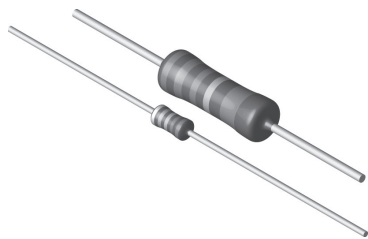


## Metal Film, Standard, Professional



### FEATURES

- Stable metal film on high quality ceramic
- Low temperature coefficient and tolerances
- Lead (Pb)-free solder contacts
- Pure tin plating provides compatibility with Lead (Pb)-free and lead containing soldering processes
- Compatible with "Restriction of the use of Hazardous Substances" (RoHS) directive 2002/95/EC (issue 2004)
- Excellent stability
- Force fitted metal caps retain a good electrical connection to the resistive film
- Suitable for commercial and professional applications



### STANDARD ELECTRICAL SPECIFICATIONS

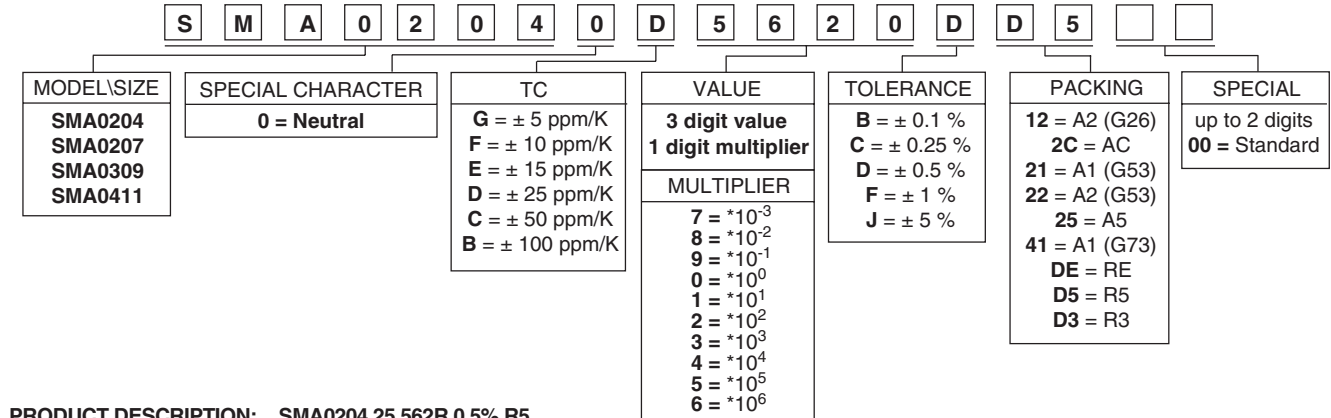
MODEL	SIZE	POWER RATING $P_{70^{\circ}\text{C}}$ W	LIMITING ELEMENT VOLTAGE MAX. $V_{\cong}$	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE $\Omega$	E-SERIES
SMA0204 MK1	0204	0.4	250	$\pm 25$	$\pm 0.5$	10R - 1M0	24 - 192
SMA0204 MK1	0204	0.4	250	$\pm 50$	$\pm 0.5$ $\pm 1$	10R - 1M0 1R0 - 10M	24 - 192 24 - 96
SMA0204 MK1	0204	0.4	250	$\pm 100$	$\pm 5$	R22 - 10M	24
SMA0204*	0204	0.5	250	$\pm 15$	$\pm 0.1, \pm 0.25, \pm 0.5$	51R1 - 332K	24 - 192
SMA0204*	0204	0.5	250	$\pm 25$	$\pm 0.1$ $\pm 0.25$ $\pm 0.5$	51R1 - 332K 22R - 322K 10R - 511K	24 - 192 24 - 192 24 - 192
SMA0204*	0204	0.5	250	$\pm 50$	$\pm 0.5$ $\pm 1$	10R - 511K 1R0 - 7M5	24 - 192 24 - 96
SMA0204*	0204	0.5	250	$\pm 100$	$\pm 5$	1R0 - 7M5	24
