

FEATURES

Netcom's 5688 is a Multi-Tune High pass/Low pass tunable filter which covers the frequency range of 130MHz to 300MHz.

This filter offers 32 tuning states which are available on both the High pass and Lowpass sections.

The filter can be controlled by the Serial Interface . The cutoff frequency f_1 of the High pass filter and the cutoff frequency f_2 of the Lowpass filter can be tuned independently through the SPI interface.

The following table shows the typical performance of the filter.

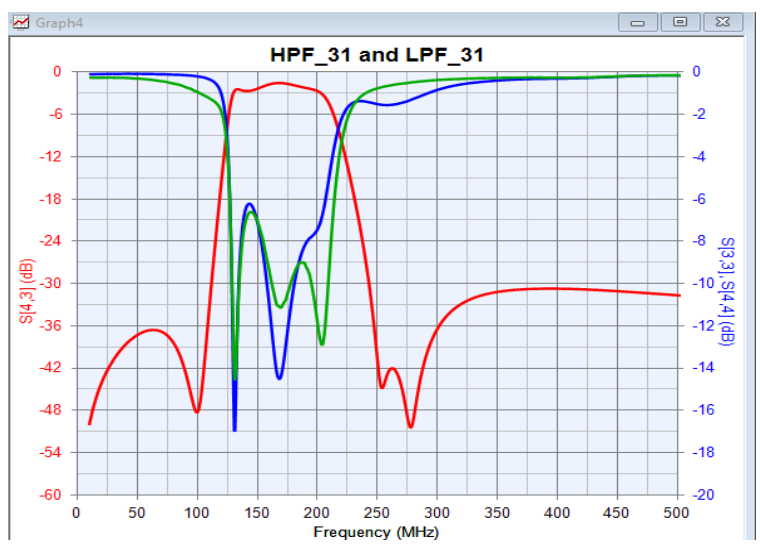
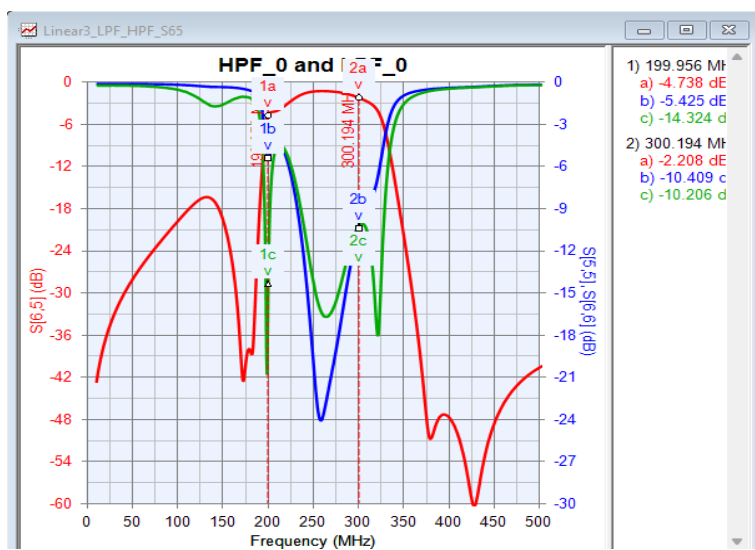
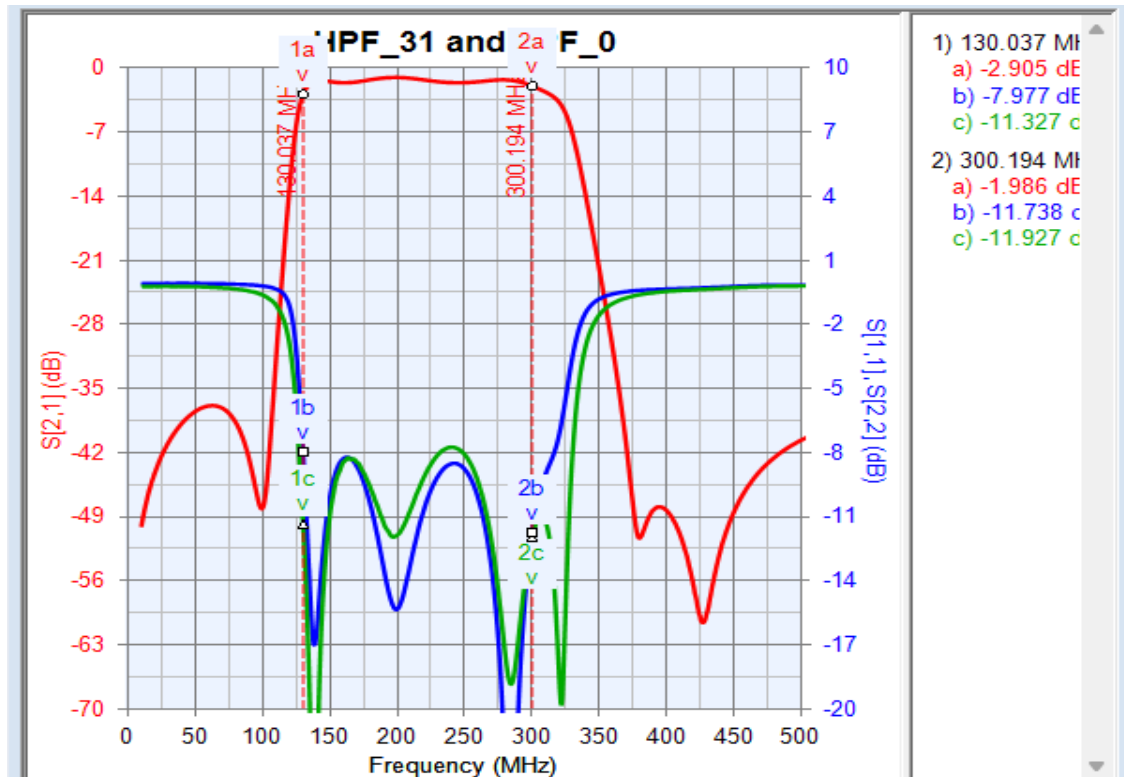
Specifications



