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Reinventing Telemetry™

Quasonix

QUASONIX PRODUCT CATALOG

Pg. 2

Rack-Mount RDMS™ Telemetry Receiver

The highest performing telemetry receiver on the market is now available in an elegant and compact 1U rack-mount package. Features up to four channels with optional diversity combining and frequency coverage in the P, Lower L, Upper L, S, and C bands.

Pg. 6

Airborne RDMS™ Telemetry Receiver

This flight-ready 12 in^3 receiver / demodulator / bit synchronizer features 6 to 8 dB better sensitivity than the competition and optional tri-band coverage (Lower L, Upper L, S) for the ultimate frequency flexibility. That's exceptional performance, no matter the size.

Pg. 10

nanoTX™ Telemetry Transmitter

Introducing the smallest multi-mode ARTM transmitter *ever*. At 1.3 in^3, this diminutive unit offers all of the same features as its bigger brother, TIMTER – including PCM/FM, SOQPSK-TG, and ARTM CPM modulation modes – while delivering 1, 2, 5, or up to 10 watts.

Pg. 10

TIMTER™ Telemetry Transmitter

The new 3rd generation TIMTER offers the finest combination of performance and value on the market. TIMTER is available in a single, tri-band, or quad band configuration, with an extremely efficient power amplifier capable of delivering up to 20 watts, and plenty of optional add-ons for application-specific tailoring.

Pg. 14

DMS™ Telemetry Demodulator

Quasonix' multi-mode, multi-symbol trellis demodulator is regarded as the industry benchmark for ARTM waveform demodulation with its unprecedented BER performance, short synchronization time, and low sync threshold. Available in several configurations: a circuit-card assembly for OEMs, a 4 in^3 airborne enclosure, or a 1U rack-mount enclosure.

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RACK-MOUNT RDMS™ TELEMETRY RECEIVER

- ***Complete Receiver – RF to Bits***
  A single-box solution that includes a downconverter, demodulator, and bit synchronizer.
- ***Versatile Rack-Mount Enclosure***
  Custom 1U 19" rack-mount chassis houses as many as 4 receiver channels covering P, lower L, upper L, full S, C, or multiple bands per channel.
- ***True Trellis Demodulation in all ARTM Modes***
  Provides true multi-symbol trellis detection in all three ARTM modes for optimal demodulation.
- ***Best SOQPSK-TG Detection in the Industry***
  RDMS's trellis detection for SOQPSK-TG yields improvements of 2 dB or more over the competition's single-symbol detectors.
- ***3.5 to 5 dB Improvement in PCM/FM Performance***
  Improves BER performance by 3.5 to 5 dB over the best single-symbol demodulators, to within 0.2 dB of the theoretical limit.
- ***NEW Enhanced Modulation Index Tracking* for PCM/FM***
  Maintains superior BER performance even if the received signal's modulation index varies by as much as 500%, a major breakthrough for tracking legacy analog transmitters.
- ***Phase Noise Compensation***
  Optimizes demodulator performance for use with transmitters with excessive phase noise.
- ***Lowest Noise Figure***
  Typical 3.5 dB noise figure bests all other ARTM receivers on the market, hands down.
- ***Rapid Synchronization***
  Synchronizes up to 100 times faster – and maintains sync at lower signal-to-noise ratios – than any other ARTM demodulator.
- ***Optional Diversity Combiner***
  Available pre-detection diversity combining is performed digitally for superior signal fidelity.

* Patent pending

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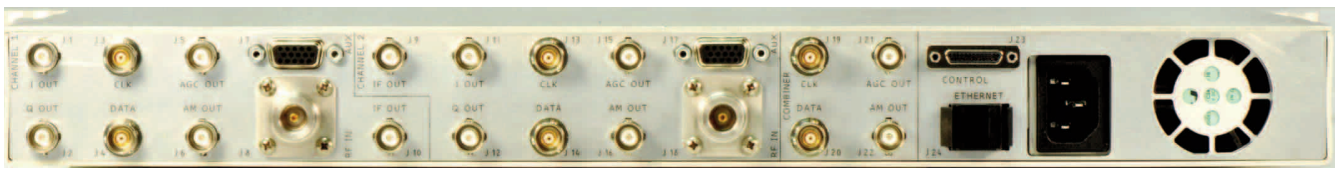
RACK-MOUNT RECEIVER SPECIFICATIONS:

Characteristic	Specification
Receiver Section	
Type	Dual-conversion superheterodyne
Input RF frequency	P band: 400.0 - 1100.0 MHz Lower-L band: 1435.5 - 1534.5 MHz Upper-L band: 1750.0 - 1855.0 MHz S band: 2200.5 - 2394.5 MHz Tri band: Lower L, Upper L, S C band: 4440.0 - 4940.0 MHz, 5091.0 - 5150.0 MHz Quad band: Lower L, Upper L, S, and *either* P or C
Tuning resolution	500 kHz
Frequency stability	1 ppm over temperature 1 ppm per year aging
Reference oscillator	20 MHz
Noise figure	3.5 dB (typical), 5 dB (maximum)
LO phase noise at 70 MHz IF output	-115 dBc/Hz @ 1 MHz offset
Max RF input	+20 dBm
Available gain (to 70 MHz IF output)	114 dB
Gain control	128 dB control range User selectable: AGC or MGC (AGC freeze)
AGC time constant	Adjustable, 0.1 ms to 1000 ms
First IF bandwidth	60 MHz (nominal)
IF rejection	> 90 dB
Image rejection	70 dB
RF input impedance	50 Ohm
VSWR	2:1 Max; 1.5:1 Typical
Second IF Section	
IF frequency	70 MHz
IF output level	0 dBm nominal (AGC mode)
IF output impedance	50 Ohm
VSWR	2:1 Max; 1.5:1 Typical
IF bandwidths	250 kHz, 500 kHz, 1 MHz, 2 MHz, 4.5 MHz, 10 MHz, 20 MHz, 40 MHz. Automatic selection based on modulation type and data rate, with manual override. Optional: 70 kHz, 1.4 MHz, 3 MHz, 6 MHz, 14 MHz, 28 MHz
Demodulator Section	
Demodulator type	ARTM Tier 0 (PCM/FM) ARTM Tier I (SOQPSK-TG) ARTM Tier II (Multi-h CPM) Legacy suite: Analog FM, BPSK, QPSK, Offset QPSK (OQPSK), Asymmetric QPSK (AQPSK), Unbalanced QPSK (UQPSK), Asymmetric Unbalanced QPSK (AUQPSK), Digital PM
Bit rates	Tier 0: 24 kbps to 23 Mbps in 1 bps steps Tier I: 100 kbps to 46 Mbps in 1 bps steps Tier II: 1 Mbps to 37 Mbps in 1 bps steps (46 Mbps available Q1 2011) Legacy: 25 kbps to 20 Mbps in Analog FM, 50 kbps to 10 Mbps in BPSK, 50 kbps to 20 Mbps in QPSK in 1 bps steps

