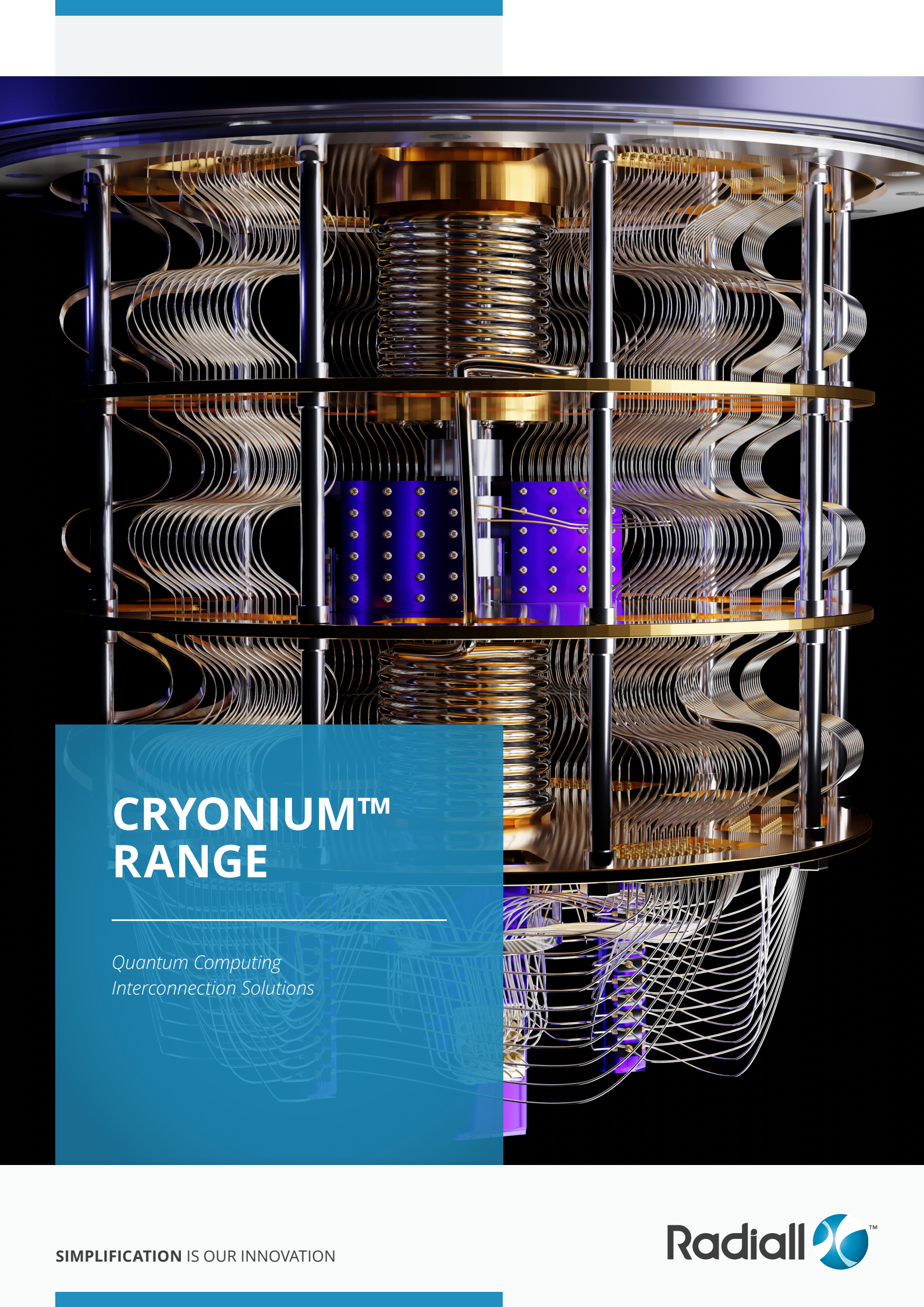




CRYONIUM™ RANGE

*Quantum Computing
Interconnection Solutions*