Frequency Range	130 - 300 MHz
High Pass Cutoff Frequency Range (f_1)	130 - 200 MHz
Low Pass Cutoff Frequency Range (f_2)	210 - 300 MHz
Center Frequency*	$(f_1 + f_2) / 2$
Passband Insertion Loss for BW > 50MHz	4.5dB max
High Side Rejection LPF (state 0,1,2,3,4... 31)	< - 30dB
Low Side Rejection HPF (state 0,1,2,3) HPF (state 4,5,6,7,8,9) HPF (state 10...to 15) HPF (state 16...to 31)	< -16 dB < -20 dB < -25 dB < -30 dB
Impedance (Input/Output)	50 Ω
Passband VSWR	2.5:1
RF Power Handling (Max)	+27dBm
IIP3	+40 dBm
Switching Speed, 90% RF Power (typical)	10 μ sec
DC Power	
DC Voltage	3.3V
DC Current	3mA
Operating Temperature Range	-40 to +85°C
Control Interface	SPI interface
Dimensions	0.650 x 0.375 x 0.125 inches 16.510 x 9.525 x 3.180 mm
*See Center Frequency Table Pages 8 and 9	

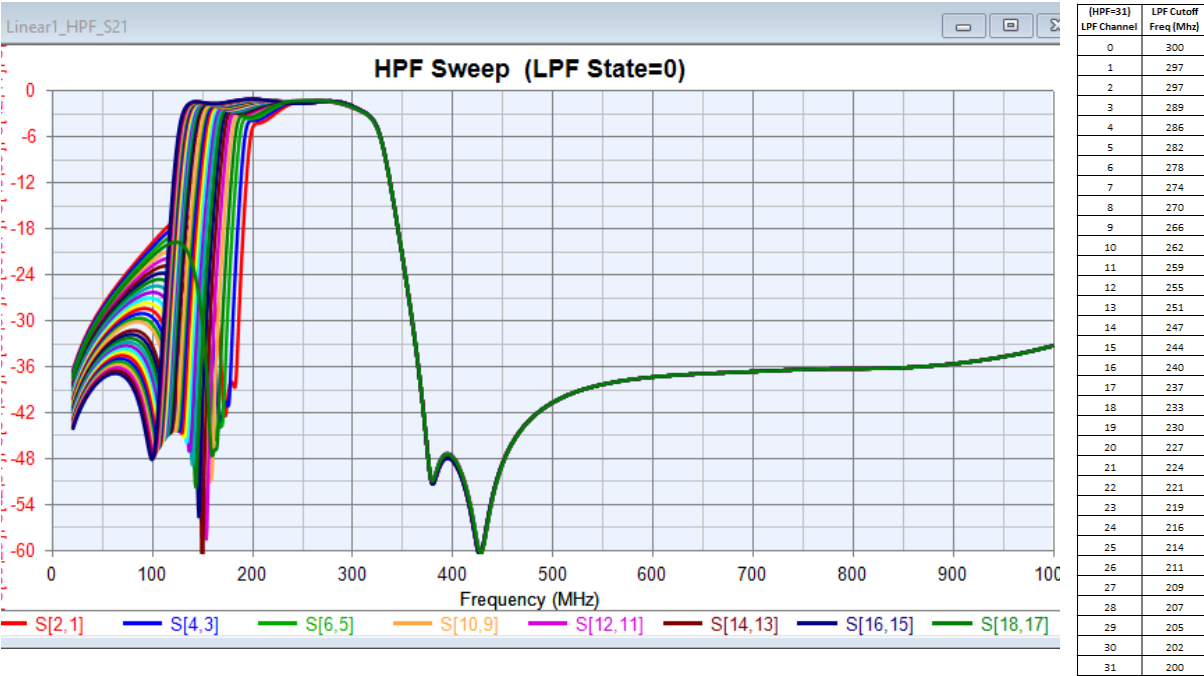
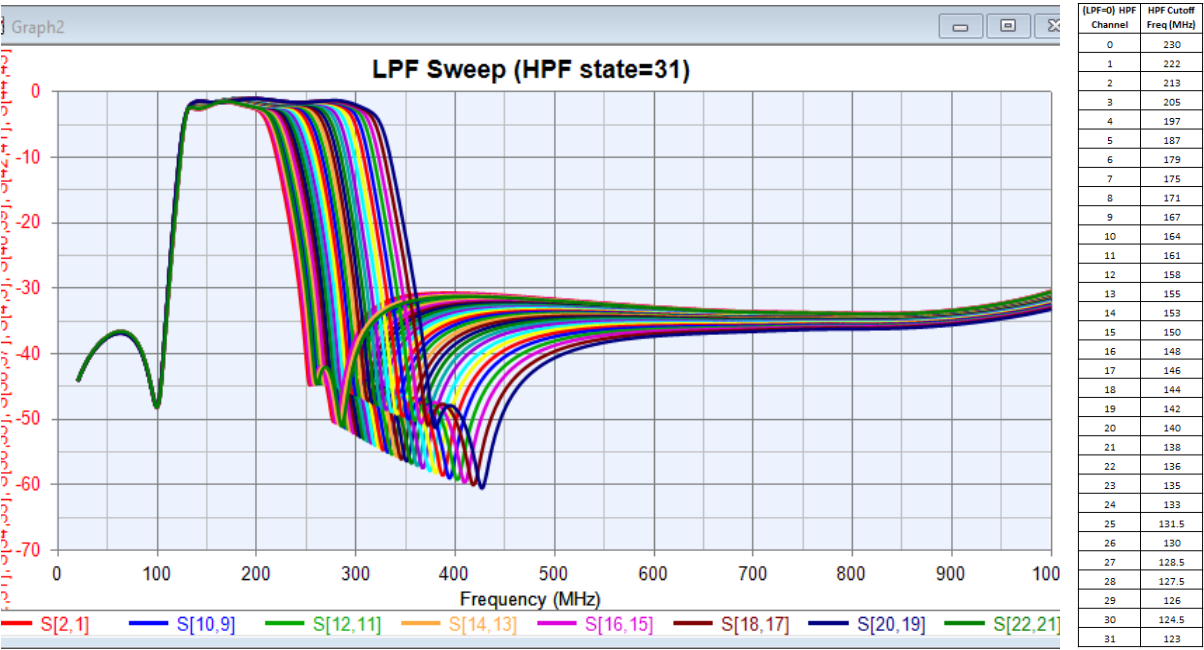
Note: Parameters subject to change

