

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**

Specifications

Multi-Band Tuning:

Band 1: 108 – 199 MHz

Band 2: 200 – 350 MHz

Band 3: 390 – 720 MHz

Insertion Loss: 1.5 dB typical

Return Loss: 20.0 dB typical

APPLICATIONS

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

GENERAL DESCRIPTION

IM2101DC is a demo 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

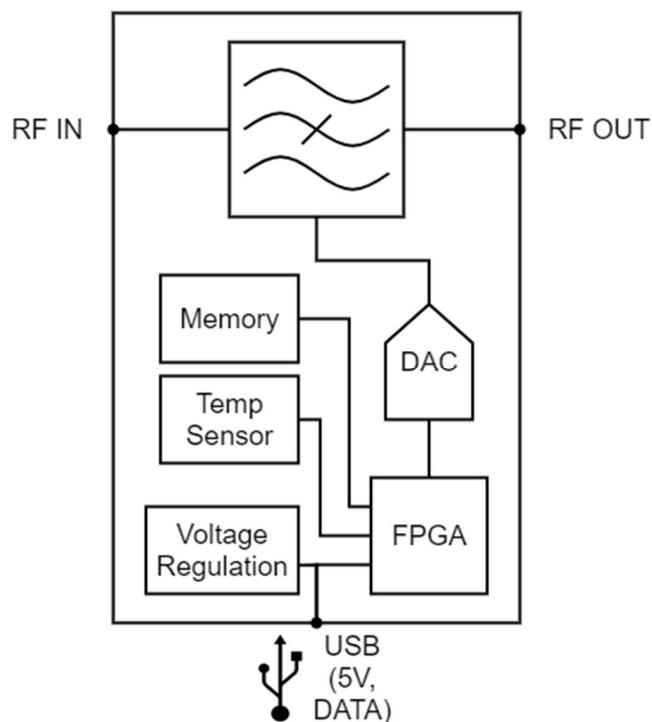


Figure 1 Functional Block Diagram

*Specifications subject to change without notice

SPECIFICATIONS

Specifications are for the IM-DEMO-3 VHF/UHF-Band demo unit.

Table 1. Electrical Specifications

PARAMETER	TEST CONDITION/COMMENTS	MIN	TYP.	MAX	UNITS
Tuning Range	Band 1	108		199	MHz
	Band 2	200		350	MHz
	Band 3	390		720	MHz
Tuning Resolution	All Bands		1		MHz
Passband					
Frequency Range	All Bands (See Note 1)	100		1000	MHz
Insertion Loss	All Bands (See Note 2)	0.93	1.5	2.2	dB
Return Loss	Band 1	9.4	20	36.8	dB
	Band 2	7.9	26	70.3	dB
	Band 3	5.8	12	15.1	dB
Group Delay	20MHz spacing from notch center frequency	10.21	11	12.71	ns
Notch Performance	Band 1				
Tuning Range		108		199	MHz
Rejection		25.7		62.8	dB
-3 dB Bandwidth		19.3		20.7	MHz
-20 dB Bandwidth		1.9		2.4	MHz
Notch Performance	Band 2				
Tuning Range		200		350	MHz
Rejection		21.3		62.0	dB
-3 dB Bandwidth		22.1		24.5	MHz
-20 dB Bandwidth		2.3		3.1	MHz
Notch Performance	Band 3				
Tuning Range		390		720	MHz
Rejection		33.5		72.3	dB
-3 dB Bandwidth		70.5		87.6	MHz
-20 dB Bandwidth		9.1		14.9	MHz
Tuning Speed	All Bands, Full Scale (See Note 4)		20		μs
IIP3	Passband 2-Tone Test (See Note 5)	25.29	34.32	45.25	dBm

*Specifications subject to change without notice

NOTES:

1. Passband is defined as the frequency range between the 3 dB insertion loss points outside of the notch filter tuning range.
2. Filter insertion loss is defined as the maximum insertion loss within the passband of the notch filter tuning range.
3. Maximum return loss in the passband frequency range outside of the notch.
4. Tuning speed is approximated for this demo unit. Actual tuning speed of the filter will depend on voltage driver and control interface latency.
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.

