Towards Excellence in *Quality, Service & Innovation*

A S J

DATA SHEET

Wide Terminal Metal Alloy Low-Resistance Resistor

CLH Wide Terminal Series

0.5% TO 5%, TCR ±50 TO ±100

SIZE: 21W/32W

RoHs Compliant

Product Specification –April 02, 2021 V.2

1. SCOPE

1.1. This specification is applicable to lead free and halogen free for CLH series wide terminal 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:

CLH	21W	1	-	R005		-	F	L
Type	Size(Inch)	Power Rting		Nominal Resistance			Tolerance	Packaging
Low-Inductance Metal Alloy Low-Resistance Resistor	21W(0508) 32W(0612)	1=1.0W		Resistor	Resistance (4~6 digits) EX: R005 = 5mΩ R010 = 10mΩ R00075= 0.75mΩ		F=±1.0% G=±2.0% J=±5.0%	L=5,000 pcs

3. RATING

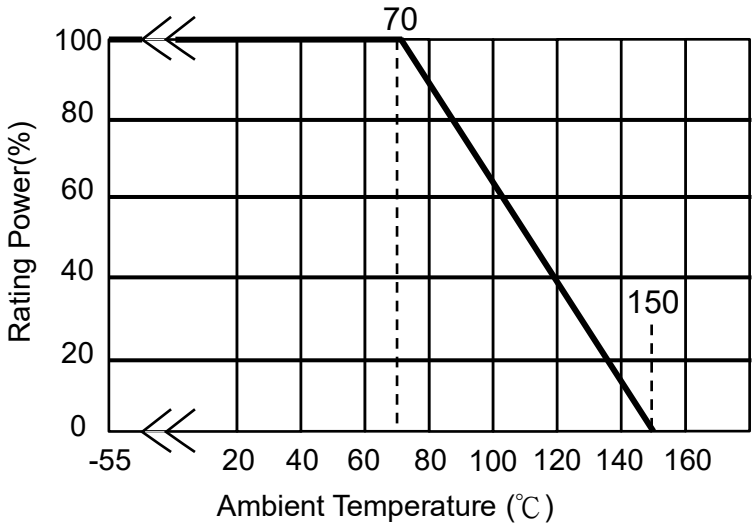
3.1. Rated Power

3.1.1 Resistor Rated Power

Type	Max. Rating Power	Max. Rating Current	Max. Overload Current
CLH21W	1.0W	$Ir=\sqrt{P/R}$	$Io=\sqrt{4P/R}$
CLH32W	1.0W		

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

3.1.2 Power Derating Curve: Operating Temperature Range: - 55 ~+150 ℃
For resistors operated in ambient temperatures 70°C, power rating shall be derated in accordance with the curve below:



3.2 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

3.3 Operating Temperature Range : -55°C to +150°C

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

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

3.6 Moisture Sensitivity Level Rating: Level 1

3.7 Product Assurance

3.8 ASJ resistor shall warranty 24 months from the date of shipment.

3.9 ASJ resistors are RoHS compliance in accordance to RoHS Directive.

3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance

Type	# of Terminals	Max. Rating Power	Rating Current	Overload Current	T.C.R. (ppm/˚C)	Inductance	Resistance Range (mΩ) F (±1%) G (±2%) J (±5%)	Operating Temperature Range
CLH21W	2	1.0W	$Ir=\sqrt{P/R}$	$Io=\sqrt{4P/R}$	≦±50	< 5nH	2≦R≦4	-55~+150°C
CLH32W	2	1.0W			≦±100	< 5nH	1≦R≦4	

3.11 Rating Current

The resistor shall have a DC continuous working current or a RMS(Root Mean Square). AC continuous working current at commercial-line frequency and wave form corresponding to the power rating, as determined from the following:

Remark:

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

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

4. MARKING FORMAT:

4.1 Marking styles by Laser(For CLH21W / CLH32W)

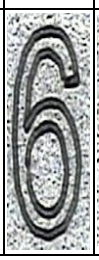
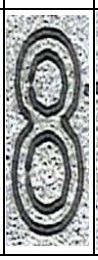
CLH21W	CLH32W
	

