

# **DATA SHEET**

# THICK FILM CHIP RESISTORS AUTOMOTIVE GRADE

AC series ±5%, ±1%, ±0.5%, ±0.1% (Low TCR)

Sizes 0201/0402/0603/0805/1206/ 1210/1218/2010/2512

RoHS compliant & Halogen free



Product specification - November 17, 2023 V.11



**YAGEO** 

#### SCOPE

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This specification describes AC0201 to AC2512 chip resistors with leadfree terminations made by thick film process.

#### **APPLICATIONS**

- All general purpose applications
- Car electronics, industrial application

#### FEATURES

- AEC-Q200 qualified
- Moisture sensitivity level: MSL I
- AC series soldering is compliant with J-STD-020D
- Halogen free epoxy
- RoHS compliant
  - Products with lead-free terminations meet RoHS requirements
  - Pb-glass contained in electrodes, resistor element and glass are exempted by RoHS
- Reduce environmentally hazardous waste
- High component and equipment reliability
- The resistors are 100% performed by automatic optical inspection prior to taping.

#### ORDERING INFORMATION - GLOBAL PART NUMBER

Part number is identified by the series name, size, tolerance, packaging type, temperature coefficient, taping reel and resistance value.

#### **GLOBAL PART NUMBER**

# AC XXXX X X X XX XXXX L

(2) (3) (4) (5) (7)

#### (I) SIZE

0201/0402/0603/0805/1206/1210/1218/2010/2512

#### (2) TOLERANCE

 $B = \pm 0.1\%$  for low TCR  $F = \pm 1\%$  $D = \pm 0.5\%$  $J = \pm 5\%$  (for Jumper ordering, use code of J)

#### (3) PACKAGING TYPE

R = Paper taping reel K = Embossed taping reel

#### (4) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Base on spec E =  $\pm$  50 ppm/°C

#### (5) TAPING REEL

07 = 7 inch dia, Reel & Standard power 7W = 7 inch dia. Reel & 2 x standard power 13 = 13 inch dia. Reel 3W = 13 inch dia. Reel &  $2 \times$  standard power

#### (6) RESISTANCE VALUE

 $I\Omega$  to 22  $M\Omega$ 

There are 2~4 digits indicated the resistance value. Letter R/K/M is decimal point, no need to mention the last zero after R/K/M, e.g. I K2, not I K20.

Detailed coding rules of resistance are shown in the table of "Resistance rule of global part number".

#### (7) DEFAULT CODE

Letter L is the system default code for ordering only. (Note)

Resistance rule	e of global part
Resistance coding rule	Example
XRXX	$IR = I\Omega$
	$IR5 = 1.5\Omega$
(I to $9.76\Omega$ )	$9R76 = 9.76\Omega$
XXRX	$IOR = IO\Omega$
(10 to 97.6 $\Omega$ )	$97R6 = 97.6\Omega$
XXXR	$100R = 100\Omega$
(100 to 976 $\Omega$ )	$976R = 976\Omega$
XKXX	IK = 1,000Ω
(1 to 9.76 K <b>Ω)</b>	$9K76 = 9760\Omega$
XMXX	$\Omega$ = 1,000,000 $\Omega$
(1 to 9.76 M $\Omega$ )	9M76= 9,760,000Ω
XXMX	
(10 MΩ)	$10M = 10,000,000\Omega$

#### **ORDERING EXAMPLE**

The ordering code for an AC0402 chip resistor, value 100 K $\Omega$  with ±1% tolerance, supplied in 7-inch tape reel is: AC0402FR-07100KL.

## NOTE

- I. All our R-Chip products are RoHS compliant and Halogen free. "LFP" of the internal 2D reel label states "Lead-Free Process".
- 2. On customized label, "LFP" or specific symbol can be printed.
- 3. AC series with  $\pm 0.5\%$  tolerance is also available. For further information, please contact sales.





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0201 to 2512

#### **MARKING**

#### AC0201 / AC0402



No marking

Fig. I

#### AC0603 / AC0805 / AC1206 / AC1210 / AC2010 / AC2512



E-24 series: 3 digits, ±5%

First two digits for significant figure and 3rd digit for number of zeros

#### AC0603



E-24 series: 3 digits, ±1% & ±0.5% One short bar under marking letter

.....



