RFID – Solution Note

Background

Radio Frequency Identification (RFID) is an automatic method of collecting data from tags and transmitting it directly into computer systems using radio waves and without human intervention.

An *RFID tag* is an object that can be integrated into or attached to a product, animal, or person for the purpose of identification and tracking. The tags are read by an *RFID reader* using radio waves.

Most RFID tags contain at least two components. One is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal.

RFID tags are powered in a variety of ways:

- **Passive.** Passive tags are pure passive devices that are powered by the incoming radio signal, and require no internal power source. Most passive tags signal by backscattering the carrier wave and modulating it to transmit data.
- **Active and semi-passive** (also known as battery-assisted or semi-active). Active and semi-passive tags require a power source, usually a small battery.
- **Beacon.** Beacon tags also require a power source. They transmit autonomously in a blink pattern and do not respond to interrogation.

Communications from active tags to readers are typically much more reliable (generating fewer errors) than those from passive tags and are much more robust in complex RF environments since they can transmit at much higher power levels.

Requirement

An excellent application of RFID technology is in the field of contactless RFID smart cards, which are used for electronic payment in Metro systems. These money cards employ a passive RFID tag using Manchester coding at 212 kbps in the 13.56 MHz range. A proximity of 10 centimeters or less is required for communication.

In order to test RFID readers, signals need to be generated by and transmitted to the tag, whose response is received and interpreted by the RFID reader. An arbitrary waveform generator serves as an ideal signal source, simulating the signals transmitted by the RFID reader.

In order to test the RFID reader, the waveform generator must be able to generate a 13.56MHz carrier wave together with a series of binary (0/1) codes that can be combined in any sequence. The waveform is output for at least 16ms, and the ASK modulation index must have a range of at least 5%-40%. An example of the waveform is shown in below:

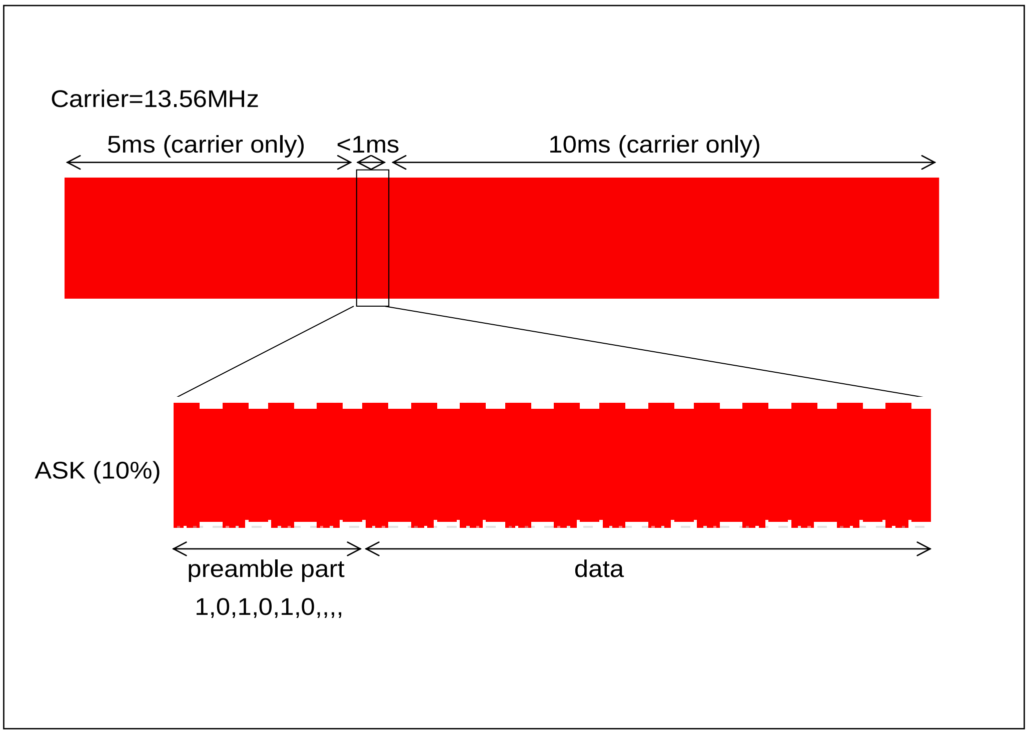

Figure 1: Required Waveform for RFID Reader Testing

Solution

Tabor Electronics' *Wonder Wave* family of Arbitrary Waveform Generators (AWGs) offers an outstanding solution for the testing of RFID readers and tags.

Wonder Wave is easily programmed to generate the carrier wave and the data specified in the above example. First, the carrier wave and the data are stored in memory. A sequence is then programmed with the required data. Background noise and frequency variations can then be applied to test the reliability of the unit.

Wonder Wave's powerful sequence generator provides outstanding support for highly complex applications, offering storage of 10,000 repeatable waveform segments, with up to 4 million memory points.

Wonder Wave is supplied with ArbConnection – Tabor's comprehensive software tool that controls AWG operation, and supports the creation of unique, arbitrary waveforms using its powerful *Waveform Composer*.

For More Information

To learn more about Tabor's solutions or to schedule a demo, please contact your local Tabor representative or email your request to info@tabor.co.il. More information can be found at our website at www.taborelec.com