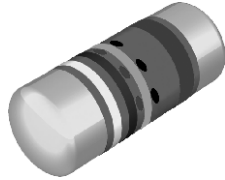


## Pulse Load MELF Resistors for High Frequency Applications



CMA 0204 HF specialty MELF resistors combine the advanced pulse load capability and the suitability for RF applications in a single component. They are the perfect choice in high frequency circuit designs where the parasitic inductance of regular, helical trimmed resistors can not be accepted, but where also pulse energies apply. Typical applications are in the fields of telecommunication equipment and industrial electronics.

### FEATURES

- Specialty product for RF applications
- Low-inductance non-helical trimmed product
- Special carbon film technology
- ESD capability: 3 kV, human body model
- Suitable for more than 10 GHz
- Compatible with lead (Pb)-free and lead containing soldering processes
- Compliant to RoHS directive 2002/95/EC


**RoHS**  
COMPLIANT

### APPLICATIONS

- Telecommunication equipment
- Industrial electronics

METRIC SIZE	
DIN	0204
CECC	RC 3715M

TECHNICAL SPECIFICATION			
DESCRIPTION	CMA 0204 HF		
CECC size	RC 3715M		
Resistance range	50 Ω; 47 Ω to 300 Ω		
Resistance tolerance	± 2 %		
Temperature coefficient	Approx. - 250 ppm/K		
Operation mode	Standard	Power	
Climatic category (LCT/UCT/days)	55/125/56	55/155/56	
Rated dissipation $P_{70}^{(1)}$	0.25 W	0.4 W	
Operating voltage, $U_{max}$ , AC/DC	Limited by $P_{70}$		
Film temperature	125 °C	155 °C	
Max. resistance change at $P_{70}$ for resistance range, $\Delta R/R$ after:	47 Ω to 300 Ω		
	1000 h	≤ 1 %	≤ 2 %
	8000 h	≤ 2 %	≤ 4 %
	225 000 h	t.b.f.	-
Permissible voltage against ambient (insulation):	1 min; $U_{ins}$	300 V	
	Continuous	75 V	
Failure rate: FIT <sub>observed</sub>	≤ 0.1 x 10 <sup>-9</sup> /h		

### Notes

- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.

<sup>(1)</sup> The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heatflow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature is not exceeded. Furthermore, a high level of ambient temperature or of power dissipation may raise the temperature of the solder joint, hence special solder alloys or board materials may be required to maintain the reliability of the assembly.

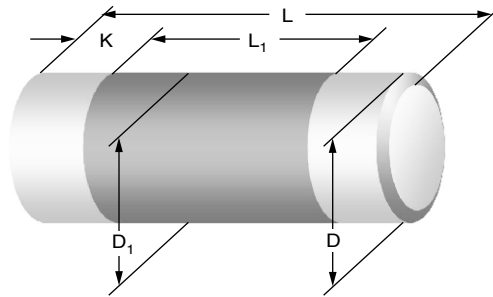


PART NUMBER AND PRODUCT DESCRIPTION																	
Part Number: CMA0204AX1000GB300																	
C	M	A	0	2	0	4	A	X	1	0	0	0	G	B	3	0	0
MODEL/SIZE	SPECIAL CHARACTER		TCR		VALUE			TOLERANCE	PACKAGING	SPECIAL							
CMA0204	A = HF High Frequency		X = No indication		3 digit value 1 digit multiplier <b>Multiplier</b> 9 = *10 <sup>-1</sup> 0 = *10 <sup>0</sup>			G = ± 2 %	B3	Up to 2 digits 00 = Standard							
Product Description: CMA 0204 2 % HF BL 100R																	
CMA	0204	2 %		HF		BL	100R										
MODEL	SIZE	TOLERANCE		SUFFIX		PACKAGING	RESISTANCE VALUE										
CMA	0204	± 2 %		HF = High Frequency		BL	100R = 100 Ω										

**Note**

- Products can be ordered using either the PART NUMBER or the PRODUCT DESCRIPTION.

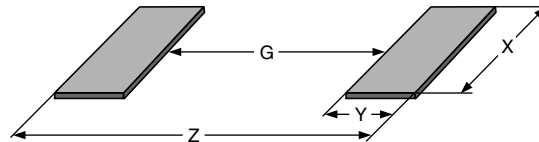
PACKAGING			
TYPE	BLISTER TAPE ON REEL ACC. IEC 60286-3		
	DIAMETER	PIECES/REEL	CODE
CMA 0204 HF	180 mm/7"	3000	B3 = BL

**DIMENSIONS**


DIMENSIONS AND MASS						
TYPE	L (mm)	D (mm)	L <sub>1</sub> min. (mm)	D <sub>1</sub> (mm)	K (mm)	MASS (mg)
CMA 0204 HF	3.6 + 0/- 0.2	1.4 + 0/- 0.1	1.8	D + 0/- 0.15	0.8 ± 0.1	19

**Note**

- Color code marking is applied according to IEC 60062<sup>(3)</sup> in four bands (E24 series) or five bands (E96 or E192 series). Each color band appears as a single solid line, voids are permissible if at least 2/3 of the band is visible from each radial angle of view. The last color band for tolerance is approximately 50 % wider than the other bands. Interrupted bands left and right of the 3<sup>rd</sup> full band indicate the special carbon film high frequency type.

