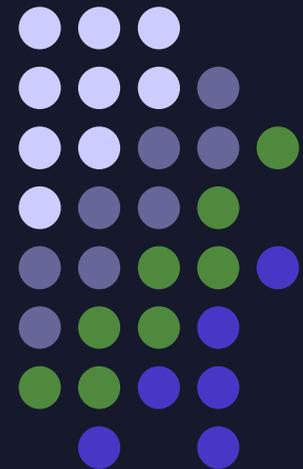


MiniTiouner & MiniTiounerPro

Create your own DVB-S/S2
USB receiver

CAT16 24/09/2015

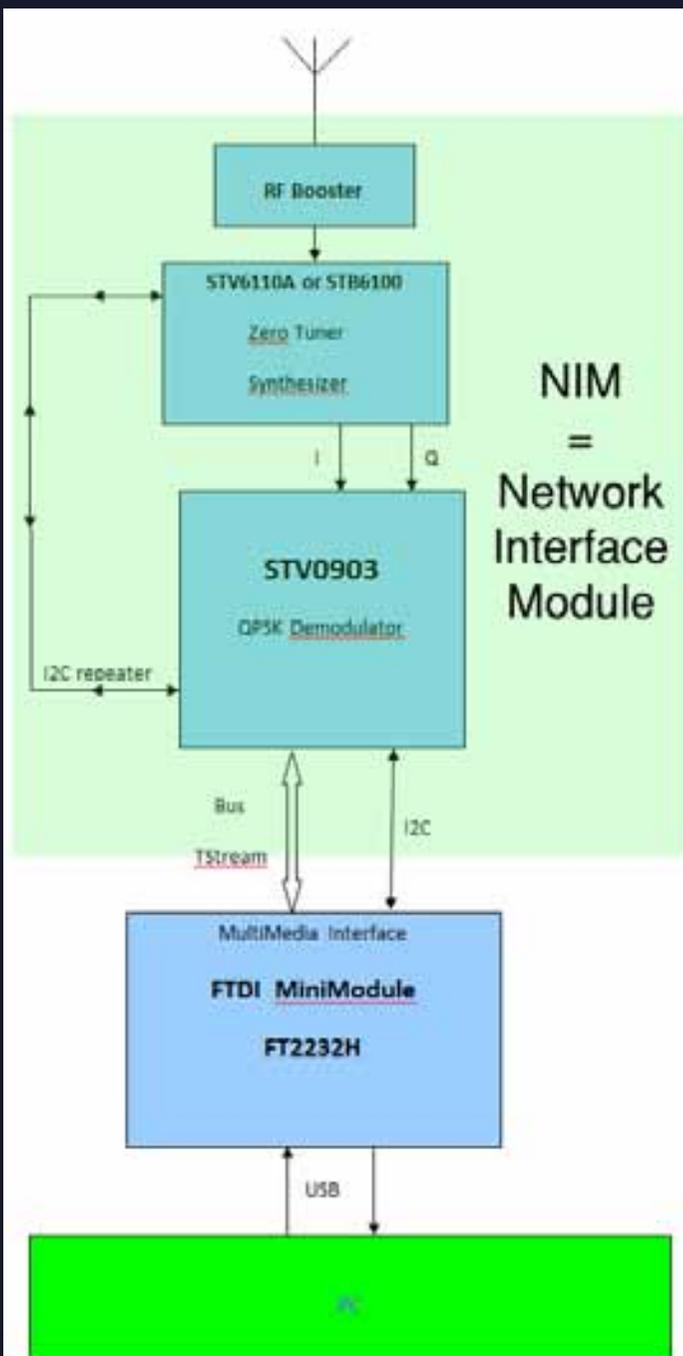
Jean Pierre Courjaud F6DZP





MiniTiouner Internals

- L-Band receiver
- Wide band or **Narrow band**, phase modulated signal
- STB6100 Or STV6110 processes RF signal
- Analogue differential I and Q signals
- QPSK demodulator, STV0903, Processes I and Q signals
- Transport Stream is transferred to the PC via the FTDI Mini-Module FT2232H, connected to the USB input of the PC.
- The software sends instructions to setup STV0903 via USB / I²C. The instructions are sent to the STB6100 or STV6110 synthesizer via an I²C repeater.

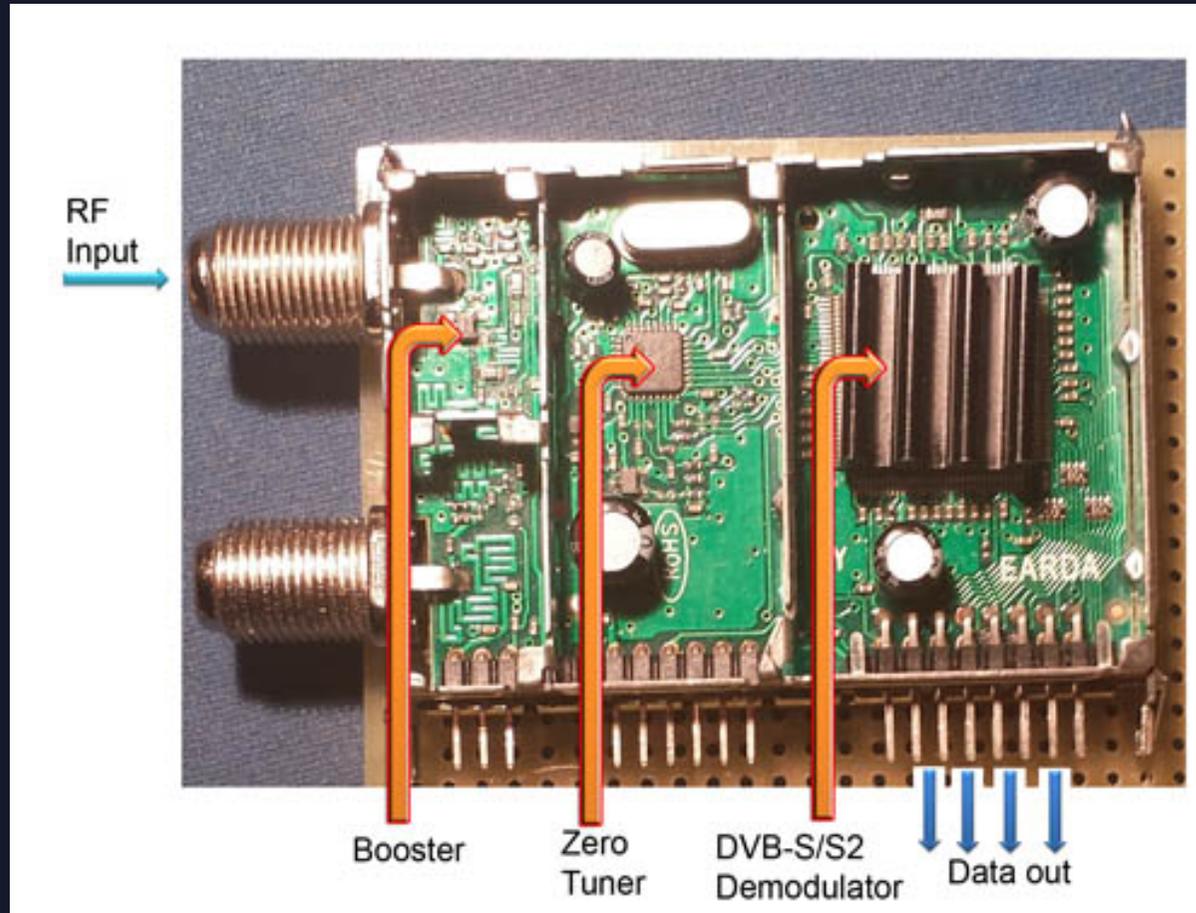
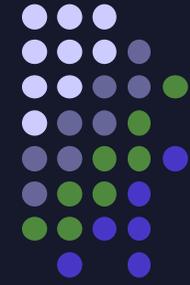


We use a NIM

Network Interface Module



Samsung



Eardatek

Which NIM must I use?



To be sure that it works well at low SR, we must chose a NIM using a STV0903 as the demodulator.

In 2015, I have selected 3 kinds of NIM.

