# ZE Demokit User Guide

**1VV0300853** Rev. 0 – 15/12/2009

This document is related to the following products :



 

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# CHAPTER I. INTRODUCTION

## I.1. Overview

Aim of this document is the handling description of the ZE Demokit dedicated to the following ZE modules:

- ZE50-2.4/SMD-WA (Without Integrated Antenna)
- ZE50-2.4/SMD-IA (With Integrated Antenna)
- ZE60-2.4/SMD-WA (Without Integrated Antenna)
- ZE60-2.4/SMD-IA (With Integrated Antenna)

All given information shall be used as a guide and a starting point for properly developing of your product. Obviously this document cannot embrace all the hardware solutions and products that may be designed.

After a description of the Demokit and its installation principles, its functioning will be detailed in more advanced operation modes.

## I.2. Reference documents

| | |
|---|---|
| **[1] ZTC User Guide** | 1vv0300846 |
| **[2] ZE50-2.4_RF_Module_User_Guide** | 1vv0300837 |
| **[3] ZE60-2.4_RF_Module_User_Guide** | 1vv0300844 |

## I.3. Document change log

| Revision | Date | Changes |
|---|---|---|
| ISSUE # 0 | 15/12/09 | First Release |
| | | |
| | | |
| | | |

## I.4. Glossary

| | |
|---|---|
| **ACP** | Adjacent Channel Power |
| **BER** | Bit Error Rate |
| **Bits/s** | Bits per second (1000 bits/s = 1Kbps) |
| **CER** | Character Error Rate |
| **dBm** | Power level in decibel milliwatt (10 log (P/1mW)) |
| **EMC** | Electro Magnetic Compatibility |
| **EPROM** | Electrical Programmable Read Only Memory |
| **ETR** | ETSI Technical Report |
| **ETSI** | European Telecommunication Standard Institute |
| **FM** | Frequency Modulation |
| **FSK** | Audio Frequency Shift Keying |
| **GFSK** | Gaussian Frequency Shift Keying |
| **GMSK** | Gaussian Minimum Shift Keying |
| **IF** | Intermediary Frequency |
| **ISM** | Industrial, Scientific and Medical |
| **kbps** | kilobits/s |
| **LBT** | Listen Before Talk |
| **LNA** | Low Noise Amplifier |
| **MHz** | Mega Hertz (1 MHz = 1000 kHz) |
| **PLL** | Phase Lock Loop |
| **PROM** | Programmable Read Only Memory |
| **NRZ** | Non return to Zero |
| **RF** | Radio Frequency |
| **RoHS** | Restriction of Hazardous Substances |
| **RSSI** | Receive Strength Signal Indicator |
| **Rx** | Reception |
| **SRD** | Short Range Device |
| **Tx** | Transmission |
| **SMD** | Surface Mounted Device |
| **VCO** | Voltage Controlled Oscillator |
| **VCTCXO** | Voltage Controlled and Temperature Compensated Crystal Oscillator |

## I.5. Generality

The **ZE DemoKit** allows a quick testing of the ZE RF performance and offers a platform for development of advanced prototype systems.

- The ZE module can be easily configured with a Terminal (like HyperTerminal) to perform RF measurements: sensitivity, RSSI, output power and other RF parameters.
- All I/O from the ZE module are available on pin connectors on the Demo mother board, allowing easy interconnection to other devices.

## I.6. DemoKit contents

The ZE DemoKit ( IA Version) contains the following components :

- 2 x Demo mother boards
- 2 x ZE modules mounted on their DIP support
- 2 x Serial cables ( Sub-D 9 ; L=1,80 m )
- 2 x Power supply blocks (12V, 500 mA)
- 2 x Primary batteries (+9V)
- 1 x Information Sheet


Figure 1: ZE Demokit ( IA Version)

The ZE Demokit ( WA Version) contains the following components :

- 2 x Demo mother boards
- 2 x ZE modules mounted on their DIP support
- 2 x Antennas
- 2 x Serial cables ( Sub-D 9 ; L=1,80 m )
- 2 x Power supply blocks (12V, 500 mA)
- 2 x Primary batteries (+9V)
- 1 x Information Sheet


Figure 2: ZE Demokit ( WA Version)

## II.1. Demo mother board

The demo mother board is the main board with user interfaces:

- UART
- LEDs
- Serial Flash
- Switches

The demo mother board is the platform for the ZE module in DIP Version and can be connected to the PC via standard RS232 port.

