

ASJ

DATA SHEET

Metal Alloy 0mΩ (Jumper) Resistor

CLS Series

±5%

SIZE: 0603, 0805, 1206 & 2512

RoHS-Compliant

METAL ALLOY 0mΩ (JUMPER) RESISTOR

CLS Series

DS-ENG-009

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1. SCOPE

- 1.1. This specification is applicable to Lead-free and Halogen-free for zero milli-ohm resistor (Jumper) series metal alloy product only.
- 1.2. The product is for general purpose.

2. PART NUMBERING SYSTEM

Part Numbering is made in accordance with the following system:

CLS	21	X	-	RXXX	-	J	L
Type	Size (Inch / mm)	Power Rating		Nominal Resistance		Resistance Tolerance	Packaging
Metal Alloy Low-Resistance Resistors	16(0603) 21(0805) 32(1206) 63(2512)	G = 0.25W A = 0.5W 1 = 1W 2 = 2W 3 = 3W		R000 = Below 0.2mΩ		J = ±5%	E = 4,000 pcs L = 5,000 pcs

3. RATING

3.1. Rated Power

3.1.1 Resistor Rated Power

Type	Number of Terminals	Rated Power at 70°C	Max Loading Current	Resistance (mΩ)
CLS16	2	$\frac{1}{4}$ W	28.9A	<0.30
CLS21	2	$\frac{1}{2}$ W	50.0 A	< 0.20
CLS32	2	$\frac{1}{2}$ W	50.0 A	< 0.20
		1 W	70.7 A	< 0.20
CLS63	2	2 W	100.0 A	< 0.20
CLS63	2	3 W	122.5 A	< 0.20



3.2 Power Derating Curve

Operating Temperature Range: - 55 ~+150 °C

For resistors operated in ambient temperatures 70°C, power rating must be derated in accordance with the curve below:

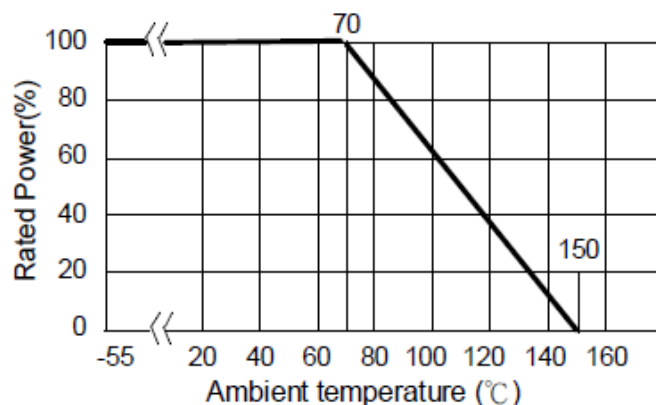


Fig.1 Power Derating Characteristics

3.3 Standard Atmospheric Condition

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

Ambient Temperature = +5°C to +35°C

Relative Humidity = < 85% RH

Air Pressure = 86 to 106kPa

If there may be any doubt about the results, measurement shall be made within the following limits :

Ambient Temperature = 20± 2°C

Relative Humidity = 60 to 70% RH

Air Pressure = 86 to 106kPa

3.4 Operating Temperature Range -55°C to +150°C

3.5 Storage Temperature Range -5°C to +40°C / < 85% RH

3.6 Flammability Rating Tested in accordance to UL-94, V-0

3.7 Moisture Sensitivity Level Rating: Level 1

3.8 Product Assurance

ASJ resistor shall warranty 24 months from manufacturing date with control conditions.

3.9 ASJ resistors are RoHS-compliant in accordance to RoHS Directive.

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3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance

Type	Number of Terminals	Rated Power at 70°C	Max Loading Current	Resistance (mΩ)	Operating Temperature Range
CLS16	2	$\frac{1}{4}$ W	28.9A	<0.30	-55~+150°C
CLS21	2	$\frac{1}{2}$ W	50.0 A	< 0.20	-55~+150°C
CLS32	2	$\frac{1}{2}$ W	50.0 A	< 0.20	-55~+150°C
		1 W	70.7 A	< 0.20	-55~+150°C
CLS63	2	2 W	100.0 A	< 0.20	-55~+150°C
CLS63	2	3 W	122.5 A	< 0.20	-55~+150°C

