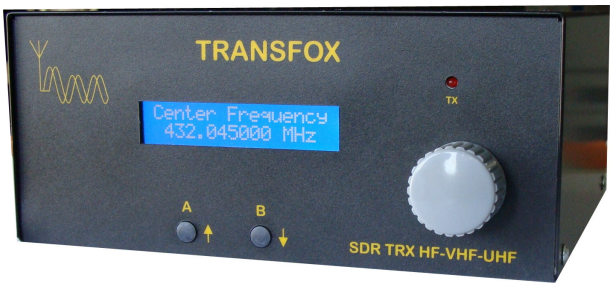

Now cover 1296 MHz

TransFox Highlights

- ***General coverage 1-1450 MHz***
- ***Outstanding LO resolution (1Hz), phase noise & lock times thanks to SynFox technology***
- ***Brings unique VHF, UHF and SHF coverage to SDR***
- ***SDR demodulation and modulation with sound card (I/Q)***
- ***Compatible with existing Windows or Linux software in addition to specific SigFox software***
- ***FFT spectrum analysis***

1 Hz tuning resolution through conventional "fixed filter/agile LO" operation, or SDR "mouse tuning" operation

TransFox is an SDR (Software Definable Radio) transceiver, based on the ***SynFox High Resolution Multi-Accumulator Fractional-N synthesis***. It is available in receiver or receiver/transmitter configuration covering 1MHz to 1450 MHz. Frequency plan can be extended beyond existing frequency range upon agreement., and some additional and unique options, "ruggedness options" or "robustness options" are either available or in preparation.

TransFox, being based on ***SynFox***, exhibits outstanding performance of high resolution (1Hz steps), low phase noise (Better than -100dBc/Hz @ 1kHz) with very short lock times (40us for 1MHz step). Main advantage of High Resolution Frac-N synthesis, is a low phase noise associated with low consumption, and this, particularly in regions far beyond DDS traditional coverage limit (200 MHz).

Thus, ***SigFox*** technology widely opens the VHF, UHF and SHF space to SDR, where other SDR radios are confined in the HF region.

An other advantage of high resolution, is the possibility to still "physically" tune or "AFC" the signal within a given "fixed" filter, and thus come back to the "fixed filter / agile LO" method used on conventional receivers, in addition to the "mouse tuning" by digital complex multiplier brought by SDR. Most of the HF SDR can't do this, because using fixed LO's in order to achieve a good noise. Although digital "mouse tuning" is the usually preferred method in SDR, physical tuning can allow to further improve robustness up to outstanding level by adding a crystal filter option to ***TransFox***, while keeping many advantages of SDR.

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General

Parameter	Unit	Value	Comment
Minimum frequency	MHz	1	With 10 dB NF degradation
Maximum frequency	MHz	1450	
Minimum frequency step	Hz	1.16	1 Hz software interpolation All other kind of steps configurable by Software
Supply voltage	V	12	Nominal voltage for full frequency coverage
Supply voltage	V	12	Partial voltage leading to partial frequency coverage depending on voltage. All other parameters equal.
Max Supply voltage	V	14.5	Max
RF connector impedance	Ohms	50	
Reference frequency	MHz	26	TCXO in standard
Frequency stability	ppm	2	With standard TCXO
Frequency stability	ppm	0.1	With standard TCXO and software temperature compensation
Frequency stability	ppm	0.01	With optional OCXO
TX Output power	dBm	HF +10dBm, Typ. +17dBm 50 MHz + 10dBm, Typ. +15 dBm 144 MHz +10dBm Typ. +15 dBm 432 MHz +10 dBm Typ. +15dBm 1296 MHz + 5dBm Typ. 10 dBm	+/- 1.5 dB over band
Phase Noise	dB/ Hz	Typ : -105 dBc / Hz	Depending of the sound card
Discrete Spurious	dBc	-80	ΔF > 600 KHz
Harmonics	dBc	-20	Absolute min with no tracking RF filter option
Settling time	µs	500 typ	10 MHz step
Settling time	µs	40 typ	1 MHz step

Receiver

Parameter	Unit	Value	Comment
Noise figure	dB	4	Max over 5 to 1450 MHz band
FM sensitivity	dBm	-116	Typ 11F3 for 20 dB sinad, CCITT filter on
SSB sensitivity	dBm	-125	Typ for 10 dB S/N, CCITT filter on
PSK30 sensitivity	dBm	-148	Typ at 100 Char/min
FM “11F3” Cochanel	dBc	-8	Typ for 11F3 FM (depends on SW)
SSB Cochanel	dBc	-5	Typ for 2.5 KHz SSB
PSK30 Cochanel	dBc	-3	Typ for PSK30
FM “11F3” Minimum Selectivity	dBc	52	Min for 11F3 @ +/- 150 KHz from carrier (selectivity dominated by LO phase noise)
SSB Minimum Selectivity	dBc	61	Min for SSB @ +/- 150 KHz from carrier (selectivity dominated by LO phase noise)

