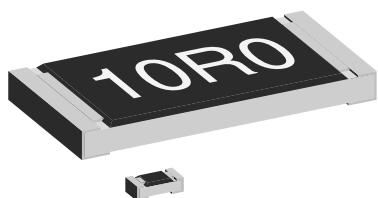


Thick Film, Rectangular Chip Resistors for Conductive Gluing



FEATURES

- AgPd-Terminations for conductive gluing
- Protective overglaze
- Metal glaze on high quality ceramic
- Compliant with "Restriction of the use of Hazardous Substances" (RoHS) directive 2002/95/EC (issue 2004)
- Excellent stability ($\Delta R/R \leq 1\%$ for 1000 h at 70 °C)



STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE		POWER RATING $P_{70\text{ °C}}$ W	LIMITING ELEMENT VOLTAGE MAX. V_{Ξ}	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	E-SERIES
	INCH	METRIC						
D10 AP	0402	1005	0.063	50	± 100 ± 200	± 1 ± 5	100R - 10M 10R - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\max.} < 200\text{ m}\Omega$, $I_{\max.} = 0.5\text{ A}$					
D11 AP	0603	1608	0.1	75	± 100 ± 200	± 1 ± 5	18R - 10M 3R6 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\max.} < 200\text{ m}\Omega$, $I_{\max.} = 0.7\text{ A}$					
D12 AP	0805	2012	0.125	150	± 100 ± 200	± 1 ± 5	18R - 10M 3R6 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\max.} < 200\text{ m}\Omega$, $I_{\max.} = 0.8\text{ A}$					
D25 AP	1206	3216	0.25	200	± 100 ± 200	± 1 ± 5	18R - 10M 3R6 - 10M	24 + 96 24
			Zero-Ohm-Resistor: $R_{\max.} < 200\text{ m}\Omega$, $I_{\max.} = 1\text{ A}$					

Notes

- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional time.
- Marking and packaging: See appropriate catalog or web pages
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	D10 AP	D11 AP	D12 AP	D25 AP
Rated Dissipation at 70 °C ⁽³⁾	W	0.063	0.10	0.125	0.25
Limiting Element Voltage ⁽²⁾	V_{Ξ}	50	75	150	200
Insulation Voltage (1 min)	V_{peak}	> 75	> 100	> 200	> 300
Thermal Resistance ⁽¹⁾	K/W	≤ 870	≤ 550	≤ 440	≤ 220
Insulation Resistance	Ω	$> 10^9$			
Category Temperature Range	°C	- 55 to + 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. to EN 140401-802

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

⁽³⁾ The power dissipation on the resistors generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature of 155 °C is not exceed.



Thick Film, Rectangular Chip Resistors for Conductive Glueing

D.. AP

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PART NUMBER AND PRODUCT DESCRIPTION D.. AP - SERIES

Part Numbering: D1208058B5620FP5⁽¹⁾

D	1	2	0	8	0	5	8	B	5	6	2	0	F	P	5		
MODEL/SIZE	SPECIAL CHARACTER				TCR		VALUE				TOLERANCE		PACKAGING ⁽²⁾		SPECIAL		
D100402 D110603 D120805 D251206	8 = AgPd terminations for conductive glueing				B = ± 100 ppm/K A = ± 200 ppm/K 0 = Jumper		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 = $\times 10^6$ 0000 = Jumper				F = ± 1 % J = ± 5 % 0 = Jumper		P0 P5 PN PZ B5 BN		Up to 2 digits		

Product Description: D12 AP 100 562R 1 % P5

D12 AP	100	562R	1 %	P5	BVxxxx
MODEL	TCR	RESISTANCE VALUE	TOLERANCE	PACKAGING ⁽²⁾	SPECIAL ⁽³⁾
D10 AP D11 AP D12 AP D25 AP	± 100 ppm/K ± 200 ppm/K	49K9 = 49.9 k Ω 5R1 = 5.1 Ω 0R0 = Jumper	± 1 % ± 5 %	P0 P5 PN PZ B5 BN	Customized part number is available on request

