
# XE1201SK Starter kit

## User's Guide

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# Table of contents

## Introduction

Firstly, may we express our gratitude for your interest in XEMICS products. The XE1201SK Starter kit is a flexible support tool that allows complete RF transmission without loosing a transceiver's flexibility e.g. data rate, output power, frequency deviation etc. All the XE1201 modes and functions behaviors are controlled via a user-friendly-menu-driven software. The starter kit can be installed on a WINDOWS based PC. configuration. Both data and results are entered and read directly via the keyboard/mouse and the PC screen.

For customers wishing to start application designs based on this Starter Kit, detailed descriptions on PCB, component characteristics and layout implementation are also provided.

In a typical utilization of the XE1201SK Starter Kit, minimum tools are recommended as follows:

- WINDOWS based PC (to program the XE1201 behaviors)
- Pattern generator or application board
- Oscilloscope to visualize the demodulated data and synchronized clock or application board

For more information on the XE1201 and XM1201 Module please refer to XE1201 datasheet, XE1201 Evaluation kit User Guide and application note AN1201.03 based on the XM1201 module.

## Kit Contents

- 2 XM1201 Module with XE1201 and printed loop antenna.
- 2 Interface boards; the PC-XE1201 INTERFACE board.
- 2 Inter-board connectors
- XEMICS' CD ROM
- This enclosed user guide

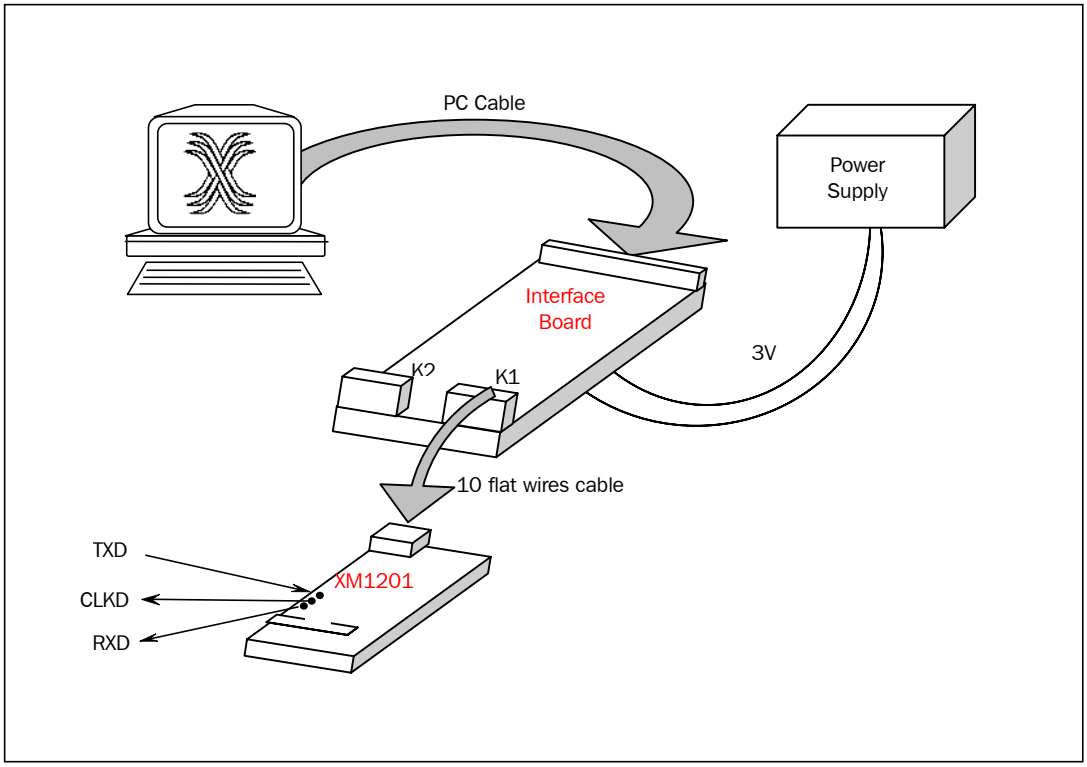
## Hardware Setup

### Connection of the XM1201 board and PC-XE1201 interface board:

The interface board is connected to the parallel port of the PC. The cable (not included in the kit) used as a connection between the interface and the PC is a 25 pin RS-232-C, as described in the schematic. The 2 boards are interconnected via the 10 flat wires cable; one can either choose the K1 or K2 connection on the RF side.
The 2 boards (XM1201 board and the PC-XE1201 interface board) must be both power-supplied by a VCC between 2.4 and 3.6 volts (same values for both boards). Power connections are made via pins (VDD_in, VSS_in on the XE1201 interface board).

In stand-alone mode (without the interface board) a VSS pin and VCC pin can power the XM1201 Module.

### Starter Connection Kit



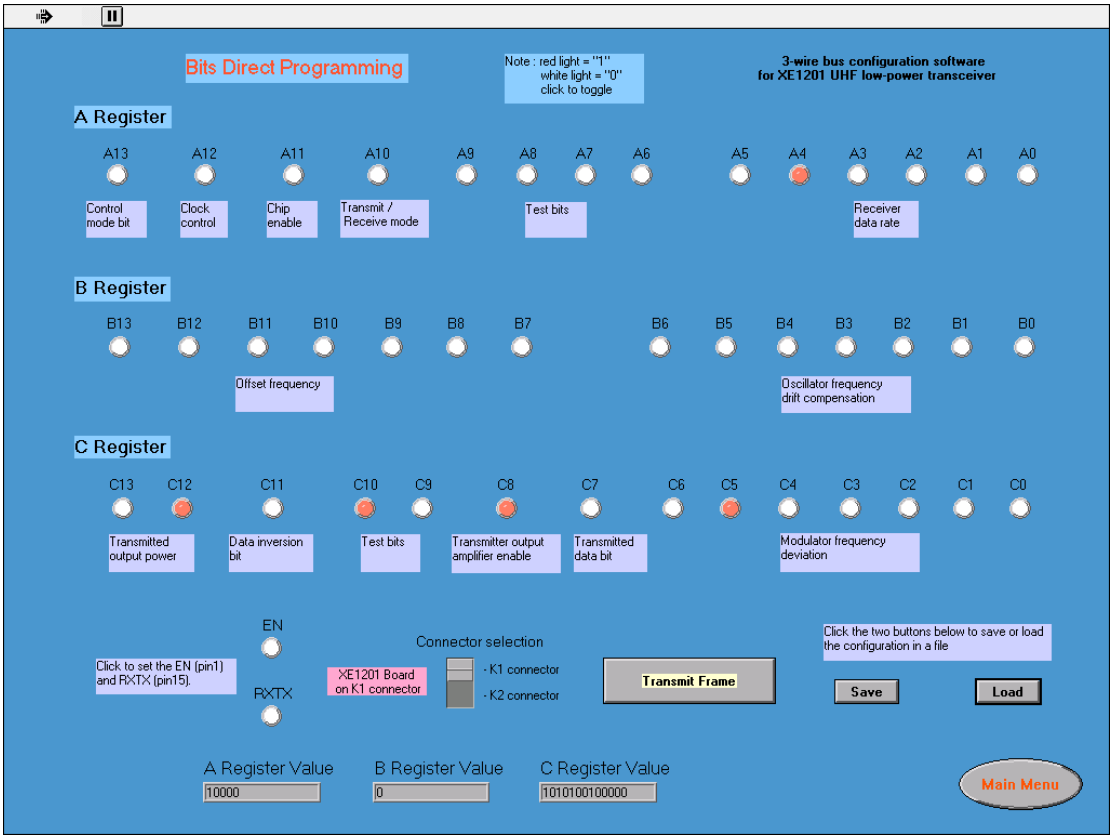
## How to use the 3-wires bus configuration software:

Once the program is executed, the main screen shows five different menus that the user has to then select. These are:

- Bits Direct Programming menu
- Features Programming menu
- Frames sequence menu
- Parallel Port Configuration menu
- Parallel Port Control

