Towards Excellence in *Quality, Service & Innovation*

ASJ

DATA SHEET

Metal Alloy Low-Resistance Resistor

CLE Series

0.5% TO 5%, TCR ±50 TO ±600

SIZE: 0402/0603/0805/1206

RoHS-Compliant

Product Specification – October 12, 2023 V13

1. SCOPE

1.1 This specification is applicable to Lead-free and Halogen-free of RoHS directive for CLE for series metal alloy low resistance resistor.

1.2 The product is for general electronic purpose.

2. PART NUMBERING SYSTEM

Part Numbering is made in accordance with the following system:

CLE	21	C	-	R003			-	F	L	-	T
Type	Size (mm/inch)	Power Rating		Nominal Resistance				Resistance Tolerance	Packaging		Terminal
Metal Alloy Low Resistance Chip Resistors	10(0402) 16(0603) 21(0805) 32(1206)	P=1/6W H=1/5W G=1/4W A=1/2W F=1/3W C=3/4W 1=1W B=1.5W		Resistors	4 Digit	EX: R0025=2.5mΩ R005=5mΩ R010=10mΩ		D=±0.5% F=±1.0% G=±2.0% J=±5.0%	L=5,000 pcs K=10,000 pcs		T : Wrap around (Leave blank if 2 terminals)

3. RATING

3.1. Rated Power

3.1.1 Resistor Rated Power

Type	Type of Terminal	Max. Rating Power	Maximum Working Current	Maximum Overload Current	Operating Temperature Range
CLE10	2	1/6W	$Ir=\sqrt{P/R}$	$Io=\sqrt{4P/R}$	-55~+150°C
		1/5W			
		1/4W			
		1/3W			
CLE16	2	1/3W			
		1/2W			
CLE21	2	1/2W			
		3/4W			
		1W			
CLE32	2	1/2W			-55~+170°C
		1W			
CLE21	T	1/2W			-55~+150°C
		3/4W			
		1W			
CLE32	T	1/2W	$Ir=\sqrt{P/R}$	$Io=\sqrt{5P/R}$	-55~+170°C
		1W			

Ir = Rating Current(A)
Io = Overload Current(A)
P = Rating Power(W)
R = Resistance(Ω)

3.2 Power Derating Curve: Operating Temperature Range: - 55 ~+170 ℃
For resistors operated in ambient temperatures 70°C, power rating shall be derated in accordance with the curve below:

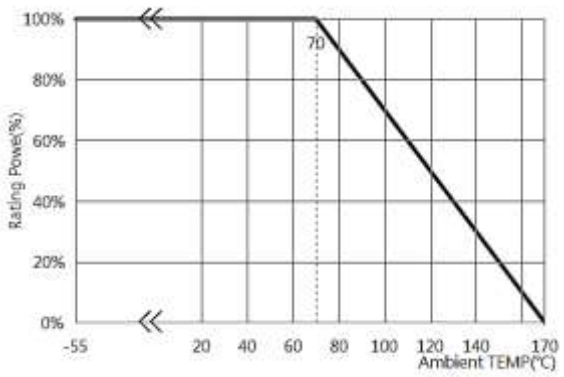
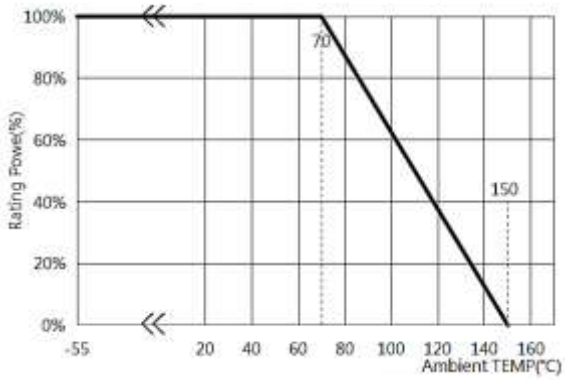
Type	CLE32	Others
Temperature Range	-55℃~+170℃	-55℃~+150℃
Description	For resistors operated in ambient temperatures 70℃~170℃, power rating shell be derated in accordance with the curve below.	For resistors operated in ambient temperatures 70℃~150℃, power rating shell be derated in accordance with the curve below.
Power derate curve		

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.

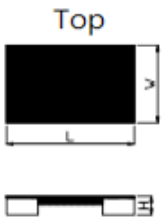
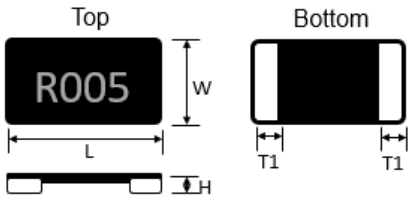
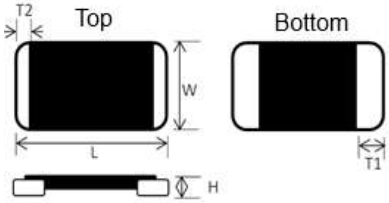
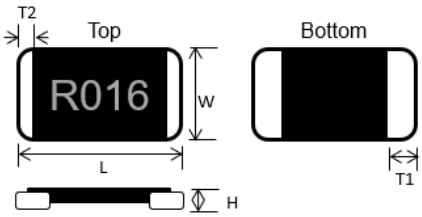
3.9 ASJ resistors are RoHS-compliant in accordance to RoHS Directive.

