Innovative Service Around the Globe YAGEO

DATA SHEET

THICK FILM CHIP RESISTORS
AUTOMOTIVE GRADE

AC series

±5%, ±1%, ±0.5%

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

RoHS compliant & Halogen free

YAGEO

Product specification – August 03, 2022 V.9

SCOPE

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

APPLICATIONS

- All general purpose applications
- Car electronics, industrial application

FEATURES

- AEC-Q200 qualified
- Moisture sensitivity level: MSL 1
- 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
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

(1) SIZE

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

(2) TOLERANCE

D = ±0.5%　　J = ±5% (for Jumper ordering, use code of J)
F = ±1%

(3) PACKAGING TYPE

R = Paper taping reel　　K = Embossed taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

– = Base on spec

(5) TAPING REEL

07 = 7 inch dia. Reel　　10 = 10 inch dia. Reel
13 = 13 inch dia. Reel　　7W = 7 inch dia. Reel & 2 x standard power
3W = 13 inch dia. Reel & 2 x standard power

(6) RESISTANCE VALUE

1Ω to 22 MΩ
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.1K2, not 1K20.
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 of global part number

Resistance coding rule	Example
XRXX (1 to 9.76Ω)	1R = 1Ω 1R5 = 1.5Ω 9R76 = 9.76Ω
XXRX (10 to 97.6Ω)	10R = 10Ω 97R6 = 97.6Ω
XXXR (100 to 976Ω)	100R = 100Ω 976R = 976Ω
XKXX (1 to 9.76 KΩ)	1K = 1,000Ω 9K76 = 9760Ω
XMXX (1 to 9.76 MΩ)	1M = 1,000,000Ω 9M76= 9,760,000Ω
XXMX (10 MΩ)	10M = 10,000,000Ω

ORDERING EXAMPLE

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

NOTE

1. 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 ±0.5% tolerance is also available. For further information, please contact sales.

MARKING

AC0201 / AC0402

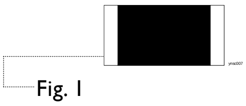

Fig. 1

No marking

AC0603 / AC0805 / AC1206 / AC1210 / AC2010 / AC2512

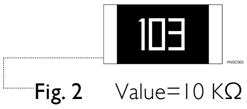

Fig. 2 Value=10 KΩ

E-24 series: 3 digits, ±5%
First two digits for significant figure and 3rd digit for number of zeros

AC0603

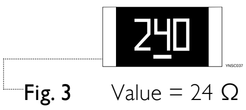

Fig. 3 Value = 24 Ω

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

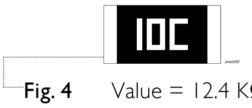

Fig. 4 Value = 12.4 KΩ

E-96 series: 3 digits, ±1% & ±0.5%
First two digits for E-96 marking rule and 3rd letter for number of zeros

AC0805 / AC1206 / AC1210 / AC2010 / AC2512

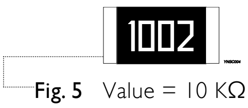

Fig. 5 Value = 10 KΩ

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

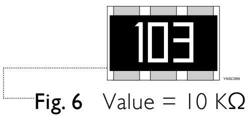

Fig. 6 Value = 10 KΩ

E-24 series: 3 digits, ±5%
First two digits for significant figure and 3rd digit for number of zeros

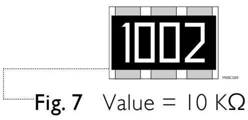

Fig. 7 Value = 10 KΩ

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

NOTE

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

CONSTRUCTION

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

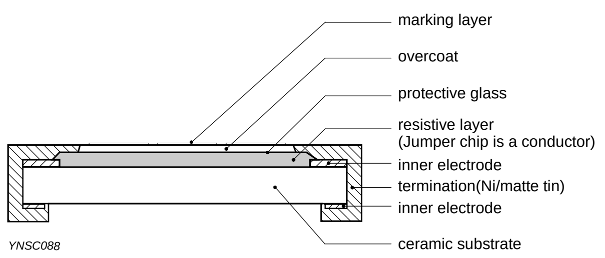

Fig. 8_1 Chip resistor outlines

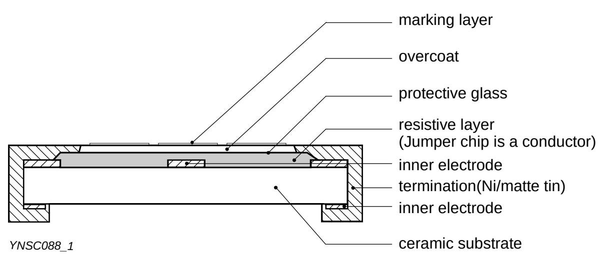

Fig. 8_2 AC2010/ 2512 double power chip resistor outlines

DIMENSIONS

Table 1 For outlines, please refer to Fig. 9

TYPE	L (mm)	W (mm)	H (mm)	l_1 (mm)	l_2 (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 ±0.05	0.32 ±0.05	0.20 ±0.10	0.25 ±0.10
AC0603	1.60 ±0.10	0.80 ±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