Samsung

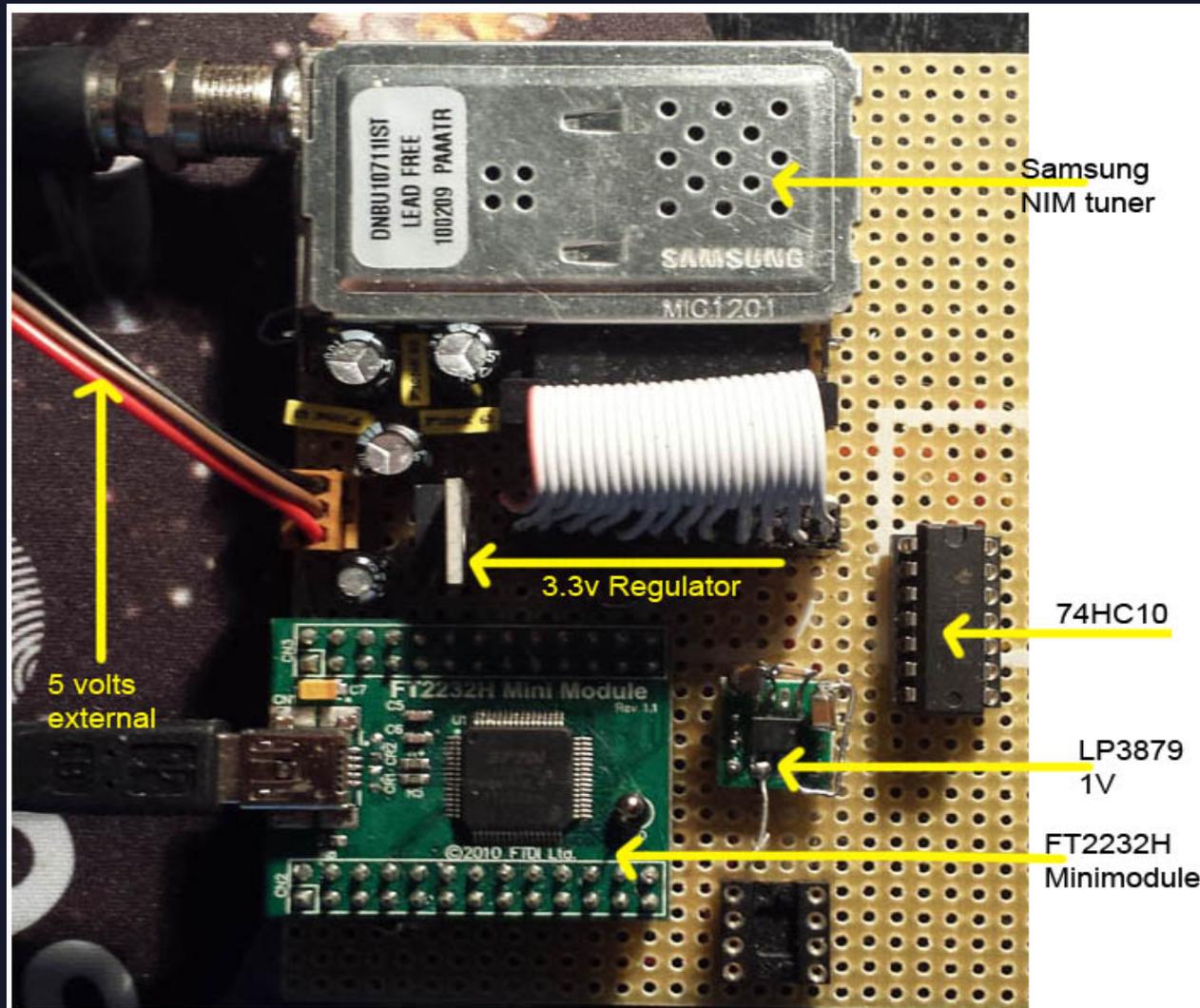
Sharp

Eardatek

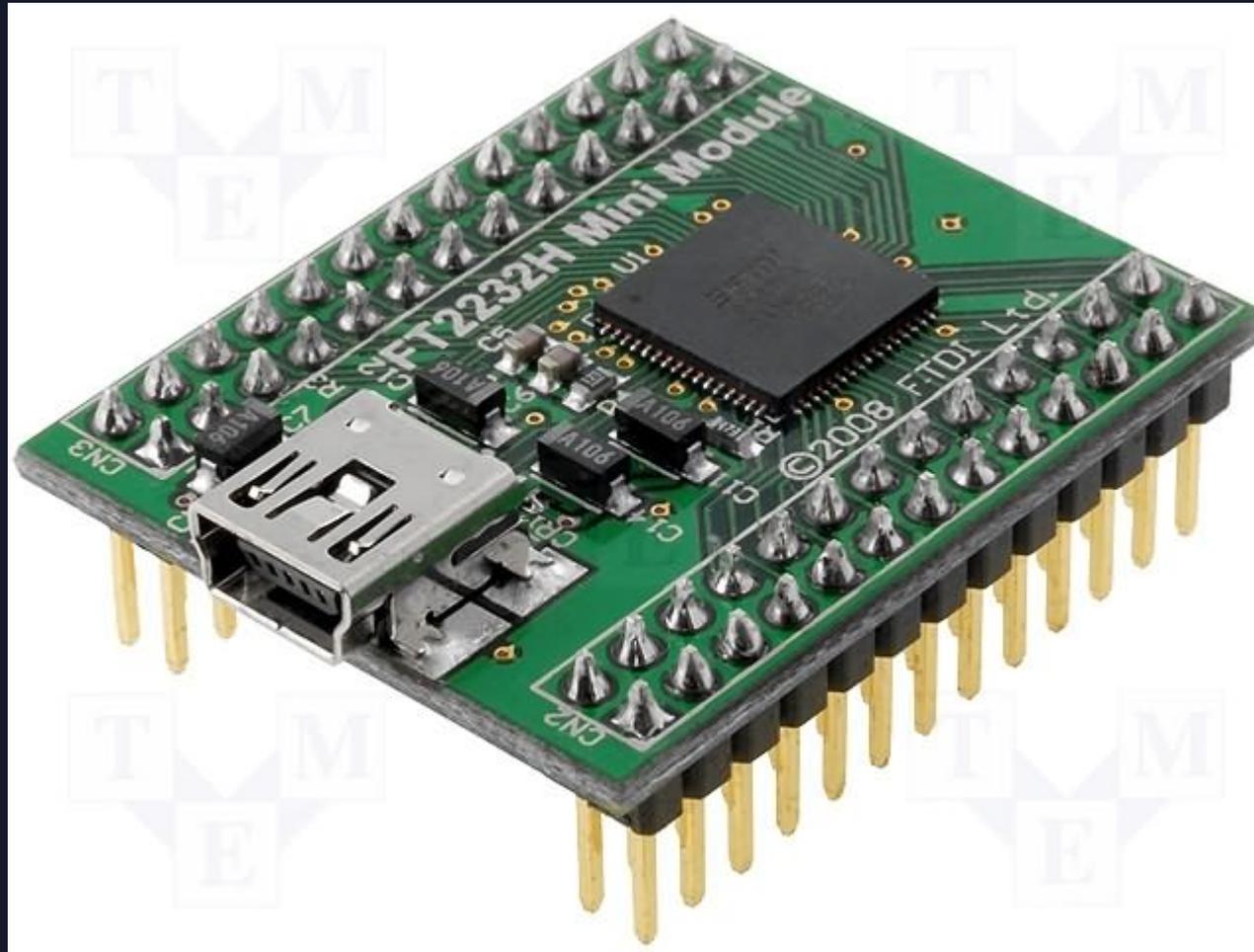


In 2016, I have added 2 new NIMs : **LG** and **Serit** with **STV0913**

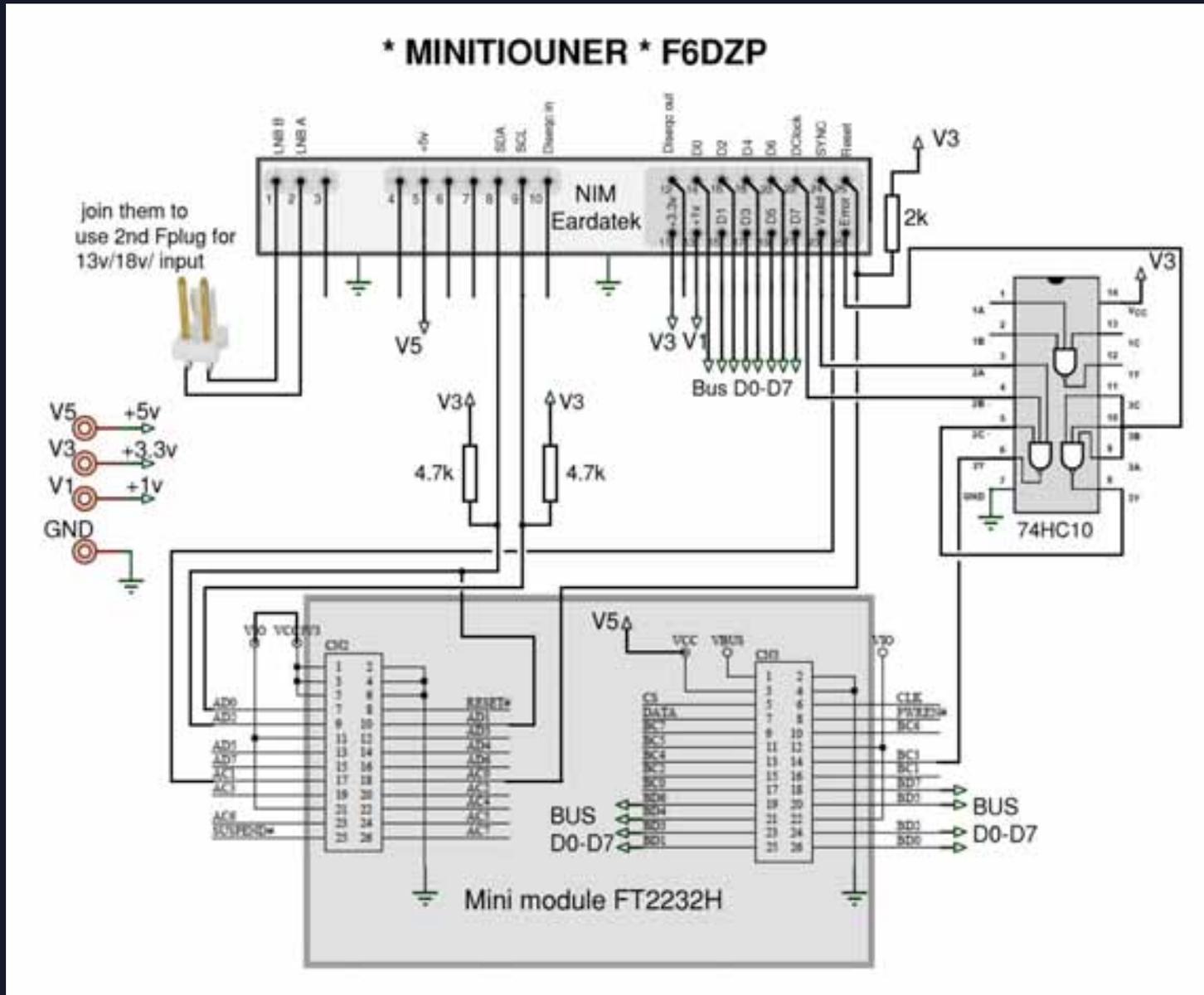
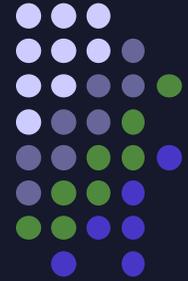
First prototype in March 2015



