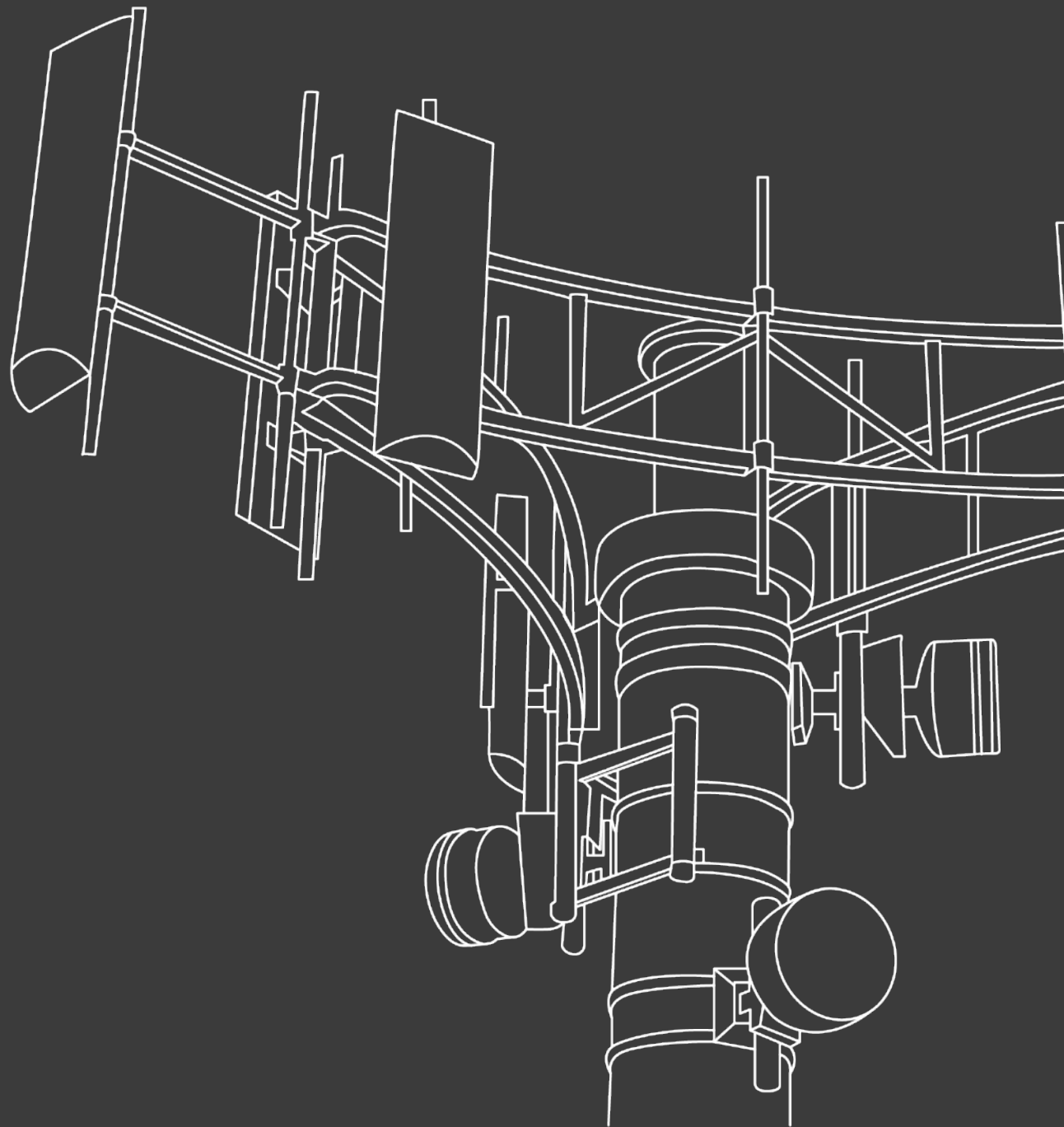


ERA[≡]ANT

NEXT GENERATION MILLIMETERWAVE COMPONENTS

PRODUCTS FOR
COMMUNICATION SYSTEM
APPLICATIONS



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TEST SETUPS PASSIVE WAVEGUIDE COMPONENTS

CONCLUSIONS

WEBSITE

INTRODUCTION

Eravant designs and manufactures total solutions for microwave and millimeterwave applications covering 10 MHz to 220 GHz.

- **This presentation introduces Eravant's standard product offering for communication system applications.**
- **In fact, the most Eravant products are ready to be used for any communication system application.**
- Our full product offering, including Limited Run Models, are listed on our website at www.eravant.com.

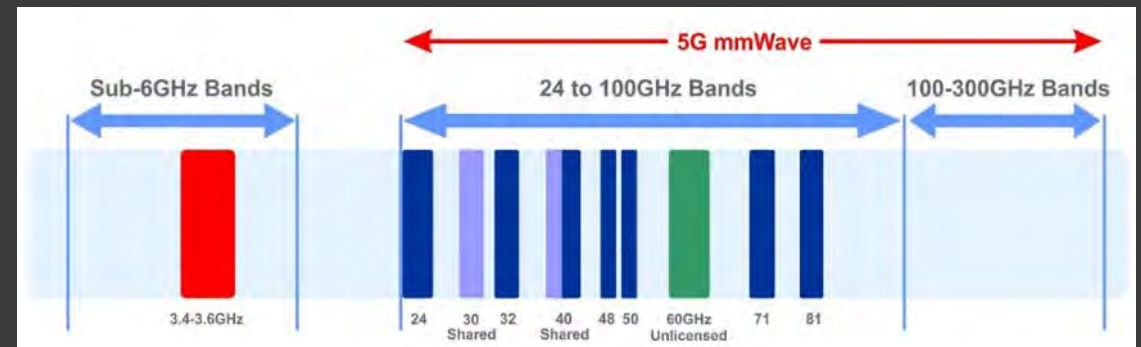
Additional products and presentations are available at customer's request:

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

COMMUNICATION BAND SPECTRUM

Major Upper Microwave and Millimeter Communication Frequency Bands

- **20 to 21 GHz Band**, VSAT Downlink and Milstar Downlink, SATCOM
- **30 to 31 GHz Band** : VSAT Uplink
- **34 to 36 GHz Band**: Military Communication Systems
- **43 to 46 GHz Band**: Milstar Uplink, SATCOM
- **55 to 65 GHz**: WiGig, Local Area Network, Space Communication Systems
- **71 to 86 GHz**: E Band Last Mile Communication Systems
- **93 to 95 GHz**: Military Communication Systems
- **5G**: Millimeterwave Communication Systems



COMMUNICATION SYSTEM SUMMARY

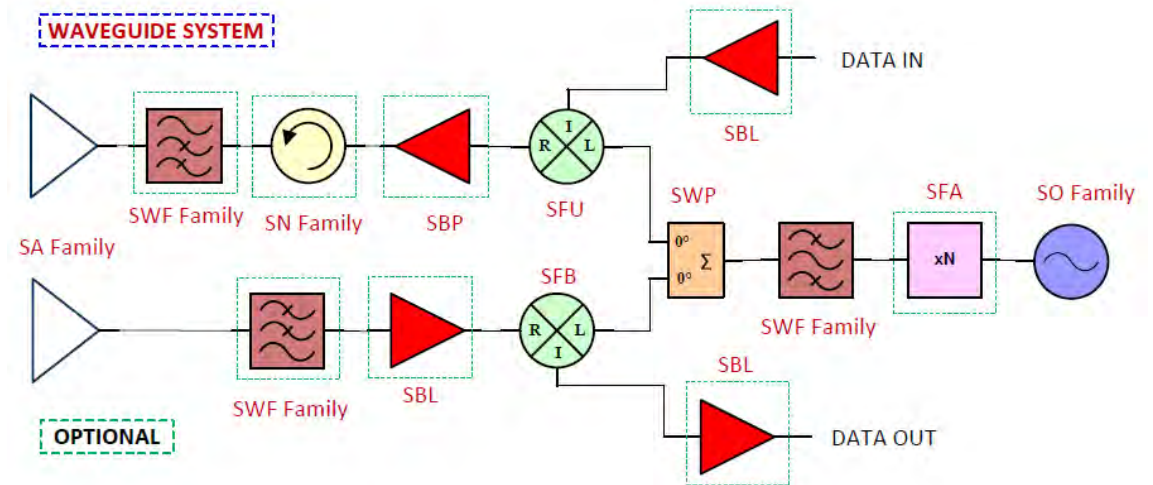
- The presentation starts with some generic block diagrams ERAVANT developed by utilizing its COTS (Commercial of the Shelf) family products.
- In addition, the presentation includes some sample modeled block diagrams ERAVANT developed in some specific frequency bands with its specific model numbers by using its standard components for some specific applications. However, the idea of these block diagrams are readily applicable for other frequency bands with or without any modifications by selecting proper COTS models from ERAVANT web offerings.
- The presentation mentions many high performance or unique COTS components and sub-assemblies for introduction purpose, although the most Eravant products are ready to be used for any communication system applications.
- The custom designed components and modules are available per request by contacting support@eravant.com.

This presentation focus on Superheterodyne System only, in which the common local oscillator is used for simplicity. The separate local oscillators or the oscillator with an offset option can be used for TX and RX channels.

- **Dual Antenna System:** The system uses two antennas, one for transmitter(TX) and other for receiver (RX) channels. This system offers the highest TX and RX isolation to improve the system performance.
- **Common Antenna System:** The system shares one antenna for both transmitter and receiver channels. The advantage of the configuration is its half aperture size compared to its counterpart, the Dual Antenna System. The drawback is its poor TX and RX isolation which invites system performance degradation or increasing damage probability of its receiver. The diplexer is the key component in such system. Several diplexers are used in such system commonly.
 - Circulators
 - Electrical Controlled Microwave Switches
 - Orthomode Transducers (OMT)
 - Frequency Division Diplexers

GENERIC BLOCK DIAGRAMS

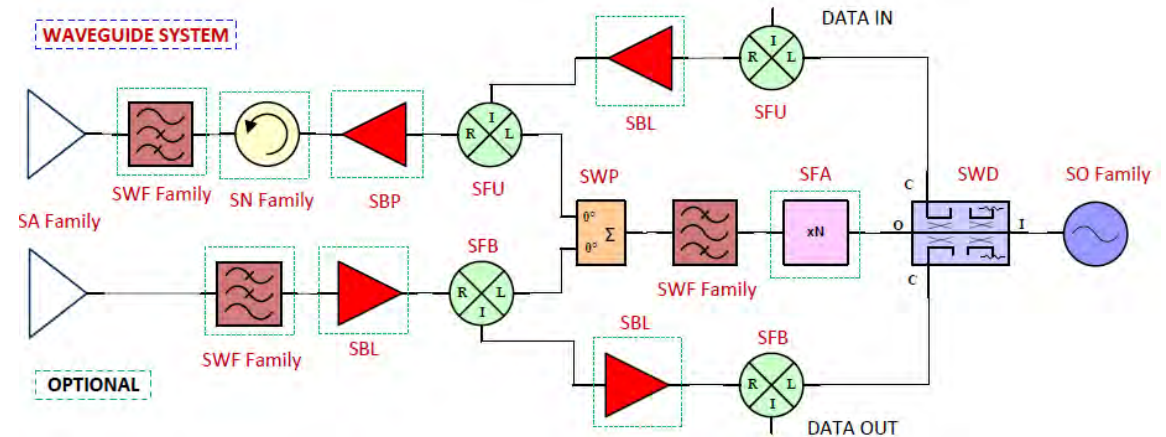
- **Dual Antenna System (Single Stage Conversion)**
 - The antenna the oscillator and the filters can be selected from SA, SO and SWF families to satisfy the system requirements.
 - The components in dotted line frame are optional per system specifications.
 - The components shown are for waveguide system. For coaxial system, the component families differ, such as SWF would be SCF, etc..



GENERIC BLOCK DIAGRAMS

Dual Antenna System (Two Stage Conversion)

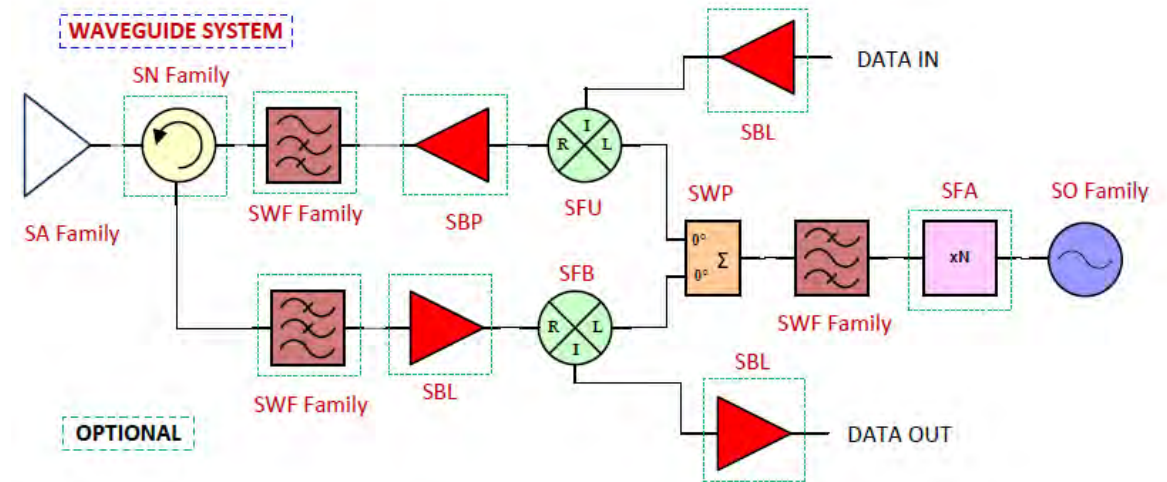
- Due to the system's requirements, such as operating bandwidth, harmonic, mixing products and spurious rejection etc., two stage conversion may be required.
- The components in the dotted line frame are optional per system specifications.
- The components shown are for waveguide systems. For coaxial systems, the component families differ, such as SWF would be SCF, etc.



GENERIC BLOCK DIAGRAMS

Single Antenna System (Circulator, Single Stage Conversion)

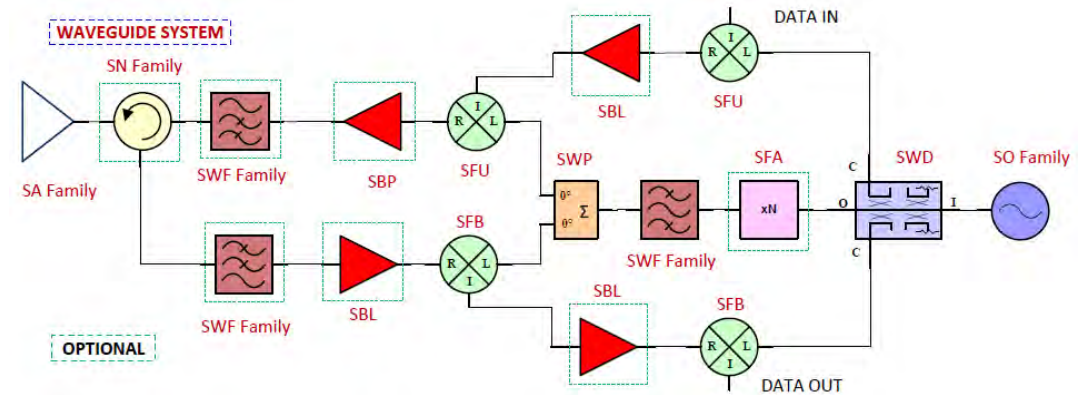
- The diplexer is a circulator in this system.
- The antenna, the oscillator, and the filters can be selected from the SA, SO and SWF families to satisfy the system's requirements.
- The components shown are for waveguide systems. For coaxial systems, the component families differ, such as SWF would be SCF, etc.



GENERIC BLOCK DIAGRAMS

Single Antenna System (Circulator, Two Stage Conversion)

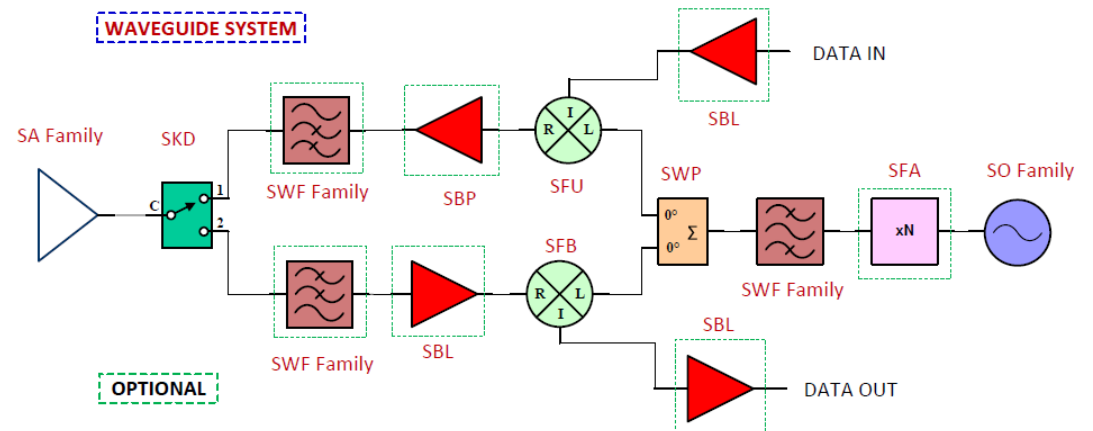
- The diplexer is a circulator in this system.
- The antenna, the oscillator, and the filters can be selected from the SA, SO and SWF families to satisfy the system's requirements.
- The components shown are for waveguide systems. For coaxial system, the component families differ, such as SWF would be SCF, etc.



GENERIC BLOCK DIAGRAMS

Single Antenna System (SPDT Switch, Single Stage Conversion)

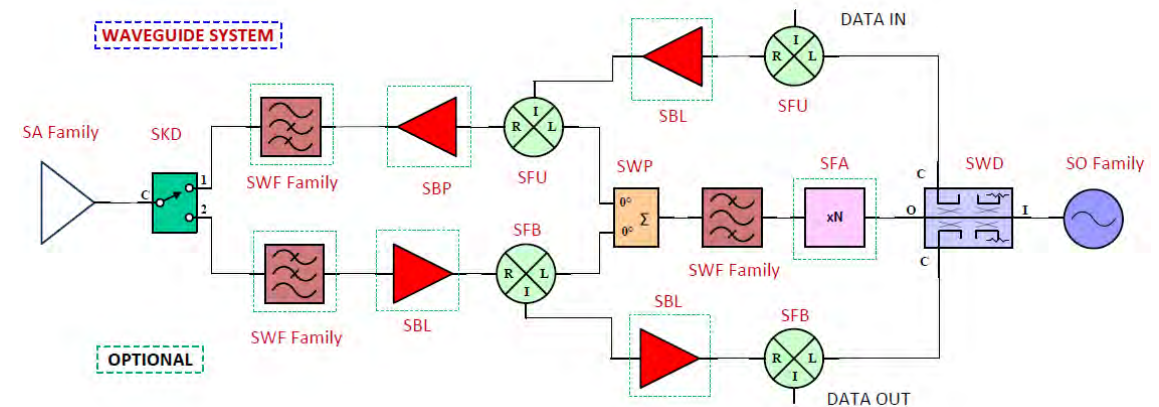
- The diplexer is a SPDT Switch (Time Division) in this system.
- The antenna, the oscillator, and the filters can be selected from the SA, SO and SWF families to satisfy the system's requirements.
- The components shown are for waveguide systems. For coaxial systems, the component families differ, such as SWF would be SCF, etc.



GENERIC BLOCK DIAGRAMS

Single Antenna System (SPDT Switch, Two Stage Conversion)

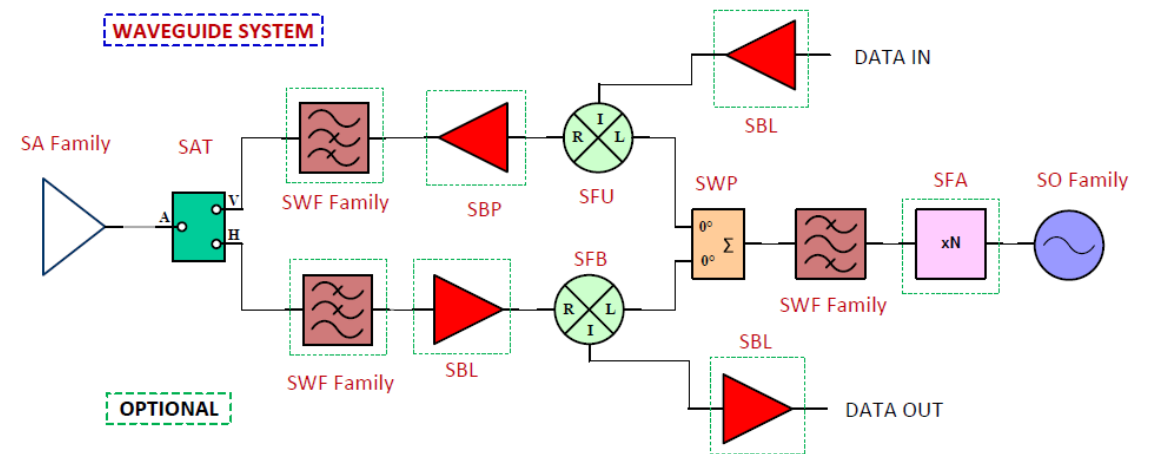
- The diplexer is an SPDT Switch (Time Division) in this system.
- The antenna, the oscillator, and the filters can be selected from the SA, SO and SWF families to satisfy the system's requirements.
- The components shown are for waveguide systems. For coaxial systems, the component families differ, such as SWF would be SCF, etc.



GENERIC BLOCK DIAGRAMS

Single Antenna System (OMT, Single Stage Conversion)

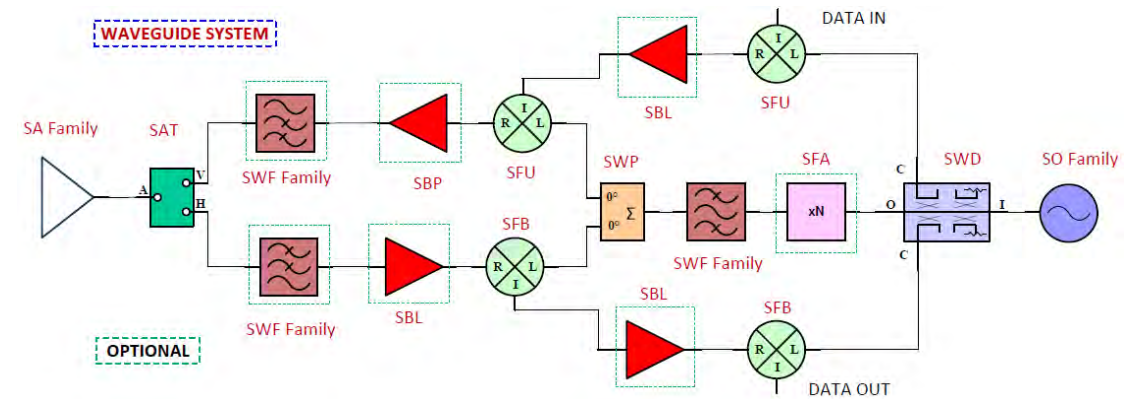
- The diplexer is an orthomode transducer in this system. In the block diagram, the vertical polarization port is used for TX and the horizontal port is used for RX.
- The antenna, the oscillator, and the filters can be selected from the SA, SO and SWF families to satisfy the system's requirements.
- The components shown are for waveguide systems. For coaxial systems, the component families differ, such as SWF would be SCF, etc.



GENERIC BLOCK DIAGRAMS

Single Antenna System (OMT, Two Stage Conversion)

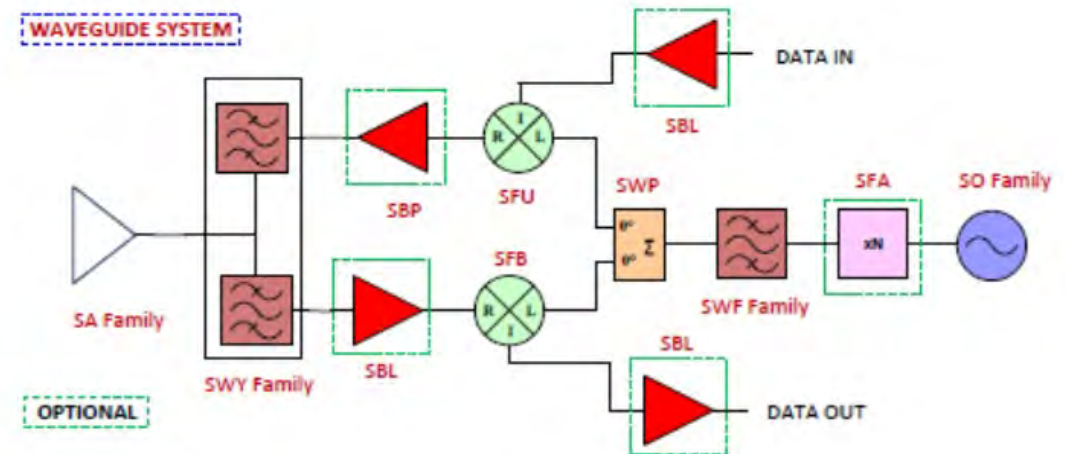
- The diplexer is an orthomode transducer in this system. In the block diagram, the vertical polarization port is used for TX and the horizontal port is used for RX.
- The antenna, the oscillator, and the filters can be selected from the SA, SO and SWF families to satisfy the system's requirements.
- The components shown are for waveguide systems. For coaxial systems, the component families differ, such as SWF would be SCF, etc..



GENERIC BLOCK DIAGRAMS

Single Antenna System (Diplexer, Single Stage Conversion)

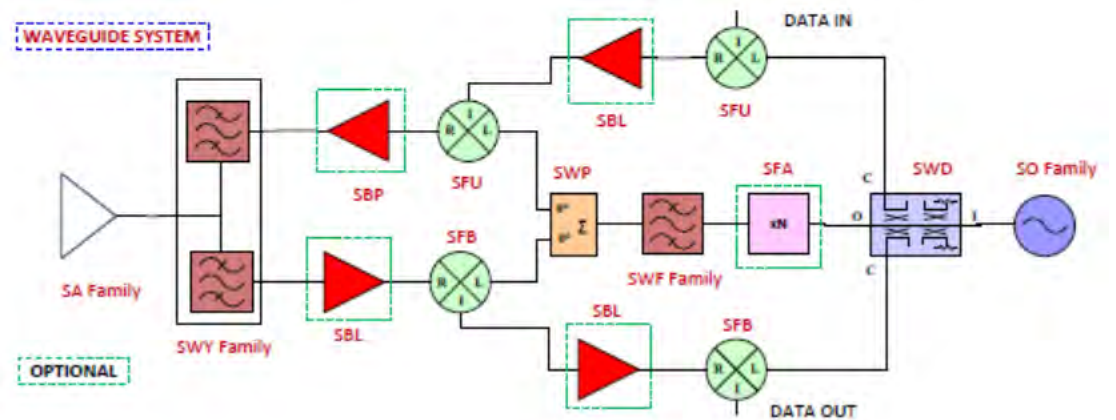
- The diplexer is a frequency division diplexer in this system.
- The antenna, the oscillator, and the filters can be selected from the SA, SO and SWF families to satisfy the system's requirements.
- The components shown are for waveguide systems. For coaxial systems, the component families differ, such as SWF would be SCF, etc.



GENERIC BLOCK DIAGRAMS

Single Antenna System (Diplexer, Two Stage Conversion)

- The diplexer is a frequency division diplexer in this system.
- The antenna, the oscillator, and the filters can be selected from the SA, SO and SWF families to satisfy the system's requirements.
- The components shown are for waveguide systems. For coaxial systems, the component families differ, such as SWF would be SCF, etc.



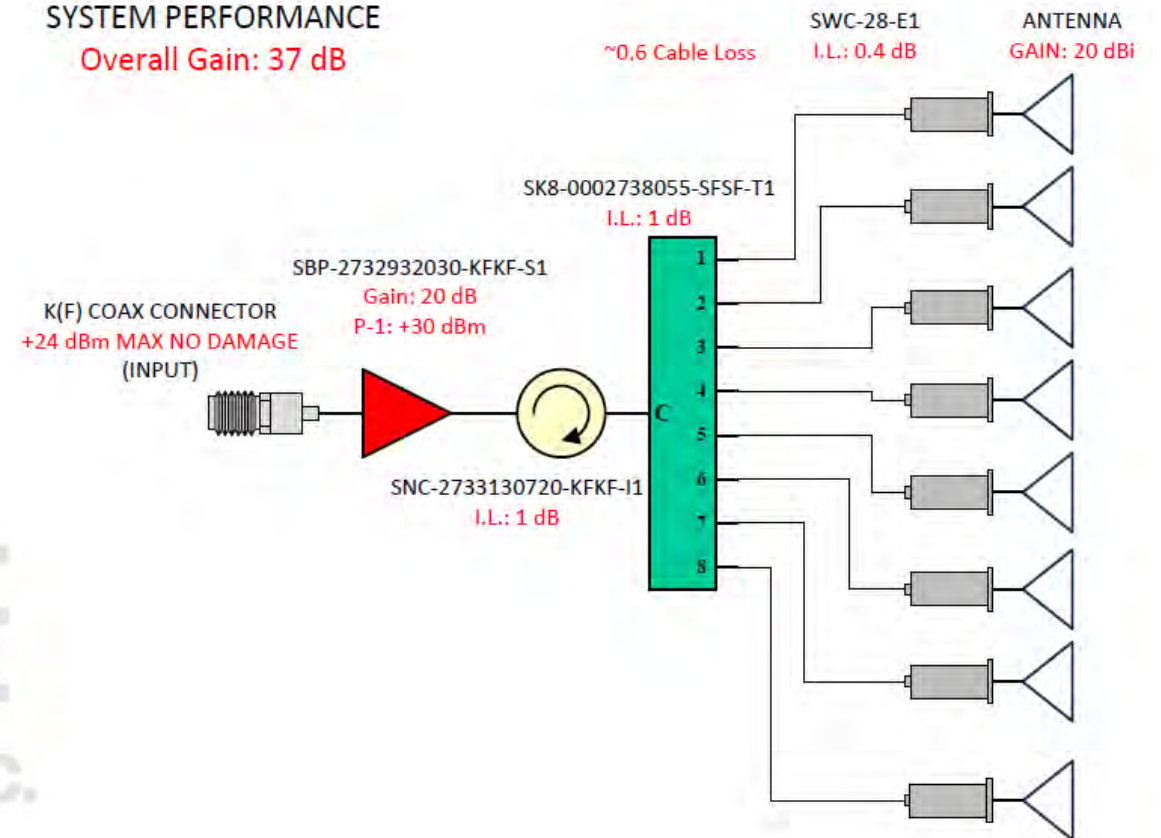
MODELED BLOCK DIAGRAMS

MIMO 8 Channel Transmitter (SST-2830231719-28-S1)



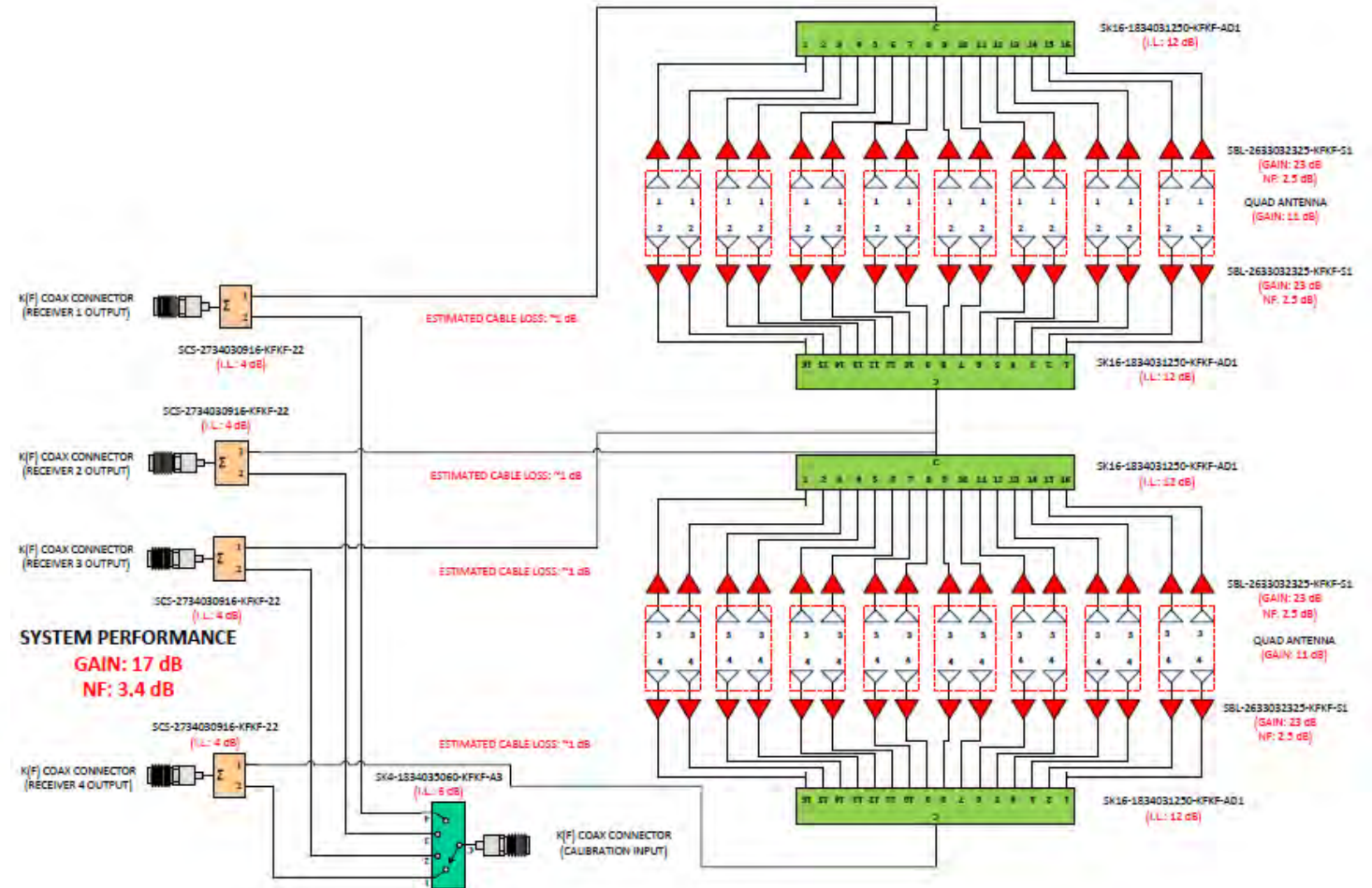
SYSTEM PERFORMANCE

Overall Gain: 37 dB



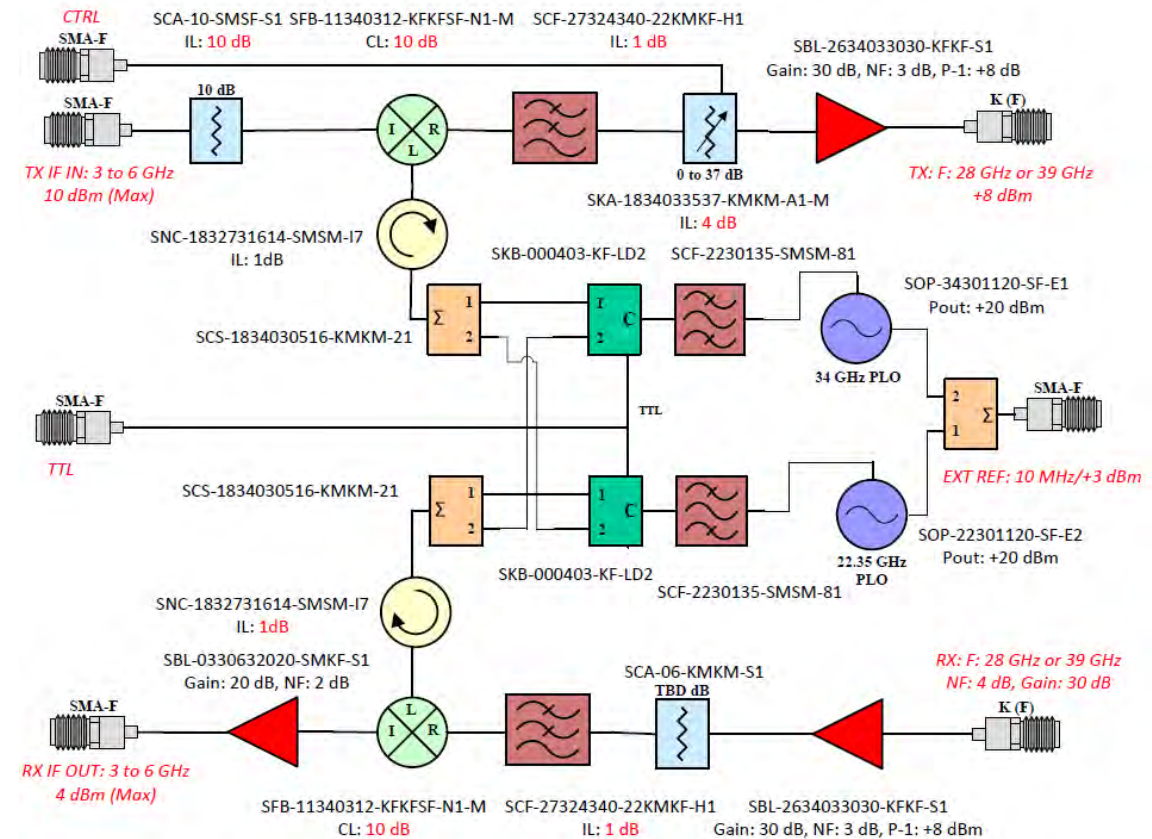
MODELED BLOCK DIAGRAMS

MIMO 64 Channel Receiver (SSR-2830233605-28-S1)



