DATA SHEET

RFT-3300 Series Microwave Downconverter

RFT-3370: with 500 MHz BW
RFT-3380: with 1000 MHz BW
RFT-3390: with 2000 MHz BW
RFT-3374-C: Dual Channel Coherent, with 500 MHz BW
RFT-3384-C: Dual Channel Coherentwith 1000 MHz BW
RFT-3394-C: Dual Channel Coherentwith 2000 MHz BW

Built for the Harsh Environment

A ruggedized full featured Microwave Tuner for both Set- on and Search applications. Includes fully modernized microwave components and microprocessor for up to data performance capabilities. At the same time, offered in the legacy ATR and Half ATR chassis, for form/fit/function compatibility with established standards.

Tested to MIL-specs for reliable performance and longevity under the harsh service conditions. .Qualified for shock, vibration, EMI, salt, dust and other harsh environments. 100% stress- screened prior to shipment.

Form - Fit - Function

Fits Legacy Applications. The RFT-3300 Series is designed with the legacy applications in mind. The chassis provided

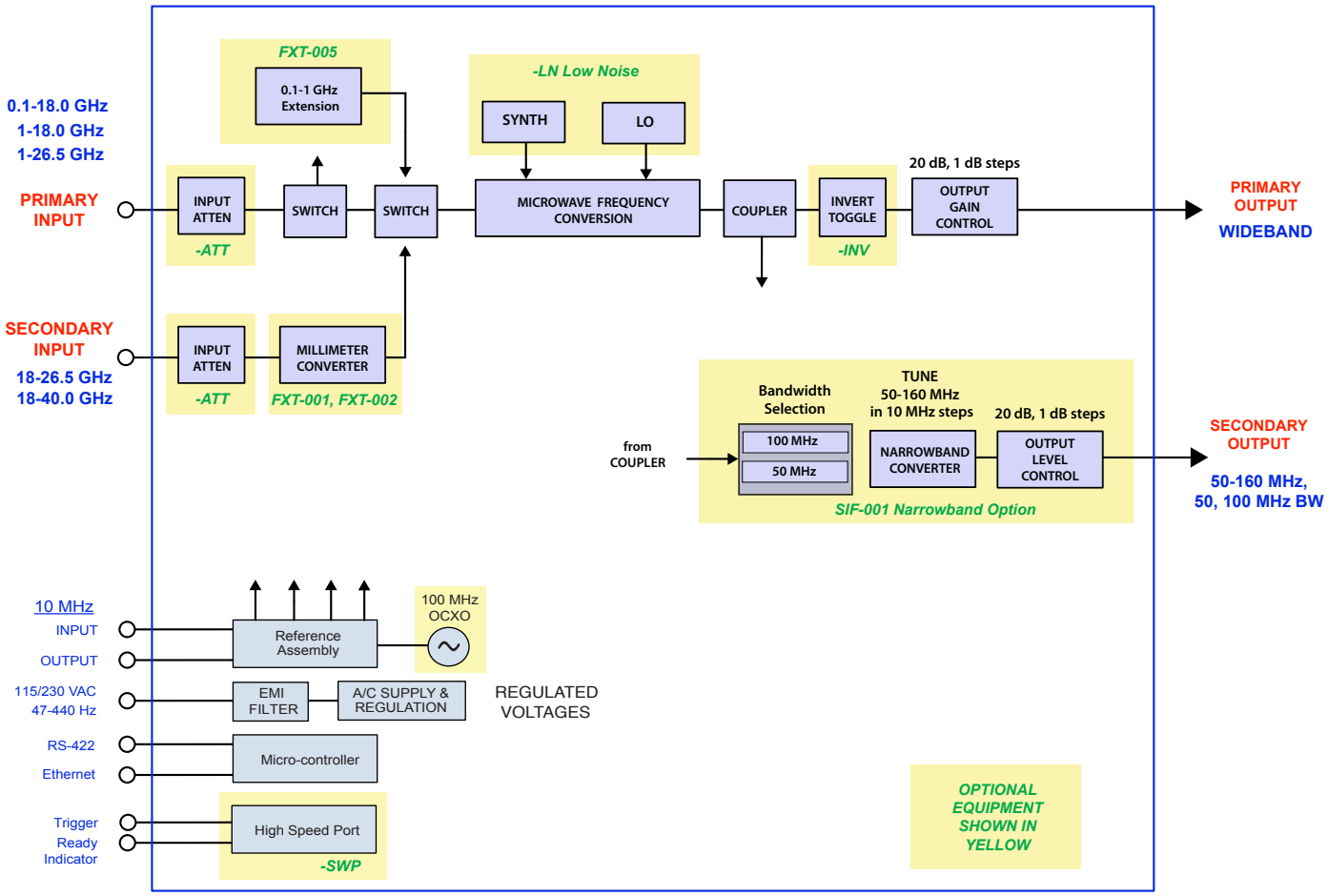
is a half ATR for proper fit. Legacy interfaces and command using legacy protocols are available, assuring ease of integration with fielded equipment and systems.

