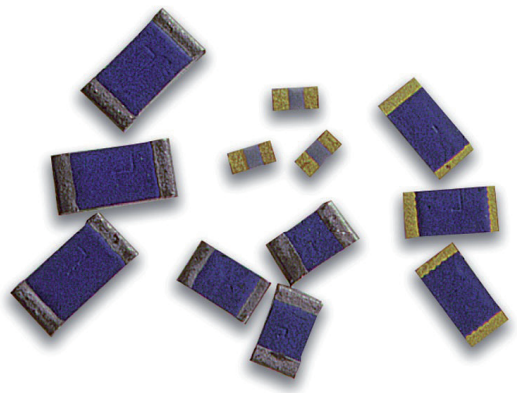
Resistors

Surface Mounted Resistors

CR Series



- Available to EN140401 & IECQ-CECC40401 release
- 100% high temperature and overload screened versions available for high reliability applications
- Terminations available for wire bonding or soldering
- Available in sizes down to 0503
- Resistance range 1 ohm to 100M ohms
- Tolerances down to 0.1%
- Solder terminations have a nickel barrier layer
- Shorting Links available

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

Electrical Data

Commercial		CR0503	CR0603	CR0805	CR1005	CR1206	CR2010	CR2512	Notes
Power rating at 70˚C	watts	0.063	0.1	0.125	0.125	0.25	0.5	1.0	
Resistance range	ohms	1R to 10M		1R to 100M			1R to 1M		
Limiting element voltage	volts	50	75	100	150	200	400	500	
TCR -55˚ to +155˚C	ppm/˚C	<10R: 200, 10R-1M0: 100, >1M0:250							
Resistance tolerance	%	0.1, 0.25, 0.5, 1, 2, 5							See table of value ranges
Ambient temperature range	˚C	-55 to 155							

EN140401-802 Requirements				RR2012M		RR3216M			
Power rating at 70˚C	watts			0.125		0.25			
Resistance range	ohms			1R5 to 10M		1R5 to 10M			
Limiting element voltage	volts			100		200			
TCR -55˚C to +125˚C	ppm/˚C	<10R: 200, 10R–1M0: 100, >1M0: 200							
Resistance tolerance	%	<10R: 5, 10R–1M0: 1, 2, 5, >1M0: 5							See table of value ranges
Ambient temperature range	˚C	-55 to 155							

IECQ-CECC 40401-004 Requirements				CR0805		CR1206			
Power rating at 70˚C	watts			0.125		0.25			
Resistance range	ohms			1R to 10M					
Limiting element voltage	volts			100		200			
TCR -55˚C to +125˚C	ppm/˚C	<10 ohms 200: 10 to 1M 100: >1M 200							
TCR +20˚C to +70˚C	ppm/˚C	<10 ohms 200: 10 to 1M 50: >1M 100							
Resistance tolerance	%	0.5, 1, 2, 5							See table of value ranges
Ambient temperature range	˚C	-55 to +125							

IECQ-CECC 40401-008 Requirements			CR0603	CR0805		CR1206	CR2010	CR2512	
Power rating at 70˚C	watts		0.1	0.125		0.25	0.5	1.0	
Resistance range	ohms		1R to 10M			1R to 10M	1R to 1M	1R to 1M	
Limiting element voltage	volts		75	100		200	400	500	
TCR -55˚C to +155˚C	ppm/˚C	<10R: 200, 10R-1M0: 100, >1M0:250							
Resistance tolerance	%		0.5, 1, 2, 5	0.1, 0.25, 0.5, 1, 2, 5					See table of value ranges
Ambient temperature range	˚C	-55 to 155							

IECQ-CECC 40401-003 Requirements				CR0805		CR1206			
Power rating at 70˚C	watts			0.063		0.125			
Resistance range	ohms			1R to 3M		1R to 5M			
Limiting element voltage	volts			100		200			
TCR -55˚C to +125˚C	ppm/˚C	<5 ohms 500: 5 to 10 ohms 350: 10 to 3M ohms 100: >3M ohms 250							
Resistance tolerance	%	0.25, 0.5, 1, 2, 5							See table of value ranges
Ambient temperature range	˚C	-55 to 125							

These tables indicate the EN140401 & CECC40401 specification requirements, and these are met or exceeded by the corresponding CR series products.

Values		E24 & E96 preferred							Any value to order
Thermal impedance	˚C/watt	800	550	360	290	200	80	70	Mounted on custom designed PCB's
Zero-ohm rating	A		1	1.5		2	3		
Zero-ohm residual resistance	mΩ	<20							

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability.
All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

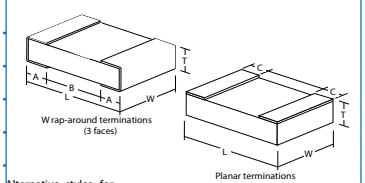
BI Technologies IRC Welwyn

www.ttelectronics.com/resistors

CR Series

Physical Data

Dimensions (mm) & Weight (mg)							
Style	L	W	T max	Wrap around A	Wrap around B[1]	C	Wt
0503	1.25±0.1	0.63±.1	0.5	Not available		0.20±0.1	1.5
0603	1.6±0.1	0.8±0.1	0.55	0.3±0.15	0.6 min	0.3±0.15	2.2
0805	2.0±0.15	1.25±0.15	0.6	0.3±0.15	0.9 min	0.3±0.1	4.7
1005	2.5±0.2	1.25±0.2	0.7	Not available		0.4±0.15	6.5
1206	3.2±0.2	1.6±0.2	0.7	0.4±0.2	1.7 min	0.4±0.15	8.5
2010	5.1±0.3	2.5±0.2	0.8	0.6±0.3	3 min	0.6±0.25	36
2512	6.5±0.3	3.2±0.2	0.8	0.6±0.3	4.4min	0.6±0.25	55



Alternative styles for surface mounting resistors

[†]This dimension determines the number of conductors which may pass under the surface mounted device.