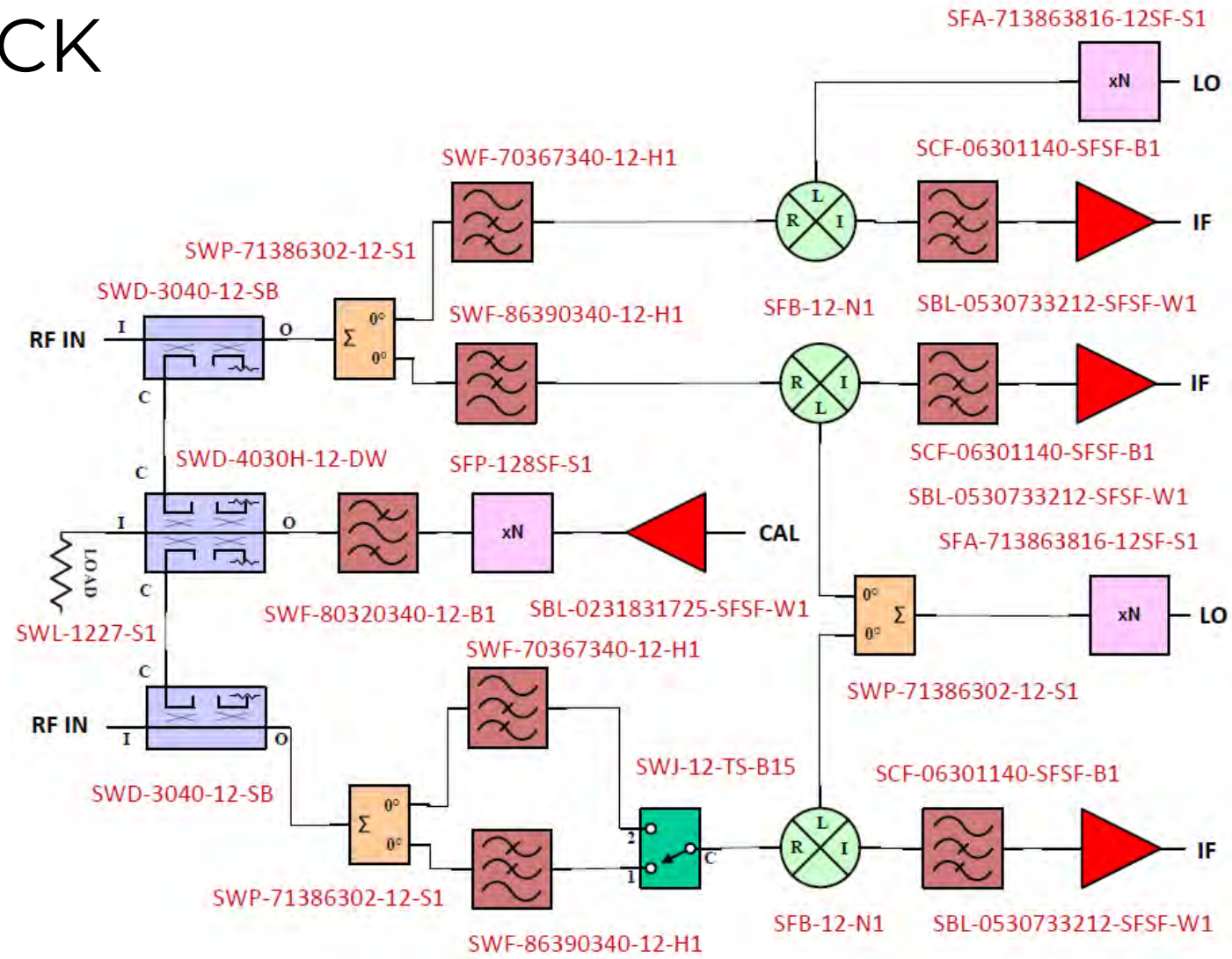
MODELED BLOCK DIAGRAMS

Ka Band 5G Transceiver (STX-2833935010-KFKF-AVT)



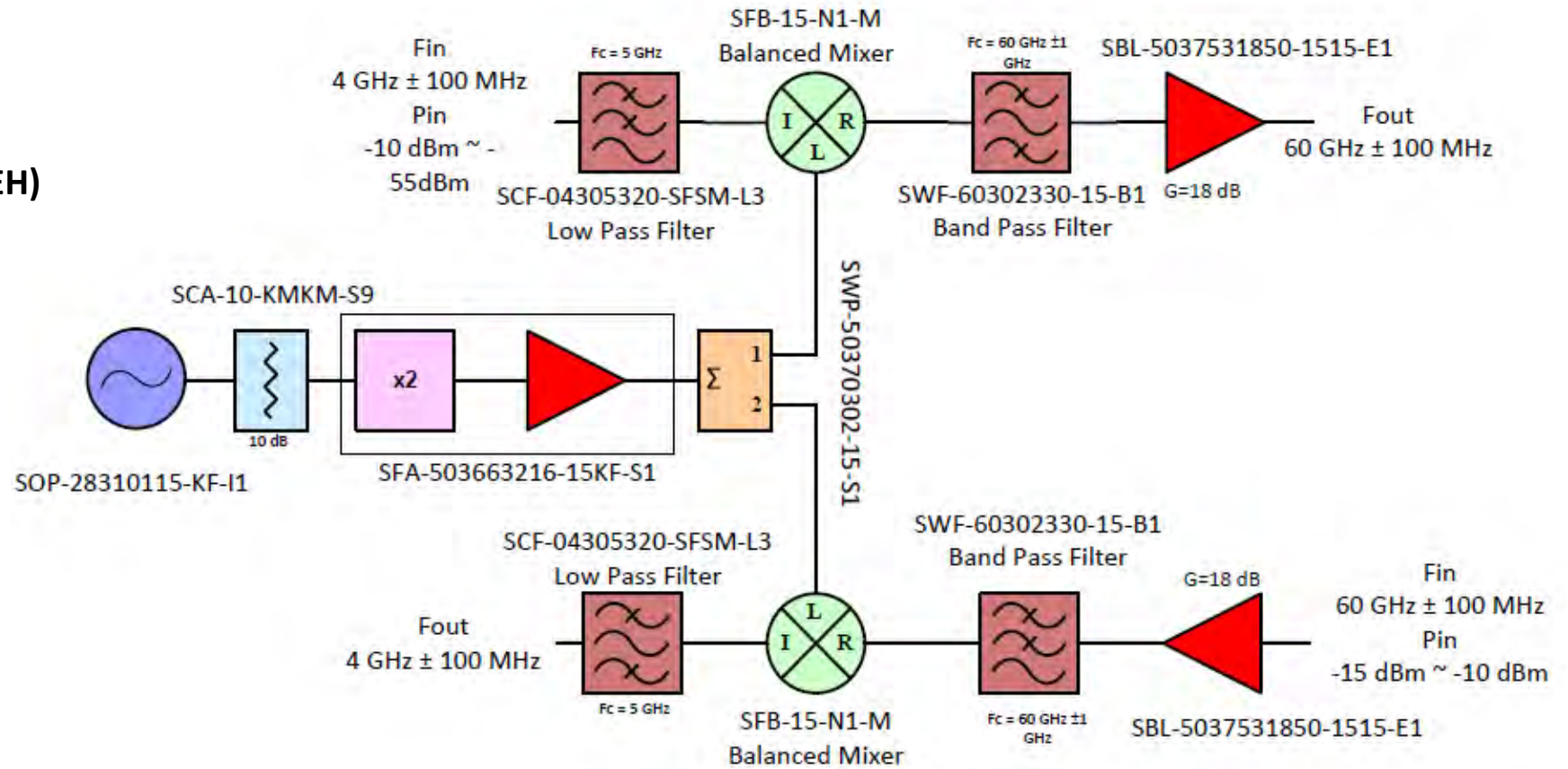
MODELED BLOCK DIAGRAMS

72 to 86 Receiver (SSK-SR723843-12-C1)



MODELED BLOCK DIAGRAMS

60 GHz Transceiver (SSC-6036035010-1515-S1-EH)



ERAVANT PRODUCT COVERAGE

- ERAVANT offers **total product solutions** to configure any communication system applications in the Frequency Range of 8.2 to 170 GHz. ERAVANT products can be found from its Website [here](#).
- ERAVANT has organized all products into its [full catalog](#) to give an overview of its product offering. Many of the products are readily available for any Radar system configuration and prototype built for concept approval.
- Furthermore, [ERAVANT products for 5G and IoT systems presentation](#) may further summarize its key technologies for this applications.
- The following presentation reveals many custom application focused products, which includes Components, Interconnection Parts, Sub-assemblies Sensors, and Test Setups.



STANDARD COMPONENTS

STANDARD COMPONENTS FOR COMMUNICATION SYSTEMS

- Per the block diagram presented above, the following components are the key building blocks for any Radar systems. This presentation includes some examples for introduction/illustration purpose.
 - **SA:** Antennas
 - **SAT:** Orthomode Transducers
 - **SAS:** Polarizers
 - **SB:** Amplifiers
 - **SF:** Mixers
 - **SFA:** Multipliers
 - **SO:** Oscillators
 - **SN:** Circulators and Isolators
 - **SK:** Switches and Attenuators
 - **SWP & SCS:** Power Dividers and **SWM:** Magic Tee
 - **SWD & SCD:** Directional Couplers
 - **SCF & SWF:** Filters

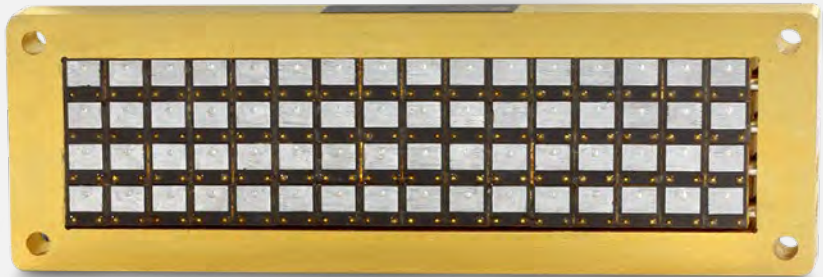
BEAMFORMING PATCH ARRAY ANTENNA

FAMILY: SAM
28 GHz

SAM-2832830695-DM-L1-64C

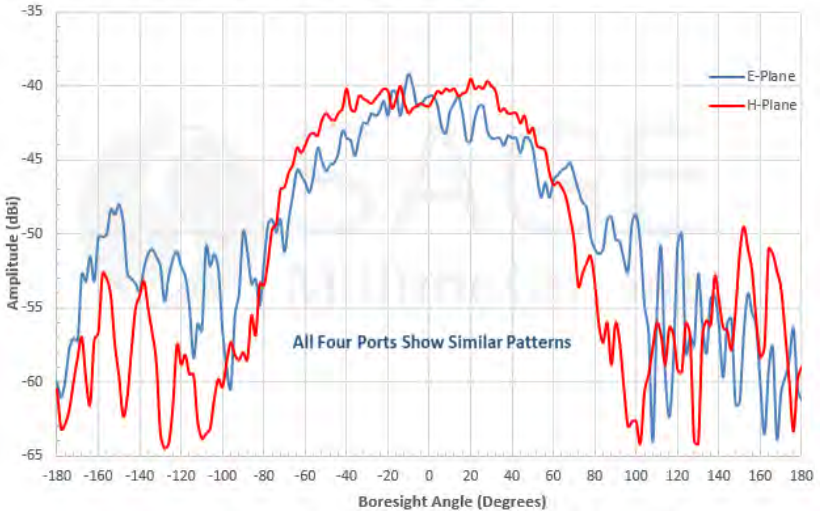
Features:

- 28 GHz
- Beamforming Feasibility
- MINO Systems
- 4x 16 Elements
- Various Array Configurations



Parameter	Minimum	Typical	Maximum
Frequency Range	68 GHz		70 GHz
Gain (Individual Patch)		4.0 dBi	
3 dB Beamwidth (Individual Patch)	50° (Vertical, E Plane) x 95° (Horizontal, H Plane)		
Sidelobe Level (Individual Patch)		-12 dB	
Array Gain (Fed in Phase)	12.0 dBi		
Array 3 dB Beamwidth (Fed in Phase)	60° (Vertical, E Plane) x 25° (Horizontal, H Plane)		
Array Sidelobe Level (Fed in Phase)	-12 dB		
Polarization	Linear		
Return Loss		8 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Measured Individual Patch Pattern @ 69.17 GHz



BEAMFORMING PATCH ARRAY ANTENNA

FAMILY: SAM
39 GHz

SAM-3934030695-2F-L1-4C

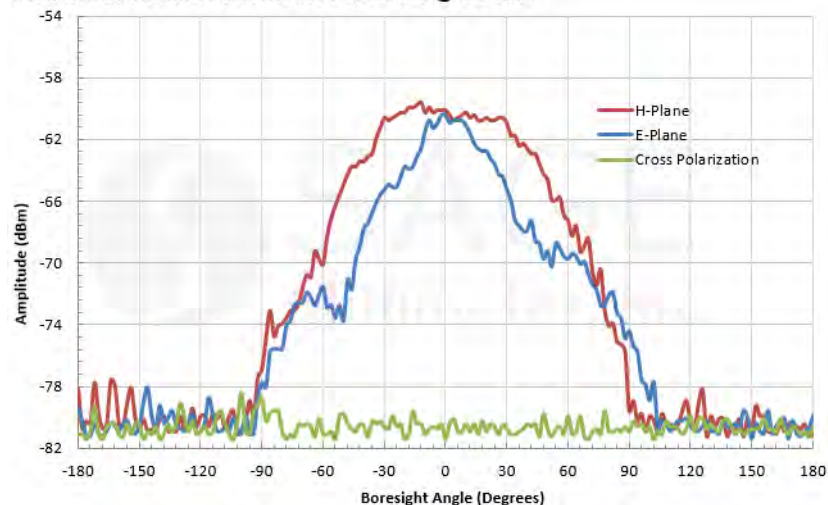
Features:

- 39 GHz
- Beamforming Feasibility
- 1 x 4 Elements
- Various Array Configurations



Parameter	Minimum	Typical	Maximum
Frequency Range	38.5 GHz		39.5 GHz
Gain		6.0 dBi	
3 dB Beamwidth	50° (Vertical, E Plane) x 95° (Horizontal, H Plane)		
Sidelobe Level		-12 dB	
Array Gain		12.0 dBi	
Array 3 dB Beamwidth	15° (Vertical, E Plane) x 95° (Horizontal, H Plane)		
Array Sidelobe Level		-12 dB	
Polarization		Linear	
Return Loss		10 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Measured Antenna Patterns for Port 2 & 3 @ 39 GHz



BEAMFORMING PATCH ARRAY ANTENNA

FAMILY: SAM
68 GHz

SAM-6837030395-15-L2-4W

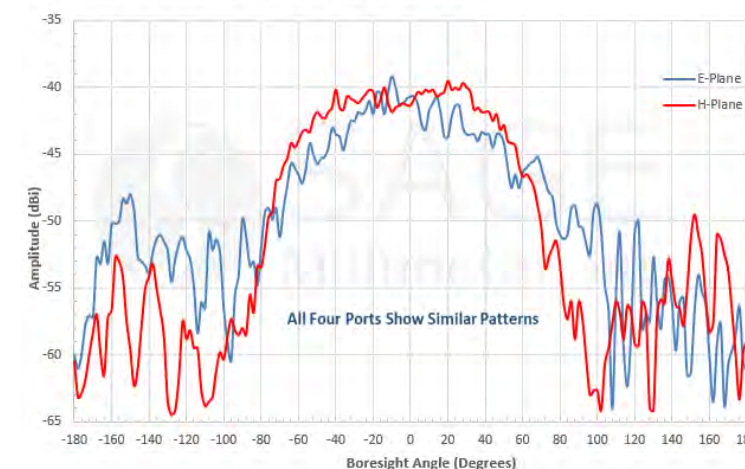
Features:

- 69 GHz
- Beamforming Feasibility
- 2 x 2 Elements
- Various Array Configurations
- Many Models in V Band



Parameter	Minimum	Typical	Maximum
Frequency Range	68 GHz		70 GHz
Gain (Individual Patch)		4.0 dBi	
3 dB Beamwidth (Individual Patch)	50° (Vertical, E Plane) x 95° (Horizontal, H Plane)		
Sidelobe Level (Individual Patch)		-12 dB	
Array Gain (Fed in Phase)		12.0 dBi	
Array 3 dB Beamwidth (Fed in Phase)	60° (Vertical, E Plane) x 25° (Horizontal, H Plane)		
Array Sidelobe Level (Fed in Phase)		-12 dB	
Polarization		Linear	
Return Loss		8 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Measured Individual Patch Pattern @ 69.17 GHz



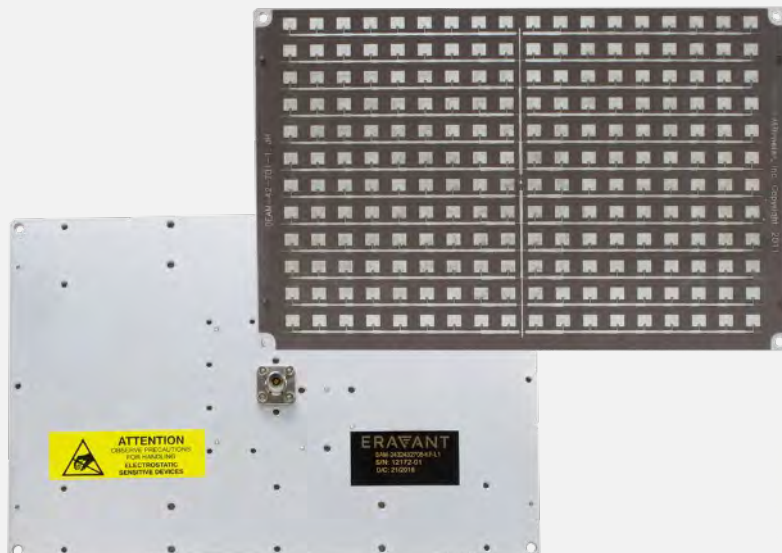
MICROSTRIP PATCH ARRAY ANTENNA

FAMILY: SAM
24 GHz

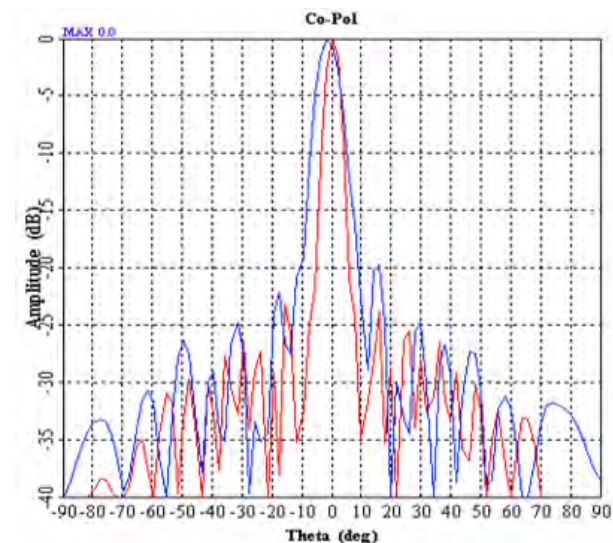
SAM-2432432505-42-L1

Features:

- 24 GHz
- Phased Array
- 12 x 18 Elements
- Low Profile



Parameter	Minimum	Typical	Maximum
Frequency Range	24.025 GHz	24.125 GHz	24.225 GHz
Gain		25 dBi	
3 dB Beamwidth	6.8° (Vertical, E Plane) x 4.6° (Horizontal, H Plane)		
Sidelobe Level	-18 dB	-20 dB	
Polarization	Linear		
Return Loss	7 dB	10 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C



SLOTTED WAVEGUIDE ARRAY ANTENNA

FAMILY: SAW
35 GHz

SAW-3533532716-28-L2-WR

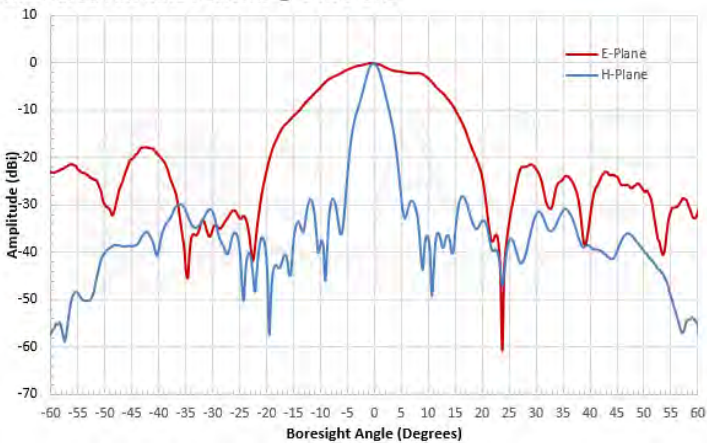
Features:

- 35 GHz
- High Aperture Efficiency
- Flat and Low Profile
- Linear Polarization
- Weather resistance



Parameter	Minimum	Typical	Maximum
Frequency	34.75 GHz		35.25 GHz
Gain		27 dBi	
Polarization	Linear, Vertical		
3 dB Beamwidth, Vertical		16°	
3 dB Beamwidth, Horizontal		2°	
Side Lobe Level		-15 dB	
Return Loss		13 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Measured Antenna Patterns @ 34.75 GHz



MONOPULSE CASSEGRAIN ANTENNA

FAMILY: SAY
35 GHz

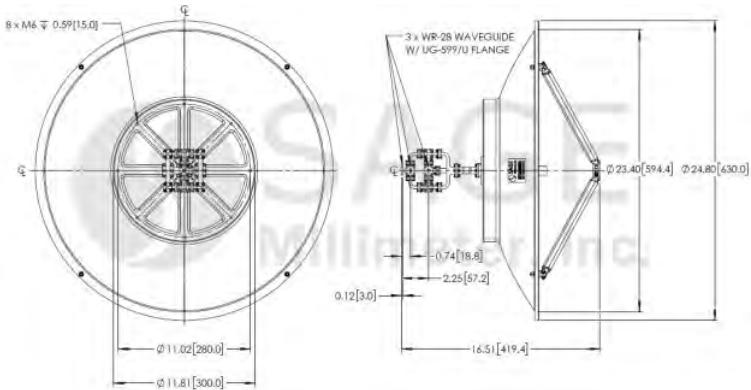
SAY-3433632750-28-U5-MP

Features:

- 34 to 36 GHz
- 43 dBi Gain
- Low Profile



Parameter	Minimum	Typical	Maximum
Frequency	34 GHz	35 GHz	36 GHz
Gain, Sum Port		38 dBi	
Sum 3 dB Beamwidth		2.0°	
Gain, Difference V-Port		34 dBi	
Gain, Difference H-Port		34 dBi	
Null Depth		30 dB	
Polarization	Linear		
Sidelobes, E-Plane		-16 dB	
Sidelobes, H-Plane		-16 dB	
Port VSWR		1.6:1	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C



OMNI-DIRECTIONAL ANTENNA

FAMILY: SAO
KA BAND

SAO-2734030345-28-S1

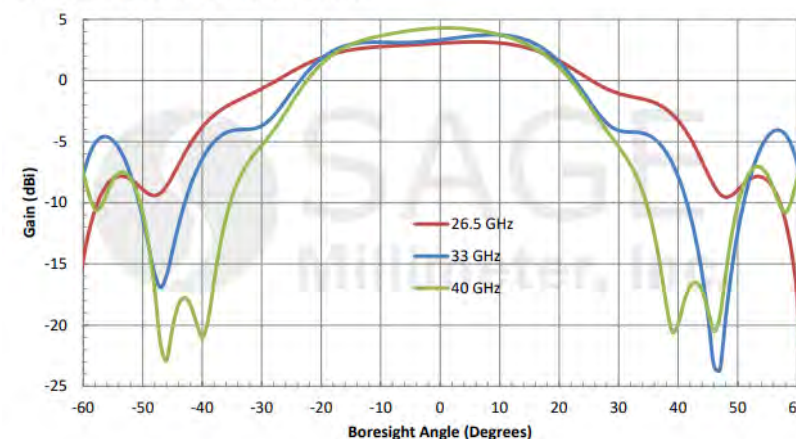
Features:

- 26.5 to 40 GHz
- 360° Azimuth Coverage
- 45° Vertical 3 dB Bandwidth
- Vertically Polarized
- Full Ka Band Bandwidth Operation



Parameter	Minimum	Typical	Maximum
Frequency Range	26.5 GHz		40.0 GHz
Gain		3 dBi	
Azimuth Gain Variation		±1 dB	
Azimuth Beamwidth		360°	
3 dB Vertical Beamwidth		45°	
Return Loss		10 dB	
Power Handling		150 W (CW)	200 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Simulated E-Plane Antenna Patterns



OMNI-DIRECTIONAL ACTIVE ANTENNA

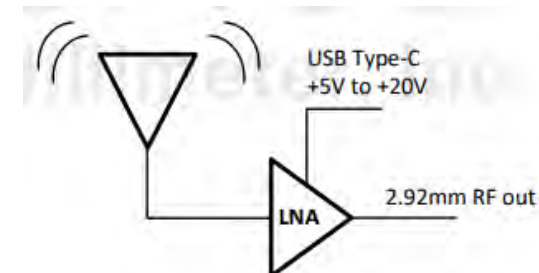
FAMILY: SAO
KA BAND

SAO-2734033045-KF-C1-BL

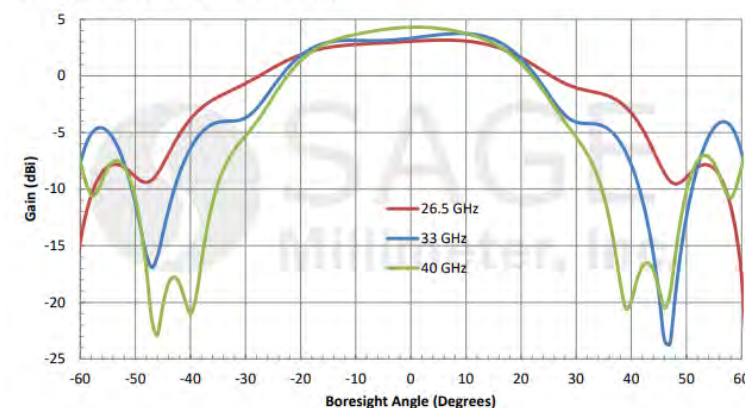
Features:

- 26.5 to 40 GHz
- 360° Azimuth Coverage
- 45° Vertical 3 dB Bandwidth
- Vertically Polarized
- Full Ka Band Bandwidth Operation

Parameter	Minimum	Typical	Maximum
Frequency Range	26.5 GHz		40.0 GHz
Gain at Center Frequency		30 dBi	
Noise Figure		5 dB	
Azimuth Gain Variation		±1 dB	
Azimuth Beamwidth		360°	
3 dB Vertical Beamwidth		45°	
P _{1dB}		+11 dBm	
Return Loss		10 dB	
RF Input Power			-8 dBm
Damage RF Input Power			-3 dBm
Supply Voltage	+4.8 V _{DC}	+5 V _{DC}	+20 V _{DC}
Supply Current		240 mA	
Specification Temperature		+25 °C	
Operating Temperature	-20 °C		+65 °C



Simulated E-Plane Antenna Patterns



OMNI-DIRECTIONAL ANTENNA

FAMILY: SAO
KA BAND

SAO-2734030810-28-S1

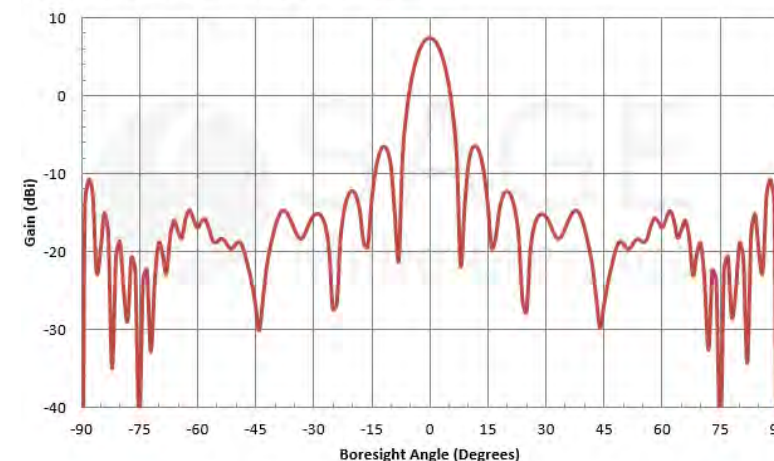
Features:

- 26.5 to 40 GHz
- 360° Azimuth Coverage
- 10° Vertical 3 dB Bandwidth
- Vertically Polarized
- Full Ka Band Bandwidth Operation



Parameter	Minimum	Typical	Maximum
Frequency Range	24 GHz		40 GHz
Gain		7.5 dBi	
Azimuth Gain Variation		±1 dB	
Azimuth Beamwidth		360°	
3 dB Vertical Beamwidth		10°	
Return Loss		9 dB	
Power Handling		150 Watts	200 Watts
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical E-Plane Antenna Pattern @ 33.25 GHz



OMNI-DIRECTIONAL ANTENNA

FAMILY: SAO
U BAND

SAO-4036030415-19-S1

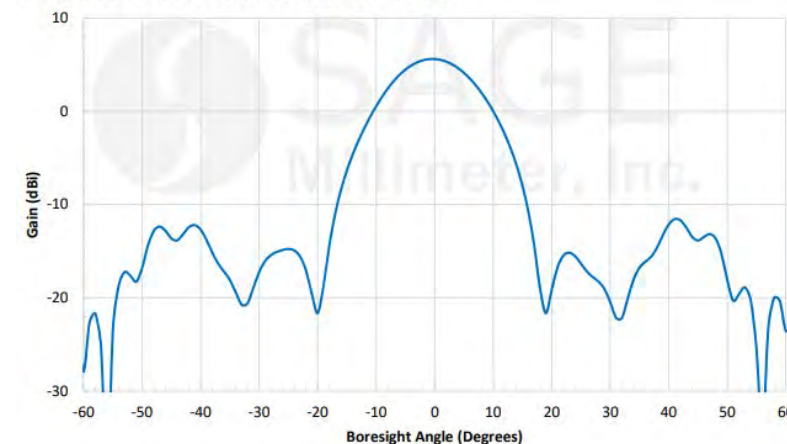
Features:

- 40 to 60 GHz
- 360° Azimuth Coverage
- 30° Vertical 3 dB Bandwidth
- Vertically Polarized
- Full V Band Bandwidth Operation



Parameter	Minimum	Typical	Maximum
Frequency	40 GHz		60 GHz
Gain		4 dBi	
Azimuth Gain Variation		±2 dBi	
Azimuth Beamwidth		360°	
3 dB Vertical Beamwidth		15°	
Return Loss		10 dB	
Power Handling		150 W (CW)	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Simulated E-Plane Antenna Pattern @ 50 GHz



OMNI-DIRECTIONAL ANTENNA

FAMILY: SAO
V BAND

SAO-5037530230-15-S1

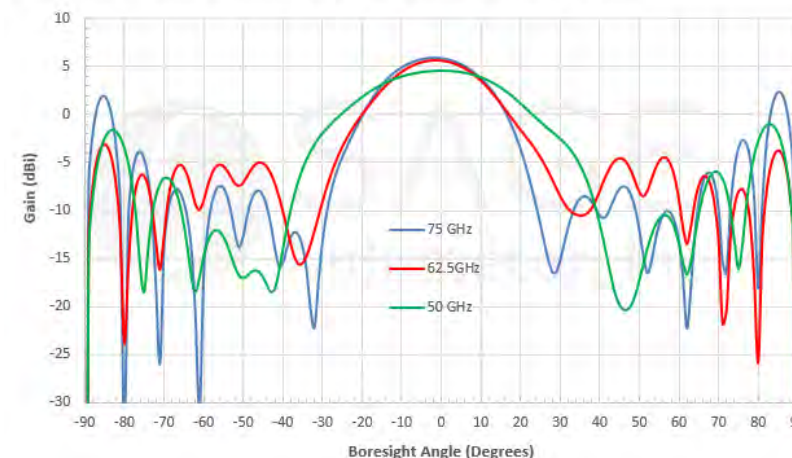
Features:

- 50 to 75 GHz
- 360° Azimuth Coverage
- 30° Vertical 3 dB Bandwidth
- Vertically Polarized
- Full V Band Bandwidth Operation



Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
Gain		2.0 dBi	
Azimuth Gain Variation		±2.0 dB	
Azimuth Beamwidth		360°	
3 dB Vertical Beamwidth		30°	
Return Loss		10 dB	
Power Handling		50 W (CW)	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Simulated H-Plane Antenna Pattern @ 50GHz, 62.5GHz, 75 GHz



OMNI-DIRECTIONAL ANTENNA

FAMILY: SAO
E BAND

SAO-6039030230-12-S1

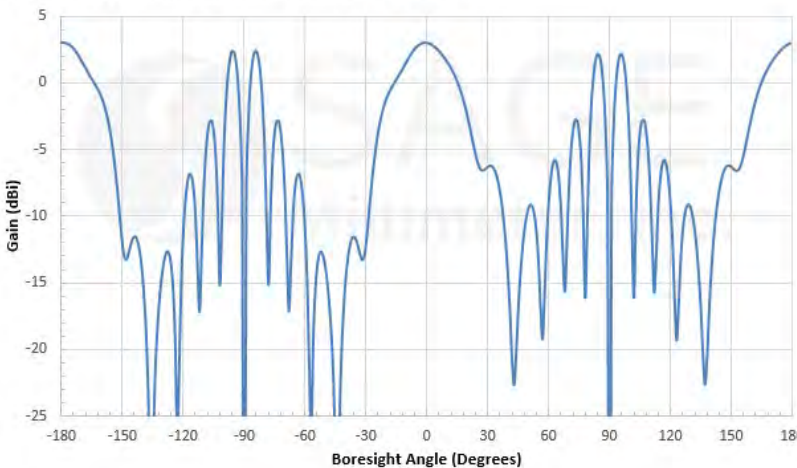
Features:

- 50 to 75 GHz
- 360° Azimuth Coverage
- 30° Vertical 3 dB Bandwidth
- Vertically Polarized
- Full V Band Bandwidth Operation



Parameter	Minimum	Typical	Maximum
Frequency Range	60 GHz		90 GHz
Gain		2 dBi	
Gain Variation		±3 dB	
Azimuth		360°	
3 dB Beamwidth, Vertical		30°	
Return Loss		9 dB	
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

