VEROTRONIC TECHNOLOGIES

CRYOGENIC RF CABLE SOLUTION

-for superconducting quantum computer

Room Temperature

- VTB500P
- VTB230P
- VTC160P
- VTB150E

300K

- VTS-SCN020
- VTS-SCN034
- VTS-SCN086

50K

- VTS-SCN020
- VTS-NT034
- VTS-SCN086

4K

- VTS-SCN020
- VTS-SCN034
- VTS-SCN086
- VTS-NT034

Still

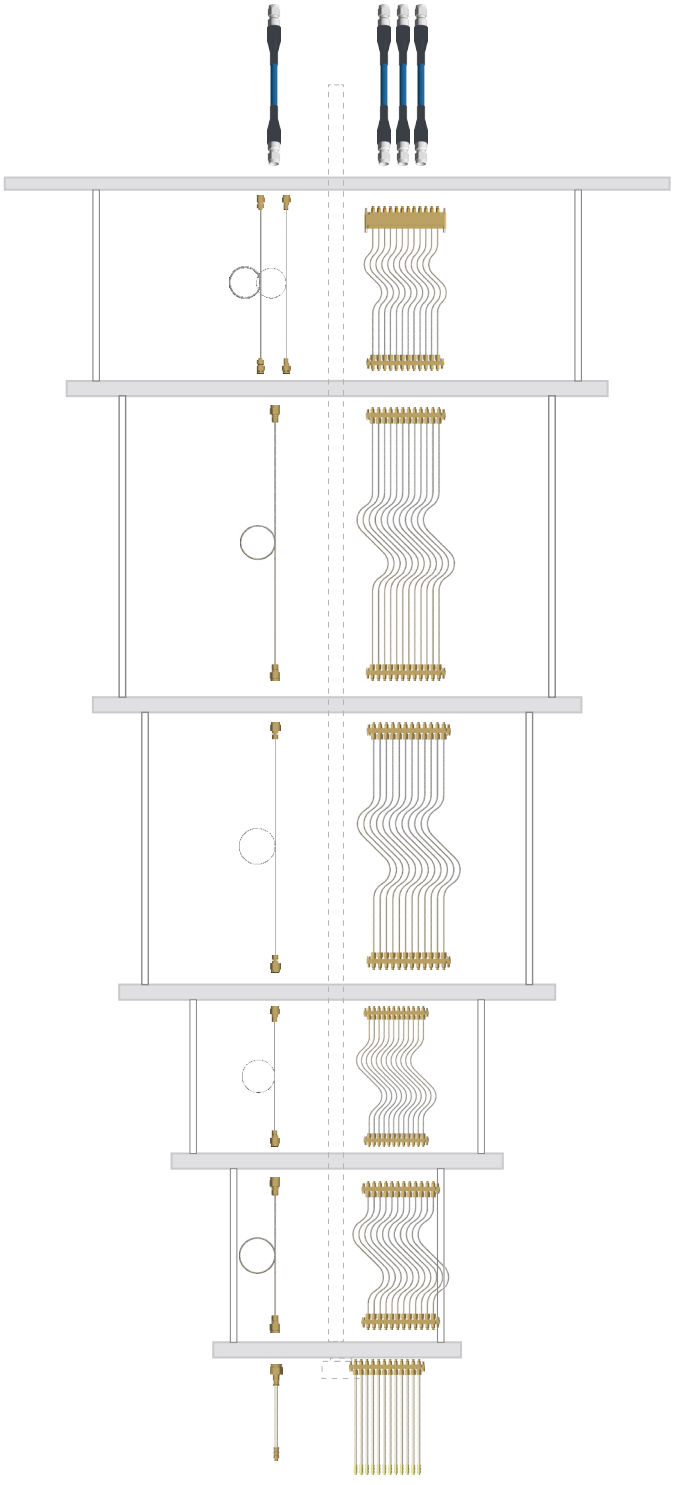
- VTS-SCN020
- VTS-SCN034
- VTS-NT0

Cold Plate (~100-300mk)

