Qubit-in-a-box 0 (QiB0)

v 2.0, 10 October 2025

Overview

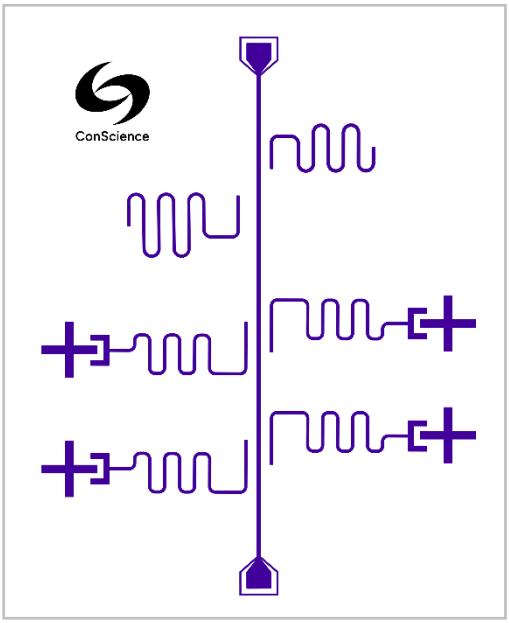
The QiB0 is a ready-to-use high-coherence superconducting quantum device designed for setup validation, benchmarking and calibration, serving as an accessible entry point for qubit experiments.

Each chip integrates four fixed-frequency transmon qubits (3–5 GHz) coupled to dedicated readout resonators, along with two additional bare coplanar-waveguide resonators (5–7 GHz).

The device comes wire-bonded and packaged in a gold-plated, oxygen-free copper case with standard SMA connectors, ensuring straightforward integration into cryogenic measurement setups.

Product features:

- 4 single qubits with T_1 = 90 – 130 µs on average and up to 256 µs *
- 4 individually coupled readout resonators
- 2 bare resonators with Qi ≳ 1×10^6 at single-photon power levels
- Gold-plated oxygen-free copper case
- Female SMA connectors for RF signals



Design parameters		
	f_q (GHz)	f_r (GHz)
Qubit 1	3.73	5.41
Qubit 2	3.90	5.54
Qubit 3	4.04	5.71
Qubit 4	4.17	5.85
Resonator 1	—	6.60

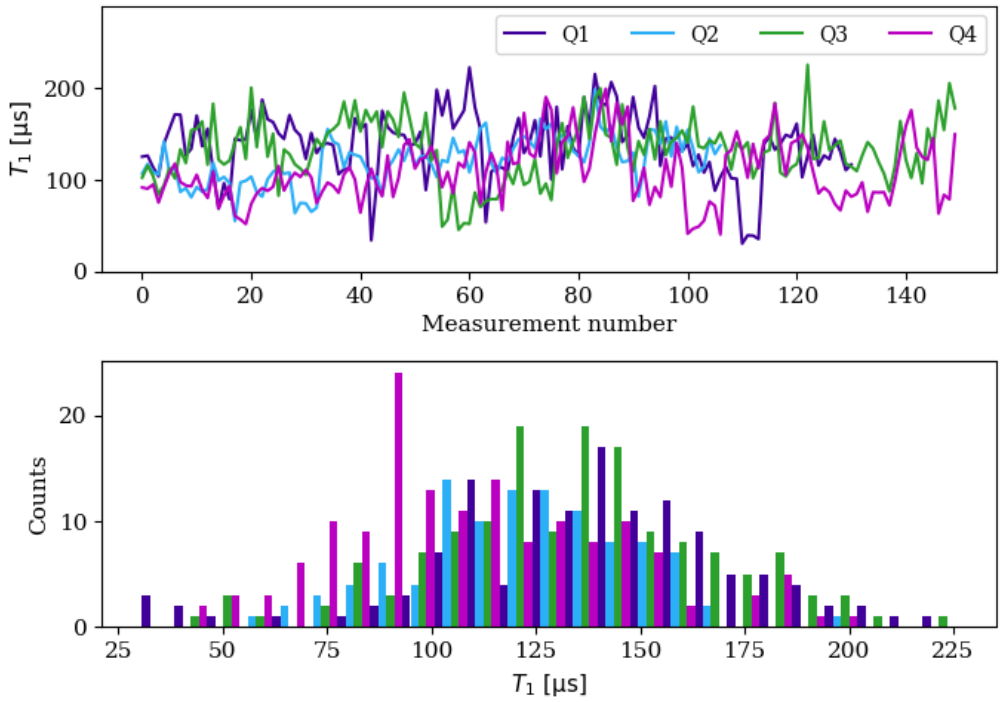
* Specific parameters for each unit are only available for individually characterized products

