

ERA^ΔANT

NEXT GENERATION MILLIMETERWAVE COMPONENTS

U BAND UPDATES

Mar 2021

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INTRODUCTION

ERAVANT designs and manufactures total solutions for microwave and millimeterwave applications covering 10 MHz to 330 GHz.

- **This presentation introduces Eravant's selective standard product offerings in the U-Band (40-60 GHz).**
- Our full product offering, including Limited Run models, are listed on our website at www.eravant.com.

Additional products and presentations are available upon customer request:

- Custom models for components and subassemblies can be configured to customers' specifications.
- Presentations about Ka, Q, V, E, W, F, D, and G-Bands are available.
- Presentations for specific applications like 5G/IoT, Space, Test Instrumentation, Communications, and Radar are also available.

ERAVANT PRODUCT COVERAGE

- ERAVANT offers Total Product Solutions to configure any system applications in the Frequency Range of DC to 330 GHz.
- U Band products are mainly used in
 - Satellite Communication Systems
 - Commercial and military Radar systems
 - 5G systems
 - Scientific and industrial systems
 - Test equipment and set ups
- The intent of this presentation is to present the ERAVANT product offerings in **U** Band to help the customers having a quick overview of available product families for their project and system planning. The model selected is for illustration purpose. Many models with various performance in the same product family are available on the website.

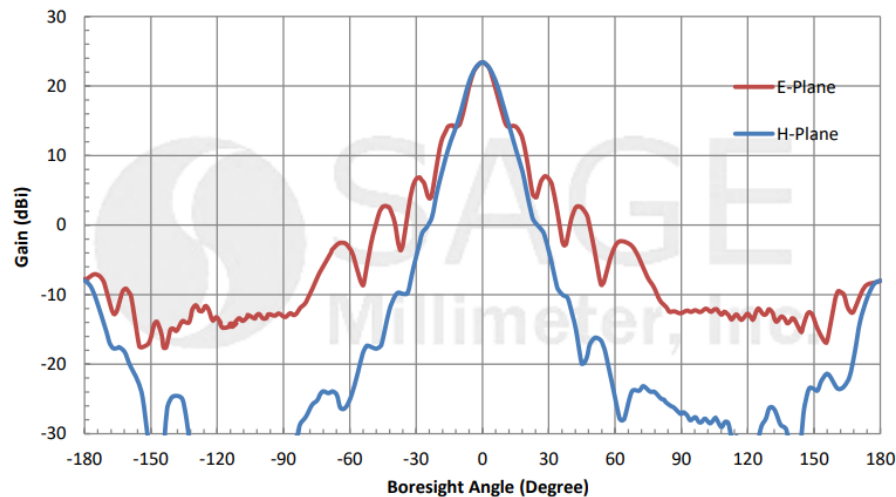
Rectangular Horn Antenna

Model SAR-2309-19-S2

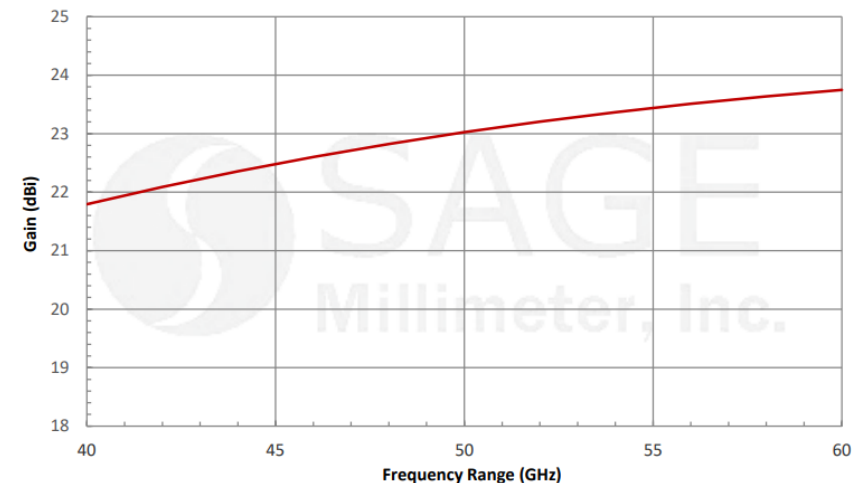
Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Gain	21.5 dBi	23 dBi	24 dBi
Polarization	Linear		
3 dB Beamwidth, E-Plane		10°	
3 dB Beamwidth, H-Plane		11°	
Sidelobes, E-Plane		-14 dB	
Sidelobes, H-Plane		-30 dB	
VSWR		1.15:1	



Typical Antenna Pattern @ 50 GHz



Typical Gain vs. Frequency



Conical Horn Antenna

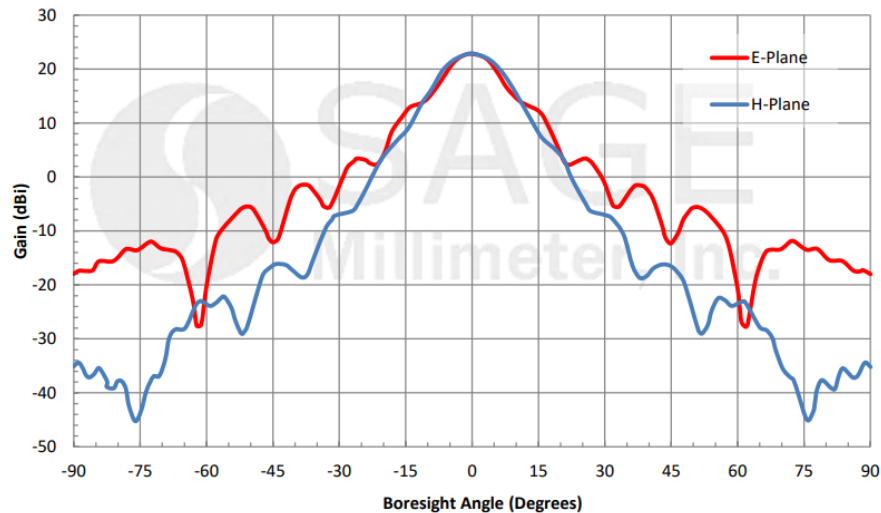
Model SAC-2309-188-S2

Parameter	Minimum	Typical	Maximum
Frequency*	43 GHz		50 GHz
Gain		23 dBi	
3 dB Beamwidth, E-plane		11°	
3 dB Beamwidth, H-plane		13°	
Sidelobes, E-plane		-20 dB	
Sidelobes, H-plane		-28 dB	
VSWR		1.15:1	

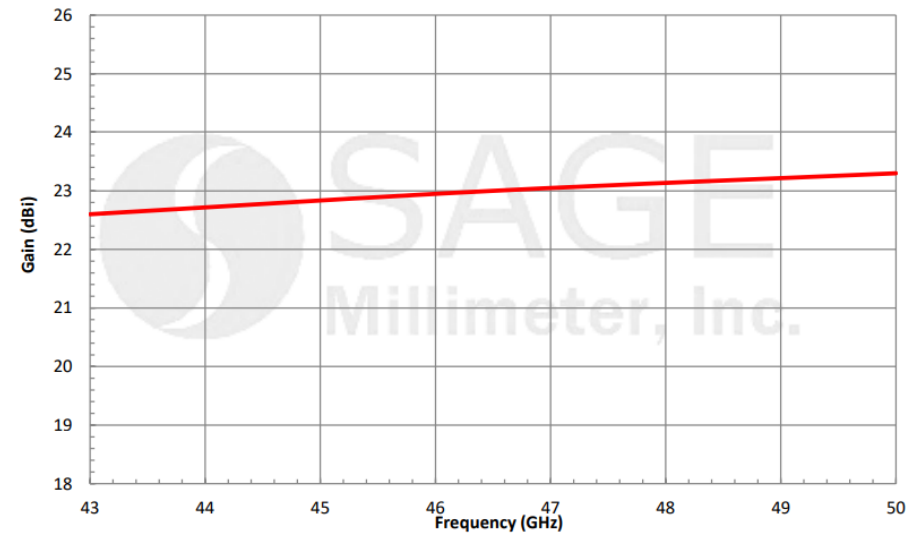
*Note: Can operate from 40 to 60 GHz if the dominant mode is maintained.



Typical Antenna Pattern @ 46.5 GHz



Typical Gain vs. Frequency



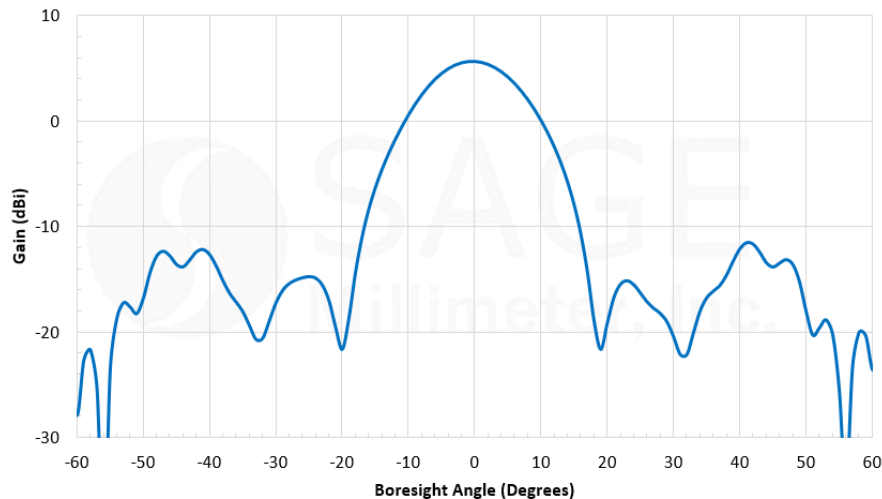
Omni-directional Antenna, 40 to 60 GHz

Model: SAO-4036030415-19-S1

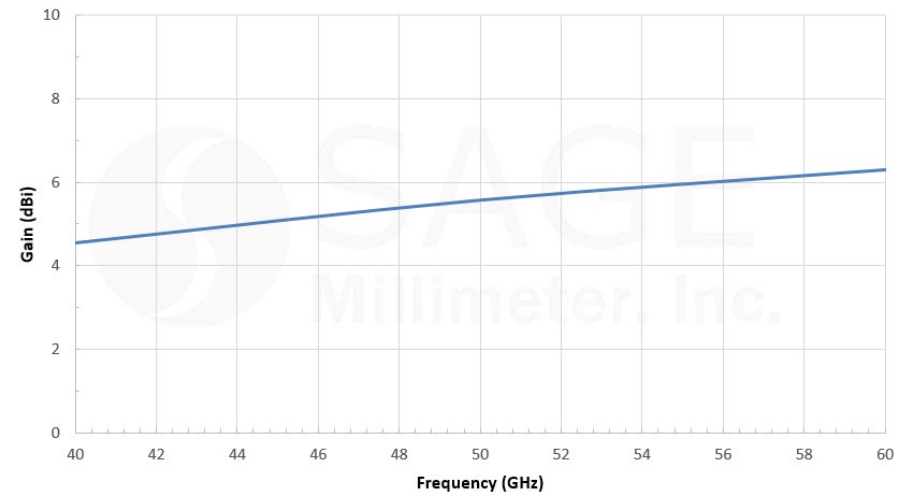
Parameter	Minimum	Typical	Maximum
Frequency Range	40 GHz		60 GHz
Gain		4.0 dBi	
Gain Variation		± 2.0 dB	
Azimuth		360°	
3 dB Beamwidth, Vertical		15°	
VSWR		1.9:1	
RF Connector	WR-19 with UG-383/U-M Flange		
Weight		0.8 Oz	



Simulated E-Plane Antenna Pattern @ 50 GHz



Simulated Gain vs. Frequency



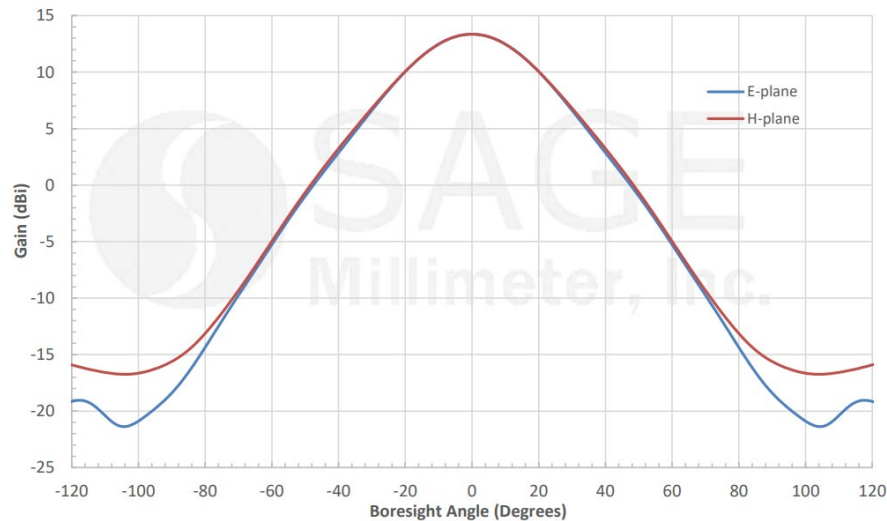
Dual Polarized Antenna, 40 to 60 GHz

Model SAF-4036031340-219-S1-188-DP

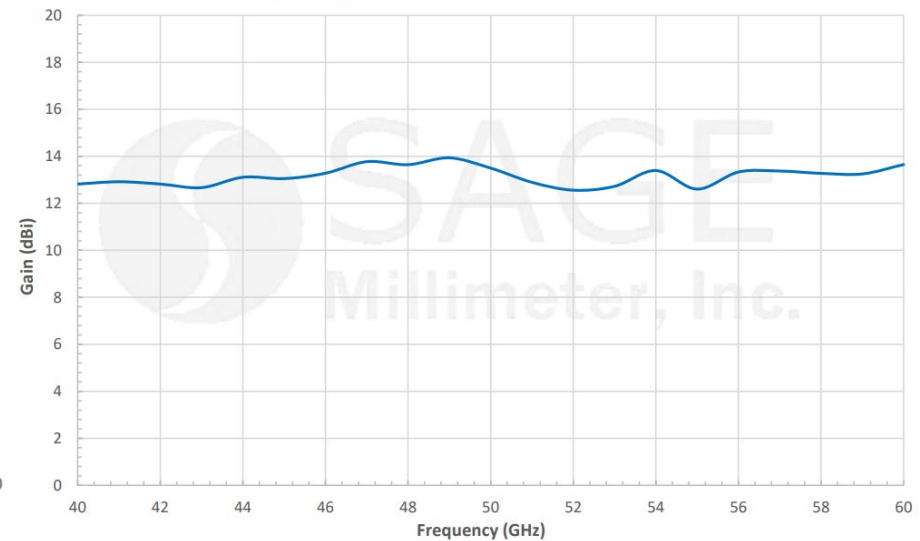
Parameter	Minimum	Typical	Maximum
Frequency	40 GHz	50 GHz	60 GHz
Gain		13 dBi	
3 dB Beamwidth, E-plane		40°	
3 dB Beamwidth, H-plane		40°	
Sidelobe Levels		-25 dB	
V and H Port Isolation		35 dB	
RF Connector	WR-19 with UG-383/U-M Flange		
Weight		0.2 lbs	



