SM2250 Hardware Manual

Release 1.0.0

SonMicro Elektronik

Apr 17, 2017

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CHAPTER

ONE

INTRODUCTION

SM2250 is a mother board for Mini20 package modules(2mm pin space - 20 pin) that supports both 125KHz RFID and 13.56 MHz Mifare pin-to-pin compatible modules, seperately.

It provides all module connections thus it can be used to evaluate the 125KHz RFID and Mifare modules, only by changing the module and the antenna.

It is the main board used with SM1250-EK, 125 KHz RFID Evaluation Kit and SM5210-EK, Mifare Evaluation Kit.

Supported Modules

- SM5210 Mifare Module
- SM1250 125KHz RFID Module

Attention: Connect the appropriate antenna(coil or PCB) only for the target module.

- Do not use supplied coil wire antenna with a Mifare Module. Coil wire antenna can be used only with a 125KHz RFID Module.
- Do not use Mifare PCB antenna with a 125KHz RFID Module. Mifare PCB antenna can be used only with a 13.56MHz Module.
- Do not connect both antenna type at the same time. This will cause short circuit and may damage the RFID module.

CHAPTER

TWO

CONNECTION PINOUT DIAGRAM

For detailed connections please check the *SM2250 Schematic* and target module datasheet.

Attention: Connection diagram must be checked with the target module datasheet for differences in electrical characteristics that depends on the target module.

