

# Automotive and Anti-Sulfuration Chip Resistor 1206



**RoHS  
Compliant**

## Description



The resistors are constructed in a high grade ceramic body (aluminium oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance by laser cutting of this resistive layer

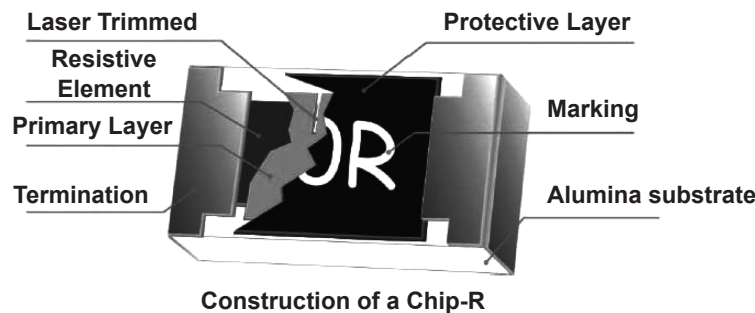
## Features:

- High reliability and stability  $\pm 1\%$
- Sulfuration resistant
- Automotive grade AEC Q-200 compliant
- 100% CCD inspection
- Lead-free

## Applications:

- Automotive application
- Consumer electrical equipment
- EDP, computer application
- Telecom application

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Tin (lead free) alloy



## Quick Reference Data

Item	General Specification	
Series no.	MCMR12	
Size code	1206	
Resistance range	1 $\Omega$ to 10M $\Omega$ ( $\pm 5\%$ tolerance), Jumper 1 $\Omega$ to 10M $\Omega$ ( $\pm 1\%$ tolerance)	
Resistance tolerance	$\pm 1\%$ E96 / E24	$\pm 5\%$ E24
TCR (ppm/ $^{\circ}$ C) R > 1M $\Omega$ 10 $\Omega$ < R $\leq$ 1M $\Omega$ R $\leq$ 10 $\Omega$	$\leq +200$ $\leq +100$ -200 to +400	
Maximum dissipation at T <sub>amb</sub> = 70 $^{\circ}$ C	1/4W	
Maximum operation voltage (DC or RMS)	200V	
Maximum overload voltage (DC or RMS)	400V	
Climatic category (IEC 60068)	55/155/56	



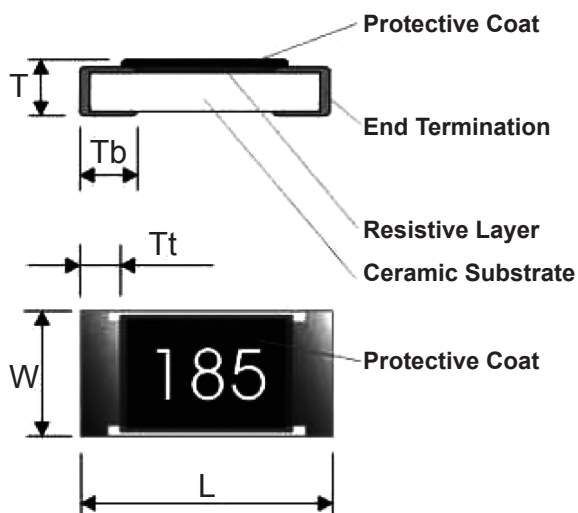
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## Note:

1. This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
2. Maximum operation voltage : So called RCWV (rated continuous working voltage) is determined by  

$$RCWV = \sqrt{\text{Rated Power} \times \text{Resistance Value or maximum RCWV listed above, whichever is lower}}$$
3. The resistance of jumper is defined  $< 0.05\Omega$



## Dimensions (mm)

MCMR12 (1206)	L	W	T	Tb	Tt
	3.1 ±0.1	1.6 ±0.1	0.6 ±0.15	0.45 ±0.2	0.5 ±0.2

## Marking

Size \ No. of Digit of Code \ Tolerance	±5%	±1%
MCMR12 (1206)	3-digits marking	4-digits marking

### 3-digits marking (±5% : 1206)

Each resistor is marked with a three digits code on the protective coating to designate the nominal resistance value

### 4-digits marking (±1% : 1206)

Each resistor is marked with a three digits code on the protective coating to designate the nominal resistance value

