

Product Catalogue

Millimeter Wave, Sub-Millimeter Wave / THz Solutions

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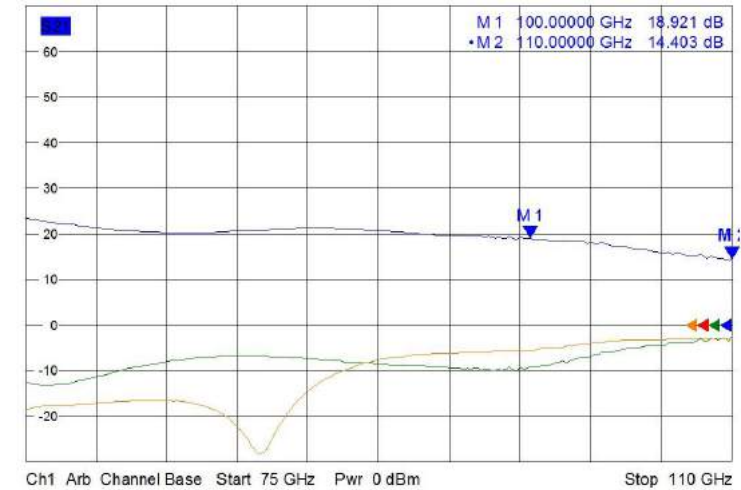
Millimeter Wave Low Noise Amplifiers – VTLNA Series

General Features

- Frequency coverage: 33 – 330 GHz
- Available for full waveguide and narrow bandwidth
- Low noise
- High P-1dB
- Low power consumption
- SMA or K connectors are available for certain models



Full-Band W Band LNA Gain and Return Loss



| Model | Frequency (GHz) | Connector | Gain (dB) | Noise Figure (dB) |
|-------------|-----------------|------------|--|---|
| VTLNA-22FB | 33 – 50 | 2.4 mm (F) | 20 minimum | 4.5 maximum |
| VTLNA-19FB | 40 – 60 | WR 19 | 17 minimum | 5.0 typical |
| VTLNA-15FB | 50 – 75 | WR 15 | 15 minimum | 4.0 typical |
| VTLNA-12FB | 60 – 90 | WR 12 | 20 typical | 4.5 typical |
| VTLNA-10FB | 75 – 110 | WR 10 | 20 typical @ < 100 GHz 15 typical @ < 110 GHz | 4.0 typical @ 75 - 100 GHz < 5.0 typical @ 100 - 110 GHz |
| VTLNA-10FBH | 75 – 110 | WR 10 | 40 dB typical | 4.5 typical |
| VTLNA-08 | 100 - 130 | WR 08 | 15 minimum | 5.5 typical |
| VTLNA-06 | 130 – 170 | WR 06 | 18 typical | 6.0 typical @ 145 GHz |
| VTLNA-03 | 250 - 330 | WR 03 | 25 typical | 10.0 typical @ 300 GHz |

How to make a request

- Select one of the Models above, or provide specifications including frequency range, noise figure, gain, and waveguide size
- Email to: sales@vivatech.biz

Millimeter Wave Power Amplifiers – VTPA Series

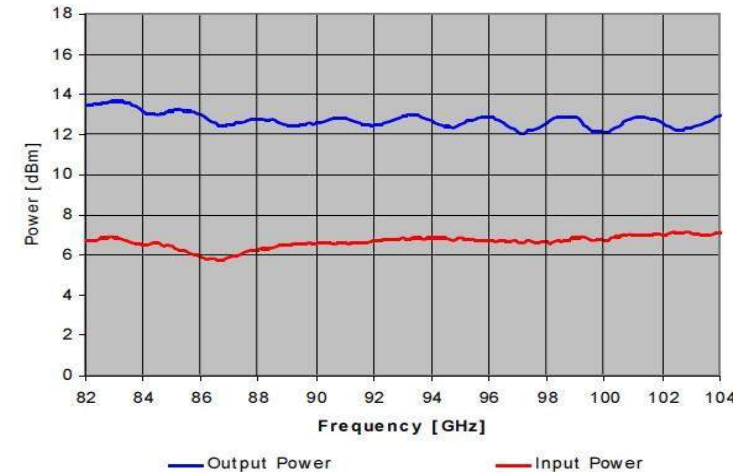
General Features

- Frequency coverage: 26.5 – 110 GHz
- Up to 1W output
- Broadband coverage
- Miniature designs
- High reliability, MMIC based
- K connectors with certain models
- Custom designs on request



| Model | Frequency (GHz) | Connector | Gain (dB) | P _{SAT} (dBm) |
|---------------|-----------------|------------|------------|------------------------|
| VTPA-28FB | 26.5 – 40 | WR 28 | 30 minimum | 30 (P ₋₁) |
| VTPA-22FB | 33 – 50 | WR 22 or V | 19 typical | 19 |
| VTPA-15NB-S01 | 50 – 70 | WR 15 | 24 minimum | 17 typical |
| VTPA-15NB-S02 | 58 – 66 | WR 15 | 25 minimum | 19 |
| VTPA-12NB-S01 | 68 -78 | WR 12 | 23 typical | 20 typical |
| VTPA-12NB-S02 | 67 – 87 | WR 12 | 16 minimum | 14 typical |
| VTPA-12NB-S03 | 74 – 80 | WR 12 | 10 typical | 20 typical |
| VTPA-10NB-S01 | 84 – 102 | WR 10 | 15 minimum | 18 typical |
| VTPA-10NB-S02 | 78 – 90 | WR 10 | 10 typical | 20 typical |
| VTPA-10FB-S03 | 70 – 110 | WR 10 | 18 typical | 20 typical |
| VTPA-08NB-S01 | 95 – 115 | WR 08 | 10 typical | 16 typical |
| VTPA-08NB-S02 | 100 - 130 | WR 08 | 10 typical | 15 typical |

Output Power VTPA-10NB-S01



How to make a request

- Select one of the Models above, or provide specifications including frequency range, output power P_{-1dB} or P_{SAT}, gain, and waveguide size
- Email to: sales@vivatech.biz

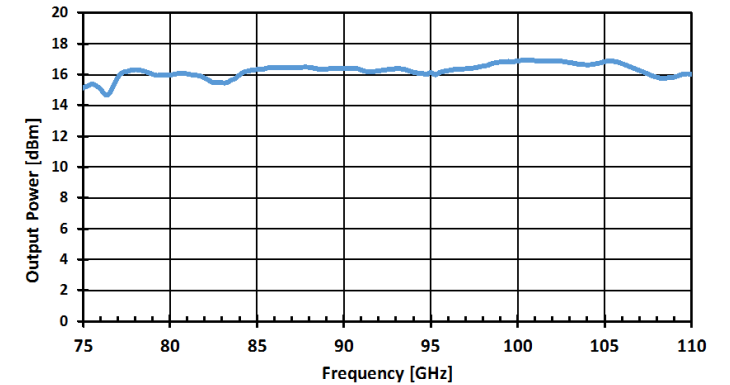
Millimeter Wave / THz Multiplier Sources – VTXFA Series

General Features

- Plug'n Play: just add DC power and RF microwave input
- Coverage: 50 – 500 GHz
- Standard waveguide full-band & narrow-band
- Ideal signal generator or frequency extender
- High output power
- Standard or custom input power levels
- Flat frequency response
- Optional output isolators (up to 220 GHz)
- Compact, fully screened enclosure with integral heat sink

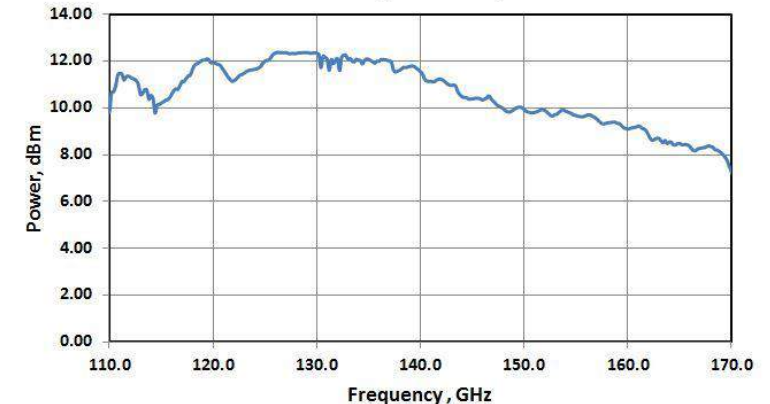


VTXFA-10FBH Output Power, 75 – 110 GHz



| Model | Output Frequency (GHz) | Waveguide | Input Frequency (GHz) | Output Power (dBm) |
|-------------|------------------------|-----------|-----------------------|---------------------|
| VTXFA-15FB | 50 – 75 | WR 15 | 8.33 – 12.50 | +3, +6 |
| VTXFA-15HA | 50 – 70 | WR 15 | 8.33 – 11.67 | +15 typical |
| VTXFA-12FB | 60 – 90 | WR 12 | 10.00 – 15.00 | +3, +5 |
| VTXFA-12HA | 67 – 87 | WR 12 | 11.16 – 14.50 | +13 typical |
| VTXFA-12HB | 68 – 78 | WR 12 | 11.33 – 13.00 | +20 typical |
| VTXFA-10FB | 75 – 110 | WR 10 | 12.50 – 18.33 | +3, +6 |
| VTXFA-10FBH | 75 – 110 | WR 10 | 12.50 – 18.33 | +13, +16 |
| VTXFA-08FB | 90 – 140 | WR 08 | 15.00 – 23.30 | +6 typical |
| VTXFA-06FB | 110 – 170 | WR 06 | 9.17 – 14.17 | +6 min, +10 typical |
| VTXFA-05FB | 140 – 220 | WR 05 | 11.66 – 18.34 | +4 typical |
| VTXFA-04H | 210 – 224 | WR 04 | 17.50 – 18.67 | +10, +12 |
| VTXFA-03FB | 220 – 330 | WR 03 | 12.20 – 18.10 | -7, -5 |
| VTXFA-2.2FB | 325 – 500 | WR 2.2 | 9.02 – 13.89 | -10, -8 |

