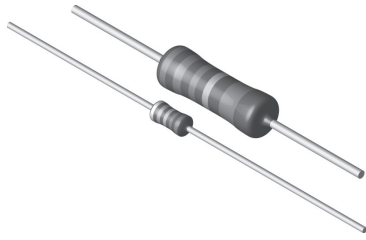


Metal Film, Standard, Professional



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 Ω	E-SERIES
SMA0204 MK1	0204	0.4	250	± 25	± 0.5	10R - 1M0	24 - 192
SMA0204 MK1	0204	0.4	250	± 50	± 0.5 ± 1	10R - 1M0 1R0 - 10M	24 - 192 24 - 96
SMA0204 MK1	0204	0.4	250	± 100	± 5	R22 - 10M	24
SMA0204*	0204	0.5	250	± 15	$\pm 0.1, \pm 0.25, \pm 0.5$	51R1 - 332K	24 - 192
SMA0204*	0204	0.5	250	± 25	± 0.1 ± 0.25 ± 0.5	51R1 - 322K 22R - 322K 10R - 511K	24 - 192 24 - 192 24 - 192
SMA0204*	0204	0.5	250	± 50	± 0.5 ± 1	10R - 511K 1R0 - 7M5	24 - 192 24 - 96
SMA0204*	0204	0.5	250	± 100	± 5	1R0 - 7M5	24
SMA0207 MK2	0207	0.25	350	± 5	$\pm 0.1, \pm 0.25, \pm 0.5$	1K0 - 100K	192
SMA0207 MK2	0207	0.25	350	± 10	$\pm 0.1, \pm 0.25, \pm 0.5$	510R - 100K	192
SMA0207 MK2	0207	0.6	350	± 15	$\pm 0.1, \pm 0.25, \pm 0.5$	47R - 1M0	24 - 192
SMA0207 MK2	0207	0.6	350	± 25	± 0.1 ± 0.25 ± 0.5	47R - 1M0 10R - 1M0 1R0 - 2M2	24 - 192 24 - 192 24 - 192
SMA0207 MK2	0207	0.6	350	± 50	± 0.5 ± 1	1R0 - 2M2 1R0 - 10M	24 - 96 24 - 96
SMA0207 MK2	0207	0.6	350	± 100	± 5	R16 - 10M	24
SMA0309	0309	0.7	350	± 50	± 1	10R - 1M0	24 - 96
SMA0309	0309	0.7	350	± 100	± 5	10R - 1M0	24
SMA0411	0411	1.0	500	± 15	$\pm 0.1, \pm 0.25, \pm 0.5$	47R - 1M0	24 - 192
SMA0411	0411	1.0	500	± 25	± 0.1 $\pm 0.25, \pm 0.5$	47R - 1M0 10R - 1M0	24 - 192 24 - 192
SMA0411	0411	1.0	500	± 50	± 0.5 ± 1	10R - 1M0 1R0 - 10M	24 - 96 24 - 96
SMA0411	0411	1.0	500	± 100	± 5	1R0 - 10M	24
MK4	0414	1.0	500	± 25	± 0.5	10R - 2M4	24 - 192
MK4	0414	1.0	500	± 50	± 0.5 ± 1.0	10R - 2M4 1R0 - 10M	24 - 96 24 - 96
MK4	0414	1.0	500	± 100	± 5	R22 - 10M	24
MK5	0617	1.2	600	± 50	± 0.5 ± 1	10R - 2M4 1R0 - 5M1	24 - 96 24 - 96
MK5	0617	1.2	600	± 100	± 5	R22 - 5M1	24
MK8	0922	1.5	600	± 50	± 0.5 ± 1	10R - 2M4 1R0 - 2M4	24 - 96 24 - 96
MK8	0922	1.5	600	± 100	± 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

