

MODFLEX SHIELD FOR ARDUINO USER GUIDE AND DEMO APPLICATION



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The information in this document is subject to change without notice.

Table of Contents

1	Introduction	3
1.1	<i>Purpose & Scope.....</i>	3
1.2	<i>Applicable Documents.....</i>	3
1.3	<i>Revision History.....</i>	3
2	Jumper Configurations	4
3	Firmware and Necessary Software	5
3.1	<i>Arduino Software</i>	5
4	Demo Application	9
5	Ping Pong Range Test on ModFLEX Shield	14
6	Contacting LS Research	15

1 Introduction

1.1 Purpose & Scope

The purpose of this document is to provide details regarding the use of the ModFLEX Shield for Arduino with the Arduino Duemilanove. While written for the Duemilanove, this guide should work with other Arduino processors. There are wireless shields available for both the ProFLEX01 and SiFLEX02 modules.

1.2 Applicable Documents

- *ProFLEX01 / SiFLEX02 Datasheet*
- *ProFLEX01 / SiFLEX02 Host Protocol User's Guide*

1.3 Revision History

Date	Change Description	Revision
12-10-2010	Initial release.	1.0
3-20-2012	Updates to support Arduino Software 1.0	2.0

Table 1 Revision History

2 Jumper Configurations

2.1.1 Jumper 1 (J1)

Jumper J1 is used to enable the software reset for the ModFLEX module. When this is enabled (moved to the position connecting pins 2 and 3) digital pin 6 (D6) on the Arduino Duemilanove controls the reset signal of the ModFLEX module. When using the software reset capability, D6 on the Duemilanove needs to be configured as a digital output and be set high for normal operation. Resetting the ModFLEX module is accomplished by setting D6 low for a couple of milliseconds, and then setting it back high.

The software reset is being used for the demo application provided, and as such J1 pins 2 and 3 should be jumpered.

2.1.2 Jumper 2 and 3 (J2 and J3)

J2 and J3 are responsible for determining which mode of UART the Duemilanove uses to communicate with the ModFLEX module on the ModFLEX Shield. When the ModFLEX Shield is configured to use hardware UART mode (J2 and J3 moved to the positions connecting pins 1 and 2) the Duemilanove will use its designated UART RX and TX pins (D0 and D1 respectively) to communicate with the ModFLEX module. When it is desired to use software UART mode, digital pins 7 (D7) and 8 (D8) will be the RX and TX UART signals respectively.

When using hardware UART mode, the J2 and J3 jumpers must be removed when uploading software to the Duemilanove. The reason for this is that the hardware UART is used by the Arduino bootloader.

For the demo application software UART mode is used, and as such jumpers J2 and J3 should be connected between pins 1 and 2.

3 Firmware and Necessary Software

3.1 Arduino Software

First you will need the Arduino Software. At the time of this writing the most current build is 1.0. It can be downloaded by using this link: <http://arduino.cc/en/Main/Software>.

Extract the downloaded .zip's contents anywhere you would like. No installation is required; you will simply locate and execute the arduino.exe file located within the extracted folder to use this software:

