

Product Datasheet - Technical Specifications



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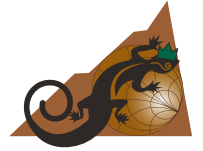
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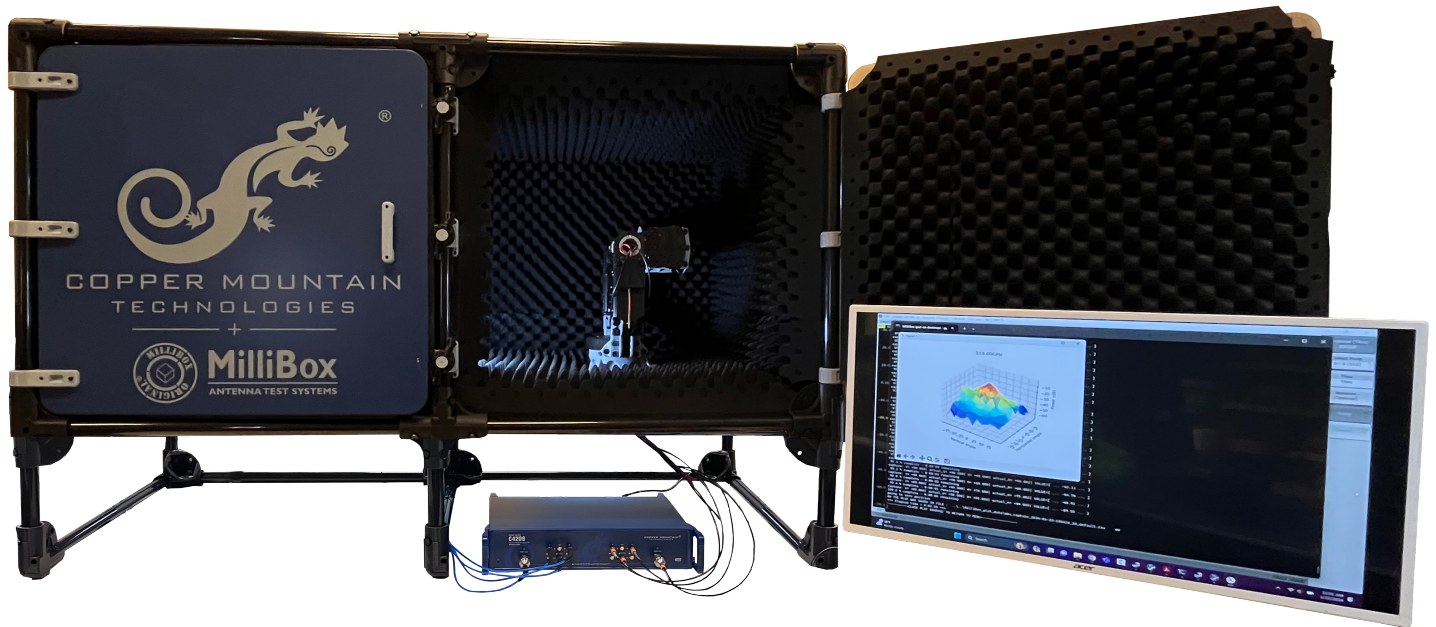
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OTA Antenna Test System



COPPER MOUNTAIN®
TECHNOLOGIES



- **Turn-key chamber system for measuring 5G or mmWave antennas**

- Coaxial band from 18-54 GHz
- Waveguides bands of
 - WR-15 (50-75 GHz)
 - WR-12 (60-90 GHz)
 - WR-10 (75-110 GHz)
 - WR-8 (90-140 GHz)
 - WR-6 (110-170 GHz)
 - WR-5 (150-220 GHz)

Smaller footprint chamber system makes it easier for engineers to do anechoic antenna tests.

Measure up to 235 cm far field measurements

Low-cost, space-saving solution ideal for antenna testing applications across automotive radar, aerospace, satellite communication, and similar industries.

5G OTA Antenna Test System



A new turnkey solution for customers needing to make far-field and sub-THz antenna measurements above 18 GHz. The over-the-air (OTA) antenna test system features a wide array of configurations depending on the user's far-field requirements, antenna size, desired frequency range, and antenna positioner functionality.

CMT has partnered with MilliBox to offer this complete OTA antenna measurement chamber solution for engineers needing to make measurements from 18 GHz to 54 GHz. Each OTA bundle features a benchtop compact anechoic chamber.

OTA-2S-54 (2 cubes) = 72 cm
OTA-3S-54 (3 cubes) = 133 cm
OTA-4S-54 (4 cubes) = 193 cm

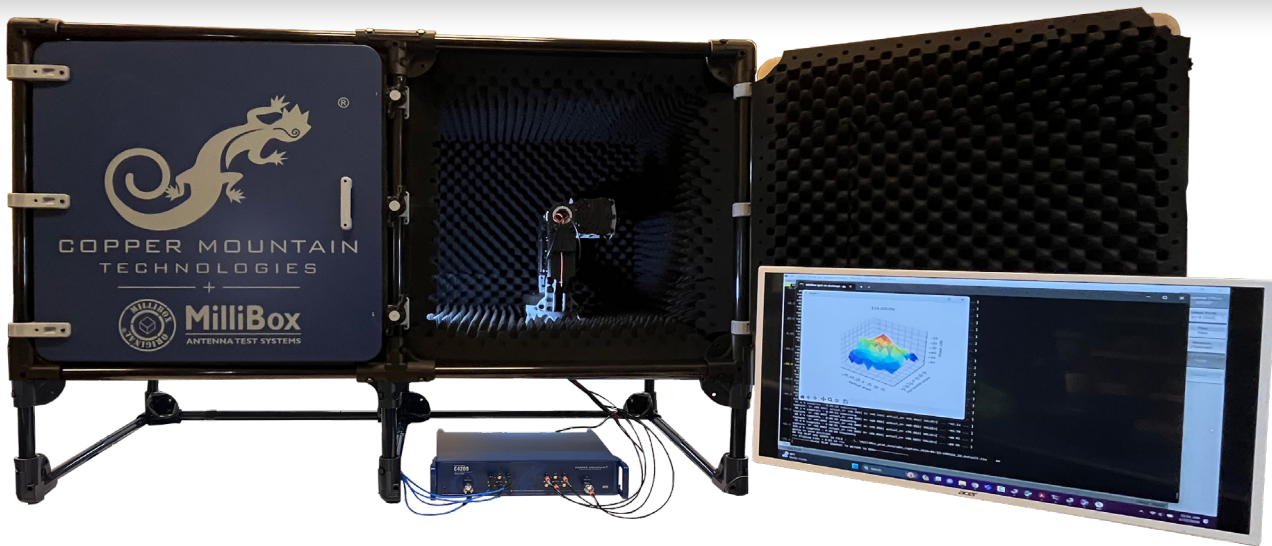
Each system includes a 3D antenna positioner (gimbal), sophisticated but intuitive measurement software, and other necessary accessories to fully set up a chamber for far-field antenna measurements.

