

- **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>**
- **AEC-Q200 Qualified**

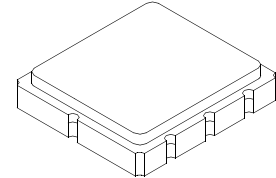


The RF3404D is a low-loss, compact, and economical surface-acoustic-wave (SAW) filter designed to provide front-end selectivity in 433.92 MHz receivers. Receiver designs using this filter include superhet with 10.7 MHz or 500 kHz IF, direct conversion and superregen. Typical applications of these receivers 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. Murata'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**

Characteristic	Value	Units
Input Power Level	10	dBm
DC Voltage	12	VDC
Storage Temperature	-40 to +125	°C
Operable Temperature Range	-40 to +90	°C
Soldering Temperature (10 seconds / 5 cycles max.)	260	°C

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		1.6	2.5	dB
Passband Ripple (Relative to $IL_{MIN}$ ) $F_c \pm 200kHz$		1, 3		1.2	1.8	dB
3 dB Bandwidth	$BW_3$	1, 3	500	600	800	kHz
Rejection Attenuation: (relative to $IL_{min}$ )						
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 @ $f_c$	Input $Z_{IN} = R_{IN} // C_{IN}$ Output $Z_{OUT} = R_{OUT} // C_{OUT}$	$Z_{IN}$ $Z_{OUT}$	1	2853Ω // 1.66pf 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		

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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 $IL_{min}$ )		1, 3	10 - 414 MHz	50	53	dB
			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	fA	5		≤10		ppm/yr
Impedance @ $f_c$	Input $Z_{IN} = R_{IN}    C_{IN}$	1	2853Ω // 1.66pf			
	Output $Z_{OUT} = R_{OUT}    C_{OUT}$		2411Ω // 1.73pf			
Lid Symbolization (Y=year WW=week S=shift)	539 // YWWS					
Standard Reel Quantity	Reel Size 7 Inch	9	500 Pieces/Reel			
	Reel Size 13 Inch		3000 Pieces/Reel			



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

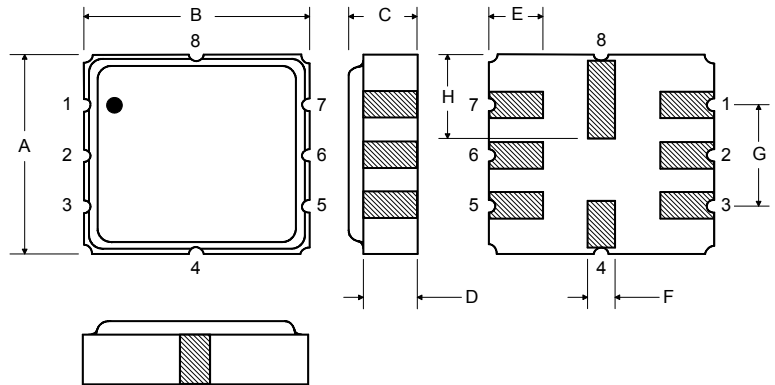
**NOTES:**

- 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 ≤ 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.
- 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:  $f = f_o [1 - FTC (T_o - T_c)^2]$ .
- 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.
- The design, manufacturing process, and specifications of this device are subject to change.
- One or more of the following U.S. Patents apply: 4,54,488, 4,616,197, and others pending.
- All equipment designs utilizing this product must be approved by the appropriate government agency prior to manufacture or sale.
- Tape and Reel Standard Per ANSI / EIA 481.
- 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.

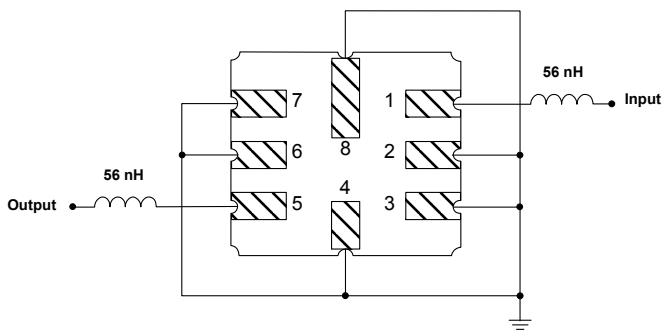
PRIMARY

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

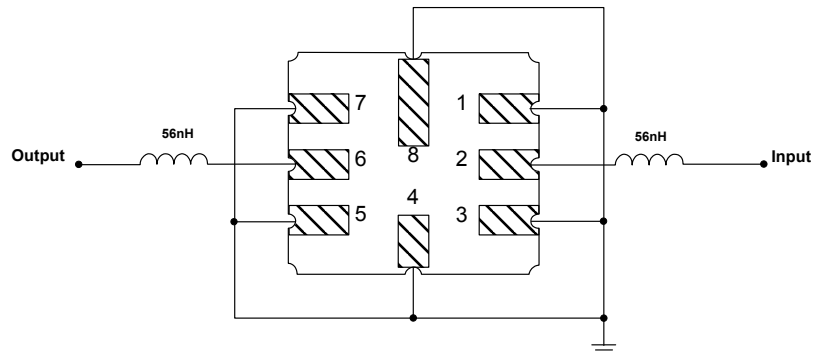
Dimension	mm			Inches		
	Min	Nom	Max	Min	Nom	Max
A	3.6	3.8	4.0	0.14	0.15	0.16
B	3.6	3.8	4.0	0.14	0.15	0.16
C	1.00	1.20	1.40	0.04	0.05	0.055
D	0.95	1.10	1.25	0.033	0.043	0.05
E	0.90	1.0	1.10	0.035	0.04	0.043
F	0.50	0.6	0.70	0.020	0.024	0.028
G	2.39	2.54	2.69	0.090	0.100	0.110
H	1.40	1.75	2.05	0.055	0.069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

