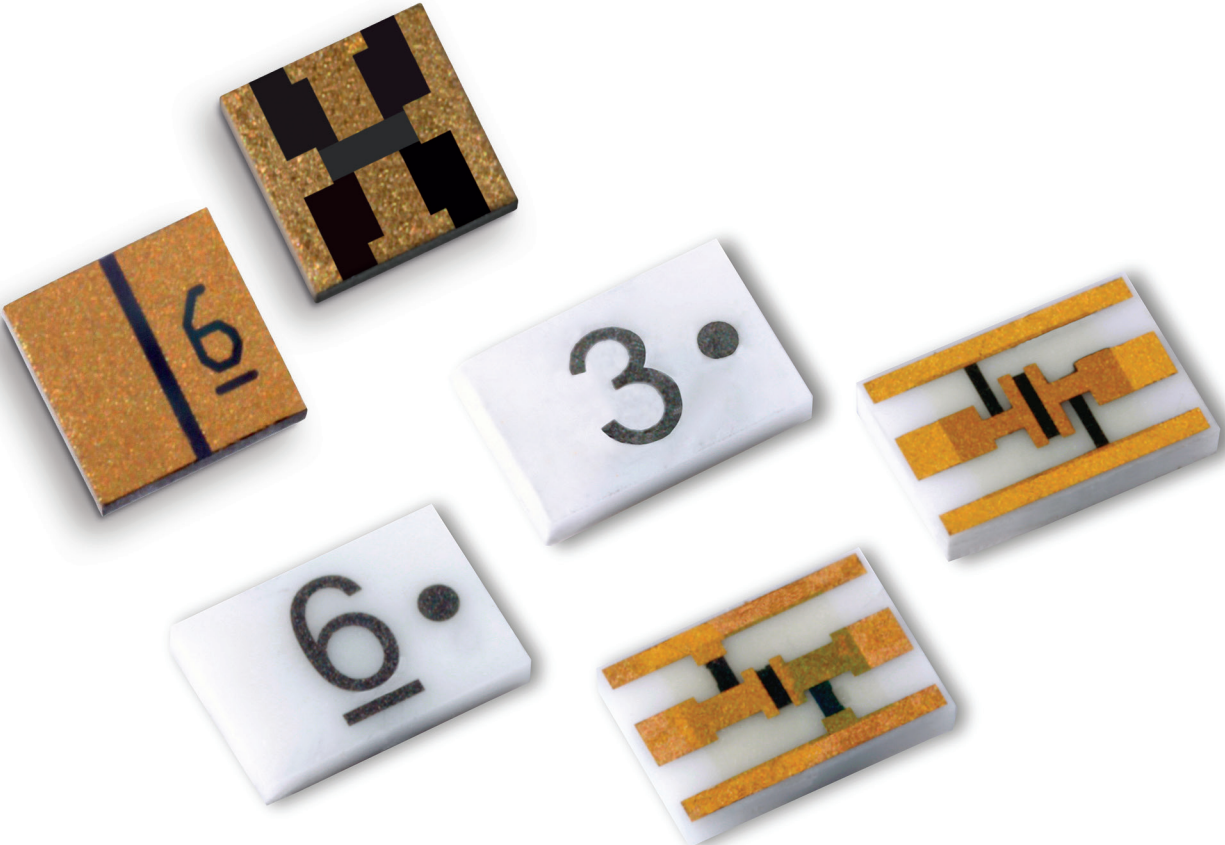
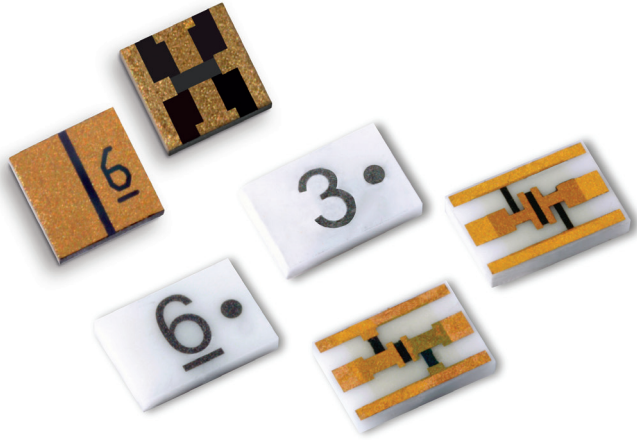


