

### Features

- High Stop-Band Rejection
- Absorptive Design
- Can be Cascaded for Multiple Notches
- On-device Temperature Measurement
- Compact Form-factor
- Control and Power over USB 2.0

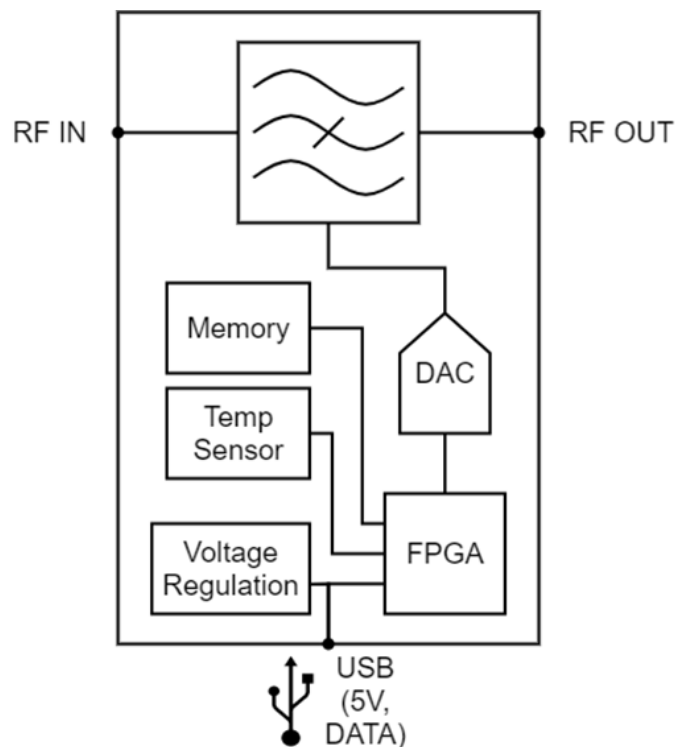
### Applications

- Jamming Mitigation
- Communications Receivers
- ESM Receiver Protection
- TR Modules
- Electronic Warfare

### General Description

TF10401 is a unit for a high-rejection, tunable, absorptive notch filter that is designed and packaged to make evaluation and testing straightforward. The unit can be controlled through the provided graphical user interface or python API.

### Functional Block Diagram



**Electrical Specifications**

Parameter	Symbol	Specification	Conditions
Tuning Range	Fc	1100 to 1900 MHz	
Tuning Resolution		1 MHz typical	
Rejection		21dB min, 45dB typical, 80dB max	Notch Performance
-3dB Bandwidth		173 MHz min, 223 MHz max	Notch Performance
-20dB Bandwidth		17 MHz min, 45 MHz max	Notch Performance
Passband Frequency		686 to 2500 MHz	See Note 1
Insertion Loss	IL	0.8dB maximum	See Note 2
Return Loss		16dB minimum	See Note 3
Group Delay		2.77ns maximum	100 MHz spacing from notch center frequency
Tuning Speed		25μs maximum	1100MHz to 1900MHz Tuning Time (See Note 4)
IIP3		34.32dBm typical	Passband 2-Tone Test (See Note 5)
Passband RF Power		+30dBm maximum	
Notch RF Power		-15dBm maximum	
Supply Voltage		5V	USB
Minimum Signal to Notch Spacing		50 MHz	

**Temperature**

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Operating Temperature	OTR	-40		+60	°C	
Storage Temperature	STR	-40		+60	°C	

