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INNOVATOR IN ELECTRONICS

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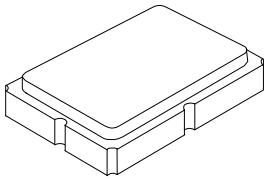
RO3188A

390.0 MHz SAW Resonator

- ***Designed for 390.0 MHz Transmitters***
- ***Very Low Series Resistance***
- ***Quartz Stability***
- ***Surface-mount Ceramic Case***
- ***Complies with Directive 2002/95/EC (RoHS)***

The RO3188A is a one-port surface-acoustic-wave (SAW) resonator packaged in a surface-mount ceramic case. It provides reliable, fundamental-mode quartz frequency stabilization of fixed-frequency transmitters operating at 390.0 MHz.



SM5035-4

Absolute Maximum Ratings

Rating	Value	Units
CW RF Power Dissipation (See: Typical Test Circuit)	+0	dBm
DC voltage Between Terminals (Observe ESD Precautions)	±30	VDC
Case Temperature	-40 to +85	°C
Soldering Temperature (10 seconds / 5 cycles maximum)	260	°C

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency, +25 °C		f_C	2,3,4,5	389.900		390.100	MHz
	Tolerance from 390.0 MHz	Δf_C				±100	kHz
Insertion Loss		IL	2,5,6		1.3	2.0	dB
Quality Factor	Unloaded Q	Q_U	5,6,7		12647		
	50 Ω Loaded Q	Q_L			1532		
Temperature Stability	Turnover Temperature	T_O	6,7,8	10	25	40	°C
	Turnover Frequency	f_O			f_C		
	Frequency Temperature Coefficient	FTC			0.032		ppm/°C^2
Frequency Aging	Absolute Value during the First Year	$\|f_A\|$	1		≤10		ppm/yr
DC Insulation Resistance between Any Two Terminals			5	1.0			MΩ
RF Equivalent RLC Model	Motional Resistance	R_M	5, 7, 9		13.8		Ω
	Motional Inductance	L_M			71.2		μH
	Motional Capacitance	C_M			2.3		fF
	Shunt Static Capacitance	C_O	5, 6, 9		3.0		pF
Test Fixture Shunt Inductance		L_{TEST}	2, 7		55		nH
Lid Symbolization (in addition to Lot and/or Date Codes)		797 // YYWWS					

CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.

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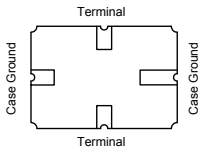
NOTES:

1. Frequency aging is the change in f_C with time and [illegible] 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 approximately equal to the specified *resonator* T_O. 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 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 approximately equal to the resonator f_C.
3. One or more of the following United States patents apply: 4,454,488 and 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 ± 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.
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 the two terminals measured at low frequency (10 MHz) with a capacitance meter. The measurement includes parasitic capacitance with "NC" pads unconnected. Case parasitic capacitance is approximately 0.05 pF. Transducer parallel capacitance can by calculated as: $C_P \approx C_O$ - 0.05 pF.
10. Tape and Reel standard per ANSI / EIA 481.

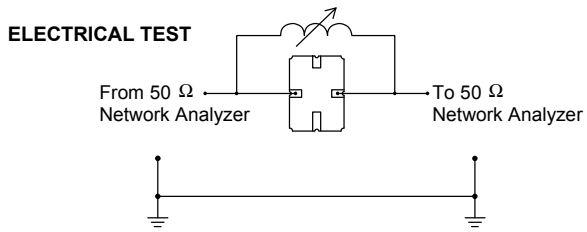
Electrical Connections

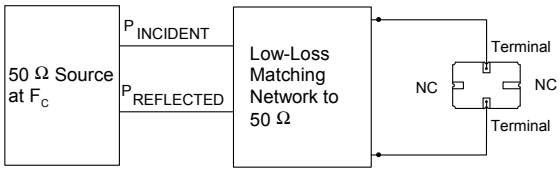
The SAW resonator is bidirectional and may be installed with either orientation. The two terminals are interchangeable and unnumbered. The callout NC indicates no internal connection. The NC pads assist with mechanical positioning and stability. External grounding of the NC pads is recommended to help reduce parasitic capacitance in the circuit.



