

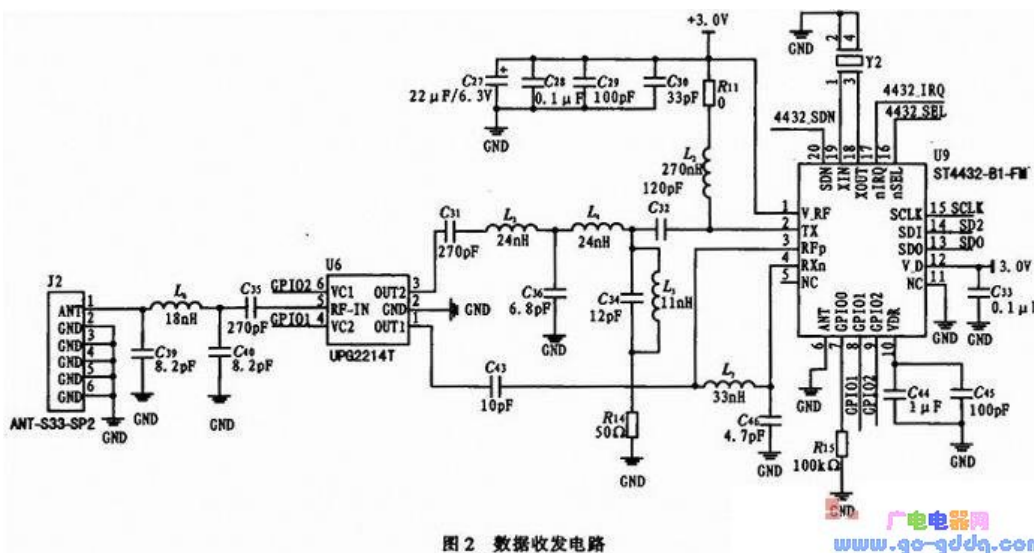
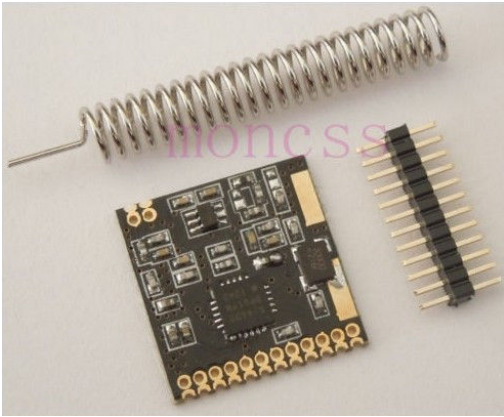
## SI4432 M470 Details

4 August, 2020

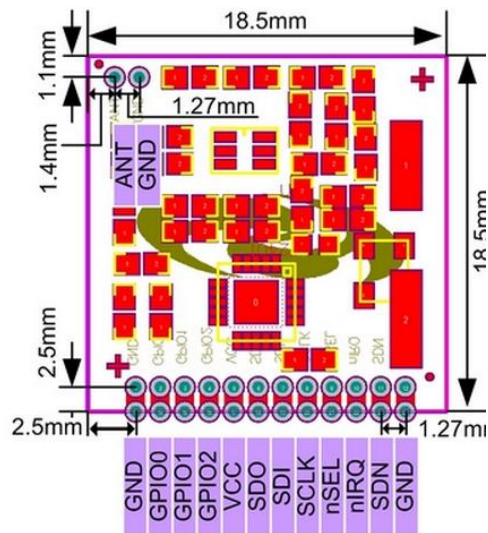
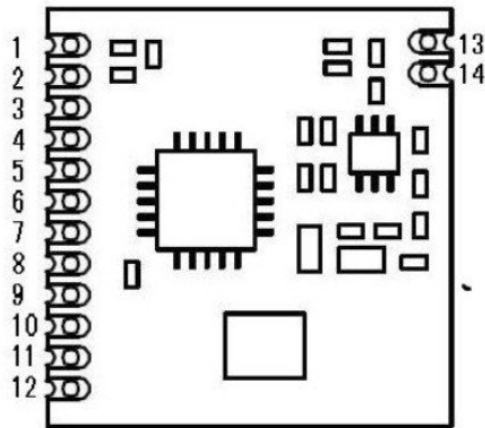
0:11

### The tranceiver 470M

Be aware that the pin spacing of this module is small, 0.05 inch (where 0.1 inch is the standard). The module has a SI4432 tranceiver, Xtal and a receive and transmit circuit. The board runs at 3V3.