3.11 Rated Current

The following equation may be used to determine the DC (Direct Current) or AC (Alternating Current) currents (RMS, root mean square value) of normal rated power. However, if the result value exceeds the highest current of regulated standards, the highest normal rated power is to be used.

$$I = \sqrt{P/R}$$

I=Rating Current(A)
P= Rating Power(W)
R=Resistance(Ω)

4. MARKING ON PRODUCT

The nominal resistance shall be marked on the surface of each resistor

4.1 Numeric Numbering(All the products marking are 1 digit):-

4.1.1 Marking for 0805/0603 – 0mΩ



4.1.2 Marking for 1206 / 2512 - 0mΩ



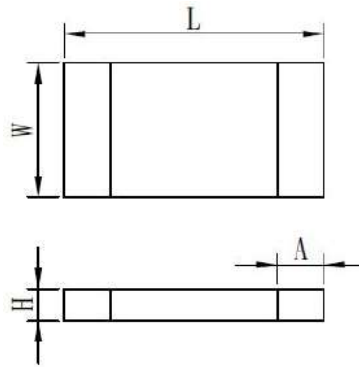
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5. DIMENSION



TYPE	Rated Power	Resistance Range(mΩ)	Dimensions(mm)			
			L	W	H	A
CLS16	$\frac{1}{4}$ W	< 0.3	1.60±0.1	0.80±0.1	0.35±0.15	0.30±0.15
CLS21	$\frac{1}{2}$ W	< 0.2	2.03±0.2	1.27±0.2	0.35±0.15	0.40±0.15
CLS32	$\frac{1}{2}$ W 1 W	< 0.2	3.20±0.2	1.60±0.2	0.50±0.2	0.70±0.2
CLS63	2 W	< 0.2	6.35±0.2	3.05±0.2	0.60±0.2	1.40±0.2
CLS63	3 W	< 0.2	6.35±0.2	3.05±0.2	0.60±0.2	1.40±0.2

- 5.1 Plating Thickness
Ni ≥ 2 μm
Sn (Tin) ≥ 3 μm
Sn (Tin) : Matte Sn

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6. RELIABILITY PERFORMANCE, CHARACTERISTICS AND TEST CONDITIONS

6.1 Electrical Performance Test

Test Item	Conditions of Test	Test Limits														
Short Time Overload	<p>Refer to JIS C 5201-1 4.13 Applied Overload for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Overload condition refer to below):</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Power (W)</th> <th># of rated power</th> </tr> </thead> <tbody> <tr> <td>CLS16</td> <td>1/4</td> <td rowspan="5">4 times</td> </tr> <tr> <td>CLS21</td> <td>1/2</td> </tr> <tr> <td>CLS32</td> <td>1/2</td> </tr> <tr> <td>CLS63</td> <td>1.0</td> </tr> <tr> <td>CLS63</td> <td>3.0</td> </tr> </tbody> </table>	Type	Power (W)	# of rated power	CLS16	1/4	4 times	CLS21	1/2	CLS32	1/2	CLS63	1.0	CLS63	3.0	<p>CLS16 : $\leq 0.3 \text{ m}\Omega$ Others : $\leq 0.2 \text{ m}\Omega$</p> <p>No evidence of mechanical damage</p>
		Type	Power (W)	# of rated power												
CLS16	1/4	4 times														
CLS21	1/2															
CLS32	1/2															
CLS63	1.0															
CLS63	3.0															
Insulation Resistance	<p>Refer to JIS-C5201-1 4.6 Put the resistor in the fixture, add 100 VDC in +, - terminal for 60secs then measured the insulation resistance between electrodes and insulating enclosure or between electrodes and base material.</p>	$\geq 10^9 \Omega$														
Dielectric Withstanding Voltage	<p>Refer to JIS-C5201-1 4.7 Applied 500VAC for 1 minute, and Limit surge current 50 mA (max.)</p>	No short or burned on the appearance.														

