



RF & Microwave

Surface Mount Ceramic Solutions

Introduction

Purpose

- To Provide an overview of KEMET's RF and Microwave Capacitors.

Objective

- Define RF
- Discuss the markets segments
- Discuss the part number breakdown

Content

- 11 pages

Learning Time

- 5 minutes

What is RF?

RF stands for Radio Frequency
Also referred to as Microwave

Frequency range 30KHz - 30GHz

RF capacitors help tune antenna to the correct frequency

Inductor + RF Capacitor = resonator circuit

RF Technology allows a cell phone to grab a signal, and the TV to tune an OTA channel, etc.



Market Segments

High Q / High Power

Wireless Power Meters

Cellular Base Stations

RF Modules

Power Modules

VCO

Radar



CBR Family: Scope

Ultra High Q-CBR Squared Series Offering

Case Size	Typical ESR (10pF @ 1 GHz)	Dielectric	Operating Frequency Range	Operating Temperature Range	Temp Coef. (TCC)	Capacitance Range	Max Voltage
0505	< 0.068	C0G	1MHz - 50GHz	-55°C to +125°C	0 ±30 ppm/°C	0.4pF - 100pF	250

High Q-CBR Series Offering (EIA Case Sizes)

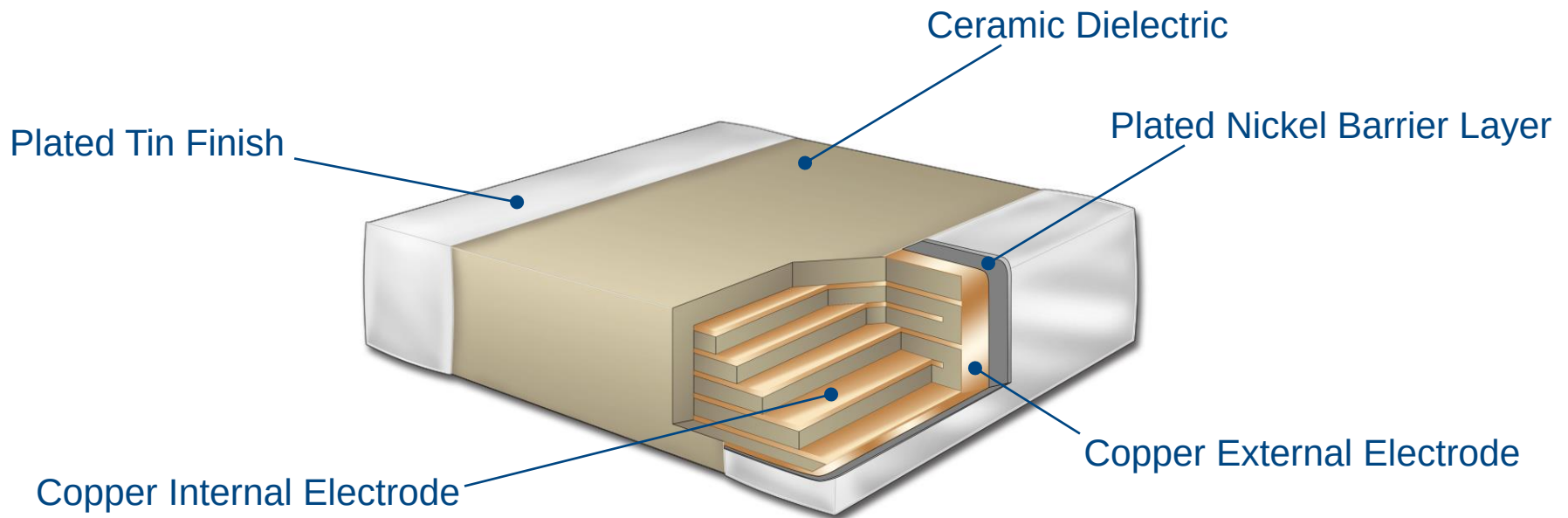
Case Size	Typical ESR Ohms (10pF @ 1 GHz)	Dielectric	Operating Frequency Range	Operating Temperature Range	Temp Coef. (TCC)	Capacitance Range	Max Voltage
0201	-	C0G	1MHz - 50GHz	-55°C to +125°C	0 ±30 ppm/°C (0 ±60 ppm/°C for 0201 case size ≥ 22 pF)	0.1pF - 33pF	50
0402	< 0.095					0.1pF - 100pF	200
0603	< 0.100					0.3pF - 100pF	250
0805	< 0.085					0.3pF - 100pF	500



 **HiQ-CBR**
RF & MICROWAVE

Capacitor Properties

HiQ-CBR **RF & MICROWAVE**



Base Metal, Copper Electrodes

- Low loss is important in terms of Power Dissipation.

