e-Gizmo MUDT-433, MUDT-315

Multi-Channel UHF Data Transceiver

Hardware Manual
Rev. 1r0

Figure 1. *The Multi-Channel Data Transceiver is available in 2 variants – MUDT-433 operates at ISM 433MHz, while MUDT-315 works at ISM 315MHz.*

e-Gizmo Multi-channel UHF Data Transceiver MUDT designed as a UART wireless cable replacement operating in fixed 9600 bps, half duplex, no hardware handshake mode. As long as your data packet does not exceed 96 bytes, your own code can be totally oblivious to its presence. Your UART code services won't need any extra handling for its use. In general, UART code services that work with direct cable connection under the just mentioned operating parameters, will work as well when the cable is replaced with the MUDT.

Multi-Channel Feature

The Multi-channel UHF Data Transceiver MUDT-433 transmits and receives at ISM 433MHz RF band, and the MUDT-315 operates at ISM 315MHz band. MUDT frequency channel can be altered by the user if it so desired by installing (or removing) a jumper at the channel select port. This is a 4-bit channel selection, allowing each module 15 channels with 400kHz.spacing.

Channel selection control can be passed on to the host controller by removing all jumpers and connecting the MUDT channel port to a 4-I/O port of the host controller.

RSSI Received Signal Strength Indicator

By forcing the MUDT RSSI control pin to logic 0, the MUDT will append the RSSI value at the end of every received data packet. You can use the RSSI to determine whether enough signal strength is available for a given installation that will ensure a reliable RF link. You can also use the feature as a rudimentary RF distance indicator or locator, albeit, keep in mind the signal strength is affected by so many things, hence, accuracy will be non-existent.

SPECIFICATIONS

Frequency Range :
431.1 MHz – 437.3 MHz
Channel Separation:
400kHz
Modulation:
FSK
RF Output power :
+10 dbm (10mW) typical
Rx sensitivity :
-105dbm
UART Baud Rate:
9600bps
Maximum Packet Size:
96 bytes
Operating Voltage:
5V/3.3V jumper selectable
Current Consumption TX:
36mA @ 5V
Current Consumption RX:
23mA @5V
Transmit to Receive latency :
20-30ms
RSSI :
150-635, with 635 corresponding to -38dbm antenna RF input signal strenght

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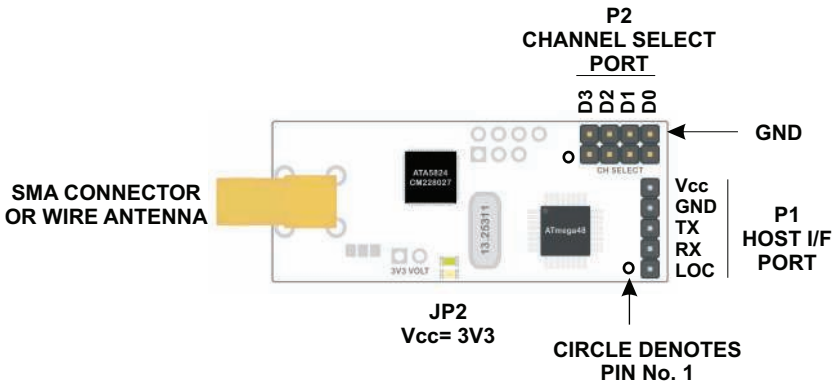