Low and High Frequency Response - Actual Unit



Note: Tuning State HPF Channel, LPF Channel

Sweep Frequency Response- Actual Unit



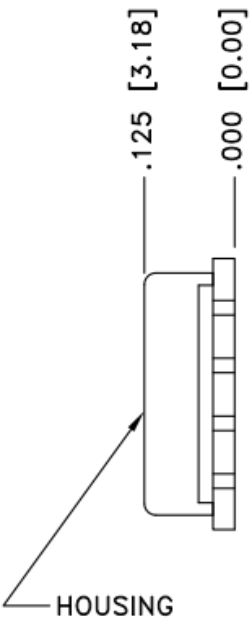
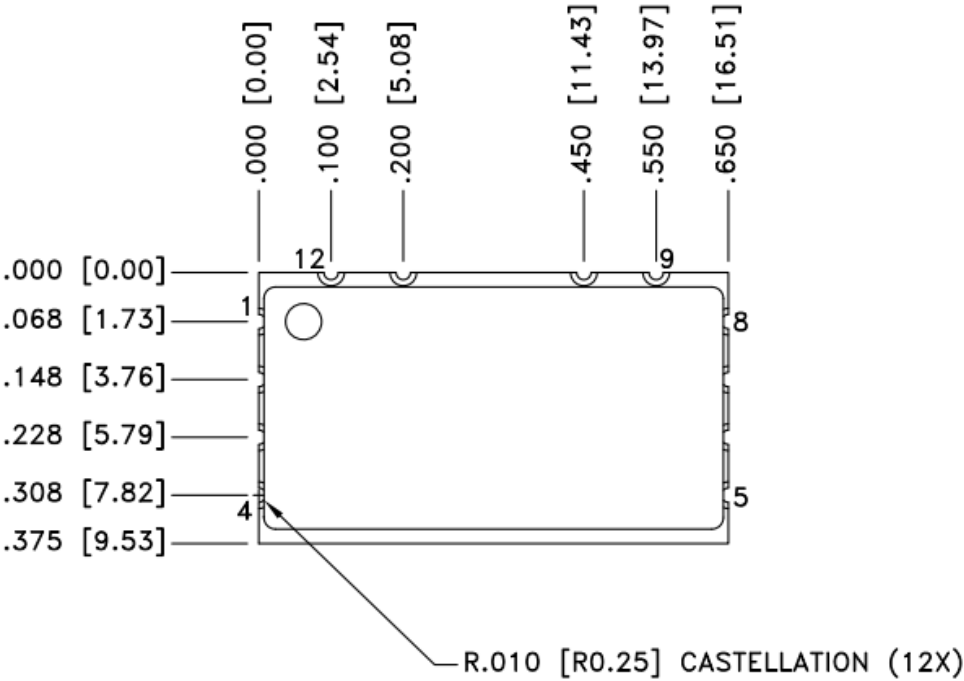
Center Frequency Table - Typical