Simulated Antenna Patterns @ 50 GHz



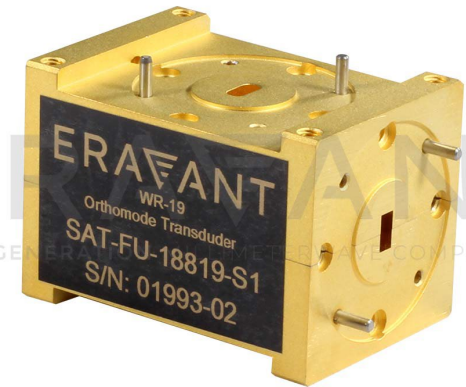
Measured Gain vs. Frequency



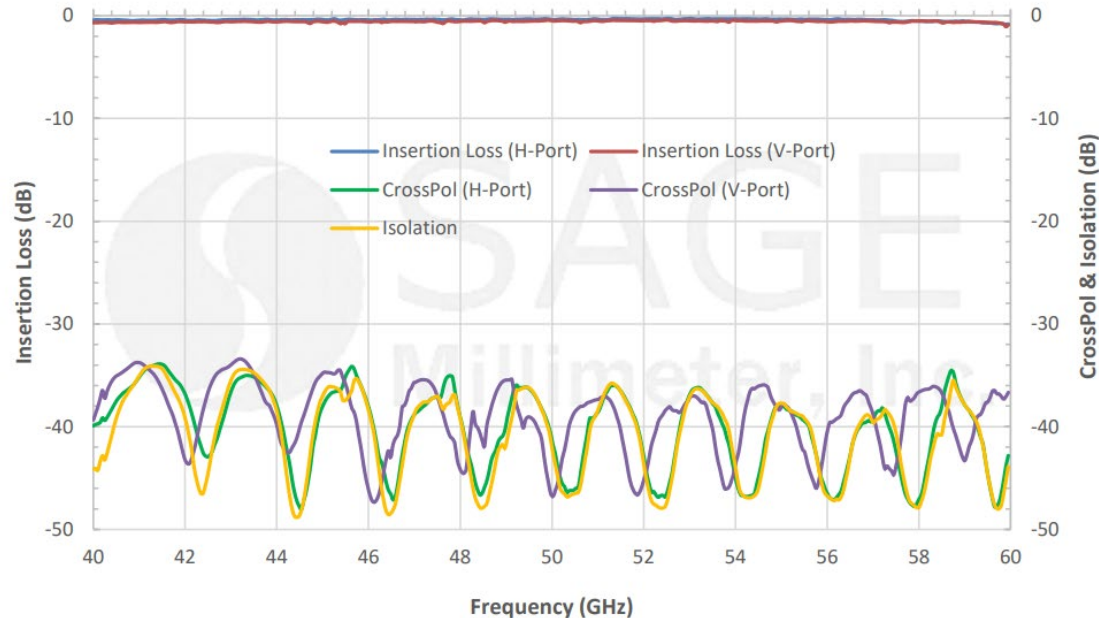
Full Band Orthomode Transducer

Model SAT-FU-18819-S1

Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Insertion Loss, Vertical		0.8 dB	
Insertion Loss, Horizontal		0.8 dB	
Isolation		40 dB	
Cross Polarization		35 dB	



Typical Performance vs. Frequency



Features

- High Isolation
- Low Insertion Loss
- Full Band Coverage
- High Crosspol Rejection

Power Amplifier, 40 to 60 GHz, +20 dBm P-1dB

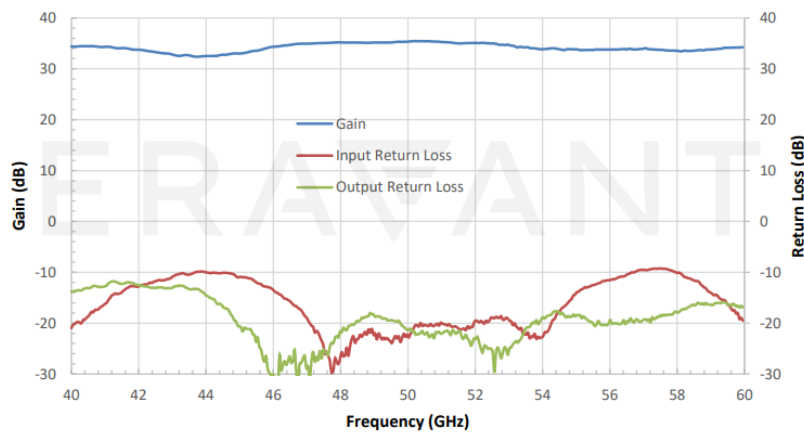
Model SBP-4036033520-1919-E1

Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Gain		35 dB	
P_{1dB}		+20 dBm	
P_{sat}		+23 dBm	
P_{in}			-3 dBm
Input VSWR		1.9:1	
Output VSWR		1.9:1	
DC Voltage		+8 V _{DC}	+12 V _{DC}
DC Supply Current		950 mA	



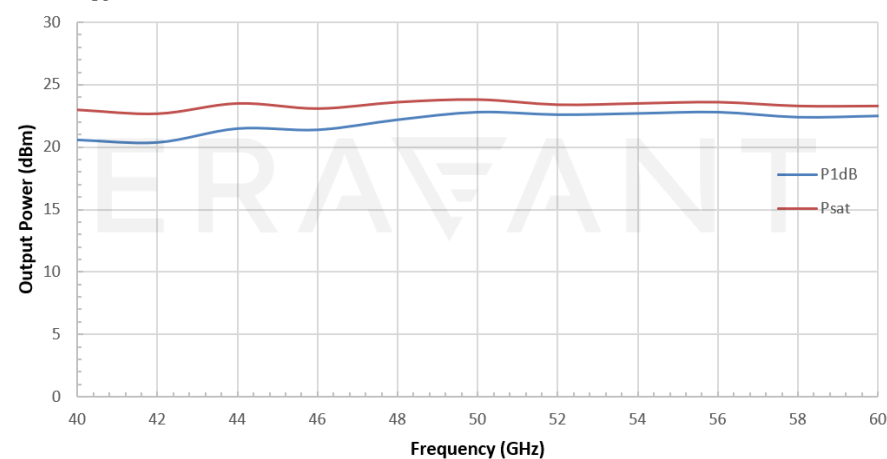
Gain and Return Loss vs. Frequency

Bias: +8 V_{DC}/899 mA



Output Power vs. Frequency

Bias: +8 V_{DC}/899 mA



Power Amplifier, 40 to 60 GHz, +19 dBm P-1dB

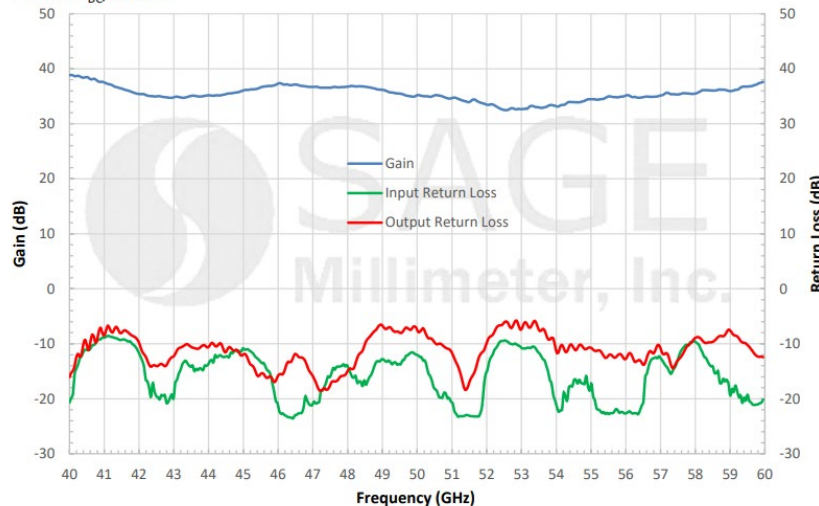
Model SBP-4036033519-VF19-E1

Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Gain		35 dB	
P_{1dB}		+19 dBm	
P_{Sat}		+20 dBm	
P_{in}			+20 dBm
Input VSWR		1.9:1	
Output VSWR		1.9:1	
DC Voltage		+8 V _{DC}	+12 V _{DC}
DC Supply Current		650 mA	



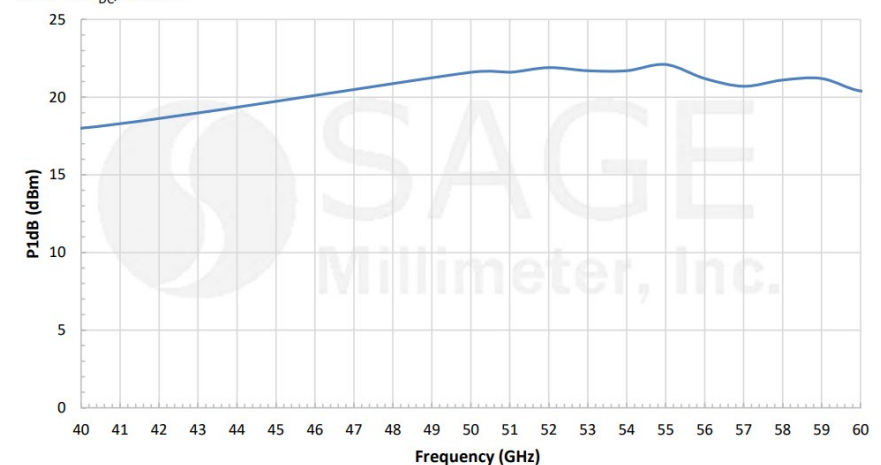
Typical Gain and Return Loss vs Frequency

Bias: +8 V_{DC}/650 mA



Typical Output Power vs. Frequency

Bias: +8 V_{DC}/850 mA



Power Amplifier, 37 to 43 GHz, +38 dBm PSat

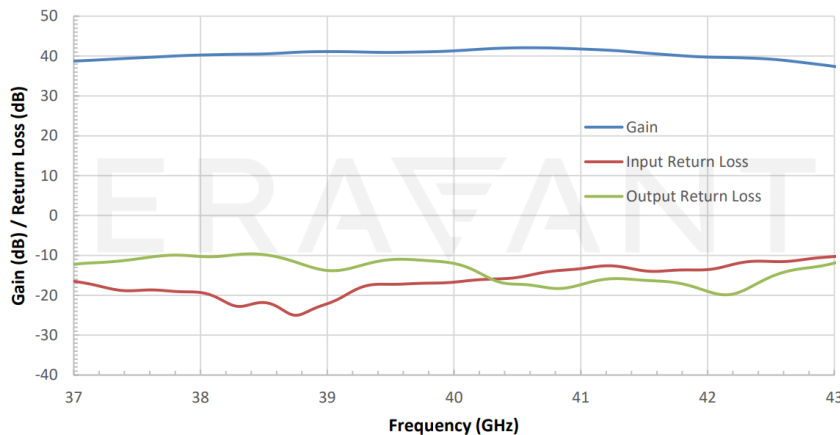
Model SBP-3734333538-2F2F-E1-HR

Parameter	Minimum	Typical	Maximum
Frequency	37 GHz		43 GHz
Gain		35 dB	
P_{1dB}		+30 dBm	
P_{Sat}		+38 dBm	
P_{in}			+10 dBm
Input VSWR		1.9:1	
Output VSWR		1.9:1	
DC Voltage	+14 V _{DC}	+15 V _{DC}	+17 V _{DC}
DC Supply Current		3.7 A	



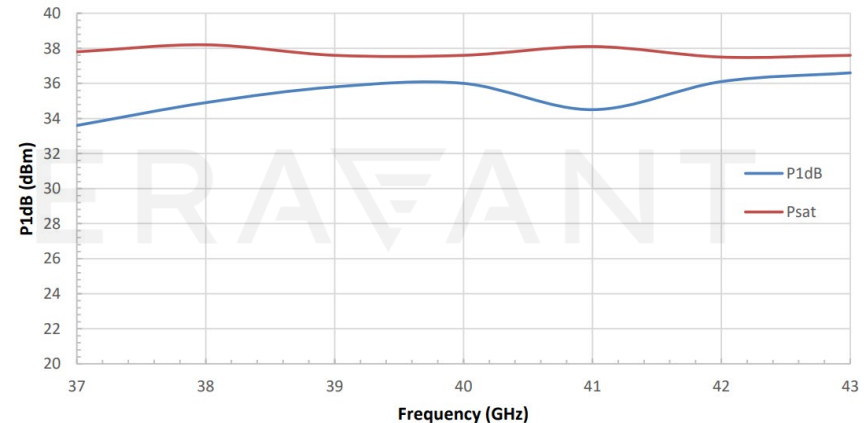
Gain and Return Loss vs. Frequency

Bias: +15 V_{DC} / 1.7 A



Output Power vs. Frequency

Bias: +15V_{DC}/3.7A



Low Noise Amplifier, 40 to 60 GHz

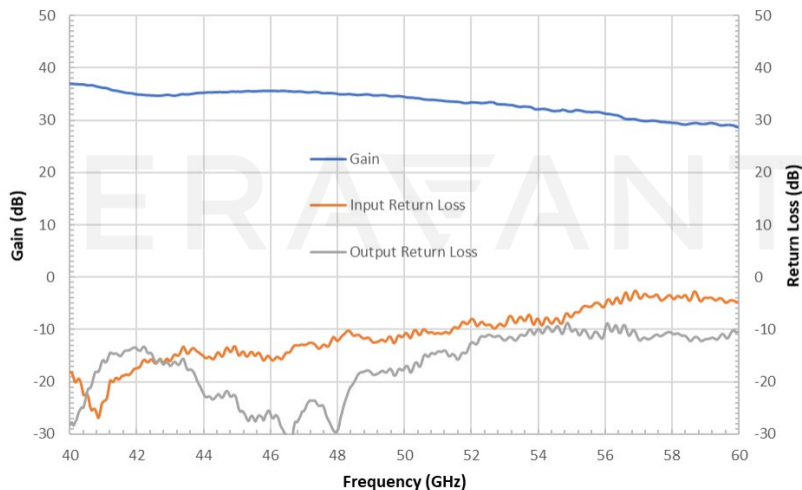
Model SBL-4036033080-1919-S1

Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Gain		30 dB	
Noise Figure		6 dB	
P_{in}			+10 dBm
Input VSWR		2.8:1	
Output VSWR		2.8:1	
DC Voltage		+6 V _{DC}	+12 V _{DC}
DC Current		60 mA	



