SI4432 - 470M Details

last updated: nov 2014, Stef Mientki

This document describes some details/bugs of the M470 module.

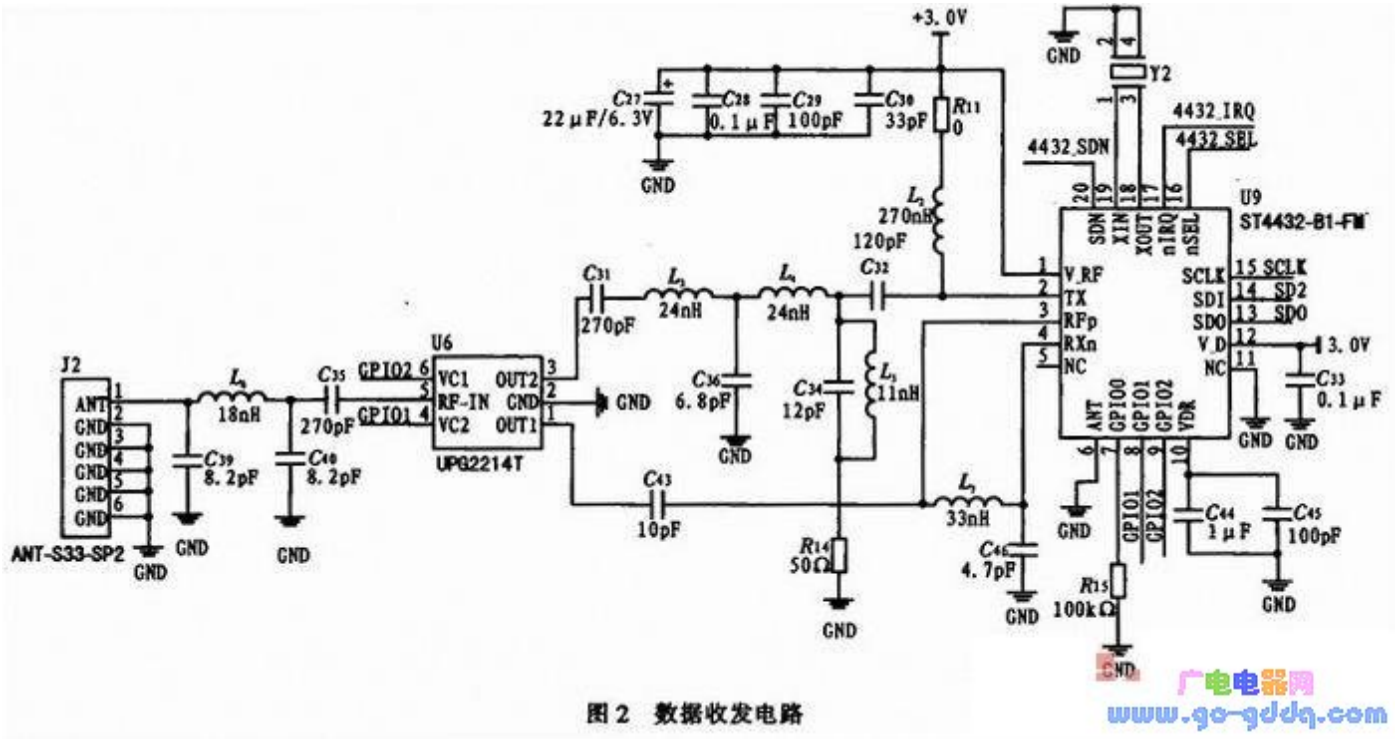
LNA and Transmit Power

Conclusion: wait at least 40 msec (and not 16..20) after a reset, before communicating with the SI4432.

During some experiments with the SI4432-UHF-generator, I found some weird settings.
All measurements in this paragraph were done with the SI4432_Spectrum_Analyzer, using the same board, with the following settings

- Center frequency = 434.0 MHz
- Step frequency = 50 kHz
- IF-Bandwidth = 200 kHz
- Display Range = 100 dB
- NSamp = 10
- Display Mode = Min
- Distance between Transmitter and Receiver about 60 cm

I wasn't able to find the exact circuit of the 470M module , but this one is probably close, except the antenna switch U6 is controlled by GPIO-0 and GPIO-1. As the receive input and transmit output has it's own connection circuit to the antenna and thus this not what they call a "Direct Tie Application". Therefor during transmission register 0x6D, bit 3 should (or could) be set to 0. Only in Direct Tie Applications it's necessary to set 0x6D bit 3 = 1, to close the LNA switches during transmission.



From previous experiments I found maximum output power with the following settings:

```
1490   -- set the antenna switch optimal for transmitting
1491   SI4432_Write ( 0x0B, 0x1D )     -- GPIO-0 : pin = 1
1492   SI4432_Write ( 0x0C, 0x1F )     -- GPIO-1 : pin = 0
1493
1494   SI4432_Write ( 0x07, 0x0B )     -- Set Tx Mode, Tx = On
1495
1496   -- LNA-switch closed in Tx-Mode, this was the best performance
1497   SI4432_Write ( 0x6D, 0x08 )     -- Set Tx Power (D3 must be 1, else 10dB less Power)
1498
```

Yes weird: closing the LNA switches (which was not required increases the output with about 10 dB)

With -1 dBm output power this gives the following result: **Measured 70 dBm**.
Let's call this our **Reference** value.

