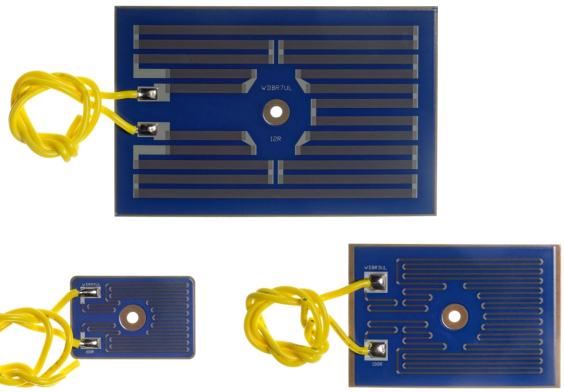
Ultra Low Profile Power Resistors

WDBR-UL Series



Features:

- Ultra low profile thick-film on steel
- Up to 7kW peak power
- Single fixing heatsink mountable
- Ideal for dynamic braking, inrush limit and snubber circuits
- Choice of flying lead or solder terminations
- Low inductance design
- High isolation, even after failsafe overload fusing
- RoHS compliant, non-flammable construction
- UL508 certified—UL file E238661

All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

Electrical Data

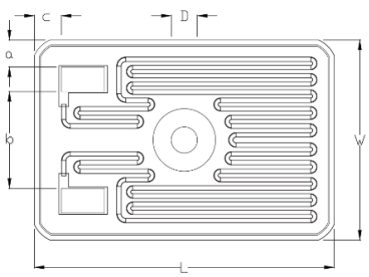
		WDBR1UL	WDBR2UL	WDBR3UL	WDBR5UL	WDBR7UL
Resistance range [5]	Ω	12, 15, 20, 22, 25, 47, 50, 100, 150				
Resistance tolerance	%	10				
Pulse peak power rating [1]	kW	1.5	2	3.5	5	7
Power rating on heatsink [2]	W	170	190	240	250	260
Power rating on fan cooled heatsink [3]	W	660	740	850	950	1410
TCR	ppm/°C	<+600				
Maximum element temperature	°C	450				
Ambient temperature range (heatsink)	°C	-55 to +200				
Dielectric withstand [4]	V (dc/ac pk)	2500				
Inductance	µH	<3		<4	<5	<6

Note 1: For details of pulse condition see Fig. 1 in Performance Data.
Note 2: Mounted on a 0.53°C/W heatsink with no forced air cooling, air temperature 25°C.
Note 3: Mounted on a 0.53°C/W heatsink with 5m/s forced air cooling, air temperature 25°C.
Note 4: Based on 100% production test, duration 2s minimum.
Note 5: Other ohmic values upon request.

Physical Data

Dimensions in mm and weight without terminations in g

Type	L ±0.1	W ±0.1	t ±0.1	ØD nom	a nom	b nom	c nom	d min	Wt. nom
WDBR1UL	49.3	35.9	0.9	3.2	4.2	17.6	4.2	2.9	12.6
WDBR2UL	61	40.6		5.3	5.5	19.7	5.5	4.5	17.1
WDBR3UL	101.6	70			14.5	24.8	10.1	7.5	50.8
WDBR5UL	122	70	1.5		15.3	27	8.6	7.5	101.2
WDBR7UL	152.4	101.6			39.3	10.7	11.8	10.5	181.8



t = substrate thickness.

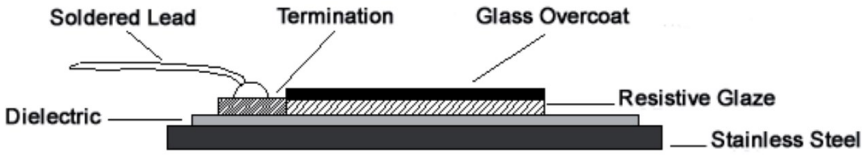
d = clearance between exposed conductor and exposed steel substrate.

The fixing hole is centrally located.

