RFT-5100 Series Microwave Up/Downconverter

RFT-5174-C, RFT-5184-C, and RFT-5194-C

Feature rich and easily configurable

- Integrated up/downconverter in a single 19 in. rackmount chassis
- RF up to 40GHz and intermediate bandwidth up to 2GHz
- SCPI or GUI control over ethernet or serial ports

The RFT-5100 Series tuners are specialized frequency converters with phase coherent RF paths for upconversion and downconversion. Both converters utilize shared LOs which the phase coherent frequency conversion. The intermediate frequency (IF) and the instantaneous bandwidth (IBW) can be tailored to customer specification at the time of order.

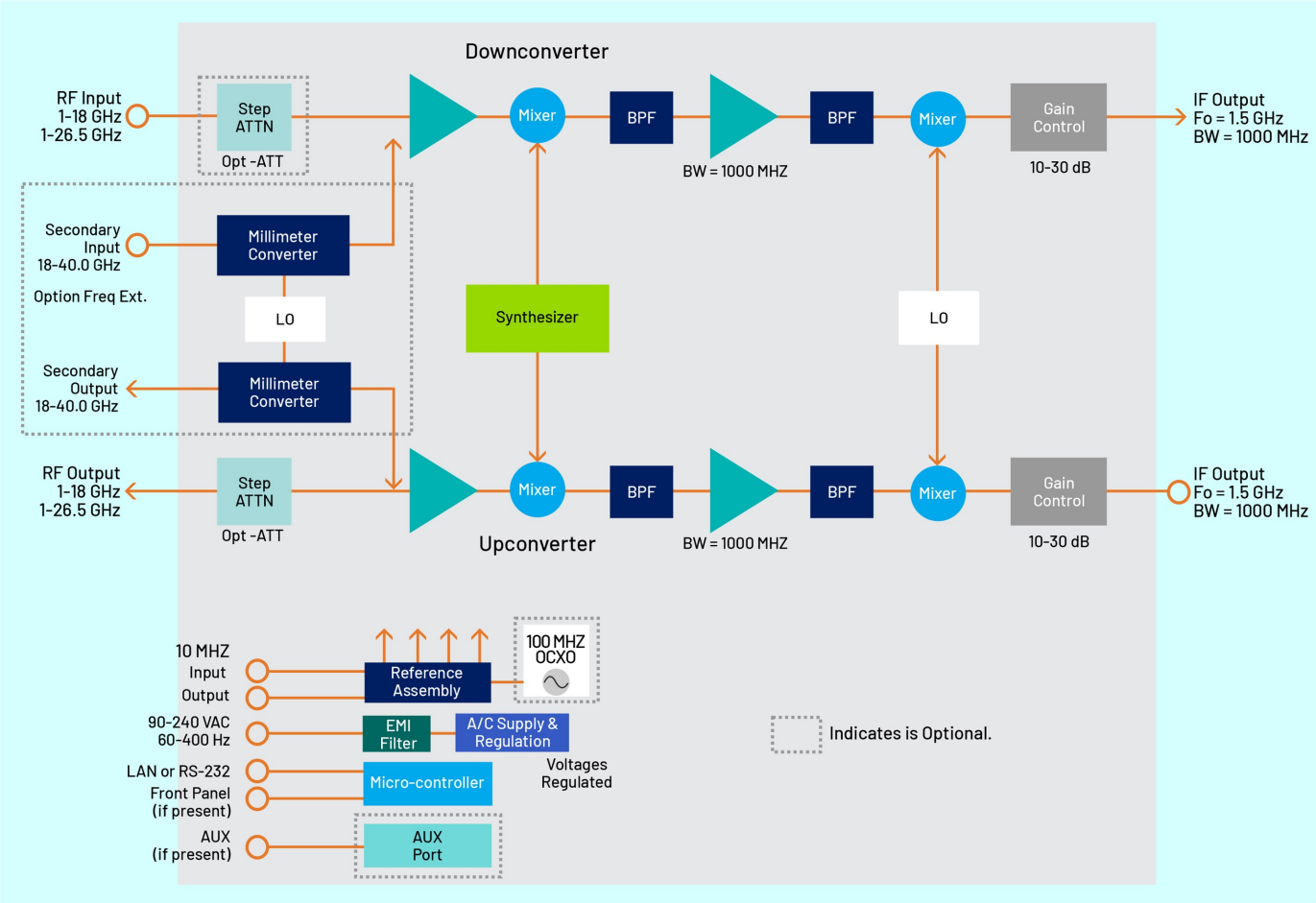
Remote access is available via Ethernet and RS-232. The device can be controlled through either front panel controls or remotely using the Windows-GUI or SCPI commands. A single set of commands control both converters.

