

Wire wound resistors

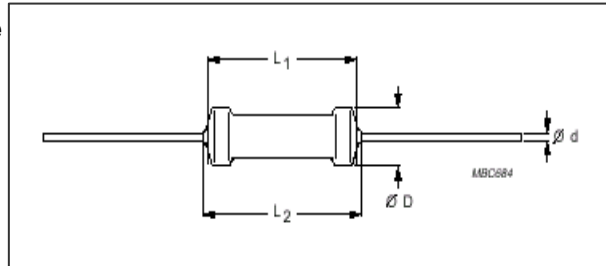
WWR 1W/2W/3W/5W/10W

FEATURES

- High power dissipation in small volume
- High pulse load handling capabilities.

APPLICATIONS

- Ballast switching
- Shunt in small electric motors
- Power supplies.



DESCRIPTION

The resistor element is a resistive wire which is wound in a single layer on a ceramic rod. Metal caps are pressed over the ends of the rod. The ends of the resistance wire and the leads are connected to the caps by welding. The resistor is coated with a brown or green silicone lacquer.

TYPE	Dimensions (mm)			
	D ±0.8	L1 ±0.8	L2 Max.	d (±0.05)
WWR 1W	4.0	9.0	11.0	0.7
WWR 2W	4.0	11.0	13.0	0.7/0.8
WWR 3W	5.6	15.5	18.0	0.8
WWR 5W	8.0	24.0	26.0	0.8
WWR 10W	8.0	40.0	42.0	0.8

QUICK REFERENCE DATA

DESCRIPTION		VALUE				
		WWR 1W	WWR 2W	WWR 3W	WWR 5W	WWR 10W
resistance range	inductive	0.04 Ω to 100 Ω	0.02 Ω to 100 Ω	0.02 Ω to 150 Ω	0.02 Ω to 470 Ω	0.1 Ω to 470 Ω
	non inductive	0.04 Ω to 0.99 Ω	0.02 Ω to 0.99 Ω	0.02 Ω to 0.99 Ω	0.02 Ω to 0.99 Ω	0.1 Ω to 0.99 Ω
resistance tolerance		±10%, ±5%, ±2% (E24) ±1% (E48, E96) ±0.5% (R≥1 Ω , E8)				
temperature coefficient R < 0.1 Ω R ≥ 0.1 Ω		± 250 ppm / °C ± 150 ppm / °C				
rated dissipation at T _{amb} = 70 °C		1 W	2 W	3W	5W	10W
max. working voltage		150 V	200 V	250 V	400 V	700 V
basic specifications		IEC 60 115-1 and 60 115-2				
climatic category (IEC60068)		40 / 200 / 56				
stability, ΔR/R _{max} after load : 1000 hours		±5%+0.1 Ω	±5%+0.1 Ω	±5%+0.1 Ω	±5%+0.1 Ω	±5%+0.1 Ω
damp heat steady state		±3%+0.1 Ω	±3%+0.1 Ω	±3%+0.1 Ω	±3%+0.1 Ω	±3%+0.1 Ω
climatic tests		±3%+0.1 Ω	±3%+0.1 Ω	±3%+0.1 Ω	±3%+0.1 Ω	±3%+0.1 Ω
soldering		±1%+0.05 Ω	±1%+0.05 Ω	±1%+0.05 Ω	±1%+0.05 Ω	±1%+0.05 Ω