RACK-MOUNT RECEIVER SPECIFICATIONS:

Characteristic	Specification
Synchronization time (average) *See pg. 19 for sync data plots*	Tier 0: 250 bits @ 0 dB E_b/N_0 Tier I: 385 bits @ 2 dB E_b/N_0 Tier II: 2,800 bits @ 2 dB E_b/N_0
Acquisition threshold *See pg. 19 for threshold data plots*	Tier 0: -2 dB E_b/N_0 Tier I: 0 dB E_b/N_0 Tier II: 2 dB E_b/N_0
Bit Synchronizer Section	
Input codes	NRZ-L/M/S, BIΦ-L/M/S
Output codes	NRZ-L/M/S, BIΦ-L/M/S
Data & clock out	TTL or RS-422
Lock detector out	TTL
Video Section	
Video out	Dual wideband outputs, DC to 35 MHz Single narrowband output, DC to 2 MHz
Video filter bandwidth	User programmable
Output level	1 Vp-p nominal, 4 Vp-p maximum
NTSC de-emphasis	Selectable on/off
Environmental Section	
Operating temperature	0°C to +50°C
Non-operating temperature	0°C to +70°C
Operating humidity	0 to 95% (non-condensing)
Altitude	Up to 30,000 ft. (with the no displays options)
Physical Section	
Size	1U rack-mount chassis; 19" wide, 1.75" tall, 14-5/16" rack depth, 15-11/16" overall depth
Weight	9.4 lbs. (dual-channel)
Connectors – per RF channel	RF In: Type-N female I Out, Q Out, Clock Out, Data Out, IF Out, AGC Out, AM Out: BNC female Status/SDI Out: DB-15 High Density female
Connectors – combined channel	Clock Out, Data Out, AGC Out, AM Out: BNC female
Connectors – per chassis	Ethernet: RJ-45 Data: USB Control: MDM-25 male
Power	100 to 240 VAC, 50/60 Hz

REAR PANEL LAYOUT – DUAL CHANNEL:



RACK-MOUNT RECEIVER SPECIFICATIONS:

MODEL NUMBERS:

QSX-RDMS-RM ◯ - ◯ - ◯ ◯ ◯ ◯ - ◯ - ◯ ◯ ◯ ◯ - ◯

- Number of Channels (**1, 2, 3, 4**)
- Band (**L** for Lower L, **U** for Upper L, **S, M** for Tri (LL+UL+S), **P, C, Q** for Quad (LL+UL+S+C), **R** for Quad (P+LL+UL+S))
- PCM/FM (**1** = Include, or **0** = Exclude)
- SOQPSK-TG (**1** or **0**)
- ARTM CPM (**1** or **0**)
- Legacy (PSK) (**1** or **0**)

Channel 1

- Band (**L** for Lower L, **U** for Upper L, **S, M** for Tri (LL+UL+S), **P, C, Q** for Quad (LL+UL+S+C), **R** for Quad (P+LL+UL+S))
- PCM/FM (**1** or **0**)
- SOQPSK-TG (**1** or **0**)
- ARTM CPM (**1** or **0**)
- Legacy (PSK) (**1** or **0**)

Optional Channel 2

⋮

- Options (separate multiple options with a dash, "-")

OPTIONAL FEATURES:

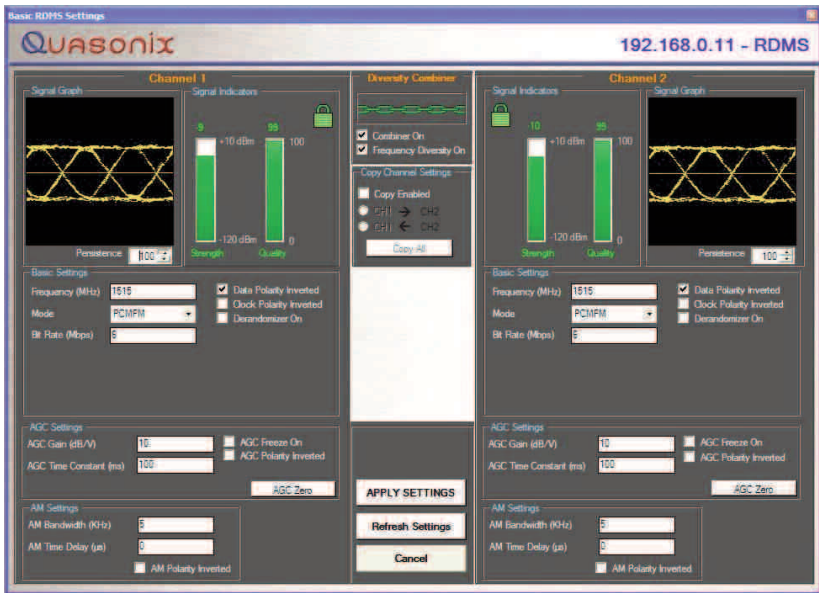
> DC — Pre-detection diversity combiner for a dual-channel receiver

> DC2 — Two pre-detection diversity combiners for a quad-channel receiver

> ND — Blank front panel with no displays or keypad

> RS — RS-422 clock and data outputs on 3-lug triax connectors

REMOTE RDMS CLIENT:



Features

> Ethernet-based application

> Intuitive layout with all primary control and monitoring functionality for Channel 1, Channel 2, and Combined Channel in one window

> Scalable to 255 networked units

> Field upgradeable

System Requirements

> Windows XP or newer OS

> Microsoft .NET Framework

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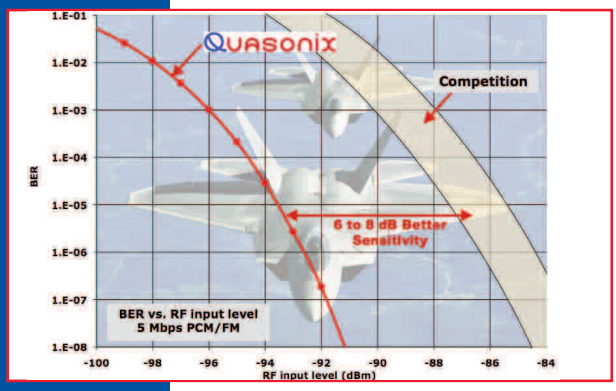
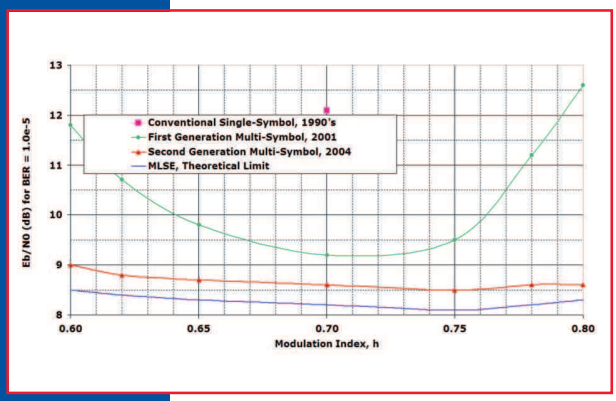
AIRBORNE RDMS™ TELEMETRY RECEIVER





