

# Moulded Surface Mount Wirewound Resistors

## WSM Series

- Flexible Terminations
- All welded construction
- Ideal for automatic pick and place
- Lead free, RoHS compliant construction only
- Contact factory for ohmic values above published ranges



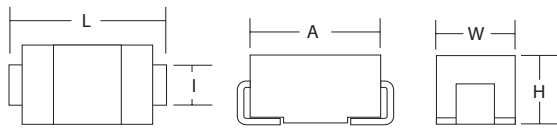
All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

## Electrical Data

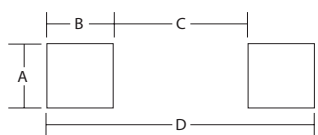
|                           |        | WSM1                      | WSM2                      | WSM3                                               |
|---------------------------|--------|---------------------------|---------------------------|----------------------------------------------------|
| Power rating at 70°C      | watts  | 1                         | 2                         | 3                                                  |
| Resistance range          | ohms   | 0R01 to 400R              | 0R01 to 1K                | 0R05 to 3K                                         |
| Limiting element voltage  | volts  | 100                       |                           |                                                    |
| TCR                       | ppm/°C | < 1 Ω : 100<br>≥ 1 Ω : 20 | < 1 Ω : 100<br>≥ 1 Ω : 20 | ≤ 0.3 Ω 700<br>≤ 0.1 Ω : 200<br>≤ 10R 100 > 10R 20 |
| Resistance tolerance      | %      | *1, 2, 5, 10              |                           |                                                    |
| Standard values           |        | E24 preferred             |                           |                                                    |
| Ambient temperature range | °C     | -55 to 275°C              |                           |                                                    |

\*Note 1% and 5% preferred. WSM1 available at 5% only below 1R0. WSM2 available at 5% only below 0R05.

## Physical Data

| Dimensions Inches (mm) |                         |                        |                         |                        |                         |  |
|------------------------|-------------------------|------------------------|-------------------------|------------------------|-------------------------|--------------------------------------------------------------------------------------|
| Type                   | L max                   | I Nom                  | A Max                   | W Max                  | H Max                   |                                                                                      |
| WSM1                   | 0.310 max<br>(7.9 max)  | 0.115 max<br>(2.9 max) | 0.275 max<br>(7.0 max)  | 0.165 max<br>(4.2 max) | 0.155 max<br>(3.94 max) |                                                                                      |
| WSM2                   | 0.462 max<br>(11.7 max) | 0.137 max<br>(3.5 max) | 0.425 max<br>(10.8 max) | 0.260 max<br>(6.6 max) | 0.195 max<br>(5.0 max)  |                                                                                      |
| WSM3                   | 0.677 max<br>(17.2 max) | 0.137 max<br>(3.5 max) | 0.64 max<br>(16.3 max)  | 0.29 max<br>(7.4 max)  | 0.265 inch<br>(6.7 max) |                                                                                      |

## Recommended Pad Sizes

| Type | A                      | B                      | C                      | D                       |  |
|------|------------------------|------------------------|------------------------|-------------------------|--------------------------------------------------------------------------------------|
| WSM1 | 0.13 inch<br>(3.3 mm)  | 0.138 inch<br>(3.5 mm) | 0.074 inch<br>(1.9 mm) | 0.35 inches<br>(8.9 mm) |                                                                                      |
| WSM2 | 0.157 inch<br>(4.0 mm) | 0.181 inch<br>(4.6 mm) | 0.221 inch<br>(5.6 mm) | 0.583 inch<br>(14.8 mm) |                                                                                      |
| WSM3 | 0.157 inch<br>(4.0 mm) | 0.236 inch<br>(6.2 mm) | 0.378 inch<br>(9.6 mm) | 0.85 inch<br>(21.6 mm)  |                                                                                      |

## Construction

A high purity ceramic substrate is assembled with interference fit end caps to which are welded the terminations. The resistive element is wound on the substrate and welded to the caps. The unit is then moulded.

## Flammability

The resistor coating is a flame retardant epoxy to UL 94.

## Marking

WSM resistors are legend marked with type value and tolerance.

WSM1 Resistors are marked with value and tolerance.

## Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuits.

