

- **Designed for 433.92 MHz Superheterodyne Receiver LOs**
- **Very Low Series Resistance**
- **Quartz Stability**
- **Surface-mount Ceramic Case**
- **Complies with Directive 2002/95/EC (RoHS)**



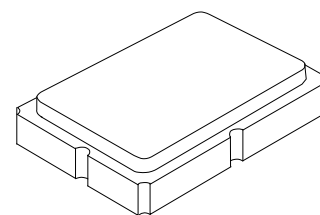
The RO3102A is a one-port surface-acoustic-wave (SAW) resonator packaged in a surface-mount ceramic case. It provides reliable, fundamental-mode, quartz frequency stabilization of local oscillators operating at 423.22 MHz. The RO3102A is designed for 433.92 MHz superheterodyne receivers using a 10.7 MHz IF. Applications include remote-control and wireless security receivers operating in Europe under ETSI EN 300 220-2.

## Absolute Maximum Ratings

| Rating                                                 | Value      | Units |
|--------------------------------------------------------|------------|-------|
| CW RF Power Dissipation (See Typical Test Circuit)     | +5         | 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    |

**RO3102A**

**423.22 MHz  
SAW  
Resonator**



**SM5035-4**

| Characteristic                                     |                                      | Sym          | Notes      | Minimum | Typical | Maximum | Units               |
|----------------------------------------------------|--------------------------------------|--------------|------------|---------|---------|---------|---------------------|
| Frequency, +25 °C                                  | Nominal Frequency                    | $f_C$        | 2, 3, 4, 5 | 423.145 |         | 423.295 | MHz                 |
|                                                    | Tolerance from 423.220 MHz           | $\Delta f_C$ |            |         |         | ±75     | kHz                 |
| Insertion Loss                                     |                                      | IL           | 2, 5, 6    |         | 1.0     | 2.0     | dB                  |
| Quality Factor                                     | Unloaded Q                           | $Q_U$        | 5, 6, 7    |         | 16,100  |         |                     |
|                                                    | 50 $\Omega$ Loaded Q                 | $Q_L$        |            |         | 1,800   |         |                     |
| 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 <sup>2</sup> |
| Frequency Aging                                    | Absolute Value during the First Year | $ f_A $      | 1, 6       |         | 10      |         | ppm/yr              |
| DC Insulation Resistance between Any Two Terminals |                                      |              | 5          | 1.0     |         |         | M $\Omega$          |
| RF Equivalent RLC Model                            | Motional Resistance                  | $R_M$        | 5, 6, 7, 9 |         | 13      |         | $\Omega$            |
|                                                    | Motional Inductance                  | $L_M$        |            |         | 87.8    |         | $\mu$ H             |
|                                                    | Motional Capacitance                 | $C_M$        |            |         | 1.6     |         | fF                  |
|                                                    | Shunt Static Capacitance             | $C_O$        | 5, 6, 9    | 1.5     | 1.8     | 2.1     | pF                  |
| Test Fixture Shunt Inductance                      |                                      | $L_{TEST}$   | 2, 7       |         | 75      |         | nH                  |
| Lid Symbolization                                  |                                      | 823 // YYWWS |            |         |         |         |                     |



**CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.**

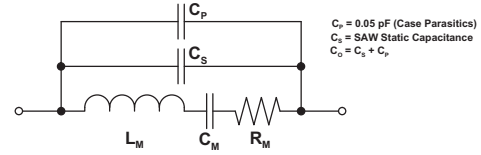
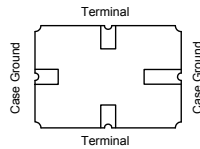
## NOTES:

- 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.
- The center frequency,  $f_C$ , is measured at the minimum insertion loss point,  $IL_{MIN}$ , with the resonator in the 50  $\Omega$  test system ( $VSWR \leq 1.2:1$ ). 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  $f_C$ .
- One or more of the following United States patents apply: 4,454,488 and 4,616,197.
- Typically, equipment utilizing this device requires emissions testing and government approval, which is the responsibility of the equipment manufacturer.
- Unless noted otherwise, case temperature  $T_C = +25 \pm 2$  °C.
- The design, manufacturing process, and specifications of this device are subject to change without notice.
- Derived mathematically from one or more of the following directly measured parameters:  $f_C$ , IL, 3 dB bandwidth,  $f_C$  versus  $T_C$ , and  $C_O$ .
- 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*  $T_O$ .
- 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.

