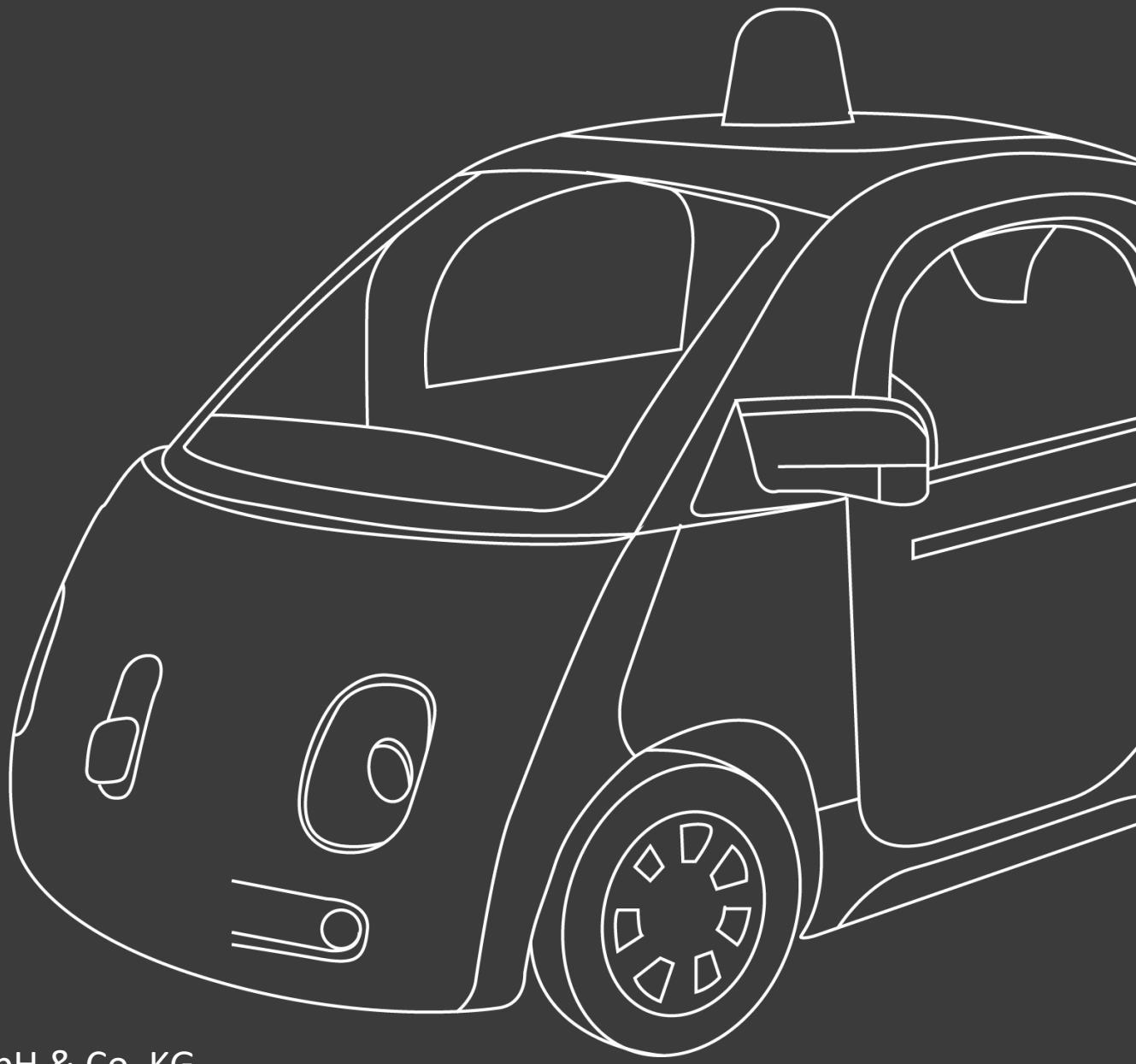
ERAVANT

NEXT GENERATION MILLIMETERWAVE COMPONENTS

# COMPONENTS FOR MILLIMETERWAVE 5G & IOT SYSTEMS

TACTRON ELEKTRONIK



ERAVANT is supported by TACTRON ELEKTRONIK GmbH & Co. KG

# CONTENTS

# 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 in broadband for 5G and IoT System Applications.**
- Our full product offering, including Limited Run models, are listed on our website at www.eravant.com.

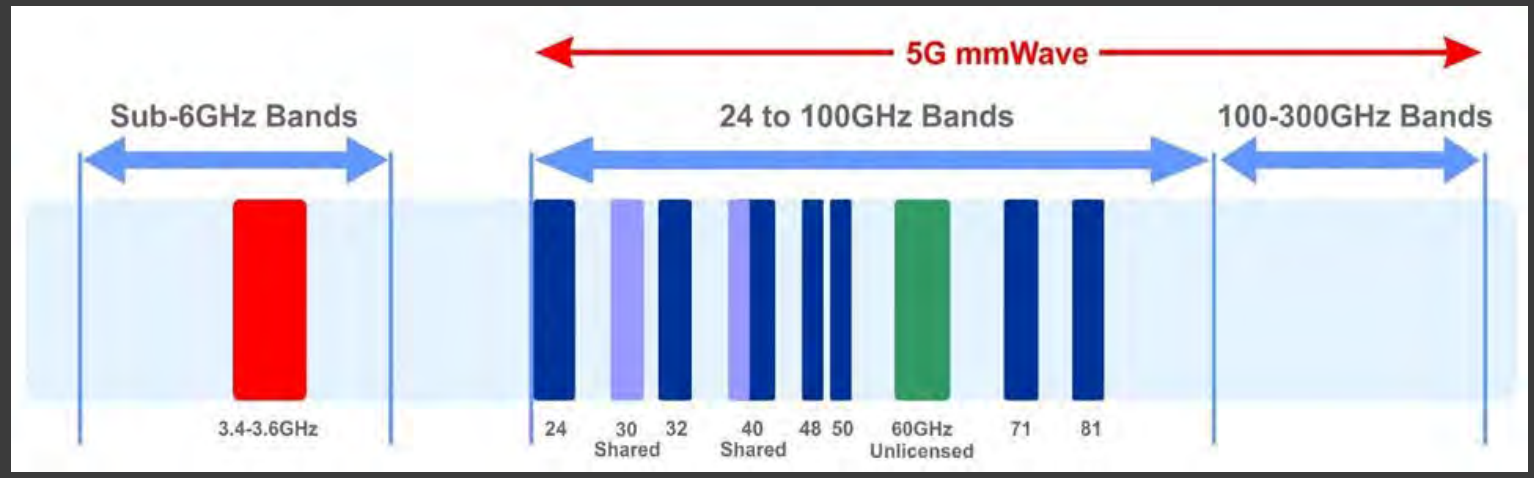
**Additional products and presentations are available upon customer request:**

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

# 5G FREQUENCY SPECTRUM

**Millimeter 5G Frequency Bands**

- Ka Band: 24 to 34 GHz
- Q Band: 37 to 53 GHz
- V Band: 55 to 76 GHz
- E Band: 81 to 86 GHz



# ERAVANT PRODUCT OFFERINGS

- **Eravant** offers Total Product Solutions to configure any system application in the Frequency Range of DC to 220 GHz.
- Although the standard models are specified for full waveguide band operations, they can cover many Extended Millimeter Wave 5G Bands.
- While thousands of offered modules cover the Full Spectrum of the Millimeter Wave 5G Band, this presentation focuses on the products especially developed for Millimeter Wave 5G Spectrum. The examples are,
    - Beamforming, Omni-Directional, Dual Polarized Antennas
    - Broadband, Low Noise and Power Amplifiers
    - Frequency Converters and Multipliers
    - Control Devices
    - Ferrite Devices
    - Passive Components and Ferrite Devices

# ERAVANT ANTENNAS

The focus of this presentation section is to introduce the **Eravant** antenna product family by highlighting some representative models. There are several hundred standard models available to satisfy all 5G system applications. The antenna family includes the following types:

- Rectangular Horn Antenna
- Circular Horn Antenna
- Scalar Feed Horn Antenna
- Choke Flange Feed Horn Antenna
- Lens Correct Horn Antenna
- Gaussian Optics Antenna
- Microstrip Patch Array Antenna
- Omni Directional Antenna
- Probe Antenna
- Polarizer
- Orthomode Transducer
- Slotted Waveguide Array Antenna
- Cassegrain Antenna

# ANTENNAS

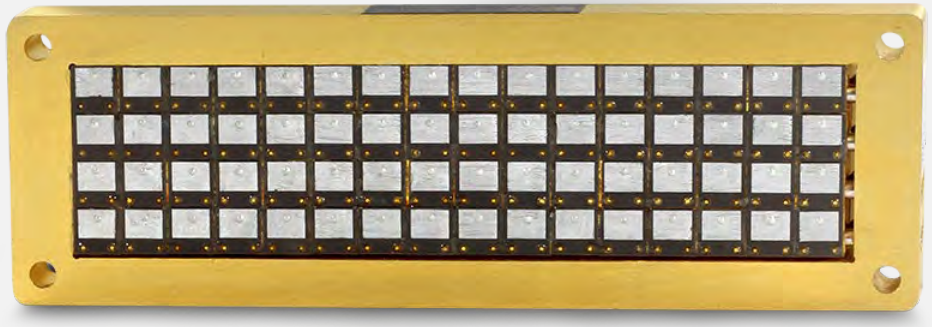
# BEAMFORMING ANTENNA

## SAM-2832830695-DM-L1-64C

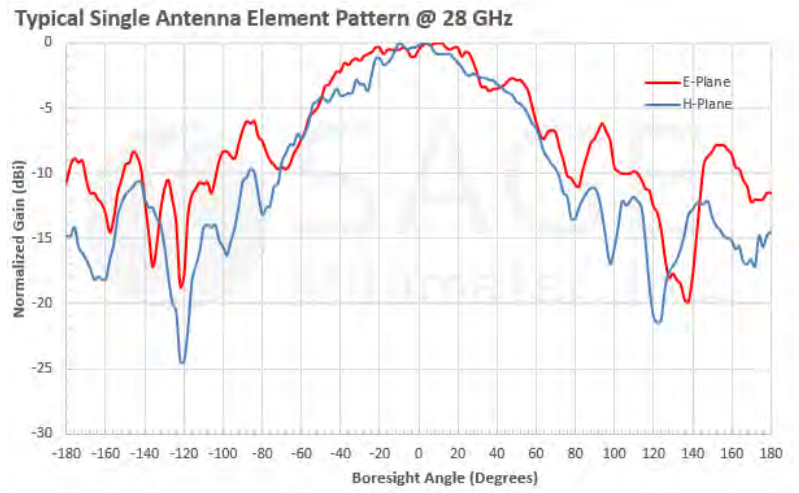
28 GHz

**Features:**

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



| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | | 28.0 GHz | |
| Bandwidth | | ±0.1 GHz | |
| Single Patch Gain | | 6.0 dBi | |
| 3 dB Beamwidth | 50° (Vertical, E Plane) x 95° (Horizontal, H Plane) | | |
| Sidelobe Level | | -12 dB | |
| Array Gain (Fed in Phase) | 24.0 dBi | | |
| Array 3 dB Beamwidth (Fed in Phase) | 4° (Vertical, E Plane) x 17° (Horizontal, H Plane) | | |
| Array Sidelobe Level (Fed in Phase) | -12 dB | | |
| Polarization | Linear | | |
| Return Loss | | 6 dB | |
| Specification Temperature | | +25 °C | |
| Operating Temperature | -40 °C | | +85 °C |



# BEAMFORMING ANTENNA

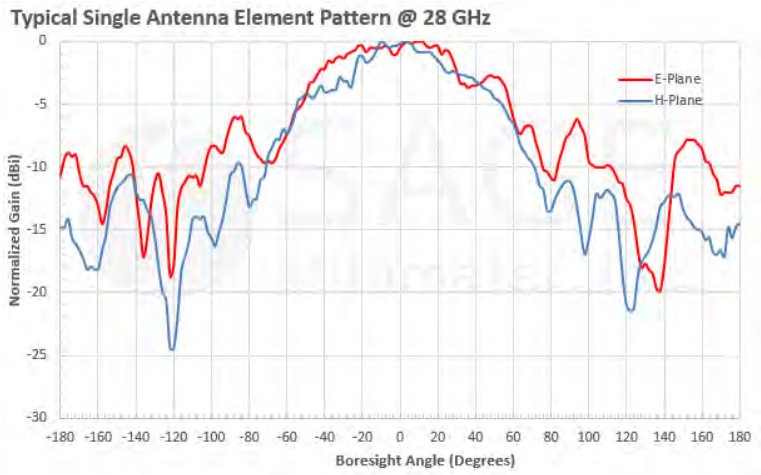
## SAM-2832830695-DM-L1-32C-1

28 GHz

**Features:**

- 28 GHz
- Beamforming Feasibility
- 1 x 32 Elements
- Various Array Configurations

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | | 28.0 GHz | |
| Bandwidth | | ±0.1 GHz | |
| Single Patch Gain | | 6.0 dBi | |
| 3 dB Beamwidth | 50° (Vertical, E Plane) x 95° (Horizontal, H Plane) | | |
| Sidelobe Level | | -12 dB | |
| Array Gain (Fed in Phase) | 21.0 dBi | | |
| Array 3 dB Beamwidth (Fed in Phase) | 50° (Vertical, E Plane) x 3° (Horizontal, H Plane) | | |
| Array Sidelobe Level (Fed in Phase) | -12 dB | | |
| Polarization | Linear | | |
| Return Loss | | 6 dB | |
| Specification Temperature | | +25 °C | |
| Operating Temperature | -40 °C | | +85 °C |



# BEAMFORMING ANTENNA

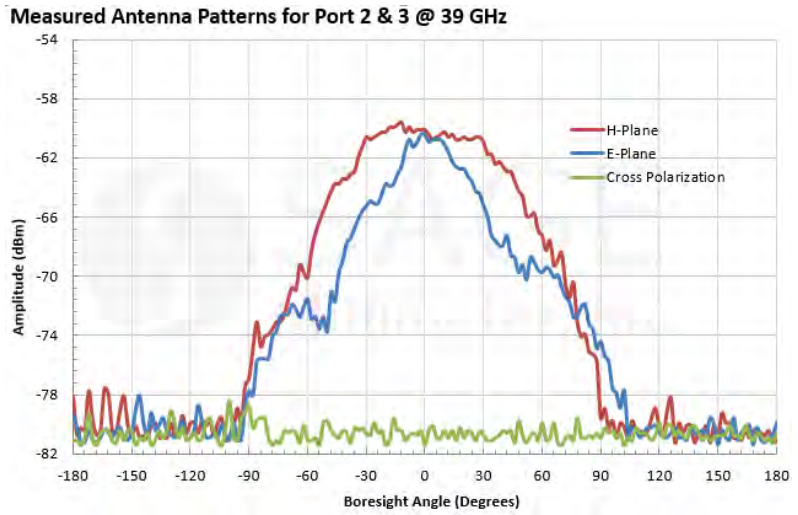
## SAM-3934030695-2F-L1-4C

39 GHz

**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 |



# BEAMFORMING ANTENNA

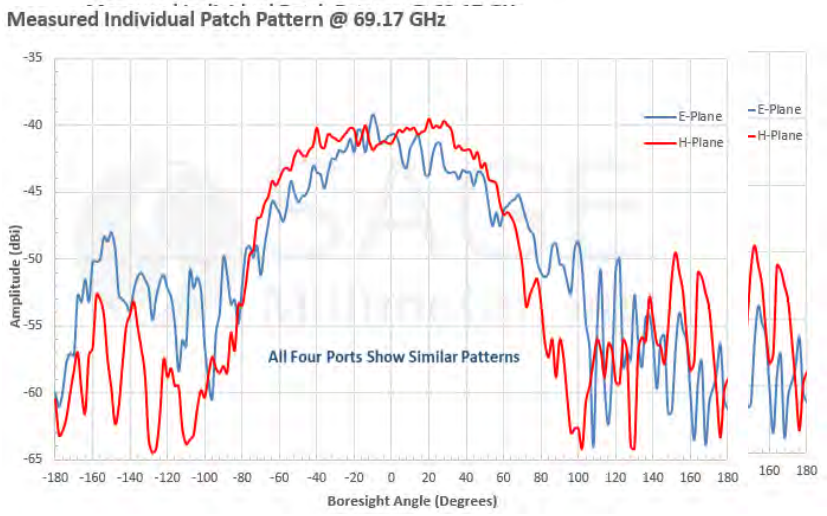
## SAM-6837030395-15-L2-4W

69 GHz

**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 |



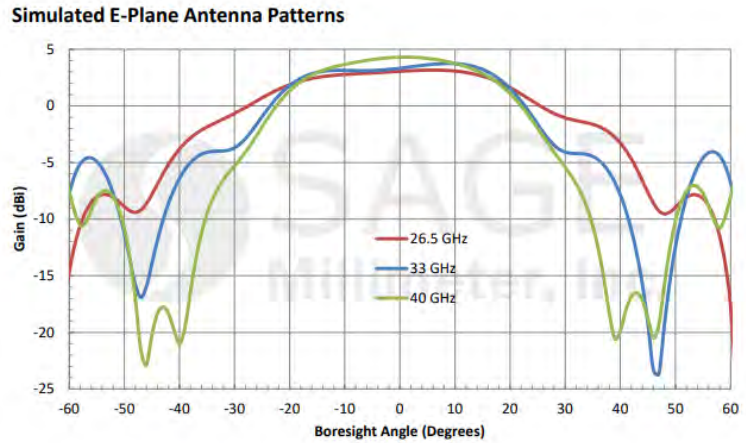
# OMNI-DIRECTIONAL ANTENNA

**SAO-2734030345-28-S1**
Ka BAND

**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 |



# OMNI-DIRECTIONAL ANTENNA

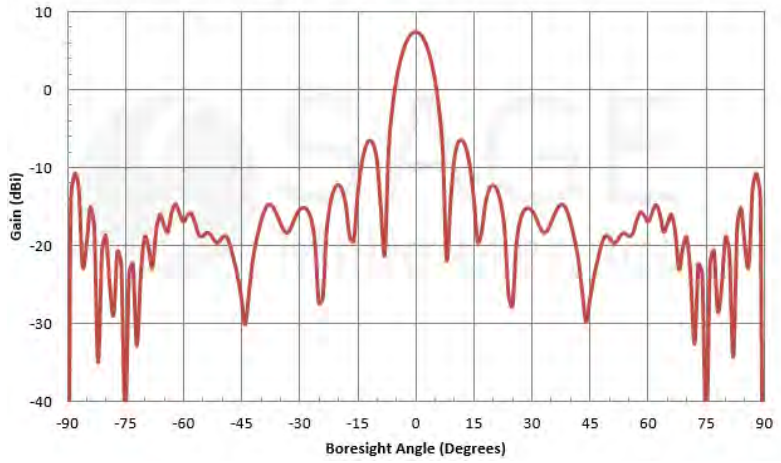
**SAO-2734030810-28-S1**
Ka BAND

**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

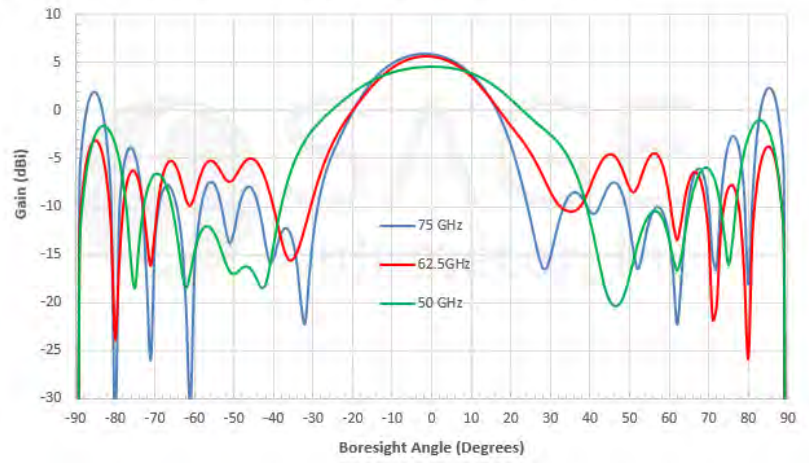
**SAO-5037530230-15-S1**
V BAND

**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

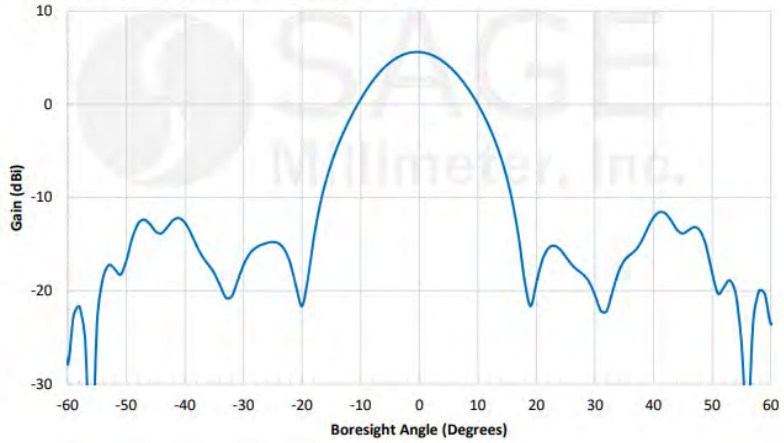
**SAO-4036030415-19-S1**
U BAND

**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

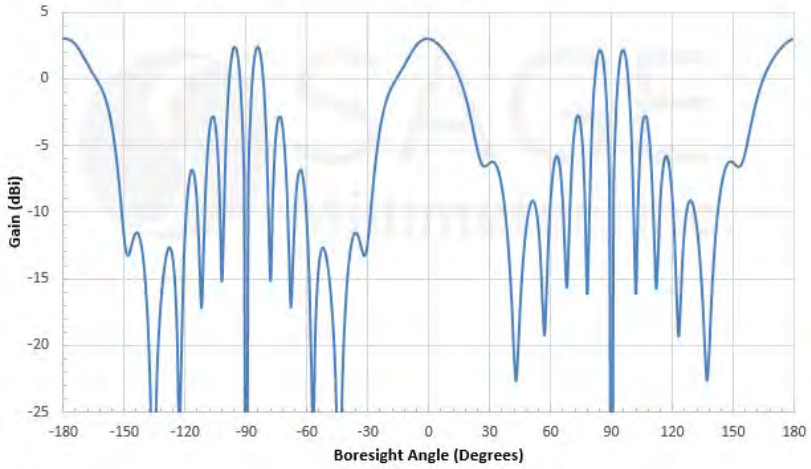
**SAO-6039030230-12-S1**
E BAND

**Features:**

- 60 to 90 GHz
- 360° Azimuth Coverage
- 30° Vertical 3 dB Bandwidth
- Vertically Polarized
- Full E 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**



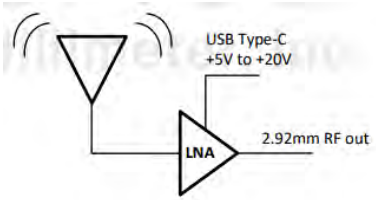
# OMNI-DIRECTIONAL ANTENNA

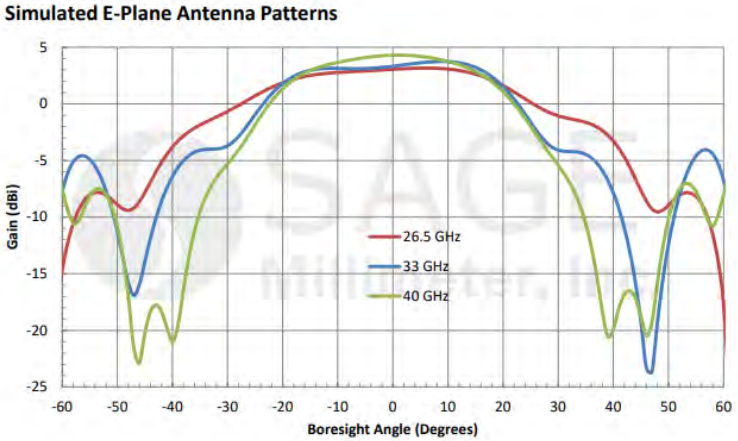
**SAO-2734033045-KF-C1-BL**
ACTIVE, Ka BAND

**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 |



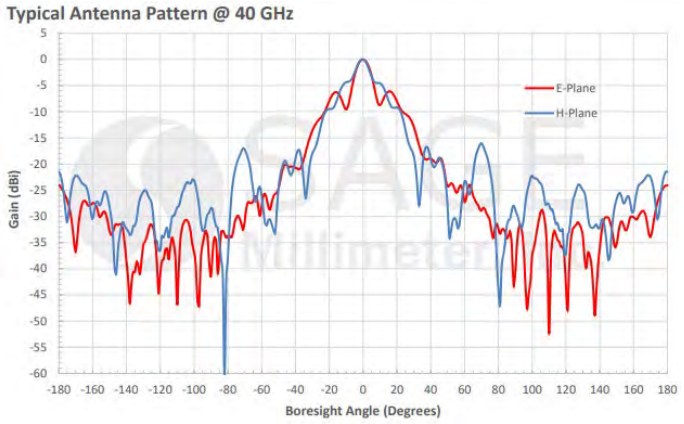
# DUAL RIDGED ANTENNA

**SAV-0434031427-KF-U5**
4 to 40 GHz

**Features:**

- 4 to 40 GHz
- Linear Polarized
- 6 Models to Cover up to 110 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 4 GHz | | 40 GHz |
| Gain | | 14 dBi | |
| Polarization | | Linear | |
| E-Plane 3 dB Beamwidth | | 27° | |
| H-Plane 3 dB Beamwidth | | 27° | |
| E-Plane Sidelobe Levels | | -10 dB | |
| H-Plane Sidelobe Levels | | -15 dB | |
| Return Loss | | 14 dB | |
| Cross Polarization | 25 dB | 30 dB | |
| Power Handling | | | 10 W (CW) |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |

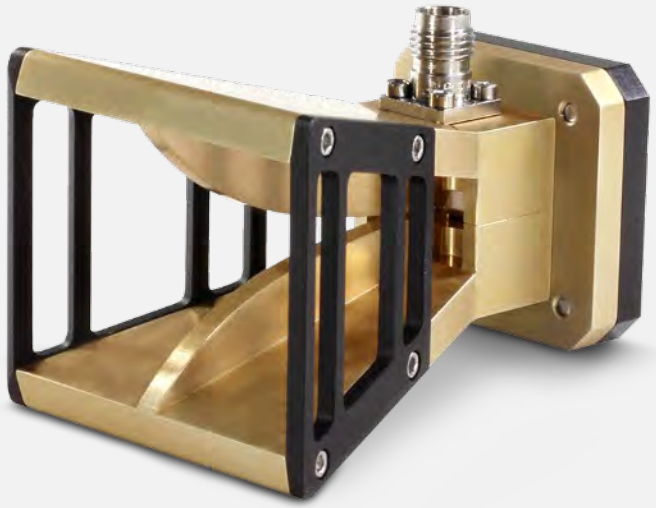


# DUAL RIDGED ANTENNA

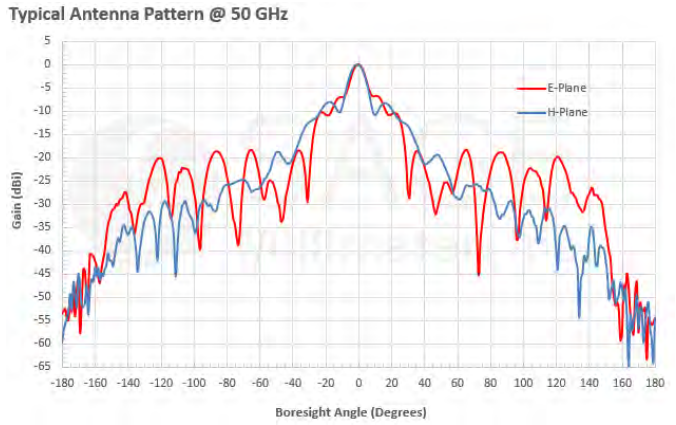
**SAV-4525031429-2F-U5**
4.5 to 50 GHz

**Features:**

- 4.5 to 50 GHz
- Linear Polarized
- 6 Models to Cover up to 110 GHz



| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 4.5 GHz | | 50 GHz |
| Gain | | 14 dBi | |
| Polarization | | Linear | |
| E-Plane 3 dB Beamwidth | | 29° | |
| H-Plane 3 dB Beamwidth | | 29° | |
| E-Plane Sidelobe Levels | | -15 dB | |
| H-Plane Sidelobe Levels | | -10 dB | |
| Return Loss | | 14 dB | |
| Cross Polarization | 25 dB | 30 dB | |
| Power Handling | | | 10 W (CW) |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |



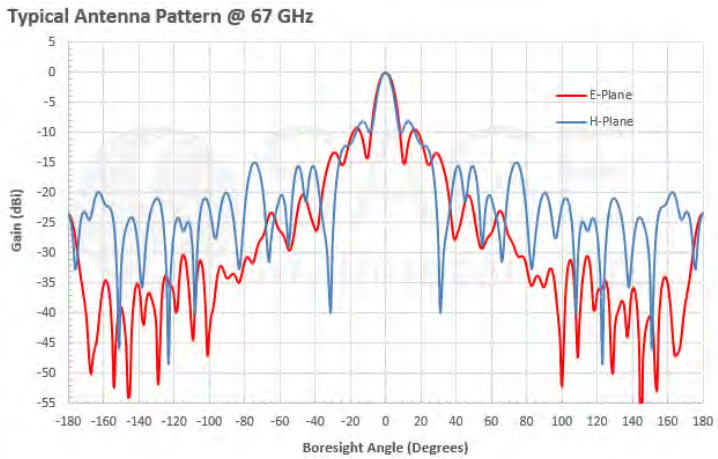
# DUAL RIDGED ANTENNA

**SAV-0636731522-VF-U5**
6 to 67 GHz

**Features:**

- 6 to 67 GHz
- Linear Polarized
- 6 Models to Cover up to 110 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 6 GHz | | 67 GHz |
| Gain | | 15 dBi | |
| Polarization | | Linear | |
| E-Plane 3 dB Beamwidth | | 22° | |
| H-Plane 3 dB Beamwidth | | 22° | |
| E-Plane Sidelobe Levels | | -10 dB | |
| H-Plane Sidelobe Levels | | -15 dB | |
| Return Loss | | 12 dB | |
| Cross Polarization | 20 dB | 25 dB | |
| Power Handling | | | 5 W (CW) |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |

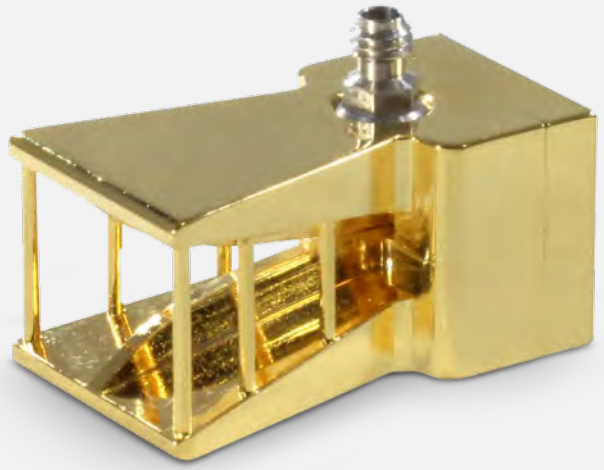


# DUAL RIDGED ANTENNA

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

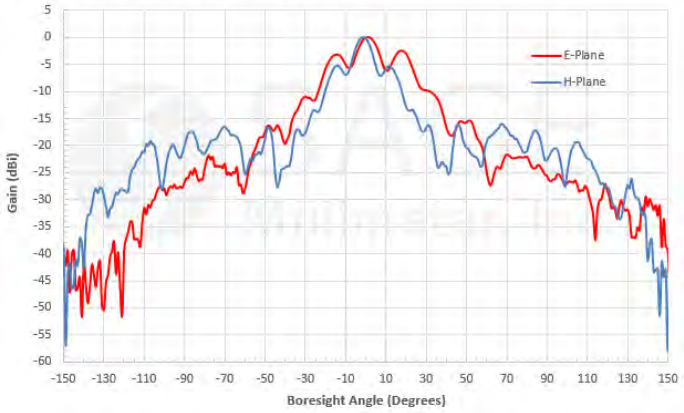
**Features:**

- 14 to 110 GHz
- Linear Polarized
- 6 Models to Cover up to 110 GHz



| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 14 GHz | | 110 GHz |
| Gain | | 15 dBi | |
| Polarization | | Linear | |
| E-Plane 3 dB Beamwidth | | 35° | |
| H-Plane 3 dB Beamwidth | | 35° | |
| E-Plane Sidelobe Levels | | -10 dB | |
| H-Plane Sidelobe Levels | | -15 dB | |
| Return Loss | | 10 dB | |
| Cross Polarization | 23 dB | 28 dB | |
| Power Handling | | | 4 W (CW) |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |

Typical Antenna Pattern @ 110 GHz



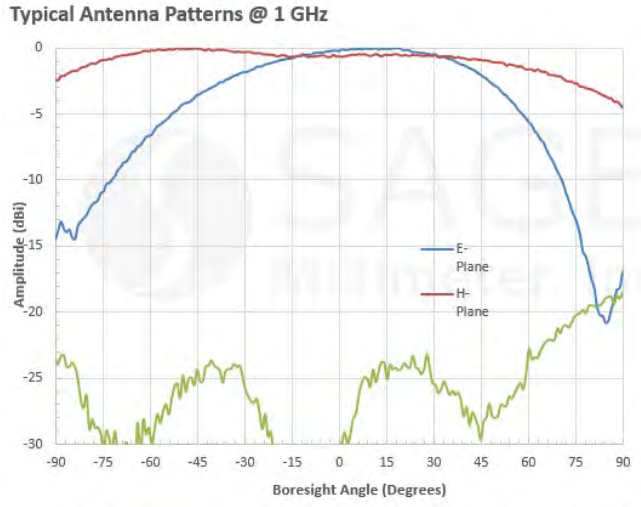
# QUAD RIDGED, DUAL POLARIZED ANTENNA

**SAV-0130430883-SF-U4-QR**
1 to 4 GHz

**Features:**

- 1 to 4 GHz
- Dual Polarized
- 5 Models to Cover up to 50 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 1.0 GHz | | 4.0 GHz |
| Gain | | 8.0 dBi | |
| Polarization | | Linear and Circular | |
| 3 dB Beamwidth, E-Plane | | 68° | |
| 3 dB Beamwidth, H-Plane | | 98° | |
| Side Lobes | | -10 dB | |
| Port Isolation | | 20 dB | |
| Return Loss | | 9 dB | |
| Specification Temperature | | +25 °C | |
| Operation Temperature | -45 °C | | +85 °C |



# QUAD RIDGED, DUAL POLARIZED ANTENNA

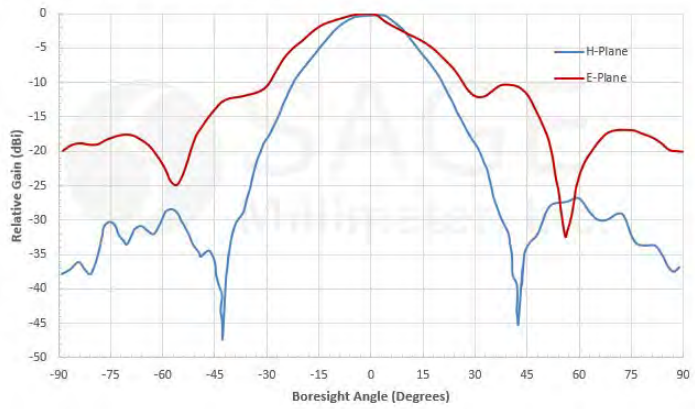
**SAV-0632531431-SF-U3-QR**
6 to 25 GHz

**Features:**

- 6 to 24.5 GHz
- Dual Polarized
- 5 Models to Cover up to 50 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 6.0 GHz | | 24.5 GHz |
| Gain | | 14 dBi | |
| Polarization | | Circular and Linear | |
| E-Plane 3 dB Beamwidth | | 26° | |
| H-Plane 3 dB Beamwidth | | 36° | |
| Port to Port Isolation | | 35 dB | |
| E-Plane Sidelobe Levels | | -17 dB | |
| H-Plane Sidelobe Levels | | -20 dB | |
| Return Loss | | 8 dB | |
| Cross Polarization | | -30 dB | |
| Power Handling | | | 25 W (CW) |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |

Typical Antenna Pattern @ 24.5 GHz

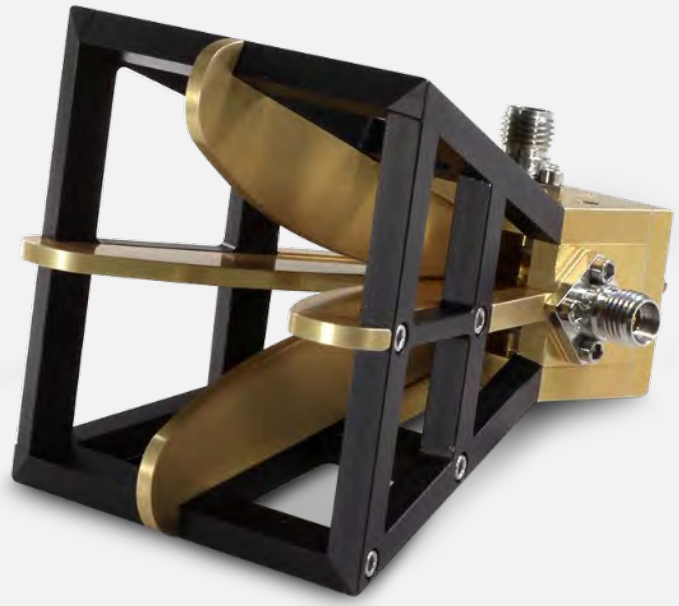


# QUAD RIDGED, DUAL POLARIZED ANTENNA

**SAV-0434031428-KF-U5-QR**
4 to 40 GHz

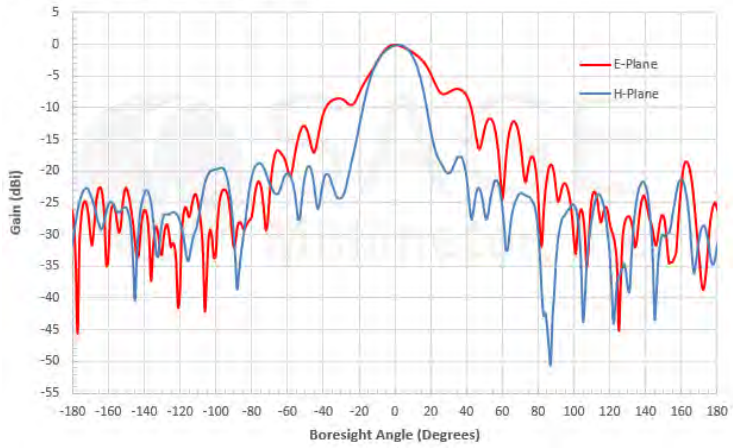
**Features:**

- 4 to 40 GHz
- Dual Polarized
- 5 Models to Cover up to 50 GHz



| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 4 GHz | | 40 GHz |
| Gain | | 14 dBi | |
| Polarization | | Linear and Circular | |
| E-Plane 3 dB Beamwidth | | 28° | |
| H-Plane 3 dB Beamwidth | | 28° | |
| Port to Port Isolation | 28 dB | 30 dB | |
| E-Plane Sidelobe Levels | | -10 dB | |
| H-Plane Sidelobe Levels | | -15 dB | |
| Return Loss | | 10 dB | |
| Cross Polarization | 23 dB | 28 dB | |
| Power Handling | | | 10 W (CW) |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |

Typical Antenna Pattern @ 40 GHz



# QUAD RIDGED, DUAL POLARIZED ANTENNA

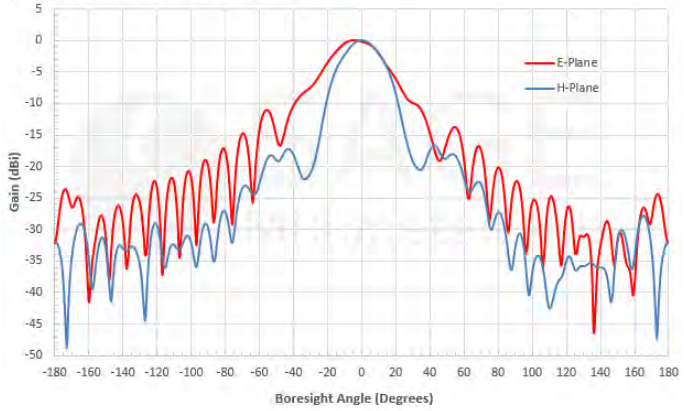
**SAV-0535031140-2F-U5-QR**
5 to 50 GHz

**Features:**

- 5 to 50 GHz
- Dual Polarized
- 5 Models to Cover up to 50 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 5 GHz | | 50 GHz |
| Gain | | 11 dBi | |
| Polarization | | Linear and Circular | |
| E-Plane 3 dB Beamwidth | | 40° | |
| H-Plane 3 dB Beamwidth | | 40° | |
| Port to Port Isolation | 28 dB | 30 dB | |
| E-Plane Sidelobe Levels | | -10 dB | |
| H-Plane Sidelobe Levels | | -15 dB | |
| Return Loss | | 10 dB | |
| Cross Polarization | 18 dB | 25 dB | |
| Power Handling | | | 5 W (CW) |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |

