SPACE AND THERMAL VAC APPLICATIONS
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WEBSITE
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 Space and Thermal Vac applications.
- In fact, most Eravant products are ready to be updated to Space and Thermal Vac applications with minor manufacturing process changes.
- 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 such as Instrumentation, 5G and IoT, Communication, and Radar are also available.
- Presentations about Ka, Q, U, V, E, W, F and D-Bands are available.
Upper Microwave and Millimeter Satellite Frequency Bands

- **Ku Band**: 12 to 18 GHz, 12.5 to 18 GHz, North America
- **K Band**: 18 to 27 GHz, 18 to 25.5 GHz, North America
- **Ka Band**: 27 to 40 GHz, 26.5 to 40 GHz, North America
- **Q Band**: 40 to 50 GHz
- **V Band**: 50 to 75 GHz
ERAVANT PRODUCT OFFERINGS

- **Eravant** offers Total Product Solutions to configure any system applications in the Frequency Range of DC to 220 GHz.
- Although the standard models are NOT specifically designed and manufactured for Space and Thermal Vac applications, many of them are readily adequate for certain applications. The examples are:
  - SAR, SAC, SAF, SAH, SAJ, SAP, SAT, SAZ Families
  - SWG, SWB, SWW, SWT, SWF, SWI, SWH, SWR, SWD, SWX, SWM, SWF Families
  - SUF, Uni-Guide™ Waveguide Connector Family
- The models with the “-V” suffix are for Thermal Vac applications.
  - SWC, Some Models with the “-V” Suffix
- Many models can be updated to the application by simply updating the manufacturing process using “no-outgassing” materials, such as the type of adhesive, OFHC copper or stainless steel, etc.
The focus of this presentation is to introduce the *E Ravant* antenna product family by highlighting some representative models. There are several hundred standard models available to satisfy Space and Thermal Vac applications. In addition, many non-space or thermal vac ready products can be updated easily.

The following models in the antenna family are Thermal Vac and Space application *ready*:

- Rectangular Horn Antennas, SAR
- Standard Gain Horn Antennas, SAZ
- Circular Horn Antennas, SAC
- Scalar Feed Horn Antennas, SAF
- Choke Flange Feed Horn Antennas, SAH
- Probe Antennas, SAP
- Orthomode Transducers, SAT
- Corner Reflector, SAJ
FAMILY: SAR
18 to 330 GHz

Summary:
• Waveguide Interface Models Only
• Unpainted Models Only
• Various Gain, 10 to 25 dBi
• Frequency up to 330 GHz

Material:
• Adhesive: None
• Aluminum: T6061-651 Alloy
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
STANDARD GAIN HORN ANTENNA

FAMILY: SAZ
18 to 220 GHz

Summary:
- Waveguide Interface
- Gain 24 dBi
- Frequency up to 220 GHz

Material:
- Adhesive: None
- Aluminum: T6061-651 Alloy
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
CONICAL HORN ANTENNA

FAMILY: SAC
18 to 260 GHz

Summary:
- Waveguide Interface Models Only
- Circular or Rectangular Port
- Unpainted Models Only
- Various Gain, 10 to 25 dBi
- Frequency up to 260 GHz

Material:
- Adhesive: None
- Aluminum: T6061-651 Alloy
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
SCALAR FEED HORN ANTENNA

FAMILY: SAF
18 to 140 GHz

Summary:

• Waveguide Interface Models Only
• Circular or Rectangular Port
• Unpainted Models Only
• Various Gain, 13 to 17 dBi
• Frequency up to 140 GHz

Material:

• Adhesive: None
• Aluminum: T6061-651 Alloy
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
DUAL POLARIZED SCALAR
FEED HORN ANTENNA

FAMILY: SAF
18 to 140 GHz

Summary:
• Waveguide Interface Models Only
• Rectangular Ports
• Unpainted Models Only
• Various Gain, 13 to 17 dBi
• Frequency up to 140 GHz

Material:
• Adhesive: None
• Aluminum: T6061-651 Alloy
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
CHOKE FLANGE HORN ANTENNA

