30MHz–6GHz field-configurable wideband frequency converter

Features

- RF Input Frequency: 30MHz–6GHz
- RF Output Frequency: 30MHz–6GHz
- LO Frequency: 85MHz–5400MHz
- Fractional-N Synthesizer
- LO Step Size: 1.5–3Hz[1]
- 2.5 ppm precision TCXO
- USB programmable (Windows or Linux)
- Generator/Mixer Function Toggle
- Input IP3 +23dBm
- Small, Portable Form Factor
- Adjustable Mixer Bias Current
- LCD Display With Backlight Feature
- Button Control Interface
- Dimensions: 88mm x 38mm x 68mm
- Weight: 7.4 oz

Applications

- Wideband Radios
- Distributed Antenna Systems
- Diversity Receivers
- Software Defined Radios
- Frequency Band Shifters
- Point-to-Point Radios
- WiMax/LTE Infrastructure
- Satellite Communications
- Wideband Jammers
- Remote Radio Heads
- Frequency Up/Down Conversion
- Automated Test Equipment (ATE)
- Wireless Communication Systems

Contents

1. Specifications: General, Synthesizer, Mixer.....pg 2
3. Device Information.....pg 3
4. Notes.....pg 3
5. User Functions.....pg 4

Product Description

moRFeus is a 30MHz–6GHz programmable Fractional-N wideband frequency converter and generator designed for low spurious emissions and dynamic configuring of the LO frequency. moRFeus is designed for easy integration into popular RF environments using SMA connectors and is powered using an external micro-USB 5V supply. The LCD display and button interface provide a dynamic way to program the mixer LO frequency in the field with a step size of 1.5–3Hz.1 The device is USB programmable, enabling automatic operation from a PC (running Linux or Windows). Dynamic toggling between mixer and generator modes adds to field-level functionality. An optional bias voltage of 5V is available via RF choke to the mixer input to supply active antenna systems.

1. Step size is frequency-dependent. Lower step sizes (1-2Hz) are characteristic of lower frequency domains and higher step sizes (2-3Hz) of higher domains.

1. Specifications

General

Parameter	Value
Input Voltage	5V
ESD Protection (RF IN and OUT ports)	IEC 61000-4-2 Contact Discharge, 8KV
Bias Voltage	5V
Active Bias Current Protection	425mA
Mixer Input/Output Isolation	See Mixer Performance
Input IP3	+23dBm
RF/IF Input Absolute Maximum Power	+15dBm
Operating Temperature	-40 to +85
Storage Temperature Range	-65 to +150

Synthesizer

LO	Phase Noise (dBc/Hz)	Offset
1GHz	-108	10kHz
1GHz	-107	100kHz
1GHz	-135	1MHz
2GHz	-102	10kHz
2GHz	-101	100kHz
2GHz	-130	1MHz
3GHz	-98	10kHz
3GHz	-98	100kHz
3GHz	-125	1MHz
4GHz	-96	10kHz
4GHz	-95	100kHz
4GHz	-124	1MHz

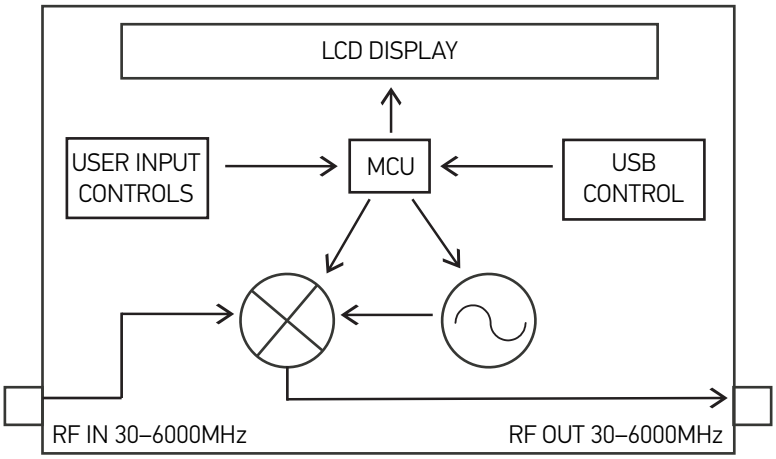
Mixer Performance

LO Frequency	Input Power	Input Frequency	Output Frequency	Output Power	Conversion Gain
400	2.47	500	100	-8.95	-11.42
400	-1.894	1000	600	-10	-8.106
400	-9.65	1500	1100	-25	-15.35
400	-10.27	2000	1600	-28.1	-17.83
400	-11.112	2500	2900	-28.4	-17.288
850	-0.73	900	50	-12.04	-11.31
1500	-10.757	2400	900	-20.24	-9.483
2400	-9.65	1500	900	-25.5	-15.85
4000	-1.894	1000	3000	-21.3	-19.406
4000	-15.4	5400	1400	-37.3	-21.9