SMA0207 MK2	0207	0.25	350	$\pm 5$	$\pm 0.1, \pm 0.25, \pm 0.5$	1K0 - 100K	192
SMA0207 MK2	0207	0.25	350	$\pm 10$	$\pm 0.1, \pm 0.25, \pm 0.5$	510R - 100K	192
SMA0207 MK2	0207	0.6	350	$\pm 15$	$\pm 0.1, \pm 0.25, \pm 0.5$	47R - 1M0	24 - 192
SMA0207 MK2	0207	0.6	350	$\pm 25$	$\pm 0.1$ $\pm 0.25$ $\pm 0.5$	47R - 1M0 10R - 1M0 1R0 - 2M2	24 - 192 24 - 192 24 - 192
SMA0207 MK2	0207	0.6	350	$\pm 50$	$\pm 0.5$ $\pm 1$	1R0 - 2M2 1R0 - 10M	24 - 96 24 - 96
SMA0207 MK2	0207	0.6	350	$\pm 100$	$\pm 5$	R16 - 10M	24
SMA0309	0309	0.7	350	$\pm 50$	$\pm 1$	10R - 1M0	24 - 96
SMA0309	0309	0.7	350	$\pm 100$	$\pm 5$	10R - 1M0	24
SMA0411	0411	1.0	500	$\pm 15$	$\pm 0.1, \pm 0.25, \pm 0.5$	47R - 1M0	24 - 192
SMA0411	0411	1.0	500	$\pm 25$	$\pm 0.1$ $\pm 0.25, \pm 0.5$	47R - 1M0 10R - 1M0	24 - 192 24 - 192
SMA0411	0411	1.0	500	$\pm 50$	$\pm 0.5$ $\pm 1$	10R - 1M0 1R0 - 10M	24 - 96 24 - 96
SMA0411	0411	1.0	500	$\pm 100$	$\pm 5$	1R0 - 10M	24
MK4	0414	1.0	500	$\pm 25$	$\pm 0.5$	10R - 2M4	24 - 192
MK4	0414	1.0	500	$\pm 50$	$\pm 0.5$ $\pm 1.0$	10R - 2M4 1R0 - 10M	24 - 96 24 - 96
MK4	0414	1.0	500	$\pm 100$	$\pm 5$	R22 - 10M	24
MK5	0617	1.2	600	$\pm 50$	$\pm 0.5$ $\pm 1$	10R - 2M4 1R0 - 5M1	24 - 96 24 - 96
MK5	0617	1.2	600	$\pm 100$	$\pm 5$	R22 - 5M1	24
MK8	0922	1.5	600	$\pm 50$	$\pm 0.5$ $\pm 1$	10R - 2M4 1R0 - 2M4	24 - 96 24 - 96
MK8	0922	1.5	600	$\pm 100$	$\pm 5$	R22 - 2M4	24