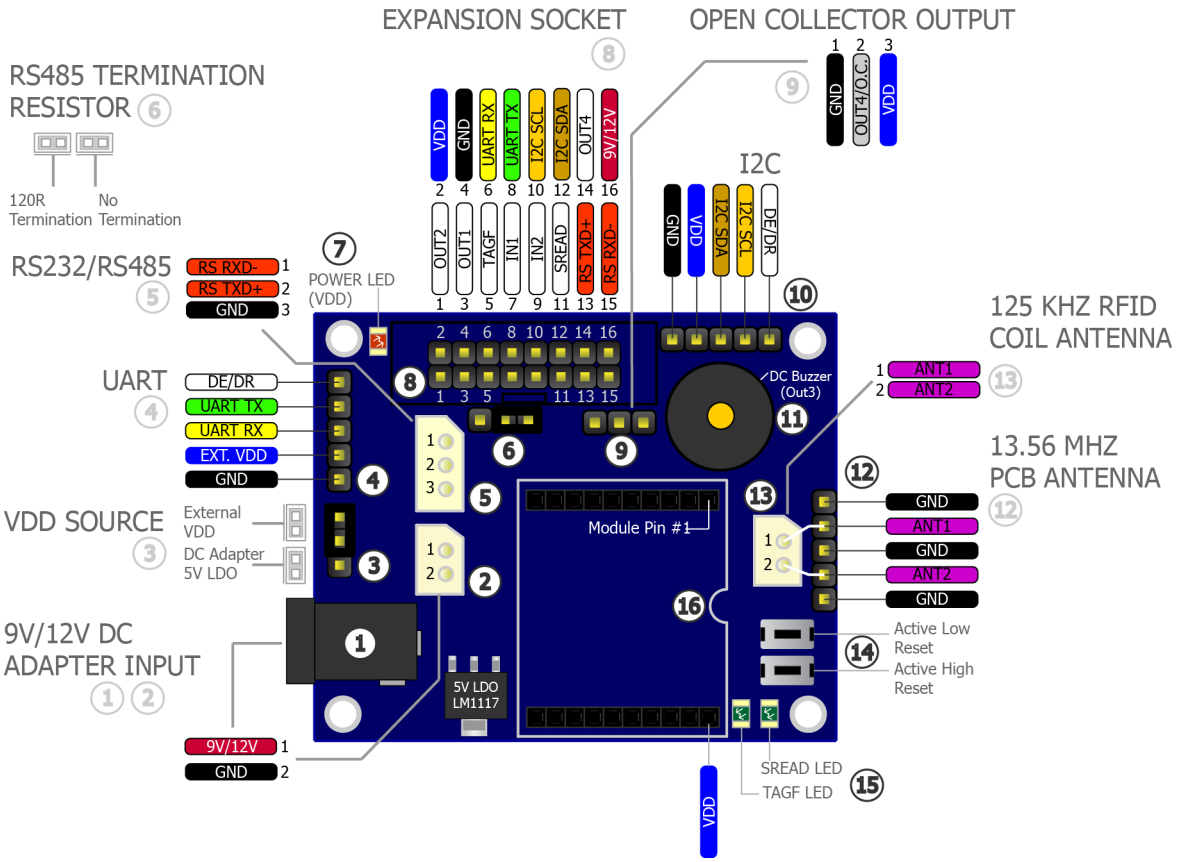

Figure 2 *SM2250 Connection Diagram*

2.1 SM5210 Mifare Module and USB-UART Converter

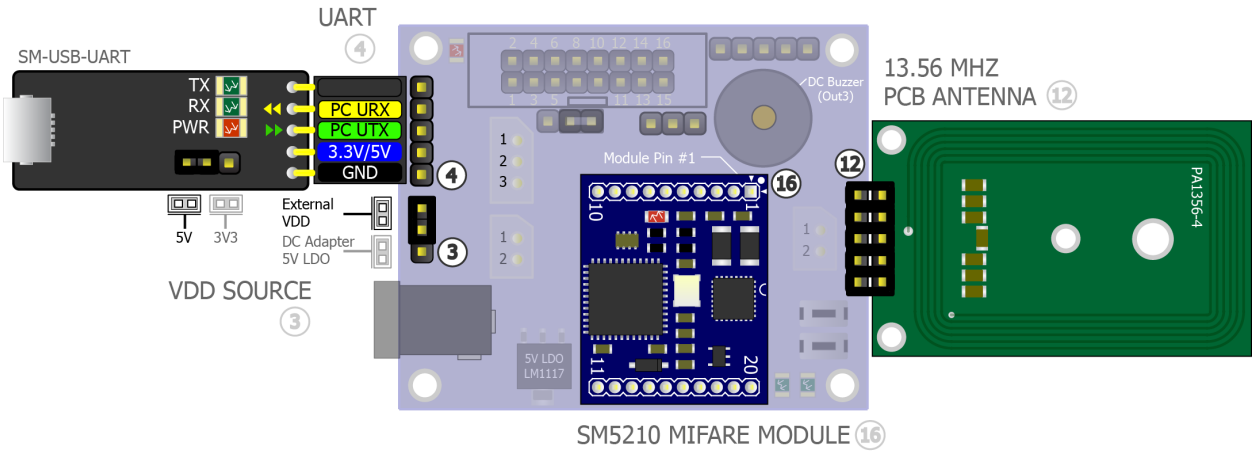

Figure 2.1 *Typical connection with SM5210 Mifare module, PCB Antenna and USB-UART Converter*

2.2 SM1250 125KHz RFID Module and USB-UART Converter

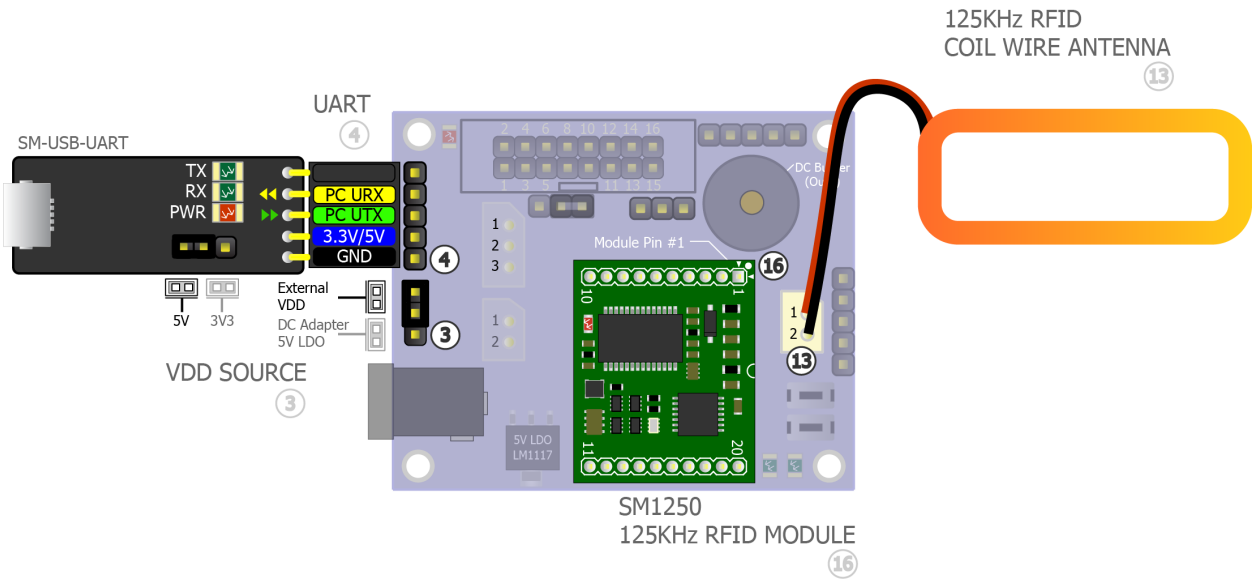

Figure 2.2 *Typical connection with SM1250 125KHz RFID module, Coil Wire Antenna and USB-UART Converter*

CHAPTER

THREE

POWER OPTIONS

SM2250 is integrated with a 5V LDO Regulator (LM1117). Power can be supplied by 9V/12V DC input thru (#1) or (#2) or externally(max 5V) thru (#4).

