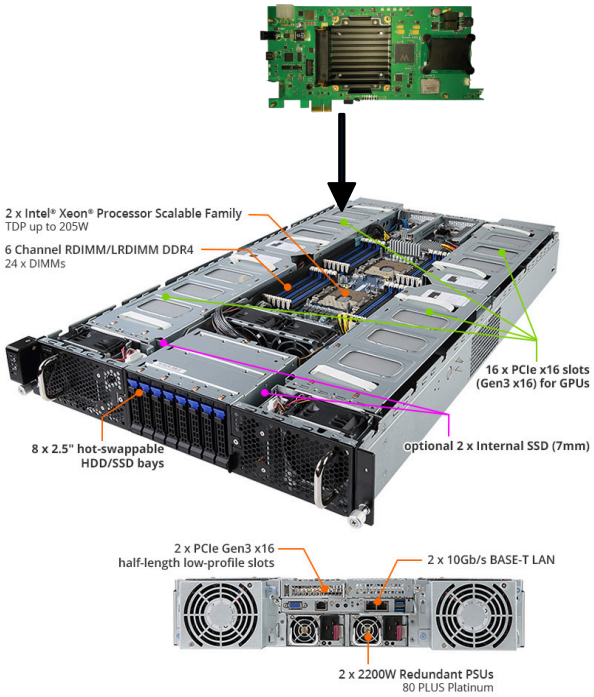
RaP Solutions for Datacenters

Thanks to our partner company E4 Computer Engineering, leading the field of high performance computing and datacenter technologies, the **RandomPower consortium can provide custom datacenter solutions embedding our Quantum Entropy sources**, such as the 64x Multi Generator Board. Our datacenter solutions achieve high density: it is possibile to configure high performance dual CPU servers with up to 8 PCIe board, reaching the number of **512 generators (8 Gbit/s at the DRBG output) in 2 standard rack units**. The server solutions are based on the platforms Gigabyte 293 or the SuperMicro Hyper A+ AS-2025, but our boards can be easily integrated also inside other solution, depending on the specific use case.

The servers can be configured in different flavours: optimized for computing, optimized for storage, optimized for network bandwidth (including optical NICs up to 40 Gbit/s), thus **satisfying different applications of quantum randomness ranging from cloud storage encryption, differencial-privacy-protected database hosting, privacy applied to AI models and datasets and large-scale Monte Carlo simulations for complex system modelization in science, industry and finance.**



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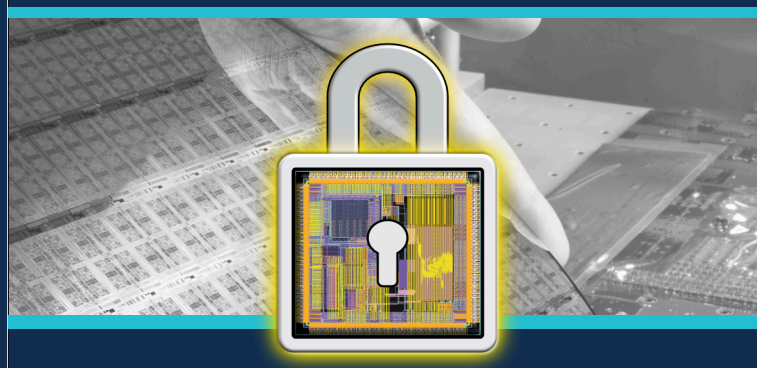
RANDOM POWER



Secure your World with a Quantum True RNG

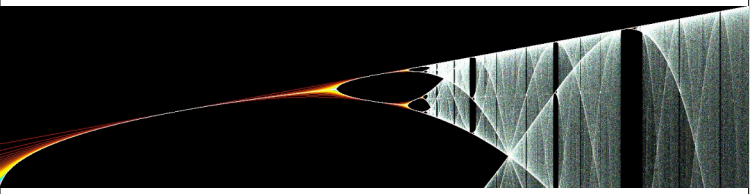
Quantum entropy generators for ultimate security, privacy, industrial and scientific applications:

- Security for critical networks
- Security for IoT
- Security for Datacenters
- Data obfuscation for privacy-safe data mining & AI
- High accuracy & large scale Monte Carlo simulations for finance and science
- Fully user-customizable solutions

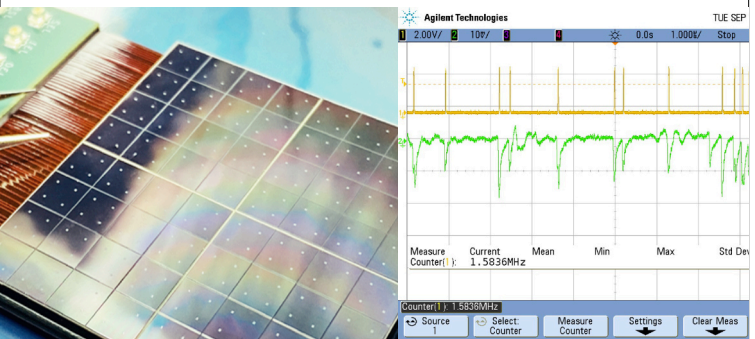
A “Quantum Coin Flipper” for privacy, security, AI and data science

Nowadays **randomness is one of the fundamental ingredients** at the core of the information technology, powering all the **encryption** and **authentication** algorithms that protect our digital lives. Furthermore, novel technologies are being developed for ensuring **privacy** and **confidentiality** of the **big data** used for training complex **AI** models, and all of them requires high-quality randomness. Finally, the modelization of complex systems in **finance**, **industry and science** is often based on “Monte Carlo” simulations, whose accuracy depends on the quality of the required Randomness.

