DATA SHEET

www.mrcy.com

RFT-3200 Series Tuner/Downconverter with fully AGILE IF

RFT-3280: 5 Selectable BW's up to 1000 MHz
RFT-3290: 5 Selectable BW's up to 2000 MHz

Agile IF means the user has the freedom to downconvert to any IF output frequency.

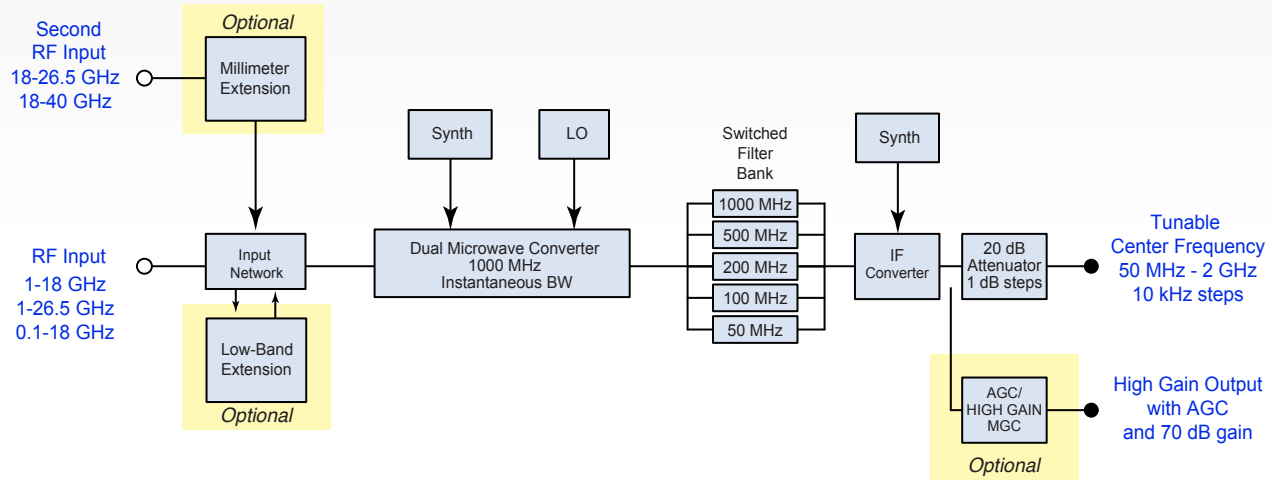
So whether you're driving into a digitizer, or any other downstream device, never be locked into a single IF Frequency choice again.

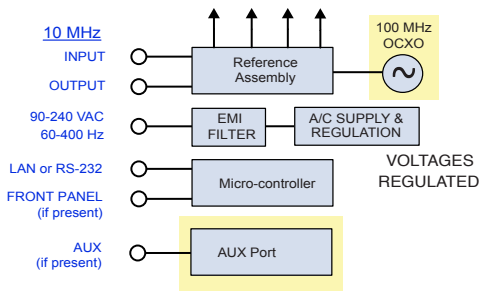
Set-up is as simple as:

1 **Tune to any input frequency, up to 40 GHz**

2 **Tune to any output frequency, 50 to 2000 MHz**

3 **Select bandwidth, from 50 MHz to 2 GHz**





RFT-3280 shown here, with configuration options

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RF Input Configuration Choices

Primary Input

The primary input can be configured to span the basic range covering 1 to 18 GHz, with possible extensions going down to 100 MHz or up as high as 26.5 GHz

Secondary Input

The secondary input is typically used for millimeter inputs, ranging up to 26.5 or 40 GHz. The inputs can be configured with overlap. For instance, the primary can go as high as 26.5 GHz and the secondary can start as low as 18 GHz, enabling two sources with overlapping frequency ranges to be supported.

Input Attenuation

Either the primary and/or the secondary input can be outfitted with a wide-ranging step attenuator. Typically these are specified with 10 dB steps and a range of 70 dB, but this can be tailored or customized at the time of order to the user's needs.

