



- Ideal Front-End Filter for European Wireless Receivers
- Low-Loss, Coupled-Resonator Quartz Design
- Simple External Impedance Matching
- Complies with Directive 2002/95/EC (RoHS)<sup>10</sup>

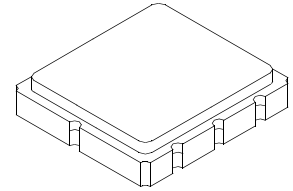


The RF3404D is a low-loss, compact, and economical surface-acoustic-wave (SAW) filter designed to provide front-end selectivity in 433.92 MHz receivers. Receiver designs using this filter include superhet with 10.7 MHz or 500 kHz IF, direct conversion and superregen. Typical applications of these receivers are wireless remote-control and security devices operating in Europe under ETSI I-ETS 300 220.

This coupled-resonator filter (CRF) uses selective null placement to provide suppression, typically greater than 40 dB, of the LO and image spurious responses of superhet receivers with 10.7 MHz IF. RFM's advanced SAW design and fabrication technology is utilized to achieve high performance and very low loss with simple external impedance matching.

**RF3404D**

**433.92 MHz  
SAW Filter**



**SM3838-8 Case  
3.8 x 3.8**

#### Electrical Characteristics

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency at 25°C      Absolute Frequency		f <sub>c</sub>	1, 2, 3		433.92		MHz
Insertion Loss		IL <sub>MIN</sub>	1, 3		1.6	2.5	dB
Passband Ripple (Relative to IL <sub>MIN</sub> ) Fc ±200kHz			1, 3		1.2	1.8	dB
3 dB Bandwidth		BW <sub>3</sub>	1, 3	500	600	800	kHz
Rejection    Attenuation: (relative to ILmin)	10 - 414 MHz		1, 3	50	55		dB
	414 - 424 MHz			45	50		
	424 - 431 MHz			30	34		
	431 - 432 MHz			18	22		
	432 - 433 MHz			12	17		
	434.92 - 442 MHz			11	14		
	442 - 550 MHz			35	38		
	550 - 1000 MHz			50	55		
Temperature                      Freq. Temp. Coefficient		FTC			0.032		ppm/ °C <sup>2</sup>
Frequency Aging	Absolute Value during the First Year	fA	5		≤10		ppm/yr
Impedance   @ fc	Input Z <sub>IN</sub> = R <sub>IN</sub>   C <sub>IN</sub>	Z <sub>IN</sub>	1	2853Ω // 1.66pf			
	Output Z <sub>OUT</sub> = R <sub>OUT</sub>   C <sub>OUT</sub>	Z <sub>OUT</sub>		2411Ω // 1.73pf			
Lid Symbolization (Y=year   WW=week   S=shift)		539 // YWWS					
Standard Reel Quantity		Reel Size 7 Inch Reel Size 13 Inch		9	500 Pieces/Reel		
					3000 Pieces/Reel		



**CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.**

#### Notes:

1. Unless noted otherwise, all measurements are made with the filter installed in the specified test fixture which is connected to a 50  $\Omega$  test system with  $VSWR \leq 1.2:1$ . The test fixture L and C are adjusted for minimum insertion loss at the filter center frequency,  $f_c$ . Note that insertion loss and bandwidth and passband shape are dependent on the impedance matching component values and quality.
2. The frequency  $f_c$  is defined as the midpoint between the 3dB frequencies.
3. Where noted specifications apply over the entire specified operating temperature range of -40°C to +90°C.
4. The turnover temperature,  $T_o$ , is the temperature of maximum (or turnover) frequency,  $f_o$ . The nominal frequency at any case temperature,  $T_c$ , may be calculated from:  $f = f_o [1 - FTC (T_o - T_c)^2]$ .
5. Frequency aging is the change in  $f_c$  with time and is specified at +65°C or less. Aging may exceed the specification for prolonged temperatures above +65°C. Typically, aging is greatest the first year after manufacture, decreasing significantly in subsequent years.
6. The design, manufacturing process, and specifications of this device are subject to change.
7. One or more of the following U.S. Patents apply: 4,54,488, 4,616,197, and others pending.
8. All equipment designs utilizing this product must be approved by the appropriate government agency prior to manufacture or sale.
9. Tape and Reel Standard Per ANSI / EIA 481.
10. This product complies with Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