For dimension, please refer to Table 1

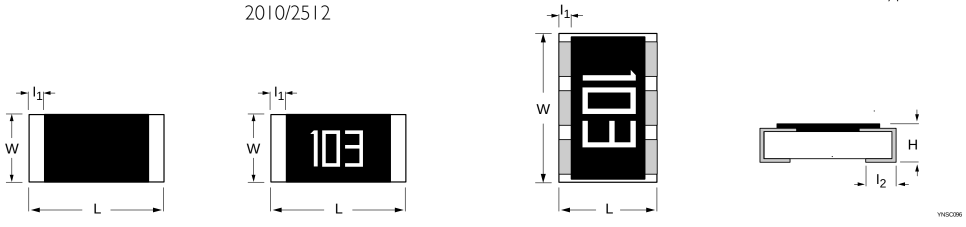

Fig. 9 Chip resistor dimensions

ELECTRICAL CHARACTERISTICS

Table 2

TYPE	POWER	CHARACTERISTICS						
		Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Temperature Coefficient	Jumper Criteria
AC0201	1/20 W	-55 °C to 155 °C	25V	50V	50V	5% (E24) 1Ω ≤ R ≤ 10MΩ 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ 0.5% (E24/E96) 10Ω ≤ R ≤ 1MΩ Jumper<50mΩ	1Ω ≤ R ≤ 10Ω -100/+350ppm°C 10Ω < R ≤ 10M ±200ppm°C	Rated Current 0.5A Maximum Current 1.0A
AC0402	1/16 W	-55 °C to 155 °C	50V	100V	100V	5% (E24) 1Ω ≤ R ≤ 22MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ Jumper<50mΩ	1Ω ≤ R ≤ 10Ω ±200ppm°C 10Ω < R ≤ 10MΩ ±100ppm°C 10MΩ < R ≤ 22MΩ ±200ppm°C	Rated Current 1A Maximum Current 2A
	1/8W	-55 °C to 155 °C	75V	100V	100V	5% (E24) 1Ω ≤ R ≤ 10MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ	1Ω ≤ R ≤ 10Ω ±200 ppm°C 10Ω < R ≤ 10MΩ ±100 ppm°C	
AC0603	1/10 W	-55 °C to 155 °C	75V	150V	150V	5% (E24) 1Ω ≤ R ≤ 22MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ Jumper<50mΩ	1Ω ≤ R ≤ 10Ω ±200ppm°C 10Ω < R ≤ 10MΩ ±100ppm°C 10MΩ < R ≤ 22MΩ ±200ppm°C	Rated Current 1A Maximum Current 2A
	1/5 W	-55 °C to 155 °C	75V	150V	150V	5% (E24) 1Ω ≤ R ≤ 10MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ	1Ω ≤ R ≤ 10Ω ±200 ppm°C 10Ω < R ≤ 10MΩ ±100 ppm°C	

TYPE	POWER	CHARACTERISTICS						
		Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Temperature Coefficient	Jumper Criteria
AC0805	1/8 W	-55 °C to 155 °C	150V	300V	300V	5% (E24) 1Ω ≤ R ≤ 22 MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ Jumper < 50mΩ	1Ω ≤ R ≤ 10Ω ±200ppm°C 10Ω < R ≤ 10MΩ ±100ppm°C 10MΩ < R ≤ 22MΩ ±200ppm°C	Rated Current 2A Maximum Current 5A
	1/4 W	–55 °C to 155 °C	150V	300V	300V	5% (E24) 1Ω ≤ R ≤ 10MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ	1Ω ≤ R ≤ 10Ω ±200 ppm°C 10Ω < R ≤ 10MΩ ±100 ppm°C	
AC1206	1/4 W	-55 °C to 155 °C	200V	400V	500V	5% (E24) 1Ω ≤ R ≤ 22MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ Jumper<50mΩ	1Ω ≤ R ≤ 10Ω ±200ppm°C 10Ω < R ≤ 10MΩ ±100ppm°C 10MΩ < R ≤ 22MΩ ±200ppm°C	Rated Current 2A Maximum Current 10A
	1/2 W	–55 °C to 155 °C	200V	400V	500V	5% (E24) 1Ω ≤ R ≤ 10MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ	1Ω ≤ R ≤ 10Ω ±200 ppm°C 10Ω < R ≤ 10MΩ ±100 ppm°C	
AC1210	1/2 W	-55 °C to 155 °C	200V	500V	500V	5% (E24) 1Ω ≤ R ≤ 22MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ Jumper<50mΩ	1Ω ≤ R ≤ 10Ω ±200ppm°C 10Ω < R ≤ 10MΩ ±100ppm°C 10MΩ < R ≤ 22MΩ ±200ppm°C	Rated Current 2A Maximum Current 10A
	1 W	-55 °C to 155 °C	200V	500V	500V	5% (E24) 1Ω ≤ R ≤ 10MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ	1Ω ≤ R ≤ 10Ω ±200 ppm°C 10Ω < R ≤ 10MΩ ±100 ppm°C	

