

## Soft Ferrites

## Multilayer suppressors

### MULTILAYER SUPPRESSORS

Multilayer suppressors are a powerful solution for EMI/RFI attenuation for electronic equipment. Supplied in four standard sizes (0603, 0805, 1206 and 1806), they have impedances between 30 and 1 000  $\Omega$  at 100 MHz.

When installed in series with signal and/or power circuits, high frequency noise is suppressed. There is no need for ground termination, which makes these devices very suitable for circuits with difficult ground. Typical suppression frequencies range from 10 MHz to 1 000 MHz and rated currents are between 0.1 and 0.6 A.

Multilayer suppressors are specially designed to reduce noise in low impedance circuits while keeping the signal free from distortion. This is because at the interfering frequencies these components behave as a resistor. The high frequency noise is converted into heat rather than reflected to the source. This dissipation prevents ringing and parasitic oscillations.

These characteristics can be used for many different purposes:

- Absorption of generated noise.
- Filtering and wave-shape correction of digital signals from high speed clock oscillators.
- Prevention of high frequency interference entering circuit electronics.

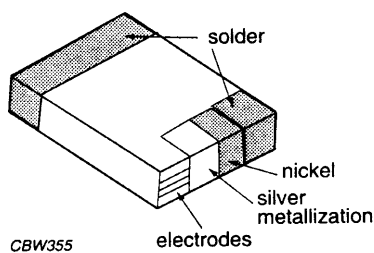


Fig.1 Structure of electrodes.

### Product construction

The use of silver for electrodes and terminations in multilayer suppressors ensures high electrical conductivity, which minimizes heat generation and crosstalk.

The internal construction can be single layer or multilayer, depending on impedance requirements. Single layer products have a meander design and are suitable for lower impedances, while multilayer types have alternating layers of ferrite and conductor stacked up to achieve higher impedance levels.

The terminal electrode forms a conductive connection to the circuit. It is formed by three layers:

- Silver: for good conductivity
- Nickel: to protect silver termination against leaching
- Tin-lead: applied to ensure good solderability.

The products are suitable for both reflow and wave soldering.

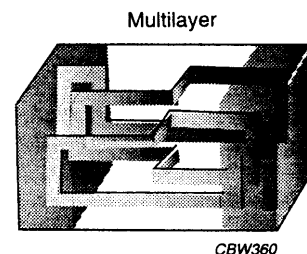
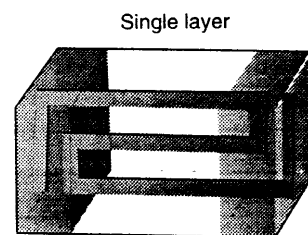


Fig.2 Internal structure of multilayer suppressors.

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## TYPE NUMBER STRUCTURE

Type numbers for these products consist of the following:

- Product type
- Size
- Material
- Impedance.

## Product type

MLS: multilayer suppressor.

## Size

0603:  $1.6 \times 0.80$  mm

0805:  $2.0 \times 1.25$  mm

1206:  $3.2 \times 1.60$  mm

1806:  $4.5 \times 1.60$  mm.

## Material

4S4

4S7

## Impedance value

Expressed in ohms ( $\Omega$ )

First two digits are significant figures

Last digit is the number of zeros to follow.

## EXAMPLES

600:  $60 \Omega$

101:  $100 \Omega$

121:  $120 \Omega$

151:  $150 \Omega$

301:  $300 \Omega$

102:  $1000 \Omega$

Example of the ordering code: MLS0603-4S7-600

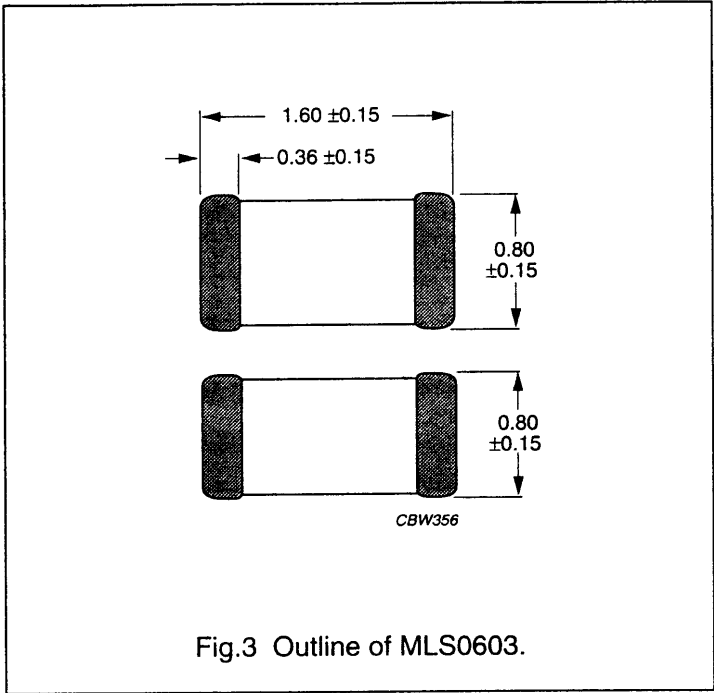
| TYPE | SIZE | MATERIAL | IMPEDANCE |
|------|------|----------|-----------|
| MLS  | 0603 | 4S7      | 60        |

Standard products are delivered taped on reel and have a tolerance on impedance of 25%. For different specifications a fifth group is added to the type number.

