smiths interconnect

WR12 Passive Components

WR12 E-Band Waveguide Components

E-Band WR12 3dB, Hybrid Couplers

E-Band components for ground and space applications

Smiths Interconnect offers a comprehensive range of E-Band broadband waveguide components designed for ground station and orbital satellite communications.

These millimeter wave waveguide passive components are part of Smiths Interconnect's continuing initiative to create readily accessible space qualified waveguide isolators, circulators, terminations, transitions, hybrid and directional couplers, RF filters and multifunction assemblies.

Most devices are supplied in Aluminum housings with a clear chromate conversion coating and features flange details that can be adapted to suit. Transitions are realized in Au plated Brass..

Features & Benefits

- E-Band waveguide products suitable for space and terrestrial environments
- Temperature stable, high performance broadband connectivity
- Minor mechanical modifications can be incorporated upon request, (circulation, flange detail etc)
- Qualified using in house environmental stress screening capability including mechanical-shock, sine/random vibration, and humidity testing
- Sample data and test reports available to assist the design and qualification process

Applications

- LEO satellities downlinks
- Ground and airborne based satellite uplinks

E-Band [WR12] Hybrid Coupler

26WC401, 26WC402, 26WC403 & 26WC404

WR12 (E-Band) 2 x 2 and 2 x 1 hybrid couplers are available in the 71 to 76 GHz, satellite downlink and 81 to 86 GHz, satellite uplink bands to support the LEO communication constellations. These couplers are intended for power combining and splitting applications.

Specifications

Hybrid Coupler Type	26WC401 (2 x 2)	26WC402 (2 x 2)	26WC403 (2 x 1)	26WC404 (2 x 1)
Performance				
Non-operating	-40 to +125C	-40 to +125C	-40 to +125C	-40 to +125C
Acceptance	-40 to +80C	-40 to +80C	-40 to +80C	-40 to +80C
Operating Frequency	81-86 GHz	71-76 GHz	81-86 GHz	71-76 GHz
Insertion Loss (excludes 3dB coupling loss)	0.40dB max	0.40dB max	0.40dB max	0.40dB max
Isolation	23dB min	23dB min	23dB min	23dB min
Return Loss	23dB min	23dB min	23dB min	23dB min
Power Handling	100 Watt CW	100 Watt CW	100 Watt CW, 1 Watt Load Fitted	100 Watt CW, 1 Watt Load Fitted
Mass	33g nom	33g nom	33g nom	33g nom

Environmental

Test	Frequency (Hz)	Acceptance	Qualification
Sine All 3 axis	5 to 22.6	4.83 mm	6.4 mm
	22.6 to 50	10.0g	13.0g
	50 to 100	7.7g	10.0g
		2 octaves/min	4 octaves/min
Random All 3 axis	20 to 50	6dB/oct	6dB/oct
	50 to 600	1.54g^2/Hz	3.94g^2/Hz
	600 to 2000	-3.0 dB/oct.	-3.0 dB/oct.
		60 secs/axis	180 secs/axis
	Overall [rms]	50g	80.0g

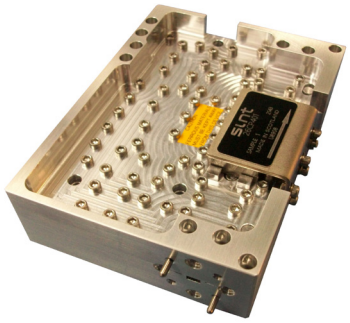
Mechanical Shock

Frequency (Hz)	Shock response (SRS, Q=10), g
	Qualification
200	280
850	1260
10000	4200
Number of Events	3 per axis

Notes:
1. Other test limits can be considered

E-Band [WR12] High Power Isolators

26CP401 & 26CP402



WR12 (E-Band) high power isolators available in both the 71 to 76 GHz, satellite downlink and 81 to 86 GHz, satellite uplink bands to support the LEO communication constellations and ground station applications.

