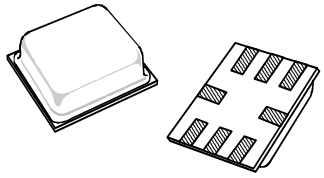
# RO2180B

# 433.92 MHz SAW Resonator

- ***Very Low Series Resistance***
- ***Quartz Stability***
- ***Surface-Mount, Solder Seal Package with 4.8 x 5.2 mm Footprint***

The RO2180B is a true one-port, surface-acoustic-wave (SAW) resonator in a surface-mount ceramic case. It provides reliable, fundamental-mode, quartz frequency stabilization.



**SM5248-8 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 |
| Soldering Temperature | +250 | °C |

**Electrical Characteristics**

| Characteristic | | Sym | Notes | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|---|---|
| Frequency (+25 °C) | Nominal Frequency | $f_C$ | 2, 3, 4, 5 | 433.845 | 433.92 | 433.995 | MHz |
| | Tolerance from 433.92 MHz | $Df_C$ | | | | ±75 | kHz |
| Insertion Loss | | IL | 2, 5, 6 | | 2 | | dB |
| Quality Factor | Unloaded Q | $Q_U$ | 5, 6, 7 | | 11,535 | | |
| | 50 Ω Loaded Q | $Q_L$ | | | 1,811 | | |
| Temperature Stability | Turnover Temperature | $T_O$ | 6, 7, 8 | | 25 | | °C |
| | Turnover Frequency | $f_O$ | | | $f_{C+}16$ | | |
| | Frequency Temperature Coefficient | FTC | | | 0.032 | | ppm/°C[2] |
| Frequency Aging | Absolute Value during the First Year | \|fA\| | 1 | | ≤10 | | ppm/yr |
| DC Insulation Resistance between Any Two Terminals | | | 5 | 1.0 | | | MΩ |
| RF Equivalent RLC Model | Motional Resistance | $R_M$ | 5, 6, 7, 9 | | 18.63 | | Ω |
| | Motional Inductance | $L_M$ | | | 78.79 | | µH |
| | Motional Capacitance | $C_M$ | | | 1.71 | | fF |
| | Shunt Static Capacitance | $C_O$ | 5, 6, 7, 9 | | 1.82 | | pF |
| Test Fixture Shunt Inductance | | $L_{TEST}$ | 2, 7 | | 63.13 | | nH |
| Lid Symbolization (in Addition to Lot and/or Date Code) | | 295 | | | | | |

**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 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°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 approximately equal to 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 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 be calculated as: $C_P \approx C_O$ - 0.05 pF.

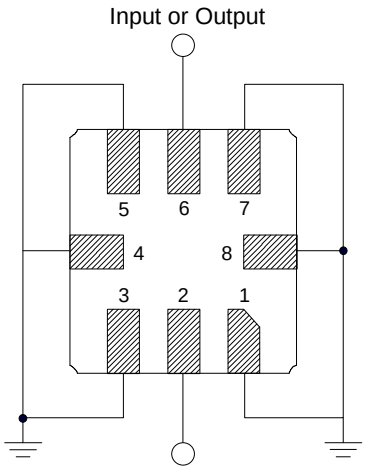
RF Monolithics, Inc. Phone: (972) 233-2903 Fax: (972) 387-8148 E-mail: info@rfm.com
RFM Europe Phone: 44 1963 251383 Fax: 44 1963 251510 http://www.rfm.com

## Electrical Connections

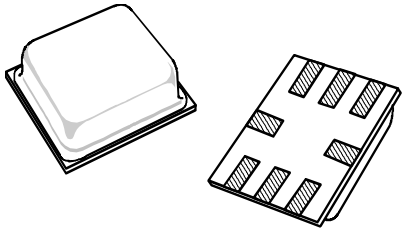
This one-port, eight-terminal solder seal resonator is bidirectional. However, impedances and circuit board parasitics may not be symmetrical, requiring slightly different oscillator component-matching values.

| Pin | Connection |
|---|---|
| 1 | Ground |
| 2 | Input or Output |
| 3 | Ground |
| 4 | Ground |
| 5 | Ground |
| 6 | Output or Input |
| 7 | Ground |
| 8 | Ground |

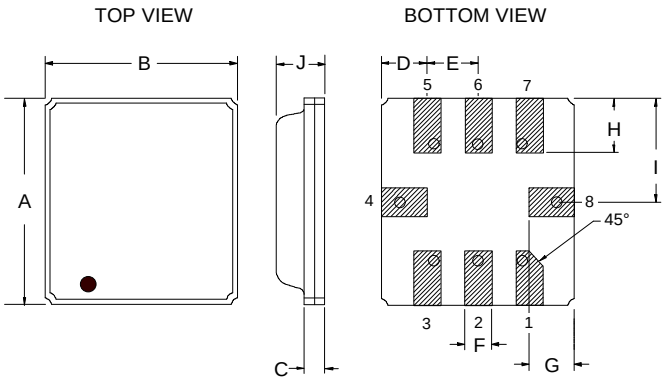
## Typical Circuit




1, 3, 4, 5, 7, 8 No Internal Connection



## Case Design




| Dimensions | Millimeters | | | Inches | | |
|---|---|---|---|---|---|---|
| | Min | Nom | Max | Min | Nom | Max |
| A | 5.21 | 5.33 | 5.46 | 0.205 | 0.210 | 0.215 |
| B | 4.83 | 4.95 | 5.08 | 0.190 | 0.195 | 0.200 |
| C | 0.38 | 0.51 | 0.64 | 0.015 | 0.020 | 0.025 |
| D | 1.07 | 1.19 | 1.32 | 0.042 | 0.047 | 0.052 |
| E | 1.14 | 1.27 | 1.40 | 0.045 | 0.050 | 0.055 |
| F | 0.58 | 0.71 | 0.84 | 0.023 | 0.028 | 0.033 |
| G | 1.07 | 1.19 | 1.32 | 0.042 | 0.047 | 0.052 |
| H | 1.32 | 1.45 | 1.57 | 0.052 | 0.057 | 0.062 |
| I | 2.54 | 2.67 | 2.79 | 0.100 | 0.105 | 0.110 |
| J | 1.52 | 1.78 | 2.03 | 0.060 | 0.070 | 0.080 |

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