VTXFA-06FB Output Power, 110-170 GHz



Notes

1. RF input power: +7 to +10 dBm
2. Harmonic and spurious: < 20 dBc typical
3. DC: +7 to +9 VDC, < 1 A typical
4. Input connector: SMA (F) or K (F)
5. **How to make a request:** specify Model above, or input and output frequencies, output power desired, waveguide size, and isolator if required; email to: sales@vivatech.biz

Millimeter Wave / THz VCO Frequency Sources – VTVC0 Series

General Features

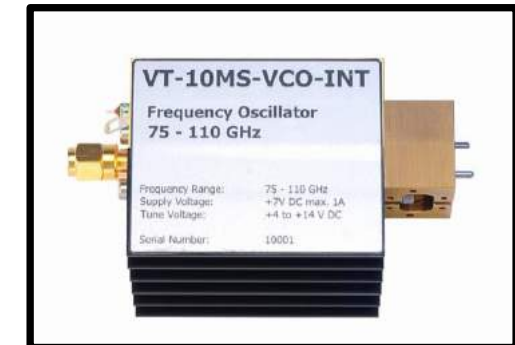
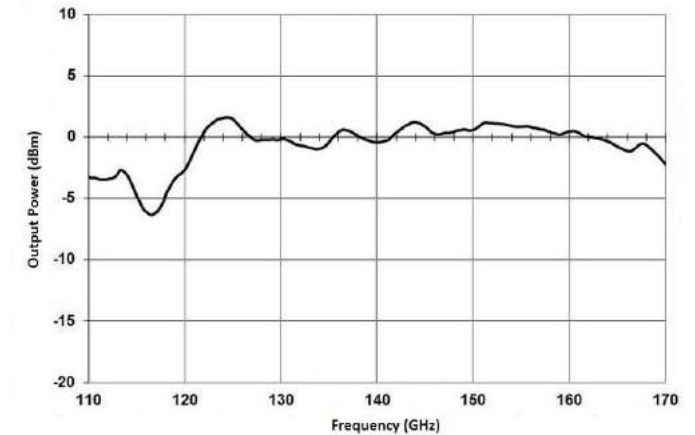
- Frequency coverage: 50 - > 670 GHz
- Analog/Digital tuned VCO driven multiplier chains
- State of art power output
- Optional output isolator
- VCO as standard, other fundamental sources eg. YIG, Synthesizer can be chosen to suit application
- Fully integrated miniature versions

| Model | Frequency (GHz) | Waveguide | Power Output (dBm) | Frequency Accuracy % ⁻¹ | Power Flatness (dB) |
|-------------|-----------------|-----------|--------------------|------------------------------------|---------------------|
| VTVC0-15FB | 50 – 75 | WR 15 | +7 to +10 | +/- 0.15 | +/- 1 |
| VTVC0-10FB | 75 – 110 | WR 10 | +10 to +13 | +/- 0.15 | +/- 1 |
| VTVC0-06FB | 110 – 170 | WR 06 | -2 to +4 | +/- 0.15 | +/- 1 |
| VTVC0-05FB | 140 – 220 | WR 05 | -10 to -5 | +/- 0.20 | +/- 2 |
| VTVC0-03FB | 220 – 325 | WR 03 | -12 to -8 | +/- 0.20 | +/- 2 |
| VTVC0-1.5NB | 656 - 672 | WR 1.5 | -10 to -15 | +/- 5 ppm | +/- 3 |

Notes

1. Based on an internal free running VCO oscillator, provided with the source
2. DC power required is + 12- 15V, 1-2 A depending on model
3. VCO tuning voltage is typically in the range 0 -16 V DC
4. Digitally tuned versions available to specification, based on integrated or external synthesizer
5. Sizes from 45 x 50 x 20 mm, excluding heat sink
6. **How to make a request:** specify waveguide size, frequency range, frequency accuracy, output power and flatness, email to: sales@vivattech.biz

110 – 170 GHz VCO Output Power Typical Performance



Millimeter Wave / THz PLO Frequency Sources – VTPLO Series

General Features

- Frequency coverage: 26 – > 670 GHz
- **Fixed frequency, or synthesized**
- Highest accuracy and stability
- State of art high power output
- Based on active multiplier chains
- Fundamental source chosen by application



| Frequency Range (GHz) | Waveguide | Power Output (mW) | Typical Phase Noise @ 100 KHz (dBc / Hz) ⁻¹ | Typical Stability (ppm / °C) ⁻² |
|-----------------------|-----------|-------------------|--|--|
| 26 – 40 | WR 28 | Up to 5000 | - 109 | +/- 0.1 |
| 40 – 60 | WR 22 | 100 to 200 | - 105 | |
| 50 – 75 | WR 15 | 50 to 100 | - 103 | |
| 75 – 110 | WR 10 | 10 to 20 | - 100 | |
| 110 – 170 | WR 06 | 1 to 3 | - 97 | |
| 140 – 220 | WR 05 | 1 to 2 | - 93 | |
| 220 – 325 | WR 03 | 0.1 to 0.5 | -90 | |
| 656 - 672 | WR 1.5 | 0.1 to 0.2 | -86 | |

Notes

1. Based on an internal OCXO / PLDRO reference oscillator, provided with the source
2. Stability quoted is for a standard internal OCXO reference. External reference options available
3. DC power required is typically + 15V, 1-2 A depending on model
4. **How to make a request:** specify fixed frequency or synthesized, frequency range, output power, state phase noise/ frequency stability desired, and waveguide size, email to: sales@vivatech.biz

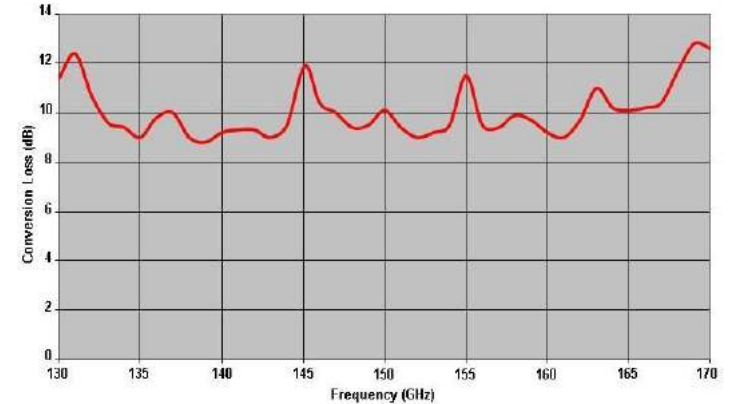
Waveguide Fundamental Balanced Mixers – VTBM Series

General Features

- Frequency coverage: 25 – >170 GHz
- No tuning required
- Wide IF bandwidths
- Lowest conversion Loss
- Low LO power biased versions



Model VTBM-06; Conversion Loss



| Model | Frequency (GHz) | Frequency Coverage RF / LO | IF Bandwidth; Typical | Conversion Loss ⁻¹ (dB); Typical | LO Power (dBm) ⁻² |
|------------|-----------------|---|--|---|------------------------------|
| VTBM-28-FB | 26.5 – 40 | <ul style="list-style-type: none"> • Up to 10% for narrow band version • Or full waveguide bandwidth (*except WR08 and WR06 mixers) | <ul style="list-style-type: none"> • Up to 20 GHz for narrow band or fixed LO models • Limited to approx. 4 GHz for full-band RF/LO models | < 6 | +10 to +13 |
| VTBM-15-FB | 50 – 75 | | | < 7 | |
| VTBM-12-FB | 60 - 90 | | | < 7.5 | |
| VTBM-10-FB | 75 – 110 | | | < 8 | |
| VTBM-08 | 90 – 140 | | | < 10 | |
| VTBM-06 | 110 – 170 | | | < 12 | |

Notes

1. Value depends on exact RF/LO/IF frequencies, and LO power. (*Full band RF/LO 90-140 and 110-170 GHz mixers are not available)
2. Low LO power, DC biased, Narrow and Full Band Mixers are also available as custom products, contact factory
3. For complete custom and standard down-converters see Page 23 of this catalogue
4. **How to make a request:** select one of Models above, or provide specifications including waveguide sizes, RF frequency range, IF frequency range, LO frequency range, conversion loss, available LO power, and external or internal bias desired, email to: sales@vivatech.biz

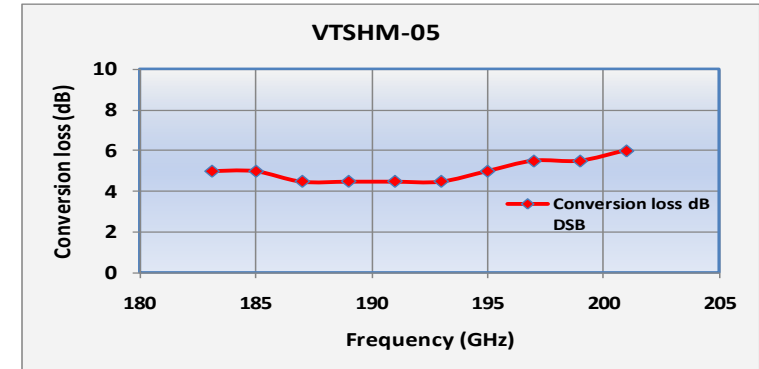
Low Noise Waveguide Sub Harmonic Mixers – VTSHM Series

General Features

- Frequency coverage: Up to 670 GHz
- Very low conversion loss and noise
- Zero bias operation
- Balanced design
- Wide IF bandwidths [with fixed LO]
- LO at ½ RF