- ***Complete Receiver – RF to Bits***
  A single-box solution that accepts RF signals, and delivers baseband clock and data. No external add-ons required.
- ***Flight-Ready Airborne Package***
  Ultra-compact 12 cubic-inch airborne chassis affords flexibility with system integration.
- ***True Trellis Demodulation in all ARTM Modes***
  Provides true trellis detection in all three ARTM modes for optimal demodulation.
- ***3.5 to 5 dB Improvement in PCM/FM Performance***
  Improves BER performance by 3.5 to 5 dB over the best single-symbol demodulators, to within 0.2 dB of the theoretical limit.
- ***Modulation Index Tracking* for PCM/FM***
  Maintains superior BER performance even if the received signal's modulation index changes by up to ±15%.
- ***Phase Noise Compensation***
  Optimizes demodulator performance for use with transmitters with excessive phase noise.
- ***Best SOQPSK-TG Detection in the Industry***
  RDMS's trellis detection for SOQPSK-TG yields improvements of 2 dB or more over the competition's single-symbol detectors.
- ***Lowest Noise Figure***
  3.5 dB noise figure bests all other ARTM receivers on the market, hands down.
- ***Rapid Synchronization***
  Synchronizes up to 100 times faster – and maintains sync at lower signal-to-noise ratios – than any other ARTM demodulator.

* Patent pending

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*The Quasonix RDMS™ Receiver's sensitive downconverter and high-performance demodulator combine to provide a solution that is **6 to 8 dB** better in overall receive sensitivity than the competition.*

PERFORMANCE. PERIOD.

Quasonix' multi-mode airborne telemetry receiver combines an extremely sensitive RF front end with superior ARTM waveform detection, demodulation, and bit synchronization in a compact 12 cubic-inch flight-ready package.

*By combining a noise figure of 3.5 dB and multi-symbol trellis demodulation that produces 2 to 5 dB better detection efficiency than competing demodulators in all three ARTM modes, the Quasonix Receiver achieves a remarkable **6 to 8 dB advantage in receive sensitivity** over the industry's previous standard-bearers.*

*The 12 cubic inch (3.00" x 4.00" x 1.00") airborne receiver is available for Lower-L band (1435.5 - 1534.5 MHz), Upper-L band (1750.0 - 1855.0 MHz) , or S band (2200.5 - 2394.5 MHz) operation. A brand-new and market-first **tri-band** version is also now available.*

Options for the RDMS Receiver include a finned heat sink cover for better heat dissipation, a double-rate SOQPSK mode for operation up to 46 Mbps, and a 37-pin MDM connector for additonal output signals, including multiple sets of clock and data, and both high-speed and low-speed analog outputs.

Photo courtesy of U.S. Air Force

AIRBORNE RECEIVER SPECIFICATIONS:

Characteristic	Specification
Receiver Section	
Type	Dual conversion superheterodyne
Input RF frequency	Lower-L band: 1435.5 MHz to 1534.5 MHz Upper-L band: 1750.0 MHz to 1855.0 MHz S band: 2200.5 MHz to 2394.5 MHz
Tuning resolution	500 kHz
Frequency stability	1 ppm over temperature 1 ppm per year aging
Reference oscillator	20 MHz
Noise figure	3.5 dB (nominal), 5 dB (maximum)
LO phase noise, measured at 70 MHz IF output	-115 dBc/Hz @ 1 MHz offset
Max RF input	+20 dBm
Available gain (to 70 MHz IF output)	114 dB
Gain control	128 dB control range User selectable: AGC or MGC (AGC freeze)
AGC time constant	Adjustable, 0.1 ms to 1000 ms
First IF bandwidth	60 MHz (nominal)
IF rejection	> 90 dB
Image rejection	70 dB
RF input impedance	50 Ohm
VSWR	2:1 Max; 1.5:1 Typical
Second IF Section	
IF frequency	70 MHz
IF output level	0 dBm nominal (AGC mode)
IF output impedance	50 Ohm
VSWR	2:1 Max; 1.5:1 Typical
IF bandwidths	250 kHz, 500 kHz, 1 MHz, 2 MHz, 4.5 MHz, 10 MHz, 20 MHz, 40 MHz. Automatic selection based on modulation type and data rate, with manual override option.
Demodulator Section	
Demodulator type	PCM/FM (ARTM Tier 0) SOQPSK-TG (ARTM Tier I) ARTM CPM (ARTM Tier II) Legacy suite: Analog FM, BPSK, QPSK, Offset QPSK (OQPSK), Asymmetric QPSK (AQPSK), Unbalanced QPSK (UQPSK), Asymmetric Unbalanced QPSK (AUQPSK), Digital PM
Bit rates	Tier 0: 24 kbps to 23 Mbps in 1 bps steps Tier I: 100 kbps to 46 Mbps in 1 bps steps Tier II: 1 Mbps to 37 Mbps in 1 bps steps (46 Mbps available Q1 2011) Legacy: 25 kbps to 20 Mbps in Analog FM, 50 kbps to 10 Mbps in BPSK, 50 kbps to 20 Mbps in QPSK in 1 bps steps
Synchronization time (average) *See pg. 19 for sync data plots*	Tier 0: 250 bits @ 0 dB E_b/N_0 Tier I: 385 bits @ 2 dB E_b/N_0 Tier II: 2,800 bits @ 2 dB E_b/N_0

Specifications subject to change without notice.