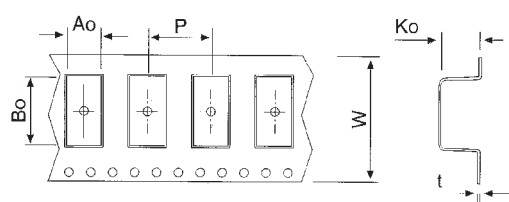
## General Note

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## Packing Data

| Dimensions (mm) |      |       |      |    |    |      |
|-----------------|------|-------|------|----|----|------|
|                 | Ao   | Bo    | Ko   | W  | P  | t    |
| <b>WSM1</b>     | 4.2  | 7.62  | 4.2  | 16 | 8  | 0.36 |
| <b>WSM2</b>     | 6.75 | 11.95 | 5.22 | 24 | 12 | 0.36 |
| <b>WSM3</b>     | 7.3  | 18.3  | 6.7  | 32 | 12 | 0.4  |



All other dimensions as per EIA481 standard

## Performance Data

|                                  |                  |      | WSM1          | WSM2       | WSM3         |
|----------------------------------|------------------|------|---------------|------------|--------------|
| Load at rated power:             | 1000 hrs @ 70°C  | ΔR%  | 2 ± 0.001Ω    | 2 ± 0.001Ω | 3 ± 0.001Ω   |
| Dry heat                         | 1000 hrs @ 155°C | ΔR%  | 2 ± 0.001Ω    | 2 ± 0.001Ω | 3 ± 0.001Ω   |
| Short term overload              |                  | ΔR%  | 2 ± 0.001Ω    |            |              |
| Derating from rated power @ 70°C |                  |      | zero at 275°C |            |              |
| Moisture                         |                  | ΔR%  | 1 ± 0.001Ω    | 1 ± 0.001Ω | 1.5 ± 0.001Ω |
| Temperature cycling              |                  | ΔR%  | 1 ± 0.001Ω    |            |              |
| Resistance to solder heat        |                  | ΔR%  | 1 ± 0.001Ω    |            |              |
| Isolation voltage                |                  | V    | 1,000         |            |              |
| Insulation resistance            |                  | ohms | >1000M        |            |              |
| Substrate bend                   |                  | ΔR%  | 0.2 ± 0.001Ω  |            |              |

Note: The power ratings to be applied depend upon the board used and the ambient temperature.

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## Ordering Procedure

This product has two valid part numbers:

**European (Welwyn) Part Number: WSM3-6K8FI** (WSM3, 6.8 kilohms  $\pm 1\%$ , Pb-free)

|   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
| W | S | M | 3 | - | 6 | K | 8 | F | I |
| 1 |   |   |   | 2 |   | 3 | 4 |   |   |

| 1<br>Type | 2<br>Value           | 3<br>Tolerance | 4<br>Packing & Termination Finish |
|-----------|----------------------|----------------|-----------------------------------|
| WSM1      | E24 = 3/4 characters | F = $\pm 1\%$  | I = Standard packing & Pb-free    |
| WSM2      | R = ohms             | G = $\pm 2\%$  | WSM1 1500/reel (13" 330mm)        |
| WSM3      | K = kilohms          | J = $\pm 5\%$  | WSM2 800/reel (13" 330mm)         |
|           |                      | K = $\pm 10\%$ | WSM3 750/reel (13" 330mm)         |

**USA (IRC) Part Number: WSM36801FLFTR** (WSM3, 6.8 kilohms  $\pm 1\%$ , Pb-free)

|   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W | S | M | 3 | 6 | 8 | 0 | 1 | F | L | F | T | R |
| 1 |   |   | 2 |   |   | 3 | 4 | 5 |   |   |   |   |

| 1<br>Type | 2<br>Value                    | 3<br>Tolerance | 4<br>Termination Finish | 5<br>Packing               |
|-----------|-------------------------------|----------------|-------------------------|----------------------------|
| WSM1      | 3 digits + multiplier         | F = $\pm 1\%$  | LF = Pb-free            | TR = Tape & Reel           |
| WSM2      | R = ohms for values <100 ohms | G = $\pm 2\%$  |                         | WSM1 1500/reel (13" 330mm) |
| WSM3      |                               | J = $\pm 5\%$  |                         | WSM2 800/reel (13" 330mm)  |
|           |                               | K = $\pm 10\%$ |                         | WSM3 750/reel (13" 330mm)  |

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