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With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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!

Getting Started

With the Y-Lynx Starter Kit

of the XEMICS XE1283 Transceiver

Table of Contents

Chapter 1

1   GENERAL INTRODUCTION

1.1   INTRODUCTION

This first chapter provides useful information in order to use the XE1283 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 XE1283 Starter Kit guide describes how to develop and test RF application based on the XEMICS XM1283 RF module. The manual layout is as follows:

Chapter 2: Overview and Installation –In this chapter a brief description is given on the XE1283SK's role, purpose and highlights the XE1283SK's top qualities. Installation instructions for the hardware and software are also provided.

Chapter 3: XE1283SK - Tutorial - A tutorial on using the Y-Lynx Starter Kit with a XEMICS XM1283 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 XM1283

Chapter 6: Advanced Features - A description of specific XE1283'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	XE1283 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 XE1283 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 XE1283SK and explains how to install the system hardware and software.

2.2 HIGHLIGHTS

The subjects discussed in this chapter include:
- The role of the XE1283SK
- XE1283SK System Components
- How XE1283SK helps you
- XE1283SK - Kit Components
- Installing XE1283SK Hardware
- Installing XE1283SK "Graphical User Interface" software

2.3 THE ROLE OF THE XE1283SK

The XE1283 Starter Kit is an embedded environment for the XEMICS XE1283 transceiver. The XE1283SK enables a two way communication between two Radio boards, to perform practical "demonstration", "range" and "site survey" testing and evaluates the RF transceiver.

XE1283SK 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 XE1283SK environment.

2.4   XE1283SK SYSTEM COMPONENTS

The XM1283 is connected to the processor board as shown in figure 2.1 below. Note that the XE1283SK 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.
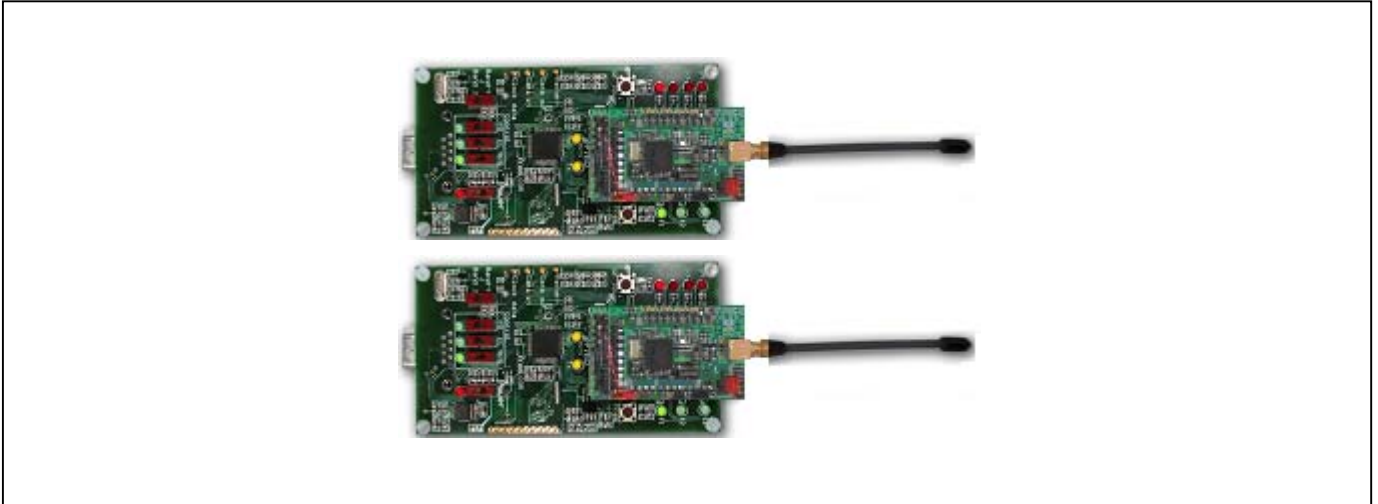
Figure 2.1: XE1283SK System Components

2.5   HOW THE STARTER KIT CAN HELP YOU

XE1283SK:
- Demonstrates a two way communication - Ping Pong Demo with a default configuration
- Changes the settings of the Ping Pong Demo
- Configures internal registers of XE1283 transceiver for evaluation purpose.
- Transmits and receives a data stream

2.6   XE1283SK KIT COMPONENTS

The components of the XE1283 Starter Kit are shown in Figure 2.2.
   1) 2 x Processor Board
   2) 2 x batteries
   3) 2 x XM1283 - XEMICS RF Module
   4) 2 x antennas