Typical Antenna Pattern @ 50 GHz

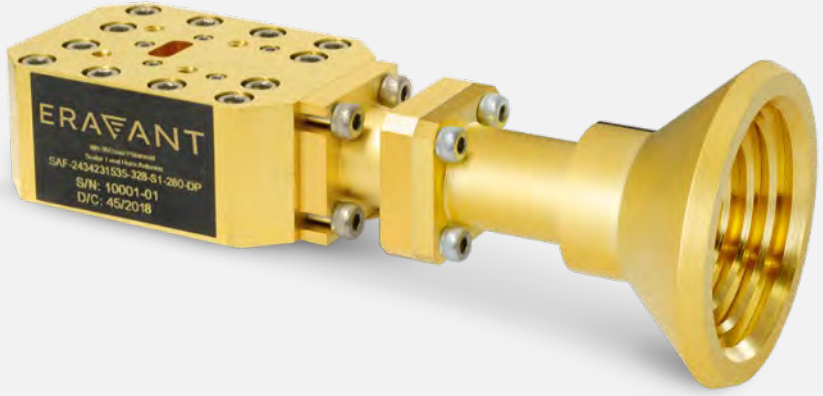


# DUAL POLARIZED SCALAR HORN ANTENNA

**SAF-2434231535-328-S1-280-DP**
24 to 42 GHz

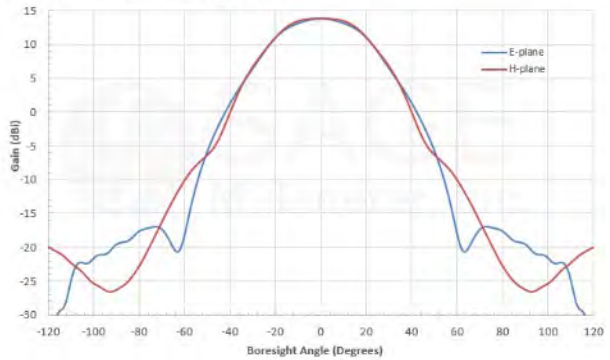
**Features:**

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

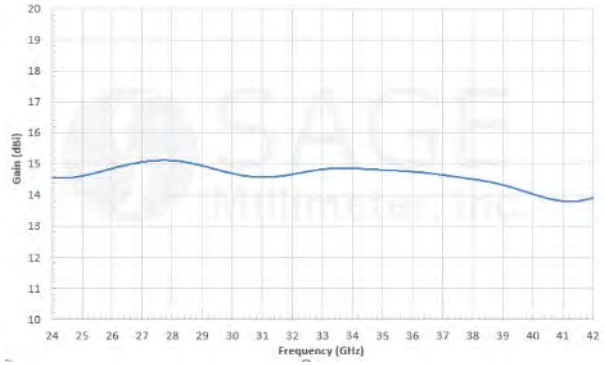



| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 24 GHz | | 42 GHz |
| Gain | | 15 dBi | |
| 3 dB Beamwidth, E-plane @ 33 GHz | | 35° | |
| 3 dB Beamwidth, H-plane @ 33 GHz | | 35° | |
| Sidelobe Levels | | -25 dB | |
| V and H Port Isolation | | 35 dB | |
| Cross Polarization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

Simulated Antenna Patterns @ 42 GHz




Simulated Gain vs. Frequency



# DUAL POLARIZED SCALAR HORN ANTENNA

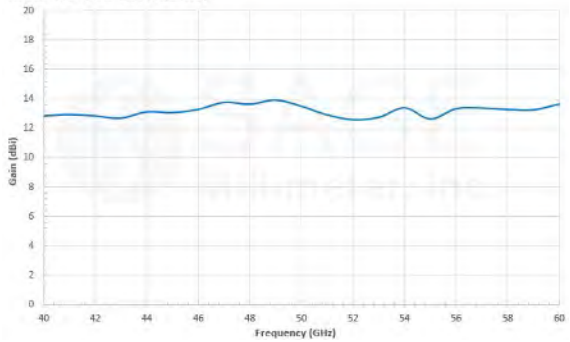
**SAF-4036031340-219-S1-188-DP**
40 to 60 GHz

**Features:**

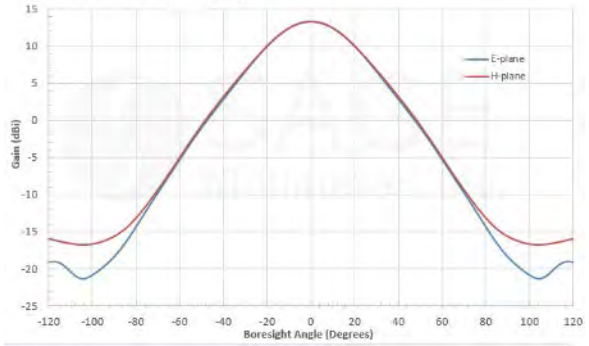
- 40 to 60 GHz
- Gain 13 dBi
- 3 dB Beamwidth 40°
- Dual Polarized
- 7 Models to Cover up to 110 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 40 GHz | 50 GHz | 60 GHz |
| Gain | | 13 dBi | |
| 3 dB Beamwidth, E-plane | | 40° | |
| 3 dB Beamwidth, H-plane | | 40° | |
| Sidelobe Levels | | -25 dB | |
| V and H Port Isolation | | 35 dB | |
| Cross Polarization Rejection | | 30 dB | |
| Port Return Loss | | 15 dB | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |

Measured Gain vs. Frequency




Simulated Antenna Patterns @ 50 GHz



# DUAL POLARIZED SCALAR HORN ANTENNA

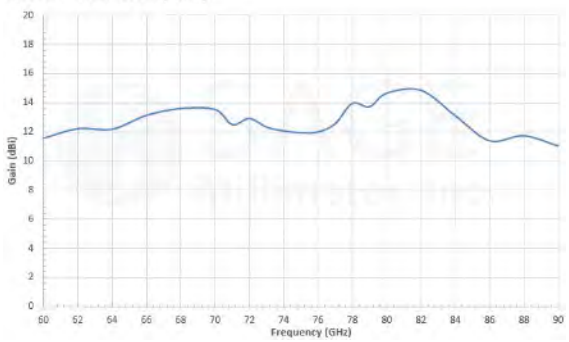
**SAF-6039031340-141-S1-122-DP**
60 to 90 GHz

**Features:**

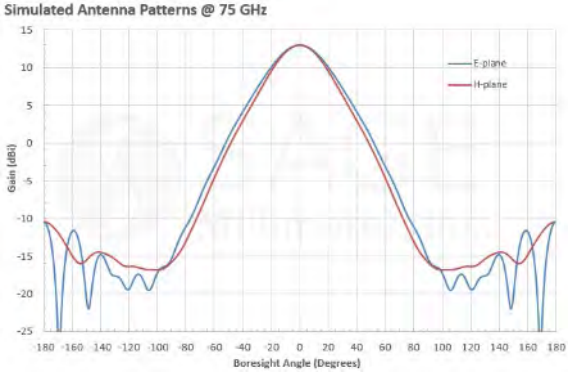
- 60 to 90 GHz
- Gain 13 dBi
- 3 dB Beamwidth 35°
- Dual Polarized
- 7 Models to Cover up to 110 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 60 GHz | 75 GHz | 90 GHz |
| Gain | 11 dBi | 13 dBi | 16 dBi |
| 3 dB Beamwidth, E-plane | | 40° | |
| 3 dB Beamwidth, H-plane | | 40° | |
| Sidelobe Levels | | -25 dB | -20 dB |
| V and H Port Isolation | 30 dB | 35 dB | |
| Cross Polarization Rejection | | 30 dB | |
| Port Return Loss | 10 dB | 15 dB | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |

Measured Gain vs. Frequency




Simulated Antenna Patterns @ 75 GHz



# DUAL POLARIZED SCALAR HORN ANTENNA

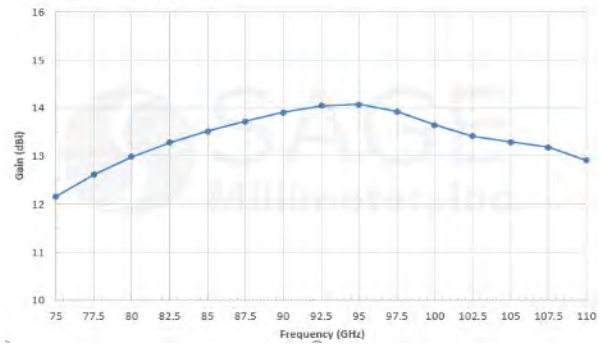
**SAF-7531141340-110-S1-100-DP**
75 to 110 GHz

**Features:**

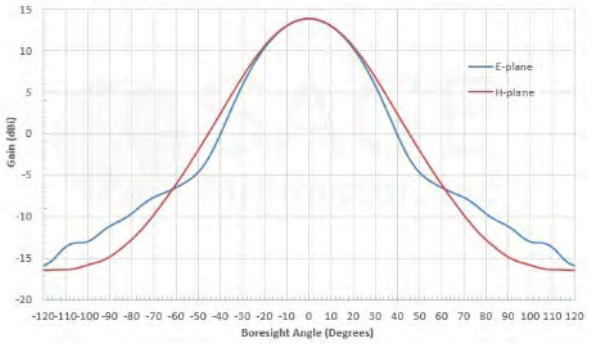
- 75 to 110 GHz
- Gain 13 dBi
- 3 dB Beamwidth 40°
- Dual Polarized
- 7 Models to Cover up to 110 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 75 GHz | 92.5 GHz | 110 GHz |
| Gain | | 13 dBi | |
| 3 dB Beamwidth, E-plane | | 40° | |
| 3 dB Beamwidth, H-plane | | 40° | |
| Sidelobe Levels | | -25 dB | |
| V and H Port Isolation | | 30 dB | |
| Cross Polarization Rejection | | 30 dB | |
| Port Return Loss | | 15 dB | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |

Simulated Gain vs. Frequency




Simulated Antenna Patterns @ 90 GHz

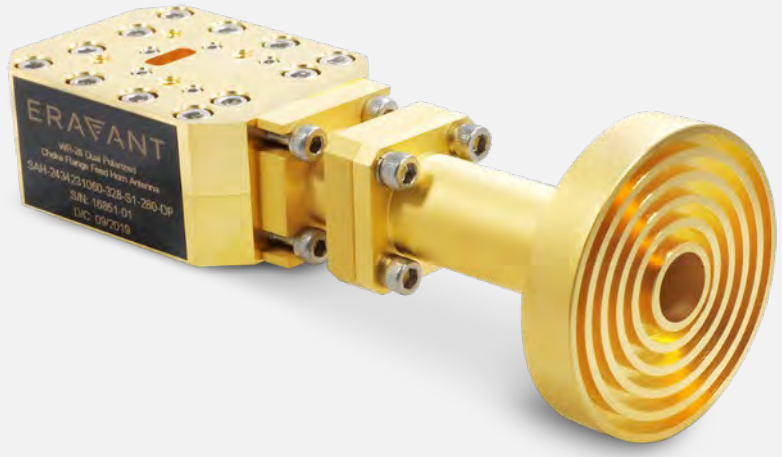


# DUAL POLRIZED CHOKE FLANGE HORN ANTENNA

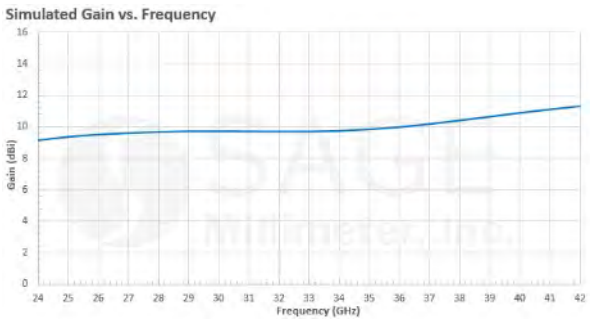
**SAH-2434231060-328-S1-280-DP**
24 to 42 GHz

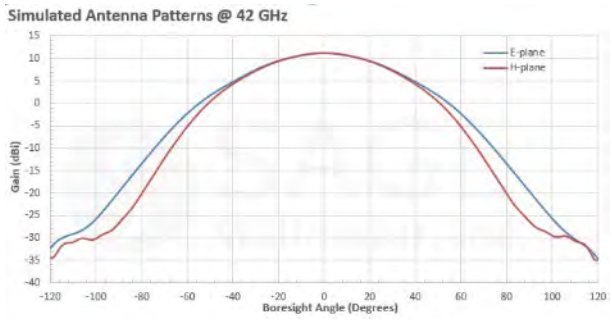
**Features:**

- 24 to 42 GHz
- Gain 10 dBi
- 3 dB Beamwidth 60°
- Dual Polarized
- 4 Models to Cover up to 110 GHz




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 24 GHz | 33 GHz | 42 GHz |
| Gain | | 10 dBi | |
| 3 dB Beamwidth, E-plane @ 33 GHz | | 60° | |
| 3 dB Beamwidth, H-plane @ 33 GHz | | 60° | |
| Sidelobes, E-plane | | -25 dB | |
| Sidelobes, H-plane | | -35 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 |



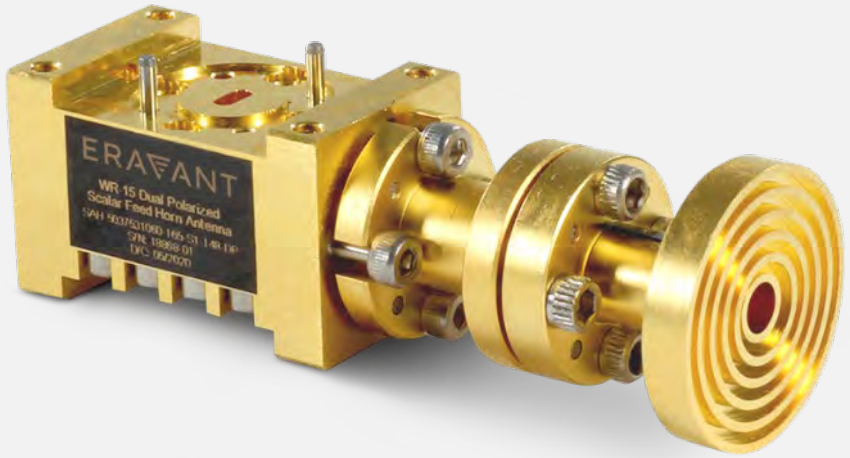



# DUAL POLRIZED CHOKE FLANGE HORN ANTENNA

**SAH-5037531060-165-S1-148-DP**
50 to 75 GHz

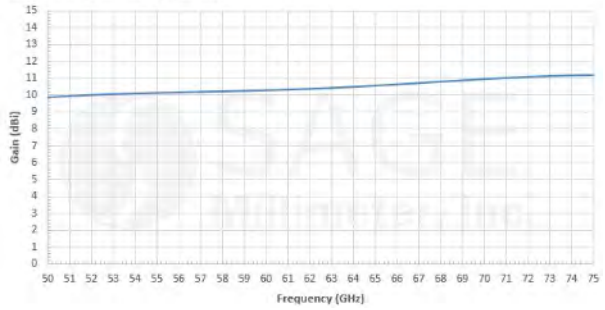
**Features:**

- 50 to 75 GHz
- Gain 10 dBi
- 3 dB Beamwidth 60°
- Dual Polarized
- 4 Models to Cover up to 110 GHz

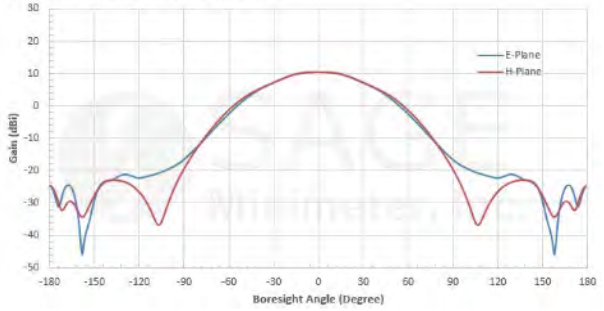



| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 50 GHz | | 75 GHz |
| Gain | | 10 dBi | |
| 3 dB Beamwidth, E-plane @ 62 GHz | | 60° | |
| 3 dB Beamwidth, H-plane @ 62 GHz | | 60° | |
| Sidelobe Levels | | -30 dB | |
| V and H Port Isolation | | 40 dB | |
| Cross Polarization 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 @ 62 GHz



# AMPLIFIERS

# ERAVANT AMPLIFIERS

The focus of this presentation section is to introduce the **Eravant** amplifier product family by highlighting some representative models. There are several hundred standard models available to satisfy all 5G system applications. The amplifier family includes the following types:

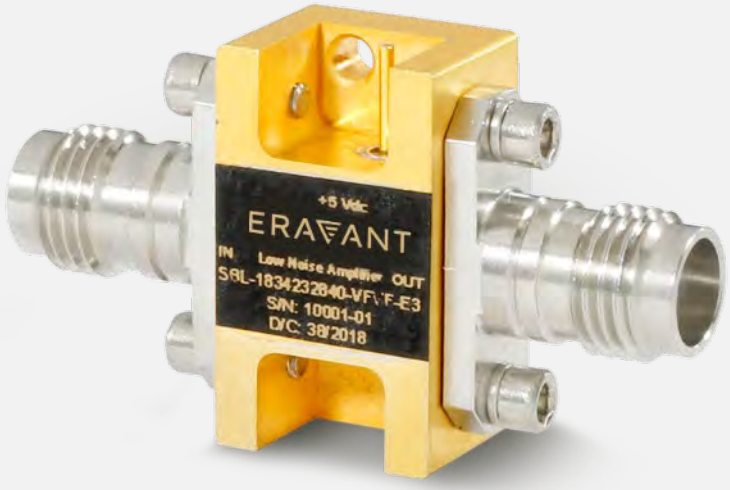
- Broad Bandwidth Amplifier
- Low Noise Amplifier
- Power Amplifier
- GaN Power Amplifier
- Bench Top Test Amplifier

# BROADBAND AMPLIFIER

**SBB-1834232815-KFKF-E3**
18 to 42 GHz

**Features:**

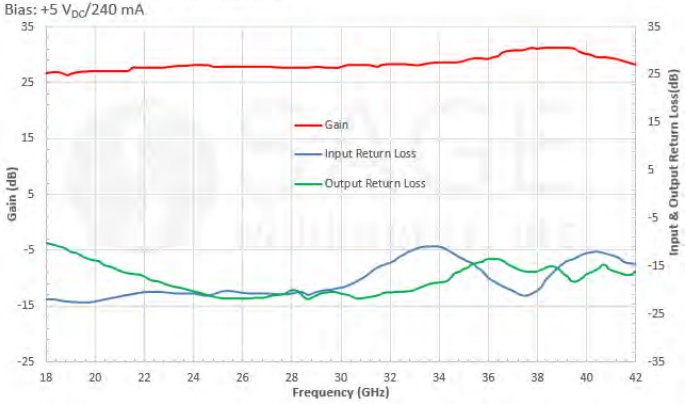
- 18 to 42 GHz
- 5G Band
- Gain 28 dBi
- SBB Family Has More than 50 Models




| 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

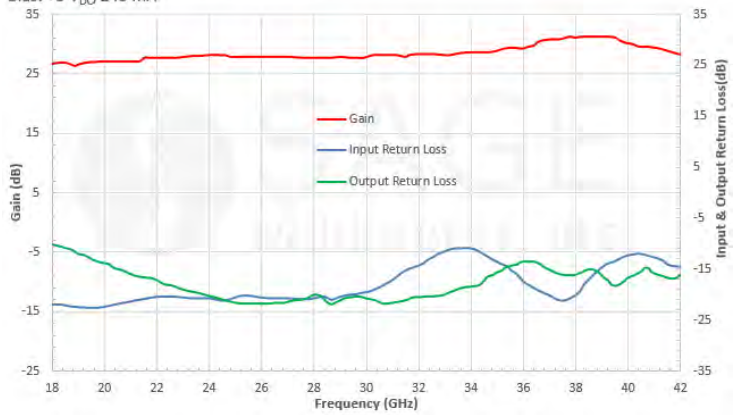
**SBL-1834232840-KFKF-E3-U**
18 to 42 GHz

**Features:**

- 18 to 42 GHz
- 5G Band
- Gain 28 dBi
- USB Powered


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 18 GHz | | 42 GHz |
| Gain | | 28 dB | |
| Noise Figure | | 4 dB | |
| $P_{1dB}$ | | +15 dBm | |
| RF Input Power | | | -5 dBm |
| Damage RF Input Power | | | 0 dBm |
| Input Return Loss | | 10 dB | |
| Output Return Loss | | 10 dB | |
| DC Voltage | | +5 $V_{DC}$ | +20 $V_{DC}$ |
| DC Supply Current | | 240 mA | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +60 ˚C |

Typical Performance vs. Frequency
Bias: +5 $V_{DC}$/240 mA

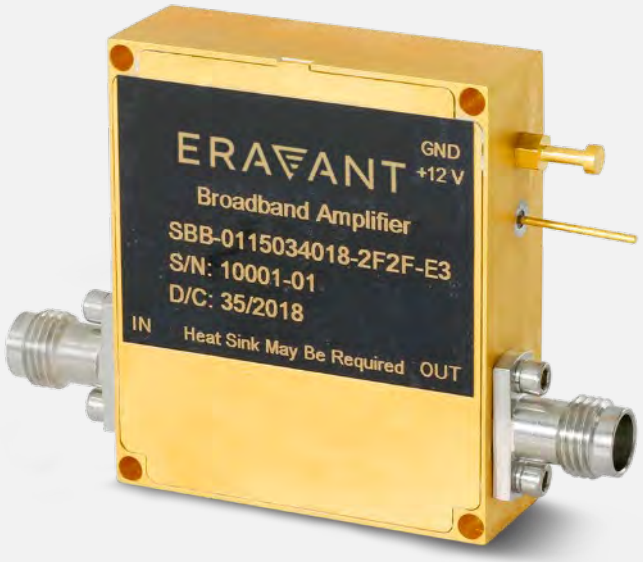


# ULTRA BROADBAND AMPLIFIER

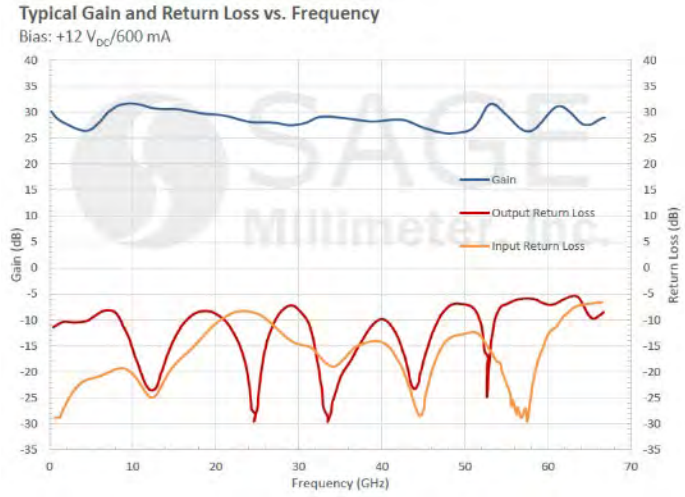
**SBB-0117033015-VFVF-E3**
10 MHz to 70 GHz

**Features:**

- 10 MHz to 70 GHz
- +16 dBm Psat
- 30 dB Nominal Gain
- SBB Family Covers up to 70 GHz




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency Range | 0.01 GHz | | 70 GHz |
| Gain | | 30 dB | |
| $P_{1dB}$ | | +15 dBm | |
| $P_{sat}$ | | +16 dBm | |
| Noise Figure | | 6.0 dB | |
| $P_{in}$ | | | +5 dBm |
| Input Return Loss | | 10 dB | |
| Output Return Loss | | 10 dB | |
| DC Voltage | | +12 $V_{DC}$ | |
| DC Supply Current | | 600 mA | 650 mA |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |



# BROADBAND LOW NOISE AMPLIFIER

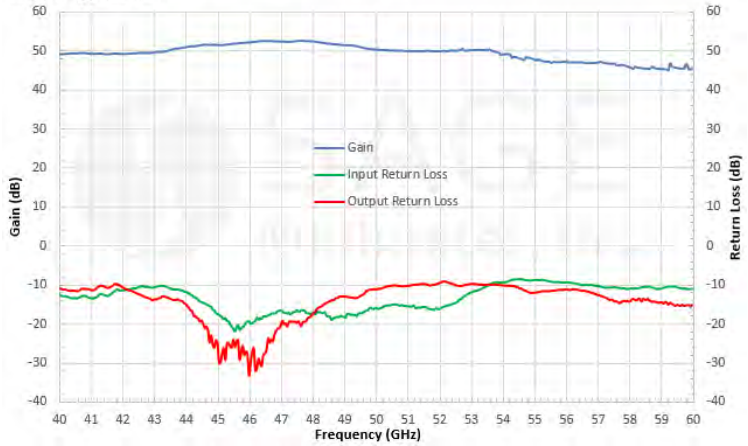
**SBL-4036035060-1919-E1**
40 to 60 GHz

**Features:**

- 40 to 60 GHz
- 6 dB Noise Figure
- 50 dB Nominal Gain
- SBL Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 40 GHz | | 60 GHz |
| Gain | | 50 dB | |
| Noise Figure (40-53 GHz) | | 6 dB | |
| Noise Figure (53-60 GHz) | | 7 dB | |
| $P_{1dB}$ | | 11 dB | |
| $P_{in}$ | | | -15 dBm |
| Input Return Loss | | 10 dB | |
| Output Return Loss | | 10 dB | |
| DC Voltage | | +6 $V_{DC}$ | +15 $V_{DC}$ |
| DC Supply Current | | 450 mA | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

**Typical Gain and Return Loss vs. Frequency**
Bias: +8 $V_{DC}$/450 mA



# BROADBAND LOW NOISE AMPLIFIER

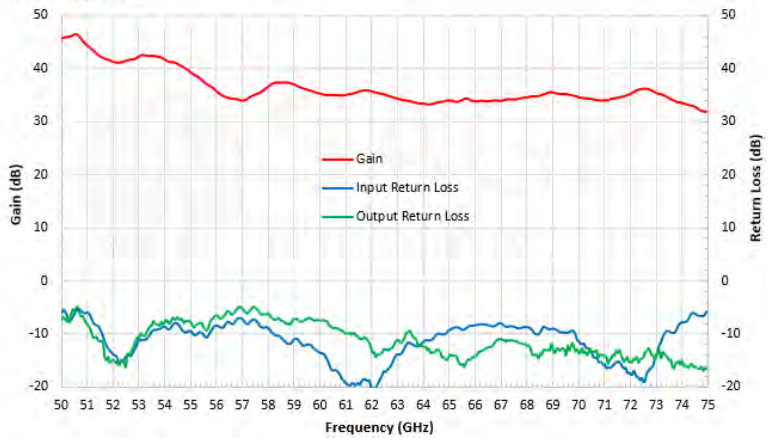
**SBL-5037533550-1515-E1**
50 to 75 GHz

**Features:**

- 50 to 75 GHz
- 5 dB Noise Figure
- 35 dB Nominal Gain
- SBL Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 50 GHz | | 75 GHz |
| Gain | | 35 dB | |
| Noise Figure | | 5 dB | |
| $P_{1dB}$ | | +11 dBm | |
| $P_{in}$ | | | -20 dBm |
| Input Return Loss | | 8 dB | |
| Output Return Loss | | 8 dB | |
| DC Voltage | +6 $V_{DC}$ | +8 $V_{DC}$ | +15 $V_{DC}$ |
| DC Supply Current | | 150 mA | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

**Typical Gain and Return Loss vs. Frequency**
Bias: +8 $V_{DC}$/150 mA



# BROADBAND LOW NOISE AMPLIFIER

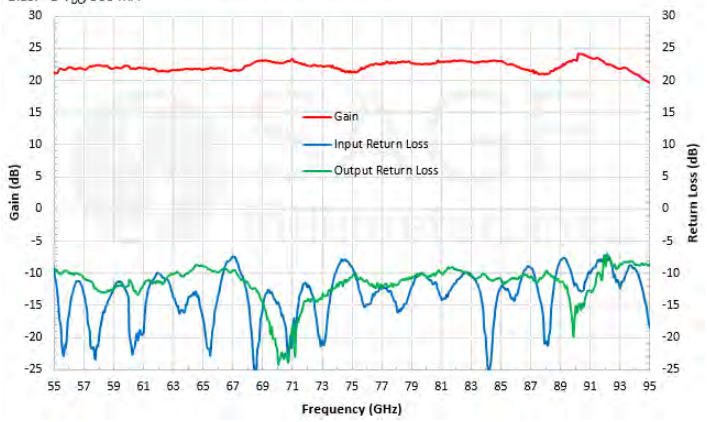
**SBL-5539532560-1212-E1**
55 to 95 GHz

**Features:**

- 55 to 95 GHz
- 6 dB Noise Figure
- 25 dB Nominal Gain
- SBL Family Cover up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 55 GHz | | 95 GHz |
| Gain | | 25 dB | |
| Noise Figure | | 6 dB | |
| $P_{1dB}$ | | +12 dBm | |
| $P_{sat}$ | | +16 dBm | |
| $P_{in}$ | | | +15 dBm |
| Input Return Loss | | 10 dB | |
| Output Return Loss | | 10 dB | |
| DC Voltage | +6 $V_{DC}$ | +8 $V_{DC}$ | +15 $V_{DC}$ |
| DC Supply Current | | 300 mA | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

**Typical Gain and Return Loss vs. Frequency**
Bias: +8 $V_{DC}$/300 mA



# BROADBAND LOW NOISE AMPLIFIER

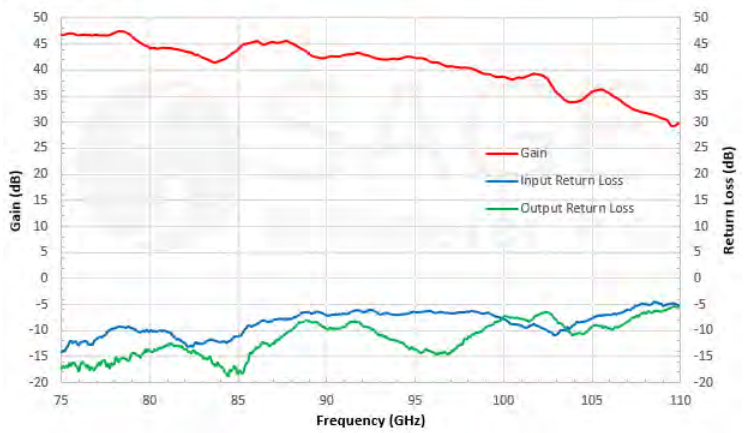
**SBL-7531143550-1010-E1**
75 to 110 GHz

**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



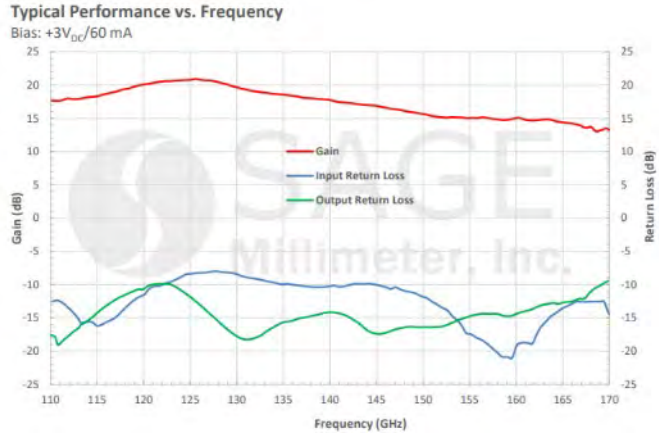
# BROADBAND LOW NOISE AMPLIFIER

**SBL-1141741860-0606-EI**
110 to 170 GHz

**Features:**

- 110 to 170 GHz
- 18 dB Nominal Gain
- 6 dB Noise Figure
- SBL Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 110 GHz | | 170 GHz |
| Gain | | 18 dB | |
| Noise Figure | | 6 dB | |
| *$P_{1dB}$ | | -5 dBm | |
| $P_{in}$ | | | -25 dBm |
| Input Return Loss | | 6 dB | |
| Output Return Loss | | 6 dB | |
| DC Voltage | | +3 $V_{DC}$ | +5 $V_{DC}$ |
| DC Supply Current | | 30 mA | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

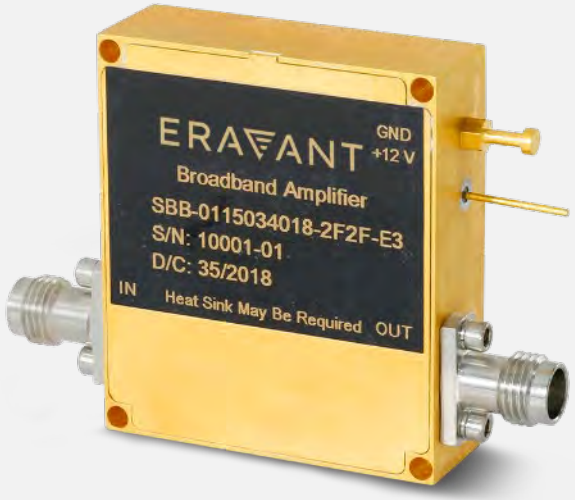


# BROADBAND POWER AMPLIFIER

**SBP-1834331824-KFKF-E3**
18 to 43 GHz

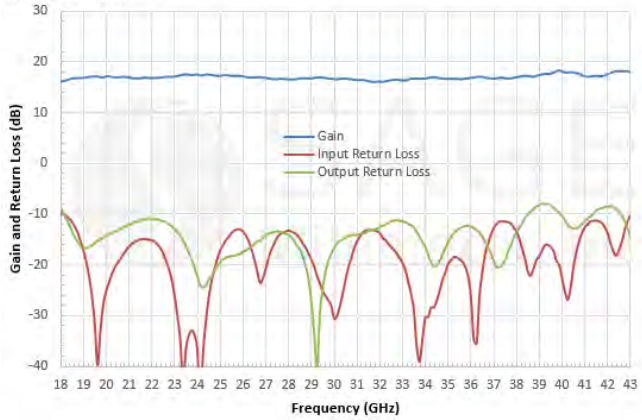
**Features:**

- 18 to 43 GHz
- +25 dBm Psat
- 18 dB Nominal Gain
- SBP Family Covers up to 110 GHz




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 18 GHz | | 43 GHz |
| Gain | 15 dB | 18 dB | |
| $P_{1dB}$ | +23 dBm | +24 dBm | |
| $P_{sat}$ | | +25 dBm | |
| Output IP3 | | +30 dBm | |
| $P_{in}$ | | +5 dBm | +10 dBm |
| Input Return Loss | | 8 dB | |
| Output Return Loss | | 8 dB | |
| DC Voltage | +8 $V_{DC}$ | +12 $V_{DC}$ | +15 $V_{DC}$ |
| DC Supply Current | | 250 mA | |
| Specification Temperature | | +25 ˚C | |
| Case Temperature | 0 ˚C | | +50 ˚C |

**Typical Gain and Return Loss vs. Frequency**
Bias: +12 Vdc/230 mA



# HIGH POWER AMPLIFIER

**SBP-3133834034-KFKF-C1-2**
31 to 38 GHz

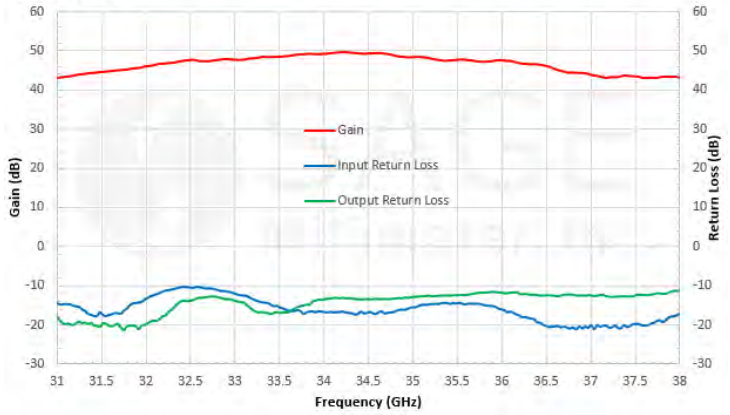
**Features:**

- 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 AMPLIFIER

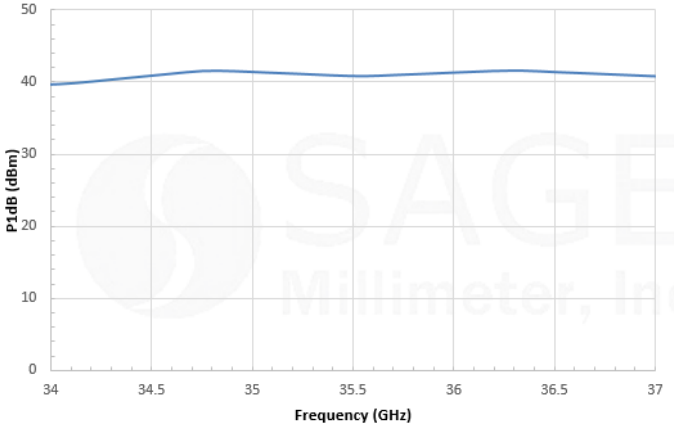
**SBP-3433735038-KFKF-E3**
34 to 37 GHz

**Features:**

- 34 to 37 GHz
- +40 dBm Psat
- 50 dB Nominal Gain
- SBP Family Covers up to 110 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 34 GHz | | 37 GHz |
| Gain | | 50 dB | |
| $P_{1dB}$ | | +38 dBm | |
| $P_{sat}$ | | +40 dBm | |
| Damage $P_{in}$ | | | +5 dBm |
| Input Return Loss | | 10 dB | |
| Output Return Loss | | 10 dB | |
| DC Voltage | | +12 $V_{DC}$ | |
| DC Supply Current | | 10 A | 15 A |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

**Typical P1dB vs Frequency**
DC Bias: +12V / 10A



# HIGH POWER GaN AMPLIFIER

**SBP-3233831838-KFKF-E1-HR**

32 to 38 GHz

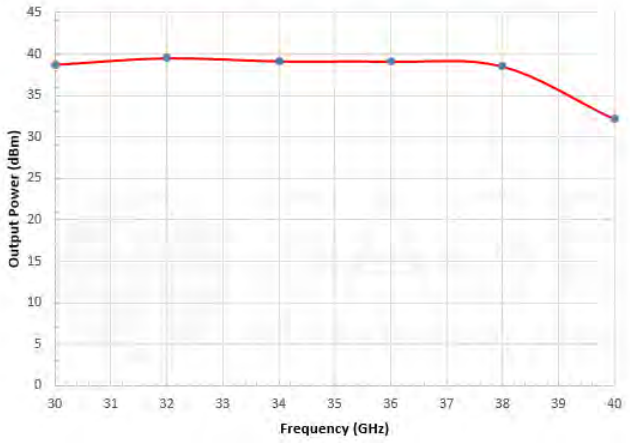
**Features:**

- 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

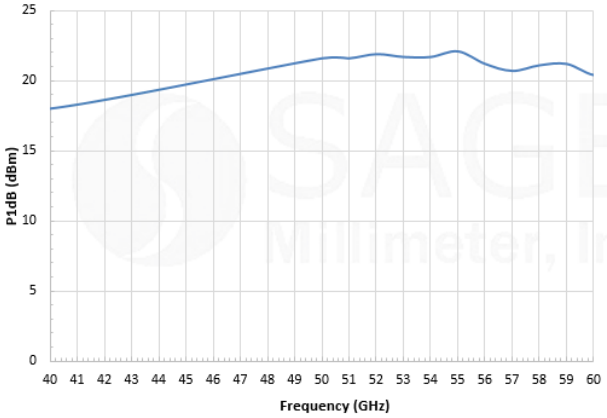
**SBP-4036033519-1919-E1**
40 to 60 GHz

**Features:**

- 40 to 60 GHz
- +20 dBm Psat
- 35 dB Nominal Gain
- SBP Family Covers up to 110 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 40 GHz | | 60 GHz |
| Gain | | 35 dB | |
| $P_{1dB}$ | | +19 dBm | |
| $P_{sat}$ | | +20 dBm | |
| $P_{in}$ | | | +20 dBm |
| Input Return Loss | | 10 dB | |
| Output Return Loss | | 10 dB | |
| DC Voltage | | +8 $V_{DC}$ | +12 $V_{DC}$ |
| DC Supply Current | | 650 mA | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