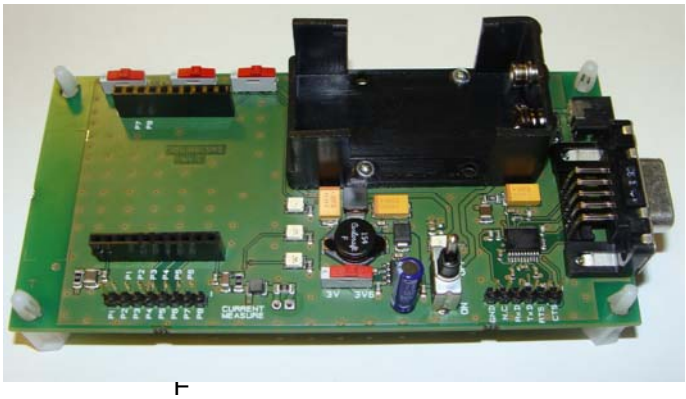


Figure 3: Demo mother board

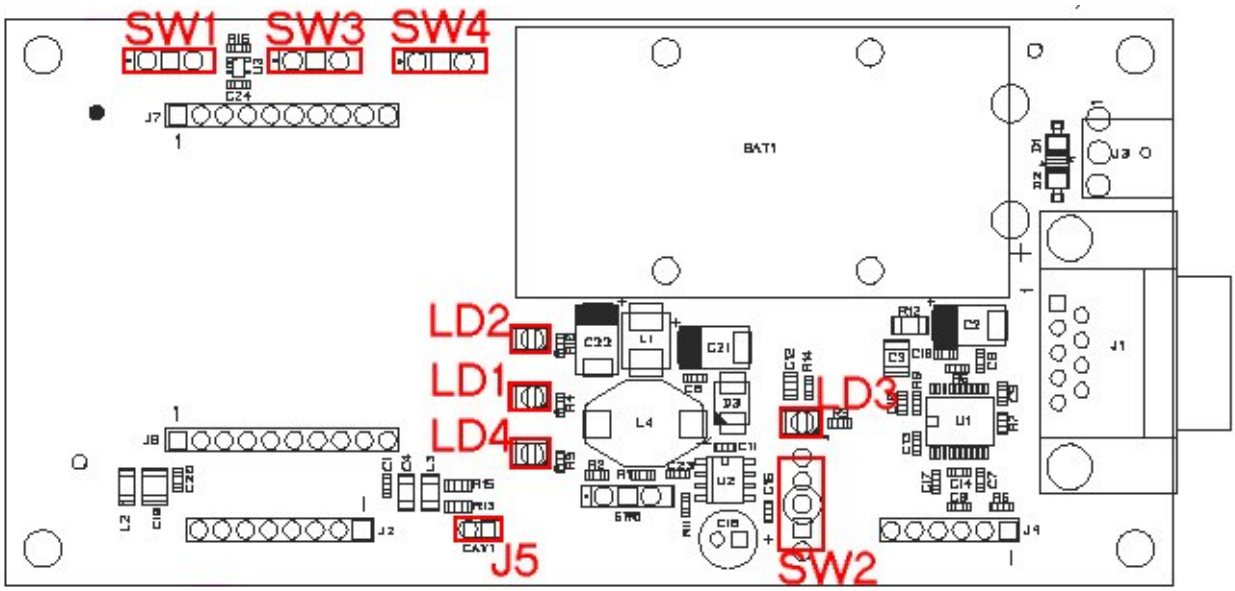



Figure 4: Switches, connectors and LEDs placement on the Demo mother board

| Feature | Designation |
|---|---|
| Stand-by switch | SW1 |
| Reset switch | SW3 |
| ON/OFF witch | SW2 |
| Programming switch | SW4 |
| Red LED | LD1 |
| Green LED | LD2 |
| Red LED | LD3 |
| Yellow LED | LD4 |

## II.2. ZE Module in DIP Version

This is the ZE modules mounted on a DIP support. The DIP support can be plugged into the demo mother board directly, for control from a Terminal or ZTC.


Figure 5 : ZExx-2.4/DIP-IA (With Integrated Antenna)


Figure 6 : ZExx-2.4/DIP-WA (Without Integrated Antenna)

