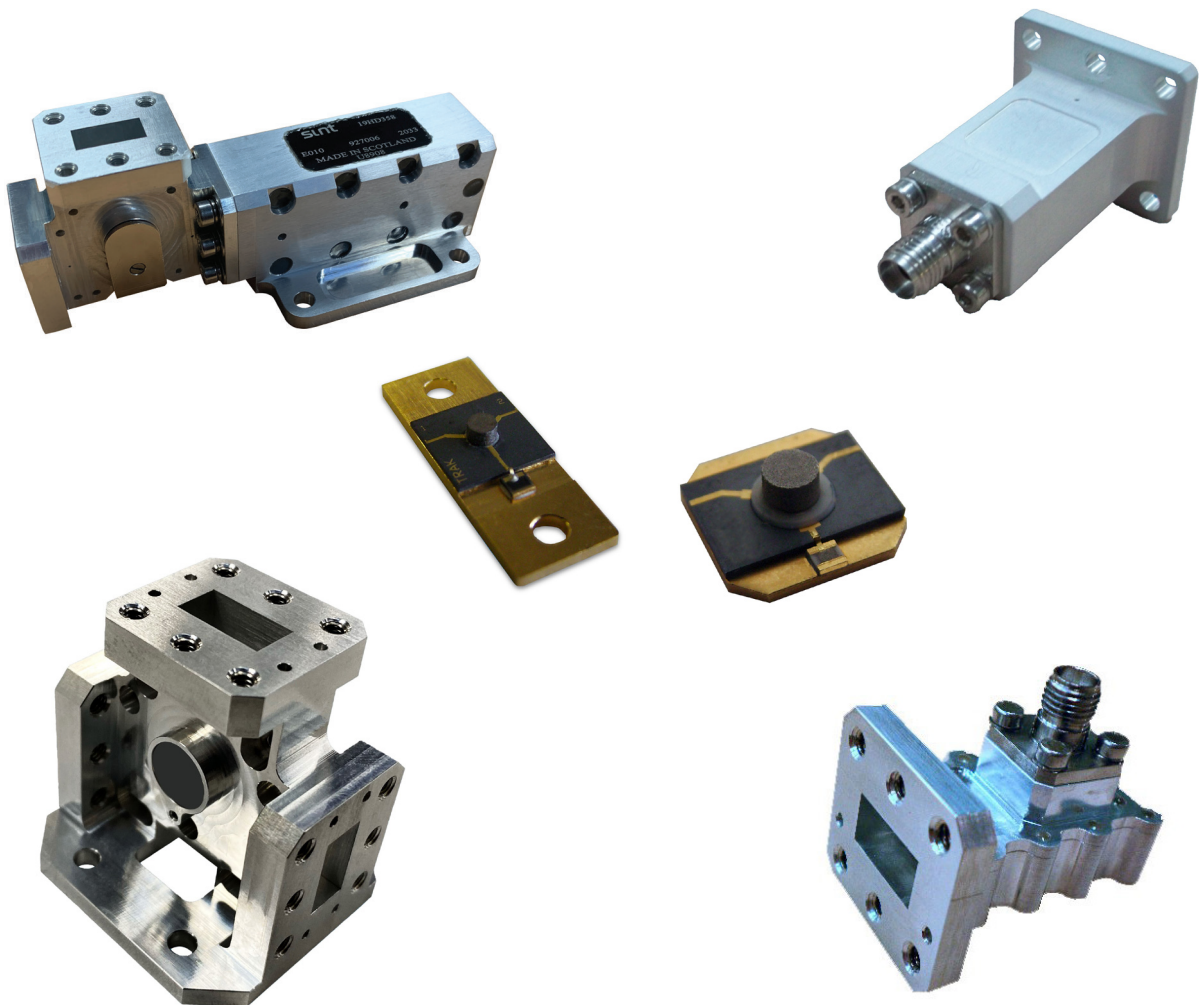
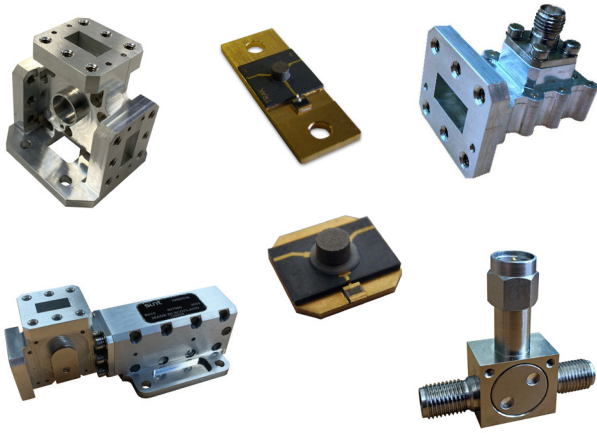


