1 Scope:

1.1 This specification is applicable to lead free and halogen free of RoHS for LRH 4 terminals low-inductance metal alloy low-resistance resistor.

1.2 The product is belong to the universal series.

2 Explanation Of Part Numbers:

ACMH 3637 - 4 2 R020 F 1

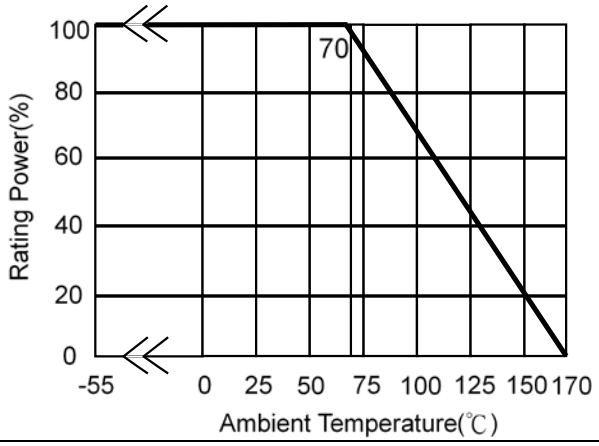
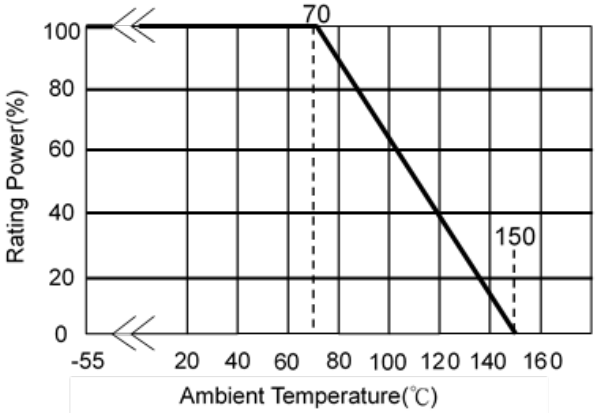
Type	Size (inch)	Number of Terminals	Rated Power	Resistance (4~6 Digits)	Tolerance	Packaging
Low-Inductance Metal Alloy Low-Resistance Resistor	• 3637 • 0612	4: 4 terminals	• 1=1.0W • 2=2.0W • 3=3.0W	EX: R0025 = 2.5mΩ R005 = 5mΩ R020 = 20mΩ	B=± 0.1% D=± 0.5% F=± 1.0% G=± 2.0% J=± 5.0%	1=1,000pcs 5=5,000pcs

3 Product Specifications:

Type	# of Terminals	Max. Rating Power	Max. Rating Current	Max. Overload Current	T.C.R. (ppm/°C)	Resistance Range (mΩ)	Tolerance	Operating Temperature Range
ACMH3637	4	2W	$Ir=\sqrt{P/R}$	$Io=\sqrt{5P/R}$	≦±50	2.5 ~ 20	B=±0.1% D=±0.5% F=±1.0%	-55~170°C
		3W			≦±50	2.5 ~ 10		
ACMH0612	4	1W	$Ir=\sqrt{P/R}$	$Io=\sqrt{4P/R}$	≦±75	1≦R≦4	F=± 1.0% G=± 2.0% J=± 5.0%	-55~+150°C
					≦±100	5		

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

3.1 Power Derating Curve:

Type	ACMH3637 -4	ACMH0612-4
Operating Temperature Range	- 55 ℃~+170 ℃	- 55 ℃~+150 ℃
Explain	For resistors operated in ambient temperatures 70°C, power rating shell be derated in accordance with the curve below	For resistors operated in ambient temperatures 70°C, power rating shell be derated in accordance with the curve below
Figure		

