

## 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: 700 – 1170 MHz
  - Band 2: 1170 – 2000 MHz
- Insertion Loss: 1.6 dB typical
- Return Loss: 20 dB typical

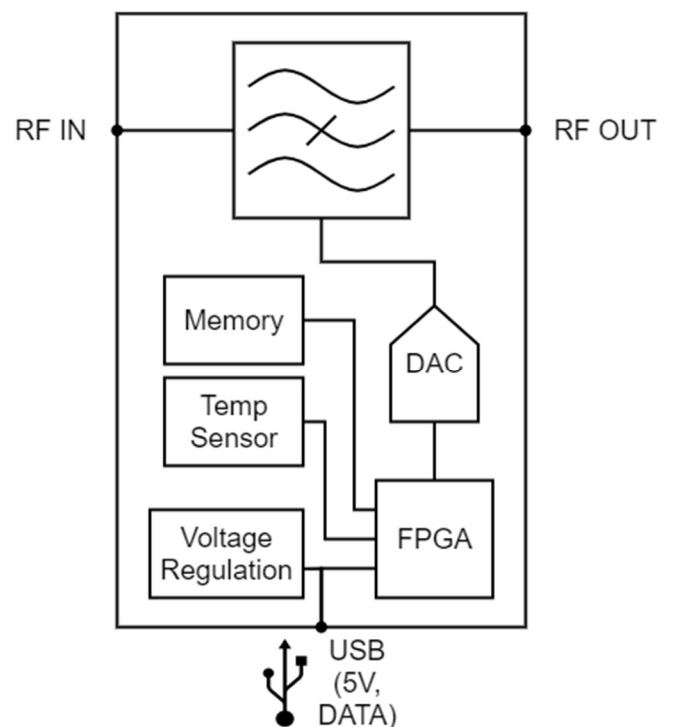
## APPLICATIONS

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

## GENERAL DESCRIPTION

IM2105DC 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 Optimus Prime UHF-Band demo unit.

**Table 1. Electrical Specifications**

PARAMETER	TEST CONDITION/COMMENTS	MIN	TYP.	MAX	UNITS
Tuning Range	Band 1	700		1170	MHz
	Band 2	1170		2000	MHz
Tuning Resolution	Calibration interval		1		MHz
Passband					
Frequency Range	All Bands (See Note 1)	620		2450	MHz
Insertion Loss	All Bands (See Note 2)	1.523	1.6	1.8	dB
	Bypass Line	1.628	1.8	2.135	dB
Return Loss	Band 1	9.4	20	36.8	dB
	Band 2	11.9	20	32.5	dB
Group Delay	20MHz spacing from notch center frequency	5	7	10	ns
Notch Performance	Band 1				
Tuning Range		700		1170	MHz
Rejection		36.8		66.7	dB
-3 dB Bandwidth		100.62		120.7	MHz
-20 dB Bandwidth		13		24	MHz
Notch Performance	Band 2				
Tuning Range		1170		2000	MHz
Rejection		32.8		78.5	dB
-3 dB Bandwidth		192		208.26	MHz
-20 dB Bandwidth		27		44	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

**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 3<sup>rd</sup> order product produced. Tone spacing of 0.5 MHz was used.

