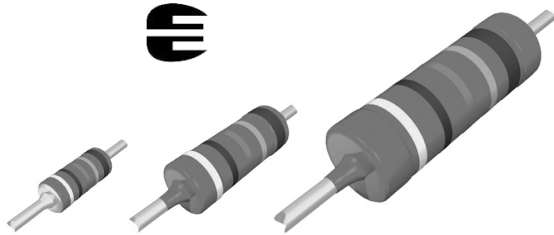


## Leaded Resistors with Established Reliability (CECC 40101-806, Version E)



MBA/SMA 0204 VG06, MBB/SMA 0207 VG06 and MBE/SMA 0414 VG06 leaded thin film resistors with established reliability are the perfect choice for all high-reliability applications typically found in the fields of military, aircraft and spacecraft electronics. These versions supplement the families of professional and precision leaded resistors MBA/SMA 0204, MBB/SMA 0207 and MBE/SMA 0414.

### FEATURES

- Approved according to CECC 40101-806, version E
- Established reliability, failure rate level E7
- Advanced thin film technology
- Excellent overall stability: Class 0.5
- Lead (Pb)-free solder contacts
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compatible with "Restriction of the use of Hazardous Substances" (RoHS) directive 2002/95/EC (issue 2004)



### APPLICATIONS

- Military
- Avionics
- Space

### METRIC SIZE

DIN:	0204	0207	0414
CECC:	A	B	D

### TECHNICAL SPECIFICATIONS

DESCRIPTION	MBA/SMA 0204	MBB/SMA 0207	MBE/SMA 0414
CECC Size, Style	A	B	D
Resistance Range	1 $\Omega$ to 5.11 M $\Omega$	1 $\Omega$ to 10 M $\Omega$	1 $\Omega$ to 21.5 M $\Omega$
Resistance Tolerance	$\pm 1\%$ ; $\pm 0.1\%$		
Temperature Coefficient	$\pm 50$ ppm/K; $\pm 15$ ppm/K		
Climatic Category (LCT/UCT/days)	55/155/56	55/155/56	55/155/56
Rated Dissipation, $P_{70}$	0.4 W	0.6 W	1.0 W
Operating Voltage, $U_{max}$ . AC/DC	200 V	350 V	500 V
Film Temperature	155 $^{\circ}$ C	155 $^{\circ}$ C	155 $^{\circ}$ C
Max. Resistance Change at $P_{70}$ for Resistance Range, $\Delta R/R$ After:	1 $\Omega$ to 332 k $\Omega$	1 $\Omega$ to 1 M $\Omega$	1 $\Omega$ to 2.43 M $\Omega$
1000 h	0.5 %		0.4 %
8000 h	1.0 %		0.8 %
Specified Lifetime	8000 h		
Permissible Voltage Against Ambient (Insulation):			
1 Min; $U_{ins}$	300 V	500 V	800 V
Continuous	75 V	75 V	75 V
Failure Rate Level	E7		
Failure Rate	$0.7 \times 10^{-9}/h$	$0.3 \times 10^{-9}/h$	$0.1 \times 10^{-9}/h$

#### Note:

- The failure rate level E7 corresponds to MIL Level R.



# MBA/SMA 0204 VG06, MBB/SMA 0207 VG06, MBE/SMA 0414 VG06

Leaded Resistors with Established Reliability  
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Vishay Beyschlag

PART NUMBER AND PRODUCT DESCRIPTION																	
PART NUMBER: MBB0207CC1001FCT00																	
M	B	B	0	2	0	7	C	C	1	0	0	1	F	C	T	0	0
MODEL/SIZE			SPECIAL CHARACTER		TCR/MATERIAL		VALUE			TOLERANCE		PACKAGING (1)		SPECIAL			
MBA0204 = MBA/SMA 0204 MBB0207 = MBB/SMA 0207 MBE0414 = MBE/SMA 0414			C = VG06 (CECC E7)		E = 15 ppm C = 50 ppm Z = Jumper		3 digit value 1 digit multiplier MULTIPLIER			B = ± 0.1 % F = ± 1.0 % Z = Jumper		CT C1		00 = Standard			
							8 = *10 <sup>-2</sup> 9 = *10 <sup>-1</sup> 0 = *10 <sup>0</sup> 1 = *10 <sup>1</sup> 2 = *10 <sup>2</sup> 3 = *10 <sup>3</sup> 4 = *10 <sup>4</sup> 5 = *10 <sup>5</sup> 6 = *10 <sup>6</sup> 0000 = Jumper										
PRODUCT DESCRIPTION: MBB/SMA 0207-50 1% VG06 CT 1K0																	
MBB/SMA 0207		-	50		1%		VG06		CT		1K0						
MODEL/SIZE			TCR		TOLERANCE		VG06 = CECC E7		PACKAGING (1)		RESISTANCE VALUE						
MBA/SMA 0204 MBB/SMA 0207 MBE/SMA 0414			15 ppm 50 ppm		± 0.1 % ± 1.0 %				CT C1		1K0 = 1 kΩ 51R1 = 51.1 Ω						