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ORDERING INFORMATION

Table 1. Inductive Note : 0.5% : $\geq 1 \Omega$

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. \pm %	Ordering code
WWR 1W	52mm	ammo	1,000	0.04 Ω to 100 Ω	0.5	PWWR 371 6xxxx
					1	PWWR 171 7xxxx
	S-F 15.0mm bulk	S-F 20.0mm bulk	1,000	0.04 Ω to 100 Ω	2	PWWR 171 28xxx
					5	PWWR 171 55xxx
R-Shape		1,500	0.04 Ω to 100 Ω	1	PWWR 171 3xxxx	
				2	PWWR 171 22xxx	
				5	PWWR 171 52xxx	
WWR 2W	52mm	ammo	1,000	0.02 Ω to 100 Ω	0.5	PWWR 372 6xxxx
					1	PWWR 372 7xxxx
	S-F 20.0mm bulk	R-Shape	1,000	0.02 Ω to 150 Ω	2	PWWR 372 24xxx
					5	PWWR 372 55xxx
R-Shape		1,500	0.02 Ω to 150 Ω	5	PWWR 172 57xxx	
				1	PWWR 172 3xxxx	
				2	PWWR 172 22xxx	
WWR 3W	64mm	ammo	500	0.02 Ω to 150 Ω	5	PWWR 172 52xxx
					1	PWWR 173 1xxxx
	S-F 22.5mm bulk	M-F 20.0mm bulk	1,000		2	PWWR 173 21xxx
					5	PWWR 173 51xxx
WWR 5Ws	64mm	ammo	500	0.02 Ω to 470 Ω	5	PWWR 173 28xxx
					1	PWWR 177 1xxxx
	S-F 23.0mm bulk	M-F 23.0mm bulk	1,000		2	PWWR 177 24xxx
5					PWWR 177 51xxx	
WWR 10W	110mm	bulk	100	0.1 Ω to 470 Ω	5	PWWR 177 58xxx
					1	PWWR 177 53xxx
					2	PWWR 176 6xxxx
					5	PWWR 176 24xxx
						PWWR 176 54xxx

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ORDERING INFORMATION

Table 2. Non Inductive

Type	Bandolier width	Packing	Quantity	Resistance range	Tol. ± %	Ordering code		
WWR 1W	52mm	ammo	1,000	0.04 Ω to 100 Ω	0.5	PWWR 471 6xxxx		
					1	PWWR 271 7xxxx		
					2	PWWR 271 28xxx		
					5	PWWR 271 55xxx		
	S-F 15.0mm bulk		1,000	0.04 Ω to 100 Ω	1	PWWR 271 4xxxx		
	S-F 20.0mm bulk				1	PWWR 271 6xxxx		
	R-Shape		1,500	0.04 Ω to 100 Ω	1	PWWR 271 3xxxx		
					2	PWWR 271 22xxx		
					5	PWWR 271 52xxx		
WWR 2W	52mm	ammo	1,000	0.02 Ω to 100 Ω	0.5	PWWR 472 6xxxx		
					1	PWWR 472 7xxxx		
					2	PWWR 472 24xxx		
					5	PWWR 472 55xxx		
	S-F 20.0mm bulk		1,000	0.02 Ω to 150 Ω	5	PWWR 272 57xxx		
	R-Shape		1,500		1	PWWR 272 3xxxx		
					2	PWWR 272 22xxx		
					5	PWWR 272 52xxx		
WWR 3W	64mm	ammo	500	0.02 Ω to 150 Ω	1	PWWR 273 1xxxx		
						2	PWWR 273 21xxx	
					5	PWWR 273 51xxx		
	S-F 22.5mm bulk		1000		5	PWWR 273 58xxx		
	M-F 20.0mm bulk				5	PWWR 273 28xxx		
WWR 5Ws	64mm	ammo	500	0.02 Ω to 470 Ω	1	PWWR 277 1xxxx		
						2	PWWR 277 24xxx	
			5		PWWR 277 51xxx			
					5	PWWR 277 58xxx		
	S-F 23.0mm bulk		1,000		5	PWWR 277 58xxx		
	M-F 23.0mm bulk				5	PWWR 277 53xxx		
WWR 10W	110mm	bulk	100	0.1 Ω to 470 Ω	1	PWWR 276 6xxxx		
							2	PWWR 276 24xxx
							5	PWWR 276 54xxx

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Limiting values

Table 3

TYPE	LIMITING VOLTAGE ⁽¹⁾ (V)	LIMITING POWER (W)
WWR 1W	150	1
WWR 2W	200	2
WWR 3W	250	3
WWR 5W	400	5
WWR 10W	700	10

Note

1. the maximum voltage that may be continuously applied to the resistor element, see “IEC publication 60 115-1”

The maximum permissible hot – spot temperature is 350°C.