- VTS-SCN020
- VTS-SCN034
- VTS-NT034

Mixing Chambei (~10mk)

- VTS-SCN020
- VTS-SCN034
- VTS-NT034
- VTS-AA047
- VC047-NM
- VC086-NM

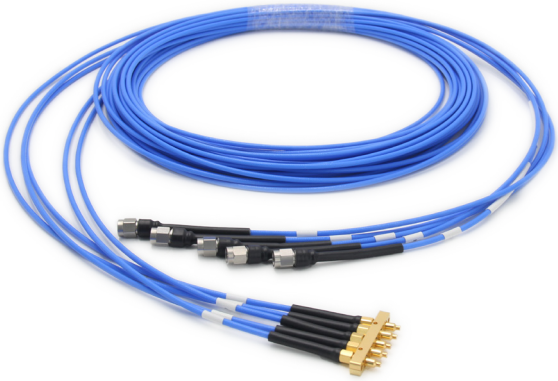


Single Channel Application Diagram Bundle Application Diagram

Version 26.04

Phase& Amplitude Stable Microwave RF Cable

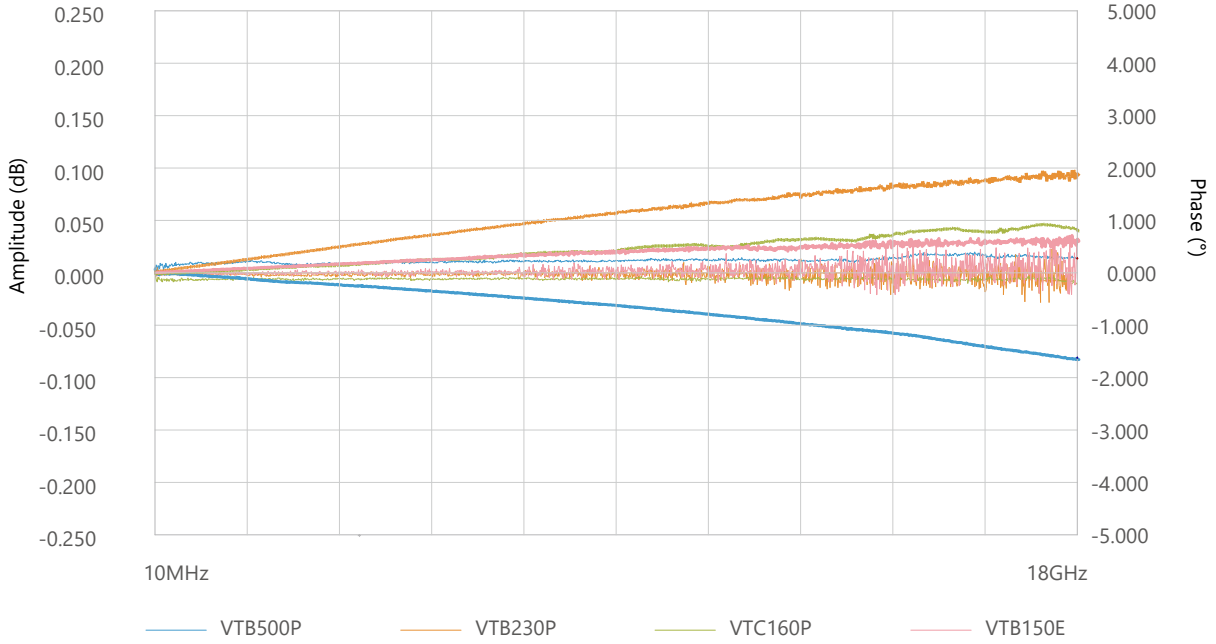
Phase-stable RF cables are engineered to maintain consistent signal amplitude and phase over wide frequency ranges, across broad temperature ranges, and under dynamic mechanical conditions such as bending and vibration.