- Temperature coefficient  $\leq 10\text{ppm}/^{\circ}\text{C}$  : temperature range  $-25^{\circ}\text{C}.. +85^{\circ}\text{C}$
- Limiting element voltage  $\sqrt{P \times R}$
- Further values and tolerances on request
- For Zero-ohm resistors, special assembly versions, and marking please see appropriate catalog or web page.

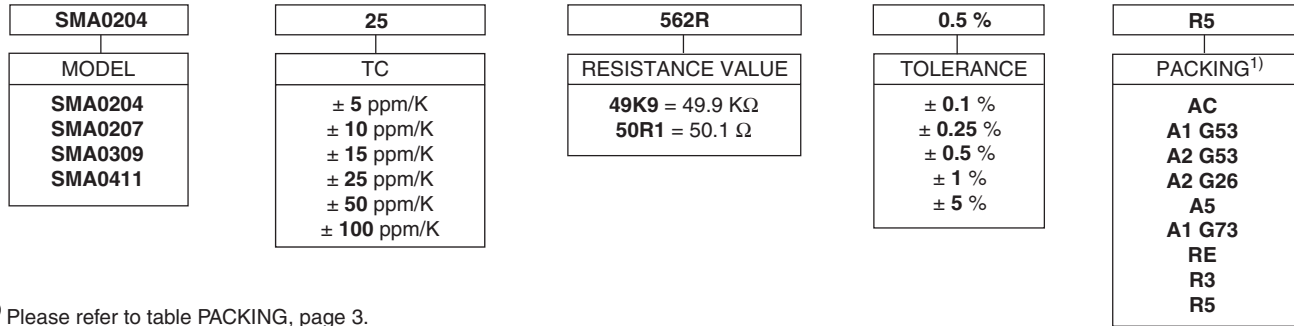


**PART NUMBER AND PRODUCT DESCRIPTION SMA-SERIES**

PART NUMBER: SMA02040D5620DD5



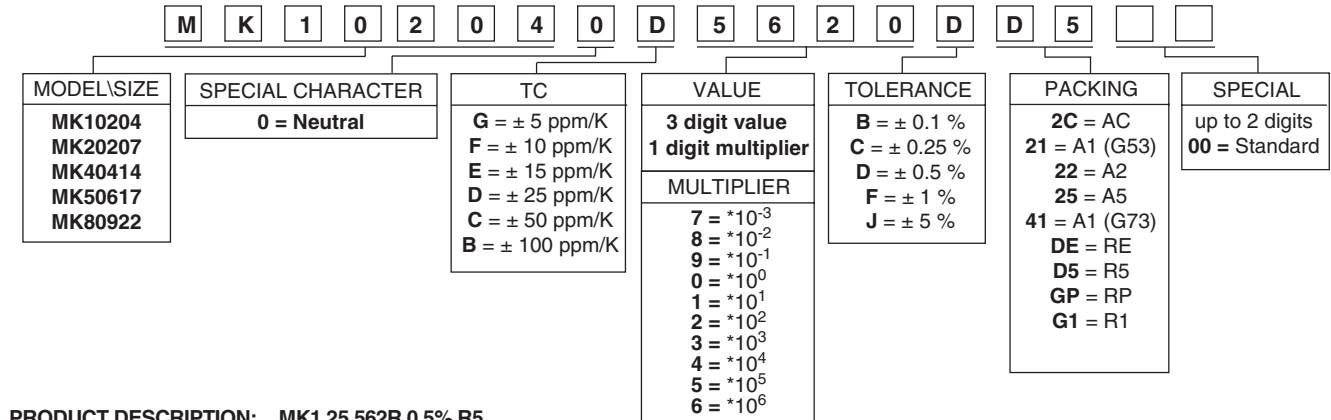
PRODUCT DESCRIPTION: SMA0204 25 562R 0.5% R5



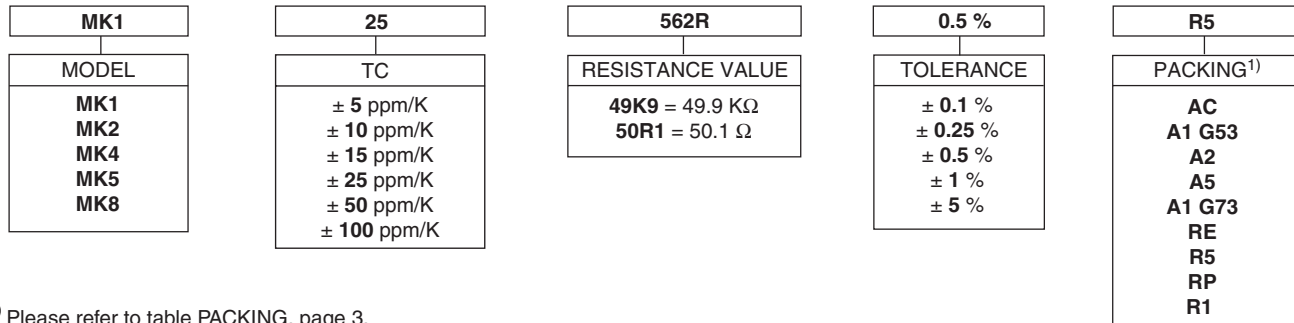
<sup>1)</sup> Please refer to table PACKING, page 3.

