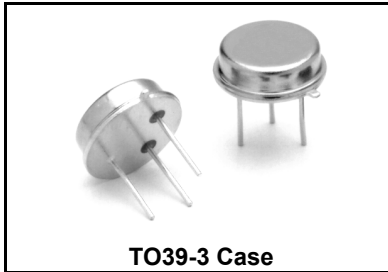


**RO3023**

**433.97 MHz  
SAW  
Resonator**



- **Ideal for European 433.92 MHz Transmitters**
- **Low Series Resistance**
- **Quartz Stability**
- **Rugged, Hermetic, Low-Profile TO39 Case**

The RO3023 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 433.92 MHz. The RO3023 is designed specifically for remote-control and wireless security devices 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
Soldering Temperature (10 seconds / 5 cycles max.)	260	°C

**Electrical Characteristics**

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units		
Center Frequency at +25 °C	Absolute Frequency	$f_C$	2, 3, 4, 5	433.895		434.045	MHz		
	Tolerance from 433.970 MHz	$\Delta f_C$							±75
Insertion Loss		IL	2, 5, 6		2.5	4.8	dB		
Quality Factor	Unloaded Q	$Q_U$	5, 6, 7		8,500				
	50 W Loaded Q	$Q_L$							2200
Temperature Stability	Turnover Temperature	$T_O$	6, 7, 8	10	25	40	°C		
	Turnover Frequency	$f_O$						$f_C + 2.3$	kHz
	Frequency Temperature Coefficient	FTC						0.037	ppm/°C <sup>2</sup>
Frequency Aging	Absolute Value during the First Year	fA	1		≤10		ppm/yr		
DC Insulation Resistance between Any Two Pins			5	1.0			MΩ		
RF Equivalent RLC Model	Motional Resistance	$R_M$	5, 7, 9		34.5		Ω		
	Motional Inductance	$L_M$						107	μH
	Motional Capacitance	$C_M$						1.3	fF
	Pin 1 to Pin 2 Static Capacitance	$C_O$	5, 6, 9	2.1	pF				
	Transducer Static Capacitance	$C_P$	5, 6, 7, 9	1.8	pF				
Test Fixture Shunt Inductance		$L_{TEST}$	2, 7		68.2		nH		
Lid Symbolization			RFM RO3023 Datecode						

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

**NOTES:**

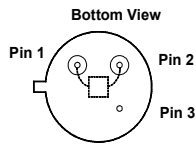
- Frequency aging is the change in  $f_C$  with time and is specified at +65°C or less. Aging may exceed the specification for prolonged temperatures above +65°C. Typically, aging is greatest the first year after manufacture, decreasing in subsequent years.
- The center frequency,  $f_C$ , is measured at the minimum insertion loss point,  $IL_{MIN}$ , with the resonator in the 50 Ω test system (VSWR ≤ 1.2:1). The shunt inductance,  $L_{TEST}$ , is tuned for parallel resonance with  $C_O$  at  $f_C$ .
- 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  $T_C = +25°C \pm 2°C$ .
- 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 20°C 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 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  $C_O$ .

# Discontinued

## Electrical Connections

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

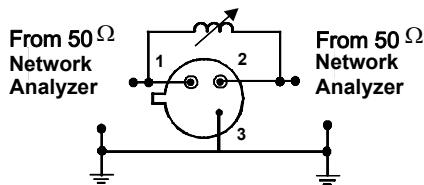
Pin	Connection
1	Terminal 1
2	Terminal 2
3	Case Ground



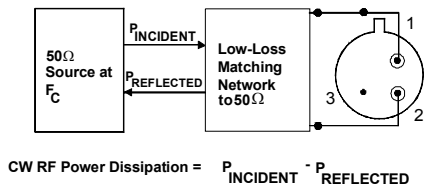
## Typical Test Circuit

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

### Electrical Test:

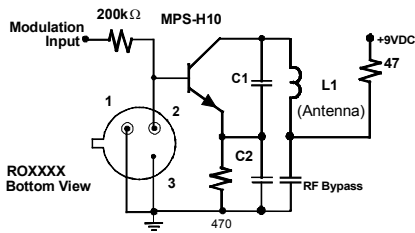


### Power Test:

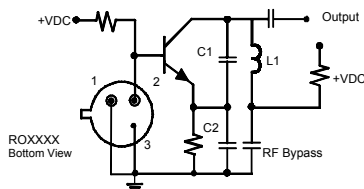


## Typical Application Circuits

### Typical Low-Power Transmitter Application:

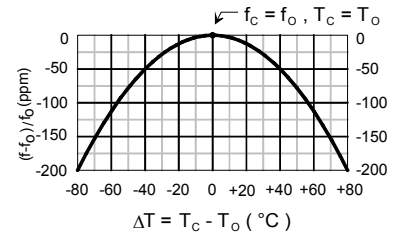


### Typical Local Oscillator Application:



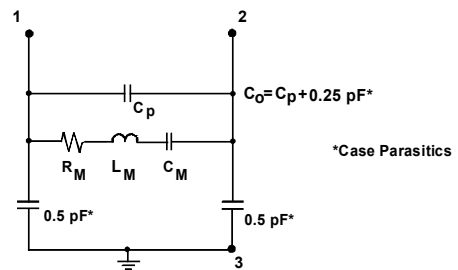
## Temperature Characteristics

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

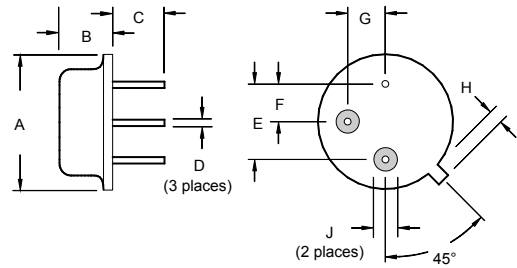


## Equivalent LC Model

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	