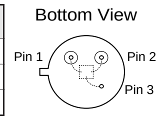
Electrical Connections

Either pin 1 or pin 2 may be used for input or output with these bidirectional, two-port, three-terminal, SAW resonators. However, impedances and circuit board parasitics may not be symmetrical, requiring slightly different oscillator component values for different resonator connections.

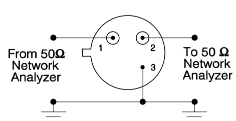
Pin	Connection
1	Input or Output
2	Output or Input
3	Case Ground

Bottom View



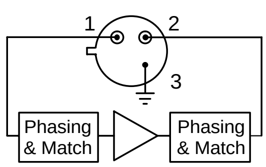
Typical Test Circuit

The test circuit inductor, L_{TEST}, is used to resonate with the static capacitance, C_O (which is measured at low frequency with a capacitance meter).



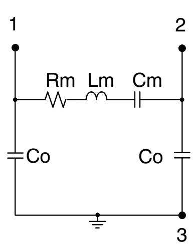
Typical Application Circuits

The following circuit illustrates a basic oscillator topology. This resonator is suitable for oscillator designs requiring 0° phase shift at resonance in a two-port configuration.



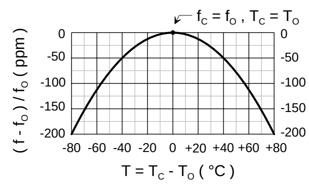
Equivalent LC Model

The following equivalent LC model is valid near resonance:

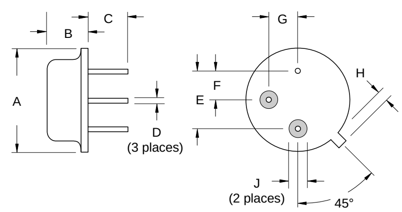


Temperature Characteristics

The curve shown on the right accounts for resonator contribution only and does not include oscillator temperature characteristics.



Case Design



Dimension	Millimeters		Inches	
	Minimum	Maximum	Minimum	Maximum
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	

RS1033-5

668.1 MHz SAW Resonator

- *Designed for 668.0 MHz CATV Converter LOs*
- *Nominal Insertion Phase Shift of 0° at Resonance*
- *Quartz Stability*
- *Rugged, Hermetic, Low-Profile TO39 Case*

The RS1033-5 is a two-port surface-acoustic-wave (SAW) resonator in a low-profile TO39 case. It provides reliable, fundamental-mode, quartz frequency stabilization of fixed-frequency oscillators operating at or near 668 MHz. Typical applications include the second LO in CATV set-top convertors with channel 2 output.

TO39-3 Case

Absolute Maximum Ratings

Rating	Value	Units
CW RF Power Dissipation (See: Typical Test Circuit.)	+5	dBm
DC Voltage between Any Two Pins (Observe ESD Precautions.)	±30	VDC
Case Temperature [1]	−40 to +85	°C

Electrical Characteristics

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency (+25°C)	Absolute Frequency	f_C	2, 3, 4, 5	668.000		668.200	MHz
	Tolerance from 668.100 MHz	Δf_C				±100	kHz
Insertion Loss		IL	2, 5, 6		8.5	12.5	dB
Quality Factor	Unloaded Q	Q_U	5, 6, 7		9,300		
	50 Ω Loaded Q	Q_L			5,800		
Temperature Stability	Turnover Temperature	T_O	6, 7, 8	50	65	80	°C
	Turnover Frequency	f_O			f_C+41		kHz
	Frequency Temperature Coefficient	FTC			0.037		ppm/°C²
Frequency Aging	Absolute Value during the 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		165	322	Ω
	Motional Inductance	L_M			368.537		µH
	Motional Capacitance	C_M			0.153984		fF
	Shunt Static Capacitance	C_O	5, 6, 9	1.3	1.6	1.9	pF

Lid Symbolization (in Addition to Lot and/or Date Codes)	RFM 1033-5

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 manufacturer.
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 parasitic capacitance.