

# DATA SHEET

## **Multilayer suppressors EMI-suppression products**

Supersedes data of April 2018

2018 October 11

**MULTILAYER SUPPRESSORS**

Multilayer suppressors are a powerful solution for EMI/RFI attenuation for electronic equipment. Supplied in seven standard sizes (0402, 0603, 0805, 1206, 1210, 1806 and 1812), they have impedances between 6 and 2 000  $\Omega$  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 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.

**Features**

- Monolithic structure for closed magnetic path and high reliability
- Standard EIA and EIAJ sizes: 0402, 0603, 0805, 1206, 1210, 1806 and 1812
- High impedance per volume which leads to effective high density circuits
- Suitable for wave and reflow soldering
- Plating material lead-free
- Wide range of impedance values
- Superior physical properties
- Available in standard EIA and EIAJ tape-and-reel
- Operating temperature -40°C to +125°C
- 100% sorting out on impedance

**Main applications areas for multilayer suppressors are:**

- computer and peripheral equipment: mother board, notebook, DVD-RW, scanner, hard disc, VGA card, sound card, LCD monitor, printer, PC server thumb drive, PCMCIA card, graphic card, etc.
- network: LAN card, hub, switcher, router set top box, etc.
- telecom: cell phone, ADSL, wired modem, cable modem, ISDN, GPS satellite receiver, etc.
- consumer: digital still camera (DSC), sound system, HDTV, projector, DVD player, VCD player, tuner for TV, cable modem, etc.

Contact Ferroxcube office to get samples.

## EMI-suppression products

## Multilayer Suppressors

**TYPE NUMBER STRUCTURE**

Type numbers for these products consist of the following:

- Product type
- Size
- Impedance.

**Product type**

MLS: Multilayer Suppressor.

MLP: Multilayer Power Beads.

MLN: Multilayer Narrow Band.

**Size**

0402: 1.0 × 0.5 × 0.5 mm  
 0603: 1.6 × 0.8 × 0.8 mm  
 0805: 2.0 × 1.25 × 0.9 mm  
 1206: 3.2 × 1.6 × 1.1 mm  
 1210: 3.2 × 2.5 × 1.3 mm  
 1806: 4.5 × 1.6 × 1.6 mm  
 1812: 4.5 × 3.2 × 1.5 mm.

**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  $\Omega$

**Multilayer Suppressor MLS0603-4S7-600**

TYPE	SIZE	INTERNAL CODE	IMPEDANCE
MLS	0603	4S7	60

**Multilayer Power Bead MLP0603-121**

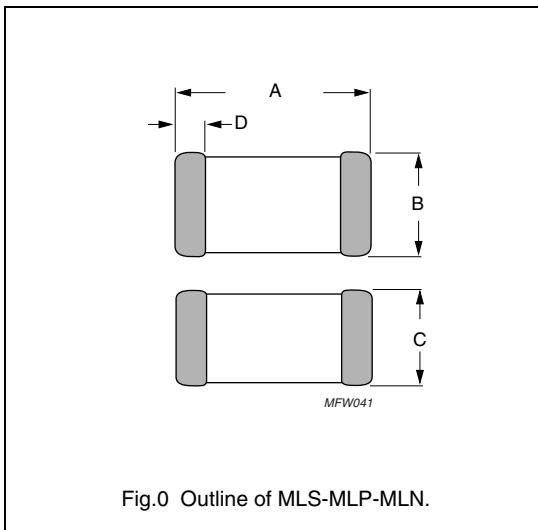
TYPE	SIZE	IMPEDANCE
MLP	0603	120

**Multilayer Narrow Band MLN0603-601**

TYPE	SIZE	IMPEDANCE
MLN	0603	600

Standard products are delivered taped on reel and have a tolerance on impedance of 25%.