- **Copper BME COG** vs. **Nickel BME**:

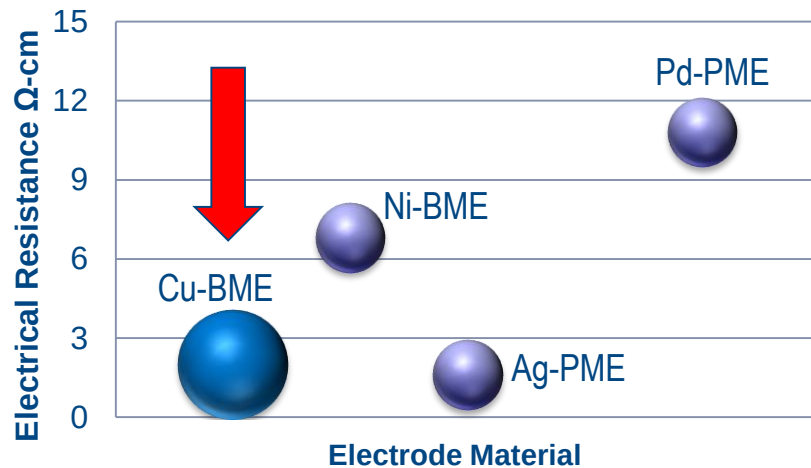
Frequency (MHz)	Power Dissipation (mW) Copper BME	Power Dissipation (mW) Nickel BME
150	4.9	15.9
300	5.8	20.5
600	6.4	26.2
1200	7.8	37.0

- Copper BME = Lower ESR = Better power dissipation
= Ideal for High Frequency applications

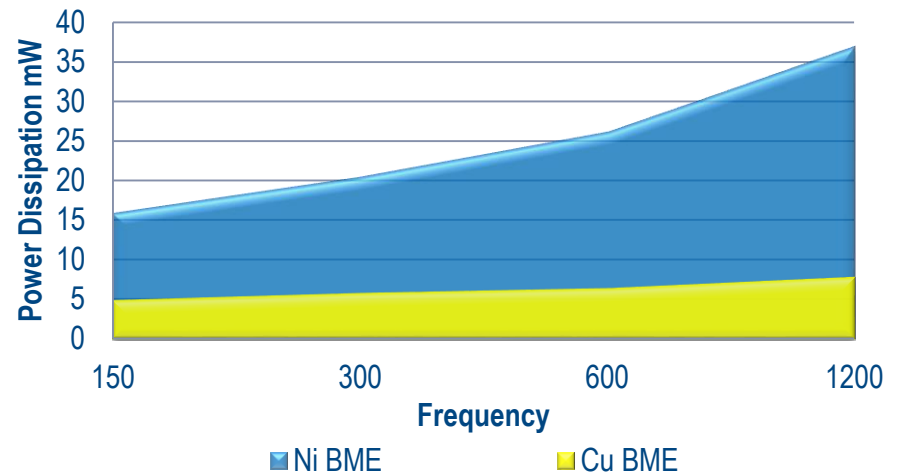
PME = Precious metal electrode technology
BME = Base metal electrode technology

