• True Trellis Demodulation in all ARTM Modes
  Provides multi-symbol trellis detection in all three ARTM modes (PCM/FM, SOQPSK-TG, Multi-h CPM) for optimal demodulation

• Integrated Bit Synchronizer

• Multiple Product Configurations
  Choose from a 19” rack-mount enclosure in a 1U space that includes one or two 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

• 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 (*patented).

• Phase Noise Compensation
  Optimizes demodulator performance for use with legacy TM packs and 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 demodulator rack-mount configuration
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 Multi-h 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 – into deep negative signal-to-noise ratios. The result is better data, sooner.

The rack-mount model, available as a single or dual demodulator, 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 and Q outputs, and a status output. The dual and quad demodulator configuration is available with an optional pre-detection diversity combiner.

### DEMODULATOR SPECIFICATIONS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IF Filter Section</strong> (Standard for Rack-Mount Model, Optional for Airborne Model)</td>
<td></td>
</tr>
<tr>
<td>IF frequency</td>
<td>70 MHz</td>
</tr>
<tr>
<td>IF output level</td>
<td>0 dBm nominal (AGC mode)</td>
</tr>
<tr>
<td>IF output impedance</td>
<td>50 ohms</td>
</tr>
<tr>
<td>VSWR</td>
<td>2:1 Max; 1.5:1 Typical</td>
</tr>
<tr>
<td>IF bandwidths</td>
<td>250 kHz, 500 kHz, 1 MHz, 2 MHz, 4.5 MHz, 10 MHz, 20 MHz, 40 MHz. Automatic selection based on data rate, with manual override Optional: 70 kHz, 1.4 MHz, 3 MHz, 6 MHz, 14 MHz, 28 MHz</td>
</tr>
<tr>
<td><strong>Demodulator Section</strong></td>
<td></td>
</tr>
<tr>
<td>Input dynamic range</td>
<td>-30 to +10 dBm for Rack-Mount Model, -5 to 0 dBm for Airborne Model</td>
</tr>
<tr>
<td>Demodulator type</td>
<td>PCM/FM (ARTM Tier 0) SOQPSK-TG (ARTM Tier I) Multi-h CPM (ARTM Tier II) Legacy suite: BPSK, QPSK, Offset QPSK (OQPSK), Asymmetric QPSK (AQPSK) Unbalanced QPSK (UQPSK) Asymmetric Unbalanced QPSK (AUQPSK), Digital PM</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice
## DEMODULATOR SPECIFICATIONS

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</table>
| **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)  
**Legacy:** 50 kbps to 10 Mbps in BPSK, 50 kbps to 20 Mbps in QPSK in 1 bps steps |
| **Synchronization time (Average, at BER = 1e-5)** | **Tier 0:** 250 bits  
**Tier I:** 385 bits  
**Tier II:** 2,800 bits |
| **Synchronization threshold**       | **Tier 0:** -8.0 dB Eb/N0; **Tier I:** -6.0 dB Eb/N0; **Tier II:** -7.0 dB Eb/N0 |
| **Sensitivity (BER = 1e-5)**        | **Tier 0:** 8.6 dB Eb/N0; **Tier I:** 11.2 dB Eb/N0; **Tier II:** 13.0 dB Eb/N0 |

### Bit Synchronizer Section
- **Input codes**: NRZ-L/M/S, B/I-L/M/S  
- **Output codes**: NRZ-L/M/S, B/I-L/M/S  
- **Data and clock out**: TTL or RS-422  
- **Lock detector out**: TTL  
- **Video out**: Dual wideband outputs, DC to 35 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  
- **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)

Specifications subject to change without notice
Rack Mount DMS™ Demodulator Part Numbering Example

QSX-DMS-RM

2 - 1 1 1 0 - X2 - 1 1 1 0 - IF

Standard
Prefix
Channels
1 or 2
Mode: 1 = Enabled
0 = Not enabled
Copy Channel 1 modes
(X2 or blank)
Options, separated by hyphens
(example include IF filter module)

Airborne DMS™ Demodulator Part Numbering Example

QSX-DMS

1 1 1 0 - AB - K7

Standard
Prefix
Mode: 1 = Enabled
0 = Not enabled
Options, separated by hyphens
(example Viterbi Decoder)
Designates Airborne Package

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

> 14 14 SAW filters (adds 70 kHz, 1.4, 3, 6, 14, and 28 MHz filters)
> IF Include IF filter module (Airborne Model only, increases chassis height)
> 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)
> K7 K7 Viterbi decoder (k=7, rate 1/2)
> DR Double-speed SOQPSK-TG, increasing max bit rate to 46 Mbps (Airborne Model only)
> RG Reverse gender of external connector to female/socket (Airborne Model only)

Please consult Quasonix for additional options.
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’ 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.
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 Eb/N0 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.