TYPE	POWER	CHARACTERISTICS						
		Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Temperature Coefficient	Jumper Criteria
AC1218	1 W	-55 °C to 155 °C	200V	500V	500V	5% (E24) 1Ω ≤ R ≤ 1MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 1MΩ Jumper<50mΩ	1Ω ≤ R ≤ 10Ω ±200ppm°C 10Ω < R ≤ 1MΩ ±100ppm°C	Rated Current 6A Maximum Current 10A
	1.5W	-55 °C to 155 °C	200V	500V	500V	5% (E24) 1Ω ≤ R ≤ 1MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 1MΩ	1Ω ≤ R ≤ 10Ω ±200 ppm°C 10Ω < R ≤ 1MΩ ±100 ppm°C	
AC2010	3/4 W	-55 °C to 155 °C	200V	500V	500V	5% (E24) 1Ω ≤ R ≤ 22MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ Jumper<50mΩ	1Ω ≤ R ≤ 10Ω ±200ppm°C 10Ω < R ≤ 10MΩ ±100ppm°C 10MΩ < R ≤ 22MΩ ±200ppm°C	Rated Current 2A Maximum Current 10A
	1.25W	-55 °C to 155 °C	200V	500V	500V	5% (E24) 1Ω ≤ R ≤ 10MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ	1Ω ≤ R ≤ 10Ω ±200 ppm°C 10Ω < R ≤ 10MΩ ±100 ppm°C	
AC2512	1 W	-55 °C to 155 °C	200V	500V	500V	5% (E24) 1Ω ≤ R ≤ 22MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ Jumper<50mΩ	1Ω ≤ R ≤ 10Ω ±200ppm°C 10Ω < R ≤ 10MΩ ±100ppm°C 10MΩ < R ≤ 22MΩ ±200ppm°C	Rated Current 2A Maximum Current 10A
	2 W	-55 °C to 155 °C	200V	500V	500V	5% (E24) 1Ω ≤ R ≤ 10MΩ 0.5%, 1% (E24/E96) 1Ω ≤ R ≤ 10MΩ	1Ω ≤ R ≤ 10Ω ±200 ppm°C 10Ω < R ≤ 10MΩ ±100 ppm°C	

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 3 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	---	---	---
	10" (254 mm)	20,000	20,000	10,000	10,000	10,000	10,000	---	---	---
	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

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=1/16W (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); 1W
AC1218=1W; 1.5W
AC2010=3/4W (0.75W); 1.25W
AC2512=1 W; 2W

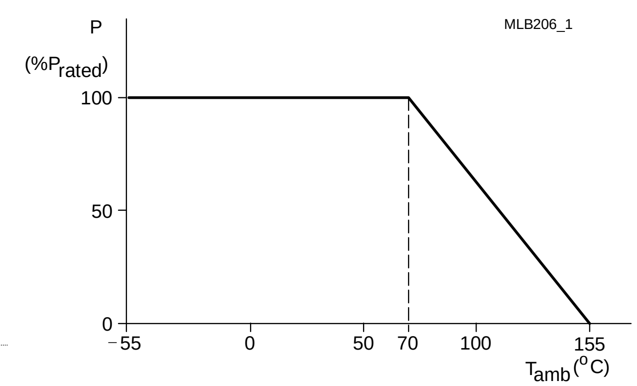

Fig. 10 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

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 (Ω)

