



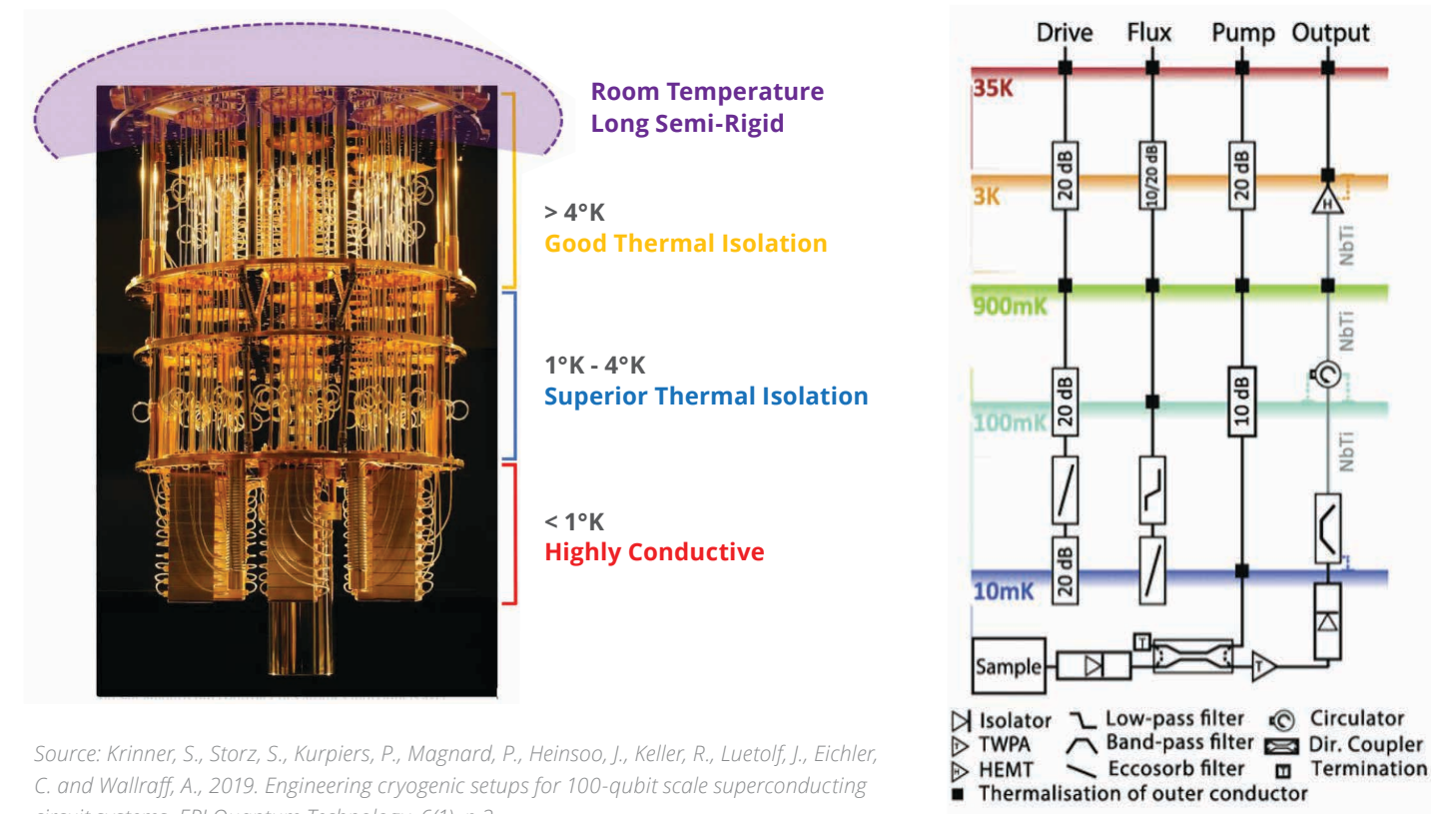
# QRYSTALL RANGE

---

**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 new market, we bring our expertise in RF and microwave technologies to address the unique challenges of quantum environments. Our QRYSTALL range is the result of years of research and cross-BU collaboration, offering cutting-edge solutions designed to perform at cryogenic temperatures and scale with the rapid growth of quantum computing.

We aim to lead this emerging field by providing flexible, reliable, and high-density components that meet the evolving needs of quantum computer manufacturers and research labs worldwide. With the QRYSTALL range, Radiall is not just entering the market — we are shaping the future of quantum connectivity.