\*Specifications subject to change without notice

## ABSOLUTE MAXIMUM RATINGS

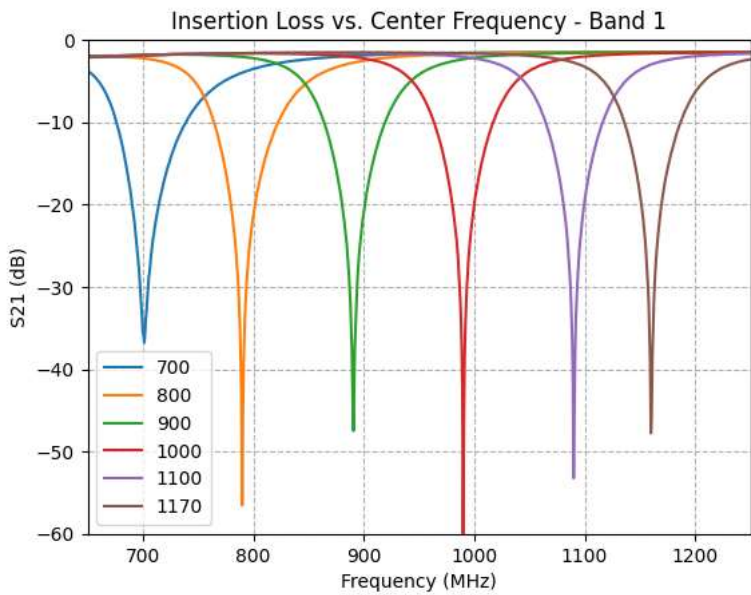
*Table 2. Absolute Maximum Ratings*

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	-55 to 60 °C

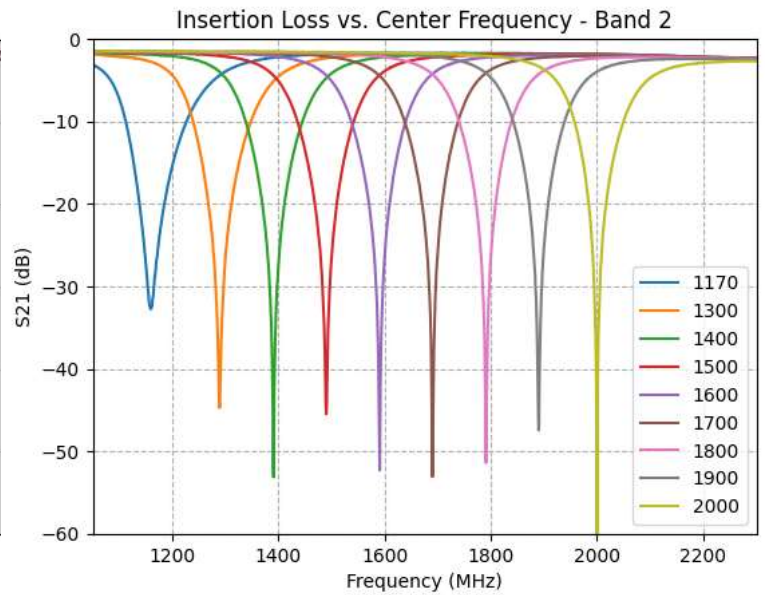
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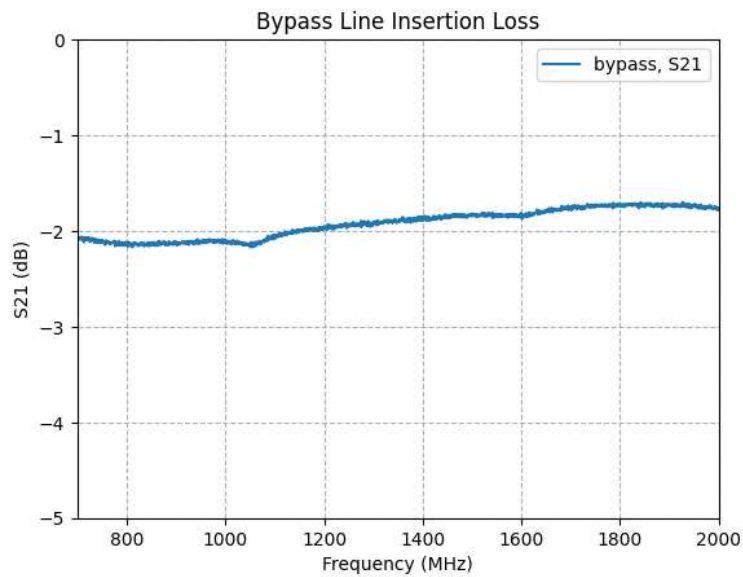
**TYPICAL PERFORMANCE DATA**