The measurement system is anchored by CMT's 2-port 9 GHz Cobalt VNA and includes a set of CobaltFx FET1854 Frequency Extender Modules for 18 GHz-54 GHz.

These comprehensive OTA solution bundles provide a low-cost, space-saving solution that is ideal for 5G antenna testing applications across automotive radar, aerospace, satellite communication, and similar industries.

The OTA bundle is an all-in-one solution that provides everything needed to accurately test a large number of 5G and sub-THz antennas. The combination of affordability and portability will enable multiple systems in a single lab environment for users to simultaneously test multiple antennas.”

mmWave OTA Antenna Test System



A new turnkey solution for customers needing to make far-field and sub-THz antenna measurements for bands from WR-15 to WR-05. The over-the-air (OTA) antenna test system features a wide array of configurations depending on the user's far-field requirements, antenna size, desired frequency range, and antenna positioner functionality.

CMT has partnered with MilliBox and Eravant to offer a complete OTA antenna measurement chamber solution for engineers needing to make measurements from 50 to 220 GHz. Each OTA bundle features a benchtop compact anechoic chamber.

OTA-2H-XX (2 cubes) = 80 cm
OTA-3H-XX (3 cubes) = 158 cm
OTA-4H-XX (4 cubes) = 235 cm

Each system includes a 3D antenna positioner (gimbal), sophisticated but intuitive measurement software, and other necessary accessories to fully set up a chamber for far-field antenna measurements.

The measurement system is anchored by CMT's 2-port 9 GHz Cobalt VNA and a set of (1) Tx Frequency Extender and (1) Rx Frequency Extender in collaboration with Eravant. The extenders are available in the following frequencies:

- WR-15: 50 to 75 GHz
- WR-12: 60 to 90 GHz
- WR-10: 75 to 110 GHz
- WR-08: 90 to 140 GHz
- WR-06: 110 to 170 GHz
- WR-05: 150 to 220 GHz

These comprehensive mmWave solution bundles provide a low-cost, space-saving solution that is ideal for millimeter wave antenna testing applications across automotive radar, aerospace, satellite communication, and similar industries.

The OTA bundle is an all-in-one solution that provides everything needed to accurately test a large number of mmWave and sub-THz antennas. The combination of affordability and portability will enable multiple systems in a single lab environment for users to simultaneously test multiple antennas."

Chamber System Specifications

MBX02 Specifications

Compact Size	4' x 3' x 2' (WHD)
Range	-180 to +180 degree in H and V planes
Far-Field Distance	72 cm
Resolution	<0.1 degree in both planes
Maximum DUT Size	40 mm x 200mm x 110mm (1.5" x 7.9" x 4.3") THW
Maximum DUT Weight	500g (1lb) balanced
Absorber Performance	-50dB at normal incidence
Instrument Bay Size	2 bays of 300mm x 500mm x 580mm (12" x 20" x 23") HWD

MBX03 Specifications

Compact Size	6' x 3' x 2' (WHD)
Range	-180 to +180 degree in H and V planes
Far-Field Distance	133cm
Resolution	<0.1 degree in both planes
Maximum DUT Size	40 mm x 200mm x 110mm (1.5" x 7.9" x 4.3") THW
Maximum DUT Weight	500g (1lb) balanced
Absorber Performance	-50dB at normal incidence
Instrument Bay Size	3 bays of 300mm x 500mm x 580mm (12" x 20" x 23") HWD

MBX04 Specifications

Compact Size	8' x 3' x 2' (WHD)
Range	-180 to +180 degree in H and V planes
Far-Field Distance	193cm
Resolution	<0.1 degree in both planes
Maximum DUT Size	40 mm x 200mm x 110mm (1.5" x 7.9" x 4.3") THW
Maximum DUT Weight	500g (1lb) balanced
Absorber Performance	-50dB at normal incidence
Instrument Bay Size	4 bays of 300mm x 500mm x 580mm (12" x 20" x 23") HWD

MBX32E Specifications

Compact Size	5'3" x 3'8" x 2'9" (WHD)
Range	-180 to +180 degree in H and V planes
Far-Field Distance	80cm
Resolution	<0.1 degree in both planes
Maximum DUT Size	28cm (11")
Maximum DUT Weight	1kg (2lbs)
Absorber Performance	-50dB at normal incidence
Instrument Bay Size	2 bays: 2'5" x 11" x 2'6" (WHD)

MBX33E Specifications

Compact Size	7'11" x 3'8" x 2'9" (WHD)
Range	-180 to +180 degree in H and V planes
Far-Field Distance	158cm
Resolution	<0.1 degree in both planes
Maximum DUT Size	28cm (11")
Maximum DUT Weight	1kg (2lbs)
Absorber Performance	-50dB at normal incidence
Instrument Bay Size	3 bays: 2'5" x 11" x 2'6" (WHD)

MBX34E Specifications

Compact Size	10'5" x 3'8" x 2'9" (WHD)
Range	-180 to +180 degree in H and V planes
Far-Field Distance	235cm
Resolution	<0.1 degree in both planes
Maximum DUT Size	28cm (11")
Maximum DUT Weight	1kg (2lbs)
Absorber Performance	-50dB at normal incidence
Instrument Bay Size	4 bays: 2'5" x 11" x 2'6" (WHD)

[1] All specifications subject to change without notice. **CAUTION!** Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2024Q1

C4209 2-Port 9 GHz VNA Specifications

Primary Specifications

Impedance	50 Ohm
Test port connector	type N, female
Number of test ports	2 ports
Direct Access (Source, Ref, and Meas)	No
Frequency extender compatible	Yes
Frequency range*	100 kHz to 9.0 GHz
Full frequency accuracy	$\pm 2 \cdot 10^{-6}$
Frequency resolution	1 Hz
Number of measurement points	2 to 500,001
Measurement bandwidths (with 1/1.5/2/3/5/7 steps)	1 Hz to 2 MHz
Dynamic range ²	
100 kHz to 1 MHz	105 dB
1 MHz to 8 GHz	148 dB (152 dB typ.)
8 GHz to 9 GHz	138 dB (142 dB typ.)