Key Features

- Excellent amplitude and phase stability
- Low insertion loss and low VSWR
- Wide frequency coverage (up to 110 GHz)
- Multiple cable diameters available (customizable)
- High shielding effectiveness

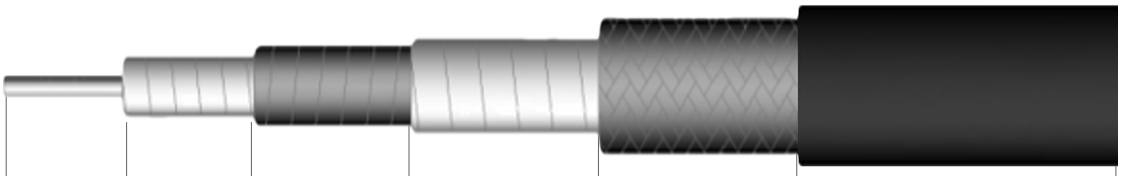
Phase& Amplitude Stability Test Curve



* Test method: Rotate clockwise around the 10cm/4cm axis for one revolution and compare the differences in phase and insertion loss from the initial values;

* Test component length: The test length for VTB500P and VTB230P is 1.5m; the test length for VTB150E and VTC160P is 0.2m.

Cable Structure



Center conductor	Dielectric	Outer Conducto	Inner Layer	Shielding	Jacket
Solid silver-plated copper	PTFE	SPC tape wrap	PTFE	SPC wire braid	FEP

*Note: The structure of individual products may vary slightly; for further details, please consult Verotronic Technologies.

Mechanical Performance

Cable Type	VTB150E	VTC160P	VTB230P	VTB500P
Center conductor (mm)	0.31	0.29	0.51	1.45
Outer conductor (mm)	0.98	1.11	1.71	4.20
Shielding (mm)	1.03	1.65	2.30	4.80
Jacket (mm)	1.50	1.80	2.60	5.30
Min. installation bend R. (mm)	8	12	13	27
Min. repeated bend R. (mm)	15	20	28	53
Weight (g/m)	8	9	17	63
Operating temperature (°C)	-55 to+165	-55 to+125	-55 to+165	-55 to+165

Electrical Performance

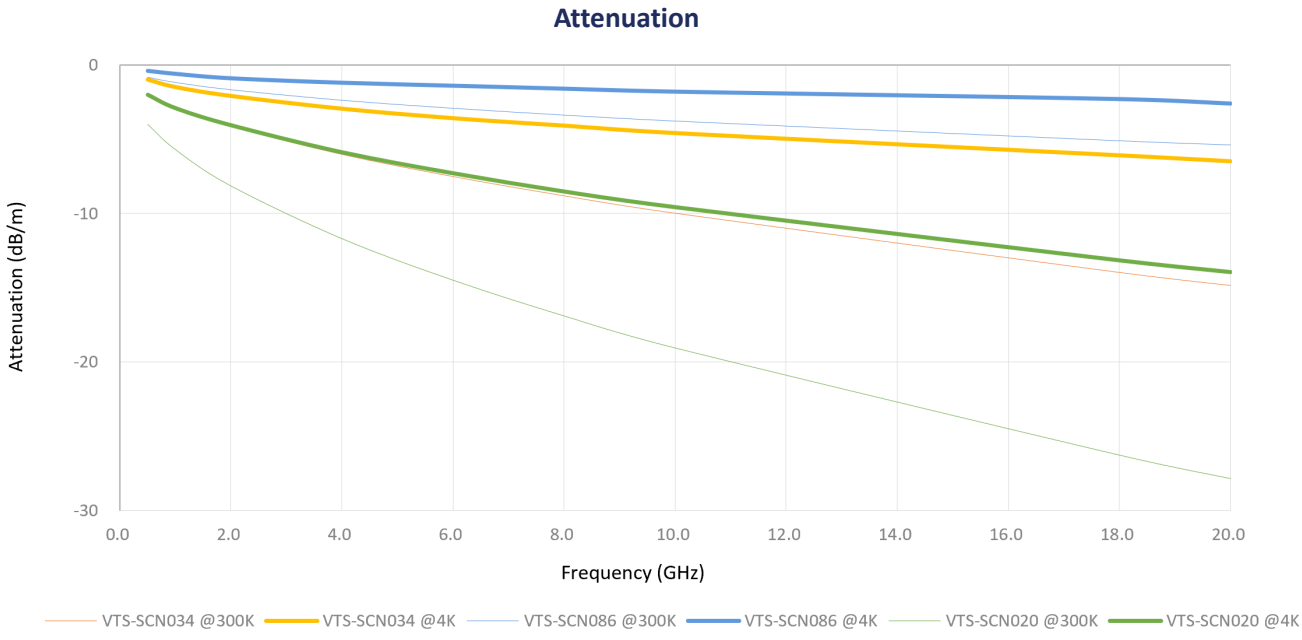
Cable Type	VTB150E	VTC160P	VTB230P	VTB500P
Frequency (GHz)	40	110	67	26.5
Velocity	81%	70%	74%	83%
Withstanding vol. (V DC)	500	500	500	1500
Phase stability (°@max F)	±10	±20	±10	±8
Amp. stability (dB@max F)	±0.10	±0.20	±0.10	±0.05
Shielding effectiveness (dB)	90			
Characteristic imped. (Ω)	50			
Attenuation	dB/100 m	dB/100 m	dB/100 m	dB/100 m
2000	157.44	191.89	89.81	32.70
4000	225.06	235.93	128.43	46.66
6000	277.91	273.32	158.64	57.52
8000	323.11	336.57	184.48	66.80
10000	363.42	390.42	207.55	75.05
K1	3.4284780	4.2166070	1.9537172	0.7156867
K2	0.0020570	0.0016590	0.0012174	0.0003280