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MLS0603

MULTILAYER SUPPRESSORS MLS0603



Mass

Approximately 5 mg.

Product specifications

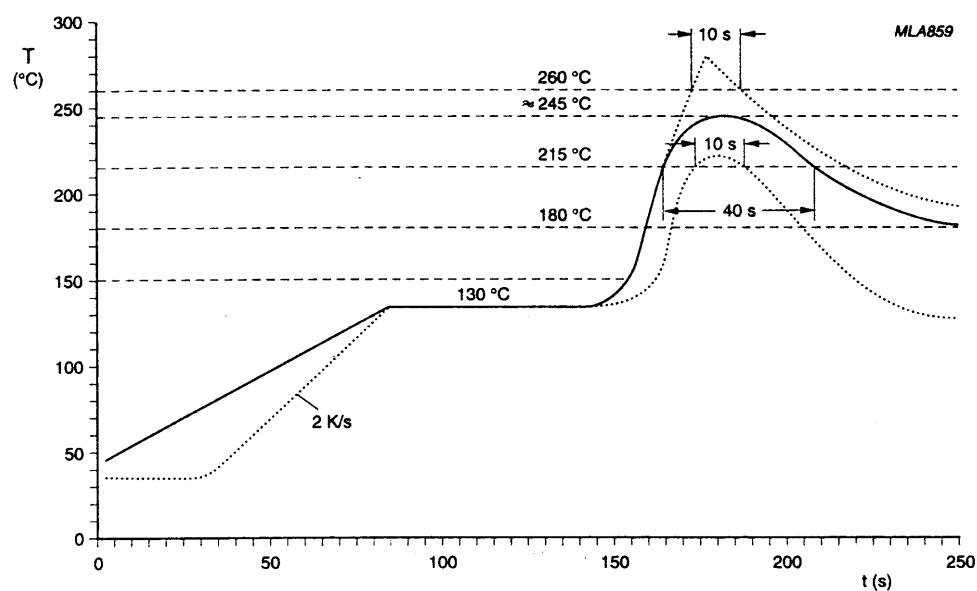
| GRADE | SIZE | Z  at 100 MHz<br>(Ω) | R <sub>DC</sub> MAX.<br>(Ω) | I MAX.<br>(mA) | TYPE NUMBER        |
|-------|------|----------------------|-----------------------------|----------------|--------------------|
| 4S7   | 0603 | 60                   | 0.2                         | 300            | MLS0603-4S7-600des |
|       |      | 100                  | 0.3                         | 250            | MLS0603-4S7-101des |
|       |      | 120                  | 0.3                         | 250            | MLS0603-4S7-121des |
|       |      | 150                  | 0.3                         | 250            | MLS0603-4S7-151des |
|       |      | 300                  | 0.35                        | 230            | MLS0603-4S7-301des |
|       |      | 600                  | 0.45                        | 210            | MLS0603-4S7-601des |
|       |      | 1000                 | 0.6                         | 190            | MLS0603-4S7-102des |

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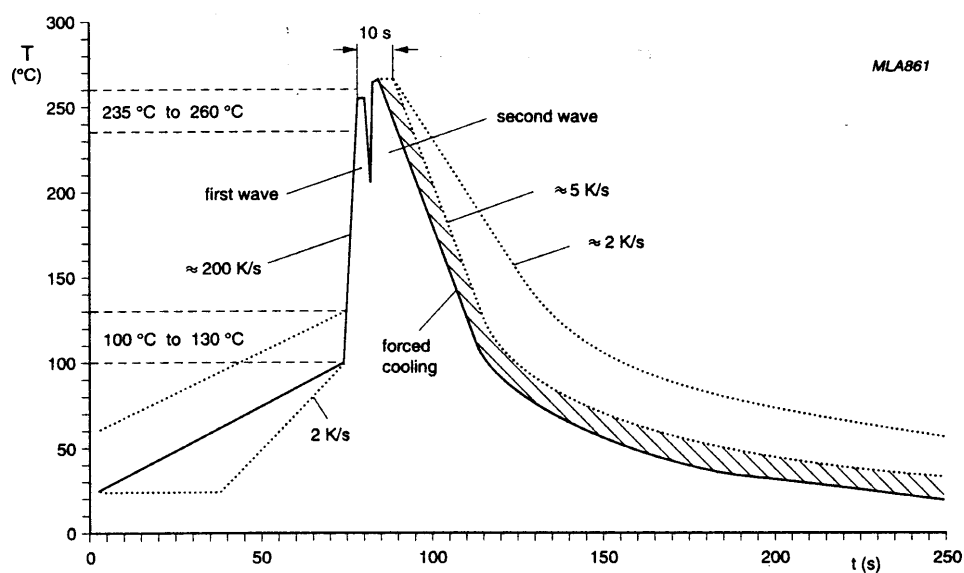
## MOUNTING

