UL Recognised Wirewound Resistors

ULW Series

Features:

- UL1412 recognised fusible resistor *
- Failsafe mains fusing at 120 / 240Vrms
- Inrush and surge withstanding
- UL94-V0 flameproof coating
- Surface mount ZI-form option

* UL file number E234469



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

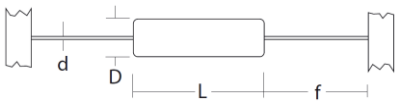
Electrical Data

		ULW2 / ULWP2R	ULW3	ULW4	ULW5
Power rating @25°C	W	2	3	4	5
5s overload rating @25°C	W	10	15	20	25
Inrush / surge performance		See Pulse Performance graphs			
Resistance range	ohms	1R0 to 100R			
TCR	ppm/°C	±200			
Isolation voltage	V	250	350	500	
Resistance tolerance	%	5			
UL recognised standard values		Any value in the range 1R0 to 100R is recognised. E24 preferred.			
Thermal impedance	°C/W	110	82	62	54
Ambient temperature range	°C	-55 to +200			

Physical Data

Dimensions in mm and weight in g

Type	L max	D max	f min	d nom	PCB mounting centres	Min. bend radius	Wt. nom
ULW2	9	3.8	19.8	0.8	12.5	1.2	0.5
ULW3	14.5	5.8	24.6		20		1.1
ULW4	13	5.6	22.8		19		1
ULW5	16.5	7.2	23.6		22		1.8



Construction

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

Marking

ULW2, ULWP2R and ULW3 resistors are marked with five colour bands. The first four indicate value and tolerance in conformance with IEC 60062. The fifth yellow band denotes defined fusibility. ULW4 and ULW5 resistors are legend marked with type, value and tolerance.

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.

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 overloa d.

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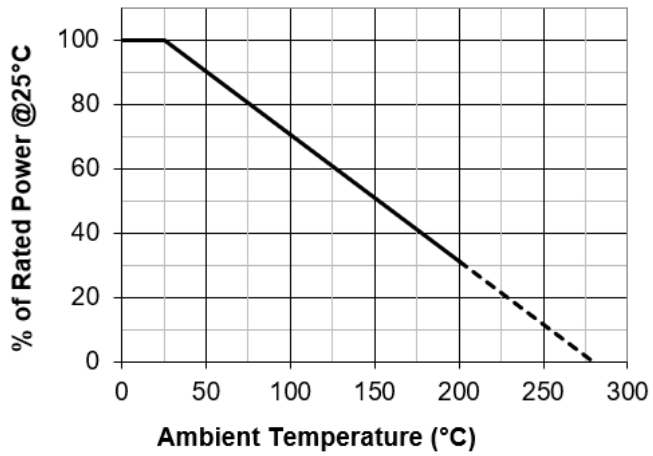
ULW Series

Performance Data

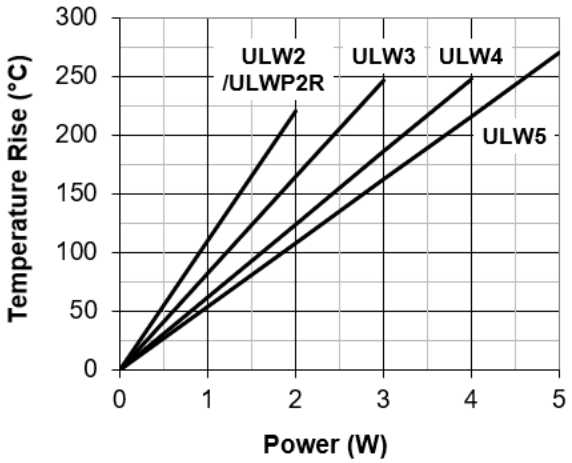
		Maximum (+R01)	Typical
Load at rated power: 1000 hours at 25°C	±ΔR%	5	3
Short term overload: 5 x P_r for 5s	±ΔR%	5	1
Pulse: see Pulse Performance graphs	±ΔR%	5	2
Climatic	±ΔR%	5	2
Long term damp heat: 56 days	±ΔR%	5	1
Climatic category		55/200/56	
Temperature rapid change	±ΔR%	5	1
Dry heat: 1000 hours at 200°C	±ΔR%	5	3
Vibration	±ΔR%	5	1
Robustness & solder heat	±ΔR%	5	1

