

# TR Multicoax Series | Quantum Computing

## Description

The newest form factors of Ardent's TR Multicoax connectors support the many unique challenges of Quantum Computing applications. Density, substantial environmental changes, and an increasing need for more high-speed lanes are causing quantum computer designers to rethink traditional routing methods of individual cables. By utilizing superconducting materials like CuNi cables and the existing patented contact technology Ardent is known for, engineers will be able to drastically decrease real estate required by individual connectors and increase their channel count while improving signal integrity in their systems.

## Key Benefits

- Feedthrough offers leak-proof design (Max leak rate  $2.00E^{-09}$  LTorr)
- Variety of coaxial cable materials available (Flexible, CuNi, NbTi)
- Extremely dense form factor (168+ channels in standard ISO disc)
- Easily mate/de-mate multiple high-speed lanes

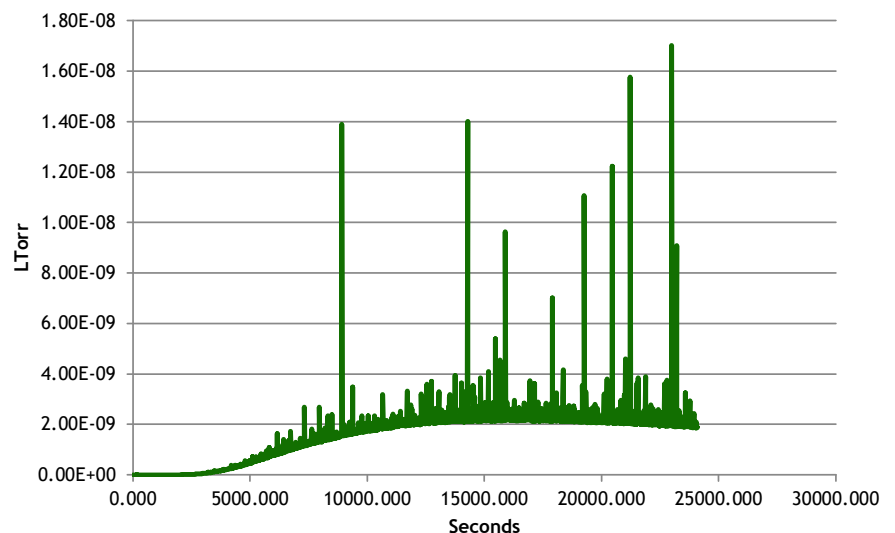


## Applications

TR for Quantum/Supercomputing Applications is ideal for use in:

- › Dilution refrigerators
- › Cryogenic devices
- › Vacuum chambers
- › Anywhere RF signals need to be passed through a sealed wall

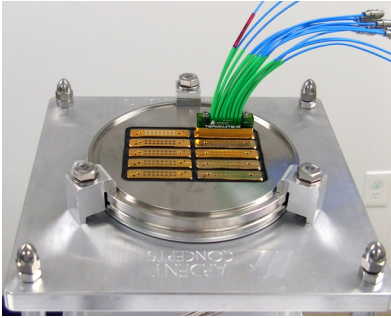
## Hermetic Feedthrough Leak Rate Data



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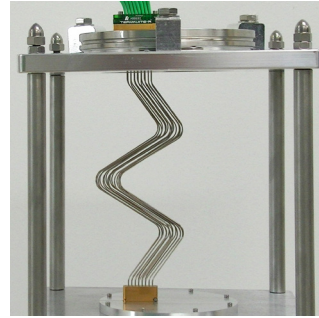
## Example Application

### 50 Ohm Hermetic Feedthrough



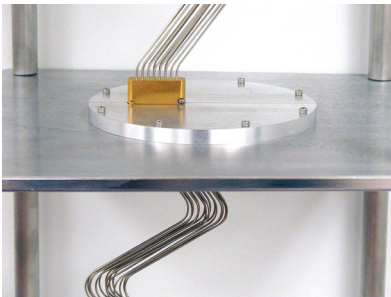
- Leak-proof Feedthrough design (Max leak rate 2.00E-09 LTorr)
- Extremely dense form factor (168+ channels in standard ISO disc)
- Easily mate/de-mate multiple high-speed lanes

