

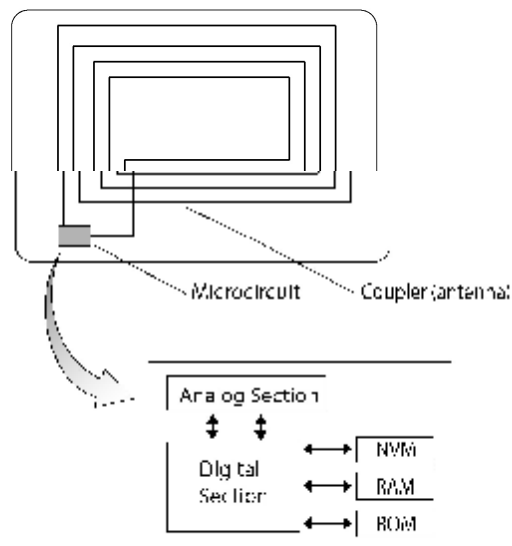
## MP9320 Operational Overview

The MP9320 UHF Long-Range Reader is a member of the SAMSys family of Radio Frequency Identification (RFID) products. RFID is a wireless data acquisition method used to remotely retrieve product data such as part number, date-of-manufacture, quantity, version, and other information. All RFID systems are comprised of the following components:

- Transponders (tags) attached to a product
- Reader/Interrogator to write and read tag data
- Reader/Interrogator Antenna

### ***Transponders (Tags)***

The transponder or tag is the data-carrying device attached to the product or container and can come in any shape or size. The most common are the “credit card” tags used for security access and the larger plastic, anti-theft tags used by retailers. Whatever the size or application, each tag always consists of a coupler (antenna coil) and a microcircuit. Tags operate in read/write mode. In other words, data can be rewritten to the tag as well as read from the tag.



The tag communicates with the reader across the air-interface. This interface is defined by its carrier frequency, bit data rate, encoding method and other parameters.

Tags are typically referred to as either active or passive devices depending on the power source. Active tags contain an internal battery and have longer read ranges but a limited operation life.

Low frequency passive tags do not have an internal battery and are powered by inductive or capacitance coupling when the tag is in the RF field of the reader. These tags typically have shorter read ranges, but have substantially longer operational lives.

UHF tags, like those used with the MP9320, use reflected electromagnetic backscatter coupling. These tags operate in the 902-928 MHz range and typically have longer read ranges.

When a UHF tag passes through the RF field, the tag is energized by the reader's time-varying, electromagnetic RF wave. This signal is called the carrier signal. When the RF field passes through the antenna, an AC voltage is generated. This voltage is rectified to supply power to the tag's microcircuit. As the microcircuit load and unloads the tag's antenna terminals, the information in the tag is transmitted back to the reader. This modulation scheme is referred to as On-Off-Keying (OOK).

### ***MP9320 Reader***

The reader contains a transmitter section, receiver section, and controller section. The transmitter section contains an RF generator, amplifiers, and the coupling circuit. The receiver section contains the envelope detector, amplifiers, demodulator, and analog/digital converter. The controller section includes the microprocessor and any input/output communication interfaces.

The reader transmits a 902-928 MHz signal to the external antenna. This RF field can range from 6 inches to 30 feet depending on the power and frequency. The RF field generated by the reader performs the following:

- Energize the tag antenna to provide power to the integrated circuit
- Provide a synchronized clock source for the tag
- Act as a carrier for returned tag data

The reader is constantly generating the RF carrier. During this time the reader is monitoring the return signal for modulation indicating the presence of a tag.

When a tag enters the RF field, the antenna is energized and the tag starts to divide down the carrier, demodulate commands from the reader, and begins to clock data to the output transistor. The output transistor shunts the antenna coil causing momentary fluctuations in the carrier amplitude. The reader detects this amplitude-modulated data and decodes the resulting bit stream into the actual tag data. The decoding scheme depends on the specific tag protocol.