

Dielectric Resonators (TE Mode)



MCV Microwave is a volume supplier of dielectric resonators with a 45,000 square foot manufacturing facility to provide customers with technically advanced high quality products at competitive prices. Our facilities have been ISO 9001 and ISO 14001 certified.

MCV's TE dielectric resonators (DR) are available in a wide range of dielectric constants, disk and cylinder type, exhibiting exceptionally high Q and temperature stability.

These components are typically used in oscillators, satellite-based communication equipment, microwave filters and combiner ranging in frequency from 260MHz to 26 GHz.

Dielectric standoffs are also available for cylinder type dielectric resonators to improve coupling, temperatures stability, while minimizing cavity losses. These dielectric supports have high thermal connectivity, high Q, providing excellent long-term reliability and performance.

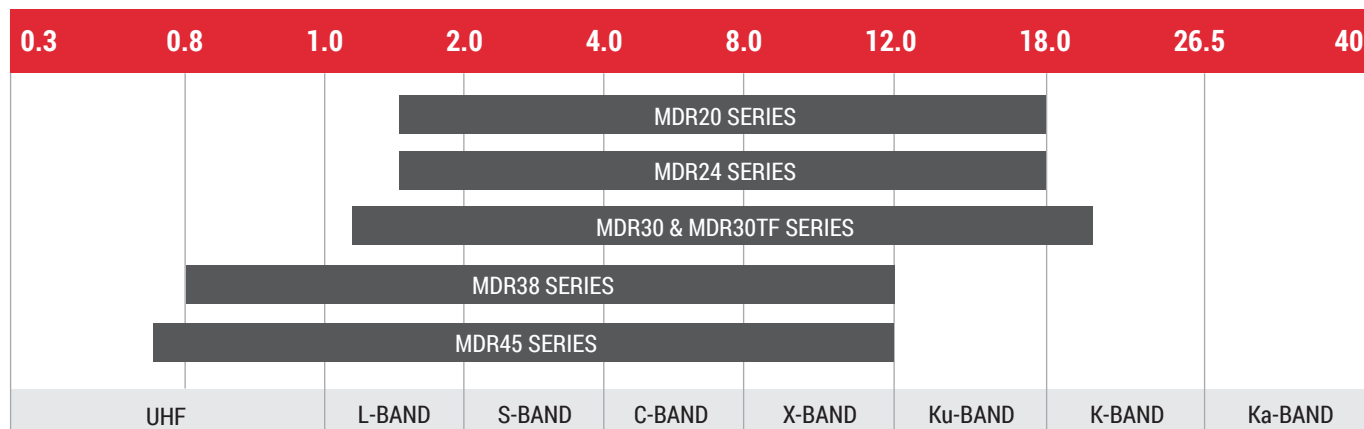
APPLICATIONS

- Dielectric Resonator Oscillator (DRO)
- Global Positioning Systems (GPS)
- Base Station DR Filters and Combiners
- Satellite Communication Equipment
- Direct Broadcast System (DBS)
- Radar Detectors
- AMPS / GSM / PCS / WLL / Wireless
- LAN / MMDS

FEATURES

- High Dielectric Constant
- High Quality Factor (Q)
- High Frequency Stability
- Low Temperature Coefficient
- Low Cost Materials
- Wide Selection of Materials

Frequency (GHz)



DIELECTRIC RESONATORS - TE MODE

Material Availability

Series	Dielectric Constant ϵ_r	τ_f (ppm/°C)	Qf Values
MDR-21	21 ± 1	5 ± 5	> 60,000 (@ 6.5 GHz)
MDR-24	24 ± 1	1 to 3 ± 1	> 300,000 (@ 10 GHz)
MDR-30	30 ± 1	0 ± 2	> 150,000 (@ 10 GHz)
MDR-34	34 ± 1	2 to 3 ± 1	> 150,000 (@ 10 GHz)
MDR-36	36 ± 2	0 ± 5	> 30,000 (@ 5 GHz)
MDR-38	38 ± 1	0.7 ± 0.5	> 47,000 (@ 5.0 GHz)
MDR-40	40 ± 1	3 ± 5	> 70,000 (@ 5.0 GHz)
MDR-45	46 ± 1	-2 to 6 ±	> 43,000 (@ 6.0 GHz)
MDR-47	47 ± 1	0 ± 10	> 46,000 (@ 6.0 GHz)

Standard OD Sizes

Standard OD sizes are available from .078" (2 mm) to 5.516" (140 mm) and are designed to meet applications requirements ranging from 260 MHz to 26 GHz.

All resonators are available in both disc and cylinder types. Please consult the factory for your specific requirements.