SIMPLIFICATION IS OUR INNOVATION

Radiall 

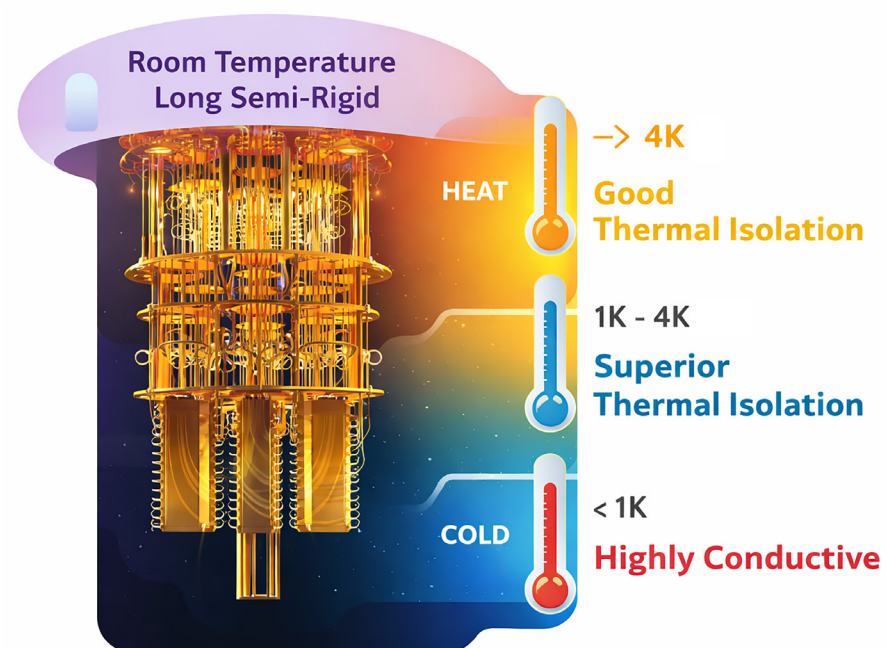
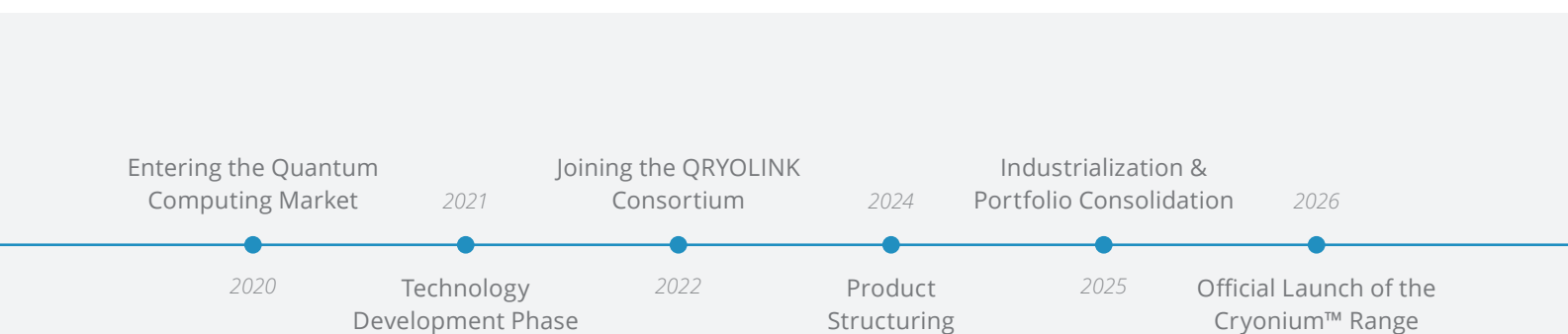


