Maury Microwave Solutions for Quantum Computing

Maury Microwave solutions support superconducting quantum computing development through cryogenic S-parameter calibration, high-density RF signal generation, and cryogenic noise parameter characterization using specialized impedance tuners. These solutions help engineers accurately characterize qubits and cryogenic components, generate high-fidelity control signals, and optimize low-noise amplifier (LNA) performance during qubit readout operations.

Cryogenic S-Parameter Calibration: Calibration Standards

Superconducting qubits operate at cryogenic temperatures, and microwave signals traveling through cryogenic cables and components experience temperature-dependent losses and reflections. These effects can alter the signal reaching the qubit and impact measurement accuracy, since each qubit exhibits its own resonant frequency. Cryogenic S-parameter calibration characterizes and corrects for these losses, enabling accurate identification of qubit resonant frequencies and improved characterization of cryogenic components.

Maury offers specialized cryogenic calibration standards designed to improve S-parameter measurement accuracy within cryogenic environments.

Qubit Control Signal Generation: HS9100 Series

Microwave pulses at each qubit's resonant frequency are used to control quantum states and perform quantum operations. Precise qubit control requires signals with high pulse fidelity, low phase noise, and stable phase relationships between channels. As quantum systems scale to support larger numbers of qubits, control hardware must also provide increasing channel density within a compact footprint.

Available in 16- and 32-channel configurations, Maury HS9100 multi-channel RF synthesizers provide the channel density, signal quality, and phase coherency needed to support scalable qubit control architectures.

- Industry-leading channel density
- Highly phase coherent relationship across all integrated channels
- Independently controlled channels
- Thermally optimized chassis provides the ultimate in channel-to-channel stability

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Cryogenic Noise Parameter Measurements: CT-Series

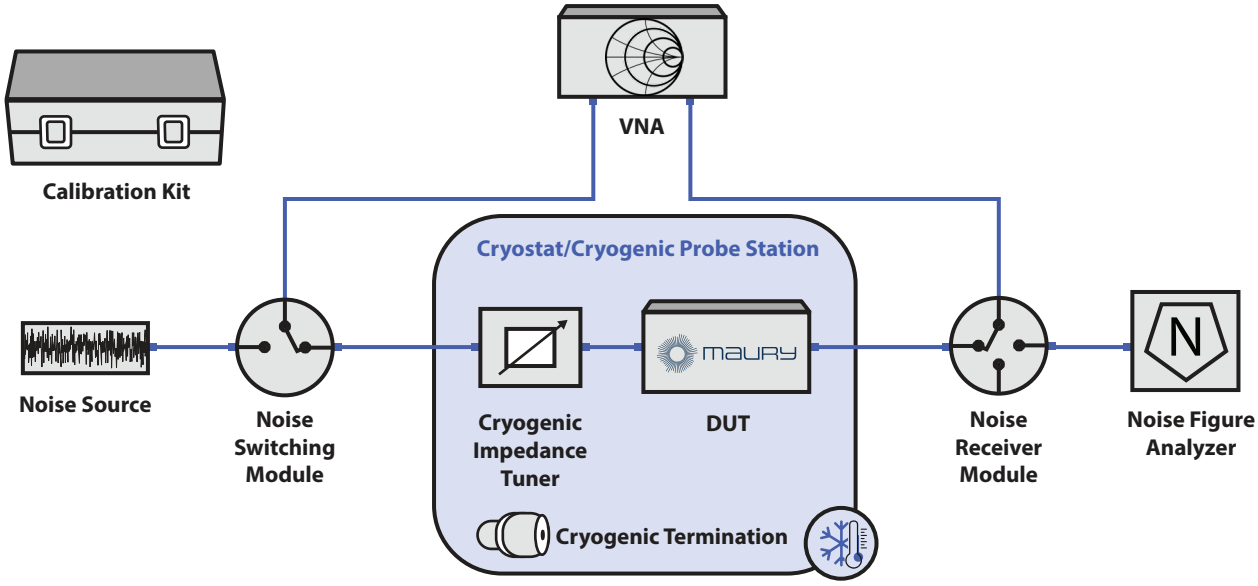
During qubit readout, the microwave signals emitted by qubits are extremely weak. These signals must be amplified before classical systems can detect and process the results. Operating inside the cryostat, cryogenic LNAs minimize noise contributions during signal amplification to help preserve the integrity of quantum information.

The Maury CT-Series cryogenic impedance tuner enables cryogenic noise parameter measurements of LNAs for precise modeling and characterization. The CT-Series electronically varies source impedance to evaluate amplifier noise behavior across multiple impedance states. Solid-state tuning technology minimizes heat generation and power consumption for reliable operation down to 4 K.

- Solid-state tuning technology eliminates the limitations of electro-mechanical tuners in cryogenic environments
- Operation at temperatures below 4 K
- Compact footprint and low power consumption (<0.2 mW) for minimal thermal impact
- Integrated temperature sensor and bias tee

Cryogenic Noise Parameter Measurement System

A typical cryogenic noise parameter measurement system incorporates the CT-Series cryogenic impedance tuner to precisely characterize LNA noise performance.



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