Entering the Quantum Computing Market

2020

Joining the QRYOLINK Consortium

2022

Launch of QRYSTALL Range

2023 - 2024

## SEMI-RIGID CABLE ASSEMBLIES

Radiall semi-rigid cables 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 multiport 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 CuN 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)

## RF CABLES, CONNECTORS & ASSEMBLY SOLUTIONS

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

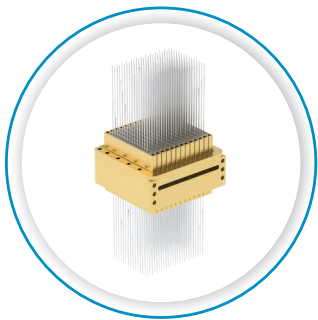
- Densification: Miniature connectors, multi coaxial harness (bundle), small diameter semi-rigid cables, multipin coax connectors
- Thermalization: Through panel, thermal conductivity insulator
- Solution: A-magnetism, seamless/solderless connectors, HF and material expertise, (cryo)switches and (cryo)attenuators

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.



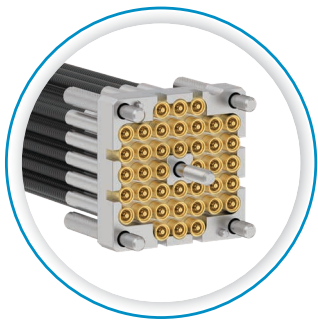
Quantum computers are accelerating the transformation of various industries like aeronautic conception and design, health care and life science, financial services and manufacturing efficiency and productivity. To support the growing quantum technologies, Radiall is working with R&D, laboratories, start-ups 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.



## SIDE LOADER HD/LD

Radiall's Side Loader solutions deliver high-performance connectivity for demanding applications. Our High-Density Side Loader features an SMPM multiport (16 ways), a 32-way attenuator module, and a 208-way feedthrough (0-50 dB), ensuring optimal signal integrity in complex environments. For lower-density needs, our Low-Density Side Loader offers SMA solutions with attenuation from 0 to 20 dB, providing flexibility and reliability.

PART NUMBER	DESCRIPTION
OK201050000	SMPM Interconnection Matrix Equipped with Attenuator (0-50 dB)
OK125049000	SMA Interconnection Matrix Equipped with Attenuator (0-20 dB)



## F2C-40/16

F2C-40/16 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.

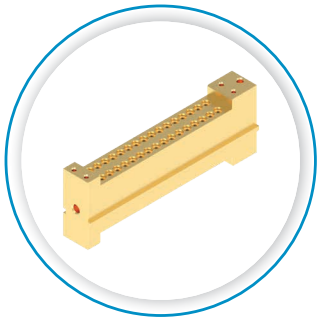
PART NUMBER	DESCRIPTION
RF2C-00010040	Solderless, Compression Mount PCB Interface
24010827-10	16 Channels Pressure Contact Connector - SMA



## 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.

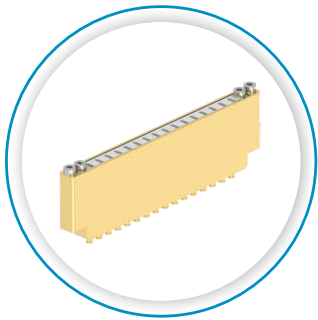
PART NUMBER	DESCRIPTION
R125052C10	Straight Male Plug Solderless Type Non Magnetic Cable .033
R125753000	Female-Female Bulkhead Adapter Hermetic
R125703001	Male-Male Adapter
R125720000	Female-Female Bulkhead Adapter



## MODULE ATTENUATOR 32 WAYS

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

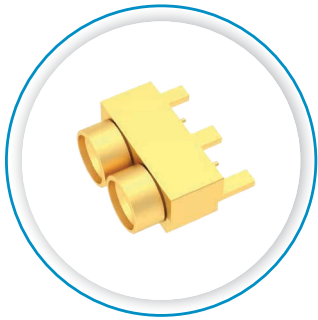
PART NUMBER	DESCRIPTION
OK429M00155	0 dB
OK429M03155	3 dB
OK429M06155	6 dB
OK429M10155	10 dB
OK429M20155	20 dB
OK429MXXXXX	Custom



## MULTIPORT 16 WAYS

The Multiport 16-way is designed to deliver high-density connectivity solutions, crucial for quantum computing applications. Each SMPM connector ensures secure and stable signal transmission in cryogenic environments.