Value =  $12.4 \text{ K}\Omega$ 

E-96 series: 3 digits,  $\pm 1\%$  &  $\pm 0.5\%$ 

First two digits for E-96 marking rule and 3rd letter for number of zeros

# AC0805 / AC1206 / AC1210 / AC2010 / AC2512



Both E-24 and E-96 series: 4 digits, ±1% & ±0.5%

First three digits for significant figure and 4th digit for number of zeros

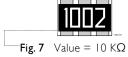
## AC1218

Fig. 4



E-24 series: 3 digits, ±5%

First two digits for significant figure and 3rd digit for number of zeros



Both E-24 and E-96 series: 4 digits,  $\pm 1\%$  &  $\pm 0.5\%$ 

First three digits for significant figure and 4th digit for number of zeros

#### NOTE

 $For further marking information, please \ refer \ to \ data \ sheet \ ``Chip \ resistors \ marking''. \ Marking \ of \ AC \ series \ is \ the \ same \ as \ RC \ series.$ 

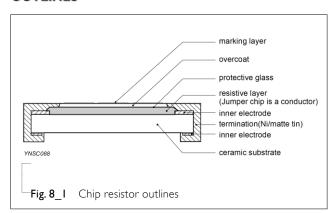
#### CONSTRUCTION

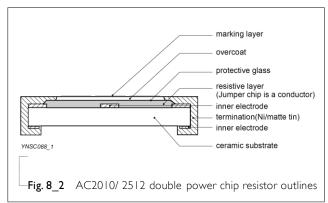
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The resistors are constructed on top of an automotive grade ceramic body. Internal metal electrodes are added at each end and connected by a resistive glaze. The resistive glaze is covered by a protective glass.

The composition of the glaze is adjusted to give the approximately required resistance value and laser trimming of this resistive glaze achieves the value within tolerance. The whole element is covered by a protective overcoat. Size 0603 and bigger is marked with the resistance value on top. Finally, the two external terminations (Ni / matte tin) are added, as shown in Fig.8.

#### **OUTLINES**

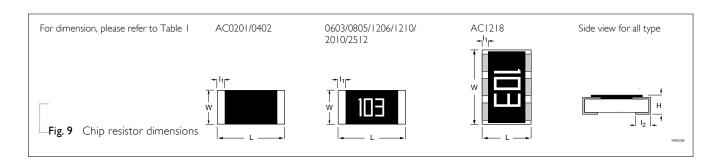




#### **DIMENSIONS**

Table I For outlines, please refer to Fig. 9

TYPE	L (mm)	W (mm)	H (mm)	I₁ (mm)	l <sub>2</sub> (mm)
AC0201	0.60 ±0.03	0.30 ±0.03	0.23 ±0.03	0.12 ±0.05	0.15 ±0.05
AC0402	1.00 ±0.05	$0.50 \pm 0.05$	0.32 ±0.05	0.20 ±0.10	0.25 ±0.10
AC0603	1.60 ±0.10	$0.80 \pm 0.10$	0.45 ±0.10	0.25 ±0.15	0.25 ±0.15
AC0805	2.00 ±0.10	1.25 ±0.10	0.50 ±0.10	0.35 ±0.20	0.35 ±0.20
AC1206	3.10 ±0.10	1.60 ±0.10	0.55 ±0.10	0.45 ±0.20	0.45 ±0.20
AC1210	3.10 ±0.10	2.60 ±0.15	0.55 ±0.10	0.45 ±0.15	0.50 ±0.20
AC1218	3.10 ±0.10	4.60 ±0.10	0.55 ±0.10	0.45 ±0.20	0.40 ±0.20
AC2010	5.00 ±0.10	2.50 ±0.15	0.55 ±0.10	0.55 ±0.15	0.55 ±0.20
AC2512	6.35 ±0.10	3.10 ±0.15	0.55 ±0.10	0.60 ±0.20	0.60 ±0.20