Figure 2. *Location of connectors, jumpers, and major parts.*

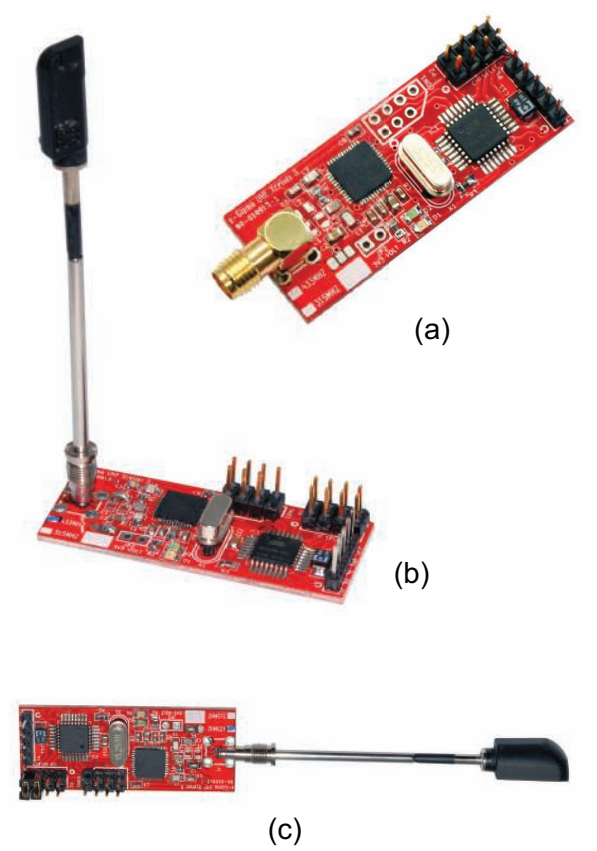


Figure 3. At your option, you can install an SMA type RF connector (2a) at the J1 RF port. Or you can directly solder a suitable antenna, either perpendicular (2b), or along the PCB plane (2c). The PCB provides little mechanical support for a rigid antenna, hence use only with additional support, or when the MUDT, together with the antenna, is housed in a protected (not metal) enclosure.

J1 - RF/ANTENNA port

JP2 - Power Supply voltage selection.
Open circuit - 5V
Shorted - 3.3V

P1 - Host Interface

Pin	ID	Description
1	LOC	RSSI enable, active low
2	RX	Rx data input
3	TX	Tx data output
4	GND	Ground
5	VCC	+3.3v/5V Power Supply (see text)

P2 - Channel Select

Pin	ID	Description
1	D3	Channel Select MSB 3
3	D2	Channel Select Bit 2
5	D1	Channel Select Bit 1
7	D0	Channel Select LSB 0

note: Pin 2,4,6,8 - GND

APPLICATION INFO

The MUDT will work with any microcontroller MCU of your choice, including the gizDuino series. A hardware UART is a necessary feature (advance programmers, of course, can do it even without hardware UART). It will work equally well with either a 5V or 3.3V MCU. Keep in mind a jumper must be installed across JP2 if the MUDT is run on a 3.3V based MCU circuit.

Channel Selection.

The MUDT-433 is optimized for operation in the 433.98MHz (Channel 8, jumper on D3 only) settings. Likewise, MUDT-315 works best when set to channel 8. There will be slight degradation in the performance, worsening further as the channel is set further away from channel 8. The effect, however, will be barely noticeable if the MUDT is operated at short distances away from each other (not more than 200 meters).

Therefore, if your application has no need to change channel, it is best to keep the default channel 8 settings.

To select a different channel, simply install the jumpers corresponding to the desired channel. In environment where a number of these transceivers in use are within range, select channels separated by at least two slots to minimize possible interference from other pairs in the vicinity.

Channel selection can be transferred under host MCU control by connecting the assigned control I/O of the host MCU to the channel select port, as shown in figure 5. Needless to say, you have to remove all the jumpers installed on it, not just for the sake of correct operation, you can't install anything else anyway if the jumper are installed. Note that the rule of channel selection is reversed logic, that's it, a logic 0 input is read as logic 1 by the MUDT.

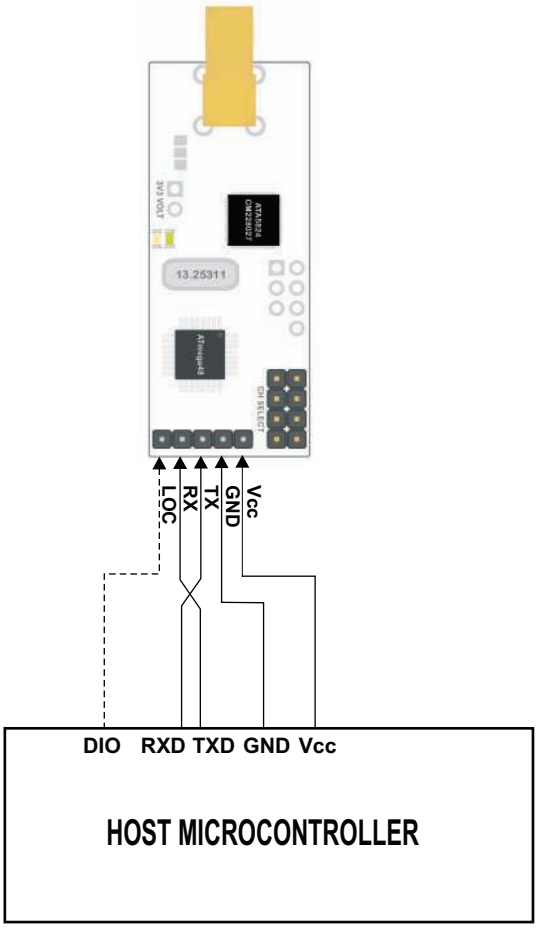


Figure 4. *An interfacing wiring example with a Host Controller. LOC connection is optional and is needed only if the RSSI feature is used.*

