

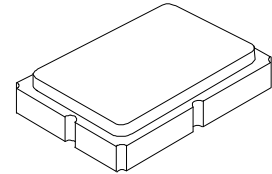
RoHS Compliance

This component is compliant with RoHS directive.

This component was always RoHS compliant from the first date of manufacture.

RO3156A/A-1/A-2

**868.95 MHz
SAW Resonator**



SM5035-4

- **Designed for European 868.95 MHz SRD Transmitters**
- **Very Low Series Resistance**
- **Quartz Stability**
- **Surface-mount Ceramic Case**

The RO3156A is a one-port surface-acoustic-wave (SAW) resonator packaged in a surface-mount ceramic case. It provides reliable, fundamental-mode quartz frequency stabilization of fixed-frequency transmitters operating at 868.95 MHz. The RO3156A is designed specifically for SRD transmitters operating in Europe under ETSI EN 300 220-2.

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 maximum	260	°C

Electrical Characteristics

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units	
Frequency, +25 °C	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	fA	1		<±10		ppm/yr	
DC Insulation Resistance between Any Two Terminals			5	1.0			M Ω	
RF Equivalent RLC Model	Motional Resistance	R_M	5, 6, 7, 9		14.5		Ω	
	Motional Inductance	L_M			18.0		μ H	
	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	RO3156A: 714, RO3156A-1: 923, RO3156A-2 828, //YYWWWS							

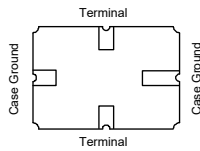
CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.

NOTES:

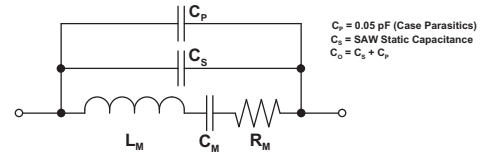
1. Frequency aging is the change in f_c with time and is specified at +65 °C or less. Aging may exceed the specification for prolonged temperatures above +65 °C. Typically, aging is greatest the first year after manufacture, decreasing in subsequent years.
2. The center frequency, f_c , is measured at the minimum insertion loss point, IL_{MIN} , with the resonator in the 50 Ω test system ($VSWR \leq 1.2:1$). 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 .
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 $T_C = +25 \pm 2$ °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 be 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.



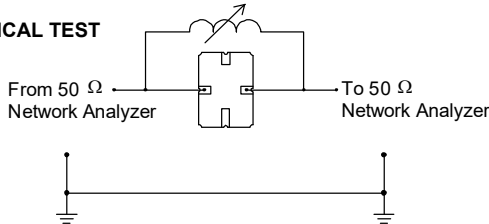
Equivalent RLC Model



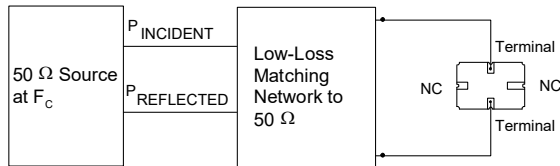
Typical Test Circuit

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

ELECTRICAL TEST



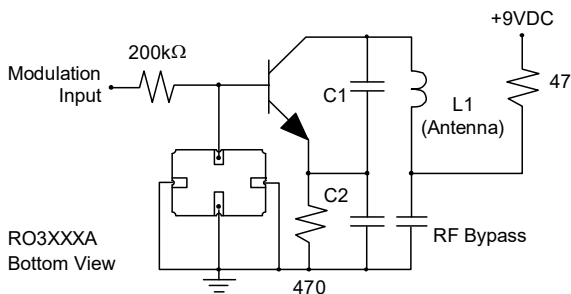
POWER TEST



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

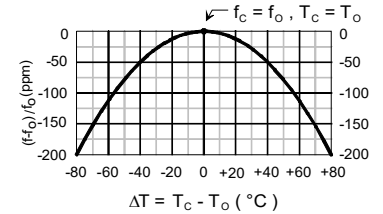
Typical Application Circuits

Typical Low-Power Transmitter Application

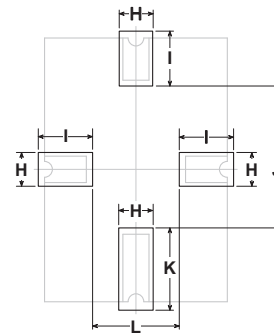
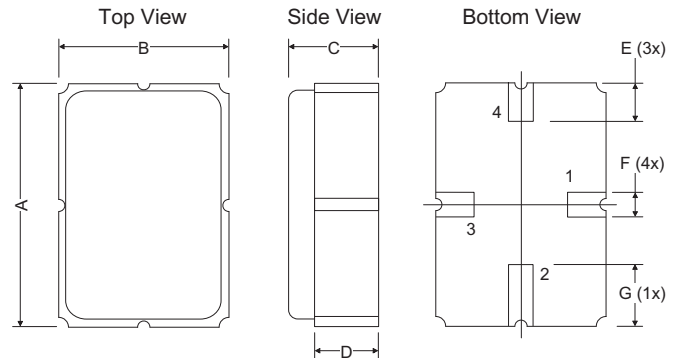


Temperature Characteristics

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

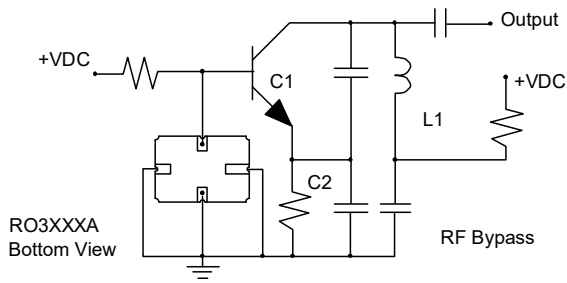


Case



PCB Land Pattern Top View

Typical Local Oscillator Applications



Dimensions	Millimeters			Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.87	5.00	5.13	0.191	0.196	0.201
B	3.37	3.50	3.63	0.132	0.137	0.142
C	1.45	1.53	1.60	0.057	0.060	0.062
D	1.35	1.43	1.50	0.040	0.057	0.059
E	0.67	0.80	0.93	0.026	0.031	0.036
F	0.37	0.50	0.63	0.014	0.019	0.024
G	1.07	1.20	1.33	0.042	0.047	0.052
H	-	1.04	-	-	0.041	-
I	-	1.46	-	-	0.058	-
J	-	3.01	-	-	0.119	-
K	-	1.44	-	-	0.057	-
L	-	1.92	-	-	0.076	-

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