# TSX Chip Attenuator Series

Fixed Chip Attenuator



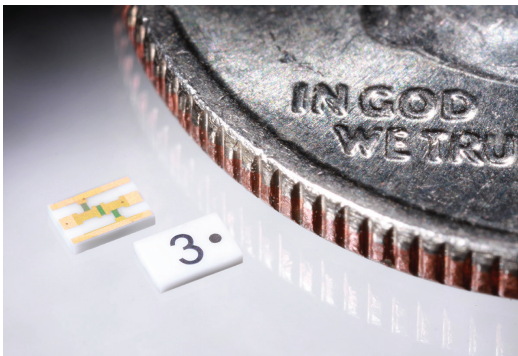
# TSX Series



Smiths Interconnect is a leading provider of chip attenuators offering the widest selection of products from DC to Q-band, backed by proven performance and significant heritage. Chip components are offered on Alumina, Aluminum Nitride, Beryllium Oxide, and CVD Diamond for a wide range of applications.

The TSX Series of chip attenuators pushes the boundaries of Size, Weight and Power in a cost effective, easy to implement surface mount or wire bondable solution, suitable for a wide array of applications. The TSX Series offers excellent broadband RF performance to 50 GHz while delivering increased power handling in a solder mount or chip and wire form factor.

The chip attenuator design offers 1 to 3 watts of power handling performance and multiple attenuation values are available for surface mounting. The use of a robust, proven all thin film process technology on an alumina substrate provides a product suitable for harsh environments, such as those of Space and Defense applications.



TSX Chip Attenuators offer excellent performance and power from DC-50 GHz in a small 0604 or 0404 package size.

## Features and Benefits

- Small form factor - Reduces overall footprint
- Surface mountable or wire bondable - Ideal for pick and place or chip and wire applications
- Broad frequency range - Reduces BOM count
- Low VSWR - Increases transmitted power
- Wide range of attenuation values - 1-10, 15 and 20dB
- Tight attenuation tolerance - For optimal performance

## Applications

- Amplifier Circuits
- Transmit/Receive Modules
- Up/Down Converters
- Instrumentation
- Satellite Communications
- Radar
- 5G

# Technical Characteristics

|                                |        |
|--------------------------------|--------|
| Mounting Configuration Options | Planar |
|--------------------------------|--------|

## Electrical

|                      |  |                 |     |            |      |       |
|----------------------|--|-----------------|-----|------------|------|-------|
| Nominal Impedance    | 50 ohms  |                 |     |            |      |       |
| Frequency Range      | DC - 50 GHz  |                 |     |            |      |       |
| Attenuation Values   | 0-10, 15 & 20 dB in 1 dB Increments                    |                 |     |            |      |       |
| Attenuation Accuracy | <b>ATTENUATION ACCURACY (dB)</b>                       |                 |     |            |      |       |
|                      | Attenuation Value (dB)                                 | DC-40 GHz       |     | 40-50 GHz  |      |       |
|                      | 0  | Continuity Only |     |            |      |       |
|                      | 1-10   | ± 0.50          |     | ± 0.5      |      |       |
|                      | 15 & 20  | ± 0.50          |     | ± 3.0      |      |       |
| Input Power CW       | <b>INPUT POWER (CW)</b>                                |                 |     |            |      |       |
|                      | dB   | Watts           | dB  | Watts      | dB   | Watts |
|                      | 0-1  | 3.0             | 2-3 | 2.0        | 4-20 | 1.0   |
| Peak Power           | 10X CW power based on 1 µS pulse width @ 1% Duty Cycle |                 |     |            |      |       |
|                      | <b>VSWR (Typical)</b>                                  |                 |     |            |      |       |
|                      | dB   | DC-40 GHz       |     | 40-50 GHz  |      |       |
|                      | 0  | Continuity Only |     |            |      |       |
|                      | 1-10   | 1.20:1 Max      |     | 1.25:1 Max |      |       |
|                      | 15-20  | 1.20:1 Max      |     | 1.25:1 Max |      |       |

## Environmental

|                            |                   |
|----------------------------|-------------------|
| Operating Temperature      | -55°C to +150°C   |
| Storage Temperature        | -65°C to +150°C   |
| Temperature Coefficient    | ±200 PPM/°C Max   |
| Moisture Sensitivity Level | MSL 1 - Unlimited |

