## mimomax

## MIMOMAX TORNADO

900MHz Radio Spec Sheet



The Mimomax Tornado is a full-duplex, software flexible, ultra spectrally efficient, long range point-tomultipoint 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.

## **KEY FEATURES**

- Point-to-Point, Point-to-Multipoint
- Linux Applications Engine
- Ultra Spectrally Efficient
- Scalable Data Throughput Rates
- SCADA, Telemetry & Data Solutions
- Software Flexible & Intelligent
- Very Low Latency
- Very Low Power Consumption
- ► Full-duplex

- Capacity to Simultaneously Operate in Poll and Interrupt Modes
- ▶ 900MHz Licensed Spectrum
- Ethernet, Serial & USB Interface
- ▶ IP Data Encryption & Firewall Security
- Advance Software Features
- ► User Settable Frequency
- User Programmable Power
- Indor & Outdoor Mountable

## 900MHz MIMOMAX TORNADO SPECIFICATIONS

Sensitivity <sup>(4)</sup> 50 kHz         <-109.5/-103/-97/-91	/s Full-duplex s Full-duplex Full-duplex O °C (+70°C) <sup>(2)</sup> excl. mounts 1 5kHz) 0kHz) 5kHz)	
Data Rates         50 kHz         320/640/960/1280kb           25 kHz         160/320/480/640kb/s           12.5 kHz         80/160/240/320kb/s           Configuration         2 x 2 Full Duplex MIM           Supply Voltage         10.5v DC to 60V DC           Maximum Power         26W (at 13.8V)           Consumption         20W typical           Standby Power Consumption         <6W typical	/s Full-duplex s Full-duplex Full-duplex O °C (+70°C) <sup>(2)</sup> excl. mounts 1 5kHz) 0kHz) 5kHz)	
25 kHz         160/320/480/640kb/s           12.5 kHz         80/160/240/320kb/s           Configuration         2 x 2 Full Duplex MIM           Supply Voltage         10.5v DC to 60V DC           Maximum Power         26W (at 13.8V)           Consumption         26W (at 13.8V)           Standby Power Consumption         <6W typical	s Full-duplex Full-duplex O O O C (+70°C) <sup>(2)</sup> excl. mounts 1 SkHz) OkHz) SkHz)	
12.5 kHz         80/160/240/320kb/s           Configuration         2 x 2 Full Duplex MIM           Supply Voltage         10.5v DC to 60V DC           Maximum Power         26W (at 13.8V)           Consumption         20W typical           Standby Power Consumption         <6W typical	Full-duplex         O         O         °C (+70°C) <sup>(2)</sup> excl. mounts         1         5kHz)         0kHz)         5kHz)	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	O °C (+70°C) <sup>(2)</sup> excl. mounts 1 5kHz) 0kHz) 5kHz)	
Supply Voltage         10.5v DC to 60V DC           Maximum Power Consumption         26W (at 13.8V) 20W typical           Standby Power Consumption         <6W typical	<sup>o</sup> C (+70ºC) <sup>(2)</sup> excl. mounts 1 5kHz) 0kHz) 5kHz)	
Maximum Power Consumption         26W (at 13.8V) 20W typical           Standby Power Consumption         <6W typical	excl. mounts 1 5kHz) 0kHz) 5kHz)	
Consumption20W typicalStandby Power Consumption<6W typical	excl. mounts 1 5kHz) 0kHz) 5kHz)	
Ambient Temperature Range       -30°C (-40°C) <sup>(1)</sup> to +60         Mounting       1U High Rack Mount         Pole Mount       Vall Mount         Dimensions (L x W x H)       180 x 270 x 44mm         Weight       2 kg radio unit only, or         Receiver       2         Modulation       QPSK/16/64/256QAM         Number of MIMO receivers       2         Symbol Rate       2x60k symbols/sec (7         Symbol Rate       2x40k symbols/sec (7         Sensitivity <sup>(4)</sup> 75 kHz       <-107.5/-101/-95/-89	excl. mounts 1 5kHz) 0kHz) 5kHz)	
Mounting         1U High Rack Mount           Pole Mount         Pole Mount           Wall Mount         DIN Rail Mount           Dimensions (L x W x H)         180 x 270 x 44mm           Weight         2 kg radio unit only, or           Receiver         2           Modulation         QPSK/16/64/256QAM           Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7           2x10k symbols/sec (2         2x10k symbols/sec (2           2x10k symbols/sec (1         Modulation <sup>(3)</sup> Sensitivity <sup>(4)</sup> 50 kHz         <-107.5/-101/-95/-89	excl. mounts 1 5kHz) 0kHz) 5kHz)	
Pole Mount           Pole Mount           Wall Mount           DIN Rail Mount           DIN Rail Mount           DIN Rail Mount           Weight         2 kg radio unit only, e           Receiver         2           Modulation         QPSK/16/64/256QAM           Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7           Symbol Rate         2x40k symbols/sec (2           Symbols         2           Modulation <sup>(3)</sup> 75 kHz         <-107.5/-101/-95/-89           Sensitivity <sup>(4)</sup> 50 kHz         <-109.5/-103/-97/-91           BER         25 kHz         <-115.5/-109/-103/-9           Modulation <sup>(3)</sup> 75 kHz         <-106.5/-100/-94/-87           Sensitivity <sup>(4)</sup> 50 kHz         <-108.5/-102/-96/-89           BER         25 kHz         <-111.5/-105/-99/-92	1 5kHz) 0kHz) 5kHz)	
Wall Mount           Dimensions (L x W x H)         180 x 270 x 44mm           Weight         2 kg radio unit only, of           Receiver         2 kg radio unit only, of           Modulation         QPSK/16/64/256QAM           Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7)           2x40k symbols/sec (5)         2x20k symbols/sec (7)           2x40k symbols/sec (7)         2x40k symbols/sec (7)           Symbol Rate         2x60k symbols/sec (7)           Symbol Rate         2x40k symbols/sec (7)           Symbol Rate         2x40k symbols/sec (7)           Symbol Rate         2x5 kHz           Sensitivity <sup>(4)</sup> 50 kHz           BER         25 kHz           Modulation <sup>(3)</sup> 75 kHz           Sensitivity <sup>(4)</sup> 75 kHz           Sensitivity <sup>(4)</sup> 50 kHz           Sensitivity <sup>(4)</sup> 50 kHz           So kHz         <-106.5/-100/-94/-87	1 5kHz) 0kHz) 5kHz)	
