RF Integrated Module

WITECH **MD915N25-1AS**

**915 MHz - Narrow Band - 25 mW**
**Core 1 - Footprint A - SMA RF Port**

*Rev 1.0  02/13*

Witech MD915N25-1AS is a 915 MHz, narrow band 25 mW fully integrated (hardware/firmware) RF module specially suited for OEM integrators who wish a high optimized and completely designed RF platform with true low power and long range features, achieving the fastest time to market and the lowest development risk. The module includes a SMA-type RF Port for greater flexibility in antenna selection, according to the size and performance specifications. This narrow band solution is specially designed for applications requiring ultra-high sensitivity for extreme link-budget, like ultra low power ad-hoc networks with extensive coverage.

## General Features

- Fully Integrated RF Module (Hardware/Firmware)
- License Free 915 MHz ISM Band
- Narrow Band for Extreme Link-Budget
- Ultra Low Power Consumption
- Long Range: ≈ 2000 m (line-of-sight)
- Fastest Time to Market, Lowest Development Risk
- Multiple I/O Interfaces and Assembly Options

## RF Performance

- Output Frequency Range: 902-928 MHz
- Channel Spacing: 12.5, 25, 50 KHz
- Output Power Range: -20 to 13 dBm
- Antenna Port Connection: SMD 50 Ω
- Modulations: GFSK, RCFSK
- Radio Data Rates: 0.1 to 25.0 Kbps
- Sensitivity (BER < $10^{-3}$)
  - 130 dBm (0.1 Kbps)
  - 121 dBm (1.0 Kbps)
  - 114 dBm (9.6 Kbps)
  - 113 dBm (25.0 Kbps)
- Frequency Stability 2.5 ppm (Temp Compensated)
- Compliant with FCC Standard (Parts 15, 90, 95)

## Power Supply and Consumptions

- Voltage Range: 3 to 6 V
- Internal Ultra Low Power Regulator Included
- Consumptions:
  - Standby 5 µA
  - Peak TX 43 mA
  - Peak RX 26 mA
  - Average <60 µA (RX 1 sec latency, 9.6 Kbps)

## Temperature Range

- Storage Temperature: -40º to 85º C
- Operating Temperature: -30º to 75º C

## Dimensions

- Size: 40 x 30 x 7.65 mm
- Weight: 6 g

## Firmware Stack Options

- Firmware Stack Options Suited for Differents Applications Types
  - WITECH LINK STACK
  - WITECH ULP-NET STACK
  - WITECH METERING STACK
  - WITECH RTLS STACK
  - WITECH DOMO STACK
- Wireless Link/Network Bootloader (WLBOOT/WNBOOT) Included for Complete Remote Firmware Update (Witech Stack and Application)
- Complete and Easy to Use Witech APIs in C Programming Language for all Stack Options:
  - WITECH LINK STACK API
  - WITECH ULP-NET STACK API
  - WITECH METERING STACK API
  - WITECH RTLS STACK API
  - WITECH DOMO STACK API
- For Every Stack, same API for Two Integration Scenarios:
  - Local Integration on Witech CPU
  - External Integration in a Second CPU (USB/Serial interface). Cross-Platform Libraries for:
    - Low Level Integration (ARM, MIPS, MSP430, AVR, COLDFIRE, ...)
    - High Level Integration (Windows, Windows CE/Mobile, Linux, ...)

## Applications

- Automatic Meter Reading Networks (AMR) for water, electricity and gas.
- General Purpose Ad-hoc Sensor Networks
- Wireless Domotic Systems
- Industrial Control
- Solar Panel Monitoring Networks
- Marinas Dock Pedestals
- Real Time Location Systems (RTLS)
- Indoor Navegation and Access Control
- Healthcare and Wellness Networks
- Weather Stations
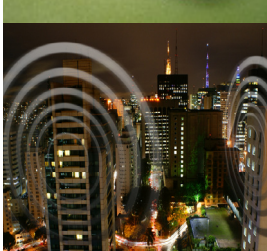- Watering and Irrigation Control Networks
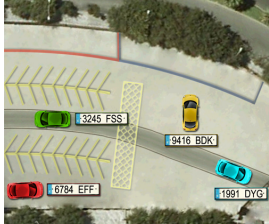
## Wireless Technologies
www.witechradio.com