S	M	A	0	2	0	4	0	D	5	6	2	0	D	D	5		
MODEL/SIZE	SPECIAL CHARACTER	TC	VALUE	TOLERANCE	PACKING	SPECIAL											
SMA0204 SMA0207 SMA0309 SMA0411	0 = Neutral	G = ± 5 ppm/K F = ± 10 ppm/K E = ± 15 ppm/K D = ± 25 ppm/K C = ± 50 ppm/K B = ± 100 ppm/K	3 digit value 1 digit multiplier MULTIPLIER 7 = $\times 10^{-3}$ 8 = $\times 10^{-2}$ 9 = $\times 10^{-1}$ 0 = $\times 10^0$ 1 = $\times 10^1$ 2 = $\times 10^2$ 3 = $\times 10^3$ 4 = $\times 10^4$ 5 = $\times 10^5$ 6 = $\times 10^6$	B = ± 0.1 % C = ± 0.25 % D = ± 0.5 % F = ± 1 % J = ± 5 %	12 = A2 (G26) 2C = AC 21 = A1 (G53) 22 = A2 (G53) 25 = A5 41 = A1 (G73) DE = RE D5 = R5 D3 = R3	up to 2 digits 00 = Standard											

PRODUCT DESCRIPTION: SMA0204 25 562R 0.5% R5

SMA0204	25	562R	0.5 %	R5
MODEL	TC	RESISTANCE VALUE	TOLERANCE	PACKING ¹⁾
SMA0204 SMA0207 SMA0309 SMA0411	± 5 ppm/K ± 10 ppm/K ± 15 ppm/K ± 25 ppm/K ± 50 ppm/K ± 100 ppm/K	49K9 = 49.9 K Ω 50R1 = 50.1 Ω	± 0.1 % ± 0.25 % ± 0.5 % ± 1 % ± 5 %	AC A1 G53 A2 G53 A2 G26 A5 A1 G73 RE R3 R5

¹⁾ Please refer to table PACKING, page 3.

PART NUMBER AND PRODUCT DESCRIPTION MK-SERIES

PART NUMBER: MK102040D5620DD5

M	K	1	0	2	0	4	0	D	5	6	2	0	D	D	5		
MODEL/SIZE	SPECIAL CHARACTER	TC	VALUE	TOLERANCE	PACKING	SPECIAL											
MK10204 MK20207 MK40414 MK50617 MK80922	0 = Neutral	G = ± 5 ppm/K F = ± 10 ppm/K E = ± 15 ppm/K D = ± 25 ppm/K C = ± 50 ppm/K B = ± 100 ppm/K	3 digit value 1 digit multiplier MULTIPLIER 7 = $\times 10^{-3}$ 8 = $\times 10^{-2}$ 9 = $\times 10^{-1}$ 0 = $\times 10^0$ 1 = $\times 10^1$ 2 = $\times 10^2$ 3 = $\times 10^3$ 4 = $\times 10^4$ 5 = $\times 10^5$ 6 = $\times 10^6$	B = ± 0.1 % C = ± 0.25 % D = ± 0.5 % F = ± 1 % J = ± 5 %	2C = AC 21 = A1 (G53) 22 = A2 25 = A5 41 = A1 (G73) DE = RE D5 = R5 GP = RP G1 = R1	up to 2 digits 00 = Standard											

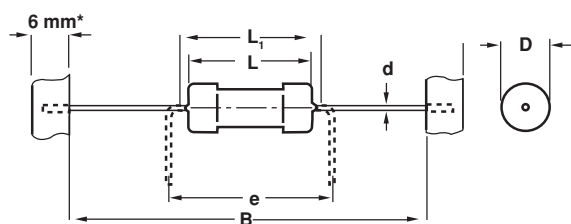
PRODUCT DESCRIPTION: MK1 25 562R 0.5% R5

MK1	25	562R	0.5 %	R5
MODEL	TC	RESISTANCE VALUE	TOLERANCE	PACKING ¹⁾
MK1 MK2 MK4 MK5 MK8	± 5 ppm/K ± 10 ppm/K ± 15 ppm/K ± 25 ppm/K ± 50 ppm/K ± 100 ppm/K	49K9 = 49.9 K Ω 50R1 = 50.1 Ω	± 0.1 % ± 0.25 % ± 0.5 % ± 1 % ± 5 %	AC A1 G53 A2 A5 A1 G73 RE R5 RP R1

¹⁾ 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	2 000 500	A2 AC	1
MK1	5 000	R5	5 000 2 000	A5 A2	1
SMA0207	5000	R5	2 000 1 000 500	A2 A1 AC	1
MK2	5000	R5	5 000 2 000	A5 A2	1
SMA0309	3000	R3	5 000 2 000	A5 A2	1
SMA0411	2500	RE	1 000 500	A1 AC	1
	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