**Hardware Interface**

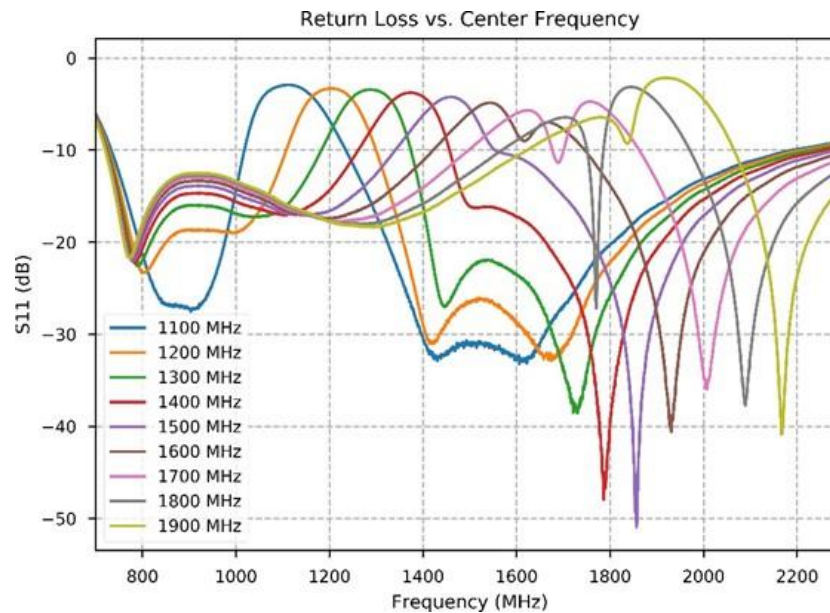
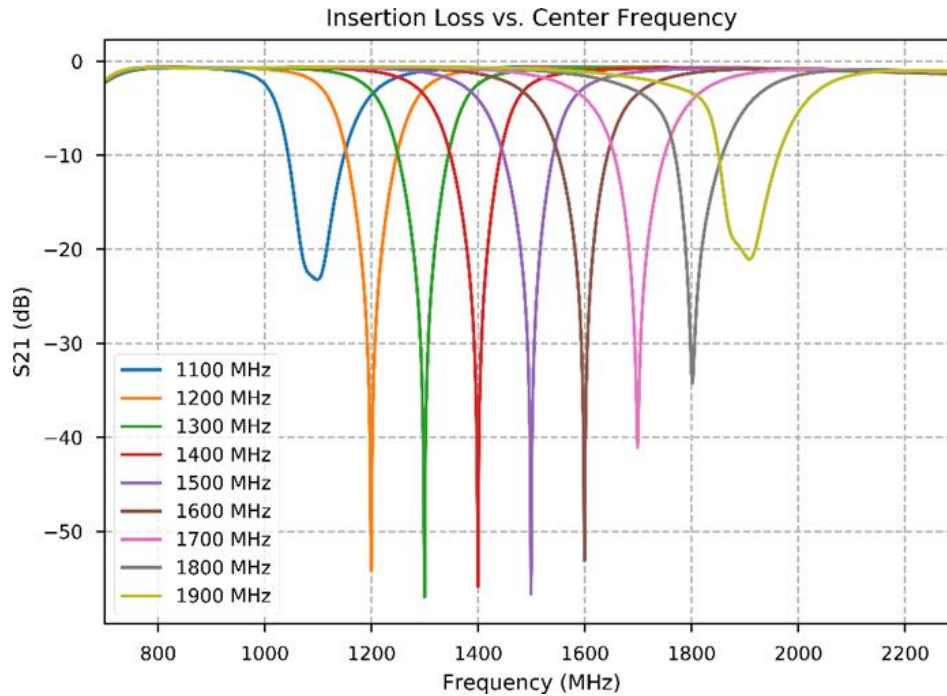
Name	Type	Hardware	Manufacturer	Manufacturer PN#
RF1	RF Input/Output	SMA Female	Amphenol RF	132146
RF2	RF Input/Output	SMA Female	Amphenol RF	132146
Power/Control	USB	USB Mini-B	Amphenol ICC	MUSB15104