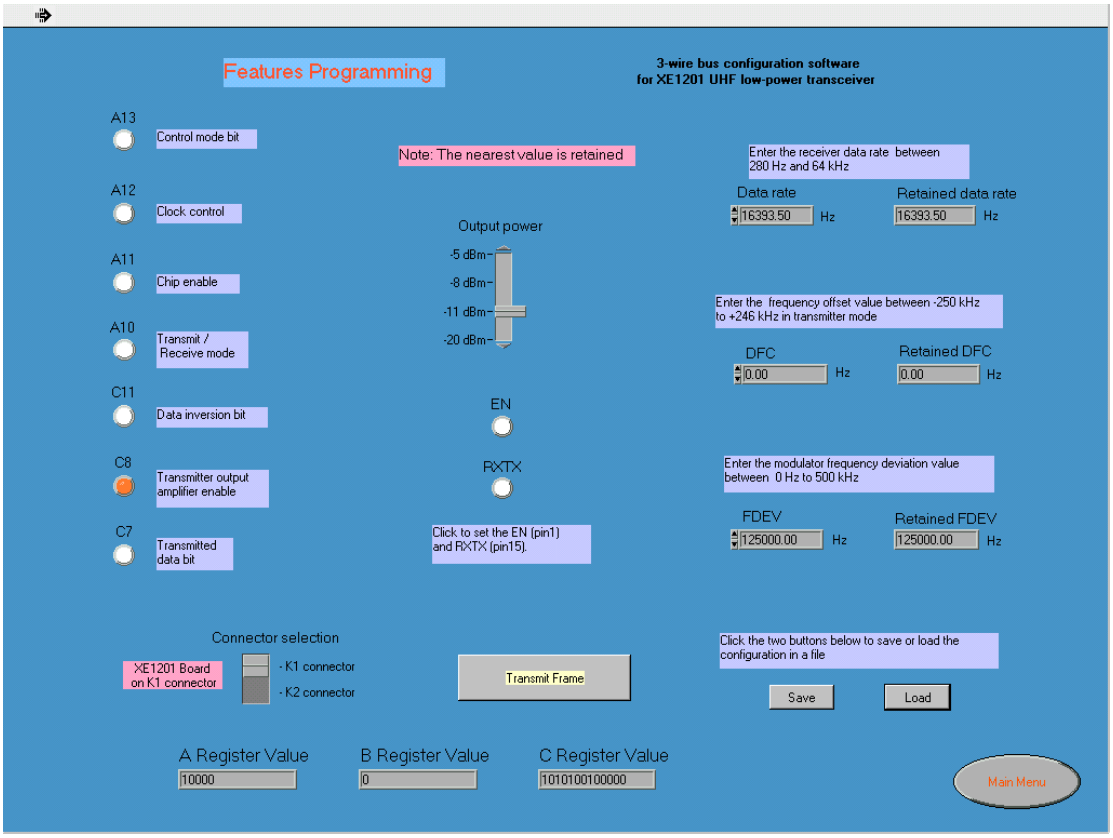
The 5 menus are shown and described here below:

### Bits Direct Programming Menu



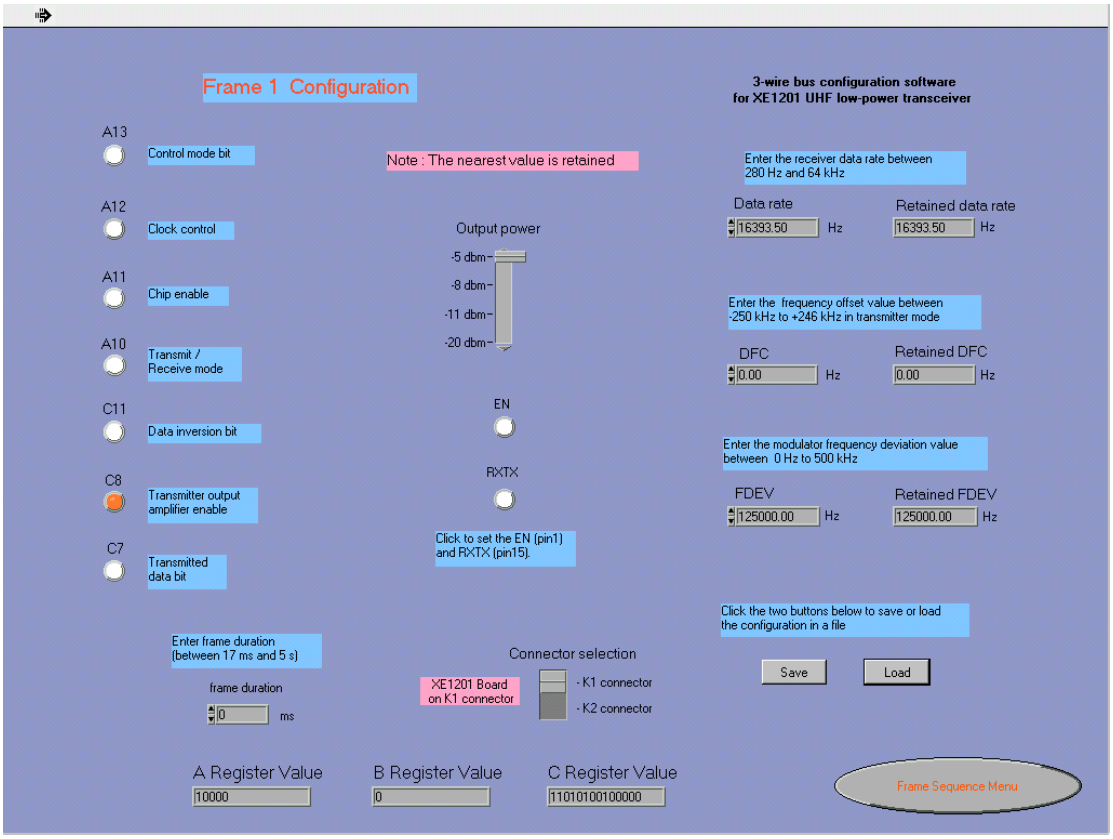

Here, one can program all the different bits of the three registers, via the data line SD. Click on the corresponding small circular buttons to select the desired option (activation at value 1; visible through a red dot). Once all the choices are validated, click on the Save button to store these settings. To activate the operations, the « Transmit Frame » button must be « pushed ».

## Features Programming




Here, one can program all the different characteristics of the transceiver, as described in the XE1201 data sheet.
The user enters the desired features; when all the data have been entered, selections are validated by a click on the Save button. Again, operations are executed after having pushed the « Transmit Frame » button.

## Frames Sequence menu




- One can send four Lift sequences to the transceiver one after the other. The duration between sequences can be changed and set by the user. The figure shows the possible set-up of one of the Frame Configurations. Use the small circular buttons to activate the Clock Control, Chip Enable, Transmit/Receive Mode, Data inversion bit, Transmitter output amplifier enable and the Transfer data bit. On this screen, one can also set the EN (pin 1) and RXTX (pin 15). The output power is set using the sliding buttons

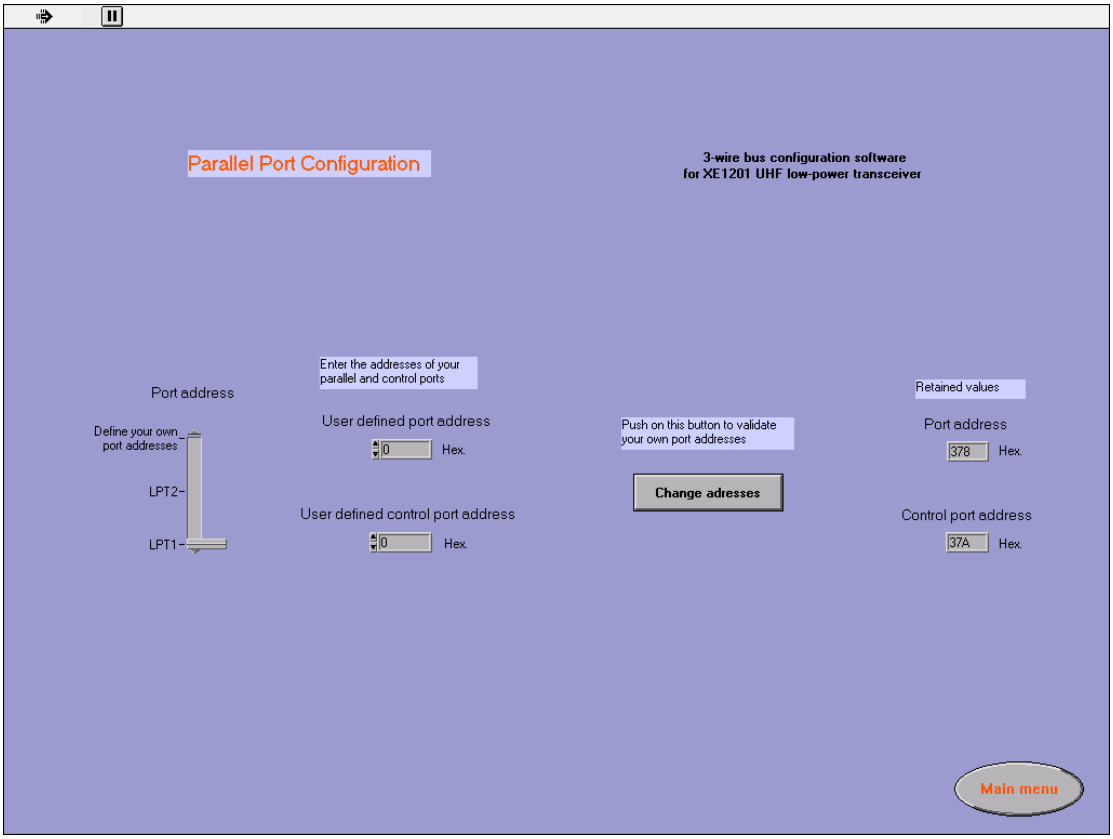
Enter here also the receiver data rate, the offset value and the modulator frequency deviation.