Model VTSHM-05 Conversion Loss



| Model | RF Frequency (GHz) | LO Frequency (GHz) | Conversion Loss (dB); Typical | Max IF Bandwidth (GHz) | Maximum RF Power (dBm) ⁻¹ | RF Input Waveguide | LO Input Waveguide |
|-----------|--------------------|--------------------|-------------------------------|------------------------|--------------------------------------|--------------------|--------------------|
| VTSHM-06A | 110 – 165 | 55 – 83 | 6 | 20 | +6 | WR 06 | WR 12 |
| VTSHM-06B | 130 – 170 | 65 – 85 | 6 | 16 | 0 / +6 | WR 06 | WR 12 |
| VTSHM-05A | 167 – 200 | 83 – 100 | 6 | 16 | 0 / +6 | WR 05 | WR 10 |
| VTSHM-05B | 185 – 230 | 93 – 115 | 6 | 18 | 0 / +6 | WR 05 | WR 10 |
| VTSHM-03A | 265 – 295 | 132 – 148 | 7 | 18 | -5 | WR 03 | WR 06 |
| VTSHM-03B | 275 – 330 | 137 – 165 | 7 | 18 | -5 | WR 03 | WR 06 |
| VTSHM-03C | 310 – 340 | 155 – 170 | 8 | 18 | -5 | WR 03 | WR 06 |
| VTSHM-02A | 380 – 440 | 190 – 220 | 9 | 20 | -10 | WR 02 | WR 04 |
| VTSHM-1.5 | 656 – 672 | 330 | 12 | 20 | -10 | WR 1.5 | WR 03 |

Notes

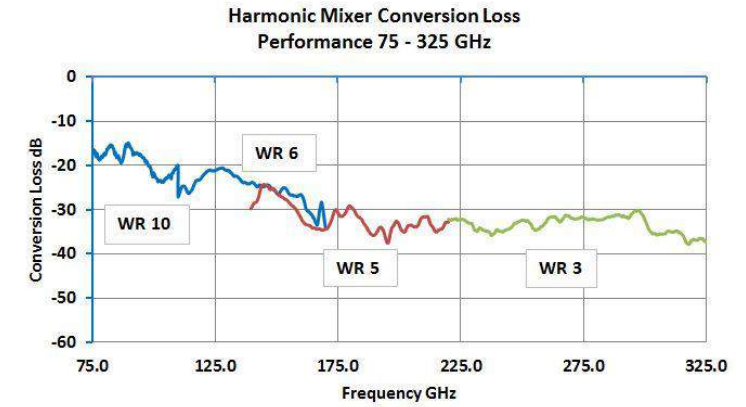
1. Mixers with integrated IF amplifiers are available as an option
2. No DC bias or RF/LO diplexer required
3. Performance approaching fundamental mixers with lower system costs
4. **How to make a request:** select one of the Models above, or provide specifications including waveguide sizes, RF frequency range, IF frequency range, LO frequency range, conversion loss, and available LO power, email to: sales@vivatech.biz

Full Band Waveguide Harmonic Mixers – VTWHM Series

General Features

- Frequency coverage: 26 – 500 GHz
- Waveguide full bandwidth as standard
- Zero bias, common or separate LO / IF ports
- General purpose frequency extension for Spectrum Analyzers / Systems
- Even mixing harmonics

| RF Frequency (GHz) | Model | Conversion Loss (dB) ⁻¹ | LO Frequency (GHz) Maximum | RF _{MAX} (dBm) | Waveguide |
|--------------------|-----------------|------------------------------------|----------------------------|-------------------------|-----------|
| 26 – 40 | VTWHM-28 | 10 to 15 | 18 | +6 | WR 28 |
| 33 – 50 | VTWHM-22 | 10 to 15 | 16 | 0 / +6 | WR 22 |
| 40 – 60 | VTWHM-19 | 15 to 20 | 16 | 0 / +6 | WR 19 |
| 50 – 75 | VTWHM-15 | 20 to 25 | 18 | 0 / +6 | WR 15 |
| 60 – 90 | VTWHM-12 | 20 to 29 | 18 | -5 | WR 12 |
| 75 – 110 | VTWHM-10 | 20 to 25 | 18 | -5 | WR 10 |
| 90 – 140 | VTWHM-08 | 30 to 35 | 18 | -5 | WR 08 |
| 110 – 170 | VTWHM-06 | 35 to 40 | 20 | -10 | WR 06 |
| 140 – 220 | VTWHM-05 | 35 to 40 | 18 | -10 | WR 05 |
| 220 – 325 | VTWHM-03 | 45 to 55 | 18 | -5 | WR 03 |
| > 325 GHz | Contact factory | | | | |



Notes

1. Conversion loss, LO range 8 - 18 GHz @ +13 dBm, IF DC - 2 GHz; actual value depends on harmonic number
2. LO/IF bandwidths up to 18 GHz. Common or separate LO/IF ports. No DC bias required
3. **How to make a request:** specify waveguide sizes, RF frequency range, IF frequency range, LO frequency range, conversion loss, harmonic number, and available input power, email to: sales@vivatech.biz

Full Band Waveguide Detectors – VTWD Series

General Features

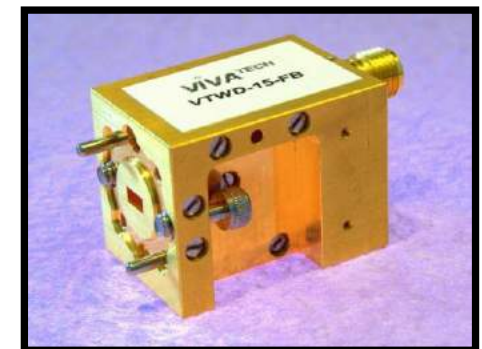
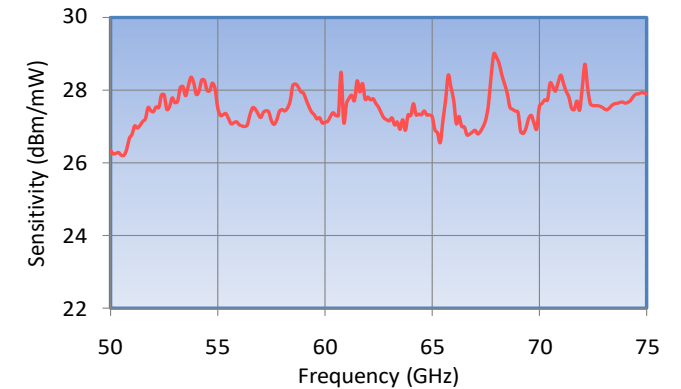
- Full band coverage
- Zero bias operation
- No mechanical tuner
- Calibrated

| Model | Frequency (GHz) | Sensitivity (mV / mW) | Input RF Power (dBm); Maximum | Waveguide |
|------------|-----------------|-----------------------|-------------------------------|-----------|
| VTWD-15-FB | 50 – 75 | > 500 | 0 | WR 15 |
| VTWD-10-FB | 75 – 110 | > 750 | 0 | WR 10 |
| VTWD-08-FB | 90 – 140 | >250 | -10 | WR 08 |
| VTWD-05-FB | 140 – 220 | >100 | -10 | WR 05 |
| VTWD-03-FB | 220 – 325 | 1750 | -10 | WR 03 |

Notes

1. Output connector: SMA(F)
2. Video bandwidth; up to 18 GHz for most models
3. Custom design available upon request
4. **How to make a request**, select one of Models above, or provide specifications including waveguide size, frequency range, video bandwidth, and sensitivity required, email to: sales@vivatech.biz

Typical V Band-Full Band Sensitivity Performance



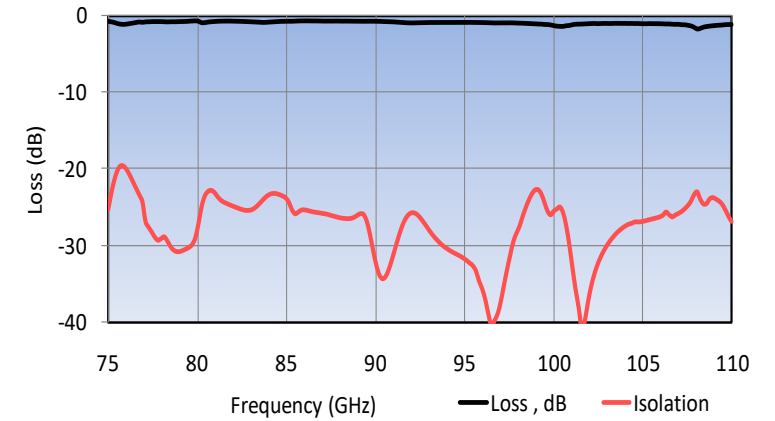
Full Band Low Loss Waveguide Isolators – WG-ISO Series

General Features

- Full band coverage
- Compact
- Lowest insertion loss in industry
- Low VSWR
- High isolation
- Available up to 220 GHz



Typical W Band Full-Band Performance



| Model | Frequency (GHz) | Insertion Loss (dB); Typical | Isolation (dB); Typical | Waveguide, Flange |
|-----------|-----------------|------------------------------|-------------------------|-------------------|
| WGISO-VFB | 50 – 75 | 1.3 | > 20 | WR 15, UG 385/U |
| WGISO-WFB | 75 – 110 | 1.3 | > 20 | WR 10, UG387/U-M |
| WGISO-FFB | 90 – 140 | 1.5 | > 20 | WR 08, UG 387/U-M |
| WGISO-DFB | 110 – 170 | 1.8 | > 20 | WR 06, UG 387/U-M |
| WGISO-GFB | 140 – 220 | 1.5, 2.3 max | > 20 | WR 05, UG 387/U-M |

How to make a request

- Select one of models above, or provide specifications including frequency range, insertion loss, isolation, and waveguide size
- Email to: sales@vivatech.biz

