

Operation Description

Summary

The Hand held Reader (part number G03301) is a proximity reader that operates with a fundamental frequency of 134.2 kHz.

A microprocessor controls all the operation of the reader.

The reader uses an internal antenna to read Radio Frequency Identification (RFID) tags off an animal. The reader can read ISO11784/ISO11785 Full Duplex (FDX) and Half Duplex (HDX) tags or transponders.

Eight cells of Nickel Metal Hydride (NiMH) batteries power the reader. The batteries are charged with an external mains powered charger. While the charger is connected, the reader will not read tags. The reader can also run off an external battery.

An LCD displays user information, eg. the number of tags read, battery life, diagnostics, etc. A LED, a vibrator and two buzzers indicates a valid tag read.

Connectivity to the reader is via RS232 or Bluetooth.

Block Description

Onboard Microprocessor

All functions are controlled by the onboard Renesas R5F21258 microprocessor. The functions include user inputs such as the button, display such as the LCD, and communications such as RS232 and wireless. The microprocessor clock is driven by the oscillator.

Power Management

The external and battery power supply to the reader is controlled by the power management circuitry. This protects the reader and batteries from over or under voltage conditions.

Power Supply

Power from the batteries power the 3.3V 500kHz Switch Mode Power Supply (SMPS), the transmit circuitry, the Buzzers, and the linear 5V (powers the FDX and HDX receive circuitry). The SMPS supply power to the microprocessor, LCD module, Bluetooth module, LED and vibrator.

Oscillator

The oscillator consists of the 17.1776MHz crystal which is driven by a 74HC04 single gate inverter. The output of the inverter is divided down to 3.3V by a voltage divider and fed to the microprocessor. The output from the inverter also feeds into a 15-stage counter to generate 134.2 kHz square wave for the transmitter.

Button

There is one trigger button for user input.

Buzzers

Two buzzers are controlled by the microprocessor for an audible indication of a valid tag read

Half Duplex (HDX) Receive

HDX tags respond during the off cycle. During the transmit cycle, the HDX tag is charged up by the antenna. The HDX then replies during the off cycle. The signal from the antenna feeds into the SA604A Frequency Modulation amplifier and demodulator system which outputs the HDX data to the microprocessor.

Full Duplex (FDX) Receive

FDX tags respond during the activation/transmit cycle. The antenna signal feeds into a network of rectifiers and filters (passive and active) to extract the FDX data. The FDX data is then feed into the microprocessor for processing.

Transmit

The activation cycle is generated as follows: The microprocessor outputs a signal to the 74HC04 single gate inverter, which feeds into the TC4428 FET drivers. The FET drivers drive the Bridge configured FETs that are loaded with the transmit transformer. The output of the transmit transformer is connected with the antenna and capacitors to form a series LC resonant circuit.

Read Range Control

To control the read (long or short range) performance of the reader, the LC circuit's performance is controlled by the microprocessor. It can 'switched in or out' a capacitor in the LC circuit to reduce the read performance.

EEPROM

I2C bus protocol 24LC512 EEPROM is used. Some configuration info and tag data is stored in the EEPROM.

Wireless

There is a Bluetooth module to give the reader Bluetooth connectivity.

LCD Module

A LCD module displays the tag count, tag number, battery condition and the connectivity of the Bluetooth. The LCD module is controlled by the microprocessor via the I2C bus.

RS232

Communications to other devices are via the MAX3232 RS232 converter chip. The RS232 ports are protected by Transient Voltage Suppressors (TVS).

Read LED

A super bright red LED controlled by the microprocessor provides visual indication of transmission and valid tag reads.

Vibrator

A 3.3V vibrating motor is controlled by the microprocessor to indicate a valid tag read.