DMSMS eliminated. Under the hood, all circuits have been modernized to eliminate troubling DMSMS issues. Advanced current circuity and components are employed, assuring a long life into the future without the problems of obsolescence and poor field reliability of past generations of equipment.

Technology insertion. Through the use of technology insertion, our most advanced technologies are put to use within the general form-fit-function of the legacy product definitions to form a marriage the puts the best in solutions that still satisfy yesterday's requirements.

Options and Configurations

A wide range of options is available for the RFT-3300 Microwave Tuner, assuring that the solution fits the requirement. Options include Input and Output frequency extensions, high speed search, low phase noise, mulitiple IF's and a host of other configurable attributes. Choose from among these options or inquire with the factory if there's something else not shown here.



Options shown in yellow

Input Choices

Primary Input

The Primary Input of the RFT-3300 Series Tuner can be configured to start as low as 100 MHz and extend as high as 26.5 GHz.

Secondary Input

The Secondary Input can be configured to extend up to 26.5 or 40.0 GHz and can have a range that overlaps with the primary Input, to support a variety of cabling and other source requirements.

RF Input	
Primary Input Ranges (customizeable at order)	0.5-18 GHz (-3370) 1.0-18 GHz (-3380) 1.5-18 GHz (-3380)
Frequency Extensions	up to 26.5 and 40 GHz down to 100 MHz

Output Choices

Primary Output

The Primary Output frequency is determined by the bandwidth of the Tuner, typically. However, a customized IF Output center frequency can be specified at the time of order, to suit the downstream input frequency requirements. Check with the factory for tailoring needs.

Secondary Output

A Secondary Output can be provided. Typically, this is a narrowband IF Output, to complement the Wideband IF Output used for the Primary Output. Our option SIF-001 is such a Narrowband option, providing a tunable output in the range from 50 to 160 MHz, in 10 MHz steps, and with output gain control with 20 dB in range.

IF Output	
Wideband Output center frequencies (customizeable at order)	1.0 GHz (-3370) 1.5 GHz (-3380, -3390)
Narrowband Output (optional)	50-160 MHz Tunable IF Out, in 10 MHz Steps 50 & 100 MHz select BW's
Level control (customizeable at order)	10-30 dB Gain, 1 dB steps

