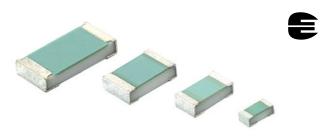
www.vishay.com

Vishay Beyschlag

Professional Thin Film Chip Resistors



MCS 0402, MCT 0603, MCU 0805, and MCA 1206 professional thin film flat chip resistors are the perfect choice for most fields of modern professional electronics where reliability and stability are of major concern. Typical applications include telecommunication, medical equipment, high-end computer and audio / video electronics.

FEATURES

- Approved to EN 140401-801
- Excellent overall stability: class 0.5



- Professional tolerance of resistance: ± 0.5 % and ± 1 %
- Rated dissipation P₇₀ up to 0.4 W for size 1206
- Sulfur resistance verified according to ASTM B 809
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Automotive
- Telecommunication
- · Medical equipment
- Industrial equipment

TECHNICAL SPECIFICATION	S						
DESCRIPTION	MCS 0402	MCT 0603	MCU 0805	MCA 1206			
Imperial size	0402	0603	0805	1206			
Metric size code	RR1005M	RR1608M	RR2012M	RR3216M			
Resistance range	10 Ω to 4.99 M Ω ; 0 Ω	1 Ω to 10 M Ω ; 0 Ω	1 Ω to 10 M Ω ; 0 Ω	1 Ω to 2 MΩ; 0 Ω			
Resistance tolerance	± 1 %; ± 0.5 %						
Temperature coefficient	± 50 ppm/K; ± 25 ppm/K						
Rated dissipation, $P_{70}^{\ (1)}$	0.100 W	0.125 W	0.200 W	0.400 W			
Operating voltage, U _{max.} AC _{RMS} /DC	50 V	75 V	150 V	200 V			
Permissible film temperature, $g_{\rm F\ max.}^{\ \ (1)}$	155 °C						
Operating temperature range		-55 °C to	o 155 °C				
Permissible voltage against ambient (insulation):							
1 min; <i>U</i> _{ins}	75 V	100 V	200 V	300 V			
Failure rate: FIT _{observed}	≤ 0.1 x 10 ⁻⁹ /h						

Note

APPLICATION INFORMATION

When the resistor dissipates power, a temperature rise above the ambient temperature occurs, dependent on the thermal resistance of the assembled resistor together with the printed circuit board. The rated dissipation applies only if the permitted film temperature is not exceeded.

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⁾ Please refer to APPLICATION INFORMATION below.



www.vishay.com

Vishay Beyschlag

MAXIMUM RESISTANCE CHANGE AT RATED DISSIPATION								
OPERATION MODE	STANDARD	POWER						
	MCS 0402	0.063 W	0.100 W					
Rated dissipation, P ₇₀	MCT 0603	0.100 W	0.125 W					
nated dissipation, F ₇₀	MCU 0805	0.125 W	0.200 W					
	MCA 1206	0.250 W	0.400 W					
Operating temperature range	-55 °C to 125 °C	-55 °C to 155 °C						
Permissible film temperature, $g_{\rm F max.}$		125 °C	155 °C					
	MCS 0402	10 Ω to 4.99 M Ω	10 Ω to 4.99 M Ω					
	MCT 0603	1 Ω to 10 M Ω	1 Ω to 10 M Ω					
	MCU 0805	1 Ω to 10 M Ω	1 Ω to 10 M Ω					
Max. resistance change at P_{70} for resistance range, $ \Delta R/R $ after:	MCA 1206	1 Ω to 2 M Ω	1 Ω to 2 M Ω					
dita	1000 h	≤ 0.25 %	≤ 0.5 %					
	8000 h	≤ 0.5 %	≤ 1.0 %					
	225 000 h	≤ 1.5 %	-					

Note

The presented operation modes do not refer to different types of resistors, but actually show examples of different loads, that lead to
different film temperatures and different achievable load-life stability (drift) of the resistance value. A suitable low thermal resistance of the
circuit board assembly must be safeguarded in order to maintain the film temperature of the resistors within the specified limits. Please
consider the application note "Thermal Management in Surface-Mounted Resistor Applications" (www.vishay.com/doc?28844) for
information on the general nature of thermal resistance.