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

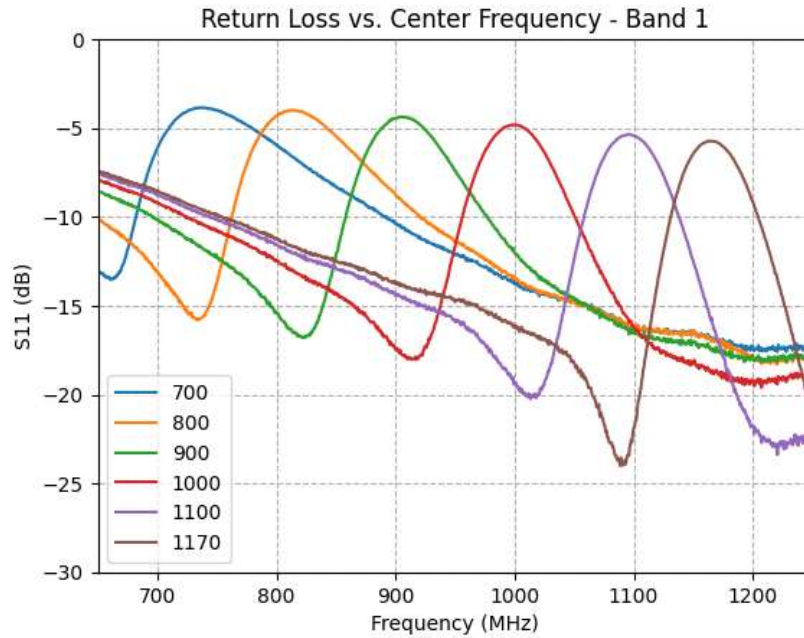


**Figure 3. Filter Insertion Loss vs Center Frequency – Band 2**

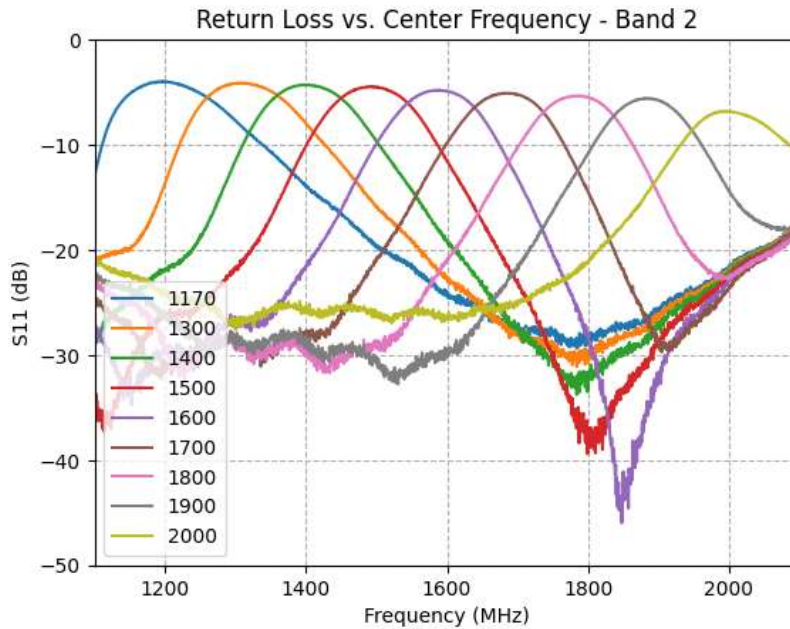


**Figure 4. Bypass Line Insertion Loss**

\*Specifications subject to change without notice

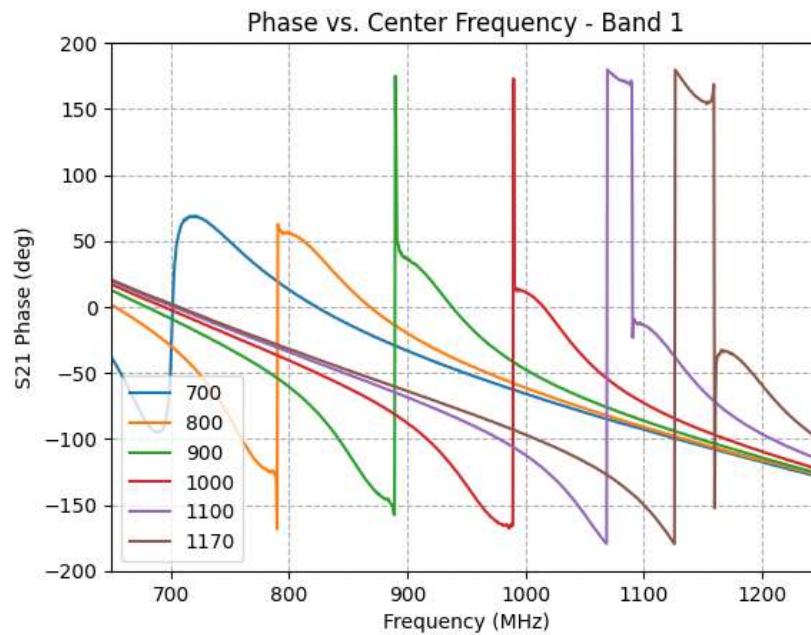


**Figure 5. Filter Return Loss vs Center Frequency – Band 1**

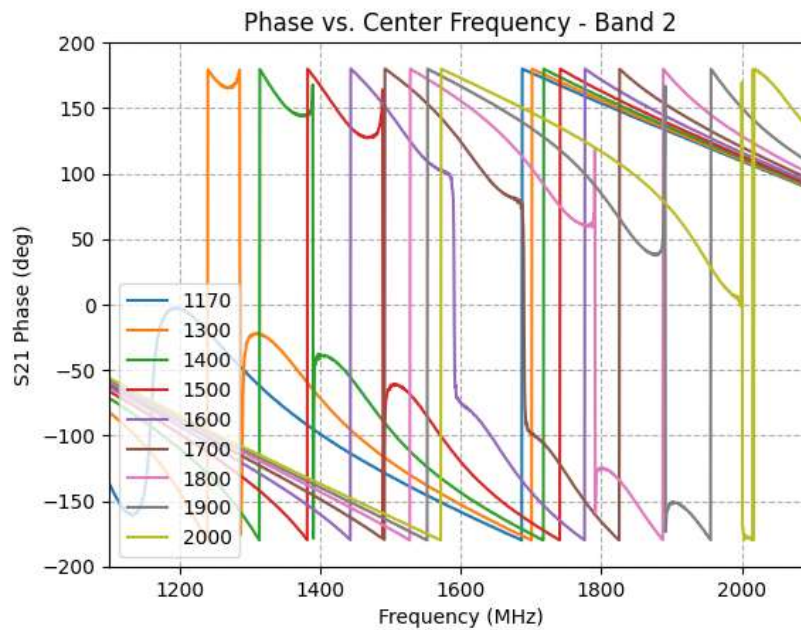


**Figure 6. Filter Return Loss vs Center Frequency – Band 2**

\*Specifications subject to change without notice

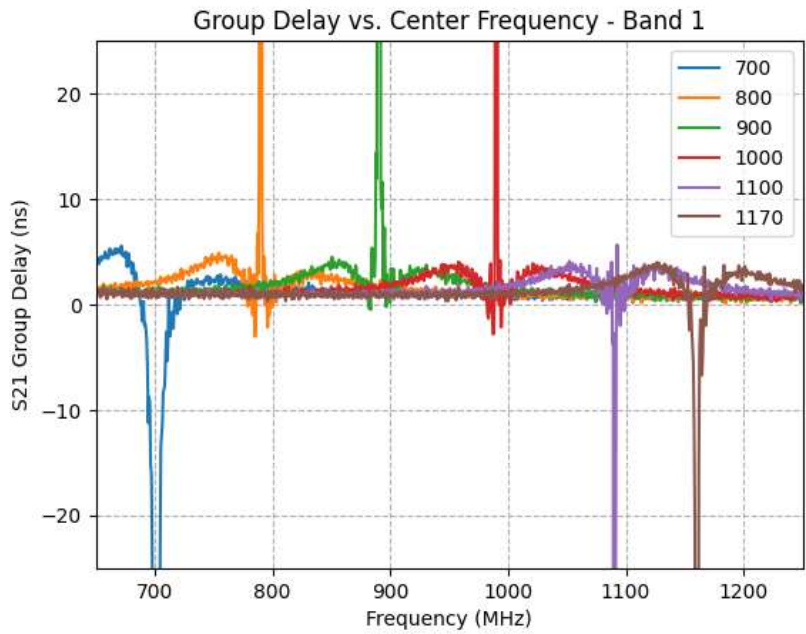


**Figure 7. Filter Phase vs Center Frequency – Band 1**

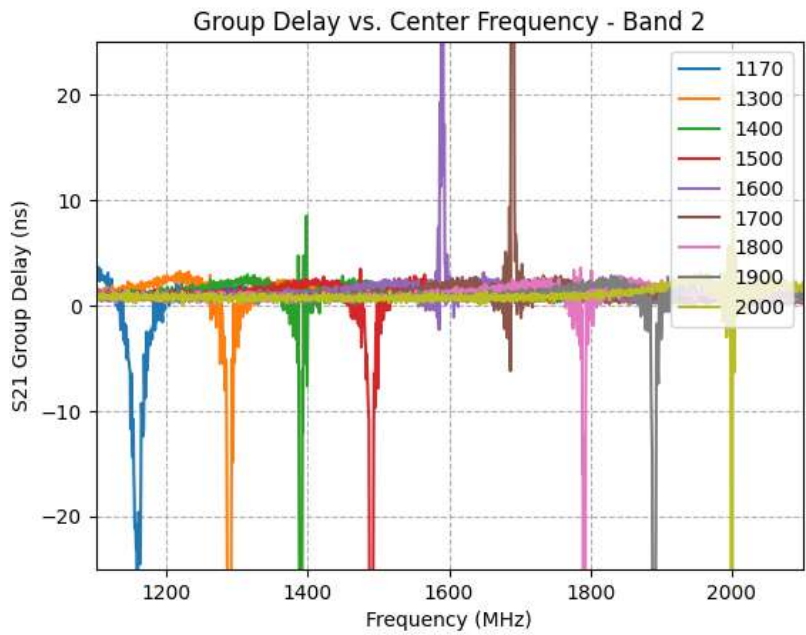