**PATTERN STYLES FOR MELF RESISTORS**


RECOMMENDED SOLDER PAD DIMENSIONS								
TYPE	WAVE SOLDERING				REFLOW SOLDERING			
	G (mm)	Y (mm)	X (mm)	Z (mm)	G (mm)	Y (mm)	X (mm)	Z (mm)
MMA 0204 HF	1.5	1.5	1.8	4.5	1.7	1.2	1.6	4.1

**Note**

- The given solder pad dimensions reflect the considerations for board design and assembly as outlined e.g. in standards IEC 61188-5-x, or in publication IPC 7351. They do not guarantee any supposed thermal properties, however, they will be found adequate for most general applications.

TOLERANCE AND RESISTANCE RANGE		
TYPE	TOLERANCE	RESISTANCE VALUE
CMA 0204 HF	± 2 %	50 Ω 47 Ω to 300 Ω <sup>(1)</sup>

**Note**

- <sup>(1)</sup> Please select resistance values for ± 2 % tolerance from the E24 series.



## DESCRIPTION

Production of the CMA 0204 HF specialty MINI-MELF resistor is strictly controlled and follows an extensive set of instructions established for reproducibility. A homogeneous and dense carbon film is deposited on a high grade ceramic body (85 %  $\text{Al}_2\text{O}_3$ ). Nickel plated steel termination caps are firmly pressed on the coated rods. A special laser is used to achieve the target value by smoothly cutting a non helical pattern with a resulting low inductivity in the resistive layer without damaging the ceramics. The resistor elements are covered by a protective coating designed for electrical, mechanical and climatic protection. The terminations receive a final pure tin on nickel plating. Four color code rings designate the resistance value and tolerance in accordance with **IEC 60062** <sup>(3)</sup>.

The result of the determined production is verified by an extensive testing procedure performed on 100 % of the individual resistors. Only accepted products are laid directly into the blister tape in accordance with **IEC 60286-3** <sup>(3)</sup>.

## ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems. They are suitable for automatic soldering using wave, reflow or vapour phase as shown in **IEC 61760-1** <sup>(3)</sup>. Excellent solderability is proven, even after extended storage in excess of 10 years. The encapsulation is resistant to all cleaning solvents commonly used in the electronics industry, including alcohols, esters and aqueous

solutions. The resistors are completely lead (Pb)-free, the pure tin plating provides compatibility with lead (Pb)-free soldering processes. The immunity of the plating against tin whisker growth has been proven under extensive testing.

All products comply with the **GADSL** <sup>(1)</sup> and the **CEFIC-EECA-EICTA** <sup>(2)</sup> list of legal restrictions on hazardous substances. This includes full compliance with the following directives:

- 2000/53/EC End of Vehicle life Directive (ELV) and the Annex II (ELV II)
- 2002/95/EC Restriction of the use of Hazardous Substances Directive (RoHS)
- 2002/96/EC Waste Electrical and Electronic Equipment Directive (WEEE)

## APPROVALS

Where applicable the resistors are tested in accordance with **EN 140401-803** which refers to **EN 60115-1**, **EN 140400** and the variety of environmental test procedures of the **IEC 60068** <sup>(3)</sup> series.

