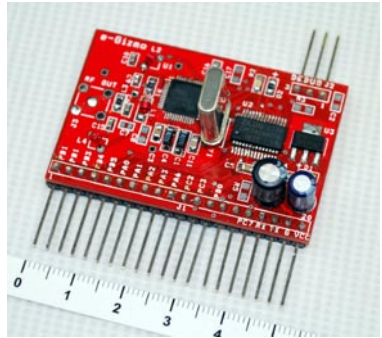


Model 5812A

UHF Data Transceiver

Technical Manual
Rev 1r1

e-Gizmo Model 5812A UHF Data Transceiver is a general purpose wireless device that provides a wireless data link between two communicating devices. It can send and receive digital data at ISM 315MHz band at a fixed speed of 9600 baud.



Model 5812A is built using ATMEL's ATA5812 radio chip. This chip has a crystal locked PLL transmitter that provides stable frequency to an RF output power of up to 10dbm. The PLL is also responsible for the receiver's excellent sensitivity and selectivity. While in the receiving mode, the ATA5812 has internal signal processing and conditioning functions that automatically rejects spurious and gibberish signals, giving a clean, serial data at its UART port. Line of sight (LOS) control range is measured at more than 100 meters (with 150 meters being typical).

You will find this kit useful for a variety of DIY wireless control systems, robot remote controller, to projects that requires a two way wireless data link in general.

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FEATURES AND SPECIFICATIONS:

Frequency: ISM 315MHz
Radio Chip: ATMEL ATA5812
MCU Chip: Zilog Encore! Z8F042A
RF Output Power: 10dbm typical
Modulation: FSK
I/O: Serial UART LVTTTL level

Communications Settings:

Baud Rate: 9600bps
Data: 8 bit
Parity: None
Stop bit: 1
Handshake: none
Mode: Half Duplex

TX Buffer Size: 512 Bytes

Operating Voltage: 3.3V (5-9V if the on board regulator is installed)

Operating Current (Typical):

Rx Mode: 24mA
Tx Mode: 35mA

BLOCK DIAGRAM

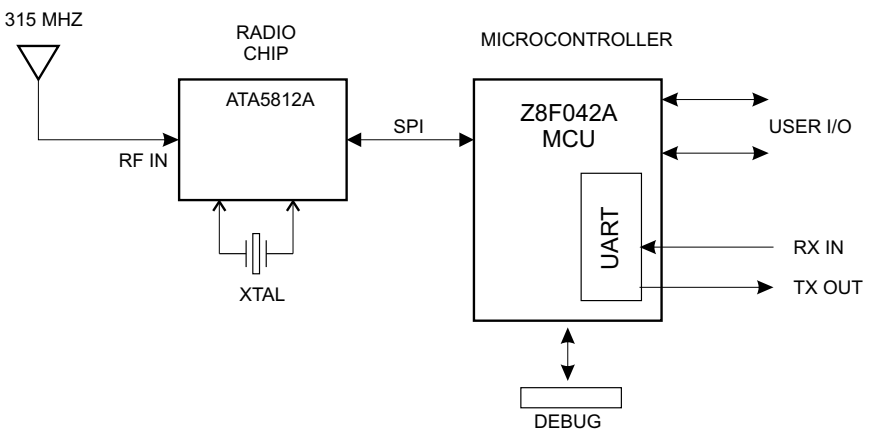


Figure 1. Model 5812A UHF Data Transceiver functional block diagram.