3.2 Rating Current:

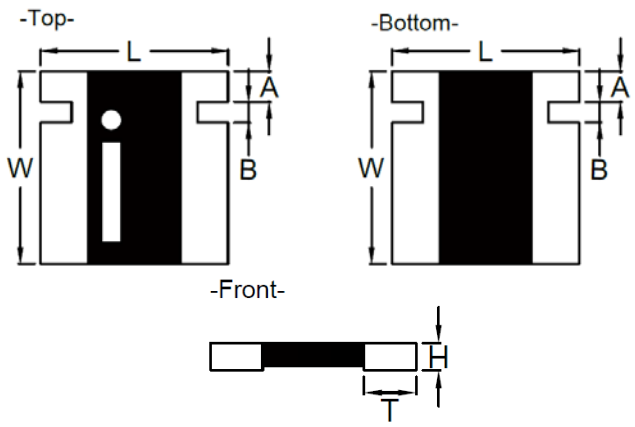
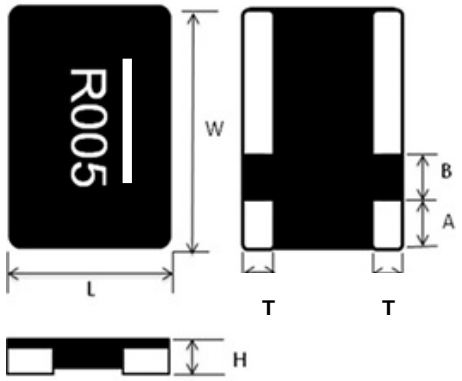
The following equation may be used to determine the DC (Direct Current) or AC (Alternating Current) currents (RMS, root mean square value) of normal rated power. However, if the result value exceeds the highest current of regulated standards, the highest normal rated power is to be used.

Remark:

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

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

4 Physical Dimensions:

ACMH3637 -4 Terminals	ACMH0612-4 Terminals
	

Type	# of Terminals	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions - in inches (millimeters)					
				L	W	A	B	T	H
ACMH3637	4	2	2.5~20	0.360±0.010 (9.14±0.254)	0.370±0.010 (9.40±0.254)	0.059±0.010 (1.50±0.254)	0.039±0.010 (1.00±0.254)	0.091±0.010 (2.31±0.254)	0.047±0.010 (1.20±0.254)
		3	2.5~10						
ACMH0612	4	1	1-4	0.063±0.008 (1.60±0.20)	0.126±0.008 (3.20±0.20)	0.020±0.006 (0.50±0.15)	0.020±0.006 (0.50±0.15)	0.016±0.006 (0.40±0.15)	0.014±0.004 (0.35±0.10)
			5						

4.1 Material of Alloy

Type	# of Terminals	Watts	Material	Resistance
ACMH3637	4	2.0	Nickel-Chromium-Aluminum Alloy	2.5mΩ ~ 20mΩ
		3.0	Nickel-Chromium Aluminum Alloy	2.5mΩ ~ 10mΩ
ACMH0612	4	1.0	Copper-Manganese Alloy	1mΩ≤R≤4mΩ
			Nickel-Chromium-Aluminum Alloy	5mΩ

5 Reliability Performance:

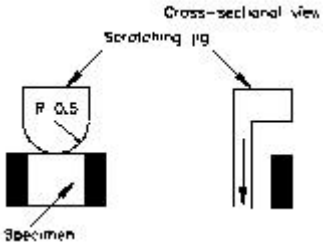
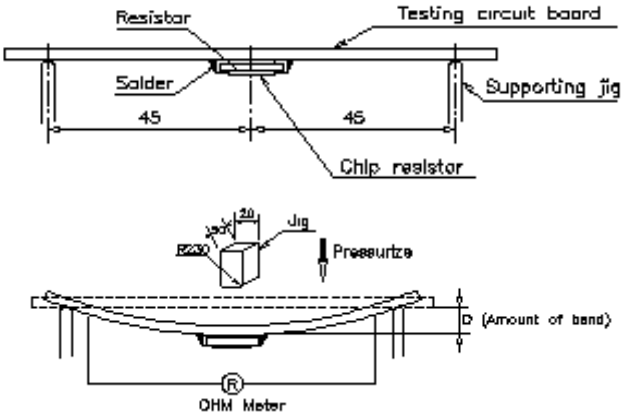
5.1 Electrical Performance:

Test Item	Conditions of Test	Test Limits
Temperature Coefficient of Resistance (TCR)	• TCR (ppm/℃) = $\frac{(R2-R1)}{R1\ (T2-T1)}$ X 10^6 • R1: resistance of room temperature • R2: resistance of 150 °C • T1: Room temperature • T2: Temperature at 150 °C • Refer to JIS C 5201-1 4.8	Refer to Paragraph 3. general specifications
Short Time Overload	Applied Overload for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Overload condition refer to below): Refer to JIS C 5201-1 4.13	LRH3637 : ±0.5% LRH0612 : ±1.0% No evidence of mechanical damage
Insulation Resistance	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. Refer to JIS-C5201-1 4.6	LRH3637 : ≧10^9Ω LRH0612 : ≧10^8Ω
Dielectric Withstanding Voltage	Applied 500VAC for 1 minute, and Limit surge current 50 mA (max.) Refer to JIS-C5201-1 4.7	No short or burned on the appearance.

Type	# of Terminals	Power (W)	# of rated power
ACMH3637	4	2.0	5 times
		3.0	
ACMH0612	4	1.0	4 times

5.2 Mechanical /Constructional Performance:

Test Item	Conditions of Test	Test Limits
Resistance to Solder Heat	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. Refer to JIS-C5201-1 4.18	±0.5% No evidence of mechanical damage
Solderability	Add flux into tested resistors, immersion into solder bath in temperature 245±5℃ for 3±0.5secs. Refer to JIS-C5201-1 4.17	Solder coverage over 95%
Vibration	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) Refer to JIS-C5201-1 4.22	±0.5% No evidence of mechanical damage
Resistance to solvent	The tested resistor be immersed into isopropyl alcohol of 20~25℃ for 60secs, then the resistor is left in the room for 48 hrs. Refer to JIS-C5201-1 4.29	±0.5% No evidence of mechanical damage