Simulated E-Plane Antenna Pattern @ 75 GHz



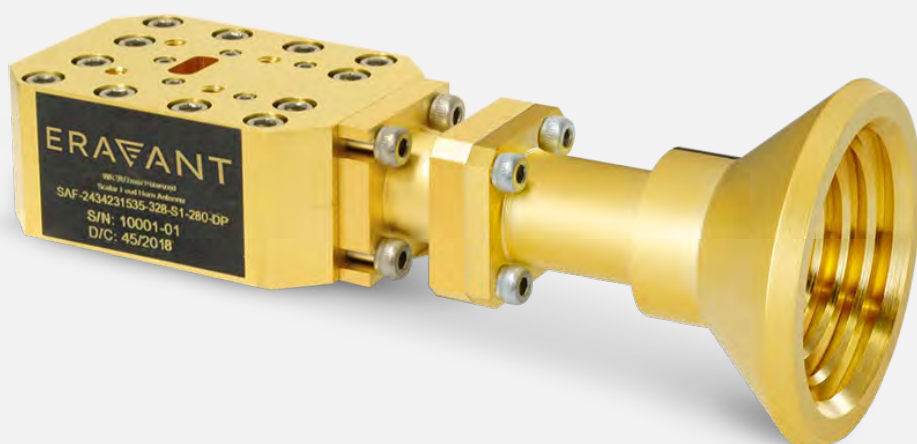
DUAL POLARIZED SCALAR HORN ANTENNA

FAMILY: SAO
24 TO 42 GHz

SAF-2434231535-328-S1-280-DP

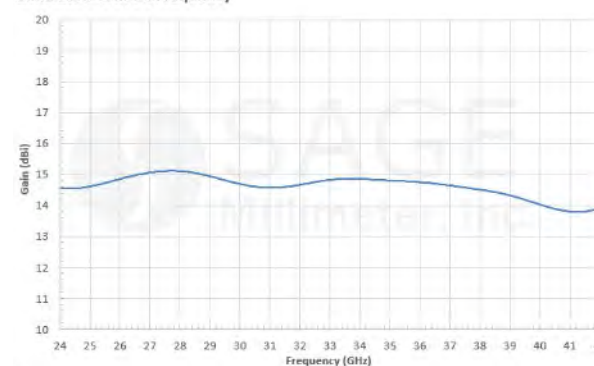
Features:

- 24 to 42 GHz
- Gain 15 dBi
- 3 dB Beamwidth 35°
- Dual Polarized
- 7 Models to Cover up to 110 GHz

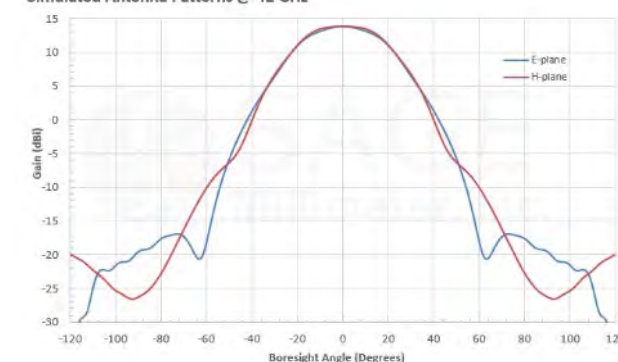


Parameter	Minimum	Typical	Maximum
Frequency	24 GHz		42 GHz
Gain		15 dBi	
3 dB Beamwidth, E-plane @ 33 GHz		35°	
3 dB Beamwidth, H-plane @ 33 GHz		35°	
Sidelobe Levels		-25 dB	
V and H Port Isolation		35 dB	
Cross Polarization Rejection		35 dB	
Port Return Loss		15 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Simulated Gain vs. Frequency



Simulated Antenna Patterns @ 42 GHz



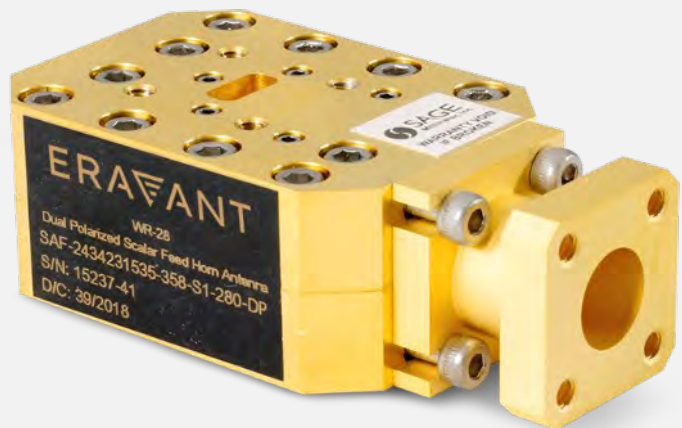
ORTHOMODE TRANSDUCER

FAMILY: SAT
18 TO 110 GHz

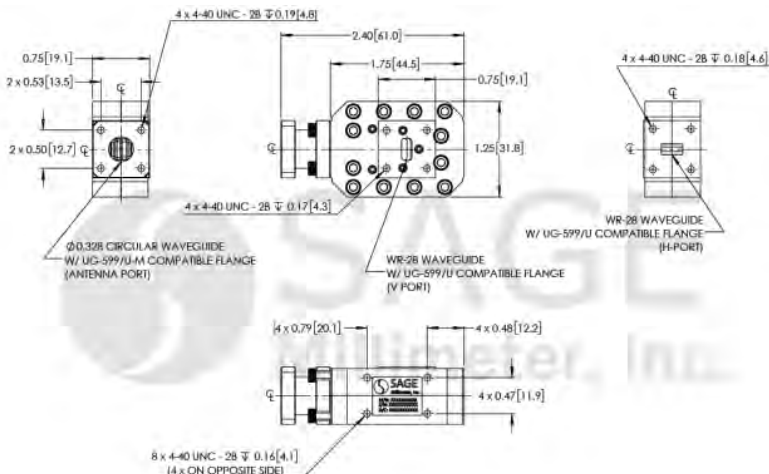
SAT-333-32828-C1

Features:

- Full Waveguide Band Operation
- High Port Isolation
- High Crosspol Rejection
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency Range	24 GHz		42 GHz
Insertion Loss (H to A Port)		0.5 dB	
Insertion Loss (V to A Port)		0.5 dB	
Isolation (H to V Port)		40 dB	
Cross Polarization (H to A Port)		35 dB	
Cross Polarization (V to A Port)		35 dB	
Return Loss (H Port)		15 dB	
Return Loss (V Port)		15 dB	
Return Loss (A Port, Vertical)		15 dB	
Return Loss (A Port, Horizontal)		15 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C



ORTHOMODE POLARIZER

FAMILY: SAS
18 TO 110 GHz

SAS-793-11012-F1

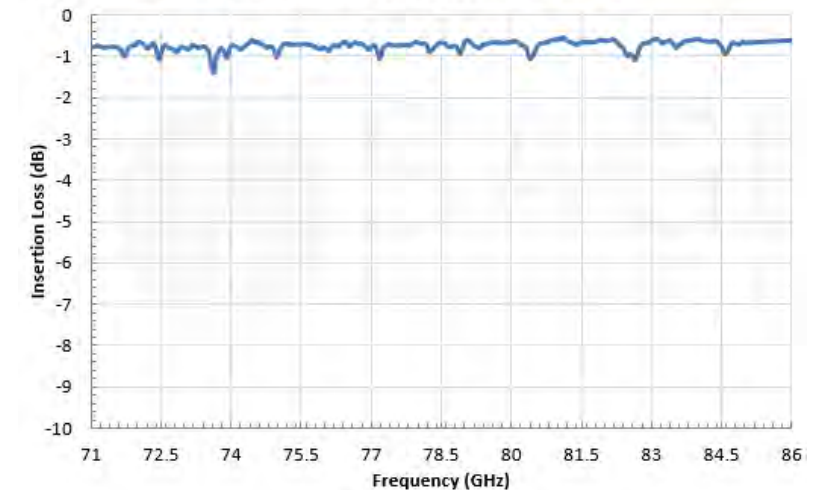
Features:

- Circular Waveguide Interface
- Low Insertion Loss
- Good Axial Ratio
- LHCP or RHCP
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency Range	71 GHz		86 GHz
Insertion Loss		0.5 dB	
Axial Ratio		1.1	1.2
Return Loss		20 dB	
Specification Temperature		+25 °C	
Operation Temperature	-40 °C		+85 °C

Typical Insertion Loss vs. Frequency (Back to Back)



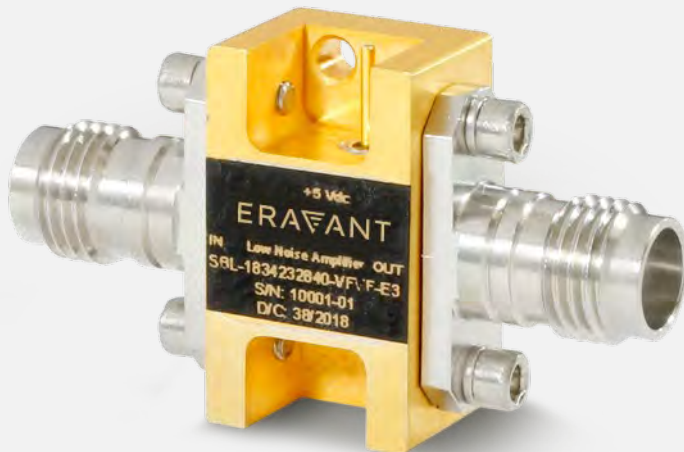
BROADBAND AMPLIFIER

FAMILY: SBB
18 TO 42 GHz

SBB-1834232815-KFKF-E3

Features:

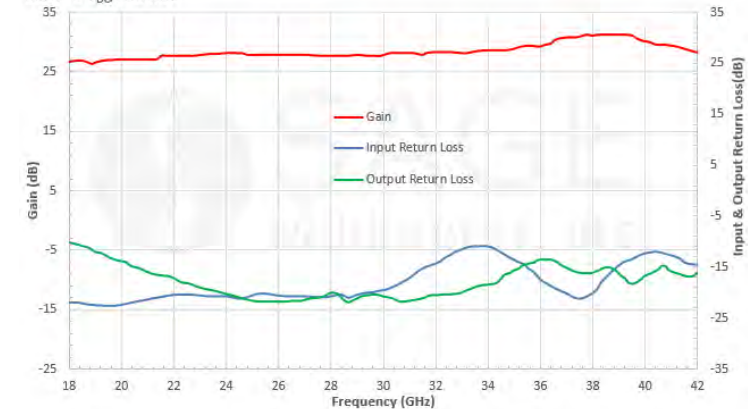
- 18 to 42 GHz
- 5G Band
- Gain 28 dBi
- SBB Family Has More than 50 Models



Parameter	Minimum	Typical	Maximum
Frequency	18 GHz		42 GHz
Gain	22 dB	28 dB	
P_{1dB}	+10 dBm	+15 dBm	
P_{sat}		+16 dBm	
Noise Figure		4.0 dB	6.0 dB
RF Input Power			-5 dBm
Damage RF Input Power			0 dBm
Input Return Loss		10 dB	
Output Return Loss		10 dB	
DC Voltage		+5 V _{DC}	+5.5 V _{DC}
DC Supply Current		240 mA	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Performance vs. Frequency

Bias: +5 V_{DC}/240 mA



BROADBAND LOW NOISE AMPLIFIER

FAMILY: SBL
75 TO 110 GHz

SBL-7531143550-1010-E1

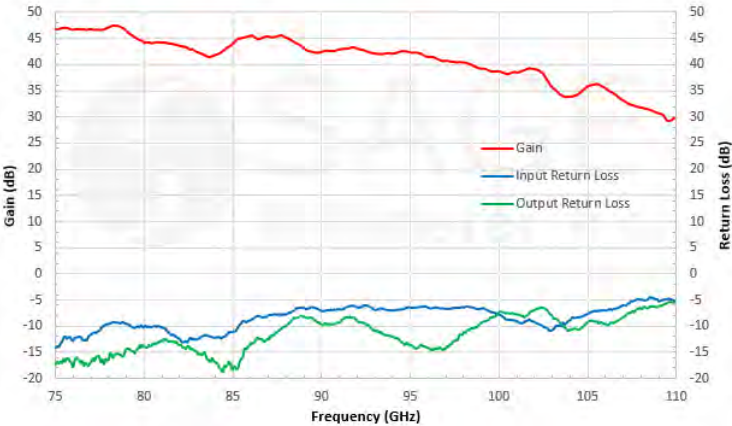
Features:

- 75 to 110 GHz
- 5 dB Noise Figure
- 35 dB Nominal Gain
- SBL Family Cover up to 170 GHz



Parameter	Minimum	Typical	Maximum
Frequency	75 GHz		110 GHz
Gain		35 dB	
Noise Figure		5 dB	
P _{1dB}		-5 dBm	
P _{in}			+15 dBm
Input Return Loss		6 dB	
Output Return Loss		8 dB	
DC Voltage	+6 V _{DC}	+8 V _{DC}	+15 V _{DC}
DC Supply Current		100 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

Typical Gain and Return Loss vs. Frequency
Bias: +8 V_{DC}/69 mA



HIGH POWER AMPLIFIER

FAMILY: SBP
31 TO 38 GHz

SBP-3133834034-KFKF-C1-2

Features:

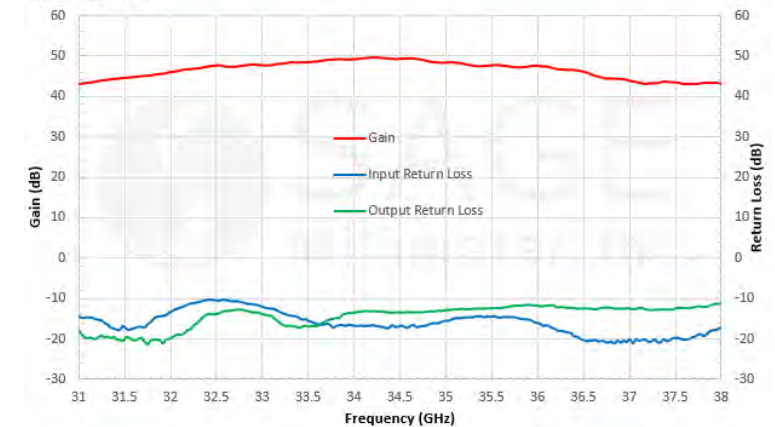
- 31 to 38 GHz
- +35 dBm Psat
- 40 dB Nominal Gain
- SBP Family Covers up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	31 GHz		38 GHz
Gain		40 dB	
P_{1dB}		+34 dBm	
P_{sat}		+35 dBm	
P_{in}			+20 dBm
Input Return Loss		10 dB	
Output Return Loss		10 dB	
DC Voltage		+8 V _{DC}	
DC Supply Current (Under RF Drive)		4 A	
Supply Voltage to Fan		+12 V _{DC}	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

Typical Gain and Return Loss vs. Frequency

V_{IN} : +8 V_{DC}/2.4 A



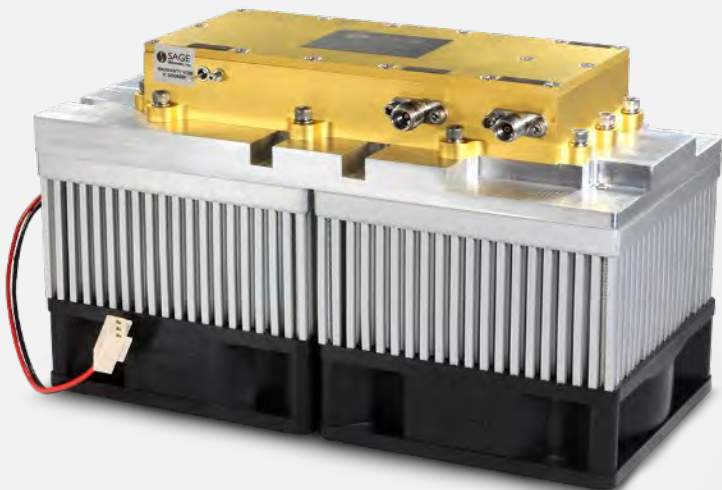
HIGH POWER GaN AMPLIFIER

FAMILY: SBP
32 TO 38 GHz

SBP-3233831838-KFKF-E1-HR

Features:

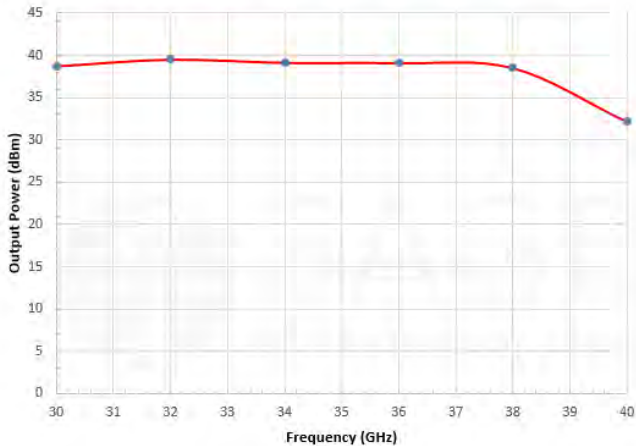
- 32 to 38 GHz
- +38 dBm Psat
- 18 dB Nominal Gain
- SBP Family Covers up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	32 GHz		38 GHz
Gain		18 dB	
P _{sat}		+38 dBm	
P _{in}			+30 dBm
Input Return Loss		15 dB	
Output Return Loss		10 dB	
DC Voltage		+30 V _{DC}	+48 V _{DC}
DC Supply Current		2 A	
Supply Voltage to Fan		+12 V _{DC}	
Specification Temperature		+25°C	
Operating Temperature	0°C		+50°C

Typical Output Power Psat Vs. Frequency

Bias = +48 V_{DC} / 2 A



HIGH POWER AMPLIFIER

FAMILY: SBP
75 TO 110 GHz

SBP-7531142515-1010-E1

Features:

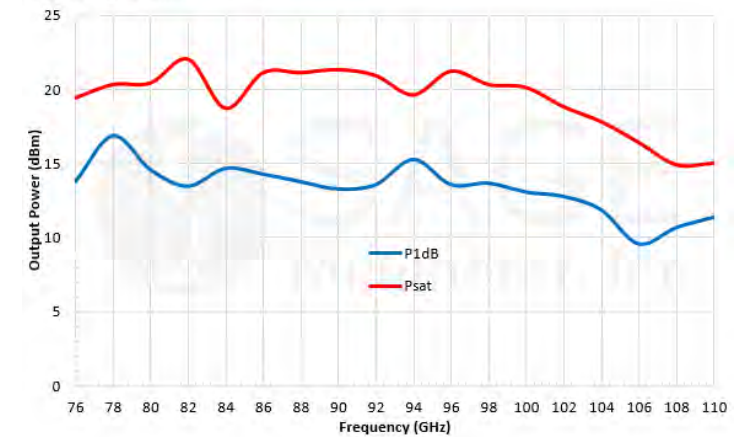
- 75 to 110 GHz
- +20 dBm Psat
- 25 dB Nominal Gain
- SBP Family Covers up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	75 GHz		110 GHz
Gain		25 dB	
P _{1dB}		+15 dBm	
P _{sat}		+20 dBm	
P _{in}			0 dBm
Input Return Loss		10 dB	
Output Return Loss		10 dB	
DC Voltage	+13 V _{DC}	+15 V _{DC}	+16 V _{DC}
DC Supply Current		190 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

Typical Output Power vs. Frequency

Bias: +15 V_{DC}/190 mA



BALANCED MIXER

FAMILY: SFB
11 TO 40 GHz

SFB-11340312-KFKFSF-N1-M

Features:

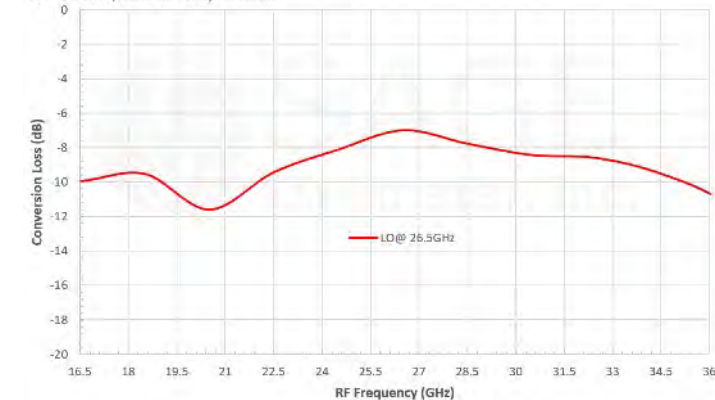
- 11 to 40 GHz
- 12 dB Conversion Loss
- Balanced Configuration
- SFB Family Has More than 30 Models



Parameter	Minimum	Typical	Maximum
RF Frequency	11 GHz		40 GHz
LO Frequency	11 GHz		40 GHz
IF Frequency	DC		10 GHz
LO Pumping Power	+13 dBm	+15 dBm	+18 dBm
Conversion Loss		12 dB	
Input P-1dB		+9 dBm	
RF to LO Isolation		30 dB	
LO to IF Isolation		25 dB	
RF to IF Isolation		25 dB	
Combined LO and RF Power			+21 dBm
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Conversion Loss vs Frequency

RF: -20dBm; LO: 26.5GHz/+13dBm



I/Q MIXER

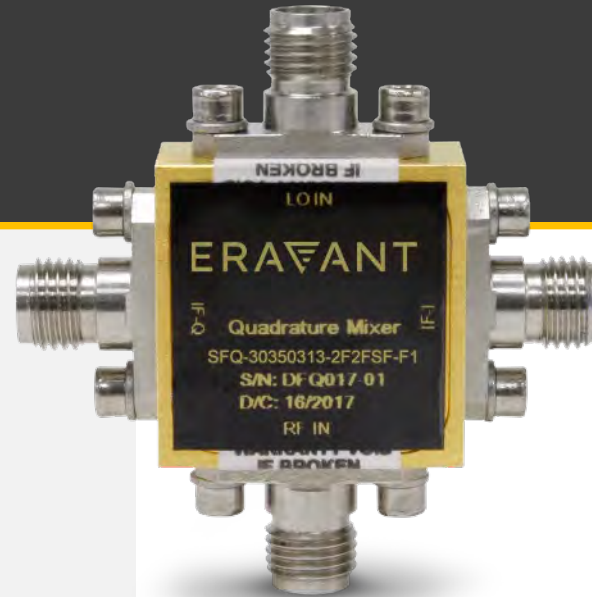
FAMILY: SFQ
30 TO 50 GHz

SFQ-30350313-2F2FSF-N1-M

Features:

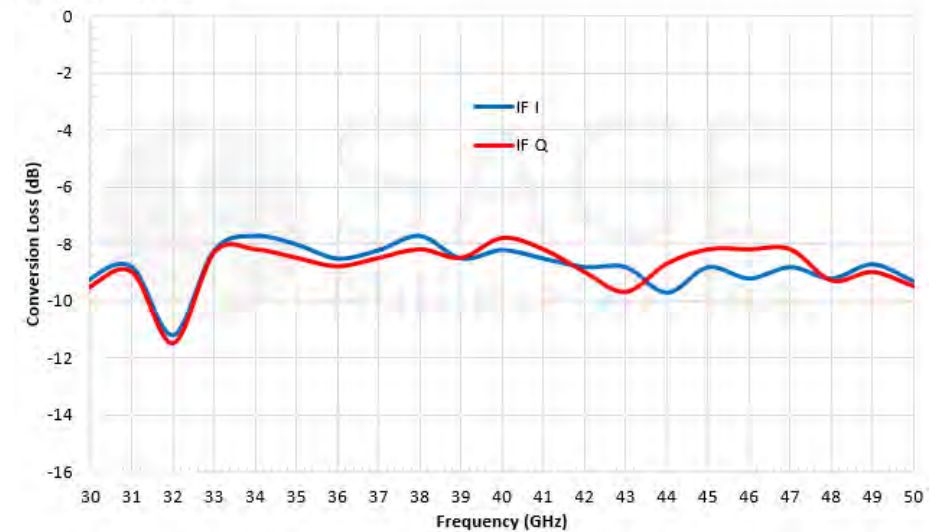
- 30 to 50 GHz
- 9 dB Conversion Loss
- Balanced Configuration
- SFQ Family Has More than 30 Models

Parameter	Minimum	Typical	Maximum
RF Frequency	30 GHz		50 GHz
LO Frequency	30 GHz		50 GHz
LO Pumping Power	+16 dBm	+17 dBm	+20 dBm
IF Frequency	DC		2.0 GHz
Conversion Loss		13 dB	15 dB
I/Q Phase Unbalance		$\pm 15^\circ$	
I/Q Amplitude Unbalance		± 1.0 dB	
LO to RF Port Isolation	20 dB	30 dB	
LO to IF Port Isolation		15 dB	
RF to IF Port Isolation		20 dB	
IP1dB		+4 dBm	
IP3dB		+13 dBm	
Combined RF & LO Power			+20 dBm



Typical Conversion Loss vs. Frequency

LO Power: +17 dBm



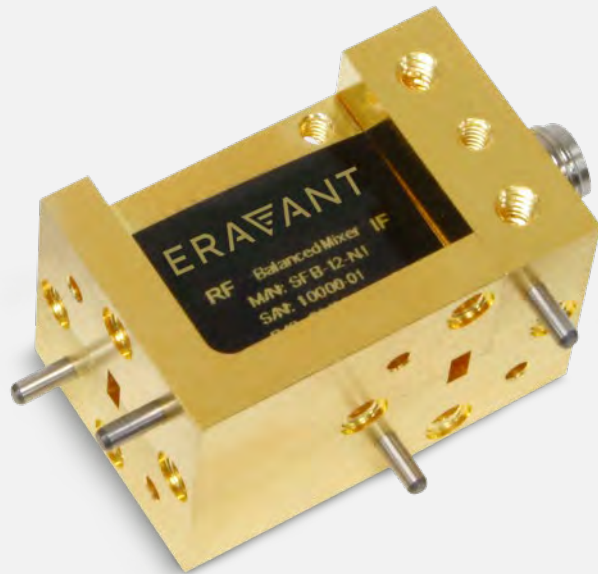
BALANCED MIXER

FAMILY: SFB
60 TO 90 GHz

SFB-12-N1

Features:

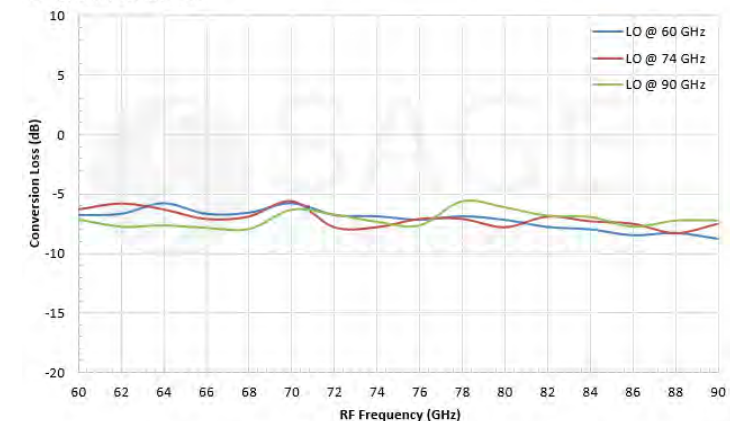
- 60 to 90 GHz
- 9 dB Conversion Loss
- Balanced Configuration
- SFB Family Has More than 30 Models



Parameter	Minimum	Typical	Maximum
RF Frequency	60 GHz		90 GHz
LO Frequency	60 GHz		90 GHz
IF Frequency	DC		30 GHz
LO Pumping Power	+10 dBm	+13 dBm	+15 dBm
Conversion Loss		9 dB	12 dB
Input P _{1dB}		-3 dBm	
RF to LO Isolation		30 dB	
Combined RF and LO Power			+18 dBm
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Conversion Loss vs. Frequency

RF: -20 dBm; LO: +13 dBm



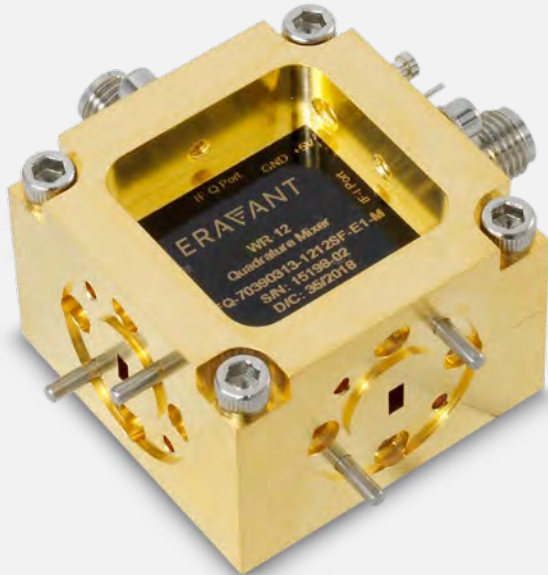
I/Q MIXER

FAMILY: SFQ
60 TO 90 GHz

SFQ-60390315-1212SF-E1-M

Features:

- 60 to 90 GHz
- 15 dB Conversion Loss
- Balanced Configuration
- SFQ Family Has More than 30 Models



Parameter	Minimum	Typical	Maximum
RF Frequency Range	60 GHz		90 GHz
RF Input P-1		5 dBm	
LO Frequency Range	60 GHz		90 GHz
LO Pumping Power		+10 dBm	+12 dBm
IF Frequency Range	DC	2 GHz	
Conversion Loss		15 dB	20 dB
I/Q Phase Unbalance		$\pm 15^\circ$	
I/Q Amplitude Unbalance		± 1.5 dB	
LO to RF Port Isolations	20 dB	40 dB	
Operating Temperature	0 °C		+50 °C

Typical Conversion Loss vs. Frequency



ACTIVE MULTIPLIER

FAMILY: SFA
20 TO 50 GHz

SFA-203503410-2FSF-S1

Features:

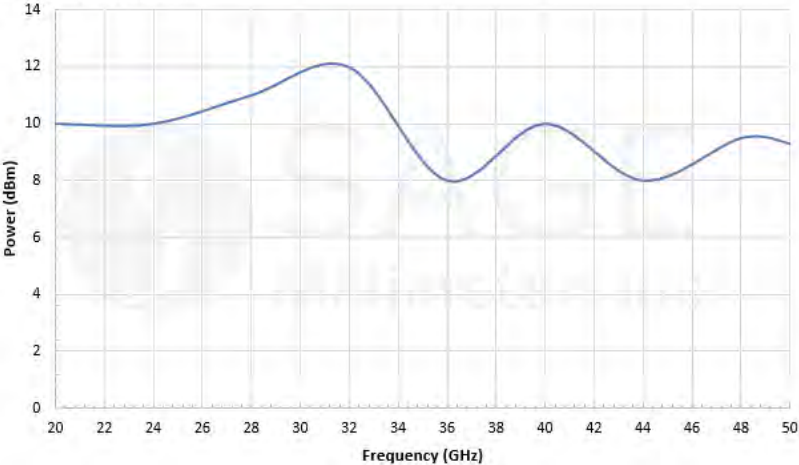
- 20 to 50 GHz
- X4 Multiplying Factor
- +10 dBm Output Power
- SFA Family Has More than 75 Models



Parameter	Minimum	Typical	Maximum
Input Frequency	5.0 GHz		12.5 GHz
Input Power	-5 dBm	+5 dBm	+15 dBm
Output Frequency	20.0 GHz		50.0 GHz
Output Power		+10 dBm	
Harmonic Suppression		-15 dBc	
Spurious		-60 dBc	
Port Return Loss		10 dB	
DC Voltage	+6 V _{DC}	+8 V _{DC}	+12 V _{DC}
DC Supply Current		500 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

Typical Output Power vs. Frequency

Pin= +3 dBm, 12 Vdc/460 mA



ACTIVE MULTIPLIER

FAMILY: SFA
60 TO 90 GHz

SFA-603903816-12SF-S1

Features:

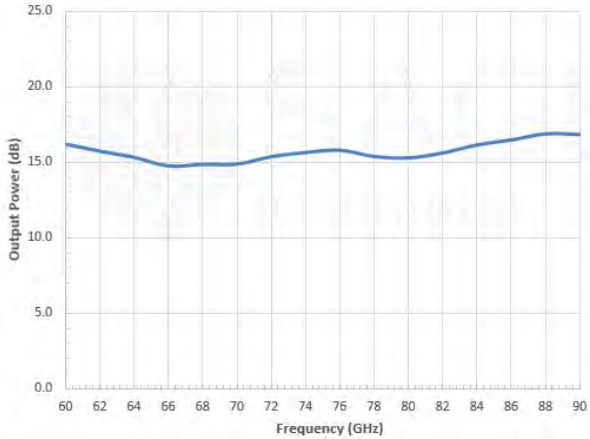
- 60 to 90 GHz
- X2, X4, X6 or X8 Multiplying Factor
- +16 dBm Output Power
- SFA Family Has More than 75 Models



Parameter	Minimum	Typical	Maximum
Input Frequency	10 GHz		15 GHz
Input Power		+3 dBm	+20 dBm
Output Frequency	60 GHz		90 GHz
Output Power		+16 dBm	
Harmonic Suppression		-20 dBc	
Spurious		-60 dBc	
Port Return Loss		10 dB	
DC Voltage	+6 V _{DC}	+8 V _{DC}	+16 V _{DC}
DC Supply Current		650 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

Typical Output Power vs. Frequency

Bias: +8 V_{DC}/650 mA, Input Power: +3 dBm



DIELECTRIC RESONATOR OSCILLATOR

FAMILY: SOD
37 GHz

SOD-37301213-22-S1

Features:

- 37 GHz
- Mechanical Tunable
- 1 to 40 GHz Coverage
- 50+ Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
Center Frequency		37 GHz	
Power Output		+13 dBm	
Mechanical Tuning Range		±50 MHz	
Frequency Stability			±4 ppm
Phase Noise @ 100 kHz Offset		-95 dBc/Hz	
Spurious			-75 dBc
Harmonics			-25 dBc
Bias Voltage	+6 V _{DC}	+8 V _{DC}	+12 V _{DC}
Bias Current		500 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

PHASE LOCKED OSCILLATOR

FAMILY: SOP
28 GHz

SOP-28310115-KF-I1

Features:

- 28 GHz
- Low Phase Noise
- Internal/External Referenced
- 50+ Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
Frequency		28 GHz	
Output Power		+15 dBm	
Phase Noise (Internally Referenced) @ 10 kHz		-100 dBc/Hz	
Harmonics		-25 dBc	
Spurious		-75 dBc	
DC Voltage Supply		+12 Vdc/450 mA	
Phase Lock Indicator (Lock)	TTL High		
Frequency Stability (Internally Referenced)		±5 ppm	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

BIAS TUNED GUNN OSCILLATOR

FAMILY: SOB
94 GHz

SOB-94301317-10-S1

Features:

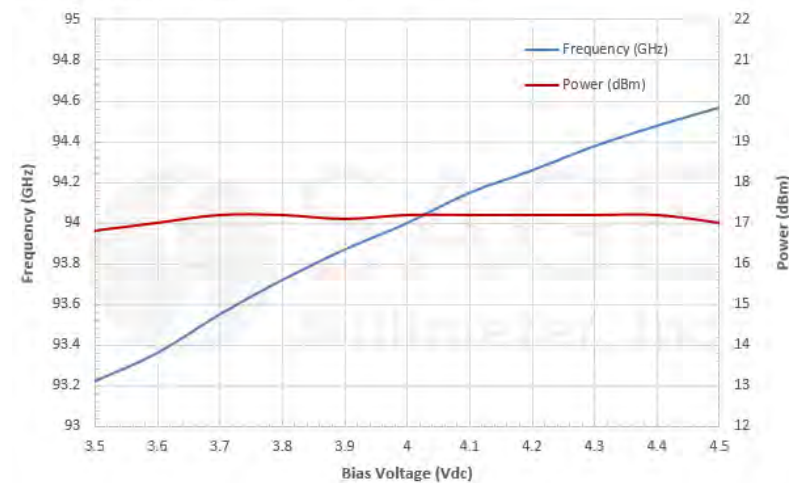
- 94 GHz
- Low AM/FM Noise and Harmonics
- Mechanical Tunable
- 10+ Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
Center Frequency	93.5 GHz	94 GHz	94.5 GHz
Power Output		+17 dBm	
Mechanical Tuning Range		±100 MHz	
Bias Tuning Range (+3.5 to +4.5 V _{DC})		±500 MHz	
Bias Voltage	+3.5 V _{DC}	+4.0 V _{DC}	+4.5 V _{DC}
Bias Tuning Speed		100 μs	
Bias Current		750 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