By extracting **endless sequences of bits from quantum events**, such as the quantum tunneling through an energy barrier, the **Random Power technology provides top-quality entropy at high throughput**.



Random Power starts as an academic spin-off of research teams from the University of Insubria in Como, Italy and the AGH University of Science and Techology in Krakow, Poland, with **top-level experience in the design of CMOS sensors for high-energy physics experiments at CERN**. This expertise lead to the design of a technology that exploits the **quantum tunneling effect occuring inside semiconductors, being it is also compatible with commercial CMOS processes**, therefore it is less expensive and much easier to integrate inside commercial product than the photonics solutions proposed by our competitors.

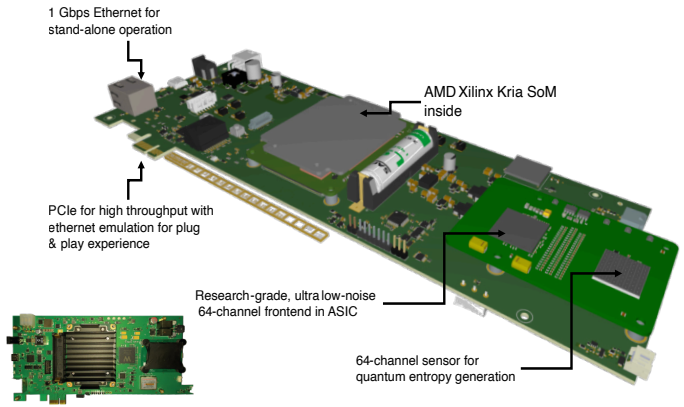


Our solutions: Single Generator Board & 64x Multi Generator Board

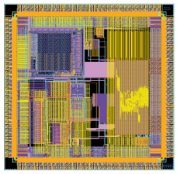
The first implementation of the innovative RandomPower concept is a **single generator USB board**, smaller than a credit card, that can provide up to **100 kHz of quantum entropy** with on-board health tests and SHA-256 real-time entropy whitening.

The device is compatible with **Windows, Linux and MacOS** and comes with a testing **GUI** and a **Python SDK**. The board is also capable of streaming the entropy to other boards. The board is capable of performing **entropy injection into the /dev/random entropy pool in Linux** and can provide entropy to the backend of the widespread **numpy** library for Python. The quality of the randomness has been extensively qualified with the **NIST** standard test suites and the **TESTU01** suite by Pierre l’Ecuyer.

The natural evolution is the **64x Multi Generator Board**, that can operate in both **stand-alone mode**, connected to an ethernet network, or as a **PCIe card inside a server**. The board embeds a powerful quad-code ARM embedded computer, including 4 GB RAM and 16 GB eMMC. The **total throughput is up to 1 Gbit/s** at the DRBG output and the board is the ideal **platform** for the deployment of **custom applications** exploiting the quantum entropy for data and stream encryption, privacy and computing applications. The system can be customized just as any other ARM-based single board computer, but the product is bundled with a collection of ready-to-use applications as well.



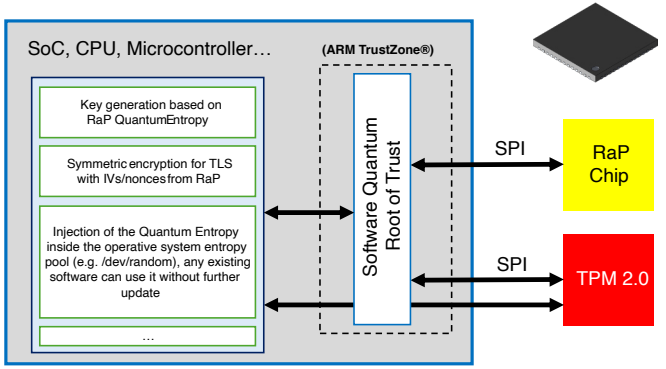
Our solutions: the Random Power chip, for critical IoT devices



The RandomPower chip is the flagship of the RandomPower technology. It is based on a commercial mixed-signal CMOS process and **it can be integrated inside any product with the same easiness of any QFN100 integrated circuit.**

The chip needs a simple single-rail power supply and offers two separate SPI (24 MHz) interfaces, being compatibile with almost any SoC, CPU, FPGA or MCU on the market. The first SPI channel is used for configuration and for setting the **AES-256 key used for the random bits encryption**, while the second channel is used for the actual streaming of the data.

Applications:
- Used together with a commercial secure element (TPM), allows easy embedding of **Quantum Root of Trust** in your product, for top-level security
- **Industrial gateways**, critical infrastructure communication nodes
- **IoT devices**, smart city, automotive
- **Networking:** VPN endpoints, TLS accelerators, post-quantum-cryptography security modules



Network devices: VPN endpoints, firewalls, mobile devices and high-end radios

Industry & critical infrastructures: PLC gateways, remote ctrl units

IoT & Professional IT: Smart devices, automotive, smart cities, security cameras