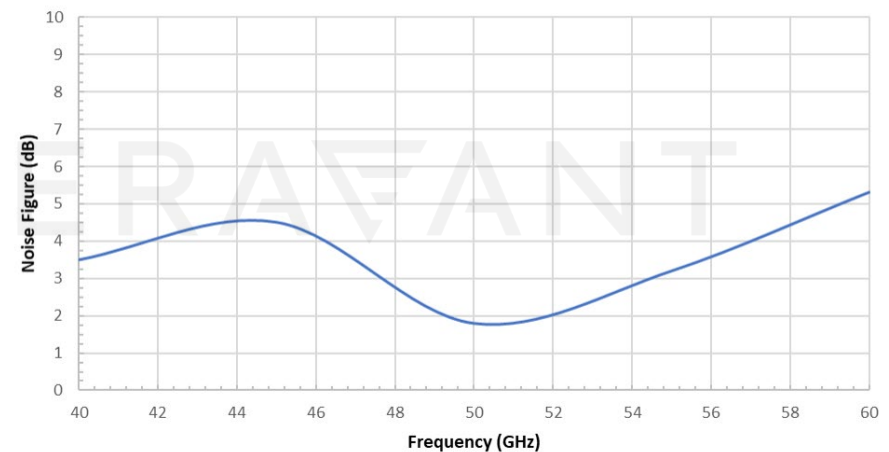
Gain and Return Loss vs. Frequency

Bias: +8 V_{DC}/ 420 mA



Noise Figure vs. Frequency

Bias: +8V_{DC}/420 mA



Low Noise Amplifier, 37 to 52 GHz

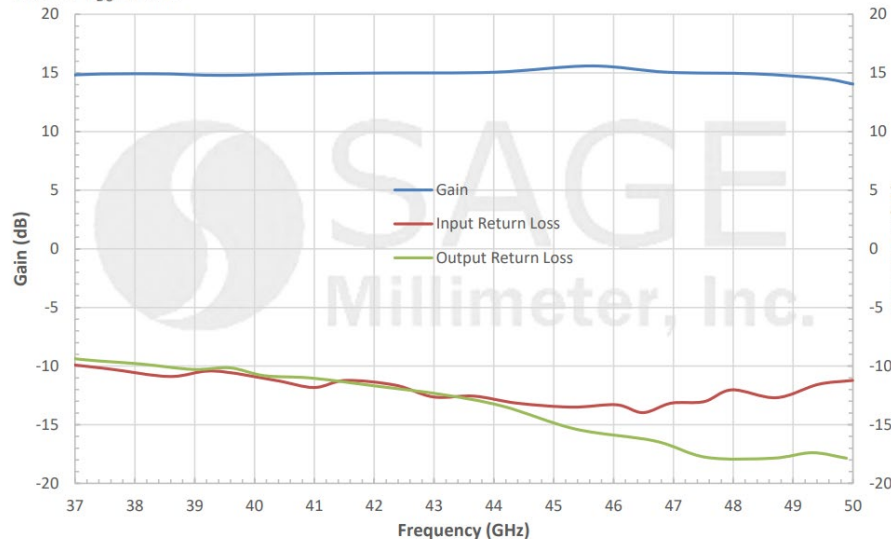
Model SBL-3735231530-1919-E1

Parameter	Minimum	Typical	Maximum
Frequency	37 GHz		52 GHz
Gain		15 dB	
Noise Figure		3 dB	
P_{in}			0 dBm
Input VSWR		2.3:1	
Output VSWR		2.3:1	
DC Voltage		+6 V _{DC}	+12 V _{DC}
DC Current		60 mA	



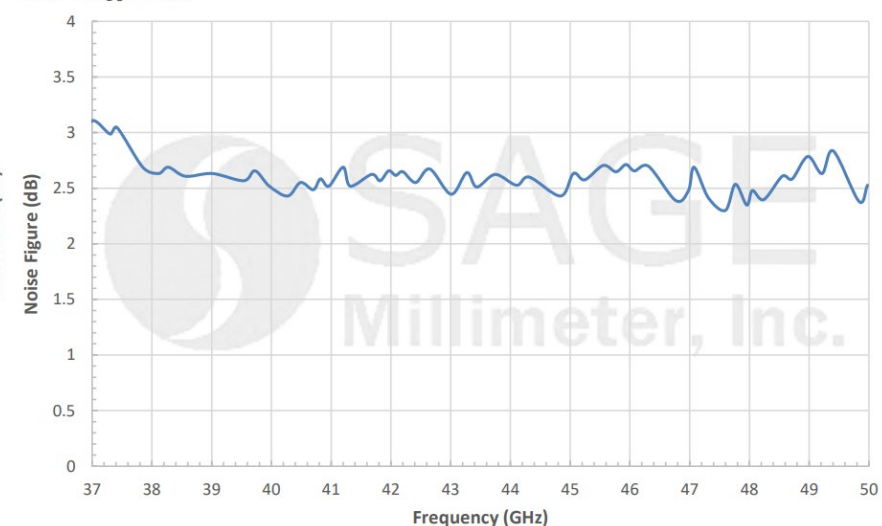
Typical Gain and Return Loss vs Frequency

Bias: +6 V_{DC}/60 mA



Typical Noise Figure vs Frequency

Bias: +6 V_{DC}/60 mA



X2 Active Multiplier, +18 dBm Pout

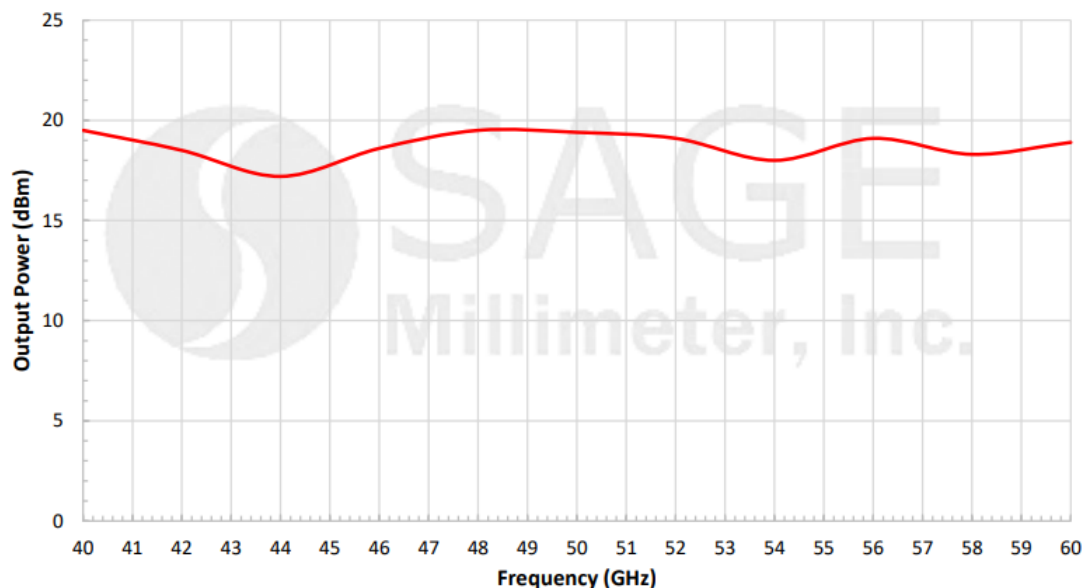
Model SFA-192KF-S1

Parameter	Minimum	Typical	Maximum
Input Frequency	20 GHz		40 GHz
Input Power		+5 dBm	+10 dBm
Output Frequency	40 GHz		60 GHz
Output Power		+18 dBm	
Harmonic Suppression		-15 dBc	
Spurious		-60 dBc	
DC Voltage	+6 V _{DC}	+8 V _{DC}	+9 V _{DC}
DC Supply Current		750 mA	



Typical Output Power vs. Frequency

Bias: +8 V_{DC}/750 mA, Input Power: +5 dBm



Features

- 40 to 60 GHz Coverage
- High Power Output
- Low Harmonic Emission

X4 Active Multiplier, +18 dBm Pout

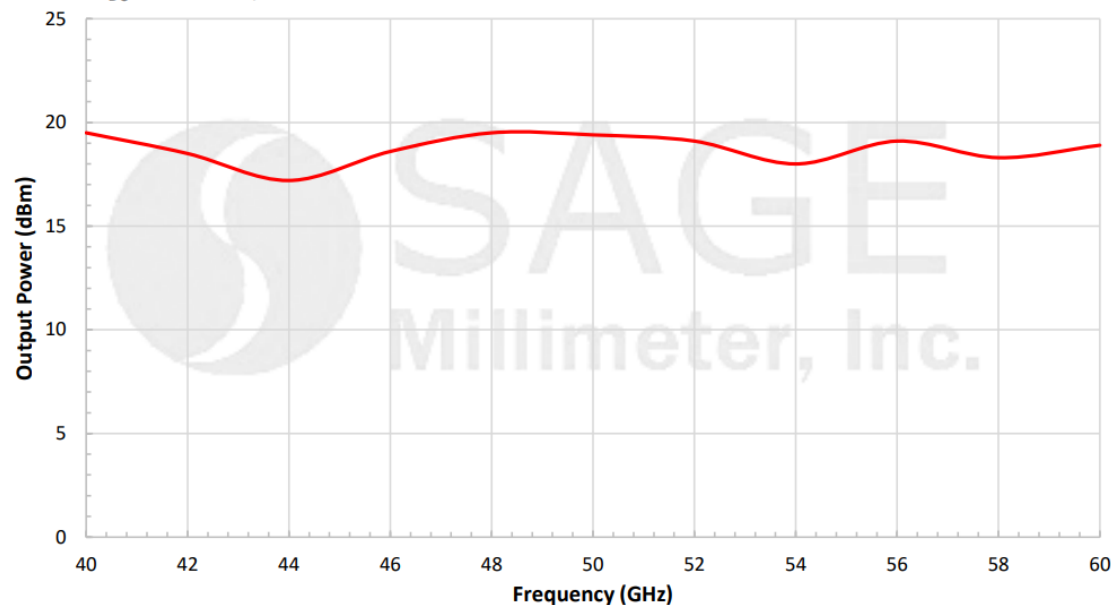
Model SFA-363603418-19SF-E1

Parameter	Minimum	Typical	Maximum
Input Frequency	9 GHz		15 GHz
Input Power		+0 dBm	+20 dBm
Output Frequency	36 GHz		60 GHz
Output Power		+18 dBm	
Harmonic Suppression		-15 dBc	
Port VSWR		-60 dBc	
DC Voltage	+6 V _{DC}	+8 V _{DC}	+12 V _{DC}
DC Supply Current		800 mA	



Typical Output Power vs. Frequency

Bias: +8 V_{DC}/800 mA; Input Power: 0 dBm



Features

- Broad-band Coverage
- High Power Output
- Low Harmonic Emission

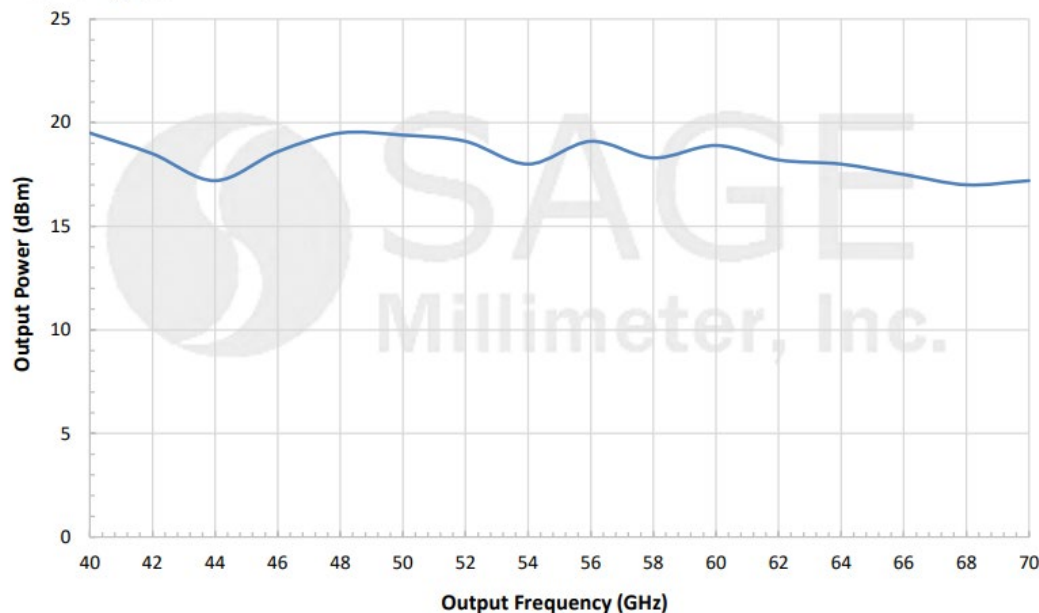
X4 Active Multiplier, +16 dBm Pout

Model SFA-403703416-VFSF-S1

Parameter	Minimum	Typical	Maximum
Input Frequency	10.0 GHz		17.5 GHz
Input Power		+0 dBm	+20 dBm
Output Frequency	40 GHz		70 GHz
Output Power		+16 dBm	
Harmonic Suppression		-15 dBc	
Port VSWR		-60 dBc	
DC Voltage	+6 V _{DC}	+8 V _{DC}	+12 V _{DC}
DC Supply Current		800 mA	

Typical Output Power vs. Output Frequency

Bias: +8 V_{DC}/800 mA



Features

- Broadband Coverage
- High Power Output
- Low Harmonic Emission

X2 Passive Multiplier

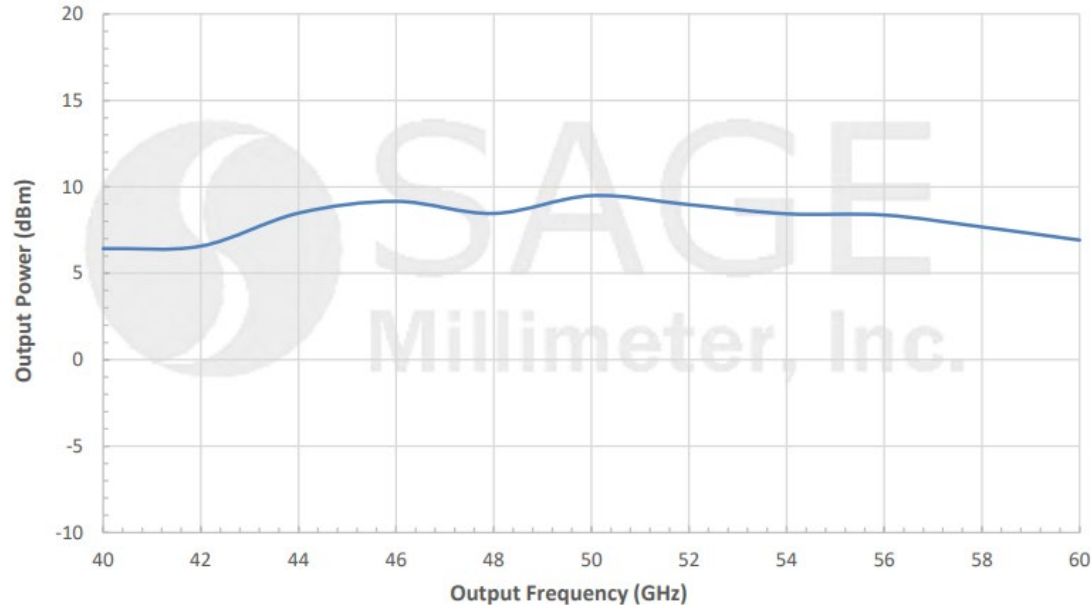
Model SFP-192KF-S1

Parameter	Minimum	Typical	Maximum
Input Frequency	20.0 GHz		30 GHz
Output Frequency	40.0 GHz		60 GHz
Input Power		+20 dBm	
Output Power		+6 dBm	
Harmonic Suppression		20 dBc	



