

Getting Started

With the Y-Lynx Starter Kit
of the XEMICS XE1205TrueRF™ Transceiver

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Chapter 1

1 GENERAL INTRODUCTION

1.1 INTRODUCTION

This first chapter provides useful information in order to use the XE1205 Starter Kit environment.

1.2 HIGHLIGHTS

The information you will learn from this chapter:

- About this Guide
- Recommended Reading
- Troubleshooting
- The Y-Lynx and XEMICS Internet Web Site
- Customer Support

1.3 ABOUT THIS GUIDE

The XE1205 Starter Kit guide describes how to develop and test RF application based on the XEMICS XM1205 RF module. The manual layout is as follows:

Chapter 2: Overview and Installation –In this chapter a brief description is given on the XE1205SK's role, purpose and highlights the XE1205SK's top qualities. Installation instructions for the hardware and software are also provided.

Chapter 3: XE1205SK - Tutorial - A tutorial on using the Y-Lynx Starter Kit with a XEMICS XM1205 RF Module.

Chapter 4: Functional Overview - A description of each application mode embedded in the kit.

Chapter 5: Test and Evolution - A description of the basic features to evaluate the XM1205

Chapter 6: Advanced Features - A description of specific XE1205's functions.

1.3.1 Conventions Used in this Guide

This manual uses the following documentation conventions:

Description	Represents	Examples
Underlined, Italic text with right arrow	A menu selection from the menu bar	File > Save
Bold characters	A window or dialog button to click	OK, Cancel, Next, Back
Characters in angle brackets <>	A key on the keyboard	<Tab>, <Enter>
Italic characters	Referenced documentations	XE1203 Datasheet

Table 1: Documentation Conventions

1.3.2 Documentation Updates

As the Starter Kit and other Y-Lynx tools are constantly evolving to meet customer needs, some PC-GUI environment dialogues and/or tool descriptions may differ from those in this document. Please refer to either our web site at www.y-lynx.com or at XEMICS web site www.xemics.com to obtain the latest documentation.

1.4 RECOMMENDED READING

This user's guide describes how to use the XE1205 Starter Kit. Other useful documents can be found at our web site www.y-lynx.com or directly at the XEMICS product page: www.xemics.com/products/XE1200

Y-Lynx Application note
XEMICS Datasheet (XE12xx)
XEMICS Application note (AN12xx)

1.5 THE Y-LYNX' INTERNET WEB SITE

Y-Lynx provides their customers with on line support, and gives them ready-to-save files and easy-to-access information at www.y-lynx.com

1.6 CUSTOMER SUPPORT

For any technical problems, customers should call either their nearest distributor, representative or field application engineer. XEMICS product users can receive assistance through a range of channels including Y-Lynx, XEMICS distributors or representatives, local sales office or field application engineer (FAE)

Chapter 2

2 OVERVIEW AND INSTALLATION

2.1 INTRODUCTION

This chapter takes a look at the XE1205SK and explains how to install the system hardware and software.

2.2 HIGHLIGHTS

The subjects discussed in this chapter include:

- The role of the XE1205SK
- XE1205SK System Components
- How XE1205SK helps you
- XE1205SK - Kit Components
- Installing XE1205SK Hardware
- Installing XE1205SK "Graphical User Interface" software

2.3 THE ROLE OF THE XE1205SK

The XE1205 Starter Kit is an embedded environment for the XEMICS XE1205 transceiver. The XE1205SK enables a two way communication between two Radio boards, to perform practical "demonstration", "range" and "site survey" testing and evaluates the RF transceiver.

XE1205SK performs basic functions such as configuration in transmitter, receiver or sleep mode, and has added features such as frequency deviation selection, filter bandwidth and output power management.

This document covers the basic set up and operation for the XE1205SK environment.

2.4 XE1205SK SYSTEM COMPONENTS

The XM1205 is connected to the processor board as shown in figure 2.1 below. Note that the XE1205SK includes two separate, but identical, module assemblies. Two complete assemblies are required to perform remote two-way communication. This reduces the amount of RF lab equipment required for effective testing.

Full evaluation mode tests require connection to a PC via an RS232 serial cable inserted into the desired board.

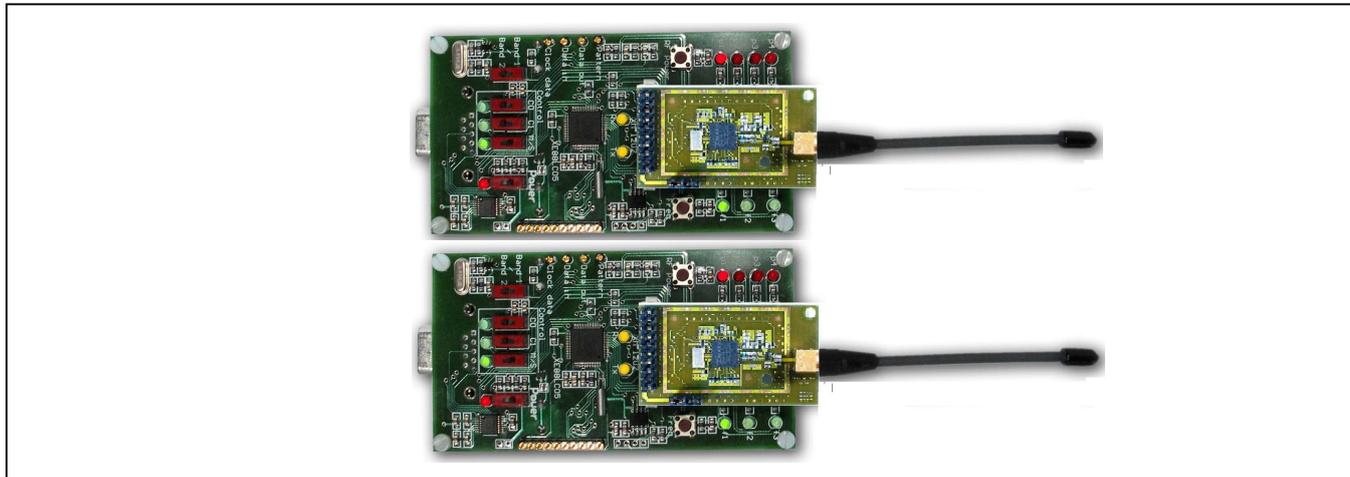


Figure 2.1: XE1205SK System Components

2.5 HOW THE STARTER KIT CAN HELP YOU

XE1205SK:

- Demonstrates a two way communication - Ping Pong Demo with a default configuration
- Changes the settings of the Ping Pong Demo
- Configures internal registers of XE1205 transceiver for evaluation purpose.
- Transmits and receives a data stream

2.6 XE1205SK KIT COMPONENTS

The components of the XE1205 Starter Kit are shown in Figure 2.2.

- 1) 2 x Processor Board
- 2) 2 x batteries
- 3) 2 x XM1205 - XEMICS RF Module
- 4) 2 x antennas

The XE1205SK package includes a serial cable that connects the Processor Board to a PC, a CD-ROM, complete with XE1205SK software, and on line documentation.

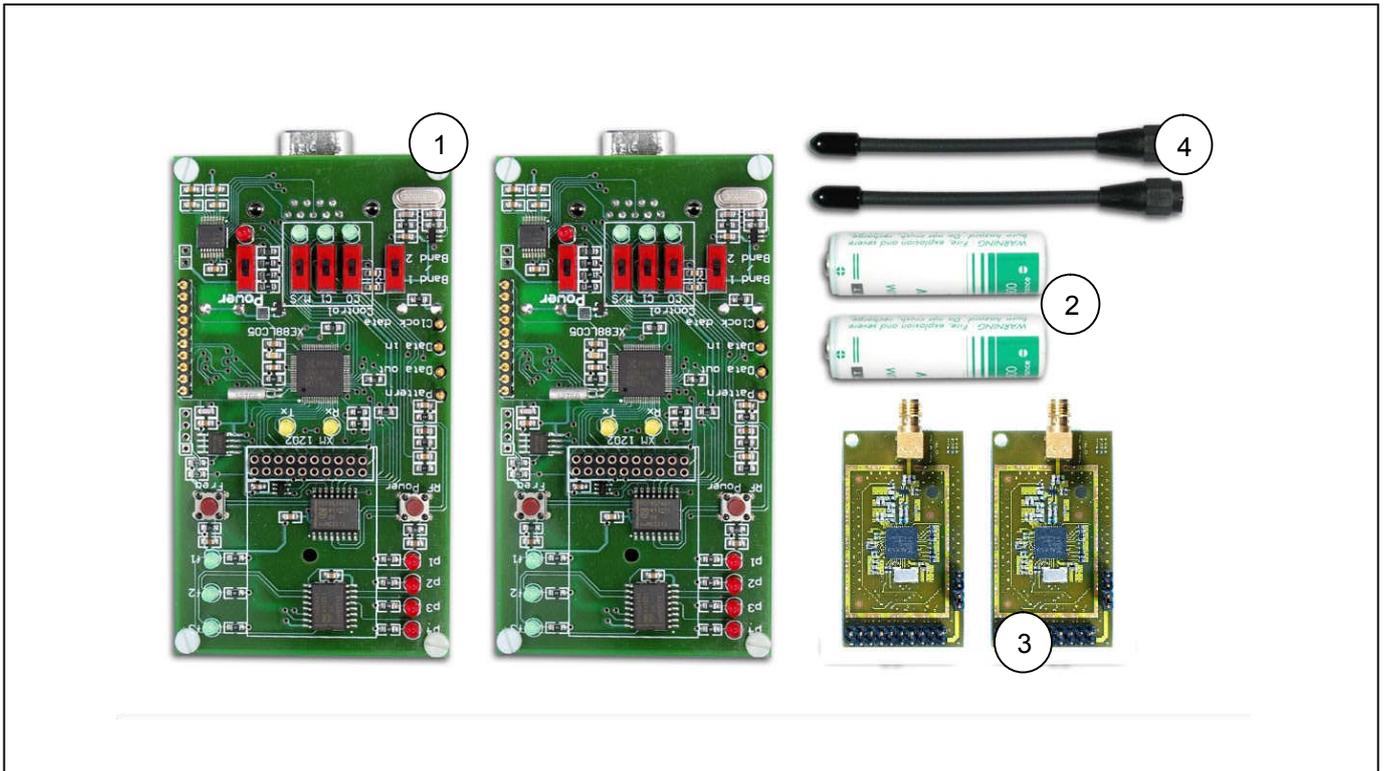


Figure 2.2: XE1205SK Components

2.7 INSTALLING XE1205 SK - HARDWARE

Follow the step-by-step instructions in this section to install the XE1205 Starter Kit



Warning

The main board should never be placed in ON position

Step 1:

Install the AA size battery(s) making sure that the polarity on the PCB is indicated. The processor board uses an AA size 3.6-volt lithium battery.

Step 2:

Connect the XM1205 RF module to the processor board



Note

That step 1 and 2 are the only steps required to perform a Ping Pong demo with the default settings.

Step 3:

RS232 interface cable needs to be connected between the PC serial port connector and the Processor RS232 socket.

Depending on the user's objective, an additional set-up procedure may be required.



2.8 XE1205SK – “GRAPHICAL USER INTERFACE” SOFTWARE

To Install

To install the XE1205SK software, locate the XE1205 GUI interface in the download section and follow the “XE1205 Set up Wizard” (please note that these steps are general guidelines and procedures and may vary depending on the individual user’s PC WINDOWS™ configuration and WINDOWS™ OS software.

To Run

- a) Click on ‘**Start**’ button on the MENU bar on the desktop window.
- b) On the pop-up window, click on the ‘**Program**’ ICON
- c) Locate and click on the XE1205SK on the sub menu bar that is displayed.