Search - Sweep/Scan

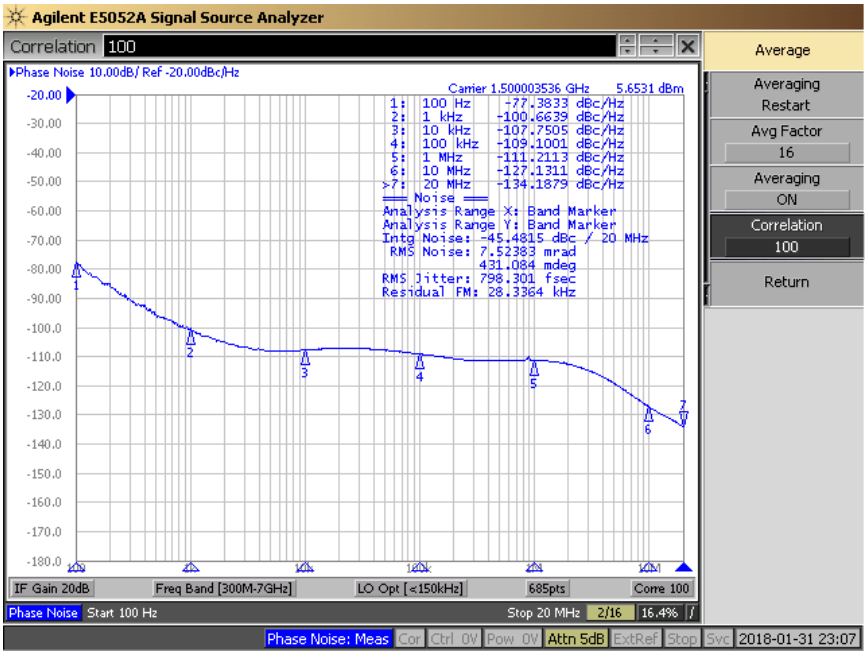
Search Option

Our Microwave RFT-Series Frequency converters can be configured to become Search and Scanning Tuners. With Option -SWP, the RFT-3300 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 front 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

Phase Noise Details

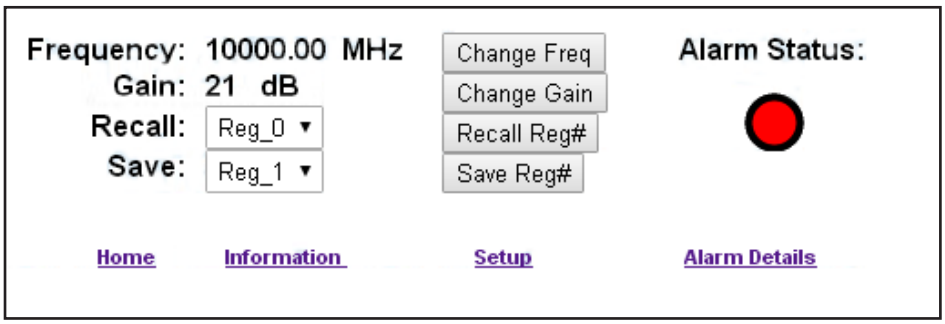
Our standard Microwave RFT-Series Frequency converters have excellent phase noise, as shown below. With option -LN, improvements by as much as 20 dBc/Hz can be obtained, as well as stability within 0.1 ppm.



Standard Phase Noise profile

GUI and SCPI-based Interfaces

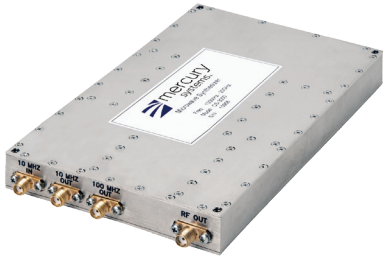
All RFT-3300 Series Microwave Converters have a complete SCPI-based command-set accessible over a choice of Ethernet or Serial Ports. GUI solutions are Browser-based and usable on Windows, Mac and Linux platforms.



Under the Hood

At the heart of every tuner and downconverter you'll find our world-class microwave synthesizer, the DS-3000.

- Tunes to 20 GHz
- Steps in 1 Hz
- Switches as fast as 200 uSec
- Offers extremely low phase noise, with <-116 dBc/Hz at 10 kHz when tuned to 10 GHz



Downconverter Input Characteristics

Characteristic	Description
Input Tuning Range	**RFT-3370**: 0.5-18 GHz **RFT-3380**: 1.0-18 GHz **RFT-3390**: 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: Input 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-001**: 18-26.5 GHz; **FXT-002**: 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-005**: 0.1-18 GHz
Input Connection	SMA-Fem
Spectral Sense	Non-Inverting
Input P1 dB	-10 dBm, typ

Output Characteristics

The standard Wideband IF Output of the RFT-3180 and -3190 has an output center frequency of 1500 MHz. The RFT-3170 has an output center frequency of 1000 MHz. This can be customized to other user-specified frequencies at the time of order.