When all these fields have been filled in, click on the SAVE button. This will save all data for Frame 1.

To load a previously saved configuration, click on the load button and select the desired settings.

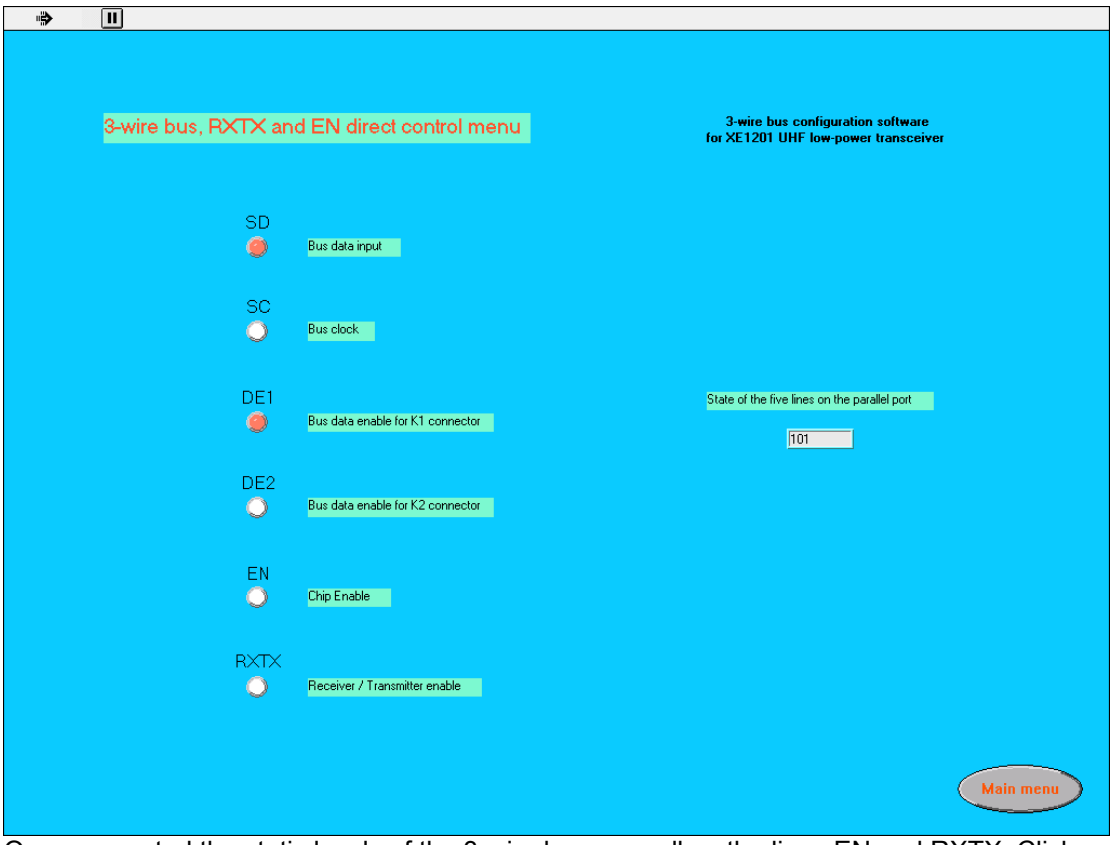
Now click on the Frame Sequence Menu button to return and set up the other Frames.

**Parallel Port Configuration menu:**




One can choose the parallel port of the PC, send data LPT1 or LPT2, or define own Port Address (in HEX). Click on the Validate button to activate the new address.

## Parallel Port Control




One can control the static levels of the 3-wire bus, as well as the lines EN and RXTX. Click on the radio buttons to activate the following parameters:

- Bus data Input
- Bus Clock
- Bus Data Enable for K1 Connector
- Bus Data Enable for K2 Connector
- Chip enable
- Receiver / Transmitter Enable

**Note:** The screen refresh is performed when one clicks on the "enter" button (localized on the upper left corner of the screen), or when you send the data.

## Parallel port address selection:

Every parallel port has an address identified in the PC. Correct address selection is required prior to sending data on the right parallel port. This address must be known in advance; it can be found in the PC documentation or through the BIOS program during any PC initialization phase.

Once known, the parallel port address can be entered from the Labview program via the menu

< Parallel Port Configuration >.

There are three different practical cases (linked to the user PC hardware):

1. The PC has only one parallel port named LPTI and is addressed by :

**0378 Hex**

And the control port is defined by:

***037A Hex. ("Default mode" in the program)***

2. The PC has two parallel ports and LPTI is already used (usually a printer). One can use the second parallel port named LPT2 and it is addressed by:

**0278 Hex**

And its control port is defined by:

***027A Hex***

3. The PC has a special address for its parallel port. In this case, enter just its corresponding address in the program.

## Choice of the 3-wire Bus Connector on the PC-XE1201 Interface:

The PC-XE1201 interface allows you to program two XM1201 modules via their connectors KI and K2. The only thing to note is that you must program the different modes on one board with the CONTROL MODE BIT (A13) set to 1. This is because you can address only one of the two connectors via the pin 15 (RXTX) and pin 1 (EN).

A detailed description of the configuration bits and pins can be found in the XEMICS XE1201 Datasheet ref D88-011on pages 5 to 7 or in the Application Note XE1201.03

## How to realize an RF transmission

The XE1201 Starter kit can be used in two different ways.

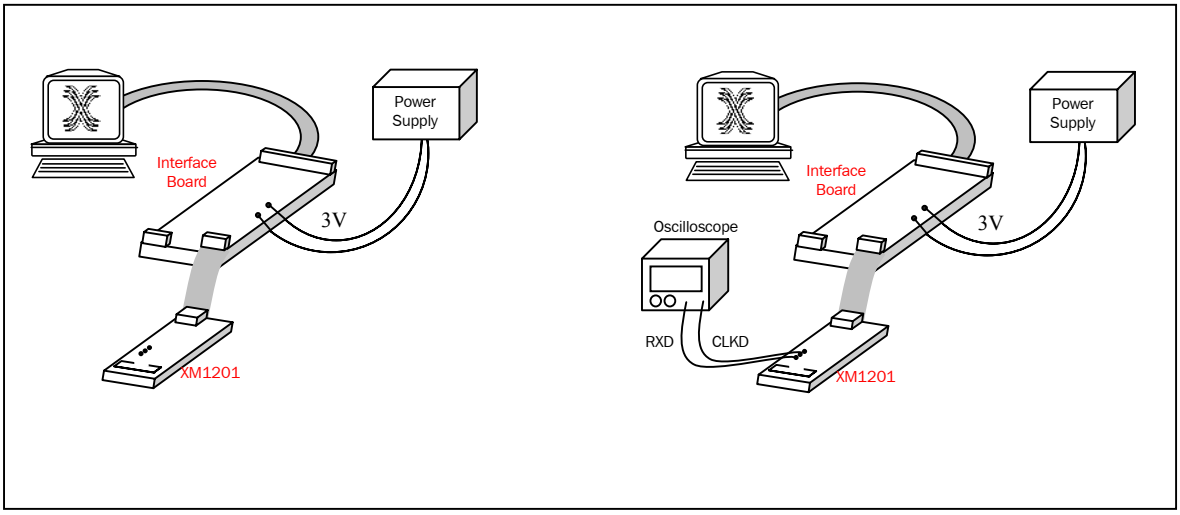
- With the Interface boards
- The XM1201 board in stand alone

### With the Interface boards

### 1. Test of the RF Link

The best way to make a quick communication test is to transmit data continuously. In this case, the user needs to configure one transceiver in transmitter mode and the other in receiver mode. The XE1201SK achieves therefore a rapid test.

