

ESUG-UPLYNX-002 Version 1.0





### BSE8001-0x

## **Evaluation Board**

### **Users Manual**

Elite Semiconductor Memory Technology Inc.



ESUG-UPLYNX-002 Version 1.0

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#### 1 Product Overview

The Uplynx XS8001 is the first System-On-Chip (SOC) solution from ESMT to address the soaring needs of Low Power Wide Area Network (LPWAN) solutions.

ESMT has developed two evaluation boards based upon the Uplynx XS8001 that cover the requirements of both the FCC and the EN regulations, these boards enable users to evaluate performance and to develop applications.

The Uplynx XS8001 provides a standard Sigfox Ready<sup>™</sup> AT command interface via UART at 9600bps. Users can control the XS8001 modem with simple AT commands. A list of all the AT commands can be found in Section 0.



#### 2 Evaluation Board Layout



2.1 Uplynx RCZ1 Evaluation Board (BSE8001-01)

2.2 Uplynx RCZ24 Evaluation Board (BSE8001-02)





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#### 2.3 Uplynx RCZ345 Evaluation Board (BSE8001-03)



Component	Function
USB Connector	Evaluation board power and connectivity to users computer
Enable Jumper	Enables USB power; fit jumper to POW_EN Enable
Module Power	To measure current consumption or to assert a different operating
lumper (12)	voltage, J2 should be open and external voltage source should be
Jumper (JZ)	connected to pin 2 (VDD_SYS)
Uplynx-M-	General purpose reference design for Uplynx. The design is not
RCZ1/2/3/4	optimized for Sigfox. Sigfox optimized design is available.
GPIO Headers	GPIO configuration
Power LED	The LED is ON when power is available to the board
Reset Button	Resets evaluation board
JTAG	Flash header (Program and Burn) for application development via
Connector	Andes AICE-MCU



#### 3 Driver Installation

Uplynx is preloaded with Sigfox Verified<sup>™</sup> application. The Sigfox AT commands can be passed from the host processor via a UART interface. The UART interface on Uplynx is connected to a USB-UART interface IC, the Prolific PL2303.

I. To access the Uplynx UART port from a PC, the corresponding driver must be installed. Instructions and drivers can be downloaded from Prolific website at;

http://www.prolific.com.tw/US/ShowProduct.aspx?p\_id=225&pcid=41

The driver installation wizard is initiated by plugging the Uplynx evaluation board into the USB port on the computer. A Prolific USB-to-Serial Comm Port will now be seen in the Windows Device Manager as shown below:

- : ◢.▋ 通用序列匯流排控制器 Bluetooth Hard Copy Cable Replacement Server Generic USB Hub Generic USB Hub ↓ Intel(R) USB 3.0 可延伸主機控制器 Intel(R) USB 3.0 根集線器 Standard Enhanced PCI to USB Host Controller Standard Enhanced PCI to USB Host Controller ■ USB 20 MTT 集線器 USB 3.0 集線器 USB Composite Device USB Composite Device USB Composite Device USB Root Hub 🏺 USB Root Hub 。 連接追 (COM 和 LPT Prolific USB-to-Serial Comm Port (COM6)
- II. Prior to plugging the Uplynx evaluation board into the USB port of the computer, user must fit a jumper across POW\_EN Enable at J5, after plug-in the power LED will light indicating that power is being drawn from the USB port.
- III. From the computer, the user can communicate with the evaluation board using HyperTerminal or other terminal emulation software.
- IV. Typing AT\$V? into the HyperTerminal window enables user to check if the connection is available as shown below;

COM6:9600baud - Te File Edit Setup Cor AT\$V? Firmware Versionc SIGFOX library ver	ra Term VT htrol Window Help 20160719_165821 ssion: UDL1-1.8.7	7		
T	Port: Baud rate: Data: Parity: Stop: Flow control:	COM6 - 9600 - 8 bit - 1 bit - none -	OK Cancel Help	
Transmit delay 0 msec/char 0 msec/line				

**Tera Term Settings** 



Termite 3.3 (by CompuP	hase)	ESUG-UPLYNX-002 Version 1.0
Serial port settings	and integral	in
Port configuration Port COM3 • Baud rate 9600 • Data bits 8 • Stop bits 1 • Parity none • Flow control RTS/CTS • Forward none •	Transmitted text Append nothing Append CR Append LF Append CR-LF Local echo Received text Polling 100 ms Max. lines Font default	Options Stay on top Quit on Escape Autocomplete edit line Keep history Close port when inactive Plug-ins
User interface language	English (en) 🔻	Cancel OK

**Termite Settings** 



#### 4 Test modes

Several test modes are available for users to evaluate the performance of the Uplynx XS8001 SOC. The same test modes are also utilized for FCC and CE certification process.

