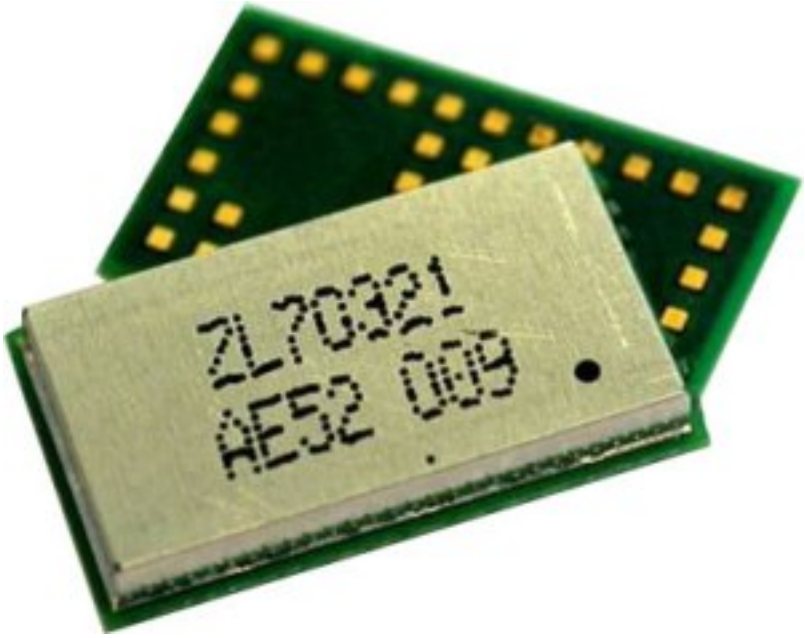
RF Modules for Implantable Medical Device Designers



Microsemi Corporation, a leading provider of semiconductor solutions differentiated by power, security, reliability and performance, today announced the availability of a complete medical network (med-net) radio link for implantable medical devices such as pacemakers, cardiac defibrillators and neurostimulators. The new radio link is comprised of the company's ZL70321 implantable radio module and its ZL70120 base station radio module for external device controllers. Both modules are based on Microsemi's ultra low power (ULP) ZL70102 medical implantable communications service (MICS) band radio transceiver chip, which supports a very high data rate RF link for medical implantable communication applications.

Radio frequency technology is increasingly being used in a wide variety of medical implantable applications including cardiac care, physiological monitoring (e.g. insulin), pain management and obesity treatments.

"RF engineering is a highly specialized discipline, and leveraging Microsemi's deep expertise in this area allows our customers to reduce design times and minimize project risk," said Martin McHugh, Microsemi's product line manager. "With Microsemi's two-module radio link, companies can now focus research dollars and development efforts on new therapies that enable a better quality of life."

The ZL70321 implantable module implements all RF-related functions needed to deploy the implant node in a MICS RF telemetry system. The integrated antenna tuning circuit allows the module to be used with a wide range of implant antennas (nominal antenna impedance is 100+j150 Ω). The module provides the following major blocks:

- ZL70102-based MICS RF transceiver with integrated matching network, SAW filters for suppression of unwanted blockers and antenna tuning
- 2.45 GHz wake-up receiver matching network
- Integrated 24 MHz reference frequency crystal
- Decoupling capacitors

The ZL70120 base station radio module also includes all RF-related functions required to deploy the external device functions in a MICS-band RF telemetry system. It is designed to meet regulatory requirements including FCC, ETSI and IEC. Additional features include:

- Integrated matching network, bandpass filters for suppression of unwanted blockers and an extra receiver LNA for maximized receiver sensitivity
- 2.45-GHz wake-up transmitter and antenna matching network
- RSSI filter and logarithmic amplifier simplifying clear channel assessment (CCA) required by the MICS standard
- 24-MHz XO reference frequency for the 400-MHz and 2.45-GHz subsystems
- Fully shielded package

Microsemi's ZL70102 transceiver chip, which is used on both the implantable and base station modules, allows patient health and device performance data to be quickly transmitted with little impact to the useful battery life of the implanted device. The device operates in the 402—405 MHz MICS band. Multiple ULP wake-up options are supported including a 2.45 GHz ISM band wake-up receiver. The ZL70102 consumes less than 6mA when transmitting or receiving data, only consumes 290nA when in listen before transmit mode and has a sleep mode that consumes just 10nA.

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