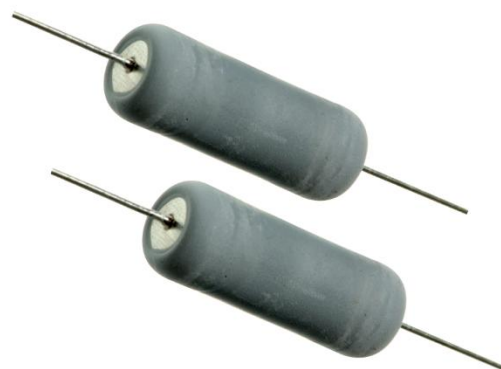


WHS Series

Features:

- Enhanced surge & pulse energy capacity
- UL94-V0 flameproof protection
- Radial taped form available
- Surface mount ZI-form option
- Non inductive type available



 All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863

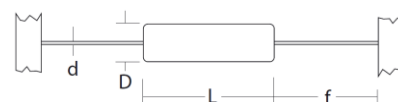
Electrical Data

		WHS2/WHSP2R	WHS3	WHS5	WHS7	WHS10	WHS10N ²
Power rating @25°C	W	2	3	5	7	10	
5s overload rating @25°C	W	10	15	25	35	50	
Short pulse performance		See Pulse Performance graphs					
Resistance range	ohms	1R0 – 330R				2R2 – 330R	5R6 – 100R
TCR	ppm/°C	±200					
Isolation voltage	V	250	350	500	700	1000	
Resistance tolerance	%	<20R: 5, ≥20R: 1, 2, 5					5
Standard values		E24 preferred					
Thermal impedance	°C/W	110	82	54	35	25	
Ambient temperature range	°C	-55 to 200					

Note 1: No Limiting Element Voltage applies to this series; the rated voltage is V(PR). Note 2: WHS10N has a non-inductive Ayrton-Perry winding.

Physical Data

Dimensions in mm and weight in g							
Type	L max	D max	f min	d max	PCB mounting centres	Min. bend radius	Wt. nom
WHS2	9	3.6	19.8	0.81	12.5	1.2	0.5
WHS3	14.5	5.2	24.55		20		1.1
WHS5	16.5	7	23.55		22		1.75
WHS7	25	8.8	28.3		31		4.4
WHS10	51	10.5	26	1.01	56	1.5	8.8
WHS10N		11					10.5



Construction

A high-purity ceramic substrate is assembled with interference fit end caps to which are welded the terminations. The resistive element is wound on the substrate and welded to the caps. Flameproof silicone cement coating is applied prior to marking with indelible ink. The components are then leadformed if required and packed.

Terminations

Terminations are hot tin dipped copper wire. They meet the strength requirements of IEC 60115-1 clause 9.5 and the solderability requirements of IEC 60115-1 clause 11.1.

Marking

WHS2, WHSP2R and WHS3 resistors are marked with four colour bands in conformance with IEC 60062. The larger sizes are legend marked with type reference, resistance value and tolerance.

General Note

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All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

WHS Series

Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuits.