INTRODUCTION

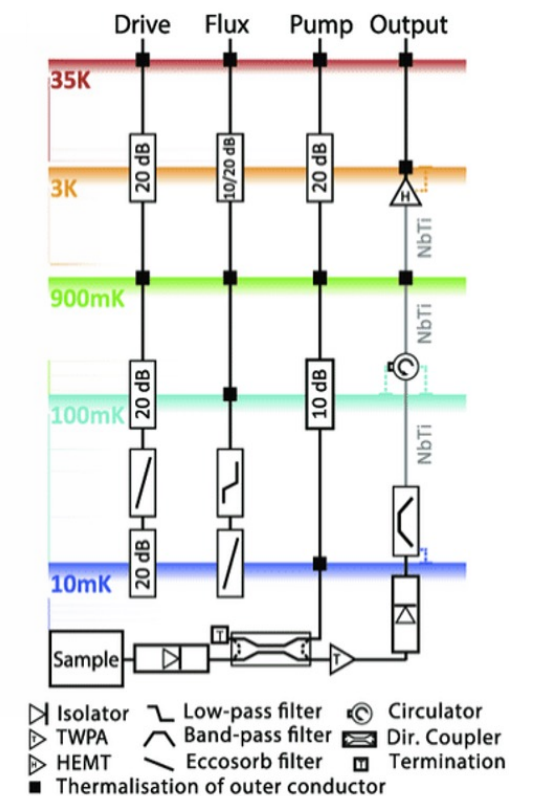
As a pioneer in high-performance connectivity solutions, Radiall is committed to driving innovation in the quantum computing sector. Entering this emerging market, we leverage our strong expertise in RF, microwave technologies, and cable assemblies to address the unique challenges of quantum environments.

Our Quantum range is the result of years of research and close cross-BU collaboration, delivering high-performance interconnect solutions designed to operate at cryogenic temperatures and support the rapid scaling of quantum computing systems. From connectors and cable assemblies to microwave components, each solution is engineered to ensure signal integrity, reliability, and long-term performance in extreme conditions.

Through this approach, Radiall supports quantum computer manufacturers and research laboratories worldwide with flexible, robust and high-density solutions adapted to their most demanding requirements. With the Cryonium™ range, Radiall goes beyond market entry and actively contributes to shaping the future of quantum connectivity.



Source: Krinner, S., Storz, S., Kurpiers, P., Magnard, P., Heinsoo, J., Keller, R., Luetolf, J., Eichler, C. and Wallraff, A., 2019. Engineering cryogenic setups for 100-qubit scale superconducting circuit systems. EPJ Quantum Technology, 6(1), p.2.



RF CABLES, CONNECTORS & ASSEMBLY SOLUTIONS

Radiall's RF cables, connectors and assemblies are able to satisfy quantum technologies' specific requirements, including:

- Densification: Miniature connectors, multi coaxial harness (bundle), small diameter semi-rigid cables, multipin coax connectors
- Thermalization: Through panel, thermal conductivity insulator
- Solution: A-magnetism, seamless/solderless connectors, HF and material expertise, (cryo)switches and (cryo)attenuators

With testing during the R&D stage, Radiall determined that SMA, 2.92, SMP and SMPM connectors remain stable at low temperatures. VSWR, insertion loss and mechanical properties remain stable down to 10 mK.