Thermal Performance

Temperature Derating



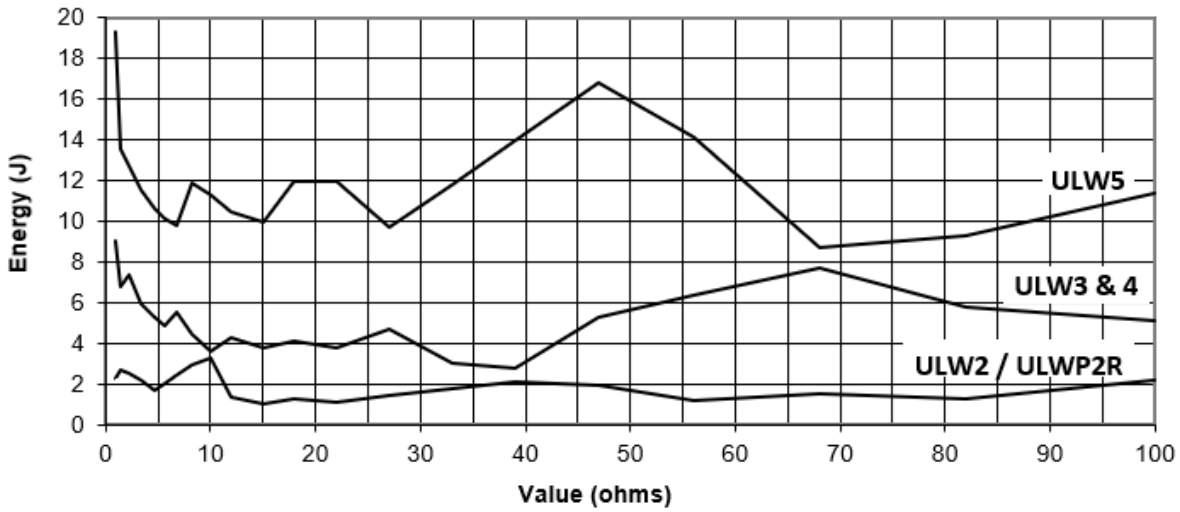
Temperature Rise



Pulse Performance

Short Pulse Energy Capacity

(Single or low repetition rate, ΔR < 5%)

