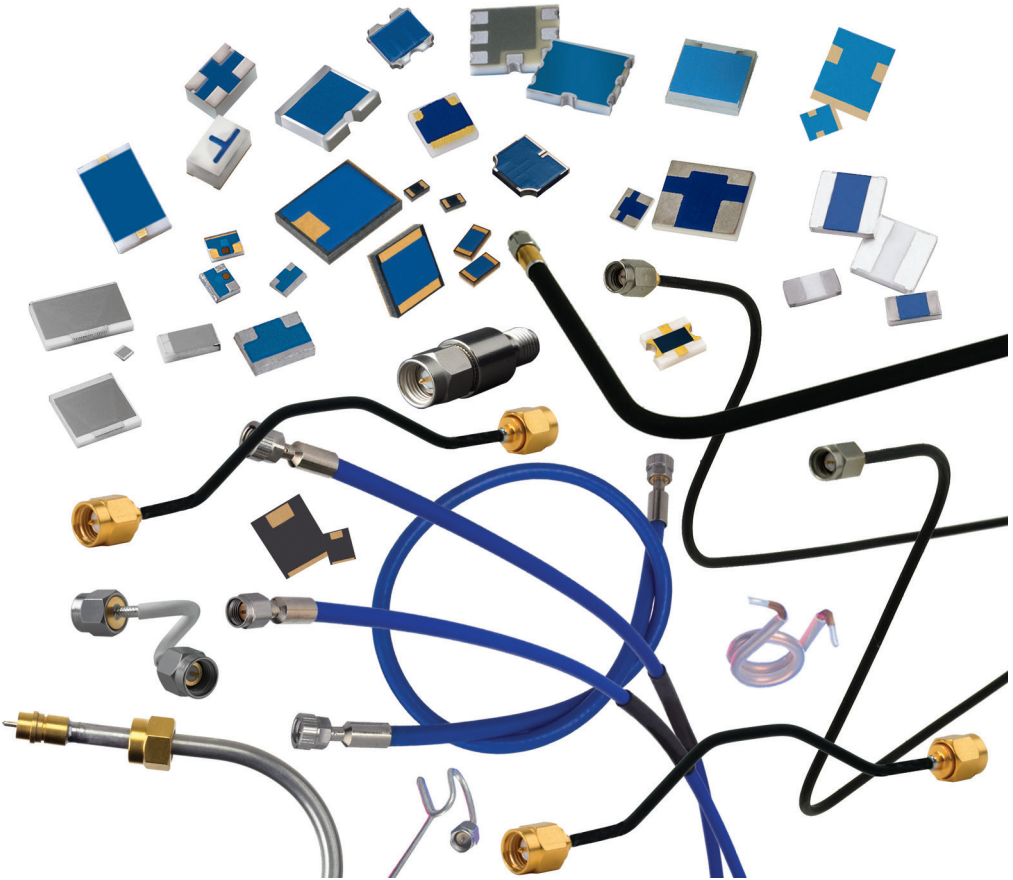


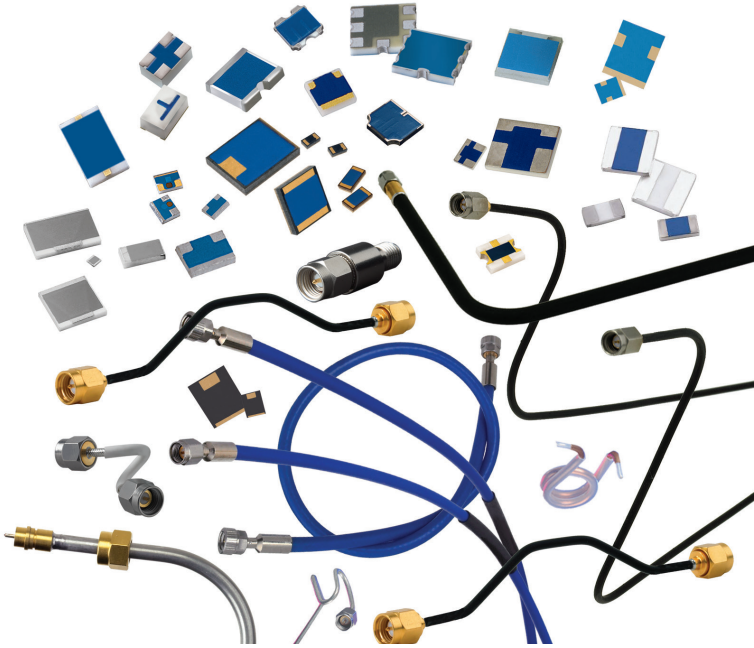
Space Heritage

Resistive Board Level Components and RF Cable Assemblies



Space Heritage

RESISTIVE BOARD LEVEL COMPONENTS AND RF CABLE ASSEMBLIES



Smiths Interconnect has been supplying RF Passive Components for space flight missions for over 40 years. We have participated in over 200 military, commercial and scientific satellite programs such as the Mars Exploration Rover. Our capabilities to assist you from design concept through launch include design reviews, qualification testing, special process documentation, serialized data, weight measurements and custom packaging.

We have long-standing relationships with many of the world's major space companies and have supplied components to leading organizations such as Jet Propulsion Labs and NASA Goddard Space Center. Our mission has always been to design and manufacture high performance products using the best core technologies of the company while maintaining the extremely high reliability levels required for long life military, commercial and civil satellites.