**Hardware Set Up**
Both modules of the XM1201 need to be connected to the PC via the interface board. A power supply connected to the interface board delivers the 3V.
An oscilloscope is connected to RXD and CLKD pins in order to visualize the received data.



## Software Set Up

### 1) Transmitter configuration

XEMICS' software enables the configuration of the XE1201 transceiver in continuous mode (transmitter and receiver). In transmitter mode the user can choose to transmit a "1" or a "0". In this case, the transceiver needs to be controlled by internal registers.

Bit description

A13 = 1 Transmit mode and enable mode are addressed by A10 and A11
A12 = 1 Clock running
A11 = 1 Chip enabler
A10 = 0 Transmitter mode

C 8 = 1 Output amplifier enabler
C7 = X Transmitted data bit (replace TXD pin)

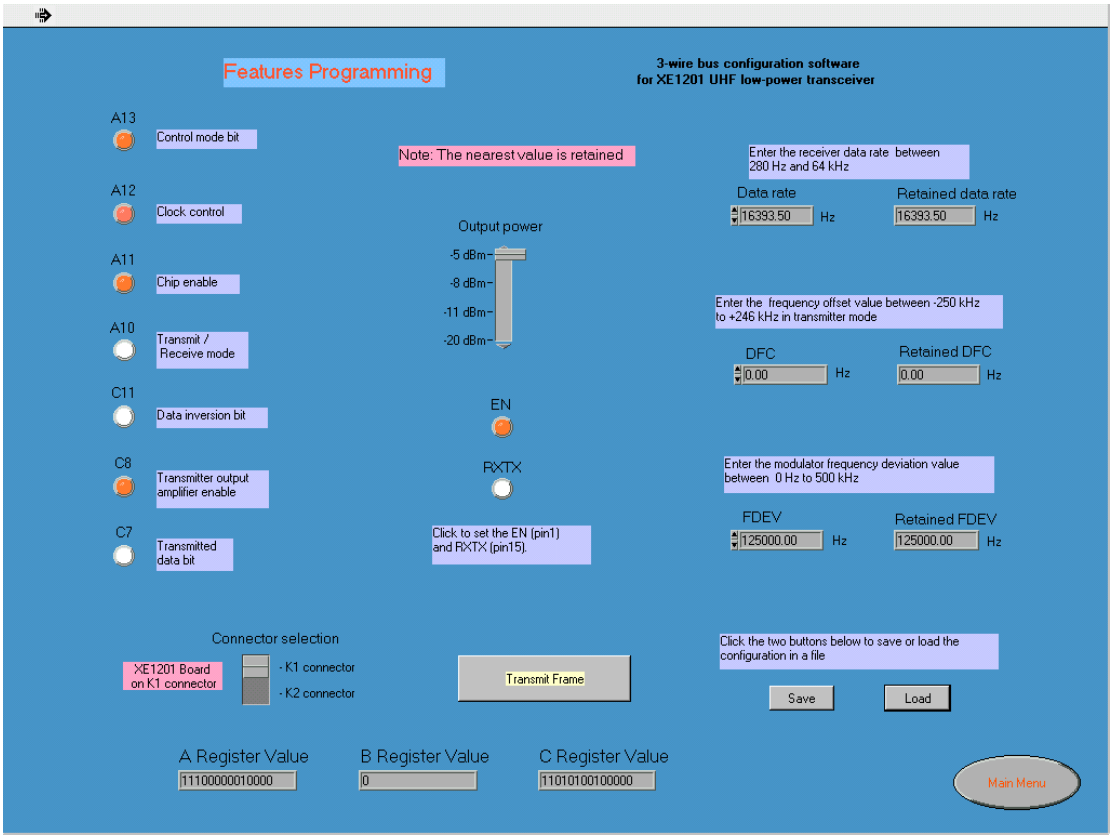
- X = 1 a "1" is transmitted (3V)
- X = 0 a "0" is transmitted (0V)

Pins description

In order to enable the external power amplifier, the pin 15 (RXTX) needs to be set up to 0V (transmitter mode). To achieve this, make sure that the button RXTX is switched off.

The figure below shows the typical configuration with a frequency deviation equal at 125KHz and a Data Rate equal at 16kbit/s.

### Features Programming Screen (Transmission of a "0")



**2) Receiver Configuration**

The Software allows the XE1201 transceiver to be configured in continuous receiver mode. The data and the synchronized clock are available on RXD and CLKD pins.

Bit description

| | |
|---|---|
| A13 = 0 | Transmit mode and enable mode are addressed by RXTX and EN pins |
| A12 = 1 | Clock running |
| A11 = X | Unused, replaced by EN pin |
| A10 = X | Unused, replaced by RXTX pin |
| C 8 = X | Unused |

Pins description

As the pin A13 is set to "0", the transceiver XE1201 needs to be controlled by the pins EN and RXTX. In this example, the user needs to click on both buttons:

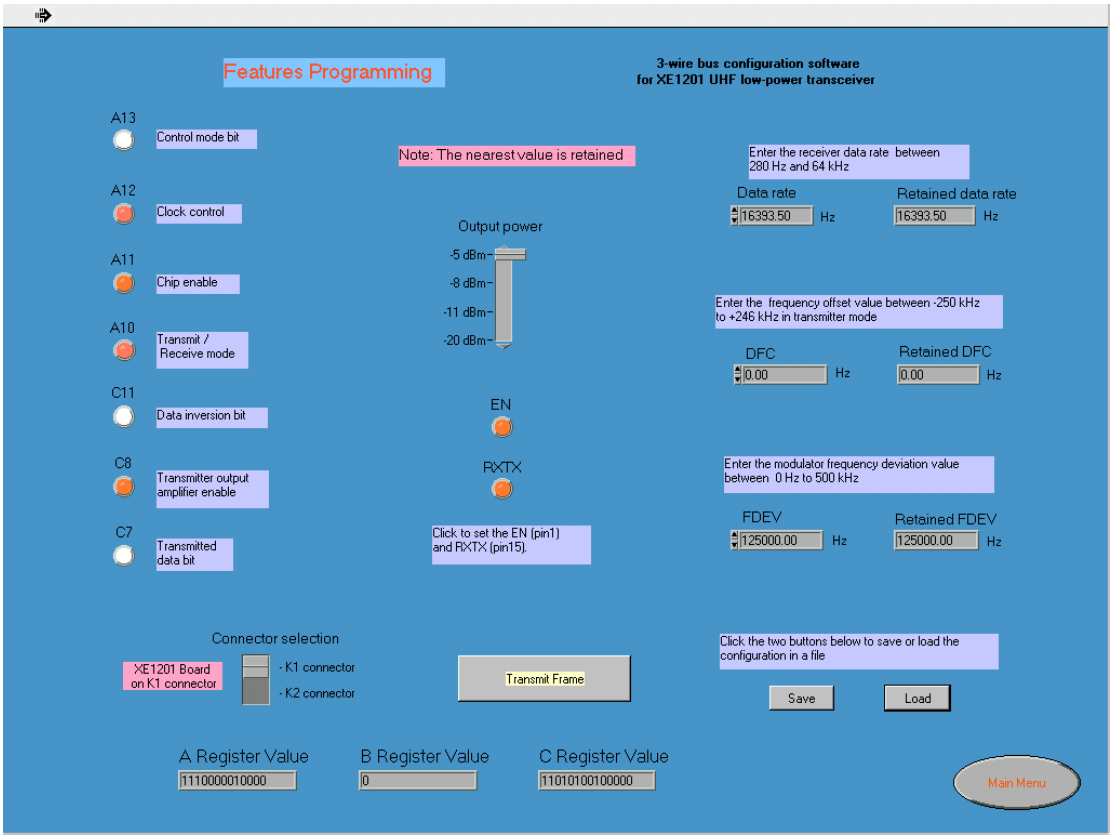
EN = 1

RXTX = 1

In receiver mode, in order to reduce the power consumption, the external power amplifier is switched off (via RXTX=1)

The figure below shows the typical configuration with a frequency deviation equal at 125KHz and a Data Rate equal at 16kbit/s.

**Features Programming Screen in Receiver Mode**



**Measures**

After the hardware set up and the transceivers' configuration has been installed, a simple RF link test can be used to validate the communication.