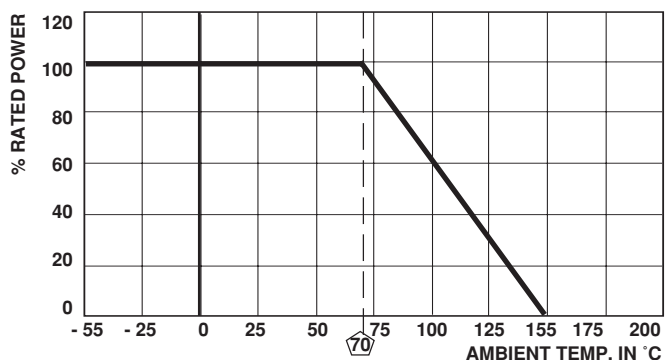
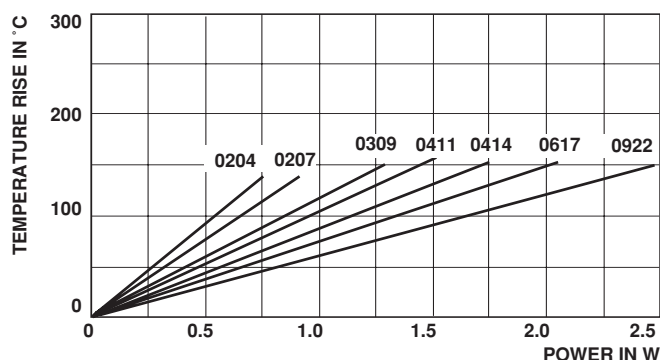
¹⁾ Also available in 26mm taping. *9mm for MK5, MK8

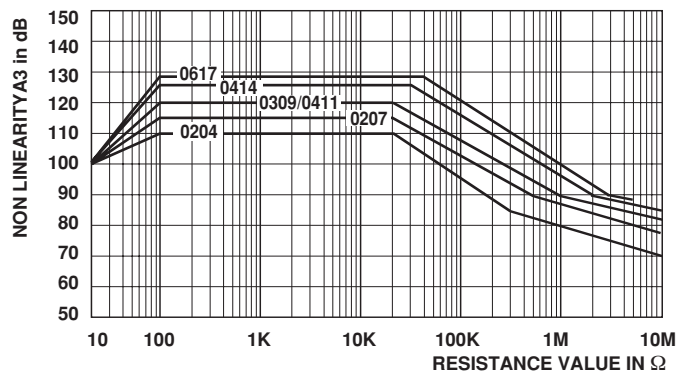
MODEL	DIMENSIONS [in millimeters]					
	D _{max}	L	L ₁ MAX	B	d	e
SMA0204/MK1	1.6 _{-0.3}	3.6 _{-0.4}	4.0	53 ±1 ¹⁾	0.5	5.0
SMA0204	1.8 _{-0.25}	3.6 _{-0.3}	4.0	53 ±1 ¹⁾	0.5	5.0
SMA0207/MK2	2.5 _{-0.3}	6.3 _{-0.5}	7.0	53 ±1 ¹⁾	0.6	7.5
SMA0309	3.0 _{-0.4}	8.2 _{-0.6}	9.5	53 ±1	0.7	10
SMA0411	3.7 _{-0.4}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



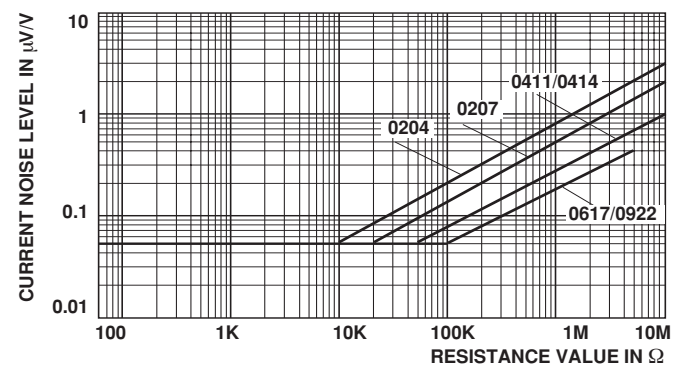
TECHNICAL SPECIFICATIONS									
PARAMETER	UNIT	MK1	SMA0204 ²⁾	SMA0207/MK2	SMA0309	SMA0411	MK4	MK5	MK8
Rated Dissipation at 70 °C	W	0.4	0.5	0.6	0.7	1.0	1.0	1.2	1.5
Limiting Element Voltage ²⁾	V _≧	≤250	≤250	≤350	≤350	≤500	≤500	≤600	≤600
Insulation Voltage (1min)	V _{eff}	>500	>500	>700	>700	>700	>500	>500	>500
Thermal Resistance	K/W	≤200	≤170	≤140	≤120	≤100	≤95	≤70	≤60
Insulation Resistance	Ω	≥10 ¹¹							
Category Temperature Range	°C	-55 to +155							
Failure Rate	10 ⁻⁹ /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

