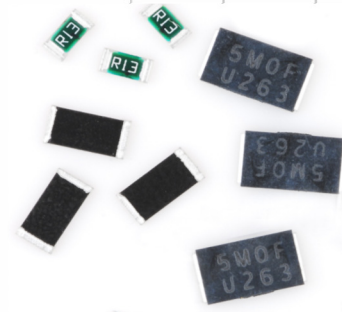


# 73M1A, 73M2A, 73M3x & 73M5 Series Current Sensing Resistor – Up To 5 Watts

## Features

- Metal Plate Construction – Copper Alloy
- 1 – 5 Watts Power Rating @ +70°C
- Resistance Range 0.25 – 120 milliohms
- Operating Temperature to +155°C
- EIA Standard Package Sizes
- Terminal Finish – Matte Tin [e3]
- Reflow Capable per JEDEC J-STD-020, +260°C Maximum
- Tape and Reel Packaging



## Applications

- Current Detection
- Current Limiting
- Regulated Battery Circuits
- Motor Control
- Power Supply
- Hard Disk Drives
- Inverter/Converter
- Industrial Equipment
- Infotainment Systems

## Description

73M1A, 73M2A, 73M3x and 73M5 Series Current Sensing Resistors are metal plate packaged devices that provides excellent accuracy for current detection. Each resistor has good electrical and thermal characteristics by using a special metallic resistor material.

## Ordering Information

Model		Resistor Value	Resistor Tolerance
73M	1A	R00025	F
↓		↓	↓
<u>Code</u>	<u>Type</u>	<u>Code</u>	<u>Resistor Value<sup>2</sup></u>
1A	1 Watt Rating	R00025	0.25 milliohms
2A	2 Watt Rating		
3A	3 Watt Rating		
3B	3 Watt Rating		
5	5 Watt Rating		
		<u>Code</u>	<u>Tolerance</u>
		F	±1%

Notes:

1. No dashes or spaces to appear in part number.
2. Resistor codes are 4, 5 or 6 characters. See Addendum for Standard EIA Values and Codes.

**Not all performance combinations and resistor values may be available.  
Contact your local CTS Representative or CTS Customer Service for availability.**

This product is specified for use only in standard commercial applications. Supplier disclaims all express and implied warranties and liability in connection with any use of this product in any non-commercial applications or in any application that may expose the product to conditions that are outside of the tolerances provided in its specification.



### Ordering Information

#### Part Number Examples

Tolerance/Value	Resistor Code F [ $\pm 1\%$ ]
1.5 milliohms	73M2AR0015F
0.25 milliohms	73M3AR00025F
50 milliohms	73M3BR050F
120 milliohms	73M5R120F

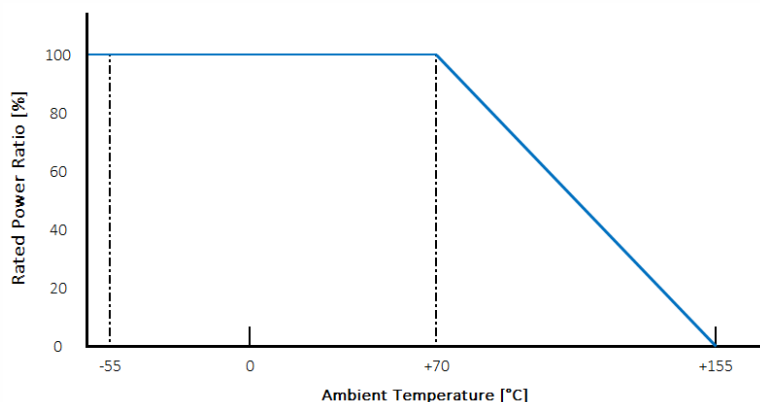
### Electrical & Environmental Specifications