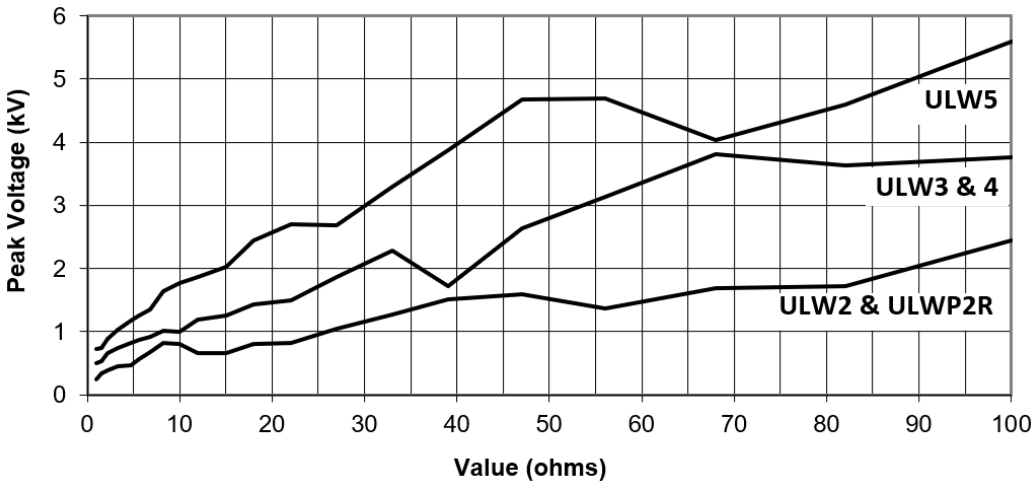


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1.2/50µs Peak Voltage Limit

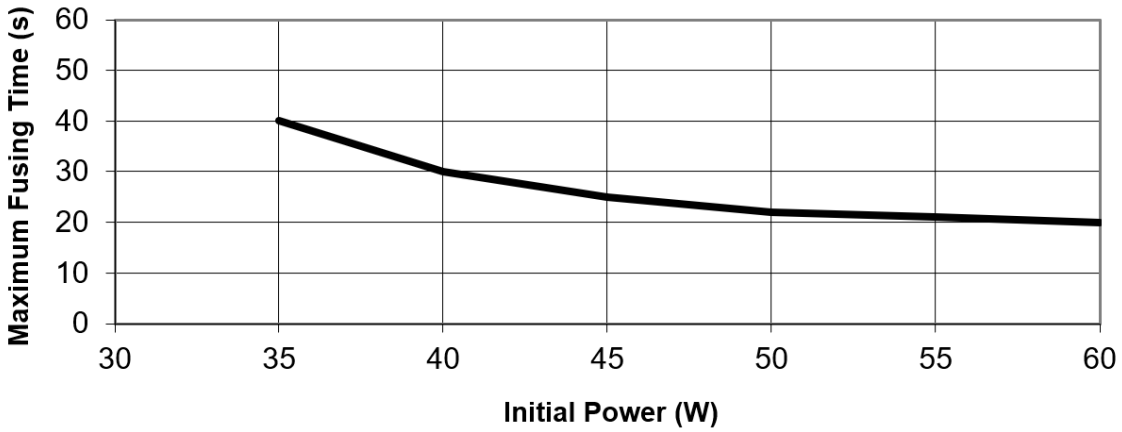
(10 pulses at 10s intervals, ΔR < 5%. Note the voltage shown is the nett voltage across the resistor. The generator open circuit voltage will be higher due to the generator's internal impedance.)



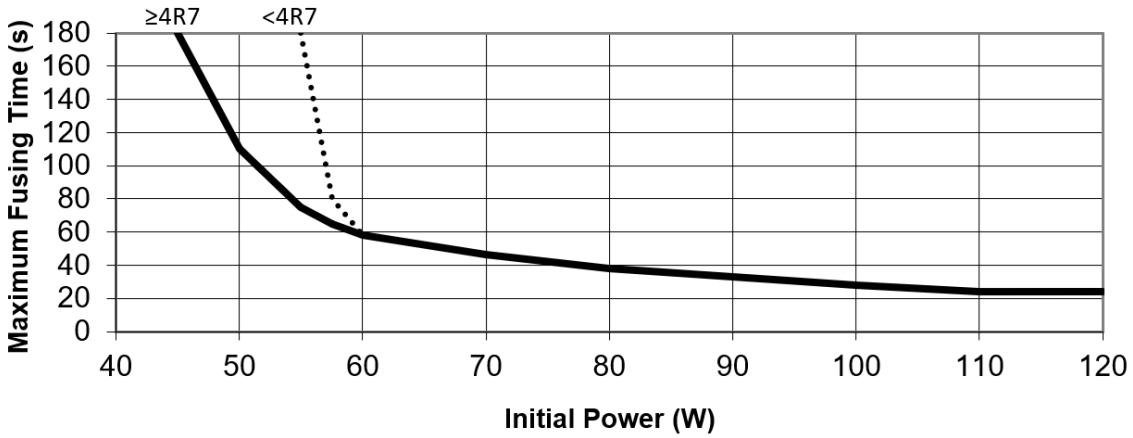
Fusing Performance

Typical fusing times are around 1/3 of the maximum figures shown in the graphs below. After fusing the resistance value is >100 times the initial nominal value, provided the initial power is at least 20 x rated power. ULW is suitable for fusing at voltages up to 264Vrms.