Spec sheet: QiB0

Reference device: CS_QIB0_30

Qubit characteristics *			
	f_q (GHz)	f_r (GHz)	T_1 (µs), average
Qubit 1	3.34	5.49†	138
Qubit 2	3.49	5.63†	121
Qubit 3	3.54	5.78†	132
Qubit 4	3.41	5.94†	109
Resonator 1	—	6.72	—
Resonator 2	—	6.91	—

† Dressed-state frequency of the resonators



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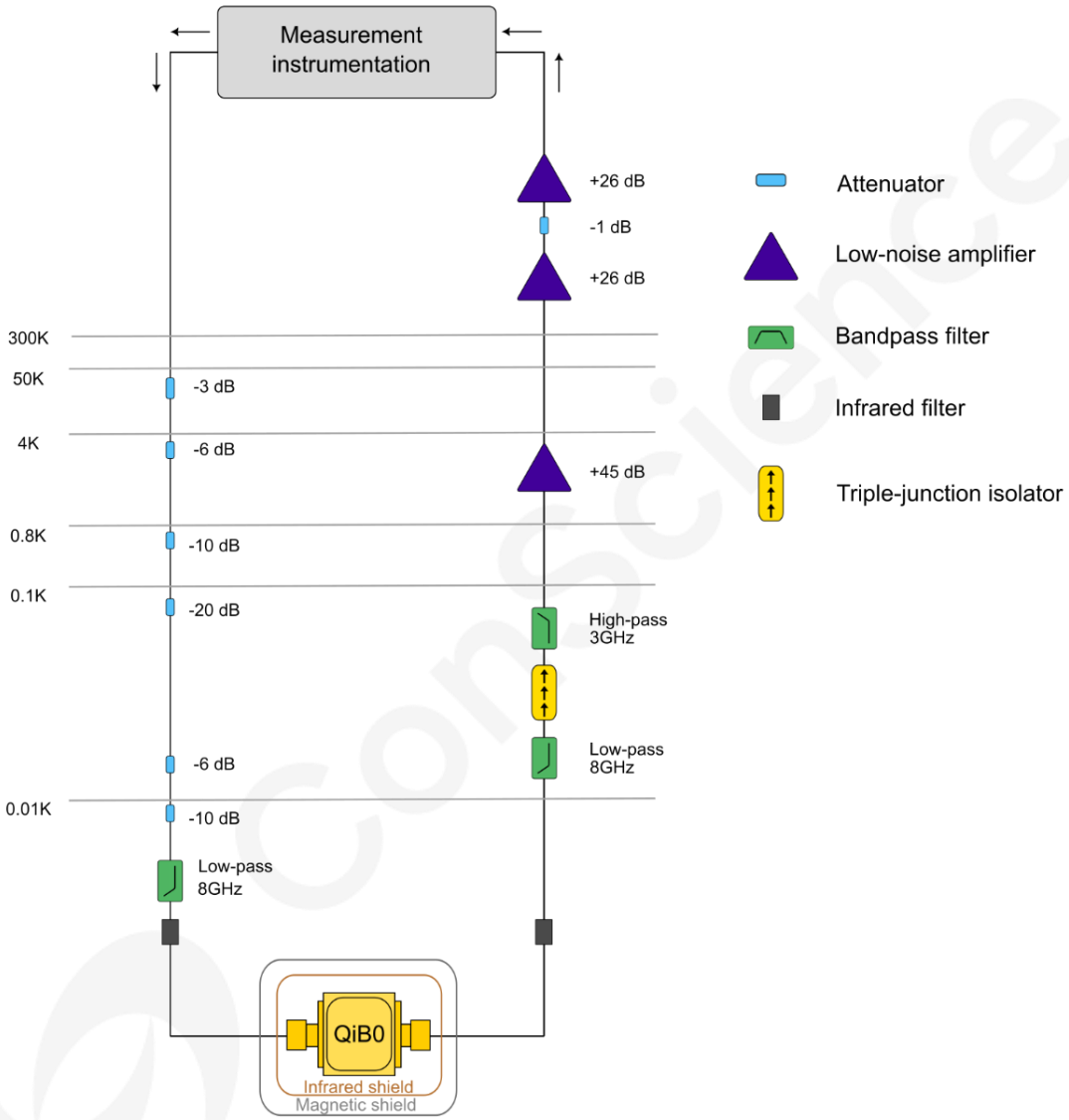
Note: Qubit coherence is strongly impacted by environmental noise. For optimal performance, we recommend operating the QiB0 in a dedicated sample space with additional shielding complementing the standard cryostat shielding. Recommended shielding comprises of a dedicated thermal+infrared shield enclosed in a magnetic shield.