The Graphic User Interface (GUI) software screen meets standard WINDOWS™ Conventions. The PC GUI provides an interactive user interface for selecting and modifying XE1205 parameters. A brief description of the screen layout and usage of the GUI interface can be found in the “XE1205 – Test and Evaluation” section.

To Remove Installation

The PC GUI software is easily REMOVED by doing the following:

- a) Click the ‘**Start**’ button on the PC’s desktop screen
- b) On the pop-up window, click on the ‘**Settings**’ button
- c) Locate and click on the ‘**Control Panel**’ button
- d) Within the Control Panel window, double-click on the ‘**Add/Remove Programs**’ ICON.
- e) Locate and select the XE1205SK ICON and follow the removal procedures.

Chapter 3

3 XE1205SK - TUTORIAL

3.1 INTRODUCTION

After installing the XE1205SK hardware and software you are ready to start using the kit.

3.2 HIGHLIGHTS

- Reviewing Hardware
- System Description
- Default Ping Pong Test Overview
- Ping Pong Test Procedure

3.3 REVIEWING HARDWARE

The hardware set-up for this tutorial is as described below:

- Verify that the power supply is turned off at this time
- Each XM1205 module is connected to the application board (processor board)
- Each antenna is connected to the XM1205
- Boards are not connected to the PC

3.4 SYSTEM DESCRIPTION

One of the main performances of the Starter Kit is to demonstrate a two way communication between two radio modules, but it also evaluates the XEMICS transceiver XE1205. To achieve high flexibility, the Starter Kit board can support all the XE1205 RF modules and very few buttons have been added to the board (see Figure 3.1).

The Board description is as follows:

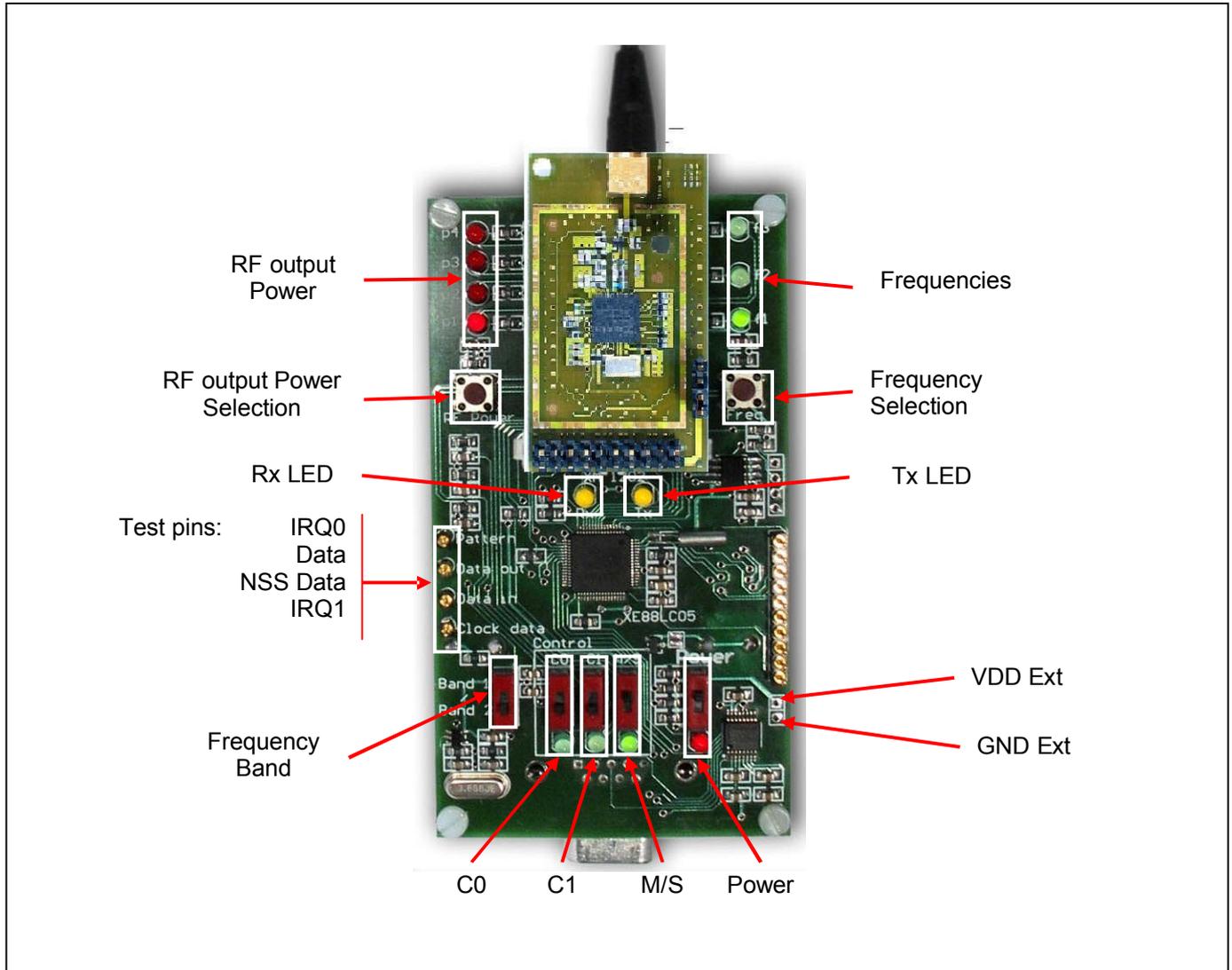


Figure 3.1: Board Overview

Brief overview of LEDs and push buttons

Power	: Switch on or switch off the power supply
Frequency band	: Switch to select the frequency band according to the XM1205 frequency band
RF Output Power	: LEDs indicate the transmitted output power: 0, 5, 10, 15dBm
RF power Selection	: Push button to select the desired output power value
Frequencies	: LEDs indicate the frequency used.
Frequency Selection	: Push button to select a frequency with the manual mode
Tx LED	: LED indicates an RF transmission
Rx LED	: LED indicates that a message has been received correctly

Control buttons

C0 / C1	: Configuration Switch buttons
M/S	: Switch button to select between Master and Slaves

3.5 DEFAULT PING PONG TEST OVERVIEW

The first Ping Pong demonstration allows the RF communication between two points to be achieved. The communication is made between a board operating as Master, and a board operating as a Slave. In addition, two operating modes are available: Automatic and Manual.

With the Automatic mode, the Master sends a message to the Slave every 125ms and changes transmission frequency after 1s (Auto-jump). When the Master receives an acknowledge message from the Slave or when the Slave receives a message from the Master, the Rx yellow LED lights up (Communication OK).

The Manual mode is the same as Automatic mode. The main difference is the selection of the frequency. In this case a user selects the frequency by pushing on the "Frequency Selection" button.

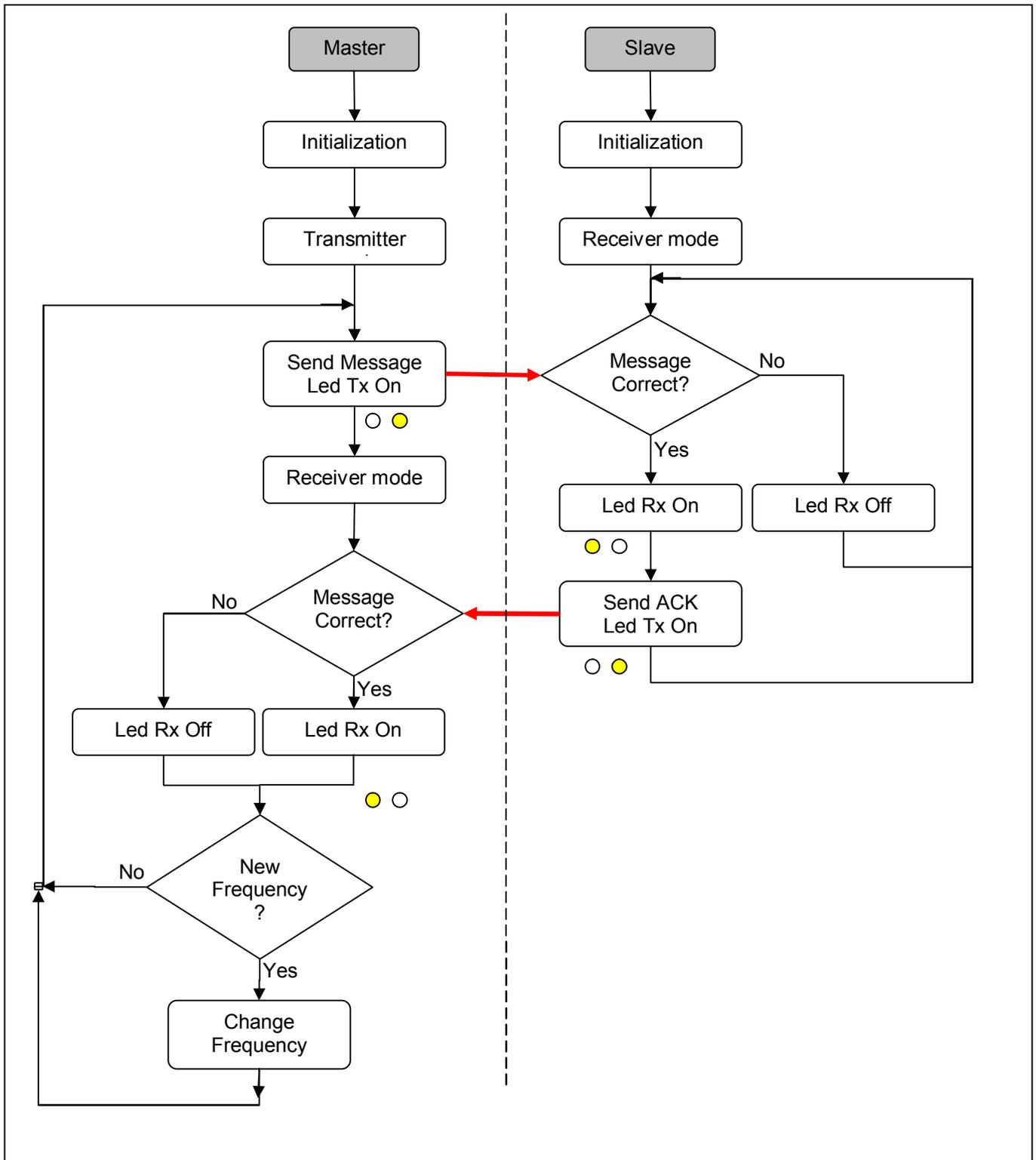


Figure 3.2: Ping. Pong Test Flowchart overview

Note: The user can change the frequency of the receiver (Slave) at anytime by pushing on the "Frequency Selection" button.

3.6 PING-PONG TEST PROCEDURE

The Ping Pong Settings flowchart is shown in Figure 3.3. At the end of this process the Ping Pong test will automatically start.