Typical Frequency and Power Output vs. Bias Voltage

Bias: +3.5 to +4.5 Vdc/740 mA



VIRACTOR TUNED GUNN OSCILLATOR

FAMILY: SOB
94 GHz

SOV-94306310-10-G1

Features:

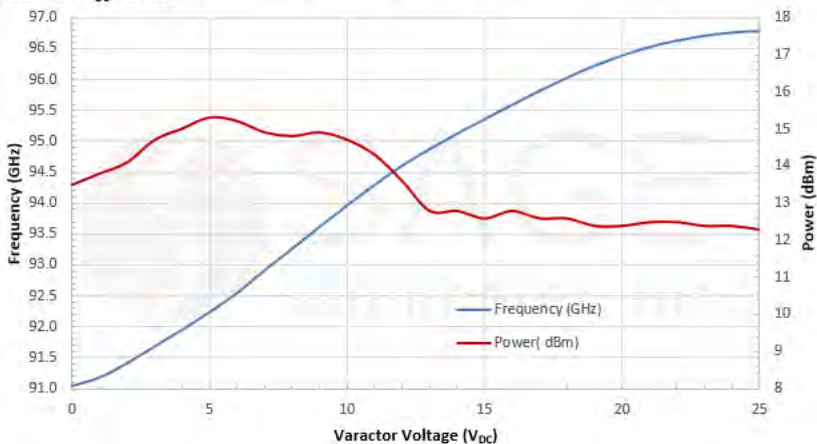
- 94 GHz
- Low AM/FM Noise and Harmonics
- Mechanical Tunable
- 25+ Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
Center Frequency	91.25 GHz	94.00 GHz	95.75 GHz
Power Output	+10 dBm	+13 dBm	
Mechanical Tuning Range		±100 MHz	
Varactor Tuning Range		±3.0 GHz	
Bias Voltage		+5.0 V _{DC}	+5.5 V _{DC}
Bias Current		780 mA	
Varactor Tuning Voltage Range	0 V _{DC}		+30 V _{DC}
Specification Temperature		+25°C	
Operating Temperature	+0°C		+50°C

Frequency and Power Output vs. Bias Voltage

Bias: +5.0 V_{DC}/760 mA



VOLTAGE TUNED OSCILLATOR

FAMILY: SOW
13 TO 17 GHz

SOW-15303315-SM-S1-H

Features:

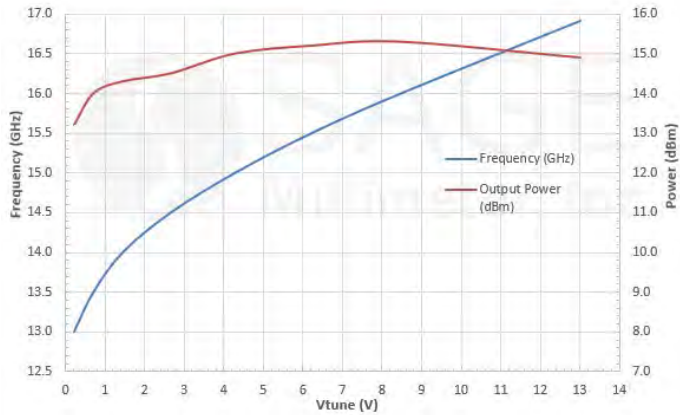
- 13 to 17 GHz
- Broad Tuning Bandwidth
- Good Power Flatness
- 4 Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
Frequency Range	13 GHz		16.5 GHz
Power Output		+15 dBm	
Frequency Tuning Range		± 1.75 GHz	
Harmonics and Sub-harmonics		-18 dBc	
Phase Noise	-85 dBc/Hz @ 100 kHz Offset		
VCO Bias Voltage	+7.0 V _{DC}	+8.0 V _{DC}	+9.0 V _{DC}
Bias Current		200 mA	
Heater Bias		+15 Vdc/100 mA	+15 Vdc/700 mA
Tuning Voltage Range	+0.2 V _{DC}		+13 V _{DC}
Temperature Stability w/ heater		0.3 MHz/°C	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

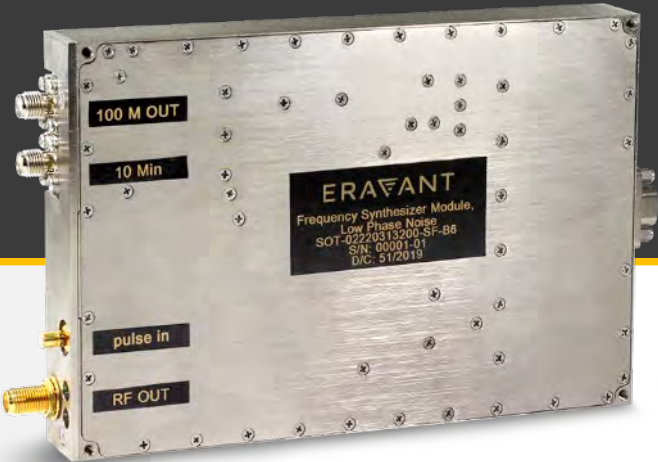
Output Frequency and Power vs. Tuning Voltage

Bias: +8V/200mA, Heater: +15V



VOLTAGE TUNED OSCILLATOR

FAMILY: SOT
200 MHz TO 20 GHz

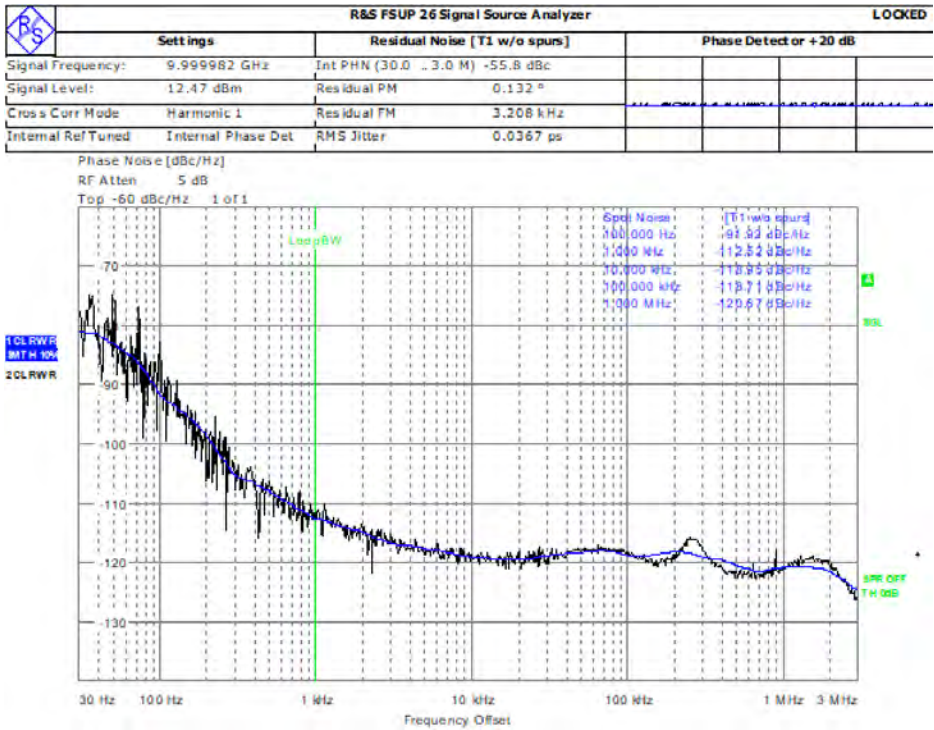


SOT-02220313200-SF-B6

Features:

- 200 MHz to 20 GHz
- Low Phase Noise
- Fast Switching Time
- 3 Models to Support 5G Bands

Parameter	Minimum	Typical	Maximum
Output Frequency Range	0.2 GHz		20.0 GHz
Step Size		0.1 Hz	
Output Power*	-20 to +13 dBm (Controllable by Command)		
Output Power Flatness	±2.5 dBm		
Frequency Stability	±0.2 ppm or Same as External Reference		
Frequency Accuracy	±0.2 ppm or Same as External Reference		
Output Spurious		-70 dBc	-65 dBc
Output Harmonics	≤-30 dBc/0.2-12 GHz and ≤-20 dBc/12-20 GHz @ +5 dBm P _{out}		
External Reference	10 MHz/ +5 dBm ± 3 dBm		
Lock Indicator	TTL High		
Phase Noise (Internal)**	≤-101 dBc/Hz @ 1 kHz; ≤-110 dBc/Hz @ 10 kHz		
RF Frequency at 20 GHz	≤-110 dBc/Hz @ 100 kHz; ≤-115 dBc/Hz @ 1,000 kHz		
Frequency Switching Time	≤200 μs (Excludes the Series Port Communication Time)		
Control Interface	SPI		
Pulse Modulation Depth	≥60 dBc @ Output Power + 10 dBm		
Pulse Modulation Pulse Width	0.1 mS	5 mS	10 mS
Pulse Modulation Time	≤30 nS Raise/50 nS Fall		
Supply Voltage/Current		+12 V _{DC} /1,600 mA	
Specification Temperature	+25 °C		
Operating Temperature	-40 °C		+70 °C



FULL WAVEGUIDE JUNCTION CIRCULATOR

FAMILY: SNF
Ka BAND

SNF-28-C5

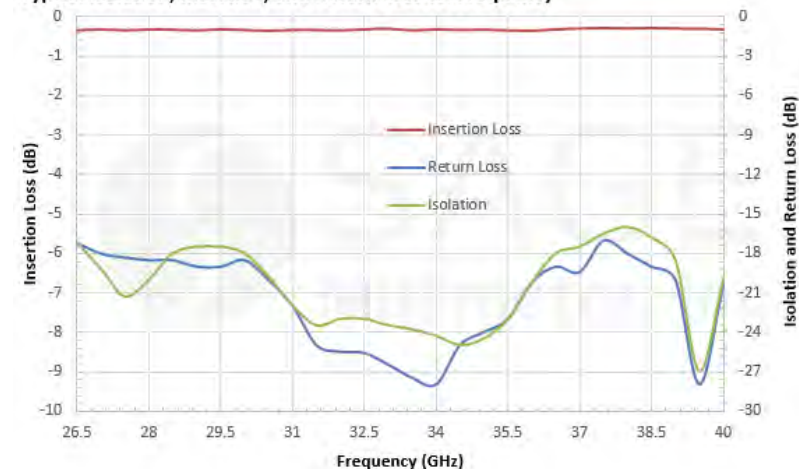
Features:

- 26.5 to 40 GHz
- Full Waveguide Bandwidth Coverage
- 18 to 26.5 GHz and 22 to 33 GHz Models
- Total 6 Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
RF Frequency	26.5 GHz		40 GHz
Insertion Loss		0.4 dB	0.7 dB
Isolation*		15 dB	
Return Loss		15 dB	
Forward Power Handling			20 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+80 °C

Typical Isolation, Insertion, and Return Loss vs. Frequency



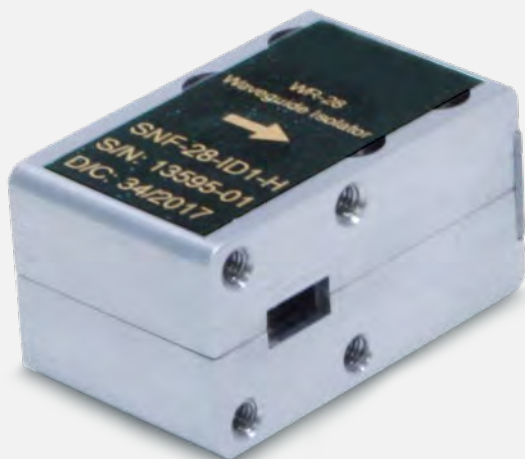
FULL WAVEGUIDE JUNCTION CIRCULATOR

FAMILY: SNF
Ka BAND

SNF-28-I5

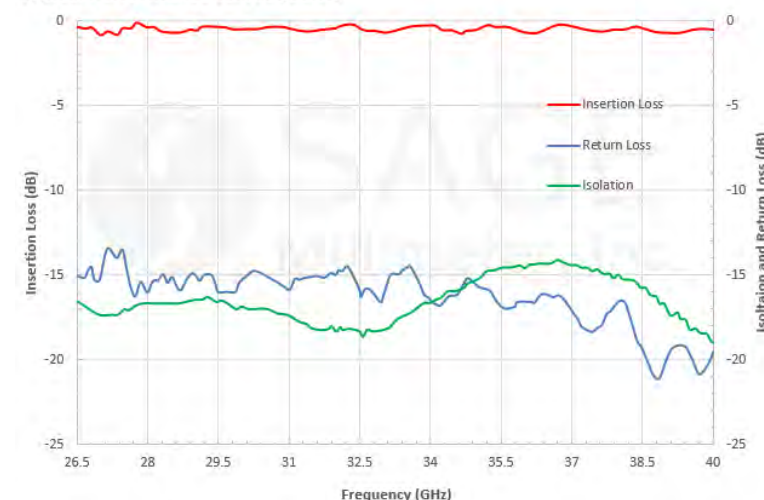
Features:

- 26.5 to 40 GHz
- Full Waveguide Bandwidth Coverage
- 18 to 26.5 GHz and 22 to 33 GHz Models
- Total 6 Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
RF Frequency	26.5 GHz		40.0 GHz
Insertion Loss		0.50 dB	0.80 dB
Isolation		17 dB	
Return Loss		15 dB	
Forward Power Handling			25 W (CW)
Reverse Power Handling			10 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Performance vs. Frequency



WAVEGUIDE JUNCTION CIRCULATOR

FAMILY: SNW
E BAND

SNW-7137630818-12-C1

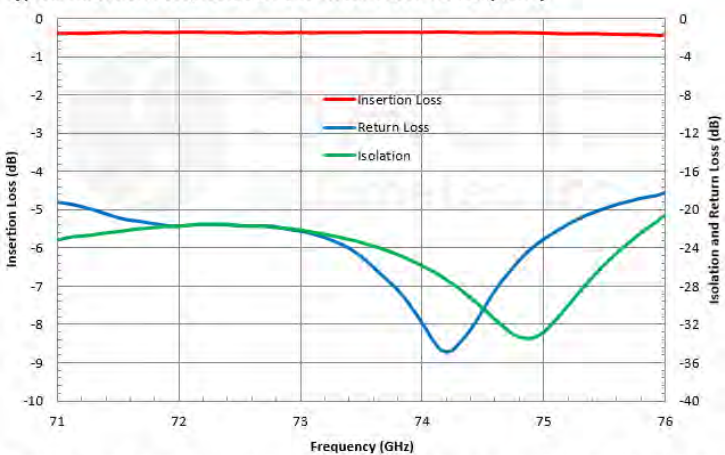
Features:

- 71 to 76 GHz
- Broad Bandwidth Coverage
- 81 to 86 and 76 to 81 GHz Models
- 40+ Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
Frequency	71 GHz		76 GHz
Insertion Loss		0.8 dB	
Isolation		18 dB	
Return Loss		16 dB	
Power Handling			3 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Insertion Loss, Isolation and Return Loss vs. Frequency



Note: The insertion loss, isolation and return loss between other ports, such as port 2 to port 3, port 3 to port 1 are similar to above given plots.

WAVEGUIDE JUNCTION ISOLATOR

FAMILY: SNW
E BAND

SNW-7137630818-12-I1

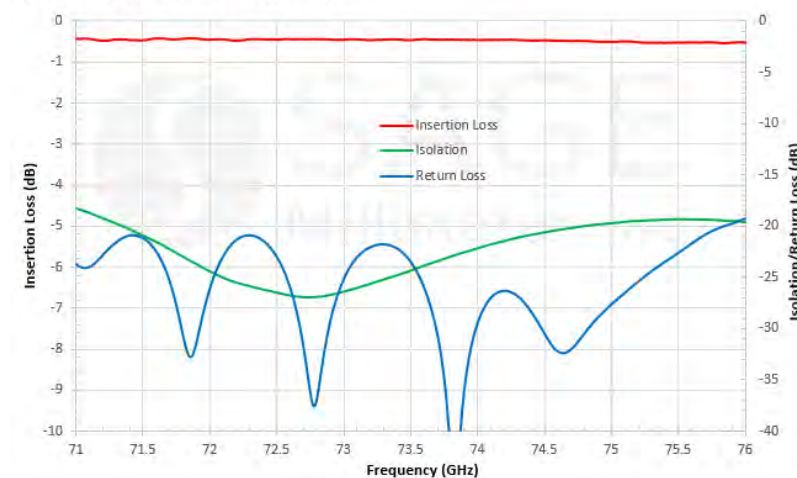
Features:

- 71 to 76 GHz
- Broad Bandwidth Coverage
- 81 to 86 and 76 to 81 GHz Models
- 40+ Models to Support 5G Bands



Parameter	Minimum	Typical	Maximum
Frequency	71 GHz		76 GHz
Insertion Loss		0.8 dB	
Isolation		18 dB	
Return Loss		16 dB	
Forward Power Handling			3 W (CW)
Reverse Power Handling			1 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Performance vs. Frequency



ELECTRICAL ATTENUATOR

FAMILY: SKA
18 TO 40 GHz

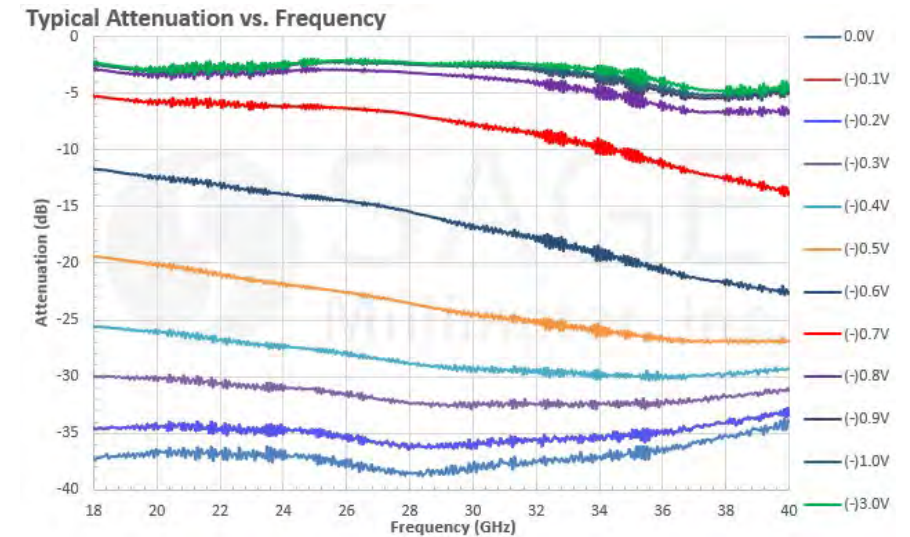
SKA-1834033537-KFKF-A1-M

Features:

- 18 to 40 GHz
- 35 dB Dynamic Range
- High Speed
- SKA Family Covers up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	18 GHz		40 GHz
Insertion Loss		3.5 dB	
Attenuation Range		37 dB	
Input P _{1dB}		+10 dBm	
Damage RF Power Level			+30 dBm
Control Voltage		0 to -3 V _{DC}	
Damage Control Voltage Level			-5 V _{DC}
Input Return Loss		8 dB	
Output Return Loss		9 dB	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C



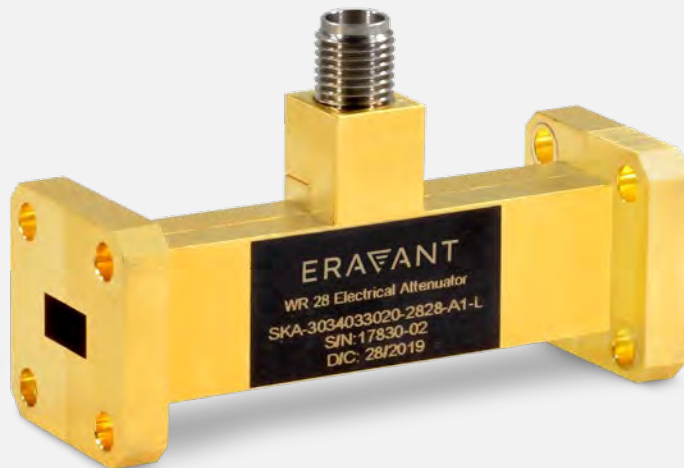
ELECTRICAL ATTENUATOR

FAMILY: SKA
26.5 TO 40 GHz

SKA-2734032530-2828-A1

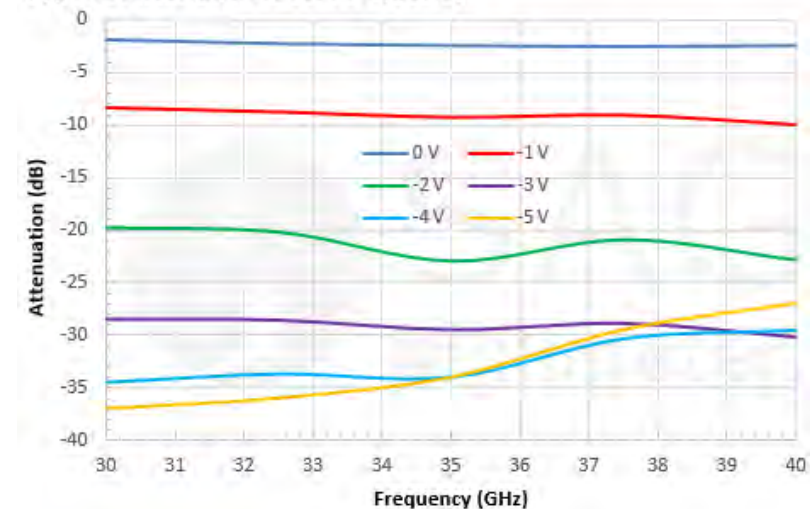
Features:

- 26.5 to 40 GHz
- 30 dB Dynamic Range
- High Speed
- SKA Family Covers up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	26.5 GHz		40 GHz
Insertion Loss		2.5 dB	3.0 dB
Attenuation		30 dB	
Power Handling		+20 dBm	+23 dBm
Control Voltage		0 to -5 V _{DC}	
Control Current		10 mA	
Control Speed		100 ns	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Attenuation vs. Frequency



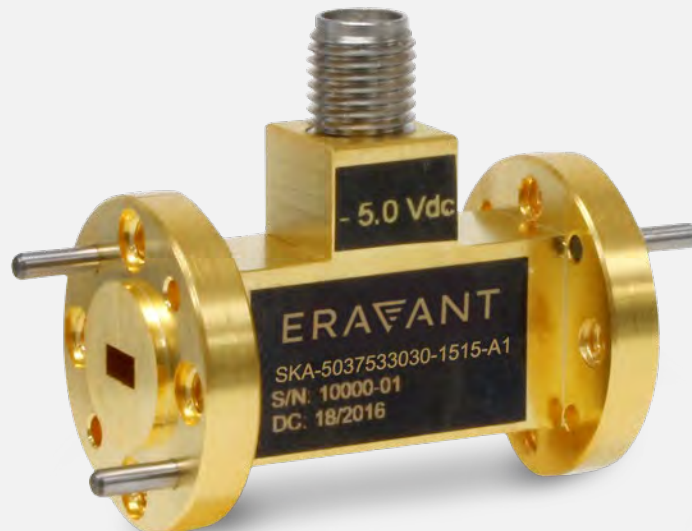
ELECTRICAL ATTENUATOR

FAMILY: SKA
50 TO 75 GHz

SKA-5037533030-1515-A1

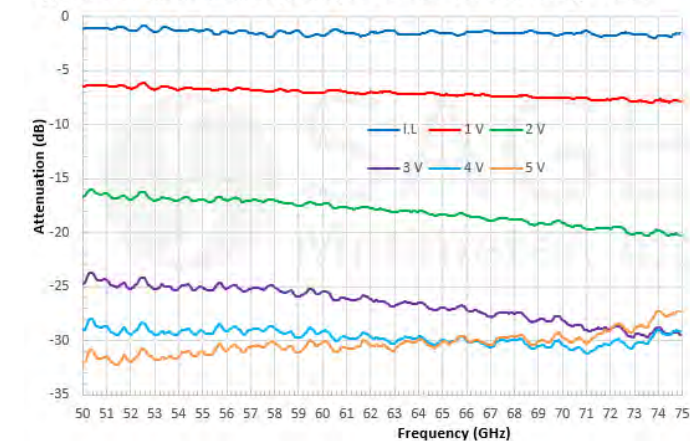
Features:

- 50 to 75 GHz
- 33 dB Dynamic Range
- High Speed
- SKA Family Covers up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
Insertion Loss		2.5 dB	3.0 dB
Attenuation	2.5 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
Control Speed		100 ns	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Attenuation vs. Frequency at Various Control Voltage Value



SPST PIN SWITCH

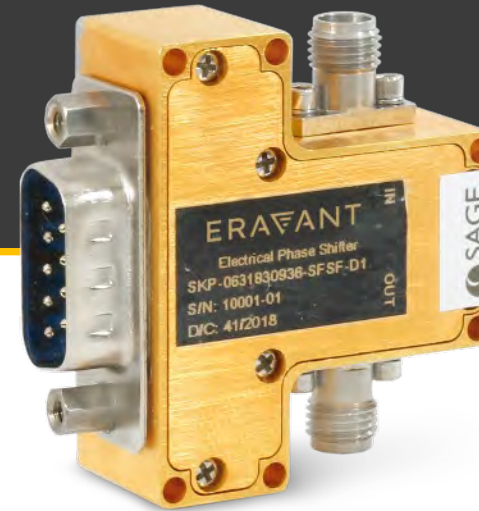
FAMILY: SKS
30 TO 40 GHz

SKS-3034032030-KFKF-A1-M

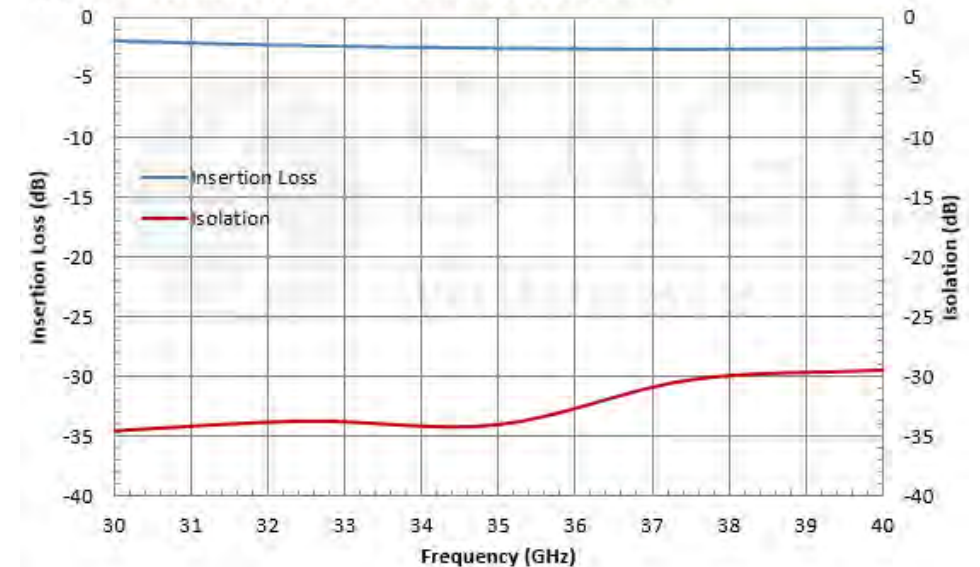
Features:

- 30 to 40 GHz
- 30 dB Control Range
- 100 ns Switching Speed
- SKS Family Covers up to 110 GHz

Parameter	Minimum	Typical	Maximum
Frequency	30 GHz		40 GHz
Insertion Loss		2.0 dB	
Isolation		30 dB	
Return Loss		9 dB	
Power Handling			+23 dBm
Bias Voltage		$\pm 5 V_{DC}$	
Bias Current		25 mA	
Control Signal		TTL	
Switching Speed		100 nS	
Switch Type		Absorptive	
Specification Temperature		+25 °C	
Operating Temperature	-25 °C		+65 °C



Typical Insertion Loss and Isolation vs. Frequency



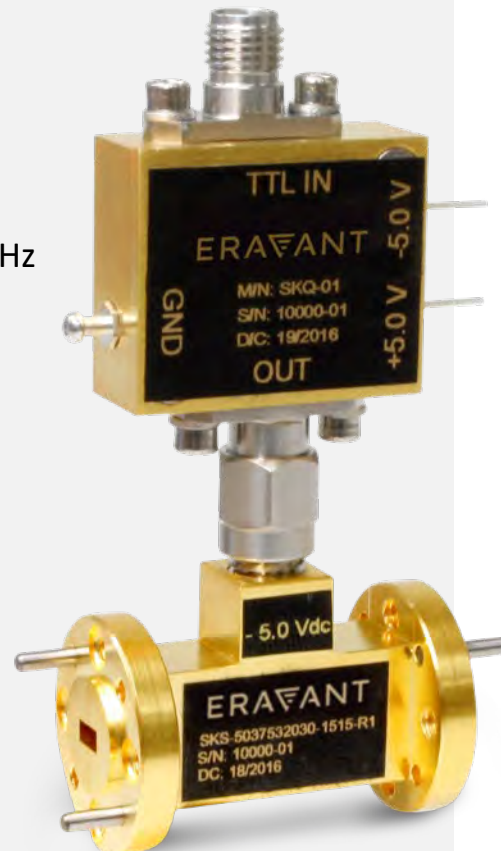
SPST PIN SWITCH

FAMILY: SKS
75 TO 110 GHz

SKS-7531142520-1010-R1

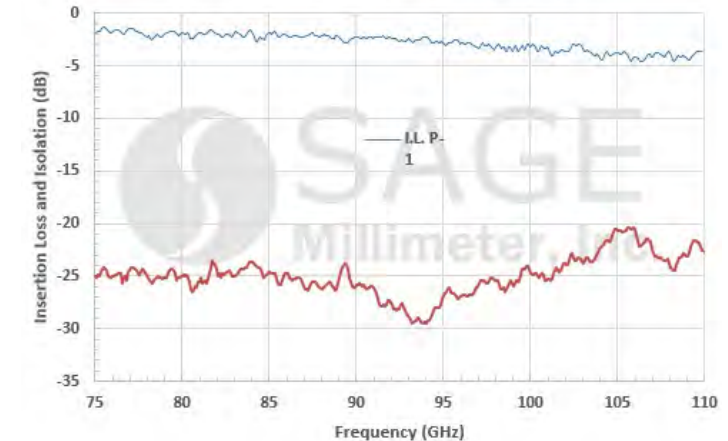
Features:

- 75 to 110 GHz
- 25 dB Control Range
- 100 ns Switching Speed
- SKS Family Covers up to 110 GHz



Parameter	Minimum	Typical	Maximum
RF Frequency	75 GHz		110 GHz
Insertion Loss		2.5 dB	
Isolation		15 dB	
Power Handling		+20 dBm	+23 dBm
Bias Voltage		$\pm 5 V_{DC}$	
Bias Current		10 mA	
Control Signal		TTL	
Switching Speed		100 ns	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Insertion Loss and Isolation vs. Frequency



SP4T PIN SWITCH

FAMILY: SK4
0.5 TO 43 GHz

SK4-0524335060-KFKF-A3

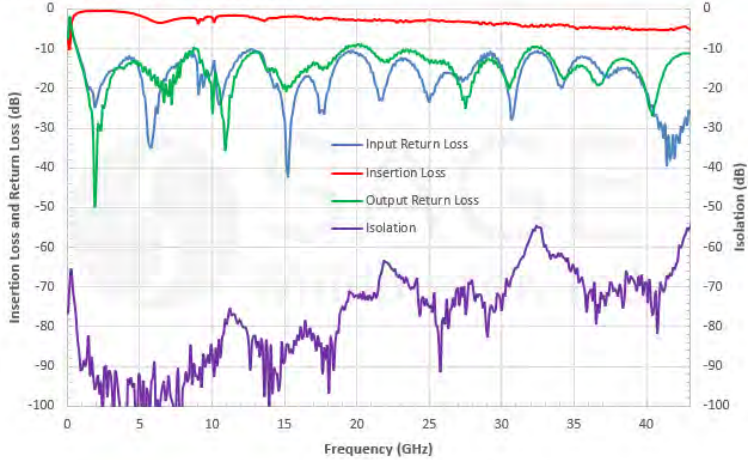
Features:

- 0.5 to 43 GHz
- 60 dB Control Range
- 100 ns Switching Speed
- SK4 Family Covers up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	0.5 GHz		43 GHz
Insertion Loss		5.0 dB	
Return Loss		10 dB	
Isolation	45 dB	60 dB	
Operational RF Input Power			+20 dBm
Damage RF Input Power			+27 dBm
Bias Voltage		$\pm 5 V_{DC}$	
Bias Current		100/50 mA	
Control		TTL	
Switching Speed		100 ns	
Specification Temperature		+25 °C	
Operation Temperature	0 °C		+50 °C

Typical Performance vs. Frequency



SP8T PIN SWITCH

FAMILY: SK8
0.5 TO 40 GHz

SK8-0524036550-KFKF-AD1

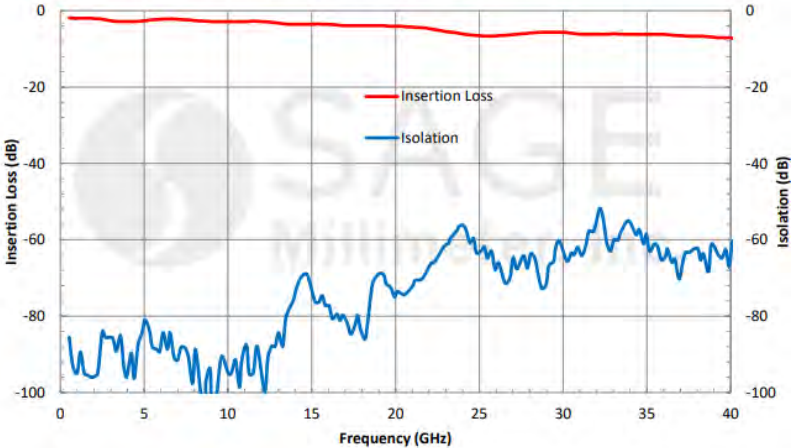
Features:

- 0.5 to 40 GHz
- 50 dB Control Range
- 50 ns Switching Speed
- SK8 Family Covers up to 110 GHz



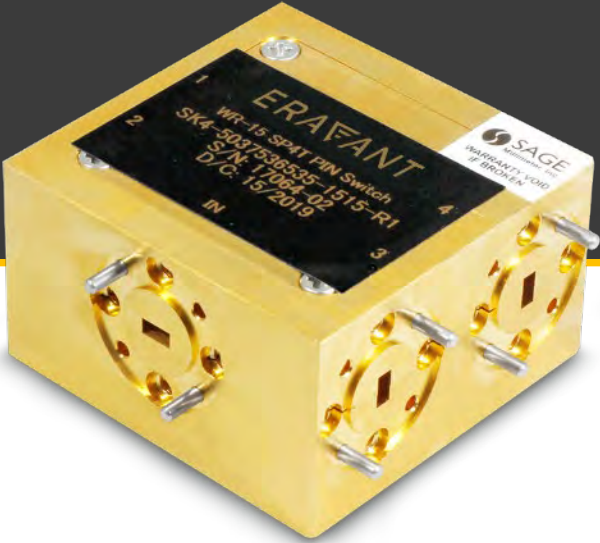
Parameter	Minimum	Typical	Maximum
Frequency	0.5 GHz		40 GHz
Insertion Loss		6.5 dB	8.5 dB
Isolation	50 dB		
Return Loss		7 dB	6 dB
Input RF Power		+20 dBm	+23 dBm
Bias Voltage	-5 V _{DC}		+5 V _{DC}
Bias Current	30 mA		100 mA
Control		TTL	
Switching Speed		50 ns	
Switch Type		Absorptive	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