# ELECTRICAL CHARACTERISTICS

# Table 2

AC0201 1/20 W -55°C to 155°C 25V 50V 50V $100 \le R \le 10M\Omega$ $-100/+350 \text{ ppm}^{\circ}\text{C}$ $1\% (E24/E96) 10\Omega \le R \le 10M\Omega$ $\pm 200 \text{ ppm}^{\circ}\text{C}$ $0.5\% (E24/E96) 10\Omega \le R \le 10M\Omega$ $\pm 200 \text{ ppm}^{\circ}\text{C}$ $1\% (E24/E96) 10\Omega \le R \le 10M\Omega$ $\pm 200 \text{ ppm}^{\circ}\text{C}$ $1\% (E24/E96) 10\Omega \le R \le 10M\Omega$ $\pm 200 \text{ ppm}^{\circ}\text{C}$ $1\% (E24/E96) 10\Omega \le R \le 10M\Omega$ $\pm 200 \text{ ppm}^{\circ}\text{C}$ $1\% (E24/E96) 10\Omega \le R \le 10M\Omega$ $\pm 200 \text{ ppm}^{\circ}\text{C}$ $1\% (E24/E96) 10\Omega \le R \le 10M\Omega$ $\pm 100 \text{ ppm}^{\circ}\text{C}$ $1\% (E24/E96) 10\Omega \le R \le 10M\Omega$ $\pm 100 \text{ ppm}^{\circ}\text{C}$ $1\% (E24/E96) 10\Omega \le R \le 10M\Omega$	Jumper Criteria
AC0201 1/20 W -55°C to 155°C 25V 50V 50V 10 $\Omega \le R \le 10M\Omega$ $10\Omega < R \le 10M$ $10\Omega < R \le 10M$ $10\Omega < R \le 10M$ $10\Omega \le R \le 10M\Omega$ $10\Omega \le 10M\Omega$ $10\Omega \le 10M\Omega$ $10\Omega \le 10M\Omega$ $10\Omega \le 10M\Omega$ $10\Omega$	
AC0201 1/20 W -55°C to 155°C 25V 50V 50V $10 \le R \le 10 \text{M} \Omega$ $\pm 200 \text{ ppm}^{\circ}\text{C}$ $\pm 200 \text{ ppm}^$	0 5 4
AC0201 1/20 W -55°C to 155°C 25V 50V 50V $I\Omega \le R \le I0M\Omega$ ±200 ppm°C 0.5% (E24/E96) $I0\Omega \le R \le IM\Omega$ Jumper<50mΩ $IMC \le R \le I0M\Omega$ ±200 ppm°C $IMC \le R \le IM\Omega$ 100V $IOV = IOV =$	0.5A
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Maximum
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Current
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1.04
AC0402	Rated Current
AC0402	I A
AC0402	Maximum
AC0402 $ ±200 \text{ ppm}^{\circ}\text{C} $	Current
	2,4
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
1/8W -55°C to 155°C 75V 100V 100V 0.5%, 1% (E24/E96) $10Ω ≤ R ≤ 10MΩ$ $1Ω ≤ R ≤ 10MΩ$ $±100 ppm$ °C $±100 ppm$ °C $±100 ppm$ °C	
$1\Omega \leq R \leq 10M\Omega \qquad \pm 100 \text{ ppm}^{\circ}\text{C}$ $5\% \text{ (E24)} \qquad 1\Omega \leq R < 10\Omega \text{ F}$	
5% (E24) IΩ≤R< I0Ω F	
	Rated Current
0.5%, $1\%$ (E24/E96) $10\Omega \le R \le 10M\Omega$	Maximum
1/10 W -55°C to 155°C 75V 150V 150V $\Omega \leq R \leq 10M\Omega$ $\pm 100$ ppm°C	Current
Jumper $\leq 50 \text{m}\Omega$ $10 \text{M}\Omega < \text{R} \leq 22 \text{M}\Omega$	2A
AC0603 ±200 ppm°C	
$=$ 5% (E24) $1\Omega \le R < 10\Omega$	
IO < R < I∩MO +200 ppm°C	
1/5 W -55°C to 155°C 75V 150V 150V 150V $0.5\%$ , 1% (E24/E96) $10\Omega \le R \le 10M\Omega$	
$I\Omega \le R \le I0M\Omega$ $\pm I00 \text{ ppm}^{\circ}\text{C}$	



