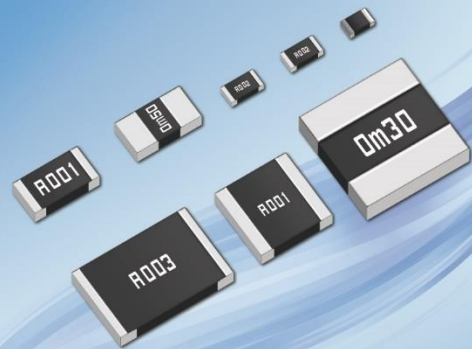


**PRODUCT
DATASHEET**

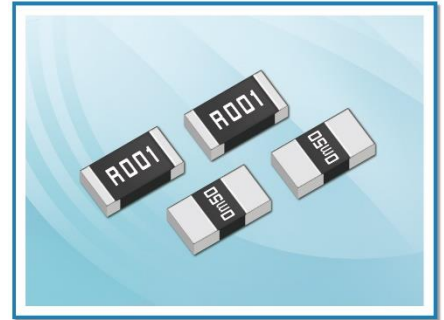


MRA2512 Series Current Sensing Resistor

MRA2512 Series Current Sensing Resistor

Description

MRA is a metal based current sensing resistor. Metal alloyed with epoxy overcoat construction carries long term stability is ideal for high current sensing. Precise resistance tolerance and wide operating temperature make this product suitable for various applications to meet the growing high-power electronics nowadays.



Features

- Chip size from 0805 to 4527
- Resistance value from 0.2mΩ (MRA2725) to 500mΩ (MRA4527)
- Low thermal EMF
- Low TCR
- Lead free, RoHS compliant without exemption
- High precision current sensing and voltage division

Application

- Switching model power supply
- Li-ion battery management
- Notebook, personal computer
- Test Instrument
- Motor controls

Environmental Compliance

Regulation Standard



2011/65/EU



IEC 61249-2-21:2003

Electrical Characteristics

Size Type	Power Rating at 70 °C (W)	Resistance Range (mΩ)	Max. TCR (ppm/ ° C)	Resistance tolerance	Operating Temp. Range
2512	2	0.5, 0.75	±75	±1% (F)	-55 °C ~ +170 °C
		1~450	±50		
	3	0.5, 0.75	±75		
		1~100	±50		

Part Number System

MRA 25 P 2 M F R002 - □□

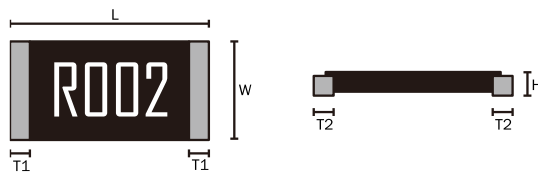
[1] [2] [3] [4] [5] [6] [7] [8]

- [1] Series name, Metal Resistor for current sensing, series A
 [2] Chip size, 25:2512
 [3] Polytronics symbol
 [4] Power code, 2:2W, 3:3W
 [5] Material code, M:MnCu, S: SnMnCu, F: FeCrAl
 [6] Resistance tolerance, F: ±1%
 [7] Resistance code, R002=2 mΩ, 2M50=2.5 mΩ
 [8] Options code

MRA2512 Series Current Sensing Resistor

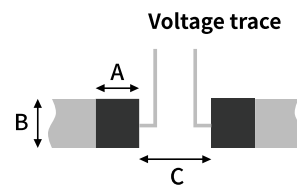
Physical Dimensions (mm)

