CERAMIC COAXIAL RESONATORS

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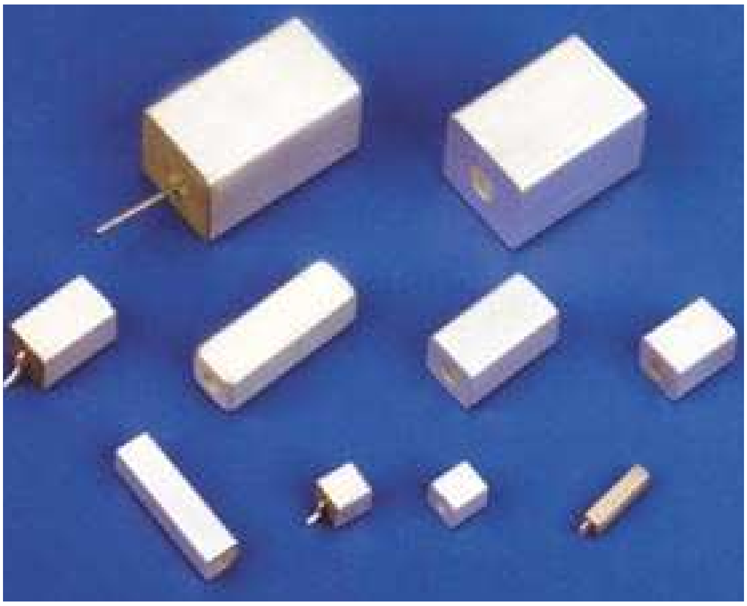

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MAIN FEATURES

Frequency:	**300 MHz to 6 GHz**
Size:	**2 to 12 mm**
Dielectric constant:	**ε21, ε37, ε90**

QUARTER WAVELENGTH
OR HALF WAVELENGTH
WITH OR WITHOUT CONNECTION

GENERAL CHARACTERISTICS

DIMENSIONS AND CONFIGURATIONS

The TEMEX coaxial resonators are available over a frequency range of 300 MHz to 6 GHz with four preferred square cross section sizes, having side length of 2, 4, 6 and 12 mm.

Other square section dimensions 3, 8 and 10 mm (S) information can be obtained upon request.

Table 1 summarizes the choice of sizes and dielectric materials available.

The length of the component (L) can be determined from the chosen frequency (F) and dielectric constant (εr) as follows:

(λ/4 application) $$L = \frac{\lambda o}{4\sqrt{\varepsilon r}}$$

(λ/2 application) $$L = \frac{\lambda o}{2\sqrt{\varepsilon r}}$$

λo in mm
L in mm
F in GHz

$$\text{with } \lambda o = \frac{300}{F}$$

A simplified formula for λ /4 applications:

εr = 21	$L = \frac{16.37}{F}$
εr = 37	$L = \frac{12.3}{F}$
εr = 90	$L = \frac{7.9}{F}$

IMPEDANCE Z

The coaxial resonator impedance used in TEM mode is a direct function of its dimensions and of the dielectric material permittivity.

Table 2 indicates for each standard side length, and for each dielectric constant, the impedance value, independent of the resonator length

APPLICATIONS

TEMEX coaxial ceramic resonators provide the users with “High Q” higher parallel resonant impedance and better temperature characteristics than inductor coils and associated lumped constant elements used in RF amplifiers and oscillators circuits.

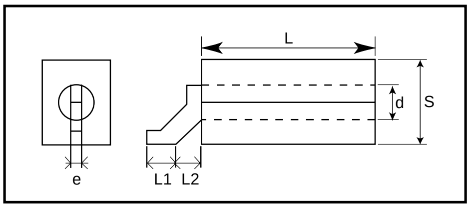
These coaxial resonators are perfectly suitable for:

- DRO/VCO oscillators
- Cellular telephone
- UHF (LC) coupled amplifiers
- Global Positioning Systems (GPS)
- Cordless telephone
- Tuned oscillators
- Narrow band filters
- Duplexers