Measurement Accuracy³

Accuracy of transmission measurements ⁴	Magnitude / Phase
100 kHz to 1 MHz	
5 dB to 15 dB	± 0.2 dB / $\pm 2^\circ$
-30 dB to 5 dB	± 0.1 dB / $\pm 1^\circ$
-50 dB to -30 dB	± 0.2 dB / $\pm 2^\circ$
-70 dB to -50 dB	± 1.0 dB / $\pm 6^\circ$
1 MHz to 8 GHz	
5 dB to 15 dB	± 0.2 dB / $\pm 2^\circ$
-70 dB to 5 dB	± 0.1 dB / $\pm 1^\circ$
-90 dB to -70 dB	± 0.2 dB / $\pm 2^\circ$
-110 dB to -90 dB	± 1.0 dB / $\pm 6^\circ$
8 GHz to 9 GHz	
5 dB to 15 dB	± 0.2 dB / $\pm 2^\circ$
-60 dB to 5 dB	± 0.1 dB / $\pm 1^\circ$
-80 dB to -60 dB	± 0.2 dB / $\pm 2^\circ$
-100 dB to -80 dB	± 1.0 dB / $\pm 6^\circ$
Accuracy of reflection measurements ⁵	Magnitude / Phase
-15 dB to 0 dB	± 0.4 dB / $\pm 3^\circ$
-25 dB to -15 dB	± 1.0 dB / $\pm 6^\circ$
-35 dB to -25 dB	± 3.0 dB / $\pm 20^\circ$
Trace noise magnitude (IF bandwidth 3 kHz)	
100 kHz to 1 MHz	0.005 dB rms
1 MHz to 9 GHz	0.001 dB rms
Temperature dependence	0.02 dB/°C (0.01 dB/°C typ.)

Uncorrected System Performance

100 kHz to 1 MHz	
Directivity	12 dB
Source match	12 dB
Load match	12 dB
1 MHz to 9 GHz	
Directivity	18 dB
Source match	20 dB
Load match	20 dB

Effective System Data

100 kHz to 1 MHz	
Directivity	46 dB
Source match	40 dB
Load match	46 dB
Reflection tracking	± 0.05 dB
Transmission tracking	± 0.10 dB
1 MHz to 9 GHz	
Directivity	46 dB
Source match	40 dB
Load match	46 dB
Reflection tracking	± 0.05 dB
Transmission tracking	± 0.05 dB

Test Port Input

Noise floor	
100 kHz to 1 MHz	-100 dBm/Hz
1 MHz to 8 GHz	-143 dBm/Hz
8 GHz to 9 GHz	-133 dBm/Hz
Damage level	+26 dBm
Damage DC voltage	35 V

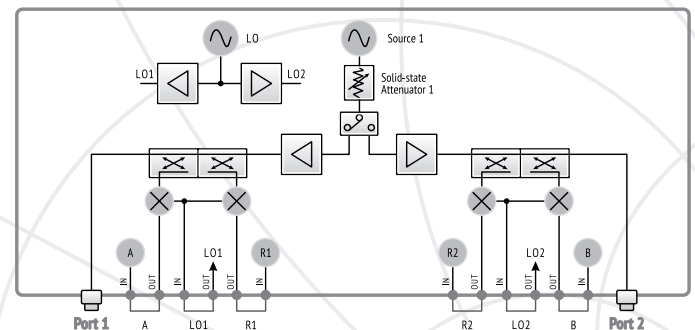
System & Power

Operating system	Windows 7 and above
CPU frequency	1.5 GHz
RAM	1 GB
Interface	USB 2.0
Connector type	USB B
Power supply	110-240 V, 50/60 Hz
Power consumption	75 W

Dimensions

Length	355 mm
Width	440 mm
Height	96 mm
Weight	7 kg (247 oz)

Block Diagram of Cobalt C4209



[1] All specifications subject to change without notice. [*] Upper frequency limit is equal 9.6 GHz. All specifications in the frequency range from 9 GHz to 9.6 GHz are typical. [2] The dynamic range is defined as the difference between the specified maximum power level and the specified noise floor. The specification applies at 10 Hz IF bandwidth. [3] Reflection and transmission measurement accuracy applies over the temperature range of (73 ± 9)° F or (23 ± 5)° C after 40 minutes of warming-up, with less than 1° C deviation from the full two-port calibration temperature, at output power of 0 dBm. Frequency points have to be identical for measurement and calibration (no interpolation allowed). [4] Transmission specifications are based on a matched DUT, and IF bandwidth of 1 Hz. [5] Reflection specifications are based on an isolating DUT. [6] Specification applies over frequency range from 1 MHz to 9 GHz, at output power of 0 dBm. © Copper Mountain Technologies – www.coppermountaintech.com | Rev. 2020Q3

CobaltFx FET1854 Specifications¹



Effective System Data

18 GHz to 36 GHz	
Directivity	38 dB
Source match	32 dB
Load match	38 dB
Reflection tracking	±0.15 dB
Transmission tracking	±0.10 dB
36 GHz to 54 GHz	
Directivity	34 dB
Source match	30 dB
Load match	34 dB
Reflection tracking	±0.20 dB
Transmission tracking	±0.20 dB

Measurement Range

Impedance	50 Ohm
Test port connector	NMD 1.85 mm, male
Number of test ports	1
Frequency range	18 GHz to 54 GHz
Full frequency accuracy	±2·10 ⁻⁶
Frequency resolution	1 Hz
Number of measurement points	2 to 500,001
Measurement bandwidths (with 1/1.5/2/3/5/7 steps)	1 Hz to 2 MHz
Dynamic range ²	
18 GHz to 36 GHz	123 dB (130 dB typ.)
36 GHz to 50 GHz	113 dB
50 GHz to 54 GHz	104 dB

Uncorrected System Performance

18 GHz to 54 GHz	
Directivity	10 dB
Source match	10 dB
Load match	10 dB

Test Port Output

Power range	
18 GHz to 50 GHz	-20 dBm to +3 dBm
50 GHz to 54 GHz	-20 dBm to -6 dBm
Power accuracy	±2 dB
Power resolution	0.1 dB
Harmonic distortion ⁶	-10 dBc
Non-harmonic spurious ⁶	-10 dBc

Measurement Accuracy³

Accuracy of transmission measurements ⁴	Magnitude / Phase
18 GHz to 36 GHz	
-50 dB to 0 dB	±0.1 dB / ±1°
-70 dB to -50 dB	±0.2 dB / ±2°
-90 dB to -70 dB	±1.0 dB / ±6°
36 GHz to 54 GHz	
-40 dB to 0 dB	±0.2 dB / ±2°
-60 dB to -40 dB	±0.3 dB / ±3°
-80 dB to -60 dB	±1.1 dB / ±8°
Accuracy of reflection measurements ⁵	Magnitude / Phase
18 GHz to 36 GHz	
-15 dB to 0 dB	±0.8 dB / ±6°
-25 dB to -15 dB	±2.5 dB / ±15°
-30 dB to -25 dB	±4.5 dB / ±25°
36 GHz to 54 GHz	
-15 dB to 0 dB	±1.2 dB / ±9°
-25 dB to -15 dB	±4.5 dB / ±25°
-30 dB to -25 dB	±9.0 dB / ±40°
Trace noise magnitude (IF bandwidth 3 kHz)	
18 GHz to 36 GHz	0.0015 dB rms
36 GHz to 54 GHz	0.0025 dB rms

Test Port Input

Noise floor	
18 GHz to 36 GHz	-130 dBm/Hz
36 GHz to 54 GHz	-120 dBm/Hz
Damage level	+23 dBm
Damage DC voltage	0 V

