

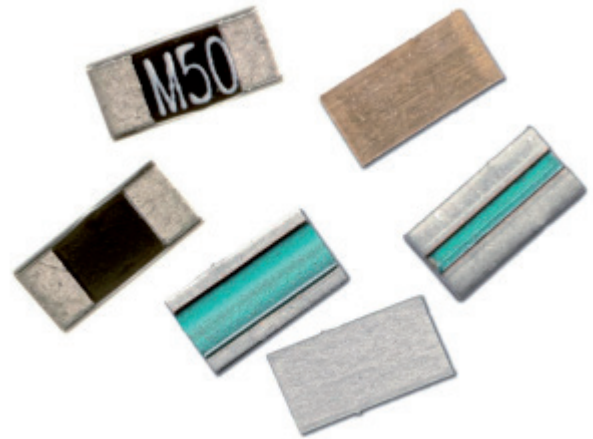
Metal Element Current Sense Resistor



ULR Series

Features

- Robust metal strip able to withstand high temperature and high current.
- Power ratings up to 5W
- Low TCR and Inductance
- Resistance Range from 0.15mΩ to 10mΩ
- RoHS compliant
- AEC-Q200
- Higher wattage devices feature PCB clearance gap to maximize thermal performance



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

Electrical Data

Type	Size	Coating	Power Rating @80°C (W)	Standard Resistance Value mΩ ¹	TCR (ppm/°C)	Tolerance (%)	Dielectric Withstanding Voltage (V)	Ambient Temperature (°C)				
ULRG1 / ULR1S	1206	Green Underside	1	0.2, 0.25, 0.3, 0.4, 0.5, 0.6	200	1, 5	N/A	-55 to +170				
ULRG15 / ULR15S	2010		1.5	0.75, 1, 1.2, 2, 2.5, 3, 3.5, 4, 5, 5.5, 6, 7, 8, 9, 10	50							
ULR2N	1020		2	0.2, 0.25, 0.3, 0.4, 0.5	150							
ULRG2 / ULR2	2512		2	0.75, 1, 1.5, 2, 2.5, 3, 4, 5, 5.5, 6, 7, 8, 9, 10	50							
ULRG25 / ULR25			3	1	300							
ULRG3 / ULR3			3	1.5, 2, 2.5, 3	170							
ULR5			5 ²	2	6.5, 7, 7.5, 8, 9, 10				50			
ULR3N			1225	3	3.5, 4, 4.5, 5, 5.5, 6				150			
ULRB1 / ULR1	2512		Black	1	0.15, 0.25, 0.3, 0.4, 0.5, 0.75				150	1, 5	200	-55 to +170
ULRB2 / ULR2					3				1, 1.5, 2, 2.5, 3			
		5 ²			0.1	500						
		5 ²			0.5, 0.75	150						
				1, 1.5, 2, 2.5, 3	50							
				0.2, 0.25, 0.3, 0.4	350							
				0.5	300							
				0.7, 0.75, 0.8, 0.9, 1.0	250							
				1.5, 2.0, 2.5, 3.0	100							
				0.5, 0.75, 1, 1.5, 2	50							
				2.5, 3, 3.5	150							
				4, 4.5, 5, 5.5, 10	100							
				6, 6.5, 7, 7.5	75							
				0.5, 0.75, 1, 1.5, 2	50							
				2.5, 3	150							

Performance Data

AEC-Q200 Table 7		Method	ΔR%	Max. (add R0005)	
ref.	Test			1206, 2010 & Black 2512	Green Underside 2512
3	High Temp. Exposure *	MIL-STD-202 Method 108	ΔR%	1	1
4	Temperature Cycling	JESD22 Method JA-104	ΔR%	0.5	1
6	Moisture Resistance	MIL-STD-202 Method 106	ΔR%	1	1
7	Biased Humidity	MIL-STD-202 Method 103	ΔR%	1	1
8	Operational Life (Cyclic Load) *	MIL-STD-202 Method 108	ΔR%	1	1
14	Vibration	MIL-STD-202 Method 204	ΔR%	0.5	1
15	Resistance to Soldering Heat *	MIL-STD-202 Method 210	ΔR%	0.5	1
16	Thermal Shock *	MIL-STD-202 Method 107	ΔR%	0.5	1
18	Solderability	J-STD-002		>95% coverage	
21	Board Flex	AEC-Q200-005	ΔR%	0.5	1
22	Terminal Strength	AEC-Q200-006	ΔR%	0.25	1
	Short Term Overload *	5 x Pr for 5s	ΔR%	0.5	1

Notes: 1. Full AEC-Q200 qualification applies to 2512 size. The 1206 and 2010 sizes have received the tests marked *.