## Absolute Maximum Ratings

Characteristic	Value	Units
Input Power Level	10	dBm
DC Voltage	12	VDC
Storage Temperature	-40 to +125	°C
Operable Temperature Range	-40 to +125	°C
Soldering Temperature (10 seconds / 5 cycles max.)	260	°C

## Electrical Characteristics

Characteristic	Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency at 25°C Absolute Frequency	$f_c$	1, 2, 3		433.92		MHz
Insertion Loss	$IL_{MIN}$	1, 3		2.3	3.0	dB
Passband Ripple (Relative to $IL_{MIN}$ ) $F_c \pm 200kHz$		1, 3		1.2	2.0	dB
3 dB Bandwidth	$BW_3$	1, 3	500	600	800	kHz
Rejection Attenuation: (relative to $IL_{min}$ )						
10 - 414 MHz			50	53		
414 - 424 MHz			45	50		
424 - 431 MHz			30	34		
431 - 432 MHz			18	22		
432 - 433 MHz			12	14		
434.92 - 442 MHz			11	14		
442 - 550 MHz			35	37		
550 - 1000 MHz			50	55		
Temperature Freq. Temp. Coefficient	FTC			0.032		ppm/°C <sup>2</sup>
Frequency Aging Absolute Value during the First Year	$ f_A $	5		$\leq 10$		ppm/yr
Impedance @ $f_c$ Input $Z_{IN} = R_{IN}    C_{IN}$	$Z_{IN}$			2853Ω // 1.66pf		
Output $Z_{OUT} = R_{OUT}    C_{OUT}$	$Z_{OUT}$			2411Ω // 1.73pf		
Lid Symbolization (Y=year WW=week S=shift)				539 // YWWS		
Standard Reel Quantity Reel Size 7 Inch				500 Pieces/Reel		
Reel Size 13 Inch				3000 Pieces/Reel		



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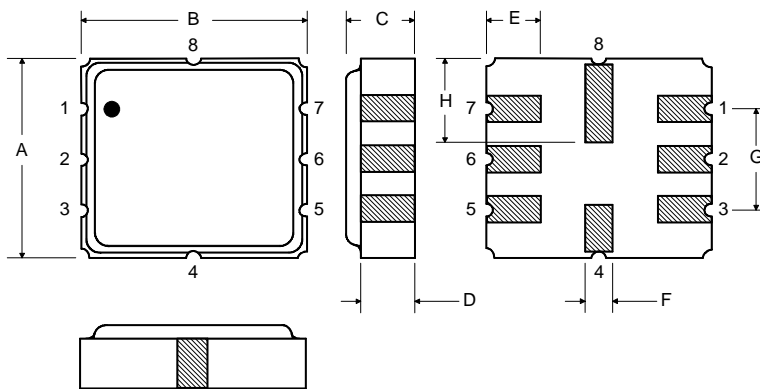
Notes:

- Unless noted otherwise, all measurements are made with the filter installed in the specified test fixture which is connected to a 50 Ω test system with VSWR  $\leq 1.2:1$ . The test fixture L and C are adjusted for minimum insertion loss at the filter center frequency,  $f_c$ . Note that insertion loss and bandwidth and passband shape are dependent on the impedance matching component values and quality.
- The frequency  $f_c$  is defined as the midpoint between the 3dB frequencies.
- Where noted specifications apply over the entire specified operating temperature range of -40°C to +125°C.
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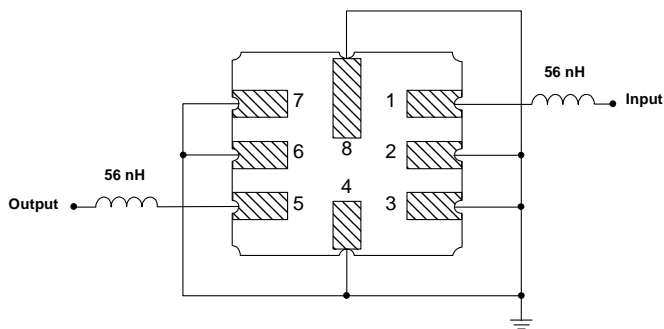
## PRIMARY

### Electrical Connections

Pin	Connection
1	Input
2	Input Ground
3	Ground
4	Case Ground
5	Output
6	Output Ground
7	Ground
8	Case Ground



### Matching Circuit to 50Ω



### Case Dimensions

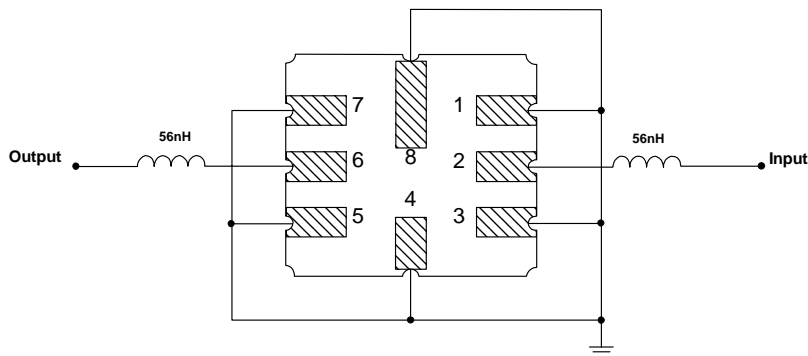
Dimension	mm			Inches		
	Min	Nom	Max	Min	Nom	Max
A	3.6	3.8	4.0	0.14	0.15	0.16
B	3.6	3.8	4.0	0.14	0.15	0.16
C	1.00	1.20	1.40	0.04	0.05	0.055
D	0.95	1.10	1.25	0.033	0.043	0.05
E	0.90	1.0	1.10	0.035	0.04	0.043
F	0.50	0.6	0.70	0.020	0.024	0.028
G	2.39	2.54	2.69	0.090	0.100	0.110
H	1.40	1.75	2.05	0.055	0.069	0.080

## OPTIONAL

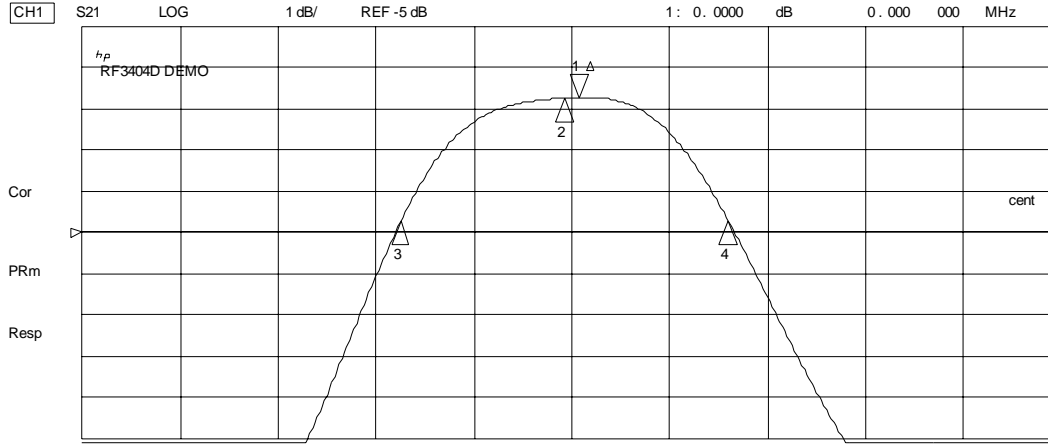
### Electrical Connections

Pin	Connection
1	Input Ground
2	Input
3	Ground
4	Case Ground
5	Output Ground
6	Output
7	Ground
8	Case Ground

