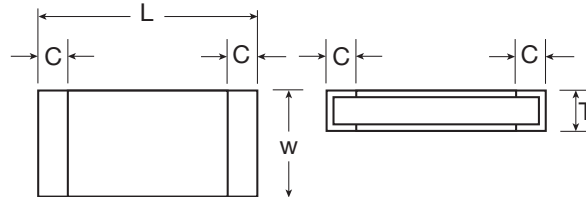


# Chip Resistors – CR, LCR and ULCR

## Features

- Flat Chip Resistors for surface mount applications
- LCR and ULCR for current sensing applications

## Dimensions

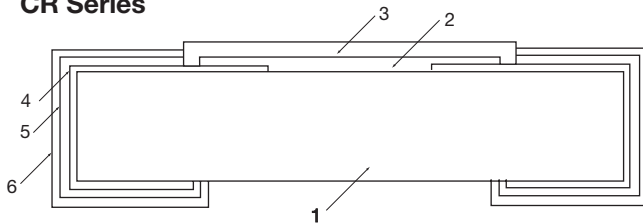


	01005	0201	0402	0603	0805	1206	1210	2010	2512*
<b>L (Length) Inches (mm)</b>	0.016 ± .0008 (0.4 ± 0.02)	0.024 ± .002 (0.6 ± 0.05)	0.040 ± .002 (1.0 ± 0.05)	0.063 ± .004 (1.6 ± 0.1)	0.079 ± .006 (2.0 ± 0.15)	0.126 ± .006 (3.2 ± 0.15)	0.126 ± .006 (3.2 ± 0.15)	0.197 ± .006 (5.0 ± 0.15)	0.248 ± .006 (6.3 ± 0.15)
<b>W (Width) Inches (mm)</b>	0.008 ± .0008 (0.2 ± 0.02)	0.012 ± .001 (0.3 ± 0.02)	0.020 ± .001 (0.5 ± 0.02)	0.031 ± .004 (0.8 ± 0.1)	0.050 ± .006 (1.25 ± 0.15)	0.063 ± .006 (1.6 ± 0.15)	0.098 ± .006 (2.50 ± 0.15)	0.098 ± .006 (2.50 ± 0.15)	0.126 ± .006 (3.2 ± 0.15)
<b>T (Thickness) Inches (mm)</b>	0.005 ± .0008 (0.13 ± 0.02)	0.010 ± .002 (0.25 ± 0.05)	0.014 ± .002 (0.35 ± .05)	0.018 ± .004 (0.45 ± 0.1)	0.018 ± .006 (0.45 ± 0.15)	0.022 ± .006 (0.56 ± 0.15)	0.022 ± .006 (0.56 ± 0.15)	0.022 ± .006 (0.56 ± 0.15)	0.022 ± .006 (0.56 ± 0.15)
<b>C (End Band) Inches (mm)</b>	0.003 ± .001 (0.08 ± 0.03)	0.006 ± .002 (0.15 ± 0.05)	0.008 ± .004 (0.2 ± 0.1)	0.012 ± .006 (0.30 ± 0.15)	0.014 ± .006 (0.35 ± 0.15)	0.020 ± .008 (0.50 ± 0.20)	0.020 ± .008 (0.50 ± 0.20)	0.024 ± .008 (0.60 ± 0.20)	0.024 ± .008 (0.60 ± 0.20)

\* ULCR. See page 43

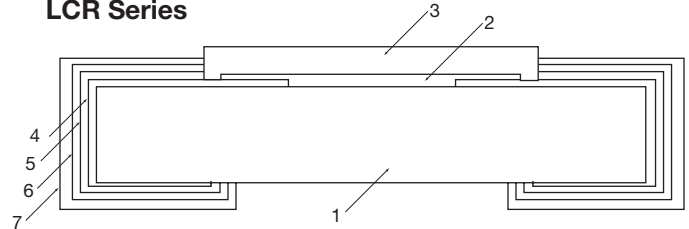
## Structure

### CR Series



Description		
1	Substrate	Alumina
2	Resistive element	Ruthenium Oxide (RuO <sub>2</sub> )
3	Protective coating	Boro-Silicate Glass
4	Inner termination	Silver Palladium (Ag-Pd)
5	Inner Plating	Nickel (Ni)
6	Outer Plating	Solder Plating, 100% matte Tin (Sn)