Measurement Speed

Time per point ⁷	10 μs typ.
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RF Input

Port	RF IN	
Frequency range		
Frequency range 1	4.5 GHz to 8.0 GHz (x4)	18 GHz to 32 GHz
Frequency range 2	4.00 GHz to 6.25 GHz (x8)	32 GHz to 50 GHz
Frequency range 3	6.25 GHz to 6.75 GHz (x8)	50 GHz to 54 GHz
Input reflection coefficient	-15 dB	
Damage level	+8 dBm	
Damage DC voltage	0 V	
Connector type	SMA, female	

LO Input

Port	LO IN	
Frequency range		
Frequency range 1	4.5 GHz to 9.0 GHz (x4)	18 GHz to 36 GHz
Frequency range 2	4.00 GHz to 6.75 GHz (x8)	36 GHz to 54 GHz
Input reflection coefficient	-15 dB	
Damage level	+8 dBm	
Damage DC voltage	0 V	
Connector type	SMA, female	

Reference IF Output

Port	IF REF
Output frequency	15.45 MHz
Connector type	SMA, female

Test IF Output

Port	IF TEST
Output frequency	15.45 MHz
Connector type	SMA, female

Calibration

Recommended factory adjustment interval	3 Years
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System & Power

Operating system	Windows 7 and above
Interface	SPI
Connector type	LEMO B-series
Power consumption	25 W
Input power	9 V DC to 15 V DC

Dimensions

Length	240 mm
Width	144 mm
Height	60 mm
Weight	2.2 kg (78 oz)

Environmental Specifications

Operating temperature	+5 °C to +40 °C (41 °F to 104 °F)
Storage temperature	-50 °C to +70 °C (-58 °F to 158 °F)
Humidity	90 % at 25 °C (77 °F)
Atmospheric pressure	70.0 kPa to 106.7 kPa

VNA Compatibility

2 port VNAs	C4209, C4220
4 port VNAs	C4409, C4420

[1] All specifications subject to change without notice. [2] The dynamic range is defined as the difference between the specified maximum power level and the specified noise floor. The specification applies at 10 Hz IF bandwidth. [3] Reflection and transmission measurement accuracy applies over the temperature range of (73 ± 9) °F or (23 ± 5) °C after 60 minutes of warming-up, with less than 1 °C deviation from the full one-port calibration (for reflection coefficient only) or two-port calibration temperature, at output power of -10 dBm. Frequency points have to be identical for measurement and calibration (no interpolation allowed). [4] Transmission specifications are based on a matched DUT, and IF bandwidth of 1 Hz. [5] Reflection specifications are based on an isolating DUT. [6] Specification applies over full frequency range, at max output power. [7] Depends on selected VNA model. © Copper Mountain Technologies - www.coppermountaintech.com - Rev. 2021Q2

CobaltFx FET-WR15-Rx Extenders

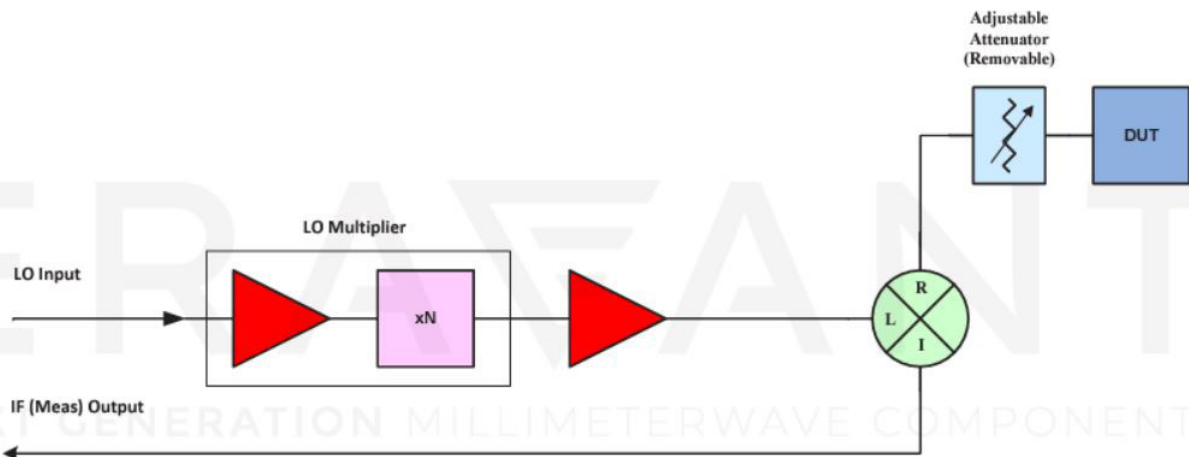
Electrical Specifications

Frequency range	50 GHz to 75 GHz
Input Attenuation Control Range	30 dB, typ
Test Port Input Power (Damage)	+5 dBm, typ
Dynamic range ²	100 dB, 120 dB typ
Test port match	20 dB, typ
LO source input frequency (RF+IF)	12.5 GHz - 18.75 GHz
LO source input power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF frequency range	10 MHz - 1000 MHz
Multiplication factor	4, typ
Specification temperature	+20°C to +30°C
Operating temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-15 waveguide with UG-385/U precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H) [Without Attenuator] 6.26" (L) x 3.75" (W) x 1.90" (H) [With Attenuator]

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR15-Tx Extenders

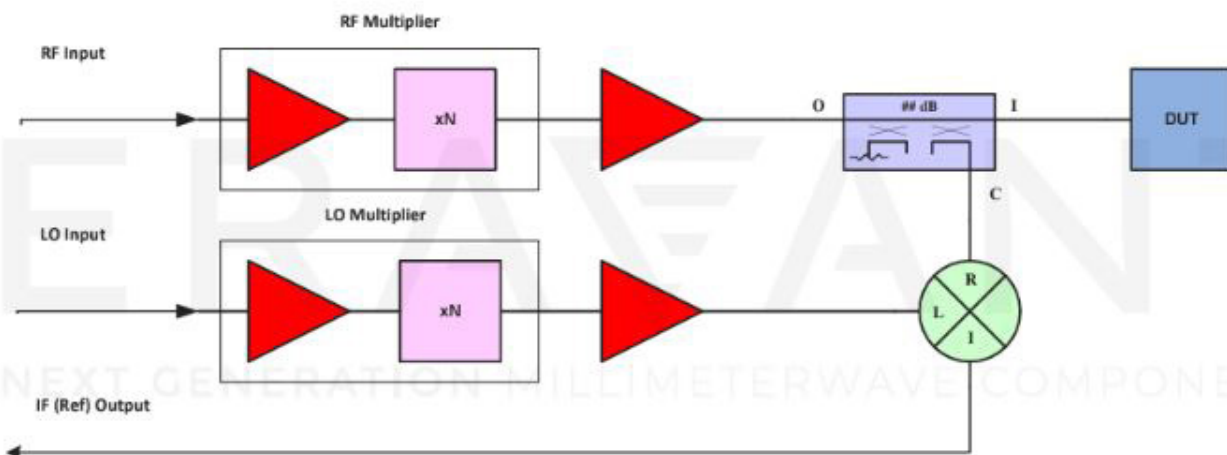
Electrical Specifications

Frequency range	50 GHz to 75 GHz
Test Port Output Power	5 dBm, typ
Dynamic range ²	100 dB, 120 dB typ
Test port match	20 dB, typ
RF Source Input Frequency	12.5 GHz - 18.75 GHz
RF Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
LO Source Input Frequency (RF±IF)	12.5 GHz - 18.75 GHz
LO Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF Frequency Range	10 MHz - 1000 MHz
Multiplication Factor	4
Operating temperature	+20°C to +30°C
Specification temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-15 waveguide with UG-385/U precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H)