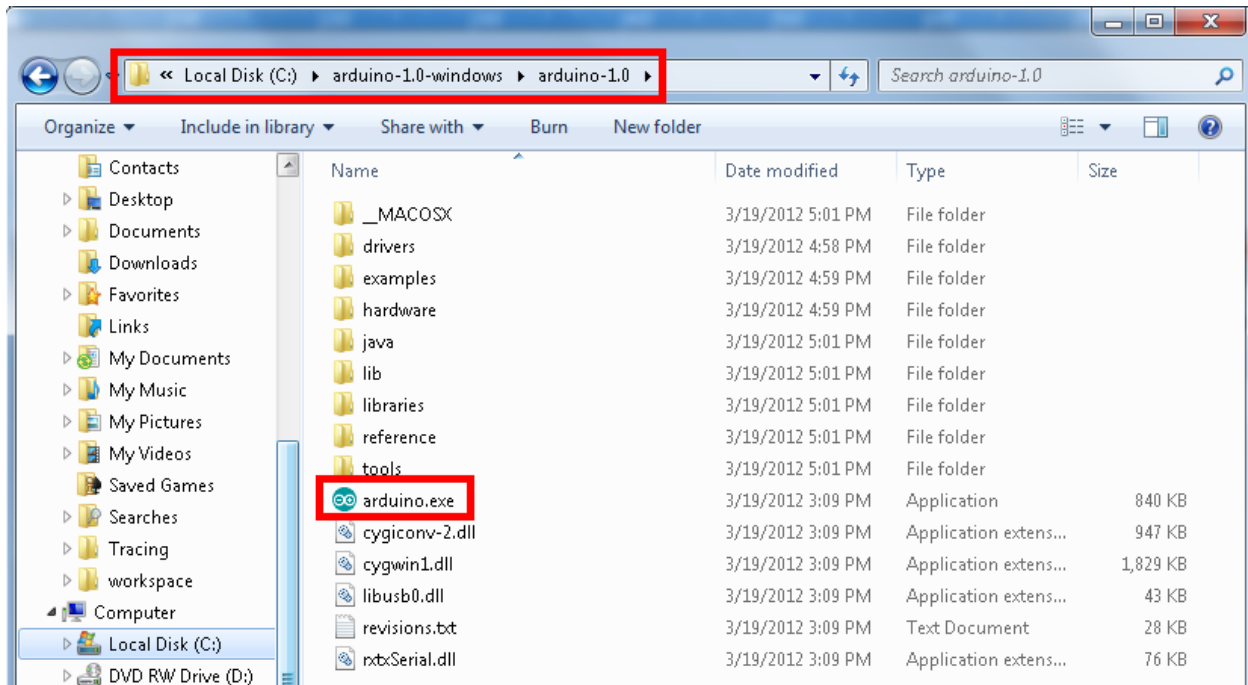


Figure 1 Arduino Software

3.1.1 ModFLEX Wireless Shield Library

Download the ModFLEX Wireless Shield Library from the LSR wiki.

<http://wiki.lsr.com/ModFLEX-Arduino.ashx?HL=arduino>

Extract the .zip's contents in the "library" folder located within the extracted "arduino-1.0" folder:

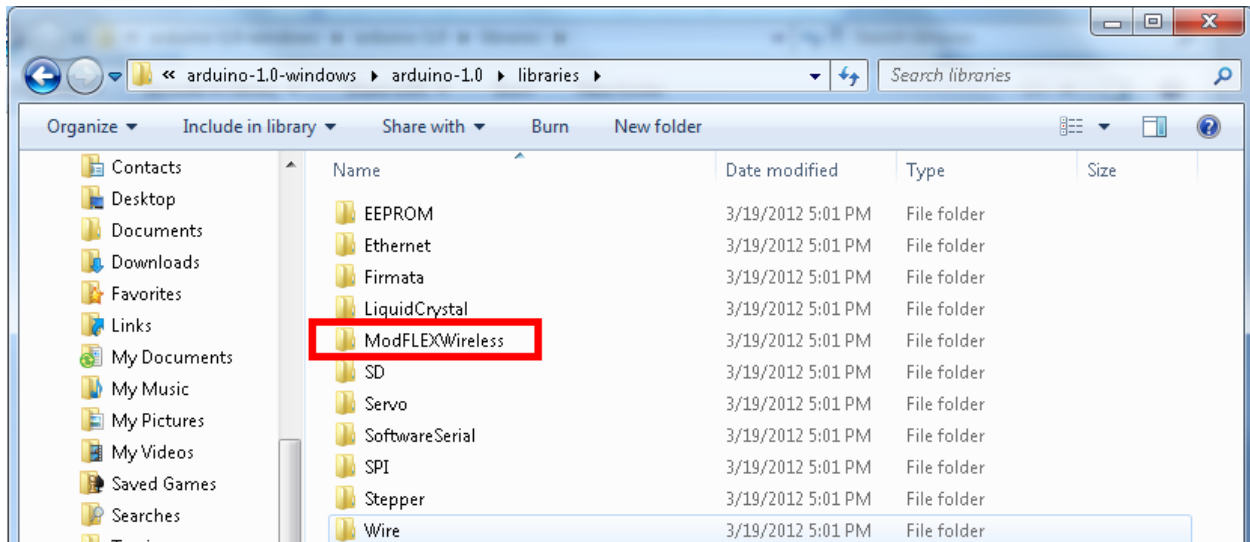


Figure 2 ModFLEX Shield Library

If you are using the SiFLEX02 module shield perform the following steps, otherwise skip to Section 3.1.2.