6.2 Mechanical Performance Test

Test Item	Conditions of Test	Test Limits
Resistance to Solder Heat	<p>Refer to JIS-C5201-1 4.18 The tested resistor be immersed 25 mm/sec into molten solder of $260 \pm 5^\circ\text{C}$ for 10 ± 1secs. Then the resistor is left in the room for 1 hour, and measured its resistance variance rate.</p>	<p>CLS16 : $\leq 0.3 \text{ m}\Omega$ Others: $\leq 0.2 \text{ m}\Omega$</p> <p>No evidence of mechanical damage</p>
Solderability	<p>Refer to JIS-C5201-1 4.17 Add flux into tested resistors, immersion into solder bath in temperature $245 \pm 5^\circ\text{C}$ for 3 ± 0.5secs.</p>	Solder coverage over 95%
Vibration	<p>Refer to JIS-C5201-1 4.22 The resistor shall be mounted by its terminal leads to the supporting terminals on the solid table. The entire frequency range :from 10 Hz to 55 Hz and return to 10 Hz, shall be transferred in 1 min. Amplitude : 1.5mm This motion shall be applied for a period of 4 hours in each 3 mutually perpendicular directions (a total of 12hrs)</p>	<p>CLS16: $\leq 0.3 \text{ m}\Omega$ Others: $\leq 0.2 \text{ m}\Omega$</p> <p>No evidence of mechanical damage</p>
Resistance to solvent	<p>Refer to JIS-C5201-1 4.29 The tested resistor be immersed into isopropyl alcohol of $20 \sim 25^\circ\text{C}$ for 60secs, then the resistor is left in the room for 48 hrs.</p>	<p>CLS16: $\leq 0.3 \text{ m}\Omega$ Others: $\leq 0.2 \text{ m}\Omega$</p> <p>No evidence of mechanical damage</p>



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6.3 Environmental Test

Test Item	Conditions of Test	Test Limits						
Low Temperature Exposure (Storage)	Refer to JIS-C5201-1 4.23.4 Put the tested resistor in chamber under temperature -55±2°C for 1,000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.	CLS16: ≤0.3 mΩ						
		Others: ≤0.2 mΩ						
High Temperature Exposure (Storage)	Refer to JIS-C5201-1 4.23.2 Put tested resistor in chamber under temperature 150±5°C for 1,000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.	CLS16: ≤0.3 mΩ						
		Others: ≤0.2 mΩ						
Temperature Cycling (Rapid Temperature Change)	Refer to JIS-C5201-1 4.19 Put the tested resistor in the chamber under the temperature cycling which shown in the following table shall be repeated 1,000 times consecutively. Then leaving the tested resistor in the room temperature for 60 minutes, and measure its resistance variance rate.	CLS16: ≤0.3 mΩ						
		Others: ≤0.2 mΩ						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Testing Condition</th> </tr> </thead> <tbody> <tr> <td style="width: 50%;">Lowest Temperature</td> <td style="width: 50%; text-align: center;">-55⁺⁰₋₁₀ °C</td> </tr> <tr> <td>Highest Temperature</td> <td style="text-align: center;">150⁺¹⁰₋₀ °C</td> </tr> </tbody> </table>		Testing Condition		Lowest Temperature	-55 ⁺⁰ ₋₁₀ °C	Highest Temperature	150 ⁺¹⁰ ₋₀ °C	No evidence of mechanical damage
Testing Condition								
Lowest Temperature	-55 ⁺⁰ ₋₁₀ °C							
Highest Temperature	150 ⁺¹⁰ ₋₀ °C							
Moisture Resistance (Climatic Sequence)	Refer to MIL-STD 202 Method 106 Put the tested resistor in chamber and subject to 10 cycles of damp heat and without power. Each one of which consists of the steps 1 to 7 (Figure 1). Then leaving the tested resistor in room temperature for 24 hr, and measure its resistance variance rate.	CLS16: ≤0.3 mΩ						
		Others: ≤0.2 mΩ						
Bias Humidity	Refer to JIS-C5201-1 4.24 Put the tested resistor in chamber under 85± 5°C and 85± 5%RH with 10% bias and load the rated voltage for 90 minutes on, 30 minutes off, total 1,000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.	CLS16: ≤0.3 mΩ						
		Others: ≤0.2 mΩ						
		No evidence of mechanical damage						