Typical Output Power vs. Output Frequency

Input Power: +20 dBm Typical



Features

- Minimal Conversion Loss
- No External Bias
- Compact Package

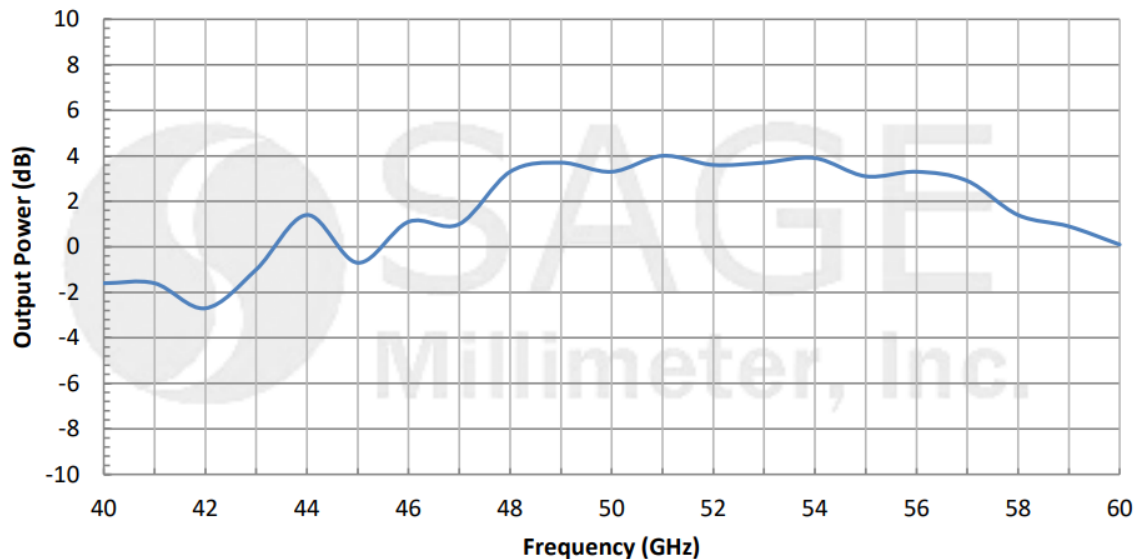
X3 Passive Multiplier

Model SFP-193SF-S1

Parameter	Minimum	Typical	Maximum
Input Frequency	13.33 GHz		20.00 GHz
Output Frequency	40 GHz		60 GHz
Input Power		+20 dBm	
Output Power		+0 dBm	
Harmonic Suppression		20 dBc	

Typical Output Power vs. Output Frequency

Input Power: +20 dBm



Features

- 40 to 60 GHz Output Frequency
- Minimal Conversion Loss
- No External Bias
- Balanced Configuration for Low Harmonic Emissions

X3 Passive Multiplier

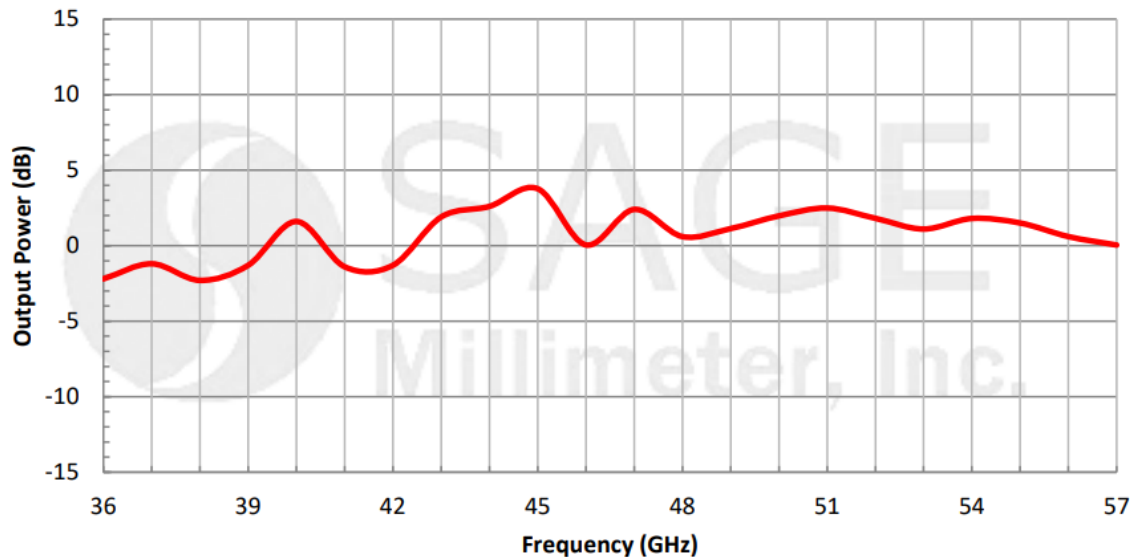
Model SFP-363573303-19SF-N1

Parameter	Minimum	Typical	Maximum
Input Frequency	12 GHz		19 GHz
Output Frequency	36 GHz		57 GHz
Input Power			+22 dBm
Output Power		+3 dBm	
Harmonic Suppression		20 dBc	



Typical Output Power vs. Output Frequency

Input Power: +20 dBm



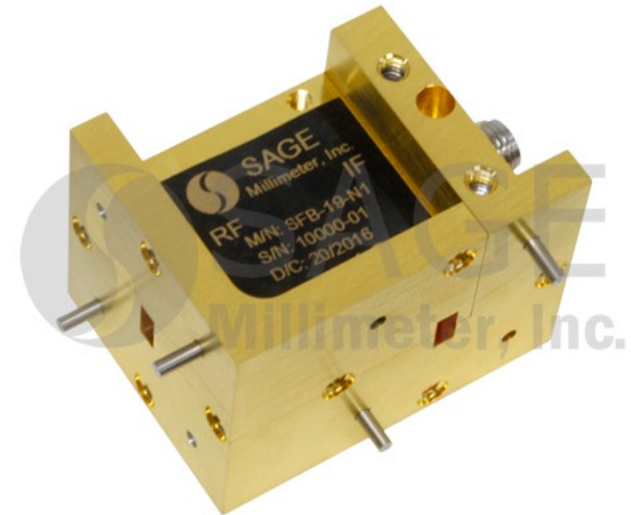
Features

- Broadband Operation
- Minimal Conversion Loss
- No External Bias
- Balanced Configuration for Low Harmonic Emissions

Balanced Mixer

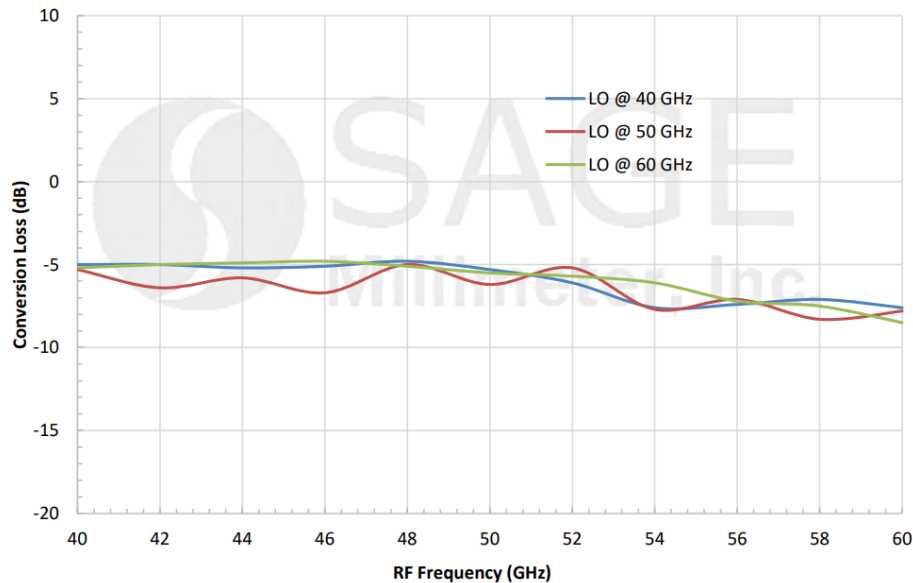
Model SFB-19-N1

Parameter	Minimum	Typical	Maximum
RF Frequency	40 GHz		60 GHz
LO Frequency	40 GHz		60 GHz
IF Frequency	DC		20 GHz
LO Pumping Power	+10 dBm	+13 dBm	+15 dBm
Conversion Loss		8 dB	10 dB
Input P _{1dB}		-3 dBm	
RF to LO Isolation		30 dB	
Combined RF and LO Power			+18 dBm



Typical Conversion Loss vs. Frequency

RF: -20 dBm; LO: +12 dBm



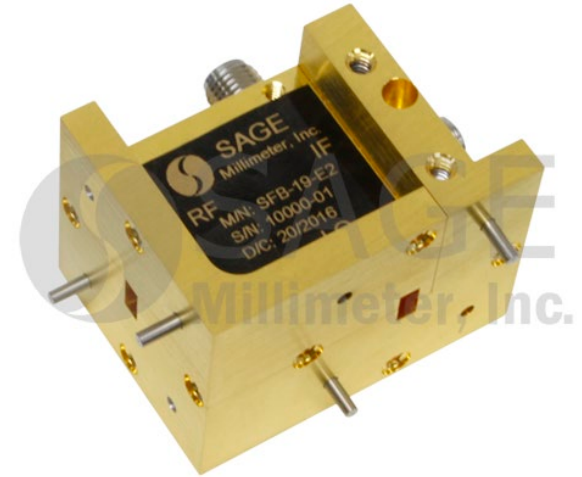
Features

- Full Waveguide Band Coverage
- Low Conversion Loss
- High IF Frequency up to 25 GHz
- Compact Package

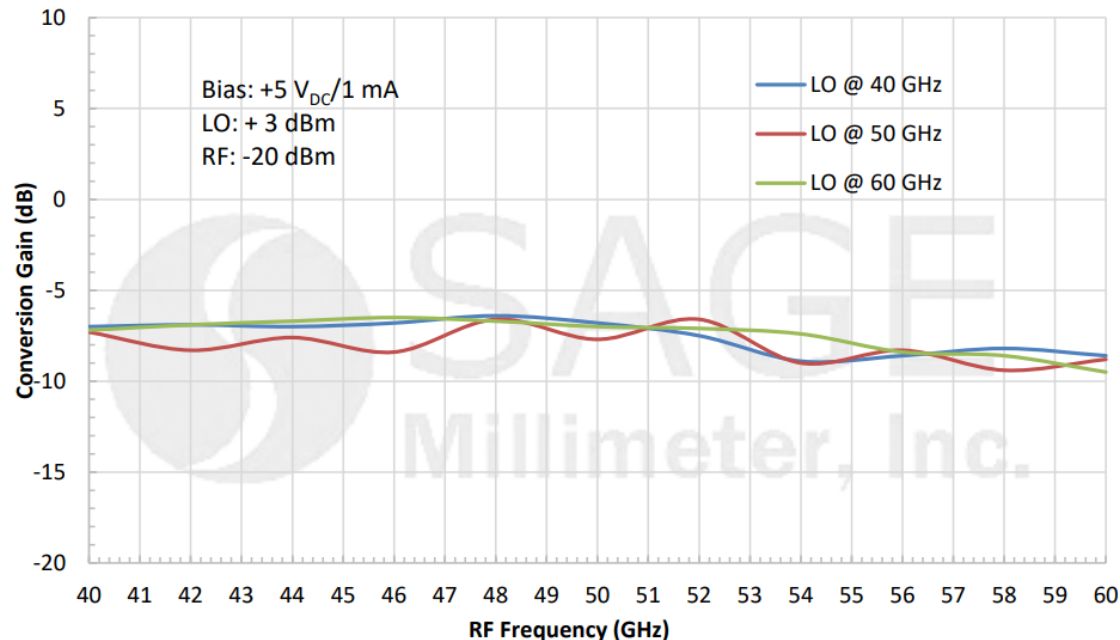
Externally Biased Balanced Mixer

Model SFB-19-E2

Parameter	Minimum	Typical	Maximum
RF Frequency Range	40 GHz		60 GHz
LO Frequency Range	40 GHz		60 GHz
IF Frequency Range	DC		20 GHz
Required LO Pumping Power	+0 dBm	+3 dBm	+10 dBm
Conversion Loss		9 dB	12 dB
Input P-1 dB		-10 dBm	
Combined RF and LO Power			+13 dBm
External Bias Voltage		+5 V _{DC} /2mA	+5 V _{DC} /5mA



Typical Conversion Loss vs. Frequency



Features

- Full Waveguide Band Coverage
- Low LO Power Requirement
- Low Conversion Loss
- High IF Frequency up to 20 GHz
- Compact Package

I/Q Mixer, Full Band

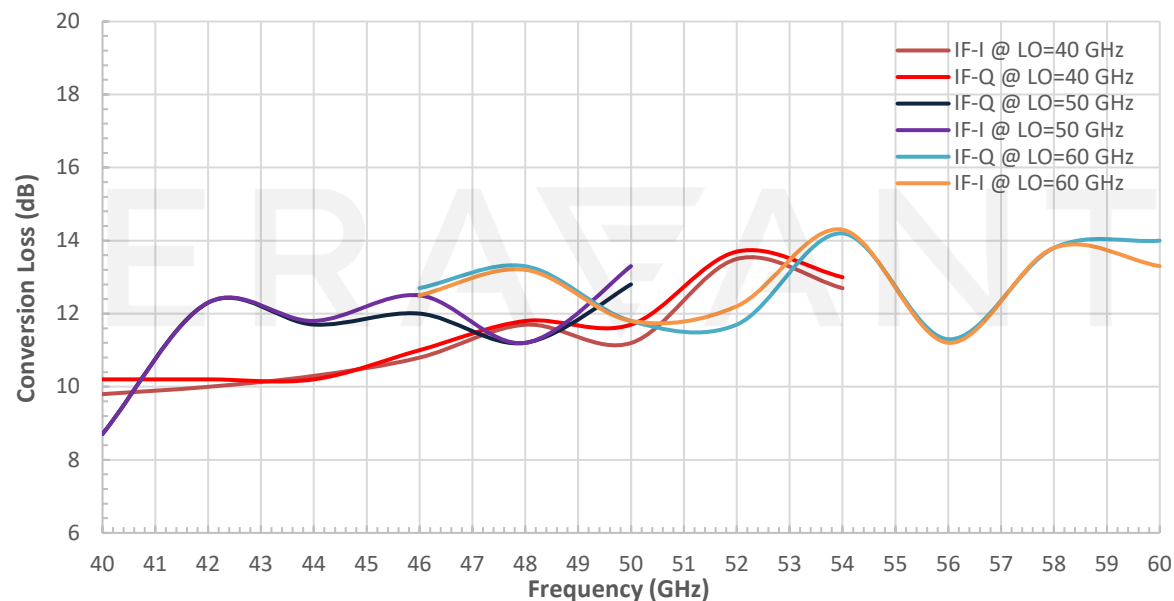
Model SFQ-40360312-1919SF-N1-M

Parameter	Minimum	Typical	Maximum
RF Frequency	40 GHz		60 GHz
LO Frequency	40 GHz		60 GHz
LO Pumping Power	+13 dBm	+15 dBm	+18 dBm
IF Frequency	DC	14 GHz	20 GHz
Conversion Loss		12 dB	
I/Q Phase Unbalance		$\pm 15^\circ$	
Damage Power, Any Port			+20 dBm