RFT-5174: with 500 MHz IBW

RFT-5184: with 1000 MHz IBW

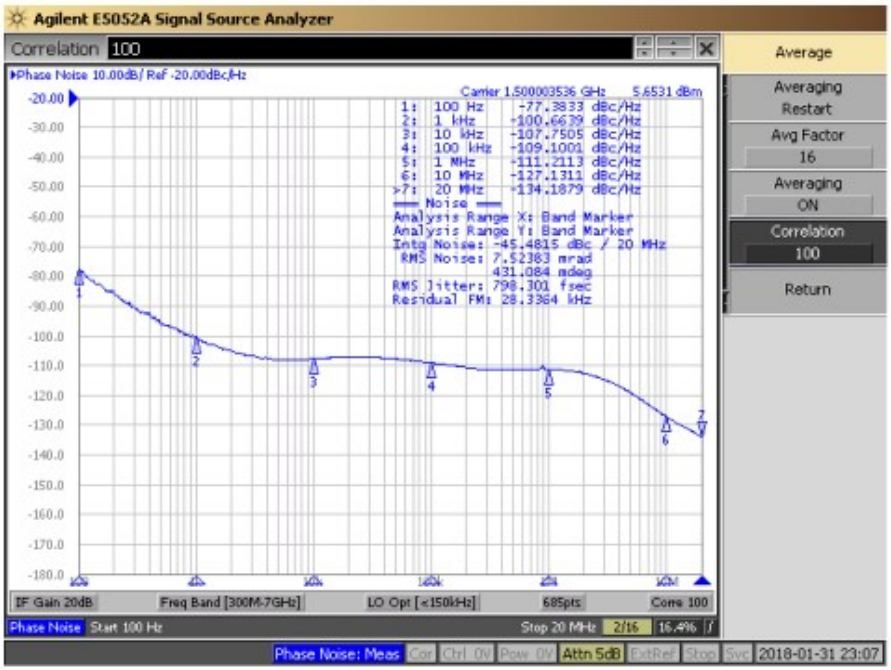
RFT-5194: with 2000 MHz IBW

CONFIGURATION OPTIONS



PHASE NOISE DETAILS

Mercury's standard Microwave RFT-Series Frequency converters have excellent phase noise, as shown below. With option -LN, improvements by as much as 20 dBc/Hz can be obtained, as well as stability within 0.1 ppm.



Standard Phase Noise Profile

GUI AND SCPI-BASED INTERFACES

All RFT-5100 Series Microwave Converters have a complete SCPI-based command-set accessible over a choice of Ethernet or Serial Ports. GUI solutions are browser-based and usable on Windows. MAC, and Linux platforms.

TERMINAL SUPPORT

In addition to the browser-based GUI, each RFT is equipped with a serial port and can support terminal communications. SCPI-based commands are “send and receive,” providing another human-readable user interface.

DOWNCONVERTER INPUT CHARACTERISTICS

Input Tuning Range	RFT-5174: 0.5-18 GHz; RFT-5184: 1.0-18 GHz ; RFT-5194: 1.0-18 GHz
Tuning Resolution	10 kHz (finer resolutions available)
Tuning speed	2 ms, typically
Input 1 dB Compression Point	-15 dBm, typically
Input iP3	-5 dBm typically
Input VSWR	2.5:1 (50 OHM), max
LO Re-Radiation (23-40 GHz)	-70 dBm, max
Max input level (no damage)	+20 dBm

MILLIMETER INPUT EXTENSION OPTION

This option provides a secondary input for millimeter inputs, used to extend the input frequency range up to 40 GHz.

Input Frequency Range	FXT-52: 18-26.5 GHz; FXT-54: 18-40 GHz
Input Connector	2.92 mm female
Spectral Sense	Inverting
Input P1 dB	-10 dBm, typically

DOWNCONVERTER OUTPUT CHARACTERISTICS

Output Center Frequency, Fixed	RFT-5174 1.0 GHz, RFT-5184 1.5 GHz, RFT-5194 1.5 GHz
Output BW (3 dB)	RFT-5174 500 MHz, RFT-5184 1.0 GHz, RFT-5194 2.0 GHz
Spectral Sense	Non-Inverting
RF Gain Variation	+/- 2 dB, typ, across the input range
Gain	10-30 dB typ, in 1 dB steps
Linear Dynamic Range, P1 dB (1 MHz BW)	85 dB, typically
Output Compression at max gain	+10 dB, min
Output Third Order Intercept, at max gain	+20 dBc, typically
Spurious, carrier related, at +10 dBm output, in band	<-70 dBc, typically
Spurious, internally generated (input referenced)	<-90 dBc, typically
SFDR, 3rd Order	>60 dB, typically
Image Rejection	60 dB min, 70 dB typ
Noise Figure, at max gain	12 dB typ, 17 dB max

UPCONVERTER INPUT CHARACTERISTICS

Frequency, Fixed	RFT-5174 1.0 GHz, RFT-5184 1.5 GHz, RFT-5194 1.5 GHz
Instantaneous BW (3 dB)	RFT-5174 500 MHz, RFT-5184 1.0 GHz, RFT-5194 2.0 GHz
VSWR (in band)	2.0:1 max (50 ohm)
RF Connectors	SMA-F
Input level	up to -10 dBm

MILLIMETER OUTPUT EXTENSIONS OPTION

This option extends the output range of the RFT. The FXT is brought out on a second RF connector and the RF output becomes active when the output frequency enters the relevant range of the option.