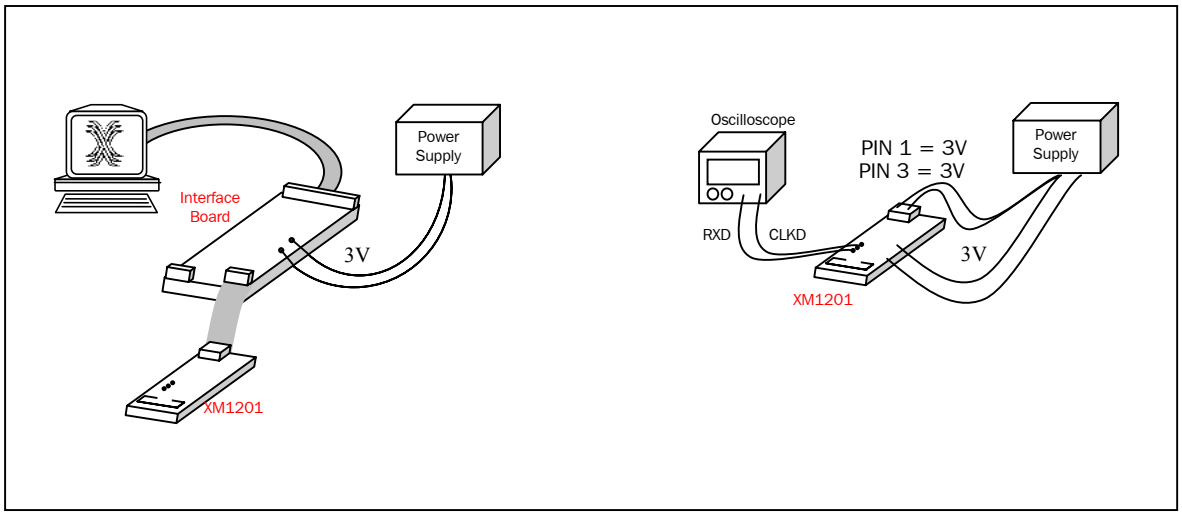
Once the transceiver has been configured in transmitter mode, the data transmitted will depend on the C7 value. Whereas the transceiver configured in receiver mode holds the received data on the RXD pin and on the synchronized clock on CLKD pin.

An oscilloscope connected to RXD and CLKD, is used to visualize the signals:

If C7 equal "1" (red on the feature programming screen), the signal RXD is equal at 3V ("1"), if C7 equal "0" " (white on the feature programming screen), the signal RXD is equal at 0V ("0"). In the both cases the signal CLKD is a square wave with a frequency corresponding to the data rate programmed (the default value is DR=16KHz).

**NOTE:**
Following the set-up of the interface board, (the receiver only), the module XM1201 can be disconnected. The input pins EN and RXTX (pin 1 and pin 3 of the 10 pin connector) need to be set at 3V in order to configure the XE1201 transceiver in receiver mode.

Schematic for performances measurement

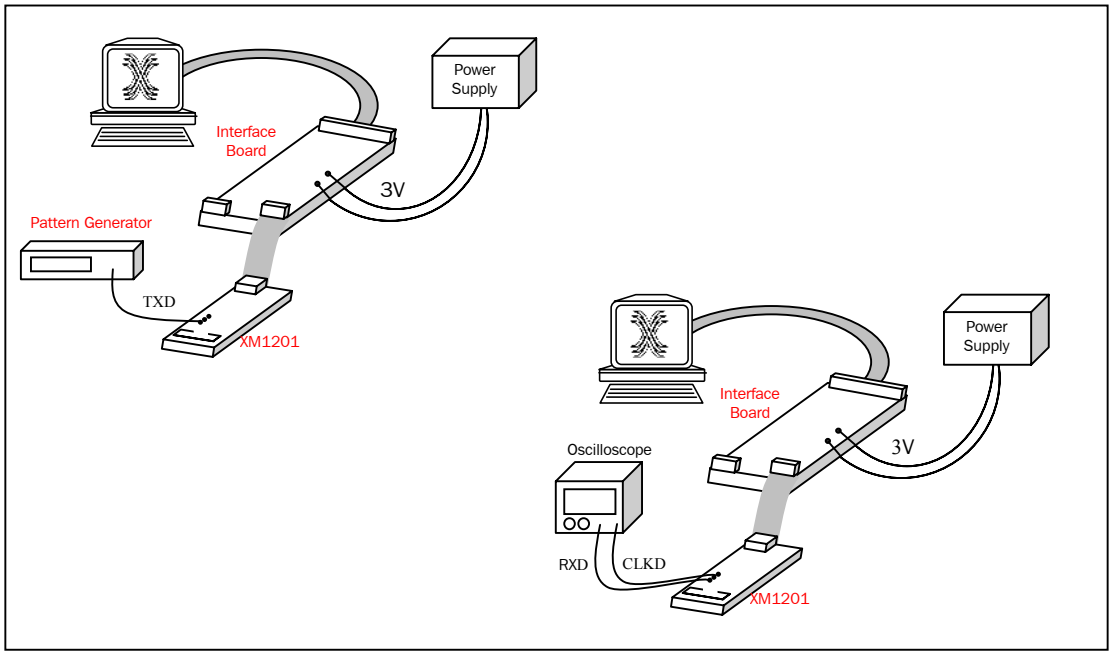


## 2. Typical evaluation

### Hardware set-up

The typical evaluation for using the XE1201SK is to connect the XM1201 to the interface board. After the configuration of each transceiver via the user-friendly software, a pattern generator is connected to the TXD pin. On the second module, an oscilloscope is connected to RXD and CLKD pins in order to visualize the received data.

Typical evaluation schematic



**Software Set-up**

1) Transmitter configuration

The data are transmit via the pin TXD, as of consequence, the control mode bit needs to be set up via external pin instead of the internal register C7. In this case, the bit A13 needs to be deactivated.

Bit description

| | |
|---|---|
| A13 = 0 | Transmit mode and enabler mode are addressed EN and RXTX pins |
| A12 = 1 | Clock running |
| A11 = X | Unused |
| A10 = X | Unused |
| C 8 = 1 | Output amplifier enables |
| C7 = X | Unused |

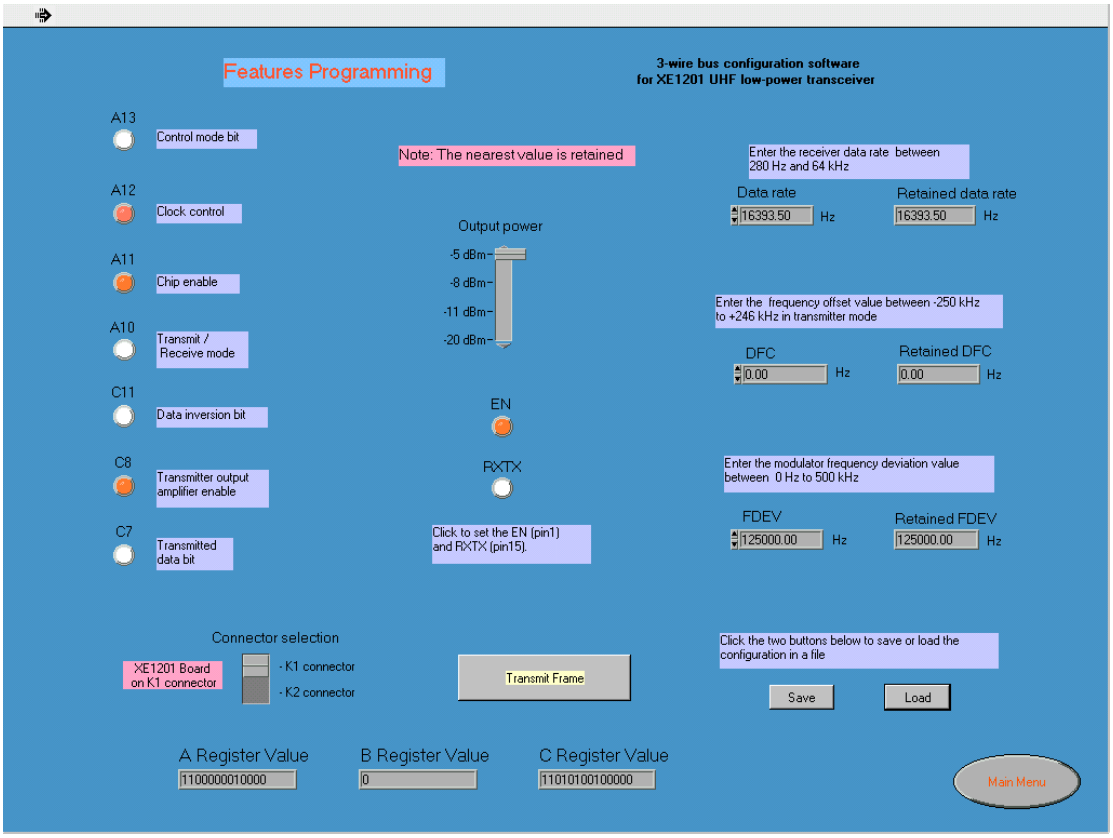
Pins description

Via the user-friendly software you can configure the status of EN and RXTX pins. For this, you must click on their buttons in order to obtain the following configuration.

| | |
|---|---|
| EN = 1 | Enables the chip via EN pin. |
| RXTX = 0 | Transmitter mode via RXTX mode |

The figure below shows the typical configuration with a frequency deviation equal at 125KHz and a Data Rate equal at 16kbit/s.