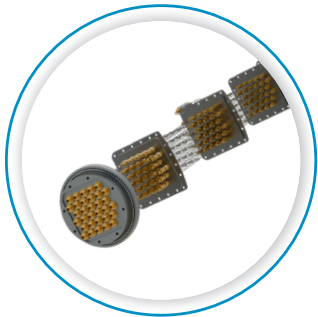
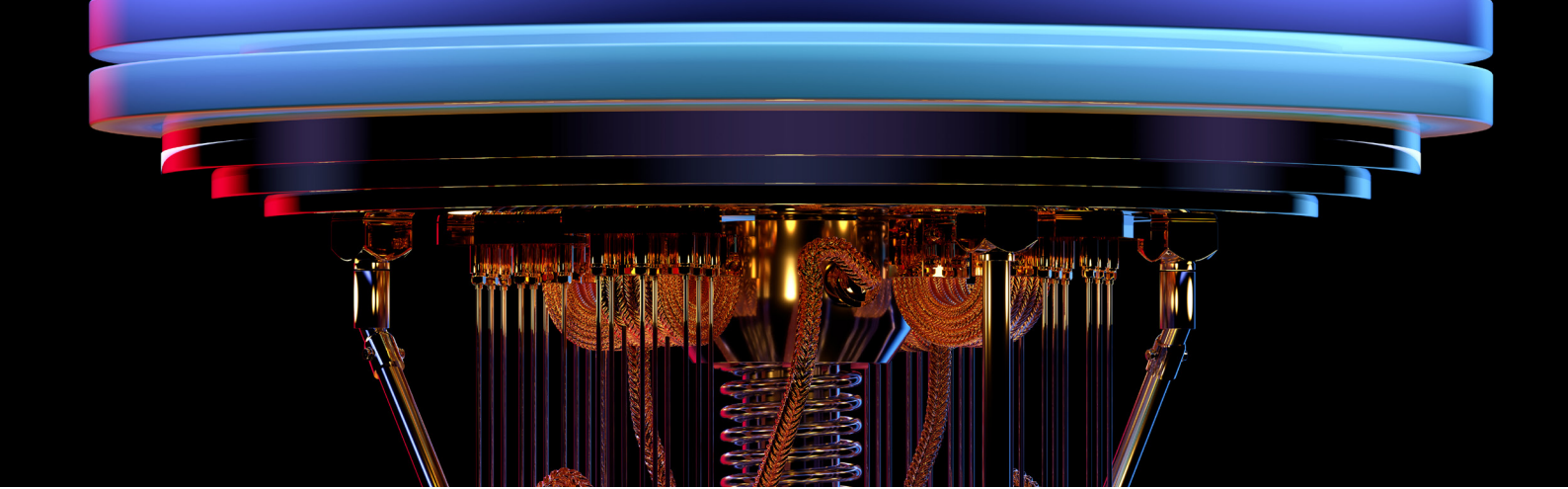
To meet market demands, Radiall is continuously developing more modular, miniaturization and cryogenic evaluation on cryogenic representative environments.

SEMI-RIGID CABLE ASSEMBLIES

Radiall's semi-rigid cable assemblies use proprietary/specific technologies to withstand the lower temperatures up to tens of millikelvin. These technologies have been proven in the laboratory in the field. With cables in .047" (and .033" - .013" under development), we have SMA, SMPM and multipoint coax connector solutions. Stage interface could use Radiall attenuators (0-30 dB on request):

- Room temperature long semi-rigid, precise bending shape
- 4 K: Cable with good thermal isolation, CuproNickel CuNi semi-rigid cables
- 1 K: Cable with superior thermal isolation, superconducting semi-rigid cables in Niobium Titanium (NbTi)
- 10 mK: Highly conductive, close to qubit, lower temperature, amagnetic, hand formable cable assembly in Copper Silver (CuPro)

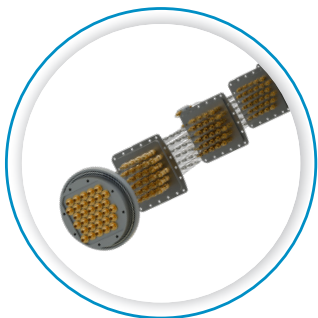
Quantum computers are accelerating the transformation of various industries like aeronautic conception and design, health care and life science, financial services and manufacturing efficiency and productivity. To support the growing quantum technologies, Radiall is working with R&D, laboratories, start-ups and others to create new interconnect solutions that are tested in-house and qualified in accredited labs. Radiall's interconnect offering brings together a solution of RF cable assemblies, connectors, attenuators, switches and fiber optics to emerging technology to solve application challenges like densification, thermalization to some tens of milliKelvin, networking and integration, miniaturization and non-magnetism.



HIGH DENSITY SIDE LOADER

Radiall's High-Density Side Loader is designed for advanced quantum and cryogenic systems requiring a high number of RF channels in a compact footprint. It integrates an SMPM multiport (16 ways), a 32-way attenuator module and a 208-way feedthrough with attenuation from 0 to 50 dB, ensuring excellent signal integrity across complex, high-density environments.