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					CHARACT			
TYPE	POWER	Operating Temperature Range	Max. Working Voltage	Max. Overload V Voltage	Dielectric Vithstanding Voltage	Resistance Range	Temperature Coefficient	Jumper Criteria
						5% (E24)	$ \Omega \le R <  \Omega $	Rated Current
						$I\Omega \le R \le 22 M\Omega$	±200 ppm°C	2A
	1/8 W	-55°C to 155°C	150V	300V	300V	0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	Maximum
	1/0 **	-55 C to 155 C	1301	300 v	300 V	$1\Omega \le R \le 10M\Omega$	±100 ppm°C	Current
						Jumper $<$ 50m $\Omega$	$10M\Omega < R \le 22M\Omega$	5A
AC0805							±200 ppm°C	
						5% (E24)	$ \Omega \le R <  \Omega $	
	1/4 W	55°C+0 155°C	150V	200\/	300V	$1\Omega \le R \le 10M\Omega$	±200 ppm°C	
	1/4 VV	V -55°C to 155°C	1300	300V	3000	0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	
						$1\Omega \le R \le 10M\Omega$	±100 ppm°C	
		/ -55°C to 155°C			400V 500V	5% (E24)	$1\Omega \le R < 10\Omega$	Rated Current
			200V	400V		$I\Omega \le R \le 22M\Omega$	±200 ppm°C	2A
	1/4 W					0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	Maximum
						$1\Omega \le R \le 10M\Omega$	±100 ppm°C	Current
A C 1204						Jumper $\!<$ 50m $\Omega$	$10M\Omega < R \le 22M\Omega$	10A
AC1206							±200 ppm°C	
			200V		00V 500V	5% (E24)	$ \Omega \le R <  \Omega $	
	1/2 W	-55°C to 155°C		400V		$1\Omega \le R \le 10M\Omega$	±200 ppm°C	
	1/Z VV	-55 C to 155 C				0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	
						$1\Omega \le R \le 10M\Omega$	±100 ppm°C	
						5% (E24)	$1\Omega \le R < 10\Omega$	Rated Current
						$I\Omega \le R \le 22M\Omega$	±200 ppm°C	2A
	1/2 \ \ /	FF0C+- 1FF0C	200V	500V	500V	0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	Maximum
	1/2 W	-55°C to 155°C	2007	3007	3007	$1\Omega \le R \le 10M\Omega$	±100 ppm°C	Current
						Jumper $\!<$ 50m $\Omega$	$10M\Omega < R \le 22M\Omega$	10A
AC1210							±200 ppm°C	
			_			5% (E24)	$1\Omega \le R < 10\Omega$	
						$1\Omega \le R \le 10M\Omega$	±200 ppm°C	
	ΙW	-55°C to 155°C	200V	500V	500V	0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	
						$1\Omega \le R \le 10M\Omega$	±100 ppm°C	