FAMILY: SAH
18 to 110 GHz

Summary:
• Waveguide Interface Models Only
• Circular or Rectangular Port
• Unpainted Models Only
• Various Gain, 13 to 17 dBi
• Frequency up to 110 GHz

Material:
• Adhesive: None
• Aluminum: T6061-651 Alloy
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
DUAL POLARIZED CHOKE FLANGE HORN ANTENNA

FAMILY: SAH
18 to 110 GHz

Summary:
• Waveguide Interface Models Only
• Rectangular Ports
• Unpainted Models Only
• Various Gain, 13 to 17 dBi
• Frequency up to 110 GHz

Material:
• Adhesive: None
• Aluminum: T6061-651 Alloy
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
**PROBE ANTENNA**

**FAMILY:** SAP

18 to 140 GHz

**Summary:**
- Rectangular or Circular Port
- Unpainted Models Only
- Gain 6.5 dBi
- Frequency up to 140 GHz

**Material:**
- Adhesive: None
- Aluminum: T6061-651 Alloy
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
ORTHOMODE TRANSDUCER

FAMILY: SAT
18 to 140 GHz

Summary:
- Waveguide Interface Models Only
- Circular or Square Antenna Port
- Unpainted Models Only
- Frequency up to 170 GHz

Material:
- Adhesive: None
- Aluminum: T6061-651 Alloy
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
**FAMILY: SAJ**
0.07” to 30” Edge Length

**Summary:**
- Various RCS
- Light Weight
- High Precision

**Material:**
- Adhesive: None
- Aluminum: T6061-651 Alloy
- Finishing: Chem Film
- Paint: No
The focus of this presentation is to introduce the Eravant waveguide product family by highlighting some representative models. There are several hundred standard models available to satisfy Space and Thermal Vac applications. In addition, many non-space or thermal vac ready products can be updated easily.

The following models in waveguide family are Thermal Vac and Space application ready:

- Rectangular and Circular Waveguide Straight Sections, SWG
- Rectangular Waveguide Bends and Twists, SWB
- Waveguide to Coax Adapters, SWC
- Waveguide Flange Adapters, SWR
- Waveguide Bulkhead Adapters, SWW
- Waveguide Transitions, SWT
- Waveguide Directional Couplers, SWD
- Waveguide Crossguide Couplers, SWX
- Waveguide Magic Tees, SWM
- Waveguide Filters, SWF
- Waveguide Connectors - Uni-Guide™, SUF
FAMILY: SWG
18 to 330 GHz

Summary:
• Rectangular Waveguide
• Unpainted Models Only
• Frequency up to 330 GHz

Material:
• Adhesive: None
• Copper: OFHC
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
**FAMILY: SWG**
18 to 330 GHz

**Summary:**
- Circular Waveguide
- Unpainted Models Only
- Frequency up to 330 GHz

**Material:**
- Adhesive: None
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
FAMILY: SWB
18 to 330 GHz

Summary:
- Rectangular Waveguide
- E and H Bends
- Various Angles
- Unpainted Models Only
- Frequency up to 330 GHz

Material:
- Adhesive: None
- Copper: OFHC
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
FAMILY: SWB
18 to 330 GHz

Summary:
- Rectangular Waveguide
- Left- and Right-Hand Twist
- Various Angles
- Unpainted Models Only
- Frequency up to 330 GHz

Material:
- Adhesive: None
- Copper: OFHC
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
WAVEGUIDE TO COAX ADAPTER

FAMILY: SWC
8.2 to 110 GHz

Summary:
- Rectangular Waveguide
- Right Angle
- Various Models
- Unpainted Models Only
- Frequency up to 110 GHz

Material:
- Adhesive: H20E
- Copper: Beryllium
- Plastic: PEI
- Aluminum: T6061-651 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
WAVEGUIDE TO COAX ADAPTER

FAMILY: SWC
8.2 to 110 GHz

Summary:
- Rectangular Waveguide
- End Launch
- Various Models
- Unpainted Models Only
- Frequency up to 110 GHz

Material:
- Adhesive: H20E
- Copper: Beryllium
- Plastic: PEI
- Aluminum: T6061-651 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
**WAVEGUIDE TO COAX ADAPTER**