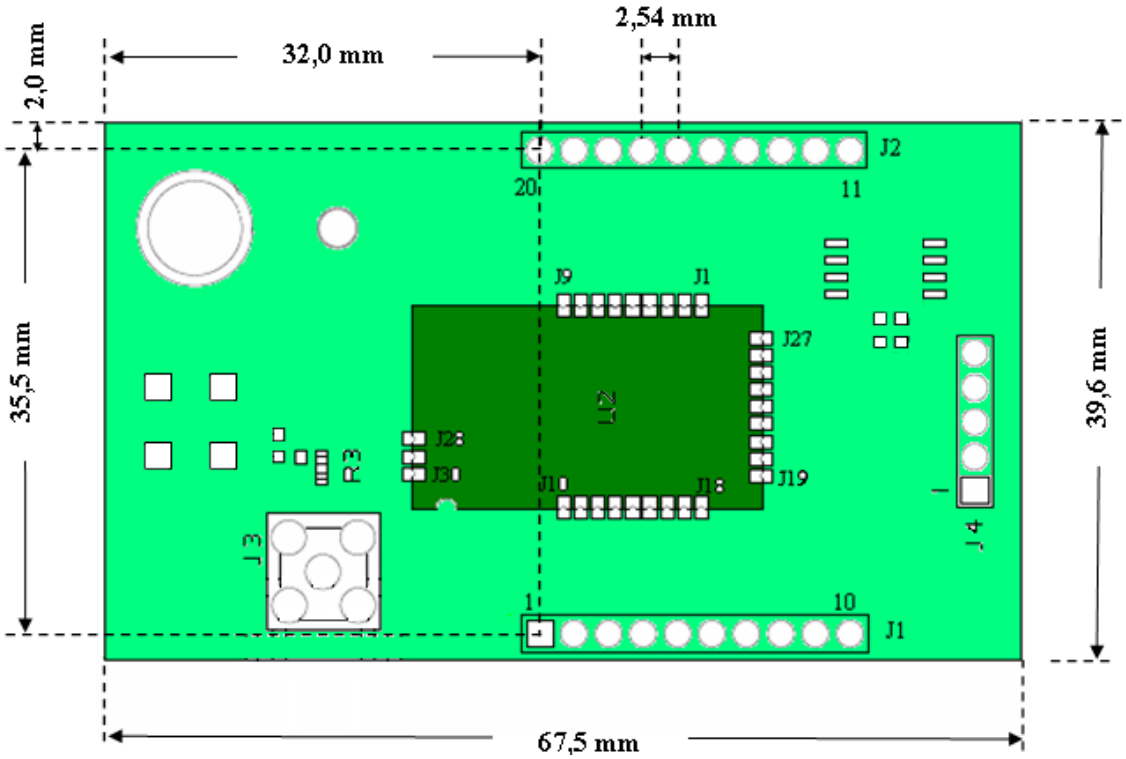



Figure 7: Mechanical dimensions of the DIP Support

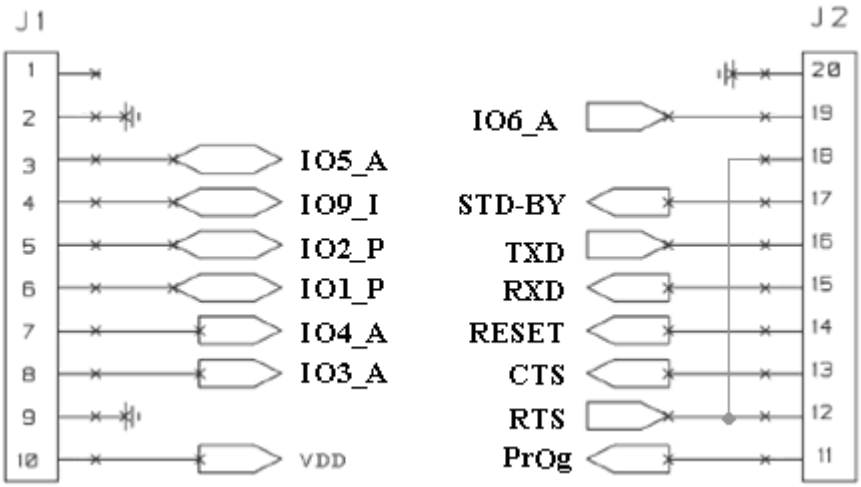



Figure 8: Pin-out of the DIP Support

## II.3. Demoboard

A demoboard is formed by a ZE Module in DIP Version mounted on a demo mother board


Figure 9: ZE50-2.4/DIP-IA (upper) fitted on demo mother board (lower)

Figure 10: ZE50-2.4/DIP-WA (upper) fitted on demo mother board (lower)

# CHAPTER III. INSTALLATION

## III.1. Startup procedure

Respect the following order to use the ZE demokit:

1. Set properly all switch in the desired position. Check that stand-by, reset and programming switches are turned OFF.

| Feature | Designation | |
|---|---|---|
| Stand-by switch | SW1 |  |
| Reset switch | SW3 |  |
| Programming switch | SW4 |  |

2. Plug the ZExx-2.4/DIP support into J7 and J8

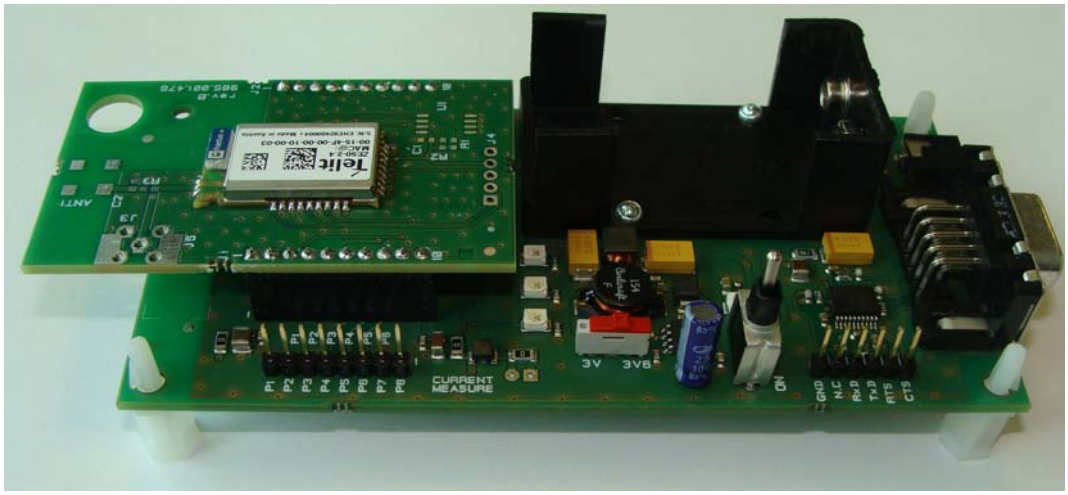



Figure 9: ZExx-2.4/DIP mounted on demo mother board

***CAUTION***
**BE CAREFUL TO CORRECTLY PLUG THE RF MODULE ON ITS SUPPORT**

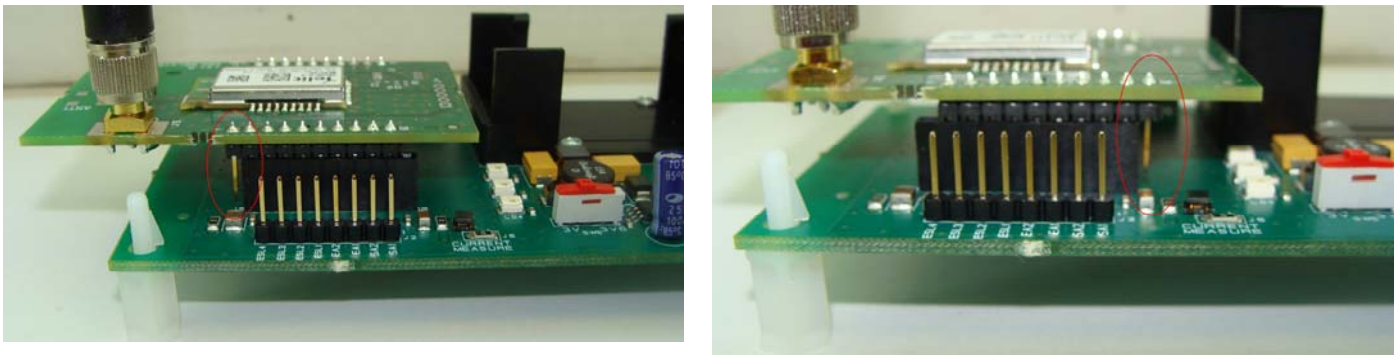


Figure 9: Examples of ZExx-2.4/DIP not correctly plug

3. Connect the antenna to RF connector ( For WA version)
4. Connect the serial cable between your PC and RS-232 connector
5. Plug the external power supply into J3 socket or/and plug the 9 Volt primary battery in BAT1 receptacle


