

Datasheet: Qubit-in-a-box 0 (QiB0)

v 1.4, 28 October 2024



Overview:

These devices featured qubits coupled to resonators come bonded and packaged with easy to connect SMA connectors - perfect for benchmarking and calibration. The standard setup includes 4 fixed frequency transmon single qubits (3-5 GHz) and 2 hanging resonators (6-7 GHz). The qubits have a lifetime, T1, up to 210 μ s and the quality factor of the resonator is approximately 1M.

Product features:

- 4 isolated qubits with T1 = 90 – 130 μ s on average and up to 210 μ s *
- 4 readout resonators, coupled separately to each qubit
- 2 hanging resonators with $Q_i > 0.8 \times 10^6$
- Oxygen-free copper case with plated gold
- Female SMA for RF connectors (required torque 0.3 – 0.6 N·m)

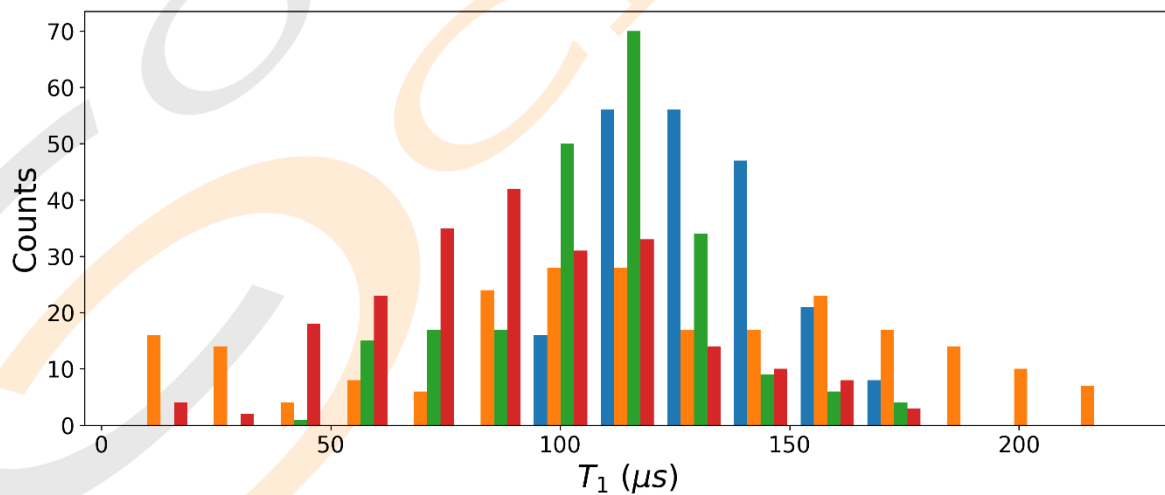
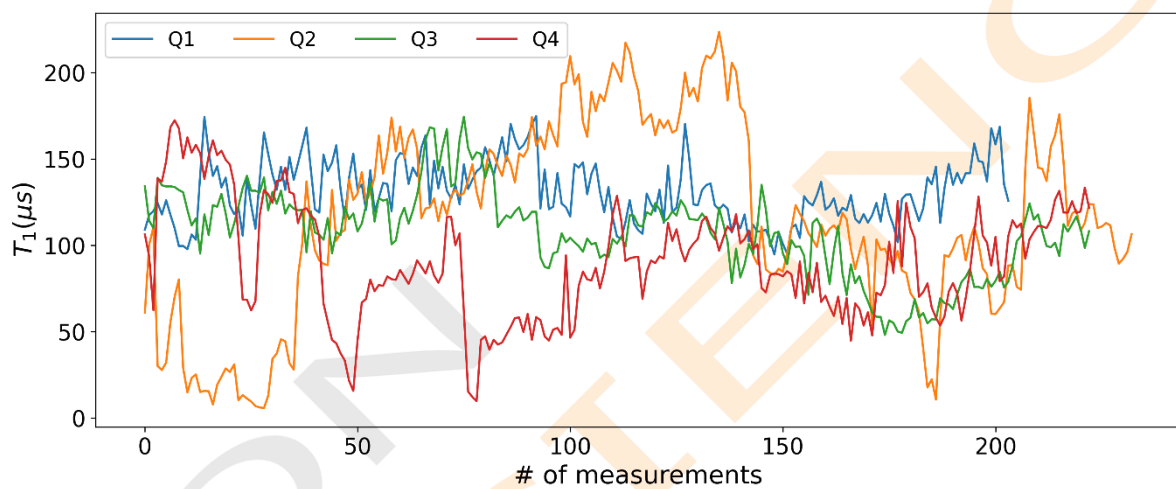
Operating range		
Parameter	Min	Max
RF input power		0 dBm
Temperature	< 10 mK	60 mK