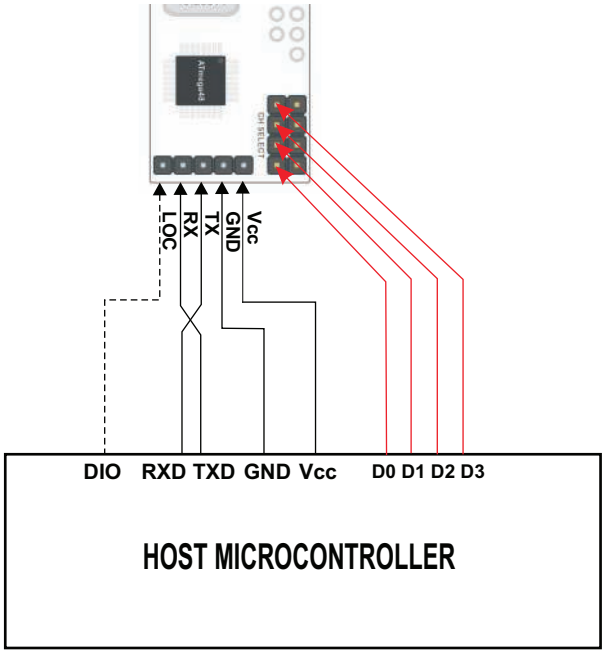


Figure 5. *Channel selection can be put under MCU control. Four MCU I/Os selects the desired channel on the fly.*

Data size and Data Integrity

A data packet is a group of data that is sent together in a single transmission. The MUDT is capable of data payload of up to 96bytes per packet. This should be more than sufficient for a vast majority of control applications. If large chunk of data need to be transferred via the MUDT, the host controller must break this down into packets not exceeding 96 bytes.

Furthermore, data integrity checking is weak in the MUDT. If high accuracy data transfer is required, data integrity checking, such as checksum or crc method, must be performed by the host controller.

RSSI

Pulling the LOC (RSSI) control to logic 0 enables the RSSI feature of the MUDT. RSSI, which stands for Received Signal Strength Indicator, is a measure of how strong the transmitting RF signal is as received by the MUDT.

RSSI is measured when the transmitting side sends a packet. Remember, you cannot measure the RSSI if the transmitter is OFF. The RSSI information is then appended to the received data packet, and is presented in fixed length 6-byte ascii format as follows:

LF + “r”+ RSSI Value (3digit) + CR

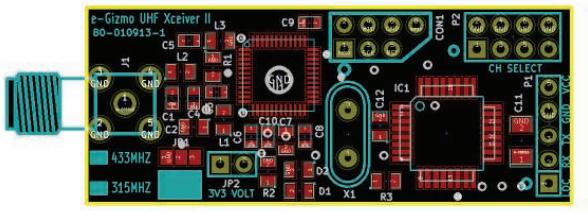
Example: RSSI = 349

LF	‘r’	RSSI (example “349”)			CR
0x0A	0x72	0x33	0x34	0x39	0x0D

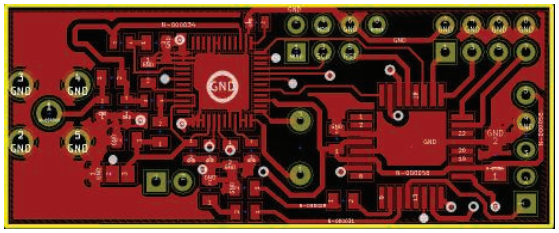
Communications Parameters

Baud Rate: 9600bps
Data: 8 bits
Stop Bits: 1
Parity: None
Handshake: None

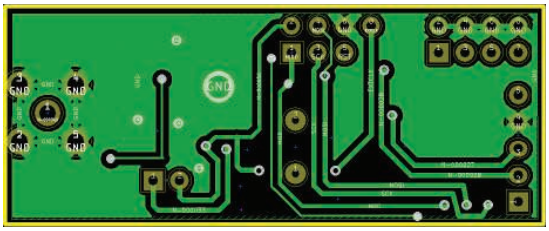
PCB ARTWORKS



COMPONENT LAYOUT



COPPER PATTERN, TOP SIDE



COPPER PATTERN BOTTOM SIDE
(VIEWED FROM THE TOP SIDE)