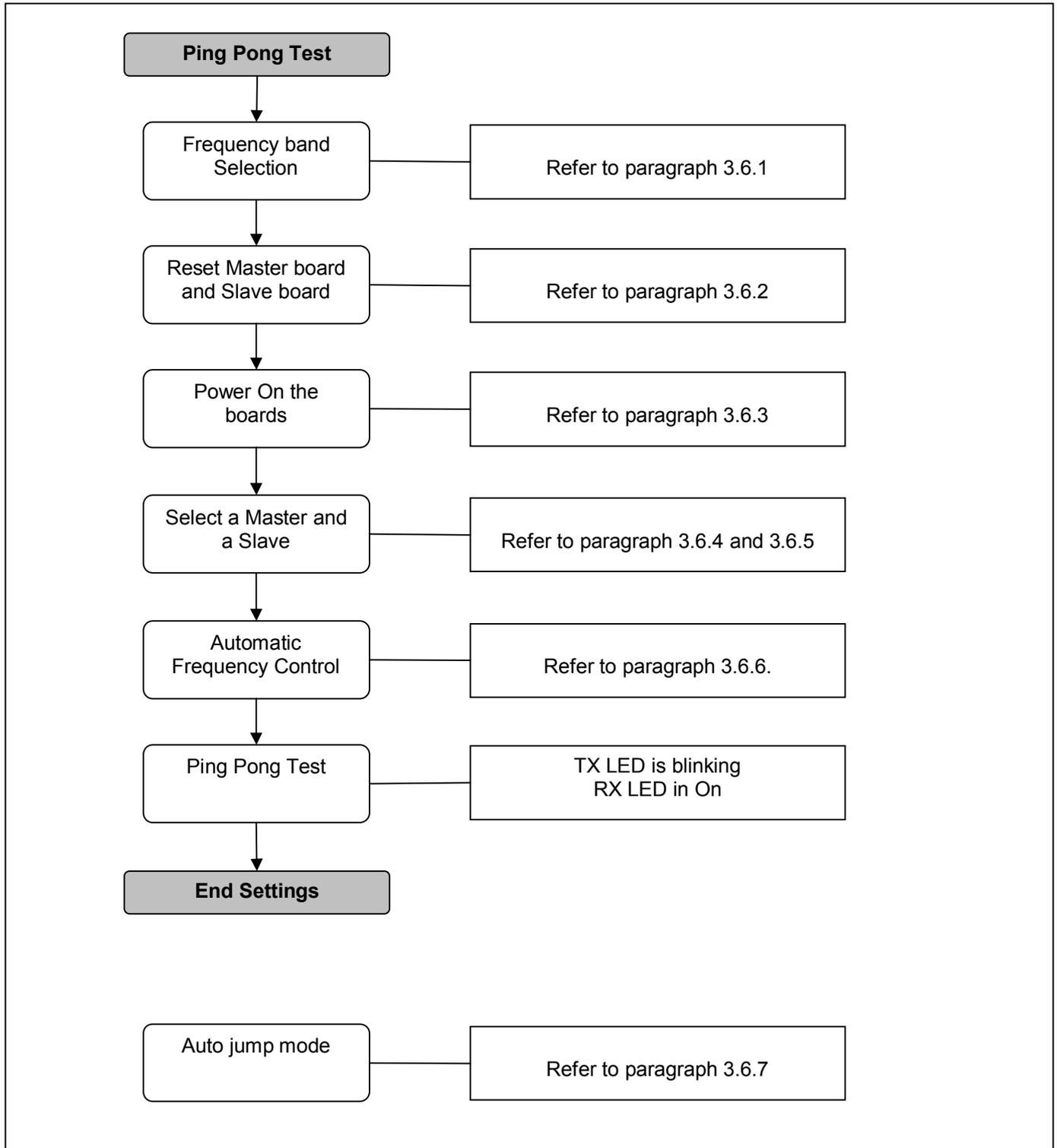


Figure 3.3: Ping-Pong Settings flowchart

3.6.1 Frequency band selection

1 – Set the Band 1/ Band 2 according to the frequency band of your RF modules.

Band 1= 915MHz

Band 2= 868MHz / 433MHz



Warning

Before starting the setting of the Ping-Pong demo, verify that all push buttons are in down position and all the LEDs are turned off.

3.6.2 Reset the boards

- 1) Set the configuration buttons C0 and C1 to 1 (up position, the both green LEDs will switch On at the power-up). This action will reset the EEPROM where the latest configuration is saved.
- 2) Switch on the power supply via the button POWER (up position). The red LED lights up.
- 3) Wait until the LED p1 and f1 light up.
- 4) Switch off the power supply, down position of POWER button.
- 5) Switch C0 and C1 to the down position

3.6.3 Switch On the boards

- 1) Switch all the buttons (C0, C1 and M/S) in down position,
- 2) Switch on the power supply, the red LED light on.
- 3) Verify that p1 LED and f1 LED are switched On

3.6.4 Slave Mode

The Slave mode is selected when all the green LEDs placed below the push buttons C0, C1 and M/S are Off.

3.6.5 Master Mode

Push up the M/S button to select the Master mode on one unit only. The green LED below push button switches ON.



Warning

The push buttons are only used to change a state and not to select a state. The state information is displayed by the green LEDs

Manual Mode: The manual mode is selected if the green LED corresponding to C0 is OFF. The user can choose the frequency by pressing on Frequency Selection button (**Freq**) and the output power via RF Power Selection button (**RF Power**).

Auto-jump Mode: To select the Automatic Mode, push up the button C0 on the Master board (the green LED switches ON) C1 is still down. The board is now in automatic mode; the user can not change the frequency manually but can still modify the output power.

3.6.6 Automatic Frequency Control

If there are some communication problems or if the range is not enough, the user must start the Automatic Frequency Control (FEI function of the XE1205) in order to automatically trim the frequencies.

On the Master and Slave boards **simultaneously**:

- 1) Switch on C1 (up position, the green LED switches ON).
- 2) p4 LED is turned ON
- 3) Wait around 1 second
- 4) Switch off C1 (down position).

3.6.7 Ping Pong Test

Ping-Pong mode has automatically started after the Automatic Frequency Control. At this stage the user should notice that the Tx yellow LED blinks (Ping). The Rx yellow LED comes on when the received message is correct (Pong).

A reliable two way radio link has been established between two modules. Each module, upon receipt of a valid radio frame will immediately “echo back”, keeping the Ping-Pong test sequence continually active. This indicates the desired state of 100% two-way communications’ reliability.

Chapter 4

4 FUNCTIONAL OVERVIEW

4.1 INTRODUCTION

After using the Ping Pong Demo, you are ready to start using the kit.

4.2 HIGHLIGHTS

- XE1205SK - Functional flow chart
- Default Ping Pong Test
- User Ping Pong Test
- Stand Alone Evaluation Mode
- PC – GUI command

4.3 XE1205SK – FUNCTIONAL FLOW CHART

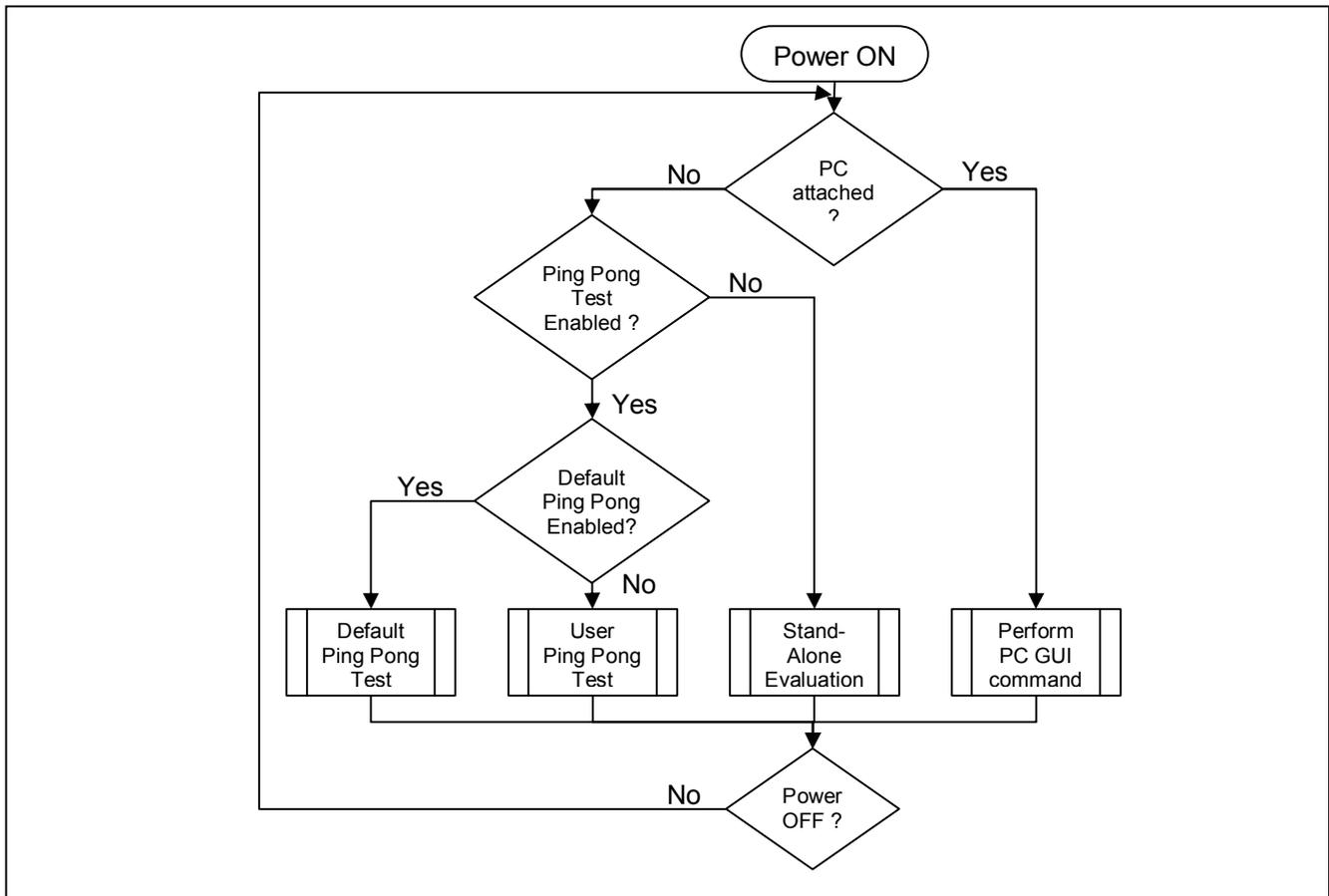


Figure 4.1: “Embedded software” general flow chart

Brief explanation of Figure 4.1

- If the PC is attached to the processor board, the embedded microcontroller software will monitor the RS232 port for a valid user request from the PC GUI software. Acceptance and execution of a request is indicated by the “blinking” of both yellow LEDs Rx and Tx together.
- If the PC is not attached and the user has disabled the Ping-Pong Test, the XE1205SK will assume “XE1205 Evaluation” mode, otherwise the “embedded software” will check if the user has defined a “User Ping-Pong Test” if not the microcontroller will assume the “Default Ping-Pong Test”.

4.4 DEFAULT PING-PONG TEST

4.4.1 Purpose

The Ping-Pong Test provides the user with a means to demonstrate a practical two-way radio communications between two processor boards with XM1205 modules attached. The Ping Pong mode can be a valuable test when conducting on-site and range tests.

A Default Ping Pong Test program is embedded within a XEMICS RISC microcontroller chip (XE88LC05) on the board. The Ping Pong Test (*Default* or *User*) is automatically started after the power up if no PC is attached to the board's RS232 connector and if the option has not been disabled from the PC-GUI Software.

In addition the RESET of the board will not affect the parameters of the default Ping Pong demo.

