Reference Tag User Manual

Model 501RT01

Version 00.03

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Document Number: UM-0002-00.01

Release Date: April 2007; Version 00.01

FCC Compliance
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment to an outlet on a circuit different from that to which the
receiver is connected.
4. Consult the dealer or an experienced radio/TV technician.
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that
may cause undesired operation.

FCC Warning
Modifications not expressly approved by the manufacturer could void the user's
authority to operate the equipment under FCC Rules.

Radio Frequency Exposure
This equipment has been evaluated in accordance with the FCC bulletin 56 "Hazards of radio frequency and electromagnetic fields" and bulletin 65 " Human exposure to radio frequency and electromagnetic fields. Safe operation in an uncontrolled environment will result if the following distances from the device are maintained as a minimum.

A distance greater than or equal to 20 cm from the device should be maintained. This device falls under the category of a "mobile" device for the purpose of determining this operating distance.

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Table of Contents

Notice To User: G2 Microsystems Model 501RT01 is to be configured by Professional Installers only who have received training on the proper configuration of internal registers that can and will affect the tags operation and performance.

1   Application

The Model 501RT01 reference tag is intended to provide the user a complete active RFID tag vehicle in which the customer can develop:

1) unique software applications for the tag.

2) use the tag as a vehicle to develop their own unique hardware design around the G2C501 802.11b WLAN RFIC. The 501RT01 can be a hardware reference design where the user uses the tag to get a design going which the user then later on develops their application and certifies its performance.

The 501RT01 comes pre-calibrated, where the user, needs to develop the application software for the tag application being considered by the developer.

2   Introduction

The G2 Microsystems, Model 501RT01, is a battery powered, 802.11b, Wi-Fi compatible, sensor platform that is capable of being networked in a WLAN environment. The 501RT01 can receive and send Wi-Fi compatible messages at user defined intervals. The Wi-Fi sensor platform serves as a means to become an RFID tag where the RFID platform can send messages with unique ID's and/or data encoded from several sensors which are part of the tag. The model 501RT01 seamlessly becomes part of the users wireless network infrastructure in that the tag becomes just another user on the WLAN network. The model 501RT01 and its inherent sensors can be configured to the application best suited by the user.

This user's guide is intended to assist the user in properly configuring G2 Microsystems model 501RT01 for their intended application.

3   Detailed Description

3.1   Hardware Description

The G2 Microsystems Model 501RT01 at its heart utilizes the G2 Microsystems G2C501 Radio Frequency Integrated Circuit (RFIC) for the core of the RFID tags functionality. The G2C501 RFIC is comprised as a complete 802.ll DSSS transceiver consuming very low power. Surrounding the G2C501 is auxiliary circuitry and functionality that extends the inherent capability of the G2C501. The auxiliary circuitry, surrounding, the G2C501 is:

1)   External RF power Amplifier, antenna diversity switch network and antenna's for 802.11b service.

2)   DC power control extends the capability of the G2C501 in that the G2C501 internal power supply can be easily converted to an efficient switching regulator for powering external amplifiers and maintaining constant voltages, to the RFID tag, from the battery, while the battery draws down.

3)   Sensor capabilities have been included in the 501RT01 that interface with the G2C501 RFIC. Sensor capabilities include

LF (Low Frequency) 125 kHz magnetic pick-up sensor
Tilt/vibration sensor
Temperature sensor
Push Button Sensor
Current/Resistor Sensor

4)   External Flash memory is available of up to 4M to store data and programming information

3.2   Product Specification

The following table summarizes the allowed performance characteristics of the 501RT01 RFID tag:

Parameter	Description
Frequency Band	2.412 to 2.462 GHz (Channel 1 thru 11)
Connectivity Protocol	802.11b Direct Sequence Spread Spectrum
Modulation	DBPSK @ 1 Mbps
Radiated Transmit Power	25.96 dBm EIRP, peak
Clear Channel Assessment (CCA)	RSSI detection
Input Power	3.0 V Lithium Battery
802.11b Message Length	TBD uSec Max
Transmission Interval	TBD minimum TBD Maximum
Duty Cycle	25% Maximum

3.3   Operational Capability

The 501RT01 is capable of being programmed for a variety of configurations. The tag is capable of being programmed via the serial RS232 port where the tags frequency, transmission interval as well as the message length and message content are programmed. In between messages being sent, the tag is shut down into a very low current state. Essentially most battery power is consumed during the transmission interval.

4 Tag Configuration

The 501RT01 comes pre-calibrated for maximum output power as well as the user being able to set the frequency to channels 1 through 11.The application to be programmed in the 501RT01 tag is programmed via the RS232 interface. The manual RS232 interface connects to the programming source where command line instructions to set the frequency, mac address and other operational parameters are entered.

5 Operation

5.1   Application Installation

The Model 501RT01 comes pre-calibrated and is initially shipped with no application installed. The user is responsible for determining the tag application, developing software for the application, programming the tag for the intended application and ensuring the tag performs as intended within the limits of the product specification of section 2.2 in this manual. In particular a duty cycle of 25% is the maximum allowed duty cycle. Use of a duty cycle greater than this will cause the tag to violate FCC regulations. Because of the potential of setting the duty cycle to high only professional installers are allowed to set up the hardware.

There is plenty of additional documentation and hardware to assist the user in developing their own applications.
Available documents are available in the G2C501 Release CD which includes:
1) G2C501 Software Development Kit (SDK)
2) G2C501 Quick Start Guide
3) Tag Interface Module Printed Circuit board (TIM) is available upon request

Application developers must be aware of the radiation safety limitations described in the "Radio Frequency Exposure" section of this users manual.

Additional assistance and suggestions can be obtained from G2 Microsystems Application Engineering department which can be reached at:

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