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

- **Tuning Range: 835 – 965 MHz**
- **Insertion Loss: 0.89 dB typical**
- **Return Loss: 21.2 dB typical**

APPLICATIONS

- **LTE Co-Channel Interference**
- **Jamming Mitigation**
- **Communications Receivers**
- **ESM Receiver Protection**
- **TR Modules**
- **Electronic Warfare**

GENERAL DESCRIPTION

IM2103DC 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

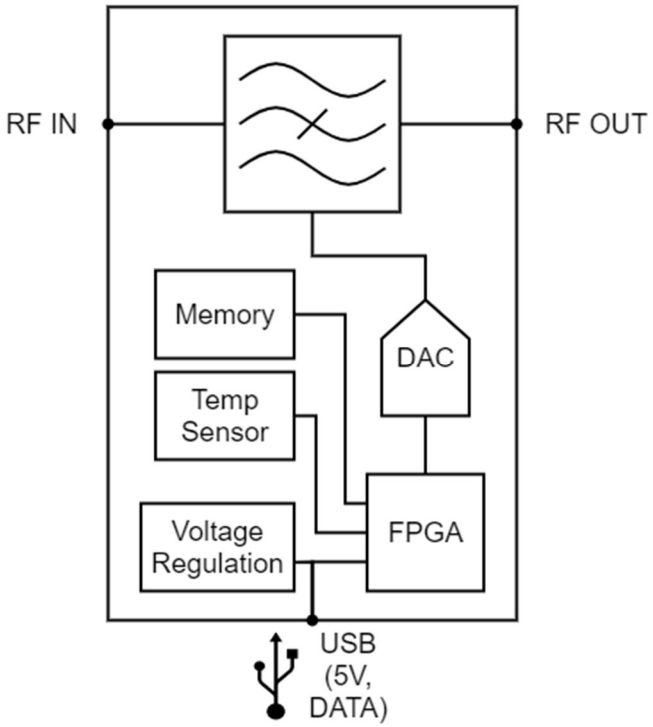

Figure 1 Functional Block Diagram

*Specifications subject to change without notice

SPECIFICATIONS

Table 1. Small-Signal Electrical Specifications

PARAMETER	TEST CONDITION/COMMENTS	MIN	TYP.	MAX	UNITS
Tuning Range		835		965	MHz
Tuning Resolution			1		MHz
Tuning Accuracy		0	0.14	1.31	MHz
Passband					
Frequency Range		500		1200	MHz
Insertion Loss	Valid only in passband (See Note 1)	0.64	0.89	1.1	dB
Return Loss	Valid only in passband (See Note 1)	10.	21.2	56.4	dB
Group Delay	Valid only in passband (See Note 1)	-6.7	1.3	5.6	ns
Notch Performance					
Rejection		44.6	54.5	70.7	dB
-3 dB Bandwidth		71.1	74.6	79.2	MHz
-20 dB Bandwidth		10.9	11.8	13.3	MHz
Tuning Speed	Full Scale (See Note 2)		20		µs
IIP3	Passband 2-Tone Test (See Note 3)		TBD		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. Tuning speed is approximated for this demo unit. Actual tuning speed of the filter will depend on voltage driver and control interface latency.
3. 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.

ABSOLUTE MAXIMUM RATINGS

Table 2. Absolute Maximum Ratings

PARAMETER	RATING
Supply Voltage	5V (USB)
Passband RF Power	+30dBm
Notch RF Power	+10dBm
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

