



Approved by:
Checked by:
Issued by:

Surface-Acoustic-Wave Resonator

SPECIFICATION

LR433T2

SMD 7.5X3.5



**433.92 MHz
SAW
Resonator**

Low Series Resistance

Quartz Stability

Rugged, Hermetic, Low-profile SMD7.5X3.5 Case

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 ETS11-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
		2,3,4,5				
Tolerance from 433.920MHz	Δf_c				±75	KHz
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		
Temperature Stability Turnover Temperature	T_O		24	39	54	°C
		5,7,8		$f_c+2.7$		KHz
	Turnover Frequency			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			MΩ
RF Equivalent RLC Model Motional Resistance	R_M			18	26	Ω
	L_M	5,7,9		86.0075		μH
	C_M			1.56417		pF
	Pin 1 to Pin 2 Static Capacitance	C_O	5,6,9	1.7	2.0	2.3
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.

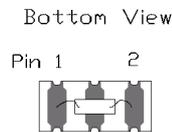
Notes:

- 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 $T_c=25°C \pm 2°C$.
- 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 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

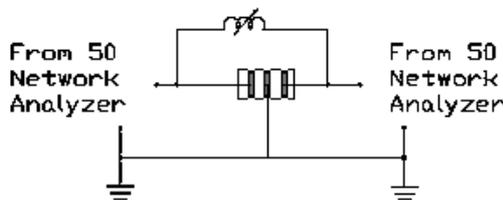


Typical Test Circuit

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

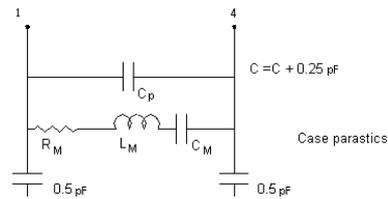
Electrical Test:

Power Test:

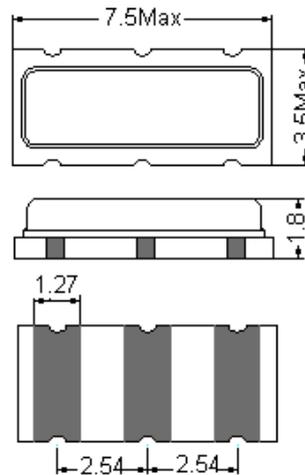


Equivalent LC Model

The following equivalent LC model is valid near resonance:

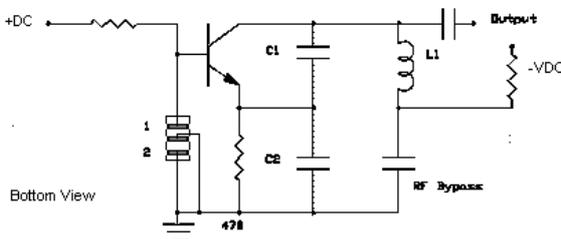


Case Design

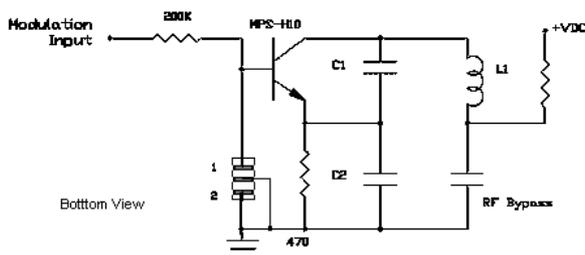


Typical Application Circuits

Typical Low-Power Transmitter Application:

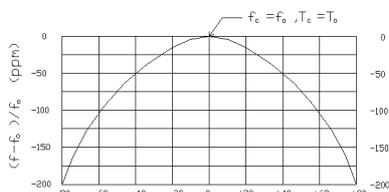


Typical Local Oscillator Application:

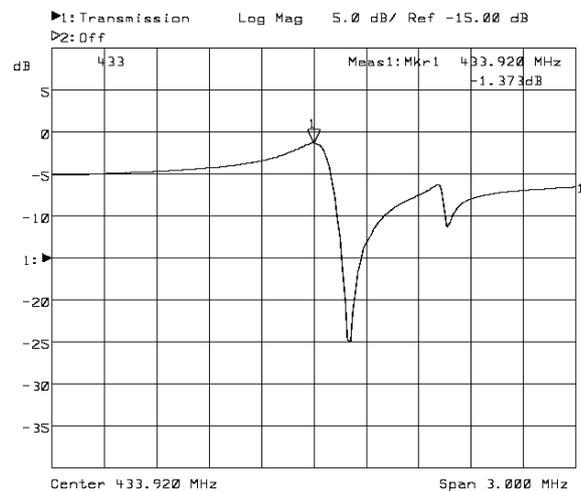


Temperature Characteristics

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



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