The USB mini module FT232H



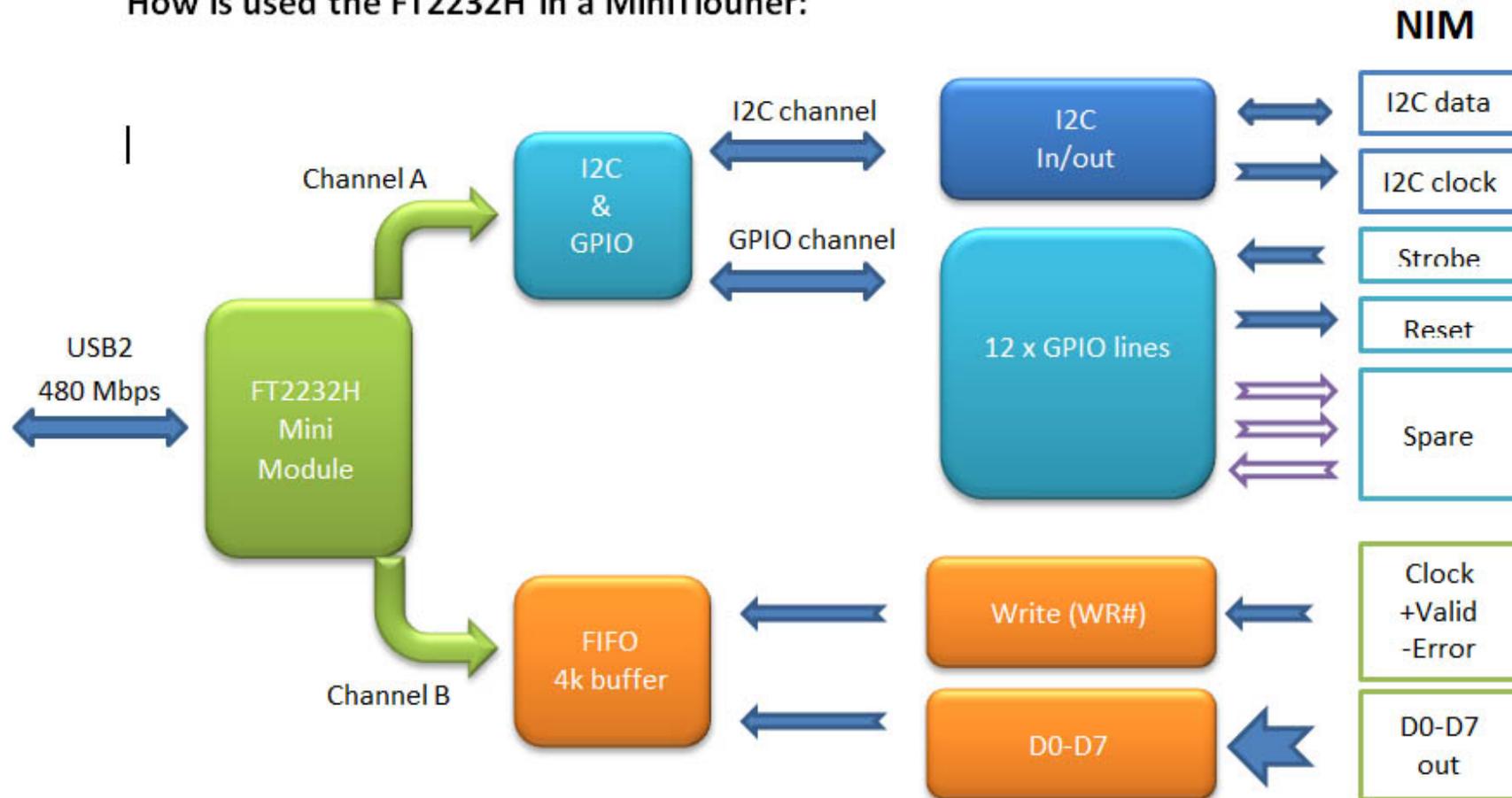
Minitiouner: basic Schematic



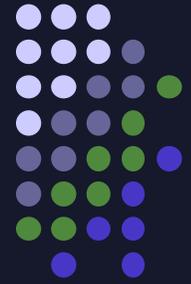
FT2232H configuration



How is used the FT2232H in a MiniTiouner:



MiniTouners...



Pipo can run MiniTioune



- A little PC running Win8.1
- Intel Atom Quad Core
- 4 USB + 1 micro USB
- HD touchscreen (1280x800)
- HDMI output
- Wi-Fi and Bluetooth
- 12v 480mA when receiving and rendering video
- Less than \$110

Using a Pipo X8



Software : Minitioune v0.1 April 2015



MINITIOUNE v0.11, beta- DVB-S Receiver/Analyser - 630 MHz to 2600 MHz- for PCI MiniTouner(FTD2232H+ NEM)

BaseBand Gain Synth: Bandwidth
14 dB Auto 36 MHz

MiniToune DVBS by F6DZP
TV mode: DVBS

SR (kS) Freq (kHz)
00250 01255000

Offset -> 00000000

SR250 1255 MHz
SR500 2395 MHz
SR800 12550 MHz
SR1000 Uoaly MHz
SR4000 437 MHz

FEC Low SR
 1/2 NoDoppler
 2/3
 3/4 FT232H
 5/6 FT4232H
 6/7
 7/8 ISS

Web Station ID:1
F6DZP
MIGNE-ADVANCES
JN0GDP Preamp 20 dB
Ant. Dir. East Gain 12 dB
Picture Video QSL Auto Stop
Lg Msg 0000
Lg Pic 0000
Web WebEx
Timing 3 sec 00000 0

Frequency (kHz)
Freq set: 1254999 kHz
Deviation: 27 kHz
Freq -> 1255026 kHz
Carrier Width: 338 KHz

Scan strategy
scan mode: search
 no loop
 loop wide
 loop narrow
 chained
scan range: wide
 narrow

PreLock PostLock
wide range: 10 narrow range: 5
Timer1: 8 Timer2: 2.5

Symbolrate (kS)
SR set: 249664S Mode: A
Deviation: 339S
SR -> 250 kS/s

Derotator ON/OFF
Derotator: Off On
Algo1: costas citoen1 citoen2
Algo2: CNR > 7dB CNR < 7dB native

Equalizer
Equalizer: Off
 frozen
 very slow
 median
 lastest

IQ Swap: OFF Compensation I: 72 Q: 71
DCOffset: Off On Off last On fixed
Imbalance: Off On Off last On fixed
Quadrature: Off On Off last On fixed

Level x2

Error/Event
Error/Event Type
 demod bit errors
 Viterbi errors
 Viterbi(ReedSolo) bit error
 Viterbi(ReedSolo) Byte error
 Frame rate LDPC(S2)
 Viterbi(ReedSolo) bit BER
 Viterbi(ReedSolo) Byte BER
 Viterbi(ReedSolo) packet error
 bad dm+sync (S2)
 TS error count, packet error final
 TS RFD
 Frame7 DFL
 packet rate

AGC Tunes = 10011 U
Period: Cb/64 Cb/16
dB 68
-12dB
-34
-AGC1
AGC Integrator = 212 U
dB 46
-23
-AGC2

S/N NOISE Absolute
NDS speed: 2^20/slow
 2^18
 2^16
 2^14
 2^12
 2^10
 2^8
 2^0last
Normalized

Constellations
Point of measure:
 Demod output
 equs output
 derot2 output
 Symbol+inter output
 symbols output
 inter symbol output
 derot1 output
 IQ mismatches out
 demod input

Error counter
Nbs of Event
 count with reset
 count without reset
 2^14
 2^16
 2^20
 2^22
 average

Carrier Lock 100%
Timing Lock 100%

Power RF -80 dBm
MER 13.0 dB

Constellations

Viterbi error 0
Vber 0.00
Fec 7/8

Bytes recvd: 5748288

TS Status
TS error 0
Shipped buffers: 000000

Beep DSave UDP Record
IN GetTS OUT Info
Quit

We use VLC to see the video



The screenshot displays the MiniToune DVB software interface, which is used for receiving and analyzing DVB-S signals. The interface is divided into several sections:

- Top Left:** SR (kS) and Freq (MHz) fields showing 00250 and 01255000 respectively. Below are Offset and a list of SR options (SR250 to SR4000).
- Top Center:** BaseBand Gain, Synth, and Bandwidth settings. The TV mode is set to DVBS.
- Top Right:** AGC Tuner, AGC1, and AGC2 meters showing signal strength in dB.
- Middle Left:** Frequency (kHz) set to 1255000 kHz, Deviation: -89 kHz, and Freq → 1254911 kHz. Carrier Width is 338 kHz.
- Middle Center:** Scan strategy (no loop, loop wide, loop narrow, chained) and Error/Event type (demod bit error, Video error, etc.).
- Middle Right:** S/N NOISE Absolute and Normalized meters.
- Bottom Left:** Symbolrate (kS) set to 2499385, Deviation: 395, and SR → 250 kS/s.
- Bottom Center:** Derotator DN/OFF and IQ Swap: OFF settings.
- Bottom Right:** Carrier Lock (100%), Timing Lock (100%), Power RF (-42 dBm), MER (31.0 dB), and Constellations display.

In the center of the interface, a VLC media player window is open, displaying a video stream. The video shows a colorful test pattern (rainbow bars) and the text "Sat 720i-576". The VLC window title is "sdcp://230.0.0.1:1234 - Lecteur multimédia VLC".

MiniTioune V0.2a Sept 2015



MINITIOUNE v0.2a - DVB-S Receiver/Analyser - 650 MHz to 2600 MHz - for MiniTouner(FTD232RL-NIM)

SR (kS) Freq (kHz)
04000 01256045

Offset -> 00000000

SR250 437R MHz
SR500 2395 MHz
SR800 1255p MHz
SR1000 Uoaly MHz
SR4000 437 MHz

FEC Low SR
 1/2 NoDoppler
 2/3 3/4
 5/6 6/7
 7/8 ISS

Web Station ID:1
F637P

MIGNE ADVANCES
JN06DP Preamp 20 dB
Ant. Dir. East Gain 12 dB

Picture Video DSL Auto Stop
Lg Mrg 1373
Lg Pic 00000
Web WebE

Timing 3 sec 0



PIDs to decode

Pid from .ini

Station1 autoPID

F6D2PH264 PID Video 01001

HDlowSR PID audio 01002

France24

QRZ DX

RaspberryP

Format 4/3 16/9 1/1 auto

Width: 768
Height: 576
Format: 4/3

Zoom min x1 max

Hit ESC to change display formats

GRAPH

Station Station1

infos: no comment

Provider:

Codec: Mpeg2

photo

Look at Web pictures

Audio level

Info

Carrier 100%
Timing Lock 100%

Power RF -85dBm
S/N MER 30.0 dB

Constellations

Web bit 0
Vber 0%

Fec 3/4

Bytes movd: 114691052

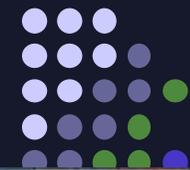
TS Status
TS err 0
Skipped Buffer: 00000

Beep Osave UDP Expert Record

Quit

IN GetTS OUT

Minitioune v0.2 Expert mode



MINITIOUNE v0.2a - DVB-S Receiver/Analyser - 650 MHz to 2600 MHz- for MiniTouner(FTD232RL+NIM)

MiniTouner DVB
TV mode: DVBS

NIM : SHARP/Samsung

AGC Tuner = 40641 U

AGC Integrator = 92 U

AGC1: 56dB

AGC2: 46dB

S/N NOISE Absolute

NDS speed

Normalized

Station Station1

Infos : no comment

Provider:

Codec : H264

photo

Look at Web pictures

Audio level

Info

SR (kS) Freq (kHz)
00250 01256045

Offset -> 00000000

SR250 437R MHz

SR500 239S MHz

SR800 1255a MHz

SR1000 Uqaly MHz

SR4000 437 MHz

FEC 1/2 2/3 3/4 5/6 6/7 7/8

Low SR NoDopples

23kHz

ISS

Web Station ID: 1

F682P

MIGNE-ALDANCES

JN06DP Preamp 20 dB

Ant. Dr. East Gain 12 dB

Picture Video QSL Auto Stop

Lg Hrg 0000

Lg Pic 0000

Web WebEr

Timing 3 sec 00000 0

BaseBand Gain Synth. Bandwidth
0 dB Auto 10 MHz

Frequency (kHz)
Freq. set: 1255000 kHz
Deviation: -90 kHz
Freq -> 1254910 kHz
Carrier Width: 330 KHz

Scan strategy
scan mode: 1 search
 no loop loop wide loop narrow chained
scan range: wide narrow