4.2 Product resistance is indicated by using two marking notation style:

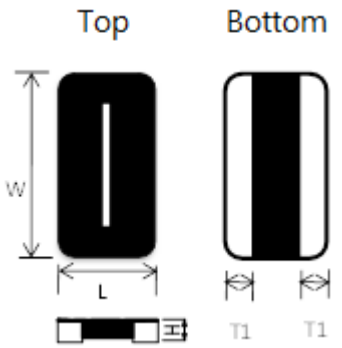
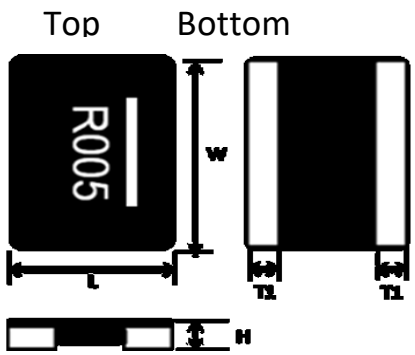
a. "R" designates the decimal location in ohm, e.g.
- For 1mΩ the product marking is R001
- For 7mΩ the product marking is R007

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

4.3 Marking Styles by Laser(For CLH32)

Marking / Type	R	m	1	2	3	4	5	6	7	8	9	0
CLH32W (0612)												

5. Dimension

CLH21W(0508)	CLH32W(0612)
	

Type	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions - in inches (millimeters)			
			L	W	H	T1
CLH21W (0508)	1	2~4	0.05±0.008 (1.270±0.20)	0.05±0.008 (2.032±0.20)	0.014±0.004 (0.35±0.10)	0.014±0.006 (0.35±0.15)
CLH32W (0612)	1	1~4	0.063±0.008 (1.60±0.20)	0.126±0.008 (3.20±0.20)	0.014±0.004 (0.35±0.10)	0.014±0.006 (0.35±0.15)

5.1 Plating Thickness:

Ni：≧2μm

Sn(Tin)：≧3μm

Sn(Tin)：Matte Sn

6. Reliability Performance

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
$TCR(ppm/^{\circ}C) = \frac{(R2-R1)}{R1(T2-T1)} x10^{6}$
● 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 rowspan="2">Short Time Overload</td><td rowspan="2">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>CLH21W</td><td>1.0</td><td>4 times</td></tr>
<tr><td>CLH32W</td><td>1.0</td><td>4 times</td></tr>
</table></td><td>CLH21W:≦±0.5%
CLH32W:≦±1.0%</td></tr>
<tr><td>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

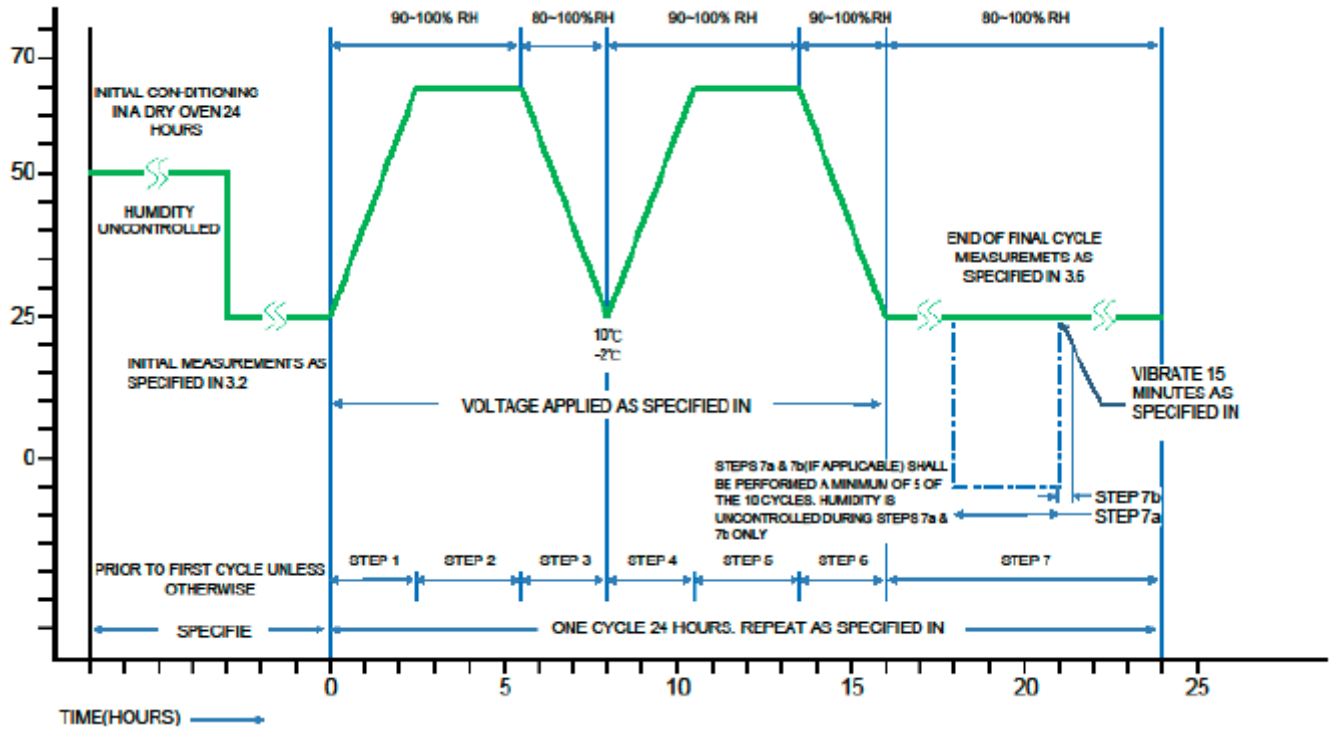
Test Item	Conditions of Test	Test Limits
Resistance to Solder Heat	***Refer to JIS-C5201-1 4.18*** The tested resistor be immersed 25 mm/sec into molten solder of 260±5℃ for 10±1secs. Then the resistor is left in the room for 1 hour, and measured its resistance variance rate.	≦±0.5% No evidence of mechanical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