### Inner-Fridge Wiring



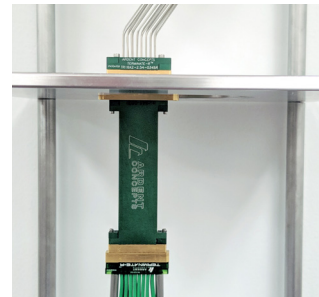
- Variety of coaxial cable materials available (Flexible, CuNi, NbTi)
- 16, 24 Channel options
- Custom lengths

### Thermal Anchoring



- Can be customized for thermal anchoring to minimize the heat load in a cryostat

### Attenuation

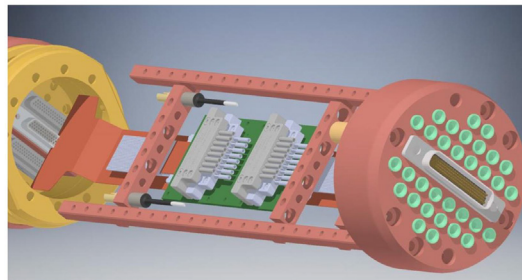


- Custom attenuation blocks can mate directly to TR assemblies
- Reliable interface eliminates fragile push on connector style attenuation

## Chip Level

- TR Right Angle (Low-profile) connectors get up to 16 channels extremely close to chip
- TR Blind Mate allows denser and more electrically/mechanically reliable connection between sample exchanger and fridge (1000 mates/de-mates)
- Quantum device interposers to PCB

### Chip-Level/ Sample Exchange Wiring



## More Information

For questions  
please contact us:

Phone: (603)474-1760

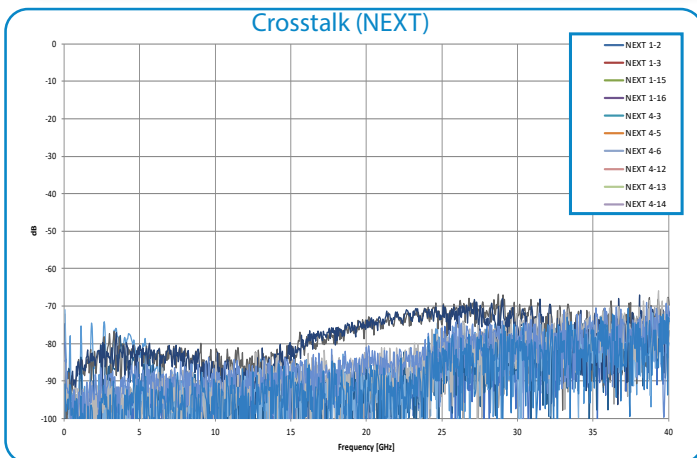
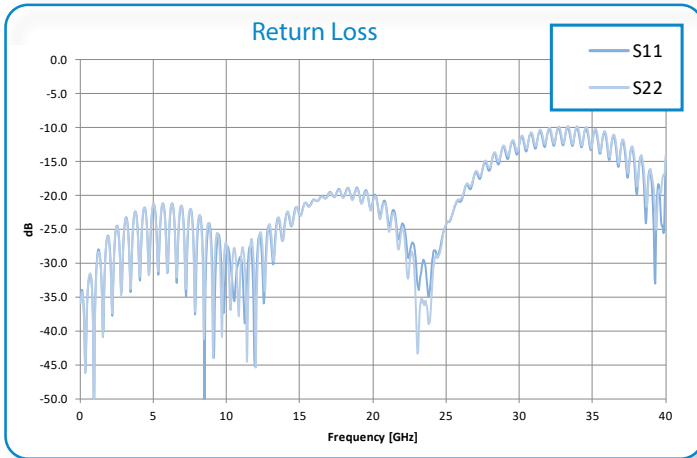
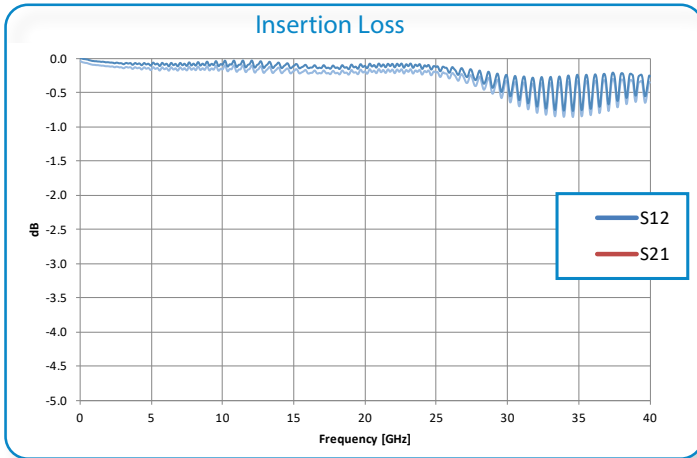
Amphenol Ardent Concepts  
4 Merrill Industrial Drive, Suite 102  
Hampton, NH 03842