**MULTILAYER SUPPRESSORS**



**PRODUCT DIMENSIONS OF MULTILAYER SUPPRESSORS MLS - MLP - MLN**

SIZE	A	B	C	D	mass (mg)
0402	1.0 ± 0.15	0.5 ± 0.15	0.5 ± 0.15	0.25 ± 0.15	≈ 1
0603	1.6 ± 0.20	0.8 ± 0.15	0.8 ± 0.15	0.3 ± 0.20	≈ 5
0805	2.0 ± 0.20	1.25 ± 0.20	0.9 ± 0.20	0.5 ± 0.30	≈ 11
1206	3.2 ± 0.20	1.6 ± 0.20	1.1 ± 0.20	0.5 ± 0.30	≈ 28
1210	3.2 ± 0.20	2.5 ± 0.20	1.3 ± 0.20	0.5 ± 0.30	≈ 50
1806	4.5 ± 0.25	1.6 ± 0.20	1.6 ± 0.20	0.5 ± 0.30	≈ 55
1812	4.5 ± 0.25	3.2 ± 0.20	1.5 ± 0.20	0.5 ± 0.30	≈ 100

## EMI-suppression products

## Multilayer suppressors

## Product specifications Multilayer Suppressors MLS

SIZE	$ Z_{typ} $ at 100 MHz ( $\Omega$ )	$R_{DC}$ MAX. ( $\Omega$ )	I MAX. (mA)	TYPE NUMBER	
0402	6 $\pm$ 25%	0.05	500	MLS0402-4S4-060	des
	10 $\pm$ 25%	0.05	500	MLS0402-4S4-100	des
	40 $\pm$ 25%	0.3	300	MLS0402-4S4-400	des
	80 $\pm$ 25%	0.4	200	MLS0402-4S4-800	des
	120 $\pm$ 25%	0.5	200	MLS0402-4S4-121	des
	240 $\pm$ 25%	0.5	200	MLS0402-4S4-241	des
	480 $\pm$ 25%	0.8	100	MLS0402-4S4-481	des
0603	11 $\pm$ 25%	0.05	500	MLS0603-4S4-110	des
	19 $\pm$ 25%	0.08	500	MLS0603-4S4-190	des
	30 $\pm$ 25%	0.1	400	MLS0603-4S7-300	des
	40 $\pm$ 25%	0.1	400	MLS0603-4S7-400	des
	60 $\pm$ 25%	0.1	300	MLS0603-4S7-600	des
	80 $\pm$ 25%	0.15	300	MLS0603-4S7-800	des
	100 $\pm$ 25%	0.25	300	MLS0603-4S7-101	des
	120 $\pm$ 25%	0.25	300	MLS0603-4S7-121	des
	150 $\pm$ 25%	0.3	200	MLS0603-4S7-151	des
	220 $\pm$ 25%	0.3	200	MLS0603-4S7-221	des
	300 $\pm$ 25%	0.4	200	MLS0603-4S7-301	des
	450 $\pm$ 25%	0.5	200	MLS0603-4S7-451	des
	600 $\pm$ 25%	0.5	200	MLS0603-4S7-601	des
	750 $\pm$ 25%	0.7	200	MLS0603-4S7-751	des
	1000 $\pm$ 25%	0.7	200	MLS0603-4S7-102	des
1500 $\pm$ 25%	1	50	MLS0603-4S4-152	des	
0805	7 $\pm$ 25%	0.1	600	MLS0805-4S4-070	des
	9 $\pm$ 25%	0.1	600	MLS0805-4S4-090	des
	11 $\pm$ 25%	0.1	600	MLS0805-4S4-110	des
	17 $\pm$ 25%	0.1	600	MLS0805-4S4-170	EOL
	30 $\pm$ 25%	0.1	600	MLS0805-4S4-300	EOL
	60 $\pm$ 25%	0.15	500	MLS0805-4S4-600	des
	70 $\pm$ 25%	0.15	500	MLS0805-4S7-700	des
	80 $\pm$ 25%	0.15	500	MLS0805-4S7-800	des
	120 $\pm$ 25%	0.25	300	MLS0805-4S7-121	des
	150 $\pm$ 25%	0.25	300	MLS0805-4S7-151	des
	220 $\pm$ 25%	0.3	300	MLS0805-4S7-221	des
	300 $\pm$ 25%	0.3	300	MLS0805-4S7-301	des
	400 $\pm$ 25%	0.3	300	MLS0805-4S7-401	des
	500 $\pm$ 25%	0.4	300	MLS0805-4S7-501	des
	600 $\pm$ 25%	0.4	300	MLS0805-4S7-601	des
750 $\pm$ 25%	0.5	200	MLS0805-4S4-751	des	