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ABSOLUTE MAXIMUM RATINGS*Table 2. Absolute Maximum Ratings*

PARAMETER	RATING
Supply Voltage	5V (USB)
Passband RF Power	30dBm
Notch RF Power	-15dBm
Minimum Signal to Notch Spacing	Half Maximum 3dB Bandwidth
Ambient Operating Temperature	-40 to 60 °C
Storage Temperature	-40 to 60 °C

*Specifications subject to change without notice

TYPICAL PERFORMANCE DATA

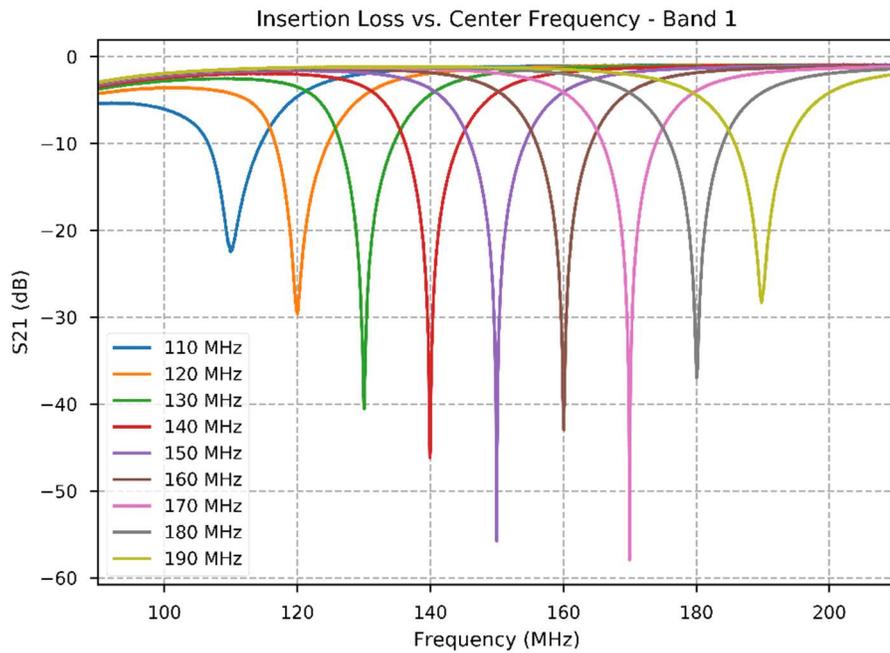


Figure 2. Filter Insertion Loss vs Center Frequency – Band 1

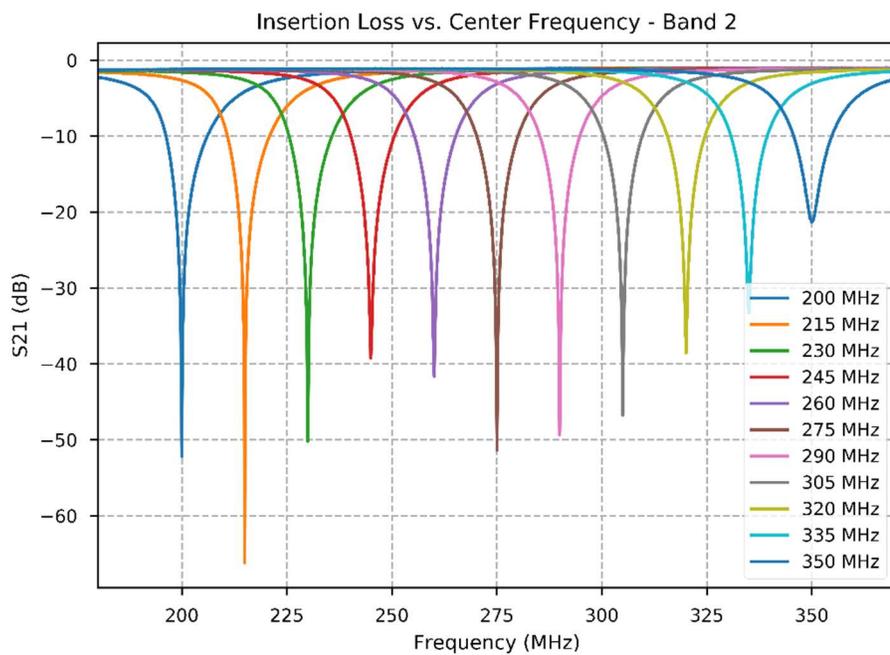


Figure 3. Filter Insertion Loss vs Center Frequency – Band 2

*Specifications subject to change without notice

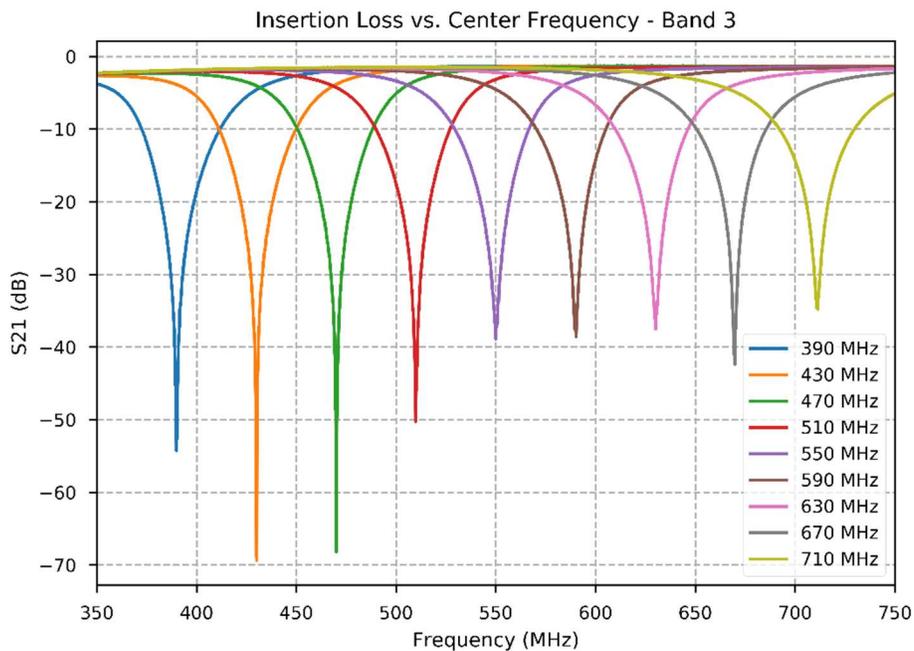


Figure 4. Filter Insertion Loss vs Center Frequency – Band 3

