

## Wire wound resistors

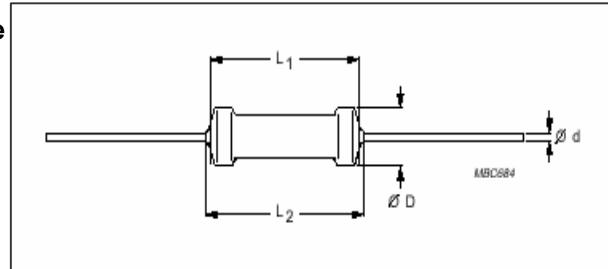
## WWR 1W/2W/3W

### 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

### QUICK REFERENCE DATA

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

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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 $\Omega$ to 100 $\Omega$	0.5	PWWR 371 6xxxx
					1	PWWR 171 7xxxx
					2	PWWR 171 28xxx
					5	PWWR 171 55xxx
	R-Shape		1,500	0.04 $\Omega$ to 100 $\Omega$	1	PWWR 171 3xxxx
					2	PWWR 171 22xxx
					5	PWWR 171 52xxx
WWR 2W	52mm	ammo	1,000	0.02 $\Omega$ to 100 $\Omega$	0.5	PWWR 372 6xxxx
					1	PWWR 372 7xxxx
					2	PWWR 372 24xxx
					5	PWWR 372 55xxx
	R-Shape		1,500		1	PWWR 172 3xxxx
					2	PWWR 172 22xxx
					5	PWWR 172 52xxx
WWR 3W	64mm	ammo	500	0.02 $\Omega$ to 150 $\Omega$	1	PWWR 173 1xxxx
					2	PWWR 173 21xxx
					5	PWWR 173 51xxx
	52mm	ammo	500	0.02 $\Omega$ to 150 $\Omega$	1	PWWR 173 7xxxx
					5	PWWR 173 63xxx

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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	0.04Ω to 0.99Ω	0.5	PWWR 471 6xxxx
					1	PWWR 271 7xxxx
					2	PWWR 271 28xxx
					5	PWWR 271 55xxx
	R-Shape		1,500	0.04Ω to 0.99Ω	1	PWWR 271 3xxxx
					2	PWWR 271 22xxx
					5	PWWR 271 52xxx
WWR 2W	52mm	ammo	1,000	0.02Ω to 0.99Ω	0.5	PWWR 472 6xxxx
					1	PWWR 472 7xxxx
					2	PWWR 472 24xxx
					5	PWWR 472 55xxx
	R-Shape		1,500		1	PWWR 272 3xxxx
					2	PWWR 272 22xxx
					5	PWWR 272 52xxx
WWR 3W	64mm	ammo	500	0.02Ω to 0.99Ω	1	PWWR 273 1xxxx
					2	PWWR 273 21xxx
					5	PWWR 273 51xxx