PIN DESCRIPTION

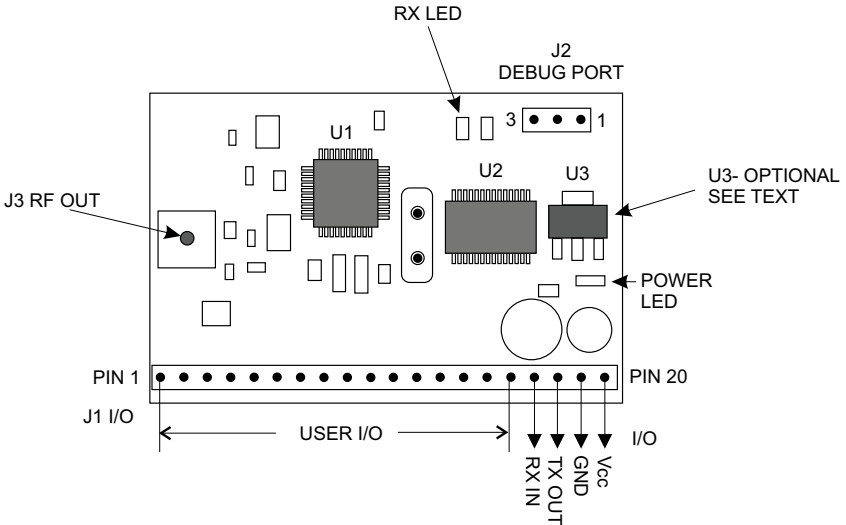


Figure 2. Location of connectors and identification of major components.

J1 I/O

J1 I/O is a 20 pin port that includes the serial I/O of the Model 5812A. Two pins are used for the power supply connection, another two for the serial I/O, and the rest for the user I/O than can be used by users who chooses to write their own code to put in the on- board MCU. Otherwise, these pins are unused and should be left unconnected.

J1 User I/O (See z8F042A Datasheet for a complete description)

Pin No	Description	Remarks
1	PB1/ANA1	User I/O or 10 bit ADC
2	PB2/ANA2	User I/O or 10 bit ADC
3	PB3/ANA3	User I/O or 10 bit ADC
4	PB4/ANA0/AMPOUT	User I/O or 10 bit ADC
5	PB5/ANA0/AMPOUT	User I/O or 10 bit ADC
6	PA0/T0IN/TOUT	User I/O or Timer I/O
7	PA1/TOUT	User I/O or Timer I/O
8	PA2/DE0	User I/O or UART H/S
9	PA3/CTS0	User I/O or UART H/S

J1 User I/O (continued..)

Pin No	Description	Remarks
10	PA6/T1IN/T1OUT	User I/O or TIMER I/O
11	PC2/AN6/LED	User I/O or 10 bit ADC IN
12	PC3/COOUT/LED	User I/O or TIMER OUT
13	PD0/RESET	User I/O or RESET
14	No connection	
15	No connection	
16	PC7/LED	User I/O or LED DRIVE

J1 Serial I/O

Pin No	Description	Remarks
10	RX IN	UART Rx Input
11	TX OUT	UART Tx Output
12	GND	GND
13	Vin	Power Supply input

J2 DEBUG

J2 Debug port supports in-circuit MCU programming and debugging. This port is compatible with e-Gizmo encore! programming dongle.

J2 Debug

Pin No	Description	Remarks
1	+3.3V Out	User I/O & 10 bit ADC
2	GND	User I/O & 10 bit ADC
3	Debug	User I/O & 10 bit ADC

LED INDICATORS

D1 - Power Indicator (Green)

D2 - Rx Indicator (Amber)

D2 flashes on when a valid Rx data is detected and received.