Typical Conversion Loss vs. Frequency

LO Power: 14 dBm; RF Power: -20 dBm; IF: 1 GHz



Features

- Full U-Band Frequency Coverage
- Low Conversion Loss
- Compact Package
- High Port Isolation
- IF Port DC Coupled for Phase Detection

I/Q Mixer

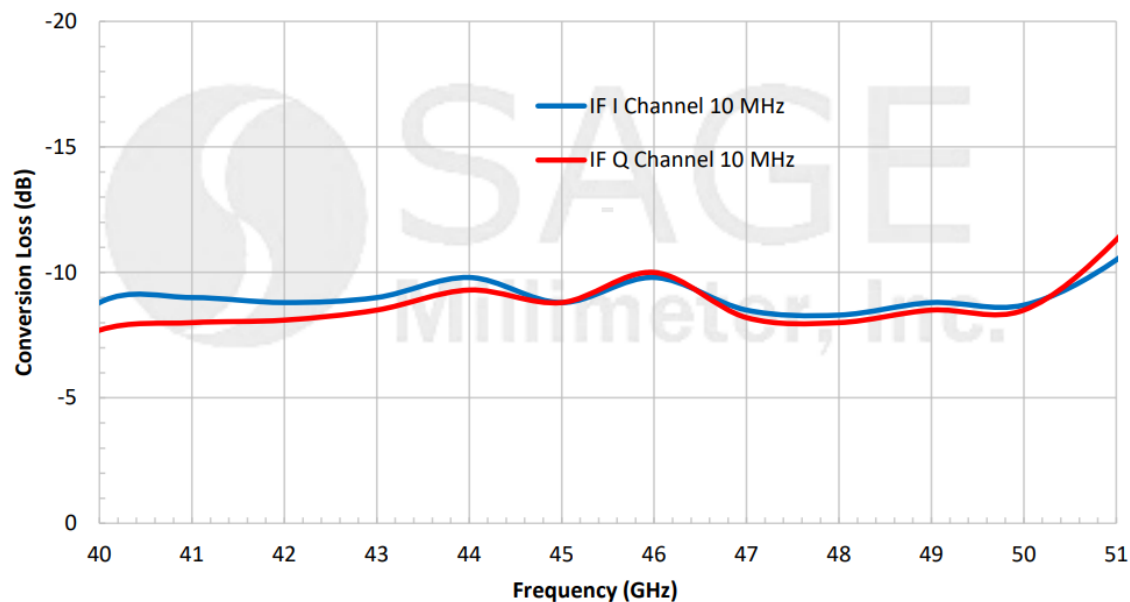
Model SFQ-49351311-1919SF-N1

Parameter	Minimum	Typical	Maximum
RF Frequency	40 GHz		51 GHz
LO Frequency	40 GHz		51 GHz
LO Pumping Power		+16 dBm	+19 dBm
IF Frequency	DC	1 GHz	2 GHz
Conversion Loss		9 dB	13 dB
I/Q Phase Unbalance		$\pm 15^\circ$	
Damage Power, Any Port			+25 dBm



Typical Conversion Loss vs. Frequency

Pin: +16 dBm



Features

- Low Conversion Loss
- Compact Package
- High Port Isolation
- IF Port DC Coupled for Phase Detection

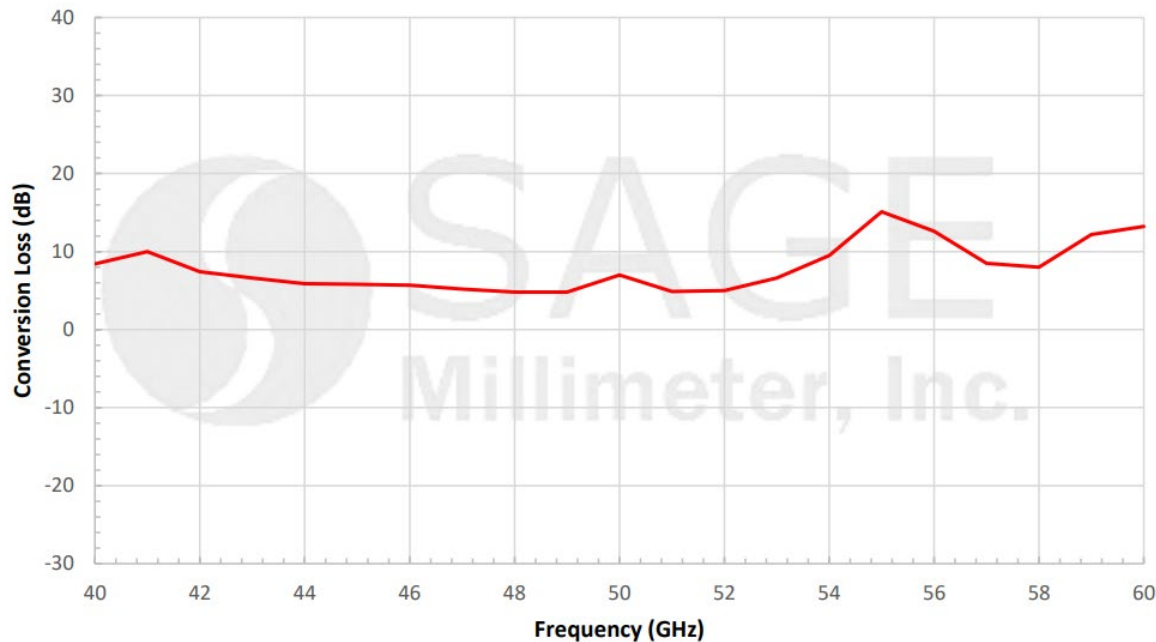
Subharmonically Pumped Mixer, Full Band

Model SFS-19-N3

Parameter	Minimum	Typical	Maximum
RF Frequency	40 GHz		60 GHz
LO Frequency	20 GHz		30 GHz
LO Pumping Power		+15 dBm	
IF Frequency	DC		5 GHz
Conversion Loss		14 dB	
RF/LO Isolation		15 dB	
Damage Power, Any Port			+25 dBm



Typical Conversion Loss vs. Frequency



Features

- Low LO Power Requirement
- Sub-harmonic Mixing
- Compact Package
- High Port Isolation

Amplitude Detector

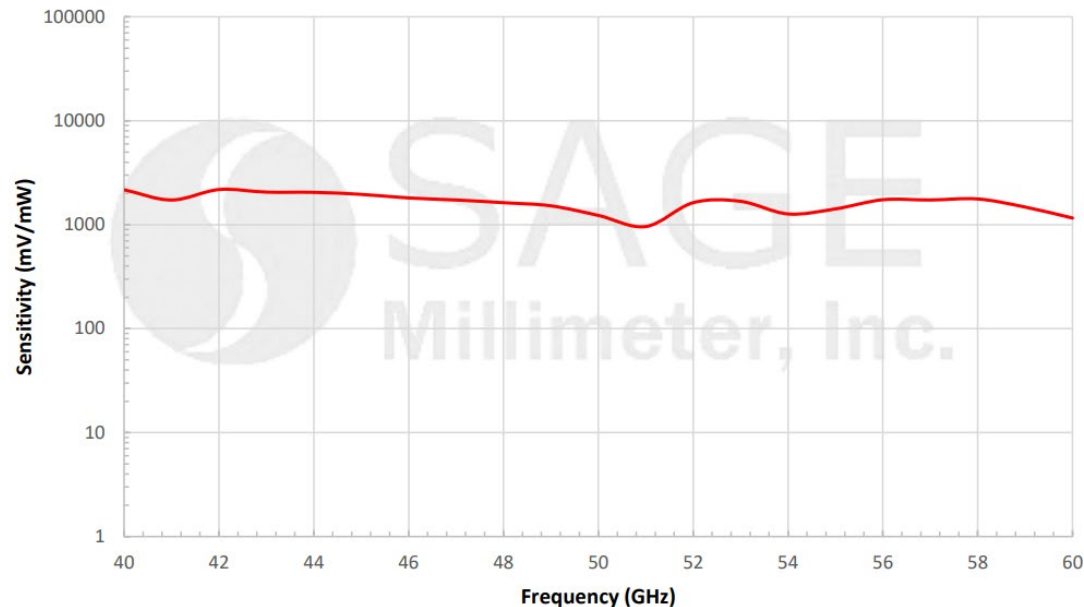
Models SFD-403603-19SF-N1 and SFD-403603-19SF-P1

Parameter	Minimum	Typical	Maximum
Frequency Range	40 GHz		60 GHz
Sensitivity (SFD-403603-19SF-N1)		-1100 mV/mV	
Sensitivity (SFD-403603-19SF-P1)		+1100 mV/mV	
Sensitivity Flatness		± 2.0 dB	
Linear Detection Range	-45 dBm	-10 dBm	0 dBm
RF Input Power		-20 dBm	+17 dBm
Video Bandwidth		10 MHz	



Typical Performance vs. Frequency

$P_{in} = -20$ dBm



Features

- Full Waveguide Band Operation
- High Sensitivity Without Tuning
- High Sensitivity Stability Over Broad Temperature Range

Amplitude Detector with Isolator

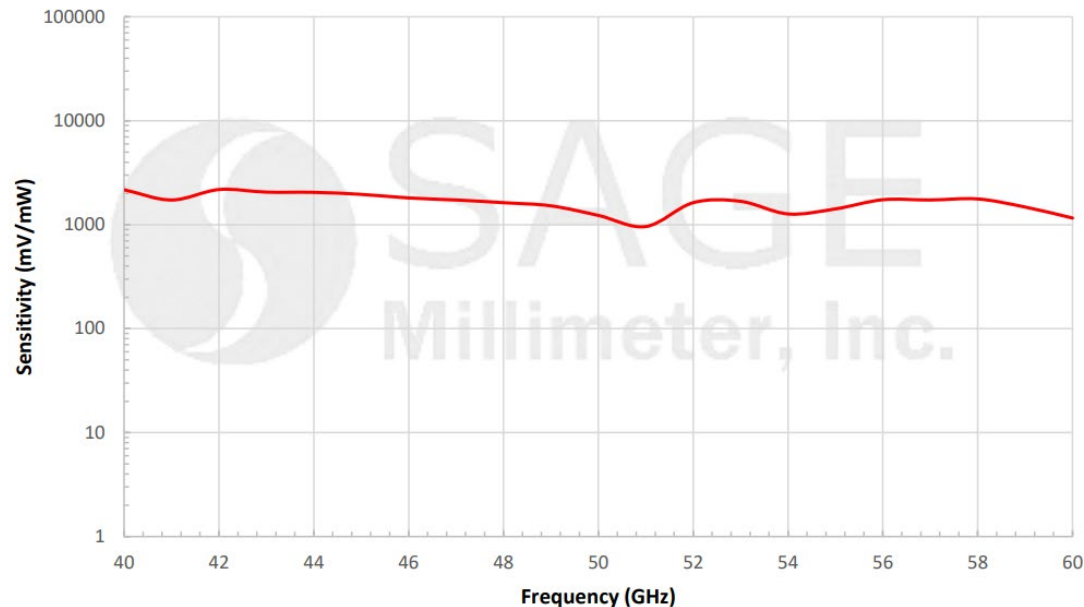
Models STD-19SF-NI and STD-19SF-PI

Parameter	Minimum	Typical	Maximum
Frequency Range	40 GHz		60 GHz
Sensitivity (STD-19SF-NI)		-1100 mV/mV	
Sensitivity (STD-19SF-PI)		+1100 mV/mV	
Sensitivity Flatness		± 2.0 dB	
Linear Detection Range	-45 dBm	-10 dBm	0 dBm
RF Input Power		-20 dBm	+17 dBm
Video Bandwidth		10 MHz	



Typical Performance vs. Frequency

$P_{in} = -20$ dBm



Features

- Full Waveguide Band Operation
- High Sensitivity Without Tuning
- Faraday Isolator Integrated

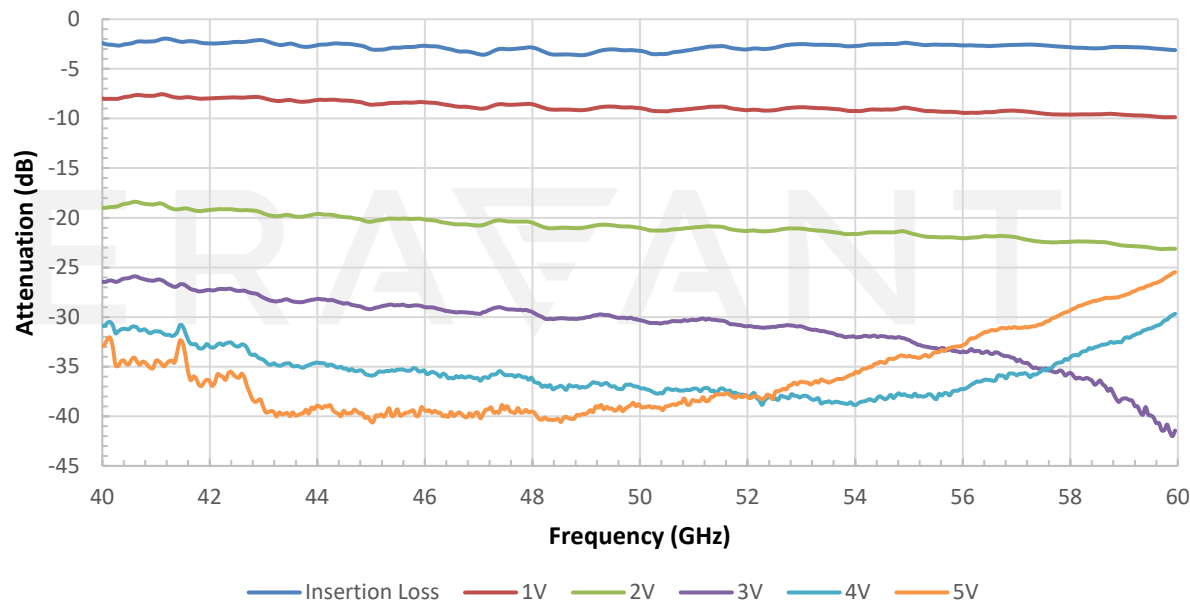
Electrical Attenuator

Model SKA-4036032530-1919-A1

Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Insertion Loss		2.5 dB	3.0 dB
Attenuation	3 dB	30 dB	
Power Handling		+20 dBm	+23 dBm
Control Voltage		0 to -5 V _{DC} / 5 mA	0 to -6 V _{DC} / 8 mA
Controlling Speed		100 ns	