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		CHARACTERISTICS						
TYPE	POWER	Operating Temperature Range	Max. Working Voltage	Max. Overload V Voltage	Dielectric Vithstanding Voltage	Resistance Range	Temperature Coefficient	Jumper Criteria
						5% (E24)	$1\Omega \le R < 10\Omega$	Rated Current
						$I\Omega \le R \le IM\Omega$	±200 ppm°C	6A
	I W	-55°C to 155°C	200V	500V	500V	0.5%, 1% (E24/E96)	$10\Omega \le R \le 1M\Omega$	Maximum
						$I\Omega \le R \le IM\Omega$	±100 ppm°C	Current
AC1218						Jumper $\!<$ 50m $\!\Omega$		10A
			_			5% (E24)	$1\Omega \le R < 10\Omega$	
	I F) A /	FF0C + 1FF0C	2001/	F00) /	F00\/	$I\Omega \le R \le IM\Omega$	±200 ppm°C	
	1.5W	-55°C to 155°C	200V	500V	500V	0.5%, 1% (E24/E96)	$10\Omega \le R \le 1M\Omega$	
						$ \Omega \le R \le  M\Omega $	±100 ppm°C	
	3/4 W	3/4 W -55°C to 155°C 200V 500V 500				5% (E24)	$1\Omega \le R < 10\Omega$	Rated Current
			200V	500V	500V	$1\Omega \le R \le 22M\Omega$	±200 ppm°C	2A
						0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	Maximum
						$1\Omega \le R \le 10M\Omega$	±100ppm°C	Current
						Jumper $\!<$ 50m $\!\Omega$	$10M\Omega < R \le 22M\Omega$	10A
AC2010					±200 ppm°C			
		1.25W -55°C to 155°C 200V	200V	500V	500V	5% (E24)	IΩ≤R< I0Ω	
						$1\Omega \le R \le 10M\Omega$	±200 ppm°C	
	1.25W					0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	
				$1\Omega \le R \le 10M\Omega$	±100 ppm°C			
						5% (E24)	IΩ≤R< I0Ω	Rated Current
						$1\Omega \le R \le 22M\Omega$	±200 ppm°C	2A
						0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	Maximum
	IW	-55°C to 155°C	200V	500V	500V	$1\Omega \le R \le 10M\Omega$	±100 ppm°C	Current
						Jumper<50mΩ	$10M\Omega < R \le 22M\Omega$	10A
AC2512							±200 ppm°C	
	<del>.</del>					5% (E24)	IΩ≤R< I0Ω	
						$1\Omega \le R \le 10M\Omega$	±200 ppm°C	
	2 W	-55°C to 155°C	200V	500V	500V	0.5%, 1% (E24/E96)	$10\Omega \le R \le 10M\Omega$	
						$1\Omega \le R \le 10M\Omega$	±100 ppm°C	
-	-							



Chip Resistor Surface Mount AC SERIES 0201 to 2512

**Table 3** Table 3 for low TCR

		CHARACTERISTICS					
TYPE	POWER	Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Temperature Coefficient
	1/16W	-55°C to 155°C	50V	100V	100V	0.1%, 0.5%, 1% (E24/E96) 10Ω ≤ R ≤ IMΩ	±50 ppm°C
AC0402	1/8W	-55°C to 155°C	50V	100V	100V	0.1%, 0.5%, 1%  (E24/E96) $10\Omega \le R \le 1M\Omega$	±50 ppm°C
	1/10 W	-55°C to 155°C	75V	150V	150V	0.1%, 0.5%, 1% (E24/E96) 10Ω ≤ R ≤ 1MΩ	±50 ppm°C
AC0603 <sup>-</sup>	1/5 W	-55°C to 155°C	75V	150V	150V	0.1%, 0.5%, 1% (E24/E96) 10Ω ≤ R ≤ 1MΩ	±50 ppm°C
	1/8 W	-55°C to 155°C	150V	300V	300V	0.1%, 0.5%, 1%  (E24/E96) $10\Omega \le R \le 1M\Omega$	±50 ppm°C
AC0805	1/4 W	-55°C to 155°C	150V	300V	300V	0.1%, 0.5%, 1% (E24/E96) 10Ω ≤ R ≤ 1MΩ	±50 ppm°C
10:22	1/4 W	-55°C to 155°C	200V	400V	500V	0.1%, 0.5%, 1%  (E24/E96) $10\Omega \le R \le 7.5\text{M}\Omega$	±50 ppm°C
AC1206	1/2 W	-55°C to 155°C	200V	400V	500V	0.1%, 0.5%, 1% (E24/E96) 10Ω ≤ R ≤ 7.5MΩ	±50 ppm°C

# **YAGEO**

## FOOTPRINT AND SOLDERING PROFILES

Recommended footprint and soldering profiles of AC-series is the same as RC-series. Please refer to data sheet "Chip resistors mounting".