General Note

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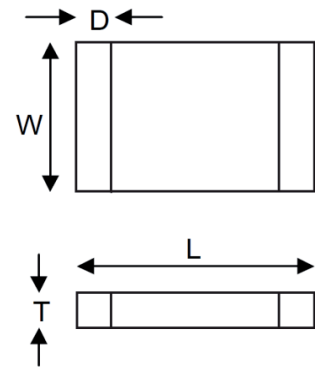
BI Technologies IRC Welwyn

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ULR Series

Physical Data

Dimensions(mm) and weight (mg)								
Size	Coating	Values	L (±0.25)	W	T (±0.2)	D	Wt (nom)	
1206	Green Underside	0.2, 0.25	3.2	1.6 ±0.3	1.0	1.5 ±0.25	25	
		0.3, 0.4				1.4 ±0.25		
		0.5, 0.6		1.6 ±0.1	0.6	1.35 ±0.25	20	
		0.75				1.23 ±0.25		
		1, 1.2, 3.5, 4, 5, 5.5, 6				1.1 ±0.25		
		2, 2.5, 3, 10				0.6 ±0.25		
		7, 8, 9				0.9 ±0.25		
2010		Green Underside	0.2	5.08	2.54 ±0.3	1.0	2.34 ±0.25	50
			0.25				2.24 ±0.25	
			0.3				2.04 ±0.25	
			0.4				1.84 ±0.25	
			0.5		2.54 ±0.15	0.6	2.17 ±0.25	40
			0.75				2.04 ±0.25	
			1, 1.5, 4, 5, 5.5				1.84 ±0.25	
	2, 2.5, 6, 7, 8		1.54 ±0.25					
	3		1.04 ±0.25					
	9, 10		1.29 ±0.25					
2512	Green Underside		0.15	6.35	3.0 ±0.3	1.0	2.98 ±0.25	60
			0.2				2.88 ±0.25	
			0.25, 0.3				2.68 ±0.25	
			0.4		3.0 ±0.2	0.6	2.18 ±0.25	
		0.5	2.68 ±0.25					
		0.75	2.48 ±0.25					
		1, 5, 5.5, 6	1.93 ±0.25					
		2, 2.5, 3, 3.5, 8, 9, 10	1.18 ±0.25					
		4, 4.5	2.18 ±0.25					
		1.5, 6.5, 7, 7.5	1.43 ±0.25					
		Black	Black	0.5	3.18 ±0.25	1.3 ±0.38	1.4	60
				0.75, 2.5			1.0	
				1			0.8	
				1.5			0.65	
	2, 5, 6			0.5				
	3	0.7						
	3.5	0.71						
	4	0.6						
	4.5	0.58						
5.5, 6.5	0.47							
7	0.45							
10	0.8	1.9 ±0.15						



General Note

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ULR Series

Construction

Black Coat

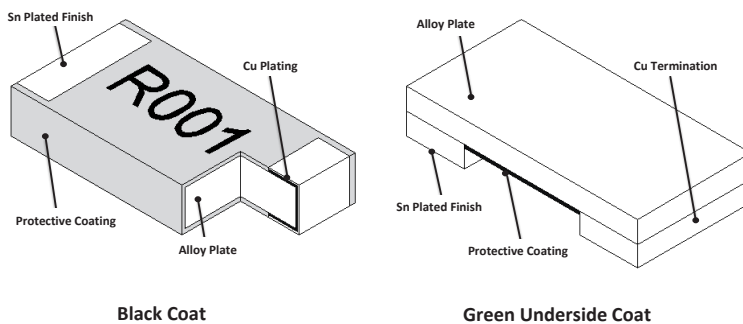
A low TCR resistance alloy plate, with tin plated connection bands is protectively coated on the upper and lower faces and numerically marked with the resistance value. This part is suitable for wave or reflow soldering.