**Typical Output Power vs. Frequency**
Bias: +8 $V_{DC}$/850 mA



# HIGH POWER AMPLIFIER

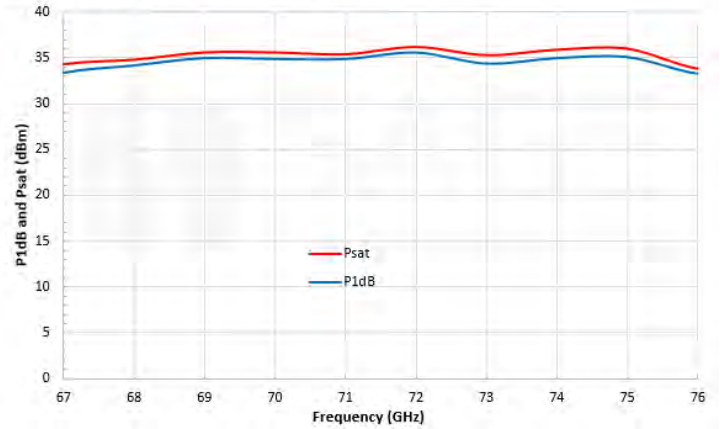
**SBP-6737633534-1212-E1**
67 to 76 GHz

**Features:**

- 67 to 76 GHz
- +35 dBm Psat
- 35 dB Nominal Gain
- SBP Family Covers up to 110 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 67 GHz | | 76 GHz |
| Gain | | 35 dB | |
| $P_{1dB}$ | | +34 dBm | |
| $P_{sat}$ | | +35 dBm | |
| $P_{in}$ | | | +15 dBm |
| Input Return Loss | | 10 dB | |
| Output Return Loss | | 10 dB | |
| DC Voltage | +6 $V_{DC}$ | +8 $V_{DC}$ | +15 $V_{DC}$ |
| DC Supply Current | | 7 A | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

**Typical $P_{1dB}$ and $P_{sat}$ vs. Frequency**
Bias: +8 $V_{DC}$/9.5 A



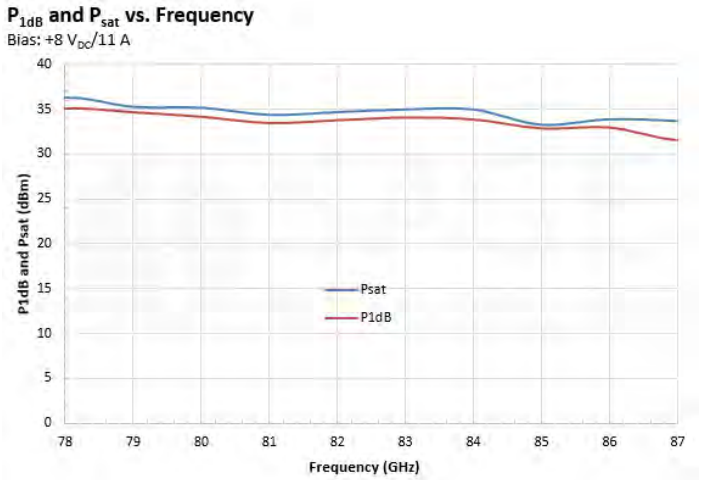
# HIGH POWER AMPLIFIER

**SBP-8138632833-1212-E1**
81 to 86 GHz

**Features:**

- 81 to 86 GHz
- +34 dBm Psat
- 28 dB Nominal Gain
- SBP Family Covers up to 110 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 81 GHz | | 86 GHz |
| Gain | | 28 dB | |
| $P_{1dB}$ | | +33 dBm | |
| $P_{sat}$ | | +34 dBm | |
| $P_{in}$ | | | +15 dBm |
| Input Return Loss | | 10 dB | |
| Output Return Loss | | 10 dB | |
| DC Voltage | +6 $V_{DC}$ | +8 $V_{DC}$ | +15 $V_{DC}$ |
| DC Supply Current | | 9 A | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |



# HIGH POWER AMPLIFIER

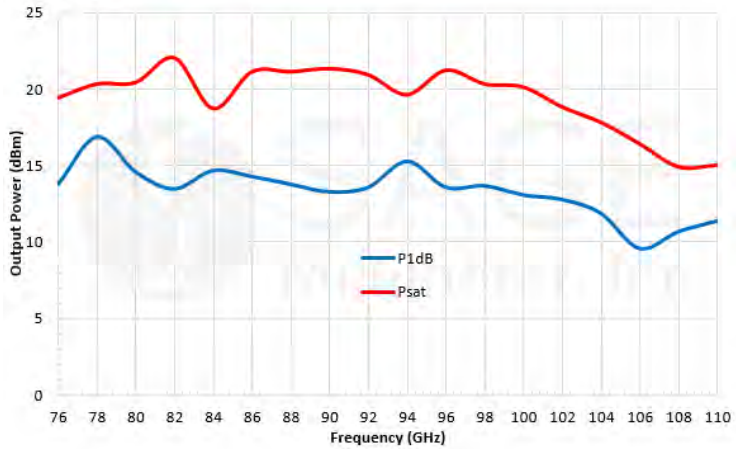
**SBP-7531142515-1010-E1**
75 to 110 GHz

**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



# CONVERTERS

# ERAVANT FREQUENCY CONVERTERS

The focus of this presentation section is to introduce the **Eravant** frequency conversion product family by highlighting some representative models. There are several hundred standard models available to satisfy all 5G system applications. The frequency converter family includes the following types:

- Balanced Mixer
- I/Q Mixer
- Subharmonically Pumped Mixer
- Harmonic Mixer
- Upconverter
- Amplitude Detector
- Active Multiplier
- Passive Multiplier

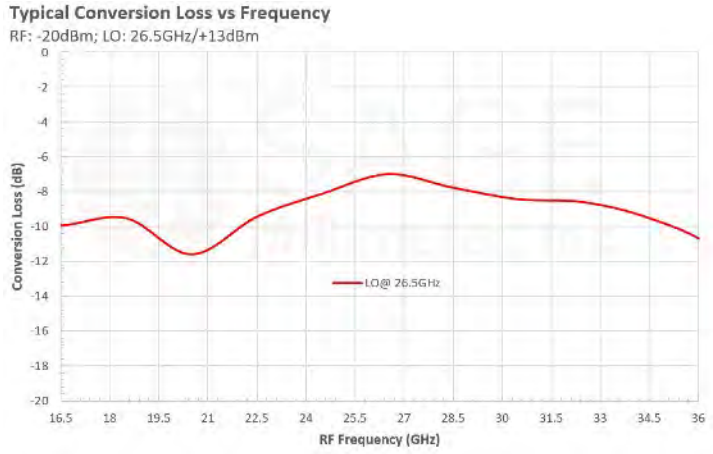
# BALANCED MIXER

**SFB-11340312-KFKFSF-N1-M**
11 to 40 GHz

**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 |

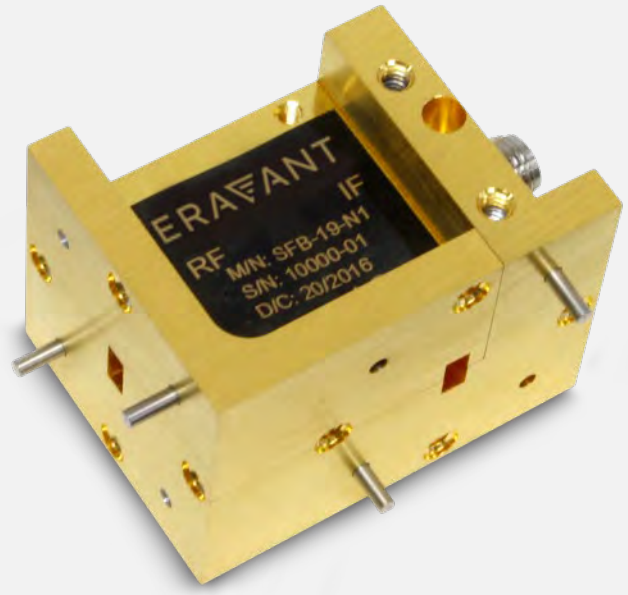


# BALANCED MIXER

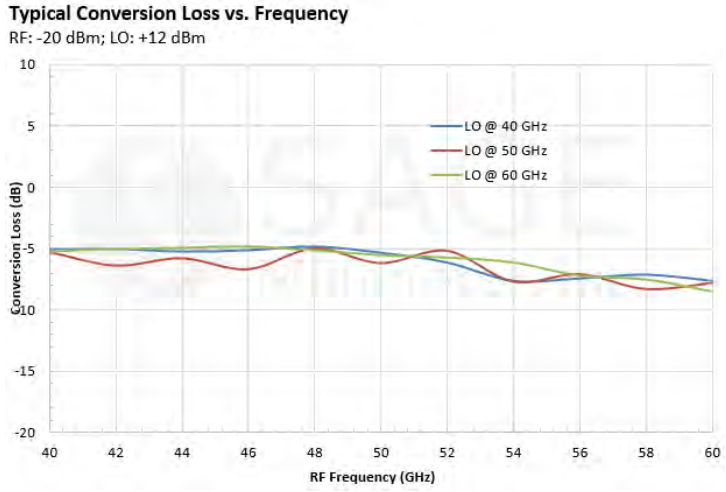
**SFB-19-N1**
40 to 60 GHz

**Features:**

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




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 40 GHz | | 60 GHz |
| LO Frequency | 40 GHz | | 60 GHz |
| IF Frequency | DC | | 20 GHz |
| LO Pumping Power | +10 dBm | +13 dBm | +15 dBm |
| Conversion Loss | | 8 dB | 10 dB |
| Input P-1dB | | -3 dBm | |
| RF to LO Isolation | | 30 dB | |
| Combined RF and LO Power | | | +18 dBm |
| Specification Temperature | | +25°C | |
| Operating Temperature | -40°C | | +85°C |

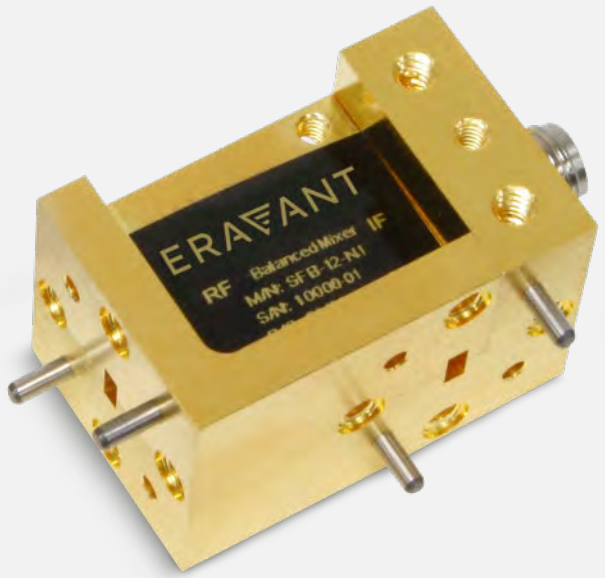


# BALANCED MIXER

**SFB-12-N1**
60 to 90 GHz

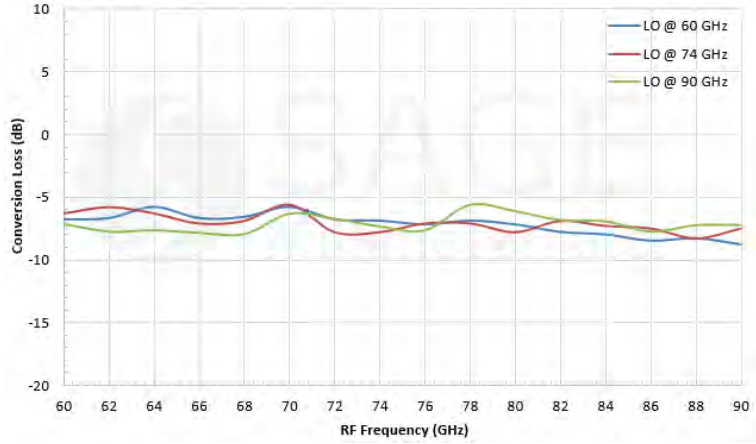
**Features:**

- 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

## SFQ-30350313-2F2FSF-N1-M

30 to 50 GHz

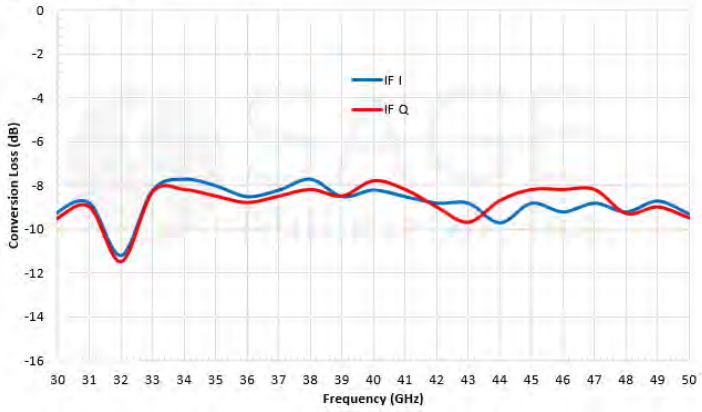
**Features:**

- 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 | | ±15° | |
| 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



# I/Q MIXER

**SFQ-60390315-1212SF-E1-M**
60 to 90 GHz

**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 | | ±15° | |
| I/Q Amplitude Unbalance | | ±1.5 dB | |
| LO to RF Port Isolations | 20 dB | 40 dB | |
| Operating Temperature | 0 °C | | +50 °C |

Typical Convertion Loss vs. Frequency

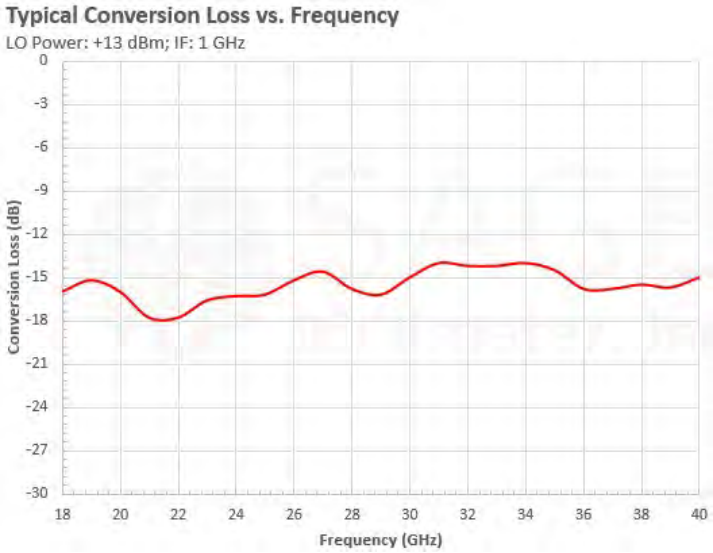
# SUBHARMONICALLY PUMPED MIXER

**SFS-18340315-KFSFSF-N1-M**
18 to 40 GHz

**Features:**

- 18 to 40 GHz
- 15 dB Conversion Loss
- Balanced Configuration
- SFS Family Covers up to 110 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 18 GHz | | 40 GHz |
| LO Frequency | 9 GHz | | 20 GHz |
| IF Frequency | 1.0 GHz | | 2.0 GHz |
| LO Pumping Power | | +13 dBm | |
| Conversion Loss | | 15 dB | |
| LO to IF Isolation | | 50 dB | |
| RF to LO Isolation | | 20 dB | |
| Combined RF & LO Damage Power | | | +23 dBm |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

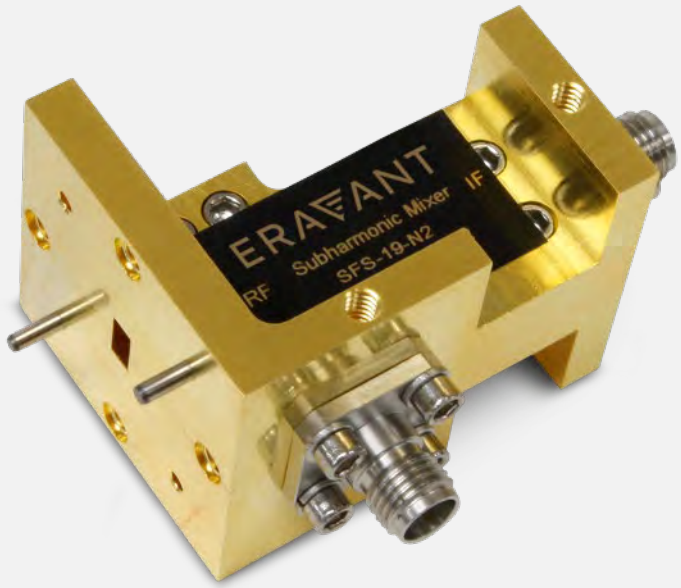


# SUBHARMONICALLY PUMPED MIXER

**SFS-19-N3**
40 to 60 GHz

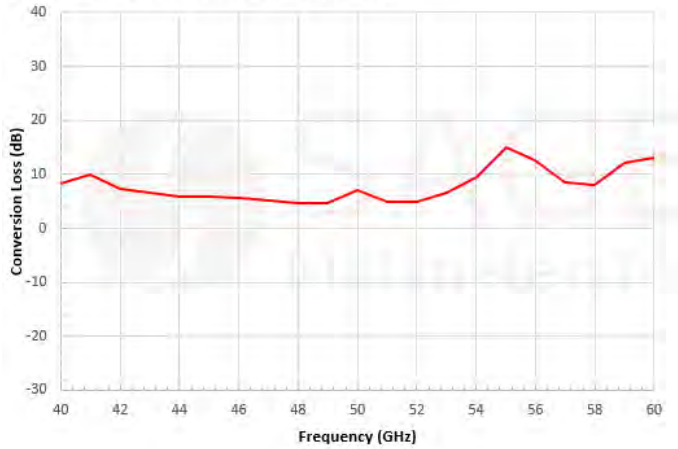
**Features:**

- 40 to 60 GHz
- 14 dB Conversion Loss
- Balanced Configuration
- SFS Family Covers up to 110 GHz




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 40 GHz | | 60 GHz |
| LO Frequency | 20 GHz | | 30 GHz |
| IF Frequency | DC | | 5.0 GHz |
| LO Pumping Power | | +15 dBm | |
| Conversion Loss | | 14 dB | |
| LO to IF Isolation | | 30 dB | |
| RF to LO Isolation | | 15 dB | |
| Combined RF and LO Power | | | +18 dBm |
| Specification Temperature | | +25 °C | |
| Operating Temperature | +0 °C | | +50 °C |

**Typical Conversion Loss vs. Frequency**



# HARMONIC MIXER

**SFH-28SFSF-A3**
26.5 to 40 GHz

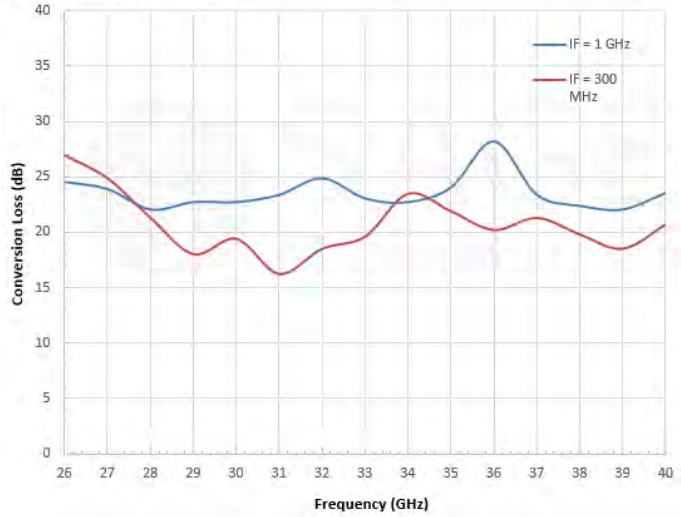
**Features:**

- 26.5 to 40 GHz
- 30 dB Conversion Loss
- Balanced Configuration
- Even Harmonic Mixing
- SFH Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 26.5 GHz | | 40 GHz |
| LO Frequency | 3.0 GHz | | 6.1 GHz |
| IF Frequency | DC | | 1.3 GHz |
| Required LO Pumping Power | | +16 dBm | +19 dBm |
| Conversion Loss | | 30 dB | |
| Combined Damage RF and LO Power | | | +20 dBm |
| Number of Harmonics* | | 8 | |
| Specification Temperature | | +25 ˚C | |
| Operation Temperature | -40 ˚C | | +85 ˚C |

*Note: Other even harmonics can be used.

**Typical Conversion Loss vs. Frequency**
RF = -20 dBm, LO = +16 dBm



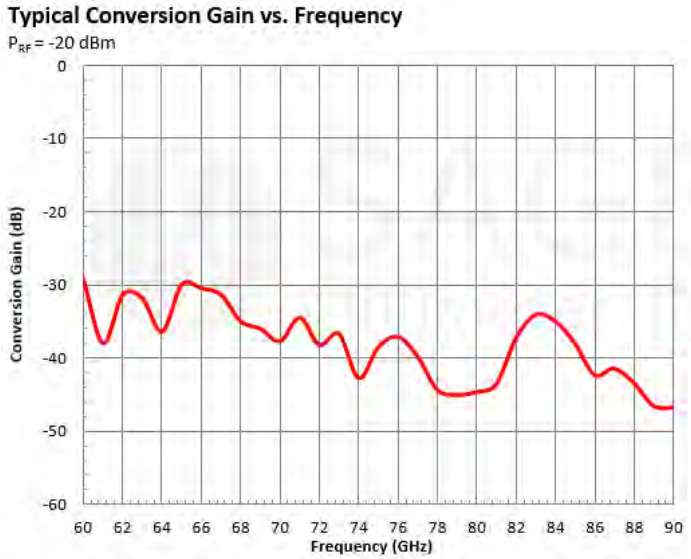
# HARMONIC MIXER

**SFH-15SFSF-A3**
50 to 75 GHz

**Features:**

- 50 to 75 GHz
- 40 dB Conversion Loss
- Balanced Configuration
- Even Harmonic Mixing
- SFH Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 60 GHz | | 90 GHz |
| LO Frequency | 3.0 GHz | | 6.1 GHz |
| IF Frequency | DC | | 1.3 GHz |
| Input Power | | +16 dBm | +19 dBm |
| Harmonic Number | | 16 | |
| Conversion Loss | | 45 dB | |
| Specification Temperature | | +25 ˚C | |
| Operation Temperature | -40 ˚C | | +85 ˚C |



# HARMONIC MIXER

**SFH-12SFSF-A3**
60 to 90 GHz

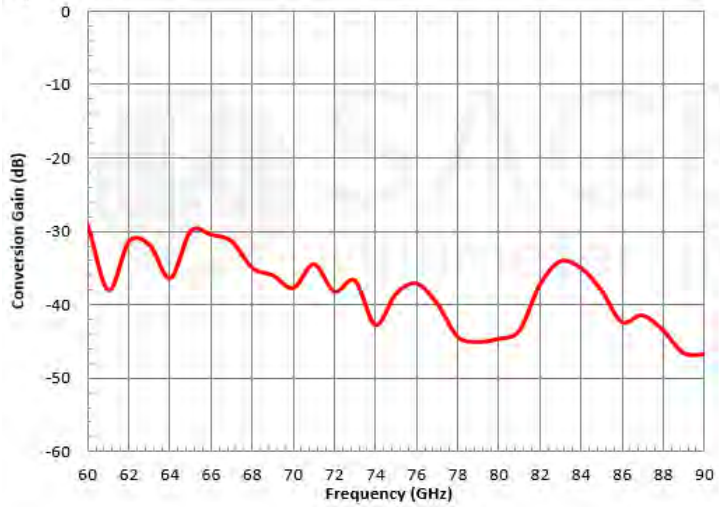
**Features:**

- 60 to 90 GHz
- 30 dB Conversion Loss
- Balanced Configuration
- Even Harmonic Mixing
- SFH Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 60 GHz | | 90 GHz |
| LO Frequency | 3.0 GHz | | 6.1 GHz |
| IF Frequency | DC | | 1.3 GHz |
| Input Power | | +16 dBm | +19 dBm |
| Harmonic Number | | 16 | |
| Conversion Loss | | 45 dB | |
| Specification Temperature | | +25 ˚C | |
| Operation Temperature | -40 ˚C | | +85 ˚C |

**Typical Conversion Gain vs. Frequency**

$P_{RF}$ = -20 dBm

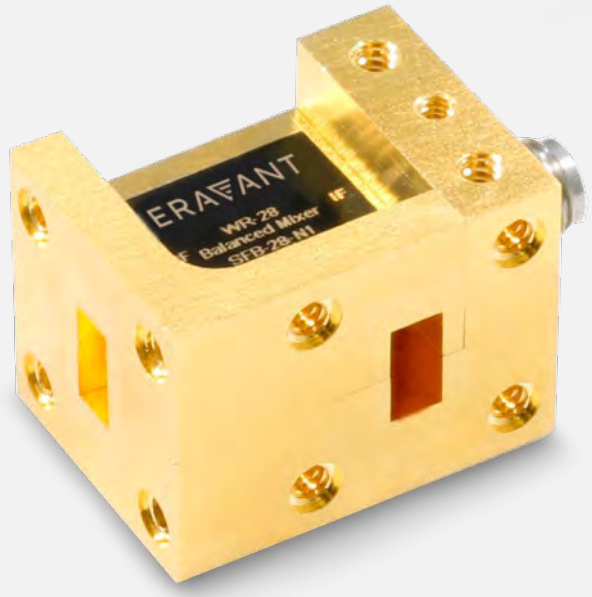


# UPCONVERTER

**SFU-28-N1**
26.6 to 40 GHz

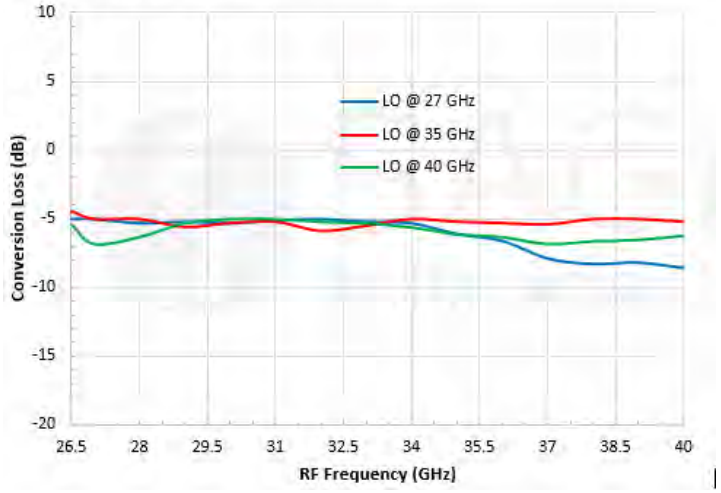
**Features:**

- 26.5 to 40 GHz
- 7.5 dB Conversion Loss
- Balanced Configuration
- No Bias Needed
- SFU Family Covers up to 170 GHz




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 26.5 GHz | | 40 GHz |
| LO Frequency | 26.5 GHz | | 40 GHz |
| IF Frequency | DC | | 13.5 GHz |
| LO Pumping Power | +10 dBm | +13 dBm | +15 dBm |
| Conversion Loss | | 7.5 dB | 9.0 dB |
| RF to LO Isolation | | 30 dB | |
| Combined IF and LO Power | | | +18 dBm |
| Specification Temperature | | +25 °C | |
| Operation Temperature | -40 °C | | +85 °C |

**Typical Conversion Loss vs. Frequency**
LO: +13 dBm, RF: -20 dBm

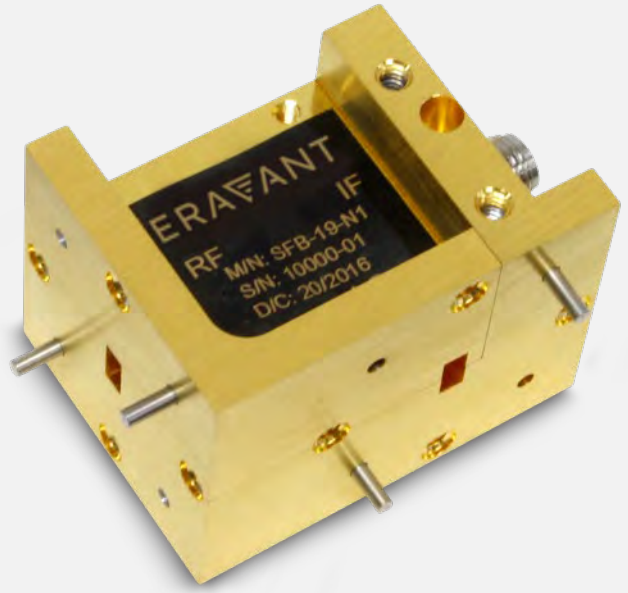


# UPCONVERTER

**SFU-19-N1**
40 to 60 GHz

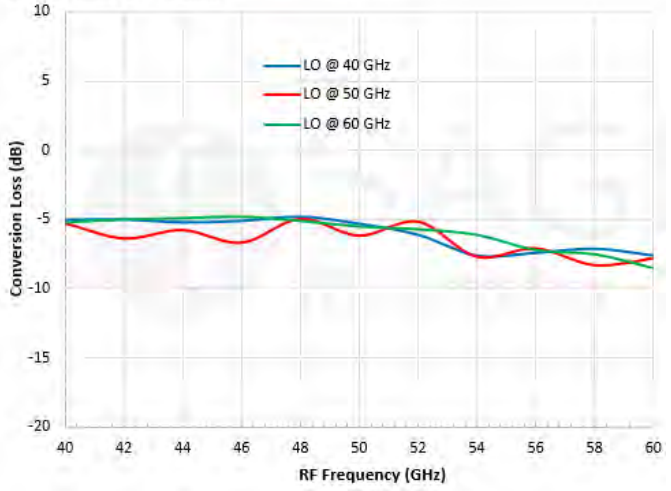
**Features:**

- 40 to 60 GHz
- 8.0 dB Conversion Loss
- Balanced Configuration
- No Bias Needed
- SFU Family Covers up to 170 GHz




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 40 GHz | | 60 GHz |
| LO Frequency | 40 GHz | | 60 GHz |
| IF Frequency | DC | | 20 GHz |
| LO Pumping Power | +10 dBm | +13 dBm | +15 dBm |
| Conversion Loss | | 8 dB | 10 dB |
| RF to LO Isolation | | 30 dB | |
| Combined IF and LO Power | | | +18 dBm |
| Specification Temperature | | +25 °C | |
| Operation Temperature | -40 °C | | +85°C |

**Typical Conversion Loss vs. Frequency**
LO: +13 dBm, RF: -20 dBm



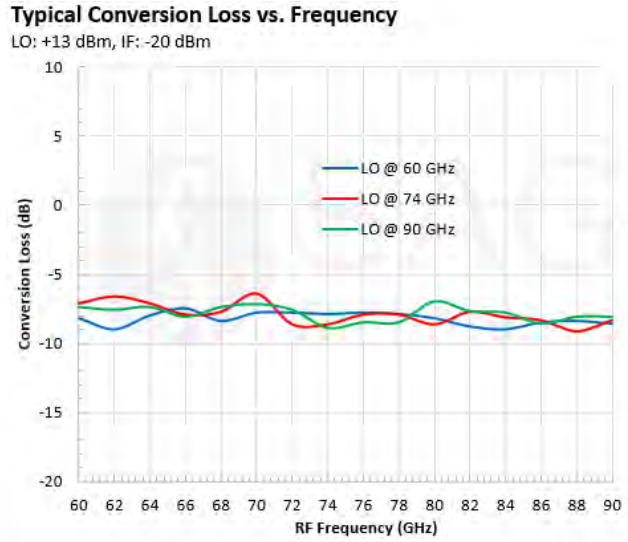
# UPCONVERTER

**SFU-12-N1**
60 to 90 GHz

**Features:**

- 60 to 90 GHz
- 9.0 dB Conversion Loss
- Balanced Configuration
- No Bias Needed
- SFU Family Covers up to 170 GHz


| 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 |
| RF to LO Isolation | | 30 dB | |
| Combined IF and LO Power | | | +18 dBm |
| Specification Temperature | | +25 °C | |
| Operation Temperature | -40 °C | | +85 °C |



# AMPLITUDE DETECTOR

**SFD-333503-22SF-N1**
33 to 50 GHz

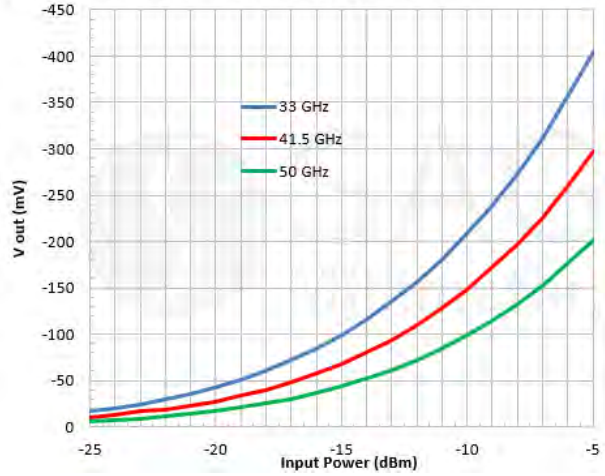
**Features:**

- 33 to 50 GHz
- 1,000 mV/mW Sensitivity
- No Tuning
- Positive or Negative Models
- SFD Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 33 GHz | | 50 GHz |
| Sensitivity* | | 1200 mV/mW | |
| Sensitivity Flatness | | ±2.0 dB | |
| RF Input Power | | -20 dBm | |
| RF Power Handling | | | +17 dBm |
| Video Bandwidth | | 10 MHz | |
| Detection Speed, Raise Time (50 Ohm Load) | | 5 Nano Second | |
| Output Voltage Polarity | | Negative | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |

*Note: The sensitivity is for the input signal level -20 dBm or below.

**Typical Detected Voltage vs. Input Power**



# AMPLITUDE DETECTOR

**SFD-503753-15SF-N1**
50 to 75 GHz

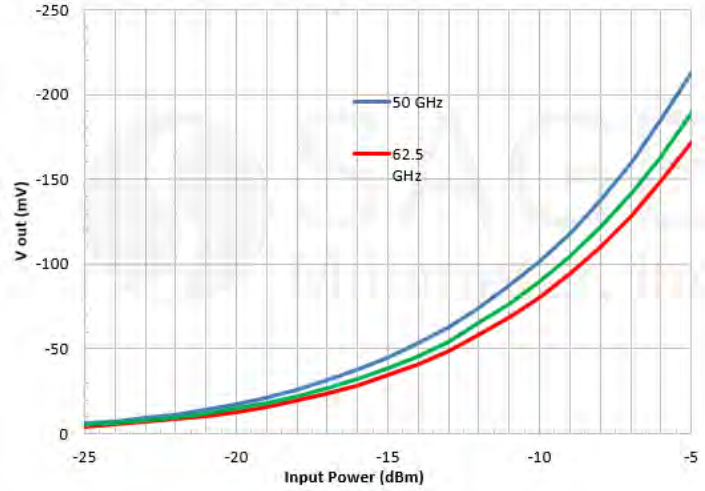
**Features:**

- 50 to 75 GHz
- 1,000 mV/mW Sensitivity
- No Tuning
- Positive or Negative Models
- SFD Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 50 GHz | | 75 GHz |
| Sensitivity* | | 1,000 mV/mW | |
| Sensitivity Flatness | | ±2.0 dB | |
| RF Input Power | | -20 dBm | |
| RF Power Handling | | | +17 dBm |
| Video Bandwidth | | 10 MHz | |
| Detection Speed, Raise Time (50 Ohm Load) | | 5 Nano Second | |
| Output Voltage Polarity | | Negative | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |

*Note: The sensitivity is for the input signal level -20 dBm or below.

**Typical Detected Voltage vs. Input Power**



# AMPLITUDE DETECTOR

**SFD-603903-12SF-N1**
60 to 90 GHz

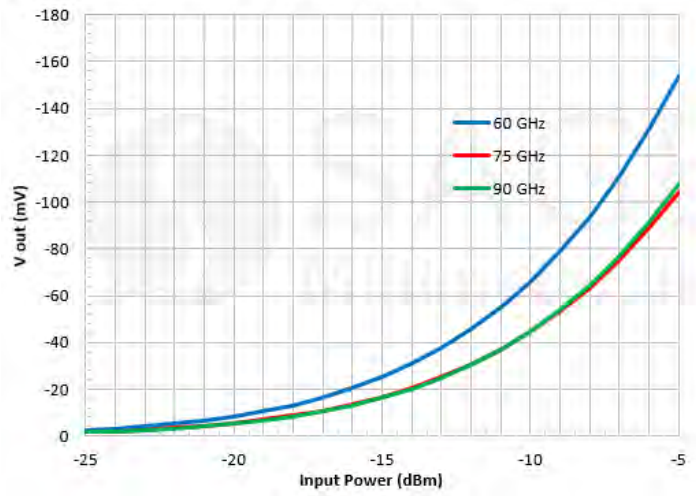
**Features:**

- 60 to 90 GHz
- 900 mV/mW Sensitivity
- No Tuning
- Positive or Negative Models
- SFD Family Covers up to 170 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 60 GHz | | 90 GHz |
| Sensitivity* | | 900 mV/mW | |
| Sensitivity Flatness | | ±2.0 dB | |
| RF Input Power | | -20 dBm | |
| RF Power Handling | | | +17 dBm |
| Video Bandwidth | | 10 MHz | |
| Detection Speed, Raise Time (50 Ohm Load) | | 5 Nano Second | |
| Output Voltage Polarity | | Negative | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |

*Note: The sensitivity is for the input signal level -20 dBm or below.

