

High Precision Thin Film Leaded Resistors



DESCRIPTION

A homogenous film of metal alloy is deposited on a high grade ceramic body. After a helical groove has been cut in the resistive layer, tinned connecting wires of electrolytic copper are welded to the end-caps. The resistors are coated with lacquer which provides electrical, mechanical, and climatic protection.

FEATURES

- High precision resistors (TCR up to ± 5 ppm/K, 0.01 % tol.)
- High stability (0.05 %)
- Low temperature coefficient (up to ± 5 ppm/K)
- Lead (Pb)-free solder contacts
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compliant to RoHS directive 2002/95/EC


RoHS
COMPLIANT

APPLICATIONS

- Test and measurement
- Telecom

TECHNICAL SPECIFICATIONS

DESCRIPTION	MPR24	
CECC Size, DIN Size	B, 0207	
Resistance Range	10 Ω to 1 M Ω	
Resistance Tolerance	± 0.05 %; ± 0.02 %; ± 0.01 %	± 0.5 %; ± 0.25 %; ± 0.1 %
Temperature Coefficient	± 25 ppm/K; ± 15 ppm/K; ± 10 ppm/K; ± 05 ppm/K	
Climatic Category (LCT/UCT/Days)	55/125/56	55/155/56
Rated Dissipation, P_{70}	0.125 W	0.25 W
Operating Voltage, U_{max} AC/DC	250 V	
Film Temperature	125 °C	155 °C
Max. Resistance Change for Resistance Range, ΔR max., After:		
Load (1000 h, P_{70})	$\pm (0.05 \% R + 0.01 \Omega)$	
Long Term Damp Heat Test (56 Days)	$\pm (0.05 \% R + 0.01 \Omega)$	
Soldering (10 s, 260 °C)	$\pm (0.01 \% R + 0.01 \Omega)$	
Permissible Voltage Against Ambient :		
1 Minute; U_{ins}	500 V	
Continuous	75 V	
Failure Rate	$\leq 0.1 \times 10^{-9}/h$	

PART NUMBER AND PRODUCT DESCRIPTION
PART NUMBER: MPR24000E1001DC100

M	P	R	2	4	0	0	0	E	1	0	0	1	D	C	1	0	0
MODEL/SIZE MPR2400			VARIANT 0 = Neutral			TCR Z = ± 5 ppm/K Y = ± 10 ppm/K X = ± 15 ppm/K E = ± 25 ppm/K			VALUE 3 digit value 1 digit multiplier MULTIPLIER 9 = *10 ⁻¹ 2 = *10 ² 0 = *10 ⁰ 3 = *10 ³ 1 = *10 ¹ 4 = *10 ⁴			TOLERANCE T = ± 0.01 % H = ± 0.02 % A = ± 0.05 % B = ± 0.1 % C = ± 0.25 % D = ± 0.5 %			PACKAGING (1) RP CU C1		SPECIAL Up to 2 digits 00 = Standard

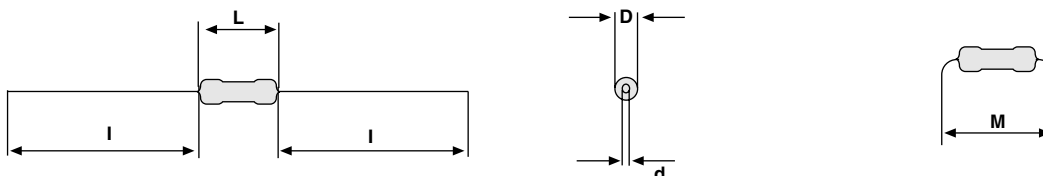
PRODUCT DESCRIPTION: MPR24 - 25 0.5 % C1 1K0

MPR24	25	0.5 %	C1	1K0
MODEL/SIZE MPR24	TCR ± 5 ppm/K ± 10 ppm/K ± 15 ppm/K ± 25 ppm/K	TOLERANCE ± 0.01 % ± 0.02 % ± 0.05 % ± 0.1 % ± 0.25 % ± 0.5 %	PACKAGING (1) RP CU C1	RESISTANCE VALUE 1K0 = 1 kΩ 50R5 = 50.5 Ω