**PART NUMBER AND PRODUCT DESCRIPTION MK-SERIES**

PART NUMBER: MK102040D5620DD5



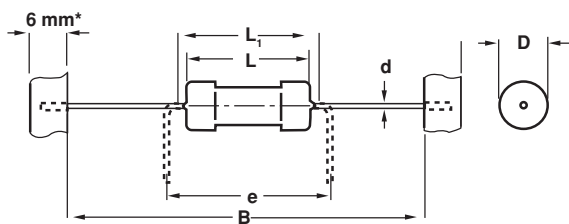
PRODUCT DESCRIPTION: MK1 25 562R 0.5% R5



<sup>1)</sup> Please refer to table PACKING, page 3.

PACKING					
MODEL	REEL		BOX		MIN.ORDER QTY PACKING UNITS
	PIECES / REEL	CODE	PIECES / BOX	CODE	
SMA0204	5000	R5	2 000	A2	1
			500	AC	
MK1	5 000	R5	5 000	A5	1
			2 000	A2	
SMA0207	5000	R5	2 000	A2	1
			1 000	A1	
MK2	5000	R5	500	AC	1
			5 000	A5	
SMA0309	3000	R3	2 000	A2	1
			5 000	A5	
SMA0411	2500	RE	1 000	A1	1
			500	AC	
	2500	RE	1 000	A1	1
MK4	2500	RE	1 000	A1	1
MK5	1500	RP	1 000	A1	1
MK8	1000	R1	500	AC	1

**DIMENSIONS**



- Taping in acc. with IEC60286-1
- D and L measured in acc. with IEC60294
- d according to IEC60301

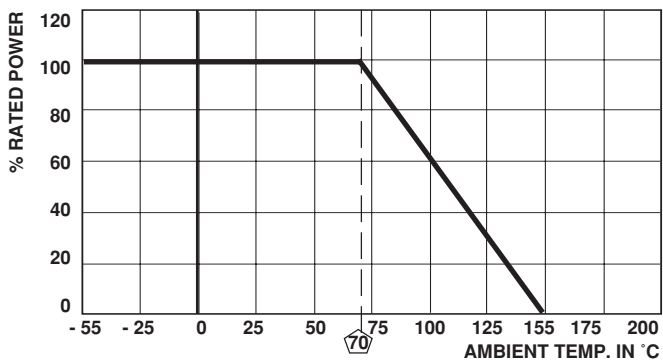
<sup>1)</sup> Also available in 26mm taping. \*9mm for MK5, MK8

MODEL	DIMENSIONS [in millimeters]					
	D <sub>max</sub>	L	L <sub>1</sub> MAX	B	d	e
SMA0204/MK1	1.6 <sub>-0.3</sub>	3.6 <sub>-0.4</sub>	4.0	53 ±1 <sup>1)</sup>	0.5	5.0
SMA0204	1.8 <sub>-0.25</sub>	3.6 <sub>-0.3</sub>	4.0	53 ±1 <sup>1)</sup>	0.5	5.0
SMA0207/MK2	2.5 <sub>-0.3</sub>	6.3 <sub>-0.5</sub>	7.0	53 ±1 <sup>1)</sup>	0.6	7.5
SMA0309	3.0 <sub>-0.4</sub>	8.2 <sub>-0.6</sub>	9.5	53 ±1	0.7	10
SMA0411	3.7 <sub>-0.4</sub>	10.5 <sub>-0.6</sub>	12.5	53 ±1	0.7	12.5
MK4	4.1 <sub>-0.5</sub>	12.0 <sub>-1.5</sub>	14.0	73 ±1	0.8	15
MK5	6.0 <sub>-0.5</sub>	16.5 <sub>-1.5</sub>	18.5	77 ±1	0.8	17.5
MK8	9.0 <sub>-0.5</sub>	20.0 <sub>-1.5</sub>	24.0	77 ±1	0.8	22.5