#### Operating Conditions

Model Type	Rated Power [Watts]	Resistance Range [m $\Omega$ ]	Resistor Tolerance [%]	Temperature Coefficient	Rated Ambient Temperature	Operating Temperature Range
73M1A	1.0	1 - 50	$\pm 1$	R $\geq$ 0.010 $\Omega$ : $\pm 50$ ppm/ $^{\circ}$ C R < 0.010 $\Omega$ : $\pm 100$ ppm/ $^{\circ}$ C	+70 $^{\circ}$ C	-55 $^{\circ}$ C to +155 $^{\circ}$ C
73M2A	2.0	1 - 75	$\pm 1$	R < 0.010 $\Omega$ : $\pm 100$ ppm/ $^{\circ}$ C R $\geq$ 0.010 $\Omega$ : $\pm 50$ ppm/ $^{\circ}$ C	+70 $^{\circ}$ C	-55 $^{\circ}$ C to +155 $^{\circ}$ C
73M3A	3.0	0.25 - 3	$\pm 1$	R $\leq$ 0.001 $\Omega$ : $\pm 200$ ppm/ $^{\circ}$ C R > 0.001 $\Omega$ : $\pm 100$ ppm/ $^{\circ}$ C	+70 $^{\circ}$ C	-55 $^{\circ}$ C to +155 $^{\circ}$ C
73M3B	3.0	4 - 100	$\pm 1$	$\pm 50$ ppm/ $^{\circ}$ C	+70 $^{\circ}$ C	-55 $^{\circ}$ C to +155 $^{\circ}$ C
73M5	5.0	1 - 120	$\pm 1$	R < 0.010 $\Omega$ : $\pm 100$ ppm/ $^{\circ}$ C R $\geq$ 0.010 $\Omega$ : $\pm 50$ ppm/ $^{\circ}$ C	+70 $^{\circ}$ C	-55 $^{\circ}$ C to +155 $^{\circ}$ C

#### Power Derating Curve 73M1A, 73M2A, 73M3A, 73M3B – Typical

With the rated ambient temperature set to +70 $^{\circ}$ C, the maximum power [maximum current for 0 $\Omega$  product] at a temperature of no more than rated ambient temperature shall be equal to the rated power [rate current for 0 $\Omega$  product]. The maximum power at a temperature exceeding the rated ambient temperature shall be a value determined by reducing the rated power according to the power reduction curve in the figure below.

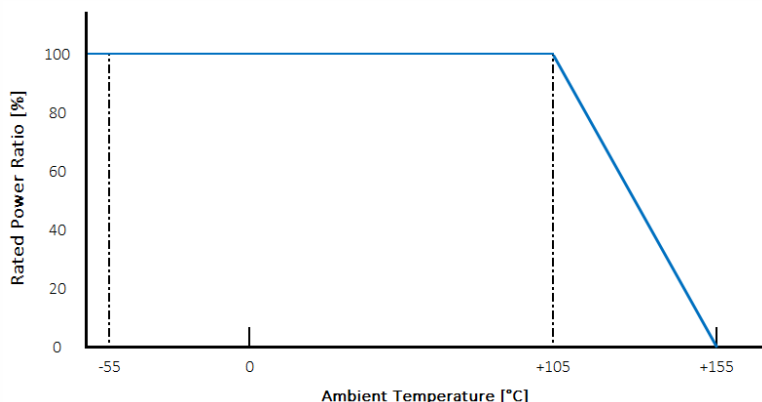




### Electrical & Environmental Specifications

#### Power Derating Curve 73M5 – Typical

With the rated ambient temperature set to +105°C, the maximum power [maximum current for 0Ω product] at a temperature of no more than rated ambient temperature shall be equal to the rated power [rate current for 0Ω product]. The maximum power at a temperature exceeding the rated ambient temperature shall be a value determined by reducing the rated power according to the power reduction curve in the figure below.



