

Summary of Performance Specifications VNA Frequency Extension Modules

Waveguide Band (GHz)	WR28	WR19	WR15	WR15 (SE Option)	WR12	WR12 (SE Option)	WR10	WR10 (SE Option)	WR8.0	WR6.5	WR5.1
Standard Frequency Coverage (GHz)	26-40	40-60	50-75	50-75	60-90	60-90	75-110	75-110	90-140	110-170	140-220
Extended Frequency Coverage (GHz) [†]	-	-	47-77	47-77	55-95	55-90	67-115	67-110	-	-	-
Dynamic Range (BW=10Hz,dB,typ)	120	120	120	120	120	120	120	120	120	120	120
Dynamic Range (BW=10Hz,dB,min)	110	105	110	110	110	110	110	110	110	110	110
Magnitude Stability (±dB, typical)	0.15	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.15	0.25	0.25
Phase Stability (±deg, typical)	2	2	1.5	1.5	1.5	1.5	1.5	1.5	2	4	4
Test Port Power (dBm, typ.)	13	17	18	13	18	13	18	-4	16	13	6
Test Port Input Limit (est., dBm, damage) - TxRx, TxRef	33	31	30	30	30	30	30	20	30	30	30
Test Port Input Limit (est., dBm, damage) - Rx in Standard Operation	40	40	23	23	23	23	23	23	23	21	21
Test Port Input Limit (est. dBm, damage) - Rx in High Sensitivity Operation	0	0	0	0	0	0	0	0	0	0	0
Directivity (dB, typical)	30	30	30	30	30	30	30	30	30	30	30

Waveguide Band (GHz)	WR5.1 (EB Option)	WR4.3	WR3.4	WM710 (WR2.8)	WM570 (WR2.2)	WM380 (WR1.5) Mini	WM250 (WR1.0) Mini	WM164 (WR0.65)**			
Standard Frequency Coverage (GHz)	140-220	170-260	220-330	260-400	330-500	500-750	750-1,100	1,100-1,500			
Extended Frequency Coverage (GHz) [‡]	130-220	-	-	-	325-500	-	-	-			
Dynamic Range (BW=10Hz,dB,typ)	120	115	115	110	110	110*	95*	60*			
Dynamic Range (BW=10Hz,dB,min)	110	110	105	100	100	95*	75*	40*			
Magnitude Stability (±dB, typical)	0.25	0.3	0.3	0.5	0.5	0.4	0.5	1			
Phase Stability (±deg, typical)	4	4	6	6	6	4	6	20			
Test Port Power (dBm, typ.)	6	4	1	-1	-3	-12	-23	-45			
Test Port Input Limit (est., dBm, damage) - TxRx, TxRef	30	28	26	23	10	7	-3	-3			
Test Port Input Limit (est., dBm, damage) - Rx in Standard Operation	30	30	20	23	10	7	-3	-3			
Test Port Input Limit (est. dBm, damage) - Rx in High Sensitivity Operation	0	0	0	0	-10	0	-10	-10			
Directivity (dB, typical)	30	30	30	30	30	30	30	30			

*The dynamic range specifications assume that low phase noise sources are used, like those used in the modern Keysight PNA / PNA-X analyzers with DDS synthesizers. While compatible, other VNAs may reduce dynamic range.

**WM164 (WR0.65) performance is specified for a TxRx-Rx configuration. Performance of a TxRx-TxRx configuration is estimated to have a ~15dB degradation of dynamic range and may additionally require the use of a mmWave controller.

†Test Port Input Powers exceeding the peak Test Port Power of the TxRx or TxRef module will compress the module.

General Notes:

- Extension modules are compatible with all modern VNAs. Please consult with VDI to discuss VNA and module configurations that will yield the best performance for your application.

Specification Notes:

- Test Port Power is typical, reduced power is possible at band edges.
- Stability is specified for 1 hr. after system warm-up, in stable environment with ideal cables.
- Specifications assume a through measurement with two TxRx heads.
- Specifications are measured on a Keysight PNA/PNAX with front panel connection at 25°C typical.
- The dynamic range (RBW 10 Hz) is measured by first connecting two TxRx heads together and normalizing the un-calibrated S21 & S12. The heads are then disconnected and terminated with a waveguide short. The RMS average of 10 sweeps of the measured S21 & S12 gives the system dynamic range.
- Typical Module Dimensions exclude testport (2" standard testport for all modules except WM250 (WR1.0), where a 1" testport is used).

‡ Where noted, Extended Frequency Coverage applies; module performance within the standard band conforms to standard specifications while performance in the extended regions can be degraded as follows:

- The minimum and typical dynamic range is degraded by 10dB or less, compared to the specification for the standard band, with the exception for WR5.1-EB. For WR5.1, the minimum dynamic range is 95dB (15dB degradation compared to the standard band specification).
- The test port power typical across the extended band is degraded by 5dB or less compared to the specification for the standard band.