**FAMILY: SWC**
8.2 to 110 GHz

**Summary:**
- Rectangular Waveguide
- Panel Mount
- Various Models
- Unpainted Models Only
- Frequency up to 110 GHz

**Material:**
- Adhesive: H20E
- Copper: Beryllium
- Plastic: PEI
- Brass: 360 Alloy
- Aluminum: T6061-651 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
FAMILY: SWR
18 to 330 GHz

Summary:
• Rectangular Waveguide
• Unpainted Models Only
• Frequency up to 330 GHz

Material:
• Adhesive: None
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
FAMILY: SWW
18 to 330 GHz

Summary:
• Rectangular Waveguide
• Unpainted Models Only
• Frequency up to 330 GHz

Material:
• Adhesive: None
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
WAVEGUIDE TAPER TRANSITION

FAMILY: SWT
18 to 330 GHz

Summary:
- Rectangular Waveguide
- Taper Transition
- Unpainted Models Only
- Frequency up to 330 GHz

Material:
- Adhesive: None
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
WAVEGUIDE MODE TRANSITION

FAMILY: SWT
18 to 330 GHz

Summary:
- Rectangular to Circular Waveguide
- Mode Transition
- Unpainted Models Only
- Frequency up to 330 GHz

Material:
- Adhesive: None
- Brass: 360 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
FAMILY: SWD
18 to 170 GHz

Summary:

• Split Block
• Bi-Directional
• 3-Port and Dual Directional*
• Unpainted Models Only
• Frequency up to 170 GHz

Material:

• Adhesive: None*
• Brass: 360 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No

*Needs to be updated with H20E adhesive under a new model number with the “–V” indicator.
**FAMILY: SWX**

18 to 170 GHz

**Summary:**
- Split Block
- 20, 30 and 40 dB
- 3-Port*
- Unpainted Models Only
- Frequency up to 170 GHz

**Material:**
- Adhesive: None*
- Brass: 360 Alloy
- Aluminum: T6061-651 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No

*Needs to be updated with H20E adhesive under a new model number with the “—V” indicator.
WAVEGUIDE MAGIC TEE

FAMILY: SWM
18 to 170 GHz

Summary:
- Split Block
- Unpainted Models Only
- Frequency up to 170 GHz

Material:
- Adhesive: None
- Brass: 360 Alloy
- Aluminum: T6061-651 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No

SWM-2233320-34-SB
22 to 33 GHz
WAVEGUIDE BANDPASS FILTER

FAMILY: SWF
18 to 170 GHz

Summary:
• Waveguide Interfaced
• Bandpass, Lowpass, Highpass and Bandstop
• Unpainted Models Only
• Frequency up to 170 GHz

Material:
• Adhesive: None
• Brass: 360 Alloy
• Aluminum: T6061-651 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
WAVEGUIDE HIGHPASS FILTER

**FAMILY: SWF**
18 to 170 GHz

**Summary:**
- Waveguide Interfaced
- Bandpass, Lowpass, Highpass and Bandstop
- Unpainted Models Only
- Frequency up to 170 GHz

**Material:**
- Adhesive: None
- Brass: 360 Alloy
- Aluminum: T6061-651 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
WAVEGUIDE LOWPASS FILTER

FAMILY: SWF
18 to 170 GHz

Summary:
• Waveguide Interfaced
• Bandpass, Lowpass, Highpass and Bandstop
• Unpainted Models Only
• Frequency up to 170 GHz

Material:
• Adhesive: None
• Brass: 360 Alloy
• Aluminum: T6061-651 Alloy
• Stainless Steel: 316
• Gold Plating: Type 1, 0.1 to 0.2 µm
• Paint: No
WAVEGUIDE CONNECTORS
UNI-GUIDE™

FAMILY: SUF
18 to 170 GHz

Summary:
- Waveguide Connector
- 12 Mil Diameter Glassbead Pin
- 3 Models: WR-28, WR-22 and WR-19
- Frequency Coverage: 26 to 60 GHz