AIRBORNE RECEIVER SPECIFICATIONS:

Characteristic	Specification
Acquisition threshold *See pg. 19 for threshold data plots*	Tier 0: -2 dB E_b/N_0 Tier I: 0 dB E_b/N_0 Tier II: 2 dB E_b/N_0
Bit Synchronizer Section	
Input codes	NRZ-L/M/S, BIΦ-L/M/S
Output codes	NRZ-L/M/S, BIΦ-L/M/S
Data & clock out	TTL or RS-422 (dual redundant outputs)
Lock detector out	TTL
Video out	Dual wideband outputs, DC to 35 MHz Single narrowband output, DC to 2 MHz
Environmental Section	
Operating temperature	-20°C to +70°C
Non-operating temperature	-40°C to +85°C
Operating humidity	0 to 95% (non-condensing)
Vibration	20 G, 5 Hz to 2 kHz (all axes)
Acceleration	100 G (all axes)
Shock	100 G pk, half-sine, 5 ms (all axes)
Altitude	Up to 100,000 ft
Physical Section	
Size / weight	4.00" x 3.00" x 1.00" / 11 oz. (standard cover) 4.00" x 3.00" x 1.25" / 13 oz. (finned cover)
Connectors	RF input: SMA female IF output: SMA female Baseband: MDM-15 or MDM-37 ("37" option)
Power	28 VDC ± 4 VDC, 750 mA typical

MODEL NUMBERS:

QSX-RDMS-○-○○○○-AB-○

*Band (**L** for Lower L, **U** for Upper L, **S**, or **M** for Tri-band)*
*PCM/FM (**1** = Include, **0** = Exclude)*
*SOQPSK-TG (**1** or **0**)*
*ARTM CPM (**1** or **0**)*
*Legacy (PSK) (**1** or **0**)*
Options (separate multiple options by a dash, "-")

OPTIONAL FEATURES:

- > DR Double-speed SOQPSK-TG to 46 Mbps
- > FC Finned heat sink cover
- > RS Differential (RS-422) clock & data output
- > 37 37-pin connector. Replaces 15-pin connector. Includes: 3 Sets of Clock and Data (single-ended or differential), 2 High-speed Analog Outputs, 1 Low-speed Analog Output

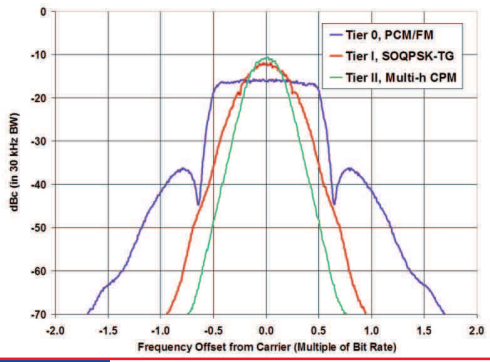
Reinventing Telemetry™

Quasonix

MULTI-MODE TELEMETRY TRANSMITTERS

2.0 in³

TIMTER™



1.3 in³

nanoTX™

- ***PCM/FM, SOQPSK-TG, and ARTM CPM Modulations Available***
  Supports ARTM Tier 0 (PCM/FM) legacy waveform as well as the more spectrally-efficient Tier I (SOQPSK-TG) and Tier II (ARTM CPM) waveforms.
- ***Output Power from 10 mW to 20 W***
  Several RF output choices, along with variable power and dual power options for software or hardware based power adjustment.
- ***Exceptional DC-to-RF Conversion Efficiency***
  Draws less current than other telemetry transmitters, at any RF output level.
- ***Tri-Band TIMTER Configuration***
  Highly flexible solution available with all three legacy TM bands: lower L, upper L, and full S .
- ***Quad-Band TIMTER Configuration***
  All-encompassing solution available with all three legacy TM bands: lower L, upper L, and full S, as well as C band.
- ***Smallest ARTM Transmiter Now Available***
  Brand-new 1.3 in³ nanoTX™ transmitter ideal for airborne applications with strict SWAP constraints.
- ***3rd Generation TIMTER Now Available***
  At less than 0.35 inches tall, new 2.0 in³ TIMTER™ transmitter can serve as a drop-in replacement for common 0.8 inch-tall transmitters in the market.
- ***Automatic Data Rate Tracking***
  Premod filtering and deviation automatically track the data rate, with no programming or configuration required.
- ***Clock-Free Input Option Available***
  Ideal for replacing analog transmitters or for use with encoders or cryptos that provide a data output only.

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TRANSMITTER SPECIFICATIONS:

Characteristic	Specification
Main Section	
Modulation type	PCM/FM (ARTM Tier 0) SOQPSK-TG (Tier I) ARTM CPM (Tier II)
Carrier frequency tuning range	All models: 1435.5 - 1534.5 MHz (Lower-L band) 1750.0 - 1855.0 MHz (Upper-L band) 2200.5 - 2394.5 MHz (S band) TIMTER model only: 4440.0 - 4940.0 MHz, 5091.0 - 5150.0 MHz (C band) Lower-L, Upper-L, & S band (Tri-band) Lower-L, Upper-L, S, & C band (Quad-band)
RF output power	TIMTER single band: 10 mW, 1 W, 5 W, 10 W, 20 W TIMTER Tri band: 20 mW, 1 W, 5 W, 10 W TIMTER Quad band: 20 mW, 1 W, 5 W, 10 W nanoTX & nanoPuck: 10 mW, 1 W, 2 W, 5 W, 10 W *Option* DP: Dual power, 2 settings, via baseband connector pin *Option* VP: Variable power, 31 settings over approx. 24 dB range via PC (non-uniform, largest step approximately 1 dB)
Carrier frequency tuning increment	0.5 MHz
Carrier frequency accuracy	± 2.5 ppm over temperature ± 7.5 ppm, all causes, including aging over 5 years
Data (bit) rate, automatic rate adaptation	TIMTER: 1-20 Mbps (0.5-10 Mbps for PCM/FM) TIMTER *option* HR: Extends upper limit to 28 Mbps (14 Mbps for PCM/FM) TIMTER *option* LR: Extends lower limit to 50 kbps (25 kbps for PCM/FM) nanoTX & nanoPuck: 1-28 Mbps (0.5-14 Mbps for PCM/FM)
Input voltage	TIMTER: +28 ± 4 VDC (*optional* wide voltage +21 to +34 VDC) nanoTX & nanoPuck: +5 to +32 VDC for 1 Watt version, +6.5 to +32 VDC for 2 Watt version, +12 to +32 VDC for 5 Watt version, +28 to +32 VDC for 10 Watt version
Input current @ +28 VDC	TIMTER Single band, 5 Watt: 1.0 A max; 0.8 A typ TIMTER Single band, 10 Watt: 1.6 A max; 1.3 A typ TIMTER Single band, 20 Watt: 3.0 A max; 2.7 A typ TIMTER Tri band, 5 Watt: 2.0 A max; 1.8 A typ TIMTER Tri band, 10 Watt: 2.5 A max; 1.8 A typ nanoTX & nanoPuck 1 Watt: 450 mA max; 350 mA typ nanoTX & nanoPuck 2 Watt: 570 mA max; 480 mA typ nanoTX & nanoPuck 5 Watt: 1.0 A max; 800 mA typ nanoTX & nanoPuck 10 Watt: 1.4 A max; 1.1 A typ
Power reversal	Reverse voltage protection
Control interface	RS-232 serial control
Signal interfaces	Serial data with separate synchronous clock, TTL or TIA/EIA-422 (RS-422)
Randomizer	15-stage LFSR, per IRIG 106. Selectable for bypass or enable
Environmental Section	
Operating temperature	-40°C to +85°C (10 mW, 5 W, 10 W models) -40°C to +70°C (20 W TIMTER , 10 W nanoTX, & 10 W nanoPuck models)
Non-operating temperature	-40°C to +85°C (all models)
Operating humidity	0 to 95% (non-condensing)
Altitude	Up to 100,000 ft.