**Typical Detected Voltage vs. Input Power**



# ACTIVE MULTIPLIER

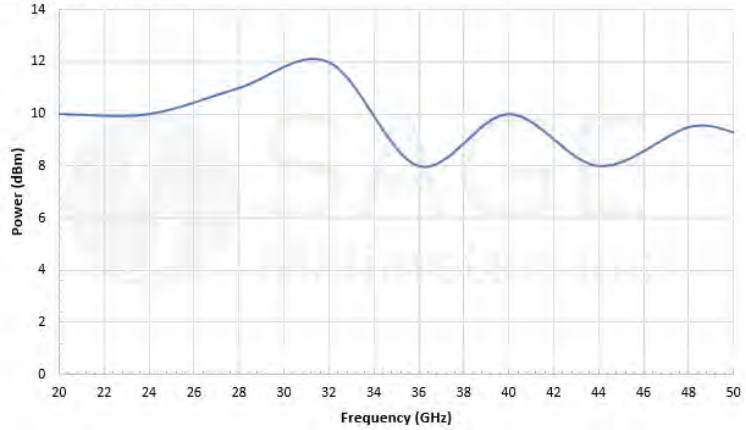
**SFA-203503410-2FSF-S1**
20 to 50 GHz

**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

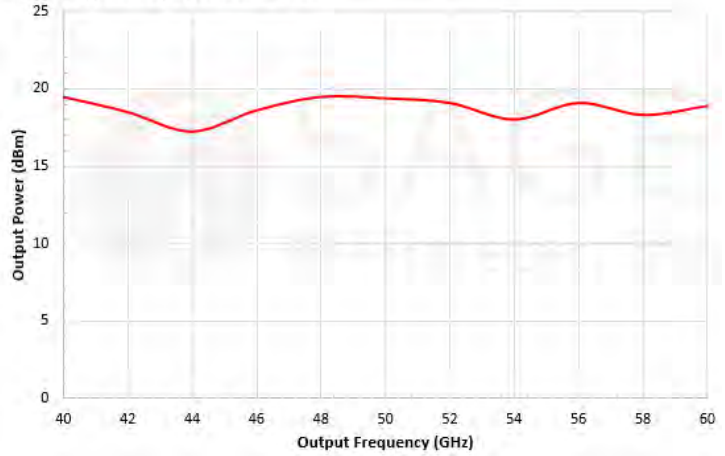
**SFA-194SF-S1**
40 to 60 GHz

**Features:**

- 40 to 60 GHz
- X2 or X4 Multiplying Factor
- +18 dBm Output Power
- SFA Family Has More than 75 Models


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Input Frequency | 10 GHz | | 15 GHz |
| Input Power | | 0 dBm | +20 dBm |
| Output Frequency | 40 GHz | | 60 GHz |
| Output Power | | +18 dBm | |
| Harmonic Suppression | | -15 dBc | |
| Spurious | | -60 dBc | |
| Port Return Loss | | 15 dB | |
| DC Voltage | +6 $V_{DC}$ | +8 $V_{DC}$ | +9 $V_{DC}$ |
| DC Supply Current | | 800 mA | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

**Typical Output Power vs. Output Frequency**
Bias: +8 $V_{DC}$/800 mA; Input Power: 0 dBm



# ACTIVE MULTIPLIER

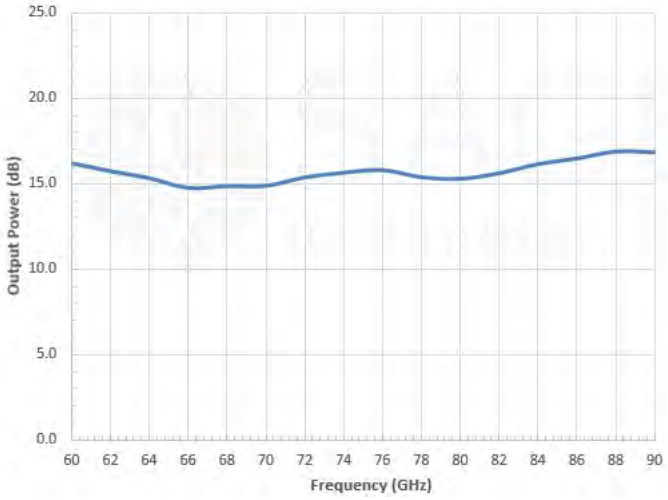
**SFA-603903816-12SF-S1**
60 to 90 GHz

**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



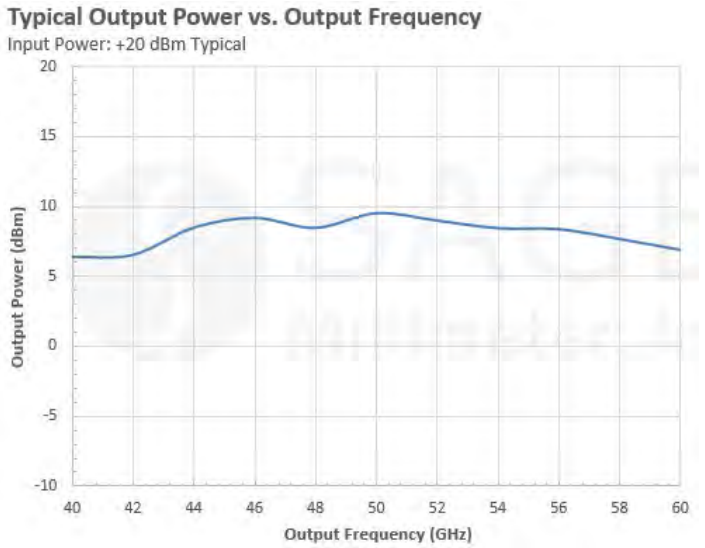
# PASSIVE MULTIPLIER

**SFP-192KF-S1**
40 to 60 GHz

**Features:**

- 40 to 60 GHz
- X2 and X3 Multiplying Factor
- +5 dBm Output Power
- SFP Family Covers up to 220 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Input Frequency | 20 GHz | | 30 GHz |
| Output Frequency | 40 GHz | | 60 GHz |
| Input Power | | +20 dBm | |
| Damage Input Power | | | +23 dBm |
| Output Power | | +6 dBm | |
| Fundamental Rejection | | 40 dB | |
| Harmonic Suppression | | 20 dB | |
| Specification Temperature | | +25 °C | |
| Operating Temperature | 0 °C | | +50 °C |



# PASSIVE MULTIPLIER

**SFP-1222F-S1**
60 to 90 GHz

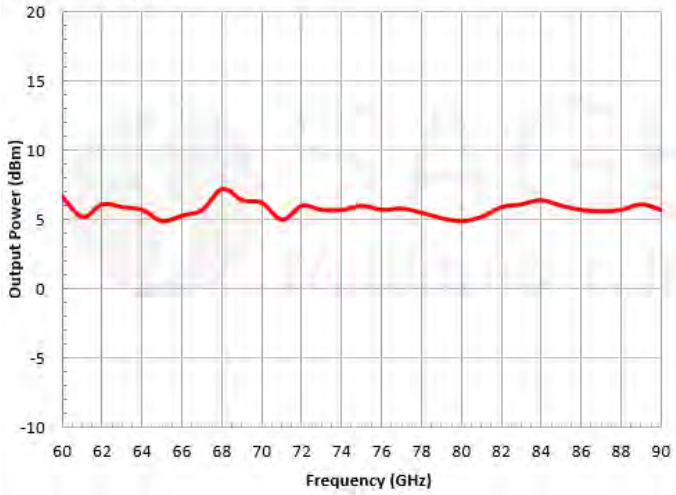
**Features:**

- 60 to 90 GHz
- X2 and X3 Multiplying Factor
- +5 dBm Output Power
- SFP Family Covers up to 220 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Input Frequency | 30 GHz | | 45 GHz |
| Output Frequency | 60 GHz | | 90 GHz |
| Input Power | | +20 dBm | |
| Damage Input Power | | | +22 dBm |
| Output Power | | +5 dBm | |
| Fundamental Rejection | | 40 dB | |
| Harmonic Suppression | | 20 dB | |
| Specification Temperature | | +25 °C | |
| Operating Temperature | 0 °C | | +50 °C |

**Typical Output Power vs. Output Frequency**

Input Power: +20 dBm



# CONTROL DEVICES

# ERAVANT CONTROL DEVICES

The focus of this presentation section is to introduce the **Eravant** control device product family by highlighting some representative models. There are several hundred standard models available to satisfy all 5G system applications. The control device family can be found here and here and includes the following types:

- Electrical Attenuator
- SPST PIN Diode Switch
- SPDT PIN Diode Switch
- SP4T PIN Diode Switch
- SP8T PIN Diode Switch
- Waveguide Level Setting Attenuator
- Waveguide Direct Reading Attenuator
- Waveguide Programable Attenuator
- Coaxial Programmable Attenuator
- Electro-Mechanical Switch

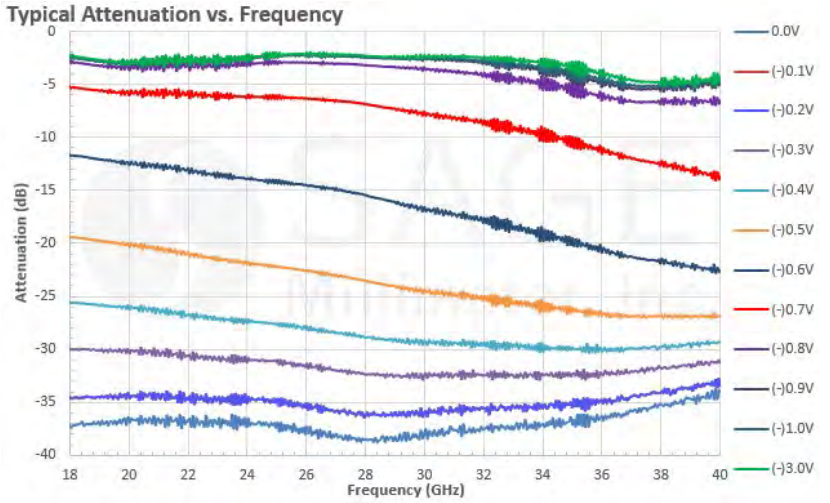
# ELECTRICAL ATTENUATOR

**SKA-1834033537-KFKF-A1-M**
18 to 40 GHz

**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 |

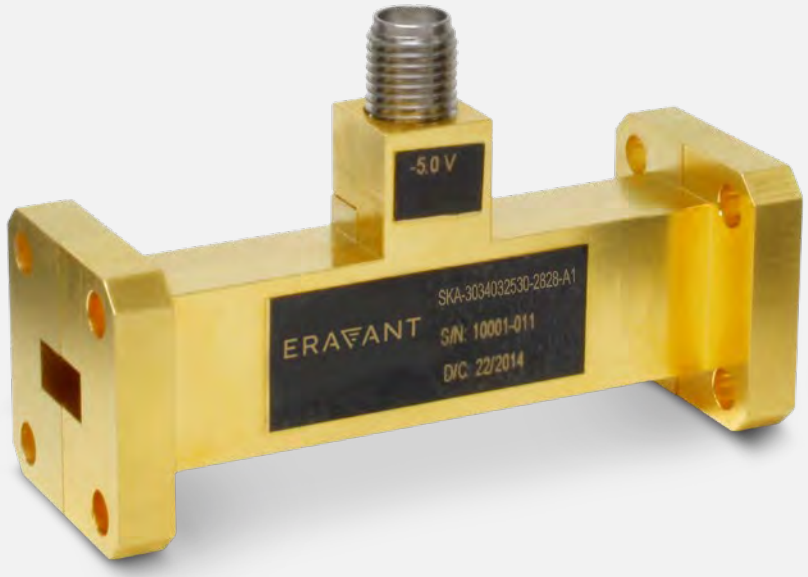


# ELECTRICAL ATTENUATOR

**SKA-2734032530-2828-A1**
26.5 to 40 GHz

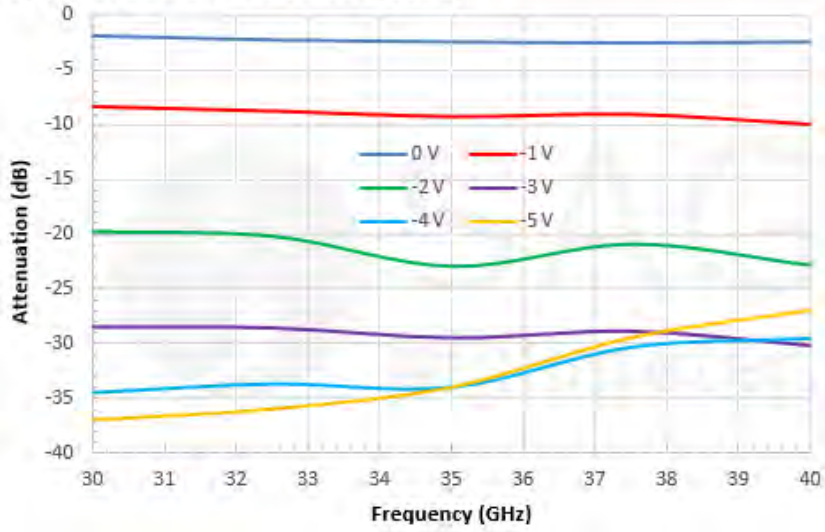
**Features:**

- 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

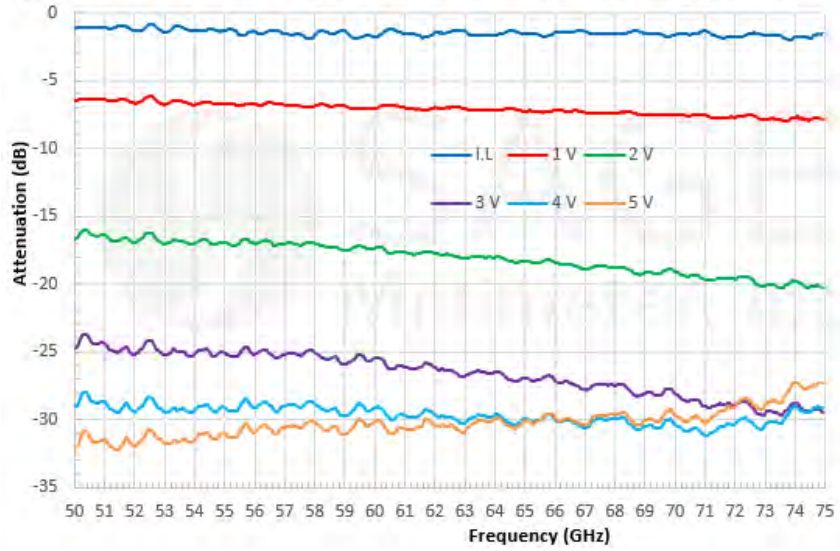
**SKA-5037533030-1515-A1**
50 to 75 GHz

**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

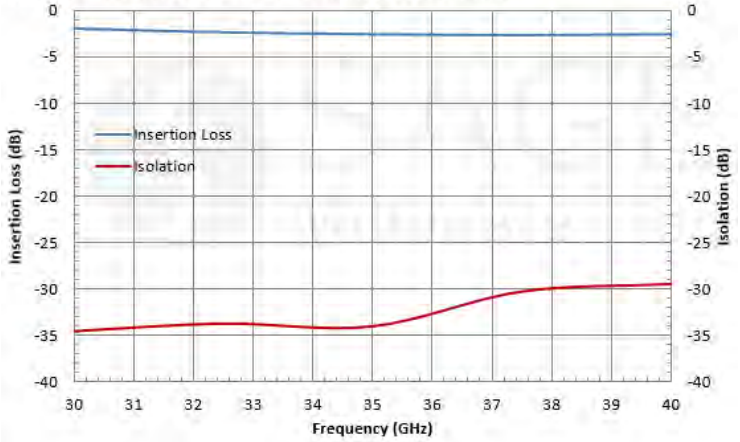
**SKS-3034032030-KFKF-A1-M**
30 to 40 GHz

**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 | | ±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

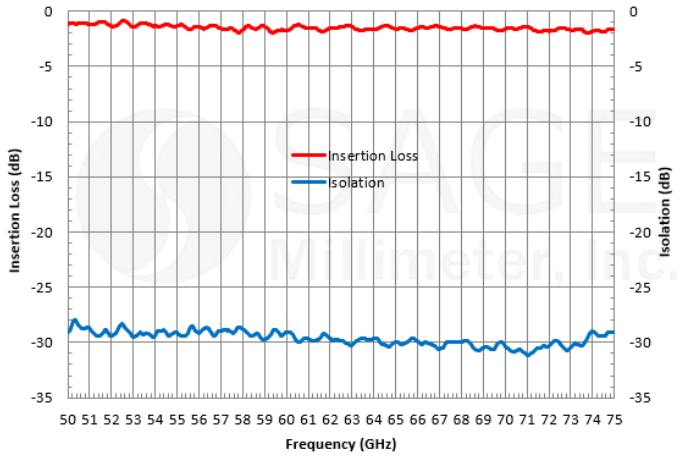
**SKS-5037533030-1515-R1**
50 to 75 GHz

**Features:**

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


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 50 GHz | | 75 GHz |
| Insertion Loss | | 2.0 dB | 3.0 dB |
| Isolation | 25 dB | 30 dB | |
| Power Handling | | +20 dBm | +23 dBm |
| Bias Voltage | | ±5 $V_{DC}$ | |
| Bias Current | | 10 mA | |
| Control Signal | | TTL | |
| Switching Speed | | 100 ns | |
| Specification Temperature | | +25 °C | |
| Operating Temperature | -25 °C | | +65 °C |

**Typical Insertion Loss and Isolation vs. Frequency**



# SPST PIN SWITCH

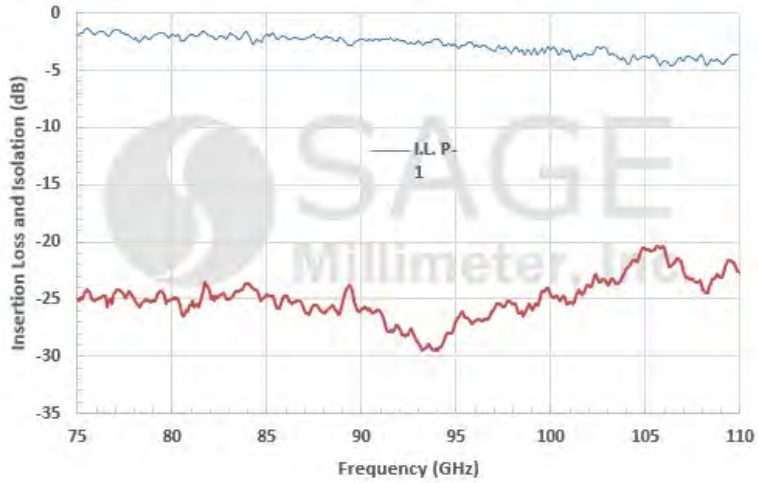
**SKS-7531142520-1010-R1**
75 to 110 GHz

**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 | | ±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



# SPDT PIN SWITCH

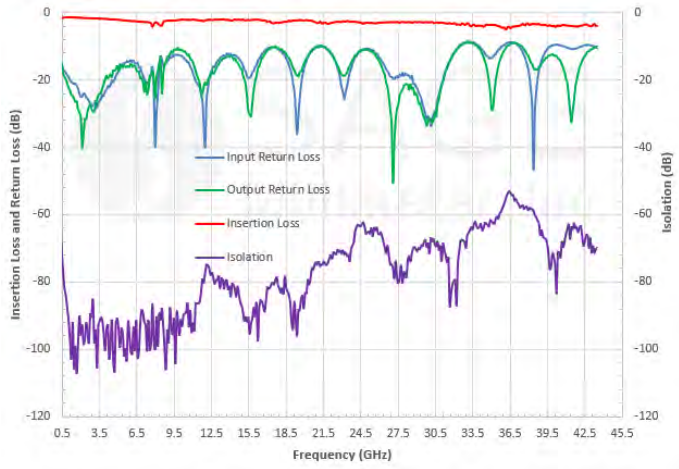
**SKD-0524334560-KFKF-A3**
75 to 110 GHz

**Features:**

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


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 0.5 GHz | | 43.0 GHz |
| Insertion Loss | | 4.5 dB | |
| Return Loss | | 10 dB | |
| Isolation | | 60 dB | |
| Operational RF Input Power | | | +20 dBm |
| Damage RF Input Power | | | +27 dBm |
| Bias Voltage | | ±5 $V_{DC}$ | |
| Bias Current | | 100/50 mA | |
| Control | | TTL | |
| Switching Speed | | 100 ns | |
| Specification Temperature | | +25 °C | |
| Operation Temperature | -45 °C | | +85 °C |

Typical Performance vs. Frequency

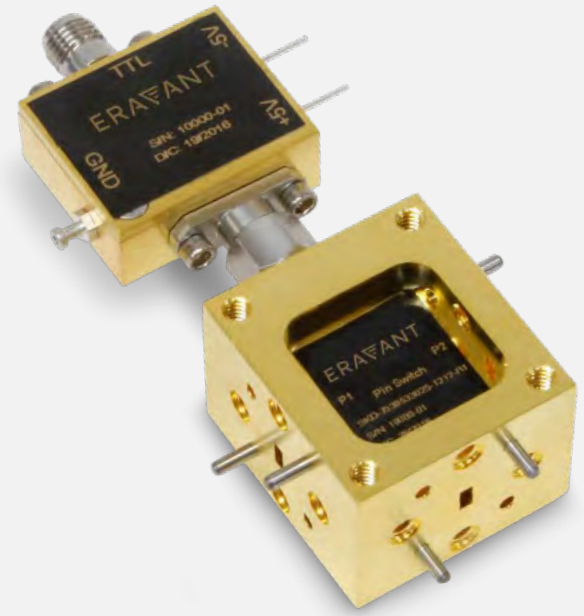


# SPDT PIN SWITCH

**SKD-6039033025-1212-R1-N**
60 to 90 GHz

**Features:**

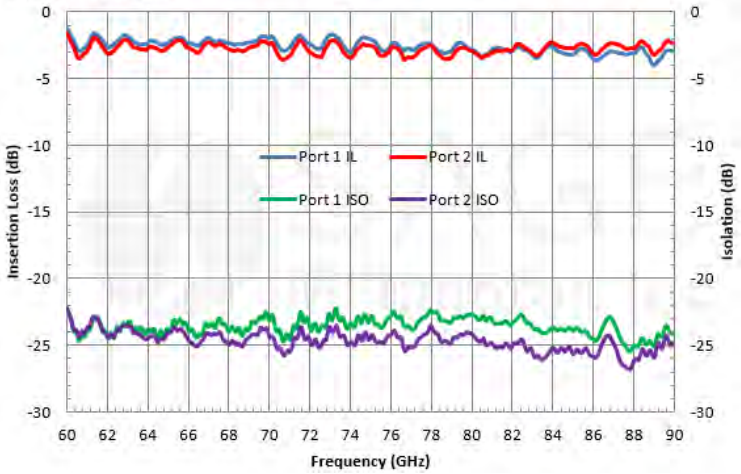
- 60 to 90 GHz
- 25 dB Control Range
- 100 ns Switching Speed
- SKD Family Covers up to 110 GHz




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 60 GHz | | 90 GHz |
| Insertion Loss | | 3.0 dB | |
| Isolation | | 25 dB | |
| Power Handling | | +20 dBm | +23 dBm |
| Bias Voltage | | ±5 $V_{DC}$ | |
| Bias Current | | 10 mA | |
| Switching Speed | | 100 ns | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -25 ˚C | | +65 ˚C |

**Typical Insertion Loss and Isolation vs Frequency**

Input Power +/- 5 Vdc



# SPDT PIN SWITCH

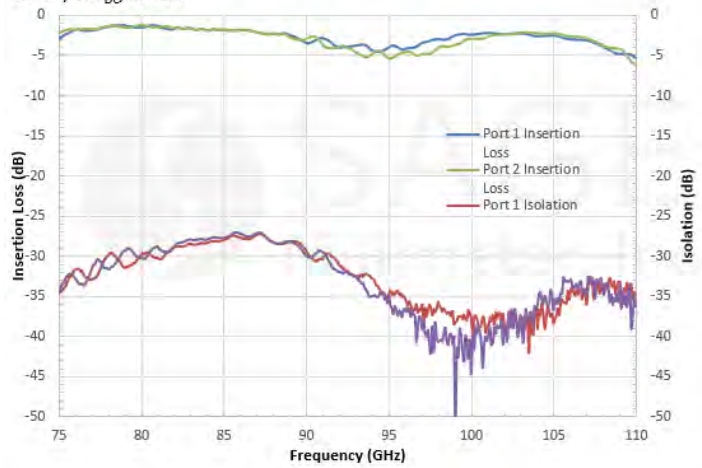
**SKD-7531143530-1010-R1-M**
75 to 110 GHz

**Features:**

- 75 to 110 GHz
- 30 dB Control Range
- 100 ns Switching Speed
- SKD Family Covers up to 110 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 75 GHz | | 110 GHz |
| Insertion Loss | | 3.5 dB | |
| Isolation | 25 dB | 30 dB | |
| Maximum Input Power | | | +30 dBm |
| Control Signal | | TTL | |
| Switching Speed | | 100 ns | |
| Bias Voltage | | ±5 $V_{DC}$ | |
| Bias Current | | 10 mA | |
| Specification Temperature | | +25˚C | |
| Operating Temperature | 0˚C | | +50˚C |

**Typical Performance vs. Frequency**
Bias: +/-5 $V_{DC}$/12 mA



# SP4T PIN SWITCH

## SK4-0524335060-KFKF-A3

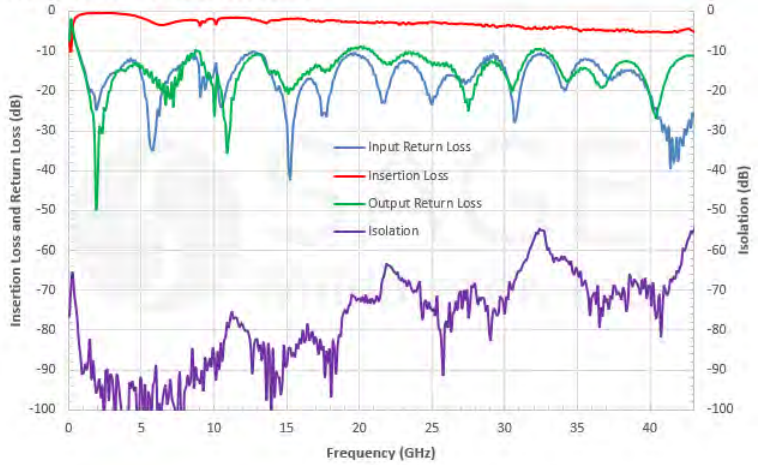
0.5 to 43 GHz

**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 | | ±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

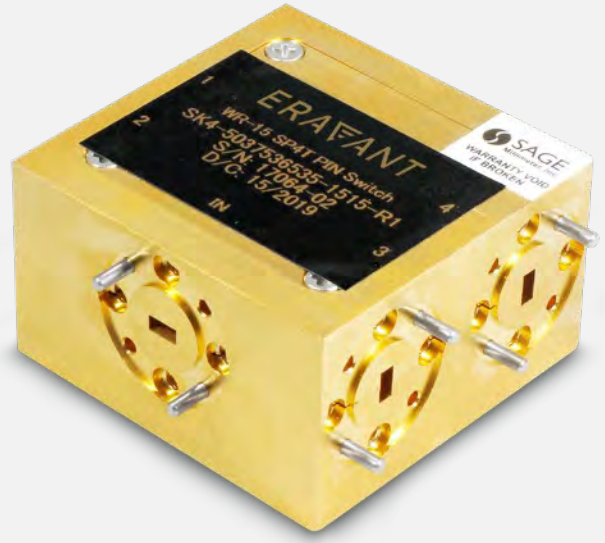


# SP4T PIN SWITCH

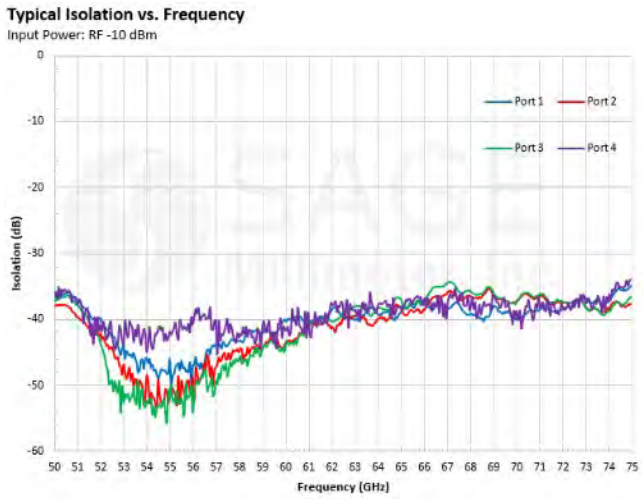
**SK4-5037536535-1515-R1-M**
50 to 75 GHz

**Features:**

- 50 to 75 GHz
- 35 dB Control Range
- 100 ns Switching Speed
- SK4 Family Covers up to 110 GHz




| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 50 GHz | | 75 GHz |
| Insertion Loss | | 6.5 dB | |
| Return Loss | | 5 dB | |
| Isolation | | 35 dB | |
| Maximum Input RF Power | | +20 dBm | +23 dBm |
| Bias Voltage | | ±5 $V_{DC}$ | ±6 $V_{DC}$ |
| Bias Current | | 100 mA | |
| Control | | TTL | |
| Switching Speed | | 100 nS | |
| Specification Temperature | | +25 °C | |
| Operation Temperature | 0 °C | | +50 °C |

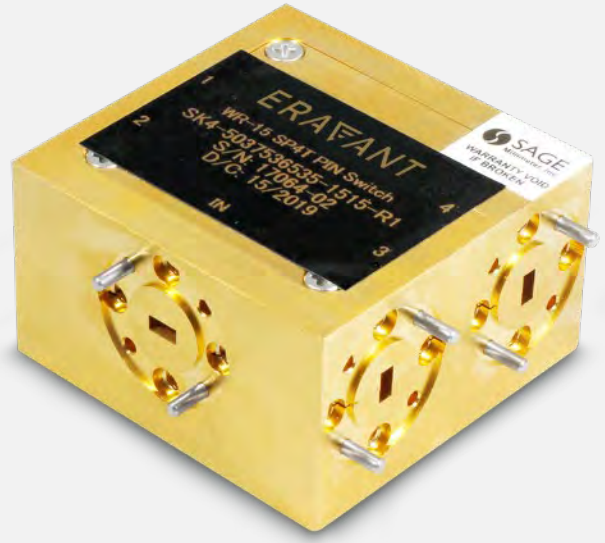


# SP4T PIN SWITCH

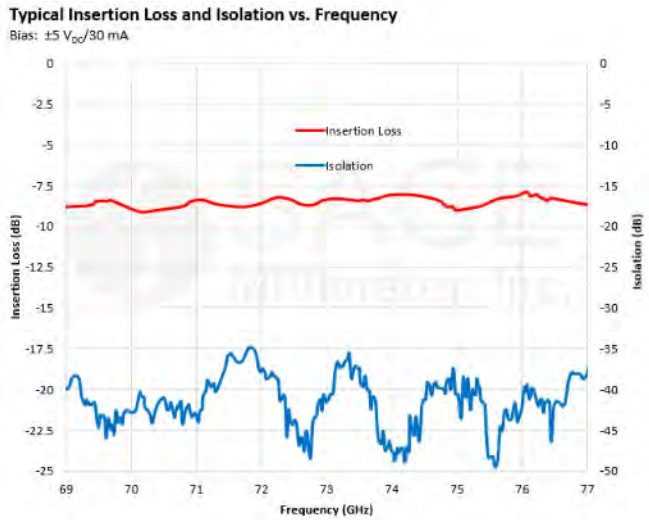
**SK4-6039038030-1212-R1-M**
60 to 90 GHz

**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 | | ±5 $V_{DC}$ | |
| Bias Current | | 30 mA | |
| Control | | TTL | |
| Switching Speed | | 100 nS | |
| Specification Temperature | | +25 °C | |
| Operation Temperature | 0 °C | | +50 °C |



# SP8T PIN SWITCH

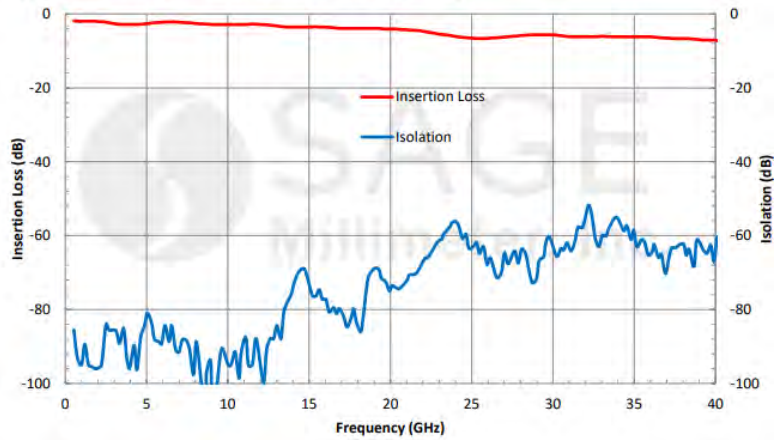
**SK8-0524036550-KFKF-AD1**
0.5 to 40 GHz

**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**



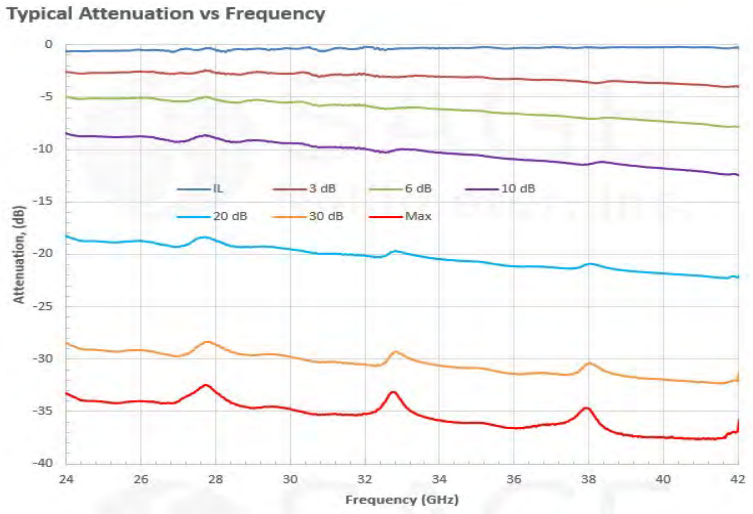
# WAVEGUIDE LEVEL SETTING ATTENUATOR

**STA-30-28-M1-L-3.0**
26.5 to 40 GHz

**Features:**

- 26.5 to 40 GHz
- 30 dB Control Range
- Micrometer Driven
- Level Setting
- Level Setting Covers up to 330 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 24 GHz | | 42 GHz |
| Insertion Loss | | 0.4 dB | |
| Attenuation | 25 dB | 30 dB | |
| Return Loss | | 20 dB | |
| Power Handling | | 1 W | 1.2 W |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |



# WAVEGUIDE DIRECT READING ATTENUATOR

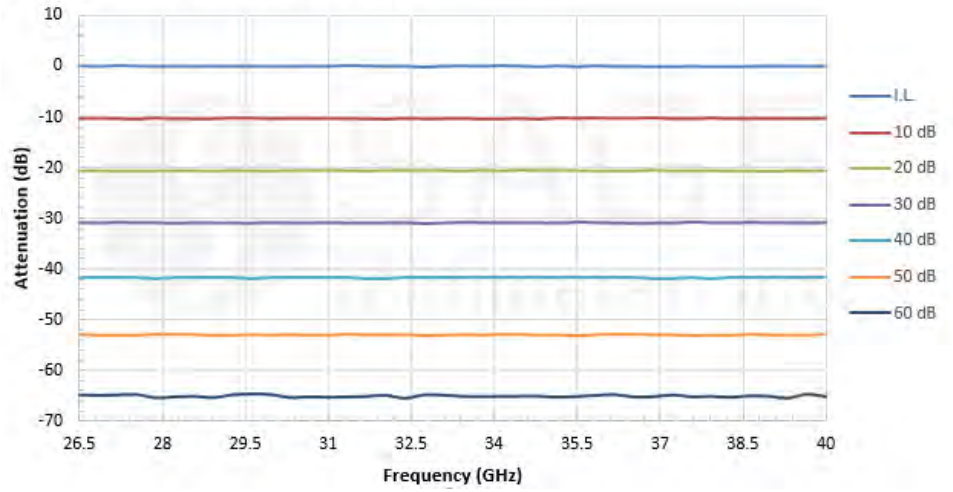
**STA-60-28-D1**
26.5 to 40 GHz

**Features:**

- 26.5 to 40 GHz
- 60 dB Control Range
- Dial Driven
- Accurate Setting and Direct Reading
- The Family Covers up to 330 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency Range | 26.5 GHz | | 40.0 GHz |
| Insertion Loss | | | 0.5 dB |
| Attenuation Range | 0 dB | | 60 dB |
| Attenuation Accuracy | 0.1 dB or 3% of reading, whichever is larger, up to 40 dB | | |
| VSWR | | | 1.15:1 |
| Power Handling | | 50 mW | 100 mW |

**Typical Attenuation vs. Frequency**



# WAVEGUIDE PROGAMMABLE ATTENUATOR

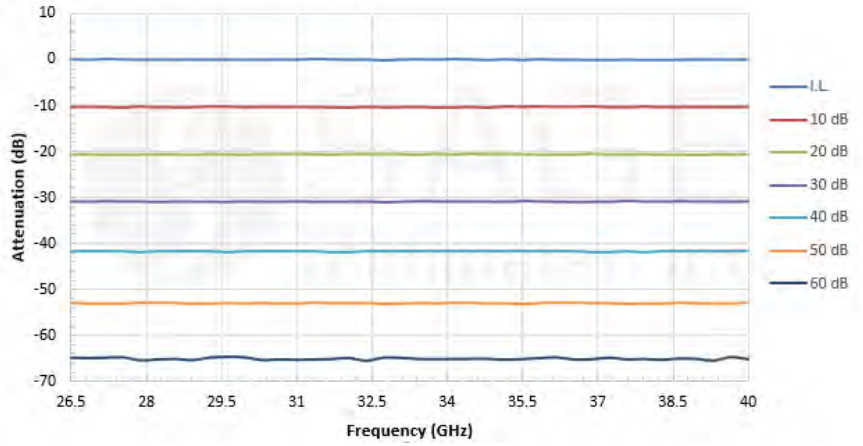
**STA-60-28-P1**
26.5 to 40 GHz

**Features:**

- 26.5 to 40 GHz
- 60 dB Control Range
- Dial Driven
- Accurate Setting and Direct Reading
- The Family Covers up to 330 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency Range | 26.5 GHz | | 40 GHz |
| Insertion Loss | | 0.5 dB | |
| Attenuation Range | 0 dB | | 70 dB |
| Attenuation Accuracy | 0.1 dB or 3% of reading, whichever is larger, up to 40 dB | | |
| Attenuation Step Size | 0.05 dB from 0 to 20 dB and 0.10 dB from 20 to 70 dB | | |
| Control Resolution | 0.01 dB from 0 to 70 dB | | |
| Return Loss | | 22 dB | |
| Operating Voltage | +24 $V_{DC}$ (100 to 240 $V_{AC}$ Adapter is Supplied) | | |
| Power Handling | | 1 W | 2.5 W (CW) |
| Absolute Maximum Power | | | 5.0 W (CW) |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | 0 ˚C | | +50 ˚C |

**Typical Attenuation vs. Frequency**



# WAVEGUIDE MOTORIZED SWITCH

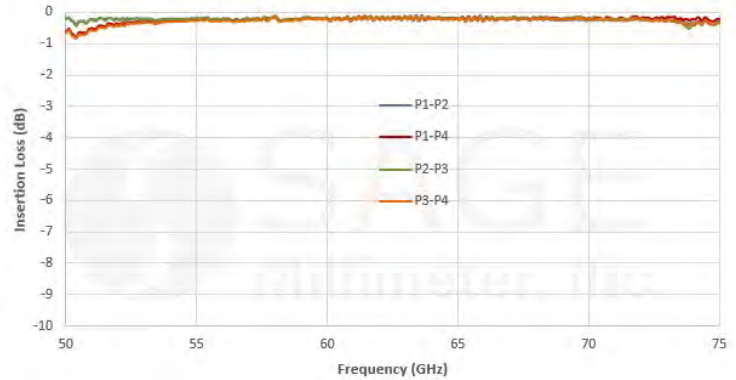
**SWJ-15-TS**
50 to 75 GHz


**Features:**

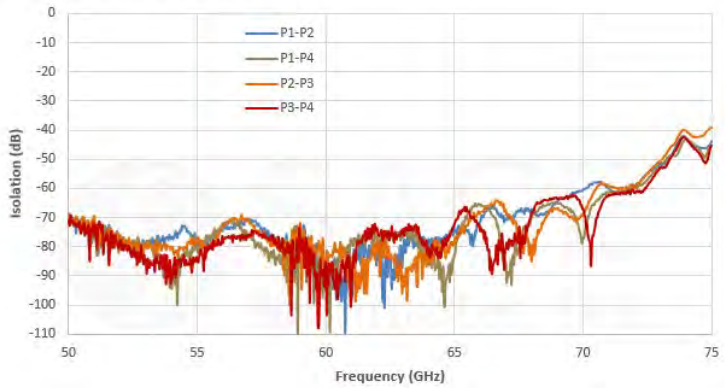
- 50 to 75 GHz
- 50 dB Control Range
- Motorized and Manual
- Low Insertion Loss and High Isolation
- The Family Covers up to 110 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 50 GHz | | 75 GHz |
| Insertion Loss | | 0.6 dB | |
| Isolation | | 50 dB | |
| Return Loss | | 20 dB | |
| Control Signal | | TTL | |
| Switching Speed | | 125 ms | |
| Cycle Time | 250,000 | 1,000,000 | |
| Power Handling | | | 100 W (CW) |
| Bias Voltage | | +28 $V_{DC}$ | |
| Bias Current | | 250 mA | |
| Specification Temperature | | +25°C | |
| Operating Temperature | -25°C | | +65°C |

Typical Insertion Loss vs Frequency




Typical Isolation vs Frequency



# FERRITE DEVICES

# ERAVANT FERRITE DEVICES

The focus of this presentation section is to introduce the **Eravant** ferrite device product family by highlighting some representative models. There are about one-hundred standard models available to satisfy all 5G system applications. The ferrite device family includes the following types:

- Full Band Coaxial Isolator and Circulator
- Full Band Waveguide Junction Isolator and Circulator
- Waveguide Junction Isolator and Circulator
- Faraday Isolator

# FULL WAVEGUIDE BAND COAXIAL ISOLATOR

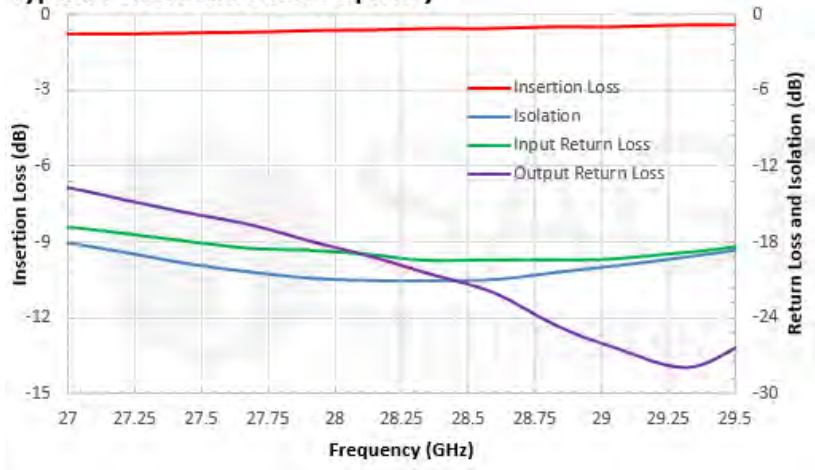
**SNC-2734031614-KFKF-I7**
26.5 to 40 GHz

**Features:**

- 26.5 to 40 GHz
- Full Waveguide Bandwidth Coverage
- 18 to 26.5 GHz and 22 to 33 GHz Models
- Total 8 Models to Support 5G Bands


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 27 GHz | | 29.5 GHz |
| Insertion Loss | | 1.6 dB | |
| Isolation | | 14 dB | |
| Return Loss | | 12 dB | |
| Forward Power Handling | | | 10 W (CW) |
| Reverse Power Handling | | | 1 W (CW) |
| Impedance | | 50 Ω | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +80 ˚C |

