RP1053-2

310.0 MHz SAW Resonator

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

The RP1053-2 is a two-port, 180° surface-acoustic-wave (SAW) resonator in a low-profile TO39 case. It provides reliable, fundamental-mode, quartz frequency stabilization.

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
Frequency (+25 °C)	Nominal Frequency	f_C	2, 3, 4, 5,	309.750		310.250	MHz
	Tolerance from 310.000 MHz	Δf_C				±250	kHz
Insertion Loss		IL	2, 5, 6		14	18	dB
Quality Factor	Unloaded Q	Q_U	5, 6, 7		4000		
	50 Ω Loaded Q	Q_L			3200		
Temperature Stability	Turnover Temperature	T_O	6, 7, 8	47	62	77	°C
	Turnover Frequency	f_O			f_C		kHz
	Frequency Temp. Coefficient	FTC			0.037		ppm/°C^2
Frequency Aging	Absolute Value during First Year	$\|f_A\|$	1, 6		10		ppm/yr
DC Insulation Resistance between Any Two Pins			5	1.0			MΩ
RF Equivalent RLC	Motional Resistance	R_M	5, 6, 7, 9			695	Ω
	Motional Inductance	L_M			2100		µH
	Motional Capacitance	C_M			0.125		fF
	Shunt Capacitance	C_O	5, 6, 9	1.0	1.3	1.6	pF
Lid Symbolization (in addition to Lot and/or Date Codes)		RFM 334-A025					

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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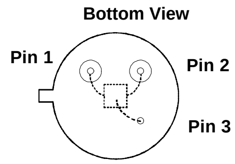
Electrical Connections

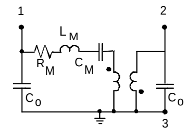
This two-port, three-terminal SAW resonator is bidirectional. However, impedances and circuit board parasitics may not be symmetrical, requiring slightly different oscillator component-matching values.

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



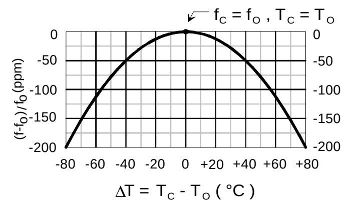
Equivalent LC Model

The following equivalent LC model is valid near resonance:

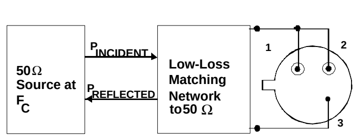


Temperature Characteristics

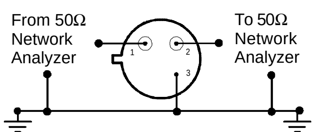
The curve shown on the right accounts for resonator contribution only and does not include LC component temperature contributions.



Typical Test Circuit

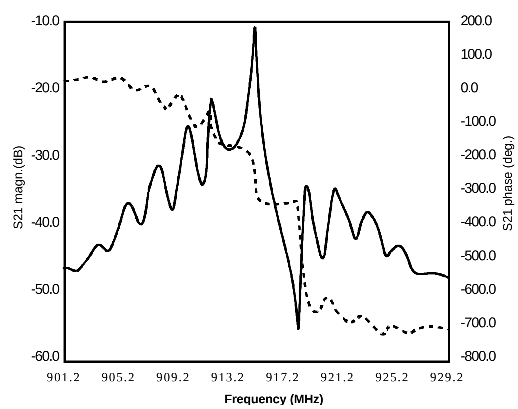


CW RF Power Dissipation = $P_{INCIDENT} - P_{REFLECTED}$



Typical Frequency Response

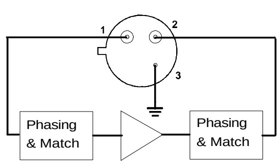
The plot shown below is a typical frequency response for the RP series of two-port resonators. The plot is for RP1094.



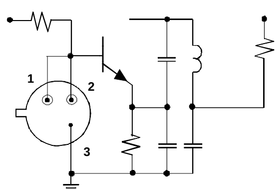
Typical Application Circuits

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.

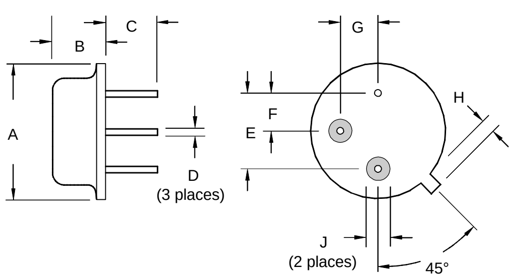
Conventional Two-Port Design:



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	

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