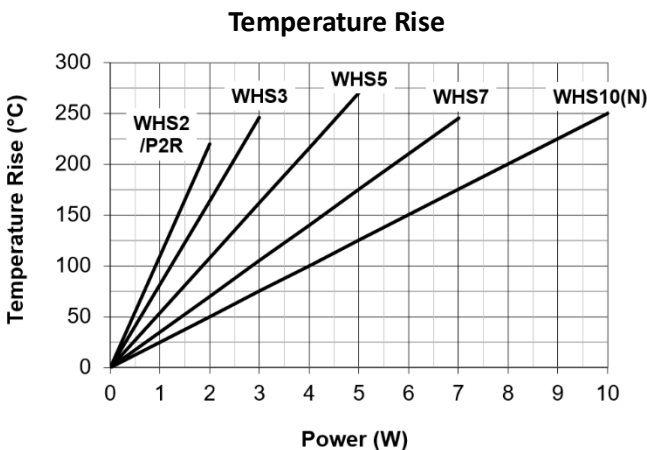
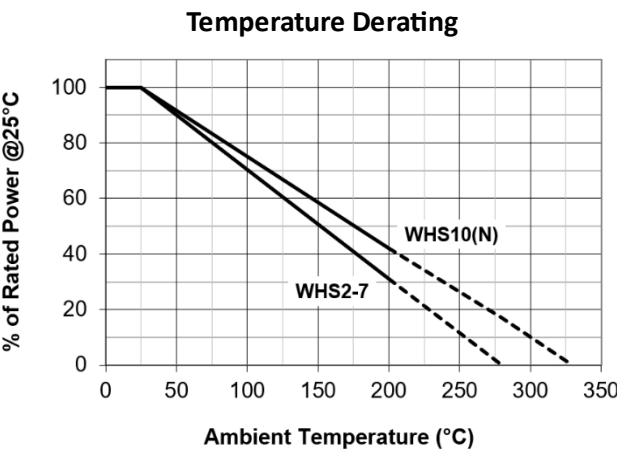
Flammability

The resistor coating will not burn or emit incandescent particles under any condition of applied temperature or power overload.

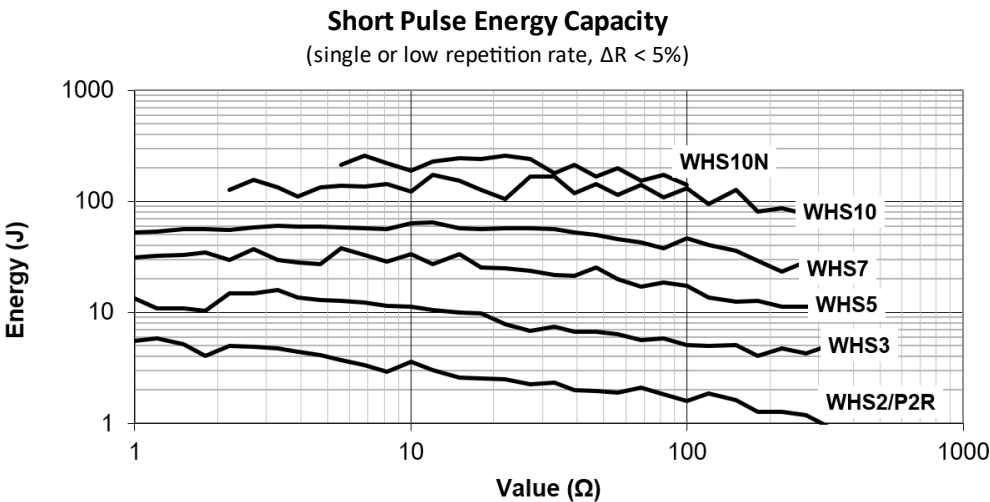
Performance Data

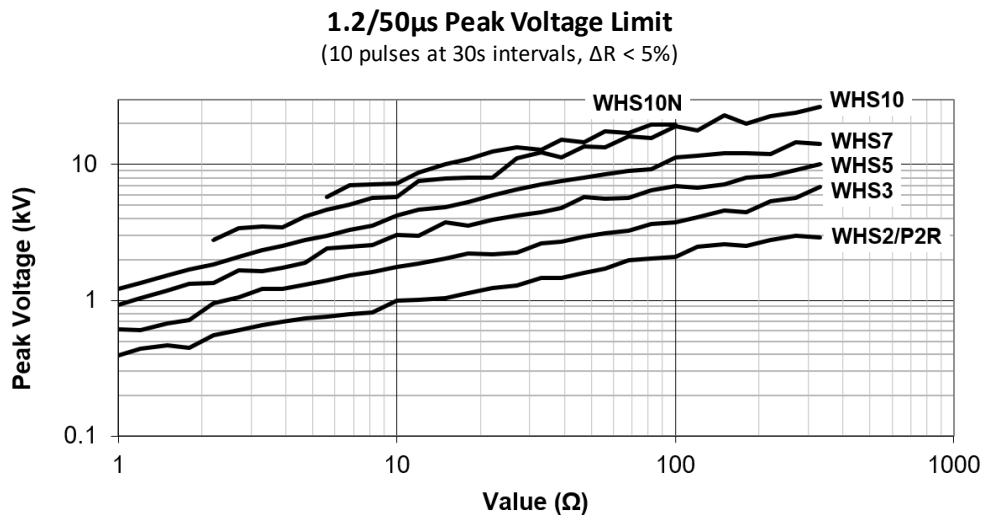
		Maximum (+R001)	Typical
Load at rated power: 1000 hours at 25°C	$\pm\Delta R\%$	5	3
Dry heat: 1000 hours at 200°C	$\pm\Delta R\%$	5	3
Short term overload: $5 \times P_r$ for 5s	$\pm\Delta R\%$	5	1
Climatic	$\pm\Delta R\%$	5	2
Climatic category		55/200/56	
Long term damp heat: 56 days	$\pm\Delta R\%$	5	1
TRC & vibration	$\pm\Delta R\%$	5	1
Robustness & solder heat	$\pm\Delta R\%$	5	1