# K-BAND PASSIVE COMPONENTS

Space Qualified Coaxial and WR51 Isolators, Circulators and Iso-adapters, Waveguide Loads and Microstrip Isolators



# K-Band Passive Components



Smiths Interconnect's broad range of K-Band passive components are specifically designed for satellite communication payloads in GEO/MEO and LEO orbits.

The devices are optimised to operate over broad assigned frequency bands. Product screening and qualification are conducted in-house using our comprehensive suite of test facilities including thermal shock and cycling, sine/random vibration, mechanical shock and, where appropriate, CW and peak power under TVAC, critical power and seeded multipaction. Summary and qualification data reports are available to prospective customers.

Waveguide devices are supplied in Aluminium housings with a standard clear passivation coating or precious metal plating. High power devices can be supplied with low emissivity black paint finish if desired.

In addition to waveguide isolators, circulators, terminations, transitions, hybrids and integrated multi-function assemblies operating in frequency ranges from S to V-band, Smiths Interconnect designs and manufactures coaxial, stripline and microstrip space qualified isolators, circulators and terminations operating in assigned bands from UHF to Ka-band for coaxial and from S to Ka bands for microstrip components.

**K-Band components for satellite communication payloads in GEO/MEO and LEO orbits.**

## Features & Benefits

- Broad range of space qualified passive products available with qualification data
- Broadband requiring fewer part options to address the allocated frequency band
- Temperature stable and multipaction free waveguide isolators and circulators and terminations
- Waveguide are available in several variants (circulation, flange detail etc) while coaxial isolators and circulators are available with any combination of connector commensurate with the body style.
- In-house facilities for average, multipaction, critical power, mechanical-shock and sine/random vibration environmental stress
- Sample data and test reports available to assist the design and qualification process

All products are designed for specific payload applications and are produced, qualified and screened depending on their power and mechanical environments.

# Compact In-line 2.92mm to WR51 Transition

19TM107

## Specifications



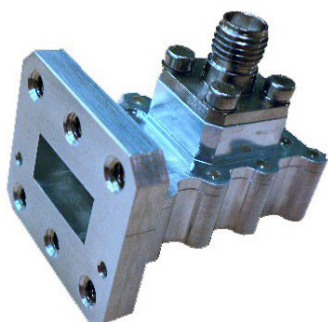
Parameter	Performance
Non-operating Temperature	-75 to +110C
Qualification/Acceptance Temperature	-65 to +100C
Operating Frequency	17.3 to 21.0GHz
Insertion Loss	0.15dB max
Return Loss	26dB min
Power Handling	2W CW
Radiated Emissions	80dBi min
Mass	15g nom [0.53 oz]

The 19TM107 is a compact in-line 2.92mm to WR51 transition. The internal structure employs a shorted pin to provide a zero Ohm DC bleed path. The transition was designed to be used in generic applications aboard GEO/MEO payloads and has been qualified in-house by Smiths Interconnect and supplied for spaceflight. Key design performance goals were electrical performance over a wide operating bandwidth and operating temperature range. Quoted performance levels are guaranteed under worst case operating conditions. The transition has been used in filter, INET and power combiner applications.

# Orthogonal High Power SMA to WR51 Transition

19TM106

## Specifications



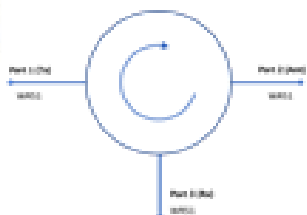
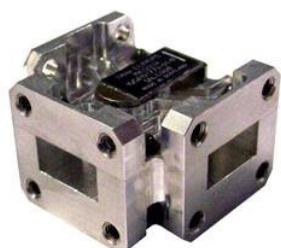
Parameter	Performance
Non-operating Temperature	-55 to +125C
Qualification	-30 to +125C
Acceptance	-25 to +120C
Operating Frequency	17.7-20.2 GHz
Insertion Loss	0.15dB max
Return Loss	23dB min
Power Handling	20W CW [PFM]
Critical Power (Corona)	20W CW [PFM]
Radiated Emissions	80dBi min
Connector	SMA, zero Ohms to ground
Mass	23g nom