- Polarity: The positive setting inside the DC Output Plug (Negative polarity outside of plug)
- Select the proper adaptor plug (3.5x1.35mm)

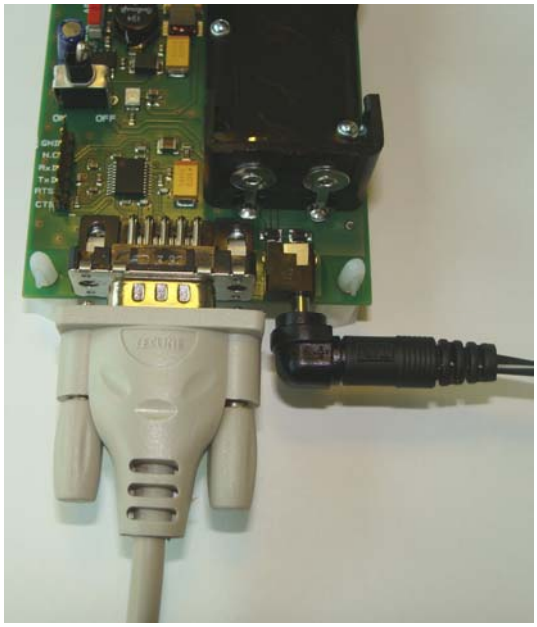


Figure 10: External Power Supply Plug

***CAUTION***
***- Two kinds of power supply are available on the Demoboard: through the +12V block or through a +9V battery. When it is connected, the power supply has priority on the battery. The battery takes over when the power supply is disconnected***

***- Be careful to the power connection polarity, even if supply line is protected by a diode against "polarity reversing".***

6. Select the appropriate Power Supply Voltage between 3 Volts and 3.6 Volts (SW5)

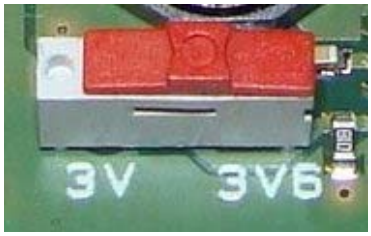



Figure 11: Voltage Selection Switch

***CAUTION***
**ALWAYS SWITCH OFF THE DEMOBOARD BEFORE SWITCHING 3V/3.6V VOLTAGE**

7. Switch the Demoboard ON (SW2).

- Check that the red LED (LD3) lights ON when supplying the Demoboard (Power supply status)
- The red LED (LD1) and yellow LED (LD4) blinked during a short lapse of time (ZE module is programmed and ready to communicate)

| Feature | Designation | |
|---|---|---|
| ON/OFF switch | SW2 |  |
| Red LED | LD3 | |
| Red LED | LD1 |  |
| Yellow LED | LD4 | |

## III.2. Demo mother board Connectors pinout (J2 and J4)

The connectors allow access to I/O signals and to connect prototyping boards.

| Pin | Signal Name | |
|---|---|---|
| 1 | P8 | RTS |
| 2 | P7 | IO6_A |
| 3 | P6 | IO3_A |
| 4 | P5 | IO4_A |
| 5 | P4 | IO1_P |
| 6 | P3 | IO2_P |
| 7 | P2 | IO6_A |
| 8 | P1 | IO5_A |

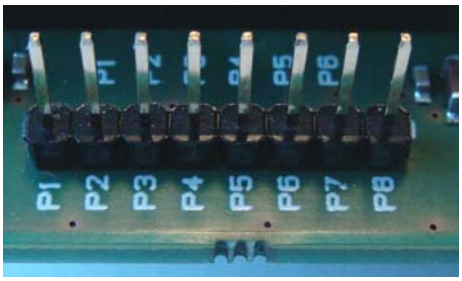


Figure 11: J2 connector pinout

| Pin | Signal Name |
|---|---|
| 1 | CTS |
| 2 | RTS |
| 3 | TxD |
| 4 | RxD |
| 5 | NC |
| 6 | GND |

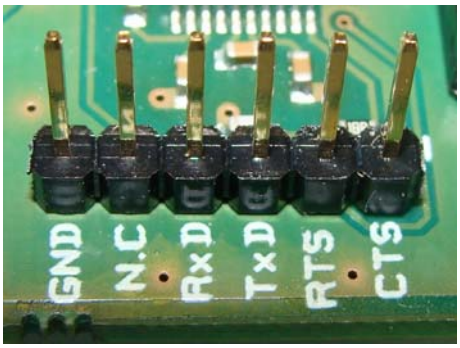


Figure 11: J2 connector pinout

## III.3. Connectors pinout correspondence

Pin-Out correspondence between Demo mother board, ZExx-2.4/DIP,and ZExx-2.4/SMD module.