3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance

Type	Type of Terminal	Rating Power	Rating Current	Overload Current	T.C.R. (ppm/°C)	Resistance Range (mΩ)		Operating Temperature Range
						D (±0.5%)	F (±1%) G (±2%) J (±5%)	
CLE10	2	1/6W	$Ir=\sqrt{P/R}$	$Io=\sqrt{4P/R}$	≦±600	--	1.5≦ R ＜3	-55~+150°C
					≦±200	--	3	
					≦±125	--	4~5	
					≦±50	--	10	
		1/5W			≦±600	--	1.5≦ R ＜3	
					≦±200	--	3	
					≦±125	--	4~5	
					≦±50	--	10	
		1/4W			≦±200	--	3	
					≦±125	--	4~5	
					≦±50	--	10	
		1/3W			≦±50	--	10	
CLE16	2	1/3W			≦±450	--	1≦ R ＜4	
					≦±50	5≦ R ≦60	4≦ R ≦60	
		1/2W			≦±450	--	1≦ R ＜4	
					≦±50	5≦ R ≦15	4≦ R ≦15	
CLE21	2	1/2W	$Ir=\sqrt{P/R}$	$Io=\sqrt{4P/R}$	≦±100	--	1≦ R ＜3	-55~+150°C
					≦±75	--	3≦ R ＜5	
					≦±50	5≦ R ≦120	5≦ R ≦120	
		3/4W			≦±100	--	1≦ R ＜3	
					≦±75	--	3≦ R ＜5	
					≦±50	5≦ R ≦50	5≦ R ≦50	
		1 W			≦±100	--	1≦ R ＜3	
					≦±75	--	3≦ R ＜5	
					≦±50	5	5	
CLE32	2	1/2 W			≦±75	--	1≦ R ＜4	-55~+170°C
					≦±50	4≦ R ≦56	4≦ R ≦56	
					≦±50	57≦ R ≦300	57≦ R ≦300	
		1 W			≦±75	--	1≦ R ＜4	
					≦±50	4≦ R ≦56	4≦ R ≦56	
					≦±50	57≦ R ≦300	57≦ R ≦300	

Type	Type of Terminal	Rating Power	Rating Current	Overload Current	T.C.R. (ppm/°C)	Resistance Range (mΩ)		Operating Temperature Range
						D (±0.5%)	F (±1%) G (±2%) J (±5%)	
CLE21	T	1/2W			≦±100	--	1.5≦ R ＜3	-55~+150°C
					≦±75	--	3≦ R ＜5	
					≦±50	5≦ R ≦70	5≦ R ≦70	
		3/4W			≦±100	--	1.5≦ R ＜3	
					≦±75	--	3≦ R ＜5	
					≦±50	5≦ R ≦50	5≦ R ≦50	
		1W			≦±100	--	1.5≦ R ＜3	
					≦±75	--	3≦ R ＜5	
					≦±50	5	5	
CLE32	T	1/2W	$Ir=\sqrt{P/R}$	$Io=\sqrt{5P/R}$	≦±75	--	2≦ R ＜4	-55~+170°C
					≦±50	4≦ R ≦56	4≦ R ≦56	
		1W			≦±75	--	2≦ R ＜4	
					≦±50	4≦ R ≦56	4≦ R ≦56	

4. DIMENSION

Type of Terminal	CLE10/ CLE16/ CLE21	CLE32
2		
T		

Type	Type of Terminal	Power Rating (Watts)	Resistance Range (mΩ)	L	W	H	T1	T2
CLE10	2	1/6 1/5	1.5≦R≦5 10	0.039±0.004 (1.00±0.10)	0.020±0.004 (0.50±0.10)	0.014±0.004 (0.35±0.10)	0.010±0.004 (0.25±0.10)	
		1/4	3≦R≦5 10					
		1/3	10					
CLE16	2	1/3	1	0.063±0.008 (1.60±0.20)	0.031±0.008 (0.80±0.20)	0.014±0.004 (0.35±0.10)	0.024±0.006 (0.60±0.15)	
			2≦R≦60				0.012±0.006 (0.30±0.15)	
		1/2	1				0.024±0.006 (0.60±0.15)	
			2≦R≦15				0.012±0.006 (0.30±0.15)	
CLE21	2	1/2	1	0.08±0.008 (2.032±0.20)	0.05±0.008 (1.270±0.20)	0.020±0.004 (0.50±0.10)	0.024±0.006 (0.60±0.15)	---
			2≦R≦2.5			0.014±0.004 (0.35±0.10)	0.02±0.006 (0.50±0.15)	
			3≦R≦120				0.014±0.008 (0.35±0.20)	
		3/4	1			0.020±0.004 (0.50±0.10)	0.024±0.006 (0.60±0.15)	
			2 / 2.5			0.014±0.004 (0.35±0.10)	0.02±0.006 (0.50±0.15)	
			3≦R≦50				0.014±0.008 (0.35±0.20)	
		1	1			0.020±0.004 (0.50±0.10)	0.024±0.006 (0.60±0.15)	
			2≦R≦2.5			0.014±0.004 (0.35±0.10)	0.02±0.006 (0.50±0.15)	
			3≦R≦5				0.014±0.008 (0.35±0.20)	
CLE32	2	1/2 1	1	0.126±0.008 (3.20±0.20)	0.063±0.008 (1.60±0.20)	0.020±0.008 (0.50±0.20)	0.04±0.008 (1.00±0.20)	
			2≦R＜3			0.016±0.008 (0.40±0.20)	0.035±0.008 (0.90±0.20)	---