### Example

Resistance	10Ω	12Ω	100Ω	6,800Ω	47,000Ω
3-digits marking (1206 ±5% )	100	120	101	682	473
4-digits marking	10R0	12R0	1000	6801	4702

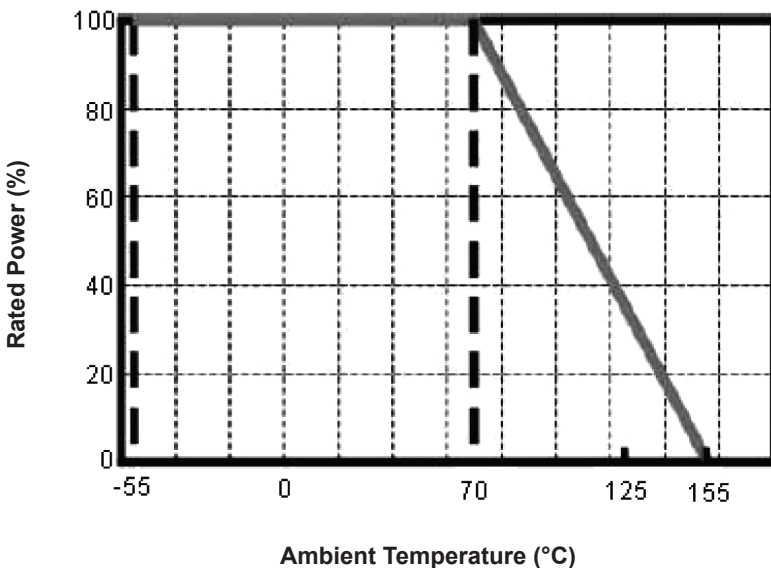
## Functional Description

### Product characterization

Standard values of nominal resistance are taken from the E24 series for resistors with a tolerance of  $\pm 5\%$ , and E24+E96 series for resistors with a tolerance of  $\pm 1\%$ . The values of the E24 / E96 series are in accordance with "IEC publication 60063"

## Derating

The power that the resistor can dissipate depends on the operating temperature



Max. dissipation in percentage of rated power as a function of the ambient temperature

## Mounting:

Due to their rectangular shapes and small tolerances, surface mountable resistors are suitable for handling by automatic placement systems

Chip placement can be on ceramic substrates and printed-circuit boards (PCBs)

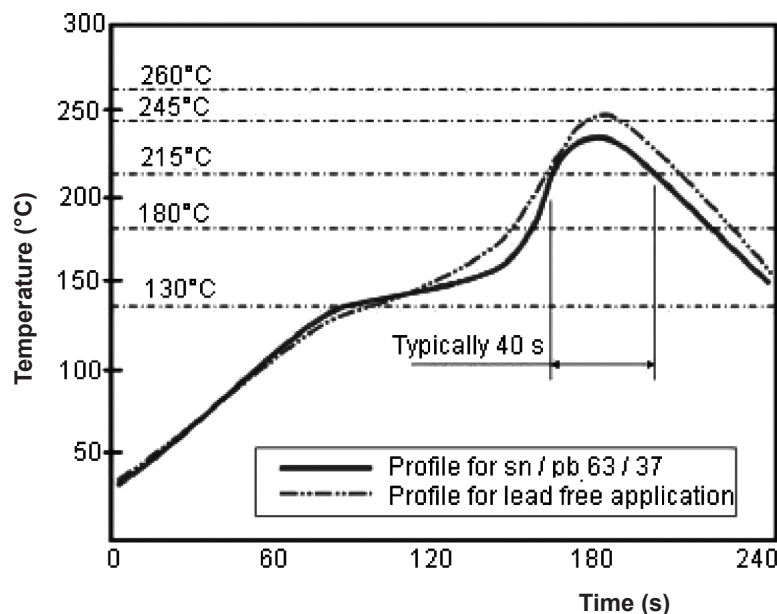
Electrical connection to the circuit is by individual soldering condition

The end terminations guarantee a reliable contact

## Soldering Condition

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for 10 seconds. Therefore, it is possible to mount surface mount resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs)

Surface mount resistors are tested for solderability at 235°C during 2 seconds. The test condition for no leaching is 260°C for 30 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in below.