#### PACKING STYLE AND PACKAGING QUANTITY

Table 4 Packing style and packaging quantity

PACKING STYLE	REEL DIMENSION	AC0201	AC0402	AC0603	AC0805	AC1206	AC1210	AC1218	AC2010	AC2512
Paper taping reel (R)	7" (178 mm)	10,000	10,000	5,000	5,000	5,000	5,000			
	13" (330 mm)	50,000	50,000	20,000	20,000	20,000	20,000			
Embossed taping reel (K)	7" (178 mm)							4,000	4,000	4,000
	13" (330 mm)								16,000	

#### NOTE

1. For paper/embossed tape and reel specifications/dimensions, please refer to data sheet "Chip resistors packing".

#### **FUNCTIONAL DESCRIPTION**

#### **OPERATING TEMPERATURE RANGE**

Range: -55 °C to +155 °C

#### **POWER RATING**

Each type rated power at 70 °C:

AC0201=1/20W (0.05W)

AC0402=I/I6W (0.0625W); 1/8W (0.125W)

AC0603=1/10W (0.1W); 1/5W (0.2W)

AC0805=1/8W (0.125W); 1/4 W(0.25 W) AC1206=1/4W (0.25W); 1/2 W (0.5 W)

AC1210=1/2W (0.5W); IW

AC1218=1W; 1.5W

AC2010=3/4W (0.75W); 1.25W

AC2512=1 W; 2W

#### RATED VOLTAGE

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$$V = \sqrt{(P \times R)}$$

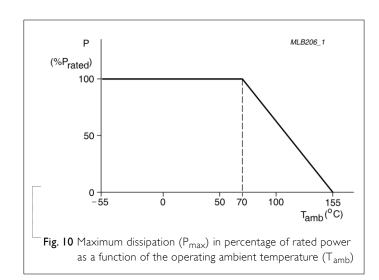
Or Maximum working voltage whichever is less

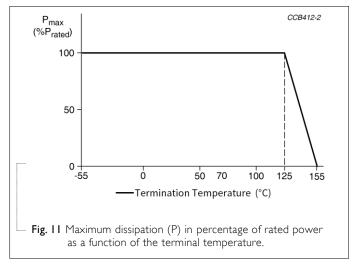
#### Where

V = Continuous rated DC or AC (rms) working voltage (V)

P = Rated power (W)

 $R = Resistance value (\Omega)$ 







# Chip Resistor Surface Mount | AC | SERIES | 0201 to 2512

# TESTS AND REQUIREMENTS

**Table 5** Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
High Temperature Exposure	AEC-Q200 Test 3 MIL-STD-202 Method 108	1,000 hours at $T_A$ = 155 °C, unpowered	$\pm (1.0\% + 0.05 \Omega)$ for D/F tol $\pm (2.0\% + 0.05 \Omega)$ for J tol $<$ 50 m $\Omega$ for Jumper
Moisture Resistance	MIL-STD-202 Method 106	Each temperature / humidity cycle is defined at 8 hours, 3 cycles / 24 hours for 10d. with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered	$\pm (0.5\% + 0.05\Omega)$ for D/F tol $\pm (2.0\% + 0.05\Omega)$ for J tol <100 m $\Omega$ for Jumper
Biased Humidity	AEC-Q200 Test 7 MIL-STD-202 Method 103	I,000 hours; 85 °C / 85% RH I 0% of operating power Measurement at 24±4 hours after test conclusion.	$\pm (1.0\% + 0.05\Omega)$ for D/F tol $\pm (3.0\% + 0.05\Omega)$ for J tol <100 m $\Omega$ for Jumper
Operational Life	AEC-Q200 Test 8 MIL-STD-202 Method 108	1,000 hours at 125 °C, derated voltage applied for 1.5 hours on, 0.5 hour off, still-air required	$\pm (1.0\% + 0.05\Omega)$ for D/F tol $\pm (3.0\% + 0.05\Omega)$ for J tol <100 m $\Omega$ for Jumper
Resistance to Soldering Heat	AEC-Q200 Test 15 MIL-STD-202 Method 210	Condition B, no pre-heat of samples Lead-free solder, 260±5 °C, 10±1 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	$\pm (0.5\% + 0.05\Omega)$ for D/F tol $\pm (1.0\% + 0.05\Omega)$ for J tol <50 m $\Omega$ for Jumper No visible damage
Thermal Shock	MIL-STD-202 Method 107	-55/+125 °C Number of cycles is 300. Devices mounted Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air — Air	$\pm (0.5\% + 0.05\Omega)$ for D/F tol $\pm (1.0\% + 0.05\Omega)$ for J tol <50 m $\Omega$ for Jumper
ESD	AEC-Q200 Test 17 AEC-Q200-002	Human Body Model,  I pos. + I neg. discharges  0201: 500V  0402/0603: IKV  0805 and above: 2KV	$\pm (3.0\% + 0.05\Omega)$ <50 m $\Omega$ for Jumper