Design parameters		
	ω_q (GHz)	ω_r (GHz)
Qubit 1	4.40	5.90
Qubit 2	4.55	6.05
Qubit 3	4.70	6.20
Qubit 4	4.85	6.35
Resonator 1	-	6.60
Resonator 2	-	6.80

Qubit Characteristics – measured at T ~ 10 mK *

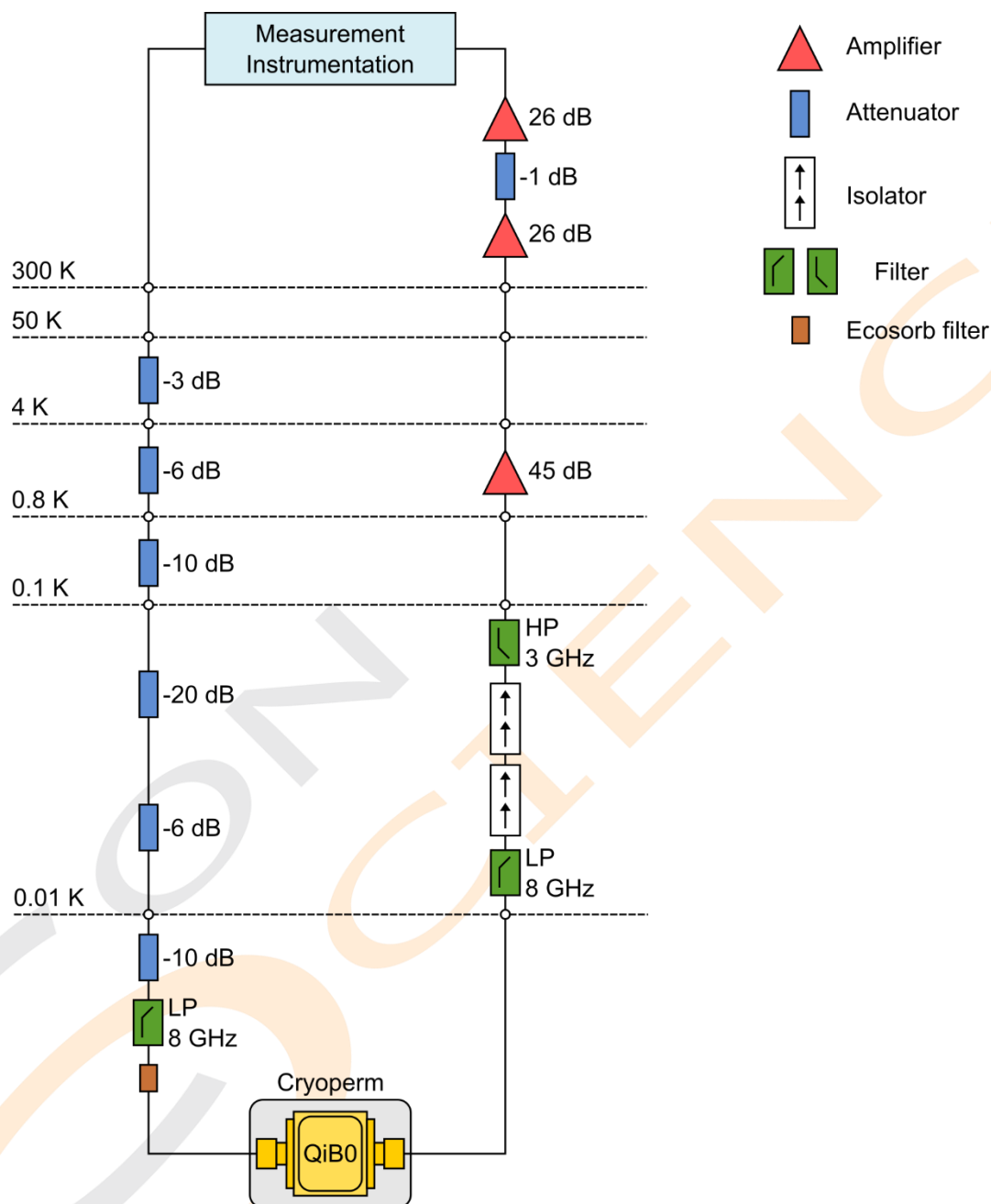
Reference device: CS_QIB0_15

Qubit characteristics			
	ω_q (GHz)	ω_r (GHz)	T_1 (μ s)
Qubit 1	4.346	5.987*	131.15
Qubit 2	4.507	6.162*	116.11
Qubit 3	4.561	6.288*	107.31
Qubit 4	4.716	6.432*	90.58
Resonator 1	-	6.724	-
Resonator 2	-	6.910	-