Copper-Nickel Cryogenic RF Cable (VTS-SCN Series)

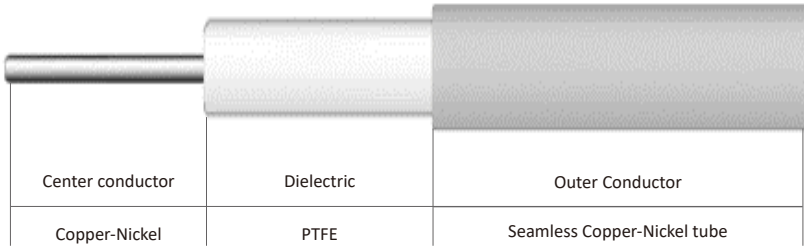
The Copper-Nickel Cryogenic (CuNi) RF cable is a semi-rigid coaxial cable specifically designed for cryogenic, high-reliability environments. Its key feature lies in the use of CuNi alloy as the conductor material, combined with specialized cryogenic dielectric materials, enabling it to deliver excellent electrical performance and mechanical stability across a temperature range from room temperature down to ultra-low temperatures.

Key Features

- Excellent performance at ultra-low temperatures
- Extremely low thermal conductivity
- High shielding effectiveness (up to 120 dB)
- Strong mechanical stability



Cable Structure



*Note: The structure of individual products may vary slightly; for further details, please consult Verotronic Technologies.

Mechanical Performance

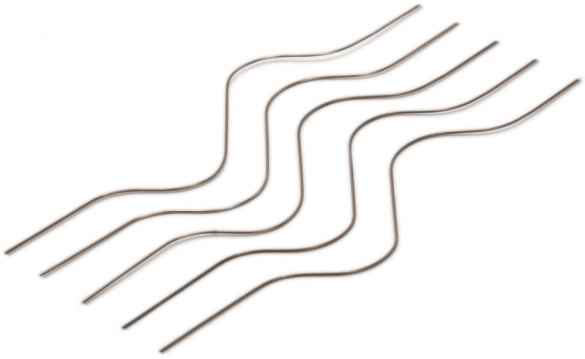
Cable Type	VTS-SCN020	VTS-SCN034	VTS-SCN086
Center conductor (mm)	0.127	0.20	0.51
Outer conductor (mm)	0.58	0.86	2.20
Min. installation bend R. (mm)	3	4	7
Weight (g/m)	3	3	20
Operating temperature (°C)	-273.15 to +125		
Thermal leak.(W/m·K@4K)	4.91E-05	7.07E-05	2.18E-04

