 毫欧电阻 毫欧制造	Ho 高精密晶圆电阻系列规格书	系列号	Ho
		修订日期	2019-05-08
		版本号	Ho-A0

# 规格书 Specification

制造商:深圳市毫欧电子有限公司

适用: 本规格书适用于深圳市毫欧电子有限公司高精密晶圆电阻系列产品选型。

包括: Ho0102/ Ho0204/ Ho0207

## ■ 产品特点 Features:

符合 AEC-Q200 标准, 薄膜技术, 出色的整体稳定性, Ni 阻挡层上的 Sn 终止

严格公差低至  $\pm 0.1\%$  极低 TCR 低至  $\pm 10 \text{ PPM} / ^\circ \text{C}$  高额定功率高达 1 瓦

SMD 启用结构无铅且符合 RoHS 标准

## ■ 产品名称 Product Name

晶圆电阻

## ■ 产品型号 Product number

**Ho0204-1/4W-10R-1%-15ppm**

供应商	封装	额定功率(W)	阻值(mR)	精度(%)	温度系数 TAR (ppm)
Ho 毫欧电子	0102	1/8~0.3	8.2R~1MR	0.1%~5%	15~100
	0204	1/4~2/5	0.1R~3.4MR	0.1%~5%	10~100
	0207	1/2~1	0.1R~3.4MR	0.1%~5%	10~100



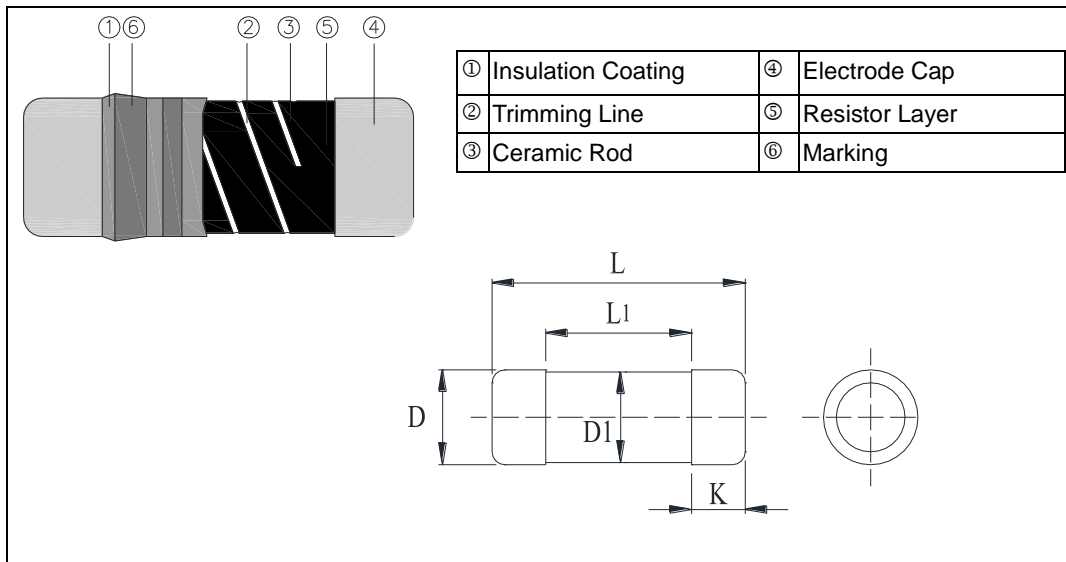
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## 产品尺寸 Product Size



产品尺寸:

型号	L(mm)	L1(mm)	Φ D(mm)	Φ D1(mm)	K(mm)
Ho 0102	2.20±0.10	1.1	1.10±0.10	D +0/-0.15	0.45±0.05
Ho0204	3.50±0.2	1.7	1.40±0.15	D +0/-0.2	0.8±0.1
Ho0207	5.90±0.2	2.9	2.20±0.20	D +0/-0.2	1.3±0.1

## 电气参数 Electrical parameter

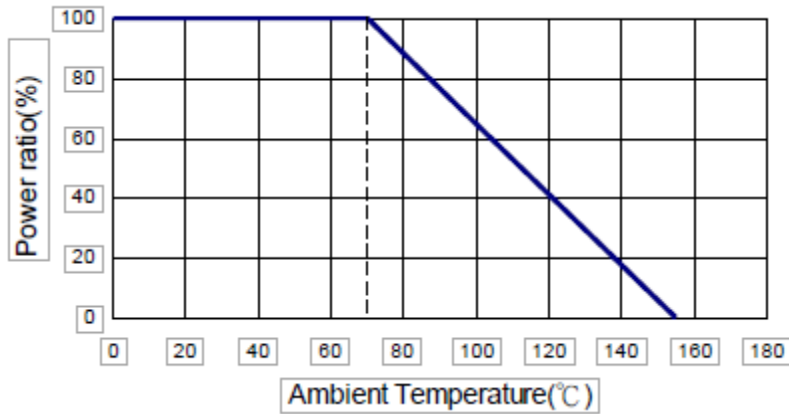
额定功率 Rated power	1/8~1W
阻值范围 Resistance range	0.1R~3.4MR
额定压降 Max. Operating Voltage	150V~350V
准确度等级 AccuracyClass	0.1%、5%
电阻温度系数 T.C.R ( ppm / °C )	± 10~± 100
工作温度范围 Operating Temperature Range	-55 °C ~+155 °C

