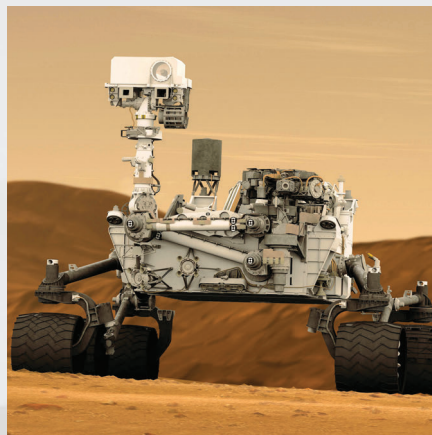




# Hi-Rel Connectors for Critical Applications

THE PERFORMANCE LEADER IN  
MICROWAVE CONNECTORS



- Meet MIL / Space Performance Specs
- Miniaturized Solutions for Lower Weight/Size
- Materials Traceability & Single Lot Control
- Satisfy NASA Outgassing Requirements
- Lowest VSWR, Insertion Loss and RF Leakage

# HI-REL CONNECTORS FOR CRITICAL APPLICATIONS

Southwest Microwave offers Hi-Rel connectors to 110 GHz to deliver the utmost in reliability and performance for critical Military and Spaceflight applications.

While the quality and performance of Southwest Microwave commercial grade connectors lead the industry, our Hi-Rel connectors are not simply upscreened versions of these connectors. Our understanding of transmission line impedance and thermal stresses as they pertain to coax connectors are key elements in the successful qualification and deployment of Hi-Rel solutions in defense and space programs.

Our Hi-Rel connectors are treated with a tighter level of control at every step in the manufacturing process - from machining, de-burring and electroplating to assembly area cleanliness, thermal conditioning and inspection.



## Space Heritage

Southwest Microwave has been involved in aerospace industry activities since 1989, with our connectors used in many mission critical Space programs, including:

- Space Exploration Vehicles
- Space Stations
- Space Exploration Satellites
- Remote Sensing Satellites
- Spacecraft
- Navigation Satellites
- Reconnaissance Satellites
- Communication Satellites
- Weather Satellites

## UNMATCHED PERFORMANCE

Southwest Microwave connectors are ideal in military and spaceflight applications where power management and low loss interconnects are critical. Our connectors have the industry's lowest VSWR (<1.10:1 typ.) up to 50 GHz, and offer the added advantage of low RF leakage (<-100 dB typ.)

Upon request, Southwest Microwave can offer Hi-Rel connectors with these additional features:

- 4 in-oz Contact Rotation Retention
- Center Contact Keyhole Slot

Connector Type	Frequency
SuperSMA	27 GHz
N & TNC	18 GHz
2.92 mm (K)	40 GHz
SSMA	40 GHz
2.40 mm	50 GHz
1.85 mm (V)	67 GHz
SSBP MultiPort Cable Harnesses	up to 67 GHz
0.9 mm SuperMini	67 GHz
SuperMini Board-to-Board	67 GHz
1.0 mm (W)	110 GHz



# HI-REL PROGRAM CONSIDERATIONS

Southwest Microwave's Hi-Rel connector program reflects the highest level of care at every phase of our design, manufacturing and test processes. This ensures our ability to deliver space-grade products built on a platform of reliability.



## MATERIAL TRACEABILITY AND SINGLE LOT CONTROL



All of Southwest Microwave's connector piece parts are traceable to their raw materials. This traceability allows us to ensure that each individual piece part that goes into the connector assembly is traceable to a single lot of raw material.

## SOURCE CONTROL DRAWINGS (SCD)



Southwest Microwave works with supplied customer SCDs for Hi-Rel applications to ensure that rigorous specifications are properly met. Our experience with SCD development also enables our staff to define and deliver connector designs and specifications for client SCDs.

## SPACE SCREENING



Our Hi-Rel team generates test plans in accordance with SCD requirements and most tests are performed in-house, with results recorded in accordance with the test plan. Results are then combined with material certifications and lot traceability information into a document called an Acceptance Test Report (ATR).

## DESTRUCTIVE PHYSICAL ANALYSIS (DPA)



When DPA is required, Southwest Microwave works with several quality labs that provide these services. We oversee all testing and integrate the DPA into the ATR.

## QUALIFICATION TESTING



Southwest Microwave performs most qualification testing in house, and will coordinate with outside labs for those tests - such as Shock and Vibration - that require specialized equipment. We will design and build the necessary tools to facilitate these tests.

## SOURCE INSPECTIONS



Southwest Microwave hosts many source inspections in coordination with our major Hi-Rel and Space customers, and is familiar with what is required to facilitate and streamline these inspections.

## OUTGASSING

All materials used in Southwest Microwave Hi-Rel connector assemblies meet NASA requirements for outgassing per IAW NASA Reference Publication 1124, Revision 4.



# RECOMMENDED ACCEPTANCE TEST TABLES

In addition to performing standard quality tests, Southwest Microwave offers special Hi-Rel testing to meet the most stringent SCD and DPA requirements. We use MIL-PRF-39012 as a reference for interface specifications and test methods, but recommend additional testing to ensure optimal connector performance. This includes electrical and mechanical testing before and after Thermal Shock to guarantee that interface and electrical performance are stable over temperature.

## TABLE I - GENERAL PRODUCT ASSURANCE

(Derived from Group A requirements)

INSPECTION TYPE (Visual and Mechanical Examination)	MIL-PRF-39012 REQUIREMENT REFERENCE PARAGRAPH	MIL-PRF-39012 TEST METHOD REFERENCE PARAGRAPH	RECOMMENDED MIL-PRF-39012 SAMPLE SIZE
MATERIAL	3.3	TABLE I	C of Cs
FINISH	3.3.1	—	C of Cs
DISSIMILAR METALS	3.3.2	MIL-STD-889	100%
MARKING	3.29	MIL-STD-130	100%
WORKMANSHIP	3.30	—	100%

## TABLE II - PRODUCT PERFORMANCE ASSURANCE

(Derived from Group B requirements with Thermal Shock added)

INSPECTION TYPE (Design and Construction Testing)	MIL-PRF-39012 REQUIREMENT REFERENCE PARAGRAPH	MIL-PRF-39012 TEST METHOD REFERENCE PARAGRAPH	RECOMMENDED MIL-PRF-39012 SAMPLE SIZE
CONFIGURATION AND FEATURES	3.4	FIGURES	Table IV
CONTACT GAGING (mating characteristics)	3.7	4.6.4	Table IV
CONTACT RETENTION	3.12	4.6.9	Table IV
VSWR	3.14	4.6.11	Table VI
INSERTION LOSS	3.27	4.6.24	Table VI
CONNECTOR INTERFACES	3.4.3	MIL-STD-348	Table IV
<b>THERMAL SHOCK</b>	<b>3.20</b>	<b>4.6.17</b>	<b>100%</b>
CONTACT GAGING (mating characteristics)	3.7	4.6.4	Table IV
CONTACT RETENTION	3.12	4.6.9	Table IV
VSWR	3.14	4.6.11	Table VI
INSERTION LOSS	3.27	4.6.24	Table VI
CONNECTOR INTERFACES	3.43	MIL-STD-348	Table IV
DIELECTRIC WITHSTANDING VOLTAGE	3.17	4.6.14	100%

Note: Southwest Microwave recommends testing before and after thermal shock to ensure proper operation in space environments.