RFT-3200 Series Tuner/Downconverter, with Selectable IBWs and Tunable IF

mercury systems®

RFT-3280 with 5 selectable IBWs up to 1000 MHz
RFT-3290 with 6 selectable IBWs up to 2000 MHz
RFT-3284-C Dual Channel Version of RFT-3280
RFT-3289-C Dual Channel Version of RFT-3290

Mercury's RFT-3200 Series builds on the -3100 Series of tuner/downconverters, with the addition of multiple, user-selectable bandwidths and a fully tunable IF output frequency. Like the 3100, the 3200 Series offers a wide array of customer configurable options, such as input frequency extensions, AGC/MGC, search/sweep capabilities, and other customizable parameters.
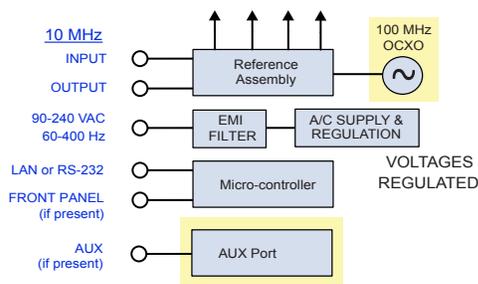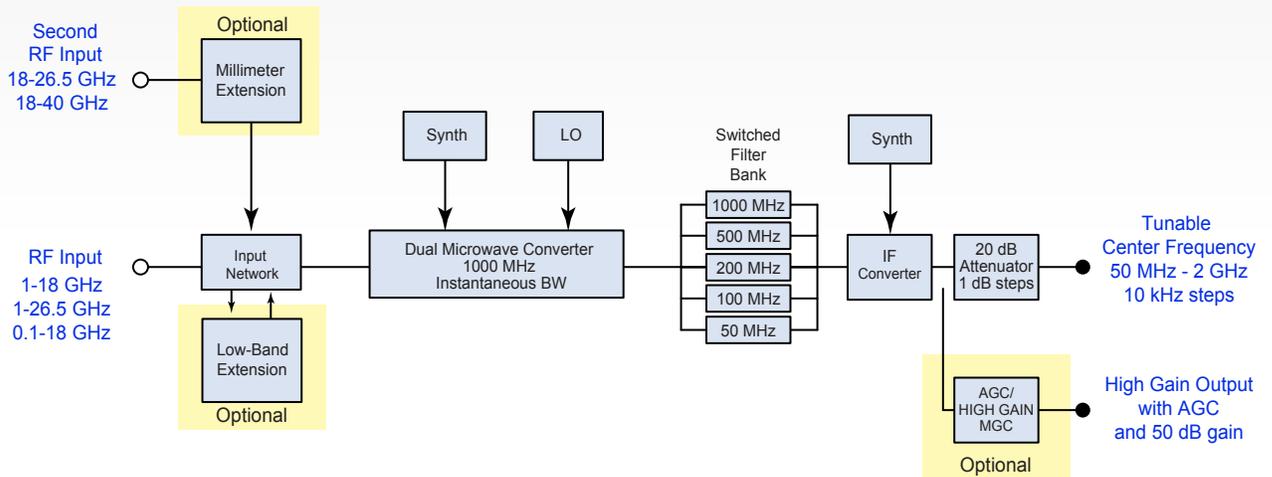
RFT-3280 shown here, with configuration options

IF Output Configuration Choices

Agile IF Output

The primary output is tunable by the user, covering a range from 50 to 2000 MHz in 10 kHz steps. The minimum recommended tuning frequency varies by the bandwidth setting applied by the user. The frequency agility gives the user total control of the IF, so that an optimize spectrum can be delivered to downstream equipment, such as a digitizer.

Output Level Control

The primary output can also be provided with an automatic level control. Our option -AGC enables the user to set the output within the range from 0 to -20 dBm, with AGC for inputs from -10 to -50 dBm.

iF Output	
IF Output center frequencies	50-2000 MHz, tuneable in 10 kHz steps
Selectable IBWs (3 dB BW)	**RFT-3280**: 1000, 500, 200, 100 and 50 MHz **RFT-3290**: 2000, 1000, 500, 200, 100 and 50 MHz
Level control (customizeable at order)	10-30 dB Gain, 1 dB steps
AGC Optional(customizeable at order)	P-OUT: 0 to -20 dBm, with input range from -10 to -50 dBm