**Features Programming Screen in Transmitter Mode.**



**2) Receiver configuration**

The configuration in receiver mode is similar to the configuration for the test link.

Bit description

| | |
|---|---|
| A13 = 0 | Transmit mode and enabler mode are addressed by RXTX and EN pins |
| A12 = 1 | Clock running |
| A11 = X | Unused, replaced by EN pin |
| A10 = X | Unused, replaced by RXTX pin |
| C 8 = X | Unused |

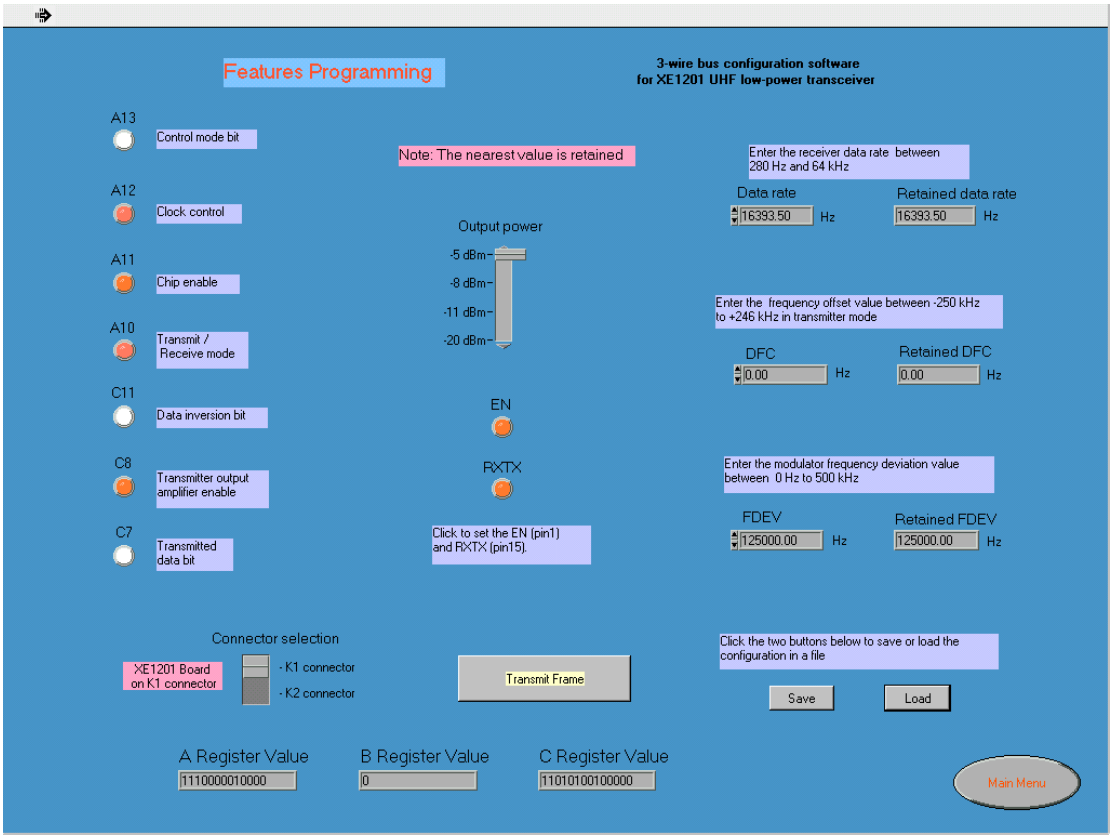
Pins description

As the pin A13 is set to "0", the transceiver XE1201 needs to be controlled by the pins EN and RXTX. Here, the user needs to click on both buttons:
EN = 1
RXTX = 1

In receiver mode the external power amplifier (via RXTX=1) is switched off in order to reduce the power consumption.

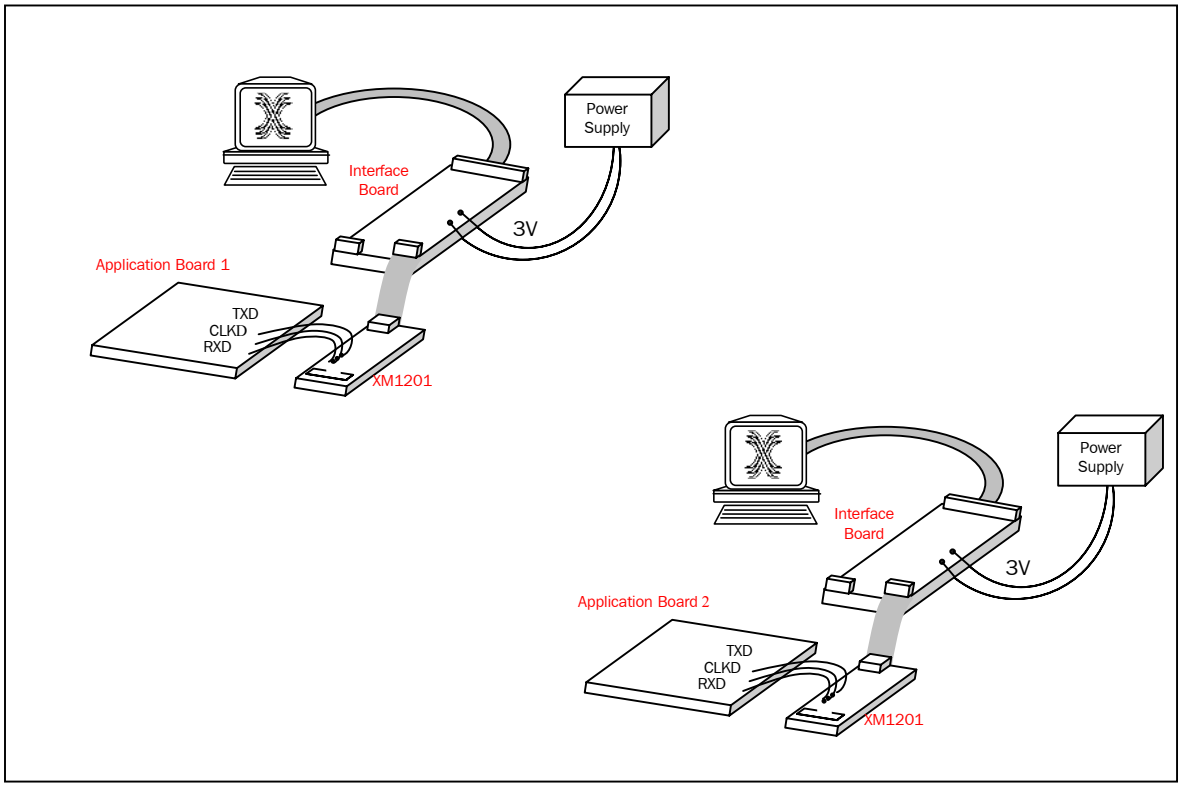
The figure below shows the typical configuration with a frequency deviation equal at 125KHz and a Data Rate equal at 16kbit/s.

