



- **Designed for 315 MHz Transmitters**
- **Nominal Insertion Phase Shift of 180° at Resonance**
- **Quartz Stability**
- **Rugged, Hermetic, Low-Profile TO39 Case**

The RP1239 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 low-power AM and FSK transmitters operating at 315.0 MHz for use in the United Kingdom under DTI MPT 1340 and in the USA under FCC Part 15. Applications include remote-control and wireless security devices. This is a pin-for-pin replacement in preexisting transmitter circuits utilizing two-port, 180° SAW resonators.

RP1239

**315.0 MHz
SAW
Resonator**



TO39-3 Case

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,	314.925		315.075	MHz
	Tolerance from 315.000 MHz	Δf_C				±75	kHz
Insertion Loss		IL	2, 5, 6		5.3	8.5	dB
Quality Factor	Unloaded Q	Q_U	5, 6, 7		18,000		
	50 Ω Loaded Q	Q_L			8,100		
Temperature Stability	Turnover Temperature	T_O	6, 7, 8	37	52	67	°C
	Turnover Frequency	f_O			$f_C + 8.5$		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			M Ω
RF Equivalent RLC	Motional Resistance	R_M	5, 7, 9		84	167	Ω
	Motional Inductance	L_M			758.027		μ H
	Motional Capacitance	C_M			0.336771		fF
	Shunt Static Capacitance	C_O	5, 6, 9	1.9	2.2	2.5	pF
Lid Symbolization (in addition to Lot and/or Date Codes)		RFM P1239					



CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.

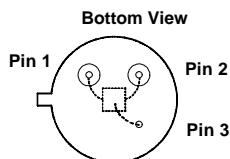
Notes:

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.

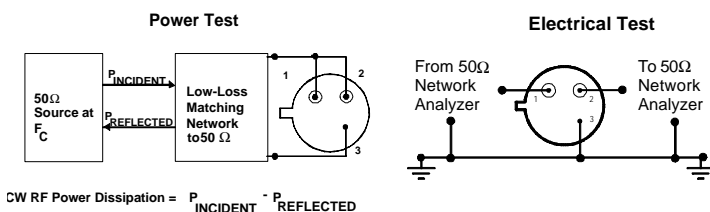
Electrical Connections

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

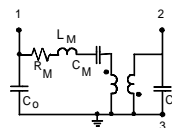


Typical Test Circuit



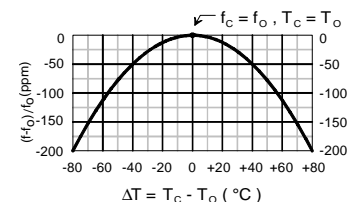
Equivalent LC Model

The following equivalent LC model is valid near resonance:



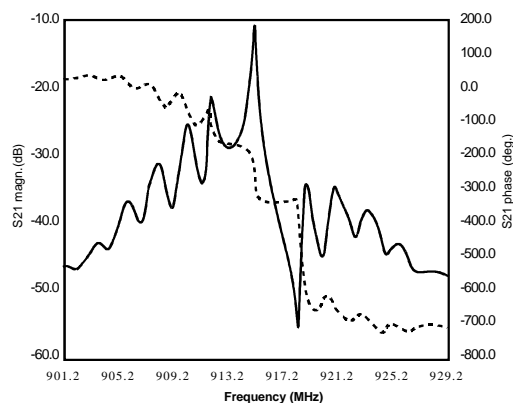
Temperature Characteristics

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



Typical Frequency Response

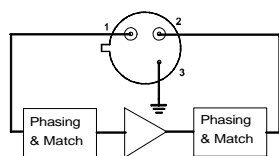
The plot shown below is a typical frequency response for the RP series of two-port resonators. The plot is for RP1094.



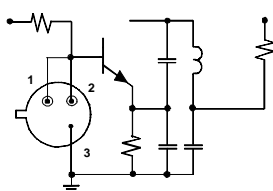
Typical Application Circuits

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.

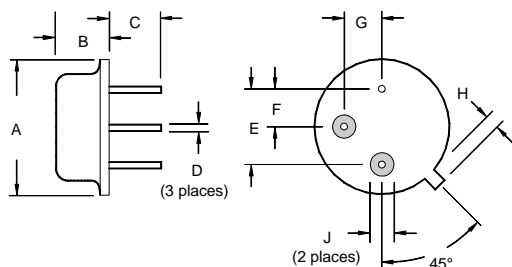
Conventional Two-Port Design:



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	