Specifications subject to change without notice.

TRANSMITTER SPECIFICATIONS:

Characteristic	Specification
Physical Section	
Size / weight	TIMTER 2D package: 2.0 in³, 2.000" (W) x 3.000" (L) x 0.322" (H) / 2.2 oz. TIMTER 4D package: 4.1 in³, 2.000" (W) x 3.000" (L) x 0.688" (H) / 4.2 oz. TIMTER 5A package: 4.8 in³, 2.000" (W) x 3.000" (L) x 0.800" (H) / 5.1 oz TIMTER 10A package: 10.2 in³, 2.000" (W) x 3.000" (L) x 1.701" (H) / 9.8 oz nanoTX 1A / 1B package: 1.3 in³, 1.250" (W) x 3.400" (L) x 0.300" (H) / 1.3 oz. nanoPuck 1E package: 1.3 in³, 2.300" (Dia) x 0.325" (H) / 1.3 oz.
Vibration	19.6 G (RMS) random, 20 Hz to 2,000 Hz, 3 axes
Shock	60 G (PK), 1/2 sine, 5 ms duration, 3 axes
Acceleration	100 G, 3 axes
Connector – RF	TIMTER: SMA female nanoTX & nanoPuck: MMCX
Connector – Baseband / Primary	TIMTER: MDM-15 (male for TTL, female for RS-422) nanoTX 1A: 15-pin Nano-D female nanoTX 1B: 21-pin Nano-D female (required for RS-422) nanoPuck: 15-pin Nano-D female

MODEL NUMBERS:

QSX-V○○-○○○-○S-20-○-○

*Band: **L** for Lower L, **U** for Upper L, **S, M** for Tri-band, **Q** for Quad-band, or **C***

*Baseband Interface: **T** = TTL, **R** = RS-422*

*PCM/FM: **1** = Include, **0** = Exclude*

*SOQPSK-TG: **1** or **0***

*ARTM CPM: **1** or **0***

*Power: **00** = 10 mW, **01** = 1 W, **02** = 2 W, **05** = 5 W, **10** = 10 W, or **20** = 20 W*

*Package: **2D** = TIMTER, **4D** = Tri-Band & 20W TIMTER, **5A** = TIMTER C-band*

__10A__ = Quad-band TIMTER, __1E__ = nanoPuck, __1A__ = nanoTX (15-pin Nano-D), __1B__ = nanoTX (21-pin Nano-D)

(Other available packages shown in our transmitter installation PDF)

Options (separate multiple options by a dash, "-")

OPTIONAL FEATURES:

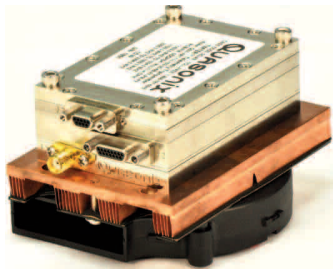
- > PS Multiple presets (2, 4, 8, or 16; concatenate to "PS")
- > WV Wide input voltage range
- > CG Clock generator output to baseband connector
- > RN Randomizer output to baseband connector
- > DP Dual power (two settings, "high" and "low")
- > AC Automatic carrier wave output
- > RG Reverse gender option for baseband connector
- > VR Variable reference level inputs (RS-422 *and* TTL)
- > CM C-band "mid" coverage (5091.0 - 5150.0 MHz)
- > VP Variable power (31 settings, spanning 24 dB)
- > CF Clock-free baseband interface
- > HR Increases max bit rate to 28 Mbps (14 Mbps for Tier 0)
- > LR Decreases min bit rate to 50 kbps (25 kbps for Tier 0)
- > LD FEC / Low Density Parity Check (LDPC)
- > EC FEC / Turbo Product Codes (TPC)
- > PF Parallel port frequency programming
- > PM Parallel port mode selection

TRANSMITTER ACCESSORIES:

- ***Handheld Programmer*** (P/N: QSX-AC-HHPROG-800N-Y)
  Ruggedized and waterproof TDS Nomad Pocket PC with custom Quasonix user interface for convenient in-field programming via RS-232 control interface.

- ***Adapter Plate*** (P/N: QSX-AC-AP96)
  Adapts the 2" x 3" TIMTER transmitter footprint to a larger 2.5" x 3.5" mounting footprint.

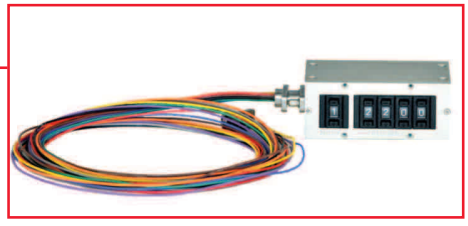
- ***Fan-Cooled Heat Sink*** (P/N: QSX-AC-32-HS-12V)
  Heat sink with fan for TIMTER model. Includes wall wart power supply for North American operation. Pictured with transmitter attached and rubber feet (not included).



- ***MDM-15 Connector & Pigtails*** (P/N: QSX-AC-MDM15-36-PIN *or* QSX-AC-MDM15-36-SOCK)
  Mating connector prewired with 36" non-terminated, color-coded pigtail cables for transmitter connections. Pin connector required for standard RS-422 transmitters, socket connector for standard TTL transmitters.

- ***MDM-15 Wiring Harness*** (P/N: QSX-AC-MDM15-HARNESS-PIN *or* QSX-MDM15-HARNESS-SOCK)
  Mating connector prewired and terminated with BNC connectors for clock and data, banana plugs for power and ground, and a DB-9 connector for serial control. Pin connector required for standard RS-422 transmitters, socket connector for standard TTL transmitters.

- ***Switch Box for Parallel Port Frequency and Mode Programming Options*** (P/N: QSX-AC-SWBX-3B-3M)
  Small aluminum switch box for use with transmitters equipped with the 9-pin parallel port (6B package). Provides frequency and mode programming capability.

