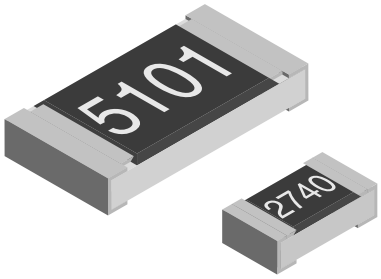
Thin Film, Rectangular, Resistor Chips



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 ≤ ± 0.2 %

RoHS COMPLIANT

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

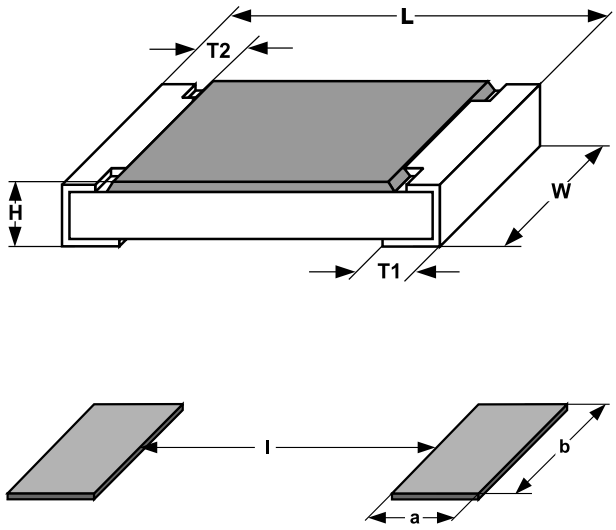
PARAMETER	UNIT	M10		M11		M12		M25	
Rated Dissipation at 70 °C (EN 140 401-801| EIA 575)	W	0.063		0.1	0.063	0.125	0.1	0.25	0.125
Limiting Element Voltage (2)	V≅	25		75		150		200	
Insulation Voltage (1 min)	$V_{dc/ac\ peak}$	> 50		> 100		> 200		> 300	
Thermal Resistance (1)	K/W	≤ 870 (1)	-	≤ 550 (1)	-	≤ 440 (1)	-	≤ 220 (1)	-
Insulation Resistance	Ω	$> 10^9$							
Category Temperature Range	°C	- 55 to + 125 (+ 155)							
Failure Rate	h^{-1}	0.3×10^{-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

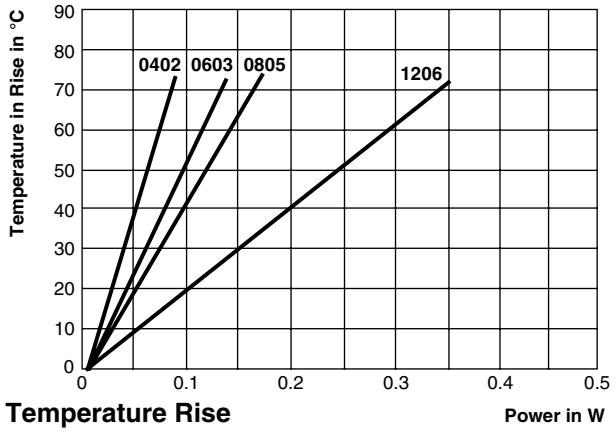
M10	25	562R	0.5 %	P0
MODEL	TCR	RESISTANCE VALUE	TOLERANCE	PACKAGING (1)
M10 **M11** **M12** **M25**	± **25** ppm/K ± **50** ppm/K	**49K9** = 49.9 kΩ **5R1** = 5.1 Ω	± **0.1** % ± **0.25** % ± **0.5** % ± **1** %	**P0** **P1** **P5** **PN** **PZ**

Notes:
(1) Please refer to table PACKAGING, page 146
(2) Products can be ordered using either the PRODUCT DESCRIPTION or the PART NUMBER

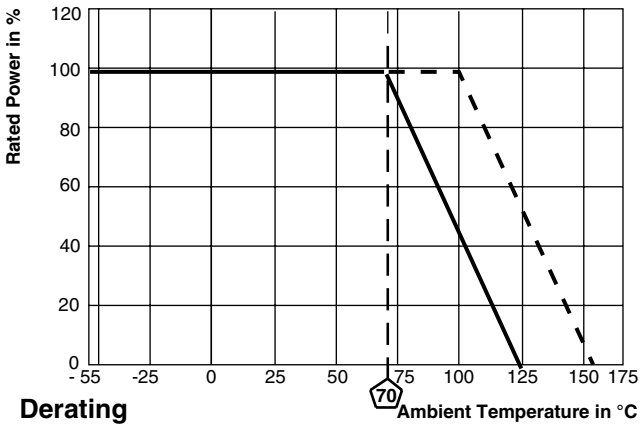
PACKAGING

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

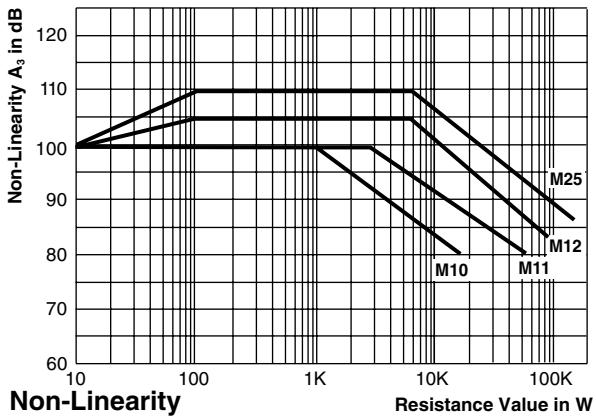
Note:
(1) For ≤ TCR 25 ppm/K and Tolerance ≤ 0.1 % only