4.4.2 Equipment required

- Two XM1205 radio modules
- Two antennas
- Two processor boards

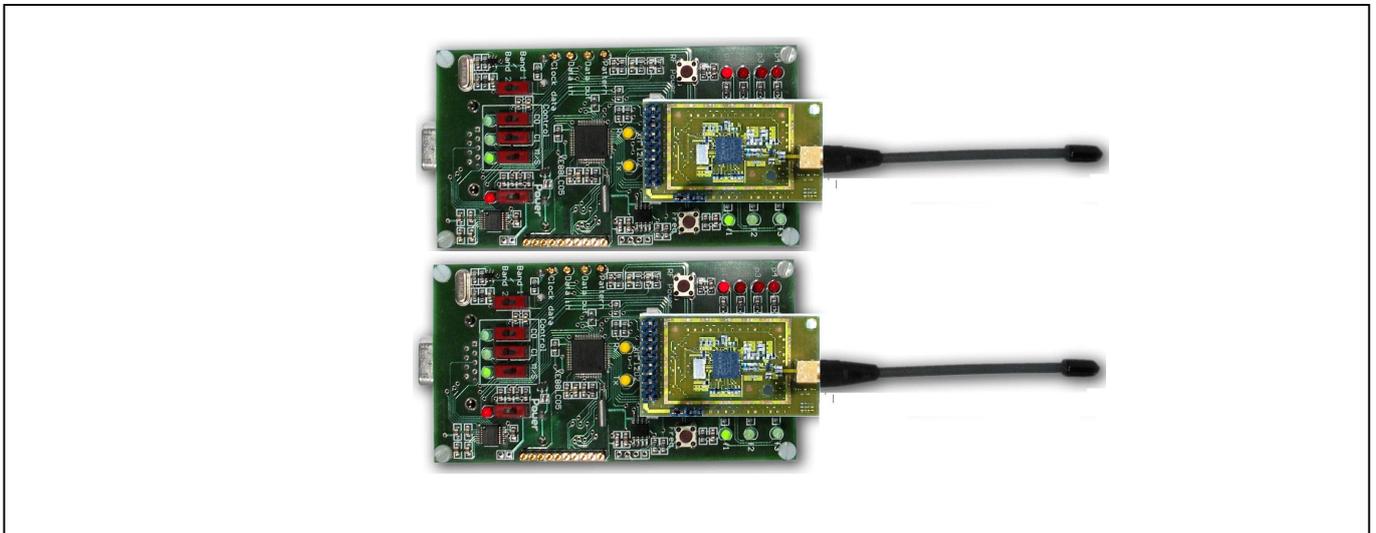


Figure 4.2 Ping-Pong test Hardware set up

While the Ping-Pong Test is in progress:

- Tx Yellow Led switched ON indicates a radio message is being sent
- Rx Yellow Led switched ON indicates a valid radio message is being received

4.4.3 Default Ping-Pong Test enabling

To enable the default Ping Pong test, the user needs to click on the “Default Ping-Pong” button on the PC-GUI interface before disconnecting the RS232 cable from the board.

4.4.4 Read back the configuration

To read the Default Ping Pong configuration saved in the Microcontoller memory, the user needs to click on “XE1205 Eval” to have access to the control buttons. Click on “Get Config”, **do not click on “Load Config”**. The Graphic Interface will display the Default Ping Pong configuration which has been saved into the microcontroller (see Figure 4.3).

4.5 USER PING-PONG TEST

4.5.1 Purpose

The “User Ping Pong Test” allows the user to achieve a Ping Pong Test with their own settings. The User configuration will be saved in an EEPROM, but will be lost after the RESET function. This mode allows the user to modify all the parameters of the XE1205 (Frequency deviation, Local Oscillator f1, f2, f3, Pattern, etc). The only restriction is the data rate, which must be lower than 38.4kbps for a Ping-Pong Test.

4.5.2 User Ping-Pong Test Enabling

To modify the Ping-Pong settings, the user needs to click on the “XE1205 Eval” button before starting the parameter modifications. The next step is to send the new configuration to the microcontroller by clicking on “Send Config”. To save this configuration into the memory (EEPROM), the user needs to click on the “Save Config” button. The RESET operation will erase all the user parameters. To start the User Ping Pong test, the user needs to click on the “User Ping-Pong” button on the PC-GUI interface before disconnecting the RS232 cable from the board.

The three predefined frequencies (f1, f2 and f3) can also be modified by clicking on “Ping Pong” on the tool bar menu

4.5.3 Read Back the Configuration

The XE1205SK allows the user to read back the latest configuration saved in the EEPROM. To display the registers contents, the user needs to click on “XE1205 Eval” to have access to the control buttons. Click on “Load Configuration” to load the latest configuration into the XE1205 transceiver followed by “Get Config”. The Graphic Interface will then display the latest configuration which has been saved into the memory.

4.6 STAND ALONE EVALUATION

4.6.1 Purpose

This operating mode allows the user to disable the Ping-Pong Test. In this condition, the user will be able to apply external data to the *Data in* pin and apply data received to the *Data out*, *Clock out* and *pattern*. The XE1205 configuration will be set via the graphic interface.

4.6.2 Stand Alone Evaluation enabling feature

To have access to this mode the user needs to click on “XE1205 Eval” button placed on the PC GUI interface. When all the bits have been set correctly, the configuration will be set to the microcontroller by clicking on “Send Config” and saved in the EEPROM by clicking on “Save Config”. The user can then disconnect the board from the RS232 cable.

4.6.3 Read back the configuration

As for the “User Ping Pong” function, the XE1205SK allows the user to read back the latest configuration saved in the EEPROM. To display the “registers contains”, the user needs to click on “XE1205 Eval” to have access to the control buttons. Click on “Load Configuration” to load the latest configuration into the XE1205 transceiver followed by “Get Config”. The Graphic Interface will display the latest configuration which has been saved into the memory.

4.7 PC-GUI COMMAND

4.7.1 Purpose

This mode allows the user to evaluate the XE1205 performances by connecting a spectrum analyzer or a FM generator but it also defines new parameters for the Ping-Pong Test and for the Stand Alone Evaluation. All the bits of each register are accessible, to set a bit, the user needs to click on corresponding LEDs or use the predefined values available from the MENU Bar. In this mode, the board needs to be connected to the PC through the serial cable.

For a better evaluation remove the jumper on the module and connect an external power supply as described in the XM1205 Product Brief. The user can also disconnect the battery and connect an external power supply to the power supply connector of the XE1205SK (pin VDDext and GNDext).

4.7.2 PC-GUI Command Enabling

To have access to all the registers, the user needs to select “XE1205 Eval” on the “App State” window from the PC-GUI screen.

Chapter 5

5 TEST AND EVALUATION

5.1 INTRODUCTION

After installing the XE1205SK hardware and software, you are ready to start using the kit.

5.2 HIGHLIGHTS

- XE1205SK – Basic PC-GUI Screen Layouts
- PC-GUI Screen Areas
- Menu Bar and Sub-Menu Options
- Ping Pong Mode modifications

5.3 XE1205SK – BASIC PC-GUI SCREEN LAYOUTS

The XE1205SK PC-GUI consists of a single fixed screen. The screen easily allows the user to manipulate the XE1205 Radio module at the binary level. The PC-GUI screen is divided into seven primary areas, as shown in the diagram below.

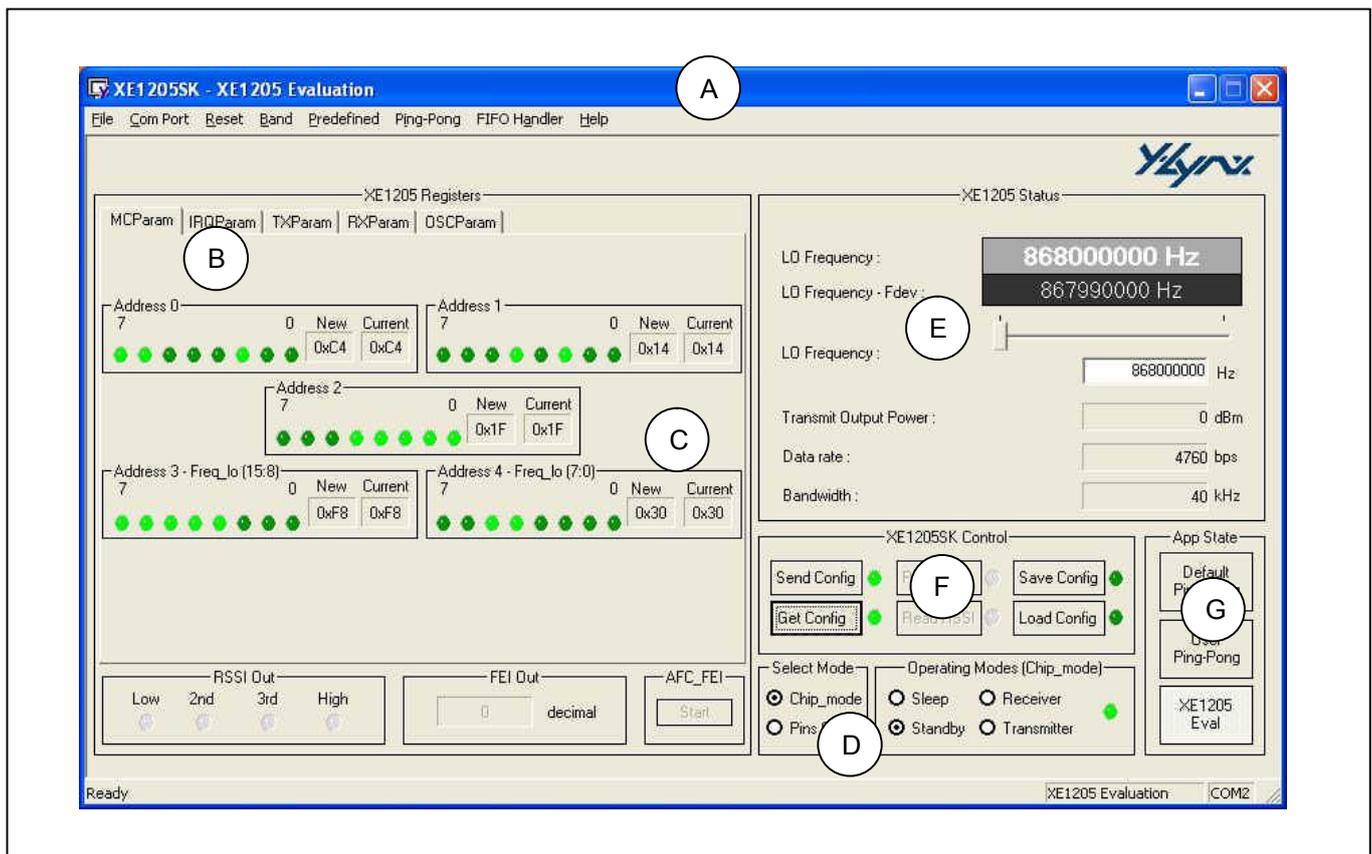


Figure 5.1: Screen Layouts

Note: The actual PC-GUI presentation may differ as new features and updates are added to PC-GUI software.