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**Limiting values**

Table 3

TYPE	LIMITING VOLTAGE <sup>(1)</sup> (V)	LIMITING POWER (W)
WWR 1W	150	1
WWR 2W	200	2
WWR 3W	250	3

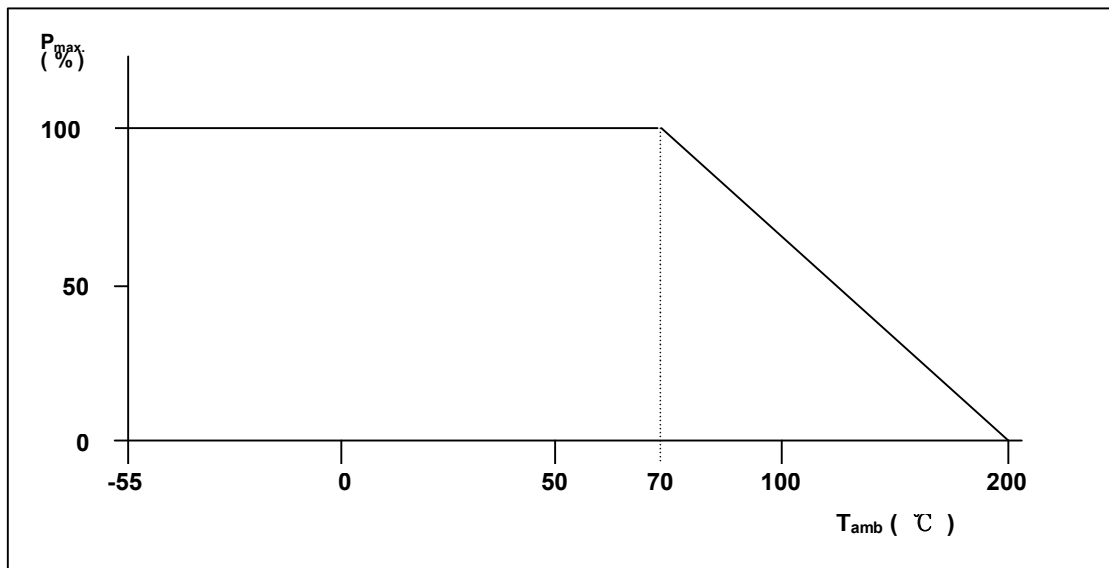
**Note**

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<sub>max</sub>) in percentage of rated power as a function of the ambient temperature (T<sub>amb</sub>)**

PULSE LOADING CAPABILITIES

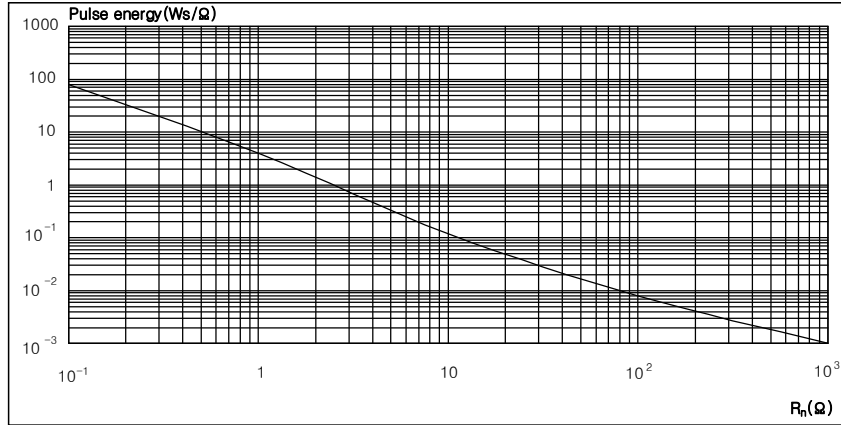


Fig. 2 Pulse capability;  $W_s$  as a function of  $R_n$ . ( WWR 1W )

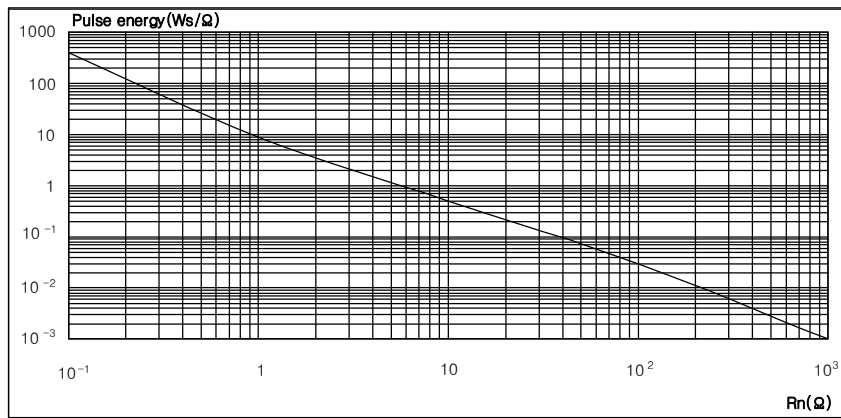


Fig. 3 Pulse capability;  $W_s$  as a function of  $R_n$ . ( WWR 2W )