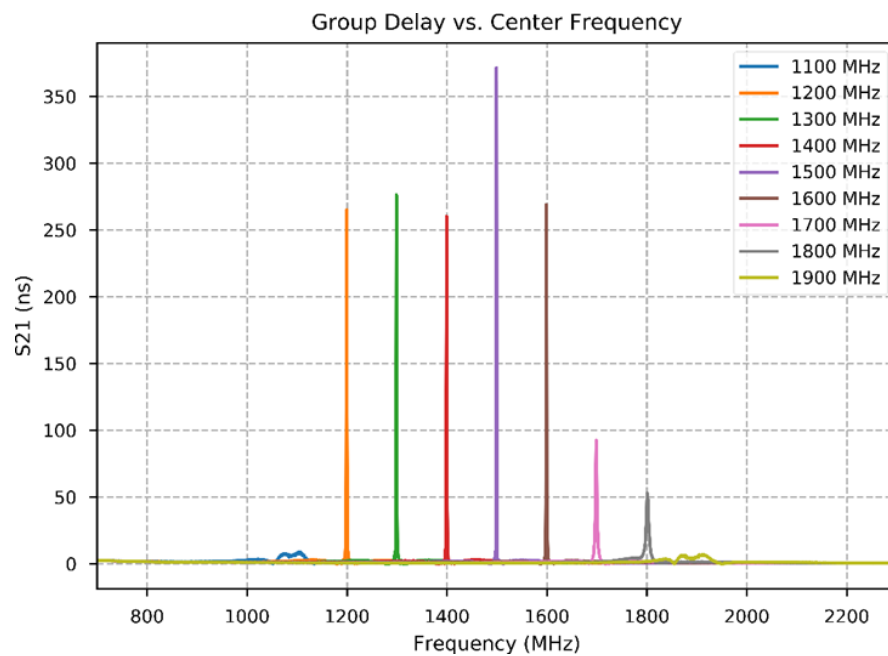
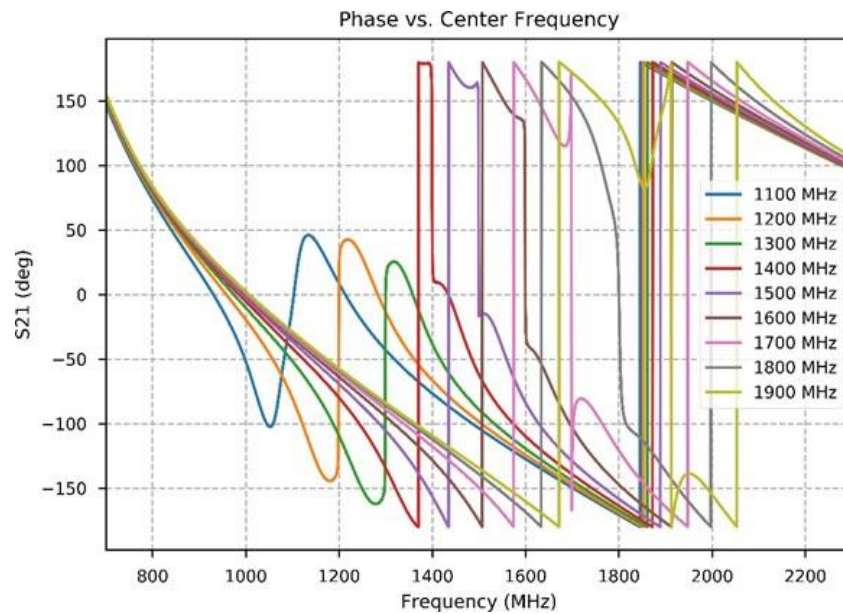
**Notes**

