

# Quside PCIe One



The Quside PCIe One is a **quantum random number generator** designed for 1Gb/s raw randomness generation on a standard PCIe interface. The PCIe One is delivered with all embedded firmware and software libraries.

## Applications

Random numbers are required in a broad range of applications, including cybersecurity, high-performance computation, or gambling. The PCIe One is designed for high-performance quantum random generation for a broad range of target computing devices.

- Quantum random number generation
- Crypto-agile & quantum-safe deployments.
- Quantum key distribution
- Post-quantum cryptography
- Advanced entropy monitoring
- Cloud security
- Entropy-as-a-Service
- High-performance Monte Carlo simulations
- Synthetic data generation

## Features

- 1 Gb/s raw generation rates
- Above 82% quantum min-entropy bounds.
- Average min-entropy above 92%.
- Standard PCIe Gen 2x4 interface
- Compliant with NIST SP800B recommendations and passes DieHarder and NIST SP800-22 test suites.
- Metrology and monitoring of the entropy source and entropy quality
- Linux compatible drivers and libraries for C and Python

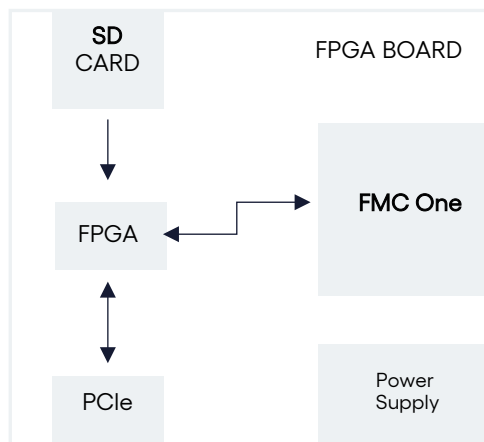


Figure 1. Block diagram of the PCIe One.

Figure 1 shows a block diagram of the PCIe One. The system consists of an FMC One module that is the quantum entropy source connected to an FPGA using a standard FMC connector. The FPGA allows post-processing of the QES signal, providing the user with quality monitors as well as system status management.

## Electrical SPECIFICATIONS

	Units	Min	Typ	Max
Power consumption	W		11	

## Status monitor SPECIFICATIONS

	Units	Min	Typ	Max
Bias monitor	mA	29	30	31
Temperature monitor <sup>1</sup> (T = environmental temp.)	°C			T + 20

## RANDOMNESS SPECIFICATIONS

	Units	Min	Typ	Max
Quantum min-entropy <sup>2</sup>	Bits	0.82	0.92	
Raw bit rate	Mbps		1000	
Extracted bit rate <sup>3</sup>	Mbps		~727	

## Absolute maximum ratings

	Units	Min	Typ	Max
Operating Temperature <sup>4</sup>	°C	20	25	50
Storage Temperature	°C	0	25	80

<sup>1</sup> At Tamb = 25°C

<sup>2</sup> Quantum conditional min-entropy [R. König, R. Renner, & C. Schaffner (2009), [IEEE Trans. Inf.](#), 55(9), 4337-4347] based on the physical model developed in [C. Abellán et al. (2015), [Phys. Rev. Lett.](#) (2015), 115(25), 250403].

<sup>3</sup> Extraction from 352 bits to 256 bits, using the randomness extractor from [D. Frauchiger, R. Renner, & M. Troyer (2013), [arXiv:1311.4547](#)].

<sup>4</sup> TBC

### OS compatibility

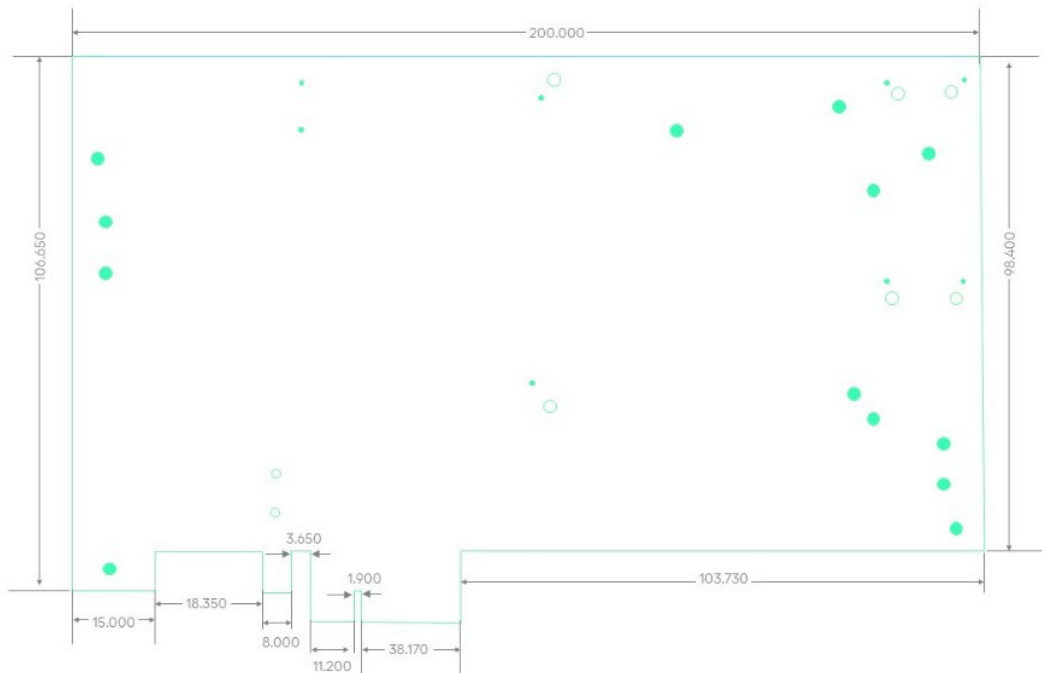
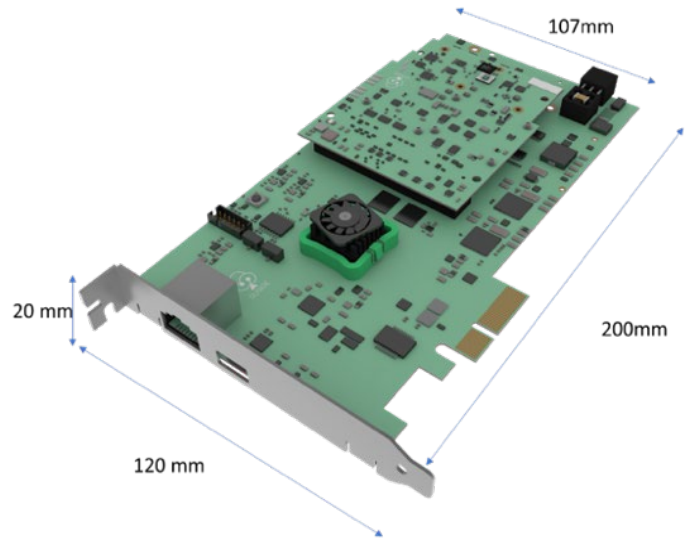
The system is compatible with LINUX Ubuntu 20.04.

### Mechanical specifications

The Quside™ PCI One is composed by the FPGA board and the FMC One.

Dimensions:

- Full Height (107 mm for the board)
- Full Length (more than half length but less of a full length: 200 mm for the board)
- Single-slot PCIe card (20 mm)



Thanks for being part  
of our quantum journey!