# Product Introduction

## Token coaxial resonators (DR) are the cornerstone of RF microwave communications.

**Features :**

- High quality factor.
- High dielectric constant.
- Low temperature coefficient.
- Wide range of resonant frequency.

**Applications :**

- CDMA/PCS/WLL/IMT2000.
- Filters, Duplexer, Oscillators (DRO/VCO).
- Wireless headphone, wireless security system.
- 900MHz, 1.8GHz, 2.4GHz, 5.8GHz wireless phone.


(DR) is a kind of microwave components, also known as ceramic resonator, Token electronics manufacturing dielectric resonator (cylindrical, ring), coaxial resonator (rectangular cavity, cylindrical cavity, coaxial cavity resonator), microwave resonator, etc. It is made high-Q dielectric ceramics; temperature coefficient is good, mainly used in microwave oscillators and filters.

Dielectric resonator size and dielectric material is inversely proportional to the square root of the dielectric constant, dielectric materials, dielectric constant the greater the required dielectric ceramic block the smaller, thus the smaller the resonator size. Another important parameter is the insertion loss, low dielectric loss microwave dielectric materials, dielectric filters that affect the insertion loss of a major factor. Microwave dielectric Q value and dielectric loss is inversely proportional to the relationship. Q value is greater the lower the filter insertion loss.

Therefore, the microwave dielectric ceramic materials of high dielectric constant is conducive to the miniaturization of microwave dielectric filters, can filter with the microwave tube, a micro strip line realization of microwave hybrid integrated circuit, so that the device dimensions to mm order of magnitude, the price is also much lower than the metallic cavity.

The (DR) impedance used in TEM mode is direct function of its dimensions and of the dielectric material permittivity. Token coaxial ceramic resonators provide the customers 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. According to dielectric resonator frequency stabilization mechanism, using dielectric resonator stabilized FET oscillator frequency (also referred to DRO) can be classified into 4 types, namely, reflective, band-reject type, transmission type and feedback type.

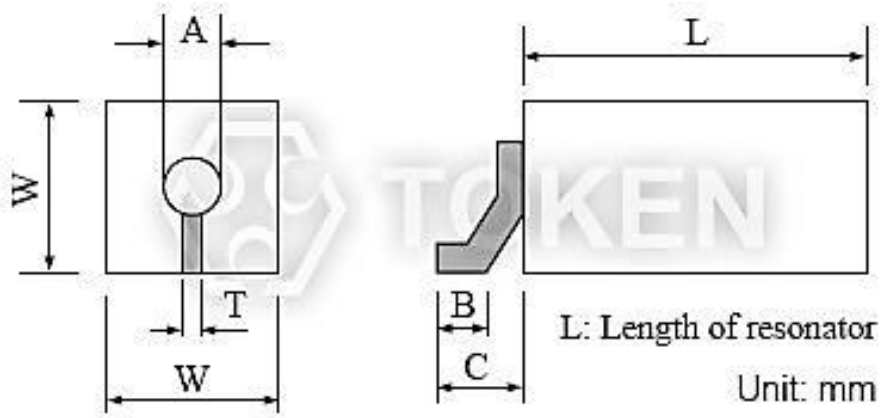
(DR) series with two ports, depending on port different boundary conditions, in accordance with the basic structure of the resonator is divided into three types: half-wavelength type, quarter-wavelength type, and capacitive load type, each structure each with distinct characteristics. Token (DR) series features with small size, high temperature stability characteristics. Indirectly, (DR) series is suitable for a variety of microwave communications equipment, particularly suitable for PCS / PCN filters, base stations, radar detectors, satellite broadcast reception systems, military microwave facilities. Comply with RoHS standards.

Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, contact us with your specific needs. For more information, please link to Token official website "Dielectric resonators".