Millimeter Wave / THz Precision Short & Terminations – VTWGT Series

General Features

- Frequency coverage: up to 325 GHz
- High precision
- Calibration Standards
- Physically extremely robust
- Shown opposite are waveguide shorts/termination



| Model | Waveguide Designation | VSWR typical | Standard Flange | Frequency Coverage (GHz) |
|----------|-----------------------|--------------|-----------------|--------------------------|
| VTWGT-15 | WR 15 | < 1.25 : 1 | UG 385/U | 50 – 75 |
| VTWGT-12 | WR 12 | < 1.25 : 1 | UG 387/U | 60 – 90 |
| VTWGT-10 | WR 10 | < 1.25 : 1 | UG 387/U-M | 75 – 110 |
| VTWGT-08 | WR 08 | < 1.25 : 1 | UG 387/U-M | 90 – 140 |
| VTWGT-06 | WR 06 | < 1.5 : 1 | UG 387/U-M | 110 – 170 |
| VTWGT-05 | WR 05 | < 1.5 : 1 | UG 387/U-M | 140 – 220 |
| VTWGT-04 | WR 04 | < 1.5 : 1 | UG 387/U-M | 170 – 260 |
| VTWGT-03 | WR 03 | < 1.5 : 1 | UG 387/U-M | 220 – 330 ⁻³ |

Notes

1. New definitions for use above 110 GHz have been proposed by IEEE in order to accommodate standards up to 1.1 THz.
2. There are variations in industry 'standard' flanges. When ordering waveguides > 100 GHz advise required flange PIN and hole dimensions
3. Waveguide WR 03 historically covers 220-325 GHz however the new standard WM-864 extends coverage to 220 – 330 GHz
4. **How to make a request:** specify Model number , email to sales@vivatech.biz

Waveguide Bends & Twists – VTWGE / VTWGH / VTWGTW Series

General Features

- Frequency coverage: up to 750 GHz
- High precision
- Custom length
- Low loss
- Physically robust

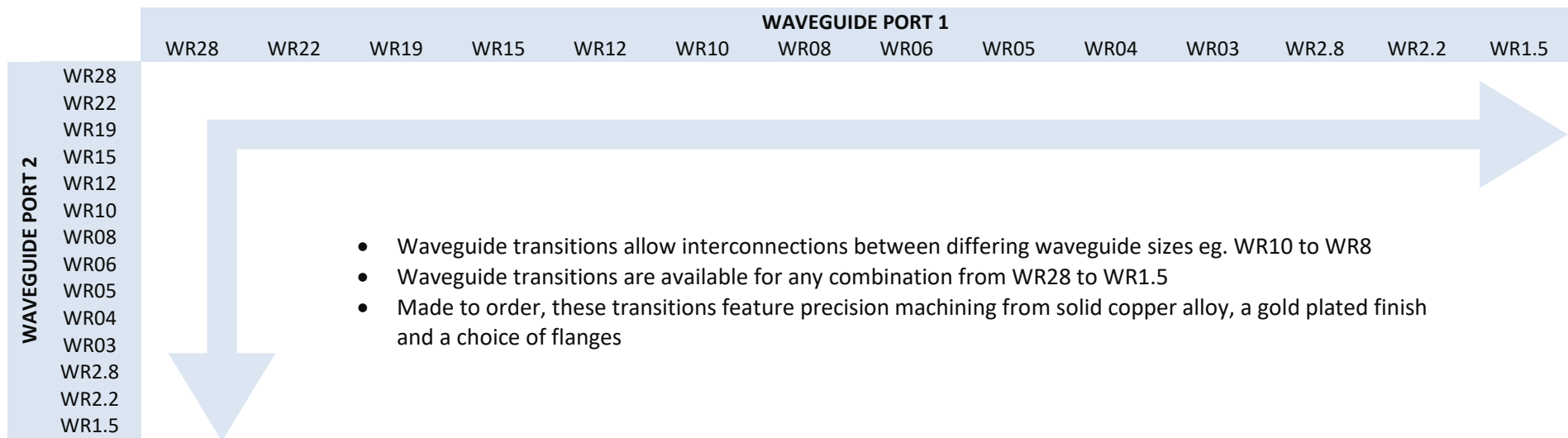
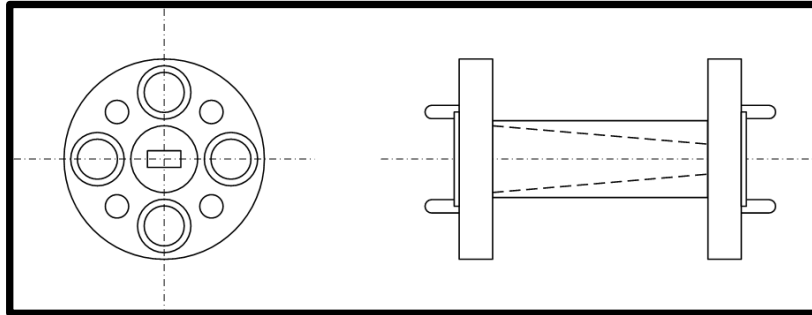


| Model E Plane 90° Bend | Model H Plane 90° Bend | Model Twist 90° | Waveguide Designation | New IEEE Waveguide Designation | Standard Flange | Frequency Coverage (GHz) |
|---------------------------|---------------------------|--------------------|-----------------------|-----------------------------------|-----------------|-----------------------------|
| VTWGE-28-xx | VTWGH-28-xx | VTWGTW-28-xx | WR 28 | | UG 599/U | 26.5 – 40 |
| VTWGE-22-xx | VTWGH-22-xx | VTWGTW-22-xx | WR 22 | | UG 383/U | 33 – 50 |
| VTWGE-19-xx | VTWGH-19-xx | VTWGTW-19-xx | WR 19 | | UG 383/U | 40 – 60 |
| VTWGE-15-xx | VTWGH-15-xx | VTWGTW-15-xx | WR 15 | | UG 385/U | 50 – 75 |
| VTWGE-12-xx | VTWGH-12-xx | VTWGTW-12-xx | WR 12 | | UG 387/U | 60 – 90 |
| VTWGE-10-xx | VTWGH-10-xx | VTWGTW-10-xx | WR 10 | WM-2540 | UG 387/U-M | 75 – 110 |
| VTWGE-08-xx | VTWGH-08-xx | VTWGTW-08-xx | WR 08 | WM-2022 | UG 387/U-M | 90 – 140 |
| VTWGE-06-xx | VTWGH-06-xx | VTWGTW-06-xx | WR 06 | WM-1651 | UG 387/U-M | 110 – 170 |
| VTWGE-05-xx | VTWGH-05-xx | VTWGTW-05-xx | WR 05 | WM-1295 | UG 387/U-M | 140 – 220 |
| VTWGE-04-xx | VTWGH-04-xx | VTWGTW-04-xx | WR 04 | WM-1092 | UG 387/U-M | 170 – 260 |
| VTWGE-03-xx | VTWGH-03-xx | VTWGTW-03-xx | WR 03 | WM-864 | UG 387/U-M | 220 – 330 ⁻³ |
| VTWGE-2.8-xx | VTWGH-2.8-xx | VTWGTW-2.8-xx | WR 2.8 | WM-710 | UG 387/U-M | 260 – 400 |
| VTWGE-2.2-xx | VTWGH-2.2-xx | VTWGTW-2.2-xx | WR 2.2 | WM-570 | UG 387/U-M | 330 – 500 |
| VTWGE-1.5-xx | VTWGH-1.5-xx | VTWGTW-1.5-xx | WR 1.5 | WM-380 | UG 387/U-M | 500 – 750 |

Notes

1. New definitions for use above 110 GHz have been proposed by IEEE in order to define standards up to 1.1 THz.
2. There are variations in industry 'standard' flanges. When ordering waveguides > 100 GHz advise required flange PIN and hole dimensions
3. Waveguide WR 03 historically covers 220-325 GHz however the new standard WM-864 extends coverage to 220 – 330 GHz
4. **How to make a request:** specify Model number with required length eg. VTWGE-1.5-50 is an E plane bend in WR1.5 with a length of 50 mm, email to: sales@vivatech.biz

Waveguide Transitions - VTST Series



Notes

1. **How to make a request:** use model # **VTST WAVEGUIDE PORT 1- WAVEGUIDE PORT 2-length in mm**, for example VTST10-08-25 is a WR10 to WR08 transition with standard UG 387/U-M flanges on both ends with a length of 25 mm
2. There are variations in industry 'standard' flanges, when requesting for waveguides > 100 GHz advise required flange PIN and hole dimensions
3. For non-standard flanges; specify your requirements

Full Band Waveguide Variable & Fixed Attenuators – WG-ATT Series

General Features

- Full band coverage: 50 – 325 GHz
- Low loss at zero setting [variable version]
- Low VSWR
- High accuracy
- Fully Calibrated : 5 dB intervals, full-band



| Model (Variable Attenuator) ⁻¹ | Frequency (GHz) | Insertion Loss (dB); Typical | Attenuation (dB) | Waveguide |
|--|-----------------|---------------------------------|---------------------|-----------|
| WG-ATT-VFB | 50 – 75 | < 0.5 | | WR 15 |
| WG-ATT-WFB | 75 – 110 | < 0.5 | | WR 10 |
| WG-ATT-FFB | 90 – 140 | < 0.5 | 0 to 30 | WR 08 |
| WG-ATT-GFB | 140 – 220 | < 0.5 | | WR 05 |
| WG-ATT-YFB | 220 – 325 | < 1.2 | | WR 03 |

| Model (Fixed Attenuator) | Frequency (GHz) | Flatness (dB) ⁻² | Attenuation (dB) | Waveguide |
|-----------------------------|-----------------|-----------------------------|-------------------|-----------|
| WG-ATT-XX-VFB | 50 – 75 | +/- 0.5 | | WR 15 |
| WG-ATT-XX-WFB | 75 – 110 | +/- 1 | | WR 10 |
| WG-ATT-XX-FFB | 90 – 140 | +/- 1.5 | -XX ⁻¹ | WR 08 |
| WG-ATT-XX-GFB | 140 – 220 | +/- 2 | | WR 05 |
| WG-ATT-XX-YFB | 220 – 325 | +/- 3 | | WR 03 |

