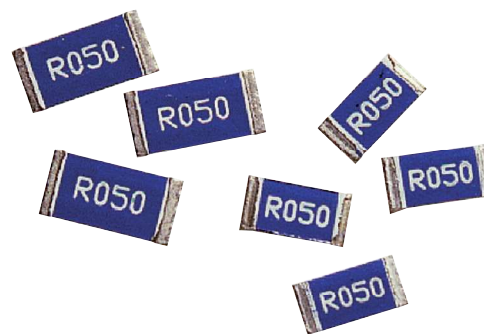


## LR Series

### Features

- Standard 2512, 2010 and 1206 sizes
- Resistance values down to 0.003 ohms
- Leach resistant solder-plated copper wrap-around termination
- AEC-Q200 Qualified
- RoHS compliant and SnPb variants



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

## Electrical Data

		LR(F)1206	LR(F)2010	LR(F)2512
Power rating @70°C	watts	0.5	1	2
Resistance range <sup>1</sup>	ohms	R003 to 1R0		
Resistance tolerance <sup>1</sup>	%	<R01: 5, ≥R01: 1, 2, 5		
TCR	ppm/°C	≥R05: ±100, R025–R047: <+500, <R025: <+900		
Dielectric withstand	volts	200		
Ambient temperature range	°C	-55 to +150		
Values		E24 preferred <sup>2</sup>		
Temperature rise at rated power	°C	40	80	90
Pad / trace area <sup>3</sup>	mm <sup>2</sup>	30	100	300

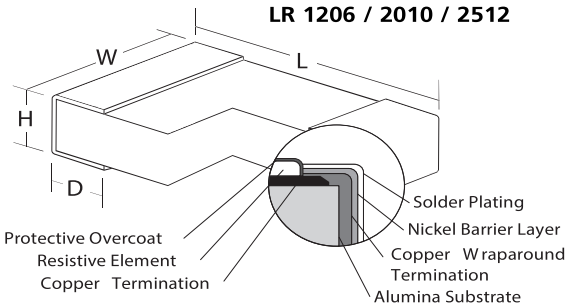
Note 1: Contact factory for value – tolerance combinations outside this range. Note 2: Many values = N x R001 and N x R005 up to N=10 are also available. Note 3: Recommended minimum pad & adjacent trace area for each termination for rated dissipation on FR4 PCB

## Physical Data

Dimensions (mm)				
Size	L	W	H (max)	D
LR(F)1206	3.20±0.305	1.63±0.20	0.8	0.6 ±0.25
LR(F)2010	5.23±0.38	2.64±0.25	0.84	0.6 ±0.25
LR(F)2512	6.50±0.38	3.25±0.25	0.84	0.6 ±0.25

**LR 1206 / 2010 / 2512**

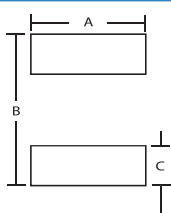


Protective Overcoat  
Resistive Element  
Copper Termination

Solder Plating  
Nickel Barrier Layer  
Copper Wraparound Termination  
Alumina Substrate

**Note:** LRF construction is identical except that Resistive Element and Protective Overcoat are on the underside of the chip.

Recommended Solder Pad Dimensions (mm)			
	A	B	C
LR(F)1206	2.0	4.0	1.25
LR(F)2010	3.05	6.5	1.5
LR(F)2512	3.7	7.75	1.5



### Marking

LR parts are marked in white on the upper blue surface, whilst LRF parts are marked in black on the upper white surface. Parts are marked with the value code, where this is up to four characters (e.g. "R025"). For five character value codes the value in milliohms is marked, with "m" indicating decimal position (e.g. "2m5" for value code R0025).

### Processing

For reflow of LRF parts, a solder paste thickness of not less than 100µm is recommended.