Characteristic	Description
Output Frequency, Fixed	**RFT-3370**: 1 GHz **RFT-3380**: 1.5 GHz **RFT-3390**: 1.5 GHz
Output BW (3 dB)	**RFT-3370**: 500 MHz **RFT-3380**: 1.0 GHz **RFT-3390**: 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, typ
Output Compression at max gain	+10 dBm, min
Output Third Order Intercept, at max gain	+20 dBm, typ
Spurious, carrier related, at +10 dBm output, in band	<-70 dBc, typ
Spurious, internally generated (input referenced)	<-90 dBm, typ
SFDR, 3rd Order	>60 dB, typ
Image Rejection	60 dB min, 70 dB typ
Noise Figure, at max gain	12 dB typ, 17 dB max

Narrowband IF Output Characteristics - Option SIF-001

The Secondary IF Output path runs independent from the Primary Output path.
Theis Narrowband Option provides an agile output frequency and selectable BW's.

Characteristic	Description
Output Frequency (user settable)	50-160 MHz, in 10 MHz steps
Output BW (3 dB) (user settable)	50 & 100 MHz
Spectral Sense	Non-Inverting
Gain	30 dB typ, 25 dB min
Gain Adjustment Range	20 dB, in 1 dB steps

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

Tuning and Control

	Standard configuration	Changes with option -LN
Interfaces	Ethernet & RS-422	Ethernet & RS-422
Ethernet Connector	Amphenol, RJFTV RJ-45 MIL-DTL-38999 Series III RJFTV2SA2N03100BTX	Amphenol, RJFTV RJ-45 MIL-DTL-38999 Series III RJFTV2SA2N03100BTX
Interface Connector (mates with MS27473T10F-35S)	MS27497T10F-35P	MS27497T10F-35P
Remote Control	SCPI-type commandset and Browser-based GUI	SCPI-type commandset and Browser-based GUI
SWP Connections (TTL)		Trigger IN Trigger Enable All settled indicator OUT
Tuning Speed (settling time)	<2 ms	<600 usec
Search Types	SCPI-based	SCPI-based HW Triggered Step/Scan SW Triggered Step/Scan HW Triggered List SW Triggered List
List Size		up to 5000 entries
IP Parameters	Set IP Mode (DHCP or Static IP) Set IP Address, Gateway, Subnet Mask Read MAC Address	Set IP Mode (DHCP or Static IP) Set IP Address, Gateway, Subnet Mask Read MAC Address

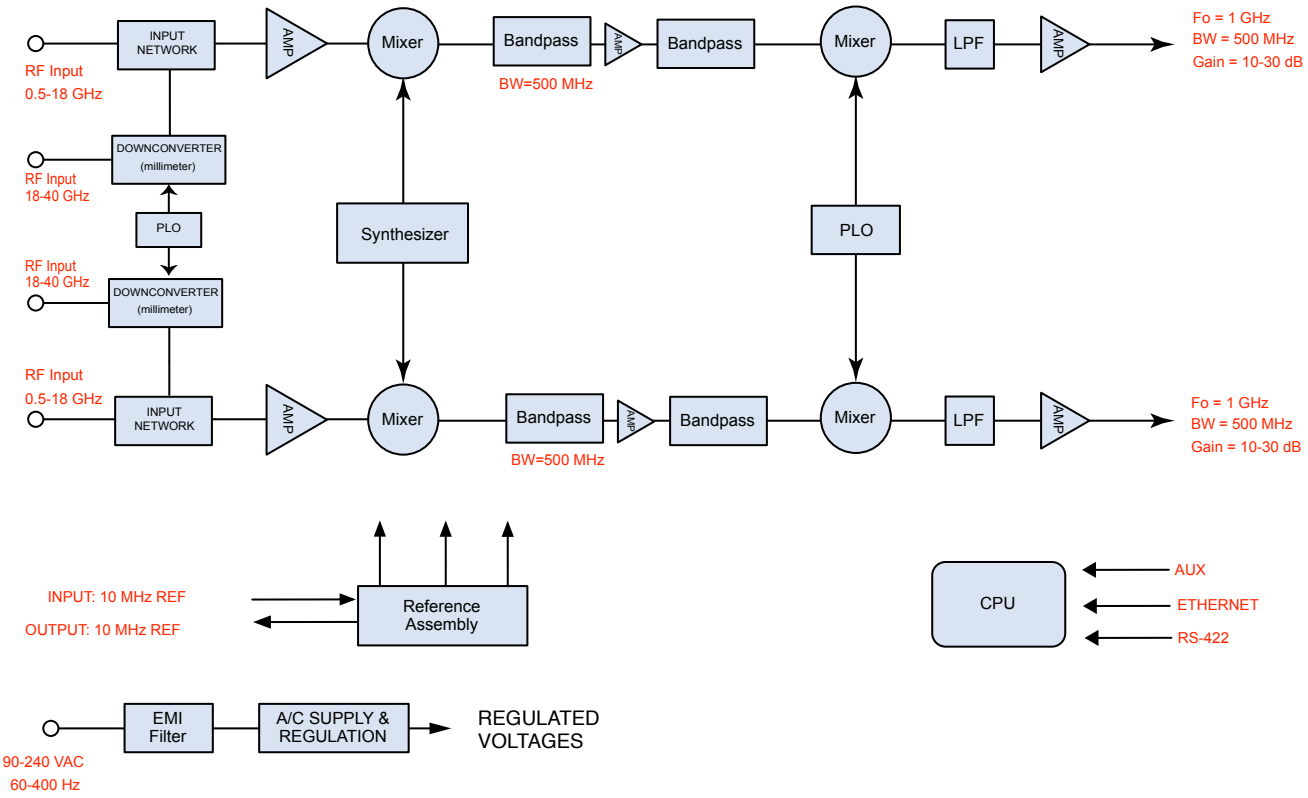
Environmental and General Characteristics