| *Demo mother board* | *ZExx-2.4/DIP Pin-out* | *ZExx-2.4/SMD Pin-out* | *Comments* |
|---|---|---|---|
| | J1 (Pin 1) : Not connected | | |
| | J1 (Pin 2) : GND | GND GND | |
| J2 (Pin 8) : P1 | J1 (Pin 3) : P1 | Pin J5 : IO5_A | |
| J2 (Pin 7) : P2 | J1 (Pin 4) : P2 | Pin J9 : IO9_I | |
| J2 (Pin 6) : P3 / Led LD1 | J1 (Pin 5) : P3 | Pin J2 : IO2_P | |
| J2 (Pin 5) : P4 / Led LD4 | J1 (Pin 6) : P4 | Pin J1 : IO1_P | |
| J2 (Pin 4) : P5 | J1 (Pin 7) : P5 | Pin J4 : IO4_A | |
| J2 (Pin 3) : P6 | J1 (Pin 8) : P6 | Pin J3 : IO3_A | |
| | J1 (Pin 9) : GND | GND GND | |
| | J1 (Pin 10) : VDD | Pin J25 : VDD | |
| | | | |
| Switch 4 / Led LD2 | J2 (Pin 11) : PROG | Pin J16 : PROG | |
| J4 (Pin 2) : RTS | J2 (Pin 12) : RTS | Pin J22 : RTS | |
| J4 (Pin 1) : CTS | J2 (Pin 13) : CTS | Pin J24 : CTS | |
| Switch 3 | J2 (Pin 14) : Reset | Pin J23 : Reset | |
| J4 (Pin 4) : RxD | J2 (Pin 15) : RxD | Pin J21 : RxD | |
| J4 (Pin 3) : TxD | J2 (Pin 16) : TxD | Pin J19 : TxD | |
| Switch 1 | J2 (Pin 17) : STAND_BY | Pin J18 : STAND_BY | |
| J2 (Pin 1) : P8 | J2 (Pin 18) : P8 | Pin J22 : RTS | |
| J2 (Pin 2) : P7 | J2 (Pin 19) : P7 | Pin J6 : IO6_A | |
| | J2 (Pin 20) : GND | GND GND | |
| | J4 Connector for debugging and programmation | | |
| | J4 (Pin 1) : Debug D | Pin J14 : Debug D | |
| | J4 (Pin 2) : Debug C | Pin J10 : Debug C | |
| | J4 (Pin 3) : Reset | Pin J23 : Reset | |
| | J4 (Pin 4) : VDD | Pin J25 : VDD | |
| | J4 (Pin 5) : GND | GND GND | |
| | Eeprom connections | | |
| | SCL pin (Eeprom U1) | Pin J7 : IO7_A | Eeprom U1,R1 and R2 are not mounted on ZExx-2.4 DIP |
| | SDA pin (Eeprom U1) | Pin J8 : IO8_A | |
| | RF connection | | |
| | J3 or J5 : SMA connector for RF Input/Output | Pin J29: Ext_Antenna | A 2.45 Ghz Half-Wave antenna is recommended |
| | ANT1 and C2: Not mounted on ZExx-2.4/DIP | | |

# CHAPTER IV.
# STANDARD FIRMWARE : DESCRIPTION OF THE FUNCTIONALITY

Telit modems and boards are provided with an embedded software which allows to choose between different communication protocols and to play on numerous parameters.

ZExx-2.4 module is available with the following firmwares :

- ***Test Stack :*** The Test Stack does not integrate the transparent mode of the S-ONE. He allows only to send short frames.
- ***Z-ONE protocol stack:***

This Chapter is dedicated to the Test Stack.

There are 2 different modes available for Test protocol stack that are described in following paragraphs :

- The ***configuration mode*** which allows to parameter the module. It is set through the use of Hayes commands (AT commands) sent on the serial link.
- The ***operating mode*** which is the functional use for data transmission. The module transmits the data transparently, without encapsulation or addressing. It acts as a half duplex wired serial link (type RS485).

## IV.1. Configuration mode

Telit modems and boards parameters are set through the use of Hayes type commands sent on the serial link.

Hayes or 'AT' commands complies with Hayes protocol used in PSTN modem standards. This 'AT' protocol or Hayes mode is used to configure the modem parameters, based on the following principles:

- ⇨ A data frame always begins with the two ASCII 'AT' characters, standing for 'ATtention'.
- ⇨ Commands are coded over one or several characters and may include additional data.
- ⇨ A given command always ends up with a <CR> Carriage Return

| | | | | |
|---|---|---|---|---|
| ***A*** | ***T*** | ***Command*** | ***Additional data*** | ***<CR>*** |

Note**:** The delay between 2 characters of the same command must be less than 10 seconds

The only exception to this data-framing rule is the switching command from the operating/communication mode to 'AT Mode'. In this case only, the escape code ('+++') must be started and followed by a silent time at least equal to the serial time out. In this case only <AT> and <CR> shall not be used.

**These three + characters must be sent as one frame. The use of the keyboard to type them will not work. If you use a terminal, you will have to copy/paste them.**

Despite its similarity to standard telecommunication modem, Telit RF modems and boards remain radio link modems and are consequently fitted with some particular and specific 'AT' commands proper to radio transmission (I.e. communication channel, radio rate, ...).

Note 1 : After an AT command (ended by <CR>), the serial link gives back result code, which is "OK", or "ERROR xx", with xx error code.

Note 2 : "+++" command gives back OK.