The XE1283SK package includes a serial cable that connects the Processor Board to a PC, a CD-ROM, complete with XE1283SK software, and on line documentation.
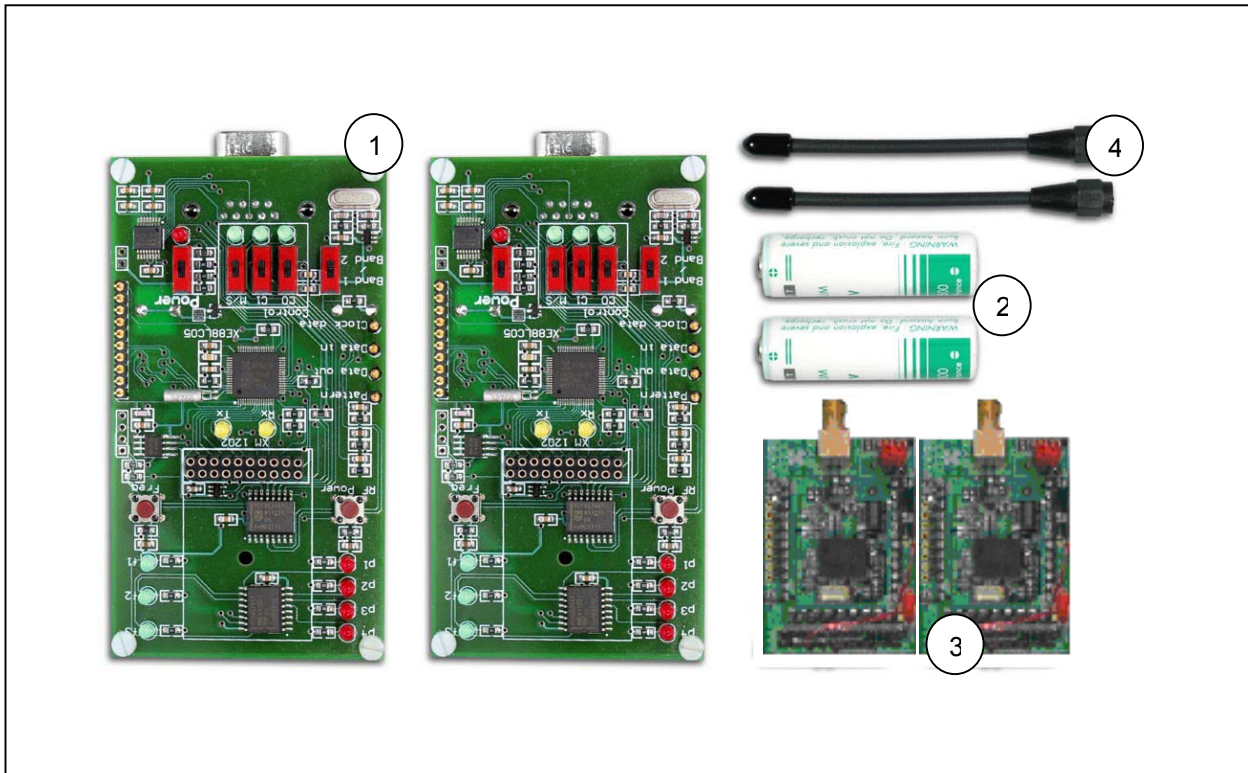
Figure 2.2: XE1283SK Components

2.7   INSTALLING XE1283SK - HARDWARE

Follow the step-by-step instructions in this section to install the XE1283 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 XM1283 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   XE1283SK – "GRAPHICAL USER INTERFACE" SOFTWARE

To Install
To install the XE1283SK software, follow the "XE1283 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 XE1283SK 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 XE1283 parameters. A brief description of the screen layout and usage of the GUI interface can be found in the "XE1283 – 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 XE1283SK ICON and follow the removal procedures.

Chapter 3

3 XE1283SK - TUTORIAL

3.1 INTRODUCTION

After installing the XE1283SK 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 XM1283 module is connected to the application board (processor board)
- Each antenna is connected to the XM1283
- 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 XE1283. To achieve high flexibility, the Starter Kit board can support all the XE1283 RF modules and very few buttons have been added to the board (see Figure 3.1).

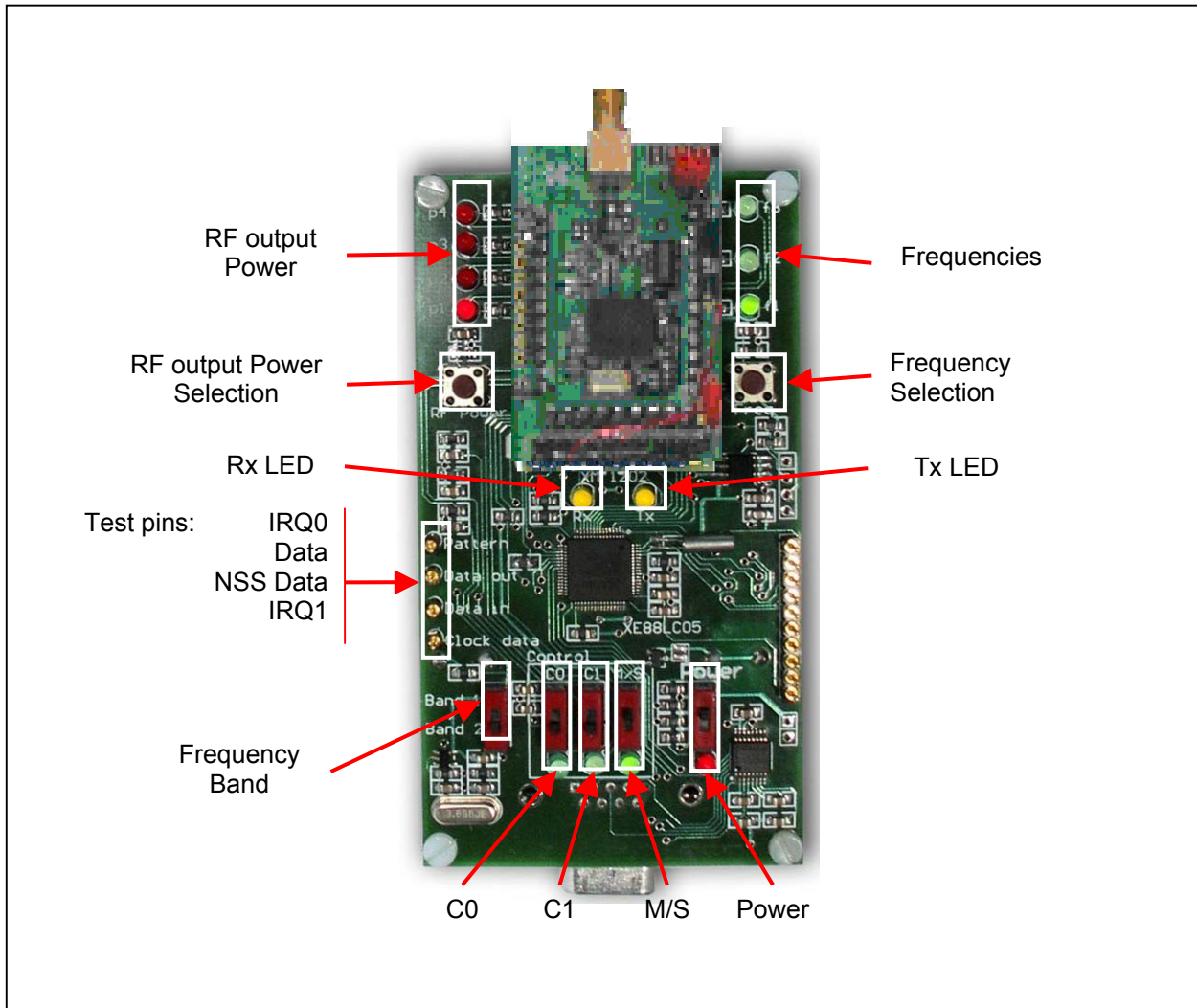The Board description is as follows:

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 XM1283 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.
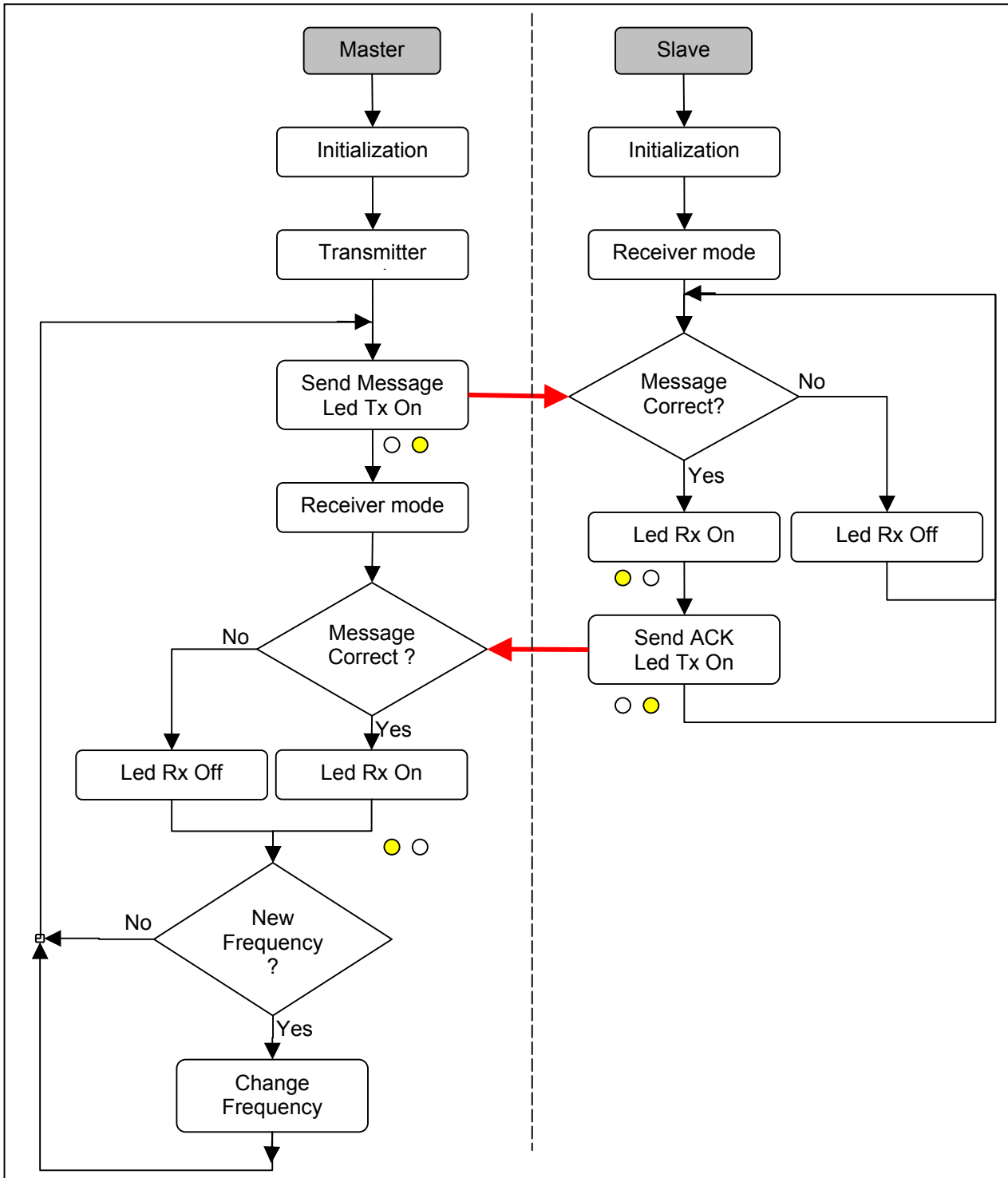
Figure 3.2: Ping. Pong Test Flowchart overview