					LPF →	0	1	2	3	4	5	6	7	8	9	10	11	12
HPF Channel	HPF Cutoff Freq (MHz)	LPF Channel	LPF Cutoff Freq (Mhz)		↓ HPF													
0	221.5	0	314		0	267.8	265.8	263.5	261.3	259.0	256.8	254.3	251.8	249.3	247.0	244.5	242.5	240.3
1	216	1	310		1	265.0	263.0	260.8	258.5	256.3	254.0	251.5	249.0	246.5	244.3	241.8	239.8	237.5
2	194	2	305.5		2	254.0	252.0	249.8	247.5	245.3	243.0	240.5	238.0	235.5	233.3	230.8	228.8	226.5
3	190	3	301		3	252.0	250.0	247.8	245.5	243.3	241.0	238.5	236.0	233.5	231.3	228.8	226.8	224.5
4	185	4	296.5		4	249.5	247.5	245.3	243.0	240.8	238.5	236.0	233.5	231.0	228.8	226.3	224.3	222.0
5	180	5	292		5	247.0	245.0	242.8	240.5	238.3	236.0	233.5	231.0	228.5	226.3	223.8	221.8	219.5
6	176	6	287		6	245.0	243.0	240.8	238.5	236.3	234.0	231.5	229.0	226.5	224.3	221.8	219.8	217.5
7	172.5	7	282		7	243.3	241.3	239.0	236.8	234.5	232.3	229.8	227.3	224.8	222.5	220.0	218.0	215.8
8	169.5	8	277		8	241.8	239.8	237.5	235.3	233.0	230.8	228.3	225.8	223.3	221.0	218.5	216.5	214.3
9	166.5	9	272.5		9	240.3	238.3	236.0	233.8	231.5	229.3	226.8	224.3	221.8	219.5	217.0	215.0	212.8
10	163.5	10	267.5		10	238.8	236.8	234.5	232.3	230.0	227.8	225.3	222.8	220.3	218.0	215.5	213.5	211.3
11	161	11	263.5		11	237.5	235.5	233.3	231.0	228.8	226.5	224.0	221.5	219.0	216.8	214.3	212.3	210.0
12	159	12	259		12	236.5	234.5	232.3	230.0	227.8	225.5	223.0	220.5	218.0	215.8	213.3	211.3	209.0
13	156.5	13	255		13	235.3	233.3	231.0	228.8	226.5	224.3	221.8	219.3	216.8	214.5	212.0	210.0	207.8
14	154.5	14	250.5		14	234.3	232.3	230.0	227.8	225.5	223.3	220.8	218.3	215.8	213.5	211.0	209.0	206.8
15	152.5	15	247		15	233.3	231.3	229.0	226.8	224.5	222.3	219.8	217.3	214.8	212.5	210.0	208.0	205.8
16	151	16	243		16	232.5	230.5	228.3	226.0	223.8	221.5	219.0	216.5	214.0	211.8	209.3	207.3	205.0
17	149	17	240		17	231.5	229.5	227.3	225.0	222.8	220.5	218.0	215.5	213.0	210.8	208.3	206.3	204.0
18	147.5	18	236		18	230.8	228.8	226.5	224.3	222.0	219.8	217.3	214.8	212.3	210.0	207.5	205.5	203.3
19	145.5	19	233		19	229.8	227.8	225.5	223.3	221.0	218.8	216.3	213.8	211.3	209.0	206.5	204.5	202.3
20	144	20	230		20	229.0	227.0	224.8	222.5	220.3	218.0	215.5	213.0	210.5	208.3	205.8	203.8	201.5
21	142.5	21	227		21	228.3	226.3	224.0	221.8	219.5	217.3	214.8	212.3	209.8	207.5	205.0	203.0	200.8
22	141	22	223.5		22	227.5	225.5	223.3	221.0	218.8	216.5	214.0	211.5	209.0	206.8	204.3	202.3	200.0
23	139.5	23	221		23	226.8	224.8	222.5	220.3	218.0	215.8	213.3	210.8	208.3	206.0	203.5	201.5	199.3
24	138.5	24	218		24	226.3	224.3	222.0	219.8	217.5	215.3	212.8	210.3	207.8	205.5	203.0	201.0	198.8
25	137	25	216		25	225.5	223.5	221.3	219.0	216.8	214.5	212.0	209.5	207.0	204.8	202.3	200.3	198.0
26	135.5	26	213		26	224.8	222.8	220.5	218.3	216.0	213.8	211.3	208.8	206.3	204.0	201.5	199.5	197.3
27	134	27	210.5		27	224.0	222.0	219.8	217.5	215.3	213.0	210.5	208.0	205.5	203.3	200.8	198.8	196.5
28	133	28	208.5		28	223.5	221.5	219.3	217.0	214.8	212.5	210.0	207.5	205.0	202.8	200.3	198.3	196.0
29	132	29	207		29	223.0	221.0	218.8	216.5	214.3	212.0	209.5	207.0	204.5	202.3	199.8	197.8	195.5
30	131	30	204.5		30	222.5	220.5	218.3	216.0	213.8	211.5	209.0	206.5	204.0	201.8	199.3	197.3	195.0
31	130	31	202.5		31	222.0	220.0	217.8	215.5	213.3	211.0	208.5	206.0	203.5	201.3	198.8	196.8	194.5