A brief description is:

- (A) Main Menu Bar with pre-defined configuration information
- (B) XE1205 Registers presentation and set-up window
- (C) Real time display window of register values (New and Current value)
- (D) XE1205 Operating Mode and set-up window
- (E) XE1205 Status display
- (F) XE1205SK Control window
- (G) Selection of the Application

5.4 XE1205SK PC-GUI SCREEN AREAS

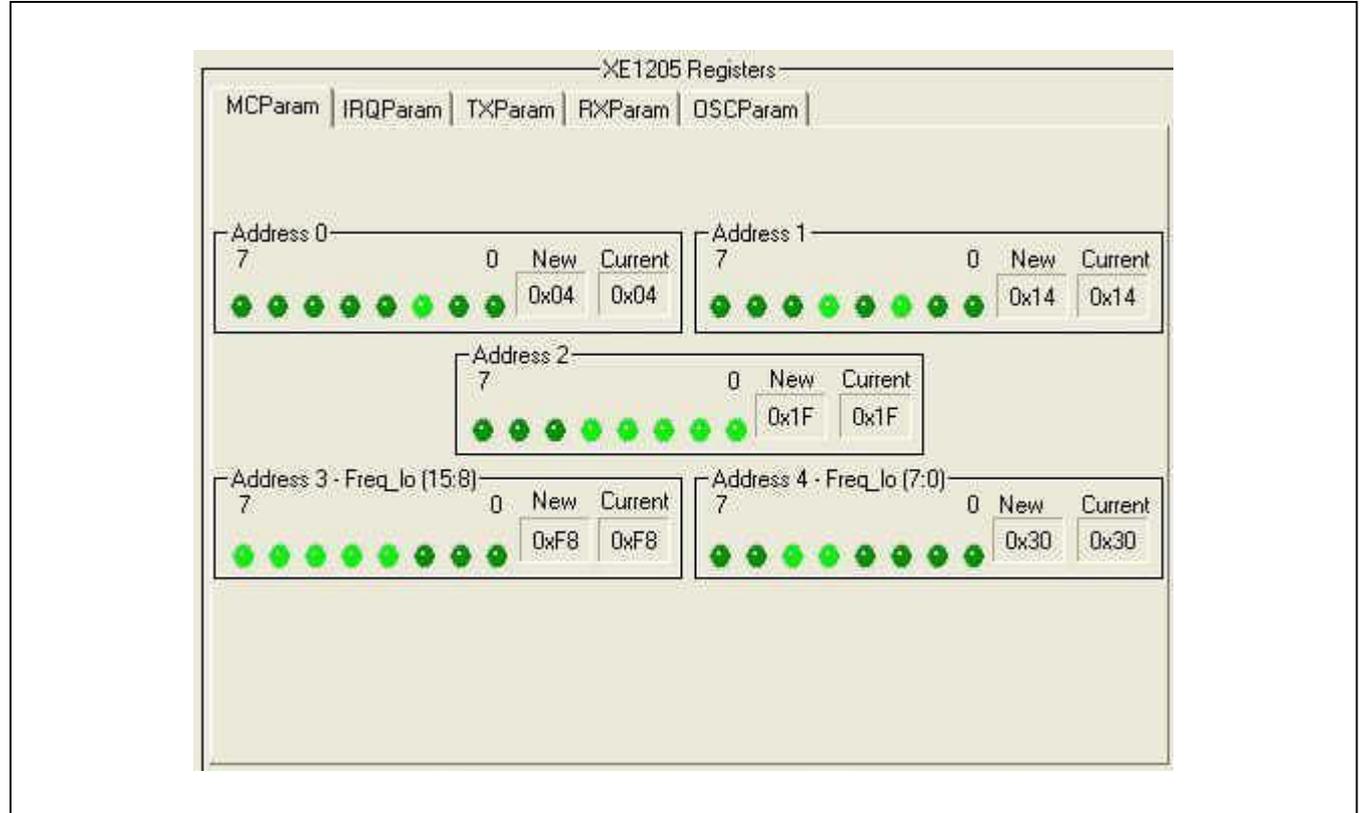
5.4.1 Menu Bar

The MENU Bar allows the user to select the Com_Port that the board is attached to. Reset registers, Band, Pre-Defined XE1205 Settings, Ping Pong, Pattern Handler and Help are included in the menu.



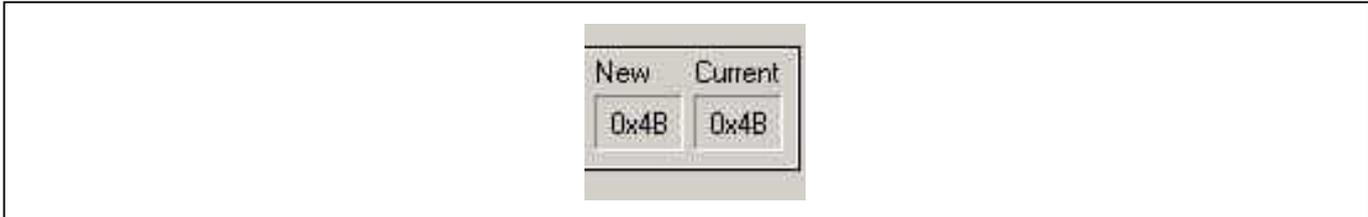
5.4.2 Binary Registers

The user can select a register by clicking on the register's name tab and can select individual bit settings for a particular XE1205 register. The new settings of the register only occur when *Send Config* button is clicked.



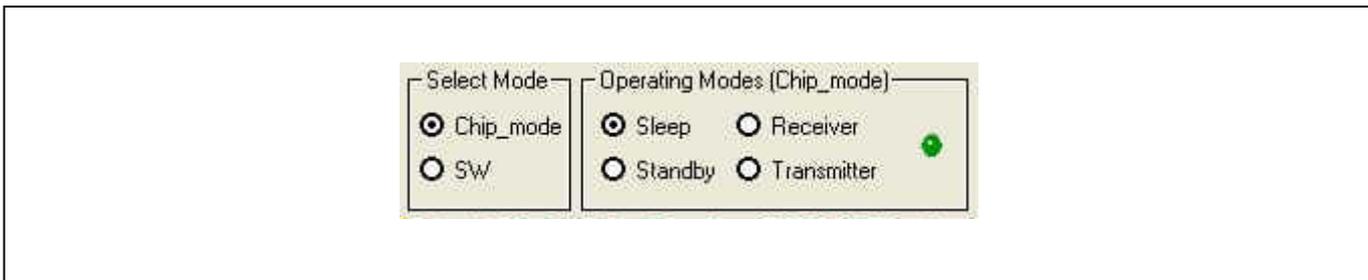
5.4.3 Register Status

Two Register status windows are displayed, the Current status and the New status. The current status corresponds to the actual XE1205 programming. This configuration can be read from the transceiver by clicking on *Get Config* and then the status window will be automatically updated. The New Status window is updated in real time (display in red) and based on the user interaction with the PC-GUI screen data. In addition, the new configuration is transferred to the XE1205 by clicking on *Send config* button, at the same time, the Current status window is updated with the value of this new configuration.



5.4.4 Select Mode and Operating Mode

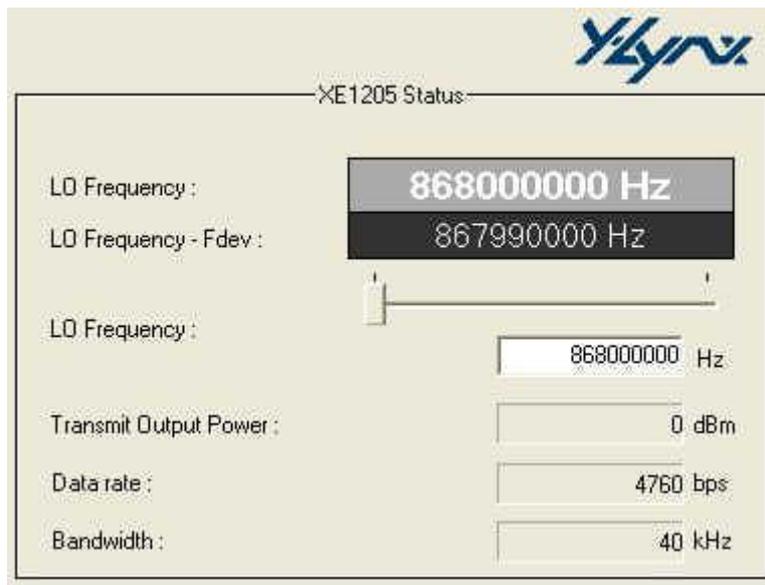
XE1205 Select Mode allows the user to select between Chip Mode and pin Switch. Operating Mode allows the user to select the mode or state that the XE1205 will assume. The selection will be transmitted automatically to the attached board, the operating mode Status LED switches on if the selection has been transmitted correctly to the board.



5.4.5 XE1205 Status display

A Narrative window is provided for informing the user about the primary XE1205 configuration currently set-up. This window is updated in real-time when the user sets and clears various parameters on the PC-GUI screen.

The “start-up” local oscillator frequency of the XM1205, when the frequency offset is zero, will, due to external components tolerance, vary from device to device (i.e. Crystal). An “LO frequency” trim slide bar has been added to allow the user to adjust the reference. For best results, the trim feature should be executed with the XE1205 modulator OFF (TXParam bit 5 set to 1). A text window allows entering the Local frequency through the keyboard. The *Reset* button on the menu bar can be clicked to reset the settings and to re-start the trim feature.



5.4.6 XE1205SK Control Window

The XE1205SK offers different modes to control the XM1205. The communication with the attached board is validated if the corresponding LED turns bright green. If the LED is red, the communication cannot be established or the operation is not allowed (the XE1205 Eval has not been selected).

Get config

By clicking on this button, the user will be able to read the values of the XE1205 registers. This operation is very useful if you need to find out what the previous programmed configuration was in the transceiver.

Send Config

This operation sends all the registers to the microcontroller to program the XM1205 with the new configuration.

Read FEI

This button is only accessible if the FEI is enabled (RXParam, Address 9, bit 3 set to 1), in addition the PC-GUI screen displays the result of the measurement.

Read RSSI

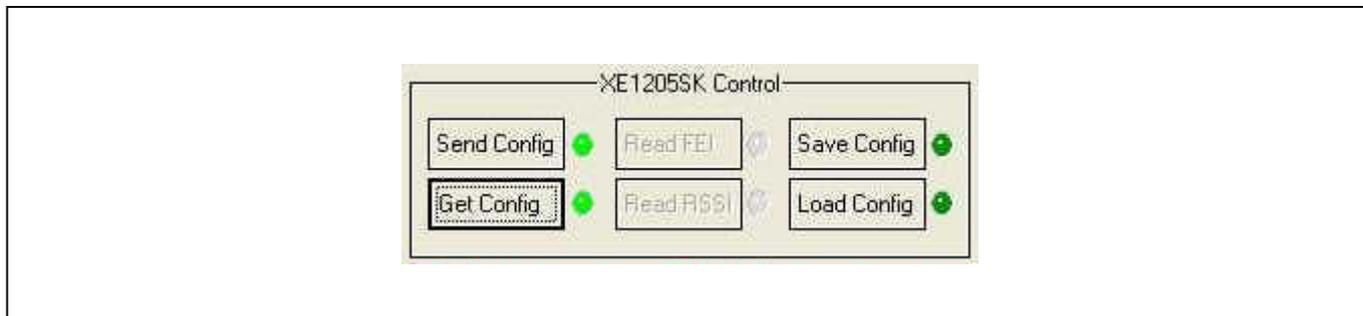
The Read RSSI button is only available if the RSSI is enabled (RXParam, Address 9, bit 7 set to 1), the PC-GUI displays the result of the measurement. The FEI and RSSI use the same output register and therefore prevent the user from reading the results of the two measurements simultaneously.

Save Config

This operation will save the configuration into an EEPROM placed on the board. In this case, the user will be able to read back the latest configuration after clicking on the "Load Config".

Load Config

This operation is used to load the configuration which has been saved in the EEPROM, onto the XE1205. The user will be able to read back the latest the configuration by clicking on "Get Config".



5.4.7 Application Selection Window

The XE1205SK combined with the PC-GUI interface provides three different applications. To enable each of them, the user needs to click on the corresponding buttons.

Default Ping Pong

By clicking on these buttons the user will have access to a range test with pre-defined parameters.

- Frequency 1 = 914.000 MHz or 868.000 MHz
- Frequency 2 = 915.000 MHz or 869.000 MHz
- Frequency 3 = 916.000 MHz or 870.000 MHz
- Data rate = 4.8 kbps
- Frequency deviation = 10 kHz

XE1205 Eval

This mode not only allows the user to evaluate the XE1205 performances but also to program other parameters for the User Ping-Pong test. For more information about XE1205 registers, please refer to the XEMICS XE1205 Datasheet.