TYPE / SIZE	TCR	TOLERANCE	RESISTANCE	E-SERIES
	. 50	± 1 %	10 Ω to 4.99 MΩ	E24; E96
MOC 0400	± 50 ppm/K	± 0.5 %	10 Ω to 221 kΩ	E24; E192
MCS 0402	± 25 ppm/K	± 0.5 %	10 Ω to 221 kΩ	E24; E192
	Jumper, I _{max.} = 0.63 A	≤ 20 mΩ	0 Ω	-
MCT 0603	. 50//	± 1 %	1 Ω to 10 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %	10 Ω to 511 kΩ	E24; E192
	± 25 ppm/K	± 0.5 %	10 Ω to 511 kΩ	E24; E192
	Jumper, I _{max.} = 1 A	≤ 20 mΩ	0 Ω	-
	. F0 nnm/V	± 1 %	1 Ω to 10 MΩ	E24; E96
MOLLOGOE	± 50 ppm/K	± 0.5 %	10 Ω to 1.5 MΩ	E24; E192
MCU 0805	± 25 ppm/K	± 0.5 %	10 Ω to 1.5 MΩ	E24; E192
	Jumper, I _{max.} = 1.5 A	≤ 20 mΩ	0 Ω	-
	. F0 xxx///	± 1 %	1 Ω to 2 MΩ	E24; E96
MCA 1206	± 50 ppm/K	± 0.5 %	10 Ω to 2 MΩ	E24; E192
VICA 1200	± 25 ppm/K	± 0.5 %	10 Ω to 2 MΩ	E24; E192
	Jumper, I _{max.} = 2 A	≤ 20 mΩ	0 Ω	-

Note

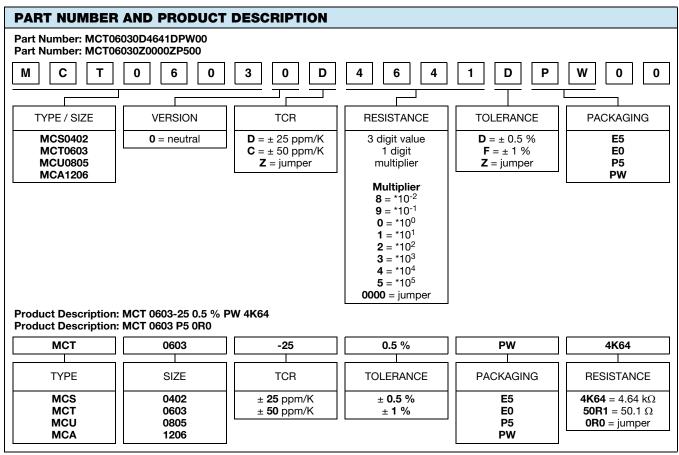
Resistance ranges printed in bold are preferred TCR / tolerance combinations with optimized availability.

PACKAGING								
TYPE / SIZE	CODE	QUANTITY	PACKAGING STYLE	WIDTH	PITCH	PACKAGING DIMENSIONS		
MCS 0402	E5	5000		8 mm	2 mm	Ø 180 mm/7"		
	E0	10 000	Paper tape acc. IEC 60286-3, Type 1a					
MOT 0000	P5	5000			4 mm	Ø 180 mm/7"		
MCT 0603	PW	20 000				Ø 330 mm/13"		
MOLLOGOE	P5	5000	120 00200 o, Type 14			Ø 180 mm/7"		
MCU 0805	PW	20 000				Ø 330 mm/13"		
MCA 1206	P5	5000				Ø 180 mm/7"		



www.vishay.com

Vishay Beyschlag



Note

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



Vishay Beyschlag

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 substrate (Al₂O₃) and conditioned to achieve the desired temperature coefficient. Specially designed inner contacts are deposited on both sides. A special laser is used to achieve the target value by smoothly cutting a meander groove in the resistive layer without damaging the ceramics. For the high and low ohmic range, optimized Cermet products provide comparable properties. 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.

