

## Axial Cemented Wirewound Resistors



### FEATURES

- All welded construction
- Non flammable cement coating
- Ceramic core
- Various kinds of lead forming available
- Lead (Pb)-free
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compliant to RoHS directive 2002/95/EC



**RoHS**  
COMPLIANT  
**GREEN**  
(5-2008)\*\*

### STANDARD ELECTRICAL SPECIFICATIONS

MODEL	POWER RATING $P_{40\text{ }^\circ\text{C}}$	RESISTANCE RANGE <sup>(1)</sup>		TOLERANCE
		TCR = - 10 ... - 80 ppm/K WM 50 (Class 1)	TCR = 100 ... 180 ppm/K WM 110 (Class 3)	
Z301	1 W	0.30 $\Omega$ to 270 $\Omega$	0.68 $\Omega$ to 2 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
ZDA0411	2 W	0.47 $\Omega$ to 560 $\Omega$	1.50 $\Omega$ to 4.30 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
ZDV0411	2 W	0.47 $\Omega$ to 560 $\Omega$	1.50 $\Omega$ to 4.30 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
Z302	3 W	0.10 $\Omega$ to 510 $\Omega$	1.80 $\Omega$ to 3.30 k $\Omega$	$\pm 10\%$
		0.10 $\Omega$ to 510 $\Omega$	24 $\Omega$ to 3.30 k $\Omega$	$\pm 5\%$
		0.22 $\Omega$ to 510 $\Omega$	-	$\pm 2\%$
		1 $\Omega$ to 510 $\Omega$	-	$\pm 1\%$
Z303	4 W	0.10 $\Omega$ to 1 k $\Omega$	1.80 $\Omega$ to 3.90 k $\Omega$	$\pm 10\%$
		0.10 $\Omega$ to 1 k $\Omega$	12 $\Omega$ to 3.90 k $\Omega$	$\pm 5\%$
		0.10 $\Omega$ to 1 k $\Omega$	-	$\pm 2\%$
		1 $\Omega$ to 1 k $\Omega$	-	$\pm 1\%$
Z305	6 W	0.10 $\Omega$ to 2.4 k $\Omega$	3.90 $\Omega$ to 10 k $\Omega$	$\pm 10\%$
		0.10 $\Omega$ to 2.4 k $\Omega$	10 $\Omega$ to 10 k $\Omega$	$\pm 5\%$
		0.62 $\Omega$ to 2.4 k $\Omega$	-	$\pm 2\%$ , $\pm 1\%$
Z306	8 W	0.13 $\Omega$ to 4.7 k $\Omega$	6.80 $\Omega$ to 16 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
		1 $\Omega$ to 4.7 k $\Omega$	-	$\pm 2\%$
		2.2 $\Omega$ to 4.7 k $\Omega$	-	$\pm 1\%$
Z307	10 W	0.20 $\Omega$ to 8.2 k $\Omega$	12 $\Omega$ to 30 k $\Omega$	$\pm 10\%$ , $\pm 5\%$
		1.80 $\Omega$ to 8.2 k $\Omega$	-	$\pm 2\%$
		3.30 $\Omega$ to 8.2 k $\Omega$	-	$\pm 1\%$

#### Note

<sup>(1)</sup> Resistance value to be selected for  $\pm 10\%$  tolerance from E12 and for  $\pm 5\%$ ,  $\pm 2\%$  and  $\pm 1\%$  from E24

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)