PreLock PostLock
wide range 10 narrow range 5
Timer1 0 Timer2 2.5

Equalizer
Equalizer Off frozen very slow median fastest

Derotator ON/OFF
Derotator Off On
Algo1 costas choen1 choen2
Algo2 ChR=7dB ChI=-7dB native

IQ Swap: ON Compensation I: 77 Q: 70

DCOffset Imbalance Quadrature
 Off On Off On Off On
 Off last On last Off last On last Off last On last

Level x2

Level: -1 -16 Imbal= 1.97 Quadra= 1.97

Error/Event
Error/Event Type
 demod bit errors
 Viterbi errors
 Viterbi(Feed5olo) bit error
 Viterbi(Feed5olo) byte error
 Frame rate LDPC(52)
 Viterbi(Feed5olo) bit BER
 Viterbi(Feed5olo) byte BER
 Viterbi(Feed5olo) packet er
 Viterbi(Feed5olo) packet er nbr
 bad dm+sync (52)
 TS error count, packet error final
 TS FIFO
 Frame7 DFL
 packet rate

Constellations
Point of measure
 Demod output
 equis output
 dect2 output
 Symb+inter output
 symbols output
 inter symbi output
 dect1 output
 IQ mismatches out
 demod input

Error counter
Nbr of Event
 count with reset
 count without re
2^14
2^16
2^18
2^20
2^22
average

Carrier Lock 100%

Timing Lock 100%

Power RF -60 dBm

MER 15 dB

Constellations

Viterbi 0

Vbar 0%

Fec 7/8

Bytes recvd: 1019040

TS Status

TS nr 0

Skipped Buffer: 000000

Deep Drive UDP Expert Record

IN GeTS OUT

Quit

Minitioune v0.4c Expert mode



MINITIOUNE v0.4c - DVB-S Receiver/Analyser - 650 MHz to 2600 MHz - for MiniTouner(FTD232RL+NM)

SR (kS) Freq (kHz)
02000 01255000
Offset -> 00000000

SR2000 12550 MHz
SR125 2395 MHz
SR250 43720 MHz
SR4000 43700 MHz
SR27500 43700 MHz

FEC Low SR
 1/2 23kHz
 2/3 OFF
 3/4 ON
 5/6 TS_OK
 7/8 ISS

Web Station ID:1
F6DZP
MIGNE-AIDANCES
JN06DP Preamp 20 dB
Ant. Dir. East Gain 12 dB
Picture Video QSL Auto Stop
Lg Msg 0000
Lg Pic 0000
Web WebEr
Timing 3 sec 00000 0

Tuner BaseBand Gain 0 dB Auto

MiniToune DVB by F6DZP NIM: SHARP/Samsung TV mode: searching

Frequency (kHz)
Freq. set: 1255000 kHz Target Freq: 1255000kHz
Freq -> 1255167 kHz

Target Dev 0 Deviation: 167 kHz

Scan strategy
scan mode: no loop search
 loop wide scan range: wide narrow
 loop narrow chanced

PreLock wide range: 12 Timer1: 8
PostLock narrow range: 10 Timer2: 3.0

AGC1: 68 dB
AGC2: 46 dB

PIDs to decode
Pid from 0000
F6DZP-Mpeg2 AutoPID
F6DZP-H264 PID Video
HDlowSR 01001
France24 PID audio 01002
GR2 DX
RaspberryPi
Codec: Mpeg2 H264
Format: 4/3 Width: 720
 16/9 Height: 540
 1/1 Format: ?
 auto
Zoom: adapt x1 none
GRAPHI

Station: F6DZP-Mpeg2
infos: no comment
Provider:
Codec: Mpeg2
photo:
Audio level:
Info

Scan width:
 +/- 8000 kHz
 +/- 4000 kHz
 +/- 2000 kHz
 +/- 1000 kHz
 +/- 500 kHz
 +/- 250 kHz
 +/- 125 kHz

Symbolrate (kS) Mode: A B
SR set: 1987812S
Deviation: -10353S
SR -> 1977 kS/s
Carrier Width: 2684 KHz

IQ Swap: OFF
x2

I: 3 Q: 3 Equa Noise

No Video or bad codec/PID

Carrier Lock: 29%
Timing Lock: 0%
Power RF: -112 dBm
MER: 8.0 dB

Constellations

WebEr:
Vber: 100%
Fec: ???
Bytes recvd: ????????

TS Status:
TS err:
TS Buffer: 7096 bytes

Beep Drive UDP Expert Record
IN GetTS OUT
Quit

Minitioune v0.4c Expert mode



The screenshot displays the Minitioune v0.4c Expert mode interface, which is a software-defined radio receiver/analyser. The main window title is "MINITIOUNE v0.4c - DVB-S Receiver/Analyser - 650 MHz to 2600 MHz- for MiniTouner(FTD232RL+NIM)".

SR (kS) Freq (kHz): 04000 01255000
Offset: 00000000

Tuner: BaseBand Gain 0 dB Auto

Frequency (kHz): Freq. set: 1255000 kHz Target Freq: 1254991kHz
Freq → 1254993 kHz

Scan strategy: scan mode: 1 search; scan range: wide; PreLock: wide range 12; PostLock: narrow range 10; Times1: 8; Times2: 3.0

AGC1: 60 dB; **AGC2:** 46 dB

Symbolrate (kS): SR set: 3976535S; Deviation: 24853S; SR → 4001 kS/s; Carrier Width: 5369 KHz

Web Station ID-1: F6DZP; MIGNE-AUXANCES; JND6DP; Ant. Di: East; Gain 12 dB

Scan width: +/- 8000 kHz, +/- 4000 kHz, +/- 2000 kHz, +/- 1000 kHz, +/- 500 kHz, +/- 250 kHz, +/- 125 kHz

IO Swap: OFF x2; L: 14 Q: 14; Equa; Noise

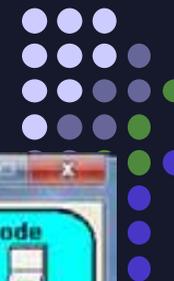
PIDs to decode: Station1; F6DZP-H264; HDlowSR; France24; QRZ DX; RaspberryP; Format: 4/3; Width: 768; Height: 576; Codec: Mpeg2; H264

Station1: no comment; Provider: Codec: Mpeg2; photo; Audio level; Info

Carrier Lock: 100%; **Timing Lock:** 100%; **Power RF:** -98dBm; **S/N MER:** 15.0 dB; **Constellations:** (displayed)

Buttons: Carrier, SR, Full, RF Pw, S/N MER, Constellations, Vber, Fec 3/4, TS Status, Bytes recvd: 303481444, Quit

Minitioune v0.4c June 2016



MINITIOUNE v0.4c - DVB-S Receiver/Analyser - 650 MHz to 2600 MHz- for MiniTouner(FTD232R+NM)

SR (kS) Freq (kHz)
04000 01255000

Offset-> 00000000

SR2000 1255p MHz
SR125 2395 MHz
SR250 437za MHz
SR4000 437ae MHz
SR27500 437ve MHz

FEC Low SR
 1/2 23kHz
 2/3 OFF
 3/4 ON
 5/6 TS_OK
 7/8 ISS

Web Station ID:1
F632P
MIGNE-AUXANCES
JN06DP Preamp 20 dB
Ant. Dir. East Gain 12 dB

Picture: Video QSL Auto Stop
Lg Msg 0000
Lg Pic 0000
Web WebEr

Timing 2 sec 00000 0



PIDs to decode

Pid from .ini

Station1 AUTOPID

F6D2P-H264 **PID Video**

HDlowSR **01001** **PID audio**

France24 **01002**

QRZ DX

RaspberryPi

Codec: Mpeg2 H264

Format: 4/3 Width: 768
 16/9 Height: 576
 1/1 Format: 4/3
 auto

Zoom: adapt x1 max

Hit ESC to change 5 display formats

GRAPH

Station Station1

info: no comment

Provider:

Codec: Mpeg2

photo

Audio level

Info

Carrier Lock 100%
Timing Lock 100%

Power RF -64dBm
S/N MER 31.0 dB

Constellations

Vber 0
Fec 3/4

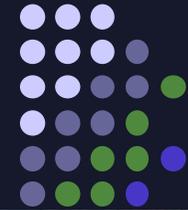
Bytes recvd: 36838788

TS Status
TS en 0
TS Buffer: 7896 bytes

Quit

IN GetTS OUT

Minitioune v0.5 Sept 2016



MINITIOUNE v0.5beta - DVB-S/S2 Receiver/Analyzer - 850 MHz to 2600 MHz - for MiniTrainer(FT10222H+NM)

SR (kS) Freq (kHz)
04000 01265000
Offset -> 00000000
SR2000 1255a MHz
SR125 2395 MHz
SR250 437za MHz
SR4000 437ae MHz
SR27500 437ve MHz

Low SR
FEC 1/2 3/5 2/3 3/4 4/5 5/6 6/7 7/8 8/9 9/10
DVB mode DVB-S DVB-S2 AUTO

Web Station ID: 1
F637P
MIGNE-ADVANCES
JN06DP Pleamp 20 dB
Ant. Dir: East Gain 12 dB
Picture Video QSL Auto Stop
Lg Msg 0000
Lg Pic 0000
Web WebEx
Timing 3 sec 00000.0

PIDs to decode
Pid from ini
Station1 AutoPID
F6DZPH264 PID Video
HDlowSR PID audio
France24 01001
QRZ OK 01002
RaspberryPi
Format 4/3 16/9 1/1 auto
Width: 1280 Height: 720 Format: 16/9
Zoom auto x1 max
Hit ESC to change 5 display formats
GRAPH

Station Station1
info: no comment
Provider:
Code: H264
photo
Audio level
 Info OSS

Carrier 100% Timing Lock 100%
Power RF -57 dBm MER 32 dB
Constellations

Web on 0
Delta 0%
BPSK 3/4
Bytes recvd: 71893880
TS Status
TS in 0
TS Buffer: 7896 bytes
IN GetTS OUT
Quit

Minitioune v0.5 = DVB-S and S2



The screenshot displays the Minitioune v0.5beta software interface, a DVB-S/S2 Receiver/Analyser. The interface is divided into several functional panels:

- SR (kS) Freq (kHz):** Shows 04000 and 01255000. Includes a list of SR options: SR2000 (12550 MHz), SR125 (2395 MHz), SR250 (43720 MHz), SR4000 (43700 MHz), and SR27500 (43700 MHz).
- Tuner:** BaseBand Gain is 0 dB. Frequency is set to 1255000 kHz, with a target of 1254991 kHz. Target Dev is -9 kHz, and Deviation is -9 kHz.
- Scan strategy:** Includes scan mode (no loop, loop wide, loop narrow, chained), scan range (wide, narrow), PreLock (wide range: 12, narrow range: 10), and PostLock (Timer1: 0, Timer2: 3.0).
- AGC meters:** Shows AGC1 at 26 dB and AGC2 at 31 dB.
- FEC and DVB mode:** A red circle highlights the FEC settings (1/2, 2/3, 4/5, 6/7, 8/9) and DVB mode (DVB-S, DVB-S2, AUTO).
- Symbolrate (kS):** SR set is 3976535S, Deviation is 24853S, and SR is 4001 kS/s. Carrier Width is 5369 Khz.
- Web Station ID:** Displays F6DZP and MIGNE-ADVANCES.
- Scan width:** Options range from +/- 9000 kHz to +/- 125 kHz.
- IQ Swap:** Shows three graphs for I, Q, and Noise.
- Station List:** A table with columns for Station, PID Video, and PID audio. Station1 is selected with PID Video 01001 and PID audio 01002.
- Format and Zoom:** Format is 4/3, Width 768, Height 576, Format 4/3. Zoom options are adapt, x1, and maxi.
- Carrier Lock:** Shows 100% Carrier Lock and 100% Timing Lock.
- Power and MER:** Power RF is -57 dBm, and S/N MER is 34 dB.
- Constellations:** A constellation diagram showing a circular pattern.
- Modulation:** A red circle highlights the modulation type: 8PSK 3/5.
- Status and Controls:** Includes a 'Quit' button, 'Bytes recvd: 12279596', and 'TS Status' (TS in: 0, TS Buffer: 7896 bytes).

