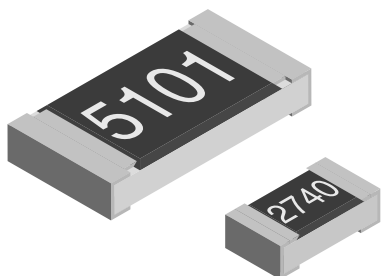


Thin Film, Rectangular, Resistor Chips



FEATURES

- Metal film layer on high quality ceramic
- Protective top coat
- Pure tin on nickel barrier layer
- Low temperature coefficient and tight tolerances
- 56 days at 40 °C and 93 % relative humidity down to $\leq \pm 0.2 \%$



STANDARD ELECTRICAL SPECIFICATIONS									
MODEL	SIZE		POWER RATING P _{70 °C}		LIMITING ELEMENT VOLTAGE MAX. V _≡	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	E-SERIES
	INCH	METRIC	EN 140 401-801	EIA 575					
M10	0402	1005	0.063	0.063	25	± 25	± 0.5; ± 1	10R - 20K	24 - 96
						± 50	± 0.5	10R - 20K	
M11	0603	1608	0.1	0.063	75	± 25	± 0.1; ± 0.25; ± 0.5; ± 1	10R - 56K	24 - 96
						± 50	± 0.1; ± 0.25; ± 0.5;	10R - 56K	
M12	0805	2012	0.125	0.1	150	± 25	± 0.1; ± 0.25; ± 0.5; ± 1	10R - 100K	24 - 96
						± 50	± 0.1; ± 0.25; ± 0.5;	10R - 100K	
M25	1206	3216	0.25	0.125	200	± 25	± 0.1; ± 0.25; ± 0.5; ± 1	10R - 220K	24 - 96
						± 50	± 0.1; ± 0.25; ± 0.5;	10R - 220K	

Notes:

- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material
- Marking: 4 digits, M10 - no marking

TECHNICAL SPECIFICATIONS									
PARAMETER	UNIT	M10		M11		M12		M25	
Rated Dissipation at 70 °C (EN 140 401-801 EIA 575)	W	0.063		0.1	0.063	0.125	0.1	0.25	0.125
Limiting Element Voltage ⁽²⁾	V _≡	25		75		150		200	
Insulation Voltage (1 min)	V _{dc/ac peak}	> 50		> 100		> 200		> 300	
Thermal Resistance ⁽¹⁾	K/W	≤ 870 ⁽¹⁾	-	≤ 550 ⁽¹⁾	-	≤ 440 ⁽¹⁾	-	≤ 220 ⁽¹⁾	-
Insulation Resistance	Ω	> 10 ⁹							
Category Temperature Range	°C	- 55 to + 125 (+ 155)							
Failure Rate	h ⁻¹	0.3 x 10 ⁻⁹							
Weight/1000 pieces	g	0.65		2		5.5		10	

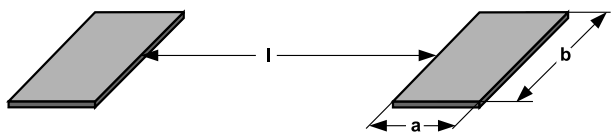
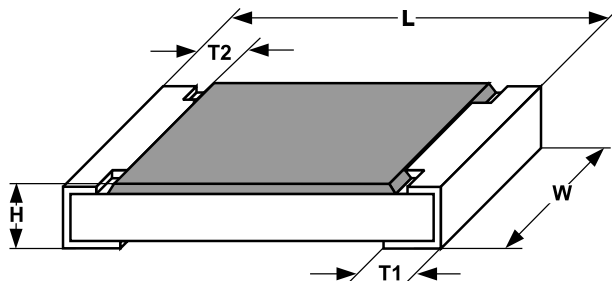
Notes:

⁽¹⁾ Measuring conditions in acc. with EN 140 401-801

⁽²⁾ Rated voltage: $\sqrt{P \times R}$



DIMENSIONS



SIZE		DIMENSIONS [in millimeters]				
INCH	METRIC	L	W	H	T1	T2
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.1	0.2 ± 0.1
0603	1608	$1.55^{+0.10}_{-0.05}$	0.85 ± 0.1	0.45 ± 0.05	0.30 ± 0.2	0.3 ± 0.2
0805	2012	$2.0^{+0.20}_{-0.10}$	1.25 ± 0.15	0.45 ± 0.05	$0.30^{+0.20}_{-0.10}$	0.3 ± 0.2
1206	3216	$3.2^{+0.10}_{-0.20}$	1.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2

		SOLDER PAD DIMENSIONS [in millimeters]					
SIZE		REFLOW			WAVE SOLDERING		
INCH	METRIC	a	b	l	a	b	l
0402	1005	0.4	0.6	0.5			
0603	1608	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	0.7	1.4	1.2	0.9	1.3	1.3
1206	3216	0.9	1.7	2.0	1.1	1.7	2.3

PART NUMBER AND PRODUCT DESCRIPTION

PART NUMBERING: M1004020D5620DP000

M	1	0	0	4	0	2	0	D	5	6	2	0	D	P	0	0	0
MODEL/SIZE		SPECIAL CHARACTER			TCR			VALUE			TOLERANCE		PACKAGING ⁽¹⁾		SPECIAL		
M100402 M110603 M120805 M251206		0 = Neutral			D = ± 25 ppm/K C = ± 50 ppm/K			3 digit value 1 digit multiplier Multiplier 8 = *10 ⁻² 9 = *10 ⁻¹ 0 = *10 ⁰ 1 = *10 ¹ 2 = *10 ² 3 = *10 ³			B = ± 0.1 % C = ± 0.25 % D = ± 0.5 % F = ± 1 %		P0 P1 P5 PN PZ		Up to 2 digits 00 = standard		

PRODUCT DESCRIPTION: M10 25 562R 0.5 % P0

M10	25	562R	0.5 %	P0
MODEL	TCR	RESISTANCE VALUE	TOLERANCE	PACKAGING ⁽¹⁾
M10 M11 M12 M25	± 25 ppm/K ± 50 ppm/K	49K9 = 49.9 k Ω 5R1 = 5.1 Ω	± 0.1 % ± 0.25 % ± 0.5 % ± 1 %	P0 P1 P5 PN PZ

Notes:

(1) Please refer to table PACKAGING, page 146

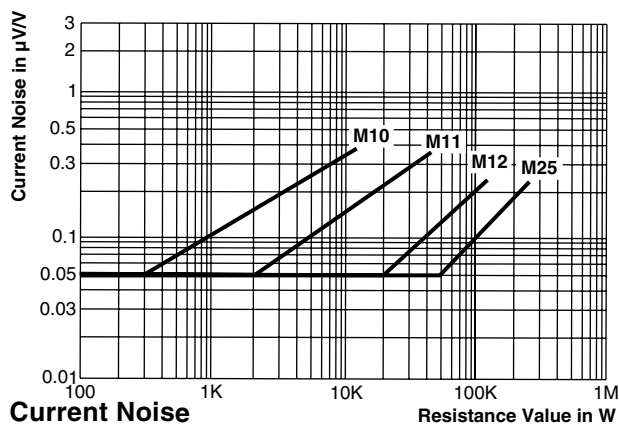
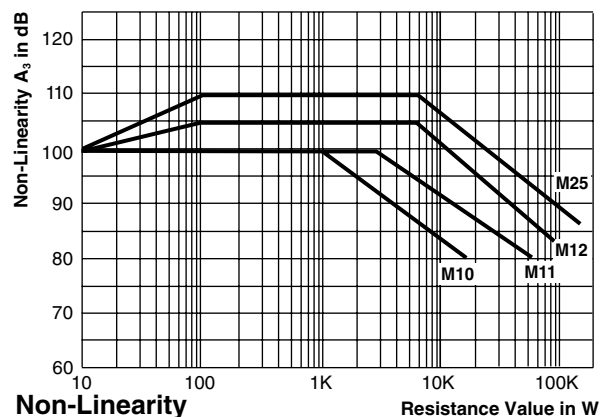
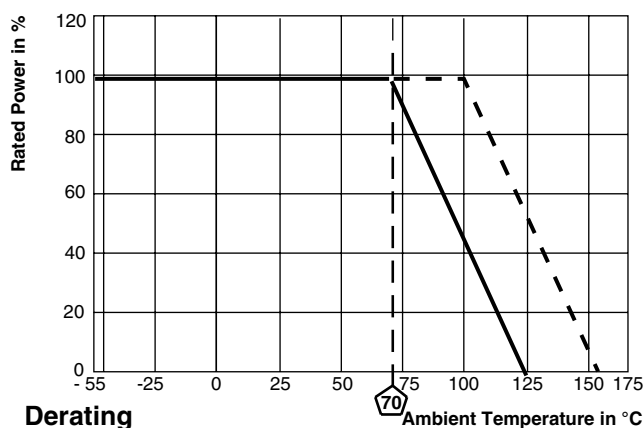
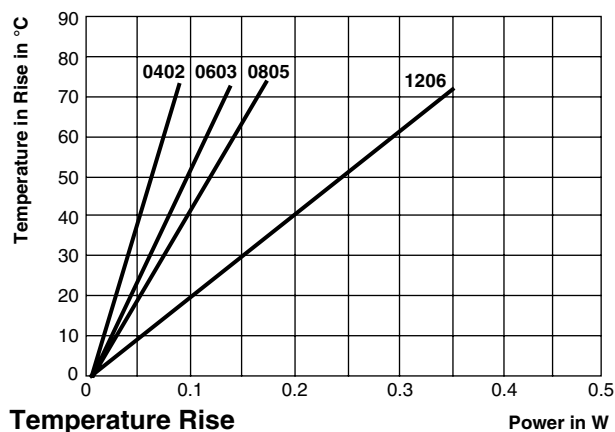
(2) Products can be ordered using either