TYPICAL APPLICATION

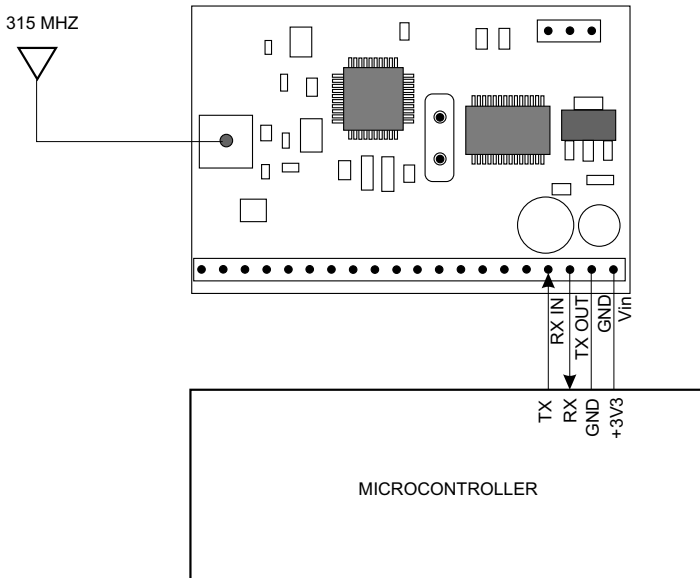


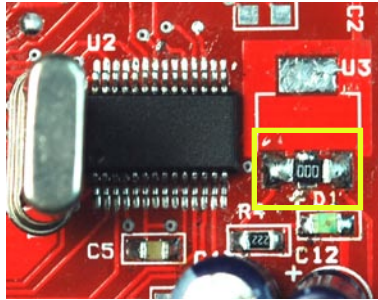
Figure 3. The transceiver kit interfaces easily with any MCU equipped with UART. The kit requires just the UART's Tx and Rx pin to complete the interface.

Model 5812A on-board MCU is preloaded with program codes that make it easy for you to use the kit. For all practical purposes, the device appears as a wireless cable replacement, were it not for a few restrictions as outlined in the Communication section. In most remote control applications however, those restrictions are of little consequence.

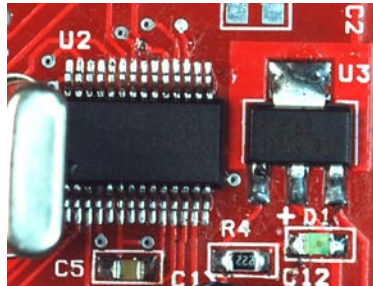
Interfacing the UHF data transceiver kit with a microcontroller is straightforward. If your MCU has a UART, all you need to do is to connect the 5812A serial I/O to the MCU UART pins as shown in figure 3. If your MCU has no UART, you can use ordinary I/O to emulate UART port using programming technique fondly referred to by programmers as bit-banging. This technique is generally reserve for advance users though, as it requires in-depth knowledge about the inner workings of a UART port.

Model 5812A serial port will work with both 5V and 3.3V MCU devices. But power supplied into it (V_{in}) should not exceed 3.5V. A 3.3V volt regulator must be installed on board if you are to use the 5812A on a 5V supply. To do this:

1. Unsolder the jumper (chip) shorting pin 1 and 3 pads of U3



2. Solder in U3 place a 3.3V LDO regulator (P/N RT9163-3.3).



COMMUNICATIONS SETTINGS:

Baud Rate: 9600bps
Data: 8 bit
Parity: None
Stop bit: 1
Handshake: none
Mode: Half Duplex

COMMUNICATIONS

Model 5812A UHF Data Transceiver is operating in half duplex mode, meaning it cannot do both TX and RX at the same time (5812A cannot receive data while transmitting, and cannot transmit data while receiving). Because of this, there are some important considerations you should note when deploying the data transceiver to your applications:

1. Transmit Latency

The data transceiver is normally operating in RX mode. If it detected a new data in its buffer queued for transmission, it will automatically switch itself in TX mode. The ATA5812 cannot send out data immediately. To begin transmission, it has to send a two byte sync that basically sets up the receiving module for the incoming data. For a single byte transmission, it will take about 14ms before the transmitted data appears at the receiving module output. This delay is what we refer to as the transmit latency time.

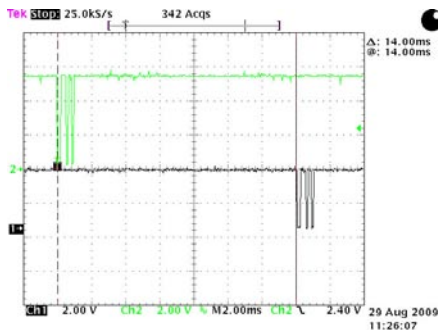


Figure 4. Transmit Latency. The upper trace shows the Rx IN waveform from the transmitting module, while the lower trace shows the Tx out of the receiving module. Transmit Latency is measured at 14 ms.

2. TX to RX switchover delay

The transmitting module, on the other hand, will automatically switched back to Rx mode after the last byte is transmitted. The time it will take for the Data Transceiver module to switch from TX to RX mode is what we call TX to RX switchover delay.