**Typical Performance vs. Frequency**



# FULL WAVEGUIDE BAND COAXIAL CIRCULATOR

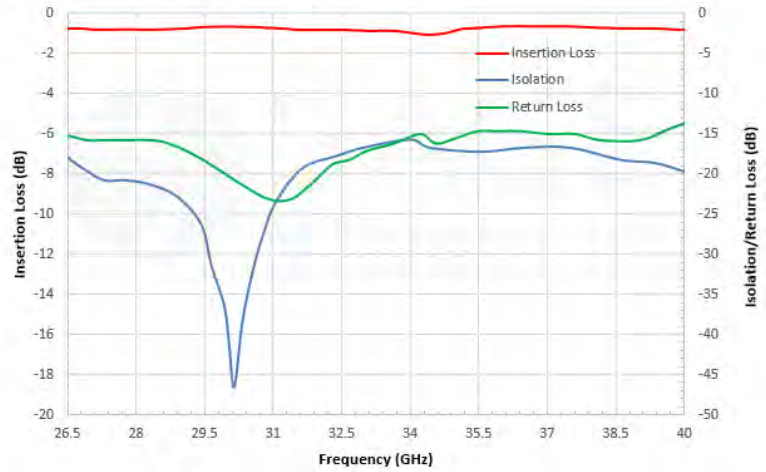
**SNC-2734031614-KFKFKF-C7**
26.5 to 40 GHz

**Features:**

- 26.5 to 40 GHz
- Full Waveguide Bandwidth Coverage
- 18 to 26.5 GHz and 22 to 33 GHz Models
- Total 8 Models to Support 5G Bands


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 26.5 GHz | | 40 GHz |
| Insertion Loss | | 1.6 dB | |
| Isolation | | 14 dB | |
| Return Loss | | 13 dB | |
| Impedance | | 50 Ω | |
| Power Handling | | | 10 W (CW) |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +80 ˚C |

**Typical Performance vs. Frequency**



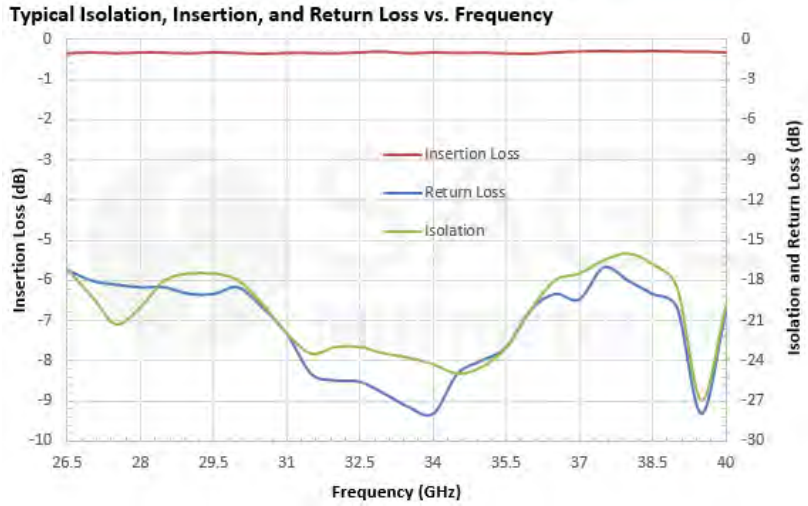
# FULL WAVEGUIDE JUNCTION CIRCULATOR

**SNF-28-C5**
26.5 to 40 GHz

**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 |



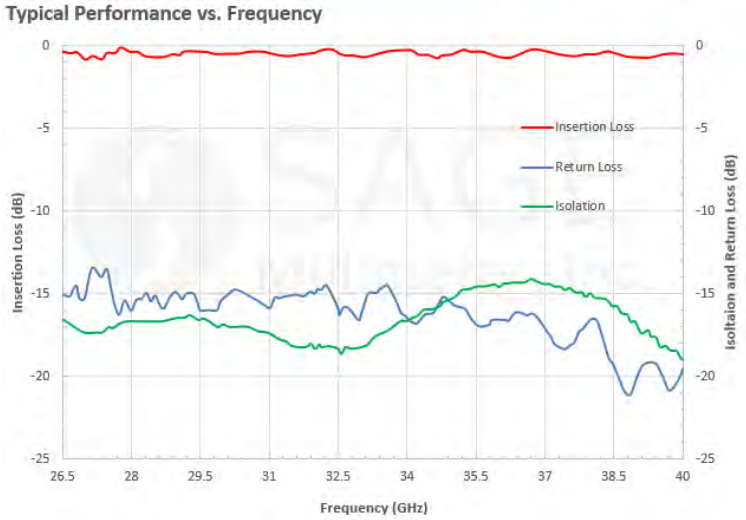
# FULL WAVEGUIDE JUNCTION ISOLATOR

**SNF-28-I5**
26.5 to 40 GHz

**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 |



# WAVEGUIDE JUNCTION ISOLATOR

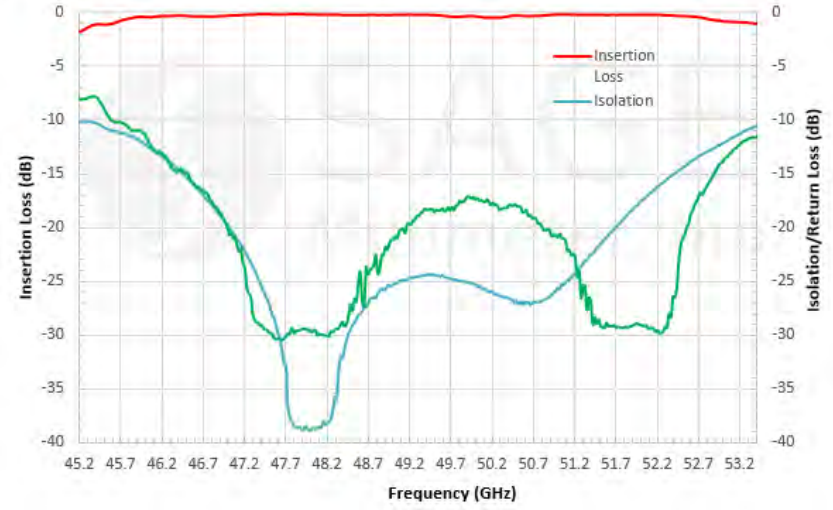
**SNW-4735130518-22-CJ**
47 to 51 GHz

**Features:**

- 47 to 51 GHz
- Broad Bandwidth Coverage
- 71 to 76 and 81 to 86 GHz Models
- 40+ Models to Support 5G Bands


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 47.2 GHz | | 51.4 GHz |
| Insertion Loss | | 0.5 dB | |
| Isolation | | 18 dB | |
| Return Loss | | 19 dB | |
| Forward Power Handling | | 5 W (CW) | |
| Reverse Power Handling | | 1 W (CW) | |
| Specification Temperature | | +25 °C | |
| Operating Temperature | -40 °C | | +85 °C |

**Typical Performance vs. Frequency**



# WAVEGUIDE JUNCTION ISOLATOR

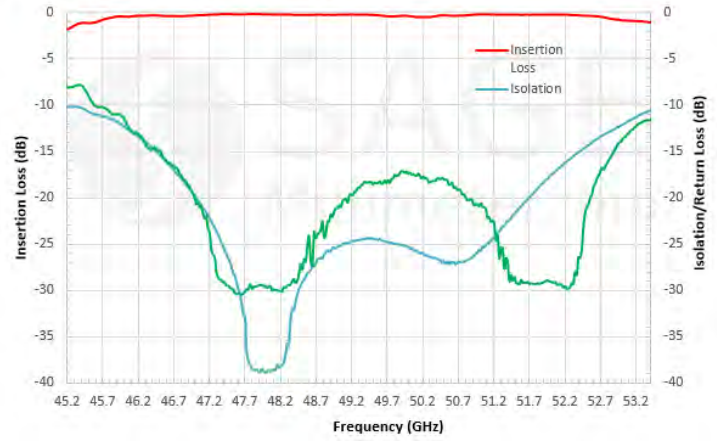
**SNW-4735130518-22-IJ**
47 to 51.4 GHz

**Features:**

- 47 to 51.4 GHz
- Broad Bandwidth Coverage
- 71 to 76 and 81 to 86 GHz Models
- 40+ Models to Support 5G Bands


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 47.2 GHz | | 51.4 GHz |
| Insertion Loss | | 0.5 dB | |
| Isolation | | 18 dB | |
| Return Loss | | 19 dB | |
| Forward Power Handling | | 5 W (CW) | |
| Reverse Power Handling | | 1 W (CW) | |
| Specification Temperature | | +25 °C | |
| Operating Temperature | -40 °C | | +85 °C |

**Typical Performance vs. Frequency**



# WAVEGUIDE JUNCTION CIRCULATOR

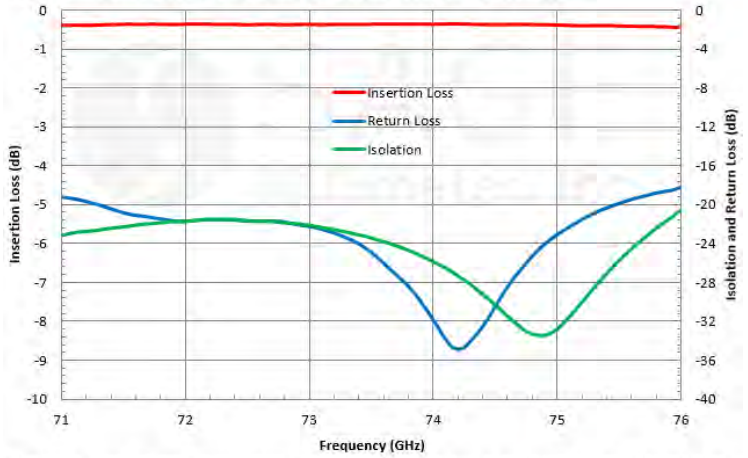
**SNW-7137630818-12-C1**
71 to 76 GHz

**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 CIRCULATOR

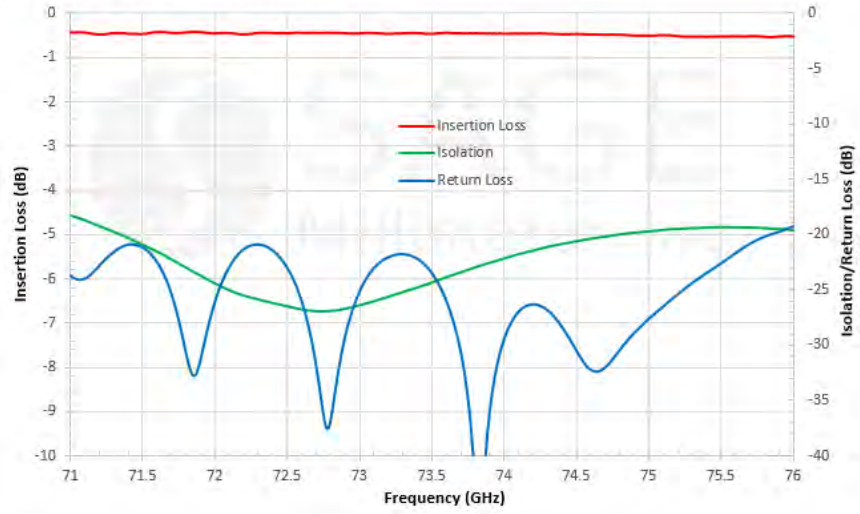
**SNW-7137630818-12-I1**
71 to 76 GHz

**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**



# FARADAY ISOLATOR

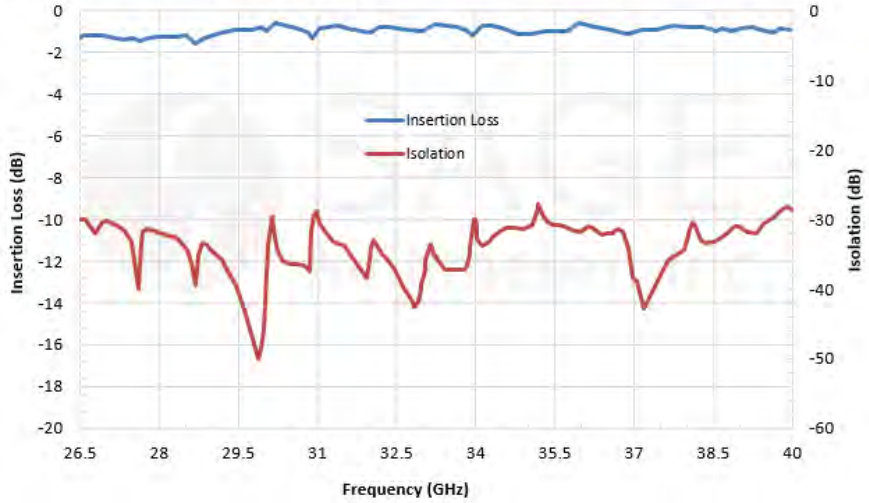
**STF-28-S1**
26.5 to 40 GHz

**Features:**

- 26.5 to 40 GHz
- Full Waveguide Bandwidth
- 30 dB Isolation
- 18 to 220 GHz Coverage
- 40+ Models to Support 5G Bands


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency* | 26.5 GHz | | 40 GHz |
| Insertion Loss | | 1.2 dB | 2.0 dB |
| Isolation | | 30 dB | |
| Return Loss | | 14 dB | |
| Power Handling | | 1.8 W (CW) | 2.0 W (CW) |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |

**Typical Performance vs. Frequency**



# FARADAY ISOLATOR

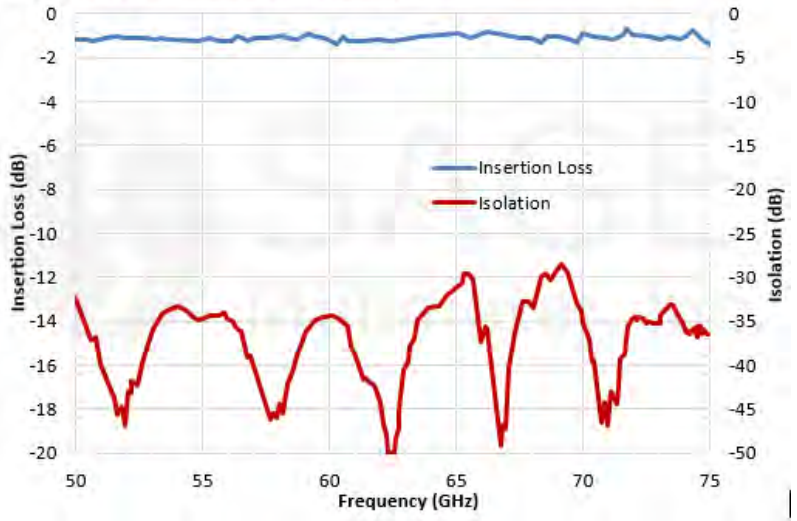
**STF-15-S1**
50 to 75 GHz

**Features:**

- 50 to 75 GHz
- Full Waveguide Bandwidth
- 30 dB Isolation
- 18 to 220 GHz Coverage
- 40+ Models to Support 5G Bands


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 50 GHz | | 75 GHz |
| Insertion Loss | | 1.5 dB | 1.8 dB |
| Isolation | | 28 dB | |
| Return Loss | | 16 dB | |
| Power Handling | | 1.0 W (CW) | 1.2 W (CW) |
| Specification Temperature | | +25 °C | |
| Operation Temperature | -40 °C | | +85 °C |

**Typical Performance vs. Frequency**



# FARADAY ISOLATOR, COMPACT

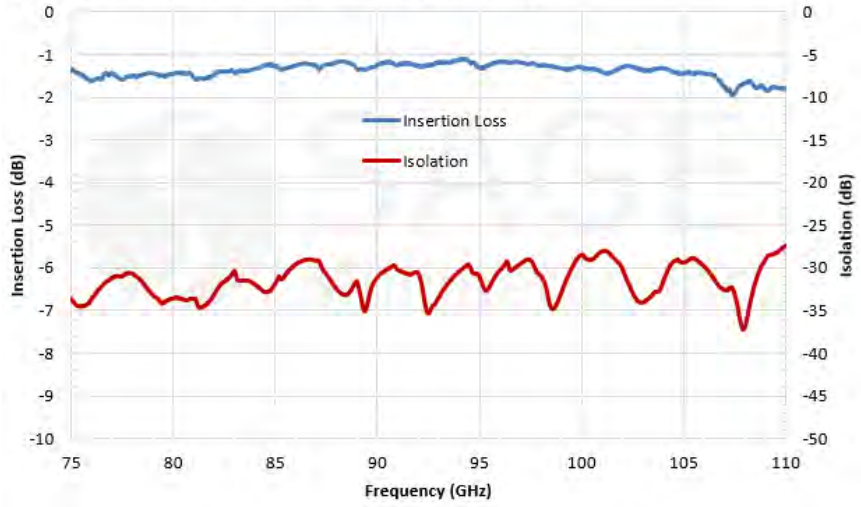
**STF-10-S1-C**
75 to 110 GHz

**Features:**

- 75 to 110 GHz
- Full Waveguide Bandwidth
- 30 dB Isolation
- Compact Design
- 18 to 220 GHz Coverage
- 40+ Models to Support 5G Bands


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| RF Frequency | 75 GHz | | 110 GHz |
| Insertion Loss | | 1.5 dB | 2.2 dB |
| Isolation | | 28 dB | |
| Return Loss | | 15 dB | |
| Power Handling | | 1.0 W (CW) | 1.2 W (CW) |
| Specification Temperature | | +25 °C | |
| Operation Temperature | -40 °C | | +85 °C |

**Typical Insertion Loss and Isolation vs. Frequency**



# OSCILLATORS

# ERAVANT OSCILLATORS

The focus of this presentation section is to introduce the **Eravant** oscillator product family by highlighting some representative models. There are several hundred standard models available to satisfy all 5G system applications. The oscillator family includes the following types:

- Dielectric Resonator Oscillator
- Mechanical Tuned Gunn Oscillator
- Bias Tuned Gunn Oscillator
- Varactor Tuned Gunn Oscillator
- Phase Locked Oscillator
- Frequency Synthesizer
- Voltage Tuned Free Running Oscillator

# DIELECTRIC RESONATOR OSCILLATOR

**SOD-37301213-22-S1**
37 GHz

**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 |

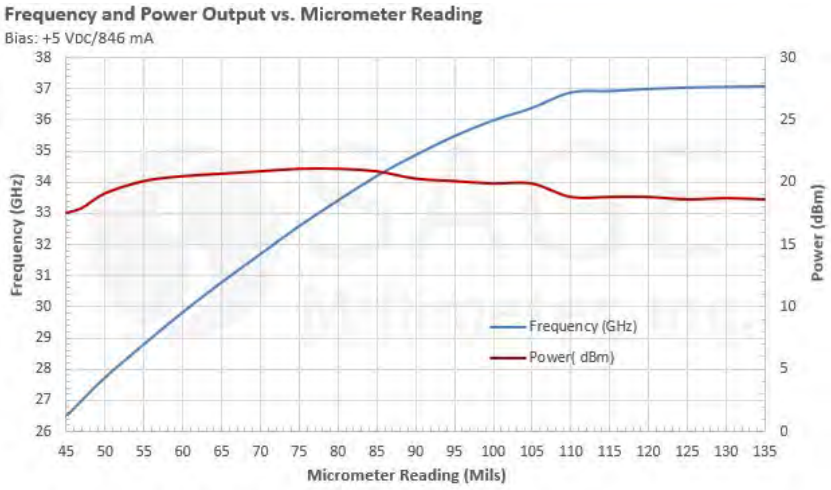
# MECHANICALLY TUNED GUNN OSCILLATOR

**SOF-2820-M1**
28 to 38 GHz

**Features:**

- 28 to 38 GHz
- Low AM/FM Noise and Harmonics
- Mechanical Tunable
- 50+ Models to Support 5G Bands


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Center Frequency | 28 GHz | 32 GHz | 38 GHz |
| Mechanical Tuning Range | | ±5 GHz | |
| Output Power | | +18 dBm | |
| Bias Voltage | | +5.0 $V_{DC}$ | +5.5 $V_{DC}$ |
| Bias Current | | 850 mA | |
| Specification Temperature | | +25°C | |
| Case Temperature | 0°C | | +50°C |

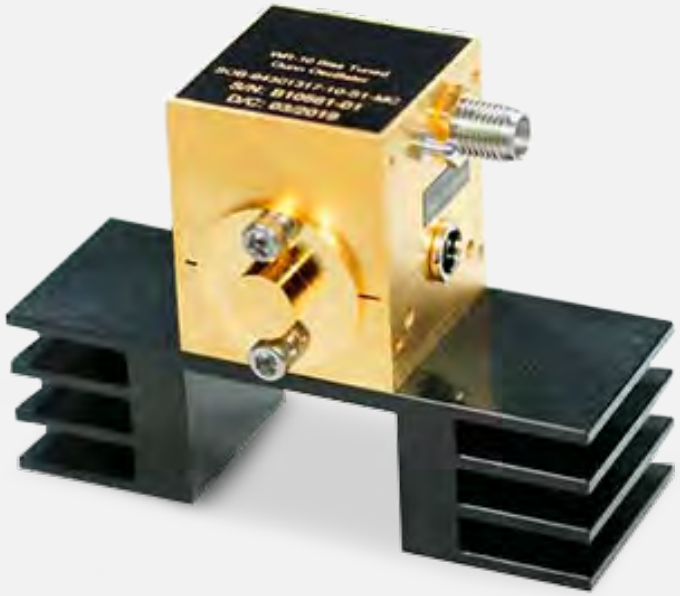


# BIAS TUNED GUNN OSCILLATOR

**SOB-94301317-10-S1**
94 GHz

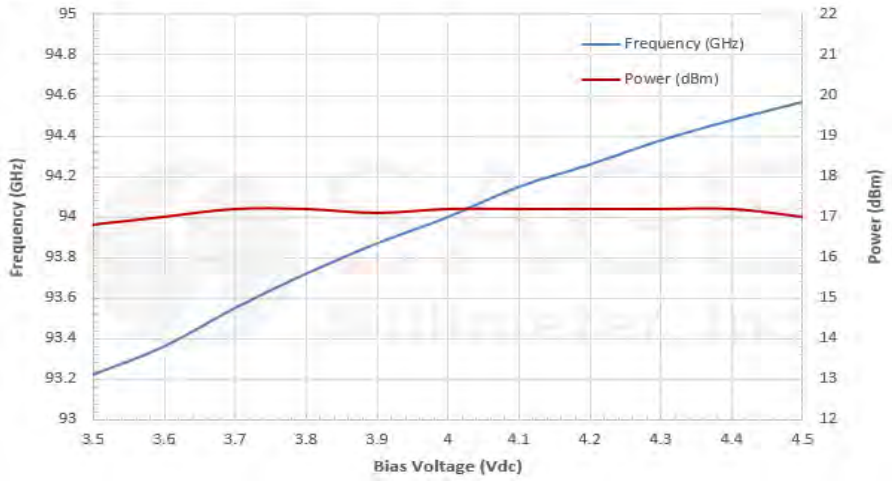
**Features:**

- 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



# VARACTOR GUNN OSCILLATOR

**SOV-94306310-10-G1**
94 GHz

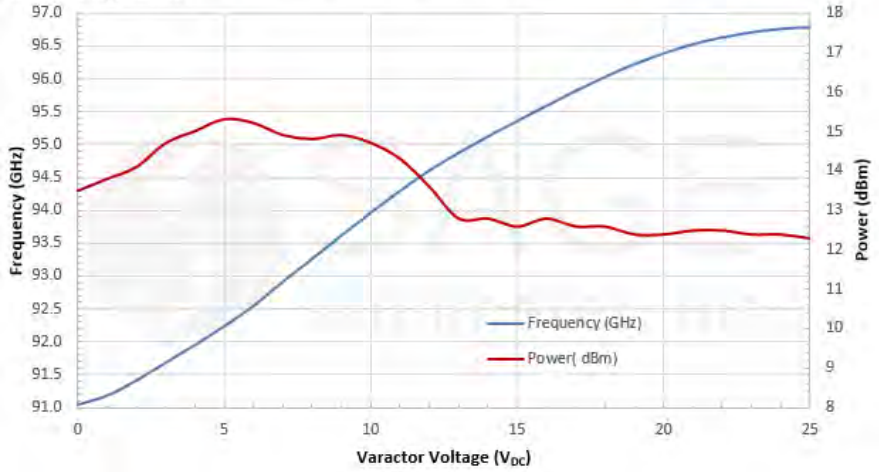
**Features:**

- 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



# PHASE LOCKED OSCILLATOR

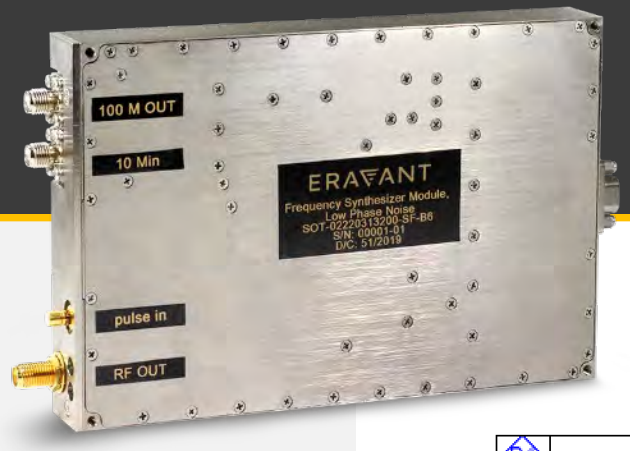
**SOP-28310115-KF-I1**
28 GHz

**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 |

# FREQUENCY SYNTHESIZER



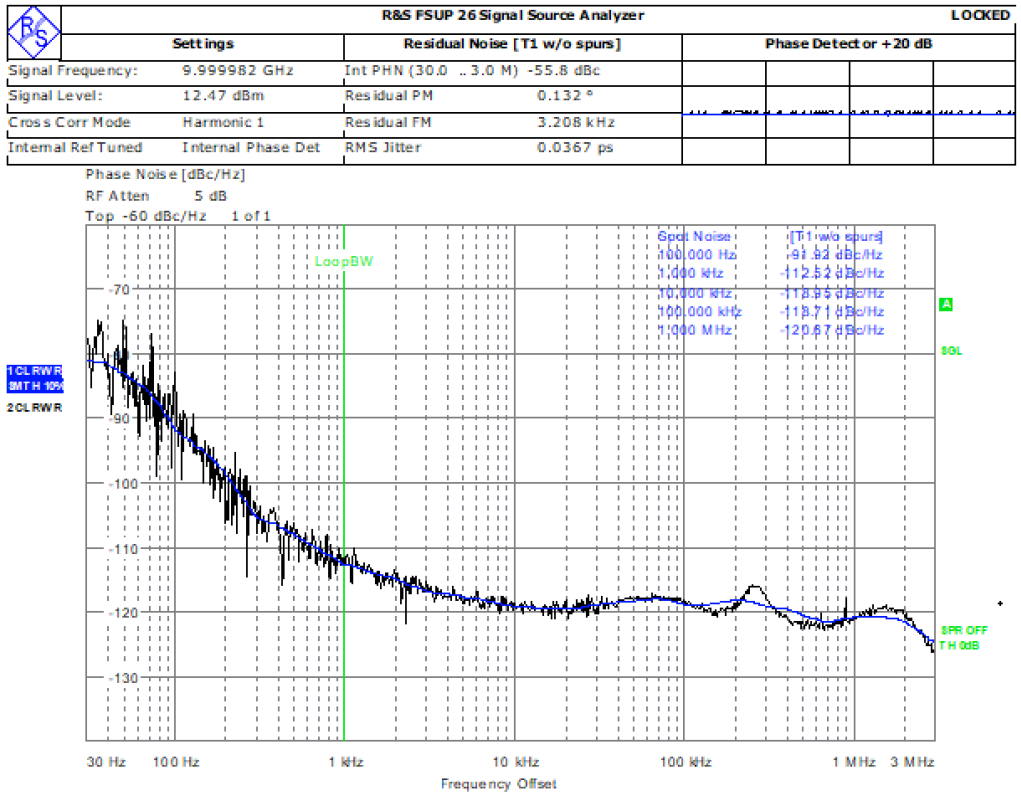

## SOT-02220313200-SF-B6

200 MHz to 20 GHz

**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)**<br>RF Frequency at 20 GHz | ≤-101 dBc/Hz @ 1 kHz; ≤-110 dBc/Hz @ 10 kHz<br>≤-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 |



# VOLTAGE TUNED OSCILLATOR

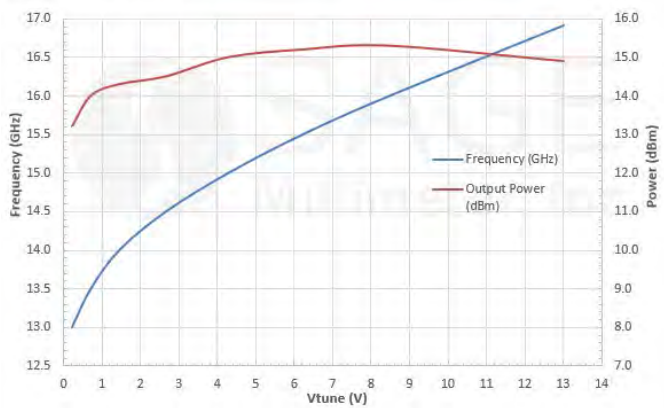
**SOW-15303315-SM-S1-H**
13 to 17 GHz

**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



# RECEIVER, TRANSMITTER, TRANSCEIVER, MODULES

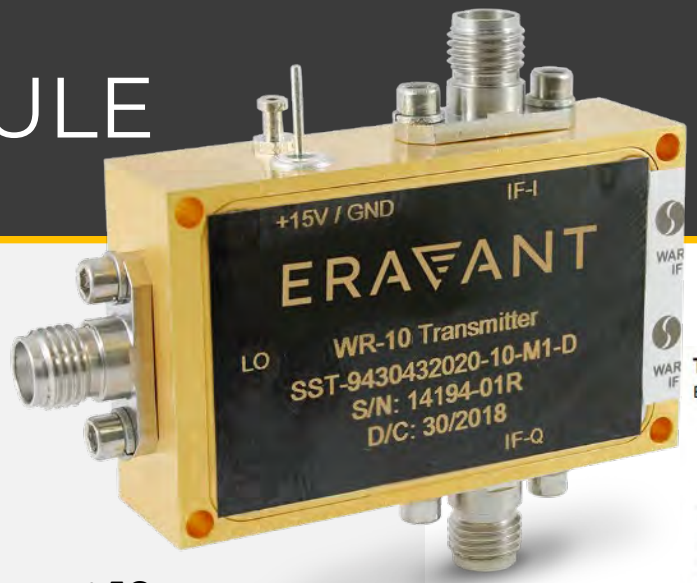
# RECEIVER, TRANSMITTER, TRANSCEIVER, MODULES

The focus of this presentation section is to introduce the **Eravant** integrated module product family by highlighting some representative models. There are many standard models available to satisfy all 5G system applications. The integrated module family includes the following types, which can be found here. Custom modules are available upon request.

- Receiver Module
- Transmitter Module
- Transceiver Module

# RECEIVER MODULE

**SSR-9430434030-10-M1-D**
92 to 96 GHz

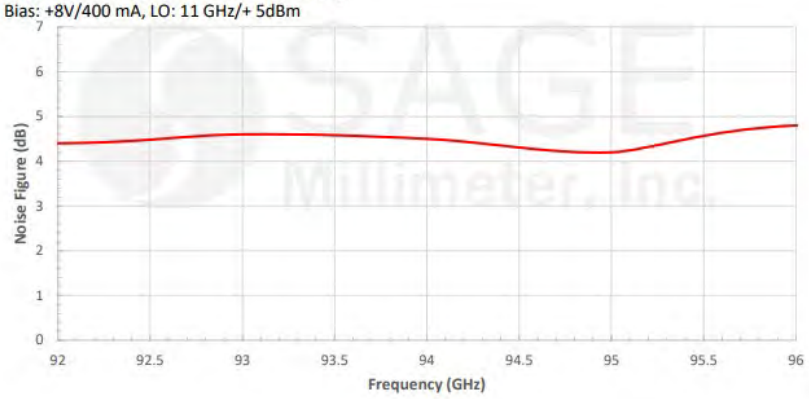



**Features:**

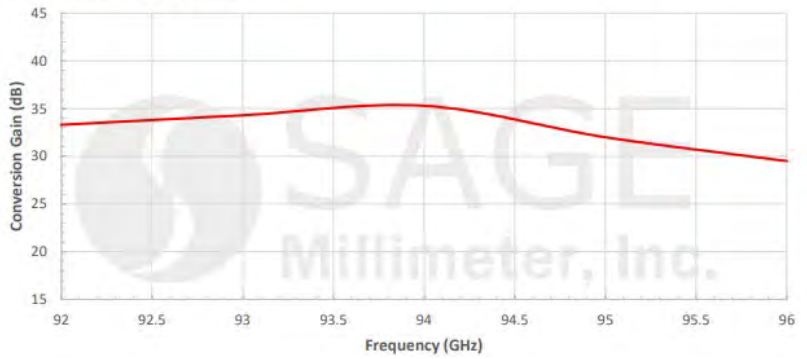
- 92 to 96 GHz
- Compact Size
- Fully Integrated
- More than 20 Models to Support 5G

| 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

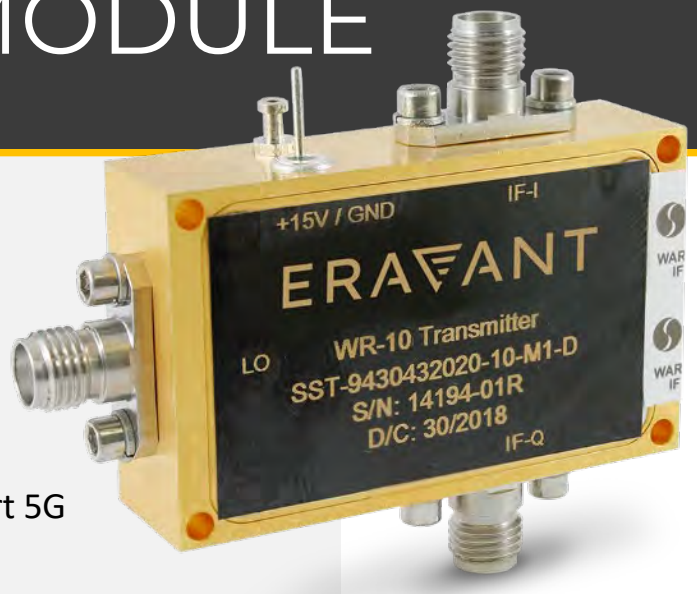



**Typical Conversion Gain vs. Frequency**
Bias: +8V/400 mA, LO: 11 GHz/+ 5dBm



# TRANSMITTER MODULE

**SST-9430432030-10-M1-D**
92 to 96 GHz

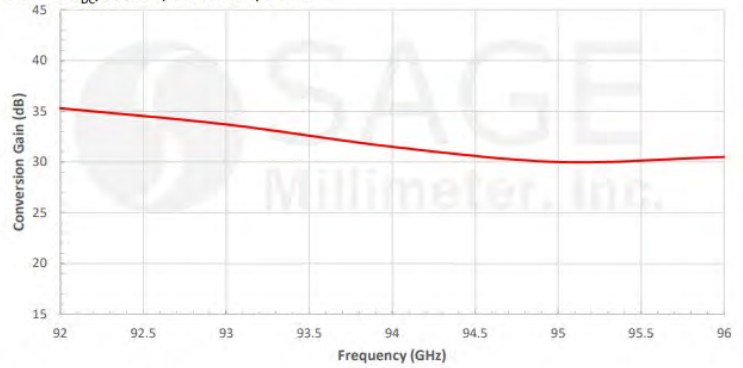



**Features:**

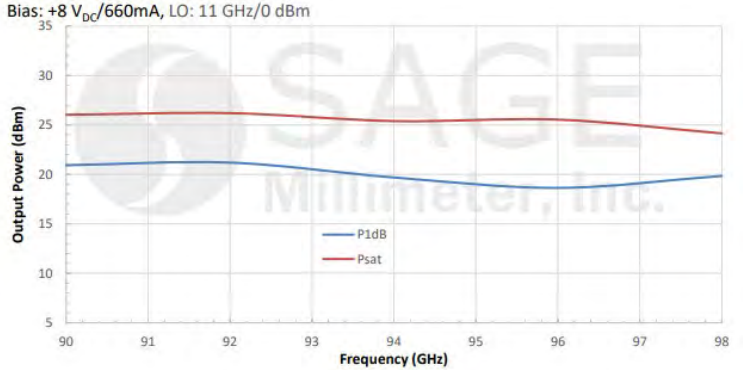
- 92 to 96 GHz
- Compact Size
- Fully Integrated
- More than 20 Models to Support 5G

| 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

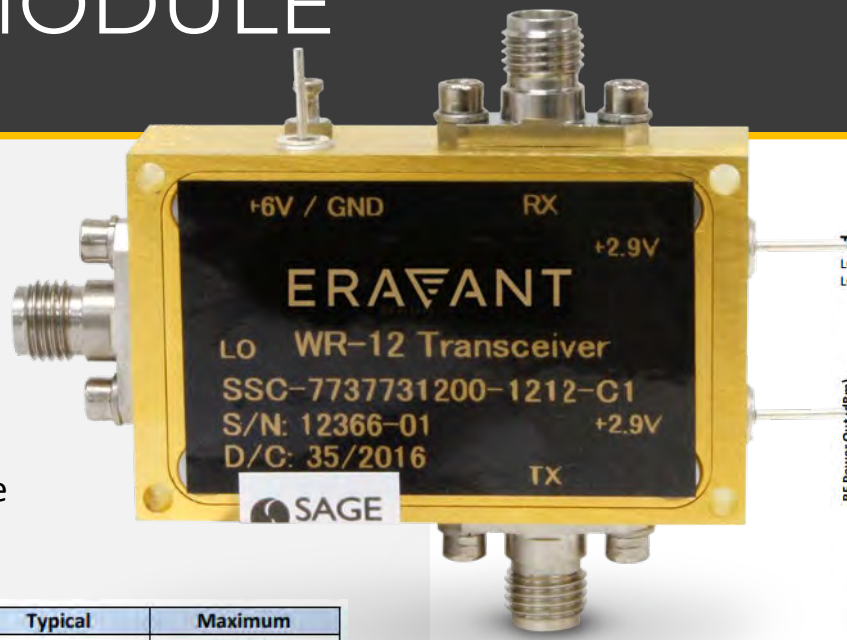


# TRANSCEIVER MODULE

SSC-7737731200-1212-C1
76 to 78 GHz

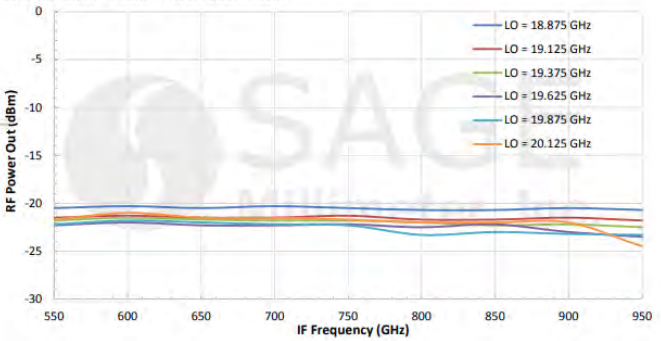
**Features:**

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

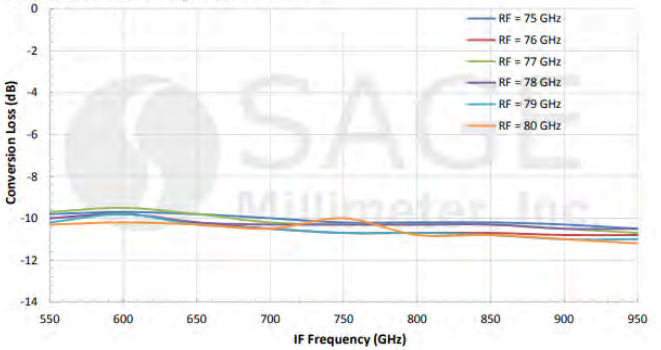



| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| TX RF Output Frequency | 76 GHz | | 78 GHz |
| TX RF Output Power | -30 dBm | | |
| TX IF Input Frequency | 550 MHz | | 950 MHz |
| TX IF Input Power | | | 0 dBm |
| RX RF Input Frequency | 76 GHz | | 78 GHz |
| RX RF Input Power | | -20 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 | | +5 $V_{DC}$ | +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



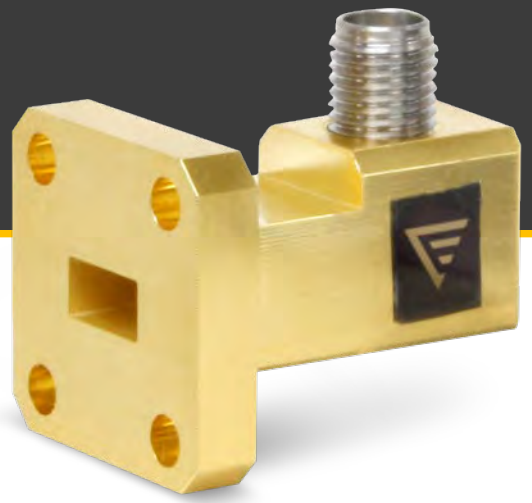
# PASSIVE WAVEGUIDE

# ERAVANT PASSIVE WAVEGUIDE

The focus of this presentation section is to introduce the **Eravant** passive waveguide product family by highlighting some representative models. There are several hundred standard models available to satisfy all 5G system applications. The passive waveguide family can be found here and here and includes the following types:

- Waveguide to Coaxial Adapter
- Waveguide Taper and Mode Transition
- Waveguide Directional Coupler
- Waveguide Crossguide Coupler
- Waveguide Power Divider
- Waveguide Magic Tee
- Waveguide Load
- Waveguide, Flexible
- Waveguide, Rigid
- Waveguide Connector - Uni-Guide

# WAVEGUIDE TO COAX ADAPTER, RIGHT ANGLE



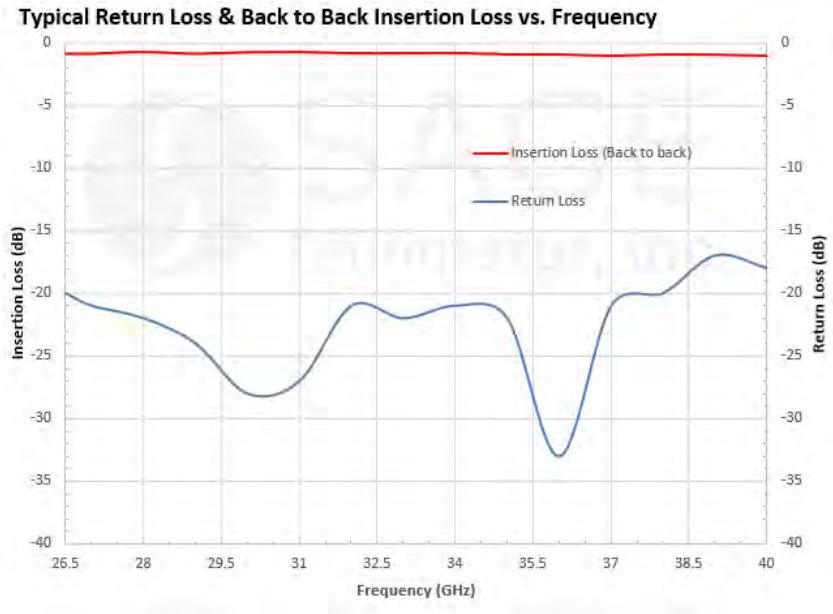
## SWC-28KF-R1 & SWC-28KM-R1

**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.



# WAVEGUIDE TO COAX ADAPTER, RIGHT ANGLE

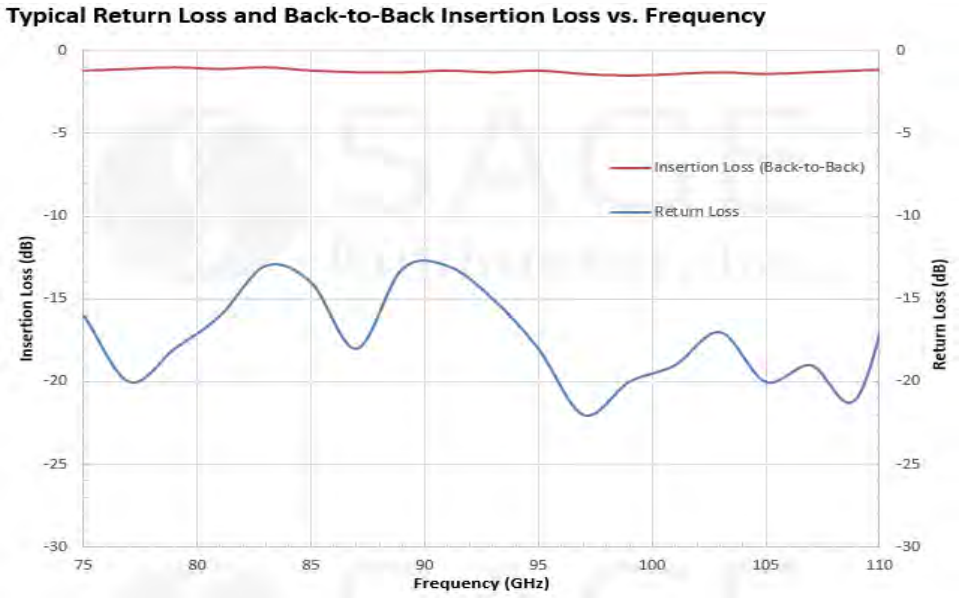
## SWC-101F-R1 & SWC-101M-R1

**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.



# WAVEGUIDE TO COAX ADAPTER, END LAUNCH

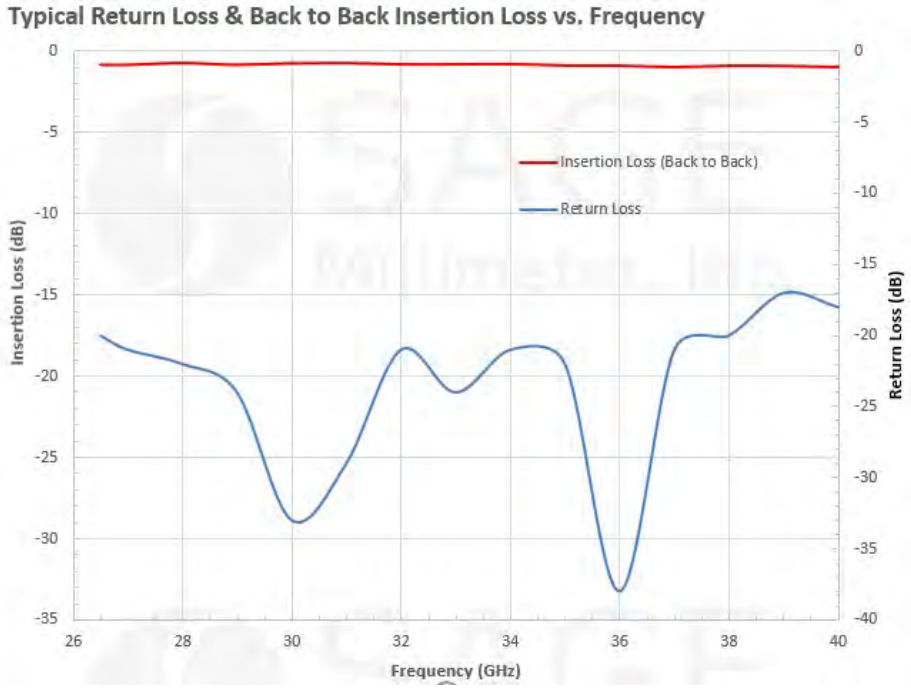

## SWC-28KF-E1 & SWC-28KM-E1

**Features:**

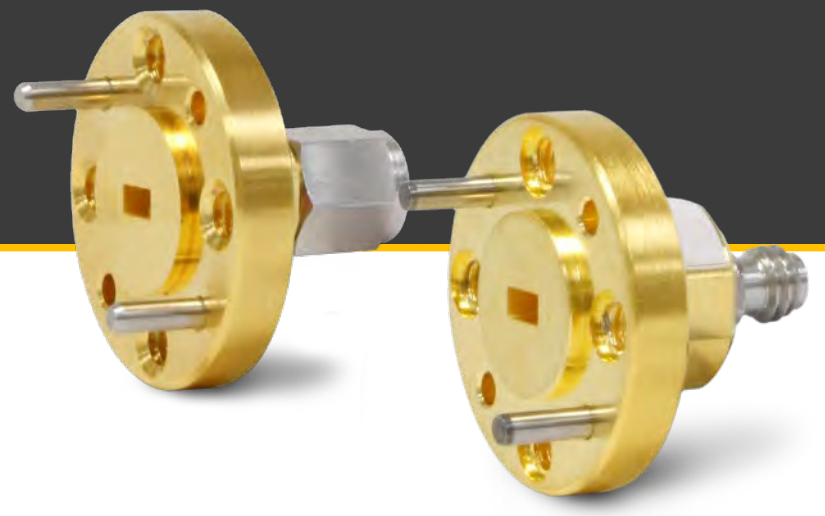
- 26 to 40 GHz
- End Launch
- Low Insertion Loss and VSWR
- 60+ Models to Support 5G Bands
- Frequency up to 130 GHz

| 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.



# WAVEGUIDE TO COAX ADAPTER, END LAUNCH



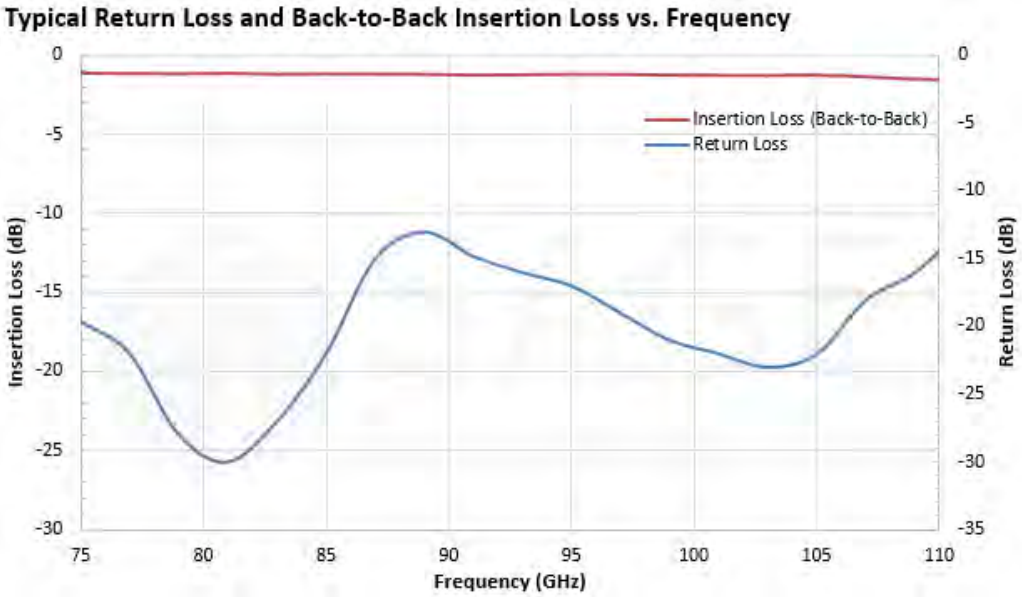
## SWC-101F-E1 & SWC-101M-E1

**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.

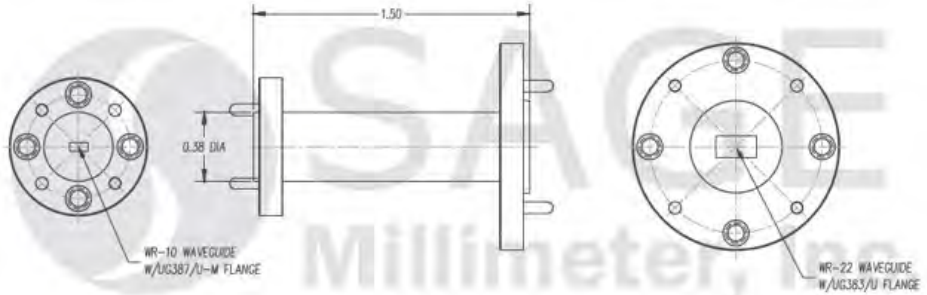


# WAVEGUIDE TAPER TRANSITION

**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

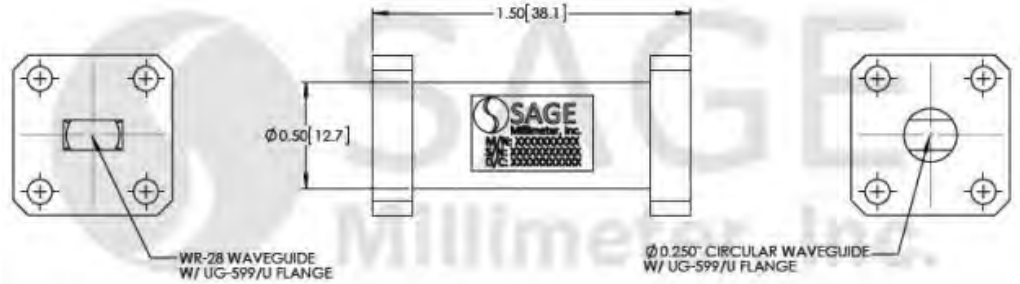

| Item | Specification |
|---|---|
| Waveguide Size | WR-10 Waveguide with UG-387/U-M Flange |
| Waveguide Size | WR-19 Waveguide with UG-383/U-M Flange |
| Insertion Length | 1.5” |
| Outline | WT-UW |
| Material | Brass |
| Finish | Gold Plated |
| Weight | 1.5 Oz |

# WAVEGUIDE MODE TRANSITION

**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 |

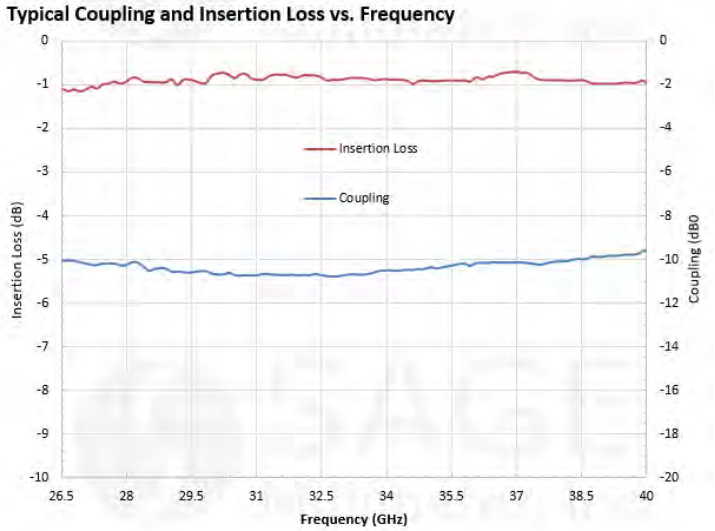
# WAVEGUIDE DIRECTIONAL COUPLER

**SWD-1040H-28-SB**
24 to 42 GHz

**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 |



# WAVEGUIDE DIRECTIONAL COUPLER

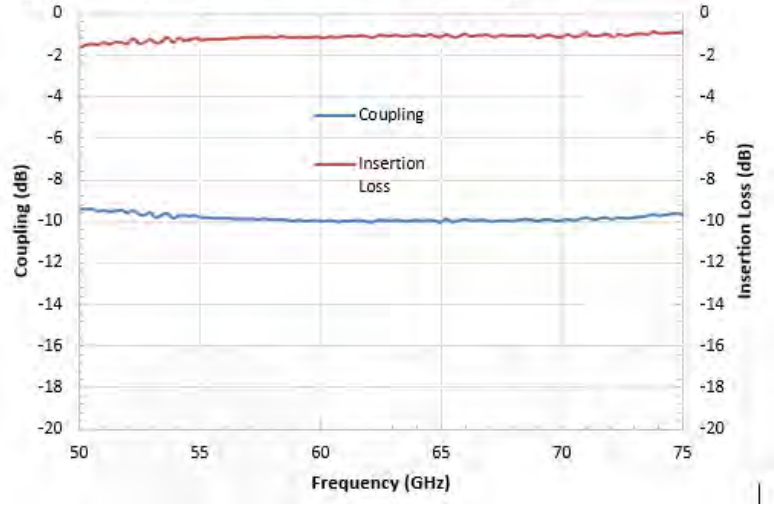
**SWD-1040H-15-SB**
50 to 75 GHz

**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**



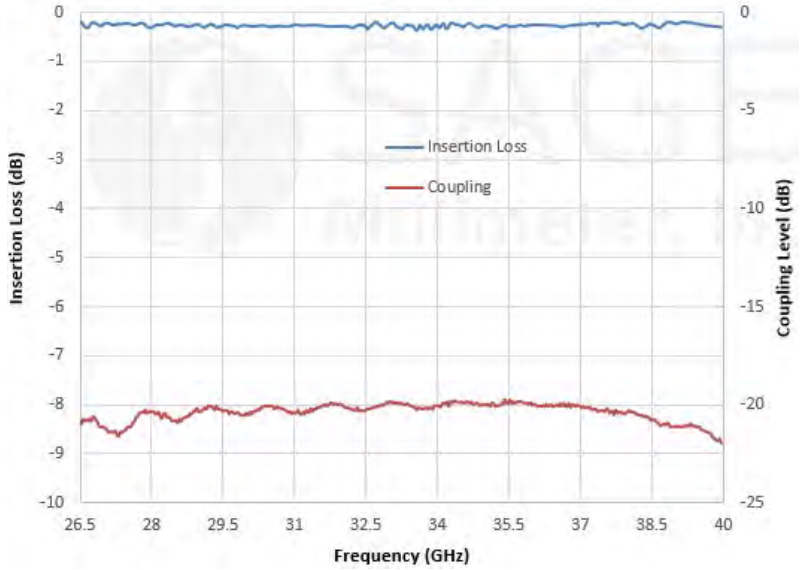
# WAVEGUIDE CROSSGUIDE COUPLER

**SWX-31339330-28-4B**
31 to 39 GHz

**Features:**

- 31 to 39 GHz
- 20, 30 and 40 dB
- 3 Port and 4 Port
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 31 GHz | | 39 GHz |
| Coupling Level | | 20 dB | |
| Insertion Loss | | 0.4 dB | |
| Directivity | | 15 dB | |
| Input Return Loss | | 20 dB | |
| Output Return Loss | | 20 dB | |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |



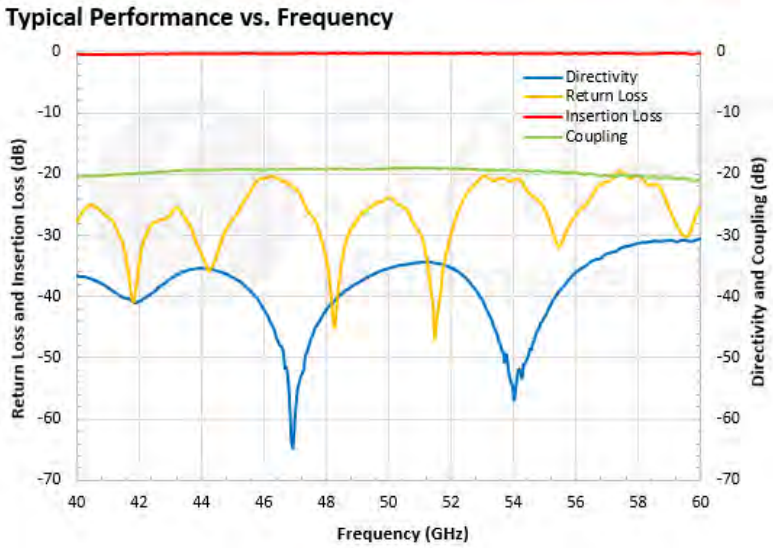
# WAVEGUIDE CROSSGUIDE COUPLER

**SWX-40360320-19-4B**
40 to 60 GHz

**Features:**

- 40 to 60 GHz
- 20, 30 and 40 dB
- 3 Port and 4 Port
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz


| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency Range | 40 GHz | | 60 GHz |
| Coupling Level | | 20 dB | |
| Insertion Loss | | 0.5 dB | |
| Directivity | | 20 dB | |
| Input/Output VSWR | | 1.1:1 | |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |



# WAVEGUIDE POWER DIVIDER, 2 WAY, RIGHT ANGLE

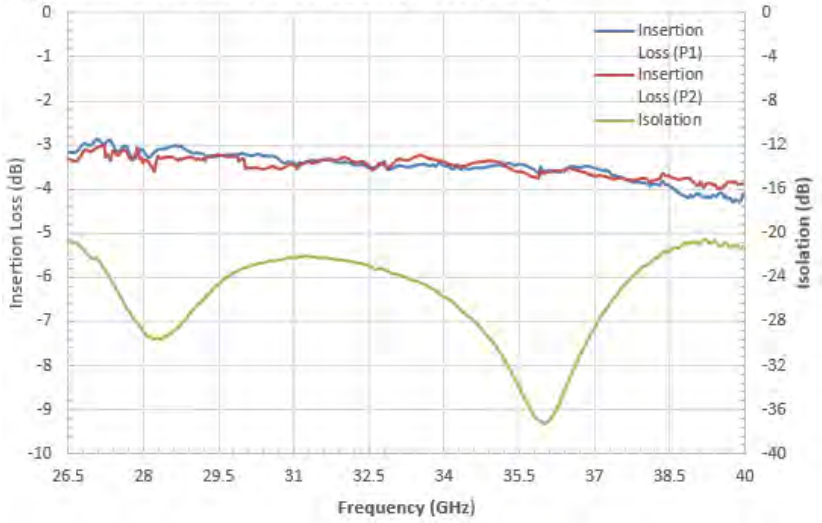
**SWP-27340302-28-S1**
26.5 to 40 GHz

**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

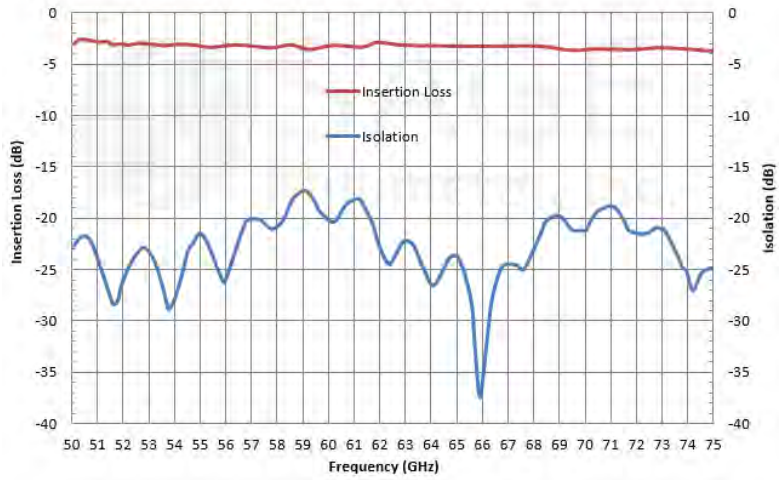
**SWP-50375302-15-S1**
50 to 75 GHz

**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



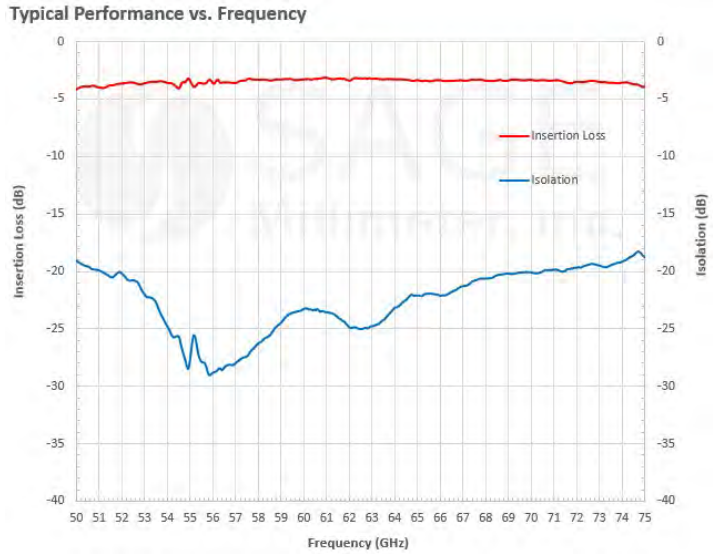
# WAVEGUIDE POWER DIVIDER, 2 WAY, IN-LINE

**SWP-50375302-15-E2**
50 to 75 GHz

**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 |

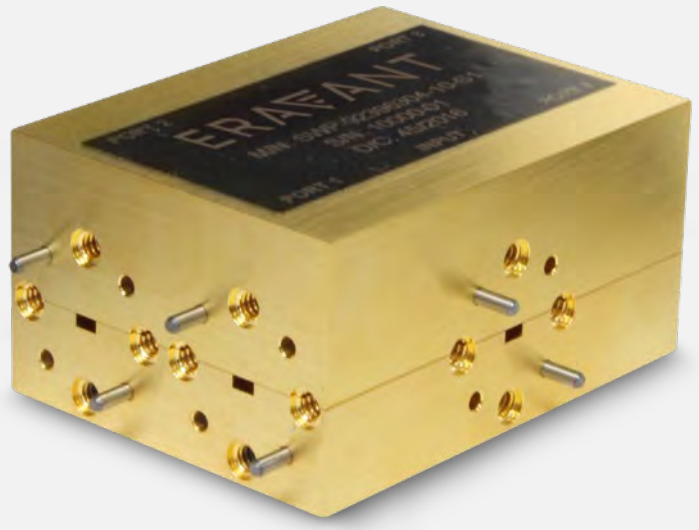


# WAVEGUIDE POWER DIVIDER, 4 WAY, IN-LINE

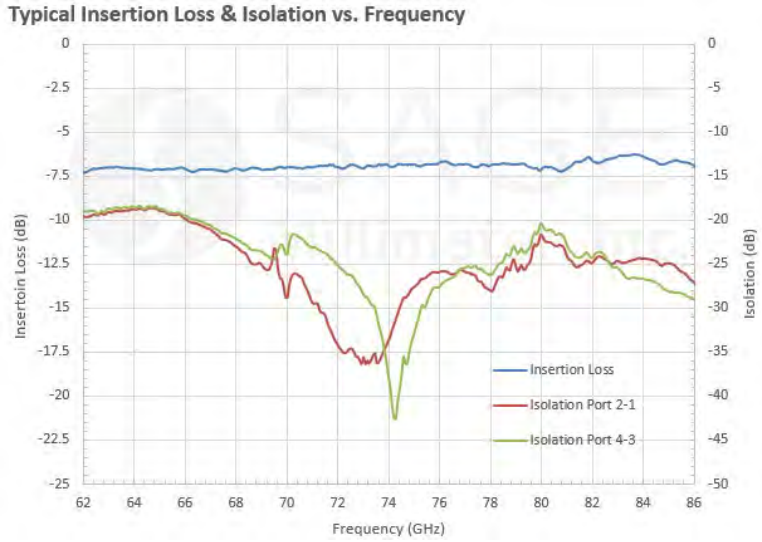
**SWP-62386304-12-S1**
62 to 86 GHz

**Features:**

- 62 to 86 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 | 62 GHz | | 86 GHz |
| Insertion Loss | | 0.8 dB | |
| Amplitude Unbalance | | | ±0.4 dB |
| Port Isolation, Adjacent Port | | 20 dB | |
| Port VSWR | | 1.5:1 | |
| Specification Temperature | | +25˚C | |
| Operating Temperature | -40˚C | | +85˚C |

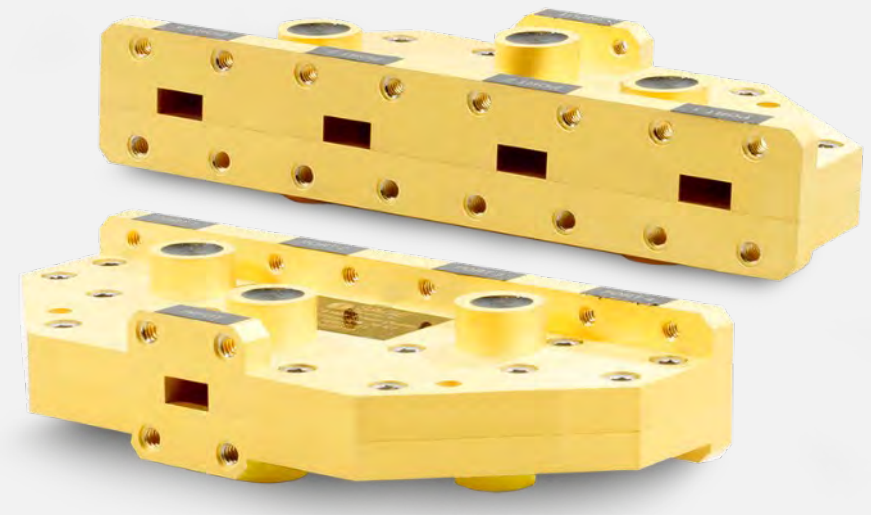


# WAVEGUIDE POWER DIVIDER, 4 WAY, IN-LINE

**SWP-30340304-28-E1**
30 to 40 GHz

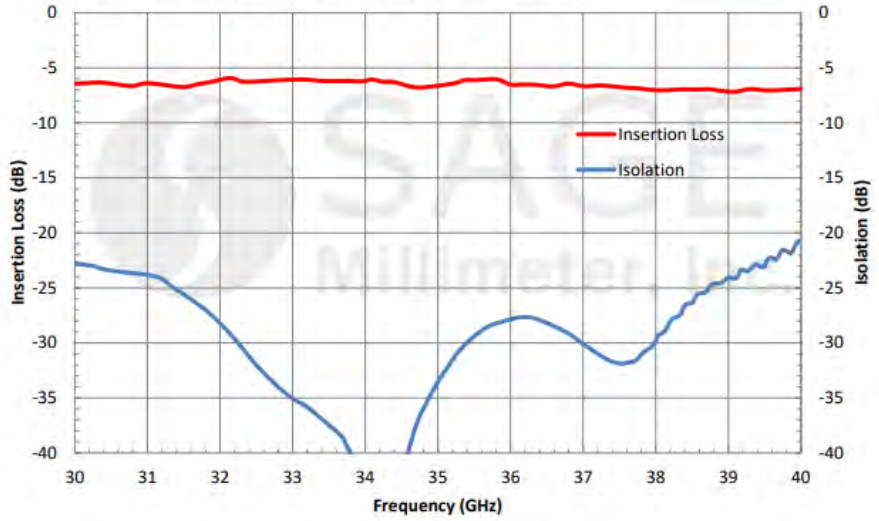
**Features:**

- 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**

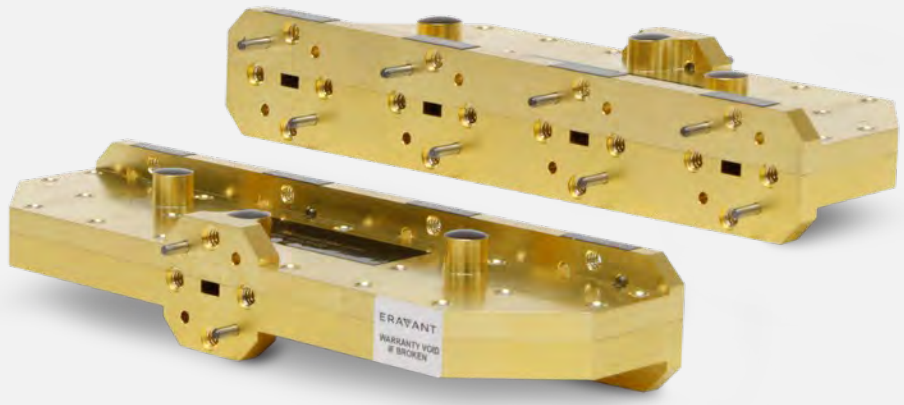


# WAVEGUIDE POWER DIVIDER, 4 WAY, IN-LINE

**SWP-50375304-15-E1**
50 to 75 GHz

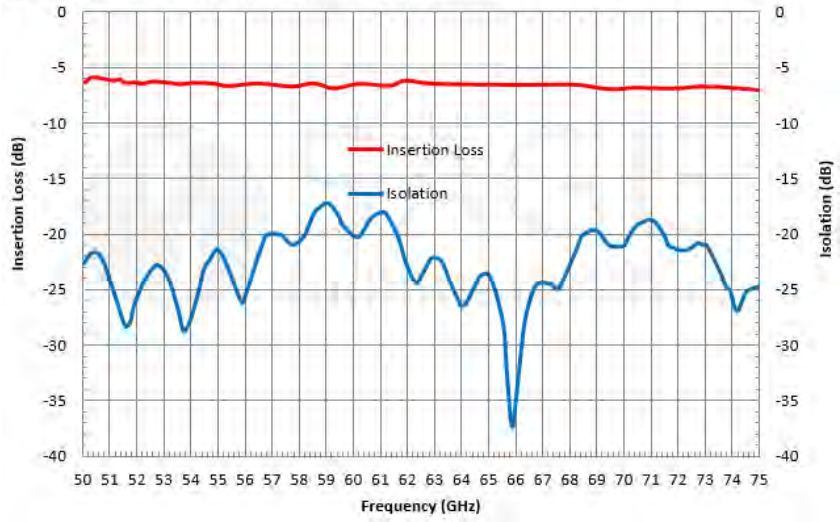
**Features:**

- 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)



# WAVEGUIDE POWER DIVIDER, 8 WAY, IN-LINE

**SWP-29331308-28-E1**
28 to 31 GHz

**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

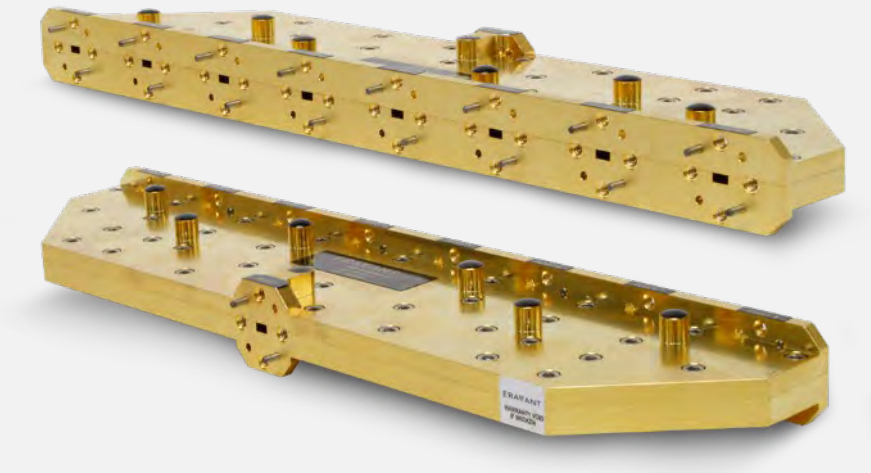

| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 28.5 GHz | | 30.5 GHz |
| Power Unbalance | | ±0.20 dB | |
| Insertion Loss | | 0.9 dB | |
| Isolation | | 25 dB | |
| Return Loss | | 15 dB | |
| Specification Temperature | | +25 °C | |
| Operating Temperature | -40 °C | |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

# WAVEGUIDE POWER DIVIDER, 8 WAY, IN-LINE

**SWP-50366308-15-E1**
50 to 66 GHz

**Features:**

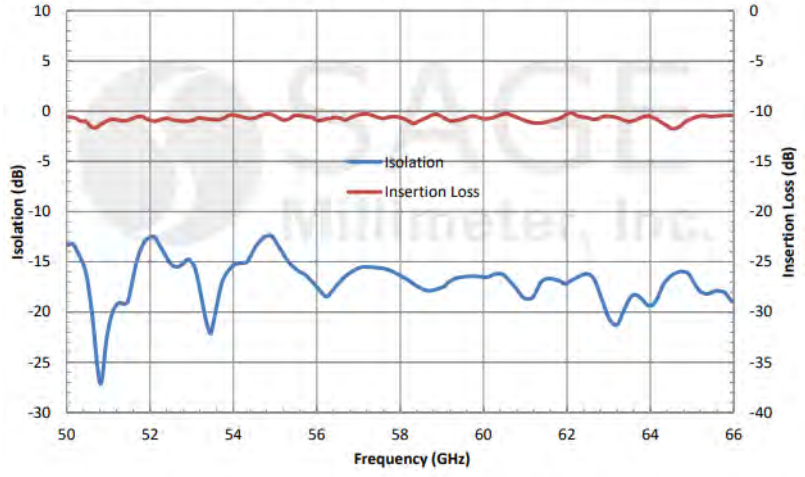
- 50 to 66 GHz
- Right Angle and End Launch
- 2-Way, 4-Way, 8-Way and 16-Way
- 50+ Models to Support 5G Bands
- Frequency up to 110 GHz



| Parameter | Minimum | Typical | Maximum |
|---|---|---|---|
| Frequency | 50 GHz | | 66 GHz |
| Power Unbalance | | ±0.4 dB | ±0.5 dB |
| Insertion Loss* | | 1.7 dB | |
| Isolation (Adjacent Ports) | | 20 dB | |
| Isolation (Non Adjacent Ports) | 20 dB | 30 dB | |
| Input/Output VSWR | | | 1.5:1 |
| Specification Temperature | | +25°C | |
| Operating Temperature | -40°C | | +85°C |

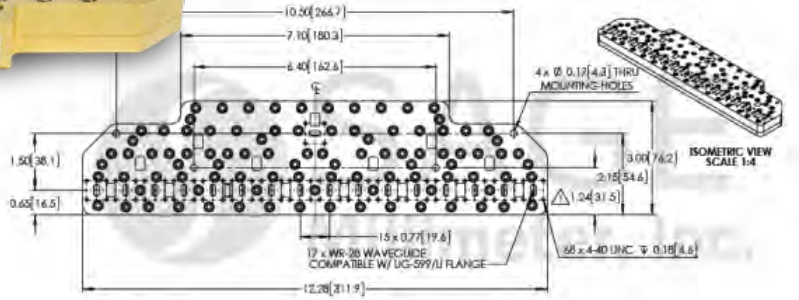
Note: The insertion loss does not include the power splitting loss.