#### Rated Voltage

The rated voltage shall be the DC or AC [effective power frequency] voltage corresponding to the rated power and shall be determined with the formula shown below. If the determined rated voltage exceeds the maximum operating voltage specified in Operating Conditions table, the maximum operating voltage shall be the rated voltage.

$$E = \sqrt{P \times R}$$

E = Rated Voltage [V]  
 P = Rated Power [W]  
 R = Nominal Resistance [Ω]

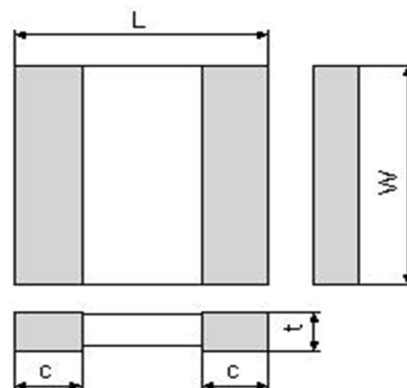
#### Environmental Parameters

Test	Maximum Delta R [%]		Test Description
	73M1A, 73M2A, 73M3A, 73M3B, 73M5		
<b>Resistance</b>	±1.0		Measurement current; 1A measured at +25°C [73M3A - 1A above 1mohm; 3A 1mohm or less]
<b>Temperature Coefficient</b>	±50ppm/°C, ≥ 10mΩ	[73M1A, 73M2A, 73M5]	Standard temperature at +25°C
	±100ppm/°C, ≥ 1mΩ	[73M3A]	
	±50ppm/°C	[73M3B]	
<b>Short-Time Overload</b>	±100ppm/°C, < 10mΩ	[73M1A, 73M2A, 73M5]	Measured temperature at +150°C
	±200ppm/°C, < 1mΩ	[73M3A]	
	±50ppm/°C	[73M3B]	
<b>Insulation Resistance</b>	±0.5	[73M1A, 73M2A, 73M3x]	Applied electric power equal to 3 times rated power in 5s [JIS C 5201-1 4.13]
<b>Dielectric Withstanding Voltage</b>	±2.0	[73M5]	Measured at terminals and center of resistor by D.C. 100V ±15V in 1 minute [JIS C 5201-1 4.6]
<b>Resistance to Solder Heat</b>	No Breakdown		Applied at terminals and center of resistor on A.C. 500V, 1 minute [JIS C 5201-1 4.7]
<b>Solderability</b>	±0.5		Place on copper sheet [t = 0.2mm] heated by solder, +260°C ±5°C, 5 ±0.5 seconds
<b>Vibration</b>	No Damage		Immerse terminal in solder [Sn3Ag0.5Cu], +245°C ±0.5°C, 3 ±0.5 seconds [JIS C 5201-1 4.17]
<b>Resistance to Solvent</b>	Over 95% Coverage		Frequency 10Hz to 55Hz, Pk-Pk amplitude 15mm, sweeping rate 1 minute, 3 directions each 2 hours [JIS C 5201-1 4.22]
<b>High Temperature Exposure</b>	No Damage		Immerse in Isopropyl alcohol, +20°C to +25°C, 60 ±5 seconds
<b>Change of Temperature</b>	±2.0		1,000 hours @ +155°C ±2°C, bias load 0% power [JIS C 5201-1 4.23.2]
<b>Moisture Resistance</b>	±0.5		30 minutes @ -55°C, 3 minutes @ +25°C, 30 minutes @ +155°C, 3 minutes @ +25°C; 5 cycles
<b>Bias Humidity</b>	No Damage		MIL-STD-202, Method 106, 0% power 7a and 7b not required, 1 cycle = 24 hours, 10 cycles
<b>Endurance [Rated Load]</b>	±1.0		1,000 hours @ +85°C ±2°C, 85% relative humidity, bias load 10%, on time 90 minutes/off time 30 minutes
	±2.0		1,000 hours @ +70°C ±3°C, bias load, on time 90 minutes/off time 30 minutes

## Mechanical Specifications

### Package Drawing/Dimensions

Model Type	Dimensions [mm]				Resistance [mΩ]
	L	W	t	c	
73M1A	3.2 ±0.3	1.6 ±0.3	0.6 ±0.3	0.5 ±0.3	-
73M2A	6.3 ±0.3	3.2 ±0.3	0.8 ±0.3	1.9 ±0.3	1.0 - 4.0
			0.6 ±0.3	1.1 ±0.3	4.1 - 75
73M3A	6.8 ±0.3	6.5 ±0.3	1.3 Max.		0.25, 0.50
			1.4 Max.	2.2 ±0.3	1.0
			1.3 Max.		1.5
				1.8 ±0.3	2.0
			1.2 Max.	1.6 ±0.3	2.5
73M3B	6.7 ±0.3	7.2 ±0.3	1.3 Max.	1.1 ±0.3	-
73M5	11.4 ±0.3	6.9 ±0.3	1.8 Max.	3.2 ±0.3	1.0 - 5.0
				1.8 ±0.3	5.1 - 120