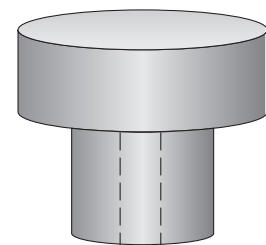
Alumina Support Materials

To improve coupling and temperature stability of the dielectric resonator use a dielectric supports to reduce phase noise and cavity losses. Supports can be supplied in either disk or cylinder form.

Support materials exhibit low loss, high thermal conductivity and excellent long term reliability.

Support Specifications

Characteristics	Std. Alumina Support	MCV Alumina Support
ϵ'	9.8	9.8
Tan δ	3.0 x 10 ⁻⁴	1.0 x 10 ⁻⁴
Density (g/cm ³)	3.75	3.90
Measuring Freq. (GHz.)	10	10



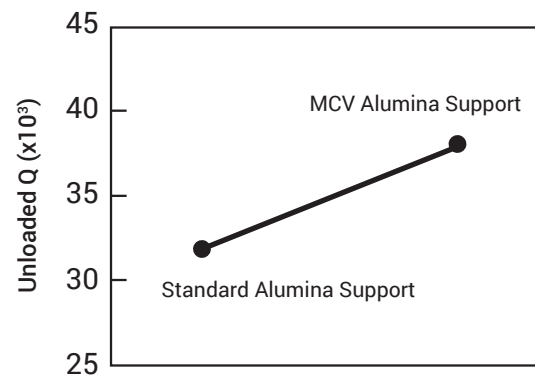
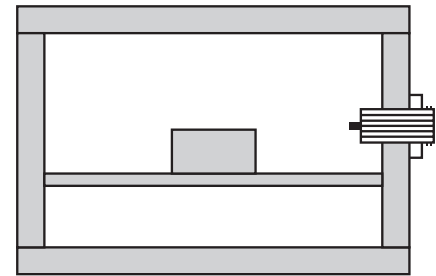
Support material specifications are shown above. Consult factory for alternative support materials and size availability.

Calculate Resonator Frequency

To Calculate Resonate Frequency in MHz (f_o) of a dielectric resonator, the resonator thickness (T) must be divided by the outside diameter D_r ; (T/ D_r) aspect ratio should be between 0.35 - 0.45 and ϵ' is the dielectric constant of the resonator.

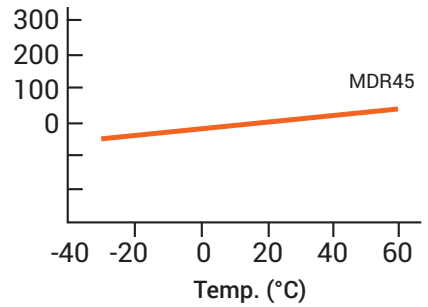
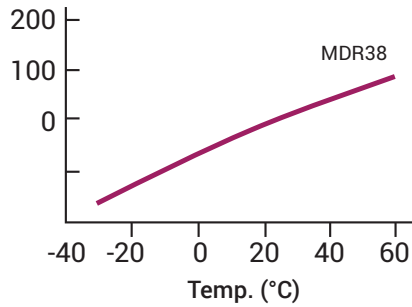
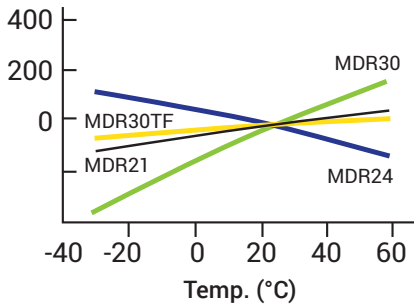
$$f_o = 8766 / ((\epsilon'^{1/2}) \times (\pi/4)^{1/3} \times (D_r^2 T)^{1/3})$$

When measuring f_o we recommend a cylindrical metal test fixture that is approximately 3-5 times larger than the D_r shown below. A low loss, low ϵ' material is used to support the resonator in the center of the fixture. A bent coaxial probe is used for coupling.



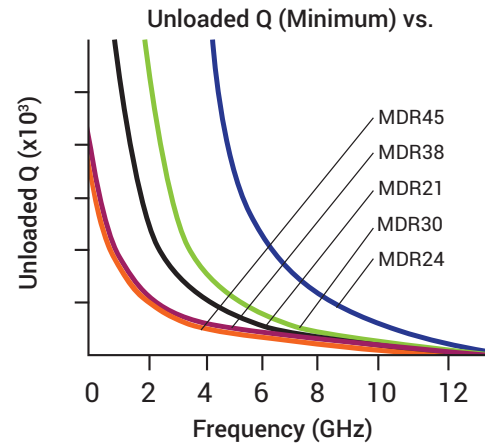
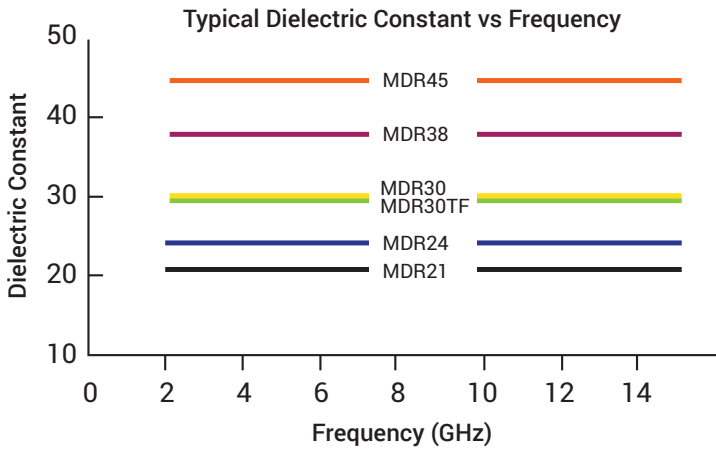
Material Properties