Typical Insertion Loss and Isolation vs. Frequency



SP4T PIN SWITCH

FAMILY: SK4
60 TO 90 GHz



SK4-6039038030-1212-R1-M

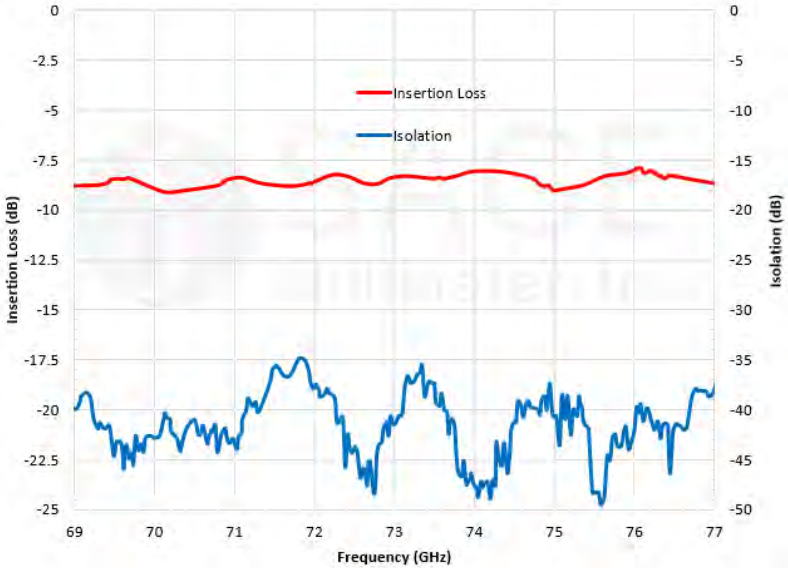
Features:

- 60 to 90 GHz
- 30 dB Control Range
- 100 ns Switching Speed
- SK4 Family Covers up to 110 GHz

Parameter	Minimum	Typical	Maximum
Frequency	60 GHz		90 GHz
Insertion Loss		8 dB	
Return Loss		10 dB	
Isolation		30 dB	
Maximum Input RF Power		+20 dBm	+23 dBm
Bias Voltage		$\pm 5 V_{DC}$	
Bias Current		30 mA	
Control		TTL	
Switching Speed		100 nS	
Specification Temperature		+25 °C	
Operation Temperature	0 °C		+50 °C

Typical Insertion Loss and Isolation vs. Frequency

Bias: $\pm 5 V_{DC}/30 \text{ mA}$



WAVEGIDE POWER DIVIDER

2 WAY, RIGHT ANGLE

FAMILY: SWP
26.5 TO 40 GHz

SWP-27340302-28-S1

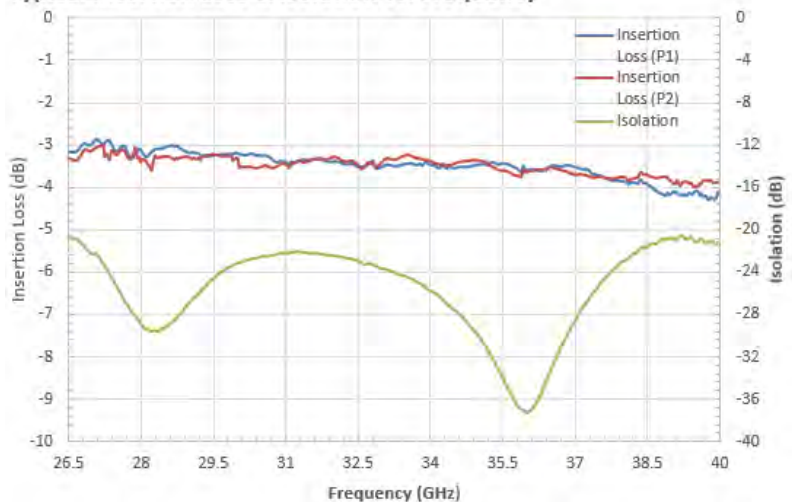
Features:

- 26.5 to 40 GHz
- Right Angle and End Launch
- 2-Way, 4-Way, 8-Way and 16-Way
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	27 GHz		40 GHz
Amplitude Unbalance		±0.2 dB	
Insertion Loss		0.4 dB	
Port Isolation		20 dB	
Port Return Loss		20 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Insertion Loss & Isolation vs. Frequency



WAVEGUIDE POWER DIVIDER 2 WAY, RIGHT ANGLE

FAMILY: SWP
50 TO 75 GHz

SWP-50375302-15-S1

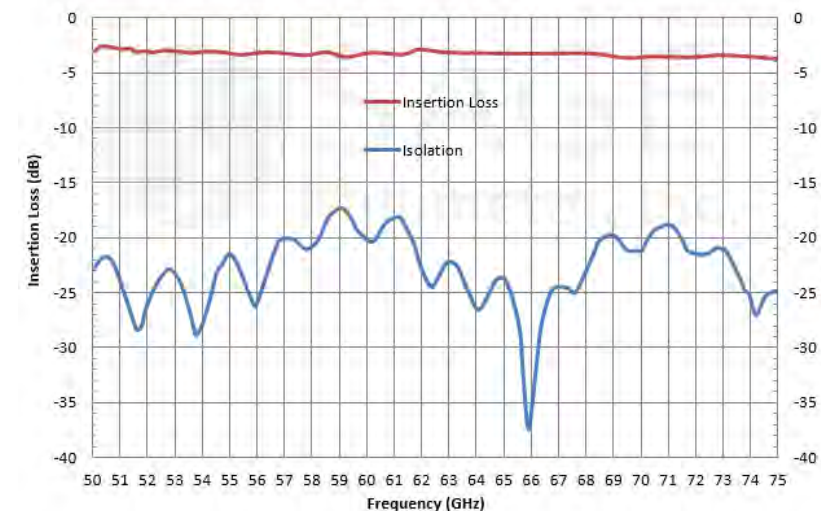
Features:

- 50 to 75 GHz
- Right Angle and End Launch
- 2-Way, 4-Way, 8-Way and 16-Way
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
Power Unbalance			±0.20 dB
Insertion Loss		0.5 dB	0.8 dB
Isolation		20 dB	
Input/Output VSWR			1.5:1
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

Typical Insertion Loss and Isolation vs. Frequency



WAVEGIDE POWER DIVIDER

2 WAY, INLINE

FAMILY: SWP
50 TO 75 GHz

SWP-50375302-15-E2

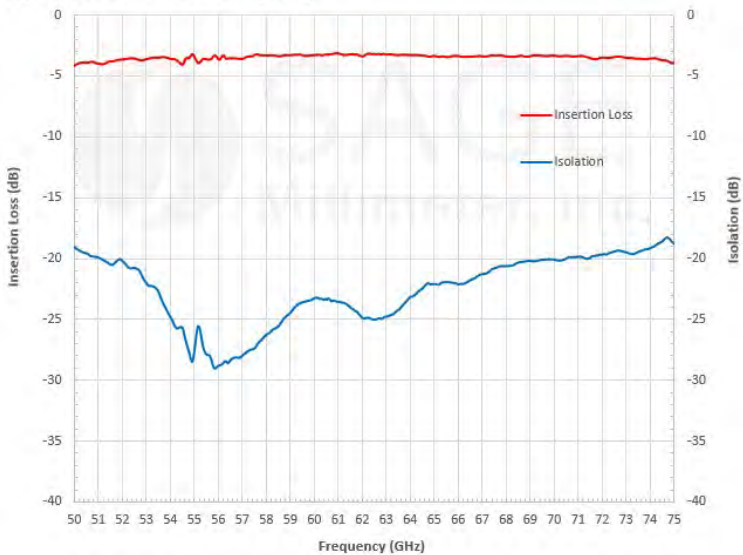
Features:

- 50 to 75 GHz
- Right Angle and End Launch
- 2-Way, 4-Way, 8-Way and 16-Way
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
Power Unbalance			±0.20 dB
Insertion Loss		0.5 dB	
Isolation		20 dB	
Return Loss		15 dB	
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

Typical Performance vs. Frequency



WAVEGIDE POWER DIVIDER

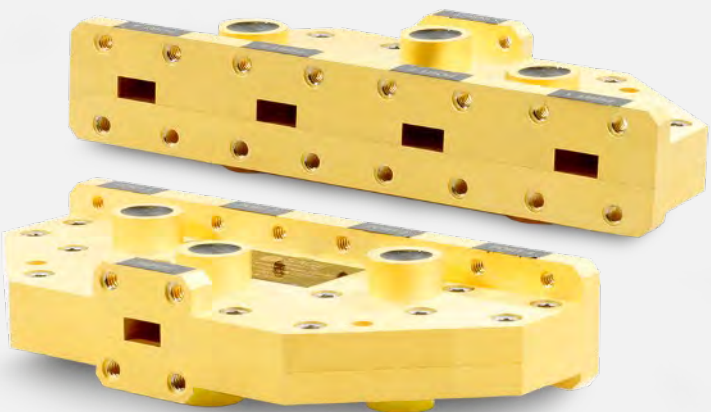
4 WAY, INLINE

FAMILY: SWP
30 TO 40 GHz

SWP-30340304-28-E1

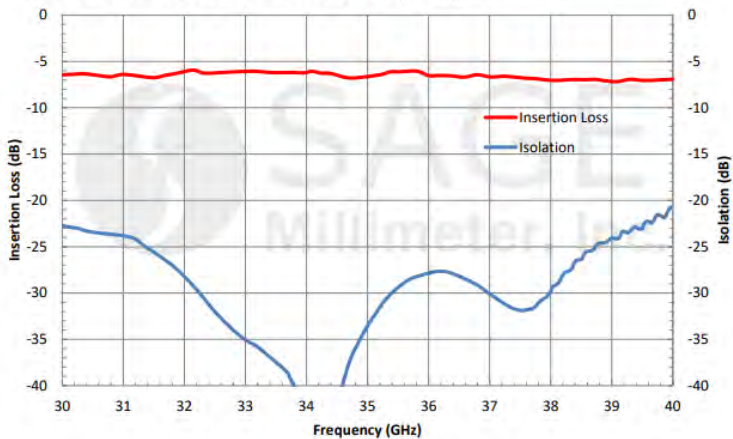
Features:

- 30 to 40 GHz
- Right Angle and End Launch
- 2-Way, 4-Way, 8-Way and 16-Way
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	30 GHz		40 GHz
Insertion Loss		0.5 dB	
Power Unbalance		±0.4 dB	
Port Isolation		20 dB	
Port Return Loss		15 dB	
Power Handling			100 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Insertion Loss and Isolation vs. Frequency



WAVEGIDE POWER DIVIDER

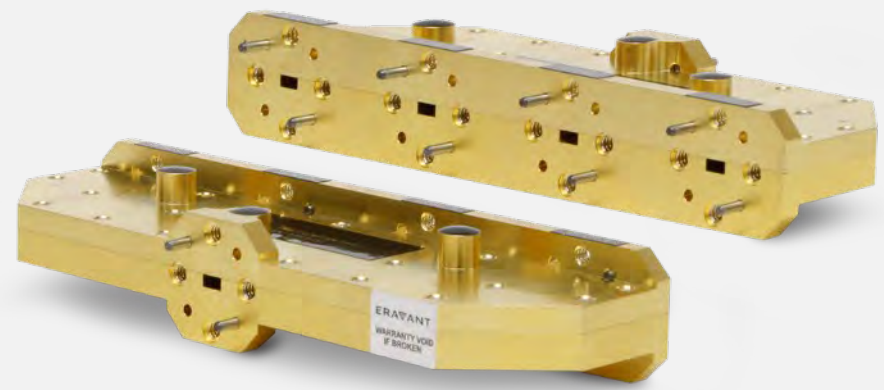
4 WAY, INLINE

FAMILY: SWP
50 TO 75 GHz

SWP-50375304-15-E1

Features:

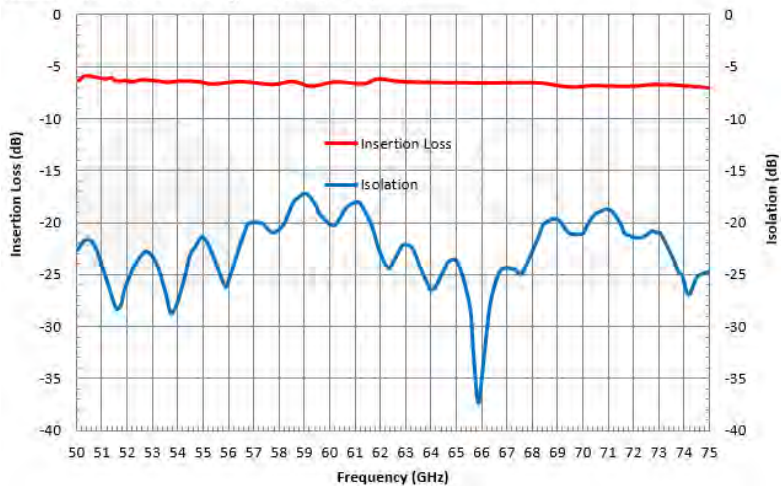
- 50 to 75 GHz
- Right Angle and End Launch
- 2-Way, 4-Way, 8-Way and 16-Way
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
Power Unbalance			± 0.20 dB
Insertion Loss		1.0 dB	1.2 dB
Isolation		20 dB	
Input/ Output Return Loss		20 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Insertion Loss and Isolation vs. Frequency

Isolation was tested between adjacent ports (i.e. 1-2, 3-4)



WAVEGIDE POWER DIVIDER

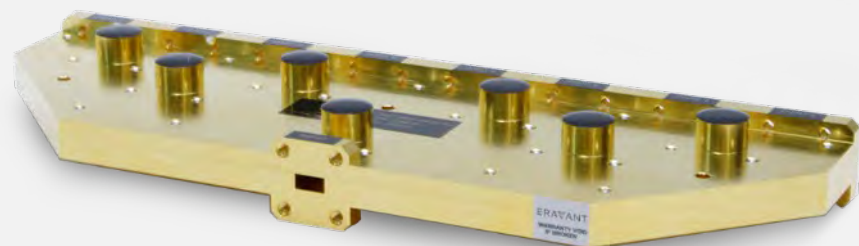
8 WAY, INLINE

FAMILY: SWP
28 TO 31 GHz

SWP-29331308-28-E1

Features:

- 28 to 31 GHz
- Right Angle and End Launch
- 2-Way, 4-Way, 8-Way and 16-Way
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	28.5 GHz		30.5 GHz
Power Unbalance		±0.20 dB	
Insertion Loss		0.9 dB	
Isolation		25 dB	
Return Loss		15 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

COAX POWER DIVIDER

FAMILY: SCS
1 TO 40 GHz

More Than 50 Models: 2 Way, 4 Way, 8 Way and 16 Way



SCS-0134031215-KFKF-22
1 to 40 GHz, 2 Way

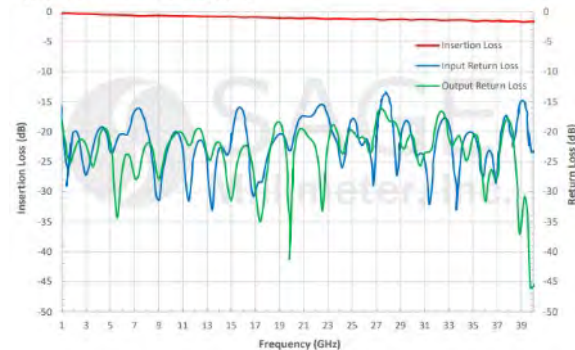


SCS-0134035014-KFKF-42
1 to 40 GHz, 4 Way

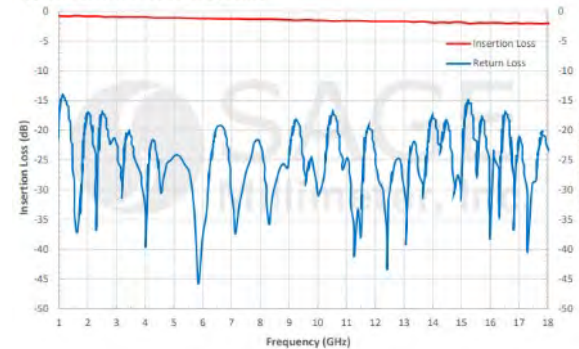


SCS-1034032615-KFKF-82
10 to 40 GHz, 8 Way

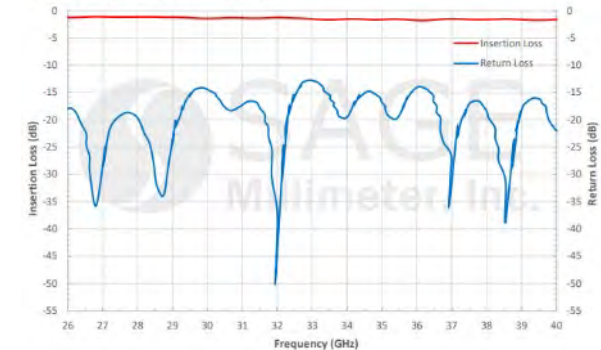
Typical Performance vs. Frequency



Typical Performance vs. Frequency



Typical Performance vs. Frequency



COAX HYBRID COUPLER

FAMILY: SCZ
1 TO 40 GHz

More Than 15 Models: 2.92 mm, SMA



SCZ-0131831509-SFSF-43
1 to 18 GHz, 90 Degree

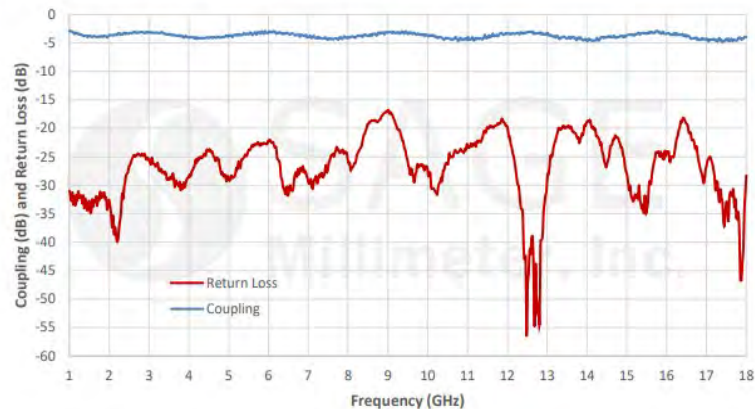


SCZ-0432431409-SFSF-43
4 to 24 GHz, 90 Degree

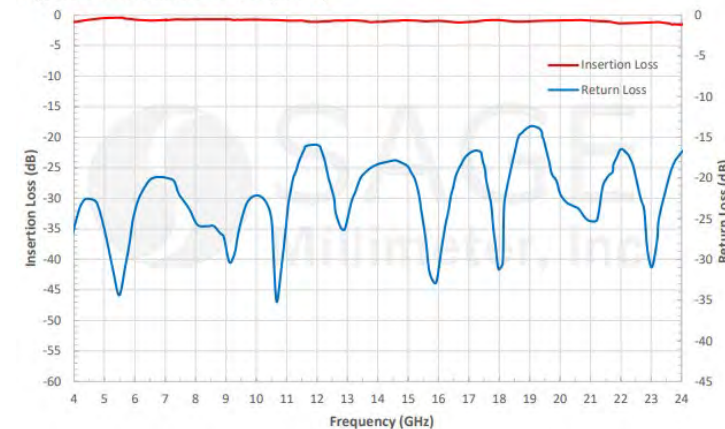


SCZ-1834031209-KFKF-43
18 to 40 GHz, 90 Degree

Typical Coupling and Return Loss vs Frequency



Typical Performance vs. Frequency



MAGIC TEE

FAMILY: SWM
33 TO 50 GHz

SWM-33350320-22-SB

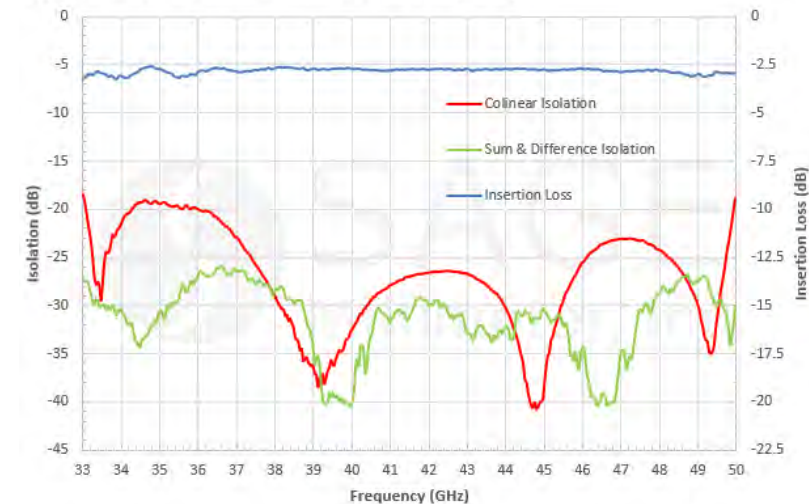
Features:

- 33 to 50 GHz
- Full Waveguide Band
- High Performance
- 10+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter		Minimum	Typical	Maximum
Frequency		33 GHz		50 GHz
Insertion Loss			0.3 dB	
Isolation	Sum and Difference Ports		30 dB	
	Collinear Ports	15 dB	20 dB	
Return Loss			14 dB	
Specification Temperature			+25°C	
Operating Temperature		-40°C		+85°C

Typical Isolation and Insertion Loss vs. Frequency



MAGIC TEE

FAMILY: SWM
75 TO 110 GHz

SWM-75311420-10-SB

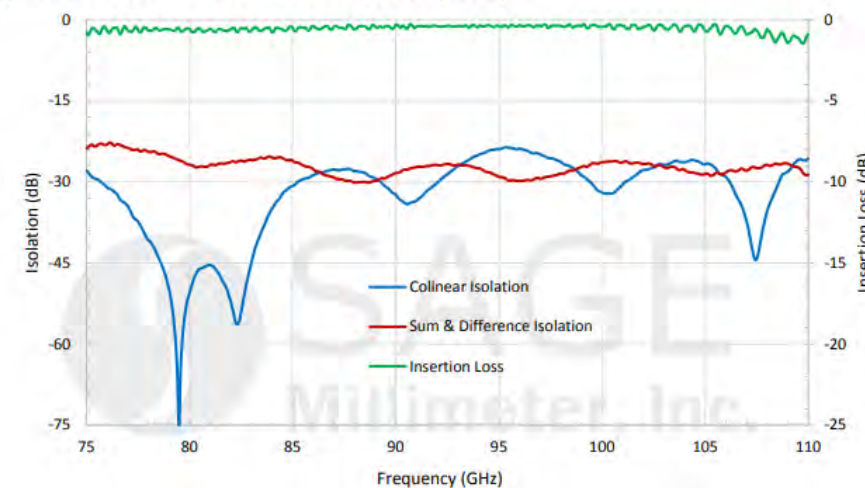
Features:

- 75 to 110 GHz
- Full Waveguide Band
- High Performance
- 10+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter		Minimum	Typical	Maximum
Frequency		75 GHz		110 GHz
Insertion Loss			0.3 dB	
Isolation	Sum and Difference Ports		30 dB	
	Collinear Ports		20 dB	
Return Loss			14 dB	
Specification Temperature			+25 °C	
Operating Temperature		-40 °C		+85 °C

Typical Isolation and Insertion Loss vs Frequency



WAVEGUIDE DIRECTIONAL COUPLER

FAMILY: SWD
24 TO 42 GHz

SWD-1040H-28-SB

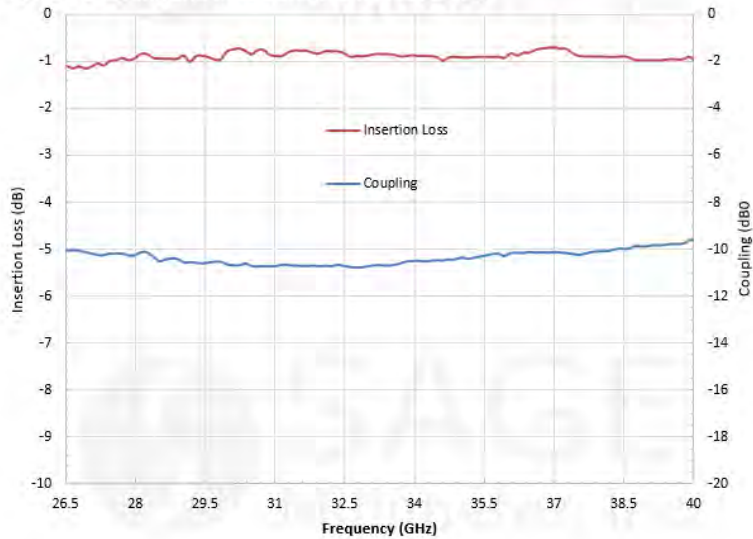
Features:

- 24 to 42 GHz
- 3, 6, 10, 20, 30 and 40 dB
- 3 Port, Bi-Directional and Dual-Directional
- 100+ Models to Support 5G Bands
- Frequency up to 170 GHz



Parameter	Minimum	Typical	Maximum
Frequency	26.5 GHz		40 GHz
Insertion Loss*		0.5 dB	
Coupling*		10 dB	
Directivity*	35 dB		
Return Loss			26 dB
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Coupling and Insertion Loss vs. Frequency



WAVEGUIDE DIRECTIONAL COUPLER

FAMILY: SWD
50 TO 75 GHz

SWD-1040H-15-SB

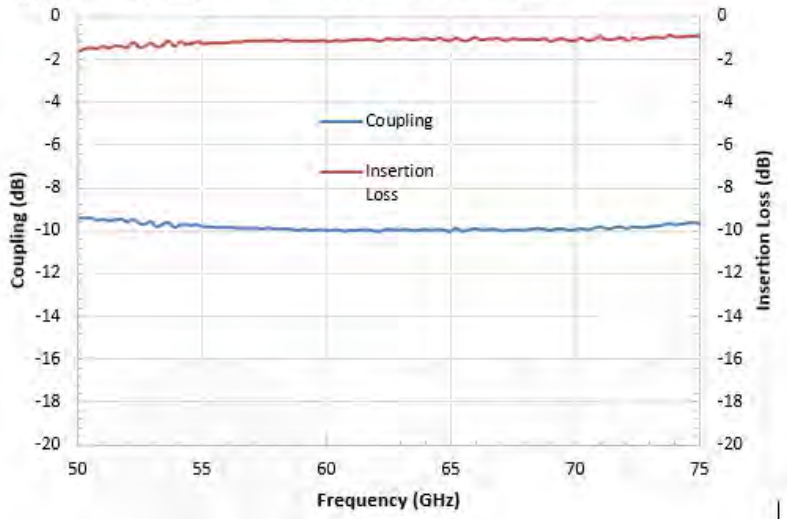
Features:

- 50 to 75 GHz
- 3, 6, 10, 20, 30 and 40 dB
- 3 Port, Bi-Directional and Dual-Directional
- 100+ Models to Support 5G Bands
- Frequency up to 170 GHz



Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
Insertion Loss*		0.7 dB	
Coupling*		10 dB	
Directivity*	30 dB	40 dB	
VSWR			1.1:1
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

Typical Coupling and Insertion Loss vs. Frequency



WAVEGUIDE DIRECTIONAL COUPLER

FAMILY: SCD
1 TO 67 GHz

**More Than 25 Models: 1.85 mm, 2.4 mm, 2.92 mm
and SMA**

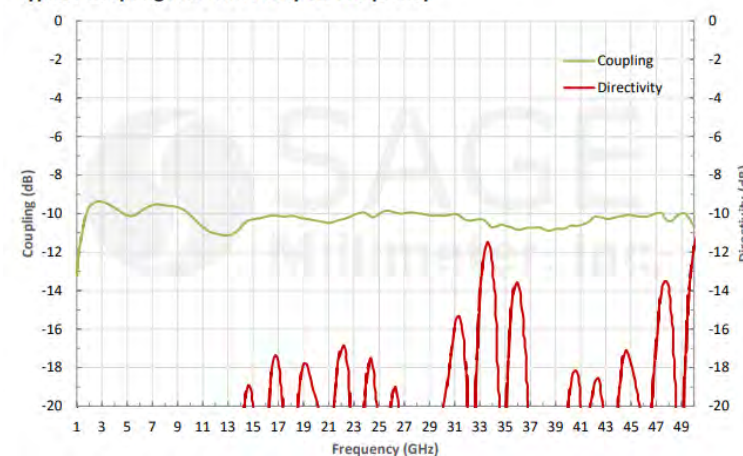


SCD-0135031008-2F-SA
1 to 50 GHz, 10 dB

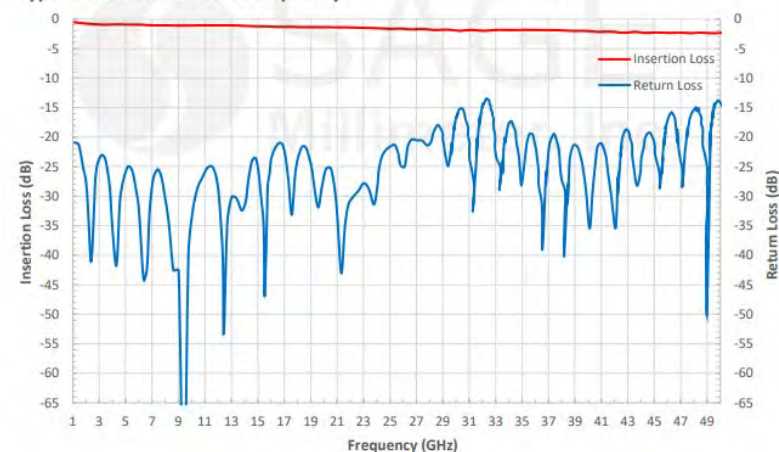


SCD-0135032008-2F-SA
1 to 50 GHz, 20 dB

Typical Coupling and Directivity vs. Frequency



Typical Performance vs. Frequency



WAVEGUIDE BANDPASS FILTER

FAMILY: SWF
Ka BAND

SWF-25301340-28-B2-D

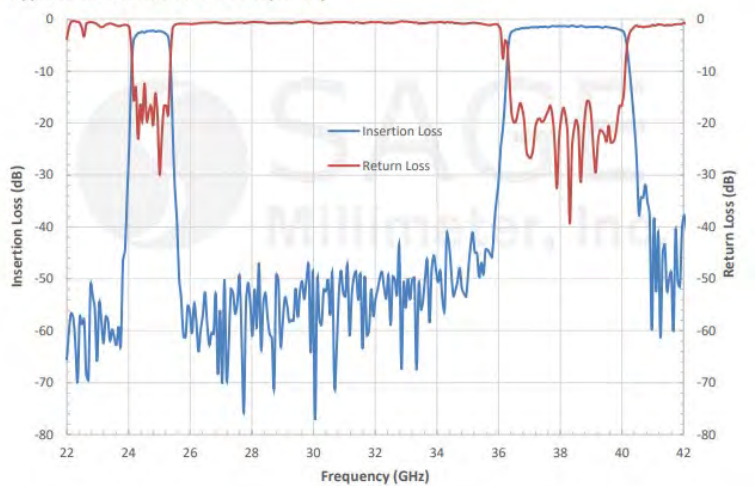
Features:

- Dual Passband, 24 and 38 GHz
- High Rejection
- Waveguide Interface
- Other Frequency Available



Parameter	Minimum	Typical	Maximum
Passband Frequency	24.25 GHz		25.25 GHz
Passband Frequency 2	36.25 GHz		40.00 GHz
Passband Insertion Loss		3.0 dB	
Passband Ripple		±1.0 dB	
Rejection Frequency 1	DC		23.8 GHz
Rejection Frequency 2	27.0 GHz		35.5 GHz
Rejection Frequency 3	42.0 GHz		49.0 GHz
Rejection		40 dB	
Return Loss		14.0 dB	
Power Handling			10 Watts
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

Typical Performance vs. Frequency



WAVEGUIDE LOWPASS FILTER

FAMILY: SWF
Ka BAND

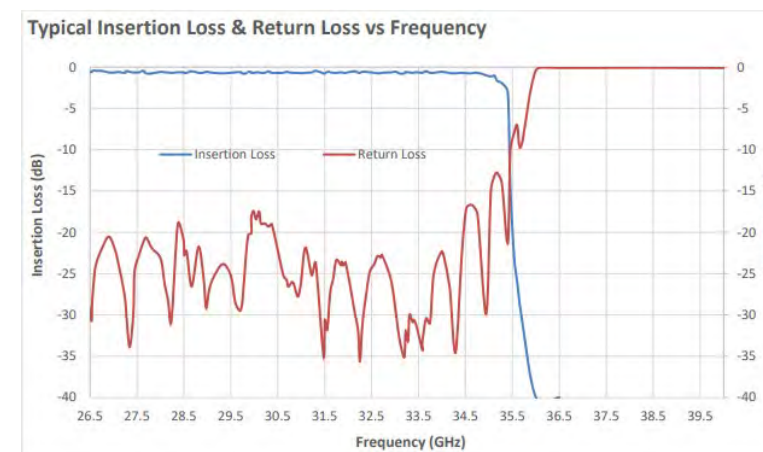
SWF-34337340-28-L1

Features:

- 22 to 34 GHz
- High Rejection
- Waveguide Interface
- Other Frequency Available



Parameter	Minimum	Typical	Maximum
Passband Frequency	22 GHz		34 GHz
Passband Insertion Loss		1 dB	
Rejection Frequency, Low Side	DC		20 GHz
Rejection Frequency, High Side	37 GHz		70 GHz
Rejection		40 dB	
Passband Return Loss			14 dB
Power Handling			100 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C



WAVEGUIDE HIGHPASS FILTER

FAMILY: SWF
Ka BAND

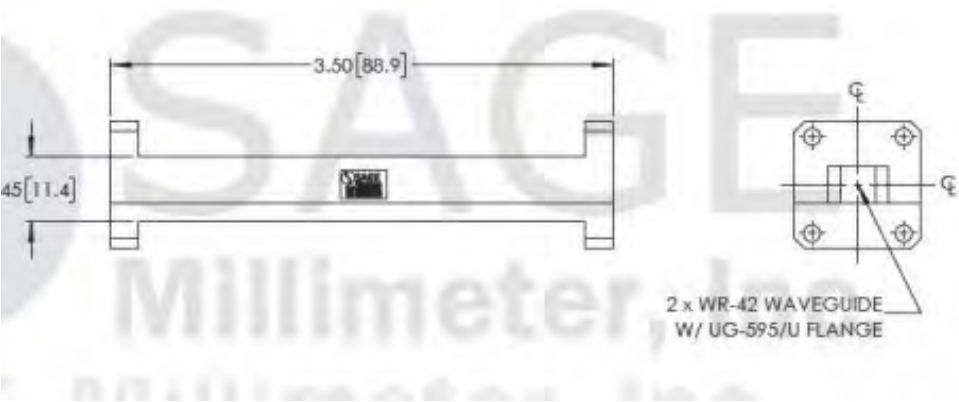
SWF-24323340-42-H1

Features:

- Passband: 24 GHz and Higher
- High Rejection
- Waveguide Interface
- Other Frequency Available



Parameter	Minimum	Typical	Maximum
Passband Frequency	24.1 GHz		
Passband Insertion Loss		0.5 dB	
Rejection Frequency	DC		23.1 GHz
Rejection		40 dB	
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C