PART NUMBER	DESCRIPTION
OK201050000	SMPM Interconnection Matrix Equipped with Attenuator (0-50 dB)



LOW DENSITY SIDE LOADER

Radiall's Low-Density Side Loader addresses applications requiring flexibility and robustness with a reduced number of RF channels. Based on SMA interconnection solutions, it offers attenuation values ranging from 0 to 20 dB, making it well suited for control, measurement and auxiliary signal paths.

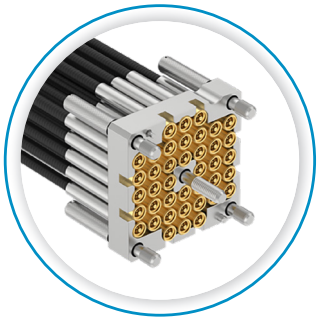
PART NUMBER	DESCRIPTION
OK125049000	SMA Interconnection Matrix Equipped with Attenuator (0-20 dB)



SMA

The SMA connector was originally designed in 1958 and standardized years later under IEC 60169-1. SMA connectors are the most popular coaxial RF/microwave connector. The range includes some SMA connectors specified up to 27 GHz.

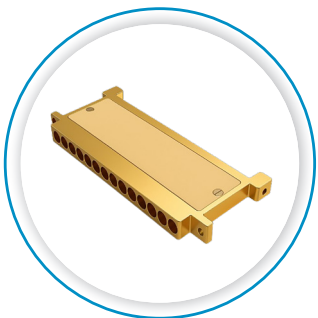
PART NUMBER	DESCRIPTION
R125052C10	Straight Male Plug Solderless Type Non Magnetic Cable .033
R125753000	Female-Female Bulkhead Adapter Hermetic
R125703001	Male-Male Adapter
R125720000	Female-Female Bulkhead Adapter



F2C-40

F2C-40 is a 40-pin high-density multi-coaxial solution designed for commercial quantum computer market demands. This solderless, cryogenic and non-magnetic solution features a floating structure to support market requirements.

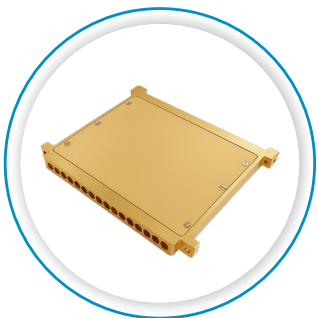
PART NUMBER	DESCRIPTION
RF2C-00010040	Solderless, Compression Mount PCB Interface
24010827-10	16 Channels Pressure Contact Connector - SMA



IR FILTERS 16 WAYS

Radiall's 16-way infrared filters are designed to protect quantum signals from thermal noise while ensuring stable RF performance at cryogenic temperatures. Using CR110 or CR112 absorbers (potted), these filters effectively suppress unwanted infrared radiation and limit crosstalk, preserving signal integrity across all channels.

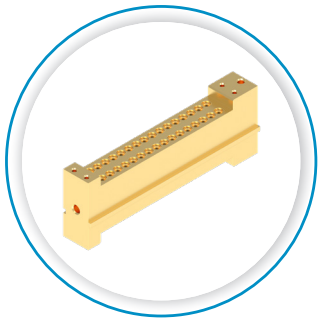
PART NUMBER	DESCRIPTION
OK4388M8002	IR Filter CR110 0.5 dB
OK4388M8003	IR Filter CR110 2 dB
OK4388M8001	IR Filter 20 GHz CR110 2.2 dB
OK4388M8000	IR Filter CR112 7.5 dB



RF FILTERS 16 WAYS

Radiall's 16-way RF low-pass filters are engineered to provide precise frequency control in quantum and cryogenic systems. Based on suspended stripline technology, they offer defined cutoff frequencies at 7.5, 10 and 12 GHz, with strong out-of-band rejection to minimize unwanted signal interference.