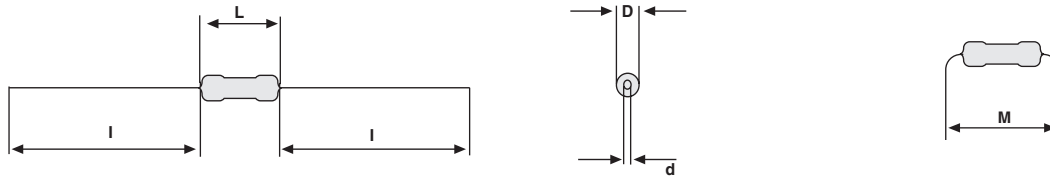
**Note:**

(1) Please refer to table PACKAGING for complete information.

- The PART NUMBER shown above is to facilitate the unified part numbering system for ordering products.

EN 140101-806 ORDERING INFORMATION	
Example of the ordering information for a resistor:	MBA/SMA 0204-50 1% VG06 287K CECC40101-806EZAC287KFE7
Example of the ordering information for jumpers:	MBA/SMA 0204 VG06 0R0 CECC40101-806EZA-0R00-E7
The elements used in this ordering information have the following meaning:	
CECC40101-806	CECC Detail specification number
EZ	Assessment level
A	Style (see table Technical Specifications)
C	Temperature coefficient (C = ± 50 ppm/K; E = ± 15 ppm/K)
287K	Resistance value according to EN 60062, 4 characters
F	Tolerance on rated resistance (B = ± 0.1 %; F = ± 1 %)
E7	Failure rate level according to EN 60115-1, Table ZB.1

PACKAGING TABLE		
MODEL	BOX	
	PIECES	CODE
MBA/SMA 0204	1000	C1
	5000	CT
MBB/SMA 0207	1000	C1
	5000	CT
MBE/SMA 0414	1000	C1

**DIMENSIONS**

<b>DIMENSIONS</b> - leaded resistor types, mass and relevant physical dimensions						
TYPE	D <sub>max.</sub> (mm)	L <sub>max.</sub> (mm)	d <sub>nom.</sub> (mm)	I <sub>min.</sub> (mm)	M <sub>min.</sub> (mm)	MASS (mg)
MBA/SMA 0204	1.6	3.6	0.5	29.0	5.0	125
MBB/SMA 0207	2.5	6.3	0.6	28.0	10.0	220
MBE/SMA 0414	4.0	11.9	0.8	31.0	15.0	700

**Note:**

- Color code marking is applied according to EN 60062 in 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. An interrupted violet band between the 1st and 2nd full band indicates the failure rate level E7. An interrupted orange band between the 4th and 5th full band indicates the temperature coefficient of 15 ppm/K.

**DESCRIPTION**

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. A homogeneous film of metal alloy is deposited on a high grade ceramic body (85 % Al<sub>2</sub>O<sub>3</sub>) and conditioned to achieve the desired temperature coefficient. Nickel plated steel termination caps are firmly pressed on the metallised rods. A special laser is used to achieve the target value by smoothly cutting a helical groove in the resistive layer without damaging the ceramics. Connecting wires of electrolytic copper plated with 100 % pure tin are welded to the termination caps. The resistor elements are covered by a light blue protective coating designed for electrical, mechanical and climatic protection. Four or five color code rings designate the resistance value and tolerance in accordance with **EN 60062**.

The result of the determined production is verified by an extensive testing procedure performed on 100 % of the individual resistors. Only accepted products are stuck directly on the adhesive tapes in accordance with **EN 60286-1**.

