Discontinued

RFM products are now Murata products.

RO3113

314.5 MHz SAW Resonator

TO39-3 Case

- *Ideal for LO in 315 MHz Superhet Receivers with 500 kHz IF*
- *Very Low Series Resistance*
- *Quartz Stability*
- *Rugged, Hermetic, Low-Profile TO39 Case*
- *Complies with Directive 2002/95/EC (RoHS)*

The RO3113 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 oscillators operating at approximately 314.5 MHz. The RO3113 is designed for IC based 315 MHz superhet receivers using a 500 kHz IF (Philips UAA3201T). Applications include wireless remote-control and security devices operating in the USA under FCC Part 15 and in Canada under DoC RSS-210.

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

| Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Center Frequency (+25 °C)	Absolute Frequency	f_C	2, 3, 4, 5	314.425		314.575	MHz
	Tolerance from 314.500 MHz	Δf_C				±75	kHz
Insertion Loss		IL	2, 5, 6		1.0	1.5	dB
Quality Factor	Unloaded Q	Q_U	5, 6, 7		13000		
	50 Ω Loaded Q	Q_L			1200		
Temperature Stability	Turnover Temperature	T_O	6, 7, 8	10	25	40	°C
	Turnover Frequency	f_O			f_c		
	Frequency Temperature Coefficient	FTC			0.037		ppm/°C^2
Frequency Aging	Absolute Value during the First Year	$|f_A|$	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			10	Ω
	Motional Inductance	L_M				70	µH
	Motional Capacitance	C_M				3.7	fF
	Pin 1 to Pin 2 Static Capacitance	C_O	5, 6, 9			2.9	pF
	Transducer Static Capacitance	C_P	5, 6, 7, 9			2.9	pF
Test Fixture Shunt Inductance		L_{TEST}	2, 7			88	nH
Lid Symbolization (in Addition to Lot and/or Date Codes)			RFM RO3113				

CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.

NOTES:

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 significantly 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 Ω test system (VSWR ≤ 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 less than the resonator f_C.
3. One or more of the following United States patents apply: 4,454,488 and 4,616,197 and others pending.
4. Typically, equipment designs utilizing this device require emissions testing and government approval, which is the responsibility of the equipment manufacturer.
5. Unless noted otherwise, case temperature T_C = +25°C±2°C.
6. The design, manufacturing process, and specifications of this device are subject to change without notice.
7. 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.
8. 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.
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 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.
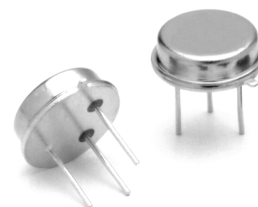
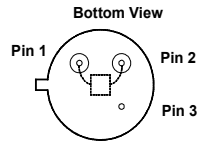## Electrical Connections

This one-port, two-terminal SAW resonator is bidirectional. The terminals are interchangeable with the exception of circuit board layout.
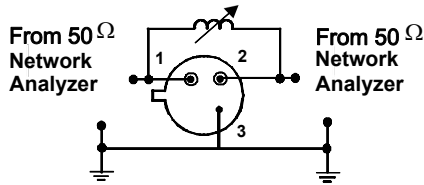
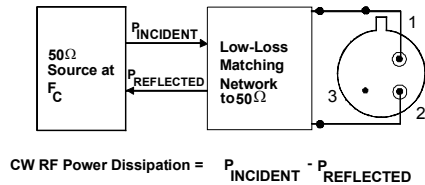| Pin	Connection
1	Terminal 1
2	Terminal 2
3	Case Ground

Bottom View

Pin 1   Pin 2

Pin 3

Typical Test Circuit

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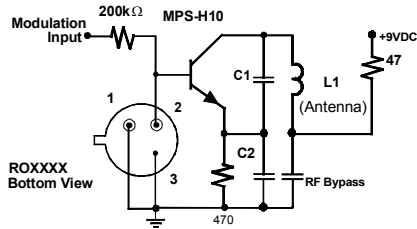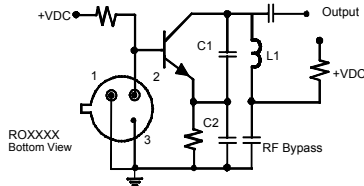
Electrical Test:

From 50 Ω Network Analyzer

From 50 Ω Network Analyzer

Power Test:

$P_{INCIDENT}$

50 Ω Source at F_C

Low-Loss Matching Network to 50 Ω

$P_{REFLECTED}$

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

Typical Application Circuits

Typical Low-Power Transmitter Application:

Modulation Input

200k Ω

MPS-H10

+9VDC

47

C1

L1 (Antenna)

1

2

3

C2

RF Bypass

ROXXXX Bottom View

470

Typical Local Oscillator Application:

+VDC

Output

C1

L1

+VDC

1

2

3

C2

RF Bypass

ROXXXX Bottom View
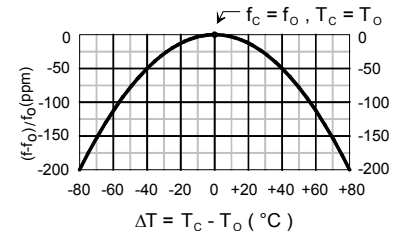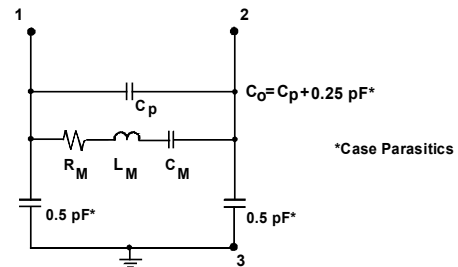
Temperature Characteristics

The curve shown on the right accounts for resonator contribution only and does not include oscillator temperature characteristics.
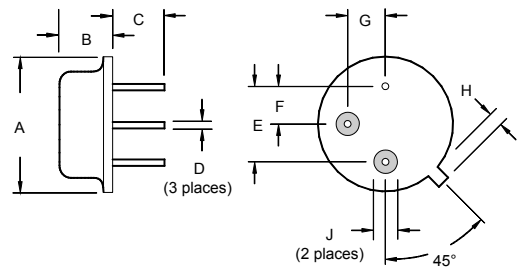
$f_c = f_O$, $T_C = T_O$

$(f-f_O)/f_O$ (ppm)

$\Delta T = T_C - T_O$ (°C)

Equivalent LC Model

The following equivalent LC model is valid near resonance:

1   2

C_p

R_M L_M C_M

$C_O = C_p + 0.25$ pF*

*Case Parasitics

0.5 pF*   0.5 pF*

3

Case Design

A

B   C

D (3 places)

G

F

E

H

J (2 places)

45°

Dimensions	Millimeters		Inches	
	Min	**Max**	**Min**	**Max**
A		9.40		0.370
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	