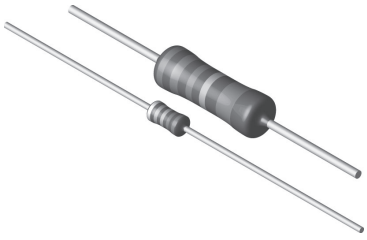
Metal Film, Standard, Professional



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 $P_{70°C}$ W	LIMITING ELEMENT VOLTAGE MAX. V≦	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	± 0.1, ± 0.25, ± 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	± 0.1, ± 0.25, ± 0.5	1K0 - 100K	192
SMA0207 MK2	0207	0.25	350	± 10	± 0.1, ± 0.25, ± 0.5	510R - 100K	192
SMA0207 MK2	0207	0.6	350	± 15	± 0.1, ± 0.25, ± 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	± 0.1, ± 0.25, ± 0.5	47R - 1M0	24 - 192
SMA0411	0411	1.0	500	± 25	± 0.1 ± 0.25, ± 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 ≤ 10ppm/°C : temperature range -25°C.. +85°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**	**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

MULTIPLIER
7 = $*10^{-3}$
8 = $*10^{-2}$
9 = $*10^{-1}$
0 = $*10^{0}$
1 = $*10^{1}$
2 = $*10^{2}$
3 = $*10^{3}$
4 = $*10^{4}$
5 = $*10^{5}$
6 = $*10^{6}$

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 KΩ **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**	**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

MULTIPLIER
7 = $*10^{-3}$
8 = $*10^{-2}$
9 = $*10^{-1}$
0 = $*10^{0}$
1 = $*10^{1}$
2 = $*10^{2}$
3 = $*10^{3}$
4 = $*10^{4}$
5 = $*10^{5}$
6 = $*10^{6}$

PRODUCT DESCRIPTION: MK1 25 562R 0.5% R5

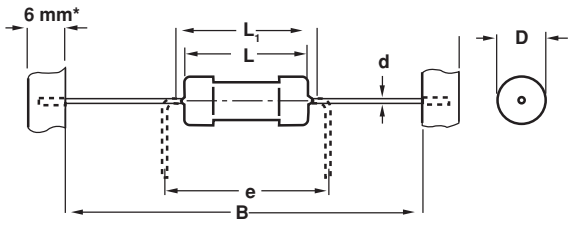
MK1	25	562R	0.5 %	R5
MODEL	TC	RESISTANCE VALUE	TOLERANCE	PACKING[1)]
MK1 **MK2** **MK4** **MK5** **MK8**	± **5** ppm/K ± **10** ppm/K ± **15** ppm/K ± **25** ppm/K ± **50** ppm/K ± **100** ppm/K	**49K9** = 49.9 KΩ **50R1** = 50.1 Ω	± **0.1** % ± **0.25** % ± **0.5** % ± **1** % ± **5** %	**AC** **A1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

[1)] Please refer to table PACKING, page 3.

PACKING

MODEL	REEL		BOX		MIN.ORDER QTY
	PIECES / REEL	CODE	PIECES / BOX	CODE	PACKING UNITS
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

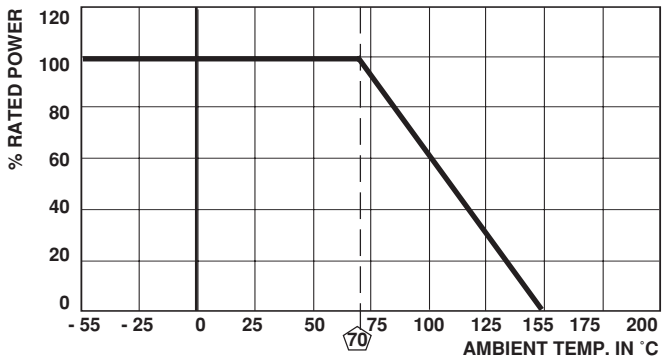
[1] Also available in 26mm taping. *9mm for MK5, MK8

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

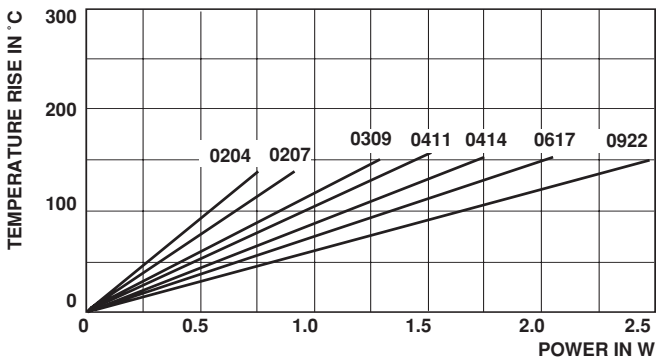
TECHNICAL SPECIFICATIONS

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)]	$V\cong$	≤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	$\geq 10^{11}$							
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