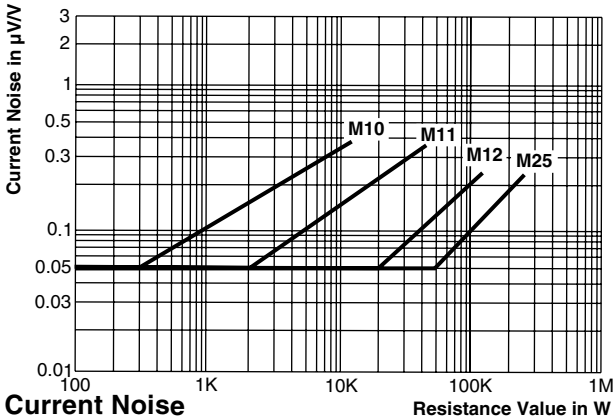
Temperature Rise



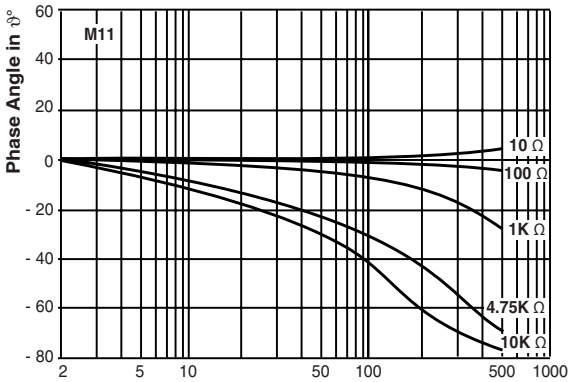
Derating



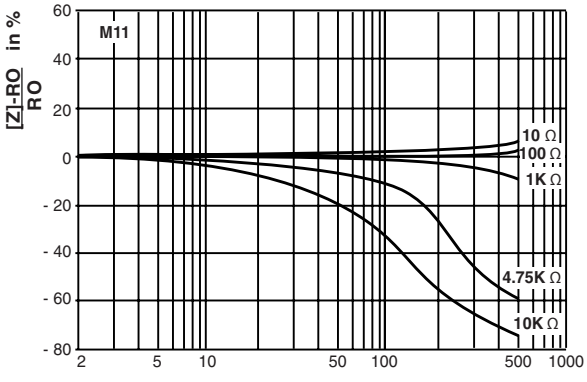
Non-Linearity



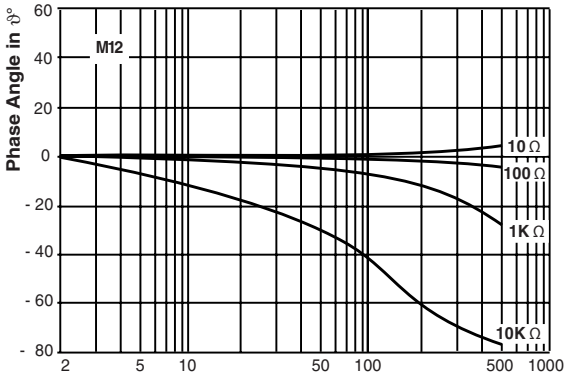
Current Noise



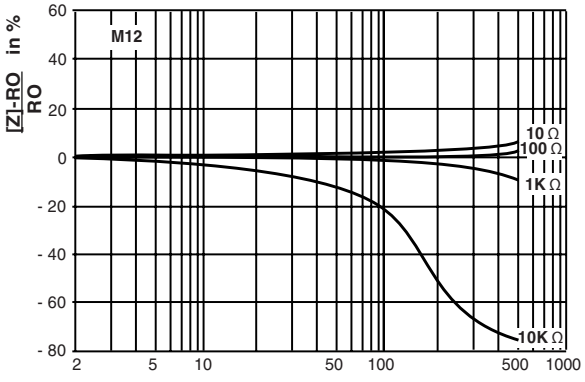
HF Performance



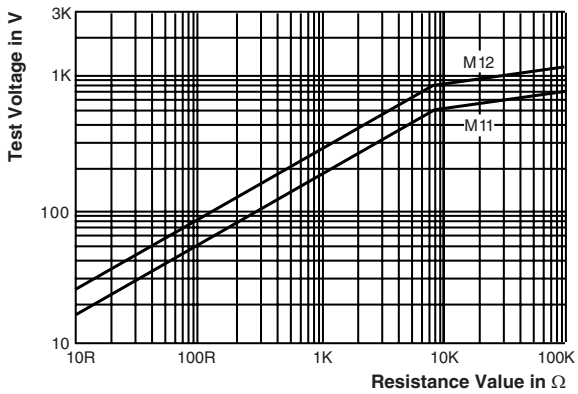
HF Performance



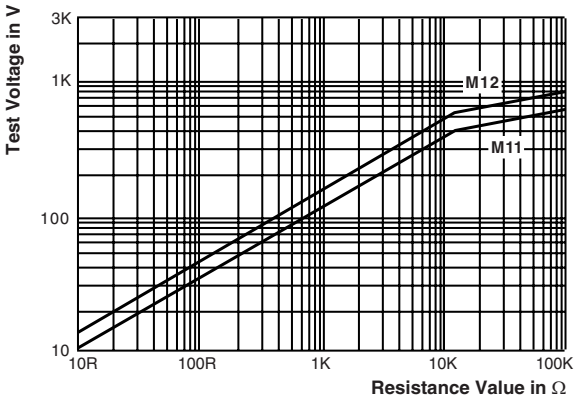
HF Performance



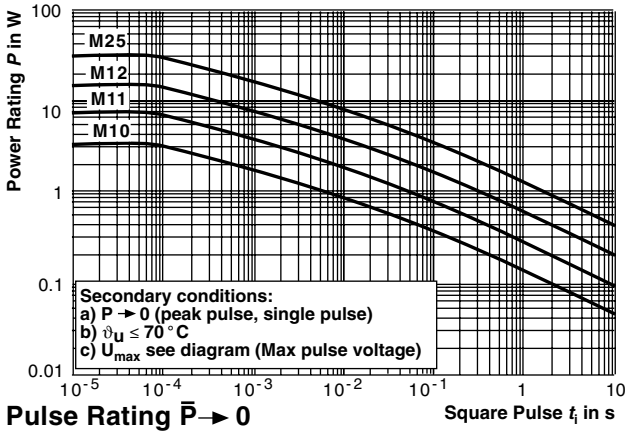
HF Performance



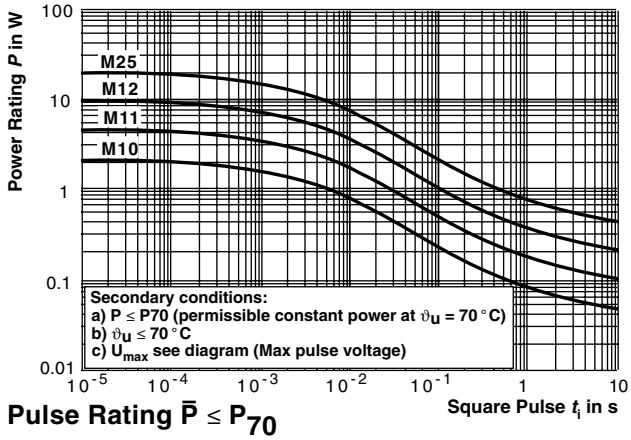
Single-Pulse High Voltage Overload Test
1.2/50 µs EN140000 4.27



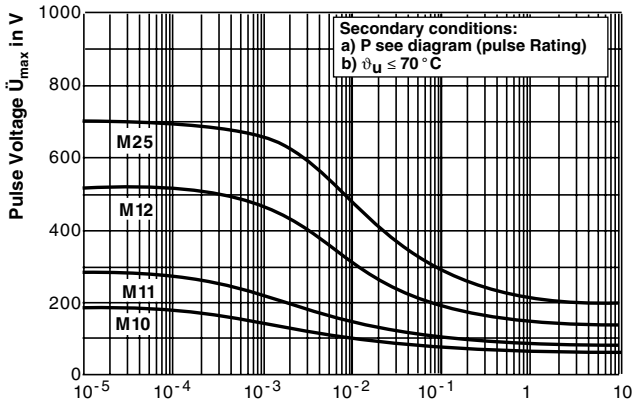
Single-Pulse High Voltage Overload Test
10/700 µs EN140000 4.27



Pulse Rating $\bar{P} \rightarrow 0$



Pulse Rating $\bar{P} \leq P_{70}$



Maximum Pulse Voltage

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	
		± 0.1 %/± 0.25 %	± 0.5 %/± 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”	≤ ± 0.2 %	≤ ± 0.5 %
Endurance at UCT IEC 60115-1 4.25.3	1000 h at 125 °C without load	≤ ± 0.2 %	≤ ± 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	≤ ± 0.05 %	≤ ± 0.1 %
Thermal Shock IEC 60115-1 4.19, IEC 60068-2-14	Rapid change between upper and lower category temperature	≤ ± 0.05 %	≤ ± 0.1 %
Damp Heat Steady State IEC 60115-1 4.24, IEC 60068-2-3	56 days at 40 °C and 93 % relative humidity	≤ ± 0.2 %	≤ ± 0.5 %
Resistance to Soldering Heat IEC 60115-1 4.18, IEC 60068-2-20	10 s at 260 °C solder bath temperature	≤ ± 0.05 %	≤ ± 0.2 %

APPLICABLE SPECIFICATIONS

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

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