If 9V/12V DC input is used and jumper(#3) position is selected appropriately then the VDD voltage will be 5V(LDO 5V).

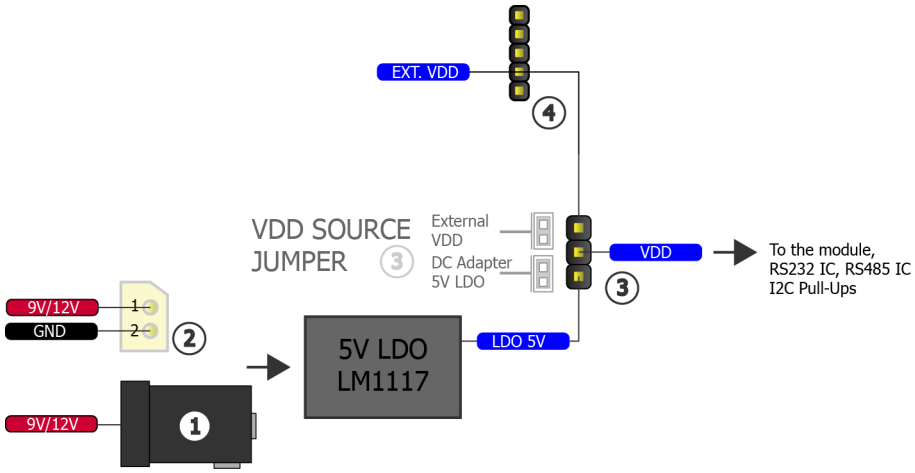

Figure 3 *SM2250 Power Supply Selection*

An alternative and recommended option for easier connections is to use SM-USB-UART Converter. It supplies power to the board thru USB and it brings also USB-UART communication with PC or USB Host. SM-USB-UART Converter includes a 3.3V LDO and supports both 5V and 3.3V output with appropriate jumper selection on board.

Note: Please notice that ST232(RS232) or ST485(RS485, optional) chips integrated to the SM2250 board is designed for 5V operation. It is possible to connect 3.3V thru Ext.VDD if target module supports 3.3V operation. In this case, standard module functions and UART, I2C, I/O etc. will work without any problem. **However RS232 and RS485 operations are not guarenteed to work with 3.3V external VDD supply.**

Attention:

- Vdd or Ext.Vdd maximum voltage value should not exceed 5V!
- Use 9V/12V DC input only thru connector (#1) and (#2).
- Use only single source for powering the SM2250 board, do not use dc adapter input and external vdd(i.e. Usb-Uart converter) at the same time.

3.1 USB-UART Converter & External VDD Connection

External Vdd input or SM-USB-UART can be used by selecting the appropriate jumper position(#3) as illustrated in the connection diagram.

SM-USB-UART converter pin-out mates one-to-one with the UART Connector(#4) on the SM2250 board. Please notice that UART TX and RX signals cross connected to each other as one side is transmitting and the other side is receiving.

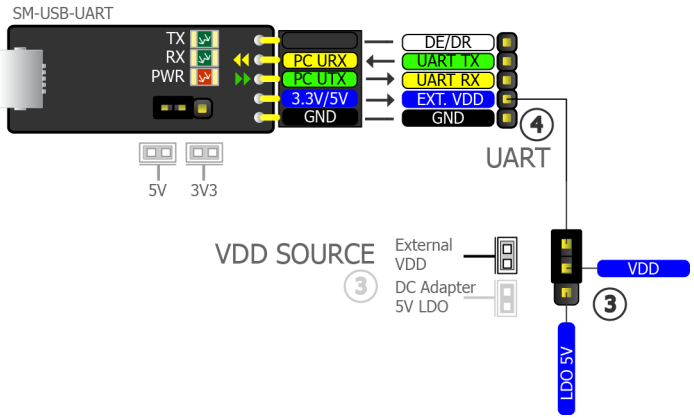

Figure 3.1 *SM2250 and SM-USB-UART Converter connection*

3.2 9V/12V DC Input Connection

To use a 9V/12V DC input power supply, instead of external direct Vdd connection, select the appropriate jumper position(#3) as illustrated in the connection diagram. 9V/12V DC can be supplied from dc adapter socket(#1) or from two pin connector(#2).