Material:
- Adhesive: H20E
- Copper: Beryllium
- Aluminum: T6061-651 Alloy
- Stainless Steel: 316
- Gold Plating: Type 1, 0.1 to 0.2 µm
- Paint: No
TRANSMITTER MODULS
ERAVANT TRANSMITTER MODULES

- Eravant has already developed space qualified transmitter modules for satellite applications. The modules shown in this presentation have been in orbit since 2014 (http://space.skyrocket.de/doc_sdat/perseus-m.htm).
- A technical paper “Low Cost Ka-Band Transmitter for CubeSat Systems” was published in IEEE 2017 Topical Workshop on Internet of Space (TWIOS).
SPACE QUALIFIED TRANSMITTER MODULE

FAMILY: SSK

Features:
- 26.7 to 26.9 GHz Bandwidth
- Circular Polarized Waveform
- 10 Degree 3 dB Beamwidth
- +52 dBm EIRP
- Space Qualified

Electrical Specifications:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenna 3 dB Beam-width</td>
<td></td>
<td>+10°</td>
<td></td>
</tr>
<tr>
<td>Antenna Side Lobes</td>
<td>-20 dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antenna Polarization</td>
<td>Circular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TX Frequency Range</td>
<td>26.7 GHz</td>
<td></td>
<td>26.9 GHz</td>
</tr>
<tr>
<td>TX Output $P_{1dB}$</td>
<td>+27 dBm</td>
<td>+29 dBm</td>
<td></td>
</tr>
<tr>
<td>TX EIRP</td>
<td>+50 dBm</td>
<td>+52 dBm</td>
<td></td>
</tr>
<tr>
<td>IF Frequency Range</td>
<td>0.9 GHz</td>
<td></td>
<td>1.1 GHz</td>
</tr>
<tr>
<td>IF to TX Linear Gain</td>
<td>23 dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF $P_{in}$</td>
<td>0 dBm</td>
<td>+4 dBm</td>
<td>+8 dBm</td>
</tr>
<tr>
<td>IF Input VSWR</td>
<td>1.5:1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harmonics</td>
<td>-50 dBc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spurious</td>
<td>-60 dBc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase Noise</td>
<td>-80 dBc/Hz @ 1 KHz</td>
<td>-90 dBc/Hz @ 10 KHz and -100 dBc/Hz @ 100 KHz</td>
<td></td>
</tr>
<tr>
<td>DC Supply Voltage</td>
<td>+8 VCC/1.5 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case Temperature</td>
<td>-25°C</td>
<td>+8 VCC</td>
<td>+65°C</td>
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</tbody>
</table>
SPACE QUALIFIED TRANSMITTER MODULE

FAMILY: SST

Features:
- 26.7 to 26.9 GHz Bandwidth
- Linear Polarized Waveform
- +29 dBm P-1 dB
- Phase Noise: -80 dBC/Hz @ 1 kHz Offset
- Space Qualified

Electrical Specifications:

<table>
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<tr>
<th>Parameter</th>
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</tr>
<tr>
<td>Phase Noise</td>
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<td></td>
<td></td>
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<tr>
<td>DC Supply Voltage</td>
<td>+8 Vcc/1.5 A</td>
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<td></td>
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<tr>
<td>Specification Temperature</td>
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<tr>
<td>Operating Temperature</td>
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<td>+65 °C</td>
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</table>
CONCLUSION

• ERAVANT has designed and fabricated total microwave and millimeterwave band COTS (Commercial of The Shelf) components and sub-assemblies to support full industrial applications. The product families are organized into 10 product families:
  ▪ Antennas
  ▪ Amplifiers
  ▪ Coaxial Passive Components
  ▪ Frequency Converters
  ▪ Control Devices
  ▪ Ferrite Devices
  ▪ Oscillators
  ▪ Subsystems
  ▪ Test Equipment
  ▪ Waveguide Passive Components

• While some of these products as shown in this presentation are designed for and manufactured for Thermal Vac (no-outgassing) and Space System applications, the rest only require small process, material, record keeping and qualification updates.
We are featuring:

- 3,000+ Products with Full Datasheets
- Price and Delivery Available Online
- Product Categorization Filters
- Blogs, Calculators and Publications

Check out our website for more!