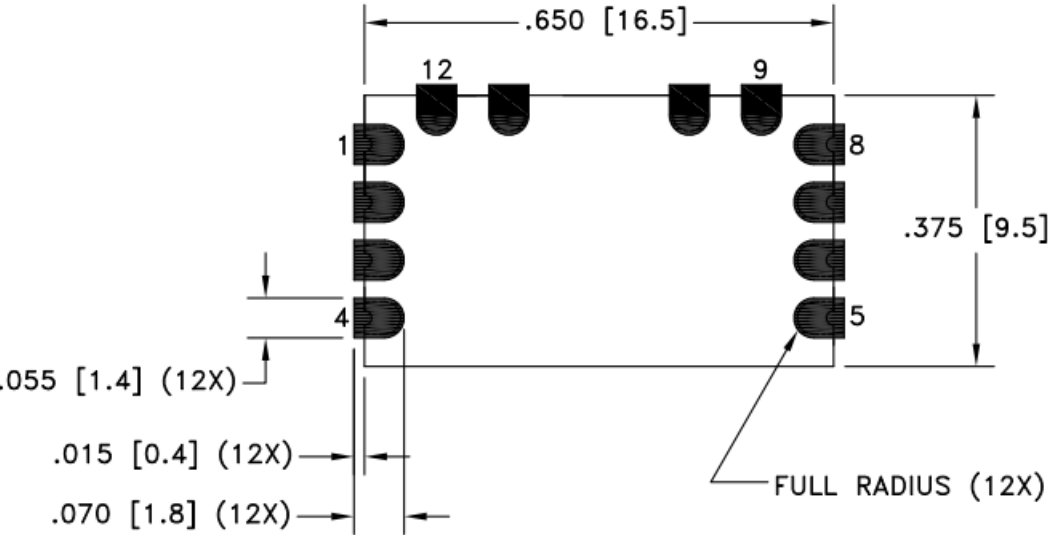
Center Frequency Table - Typical

13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	LPF ←
																			HPF ↓
238.3	236.0	234.3	232.3	230.8	228.8	227.3	225.8	224.3	222.5	221.3	219.8	218.8	217.3	216.0	215.0	214.3	213.0	212.0	0
235.5	233.3	231.5	229.5	228.0	226.0	224.5	223.0	221.5	219.8	218.5	217.0	216.0	214.5	213.3	212.3	211.5	210.3	209.3	1
224.5	222.3	220.5	218.5	217.0	215.0	213.5	212.0	210.5	208.8	207.5	206.0	205.0	203.5	202.3	201.3	200.5	199.3	198.3	2
222.5	220.3	218.5	216.5	215.0	213.0	211.5	210.0	208.5	206.8	205.5	204.0	203.0	201.5	200.3	199.3	198.5	197.3	196.3	3
220.0	217.8	216.0	214.0	212.5	210.5	209.0	207.5	206.0	204.3	203.0	201.5	200.5	199.0	197.8	196.8	196.0	194.8	193.8	4
217.5	215.3	213.5	211.5	210.0	208.0	206.5	205.0	203.5	201.8	200.5	199.0	198.0	196.5	195.3	194.3	193.5	192.3	191.3	5
215.5	213.3	211.5	209.5	208.0	206.0	204.5	203.0	201.5	199.8	198.5	197.0	196.0	194.5	193.3	192.3	191.5	190.3	189.3	6
213.8	211.5	209.8	207.8	206.3	204.3	202.8	201.3	199.8	198.0	196.8	195.3	194.3	192.8	191.5	190.5	189.8	188.5	187.5	7
212.3	210.0	208.3	206.3	204.8	202.8	201.3	199.8	198.3	196.5	195.3	193.8	192.8	191.3	190.0	189.0	188.3	187.0	186.0	8
210.8	208.5	206.8	204.8	203.3	201.3	199.8	198.3	196.8	195.0	193.8	192.3	191.3	189.8	188.5	187.5	186.8	185.5	184.5	9
209.3	207.0	205.3	203.3	201.8	199.8	198.3	196.8	195.3	193.5	192.3	190.8	189.8	188.3	187.0	186.0	185.3	184.0	183.0	10
208.0	205.8	204.0	202.0	200.5	198.5	197.0	195.5	194.0	192.3	191.0	189.5	188.5	187.0	185.8	184.8	184.0	182.8	181.8	11
207.0	204.8	203.0	201.0	199.5	197.5	196.0	194.5	193.0	191.3	190.0	188.5	187.5	186.0	184.8	183.8	183.0	181.8	180.8	12
205.8	203.5	201.8	199.8	198.3	196.3	194.8	193.3	191.8	190.0	188.8	187.3	186.3	184.8	183.5	182.5	181.8	180.5	179.5	13
204.8	202.5	200.8	198.8	197.3	195.3	193.8	192.3	190.8	189.0	187.8	186.3	185.3	183.8	182.5	181.5	180.8	179.5	178.5	14
