Thin Film Technology Corp.

Product Family: 2-Terminal, Current Sensing Power Resistor

Part Number Series: MPA*2512 Series Auto

Construction:

- Metal strip construction
- Molded epoxy cover
- 100% matte tin over Ni terminations
- RoHS compliant and Pb Free
- Inherently Anti-Sulfur

Features:

- 2512 English case size
- Resistance from 0.5mΩ~10mΩ
- Power up to 3W
- Tolerance of ±1.0%
- TCR down to ±50ppm/°C
- AEC-Q200 qualified

Description:

This product features low ohm technology that is utilized for current sensing applications. This metal plate offering is robust, and suitable for applications specifically where high power with a small footprint is needed in the automotive industry. High volume production capabilities makes this product suitable for commercial applications. For non-automotive applications, please see MPA*2512 series.

Product Construction:

Figure A

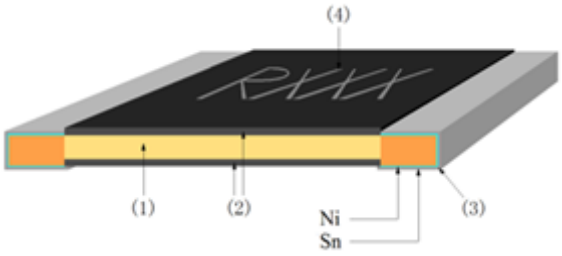
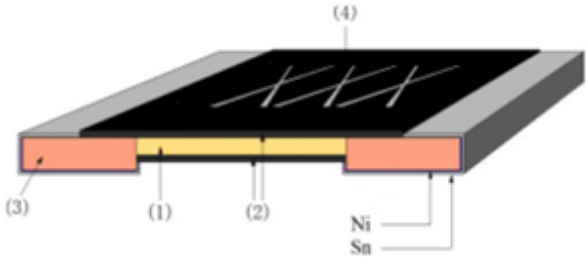


Figure B



Number	Description
1	Resistive element (Complex alloy MnCu, Cu)
2	Protective coating (Epoxy)
3	Terminal electrode (Ni, Sn)
4	Marking

Part Numbering: Ex: MPAB2512RR001FAA-T4

Series Name	Power Rating	English Size (Metric Size)	Temp. Coefficient of Resistance (TCR)	Resistance Value	Resistance Tolerance	Internal Code	Automotive Grade	T&R Packaging Qty
MPA	**B** = 2W **C** = 3W	**2512** (6432)	**Q** = ±50ppm/°C **R** = ±100ppm/°C **G** = ±150ppm/°C (refer to tables)	For all sizes, use 4 digit code for all values. "R" denotes decimal position as necessary. Ex. **R001** = 1mΩ ***0M50** = 0.5mΩ (4 digits)	**F** = ±1.0%	**A** = Wrapped Electrodes	**A** = AEC-Q200	**-T4** = 4,000 pcs/ reel

*Note: For resistance values of one milliohm or greater, use "R" to specify the decimal point (i.e. R005=0.005Ω). For resistance values less than one milliohm, or those with increments of less than one milliohm, use "M" to specify the decimal point (i.e. 0M50+0.50mΩ).

Product Dimensions:

Figure A

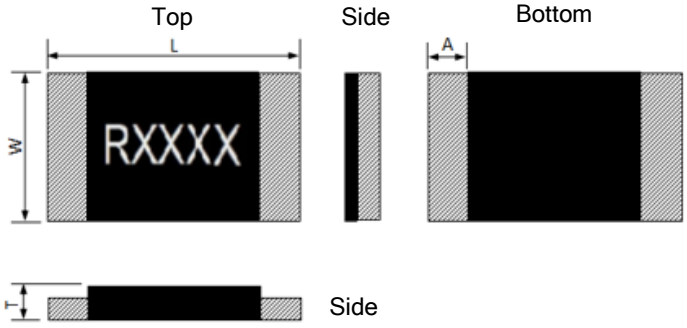
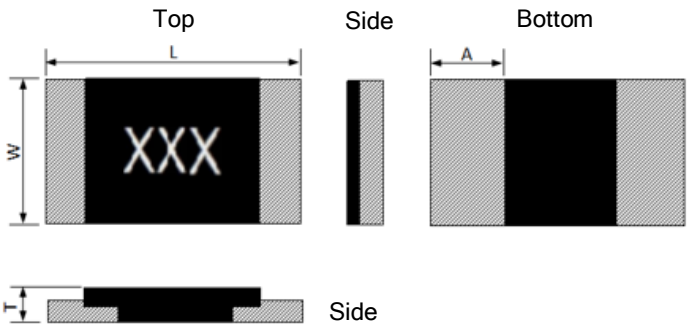