1. Open the newly extracted ModFLEXWireless folder and open the LsrModuleApi.h file using any text editor:

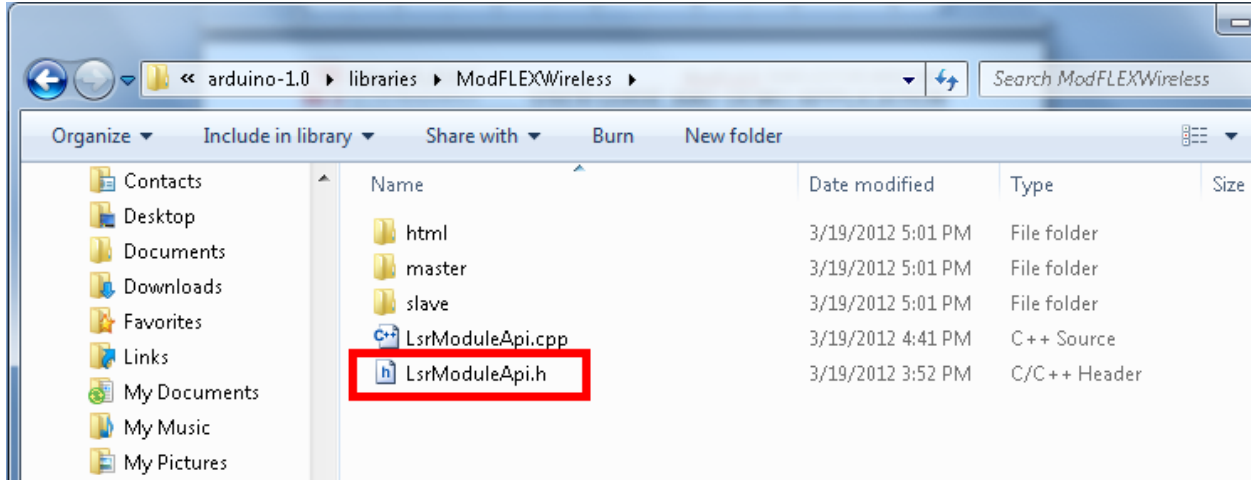


Figure 3 Open API Header File

2. Modify the following #define to SiFLEX02 instead of PROFLEX01:

This can be done by commenting out the PROFLEX01 #define, and un-commenting out the SiFLEX02 #define as shown below.

```
#ifndef LsrModuleApi_h
#define LsrModuleApi_h

#include <inttypes.h>

#ifndef NULL
#define NULL 0
#endif

#define SiFLEX02 ///< Use with a SiFLEX02 ModFLEX Shield (900MHz)
// #define PROFLEX01 ///< Use with a ProfFLEX01 ModFLEX Shield (2.4GHz)
```

Figure 4 Configure for SiFLEX02

3.1.2 Move Sketches

Move the sketches for both the Master and Slave ends of the demo to a project directory. Note that the sketches should not be in the Arduino software directory.