When the board is connected to the PC, the user can evaluate the performance of the XE1205 transceiver by connecting a spectrum analyzer or an FM generator.

This mode is used to transfer an external data stream from one board to another. In this case, the input Data stream will be connected to the “Test 3” pin (NSS-DATA) and the received data will be observed on “Test 2” pin (DATA). Moreover, two pins “Test 1” (IRQ0) and “Test 4” (IRQ1) are available on the board.

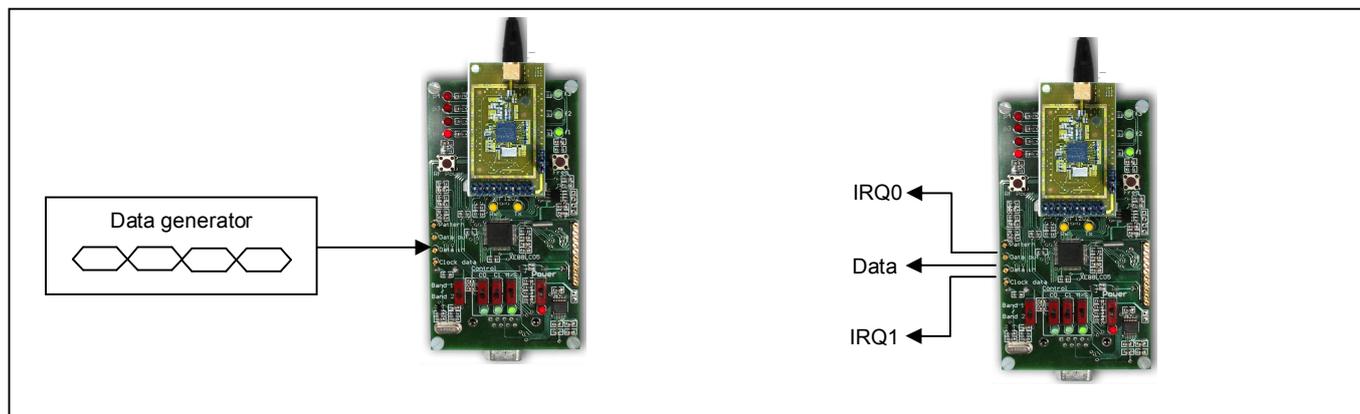
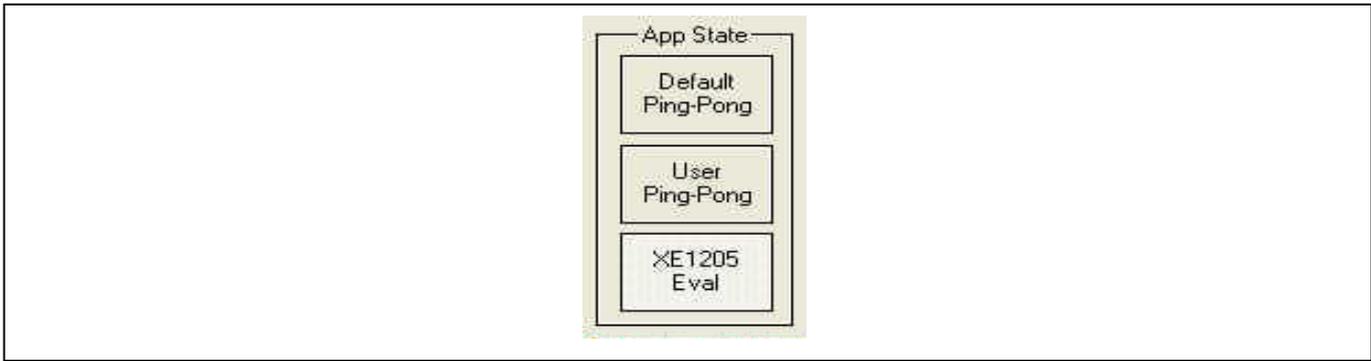


Figure 5.2: Stand Alone Mode

User Ping Pong

This mode is used by the user to achieve a Ping Pong test with their own parameters. This draws them closer to the final application test. Before switching onto this mode, the user needs to define or modify parameters; in this case the XE1205 Eval needs to be selected. At the end of the modification, the user will activate the “User Ping-Pong” feature and disconnect the board from the RS232 cable. At this time, the user will be able to achieve the field range test with their own parameters.



5.5 XE1205SK MENU BAR AND SUB-MENU OPTION

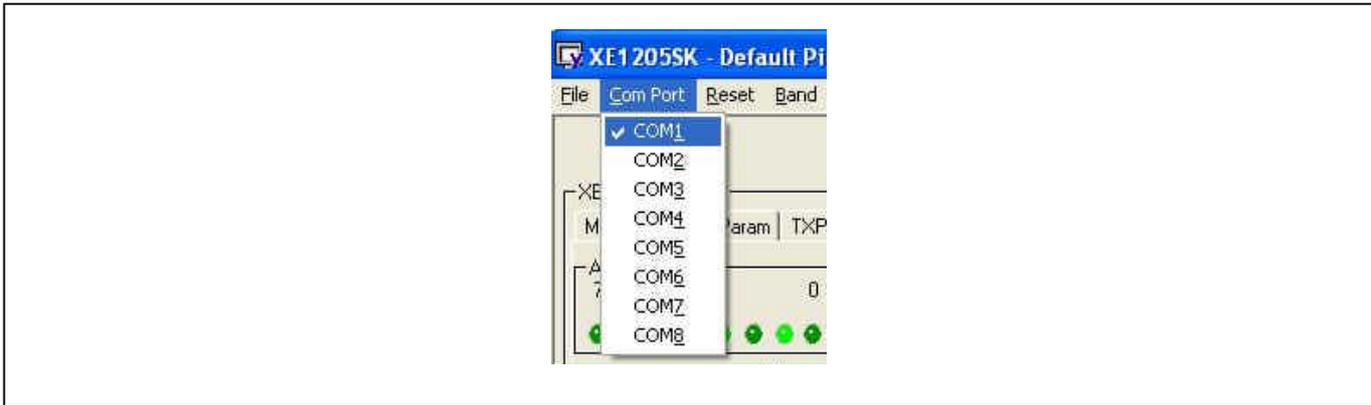


Note

The actual PC-GUI presentation may differ from the illustrations as new features and updates are added to the software

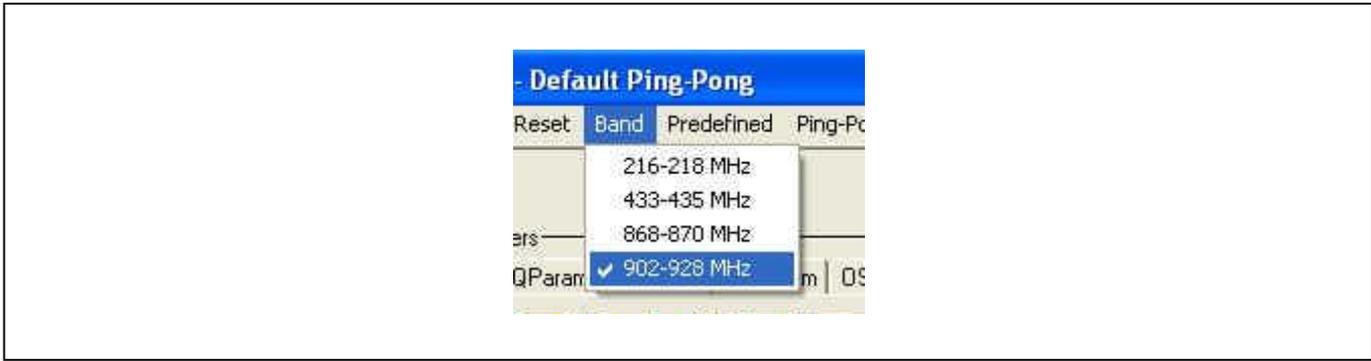
5.5.1 Com Port

The Com Port submenu will allow the user to specify the PC serial RS232 communication port to employ when attaching the board.

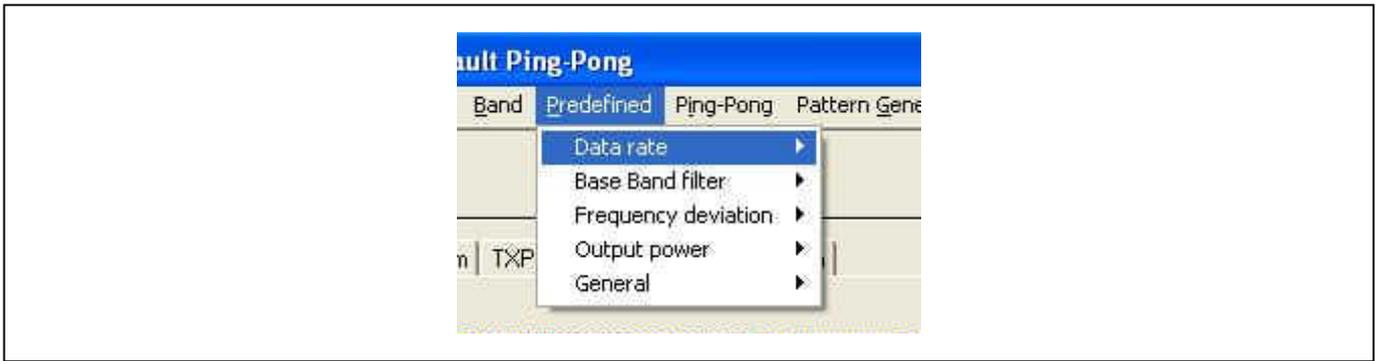


5.5.2 Band

The XE1205 Band set submenus allows the user to select the operating radio spectrum or the band that the XM1205 module being tested is designed for. (see XE1205, MCParm, Address 0, bit 1 and 2)



5.5.3 Pre-defined



Data Rate

The Data rate submenu allows the user to set a pre-defined receive data rate (see XE1205, MCPParam, Address 2, bit [6.. 0])

Base Band filter

The XE1205 Base Band filter submenu allows the user to select the receive bandwidth for the most effective "Adjacent channel Rejection" verses the operating data rate. (See XE1205, RXParam, Address 8, bit 6, 5 and 4)

Frequency Deviation

The frequency deviation submenu allows the user to set a pre-defined "Transmit" frequency deviation (see XE1205, MCPParam, Address 1, bit [7.. 0])

Note: the transmit frequency deviation is applied both above and below the center frequency; therefore the total deviation is 2 x the frequency-deviation selected.

Output Power

The output power submenu allows the user to set the desired XE1205 transmit output power level for Mode1 and Mode2. (See XE1205, TXParam, Address 7, bit 7 and 6)

General

The General submenu allows the user to set selected parameters (Bit Sync, FEI, RSSI and Buffered mode). The Bit Synchronizer is enabled by default.

5.6 PING PONG MODE MODIFICATION

By default the Ping Pong mode is activated when no PC is connected to the board. If the user wants to alter the Ping Pong, each board needs to be connected temporarily to the PC and the XE1205 Eval Application needs to be selected. After the parameters alteration click on the command "send configuration".

The user can also change the three frequencies used in the Ping Pong demo. After completion of desired settings, the user needs to select "User Ping Pong" before removing the PC connection to the board. By clicking on "OK" the new frequencies will be automatically transferred to the XE1205, **do not click on "Send configuration"**



Chapter 6

6 ADVANCE FEATURES

6.1 INTRODUCTION

The XE1205 Starter Kit is also a development environment. In response, advanced features have been built into this development tool. A general description of these features is provided here.