Electrical Performance

Cable Type	VTS-SCN020		VTS-SCN034		VTS-SCN086	
Frequency (GHz)	20					
Velocity	70%					
Capacitance (pF/m)	95		95		95	
Withstanding vol. (V DC)	300		300		2000	
Characteristic imped. (Ω)	50					
Shielding effectiveness (dB)	120					
Attenuation	dB/m@300K	dB/m@4K	dB/m@300K	dB/m@4K	dB/m@300K	dB/m@4K
2000	8.14	4.05	4.16	2.10	1.67	0.90
4000	11.69	5.87	6.04	2.96	2.38	1.20
6000	14.49	7.28	7.53	3.60	2.92	1.40
8000	16.90	8.51	8.83	4.10	3.38	1.60
10000	19.05	9.56	10.00	4.60	3.78	1.80
K1	0.1750000	/	0.0875558	/	0.0371369	/
K2	0.0001555	/	0.0001244	/	0.0000069	/

Niobium-Titanium Cryogenic RF Cable (VTS-NT Series)

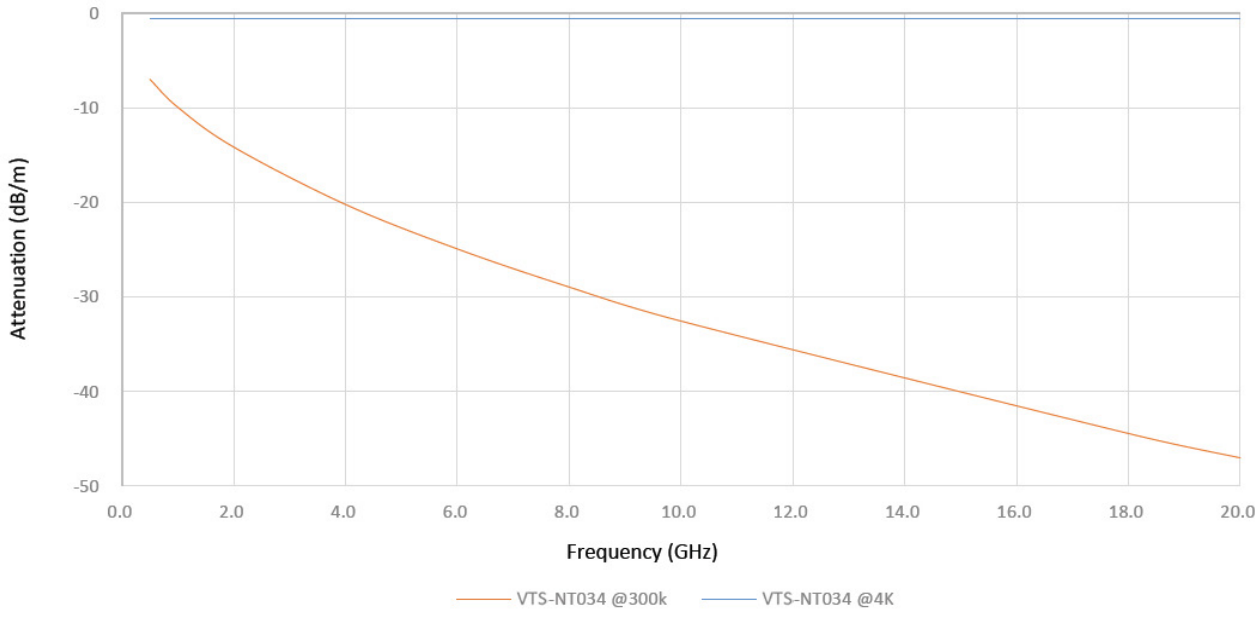
The Niobium-Titanium (NbTi) alloy ultra-low temperature RF cable is a specialized coaxial cable that uses NbTi alloy for both its center conductor and outer conductor. Its most notable characteristic is that when cooled below its superconducting transition temperature (approximately 4.2K), the conductor enters a superconducting state, enabling near-zero loss microwave signal transmission.