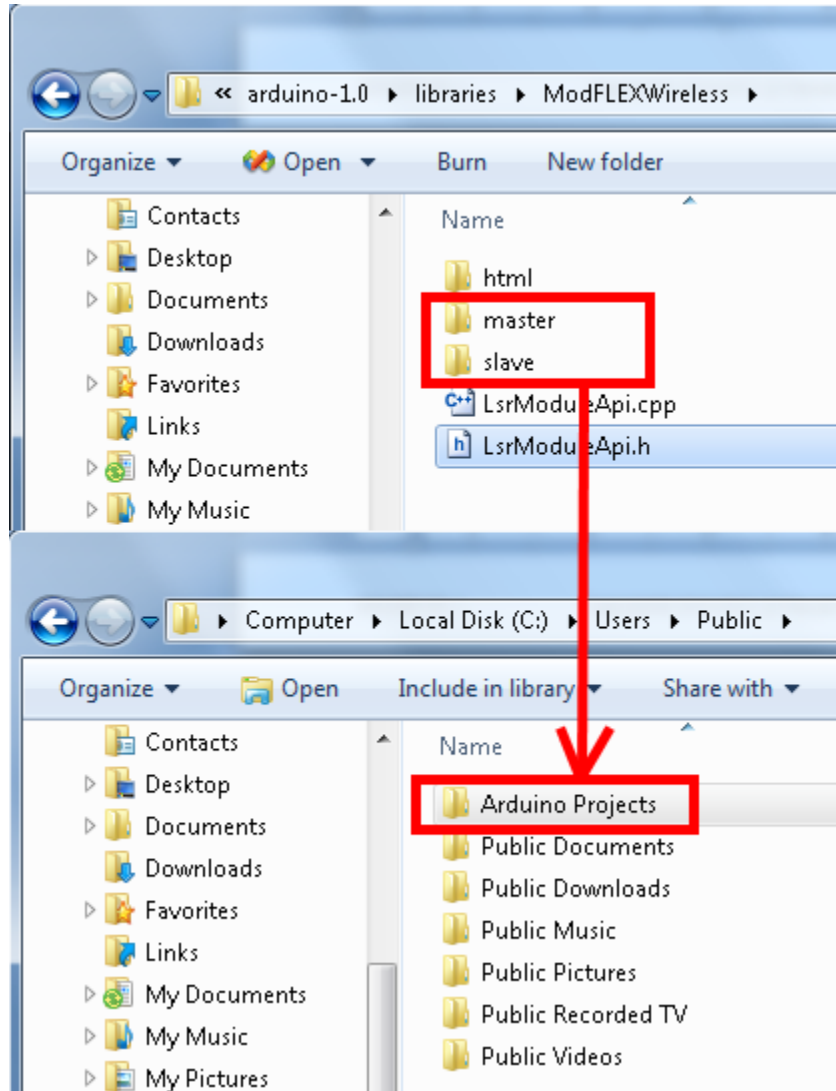


Figure 5 Move Sketches to Project Folder

4 Demo Application

4.1.1 Purpose

The demo application is provided to show users how the ModFLEX Wireless shield can utilize both a hardware and a software UART on the Arduino, as well as how to make use of the ModFLEX Wireless Library. The Arduino communicates with the ModFLEX module on the shield using a software UART, and with the PC using the hardware UART. Two Arduino Duemilanoves equipped with the same type of ModFLEX Wireless shields (ProfFLEX01 or SiFLEX02) are required for this demo application.

4.1.2 Loading the Demo Application

1. Determine which Duemilanove you want to be the “slave” and which one you want to be the “master”.
2. Open the “*arduino-1.0*” folder and execute the “*arduino.exe*” file:

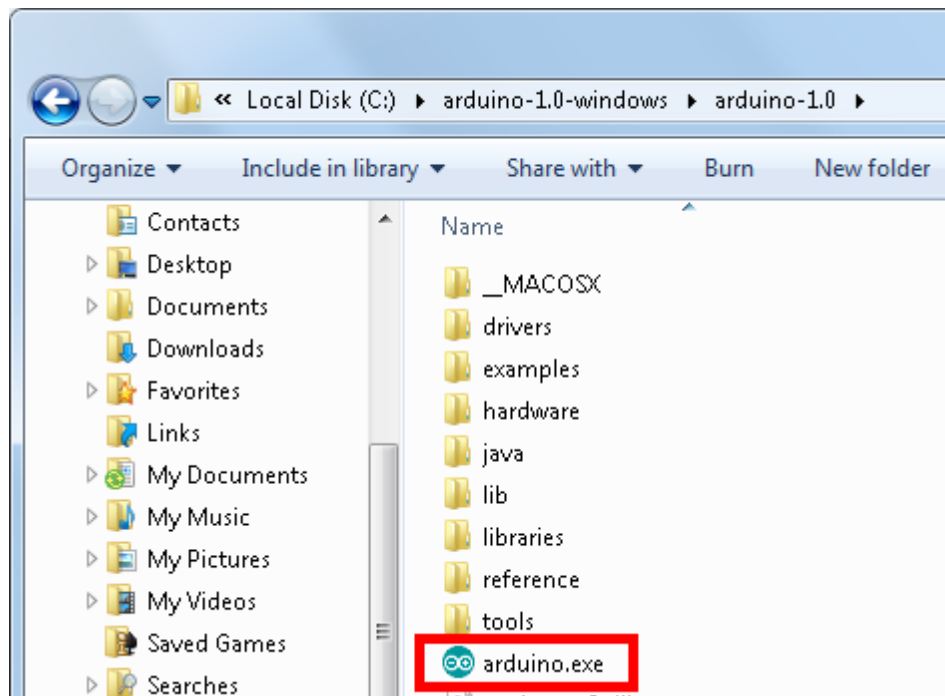


Figure 6 Start Arduino Software

3. First we will load the slave. Locate the “sketch” to be loaded onto the slave. The file is located in the “Slave” folder and is named “slave.ino”.