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■ 功率曲线 Power curve

操作温度范围 -55 ~ +155 °C 电阻温度达到 70 °C 时降功率示意图



■ 额定电流计算公式 The rated current is calculated by the following Formu

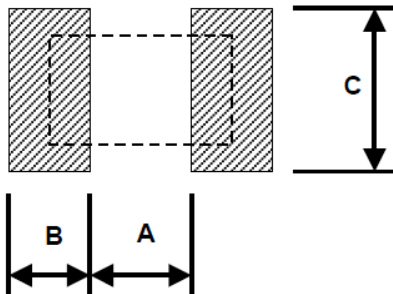
I : Rated Current (A)

P: Rated Power (W)

R: Resistance Value (Ω)

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

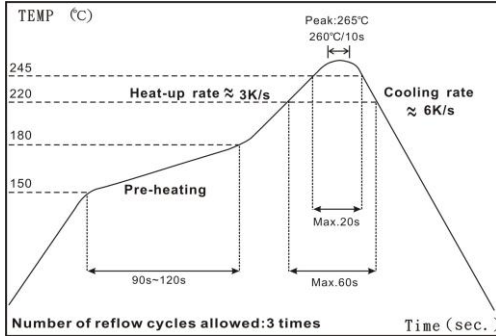
■ 建议焊盘尺寸 Recommended Solder Pad Dimension



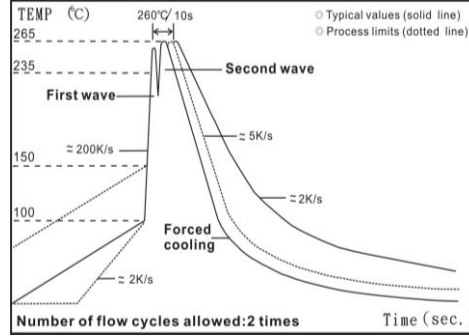
型号	A(mm)	B(mm)	C(mm)
Ho0102	1	0.8	1.5
Ho0204	1.6	1.2	1.6
Ho0207	3.0	1.7	2.4

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■ 建议焊接参数 / Recommended Customer Soldering Parameters



IR Reflow Soldering



Wave Soldering (For R>10Ω)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

■ 标准电气规范 Standard Electrical Specifications

Item Type	Power Rating at 70 °C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR (PPM/°C)	
					±0.1%	±0.25%	±0.5%	±1%	±5%		
0102	1/8W Jumper:2A	-55 ~ +155°C	150V	300V	100Ω-56KΩ					-	±15
					100Ω-82KΩ	49.9Ω- 200KΩ	49.9Ω- 390KΩ	-	±25		
					-	8.2Ω-1MΩ			±50		
					-	40Ω-1MΩ			±100		
					-	0Ω(<15mΩ)			-		
0204	1/4W Jumper:2A	-55 ~ +155°C	200V	400V	49.9Ω-20KΩ					±10	
					10Ω-300KΩ					±15	
					10Ω-1MΩ	10Ω-3.4MΩ	1Ω-3.4MΩ	±25			
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ	±50		
					-	0.1Ω-1MΩ			±100		
0207	1/2W Jumper:4A	-55 ~ +155°C	300V	600V	49.9Ω-20KΩ					±10	
					10Ω-300KΩ					±15	
					10Ω-1MΩ	10Ω-3.4MΩ	1Ω-3.4MΩ	±25			
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ	±50		
					-	0.1Ω-1MΩ			±100		
-	0Ω(<15mΩ)			-							

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## ■ 高功率等级电气规范 High Power Rating Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR (PPM/°C)	
					±0.1%	±0.25%	±0.5%	±1%	±5%		
0102	1/5W	-55 ~ +155°C	200V	400V	100Ω-56KΩ					-	±15
					-	100Ω-82KΩ	49.9Ω-200KΩ	49.9Ω-390KΩ	-	±25	
	-				8.2Ω-1MΩ			-	±50		
	-				40Ω-1MΩ		-	±100			
0204	2/5W	-55 ~ +155°C	200V	400V	10Ω-300KΩ					-	±15
					10Ω-1MΩ		10Ω-3.4MΩ	1Ω-3.4MΩ	-	±25	
					10Ω-1MΩ	1Ω - 1MΩ	1Ω - 3.4MΩ	0.2Ω-3.4MΩ	-	±50	
					-			0.1Ω-1MΩ		-	±100
0207	1W	-55 ~ +155°C	350V	700V	10Ω-300KΩ					-	±15
					10Ω-1MΩ		10Ω-3.4MΩ	1Ω-3.4MΩ	-	±25	
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ	-	±50	
					-			0.1Ω-1MΩ		-	±100