#### 4.1 Continuous Single Tone Test

This configuration is useful for testing the frequency accuracy and emission power. The following AT commands are used for these purposes:

AT command	Description	
AT\$O=1,mode	Open Sigfox AT command library, a return "ok" indicates library successful loaded. EU or US mode is loaded with mode equals to 0 or 1 respectively	
AT\$CW=frequency,1	Frequency is in Hertz (i.e. 868000000 = 868MHz).	
AT\$302=txpower	Txpower is the RF output power. The current version supports 14dBm, 17dBm, 20dBm and 22dBm only.	

**NOTE:** The measured power at the connector of the evaluation board may not match the parameter "txpower". The board has been designed and implemented for the 868MHz band. Hence the output power will be lower at 915MHz.

Users should refer to the application notes and layout guidance for the optimal design at various operating frequency bands. To attain 22dBm, the power jumper should be removed and an external 3.6V must be connected to "VBAT".

#### 4.2 Continuous Sigfox Packet Test

This configuration is useful for testing the frequency accuracy and emission power. The following AT commands are used for these purposes:

AT command	Description	
AT\$O=1,mode	Open Sigfox AT command library, a return "ok" indicates library successful loaded. EU or US mode is loaded with mode equals to 0 or 1 respectively	
AT\$IF=frequency	Frequency is in Hertz (i.e. 868000000 = 868MHz).	
AT\$302=txpower	Txpower is the RF output power. The current version supports 14dBm, 17dBm, 20dBm and 22dBm only.	
AT\$CM=num_packet	Num_packet Sigfox packets are to be sent at the frequency specified using AT\$IF	

**NOTE:** The measured power at the connector of the evaluation board may not match the parameter "txpower". The board has been designed and implemented for the 868MHz band. Hence the output power will be lower at 915MHz.

Users should refer to the application notes and layout guidance for the optimal design at various operating frequency bands. To attain 22dBm, the power jumper should be removed and an external 3.6V must be connected to "VBAT".



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#### Supported AT Commands

Command	Description	Value
AT\$302=pwr	Set Tx power	Pwr = Tx power [14 to 22]
AT\$302?	Get current TX power	Return Current transmission power setting
AT\$400=v1,v2,v3,v4	Set Sigfox configuration word for RCZ2, RCZ3 and RCZ4 settings	<pre>v1 = config_words_0 v2 = config_words_1 v3 = config_words_2 v4 = default FCC Channel</pre>
AT\$400?	Inquire the Sigfox configuration words	
AT\$410=mode	Enable Public Key for emulator mode	Mode: 0-normal mode; 1- Public key enabled (emulator mode)
AT\$SB=bitvalue	Send a bit value of 0 or 1	Bitvalue = 0/1
AT\$SF=frame	Send payload data, 1 to 12 bytes	Frame: data bytes (0,1,2,3C,D,E,F) to be sent, 12 byte maximum
AT\$RC	SIGFOX_API_reset	
AT\$ID?	Get device ID	return ID
AT\$PAC?	Get device PAC	return PAC
AT\$IF=freq	Set transmission frequency in Hz	e.g. 86800000
AT\$IF?	Inquire current frequency setting	Return frequency in Hz
AT\$CW= freq, mode	Test mode with continuous wave emission	Freq: 868000000 mode: 0-disable; 1-enable
AT\$CM= packetlength	Test mode with random data packet at fixed frequency	Packetlength = number of bytes to be transmitted (1~26)
AT\$V?	Read firmware information	
AT\$O=mode, standard	Open Sigfox API library	Mode: 1 to load Sigfox library Standard: 1-RCZ1; 2-RCZ2; 3-RCZ3; 4-RCZ4
AT\$RCZ=standard	Sigfox library regional setting	Standard: 1-RCZ1; 2-RCZ2; 3-RCZ3; 4-RCZ4
AT\$RCZ?	Inquire Sigfox library regional setting	Standard: 1-RCZ1; 2-RCZ2; 3-RCZ3; 4-RCZ4
AT\$O?	Inquire Sigfox API library open or not	Mode: 1 to load Sigfox library standard: 0(EU)/1(US)