### LCR Series



Description		
1	Substrate	Alumina
2	Resistive element	Silver Palladium (Ag-Pd)
3	Protective coating	Boro-Silicate Glass
4	Inner termination	Silver Palladium (Ag-Pd)
5	1st Plating	Copper (Cu)
6	2nd Plating	Nickel (Ni)
7	3rd Plating	Solder Plating, 100% matte Tin (Sn)

All components in this section are RoHS compliant per the EU directives and definitions.

For standard resistance values, please see "EIA Standard Resistance Values" on page 62.

## CR – Standard Chip Resistors

### Specifications

Series	Power Rating at 70°C	Max. Working Voltage	T.C.R. Temperature Coefficient of Resistance (PPM/°C)	Zero (ohm) Current Rating	Resistance Range
CR01005-32W	0.03W	$\sqrt{PR}$ or 15V whichever is less	+600 ~ -200 for (4.7Ω - 9.1Ω); ±250 for (10Ω - 1MegΩ)	0.5A	Zero, 10Ω - 1Meg Ω Only available in 5% tolerance
CR0201-20W	0.050W	$\sqrt{PR}$ or 25V whichever is less	±200 for F and J Tolerance (10Ω - 1MegΩ)	0.5A	Zero, 1Ω - 10Meg Ω E-12 (1.2Meg Ω - 10Meg Ω)
CR0402-16W	0.063W	$\sqrt{PR}$ or 50V whichever is less	*SEE NOTE	1A	Zero, 1Ω - 10MegΩ
CR0603-16W	0.063W	$\sqrt{PR}$ or 50V whichever is less	*SEE NOTE	1A	Zero, 1Ω - 22Meg Ω
CR0603-10W	0.10W	$\sqrt{PR}$ or 50V whichever is less	*SEE NOTE	1A	Zero, 1Ω - 22Meg Ω
CR0805-10W	0.10W	$\sqrt{PR}$ or 150V whichever is less	*SEE NOTE	2A	Zero, 1Ω - 22Meg Ω
CR0805-8W	0.125W	$\sqrt{PR}$ or 150V whichever is less	*SEE NOTE	2A	Zero, 1Ω - 22Meg Ω
CR1206-8W	0.125W	$\sqrt{PR}$ or 200V whichever is less	*SEE NOTE	2A	Zero, 1Ω - 22Meg Ω
CR1206-4W	0.25W	$\sqrt{PR}$ or 200V whichever is less	*SEE NOTE	2A	Zero, 1Ω - 22Meg Ω
CR1210-4W	0.25W	$\sqrt{PR}$ or 200V whichever is less	*SEE NOTE	4A	Zero, 1Ω - 10Meg Ω
CR1210-2W	0.50W	$\sqrt{PR}$ or 200V whichever is less	*SEE NOTE	4A	Zero, 1Ω - 10Meg Ω
CR2010-2W	0.50W	$\sqrt{PR}$ or 200V whichever is less	*SEE NOTE	5A	Zero, 1Ω - 10Meg Ω
CR2010-1W	1.00W	$\sqrt{PR}$ or 200V whichever is less	*SEE NOTE	5A	Zero, 1Ω - 10Meg Ω
CR2512-1W	1.00W	$\sqrt{PR}$ or 200V whichever is less	*SEE NOTE	5A	Zero, 1Ω - 10Meg Ω
CR2512-2W	2.00W	$\sqrt{PR}$ or 200V whichever is less	*SEE NOTE	5A	Zero, 1Ω - 10Meg Ω

\*NOTE: G and J Tol.: ±200 (1Ω - 10MegΩ); F and D Tol.: ±100 (10Ω - 1MegΩ); ±200 (1Ω - 9.76Ω) & (1.02MegΩ - 9.76MegΩ); D, F, G & J Tol.: ±350 (over 10MegΩ)  
T.C.R. is ±350 for values outside referenced range.

