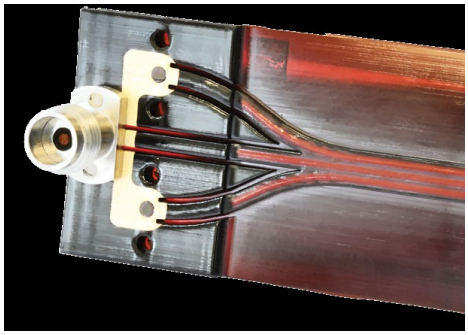
QTREX

TECHNICAL DATA SHEET
September 2026

HIGH-DENSITY CRYOGENIC I/O INFRASTRUCTURE

AME Coaxial Interconnect



Coaxial lines and thermal interface formed as one AME component.

Coaxial lines formed in a single build. Conductor, dielectric, shielding and routing are printed together as one monolithic structure, designed to carry control and readout signals from the cryostat stage to the processor interface.

- One integrated structure: conductor, dielectric, shielding and routing in a single Additively Manufactured Electronics (AME) build. No cable-by-cable assembly.
- Round and rectangular coaxial geometries. Lower-profile rectangular coax enables denser stacking.
- Software-defined geometry: closed coaxial shields and customer-specific routing inside the part.
- 54-channel coaxial interconnect produced. Full-scale architecture supports up to 17,280 coaxial lines per cryogenic stage.
- Room-temperature RF characterization to 20 GHz completed. Cryogenic RF, thermal-load and reliability qualification underway.

General properties

Transmission-line type	Coaxial, closed shield
Geometry	Round or rectangular coax
Manufacturing	Single-build AME process
Conductor	Printed silver, 24k gold electroplated
Dielectric	INSU 300 polyimide-based low-loss material
Channels produced	54 per interconnect
Channel capacity, full-scale architecture	Up to 17,280 lines per cryogenic stage
Line length	Customer-specific (test articles: 150 mm)
Connector interface, test articles	2.92 mm
Form factor	Rigid and flexible interconnect components

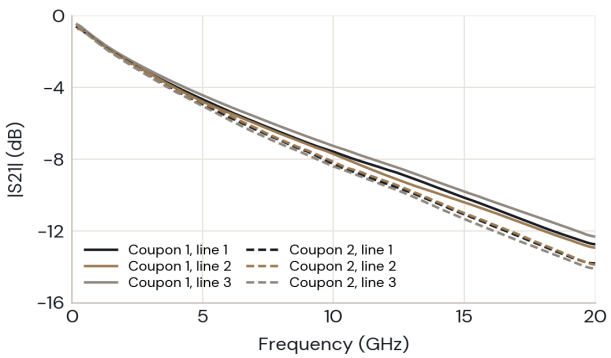
Electrical properties

Measured at 300 K, six lines on two coupons

Characteristic impedance	Designed for 50 Ω · measured 51.3–54.0 Ω, 5–20 GHz
Characterized bandwidth	10 MHz to 20 GHz
Insertion loss, 150 mm line	1.34–1.50 dB @ 1 GHz · 6.19–7.17 dB @ 8 GHz · 12.37–14.22 dB @ 20 GHz
Loss per unit length, six-line mean	0.097 dB/cm @ 1 GHz · 0.449 dB/cm @ 8 GHz · 0.892 dB/cm @ 20 GHz
Return loss, worst case to 20 GHz	≤ -18.6 dB (S11) · ≤ -19.3 dB (S22)
VSWR, peak, either port	≤ 1.27
Group delay, 150 mm line	0.99–1.00 ns · delay flatness ≤ 72 ps
Crosstalk, adjacent lines	≤ -68 dB peak · margin ≥ 55.8 dB

Insertion loss, six printed coaxial lines

|S21| vs. frequency, 150 mm lines, 300 K, 10 MHz to 20 GHz



Attenuation

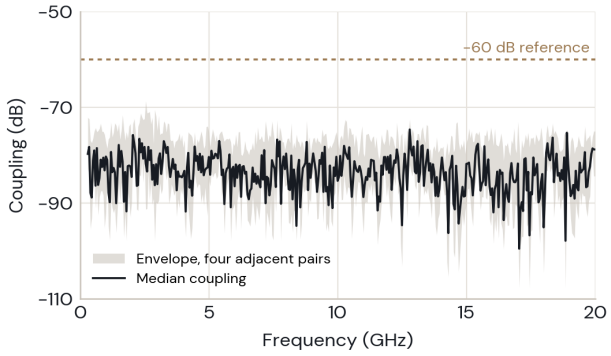
dB per 150 mm line · mean dB/cm

Frequency	300 K	77 K	4 K
1 GHz	1.34–1.50 dB 0.097 dB/cm	†	†
8 GHz	6.19–7.17 dB 0.449 dB/cm	†	†
20 GHz	12.37–14.22 dB 0.892 dB/cm	†	†