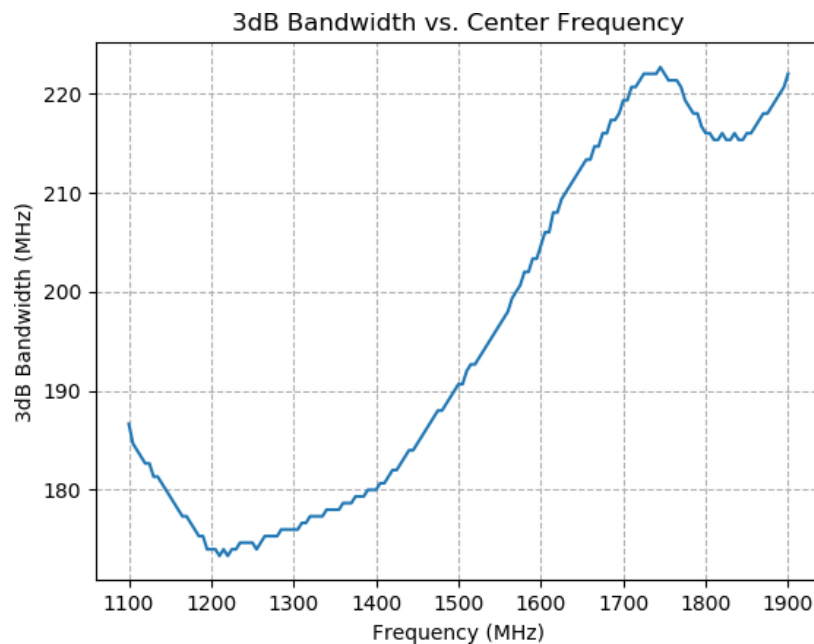
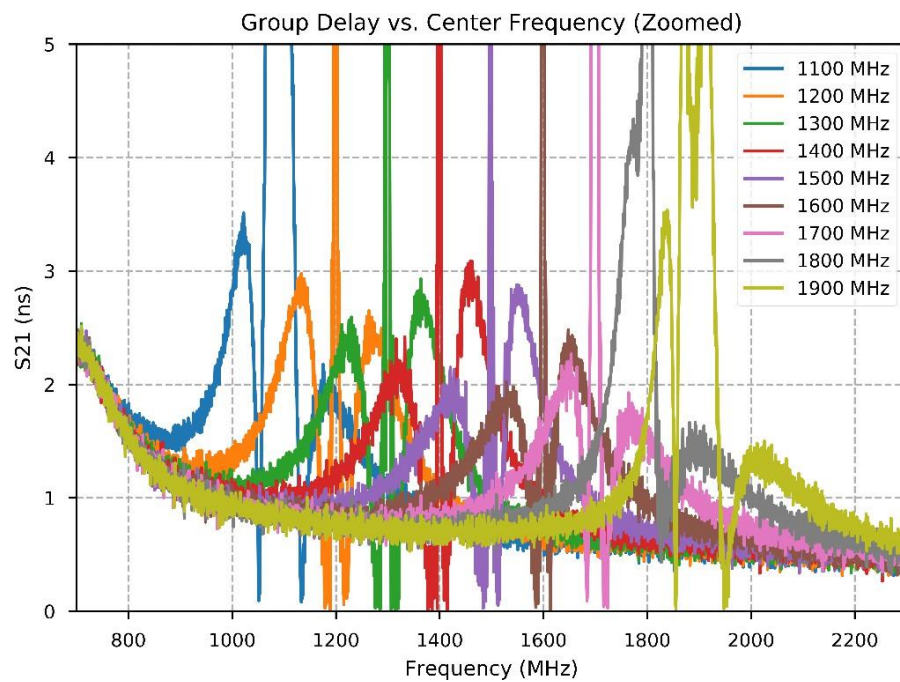
Note 1	Passband is defined as the frequency range between the 3 dB insertion loss points outside of the notch filter tuning range.
Note 2	Filter insertion loss is defined as the maximum insertion loss within the passband of the notch filter tuning range.
Note 3	Maximum return loss in the passband frequency range outside of the notch.

Note 4	Tuning speed is approximated for this demo unit. Actual tuning speed of the filter will depend on voltage driver and control interface latency.
Note 5	IIP3 is determined using the fundamental tone in the passband and the highest 3rd order product produced. Tone spacing of 0.5 MHz was used.