PART NUMBER	DESCRIPTION
OK4383M8000	LowPass Filters 7.5 GHz
OK4384M8000	LowPass Filters 10 GHz



MODULE ATTENUATOR 32 WAYS

The Cryonium™ Module Attenuator 32 Ways offers precise signal attenuation across 32 independent channels, designed for cryogenic environments to support quantum computing applications.

PART NUMBER	DESCRIPTION
OK429M00901	0 dB
OK429M00903	0 dB (SS Strip)
OK429M03901	3 dB
OK429M05901	5 dB
OK429M10901	10 dB
OK429M20901	20 dB
OK429M30901	30 dB
OK429M45901	45 dB



MULTIPORT 16 WAYS

The Cryonium™ Attenuator 16 Ways offers precise signal attenuation across 32 independent channels, designed for cryogenic environments to support quantum computing applications.

PART NUMBER	DESCRIPTION
OK429M00900	16-Way Multiport Housing with 0 dB Attenuator
OK429M00902	16-Way Multiport Housing with 0 dB Attenuator (SS Strip)
OK429M03900	16-Way Multiport Housing with 3 dB Attenuator
OK429M05900	16-Way Multiport Housing with 5 dB Attenuator
OK429M10900	16-Way Multiport Housing with 10 dB Attenuator
OK429M20900	16-Way Multiport Housing with 20 dB Attenuator
OK429M30900	16-Way Multiport Housing with 30 dB Attenuator
OK429M45900	16-Way Multiport Housing with 45 dB Attenuator



SMPM

The SMPM connector is an ultra-miniature push-on solution, optimized for frequencies up to 65 GHz. Its compact design—30% smaller than SMP—makes it ideal for the high-performance demands of quantum computing systems.

PART NUMBER	DESCRIPTION
R201050010	DC - 65 GHz



RF SWITCHES

With cryogenic switches, Radiall provides a solution to meet emerging market demands. These switches function at extremely low temperatures (0 Kelvin/-273 °C) and actuate at very low power. They can be easily integrated into equipment and are a perfect solution for a variety of laboratory applications.

PART NUMBER	DESCRIPTION
R583423141	Specific SP6T Ramses SMA 18 GHz Latching 28 Vdc D-SUB Male Connector Bipolar Actuator Command for Cryogenic Application
R571433141	Specific SPDT Ramses SMA 18 GHz Latching 28 Vdc Pins Terminals Bipolar Actuator Command for Cryogenic Application
R5927B2141	Specific SP6T Ramses Sub-Miniature SMA 26.5 GHz Latching 12 Vdc Pins Terminals Bipolar Actuator Command for Cryogenic Application
R5834B3141BR	Specific SP12T Ramses SMA 18 GHz Square Flange Latching 28 Vdc Pins Terminals Bipolar Actuator Command for Cryogenic Application with Brass Material
R5927B2141BR	Specific SP6T Ramses Sub-Miniature SMA 26.5 GHz Latching 12 Vdc Pins Terminals Bipolar Actuator Command for Cryogenic Application with Brass Material



RF ATTENUATORS

In quantum computing, cryogenic microwave attenuators are used at different stages of the thermal dilution refrigerator to reduce thermal noise in the signal. The RF lines within each layer increase the signal-to-noise ratio (SNR), requiring the attenuator for the thermalized layer to protect the signal level. These attenuators are particularly crucial in the 10 mK stage of the quantum fridge, where ultra-low temperatures are needed to maintain qubit coherence and minimize signal degradation.

PART NUMBER	DESCRIPTION
R429800000	SMA 0 dB 18 GHz 2W Cryo
R429803000	SMA 3 dB 18 GHz 2W Cryo
R429806000	SMA 6 dB 18 GHz 2W Cryo
R429810000	SMA 10 dB 18 GHz 2W Cryo
R429820000	SMA 20 dB 18 GHz 2W Cryo



ATTENUATOR M/F

In quantum computing, cryogenic microwave attenuators play a crucial role in minimizing signal noise at various stages of the dilution refrigerator. Our male-to-female attenuators, engineered for reliable operation down to 10mK.