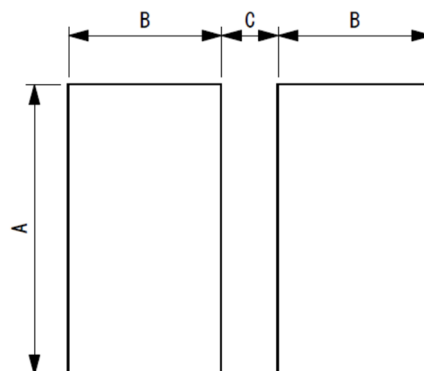


### Notes

- Terminal Details
  - Base Metal – Copper [Cu]
  - Barrier Plating – Nickel [Ni]
  - Finish Plating – Matte Tin [Sn]

### Recommended Pad Layout

Model Type	Dimensions [mm]			Resistance [mΩ]
	A	B	C	
73M1A	2.1	1.4	1.6	-
73M2A	3.7	2.8	1.9	1.0 - 4.0
		2.0	3.5	4.1 - 75
73M3A	7.1	3.8	1.4	0.25 - 1.5
		3.4	2.2	2.0
		3.2	2.6	2.5
		2.9	3.2	3.0
73M3B	7.8	2.7	3.5	-
73M5	7.5	4.8	4.0	1.0 - 5.0
		3.4	6.8	5.1 - 120



## Mechanical Specifications

### Marking Information

Model Type	Part Marking
<b>73M1A</b>	Rxxx = "R" is the decimal point and 3 digits [E24] are significant values. See resistor tables for codes.
<b>73M2A</b>	Rxxx = "R" is the decimal point and 3 digits [E24] are significant values. See resistor tables for codes. Nominal resistances that includes a decimal point; marking is denoted by "m" expressing a decimal point in milliohms and three digits. Ex. 1m50 [1.5 milliohms]
<b>73M3A</b> <b>73M3B</b>	Rxxx = "R" is the decimal point and 3 digits [E24] are significant values. See resistor tables for codes. Nominal resistances that includes a decimal point; marking is denoted by "m" expressing a decimal point in milliohms and three digits. Ex. 0m25 [0.25 milliohms]
<b>73M5</b>	Rxxx = "R" is the decimal point and 3 digits [E24] are significant values. See resistor tables for codes.

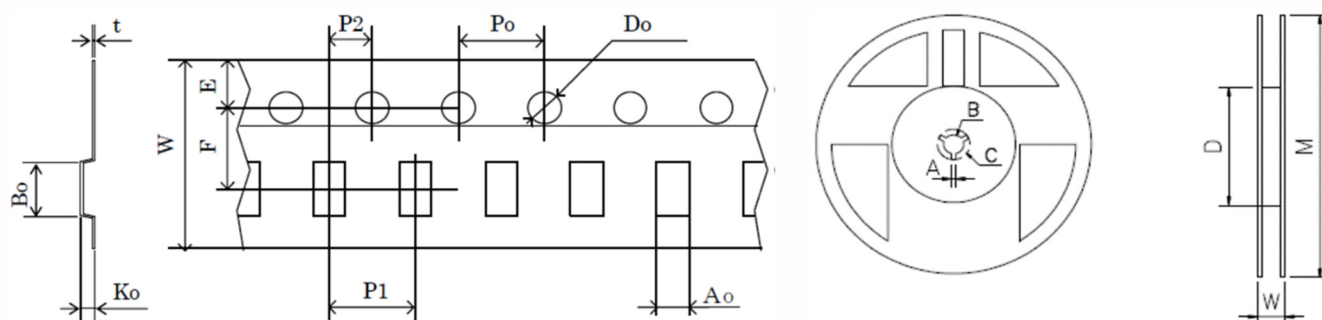
## Packaging

### Tape and Reel Information

#### Embossed Tape

[mm]