Typical Attenuation vs. Frequency at Various Control Voltage



Features

- Low Insertion Loss
- High Dynamic Range
- Fast Control Speed

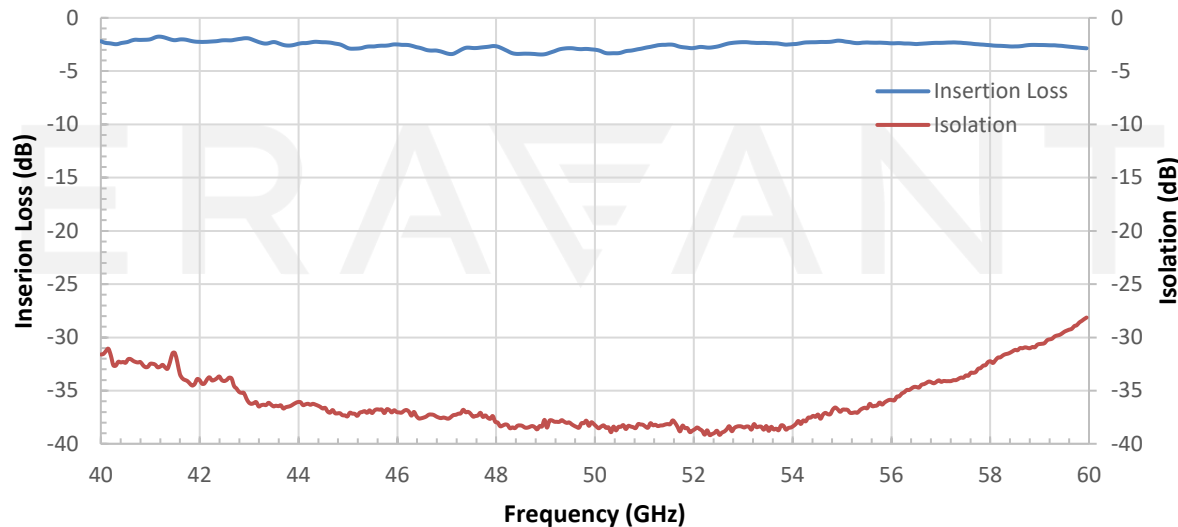
SPST PIN Diode Switch

Model SKS-4036032530-1919-R1

Parameter	Minimum	Typical	Maximum
RF Frequency	40 GHz		60 GHz
Insertion Loss		2.5 dB	
Isolation	25 dB	30 dB	
Power Handling		+20 dBm	+23 dBm
Bias Voltage		± 5 V _{DC}	
Bias Current		10 mA	
Control Signal		TTL	
Switching Speed		100 ns	



Insertion Loss & Isolation vs. Frequency



Features

- Low Insertion Loss
- High Isolation
- Fast Control Speed

Waveguide Motorized Switch

Model SWJ-19-TS

Features

- Low Insertion Loss
- High Isolation
- TTL Control

Applications:

- Test Set
- Communication Systems
- Radar Systems



Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Insertion Loss		0.2 dB	
Isolation	50 dB		
Bias Voltage		$\pm 28 V_{DC}$	$\pm 30 V_{DC}$
Bias Current		250 mA	
VSWR			1.15:1
Control Signal		TTL	
Switching Speed		150 ms	300 ms
Power Handling			100 W (CW)

Waveguide to Coax Adapter

Models SWC-19VF-R1 and SWC-19VM-R1

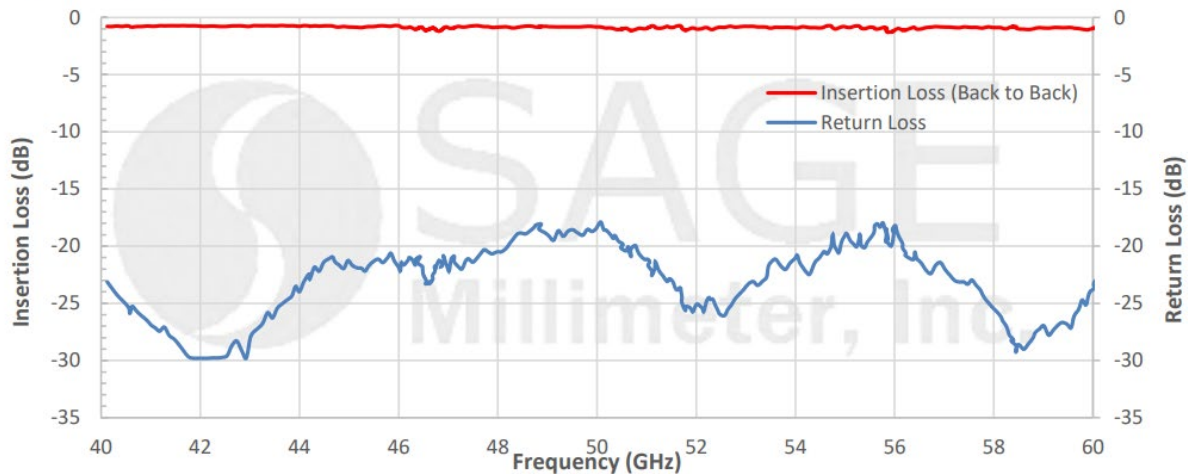
Parameter	Minimum	Typical	Maximum
Frequency Range	40 GHz		60 GHz
Insertion Loss		0.5 dB	0.8 dB
Return Loss	16 dB	18 dB	
Power Handling			40 W (CW)



Features

- Full Waveguide Band Coverage
- Lower Insertion Loss and VSWR
- Instrumentation Grade
- DC Open Circuit

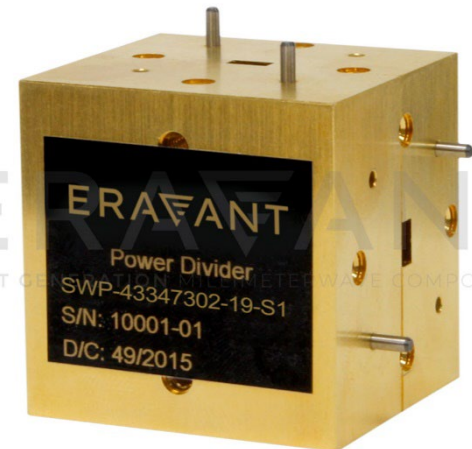
Typical Return Loss and Back to Back Insertion Loss vs. Frequency



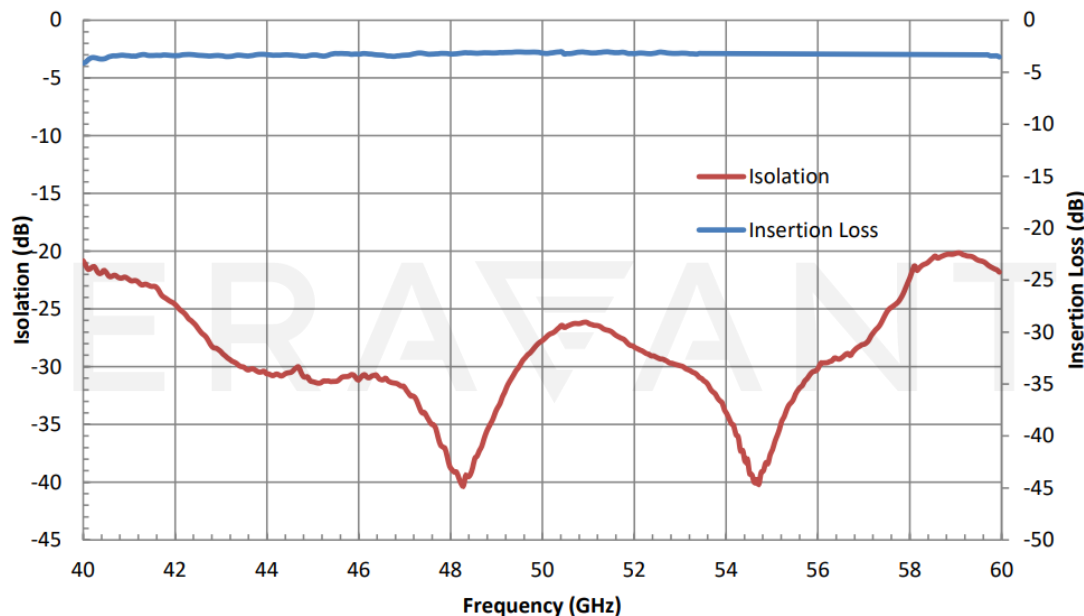
Waveguide 2-Way Power Divider

Model SWP-40360302-19-S1

Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Power Unbalance		± 0.3 dB	
Insertion Loss		0.3 dB	0.5 dB
Isolation		20 dB	
Input / Output VSWR			1.3:1



Typical Isolation and Insertion Loss vs Frequency



Features

- 2, 4, 8, 16, 32 Ways
- Right Angle and Inline Configuration
- Low Insertion Loss
- High Isolation
- Compact Package

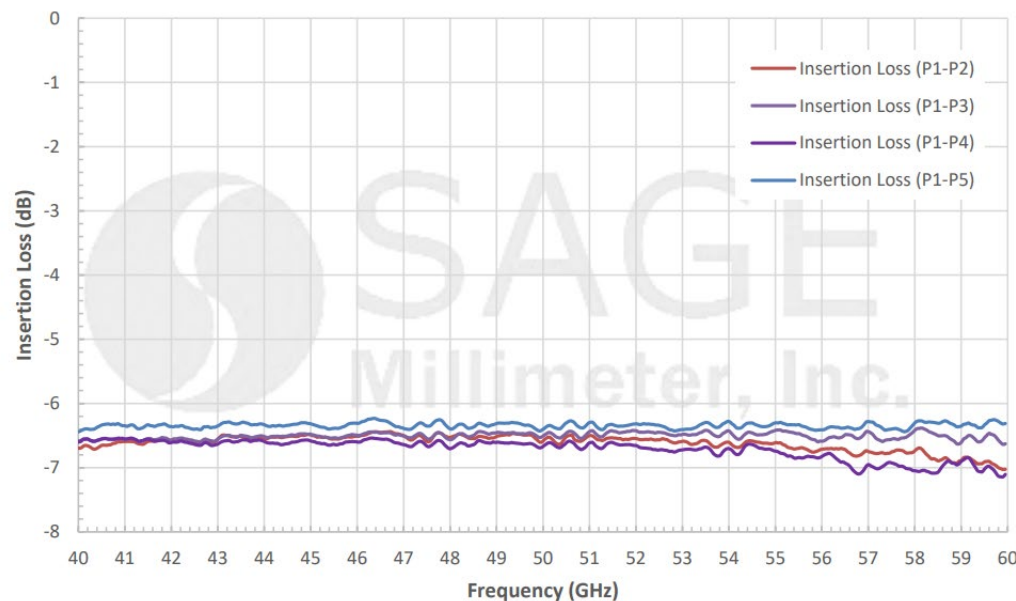
Waveguide 4-Way Power Divider

Model SWP-40360304-19-E1

Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
Insertion Loss		1.0 dB	
Power Imbalance		± 0.2 dB	
Port Isolation (Adjacent Ports)		15 dB	
Port Isolation (Non-Adjacent Ports)		20 dB	
Input / Output VSWR		1.5:1	



Typical Measured Insertion Loss vs Frequency



Features

- 2, 4, 8, 16, 32 Ways
- Right Angle and Inline Configuration
- Low Insertion Loss
- High Isolation
- Inline Configuration

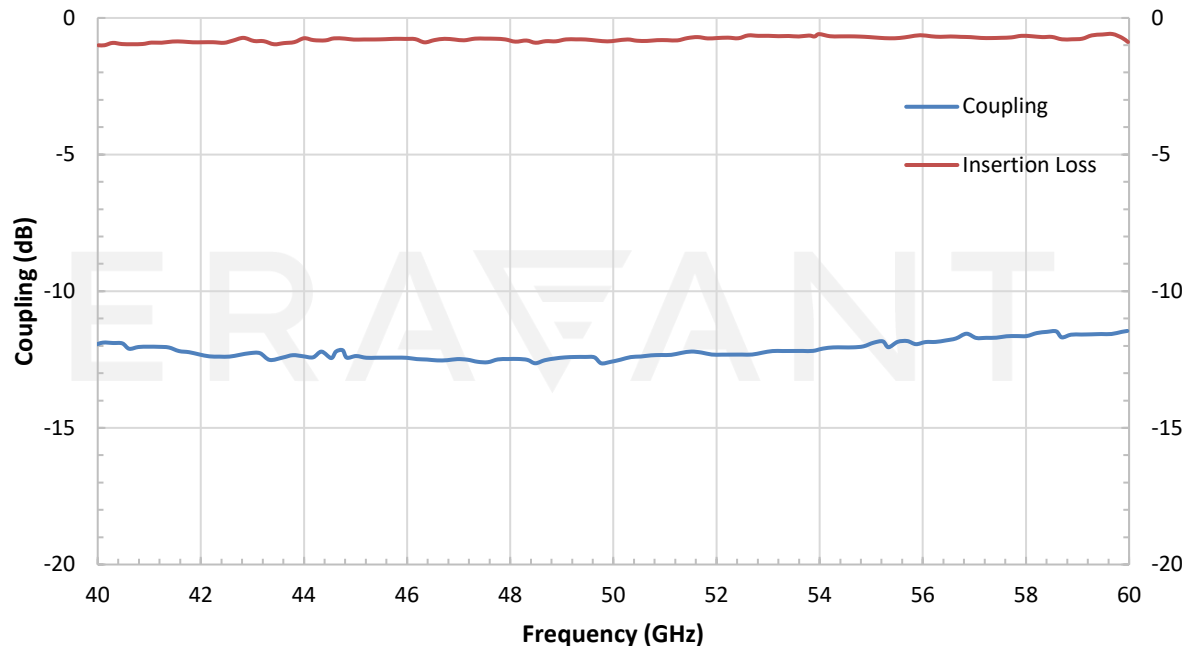
Waveguide Directional Coupler

Model SWD-1040H-19-BB

Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Insertion Loss		0.7 dB	
Coupling		10 dB	
Directivity	30 dB	40 dB	
Main Line VSWR			1.1:1



Typical Coupling and Insertion Loss vs. Frequency



Features

- Full Band Operation
- 3, 6, 10, 20, 30, 40 dB
- Dual Directional
- Bi-Directional
- Waveguide Version
- Low Insertion Loss
- High Directivity