Notes

(1) Preferred way for ordering products is by use of the PART NUMBER

(2) Please refer to table PACKAGING, see below

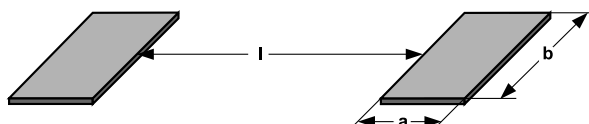
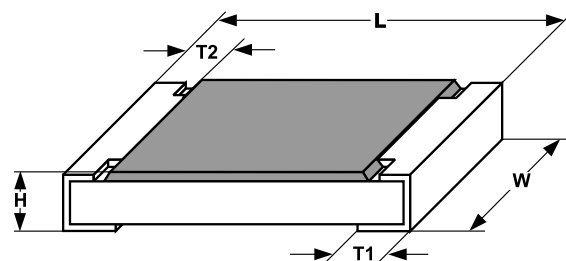
(3) Detailed BV Number will appear on the Packaging Label

PACKAGING

MODEL	REEL					
	TAPE WIDTH	DIAMETER	PITCH	PIECES/REEL	PACKAGING CODE	
					PAPER ⁽⁴⁾	BLISTER
D10 AP	8 mm	180 mm/7"	2 mm	10 000	P0	
		330 mm/13"	2 mm	50 000	PZ	
D11 AP	8 mm	180 mm/7"	4 mm	5000	P5	B5
		255 mm/10"	4 mm	10 000	P0	
		330 mm/13"	4 mm	20 000	PN	BN
D12 AP	8 mm	180 mm/7"	4 mm	5000	P5	B5
		255 mm/10"	4 mm	10 000	P0	
		330 mm/13"	4 mm	20 000	PN	BN
D25 AP	8 mm	180 mm/7"	4 mm	5000	P5	B5
		255 mm/10"	4 mm	10 000	P0	
		330 mm/13"	4 mm	15 000		BN
		330 mm/13"	4 mm	20 000	PN	

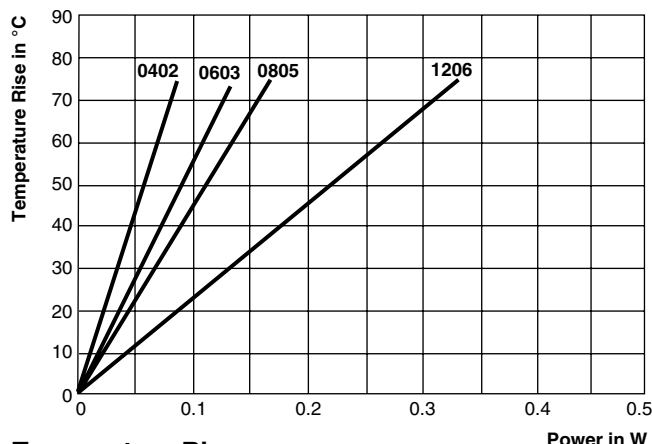
Note

(4) Flame treated paper for sizes D10 and D11. Regular paper for sizes D12 and D25.

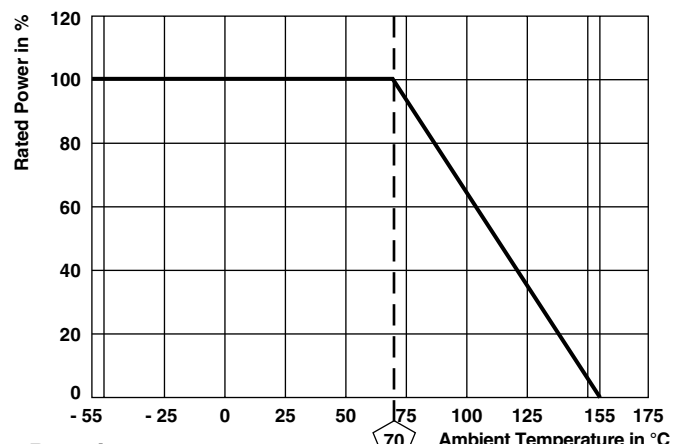
DIMENSIONS

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 ± 0.05	$0.2 + 0.10 - 0.15$
0603	1608	$1.55 + 0.10 - 0.05$	0.85 ± 0.1	0.45 ± 0.05	0.3 ± 0.2	0.3 ± 0.2
0805	2012	$2.0 + 0.20 - 0.10$	1.25 ± 0.15	0.45 ± 0.05	$0.3 + 0.20 - 0.10$	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