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.
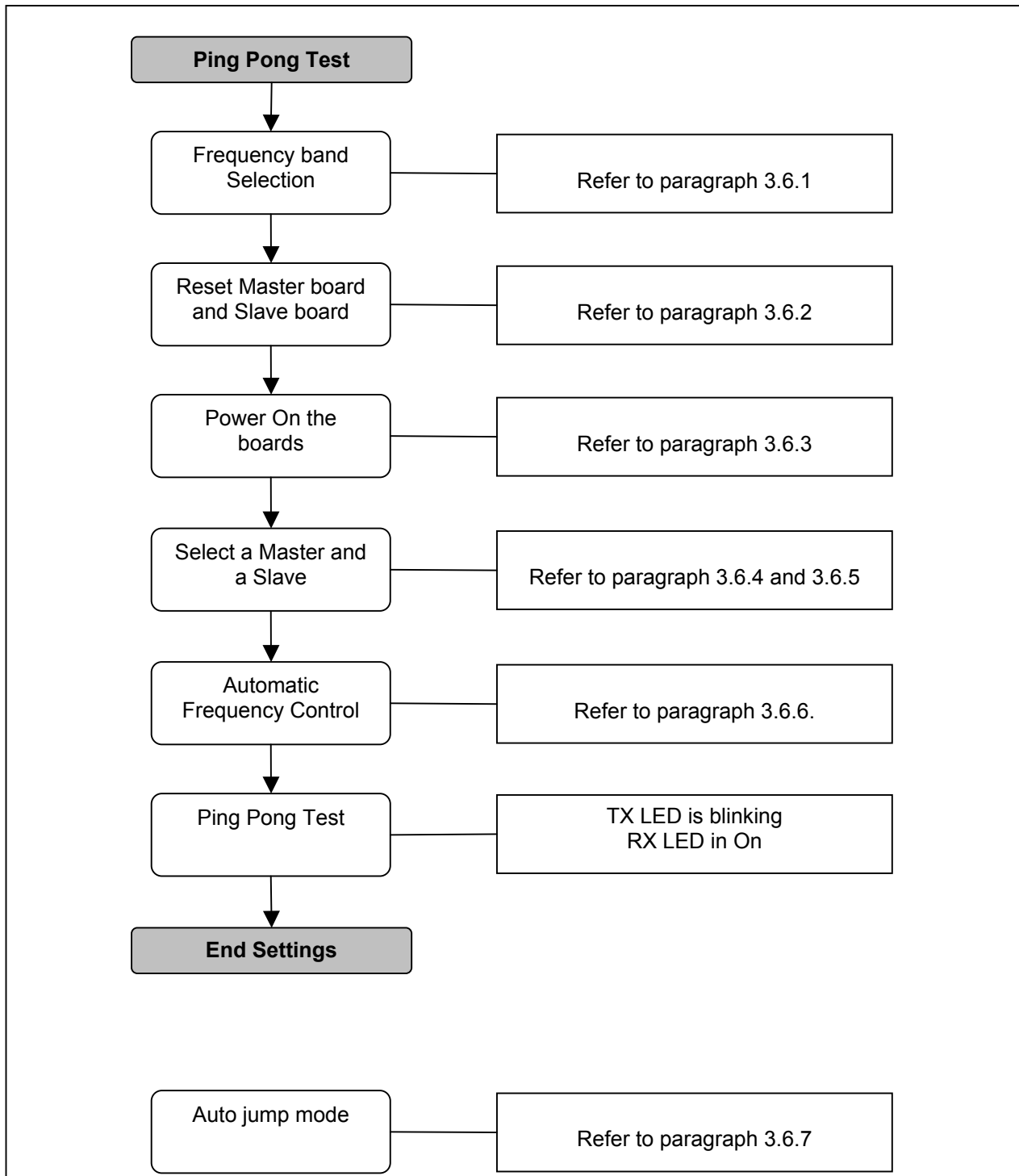
```
                    ┌─────────────────────┐
                    │   Ping Pong Test     │
                    └─────────────────────┘
                              │
                              ▼
          ┌─────────────────┐         ┌──────────────────────────────┐
          │ Frequency band  │─────────│   Refer to paragraph 3.6.1   │
          │   Selection     │         │                              │
          └─────────────────┘         └──────────────────────────────┘
                    │
                    ▼
          ┌─────────────────┐         ┌──────────────────────────────┐
          │ Reset Master    │─────────│   Refer to paragraph 3.6.2   │
          │ board and Slave │         │                              │
          │     board       │         └──────────────────────────────┘
          └─────────────────┘
                    │
                    ▼
          ┌─────────────────┐         ┌──────────────────────────────┐
          │ Power On the    │─────────│   Refer to paragraph 3.6.3   │
          │    boards       │         │                              │
          └─────────────────┘         └──────────────────────────────┘
                    │
                    ▼
          ┌─────────────────┐         ┌──────────────────────────────┐
          │ Select a Master │─────────│ Refer to paragraph 3.6.4 and │
          │  and a Slave    │         │           3.6.5              │
          └─────────────────┘         └──────────────────────────────┘
                    │
                    ▼
          ┌─────────────────┐         ┌──────────────────────────────┐
          │   Automatic     │─────────│   Refer to paragraph 3.6.6.  │
          │ Frequency Ctrl  │         │                              │
          └─────────────────┘         └──────────────────────────────┘
                    │
                    ▼
          ┌─────────────────┐         ┌──────────────────────────────┐
          │ Ping Pong Test  │─────────│     TX LED is blinking       │
          │                 │         │       RX LED in On           │
          └─────────────────┘         └──────────────────────────────┘
                    │
                    ▼
          ┌─────────────────┐
          │  End Settings   │
          └─────────────────┘


          ┌─────────────────┐         ┌──────────────────────────────┐
          │ Auto jump mode  │─────────│   Refer to paragraph 3.6.7   │
          └─────────────────┘         └──────────────────────────────┘
```

