG1665/U |
| | 62CT26-1 | 6 | ±0.5 | 30 | 1 | 6.50 | 1.20 | 0.81 | |
| | 62CT36-1 | 10 | ±0.5 | 30 | 1 | 6.00 | 1.20 | 0.81 | |
| | 62CT46-1 | 20 | ±0.5 | 30 | 1 | 5.50 | 1.20 | 0.81 | |
| | 62CT56-1 | 30 | ±0.5 | 30 | 1 | 5.50 | 1.20 | 0.81 | |
| WR75 10.00-15.00 | 75CT16-1 | 3 | ±0.5 | 25 | 1 | 8.25 | 1.50 | 0.80 | 75FA22 (1.50x1.50- cover flanges with four 6-32 threads.) |
| | 75CT26-1 | 6 | ±0.5 | 25 | 1 | 7.50 | 1.50 | 0.80 | |
| | 75CT36-1 | 10 | ±0.5 | 25 | 1 | 7.00 | 1.50 | 0.80 | |
| | 75CT46-1 | 20 | ±0.5 | 25 | 1 | 6.50 | 1.50 | 0.80 | |
| | 75CT56-1 | 30 | ±0.5 | 25 | 1 | 6.50 | 1.50 | 0.80 | |
| WR90 8.20-12.40 | 90CT86-1 | 3 | ±0.5 | 30 | 1 | 9.25 | 1.53 | 0.80 | UG39/U, UG135/U except 8-32 threads |
| | 90CT96-1 | 6 | ±0.5 | 30 | 1 | 8.50 | 1.53 | 0.80 | |
| | 90CT106-1 | 10 | ±0.5 | 30 | 1 | 7.75 | 1.53 | 0.80 | |
| | 90CT116-1 | 20 | ±0.5 | 30 | 1 | 7.25 | 1.53 | 0.80 | |
| | 90CT126-1 | 30 | ±0.5 | 30 | 1 | 7.25 | 1.53 | 0.80 | |
| | 90CT136-1 | 40 | ±0.5 | 30 | 1 | 7.25 | 1.53 | 0.80 | |
| WR102 7.05-11.00 | 102CT16-1 | 3 | ±0.6 | 30 | 1 | 11.00 | 1.78 | 0.90 | UG1493/U except 8-32 threads |
| | 102CT26-1 | 6 | ±0.6 | 30 | 1 | 10.25 | 1.78 | 0.90 | |
| | 102CT36-1 | 10 | ±0.6 | 30 | 1 | 9.50 | 1.78 | 0.90 | |
| | 102CT46-1 | 20 | ±0.6 | 30 | 1 | 8.75 | 1.78 | 0.90 | |
| | 102CT56-1 | 30 | ±0.6 | 30 | 1 | 8.75 | 1.78 | 0.90 | |
| | 102CT86-1 | 10 | ±0.7 | 40 | 2 | 15.50 | 1.78 | 1.00 | |
| | 102CT96-1 | 20 | ±0.7 | 40 | 2 | 15.50 | 1.78 | 1.00 | |
| WR112 7.00-10.00 | 112CT86-1 | 3 | ±0.4 | 30 | 1 | 12.00 | 1.75 | 1.19 | UG51/U, UG138/U except 8-32 threads |
| | 112CT96-1 | 6 | ±0.4 | 30 | 1 | 11.00 | 1.75 | 1.19 | |
| | 112CT106-1 | 10 | ±0.4 | 30 | 1 | 10.00 | 1.75 | 1.19 | |
| | 112CT116-1 | 20 | ±0.4 | 30 | 1 | 9.50 | 1.75 | 1.19 | |
| | 112CT126-1 | 30 | ±0.4 | 30 | 1 | 9.50 | 1.75 | 1.19 | |
| | 112CT136-1 | 40 | ±0.4 | 30 | 1 | 9.50 | 1.75 | 1.19 | |
| WR137 5.40-8.20 | 137CT16-1 | 3 | ±0.5 | 30 | 1 | 15.00 | 2.38 | 1.75 | UG441/U, UG344/U |
| | 137CT26-1 | 6 | ±0.5 | 30 | 1 | 14.00 | 2.38 | 1.75 | |
| | 137CT36-1 | 10 | ±0.5 | 30 | 1 | 13.00 | 2.38 | 1.75 | |
| | 137CT46-1 | 20 | ±0.5 | 30 | 1 | 12.00 | 2.38 | 1.75 | |
| | 137CT56-1 | 30 | ±0.5 | 30 | 1 | 12.00 | 2.38 | 1.75 | |

*Style 1 not available with choke flange on input terminal



When ordering Style 2, contact factory for length.

MULTIHOLE COMPENSATED



Broadwall couplers

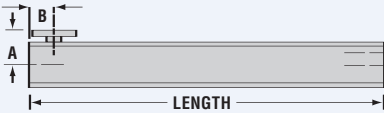
Multihole Compensated

MDL's broadwall compensated directional couplers feature minimum coupling variation with frequency – making them ideal for use in leveling circuits and broadband power monitoring. In contrast to most broadwall couplers, in which variation from mean coupling is ± 0.5 dB over a waveguide bandwidth, MDL's new compensated directional couplers reduce variation from mean coupling to only ± 0.2 to ± 0.3 dB.

