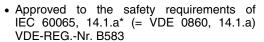






CMB 0207 speciality MELF resistors with advanced pulse load capability are the perfect choice for the protection of circuitry with signal and mains input lines from surge pulses. The resistors are also suitable for circuits exposed to high levels of electromagnetic interference or electro-static discharge. The applications are in all fields of automotive, telecommunication, industrial and medical equipment.

### **FEATURES**





- · Special carbon film technology
- Up to 10 kV or 17 kW single pulse capability
- Up to tbf. continuous pulse load capability
- ESD capability: 16 kV, Human Body Model
- Compatible with lead (Pb)-free and lead containing soldering processes
- Lead (Pb)-free and RoHS compliant

#### **APPLICATIONS**

- Automotive
- Telecommunication
- Industrial
- · Medical equipment

METRIC SIZE		
DIN:	0207	
CECC:	RC 6123M	

TECHNICAL SPECIFIC	ATIONS			
DESCRIPTION		CMB 0207		
CECC size		RC 6123M		
Resistance range		2.2 $\Omega$ to 1.5 M $\Omega$		
Resistance tolerance		± 5 %; ± 2 %		
Temperature coefficient		see TCR graph		
Operation mode		standard	power	
Climatic category (LCT/UCT/days)		55/125/56	55/155/56	
Rated dissipation, $P_{70}^{-1}$		0.4 W	1.0 W	
Operating voltage, U <sub>max</sub> AC/DC		500 V		
Film temperature <sup>3)</sup>		125 °C	155 °C	
Max. resistance change at $P_{70}$ for resistance range,		2.2 Ω to 10 kΩ		
$ \Delta R/R $ after:	1000 h	≤ 0.5 %	≤ 1 %	
8000 h	8000 h	≤ 1 %	≤ 2 %	
225 000 h		t.b.f	-	
Permissible voltage against ambie	ent (insulation):		•	
1 minute; $U_{ins}$		750	) V	
continuous		75 V		
Failure rate		≤ 1 ×	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.
- 1. 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.
- 2. Specified power rating requires dedicated heat-sink pads.
- 3. Film temperatures above the specified range may be permissible, e.g. 175 °C. Please contact the factory for details.

# Vishay Beyschlag

### High Pulse Load MELF Resistor



### **12NC INFORMATION**

- The resistors have a 12-digit numeric code starting 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

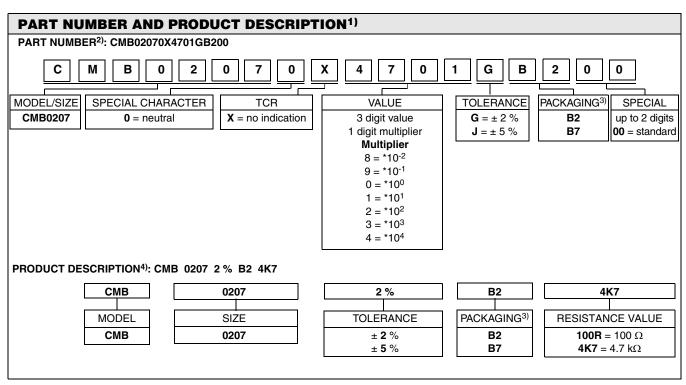
### **Last Digit of 12NC Indicating Resistance Decade**

RESISTANCE DECADE	LAST DIGIT
1 Ω to 9.99 Ω	8
10 $\Omega$ to 99.9 $\Omega$	9
100 $\Omega$ to 999 $\Omega$	1
1 kΩ to 9.99 kΩ	2
10 kΩ to 99.9 kΩ	3
100 kΩ to 999 kΩ	4
1 MΩ to 9.99 MΩ	5

### 12NC Example

The 12NC of a CMB 0207 resistor, value 47 k $\Omega$  with  $\pm$  2 % tolerance, supplied in blister tape of 2000 units per reel is: 2312 199 24703.

12NC - resistor type and packaging			
DESCRIPTION -		ORDERING CODE 2312	
		BLISTER TAPE ON REEL	
TYPE	TOL.	B2 2000 UNITS	B7 7000 UNITS
CMB 0207	± 5 %	199 3	189 3
CIVID UZU7	± 2 %	199 2	189 2



### **Notes**

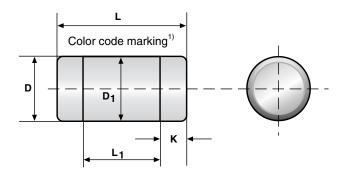
- 1. Products can be ordered using either the PRODUCT DESCRIPTION or the 12NC.
- 2. The PART NUMBER is shown to facilitate the introduction of the unified part numbering system. Currently, this PART NUMBER is applicable in the Americas and in Asia/Pacific only.
- 3. Please refer to table PACKAGING, see below.
- 4. For CMB 0207 the temperature coefficient is not identified in the PRODUCT DESCRIPTION.