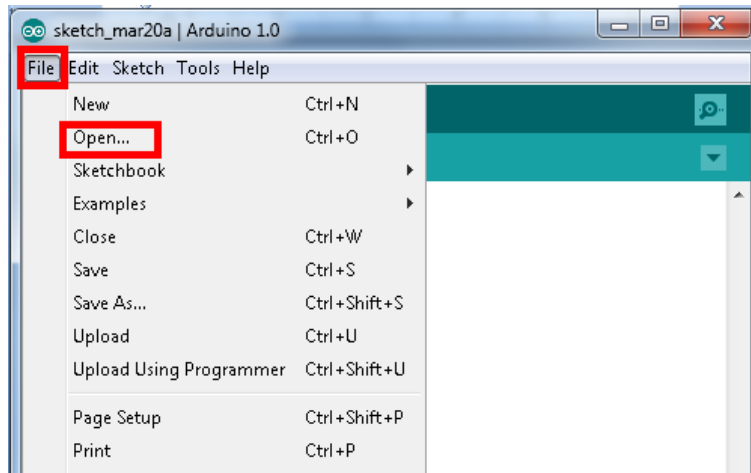


Figure 7 Open Slave Sketch Step 1

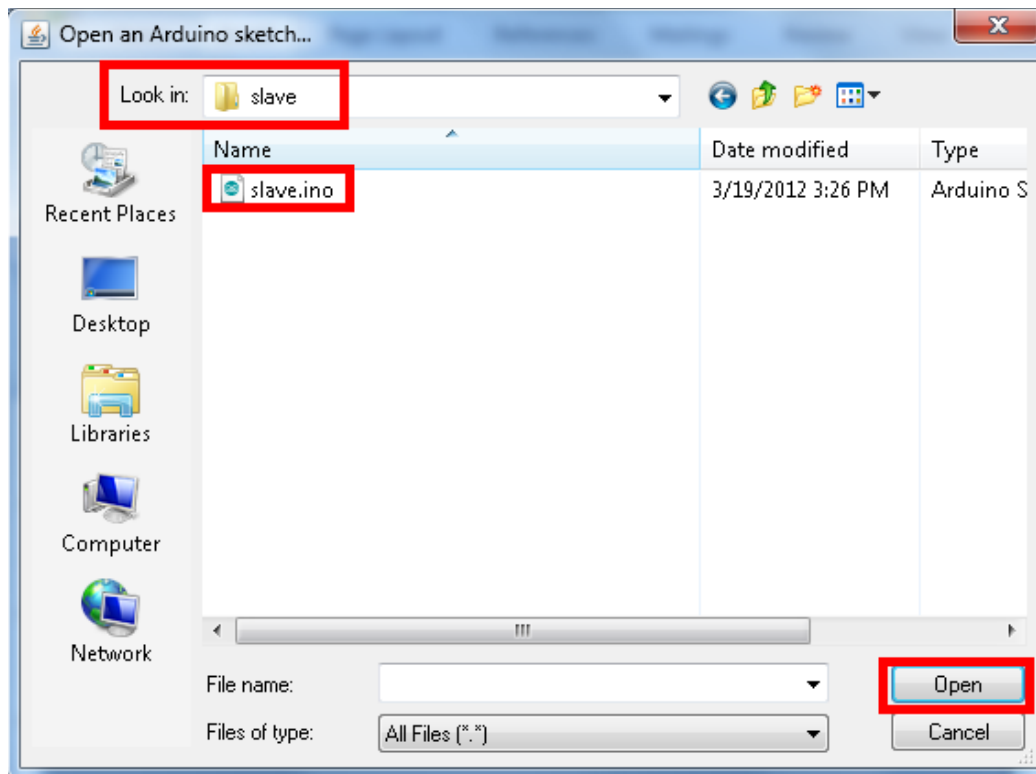
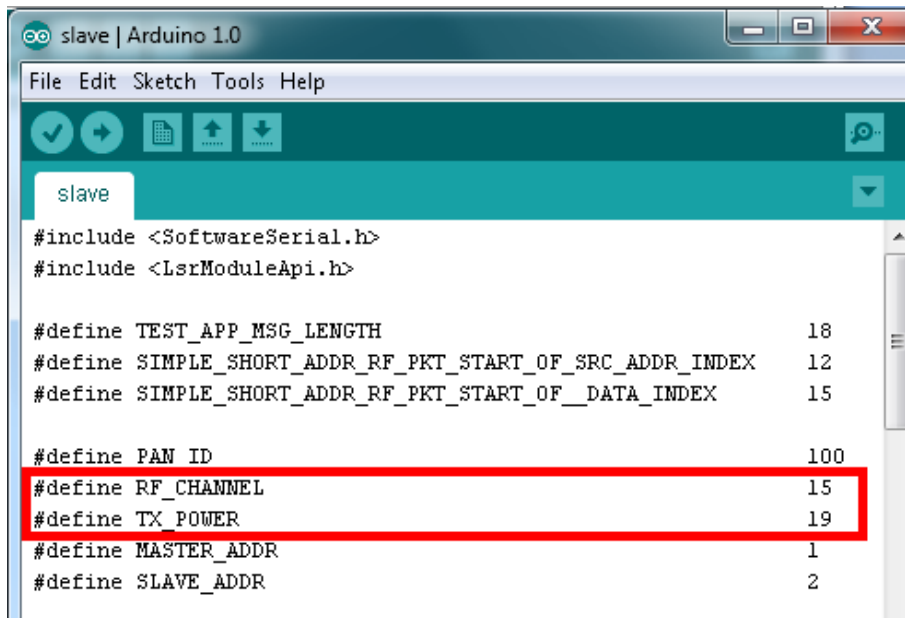