# Chip Resistor Surface Mount AC SERIES 0201 to 2512

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	AEC-Q200 Test 18 J-STD-002	<ul> <li>Electrical Test not required Magnification 50X</li> <li>SMD conditions:</li> <li>(a) Method B, aging 4 hours at 155 °C dry heat, dipping at 235±3 °C for 5±0.5 seconds.</li> <li>(b) Method B, steam aging 8 hours, dipping at 215±3 °C for 5±0.5 seconds.</li> <li>(c) Method D, steam aging 8 hours, dipping at 260±3 °C for 30±0.5 seconds.</li> </ul>	Well tinned (≥95% covered) No visible damage
Board Flex	AEC-Q200 Test 21 AEC-Q200-005	Chips mounted on a 100mm x 40mm glass epoxy resin PCB (FR4)  Bending for 0201/0402: 5 mm 0603/0805: 3 mm 1206 and above: 2 mm  Holding time: minimum 60 seconds	$\pm$ (1.0%+0.05Ω) <50 mΩ for Jumper
Temperature Coefficient of Resistance (T.C.R.)	MIL-STD-202 Method 304	At +25/–55 °C and +25/+125 °C  Formula:  T.C.R= $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6 \text{ (ppm/°C)}$ Where $t_1$ =+25 °C or specified room temperature $t_2$ =-55 °C or +125 °C test temperature $R_1$ =resistance at reference temperature in ohms $R_2$ =resistance at test temperature in ohms	Refer to table 2
Short Time Overload	IEC60115-1 8.1	2.5 times of rated voltage or maximum overload voltage whichever is less for 5 sec at room temperature	$\pm (1.0\% + 0.05\Omega)$ for D/F tol $\pm (2.0\% + 0.05\Omega)$ for J tol <50 m $\Omega$ for Jumper
FOS	ASTM-B-809-95	Sulfur (saturated vapor) 500 hours, 60±2°C, unpowered	±(1.0%+0.05Ω)



## REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 11	Nov. 17, 2023	-	- Combine low TCR, upgrade TCR (60ppm to 50ppm) for AC1206-IMohm to 7.5Mohm (low TCR) and add double power for low TCR. Add power rating of the terminal temperature.
Version 10	Jan. 04, 2023	-	- 10ohm TCR upgrade to 100ppm, for 0603~2512 normal power and 0402~2512 double power.
Version 9	Aug. 02, 2022	-	- 12 dimension updated, for size 1206, size 2010, size 2512.
Version 8	Mar. 19, 2021	-	- Upgrade the working voltage of 0402 double power to 75V
Version 7	July 10, 2017	-	- Add "3W" part number coding for 13" Reel & double power
Version 6	May 31, 2017	-	- Add 10" packing
Version 5	Dec. 07, 2015	-	- Add in AC double power
Version 4	May 25, 2015	-	<ul> <li>Remove 7D packing</li> <li>Extend resistance range</li> <li>Add in AC0201</li> <li>Update FOS test and requirements</li> </ul>
Version 3	Feb 13, 2014	-	- Feature description updated - add ±0.5% - delete 10" taping reel
Version 2	Feb. 10, 2012	-	- Jumper criteria added - AC1218 marking and outline figure updated
Version I	Feb. 01, 2011	-	- Case size 1210, 1218, 2010, 2512 extended - Test method and procedure updated - Packing style of 7D added
Version 0	Nov. 10, 2010	-	- First issue of this specification



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