General Frequency & Power Guidelines

Electrical Resistance



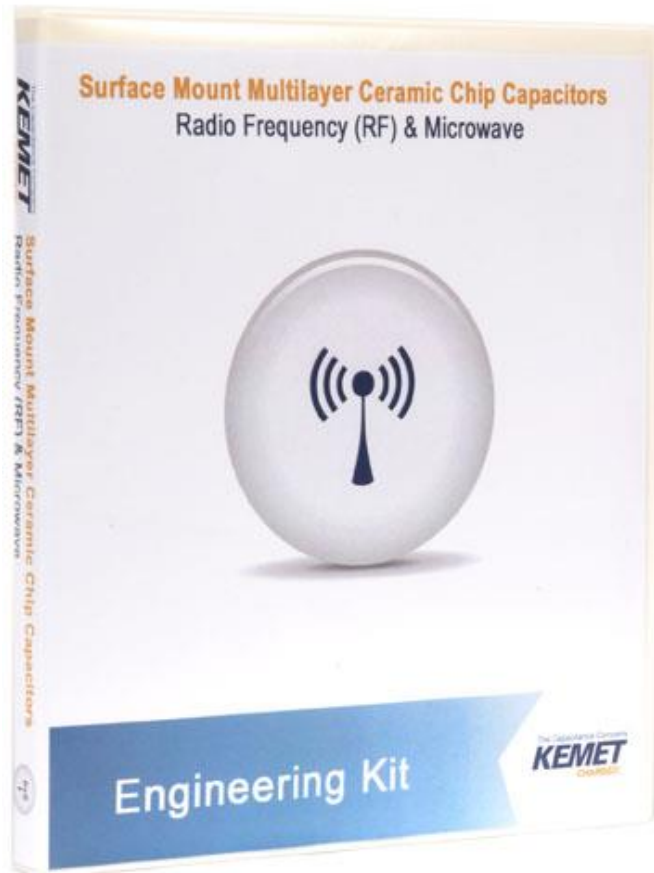
Power Dissipation vs. Frequency



Copper BME = Lower ESR = Better power dissipation = **Ideal for High Frequency applications**

Application	Power and Frequency Capabilities	
Base Station / Power Amp	C0603-C2225 <10W Power <100MHz Frequency	CBR06, CBR08 >10W Power >1GHz Frequency
Mobile Phone	C0201, C0402 <1W Power <100MHz Frequency	CBR02, CBR04 >10W Power >1GHz Frequency
	COMMERCIAL	RF & MICROWAVE

HiQ-CBR **RF & MICROWAVE**



C0G, High Q, Base Metal
0201 – 0805 and 0505

Case Sizes

6.3 – 250V

0.1pF to 100pF

Pb-Free & RoHS Compliant

Low ESR

No Piezoelectric Noise

Ordering Information

CBR	02	C	330	F	9	G	A	C	
Ceramic	Case Size (L" x W")	Specification / Series	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Dielectri c	Failure Rate/ Design	Termination Finish	Packaging/ Grade (C-Spec) ¹
CBR	02 = 0201 04 = 0402 06 = 0603 08 = 0805 05 = 0505	C = Standard	2 significant digits + number of zeros Use 9 for 1.0 - 9.9pF Use 8 for 0.5 - .99pF ex. 2.2pF = 229 ex. 0.5pF = 508	A = $\pm 0.05\text{pF}$ B = $\pm 0.1\text{pF}$ C = $\pm 0.25\text{pF}$ D = $\pm 0.5\text{pF}$ F = $\pm 1\%$ G = $\pm 2\%$ J = $\pm 5\%$	9 = 6.3V 8 = 10V 3 = 25V 5 = 50V 1 = 100V 2 = 200V A = 250V C = 500V	G = C0G	A = N/A	C = 100% Matte Sn	Blank = 7" Reel, Unmarked

¹ When ordering CBR series devices, a "suffix" or "C-spec" is not required to indicate a 7" reel packaging option.
CBR devices are only available and shipped on 7" reels (paper tape). Bulk bag and cassette packaging options are not available.
Please contact KEMET if you have a specific, non-standard packaging requirement.



Chip Size In. (mm)	Chip Thickness (mm)	Reel Quantity	
		7" Paper	13" Paper
0201 (0603)	0.30 $\pm$ 0.03	15,000	Contact KEMET for availability.
0402 (1005)	0.50 $\pm$ 0.05	10,000	
0603 (1608)	0.80 $\pm$ 0.07	4,000	
0805 (2012)	0.85 $\pm$ 0.10	4,000	
0505 (1414)	1.15 $\pm$ 0.15	3,000	

Summary:

KEMET's CBR series of Hi-Q RF ceramic capacitors offers excellent high frequency performance.

Our copper BME (base metal electrode) dielectric provides lower ESR than standard MLCCs and better dissipation factor.

Sample kits are available at Digi-Key

[**www.kemet.com/rf**](http://www.kemet.com/rf)

