Chipsmall

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We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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ZULU-DONGLE

Features

- Intelligent RF modem module
- Serial data interface with handshake
- Host data rates up to 57,600 baud
- RF Data Rates to 115Kbps
- Range up to 1Km
- Minimal external components
- Direct LED drive shows data flow
- Secure data protocol
- Ultra low power 2.4 - 3.6V operation
- CE compliant for licence free use
- 868MHz multi channel operation
- 100mW transmit power (+20dBm)
- Receiver sensitivity –121dBm

Applications

- Remote networking
- USB/RS232 cable replacement
- Remote data log
- Meter reading

Description

The ZULU DONGLE is a highly integrated RF modem and intelligent controller with a plug and play (virtual comm port) USB interface. The ZULU DONGLE can achieve a wireless serial data link at up to 38K4bps over a 1Km range. Range may be further extended with suitable   antenna.

The user interface is standard USB operating at low voltage. All RF operation is automatically controlled (with error checking etc) so the ZULU DONGLE can be treated as a simple serial communications device.

Possible applications include one-to-one and multi-node wireless links in applications   including car and building security, EPOS, inventory tracking, remote industrial monitoring and computer networking.

Because of the small size and low power requirements these modules are ideal for use in with handheld terminals also.
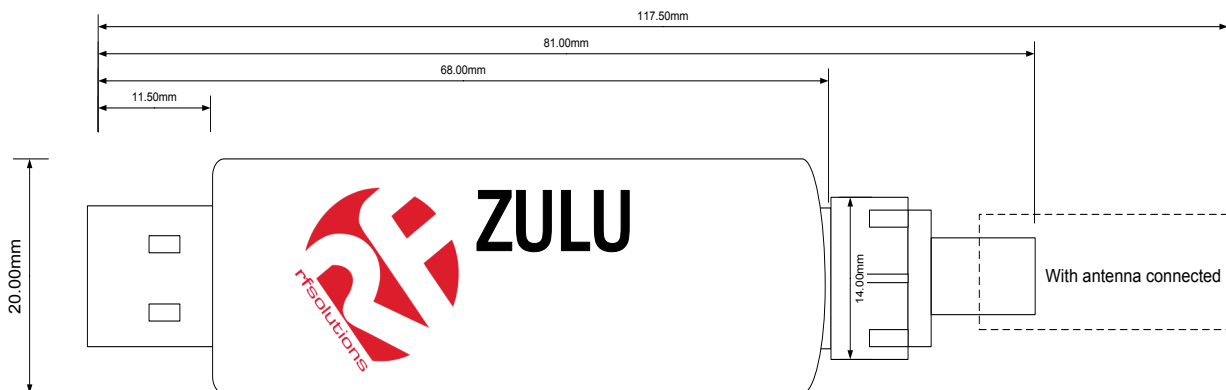
Ordering Information

Part Number	Description
ZULU-DONGLE	Radio Modem 868MHz +20dBm

FM76316

ZULU-DONGLE Modem

Product overview

This product is Plug and Play, connect the antenna to the SMA connector and plug into a USB port. Two or more ZULU-DONGLEs (or other compatible items) are needed for operation.

Power supply:

Power is supplied directly from the USB port - external power option is not offered.

Tx/Rx LED:

The LED operates whenever there is RF activity

Operational overview:

1. Plug in the ZULU-DONGLE into a PC or host via USB
2. Configure the USB port and the virtual comm port created as below:

   Serial data format:
   Baud rate: 19,200kbps as default - can be configured.
   Data bits: 8
   Parity: None
   Stop bits: 1
   Flow control: Hardware CTS / RTS

3. Data is passed between the two modems

Notes on compatibility with other products

ZULU-DONGLE is fully compatible with:

- **ZULU-M868** (SMT and PDIP versions: Firmware R1.4 and newer when Unit ID (R7) is set to the correct value D3)

- **KAPPA-M868** (SMT and PDIP)

- **BLIZZARD-868** IP68 radio modem

- **ZULU-M-ARDUNIO SHIELD**

- **ZULUEVAL-M**

Check the configuration set-up for new features and any changes to defaults.

ZULU-DONGLE Modem

Operation Overview

The ZULU DONGLE provides a simple interface to the host controller. It handles all RF data communications automatically and without any requirement from the user (RF packetising , preamble, encoding, CRC check etc).
With this powerful high-speed radio link, the following networks can be realised:

Networking

One-to-One; For point to point data communication

One-to-Many/Broadcast; A network consisting a master and many slaves (all receivers have the same address)

Many-to-One; Where all transmitters with different addresses send to a single receiver   address.