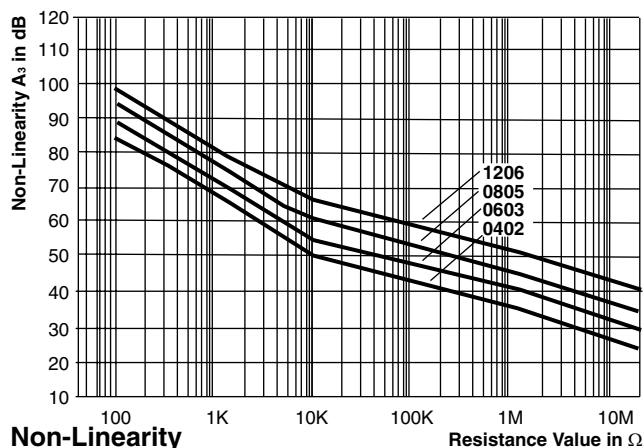
SIZE		GLUING PADS DIMENSIONS [in millimeters]		
INCH	METRIC	a	b	l
0402	1005	0.4	0.6	0.5
0603	1608	0.9	0.9	1.0
0805	2012	0.9	1.3	1.3
1206	3216	1.1	1.7	2.3

FUNCTIONAL PERFORMANCE

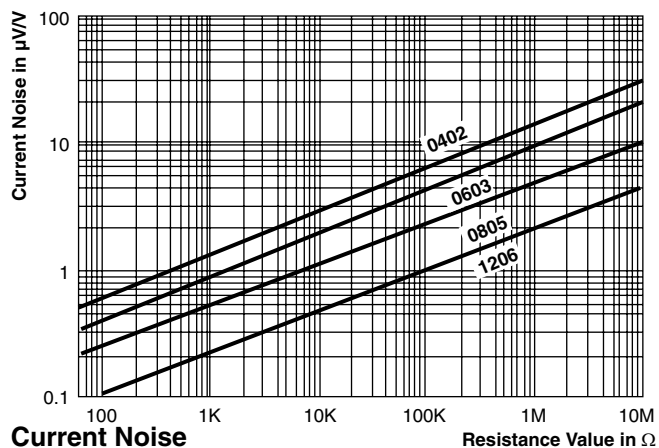
Temperature Rise



Derating



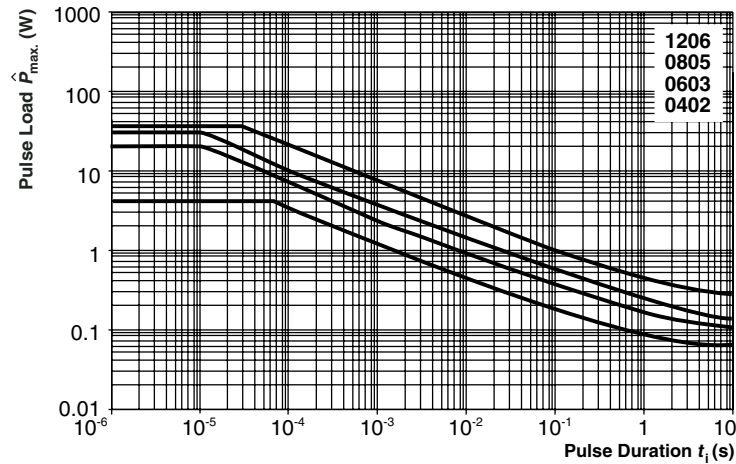
Non-Linearity



Current Noise

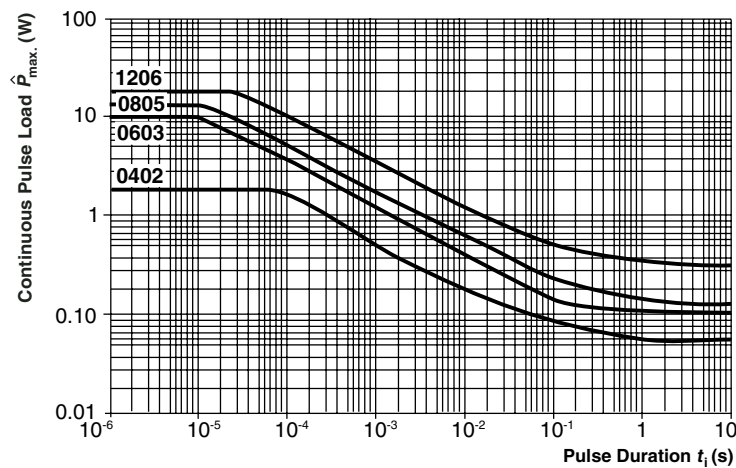
Thick Film, Rectangular Chip Resistors for Conductive Gluing