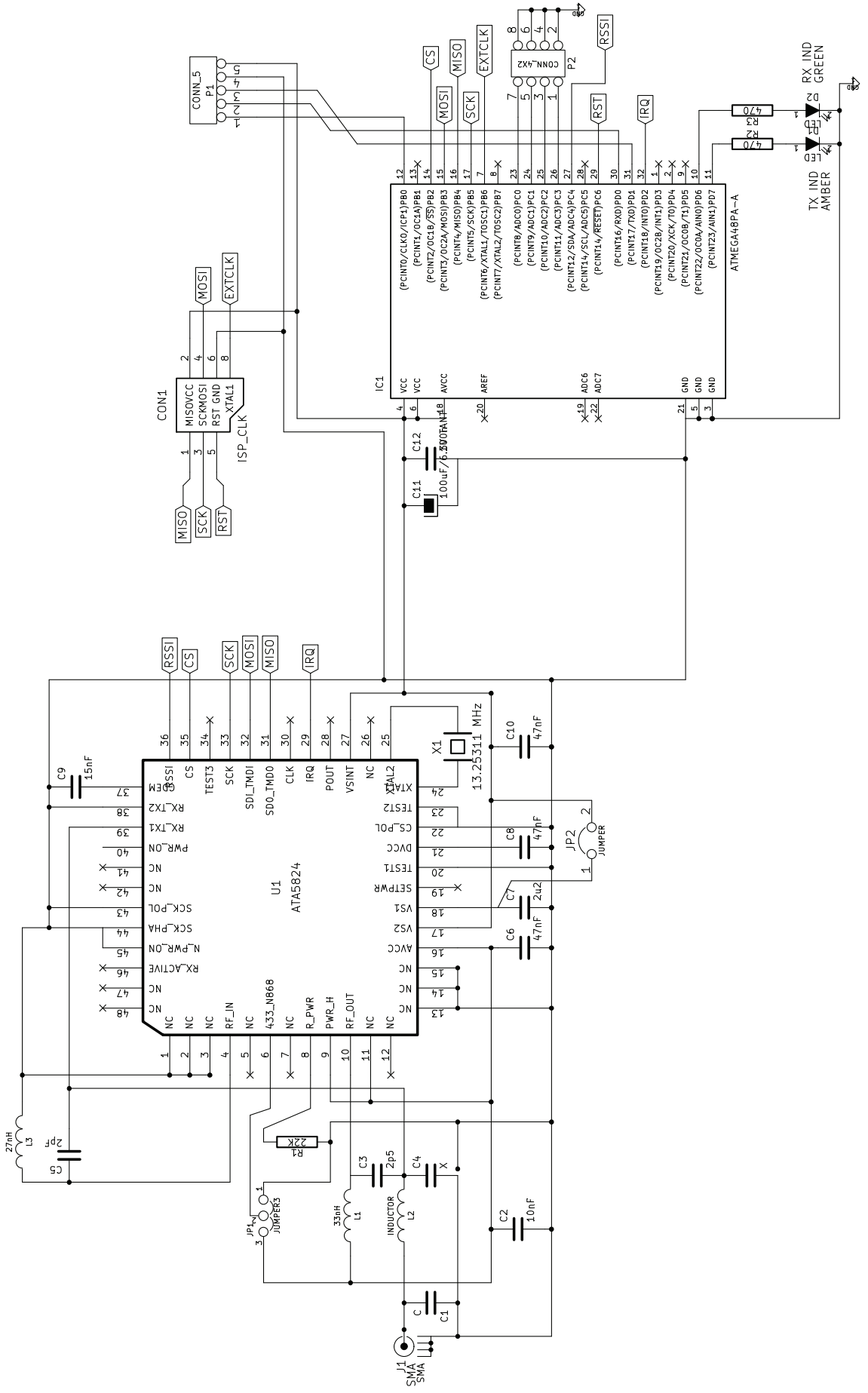


Figure 6. Schematic Diagram of the UHF Multi-Channel Data Tranceiver MUDT.