Specifications

Isolator Type	26CP401	26CP402
Performance		
Non-operating	-40 to +125C	-40 to +125C
Acceptance	-40 to +80C	-40 to +80C
Operating Frequency	81-86 GHz	71-76 GHz
Insertion Loss	1.2dB max	1.2dB max
Isolation	20dB min	20dB min
Return Loss	21dB min	21dB min
Power Handling	50 Watt CW	50 Watt CW
Mass	200g nom	200g nom

Environmental

Test	Frequency (Hz)	Acceptance	Qualification
Sine All 3 axis	5 to 22.6	4.83 mm	6.4 mm
	22.6 to 50	10.0g	13.0g
	50 to 100	7.7g	10.0g
		2 octaves/min	4 octaves/min
Random All 3 axis	20 to 50	6dB/oct	6dB/oct
	50 to 600	1.54g^2/Hz	3.94g^2/Hz
	600 to 2000	-3.0 dB/oct.	-3.0 dB/oct.
		60 secs/axis	180 secs/axis
	Overall [rms]	50g	80.0g

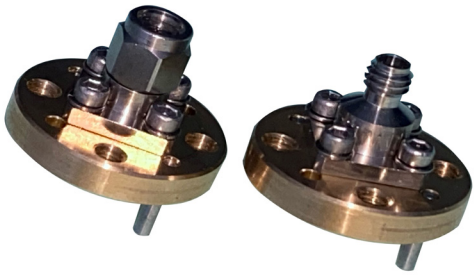
Mechanical Shock

Frequency (Hz)	Shock response (SRS, Q=10), g
	Qualification
200	280
850	1260
10000	4200
Number of Events	3 per axis

Notes:
1. Other test limits can be considered

E-Band [WR12] Transitions to Coaxial [1mm]

26TM101, 26TM102, 26TM103 & 26TM104



WR12 (E-Band) coaxial transition to 1mm available in the 71 to 76 GHz, satellite downlink and 81 to 86GHz, satellite uplink bands to suort LEO communications constellations and ground station applications

Specifications

Transition Tye	26TM101	26TM102	26TM103	26TM104
Performance				
Non-operating	-40 to +125C	-40 to +125C	-40 to +125C	-40 to +125C
Acceptance	-40 to +80C	-40 to +80C	-40 to +80C	-40 to +80C
Operating Frequency	81-86 GHz	81-86 GHz	71-76 GHz	71-76 GHz
Insertion Loss	0.50dB max	0.50dB max	0.50dB max	0.50dB max
Return Loss	18dB min	18dB min	18dB min	18dB min
Power Handling	1 Watt CW	1 Watt CW	1 Watt CW	1 Watt CW
Coaxial Interface	1 mm (f)	1 mm (m)	1 mm (f)	1 mm (m)
Mass	10g nom	10g nom	10g nom	10g nom

Environmental

Test	Frequenc (Hz)	Acceptance	Qualification
Sine All 3 axis	5 to 22.6	4.83 mm	6.4 mm
	22.6 to 50	10.0g	13.0g
	50 to 100	7.7g	10.0g
		2 octaves/min	4 octaves/min
Random All 3 axis	20 to 50	6dB/oct	6dB/oct
	50 to 600	1.54g^2/Hz	3.94g^2/Hz
	600 to 2000	-3.0 dB/oct.	-3.0 dB/oct.
		60 secs/axis	180 secs/axis
	Overall [rms]	50g	80.0g

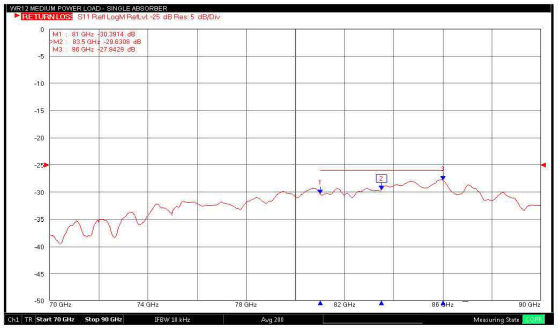
Mechanical Shock

Frequency (Hz)	Shock response (SRS, Q=10), g
	Qualification
200	280
850	1260
10000	4200
Number of Events	3 per axis

Notes:
1. Other test limits can be considered
2. Flanges are Au lated brass
3. 1mm connectors meet the requirements of IEEE STD 287

E-Band [WR12] Conduction cooled, high power loads

26TE101, 26TE102, 26TE103 & 26TE104



WR12 (E-Band) high power terminations are available spanning the 70-90GHz band which includes the 71 to 76 GHz, satellite downlink and 81 to 86GHz, satellite uplink to support the LEO communication constellations and ground station applications. No product images are included as the loads must be configured with suitable mechanical cooling arrangements.

