

THE NEXT GENERATION OF INNOVATIVE TWPAS

ONE STREAMLINED ARCHITECTURE

By integrating Silent Waves' TWPA and pump coupler into a single compact device, the Zephyr redefines performance, efficiency, and footprint at the millikelvin stage. It unifies amplification and coupling in one streamlined readout architecture.

MORE COMPACT

The Zephyr reduces system footprint by 2x. For large-scale quantum processors – where every millimeter cube at base temperature matters – this enables higher channel density, simplified mechanical integration, and more efficient use of cryogenic space.

HIGHER QUANTUM EFFICIENCY

By eliminating the external coupler and associated interconnects, the Zephyr reduces insertion losses by 0.5–1 dB between source and amplifier. This translates into a 1.12–1.26x improvement in overall quantum efficiency – a meaningful gain for organizations focused on getting the best readout performance from their quantum devices.

EASIER TO INSTALL

As a single fully-integrated, plug-and-play module, each Zephyr is rigorously cryogenically tested before shipment and arrives ready for installation. By eliminating external couplers and additional interconnects, the Zephyr reduces complexity and lowers the risk of integration errors.

INNOVATIVE QUANTUM READOUT DEVICES HIGH-PERFORMANCE QUBIT AMPLIFICATION AND PUMP COUPLING IN ONE COMPACT ARCHITECTURE

At Silent Waves, we specialize in delivering reliable, high-performance quantum readout solutions. Our products are built on years of R&D conducted at the forefront of internationally recognized quantum research laboratories.

We believe that compact, high-performance architectures like those pioneered by Silent Waves will be critical elements for scaling quantum computers from laboratory systems to impactful, real-world applications.



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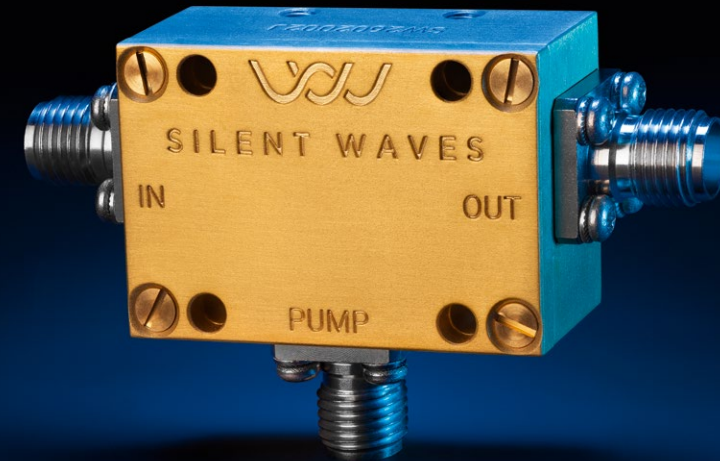
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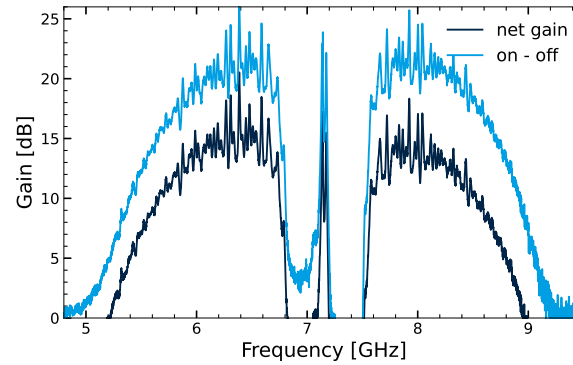
THE ZEPHYR

INTEGRATED
TWPA & PUMP COUPLER
SOLUTION

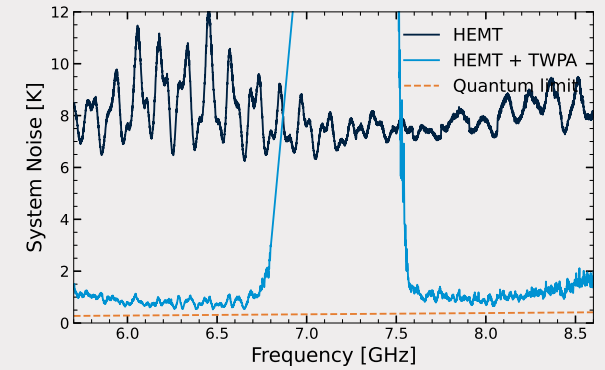
THE ZEPHYR

The Zephyr integrates our landmark Argo Traveling-Wave Parametric Amplifier (TWPA) with an on-chip pump coupler. The integrated low-loss coupler reduces the number of connectors and cables, minimizing space requirements and insertion losses. This makes the Zephyr the ultimate plug-and-play solution for enhanced readout performance.

GAIN FIGURE



TOTAL SYSTEM NOISE



TWO PRODUCTS IN ONE

- Argo amplifier
- Integrated pump coupler
- Easy-to-install
- 50 ohm matched
- No magnetic bias
- Compact form-factor

FIGURES OF MERIT



Max net gain
>15 dB



Bandwidth
2 GHz



Saturation power
-100 dBm
(at 20 dB gain)



Added noise
~ 1.5 SQL

PUBLICATIONS

- Planat et al., Phys. Rev. X 10, 021021 (2020)
- Ranadive et al., Nat. Com. 13, 1737 (2022)
- Ranadive et al., Nat. Electron 8, 1089 (2025)



FULLY CRYO-CHARACTERIZED

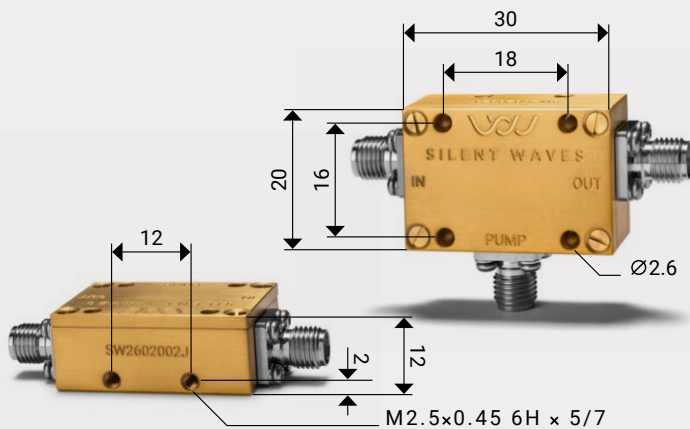
Every Zephyr undergoes comprehensive performance characterization prior to shipment, including full cryogenic testing at 20 mK. Each unit is delivered with a detailed characterization report provided to customers ahead of shipment, ensuring complete transparency and verified performance from day one.

CUSTOMIZEABLE

The Zephyr features a standard gap frequency position between 6–7 GHz, with customizable configurations available across the 4–8 GHz range that can be tailored to meet specific system requirements.

THE ZEPHYR COMES WITH

- 1-Year Off-Site Warranty
- Pre-Integration System Assessment
- 10 Hours of Dedicated Remote Support



SATURATION CURVES