**ASSEMBLY**

The resistors are suitable for processing on automatic insertion equipment and cutting and bending machines. Excellent solderability is proven, even after extended storage. They are suitable for automatic soldering using wave or dipping. The encapsulation is resistant to all cleaning solvents commonly used in the electronics industry, including alcohols, esters and aqueous solutions. The suitability of conformal coatings, if applied, shall be qualified by appropriate means to ensure the long-term stability of the whole system. The resistors are completely lead (Pb)-free, the pure tin plating provides compatibility with lead (Pb)-free and lead-containing soldering processes. The immunity of the plating against tin whisker growth has been proven under extensive testing.

All products comply with the CEFIC-EECA-EICTA list of legal restrictions on hazardous substances.

This includes full compliance with the following European RoHS directives:

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

Solderability is specified for 2 years after production or re-qualification. The permitted storage time is 20 years.



# MBA/SMA 0204 VG06, MBB/SMA 0207 VG06, MBE/SMA 0414 VG06

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## APPROVALS

The resistors are tested in accordance with **CECC 40101-806** which refers to **EN 60115-1** and **EN 140400** and the variety of environmental test procedures of the **IEC/EN 60068** series. Approval of conformity is indicated by the **CECC** logo on the package label.

Vishay BEYSCHLAG has achieved “**Approval of Manufacturer**” in accordance with **EN 100114-1**. The release certificate for “**Technology Approval Schedule**” in accordance with **CECC 240 001** based on **EN 100114-6** is granted for the Vishay BEYSCHLAG manufacturing process.

## SPECIALS

This product family of thin film leaded resistors with established reliability is complemented by **Zero Ohm Jumpers**.

## FUNCTIONAL PERFORMANCE

Further information on the performance of these products may be found in the following datasheets:

- “Professional Leaded Resistors”  
Document No. 28766
- “Precision Leaded Resistors”  
Document No. 28767

TEMPERATURE COEFFICIENT AND RESISTANCE RANGE				
DESCRIPTION		RESISTANCE VALUE <sup>(1)</sup>		
TCR	TOLERANCE	MBA/SMA 0204	MBB/SMA 0207	MBE/SMA 0414
± 50 ppm/K	± 1 %	1 Ω to 5.11 MΩ	1 Ω to 10 MΩ	1 Ω to 21.5 MΩ
± 15 ppm/K	± 0.1 %	100 Ω to 221 kΩ	100 Ω to 499 kΩ	100 Ω to 470 kΩ
Jumper	-	10 mΩ; <i>I</i> <sub>max.</sub> = 3 A	10 mΩ; <i>I</i> <sub>max.</sub> = 5 A	-

Note:

<sup>(1)</sup> Resistance values to be selected for ± 1 % tolerance from E96 only and for ± 0.1 % tolerance from E192 only

## 12NC INFORMATION

### Resistance Decade

RESISTANCE DECADE	LAST DIGIT
1 Ω to 9.99 Ω	8
10 Ω to 99.9 Ω	9
100 Ω to 999 Ω	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
10 MΩ to 99.9 MΩ	6

### Ordering example (For historical coding reference of MBA 0204 VG06/MBB 0207 VG06/MBE 0414 VG06)

The Part Number of a MBA 0204 VG06 resistor, value 287K and TCR 50 with ± 1 % tolerance, supplied on bandolier in a box of 5000 units is: 2312 905 02874.

12NC CODE FOR HISTORICAL CODING REFERENCE OF MBA 0204 VG06/MBB 0207 VG06/MBE 0414 VG06				
DESCRIPTION			PART NUMBER 2312 ... ..	
			BANDOLIER IN BOX	
TYPE	TCR	TOL.	C1 1000 UNITS	CT 5000 UNITS
MBA 0204 VG06	± 50 ppm/K	± 1 %	900 0....	905 0....
	± 15 ppm/K	± 0.1 %	902 0....	907 0....
	jumper	-	902 90001	907 90001
MBB 0207 VG06	± 50 ppm/K	± 1 %	910 0....	915 0....
	± 15 ppm/K	± 0.1 %	912 0....	917 0....
	jumper	-	912 90001	917 90001
MBE 0414 VG06	± 50 ppm/K	± 1 %	920 0....	-
	± 15 ppm/K	± 0.1 %	922 0....	



## Disclaimer

All product specifications and data are subject to change without notice.

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