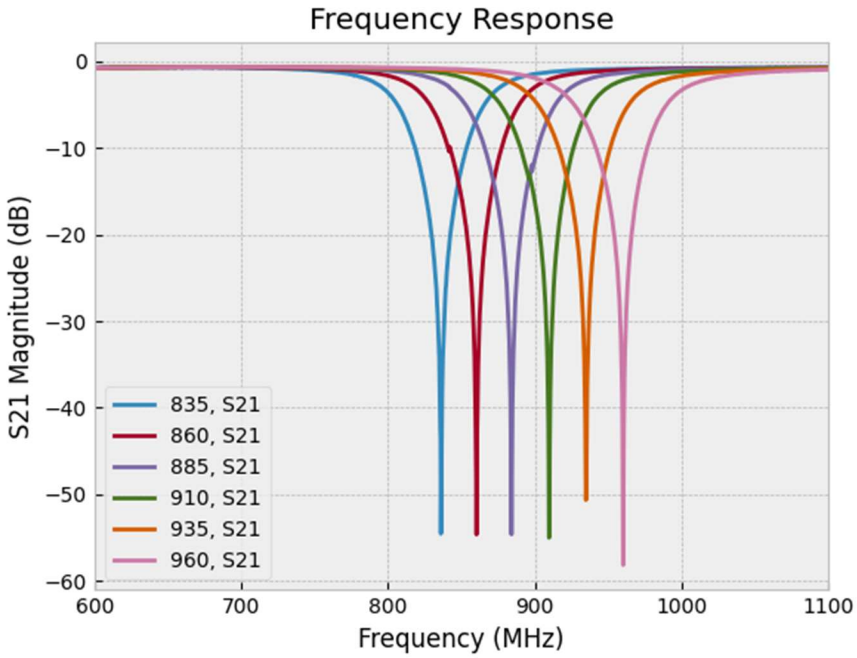

Figure 2. Filter Insertion Loss vs Center Frequency

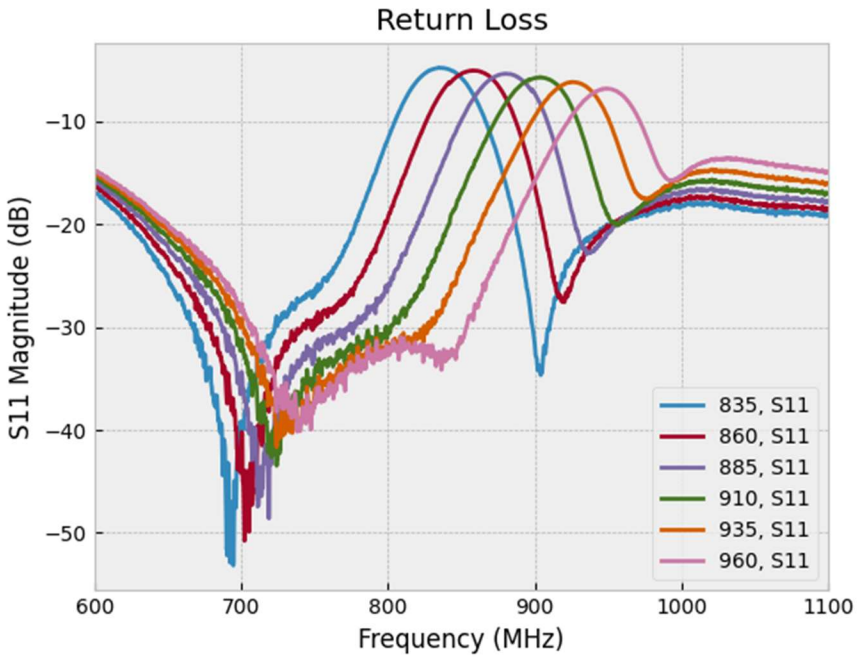

Figure 3. Filter Return Loss vs Center Frequency

*Specifications subject to change without notice

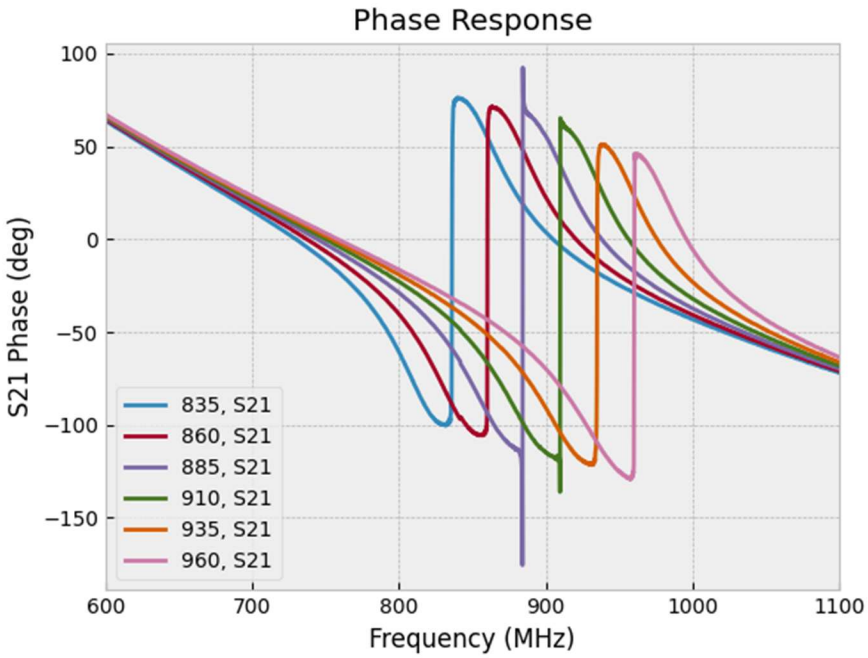

Figure 4. Filter Phase vs Center Frequency

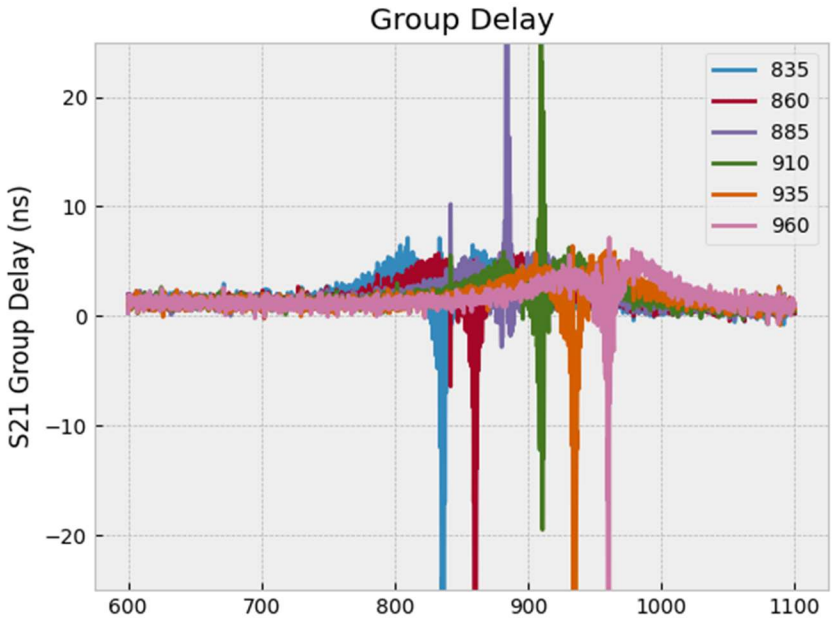

Figure 5. Filter Group Delay vs Center Frequency

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

FILTER CONTROL SOFTWARE

The IM2103DC 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 6 and Figure 7:

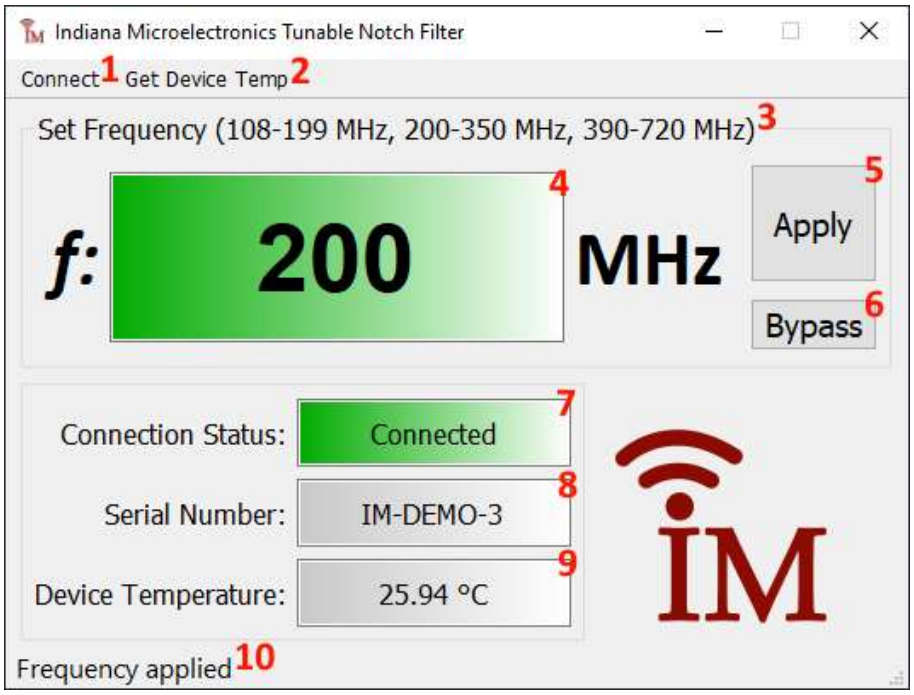

Figure 6. Tunable Notch Filter Control Software

INDEX	NAME	FUNCTION
1	Connect Button	Opens the connection browser (see Figure 7 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

NOTES:

1. Some devices have multiple ranges of valid tune states. Values between listed ranges are invalid (e.g., 375 MHz in the Figure 6 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.

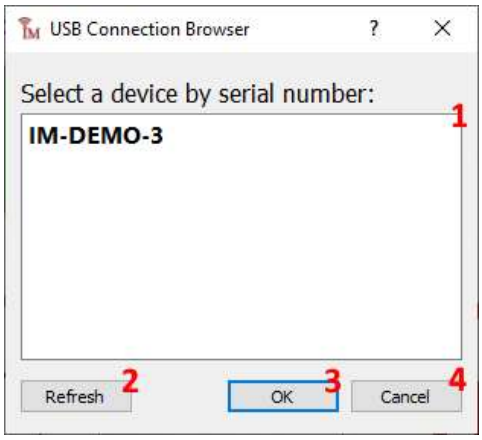

Figure 7. Control Software Connection Browser

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.