Resistors

UL Recognised Wirewound Resistors

ULW Series

- 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 (RoHS3)

Electrical Data

		ULW2 / ULWP2R	ULW3	ULW4	ULW5
Power rating at 25°C	watts	2	3	4	5
5 second overload rating at 25°C	watts	10	15	20	25
Inrush / surge performance		See Pulse Performance graphs			
Resistance range	ohms	1R0 to 100R			
TCR	ppm/°C	±200			
Isolation voltage	volts	250	350	500	
Resistance tolerance	%	5			
UL recognised standard values	ohms	Any value in the range 1R0 to 100R is recognised. E24 preferred			
Thermal impedance	°C/watt	110	82	62	54
Ambient temperature range	°C	-55 to +155			

Note - no limiting element voltage applies; maximum continuous voltage is √(P.R)

Physical Data

Dimensions (mm) and weight (g)							
Type	L Max	D Max	f min	d nom	PCB mount centres	Min bend radius	Wt. Nom
ULW2	9.0	3.8	19.8	0.8	12.7	1.2	0.5
ULW3	14.5	5.8	24.6		20.3		1.1
ULW4	13	5.6	22.8		18.9		1.0
ULW5	16.5	7.2	23.6		22.9		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 & ULW3 resistors are marked with five colour bands. The first four indicate value and tolerance in conformance with IEC62. The fifth yellow band denotes defined fusibility. ULW4 and ULW5 resistors are legend marked with type, value and tolerance.

General Note

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Terminations

Material:	Hot tin dipped copper wire
Strength:	The terminations meet the requirements of IEC 68.2.21
Solderability:	The terminations meet the requirements of IEC 115-1 Clause 4.17.3.2

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.

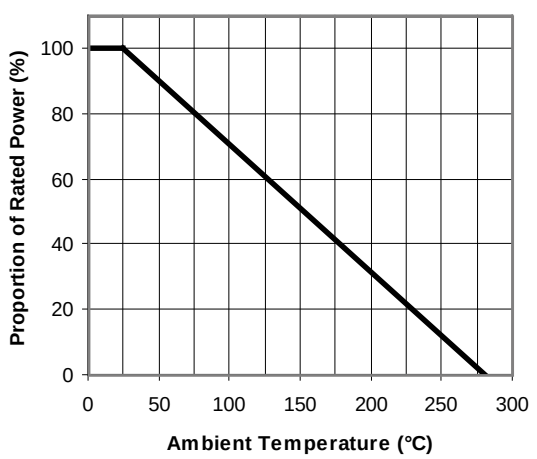
Performance Data

		Maximum*	Typical
Load at rated power (1000 hours @ 25°C)	ΔR%	5	3
Short term overload (5 x Pr for 5 seconds)	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 @ 200°C)	ΔR%	5	3
Vibration	ΔR%	5	1
Robustness & solder heat	ΔR%	5	1