The 19TM106 is a compact orthogonal SMA to WR51 transition. The internal structure employs a shorted pin to provide a zero Ohm DC bleed path and optimal thermal path. The transition was designed to be used in generic applications aboard GEO/MEO payloads and has been qualified in house by Smiths Interconnect and supplied for spaceflight. Key design performance goals were electrical performance over a wide operating bandwidth and a wide operating temperature range. Quoted performance levels are guaranteed under worst case operating conditions. The transition has been used in filter, INET and power combiners applications.

# Low Power WR51 Circulator

19CD328

## Specifications



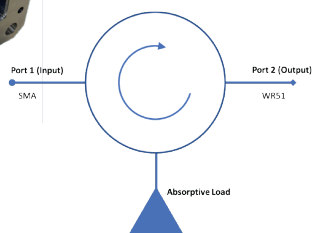
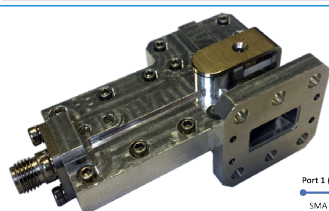
Parameter	Performance
Non-operating Temperature	-40 to +105C
Qualification Temperature	-35 to +80C
Acceptance Temperature	-30 to +75C
Operating Frequency	18.0 to 20.0GHz
Insertion Loss	0.15dB max
Return Loss	23dB min
Isolation [if supplied as an isolator]	23dB min
Power Handling	2W CW
Radiated Emissions	80dBi min
Mass	38g nom [1.34 oz]

The 19CD328 is a low power circulator designed specifically for waveguide demultiplexers (channel droppers) and is arranged mechanically so that these devices can be cascaded to suit the number of channels required. This circulator used in conjunction with a compact termination allows maximum flexibility to create an isolator with the loaded port selected to suit the designer's mechanical constraints. Quoted performance levels are guaranteed under worst case operating conditions. The device can be supplied with flange details to suit specific user requirements

# SMA to WR51 Isolating Transition (iso-adapter)

19HD353

## Specifications



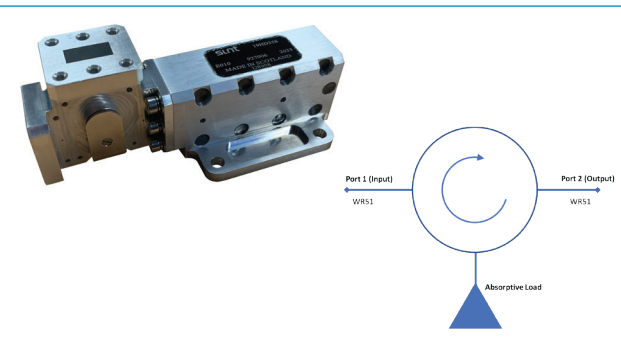
Parameter	Performance
Non-operating Temperature	-40 to +85C
Qualification Temperature	-30 to +80C
Acceptance Temperature	-25 to +75C
Operating Frequency	17.8 to 20.2GHz
Insertion Loss	0.30dB max
Return Loss	23dB min
Isolation	23dB min
Power Handling	2W CW
Radiated Emissions	80dBi min
Mass	38g nom [1.34 oz]

The 19HD353 is a compact isolated transition or iso-adapter. The part features a 2.92mm connector where the centre contact is shorted to ground to provide a zero Ohm DC bleed path. The isolation is achieved using a waveguide isolator to provide minimum insertion loss. The transition was designed to be used in the filter system applications aboard GEO/MEO payloads and has been qualified in house by Smiths Interconnect and supplied for spaceflight. The key design performance goal was superior electrical performance over a wide operating bandwidth. Quoted performance levels are guaranteed under worst case operating conditions. The 19HD353 is available as the 19HD352 with the opposite direction of circulation.