the PRODUCT DESCRIPTION or the PART NUMBER

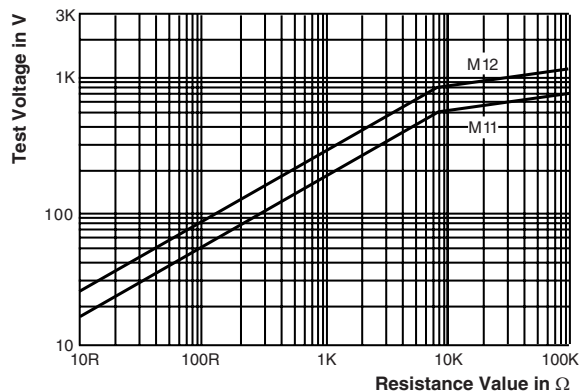
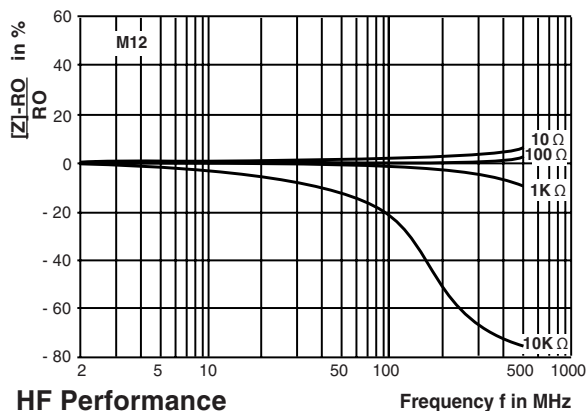
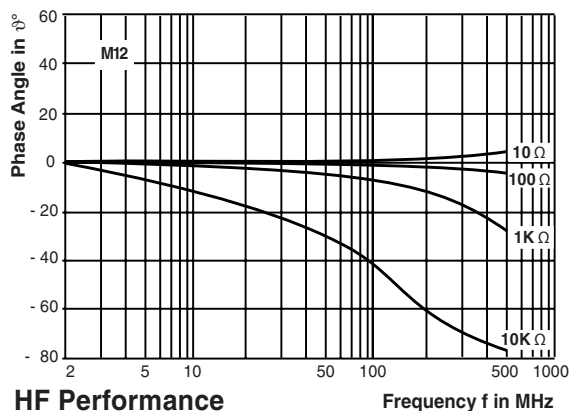
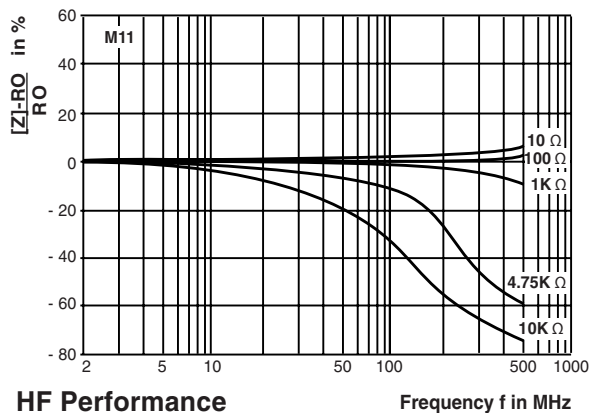
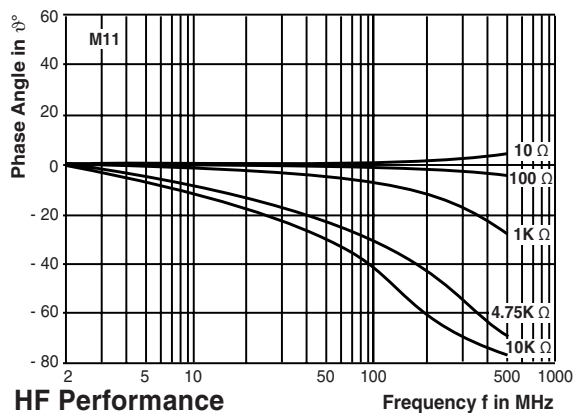