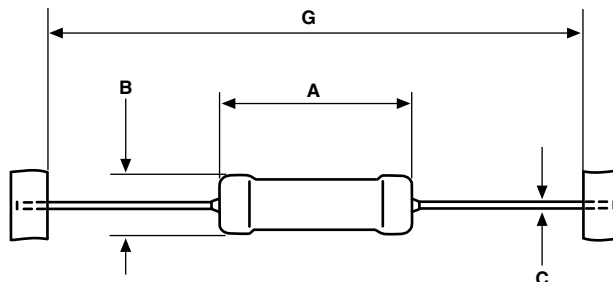
PART NUMBER AND PRODUCT DESCRIPTION																	
Part Number: Z32041411509K2C000																	
Z	3	2	0	4	1	4	1	1	5	0	9	K	2	C	0	0	0
<b>MODEL</b>	<b>TCR/MATERIAL</b>		<b>VALUE</b>			<b>TOLERANCE CODE</b>		<b>PACKAGING CODE</b>		<b>SPECIAL</b>							
Z310309 = Z301 ZDA0411 = ZDA0411 ZDV0411 = ZDV0411 Z320414 = Z302 Z330617 = Z303 Z350922 = Z305 Z360933 = Z306 Z370947 = Z307	1 = - 10 ... - 80 ppm/K WM 50 Class 1 3 = 100 ... 180 ppm/K WM 110 Class 3 4 = SWI (special winding)		3 digit value 1 digit multiplier MULTIPLIER F = *10 <sup>-4</sup> 7 = *10 <sup>-3</sup> 8 = *10 <sup>-2</sup> 9 = *10 <sup>-1</sup> 0 = *10 <sup>0</sup> 1 = *10 <sup>1</sup> 2 = *10 <sup>2</sup>			F = ± 1.0 % G = ± 2.0 % J = ± 5.0 % K = ± 10.0 %		(See Packaging table)		The 5 digit BV number will be encoded using a 36 character code. This code contains numbers 0...9 and letters A...Z (36 characters total) and allows to encode at least 46 655 five digit BV numbers. 000 = Standard							
Product Description: Z302 1 15R 10 % AC G53																	
Z302	1		15R			10 %		AC G53									
MODEL (1)	TCR/MATERIAL (1)		VALUE (1)			TOLERANCE CODE (1)		PACKAGING DESCRIPTION (2)									

**Notes**

- (1) See "Part Number" above
- (2) See "Packaging Table"

PACKAGING TABLE										
MODEL	TAPE/LEAD LENGTH (mm)	AMMO PACK			REEL			LOOSE		
		PCS	PACKAGING CODE	PACKAGING DESCRIPTION	PCS	PACKAGING CODE	PACKAGING DESCRIPTION	PCS	PACKAGING CODE	PACKAGING DESCRIPTION
Z301	53	1000	21	A1 G53	7500	DS	RS R53			
					2000	D2	R2 R53			
Z302	53	500	2C	AC G53	7500	DS	RS R53			
		4000	24	A4 G53	2000	D2	R2 R53			
	63	4000	25	A4 G63						
	73	500	4C	AC G73						
	83	500	6C	AC G83	1000	H1	R1 R83			
	7500				HS	RS R83				
	94							500	LC	LC
108				7500	JS	RS R108				
Z303	53	500	2C	AC G53	1000	D1	R1 R53			
	83	500	6C	AC G83	1000	H1	R1 R83			
	94									
Z305	83	100	6A	AA G83						
		250	6B	AB G83	500	HC	RC R83			
Z306	83	250	6B	AB G83	500	HC	RC R83			
Z307	120							200	LJ	LJ
ZDA0411	73	1000	41	A1 G73	2000	F2	R2 R73			
ZDV0411	73	2000	40	A2 G73						