203.8	201.5	199.8	197.8	196.3	194.3	192.8	191.3	189.8	188.0	186.8	185.3	184.3	182.8	181.5	180.5	179.8	178.5	177.5	15
203.0	200.8	199.0	197.0	195.5	193.5	192.0	190.5	189.0	187.3	186.0	184.5	183.5	182.0	180.8	179.8	179.0	177.8	176.8	16
202.0	199.8	198.0	196.0	194.5	192.5	191.0	189.5	188.0	186.3	185.0	183.5	182.5	181.0	179.8	178.8	178.0	176.8	175.8	17
201.3	199.0	197.3	195.3	193.8	191.8	190.3	188.8	187.3	185.5	184.3	182.8	181.8	180.3	179.0	178.0	177.3	176.0	175.0	18
200.3	198.0	196.3	194.3	192.8	190.8	189.3	187.8	186.3	184.5	183.3	181.8	180.8	179.3	178.0	177.0	176.3	175.0	174.0	19
199.5	197.3	195.5	193.5	192.0	190.0	188.5	187.0	185.5	183.8	182.5	181.0	180.0	178.5	177.3	176.3	175.5	174.3	173.3	20
198.8	196.5	194.8	192.8	191.3	189.3	187.8	186.3	184.8	183.0	181.8	180.3	179.3	177.8	176.5	175.5	174.8	173.5	172.5	21
198.0	195.8	194.0	192.0	190.5	188.5	187.0	185.5	184.0	182.3	181.0	179.5	178.5	177.0	175.8	174.8	174.0	172.8	171.8	22
197.3	195.0	193.3	191.3	189.8	187.8	186.3	184.8	183.3	181.5	180.3	178.8	177.8	176.3	175.0	174.0	173.3	172.0	171.0	23
196.8	194.5	192.8	190.8	189.3	187.3	185.8	184.3	182.8	181.0	179.8	178.3	177.3	175.8	174.5	173.5	172.8	171.5	170.5	24
196.0	193.8	192.0	190.0	188.5	186.5	185.0	183.5	182.0	180.3	179.0	177.5	176.5	175.0	173.8	172.8	172.0	170.8	169.8	25
195.3	193.0	191.3	189.3	187.8	185.8	184.3	182.8	181.3	179.5	178.3	176.8	175.8	174.3	173.0	172.0	171.3	170.0	169.0	26
194.5	192.3	190.5	188.5	187.0	185.0	183.5	182.0	180.5	178.8	177.5	176.0	175.0	173.5	172.3	171.3	170.5	169.3	168.3	27
194.0	191.8	190.0	188.0	186.5	184.5	183.0	181.5	180.0	178.3	177.0	175.5	174.5	173.0	171.8	170.8	170.0	168.8	167.8	28
193.5	191.3	189.5	187.5	186.0	184.0	182.5	181.0	179.5	177.8	176.5	175.0	174.0	172.5	171.3	170.3	169.5	168.3	167.3	29
193.0	190.8	189.0	187.0	185.5	183.5	182.0	180.5	179.0	177.3	176.0	174.5	173.5	172.0	170.8	169.8	169.0	167.8	166.8	30
192.5	190.3	188.5	186.5	185.0	183.0	181.5	180.0	178.5	176.8	175.5	174.0	173.0	171.5	170.3	169.3	168.5	167.3	166.3	31

