SAX239 R2
[30 – 520] MHz Tunable Bandpass Filter

Application
The SAX239 R2 electronically tunable bandpass filter is designed for Tactical Communications Applications using binary weighted digital tunable capacitor arrays to cover greater than an octave bandwidth.
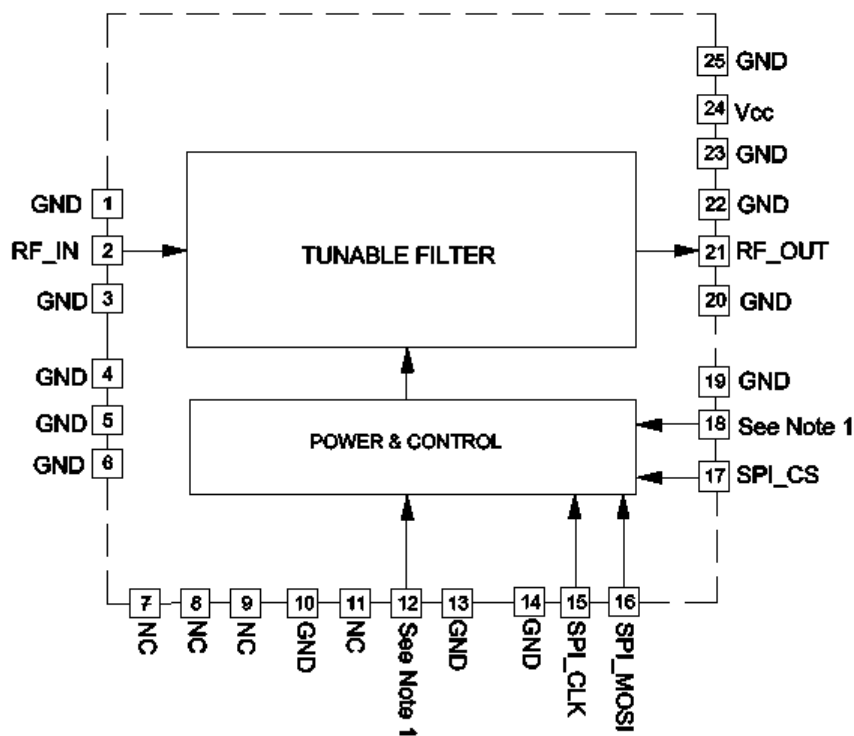
Features
• Full Tactical Communications band resolutions
• Low insertion loss
• Fast tuning across band to 1.0 MHz resolution
• 33 dBm P1dB
• DC Power < 100 mW

NOTES:

1. OPTION A: INTERNAL DC—DC; PIN 12 OPEN, PIN 18 OPEN.
   OPTION B: EXTERNAL +35V; PIN 12 +35±1.0V, PIN 18 GND.

Parameter	Specification	Min	Typ	Max	Units
Supply Voltage	-	+3.4	+3.5	+3.6	V
	Optional External Voltage	+34.5	+35	+35.5	V
Supply Current	-	-	-	30	mA
Tunable Frequency Range	-	30	-	520	MHz
Input / Output Impedance	-	-	50	-	Ohms
Return Loss	[30-520] MHz	9.54	13.98	-	dB
Insertion Loss	[30-520] MHz	-	4.3	5.1	dB
Passband Bandwidth	-	-	3.5	-	%
Rejection	Ftune +/- 10%	-	14	-	dB
	Ftune +/- 15%	20	-	-	dB
	Ftune +/- 20%	27	-	-	dB
	30MHz to <0.5*Ftune>	40	-	-	dB
	[2*Ftune to 750]MHz	35	-	-	dB
	[750-1000]MHz	25	-	-	dB
Noise Figure	Above Insertion Loss	-	-	0.5	dB
Tuning Speed	-	-	25	40	µs
Tuning Step Size	[30-88] MHz	-	1	-	MHz
	[90-520] MHz	-	2	-	MHz
P1dB Input Power	[30-520] MHz	-	-	33	dBm
Operating Temperature		-40	-	+85	C
Tuning Control	Serial [SPI]	-	-	-	

| Pin No.	Label	Description, Conditions
1,3-6,10,13-14,19-20,22-23,25	GND	Ground
2	RF IN	RF In
7-9,11	NC	Not Connected
12	OPT_EXT	Not Connected or +35VDC Supply Voltage
15	SPI_CLK	SPI Mode. Serial Tune Interface Clock
16	SPI_MOSI	SPI Mode: Serial Tune Interface Master Out Slave Input
17	SPI_CS	SPI Mode. Serial Tune Chip Select
18	OPT_EXT_GND	Not Connected or Ground
21	RF OUT	RF Out
24	VCC	+3.5VDC Supply Voltage