The result of the determined production is verified by an extensive testing procedure and optical inspection performed on 100 % of the individual chip resistors. This includes full screening for the elimination of products with potential risk of early field failures (feasible for $R \geq 10~\Omega$). Only accepted products are laid directly into the paper tape in accordance with **IEC 60286-3 Type 1a** ⁽¹⁾.

ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems. They are suitable for automatic soldering using wave, reflow or vapor phase as shown in **IEC 61760-1**. 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, potting compounds and their processes, if applied, shall be qualified by appropriate means to ensure the long-term stability of the whole system.

The resistors are RoHS-compliant, the pure tin plating provides compatibility with lead (Pb)-free and lead-containing soldering processes. Solderability is specified for 2 years after production or requalification. The permitted storage time is 20 years. The immunity of the plating against tin whisker growth has been proven under extensive testing.

MATERIALS

Vishay acknowledges the following systems for the regulation of hazardous substances:

- IEC 62474, Material Declaration for Products of and for the Electrotechnical Industry, with the list of declarable substances given therein (2)
- The Global Automotive Declarable Substance List (GADSL) (3)
- The REACH regulation (1907/2006/EC) and the related list of substances with very high concern (SVHC) (4) for its supply chain

The products do not contain any of the banned substances as per IEC 62474, GADSL, or the SVHC list, see www.vishav.com/how/leadfree.

Hence the products fully comply with the following directives:

- 2000/53/EC End-of-Life Vehicle Directive (ELV) and Annex II (ELV II)
- 2011/65/EU Restriction of the Use of Hazardous Substances Directive (RoHS) with amendment 2015/863/EU
- 2012/19/EU Waste Electrical and Electronic Equipment Directive (WEEE)

Vishay pursues the elimination of conflict minerals from its supply chain, see the Conflict Minerals Policy at www.vishay.com/doc?49037.

APPROVALS

The resistors are approved within the IECQ-CECC Quality Assessment System for Electronic Components to the detail specification **EN 140401-801** which refers to **EN 60115-1**, **EN 60115-8** and the variety of environmental test procedures of the **IEC 60068** (1) series. The detail specification refers to the climatic category 55/125/56, which relates to the "standard operation mode" of this datasheet.

Conformity is attested by the use of the **CECC** logo () as the mark of conformity on the package label.

Vishay Beyschlag has achieved "Approval of Manufacturer" in accordance with IECQ 03-1. The release certificate for "Technology Approval Schedule" in accordance with CECC 240001 based on IECQ 03-3-1 is granted for the Vishay BEYSCHLAG manufacturing process.

RELATED PRODUCTS

For more information about products with better TCR and tighter tolerance please refer to the Precision Thin Film Chip Resistors datasheet (www.vishav.com/doc?28700).

Resistors are available with established reliability in accordance with EN 140401-801 version E. Please refer to the special datasheet (www.vishay.com/doc?28744) for information on failure rate level, available resistance ranges and order codes.

Precision chip resistor arrays may be used in voltage divider applications or precision amplifiers where close matching between multiple resistors is necessary. ACAS 0612 chip arrays are specified by the following datasheets:

- Professional type (www.vishay.com/doc?28754)
- Precision type (www.vishav.com/doc?28751)

Notes

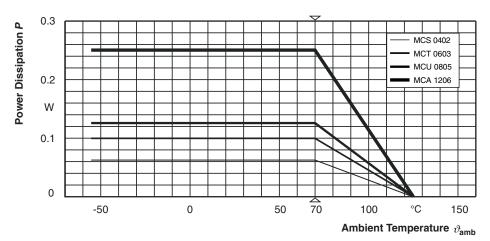
Revision: 16-Aug-16

- (1) The quoted IEC standards are also released as EN standards with the same number and identical contents.
- (2) The IEC 62474 list of declarable substances is maintained in a dedicated database, which is available at http://std.iec.ch/iec62474.
- (3) The Global Automotive Declarable Substance List (GADSL) is maintained by the American Chemistry Council and available at www.gadsl.org.
- (4) The SVHC list is maintained by the European Chemical Agency (ECHA) and available at http://echa.europa.eu/candidate-list-table.

