RFM®

RP1237

418.0 MHz SAW Resonator

- ***Designed for 418.00 MHz Transmitters***
- ***Nominal Insertion Phase Shift of 180° at Resonance***
- ***Quartz Stability***
- ***Rugged, Hermetic, Low-Profile TO39 Case***
- ***Complies with Directive 2002/95/EC (RoHS)*** Pb

TO39-3 Case

The RP1237 is a two-port, 180° surface-acoustic-wave (SAW) resonator in a low-profile TO39 case. It provides reliable, fundamental-mode, quartz frequency stabilization of fixed-frequency transmitters operating at 418.0 MHz. The RP1237 is designed specifically for remote-control and wireless security transmitters operating in the United Kingdom under DTI MPT 1340 and in the USA under FCC Part 15.231 regulations.

Absolute Maximum Ratings

Rating	Value	Units
CW RF Power Dissipation (See: Typical Test Circuit)	+0	dBm
DC Voltage Between Any Two Pins (Observe ESD Precautions)	±30	VDC
Case Temperature	-40 to +85	°C

Electrical Characteristics

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency	Absolute Frequency	f_C	2, 3, 4, 5,	417.925		418.075	MHz
	Tolerance from 418.000 MHz	Δf_C				±75	kHz
Insertion Loss		IL	2, 5, 6		5.7	8.0	dB
Quality Factor	Unloaded Q	Q_U	5, 6, 7		13,600		
	50 Ω Loaded Q	Q_L			6,500		
Temperature Stability	Turnover Temperature	T_O	6, 7, 8	47	62	77	°C
	Turnover Frequency	f_O			f_C+21		kHz
	Frequency Temp. Coefficient	FTC			0.037		ppm/°C^2
Frequency Aging	Absolute Value during First Year	$\|f_A\|$	6		≤ 10		ppm/yr
DC Insulation Resistance between Any Two Pins			5	1.0			MΩ
RF Equivalent RLC	Motional Resistance	R_M	5, 7, 9		93	152	Ω
	Motional Inductance	L_M			477.932		µH
	Motional Capacitance	C_M			0.303334		fF
	Shunt Static Capacitance	C_O	5, 6, 9	2.0	2.3	2.6	pF
Lid Symbolization (in addition to Lot and/or Date Codes)		RFM P1237					

CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.

Notes:

1. 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.
2. The frequency f_C is the frequency of minimum IL with the resonator in the specified test fixture in a 50 Ω test system with VSWR ≤ 1.2:1. Typically, $f_{OSCILLATOR}$ or $f_{TRANSMITTER}$ is less than the resonator f_C.
3. One or more of the following United States patents apply: 4,454,488; 4,616,197.
4. Typically, equipment utilizing this device requires emissions testing and government approval, which is the responsibility of the equipment manufacturer.
5. Unless noted otherwise, case temperature T_C = +25°C± 5°C
6. The design, manufacturing process, and specifications of this device are subject to change without notice.
7. Derived mathematically from one or more of the following directly measured parameters: f_C, IL, 3 dB bandwidth, f_C versus T_C, and C_O.
8. 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: $f = f_O [1 - FTC (T_O - T_C)^2]$. Typically, *oscillator* T_O is 20° less than the specified *resonator* T_O.
9. This equivalent RLC model approximates resonator performance near the resonant frequency and is provided for reference only. The capacitance C_O is the measured static (nonmotional) capacitance between either pin 1 and ground or pin 2 and ground. The measurement includes case parasitic capacitance.

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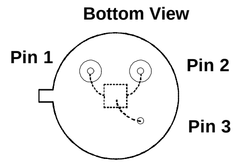
Electrical Connections

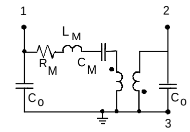
This two-port, three-terminal SAW resonator is bidirectional. However, impedances and circuit board parasitics may not be symmetrical, requiring slightly different oscillator component-matching values.

Pin	Connection
1	Input or Output
2	Output or Input
3	Case Ground



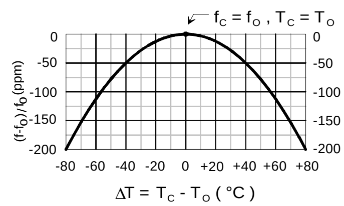
Equivalent LC Model

The following equivalent LC model is valid near resonance:

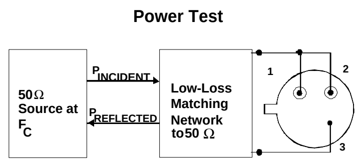


Temperature Characteristics

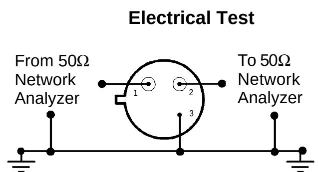
The curve shown on the right accounts for resonator contribution only and does not include LC component temperature contributions.



Typical Test Circuit

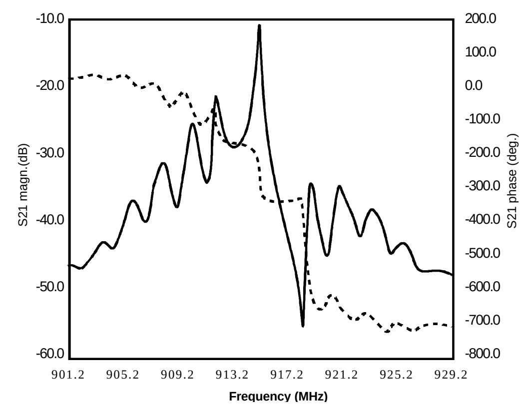


CW RF Power Dissipation = $P_{INCIDENT} - P_{REFLECTED}$



Typical Frequency Response

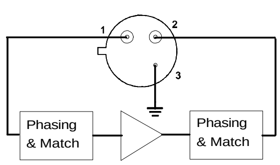
The plot shown below is a typical frequency response for the RP series of two-port resonators. The plot is for RP1094.



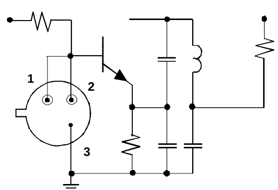
Typical Application Circuits

This SAW resonator can be used in oscillator or transmitter designs that require 180° phase shift at resonance in a two-port configuration. One-port resonators can be simulated, as shown, by connecting pins 1 and 2 together. However, for most low-cost consumer products, this is only recommended for retrofit applications and not for new designs.

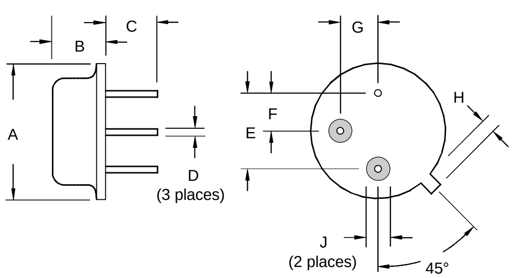
Conventional Two-Port Design:



Simulated One-Port Design:



Case Design



Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A		9.40		0.370
B		3.18		0.125
C	2.50	3.50	0.098	0.138
D	0.46 Nominal		0.018 Nominal	
E	5.08 Nominal		0.200 Nominal	
F	2.54 Nominal		0.100 Nominal	
G	2.54 Nominal		0.100 Nominal	
H		1.02		0.040
J	1.40		0.055	