ULW2 & ULWP2R Fusing Characteristic

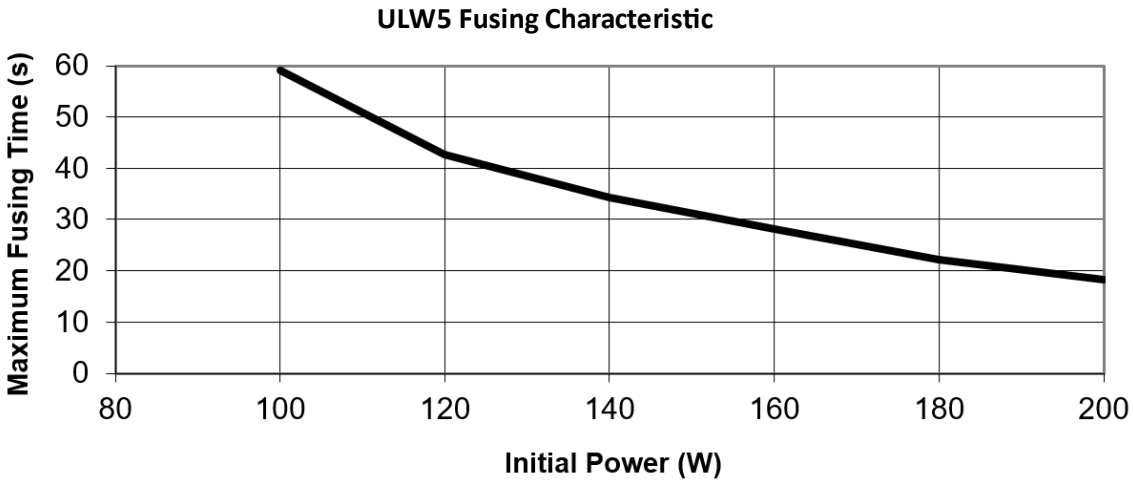


ULW3 & ULW4 Fusing Characteristic



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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.

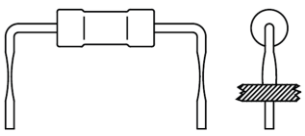
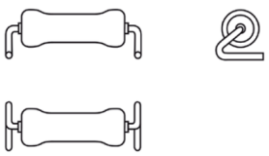
2. Due to operating temperature limits imposed by some PCB materials, derating may be necessary. The surface temperature rise at the centre of the body is shown under Thermal Performance.

3. For the purposes of UL approval, the following points should be observed:

   3.1 To protect against fire under all conditions of overload, a positive clearance of at least 13mm should be provided between the body of the resistor and any combustible materials.
   3.2 A positive clearance of 13mm should be provided between the resistor body or terminations and uninsulated parts of opposite polarity or uninsulated dead metal parts.
   3.3 Limited Short Circuit testing should be performed in the complete appliance.

4. ULW resistors can also be supplied with goalpost or lancet pre-formed leads. Hairpin form is also available on ULW2, ULW3 and ULW4 only. For details see:
https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Application-Note/TN008-Resistors-Leadform-Capability.pdf.