Construction

A high integrity dielectric layer is applied to a machined stainless-steel substrate. Thick-film conductor and resistor patterns are printed and fired, then protected with a high temperature overglaze. The termination pads are tinned with solder and optional leads are soldered on.

Construction Cross Section



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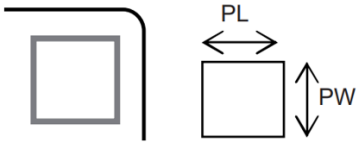
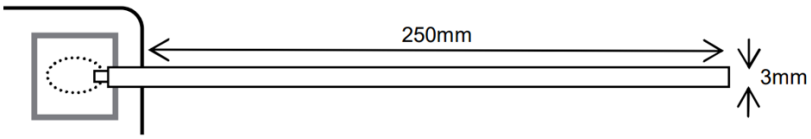
Termination Options

Option	Code	Nominal Dimensions (mm)
Solder pads only	I	
Flying leads UL3134/5 40A, 600V	L	

WDBR-UL Size	1 & 2	3	5 & 7
Pad Length, PL	8.8	8.1	9.1
Pad Width, PW	5	8.1	6.1

Note: Two options exist for solder type. The standard is SnAg (96SC) which is Pb-free and the second (HT) is high temperature HMP alloy which is Pb-bearing. Both are RoHS compliant, but the second relies on the RoHS exemption for high temperature solders and is targeted at specialist high temperature applications.

Performance Data

	±ΔR%
Pulsed load at full pulse power rating 50,000 cycles (see Fig. 1) Mounted on a 0.53°C/W heatsink with 5m/s forced air cooling, air temperature 25°C	5
Derating at heatsink temperatures >160°C	See Fig. 2

Fig. 1 Duty Cycle Waveform

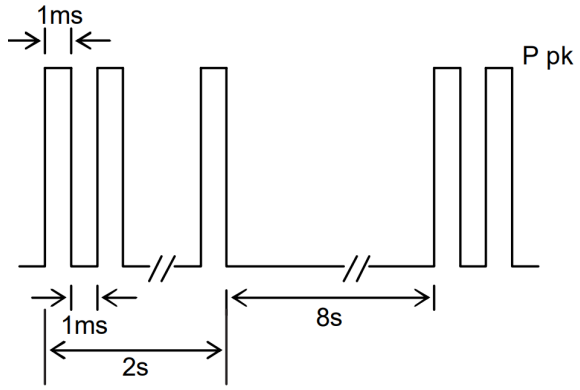
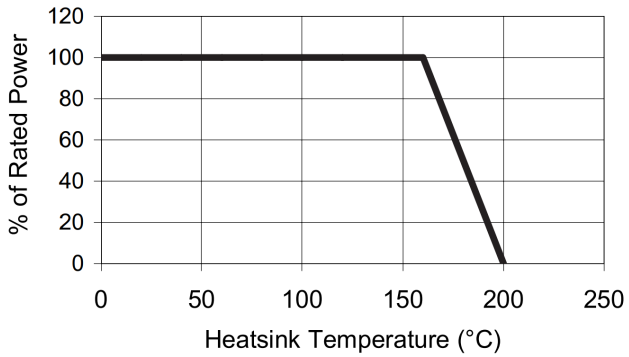
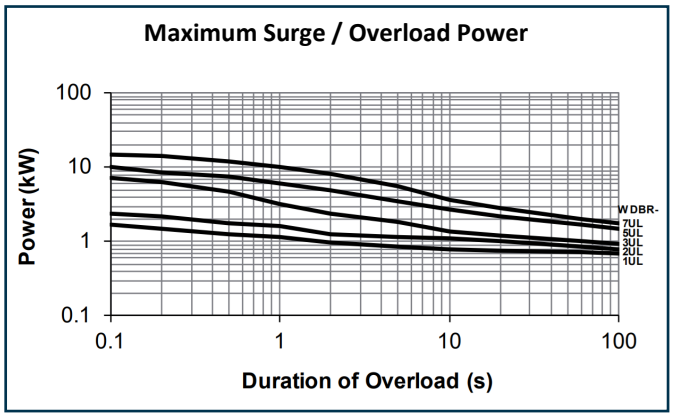
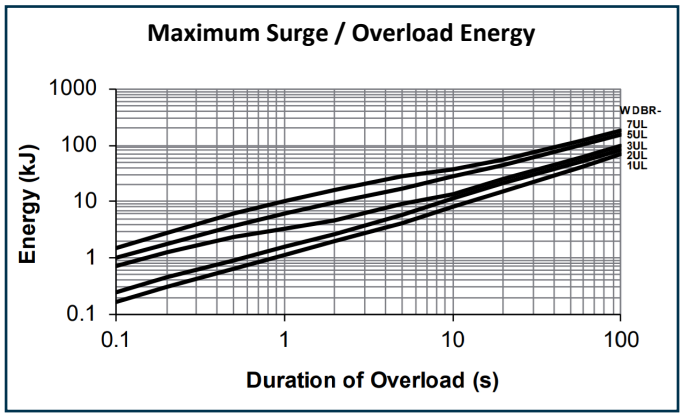