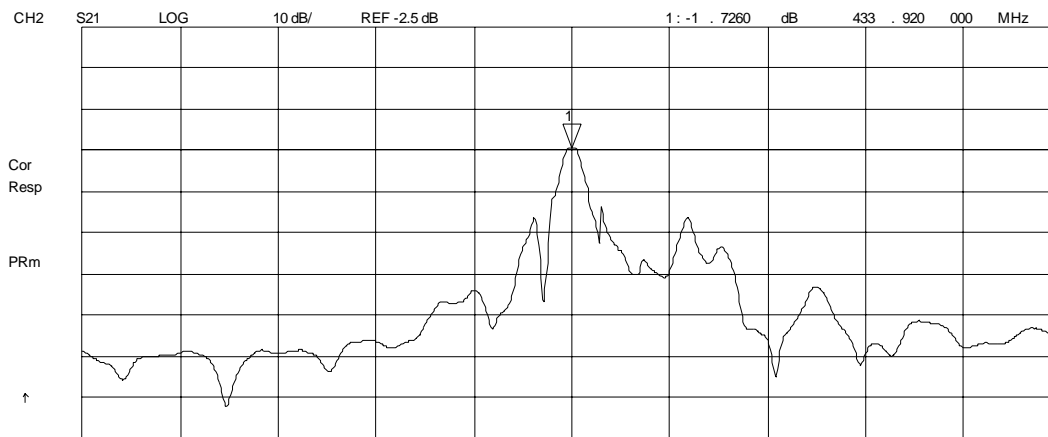
### Matching Circuit to 50Ω



1 Aug 2007 14:03:00



CH1 Markers  
 Max  $\Delta$  REF=1  
 BW: .669068 MHz  
 cent : 433.905059 MHz  
 Q: 648.52  
 1\_loss : -1.7269 dB



Max

CH1 S11 1 U FS

$h_p$   
RF3404D DEMO

1 Aug 2007 14:03:18

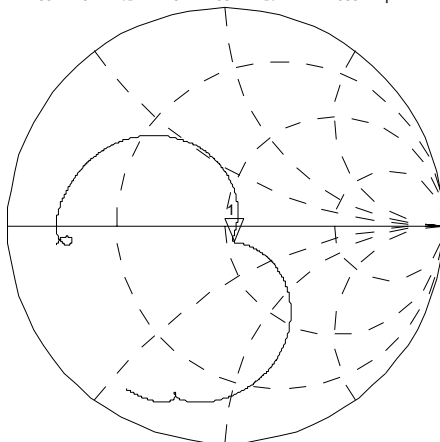
1: 53.467  $\Omega$  -8.236  $\Omega$  44.585 pF 433.920 000 MHz

Cor

PRm

Full

↑



CH2 S22 1 U FS

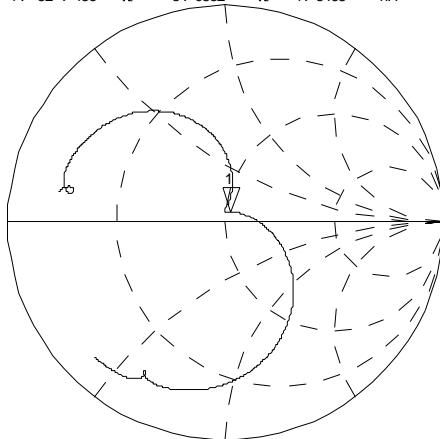
1: 52.436  $\Omega$  5.0352  $\Omega$  1.8468 nH 433.920 000 MHz

Cor

Full

PRm

↑



CENTER 433.920 000 MHz

SPAN 2.000 000 MHz