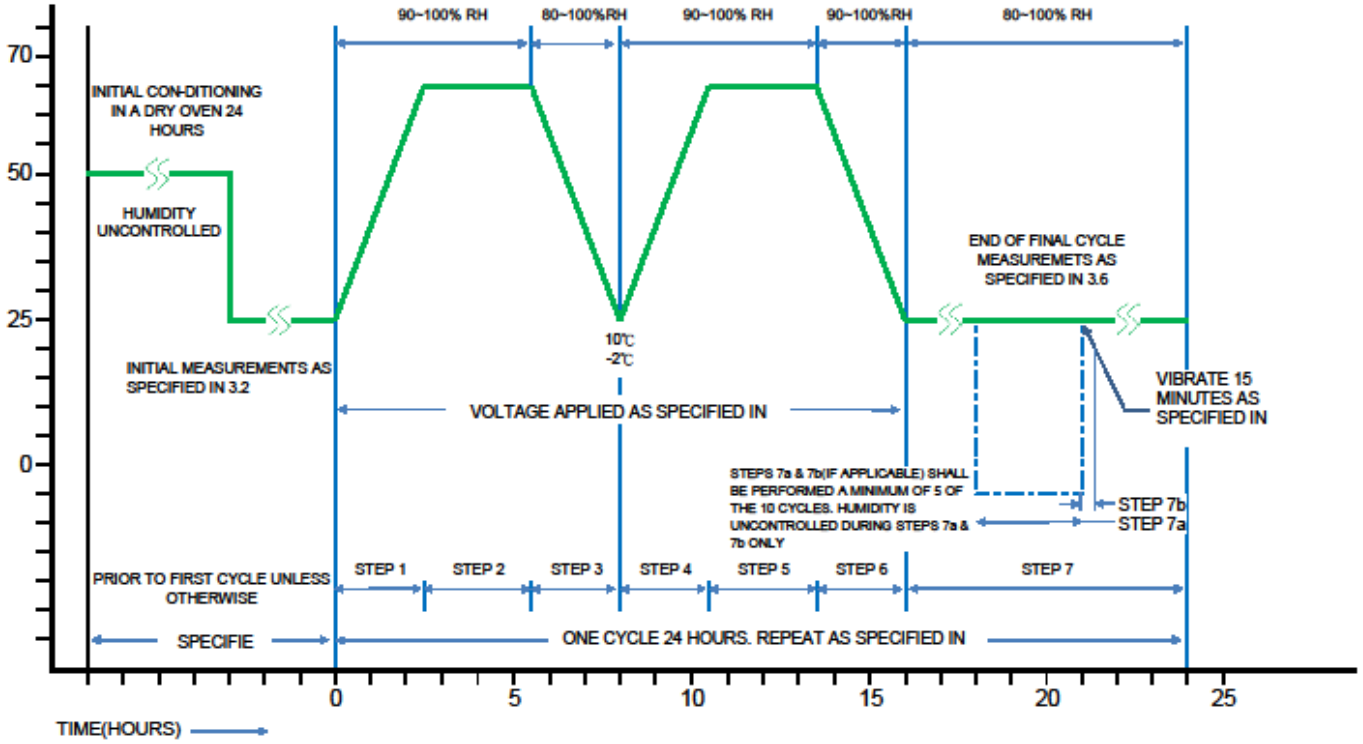
Test Item	Conditions of Test	Test Limits
Joint Strength of Solder	Preconditioning Put tested resistor in the apparatus of PCT, at a temperature of 105℃, humidity of 100% RH, and pressure of 1.22×105 Pa for a duration of 4 hours. Then after left the specimen in a temperature for 2 hours or more. Test method: ◎Test item 1 (Adhesion): A static load using a R0.5 scratch tool shall be applied on the core of the component and in the direction of the arrow and held for 10 seconds and under load measured its resistance variance rate. Load:17.7N  Refer to JIS-C5201-1 4.32	Test item 1: (1).±0.5% (2).No evidence of mechanical damage. No terminal peeling off. Test item 2: (1).±0.5% (2).No evidence of mechanical damage. No terminal peeling off and core body cracked.
	◎Test item 2 (Bending Strength): Solder tested resistor on to PC board add force in the middle down, and under load measured its resistance variance rate. D:2mm  Refer to JIS-C5201-1 4.33	

5.3 Environmental Performance:

Test Item	Conditions of Test	Test Limits
Low Temperature Exposure (Storage)	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. Refer to JIS-C5201-1 4.23.4	±0.5% No evidence of mechanical damage
High Temperature Exposure (Storage)	Put tested resistor in chamber under temperature 170±5℃ for 1,000 hours. Then leaving the tested resistor in room temperature for 60 minutes , and measure its resistance variance rate. Refer to JIS-C5201-1 4.23.2	LRH3637：±0.5% LRH0612：±1.0% No evidence of mechanical damage
Temperature Cycling (Rapid Temperature Change)	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. Testing Condition: Lowest Temperature -55 +0/-10℃; Highest Temperature 150 +10/-0℃ Refer to JIS-C5201-1 4.19	LRH3637：±0.5% LRH0612：±1.0% No evidence of mechanical damage
Moisture Resistance (Climatic Sequence)	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. Refer to MIL-STD 202 Method 106	±0.5% No evidence of mechanical damage
Bias Humidity	Put the tested resistor in chamber under 85± 5℃and 85± 5%RH with 10% bias and load the rated current 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. Refer to JIS-C5201-1 4.24	LRH3637：±0.5% LRH0612：±1.0% No evidence of mechanical damage
Whisker Test	◎Test item (Thermal Shock test): Minimum storage temperature -55+0/-10℃ Maximum storage temperature 85+10/-0℃ Temperature-retaining time 10 min. Number of temperature cycles 1,500 ◎Inspection: Inspect for whisker formation on specimens that underwent the acceleration test specified in subciause 4.2, with a magnifier (stereo microscope) of about 40 or higher magnification. If judgment is hard in this method, use a scanning electron microscope (SEM) of about 1,000 or higher magnification. By JESD Standard NO.22A121 class 2.	Max. 50 μm