Minitioune v0.5 DVBS2-low SR



MINITIOUNE v0.5beta - DVB-S/S2 Receiver/Analyser - 650 MHz to 2600 MHz - for MiniTouner(FTD232RL+NIM)

Tuner BaseBand Gain: 0 dB Auto

SR (kS) Freq (kHz)
00250 01255000
Offset -> 00000000

SR2000 1255p MHz
SR125 2395 MHz
SR250 437za MHz
SR4000 437ae MHz
SR27500 437ve MHz

Low SR
FEC: 1/2 2/3 4/5 6/7 8/9 3/5 2/4 5/6 7/8 9/10
DVB mode: DVB-S DVB-S2 AUTO

Frequency (kHz)
Freq. set: 1255000 kHz Target Freq: 1254995kHz
Freq -> 1254994 kHz
Target Dev -5kHz Deviation: -6 kHz

Scan strategy
scan mode: no loop 1 search loop wide loop narrow channel
scan range: wide narrow
PreLock: wide range 12 PostLock: narrow range 10
Timer1 0 Timer2 3.0
pll con: 0 auto

AGC1 26dB
AGC2 46dB

PIDs to decode
Pid from ini: Station1
Station1: F6DZP-H264 PID Video: 01001
HDlowGR: France24 PID audio: 01002
GR2 DX
RaspberryPi
Codec: Mpeg2 H264
Format: 4/3 Width: 320 Height: 240 16/9 1/1 Format: 4/3 ar/0
Zoom: adapt x1 max

Web Station ID: 1
F6DZP
MIGNE-AUXANCES
JN06DP Presamp 20 dB
Ant. Dir. East Gain 12 dB
Picture: Video QSL Auto Stop
Lg Msg 0000 Lg Pic 0000
Web WebEri
Timing 3 sec 00000 0

Scan width
 +/- 8000 kHz +/- 4000 kHz +/- 2000 kHz +/- 1000 kHz +/- 500 kHz +/- 250 kHz +/- 125 kHz

Symbolrate (kS) Mode: A B
SR set: 248475S
Deviation: 1553S
SR -> 250 kS/s
Carrier Width: 335 KHz

IQ Swap: ON OFF
x2
I: 72 Q: 74 Equa Noise

Station1
info: no comment
Provider:
Codec: H264
photo
Audio level: Info ISS

Carrier Lock 100%
Timing Lock 100%

Power RF -42dBm
MER 26 dB

Constellations

Weberr 0 Delin 0% QPSK 5/6
Bytes recvd: 466517300
TS Status: TS en 0 TS Buffer: 7896 bytes
IN GetTS OUT Quit

What new features does DVB-S2 offer?



Four modulation modes:

- **QPSK** and **8PSK** are proposed for broadcast applications, and can be used in non-linear transponders driven near to saturation.
- **16APSK** and **32APSK** are used mainly for professional, semi-linear applications, but can also be used for broadcasting though they require a higher level of available C/N and an adoption of advanced pre-distortion methods in the uplink station in order to minimize the effect of transponder linearity. (not offered with standard NIM)

What new features does DVB-S2 offer?



Improved coding

a modern large **LDPC code** is concatenated with an outer **BCH code** to achieve quasi-error free (QEF) reception conditions on an AWGN channel. The outer code is introduced to avoid error floors at low bit-error rates.

A single FEC frame may have either 64800 bits (normal) or 16200 bits (short) not offered with standard NIM.

Several code rates for flexible configuration

1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, and 9/10. Code rates 1/4, 1/3, and 2/5 have been introduced for exceptionally poor reception conditions in combination with QPSK modulation. (not offered with standard NIM)

What new features does DVB-S2 offer?



Improved rolloff:

0.20 and 0.25 in addition to the roll-off of DVB-S 0.35.

ACM/VCM : adaptive / variable coding modulation.

- Variable coding and modulation (VCM) to optimize bandwidth utilization based on the priority of the input data, e.g., SDTV could be delivered using a more robust setting than the corresponding HDTV service.
- Adaptive coding and modulation (ACM) to allow flexibly adapting transmission parameters to the reception conditions of terminals, e.g., switching to a lower code rate during fading. (not offered with standard NIM)

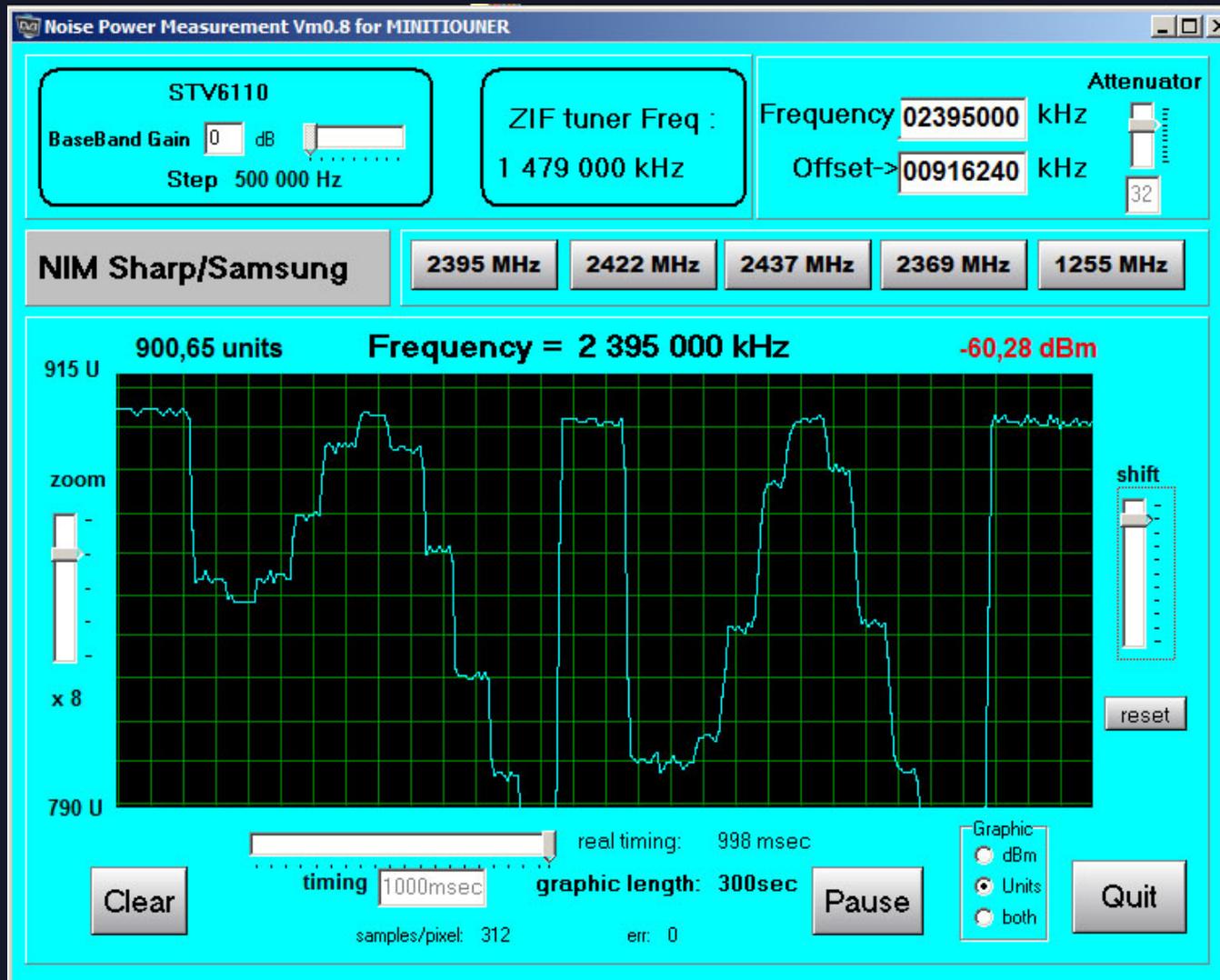
Should we use DVB-S2?

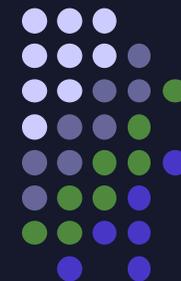


- At standard Symbol rate QPSK:
Better lock for lowest signal.
We could expect a gain of 2dB ???
- At low Symbol Rate QPSK:
Using a standard NIM, my first tests give me
a better result with DVBS
To be confirmed....
Using a NIM “pro”I have not tested yet,
but I suppose a better result.