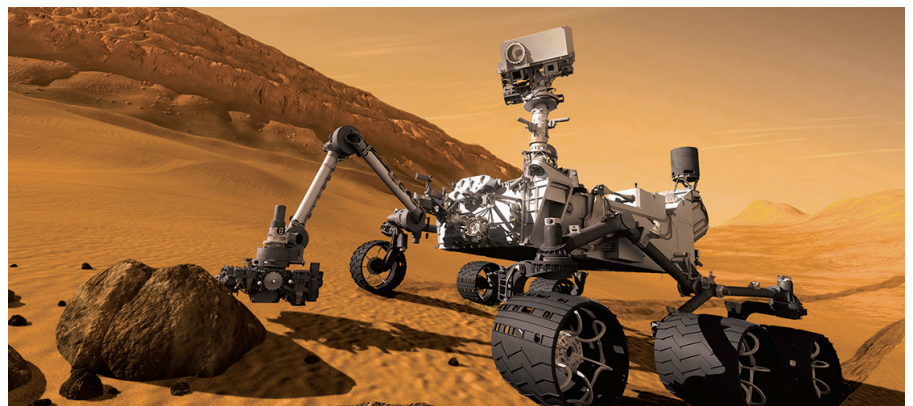
Smiths Interconnect is certified to the following international standards:

AS9100, Nadcap, ISO9001, ISO14001, OHSAS18001

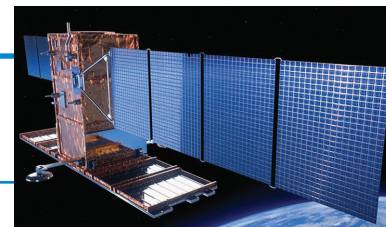
The following Space Approved Product groups have flown or are scheduled to fly on space programs listed on the following pages.

Space Product Groups

- High Reliability Fixed Attenuators
- Thermopad® High Reliability Temperature Variable Attenuators
- Coaxial Fixed & Thermopad® Temperature Variable Attenuators
- High Power Chip Attenuators
- CVD Diamond Rf Resistives®
- Coaxial Terminations
- Stripline Flange Terminations
- Stripline Pill Terminations
- High Power Flange Terminations
- High Power Chip Resistors
- Semi-Rigid Cable Assemblies – Copper & Aluminum Jackets Solid Teflon® & Low-Loss Dielectrics
- Mini-Flex 105 Flexible Cable Assemblies
- HybriX® 3dB Hybrid Couplers
- HybriX® Directional Couplers