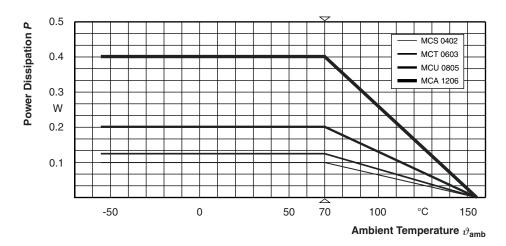
Vishay Beyschlag

www.vishay.com

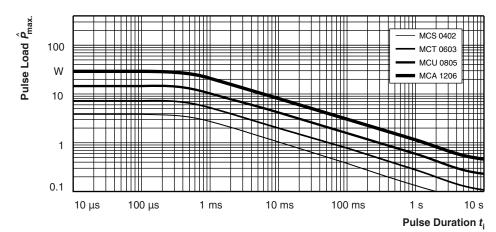
FUNCTIONAL PERFORMANCE



Derating - Standard Operation



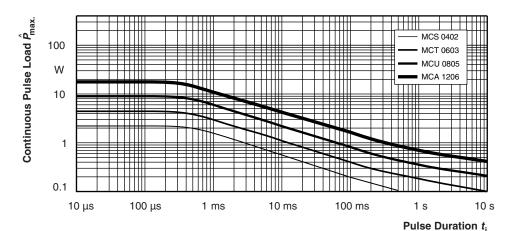
Derating - Power Operation



Maximum pulse load, single pulse; applicable if $\bar{P} \to 0$ and $n \le 1000$ and $\hat{U} \le \hat{U}_{max}$; for permissible resistance change equivalent to 8000 h operation in standard operation mode

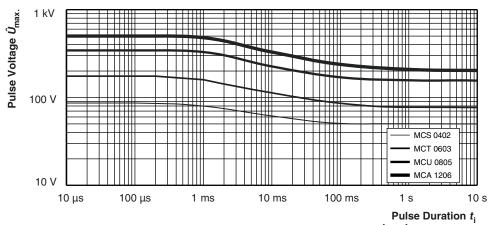
Single Pulse

ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishav.com/doc?91000



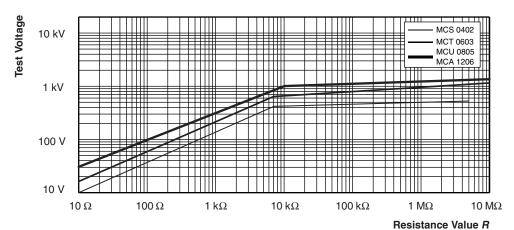
Maximum pulse load, continuous pulses; applicable if $\bar{P} \leq P\left(\mathcal{S}_{amb}\right)$ and $\hat{U} \leq \hat{U}_{max}$; for permissible resistance change equivalent to 8000 h operation in standard operation mode

Continuous Pulse



Maximum pulse voltage, single and continuous pulses; applicable if $P \leq P_{\text{max}}$; for permissible resistance change equivalent to 8000 h operation in standard operation mode

Pulse Voltage

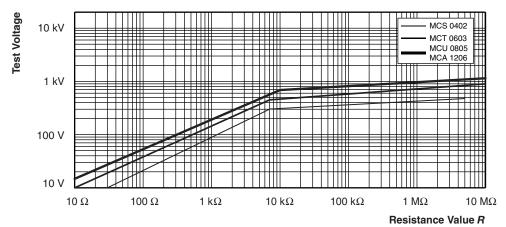


Pulse load rating in accordance with EN 60115-1 clause 4.27; 1.2 μ s/50 μ s; 5 pulses at 12 s interval; for permissible resistance change \pm (0.5 % R + 0.05 Ω)