## Soldering profiles



Typical values (solid line).  
Process limits (dotted lines).

Fig.7 Reflow soldering.



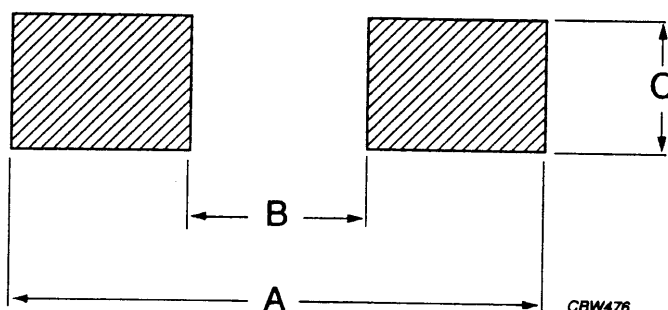
Typical values (solid line).  
Process limits (dotted lines).

Fig.8 Double wave soldering.

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## Dimensions of solderlands



CBW476

For dimensions see Table 1.

Fig.9 Recommended dimensions of solder lands.

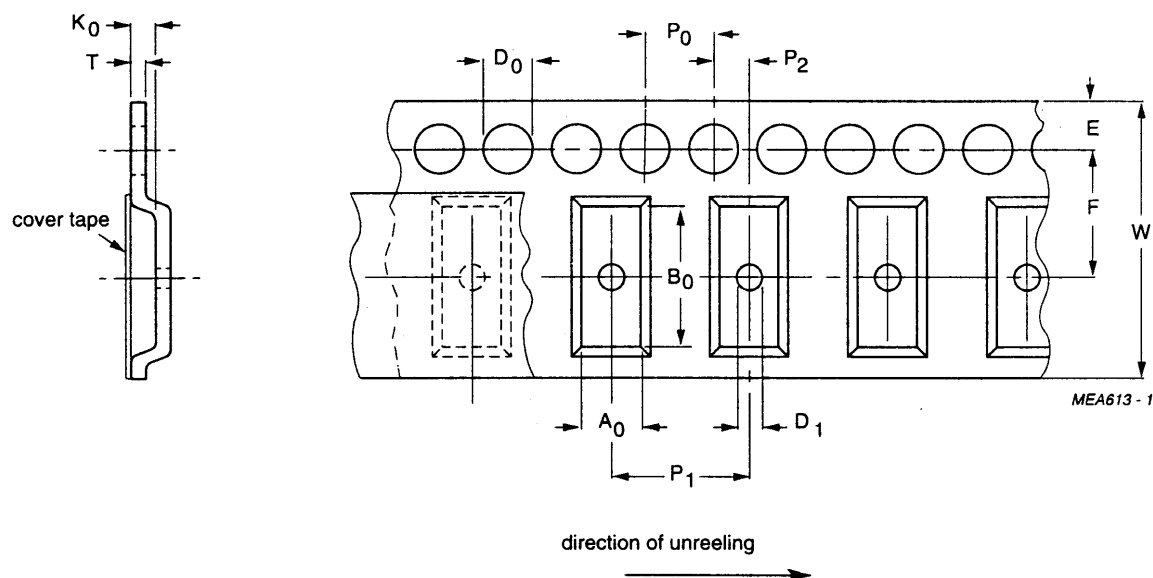
Table 1 Solder land dimensions; see Fig.9

| CASE<br>SIZE | FOOTPRINT DIMENSIONS<br>(mm) |     |      |
|--------------|------------------------------|-----|------|
|              | A                            | B   | C    |
| 0603         | 2.1                          | 0.7 | 0.7  |
| 0805         | 2.6                          | 1.0 | 1.0  |
| 1206         | 4.4                          | 2.2 | 1.35 |
| 1806         | 6.0                          | 3.0 | 1.35 |

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## BLISTER TAPE AND REEL DIMENSIONS



MEA613 - 1

For dimensions see Table 2.

Fig.10 Blister tape.