Temperature Characteristics



LEGEND ■ MDR21 ■ MDR24 ■ MDR30 ■ MDR30TF ■ MDR38 ■ MDR45

Performance



Dielectric Resonator - TE Mode

MDR	38	03	03	108	40	50
MCV Dielectric Resonator	Material Dielectric	Temperature Coefficient	Temperature Coefficient Tolerance	Outer Diameter (x10 ⁻¹ mm)	Inner Diameter (x10 ⁻¹ mm)	Height (x10 ⁻¹ mm)
	20	00=Special	P = ±0.5 ppm/°C	108 = 10.8 mm	40 = 4 mm	50 = 5 mm
	24	01 = +6 ppm/°C	S = ±1.0 ppm/°C		00 = disc	
	30	02 = +3 ppm/°C	N = ±2.0 ppm/°C			
	30TF	03 = 0 ppm/°C				
	38	04 = -3 ppm/°C				
	45	05 = -6 ppm/°C				

DIELECTRIC RESONATORS - TM MODE

Dielectric Resonator - TM Mode

MCV Patented High Q Dielectric Resonators - TM mode is the ideal choice or next-generation mobile communication where controlling interferential signal, size and performance are required. Typically 1/10 the size of standard TM-Mode resonators, exhibits excellent temperature coefficient, high Qu for frequencies ranging from 0.1 to 30 GHz.



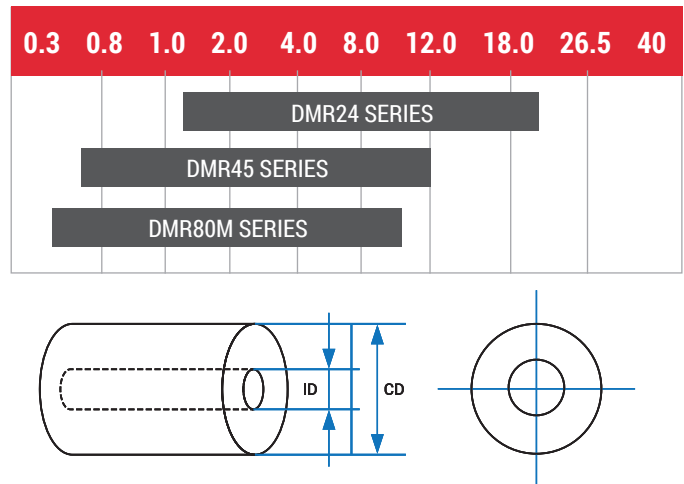
FEATURES

- High Q / Low Loss
- Small / Compact Size
- Stable Temperature Coefficient
- Frequency 0.1 to 30 GHz.
- Material Availability $\epsilon' = 24, 45, 80M$

Available Sizes

Size Code	OD ϕ	ID ϕ	L MAX
D560C	5.6	1.47	20.0
D620C	6.2	2.48	20.0
D1360C	13.6	4.04	30.0
D1600C	16	5.25	55.0
D1700C	17	4.62	55.0
D2450C	24.5	8.56	55.0
D3000C	30	8.84	55.0
D4500C	45	12.80	55.0

Frequency (GHz)



Dielectric Resonator - TM

DMR	38	03	03	108	40	50
MCV Dielectric Resonator (TM Mode)	Material Dielectric	Temperature Coefficient	Temperature Coefficient Tolerance	Outer Diameter (x10 ⁻¹ mm)	Inner Diameter (x10 ⁻¹ mm)	Height (x10 ⁻¹ mm)
	20	00=Special	P = ±0.5 ppm/°C	108 = 10.8 mm	40 = 4 mm	50 = 5 mm
	24	01 = +6 ppm/°C	S = ±1.0 ppm/°C			
	30	02 = +3 ppm/°C	N = ±2.0 ppm/°C			
	30TF	03 = 0 ppm/°C				
	38	04 = -3 ppm/°C				
	45	05 = -6 ppm/°C				