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℃ 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℃ 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 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

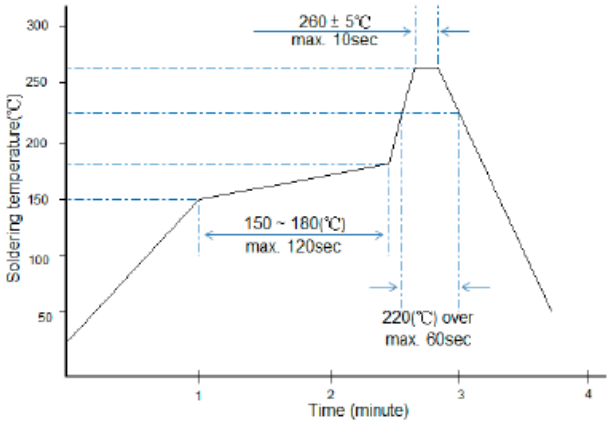

90~100% RH
80~100%RH
90~100% RH
90~100%RH
80~100% RH
70
50
25
0
INITIAL CON-DITIONING IN A DRY OVEN 24 HOURS
HUMIDITY UNCONTROLLED
INITIAL MEASUREMENTS AS SPECIFIED IN 3.2
END OF FINAL CYCLE MEASUREMETS AS SPECIFIED IN 3.5
10℃
-2℃
VOLTAGE APPLIED AS SPECIFIED IN
VIBRATE 15 MINUTES AS SPECIFIED IN
STEPS 7a & 7b(IF APPLICABLE) SHALL BE PERFORMED A MINIMUN 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 Technical Notes: (This is for recommendation, customer are please to perform adjustment according to actual application)

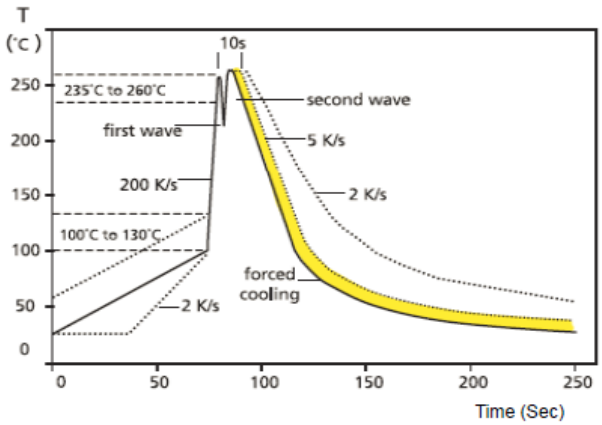
Recommend Soldering Method

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

Typical examples of soldering process that provides reliable joints without any damage are Given in below:



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



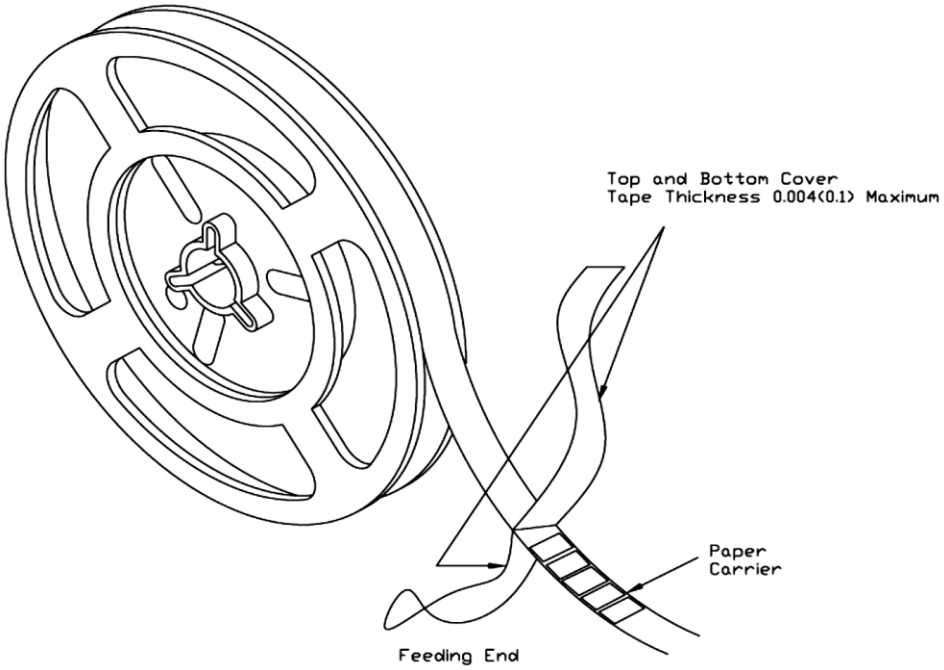
Recommended Wave Soldering Profile
Typical values (solid line)
Process limits (dotted line)