Notes

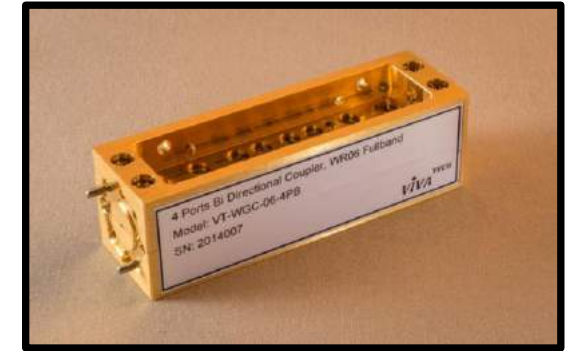
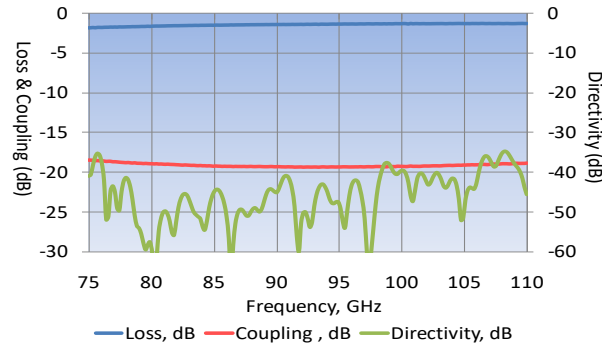
1. Attenuation range: 0 to 30 dB
2. Typical - fixed 10 dB attenuator
3. **How to make a request:** select one of the Models above, or provide specifications including frequency range, insertion loss, attenuation value for the fixed attenuator, attenuation range for the variable attenuator, and waveguide size, email to: sales@vivatech.biz

Full Band Waveguide Couplers – VT-WGC Series

General Features

- Frequency coverage: 50 – 325 GHz
- Full waveguide band available
- Low loss
- Various directivities
- 3-port or 4-port models
- Fully Calibrated

W Band Full-Band 20 dB Coupler
Typical Performance



| Model | Frequency (GHz) | Insertion Loss, typ (dB) | Directivity (dB); Minimum | Coupling (dB) | Waveguide |
|-----------|-----------------|--------------------------|---------------------------|------------------------|-----------|
| VT-WGC-19 | 40 – 60 | 0.6 | 35 | | WR 19 |
| VT-WGC-15 | 50 – 75 | 0.75 | 35 | | WR 15 |
| VT-WGC-10 | 75 – 110 | 0.9 | 35 | | WR 10 |
| VT-WGC-08 | 90 – 140 | 1.1 | 30 | 10 to 40 ⁻¹ | WR 08 |
| VT-WGC-06 | 110 – 170 | 1.2 | 25 | | WR 06 |
| VT-WGC-05 | 140 - 220 | 1.5 | 25 | | WR 05 |
| VT-WGC-04 | 170 – 260 | 1.7 | 25 | | WR 04 |
| VT-WGC-03 | 220 – 325 | 2.2 | 25 | | WR 03 |

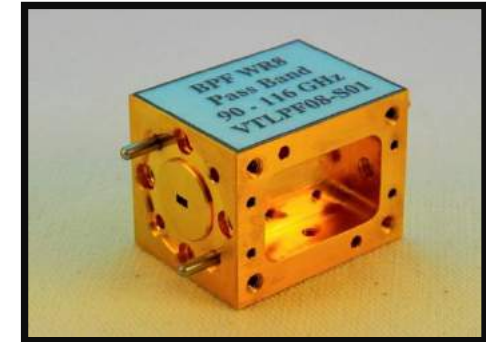
Notes

1. Coupling values available depend on frequency band selected
2. Dual couplers with internal terminations are available upon request
3. **How to make a request:** select one of the Models above, or provide specifications including frequency range, waveguide size, coupling value, directivity, and number of ports, email to: sales@vivatech.biz

Waveguide Low Pass Filters – VTLPF Series

General Features

- Coverage 50 – 325 GHz
- Custom specifications
- Low loss
- High rejection
- Fully modelled performance predictions



| Model | Frequency Range (GHz) | Pass Band Loss (dB); Typical | Rejection Band (dB); Typical | Waveguide |
|----------|-----------------------|------------------------------|------------------------------|-----------|
| VTLPF-15 | 50 – 75 | < 1.0 | | WR 15 |
| VTLPF-10 | 75 – 110 | < 1.0 | | WR 10 |
| VTLPF-08 | 90 – 140 | < 1.0 | 40 | WR 08 |
| VTLPF-05 | 140 – 220 | < 1.5 | | WR 05 |
| VTLPF-03 | 220 – 325 | < 2.0 | | WR 03 |

How to make a request

- Select one of the Models above, and provide specifications including pass band frequency, pass band loss, reject band frequency and attenuation, and waveguide size
- Email to: sales@vivatech.biz

Model VTLPF-06 Performance



Waveguide Band Pass & Band Stop Filters – VTBPf Series

General Features

- Frequency coverage: 50 – 325 GHz
- Custom specifications
- Band Pass or Band Stop (Notch Filters)
- High rejection
- Fully modelled performance predictions

| Model | Frequency Range (GHz) | Pass Band Loss (dB); Typical | Rejection Band (dB); Typical | Waveguide |
|----------|-----------------------|------------------------------|------------------------------|-----------|
| VTBPF-15 | 50 – 75 | < 1 | | WR 15 |
| VTBPF-10 | 75 – 110 | < 1 | | WR 10 |
| VTBPF-08 | 90 – 140 | < 1 | | WR 08 |
| VTBPF-06 | 110 – 170 | < 1 | > 40 | WR 06 |
| VTBPF-05 | 140 – 220 | < 1.5 | | WR 05 |
| VTBPF-04 | 170 – 260 | < 1.5 | | WR 04 |
| VTBPF-03 | 220 – 325 | < 2 | | WR 03 |

How to make a request

- Select one of the Models above, and provide specifications including pass band frequency, pass band losses, reject band frequency, reject band attenuation, and waveguide size
- Email to: sales@vivatech.biz

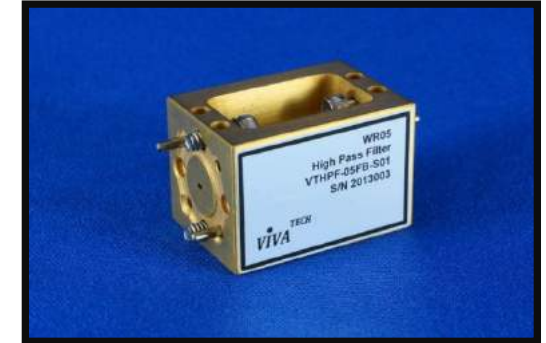
Model VTBPF-06 Band Stop Filter 200 – 220 GHz



Waveguide High Pass Filters – VTHPF Series

General Features

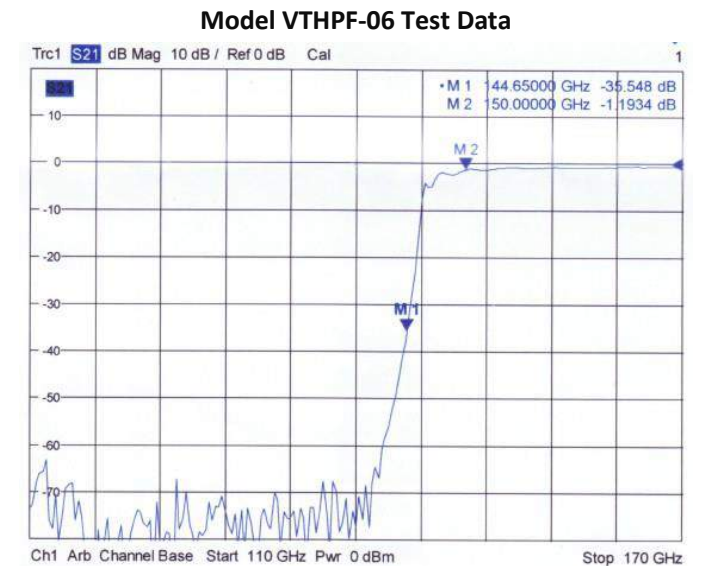
- Coverage 50 – 325 GHz
- Custom specifications
- Low pass band loss
- High rejection
- Fully modelled performance predictions



| Model | Frequency Range (GHz) | Pass Band Loss (dB); Typical | Rejection Band (dB); Typical | Waveguide |
|----------|-----------------------|------------------------------|------------------------------|-----------|
| VTHPF-15 | 50 – 75 | < 1.0 | | WR 15 |
| VTHPF-10 | 75 – 110 | < 1.0 | | WR 10 |
| VTHPF-08 | 90 – 140 | < 1.0 | | WR 08 |
| VTHPF-06 | 110 – 170 | < 1.0 | > 40 | WR 06 |
| VTHPF-05 | 140 – 220 | < 1.0 | | WR 05 |
| VTHPF-04 | 170 – 260 | < 1.0 | | WR 04 |
| VTHPF-03 | 220 – 325 | < 1.5 | | WR 03 |