## Mechanical

|                    |   |
|--------------------|---|
| Substrate Material | Alumina (Al <sub>2</sub> O <sub>3</sub> ) 96% |
| Resistive Film     | Thin Film, Tantalum Nitride                   |
| Terminal Material  | Thin Film, Solderable Gold over Nickel        |
| Protective Coating | Silicon Nitride                               |

## Marking

|              |                              |
|--------------|------------------------------|
| Unit Marking | Orientation dot and dB Value |
|--------------|------------------------------|

## Quality Assurance

|  |  |
|--|--|
|  | Sample visual and mechanical inspection - 1.0 AQL per mechanical drawing requirements.<br>Periodic electrical inspection performed for commercial grade products.<br>High reliability tested products are available per MIL-PRF-55342. |
|--|--|

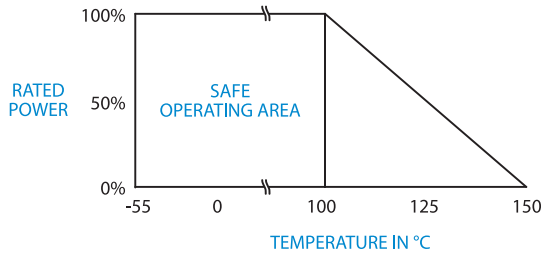
## Packaging

|                    |                              |
|--------------------|------------------------------|
| Standard Packaging | Tape and Reel or Waffle Pack |
|--------------------|------------------------------|

# Technical Characteristics

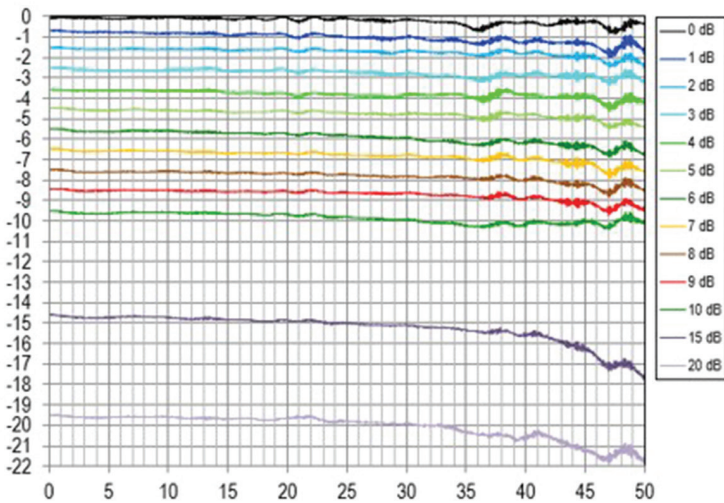
|                                       |  |                  |           |                  |           |                  |
|---------------------------------------|--|------------------|-----------|------------------|-----------|------------------|
| <b>Mounting Configuration Options</b> | WB2  |                  |           |                  |           |                  |
| <b>Electrical</b>                     |  |                  |           |                  |           |                  |
| <b>Nominal Impedance</b>              | 50 ohms  |                  |           |                  |           |                  |
| <b>Frequency Range</b>                | DC - 50 GHz  |                  |           |                  |           |                  |
| <b>Attenuation Values</b>             | 0-10, 15, 20 & 30dB in 1 dB Increments   |                  |           |                  |           |                  |
| <b>Attenuation Accuracy</b>           | <b>ATTENUATION ACCURACY (dB)</b>   |                  |           |                  |           |                  |
|                                       | <b>Attenuation Value (dB)</b>  | <b>DC-20 GHz</b> |           | <b>20-40 GHz</b> |           | <b>40-50 GHz</b> |
|                                       | 0  | Continuity Only  |           |                  |           |                  |
|                                       | 1-10   | ± 0.50           |           | ± 0.75           |           | ± 0.75           |
|                                       | 15, 20 & 30  | ± 0.50           |           | ± 0.75           |           | ± 3.00           |
| <b>Input Power CW</b>                 | <b>INPUT POWER (CW)</b>  |                  |           |                  |           |                  |
|                                       | <b>dB</b>  | <b>Watts</b>     | <b>dB</b> | <b>Watts</b>     | <b>dB</b> | <b>Watts</b>     |
|                                       | 0-1  | 3.0              | 2-3       | 2.0              | 4-30      | 1.0              |