Infrared soldering profile for Chip Resistors

## Test and Requirements

Essentially all tests are carried out according to the schedule of IEC publication 115-8, category LCT/UCT/56 (rated temperature range : Lower Category Temperature, Upper Category Temperature; damp heat, long term, 56 days). The testing also meets the requirements specified by EIA, EIAJ and JIS

The tests are carried out in accordance with IEC publication 68, "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmospheric conditions according to IEC 60068-1, sub-clause 5.3. Unless otherwise specified, the following value supplied :

Temperature : 15°C to 35°C

Relative humidity : 45% to 75%

Air pressure : 86kPa to 106kPa (860 mbar to 1,060 mbar)

All soldering tests are performed with mildly activated flux

## Test and Requirements

Test	Procedure / Test Method	Requirement	
		Resistance $\pm 5\%$ , $\pm 1\%$	0 $\Omega$
Electrical Characteristics JISC5201-1: 1998 Clause 4.8	- DC resistance values measurement - Temperature Coefficient of Resistance (T.C.R) Natural resistance change per change in degree centigrade $\frac{R2 - R1}{R1 (t2 - t1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ t1 : 20°C +5°C -1°C R1 : Resistance at reference temperature R2 : Resistance at test temperature	Within the specified tolerance Refer to "Quick Reference Data"	
Resistance to soldering heat (R.S.H) MIL-STD-202 method 210	Un-mounted chips completely immersed for 10 $\pm 1$ second in a SAC solder bath at 270°C $\pm 5^\circ\text{C}$	$\Delta R/R$ Max. $\pm (0.5\%+0.05\Omega)$ No visible damage	< 50m $\Omega$
Solderability J-STD-002	a) Bake the sample for 155°C dwell time 4 hours / solder dipping 235°C / 5 s b) Steam the sample dwell time 1 hour/ solder dipping 215°C/ 5 s c) Steam the sample dwell time 1 hour/ solder dipping 260°C / 7 s	95% coverage minimum, good tinning No visible damage	
Temperature cycling JESD22 method JA-104	1,000 cycles, -55°C to +155°C, dwell time 5 to 10mins	$\Delta R/R$ Max. $\pm (0.5\%+0.05\Omega)$ No visible damage	< 50m $\Omega$
Moisture Resistance MIL-STD-202 method 106	65 $\pm 2^\circ\text{C}$ , 80 to 100% RH, 10 cycles, 24 hours / cycle	$\Delta R/R$ Max. $\pm (0.5\%+0.05\Omega)$ No visible damage	< 50m $\Omega$
Bias Humidity MIL-STD-202 method 103	1,000 +48/-0 hours; 85°C, 85% RH, 10% of operation Power	$\Delta R/R$ Max. $\pm (1\%+0.05\Omega)$ No visible damage	< 50m $\Omega$
Operational Life MIL-STD-202 method 108	1,000 +48/-0 hours; 35% of operation power, 125 $\pm 2^\circ\text{C}$	$\Delta R/R$ Max. $\pm (1\%+0.05 \Omega)$ No visible damage	< 50m $\Omega$
High Temperature Exposure MIL-STD-202 method 108	1,000+48/-0 hours; without load in a temperature chamber controlled 155 $\pm 3^\circ\text{C}$	$\Delta R/R$ Max. $\pm (1\%+0.05 \Omega)$ No visible damage	< 50m $\Omega$
Mechanical Shock MIL-STD-202 method 213	1/2 sine pulse / 1,500 g peak / Velocity 15.4 ft/s	Within the specified tolerance No visible damage	< 50m $\Omega$
Board Flex AEC-Q200-005	Resistors mounted on a 90 mm glass epoxy resin PCB(FR4), bending once 2 mm for 10 s	$\Delta R/R$ Max. $\pm (1\%+0.05 \Omega)$ No visible damage	< 50m $\Omega$
Terminal strength AEC-Q200-006	Pressurizing force: 1 Kg, Test time: 60 $\pm 1$ s	No remarkable damage or removal of the terminations	
Vibration MIL-STD-202 method 204	Test 5 g's for 20 minimum, 12 cycles each of 3 orientations	$\Delta R/R$ Max. $\pm (1\%+0.05 \Omega)$ No visible damage	< 50m $\Omega$
Thermal shock MIL-STD-202 method 107	Test -55 to 155 / dwell time 15 minimum / maximum transfer time 20 seconds 300 cycles	$\Delta R/R$ Max. $\pm (0.5\%+0.05 \Omega)$ No visible damage	< 50m $\Omega$
ESD AEC-Q200-002	Test contact 1 KV ( 0.5 KV for 0402 only)	$\Delta R/R$ Max. $\pm (1\%+0.05 \Omega)$ No visible damage	< 50m $\Omega$