6.4 Operational Life Endurance

Test Item	Conditions of Test	Test Limits
Load Life	Put the tested resistor in chamber under temperature 70± 2°C and load the rated voltage for 90 minutes on 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate. Refer to JIS-C5201-1 4.25	CLS16: ≤0.3 mΩ
		Others: ≤0.2 mΩ
		No evidence of mechanical damage



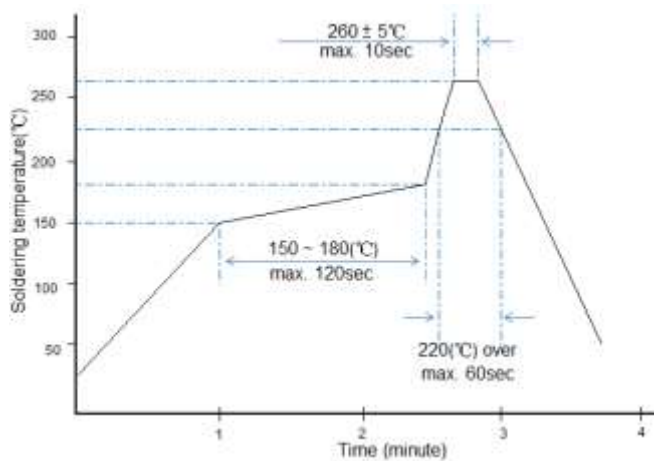
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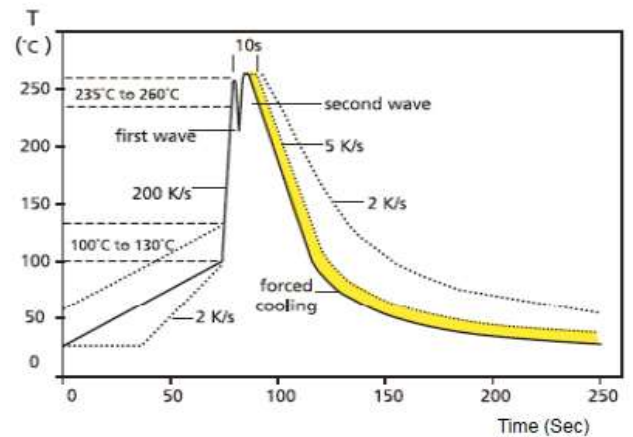
6.4 Recommended Soldering Method

Technical Notes: This is for recommendation, customer please perform adjustment according to actual application.

6.4.1 Surface mount components are tested for solderability at a temperature of 245°C For 3 seconds, Typical examples of soldering processes that provide reliable joints without any damage are given below:



Recommended IR Reflow Soldering Profile
MEET J-STD-020

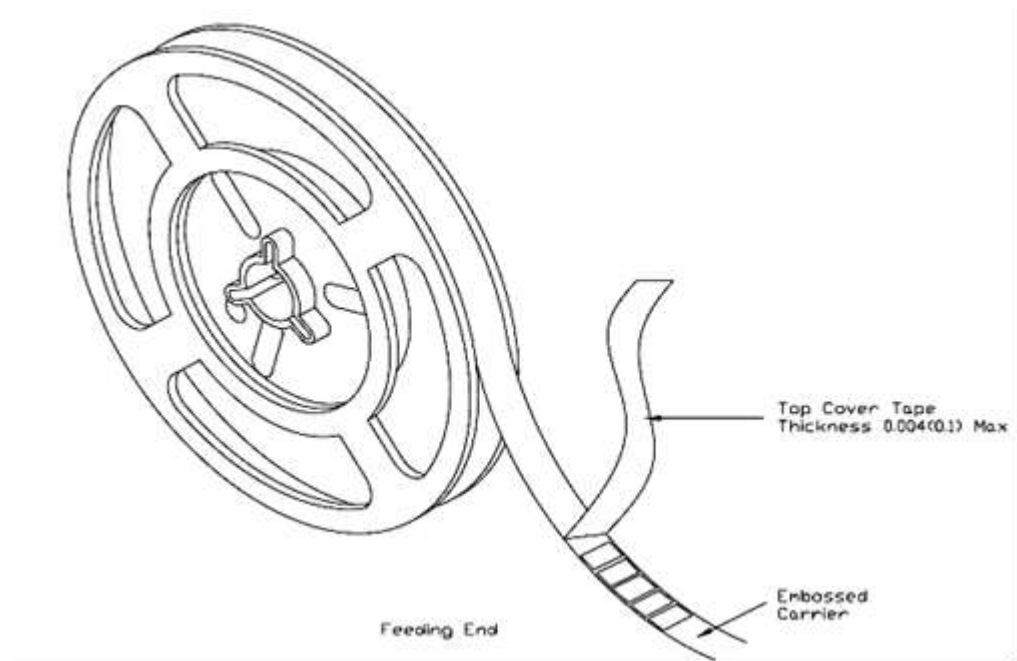


Recommended double-wave Soldering Profile
Typical Values (solid line)
Process limits (dotted line)

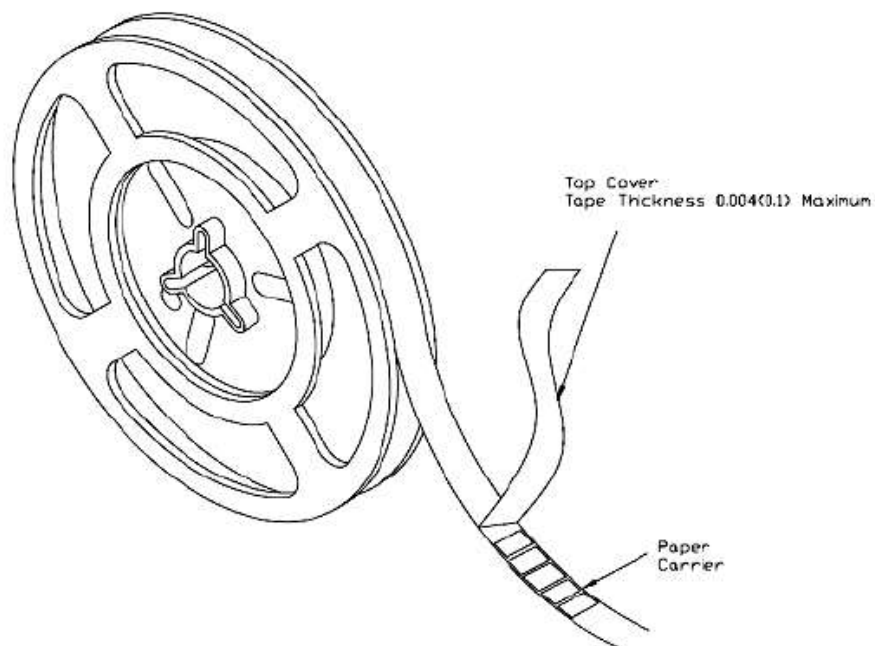
7. TAPING

7.1 Structure of Taping

Embossed Plastic Carrier



Paper Carrier



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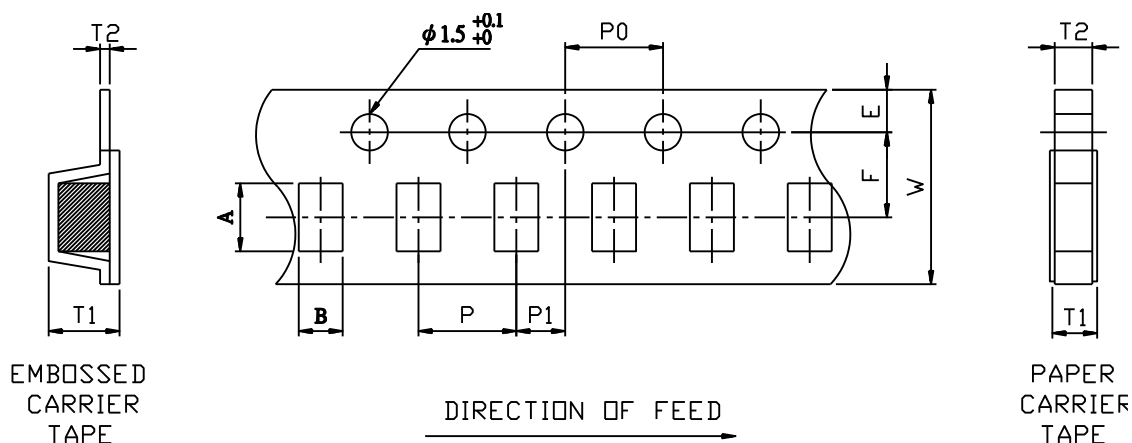
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7.2 Tape Dimension