Additional Output Frequency	FXT-52: 18-26.5 GHz; FXT-54: 18-40 GHz
Output Connector	2.92 mm
Conversion Sense	Inverted
Gain @ 25 C, at minimum attenuation	30 dBm, typically, 25 dB min
Gain Adjustment range (same as 1-18 GHz path)	20 dB min, 1 dB steps
1 dB Compression Point, at max gain	+10 dBm typ, +7 min

UPCONVERTER OUTPUT CHARACTERISTICS

Tuning Range	RFT-5174: 0.5-18 GHz; RFT-5184: 1-18 GHz , RFT-5194: 1.5-18 GHz
Tuning Resolution	10 kHz (finer resolutions available)
Tuning Speed	2 ms, typically
Spectral Sense	Non-Inverting
If to RF Gain	10-30 dB, typically, in 1 dB steps
RF Gain Variation	+/- 2 dB, typically, across output frequency range
Linear Dynamic Range, P1 dB, (1 MHz BW)	85 dB, typically
3rd Order Dynamic Range, (1 MHz BW)	>60 dB, typically
1 dB Compression Point	+10 dBm, typically +7 dBm min
Spurious	>-50 dB, typically
Harmonics	-25 dBc, typically at 0 dBm output
VSWR	2.5:1 (50 OHM), max
Connector	SMA-F

329REFERENCE AND LOCAL OSCILLATORS

The LO system includes an internal reference that is used for all phase-locked and synthesized sources. The system is auto-sensing and will become phase-locked to an external reference if one is detected.

	Standard Configuration	Changes with Option -LN
Reference Select	Auto-select. Locks to external, if present	
Aging, Internal Reference	<2 ppm/yr	<1 ppm/yr
Internal Reference Stability	<+/- 0.5 ppm	+/-0.1 ppm
External Reference	10 MHz @ 0 dBm +/- 6 dB	
Lock-In Range of External Reference	+/- 3 ppm	+/-0.5 ppm
Reference Connectors	BNC, Female (input and output)	
Reference Output	10 MHz @ 0 dBm, min, locked to ref in use	
Phase Noise, typically (10 GHz input), at 100 Hz offset (can vary based on options installed)	-76 dBc/Hz	-90 dBc/Hz
at 1 kHz offset	-100 dBc/Hz	-105 dBc/Hz
at 10 kHz offset	-107 dBc/Hz	-107 dBc/Hz
at 100 kHz offset	-109 dBc/Hz	-111 dBc/Hz
at 1 MHz offset	-111 dBc/Hz	
at 10 MHz offset	-127 dBc/Hz	
System Phase Noise	0.5 deg RMS, typically (100 Hz to 10 MHz)	0.4 deg RMS, typically

GENERAL CHARACTERISTICS

	Rackmount or Desktop	Option -XTR (Ruggedized/ATR)
Operating Temperature	0-50 deg C	-30 to +55 deg C
Storage Temperature		–54° C to +71° C per MIL-STD-810E, Method 501.4 & 502.4, Procedure I
Humidity		Up to 95% non-condensing
Altitude		0 to 10,000 ft
Shock		Per MIL-STD-810E, Method 516.4, Procedure 1, functional test profile for flight equipment, with peak shock level of 20 G's.
Vibration		MIL-STD-810E Method 514.4, Categories 1, 2, 6, and 8
EMI		Designed to MIL-STD-461F, surface ship limits, below decks. Tested to CE102

ORDERING INFORMATION

Model	Name	Description
RFT-5174-C	Base Unit, 500 MHz BW	Tuner, 0.5 to 18 GHz
RFT-5184-C	Base Unit, 1000 MHz BW	Tuner, 1.0 to 18 GHz
RFT-5194-C	Base Unit, 2000 MHz BW	Tuner, 1.5 to 18 GHz

Options: Output Extensions	Name	Description
FXT-52-C	Frequency Extensions	Extends Microwave to 26.5 GHz
FXT-54-C	Frequency Extensions	Extends Microwave to 40.0 GHz
FXT-50-C	Frequency Extensions	Extends RF down to 100 MHz

Other Factory Options	Name	Description
-LN	Improved Phase Noise	Up to 20 dB improvement in near-in phase noise, and increases stability to 0.1 ppm.
-ATT	Optional RF Step Attenuator	Adds RF Step attenuat (30 dB range, in 1 dB steps) to Dowconverter RF Input and/or Upconverter RF Output

Need More Help? Need a Variant of This Product?

Contact Mercury's RF & Microwave engineering team at rf.microwave@mrcy.com

Corporate Headquarters
50 Minuteman Road
Andover, MA 01810 USA
+1 978.967.1401 tel
+1 866.627.6951 tel
+1 978.256.3599 fax

International Headquarters
Mercury International
Avenue Eugène-Lance, 38
PO Box 584
CH-1212 Grand-Lancy 1
Geneva, Switzerland
+41 22 884 5100 tel

Learn more
Visit: mrcy.com
For technical details, contact:
dl-sdl-techsales@mrcy.com