† Cryogenic RF characterization in progress with development partners. Results are shared under NDA as part of a joint evaluation.

No resonance or discontinuity observed across the 4001-point sweep. |S21| to |S12| agreement within 0.027 dB on all six lines.

Crosstalk coupling, adjacent printed coaxial lines
Near-end and far-end coupling, four measured pairs, 300 K



Channel-to-channel consistency

300 K

Crosstalk, adjacent pair, peak	-68.0 dB @ 2.57 GHz
Signal-to-crosstalk margin	≥ 55.8 dB (floor-limited, lower bound)
Insertion-loss spread within a coupon	≤ 0.24 dB @ 8 GHz (five comparable lines)
Impedance spread within a coupon	≤ 0.9 Ω, 5–20 GHz (five comparable lines)
Group-delay spread, five comparable lines	≤ 7 ps
Reciprocity, |S21| vs. |S12|	≤ 0.027 dB

Dielectric material

Printed low-loss polyimide-based dielectric

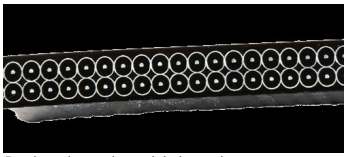
Property	INSU 300	INSU 400 (prelim.)
Dielectric constant (ε′), 1–20 GHz	3.44–3.60	—
Dissipation factor (tan δ), 1–20 GHz	0.0165–0.0195	< 0.01
Glass transition, Tg (DMA)	240 °C	260 °C
CTE (TMA)	46–68 ppm/°C (30–250 °C)	55–58 ppm/°C (25–150 °C)
Tensile strength	110 MPa	90 MPa
Elongation at break	11 %	65 %
Elastic modulus	2.6 GPa	—
Decomposition temp., Td 2 % (TGA)	> 400 °C	—
Density	1.28 g/cm³	—
Flame retardancy	UL94 V-0	—

Test methods: IPC-TM-650, ASTM D638, ISO 527, ASTM D792, UL94, UL 796F. Dielectric measurements 1–20 GHz. INSU 400 values preliminary.

Thermal and cryogenic

300 K	50 K	4 K	Still	Cold plate	mK / QPU

Operating range	Designed for one structure from cryostat stage to processor interface
Thermal anchoring	Designed for anchoring across cryogenic stages; thermal interface formed in the same build
Cryogenic qualification	In progress with development partners; joint evaluation of customer-specific lines available
Passive heat load per channel	† Under validation
Cryogenic RF performance	† Under validation


Produced round coaxial channels


Rectangular coaxial channels, seen by X-ray

DISCUSS YOUR CRYOGENIC I/O REQUIREMENTS

Your system defines the geometry, routing, shielding, grounding, thermal contact, connector interfaces and qualification plan. Share your processor and cryostat details, channel count, RF requirements, thermal budget and geometry. QTREX turns those inputs into an engineering configuration and a commercial proposal.

info@q-trex.com

Test conditions: vector network analyzer, 10 MHz to 20 GHz, 4001 points, full two-port error correction, 50 Ω reference, 2.92 mm interfaces, 150 mm printed coaxial lines, room temperature. Insertion-loss figures are ranges across six lines on two coupons; crosstalk was measured on four adjacent line pairs of the preceding coupon set. Preliminary data; specifications are subject to change without notice.

QTREX Quantum Ltd. (Nasdaq: QTEX) is a technology company focused on advanced connectivity and electronics manufacturing solutions for next-generation hardware markets. Following its acquisition of the AME platform, the Company is developing high-density, thermally optimized quantum connectivity solutions for dilution cryostats and advancing AME applications for defense, aerospace, missile, space, and other mission-critical environments.

CONTACT
q-trex.com
info@q-trex.com
linkedin.com/company/q-trex/