How to make a request

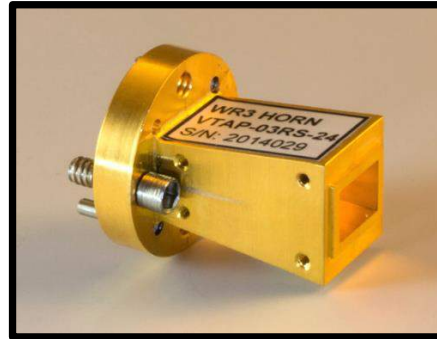
- Select one of the Models above, and provide specifications including pass band frequency, pass band loss, reject band frequency, reject band attenuation, and waveguide size
- Email to: sales@vivatech.biz



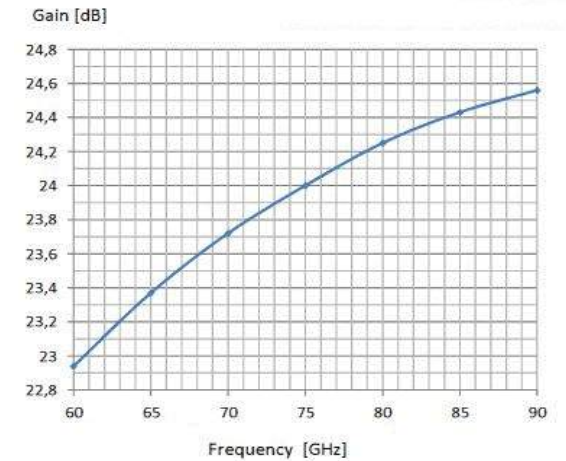
Waveguide Pyramidal Horn Antennas – VTAP Series

General Features

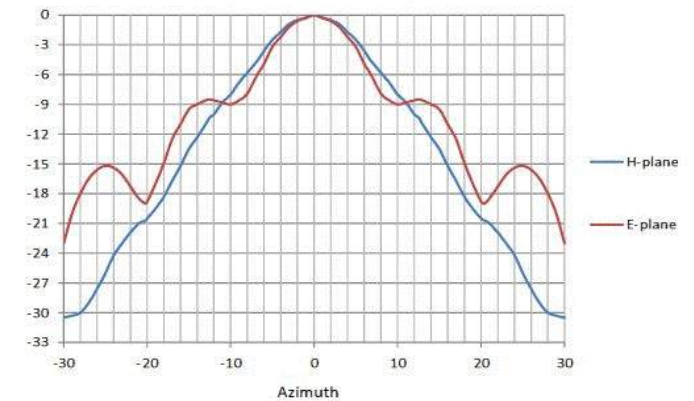
- Frequency coverage: 18 – 1100 GHz
- Broadband with full waveguide bandwidth coverage
- Standard gain horns
- Predictable characteristics



WR12 Standard Gain Horn



WR12 Radiation Pattern



| Model | Frequency (GHz) | Gain (dB), nominal at Mid-band | VSWR, typical | Waveguide |
|------------|-----------------|--------------------------------|---------------|-----------|
| VTAP-15RS | 50 – 75 | 24.0 | < 1.1 | WR 15 |
| VTAP-12RS | 60 – 90 | 24.0 | < 1.1 | WR 12 |
| VTAP-10RS | 75 – 110 | 24.0 | < 1.1 | WR 10 |
| VTAP-08RS | 90 – 140 | 24.0 | < 1.1 | WR 08 |
| VTAP-06RS | 110 – 170 | 24.0 | < 1.2 | WR 06 |
| VTAP-05RS | 140 – 220 | 24.0 | < 1.2 | WR 05 |
| VTAP-04RS | 170 – 260 | 24.0 | < 1.25 | WR 04 |
| VTAP-03RS | 225 – 325 | 24.0 | < 1.25 | WR 03 |
| VTAP-2.8RS | 260 – 400 | 24.0 | < 1.4 | WR 2.8 |
| VTAP-2.2RS | 330 – 500 | 24.0 | < 1.5 | WR 2.2 |
| VTAP-1.5RS | 500 – 750 | 24.0 | < 1.5 | WR 1.5 |
| VTAP-1.0RS | 750 - 1100 | 24.0 | < 1.5 | WR 1.0 |

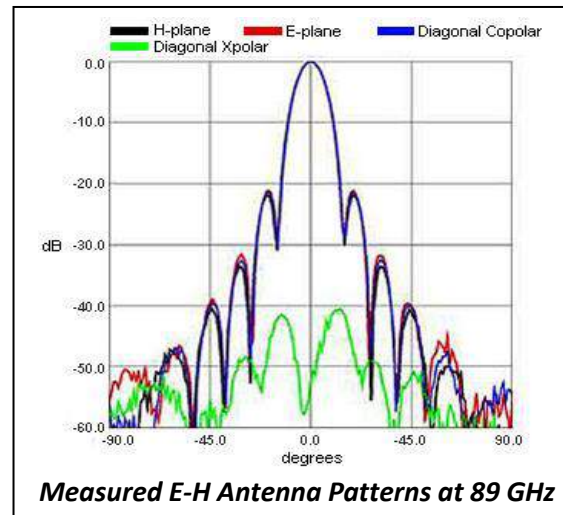
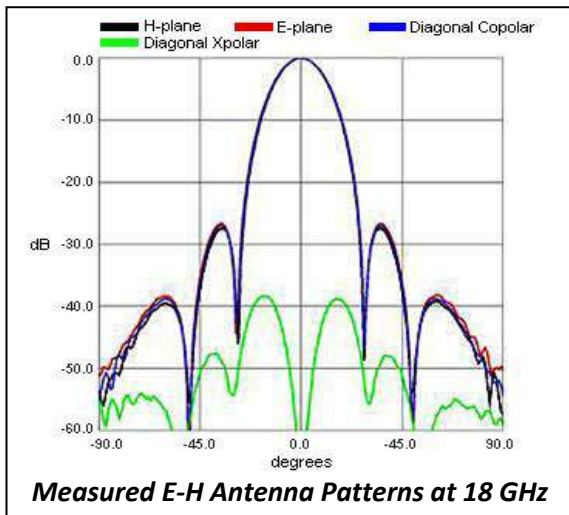
Notes

1. Standard horns have 24 dBi gain at mid band. Other gains are available to order.
2. Flange types above 110 GHz (WR10) may vary. Specify your flange requirement above WR10.
3. Material is copper or copper alloy gold plated.

Waveguide Corrugated Horn Antennas – VTAC Series

General Features

- Frequency coverage: 18 – 325 GHz
- Broadband with full waveguide bandwidth coverage (some models)
- E-H plane symmetry
- Exceptionally low cross polarization



Notes

1. Corrugated horn antennas are customized to user requirements
2. How to make a request: Specify center frequency, 3 dB beam width, waveguide size, gain, any other requirements; email to: sales@vivatech.biz

Lens Horn Antennas - VTA-HL Series

General Features

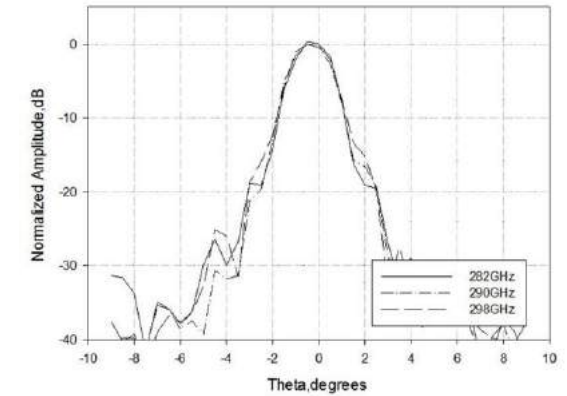
- Frequency coverage: 50 – 500 GHz
- Pencil beam and asymmetric beams
- Radar Imaging
- Communications
- Custom Designs



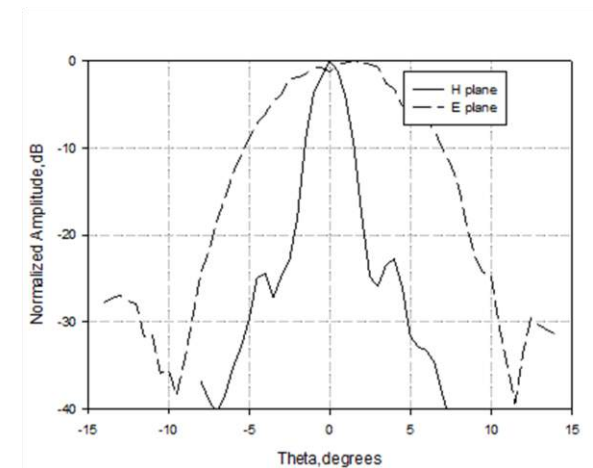
| Model | Frequency (GHz) | Type | Gain (dB) | Beamwidth (E/H) deg ¹ | Waveguide, Flange |
|--------------|-----------------|-------------|-------------|----------------------------------|-------------------|
| VTA-HL-15SNB | 50 – 75 | Pencil beam | >25 typical | 1-5 | WR15, UG385/U-M |
| VTA-HL-15SAB | 50 - 75 | Assymmetric | custom | 1-5, 10-20 | WR15, UG385/U-M |
| VTA-HL-10SNB | 75 - 110 | Pencil beam | >25 typical | 1-5 | WR10, UG387/U-M |
| VTA-HL-10SAB | 75 – 110 | Assymmetric | custom | 1-5, 10-20 | WR10, UG387/U-M |
| VTA-HL-06SNB | 110 - 170 | Pencil beam | >25 typical | 1-5 | WR06, UG387/U-M |
| VTA-HL-06SAB | 110 – 170 | Assymmetric | custom | 1-5, 10-20 | WR06, UG387/U-M |
| VTA-HL-05SNB | 140 – 220 | Pencil beam | >25 typical | 1-5 | WR05, UG387/U-M |
| VTA-HL-05SAB | 140 – 220 | Assymmetric | custom | 1-5, 10-20 | WR05, UG387/U-M |
| VTA-HL-03SNB | 220 – 325 | Pencil beam | >25 typical | 1-5 | WR05, UG387/U-M |
| VTA-HL-03SAB | 220 - 325 | Assymmetric | custom | 1-5, 10-20 | WR05, UG387/U-M |

