

## MM3 Series

### 900 MHz OEM Radio



The FreeWave MM3 radio has been designed to provide the performance, reliability, and quality that our customers have come to know and expect in our products in a compact form factor for applications where space is at a premium. The MM3 has all of the functionality of the larger footprint FGR3 Series of radios.

The MM3 radio is an OEM module available in a variety of configurations and 3.5 or 5.0 VDC versions. Each of these can be ordered as RoHS or UL Class I, Division 2 compliant.

GaAs FET RF front end with multistage SAW filtering has an unmatched combination of overload immunity and sensitivity for unparalleled signal performance.

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

#### Key Features

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

**Long Range:** 32 km (20 miles) with clear line of sight with the ability to extend through Repeaters

**Noise Immunity:** Superior performance in noise congested environments

**Secure:** Using Frequency Hopping Spread Spectrum (FHSS) technology; available with 128-, 192-, and 256-bit AES encryption

**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 +85°C

## Transmitter

|                 |   |
|-----------------|---|
| Frequency Range | 902 to 928 MHz                                  |
| Output Power    | Up to 1 W                                       |
| Range           | Up to 97 km (60 miles) with clear line of sight |
| Channel Spacing | 230.4 kHz                                       |
| RF Data Rate    | 115.2 or 153.6 kbps, user-selectable            |

## Receiver

|                |  |
|----------------|--|
| Sensitivity    | -108 dBm @ 115.2 kbps for BER 10 <sup>-4</sup><br>-103 dBm @ 153.6 kbps for BER 10 <sup>-4</sup> |
| IF Selectivity | 40 dB at fc +/- 230 kHz  |
| RF Selectivity | 50 dB at 896 MHz, 935 MHz  |
| Dynamic Range  | +10 dBm 3rd order intercept point at input connector   |

## Data Transmission

|                  |  |
|------------------|--|
| Type             | Frequency Hopping Spread Spectrum<br>Options: TDMA, Super Epoch TDMA |
| Modulation       | 2 level GFSK   |
| Data Throughput  | 80 or 115.2 kbps   |
| Error Detection  | 32-bit CRC, retransmit on error                                      |
| Data Encryption  | Options: 128-, 192-, 256-bit AES encryption                          |
| Hopping Zones    | 16 zones, user-selectable  |
| Hopping Bands    | 7, user-selectable   |
| Hopping Channels | 50 to 110, user-selectable   |
| Hopping Patterns | 15 per band, 105 total, user-selectable                              |
| Protocol         | TTL  |

## Power Requirements

|                     |                  |          |         |       |
|---------------------|------------------|----------|---------|-------|
| Operating Voltage   | +5.0 VDC (+/-5%) |          |         |       |
| Current Consumption | Voltage          | Transmit | Receive | Idle  |
| T Versions          | + 5.0 VDC        | 855 mA   | 90 mA   | 21 mA |

## Interfaces

|                       |   |
|-----------------------|---|
| Data Interface        | 14-pin straight, dual row header for power, data, and diagnostics<br>2 mm pin spacing |
| Diagnostics Interface | TTL Serial  |
| RF Connector          | MMCX  |

## General Information

|                       |   |
|-----------------------|---|
| Operating Temperature | -40°C to +85°C (-40°F to +185°F)                          |
| Humidity              | 0 to 95%, non-condensing                                  |
| Dimensions            | 50.8 L x 35.6 W x 9.6 H (mm)<br>2 L x 1.4 W x 0.38 H (in) |
| Weight                | 15 g (0.3 lbs)  |

## Information to Order

| Model Number | Description                               |
|--------------|---|
| MM3-T        | Board level, 5.0V, UL Class I, Division 2 |