OPTIONAL

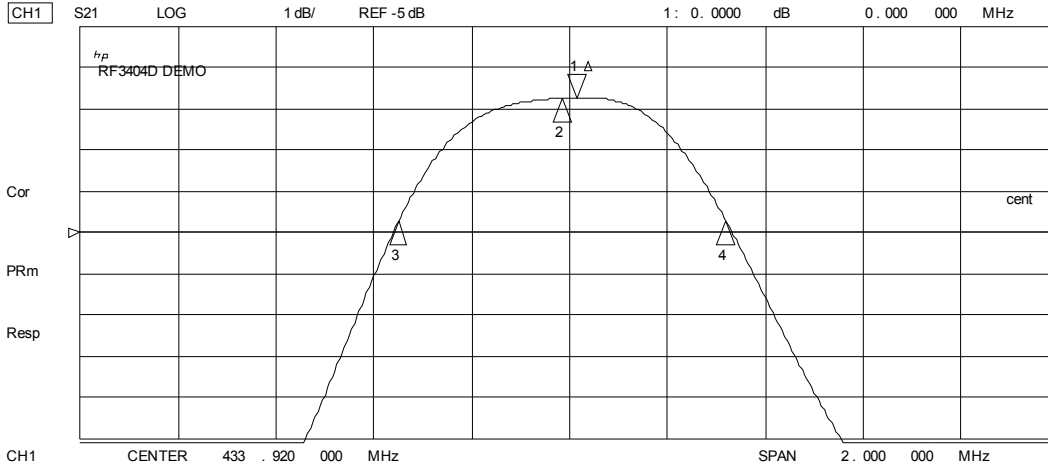
Electrical Connections

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

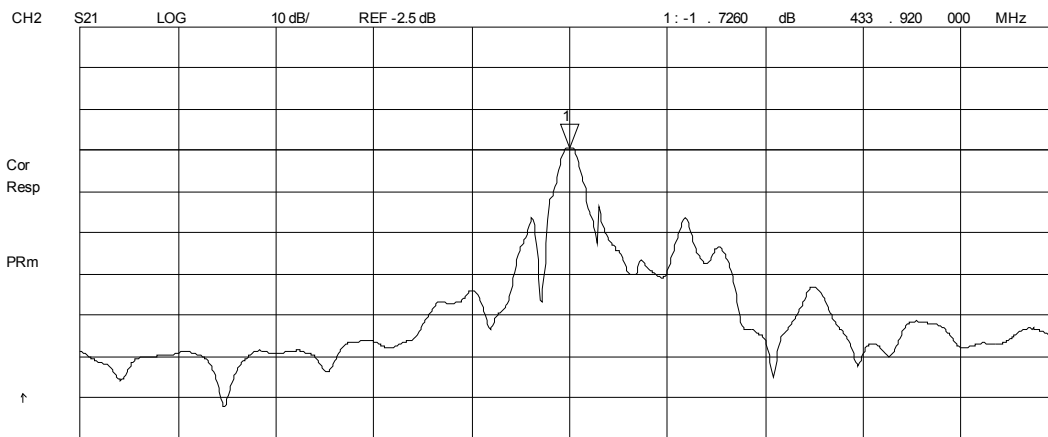
Matching Circuit to 50Ω



1 Aug 2007 14:03:00



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



Max

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CH1 S11 1UFS

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

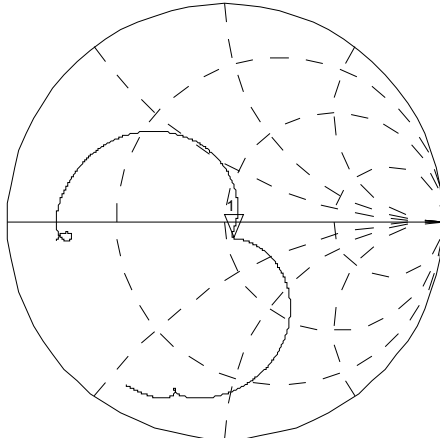
*h<sub>p</sub>*  
RF3404D DEMO

Cor

PRm

Full

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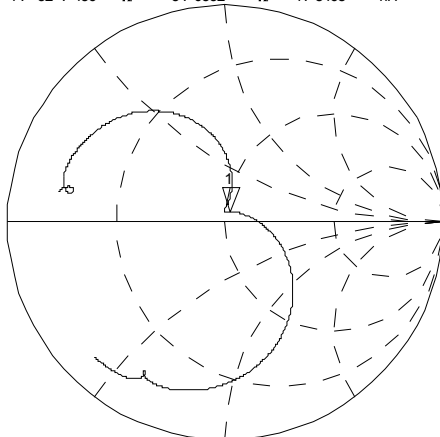
CH2 S22 1UFS

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