| <b>Peak Power</b>                     | 10X CW power based on 1 $\mu$ S pulse width @ 1% Duty Cycle  |                  |           |                  |           |                  |
|                                       | <b>VSWR (Typical)</b>  |                  |           |                  |           |                  |
|                                       | <b>dB</b>  | <b>DC-20 GHz</b> |           | <b>20-40 GHz</b> |           | <b>40-50 GHz</b> |
| <b>VSWR</b>                           | 0  | Continuity Only  |           |                  |           |                  |
|                                       | 1-3  | 1.25:1 Max       |           | 1.35:1 Max       |           | 1.50:1 Max       |
|                                       | 4-6  | 1.25:1 Max       |           | 1.35:1 Max       |           | 1.50:1 Max       |
| <b>Environmental</b>                  |  |                  |           |                  |           |                  |
| <b>Operating Temperature</b>          | -55°C to +150°C  |                  |           |                  |           |                  |
| <b>Storage Temperature</b>            | -65°C to +150°C  |                  |           |                  |           |                  |
| <b>Temperature Coefficient</b>        | ±200 PPM/°C Max  |                  |           |                  |           |                  |
| <b>Moisture Sensitivity Level</b>     | MSL 1 - Unlimited  |                  |           |                  |           |                  |
| <b>Mechanical</b>                     |  |                  |           |                  |           |                  |
| <b>Substrate Material</b>             | Aluminum Nitride   |                  |           |                  |           |                  |
| <b>Resistive Film</b>                 | Thin Film, Tantalum Nitride  |                  |           |                  |           |                  |
| <b>Terminal Material</b>              | Thin Film, Bondable Gold   |                  |           |                  |           |                  |
| <b>Protective Coating</b>             | N/A  |                  |           |                  |           |                  |
| <b>Marking</b>                        |  |                  |           |                  |           |                  |
| <b>Unit Marking</b>                   | dB Value on ground plane   |                  |           |                  |           |                  |
| <b>Quality Assurance</b>              |  |                  |           |                  |           |                  |
|                                       | Sample visual and mechanical inspection - 1.0 AQL per mechanical drawing requirements.<br>Periodic electrical inspection performed for commercial grade products.<br>High reliability tested products are available per MIL-PRF-55342. |                  |           |                  |           |                  |
| <b>Packaging</b>                      |  |                  |           |                  |           |                  |
| <b>Standard Packaging</b>             | Tape and Reel or Waffle Pack   |                  |           |                  |           |                  |