Shown here with Dual OUTPUTs. Fixed Gain + AGC/MGC

Bandwidth Choices

Models	Bandwidths
Model RFT-3280	1000, 500, 200, 100 and 50 MHz
Model RFT-3290	2000, 1000, 500, 200, 100 and 50 MHz
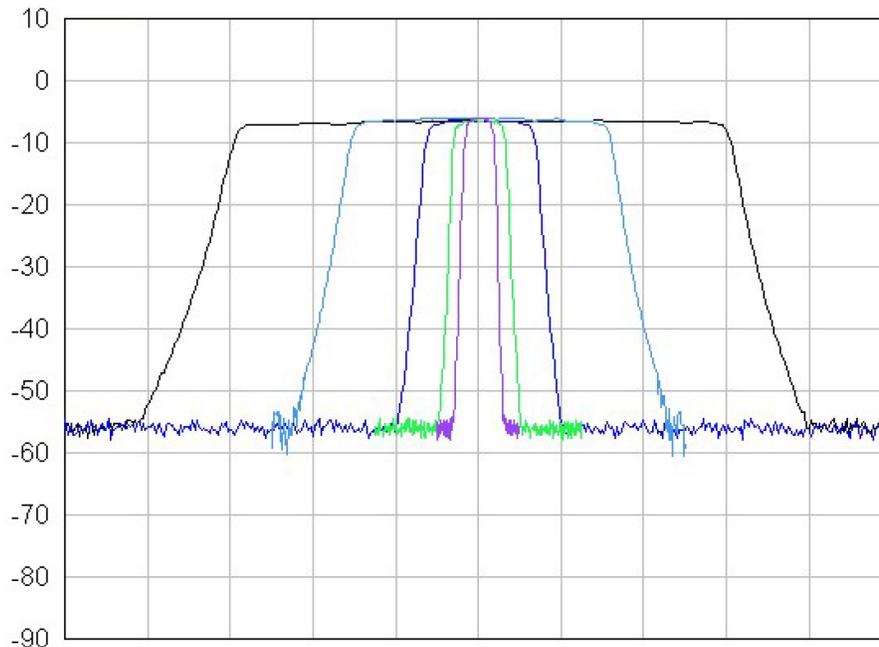
Shown with IBWs of 1000, 500, 200, 100 and 50 MHz

Search - Sweep/Scan Option - SWP

Search Option

Our microwave RFT-Series frequency converters can be configured to become search and scanning tuners. With the -SWP option, the RFT-3200 Series downconverter gains two modes for Search: List Mode and Step/Scan. With this option, the tuning speed increases to 600 uSec and a TTL trigger line is brought to the rear panel. Triggered pulses can be used to enable auto-scanning or single, user-actuated individual steps. Controls for search can be configured using SCPI commands or the GUI.

Search Modes	Description	Programmable	Enable
Step/Scan - Manual	Triggers used to manually/externally step from Start to Stop based on preset step size. Dwell times determined by external control	Start, Stop, Step Size, and Direction	HW or SW Trigger
Step/Scan - Auto	Trigger initiates programmed step/scan routine. Used for scans with fixed step size increments and dwell times.	Start, Stop, Step Size, Dwell time, Scan Direction, Number of Cycles	HW or SW Trigger, HW Pause
List Mode - Manual	Preloaded list of up to 5000 entries entered to RFT. Trigger used to take individual step to next entry in list. Dwell times determined by external control	List entry, Scan Direction, Repeat	HW or SW Trigger
List Mode - Auto	Preloaded list of up to 5000 entries entered to RFT. Trigger used to run list. Dwell times determined by list parameters	Start, Stop, Step Size, Dwell time(s), Scan Direction, Repeat	HW or SW Trigger, HW Pause

GUI and SCPI-based Interfaces

All RFT-3200 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 received," providing another human-readable user interface.

Downconverter Input Characteristics

Characteristic	Description
Input Tuning Range	RFT-3280: 1.0-18 GHz; RFT-3290: 1.5-18 GHz
Tuning Resolution	10 kHz (finer resolutions available)
Tuning Speed (standard configuration - use option -SWP for high speed)	2 ms, typ
Input 1 dB Compression Point	-15 dBm, typ
Input iP3	-5 dBm typ
Input VSWR	2.5:1 (50 OHM), max
LO Re-radiation (23-40 GHz)	- 70 dBm, max
Max input level (no damage)	+20 dBm

Option: Millimeter Extensions

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

Characteristic	Description
Input Frequency Range	FXT-32: 18-26.5 GHz; FXT-34: 18-40 GHz
Input Connector	2.92mm female
Spectral Sense	Inverting
Input P1 dB	-10 dBm, typ

Option: 100 MHz Input Extension

Extends the input frequency range of the primary input path to provide 100-999 MHz coverage.
Instantaneous bandwidth of this extended range is limited to 100 MHz.

Characteristic	Description
Extended Input Frequency Range	FXT-30: Adds input extension covering 100-999.99 MHz
Input Connection	Uses Primary Input Connector
Instantaneous BW	100 MHz for Tuned Inputs from 100-999.99 MHz. Otherwise, as determined by BW selection in use.
Spectral Sense	Non-Inverting
Input P1 dB	-10 dBm, typ

Output Characteristics

The IF output of the RFT-3280 employs a unique approach. The output frequency is tunable, enabling changes from application to application.