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR12-Rx Extenders

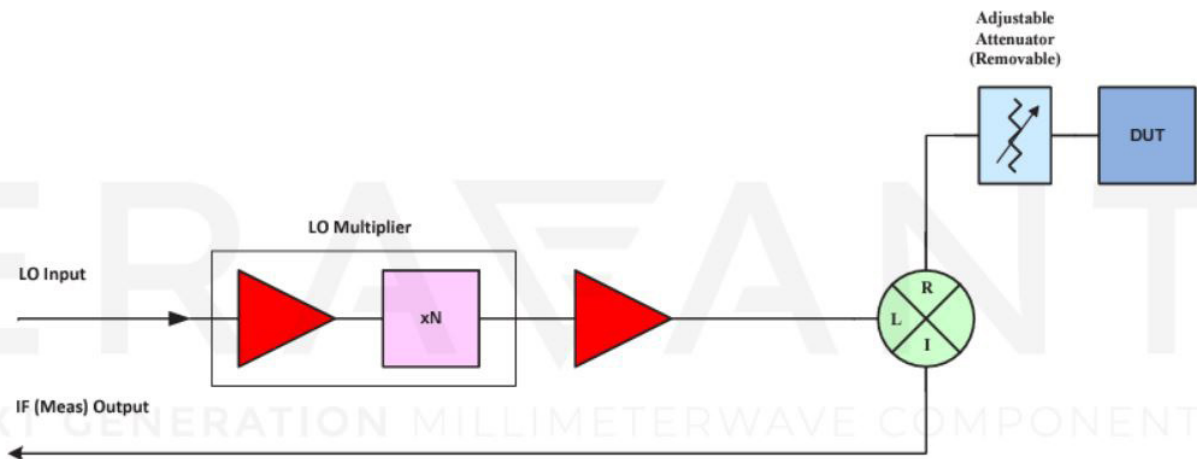
Electrical Specifications

Frequency range	60 GHz to 90 GHz
Input Attenuation Control Range	30 dB, typ
Test Port Input Power (Damage)	+5 dBm, max
Dynamic range ²	100 dB, 120 dB typ
Test port match	20 dB, typ
LO source input frequency (RF+IF)	10 GHz - 15 GHz
LO source input power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF frequency range	10 MHz - 1000 MHz
Multiplication factor	6, typ
Specification temperature	+20°C to +30°C
Operating temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-12 waveguide with UG-387/U precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H) [Without Attenuator]
	6.26" (L) x 3.75" (W) x 1.90" (H) [With Attenuator]

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR12-Tx Extenders

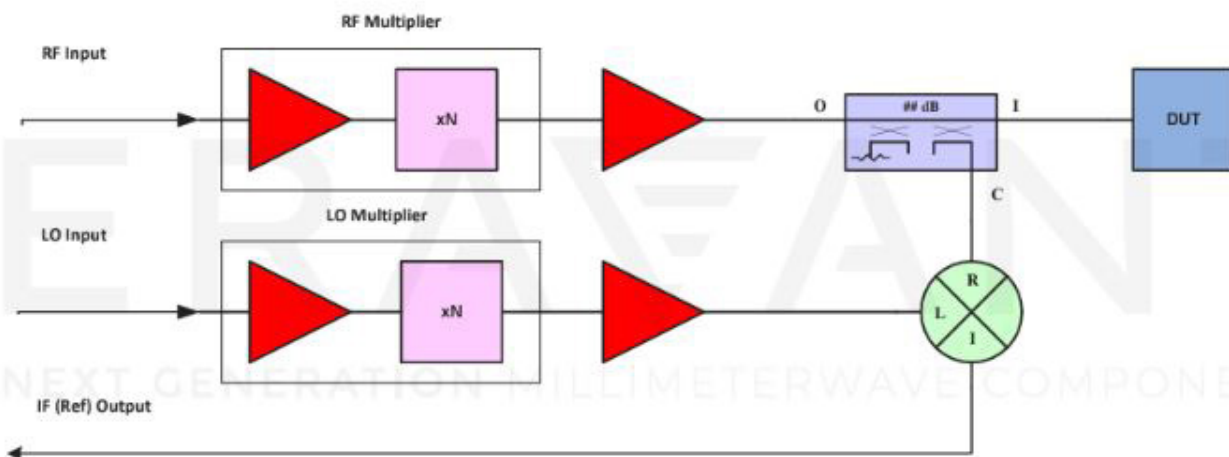
Electrical Specifications

Frequency range	60 GHz to 90 GHz
Test Port Output Power	5 dBm, typ
Dynamic range ²	100 dB, 120 dB typ
Test port match	20 dB, typ
RF Source Input Frequency	10 GHz - 15 GHz
RF Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
LO Source Input Frequency (RF±IF)	10 GHz - 15 GHz
LO Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF Frequency Range	10 MHz - 1000 MHz
Multiplication Factor	6, typ
Operating temperature	+20°C to +30°C
Specification temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-12 waveguide with UG-387/U precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H)