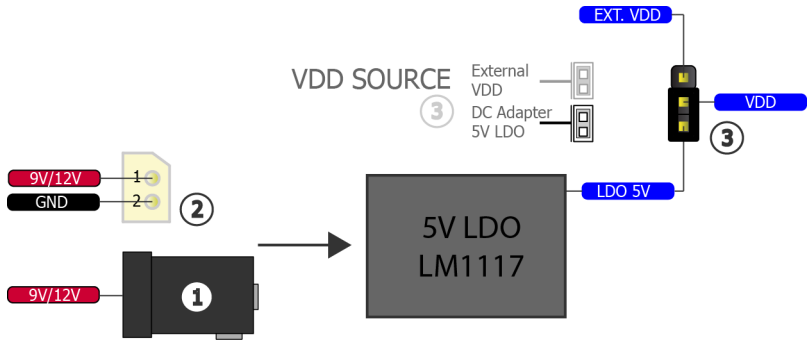

Figure 3.2 *SM2250 9V/12V DC Input Connection*

CHAPTER

FOUR

RS232 CONNECTION

SM2250 is integrated with ST232(RS232 Transreceiver IC) as default option. It is designed to work for 5V operation only. 3.3V operation for RS232 is not supported. 5V can be supplied directly from Ext.VDD pin (#4) or from 5V LDO by using 9V/12V DC input from (#1) or (#2). Use the jumper(#3) for the desired power option.

Note:

- RS232 will not function properly if USB-UART converter is used at the same time. USB-UART converter will function properly in this case.
- If External VDD is used then it should be 5V for RS232 operation.
- If DC Adapter or 9V/12V DC input is used then 5V(VDD) will be supplied thru LM1117 Regulator to the RS232 and the module.