# Dimensions

## Dimensions (Unit: mm) (DR)

| Part Number | W(O/D) | A(I/D) | B | C | T |
|---|---|---|---|---|---|
| **DR120** | 12.0±0.2 | ① Φ4.0±0.2 | without tab | 3.2 | 1.0 |
| | | ② Φ3.55±0.2 | 1.5 | | |
| **DR100** | 10.0±0.2 | ① Φ3.3±0.2 | 1.3 | 3.0 | 1.0 |
| **DR80** | 8.0±0.2 | ① Φ2.7±0.2 | 1.3 | 2.6 | 0.7 |
| **DR60** | 6.0±0.2 | ① Φ2.5±0.2 | without tab | 2.4 | 0.7 |
| | | ② Φ2.2±0.2 | without tab | | |
| | | ③ Φ2.0±0.2 | 1.2 | | |
| **DR50** | 5.0±0.2 | ① Φ1.8±0.2 | 1.0 | 2.2 | 0.6 |
| | | ② Φ1.5±0.2 | 1.0 | | |
| **DR40** | 4.0±0.1 | ① Φ1.8±0.1 | 0.8 | 1.8 | 0.6 |
| | | ② Φ1.5±0.1 | without tab | | |
| | | ③ Φ1.2±0.1 | without tab | | |
| **DR30** | 3.0±0.1 | ① Φ1.0±0.1 | 0.7 | 1.5 | 0.5 |
| **DR20** | 2.1±0.1 | ① Φ0.6±0.1 | 0.5 | 1.2 | 0.5 |




**(DR) Dimensions**

# Available Range of TEM Mode

## Available Range of TEM Mode (DR)

| Material | Dielectric Constant | Tf [1] | Type | Characteristic Impedance (Ω) | Wave Length | Frequency Range (MHz) | Q [2] (min) |
|---|---|---|---|---|---|---|---|
| A Series | 21±1 | 0±10 | DR120 | ①15 ②17 | λ/4 | 800~1300 | 800 |
| | | | | | λ/2 | 1600~2700 | 1000 |
| | | | DR100 | 16 | λ/4 | 800~1300 | 700 |
| | | | | | λ/2 | 1600~3200 | 800 |
| | | | DR80 | 15 | λ/4 | 1000~3200 | 650 |
| | | | | | λ/2 | 2000~3000 | 700 |
| | | | DR60 | ①12 ②14 ③15 | λ/4 | 1000~2700 | 550 |
| | | | | | λ/2 | 2000~3000 | 600 |
| | | | DR50 | ①14 ②17 | λ/4 | 1300~3000 | 450 |
| | | | | | λ/2 | 2500~4000 | 500 |
| | | | DR40 | ①11 ②14 ③17 | λ/4 | 1300~4000 | 380 |
| | | | | | λ/2 | 2500~4000 | 400 |
| | | | DR30 | 15 | λ/4 | 1900~4000 | 320 |
| | | | DR20 | 17 | λ/4 | 2800~5000 | 250 |
| B Series | 36±1 | 0±10 | DR120 | ①12 ②13 | λ/4 | 600~1000 | 700 |
| | | | | | λ/2 | 1200~2400 | 900 |
| | | | DR100 | 12 | λ/4 | 600~1200 | 600 |
| | | | | | λ/2 | 1200~2400 | 800 |
| | | | DR80 | 12 | λ/4 | 800~1500 | 500 |
| | | | | | λ/2 | 1600~3000 | 700 |
| | | | DR60 | ①10 ②11 ③12 | λ/4 | 800~1800 | 450 |
| | | | | | λ/2 | 1600~3500 | 550 |
| | | | DR50 | ①11 ②13 | λ/4 | 800~1800 | 380 |
| | | | | | λ/2 | 1600~3500 | 450 |
| | | | DR40 | ①9 ②11 ③13 | λ/4 | 1000~2700 | 320 |
| | | | | | λ/2 | 2000~4800 | 400 |
| | | | DR30 | 12 | λ/4 | 1300~3000 | 220 |
| | | | DR20 | 13 | λ/4 | 1300~3000 | 220 |
| C Series | 90±2 | 0±10 | DR120 | ①7 ②8 | λ/4 | 400~800 | 650 |
| | | | | | λ/2 | 800~1500 | 700 |
| | | | DR100 | 7 | λ/4 | 600~800 | 550 |
| | | | | | λ/2 | 1200~2400 | 650 |
| | | | DR80 | 7 | λ/4 | 440~1000 | 450 |
| | | | | | λ/2 | 1000~1500 | 550 |
| | | | DR60 | ①6 ②7 ③7 | λ/4 | 440~1300 | 400 |
| | | | | | λ/2 | 1000~2200 | 470 |
| | | | DR50 | ①7 ②8 | λ/4 | 500~1800 | 380 |
| | | | | | λ/2 | 1000~3000 | 450 |
| | | | DR40 | ①6 ②7 ③8 | λ/4 | 900~1600 | 200 |
| | | | | | λ/2 | 2000~4800 | 300 |
| | | | DR30 | 7 | λ/4 | 900~1600 | 250 |
| | | | DR20 | 8 | λ/4 | 900~1600 | 150 |