1.2/50 Pulse

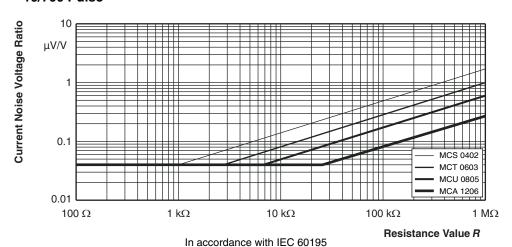
www.vishay.com

Vishay Beyschlag

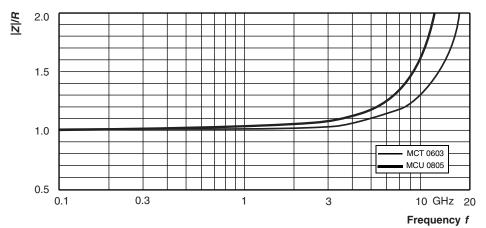


Pulse load rating in accordance with EN 60115-1 clause 4.27; 10 μ s/700 μ s; 10 pulses at 1 min intervals; for permissible resistance change \pm (0.5 % R + 0.05 Ω)

10/700 Pulse



Current Noise Voltage Ratio



Relative impedance for 49.9 Ω chip resistor

RF-Behavior



Vishay Beyschlag

TESTS AND REQUIREMENTS

All tests are carried out in accordance with the following specifications:

EN 60115-1, generic specification

EN 60115-8 (successor of EN 140400), sectional specification

EN 140401-801, detail specification

IEC 60068-2-xx, test methods

The components are approved under the IECQ-CECC quality assessment system for electronic components.

The parameters stated in the Test Procedures and Requirements table are based on the required tests and permitted limits of EN 140401-801. The table presents only the most important tests, for the full test schedule refer to the documents listed above. However, some additional tests and a number of improvements against those minimum requirements have been included.

The testing also covers most of the requirements specified by EIA/ECA-703 and JIS-C-5201-1.

The tests are carried out under standard atmospheric conditions in accordance with IEC 60068-1, 4.3, whereupon the following values are applied:

Temperature: 15 °C to 35 °C Relative humidity: 25 % to 75 %

Air pressure: 86 kPa to 106 kPa (860 mbar to 1060 mbar)

A climatic category LCT / UCT / 56 is applied, defined by the lower category temperature (LCT), the upper category temperature (UCT), and the duration of exposure in the damp heat, steady state test (56 days).

The components are mounted for testing on printed circuit boards in accordance with EN 60115-8, 2.4.2, unless otherwise specified.

EN 60115-1	IEC 60068-2 ⁽¹⁾	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (∆ <i>R</i>)		
CLAUSE	TEST METHOD			STABILITY CLASS 0.5	STABILITY CLASS 1	
			Stability for product types:			
			MCS 0402	10 Ω to 33.2 $k\Omega$	$>$ 33.2 k Ω to 4.99 M Ω	
			MCT 0603	10 Ω to 100 kΩ	1 Ω to < 10 Ω ; > 100 k Ω to 10 M Ω	
			MCU 0805	10 Ω to 221 k Ω	1 Ω to < 10 Ω ; > 221 k Ω to 10 M Ω	
			MCA 1206	10 Ω to 332 k Ω	1 Ω to < 10 Ω ; > 332 k Ω to 2 M Ω	
4.5	-	Resistance	-	± 1 % R; ± 0.5 % R		
4.8	-	Temperature coefficient	At (20 / -55 / 20) °C and (20 / 125 / 20) °C	± 50 ppm/K; ± 25 ppm/K		
		Endurance at 70 °C: standard	$U = \sqrt{P_{70} \times R}$ or $U = U_{\text{max.}}$; whichever is the less severe; 1.5 h on; 0.5 h off;			
		operation mode	70 °C; 1000 h	$\pm (0.25 \% R + 0.05 \Omega)$		
4.25.1	_		70 °C; 8000 h	± (0.5 % R	' + 0.05 Ω)	
		Endurance at 70 °C: power	$U = \sqrt{P_{70} \times R} \text{ or } U = U_{\text{max.}};$ whichever is the less severe; $1.5 \text{ h on; } 0.5 \text{ h off;}$			
		operation mode	70 °C; 1000 h	± (0.5 % R	$l+0.05 \Omega$)	
			70 °C; 8000 h	± (1 % R	+ 0.05 Ω)	
4.05.0		Endurance at	125 °C; 1000 h	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$	
4.25.3	-	upper category temperature	155 °C; 1000 h	$\pm~(0.5~\%~R~+~0.05~\Omega)$	± (1 % R + 0.05 Ω)	
4.24	78 (Cab)	Damp heat, steady state	(40 ± 2) °C; 56 days; (93 ± 3) % RH	± (0.5 % R + 0.05 Ω)	± (1 % R + 0.05 Ω)	