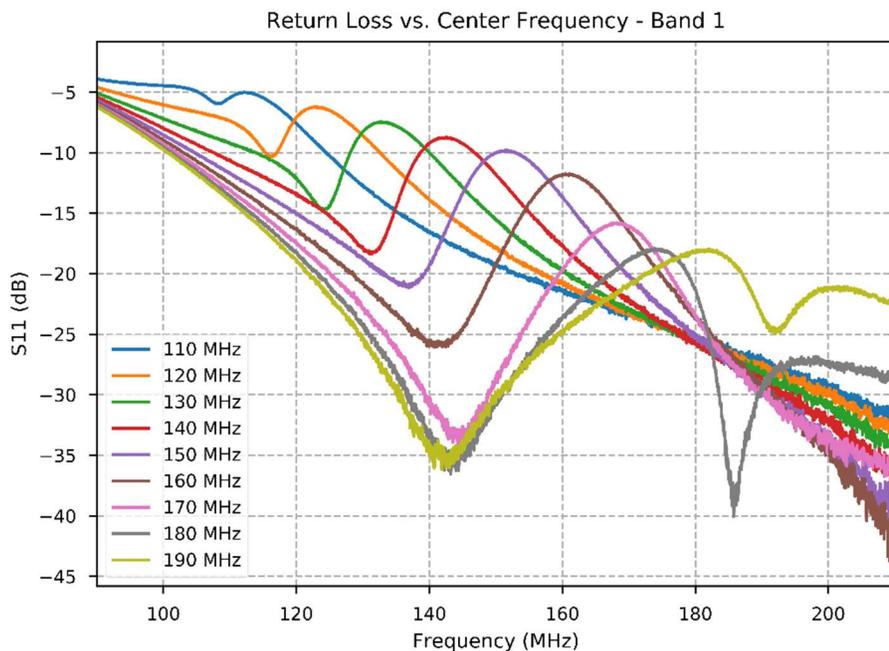


Figure 5. Filter Return Loss vs Center Frequency – Band 1

*Specifications subject to change without notice

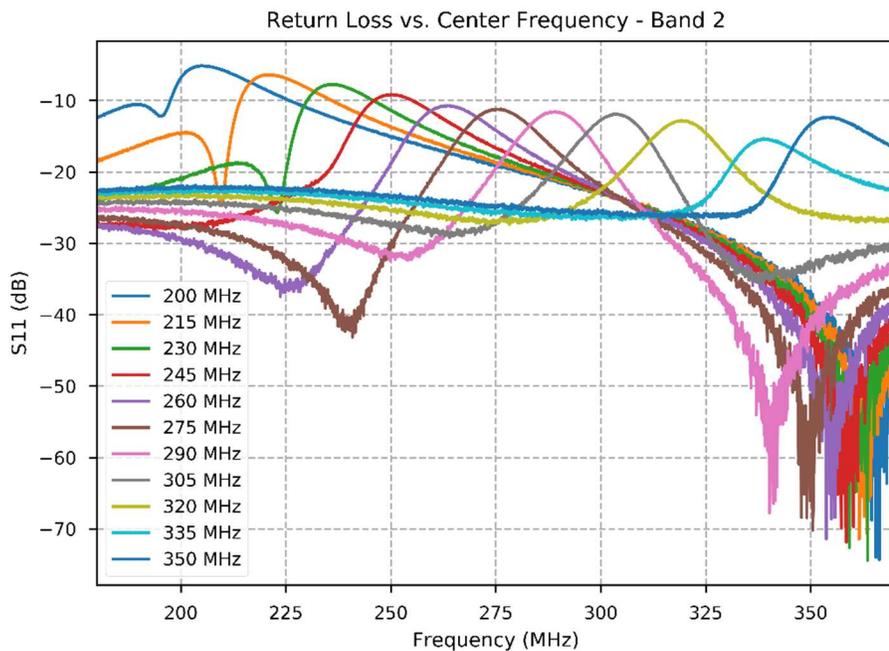


Figure 6. Filter Return Loss vs Center Frequency – Band 2

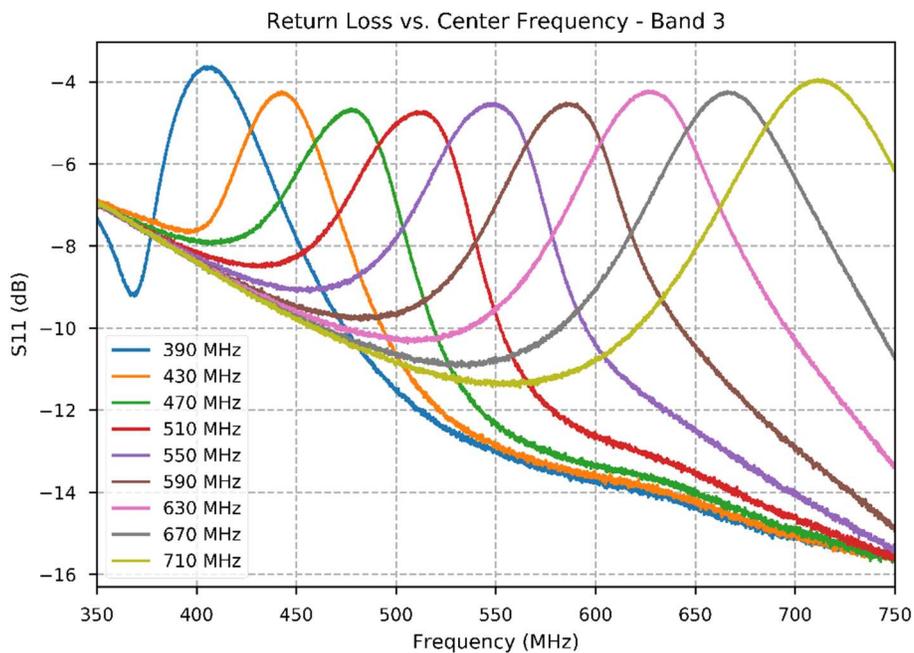


Figure 7. Filter Return Loss vs Center Frequency – Band 3