Notes

1. Nominal, mid band, varies with frequency. Other values are available to order.
2. Flange types above 110 GHz (WR10) may vary. Specify your flange requirement above WR10.
3. Other frequency ranges are available to order.
4. Material is copper or copper alloy gold plated, excluding lens.
5. How to make a request: Specify center frequency, 3 dB E/H beam width, waveguide size, gain, any other requirements, email to: sales@vivatech.biz



300 GHz Pencil Beam Antenna

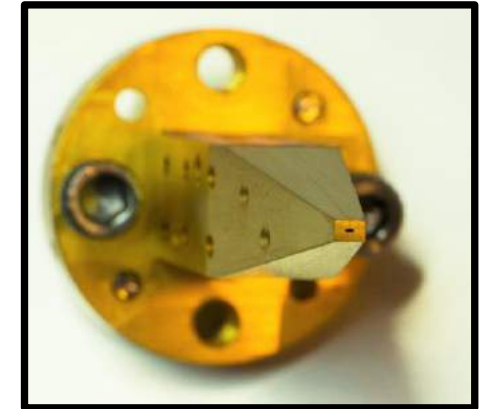


Sectoral Lens Horn Antenna with broad E beam and narrow H beam

Waveguide Millimeter / THz Near Field Probes – VTWGP Series

General Features

- Frequency coverage: 50 – 1100 GHz
- Near Field Scanning Applications
- Standard waveguide interfaces
- Quasi-uniform main beam
- Precision machining
- Custom designs

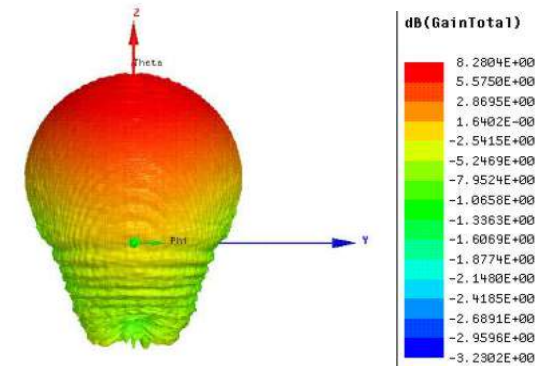


WR1.5 Waveguide Probe

| Model | Frequency (GHz) | Standard Length, mm | VSWR, typical | Waveguide |
|--------------|-----------------|---------------------|---------------|-----------|
| VTWGP-15-XX | 50 – 75 | 100.0 | < 1.1 | WR 15 |
| VTWGP-10-XX | 75 – 110 | 100.0 | < 1.1 | WR 10 |
| VTWGP-08XX | 90 – 140 | 100.0 | < 1.1 | WR 08 |
| VTWGP-06XX | 110 – 170 | 100.0 | < 1.2 | WR 06 |
| VTWGP-05XX | 140 – 220 | 50.0 | < 1.2 | WR 05 |
| VTWGP-04XX | 170 – 260 | 50.0 | < 1.25 | WR 04 |
| VTWGP-03XX | 225 – 325 | 50.0 | < 1.5 | WR 03 |
| VTWGP-2.8XX | 260 – 400 | 35.0 | < 1.5 | WR 2.8 |
| VTWGP-2.2XXS | 330 – 500 | 35.0 | < 1.75 | WR 2.2 |
| VTWGP-1.5XX | 500 – 750 | 35.0 | < 1.75 | WR 1.5 |
| VTWGP-1.0RS | 750 - 1100 | 25.0 | < 1.75 | WR 1.0 |

Notes

1. Suffix – XX denotes length. Standard lengths are shown above. Custom lengths available.
2. Flange types above 110 GHz (WR10) may vary. Specify your flange requirement above WR10.
3. Probe material is copper or copper alloy gold plated.



Simulated Pattern VTWGP-03-50

Millimeter Wave / THz Down Converters – BDC Series

General Features

- Coverage 26.5 - 670 GHz
- Broadband sensitive receivers for spectrum analysis
- Linear converters for Keysight 'Fieldfox' portable VNA
- Extend Noise Figure measurements to millimeter wave
- Complementary to Source Modules for Transmission and Radar measurements, see Page 5
- Custom designs



| Model | BDC- KH | BDC-12SA* | BDC-10-798 | BDC-08S | BDC-03S** | BDC-1.5S** |
|---|-------------------|---------------------------|--------------------------|--------------------------------|---------------|----------------|
| RF Frequency (GHz) | 26.5 – 40 | 70 – 83 | 75 – 83 | 100 – 124 | 280 – 320 | 656 - 672 |
| LO Frequency (GHz) | 14.40 | Internal | Internal | 16-20 | FieldFox | FieldFox |
| LO Power (dBm) | -3.0 | Internal | Internal | +10 | FieldFox | FieldFox |
| IF Frequency (GHz) | 3.2-16.7 | 4.5-18 | 4-12 | 0.01-7.0 | FieldFox | FieldFox |
| Noise Figure (dB); typical | 10.5 | < 15.0 | 8.5 | < 10.0 | < 15.0 | < 20.0 |
| Conversion Gain/ Loss ¹ , dB | 9 min, 12 typical | 15 typical, 18 dB maximum | 15 minimum 18 typical | 7.0 min, 10.0 max ¹ | 10.0 typical | 10.0 typical |
| Maximum RF CW Input Power (dBm) | +13 (20 mW) | 0 (1 mW) | +3 (2 mW) | 0 (1 mW) | +0 (1 mW) | +0 (1mW) |
| LO /IF Connector | SMA/K (F) | Internal | Internal | SMA/K (F) | SMA/K (F) | SMA/K (F) |
| RF Connector | K SMA(F) | WR12; UG387/U | WR10; UG387/U | WR08; UG387/U | WR03; UG387/U | WR1.5; UG387/U |

Notes

1. A variety of designs exist, of which only some samples are shown
2. Local oscillator can be internal or externally provided. State required phase noise and stability if required internally.
3. Frequency plan depends on final selection of harmonic numbers
4. See **Fullband Waveguide Harmonic Mixers** for unpackaged solutions and other frequency bands as shown in **-VTHM series** at page 10 of this catalogue
5. *Compatible with Agilent Noise Figure Analyzers eg. Model N8975A
6. **Compatible with Keysight Portable VNA FieldFox 26.5 GHz/40 GHz Model N9927 when using companion Upconverter Module
7. **How to make a request:** provide Model No and details of RF, LO and IF ranges, advise required gain and noise figure, email to: sales@vivatech.biz

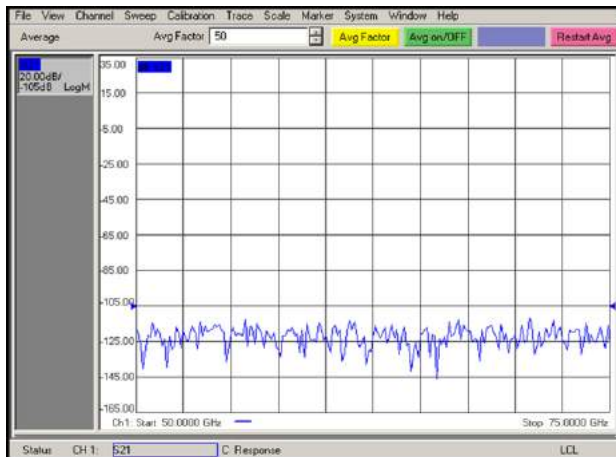
VNA Frequency Extenders TR-R and TR-TR Sets

General Features

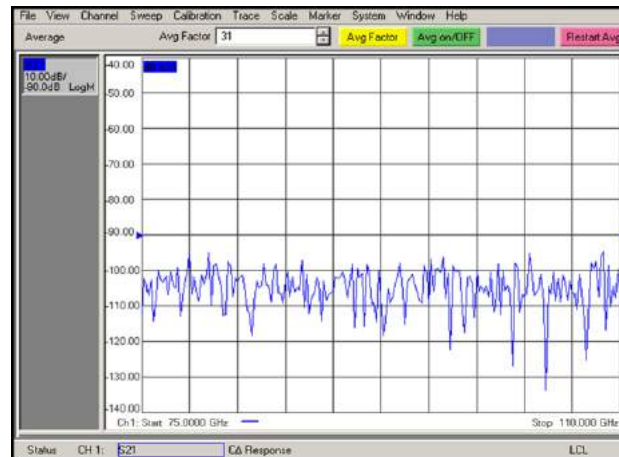
- Frequency Coverage: 50 – >325 GHz in standard waveguide bands
- Broadband high output power with low ripple
- Full 2 way S parameters with 2 x TR modules or economical TR-R combinations
- Compatible with standard benchtop microwave VNA / PNA test equipment
- Customizable for antenna test and other applications
- State of art dynamic range
- Optional level set attenuators
- Flexible height and levelling adjustments



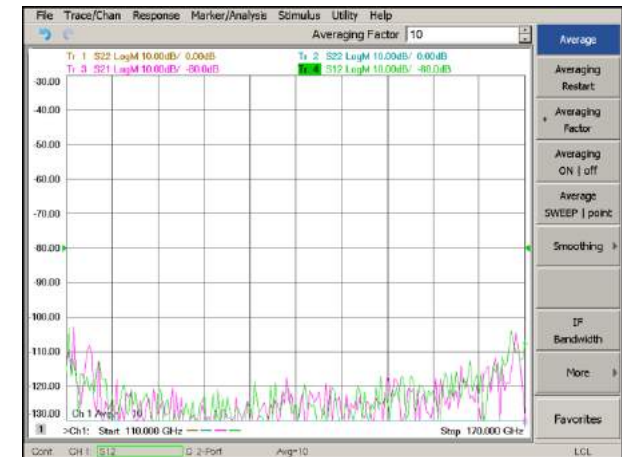
VivaTech's TR-R Modules with Keysight VNA / PNA