# Broadband, Medium Power WR51 Isolator

19HD358

## Specifications

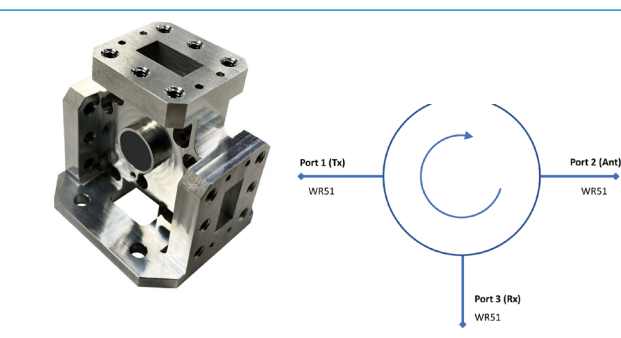
	Parameter	Performance
	Non-operating Temperature	-54 to +100C
	Qualification Temperature	-30 to +85C
	Operating Frequency	17.3 to 21.2GHz
	Insertion Loss	0.20dB max
	Return Loss	21dB min
	Isolation	21dB min
	Power Handling	20W CW
	Multipaction	80W peak min
	Radiated Emissions	70dBi min
	Mass	166g nom [8.86 oz]

The 19HD358 was designed to be used on the output of a TWTA employed in the transmission network of a GEO/ MEO payload and following qualification by Smiths Interconnect that included multipaction testing, has been supplied for spaceflight. Key design performance goals were power handling, thermal stability and operating bandwidth with quoted performance levels being that guaranteed under worst case operating conditions. The isolator uses a variation of the junction employed in the 19HD359 and employs a load based on the 19TE111.

# High Power WR51 Circulator

19HD359

## Specifications

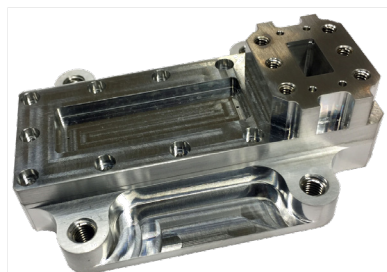
	Parameter	Performance
	Non-operating Acceptance	-54 to +100C
	Operating Frequency	-25 to +120C
	Insertion Loss	17.7-20.2GHz
	Return Loss	0.20dB max
	Power Handling	20dB min
	Multipaction	183W CW [PFM]
	Radiated Emissions	580W peak min
	Mass	70dBi min
		62g nom [2.19 oz]

The 19CD359 was designed to be used in the transmission network of a GEO/MEO payload. Smiths Interconnect has qualified the device including multipaction and the circulator has been supplied for spaceflight. Key design performance goals were power handling, thermal stability and operating bandwidth with quoted performance levels guaranteed under worst case operating conditions. The circulator was designed to be used in conjunction with a remote WR19 termination (such as the 19TE110). The mechanical mounting arrangement, direction of circulation and flange details can be adapted to meet specific customer requirements.

# High Power WR51 Load

19TE110

## Specifications



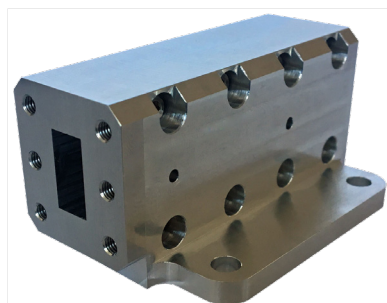
Parameter	Performance
Non-operating Temperature	-45 to +125C
Qualification Temperature	-65 to +100C
Acceptance Temperature	-25 to +120C
Operating Frequency	17.3 to 22.0GHz
Return Loss	26dB min
Power Handling	200W CW
Radiated Emissions	80dBi min
Multipaction	400W pk min.
Mass	120g nom [4.23 oz]

The 19TE110 was designed to be used in the transmission network of a GEO/MEO payload and has qualified, including multipaction, and supplied for spaceflight. Key design performance goals were power handling, thermal stability and operating bandwidth with quoted performance levels guaranteed under worst case operating conditions. The circulator was designed to be used in conjunction with a WR51 junction circulator (such as the 19CD359). The mechanical mounting arrangements can be customized to suit specific cold plate mounting pitches. Please note the power handling of this device is dependent on the thermal capacity on the cold plate on which it is mounted.

# High Power WR51 Load

19TE111

## Specifications




Parameter	Performance
Non-operating Temperature	-45 to +125C
Qualification Temperature	-30 to +125C
Acceptance Temperature	-25 to +120C
Operating Frequency	17.3 to 22.0GHz
Return Loss	26dB min
Power Handling	180W CW
Radiated Emissions	80dBi min
Multipaction	400W pk min.
Mass	110g nom [4.23 oz]

The 19TE111 was designed to be used in the transmission network of a GEO/MEO payload. It has been qualified including multipaction. Key design performance goals were power handling, thermal stability and operating bandwidth with quoted performance levels guaranteed under worst case operating conditions. The termination was designed to be used in conjunction with a WR51 junction circulator. The mechanical mounting arrangements can be customized to suit specific cold plate mounting pitches. Please note the power handling of this device is dependent on the thermal capacity of the cold plate on which it is mounted.