DIN Rail Mount           Dimensions (L x W x H)         180 x 270 x 44mm           Weight         2 kg radio unit only, of           Receiver         2           Modulation         QPSK/16/64/256QAM           Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7           2x40k symbols/sec (2         2x10k symbols/sec (2           2x10k symbols/sec (2         2x10k symbols/sec (2           2x10k symbols/sec (1         Modulation <sup>(3)</sup> Sensitivity <sup>(4)</sup> 50 kHz         <-107.5/-101/-95/-89	1 5kHz) 0kHz) 5kHz)	
Dimensions (L x W x H)         180 x 270 x 44mm           Weight         2 kg radio unit only, e           Receiver         2           Modulation         QPSK/16/64/256QAM           Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7           Symbol Rate         2x40k symbols/sec (7           Symbol Rate         2x50k symbols/sec (7           Dimestrict         2x40k symbols/sec (7           Symbol Rate         2s60k symbols/sec (7           Symbol Rate         2s60k symbols/sec (7           Dimestrict         2x10k symbols/sec (7           Symbol Rate         -107.5/-101/-95/-89           Sensitivity <sup>(4)</sup> 50 kHz           Sensitivity <sup>(4)</sup> 50 kHz           Son kHz         -106.5/-100/-94/-87           Sensitivity <sup>(4)</sup> 50 kHz           Son kHz         -101.5/-105/-99/-92           BER         25 kH	1 5kHz) 0kHz) 5kHz)	
Weight         2 kg radio unit only, e           Receiver         QPSK/16/64/256QAM           Modulation         QPSK/16/64/256QAM           Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7 2x40k symbols/sec (5 2x20k symbols/sec (2 2x10k symbols/sec (2 2x10k symbols/sec (1           Modulation <sup>(3)</sup> 75 kHz         <-107.5/-101/-95/-89 50 kHz            Sensitivity <sup>(4)</sup> for 10 <sup>-4</sup> 50 kHz         <-109.5/-103/-97/-91 12.5 kHz         <	1 5kHz) 0kHz) 5kHz)	
Receiver         QPSK/16/64/256QAM           Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (2 2x10k symbols/sec (2 2x10k symbols/sec (1 2x10k s	1 5kHz) 0kHz) 5kHz)	
Modulation         QPSK/16/64/256QAM           Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7 2x40k symbols/sec (5 2x20k symbols/sec (2 2x10k symbols/sec (2 2x10k symbols/sec (1 2x10k	5kHz) OkHz) 5kHz)	
Number of MIMO receivers         2           Symbol Rate         2x60k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (7 2x10k symbols/sec (7 2x40k symbols/sec (7 2x10k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (7 2x10k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (7 2x10k symbols/sec (7 2x40k symbols/sec (7 2x40k symbols/sec (7 2x10k symbols/sec (7 2x40k symbols/sec (7 2x10k symbols/sec (7 50 kHz s-1105/-100/-94/sec 50 kHz s-1105/-100	5kHz) OkHz) 5kHz)	
Symbol Rate         2x60k symbols/sec (7 2x40k symbols/sec (5 2x20k symbols/sec (2 2x10k symbols/sec (2 2x10k symbols/sec (2 2x10k symbols/sec (1 2x10k symbols/sec (1	0kHz) 5kHz)	
Addition (3)         25 kHz         2x40k symbols/sec (5)           Sensitivity(4)         50 kHz         <-107.5/-101/-95/-89	0kHz) 5kHz)	
2x20k symbols/sec (2           2x10k symbols/sec (1           Modulation <sup>(3)</sup> Sensitivity <sup>(4)</sup> for 10 <sup>-4</sup> BER           25 kHz           <-112.5/-103/-97/-91	5kHz)	
Zx10k symbols/sec (1           Modulation <sup>(3)</sup> 75 kHz         <-107.5/-101/-95/-89		
Modulation <sup>(3)</sup> Sensitivity <sup>(4)</sup> for 10 <sup>-4</sup> 75 kHz         <-107.5/-101/-95/-89           BER         50 kHz         <-109.5/-103/-97/-91	2.5kHz)	
Sensitivity <sup>(4)</sup> for 10 <sup>-4</sup> BER         50 kHz         <-109.5/-103/-97/-91           25 kHz         <-112.5/-106/-100/-9		
for 10-4         50 kHz         <-105/5/105/-5/7/51           BER         25 kHz         <-112.5/-106/-100/-9	<-107.5/-101/-95/-89dBm	
BER         25 kHz         <-112.5/-106/-100/-9           12.5 kHz         <-115.5/-109/-103/-9	<-109.5/-103/-97/-91dBm	
Modulation <sup>(3)</sup> 75 kHz         <-106.5/-100/-94/-87           Sensitivity <sup>(4)</sup> 50 kHz         <-108.5/-102/-96/-89	<-112.5/-106/-100/-93.5dBm	
Sensitivity <sup>(4)</sup> 50 kHz         <-108.5/-102/-96/-89           for 10 <sup>-6</sup> 25 kHz         <-111.5/-105/-99/-92	6dBm	
for 10 <sup>-6</sup> BER 25 kHz <-111.5/-105/-99/-92	.5dBm	
for 10-b           BER           25 kHz           <-111.5/-105/-99/-92	<-108.5/-102/-96/-89.5dBm	
	dBm	
	4.5dBm	
Measurements via duplexer at antenna	s via duplexer at antenna port	
Frequency Range 806 to 960 MHz other	806 to 960 MHz other frequencies available on request	
Frequency Step Size 5 kHz & 6.25 kHz selec	5 kHz & 6.25 kHz selectable	
Frequency Accuracy and better than +/- 1ppm Stability	better than +/- 1ppm	
	12.5 kHz, 25 kHz, 50 kHz, 75 kHz	
Transmitter		
Number of MIMO transmitters 2		
Modulation QPSK/16/64/256QAM	QPSK/16/64/256QAM	
Symbol Rate 2x60k symbols/sec (7	2x60k symbols/sec (75 kHz)	
2x40k symbols/sec (5	2x40k symbols/sec (50 kHz)	
2x20k symbols/sec (2	2x20k symbols/sec (25kHz)	
2x10k symbols/sec (1	2x10k symbols/sec (12.5kHz)	
Avg. after duplexer 2 x 24 Peak before duplexer 2 x	Avg. before duplexer 2 x 26dBm Avg. after duplexer 2 x 24dBm Peak before duplexer 2 x 34dBm Peak after duplexer 2 x 32dBm	