Single Pulse



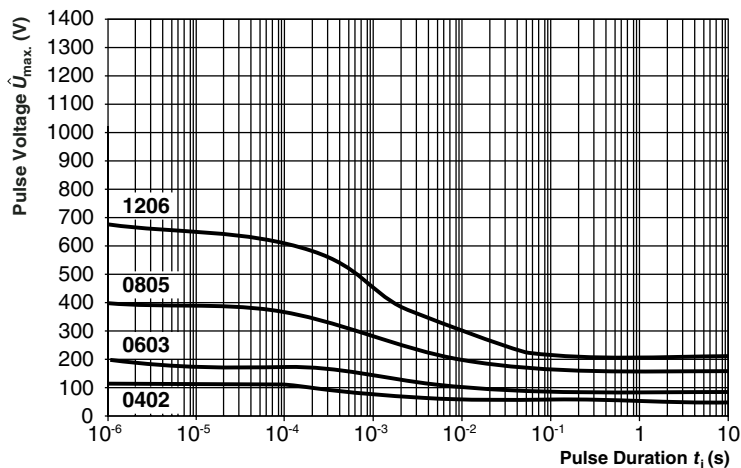
Maximum pulse load, single pulse; applicable if $\bar{P} \rightarrow 0$ and $n \leq 1000$ and $\bar{U} \leq \bar{U}_{max}$; for permissible resistance change equivalent to 8000 h operation

Continuous Pulse

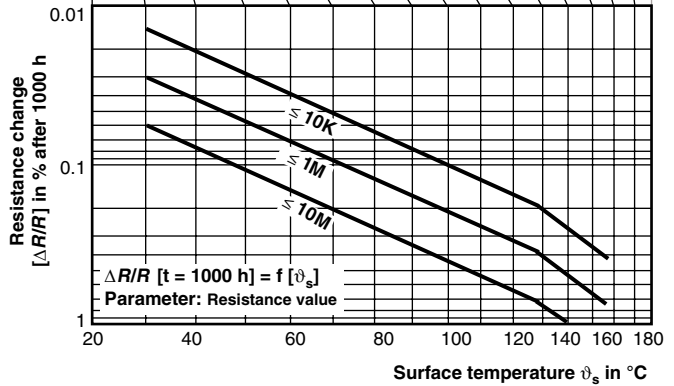
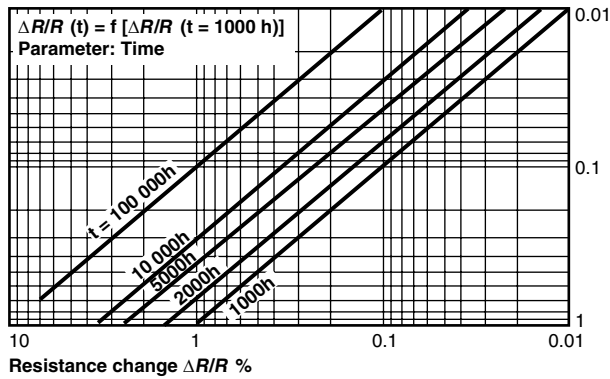
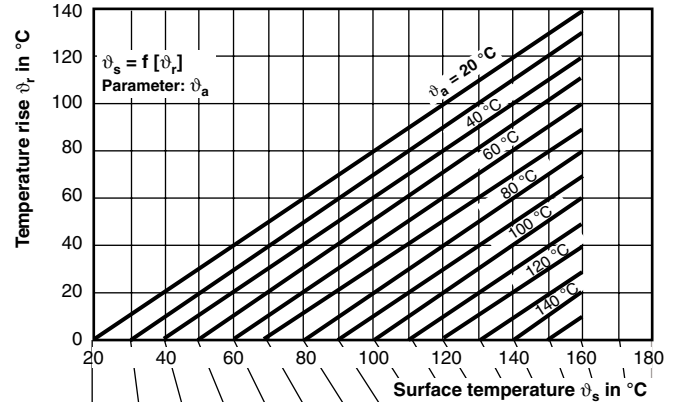
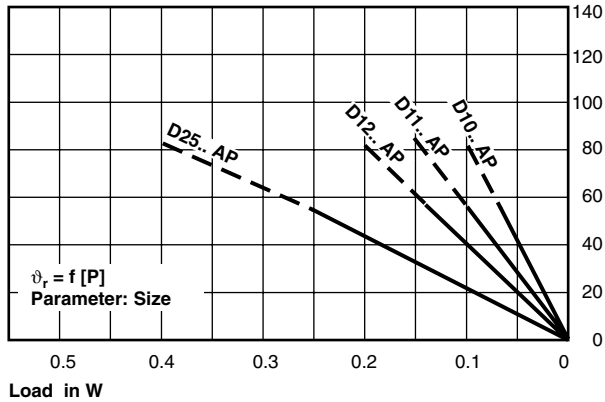