Specifications

Load Type	26TE101	26TE102	26TE103	26TE104
Performance				
Non-operating	-40 to +125C	-40 to +125C	-40 to +125C	-40 to +125C
Acceptance	-40 to +80C	-40 to +80C	-40 to +80C	-40 to +80C
Operating Frequency	81-86 GHz	71-76 GHz	81-86 GHz	71-76 GHz
Return Loss	23dB, 26dB ty min	26dB, 26dB ty min	26dB, 26dB ty min	26dB, 26dB ty min
Power Handling	10 Watt CW	40 Watt CW	40 Watt CW	20 Watt CW
Mass	refer to factory	refer to factory	refer to factory	refer to factory

Environmental

Test	Frequenc (Hz)	Acceptance	Qualification
Sine All 3 axis	5 to 22.6	4.83 mm	6.4 mm
	22.6 to 50	10.0g	13.0g
	50 to 100	7.7g	10.0g
		2 octaves/min	4 octaves/min
Random All 3 axis	20 to 50	6dB/oct	6dB/oct
	50 to 600	$1.54g^2$/Hz	$3.94g^2$/Hz
	600 to 2000	-3.0 dB/oct.	-3.0 dB/oct.
		60 secs/axis	180 secs/axis
	Overall [rms]	50g	80.0g

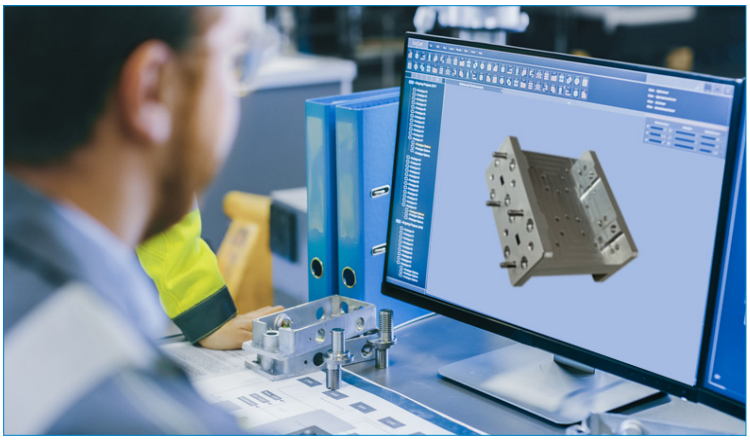
Mechanical Shock

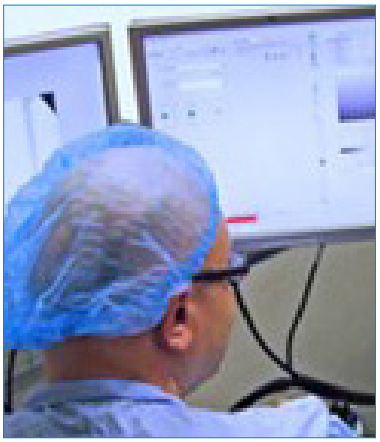
Frequency (Hz)	Shock response (SRS, Q=10), g
	Qualification
200	280
850	1260
10000	4200
Number of Events	3 per axis

Notes:
1. Other test limits can be considered
2. The plot was recorded at VNA power at +20C on the 26TE103

Additional Test Capabilities

Smiths Interconnect can provide a wide array of add-on test services to suit market and program needs. Below is a list of standard available test options. Please consult factory for individual program needs.





Qualification and Test Laboratory in Dundee, Scotland

Features

- 300 square metres of modern and purpose built lab space
- All rooms with independent air conditioning and temperature control
- Dedicated ISO8 clean room for Seeded Multipaction, Corona & High-power thermal vacuum test from 200 MHz to 22GHz
- SRS mechanical shock test (Q= 10)

Per MIL, ESA or Custom Test and Inspection Standards

SRS Mechanical Shock Test to 5000g	Thermal Cycle and Shock Testing
Optical Inspection to 200x	RF Power Withstanding (Facility Ranges from 200MHz to 22.2GHz)
3D X-Ray Tomography and Inspection	Radio Active Seeded Multipaction Testing
Random and Sine Vibration Testing	Corona Discharge (Critical power) Testing
Gross Leak Testing	VNA Testing to 110GHz
Voltage Withstanding and Insulation Testing	Automated Bondpull Testing
Continuous Insertion Phase and Amplitude Monitoring	Barometric Pressure (Altitude) Testing

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