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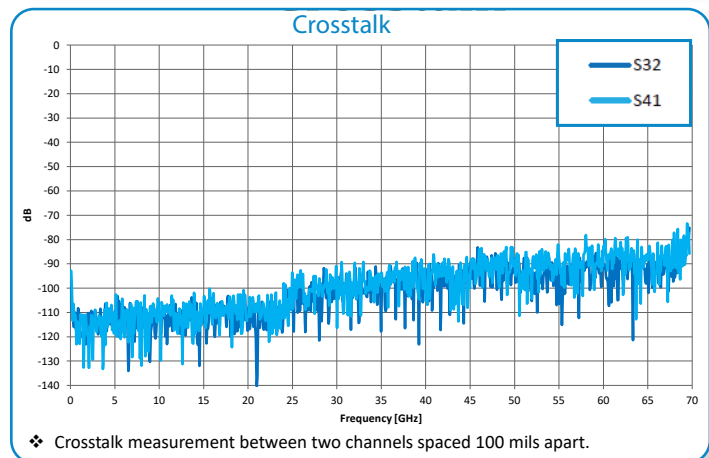
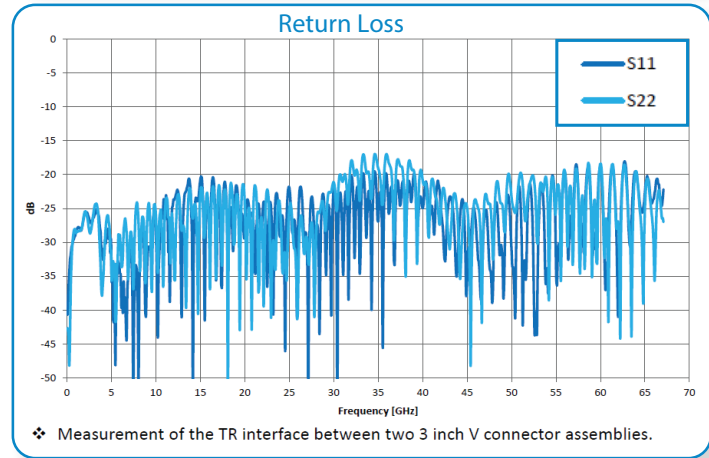
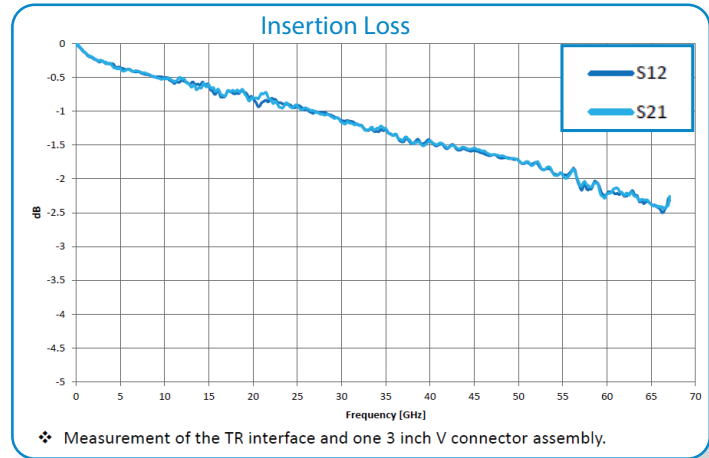
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## Hermetic Feedthrough Data