Characteristic	Description
Power Requirements	115 VAC +/-10% or 230 VAC +/-10%, 47-440 Hz <40 Watts (base, 0.5-18 GHz) <60 Watts (base, 0.5-40 GHz)
A/C Power Connector	MS3472L12-3PY (mates with MS3476L12-3SY)
Chassis Type	1/2 ATR (Long); Base Unit <26 lbs
Operating Temperature	-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

Dual Channel Phase Coherent Configuration

Dual Channel, Coherent operations are supporterd within the RFT-3300 Series. In this configuration, two sets of side-by-side converters share a common set of Local Oscillators and system reference to enable phase coherent frequency conversion paths.

A simplified block diagram is shown below for the RFT-3374-C, the 500 MHz BW system.



Models:

RFT-3374-C: Dual Channel Coherent, with 500 MHz BW

RFT-3384-C: Dual Channel Coherent, with 1000 MHz BW

RFT-3394-C: Dual Channel Coherent, with 2000 MHz BW

Ordering Information

Model	General Characteristics	Specifications
RFT-3370	Base Unit, 500 MHz BW	0.5-18 GHz Input, Wideband Output Center Frequency 1000 MHz, 500 MHz BW; Ethernet Remote access
RFT-3380	Base Unit, 1000 MHz BW	1.0-18 GHz Input, Wideband Output Center Frequency 1500 MHz, 1000 MHz BW; Ethernet Remote access
RFT-3380	Base Unit, 1000 MHz BW	1.5-18 GHz Input, Wideband Output Center Frequency 1500 MHz, 2000 MHz BW; Ethernet Remote access
Options		
Option -LN	Improved Phase Noise and Stability	Improves system phase noise, particularly at close offsets (100 Hz and 1 kHz), by as much as 20 dB and improves frequency stability of system to +/- 0.1 ppm over temperature range
Option -SWP	Adds high speed tuning (600 uSec)	Includes HW trigger line to enable fast stepping scanning routine and TTL Status indicator
Option SIF-001	Adds Secondary IF for narrowband	IF Outputs from 50-160 MHz, in 10 MHz steps; Selectable BW's of 50 and 100 MHz
Option FXT-001	Adds 26.5 GHz input Extension	RF Input extends up to 26.5 GHz
Option FXT-002	Adds 40.0 GHz input Extension	RF Input extends up to 40.0 GHz
Option FXT-005	Adds low band input Extension	RF Input extends down to 100 MHz
Dual Channel Models		
RFT-3374-C	Dual Channel Option	Converts RFT-3370 to Dual Channel, Phase Coherent
RFT-3384-C	Dual Channel Option	Converts RFT-3380 to Dual Channel, Phase Coherent
RFT-3394-C	Dual Channel Option	Converts RFT-3390 to Dual Channel, Phase Coherent

Need More Help? Need a Variant of This Product?

Contact Mercury's RF & Microwave engineering team at **rf.microwave@mrcy.com** or visit **www.mrcy.com/rf** for a detailed listing of RF and Microwave products.

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