4.1 RS232 Connection with DC Adapter or 9V/12V Input

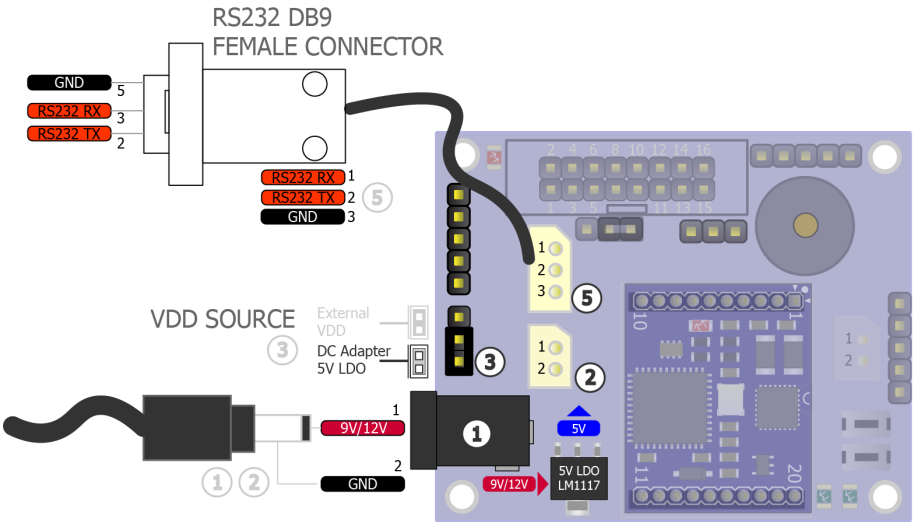

Figure 4.1 *Typical RS232 connection with 9V/12V DC input*

4.2 RS232 Connection with External 5V Input

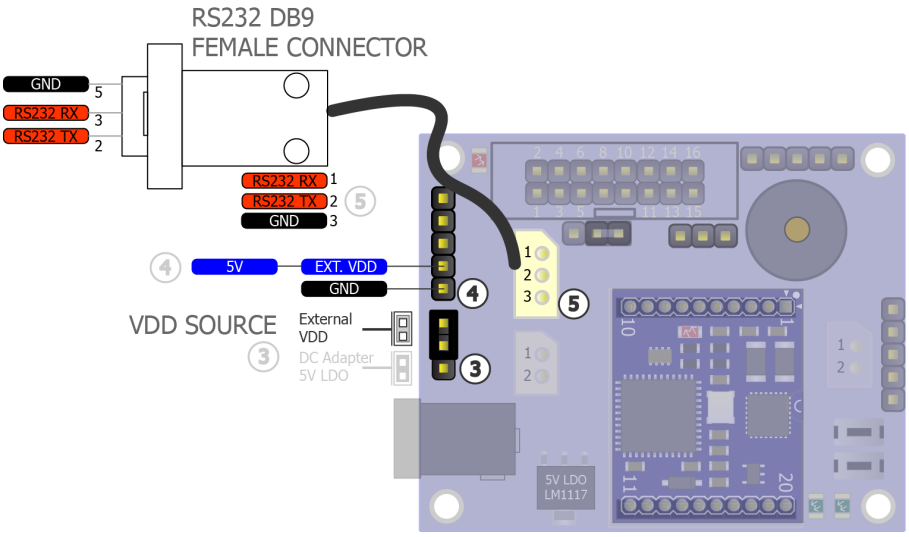

Figure 4.2 *Typical RS232 connection with external 5V Input*

4.3 RS232 DESIGN NOTES

A resistor divider on module UART RX pin(where external microcontoller's UART TX pin is connected) is used for two purposes.

One of these purpose is to protect the 3.3V tolerant external microcontroller's UART TX pin by not directly interfacing it with 5V signal level coming from ST232 IC.

However if the RFID module's UART_TX pin is at 5V level - which is the case for SM1250 125 KHz RFID module if supplied with 5V, then the external microcontroller's UART RX pin must be 5V tolerant. If the external micorocontorller has not 5V tolerant UART RX pin then the RFID module can be supplied with 3.3V(provided that it supports 3.3V operation) or a protection circuit such as resistor divider can be used at the external microcontroller side.

Second purpose of the resistor divider is; it makes USB-UART converter possible to be functional by not directly interfacing with the ST232 R1OUT pin, and reduce effects of the output conflict.

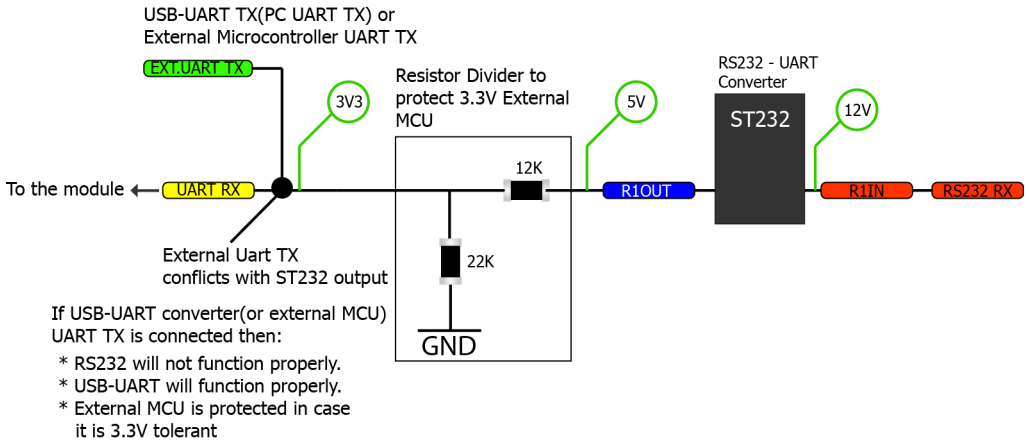

Figure 4.3 *SM2250 internal RS232 circuit*

CHAPTER

FIVE

I2C CONNECTION

SM2250 board provides I2C connections of the target module. **4.7K pull-up resitors connected internally to the VDD on board.** If master I2C have pull-up resistors then you can remove 4.7K resistors, R10 and R11 on SM2250 board. They are just near the module I2C pins on the SM2250 board.

Attention: If VDD is 5V then I2C pull-up is connected to 5V. Please make sure your external microcontroller can tolarate 5V signals in this case. **If not(i.e. Raspberry Pi) it is strongly recommended to remove pull-up resistors on the SM2250 board to protect the external microcontroller. Otherwise external microcontoller will interface with 5V.**

Please remember that if you use 9V/12V DC input supply option then VDD will be 5V.

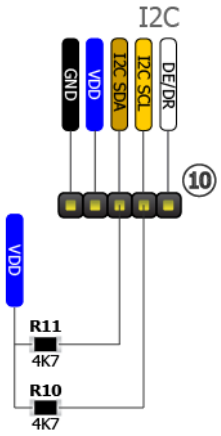

Figure 5 *SM2250 I2C connection*

CHAPTER

SIX

SM2250 SCHEMATIC

Please notice that some of the components are optional(i.e. RS485, EEPROM) and might not be populated on the standard boards.