RF Power Control Range		20 dB		
Frequency Range		806 to 960 MHz		
Frequency Step Size		5 kHz & 6.25 kHz selectable		
Frequency Accuracy and Stability		better than +/- 1ppm		
Nominal Channel Bandwidth		12.5 kHz, 25 kHz, 50 kHz, 75 kHz		
Duplexer (Internal)				
Туре	Bandpas	Bandpass		
Tx / Rx Split	9 MHz minimum			
Frequency Range	806 to 960 MHz other frequencies available on request			
Duplexer Sub Bands	806-869 MHz			
	852-933 MHz			
	896-960 MHz			
Stop Band Attenuation	>65 dB @	>65 dB @ >9 MHz from centre		
Pass Band Bandwidth <sup>(6)</sup>	1 MHz			
Duplexer (External)				
Туре	Bandpass	Bandpass		
Tx / Rx Split	3.6 MHz	3.6 MHz minimum		
Frequency Range	806 to 96	806 to 960 MHz		
Insertion Loss	<1.5 dB	<1.5 dB		
Stop Band Attenuation	>70 dB			
Pass Band Bandwidth <sup>(6)</sup>	2 MHz			
Mounting	To be cor	nfirmed		
Interfaces (Digital & Ana	logue)			
ETHERNET	Dual 10B	Dual 10BaseT/100BaseT		
Connectors	2 x RJ45			
ASYNCHRONOUS SERIAL		(Other data interfaces available via external media converters <sup>(7)</sup> )		
Format	Dual RS232			
Connectors	2 x RJ45			
Baud Rate	300 - 115,200 baud			
USB	High speed USB 2.0			
Connectors	Type A a	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 o	differential pair		
Compliances				
Radio Performance	AS/NZS 4295 : 2015			
	FCC 47CF	FCC 47CFR part 101		
	IC Canad	a RSS-119		
EMC	FCC 47CF	FCC 47CFR part 15		
Environmental	60950-22 Outdoor Safety <sup>(9)</sup>			
Safety	IEC 60950-1: 2005, Am 1 : 2009			

Important: Specifications are subject to change without prior notice
 (1) -40°C for RNU-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 for more information
 (8) Designed to meet