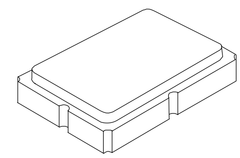
RO3156A
RO3156A-1
RO3156A-2

868.95 MHz SAW Resonator

- ***Ideal for European 868.95 MHz Transmitters***
- ***Very Low Series Resistance***
- ***Quartz Stability***
- ***Surface-Mount Ceramic Case with 21 mm^2 Footprint***
- ***Complies with Directive 2002/95/EC (RoHS)***



SM5035-4

The RO3156A 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 868.95 MHz. This SAW is designed specifically for remote-control and wireless security transmitters operating under ETSI-ETS 300 220 in Europe and under FTZ 17 TR 2100 in Germany.

Absolute Maximum Ratings

Rating	Value	Units
CW RF Power Dissipation	+5	dBm
DC Voltage Between Terminals	±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
Frequency (+25 °C) Nominal Frequency RO3156A	f_C	2,3,4,5	868.750		869.150	MHz
RO3156A-1			868.800		869.100	
RO3156A-2			868.850		869.050	
Tolerance from 868.95 MHz RO3156A	Δf_C				±200	kHz
RO3156A-1					±150	
RO3156A-2					±100	
Insertion Loss	IL	2,5,6		1.2	2.0	dB
Quality Factor Unloaded Q	Q_U	5,6,7		6200		
50 Ω Loaded Q	Q_L			850		
Temperature Stability Turnover Temperature	T_O	6,7,8	10	25	40	°C
Turnover Frequency	f_O			f_C		kHz
Frequency Temperature Coefficient	FTC			0.032		ppm/°C^2
Frequency Aging Absolute Value during the First Year	$\lvert fA \rvert$	1		<±10		ppm/yr
DC Insulation Resistance between Any Two Terminals		5	1.0			MΩ
RF Equivalent RLC Model Motional Resistance	R_M	5, 6, 7, 9		14.5		Ω
Motional Inductance	L_M			18.0		µH
Motional Capacitance	C_M			2.0		fF
Shunt Static Capacitance	C_O	5, 6, 9		2.1		pF
Test Fixture Shunt Inductance	L_{TEST}	2, 7		15.8		nH
Lid Symbolization (in addition to Lot and/or Date Codes)	714 // YWWS					

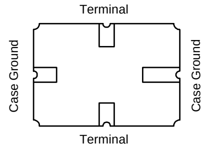
CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.

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 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 approximately equal to the resonator f_C.
3. One or more of the following United States patents apply: 4,454,488 and 4,616,197.
4. 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°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 approximately equal to 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 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.

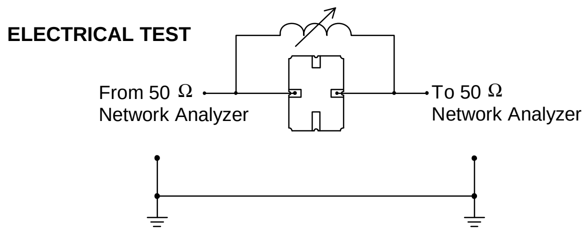
Electrical Connections

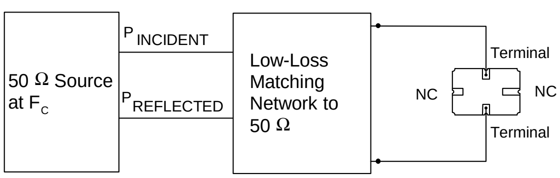
The SAW resonator is bidirectional and may be installed with either orientation. The two terminals are interchangeable and unnumbered. The callout NC indicates no internal connection. The NC pads assist with mechanical positioning and stability. External grounding of the NC pads is recommended to help reduce parasitic capacitance in the circuit.



Typical Test Circuit

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

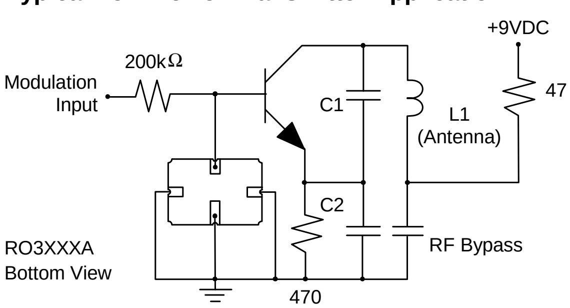




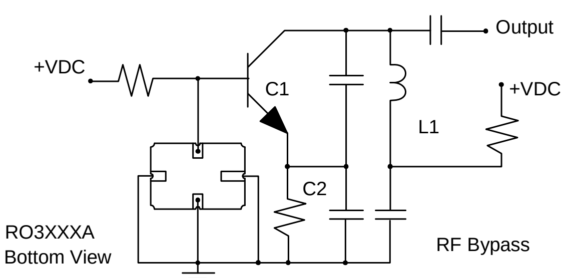
CW RF Power Dissipation = $P_{INCIDENT} - P_{REFLECTED}$

Typical Application Circuits

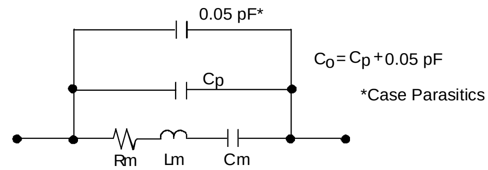
Typical Low-Power Transmitter Application



Typical Local Oscillator Applications

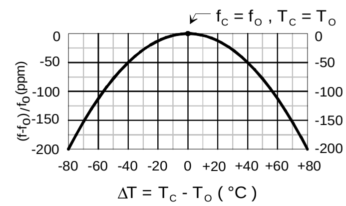


Equivalent LC Model



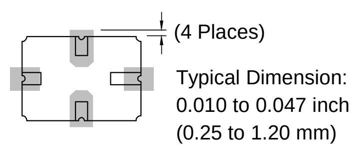
Temperature Characteristics

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

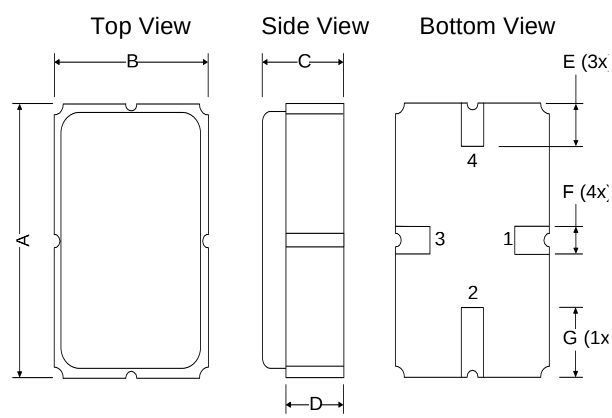


Typical Circuit Board Land Pattern

The circuit board land pattern shown below is one possible design. The optimum land pattern is dependent on the circuit board assembly process which varies by manufacturer. The distance between adjacent land edges should be at a maximum to minimize parasitic capacitance. Trace lengths from terminal lands to other components should be short and wide to minimize parasitic series inductances.



Case Design



Dimensions	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.87	5.0	5.13	.191	.196	.201
B	3.37	3.5	3.63	.132	.137	.142
C	1.45	1.53	1.60	.057	.060	.062
D	1.35	1.43	1.50	.040	.057	.059
E	.67	.80	.93	.026	.031	.036
F	.37	.50	.63	.014	.019	.024
G	1.07	1.20	1.33	.042	.047	.052