These commands are effective after a maximum delay of 10 mS ; the back code OK indicates the good execution of the command, and another command can be sent right after the back code OK.

| Command | Description |
|---|---|
| ***Operating mode*** | |
| +++ | ***Hayes Mode Activation***<br>'+++' command gives an instant access to the modem's parameters configuration mode (Hayes or AT mode), whatever the current operating mode in process might be.<br>'+++' command should be entered as one string, i.e. it should not be preceded by 'AT' and followed by <CR> but two silent times which duration is configurable via S214 register (Serial time-out). The time between two'+' must not exceed the time-out value.<br>Hayes mode inactivates radio functions. |
| ATO | ***Communication mode activation***<br>'ATO' command gives an instant access to the modem's operating mode, configured in S220 register.<br>'ATO' command is used to get out of Hayes mode.<br>Answer : OK or ERROR if the configuration in not complete. |
| ***Register Handling*** | |
| AT/V | ***Modem's firmware and bootloader version***<br>'AT/V' command displays the modem's firmware + bootloader version number as follow:<br>*pp.TP0.*MM.mm-Bbbb<br>*pp*.BP0.MM.mm-Bbbb<br>With:<br>pp is the platform (EH and EN for ZE50)<br>TP0: T means Test firmware, P=0 for OEM boards, P=1 for USB dongle<br><br>MM: Major version<br>mm: minor version<br>Bbbb: Build number<br>Example:<br>EN.T00.01.03-B005 is a Test firmware V1.03 (Build 005) for ZE50-2.4/SMD-WA module.<br>EN.B00.01.01 is a Boot firmware V1.01 for ZE50-2.4/SMD-WA |
| AT/B | 'AT/B' command displays the modem's bootloader version number. |
| AT/F | 'AT/B' command displays the modem's firmware version number. |
| AT/S | ***Modem's registers status***<br>'AT/S' command displays a dynamic and clear status of all relevant registers of the modem with the following categories:<br>• Radio<br>• Serial link<br>• Operation |
| ATSn? | ***Register interrogation***<br>'ATSn?' command displays the content of Hayes register number n (Refer to the register description table).<br>Some registers are standard for every Telit RF modems while others are specific to some products.<br>Answer : Sn=x<CR> |

| | |
|---|---|
| ATSn=m | ***Register modification***<br>'ATSn=m' command configures Hayes register number n with the value m, e.g. ATS200=4<CR> enters the value '4' in the register S200. The value is automatically stored in the EEPROM memory.<br>Answer : OK or ERRORxx (Refer to the Error codes table) |
| ATR | ***Parameters reset***<br>'ATR' command resets all modem's parameters to their default values.<br>Answer : OK |
| ATP | ***Parameters standby***<br>'ATP' command put the modem in soft standby |
| ATBL | ***Parameters programming***<br>'ATBL' command puts the modem in programming mode. |

## IV.2. Specific test command

Specific 'AT' commands have been integrated in order to make measurements in continuous mode.

| *Command* | *Description* |
|---|---|
| ***Test functions*** | |
| ATT0 | ***Pure carrier transmission*** for testing purposes |
| ATT1 | ***Modulated carrier transmission*** for testing purposes |
| ATTOUT | ***Exit the carrier mode transmission*** |

The yellow LED (LD4) lights ON during transmission.

## IV.3. Registers Detailed Use

The parameters to be configured via Hayes mode are stored in the modem's permanent memory, called S registers.
Those registers are always listed as follows:
- S20x registers correspond to the radio parameters
- S21x registers correspond to the serial parameters
- S22x registers correspond to the general operation parameters

Numbers in **bold** indicate the default value

| *Access* | *Register* | *Name* | *Description* |
|---|---|---|---|
| ***Module identification*** | | | |
| R | S190 | IEEE address | IEEE Address of the module on 8 bytes.<br>xx-xx-xx-xx-xx-xx-xx-xx |
| R | S192 | Serial Number | Serial Number of the module on 11 bytes. |
| ***Radio*** | | | |
| R/W | S200 | Channel | Number of the radio channel in use.<br>From 11 to 26<br><br>**Default: 11 (1st Channel).** |
| R/W | S202 | Output Power | Adjustable radio output power in dBm.<br><br>**Default: 0.** |
| W | S208 | Temporary channel | Number of the radio channel in use, but not stored in EEPROM : if the modem is switched on – off, the channel will come back to the S200 value.<br>Used to change channel often without burning the internal EEPROM |

<table>
<tr><th>Access</th><th>Register</th><th>Name</th><th>Description</th></tr>
<tr><td colspan="4">Serial Link</td></tr>
<tr><td>R/W</td><td>S210</td><td>Serial Speed.</td><td>Indicates the speed on the Serial Connection<br>'1': 1200 Bits/s '5': 19200 Bits/s (default)<br>'2': 2400 Bits/s '6' : 38400 Bits/s<br>'3': 4800 Bits/s ‘7’ : 57600 Bits/s<br>'4': 9600 Bits/s ‘8’ : 115200 Bits/s<br><br>The time out value must be compatible with the serial speed:
<table>
<tr><th>Min. time-out (S214)</th><th>Serial Speed (S210)</th></tr>
<tr><td>17 ms</td><td>1200 bits/s</td></tr>
<tr><td>9 ms</td><td>2400 bits/s</td></tr>
<tr><td>5 ms</td><td>4800 bits/s</td></tr>
<tr><td>3 ms</td><td>9600 bits/s</td></tr>
<tr><td>2 ms</td><td>⩾19200 bits/s</td></tr>
</table></td></tr>
<tr><td>R/W</td><td>S211</td><td>Data Bits</td><td>Serial Link Data Bits :<br>• 8 bits (default).</td></tr>
<tr><td>R/W</td><td>S212</td><td>Parity</td><td>Serial Link Parity Type:<br>• '1': None (default)<br>• '2': Even,<br>• '3': Odd.</td></tr>
<tr><td>R/W</td><td>S213</td><td>Number of Stop bits</td><td>Serial Link Stop Bits :<br>• 1 bit (default)</td></tr>
<tr><td>R/W</td><td>S214</td><td>Serial Link Time Out</td><td>Indicates the value of the time-out on the serial link. The time out value must be compatible with the serial speed: (see S210 register description).<br>Between 1 and 100 milliseconds<br>Default : 5.</td></tr>
<tr><td>R/W</td><td>S216</td><td>Flow Control</td><td>Indicates flow control type:<br>• '0': Hardware: CTS/RTS<br>• '1': Software: Xon/Xoff<br>• '2': None (default)</td></tr>
<tr><td>R/W</td><td>S218</td><td>Buffer Size</td><td>Indicates the maximum frames size that will be given to the Modem. When this size is reached, the modem resets the RTS signal. Between 30 and 115<br>Default : 115.</td></tr>
</table>

