

Application

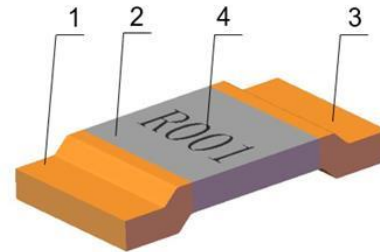
- Current sensor for power hybrid applications
- For welding on bus bars
- High current applications for the automotive market
- Frequency converters
- Power modules
- Power rating up to 15 W

Features

- Power rating up to 15 W
- Heavy copper connectors
- Excellent long-term stability
- Ideal suited for mounting on DBC / IMS substrate
- High application temperature range -55 to +170 °C due to special design
- RoHs compliant and halogen free
- AEC-Q200 qualification

Product structure

- Terminal electrode : Cu
- Resistor body: CuMn7Sn/MnCu/Kamar
- Terminal electrode : Cu
- Marking:Laser Marking

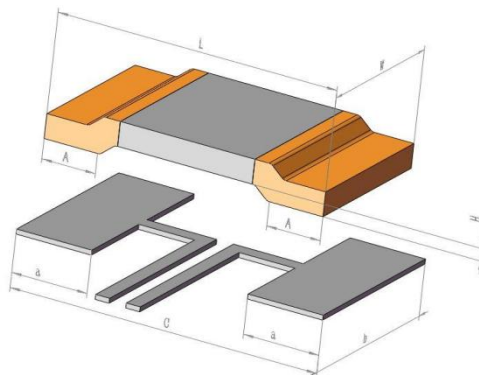


Part Number Explanation

3921	MP	08	F	R005
Size (Inch)	Product Type	Rated Power	Tolerance	Resistance
2512 3921 5931	MP	03=3W 04=4W 05=5W 06=6W 07=7W 08=8W 09=9W 10=10W 12=12W 15=15W	D=0.5% F=±1% G=±2% J=±5%	0M50=0.5mΩ R001=1mΩ R002=2mΩ R005=5mΩ

Standard Electrical Specifications

Type	Part Number	Rated Power /W	TCR ppm/°C	Resistance /mΩ	Material	Applicable temperature range /°C
2512	2512MP06F0M20	6	200	0.2	CuMn7Sn	-55~170
	2512MP06F0M30	6	200	0.3	CuMn7Sn	
	2512MP06F0M50	6	100	0.5	MnCu	
	2512MP05FR001	5	100	1	MnCu	
	2512MP05FR002	5	50	2	Kamar	
	2512MP04FR003	4	50	3	Kamar	
	2512MP03FR004	3	50	4	Kamar	
	2512MP03FR005	3	50	5	Kamar	
3921	3921MP12F0M20	12	200	0.2	CuMn7Sn	-55~170
	3921MP10F0M30	10	100	0.3	MnCu	
	3921MP09F0M50	9	100	0.5	MnCu	
	3921MP08FR001	8	50	1	Kamar	
	3921MP06FR002	6	50	2	Kamar	
	3921MP05FR003	5	50	3	Kamar	
	3921MP05FR004	5	50	4	Kamar	
	3921MP05FR005	5	50	5	Kamar	
5931	5931MP15F0M10	15	200	0.1	CuMn7Sn	-55~170
	5931MP15F0M20	15	100	0.2	MnCu	
	5931MP08F0M50	8	100	0.5	MnCu	
	5931MP10FR001	10	50	1	Kamar	
	5931MP07FR002	7	50	2	Kamar	
	5931MP07FR003	7	50	3	Kamar	

Type Dimension


Standard Electrical Dimension

Type	Resistance Range (mΩ)	L	W	H	A
2512	0.2-5	6.3±0.2	3.1±0.3	0.4±0.1	1.2±0.2
3921	0.2-5	10.0±0.2	5.2±0.3	0.5±0.1	2.0±0.2
5931	0.1-3	15.0±0.2	7.7±0.3	0.5±0.1	4.2±0.3

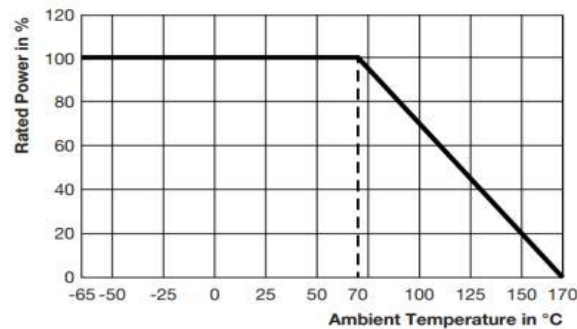
PCB-layout proposal

Type	a	b	c
2512	1.8	3.6	7.0
3921	2.7	6.2	11.0
5931	5.2	8.7	16.0

Power Derating Curve

The Operating Temperature Range: -55°C ~+170°C

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


Rating Current

The following equation may be used to determine the DC (Direct Current) or AC (Alternating Current) (RMS, root mean square value) of normal rated power. However, if the result value exceeds the highest current of regulated standards (paragraph 5), the highest normal rated power is to be used

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

I= Rating current (A)

P= Rating Power (W)

R= Resistance(Ω)