5.4 Operational Life Endurance:

Test Item	Conditions of Test	Test Limits
Load Life	Put the tested resistor in chamber under temperature 70± 2℃ and load the rated current 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	±1.0% No evidence of mechanical damage

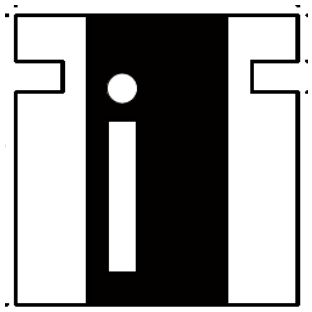


(Figure 1)

6 Marking Format:

6.1 ACMH3637-4 Terminals (Dot / Bar marking)

Recognize Top/Bottom side and A/B terminal.



6.2 ACMH0612-4 Terminals Product resistance is indicated by using two marking notation styles

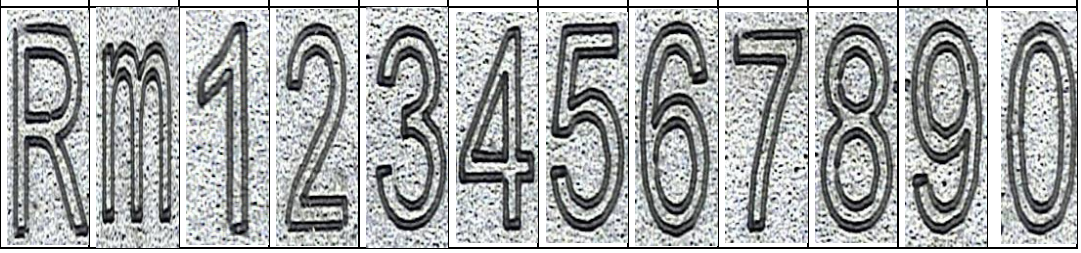
a. "**R**" designates the decimal location in ohms, e.g.

- For 1mΩ the product marking is R001;
- For 5mΩ the product marking is R005;

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 1.5mΩ the product marking is 1m50;