Operating Temp. Range is -55°C to +155°C • DC Resistance Value of zero ohm is 50m ohms max.

# Chip Resistors

## LCR – Low Value Chip Resistors

### Specifications

Series	Power Rating At 70°C (W)	Rated Current Range (A)	Resistance Range (mΩ)	Specific Resistance Range (SRR) (mΩ)	Tolerance Available	Temperature Coefficient of Resistance (PPM) (10 <sup>-6</sup> /°C)	Dielectric Withstanding Voltage (DWV) (V)	Operating Temperature Range (°C)
LCR0402	0.125	0.36 – 1.58	50 – 976	50 – 100	F, G, J	±300	100	-55 ~ +125
				102 – 500		±200		
				511 – 976		±100		
LCR0603	0.125	0.36 – 2.5	20 – 976	20 – 50	F, G, J	±450	100	-55 ~ +125
				51 – 100		±300		
				102 – 500		±200		
				511 – 976		±100		
LCR0805	0.25	0.50 – 3.53	20 – 976	20 – 50	F, G, J	±450	500	-55 ~ +125
				51 – 100		±300		
				102 – 500		±200		
				511 – 976		±100		
LCR1206	0.50	0.71 – 7.07	10 – 976	10 – 20	F, G, J	±450	500	-55 ~ +125
				21 – 50		±300		
				51 – 500		±200		
				511 – 976		±100		
LCR1210	0.66	0.85 – 3.63	50 – 900	50 – 470	F, G, J	±200	500	-55 ~ +125
				500 – 900	F, G, J	±100		
LCR2010	0.75	0.87 – 8.66	10 – 976	10 – 20	F, G, J	±450	500	-55 ~ +125
				21 – 50		±300		
				51 – 500		±200		
				511 – 976		±100		
LCR2512	2.00	1.01 – 10.0	10 – 976	10 – 20	F, G, J	±450	500	-55 ~ +125
				21 – 50		±300		
				51 – 500		±200		
				511 – 976		±100		

Note: Other nominal resistance values may also be available, please contact VENKEL LTD. for further information.

### Standard resistance values and corresponding codes:

Resistance	P/N Code	Resistance	P/N Code	Resistance	P/N Code	Resistance	P/N Code	Resistance	P/N Code	Resistance	P/N Code	Resistance	P/N Code
10m ohm	R010	27m ohm	R027	50m ohm	R050	80m ohm	R080	160m ohm	R160	330m ohm	R330	600m ohm	R600
12m ohm	R012	30m ohm	R030	56m ohm	R056	90m ohm	R090	180m ohm	R180	360m ohm	R360	650m ohm	R650
15m ohm	R015	33m ohm	R033	60m ohm	R060	100m ohm	R100	200m ohm	R200	400m ohm	R400	680m ohm	R680
18m ohm	R018	35m ohm	R035	65m ohm	R065	110m ohm	R110	220m ohm	R220	430m ohm	R430	700m ohm	R700
20m ohm	R020	40m ohm	R040	68m ohm	R068	120m ohm	R120	250m ohm	R250	470m ohm	R470	750m ohm	R750
22m ohm	R022	43m ohm	R043	70m ohm	R070	130m ohm	R130	270m ohm	R270	500m ohm	R500	800m ohm	R800
25m ohm	R025	47m ohm	R047	75m ohm	R075	150m ohm	R150	300m ohm	R300	560m ohm	R560	900m ohm	R900

### Marking for LCR:

The resistance code shall be marked on the resistor as follows (this code is the same for 1% and 5% tolerances):

0402 size: no markings

0603 size: 3-digit markings using "R" and 2 digits. When "R" can not be used then 3 digits and underlined. (see below)

0805 – 2512 size: 4-digit markings using "R" and 3 digits. "Rxxx." R010 = 10m ohm, R120 = 120m ohm.