7.2.1 Tape Dimension



Unit: mm

DIM Item	A	B	W	E	F	T1	T2	P	P0	10*P0	P1
CLS16	1.75±0.05	1.05±0.05	8.0±0.10	1.75±0.05	3.5±0.05	0.42 ^{+0.2} ₋₀	0.42±0.10	4.0±0.10	4.0±0.10	40.0±0.10	2.0±0.05
CLS21	2.30±0.10	1.55±0.10	8.0±0.20	1.75±0.10	3.5±0.05	0.42 ^{+0.2} ₋₀	0.42±0.10	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.05
CLS32	3.50±0.20	1.90±0.20	8.0±0.20	1.75±0.10	3.5±0.05	0.75 ^{+0.2} ₋₀	0.75±0.10	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.05
CLS63	6.70±0.20	3.40±0.20	12.0±0.20	1.75±0.10	5.5±0.05	1.10±0.15	0.23±0.05	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10

7.3 Packaging

7.3.1 Taping

Quantity – Tape and Reels

Type	Tape Width	Packaging Quantity(pcs/reel)
		4 mm Pitch
CLS16	8 mm	5000 pcs
CLS21		5000 pcs
CLS32		4000 pcs
CLS63	12 mm	4000 pcs

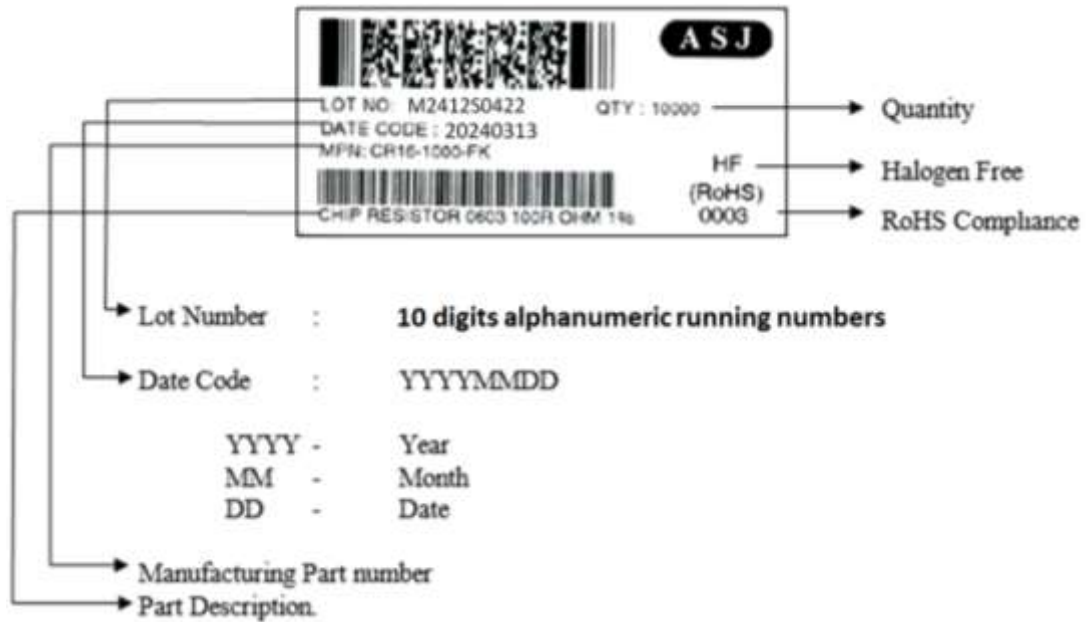


Product Specification

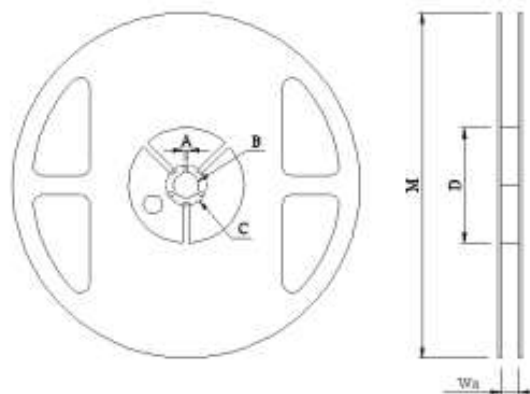
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7.3.2 Identification