Noise Power Measurement

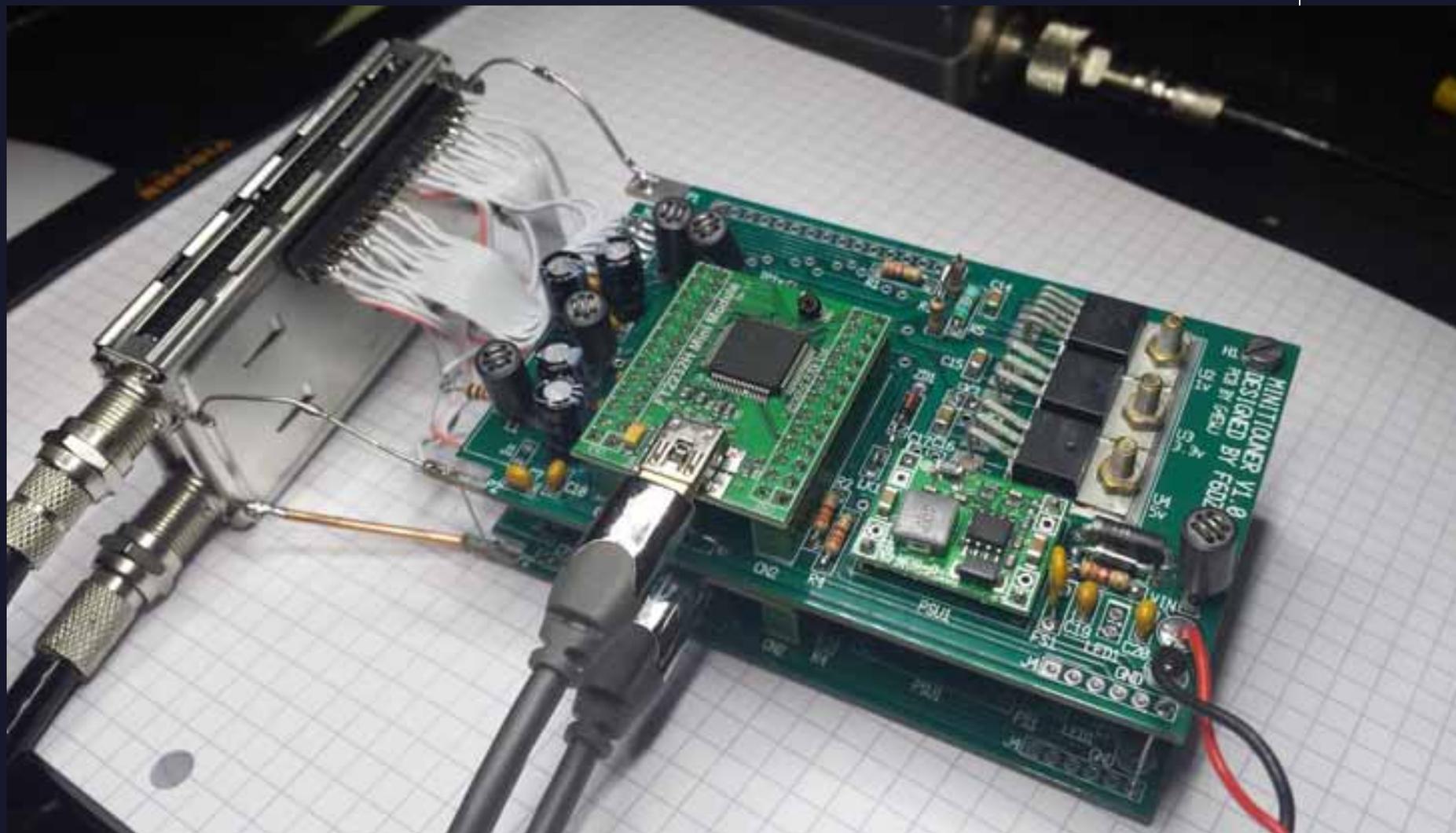
That helps for setting our tracking system, measuring the sun noise, using your MiniTiouner





MiniTiouner Pro

MiniTiouner Pro - prototype



MiniTiouner Pro



Using a NIM Pro : Serit FTS-4335

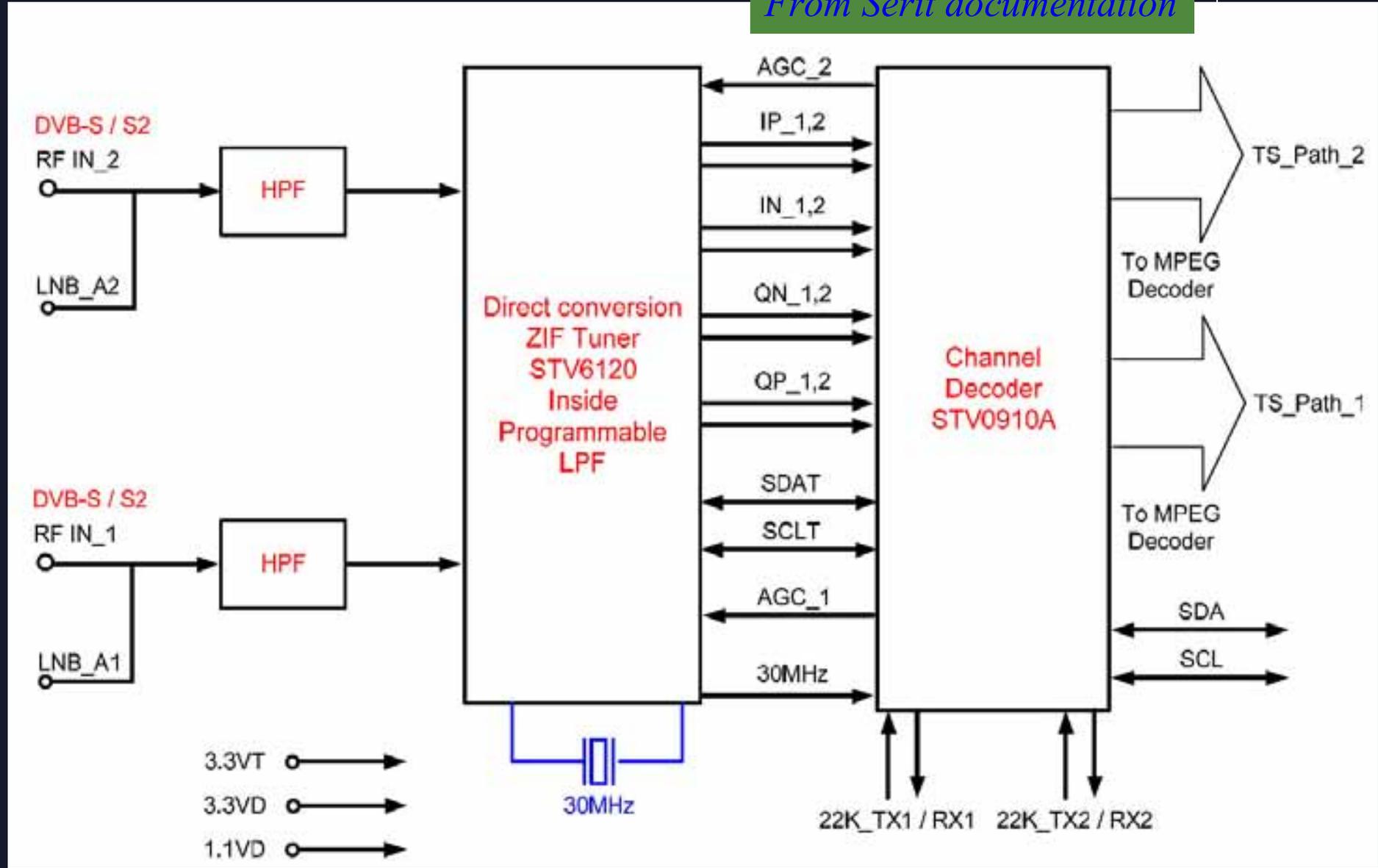
- 2 x RF inputs
- 2 x ZIF tuners **wide bandwidth**
- 2 x DVB-S/S2 demodulators **Advanced**
- 2 x TS parallel outputs



NIM FTS-4335



From Serit documentation



Why I call it « Pro » ?



Because there is an « A »!

The DVB S/S2 demodulator is the STV0910A

The « A » means « Advanced »

So we will have advanced features:

- Code rates 1/4, 1/3, and 2/5
- 16 APSK and 32 APSK
- Short frames
- ACM Adaptive coding and modulation
- Low Symbol Rate optimisation
- Data mode, Measuring mode ...

Dual tuner STV6120



Four VLNA inputs + On-chip 4:2 matrix

Input frequency range 250 MHz to 2150 MHz
→ tested working from 144MHz to 2450 MHz

Two independently programmable tuners

RF to baseband direct conversion

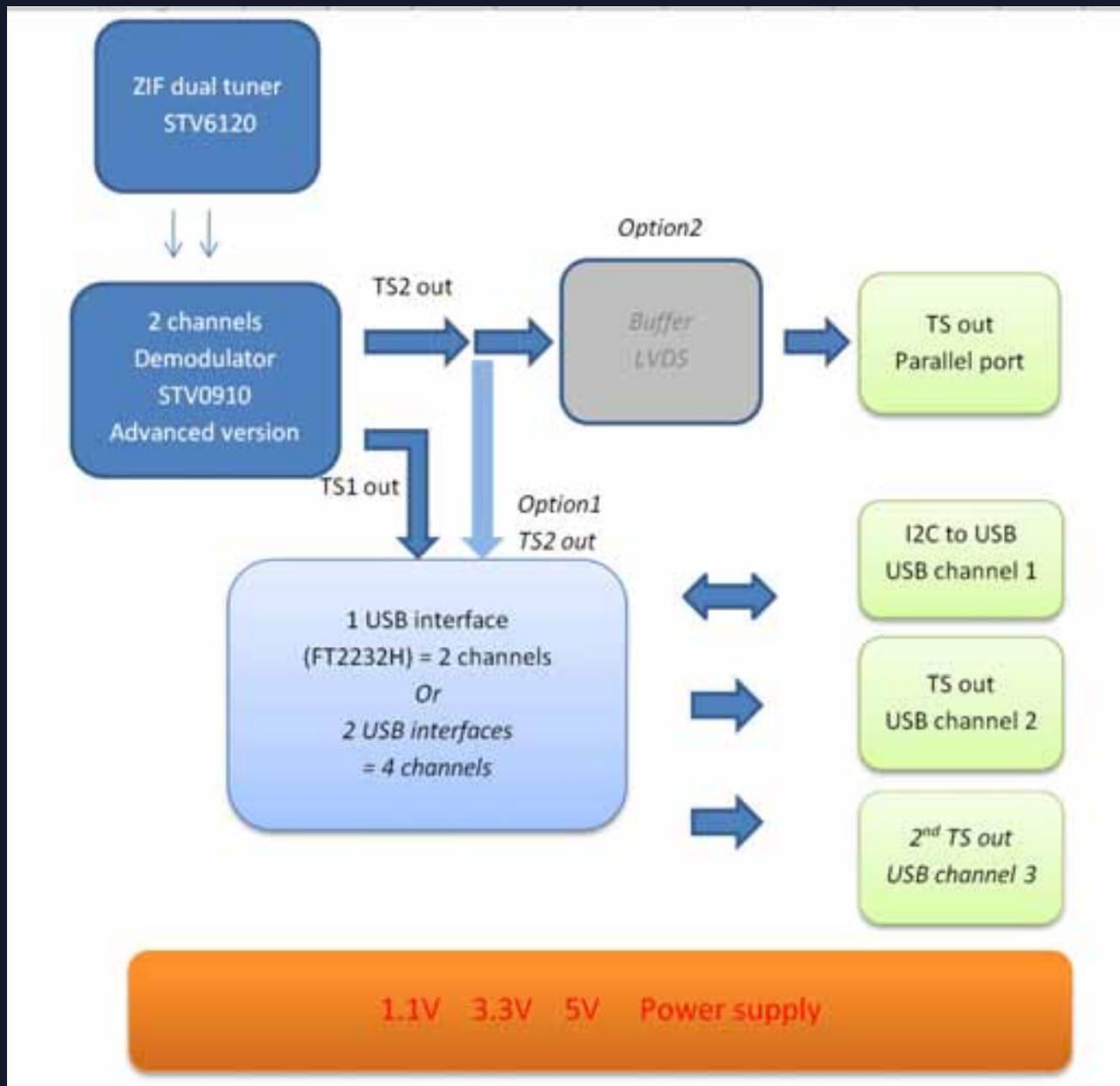
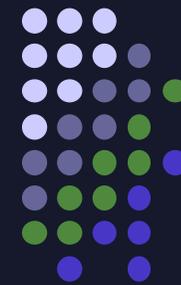
Extremely low phase noise