Examples of 3-digit markings:

R01 = 10m ohm    022 = 22m ohm    068 = 68m ohm    R08 = 80m ohm    R10 = 100m ohm

All components in this section are RoHS compliant per the EU directives and definitions.

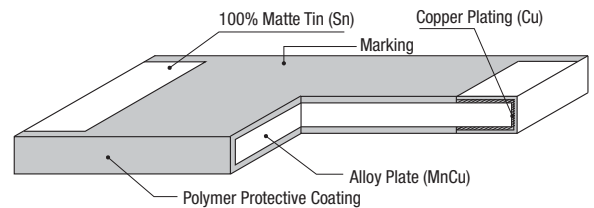
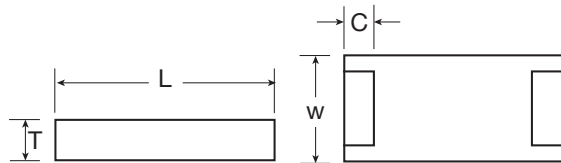
5900 Shepherd Mountain Cove • Austin, TX 78730  
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VENKEL LTD.

# ULCR – Ultra Low Value Chip Resistors

## Dimensions



## Specifications

Unit: (mm)

Size	Resistance (mΩ)	Power Rating At 70°C (W)	Tolerance Available	Temperature Coefficient of Resistance (PPM) (10 <sup>-6</sup> /°C)	Maximum Rated Current (A)	Dimensions			
						L	W	T	C
2512	0.50	2	J	±50	44.7	6.35 ±0.25	3.18 ±0.25	1.40 ±0.20	1.30 ±0.30
2512	0.75	2	F, J	±50	36.5	6.35 ±0.25	3.18 ±0.25	1.00 ±0.20	1.30 ±0.30
2512	1.00	2	F, J	±50	31.6	6.35 ±0.25	3.18 ±0.25	0.80 ±0.20	1.30 ±0.30
2512	1.50	2	F, J	±50	25.8	6.35 ±0.25	3.18 ±0.25	0.65 ±0.20	1.30 ±0.30
2512	2.00	2	F, J	±50	22.4	6.35 ±0.25	3.18 ±0.25	0.50 ±0.20	1.30 ±0.30
2512	2.50	2	F, J	±100	20.0	6.35 ±0.25	3.18 ±0.25	1.00 ±0.20	1.30 ±0.30
2512	3.00	2	F, J	±100	18.3	6.35 ±0.25	3.18 ±0.25	0.70 ±0.20	1.30 ±0.30
2512	3.50	2	F, J	±100	16.9	6.35 ±0.25	3.18 ±0.25	0.71 ±0.20	1.30 ±0.30
2512	4.00	2	F, J	±100	15.8	6.35 ±0.25	3.18 ±0.25	0.60 ±0.20	1.30 ±0.30
2512	4.50	2	F, J	±100	14.9	6.35 ±0.25	3.18 ±0.25	0.58 ±0.20	1.30 ±0.30
2512	5.00	2	F, J	±100	14.1	6.35 ±0.25	3.18 ±0.25	0.50 ±0.20	1.30 ±0.30
2512	5.50	2	F, J	±100	13.4	6.35 ±0.25	3.18 ±0.25	0.47 ±0.20	1.30 ±0.30
2512	6.00	2	F, J	±100	12.9	6.35 ±0.25	3.18 ±0.25	0.50 ±0.20	1.30 ±0.30
2512	6.50	2	F, J	±100	12.4	6.35 ±0.25	3.18 ±0.25	0.47 ±0.20	1.30 ±0.30
2512	7.00	2	F, J	±100	12.0	6.35 ±0.25	3.18 ±0.25	0.45 ±0.20	1.30 ±0.30

### Standard resistance values and corresponding codes:

Resistance (mΩ)	P/N Code	Marking Code	Resistance (mΩ)	P/N Code	Marking Code
0.50	M500	M50	4.00	4M00	R004
0.75	M750	M75	4.50	4M50	4M5
1.00	1M00	R001	5.00	5M00	R005
1.50	1M50	1M5	5.50	5M50	5M5
2.00	2M00	R002	6.00	6M00	R006
2.50	2M50	2M5	6.50	6M50	6M5
3.00	3M00	R003	7.00	7M00	R007
3.50	3M50	3M5			

Note: Other nominal resistance values may also be available, please contact VENKEL LTD. for further information.