Key Features

- Near-zero signal loss at cryogenic temperatures
- Excellent phase stability
- Low thermal conductivity
- Non-magnetic design
- High shielding effectiveness

Attenuation



Cable Structure

Center conductor	Dielectric	Outer Conductor
Niobium-Titanium	PTFE	Seamless Niobium-Titanium tube

*Note: The structure of individual products may vary slightly; for further details, please consult Verotronic Technologies.

Mechanical Performance

Cable Type	VTS-NT034
Center conductor (mm)	0.20
Outer conductor (mm)	0.86
Min. installation bend R. (mm)	4
Weight (g/m)	3
Operating temperature ()	-273.15 to +125
Thermal leak.(W/m·K@4K)	4.63E-06

Electrical Performance

Cable Type	VTS-NT034	
Frequency (GHz)	20	
Velocity	70%	
Capacitance (pF/m)	95	
Withstanding vol. (V DC)	300	
Characteristic imped. (Ω)	50	
Shielding effectiveness (dB)	120	
Attenuation	dB/m@300K	dB/m@4K
2000	14.14	<0.5
4000	20.21	
6000	24.91	
8000	28.94	
10000	32.54	
K1	0.3085853	/
K2	0.0001680	/

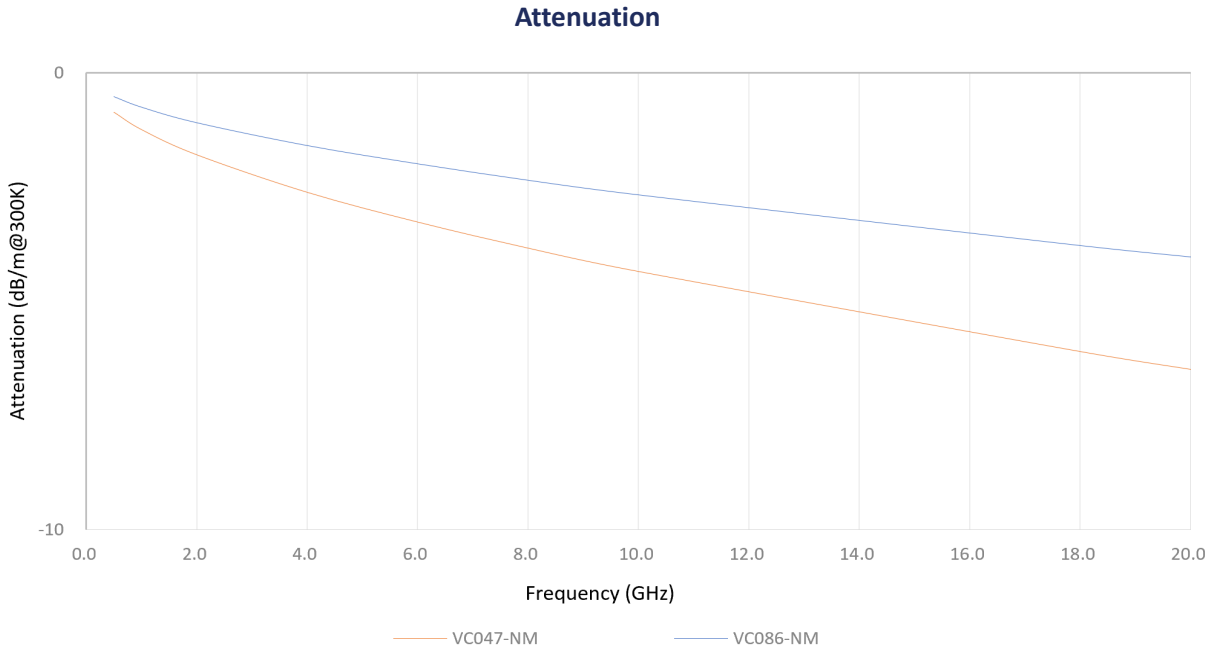
Semi-flex Cryogenic RF Cable (VC Series)

The Semi-Flex Ultra-Low Temperature RF Cable is specifically designed for superconducting quantum computing systems. It is installed on the Mixing Chamber flange/plate inside the dilution refrigerator, serving as the interconnection between the control and measurement system and the quantum chip.