6.3 Marking Style by Laser:

Type \ Marking	R	m	1	2	3	4	5	6	7	8	9	0
ACMH0612-4												

《EX》Marking→R001 = 1mΩ

7 Plating Thickness：

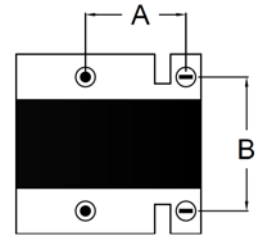
7.1 Ni：≧2μm

7.2 Sn(Tin)：≧3μm

7.3 Sn(Tin)：Matte Sn

8 Measurement Point：

Bottom electrode



Current Terminal

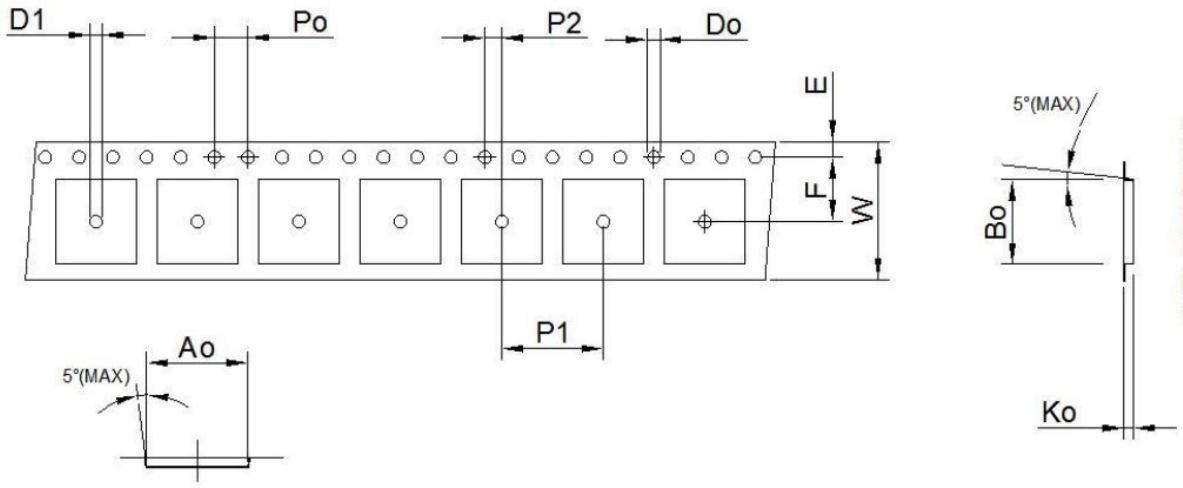
Voltage Terminal

Unit：mm

Type \ DIM	A	B
ACMH3637-4T	5.10 ±0.10	6.82±0.10
ACMH0612-4T	1.78±0.05	1.20±0.05

9 Taping specifications:

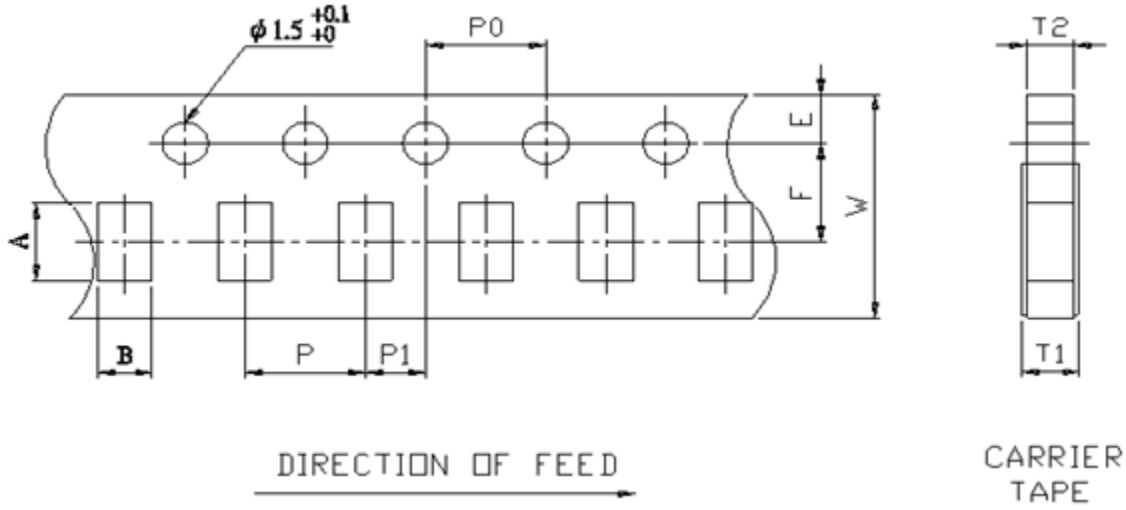
9.1 Embossed Tape Dimensions(for ACMH3637-4):



Unit: mm

DIM / Item	Ao	Bo	W	E	F	Ko	Po	P1	P2	Do	D1
ACMH3637-4	9.6±0.1	9.9±0.1	16.0±0.2	1.75±0.1	7.5±0.1	1.5 Max	4.0±0.1	12.0±0.1	2.0±0.1	1.5±0.1	1.5 Max

9.2 Carrier Tape Dimensions(for ACMH0612-4):



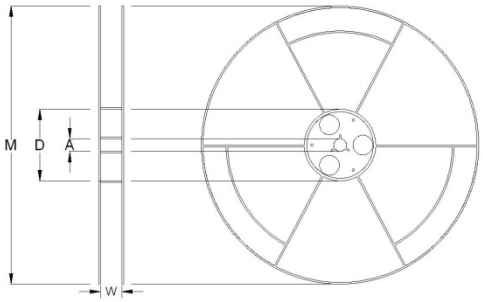
Unit: mm

DIM / Item	A	B	W	E	F	T1	T2	P	P0	10*P0	P1
ACMH0612-4	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