## ■ 环境特征 Environmental Characteristics

Item	Requirement		Test Method
	5% and Below	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec		<b>JIS-C-5201-1 4.8</b> <b>IEC-60115-1 4.8</b> -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	10Ω-270KΩ: ±(0.1%+0.05Ω) <10Ω & >270KΩ: ±(0.15%+0.05Ω) 0102: ±(0.15%+0.05Ω)	<15mΩ	<b>JIS-C-5201-1 4.13</b> <b>IEC-60115-1 4.13</b> RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	≥10G		<b>JIS-C-5201-1 4.6</b> <b>IEC-60115-1 4.6</b> Max. Overload Voltage for 1 minute
Operational Life	10Ω-270KΩ: ±(0.25%+0.05Ω) <10Ω & >270KΩ: ±(0.5%+0.05Ω) 0102: ±(0.5%+0.05Ω)	<15mΩ	<b>MIL-STD-202 Method 108</b> Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion.
Biased Humidity	10Ω-270KΩ: ±(0.5%+0.05Ω) <10Ω & >270KΩ: ±(1%+0.05Ω) 0102: ±(2%+0.05Ω)	<15mΩ	<b>MIL-STD-202 Method 103</b> 1000 hrs 85°C/85%RH 10% of operating power.
High Temperature Exposure	10Ω-270KΩ: ±(0.25%+0.05Ω) <10Ω & >270KΩ: ±(1%+0.05Ω) 0102: ±(1%+0.05Ω)	<15mΩ	<b>MIL-STD-202 Method 108</b> at +155°C for 1000 hrs
Board Flex	10Ω-270KΩ: ±(0.1%+0.05Ω) <10Ω & >270KΩ: ±(0.5%+0.05Ω) 0102: ±(0.5%+0.05Ω)	<15mΩ	<b>AEC-Q200-005</b> Bending once for 60 seconds with 2mm

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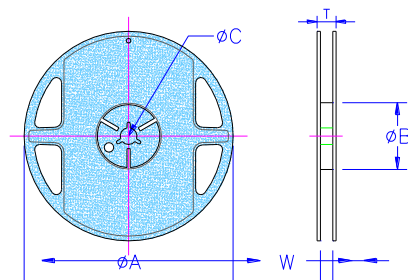


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Board Flex	10Ω-270KΩ: $\pm(0.1\%+0.05\Omega)$ <10Ω & >270KΩ: $\pm(0.5\%+0.05\Omega)$ 0102: $\pm(0.5\%+0.05\Omega)$	<15mΩ	<b>AEC-Q200-005</b> Bending once for 60 seconds with 2mm
Solderability	95% min. coverage		<b>JIS-C-5201-1 4.17</b> <b>IEC-60115-1 4.17</b> <b>J-STD-002</b> 245±5°C for 3 seconds
Resistance to Soldering Heat	10Ω-270KΩ: $\pm(0.1\%+0.05\Omega)$ <10Ω & >270KΩ: $\pm(0.25\%+0.05\Omega)$ 0102: $\pm(0.25\%+0.05\Omega)$	<15mΩ	<b>MIL-STD-202 Method 210</b> 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover		<b>JIS-C-5201-1 4.7</b> <b>IEC-60115-1 4.7</b> 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$		<b>JIS-C-5201-1 4.18</b> <b>IEC-60068-2-58 8.2.1</b> 260±5°C for 30 seconds
Temperature Cycling	10Ω-270KΩ: $\pm(0.25\%+0.05\Omega)$ <10Ω & >270KΩ: $\pm(0.5\%+0.05\Omega)$ 0102: $\pm(1\%+0.05\Omega)$	<15mΩ	<b>JESD22 Method JA-104</b> -55°C to +125°C, 1000 cycles
Mechanical Shock	$\pm(0.25\%+0.05\Omega)$	<15mΩ	<b>MIL-STD-202 Method 213</b> Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	$\pm(0.5\%+0.05\Omega)$	<15mΩ	<b>MIL-STD-202 Method 204</b> 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	$\pm(0.5\%+0.05\Omega)$	<15mΩ	<b>AEC-Q200-002</b> Human body, 2KV
Resistance to Solvents	No visible damage on appearance and marking.		<b>MIL-STD-202 Method 215</b> Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Terminal Strength	No broken		<b>AEC-Q200-006</b> Force of 1.8kg for 60 seconds.

## ■ 包装



包装数量和卷轴规格

Type	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)	Emboss Plastic Tape (EA)
Ho0102	7 inch	178.5±1.5	60.0±1.0	13.0±0.2	9.0±0.5	12.5±0.5	3,000
Ho0204	7 inch	178.5±1.5	60.0±1.0	13.0±0.2	9.0±0.5	12.5±0.5	3,000
Ho0207	7 inch	178.5±1.5	60.0±1.0	13.0±0.5	13.0±0.5	15.5±0.5	2,000

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