PSK30 Minimum Selectivity	dBc	80	Typ for PSK30 @ +/- 150 KHz from carrier (selectivity dominated by LO phase noise)
I/Q image rejection	dBc	40 70	Min without calibration Typ with multipoint calibration **Depending of quality of sound card use**
Blocking	dBc	72 81 100	FM @ +/- 1.5 MHz beside carrier SSB @ +/- 1.5 MHz beside carrier PSK30 @ +/- 1.5 MHz (Dominated by LO phase noise)
Typical IMD3	dBc	70	Typ, measured in 11F3
IP3	dBm	+2	Typ
1 dB comp point	dBm	-15	With max RF gain
1 dB comp point	dBm	+25	With AGC options
RF Image rejection	dBc	60	Up conversion
Half IF response	dBc	60	458.25 MHz
2 x IF response	dBc	75	min
IF response	dBc	N/A	Depends on RF filter options
Maximum usable baseband	KHz	+/- 300	600 KHz maximum baseband spectrum available in I/Q mode depending of software and sound card use
Recommended baseband and A/D conversion	KHz Ksample/s Resolution in bits	+/- 100 200 20 or 24	200 KHz baseband spectrum depending of software use 16 bits possible but with final dynamic limited to around 85 dB
Power consumption	mA	RX: 450mA TX: 530 mA	Typ @ 12V, 25°C

Transmitter

Parameter	Unit	Value	Comment
RF output Spurious	dBc	-40 max	Depends on RF filter options
RF output Spurious	dBc	-60 max	With tracking filters
Output power	dBm	HF +10dBm, Typ. +17dBm 50 MHz + 10dBm, Typ. +15 dBm 144 MHz +10dBm Typ. +15 dBm 432 MHz +10 dBm Typ. +15dBm 1296 MHz + 5dBm Typ. 10 dBm	+/- 1.5 dB over band
Phase Noise	dB/ Hz	Typ : -105 dBc / Hz	Within the loop bandwidth and below 2 times D/A sampling frequency Fs Depending of sound card use

Harmonics	dBc	-20	Absolute maximum with no tracking RF filter option
2 tone IMD	dBc	-50	@15 dBm output in SSB mode
Maximum usable baseband	KHz	+/- 150	300 KHz maximum baseband spectrum available in I/Q mode, depending of sound card capability
Recommended baseband and A/D conversion	KHz Ksample/s Resolution in bits	+/- 100 200 16	200 KHz baseband spectrum depending of sound card capability 16 bits is enough for simple signals. 20 to 24 bits recommended for multi-

			carrier handling
I/Q modulation capabilities	-	All FM, PM,AM, SSB, DSB All FSK, GMSK All PSK family Multi-tone Multi-carrier OFDM…Etc	Only software and baseband limitation above 20 bits resolution depending of software used
Power consumption	mA	530	Typ @ full power, 12V, 25°C

Physical parameters and I/O's

Parameter	Unit	Value	Comment
Transfox dimensions	mm	200 X 175 X 80	Included connector & knob

RF access	-	Coaxial connector	BNC
Baseband and control standard interface	-	DB9	Can be programmed by user
USB interface	-	1.1	USB option allows full control of the transceiver

Man to machine interface

	Unit	Value	Comment
Frequency tuning	-	Main encoder + push buttons	Frequency programming via MMI (rotating encoder + 2 buttons + 2x16 char display). Steps can be chosen from 1 Hz to 1 GHz
TCXO Crystal calibration	-	Main encoder + push buttons	Crystal frequency can be electronically adjusted with 1 Hz resolution by hand, on a frequency standard
TCXO Crystal Temperature compensation	-	TBD	A TCXO temperature compensation leading to 0.5 ppm accuracy is under preparation. Compensation is based on embedded temperature sensor
Manual TX or RX forcing	-	Main encoder + push buttons	Manual switch from RX to TX and vice versa, independently from application software. (test purpose)
IF tuning	-	Main encoder + push buttons	Exact central IF frequency can be tuned up to 1 Hz accuracy for spurious removal, or complementary fast scanning. Tuning can be made +/- 300 KHz around 916.5 MHz nominal IF on current design.

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Block-Diagram – TransFox demo V1