**Features Programming Screen in Receiver Mode.**



## 3. Typical Use of application

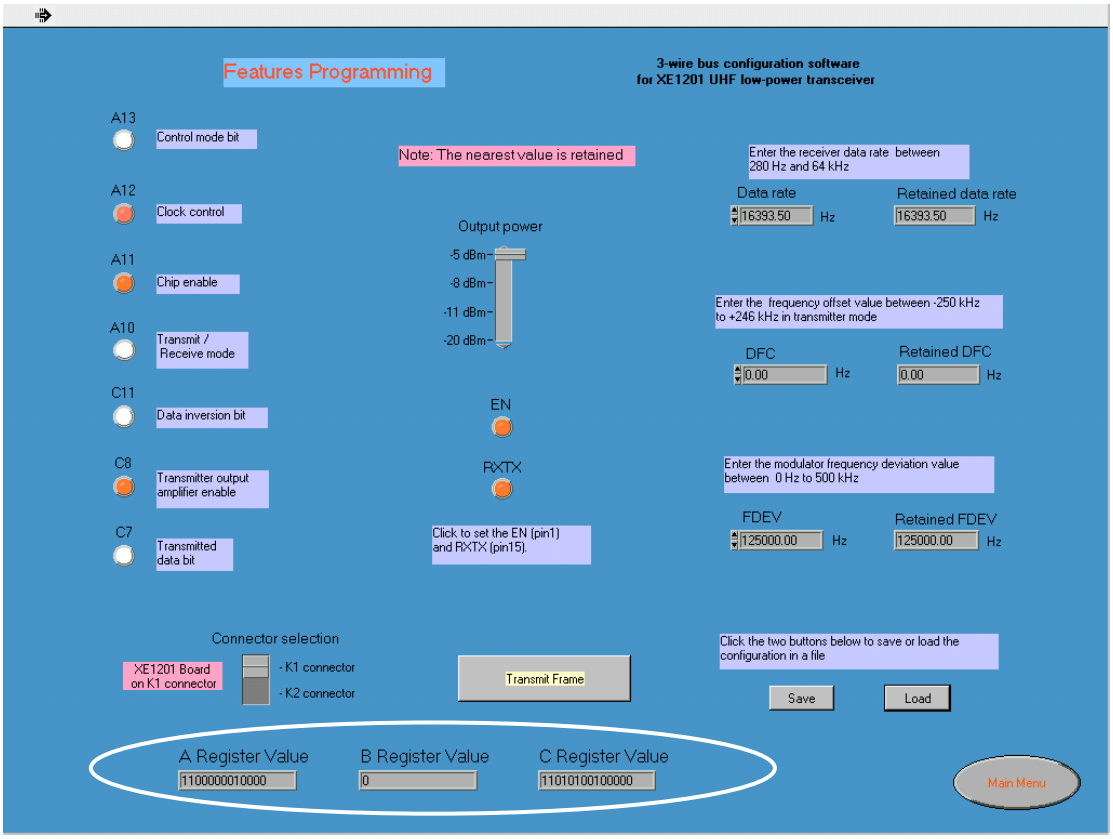
The XE1201SK can by removing a wire with an existing application achieve a half-duplex transmission. For this to be done the 3 pins TXD, RXD and CLKD are connected to a motherboard (application board).



## XM1201 in Stand alone

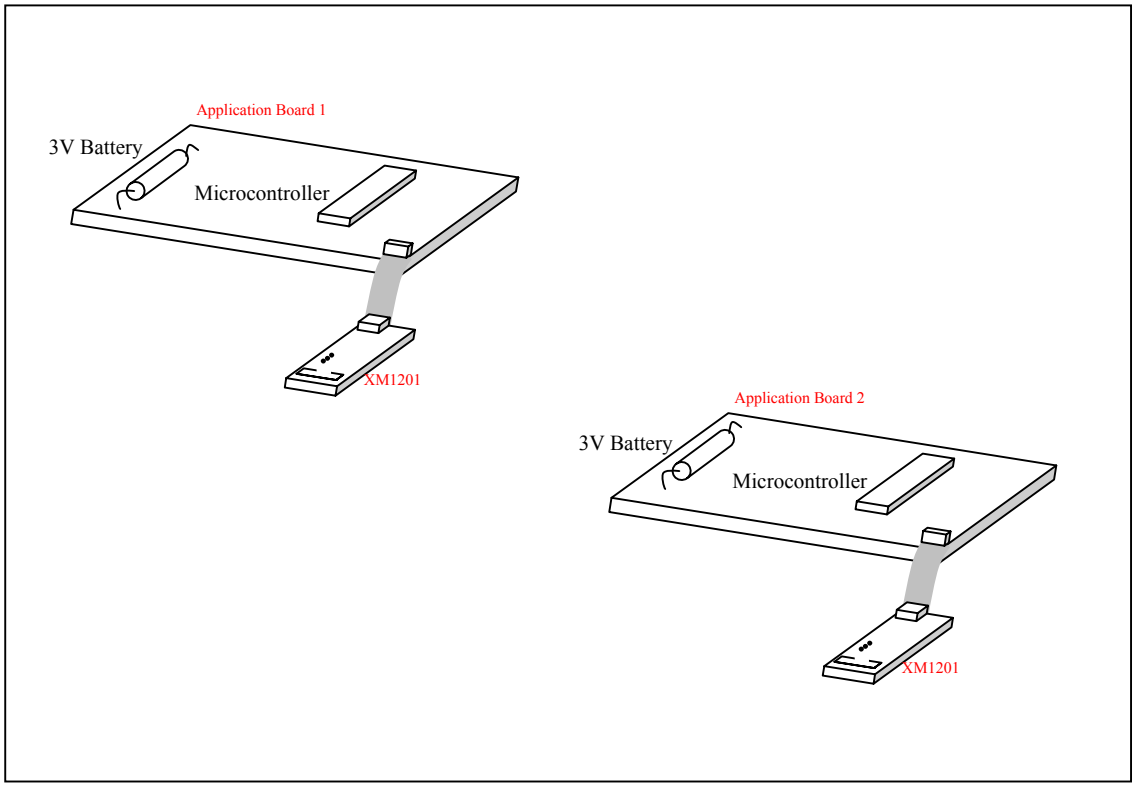
The two modules XM1201 can be used as a stand alone to reduce the prototype development time. In this case, XEMICS' software can be used to help engineers configure correctly their transceiver. For that, the value of each register can be visualized at the bottom of the features-programming screen.