www.vishay.com

Vishay Beyschlag

EN 60115-1	IEC 60068-2 ⁽¹⁾	TEST	PROCEDURE		EMENTS : CHANGE (Δ <i>R</i>)
CLAUSE	TEST METHOD	1531	PROCEDURE	STABILITY CLASS 0.5	STABILITY CLASS 1
			Stability for product types:		
			MCS 0402	10 Ω to 33.2 $k\Omega$	$>$ 33.2 k Ω to 4.99 M Ω
			MCT 0603	10 Ω to 100 kΩ	1 Ω to < 10 Ω ; > 100 k Ω to 10 M Ω
			MCU 0805	10 Ω to 221 kΩ	1 Ω to < 10 Ω ; > 221 k Ω to 10 M Ω
			MCA 1206	10 Ω to 332 kΩ	1 Ω to < 10 Ω ; > 332 k Ω to 2 M Ω
4.23		Climatic sequence: standard operation mode:			
4.23.2	2 (Bb)	dry heat	125 °C; 16 h		
4.23.3	30 (Db)	damp heat, cyclic	55 °C; 24 h; > 90 % RH; 1 cycle		
4.23.4	1 (Ab)	cold	-55 °C; 2 h		
4.23.5	13 (M)	low air pressure	8.5 kPa; 2 h; (25 ± 10) °C	$\pm (0.5 \% R + 0.05 \Omega)$	± (1 % R + 0.05 Ω)
4.23.6	30 (Db)	damp heat, cyclic	55 °C; 24 h; > 90 % RH; 5 cycles		
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R} \le U_{\text{max.}};$ 1 min.		
-	1 (Aa)	Cold	-55 °C; 2 h	$\pm~(0.1~\%~R~+~0.01~\Omega)$	± (0.25 % R + 0.05 Ω)
4.19	14 (Na)	Rapid change of temperature	30 min at LCT and 30 min at UCT; LCT = -55 °C; UCT = 125 °C; 5 cycles	± (0.1 % R + 0.01 Ω) no visible damage	
		or tomporatare	LCT = -55 °C; UCT = 125 °C; 1000 cycles		R + 0.05 Ω) e damage
4.10		Short time overload: standard operation mode	$U = 2.5 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{\text{max}}$; whichever is the less severe; 5 s	± (0.1 % R + 0.01 Ω)	± (0.25 % R + 0.05 Ω)
4.13	-	Short time overload: power operation mode	$U = 2.5 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{\text{max}}$; whichever is the less severe; 5 s	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
4.27	-	Single pulse high voltage overload: standard operation mode	Severity no. 4: $U = 10 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{\text{max}}$; whichever is the less severe; 10 pulses 10 µs/700 µs		$R+0.05~\Omega$) e damage
4.39	_	Periodic electric overload: standard operation mode	$U = \sqrt{15 \times P_{70} \times R}$ or $U = 2 \times U_{\text{max}}$; 0.1 s on; 2.5 s off; whichever is the less severe; 1000 cycles		R + 0.05 Ω) e damage
4. 03	-	Periodic electric overload: power operation mode	$U = \sqrt{15 \times P_{70} \times R}$ or $U = 2 \times U_{max}$; 0.1 s on; 2.5 s off; whichever is the less severe; 1000 cycles	± (1 % R + 0.05 Ω) no visible damage	