Notes

(1) Please refer to table PACKAGING for complete information

- The PART NUMBER is shown to facilitate the introduction of a unified part numbering system for ordering products

DIMENSIONS

DIMENSIONS - Leaded resistor types, mass and relevant physical dimensions

TYPE	D _{max.} (mm)	L _{max.} (mm)	d _{nom.} (mm)	I _{min.} (mm)	M _{min.} (mm)	MASS (mg)
MPR 24	2.5	6.3	0.6	28.0	7.5	220

SCRIPT MARKING (2)
TEMPERATURE COEFFICIENT AND TOLERANCE - Printed resistance value and letter coding

RESISTANCE VALUE	TOL. (%)	LETTER CODE	TCR (ppm/K)	LETTER CODE
Clear text code for value	± 0.5	D	± 25	E
	± 0.25	C	± 15	F
	± 0.1	B	± 10	B
	± 0.05	A	± 05	A
	± 0.02	P	-	-
	± 0.01	T	-	-

Note

(2) Resistors of TCR ± 25 ppm/K in combination with tolerances ± 0.5 %, ± 0.25 % and ± 0.1 % are only available with color coding in accordance with IEC 60062.

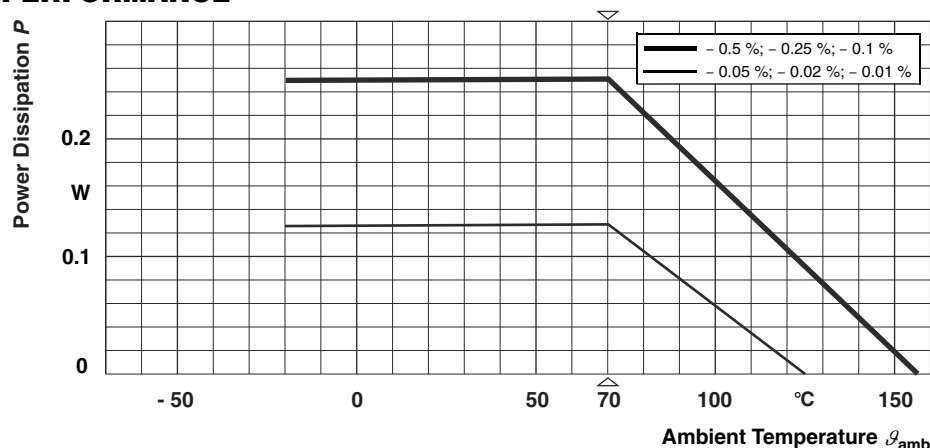
TEMPERATURE COEFFICIENT AND RESISTANCE RANGE		
DESCRIPTION		RESISTANCE VALUE ⁽²⁾
TCR ⁽¹⁾	TOLERANCE	MPR24
± 25 ppm/K	± 0.5 %	10 Ω to 1 MΩ
	± 0.25 %	10 Ω to 1 MΩ
	± 0.1 %	10 Ω to 1 MΩ
	± 0.05 %	24 Ω to 100 kΩ
	± 0.02 %	24 Ω to 100 kΩ
	± 0.01 %	24 Ω to 100 kΩ
± 15 ppm/K	± 0.5 %	10 Ω to 1 MΩ
	± 0.25 %	10 Ω to 1 MΩ
	± 0.1 %	10 Ω to 1 MΩ
	± 0.05 %	24 Ω to 100 kΩ
	± 0.02 %	24 Ω to 100 kΩ
	± 0.01 %	24 Ω to 100 kΩ
± 10 ppm/K	± 0.5 %	10 Ω to 1 MΩ
	± 0.25 %	10 Ω to 1 MΩ
	± 0.1 %	10 Ω to 1 MΩ
	± 0.05 %	24 Ω to 100 kΩ
	± 0.02 %	24 Ω to 100 kΩ
	± 0.01 %	24 Ω to 100 kΩ
± 5 ppm/K	± 0.5 %	10 Ω to 1 MΩ
	± 0.25 %	10 Ω to 1 MΩ
	± 0.1 %	10 Ω to 1 MΩ
	± 0.05 %	24 Ω to 100 kΩ
	± 0.02 %	24 Ω to 100 kΩ
	± 0.01 %	24 Ω to 100 kΩ