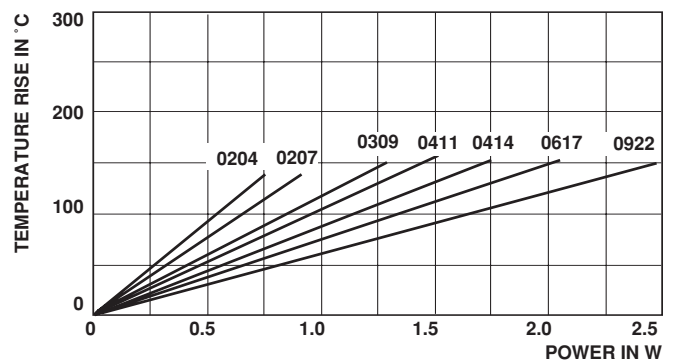


<b>TECHNICAL SPECIFICATIONS</b>									
PARAMETER	UNIT	MK1	SMA0204 <sup>2)</sup>	SMA0207/MK2	SMA0309	SMA0411	MK4	MK5	MK8
Rated Dissipation at 70 °C	W	0.4	0.5	0.6	0.7	1.0	1.0	1.2	1.5
Limiting Element Voltage <sup>2)</sup>	V <sub>≧</sub>	≤250	≤250	≤350	≤350	≤500	≤500	≤600	≤600
Insulation Voltage (1min)	V <sub>eff</sub>	>500	>500	>700	>700	>700	>500	>500	>500
Thermal Resistance	K/W	≤200	≤170	≤140	≤120	≤100	≤95	≤70	≤60
Insulation Resistance	Ω	≥10 <sup>11</sup>							
Category Temperature Range	°C	-55 to +155							
Failure Rate	10 <sup>-9</sup> /h	<1							
Terminal Strength, axial	N	>30	>30	>50	>60	>60	>80	>80	>80
Weight	g	0.1	0.14	0.22	0.31	0.52	0.67	1.5	3.3

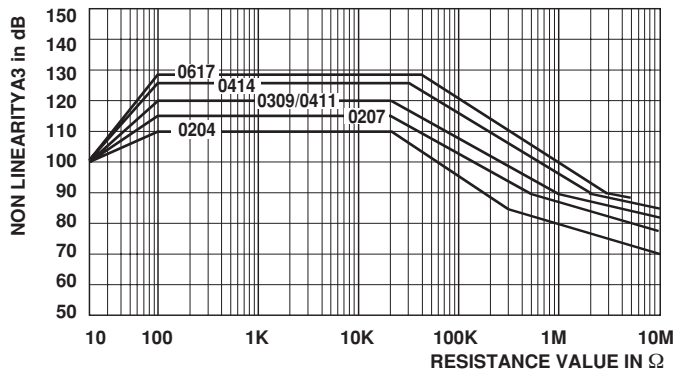
<sup>2)</sup>Rated Voltage  $\sqrt{P \times R}$