Series	Power Rating	Resistance	L	W	H	T1	T2
MRA2512	2W	0.5 mΩ	6.350±0.254	3.050±0.254	0.820±0.254	1.980±0.254	2.000±0.254
		0.75	6.350±0.254	3.050±0.254	0.700±0.254	1.150±0.254	1.980±0.254
		1 mΩ	6.350±0.254	3.050±0.254	0.720±0.254	1.150±0.254	2.200±0.254
		1.5 mΩ	6.350±0.254	3.050±0.254	0.720±0.254	1.150±0.254	1.400±0.254
		2~5 mΩ	6.350±0.254	3.050±0.254	0.720±0.254	1.150±0.254	1.150±0.254
		6 mΩ	6.350±0.254	3.050±0.254	0.550±0.254	1.150±0.254	1.100±0.254
		7~10 mΩ	6.350±0.254	3.050±0.254	0.600±0.254	1.150±0.254	1.100±0.254
		11~75 mΩ	6.350±0.254	3.050±0.254	0.600±0.254	1.050±0.254	1.100±0.254
		76~100 mΩ	6.350±0.254	3.050±0.254	0.550±0.254	0.750±0.254	1.100±0.254
		101~135 mΩ	6.350±0.254	3.050±0.254	0.470±0.254	0.750±0.254	1.100±0.254
		136~200 mΩ	6.350±0.254	3.050±0.254	0.400±0.254	0.750±0.254	1.100±0.254
	201~450 mΩ	6.350±0.254	3.050±0.254	0.400±0.254	0.750±0.254	0.850±0.254	
	3W	0.5 mΩ	6.350±0.254	3.050±0.254	0.820±0.254	1.980±0.254	2.000±0.254
		0.75	6.350±0.254	3.050±0.254	0.700±0.254	1.150±0.254	1.980±0.254
		1 mΩ	6.350±0.254	3.050±0.254	0.720±0.254	1.150±0.254	2.200±0.254
		1.5 mΩ	6.350±0.254	3.050±0.254	0.720±0.254	1.150±0.254	1.400±0.254
		2~5 mΩ	6.350±0.254	3.050±0.254	0.720±0.254	1.150±0.254	1.150±0.254
		6 mΩ	6.350±0.254	3.050±0.254	0.550±0.254	0.750±0.254	1.100±0.254
		7~10 mΩ	6.350±0.254	3.050±0.254	0.600±0.254	1.150±0.254	1.100±0.254
		11~75 mΩ	6.350±0.254	3.050±0.254	0.600±0.254	0.750±0.254	1.100±0.254
		76~100 mΩ	6.350±0.254	3.050±0.254	0.550±0.254	0.750±0.254	1.100±0.254



Recommended Solder Pad Layout (mm)

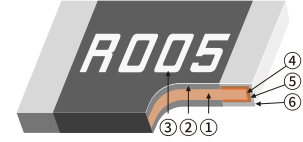
Size Type	Resistance	A	B	C
2512	0.5~1 mΩ	3.24	3.68	1.27
	1.5 mΩ	3.20	3.68	1.35
	2~5 mΩ	2.60	3.68	2.55
	6~200 mΩ	2.30	3.68	3.15
	201~450 mΩ	2.05	3.68	3.65



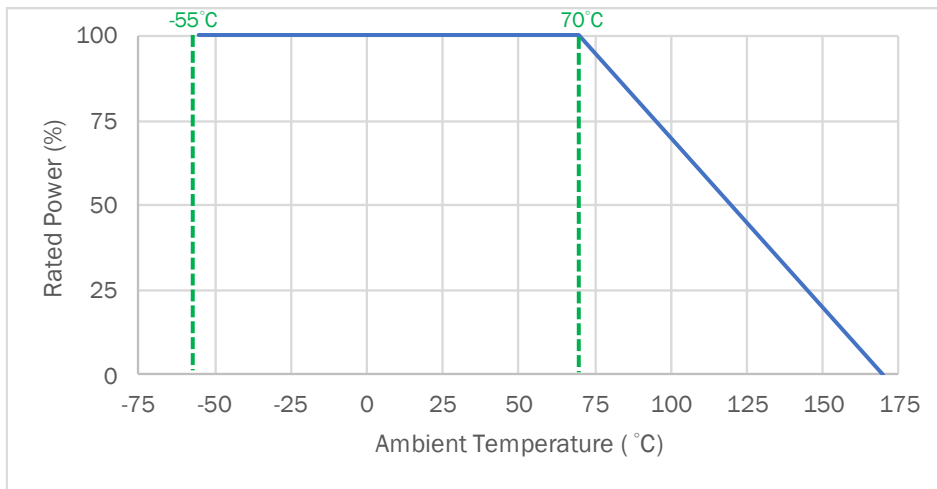
MRA2512 Series Current Sensing Resistor

Physical Specifications

Materials	Element: ① MnCu / SnMnCu / NiCu / FeCrAl Package: ② PI & Epoxy, ③ Epoxy Electrode: ④ Copper, plated with ⑤ Ni and ⑥ Sn
Solderability	MIL-STD-202