Green Underside Coat

A low TCR resistance alloy plate is grooved to set the final resistance and the lower face only is protected with an epoxy coating. The lower faces are tin plated for connections. This part is ONLY suitable for reflow soldering.

Marking

Only black coated parts are marked. For values which are integer numbers of milliohms, the marking is 4-character IEC62 code; e.g. "R002" for 2mΩ, "R010" for 10mΩ. For values including fractions of a milliohm the marking is 3 or 4-character code using "M" to indicate the decimal point, e.g. "M75" for 0.75mΩ, "1M50" for 1.5mΩ.



Termination Details:

Material

Matt tin plated finish over copper.

Solderability

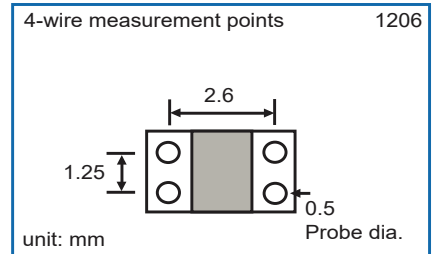
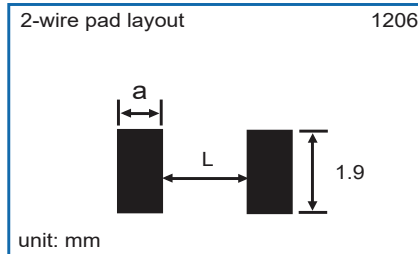
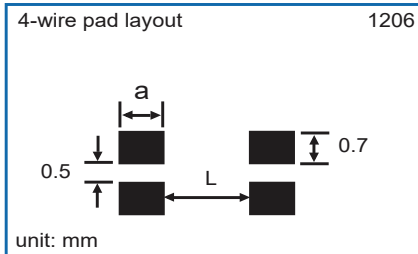
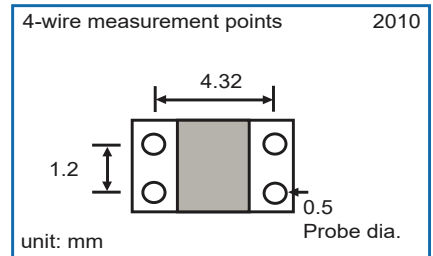
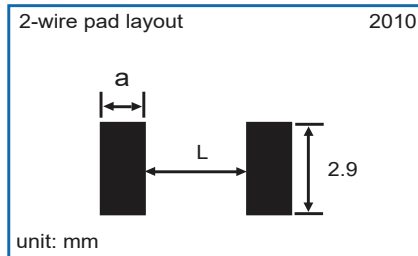
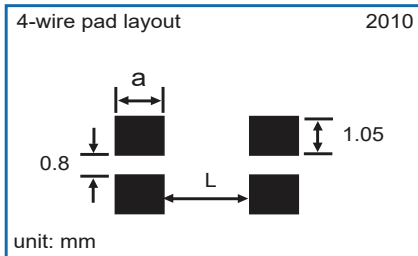
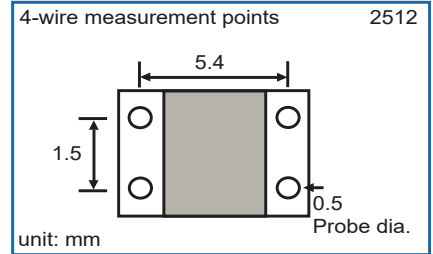
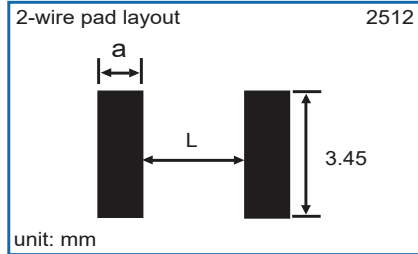
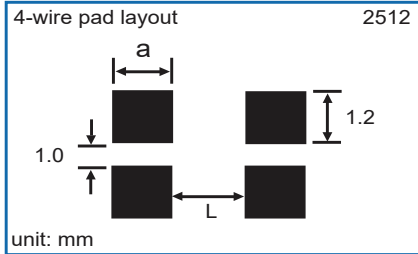
95% min coverage (MIL-STD 202F / 208H, 235°C 2 secs)

