**SDR-Micron protocol description V.1.1**

Initialization device

In order to successfully start this device, the PC program should make an initialization of FTDI chip and send specific commands. At first, to gain access to the FTDI chip, it should be opened with command openEx(serial), where ‘serial’ is a defined serial number of FTDI device, then setBitMode(255, 0) for the reset and setBitMode(255, 64) for the switch of the FTDI chip to the correct mode.  
 After that, the PC program should wait 0.5 second for the reset of the internal logic. Then, during the next 0.5 seconds, the PC program can keep the device in the bootloader mode by sending the command:

Bootloader Mode Commands

All the packets start preamble 7\*h55 + delimiter hd5\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Preamble + ‘SBL’ + 21 binary zeroes

Reply from device:

The same.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If the entry to the bootloader mode was successful, the green LED on the device will glow continuously and the red LED will blink with a half second period.

In order to load the normal working mode from the bootloader mode, PC should send the following command:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Preamble + ‘RFW’ + 21 binary zeroes

Reply from device:

No

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Erase flash memory, to device

Preamble + ‘ERS’ + SN + 20 binary zeroes

Where SN is “sector’s number”, from 0 to 21

Reply, from device:

The same, after finishing.

Data 256 bytes (a page) for writing to the flash memory, 288 bytes total

Preamble + ‘WPD’ + 21 binary zeroes + 256 bytes of data

Reply from device, after finishing:

Preamble + ‘WPD’ + 21 binary zeroes

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If the device was not left in the bootloader mode by the commands written above, the device will automatically switch to the normal working mode in one second after initialization.

Normal Mode Commands

RX control, to device

Preamble + ‘RX0’ + enable + rate + 4 bytes frequency + attenuation + 14 binary zeroes

where bytes:

enable – binary 0 or 1, for enable receiver

rate:

binary

0 for 48 kHz,

1 for 96 kHz,

2 for 192 kHz,

3 for 240 kHz

4 for 384 kHz

5 for 480 kHz

6 for 640 kHz

7 for 768 kHz

8 for 960 kHz

9 for 1536 kHz

frequency – 32 bits of tuning frequency, MSB is first

attenuation – binary 0 to 31 for needed attenuation

No return to PC

Band Scope control, to device, 32 bytes total

Preamble + ‘BS0’ + enable + period + 19 binary zeroes

Where period is the full frame period in ms, from 50 to 255, 100ms is recommended for 10Hz refresh rate window.

No return to PC

RX data, to PC, 508 bytes total

Preamble + ‘RX0’ + FW1 + FW2 + CLIP + 2 zeroes + 492 bytes IQ data

Where:

FW1 and FW2 – char digits firmware version number

CLIP – ADC overflow indicator, 0 or 1 binary

IQ data for 0 - 7 rate:

82 IQ pairs formatted as “I2 I1 I0, Q2 Q1 Q0…..”, MSB is first, 24 bits per sample

IQ data for 8 - 9 rate:

123 IQ pairs formatted as "I1 I0, Q1 Q0..... ", MSB is first, 16 bits per sample

Band Scope data, to PC, 16384 16bit samples, 32768 bytes by 492 in each packet

Preamble + ‘BS0’ + FW1 + FW2 + CLIP + PN + 1 zero + 492 bytes BS data

Where PN is packet number,

BS data in format “BS1, BS0, BS1, BS0, …..”, MSB is first

\*PN=0-65 packets contain by 492 bytes and PN=66 packet contain the rest 296 bytes of data and junk

data to full 492 bytes size

After using the device, the PC program should set the FTDI chip in reset mode with setBitMode(255, 0) then close the connection with close().