# Power Derating Curve

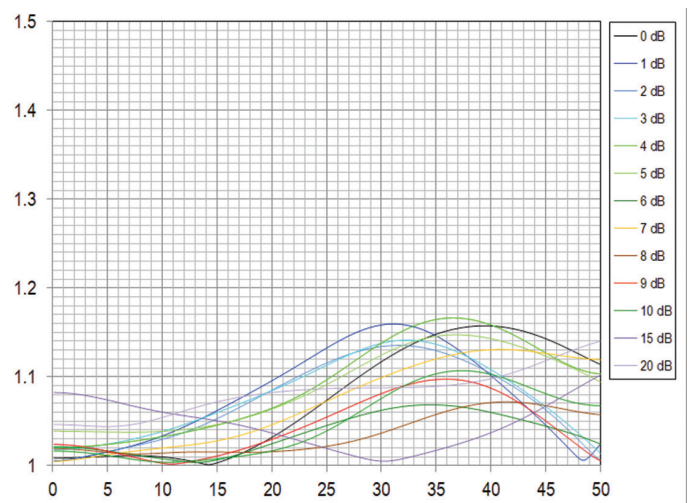


## Typical Data

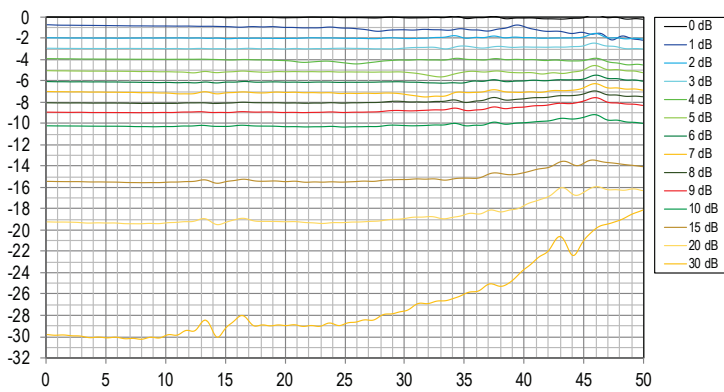
TSX Planar Series Attenuation



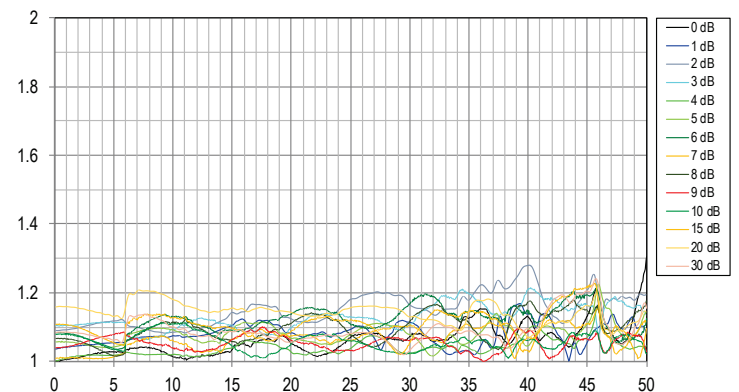
TSX Planar Series VSWR



TSX WB2 Series Attenuation

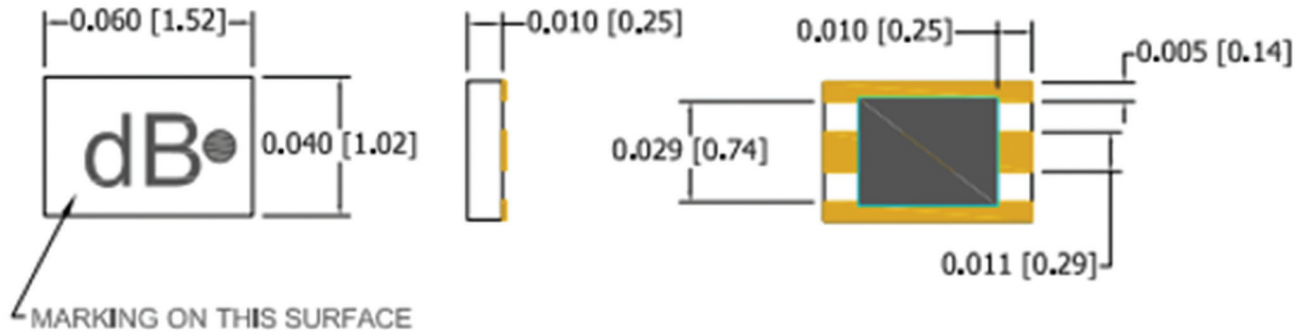


TSX WB2 Series VSWR



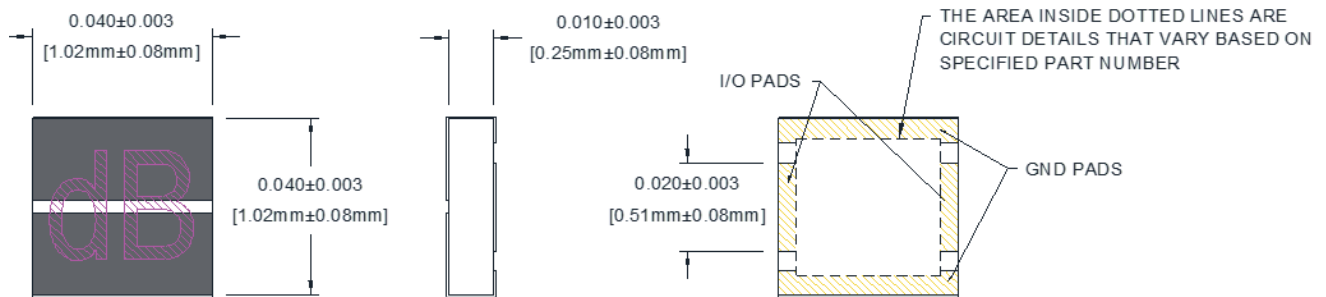
# Mechanical

## TSX Planar Series



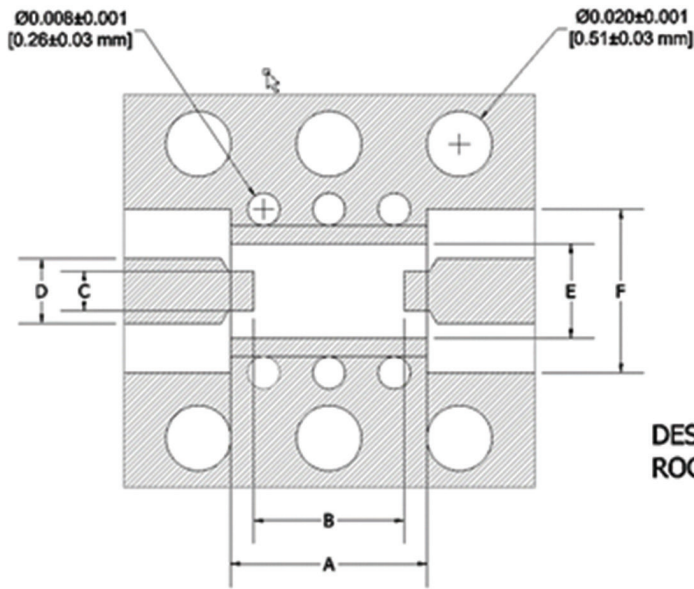
# Mechanical

## TSX WB2 Series



# Suggested Mounting Footprint

| Part Number | Inches |       |       |       |       |       | Millimeters |      |      |      |      |      |
|-------------|--------|-------|-------|-------|-------|-------|-------------|------|------|------|------|------|
|             | A      | B     | C     | D     | E     | F     | A           | B    | C    | D    | E    | F    |
| TSXdB.00    | 0.060  | 0.046 | 0.012 | 0.020 | 0.029 | 0.050 | 1.52        | 1.17 | 0.30 | 0.51 | 0.74 | 1.27 |



DESIGN BASED ON MICROSTRIP,  
ROGERS 6035HTC, 0.010" SUBSTRATE

## How To Order

Specify Model Number: **TSXdB.00**

|                     | <b>T S X</b>                        |  | <b>. 0 0</b>       |                    |
|---------------------|-------------------------------------|--|--------------------|--------------------|
|                     | 1                                   | 2  | 3                  | 4                  |
| 1 Series Name       | <b>T S X</b> Series                 |  |                    |                    |
| 2 Attenuation Value | <b>0 0</b> 00 dB through 10.0 dB    |  | <b>1 5</b> 15.0 dB | <b>2 0</b> 20.0 dB |
| 3 SINT Code         | <b>. 0 0</b> Smiths                 |  |                    |                    |