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ULR Series

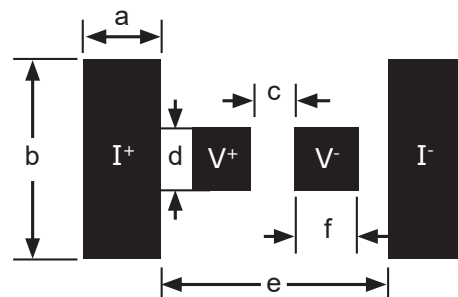
Electrical Connections



Note: These resistors are designed to have the correct ohmic value when mounted on a PCB. Probed measurements may read higher values and mounting offsets may need to be established to account for this, especially with sub-milliohm values.

Package	Resistance	a	L
1206	0.5, 0.6, 1, 4 - 6	1.55	0.55
	2 - 3, 10	1.05	1.55
	7 - 9	1.35	0.95
2010	0.5	2.61	0.3
	1, 4 - 5	2.29	0.95
	2, 6 - 8	1.99	1.55
	3	1.49	2.55
9 - 10	1.74	2.05	
2512 - Black	All	2.7	2.9
2512 - Green Underside	0.5	3.13	0.54
	0.75	2.93	0.94
	1	2.38	2.04
	1.5	1.88	3.04
	2 - 3	1.63	3.54
	4, 4.5	2.63	1.54
	5 - 6	2.38	2.04
	6.5, 7	1.88	3.04
8 - 10	1.63	3.54	

Package	Resistance (mΩ)	a	b	c	d	e	f
1206	0.2 - 0.4	0.75	1.9	0.4	0.6	2.15	0.6
2010	0.2 - 0.4	1.35	2.89	1.4	0.6	3.08	0.6
2512 - Green Underside	0.15 - 0.3	2	3.4	1.0	0.6	2.8	0.6
	0.4	1.5	3.4	2.0	0.6	3.8	0.6

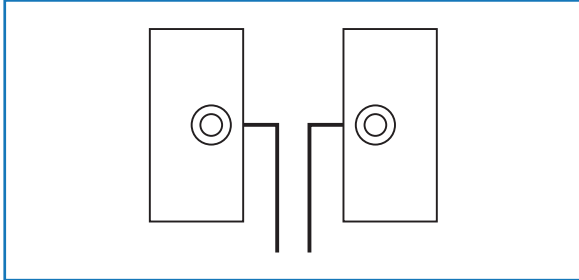


General Note

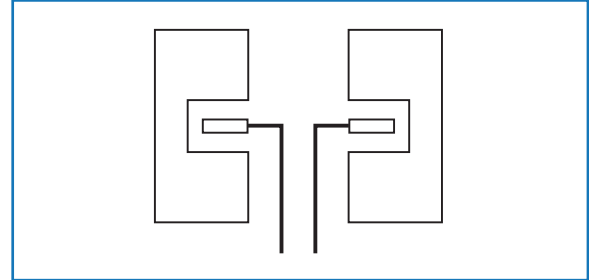
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ULR Series

Suggested Alternative 4-Wire Design Methods

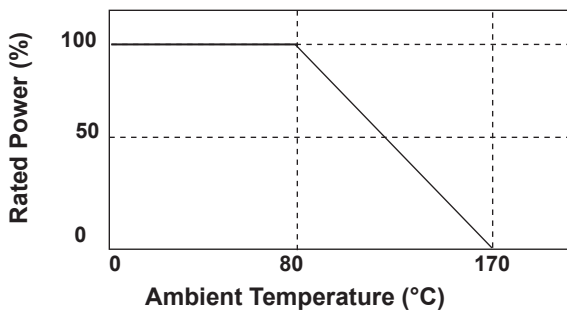


Vias with copper traces on internal layers.