All components in this section are RoHS compliant per the EU directives and definitions.

## Characteristics

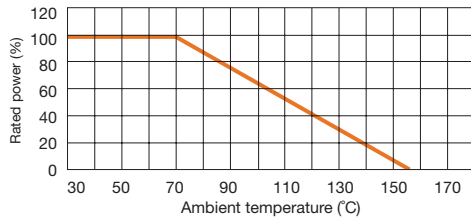
Item	Test Basis: JIS-C-5202	Specification Requirements	Typical
Short-time Overload	2.5 x rated voltage DC for 5 sec.	±1% +0.5Ω, no arc evidence	within ±0.4%
Load Life	70°C, rated voltage for 1.5 hrs. on/0.5 hr. for 1000 hrs.	<1 meg. ±3% +0.1Ω, > 1 meg. ±5%	—
Dielectric Withstanding Voltage	500V for 1 minute	No insulation breakdown	above 900-950V
Resistance to Soldering Heat	270°C for 10 seconds	±1% +0.05Ω, no mechanical damage	—
Temperature Cycling	EIA STD. 575, Para. 3.5 -55 ~ +125° C, 5 cycles.	± 1.0%	—
Solderability	230°C, 3 seconds, flux applied	95% minimum coverage	more than 97-98%
Curing Heat Resistance	+150°C for 10 minutes	±1% +0.05Ω	within ±0.3%
Dry Heat Resistance	-125°C for 1,000 hours	±3% +0.1Ω, no mechanical damage	within ±0.5%
Pull Terminal Strength	500G load for 30 seconds	±1% +0.05Ω, no mechanical damage	within ±0.2%
PCB Terminal Strength	1/45mm bend for 10 seconds	±1% +0.05Ω, no mechanical damage	within ±0.2%
Moisture Resistance, Thermal Shock	-55°C to +125°C, 5 cycles	±1% +0.05Ω, no mechanical damage	within ±0.2%
Moisture Load Life	40°C, 95% R.H., 1.5 hr. on, 0.5 hr. off, 1,000 hours	<1 meg ±3% +0.1Ω, > 1 meg. ±5%	—
Insulation Resistance	500V, 1 minute	1,000 meg. minimum	more than 10 Meg.
Voltage Coefficient	Rated voltage and 1/10 times rated voltage	+0/-100ppm/v: above 1K ±	within - 90ppm/V
Low Temperature Exposure	-55°C for 1,000 hours	±3% +0.1Ω, no mechanical damage	within ±0.5%

**T.C.R.**  
**Temperature Coefficient of Resistance (PPM/°C)**  
 (For CR Series only)

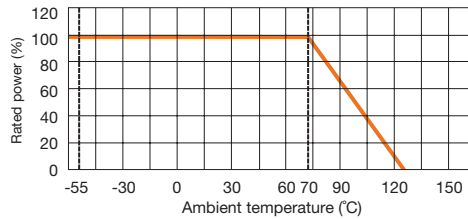
0402 – 2512 case sizes: G & J Tol.: ±200 (1Ω – 10 Meg. Ω);  
 F & D Tol.: ±100 (10Ω – 1 Meg. Ω); ±200 (1Ω – 9.76Ω) & (1.02 Meg. Ω – 9.76 Meg. Ω)  
 D, F, G & J Tol.: ±350 (over 10 Meg. Ω)  
 0201 case size: ±200 for F and J Tol. (10Ω – 1 Meg. Ω);  
 TCR is ±350 for values outside referenced range  
 01005 case size: +600 ~ -200 for (4.7Ω – 9.1Ω); ±250 for (10Ω – 1 Meg. Ω)