| 4 Options           | <input type="checkbox"/> Solderable | <input checked="" type="checkbox"/> <b>W B 2</b> Wire bondable |                    |                    |

# Worldwide Support

## Connectors

### Americas

#### Sales

connectors.uscsr@smithsinterconnect.com

#### Technical Support

connectors.ustechsupport@smithsinterconnect.com

### Europe

#### Sales

connectors.emeacsr@smithsinterconnect.com

#### Technical Support

connectors.emeatechsupport@smithsinterconnect.com

### Asia

#### Sales

asiacsr@smithsinterconnect.com

#### Technical Support

asiatechsupport@smithsinterconnect.com

## Fibre Optics & RF Components

### Americas

#### Sales

focom.uscsr@smithsinterconnect.com

#### Technical Support

focom.techsupport@smithsinterconnect.com

### Europe

#### Sales

focom.emeacsr@smithsinterconnect.com

#### Technical Support

focom.techsupport@smithsinterconnect.com

### Asia

#### Sales

focom.asiacsr@smithsinterconnect.com

#### Technical Support

focom.techsupport@smithsinterconnect.com

## Semiconductor Test

### Americas

#### Sales

semi.uscsr@smithsinterconnect.com

#### Technical Support

semi.techsupport@smithsinterconnect.com

### Europe

#### Sales

semi.emeacsr@smithsinterconnect.com

#### Technical Support

semi.techsupport@smithsinterconnect.com

### Asia

#### Sales

semi.asiacsr@smithsinterconnect.com

#### Technical Support

semi.techsupport@smithsinterconnect.com

## RF/MW Subsystems

### Americas, Europe & Asia

#### Sales

subsystems.csr@smithsinterconnect.com

#### Technical Support

subsystems.techsupport@smithsinterconnect.com

## Connecting Global Markets

more > [smithsinterconnect.com](https://www.smithsinterconnect.com) | [in](#) [X](#) [v](#)