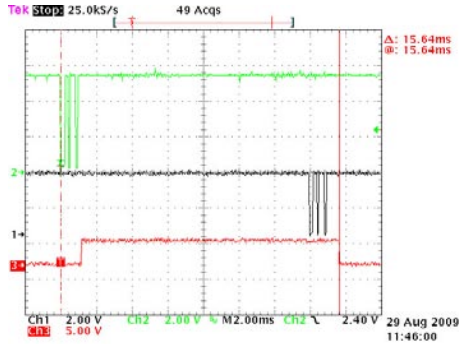


Figure 5. A single byte transmission represents the worst Tx to Rx switchover, which measures at 15.64ms. Add an error budget by assuming a 18ms delay in your design to ensure reliable operation

3. First Byte transmission: 0xFF not allowed

As was mentioned, to initiate data reception in RX mode, the ATA5812 will check for the presence of synchronizing bits, which consists of two bytes of 0xFF (dec 255). This is done automatically by the Data transceiver kit, and the user need not include the synchronizing bytes when transmitting data. The catch is, the receiving side ATA5812 chip will start receiving data only immediately after the last 0xFF is received. In other words, you cannot transmit 0xFF as your first data byte. This behaviour will be of consequence if you are transmitting binary data, but should be of no concern if you are transmitting 7 bit ASCII characters.

With binary data transfer, the user can go around this restriction by defining a transfer protocol that avoids 0xFF as the first transmitted byte. An example of this technique is to define a protocol as a fixed size transmission packet that starts with an STX (0x02) and ends with an ETX (0x03). Variable length packets will include the size of the transmitted packet among the first data to be transmitted.

4. Transmit buffer size : 512 Bytes

Model 5812A UHF Data Transceiver has an internal Tx buffer that can hold up to 512 bytes of data. This basically defines the packet size limit per transmission.

5. Error Correction

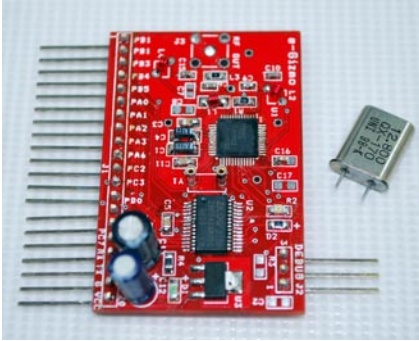
Model 5812A has built in mechanism that automatically rejects data bytes that appears spurious or has lost integrity. It simply drops this byte; it has no capability to reconstruct or correct it. For data transfers that cannot tolerate dropped bytes, the user must provide his own codes to check the integrity of the received packets (e.g. checksum, CRC) and if necessary initiate a request for retransmission whenever an error is detected.

FLASHING YOUR OWN CODES

ATA5812 is a remarkable radio chip and has lot of advance features, each of which can be programmed to suit some specific needs. As with other feature laden devices though, these devices usually requires a lot of codes just to set it up to a desired functions. Several housekeeping codes are also needed to keep the radio chip happy and ensure the flow of data. Model 5812A UHF Data Transceiver has an on board microcontroller chip that takes this chore, and with it, all the user code has to do is to read and write data through the UART port to receive or transmit data.

Model 5812A kit is essentially a Z8F042A wireless development platform! If you are an advance user, you can write your own code and use the MCU free I/O and peripherals for a application specific functions. The Z8F042A debug port is made available for this purpose. The debug port is compatible with e-Gizmo encore! serial programming cable. Example applications include wireless analog data logger, remote control I/O, wireless security controller, and a host of others.

SUPPLEMENTAL INFORMATION



Tx/Rx frequency can be changed by replacing the crystal with one different frequency. The crystal is socketed and does not require soldering to replace. The operating frequency cannot be made to wander way off the nominal 315MHz as this will affect the usable control range, and might cause the device to operate outside the ISM band. This may be illegal in some areas. Refer to the ATA5812 Datasheet for more details.



A quarter wave antenna (24 cm long) using a AWG 18 insulated wire (with solid core) can be directly soldered at the RF OUT terminal. A RF connector (SMA or SMB) can be soldered at the RF out port; this will make installation of external antenna quick and easy.

Please visit www.e-gizmo.com and view this kit product page for more info and updates.