## EMI-suppression products

## Multilayer suppressors

SIZE	$ Z_{typ} $ at 100 MHz ( $\Omega$ )	$R_{DC}$ MAX. ( $\Omega$ )	I MAX. (mA)	TYPE NUMBER	
0805	1000 $\pm$ 25%	0.5	200	MLS0805-4S7-102	des
	1500 <sup>(1)</sup> $\pm$ 25%	0.6	200	MLS0805-4S7-152	des
	1500 $\pm$ 25%	0.4	400	MLS0805-4S8-152	des
	2000 $\pm$ 25%	0.8	100	MLS0805-4S4-202	des
1206	19 $\pm$ 25%	0.05	600	MLS1206-4S4-190	des
	26 $\pm$ 25%	0.05	600	MLS1206-4S4-260	des
	30 $\pm$ 25%	0.05	600	MLS1206-4S4-300	EOL
	50 $\pm$ 25%	0.1	500	MLS1206-4S4-500	EOL
	60 $\pm$ 25%	0.1	500	MLS1206-4S4-600	EOL
	70 $\pm$ 25%	0.1	500	MLS1206-4S4-700	des
	90 $\pm$ 25%	0.15	500	MLS1206-4S4-900	des
	120 $\pm$ 25%	0.15	500	MLS1206-4S4-121	des
	150 $\pm$ 25%	0.15	500	MLS1206-4S4-151	des
	200 $\pm$ 25%	0.2	400	MLS1206-4S4-201	des
	400 $\pm$ 25%	0.2	400	MLS1206-4S4-401	des
	500 $\pm$ 25%	0.2	400	MLS1206-4S4-501	des
	600 $\pm$ 25%	0.3	400	MLS1206-4S4-601	des
	1000 <sup>(1)</sup> $\pm$ 25%	0.4	200	MLS1206-4S7-102	des
1200 <sup>(1)</sup> $\pm$ 25%	0.4	200	MLS1206-4S7-122	des	
2000 <sup>(2)</sup> $\pm$ 25%	0.6	200	MLS1206-4S7-202	des	
1210	32 $\pm$ 25%	0.2	500	MLS1210-4S4-320	des
	60 $\pm$ 25%	0.2	500	MLS1210-4S4-600	des
	90 $\pm$ 25%	0.2	500	MLS1210-4S4-900	des
1806	50 $\pm$ 25%	0.2	600	MLS1806-4S4-500	des
	60 $\pm$ 25%	0.2	600	MLS1806-4S4-600	EOL
	80 $\pm$ 25%	0.2	600	MLS1806-4S4-800	EOL
	100 $\pm$ 25%	0.3	500	MLS1806-4S4-101	des
	150 $\pm$ 25%	0.3	500	MLS1806-4S4-151	des
	170 $\pm$ 25%	0.3	500	MLS1806-4S4-171	des
1812	70 $\pm$ 25%	0.3	500	MLS1812-4S4-700	des
	120 $\pm$ 25%	0.3	500	MLS1812-4S4-121	des

**Note**

- at 50 MHz
- at 30 MHz

- RDC: Resistance of component for DC current.
- Maximum rated current: measure of current capacity of the component. When the maximum rated current is applied, temperature rise shall not exceed 20°C.
- Standard tolerance on impedance is  $\pm 25\%$ .
- Other tolerances can be provided upon request.
- Operating temperature: -40°C to +125°C.

