



Approved by:
Checked by:
Issued by:

Surface-Acoustic-Wave Resonator

SPECIFICATION

LR433T2

SMD 7.5X3.5



Low Series Resistance**Quartz Stability****Rugged, Hermetic, Low-profile SMD7.5X3.5 Case**

433.92 MHz
SAW
Resonator

The R433T2 is a true one-port, surface-acoustic-wave (SAW) resonator in low-profile SMD case. It provides reliable, fundamental-mode, quartz frequency stabilization of fixed-frequency transmitters operating at 433.92 MHz. The R433T2 is designed specifically for remote-controls and wireless security transmitters. Operating in the Europe under ETSI 11-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

Electrical Characteristics

Characteristics	Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency (+25°C) Absolute Frequency	f_c		433.845		433.995	MHz
	Δf_c	2,3,4,5			±75	KHz
Tolerance from 433.920MHz						
Insertion Loss	IL	2,5,6		1.5	2.0	dB
Quality Factor Unloaded Q	Q_U			12.800		
	Q_L	5,6,7		2.000		
50 Ω loaded Q						
Temperature Stability Turnover Temperature	T_O		24	39	54	°C
	f_O	5,7,8		$f_c+2.7$		KHz
	FTC			0.037		ppm/°C ²
Frequency Aging Absolute Value during the First Year	$ f_A $	1		≤10		ppm/y τ
DC Insulation Resistance between Any Two Pins		5	1.0			M Ω
RF Equivalent RLC Model Motional Resistance	R_M			18	26	Ω
	L_M	5,7,9		86.0075		μ H
	C_M			1.56417		pF
	C_O	5,6,9	1.7	2.0	2.3	pF
Pin 1 to Pin 2 Static Capacitance						
Transducer Static Capacitance	C_P	5,6,7,9		1.7		pF
Test Fixture Shunt Inductance	L_{TEST}	2,7		78		nH
Lid Symbolization (in Addition to Lot and/or Date Code)	LR433T2					

CAUTION: electrostatic Sensitive Device, Observe precautions for handling.**Notes:**

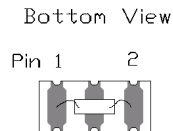
- Frequency aging is the change in f_c with time and is specified at +65°C or less. Aging may exceed the specification for prolonged temperatures above +65°C. Typically, aging is greatest the first year after manufacture, decreasing significantly in subsequent years.
- The center frequency, f_c , is 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 turned for parallel resonator with C_O at f_c . Typically, $f_{OSCILLATOR}$ or $f_{TRANSMITTER}$ is less than the resonator f_c .
- One or more of following United States patents apply: 4,454,488 and 4,616,197 and others pending.
- Typically, equipment designs utilizing this device require emissions testing and government approval, which is the responsibility of the equipment manufacturer.
- Unless noted otherwise, case temperature $T_c = 25^\circ\text{C} \pm 2^\circ\text{C}$.
- 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 parameter: f_c , IL, 3dB 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 resonators performance near the resonant frequency and is provided for reference only. The capacitance C_O is the static (non-motional) capacitance between pin 1 and pin 2 measured at low frequency (10MHz) 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 0.25pF to C_O .

Electrical Connections

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

Pin	Connection
1	Terminal 1
2	Terminal 2

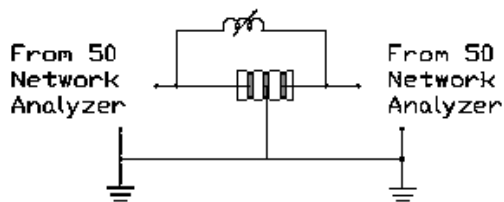


Typical Test Circuit

The test circuit inductor, L_{TEST} , is turned to resonate with the static capacitance, C_o at F_o .

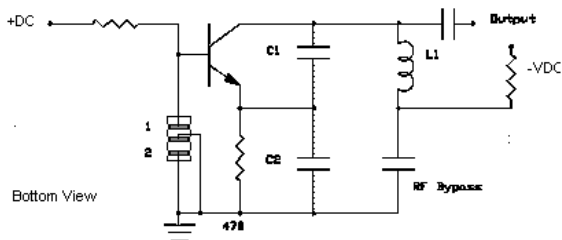
Electrical Test:

Power Test:

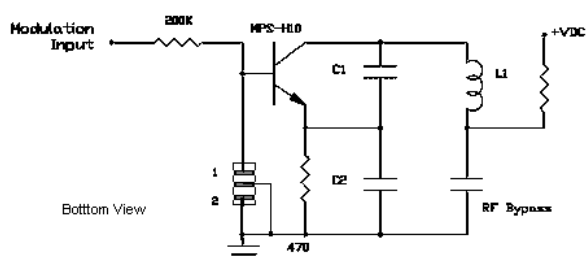


Typical Application Circuits

Typical Low-Power Transmitter Application:

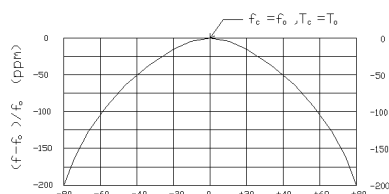


Typical Local Oscillator Application:



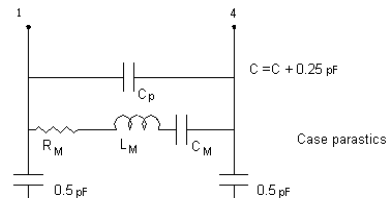
Temperature Characteristics

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

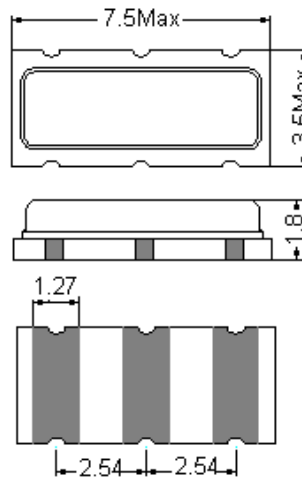


Equivalent LC Model

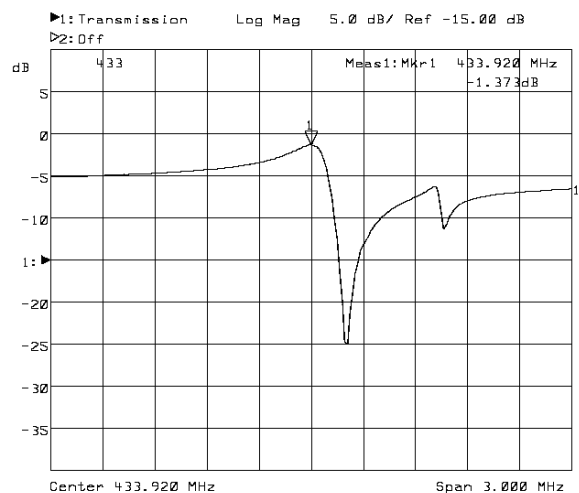
The following equivalent LC model is valid near resonance:



Case Design



Frequency Response



Taping structure

Component load: per 7' reel 2500pcs or per13' reel 8000pcs

ITEM	W	A ₀	B ₀	K ₀	E	F	D ₀	D ₁	P ₀	P ₁	P ₂	T	
DIM	16.0	3.40	7.85	2.00	1.75	7.50	Ø1.50	Ø1.50	4.00	4.00	2.00	0.30	PCS/R
TOL	+0.30 -0.30	+0.10 -0.00	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.10 -0.00	+0.25 -0.00	+0.10 -0.10	+0.10 -0.10	+0.10 -0.10	+0.05 -0.05	M/R