Sense traces on Solder pads beneath the chip

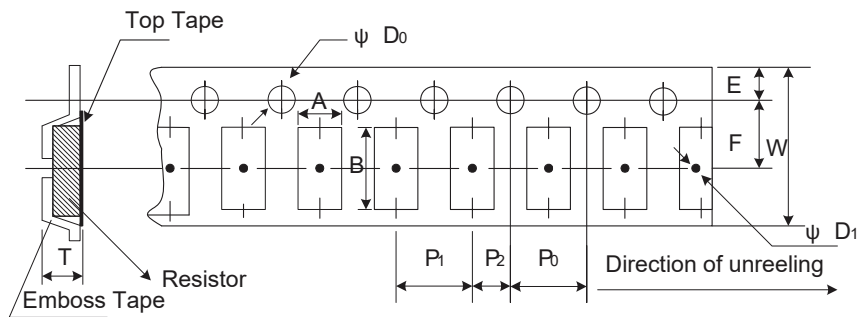
Power Derating Curve



Notes

The power derating curve is a guidance based on a conservative design model. The ULR is a solid metal alloy construction that can withstand significantly greater operating temperatures than the conservative model permits. The protective coating will operate up to 260°C and the alloy can withstand in excess of 350°C. Therefore, the system thermal design will be a more significant design parameter due to the heat limitations of the solder joint.

Packaging



Type	Resistance (mΩ)	A	B	W	E	F	P0	P1	P2	ØD0	ØD0	T	Quantity (EA)
1206	<0.5	1.90 ± 0.1	3.60 ± 0.1	8.0 ± 0.2	1.75 ± 0.1	3.5 ± 0.05	4.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	1.55 ± 0.05	1.0min	1.25 ± 0.1	2000 on 7" reel
	≥0.5											0.87 ± 0.1	
2010	<0.5	2.85 ± 0.1	5.55 ± 0.1	12.0 ± 0.2	1.75 ± 0.1	5.5 ± 0.05	4.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	1.55 ± 0.05	1.5min	1.35 ± 0.1	
	≥0.5											0.85 ± 0.1	
2512 Black	0.50 - 0.75	3.40 ± 0.1	6.75 ± 0.1	12.0 ± 0.1	1.75 ± 0.1	5.5 ± 0.05	4.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	1.55 ± 0.05	1.4min	1.45 ± 0.2	
	1.45 ± 0.2											0.81 ± 0.1	
2512 Green Underside	<0.5	3.40 ± 0.1	6.75 ± 0.1	12.0 ± 0.3	1.75 ± 0.1	5.5 ± 0.05	4.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	1.55 ± 0.05	1.5min	1.4 ± 0.1	
	≥0.5											0.8 ± 0.1	

Note:

- The cumulative tolerance of 10 sprocket hole pitch is ± 0.2 mm.
- Carrier camber shall not be more than 1 mm per 100 mm through a length of 250 mm.
- A & B measured 0.3 mm from the bottom of the packet.

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ULR Series

Ordering Procedure

This product has two valid part numbers:

European (Welwyn) Part Number: ULR2-R0015FT2 (2512, 1.5 milliohms $\pm 1\%$, Pb-free)

U	L	R	2	-	R	0	0	1	5	F	T	2
1			2				3	4				

1 Type	2 Value	3 Tolerance	4 Packing	
ULR1S, ULR1, ULR15S, ULR2N, ULR2, ULR25, ULR3, ULR3N	3 to 6 characters R = ohms	F = $\pm 1\%$ J = $\pm 5\%$	T2 = Plastic tape	All sizes 2000/reel

USA (IRC) Part Number: ULRB22512R0015FLFSLT (2512, 1.5 milliohms $\pm 1\%$, Pb-free)

U	L	R	B	2	2	5	1	2	R	0	0	1	5	F	L	F	S	L	T
1			2			3			4	5	6								

1 Type	2 Size	3 Value	4 Tolerance	5 Termination	6 Packing	
ULRG1, ULRG15, ULRG2, ULRG25, ULRG3, ULRB1, ULRB2	1206 2010 2512	4 - 6 characters R = ohms	F = $\pm 1\%$ J = $\pm 5\%$	LF = Pb-free	SLT = Plastic tape	All sizes 2000/reel

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[ULRG32512R001FLFSLT](#) [ULRG32512R003FLFSLT](#) [ULRG32512R0015FLFSLT](#) [ULRG32512R002FLFSLT](#)
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[R0055JT2](#) [ULR2-R007JT2](#) [ULR2-R008JT2](#)