Recommended measurement setup

The schematic below illustrates a representative measurement configuration used to characterize the QiB0. The input and output lines include attenuation, filtering and isolation to suppress thermal noise and backaction. The sample space is enclosed by dedicated thermal + infrared and magnetic shielding.

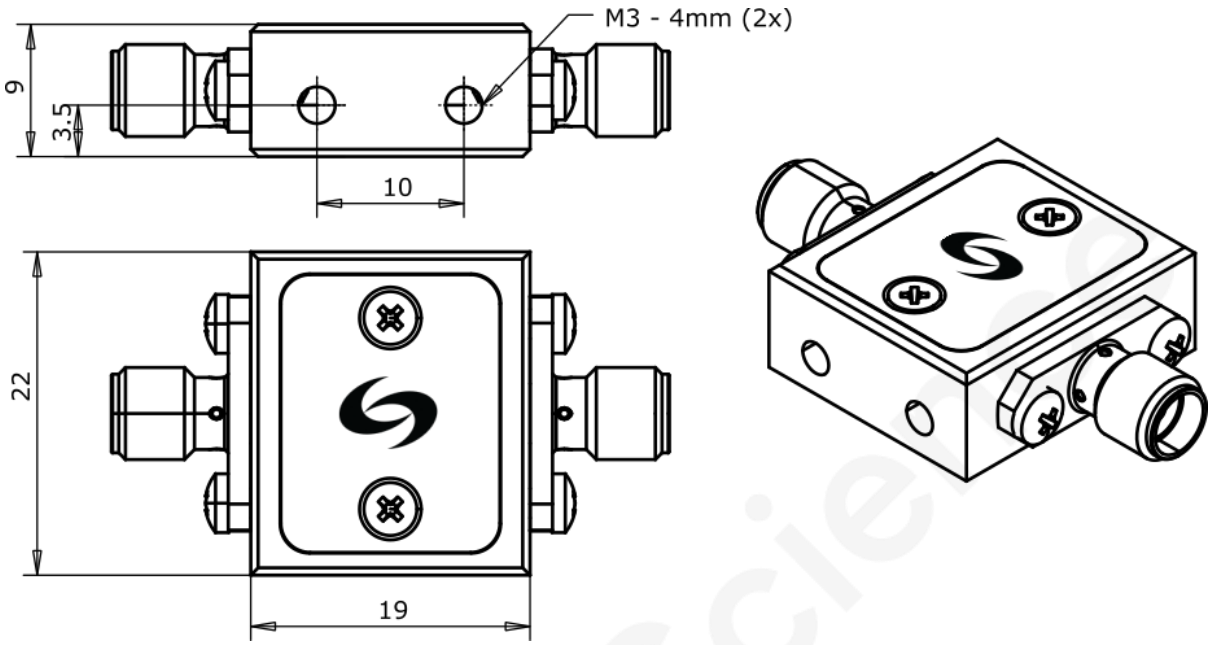


Installation

1. Mount the QiB0 with 2×M3 screws to the lowest temperature plate of a cryostat. The depth of the threaded hole in the QiB0 package is 4mm. The optimal operating temperature is below 50 mK.
2. Connect one of the SMA connectors to the signal input line and the remaining connector to the output line. Do not over-tighten (required torque 0.3 – 0.6 N·m).

Dimensions

Units: mm



Dual-use

The device is classified as dual-use (can be used for both civilian and military applications) according to Annex 1, Category 3: Electronics, 3A001 **:

Electronic devices and circuits containing components, manufactured from "superconductive" materials, specially designed for operation at temperatures below the "critical temperature" of at least one of the "superconductive" constituents and having any of the following:

1. Current switching for digital circuits using "superconductive" gates with a product of delay time per gate (in seconds) and power dissipation per gate (in watts) of less than 10-14 J; or
2. Frequency selection at all frequencies using resonant circuits with Q-values exceeding 10 000;

** Specific export regulations may apply depending on destination country.