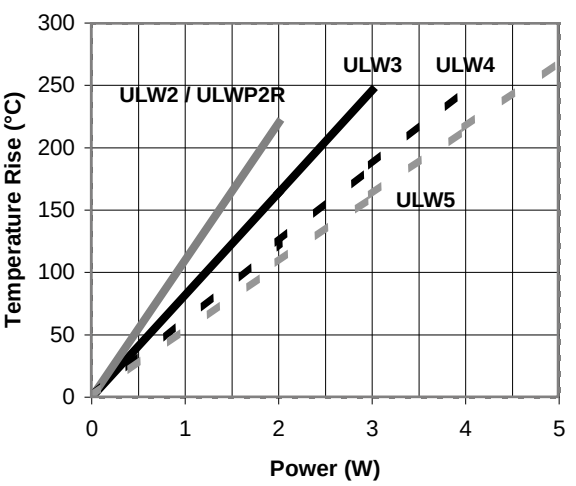
* Addition of 0.01Ω applies

Thermal Performance

Derating Curve



Body Temperature Rise



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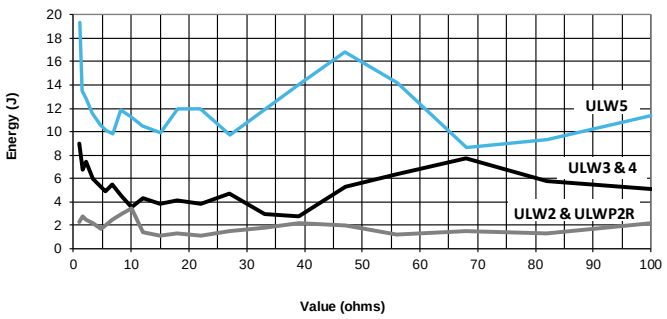
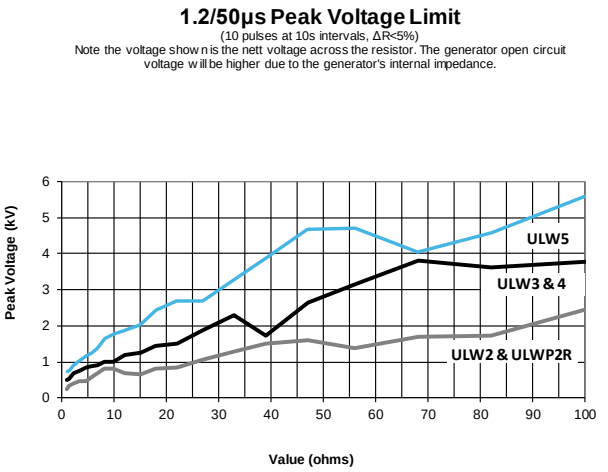
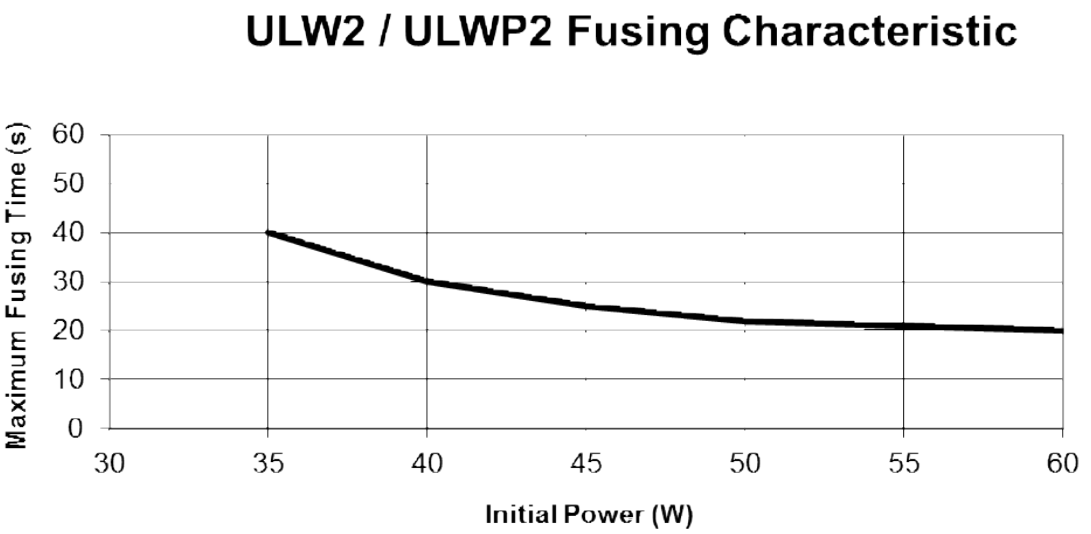
Pulse Performance