Construction
Thick film resistor material, overglaze and organic protection are screen printed on a 96% alumina substrate.

Terminations
Planar (or single-sided) termination is gold and suitable for wire-bonding; wrap-around is suitable for soldering.

Solderability
Wrap-around terminations have an electroplated nickel barrier and solder coating, this ensures excellent 'leach' resistance properties and solderability. They will withstand immersion in solder at 260˚C for 30 seconds.

Marking
All relevant information recorded on the primary package or reel.

Performance Data

		EN140401-802 Requirements	IECQ-CECC 40401-008 Requirements	IECQ-CECC 40401-004 Requirements	IECQ-CECC 40401-003 Requirements	Actual Maximum	Actual Typical
Load at rated power: 1000 hours at 70˚C	ΔR%	1	2	2	≤ 3M3 2 >3M3 3	1	0.25
Shelf life: 12 months at room temp.	ΔR%	-	-	-	-	0.1	0.02
Derating from rated power at 70˚C		Zero at 125˚C	Zero at 155˚C	Zero at 125˚C	Zero at 125˚C		
Overload	ΔR%	1	0603, 0805:1 1206:0.5	0.5	2	1	0.1
Dry Heat: 1000 hours at UCT	ΔR%	1	2	1	≤ 3M3 2 >3M3 3	to 10M 1 >10M 2	0.2 >10M 1
Long term damp heat	ΔR%	1	2	2	2	1	0.25
Temperature rapid change	ΔR%	0.25	0.5	0.5	1	0.25	0.05
Resistance to solder heat	ΔR%	0.25	0.5	0.5	2	0.25	0.05
Voltage proof	volts	284	0603:150, 0805:200, 1206:300, 2010:400, 2512:500	0805:200, 1206:300		0503:100, 0603:300, All others: 500	

Note: An 0.01 ohm addition to be added to the performance of all resistors <10 ohms

Value Ranges (ohms)

Tolerance	%					
Size	5	2	1	0.5	0.25	0.1
0503	1 to 10M	1 to 10M	10 to 10M	100 to 1M	N/A	N/A
0603	1 to 10M	1 to 10M	1 to 10M	100 to 1M	N/A	N/A
0805	1 to 100M	1 to 50M	1 to 20M	10 to 10M	100 to 1M	100 to 1M
1005	1 to 100M	1 to 50M	1 to 20M	10 to 10M	100 to 1M	100 to 1M
1206	1 to 100M	1 to 50M	1 to 25M	10 to 10M	100 to 1M	100 to 1M
2010	1 to 1M	1 to 1M	1 to 1M	10 to 10M	100 to 1M	N/A
2512	1 to 1M	1 to 1M	1 to 1M	10 to 10M	100 to 1M	N/A

Application Notes

Operating Temperature Range

The chips themselves can operate at a maximum temperature of 155°C (see performance claims above). For soldered chips, the joint temperature should not exceed 110°C. This condition is met when the stated power levels at 70°C are used.

Mounting

This chip resistor is ideally suited for handling by automatic methods due to its rectangular shape and the small dimensional tolerances. Electrical connection to a ceramic substrate or to a printed circuit board can be made by wire bonding (eg suffix 'G' in CR0805G) or by reflow soldering of wrap-around terminations (eg suffix 'F' in CR0805F).

The 'F' terminations provide good leach properties and ensure reliable contact. Due to the robust construction the resistor chip can be immersed in the solder bath for 30 seconds at 260°C. This enables the resistor to be mounted on one side of a printed circuit board and other wire-leaded components on the other side.

Packaging

Wrap-around Termination

Chip resistors are supplied taped and reeled on standard 8mm tape to IEC 286-3.

Planar Terminations

Resistor chips are supplied in waffle packs.

Ordering Procedure

Example: CR2512F-10KFI (2512 with solderable wraparound terminations, 10 kilohms ±1%, Pb-free)

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

1 Type	2 Size	3 Termination			4 Value	5 Tolerance	6 Termination & Packing			7 Release
CR	0503	F	0603, 0805, 1206, 2010, 2512	Solderable wraparound	E24 or E96 3/4 characters R = ohms K = kilohms M = megohms	B = ±0.1%	Pb-free solderable (RoHS)			Omit for commercial or CECC[1]
	0603					C = ±0.25%	I	0603F	Standard 2000 (max 5000)/reel	
	0805					D = ±0.5%		0805F, 1206F, 2010F	Standard 800 (max 3000)/reel	EN = EN140401-802
	1005					F = ±1%		2512F	Standard 800 (max 1800)/reel	
	1206					G = ±2%	SnPb solderable			
	2010	G	All	Gold planar		J = ±5%	PB	0603F	Standard 2000 (max 5000)/reel	
	2512				R005J = zero ohm jumper			0805F, 1206F, 2010F	Standard 800 (max 3000)/reel	
								2512F	Standard 800 (max 1800)/reel	
							Gold planar			
							I	xxxxG	Waffle pack	

Note 1: For CECC released product state on order the CECC number. Example: **CR2512F-10KFI IECQ-CECC40401-008**