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 XE1283) 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

- XE1283SK - Functional flow chart
- Default Ping Pong Test
- User Ping Pong Test
- Stand Alone Evaluation Mode
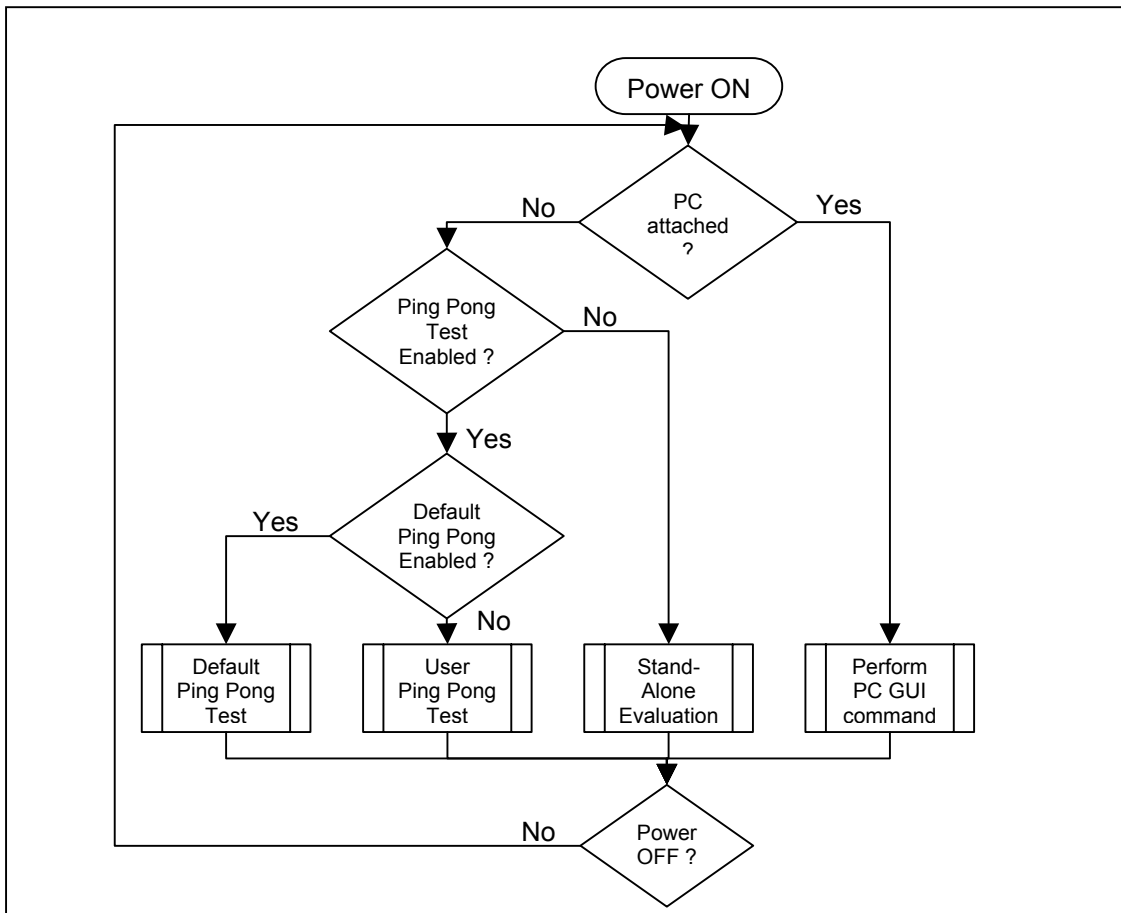- PC – GUI command

4.3   XE1283SK – 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 XE1283SK will assume *"XE1283 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 XM1283 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 (XE88LC06A) integrated in the RF transceiver XE1283. The second XEMICS RISC microcontroller XE88LC05 placed on the board is transparent for the application. 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 XM1283 radio modules
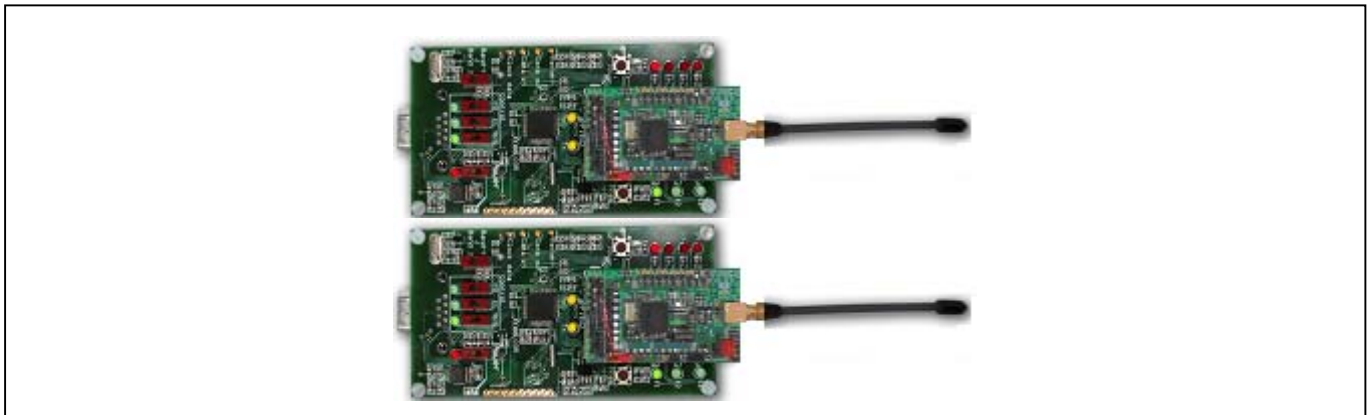- Two antennas
- Two processor boards