Continuously variable gain: 0 to 65 dB

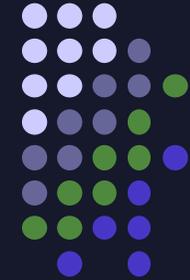
Additional and programmable gain on baseband amplifier:
0 to 16 dB

Programmable 5- to 36-MHz cut-off frequency (Butterworth
5th-order baseband filters)

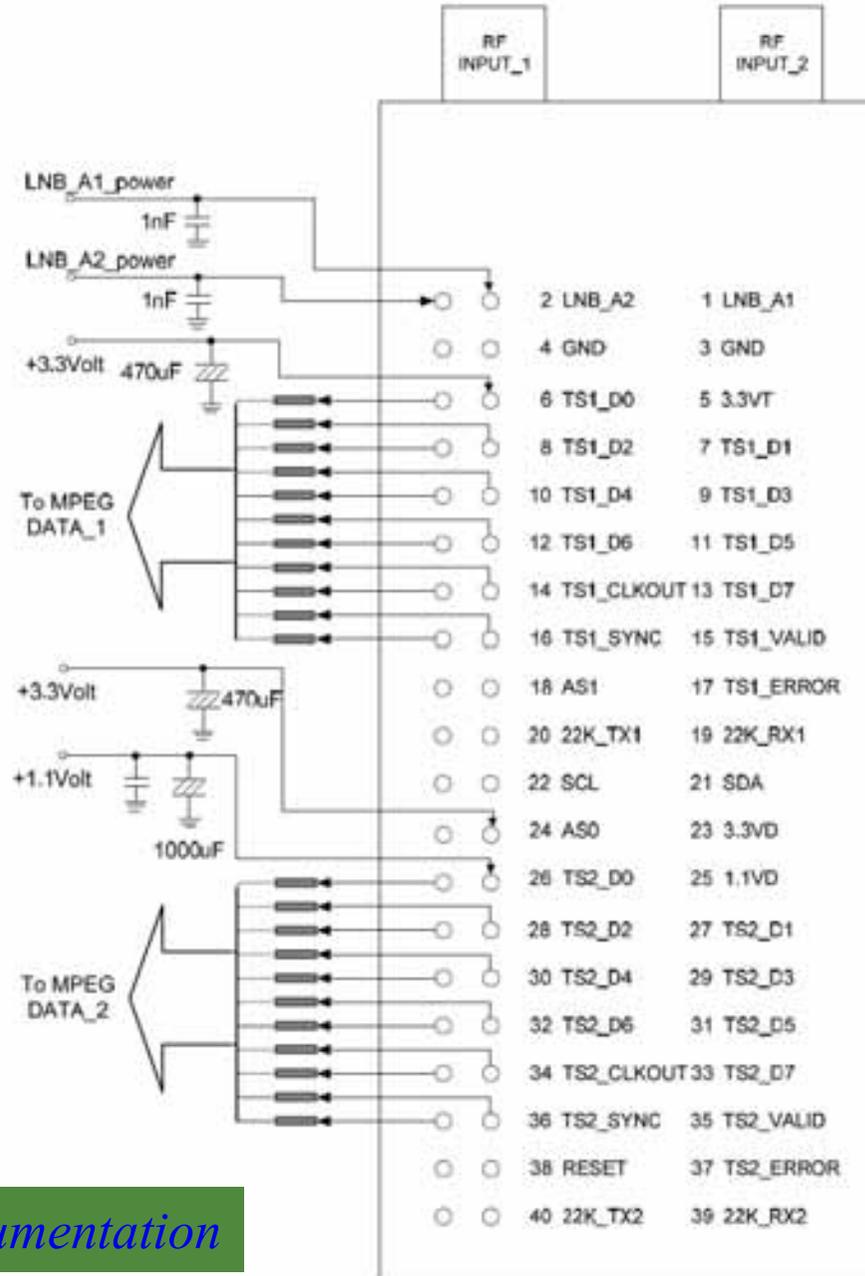
MiniTiounerPro synoptic



FTS-4335



Pin Application Circuit



From Serit documentation

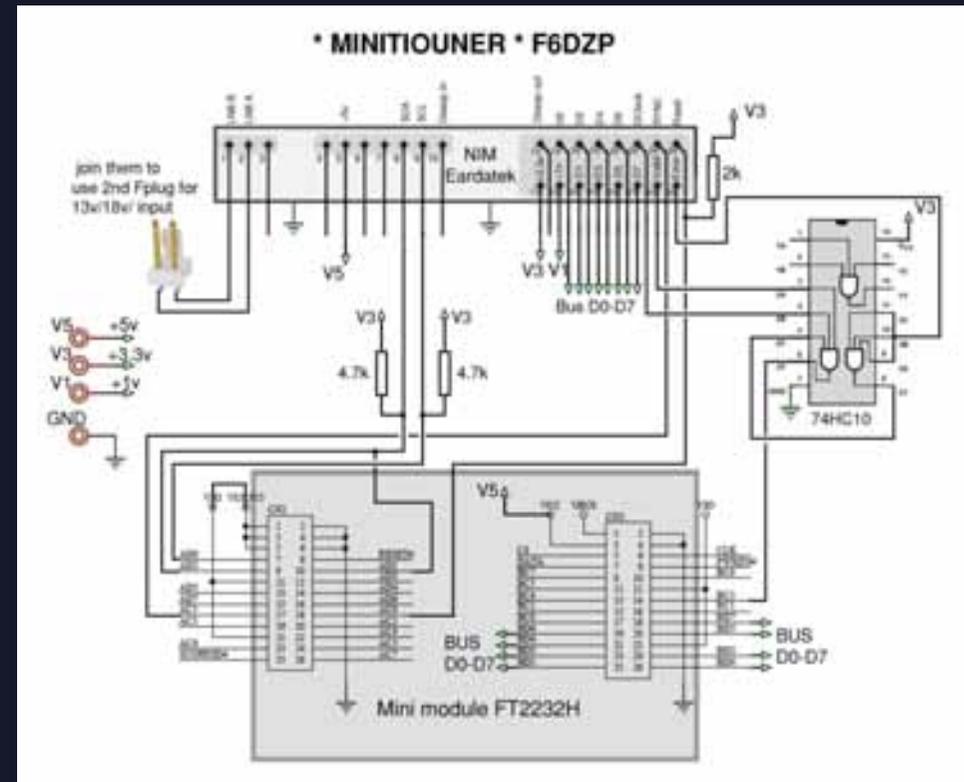
MiniTiounerPro schematic



We can use the same schematic as we have used for the MiniTiouner.

We just need another FT2232H if we want to output the 2nd TS via USB

Another option is to output the second TS to a DVB parallel port



New software: Minitioune Pro



The screenshot displays the Minitioune Pro software interface, which is a DVB-S Receiver/Analyser. The window title is "MINITIOUNEpro v0.1h - DVB-S Receiver/Analyser - 144 MHz to 2430 MHz - for MiniTounerPro/FTD232RL+NB Pro".

Tuner 1 (Top):

- Frequency (kHz): 1255130 kHz (Target: 1255000 kHz)
- Symbolrate (kS): 1999 kS/s (Target: 19901385)
- Carrier Width: 2697 KHz
- Scan strategy: search, scan range: wide
- RF Pw: -78dBm, MER: 0.0 dB
- Carrier Lock: 21%
- Timing Lock: 0%
- RF Pw: -78dBm
- Bytes recvd: ??????????
- Station: FEDZP-Mpeg
- Format: 4/3, Width: 720, Height: 540
- Codec: Mpeg2

Tuner 2 (Bottom):

- Frequency (kHz): 1478522 kHz (Target: 1478760 kHz)
- Symbolrate (kS): 2802 kS/s (Target: 28001385)
- Carrier Width: 2697 KHz
- Scan Strategy: search, scan range: wide
- RF Pw: -112dBm, MER: 0.0 dB
- Carrier Lock: 38%
- Timing Lock: 3%
- RF Pw: -112dBm
- Bytes recvd: ??????????
- Station: MIGNE-AUXANCES
- Format: Video, Lg Mag: 0000
- Codec: Mpeg2

The interface includes various control panels for FEC, RF input path, and scan strategy. A central display area shows "No Video or bad codec/PID". The bottom right corner features a "Quit" button and a "T1 to T2 Expert" button.

Minitioune Pro – 1 freq locked



The screenshot displays the Minitioune Pro software interface, which is used for receiving and analyzing digital video broadcasts. It features two tuner windows, one for a locked frequency and one for an unlocked frequency.