*Specifications subject to change without notice

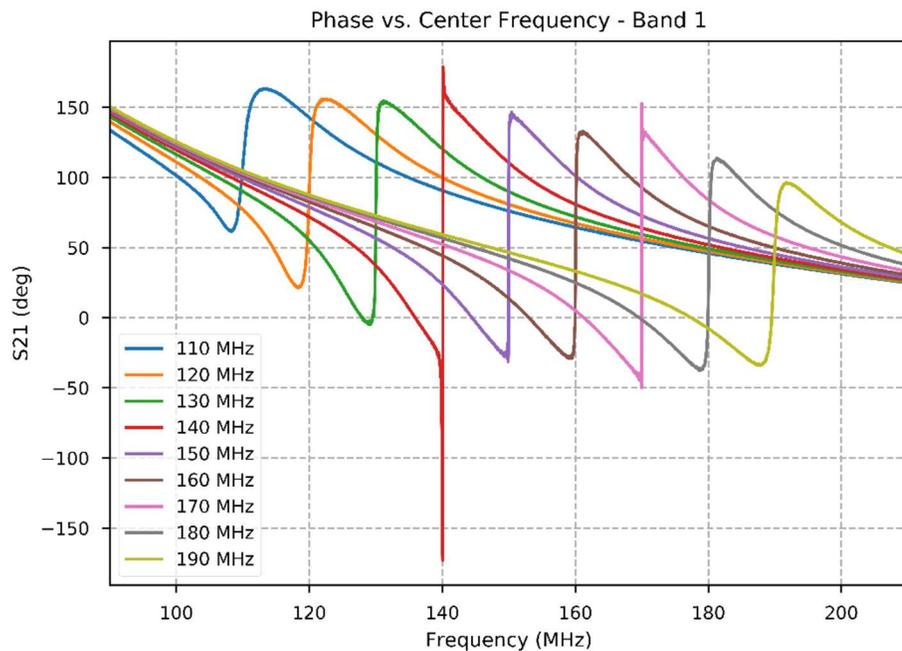


Figure 8. Filter Phase vs Center Frequency – Band 1

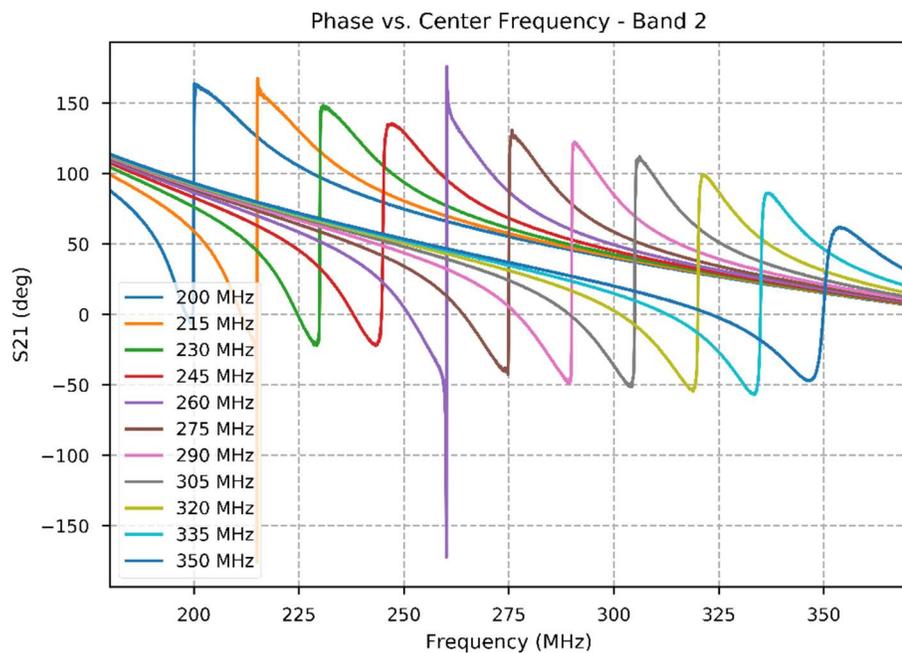


Figure 9. Filter Phase vs Center Frequency – Band 1

*Specifications subject to change without notice

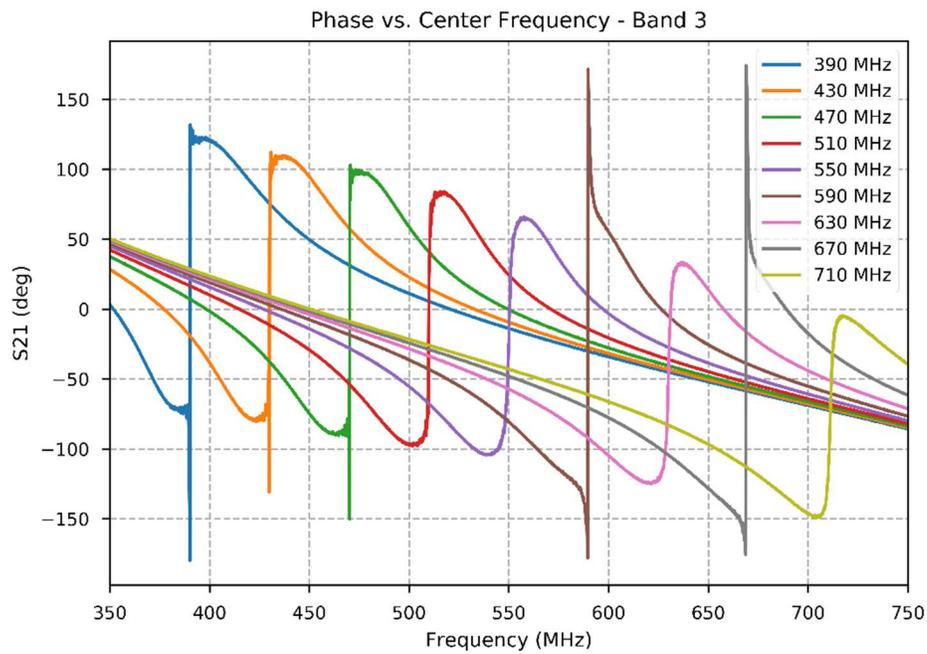


Figure 10. Filter Phase vs Center Frequency – Band 3