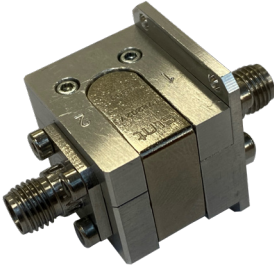
# Full Band Low Power WR51 Termination

19TE109

Specifications		
	Parameter	Performance
	Non-operating Temperature	-45 to +125C
	Qualification Temperature	-35 to +125C
	Acceptance Temperature	-30 to +125C
	Operating Frequency	15.0 to 22.0GHz
	Return Loss	23dB min
	Power Handling	2W CW
	Radiated Emissions	80dBi min
	Mass	7g nom [0.25 oz]
The 19TE109 was designed for generic applications aboard GEO/MEO/LEO payloads. It has been qualified by Smiths Interconnect and supplied for spaceflight. Key design performance goals were electrical performance over a wide operating bandwidth and temperature range. Quoted performance levels are guaranteed under worst case operating conditions. The termination was designed to be used in conjunction with WR51 low power junction circulators, on waveguide switch assemblies and to terminate 3dB hybrids.		

# Low-Power 2.9mm Coaxial Isolator

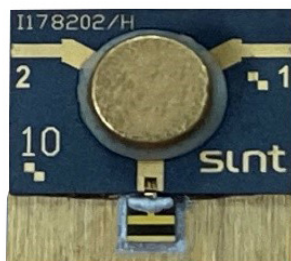
I178202/J

Specifications		
	Parameter	Performance
	Non-operating Temperature	-45 to +125C
	Qualification Temperature	-30 to +95C
	Acceptance Temperature	-25 to +80C
	Operating Frequency	17.8 to 20.2GHz
	Insertion Loss	0.50dB max
	Isolation	20dB min
	Return Loss	20dB min
	Power Handling	1W CW
	Radiated Emissions	70dBi min
	Mass	30g nom
The I178202/J was designed to be used in a beam forming network aboard a LEO payload. It is in the process of being qualified. Key performance requirements included mechanical footprint, operating bandwidth over which the electrical performance had to maintained and the 2.9mm interfaces. The product is designed to produced in high volume at low cost.		

# Low Power Miniature Microstrip Isolator

I178202/H

## Specifications



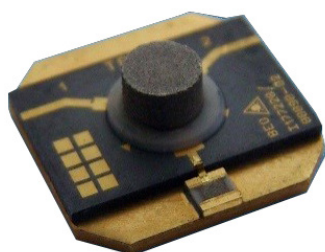
Parameter	Performance
Non-operating Temperature	-45 to +125C
Qualification	-30 to +95C
Acceptance	-25 to +80C
Operating Frequency	17.8-20.2.0GHz
Insertion Loss	0.50dB max
Isolation	18dB min
Return Loss	20dB min
Power Handling	2W CW
Radiated Emissions	80dBi min
Mass	0.2g nom

The I178202/H was designed to be used in a LEO beam forming network. It has been qualified but not yet supplied for spaceflight. Key performance requirements included electrical performance in a footprint approximately 50% smaller than a product optimised for electrical performance. This device features a microstrip interface and is ideal for hybrid construction. It must be wire bonded into the user's circuit.

# Low Power Microstrip Isolator

I177220/H

## Specifications



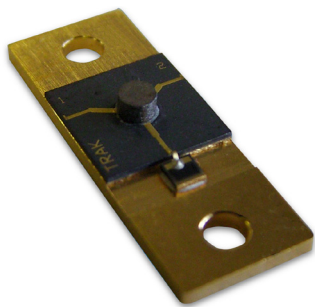
Parameter	Performance
Non-operating Temperature	-55 to +160C
Acceptance	-35 to +95C
Impedance	50 Ohms
Operating Frequency	17.7 to 22.0 GHz
Insertion Loss	0.80 dB
Isolation	16 dB min
Return Loss	16 dB min
Power Handling	1W CW
Mass	<0.5g nom

The I177220/H was designed to for the output of a K-band LNA. It has been qualified and supplied for spaceflight. Key performance requirements included operating bandwidth and electrical performance. This device features a microstrip interface and is ideal for hybrid construction. It must be wire bonded into the user's circuit.