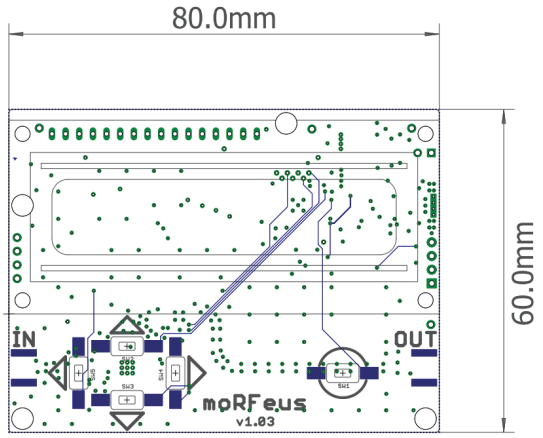
Mixer Performance:
First row is the LO Frequency set in moRFeus. The third row, Input Frequency, is driven from a signal generator to moRFeus's input port. Output Frequency is the difference between LO and Input Frequencies.

3. Device Information

Block Diagram



Drawing

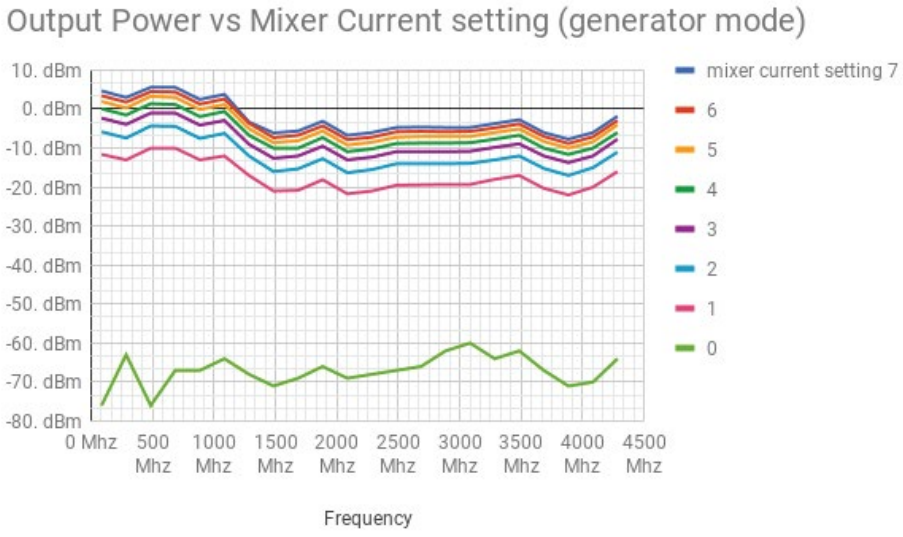


4. Notes

Mixer Current:
moRFeus offers an optional mixer current control which impacts the linearity of the output signal. The controls are exposed for advanced users to experiment and fine tune mixer performance.

Generator Mode:
In generator mode, the output port of moRFeus is set to the LO frequency. It has a range limited by the internal LO which is 85Mhz to 5.4GHz (it should be noted that the mixer input handles frequencies up to 6GHz). Generator mode can be used to generate arbitrary CW signals for testing or mixing purposes.

In generator mode, output power changes relative to the mixer current setting. When the mixer current is set to 0, output power is relatively low. For settings 1-7, output power is stronger. This chart plots output power relative to the mixer current setting.



5. User Functions

Menu #	Description	Controls
1	Frequency	Pressing the “ENTER” button enables programming of the LO frequency or OUTPUT Frequency. The UP/DOWN and LEFT/RIGHT toggles let you select the frequency.
2	Functionality	Pressing “ENTER” allows for programming of the moRFeus mode between “MIXER” and “GENERATOR” functions. In Generator mode the output frequency is the frequency selected in menu 1.
3	Mixer Current	Pressing “ENTER” allows for modification of the mixer current from eight different levels. See “3. Notes” on page 3 for more information on this setting.
4	Bias Tee	Pressing “ENTER” allows for the control of the Bias option. “ON” enables a 5V@425mA max DC current to be supplied to the mixer input for powering active antennas, etc.“OFF” disables this supply.
5	LCD Backlight	Pressing “ENTER” provides control over the LCD backlight behavior from being “Always ON” to having a timeout.
6	USB Bootload	Pressing “ENTER” toggles USB Bootload from Cancel to ACTIVE for USB interface.