MMU 0102 VG03, MMA 0204 VG03, MMB 0207 VG03

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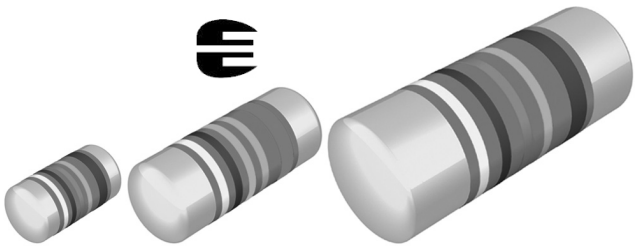
MELF Resistors with Established Reliability



MMU 0102 VG03, MMA 0204 VG03 and MMB 0207 VG03 thin film MELF 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 MELF resistors MMU 0102, MMA 0204 and MMB 0207.

FEATURES

- Approved according to EN 140401-803, version E
- Established reliability, failure rate level E6
- Advanced thin film technology
- Excellent overall stability: Class 0.25
- Green product, supports Lead (Pb)-free soldering.

APPLICATIONS

- Military
- Avionics
- Space

METRIC SIZE			
DIN:	0102	0204	0207
CECC:	RC 2211M	RC 3715M	RC 6123M

TECHNICAL SPECIFICATIONS			
DESCRIPTION	**MMU 0102**	**MMA 0204**	**MMB 0207**
CECC size, style	RC 2211M	RC 3715M	RC 6123M
Resistance range	100 Ω to 2.21 MΩ	1 Ω to 5.11 MΩ	1 Ω to 10 MΩ
Resistance tolerance	± 1 %; ± 0.1 %		
Temperature coefficient	± 50 ppm/K; ± 15 ppm/K		
Climatic category (LCT/UCT/days)	55/125/56	55/125/56	55/125/56
Rated dissipation, P_{70}	0.2 W	0.25 W	0.4 W
Operating voltage, U_{max} AC/DC	150 V	200 V	300 V
Film temperature	125 °C	125 °C	125 °C
Max. resistance change at P_{70} for resistance range, ΔR/R after:	100 Ω to 221 kΩ	1 Ω to 332 kΩ	1 Ω to 1 MΩ
1000 h	= 0.15 %		
8000 h	= 0.3 %		
225 000 h	= 1 %		
Specified lifetime	225 000 h		
Permissible voltage against ambient (insulation):			
1 minute; U_{ins}	200 V	300 V	500 V
continuous	75 V	75 V	75 V
Failure rate level	E6		
Failure rate	$= 2 \times 10^{-9}$/h	$= 0.7 \times 10^{-9}$/h	$= 0.7 \times 10^{-9}$/h

Note: The failure rate level E6 corresponds to MIL Level P.

PRODUCT DESCRIPTION

M	M	A	0204	-50	1 %	VG03	BL	287 K
FILM TYPE	PRODUCT CODE	SIZE CODE	METRIC DIN SIZE	TEMPERATURE COEFFICIENT	TOLERANCE	ESTABLISHED RELIABILITY	PACKING[1]	RESISTANCE VALUE
M = Metal	B = MELF, cylindrical	U = 0102 A = 0204 B = 0207	0102 0204 0207	± 15 ppm/K ± 50 ppm/K	± 0.1 % ± 1 %	Reference to EN 140401-803 Version E	B1 = 1 000 units B2 = 2 000 units BL = 3 000 units B7 = 7 000 units B0 = 10 000 units M3 = 3 000 units M8 = 8 000 units	See Temperature coefficient and resistance range table

Note: We recommend that the clear text ordering code is used to minimize the possibility of errors in order handling.
1. Availability in accordance to the table Part Numbers at the end of this datasheet.
2. Jumpers are ordered by the resistance value 0 ?, e.g. MMU 0102 VG03 BL 0R0.

EN 140401-803 ORDERING INFORMATION

Example of the ordering information for a resistor: MMA 0204-50 1 % VG03 287K

CECC40401-803EZRC3715MC287KFE6

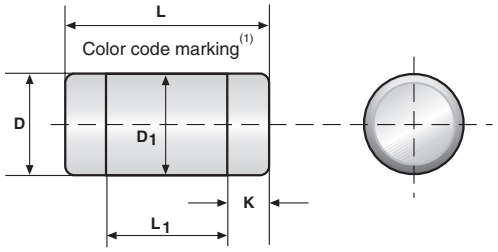
Example of the ordering information for jumpers: MMA 0204 VG03 0R0