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

Recommended measurement setup

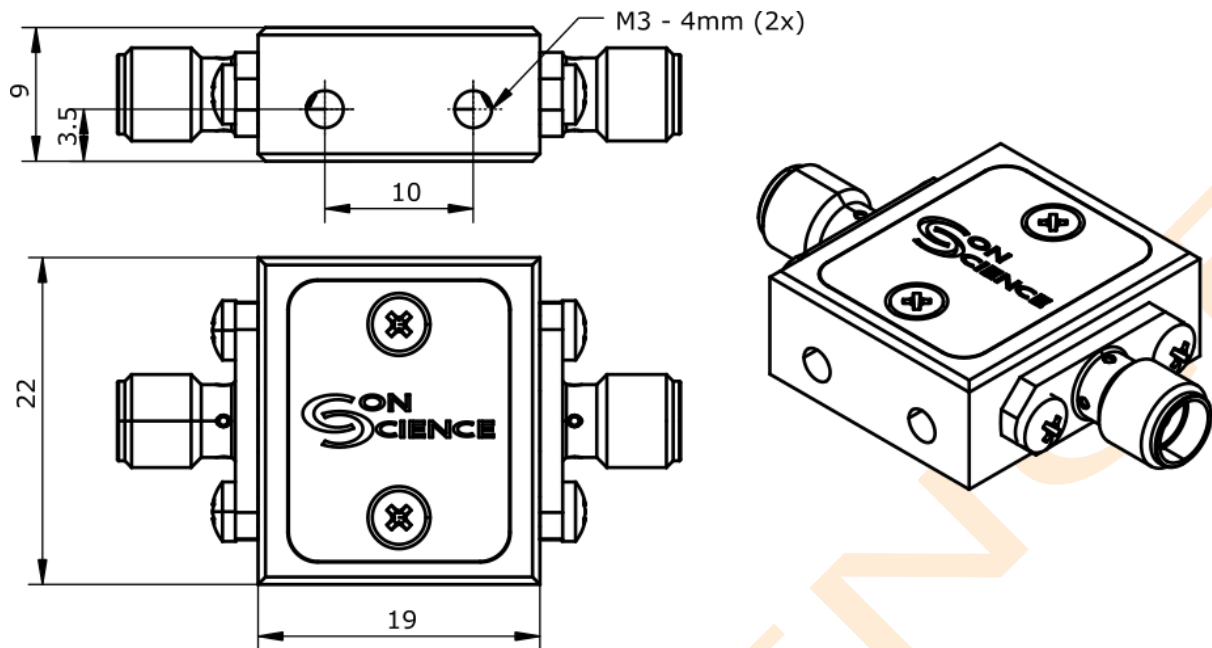


Installation

1. Mount the QiB0 with 2 M3-4mm screws to a mixing chamber plate of a dilution refrigerator. The optimal operating temperature is below 50 mK.
2. Connect one end of the SMA connectors to the signal input line and another end to the readout line.

Dimensions

Units: mm



Dual-use (can be used for both civilian and military application)

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.