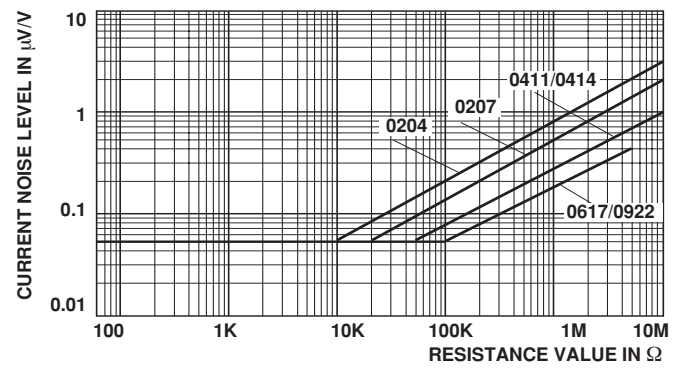
**DERATING**



**TEMPERATURE RISE**

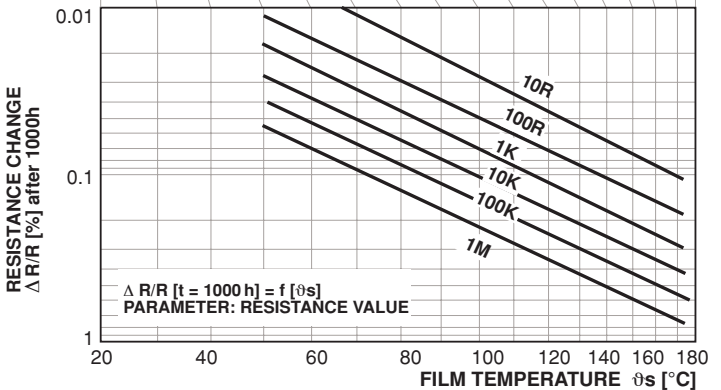
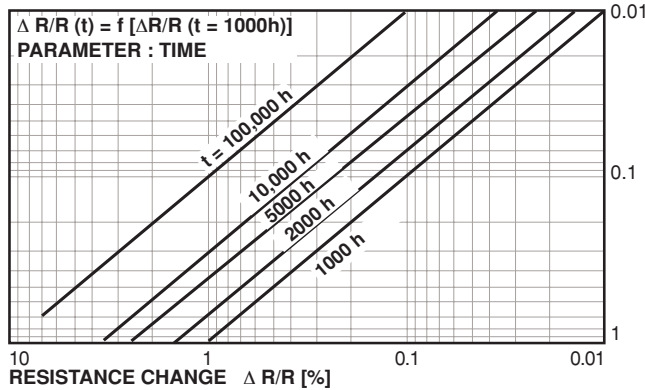
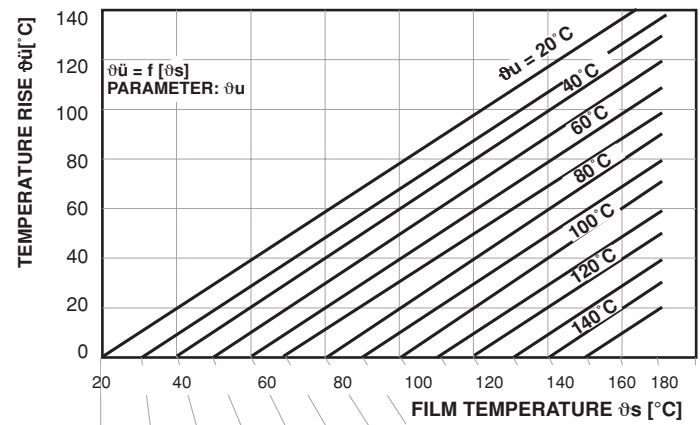
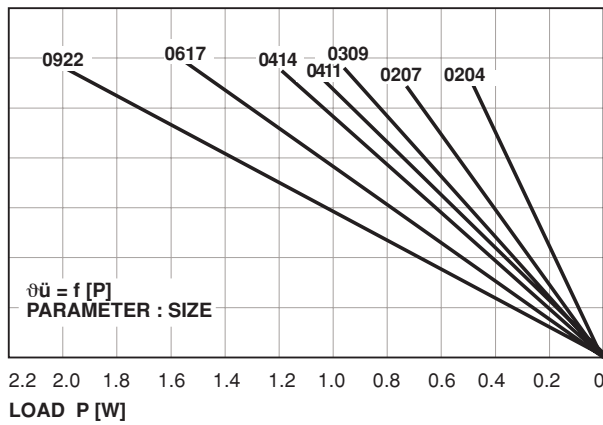