In the 0x90 and 0x91 buttons of the UHF-Generator the following commands were placed

- 0x90 : LNA-switch closed (the optimal setting until now)
- 0x91 : LNA-switch open

```
1635          elsif RS232 == 0x90 then
1636            -- LNA-switch closed in Tx-Mode, this was the best performance
1637            SI4432_Write ( 0x6D, 0x08 )
1638
1639          elsif RS232 == 0x91 then
1640            -- LNA-switch open in Tx-Mode
1641            SI4432_Write ( 0x6D, 0x00 )
```

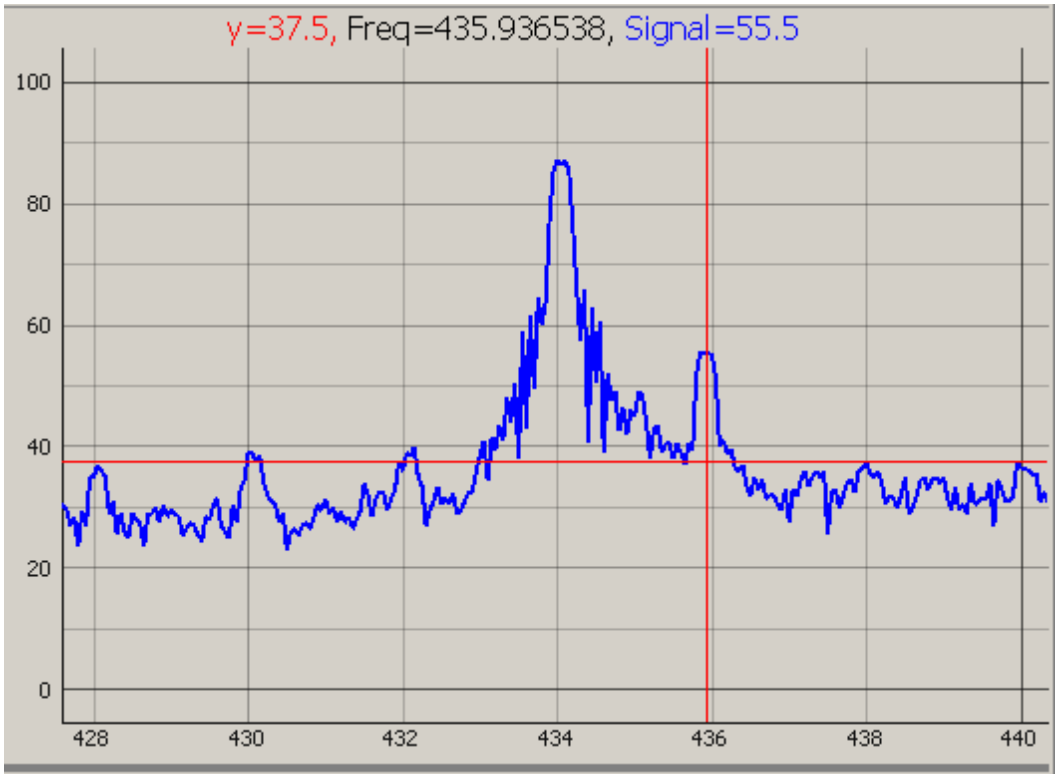
Pressing 0x91, indeed gives less output power: **Measured 55 dBm**
That's 15 dB less !!!

In the 0x92 and 0x93 buttons of the UHF-Generator the following commands were placed

- 0x92 : GPIO-0, GPIO-1 best settings for transmit
- 0x93 : GPIO-0 and GPIO-1 exchanged

```
1643          elsif RS232 == 0x92 then
1644            -- GPIO0/GPIO1 antenna swicth settings, this was the best
1645            SI4432_Write ( 0x0B, 0x1D )     -- GPIO-0 : pin = 1
1646            SI4432_Write ( 0x0C, 0x1F )     -- GPIO-1 : pin = 0
1647
1648          elsif RS232 == 0x93 then
1649            SI4432_Write ( 0x0B, 0x1F )     -- GPIO-0 : pin = 0
1650            SI4432_Write ( 0x0C, 0x1D )     -- GPIO-1 : pin = 1
1651
```

So we expect nothing to happen if we press 0x92 button (because these settings are already there).
What the hell happens: **Measured 87 db, that's 17 dB MORE !!!**



and from this moment, pressing 0x90 or 0x91 doesn't matter anymore !!!! ?????

After some further experiments it showed that a 20 msec delay (from the datasheet) after a reset wasn't enough. 30 msec seems to work, but to be sure we set it to 40 msec.
And now these optimal settings achieve the highest ouput power and indeed the 0xD6 bit3 (LNA switches) doesn't matter anymore, but it can do no harm to always close them in transmission.

```
1484 procedure  SI4432_Init_UHF_Generator () is
1485   SI4432_Reset ()
1486   SI4432_Write ( 0x0B, 0x1D )     -- GPIO-0 : pin = 1
1487   SI4432_Write ( 0x0C, 0x1F )     -- GPIO-1 : pin = 0
1488 end procedure
```