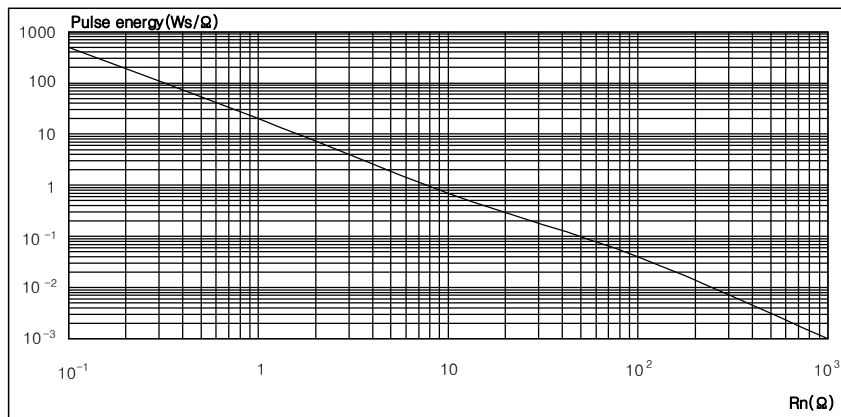


Fig. 4 Pulse capability;  $W_s$  as a function of  $R_n$ . ( WWR 3W )

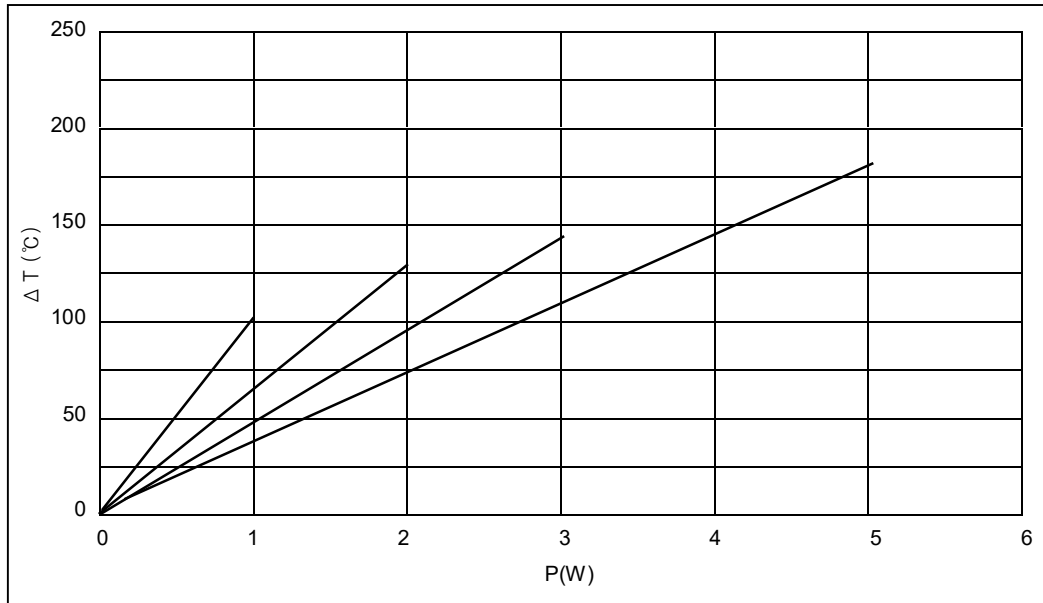


Fig. 5 Hot – spot temperature rise ( $\Delta T$ ) as a function of dissipated power

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**MECHANICAL DATA****Table 4. Mass per 100 units**

TYPE	MASS ( g )
WWR 1W	55
WWR 2W	72
WWR 3W	133

**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

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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 <sub>DC</sub> 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 <sub>RMS</sub> during 1minute; V-block method	no breakdown