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**915 MHz - Narrow Band - 25 mW**
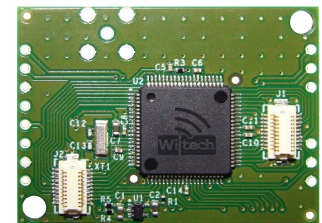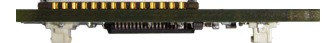**Core 1 - Footprint A - SMA RF Port**

## RF Integrated Module

*Rev 1.0  02/13*

### Internal CPU: Witech Core 1

- Flash based Ultra Low Power Microcontroller
- 16-Bit RISC Architecture
- 2.2V to 3.6V Operation
- Max Frequency: 25 MHz
- Ultra Low Power Consumption:
  - 0.1 µA RAM retention
  - 2.5 µA RTC operative
  - 165 µA/MIPS in active state
- Wake-up from Standby Mode < 5 µs
- Flash Options: up to 256 KBytes
- RAM Options: 16 KBytes
- Integated LDO, Monitoring and Brownout
- Integrated Peripherals
  - 3 16-Bit Timers, 15 Cap/Comp Channels
  - Up to 4 Serial Modules (UART/SPI/I2C/IRDA)
  - RTC
  - ADC (12-Bit, 16 Channels)
  - DMA (3 Channels)
  - Hardware Multiplier (32-Bit)
  - External Interrupt Inputs (up to 16)
  - Embedded Emulation Module (JTAG/SBW)

### Support for Witech Devices

- HW Design Support
- FW/SW Design Support
  - HW Abstraction Layers (CPU and Peripherals)
  - Libraries for Peripherals and Basic Utilities
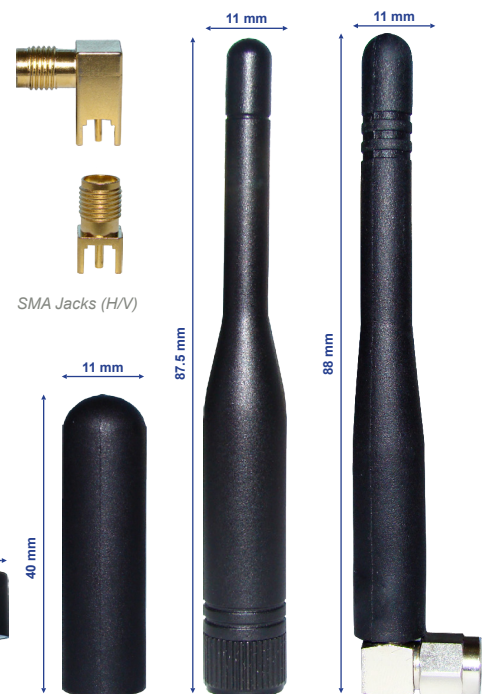  - Tutorials and Examples

### Assembly Options and Accessories

- SMD Assembly Option (Full Interface)
  - 40 (2 x 20) pins Interface (HIROSE DF-12 Series)
  - 3 Stacking Heighs: 3.5, 4 or 5 mm
  - Vin, 3V, GND and 34 Input/Output Ports
- Through-Hole Assembly Option (Basic Interface)
  - 14 (8+3+3) pins Interface (2.54 mm)
  - Standard 2.54 mm Cables, Headers and Sockets
  - Vin, 3V, GND, SBW, 8 E/S (UART, SPI, I2C, ADC, INT)
- Multiple Antenna Options