Type	Type of Terminal	Power Rating (Watts)	Resistance Range (mΩ)	L	W	H	T1	T2
			3≦R＜4				0.028±0.008 (0.70±0.20)	
			4≦R≦13				0.014±0.008 (0.35±0.20)	
			14≦R≦21				0.028±0.008 (0.70±0.20)	
			22≦R≦56				0.014±0.008 (0.35±0.20)	
			57≦R≦300				0.018±0.08 (0.45±0.20)	
CLE21	T	1/2	1.5≦R≦2.5	0.08±0.008 (2.032±0.20)	0.05±0.008 (1.270±0.20)	0.014±0.004 (0.35±0.10)	0.02±0.006 (0.50±0.15)	0.010±0.008 (0.25±0.20)
			3≦R≦70				0.014±0.008 (0.35±0.20)	
		3/4	1.5≦R≦2.5				0.02±0.006 (0.50±0.15)	
			3≦R≦50				0.014±0.008 (0.35±0.20)	
		1	1.5≦R≦2.5				0.02±0.006 (0.50±0.15)	
			3≦R≦5				0.014±0.008 (0.35±0.20)	
CLE32	T	1/2 1	2≦R＜3	0.126±0.008 (3.20±0.20)	0.063±0.008 (1.60±0.20)	0.016±0.008 (0.40±0.20)	0.035±0.008 (0.90±0.20)	0.010±0.008 (0.25±0.20)
			3≦R＜4				0.028±0.008 (0.70±0.20)	
			4≦R≦13				0.014±0.008 (0.35±0.20)	
			14≦R≦21				0.028±0.008 (0.70±0.20)	
			22≦R≦56				0.014±0.008 (0.35±0.20)	

4.1 Material of Alloy

Type	Type of Terminal	Watts	Resistance	Material
CLE10	2	1/6W 1/5W 1/4W 1/3W	1.5mΩ≤R≤10mΩ	Copper-Manganese Alloy
CLE16	2	1/3W 1/2W	1mΩ≤R<25mΩ	Copper-Manganese Alloy
			25mΩ≤R≤60mΩ	Iron-Chromium Aluminum Alloy
CLE21	2	1/2W	1mΩ≤R≤20 mΩ	Copper-Manganese Alloy
			21mΩ≤R≤120mΩ	Iron-Chromium Aluminum Alloy
		3/4W	1mΩ≤R≤10 mΩ	Copper-Manganese Alloy
			11mΩ≤R≤20mΩ	Nickel Chromium Aluminum Alloy
			21mΩ≤R≤50mΩ	Iron-Chromium Aluminum Alloy
		1W	1mΩ≤R≤5mΩ	Copper-Manganese Alloy
CLE32	2	1/2W 1W	1mΩ≤R≤13mΩ	Copper-Manganese Alloy
			14mΩ≤R≤300mΩ	Iron-Chromium Aluminum Alloy
CLE21	T	1/2W	1.5mΩ≤R≤20 mΩ	Copper-Manganese Alloy
			21mΩ≤R≤70mΩ	Iron-Chromium Aluminum Alloy
		3/4W	1.5mΩ≤R≤10 mΩ	Copper-Manganese Alloy
			11mΩ≤R≤20mΩ	Nickel Chromium Aluminum Alloy
			21mΩ≤R≤50mΩ	Iron-Chromium Aluminum Alloy
		1W	1.5mΩ≤R≤5mΩ	Copper-Manganese Alloy
CLE32	T	1/2W 1W	2mΩ≤R≤13mΩ	Copper-Manganese Alloy
			14mΩ≤R≤56mΩ	Iron-Chromium Aluminum Alloy

4.2 Plating Thickness

4.1.1 Ni：≧ 2 μm

4.1.2 Sn (Tin)：≧ 3 μm

4.1.3 Sn (Tin)：Matte Sn

5. MARKING FORMAT (ALL THE PRODUCTS MARKING ARE 4 DIGITS)

5.1 Numeric Numbering

5.1.1 CLE10, CLE16, CLE21 No Marking

5.1.2 CLE32 Series :

Product resistance is indicated by using two marking notation styles:

a. "**R**" designates the decimal location in ohms, e.g.
- For 1mΩ the product marking is R001
- For 25mΩ the product marking is R025

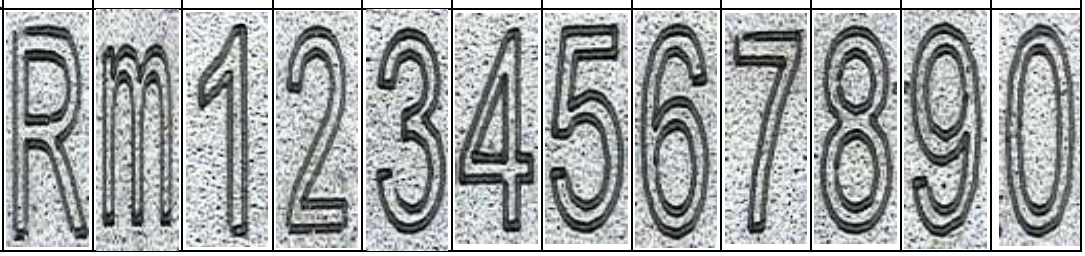
b. "**m**" designates the decimal location in milliohms, e.g.
- For 0.25mΩ the product marking is 0m25
- For 0.5mΩ the product marking is 0m50
- For 5.5mΩ the product marking is 5m50
- For 25.5mΩ the product marking is 25m5