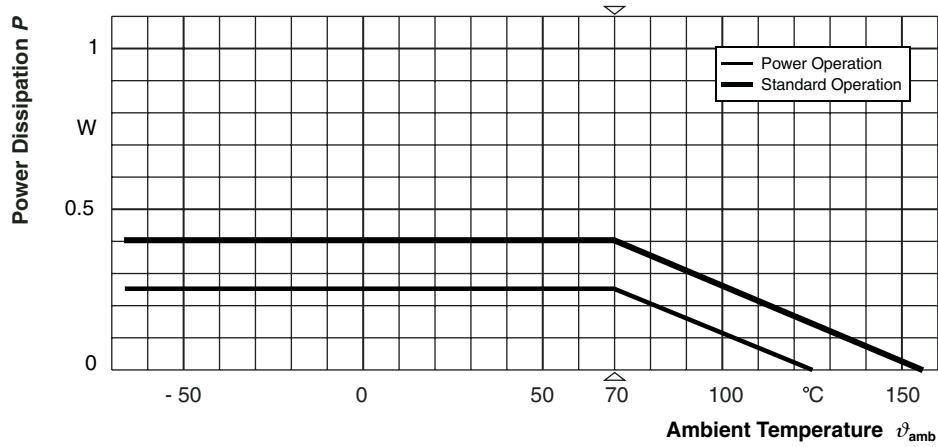
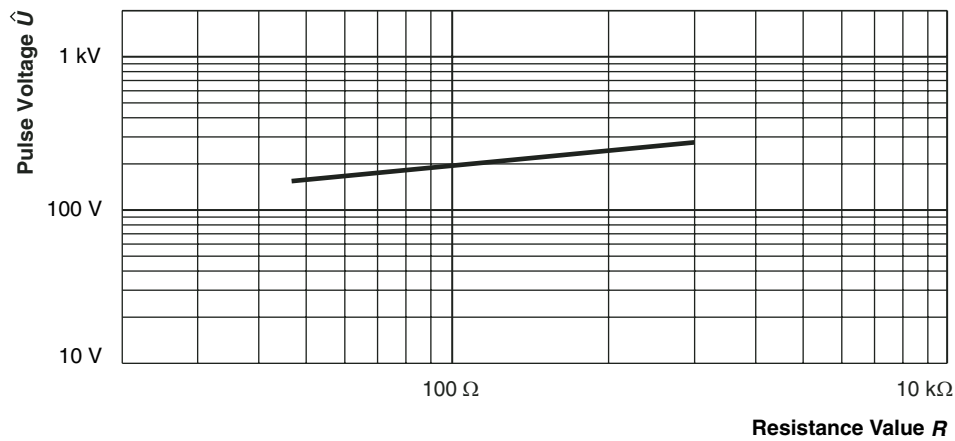
Vishay Beyschlag has achieved “**Approval of Manufacturer**” in accordance with **IEC QC 001002-3, clause 2**. The release certificate for “**Technology Approval Schedule**” in accordance with **CECC 240001** based on **IEC QC 001002-3, clause 6** is granted for the Vishay Beyschlag manufacturing process.

## Notes

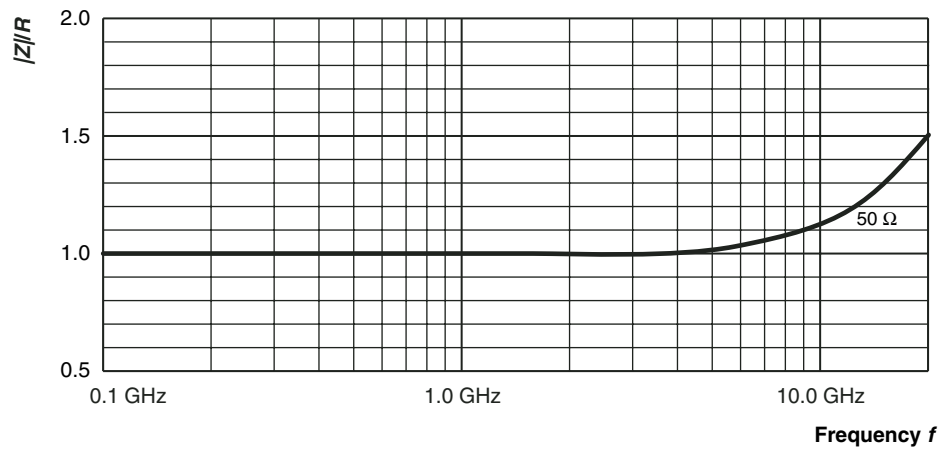
<sup>(1)</sup> Global Automotive Declarable Substance List, see [www.gadsl.org](http://www.gadsl.org).

<sup>(2)</sup> CEFIC (European Chemical Industry Council), EECA (European Electronic Component Manufacturers Association), EICTA (European trade organisation representing the information and communications technology and consumer electronics), see [www.eicta.org/index.php?id=995](http://www.eicta.org/index.php?id=995) → issues → environment policy → chemicals → chemicals for electronics.

<sup>(3)</sup> The quoted IEC standards are also released as EN standards with the same number and identical contents.

**FUNCTIONAL PERFORMANCE**

**Derating - Standard Operation**


1.2/50 Pulse Pulse load rating in accordance with IEC 60115-1, 4.27; 1,2  $\mu$ s/50  $\mu$ s; 5 pulses at 12 s intervals; for permissible resistance change 0.5 %


**RF - Behaviour**



## 12NC INFORMATION

- The 12-digit numeric code starts with 2312.
- The subsequent 4 digits indicate the resistor type, specification and packaging; see the 12NC table.
- The remaining 4 digits indicate the resistance value:
  - The first 3 digits indicate the resistance value.
  - The last digit indicates the resistance decade in accordance with the 12NC Indicating Resistance Decade table.

### Last digit of 12nc indicating resistance decade

RESISTANCE DECADE	LAST DIGIT
10 Ω to 99.9 Ω	9
100 Ω to 999 Ω	1

### 12NC Example

The 12NC of a CMA 0204 HF resistor, value 50 Ω with ± 1 % tolerance, supplied in blister tape of 3000 units per reel is: 2312 158 25009.

12NC - Resistor type and packaging		
DESCRIPTION		ORDERING CODE 2312 ... ..
		BLISTER TAPE ON REEL
TYPE	TOL.	BL 3000 UNITS
CMA 0204 HF	± 2 %	.... 158 2 ....



## Disclaimer

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