CECC40401-803EZRC3715M-0R00-E6

The elements used in this ordering information have the following meaning:

CECC40401-803	CECC Detail specification number
EZ	Assessment level
RC3715M	Style (see table Technical Specification)
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 %)
E6	Failure rate level according to EN 60115-1, Table ZB.1

DIMENSIONS



DIMENSIONS - MELF resistor types, mass and relevant physical dimensions

TYPE	L (mm)	D (mm)	$L_{1\ min}$ (mm)	D_1 (mm)	K (mm)	MASS (mg)
MMU 0102	2.2 + 0/- 0.1	1.1 + 0/- 0.1	1.2	D + 0/- 0.1	0.4 ± 0.05	7
MMA 0204	3.6 + 0/- 0.2	1.4 + 0/- 0.1	1.8	D + 0/- 0.15	0.8 ± 0.1	19
MMB 0207	5.8 + 0/- 0.2	2.2 + 0/- 0.2	2.8	D + 0/- 0.2	1.25 ± 0.15	79

Note: Color code marking is applied according to EN 60062 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. An interrupted blue band between the 1st and 2nd full band indicates the failure rate level E6. 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_2O_3, for MICRO-MELF: 96 % Al_2O_3) 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. 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 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 laid directly into the blister tape in accordance with **EN 60286-3** or bulk case in accordance with **EN 60286-6.**

ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems. They are suitable for automatic soldering using wave, reflow or vapour phase. 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 (category **e3**), the pure tin plating provides compatibility with lead (Pb)-free and 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.

APPROVALS

The resistors are tested in accordance with **EN 140401-803** (superseding **CECC 40401-803**) which refers to **EN 60115-1, 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 MELF 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 Data Sheets:

- “Professional MELF Resistors” Document No. 28713
- “Precision MELF Resistors” Document No. 28714

TEMPERATURE COEFFICIENT AND RESISTANCE RANGE				
DESCRIPTION		RESISTANCE VALUE		
T.C.	TOLERANCE	MMU 0102	MMA 0204	MMB 0207
± 50 ppm/K	± 1 %	100 Ω to 2.21 MΩ	1 Ω to 5.11 MΩ	1 Ω to 10 MΩ
± 15 ppm/K	± 0.1 %	100 Ω to 100 kΩ	75 Ω to 100 kΩ	75 Ω to 499 kΩ
Jumper	-	= 10 mΩ; I_{max} = 2 A	= 10 mΩ; I_{max} = 3 A	= 10 mΩ; I_{max} = 5 A

Note: Resistance values to be selected for ± 1 % tolerance from E96 only and for ± 0.1 % tolerance from E192 only.

ORDERING INFORMATION

Components may be ordered by using either the Product Description, the EN 140401-803 Ordering Information or the Part Number.

Part Number

- The resistors have a 12-digit Part Number starting with 2312.
- The subsequent 4 digits indicate the resistor type, specification and packaging; see the Part Number 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 Resistance Decade table.

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	6

Ordering example

The Part Number of a MMU 0102 VG03 resistor, value 287 k and TC 50 with ± 1 % tolerance, supplied in blister tape of 3 000 units per reel is: 2312 165 02874.

PART NUMBER - resistor type and packing						
DESCRIPTION			ORDERING CODE 2312			
			BLISTER TAPE ON REEL			BULK CASE
TYPE	T.C.	TOL.	B1 1 000 UNITS	BL 3 000 UNITS	B0 10 000 UNITS	M8 8 000 UNITS
MMU 0102 VG03	± 50 ppm/K	± 1 %	170 0....	165 0....	175 0....	060 0....
	± 15 ppm/K	± 0.1 %	172 0....	167 0....	177 0....	062 0....
	jumper	–	172 90001	167 90001	177 90001	062 90001
TYPE	T.C.	TOL.	B1 1 000 UNITS	BL 3 000 UNITS	B0 10 000 UNITS	M3 3 000 UNITS
MMA 0204 VG03	± 50 ppm/K	± 1 %	140 0....	155 0....	145 0....	040 0....
	± 15 ppm/K	± 0.1 %	142 0....	157 0....	147 0....	042 0....
	jumper	–	142 90001	157 90001	147 90001	042 90001
TYPE	T.C.	TOL.	B1 1 000 UNITS	B2 2 000 UNITS	B7 7 000 UNITS	
MMB 0207 VG03	± 50 ppm/K	± 1 %	180 0....	195 0....	185 0....	
	± 15 ppm/K	± 0.1 %	182 0....	197 0....	187 0....	
	jumper	–	182 90001	197 90001	187 90001	

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