6.5.2 Soldering Iron: temperature 350°C±10°C , dwell time shall be less than 3 sec.

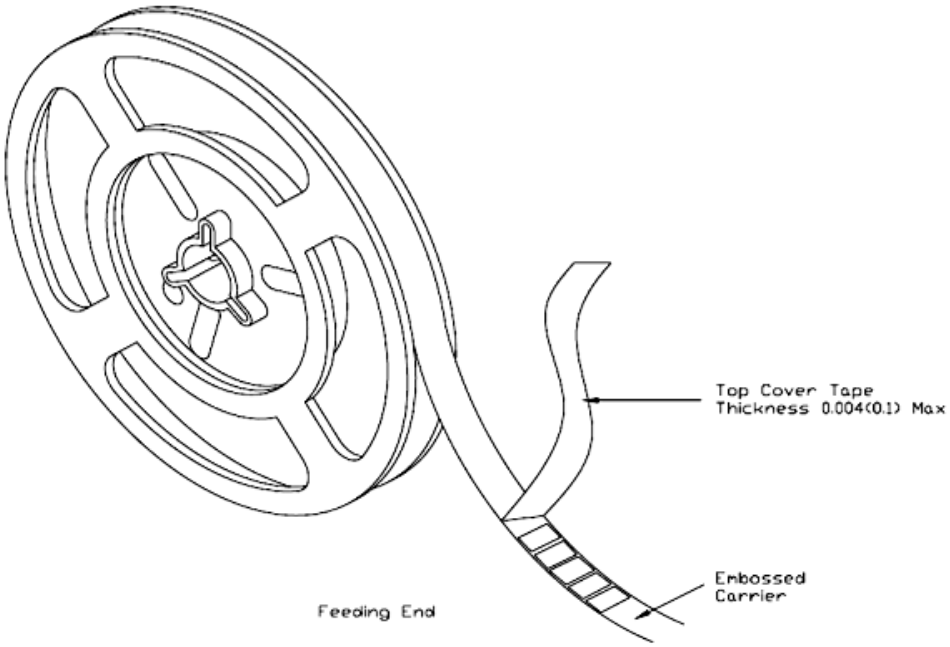
7. TAPING

7.1 Structure of Taping

Paper Carrier

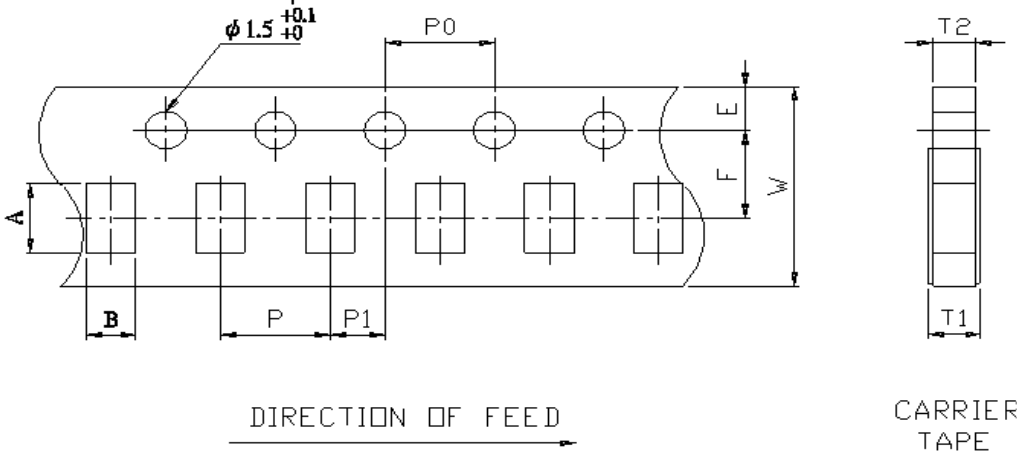


Embossed Plastic Carrier



7.2 Tape dimension.

7.2.1 Carrier Tape Dimension



Unit: mm

DIM / Item	A	B	W	E	F	T1	T2	P	P0	10*P0	P1
CLH21W	2.30±0.10	1.55±0.10	8.0±0.20	1.75±0.10	3.5±0.05	$0.40^{+0.2}_{-0}$	0.40±0.10	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.05
CLH32W	3.50±0.20	1.90±0.20	8.0±0.20	1.75±0.10	3.5±0.05	$0.60^{+0.2}_{-0}$	0.60±0.05	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.05