# Automotive and Anti-Sulfuration Chip Resistor 1206



## Test Condition for Jumper (0Ω)

Item	MCMR12 (1206)
Power rating at +70°C	1/4 W
Resistance	Max. 50mΩ
Rated current	2A
Peak current	5A
Operating temperature	-55°C to +155°C

## MCMR12 (1206):

1. Reeled tape packaging : 8 mm width paper taping 5,000 pieces per 7" reel, 10 k pieces per 10" reel, 20 k pieces per 13" reel
2. Bulk packaging : 5,000 pieces per poly-bag

## Part Number Table

Description	Part Number
Resistor, 1206, 10M, 1%, Anti Sulfur	MCMR12W1005FTL
Resistor, 1206, 2R2, 1%, Anti Sulfur	MCMR12W2R20FTL
Resistor, 1206, 3R4, 1%, Anti Sulfur	MCMR12W3R40FTL
Resistor, 1206, 5M6, 1%, Anti Sulfur	MCMR12W5604FTL
Resistor, 1206, 8R2, 1%, Anti Sulfur	MCMR12W8R20FTL
Resistor, 1206, 8R25, 1%, Anti Sulfur	MCMR12W8R25FTL
Resistor, 0R, 250mW, 0.05R, Anti Sulphur	MCMR12X000 PTL
Resistor, 10R, 1206, 5%, Anti Sulfur	MCMR12X100 JTL
Resistor, 100R, 250mW, 1%, Anti Sulfur	MCMR12X1000FTL
Resistor, 1K, 250mW, 1%, Anti Sulphur	MCMR12X1001FTL
Resistor, 10K, 250mW, 1%, Anti Sulphur	MCMR12X1002FTL
Resistor, 1206, 100K, 1%, Anti Sulfur	MCMR12X1003FTL
Resistor, 100R, 1206, 5%, Anti Sulfur	MCMR12X101 JTL
Resistor, 1K, 1206, 5%, Anti Sulfur	MCMR12X102 JTL
Resistor, 100K, 1206, 5%, Anti Sulfur	MCMR12X104 JTL
Resistor, 1M, 1206, 5%, Anti Sulfur	MCMR12X105 JTL
Resistor, 1206, 10R, 1%, Anti Sulfur	MCMR12X10R0FTL
Resistor, 110R, 1206, 5%, Anti Sulfur	MCMR12X111 JTL
Resistor, 1206, 1K18, 1%, Anti Sulfur	MCMR12X1181FTL
Resistor, 1K2, 1206, 5%, Anti Sulfur	MCMR12X122 JTL
Resistor, 1206, 13K, 1%, Anti Sulfur	MCMR12X1302FTL
Resistor, 1K3, 1206, 5%, Anti Sulfur	MCMR12X132 JTL