| W/G SIZE FREQ. RANGE (GHz) | MDL MODEL NUMBERS | MEAN COUPLING (dB) | VAR. FROM MEAN COUPLING vs FREQ. (dB) | DIRECT- IVITY (dB min) | MAIN ARM | SECOND ARM | MECHANICAL DIMENSIONS (INCHES) | | | INPUT TERMINAL FLANGES EQUIV TO† |
|--|-------------------------|--------------------------|---|------------------------------|-------------|---------------|--------------------------------------|------|------|--|
| | | | | | | | LGT. | A | B | |
| WR62 12.40-18.00 | 62FC16-1 | 20 ± 0.50 | ± 0.20 | 25 | 1.08 | 1.25 | 8.00 | 1.20 | 0.81 | UG419/U |
| WR90 8.20-12.40 | 90FC86-1 | 3 ± 0.40 | ± 0.20 | 30 | 1.10 | 1.25 | 11.50 | 1.53 | 0.80 | UG36/U |
| | 90FC106-1 | 10 ± 0.40 | ± 0.20 | 30 | 1.08 | 1.20 | 10.00 | 1.53 | 0.80 | UG135/U except 8-32 thread |
| | 90FC176-1 | 17 ± 0.40 | ± 0.20 | 30 | 1.08 | 1.20 | 10.00 | 1.53 | 0.80 | |
| WR102 7.00-11.00 | 102FC106-1 | 10 ± 0.40 | ± 0.30 | 25 | 1.08 | 1.20 | 12.00 | 1.78 | 0.90 | UG1493/U except 8-32 thread |

† Terminal 1 (input) not available with choke flanges.

MULTIHOLE HIGH DIRECTIVITY



Multihole High Directivity

MDL high directivity couplers are made using broached waveguides. Walls on the waveguide are extremely thick to prevent changes in characteristics caused by physical distortion. The electrical design assures a minimum directivity of at least 45 dB and typically 50 dB over the entire band, making possible the design of high performance reflectometers. These couplers available with cover flanges only. Material aluminum only.

| W/G SIZE FREQ. RANGE (GHz) | MDL MODEL NUMBERS | MEAN COUPLING (dB) | VAR. FROM MEAN COUPLING vs FREQ. (dB) | DIRECTIVITY (dB min) | MECHANICAL DIMENSIONS (INCHES) | | |
|--|-------------------------|--------------------------|---|-------------------------|--------------------------------------|------|------|
| | | | | | LGT. | A | B |
| WR90 8.20-12.40 | 90CT336-1 | 10 ± 0.40 | ± 0.50 | 50 | 13.62 | 1.25 | 0.80 |

Narrow-wall couplers

| W/G SIZE | FREQ. RANGE (GHz) | MDL MODEL NUMBERS | MEAN COUPLING (dB) | VAR. FROM MEAN COUPLING vs FREQ. (dB) | PEAK POWER MAIN ARM (KW) | DIRECTIVITY (dB min) | MECHANICAL DIMENSIONS (INCHES) | | | INPUT TERMINAL FLANGES EQUIV. TO |
|----------|-------------------|-------------------|--------------------|---------------------------------------|--------------------------|----------------------|--------------------------------|---|---|----------------------------------|
| | | | | | | | LGT. | A | B | |

Multihole

| | | | | | | | | | | | |
|--------------|------------|-------------|----------|---------------------------|-----|----|-------|------|------|------|-------------------------------|
| WR90 | 8.20-12.40 | 90CS136-1 | 10 ± 0.7 | ±1.5 | 200 | 30 | 11.50 | 0.95 | 0.90 | 1.60 | UG39/U |
| | | 90CS146-1 | 20 ± 0.7 | ±1.5 | 200 | 30 | 10.25 | 0.95 | 0.90 | 1.60 | UG135/U |
| | | 90CS156-1 | 30 ± 0.7 | ±1.5 | 200 | 30 | 10.25 | 0.95 | 0.90 | 1.60 | |
| | 8.50-10.50 | 90CS76-1 | 10 ± 1.0 | Included in mean coupling | 200 | 25 | 8.25 | 0.95 | 0.90 | 1.60 | |
| | | 90CS86-1 | 20 ± 1.0 | | 200 | 25 | 8.25 | 0.95 | 0.90 | 1.60 | |
| | | 90CS96-1 | 30 ± 1.0 | | 200 | 25 | 8.25 | 0.95 | 0.90 | 1.60 | |
| WR112 | 8.50-9.60 | 112CS106-1* | 30 ± 1.0 | Included in mean coupling | 350 | 25 | 7.00 | 1.06 | 0.90 | 1.60 | Main arm: UG51/U UG138/U |
| | | 112CS116-1* | 40 ± 1.0 | | 350 | 25 | 7.00 | 1.06 | 0.90 | 1.60 | |
| | | 112CS126-1* | 50 ± 1.0 | | 350 | 25 | 7.00 | 1.06 | 0.90 | 1.60 | Secondary arm: UG39/U UG135/U |
| | 7.05-10.00 | 112CS66-1 | 10 ± 0.7 | ±1.5 | 350 | 30 | 12.75 | 1.17 | 1.00 | 2.00 | |
| | | 112CS76-1 | 20 ± 0.7 | ±1.5 | 350 | 30 | 11.25 | 1.17 | 1.00 | 2.00 | UG138/U |
| | | 112CS86-1 | 30 ± 0.7 | ±1.5 | 350 | 30 | 11.25 | 1.17 | 1.00 | 2.00 | UG51/U |
| WR137 | 6.50-8.00 | 137CS16-1 | 10 ± 1.0 | - | 500 | 25 | 16.50 | 1.44 | 1.80 | 2.30 | UG441/U |
| | | 137CS26-1 | 20 ± 1.0 | - | 500 | 25 | 16.50 | 1.44 | 1.80 | 2.30 | UG344/U |

*WR90 waveguide in the auxiliary arm. Auxiliary arm load: 3 watts average.

NARROW-WALL COUPLERS