Table 1: Dimensions

Section S **(mm)**	2.0 ± 0.2	3.0 ± 0.2	4.0 ± 0.2	4.0 ± 0.2	6.0 ± 0.2	6.0 ± 0.2	8.0 ± 0.2	10.0 ± 0.2	12.0 ± 0.2	12.0 ± 0.2
Hole d (mm)	0.65 ± 0.1	0.95 ± 0.1	1.5 ± 0.1	2.0 ± 0.1	2.0 ± 0.1	2.5 ± 0.1	2.7 ± 0.2	3.3 ± 0.2	3.55 ± 0.2	4.0 ± 0.5
TEMEX Ref.	CRS02	CRS03	CRS04	CRS24	CRS06	CRS26	CRS08	CRS10	CRS12	CRS412

Note: (λ/4 application): all faces but (1) are metallized
(λ/2 application): all faces but (1) and (2) are metallized



Section (mm)	**2**	**3**	**4**	**6**	**8**	**12**
L1 (mm)	0.5	0.8	0.8	1.5	1.5	2.0
L2 (mm)	1.0	1.2	1.3	1.7	2.0	2.5
e (mm)	0.5	0.5	0.5	0.5	0.7	1.0

Table 2: Impedance

TEMEX Ref.	**εr =21**	**εr = 37**	**εr = 90**
CRS02	16.5	12.5	8.0
CRS03	16.0	12.0	7.5
CRS04	14.0	10.5	6.5
CRS24	10.0	7.5	5.0
CRS06	15.5	11.5	7.5
CRS26	12.5	9.5	6.0
CRS08	15.0	11.5	7.0
CRS10	15.5	11.5	7.5
CRS12	17.0	12.5	8.0
CRS412	15.5	11.5	7.5

Table 3: General characteristics

Cross section square	□	Standard S = 2, 3, 4, 6, 8, 12mm
Dielectric constant	εr	21 ± 2 37 ± 1 90 ± 2
Temperature coefficient of the dielectric (Standard values)	τf	21: 5 ± 5 ppm 37: 0 ± 3 ppm 90: 0 ± 10 ppm
Resonant freq. range	Fo	See tables
Frequency tolerance		Standard: ± 1 % (F) ± 0.5 % (D) and other on request
Quality factor	Q	See curves
Impedance	Z	See table 2
Metallization		Standard: Silver

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How to order?

Table 4: Standard frequency range λ/4 in MHz

	2 mm	3 mm	4 mm	6 mm	12 mm
ε21	2000 - 4000	1500 - 4000	1000 - 4000	600 - 2500	600 - 1250
ε37	1500 - 3000	1500 - 3000	800 - 3000	500 - 2000	450 - 1000
ε90	900 - 2000	650 - 2000	450 - 2000	450 - 1000	300 - 650

For special request, please consult your local Sales Office.

HOW TO ORDER?

CR	S	06	T	Q	1500	F	S	1	E
Coaxial Resonator	Shape S: Square	Size	Material N: εr = 90 T: εr = 37 V: εr = 21	Application Q: λ / 4 H: λ / 2	Resonant frequency (MHz)	Frequency tolerance F = ± 1 % D = ± 0.5 % 5 = ± 5 MHz 1 = ± 1 MHz	Metallization S: silver	Connection 1: one 0: none X: special	Tape & reel

APPLICATION NOTES

SOLDERING RECOMMENDATIONS

Before any soldering operation is implemented, the coaxial resonator must be preheated in order to avoid a thermal shock and a subsequent mechanical stress liable to initiate failure mechanism. TEMEX recommends a minimum preheating time of 2 minutes at 120° C with a maximum heating rate of 2° C / sec.

FREQUENCY ADJUSTMENT

When the frequency tuning adjustment is needed, two solutions can be adopted:

a) Mechanical lapping of the ceramic, or mechanical grinding of metallization, depending where metallization will be grinded off.

b) Using a TEMEX air or sapphire dielectric tuning capacitor ("Air trimmer" or"Gigatrim"): in this case, the frequency will decrease when capacitance will increase.

   This provides an additional advantage of mounting / terminating resonator to the assembly by utilizing the leg configuration of the tuning capacitor.

QUALITY FACTOR Q

The Q factor of a coaxial resonator is essentially determined by the metallization.

The dielectric material, having low losses, does not have a direct effect on the "Q" (secondary influence).

The curves show the range of "Q" factor versus resonator size and frequency range.

Curves show that Q min. increases as frequency increases (proportionally to $\sqrt{Fo}$).

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Application notes