www.vishay.com

Vishay Beyschlag

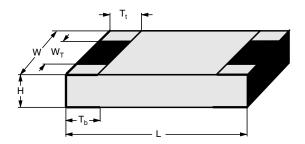
EN 60115-1	IEC 60068-2 ⁽¹⁾	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (∆ <i>R</i>)		
CLAUSE	TEST METHOD	1231	PROCEDURE	STABILITY CLASS 0.5	STABILITY CLASS 1	
			Stability for product types:			
			MCS 0402	10 Ω to 33.2 $k\Omega$	$>$ 33.2 k Ω to 4.99 M Ω	
			MCT 0603	10 Ω to 100 k Ω	1 Ω to < 10 Ω ; > 100 k Ω to 10 M Ω	
			MCU 0805	10 Ω to 221 k Ω	1 Ω to < 10 Ω ; > 221 k Ω to 10 M Ω	
			MCA 1206	10 Ω to 332 k Ω	1 Ω to < 10 Ω ; > 332 k Ω to 2 M Ω	
4.38	-	Electro static discharge (human body model)	IEC 61340-3-1 ⁽¹⁾ ; 3 pos. + 3 neg. (equivalent to MIL-STD-883, method 3015) MCS 0402: 500 V MCT 0603: 1000 V MCU 0805: 1500 V MCA 1206: 2000 V	± (0.5 % R + 0.05 Ω)		
4.22	6 (Fc)	Vibration	Endurance by sweeping; 10 Hz to 2000 Hz; no resonance; amplitude \leq 1.5 mm or \leq 200 m/s ² ; 7.5 h	± (0.1 % R + 0.01 Ω) no visible damage		
			Solder bath method; SnPb40; non-activated flux; (215 ± 3) °C; (3 ± 0.3) s	Good tinning (≥ 95 % covered); no visible damage		
4.17	58 (Td)	Solderability	Solder bath method; SnAg3Cu0.5 or SnAg3.5; non-activated flux; (235 ± 3) °C; (2 ± 0.2) s	Good tinning (≥ 95 % covered); no visible damage		
4.18	58 (Td)	Resistance to soldering heat	Solder bath method; (260 ± 5) °C; (10 ± 1) s	\pm (0.1 % R + 0.01 Ω) no visible damage	\pm (0.25 % R + 0.05 Ω) no visible damage	
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol +50 °C; method 2	No visibl	e damage	
4.00	04 (11)	Shear	MCS 0402 and MCT 0603: 9 N			
4.32	21 (Ue ₃)	(adhesion)	MCU 0805 and MCA 1206: 45 N	No visible damage		
4.33	21 (Ue ₁)	Substrate bending	Depth 2 mm, 3 times	\pm (0.1 % R + 0.01 Ω) no visible damage, no open circuit in bent position		
4.7	-	Voltage proof	$U_{\rm RMS} = U_{\rm ins}; (60 \pm 5) {\rm s}$	No flashover	or breakdown	
4.35	-	Flammability	IEC 60695-11-5 ⁽¹⁾ , needle flame test; 10 s	No burning after 30 s		

Note

⁽¹⁾ The quoted IEC standards are also released as EN standards with the same number and identical contents.

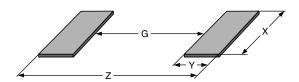
Vishay Beyschlag

DIMENSIONS



DIMENSI	DIMENSIONS AND MASS									
TYPE / SIZE	H (mm)	L (mm)	W (mm)	W _T (mm)	T _t (mm)	T _b (mm)	MASS (mg)			
MCS 0402	0.32 ± 0.05	1.0 ± 0.05	0.5 ± 0.05	> 75 % of W	0.2 + 0.1 / - 0.15	0.2 ± 0.1	0.6			
MCT 0603	0.45 + 0.1 / - 0.05	1.55 ± 0.05	0.85 ± 0.1	> 75 % of W	0.3 + 0.15 / - 0.2	0.3 + 0.15 / - 0.2	1.9			
MCU 0805	0.45 + 0.1 / - 0.05	2.0 ± 0.1	1.25 ± 0.15	> 75 % of W	0.4 + 0.1 / - 0.2	0.4 + 0.1 / - 0.2	4.6			
MCA 1206	0.55 ± 0.1	3.2 + 0.1 / - 0.2	1.6 ± 0.15	> 75 % of W	0.5 ± 0.25	0.5 ± 0.25	9.2			