Figure B



All dimensions shown in inches, mm in parentheses.

Dimension (Metric)	Figure	Resistance Range	W	L	T	A
MPAB2512 (6432)	B	1mΩ	0.126 ±0.012 (3.20 ±0.30)	0.252 ±0.012 (6.40 ±0.30)	0.035 ±0.008 (0.90 ±0.20)	0.075 ±0.010 (1.90 ±0.25)
	B	2mΩ~4mΩ				
	A	5mΩ~10mΩ				0.031 ±0.010 (0.80 ±0.25)
MPAC2512 (6432)	B	0.5mΩ, 0.75mΩ			0.041 ±0.008 (1.05 ±0.20)	0.075 ±0.010 (1.90 ±0.25)
	B	1mΩ			0.035 ±0.008 (0.90 ±0.20)	
	B	2mΩ~4mΩ				
	A	5mΩ~10mΩ				0.031 ±0.010 (0.80 ±0.25)

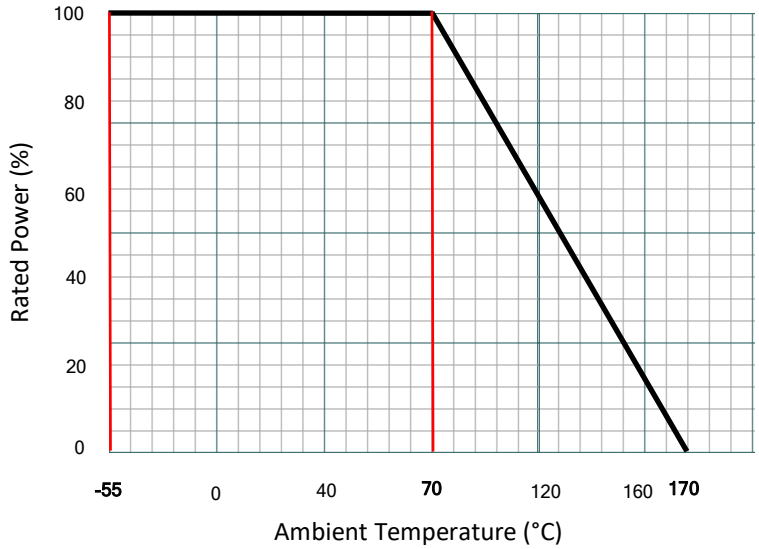
Electrical Specifications:

Type	MPAB2512	
Metric Size	6432	
Power Rating	2W	
Resistance Range	1mΩ	2mΩ~10mΩ
Resistance Tolerance (code)	±1.0% (F)	
TCR ppm/°C (code)	±100 (R)	±50 (Q)
Rated Voltage	√(Power x Resistance)	
Operating Temp. Range	-55°C~+170°C	
Packaging (code)	4,000 pcs/reel (-T4)	

Electrical Specifications (Cont.):

Type	MPAC2512		
Metric Size	6432		
Power Rating	3W		
Resistance Range	0.5mΩ, 0.75mΩ	1mΩ	2mΩ~10mΩ
Resistance Tolerance (code)	±1.0% (F)		
TCR ppm/°C (code)	±150 (G)	±100 (R)	±50 (Q)
Rated Voltage	√(Power x Resistance)		
Operating Temp. Range	-55°C~+170°C		
Packaging (code)	4,000 pcs/reel (-T4)		

Power Derating Curve:



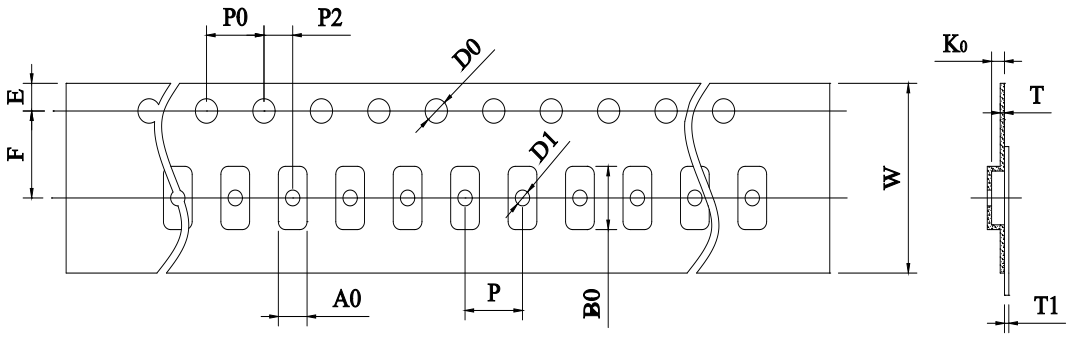
AEC-Q200 Reliability Specifications (Table 7):

AEC Test #	Test Name	AEC-Q200 Test Requirements	Specification
3	High Temp. Exposure (Storage) MIL-STD-202, Method 108	Test Temp 125 +/-3°C Test Period: 1,000 hours No Electrical Load	±1.0%
4	Temp. Cycling (Thermal Shock) JESD22 Method JA-104	Repeat 1,000 cycles as follows: -55 +/-3°C for 30 minutes 125 +/-3°C for 30 minutes Transition time of 1 minute max	±1.0%
7	Biased Humidity MIL-STD-202, Method 103	Test conditions: 85°C and 85% RH 10% of rated power Test Period 1,000 hours	±1.0%
8	Load Life (Operational Life) MIL-STD-202, Method 108	Test Temperature: 125 +/-3°C Applied voltage: rated power (derated Power will be required if temp exceeds the derating point of part) Test Period: 1,000 hours (condition D)	±1.0%
12	Resistance to Solvents MIL-STD-202, Method 215	3 minute soak 2-3 ounce force 10 strokes/repetition 3 repetitions	No damage

AEC-Q200 Reliability Specifications (Table 7 Cont.):

AEC Test #	Test Name	AEC-Q200 Test Requirements	Specifications
13	Mechanical Shock MIL-STD-202, Method 213	Force: 100G peak Test duration: 6 ms Half-sine waveform Velocity: 12.3ft/sec	±1.0%
14	Vibration MIL-STD-202, Method 204	Frequency: 10-2,000 Hz Acceleration: 5G Test duration: 20 minutes, 12 cycles	±1.0%
15	Resistance to Soldering Heat MIL-STD-202, Method 210	Condition B (Solder dip, no pre-heat) 260 +/-5°C	±1.0%
17	ESD AEC-Q200-002	HBM, 100pF, 1.5k ohms Repetition: 5 times	±1.0%
18	Solderability J-STD-002	Non-activated flux dip: 5-10 seconds SAC solder dip: 2 +/-0.5 seconds at 245 +/-5°C	95% coverage
20	Flammability UL-94	V-0 or V-1 are acceptable Electrical test not required	Provide certificate
21	Board Flex AEC-Q200-005	90 mm span between fulcrums 2 mm bend 60 seconds minimum holding time	±1.0%
22	Terminal Strength (SMD) AEC-Q200-006	Force of 17.7 N 60 seconds	±1.0%
24	Flame Retardance AEC-Q200-001	Mounted parts subjected to voltages from 9.0 to 32 VDC (current clamped up to 500A) in 1.0 VDC increments. Voltage applied for 1 hour minimum or until failure occurs	Must meet AEC-Q200 requirements

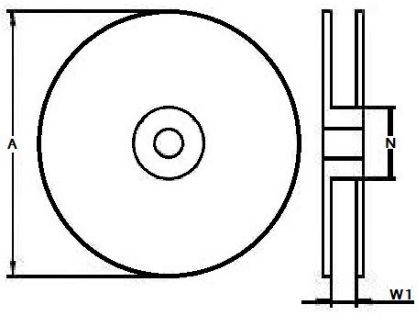
Plastic Tape Dimensions:



All dimensions in mm.