# Automotive and Anti-Sulfuration Chip Resistor 1206



Description	Part Number
Resistor, 1206, 1K5, 1%, Anti Sulfur	MCMR12X1501FTL
Resistor, 150R, 1206, 5%, Anti Sulfur	MCMR12X151 JTL
Resistor, 1K5, 1206, 5%, Anti Sulfur	MCMR12X152 JTL
Resistor, 1206, 15R, 1%, Anti Sulfur	MCMR12X15R0FTL
Resistor, 1206, 160R, 1%, Anti Sulfur	MCMR12X1600FTL
Resistor, 1K6, 1206, 5%, Anti Sulfur	MCMR12X162 JTL
Resistor, 160K, 1206, 5%, Anti Sulfur	MCMR12X164 JTL
Resistor, 18R, 1206, 5%, Anti Sulfur	MCMR12X180 JTL
Resistor, 1K8, 1206, 5%, Anti Sulfur	MCMR12X182 JTL
Resistor, 1R0, 1206, 5%, Anti Sulfur	MCMR12X1R0 JTL
Resistor, 20R, 1206, 5%, Anti Sulfur	MCMR12X200 JTL
Resistor, 1206, 200K, 1%, Anti Sulfur	MCMR12X2003FTL
Resistor, 2M, 1206, 5%, Anti Sulfur	MCMR12X205 JTL
Resistor, 1206, 20R, 1%, Anti Sulfur	MCMR12X20R0FTL
Resistor, 22R, 1206, 5%, Anti Sulfur	MCMR12X220 JTL
Resistor, 1206, 220R, 1%, Anti Sulfur	MCMR12X2200FTL
Resistor, 1206, 2K2, 1%, Anti Sulfur	MCMR12X2201FTL
Resistor, 1206, 22K, 1%, Anti Sulfur	MCMR12X2202FTL
Resistor, 220R, 1206, 5%, Anti Sulfur	MCMR12X221 JTL
Resistor, 2K2, 1206, 5%, Anti Sulfur	MCMR12X222 JTL
Resistor, 1206, 300R, 1%, Anti Sulfur	MCMR12X3000FTL
Resistor, 1206, 3K, 1%, Anti Sulfur	MCMR12X3001FTL
Resistor, 3K, 1206, 5%, Anti Sulfur	MCMR12X302 JTL
Resistor, 1206, 30R, 1%, Anti Sulfur	MCMR12X30R0FTL
Resistor, 1206, 30R9, 1%, Anti Sulfur	MCMR12X30R9FTL
Resistor, 1206, 3K3, 1%, Anti Sulfur	MCMR12X3301FTL
Resistor, 1206, 33K, 1%, Anti Sulfur	MCMR12X3302FTL
Resistor, 330R, 1206, 5%, Anti Sulfur	MCMR12X331 JTL
Resistor, 3K3, 1206, 5%, Anti Sulfur	MCMR12X332 JTL
Resistor, 360R, 1206, 5%, Anti Sulfur	MCMR12X361 JTL
Resistor, 1206, 3K9, 1%, Anti Sulfur	MCMR12X3901FTL
Resistor, 1206, 41K2, 1%, Anti Sulfur	MCMR12X4122FTL
Resistor, 1206, 442R, 1%, Anti Sulfur	MCMR12X4420FTL
Resistor, 470R, 1206, 5%, Anti Sulfur	MCMR12X471 JTL
Resistor, 4K7, 1206, 5%, Anti Sulfur	MCMR12X472 JTL
Resistor, 1206, 499K, 1%, Anti Sulfur	MCMR12X4993FTL
Resistor, 1206, 49R9, 1%, Anti Sulfur	MCMR12X49R9FTL

# Automotive and Anti-Sulfuration Chip Resistor 1206



Description	Part Number
Resistor, 51R, 1206, 5%, Anti Sulfur	MCMR12X510 JTL
Resistor, 1206, 510R, 1%, Anti Sulfur	MCMR12X5100FTL
Resistor, 5K1, 1206, 5%, Anti Sulfur	MCMR12X512 JTL
Resistor, 1206, 560R, 1%, Anti Sulfur	MCMR12X5600FTL
Resistor, 1206, 5K6, 1%, Anti Sulfur	MCMR12X5601FTL
Resistor, 5K6, 1206, 5%, Anti Sulfur	MCMR12X562 JTL
Resistor, 5R6, 1206, 5%, Anti Sulfur	MCMR12X5R6 JTL
Resistor, 1206, 60R4, 1%, Anti Sulfur	MCMR12X60R4FTL
Resistor, 1206, 61R9, 1%, Anti Sulfur	MCMR12X61R9FTL
Resistor, 6K2, 1206, 5%, Anti Sulfur	MCMR12X622 JTL
Resistor, 1206, 62R, 1%, Anti Sulfur	MCMR12X62R0FTL
Resistor, 1206, 680R, 1%, Anti Sulfur	MCMR12X6800FTL
Resistor, 680R, 1206, 5%, Anti Sulfur	MCMR12X681 JTL
Resistor, 1206, 7K5, 1%, Anti Sulfur	MCMR12X7501FTL
Resistor, 1206, 768R, 1%, Anti Sulfur	MCMR12X7680FTL
Resistor, 82R, 1206, 5%, Anti Sulfur	MCMR12X820 JTL
Resistor, 1206, 820R, 1%, Anti Sulfur	MCMR12X8200FTL
Resistor, 1206, 825K, 1%, Anti Sulfur	MCMR12X8253FTL
Resistor, 91R, 1206, 5%, Anti Sulfur	MCMR12X910 JTL
Resistor, 9R1, 1206, 5%, Anti Sulfur	MCMR12X9R1 JTL

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