Tuner 1 (Locked):

- Frequency (kHz): 1255044 kHz (Target: 1255043 kHz)
- Symbolrate (kS): 3998336S (Target: 3998336S)
- Deviation: 1735S
- Carrier Width: 5397 KHz
- Scan strategy: search, scan range: wide
- PreLock: wide range 12, PostLock: narrow range 10
- Carrier Lock: 100%, Timing Lock: 100%
- RF Pw: -81dBm, MER: 11.2 dB
- Fec: 3/4
- Bytes recvd: 6135192

Tuner 2 (Unlocked):

- Frequency (kHz): 1478825 kHz (Target: 1478760 kHz)
- Symbolrate (kS): 1998138S (Target: 1998138S)
- Deviation: -15610S
- Carrier Width: 2597 KHz
- Scan strategy: search, scan range: wide
- PreLock: wide range 12, PostLock: narrow range 10
- Carrier Lock: 32%, Timing Lock: 66%
- RF Pw: -112dBm, MER: 0.0 dB
- Fec: ???
- Bytes recvd: 77777777

Right Panel (Station 1):

- Station: Station1
- Format: 4/3, Width: 708, Height: 576
- Codec: Mpeg2
- Audio level: 0
- Web Station ID: 1
- Picture: Video, Lg Mig: 0000
- Timing: 3 sec, 00000 0

Minitioune Pro – 2 freq locked



The screenshot displays the Minitioune Pro software interface, which is a DVB-S Receiver/Analyser. It is configured for two frequencies, both of which are locked. The interface is divided into several sections:

- Tuner 1 (Top):** Frequency (kHz) is set to 1255044 kHz (Target: 1255043 kHz). Symbolrate (kS) is 4000 kS/s. Carrier Width is 5397 KHz. The interface shows a spectrum plot with a signal at the target frequency. Below the plot are three sub-plots: I: 153 Q: 149, Eqa, and Noise. The carrier and SR are both locked (100%).
- Tuner 2 (Bottom):** Frequency (kHz) is set to 1339045 kHz (Target: 1339045 kHz). Symbolrate (kS) is 250 kS/s. Carrier Width is 336 KHz. The interface shows a spectrum plot with a signal at the target frequency. Below the plot are three sub-plots: I: 142 Q: 155, Eqa, and Noise. The carrier and SR are both locked (100%).
- RF Power and MER:** For Tuner 1, RF Pw is -61 dBm and MER is 33.0 dB. For Tuner 2, RF Pw is -44 dBm and MER is 28.5 dB.
- Scan Strategy:** Both tuners are in 'search' mode with 'wide' scan range and 'narrow' filter.
- Station Information (Right):** Station 1 is identified as 'MIGNE-AIXANCES 5 JMSDP' with a frequency of 1339045 kHz. The interface shows various settings for video and audio, including format (4/3), width (768), height (576), and codec (Mpeg2).
- Control Panel (Bottom Right):** Includes buttons for 'Beep', 'UDP', 'Drive Record', '22KHz', 'OFF', 'ON', and 'TS_OK'. A 'Quit' button is also present.

Minitioune Pro – 2 freq locked



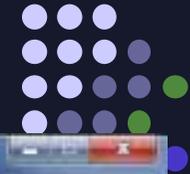
The screenshot displays the Minitioune Pro software interface, which is a receiver/analyser for MiniTunerPro (FTD232RL+ NIM Pro). The interface is divided into two main sections for Tuner 1 and Tuner 2, each showing a different locked frequency.

Tuner 1:
- Frequency (kHz): 1255044 kHz (Target: 1255043 kHz)
- Symbolrate (kS): 4000 kS/s (Target: 3998336S, Deviation: 1735S)
- Carrier Width: 5397 KHz
- Scan strategy: search, scan range: wide, narrow
- PreLock: wide range 12, PostLock: narrow range 10
- Time1: 0, Time2: 3.0
- RF Pw: -61 dBm, MER: 34.5 dB
- Bytes recvd: 9639700
- FEC: 3/4
- Viterbi on: TS on

Tuner 2:
- Frequency (kHz): 1339045 kHz (Target: 1339045 kHz)
- Symbolrate (kS): 250 kS/s (Target: 249252S, Deviation: 779S)
- Carrier Width: 336 KHz
- Scan strategy: search, scan range: wide, narrow
- PreLock: wide range 12, PostLock: narrow range 10
- Time1: 0, Time2: 2.0
- RF Pw: -44 dBm, MER: 28.5 dB
- Bytes recvd: 187560372
- FEC: 7/8
- Viterbi on: TS on

Right Panel:
- Station: Station1
- PID from: AutoPID
- Station1: F6DZP-H264, PID Video: 01001, PID audio: 01002
- Codec: H264
- Format: 4/3, Width: 320, Height: 240, Format: 4/3
- Zoom: adapt, photo
- Station: Station1, info: no comment
- Provider: H264, Audio level: [slider]
- Web Station ID: 1: F6DZP
- MIGNE-AIXANCES JNDGDP, Presamp: 20 dB
- Arr. Dk: East, Gain: 12 dB
- Picture: Video, Lg Mig: 0000, Lg Pic: 0000
- Timing: 3 sec, 00000 0
- Quit button

Minitioune Pro - TS1 display



The screenshot displays the Minitioune Pro software interface, which is a DVB-S Receiver/Analyser. The main window shows a central display area with a test pattern consisting of a sphere with a rainbow-colored top and a grid of black and white squares. The text "Test 720 x 576" is overlaid on the sphere. Below the sphere are four vertical bars with labels: "144 points/ligne", "180 points/ligne", "360 points/ligne", and "720 points/ligne".

The interface is divided into several panels:

- Left Panel:** Contains two tuner sections, "Tuner 1" and "Tuner 2". Each section includes a "Baseband Gain" control, a "SR (kS) Freq (kHz)" display, and a list of SR options (SR2000, SR125, SR250, SR4000, SR27500) with their corresponding frequencies. There are also "FEC" options (1/2, 2/3, 3/4, 5/6, 6/7, 7/8) and "RF input path" options (LNA A, LNA B).
- Right Panel:** Contains a "Pid from .ini" section with fields for "Station1", "FEC2P-H264", "HDlowSR", "France24", and "GRZ OK". It also has a "Format" section with options for "Width" (720, 576) and "Format" (4/3, auto). There is a "photo" button and a "GRAPH" checkbox. Below this is a "Station" section with "Station1" and "no comment" fields, and a "Provider" section with "Mpeg2" and "ISS" options. An "Audio level" slider is also present.
- Bottom Panel:** Contains two rows of control panels. The top row shows "Carrier Lock" (100%), "Timing Lock" (100%), "Power RF" (-61 dBm), "MER" (33.0 dB), "Fec 3/4", "Vber" (green), and "TS en" (green). The bottom row shows "Carrier Lock" (45%), "Timing Lock" (6%), "Power RF" (-112 dBm), "MER" (0.0 dB), "Fec 7/7", "Vber" (red), and "TS en" (red). There are also "Beep", "UDP", and "Dsave Record" controls.
- Bottom Right Panel:** Contains a "Web Station ID:1" section with a "F637P" display, "MIGNE AUXANCES", "JNB6DP", "Ant. Dis: East", "Gain: 12 dB", "Picture" options (Video, DSL, Auto, Stop), "Timing" (3 sec), and "Lg Meg" (0000), "Lg Pic" (0000), "WebEr" (0000000). There is also a "Quit" button and a "T1-T2 Expert" button.

Minitioune Pro –TS2 display



MINITIOUNEpro v0.1h - DVB-S Receiver/Analyser - 144 MHz to 2450 MHz- for MiniTounerPro(FTD232RL-NIM Pro)

MiniTounerPro DVB



Tuner 1 BaseBand Gain: 0 dB Auto

| SR (kS) | Freq (kHz) |
|---------|------------|
| 04000 | 01255000 |

Offset-> 00000000

| | |
|---------|-------------|
| SR2000 | 12550 MHz |
| SR125 | 2395 MHz |
| SR250 | 43700 MHz |
| SR4000 | 437000 MHz |
| SR27500 | 4370000 MHz |

FEC Low SR

- 1/2 RF input path1
- 2/3 LNA A
- 3/4 LNA B
- 5/6
- 6/7
- 7/8

Tuner 2 BaseBand Gain: 0 dB Auto

| SR (kS) | Freq (kHz) |
|---------|------------|
| 00250 | 00437000 |

Offset-> 00902000

| | |
|---------|-------------|
| SR2000 | 12550 MHz |
| SR125 | 2395 MHz |
| SR250 | 43700 MHz |
| SR4000 | 437000 MHz |
| SR27500 | 4370000 MHz |

FEC Low SR

- 1/2 RF input path2
- 2/3 LNA A
- 3/4 LNA B
- 5/6
- 6/7
- 7/8

Station 1 AutoPSK

F602FH264 PID Video: 01001

France24 PID audio: 01002

QPSK DCS

Raspberry Codec: Mpeg2, H264

Format: 4/3 Width: 320, 16/9 Height: 240, 1/1 Format: 4/3, auto

Zoom: adapt, x1, none

photo GRAPH

Station: Station1

info: no comment

Provider: Codec: H264 ISS

Audio level

Web Station ID:1

F602P

MIGNE AUXANCES

JN06DP Preamp: 20 dB

Ant. Di: East Gain: 12 dB

Picture: Video, QSL, Auto, Stop

Lg Msg: 0000, Lg Pic: 0000, WebEx: 0000

Timing: 3 sec, 00000 0

Beep, UDP, Drive Record, 20kHz, OFF, ON, TS_OK

Quit

T1 T2 Expert

Carrier 100% Carrier Lock

SR 100% Timing Lock

RF Pw -61dBm

MER 34.5 dB

Bytes recvd: 36809836

Fec 3/4

Vber 0

TS err 0

TS

Carrier 100% Carrier Lock

SR 100% Timing Lock

RF Pw -44dBm

MER 28.5 dB

Fec 7/8

Vber 109313204

TS err 0

TS

Minitioune Pro Using 2 VLC



The image displays the Minitioune Pro software interface, which is used for signal analysis and video processing. The interface is divided into two main sections, each representing a different tuner.

Tuner 1 (Top):

- Frequency (kHz): 125544 kHz
- Symbolrate (kS): 4888 kS
- RF Pwr: -41 dBm
- MER: 33.6 dB

Tuner 2 (Bottom):

- Frequency (kHz): 133845 kHz
- Symbolrate (kS): 7788 kS
- RF Pwr: -44 dBm
- MER: 28.5 dB

Two VLC media player windows are open on the right side of the screen:

- The top VLC window displays a test pattern labeled "F6DZP" and "mire diffusion".
- The bottom VLC window displays a video of a person in a classroom setting.

MiniTiouner Pro / Minitioune next steps



NIM FTS-4335 is easy to buy in lots of 100 units.
Before we create a PCB, we have now to decide which option to choose:

1. Same as MiniTiouner, same schematic : 1 x FT2232H → 1 TS output (demod1 **or** demod2).
2. Double USB TS output using 2 x FT2232H
3. 1 x USB TS output and 1 x TS parallel output
(remember that we have 2 multiplexers that allow us to do many things : receiving and showing a TS and sending the same to the parallel output ...or different TS at different output or ...)

In case we choose solution 3, it is easy to create a little external parallel to USB converter using a 2nd FT2232H

MiniTiouner-Pro - availability



MiniTiouner-Pro seems to be a good solution for the future
It can be used for many applications:

- DATV DVB-S
- Narrow band DATV
- DATV DVB-S2
- Receiving HamTV
- Receiving broadcast satellite DVB-S or DVB-S2

For a first solution, a kit or PCB could be offered.
A second solution could be a MiniTiouner-Pro fully assembled and tested, as proposed by Art Towslee WA8RMC.

Conclusion



- The Minitiouner /MiniTiouner-Pro project offer us to build our own USB DVB-S/**S2** tuner that can receive from SR 120 kS/s up to 45000 kS/s.
- NIM, pcb and others components are available at the BATC shop
- Pipo X8/X9 + Minitiouner = a mobile solution
- Narrow Bandwidth DATV is now possible for DX
- Useful also for receiving HamTV.

All information on www.vivadatv.org Forum

You can also look at the BATC forum :

<http://www.batc.org.uk/forum/>



Thank you for your attention