## Derating Curves

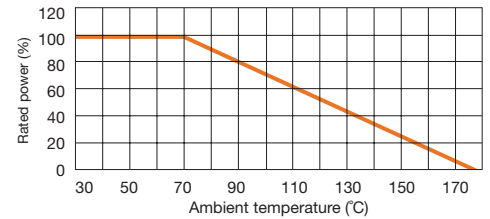
DERATING CURVE (CR Only)



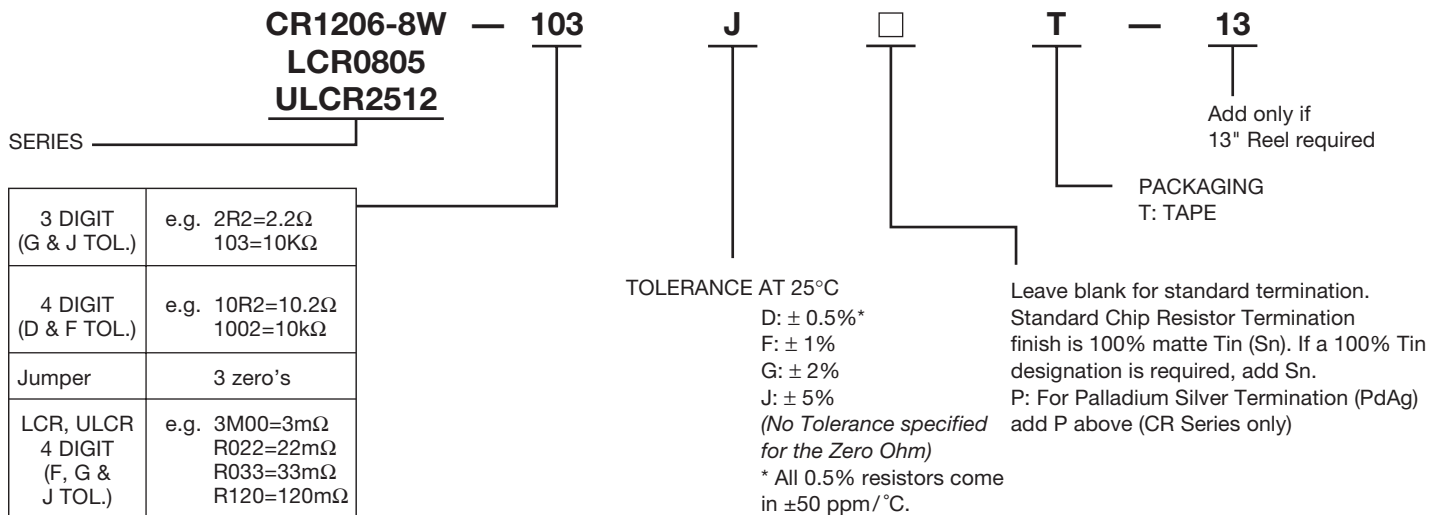
DERATING CURVE (LCR only)



DERATING CURVE (ULCR Only)



## How To Order



### 0603 — 1% Chip Resistors may not be marked. (For CR Series)

Please consult your salesperson if marking is required. (See the data sheet on Marking Codes)

\* E-24 Standard Resistance values that are available in 1%, may be marked with the standard 3-digit code identifier or an alpha numeric code.

For the alpha numeric marking see page 60 for details.

\* NOTE: 01005, 0201 and 0402 Resistors cannot be marked.

\* NOTE: See page 59 for Standard Resistance Values

Note: Other nominal resistance values may also be available, please contact your sales representative for further information.

See page 62 for Standard Resistance Values.

**Please Note: Venkel offers Engineering Kits for this product. See page 120 for details.**

All components in this section are RoHS compliant per the EU directives and definitions.

For standard resistance values, please see "EIA Standard Resistance Values" on page 62.