Maximum pulse load, continuous pulses; applicable if $\bar{P} \leq P(S_{amb})$ and $\bar{U} \leq \bar{U}_{max}$; for permissible resistance change equivalent to 8000 h operation

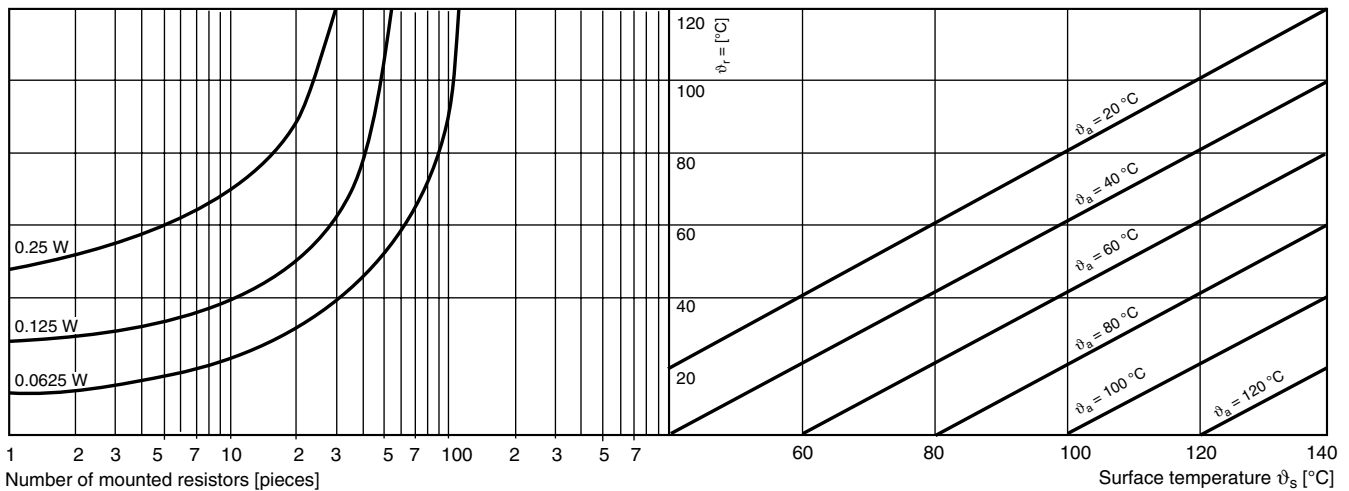
Pulse Voltage



Maximum pulse voltage, single and continuous pulses; applicable if $\hat{P} \leq \hat{P}_{max}$; for permissible resistance change equivalent to 8000 h operation



Stability nomogram typical values (for handling see general explanations)



Power rating as a function of packaging density (guideline)



Thick Film, Rectangular Chip Resistors for Conductive Gluing

D.. AP

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TEST PROCEDURES AND REQUIREMENTS

EN 60115-1

TEST (clause)	CONDITIONS OF TEST	REQUIREMENTS PERMISSIBLE CHANGE ($\Delta R/R$)	
		STABILITY CLASS 1 OR BETTER	
		D10 AP	D11 AP D12 AP D25 AP
	Stability for product types: D..AP	100 Ω to 10 M Ω	18 Ω to 10 M Ω
Resistance (4.5)	-	$\pm 1 \%$	$\pm 1 \%$
Endurance at 70 °C (4.25.1)	$U = (P_{70} \times R)^{1/2}$ $U = U_{max}$; whichever is less severe 1.5 h ON; 0.5 h OFF; 70 °C; 1000 h	$\pm 1.0 \%$	
Endurance at upper category temperature (4.25.3)	UCT = 125 °C; 1000 h	$\pm 1.0 \%$	
Overload (4.13)	$U = 2.5 \times (P_{70} \times R)^{1/2}$ $\leq 2 \times U_{max}$; Duration: according the style	$\pm 0.25 \%$	
Rapid change of temperature (4.19)	30 min at LCT = - 55 °C 30 min at UCT = 125 °C; 5 cycles	$\pm 0.25 \%$	
Damp heat, steady state (4.24)	(40 $\pm$ 2) °C; 56 days; (93 $\pm$ 3) % RH	$\pm 1.0 \%$	

APPLICABLE SPECIFICATIONS

- EN 60115-1 Generic Specification
- EN 140400 Sectional Specification
- EN 140401-802 Detail Specification
- IEC 60068-2-X Variety of environmental test procedures
- IEC 60286-3 Packaging of SMD components



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