**Table 2** Dimensions of blister tape for relevant product size code; see Fig.10

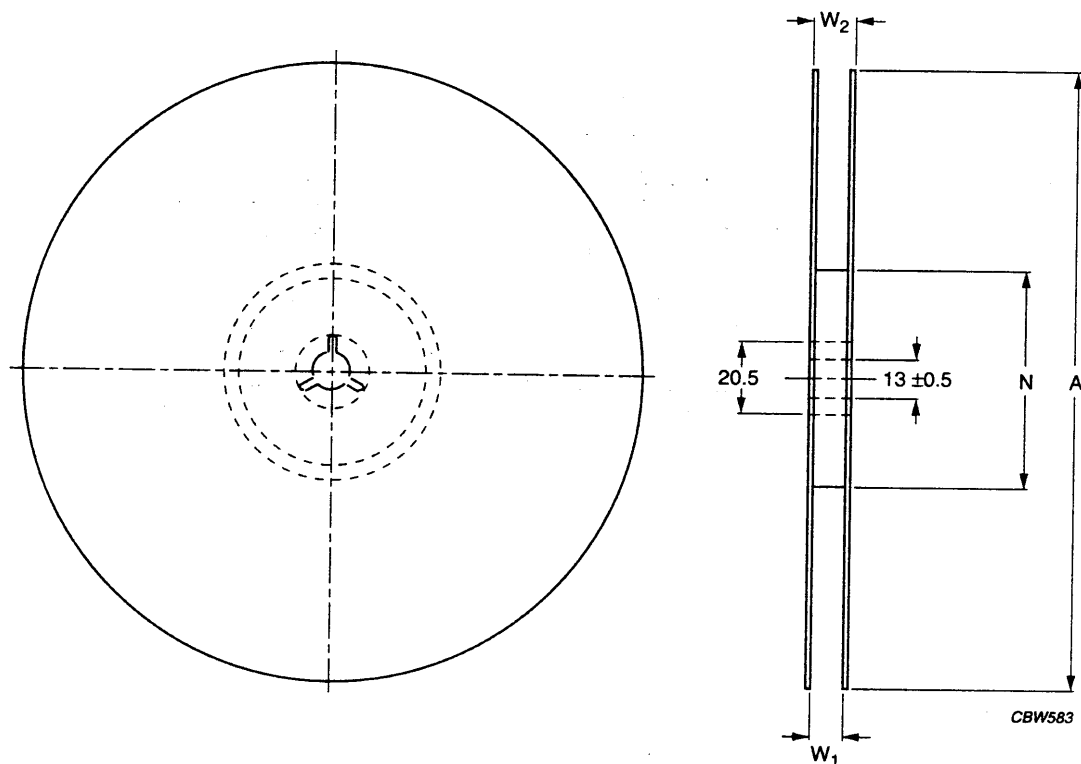
| DIMENSION                       | PRODUCT SIZE CODE |               |               |                |
|---------------------------------|-------------------|---------------|---------------|----------------|
|                                 | 0603              | 0805          | 1206          | 1806           |
| $A_0$                           | $1.1 \pm 0.1$     | $1.6 \pm 0.1$ | $2.0 \pm 0.1$ | $2.0 \pm 0.1$  |
| $B_0$                           | $1.9 \pm 0.1$     | $2.4 \pm 0.1$ | $3.6 \pm 0.1$ | $5.0 \pm 0.2$  |
| $K_0$ minimum clearance; note 1 | 1.1               | 1.2           | 1.2           | 2.0            |
| $W$                             | $8.0 \pm 0.2$     | $8.0 \pm 0.2$ | $8.0 \pm 0.2$ | $12.0 \pm 0.3$ |
| $E$                             | —                 | —             | —             | —              |
| $F$                             | —                 | —             | —             | —              |
| $D_{0 \text{ min}}$             | 0.5               | 0.5           | 0.5           | 0.5            |
| $D_{1 \text{ min}}$             | 0.5               | 0.5           | 0.5           | 0.5            |
| $P_0$                           | 4.0               | 4.0           | 4.0           | 8.0            |
| $P_1$                           | $4.0 \pm 0.1$     | $4.0 \pm 0.1$ | $4.0 \pm 0.1$ | $4.0 \pm 0.1$  |
| $P_2$                           | —                 | —             | —             | —              |
| $T_{\text{max}}$                | 0.3               | 0.3           | 0.3           | 0.3            |

**Note**

1. Typical product displacement in pocket.

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Dimensions in mm.  
For dimensions see Table 3.

Fig.11 Reel.

Table 3 Reel dimensions; see Fig.11

| TAPE<br>WIDTH | DIMENSIONS (mm) |           |                |                |
|---------------|-----------------|-----------|----------------|----------------|
|               | A               | N<br>MIN. | W <sub>1</sub> | W <sub>2</sub> |
| 8             | 178 ±2          | 50        | 10 ±1.5        | —              |
| 12            |                 |           | 14 ±1.5        | —              |