Note: Because each ZULU-DONGLE can be given a unique address, multiple ZULU-DONGLE   networks can co-exist in the same area. This type of operation requires clear timing between transmissions or corruption of packets can occur.

Addressing Networks
Each ZULU-DONGLE has a generic pre-configured default address (7F7F7F). This can be modified during configuration. When data received via RF it is examined and the address header embedded within it is compared with its address. Only data received with matching address will be   processed and output to the host, all other data will be discarded.
When sending data, the ZULU-DONGLE has a default destination address set to 7F7F7F, this can be user configured.
By setting the two addresses appropriately the above network types can be easily achieved.

Operating Modes

Configuration Mode: In configuration mode the ZULU-DONGLE can receive commands to set internal registers to define its eventual operation. In this mode the ZULU-DONGLE is 'Offline' and cannot send or receive RF data.
Normal Operation: The ZULU DONGLE is 'Online' automatically transmitting and receiving data from its serial interface across its RF network.
Acknowledge Secure Mode : In this mode each time a ZULU DONGLE transmits an RF packet, an additional 'packet ID' is added. This ID is a rolling verification counter to receiving ZULU DONGLE modems.
Any correctly addressed receiving ZULU-DONGLE replies with an RF acknowledgment also containing the 'packet ID'. If the transmitting ZULU DONGLE fails to receive the expected acknowledgement it will transmit the packet again (up to 10 times).

Handshaking

The ZULU DONGLE requires the handshaking (RTS/CTS) to communicate with its host interface.

Configuration Mode (offline)

Commands can be set using a standard terminal program or by sending the relevant ASCII characters.
Each command must be followed by the Carriage Return <CR> or 'Enter' except "+++"

Note: All commands are entered in upper case

Command	Description	Response from ZULU-DONGLE
+++	Enter Configuration Mode Note: This command must be sent as a string with no characters in front or behind. This is to ensure that the +++ is not mistakenly received in mid-data.**(<CR> is not to be used with +++).**	ZULU-DONGLE responds with status info
?	Retrieve the current register values	ZULU-DONGLE responds with all register values
F	Pre-configured factory defaults; R1=7F7F7F R2=7F7F7F R3 = Ch2 (869.450MHz) R4 = 7 (+20dBm) R5 = 1 (19K2)	'OK'
H	Help	Brief description of commands available
P	Ping ModeThis sends a ping request .On receiving, the recipient ZULU DONGLEs will respond with its address and the level of RSSI (Received Signal Strength)The Ping command is continuously repeated every 1 second until any command or character is entered. Please note: R1 and R2 on both devices must be set to the same address for RSSI signal strength to show.	The originating ZULU-DONGLE will respond with the recipient ZULU modems' address. eg. Received from 7F7F7F (D5) Where 7F7F7F = the recipient address D5= RSSI **RSSI** Is a hex value corresponding to the received signal strength Min = 20hex Max =E0hex
S	Save Configuration	'SAVED'
Q	Exit configuration mode and return to online mode	No response

ZULU-DONGLE Modem

Register Values (Configuration Mode)

Set a register:

To set a register, type 'R#=x' where # is the register number (1-6) and **x** is the value to set.
For example, to set the RF channel to 3 type : R3=3<CR>
(Where <CR> is carriage return or enter on the keyboard)

Register	Value Range	Description	Example
R1	0000 - FFFFFF (24 bit address) **Default: 7F7F7F**	Sets the recipient ZULU-DONGLE address	R1=000100 (Data sent to ZULU DONGLE with address 000100)
R2	0000 - FFFFFF (24 bit address) **Default: 7F7F7F**	Set ZULU-DONGLE address	R2=F00100 (Data sent is from ZULU-DONGLE)
R3	CH0 to CH4	Sets the RF channel selection page 7.	R3=2 (Transmit on channel 2)
R4	0 = +1dBm 1 = +2dBm 2 = +5dBm 3 = +8dBm 4 = +11dBm 5 = +14dBm 6 = +17dBm **7 = +20dBm**	Set the RF transmit power output*	R4=7 (sets transmit power to max)*
R5	0 = 9,600 **1 = 19,200** 2 = 28,800 3 = 56,000 4 = 115,200	Set the RF baud rate*	R5=3 (sets the RF data rate to 56Kbps)
R6	**0 = Off** 1 = On	(Acknowledge) Secure mode enable	R6=1 (Secure Mode on)
R7	0-FF (hex) **Default = D4**	Unique system identifier	R7=A3 Identifier set to A3.
R8	0 = 4800 **1 = 9600** 2 = 14400 3 = 19200 4 = 28800 5 = 38400 6 = 56000 7 = 57600	Host baud rate - software override. FF - uses DR1 and DR1 pins.	R8=3 Baud rate set to 19K2
R9	0 or **1**	Data whitening enable	R9=1 Enable
R0	**00** or 01	OTA Enable Over the air configuration	R0=1 Enable

ZULU-DONGLE Modem

Using Configuration Mode

Baud rates:

It is possible to set both host and RF baud rate via configuration mode. The RF Baud rate should always be twice the host baud rate for best operation.