Model Type	W	P1	E	F	Do	Po	P2	Ao	Bo	Ko	t
<b>73M1A</b>	8.0 ±0.15	4.0 ±0.1	1.75 ±0.10	3.5 ±0.1	1.55 ±0.05	4.0 ±0.1	2.0 ±0.1	1.83 ±0.10	3.48 ±0.10	0.9 ±0.1	0.20 ±0.05
<b>73M2A</b>	12.0 ±0.15	4.0 ±0.1	1.75 ±0.10	5.5 ±0.1	1.55 ±0.05	4.0 ±0.1	2.0 ±0.1	3.50 ±0.10	6.74 ±0.10	1.1 ±0.1	0.20 ±0.05
<b>73M3A</b>	12.0 ±0.15	8.0 ±0.1	1.75 ±0.10	5.5 ±0.1	1.50 ±0.05	4.0 ±0.1	2.0 ±0.1	6.75 ±0.10	7.15 ±0.10	1.7 ±0.1	0.25 ±0.05
<b>73M3B</b>	12.0 ±0.15	12.0 ±0.1	1.75 ±0.10	5.5 ±0.1	1.55 ±0.05	4.0 ±0.1	2.0 ±0.1	7.70 ±0.10	7.15 ±0.10	1.2 ±0.1	0.25 ±0.05
<b>73M5</b>	24.0 ±0.30	12.0 ±0.1	1.75 ±0.10	11.5 ±0.1	1.55 ±0.05	4.0 ±0.1	2.0 ±0.1	7.20 ±0.10	11.80 ±0.10	1.7 ±0.1	0.30 ±0.10



#### Reel

[mm]

Model Type	Quantity Per Reel	W	M	A	B	C	D
<b>73M1A</b>	4,000	12.0 ±0.5	178 ±0.1	2.0 ±0.5	13.2 ±0.5	21.7 ±0.5	60.0 ±0.5
<b>73M2A</b>	4,000	16.2 ±0.5	178 ±0.1	2.5 ±0.6	13.5 ±0.6	21.9 ±0.6	60.0 ±0.5
<b>73M3A</b>	1,000	16.2 ±0.5	178 ±0.1	2.5 ±0.6	13.5 ±0.6	21.9 ±0.6	60.0 ±0.5
<b>73M3B</b>	1,000	16.2 ±0.5	178 ±0.1	2.5 ±0.6	13.5 ±0.6	21.9 ±0.6	60.0 ±0.5
<b>73M5</b>	500	24.4 +2.0 -0.0	178 ±0.1	2.5 ±0.6	13.5 ±0.6	21.9 ±0.6	60.0 ±0.5



# 73M1A, 73M2A, 73M3x & 73M5 Series

Current Sensing Resistor – Up To 5 Watts

## Addendum

Standard EIA Codes and Resistor Values - E-24 [4, 5, 6-Digit Resistor Code for F Tolerances]

CODE	OHMS	CODE	OHMS	CODE	OHMS	CODE	OHMS
R00025	0.00025	R009	0.00900	R030	0.03000	R082	0.08200
R0005	0.00050	R010	0.01000	R033	0.03300	R091	0.09100
R001	0.00100	R011	0.01100	R036	0.03600	R100	0.10000
R0015	0.00150	R012	0.01200	R039	0.03900	R110	0.11000
R002	0.00200	R013	0.01300	R043	0.04300	R120	0.12000
R0025	0.00250	R015	0.01500	R047	0.04700		
R003	0.00300	R016	0.01600	R050	0.05000		
R004	0.00400	R018	0.01800	R051	0.05100		
R005	0.00500	R020	0.02000	R056	0.05600		
R006	0.00600	R022	0.02200	R062	0.06200		
R007	0.00700	R024	0.02400	R068	0.06800		
R008	0.00800	R027	0.02700	R075	0.07500		