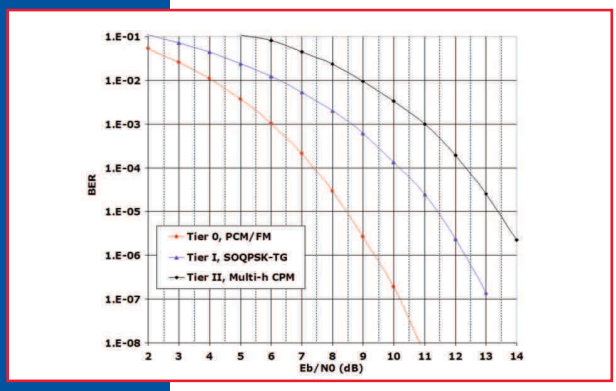


- ***USB to Serial Adapter*** (P/N: QSX-AC-USBSER-CONV)
  Converts USB interface to serial interface for controlling transmitters from a PC that does not have a DB-9 connector.

Reinventing Telemetry™

Quasonix

DMS™ TRELLIS TELEMETRY DEMODULATOR



- ***True Trellis Demodulation in all ARTM Modes***
  Provides multi-symbol trellis detection in all three ARTM modes (PCM/FM, SOQPSK-TG, ARTM CPM) for optimal demodulation.
- ***Integrated Bit Synchronizer***
- ***Multiple Product Configurations***
  Choose from a 19" rack-mount enclosure in a 1U space that includes 1, 2, or 4 demodulators, a 4 cubic-inch airborne enclosure, or a two-board circuit card assembly for OEM product integration.
- ***3.5 to 5 dB Improvement in PCM/FM Performance***
  Improves BER performance by 3.5 to 5 dB over the best single-symbol demodulators, to within 0.2 dB of the theoretical limit.
- ***Modulation Index Tracking* for PCM/FM***
  Maintains superior BER performance even if the received signal's modulation index changes by up to ±15%.
- ***Phase Noise Compensation***
  Optimizes demodulator performance for use with transmitters with excessive phase noise.
- ***Best SOQPSK-TG Detection in the Industry***
  Trellis detection for SOQPSK-TG yields improvements of 2 dB or more over the competition's single-symbol detectors.
- ***Rapid Synchronization***
  Synchronizes up to 100 times faster – and maintains sync at lower signal-to-noise ratios – than other ARTM demodulators on the market.
- ***Bypassable De-Randomizer***
  Standard IRIG-106 fifteen-stage de-randomizer.
- ***Optional Diversity Combiner***
  Digitally-implemented pre-detection diversity combiner option available for dual or quad demodulator rack-mount configuration.

* Patent pending

www.quasonix.com

The Quasonix DMS™ Demodulator is known as the standard in the aeronautical telemetry community with its proven ability to detect and demodulate ARTM waveforms in the most challenging conditions.

PERFORMANCE. PERIOD.

Quasonix' multi-mode, multi-symbol trellis demodulator shatters performance benchmarks of the industry's previous standard-bearers.

Unlike the competition, DMS™ offers ***multi-symbol trellis demodulation for all ARTM waveforms*** *(PCM/FM, SOQPSK-TG, and ARTM CPM), which provides superior detection at low signal-to-noise ratios.*

DMS will not only detect at higher bit error rates, but it will also synchronize much faster than the competition. Furthermore, its sync threshold is extremely low – approaching negative signal-to-noise ratios. The result is better data, sooner.

The rack-mount model, available as a single, dual, or quad demod, offers an intuitive front panel interface with four high-quality color LCDs for displaying configuration settings, status indicators, and constellation / eye patterns. Also included are function keys for each of the primary settings, a numeric keypad, and a USB port for in-field firmware upgrades.

Each demodulator channel includes two sets of clock and data outputs, a set of analog I & Q outputs, and a status output. The dual and quad demodulator configuration is available with an optional pre-detection diversity combiner.

DEMODULATOR SPECIFICATIONS:

Characteristic	Specification
IF Filter Section	*(Standard for Rack-Mount Model, Optional for Airborne Model)*
IF frequency	70 MHz
IF output level	0 dBm nominal (AGC mode)
IF output impedance	50 Ohm
VSWR	2:1 Max; 1.5:1 Typical
IF bandwidths	250 kHz, 500 kHz, 1 MHz, 2 MHz, 4.5 MHz, 10 MHz, 20 MHz, 40 MHz. Automatic selection based on modulation type and data rate, with manual override option.
Demodulator Section	
Input dynamic range	-30 to +10 dBm for Rack-Mount Model, -5 to 0 dBm for Airborne Model
Demodulator type	PCM/FM (ARTM Tier 0) SOQPSK-TG (ARTM Tier I) ARTM CPM (ARTM Tier II) Legacy suite: BPSK QPSK Offset QPSK (OQPSK) Asymmetric QPSK (AQPSK) Unbalanced QPSK (UQPSK) Asymmetric Unbalanced QPSK (AUQPSK) Digital PM

Specifications subject to change without notice.

DEMODULATOR SPECIFICATIONS:

Characteristic	Specification
Bit rates	Tier 0: 24 kbps to 23 Mbps in 1 bps steps Tier I: 100 kbps to 23 Mbps in 1 bps steps (46 Mbps with Rack-Mount Model) Tier II: 1 Mbps to 37 Mbps in 1 bps steps (46 Mbps available Q2 2010) Legacy: 50 kbps to 10 Mbps in BPSK, 50 kbps to 20 Mbps in QPSK in 1 bps steps
Synchronization time (average) *See pg. 19 for sync data plots*	Tier 0: 250 bits @ 0 dB E_b/N_0 Tier I: 385 bits @ 2 dB E_b/N_0 Tier II: 2,800 bits @ 2 dB E_b/N_0
Acquisition threshold *See pg. 19 for threshold data plots*	Tier 0: -2 dB E_b/N_0 Tier I: 0 dB E_b/N_0 Tier II: 2 dB E_b/N_0
Bit Synchronizer Section	
Input codes	NRZ-L/M/S, BIΦ-L/M/S
Output codes	NRZ-L/M/S, BIΦ-L/M/S
Data & clock out	TTL or RS-422 (dual redundant outputs)
Lock detector out	TTL
Video out	Dual wideband outputs, DC to 35 MHz; Single narrowband output, DC to 2 MHz
Environmental Section – Rack-Mount Model	
Operating temperature	0°C to +50°C
Non-operating temperature	0°C to +70°C
Operating humidity	0 to 95% (non-condensing)
Altitude	Up to 30,000 ft. (with no displays option)
Environmental Section – Airborne Model	
Operating temperature	-20°C to +70°C
Non-operating temperature	-20°C to +70°C
Operating humidity	0 to 95% (non-condensing)
Vibration	20 G, 5 Hz to 2 kHz (all axes)
Acceleration	100 G (all axes)
Shock	100 G pk, half-sine, 5 ms (all axes)
Altitude	Up to 100,000 ft.
Physical Section – Rack-Mount Model	
Size / weight	1U rack-mount chassis; 19" wide, 1.75" tall, 14-5/16" rack depth, 15-11/16" overall depth / 8 lbs.
Connectors – per channel	I, Q, Clock A, Data A, Clock B, and Data B outputs, IF input: BNC female Status/SDI Out: DB-9 female
Connectors – per combined channel	Clock Out, Data Out, AGC Out, AM Out
Connectors – per chassis	Ethernet: RJ-45 Data: USB
Power	100 to 240 VAC, 50/60 Hz
Physical Section – Airborne Model	
Size / weight	2.000" x 3.000" x 0.674" (4.044 $in.^3$) / 3.9 oz.
Connectors	IF input: Hirose U.FL pigtail (standard) or SMA female (optional IF filter module) Baseband: MDM-15 or MDM-37 ("37" option)
Power	+5 VDC, 1.7 A typical (1.9 A with optional IF filter module)