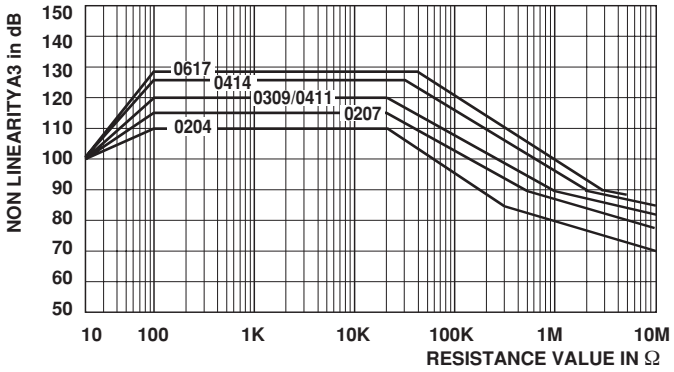
[2)]Rated Voltage $\sqrt{P \times R}$



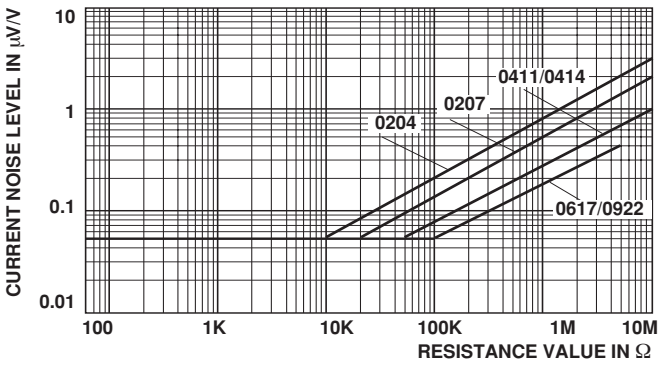
DERATING



TEMPERATURE RISE

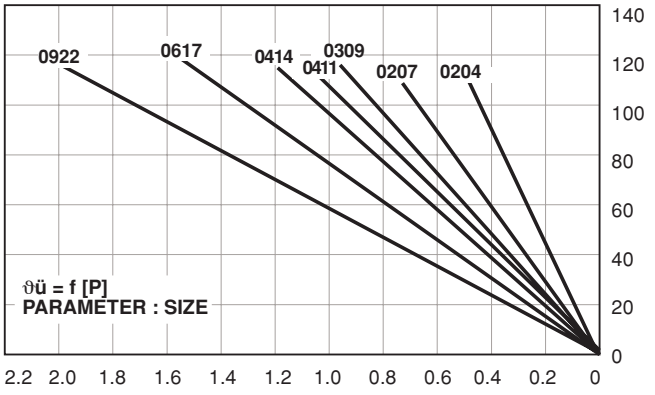


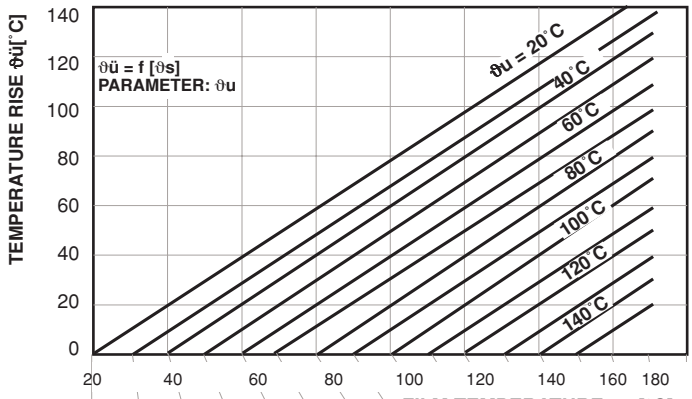
NON-LINEARITY

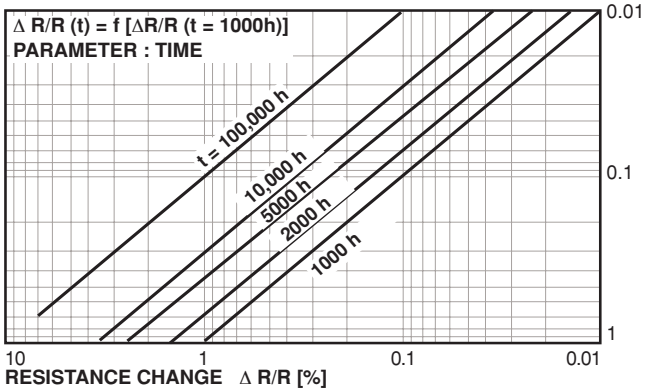


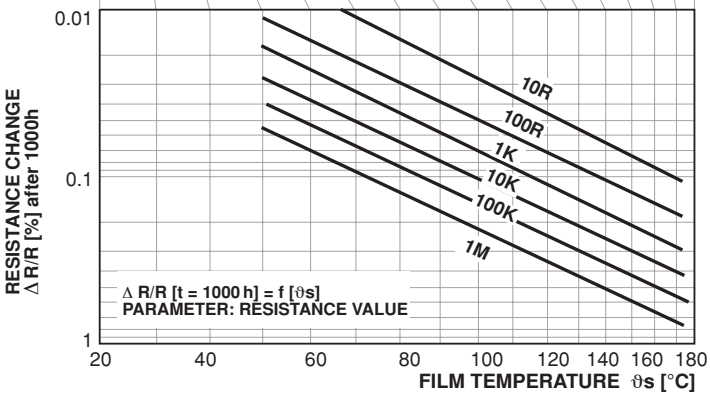
CURRENT NOISE

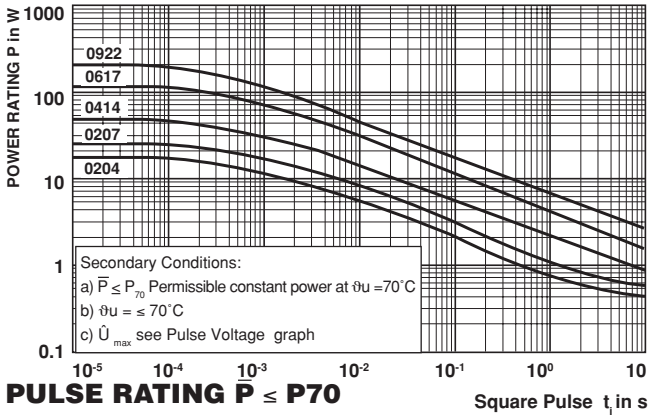
STABILITY NOMOGRAM, TYPICAL VALUES (For handling see General Information)

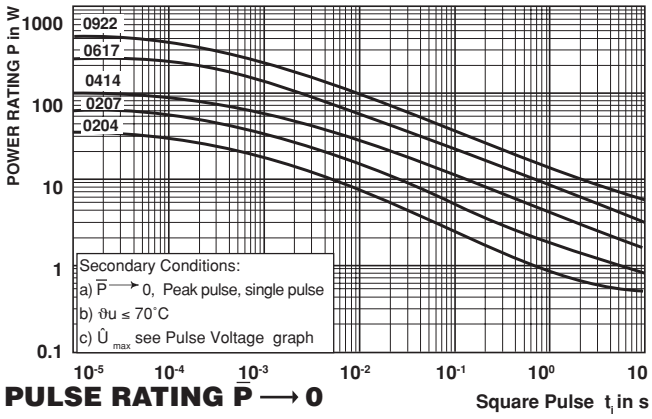


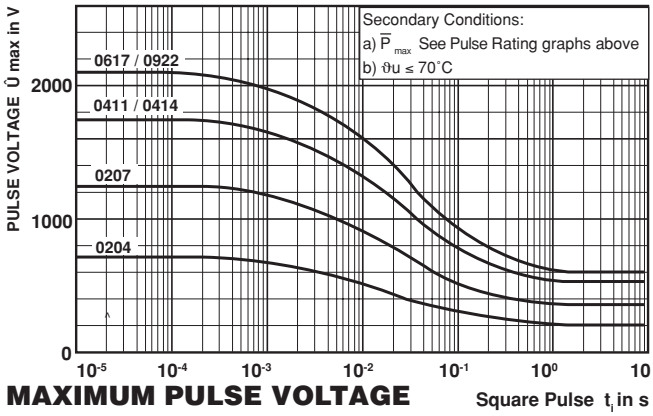












PERFORMANCE		
TEST	**CONDITIONS OF TEST**	**REQUIREMENTS***
Endurance at 70°C IEC 60115-1 4.25.1	1000 hours at 70°C 1.5 hours "ON", 0.5 hours "OFF" 8000 hours at 70°C 1.5 hours "ON", 0.5 hours "OFF"	≤ ± 0.5% ≤ ± 1.0%
Endurance at Upper Category Temperature IEC 60115-1 4.25.3	1000 hours at 155°C without 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 from10Ω to 2M2, limits for change of resistance at test

APPLICABLE SPECIFICATIONS

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

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