Example : Marking→ R010 = 10 mΩ

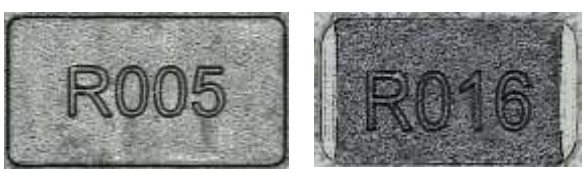
Example : Marking→ 5m50 = 5.50 mΩ

Example : Marking→ 25m5 = 25.50 mΩ

5.2 Marking Style by Laser

Type \ Marking	R	m	1	2	3	4	5	6	7	8	9	0
CLE32												

Example : Marking→R005 = 5 mΩ



6. ELECTRICAL, MECHANICAL, ENVIRONMENTAL CHARACTERISTICS AND TEST CONDITIONS

6.1 Electrical Performance Test

<table>
<tr><th>Test Item</th><th>Conditions of Test</th><th>Test Limits</th></tr>
<tr><td>Temperature Coefficient of Resistance (TCR)</td><td>Refer to JIS C 5201-1 4.8
$TCR(ppm/^{\circ}C) = \frac{R_2 - R_1}{R_1(T_2 - T_1)} x10^6$
● R1: resistance of room temperature
● R2: resistance of 150 °C
● T1: Room temperature
● T2: Temperature at 150 °C</td><td>Refer to Paragraph 3.10</td></tr>
<tr><td>Short Time Overload</td><td>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):
<table>
<tr><th>Type</th><th>Power (W)</th><th># of rated power</th></tr>
<tr><td>CLE10</td><td>1/6, 1/5, 1/4,1/3</td><td>4 times</td></tr>
<tr><td>CLE16</td><td>1/3, 1/2</td><td>4 times</td></tr>
<tr><td>CLE21</td><td>1/2, 3/4 & 1</td><td>4 times</td></tr>
<tr><td>CLE21-T</td><td>1/2 & 3/4 & 1.0</td><td>4 times</td></tr>
<tr><td>CLE32</td><td>1/2 , 1.0</td><td>4 times</td></tr>
<tr><td>CLE32-T</td><td>1/2 & 1.0</td><td>5 times</td></tr>
</table></td><td>≦±0.5%
No evidence of mechanical damage</td></tr>
<tr><td>Insulation Resistance</td><td>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.</td><td>≧$10^8\Omega$</td></tr>
<tr><td>Dielectric Withstanding Voltage</td><td>Refer to JIS-C5201-1 4.7
Applied 300VAC for 1 minute, and Limit surge current 50 mA (max.)</td><td>No short or burned on the appearance.</td></tr>
</table>

6.2 Mechanical Performance Test

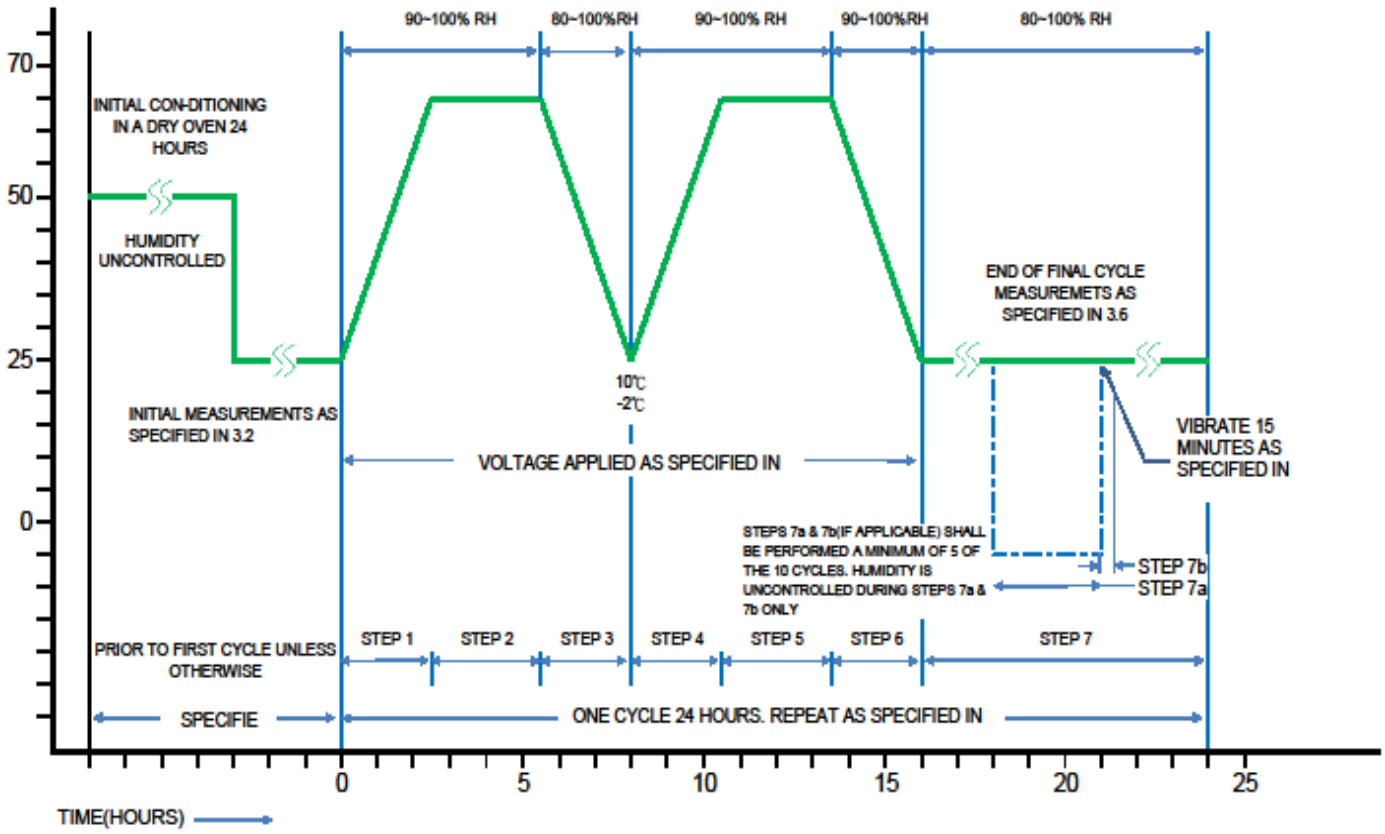
<table>
<tr><th>Test Item</th><th>Conditions of Test</th><th>Test Limits</th></tr>
<tr><td>Resistance to Solder Heat</td><td>Refer to JIS-C5201-1 4.18
The tested resistor be immersed 25 mm/sec into molten solder of 260±5℃ for 10±1secs. Then the resistor is left in the room for 1 hour, and measured its resistance variance rate.</td><td>≦±0.5%
No evidence of mechanical damage</td></tr>
<tr><td>Solderability</td><td>Refer to JIS-C5201-1 4.17
Add flux into tested resistors, immersion into solder bath in temperature 245±5℃ for 3±0.5secs.</td><td>Solder coverage over 95%</td></tr>
<tr><td>Vibration</td><td>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)</td><td>≦±0.5%
No evidence of mechanical damage</td></tr>
<tr><td>Resistance to solvent</td><td>Refer to JIS-C5201-1 4.29
The tested resistor be immersed into isopropyl alcohol of 20~25℃ for 60secs, then the resistor is left in the room for 48 hrs.</td><td>≦±0.5%
No evidence of mechanical damage</td></tr>
</table>