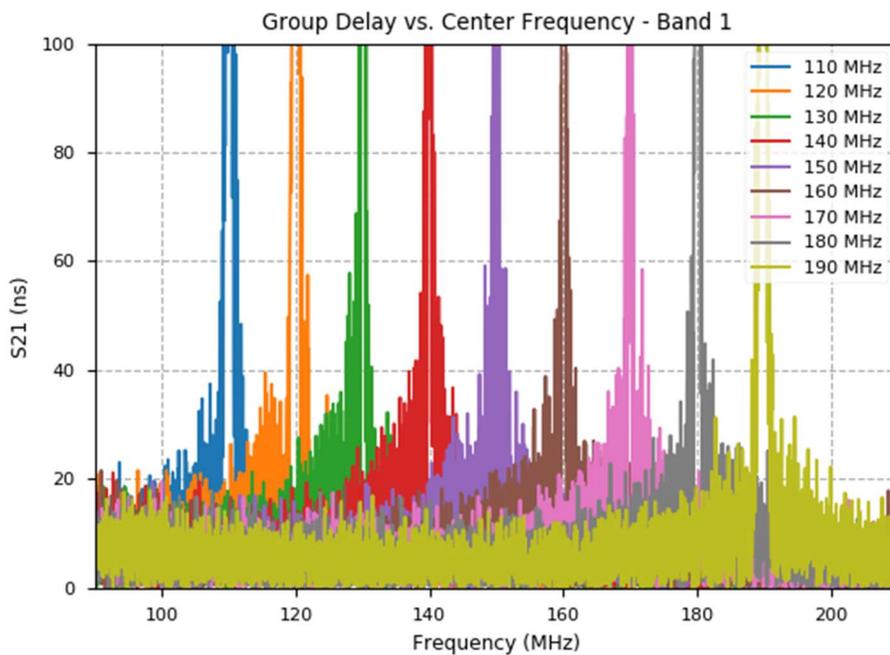


Figure 11. Filter Group Delay vs Center Frequency

*Specifications subject to change without notice

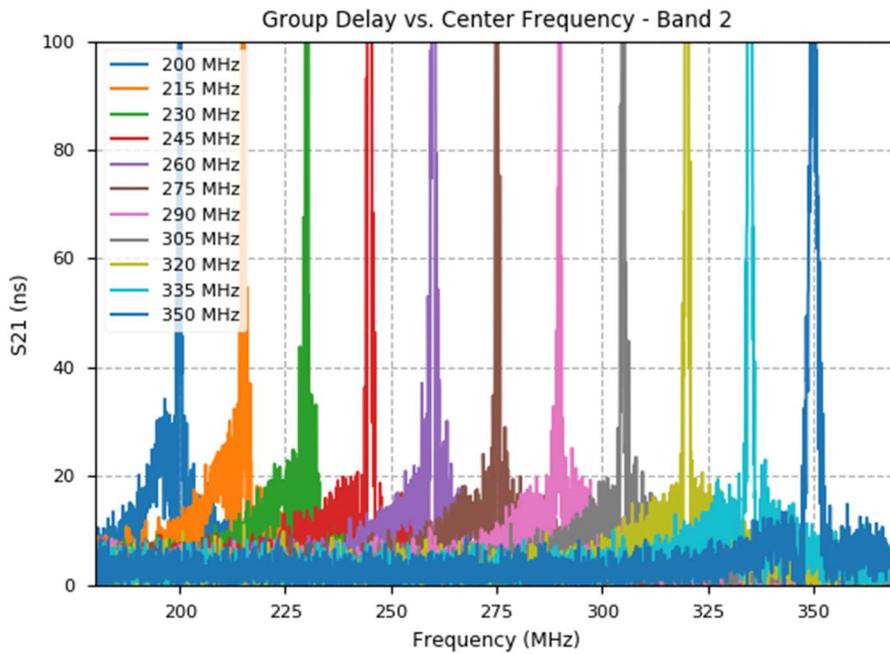


Figure 12. Notch -3dB Bandwidth vs Center Frequency

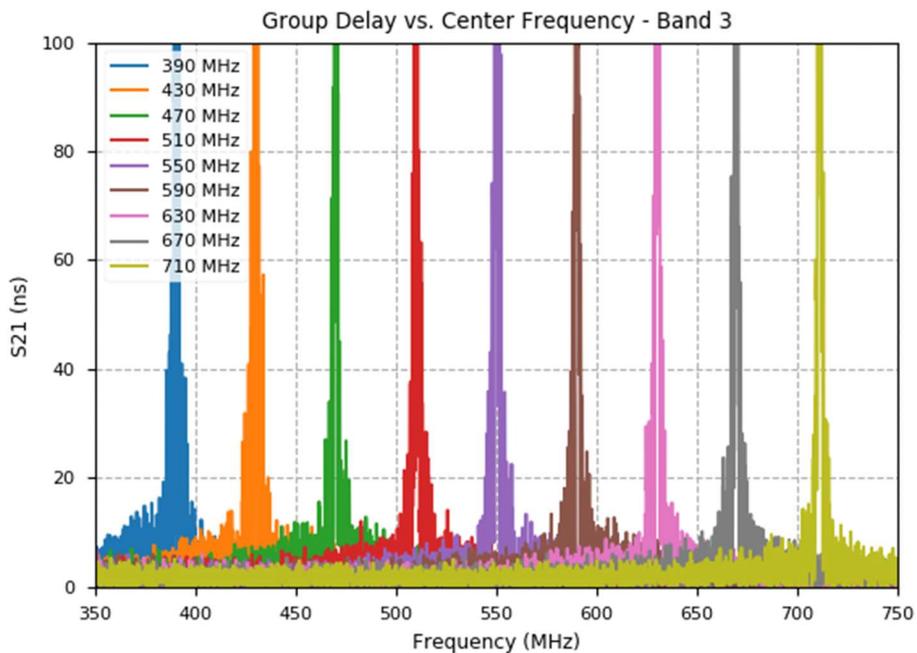


Figure 13. Notch -3dB Bandwidth vs Center Frequency

*Specifications subject to change without notice

HARDWARE INTERFACE*Table 3. Connectors*

NAME	TYPE	HARDWARE	MANUFACTURER	MANUFACTURER PART NUMBER
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

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FILTER CONTROL SOFTWARE

The IM Notch filter Demo 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 *TunableNotchFilter.exe*. The user interface is detailed below in Figure 14 and Figure 15:

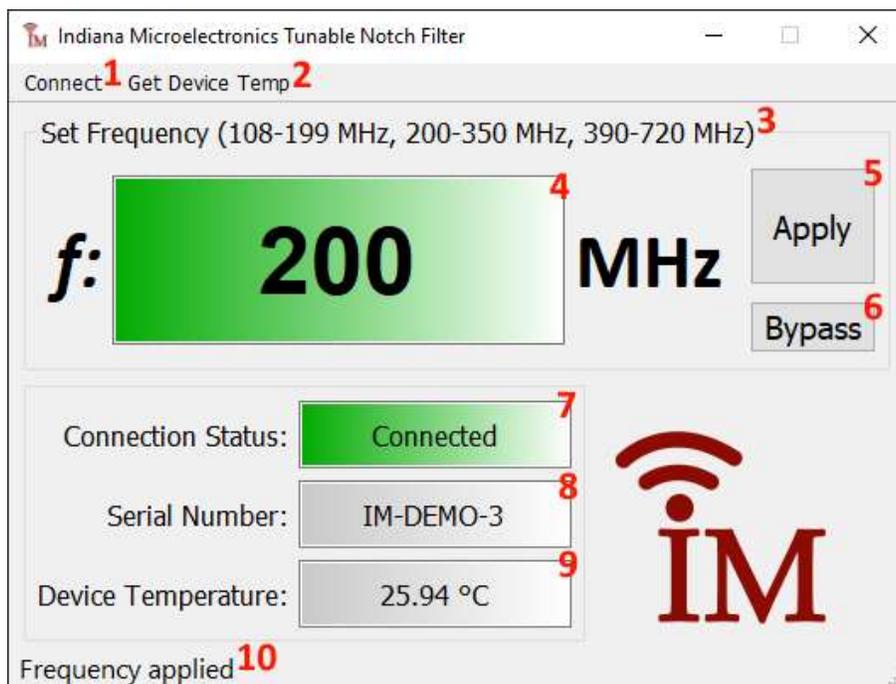


Figure 14. Tunable Notch Filter Control Software

INDEX	NAME	FUNCTION
1	Connect Button	Opens the connection browser (see Figure 15, Table 5)
2	Get Temperature Button	Reads device temperature and updates respective field
3	Frequency Tuning Range(s)	Tuning range of notch (See Note 1)
4	Frequency Input Field	Field to type desired frequency setpoint
5	Apply Frequency Button	Applies frequency typed in Frequency Input Field (See Note 2)
6	Bypass State Enable	Applies Bypass (all-pass) state, if applicable (See Note 3)
7	Connection Status	Shows status of connection to Tunable Notch Filter
8	Connected Device Serial Number	Shows Serial Number of connected Tunable Notch Filter
9	Connected Device Temperature	Shows last read Device Temperature (See Note 4)
10	Status Bar	Temporarily shows relevant messages and errors

Table 4. Control Software Details

*Specifications subject to change without notice

NOTES:

1. Some devices have multiple ranges of valid tune states. Values between listed ranges are invalid (e.g., 375 MHz in the Figure 14 example). Bounds of listed ranges are inclusive.
2. Pressing ENTER also applies the value in the Frequency Input Field.
3. Not all devices have a bypass state. The button will be unavailable in this case.
4. Device temperature is read on initial connect, but will only update when Get Device Temp is pressed.



Figure 15. Control Software Connection Browser

INDEX	NAME	FUNCTION
1	Discovered Device List	Shows a list of all discovered IM Tunable Notch Filters.
2	Refresh List Button	Re-searches for available IM Tunable Notch Filters and updates list
3	OK Button	Connects to selected serial number (See Note 1)
4	Cancel Button	Cancels connection attempt and closes browser (See Note 2)

Table 5. Connection Browser Details

NOTES:

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

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