**Figure 8. Filter Phase vs Center Frequency – Band 2**

\*Specifications subject to change without notice



**Figure 9. Filter Group Delay vs Center Frequency**



**Figure 10. Notch -3dB Bandwidth vs Center Frequency**

\*Specifications subject to change without notice

**HARDWARE INTERFACE**

*Table 3. Connectors*

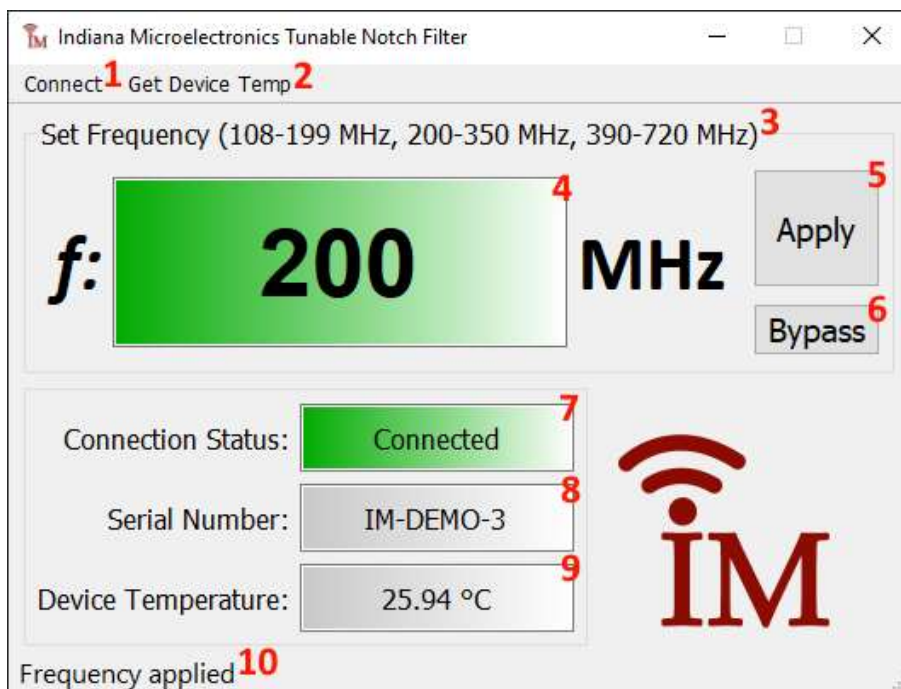
<b>NAME</b>	<b>TYPE</b>	<b>HARDWARE</b>	<b>MANUFACTURER</b>	<b>MANUFACTURER PART NUMBER</b>
RF1	RF Input / Output	SMA Female	Amphenol RF	132146
RF2	RF Input / Output	SMA Female	Amphenol RF	132146
Power / Control	USB	USB Mini-B	Amphenol ICC	MUSB15104

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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 11. Tunable Notch Filter Control Software**

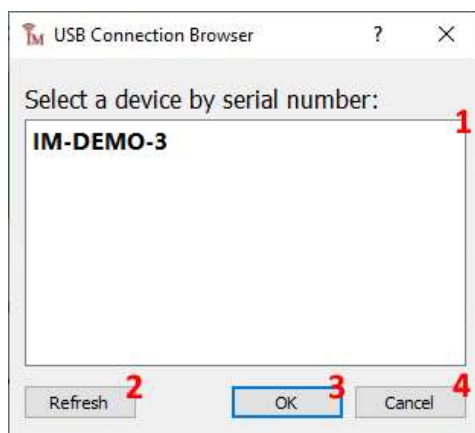
INDEX	NAME	FUNCTION
1	Connect Button	Opens the connection browser (see Figure 15, Table 5)
2	Get Temperature Button	Reads device temperature and updates respective field
3	Frequency Tuning Range(s)	Tuning range of notch (See Note 1)
4	Frequency Input Field	Field to type desired frequency setpoint
5	Apply 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 12. 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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