**Typical Port Isolation and Insertion Loss vs. Frequency**
Isolation was tested between adjacent ports (i.e. 1-2, 3-4, 5-6 and 7-8)



# WAVEGUIDE POWER DIVIDER, 16 WAY, IN-LINE

**SWP-27335316-28-C1**
50 to 66 GHz

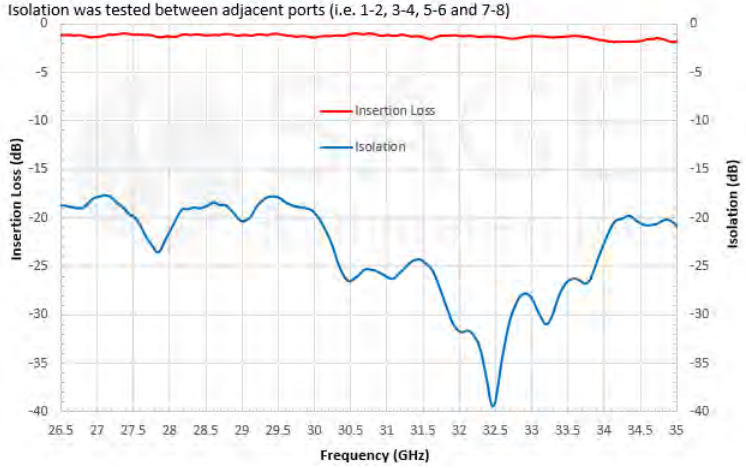




**Features:**

- 50 to 66 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 | 26.5 GHz | | 35 GHz |
| Insertion Loss | | 1.2 dB | |
| Power Unbalance | | ±0.2 dB | |
| Port Isolation | | 20 dB | |
| Specification Temperature | | +25°C | |
| Operating Temperature | -40°C | | +85°C |

**Typical Isolation and Insertion Loss vs. Frequency**
Isolation was tested between adjacent ports (i.e. 1-2, 3-4, 5-6 and 7-8)



# MAGIC TEE

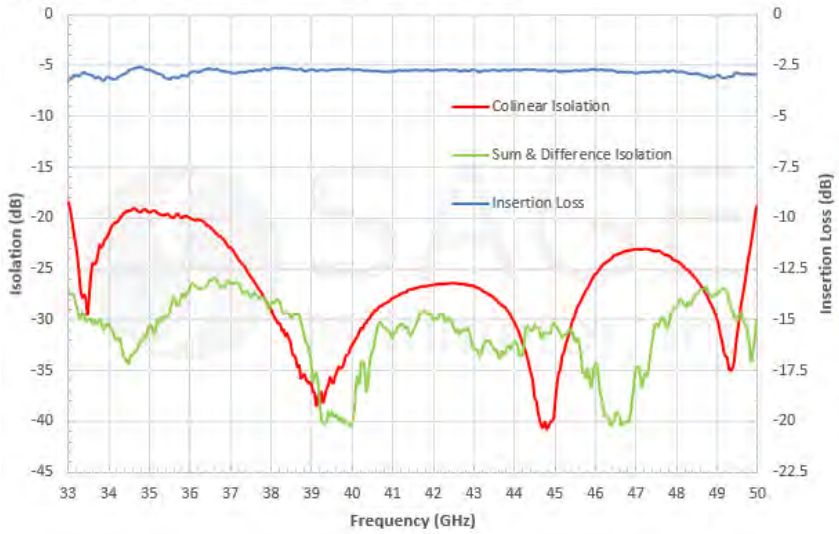
**SWM-33350320-22-SB**
33 to 50 GHz

**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

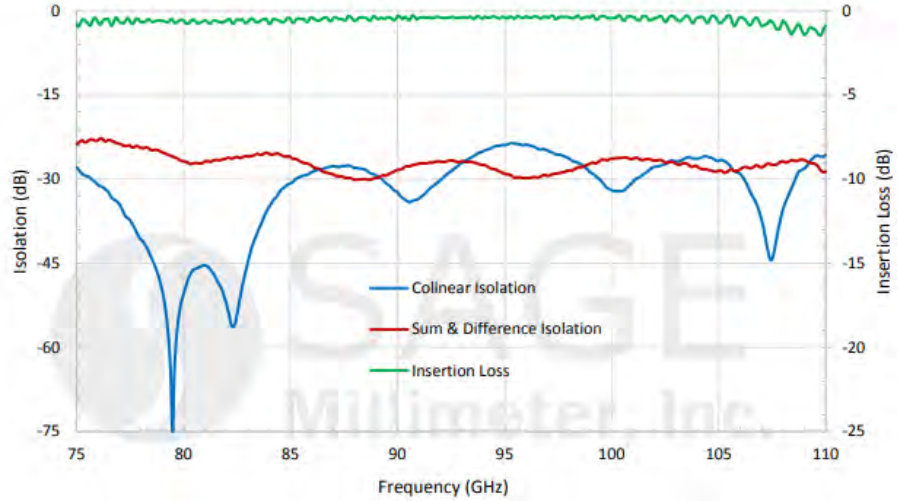
**SWM-75311420-10-SB**
75 to 110 GHz

**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 LOAD, FIXED, LOW POWER

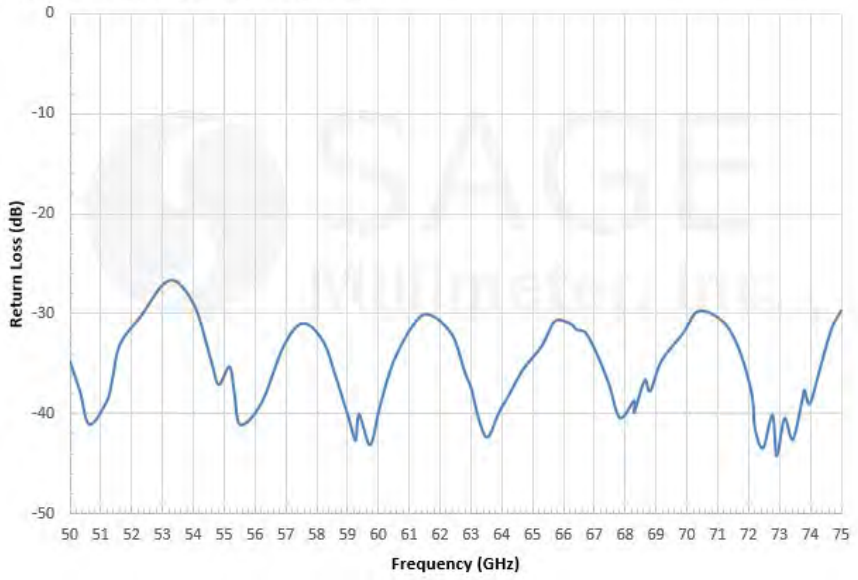
**SWL-1527-S1**
50 to 75 GHz

**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

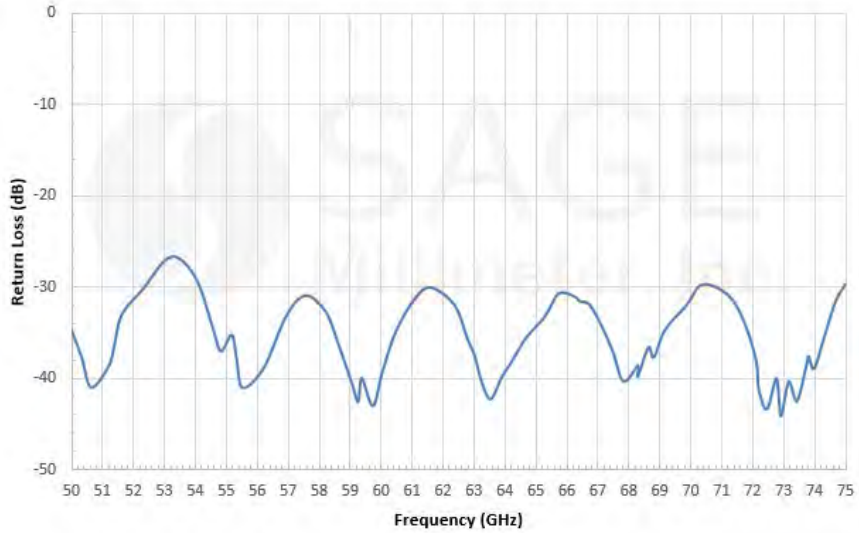
**SWL-1537-S1**
50 to 75 GHz

**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**



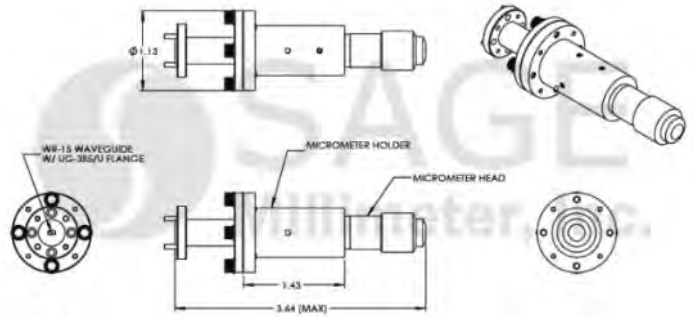
# WAVEGUIDE LOAD, TUNABLE, LOW POWER

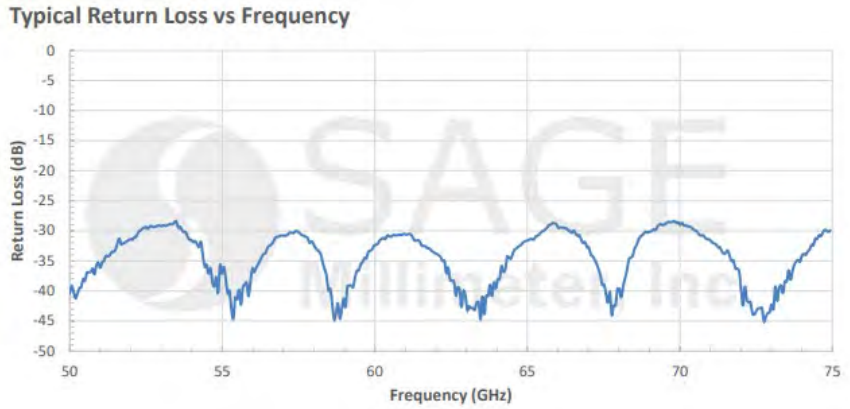
**SWL-1523-T1**
50 to 75 GHz

**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 |
| Return Loss | | 30 dB | |
| Power Handling | | +23 dBm | +25 dBm |
| Specification Temperature | | +25 ˚C | |
| Operating Temperature | -40 ˚C | | +85 ˚C |



# WAVEGUIDE, FLEXIBLE

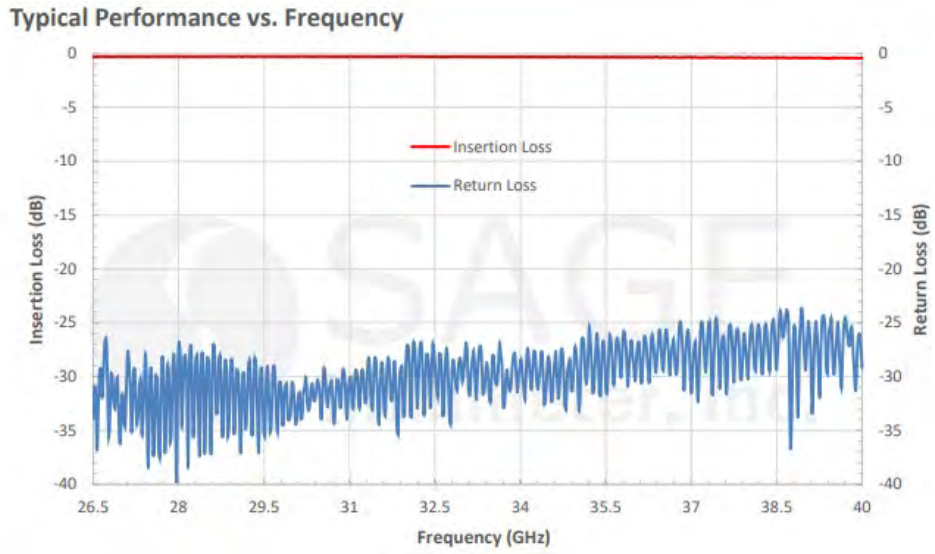
## SWG-28059-FB-FT-G

50 to 75 GHz

**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 |



# WAVEGUIDE, FLEXIBLE

## SWG-22354-FB-FT-A-G

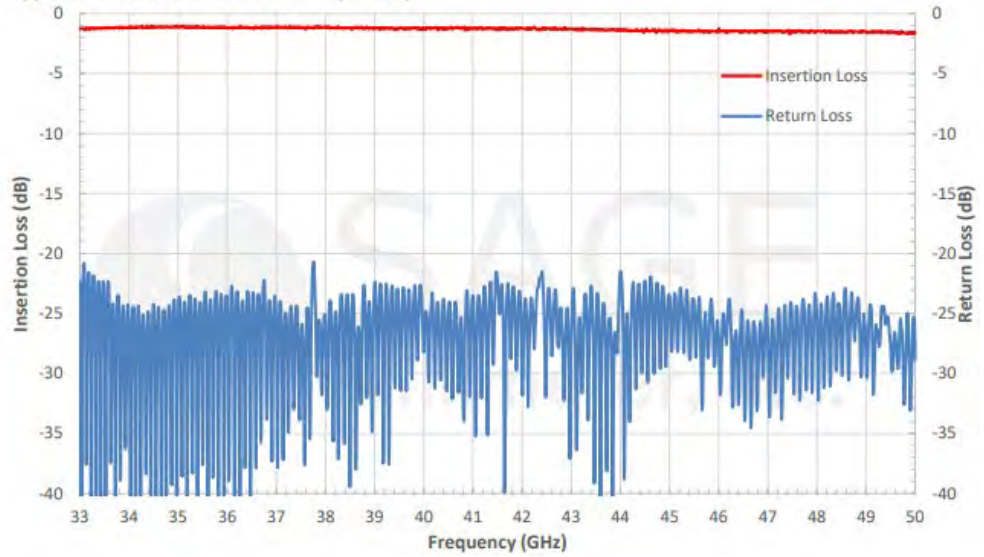
35 to 50 GHz

**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



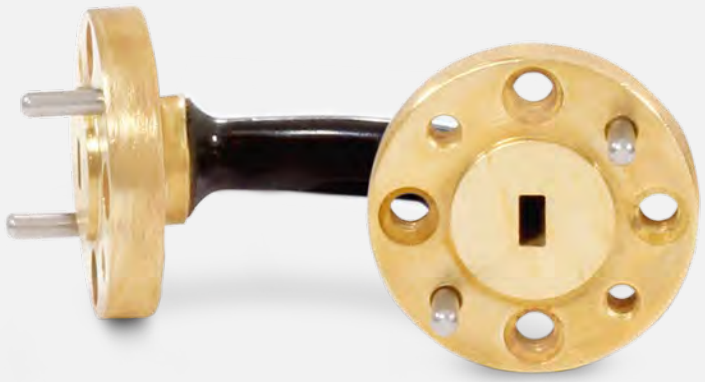
# WAVEGUIDE, FLEXIBLE

**SWG-10020-FB-F**

75 to 110 GHz

**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 |

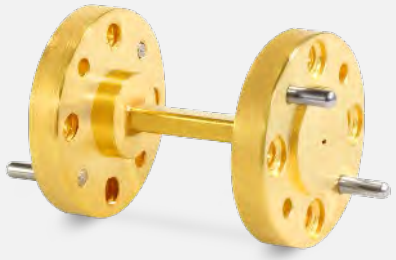
# WAVEGUIDE, RIGID

**Features:**

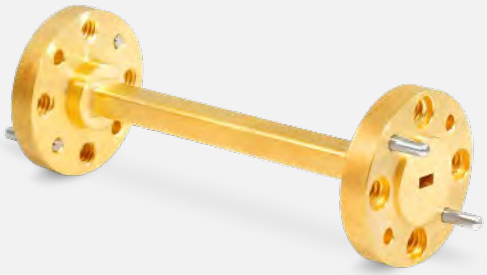
- WR-42 to WR-03
- Various Length
- 500+ Models to Support 5G Bands
- Frequency up to 325 GHz

**SWB-06090-EB**
**WR-06 E-Plane Bend, 90°**

**SWB-10090-TB**
**WR-10 Twist, 90°**



**SWG-03010-FB**
**WR-03 Straight Section, 1”**



**SWG-10020-FB**
**WR-10 Straight Section, 2”**

**SWB-10090-HB**
**WR-10 H-Plane Bend, 90°**

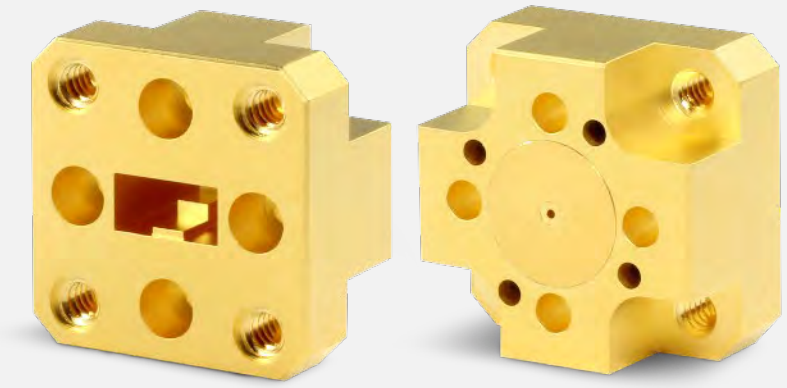
**SWB-12090-TB**
**WR-12 Twist, 90°**

# WAVEGUIDE CONNECTOR, UNI-GUIDE™

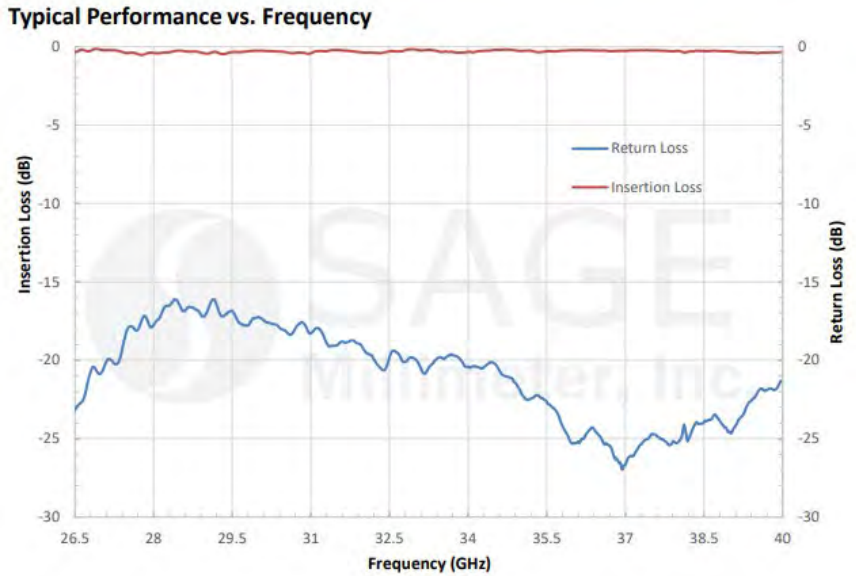
**SUF-2812-480-S1**
26.5 to 40 GHz

**Features:**

- 26.5 to 40 GHz
- WR-28, WR-22 and WR-19 Bands
- 3 Models to Support 5G Bands
- Field Replicable
- 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 |



# WAVEGUIDE CONNECTOR, UNI-GUIDE™

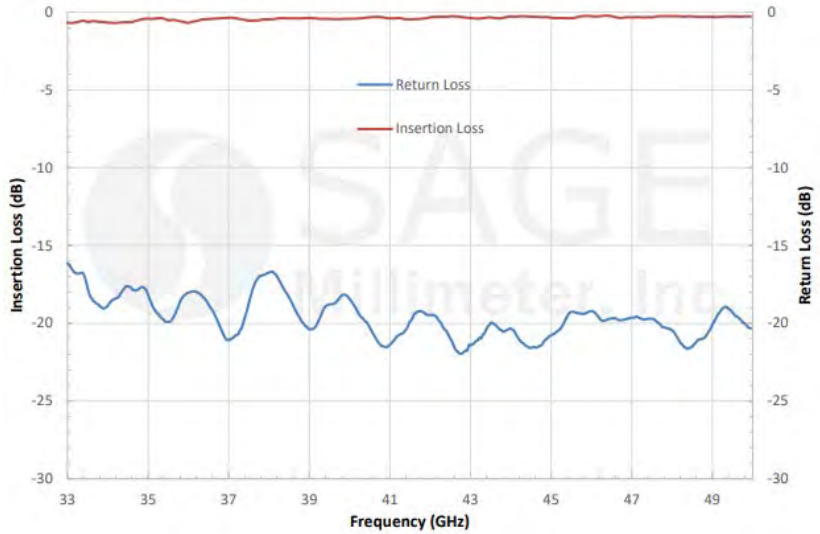
**SUF-2212-480-S1**
33 to 50 GHz

**Features:**

- 33 to 50 GHz
- WR-28, WR-22 and WR-19 Bands
- 3 Models to Support 5G Bands
- Field Replicable
- 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™

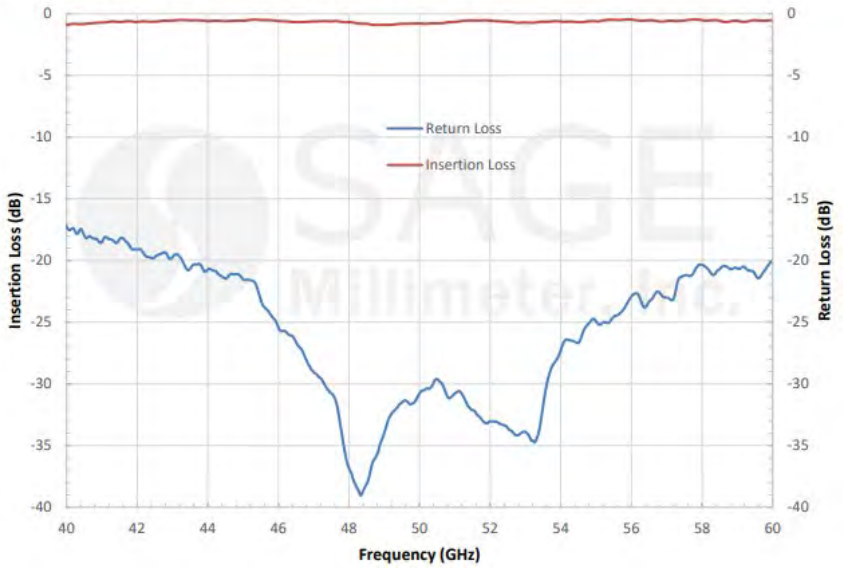
**SUF-1912-480-S1**
40 to 60 GHz

**Features:**

- 40 to 60 GHz
- WR-28, WR-22 and WR-19 Bands
- 3 Models to Support 5G Bands
- Field Replicable
- 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**



# PASSIVE COAXIAL PRODUCTS

# ERAVANT PASSIVE COAXIAL PRODUCTS

The focus of this presentation section is to introduce the **Eravant** passive coaxial product family by highlighting some representative models. There are several hundred standard models available to satisfy all 5G system applications. The passive coaxial family includes the following types:.

- Coaxial Adapter
- Coaxial Attenuator
- Coaxial Matching Load
- Coaxial DC Block
- Coaxial Bias Tee
- Coaxial Filter
- Coaxial Directional Coupler
- Coaxial Power Divider
- Coaxial Hybrid Coupler
- Coaxial Cable

# COAX ADAPTER (IN SERIES)

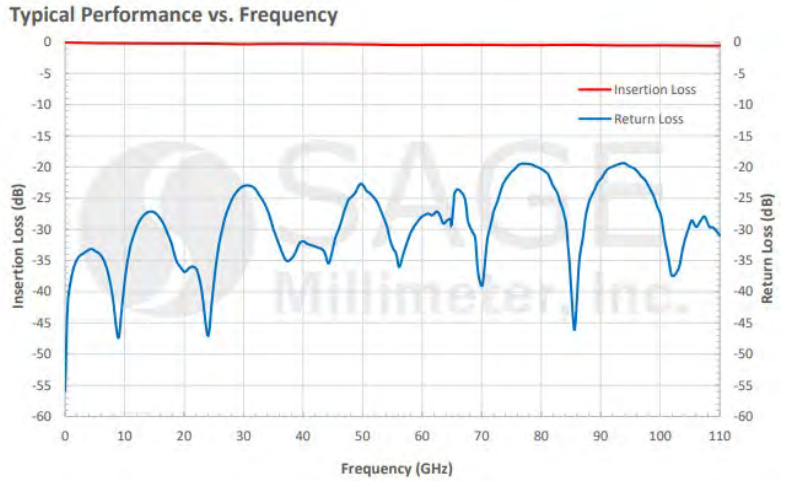
**FAMILY: SCT**
DC to 110 GHz

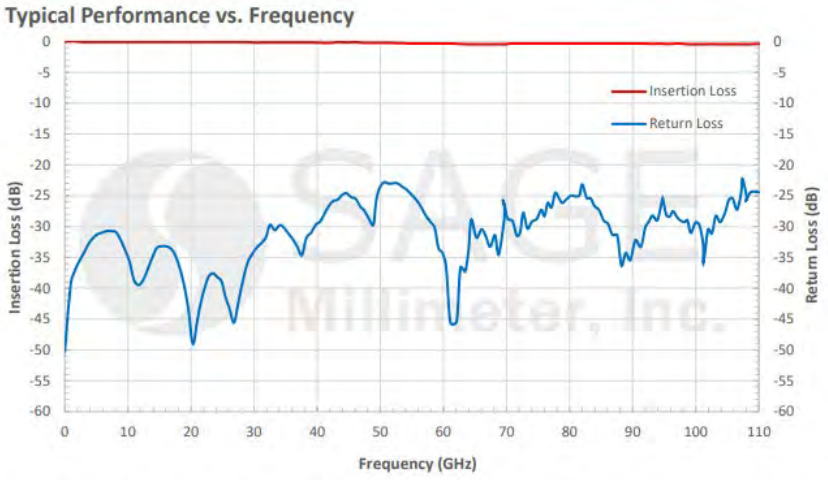
More Than 50 Models

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**



# COAX ADAPTER (BETWEEN SERIES)

**FAMILY: SCT**
DC to 110 GHz

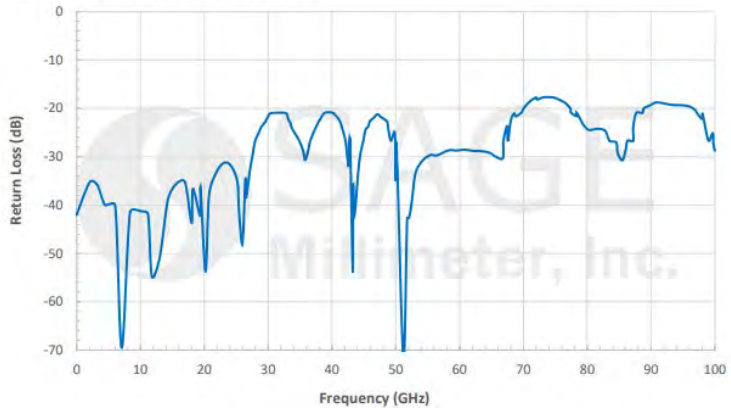
More Than 50 Models

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

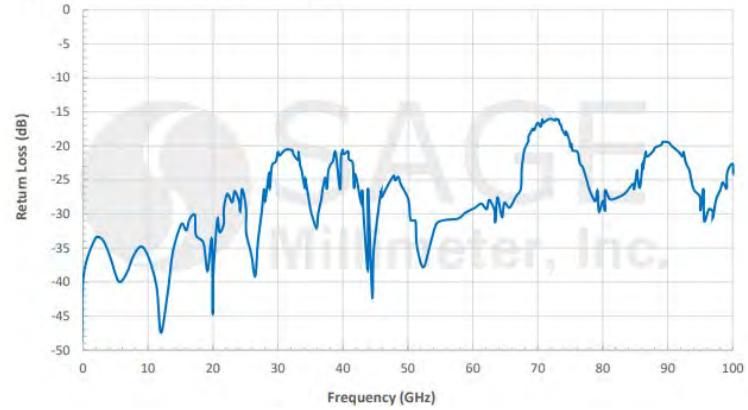
**SCT-AF1M-UB**
**DC to 100 GHz**

**SCT-AF1F-UB**
**DC to 100 GHz**

Typical Return Loss vs. Frequency




Typical Return Loss vs. Frequency



# COAX ADAPTER (FIXED)

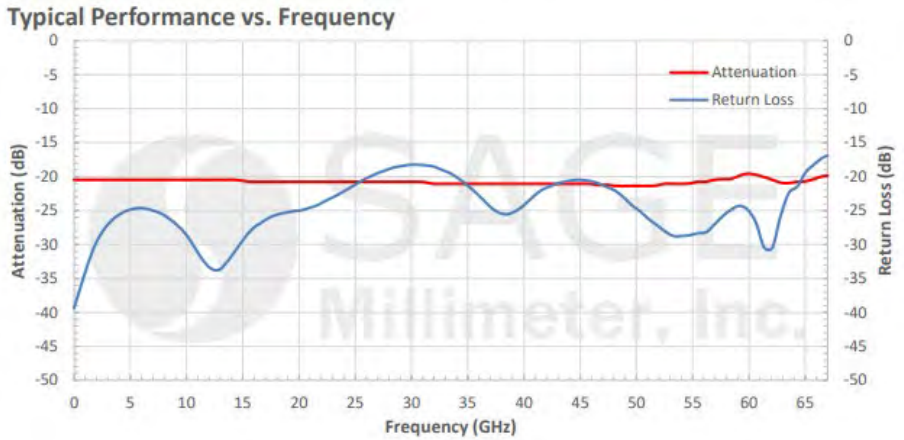
**FAMILY: SCA**
DC to 67 GHz
3 dB THRU 30 dB