5. ULW resistors 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
			

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

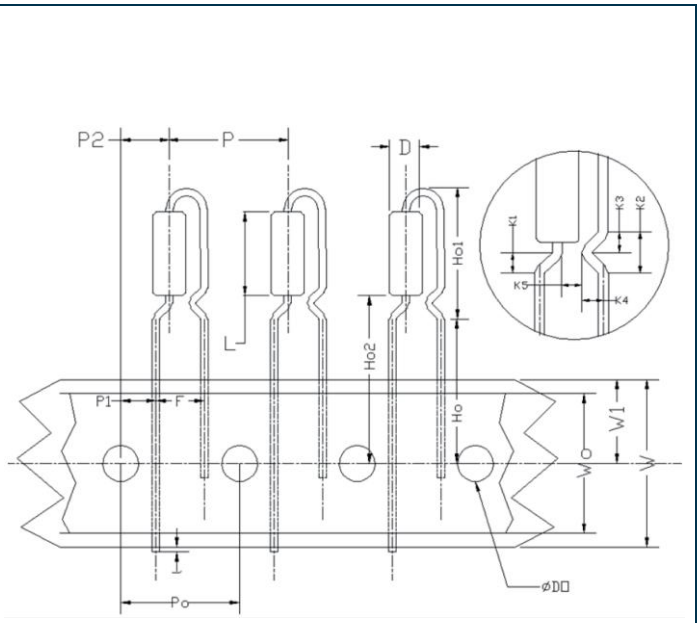
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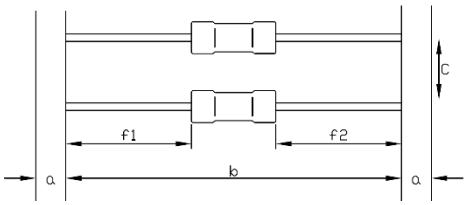
Radial Taped Dimensions in mm			
Dimension	**Notation**	**ULWP2R [1]**	**ULW3R**
Component body length	L	10 max	14.5 max
Component body diameter	D	4 max	5.8 max
Terminal lead diameter	d	0.8 nom	
Component pitch	P	12.7 ±0.5	12.7 ±1
Hole pitch	P_0	12.7 ±0.2	12.7 ±0.3
Component to hole offset	P_1	3.85 ±0.3	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	<2.5	
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, ULWP2R Performance and Electrical Data are identical to those of ULW2.

Packaging

The standard packaging for ULW 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 hairpin, goalpost and lancet resistors are supplied loose packed in plastic bags or boxes. ZI form SMD parts are packed in blister tape.



Dims in mm	ULW2	ULW3	ULW4	ULW5
a ±1	6			
b ±2	52	67	63	
c ±0.5[1]	5	10		
$f_1 - f_2$	≤ 1.4			

Note 1: Cumulative tolerance over 10 pitches is ±2mm

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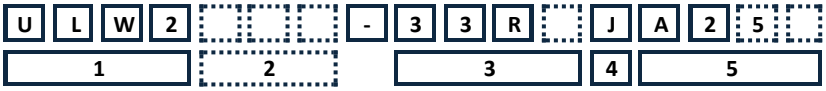
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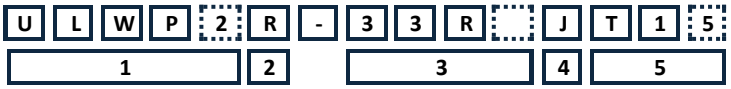
Ordering Procedure

Example: ULW2-33RJA25 (ULW2, 33 ohms ±5%, Pb-free)



1 Type	2 Leadforming	3 Value	4 Tolerance	5 Packing			
ULW2	Optional code	E24 = 3/4 characters R = ohms	J = ±5%	A25	ULW2	Ammo pack	2500/box
ULW3				A1	ULW3, ULW4		1000/box
ULW4				T075	ULW5	Tape & reel	750/reel
ULW5							

Radial Taped Example: ULWP2R-33RT15 (ULWP2R radially formed & taped, 33 ohms ±5%, Pb-free)



1 Type	2 Lead forming	3 Value	4 Tolerance	5 Packing			
ULWP2	R = radial taped	E24 = 3/4 characters R = ohms	J = ±5%	T15	ULWP2R	Tape & reel	1500/reel
ULW3				A1	ULW3R	Ammo pack	1000/box
				T1		Tape & reel	1000/reel

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