WR15 Full Band TR-R Dynamic Range



WR10 Full Band TR-R Dynamic Range



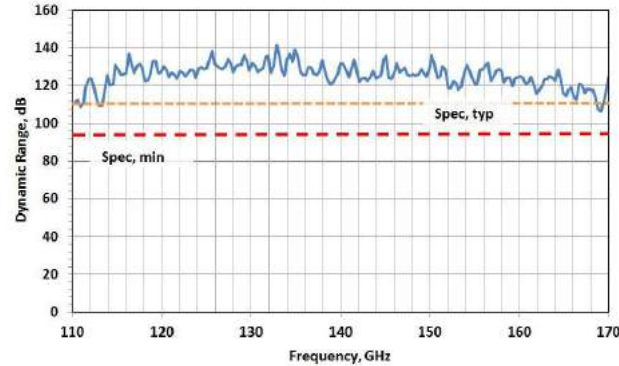
WR06 Full Band TR-TR Dynamic Range

VNA Frequency Extenders TR-R and TR-TR Sets (Cont')

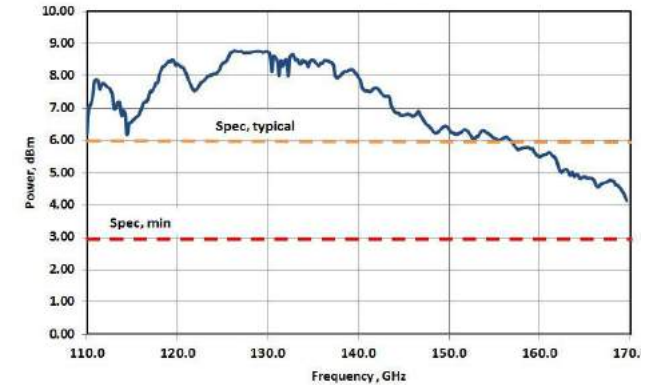
Model VTWR06-TR-TR Dynamic Range & Power Output



Dynamic Range
TR Module SN2016008/006



Test Port Power Output, dBm



| Performance Specification of TR Modules | | | | | |
|---|-------------------------------|---------------------------|------------------------------|------------------------------|--------------|
| TR, Transceivers | VTWR15-TR | VTWR10-TR | VTWR06-TR | VTWR05-TR | VTWR03-TR |
| RF Frequency (GHz) | 50 – 75 | 75 – 110 | 110 – 170 | 140 – 220 | 220 – 325 |
| Test Port Output Power (dBm) | 13; minimum 15; typical | 8; minimum 10; typical | +3 ; minimum +6 ; typical | -10; typical | -15; typical |
| Coupler Directivity (dB) | 35 ; minimum > 40; typical | | 34 ; minimum >36; typical | 30 ; minimum >35; typical | |

| Performance Specification of R Module and TR-R Combination | | | | | |
|--|--|----------|-----------|-----------|-----------|
| R, Receiver | VTWR15-R | VTWR10-R | VTWR06-R | VTWR05-R | VTWR03-R |
| RF Frequency (GHz) | 50 – 75 | 75 – 110 | 110 – 170 | 140 – 220 | 220 – 325 |
| Test Port Input Power 1 dB GCP (dBm) ; typical | +3 | 0 | | -10 | |
| Dynamic Range (dB) ⁻¹ ; min, typical | 110 – 120 | | 95 – 110 | 85 – 105 | 90 – 100 |
| Attenuator Adjustment (dB); minimum | 30 [Option : can be fitted to one or both modules] | | | | |

Notes

1. Dynamic range refers to TR_R pair for S-parameter measurement, including typical noise in user instruments. Measured with 10 Hz IF BW
2. An external interface module is required in some cases to interface the modules with standard VNA / PNA models. Consult us for details
3. Custom modules for frequencies up to 500 GHz are available.
4. Standard product dimensions are 140 x 100 x 160 mm [R Module] and 230 x 100 x 308 mm [TR Module]
5. **How to make a request:** Select Model above, specify manufacturer and model number of the PNA/VNA to be used, email to: sales@vivattech.biz

Portable Millimeter Wave / THz Transmitter & Receivers

General Features

- Extend portable VNA's to mm-wave and THz
- Coverage 50 - 670 GHz in custom bands
- Extends VNA's without LO/IF access
- Synchronous frequency and sweep operation
- Fully compatible with Keysight 'Fieldfox' portable VNA and various Anritsu models
- Radar, communications and antenna test applications
- Complementary to Source Modules see Page 5
- Compact & Portable



Portable 300 GHz Extender System with Fieldfox VNA

| Model | BUC/BDC-15S* | BUC/BDC-10S* | BUC/BDC-03S** | BUC/BDC-1.5S** |
|-----------------------------------|-------------------|-------------------|---------------|----------------|
| RF Input / Output Frequency (GHz) | 54-72 | 87-105 | 280 – 320 | 656 - 672 |
| VNA RF Frequency (GHz) | 2-20 | 2-20 | 4-20 | 4 - 20 |
| VNA RF Power (dBm) | Anritsu | Anritsu | FieldFox | FieldFox |
| Transmit Power (dBm) | +6 | +10 | -14 | -10 |
| RX Noise Figure (dB); typical | < 15.0 | < 15.0 | < 15.0 | < 20.0 |
| RX Conversion Gain, dB | 7.0 min, 10.0 max | 7.0 min, 10.0 max | 10.0 typical | 10.0 typical |
| Maximum RF CW Input Power (dBm) | +3 (2 mW) | +3 (2 mW) | +0 (1 mW) | -10 (0.1mW) |
| LO /IF Connector | SMA/K (F) | SMA/K (F) | SMA/K (F) | SMA/K (F) |
| RF Connector | WR15; UG385/U | WR10; UG387/U | WR03; UG387/U | WR1.5; UG387/U |

Notes

1. **Compatible with Keysight Portable VNA FieldFox 26.5 GHz/40 GHz Models N9918A, N9950A
2. *Compatible with Anritsu MS46122A Shockline compact VNA
3. Transmitter receiver pair measures S21 (transmission) phase and amplitude
3. S11 requires a separate directional coupler, optional
4. Other frequency ranges on request
5. **How to make a request:** state required frequency range, extender Model No, VNA and its options, email to: sales@vivatech.biz

Cryogenic Primary Noise Standard

VivaTech's Cryogenic Noise Standard is a noise source with primary reference performance. Providing precision calibration of low noise components such as amplifiers, diode noise sources or receiver systems, it offers the ultimate in performance. The unique design provides coverage from 18 to 325 GHz in standard waveguide bands, incorporating replaceable waveguide assemblies. The standard is particularly suited to mm and sub-mm wave [THz] low noise measurement applications and operates to 500 GHz in custom versions.

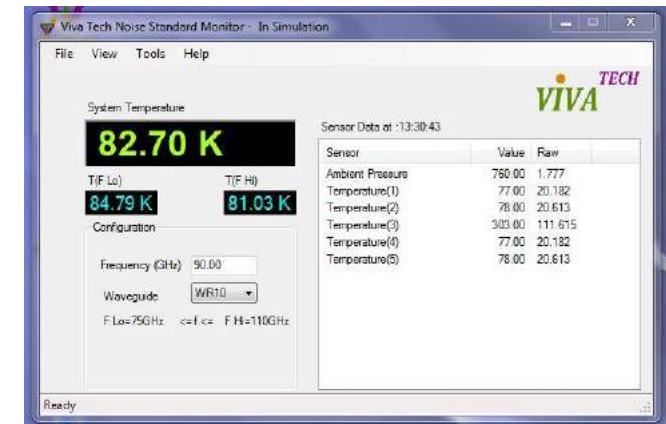
General Features

- Side entry design enables convenient connections to waveguide systems
- Vertical or horizontal waveguide orientation – no mismatched bends or twists needed
- Low maintenance, compact temperature stabilization system – no water cooling
- Interchangeable waveguide feed-horn assemblies provide mm to sub-mm wave [THz] coverage
- Automatic or manual LN2 filling-auto fill minimizes LN2 use and allows continuous operation
- Convenient, fully automated operation with integrated PC
- Real time noise temperature display at any frequency with full data logging



Typical Output Temperature Display

| Frequency (GHz) | Effective Noise Temperature (K) ⁻¹ | Feed-horn Assembly | Waveguide |
|-----------------|---|--------------------|-----------|
| 18 – 26 | 83.27 | VTA-42-NS | WR 42 |
| 26 – 40 | 82.98 | VTA-28-NS | WR 28 |
| 50 – 75 | 83.45 | VTA-15-NS | WR 15 |
| 75 – 110 | 83.95 | VTA-10-NS | WR 10 |
| 90 – 140 | 85.20 | VTA-8-NS | WR 08 |
| 110 – 170 | 81.06 | VTA-6-NS | WR 06 |
| 140 – 220 | 79.27 | VTA-5-NS | WR 05 |
| 220 – 275 | 76.82 | VTA-3.4FA-NS | WR 3.4 |
| 275 – 325 | 72.45 | VTA-3.4FB-NS | WR 3.4 |
| 325 – 400 | 71.31 | VTA-2.2FA-NS | WR 2.2 |
| 400 – 500 | 65.60 | VTA-2.2FB-NS | WR 2.2 |



Notes

1. Typical average mid band noise temperature
2. **How to make a request:** Indicate the feed-horn assembly (s) required listed above; Specify manual or automatic liquid nitrogen filling. [Auto fill also adds a 35 litre LN2 dewar], send mail to: sales@vivatech.biz