## EMI-suppression products

## Multilayer suppressors

## Product specifications Multilayer Power Beads MLP

SIZE	$ Z_{typ} $ at 100 MHz ( $\Omega$ )	$R_{DC}$ MAX. ( $\Omega$ )	I MAX. (mA)	TYPE NUMBER	
0603	11 $\pm$ 25%	0.02	4000	MLP0603-110	des
	25 $\pm$ 25%	0.03	3000	MLP0603-250	des
	40 $\pm$ 25%	0.035	3000	MLP0603-400	des
	60 $\pm$ 25%	0.04	3000	MLP0603-600	des
	120 $\pm$ 25%	0.07	1800	MLP0603-121	des
	300 $\pm$ 25%	0.14	1500	MLP0603-301	des
	500 $\pm$ 25%	0.18	1500	MLP0603-501	des
	600 $\pm$ 25%	0.2	1000	MLP0603-601	des
	1000 $\pm$ 25%	0.25	800	MLP0603-102	des
0805	11 $\pm$ 25%	0.01	6000	MLP0805-110	des
	17 $\pm$ 25%	0.02	5000	MLP0805-170	des
	30 $\pm$ 25%	0.02	4000	MLP0805-300	des
	60 $\pm$ 25%	0.03	3000	MLP0805-600	des
	80 $\pm$ 25%	0.04	3000	MLP0805-800	des
	120 $\pm$ 25%	0.04	3000	MLP0805-121	des
	200 $\pm$ 25%	0.05	2500	MLP0805-201	des
	300 $\pm$ 25%	0.08	2000	MLP0805-301	des
	600 $\pm$ 25%	0.1	2000	MLP0805-601	des
1000 $\pm$ 25%	0.12	1500	MLP0805-102	des	
1206	19 $\pm$ 25%	0.015	7000	MLP1206-190	des
	30 $\pm$ 25%	0.015	4000	MLP1206-300	NEW
	32 $\pm$ 25%	0.015	4000	MLP1206-320	des
	50 $\pm$ 25%	0.02	4000	MLP1206-500	des
	60 $\pm$ 25%	0.02	4000	MLP1206-600	NEW
	70 $\pm$ 25%	0.025	3000	MLP1206-700	des
	80 $\pm$ 25%	0.025	3000	MLP1206-800	des
	100 $\pm$ 25%	0.03	2500	MLP1206-101	des
	300 $\pm$ 25%	0.06	2000	MLP1206-301	des
	600 $\pm$ 25%	0.1	1800	MLP1206-601	des
	1000 <sup>(1)</sup> $\pm$ 25%	0.15	1200	MLP1206-102	des
	1200 <sup>(1)</sup> $\pm$ 25%	0.18	1000	MLP1206-122	des
1500 <sup>(1)</sup> $\pm$ 25%	0.2	800	MLP1206-152	des	
1210	60 $\pm$ 25%	0.025	4000	MLP1210-600	des
	90 $\pm$ 25%	0.025	3000	MLP1210-900	des

## EMI-suppression products

## Multilayer suppressors

SIZE	$ Z_{typ} $ at 100 MHz ( $\Omega$ )	$R_{DC}$ MAX. ( $\Omega$ )	I MAX. (mA)	TYPE NUMBER	
1806	50 $\pm$ 25%	0.02	6000	MLP1806-500	des
	60 $\pm$ 25%	0.02	5000	MLP1806-600	des
	80 $\pm$ 25%	0.025	4000	MLP1806-800	des
	150 $\pm$ 25%	0.1	2000	MLP1806-151	des
1812	70 $\pm$ 25%	0.03	6000	MLP1812-700	des
	120 $\pm$ 25%	0.03	4000	MLP1812-121	des