Figure 8 Open Slave Sketch Step 2

- If you are using ProFLEX01 ModFLEX shields, edit the following section of code to look like this. This sets the RF output power to a maximum setting of 19, and the RF channel to 15.



```

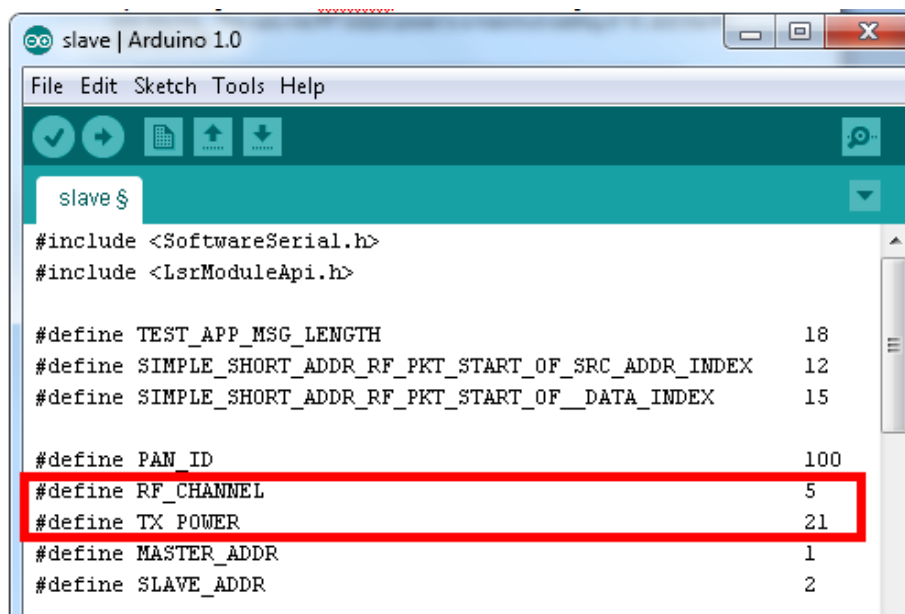
slave | Arduino 1.0
File Edit Sketch Tools Help
slave
#include <SoftwareSerial.h>
#include <LsrModuleApi.h>

#define TEST_APP_MSG_LENGTH 18
#define SIMPLE_SHORT_ADDR_RF_PKT_START_OF_SRC_ADDR_INDEX 12
#define SIMPLE_SHORT_ADDR_RF_PKT_START_OF_DATA_INDEX 15

#define PAN_ID 100
#define RF_CHANNEL 15
#define TX_POWER 19
#define MASTER_ADDR 1
#define SLAVE_ADDR 2
  
