

## Product Brief Overview

RFMicron's Magnus<sup>®</sup> S2 single chip IC enables a new class of fully-functional wireless passive sensors consisting of nothing more than the Magnus<sup>®</sup> S2 chip and an antenna – the same components needed for a conventional read-only RFID tag.

RFMicron is driving a revolutionary change in the RFID market by providing single-chip sensing capability via affordable sensor tags for multiple stimuli such as **moisture**, **pressure** and **proximity**. This innovation enables substantially lower cost, easily deployed, maintenance-free and battery-free, sensing solutions to business problems for improved product and quality control.

The Magnus<sup>®</sup> S2 UHF RFID Tag IC is designed for use in EPCglobal<sup>™</sup> Gen 2 (v. 2.0.0) and ISO/IEC 18000-6C compliant tags. It offers an unprecedented degree of user control and feedback, correction of interference and detuning conditions and allows for precise management of tag response.

Magnus<sup>®</sup> S2 ICs feature RFMicron's patented Chameleon<sup>™</sup> technology, Sensor Access and On-Chip RSSI. Chameleon<sup>™</sup>, the first truly adaptive RFID front end, automatically adjusts the input impedance of the IC to optimally tune the tag to varying frequencies and environmental conditions.

Sensor Access gives the user access to the Chameleon<sup>™</sup> self-tuning circuit results as a 5-bit Sensor Code using a standard EPC Gen 2 READ command. The Sensor Code provides a direct measure of the antenna's impedance. Based on the chosen antenna design and the effect of the environment on the impedance, changes in the Sensor Code indicate a change in the environment.

On-Chip RSSI is another capability unique to RFMicron. The On-Chip RSSI is a 5-bit digital output that can be read by the reader using standard EPC Gen2 commands and can be used as a data resource providing a direct measurement of the signal strength seen by the tag. This feature is useful in development, characterization and system installation to manage the response of large tag deployments.

The Magnus<sup>®</sup> S2 Sensor IC enables cost-effective solutions which today can only be achieved by conventional sensors costing 10 to 100 times more. RFMicron sensors respond to a variety of environmental stimuli and provide the economies of scale necessary to drive pervasive deployment into markets such as automotive, construction, energy, and healthcare.

## Features

- RFMicron's patented Chameleon<sup>™</sup> technology enables self-tuning highly consistent-performing passive tags
- 5-bit Sensor Code reports changes in impedance due to environmental effects
- On-Chip RSSI provides an unprecedented level of information on system performance
- Meets EPCglobal<sup>™</sup> Gen2 (v. 2.0.0) and ISO/IEC 18000-6C requirements
- Worldwide operation in the RFID UHF band from 860 to 960 MHz
- User-accessible read-only and read/write memory
  - 64-bit factory programmed unique Tag ID (read-only; unalterable)
  - 144-bit user memory with user-writable EPC<sup>™</sup> code up to 128-bit in length
  - Or up to 272-bit EPC<sup>™</sup> code with no user memory
  - 32-bit Access and Kill passwords

**Applications:** Automotive, Construction, Materials, Energy, Healthcare

### Operating Conditions and Electrical Characteristics

Parameter	Min	Typ	Max	Units	Notes
Operating Frequency	860		960	MHz	
Operating Temperature	-40		+85	°C	
Read Sensitivity		-16.1		dBm	1
Write Sensitivity (EPC compliant)		-6.1		dBm	1
Data Retention	10			Years	2
Write and Erase Endurance		10,000		Cycles	2
Received RF Power			+10	dBm	800-1000 MHz
ESD Immunity			1000	V	Human Body Model (HBM)
Storage Temperature	-40		100	°C	
Assembly Temperature			150	°C	1 minute duration

1. DSB-ASK modulation with 90% modulation depth and 25  $\mu$ s  $T_{\text{ari}}$  used for reader-to-tag communication. Miller M=4 encoding with 256 kbps BLF used for tag-to-reader communication. Ambient temperature: 25 °C.
2. -40 to +85 °C

### Pad Description.

Pad	Description
<b>RFN</b>	Antenna connection
<b>RFP</b>	Antenna connection
<b>NC</b>	Not connected – pads are for mechanical support and planarity after assembly. Must be electrically floating.

**Ordering Information** - Available in wafer and packaged form

Part #	Description
<b>RFM-5200-WR</b>	Raw Tested Wafer (8 inch) non-thinned ~750 $\mu$ m wafer thickness
<b>RFM-5200-WF</b>	Finished (Bumped, thinned to ~130 $\mu$ m, Sawn) Tested Wafer (8 inch)
<b>RFM-5200-QN</b>	Two lead QFN Package (1.6mm x 1.6mm x 0.4mm)