TESTS AND REQUIREMENTS

Table 4 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	±(1.0%+0.05Ω) for D/F tol ±(2.0%+0.05Ω) for J tol <50 mΩ for Jumper
Moisture Resistance	AEC-Q200 Test 6 MIL-STD-202 Method 106	Each temperature / humidity cycle is defined at 8 hours (method 106F), 3 cycles / 24 hours for 10d. with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered	±(0.5%+0.05Ω) for D/F tol ±(2.0%+0.05Ω) for J tol <100 mΩ for Jumper
Biased Humidity	AEC-Q200 Test 7 MIL-STD-202 Method 103	1,000 hours; 85 °C / 85% RH 10% of operating power Measurement at 24±4 hours after test conclusion.	±(1.0%+0.05Ω) for D/F tol ±(3.0%+0.05Ω) for J tol <100 mΩ 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	±(1.0%+0.05Ω) for D/F tol ±(3.0%+0.05Ω) for J tol <100 mΩ 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	±(0.5%+0.05Ω) for D/F tol ±(1.0%+0.05Ω) for J tol <50 mΩ for Jumper No visible damage
Thermal Shock	AEC-Q200 Test 16 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	±(0.5%+0.05Ω) for D/F tol ±(1.0%+0.05Ω) for J tol <50 mΩ for Jumper
ESD	AEC-Q200 Test 17 AEC-Q200-002	Human Body Model, 1 $_{pos.}$ + 1 $_{neg.}$ discharges 0201: 500V 0402/0603: 1KV 0805 and above: 2KV	±(3.0%+0.05Ω) <50 mΩ for Jumper

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	AEC-Q200 Test 18 J-STD-002	Electrical Test not required Magnification 50X SMD conditions: (a) Method B, aging 4 hours at 155 °C dry heat, dipping at 235±3 °C for 5±0.5 seconds. (b) Method B, steam aging 8 hours, dipping at 215±3 °C for 5±0.5 seconds. (c) Method D, steam aging 8 hours, dipping at 260±3 °C for 30±0.5 seconds.	Well tinned (≥95% covered) No visible damage
Board Flex	AEC-Q200 Test 21 AEC-Q200-005	Chips mounted on a 90mm 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	±(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:** $T.C.R = \frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6$ (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 4.13	2.5 times of rated voltage or maximum overload voltage whichever is less for 5 sec at room temperature	±(1.0%+0.05Ω) for D/F tol ±(2.0%+0.05Ω) for J tol <50 mΩ 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 9	Aug. 03, 2022	-	- l2 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	-	- Remove 7D packing - Extend resistance range - Add in AC0201 - Update FOS test and requirements
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 1	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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AC0603FR-0733KL AC0603FR-0710RL AC0603FR-070RL AC0603FR-071KL AC0603FR-071K37L AC0603FR-071K5L AC0603FR-071K8L AC0603FR-071ML AC0603FR-0710KL AC0603FR-07100KL AC0603FR-07120RL AC0603FR-07191KL AC0603FR-072K21L AC0603FR-0720KL AC0603FR-074K7L AC0603FR-074R75L AC0603FR-07470RL AC1206FR-07150RL AC1206FR-0760R4L AC1206FR-0751KL AC1206FR-07100KL AC0402FR-07100KL AC0402FR-07100RL AC0402FR-0710KL AC0402FR-07110RL AC0402FR-07120RL AC0402FR-0712KL AC0402FR-0712RL AC0402FR-07130RL AC0402FR-07150RL AC0402FR-0715KL AC0402FR-07180KL AC0402FR-0718KL AC0402FR-071K5L AC0402FR-071K8L AC0402FR-071KL AC0402FR-071ML AC0402FR-07200KL AC0402FR-0720KL AC0402FR-07220KL AC0402FR-07220RL AC0402FR-0722KL AC0402FR-0722RL AC0402FR-07240KL AC0402FR-0724KL AC0402FR-07270KL AC0402FR-07270RL AC0402FR-072K2L AC0402FR-072K7L AC0402FR-072KL AC0402FR-07300KL AC0402FR-0730KL AC0402FR-07330KL AC0402FR-0733RL AC0402FR-07360KL AC0402FR-073K3L AC0402FR-073KL AC0402FR-07430KL AC0402FR-0743RL AC0402FR-07470KL AC0402FR-07470RL AC0402FR-0747KL AC0402FR-0747RL AC0402FR-074K7L AC0402FR-0751KL AC0402FR-0751RL AC0402FR-07560RL AC0402FR-075K6L AC0402FR-0762RL AC0402FR-07680RL AC0402FR-0768KL AC0402FR-0768RL AC0402FR-07750KL AC0402FR-0775RL AC0402FR-07820RL AC0402FR-0782RL AC0402FR-07910KL AC0402FR-079K1L AC0603FR-07100RL AC0603FR-07110KL AC0603FR-07110RL AC0603FR-0711KL AC0603FR-0711RL AC0603FR-07120KL AC0603FR-0712KL AC0603FR-0712RL AC0603FR-07130KL AC0603FR-0713KL AC0603FR-07150KL AC0603FR-07150RL AC0603FR-0715KL AC0603FR-0715RL AC0603FR-07160KL AC0603FR-0716KL AC0603FR-0716RL AC0603FR-07180KL AC0603FR-07180RL AC0603FR-0718KL AC0603FR-07200KL AC0603FR-0720RL