Notes

⁽¹⁾ The temperature coefficient is specified over the temperature range + 20 °C to + 70 °C

⁽²⁾ Resistance values to be selected from E192 series, for other values please contact the factory

PACKAGING				
MODEL	REEL		BOX	
	PIECES/REEL	CODE	PIECES/BOX	CODE
MPR24	5000	RP	100 1000	CU C1

FUNCTIONAL PERFORMANCE

Derating (Depending on Resistance Tolerances)

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with the following specifications:

EN 60115-1, Generic specification (includes tests)

EN 140100, Sectional specification (includes schedule for qualification approval)

CECC 40101-806, Detail specification (includes schedule for conformance inspection)

Most of the components are approved in accordance with the European CECC-system, where applicable. The following table contains only the most important tests. For the full test schedule refer to the documents listed above. The testing also covers most of the requirements specified by EIA/IS-703 and JIS-C-5202.

The tests are carried out in accordance with IEC 60068-2-xx test method and under standard atmospheric conditions in accordance with IEC 60068-1, 5.3. Climatic category

LCT/UCT/56 (rated temperature range: Lower category temperature, upper category temperature; damp heat, long term, 56 days) is valid.

Unless otherwise specified the following values apply:

Temperature: 15 °C to 35 °C

Relative humidity: 45 % to 75 %

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

For testing the components are mounted on a test board in accordance with IEC 60115-1, 4.31 unless otherwise specified.

In the Test Procedures and Requirements table only the tests and requirements are listed with reference to the relevant clauses of IEC 60115-1 and IEC 60068-2-xx test methods. A short description of the test procedure is also given.

TEST PROCEDURES AND REQUIREMENTS					
IEC 60115-1 CLAUSE	IEC 60068-2-xx TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)	
			Stability for product types:	24 Ω to 100 k Ω	4.99 Ω to < 24 Ω ; > 100 k Ω to 1 M Ω
4.5	-	Resistance ($\Delta R/R$)	-	$\pm 0.5\%$; $\pm 0.25\%$; $\pm 0.1\%$; $\pm 0.05\%$; $\pm 0.02\%$; $\pm 0.01\%$	$\pm 0.5\%$; $\pm 0.25\%$; $\pm 0.1\%$
4.8	-	Temperature coefficient	At 20/70/20 °C	± 25 ppm/K; ± 15 ppm/K; ± 10 ppm/K; ± 05 ppm/K	
			At 20/LCT/20 °C and 20/UCT/20 °C	± 25 ppm/K	
4.25.1	-	Endurance at 70 °C	$U = \sqrt{P_{70} \times R}$ or $U = U_{max.}$; 1.5 h ON; 0.5 h OFF 70 °C; 2000 h	$\pm (0.05\% R + 0.01 \Omega)$	
4.24	78 (Cab)	Damp heat, steady state	(40 \pm 2) °C; 56 days; (93 \pm 3) % RH	$\pm (0.05\% R + 0.01 \Omega)$	
4.23		Climatic sequence:			
4.23.2	2 (Ba)	Dry heat	125 °C; 16 h		
4.23.3	30 (Db)	Damp heat, cyclic	55 °C; 24 h; 90 % to 100 % RH; 1 cycle		
4.23.4	1 (Aa)	Cold	- 55 °C; 2 h		
4.23.5	13 (M)	Low air pressure	8.5 kPa; 2 h; 15 °C to 35 °C		