PART NUMBER	DESCRIPTION
R429800102	SMA Attenuator 0 dB 18 GHz 2W Cryo Male Female
R429803102	SMA Attenuator 3 dB 18 GHz 2W Cryo Male Female
R429806102	SMA Attenuator 6 dB 18 GHz 2W Cryo Male Female
R429810102	SMA Attenuator 10 dB 18 GHz 2W Cryo Male Female
R429820102	SMA Attenuator 20 dB 18G Hz 2W Cryo Male Female



INFRARED FILTERS

Infrared filters are utilized in quantum computing environments to manage thermal noise and electromagnetic interference, ensuring the qubits remain in their delicate quantum states for longer durations by blocking unwanted IR radiation.

PART NUMBER	DESCRIPTION
R438538000	Infrared Filter 2 dB
R438538001	Infrared Filter 0.5 dB



SMPPM-LOCK

This micro-miniature product features electrical performance up to 65 GHz. It is the smallest SMPM connector on the market with a locking system and space optimization, even in the tightest spaces, thanks to our right angle plug version. SMPM-LOCK features a robust locking mechanism.

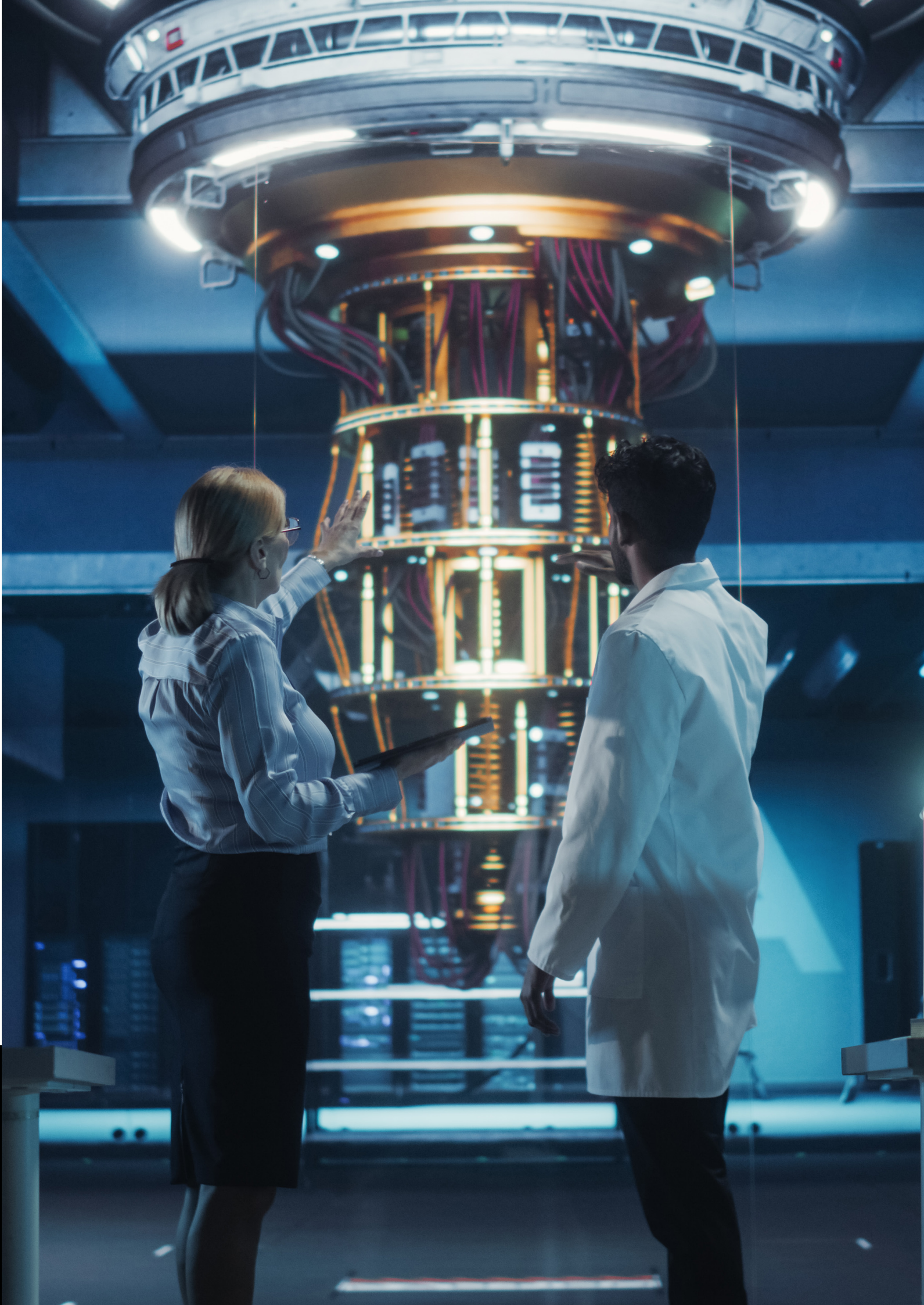
