

1. Product Description

The Master Handheld data Terminal (MHHT) is a compact RFID reader module for PDA / Pocket PC with a compact flash (CF) card interface. The reader plugs into a standard CF connector, it has been designed to allow pocket PC's and mobile handhelds both short and long range access to Hi-G-Tek's electronic seal /tag for a various RFID applications,

The MHHT writes information into the electronic seal's memory at the departure point and retrieves the information at the destination. Events occurring in transit and logged in the electronic seal's memory are downloaded into the Handheld DataTerminal at the destination.

The module is powered from the PDA's power, both LF & HF antennas are completely integrated, The reader uses two RF channels (L.F , H.F) for communication with the electronic seal / tag:

High Frequency channel: Transmit/Receive at 916.5 MHz FSK modulated with 40 kHz deviation and 16KHz data.

Low frequency channel (short range): Transmit/Receive at 127 kHz, AM, 4 k Hz data rate.

2. EUT Exercise Software

Normally, the EUT transmits short messages in short periods. Therefore, in order to enable measurements of the transmitted signals, the EUT exercise program (RF tester utility running in a PDA) used during the RF testing.

The EUT was programmed by the utility to transmit continuously random data or carrier wave (cw) according to test procedures.

3. Theory of Operation

The MHHT Data Reader is a RFID module that consists of a main PCB and a custom made UHF PCB antenna (ANT2), 0 dBi gain.

The main board comprises a Micro Controller unit, UHF transceiver module for long range communication, LF transceiver for short range comm. and a CF serial communication interface & UART driver.

The UHF module is a Chipcon's RF Transceiver (U8) -model CC1021 (Complies with FCC CFR47 part 15) the module, oscillated from a 14.7456 MHz crystal oscillator (Y3) provides operational frequency (transmit/receive) at 916.5 MHz, it is FSK modulated with 40KHz deviation and 16KHz data rate. Typically, the UHF receiver is constantly open for burst messages coming from the sensors in order to obtain continuously "listening". In Tx mode - the reader interrogates the sensors for their ID, status and user data. It writes information into the sensors and retrieves logged information (events) into its Flash memory module - U11; 256KB EEPROM.

The demodulated data coming from the UHF transceiver is transferred to U1- control unit (Texas Instruments MSP430 16-bit Microcontroller) via the SPI channel for processing & decoding. The microcontroller fed from a 14.7456 MHz crystal oscillator (Y1) as well.

For short-range communication the MHHT Data Reader uses a LF Transceiver; transmit/receive at 127 kHz, AM modulated (on-off key, OOK) with 4 kHz data rate. The LF transmitter includes two sets of push-pull transistors driving a resonance circuit (where ANT1 is a SMD 1.08mH ferrite low frequency antenna).

The RFID module communicates with the PDA over a standard compact flash serial communication interface using its compact flash / UART driver (u3)

As the MHHT module doesn't have an internal power source, it is powered from the PDA's regulated output voltage once inserted into the PDA (3.3VDC generated by the PDA's main power source).