Supported Space Programs



Program Name	Customer(s)	Activity/Application(s)
ACES	EADS	Hi-Rel Attenuators
ACSS	Lockheed Martin	Semi-Rigid Cables for Aircraft Surveillance Satellite
Advanced EHF (MILSTAR II)	Lockheed Martin, Northrop Grumman	Semi-Rigid Cables & Temperature Variable Attenuators (TVAs)
Aireon/Birdtracker	Harris	Semi-Rigid Cables, TVAs, Fixed Attenuators
Aireon/Roadrunner	Harris	Hi-Rel Attenuators & TVAs
Alphasat	Astrium	Hi-Rel Attenuators & TVAs
Amazonas	Astrium	Hi-Rel Attenuators & TVAs for Commercial Communications Satellite (Brazil)
AMC-21	Thales Alenia Space	Hi-Rel Attenuators & TVAs
Amos 1, 2, 3, 4	Thales Alenia Space	Hi-Rel Attenuators & TVAs
Anik F1 & F2	Boeing Space	Hi-Rel Attenuators & TVAs. Prime: Telesat Canada
Applications Technology Satellite (ATS)	Hughes Space, Boeing Space for NASA	Hi-Rel Attenuators & TVAs
Asiasat 5, 9	Space Systems/Loral	Semi-Rigid Cables
ASTRA	ND SATCOM, Astrium	Hi-Rel Attenuators
Bepi Colombo	Thales Alenia Space	Hi-Rel Attenuators & TVAs for Planet Mercury Exploration
Bock III	Lockheed Martin	Hi-Rel TVAs
BRASILSAT	Jet Propulsion Labs	Hi-Rel Attenuators
Chandrayaan-1, 2	SAC, ISRO, Astra Microwave, GAETEC	Hi-Rel Attenuators, TVAs, CVD Diamond Rf Resistives® for Govt of India Moon Landing
CHINA STAR	Lockheed Martin, Tesat	Hi-Rel Attenuators
COMSTAR	Boeing Space	Hi-Rel Attenuators
COSMO, SG	Hughes Space, Thales Alenia Space	Hi-Rel TVAs & Hi-Rel Diamond Rf Resistives®
Deep Space Probe	Boeing Space	Hi-Rel TVAs
DirecTV 5, 6, 7S, 10, 11,12	Space Systems/Loral, Boeing Space	Semi-Rigid Cables
DISCUS 1-5	Alcatel Space	Hi-Rel Attenuators
DMSP	Hughes Space, Boeing Space	Hi-Rel TVAs
DSCS-SLEP	Lockheed Martin	Semi-Rigid Cables for Military Satellite
Earth Observation	Astrium	Hi-Rel Attenuators & TVAs
EchoStar V, VI, VII, VIII, IX, XI, XIV, XV	Space Systems/Loral, Lockheed Martin	Semi-Rigid Cables. End Customer Dish Network
Edusat	Astra Microwave	Hi-Rel Thermopads for Educational Satellite
Eutel Sat	Thales Alenia Space, Space Systems/Loral	Hi-Rel Attenuators & TVAs for Broadcast & VSAT, Semi-Rigid Cables
Firestone	Harris Government Systems	Hi-Rel Attenuators & TVAs for Classified Satellite (WRF-5) Prime: Lockheed
GALAXY III C, XI	Boeing Space	Customer: Pan Am Sat Corp.
GALILEO PROBE	Jet Propulsion Labs	Hi-Rel Attenuators
GEO	Space Systems/Loral	Semi-Rigid Cables
GOES D-H, I-M, N-P	Boeing Space, Northrop Grumman, Harris Govt. Systems	Hi-Rel Attenuators & TVAs for Geostationary Operational Environmental Satellite Weather Tracking Satellites
Globalstar	Space Systems/Loral	Hi-Rel Attenuators
GlobalStar2	Thales Alenia Space, Com Dev	Hi-Rel Attenuators & TVAs for Mobile Satellite Voice & Data
GPM	General Dynamics	Global Precipitation Measurement Satellite for NASA Goddard
GMS-1	Hughes Space	Hi-Rel Attenuators
GPS I & II, IIF, III	Lockheed Martin, Boeing Space, General Dynamics	Hi-Rel Attenuators, TVAs, & Semi-Rigid Cables
GRAIL	Jet Propulsion Labs	Hi Rel Attenuators for Gravity Recovery and Interior Laboratory
GSAT-5	ISRO (SAC & ISAC)	Hi-Rel Attenuators, TVAs & Cable Assemblies for Geo-Stationary Satellite
G-STAR SATELLITE	Lockheed Martin	Hi-Rel Attenuators