6.3 Environmental Performance

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℃ for 1,000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.	≦±0.5% No evidence of mechanical damage
High Temperature Exposure (Storage)	***Refer to JIS-C5201-1 4.23.2*** Put tested resistor in chamber under temperature 150±5℃ (CLE32 170±5℃) for 1,000 hours. Then leaving the tested resistor in room temperature for 60 minutes , and measure its resistance variance rate.	≦±1.0% No evidence of mechanical damage
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 (0603 & 0402 for 300 times)consecutively. Then leaving the tested resistor in the room temperature for 60 minutes, and measure its resistance variance rate. Testing Condition: Lowest Temperature -55 +0/-10℃; Highest Temperature 150 +10/-0℃	≦±1.0% No evidence of mechanical damage
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.	≦±0.5% No evidence of mechanical damage
Bias Humidity	***Refer to JIS-C5201-1 4.24*** Put the tested resistor in chamber under 85± 5℃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.	≦±1.0% No evidence of mechanical damage

6.4 Operational Life Endurance

Test Item	Conditions of Test	Test Limits
Load Life	***Refer to JIS-C5201-1 4.25*** Put the tested resistor in chamber under temperature 70± 2℃ 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.	≦±1.0% No evidence of mechanical damage

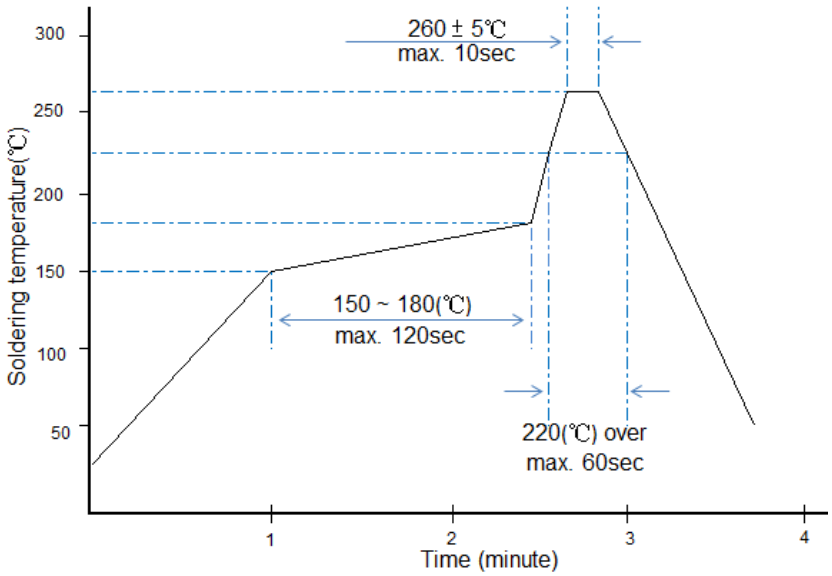

90~100% RH
80~100%RH
90~100% RH
90~100%RH
80~100% RH
70
50
25
0
INITIAL CON-DITIONING IN A DRY OVEN 24 HOURS
HUMIDITY UNCONTROLLED
END OF FINAL CYCLE MEASUREMETS AS SPECIFIED IN 3.6
10℃
-2℃
INITIAL MEASUREMENTS AS SPECIFIED IN 3.2
VOLTAGE APPLIED AS SPECIFIED IN
VIBRATE 15 MINUTES AS SPECIFIED IN
STEPS 7a & 7b(IF APPLICABLE) SHALL BE PERFORMED A MINIMUM OF 5 OF THE 10 CYCLES. HUMIDITY IS UNCONTROLLED DURING STEPS 7a & 7b ONLY
STEP 7b
STEP 7a
PRIOR TO FIRST CYCLE UNLESS OTHERWISE
STEP 1
STEP 2
STEP 3
STEP 4
STEP 5
STEP 6
STEP 7
SPECIFIE
ONE CYCLE 24 HOURS. REPEAT AS SPECIFIED IN
0
5
10
15
20
25
TIME(HOURS)