Reliability Test and Requirement

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	MIL-STD-202 Method 304	TCR (ppm/°C) = $\frac{(R2-R1)}{R1(T2-T1)} \times 10^6$ R1: resistance at 25°C (T1) R2: resistance at 125°C (T2)	Refer to Electrical Specification
Short Time Overload	JIS C 5201-1 clause 4.13	The number of rated power are as follows: 5 times of rated power Rating power duration: 5secs	±1.0%
High Temperature Exposure	JIS C 5201-1 clause 4.23.2	170°C±2°C for 1000hrs	±1.0%
Low Temp. Storage	JIS C 5201-1 clause 4.23.4	-55°C±2°C for 1000hrs	±1.0%
Soldering Heat	MIL-STD-202 Method 210	260±5°C for 10±1 seconds.	±1.0%
Temperature Cycling	JIS C 5201-1 clause 4.19	-55°C to +155°C, 100 cycles	±1.0%
Load Life	MIL-STD-202 Method 108	70°C± 2°C, 1000 hours, at rated power 1.5 hours "ON", 0.5 hours "OFF"	±1.0%
Temperature Humidity Bias Test	MIL-STD-202 Method103	+85°C, 85% RH, 10%bias, 1000hou	±0.5%
Mechanical shock	MIL-STD-202 Method 213	100 g'sec ,6 msec, 5puls	±0.5%
Vibration	MIL-STD-202 Method 204	Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h	±1.0%
Moisture resistance	MIL-STD-202 Method 106	MIL-STD-202,method 106, No power, 7a and 7b not required	±1.0%

Marking Format

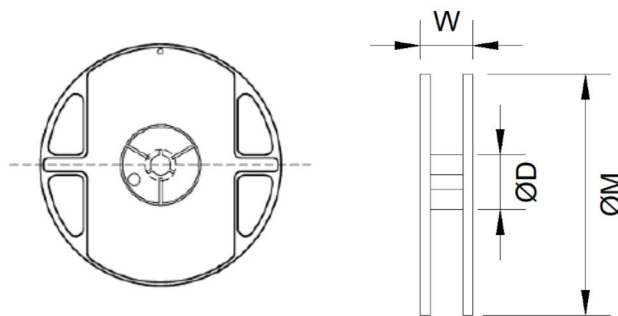
- All type products marking are 4 digits.
 - "R" designates the decimal location in ohms
e.g. 1mΩ the product marking is R001.
5mΩ the product marking is R005 .
 - "M" designates the decimal location in milli-ohms
e.g. 0.2mΩ the product marking is 0M20.
0.5mΩ the product marking is 0M50.
2.5mΩ the product marking is 2M50.
- The criteria to distinguishing the mark on the surface of products are that characters can be identified

Quantity of Package

Type	Resistance Value /mΩ	Quantity /Pcs
2512	0.2-5	4000
3921	0.2-5	3000
5931	0.1-3	2000

Reel Dimensions

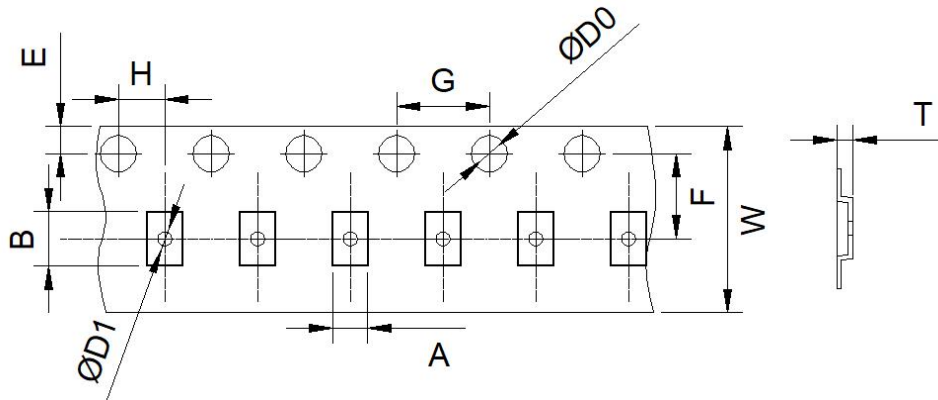
Unit: mm



TYPE	ØD	W	ØM
2512	100.0±1.0	17.0±1.0	330.0±2.0
3921	100.0±1.5	28.5±2.0	330.0±2.0
5931	100.0±1.5	28.5±2.0	330.0±2.0

Carrier Dimensions

Unit: mm



Item	W	E	F	ØD0	ØD1	G	H	A	B	T
2512	12.0±0.2	1.75±0.1	5.5±0.1	1.5±0.1	1.5±0.1	4.0±0.1	2.0±0.1	3.5±0.2	6.8±0.2	1.0±0.1 2.0±0.1
3921	24.0±0.3	1.75±0.1	11.5±0.1	1.5±0.1	1.5±0.1	4.0±0.1	2.0±0.1	6.0±0.2	10.6±0.2	1.2±0.1 2.5±0.1
5931	24.0±0.3	1.75±0.1	11.5±0.1	1.5±0.1	1.5±0.1	4.0±0.1	2.0±0.1	8.6±0.2	15.6±0.2	1.2±0.1 2.35±0.1

Peeling Strength of Top Cover Tape

Peeling Strength : 0.1-1.0N at a peel-off speed of 300 mm/min..

Storage Requirement

Temperature : 5~30°C, Humidity : 25%RH~60%RH

Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and shall only be opened prior to use.

The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.

When the product is finally discarded, it can be treated as general electronic waste, and raw material compositions of CSR can be referred to MSDS.