SAX239 R2 Passband Bandwidth & Rejection
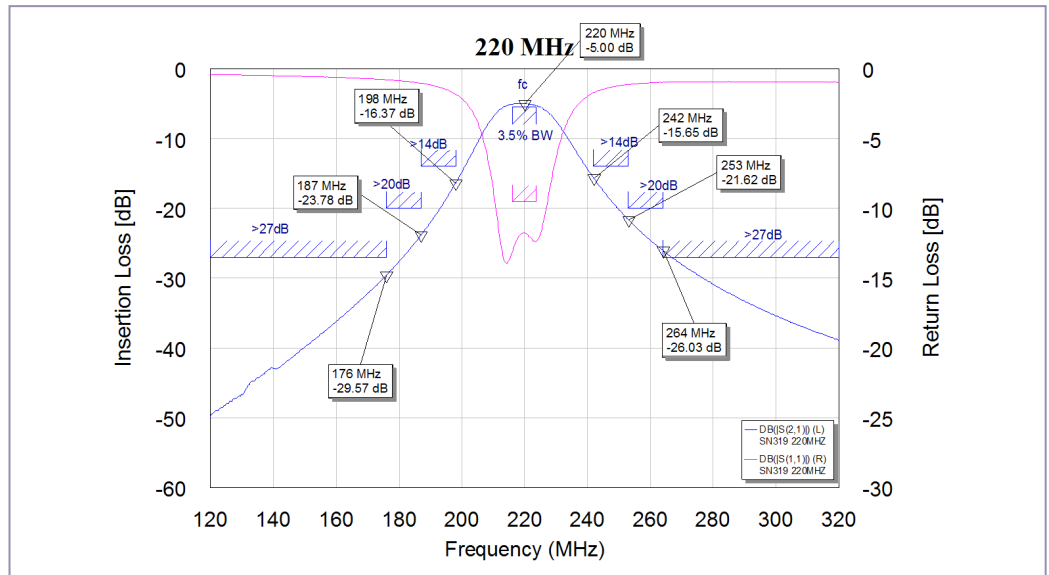
SAX239 R2 Passband IL over [30-520] MHz Tuning Range
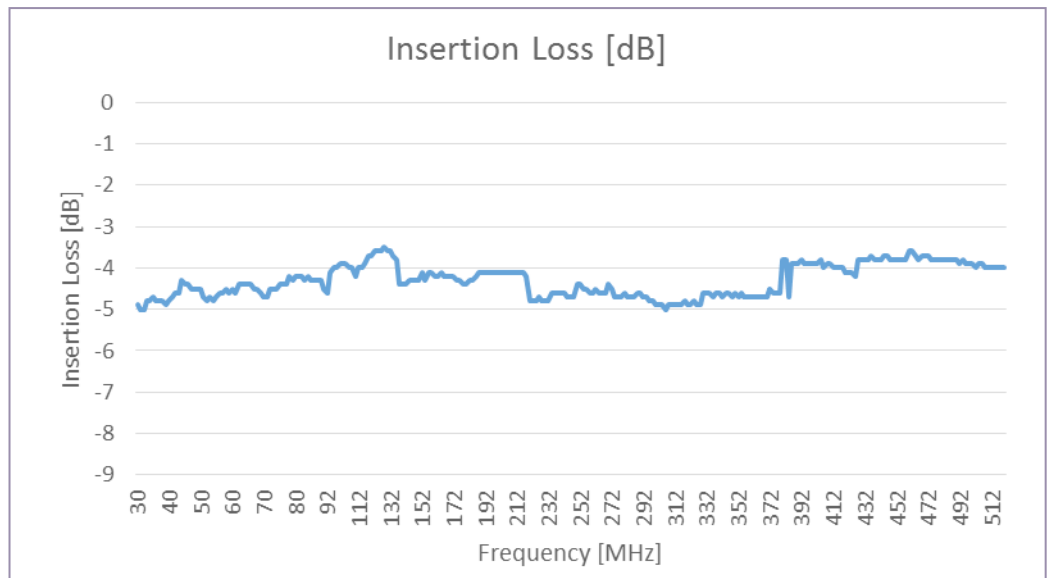
SAX239 R2 Step Size & Frequency Accuracy
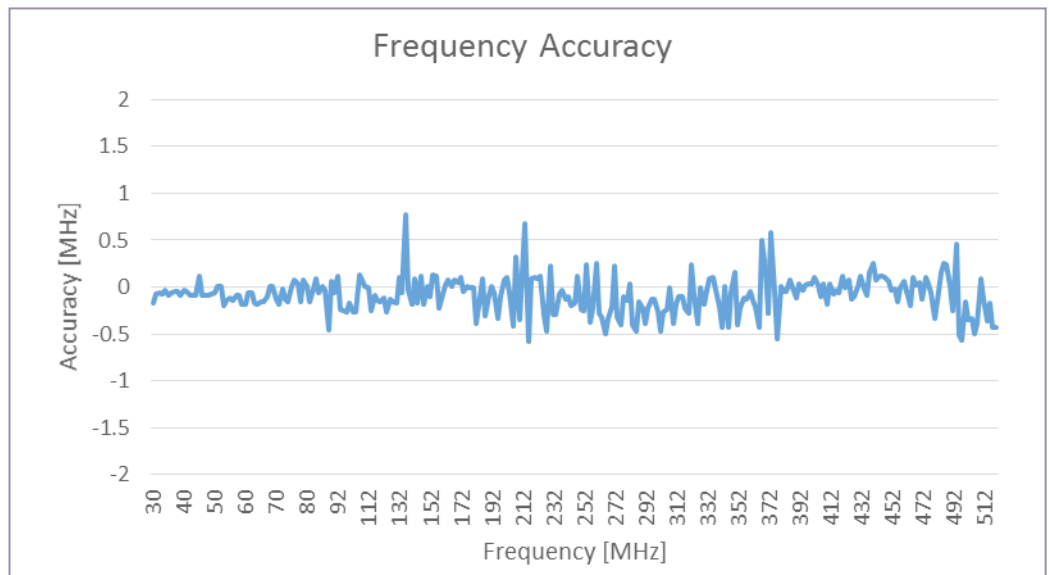
Control & Interface	**Tuning Control**	Serial [SPI]
	DC Power	+3.5V +/- 0.2V <30mA
		Option for external +35V **[See Note_1]**
	Tuning Speed	40µs [max]. 25µs typ.
	Tuning Algorithm	Binary equivalent to desired tune Frequency [MHz]