Mechanical Filter



RECOMMENDED LAYOUT PATTERN
TOP VIEW



PIN DESIGNATORS	
PIN NUMBER	DESCRIPTION
1	SENS_1
2	GND
3	RF_IN
4	GND
5	GND
6	RF_OUT
7	GND
8	SENS_2
9	3.3V
10	SDATA
11	SCLK
12	GND



Maximum Passband Response - Actual Unit

Wideband Response

Serial Address Input Timing Diagram

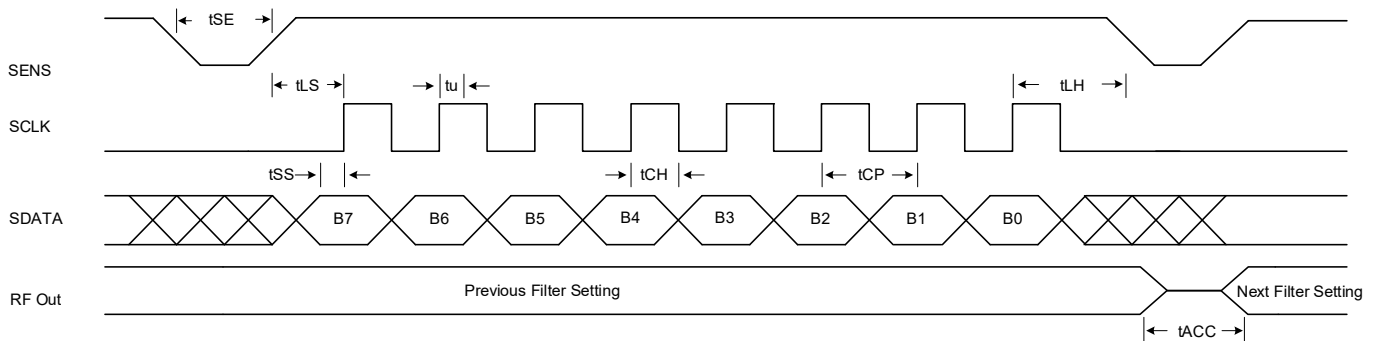
To tune the High Pass Filter (HPF)