SOLDER PAD DIMENSIONS



RECOMMENDED SOLDER PAD DIMENSIONS									
	WAVE SOLDERING				REFLOW SOLDERING				
TYPE / SIZE	G (mm)	Y (mm)	X (mm)	Z (mm)	G (mm)	Y (mm)	X (mm)	Z (mm)	
MCS 0402	-	-	-	-	0.35	0.55	0.55	1.45	
MCT 0603	0.55	1.10	1.10	2.75	0.65	0.70	0.95	2.05	
MCU 0805	0.80	1.25	1.50	3.30	0.90	0.90	1.40	2.70	
MCA 1206	1.40	1.50	1.90	4.40	1.50	1.15	1.75	3.80	

Notes

- The given solder pad dimensions reflect the considerations for board design and assembly as outlined e.g. in standards IEC 61188-5-x (1), or in publication IPC-7351.
- (1) The quoted IEC standards are also released as EN standards with the same number and identical contents.

Vishay Beyschlag

HISTORICAL 12NC INFORMATION

- The resistors had a 12-digit numeric code starting with 2312.
- The subsequent 4 digits indicated the resistor type, specification and packaging; see the 12NC table.
- The remaining 4 digits indicated the resistance value:
 - The first 3 digits indicated the resistance value.
 - The last digit indicated the resistance decade in accordance with the last digit of 12NC indicating resistance decade table.

Last Digit of 12NC Indicating 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 M Ω to 99.9 M Ω	6

Historical 12NC example

The 12NC of a MCT 0603 resistor, value 47 k Ω and TCR 50 with \pm 1 % tolerance, supplied in cardboard tape of 5000 units per reel was: 2312 215 14703.

HISTORICAL 12NC - Resistor type and packaging								
	DESCRIPTION		2312					
DESCRIPTION			CA	RDBOARD TAPE ON R	EEL			
ТҮРЕ	TYPE TCR TOL.			E0 (10 000 UNITS)	PW (20 000 UNITS)			
	. FO nam //	± 1 %	-	275 1	-			
MCS 0402	± 50 ppm/K	± 0.5 %	-	275 5	-			
WICS 0402	± 25 ppm/K	± 0.5 %	-	276 5	-			
	Jumper	-	-	275 90001	-			
	50 mm/l/	± 1 %	215 1	-	205 1			
MCT 0603	± 50 ppm/K	± 0.5 %	215 5	-	205 5			
WC1 0603	± 25 ppm/K	± 0.5 %	216 5	-	206 5			
	Jumper	-	215 90001	-	205 90001			
	± 50 ppm/K	± 0.5 %	255 5	-	245 5			
MCU 0805	± 25 ppm/K	± 0.5 %	256 5	-	246 5			
	Jumper	-	255 90001	-	245 90001			



Legal Disclaimer Notice

Vishay

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Revision: 13-Jun-16 1 Document Number: 91000

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Vishay manufacturer:

Other Similar products are found below:

RER60F3010RC02 RER75F2260PCSL RER75F6R49RC02 RER70F75R0RC02 RER65F5111RC02 C52TF15R0JB VS-8ETH06PBF

DG1413EQ-T1-GE3 CRA04S0837K50JTD CRA06S08382K0JTA CRA06P08327R0JTA RER60F2430RC02 RER70FR100MC02

RER65F4870RC02 RER50F18R7RC02 M8340107K4751FGD03 M8340108K1052FGD03 CRA06S083180KJTA CRA06S083220KJTA

DG211BDY CRA04S08368K0JTD VS-60EPS08PBF CRA06S0835K60JTA IH10EB600K12 VS-MBRB1545CTPBF VS-60CTQ150-N3

CNY651AGRST CRA04S0833K90JTD 1KAB100E D55342H07B10E0RT5 516D477M016MN6AE3 BFC237852224 VJ0402A4R7CNAAJ

CRA04S08322K0JTD RS02C30K00FB12 TLHK5400 CRA04S08336R0JTD IRF644 PTN0805H40R2BBT1 516D227M016MM6AE3

MKP1848C65090JY5L CRA04S08320K0JTD 516D476M035LM6AE3 CRA04S08318K0JTD SIA406DJ-T1-GE3 CRA06P08318R0JTA

CRA06S0834K30JTA CRA06S083360RJTA 562R5GAD47RR VJ1825A223FXAAT