RACK-MOUNT DEMOD MODEL NUMBERS:

QSX-DMS-RM○-○○○○-○○○○-○

- Number of Channels (**1**, **2**, or **4**)
- Channel 1
  - PCM/FM (**1** = Include, **0** = Exclude)
  - SOQPSK-TG (**1** or **0**)
  - ARTM CPM (**1** or **0**)
  - Legacy (PSK) (**1** or **0**)
- Optional Channel 2
  - PCM/FM (**1** or **0**)
  - SOQPSK-TG (**1** or **0**)
  - ARTM CPM (**1** or **0**)
  - Legacy (PSK) (**1** or **0**)
- ⋮
- Options (separate multiple options with a dash, "-")

AIRBORNE DEMOD MODEL NUMBERS:

QSX-DMS-○○○○-AB-○

- PCM/FM (**1** = Include, **0** = Exclude)
- SOQPSK-TG (**1** or **0**)
- ARTM CPM (**1** or **0**)
- Legacy (PSK) (**1** or **0**)
- Options (separate multiple options with a dash, "-")

OPTIONAL FEATURES:

Order by appending options to model number, separated by "-"

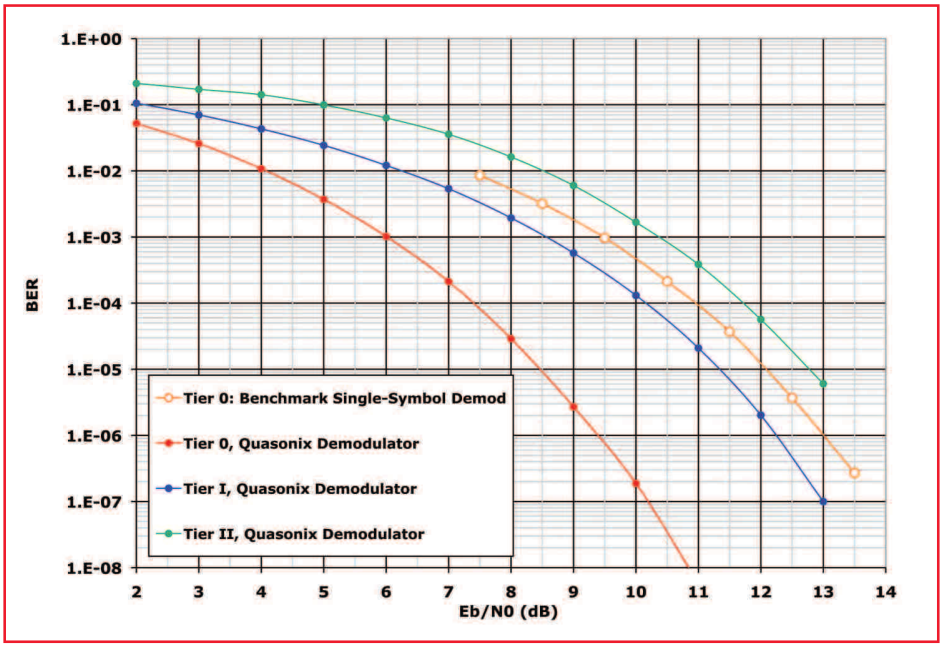
- > DR — Double-speed SOQPSK-TG, increasing max bit rate to 46 Mbps (Airborne Model only)
- > NH — No housing option (Airborne Model only)
- > RA — Right angle inter-board connectors (Requires NH option)
- > IF — Include IF filter module (Airborne Model only, increases chassis height)
- > DC — Diversity combiner option (Rack-Mount Model only, dual or quad demod configuration required)
- > 37 — 37-pin connector. Replaces 15-pin connector. Includes 3 sets of Clock and Data (single-ended or differential), 2 high-speed analog outputs, 1 low-speed analog output (Airborne Model only)
- > NC — No MDM-15 external connector (Airborne Model only)
- > RG — Reverse gender of external connector to female / socket (Airborne Model only)
- > AGC — Internal AGC with input dynamic range of -30 to +10 dBm (Airborne Model only)

Please consult the factory for additional options.

DEMODULATOR BER PERFORMANCE:

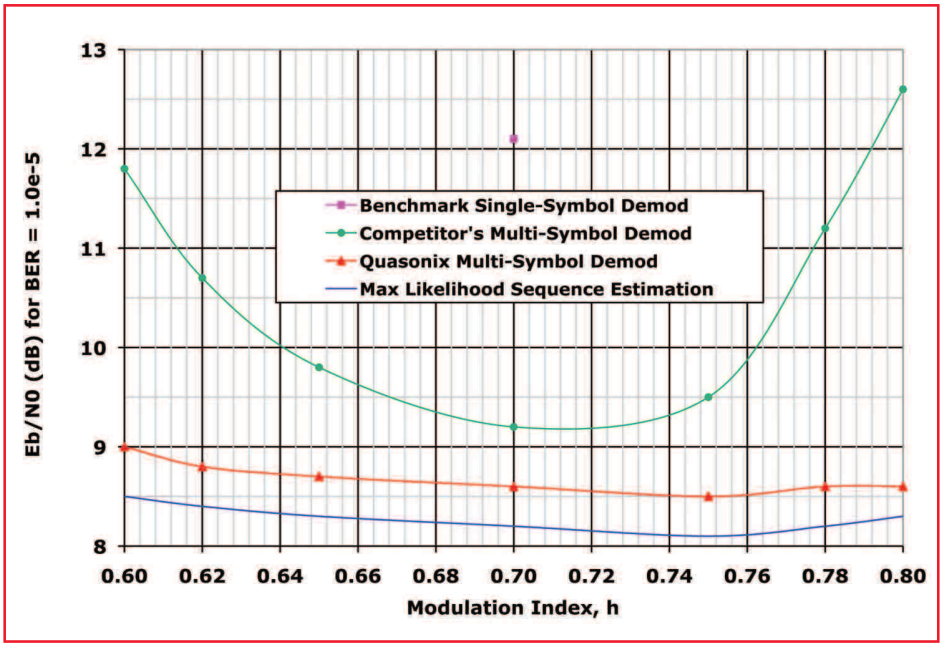
BER Performance Overview

What does multi-symbol trellis demodulation get you? Three things: fewer bit errors, faster synchronization, and lower acquisition thresholds. Under the hood Quasonix' highly sophisticated demodulator engine explores all possible branches through the phase trellis that the transmitted signal could have taken, rather than examining the symbols one at a time. With each symbol decision the demodulator chooses the most probable path through the trellis for near-optimal decoding of every bit. The result is bit error rates that are less than 0.2 dB from the theoretical limits, more than four orders of magnitude lower than single-symbol detectors.