PACKAGING				
MODEL	REEL			
	TAPE WIDTH	DIAMETER	PIECES/REEL	PACKING CODE
				PAPER
M10	8 mm	180 mm/7" 330 mm/13"	10 000 50 000	P0 PZ
M11 M12 M25	8 mm	180 mm/7" 180 mm/7" 330 mm/13"	1000 ⁽¹⁾ 5000 20 000	P1 P5 PN

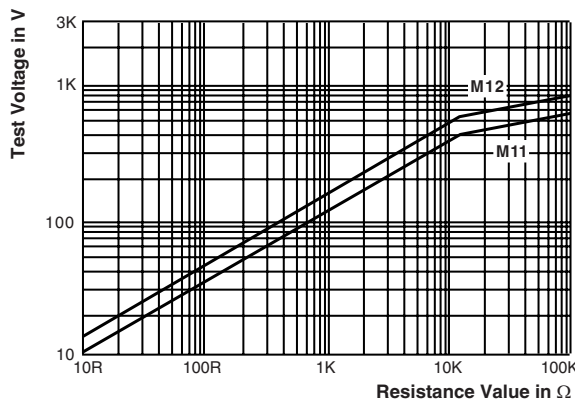
Note:

⁽¹⁾ For $\leq$ TCR 25 ppm/K and Tolerance $\leq$ 0.1 % only

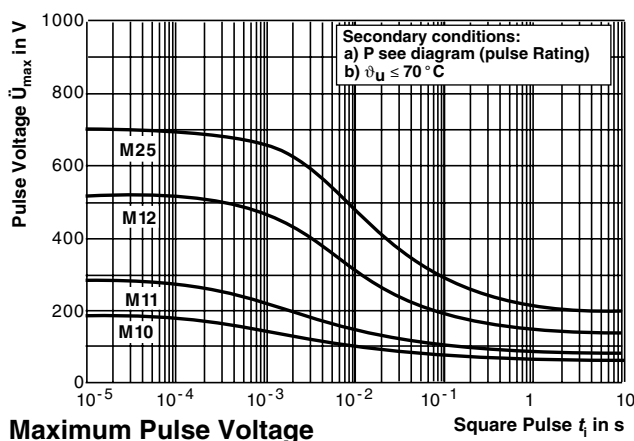
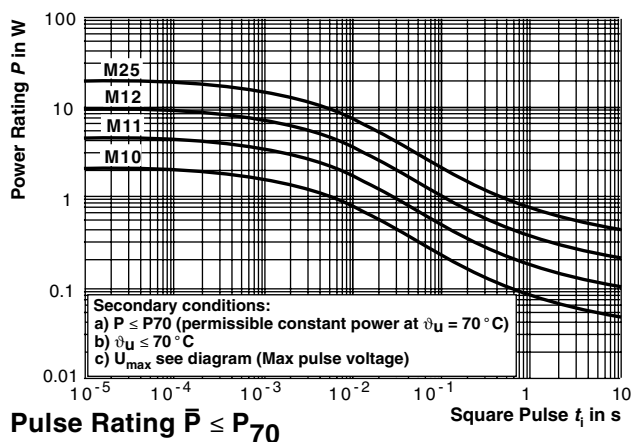
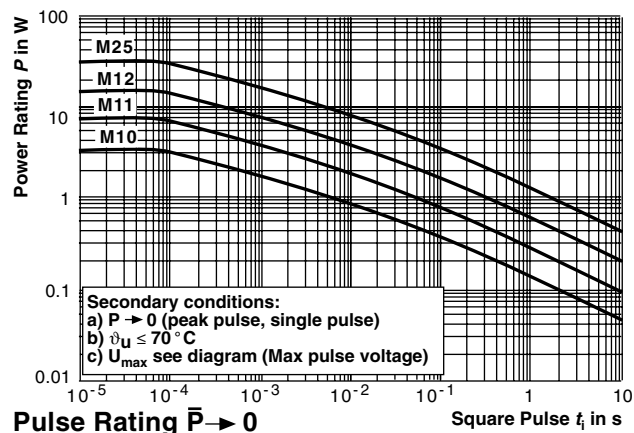




Single-Pulse High Voltage Overload Test
1.2/50 μ s EN140000 4.27



Single-Pulse High Voltage Overload Test
10/700 μ s EN140000 4.27



ASSEMBLY

The suitability of conformal coatings, if applied, shall be qualified by appropriate means to ensure the long-term stability of the whole system.



PERFORMANCE			
TEST	CONDITIONS OF TEST	TEST RESULTS	
		TOLERANCES	
		$\pm 0.1 \% / \pm 0.25 \%$	$\pm 0.5 \% / \pm 1.0 \%$
Endurance Test at 70 °C IEC 60115-1 4.25.1	1000 h at 70 °C, 1.5 h "ON", 0.5 h "OFF"	$\leq \pm 0.2 \%$	$\leq \pm 0.5 \%$
Endurance at UCT IEC 60115-1 4.25.3	1000 h at 125 °C without load	$\leq \pm 0.2 \%$	$\leq \pm 0.5 \%$
Overload Test IEC 60115-1 4.13	Short time overload for 2 s 2.5 x rated voltage or ≤ 2 x limiting element voltage	$\leq \pm 0.05 \%$	$\leq \pm 0.1 \%$
Thermal Shock IEC 60115-1 4.19, IEC 60068-2-14	Rapid change between upper and lower category temperature	$\leq \pm 0.05 \%$	$\leq \pm 0.1 \%$
Damp Heat Steady State IEC 60115-1 4.24, IEC 60068-2-3	56 days at 40 °C and 93 % relative humidity	$\leq \pm 0.2 \%$	$\leq \pm 0.5 \%$
Resistance to Soldering Heat IEC 60115-1 4.18, IEC 60068-2-20	10 s at 260 °C solder bath temperature	$\leq \pm 0.05 \%$	$\leq \pm 0.2 \%$

APPLICABLE SPECIFICATIONS
• CECC40000/40400/40401-801 • EN140400/IEC 60115 - 1/EN 140 401-801



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.