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 "XE1283 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 XE1283 (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 "XE1283 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 been modified by clicking on "Ping Pong" on the tool bar menu

4.5.3 Read Back the Configuration

The XE1283SK allows the user to read back the latest configuration saved in the EEPROM. To display the registers contents, the user needs to click on "XE1283 Eval" to have access to the control buttons. Click on "Load Configuration" to load the latest configuration into the XE1283 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 XE1283 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 "XE1283 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 XE1283SK allows the user to read back the latest configuration saved in the EEPROM. To display the "registers contains", the user needs to click on "XE1283 Eval" to have access to the control buttons. Click on "Load Configuration" to load the latest configuration into the XE1283 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 XE1283 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.

4.7.2 PC-GUI Command Enabling

To have access to all the registers, the user needs to select "XE1283 Eval" on the "App State" window from the PC-GUI screen.

Chapter 5

5   TEST AND EVALUATION

5.1   INTRODUCTION

After installing the XE1283SK hardware and software, you are ready to start using the kit.

5.2   HIGHLIGHTS

- XE1283SK – Basic PC-GUI Screen Layouts
- PC-GUI Screen Areas
- Menu Bar and Sub-Menu Options
- Ping Pong Mode modifications

5.3   XE1283SK – BASIC PC-GUI SCREEN LAYOUTS

The XE1283SK PC-GUI consists of a single fixed screen. The screen easily allows the user to manipulate the XE1283 Radio module at the binary level. The PC-GUI screen is divided into seven primary areas, as shown in the diagram below.
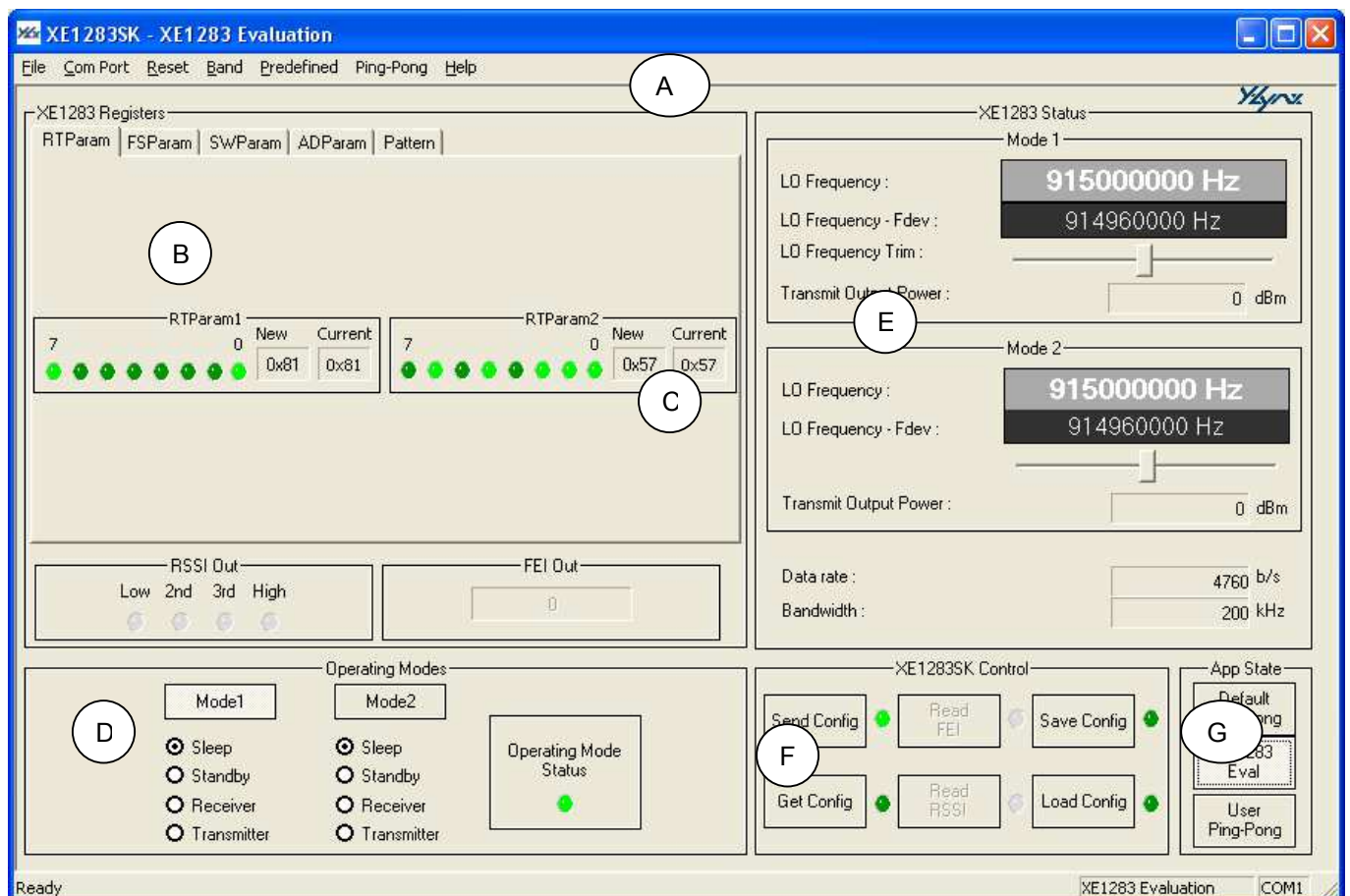