- [1] Frequency stability of temperature.[2] Q value depends on lower limit of frequency range.

# Order Codes

## Order Codes (DR)

| DR | 30 | A | 1 | W4 | 2533 | T |
|---|---|---|---|---|---|---|
| Dielectric Resonators Part Number | Dimension | Material | Impedance | Wave Length | Center Frequency (MHz) | Configuration |

| Impedance | |
|---|---|
| 1 | ① |
| 2 | ② |
| 3 | ③ |

| Wave Length | |
|---|---|
| W2 | λ/2 |
| W4 | λ/4 |

| Configuration | |
|---|---|
| T | tab |
| N | without tab |

# General Information

## Advantage of Token's Microwave Dielectric Components

New Microwave Dielectric Materials for Wireless Communication from Token Electronics
"Everything from the electromagnetic properties to microstructure of the material is important for the final result"

A small ceramic component made from a dielectric material is fundamental to the operation of filters and oscillators in several microwave systems, such as satellite TV receivers, military radar systems, Global Positioning System (GPS) devices, and mobile communications. Token Electronics had been able to develop specialized piezoelectric materials which lead to more reliable and clearer microwave communication signals.

In microwave communications, dielectric components are used to discriminate between wanted and unwanted signal frequencies in the transmitted and received signal. When the wanted frequency is extracted and detected it is necessary to maintain a strong signal nevertheless. For clarity it is also critical that the wanted signal frequencies are not affected by seasonal temperature changes.

The resonator materials for practical applications have to have certain key properties. A high relative dielectric constant is needed so that the materials can be miniaturized and a high quality factor (Q) is needed for improved selectivity. Low temperature variation of the material's resonant frequency is also required so that the microwave circuits remain stable.

Although large numbers of ceramic dielectric materials have been developed, it has proven difficult to satisfy all these requirements in a single material at a reasonable cost. "Token takes the advantages of these new materials that they are relatively cheap compared with some of the compounds currently used and in the future they can be improved even further by suitable additives and by optimizing the preparation conditions."

## Dielectric Material Composition & Study

The new dielectric materials developed by Token, are based on ceramics formed by baking the pressed powdered starting material mixture in a furnace at between 1200 and 1550 degrees Celsius.

Token Engineers used X-ray diffraction studies, Raman spectroscopy and scanning electron microscopy to reveal the structure of the ceramics. The materials have the general formula Ce(M1/2Ti1/2)O3.5. Ce is the element cerium, Ti is titanium and O is oxygen. "M" represents any one of the metals magnesium, zinc, calcium, cobalt, manganese, nickel or tungsten. The numbers refer to the proportions of each element in the ceramic.

"Further work is in progress to find the exact composition, internal structure and secondary phases in the ceramics".

## Token's Service & PDF Catalogue Download

Token reliably deliver high-quality microwave dielectric components according to the each customer special needs with respect to performance, costs, and technology modifications.

For marketing discontinuations or sourcing activities concerning dielectric products, you are encouraged to contact our Sales Department so the request can be properly directed within Token.