### General Note

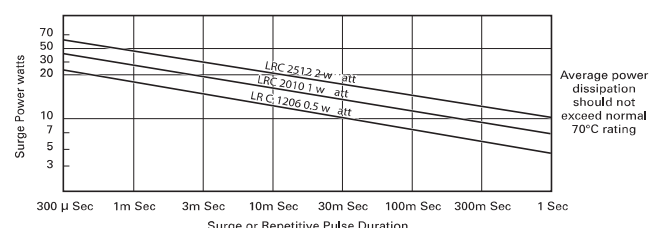
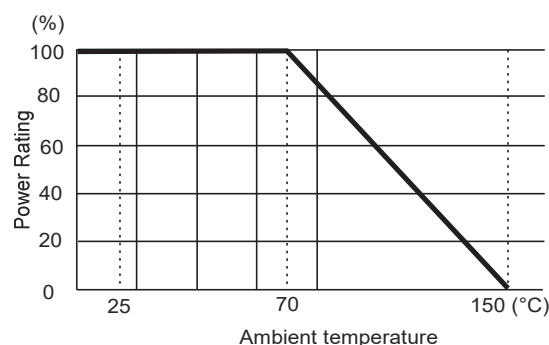
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### Performance Data

AEC-Q200 Table 7			Max. (add R05)	Typ. (@1R0)
ref	Test	Method		
3	High Temp. Exposure	MIL-STD-202 Method 108	$\Delta R\%$ 0.5	0.2
4	Temperature Cycling	JESD22 Method JA-104	$\Delta R\%$ 0.25	0.1
6	Moisture Resistance	MIL-STD-202 Method 106	$\Delta R\%$ 0.5	0.2
7	Biased Humidity	MIL-STD-202 Method 103	$\Delta R\%$ 0.5	0.2
8	Operational Life (Cyclic Load)	MIL-STD-202 Method 108	$\Delta R\%$ 1	0.5
14	Vibration	MIL-STD-202 Method 204	$\Delta R\%$ 0.5	0.05
15	Resistance to Soldering Heat	MIL-STD-202 Method 210	$\Delta R\%$ 0.25	0.05
16	Thermal Shock	MIL-STD-202 Method 107	$\Delta R\%$ 0.25	0.1
18	Solderability	J-STD-002	>95% coverage	
21	Board Flex	AEC-Q200-005	$\Delta R\%$ 0.5	0.2
22	Terminal Strength	AEC-Q200-006	$\Delta R\%$ 0.25	0.1
Short Term Overload			6.25 x Pr for 2s	$\Delta R\%$ 0.5
Low Temperature Storage			-65°C for 100 hours	$\Delta R\%$ 0.5
Leach Resistance			Solder dip at 250°C	90s minimum



#### Note:

1. Although 2010 and 2512 sizes have passed temperature cycling and thermal shock, it is in general not recommended that ceramic chips this large be used on FR4 in a severe temperature cycle environment due to the possibility of solder joint fatigue.

Full AEC-Q200 qualification applies only to ohmic values  $\geq R01$ .

### Ordering Procedure

This product has two valid part numbers:

**European (Welwyn) Part Number: LRF1206-R02FW** (1206, 20 milliohms  $\pm 1\%$ , Pb-free)

L	R	F	1	2	0	6	-	R	0	2	F	W
1			2				3			4 5		

1 Type	2 Size	3 Value	4 Tolerance	5 Termination & Packing
LR = Conventional orientation (values $\geq R025$ )	1206	E24 = 3/4 characters	F = $\pm 1\%$	W Pb-free, standard packing
	2010		G = $\pm 2\%$	T1 Pb-free, 1000/reel (non-standard)
LRF = Flip-chip orientation (values $\leq R025$ )	2512	R = ohms	J = $\pm 5\%$	PB SnPb finish, standard packing
				T1PB SnPb finish, 1000/reel (non-standard)
				Standard packing is tape & reel
				1206 & 2010 3000/reel
				2512 1800/reel

**USA (IRC) Part Number: LRC-LRF1206LF-01-R020-F** (1206, 20 milliohms  $\pm 1\%$ , Pb-free)

L	R	C	-	L	R	F	1	2	0	6	L	F	-	0	1	-	R	0	2	0	-	F
1				2		3			4			5		6			7					

1 Family	2 Model	3 Size	4 Termination	5 TCR	6 Value	7 Tolerance	Packing		
LRC	LR = Conventional orientation (values $\geq R025$ )	1206	Omit for SnPb	01 = standard ( $\pm 100\text{ppm}/^\circ\text{C}$ values $\geq R05$ )	4 characters R = ohms	F = $\pm 1\%$	Standard packing is tape & reel		
		2010	LF = Pb-free			G = $\pm 2\%$	Pb-free	All sizes	1000/reel
	LRF = Flip-chip orientation (values $\leq R025$ )	2512				J = $\pm 5\%$	SnPb	1206 & 2010	3000/reel
								2512	1800/reel

#### General Note

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