Modulation Index Tracking Overview

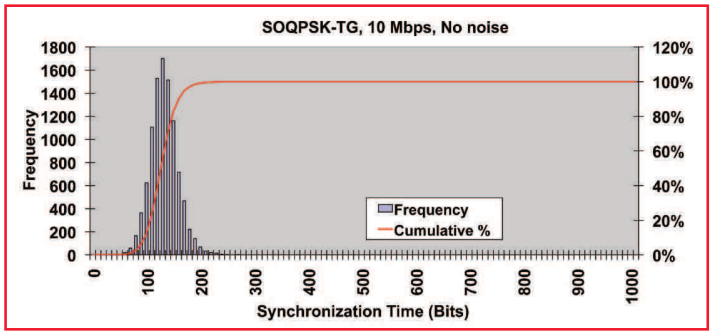
Quasonix' patent-pending Modulation Index Tracking feature for PCM/FM automatically reconfigures the trellis connections to match the modulation index of the input signal, thereby maintaining optimal performance for signals that are over- or under-deviated.

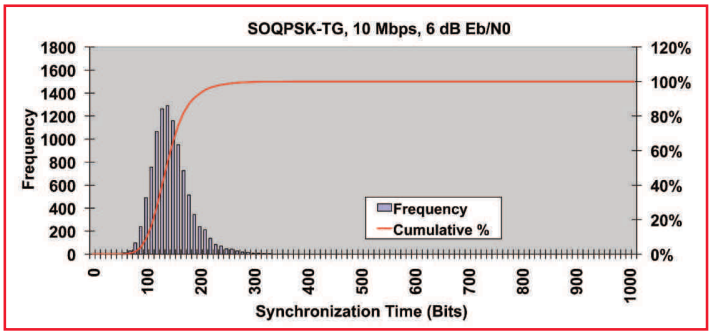


DEMOD SYNCHRONIZATION PERFORMANCE:

Synchronization Overview

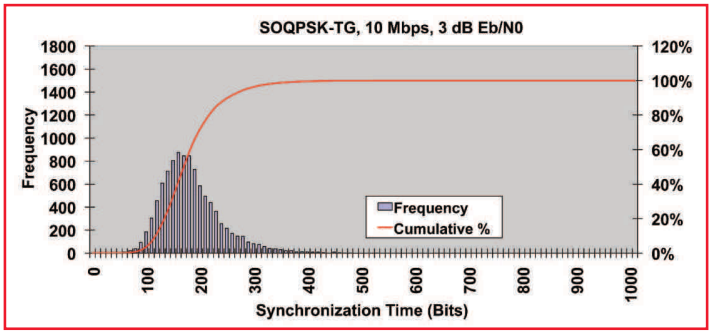
Quasonix is the only vendor in the telemetry market offering trellis demodulation in all ARTM modes. Not only does this approach yield BER results that are less than 0.2 dB from the theoretical limits, but it brings unprecedented synchronization performance.

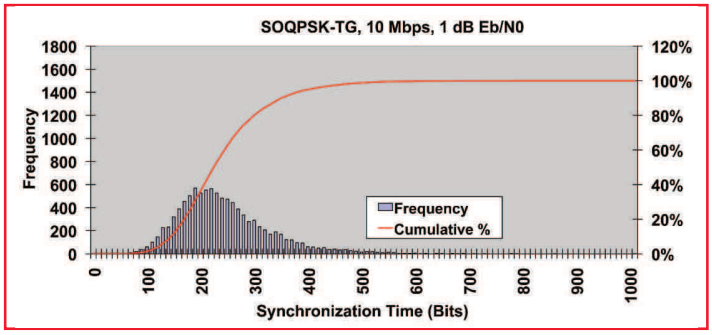




Synchronization Time

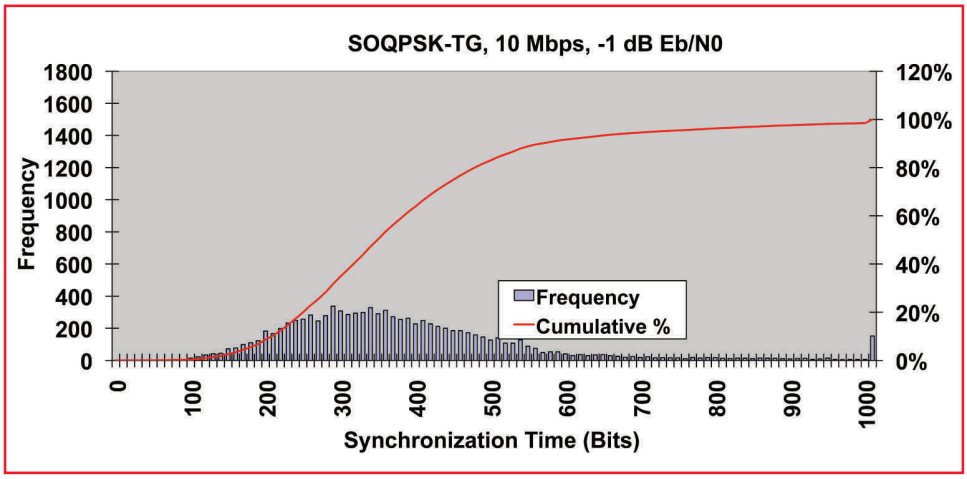
The entire Quasonix receiver and demodulator product line offers extremely fast synchronization in all modes. Our trellis-based synchronization engine provides sync times as short as 100 bits on average.





Synchronization Threshold

Only Quasonix can show synchronization times at negative E_B/N_0 values because we're the only vendor with trellis demodulators that can operate in this region. Our ability to achieve synchronization at such low signal to noise ratios means that we can maintain bit count integrity through extremely deep fades. This allows the user's crypto devices to stay synchronized under the most severe fading conditions, thereby eliminating the long data outages that occur when the crypto devices lose sync.



Reinventing Telemetry™

With a razor-sharp focus on the aeronautical telemetry market and a team rich in talent, experience, and sheer determination, Quasonix is able to consistently design, develop, and manufacture *what our customers regard as* market-leading telemetry products.

Quasonix is...*Reinventing Telemetry™*

Photos courtesy of U.S. Air Force

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