## EMI-suppression products

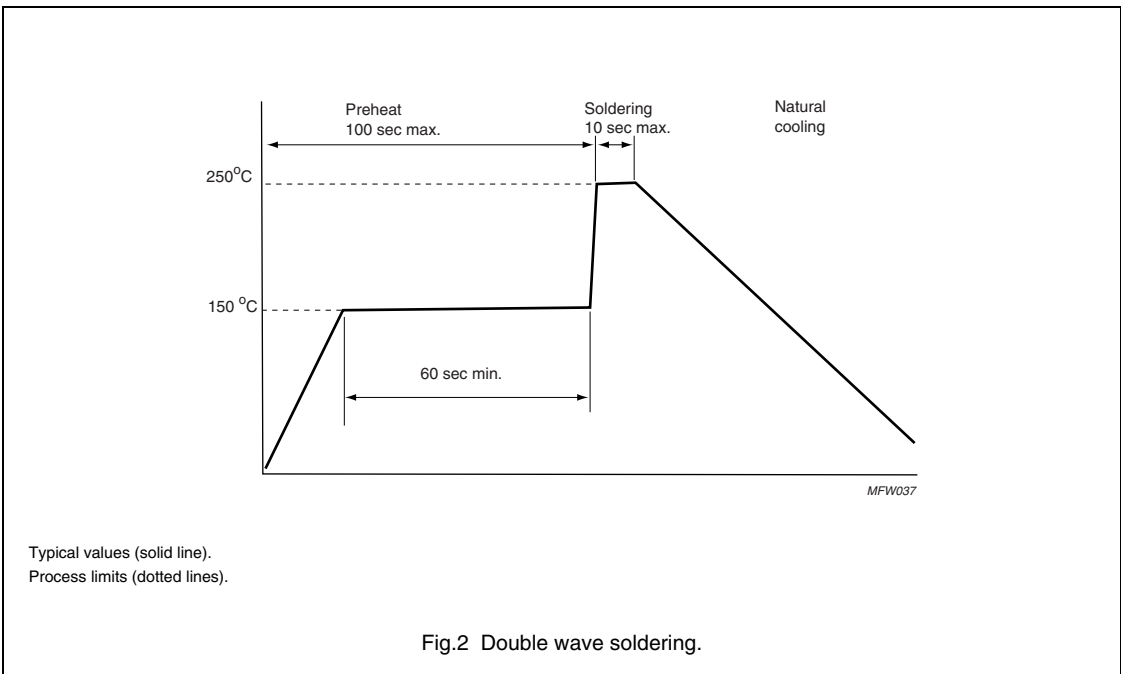
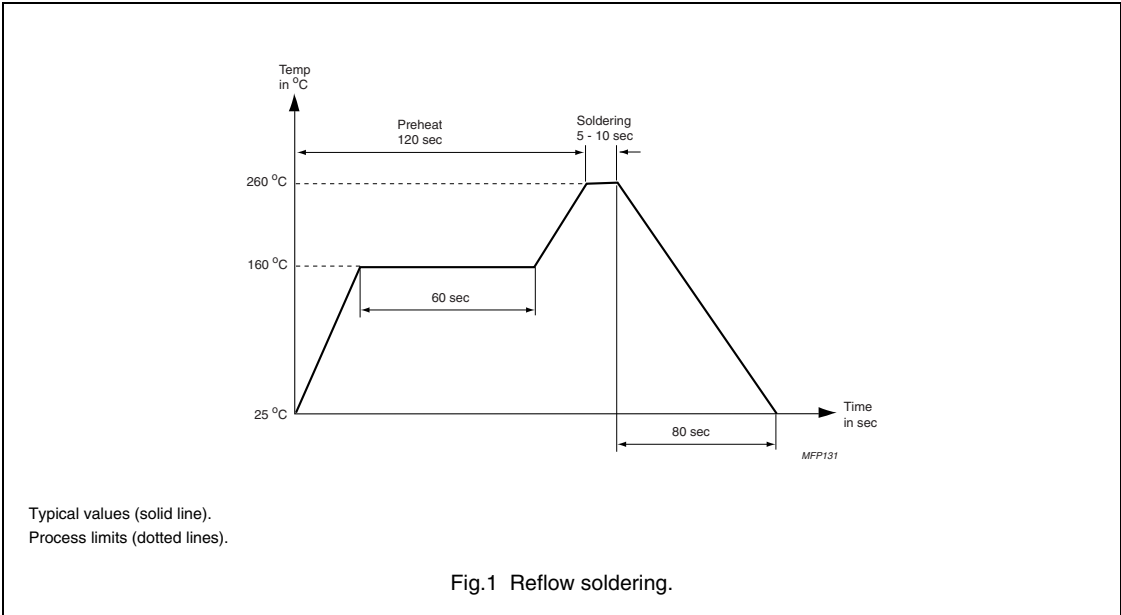
## Multilayer suppressors