### Simulation plots

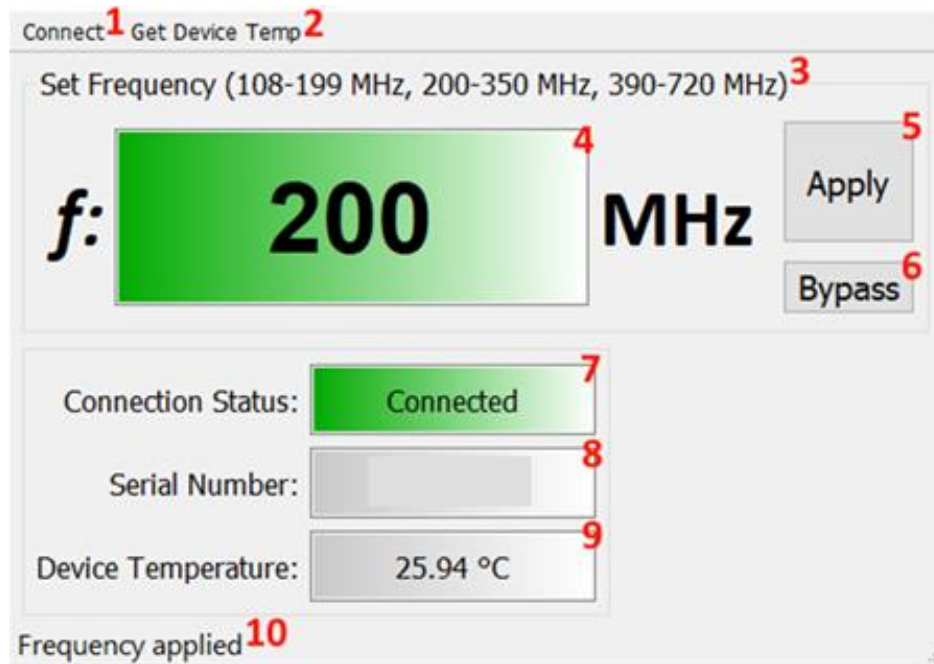






### Filter Control Software

The Tunable Filter unit is provided with control software for ease of testing. To run, connect the filter and the provided USB thumb drive to the same Windows machine. Launch *TunableFilter.exe*. The user interface is detailed below:

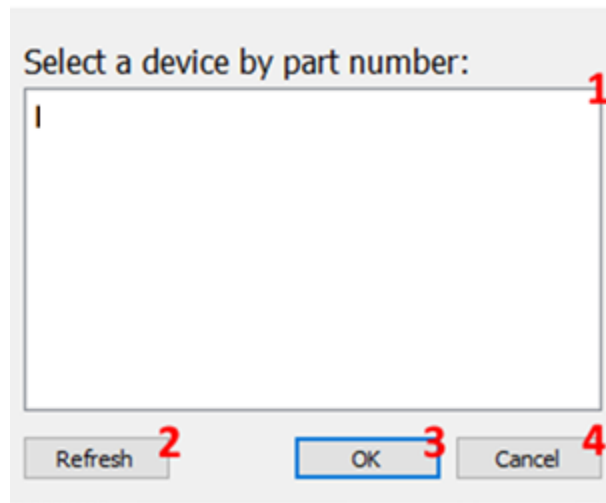


Index	Name	Function
1	Connect Button	Opens the connection browser
2	Get Temperature Button	Reads device temperature and updates respective field
3	Frequency Tuning Range(s)	Tuning range of notch. <sup>1</sup>
4	Frequency Input Field	Field to type desired frequency setpoint
5	Apply Frequency Button	Applies frequency typed in Frequency Input Field. <sup>2</sup>
6	Bypass State Enable	Applies Bypass (all-pass) state, if applicable. <sup>3</sup>
7	Connection Status	Shows status of connection to Tunable Notch Filter
8	Connected Device PN	Shows Part Number of connected Tunable Notch Filter
9	Connected Device Temperature	Shows last read Device Temperature. <sup>4</sup>
10	Status Bar	Temporarily shows relevant messages and errors

### Notes

Note 1	Some devices have multiple ranges of valid tune states. Values between listed ranges are invalid (e.g., 375 MHz in the example). Bounds of listed ranges are
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	inclusive.
Note 2	Pressing ENTER also applies the value in the Frequency Input Field.
Note 3	Not all devices have a bypass state. The button is unavailable in this case.
Note 4	Device temperature is read on initial connect but will only update when Get Device Temp is pressed.