- Take the SENS_1 line from low to high state (active)
- Data is loaded from MSB (B7) to LSB (B0).
- Data is clocked in on the leading edge of the clock.
- Only the last 8 data bits clocked in are set as the data input.
- Take the SENS_1 line from high to low state (deactivate)
- Data set on the falling edge of SENS_1

To tune the Low Pass Filter (LPF)

- Take the SENS_2 line from low to high state (active)
- Data is loaded from MSB (B7) to LSB (B0).
- Data is clocked in on the leading edge of the clock.
- Only the last 8 data bits clocked in are set as the data input.
- Take the SENS_2 line from high to low state (deactivate)
- Data set on the falling edge of SENS_2

Symbol	Parameter	Min	Max	Units
tLS	Setup time SENS rising edge to SCLK*	20		ns
tSS	Setup time MOSI Data to SCLK*	15		ns
tu	Hold Time MOSI Data	15		ns
tCH	Clock High Time	20		ns
tCP	Clock Period	40		ns
tLH	Setup time rising edge SCLK to SENS falling edge	20		ns
tSE	SENS falling edge to SENS rising edge	40		ns
tACC	Access time from Last SCLK edge to Fo		10	us



Serial Data Map

B7	B6	B5	B4	B3	B2	B1	B0
0	0	0	D4	D3	D2	D1	D0

Tune as follows:

- B7 is first bit clocked in (MSB)
- B7, B6, and B5 data bits must be set as shown in chart second row.
- D4, D3, D2, D1, and D0 data bits are the LPF or HPF tune values (0 to 31)
- B0 is last bit clocked in (LSB)

Ordering Information

Model Number	(-)	Options	Add “-EB” for Unit Mounted on Evaluation Board	
5689	(-)		(-)	EB

Options:

- A:
- B:
- C:

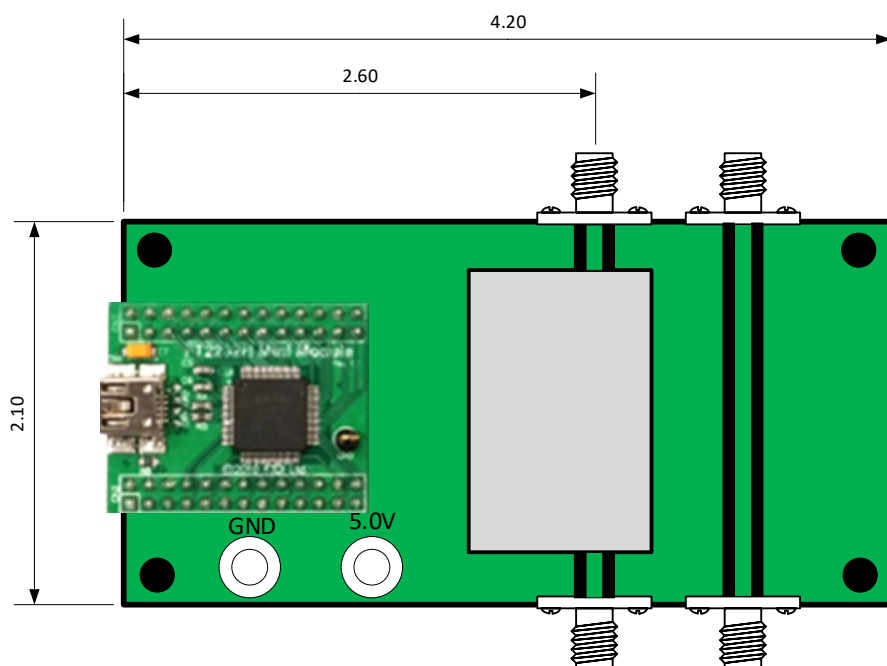
RF In/Out Note:

- When connecting the RF signals:
- Use a coupling capacitor if DC power is expected on the RF Input or Output.

Corresponding Evaluation Board

The EB5692 Evaluation Board is designed to test and evaluate Netcom's Model 5692 Multi-Tune Filter. The evaluation board provides the option of using a separate 5 volt power supply input to provide power to the unit and the User USB interface or use of the USB interface to provide the unit power. The Evaluation board provides tuning control to facilitate measurements of the filter's RF parameters.

The EB5692 Evaluation Board includes a separate RF thru path for calibration of test equipment to improve the accuracy of RF measurements.



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REVISION CONTROL

Date (if applicable)	REV. (if applicable)	Notes / Changes
02262026		Initial Preliminary Cutsheet

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