```

Figure 9 Configure Settings for ProFLEX01

Otherwise if you are using SiFLEX02 ModFLEX shields, then edit the following section of code to look like this. This sets the RF output power to a maximum setting of 21, and the RF channel to 5.



```

slave | Arduino 1.0
File Edit Sketch Tools Help
slave $
#include <SoftwareSerial.h>
#include <LsrModuleApi.h>

#define TEST_APP_MSG_LENGTH 18
#define SIMPLE_SHORT_ADDR_RF_PKT_START_OF_SRC_ADDR_INDEX 12
#define SIMPLE_SHORT_ADDR_RF_PKT_START_OF_DATA_INDEX 15

#define PAN_ID 100
#define RF_CHANNEL 5
#define TX_POWER 21
#define MASTER_ADDR 1
#define SLAVE_ADDR 2
  
```

Figure 10 Configure Settings for SiFLEX02

5. Connect the Duemilanove (ModFLEX shield attached) to your PC, make sure the appropriate COM port is selected, and upload to the board:

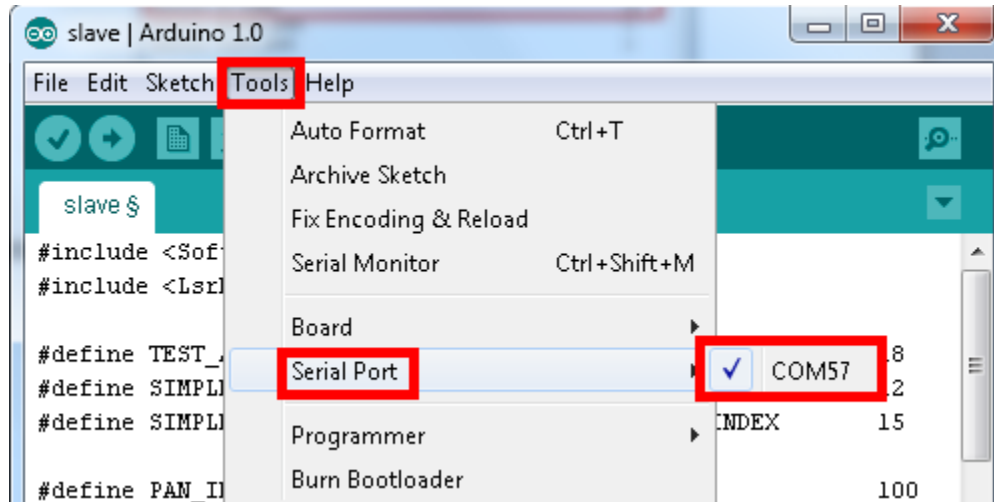


Figure 11 Select COM Port

6. Download the sketch into the shield.

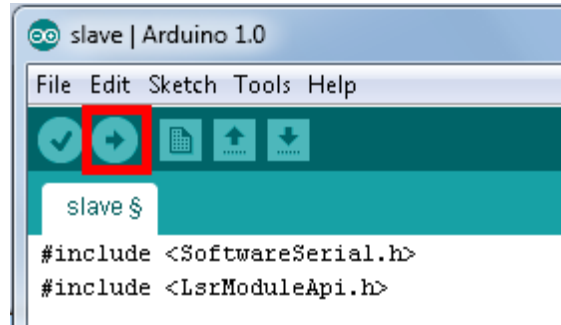


Figure 12 Download Sketch

7. Repeat the same steps for the master.

- At this point both Duemilanoves should be powered up and communicating. Open the Arduino Serial Monitor to see the data the master is sending to the PC using the hardware UART. Make sure the COM port is the same as the one the master is connected to. Also the baud rate should be set to 19,200.

