Embeddable Industrial-Grade Radio Module

FreeWave’s ZumLink™ 900 Series is made for secure collection, transport, and control of data in rugged industrial environments, providing a long-range, low-power solution for remote wireless communications.

Infuse your next product with the industrial-grade reliability inherent in FreeWave’s ZumLink serial radio module. The ZumLink Z9-C and Z9-T are ideal for embedded systems that demand the highest standard in quality and performance, particularly in noise congested environments. They provide a Cost, Size, Weight, and Power (CSWaP) advantage with their small, lightweight form factor, industry-leading low power consumption, and low-cost integration.

These user-configurable radio modules operate in the unlicensed 900 MHz spectrum and support multiple high-speed RF link rates up to 4 Mbps.

Note: The ZumLink 900 Series serial radio module shares the same 14-pin interface found on FreeWave’s MM2 OEM board-level radios to ease migration (although it is not a drop-in replacement).

Key Features

- **Operates in the Unlicensed 900 MHz Spectrum:** Cost-effective, easy to deploy
- **High Speed Data Rates:** Five RF link rates supporting from 115.2 kbps to 4 Mbps
- **Long Range:** Up to 97 km (60 miles) with clear line of sight
- **Industrial Grade:** Class I, Division 2 certified; operating temperature from -40°C to +85°C
- **Low Current Consumption:** 843 mA @ 3 VDC in transmit; 680 mA @ 5 VDC in transmit
- **Flexible Interface Options:** Either two RS232 or two TTL serial interfaces
- **Diagnostics:** Allows real-time access to receive signal characteristics for all used channels
- **Secure:** Using Frequency Hopping Spread Spectrum (FHSS)
- **CSWaP Advantage:** Optimal Cost, Size, Weight, and Power combination
### Technical Specifications | ZumLink™ 900 Series Serial Radio Module

#### Transmitter
- **Frequency Range**: 902 to 928 MHz
- **Output Power**: 10 mW to 1 W; user selectable
- **Range**: 97 km (60 miles) with clear line of sight
- **Channel Spacing**: 230.4, 345.6, 691.2, 1382.4, 1612.8 (Beta), & 3225.6 kHz
- **RF Data Rate**: 115.2, 250, 500 kbps, 1, 1.5 (Beta), & 4 Mbps; user selectable

#### Receiver
- **IF Selectivity**: > 40 dB
- **System Gain**: 135 dB
- **Sensitivity**
  - 115.2 kbps: -105 dBm
  - 250 kbps: -102 dBm
  - 500 kbps: -99 dBm
  - 1 Mbps: -95 dBm
  - 1.5 Mbps (Beta): -90 dBm
  - 4 Mbps: -83 dBm

#### Data Transmission
- **Type**: Frequency Hopping Spread Spectrum
- **Modulation**: 2 level GFSK, 8-ary FSK
- **Link Throughput**: Up to 2.2 Mbps
- **Error Detection**: 16-bit ARQ, 16-bit CRC, retransmit on error
- **Hopping Rates**: 400, 200, 100, 50, 25 ms
- **Hopping Channels**: Up to 110; RF Data Rate Dependent
- **Hopping Patterns**: Up to 16; RF Data Rate Dependent
- **Protocol**: Adaptive Spectrum Learning (ASL)
- **User Interface Rates**: TTL 3 Mbps, RS232 5 Mbps

#### Power Requirements
- **Operating Voltage**: +3 to +5 VDC
- **Current Consumption**
<table>
<thead>
<tr>
<th>Voltage</th>
<th>Transmit</th>
<th>Receive</th>
<th>Idle</th>
</tr>
</thead>
<tbody>
<tr>
<td>+3 VDC</td>
<td>843 mA</td>
<td>30 mA</td>
<td>13 mA</td>
</tr>
<tr>
<td>+5 VDC</td>
<td>680 mA</td>
<td>30 mA</td>
<td>13 mA</td>
</tr>
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#### Interfaces
- **Data Interface**: 14-pin dual row header for power, data, and diagnostics
- **2 mm pin spacing**
- **Either two RS232 or two TTL serial interfaces**
- **Diagnostics Interface**: Serial, RS232 or TTL
- **RF Connector**: MMCX

#### General Information
- **Temperature**: -40°C to +85°C (-40°F to +185°F)
- **Humidity**: 0 to 95%, non-condensing
- **Dimensions**: 50.8 L x 36.07 W x 8.90 H (mm)
  - 2.0 L x 1.42 W x 0.35 H (in)
- **Weight**: 15 g (0.03 lbs)
- **Reliability**: 91,328 hour MTBF
- **Safety**: Class I, Division 2, Groups A-D
- **UL**: Directive 2011/65/EU

#### Information to Order
- **Model Number** | **Description**
  | **Z9-C** | Board Level Unit, RS232
  | **Z9-T** | Board Level Unit, TTL
  | **Z9-T-DEVKIT** | Includes 2 Z9-T units and accessories

*Country-specific models and information are available. Contact FreeWave Sales for information.*