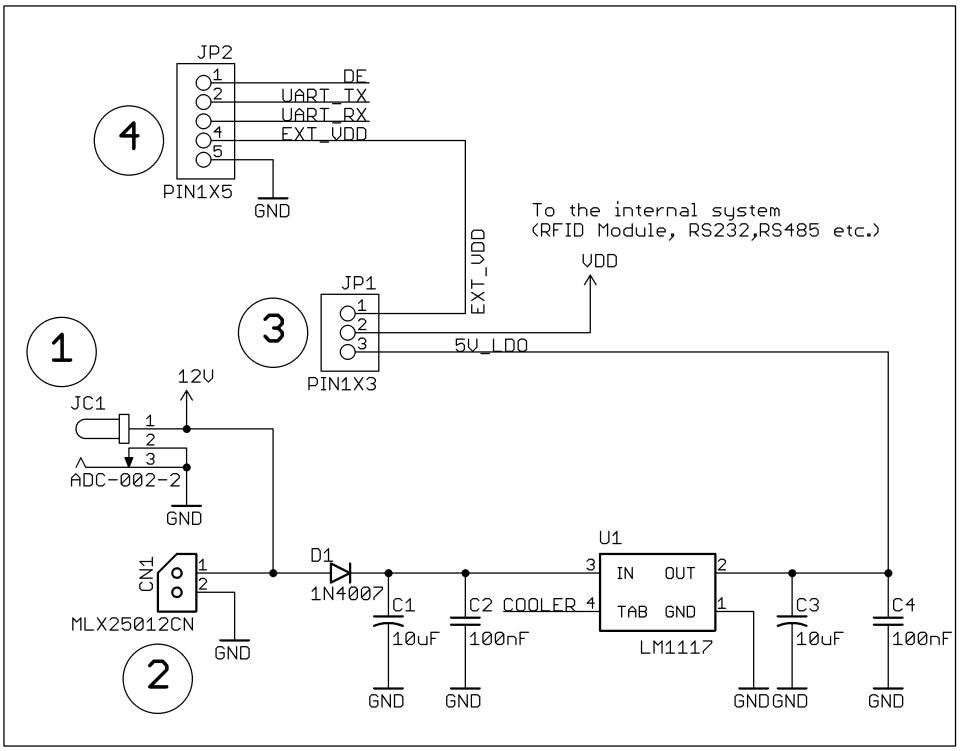

Figure 6 *SM2250 Schematic Part 1/4*

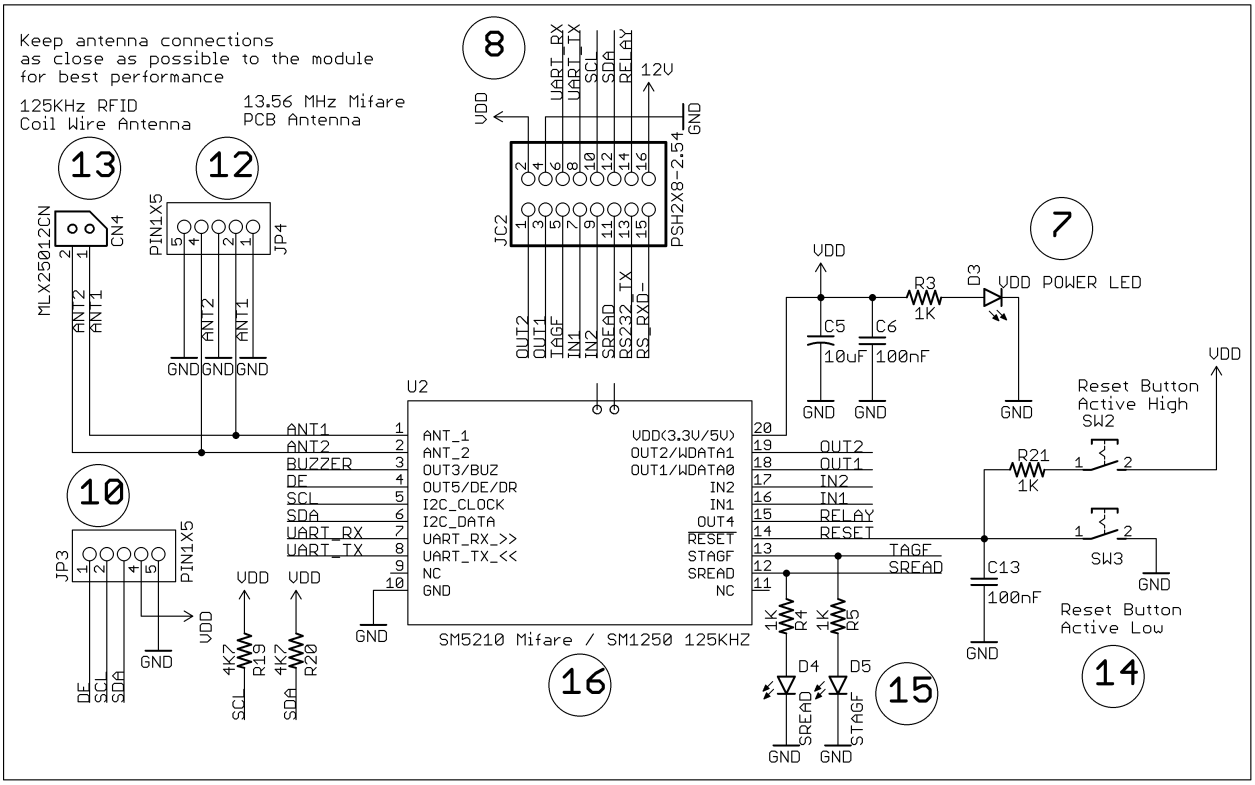

Figure 6 *SM2250 Schematic Part 2/4*