COAX FILTER, BANDPASS

FAMILY: SCF
2 TO 40 GHz

More Than 25 Models
Bandpass Filter

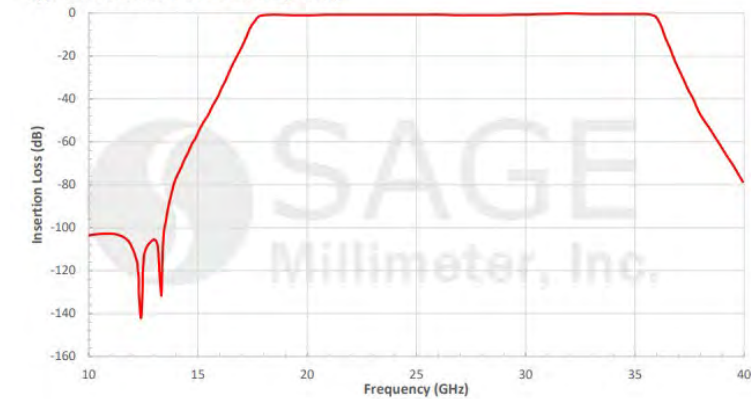


SCF-27317335-VFVF-B1
Passband: 18 to 35 GHz

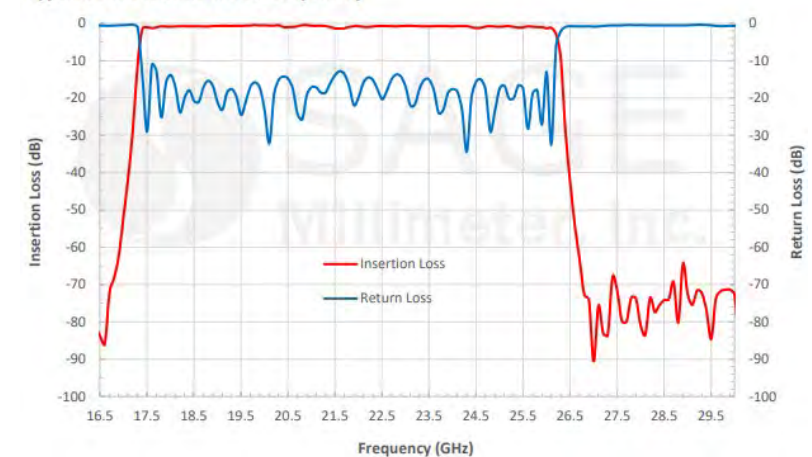


SCF-22308340-SFSF-B3
Passband: 18 to 26.5 GHz

Typical Insertion Loss vs. Frequency



Typical Performance vs. Frequency



COAX FILTER, BANDSTOP

FAMILY: SCF

SCF-24324340-KFKF-N3

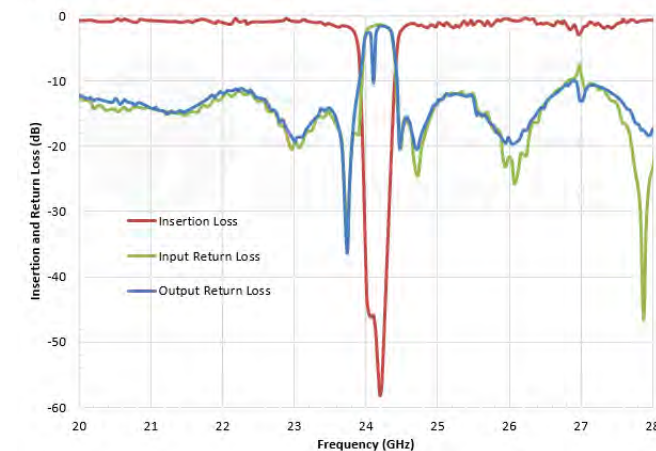
Features:

- Notch at 24.125 GHz
- High Rejection
- Narrow Notch Bandwidth
- Other Frequency Available



Parameter	Minimum	Typical	Maximum
Passband Frequency, Low Side	DC		23.5 GHz
Passband Frequency, High Side	25 GHz		40 GHz
Passband Insertion Loss		3.0 dB	
Rejection Frequency	24.0 GHz		24.25 GHz
Rejection		40 dB	
Passband Return Loss		9 dB	
Impedance		50 Ω	
Power Handling			1 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-20 °C		+60 °C

Typical Performance vs. Frequency



COAX FILTER, LOWPASS

FAMILY: SCF
15 TO 110 GHz

10 Models
Highpass Filter

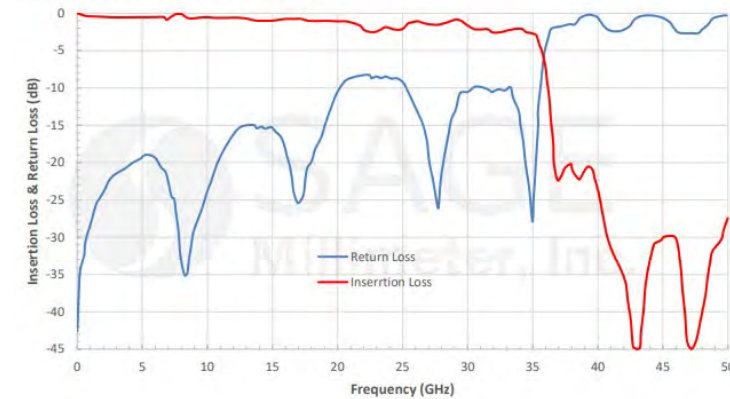


SCF-33337325-KFKM-L3
Passband: DC to 30 GHz

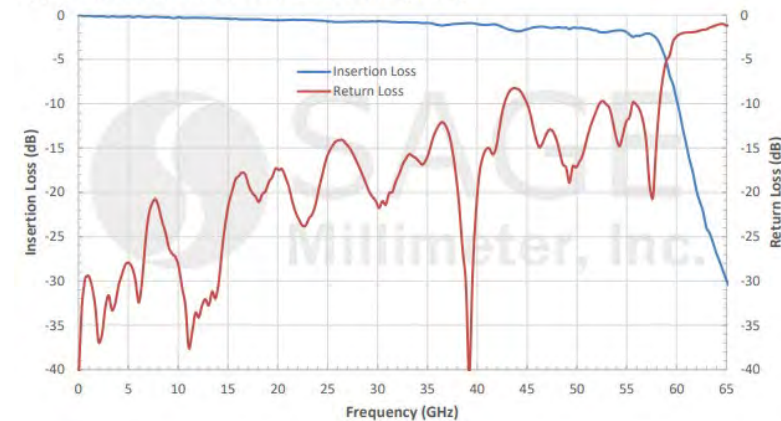


SCF-55375330-KFKM-L1
Passband: DC to 55 GHz

Typical Performance vs. Frequency



Typical Insertion and Return Loss vs Frequency



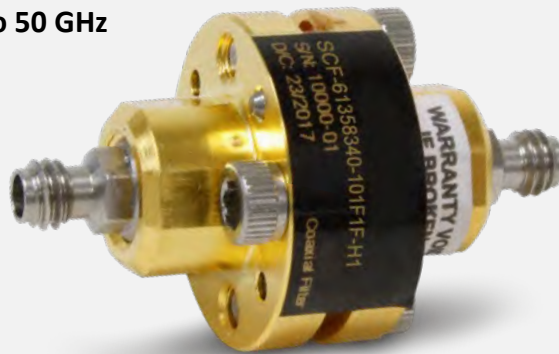
COAX FILTER, HIGHPASS

FAMILY: SCF
15 TO 110 GHz

10 Models
Highpass Filter

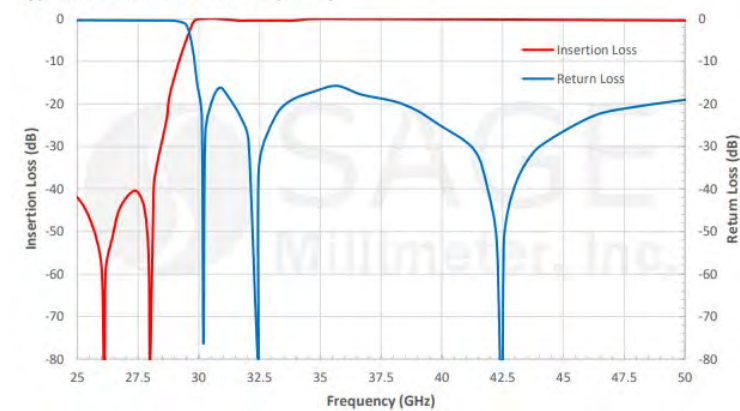


SCF-30328330-2F2F-H3
Passband: 30 to 50 GHz

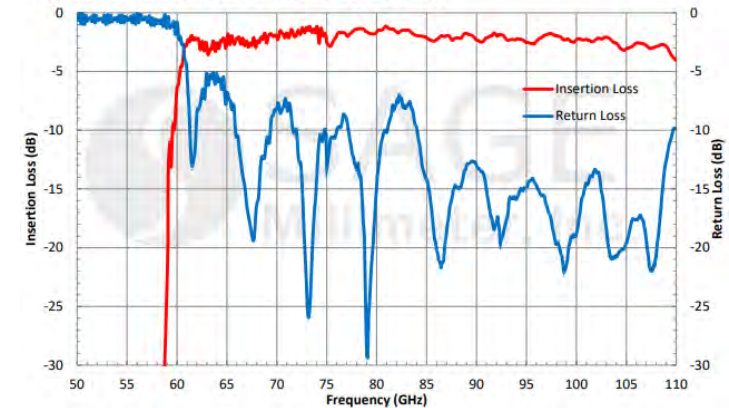


SCF-61358340-101F1F-H1
Passband: 61 to 110 GHz

Typical Performance vs. Frequency



Typical Insertion and Return Loss vs. Frequency



INTERCONNECTION PARTS

COMPONENTS FOR COMMUNICATION SYSTEMS

- Per the block diagram presented above, the following interconnection parts are essential for any communication system integrations. This presentation includes some examples for introduction/illustration purpose.
 - **SWC:** Waveguide to Coaxial Adapter
 - **SWT:** Waveguide Taper and Mode Transition
 - **SWG:** Waveguide, Ridged and Flexible
 - **SWB:** Waveguide, Bends and Twist
 - **SUF:** Waveguide Connector - Uni- Guide™
 - **SCT:** Coaxial Adapter
 - **SCA:** Coaxial Attenuator
 - **STQ:** Coaxial Matching Load
 - **SCB:** Coaxial DC Block
 - **SCV:** Coaxial Bias Tee
 - **SCW:** Coaxial Cable

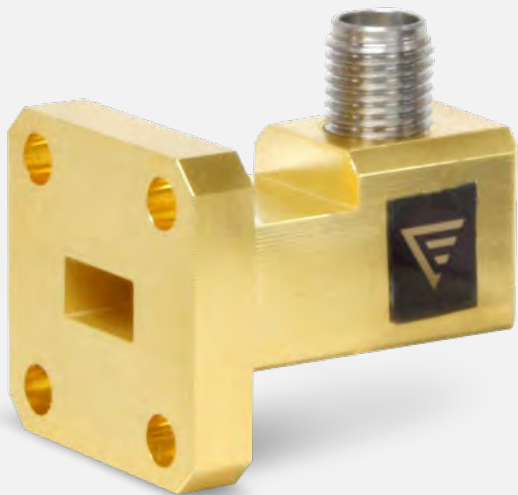
WAVEGUIDE TO COAXIAL ADAPTER, RIGHT ANGLE

FAMILY: SWC
26 TO 40 GHz

SWC-28KF-R1 & SWC-28KM-R1

Features:

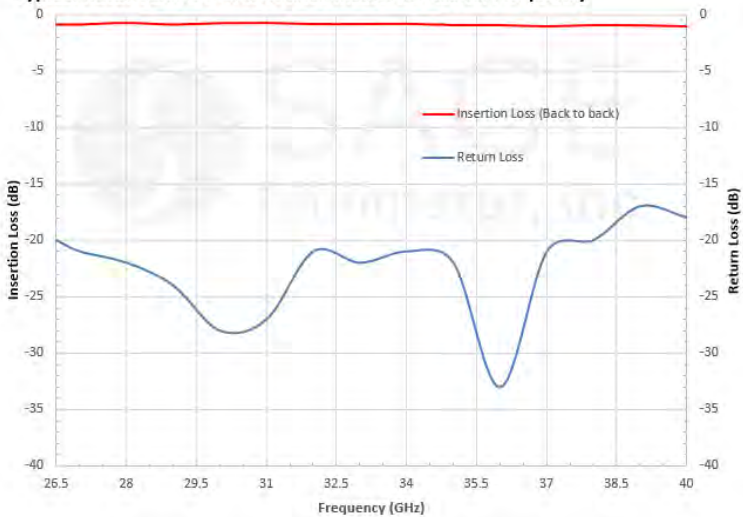
- 26 to 40 GHz
- Right Angle
- Low Insertion Loss and VSWR
- 60+ Models to Support 5G Bands
- Frequency up to 130 GHz



Parameter	Minimum	Typical	Maximum
Frequency Range	26.5 GHz		40.0 GHz
Insertion Loss*		0.35 dB	0.50 dB
Return Loss	17 dB	20 dB	
Power Handling			30 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

*Insertion loss is tested back to back with a male and female adapter.
The result is divided by 2.

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



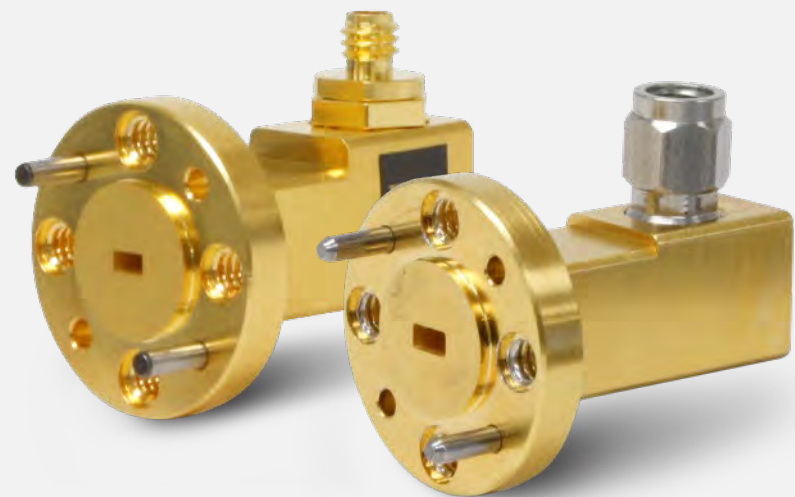
WAVEGUIDE TO COAXIAL ADAPTER, RIGHT ANGLE

FAMILY: SWC
75 TO 1110 Hz

SWC-101F-R1 & SWC-101M-R1

Features:

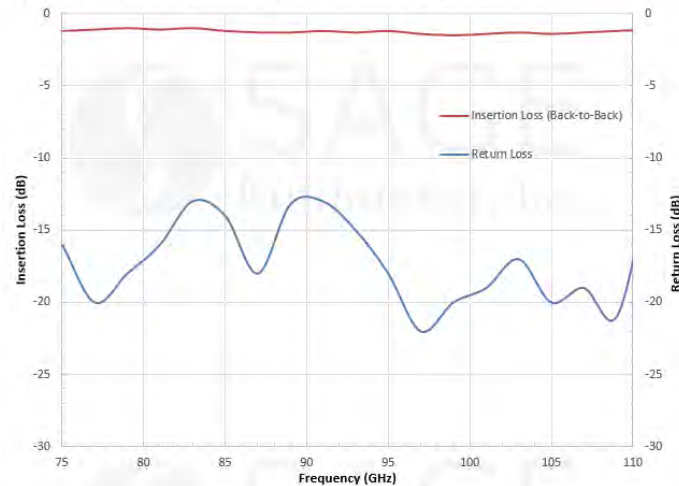
- 75 to 110 GHz
- Right Angle
- Low Insertion Loss and VSWR
- 50+ Models to Support 5G Bands
- Frequency up to 130 GHz



Parameter	Minimum	Typical	Maximum
Frequency Range	75 GHz		110 GHz
Insertion Loss*		1.2 dB	1.5 dB
Return Loss	12 dB	15 dB	
Power Handling			10 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

*Insertion loss is tested back to back with a male and female adapter, the result is divided by 2.

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



WAVEGUIDE TO COAXIAL ADAPTER, END LAUNCH

FAMILY: SWC
26 TO 40 GHz

SWC-28KF-E1 & SWC-28KM-E1

Features:

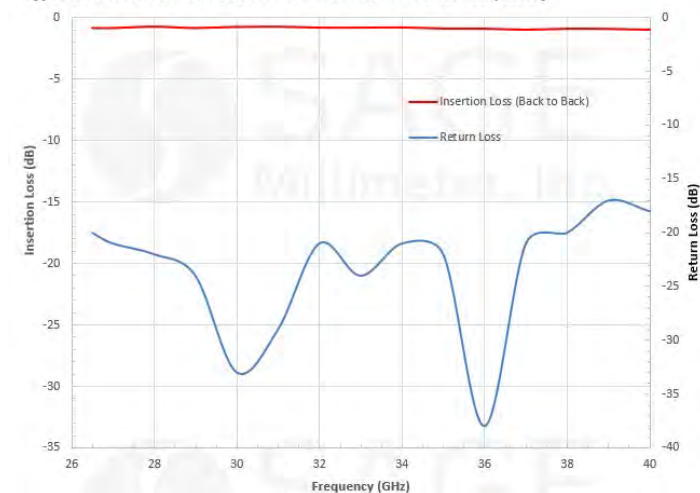
- 26 to 40 GHz
- End Launch
- Low Insertion Loss and VSWR
- 60+ Models to Support 5G Bands
- Frequency up to 130 GHz



Parameter	Minimum	Typical	Maximum
Frequency Range	26.5 GHz		40.0 GHz
Insertion Loss*		0.35 dB	0.50 dB
Return Loss	17 dB	20 dB	
Power Handling			30 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

*Insertion loss is tested back to back with a male and female adapter.
The result is divided by 2.

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



WAVEGUIDE TO COAXIAL ADAPTER, END LAUNCH

FAMILY: SWC
75 TO 110 GHz

SWC-101F-E1 & SWC-101M-E1

Features:

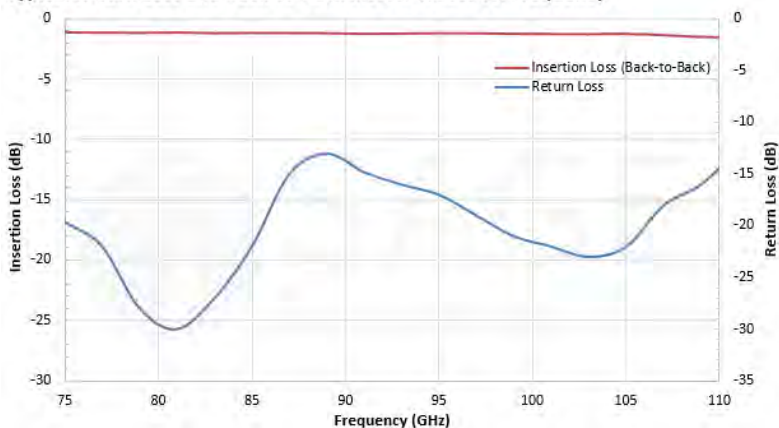
- 75 to 110 GHz
- End Launch
- Low Insertion Loss and VSWR
- 50+ Models to Support 5G Bands
- Frequency up to 130 GHz



Parameter	Minimum	Typical	Maximum
Frequency Range	75 GHz		110 GHz
Insertion Loss*		1.2 dB	1.5 dB
Return Loss	12 dB	15 dB	
Power Handling			10 W (CW)
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

*Insertion loss is tested back to back with a male and female adapter, the result is divided by 2.

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



WAVEGUIDE TAPER TRANSITION

FAMILY: SWT
WR-19 TO WR-10

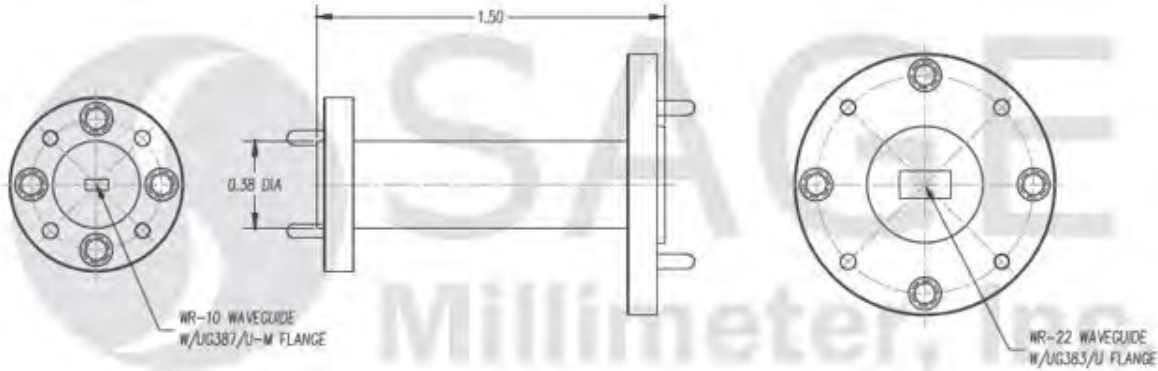
SWT-1910-LB

Features:

- WR-19 to WR-10 Taper Transition
- In Series and Out Series
- Low Insertion Loss and VSWR
- 50+ Models to Support 5G Bands
- Frequency up to 220 GHz



Item	Specification
Waveguide Size	WR-10 Waveguide with UG-387/U-M Flange
Waveguide Size	WR-19 Waveguide with UG-383/U-M Flange
Insertion Length	1.5"
Outline	WT-UW
Material	Brass
Finish	Gold Plated
Weight	1.5 Oz



WAVEGUIDE MODE TRANSITION

FAMILY: **SWT**
WR-28

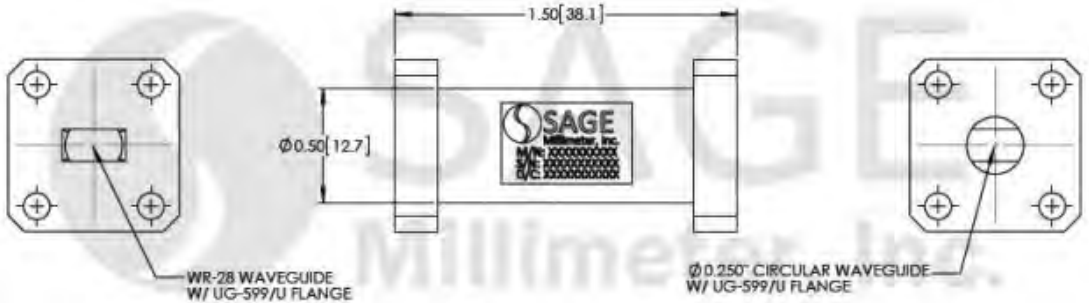
SWT-28250-SB

Features:

- WR-28 to 0.250" D Mode Transition
- In Series and Out Series
- Low Insertion Loss and VSWR
- 50+ Models to Support 5G Bands
- Frequency up to 220 GHz



Item	Specification
Waveguide Size	WR-28 Waveguide with UG-599/U Flange
Waveguide Size	0.250" Diameter Circular Waveguide with UG-599/U-M Flange
Material	Brass
Finish	Gold Plated
Weight	2.2 Oz
Insertion Length	1.5"
Outline	WT-AC-250-1.5



WAVEGUIDE LOAD FIXED, LOW POWER

FAMILY: SWL
50 TO 75 GHz

SWL-1527-S1

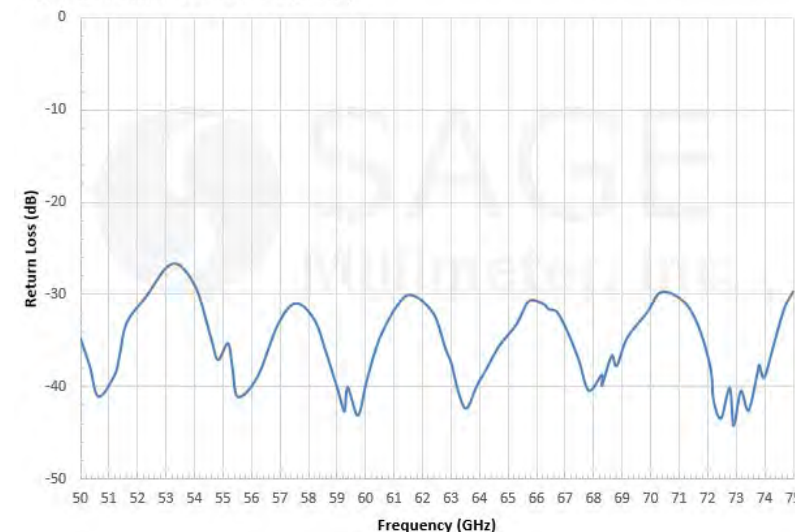
Features:

- 50 to 75 GHz
- Full Waveguide Band
- Fixed and Tunable
- Low and High Power up to 1 kW
- 100+ Models to Support 5G Bands
- Frequency up to 170 GHz



Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
VSWR		1.05:1	
Power Handling		0.5 W (CW)	2 W (CW)
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

Typical Return Loss vs. Frequency



WAVEGUIDE LOAD FIXED, HIGH POWER

FAMILY: SWL
50 TO 75 GHz

SWL-1537-S1

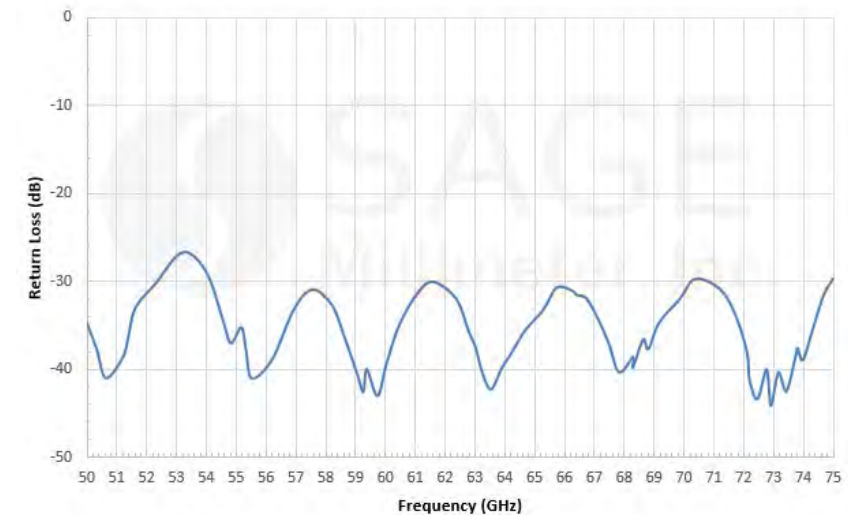
Features:

- 50 to 75 GHz
- Full Waveguide Band
- Fixed and Tunable
- Low and High Power up to 1 kW
- 100+ Models to Support 5G Bands
- Frequency up to 170 GHz



Parameter	Minimum	Typical	Maximum
Frequency	50 GHz		75 GHz
VSWR		1.06:1	
Power Handling		5 W (CW)	6 W (CW)
Specification Temperature		+25°C	
Operating Temperature	-40°C		+85°C

Typical Return Loss vs. Frequency

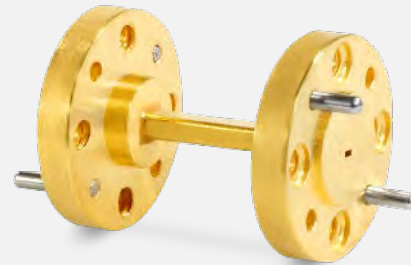


WAVEGUIDE, RIDGED

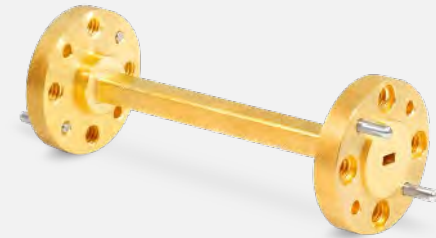
FAMILY: SWG
WR-42 TO WR-03

Features:

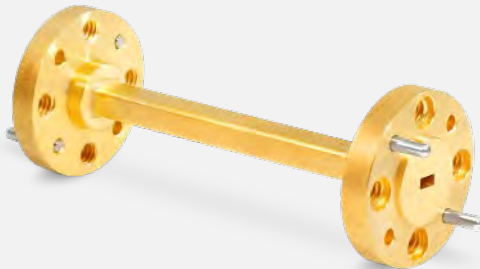
- WR-42 to WR-03
- Various Length
- 500+ Models to Support 5G Bands
- Frequency up to 325 GHz



SWG-05020-FB
WR-05 Straight Section, 2"



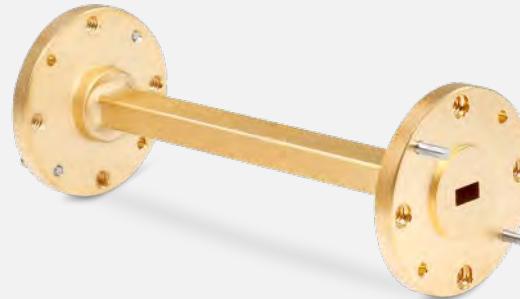
SWG-06040-FB
WR-06 Straight Section, 4"



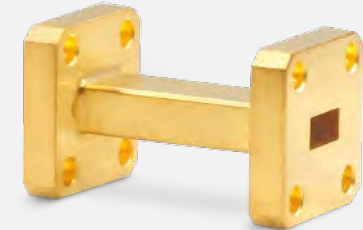
SWG-10020-FB
WR-10 Straight Section, 2"



SWG-03010-FB
WR-03 Straight Section, 1"



SWG-22030-FB
WR-22 Straight Section, 3"



SWG-28013-FB-1.25
WR-28 Straight Section, 1.25"

WAVEGUIDE, FLEXIBLE

FAMILY: SWG
Ka BAND

SWG-28059-FB-FT-G

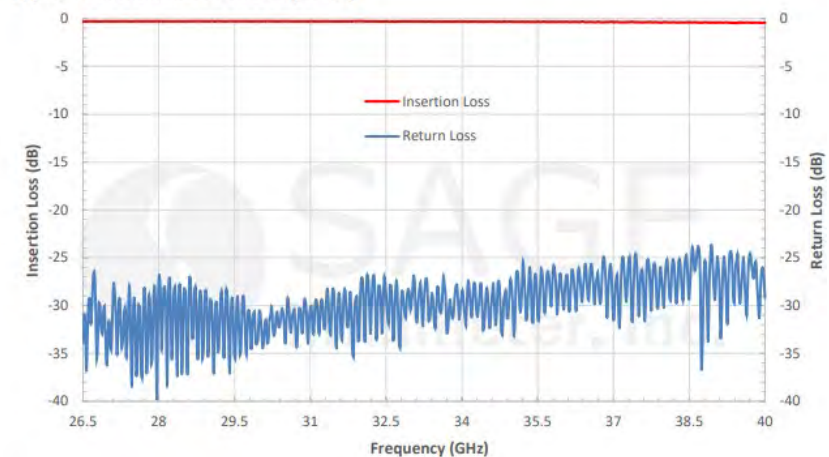
Features:

- 24 to 42 GHz
- Full Waveguide Band
- Various Length
- WR-42 to WR-10
- 100+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	26.5 GHz		40 GHz
Insertion Loss		0.3 dB	
Return Loss		21 dB	
Power Handling			75 W (CW)
Specification Temperature		+25 °C	
Operation Temperature	-40 °C		+85 °C

Typical Performance vs. Frequency



WAVEGUIDE, FLEXIBLE

FAMILY: SWG
Q BAND

SWG-22354-FB-FT-A-G

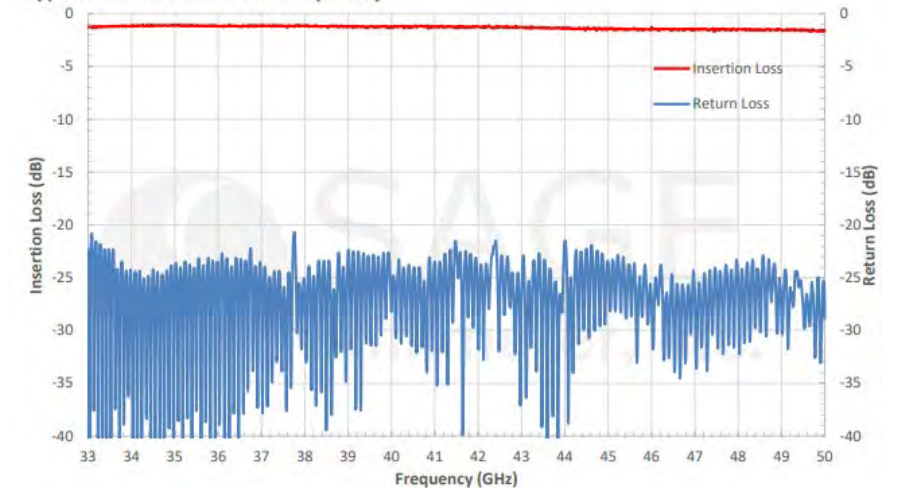
Features:

- 33 to 50 GHz
- Full Waveguide Band
- Various Length
- WR-42 to WR-10
- 100+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	33 GHz		50 GHz
Insertion Loss		2.3 dB	
Return Loss		14 dB	
Specification Temperature		+25 °C	
Operation Temperature	-40 °C		+85 °C

Typical Performance vs. Frequency



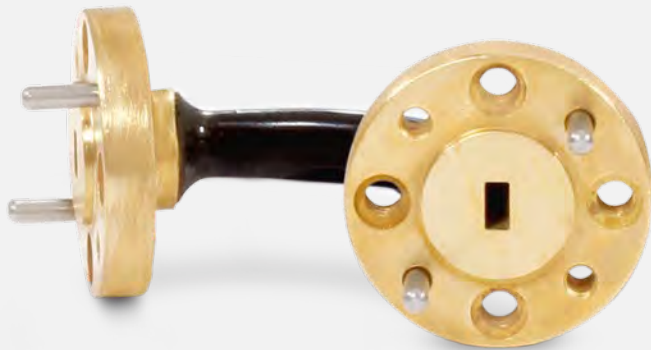
WAVEGUIDE, FLEXIBLE

FAMILY: SWG
W BAND

SWG-10020-FB-F

Features:

- 75 to 110 GHz
- Full Waveguide Band
- Various Length
- WR-42 to WR-10
- 100+ Models to Support 5G Bands
- Frequency up to 110 GHz



Parameter	Minimum	Typical	Maximum
Frequency	75 GHz		110 GHz
Insertion Loss		1.5 dB	
Return Loss	10 dB	15 dB	
Power Handling (CW/PK)		15 W / 1 kW	30 W / 2.5 kW
Specification Temperature		+25 °C	
Operation Temperature	-40 °C		+85 °C



WAVEGUIDE, BENDS & TWISTS

FAMILY: SWB
WR-42 TO WR-03

Features:

- WR-42 to WR-03
- Various Length
- 500+ Models to Support 5G Bands
- Frequency up to 325 GHz



SWB-10090-HB
WR-10 H-Plane Bend, 90°



SWB-28090-EB
WR-28 E-Plane Bend, 90°



SWB-06090-EB
WR-06 E-Plane Bend, 90°



SWB-06090-TB
WR-06 Twist, 90°



SWB-12090-TB
WR-12 Twist, 90°



SWB-10090-TB
WR-10 Twist, 90°

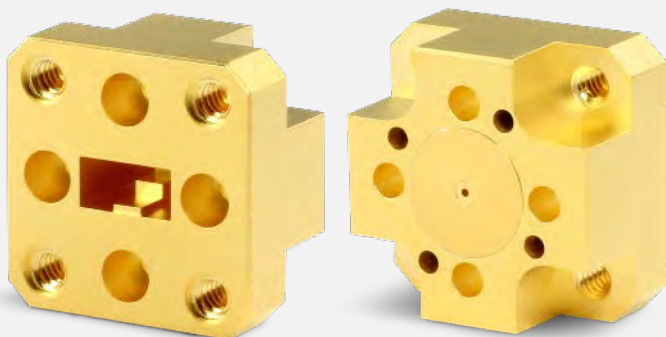
WAVEGUIDE CONNECTOR UNI-GUIDE™

FAMILY: SUF
Ka BAND

SUF-2812-480-S1

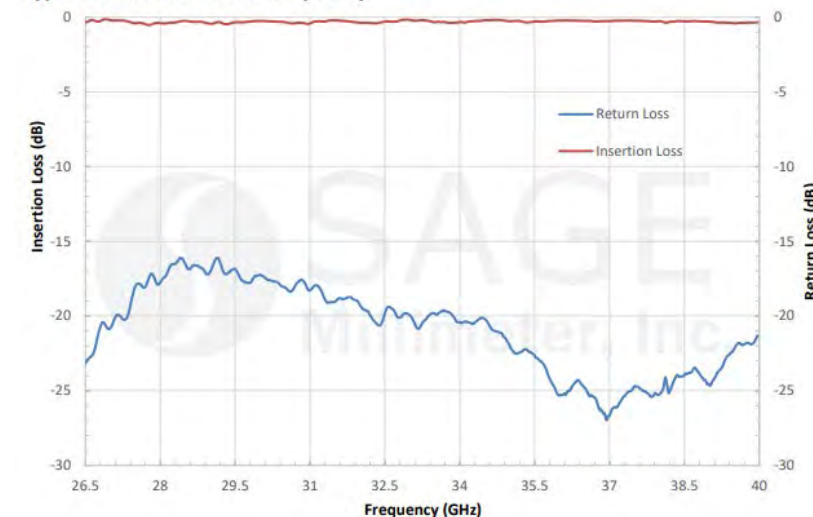
Features:

- 26.5 to 40 GHz
- WR-28, WR-22 and WR-19 Bands
- 3 Models to Support 5G Bands
- Field Replaceable
- Interchangeable with Correspondent Coax Connector
- Hermetical Package Preservation



Parameter	Minimum	Typical	Maximum
Frequency Range	26.5 GHz		40.0 GHz
Insertion Loss		0.5 dB	
Return Loss		20 dB	
Power Handling			100 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Performance vs. Frequency



WAVEGUIDE CONNECTOR UNI-GUIDE™

FAMILY: SUF
Q BAND

SUF-2212-480-S1

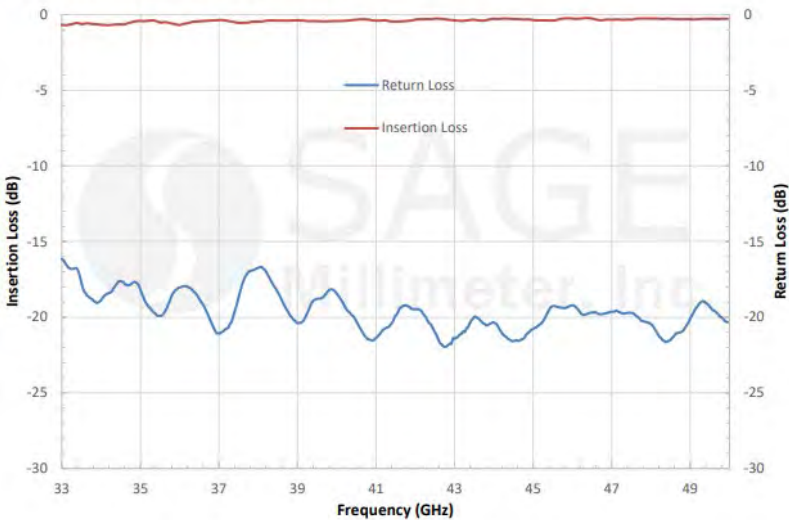
Features:

- 33 to 50 GHz
- WR-28, WR-22 and WR-19 Bands
- 3 Models to Support 5G Bands
- Field Replaceable
- Interchangeable with Correspondent Coax Connector
- Hermetical Package Preservation



Parameter	Minimum	Typical	Maximum
Frequency Range	33 GHz		50 GHz
Insertion Loss		0.6 dB	
Return Loss		20 dB	
Power Handling			100 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Performance vs. Frequency



WAVEGUIDE CONNECTOR UNI-GUIDE™

FAMILY: SUF
U BAND

SUF-1912-480-S1

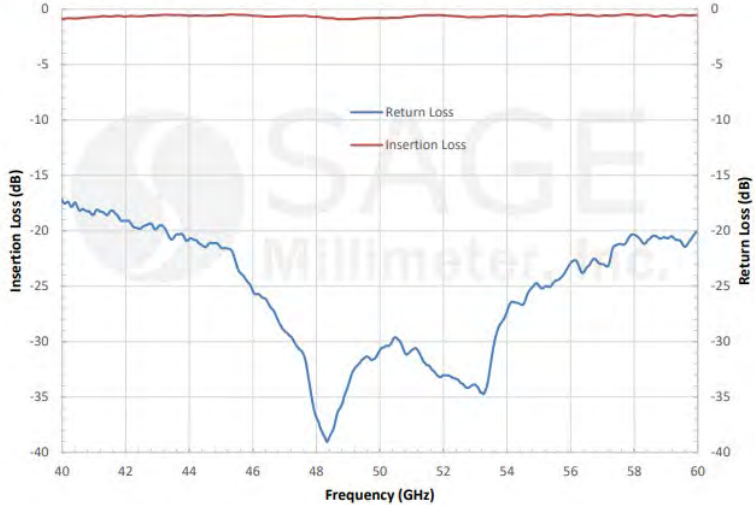
Features:

- 40 to 60 GHz
- WR-28, WR-22 and WR-19 Bands
- 3 Models to Support 5G Bands
- Field Replaceable
- Interchangeable with Correspondent Coax Connector
- Hermetical Package Preservation



Parameter	Minimum	Typical	Maximum
Frequency Range	40 GHz		60 GHz
Insertion Loss		0.7 dB	
Return Loss		20 dB	
Power Handling			100 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Typical Measured Performance vs. Frequency



COAX ADAPTER (IN SERIES)

FAMILY: SCT
DC TO 110 GHz

More Than 50 Models

1 mm, 1.35 mm, 1.85 mm, 2.4 mm, 2.92 mm, SMP, SMA

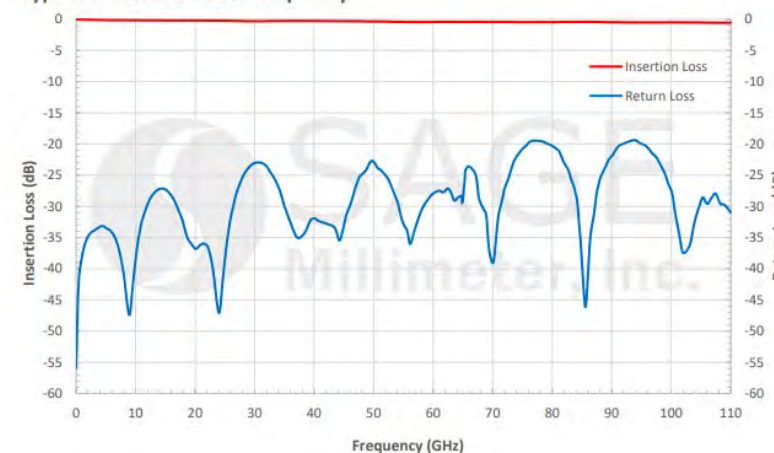


SWC-101F-R1
DC to 110 GHz

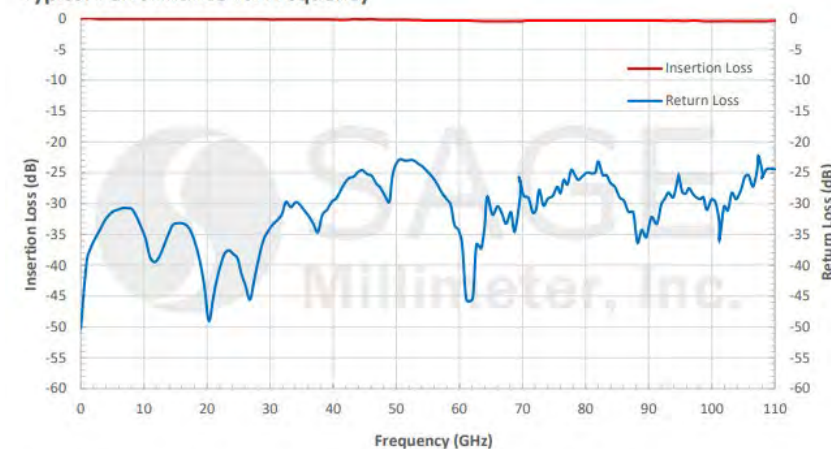


SCT-1M1M-UB
DC to 110 GHz

Typical Performance vs. Frequency



Typical Performance vs. Frequency



COAX ADAPTER (BETWEEN SERIES)

FAMILY: SCT
DC TO 110 GHz

More Than 50 Models

1 mm, 1.35 mm, 1.85 mm, 2.4 mm, 2.92 mm, SMP, SMA

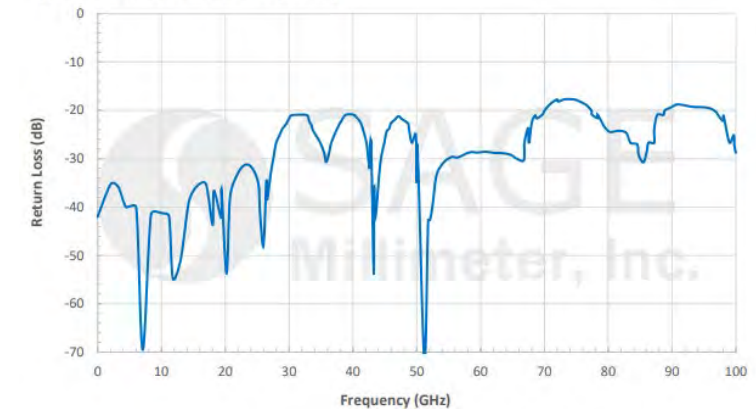


SCT-AF1M-UB
DC to 100 GHz

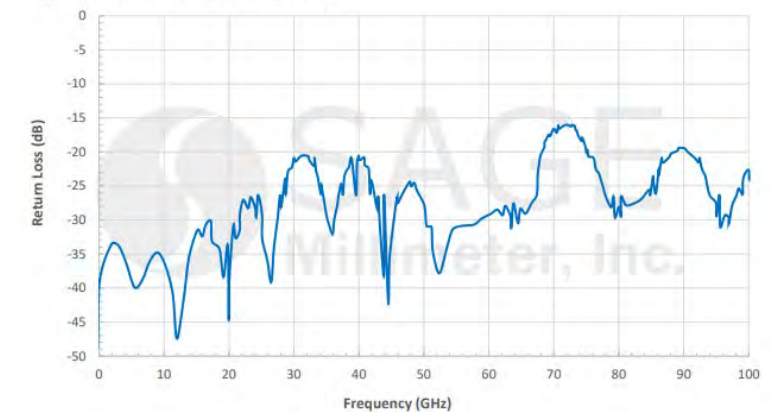


SCT-AF1F-UB
DC to 100 GHz

Typical Return Loss vs. Frequency



Typical Return Loss vs. Frequency



COAX ADAPTER (FIXED)

FAMILY: SCA
DC TO 67 GHz
3 dB THRU 30 dB

More Than 50 Models

1.85 mm, 2.4 mm, 2.92 mm. 3.5 mm and SMA

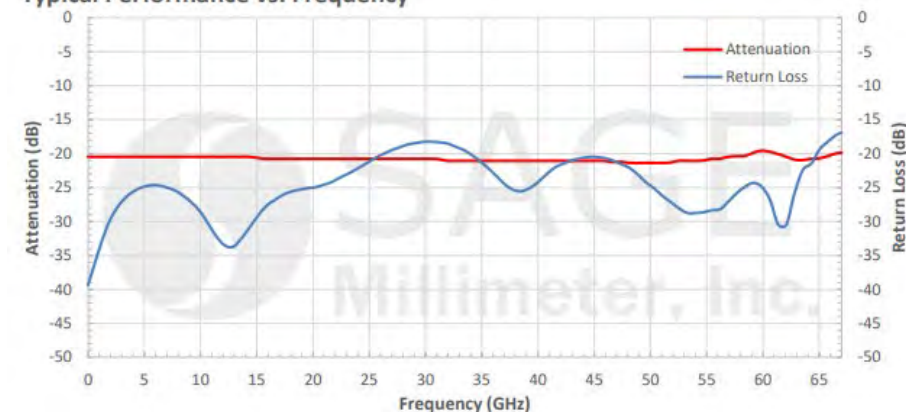


SCA-20-VMVF-S9
DC to 67 GHz

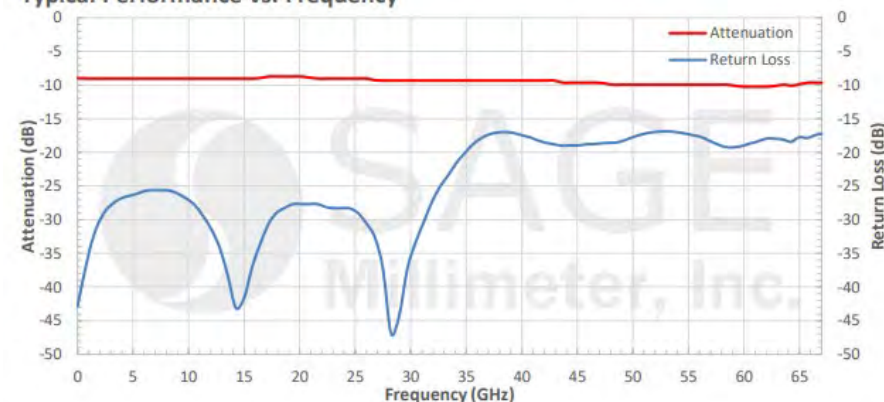


SCA-10-VMVF-S9
DC to 67 GHz

Typical Performance vs. Frequency



Typical Performance vs. Frequency



COAX MATCHING LOAD

FAMILY: SCL
DC TO 67 GHz

More Than 6 Models

1.85 mm, 2.4 mm, 2.92 mm



STQ-CM-KF27-U2
DC to 50 GHz

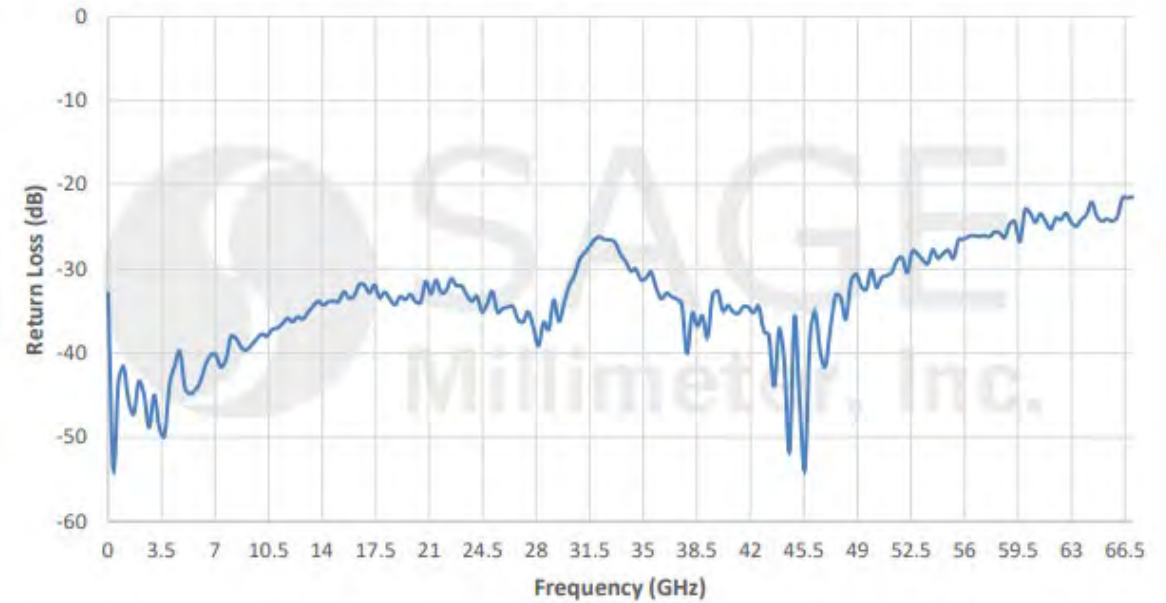


STQ-CM-VM27-U2
DC to 67 GHz



STQ-CM-2M27-U2
DC to 40 GHz

Measured Return Loss vs Frequency



COAX DC BLOCK

FAMILY: SCB
DC TO 67 GHz

5 Models

1.85 mm, 2.4 mm, 3.5 mm, 2.92 mm

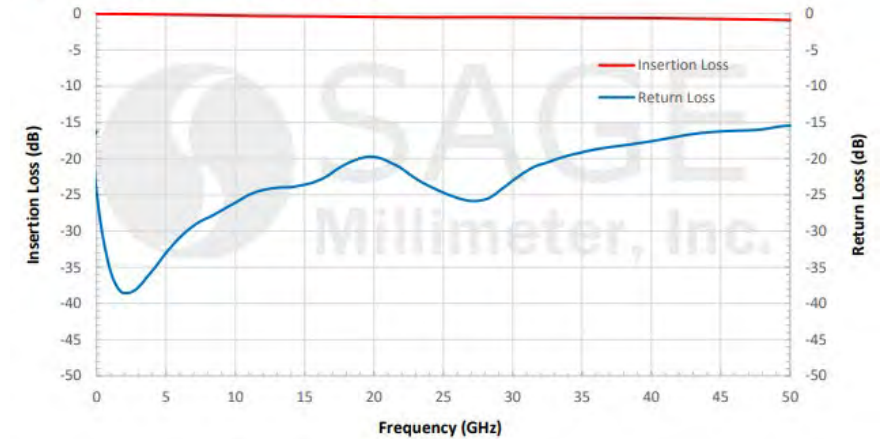


SCB-050-2F2M-U2
DC to 50 GHz

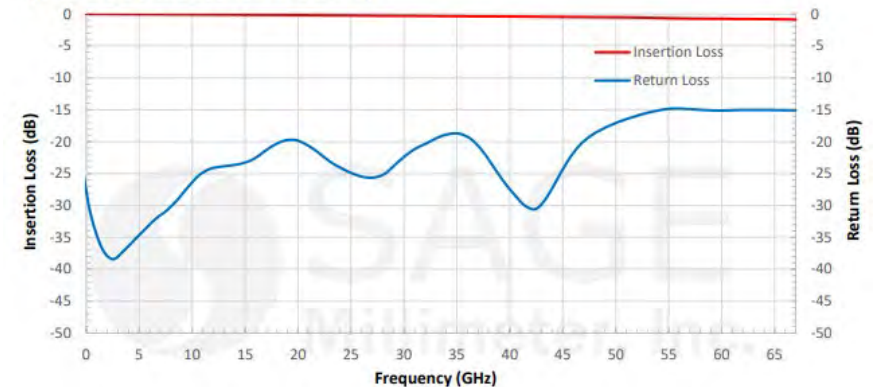


SCB-016-VFVM-U2
DC to 67 GHz

Typical Performance vs. Frequency



Typical Performance vs. Frequency



COAX BIAS TEE

FAMILY: SCV
DC TO 85 GHz

5 Models

1.85 mm, 2.4 mm, 3.5 mm, 2.92 mm

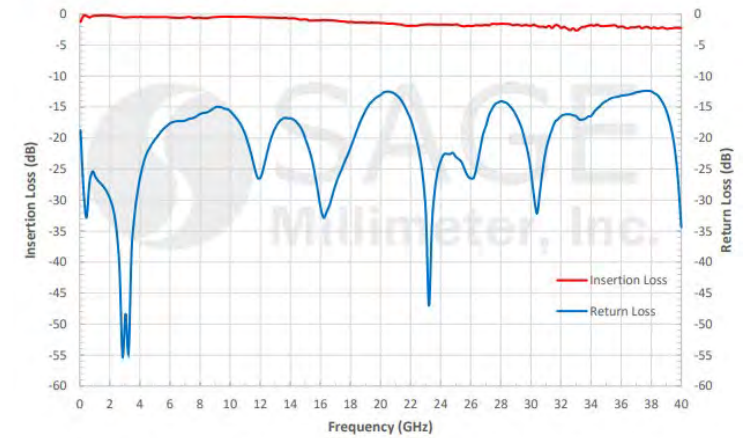


SCV-000403302508-KFKF-U3
DC to 40 GHz

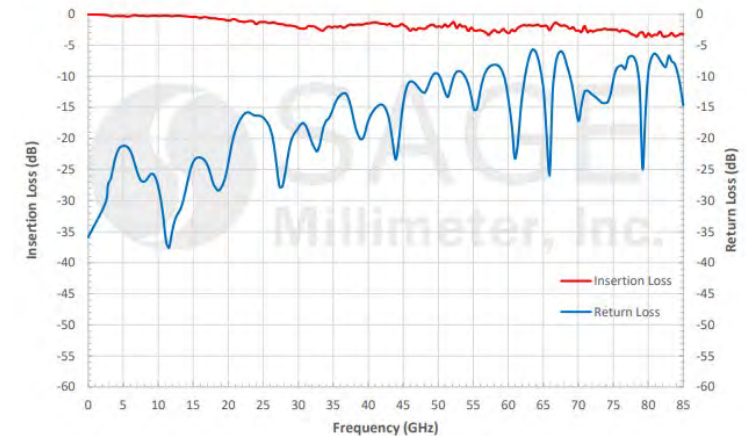


SCV-000853402505-VFVF-U3
DC to 85 GHz

Typical Performance vs. Frequency



Typical Performance vs. Frequency



COAX CABLES (FLEXIBLE)

FAMILY: SCW
DC TO 110 GHz

More Than 50 Models

1 mm, 1.85 mm, 2.4 mm, 2.92 mm

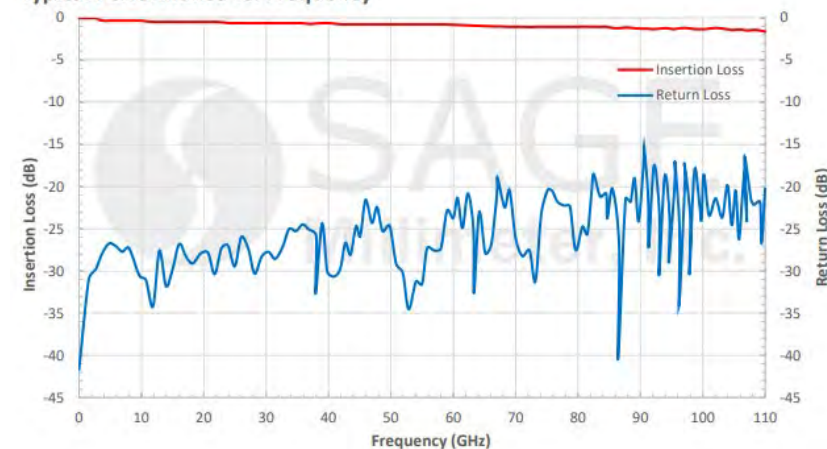


SCW-1M1M003-F1
DC to 110 GHz, 3"

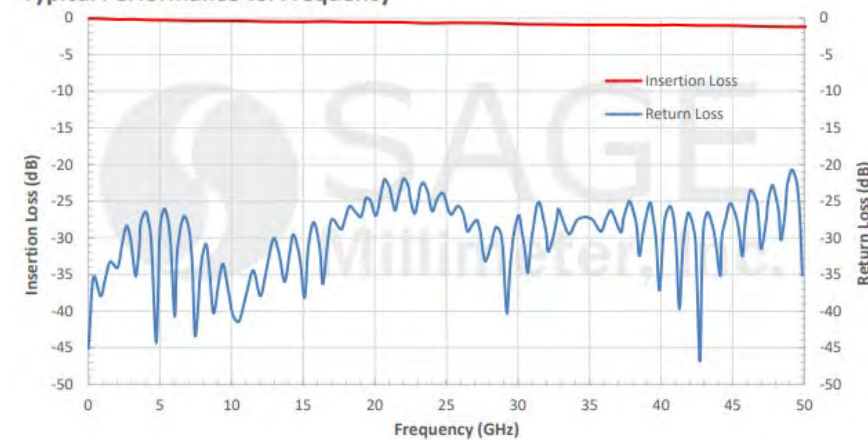


SCW-2M2M006-F1
DC to 50 GHz, 6"

Typical Performance vs. Frequency



Typical Performance vs. Frequency



COAX CABLES (SEMI RIDGED)

FAMILY: SCW
DC TO 110 GHz

More Than 50 Models

1 mm, 1.85 mm, 2.4 mm, 2.92 mm

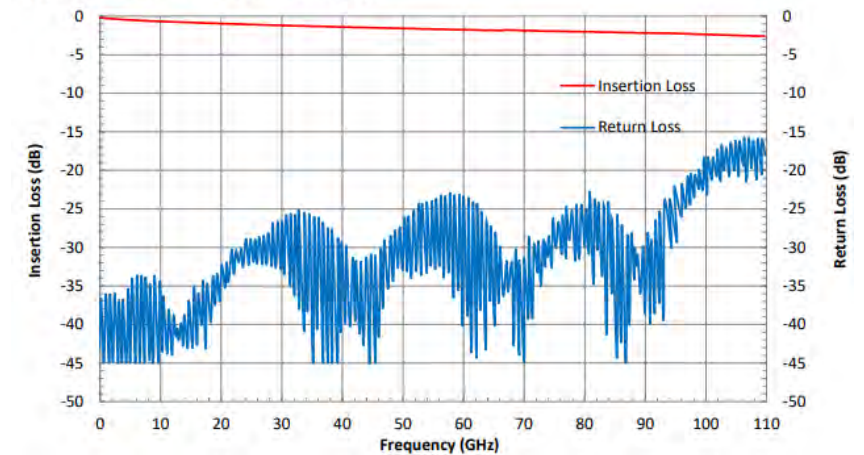


SCW-1M1M006-S1
DC to 110 GHz, 6"

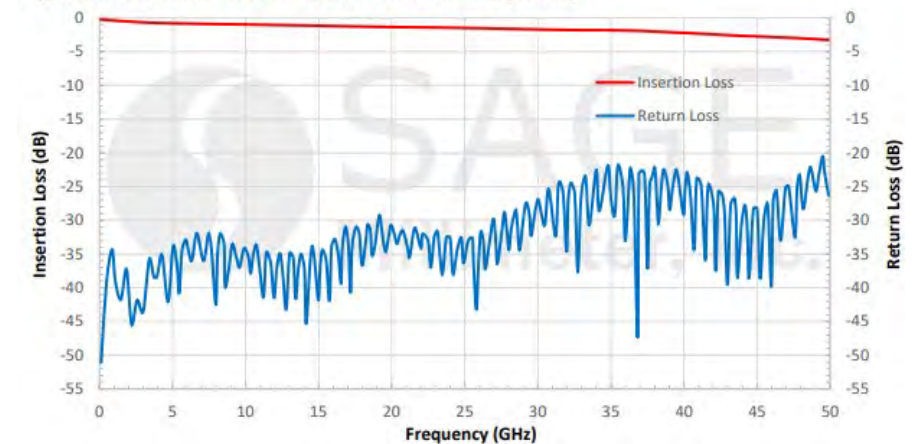


SCW-2M2M012-S1
DC to 50 GHz, 12"

Typical Performance vs. Frequency



Typical Insertion Loss & Return Loss vs. Frequency



SUB-ASSEMBLIES

COMPONENTS FOR COMMUNICATION SYSTEMS

- ERAVANT has designed and manufactured many integrated models for communication system applications.
- In addition, many communication sub-assemblies can be constructed by using **ERAVANT** components and interconnection products.
- This presentation includes some examples for introduction/illustration purpose.
 - **SSR:** Receiver Modules
 - **SST:** Transceiver Modules
 - **SSC:** Transceiver Modules
 - **SSK:** Custom Build Transceivers

RECEIVER MODULE

FAMILY: SSR
W BAND

SSR-9430434030-10-M1-D

Features:

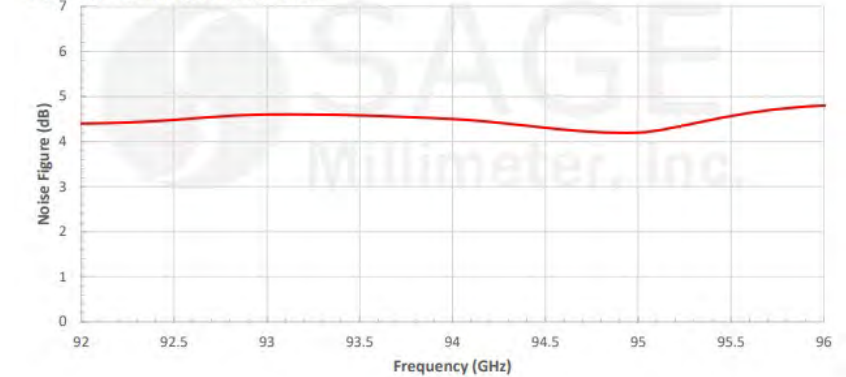
- 92 to 96 GHz
- Compact Size
- Fully Integrated
- More than 20 Models to Support Communication Systems



Parameter	Minimum	Typical	Maximum
RF Input Frequency	92 GHz		96 GHz
RF Input Power		-60 dBm	-24 dBm
Noise Figure		4 dB	
IF Output Frequency	4 GHz		8 GHz
I/Q Phase Unbalance		±15°	
I/Q Amplitude Unbalance		±1.0 dB	
RF to IF Conversion Gain		30 dB	
LO Frequency		11 GHz	
LO Input Power	0 dBm	+5 dBm	+10 dBm
DC Voltage Supply	+6 V _{DC}	+8 V _{DC}	+12 V _{DC}
Current Supply		400 mA	
Specification Temperature		+ 25 °C	
Operating Temperature	0 °C		+ 50 °C

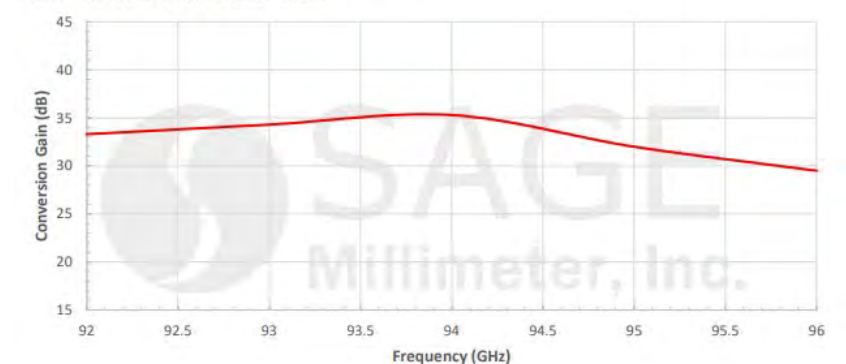
Typical Noise Figure vs. Frequency

Bias: +8V/400 mA, LO: 11 GHz/+ 5dBm



Typical Conversion Gain vs. Frequency

Bias: +8V/400 mA, LO: 11 GHz/+ 5dBm



RECEIVER MODULE

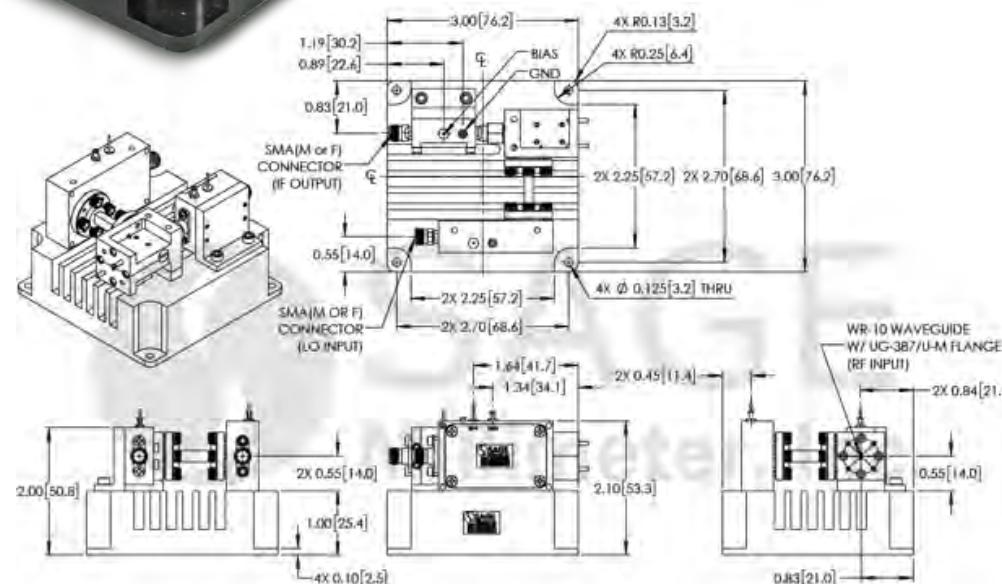
FAMILY: SSR
W BAND

SSR-9333531430-10-B1

Features:

- 75 to 110 GHz
- Bolt Together Solution
- More than 20 Models to Support Communication Systems

Parameter	Minimum	Typical	Maximum
RF Input Frequency	75 GHz		110 GHz
RF Input Power		-60 dBm	-10 dBm
Damage RF Power			-10 dBm
Noise Figure		14 dB	19 dB
IF Output Frequency	10 MHz		3 GHz
RF to IF Conversion Gain		30 dB	
LO Frequency	12.5 GHz		18.33 GHz
LO Input Power	+1 dBm	+2 dBm	+5 dBm
LO DC Bias Voltage	+10 V _{DC}	+12 V _{DC}	+14 V _{DC}
LO DC Bias Current		760 mA	
Specification Temperature		+ 25 °C	
Operating Temperature	0 °C		+ 50 °C



RECEIVER MODULE

FAMILY: SSR
E BAND

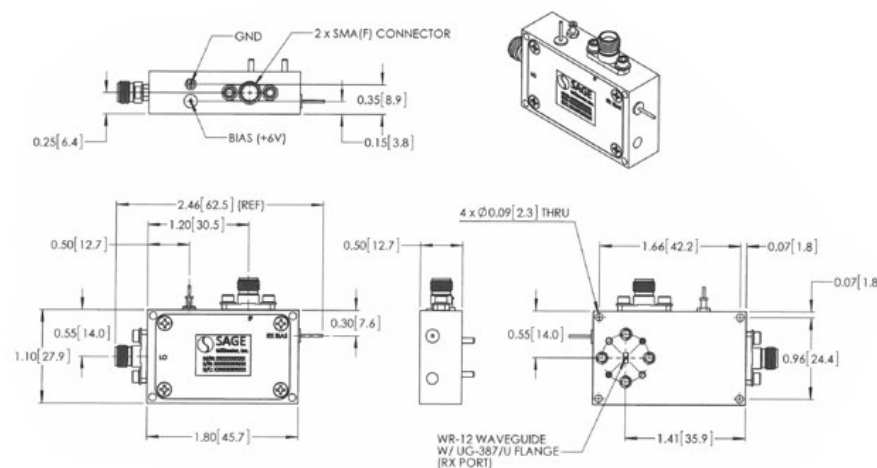
SSR-7930837005-12-S1

Features:

- 71 to 86 GHz
- Compact Size
- Fully Integrated
- More than 20 Models to Support Communication Systems



Parameter	Minimum	Typical	Maximum
RF Input Frequency	71 GHz		86 GHz
IF Frequency Output	DC		12 GHz
LO Input Frequency	8.875 GHz		10.75 GHz
LO Power		+10 dBm	+14 dBm
Conversion Gain		4 dB	
Noise Figure		7 dB	
Harmonic Suppression		20 dB	
DC Bias	+5 V _{DC}	+12 V _{DC}	
DC Current		350 mA	
Specification Temperature		+ 25 °C	
Operating Temperature	0 °C		+ 50 °C



TRANSMITTER MODULE

FAMILY: SST
W BAND

SST-9430432030-10-M1-D

Features:

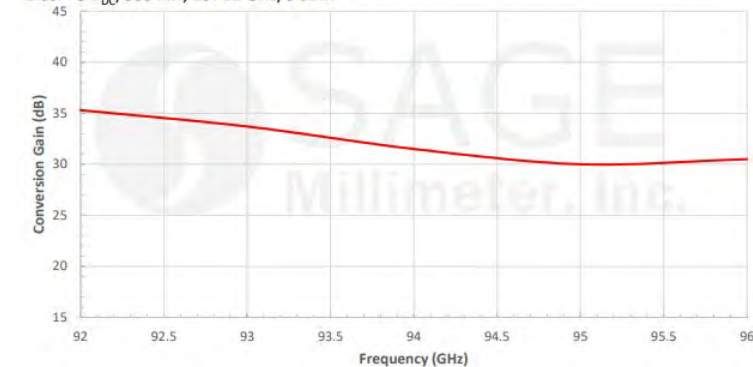
- 92 to 96 GHz
- Compact Size
- Fully Integrated
- More than 20 Models to Support 5G



Parameter	Minimum	Typical	Maximum
RF Output Frequency	92 GHz		96 GHz
IF Input Frequency	4 GHz	6 GHz	8 GHz
IF Input Power		-20 dBm	+7 dBm
RF to IF Conversion Gain		30 dB	
RF Output P_{1dB}/P_{sat}		+20/+24 dBm	
LO Frequency		11.00 GHz	
LO Input Power		0 dBm	+10 dBm
LO DC Voltage Supply	+6 V _{DC}	+8 V _{DC}	+16 V _{DC}
LO Current Supply		750 mA	
Specification Temperature		+ 25 °C	
Operating Temperature	0 °C		+ 50 °C