6.5 Recommended Soldering Method

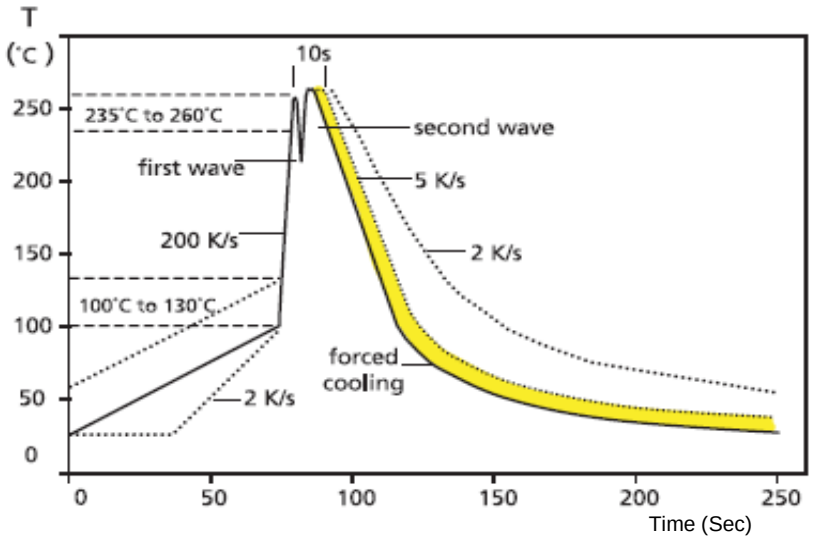
Technical application note : This is for recommendation, customer please perform adjustment according to the actual application.

6.5.1 This product is applicable to IR-reflow process only.(Infrared Reflow)

6.5.2 Typical examples of soldering processes that provides reliable joints without any damage are given below:



Recommended IR Reflow Soldering profile
Meet J-STD-020D



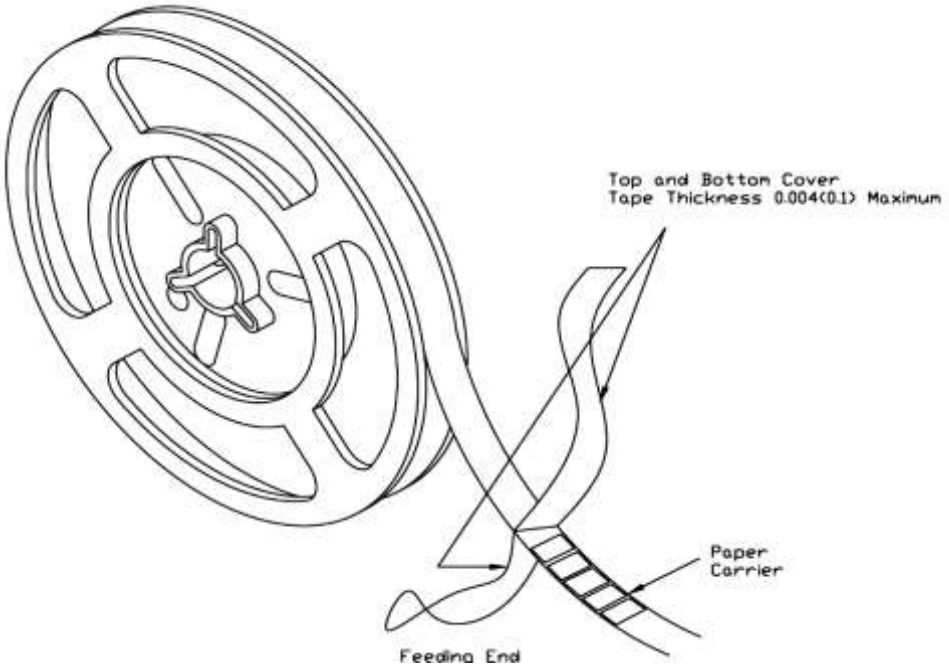
Recommended double-wave Soldering Profile
Typical values (solid line)
Process limits (dotted line)