9.3 Packaging model:

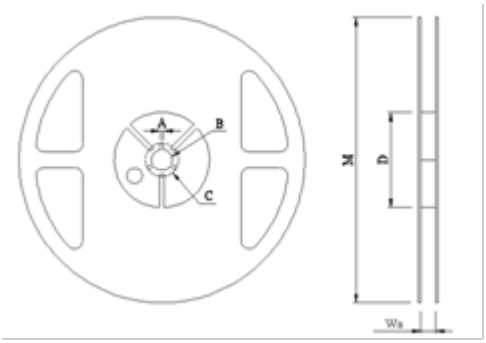
Type	# of Terminals	Tape width	Max. Packaging Quantity (pcs/reel)	
			Embossed Plastic Type	Carrier Tape
			4 mm pitch	4 mm pitch
ACMH3637	4	16 mm	1,000pcs	--
ACMH0612	4	8 mm	--	5,000pcs

9.4 Reel Dimensions:



Unit: mm

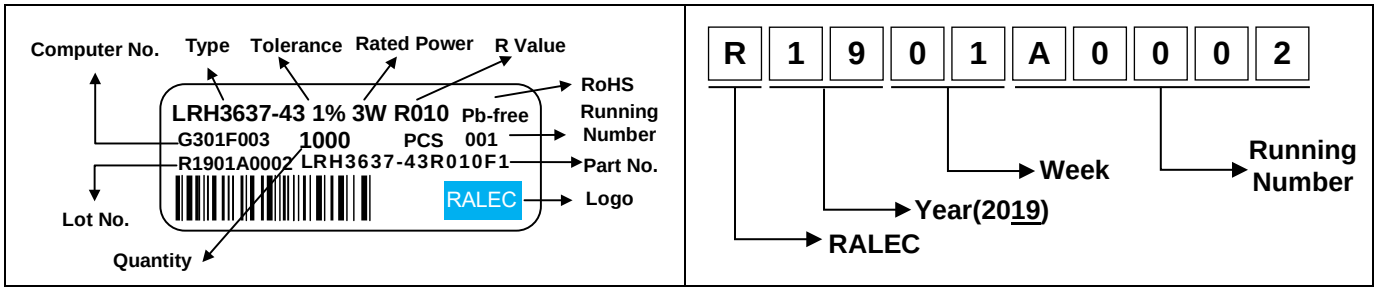
Type	Reel Type / Tape	W	M	A	D
ACMH3637-4	7”reel for 16 mm tape	17.4 ± 1.0	178 ± 2.0	13.2 ± 0.5	60.0 ± 1.0



Unit: mm

Type	Reel Type / Tape	W	M	A	B	C	D
ACMH0612-4	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

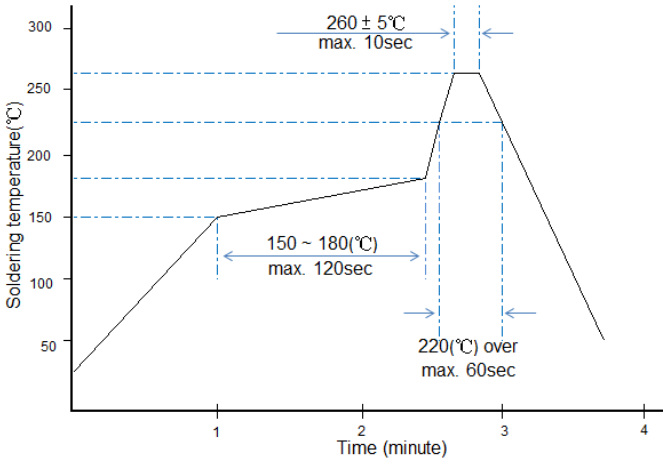
9.5 Label:



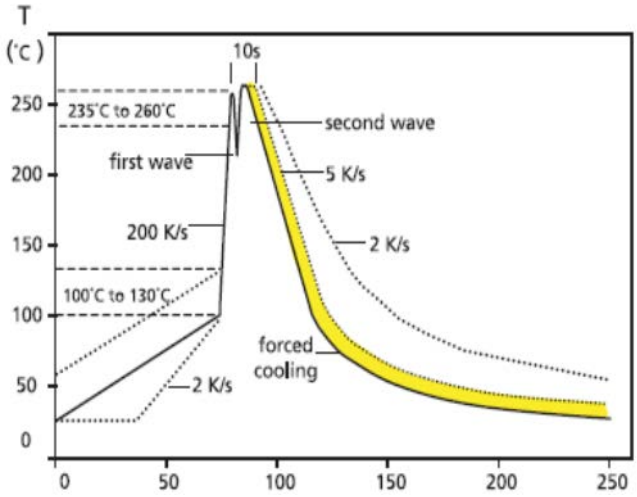
10 Technical application note (This is for recommendation, please customer perform adjustment according to actual application)

10.1 Recommend soldering method:

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



Recommended IR Reflow Soldering Profile
(MEET J-STD-020D)



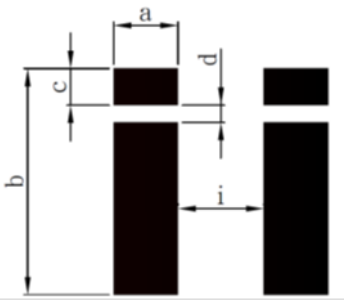
Recommended double-wave Soldering Profile
Typical values (solid line)
Process limits (dotted line)

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

10.1.3 Surface-mount components are tested for solderability at a temperature of 245 °C for 3 seconds

10.2 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	# of Terminals	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions - in millimeters				
				a	b	c	d	i
ACMH3637	4	2.0	2.5 ~ 20	2.95	9.90	1.68	0.60	4.50
		3.0	2.5 ~ 10					
ACMH0612		1.0	1~5	1.00	3.50	0.80	0.40	0.70

10.3 Environment Precautions:

This specification product is for general electronic use, ABCO will not be responsible for any damage, cost or loss caused by using this specification product in any special environment. If other applications need to confirm with ABCO.

If consumer intends to use our Company product in special environment or condition (including but not limited to those mentioned below), then will need to make individual recognition of product features and reliability accordingly.

(a) Used in high temperature and humidity environment

(b) Exposed to sea breeze or other corrosive gas, such as Cl2、H2S、NH3、SO2 and NO2.

(c) Used in non-verified liquids including water, oil, chemical and organic solvents.

(d) Using non-verified resin or other coating material to seal or coat our Company product.

(e) After soldering, it is necessary to use water-soluble detergents to clean residual solder fluxes, even though no-clean fluxes are recommended.

10.4 Momentary Overload Precautions:

The product might be out of function when momentary overloaded. Please make sure to avoid momentary overloading while using and preserving.

10.5 Operation and Processing Precautions:

(a) Avoid damage to the edge of resistor and protective layer caused by mechanical stress.

(b) Handle with care when printing circuit board (PCB) is divided or fixed on support body, because bending of printing circuit board (PCB) mounting will make mechanical stress for resistors.

(c) Make sure the power rating is under the limit when using the resistor. When power rating is over the limit, the resister will be overloaded. There might be machinery damage due to the climbing temperature.

(d) If the resister will be exposed under massive impact load (shock wave) in a short period of time, the working environment must be set up well before use.

(e) Please make evaluation and confirmation when the product is well used in your company and have a through consideration of it's fail-safe design to ensure the system safety.

11 Storage and transportation requirement:

11.1 The temperature condition must be controlled at 25±5℃, the R.H. must be controlled at 60±15%. The stock can maintain quality level in two years。

11.2 Please avoid the mentioned harsh environment below when storing to ensure product performance and its' weldability. Places exposed to sea breeze or other corrosive gas, such as Cl2、H2S、NH3、SO2 and NO2.

11.3 When the product is moved and stored, please ensure the correct orientation of the box. Do not drop or squeeze the box. Otherwise, the electrode or the body of the product may be damaged.

12 Inductance

Inductance characteristics:＜5nH(Circuit frequency is below 1MHz)

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