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR10-Rx Extenders

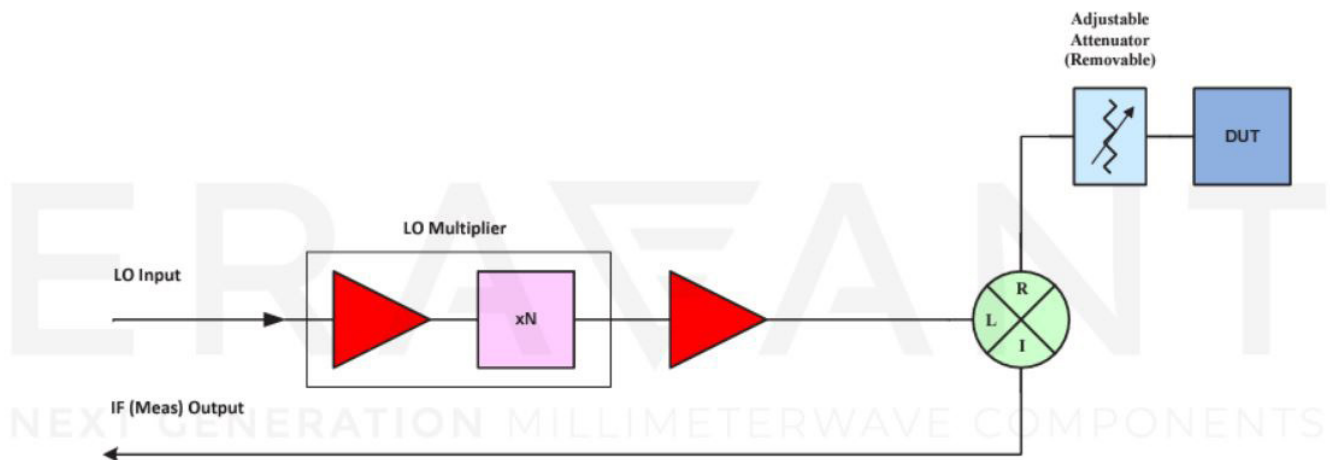
Electrical Specifications

Frequency range	75 GHz to 110 GHz
Input Attenuation Control Range	30 dB, typ
Test Port Input Power (Damage)	+10 dBm, max
Dynamic range ²	100 dB, 120 dB typ
Test port match	20 dB, typ
LO source input frequency (RF+IF)	12.5 GHz - 18.33 GHz
LO source input power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF frequency range	10 MHz - 1000 MHz
Multiplication factor	6, typ
Specification temperature	+20°C to +30°C
Operating temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-10 waveguide with UG-387/U precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H) [Without Attenuator] 6.26" (L) x 3.75" (W) x 1.90" (H) [With Attenuator]

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR10-Tx Extenders

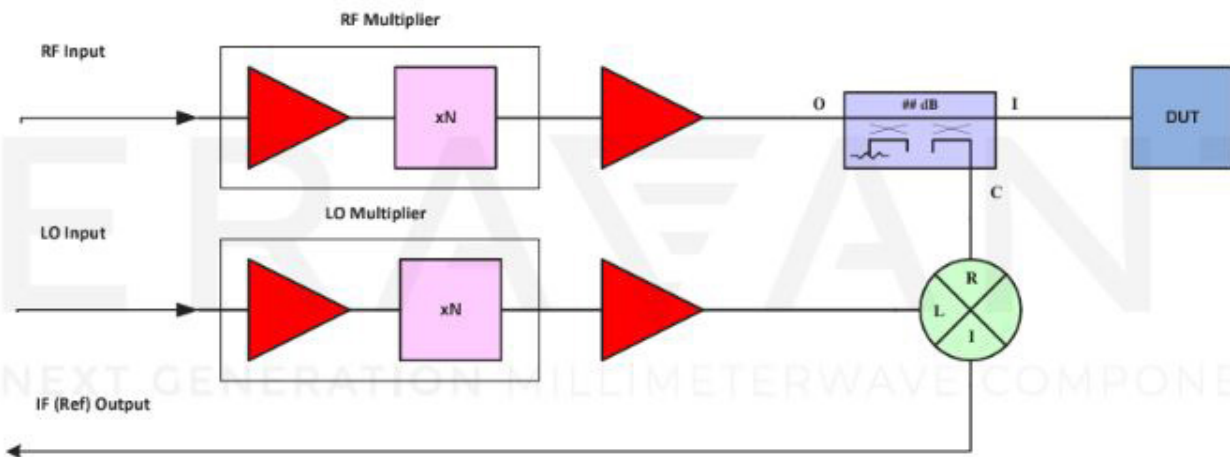
Electrical Specifications

Frequency range	75 GHz to 100 GHz
Test Port Output Power	5 dBm, typ
Dynamic range ²	100 dB, 120 dB typ
Test port match	20 dB, typ
RF Source Input Frequency	12.5 GHz - 18.33 GHz
RF Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
LO Source Input Frequency (RF±IF)	12.5 GHz - 18.33 GHz
LO Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF Frequency Range	10 MHz - 1000 MHz
Multiplication Factor	6, typ
Operating temperature	+20°C to +30°C
Specification temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-10 waveguide with UG-387/U-M precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H)

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR08-Rx Extenders

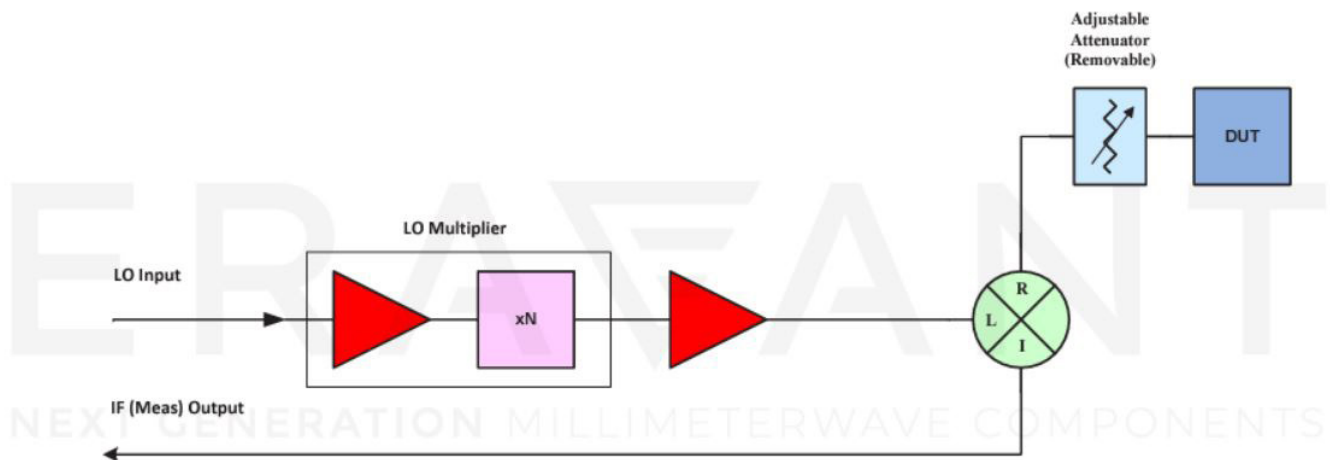
Electrical Specifications

Frequency range	90 GHz to 140 GHz
Input Attenuation Control Range	30 dB, typ
Test Port Input Power (Damage)	+10 dBm, max
Dynamic range ²	100 dB, typ
Test port match	20 dB, typ
LO source input frequency (RF+IF)	11.25 GHz - 17.5 GHz
LO source input power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF frequency range	10 MHz - 1000 MHz
Multiplication factor	8, typ
Specification temperature	+20°C to +30°C
Operating temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-08 waveguide with UG-387/U-M precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H) [Without Attenuator]
	6.26" (L) x 3.75" (W) x 1.90" (H) [With Attenuator]