6.2 HIGHLIGHTS

The subjects discussed in this chapter include:

- Automatic Frequency Control
- Transmitter FIFO Handler
- Receiver FIFO

6.3 AUTOMATIC FREQUENCY CONTROL

The Automatic Frequency Control models itself on the FEI function and calibrates the slave's frequency on the input carrier frequency (master's frequency). It is used to compensate the tolerance of the Local Oscillator due to the Xtal precision or to compensate the temperature drift.

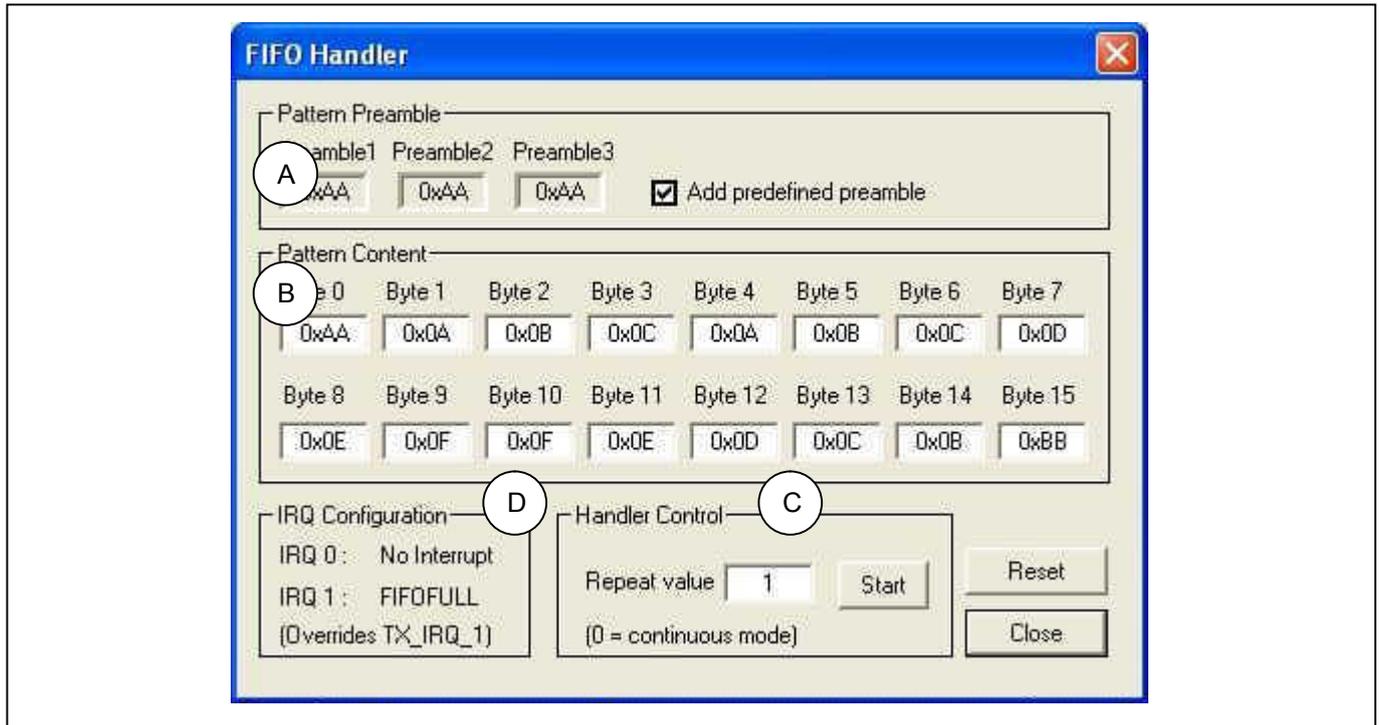
This operation is only activated when the receiver mode and the buffered mode have been enabled. To guarantee correct behaviour of the AFC, the operation must be done when a preamble is received.

The XE1205SK is capable of continuously transmitting a preamble. Select one Starter Kit as master (M/S up position) and set the switch button C1 to the up-position, the LEDs *f1*, *p4* and *RX* are on. To run the Automatic Frequency Control, the second starter Kit must be connected to the PC click on AFC and to check the frequency alignment, a FEI measurement can be done.



6.4 TRANSMITTER FIFO HANDLER

The GUI interface for the XE1205SK offers the advantage to program a data generator, the FIFO Handler.



A: Pattern Preamble: Three preamble bytes can be added at the beginning of the message. It will be used to lock the Bit Synchronizer at the receiver.

B: Pattern Content: The size of the pattern is fixed to 16 bytes, the same size as the receiver FIFO. The content of the pattern can be modified by the user.

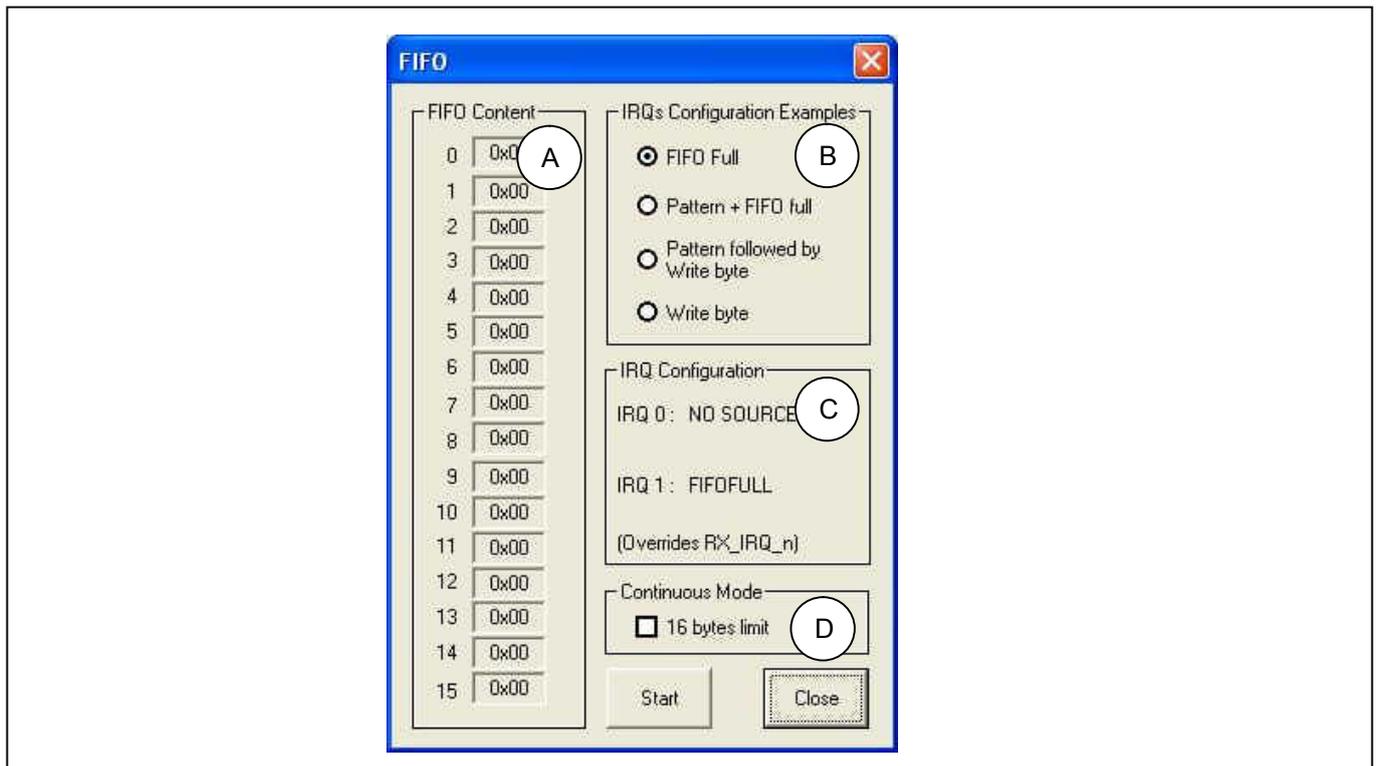
C: Handler Control: The number of transmissions can be programmed. If a "0" is set, the pattern content and the Pattern Preamble, if enabled, are sent continuously.

D: IRQ Configuration, display interrupts status.

6.5 RECEIVER FIFO

The XE1205 FIFO can be displayed by the GUI interface. The Receiver FIFO is only accessible if the XE1205SK is in receiver mode and if the Buffered mode has been selected. The interrupt configuration (IRQ0 and IRQ1) will affect the way to fill the FIFO. For more information about the XE1205 interrupts, please refer to the XEMICS Datasheet XE1205.

The XE1205SK is based on a XEMICS XE88LC05A; a microcontroller at 153.2kbps, its speed is limited and can therefore not read the FIFO content before the arrival of a new frame. For more information about the FIFO at 153.2kbps, please refer to chapter 6.6



A: FIFO Content, display the 16 bytes received by the XM1205. The 16th byte received is store in byte 0, as it is a FIFO (First In First Out).

B: IRQs Configuration Examples show four ways to fill the FIFO.

1. FIFO Full, the FIFO is displayed only when 16 bytes are received
2. Pattern + FIFO Full, the FIFO is filled only after the pattern detection and after the reception of 16 bytes. The pattern will not be stored in the FIFO's registers.
3. Pattern followed by Write Byte, the FIFO registers are filled after each byte received and only after the pattern detection. As Pattern and Write bytes are using the same interrupt IRQ0, the IRQ configuration register will be modified during the RF communication.
4. Write byte, the FIFO register is filled after each byte received.

C: IRQ Configuration, display the interrupt status accordingly with the selection.

D: Continuous mode: If the 16 bytes limit is enabled, the fill of the FIFO will be stop after 16th byte received.

6.6 FIFO HANDLER AT 153.2KBPS

Due to the XE1205 (153.2kbps) high rate capacity, the microcontroller is compelled to read the FIFO content faster than the FIFO fill. On the hand, the XEMICS XE88LC05A microcontroller has a lesser speed capacity which can cause some errors in the receiver FIFO (e.g. the last bytes can be wrong)

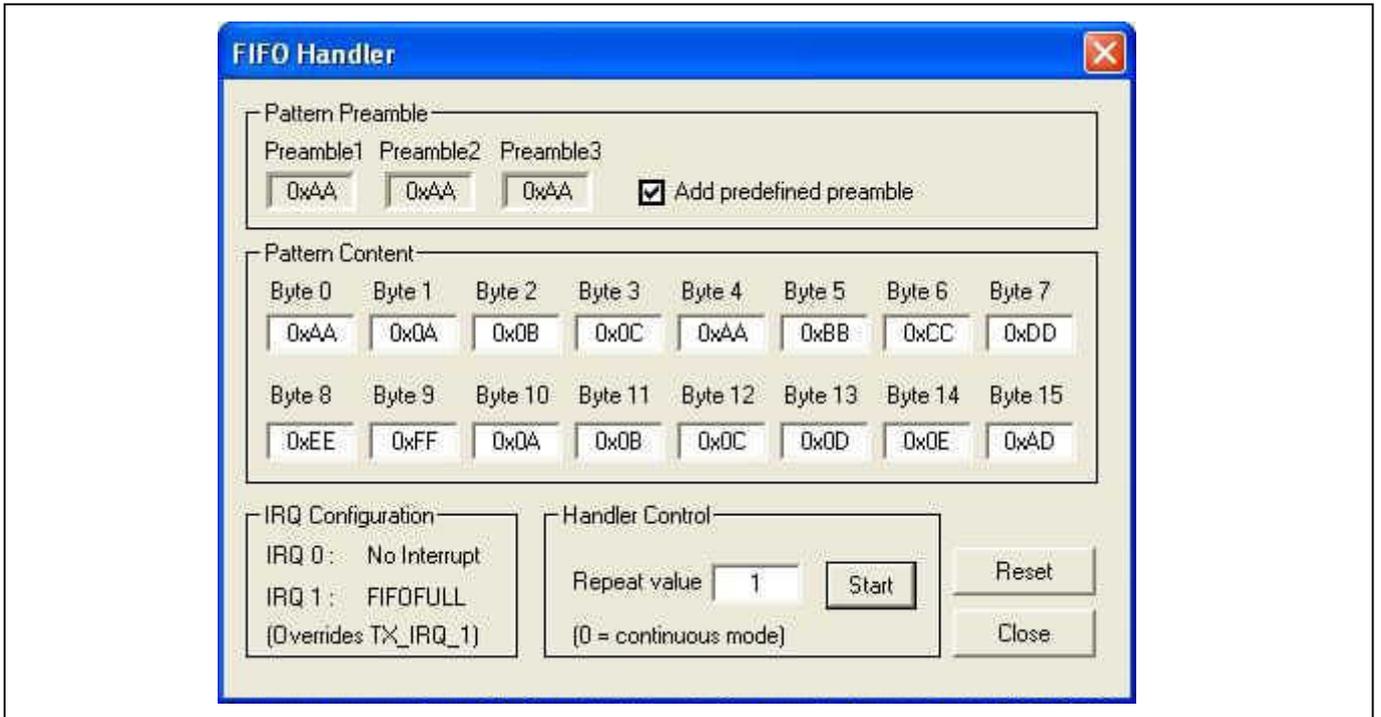
To demonstrate a robust communication between two RF modules at 153.2kbps, the Starter Kit configuration is at the following.