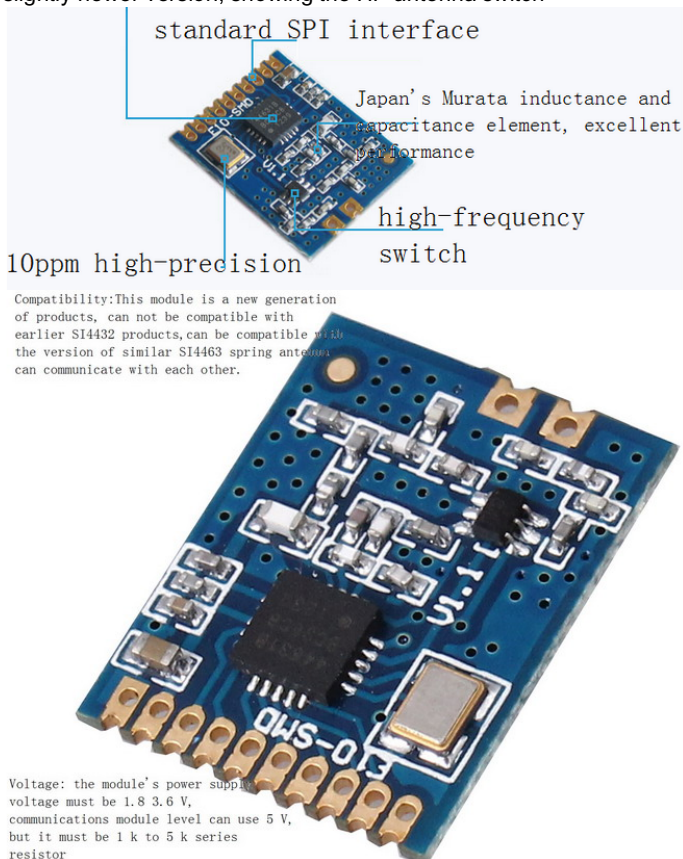
The GPIO-pins to the antenna-switch are not correctly shown in the above figure. In fact the antenna switch is controlled by GPIO-0 and GPIO-1 (drive capability of the port is not important and can be left to 00).



- 1 CND power supply
- 2 GPIO0 internal module, launch control foot
- 3 GPIO1 internal access module to accept control foot
- 4 GPIO2 directly connected to the chip GPIO2 pin
- 5 VCC positive supply 3.3V
- 6 SDO 0-VDD V digital output provides a serial readback function of the internal control register
- 7 SDI serial data input. 0-VDD V digital input, this pin for 4-wire serial data clock function
- 8 SCLK serial clock input. 0-VDDV last month set of inputs. This pin provides a 4-wire serial data clock function
- 9 NSEL serial interface select input pin, 0-VDDV digital input. This pin to 4-wire serial data bus select / enable function, this signal is a read / write mode.
- 10 nIRQ interrupt output pin
- 11 SDN Close the input pin. Input 0-VDDV digital. SDN = 0 in shutdown mode, so mode
- 12 GND access power ground
- 13 ANT 50 ohm coaxial antenna

Datasheet: <http://www.dorji.com/docs/data/DRF4432F20.pdf>

a slightly newer version, showing the HF-antenna switch



The datasheet of the RF-antenna switch can be found here

## LNA and Transmit Power

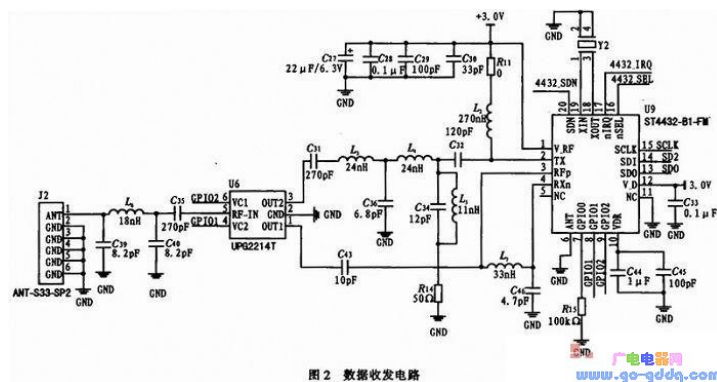
Conclusion: wait at least 40 msec (and not 16..20) after a reset, before communicating with the SI4432.

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". Therefore 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 )
1642
1643

```

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 switch 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 output 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

```