| Access | Register | Name | Description |
|---|---|---|---|
| ***Operation*** | | | |
| R/W | S220 | Function Mode | Operation mode of the Modem.<br>**'1' : Transparent** |
| R/W | S221 | Auto-Repeat Mode | Indicates auto repeat status :<br>**'0': Auto-Repetition Off (Default)**<br>'1' : Auto-Repetition On. |
| ***Low Power*** | | | |
| R | S240 | Type of Low-power | Indicates whether the low power control pin is used or not<br>**'0': No Low Power (default),**<br>'1': Stand-By activated by Hardware pin,<br>'2': Stand-By activated by Serial, |
| ***RSSI*** | | | |
| R/W | S255 | RSSI | |

| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|
| Write RSSI | Reserved | Reserved | Return Off | Reserved | Header Num | Reserved | Header On |

*Header On*: activate the header on the serial link
*Header Num*: activate the hexadecimal header
*Return Off*: deactivate the return on the serial link ("OK", "ERROR")
*Write RSSI*: activate the RSSI writing on the serial link.

A compensation is done which depends of the module:

| **Module** | **ZE50 IA** | **ZE50 WA** | **ZE60 IA** | **ZE60 WA** |
|---|---|---|---|---|
| **Part Number Header** | EH | EN | FT | FK |
| | +7dB | 0dB | -6dB | -14dB |

Ex: to write RSSI on the serial link on reception of radio frame the register must be: ***S255=129***

**'0' : default**

| | | | |
|---|---|---|---|
| ***IO*** | | | |
| R/W | S260 | IO Direction | Configure Pin in Input or Output: |

| Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| / | / | / | / | / | IO1_P | IO2_P | IO3_A | IO4_A | IO5_A | IO6_A | IO7_A | IO8_A | IO9_I | RTS | CTS |

Ouput Pin: 0
Input Pin: 1

| | | | |
|---|---|---|---|
| R/W | S262 | IO Value | Value of each Pin: |

| Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| / | / | / | / | / | IO1_P | IO2_P | IO3_A | IO4_A | IO5_A | IO6_A | IO7_A | IO8_A | IO9_I | RTS | CTS |

## IV.4. Operating mode

- The yellow LED (LD4) lights ON for each transmission frame
- The red LED (LD1) lights ON for each reception frame

## IV.5. Error codes

| Code | Error |
|---|---|
| ***Hayes commands*** | |
| 01 | AT characters are missing in the command |
| 02 | Command unknown or unauthorized in the current configuration |
| 03 | Register unknown |
| 04 | Register content not correct. Refer to the registers description for various limitations |
| 07 | Serial speed modification impossible because of low time-out.<br>Time-out should be modified before serial speed. |
| 08 | Time-out modification impossible because of high serial speed.<br>Serial speed should be modified before time-out |
| 09 | The addressing is missing in the command (Client ID =) |
| 10 | Channels to be scanned not correct |
| 11 | Command not correct. The client must have a network ID different from 0 |
| 12 | Command not correct. The server must have a network ID different from 0 |
| 13 | Client activation impossible. The network ID must be different from 0 |
| 14 | Server activation impossible. The network ID must be different from 0 |
| 15 | Radio speed modification impossible because of high serial speed.<br>Serial speed should be modified before radio speed |
| 16 | Serial speed modification impossible because of low radio speed.<br>Radio speed should be modified before serial speed |
| 17 | Radio speed modification impossible because of high number of channels.<br>Number of channels should be modified before radio speed |
| 18 | Repeater mode only. Radio speed modification impossible because channel N°2 is above the number of channel limits. Channel N°2 should be modified before radio speed |
| 19 | Repeater not allowed in network |

# CHAPTER V. ADVANCED OPERATIONS

The following paragraph described the main aspects of the Demokit advanced operation, i.e. standby mode, programming, range evaluation, etc.

## V.1. Stand-by Mode

In order to make stand-by consumption measurement on the Demoboard (e.g. for integration application), the radio module can be put in stand-by mode.

To configure the stand-by mode, only one register needs to be modified, S240 :

- ⇨ If S240 is set to ‘1’ (ATS240=1<CR>), the unit is ready to be in stand-by mode.
- ⇨ If S240 is set to ‘0’ (ATS240=0<CR>), the unit can not be configured in stand-by mode.