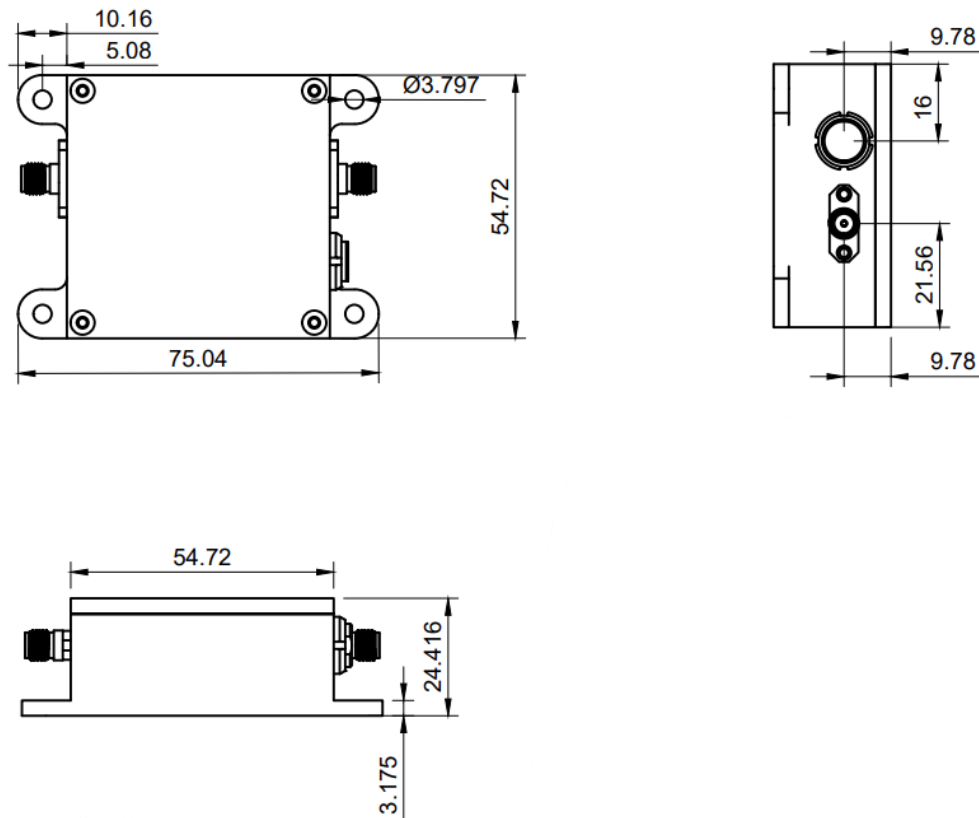
Index	Name	Function
1	Discovered Device List	Shows a list of all discovered Tunable Filters.
2	Refresh List Button	Re-searches for available Tunable Filters and updates list.
3	OK Button	Connects to selected part number. <sup>1</sup>
4	Cancel Button	Cancels connection attempt and closes browser. <sup>2</sup>

### Notes

Note 1	Desired Part number must be highlighted in the list when pressed. Double-clicking desired serial number also initiates connection.
Note 2	Equivalent to closing window with X button.



## Outline Drawing



All units in mm

## Revision History

Date	Rev	Author	Details of Revision
07-22-25	A	AR	Added outline drawing
04-16-25	0	AR	Initial Version