²⁾Rated Voltage $\sqrt{P \times R}$

**DERATING****TEMPERATURE RISE**

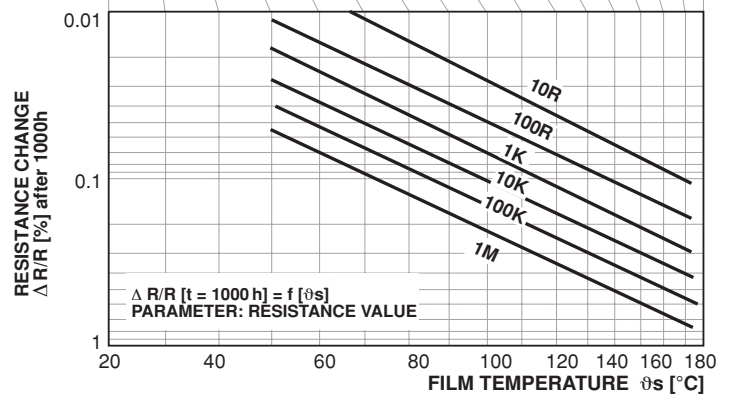
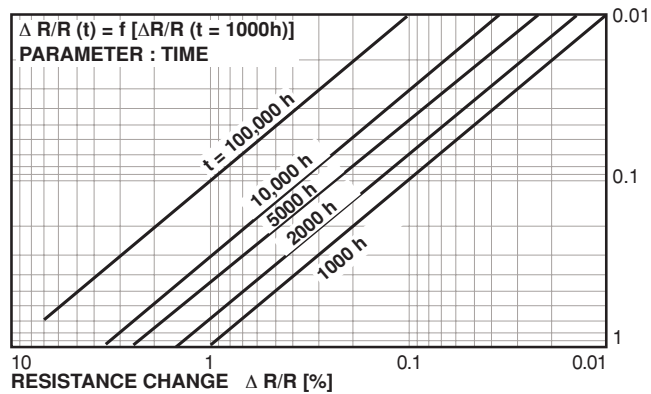
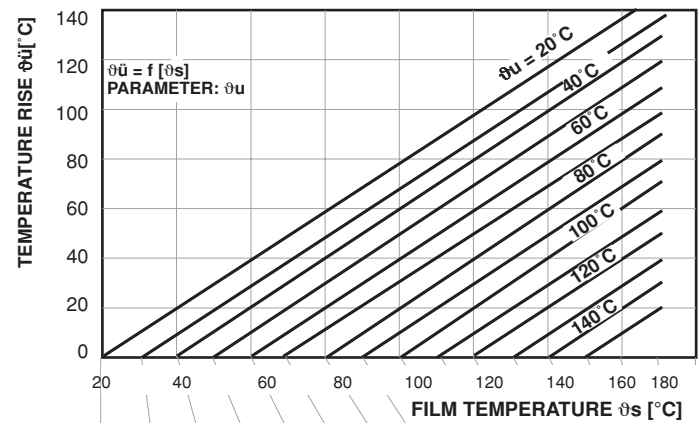
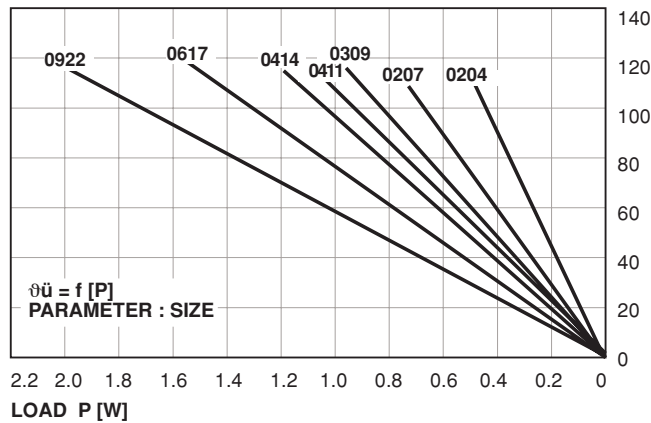