Production label that indicates the 10 digits lot number, product type, resistance value and tolerance shall be pasted on the surface of each reel.



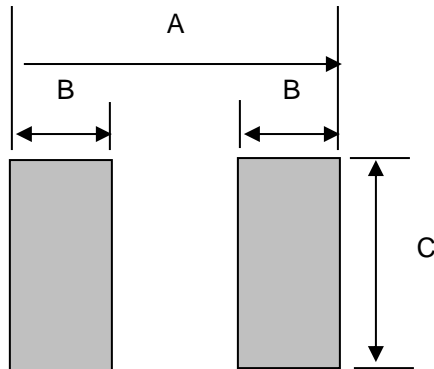
7.3.3 Reel Dimensions



Unit: mm

Reel Type / Tape	Wa	M	A	B	C	D
7" reel for 8mm tape	12.0± 0.5	178 ± 1.0	2.0 ± 0.5	13.2 ± 0.5	17.7 ± 0.5	60.0 ± 0.5
7" reel for 12mm tape	16.2± 0.5	178 ± 1.0	2.5 ± 0.5	13.5 ± 0.5	17.7 ± 0.5	60.0 ± 0.5
7" reel for 24mm tape	24.0± ₀ ²	178 ± 1.0	2.0 ± 0.5	13.2 ± 0.5	17.7 ± 0.5	60.0 ± 1.0

8. RECOMMENDED LAND PATTERN



Type	Dimensions (mm)		
	A	B	C
CLS16	2.60	0.90	0.90
CLS21	3.40	1.30	1.30
CLS32	4.00	1.50	1.80
CLS63	7.60	2.60	3.80

9. REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version.1	13.02.2015		Initial Release
Version.2	14.07.2015		Update Max. Rating Power, Max. Overload Current and Part Ordering Number
Version.3	07.09.2016		Update information as below : 2. Part Numbering System 3.1 Power derating characteristic 5. Dimension 6.1 Electrical Performance Test 6.3. Environmental Test 6.4.1 Recommended Soldering Profile 7.2 Tape Dimension 7.3.1 Tape and Reels 8 Land Pattern Dimension Typo error in clause 2
Version.4	14.10.2016		Update Clause 4, Marking on Product Update Clause 5, Dimension information
Version.5	19.01.2017		Update clause 6.4.1, soldering profile Update clause 7.3.3 reel dimension
Version.6	26.04.2017	Refer to ECO : 01/2017	Delete clause 4.1.2 1206 marking information, add 1206 marking information together with 2512 Typo error in clause 5
Version.7	09.08.2018		Replace AEC-Q200 to general purpose in clause 1.2 Add in CLS16 to clause 2 Add in CLS16 to clause 3.11 Add in CLS16 to clause 3.10 Add in CLS16 Marking on product in clause 4.1.1 Add in CLS16 dimension to clause 5 Add in CLS16 specification to clause 6.1, 6.2 and 6.3 Add in CLS16 tape dimension to clause 7.2.1 Add in CLS16 Packaging to clause 7.3.1.1 Add in CLS16 Land Pattern into clause 8
Version.8	03.01.2019		Remove AEC-Q200 from clause 1.2 Update datasheet
Version.9	04.09.2019		Revise clause 3.9
Version.10	24.09.2020		Revise clause 3.5 Revise clause 7.3.1.1 qty tape and reel table
Version.11	19.04.2022		Revise clause 5 dimension Add 6.3.1 Operational Life Endurance Add 6.3.2 Plating thickness
Version 12	19.04.2024		Revise clause 3.8 Product Assurance Revise clause 7.3.2 Identification