Preliminary

RFM®

RO2044

318.00 MHz SAW Resonator

- ***Designed for 318 MHz Transmitter Applications***
- ***Low Series Resistance***
- ***Quartz Stability***
- ***Rugged, Hermetic, Low-Profile TO39 Case***
- ***Complies with Directive 2002/95/EC (RoHS)*** Pb

The RO2044 is a true one-port, 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 or near 318 MHz. The RO2044 is designed specifically for remote-control and wireless security AM transmitters operating in the USA under FCC Part 15, in Canada under Doc RSS-210, and in Australia.

TO39-3 Case

Absolute Maximum Ratings

Rating	Value	Units
CW RF Power Dissipation	+0	dBm
DC Voltage Between Terminals (Observe ESD Precautions)	±30	VDC
Case Temperature	-40 to +85	°C

Electrical Characteristics

Characteristic		Sym	Notes	Minimum	Typical	Maximu	Units
Frequency (+25 °C)	Nominal Frequency	f_C	2, 3, 4, 5	317.900		318.100	MHz
	Tolerance from 318.000 MHz	Δf_C				±100	kHz
Insertion Loss		IL	2, 5, 6		2.4	5.0	dB
Quality Factor	Unloaded Q	Q_U	5, 6, 7		10400		
	50 Ω Loaded Q	Q_L			2400		
Temperature Stability	Turnover Temperature	T_O	6, 7, 8	29	44	59	°C
	Turnover Frequency	f_O			f_C+4.2		kHz
	Frequency Temperature Coefficient	FTC			0.037		ppm/°C^2
Frequency Aging	Absolute Value during the First Year	|fA|	1, 6		10		ppm/yr
DC Insulation Resistance between Any Two Pins			5	1.0			MΩ
RF Equivalent RLC Model	Motional Resistance	R_M	5, 6, 7, 9		32	78	Ω
	Motional Inductance	L_M			160.269		µH
	Motional Capacitance	C_M			1.56292		fF
	Pin 1 to Pin 2 Static Capacitance	C_O	5, 6, 9	2.9	3.2	3.6	pF
	Transducer Static Capacitance	C_P	5, 6, 7, 9		3.0		pF
Test Fixture Shunt Inductance		L_{TEST}	2, 7		78		nH
Lid Symbolization (in addition to Lot and/or Date Codes)		RFM // RO2044 // YWWS##					

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 center frequency, f_C, is measured at the minimum insertion loss point, IL_{MIN}, with the resonator in the 50 Ω test system (VSWR ≤ 1.2:1). The shunt inductance, L_{TEST}, is tuned for parallel resonance with C_O at f_C. 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 and 4,616,197 and others pending.
4. Typically, equipment designs utilizing this device require 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°C 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 static (nonmotional) capacitance between pin1 and pin 2 measured at low frequency (10 MHz) with a capacitance meter. The measurement includes case parasitic capacitance with a floating case. For usual grounded case applications (with ground connected to either pin 1 or pin 2 and to the case), add approximately 0.25 pF to C_O.

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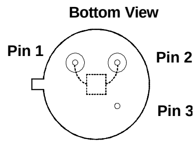
Electrical Connections

This one-port, two-terminal SAW resonator is bidirectional. The terminals are interchangeable with the exception of circuit board layout.

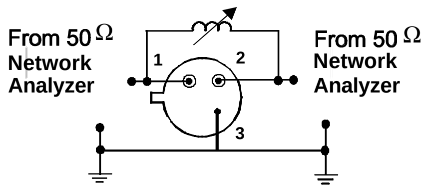
Pin	Connection
1	Terminal 1
2	Terminal 2
3	Case Ground



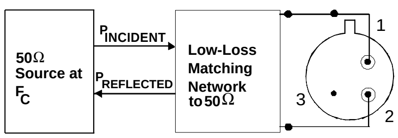
Typical Test Circuit

The test circuit inductor, L_{TEST}, is tuned to resonate with the static capacitance, C_O at F_C.

Electrical Test:



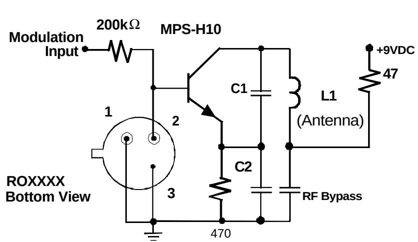
Power Test:



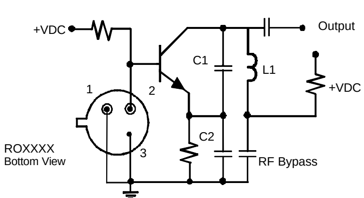
CW RF Power Dissipation = $P_{INCIDENT} - P_{REFLECTED}$

Typical Application Circuits

Typical Low-Power Transmitter Application:

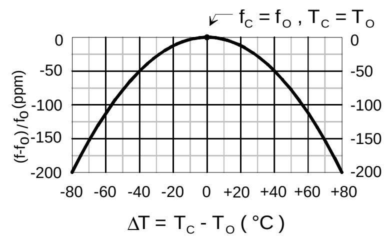


Typical Local Oscillator Application:



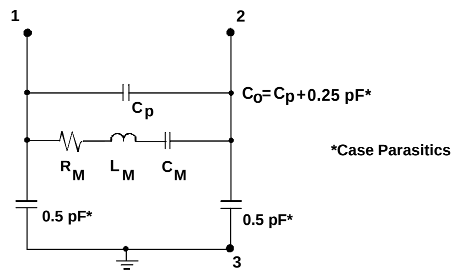
Temperature Characteristics

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

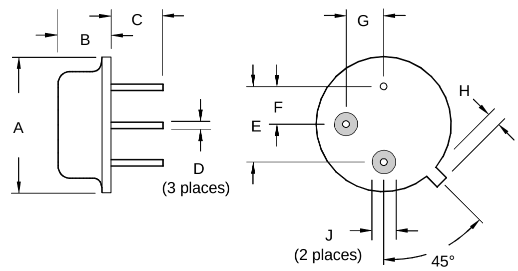


Equivalent LC Model

The following equivalent LC model is valid near resonance:



Case Design



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	

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