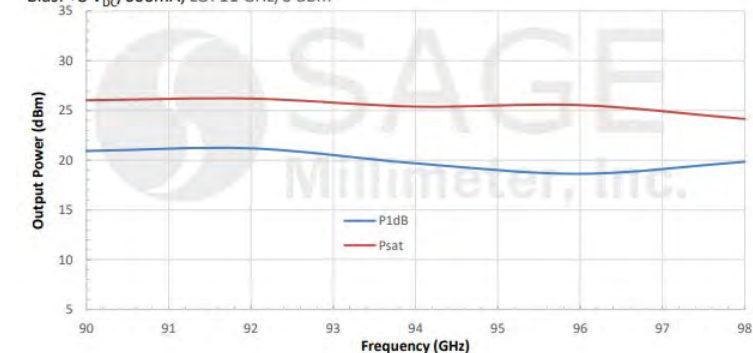
Typical Conversion Gain vs. Frequency

Bias: +8 V_{DC}/660 mA, LO: 11 GHz/0 dBm



Output Power vs. Frequency

Bias: +8 V_{DC}/660mA, LO: 11 GHz/0 dBm



TRANSMITTER MODULE

FAMILY: SST
E BAND

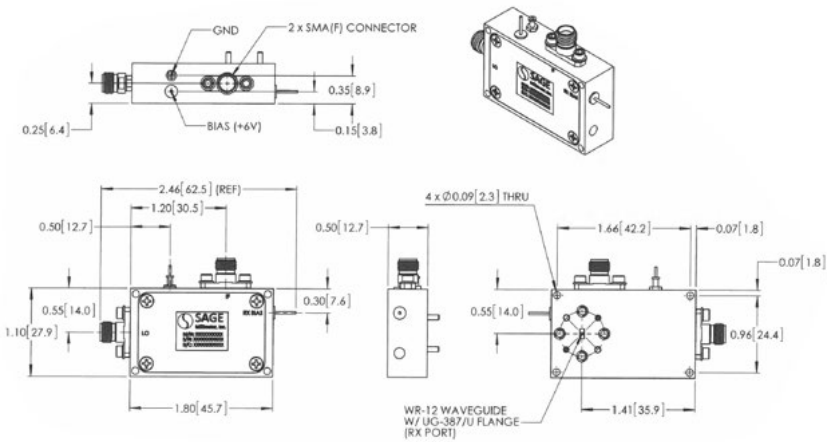
SST-7931531010-12-S1

Features:

- 71 to 86 GHz
- Compact Size
- Fully Integrated
- More than 20 Models to Support Communication Systems



Parameter	Minimum	Typical	Maximum
RF Output Frequency	71 GHz		86 GHz
Damaged RF Power		+15 dBm	
Output P _{1dB}		+9 dBm	
Output Psat		+12 dBm	
IF Input Frequency	DC		12 GHz
RF to IF Conversion Gain		10 dB	
LO Frequency	11.8 GHz		14.4 GHz
LO Input Power	+5 dBm	+7 dBm	+15 dBm
DC Voltage		+8 V _{DC}	+15 V _{DC}
DC Current		250 mA	
Output Return Loss		10 dB	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C



TRANSMITTER MODULE

FAMILY: SST
V BAND

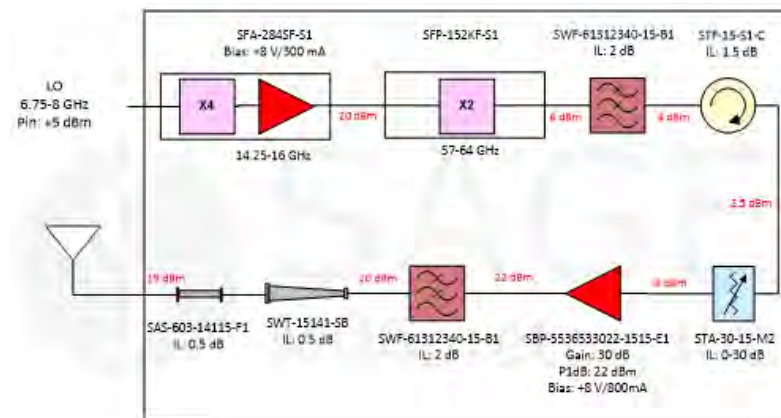
SST-5931031914-15-C1-HU1

Features:

- 54 to 64 GHz
- Bolt-Together Solution
- More than 20 Models to Support Communication Systems



Parameter	Minimum	Typical	Maximum
Output Frequency	54 GHz		64 GHz
TX Output Power		+19 dBm	
TX EIRP		+34 dBm	
LO to TX Linear Gain		14 dB	
Polarization		RHCP	
Horn Antenna Gain		15 dBi	
Amplifier Gain		30 dB	
LO Input Frequency	6.75 GHz		8 GHz
LO Input Power	+2 dBm	+5 dBm	+10 dBm
RF to LO Isolation		28 dB	
Variable Attenuation Range		30 dB	
DC Voltage Supply		+12 V _{DC}	+15 V _{DC}
LO Current Supply		1100 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C



TRANSCEIVER MODULE

FAMILY: SSC
E BAND

SSC-7737731200-1212-C1

Features:

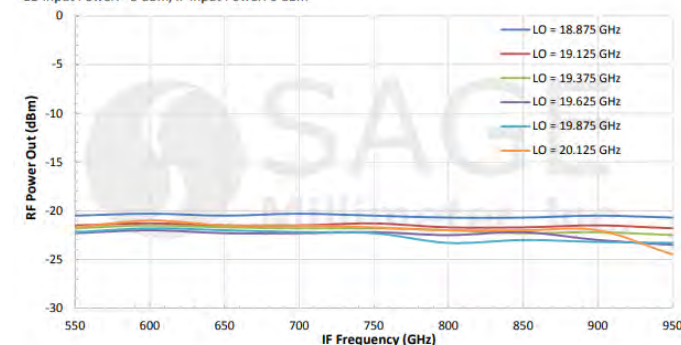
- 76 to 78 GHz
- Compact Size
- Fully Integrated
- Custom Modules Available



Parameter	Minimum	Typical	Maximum
TX RF Output Frequency	76 GHz		78 GHz
TX RF Output Power	-30 dBm		
TX IF Input Frequency	550 MHz		950 MHz
TX IF Input Power			0 dBm
RX RF Input Frequency	76 GHz		78 GHz
RX RF Input Power		-20 dBm	+3 dBm
RX IF Output Frequency	550 MHz		950 MHz
RX Conversion Loss		-12 dB	
LO Frequency	19.0 GHz		19.5 GHz
LO Input Power		+5 dBm	
TX Mixer DC Voltage Supply		+5V _{DC}	+6 V _{DC}
TX Mixer Current Supply		2.0 mA	2.5 mA
RX Mixer DC Voltage Supply		+5 V _{DC}	+6 V _{DC}
RX Mixer Current Supply		2.0 mA	2.5 mA
LO DC Voltage Supply		+6 V _{DC}	
LO Current Supply		300 mA	

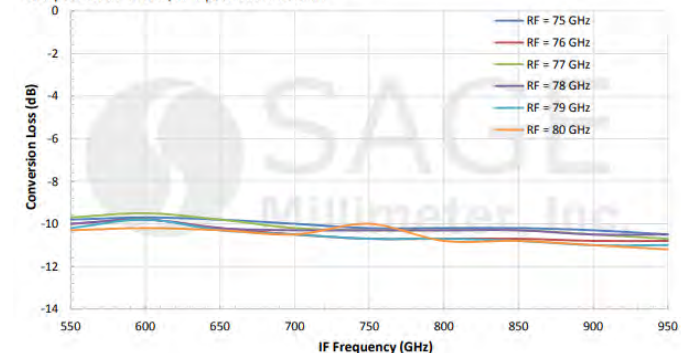
Typical TX Output Power vs. IF Frequency

LO Multiplier Bias: +6 V_{DC}/300 mA, Mixer Bias: +2.9 V_{DC}/2 mA
LO Input Power: +5 dBm, IF Input Power: 0 dBm



Typical RX Conversion Loss vs. IF Frequency

LO Multiplier Bias: +6 V_{DC}/300 mA, Mixer Bias: +2.9 V_{DC}/2 mA
LO Input Power: +5 dBm, RF Input Power: -20 dBm



TEST SETUPS PASSIVE WAVEGUIDE COMPONENTS

TEST SETUPS

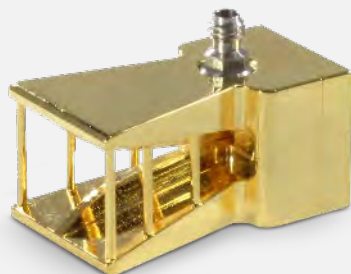
PASSIVE WAVEGUIDE COMPONENTS

- ERAVANT offers several test equipment or test sets for communicate system evaluation and testing. They are organized into the following product families.
 - **SAV:** Broad Band Antennas
 - **SAC:** Dual Polarized Quad Ridge Circular Antennas
 - **SAF:** Dual Polarized Antennas
 - **SAH:** Dual Polarized Antennas
 - **SAN:** Rotary Joints
 - **SAX:** Antenna Mounting Fixtures
 - **STZ:** Noise Sources
 - **STC:** Frequency Down-converters
 - **STG:** Noise and Gain Test Extenders

DUAL RIDGED SQUARE ANTENNAS

FAMILY: SAV
DC TO 110 GHz

5 Models
Octave Bandwidth



SAV-1431141535-1F-U5
14 to 110 GHz



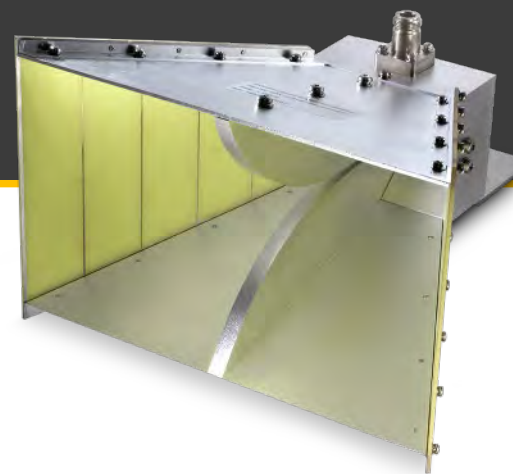
SAV-0636731522-VF-U5
6 to 67 GHz



SAV-4525031429-2F-U5
4.5 to 50 GHz

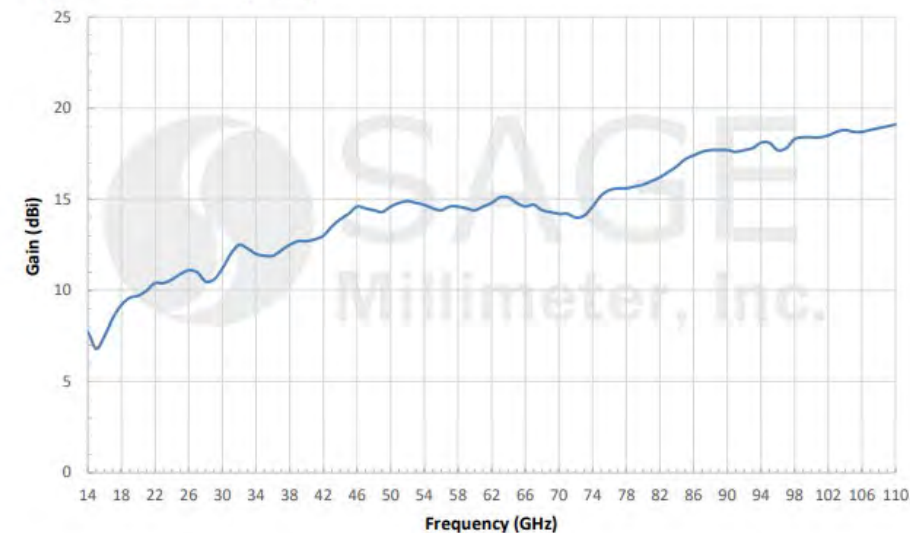


SAV-0434031427-KF-U5
4 to 40 GHz



SAV-0131831040-NF-U2
1 to 18 GHz

Typical Gain vs. Frequency



DUAL RIDGED SQUARE ANTENNAS

FAMILY: SAV
1 TO 50 GHz

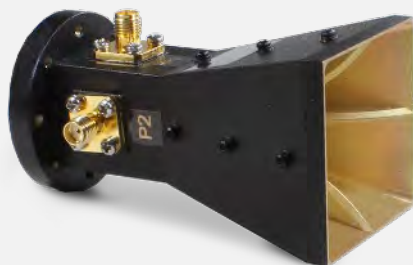
4 Models

Octave Bandwidth



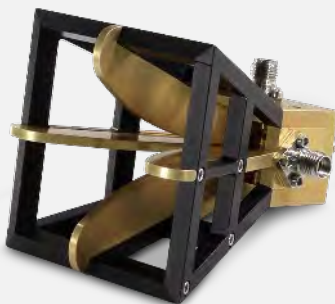
SAV-0130430883-SF-U4-QR

1 to 4 GHz



SAV-0632531431-SF-U3-QR

6 to 25 GHz



SAV-0434031428-KF-U5-QR

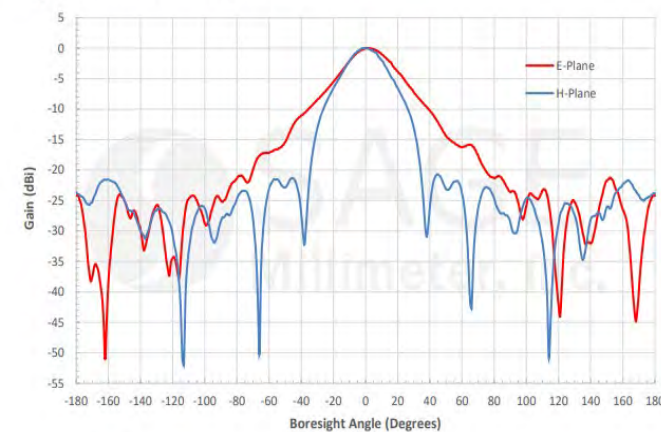
4 to 40 GHz



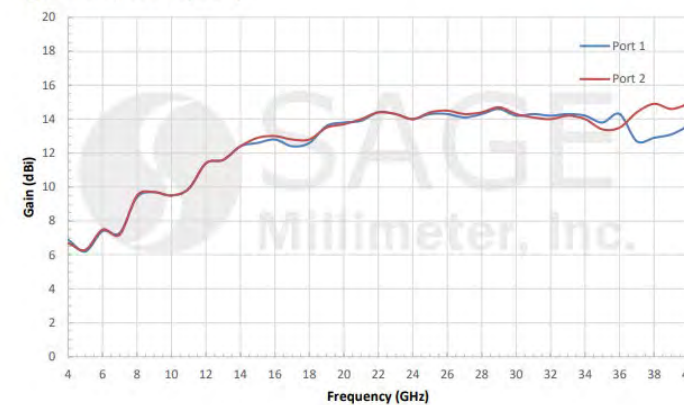
SAV-0535031140-2F-U5-QR

5 to 50 GHz

Typical Antenna Pattern @ 22 GHz



Typical Gain vs. Frequency

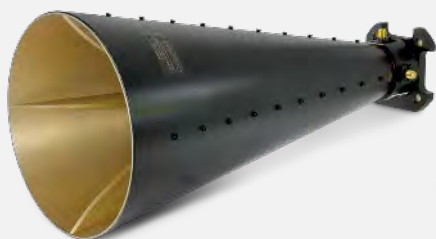


DUAL POLARIZED QUAD RIDGED CIRCULAR ANTENNAS

FAMILY: SAC
2 TO 40 GHz

6 Models

Octave Bandwidth



SAC-0231831225-SF-S4-DP

2 to 18 GHz



SAC-0432431235-SF-S4-DP-QR

4 to 24 GHz



SAC-1834031621-KF-S5-DP

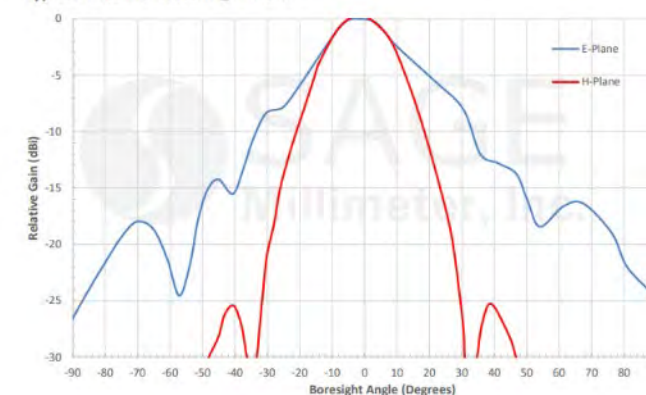
18 to 40 GHz



SAC-2734031517-KF-S5-DP

27 TO 40 GHz

Typical Antenna Pattern @ 12 GHz



Measured Isolation vs. Frequency



DUAL POLRIZED SCALAR HORN ANTENNAS

FAMILY: SAF
24 TO 110 GHz

7 Models

Full Waveguide Bandwidth



SAF-7531141340-110-S1-100-DP

75 to 110 GHz



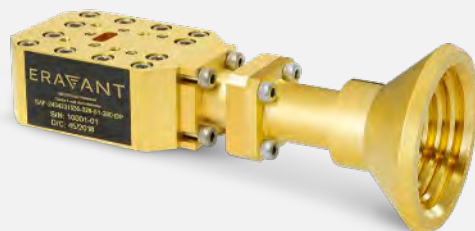
SAF-6039031340-141-S1-122-DP

60 to 90 GHz



SAF-4036031340-219-S1-188-DP

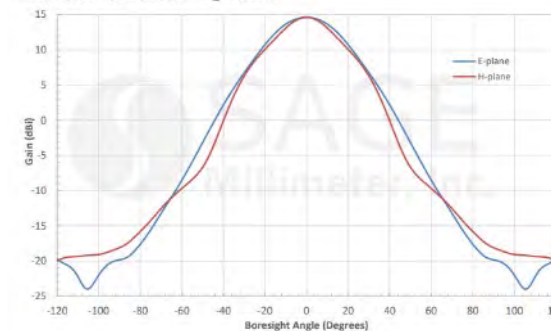
40 to 60 GHz



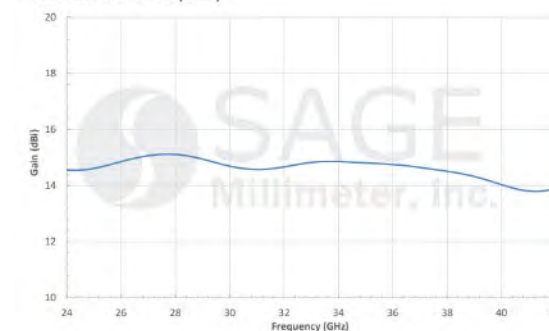
SAF-2434231535-328-S1-280-DP

24 to 42 GHz

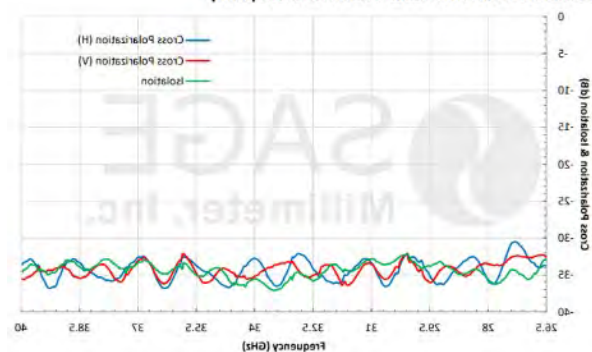
Simulated Antenna Patterns @ 30 GHz



Simulated Gain vs. Frequency



Measured Cross Polarization & Isolation vs. Frequency



DUAL POLRIZED CHOKE HORN ANTENNAS

FAMILY: SAH
24 TO 110 GHz

6 Models

Full Waveguide Bandwidth



SAH-7531141060-110-S1-100-DP

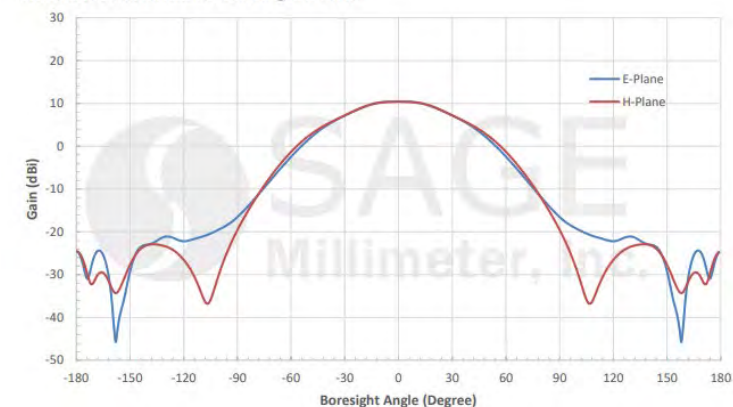
75 to 110 GHz



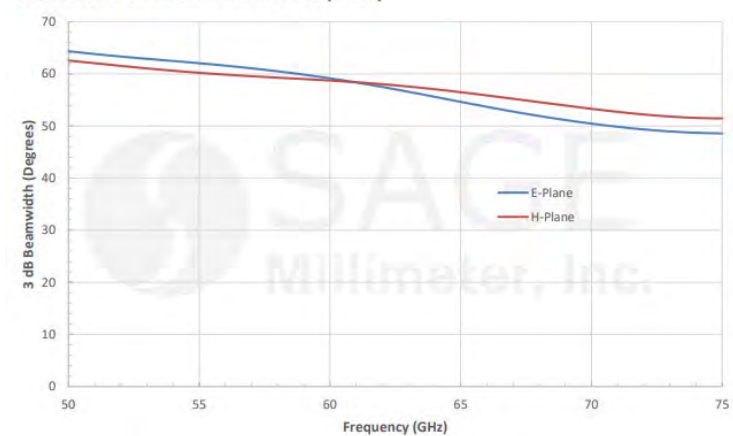
SAH-5037531060-165-S1-148-DP

50 to 75 GHz

Simulated Antenna Patterns @ 62 GHz



Simulated 3 dB Beamwidth vs. Frequency



WAVEGUIDE ROTARY JOINT

FAMILY: SAN
E BAND

SAN-60390310-125I125I-S1

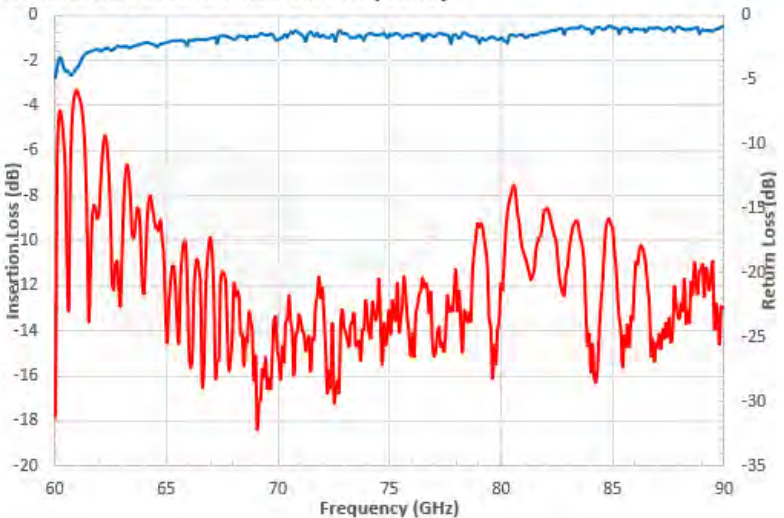
Features:

- Doppler Directional Sensor
- 35 GHz Operation
- Lens Corrected Antenna
- Volume Production Ready



Parameter	Minimum	Typical	Maximum
Frequency Range	60 GHz		90 GHz
Insertion Loss		1.0 dB	
Return Loss		15 dB	
Rotating Speed		10 Turns/Second	
Waveform Supported	Circular Polarized		
Power Handling			10 W (CW)
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C

Measured Performance vs. Frequency



ANTENNA MOUNTING FIXTURES

FAMILY: SAX
0.70" to 30" Edge Length

More than 10 Models
Various Sizes



SAX-MT0750-C1
0.75" Diameter Flange
UG-385/U and UG-387/U



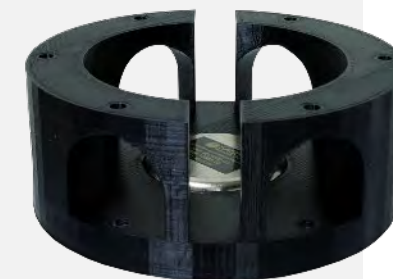
SAX-MT0750-S1
0.75" Square Flange
UG-599/U



SAX-MT0880-S1
0.88" Square Flange
UG-595/U



SAX-MT1125-C1
1.125" Diameter Flange,
UG-383/U



SAX-ME5000-C1
5" Diameter Mount for
SAO-2734030810-KF-S1
SAO-2734030810-28-S1

NOISE SOURCES

FAMILY: STZ
V BAND

STZ-15-01

Features:

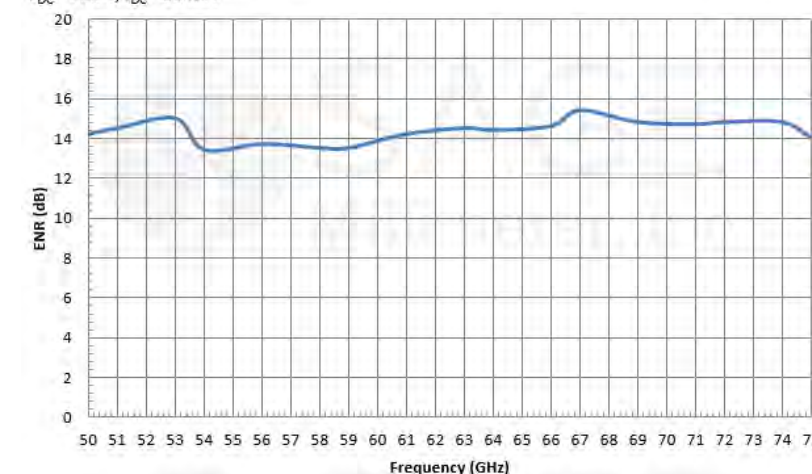
- 26.5 to 170 GHz Coverage
- Full Waveguide Band Operation
- TTL or Manual On and Off Switches
- CW or Pulsed AM Operation Modes
- Precision Calibrated and Flat ENR
- More than 20 Models



Parameter	Minimum	Typical	Maximum
RF Frequency Range	50.0 GHz		75.0 GHz
ENR	11.0 dB	13.5 dB	
ENR Flatness		±1.4 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		
Port Return Loss		16 dB	
DC Bias	+18 V _{DC} /35 mA	+28 V _{DC} /60 mA	+30 V _{DC} /75 mA
Specification Temperature		+25°C	
Case Temperature	0°C		+50°C

Typical ENR vs. Frequency

V_{DC} = +28 V, I_{DC} = 60 mA



FREQUENCY DOWN CONVERTERS

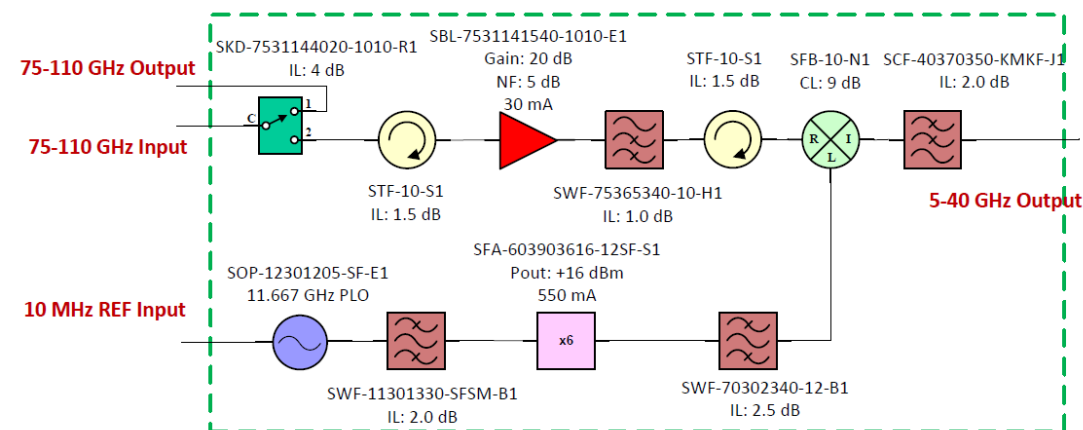
FAMILY: STC
W BAND

STC-75311405-10-C1

Features:

- 26.5 to 170 GHz Coverage
- Full Waveguide Band

Parameter	Minimum	Typical	Maximum
RF Input Frequency	75 GHz		110 GHz
IF Frequency Output	6 GHz		41 GHz
Conversion Gain	-6.5 dB	3 dB	10 dB
Combined Harmonic Power		-70 dBm	-65 dBm
Spurious		-40 dBc	-35 dBc
Noise Figure		11 dB	17 dB
Bypass Insertion Loss		4 dB	6 dB
Bypass "on"		TTL "Low"	
TTL Low	0 V _{DC}		+ 0.8 V _{DC}
TTL High	+2.7 V _{DC}		+5.0 V _{DC}
Switch Isolation	15 dB	20 dB	
Input P _{1dB}	-20 dBm		
Reference Frequency		10 MHz	
Reference Input Power	-5 dBm	+3 dBm	
Reference Damage Level			+10 dBm
RF Damage Level			-15 dBm
Return Loss		10 dB	
Bias Voltage	+8 V _{DC}	+12 V _{DC}	+15 V _{DC}
Bias Current		750 mA	
Specification Temperature		+25 °C	
Operating Temperature	+0 °C		+50 °C



NOISE FIGURE & GAIN TEST EXTENDERS

FAMILY: STC
W BAND

STC-75311405-10-C1

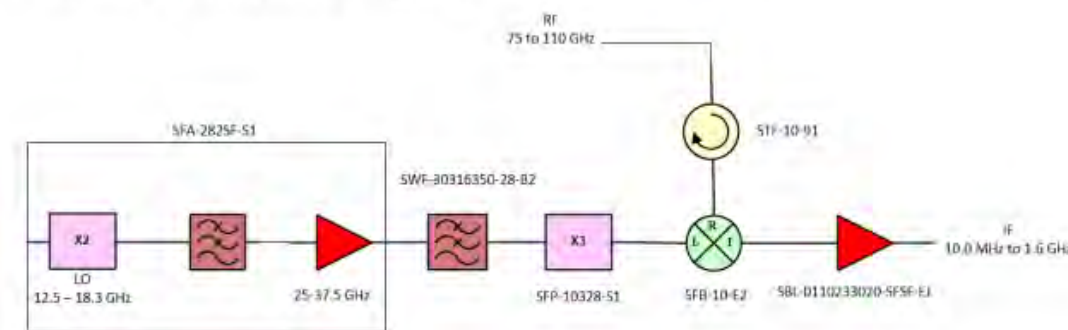
Features:

- 26.5 to 170 GHz Coverage
- Full Waveguide Band
- Flat ENR
- More than 10 Models

Parameter	Minimum	Typical	Maximum
RF Frequency	75.0 GHz		110.0 GHz
Noise Source ENR	10.0 dB	12.0 dB	
Noise Source Bias Voltage/Current	+18 V _{DC} /50 mA	+28 V _{DC} /60 mA	+30 V _{DC} /75 mA
Down Converter IF Frequency	10.0 MHz		1.6 GHz
Down Converter LO Frequency/Power	12.5 GHz/+3 dBm	15.4/+5 dBm	18.3 GHz/+20 dBm
Down Converter LO Damage Level			+20 dBm
Down Converter RF Damage Level			+15 dBm
Down Converter Noise Figure		13 dB	
Down Converter Gain		20 dB	
Down Converter Bias Voltage	+8 V _{DC}	+12 V _{DC}	+15 V _{DC}
Down Converter Bias Current		450 mA	
Specification Temperature		+25 °C	
Operating Temperature	0 °C		+50 °C



Simplified System Block Diagram:



CONCLUSION

- ERAVANT has designed and fabricated total microwave and millimeterwave band COTS (Commercial of The Shelf) components and sub-assemblies to support full industrial applications. The product families are organized into 10 product families.
 - Antennas
 - Amplifiers
 - Coaxial Passive Components
 - Frequency Converters
 - Control Devices
 - Ferrite Devices
 - Oscillators
 - Subsystems
 - Test Equipment
 - Waveguide Passive Components
- While some of these products as shown in this presentation are designed for and manufactured for Communication System Application, many products and custom solutions are available per requests. Contact support@eravant.com for more information.

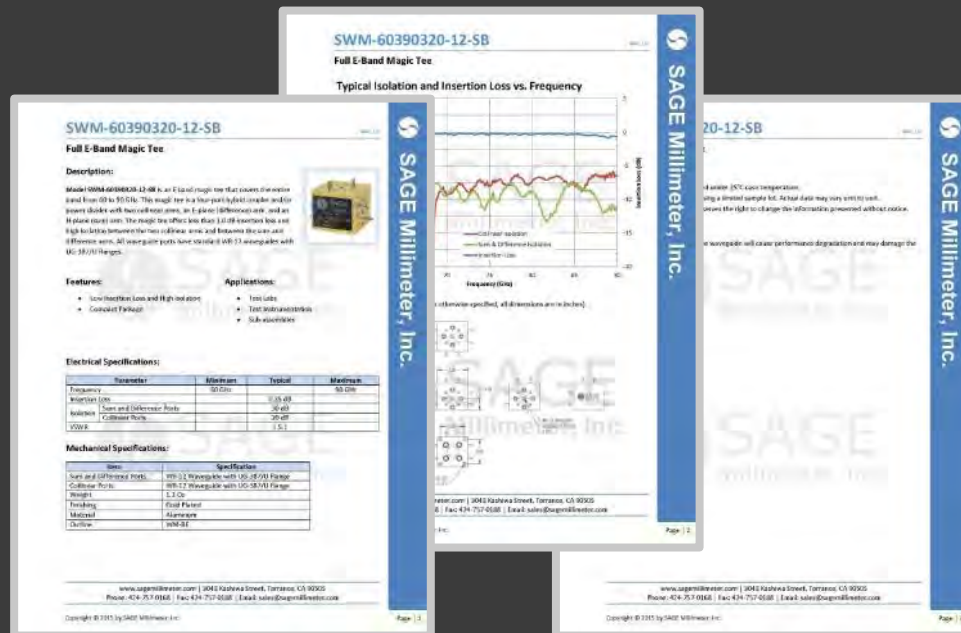
ERAVANT

NEXT GENERATION MILLIMETERWAVE COMPONENTS

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- Price and Delivery Available Online
- Product Categorization Filters
- Blogs, Calculators and Publications



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-00210-S2	110 GHz	170 GHz	0 dBm	55 GHz	55 GHz	+10 dBm	WR-06 Waveguide	WR-12 Waveguide	Datasheet	View
SFP-00210-US	110 GHz	170 GHz	-3 dBm	55 GHz	55 GHz	+20 dBm	WR-06 Waveguide	WR-10 Waveguide	Datasheet	View
SFP-00210-S2	140 GHz	220 GHz	-3 dBm	70 GHz	110 GHz	+17 dBm	WR-04 Waveguide	WR-10 Waveguide	Datasheet	View
SFP-223403200-28SF-S1	22 GHz	40 GHz	+5 dBm	11 GHz	20 GHz	+10 dBm	WR-28 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-243403200-28SF-S1	24 GHz	42 GHz	+3 dBm	8 GHz	14 GHz	+20 dBm	WR-28 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-2635F-4-9	26.5 GHz	40 GHz	+5 dBm	8.37 GHz	13.33 GHz	+20 dBm	WR-28 Waveguide	SMA (F)	Datasheet	View
SFP-273403200-28SF-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	60 GHz	+3 dBm	11 GHz	18.87 GHz	+20 dBm	WR-22 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-222VF-S1	33 GHz	50 GHz	+7 dBm	16.5 GHz	25 GHz	+20 dBm	WR-22 Waveguide	2.92 mm (F)	Datasheet STEP File	View
SFP-303673200-19SF-N1	57 GHz	90 GHz	+3 dBm	12 GHz	19 GHz	+20 dBm	WR-18 Waveguide	SMA (F)	Datasheet STEP File	View
SFP-102VF-S1	40 GHz	60 GHz	+5 dBm	20 GHz	30 GHz	+20 dBm	WR-14 Waveguide	2.92 mm (F)	Datasheet STEP File	View