Thermal Performance



Pulse Performance

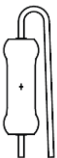
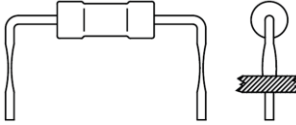
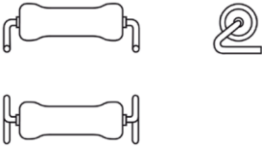




Note: The voltage shown is the nett voltage across the resistor. At low values, the generator open circuit voltage will be higher due to the generator's 2 Ω output impedance.

Application Notes

1. If the resistors are to dissipate full rated power, it is recommended that the terminations should not be soldered closer than 4mm from the body.
2. Due to operating temperature limits imposed by some PCB materials, derating may be necessary. The surface temperature rise at the centre of the body is shown under Thermal Performance.
3. WHS2, WHS3, and WHS5 resistors can also be supplied with goalpost or lancet pre-formed leads. Hairpin form is available on WHS2 and WHS3 only. For details see:
<https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Application-Note/TN008-Resistors-Leadform-Capability.pdf>.
4. WHS2, WHS3, and WHS5 are also available in an SMD format with ZI formed leads and packed in blister tape. For details see:
<https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Datasheet/ZI-form.pdf>.

Hairpin	Goalpost	Lancet	ZI-form
			

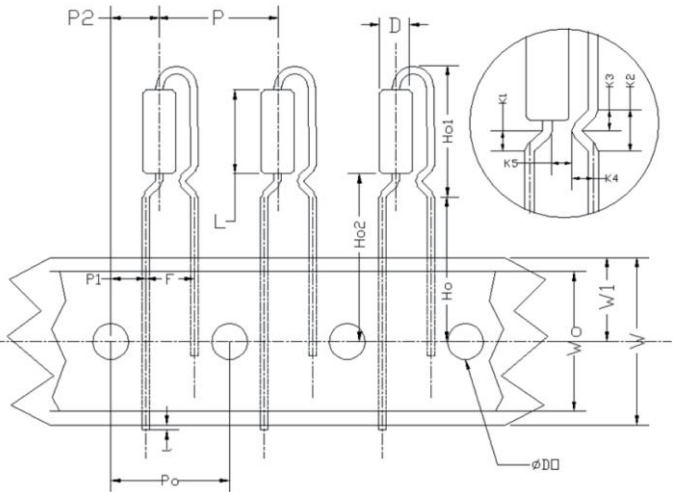
5. A 2W and 3W radial taped version is also available as shown below:

Wirewound High Surge Resistors

WHS Series

Radial Taped Dimensions in mm

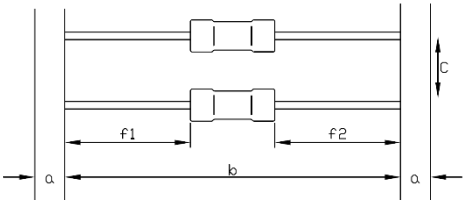
Dimension	Notation	WHSP2R ¹	WHS3R
Component body length	L	10 max	14.5 max
Component body diameter	D	4 max	5.2 max
Terminal lead diameter	d	0.8 nom	
Component pitch	P	12.7 ±0.5	12.7 ±1
Hole pitch	P ₀	12.7 ±0.2	12.7 ±0.3
Component to hole offset	P ₁	3.85 ±0.3	3.85 ±0.7
	P ₂	5.85 ±0.5	6.35 ±1.3
Lead pitch	F	5 +0.75, -0.34	5 ±1
Width of backing strip	W	18 ±0.3	18 ±1
Position of hole	W ₁	9 ±0.25	9 ±0.5
Diameter of hole	Do	4 ±0.3	
Height to lead form	Ho	16 ±0.3	17 ±1
Height from lead form	Ho ₁	17 max	23 max
Height to resistor	Ho ₂	18 min	
Width of adhesive tape	W ₀	15 ±0.5	
Length of protrusion	I	<0.25	
Form dimensions	K ₁	2 ±0.3	
	K ₂	3 ±0.5	
	K ₃	1.5 ±0.25	
	K ₄	1 ±0.2	
	K ₅	-	2 min



Note 1: Although body dimensions differ slightly, WHSP2R Performance and Electrical Data are identical to those of WHS2.

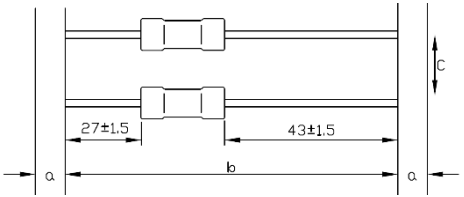
Packaging

The standard packaging for WHS is taped. The critical dimensions are shown below. The component wires will not protrude beyond the outside edge of the tapes. Taped product is then packed into boxes or onto reels; see Ordering Procedure for details. Alternative packaging is available by request. Pre-formed resistors are supplied loose packed in plastic bags or boxes.



Dims in mm	WHS2	WHS3	WHS5	WHS7	WHS10	WHS10N
a	6				9	
b	52	67	63	85	105	
c	5	10				20
f ₁ – f ₂	≤ 1.4					

An unequal lead length version of WHS7 permits vertical radial forming. This is ordered as WHS7U.



Dims in mm	WHS7U
a	6
b	95
c	10

General Note

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Ordering Procedure

Example: WHS2-100RJA25 (WHS2, 100 ohms $\pm 5\%$, Pb-free)

W	H	S	2			-	1	0	0	R	J	A	2	5		
1				2		3				4		5				

1 Type	2 Variant	3 Value	4 Tolerance	5 Packing			
WHS2	U = unequal lead length (WHS7 only)	E24 = 3/4 characters R = ohms	F = $\pm 1\%$	A25	WHS2	Ammo	2500/box
WHS3			G = $\pm 2\%$	A1	WHS3	pack	1000/box
WHS5	N = non-inductive (WHS10 only)		J = $\pm 5\%$	T075	WHS5	Tape &	750/reel
WHS7				T07	WHS7(U)	reel	700/reel
WHS10				A02	WHS10	Ammo	200/box
				A01	WHS10N	pack	100/box

Radial Taped Example: WHSP2R-100RT15 (WHSP2R radially formed & taped, 100 ohms $\pm 5\%$, Pb-free)

W	H	S	P	2	R	-	1	0	0	R	J	T	1	5	
1					2	3					4	5			

1 Type	2 Lead forming	3 Value	4 Tolerance	5 Packing			
WHSP2	R = radial taped	E24 = 3/4 characters R = ohms	F = $\pm 1\%$	T15	WHSP2R	Tape & reel	1500/reel
WHS3			G = $\pm 2\%$	A1	WHS3R	Ammo pack	1000/box
			J = $\pm 5\%$	T1		Tape & reel	1000/reel