Figure 5.1: Screen Layouts

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)   XE1283 Registers presentation and set-up window
      (C)   Real time display window of register values (New and Current value)
      (D)   XE1283 Operating Mode and set-up window
      (E)   XE1283 Status display
      (F)   XE1283SK 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 XE1283 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 XE1283 register. The new settings of the register only occur when *Send Config* button is clicked.
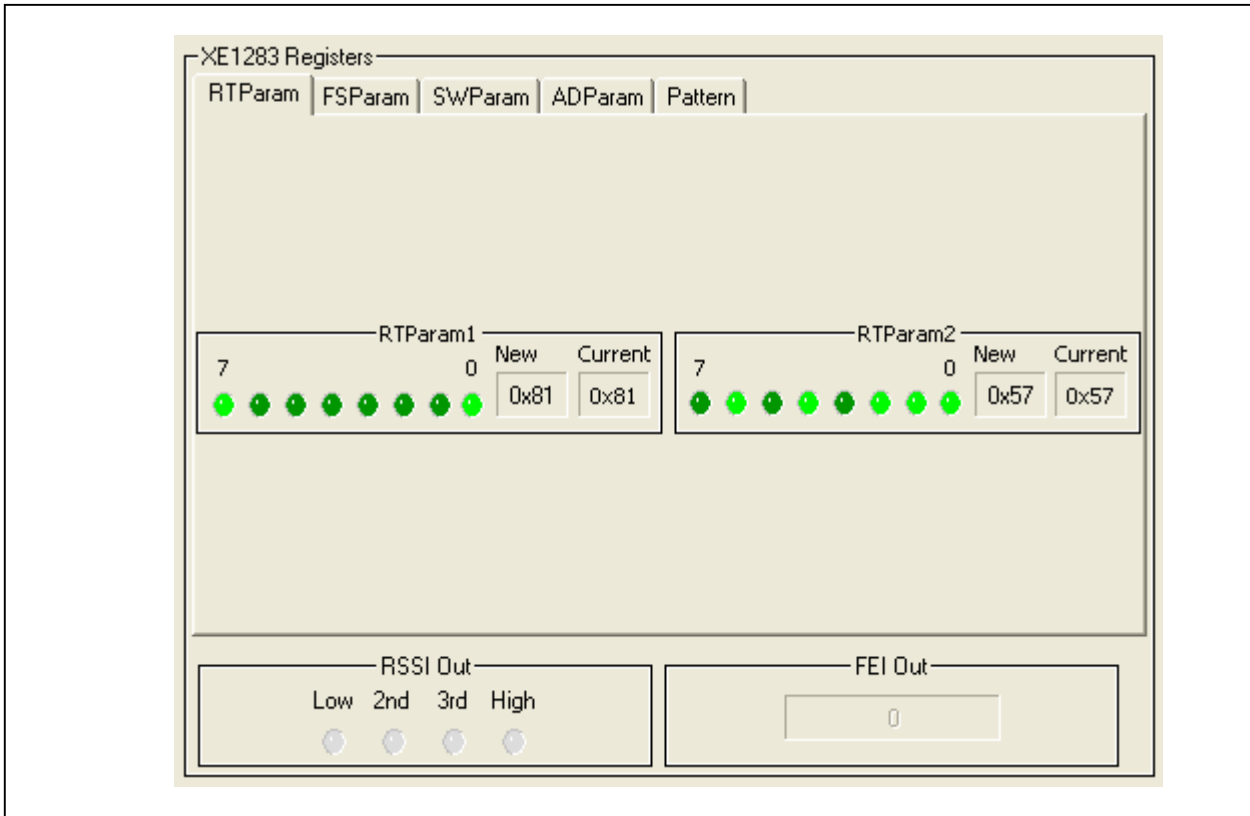
5.4.3   Register Status

Two Register status windows are displayed, the Current status and the New status. The current status corresponds to the actual XE1283 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 XE1283 by clicking on *Send config* button, at the same time, the Current status window is updated with the value of this new configuration.
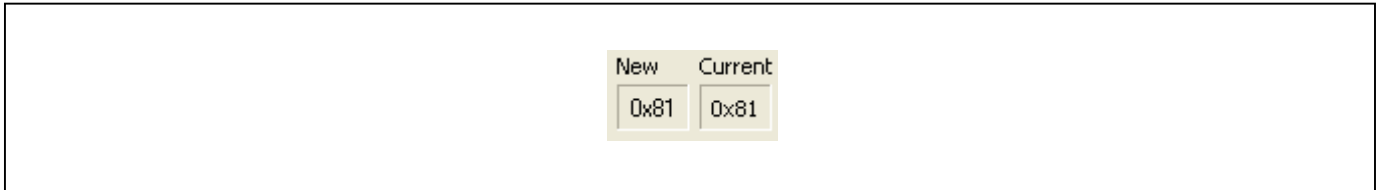
### 5.4.4   Select Mode and Operating Mode