6.5.3 Soldering Iron : Temperature 350℃±10℃ , dwell time shall be less than 3 sec.

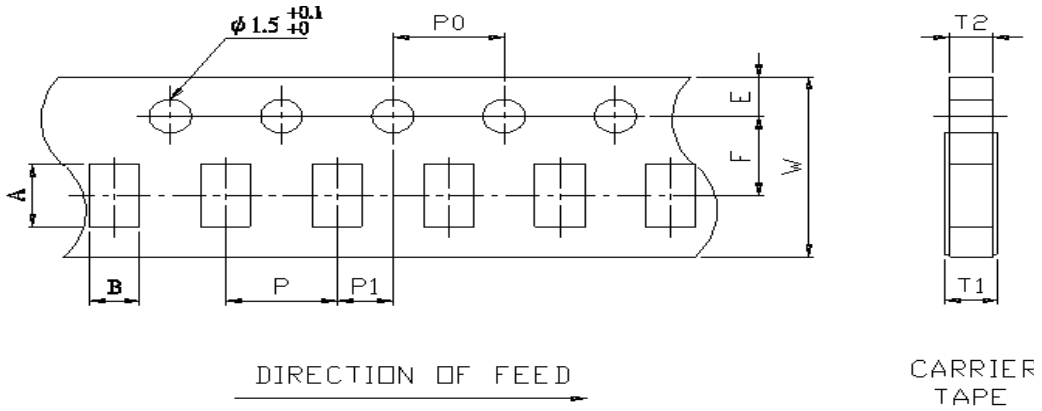
7. TAPING

7.1 Structure of Taping

Paper Carrier



7.2 Tape Dimension



Unit: mm

Item \ DIM		A	B	W	E	F	T1	T2	P	P0	10*P0	P1
CLE10	R0015~ R010	1.15±0.05	0.65±0.05	8.00±0.20	1.75±0.10	3.50±0.05	0.40+0.2/-0	0.40±0.05	2.00±0.10	4.00±0.05	40.0±0.20	2.00±0.05
CLE16	R001~ R060	1.80±0.10	1.00±0.10	8.00±0.20	1.75±0.10	3.50±0.05	0.40+0.2/-0	0.40±0.05	4.00±0.10	4.00±0.10	40.0±0.20	2.00±0.05
CLE21	R001	2.30±0.10	1.55±0.10	8.00±0.20	1.75±0.10	3.50±0.05	0.60+0.2/-0	0.60±0.05	4.00±0.10	4.00±0.10	40.0±0.20	2.00±0.05
	R0015~ R070	2.30±0.10	1.55±0.10	8.00±0.20	1.75±0.10	3.50±0.05	0.40+0.2/-0	0.40±0.05	4.00±0.10	4.00±0.10	40.0±0.20	2.00±0.05
CLE32	R001~ R056	3.50±0.20	1.90±0.20	8.00±0.20	1.75±0.10	3.50±0.05	0.60+0.2/-0	0.60±0.05	4.00±0.10	4.00±0.10	40.0±0.20	2.00±0.05

7.3 Packaging

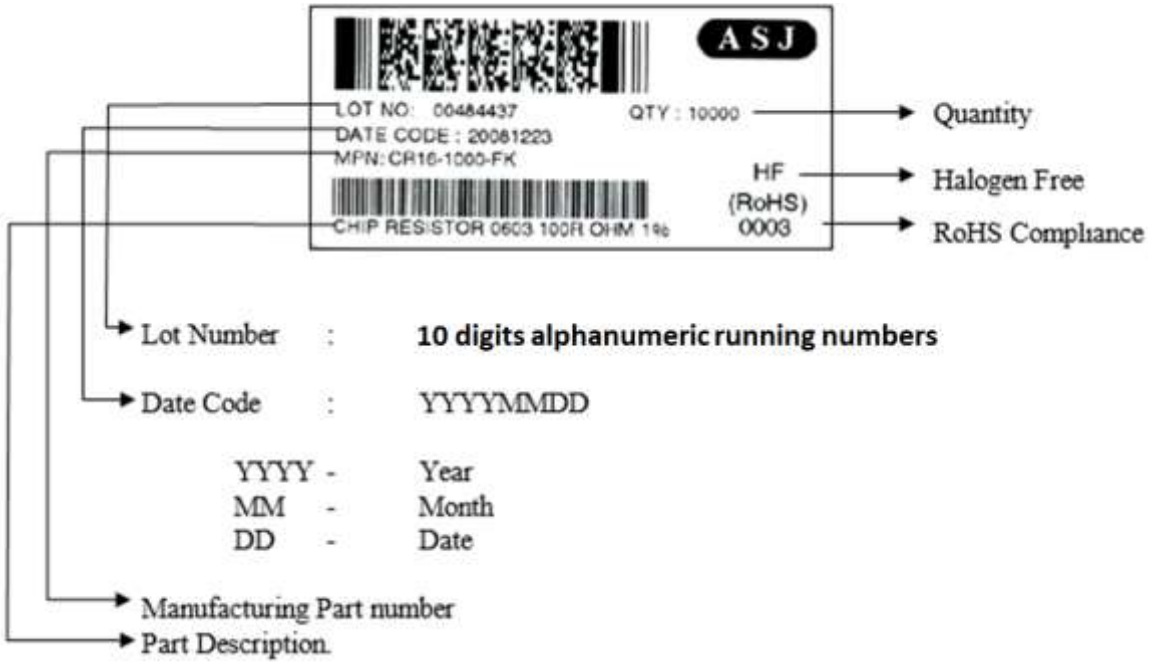
7.3.1 Taping

Quantity – Tape and Reels

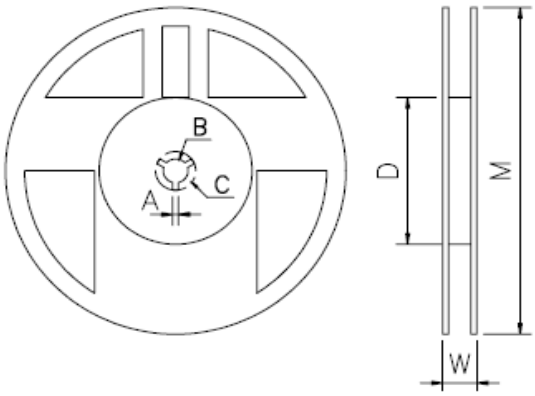
Type	Tape Width	Max. Packaging Qty (pcs/reel)	
		2 mm pitch	4 mm pitch
CLE10	8mm	10,000 pcs	---
CLE16	8mm	---	5,000 pcs
CLE21	8mm	---	5,000 pcs
CLE32	8mm	---	5,000 pcs

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

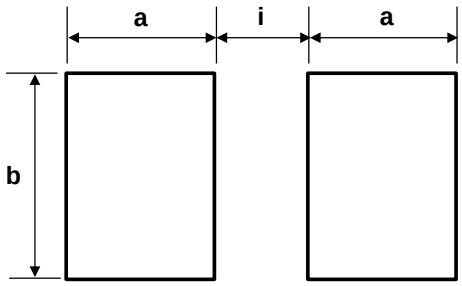


(Unit: mm)