# Discontinued

## Electrical Connections

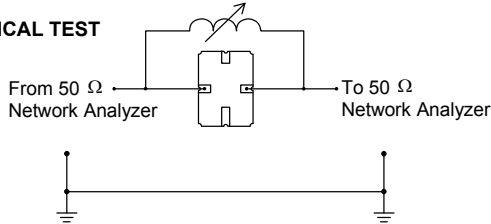
The SAW resonator is bidirectional and may be installed with either orientation. The two terminals are interchangeable and unnumbered. The callout NC indicates no internal connection. The NC pads assist with mechanical positioning and stability. External grounding of the NC pads is recommended to help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



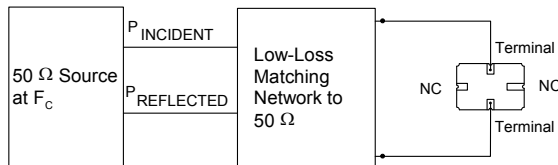
## Typical Test Circuit

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

### ELECTRICAL TEST



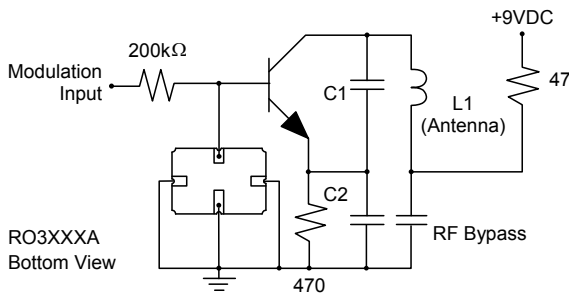
### POWER TEST



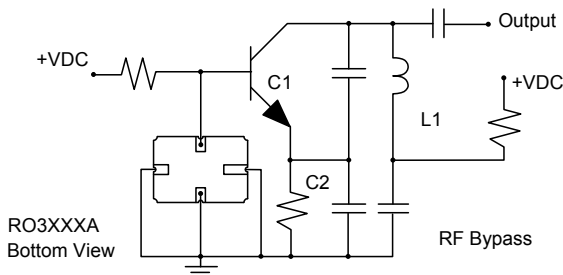
$$CW \text{ RF Power Dissipation} = P_{INCIDENT} - P_{REFLECTED}$$

## Typical Application Circuits

### Typical Low-Power Transmitter Application

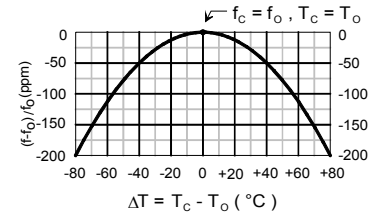


### Typical Local Oscillator Applications

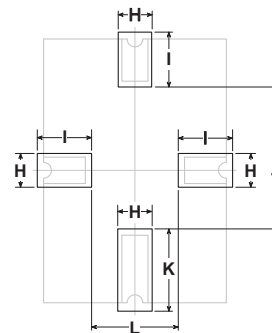
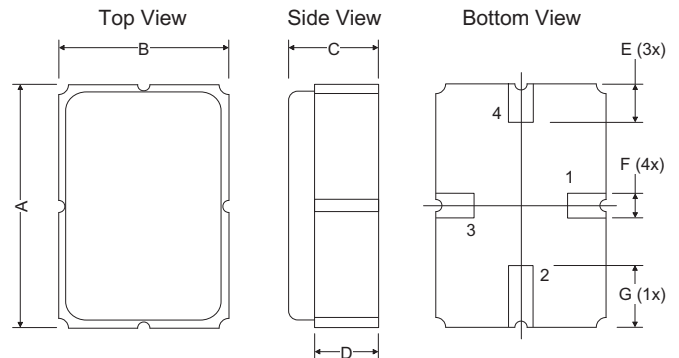


## Temperature Characteristics

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



## 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 | -     |