Thermal Derating Curve



Marking and Packaging Quantity

Chip Size & Wattage	Resistance (mΩ)	Part Number (Partially Listed)	Packing Quantity	Marking
2512 2W	0.5	MRA25P2SF0M50	4000	0m50
	0.75	MRA25P2SF0M75		0m75
	1	MRA25P2MFR001		R001
	1.5	MRA25P2MF1M50		1m50
	2	MRA25P2MFR002		R002
	2.5	MRA25P2MF2M50		2m50
	3	MRA25P2MFR003		R003
	4	MRA25P2MFR004		R004
	5	MRA25P2MFR005		R005
	6	MRA25P2MFR006		R006
	7	MRA25P2FFR007		R007
	8	MRA25P2FFR008		R008

MRA2512 Series Current Sensing Resistor

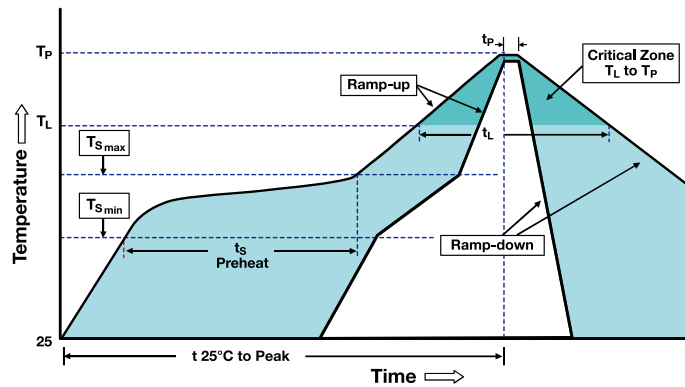
2512 3W	9	MRA25P2FFR009	4000	R009
	10	MRA25P2FFR010		R010
	0.5	MRA25P3SF0M50		0m50
	0.75	MRA25P3SF0M75		0m75
	1	MRA25P3MFR001		R001
	1.5	MRA25P3MF1M50		1m50
	2	MRA25P3MFR002		R002
	2.5	MRA25P3MF2M50		2m50
	3	MRA25P3MFR003		R003
	4	MRA25P3MFR004		R004
	5	MRA25P3MFR005		R005
	6	MRA25P3MFR006		R006
	7	MRA25P3FFR007		R007
	8	MRA25P3FFR008		R008
	9	MRA25P3FFR009		R009
	10	MRA25P3FFR010		R010

Soldering Parameters

Reflow Soldering	Pb-free assembly
Average Ramp-Up Rate ($T_{S_{max}}$ to T_P)	3°C/second max.
Preheat	
-Temperature Min ($T_{S_{min}}$)	150°C
-Temperature Max ($T_{S_{max}}$)	200°C
-Time ($T_{S_{min}}$ to $T_{S_{max}}$)	60-180 seconds
Time maintained above:	
-Temperature (T_L)	217°C
-Time (t_L)	60-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_P)	20 seconds max.
Ramp-Down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

Wave Soldering	260°C peak temperature, 10 second max.
Hand Soldering	350°C peak temperature, 3 second max.

Note: If temperatures exceed the recommended profile, devices may not meet the performance requirements.