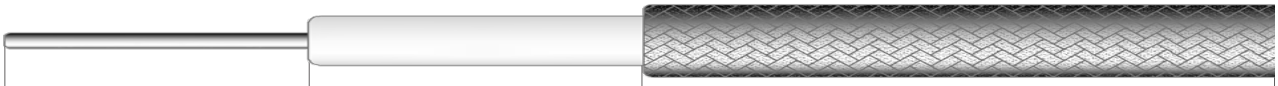
The Semi-Flex RF cable assembly is available in two outer diameter specifications: 2.20 mm and 1.20 mm, allowing for flexible selection based on specific application requirements.

Key Features

- Ultra-low insertion loss
- Excellent phase stability
- High shielding performance
- Superior linearity
- Non-magnetic materials



Cable Structure



Center conductor	Dielectric	Outer Conductor
Solid silver-plated copper	PTFE	SPC wire braid and Tin-soaked

*Note: The structure of individual products may vary slightly; for further details, please consult Verotronic Technologies.

Mechanical Performance

Cable Type	VC047-NM	VC086-NM
Center conductor (mm)	0.29	0.53
Outer conductor (mm)	1.20	2.17
Min. installation bend R. (mm)	4	6
Weight (g/m)	6.5	18
Operating temperature (°C)	-273.15 to +125	

Electrical Performance

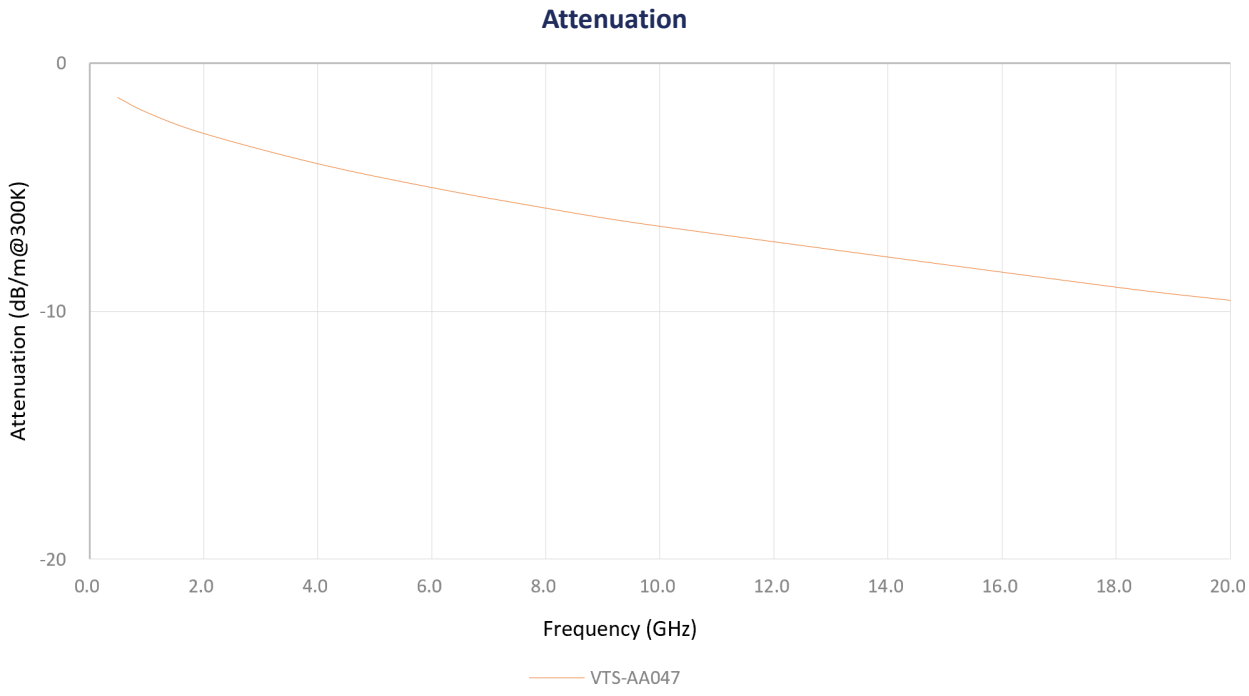
Cable Type	VC047-NM	VC086-NM
Frequency (GHz)	20	
Velocity	70%	
Capacitance (pF/m)	95	95
Withstanding vol. (V DC)	500	1500
Characteristic imped. (Ω)	50	
Shielding effectiveness (dB)	120	
Attenuation	dB/m@300K	dB/m@300K
2000	1.80	1.09
4000	2.62	1.59
6000	3.27	1.99
8000	3.84	2.35
10000	4.35	2.67
K1	0.0377987	0.0225227
K2	0.0000575	0.0000423