## Product specifications Multilayer Narrow Band MLN

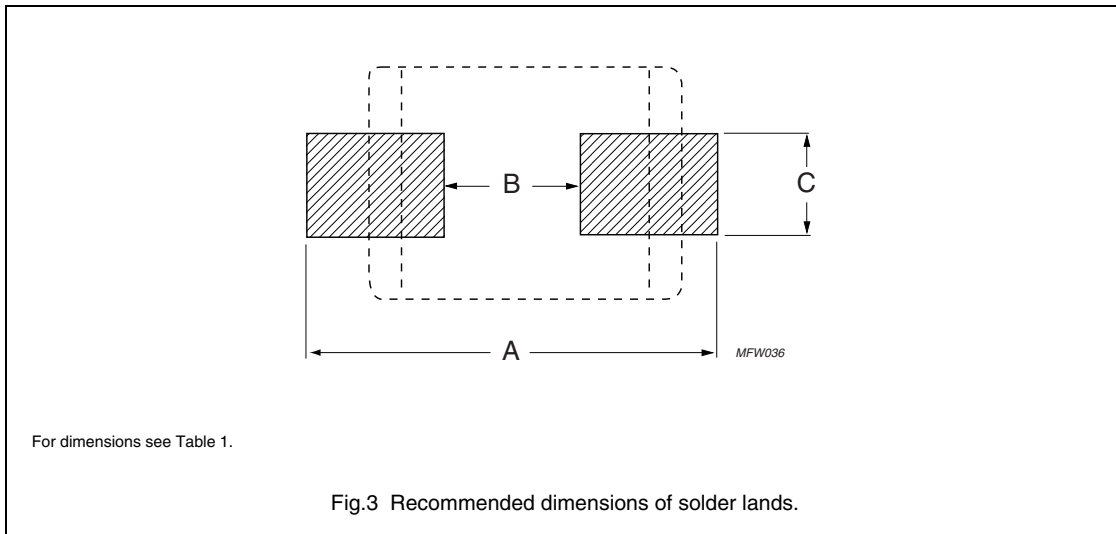
SIZE	$ Z_{typ} $ at 100 MHz ( $\Omega$ )	$R_{DC}$ MAX. ( $\Omega$ )	I MAX. (mA)	TYPE NUMBER	
0603	6 $\pm$ 25%	0.05	500	MLN0603-060	des
	10 $\pm$ 25%	0.07	400	MLN0603-100	des
	40 $\pm$ 25%	0.30	300	MLN0603-400	des
	80 $\pm$ 25%	0.50	300	MLN0603-800	des
	120 $\pm$ 25%	0.40	300	MLN0603-121	des
	240 $\pm$ 25%	0.60	200	MLN0603-241	des
	300 $\pm$ 25%	0.60	200	MLN0603-301	des
	480 $\pm$ 25%	0.70	150	MLN0603-481	des
	600 $\pm$ 25%	0.60	100	MLN0603-601	des
0805	6 $\pm$ 25%	0.07	800	MLN0805-060	des
	11 $\pm$ 25%	0.10	700	MLN0805-110	des
	26 $\pm$ 25%	0.20	600	MLN0805-260	des
	32 $\pm$ 25%	0.20	600	MLN0805-320	des
	60 $\pm$ 25%	0.30	500	MLN0805-600	des
	75 $\pm$ 25%	0.30	500	MLN0805-750	des
	90 $\pm$ 25%	0.30	500	MLN0805-900	des
	120 $\pm$ 25%	0.40	400	MLN0805-121	des
	150 $\pm$ 25%	0.40	400	MLN0805-151	des
	170 $\pm$ 25%	0.50	400	MLN0805-171	des
	220 $\pm$ 25%	0.50	300	MLN0805-221	des
	300 $\pm$ 25%	0.50	300	MLN0805-301	des
	400 $\pm$ 25%	0.60	300	MLN0805-401	des
	500 $\pm$ 25%	0.70	200	MLN0805-501	des
	600 $\pm$ 25%	0.50	200	MLN0805-601	des
	1000 $\pm$ 25%	1.0	100	MLN0805-102	des
1200 $\pm$ 25%	0.70	100	MLN0805-122	des	
1500 $\pm$ 25%	0.70	100	MLN0805-152	des	
1206	32 $\pm$ 25%	0.20	600	MLN1206-320	des
	60 $\pm$ 25%	0.30	500	MLN1206-600	des
	80 $\pm$ 25%	0.30	500	MLN1206-800	des
	90 $\pm$ 25%	0.30	500	MLN1206-900	des
	120 $\pm$ 25%	0.40	400	MLN1206-121	des
	150 $\pm$ 25%	0.40	400	MLN1206-151	des
	200 $\pm$ 25%	0.50	300	MLN1206-201	des
	220 $\pm$ 25%	0.30	300	MLN1206-221	des
	350 $\pm$ 25%	0.30	300	MLN1206-351	des
	400 $\pm$ 25%	0.60	300	MLN1206-401	des
	600 $\pm$ 25%	0.80	300	MLN1206-601	des
	1200 $\pm$ 25%	1.00	200	MLN1206-122	des