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR08-Tx Extenders

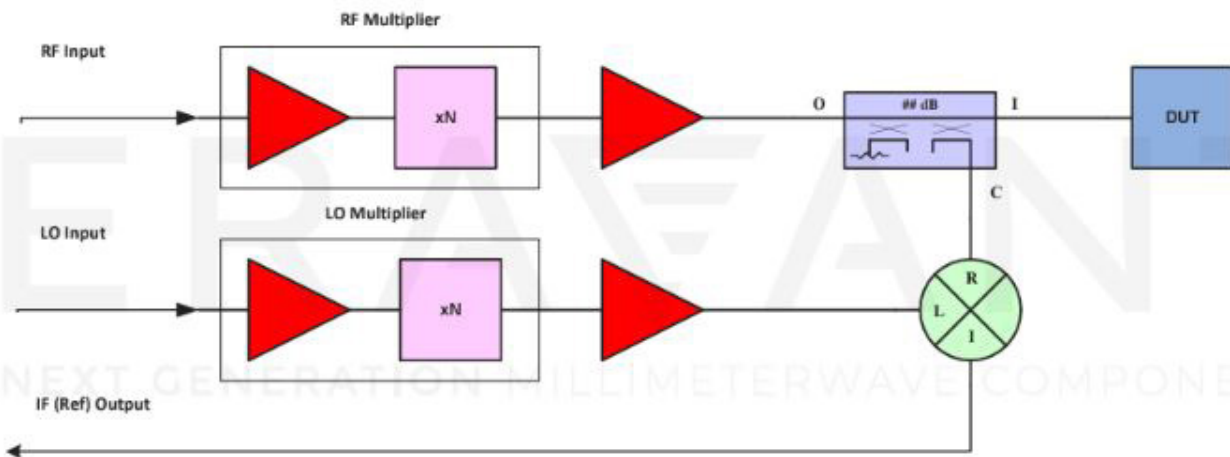
Electrical Specifications

Frequency range	90 GHz to 140 GHz
Test Port Output Power	-5 dBm, typ
Dynamic range ²	100 dB, typ
Test port match	20 dB, typ
RF Source Input Frequency	11.25 GHz - 17.5 GHz
RF Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
LO Source Input Frequency (RF±IF)	11.25 GHz - 17.5 GHz
LO Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF Frequency Range	10 MHz - 1000 MHz
Multiplication Factor	8, typ
Operating temperature	+20°C to +30°C
Specification temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-08 waveguide with UG-387/U-M precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H)

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR06-Rx Extenders

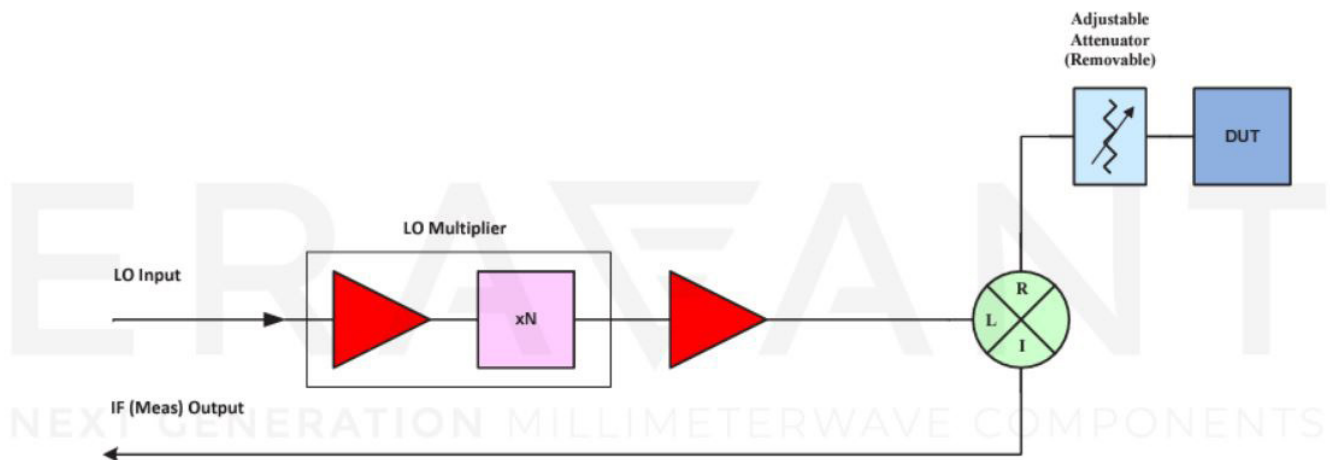
Electrical Specifications

Frequency range	110 GHz to 170 GHz
Input Attenuation Control Range	30 dB, typ
Test Port Input Power (Damage)	+10 dBm, max
Dynamic range ²	100 dB, typ
Test port match	20 dB, typ
LO source input frequency (RF+IF)	9.17 GHz - 14.17 GHz
LO source input power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF frequency range	10 MHz - 1000 MHz
Multiplication factor	12, typ
Specification temperature	+20°C to +30°C
Operating temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-06 waveguide with UG-387/U-M precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H) [Without Attenuator]
	6.26" (L) x 3.75" (W) x 1.90" (H) [With Attenuator]

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR06-Tx Extenders

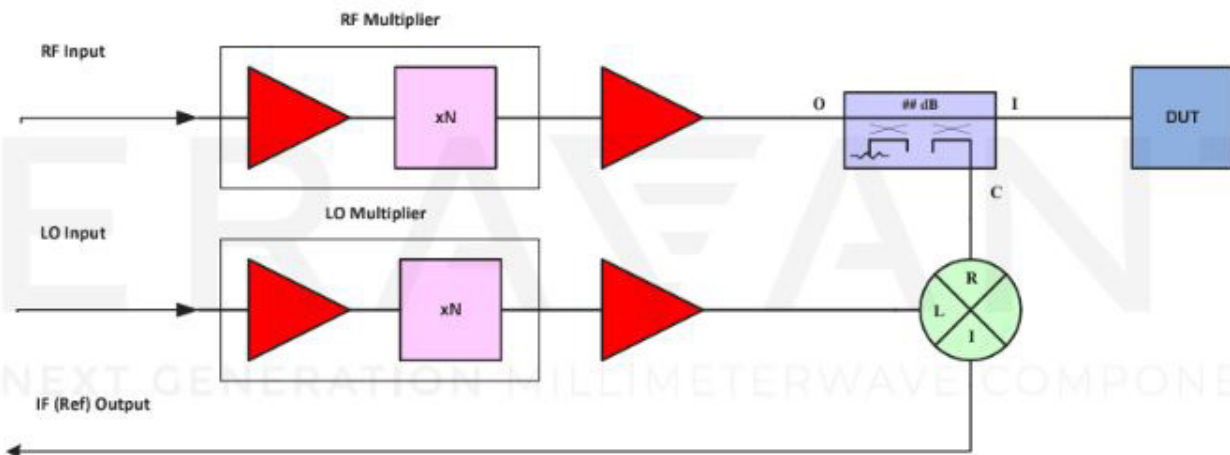
Electrical Specifications

Frequency range	110 GHz to 170 GHz
Test Port Output Power	-5 dBm, typ
Dynamic range ²	100 dB, typ
Test port match	20 dB, typ
RF Source Input Frequency	9.17 GHz - 14.17 GHz
RF Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
LO Source Input Frequency (RF±IF)	9.17 GHz - 14.17 GHz
LO Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF Frequency Range	10 MHz - 1000 MHz
Multiplication Factor	12, typ
Operating temperature	+20°C to +30°C
Specification temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-06 waveguide with UG-387/U-M precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H)