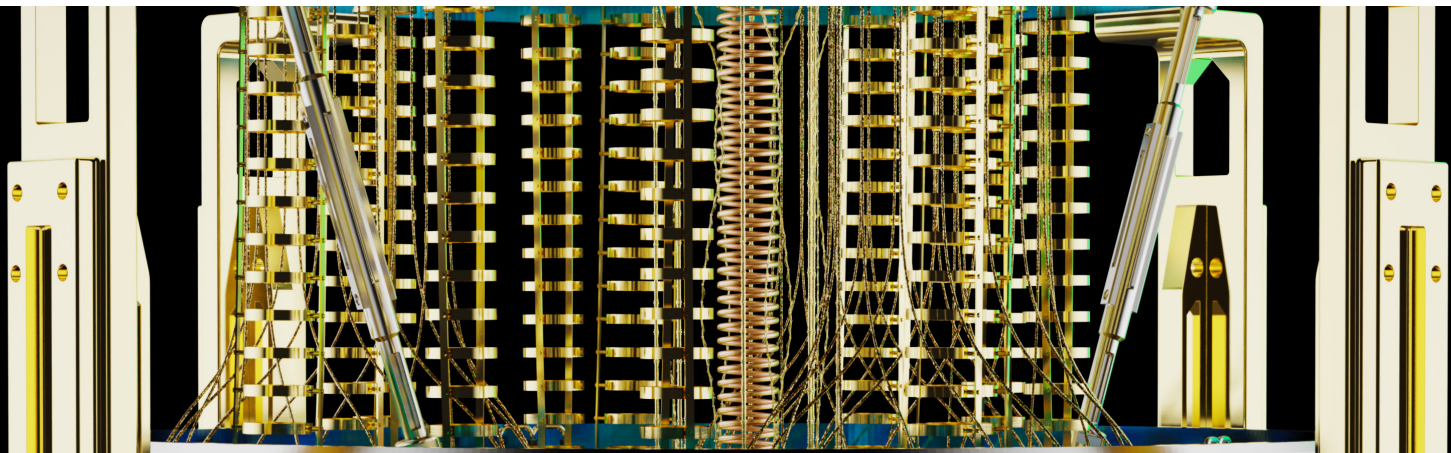
PART NUMBER	DESCRIPTION
R201L80300	Female Right Angle Plug Solder Type for 1.42/50d Cable
R201L80000	Female Straight Plug Solder Type for .047 Cable
R201L00010	Edge Card Male Straight Receptacle - Tape and Reel / 500



SEMI-RIGID 3D BENDING

Radiall's semi-rigid cable assemblies use proprietary/specific technologies to withstand lower temperatures up to tens of milliKelvin. These technologies have been proven in the laboratory and in the field.

PART NUMBER	DESCRIPTION
C291052005	Semi-Rigid .034" (0.86 mm) NbTi
C291850016	Semi-Rigid .034" (0.86 mm) CuNi



SIMPLIFICATION is our INNOVATION

We advance the design and engineering process for innovators, ground breakers and pioneers of technology. We reduce weight, improve durability and streamline installation to provide leading-edge connectors that drive product performance.

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GLOBAL PRESENCE

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