RF Input	
Primary Input choose one	1.0-18 GHz 0.1-18 0.1-26.5 1.0-26.5
Secondary Input options	18-26.5 26.5-40 18-40 GHz
RF Input Level Range	to -15 dBm

IF Output Configuration Choices

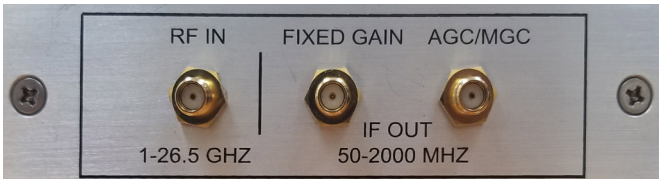
Agile IF Output

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 what bandwidth setting the user has applied. 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 -65 dBm.

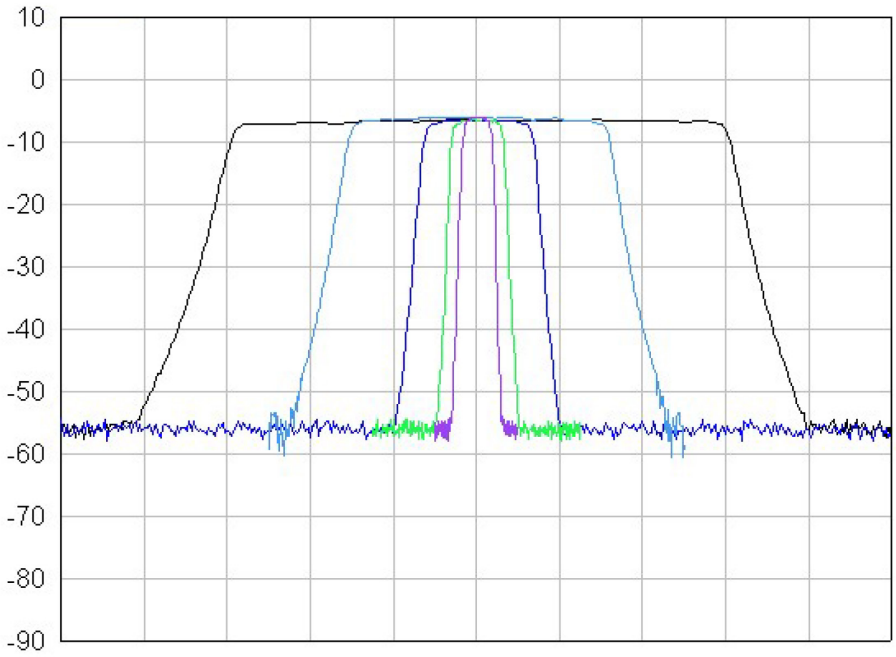
RF Output	
IF Output center frequencies	50-2000 MHz, tuneable in 10 kHz steps
Selectable BW's (3 dB BW)	**RFT-3280**: 1000, 500, 200, 100 and 50 MHz **RFT-3290**: 2000, 1000, 500, 200, 100 and 50 MHz
Level control (customizeable at order)	0-30 dB Gain, 1 dB steps
AGC Optional(customizeable at order)	P-OUT: 0 to -20 dBm, with input range from -10 to -65 dBm



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

Bandwidth Choices

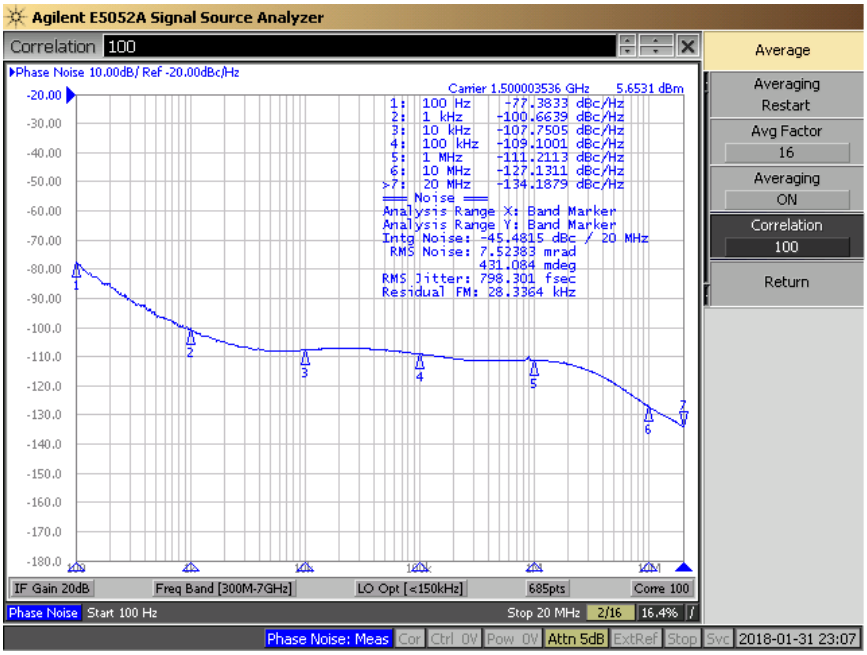
Models	Bandwidths
Model RFT-3280	1000, 500, 200, 100 and 50 MHz
Model RFT-3290	2000, 1000, 500, 200, 100 and 50 MHz