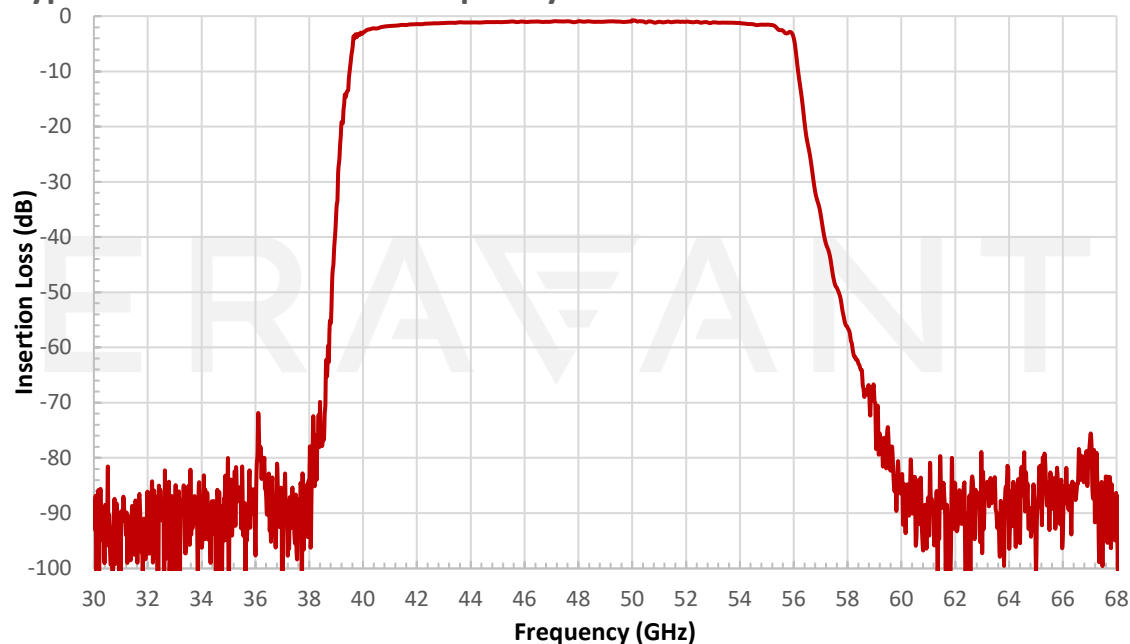
Waveguide Bandpass Filter

Model SWF-48312340-19-B1

Parameter	Minimum	Typical	Maximum
Passband Frequency	42 GHz		54 GHz
Passband Insertion Loss		1.5 dB	
Passband Ripple		± 0.5 dB	
Rejection Frequency, Low Side	DC		38 GHz
Rejection Frequency, High Side	57 GHz		90 GHz
Rejection		40 dB	
Passband VSWR		1.5:1	



Typical Insertion Loss vs. Frequency



Features

- Lowpass, Highpass and Bandpass
- Narrow and Broadband
- Low Cost
- Low Insertion Loss
- High Rejection

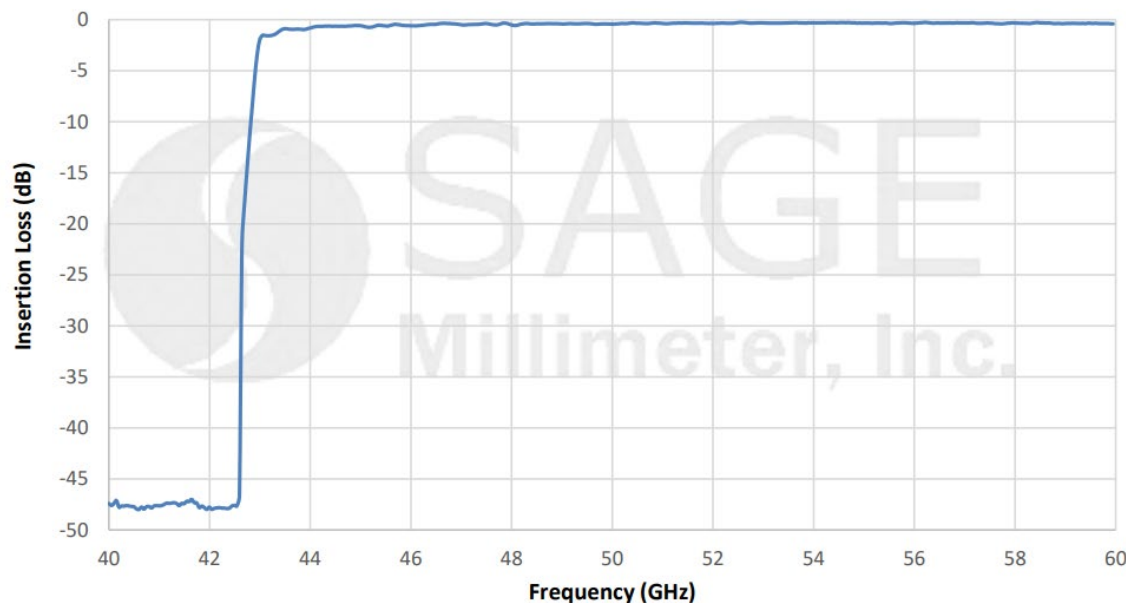
Waveguide Highpass Filter, 44 GHz and Higher

Model SWF-44340340-19-H1

Parameter	Minimum	Typical	Maximum
Passband Frequency	44 GHz		
Passband Insertion Loss		1.0 dB	
Passband Ripple		± 0.3 dB	
Passband VSWR		1.4:1	
Rejection Frequency	DC		40 GHz
Rejection		40 dB	
Waveguide	WR-19 with UG-383/U-M Anti-Cocking Flange		



Typical Insertion Loss vs. Frequency

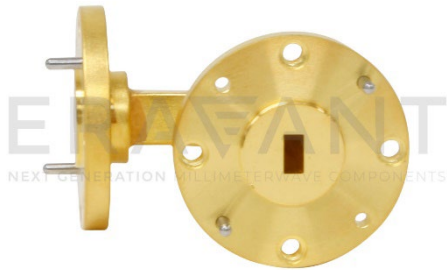


Features

- Lowpass, Highpass and Bandpass
- Narrow and Broadband
- Low Cost
- Low Insertion Loss
- High Rejection

Waveguides

- Straights: 1", 2" etc. and Custom Length
- Bends, 45°, 90° and Custom Angle
- Twists, 45°, 90° and Custom Angle
- Flexible Waveguides, 1", 2", 3" and 4"



Waveguide E-Bend: 90°



Waveguide Straight: 1"



Waveguide H-Bend: 90°



Waveguide Twist: 90°

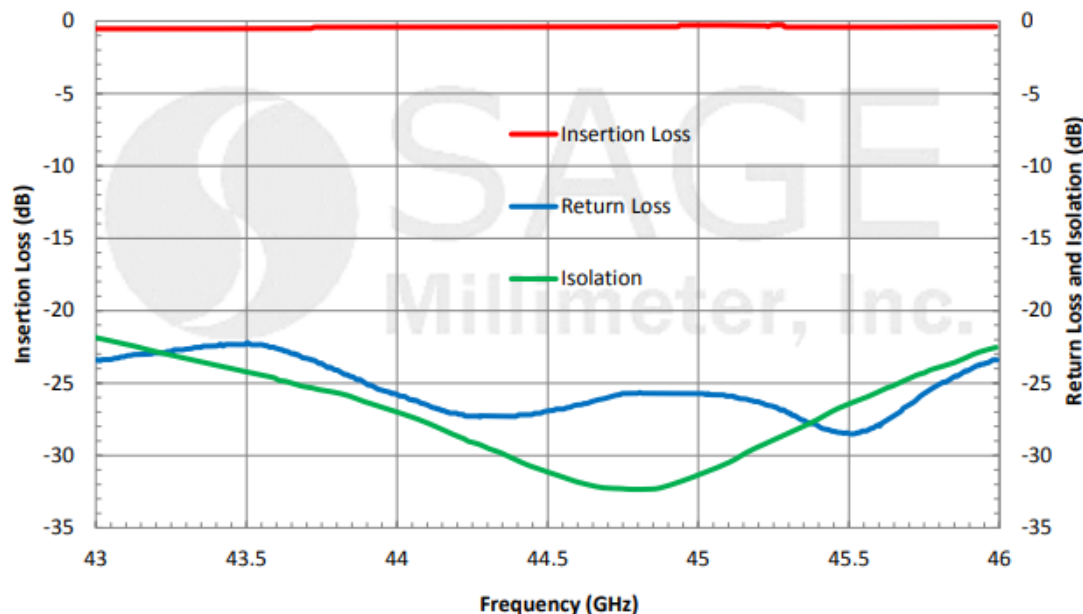
Junction Isolators and Circulators, 43.5 to 45.5 GHz

Model SNW-4434630520-19-C1 and SNW-4434630520-19-I1

Parameter	Minimum	Typical	Maximum
Frequency	43.5 GHz		45.5 GHz
Insertion Loss		0.5 dB	
Isolation	18 dB	20 dB	
Forward Power Handling			5 W (CW)
VSWR		1.3:1	



Typical Performance vs. Frequency



Features

- Compact Configuration
- Low Insertion Loss
- Moderate Isolation

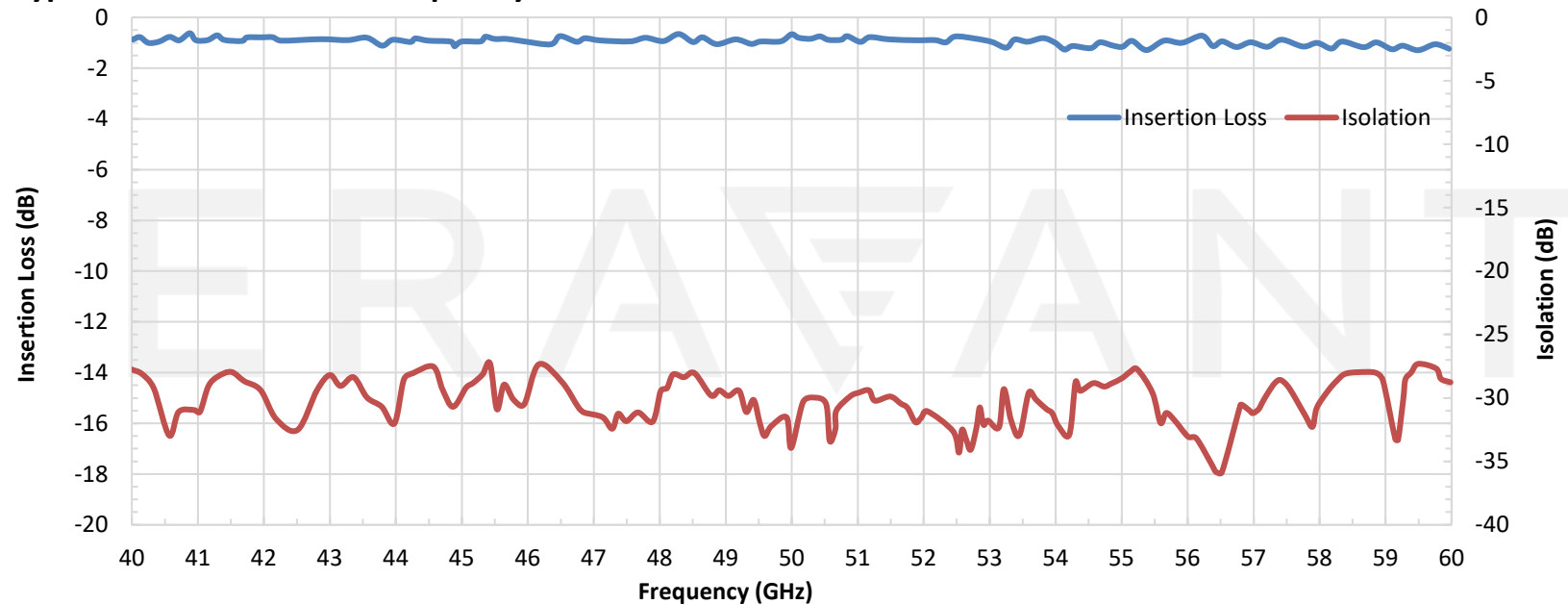
Faraday Isolator, Full Band

Model STF-19-S1

Parameter	Minimum	Typical	Maximum
RF Frequency	40 GHz		60 GHz
Insertion Loss		1.3 dB	1.5 dB
Isolation		28 dB	
VSWR		1.4:1	
Power Handling		1.5 W (CW)	2.0 W (CW)



Typical Performance vs. Frequency



Full Band Frequency Extender

Model STE-SF419-04-S1

Features

- Full Waveguide Band Operation
- X4 Frequency Extension
- Low Harmonics and Spurious Emission
- Cost Effective
- Instrumentation Grade
- Adjustable/Removable Legs

Applications

- Network Analyzer Systems
- Frequency Sources
- Test Instrumentations
- Antenna Range



Parameter	Minimum	Typical	Maximum
Output Frequency Range	40 GHz		60 GHz
Input Frequency Range	10 GHz		15 GHz
Output Power		+4 dBm	
Input Power	+1 dBm	+5 dBm	+20 dBm
Harmonic Suppression		20 dBc	
Spurious Suppression		60 dBc	
DC Voltage	+8 V	+12 V	+15 V
DC Current		450 mA	

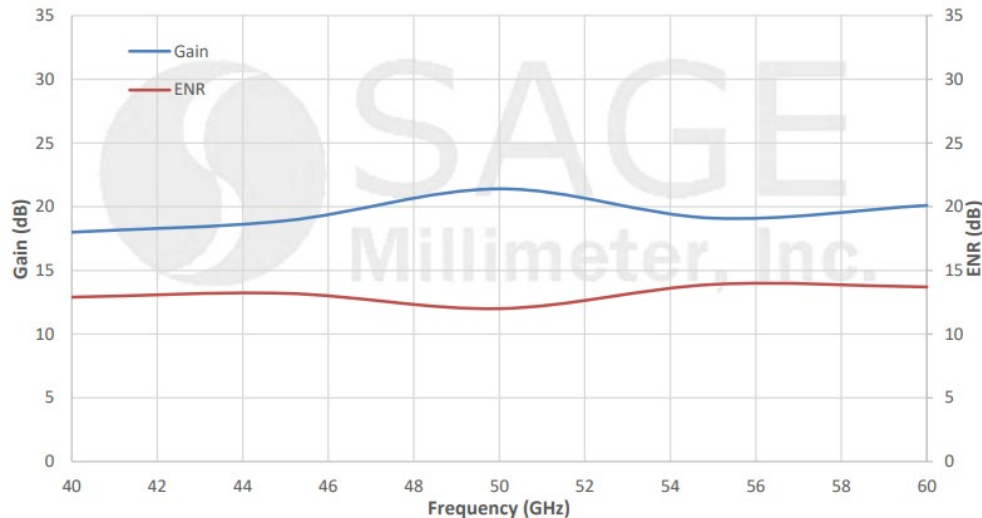
Full Band Noise Figure and Gain Test Extender