## Multicoax Connector Data



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Custom Cables Available

			COAX CO., LTD. SC-086/50-SCN-CN	COAX CO., LTD. SC-086/50-CN-CN	COAX CO., LTD. SC-086/50-NbTi-CN	
Physical Structure	Materials	Center Conductor	Silver-plated cupronickel	Cupronickel	Niobium Titanium	
		Dielectric	PTFE	PTFE	PTFE	
		Outer Conductor	Cupronickel	Cupronickel	Cupronickel	
	Dimensions	Center Conductor	0.203+/-0.013mm (0.0080+/-0.0005 inch)	0.203+/-0.013mm (0.0080+/-0.0005 inch)	0.203+/-0.013mm (0.0080+/-0.0005 inch)	
Dielectric		0.66+/-0.0254mm (0.026+/-0.001 inch)	0.66+/-0.0254mm (0.026+/-0.001 inch)	0.66+/-0.0254mm (0.026+/-0.001 inch)		
Outer Conductor		0.86+/-0.0254mm (0.034+/-0.001 inch)	0.86+/-0.0254mm (0.034+/-0.001 inch)	0.86+/-0.0254mm (0.034+/-0.001 inch)		
Electrical Properties	Thermal Conductivity @4K		7.07E-05 W-cm/K	9.80E-06 W-cm/K		
	Characteristic Impedance		50+/-2.5ohms	50+/-2.5ohms	50+/-3.0ohms	
	Corona Extinction Voltage @60Hz		2000VRMS	2000VRMS	750VRMS	
	Maximum Operating Frequency		154GHz	154GHz	154GHZ	
	Average Capacitance		95.2pF/m	95.2pF/m	96.2pF/m	
	Attenuation @300K & @4K	0.5GHz	300K	2.1dB/m	5.4dB/m	6.9dB/m
			4K	1.0dB/m	4.1dB/m	1.21dB/m
		1.0GHz	300K	3.0dB/m	7.7dB/m	9.7dB/m
			4K	1.5dB/m	5.7dB/m	1.8dB/m
		5.0GHz	300K	6.7dB/m	17.1dB/m	21.8dB/m
			4K	3.2dB/m	12.8dB/m	4.0dB/m
		10.0GHz	300K	9.5dB/m	24.3dB/m	30.9dB/m
4K			4.6dB/m	18.1dB/m	5.6dB/m	
20.0GHz		300K	13.4dB/m	34.6dB/m	43.9dB/m	
		4K	6.5dB/m	25.7dB/m	7.9dB/m	
Mechanical Properties		Operating Temperature		-40°C to +100°C	-40°C to +100°C	-40°C to +100°C
		Minimum Inside Bend Radius		3.2mm	3.2mm	3.2mm
	Standard Length		1 or 2m	1 or 2m	1m	

			AMAWAVE M17/154-00001
Physical Structure	Materials	Center Conductor	SPCW
		Dielectric	PTFE
		Outer Conductor	Copper
	Dimensions	Center Conductor	0.2032mm (0.0080in)
Dielectric		0.660 ± 0.025mm (0.026 ± 0.001in)	
Outer Conductor		0.864 ± 0.025mm(0.034 ± 0.001in)	
Electrical Properties	Characteristic Impedance		50 Ohms
	Corona Extinction Voltage @60Hz		2100VRMS
	High Order Mode Frequency		155GHz
	Average Capacitance		95.2pF/m
	Attenuation (dB/100Ft Typical)	0.5 GHz	34
		1.0 GHz	48.3
		5.0 GHz	110.4
		10.0 GHz	158.5
		18.0 GHz	216.5
		26.5 GHz	266.6
		40.0 GHz	333.7
		50.0 GHz	377.5
65.0 GHz		437	
90.0 GHz		525.5	
Mechanical Properties	Operating Temperature		150°C to +125°C
	Minimum Inside Bend Radius		1.27mm
	Standard Length		4.57m maximum

## More Information

For questions please contact us:

Phone: (603)474-1760

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