# Flanged Low Profile Microstrip Isolator

I255270/A

## Specifications



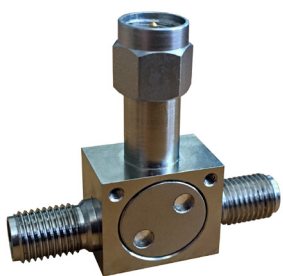
Parameter	Performance
Non-operating Temperature	-50 to +90C
Acceptance Temperature	-30 to +70C
Impedance	50 Ohms
Operating Frequency	25.5-27.0 GHz
Insertion Loss	0.50 dB
Return Loss	19 dB min
Isolation	19 dB min
Power Handling Forward	20W CW
Power Handling Reserved	2W CW
Mass	<0.7g nom

The I255270/A was designed to provide interstage isolation in an SSPA used aboard a deep space probe. It has been qualified and supplied for spaceflight. Key performance requirements included device height (<2.5mm) and power handling performance. This device features a microstrip interface and is ideal for hybrid construction. It must be wire bonded into the user's circuit.

# SMA Low-Power Circulator

C173202/C

## Specifications



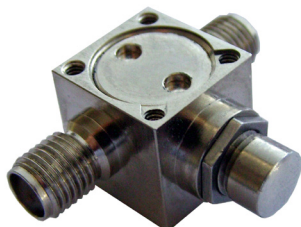
Parameter	Performance
Non-operating Temperature	-45 to +125C
PFM & Qualification Temperature	-30 to +80C
Acceptance Temperature	-30 to +75C
Operating Frequency	17.3 to 20.2 GHz
Insertion Loss	0.40 dB max
Return Loss	23 dB min
Power Handling (fault)	2W CW
Radiated Emissions	80dBi min
Mass	20g nom

The C173202/C was designed to be used in a K-Band filter application used aboard a GEO payload. It has been qualified and supplied for spaceflight. Key performance requirements included mechanical footprint, operating bandwidth, and a unique SMA barrel length. At only 10mm thick the device is the thinnest coaxial device Smiths Interconnect produces made possible using in-house connectors that are machined to be integral with the stainless-steel housing. This device is also available as an isolator.

# SMA Low-Power Isolator

I233236/A

## Specifications



Parameter	Performance
Non-operating Temperature	-45 to +125C
Qualification Temperature	-35 to +75C
Acceptance Temperature	-30 to +70C
Operating Frequency	23.3 to 23.6 GHz
Isolation	21dB min
Return Loss	21dB min
Insertion Loss	0.30dB max
Power Handling	2W CW
Radiated Emissions	80dBi min
Mass	20g nom (0.70 oz)

The I233236/A was designed to be used in an experimental inter-satellite link aboard a LEO payload. It has been qualified and supplied for spaceflight. Key performance requirements included mechanical footprint, operating performance and SMA interfaces. Smiths Interconnect SMA connectors are designed to be suitable to 26GHz and in this case the SMA connector is machined to be integral with the stainless-steel housing.

# Broadband Low-Power SMA to Bulkhead SSMA Isolator

I173220/A

## Specifications



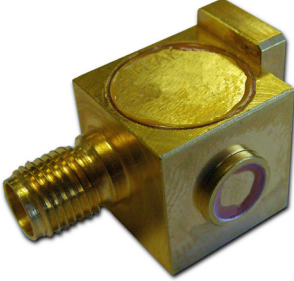
Parameter	Performance
Non-operating Temperature	-45 to +125C
PFM & Qualification Temperature	-30 to +80C
Acceptance Temperature	-20 to +75C
Operating Frequency	17.3 to 22.0GHz
Insertion Loss	0.40 dB max
Isolation	21dB min
Return Loss	21dB min
Power Handling (fault)	2 W CW
Radiated Emissions	80dBi min
Mass	35g nom (1.23)

The I173220/A was designed to be used on the output of a Ka to K-Band converter used aboard a GEO payload. It has been qualified and supplied for spaceflight. Key performance requirements included mechanical footprint and electrical performance over the operating bandwidth. Smiths Interconnect SMA connectors are designed to be suitable to 26GHz and in this case the SMA connector is machined to be integral with the stainless-steel housing. The SMP is a half détente male type designed by Smiths Interconnect. This device is available in several variants centred in X, Ku, and K-bands.