PART NUMBER	DESCRIPTION
OK429M00900	16-Way Multiport Housing with 0 dB Attenuator
OK429M10900	16-Way Multiport Housing with 10 dB Attenuator
OK429M20901	16-Way Multiport Housing with 20 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



## 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 4K

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 4K, provide a cost-effective solution for upper stages, ensuring efficient thermalization while preserving signal integrity.

PART NUMBER	DESCRIPTION
R429800101	SMA Attenuator 0 dB 18 GHz 2W Cryo 4K Male Female
R429803101	SMA Attenuator 3 dB 18 GHz 2W Cryo 4K Male Female
R429806101	SMA Attenuator 6 dB 18 GHz 2W Cryo 4K Male Female
R429810101	SMA Attenuator 10 dB 18 GHz 2W Cryo 4K Male Female
R429820101	SMA Attenuator 20 dB 18G Hz 2W Cryo 4K 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.

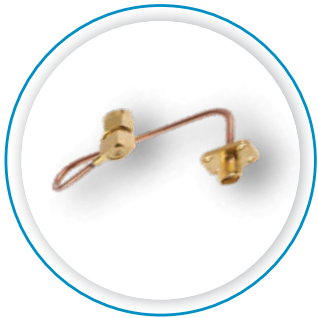
PART NUMBER	DESCRIPTION
R438538000	Infrared Filter 2 dB
R438538001	Infrared Filter 0.5 dB



## SMPM-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 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, groundbreakers and pioneers of technology. We reduce weight, improve durability and streamline installation to provide leading-edge connectors that drive product performance.*

## AREA OFFICES LOCAL CONTACTS

### EUROPE

	ADDRESS	PHONE	FAX	EMAIL
<b>FINLAND</b>	Radiall Finland PO Box 202, 90101, Oulu	+358407522412		infofi@radiall.com
<b>FRANCE</b>	Radiall SA 25 Rue Madeleine Vionnet, 93300, Aubervilliers	+33149353535		info@radiall.com
<b>GERMANY</b>	Radiall GmbH Carl-Zeiss-Straße 10, 63322, Rödermark	+49607491070	+496074910710	infode@radiall.com
<b>ITALY</b>	Radiall Elettronica S.R.L. Via Zambelletti 19, 20021, Baranzate Milano	+39024885121	+390248843018	infoit@radiall.com
<b>NETHERLANDS</b>	Radiall Nederland BV Hogebrinkerweg 15b, 3871, KM Hoevelaken	+31332534009	+31332534512	infonl@radiall.com
<b>SWEDEN</b>	Radiall AB Sollentunavägen 63, 191 40 Sollentuna	+4684443410		infose@radiall.com
<b>UNITED KINGDOM</b>	Radiall Ltd. Profile West, 950 Great West Rd., Brentford, Middlesex TW8 9ES	+441895425000	+441895425010	infouk@radiall.com

### ASIA

<b>CHINA</b>	Shanghai Radiall Electronics Co., Ltd. No.688 Hui Fang Road, Shanghai, China, 201806	+862166523788	+862166521177	infozh@radiall.com
<b>HONG KONG</b>	Radiall Electronics (Asia) Ltd. Room A, 16/F., Ford Glory Plaza, 37-39 Wing Hong Street, Cheung Sha Wan, Kowloon, Hong Kong	+85229593833	+85229592636	infohk@radiall.com
<b>INDIA</b>	Radiall India Pvt. Ltd. 25D, Phase 2, Peenya Industrial Area, Bengaluru 560 058	+918028395271	+918028397228	infoin@radiall.com
<b>JAPAN</b>	Nihon Radiall K.K. Sawada Building 8F, Shibuya-ku, Tokyo 150-0011	+81364274455	+81364274456	infojp@radiall.com

### AMERICAS

<b>USA &amp; CANADA</b>	Radiall USA, Inc. 8950 South 52nd Street, Ste. 401 Tempe, AZ 85284	+14806829400	+14806829403	infousa@radiall.com
-------------------------	--	--------------	--------------	---------------------

## GLOBAL PRESENCE

Australia · Austria · Belgium · Brazil · Czech Republic · Denmark · Estonia · Greece · Hungary · Indonesia · Israel · Korea · Latvia · Lithuania  
Malaysia · Norway · Philippines · Poland · Portugal · Singapore · South Africa · Spain · Switzerland · Taiwan · Thailand · Turkey · Vietnam