Fig. 2 Temperature De-rating



Pulse and Overload Performance





Note: Mounted on a 0.53°C/W heatsink with 5m/s forced air cooling, air temperature 25°C. Single pulse or low repetition rate, such that mean power ≤ 10% of rated power. ΔR ≤ 5% .

Maximum Peak Current

Type	Maximum Peak Current (A)	
	12R – 25R	47R – 150R
WDBR1UL	21.6	8.1
WDBR2UL	20.5	9
WDBR3UL	25.4	11.4
WDBR5UL	27.8	10.2
WDBR7UL	44.5	20.3

Application Notes

A heatsink with thermal resistance ≤0.53°C/W will enable the component to operate at its continuous power rating. Sufficient thermal grease (e.g. Dow Corning DC340) to give void-free coverage, or a 0.5mm thick compliant thermal pad (e.g. T Global TG-X) should be used and the heatsink should have a surface finish of <6.3µm with flatness of <0.05mm. The resistor should be mounted using an appropriate bolt as listed in the table below. This should be tightened so as to bring the whole area of the steel substrate into intimate contact with the heatsink. The unmounted part is slightly bowed so that the centre is above the edges. Inadequate tightening will leave the centre out of contact with the heatsink, whilst over tightening can cause the edges to rise. The tightening torque required will depend on the fixings and heatsink used, but typical figures are given for guidance.

Type	Bolt Size	Typical Tightening Torque (Nm)
WDBR1UL	M3	2
WDBR2UL	M5	2.5
WDBR3UL		
WDBR5UL		3.5
WDBR7UL		4

WDBR-UL resistors will fail safe (open circuit) under overload fault conditions and still maintain a 1kV dielectric withstand.

Soldering of solder pad (termination I) variants requires the use of a hot plate. Hand solder process recommendations are available.

WDBR-UL resistors may be customised in various ways including:

- Alternative shapes and dimensions up to 406mm x 406mm
- Integration of temperature measurement elements and thermal cutouts
- Alternative ohmic values and tolerances
- Increased dielectric withstand voltage
- Custom braking resistors with UL approval
- Integration of multiple power resistors

Ordering Procedure

Example: WDBR2UL-100RKLW (WDBR2UL with standard solder and flying lead terminations, 100 ohms ±10%, Pb-free)

1 Size	2 Certification	3 Solder Option	4 Value	5 Tolerance	6 Termination	7 Packing		
WDBR1	UL = UL508	Omit for standard (96SC)	3/4 characters R = ohms	K = ±10%	I = Solder pads only	W = Standard packing		
WDBR2						Term. I	Term. L	Bulk pack
WDBR3		HT = High Temperature			L = Flying leads	1 & 2		100/box
WDBR5						3 & 5	1 & 2	40/box
WDBR7						7	3, 5 & 7	20/box