Size	W	P0	P	P2	A0	B0	D0	F	E	T	T1	K0
MPAB2512 MPAC2512	12.0 ±0.30	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	3.40 ±0.20	6.75 ±0.20	1.55 ±0.10	5.50 ±0.10	1.75 ±0.10	0.20 ±0.10	Max 0.10	1.00 ±0.20

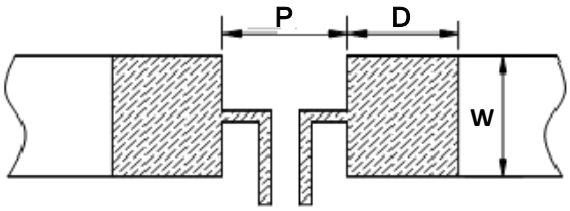
Reel Dimensions:



All dimensions in mm.

Size	Quantity	A	N	W1
MPAB2512	4,000 pcs/ reel	178 ±5.00	60.0 ±2.00	13.0 ±1.00
MPAC2512				

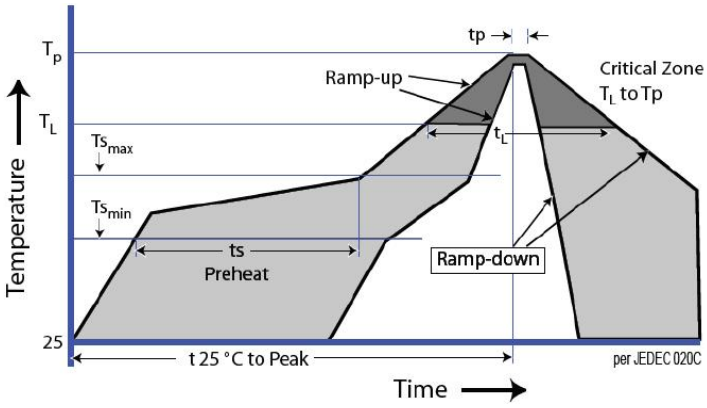
Recommended Land Pattern:



All dimensions in mm.

Size	Resistance Range	P	W	D
MPAB2512	1mΩ~4mΩ	1.50	3.57	2.95
	5mΩ~10mΩ	3.18		2.11
MPAC2512	0.50mΩ, 0.75mΩ, 1mΩ~4mΩ	1.50		2.95
	5mΩ~10mΩ	3.18		2.11

Soldering Profile:



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to Tp)	3 °C/second max.
Preheat	
- Temperature Min (Ts_{min})	150 °C
- Temperature Max (Ts_{max})	200 °C
- Time (ts_{min} to ts_{max})	60-180 seconds
Time maintained above:	
- Temperature (T_L)	217 °C
- Time (t_L)	60-150 seconds
Peak Temperature (T_p)	260 +0 °C
Time within 5 °C of actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	6 °C/second max.
Time 25 °C to Peak Temperature	8 minutes max.

Marking Information:

Figure A

2512: 5 digits marking

Figure B

2512: 3 digits marking

Examples of 5 Digit Resistance Codes for Figure A			
R-Value	5mΩ	7mΩ	10mΩ
Code	R005X	R007X	R010X
Examples of 3 Digit Codes for Figure B			
R-Value	0.5mΩ	1mΩ	4mΩ
Code	0M5	1M0	4M0

Note: “R” denotes decimal position as necessary.
Note: “X” denotes fifth digit for resistance values 5mΩ~10mΩ.
Note: “M” denotes decimal position as necessary for 3 digits marking.

Storage Conditions:

Environmental Conditions:

Products should be stored under the following environmental conditions:

- Temperature: +5 to +35°C
- Humidity: 45 to 85% relative humidity
- Do not keep products in environments where they may be subject to particulate contamination or harmful gases such as sulfuric acid or hydrogen chloride as it may cause oxidization on electrodes, resulting in poor solderability.
- Products should be stored in a space that does not expose it to high temperatures, vibration, or direct sunlight.
- Products should be stored in the original airtight packaging until use.