



MiMOMax 400MHz TORNADO

The MiMOMax Tornado is a full-duplex, software flexible, ultra spectrally efficient, long range point-to-multipoint remote radio unit with built-in intelligent network features for Critical Network Infrastructure. With scalable data rates and an efficient random access protocol, it can provide near real-time access to a large number of remote sites with very high reliability and low latency. The MiMOMax Tornado is fully compatible with all MiMOMax products and provides economical SCADA and Telemetry solutions to remote sites in the Power, Gas and Water acquisition and distribution industries.

BENEFITS KEY FEATURES

SERIOUSLY SMART

- ▶ Point-to-Multipoint
- ▶ Linux Application Engine

SCALABLE

- ▶ Ultra Spectrally Efficient
- ▶ Scalable Data Throughput Rates

VERY ECONOMICAL

- ▶ SCADA, Telemetry & Data Solutions

HIGHLY EFFICIENT

- ▶ Software Flexible & Intelligent
- ▶ Very Low Latency

COMPATIBLE

- ▶ Very Low Power Consumption

ROBUST

- ▶ Full-duplex
- ▶ Capacity to Simultaneously Operate in Poll and Interrupt Modes

EXCLUSIVE TO USER

- ▶ UHF Licensed Spectrum
- ▶ Ethernet, Serial & USB Interfaces

FUTURE DEFENSIVE

- ▶ IP Data Encryption & Firewall Security

ENVIRONMENTALLY SOUND

- ▶ Advanced Software Features
- ▶ User Settable Frequency
- ▶ User Programmable Power
- ▶ Indoor & Outdoor Mountable

400MHz TORNADO PRODUCT SPECIFICATIONS

| General | | |
|---------------------------|--|--|
| Gross Data Rates | 25 kHz | 80/160/240/320kb/s Uplink and/or downlink 160/320/480/640kb/s Full-duplex |
| | 12.5 kHz | 40/80/120/160kb/s Uplink and/or downlink 80/160/240/320kb/s Full-duplex |
| Configuration | 2 x 2 Full Duplex MIMO | |
| Supply Voltage | 10.5V DC to 60V DC | |
| Maximum Power Consumption | 26W (at 13.8V) 20W typical | |
| Standby Power Consumption | <6W typical | |
| Ambient Temperature Range | -30°C (-40°C) ⁽¹⁾ to +60°C (+70°C) ⁽²⁾ | |
| Mounting | 1U High Rack Mount | |
| | Pole Mount | |
| | Wall Mount | |
| | DIN Rail Mount | |
| Dimensions (L x W x H) | 180 x 270 x 44mm | |
| Weight | 2 kg <i>radio unit only, excl. mounts</i> | |

| Receiver | | |
|--|--|------------------------|
| Modulation | QPSK/16/64/256QAM | |
| Number of MIMO receivers | 2 | |
| Symbol Rate | 2x20k symbols/sec (25kHz) | |
| | 2x10k symbols/sec (12.5kHz) | |
| Modulation ⁽³⁾ Sensitivity ⁽⁴⁾ for 10 ⁻⁴ BER | 25 kHz | <-114/-107/-101/-94dBm |
| | 12.5 kHz | <-117/-110/-104/-97dBm |
| Modulation ⁽³⁾ Sensitivity ⁽⁴⁾ for 10 ⁻⁷ BER | 25 kHz | <-112/-105/-99/-92dBm |
| | 12.5 kHz | <-116/-108/-102/-96dBm |
| <i>Measurements via duplexer at antenna port</i> | | |
| Frequency Range | 400 to 470 MHz other frequencies available on request | |
| Frequency Step Size | 5 kHz & 6.25 kHz selectable | |
| Frequency Accuracy and Stability | better than +/- 1ppm | |
| Nominal Channel Bandwidth | 12.5 kHz, 25 kHz | |

| Transmitter | | |
|----------------------------------|--|--|
| Number of MIMO transmitters | 2 | |
| Modulation | QPSK/16/64/256QAM | |
| Symbol Rate | 2x20k symbols/sec (25 kHz) | |
| | 2x10k symbols/sec (12.5 kHz) | |
| RF Power Output ⁽⁵⁾ | Avg. before duplexer 2 x 27dBm Avg. after duplexer 2 x 24dBm Peak before duplexer 2 x 35dBm Peak after duplexer 2 x 32dBm | |
| RF Power Control Range | >20 dB | |
| Frequency Range | 400 to 470 MHz | |
| Frequency Step Size | 5 kHz & 6.25 kHz selectable | |
| Frequency Accuracy and Stability | Better than +/- 1 ppm | |

| Duplexer (Internal) | |
|------------------------------------|---|
| Type | Bandpass |
| Tx / Rx Split | 5 MHz minimum |
| Frequency Range | 400 to 470 MHz other frequencies available on request |
| Duplexer Sub Bands | 400-430 MHz |
| | 440-450 MHz |
| | 450-470 MHz |
| Stop Band Attenuation | >60 dB @ >5 MHz from centre |
| Pass Band Bandwidth ⁽⁶⁾ | 2 MHz (-0.5dB) |

| Duplexer (External) | |
|-----------------------|--------------------|
| Type | Bandpass |
| Tx / Rx Split | 4.5 MHz |
| Frequency Range | 400-470 MHz |
| Insertion Loss | <1.75 dB |
| Stop Band Attenuation | >70 dB |
| Pass Band Bandwidth | 1 MHz min |
| Mounting | 2U High Rack Mount |

| Interfaces (Digital & Analogue) | |
|---|---|
| ETHERNET | Dual 10BaseT/100BaseT |
| Connectors | 2 x RJ45 |
| ASYNCHRONOUS SERIAL (Other data interfaces available via external media converters ⁽⁷⁾) | |
| Format | Dual RS232 |
| Connectors | 2 x RJ45 |
| Baud Rate | 300 - 115,200 baud |
| USB | High speed USB 2.0 |
| Connectors | Type A and mini B |
| ALARM | 1 set of volt-free change over contacts |
| GPIO Analogue/Digital | 4 x s/w configurable I/O ports |
| FREQUENCY REFERENCE Input/Output | isolated differential pair |

| Compliances | |
|-------------------|---|
| Radio Performance | AS/NZS 4768.3:2018 ⁽⁸⁾ |
| | FCC 47CFR part 90 |
| | IC Canada RSS-119 |
| EMC | ETSI EN 302-561 V2.1.1 (2016-03) ⁽⁸⁾ |
| | EN 301 489 EN 301 489-1 V1.9.2 (2011-09) EN301 489-4 V2.1.1 (2012-11) |
| | FCC 47CFR part 15 |
| Environmental | 60950-22 Outdoor Safety ⁽⁹⁾ |
| Safety | IEC 60950-1: 2005, Am 1 : 2009 |

Important: Specifications are subject to change without prior notice

(1) -40°C for continuous operation.
(2) +70°C for RRU-T with 25% duty cycle.
(3) Systems employing modulation swapping will automatically reduce the modulation order at a signal level higher than the specified sensitivity level.
(4) Sensitivity as specified includes forward error correction and internal duplexer loss.
(5) Tornado RF output remains constant at all modulations.
(6) The maximum acceptable frequency shift without retuning the duplexer is also subject to the stop band performance.
(7) Contact MIMOMax Wireless for more information
(8) Tested up to receiver modulation of 64 QAM and transmitter modulation of 256 QAM for 25kHz channel
(9) Designed to meet