Copper-nickel Cryogenic RF Cable (VTS-AA Series)

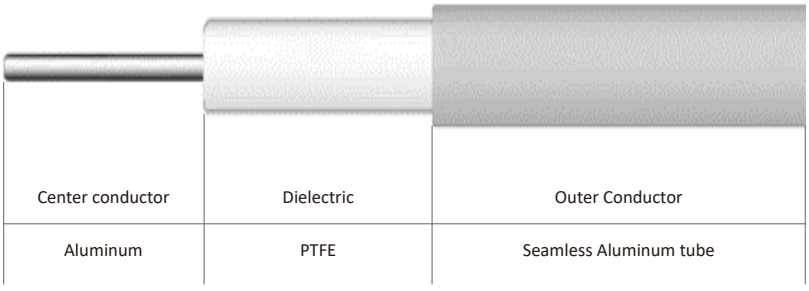
The Aluminum RF cable is a specialized coaxial cable that uses pure aluminum for both its center conductor and outer conductor. Its most notable characteristic is that when cooled below its superconducting transition temperature (approximately 1.2K), the conductor enters a superconducting state, enabling near-zero loss microwave signal transmission.

Key Features

- Near-zero loss at ultra-low temperatures
- Excellent flexibility for installation
- Low VSWR design
- Stable electrical performance



Cable Structure



*Note: The structure of individual products may vary slightly; for further details, please consult Verotronic Technologies.

Mechanical Performance

Cable Type	VTS-AA047
Center conductor (mm)	0.29
Outer conductor (mm)	1.20
Min. installation bend R. (mm)	5
Weight (g/m)	3
Operating temperature ()	-273.15 to +125

Electrical Performance

Cable Type	VTS-AA047	
Frequency (GHz)	20	
Velocity	70%	
Capacitance (pF/m)	95	
Withstanding vol. (V DC)	300	
Characteristic imped. (Ω)	50	
Shielding effectiveness (dB)	120	
Attenuation	dB/m@300K	dB/m@1.2K
2000	2.84	<0.5
4000	4.06	
6000	5.02	
8000	5.85	
10000	6.58	
K1	0.0615256	/
K2	0.0000430	/

VEROTRONIC
TECHNOLOGIES

OUR VISION

BE A GLOBAL LEADER IN RF AND MICROWAVE INTERCONNECT SOLUTIONS, SERVING ASIA AND BEYOND

OUR MISSION

TO BE THE PREFERRED PARTNER OF RF INTERCONNECT, CONTINUOUSLY IMPROVE OUR PROCESS AND DELIVER HIGH-QUALITY, RELIABLE AND EFFICIENT SOLUTIONS THAT EXCEED CUSTOMER EXPECTATIONS

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