Fusing Performance



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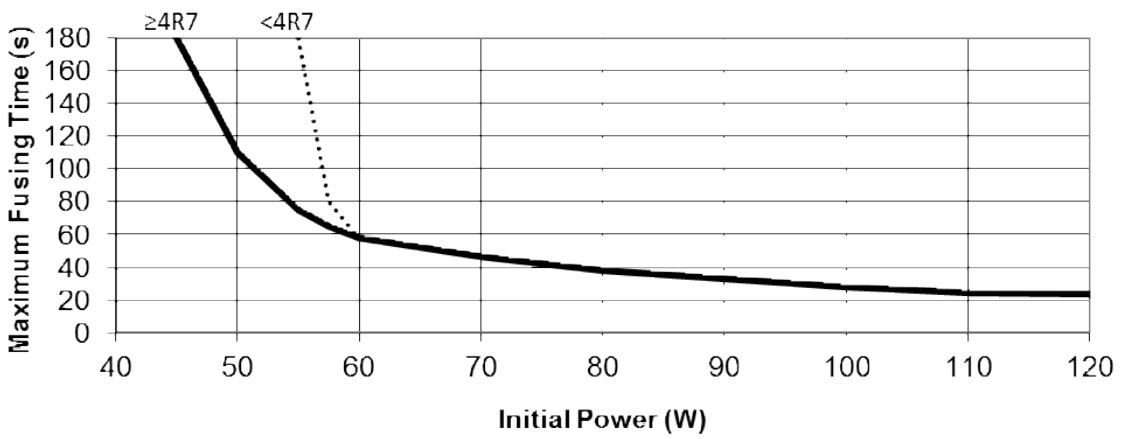
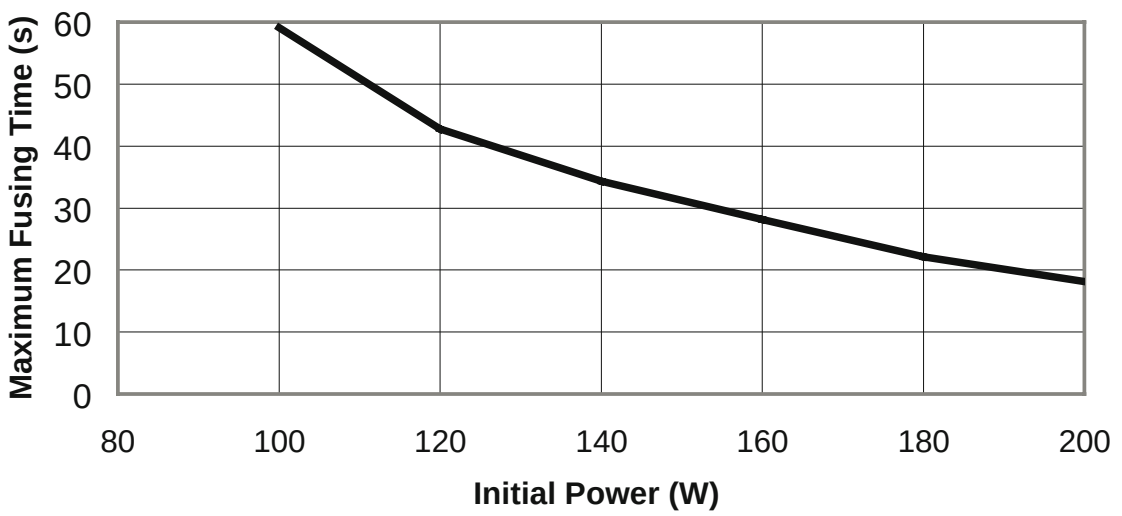
Fusing Performance

ULW3 & ULW4 Fusing Characteristic



ULW5 Fusing Characteristic



Notes:

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

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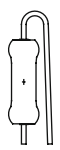
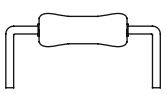
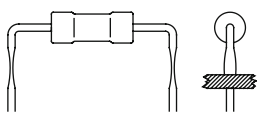
Application Notes

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. An estimate of the temperature rise to be expected can be calculated using the thermal impedance figures given under Electrical Data.

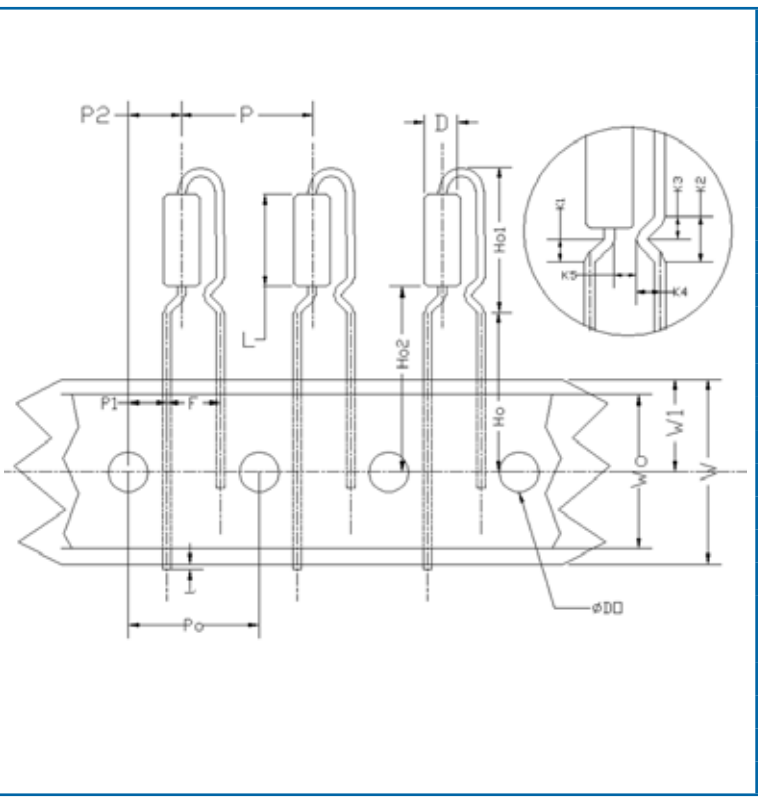
3. For the purposes of UL approval, the following points should be observed:
   - 3.1 To protect against fire under all conditions of overload, a positive clearance of at least 13mm should be provided between the body of the resistor and any combustible materials.
   - 3.2 A positive clearance of 13mm 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 radial, goalpost or lancet pre-formed leads - see https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Resistors/ApplicationNotes/TN008-resistors-Leadform-Capability.pdf. ULW2, ULW3, ULW4 and ULW5 are available in ZI-form SMD format packed in blister tape - see https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Resistors/Datasheets/ZI-form.pdf