# SMA to 0.38mm Socket Bulkhead Isolator

I190220/B

## Specifications

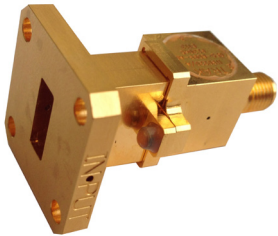
	Parameter	Performance
	Non-operating Temperature	-55 to +125C
	Qualification Temperature	-55 to +85C
	Acceptance Temperature	-30 to +80C
	Operating Frequency	19.0 to 22.0 GHz
	Insertion Loss	0.40 dB max
	Isolation	23 dB min
	Return Loss (SMA)	23 dB min
	Return Loss (SKT)	23 dB min
	Power Handling (fault)	1 W CW
	Radiated Emissions	-95dBi min
	Mass	23g nom

The I190220/B was designed to be used on the output of a Ka to K-Band converter used aboard a GEO payload. It has been qualified and supplied for spaceflight. Key performance requirements included mechanical footprint, electrical performance, and the unique requirement to have a zero Ohm DC bleed path. Smiths Interconnect SMA connectors are designed to be suitable to 26GHz and in this case the SMA connector is machined to be integral with the stainless-steel housing. This device is available in a number variants each with 3GHz of operating bandwidth.

# SMA to WR51 (or WR42) Iso-Adapter

I190220/A

## Specifications

	Parameter	Performance
	Non-operating Temperature	-55 to +125C
	Qualification Temperature	-55 to +85C
	Acceptance Temperature	-30 to +70C
	Operating Frequency	19.0 to 22.0 GHz
	Insertion Loss	0.40 dB max
	Isolation	23 dB min
	Return Loss (SMA)	23dB min
	Return Loss (WG)	23 dB min
	Power Handling (fault)	2W CW
	Radiated Emissions	-95dBc max
	Mass	26g nom (0.92 ox)

The I190220/A was designed to be used on the output of a Ka to K-Band converter used aboard a GEO payload. It has been qualified and supplied for spaceflight. Key performance requirements included mechanical footprint, electrical performance, and inline launch to the WR42 (or WR51) interface. Smiths Interconnect SMA connectors are designed to be suitable to 26GHz and in this case the SMA connector is machined to be integral with the stainless-steel housing. This device is available in a number K-Band variants each with 3GHz of operating bandwidth.

# SMA Low-Power Isolator

I173220/C

## Specifications



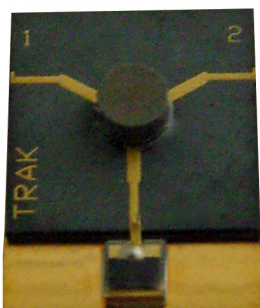
Parameter	Performance
Non-operating Temperature	-45 to +125C
PFM & Qualification Temperature Acceptance	-30 to +80C
Operating Frequency	-30 to +75C
Insertion Loss	17.3 to 22.0GHz
Return Loss	0.20dB max
Isolation	21dB min
Power Handling	21dB min
Multipaction	20W CW
Radiated Emissions	80W peak min
	70dBi min

The I173220/C was designed to be used on the output of a Ka to K-Band converter used aboard a GEO payload. It has been qualified and supplied for spaceflight. Key performance requirements included mechanical footprint and operating bandwidth. Smiths Interconnect SMA connectors are designed to be suitable to 26GHz and in this case the SMA connector is machined to be integral with the stainless-steel housing. This device is available in several variants centred in X, Ku, and K-bands.

# Microstrip Low-Power Isolator

I235240/A

## Specifications



Parameter	Performance
Non-operating Temperature	-45 to +125C
Acceptance	-30 to +70C
Operating Frequency	23.5-24.1 GHz
Insertion Loss	0.65 dB max
Isolation	21dB min
Return Loss	21dB min
Power Handling (fault)	2 W CW
Radiated Emissions	80dBi min
Mass	0.4g now (0.014 oz)

The I235240/A was designed to be used in an experimental inter satellite link aboard a LEO payload. It has been qualified and supplied for spaceflight. Key performance requirements included low mass and electrical performance. This device features a microstrip interface and is ideal for hybrid construction. It must be wire bonded into the user's circuit.

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