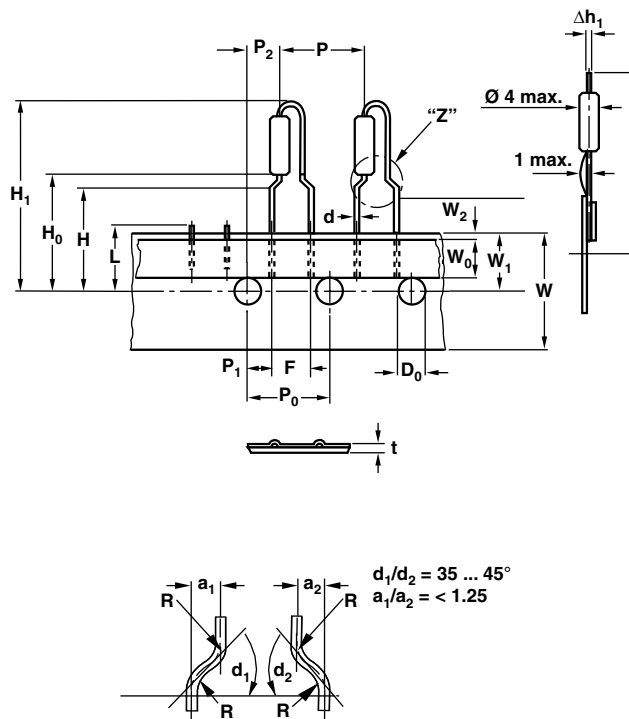
**DIMENSIONS**



For packaging dimensions see appropriate catalog or web page.

MODEL	DIMENSIONS in millimeters [inches]				
	A <sub>max.</sub>	B <sub>max.</sub>	C <sub>max.</sub>	G	MASS (g)
Z301	8.5 [0.355]	3 [0.118]	0.7 [0.027]	53 ± 1 [2.087 ± 0.039]	0.5
ZDA0411	11 [0.433]	4 [0.157]	0.7 [0.027]	53 ± 1 [2.087 ± 0.039]	0.8
Z302	13 [0.512]	4.8 [0.189]	0.8 [0.031]	53 ± 1 [2.087 ± 0.039]	1.1
Z303	15.8 [0.622]	5.5 [0.217]	0.8 [0.031]	53 ± 1 [2.087 ± 0.039]	1.4
Z305	22.3 [0.878]	8.7 [0.343]	0.8 [0.031]	83 ± 1 [3.268 ± 0.039]	3.7
Z306	32.3 [1.272]	8.7 [0.343]	0.8 [0.031]	83 ± 1 [3.268 ± 0.039]	5
Z307	49.8 [1.961]	9 [0.354]	0.8 [0.031]	120 ± 2 [4.724 ± 0.079]	7

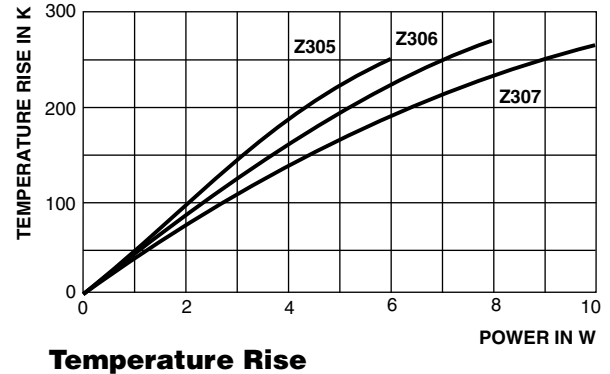
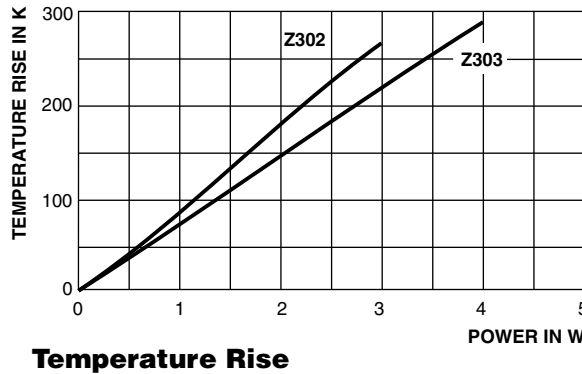
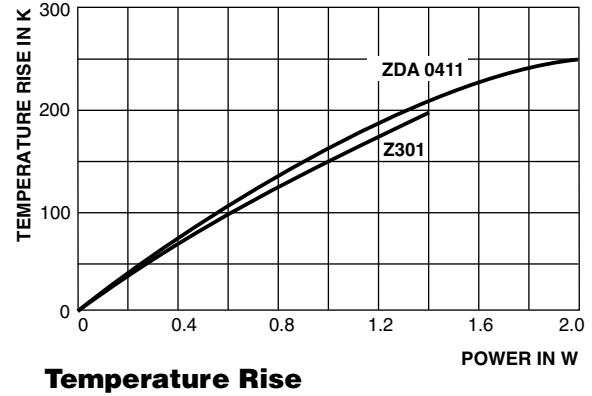
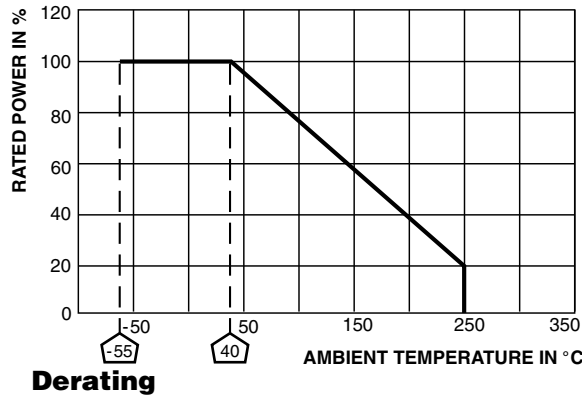
**DIMENSIONS ZDV0411**