Hairpin	Goalpost	Lancet	ZI-form
			

Also a 2W and 3W radial taped version is available as shown below

Radial Taped Dimensions (mm)			
Dimension	Notation	ULWP2R	ULW3R
Component body length	L	10.0 Max	14.5 Max
Component body diameter	D	4.0 Max	5.8 Max
Terminal lead diameter	d	0.8 Nom	
Component pitch	P	12.7±0.5	12.7±1.0
Hole pitch	Po	12.7±0.2	12.7±0.3
Component to hole offset	P1	3.85±0.3	3.85±0.7
	P2	5.85±0.5	6.35±1.3
Lead pitch	F	5.0 +0.75 -0.34	5.0±1.0
Width of backing strip	W	18.0±0.3	18.0±1.0
Position of hole	W1	9.0±0.25	9.0±0.5
Diameter of hole	Do	4.0±0.3	
Height to lead form	Ho	16.0±0.3	17.0±1.0
Height from lead form	Ho1	17.0 Max	23.0 Max
Height to resistor	Ho2	18.0 Min	
Width of adhesive tape	W0	15.0±0.5	
Length of protrusion	l	<2.5	
Form dimensions	K1	2.0±0.3	
	K2	3.0±0.5	
	K3	1.5±0.25	
	K4	1.0±0.2	
	K5	--	2.0 Min



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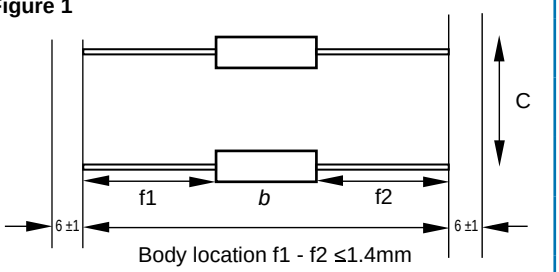
Packaging

The standard packaging for ULW is taped. The critical dimensions are shown in Figure 1. The component wires will not protrude beyond the outside edge of the tapes. Taped product is then packed into ammo boxes for ULW2, 3 and 4 or onto reels for ULW5. Alternative packaging is available by request.
The standard packaging for ULWP2R is tape and reel. Pre-formed radial, goalpost & lancet resistors are supplied loose packed in plastic bags or boxes.
ZI-form SMD are packed in blister tape.

Dimensions (mm)		
Type	b ±2	C ±0.5 [1]
ULW2	52	5
ULW3	67	10
ULW4	63	10
ULW5		

Figure 1



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

Ordering Procedure

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

U	L	W	2				-	3	3	R	J	A	2	5
1				2				3			4	5		

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

Example: ULWP2R-33RJT15 (ULWP2R radially formed & taped, 33 ohms ±5%, Pb-free)

U	L	W	P	2	R	-	3	3	R	J	T	1	5
1					2		3			4	5		

1 Type	2 Leadforming	3 Value	4 Tolerance	5 Packing			
ULWP2	R = Radial taped	3/4 characters R = ohms	J = ±5%	T15	ULWP2R	Tape & reel	1500/reel
ULW3				A2	ULW3R	Ammo pack	2000/box
				T1		Tape & reel	1000/reel

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