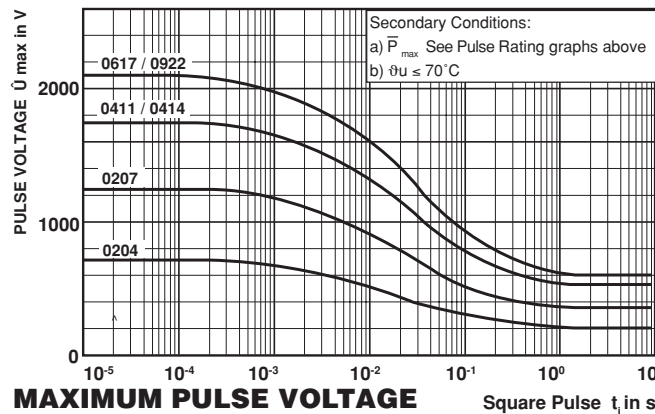
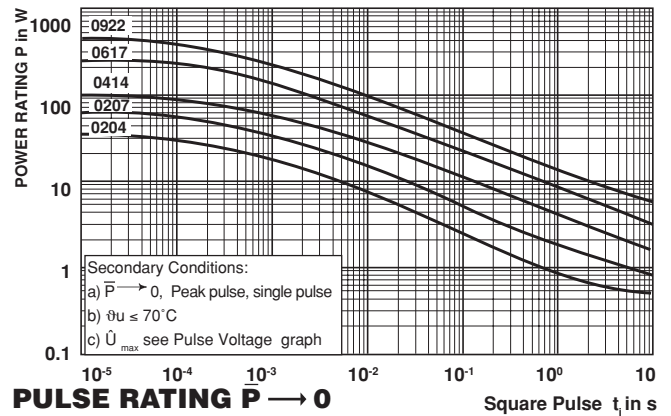
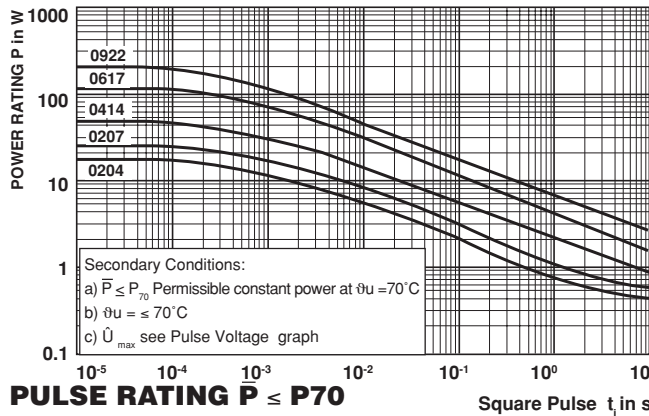
NON-LINEARITY



CURRENT NOISE

STABILITY NOMOGRAM, TYPICAL VALUES (For handling see General Information)





PERFORMANCE		
TEST	CONDITIONS OF TEST	REQUIREMENTS*
Endurance at 70°C IEC 60115-1 4.25.1	1000 hours at 70°C 1.5 hours "ON", 0.5 hours "OFF" 8000 hours at 70°C 1.5 hours "ON", 0.5 hours "OFF"	≤ ± 0.5% ≤ ± 1.0%
Endurance at Upper Category Temperature IEC 60115-1 4.25.3	1000 hours at 155°C without load 8000 hours at 155°C without load	≤ ± 0.5% ≤ ± 1.0%
Overload Test IEC 60115-1 4.13	Short time overload at 6.25 x rated power 2 seconds for size 0204 and 5s for sizes ≥ 0207	≤ ± 0.1%
Thermal Shock IEC 60115-1 4.19 IEC 60068-2-14	Rapid change between upper and lower category temperature	≤ ± 0.1%
Climatic Sequence IEC 60115-1 4.23	Dry heat, damp heat cyclic, cold, low air pressure	≤ ± 0.5%
Damp Heat Steady State IEC 60115-1 4.24 IEC 60068-2-3	56 days at 40°C and 93% relative humidity	≤ ± 0.5%
Resistance to Soldering Heat IEC 60115-1 4.18; IEC 60068-2-20	10 seconds at 260°C solder bath temperature	≤ ± 0.1%
Robustness of Terminations IEC 60115-1 4.16	Tensile, bending and torsion	≤ ± 0.1%
Vibration IEC 60115-1 4.22	0.75mm or 10g, 10Hz - 500Hz 6 hours	≤ ± 0.1%

\* for a resistance range from 10Ω to 2MΩ, limits for change of resistance at test

APPLICABLE SPECIFICATIONS
<ul style="list-style-type: none"> <li>CECC 40000 / 40100 / 40101</li> <li>EN 140 000 / 140 100</li> </ul>



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