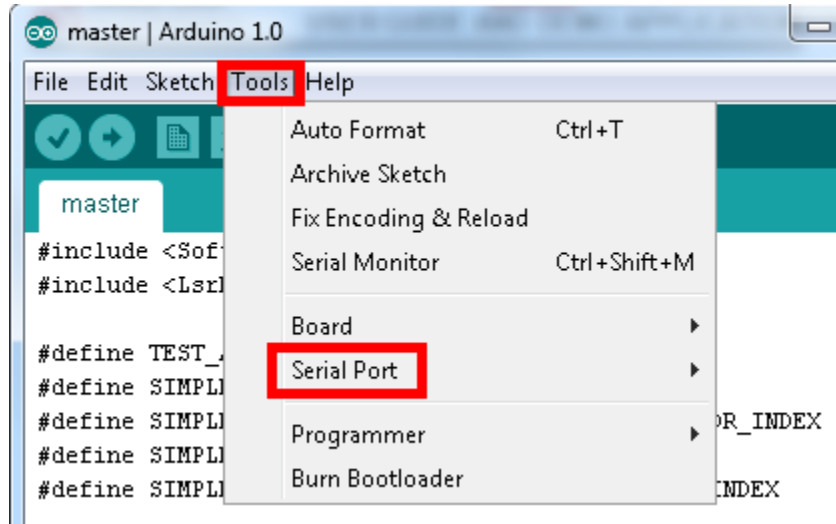


Figure 13 Start Serial Monitor

The Serial Monitor window will appear displaying simple statistics from the master:

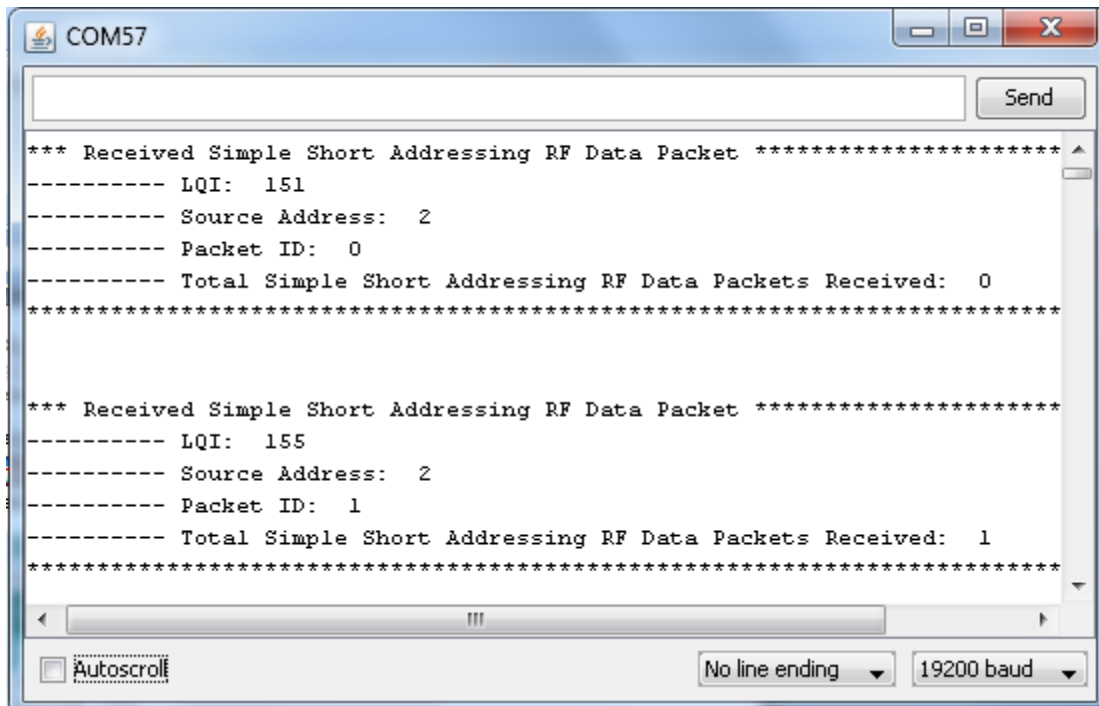


Figure 14 Serial Monitor Output

5 Ping Pong Range Test on ModFLEX Shield

See the Development Kit Quick Start Guide for detailed information regarding the Ping Pong Range Test usage.

The Ping Pong Range Test firmware is built into the module firmware. This allows for the test to be used on the ModFLEX shield. Jumper J1 must be set so the software reset is disabled.

6 Contacting LS Research

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Wiki	wiki.lsr.com
Technical Support	forum.lsr.com
Sales Contact	sales@lsr.com

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