Supported Space Programs



Program Name	Customer(s)	Activity/Application(s)
Hispasat	Thales Alenia Space	Hi-Rel Attenuators & TVAs for Global Communication Satellite
Hylas	Astrium	Hi-Rel Attenuators & TVAs
Immarsat	Thales Alenia Space	Hi-Rel Attenuators & TVAs for Satellite Telephone System
INMARSAT 1 & 2	Astrium	Hi-Rel Attenuators
Insat	SAC, ISRO, Astra Microwave, Tesat	Hi-Rel Attenuators & TVAs
Intelsat 1-4	Lockheed, Boeing Space	Semi-Rigid Cables
Intelsat 5, 7, 9, 15, 16,19, 20, 34	Space Systems/Loral	Semi-Rigid Cables
Iridium	Boeing Space, Argon ST, Thales Alenia Space	Hi-Rel Attenuators, TVAs & Hi-Rel Diamond Rf Resistives®
Iridium-Next	Lockheed Martin, Thales Alenia Space	Semi-Rigid Cables, TVAs
Jaquar	General Dynamics	Cable Assemblies and Thermopads
JCSAT, 14	Lockheed Martin	Hi-Rel Attenuators & Semi-Rigid Cables
JUNO	Thales Alenia Space, Jet Propulsion Labs	Leaded Hi-Rel Attenuators
Jupiter, 2	Space Systems/Loral	Semi-Rigid Cables for Hughes Network - Broadband Communications
JWST, SMAP	Jet Propulsion Labs	Hi-Rel Attenuators, TVAs, Terminations, Multipaction Tested Couplers
Ka-band Transceiver	Gaetech	Communications for ISRO
KA-SAT	Thales Alenia Space	Ka Band
Kitty Hawk	Harris	Hi-Rel Attenuators & TVAs
Kizuna	NT Space	Communications
Kompsat	Thales Alenia Space	Hi-Rel Attenuators & TVAs for Korean Multi-Purpose Earth Observation
Ku-IMUX	Thales Alenia Space	Hi-Rel Attenuators
LDCM	General Dynamics	Hi-Rel Attenuators & TVAs for Landsat Data Continuity Mission
LEASAT	Hughes Space	US Navy
LEO L/S	Orbital Space	Hi-Rel Attenuators
Little Bear	General Dynamics	Hi-Rel Attenuators & TVAs for AKA P06. Secret Program. Prime: Lockheed
Luxembourg Satellite	Astrium	Astrium
Mars Lander & Rover	Jet Propulsion Labs	Hi-Rel Attenuators & TVAs for Mars Exploration Vehicle
MEASAT 1,2,3	Boeing Space	Hi-Rel Attenuators & TVAs for Malaysia East Asia Satellite
MER	Jet Propulsion Labs	Mars Exploration Rover
MEXSAT	Boeing Space	Hi-Rel Attenuators
MSAT	Boeing Space	Hi-Rel Attenuators
MUOS (Mobile User Objective System)	Lockheed Martin	Semi-Rigid Cables, Hi-Rel Attenuators & TVAs for a Tactical Satellite Communications System to Improve Ground Communications for U.S. forces
New Skies XIV	Space Systems/Loral	Semi-Rigid Cables
NPOESS	Northrop Grumman	Custom & Standard Hi-Rel Attenuators & TVAs for National Polar-Orbiting Operational Environmental Satellite System
NSS-12	Space Systems/Loral	Semi-Rigid Cables for New Skies Satellite
OCEANSAT-2	SAC, ISRO	Hi-Rel Attenuators & TVAs for Microwave Remote Sensing
OCO	Orbital Sciences	High Power Coax Termination for Orbiting Carbon Observatory Monitors Greenhouse Gas Co2 Emissions
ORION Crew Exploration Vehicle	General Dynamics	Hi-Rel Attenuators for CEV Transponder
OSO-8	Lockheed Martin	Orbiting Solar Observatory
P01 - P10	General Dynamics	Hi-Rel Attenuators & TVAs for Classified Spy Satellite Systems
P072, P461, P617, P982, P1196	Northrop Grumman	Hi-Rel Attenuators & TVAs for Secret Programs
PALAPA-A, B	Boeing Space	Hi-Rel Attenuators
Payload W	General Dynamics	Hi-Rel Attenuators & TVAs for Secret Program
Phoenix	Lockheed Martin	Classified Spy Satellite System