Typical Test Circuit

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

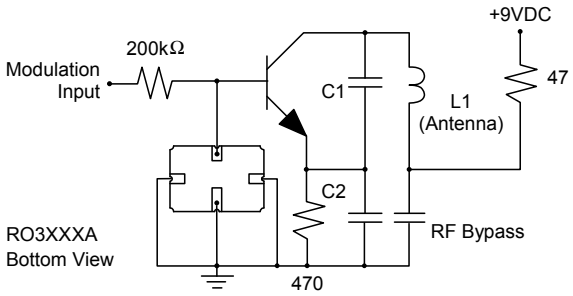




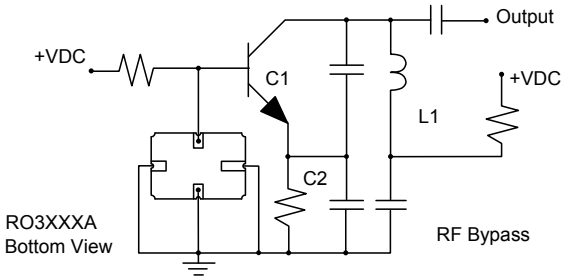
CW RF Power Dissipation = $P_{INCIDENT} - P_{REFLECTED}$

Typical Application Circuits

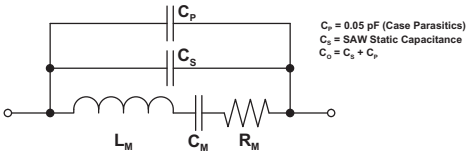
Typical Low-Power Transmitter Application



Typical Local Oscillator Applications

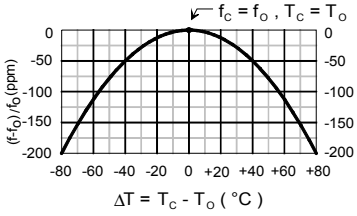


Equivalent RLC Model



Temperature Characteristics

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



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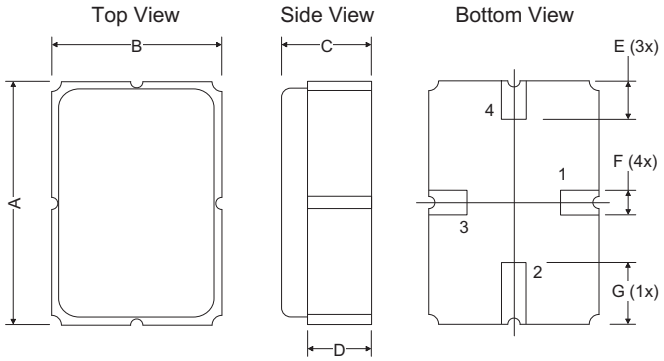
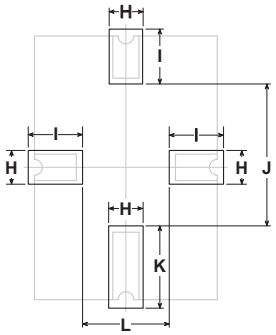
Case





PCB Land Pattern

Top View

Dimensions	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.87	5.00	5.13	0.191	0.196	0.201
B	3.37	3.50	3.63	0.132	0.137	0.142
C	1.45	1.53	1.60	0.057	0.060	0.062
D	1.35	1.43	1.50	0.040	0.057	0.059
E	0.67	0.80	0.93	0.026	0.031	0.036
F	0.37	0.50	0.63	0.014	0.019	0.024
G	1.07	1.20	1.33	0.042	0.047	0.052
H	-	1.04	-	-	0.041	-
I	-	1.46	-	-	0.058	-
J	-	3.01	-	-	0.119	-
K	-	1.44	-	-	0.057	-
L	-	1.92	-	-	0.076	-

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