DATA SHEET

8700 Series: Temperature-Stable Resonators

Applications

- Microwave filters
- LMDS
- High stability DROs
- Satellite communications
- Telemetry
- Automobile collision avoidance

Features

- High ε_r
- Q >10,000
- Wide range of τf
- Frequency stability versus temperature
- Reduced size and weight
- High stability DRO design
- Ease of compensation for temperature drift
- Repeatability of design
- Negligible aging effects

Introduction

Skyworks, through its wholly owned subsidiary, Trans-Tech, offers the 8700 series temperature-stable resonators, designed for use from 6 GHz to 40 GHz with excellent loss characteristics. The 8700 series offers a wide selection of temperature coefficients of resonant frequency for easier circuit compensation and a Quality factor (Q) greater than 10,000 at 10 GHz for high stability dielectric resonator oscillator (DRO) designs up to millimeter (mm) wave frequencies.

Table 1. Temperature Characteristics for Series D/C87

Type	Dielectric Constant	Temperature Coefficient of fo (τf) ± 2 (ppm/°C)	Q at 4.3 GHz
35	30.7 ± 1.0	+4	>10,000
34	30.4 ± 1.0	+2	
33	30 ± 1	0	
32	29 ± 1	–2	

Note: Contact us for custom τf and tolerances.

Table 2. Material Characteristics

Item	Value
Dielectric constant	29.0 to 30.7
Temperature coefficient of resonant frequency (τf) (ppm/°C)	–2 to +4
Q (1/tan δ) minimum	>10,000 at 10.0 GHz
Insulation resistance (Ω cm)	~10^{14}
Thermal expansion (ppm/°C) (20°C – 200°C)	10
Thermal conductivity (cal/cm-sec °C) at 25°C	0.006
Specific heat (cal/g°C)	0.07
Density (g/cc)	>7.6
Water absorption	<0.01
Vicker hardness no. (kg/mm)	700
Flexural strength (PSI)	10,000
Composition	Ba, Zn, Ta-oxide (perovskite)
Color	Yellow

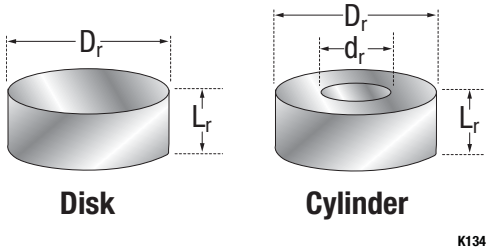

Figure 1. 8700 Disk and Cylinder

Table 3. Disk and Cylinder Ranges

Disk	Cylinder
Diameter Range	
Dr: 0.405 to 0.076 Lr: 35% to 45% of Dr dr: N/A	Dr: 0.405 to 0.245 Lr: 35% to 45% of Dr dr: 0.083
Frequency Range	
5550 to 32150	5550 to 9870

Note: Contact us for custom sizes.

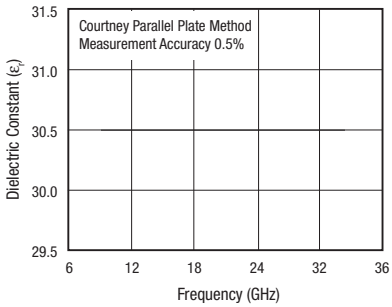

Figure 3. Typical (εr) vs Frequency

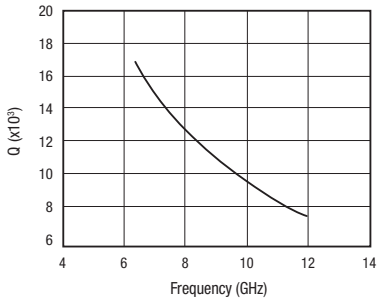

Figure 2. Typical Q vs Frequency

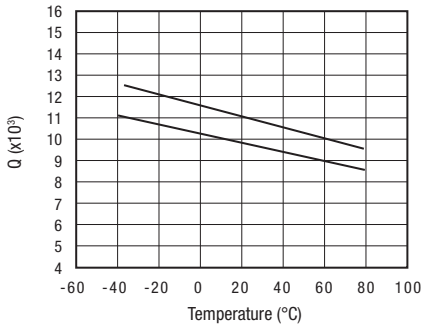

Figure 4. Typical Q vs Temperature @ 10 GHz