Shown with BW's of 1000, 500, 200, 100 and 50 MHz

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.



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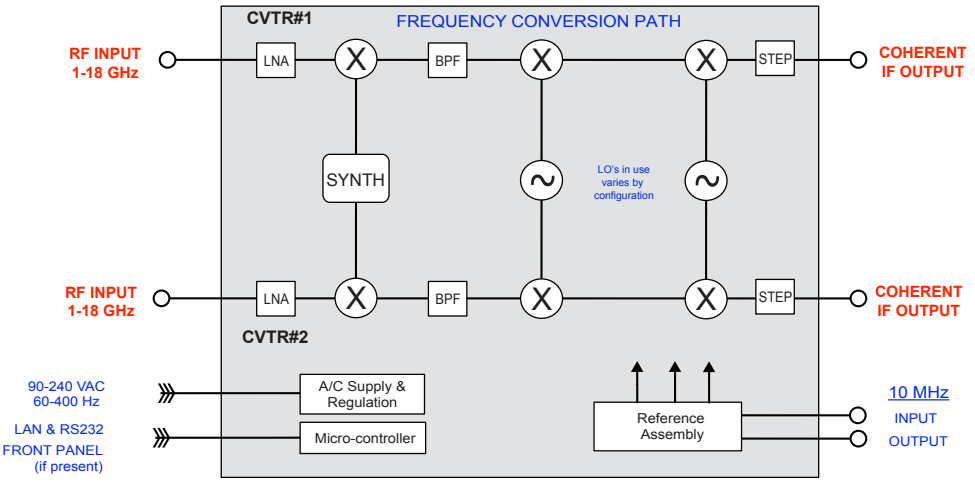
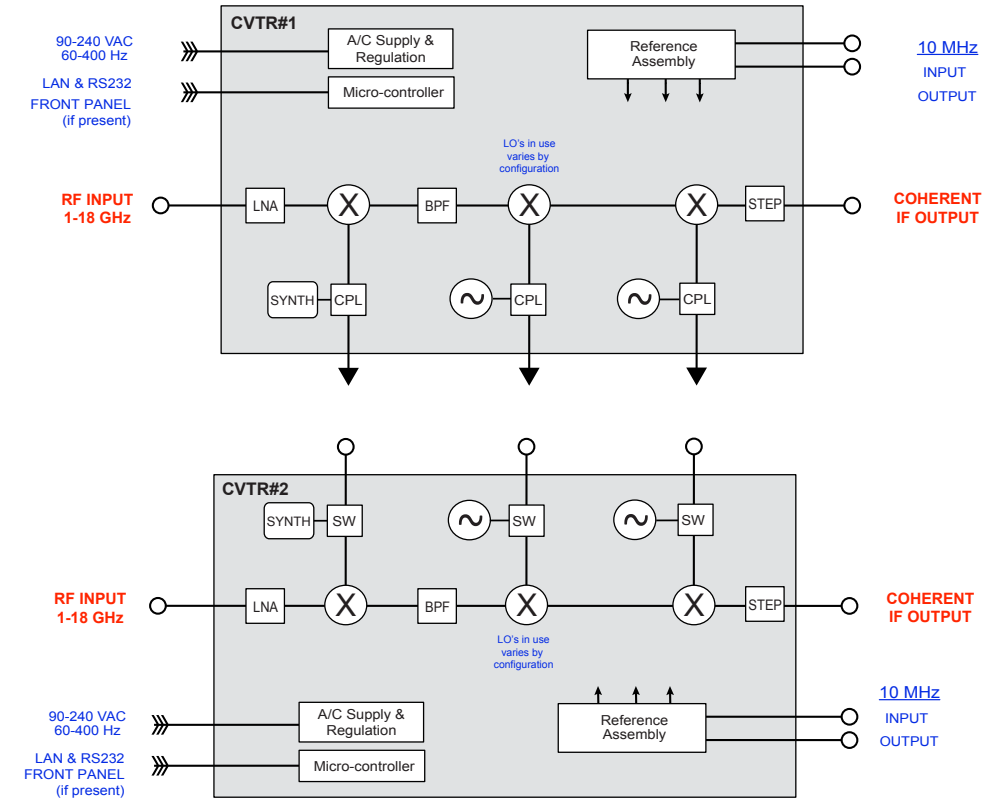
Phase Coherent

