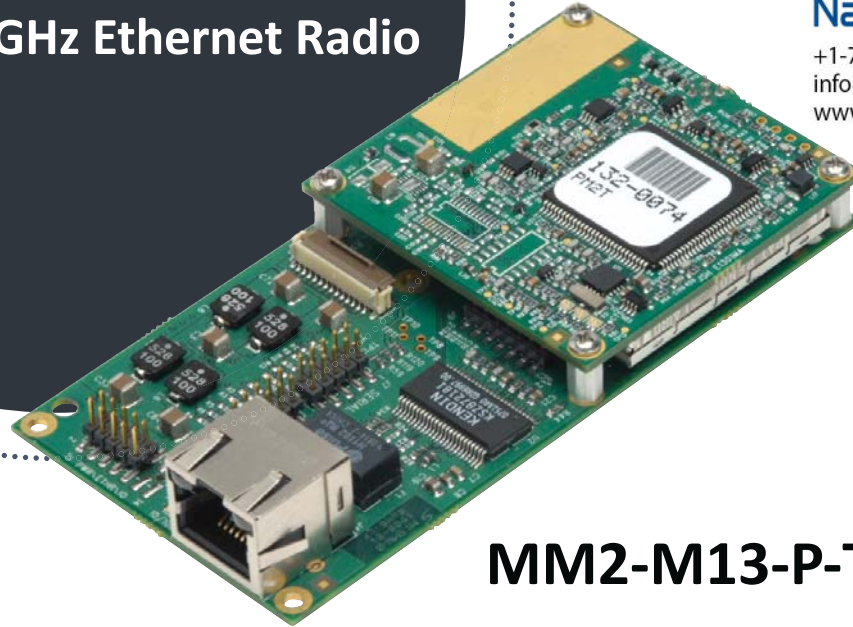# M13 Series
MM2-M13 1.3 GHz Ethernet Radio

MM2-M13-P-T-SR001

KEY FEATURES

Versatility: Gateway, Endpoint, Repeater or simultaneous Endpoint and Repeater function in a single radio.

Long Range: 40 miles with clear line of sight with the ability to extend through Repeaters.

Noise Immunity: Superior performance in noise congested environments.

Secure: Frequency Hopping Spread Spectrum technology prevents detection and unauthorized access. 128 and 256-bit AES encryption standard.

Error Free Communications: 32-bit CRC with automatic retransmissions.

Low Power Consumption: Ideal for solar, battery, and DC applications.

Industrial Grade: Operating Temperature from -40°C to +75°C.

OVERVIEW

FreeWave Technologies' restricted products are designed to meet the rigorous demands of military and government users worldwide. This user-configurable 1.3 GHz product is available as an OEM board level radio.

It is used in applications ranging from UAVs to UGVs, and more. FreeWave restricted products share the same features as our commercial radios that assure reliable data transmission, such as 32 bit CRC error detection with automatic retransmission and more.

The FreeWave MM2 Series of radios have been designed to provide the performance, reliability, and quality that our customers have come to know and expect in our products. The M13 combines high performance with a small size making it ideal for applications where space is at a premium.

All radios are designed, manufactured and tested in Boulder, CO.

SOLUTIONS

| DRONES & ROBOTICS | EARTH MONITORING | GOV & DEFENSE | IRRIGATION & PRECISION AGRICULTURE | ASSET TRACKING | OIL & GAS | WATER & WASTEWATER | SMART CITIES | UTILITIES |

TECHNICAL SPECIFICATIONS

TRANSMITTER

Frequency Range	1.350 to 1.390 GHz
Output Power	Up to 1 W
Range	Up to 64 km (40 mi.), clear line of sight
Channel Spacing	230 kHz
RF Data Rate	115.2 or 153.6 kbps, user-selectable

RECEIVER

Sensitivity	-106 dBm @ BER 10^{-4}
IF Selectivity	-20 dB at fc +/- 230 kHz
System Gain	136 dB

DATA TRANSMISSION

Type	Frequency Hopping Spread Spectrum
Modulation	2 level GFSK
Data Throughput	92 kbps
Error Detection	32-bit CRC, retransmit on error
Data Encryption	AES 128- and 256-bit encryption user-selectable
Hopping Zones	16 zones, user-selectable
Hopping Bands	7, user-selectable
Hopping Channels	1 to 112 (out of 172), user-selectable
Hopping Patterns	15 per band, 105 total, user-selectable
Protocol	Ethernet: IEEE 802.3
User Interface Rates	Ethernet Rate 10/100 Mbps Serial Rate Up to 1 Mbps

POWER REQUIREMENTS

Operating Voltage	+5 VDC (+/- 5%)

Current Consumption

Voltage	Transmit	Receive	Idle
+5 VDC	1025 mA	250 mA	150 mA

INTERFACES

Data Interface	10-pin and Ethernet header, 2 10-pin serial RS232 headers for power, data, and diagnostics 2mm pin spacing Options: 1 RJ45 Ethernet connector
RF Connector	MMCX or SSMC

GENERAL INFORMATION

Operating Temperature	-40°C to +75°C (-40°F to +167°F)
Humidity	0 to 95%, non-condensing
Dimensions	102 L x 50.8 W x 7.6 H (mm) 4.00 L x 2.00 W x 0.30 H (in.)
Weight	44g (0.10 lbs.)

INFORMATION TO ORDER

Model Number	Description
MM2-M13-P-SR	Board level, SSMC, Ethernet, RS232
MM2-M13-P-SR-CCNB	Board level, SSMC, Ethernet, RS232 Conformal Coated
MM2-M13-P-T	Board level, MMCX, Ethernet, TTL
MM2-M13-P-T-SR001	Board level with RJ45 connector, MMCX, Ethernet, TTL
MM2-M13-P-DEVKIT	2 MM2-M13-P-T radios with accessories