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PACKAGING				
MODEL	BLISTER TAPE ON REEL ACC. IEC 60286-3			
	DIAMETER	PIECES/REEL	CODE	
CMB0207	180 mm/7"	2000	B2	
	330 mm/13"	7000	B7	

### **DIMENSIONS**



DIMENSIONS - MELF resistor types, mass and relevant physical dimensions						
ТҮРЕ	L (mm)	D (mm)	L <sub>1 min</sub> (mm)	D <sub>1</sub> (mm)	K (mm)	MASS (mg)
CMB 0207	5.8 + 0/- 0.15	2.2 + 0/- 0.2	3.2	D + 0/- 0.2	1.15 ± 0.1	79

### Note

1. Color code marking is applied according to IEC 60062\* in four bands. 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. A brown interrupted band between the 2nd and 3rd full band indicates the special carbon film type.

TOLERANCE AND RESISTANCE RANGE			
DESCRIPTION	RESISTANCE VALUE <sup>2)</sup>		
TOLERANCE	CMB 0207		
± 5 %	2.2 $\Omega$ to 15 $\Omega$		
± 2 %	16 $\Omega$ to 1.5 M $\Omega$		

### Note

2. Please select resistance values for  $\pm$  5 % and  $\pm$  2 % tolerance from the E24 series.

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## Vishay Beyschlag

## High Pulse Load MELF Resistor



### **DESCRIPTION**

Production of the CMB 0207 speciality 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 (96 %  $Al_2O_3$ ). Nickel plated steel termination caps are firmly pressed on the coated rods. Products with a resistance of 15  $\Omega$  or lower are made without trimming, whereas a special laser is used to achieve a target value of 16  $\Omega$  or above by smoothly cutting a helical groove 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 60 062<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 60 286-3**<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 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)

### Notes

- 1. Global Automotive Declarable Substance List, see www.gadsl.org
- 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 <a href="https://www.eicta.org"><u>www.eicta.org</u></a> -> issues -> environment policy -> chemicals -> chemicals for electronics

#### **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.

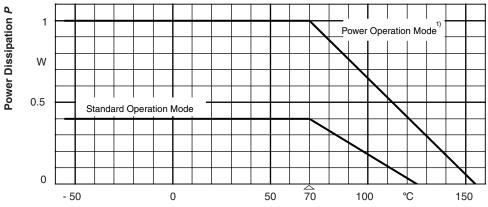
Vishay BEYSCHLAG has achieved "Approval of Manufacturer" in accordance with IEC QC 001002-3, clause 2. The release certificate for "Technology Approval Schedule" in accordance with CECC 240001 based on IEC QC 001002-3, clause 6 is granted for the Vishay BEYSCHLAG manufacturing process.

#### Note

The quoted IEC standards are also released as EN standards with the same number and identical contents.

For technical questions, contact: <u>ff3bresistors@vishay.com</u>
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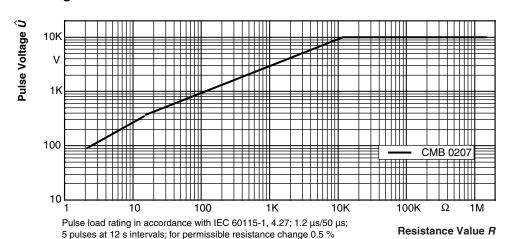
### **FUNCTIONAL PERFORMANCE**



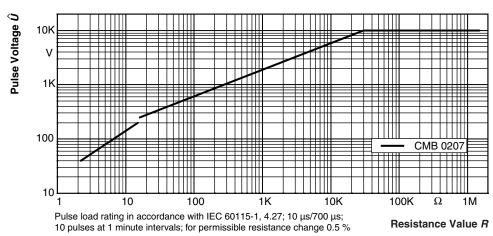
<sup>1)</sup> Specified power rating requires dedicated heat sink pads

Ambient Temperature  $\,\vartheta_{\rm amb}$ 

### Derating

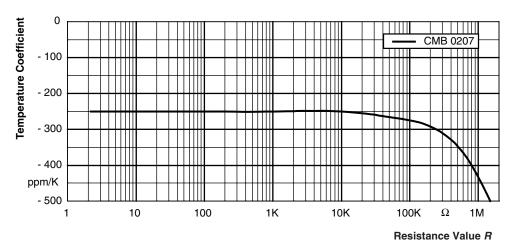


### 1.2/50 Pulse

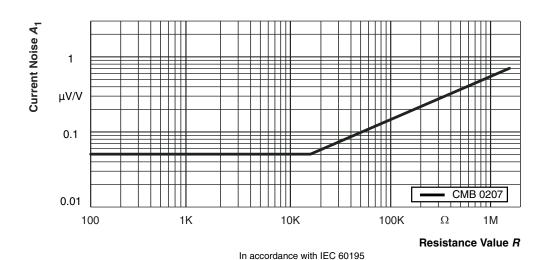


10/700 Pulse





**Temperature Coefficent (TCR)** 



Current Noise - A<sub>1</sub>

## **REVISION HISTORY**

Compared to the prior revision of this datasheet, short rev3, the following changes have been applied:

- Transfer into Vishay format for publication on the internet
- Introduction of a standardized part numbering system
- Additional emphasis on the clean balance of materials and on the compliance with various EU directives
- Revision of the 1.2/50 pulse load diagram
- Introduction of diagrams on 10/700 pulse load and on current noise
- Introduction of information on electrostatic discharge (ESD) capability
- No other change of technical contents
- No product change

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# **Legal Disclaimer Notice**



Vishay

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