Secure mode

See "Operating Modes" Page 4

Unique system identifier

Adds a unique identifier at the RF stage. This allows unmatched data packets to be ignored without the need to decode - saving processor time and making a more efficient system when many nodes are present in one location. Systems with the same identifier will operate together. Use for multiple networks in one location.

Do not use addresses: FF, AA or 55

OTA - Over the air configuration

It is possible to have a remote node enter configuration mode and change that node's register settings by sending it the unique code <918273> (including the <>) Instead of usual +++ command.

After entering OTA mode - all subsequent communications must be sent as macros and will need to include the Line Feed <LF> (do not send "<LF>" this command must be sent as ASCII code 10 which can vary depending on the software used)

Examples:

Send:	Response:	Send:	Response:	Send:	Response:
<918273>	7F7F7F 7F7F7F 02 00 03 00 D4 01 01 01 01	?<LF>	7F7F7F 7F7F7F 02 00 03 00 D4 01 01 01 01	R4=05<LF> R5=02<LF> Q<LF> S<LF>	OK OK NONE NONE

IMPORTANT Notes:

1. In OTA mode all values are entered in hex and sent as ASCII. Registers must be set in multiples of two characters - ie to set register 6 you must send 06 - as above examples show.

RF Channel Selection

The EU standard sets maximum power transmission limits dependent on frequency, bandwidth and application. Please check the relevant standards are being met when implementing your Application. A rough guidance applicable to the ZULU DONGLE channel numbers is given below

Channel Number	Frequency Centre (MHz)	EU Power Allowance mW / dBm	Notes
0	868.400	25 / 14	
1	868.900	25 / 14	
2	**869.450**	**100 / 20***	Applicable standard - EN300-220
3	869.600	100 / 20*	
4	869.800	25 / 14	

*Maximum power is only achievable if the USB port can supply the required amount of current.

ZULU-DONGLE Modem

DC Characteristics

Parameter	Min	Typical	Max	Units
Supply Voltage		5		V
Operating Temperature	-40		+85	°C
Pi Tx Supply Current: When Transmitting When sleeping		100 disabled		mA
Pi Rx Supply Current: When Receiving When sleeping		18.5 disabled		mA

AC Characteristics

Parameter	Min	Typical	Max	Units
Operating Frequency - 868: see freq channel setting	868		870	MHz
Operating Temperature	-40		+85	°C
Band width per channel		100		KHz
Deviation		45		KHz
ZULU DONGLE Tx MAX Output Power			+20	dBm
ZULU DONGLE Tx—Rx FSK Raw RF Data Rate			115	Kbps
ZULU DONGLE Rx Sensitivity		-121		dBm

Range

The antenna choice and position affects controls the system range. Keep the antenna clear of any large metal components in the system. The best position by far, is protruding vertically from the top of the product. This is often not desirable for practical reasons and thus a compromise may be needed. Note that the space around the antenna is as important as the antenna itself. All radio systems are dependent on a radio signal being received through airspace.

The range quoted is the optimal in direct line of sight without obstacles and in good atmospheric conditions.

Range is affected by many things, for example local environmental conditions, atmospheric conditions, interference from other radio transmitters. For evaluating the local environment please see our RF meter (DS006)

In the worst case, range quoted may be drastically reduced.

ZULU-DONGLE Modem

Reader Response

It is our intention to provide you with the best documentation possible to ensure successful use of your RF Solutions product.

If you wish to provide your comments on organization, clarity, subject matter, and ways in which our documentation can better serve you, please email us your comments to the Technical Publications Manager

Application:

Would you like a reply?   Y / N

Datasheet: DS-ZULU-DONGLE Rev4

Questions:

1. What are the best features of this document?

2. How does this document meet your hardware and software development needs?

3. Do you find the organization of this document easy to follow? If not, why?

4. What additions to the document do you think would enhance the structure and subject?

5. What deletions from the document could be made without affecting the usefulness?

6. Is there any incorrect or misleading information (what and where)?

7. How would you improve this document?

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