**MOUNTING**

**Soldering profiles**



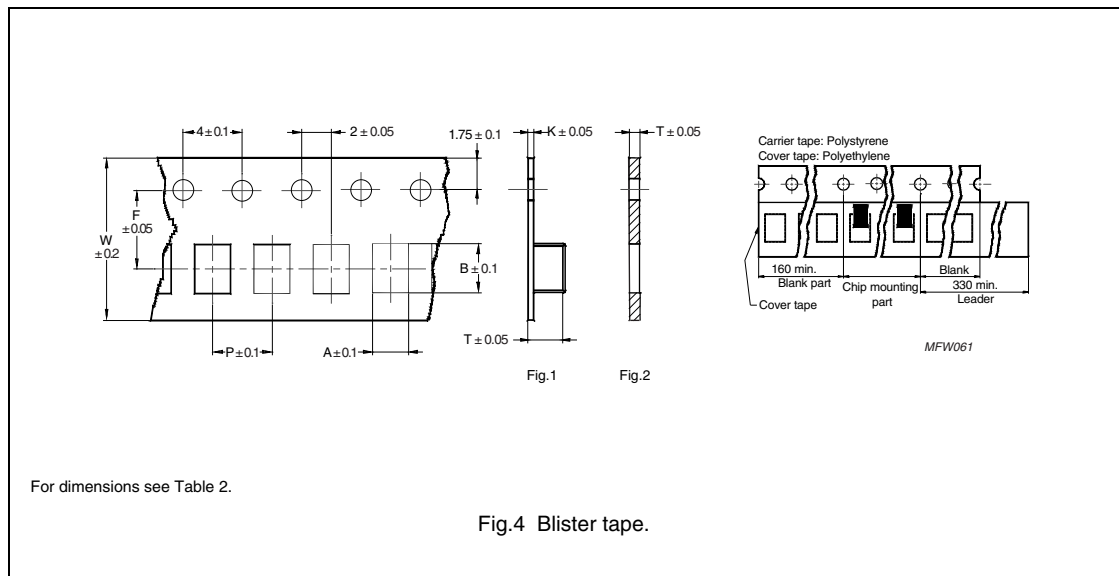
**Dimensions of solderlands**



**Table 1** Solder land dimensions for MLS, MLP and MLN types; see Fig.3

SIZE	FOOTPRINT DIMENSIONS (mm)		
	A	B	C
0402	1.2 – 1.4	0.4	0.4
0603	2.4 – 3.4	0.8	0.6
0805	3.0 – 4.0	1.2	1.0
1206	4.2 – 5.2	2.0	1.2
1210	5.5 – 6.5	2.0	1.8
1806	5.5 – 6.5	3.0	1.2
1812	5.5 – 6.5	3.0	2.4

**BLISTER TAPE AND REEL DIMENSIONS**



**Table 2** Dimensions of blister tape for relevant product size code; see Fig.4

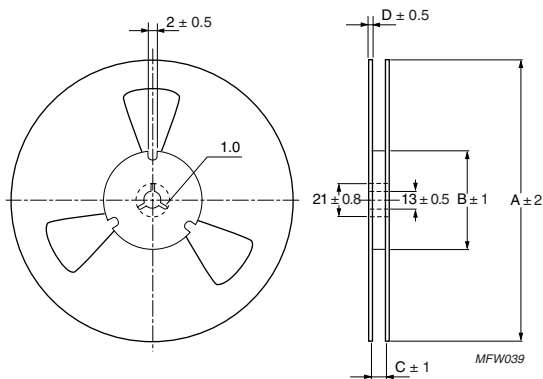
DIMENSION	PRODUCT SIZE CODE						
	0402	0603	0805	1206	1210	1806	1812
A	0.65	0.975	1.54	1.94	2.80	1.94	3.64
B	1.15	1.8	2.32	3.54	3.42	4.94	4.94
T	0.7	1.05	1.15	1.29	1.64	1.90	1.80
W	8.0	8.0	8.0	8.0	8.0	12	12
P	2.0	4.0	4.0	4.0	4.0	4.0	8.0
F	3.5	3.5	3.5	3.5	3.5	5.5	5.5
K	-	-	0.2	0.2	0.2	0.3	0.3
Tape fig.	2	2	1	1	1	1	1

**MATERIAL BLISTER TAPE:**

- Sizes 0402 and 0603: paper
- Other sizes: Polystyrene

**MATERIAL COVER FILM:**

- Polyethylene



Dimensions in mm.  
For dimensions see Table 3.

Fig.5 Reel.

Table 3 Reel dimensions; see Fig.5

DIMENSION	PRODUCT SIZE CODE						
	0402	0603	0805	1206	1210	1806	1812
A	178	178	178	178	178	178	178
B	60	60	60	60	60	60	60
C	10	10	10	10	10	14	14
D	2	2	2	2	2	2	2

Table 4 Packing quantities

	PRODUCT SIZE CODE						
	0402	0603	0805	1206	1210	1806	1812
Pcs./reel	10 000	4 000	4 000	3 000	2 500	2 000	1 000

## EMI-suppression products

## Multilayer suppressors




## DATA SHEET STATUS DEFINITIONS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS
Preliminary specification	Development	This data sheet contains preliminary data. Ferroxcube reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Ferroxcube reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

## DISCLAIMER

**Life support applications** — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Ferroxcube customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Ferroxcube for any damages resulting from such application.

## PRODUCT STATUS DEFINITIONS

STATUS	INDICATION	DEFINITION
<b>Prototype</b>		These are products that have been made as development samples for the purposes of technical evaluation only. The data for these types is provisional and is subject to change.
<b>Design-in</b>		These products are recommended for new designs.
<b>Preferred</b>		These products are recommended for use in current designs and are available via our sales channels.
<b>Support</b>		These products are <b>not</b> recommended for new designs and may not be available through all of our sales channels. Customers are advised to check for availability.