

- Designed for European 433.92 MHz SRD Transmitters
- · Very Low Series Resistance
- Quartz Stability
- Complies with Directive 2002/95/EC (RoHS)



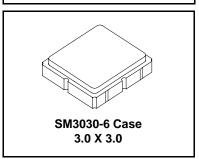
The RO3101E is a true one-port, surface-acoustic-wave (SAW) resonator in a surface-mount, ceramic case. It provides reliable, fundamental-mode, quartz frequency stabilization of fixed-frequency transmitters operating at 433.92 MHz. This SAW is designed specifically for remote control and wireless security transmitters operating in Europe under ETSI I-ETS 300 220 regulations.

#### **Absolute Maximum Ratings**

Abbolate maximum ratings			
Rating	Value	Units	
Input Power Level	0	dBm	
DC voltage	12	VDC	
Storage Temperature Range	-40 to +125	°C	
Operating Temperature Range	-40 to +105	°C	
Soldering Temperature (10 seconds / 5 cycles maximum)	260	°C	

## **RO3101E**

# 433.92 MHz SAW Resonator



#### **Electrical Characteristics**

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency (+25 °C)	Absolute Frequency	f <sub>C</sub>	2245	433.845		433.995	MHz
	Tolerance from 433.920 MHz	$\Delta f_{\mathbb{C}}$	2,3,4,5			±75	kHz
Insertion Loss		IL	2,5,6		1.4	2.2	dB
Quality Factor	Unloaded Q	Q <sub>U</sub>	F 0.7		8280		
	50 $Ω$ Loaded $Q$	Q <sub>L</sub>	5,6,7		1228		
Temperature Stability	Turnover Temperature	T <sub>O</sub>	) 10	10	25	35	°C
	Turnover Frequency	f <sub>O</sub>	6,7,8		f <sub>C</sub>		
	Frequency Temperature Coefficient	FTC			0.032		ppm/°C <sup>2</sup>
Frequency Aging	Absolute Value during the First Year	f <sub>A</sub>	1		≤10		ppm/yr
DC Insulation Resistance between Any Two Terminals			5	1.0			MΩ
RF Equivalent RLC Model	Motional Resistance	R <sub>M</sub>			17.5		Ω
	Motional Inductance	L <sub>M</sub>	5, 7, 9		53.5		μH
	Motional Capacitance	C <sub>M</sub>			2.5		fF
	Shunt Static Capacitance	Co	5, 6, 9		2.5		pF
Test Fixture Shunt Inductance		L <sub>TEST</sub>	2, 7		53.2		nH
Lid Symbolization (in addition	o Lot and/or Date Codes) 701 // YWWS		•				
Standard Reel Quantity	Reel Size 7 Inch		10 500 Pieces/Reel				
	Reel Size 13 Inch		10	3000 Pieces/Reel			

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Notes:

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

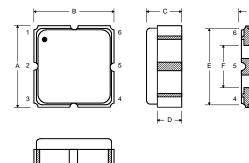
- 1. Frequency aging is the change in  $f_C$  with time and is specified at +65 °C or less. Aging may exceed the specification for prolonged temperatures above +65 °C. Typically, aging is greatest the first year after manufacture, decreasing in subsequent years.
- 2. The center frequency,  $f_C$ , is 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.
- 5. Unless noted otherwise, case temperature  $T_C = +25 \,^{\circ}\text{C} \pm 2 \,^{\circ}\text{C}$ .
- 6. 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<sub>C</sub>, IL, 3 dB bandwidth, f<sub>C</sub> versus T<sub>C</sub>, and C<sub>O</sub>.
   Turnover temperature, T<sub>O</sub>, is the temperature of maximum (or turnover)
- Turnover temperature, T<sub>O</sub>, is the temperature of maximum (or turnover) frequency, f<sub>O</sub>. The nominal frequency at any case temperature, T<sub>C</sub>, may be calculated from: f = f<sub>O</sub> [1 FTC (T<sub>O</sub> -T<sub>C</sub>)<sup>2</sup>]. Typically oscillator T<sub>O</sub> is approximately equal to the specified resonator T<sub>O</sub>.
- 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.
- 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.

Pin	Connection			
1	NC			
2	Terminal			
3	NC			
4	NC			
5	Terminal			
6	NC			



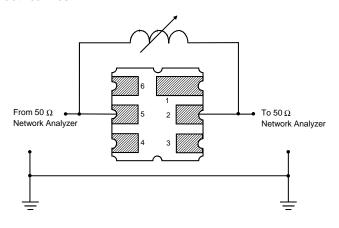
#### **Case Dimensions**

Dimension	mm		Inches			
	Min	Nom	Max	Min	Nom	Max
Α	2.87	3.00	3.13	0.113	0.118	0.123
В	2.87	3.00	3.13	0.113	0.118	0.123
С	1.12	1.25	1.38	0.044	0.049	0.054
D	0.77	0.90	1.03	0.030	0.035	0.040
E	2.67	2.80	2.93	0.105	0.110	0.115
F	1.47	1.60	1.73	0.058	0.063	0.068
G	0.72	0.85	0.98	0.028	0.033	0.038
Н	1.37	1.50	1.63	0.054	0.059	0.064
I	0.47	0.60	0.73	0.019	0.024	0.029
J	1.17	1.30	1.43	0.046	0.051	0.056

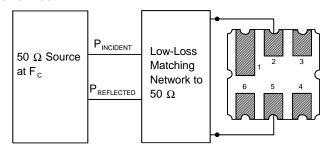
## **Typical Test Circuit**

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

Modulation Input

200k Ω

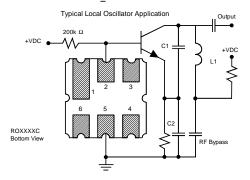
+9VDC

(Antenna)

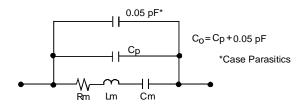
1 2 3

ROXXXXC

Bottom View



## **Equivalent LC Model**



#### **Temperature Characteristics**

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