Supported Space Programs



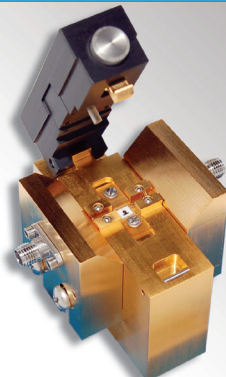
Program Name	Customer(s)	Activity/Application(s)
Pioneer Venus Multprobe & Orbiter	Boeing Space	Hi-Rel Attenuators
Polar Platform-ESA	Marta Marconi Space	European Space Agency
QuetzSat 1	Space Systems/Loral	Semi-Rigid Cables
RCM (RADARSAT)	MDA, COM DEV	Attenuators, MTVAs, and Semi-Rigid Cable Assemblies
RISAT-2	ISRO	Earth Observation Satellite
SARSAT	Com Dev	TVAs, Flg Termination for Search & Rescue Satellite - Aided Tracking
Satellite Navigation and Remote Sensing	Electronics Institute of CAST	Cable Assemblies
SATMEX-6	Space Systems/Loral	Semi-Rigid Cables
SBIRS	Lockheed Martin	Semi-Rigid Cables, Hi-Rel Attenuators & TVAs
Sentinal-1	Astrium, Thales Alenia Space	Hi-Rel Attenuators & TVAs for Earth Observation for Europe's GMES Global Monitoring for Environment & Security
SES Sirius-5, 9	Space Systems/Loral	Semi-Rigid Cables & Hi-Rel Attenuators
SHARAD SkyNet V	Astrium, Tesat	Hi-Rel Attenuators
Shen Zhou	503 Institute of CAST	TVA for Satellite and Manned Space Craft
Sicral 1A, 1B, 2	Thales Alenia Space	Hi-Rel Attenuators & TVAs for Strategic Military Communications
SIRIUS 1,2,3,4,6	Space Systems/Loral	Semi-Rigid Cables
SKYNET V	Astrium, Tesat	Hi-Rel Attenuators
SMAP	Jet Propulsion Labs	Directional Coupler
Spaceway	Space Systems/Loral	Semi-Rigid Cables for Hughes Network Systems (Augment to Spaceway for High-Speed Internet Access)
Spaceway 1,2, 3	Boeing Space	DirecTV, Hughes Network Systems
SSPA Glonass	Astrium	Hi-Rel Attenuators & TVAs
STAR One C2, D1	Thales Alenia Space, Space Systems/Loral	Hi-Rel Attenuators, TVAs & Semi-Rigid Cables for Brazilian Communications
Superbird C-2	Mitsubishi Space	Communications
SURVEYOR	Hughes Space	Hi-Rel Attenuators
SYNCOM	Hughes Space	Hi-Rel Attenuators
TACSAT	Hughes Space	Hi-Rel Attenuators
TDRSS	Boeing Space	Tracking & Data Relay Satellite System
TELSTAR, 3	Boeing Space	Hi-Rel Attenuators
TELSTAR 14	Space Systems/Loral	Semi-Rigid Cables
TerreStar	Space Systems/Loral	Semi-Rigid Cables
THURAYA 1, 2, 3	Boeing Space	Hi-Rel Attenuators
TIROS	Lockheed Martin	Hi-Rel TVAs
TSAT	Boeing Space	Transformational Satellite System
Turksat 1C, 2A, 3A	Thales Alenia Space	Hi-Rel Attenuators & TVAs for Communications Satellite
Tuscany	Harris	Hi-Rel Attenuators
Tx	Astra Microwave	Educational Satellite Payload
VIASAT-1, -2	Space Systems/Loral	Semi-Rigid Cables & Hi-Rel Attenuators
WESTAR I, II, III, IV, V, VI	Hughes Space	Hi-Rel Attenuators
WGS	Boeing Space	Hi-Rel Attenuators for Wideband Global Satcom
WISE	Lockheed Martin	NASA's Wide-Field Infrared Survey Explorer
WORLD STAR	EADS Astrium	Commercial Communications
WRF-5	Lockheed Martin, Harris Govt. Systems, Assurance Technology	Hi-Rel Attenuators & TVAs for Secret Satellite Program
XM-1,2,3 & 4	Boeing Space	Hi-Rel Attenuators
XM-5 Radio	Space Systems/Loral	Semi-Rigid Cables

Standard High Reliability Test Flow For RF Components

Group A Testing and Inspection (100% Of the Lot)	Group B Testing and Inspection (Sample)	Group C Testing and Inspection (Sample)
Pre-cap Visual Inspection	Subgroup 1 (sample)	Electrical Performance
Conductor Metallization Defects	Low Temperature Operation	Load Life. Burn-in units at 125°C for duration of 1000 hours at maximum input power specified.
Resistor Defects	Electrical Performance	
Substrate Defects	High Temperature Bake	
Foreign Material	Visual Mechanical Inspection	Electrical Performance
Visual Mechanical Inspection	Electrical Performance	Data Review and Data Pack
Electrical Inspections	Termination Adhesion (Planar, W1, W3 only)	Additional RF Component Testing Available
Electrical Performance	Bondability (WB1 and G only)	
Thermal Shock	Termination Solderability (Planar, W1, W3, T3 and T3S only)	Stability of Attenuation After:
Electrical Performance		Temperature Change
Burn-In [100% 168 hours at input power]	Terminal Lead Strength (T3 and T3S only)	Thermal Shock
Final RF Test	Subgroup 2 (sample)	Vibration
Percent Defective Allowable (PDA)	Electrical Performance	Shock
Temperature Coefficient of Attenuation	Life Test. Sample units for 1000 hours at the maximum input power specified	Moisture Resistance
		Peak Power
		Salt Spray
		Sensitivity of Attenuation After:
		Change in Input Power
		Change in Frequency