*Note: All Images on this Page are Actual Size*

*SMA Jacks (H/V)*

**SH 3.5 mm**  **SH 4 mm**  **SH 5 mm**

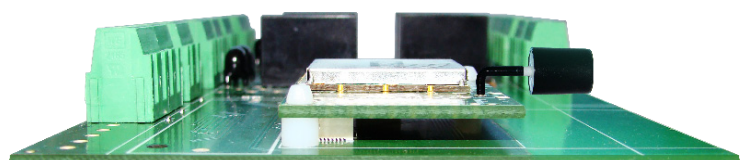*Matting Connectors (3 Stacking Heighs)*

**SH 3.5 mm**  **SH 5 mm**

*Plastic Support Spacers*

*PCB Mount Helical Antennas*

*Whip Style Antennas*

*SMD Assembly Example With Plastic Spacer (Lateral View)*

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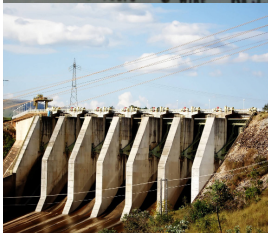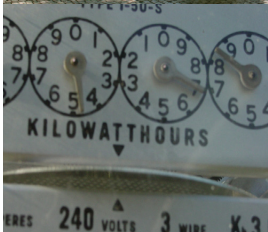
### Witech Link Stack

• Data Interleaving, Data Whitening
• Forward Error Correction (FEC/BCH)
• Automatic Frequency Control (AFC)
• Frequency Hopping Spread Spectrum (FHSS)
• Encryption (AES 128)
• Quality of Service Management (RSSI)
• Output Power Control, Power Amplifier Ramping
• Automatic Sensitivity Control
• Comunications Features
   - Point to point, Multicast, Broadcast, Mutihop
   - Asynchronous/Synchronous
   - Connection-Based/Connection-Less
   - ACK/NACK
   - CS/LBT (Carrier Sense/Listen Before Talk)

### Witech ULP-NET Stack

• Witech Link Stack + ULP-NET Layer
• True Ultra Low Power Ad-hoc Network
• Star, Tree or Mesh Network
• Full Mesh or Partial Mesh (Centralized)
• Dynamic Topology and Routing
• No different logical Devices (Planning Exempt, all Nodes are Routers and Endpoints)

### Witech Metering Stack

• Witech ULP-NET Stack + Metering Application Layer
• Fast Time to Market Solution for Complex Ultra Low Power Metering Network Systems
• Multiple Meter Interface Options:
   - Pulse Meters (up to 4 Meters per Node)
   - Bus Meters (Modbus, M-bus, CzBus, ...)
   - Serial (UART/SPI/I2C) for General Purpose
• Powerful Programming of Meter Readings
• Automatic Leak Detection, Anomalous Consumptions, Special Monitorig intervals, ...
• Remote Actuation Features: Supply Cutt off, Alarms Signaling, Redundancy Management
• Prepaid Management, Simple and Mixed

### Witech RTLS Stack

• Witech ULP-NET Stack + RTLS Application Layer
• Fast Time to Market Solution for Complex Ultra Low Power Real Time Location Network Systems
• Types of devices: Active Tags, Beacon nodes and Dongle Nodes
• Optimal Solution for Indoor Location and Navegation
• High Level Utilities for Access Control

### Witech DOMO Stack

• Witech ULP-NET Stack + DOMO Application Layer
• Fast Time to Market Solution for Complex Ultra Low Power Domotic Network Systems
• Types of devices: General purpose Analog and Digital Input/Output Devices, and Specific Devices (Light Control, Climate Control, Shutter and Blind Control, Dongle, ...)
• High Level Utilities: Scenarios, Programming, ReStart, ...

## FIRMWARE STACK OPTIONS

**WITECH LINK STACK**

| USR APP (User application) | WLBOOT (Wireless Link Bootloader) |

WITECH LiNK API

| LiNK (Link Layer, MAC) |
| PHY (Physical Layer) |

**WITECH ULP-NET STACK**

| USR APP (User application) | WNBOOT (Wireless Network Bootloader) |

WITECH ULP-NET API

| ULP-NET (Ultra Low Power Network Layer) |
| LiNK (Link Layer, MAC) |
| PHY (Physical Layer) |

**WITECH METERING STACK**
**WITECH RTLS STACK**
**WITECH DOMO STACK**

| USR APP (User application) | WNBOOT (Wireless Network Bootloader) |

WITECH METERING API
WITECH RTLS API
WITECH DOMO API

| METERING APP / RTLS APP / DOMO APP |
| ULP-NET (Ultra Low Power Network Layer) |
| LiNK (Link Layer, MAC) |
| PHY (Physical Layer) |