- 1- In the Transmitter FIFO Handler window
 - Set the first 4 bytes (byte 0 to 3) accordingly with the pattern detection defined in the receiver registers (RXParam, Address 13 to 16)
 - Set the Repeat Value to "1". Do not click on Start

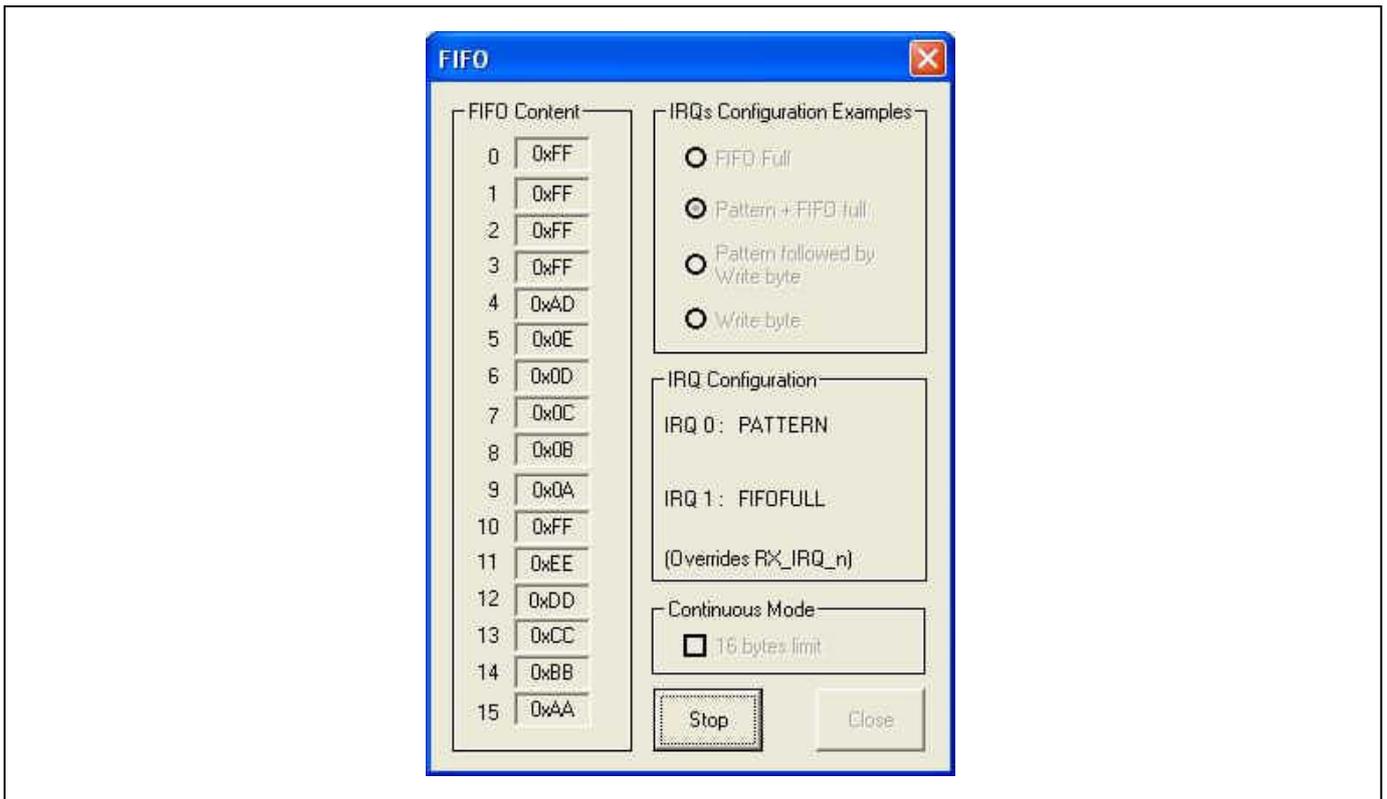
- 2- In the Receiver FIFO Handler
 - Select the following IRQ Configuration: Pattern + FIFO Full (Do not select other IRQ Configurations)
 - Click on Start

- 3- In the Transmitter FIFO Handler
 - Click on Start

The transmitted data will be displayed in the FIFO receiver, the latest bytes 0 to 3 received by the XE1205 should be disregarded as the transmit frame is constituted of 12 bytes of data (4 bytes are used by the Pattern). The default value is "0xFF"



Transmitter FIFO Handler



Receiver FIFO Handler

Chapter 7

7 TROUBLESHOOTING

7.1 INTRODUCTION

This section describes some common problems when using XE1205 Starter Kit and steps to follow to solve them

7.2 HIGHLIGHTS

This section discusses the following matters:

- Communications cannot be established with the Starter Kit
- Transmitter FIFO Handler menu not enabled
- Receiver FIFO menu not enabled
- FIFO always display 0x00 or 0xFF

7.3 COMMON PROBLEMS

Communication cannot be established with the XE1205SK



Check the serial port

- Verify that the XE1205SK is connected to the selected serial port. By default the COM1 is selected. If the RS232 is connected to another com port, click on OK and select the right com port in menu tool bar. The selected com port is displayed on the bottom-right corner of the screen.

Check the power supply

- Verify that the XE1205SK is powered (the LED power indicator is ON)
- Verify that the XM1205 is well powered. If the XM1205 is battery operated, a jumper must be placed on the module (default configuration)
- Verify that the voltage of the battery or of the external source is between 2.4V and 3.6V.

Transmitter FIFO Handler menu not enabled



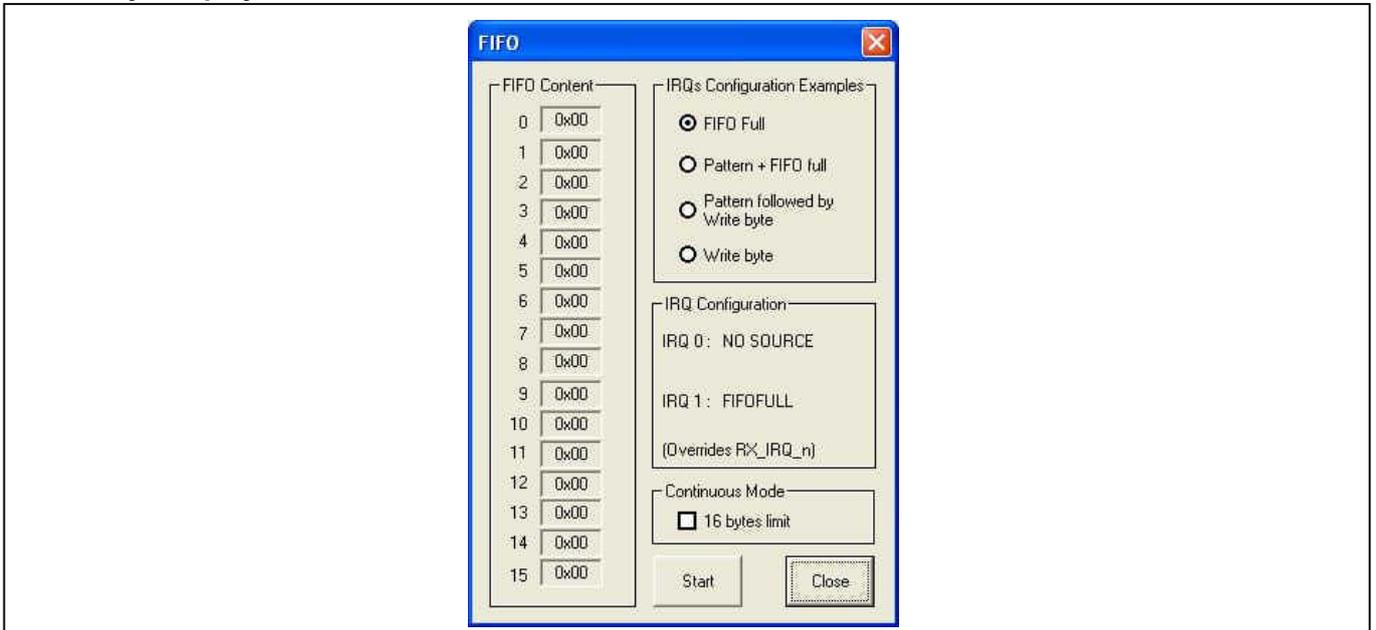
The Transmitter FIFO Handler function is only available if the XE1205SK is set in transmitter mode and if the Buffered mode is enabled. A message is displayed at the bottom right corner of the screen.

Receiver FIFO menu not enabled



The Receiver FIFO is only enabled if the XE1205SK is set in receiver mode and if the Buffered mode is activated. A message is displayed at the bottom right corner of the screen.

FIFO always display 0x00 or 0xFF



This problem appears when the two Local Oscillators are not well calibrated. The receiver continuously receives a zero, the FIFO displays 0x00 or continuously a one, the FIFO displays a 0xFF.

With the Starter Kit follows these steps:

1. Connect a starter Kit to the PC and launch the XE1205SK.exe
2. On the Menu bar click on *Predefined>General>Enable Buffered mode* and in the Operating Modes window click on *Transmitter*. This operation will enable the data generator.
3. On the Menu bar click on *FIFO Handler>Transmitter FIFO Handler*
4. On the FIFO Handler window, click on *reset* to obtain all the bytes loaded with 0xAA (preamble) and after set the *Repeat Value* to zero for the continuous mode.
5. Click on *Start*.

6. Connect the second starter kit to the PC
7. In the window App State, click on *XE1205 Eval*
8. In the Operating Modes window click on *Receiver*.
9. Click on the AFC button to automatically calibrate the Receiver local oscillator
10. On the Menu bar click on *Predefined>General>Enable FEI*, and in the XE1205SK Control window click on *Read FEI* .
11. Check the FEI value is around zero
12. On the Menu bar click on *Predefined>General>Enable Buffered mode*. This operation will enable the Receiver FIFO
13. In the Receiver FIFO window, validate the FIFO full option and the 16bytes limit.
14. The content of FIFO displays what the transmitter sends (0xAA).

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