Standard High Reliability Test Flow for Cable Products

Testing and Inspection (100% of the Lot)	Additional Testing and Services Available	
Visual Mechanical Inspection	Phase Matching	Change in Temperature
Materials	Vibration and Shock	Vibration and Shock Testing
Finish	Moisture Resistance	Moisture Resistance
Configuration and Features	Peak Power	Peak Power
Mechanical Definition Verification (Fit Fixtures), as required	Salt Spray	Salt Spray
Mechanical Master, as required	Corrosion	Barometric Pressure
First Article Inspection	Barometric Pressure	Outgassing
Marking	Resistance to Solvents	Endurance
Mating	Force to Engage/Disengage	Resistance to Bonding Exposure
Workmanship	Cable Forming	Low Temperature Operation
Electrical Inspections	Custom Painting	Short Term Overload
Pre-Conditioning	Custom Marking	High Temperature Exposure
DWV (Dielectric Withstanding Voltage)	Custom Packaging & Packing	Solderable Mounting Integrity
Electrical Performance	Source Inspection	Bondable Mounting Integrity
VSWR & Insertion Loss	Other testing services are available upon request.	Resistance to Solvents
Thermal Shock		Gross and Fine Leak Detection
Electrical Performance		Radiographic Inspection
Serialized Data (as required)		First Article Inspection
Insertion Loss (read & record)		Pre-Cap Inspection
VSWR (read & record)		Source Inspection
X-Ray Inspection (as required)		Other testing services are available upon request.
Data Review and Data Pack Supplied		



Additional Testing Services

In addition to standard HR Series testing, Smiths Interconnect offers a wide array of additional test services to support various application and market requirements. We can develop a custom test plan per a customer supplied test plan or unique application specific requirements offering ultimate flexibility. With over 40 years of heritage, Smiths Interconnect is a global leader in high reliability board level components supporting the stringent requirements of the space, aerospace, defense and medical markets.

HR Series Products Test Capabilities

Stability of Attenuation After:

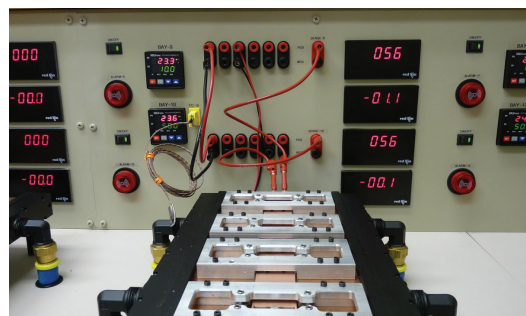
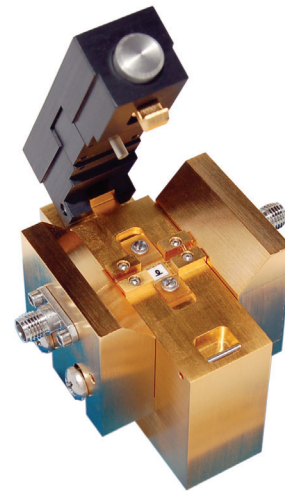
- Temperature Change
- Thermal Shock
- Vibration
- Shock
- Moisture Resistance
- Peak Power
- Salt Spray

Sensitivity of Attenuation After:

- Change in Input Power
- Change in Frequency
- Change in Temperature

Additional Test Capabilities:

- Vibration and Shock Testing
- Moisture Resistance
- Peak Power
- Salt Spray
- Barometric Pressure
- Outgassing
- Endurance
- Resistance to Bonding Exposure
- Low Temperature Operation
- Short Term Overload
- High Temperature Exposure
- Solderable Mounting Integrity
- Bondable Mounting Integrity
- Resistance to Solvents
- Gross and Fine Leak Detection
- Radiographic Inspection
- First Article Inspection
- Pre-Cap Inspection
- Source Inspection
- Additional testing services available upon request



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](#)