Note_1: SAX239 R2 can be used in 2-modes.

Mode 1 has internal dc –dc converter, and the unit powered via +3.5V [+/- 0.2V] only.

Mode 2 is powered via external +3.5V [+/-0.2V] and external +35V [+/-1.0V].

Mode	Pin 24	Pin 12	Pin 18
1	+3.5V +/-0.2V	N/C	N/C
2	+3.5V +/-0.2V	+35V +/- 1.0V	GND

The SAX239 R2 Tunable Filter is controlled as a slave SPI device. The control registers are write only so there are only three SPI signals required:

- CS input: When CS is low, the SPI bus is enabled.

  When CS is high, signals on the other SPI inputs are ignored.
- SCLK: Serial data clock generated by the SPI bus master.
- MOSI: Data from master to slave (Master Out, Slave In).

The timing of the SPI bus is:

- The base value of the clock is low (0).
- The SAX239 R2 reads the incoming data (MOSI) on the rising edge of the clock SCLK.
- The maximum allowed SCLK rate is 1.0 MHz.

A single 16-bit tuning word is transmitted to the filter.

The filter will begin to tune to the new frequency upon receipt of the last of the 16 bits.

The valid range of tuning bytes in this mode is 0x001E to 0x0208 (30 to 520 decimal).

The SAX239 R2 will tune to the frequency equivalent to the binary tuning word (in MHz).

For tuning words from 89 to 519, the LSB will be set to zero, resulting in 2 MHz frequency resolution.

The figure below shows the SPI bus set command operation:

- The SPI bus master sets CS low and generates the SCLK.
- The master sends a 16-bit filter select word (MSB first) on the MOSI line.
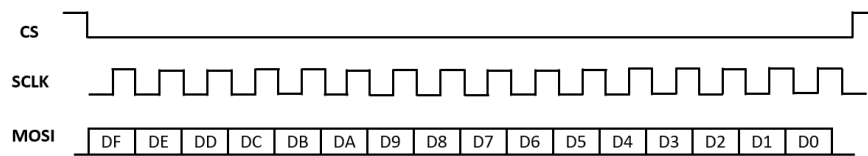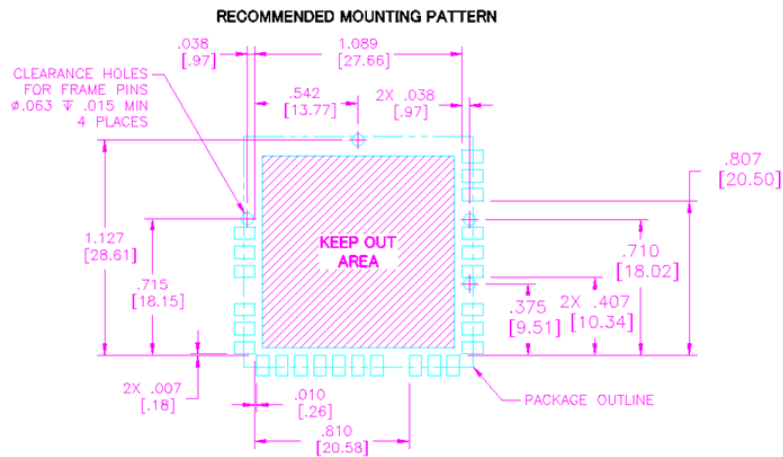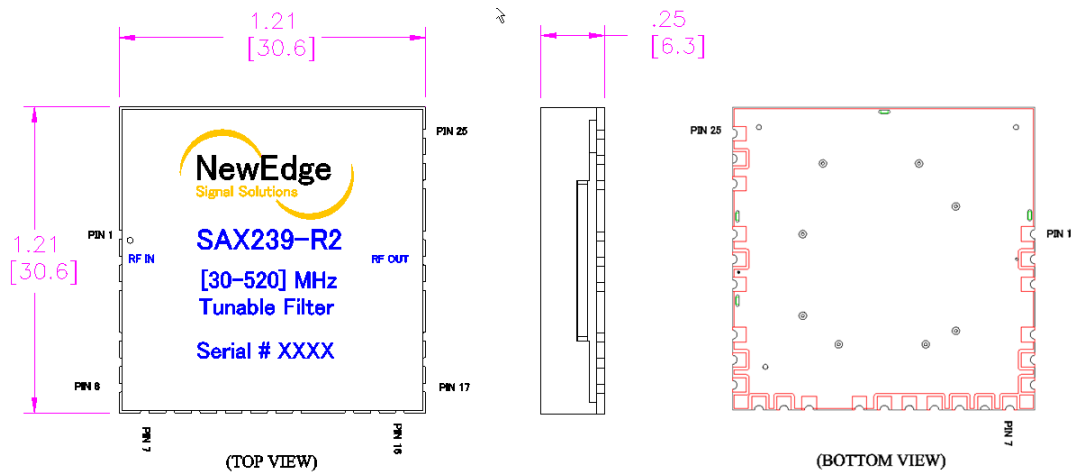- After the last clock pulse, the SPI bus master sets CS high.

Figure 1. SAX239 R2 SPI Control Interface

Environmental	**Vibration Testing**	Vehicular to MIL_STD_810G Method 514.6
		Jet Fighter to MIL_STD_810F Method 514.5G
Mechanical	**Size**	[1.2 x 1.2 x 0.25] inch

(TOP VIEW)

(BOTTOM VIEW)

RECOMMENDED MOUNTING PATTERN

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