MRA2512 Series Current Sensing Resistor

Reliability Test

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25°C /+150°C, 25°C is the reference temperature	As Spec
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	5 times of rated power	$\Delta R/R1 \leq \pm 0.5\%$
High Temperature Exposure	JIS-C5201-1 4.25 IEC 60068-2-2	At 170°C for 1000 hours.	$\Delta R/R1 \leq \pm 1.0\%$
Resistance to solder heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260°C± 5°C, duration time: 10sec	$\Delta R/R1 \leq \pm 0.5\%$
Thermal cycling	JESD22 Method JA-104	1000 Cycles (-55°C to +155°C) Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme.	$\Delta R/R1 \leq \pm 0.5\%$
Biased Humidity	MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion.	$\Delta R/R1 \leq \pm 0.5\%$
Load life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2°C, RCWV or Max. working voltage whichever is less for 1000 hours with 1.5 hours ON and 0.5 hour OFF.	$\Delta R/R1 \leq \pm 1.0\%$
Solderability	JIS-C-5201-1 4.17 IEC-60115-1 4.17	245±5°C for 3 seconds	> 95% coverage
Dielectric Withstanding Voltage	JIS-C5201-1 4.7	Apply 500VAC for 1 minute	No short or burned on the appearance
Core Body Strength	JIS-C5201-1 4.15	Central part pressurizing force: 5N, 10 seconds	No broken
Terminal Strength (SMD)	AEC Q200-006	Pressurizing force 17.7N for 60 seconds	No broken
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once 2mm for 10 seconds	$\Delta R/R1 \leq \pm 0.5\%$ No broken
Moisture resistance	MIL-STD 202 Method 106	T=24 hours per Cycle, 10 Cycles, unpowered. Steps 7a & 7b not required.	$\Delta R/R1 \leq \pm 0.5\%$

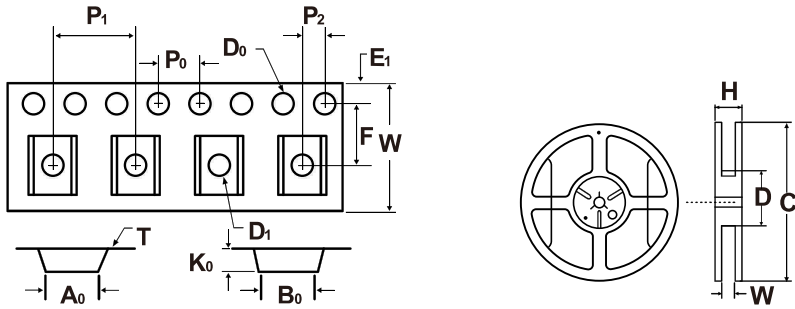
Storage

- The ambient temperature recommended for storage shall between 20°C~30°C.
- The relative humidity recommended for storage shall be between 40%RH~80%RH.
- Sealed plastic bags with desiccant shall be used to reduce the oxidation of the terminals 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.

MRA2512 Series Current Sensing Resistor

Tape & Reel Specification (mm.)

Devices are packaged per EIA481 and EIA-2 standard



Tape measurements

Size Type	W	F	E ₁	D ₀	D ₁	P ₀
2512 (0.5~1mΩ)	12.00 ± 0.30	5.50 ± 0.10	1.75 ± 0.10	1.50 ± 0.10	1.55 ± 0.10	4.00 ± 0.10
2512 (1.5~450mΩ)	12.00 ± 0.30	5.50 ± 0.10	1.75 ± 0.10	1.50 ± 0.10	1.55 ± 0.10	4.00 ± 0.10

Size Type	P ₁	P ₂	A ₀	B ₀	T	K ₀
2512 (0.5~1mΩ)	4.00 ± 0.10	2.00 ± 0.10	3.50 ± 0.10	6.75 ± 0.10	0.20 ± 0.05	1.10 ± 0.10
2512 (1.5~450mΩ)	4.00 ± 0.10	2.00 ± 0.10	3.50 ± 0.10	6.75 ± 0.10	0.20 ± 0.05	0.90 ± 0.10

Reel measurements

Size Type	H	W	D	C
2512	16.0 ± 1.0	13.2 ± 1.5	60.0 ± 1.5	178.0 ± 2.0