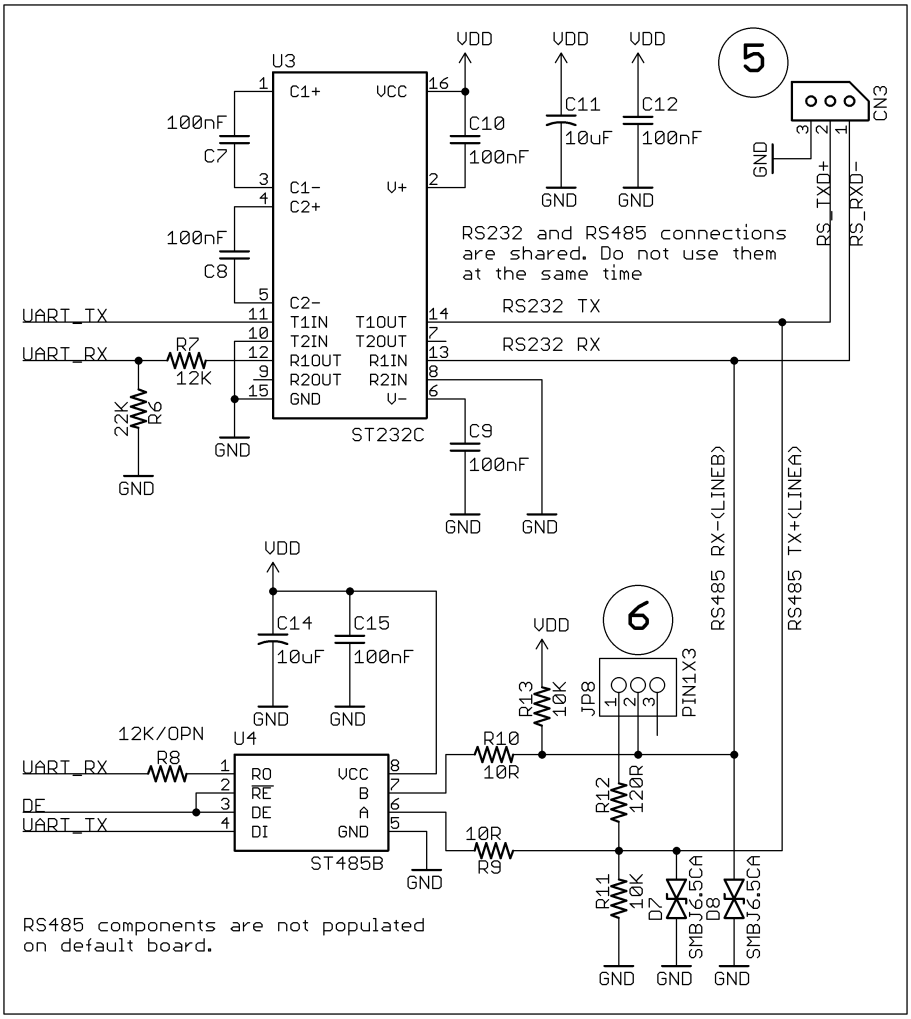

Figure 6 *SM2250 Schematic Part 3/4*

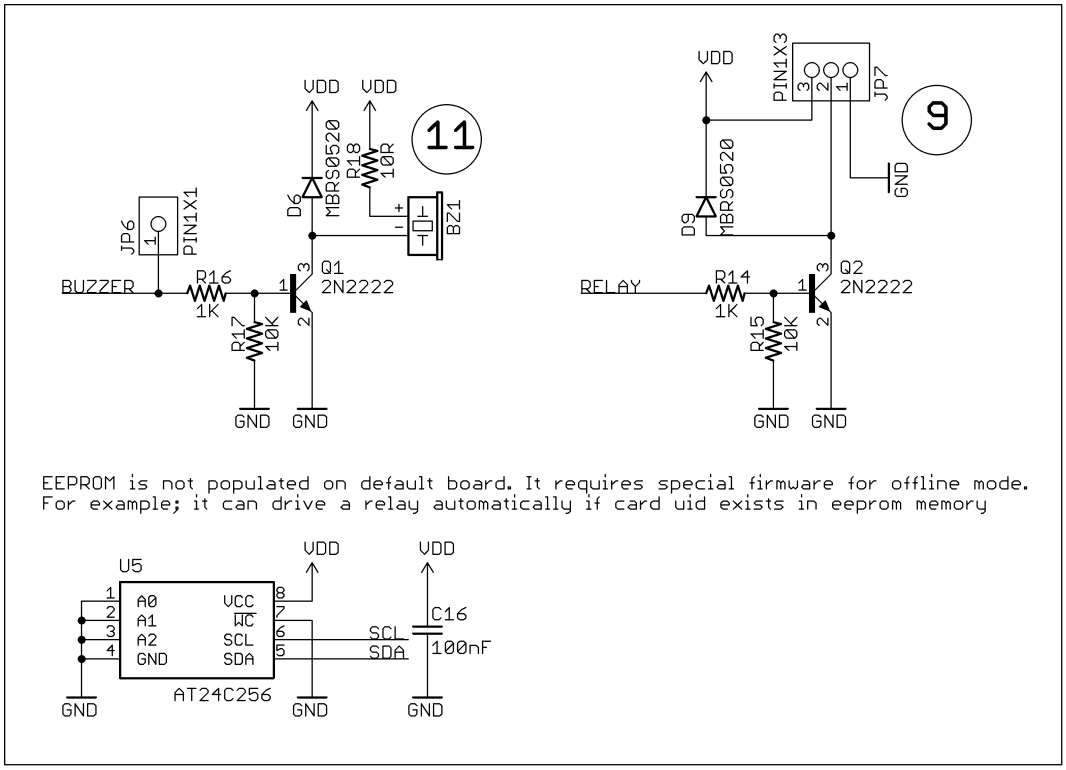

Figure 6 *SM2250 Schematic Part 4/4*

CHAPTER

SEVEN