7.3 Packaging

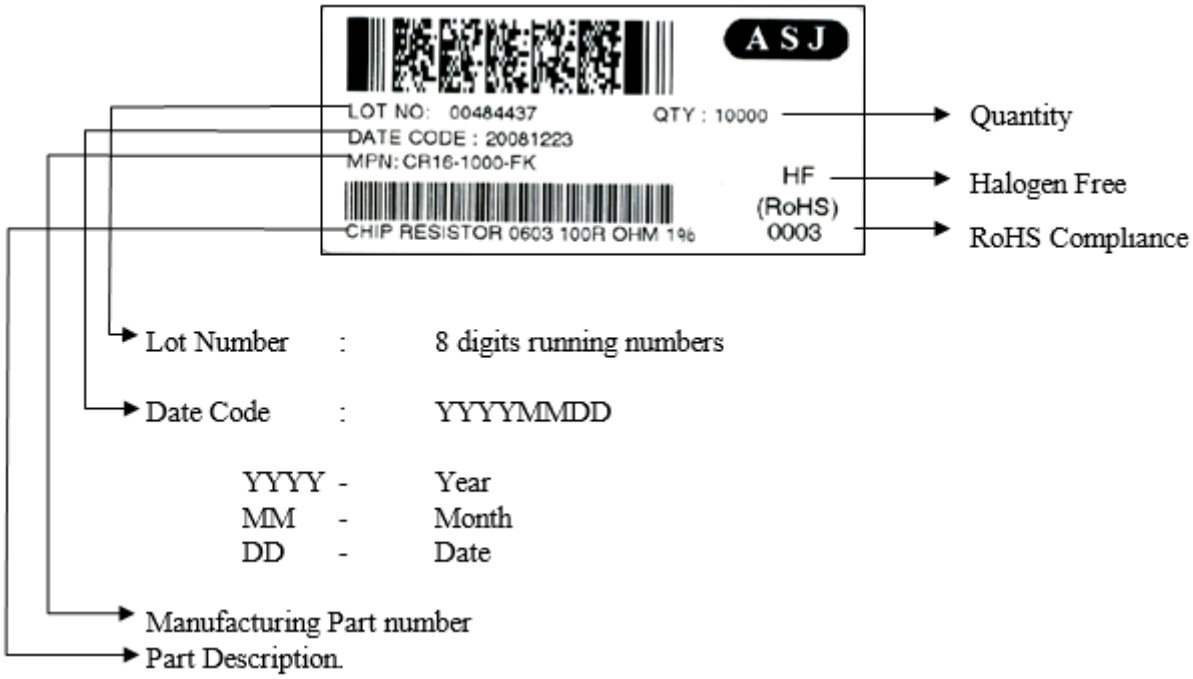
7.3.1 Taping

7.3.1.1 Quantity - Tape and Reels

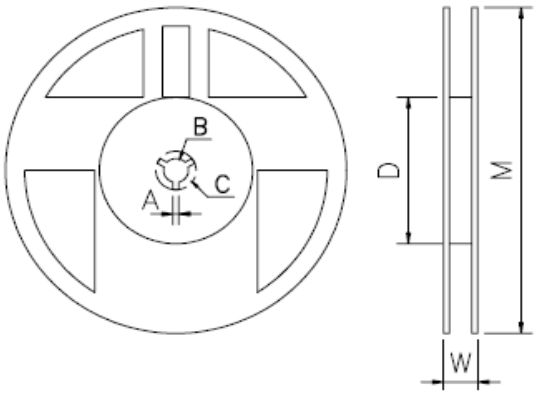
Type	Tape width	Max. Packaging Quantity (pcs/reel)
		Carrier Tape
		4mm pitch
CLH21W (0508)	8mm	5,000pcs
CLH32W (0612)	8mm	5,000pcs

7.3.2 Identification

Production label that indicates the 8 digits lot number, product type, resistance value and tolerance shall be pasted on the surface of each reel.



7.3.3 Reel Dimension

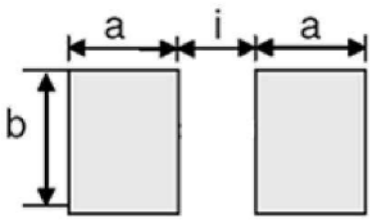


Unit: mm

Reel Type / Tape	W	M	A	B	C	D
7” reel for 8 mm tape	12.00±0.5	178±1.0	2.0±0.5	13.2±0.5	17.7±0.5	60.0±1.0

8. RECOMMEND LAND PATTERN

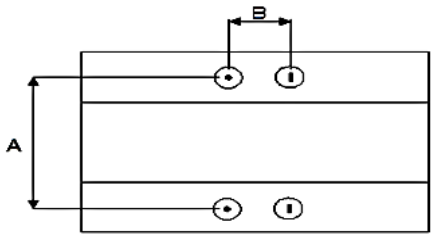
When a component is soldered, the resistance after soldering changes slightly depending on the size of the soldering area and the amount of soldering. When designing a circuit, it is necessary to consider the effect of a decrease or increase in its resistance.



Type	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions - in millimeters		
			a	b	i
CLH21W	1.00	2~4	0.45	2.20	0.55
CLH32W	1.00	1~4	1.65	3.50	0.5

9. Measurement Point:

Bottom electrode



⊙ Current Terminal

⊖ Voltage Terminal

Unit : mm

TYPE \ DIM	A	B
CLH21W	0.90±0.05	0.46±0.05
CLH32W	1.20±0.05	0.46±0.05

10. REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version.1	08.01.2019		Initial Release
Version.2	02.04.2021		Revise clause 3.1.1, Resistor Rated Power Revise clause 3.4, Storage Temp. range Revise clause 3.9 Revise clause 3.10, TCR table Revise clause 4.1, Marking style by Laser Revise clause 4.2, Product resistance indicated Revise clause 5, Dimension Revise clause 8, Recommend Land Pattern item Resistance range column