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4

CobaltFx FET-WR05-Rx Extenders

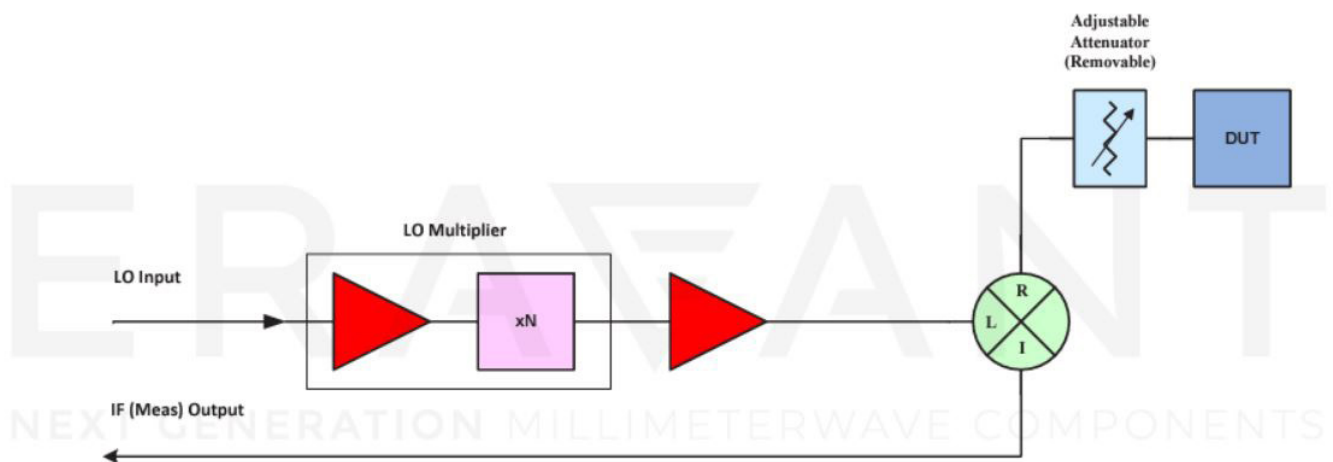
Electrical Specifications

Frequency range	150 GHz to 220 GHz
Input Attenuation Control Range	30 dB, typ
Test Port Input Power (Damage)	+10 dBm, max
Dynamic range ²	90 dB, typ
Test port match	20 dB, typ
LO source input frequency (RF+IF)	12.5 GHz - 18.33 GHz
LO source input power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF frequency range	10 MHz - 1000 MHz
Multiplication factor	12, typ
Specification temperature	+20°C to +30°C
Operating temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-06 waveguide with UG-387/U-M precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H) [Without Attenuator]
	6.26" (L) x 3.75" (W) x 1.90" (H) [With Attenuator]

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply.. Rev. 2023Q4

CobaltFx FET-WR05-Tx Extenders

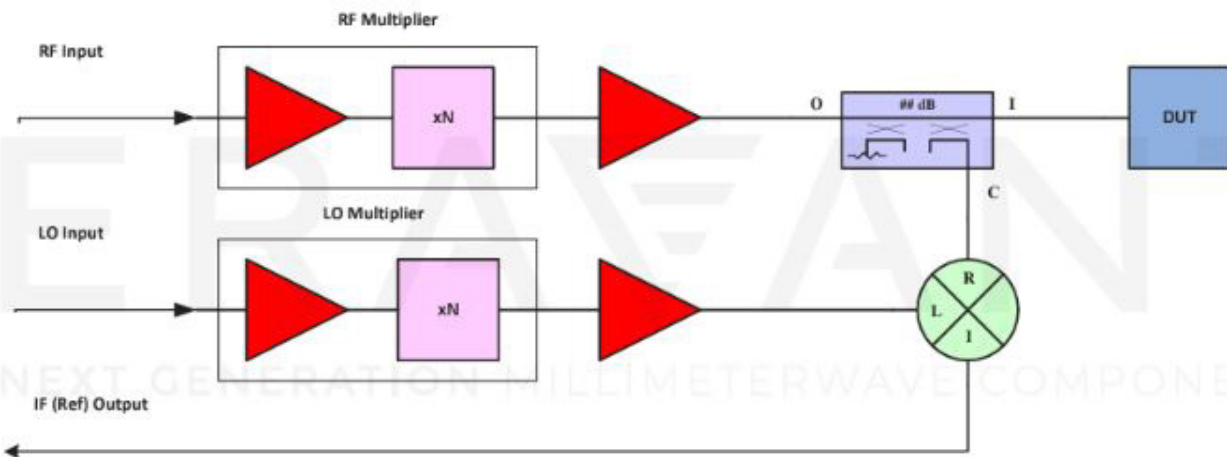
Electrical Specifications

Frequency range	150 GHz to 220 GHz
Test Port Output Power	-5 dBm, typ
Dynamic range ²	90 dB, typ
Test port match	20 dB, typ
RF Source Input Frequency	12.5 Ghz - 18.33 GHz
RF Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
LO Source Input Frequency (RF±IF)	12.5 Ghz - 18.33 GHz
LO Source Input Power	0 dBm, min; +3 dBm, typ; +6 dBm, max
IF Frequency Range	10 MHz - 1000 MHz
Multiplication Factor	12, typ
Operating temperature	+20°C to +30°C
Specification temperature	0°C to +50°C

Mechanical Specifications

Test port	WR-05 Waveguide with UG-387/U-M precision anti-cocking flange
LO Source Input Port	SMA (F)
IF measure port	SMA (F)
DC power receptacle	LEMO EGG.0B.304.CLL
Finish	Cobalt Blue Anodized
Weight (per module)	2.1 lbs
Size (without adjustable feet)	5.00" (L) x 3.75" (W) x 1.90" (H)

Simplified Block Diagram



[1] All specifications subject to change without notice. CAUTION! Exceeding absolute maximum ratings of the device will damage the extenders. Proper torque, 8.0 ± 0.15 inch-pounds (0.90 ± 0.02 Nm), should be applied. Any foreign objects in the waveguide will cause performance degradation or damage the device. [2] Dynamic range specification at 10 Hz BW. [3] Specification at 300 Hz BW. Necessary Accessories: Each extender includes DC power supply. Rev. 2023Q4