MECHANICAL DRAWINGS

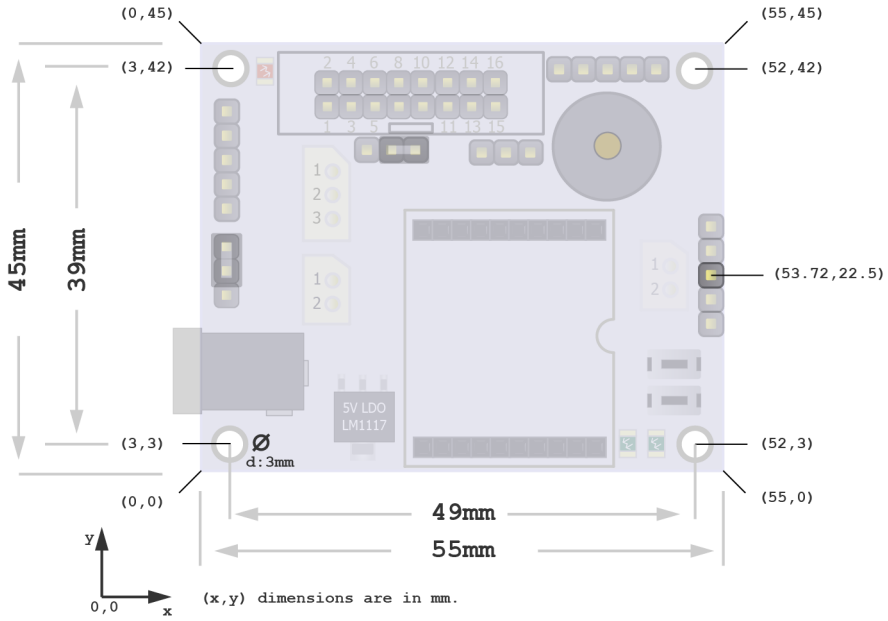

Figure 7 *SM2250 Mechanical Dimensions*

CHAPTER

EIGHT

REVISON HISTORY

Version 1.0.0 (17 Apr 2017)

Initial release.