DIMENSIONS in millimeters			TOL.
Lead Ø	d	0.6	
Pitch of components	P	12.7	± 1.0
Pitch of sprocket holes <sup>(1)</sup>	P <sub>0</sub>	12.7	± 0.3
Distance between hole center and resistor center	P <sub>1</sub>	3.85	± 0.7
Distance between hole center and lead center	P <sub>2</sub>	6.35	± 0.7
Lead spacing	F	5	+ 0.6, - 0.1
Angle of Insertion	Δh <sub>1</sub>	2 max.	-
Width of carrier tape	W	18.0	+ 1, - 0.5
Width of adhesive tape	W <sub>0</sub>	12.0	± 0.5
Position of holes	W <sub>1</sub>	9	+ 0.75, - 0.5
Position of adhesive tape	W <sub>2</sub>	0.5	+ 0, - 0.5
Body to hole center	H	16.0	± 0.5
Lead crimp to hole center <sup>(2)</sup>	H <sub>0</sub>	19.5	± 1.0
Hole Ø	D <sub>0</sub>	4.0	± 0.2
Thickness of tape <sup>(3)</sup>	t	0.9 max.	-
Height of cutting	L	11 max.	-
Height of insertion	H <sub>1</sub>	32.3 max.	-

**Notes**

- (1) Test over 10 holes - 9 intervals P<sub>0</sub> 12 x 9 = 114.3 ± 0.5
- (2) Parallelism, < 0.5 mm
- (3) Thickness of carrier tape: 0.55 mm ± 0.1



PERFORMANCE	
TEST	PERMISSIBLE CHANGE
Climatic category (LCT/UCT/Days)	40/200/56
Climatic sequence, IEC 60115-1, 4.23	$\Delta R = \pm (3\% R + 0.05 \Omega)$
Damp heat, steady state, IEC 60115-1, 4.24 (40 ± 2) °C, 56 days, (93 ± 3) % RH	$\Delta R = \pm (3\% R + 0.1 \Omega)$
Endurance at room temperature (116 % P <sub>70</sub> ), 1000 h, IEC 60115-1, 4.25.2	$\Delta R = \pm (3\% R + 0.1 \Omega)$
Storage at UCT, 1000 h, no load, IEC60115-1,4.25.3	$\Delta R = \pm (3\% R + 0.1 \Omega)$
Resistance to soldering heat, IEC 60115-1, 4.18 (260 ± 5) °C, (10 ± 1) s	$\Delta R = \pm (0.5\% R + 0.05 \Omega)$
Robustness of Termination, IEC 60115-1, 4.16 10N	$\Delta R = \pm (0.5\% R + 0.05 \Omega)$
Short time overload, IEC 60115-1, 4.13 10 x rated power for 5 s	$\Delta R = \pm (1\% R + 0.1 \Omega)$



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