Derating curve

The power that the resistor can dissipate depends on the operating temperature : Fig. 1

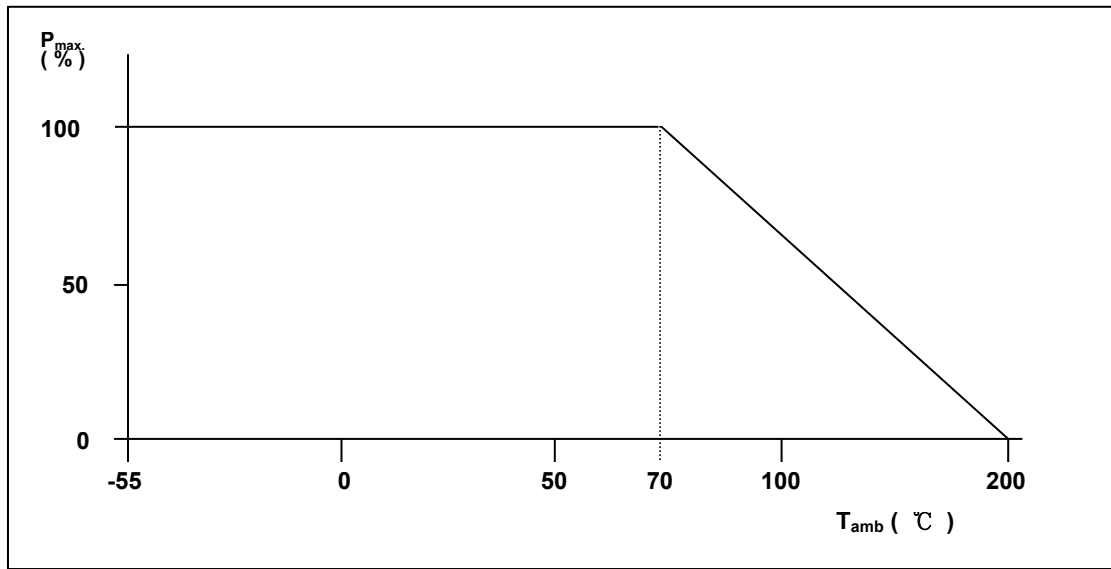


Fig. 1 Maximum dissipation (P_{max}) in percentage of rated power as a function of the ambient temperature (T_{amb})

PULSE LOADING CAPABILITIES

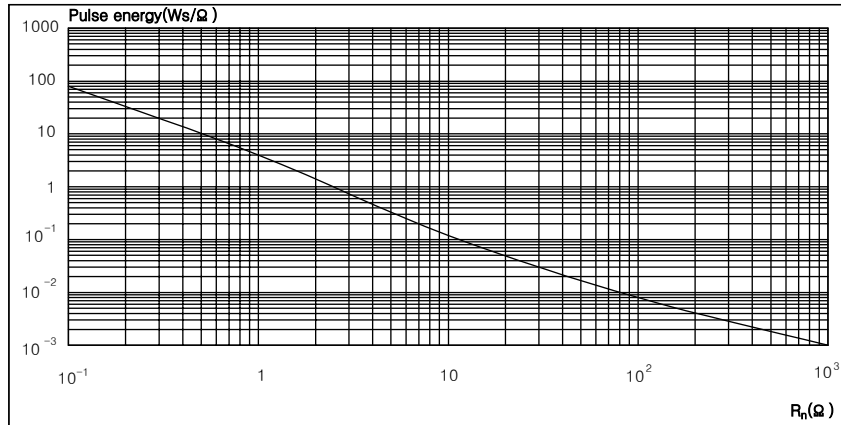


Fig. 2 Pulse capability; W_s as a function of R_n. (WWR 1W)

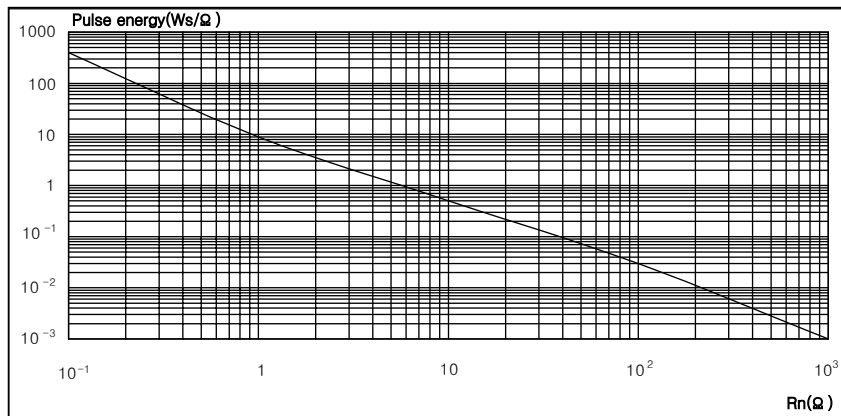


Fig. 3 Pulse capability; W_s as a function of R_n. (WWR 2W)