Reel Type/ Tape	W	M	A	B	C	D
7" reel for 8 mm tape	12.0 ± 0.5	178 ± 1.0	2.0 ± 0.5	13.2 ± 0.5	17.7 ± 0.5	60.0 ± 1.0

8. RECOMMENDED LAND PATTERN

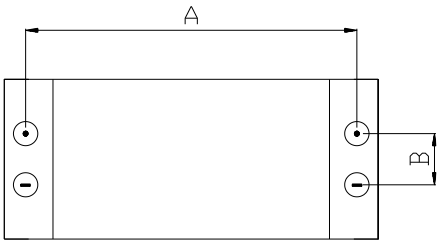
When a component is soldered, the resistance after soldering changes slightly depending on the size of the soldering area and the amount of soldering. When designing a circuit, it is necessary to consider the effect of a decrease or increase in its resistance.



Type	Type of Terminal	Power Rating (Watts)	Resistance Range (mΩ)	Dimensions - millimeters		
				a	b	i
CLE10	2	1/6 & 1/5	1.5 ~ 5、10	0.65	0.50	0.50
		1/4	3 ~ 5、10			
		1/3	10			
CLE16	2	1/3	1	0.85	1.00	0.40
			2 ~ 60	1.00	1.27	0.50
		1/2	2 ~15			
CLE21	2	1/2	1 ~ 120	1.45	1.78	0.66
		3/4	1 ~ 70			
		1.0	1 ~ 5			
CLE32	2	1/2 & 1.0	1 ≦ R＜3	1.65	2.18	0.60
			3 ≦ R＜4			0.90
			4 ≦ R ≦ 300			1.00
CLE21	T	1/2	1.5 ~ 70	1.45	1.78	0.66
		3/4	1.5 ~ 50			
		1.0	1.5 ~ 5			
CLE32	T	1/2 & 1.0	2 ≦ R＜3	1.65	2.18	0.60
			3 ≦ R＜4			0.90
			4 ≦R ≦ 56			1.00

9. MEASUREMENT POINT

Bottom electrode



⊙ Current Terminal

⊖ Voltage Terminal

Unit : mm

TYPE \ DIM	A	B
CLE10	0.65±0.05	0.20±0.05
CLE16	1.25±0.05	0.30±0.05
CLE21	1.65±0.05	0.70±0.05
CLE32	2.70±0.05	0.40±0.05

10. REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version.1	07.09.2016		Initial Release
Version.2	14.10.2016		Typo error in clause 2
Version.3	14.06.2018		1、Remove AEC-Q200 standard 2、Update information to clause 2 3、Update information to clause 3.1.1 table 4、Update information to clause 3.10 5、Update information to clause 4 6、Update information to clause 5 7、Update information to clause 6.1, 6.2, 6.3 8、Update information to clause 7 9、Update information to clause 7.3.1.1 10、Update information to clause 8
Version.4	12.09.2018		1、Update clause 3.1.1 table information 2、Update clause 3.10 table information 3、Update clause 4 dimension information 4、Update clause 5 marking format 5、update clause 6.5, recommended soldering profile 6、Update clause 8 Land pattern information
Version.5	10.01.2019		Datasheet update
Version.6	20.09.2019		1、Revise clause 3.9 2、Revise clause 3.10
Version.7	15.11.2019		Revise clause 2 Part Numbering System Revise clause 3.10 TCR table Revise clause 4 dimension table Revise clause 8 Land Pattern dimension table
Version.8	18.05.2020		Revise clause 3.1.1 Resistor Rated Power Revise clause 3.5 Revise clause 3.10 TCR table Delete clause 3.11 & 3.12 Revise clause 4 dimension Revise clause 8 Land Pattern table Add clause 8.1 measurement point Add clause 8.2 material of alloy
Version.9	28.10.2020		Add product CLE10 1/3W Revise clause 3.1.1 Resistor rated power Revise clause 3.10 TCR table Revise clause 4 dimension Revise clause 6.1 item Short time overload Revise clause 8 Land pattern dimension Revise clause 8.2 Material of alloy
Version.10	01.04.2021		Revise clause 3.10 TCR Table Revise clause 4 Dimension Revise clause 8 Recommend Land Pattern Revise clause 8.2 Material of Alloy
Version.11	19.01.2022		Revise clause 2 Part Numbering System Revise clause 3.1.1 Resistor rated power Revise clause 3.10 TCR table Revise clause 4 dimension Revise clause 6.1 item Short time overload Revise clause 8 Land Pattern Revise clause 8.2 Material of alloy

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version.12	25.10.2022		Add in CLE21 R001 resistance Revise clause 3.1.1 Resistor rated power Revise clause 3.8 Product Assurance Revise clause 3.10 TCR table Revise clause 4 dimension Revise clause 6.1 item Short time overload Revise clause 6.5.2 Add in double wave soldering profile Revise clause 7.2 Tape dimension Revise clause 8 Land Pattern Revise clause 8.2 Material of alloy
Version 13	12.10.2023		Revise clause 3.1.1 Resistor Rated Power Revise clause 3.2 Power Derating Curve table Revise clause 3.10 table Revise clause 4 Dimension table Revise clause 4.1 Material of Alloy table Revise clause 6.3 Environmental Performance Test Item High Temperature Exposure (Storage) temperature Revise clause 8 Recommended Land Pattern table
Version 14	15.02.2024		Revise clause 2 Part Numbering System. Revise clause 7.3.2 Identification.