Our Microwave RFT-Series Frequency converters are available in a variety of phase-coherent configurations, supports such modes as “shared LO” and “Master/Slave”. The phase coherent converters can also be configured for stand-alone or coherent operation, so as needs shift the equipment continues to meet user’s needs.

“All-in-One” Configuration



“Master/Slave” Configuration



Search - Sweep/Scan Option - SWP

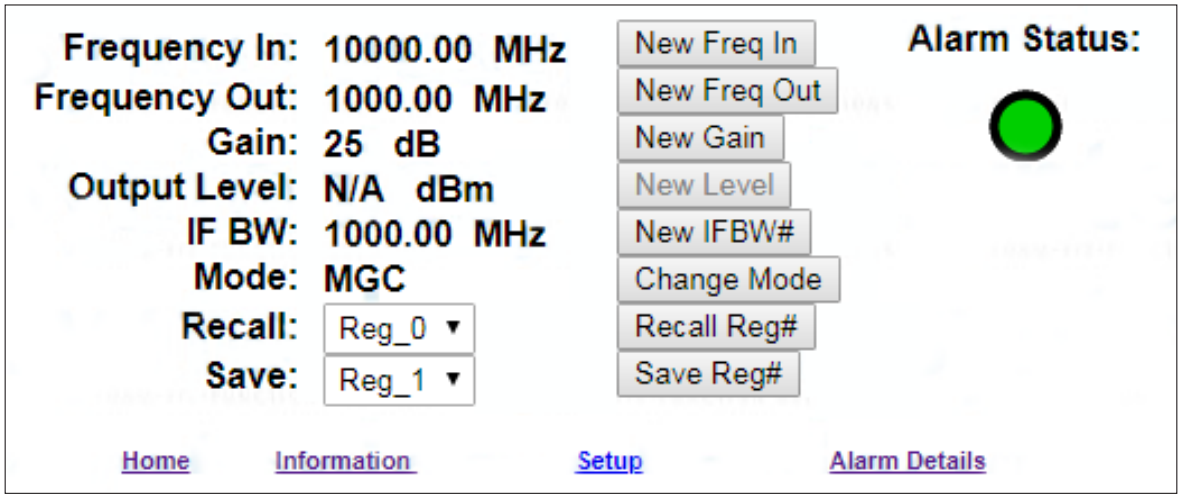
Search Option

Our Microwave RFT-Series Frequency converters can be configured to become Search and Scanning Tuners. With Option -SWP, 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-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: 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, 70 dB typical
Gain Adjustment range	20 dB min, in 1 dB steps	MGC: 10 to 70 dB, min, 1 dB steps; AGC: P-OUT: 0 to -20 dBm, with input range from -10 to -65 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

Ordering Information

Model	Name	Features
RFT-3280	Base Unit, 1000 MHz max BW	Tuner, 1.0 to 18 GHz
RFT-3290	Base Unit, 2000 MHz max BW	Tuner, 1.5 to 18 GHz
(Options: Input Extensions)		
FXT-001	For Primary or Second. Input	Extends input to 26.5 GHz
FXT-002		Extends input to 40.0 GHz
FXT-005		Extends input down to 100 MHz
(Other Factory Options)		
-XTR	Ruggedized version, in 1/2 ATR	Increases temperature range and adds specs for shock, vibe and other harsh service conditions
-ATT	Adds Input attenuator	Up to 70 dB of input attenuation. 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 (200 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 a matching Upconverter

Our RFT-4200 Series Upconverters match the RFT-3200 Series Downconverters, with

- Input/Output frequencies
- Bandwidths
- Common command-sets.

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

8008.00E-0719-ds-RFT-3200

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