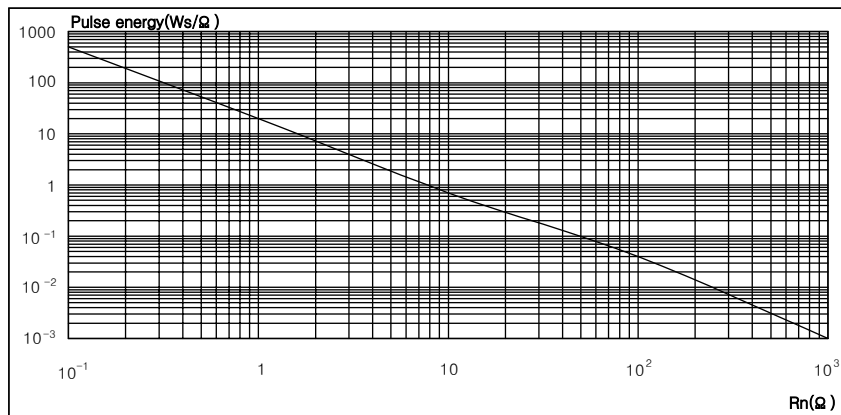


Fig. 4 Pulse capability; W_s as a function of R_n. (WWR 3W)

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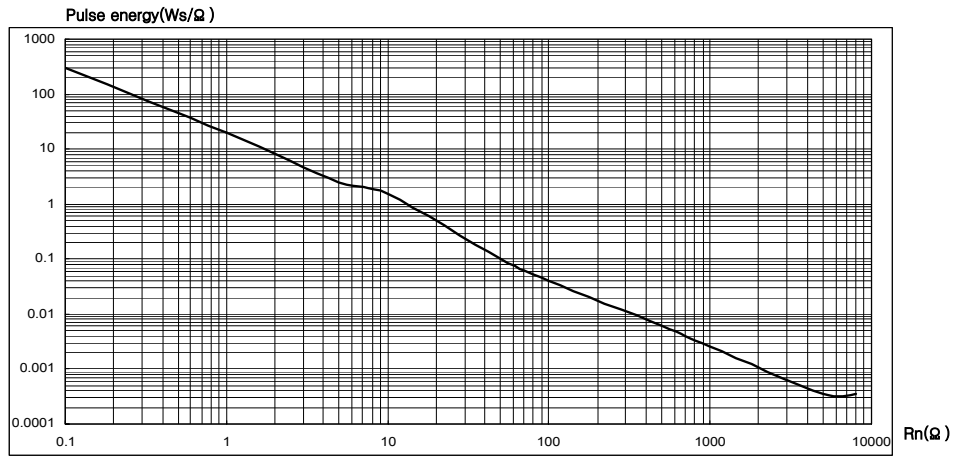


Fig. 5 Pulse capability; W_s as a function of R_n . (WWR 5W)

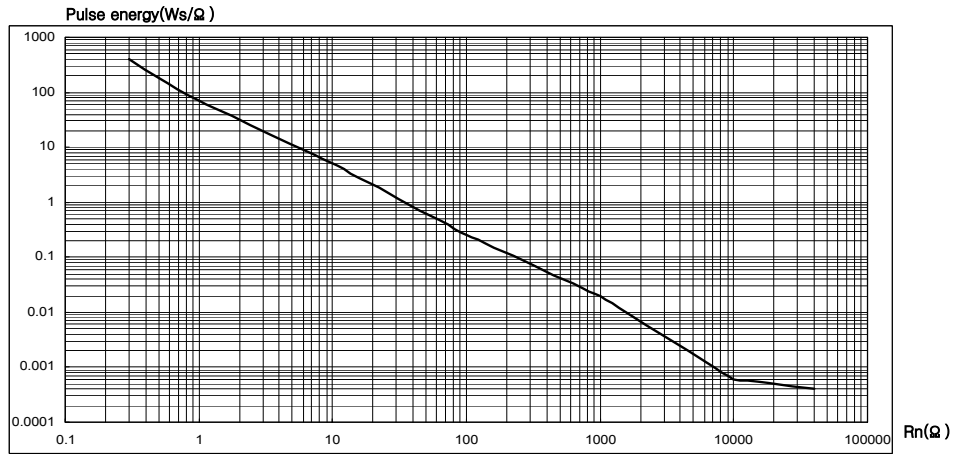


Fig. 6 Pulse capability; W_s as a function of R_n . (WWR 10W)