Model STG-19-S1

Parameter	Minimum	Typical	Maximum
RF Frequency Range	40 GHz		60 GHz
Noise Source: ENR		13 dB	
Noise Source: Bias	+18 V _{DC} /50mA	+28 V _{DC} /60mA	+30 V _{DC} /75mA
IF Frequency Range	10 MHz		1.6 GHz
LO Frequency Range	10 GHz		15 GHz
LO Power			+20 dBm
N.F. Dynamic Range	0 dB		20 dB
Conversion Gain	15 dB	20 dB	
Down-Converter: Bias		+12 V _{DC} /450mA	+15 V _{DC} /550mA

Typical Performance vs. Frequency

IF: 1 GHz, LO: +0 dBm, RF: -50 dBm



Features

- Full Band Coverage
- Precisely Calibrated ENR
- Great ENR and Gain Flatness

Full Band Waveguide Calibration Kit

Model STQ-TO-19-S1-CKIT1

Features

- Precisely Machined and Manufactured
- Metrology Grade
- High Electrical Performance
- Ruggedized Packaging



Components Included in the Kit

Item	Eravant M/N	Quantity
Metrology Fixed Short	STQ-WS-QU-F1	1 Piece
Metrology Fixed Waveguide Load	STQ-WL-1923-S1	1 Piece
Metrology $\frac{1}{8}$ Wavelength Offset	STQ-WI-19038-SB	1 Piece
Metrology $\frac{1}{4}$ Wavelength Offset	STQ-WI-19076-SB	1 Piece
Metrology $\frac{3}{8}$ Wavelength Offset	STQ-WI-19114-SB	1 Piece
Waveguide Quick Connect, 0.125" Diameter Flange	SWH-QC-1125C-R2	2 Pieces
Waveguide Screws, 3/32 Hex Head	SWH-332-SS-10	1 Bag (10 Pieces)
Waveguide Screwdriver, 3/32 Hex Head	SWH-332-DS	1 Piece
Calibration Data, USB Drive	STQ-TO-19-S1-U	1 Piece

Calibrated Noise Source with Isolator

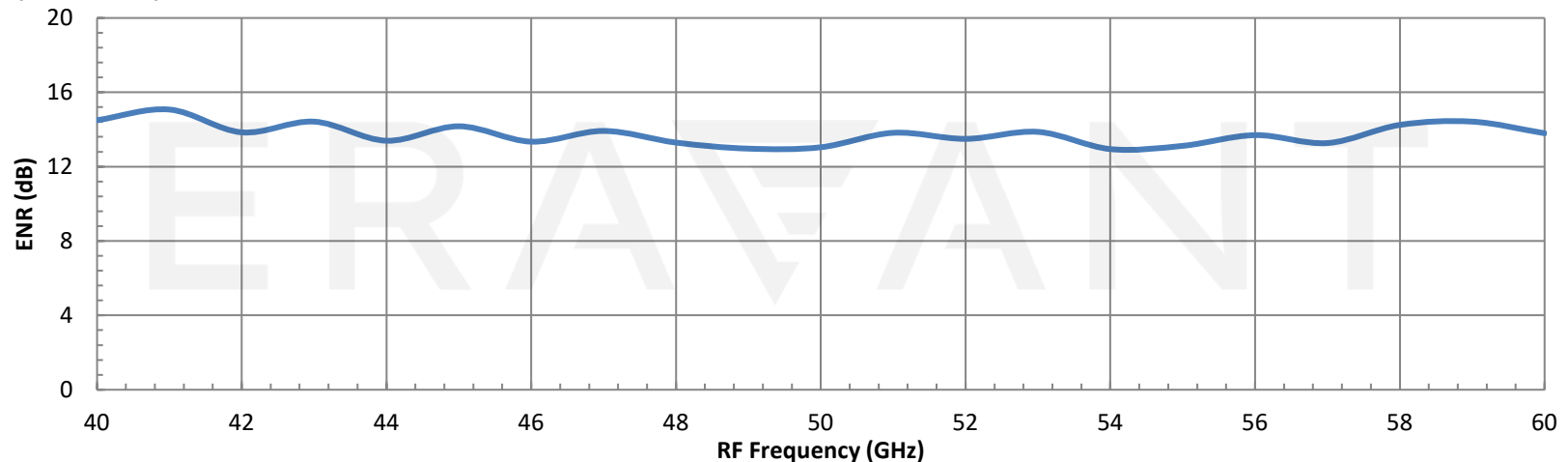
Model STZ-19-I1

Parameter	Minimum	Typical	Maximum
RF Frequency Range	40.0 GHz		60.0 GHz
ENR		13 dB	
ENR Flatness		± 1.5 dB	
Temperature Stability		0.01 dB/°C	
Long Term Temperature Stability		0.05 dB/day	
AM Modulation Trigger	TTL		
AM Modulation Rate	1.0 kHz		
DC Bias	+15 V _{DC} /35 mA	+28 V _{DC} /60 mA	+30 V _{DC} /75 mA



Typical ENR vs. Frequency

V_{DC} = +28 V, I_{DC} = 35 mA



Direct Reading Attenuator

Model STA-60-19-D1

Features

- Full Band Coverage
- High Attenuation Accuracy
- Large Scaled Dial

Applications:

- Test Lab
- Instrumentations
- Manual Test Set



Parameter	Minimum	Typical	Maximum
RF Frequency Range	40 GHz		60 GHz
Insertion Loss		0.7 dB	
Attenuation Range	0 dB		60 dB
Attenuation Accuracy	0.1 dB or 3% of reading, whichever is larger, up to 40 dB		
VSWR			1.17:1
Power Handling (CW)		50 mW	100 mW

Digital Direct Reading Attenuator

Model STA-60-19-D5

Features

- Full Band Coverage
- High Attenuation Accuracy
- Digital Screen with Back Light

Applications:

- Test Lab
- Instrumentations
- Manual Test Set



Parameter	Minimum	Typical	Maximum
RF Frequency Range	40 GHz		60 GHz
Insertion Loss		0.7 dB	
Attenuation Range	0 dB		60 dB
Attenuation Accuracy	0.1 dB or 2% of reading, whichever is larger, up to 40 dB		
VSWR			1.17:1
Power Handling (CW)		200 mW	750 mW

Programmable Attenuator

Model STA-60-19-P1

Features

- Full Band Coverage
- High Attenuation Accuracy
- IEEE-488 and USB Control Ports

Applications:

- Test Lab
- Instrumentations
- Auto Test Set



Parameter	Minimum	Typical	Maximum
RF Frequency Range	40 GHz		60 GHz
Insertion Loss		0.7 dB	
Attenuation Range	0 dB		70 dB
Attenuation Accuracy	0.05 dB or 3% of reading, whichever is larger, up to 40 dB		
VSWR			1.17:1
Power Handling (CW)		0.750 W (CW)	1.5 W (CW)

Harmonic Mixer for Keysight Spectrum Analyzer

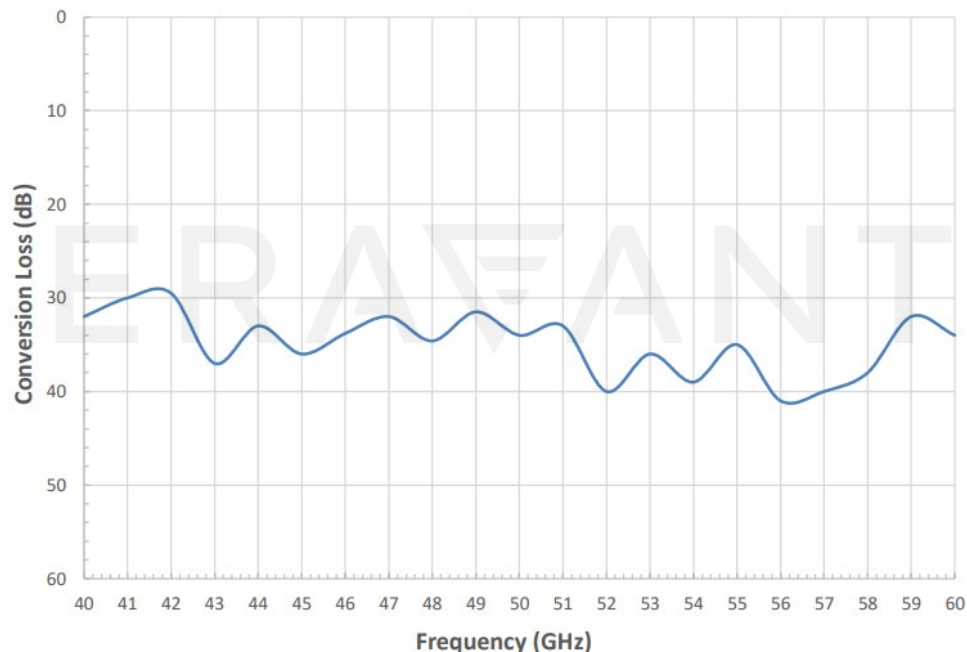
Model SFH-19SFSF-A3

Parameter	Minimum	Typical	Maximum
RF Range	40 GHz		60 GHz
LO Frequency	3.0 GHz		6.1 GHz
IF Range	DC		1.3 GHz
Input Power		+16 dBm	+19 dBm
Harmonic Number		10	
Conversion Loss		35 dB	



Conversion Loss vs Frequency

LO: 5.0 to 12 GHz/+16 dBm; IF: 1 GHz; $P_{RF} = -25$ dBm



Features

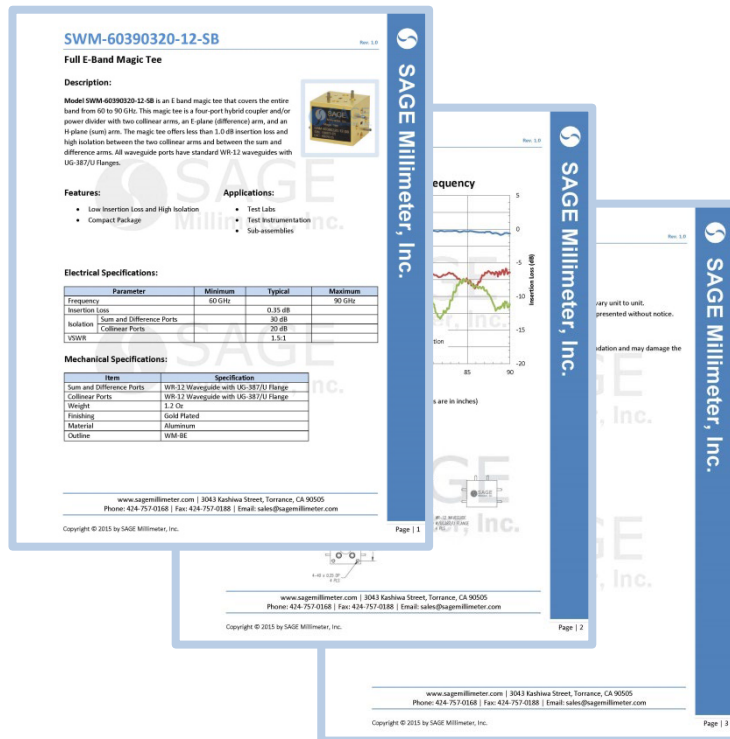
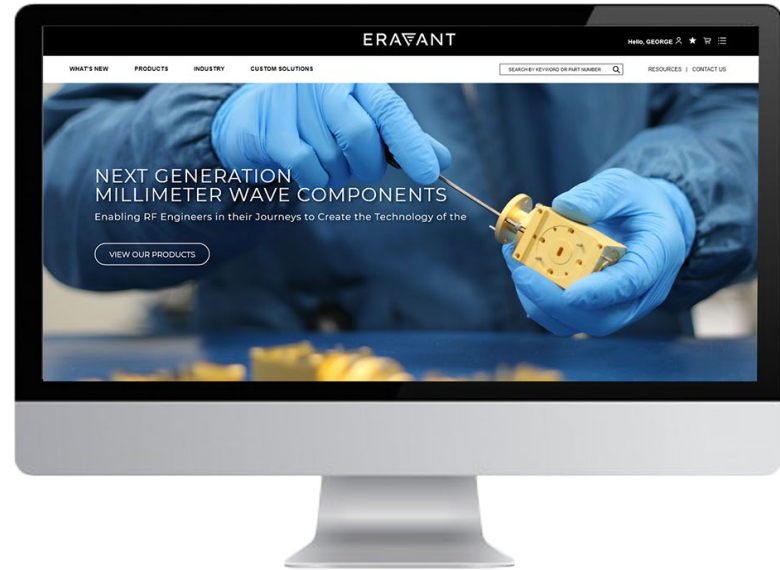
- Full Waveguide Band Operation
- No External Bias Required
- 10th Harmonic Detection

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PASSIVE FREQUENCY MULTIPLIERS

GRID TABLE 28 RESULTS

MODEL	MINIMUM OUTPUT FREQUENCY	MAXIMUM OUTPUT FREQUENCY	OUTPUT POWER	MINIMUM INPUT FREQUENCY	MAXIMUM INPUT FREQUENCY	INPUT POWER	OUTPUT PORT	INPUT PORT	DOWNLOADS	VIEW
SFP-06212-S2	110 GHz	170 GHz	0 dBm	55 GHz	55 GHz	+16 dBm	WR-08 Waveguide	WR-12 Waveguide	Datasheet	View
SFP-06319-U6	110 GHz	170 GHz	-3 dBm	36.67 GHz	56.67 GHz	+20 dBm	WR-06 Waveguide	WR-19 Waveguide	Datasheet	View
SFP-06210-S2	140 GHz	220 GHz	-3 dBm	70 GHz	110 GHz	+17 dBm	WR-05 Waveguide	WR-10 Waveguide	Datasheet	View
SFP-2234033-28SF-S1	22 GHz	40 GHz	+5 dBm	11 GHz	20 GHz	+18 dBm	WR-28 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-243423303-28SF-S1	24 GHz	42 GHz	+3 dBm	8 GHz	14 GHz	+20 dBm	WR-28 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-2835F-U9	26.5 GHz	40.0 GHz	+5 dBm	8.37 GHz	13.33 GHz	+20 dBm	WR-28 Waveguide	SMA (F)	Datasheet	View
SFP-2734033-05-28SF-S1	26.5 GHz	40 GHz	-5 dBm	8.37 GHz	13.33 GHz	+10 dBm	WR-28 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-2235F-S1	33 GHz	50 GHz	+3 dBm	11 GHz	16.67 GHz	+20 dBm	WR-22 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-222KF-S1	33 GHz	50 GHz	+7 dBm	16.5 GHz	25 GHz	+20 dBm	WR-22 Waveguide	2.82 mm (F)	Datasheet STEP File	View
SFP-363673303-19SF-N1	57 GHz	36 GHz	+3 dBm	12 GHz	19 GHz	+20 dBm	WR-19 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-192KF-S1	40 GHz	60 GHz	+6 dBm	20 GHz	30 GHz	+20 dBm	WR-19 Waveguide	2.82 mm (F)	Datasheet STEP File	View