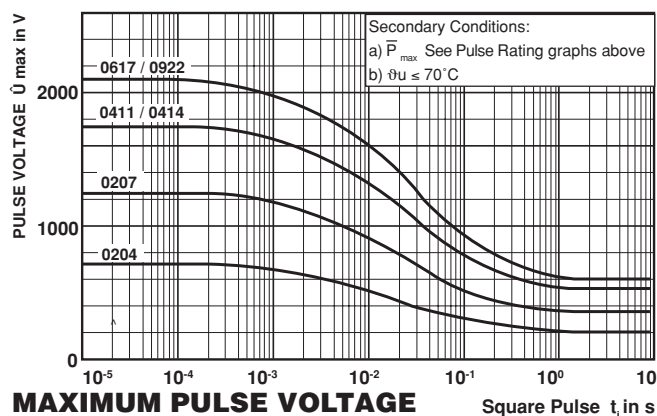
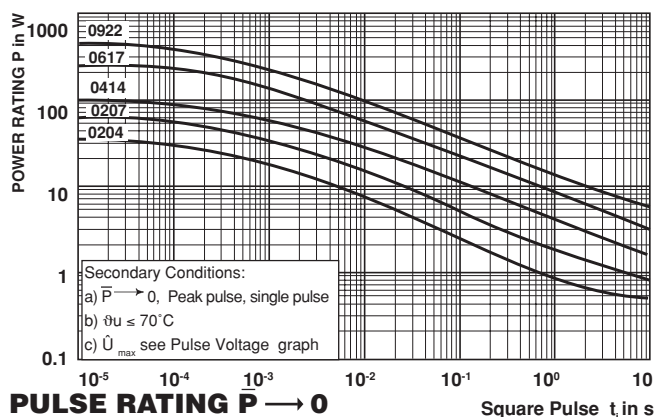
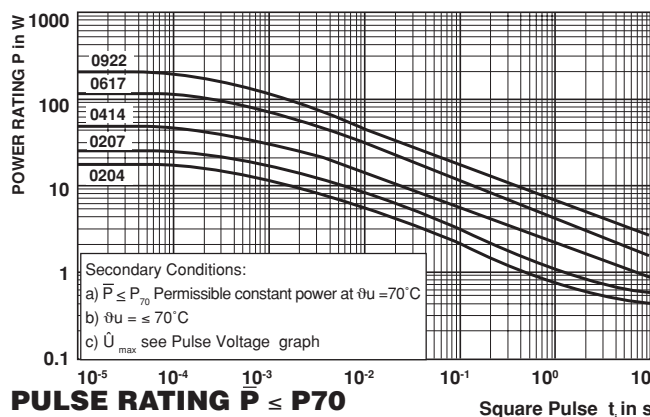
NON-LINEARITY



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"	$\leq \pm 0.5\%$ $\leq \pm 1.0\%$
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	$\leq \pm 0.5\%$ $\leq \pm 1.0\%$
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	$\leq \pm 0.1\%$
Thermal Shock IEC 60115-1 4.19 IEC 60068-2-14	Rapid change between upper and lower category temperature	$\leq \pm 0.1\%$
Climatic Sequence IEC 60115-1 4.23	Dry heat, damp heat cyclic, cold, low air pressure	$\leq \pm 0.5\%$
Damp Heat Steady State IEC 60115-1 4.24 IEC 60068-2-3	56 days at 40°C and 93% relative humidity	$\leq \pm 0.5\%$
Resistance to Soldering Heat IEC 60115-1 4.18; IEC 60068-2-20	10 seconds at 260°C solder bath temperature	$\leq \pm 0.1\%$
Robustness of Terminations IEC 60115-1 4.16	Tensile, bending and torsion	$\leq \pm 0.1\%$
Vibration IEC 60115-1 4.22	0.75mm or 10g, 10Hz - 500Hz 6 hours	$\leq \pm 0.1\%$

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

APPLICABLE SPECIFICATIONS
- CECC 40000 / 40100 / 40101 - EN 140 000 / 140 100



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