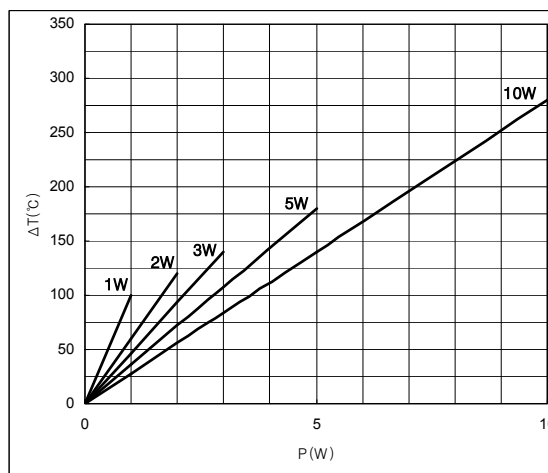


Fig. 7 Hot – spot temperature rise (ΔT) as a function of dissipated power

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Table 4. Mass per 100 units

TYPE	MASS (g)
WWR 1W	55
WWR 2W	72
WWR 3W	133
WWR 5W	358
WWR 10W	595

MARKING

The nominal resistance and tolerance are marked on the resistor using four or five colored bands in accordance with IEC publication 60062 “color codes for fixed resistors”

Table 5. BODY COLORS

TYPE	COLORS	
	Non inductive	Inductive
WWR 1W	Light brown	Light green
WWR 2W	Light brown	Light green
WWR 3W	Light brown	Light green
WWR 5W	Light brown	Light green
WWR 10W	Black	

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TEST AND REQUIREMENTS

Table 6. Test procedures and requirements

TEST	PROCEDURE	REQUIREMENTS
terminal strength	Load : 4.5Kg ; 10s	No evidence of mechanical damage or loosening terminals.
bending half number of samples	load : 0.5Kg ; 4x90°	no damage
torsion other half of samples	3x360° in opposite directions	no damage $\Delta R/R_{\max} : \pm 0.25\% + 0.05 \Omega$
solderability	5s; 260 °C	good tinning ; $\geq 95\%$
resistance to soldering heat	thermal shock : 3s; 350 °C; 2.5mm from body	$\Delta R/R_{\max} : \pm 2\% + 0.05 \Omega$
rapid change of temperature	30minutes at -40 °C and 30minutes at +200 °C; 5cycles	$\Delta R/R_{\max} : \pm 2\% + 0.05 \Omega$
damp heat (steady state)	56days; 40 °C; 90 to 95% RH; dissipation $\leq 0.01 P_n$	$\Delta R/R_{\max} : \pm 3.0\% + 0.1 \Omega$
endurance	1000hours at 70 °C; P_n or V_{\max} 1.5 hours on and 0.5 hours off	$\Delta R/R_{\max} : \pm 5.0\% + 0.1 \Omega$
endurance at upper category temperature	1000 hours; 200 °C; no load	$\Delta R/R_{\max} : \pm 5.0\% + 0.1 \Omega$
temperature coefficient	between -40 °C and +200 °C ($TC \times 10^{-6}/K$)	$R < 0.1R : \pm 250\text{ppm} / ^\circ\text{C}$ $R \geq 0.1R : \pm 150\text{ppm} / ^\circ\text{C}$
insulation resistance	500V _{DC} during 1minute; V-block method	$R_{\text{ins min}} : 1000 M\Omega$
short time overload	rated voltage x 2.5, 5s on 45s off 5cycles ($V \leq V_{\max}$)	$\Delta R/R_{\max} : \pm 2.0\% + 0.05 \Omega$
dielectric withstanding voltage	500V _{RMS} during 1minute; V-block method	no breakdown