XE1283 Select Mode allows the user to select the mode or state that the XE1283 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.
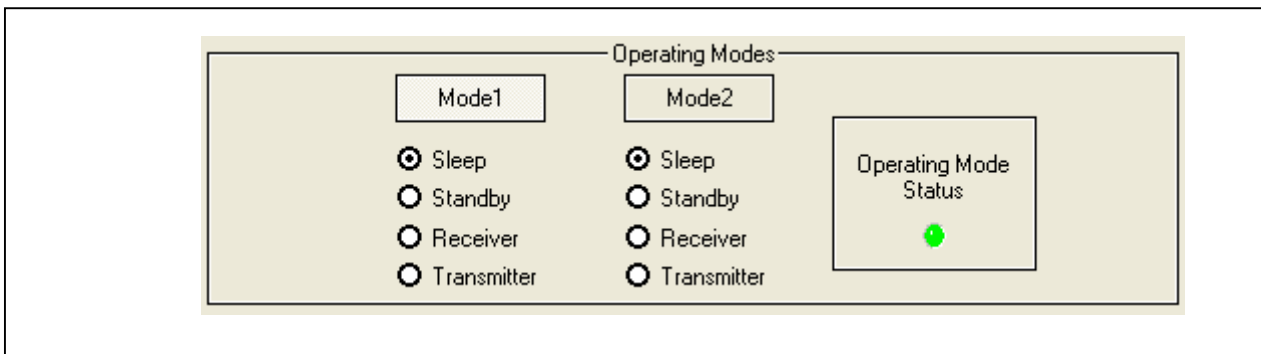
5.4.5 XE1283 Status display

A Narrative window is provided for informing the user about the primary XE1283 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 RF module, 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 XE1283 modulator OFF (RTParam2 bit 5 set to 1). The *Reset* button on the menu bar can be clicked to reset the settings and to re-start the trim feature.
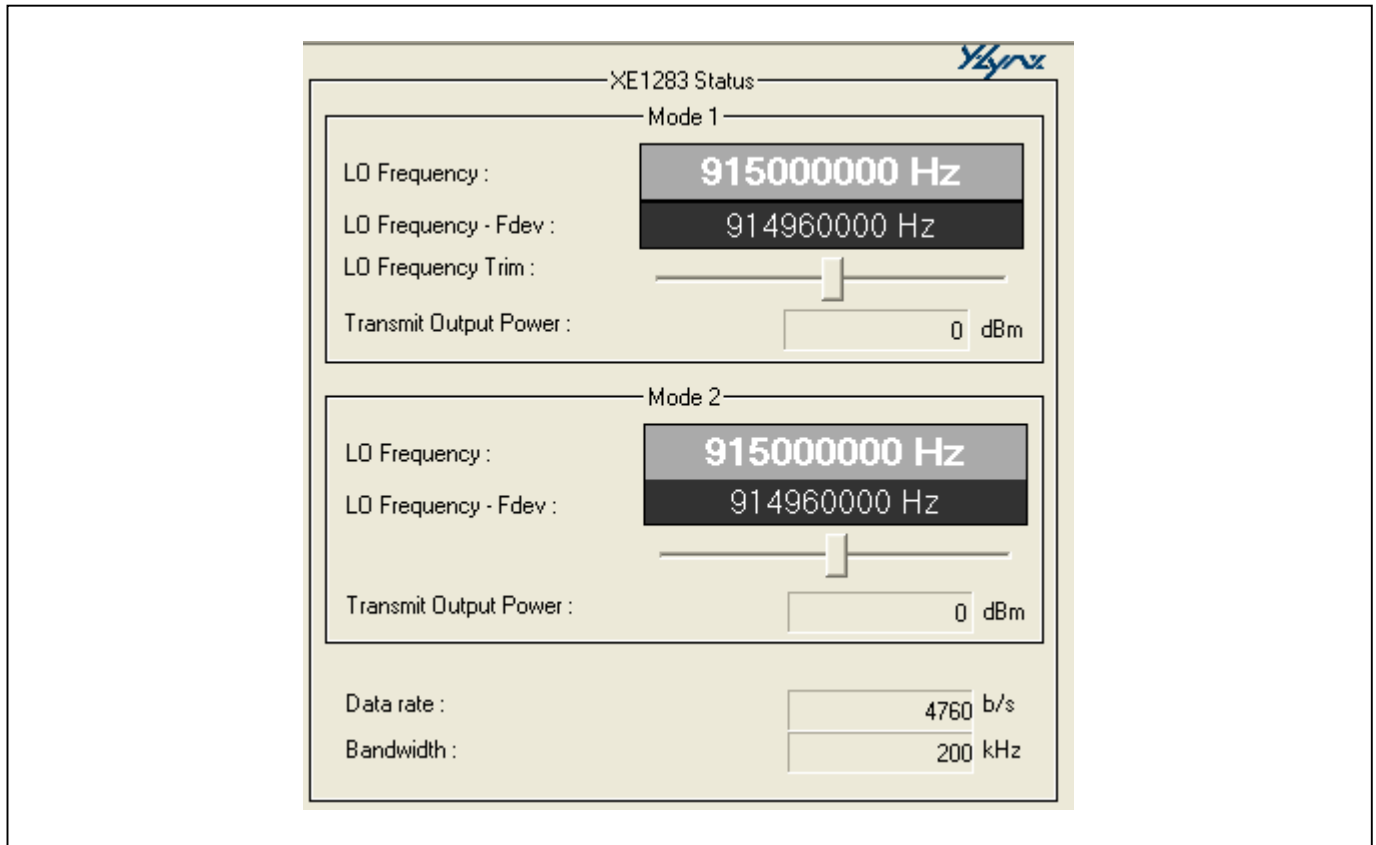
5.4.6 XE1283SK Control Window

The XE1283SK offers different modes to control the XE1283 RF module. 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 *XE1283 Eval* has not been selected).

Get config
By clicking on this button, the user will be able to read the values of the XE12835 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 XM1283 with the new configuration.

Read FEI
This button is only accessible if the FEI is enabled (RXParam1, 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 (RXParam1, bit 5 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 XE1283. The user will be able to read back the latest the configuration by clicking on "Get Config".