## Register Values Menu



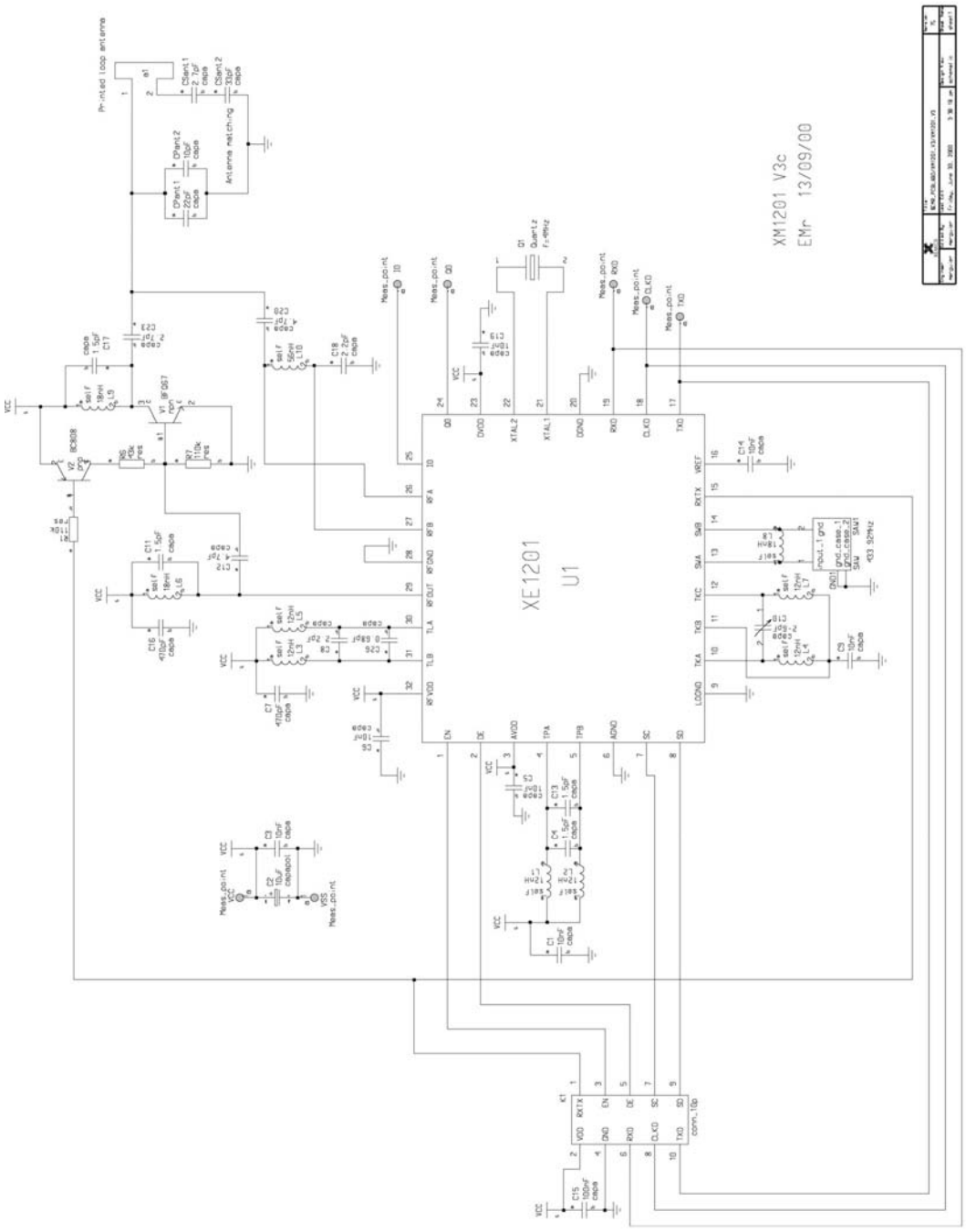

To achieve an application in stand-alone mode the module XM1201 needs to be programmed (via SD, SC, DE). Moreover, the communication management needs to be made by EN and RXTX. The last three signals TXD, RXD and CLKD are also connected to the application board in order to transmit and receive data.
The two pins VCC and VSS are used to drive the module.

The typical application in stand-alone mode is illustrated in the following diagram:

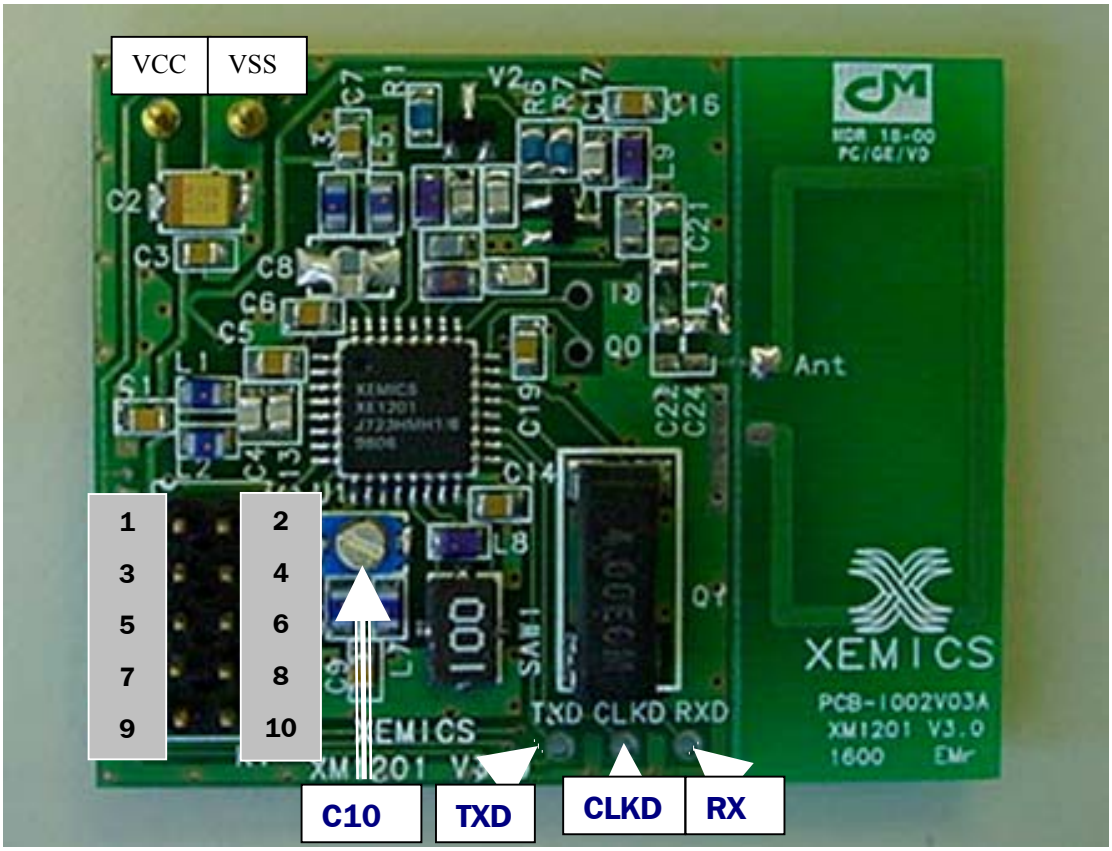


# Annexes : hardware descriptions:

**A1 : Electrical schematic XM1201 Module V3.0:**



**A2 : Layout of XM1201 Module V3.0 :**

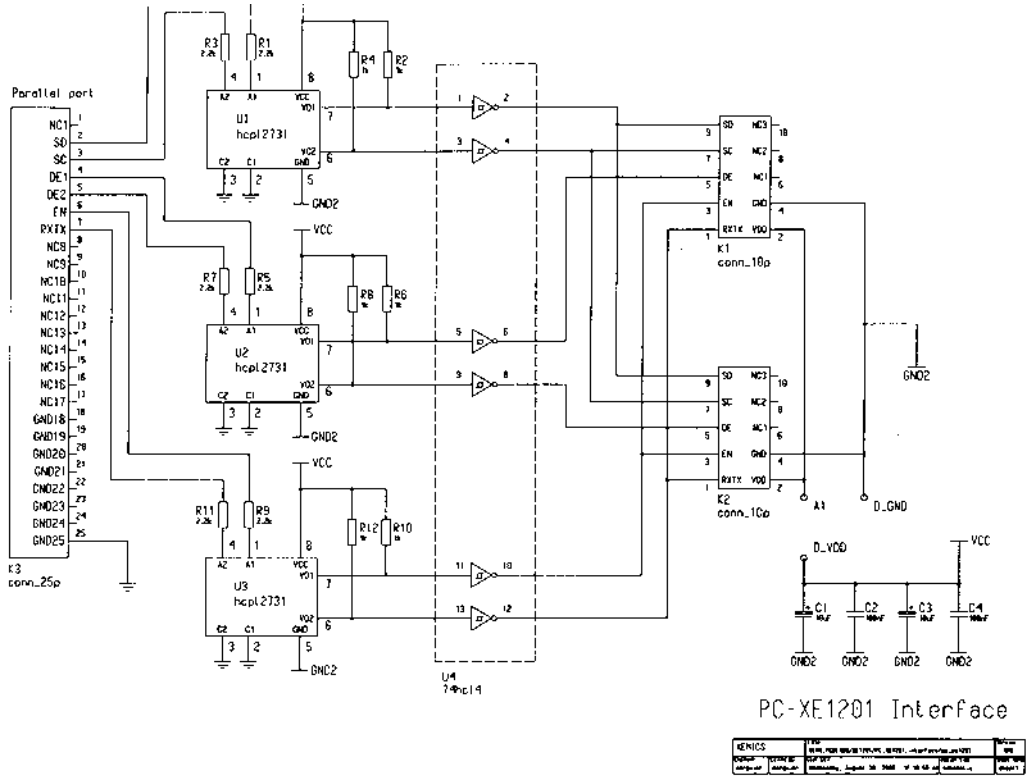



**Top View of XM1201 Module**

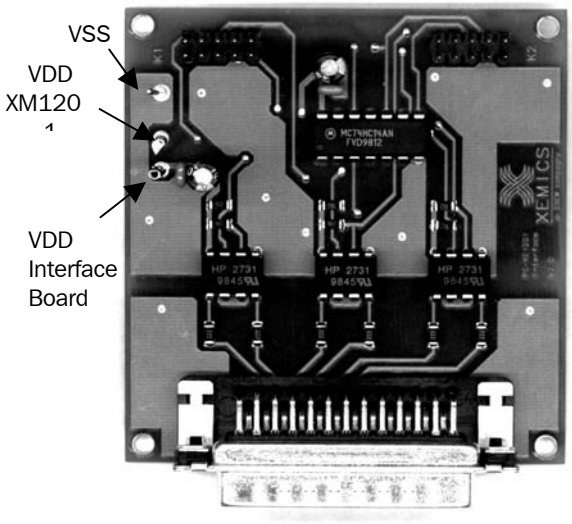
Board adjustment:

The Local Oscillator value can be modified with the trimmer capacitor C10. The default value is 433.92MHz.

## A3 : Electrical Schematic PC-XE1201 Interface board V2.0 :



**A4 : Layout of PC-XE1201 Interface board V2.0 :**




PC-XE1201 Interface board –
Top view