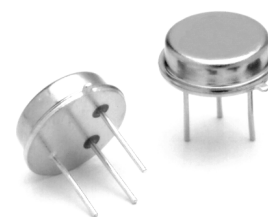


RP1298

423.22 MHz SAW Resonator



TO39-3 Case

- **Ideal for 433.92 MHz Superhet Receiver LOs**
- **Nominal Insertion Phase Shift of 180° at Resonance**
- **Quartz Stability**
- **Rugged, Hermetic, Low-Profile TO39 Case**
- **Complies with Directive 2002/95/EC (RoHS)**



The RP1298 is a two-port, 180° surface-acoustic-wave (SAW) resonator in a low-profile TO39 case. It provides reliable, fundamental-mode, quartz frequency stabilization of local oscillators operating at approximately 423.22 MHz. The RP1298 is designed for 433.92 MHz superhet receivers in remote-control and wireless security applications operating in Europe under ETSI I-ETS 300 220 and in Germany under FTZ 17 TR 2100.

Absolute Maximum Ratings

| Rating | Value | Units |
|---|------------|-------|
| CW RF Power Dissipation (See: Typical Test Circuit) | +0 | dBm |
| DC Voltage Between Any Two Pins (Observe ESD Precautions) | ±30 | VDC |
| Case Temperature | -40 to +85 | °C |

| Characteristic | | Sym | Notes | Minimum | Typical | Maximum | Units |
|--|----------------------------------|--------------|-------------|-----------|-------------|---------|---------------------|
| Center Frequency | Absolute Frequency | f_C | 2, 3, 4, 5, | 423.120 | | 423.320 | MHz |
| | Tolerance from 423.220 MHz | Δf_C | | | | ±100 | kHz |
| Insertion Loss | | IL | 2, 5, 6 | | 5.2 | 8.0 | dB |
| Quality Factor | Unloaded Q | Q_U | 5, 6, 7 | | 15,200 | | |
| | 50 Ω Loaded Q | Q_L | | | 6,900 | | |
| Temperature Stability | Turnover Temperature | T_O | 6, 7, 8 | 24 | 39 | 54 | °C |
| | Turnover Frequency | f_O | | | $f_C + 2.6$ | | kHz |
| | Frequency Temp. Coefficient | FTC | | | 0.037 | | ppm/°C ² |
| Frequency Aging | Absolute Value during First Year | $ f_A $ | 6 | | ≤ 10 | | ppm/yr |
| DC Insulation Resistance between Any Two Pins | | | 5 | 1.0 | | | M Ω |
| RF Equivalent RLC | Motional Resistance | R_M | 5, 7, 9 | | 82 | 152 | Ω |
| | Motional Inductance | L_M | | | 475.283 | | μ H |
| | Motional Capacitance | C_M | | | 0.297547 | | fF |
| | Shunt Static Capacitance | C_O | 5, 6, 9 | 2.2 | 2.5 | 2.8 | pF |
| Lid Symbolization (in addition to Lot and/or Date Codes) | | | | RFM P1298 | | | |



CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.

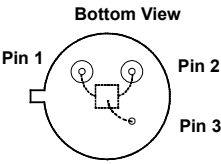
NOTES:

- 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 significantly in subsequent years.
- 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 .
- One or more of the following United States patents apply: 4,454,488; 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 $T_C = +25^\circ\text{C} \pm 5^\circ\text{C}$.
- 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 20° less than 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 measured static (nonmotional) capacitance between either pin 1 and ground or pin 2 and ground. The measurement includes case parasitic capacitance.

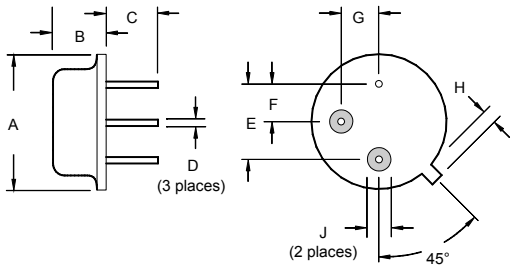
Electrical Connections

This two-port, three-terminal SAW resonator is bidirectional. However, impedances and circuit board parasitics may not be symmetrical, requiring slightly different oscillator component-matching values.

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

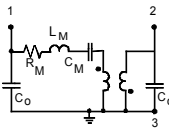


Case Design

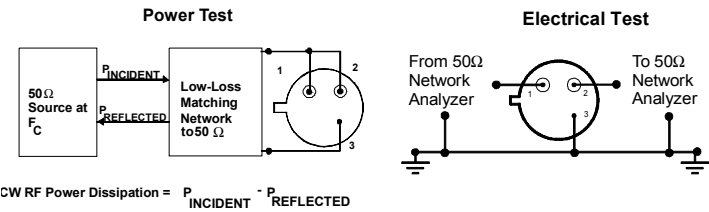


Equivalent LC Model

The following equivalent LC model is valid near resonance:



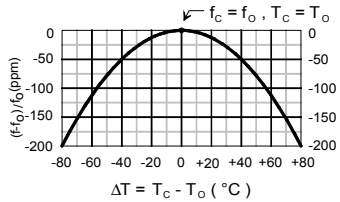
Typical Test Circuit



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

Temperature Characteristics

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

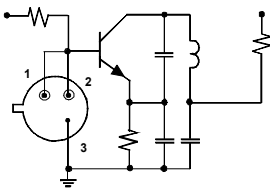
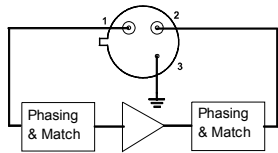


Typical Application Circuits

This SAW resonator can be used in oscillator or transmitter designs that require 180° phase shift at resonance in a two-port configuration. One-port resonators can be simulated, as shown, by connecting pins 1 and 2 together. However, for most low-cost consumer products, this is only recommended for retrofit applications and not for new designs.

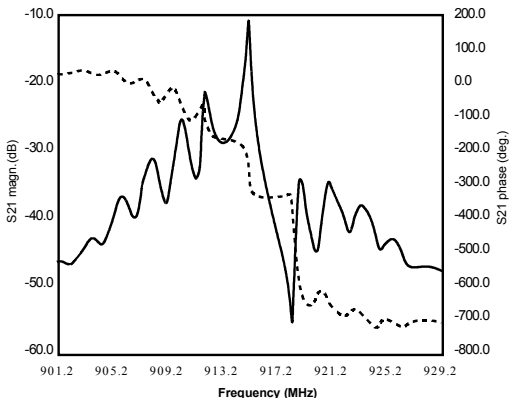
Conventional Two-Port Design:

Simulated One-Port Design:



Typical Frequency Response

The plot shown below is a typical frequency response for the RP series of two-port resonators. The plot is for RP1094.



| Dimensions | Millimeters | | Inches | |
|------------|-------------|-----|--------|-----|
| | Min | Max | Min | Max |