	Standard configuration	With agc option
Frequency Range	50 to 2000 MHz	
IF Output Tuning Resolution	10 kHz	
Output Power @ P1 dB, at max gain	+10 dBm, min	
Gain @ 25 C	25 dB min, 30 dB typical	60 dB min, 50 dB typical
Gain Adjustment range	20 dB min, in 1 dB steps	MGC: 10 to 50 dB, min, 1 dB steps; AGC: P-OUT: 0 to -20 dBm, with input range from -10 to -50 dBm
Second IF Output	n/a	Fixed Gain, 20 dB, typ
Spurious (at rated output level)	<-60 dBc typ	
Image Rejection	60 dB, min	
Noise Figure, at max gain setting	12 dB typ, 17 dB max	
Harmonics, at +10 dBm Pout	-20 dBc, typ	
Frequency Sense	noninverting, for inputs up to 18 GHz	
Connector(s)	SMA-female	Two outputs, both SMA-female

Bandwidths

User-selectable bandwidths are another unique feature of the RFT-3200, offering the variety of throughput range to support ever-changing requirements and set-up configurations. This table shows the bandwidth choices available as well as the correspondent minimum recommended IF output center frequencies.

Bandwidth Selection	Minimum recommended IF output center frequency
50 MHz	50 MHz
100 MHz	70 MHz
200 MHz	120 MHz
500 MHz	270 MHz
1000 MHz	520 MHz
2000 MHz	1020 MHz (RFT-3290 only)

Reference 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	<+/- 0.1ppm
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, typ (10 GHz input), at 100 Hz offset	-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	
at 1 MHz offset	-111 dBc/Hz	
at 10 MHz offset	-127 dBc/Hz	
System Phase Noise	0.5 deg RMS, typ (100 Hz to 10 MHz)	0.4 deg RMS, typ

General Characteristics

Characteristic	Description
Operating Temperature	0-50 deg C ambient
Humidity	Up to 95% non-condensing
Power Requirement	90-240VAC, 60-400 Hz; 40 Watts typ (1-18 GHz), 60 Watts (1-40 GHz)
Size, inches	EIA 19" 1RU Chassis: 24" deep max
IP Parameters	Set IP Mode (DHCP or Static IP) Set IP Address, Gateway, Subnet Mask Read MAC Address
Remote Access	Ethernet & RS-232
Remote Control	SCPI-type commandset and Browser-based GUI

Product Comparison: TAC-3290 vs. RFT-3290

Attributes	TAC-3290	RFT-3290
Form Factor	Low SWaP	Rack mount
Customizability	Limited	Full
Input Frequency Coverage	Up to 26.5GHz (44GHz with ext block)	Up to 40GHz
Instanteous IBWs	choice of three IBWs	choice of six IBWs
Low-band extension?	with External extension	Yes
AGC available?	Yes	Yes
High-speed search available?	Yes	Yes
Tuning Speed	200 usec	600 usec with -SWP
Temperature Range	-20 to +55°C	0 to +50°C
Options for Phase Coherent Tuners	Optional coherent 2nd channel	Master/slave all-in-one dual channel
Power	DC	AC

Ordering Information

Model	Name	Features
RFT-3280	Base Unit	Tuner, 1.0 to 18 GHz, 1000 MHz max BW
RFT-3290	Base Unit	Tuner, 1.5 to 18 GHz, 2000 MHz max BW
RFT-3284-C	Dual Channel Coherent	Tuner, 1.0 to 18 GHz, 1000 MHz max BW
RFT-3294-C	Dual Channel Coherent	Tuner, 1.5 to 18 GHz, 2000 MHz max BW
(Options: Input Extensions)		
FXT-32	For Primary or Second. Input	Extends input to 26.5 GHz
FXT-34		Extends input to 40.0 GHz
FXT-30		Extends input down to 100 MHz
(Other Factory Options)		
-ATT	Adds Input attenuator	30 dB of input attenuation, in 1 dB steps. Can be added to Primary or Secondary inputs, or both
-LN	Improves Phase Noise	Up to 20 dB improvement in near-in phase noise, and increases stability to 0.1ppm
-SWP	Fast Step/Sweep/Search	Adds high speed tuning (600 uSec) with a dedicated trigger line to enable fast stepping scanning routine. Includes AUX connector on rear panel. Includes "all ready" TTL strobe indicating a settled state for all synthesizers, switches and frequency dependent elements.
-MS	Master/Slave Option	Adds internal components to enable the converter to be used either as an independent, stand-alone converter, or paired into a Master/Slave configuration, in which the Master controls the Slave, and LOs and Reference from the Master are shared with the Slave.
-AGC	Adds Output Level Control	Increases gain, converts Primary Output to ALC, adds secondary output with fixed gain

Need more help? Need a variant of this product?

Contact Mercury's Mixed Signal Engineering team at: digital.rf@mrcy.com or
visit www.mrcy.com/mixed-signal-processing for a detailed listing of OpenVPX products.

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