RP1238
407.3 MHz   SAW Resonator

RFM

- *Ideal for 418 MHz Superhet Receiver LOs*
- *Nominal Insertion Phase Shift of 180° at Resonance*
- *Quartz Stability*
- *Rugged, Hermetic, Low-Profile TO39 Case*

The RP1238 is a two-port, 180° surface-acoustic-wave (SAW) resonator in a low-pro-file TO39 case. It provides reliable, fundamental-mode, quartz frequency stabilization of local oscillators operating at approximately 407.30 MHz. The RP1238 is designed for 418.0 MHz superhet receivers in remote-control and wireless security applications operating in the United Kingdom under DTI MPT 1340 and in the USA under FCC Part 15.

TO39-3 Case

Electrical Characteristics

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency (+25°C)	Absolute Frequency	f_C	2, 3, 4, 5,	407.200		407.400	MHz
	Tolerance from 407.300 MHz	Δf_C				±100	kHz
Insertion Loss		IL	2, 5, 6		5.4	8.0	dB
Quality Factor	Unloaded Q	Q_U	5, 6, 7		13,700		
	50 Ω Loaded Q	Q_L			6,300		
Temperature Stability	Turnover Temperature	T_O	6, 7, 8	43	58	73	°C
	Turnover Frequency	f_O			f_C+16		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 Model	Motional Resistance	R_M	5, 7, 9		86	152	Ω
	Motional Inductance	L_M			462.150		μH
	Motional Capacitance	C_M			0.330391		fF
	Shunt Static Capacitance	C_O	5, 6, 9	2.1	2.4	2.7	pF
Lid Symbolization (in addition to Lot and/or Date Codes)				RFM P1238			

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 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 manufac-turer.
5. Unless noted otherwise, case temperature T_C = +25°C± 2°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 para-sitic capacitance.
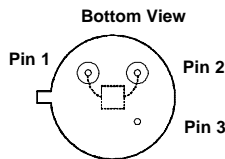
407.3 MHz SAW Resonator

Absolute Maximum Ratings

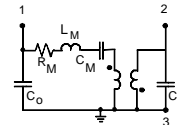| Rating	Value	Units
CW RF Power Dissipation (See: Typical Test Circuit)	+0	dBm
DC Voltage Between Any Two Pins (Observe ESD Precautions)	±30	VDC
Case Temperature	-40 to +85	°C

Electrical 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

Bottom View

Typical Test Circuit

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

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:
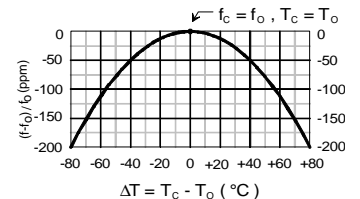

Case Design

Equivalent LC Model

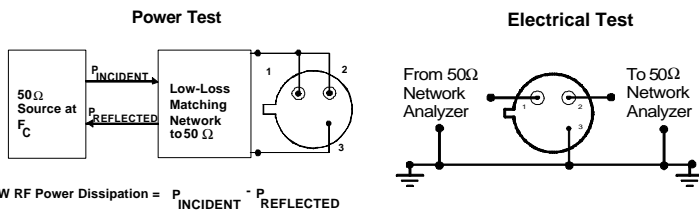The following equivalent LC model is valid near resonance:

Temperature Characteristics

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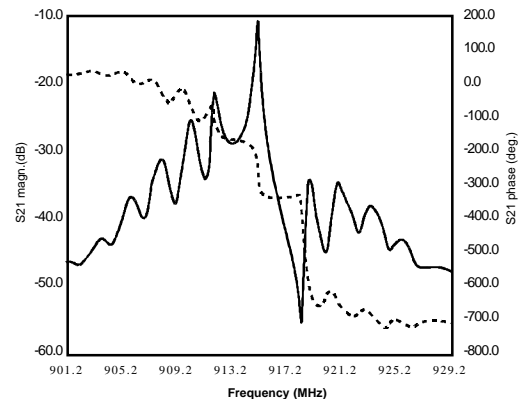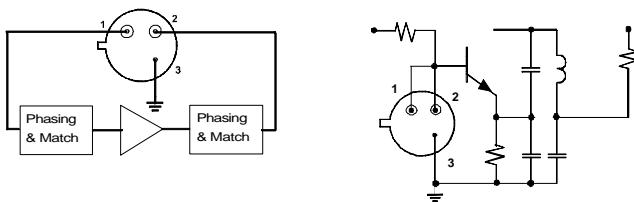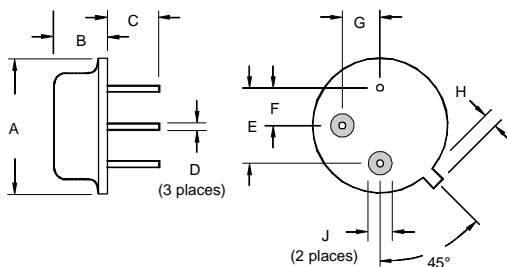

$\Delta T = T_C - T_O$ (°C)

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.

Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A		9.30		0.366
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	