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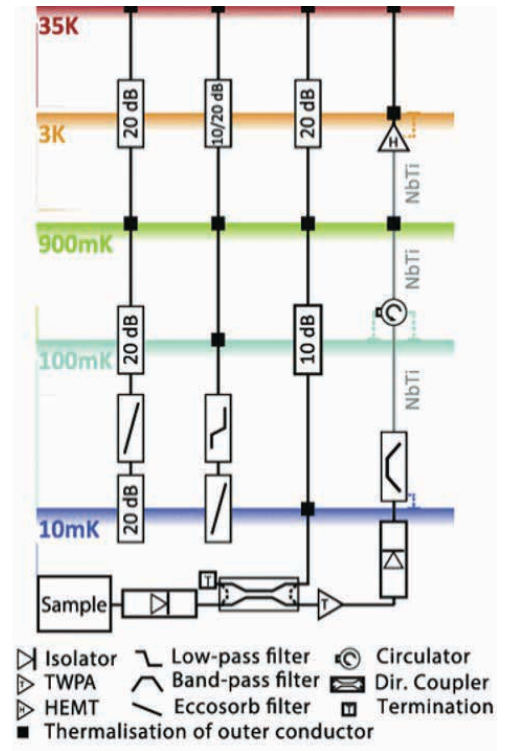


QUANTUM TECHNOLOGIES

Plot no. 845, DSIIIDC Industrial Area KHASRA NO. 33/23 (0-7) & 37/4 (0-10)Gali no. 6, near Harnandi dharam kanta
Mundka Industrial Area, New Delhi, Delhi, 110041



- Room Temperature
Long Semi-Rigid
- > 4°K
Good Thermal Isolation
- 1°K - 4°K
Superior Thermal Isolation
- < 1°K
Highly Conductive



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.

SEMI-RIGID CABLE ASSEMBLIES

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 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

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

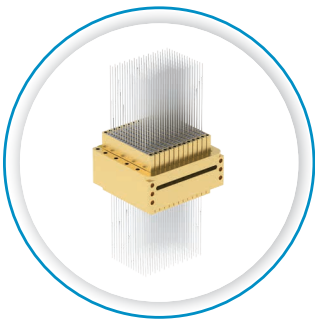
- **Densification:** Miniature connectors, multi coaxial harness (bundle), small diameter semi-rigid cables, multipin coax connectors
- **Thermalization:** Through panel, thermal conductivity insulator
- **Solution:** A-magnetism, seamless/solderless connectors, HF and material expertise, (cryo)switches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

With testing during the R&D stage, 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, continuously developing more modular, miniaturization and cryogenic evaluation on cryogenic representative environments.



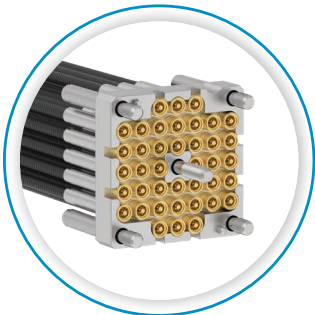
Quantum computers are accelerating the transformation of various industries like aeronautic conception and design, health care and life science, financial services and manufacturing efficiency and productivity. To support the growing quantum technologies, working with R&D, laboratories, start-ups and others to create new interconnect solutions that are tested in-house and qualified in accredited labs. 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

Equipped with small form factor connectors and attenuators, the matrix allows you to interconnect the stages of a cryostat with very high density wiring.

PART NUMBER	DESCRIPTION
STPT2201-70	SMPM Interconnection Matrix Equipped with Attenuators (0-20 dB)



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
STF2C-00010040	Solderless, Compression Mount PCB Interface



SMPW

Radiall's new subminiature coaxial connector features higher data rates and frequencies for next-generation equipment. SMPW satisfies market demands for defense and telecom markets, specifically for electronic warfare and Dense Wavelength Division Multiplexing Modules (DWDM).

PART NUMBER	DESCRIPTION
ST218423000	Male Edge Mount Full Detent
ST218508700	Straight Male Receptacle SMT Smooth Bore
ST218705030	Female - Female Adapter
ST218890700	Right Angle Receptacle 4 Channels SMT Type Smooth Bore



SEMI-RIGID 3D BENDING

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
ST291052005	Semi-Rigid .034" (0.86 mm) NbTi
ST291850016	Semi-Rigid .034" (0.86 mm) CuNi



RF ATTENUATORS

In quantum computing, cryogenic microwave attenuators are used in different stages of the thermal dilution refrigerator to reduce the thermal noise in the signal. The RF lines within each layer increases the signal-to-noise ratio (SNR), requiring the attenuator for the thermalized layer to protect the signal level.

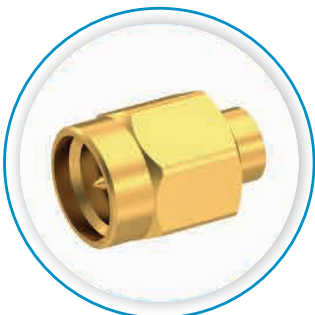
PART NUMBER	DESCRIPTION
ST429800000	SMA Attenuator 0 dB 18 GHz 2W
ST429820000	SMA Attenuator 20 dB 18 GHz 2W
ST429810000	SMA Attenuator 10 dB 18 GHz 2W



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
ST583423141	Specific SP6T Ramses SMA 18 GHz Latching 28 Vdc D-SUB Male Connector Bipolar Actuator Command for Cryogenic Application
ST571433141	Specific SPDT Ramses SMA 18 GHz Latching 28 Vdc Pins Terminals Bipolar Actuator Command for Cryogenic Application
ST5927B2141	Specific SP6T Ramses Sub-Miniature SMA 26.5 GHz Latching 12 Vdc Pins Terminals Bipolar Actuator Command for Cryogenic Application



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
ST125052C10	Straight Male Plug Solderless Type Non Magnetic Cable .033



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
ST201L80300	Female Right Angle Plug Solder Type for 1.42/50d Cable
ST201L80000	Female Straight Plug Solder Type for .047 Cable
ST201L00010	Edge Card Male Straight Receptacle - Tape and Reel / 500



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
ST438538000	Infrared Filter 2 dB
ST438538001	Infrared Filter 0.5 dB