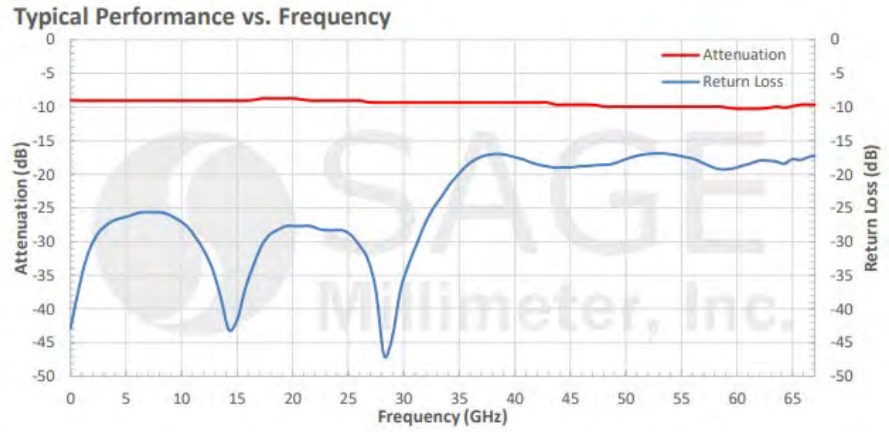
More Than 50 Models

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**



# COAX MATCHING LOAD

**FAMILY: SCM**
DC to 67 GHz

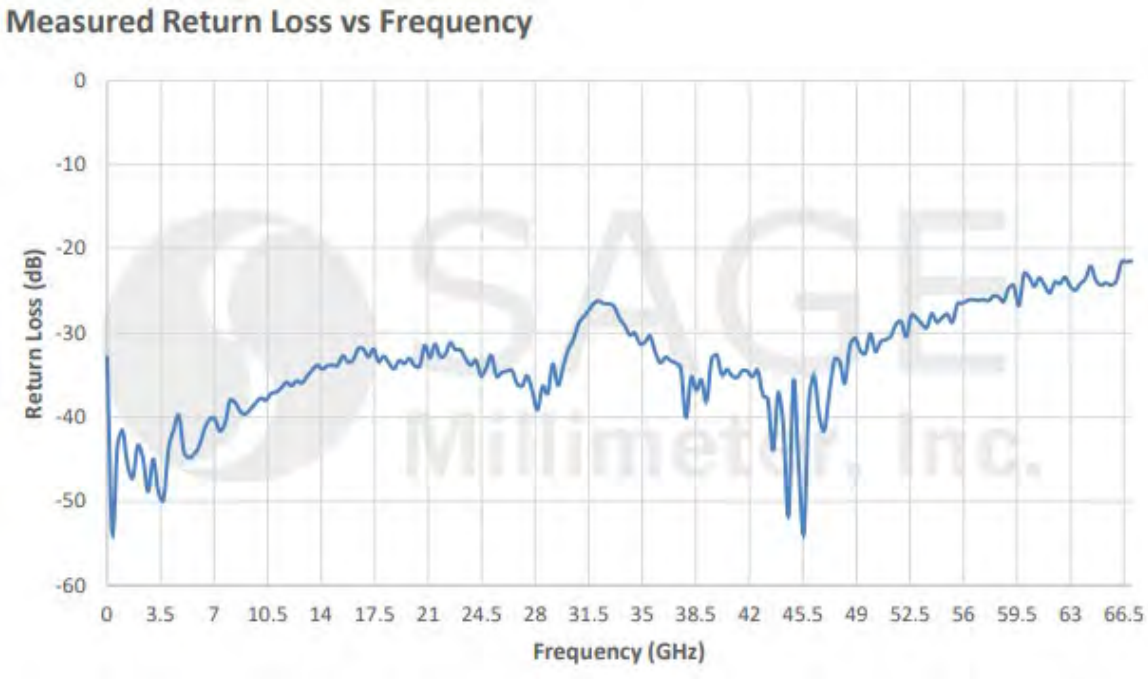
More Than 6 Models

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**



# COAX DC BLOCK

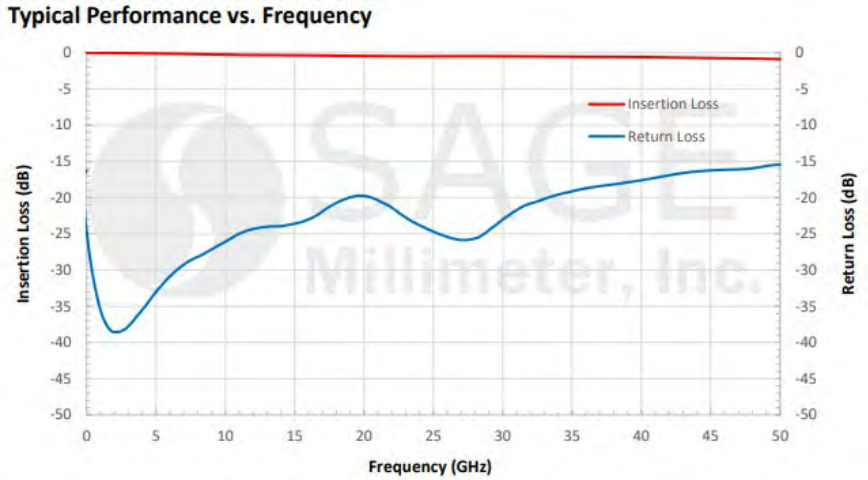
**FAMILY: SCB**
DC to 67 GHz

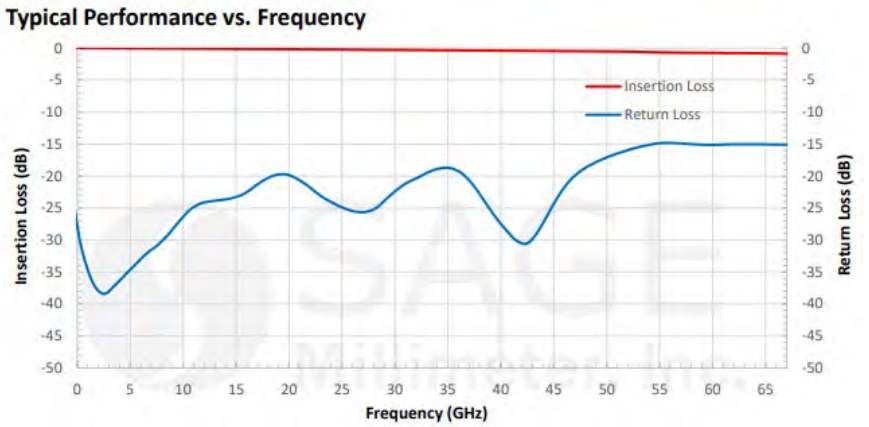
5 Models

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**



# COAX BIAS TEE

**FAMILY: SCV**
DC to 85 GHz

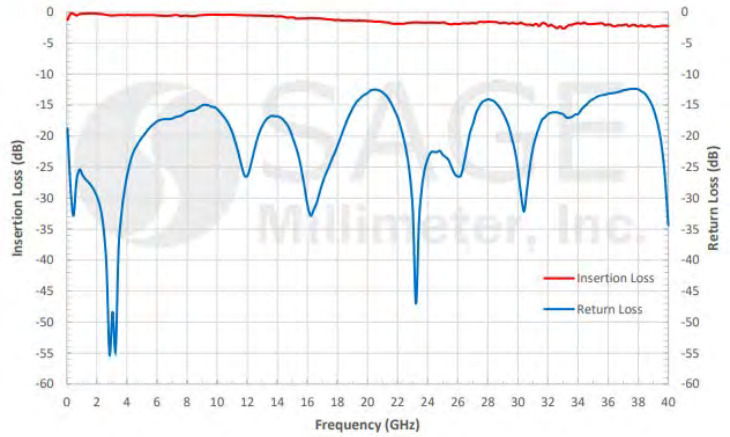
5 Models

1.85 mm, 2.4 mm, 3.5 mm, 2.92 mm

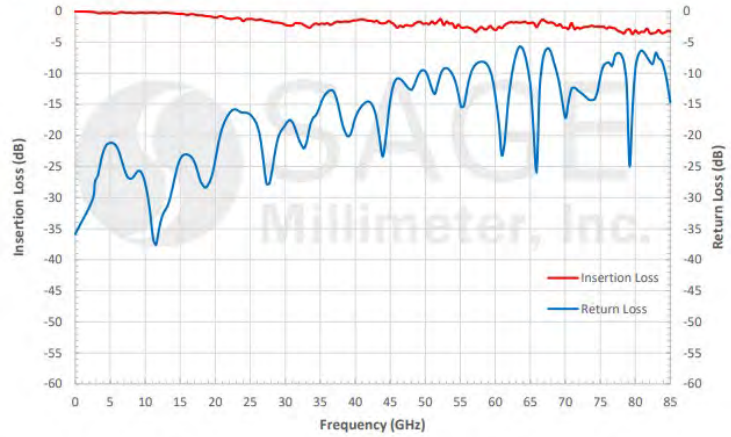

**SCV-000403302508-KFKF-U3**
**DC to 40 GHz**


**SCV-000853402505-VFVF-U3**
**DC to 85 GHz**

Typical Performance vs. Frequency




Typical Performance vs. Frequency



# COAX FILTER, BANDPASS

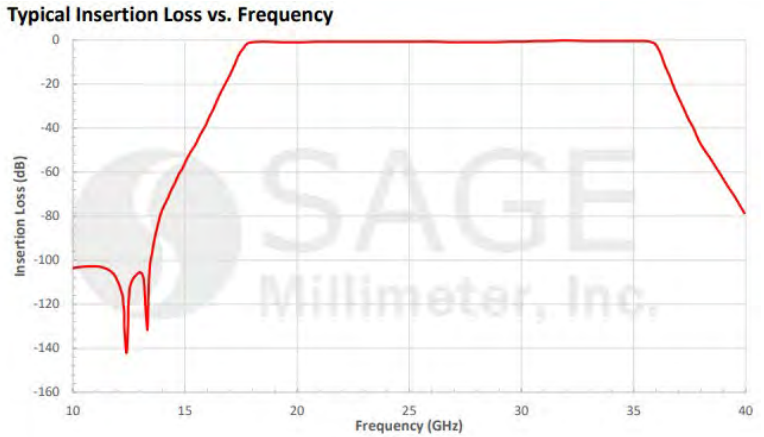
**FAMILY: SCF**
2 to 40 GHz

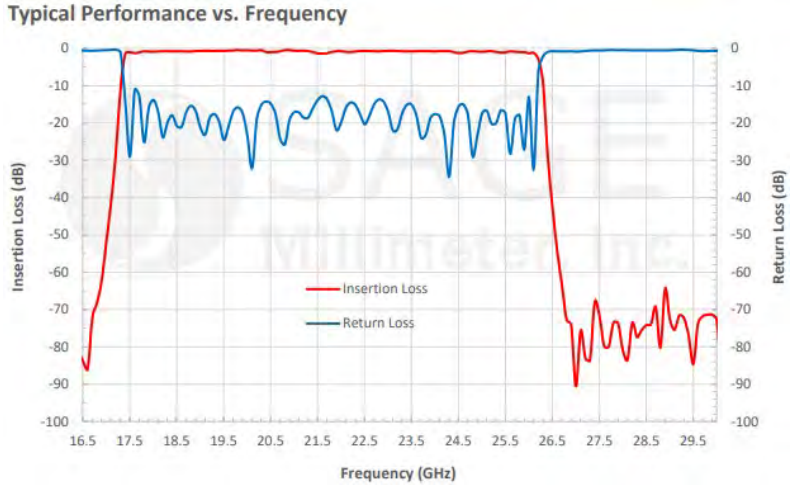
More Than 25 Models

Bandpass Filter


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


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



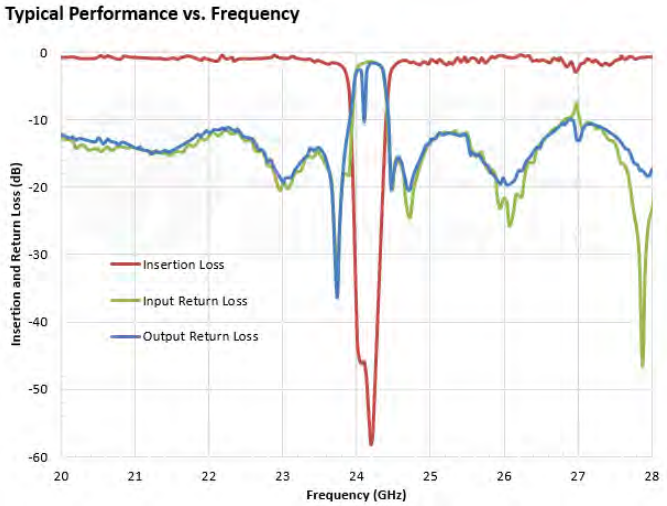
# COAX FILTER, BANDSTOP

**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 |

# COAX FILTER, HIGHPASS

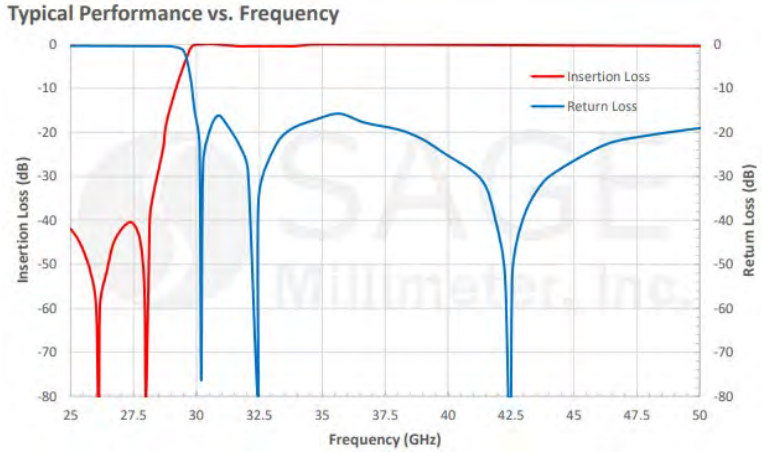
**FAMILY: SCF**
15 to 110 GHz

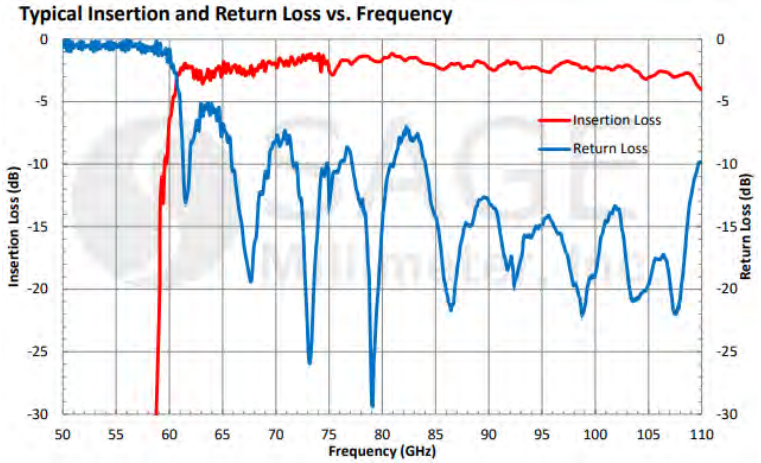
10 Models

Highpass Filter


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


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



# COAX FILTER, LOWPASS

**FAMILY: SCF**
15 to 110 GHz

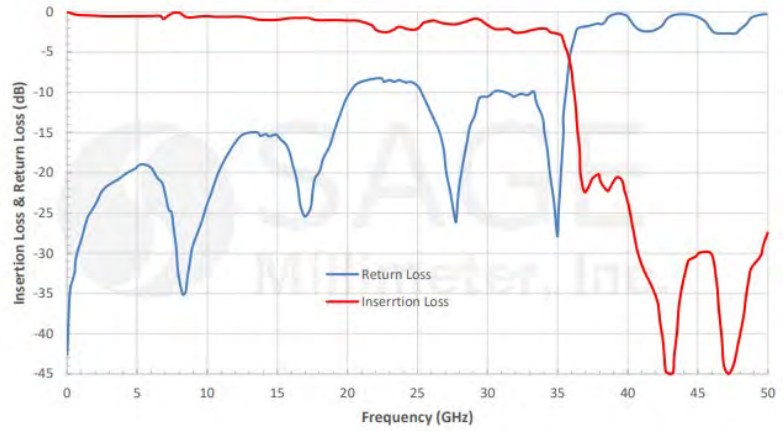
10 Models

Highpass Filter

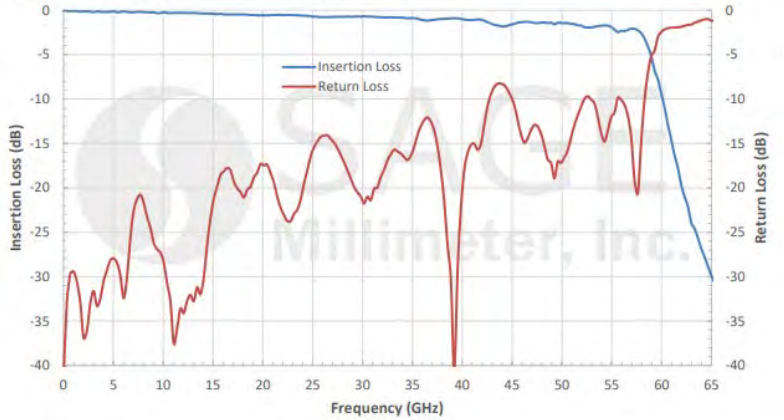

**SCF-33337325-KFKM-L3**
**Passband: DC to 30 GHz**


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

Typical Performance vs. Frequency




Typical Insertion and Return Loss vs Frequency



# COAX DIRECTIONAL COUPLER

**FAMILY: SCD**
1 to 67 GHz

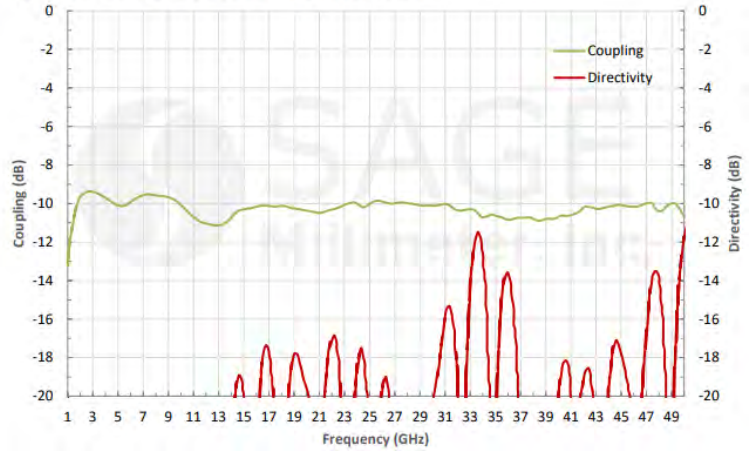
More Than 25 Models

1.85 mm, 2.4 mm, 2.92 mm and SMA

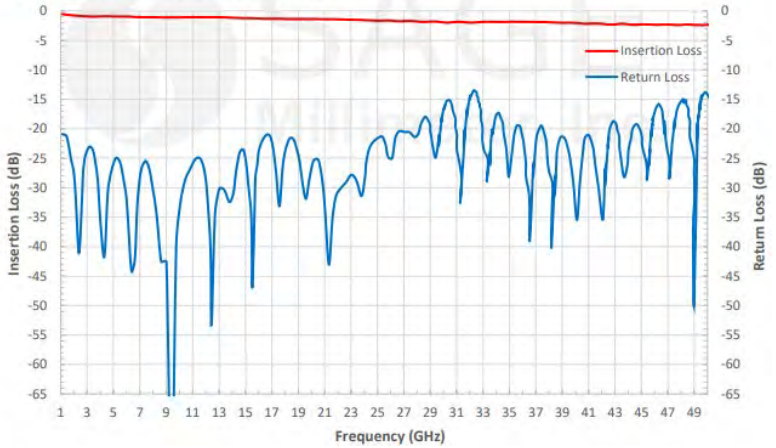

**SCD-0135031008-2F-SA**
**1 to 50 GHz, 10 dB**


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

**Typical Coupling and Directivity vs. Frequency**




**Typical Performance vs. Frequency**



# COAX POWER DIVIDER

**FAMILY: SCS**
1 to 40 GHz

More Than 50 Models

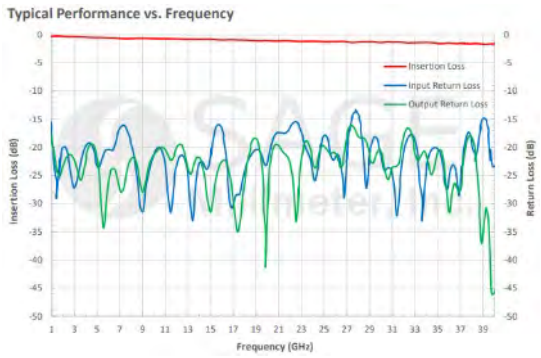
2 Way, 4 Way, 8 Way and 16 Way

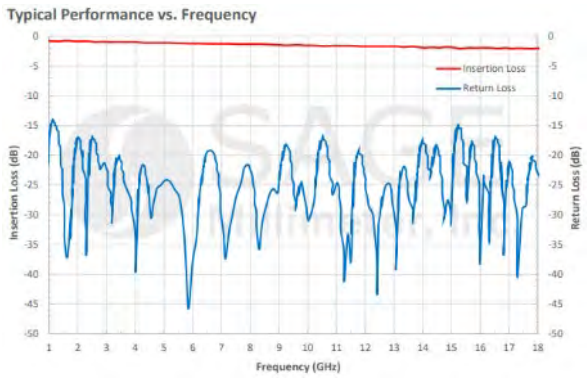


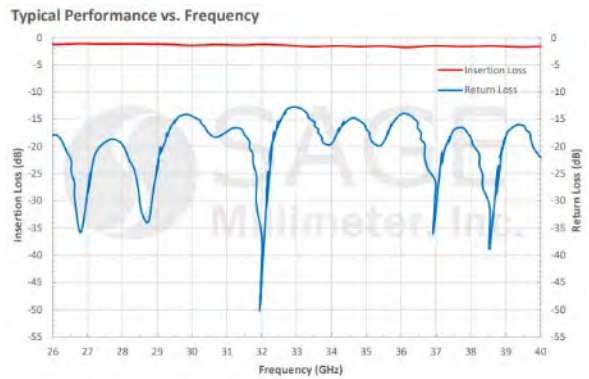

**SCS-0134031215-KFKF-22**
**1 to 40 GHz, 2 Way**

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

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



# COAX HYBRID COUPLER

**FAMILY: SCZ**
1 to 40 GHz

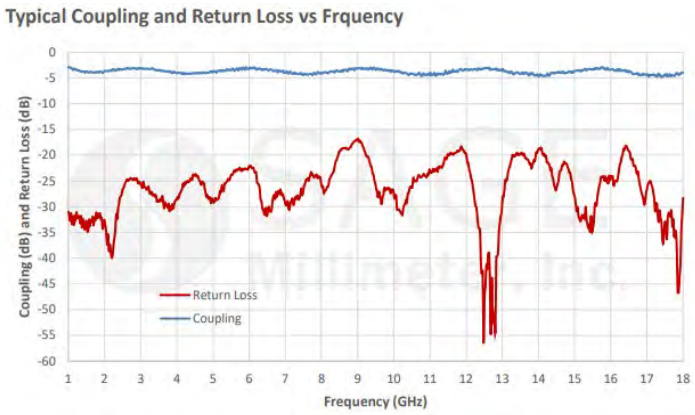
More Than 15 Models

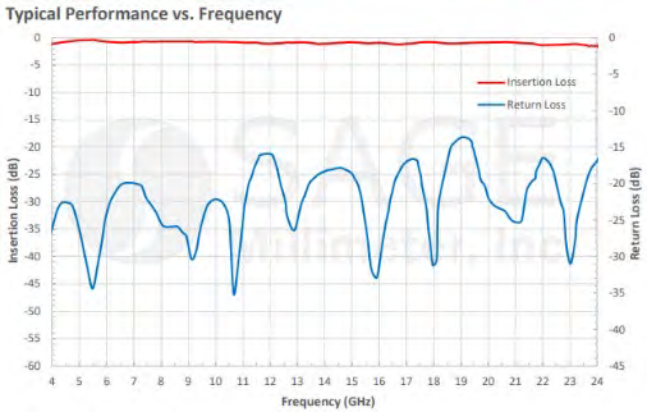
2.92 mm, SMA


**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**



# COAX CABLES (FLEXIBLE)

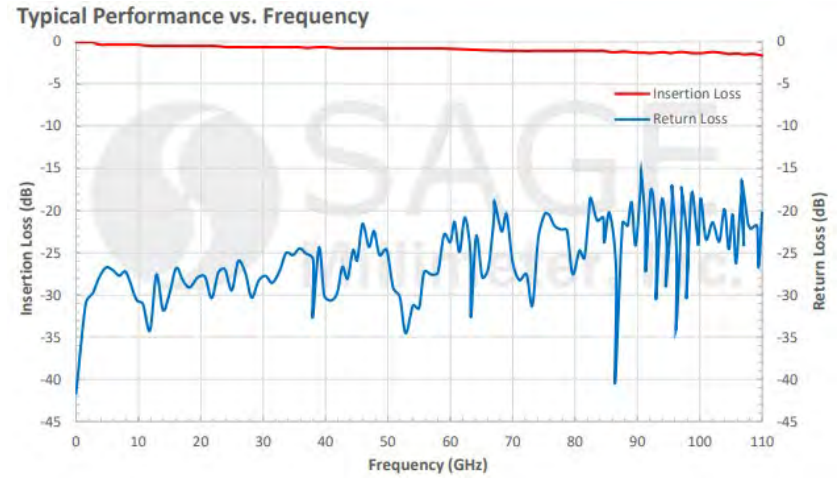
**FAMILY: SCW**
DC to 110 GHz

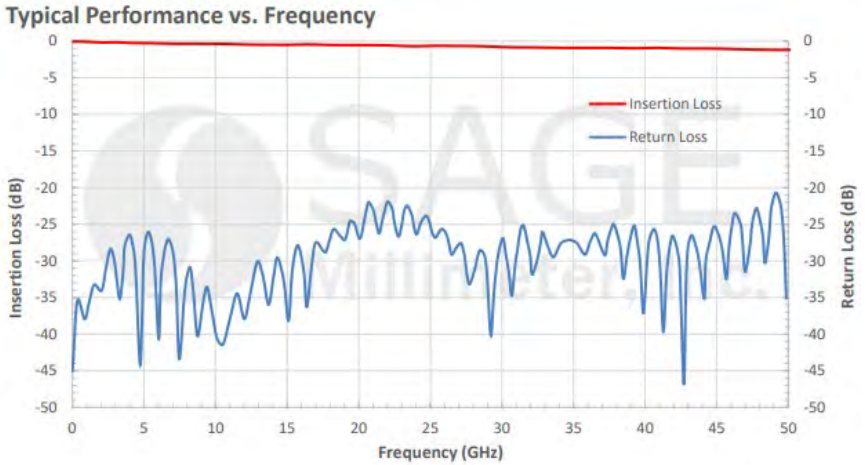
More Than 50 Models

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”**



# COAX CABLES (SEMI RIGID)

**FAMILY: SCW**
DC to 110 GHz

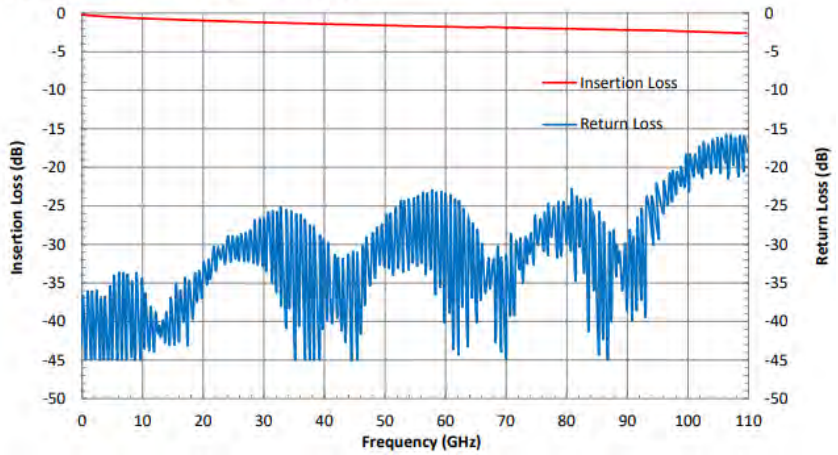
More Than 50 Models

1 mm, 1.85 mm, 2.4 mm, 2.92 mm

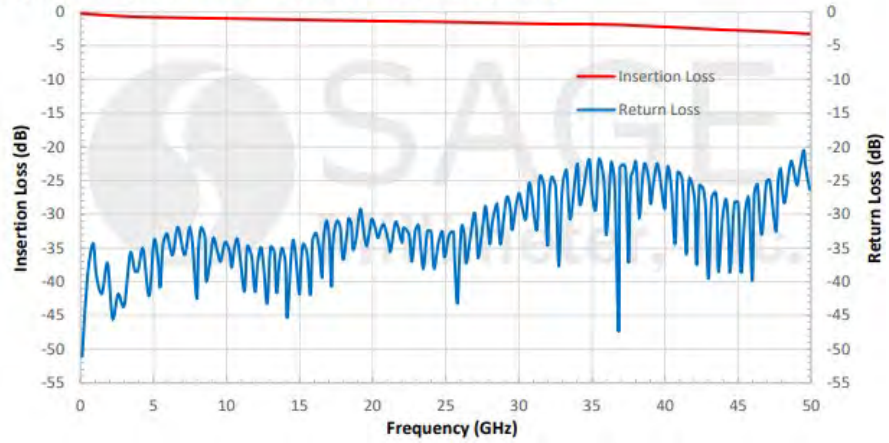
**SCW-1M1M006-S1**
**DC to 110 GHz, 6”**

**SCW-2M2M012-S1**
**DC to 50 GHz, 12”**

**Typical Performance vs. Frequency**




**Typical Insertion Loss & Return Loss vs. Frequency**



# TEST EQUIPMENT

# ERAVANT TEST EQUIPMENT

The focus of this presentation section is to introduce the **Eravant** test equipment product family by highlighting some representative models. There are many standard models available to satisfy all 5G system applications. The test equipment family includes the following types, which can be found here. Custom test equipment is available upon request.

# BROAD BANDWIDTH NOISE SOURCE

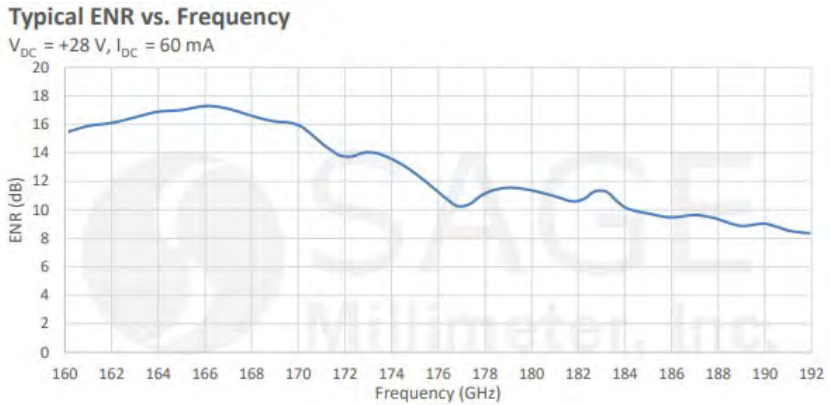
**FAMILY: STZ**
26.5 to 220 GHz

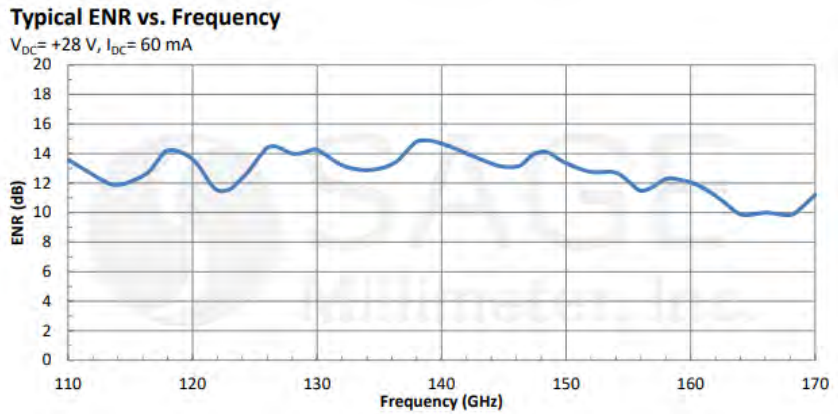
## More Than 20 Models: Full Waveguide Bandwidth

**STZ-05-I1**
**140 to 220 GHz**

**STZ-12-I1**
**60 to 90 GHz**

**STZ-06-I1**
**110 to 170 GHzc**



# SPECTRUM ANALYZER HARMONIC MIXER

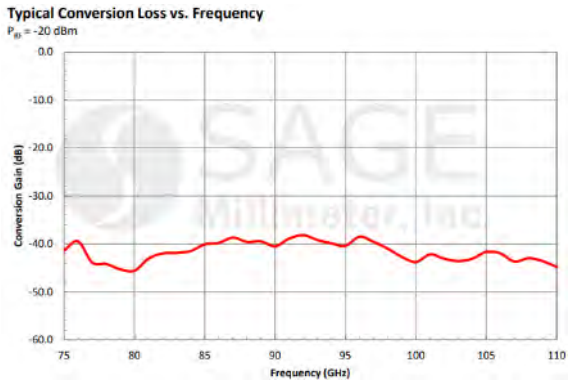
**FAMILY: SFH**
26.5 to 110 GHz

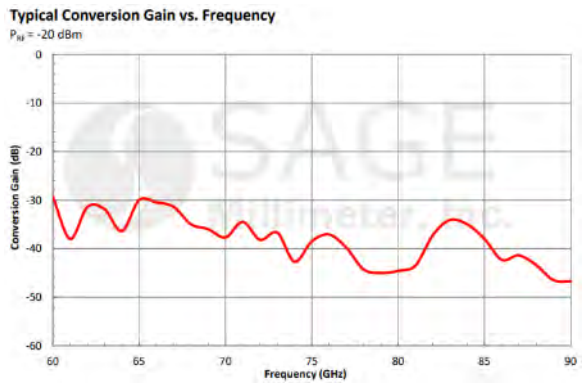
## More Than 8 Models: Full Waveguide Bandwidth

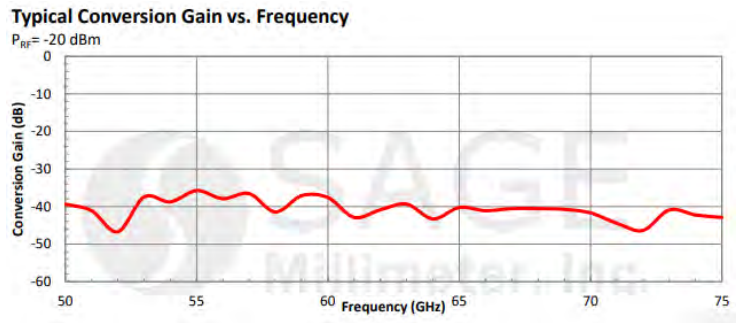
**SFH-10SFSF-A3**
**75 to 110 GHz**


**SFH-12SFSF-A3**
**60 to 90 GHz**


**SFH-15SFSF-A3**
**40 to 60 GHz**

# CALIBRATION KIT (VECTOR NETWORK ANALYZER)

**FAMILY: STQ**
DC to 220 GHz

**14 Models: WR-05 to WR-42 & COAX**

**STQ-TO-05-U3-CKIT1**
**WR-05, 140 to 220 GHz**

**STQ-TO-10-U3-CKIT1**
**WR-10, 75 to 110 GHz**

**STQ-TO-28-U3-CKIT1**
**WR-28, 26.5 to 40 GHz**

**STQ-TO-VFVM-U3-CKIT1**
**1.85 mm, DC to 67 GHz**

**STQ-TO-2F2M-U3-CKIT1**
**2.4 mm, DC to 50 GHz**

**STQ-TO-KFKM-U3-CKIT1**
**2.92 mm, DC to 40 GHz**

# SYNTHESIZER/SWEEPER FREQUENCY EXTENDER

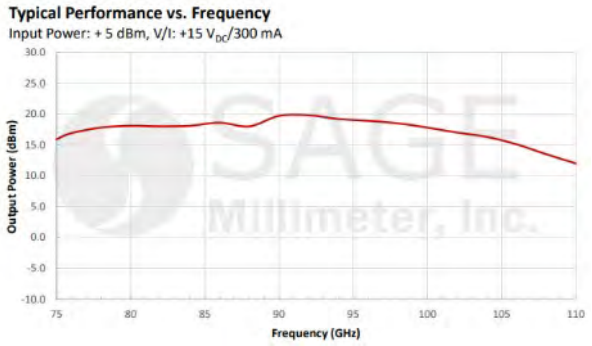
**FAMILY: STE**
DC to 220 GHz

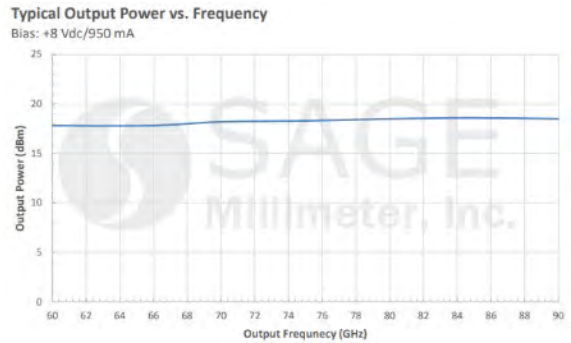
**More Than 20 Models: WR-05 to WR-15 Bands**

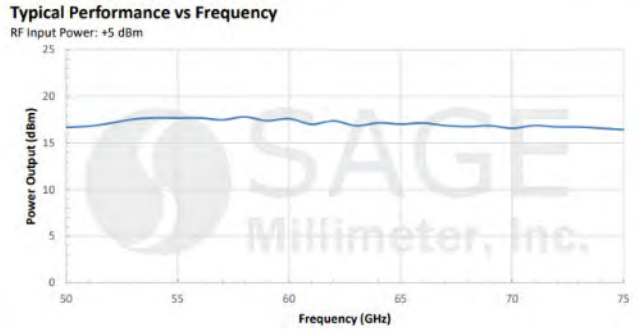

**STE-KF310-15-S1**
**75 to 110 GHz, +15 dBm**


**STE-SF612-18-S1**
**60 to 90 GHz, +18 dBm**


**STE-SF415-04-S1**
**50 to 75 GHz, +15 dBm**



# FREQUENCY DOWN-CONVERTER

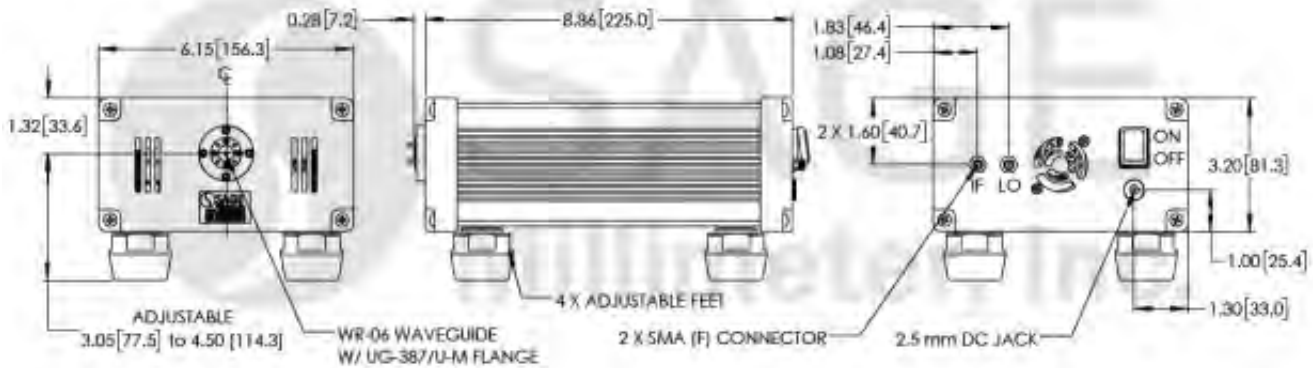
**FAMILY: STC**
26.5 to 170 GHz

**More Than 8 Models: WR-06 to WR-28 Bands**


**STC-20-06-S1**
**110 to 170 GHz**


**STC-20-10-S1**
**75 to 110 GHz**


**STC-20-15-S1**
**50 to 75 GHz**



# NOISE FIGURE & GAIN TEST EXTENDER

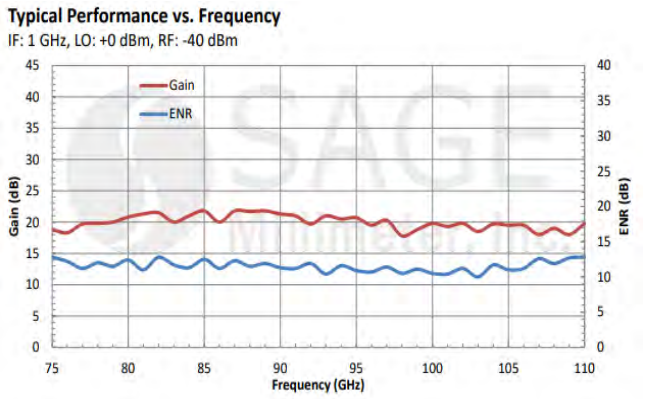
**FAMILY: STG**
26.5 to 170 GHz

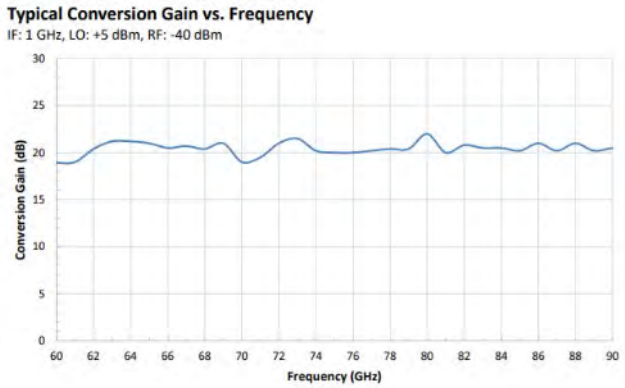
**More Than 8 Models: WR-06 to WR-28 Bands**

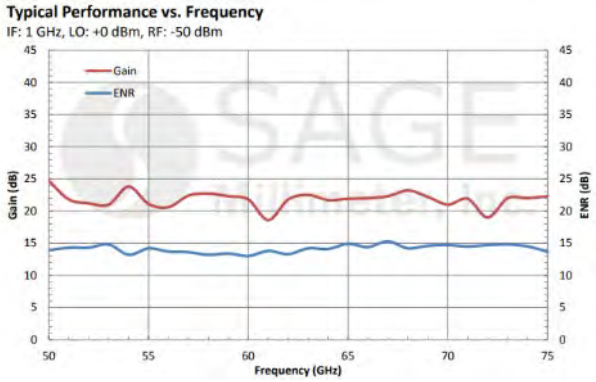

**STG-10-S1**
**75 to 110 GHz**


**STG-12-S1**
**60 to 90 GHz**


**STG-15-S1**
**50 to 75 GHz**



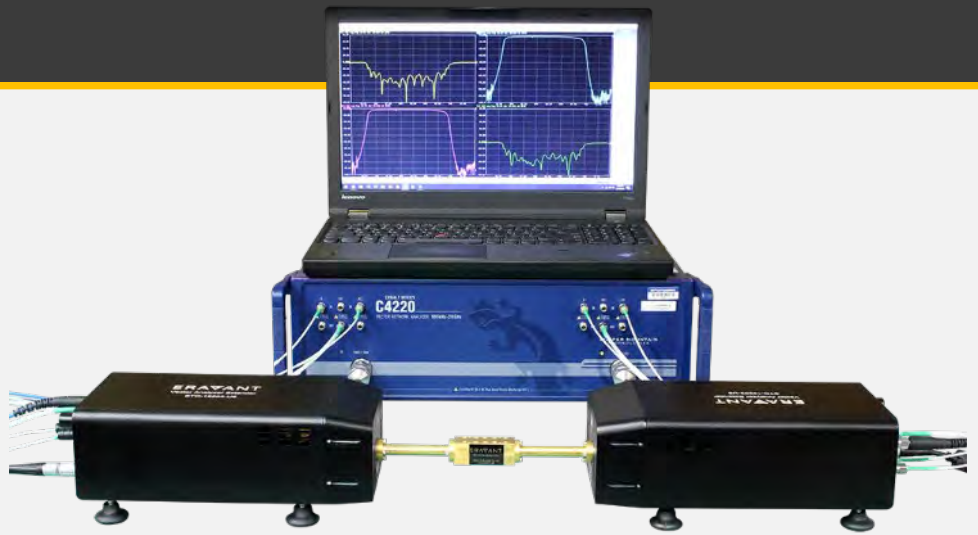



# VECTOR ANALYZER EXTENDER

**FAMILY: STO**
50 to 170 GHz

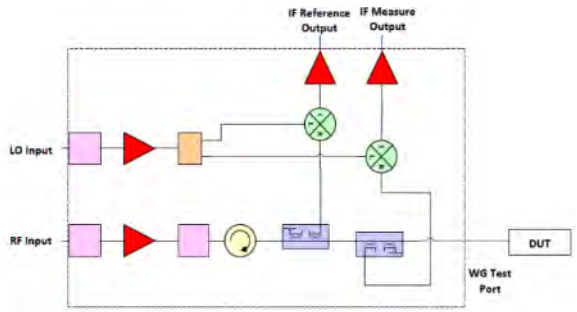
**5 Models: WR-06 to WR-15 Bands**

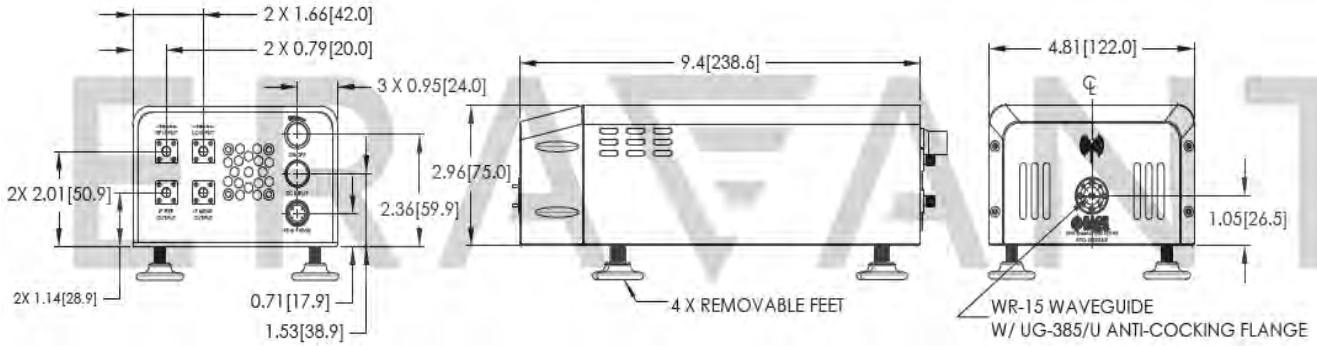
**STO-10203-U6**
**75 to 110 GHz**




**STO-12203-U6**
**60 to 90 GHz**

**STO-15203-U6**
**50 to 75 GHz**



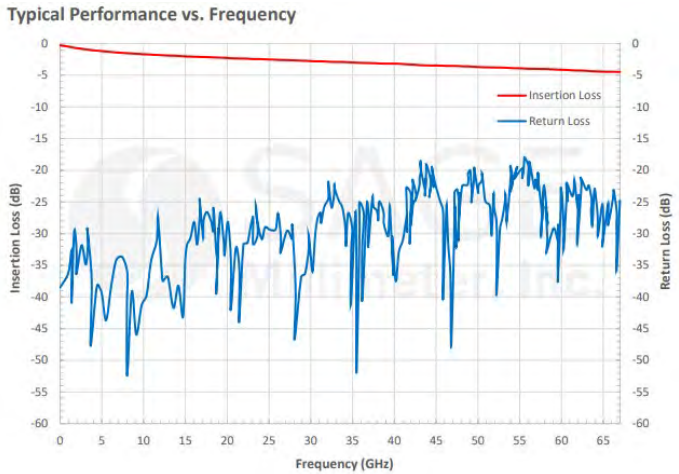
# COAX CABLE (VECTOR NETWORK ANALYZER)

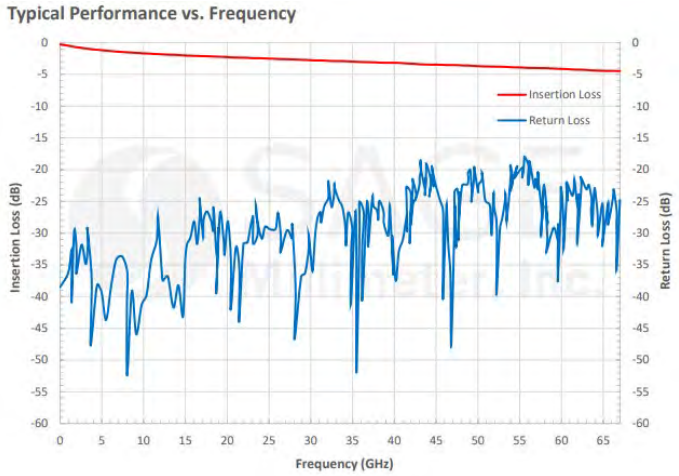
**FAMILY: STQ**
DC to 67 GHz

**More Than 50 Models: 1.85 mm, 2.4 mm, 2.92 mm**

**STQ-CW-VFVF025-F1**
**DC to 67 GHz, 25”**

**STQ-CW-VFVM025-F1**
**DC to 67 GHz, 25”**



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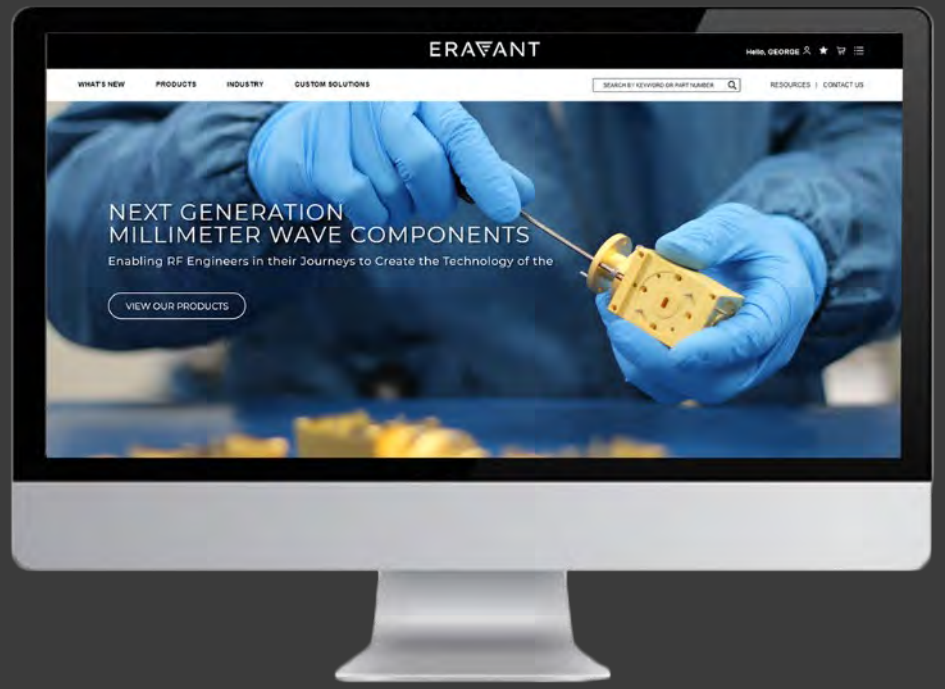


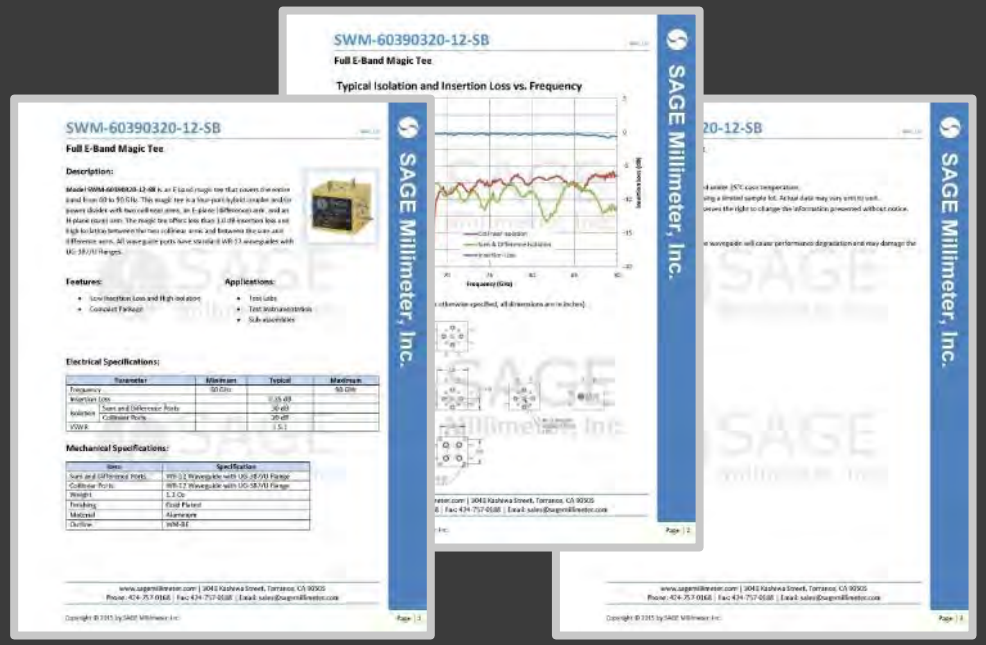


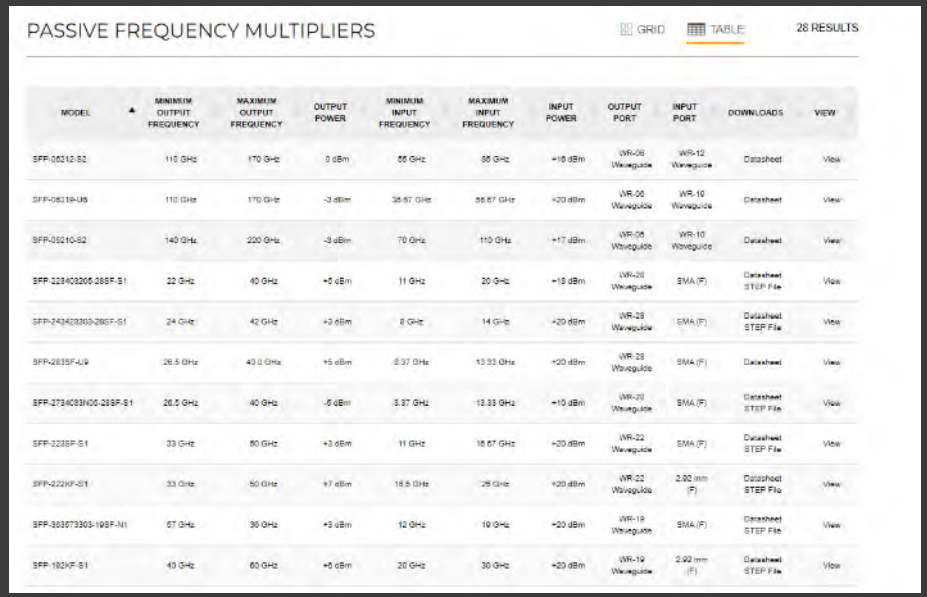

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