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Command	Description	Value
AT\$OOB?	Get operation condition	Return values: [Battery voltage before active transmission in mV] [Battery voltage during active transmission in mV] [10x silicon temperature ] e.g. 2650 [battery voltage 2.65V before transmission] 2550 [battery voltage 2.55V during transmission] 270 [27C silicon temperature]
AT\$FW=mode	Firmware update mode	0: normal mode 1: update firmware with UART at 115200 After asserting the command, the device needs to be rebooted into XMODEM mode with UART speed of 115200bps. New binary can be loaded via XMODEM protocol over UART.
AT\$GPIODIR=gpio, val	Set GPIO pin direction.	gpio = 1-GPIO0; 2-GPIO1; , 6- GPIO5 val: 0-input (weak pull high); 1- output (input float)
AT\$GPI=gpio	Return GPIO value	gpio = 1-GPIO0; 2-GPIO1; , 6- GPIO5
AT\$GPO=gpio, val	Set GPIO output high or output low	gpio = 1-GPIO0; 2-GPIO1; , 6- GPIO5 val: 0(output low)/1(output high)
AT\$FEAT=page	Erase flash page	Page: 0 ~ 13 [EasyAT Commander related]
AT\$SIO=port	Scan GPIO input values and execute relevant flash page	Port: 6-bit input for GPIO0 to GPIO5. A "1" represents the relevant GPIO input will be scanned. [EasyAT Commander related] e.g. port = "100000", GPIO0 value is scanned and either GPIO0_Input(High) or GPIO0_input(Low) flash page will be executed [EasyAT Commander related]
AT\$IFVTH=voltage	Set battery detection voltage threshold	Voltage supply is measured and the AT command on page 12 or page 13 will be executed if the voltage is lower and higher than the threshold respectively [EasyAT Commander related]



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Command	Description	Value
AT\$DLY=count	No operation delay	Count: number of 100ms delays
AT\$SNEK	Load SNEK mode configuration	The Sigfox control registers are set automatically to allow proper operation with SNEK
AT\$RFENA	Turns off the internal ADC after AT\$OOB? and AT\$IFVTH are used to minimize system current consumption	Value: 0 – Disable internal ADC
AT\$SAVE	Saves all settings to flash, values will be retained after power off	



#### 5 Frequently Asked Questions

#### 1. UART connection is not detected.

User should check if the device "USB-to-Serial Comm Port" appears in the Windows Device Manager list. User should also note the com port index which must match the configuration in HyperTerminal. The configuration of the UART port must match as provided in this document.

#### 2. Does ESMT provide modules for application development?

ESMT can provide Sigfox Ready<sup>™</sup> modules for both the US and EU markets. For more information, please contact the ESMT sales team.

#### 3. Is the evaluation board design suitable for FCC/CE certification?

The evaluation board is designed for SoC evaluation purposes. ESMT provides Sigfox certified reference designs to help reduce design time and reduce design risk. For more information, please contact the ESMT sales team.

# 4. What AT commands are supported by the product? Is there any alternative way to input the AT commands?

ESMT provides an extensive set of AT commands for modem type applications and also provide EasyAT for simple standalone application development and a full feature software development kit. ESMT provides an easy to use GUI to simplify operation. "UG-Uplynx-001: Uplynx AT Command GUI and EasyAT Users Manual and UG-Uplynx-006: Uplynx AT Command GUI and EasyAT Users Manual (RCZ345)" are available to help you through the steps.

# 5. Why are the LEDs on the evaluation board OFF? How do I make sure that the module is in an operating condition?

To enable the evaluation board, user must open the corresponding COM port using Tera Term terminal emulator or another COM port terminal application. With the COM port opened, the LED should be lit and voltages on VLDO, VDD\_SYS(VDD), POW\_EN should be 2.5V(3.3V), 5V(5V) and 5V(5V) for RCZ1 (RCZ2/4)

# 6. The SMA connector on the RCZ24 evaluation board is not generating a signal or it is very weak, why?

There is a short RF cable connection between the SMA connector and the module IPEX connector, this cable may become loose, special care must be taken to ensure that the cable is firmly fitted.