To perform power consumption measurement :

1. Connect an ammeter in place of the R13 Resistor .

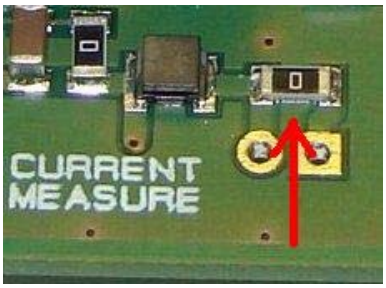



Figure 11: Current measure

To perform the stand-by mode, the unit must be configured in stand-by mode by setting its register S240 to ‘1’. Then :

2. Switch the Demoboard ON.

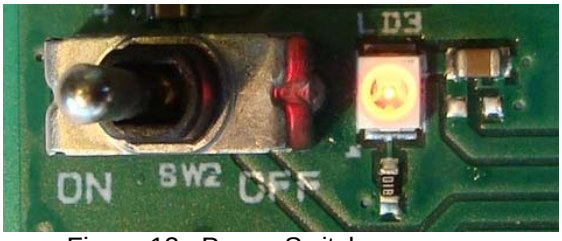



Figure 12: Power Switch

3. Turn the stand-by switch ON.

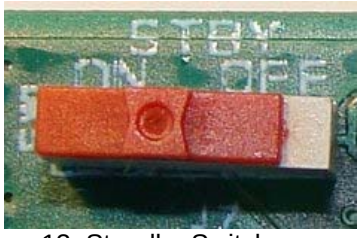



Figure 13: Standby Switch

4. To exit the stand-by mode. Turn back the stand-by switch OFF.

## V.2. Programming Mode

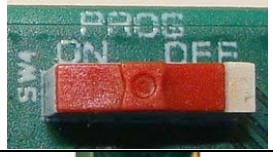
### ▪ ***ZTC Installation***

The **ZTC [1]** software allows programming of ZE Demoboard through the PC.

1. ZTC file is available on the Telit official web site www.telit.com in the download zone.
2. Go to ZTC repository and launch the “install.exe” software, and then follow the instruction.

### ▪ ***Demoboard Connections***

1. Connect the Demoboard to the PC via the RS-232 connector with the provided serial cable.
2. Connect the power supply to the Demoboard with the provided power supply.
3. Turn the programming switch ON (SW4).
   - Check that the green LED (LD2) lights ON

| Feature | Designation | |
|---|---|---|
| Prog switch | SW4 |   |
| Green LED | LD2 |   |

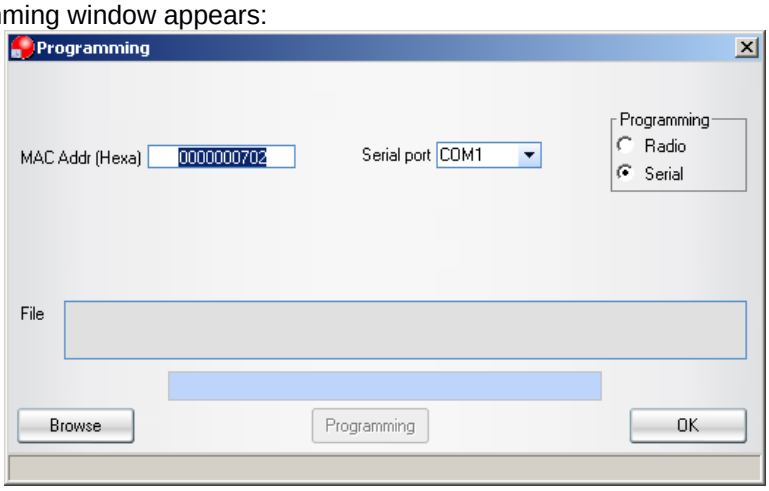
4. Switch the Demoboard ON (SW2).

## ▪ *ZTC Configuration*

1. Launch ZTC, go to the menu bar, choose “Configuration” and select “Programming”.

2. The Programming window appears:




3. Write the last 5 bytes of the MAC Address of the Module.

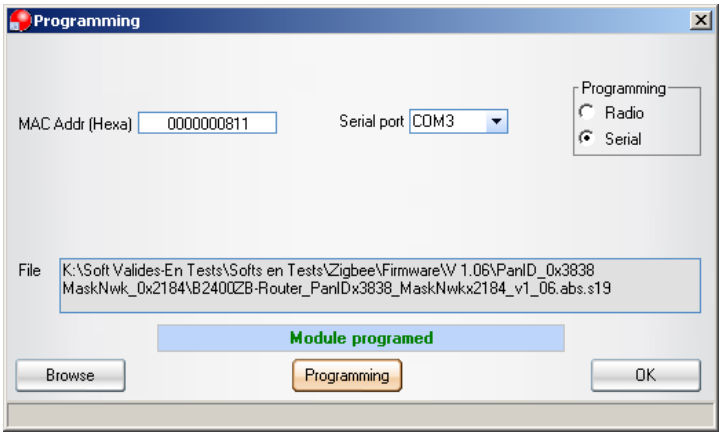
4. Select “Serial” in the “Programming” field.

5. Select the serial port on which the module is connected.

6. Select the file with the “Browse” tool.

7. Click on “Programming”.

8. When the module is correctly reprogrammed, the following window appears :



- ***Demoboard Connections (bis)***

1. Switch the Demoboard OFF (SW2).
2. Turn back the programming switch OFF (SW4).

## V.3. Auto-repeat mode :

This is a specific communication protocol in which the module sends back the frames it has received (radio or serial) without echoing. It allows the user to easily test the module remotely and to measure the communication range.

- ***Basic Illustration of Autorepeat mode***

| | *Démoboard N°1* | *Démoboard N°2* |
|---|---|---|
| *Configuration Mode* | +++<br>ATO | +++<br>ATS221=1<br>ATO |
| *Operating Mode* | **<HELLO>**<br>**<HELLO>** | **<HELLO>*** |

**<in blue> : data sent**
**<in red> : data received**

- ***Basic Illustration of Autorepeat mode with RSSI level***

| | *Démoboard N°1* | *Démoboard N°2* |
|---|---|---|
| *Configuration Mode* | +++<br>ATS255=129<br>ATO | +++<br>ATS221=1<br>ATO |
| *Operating Mode* | **<HELLO>**<br>**<rssi_level/HELLO>** | **<HELLO>*** |

**<in blue> : data sent**
**<in red> : data received**

*Received data do not appear on the serial link for demoboard in autorepeat mode