TEST PROCEDURES AND REQUIREMENTS					
IEC 60115-1 CLAUSE	IEC 60068-2-xx TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)	
			Stability for product types:	24 Ω to 100 k Ω	4.99 Ω to < 24 Ω ; > 100 k Ω to 1 M Ω
4.23.6	30 (Db)	Damp heat, cyclic	55 °C; 5 days; 95 % to 100 % RH; 5 cycles	$\pm (0.05 \% R + 0.01 \Omega)$ no visible damage	
4.13	-	Short time overload	Room temperature; $U = 2.5 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{\max.}$; 5 s	$\pm (0.01 \% R + 0.01 \Omega)$ no visible damage	
4.19	14 (Na)	Rapid change of temperature	30 min at LCT = - 55 °C and 30 min at UCT = 155 °C 5 cycles 200 cycles	$\pm (0.01 \% R + 0.01 \Omega)$ $\pm (0.25 \% R + 0.05 \Omega)$	
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol + 23 °C; toothbrush method	marking legible; no visible damage	
4.18.2	20 (Tb)	Resistance to soldering heat	Unmounted components; (260 \pm 3) °C; (10 \pm 1) s	$\pm (0.01 \% R + 0.01 \Omega)$ no visible damage	
4.17	20 (Ta)	Solderability	+ 235 °C; 2 s solder bath method; SnPb40	Good tinning (\geq 95 % covered, no visible damage)	
			+ 245 °C; 3 s solder bath method; SnAg3Cu0.5		
4.22	6 (B4)	Vibration	6 h; 10 Hz to 2000 Hz 1.5 mm or 196 m/s ²	$\pm (0.01 \% R + 0.01 \Omega)$; no visible damage	
4.16	21 (Ua) 21 (Ub) 21 (Uc)	Robustness of terminations	Tensile, bending and torsion	$\pm (0.01 \% R + 0.01 \Omega)$; no visible damage	
4.7	-	Voltage proof	$U_{\text{RMS}} = U_{\text{ins.}}$; 60 s	No flashover or breakdown	
4.12	-	Noise	IEC 60195: $R \leq 100 \text{ k}\Omega$ $R > 100 \text{ k}\Omega$	max. 0.25 $\mu\text{V/V}$ max. 0.5 $\mu\text{V/V}$	
4.40	-	Electrostatic discharge (human body model)	IEC 61340-3-1; 3 pos. + 3 neg. 4 kV	$\pm (0.5 \% + 0.05 \Omega)$	

12NC INFORMATION FOR HISTORICAL CODING REFERENCE

- The resistors have a 12-digit numeric code starting with 2322 14.
- The subsequent 3 digits indicate the resistor type, specification and packaging; see the 12NC table.
- The remaining 3 digits indicate the resistance value. The number is available upon request and is fixed by the supplier.

12NC Example

The 12NC of an MPR24 resistor with tolerance of $\pm 0.02\%$ and TCR ± 05 ppm/K, taped on bandolier in box of 100 units starts with 2322 141 77...; the last 3 digits are available upon request and are fixed by the supplier.

12NC - Resistor type and packaging					
DESCRIPTION			2322 14.		
			BANDOLIER IN BOX	BANDOLIER IN BOX	BANDOLIER ON REEL
TYPE	TCR	TOL.	100 units	1000 units	5000 units
MPR24	± 25 ppm/K	$\pm 0.5\%$	1 00...	1 10...	3 10...
		$\pm 0.25\%$	1 20...	1 30...	3 30...
		$\pm 0.1\%$	1 40...	1 50...	3 50...
		$\pm 0.05\%$	1 64...	3 64...	-
		$\pm 0.02\%$	1 74...	3 74...	-
		$\pm 0.01\%$	1 84...	3 84...	-
	± 15 ppm/K	$\pm 0.5\%$	1 05...	1 15...	3 15...
		$\pm 0.25\%$	1 25...	1 35...	3 35...
		$\pm 0.1\%$	1 45...	1 55...	3 55...
		$\pm 0.05\%$	1 65...	3 65...	-
		$\pm 0.02\%$	1 75...	3 75...	-
		$\pm 0.01\%$	1 85...	3 85...	-
	± 10 ppm/K	$\pm 0.5\%$	1 06...	1 16...	3 16...
		$\pm 0.25\%$	1 26...	1 36...	3 36...
		$\pm 0.1\%$	1 46...	1 56...	3 56...
		$\pm 0.05\%$	1 66...	3 66...	-
		$\pm 0.02\%$	1 76...	3 76...	-
		$\pm 0.01\%$	1 86...	3 86...	-
	± 5 ppm/K	$\pm 0.5\%$	1 07...	1 17...	3 17...
		$\pm 0.25\%$	1 27...	1 37...	3 37...
		$\pm 0.1\%$	1 47...	1 57...	3 57...
		$\pm 0.05\%$	1 67...	3 67...	-
		$\pm 0.02\%$	1 77...	3 77...	-
		$\pm 0.01\%$	1 87...	3 87...	-



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.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9