

DATA SHEET

Multilayer suppressors EMI-suppression products

Supersedes data of November 2000

2002 Feb 01

EMI-suppression products

Multilayer suppressors

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 Ω 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
- 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, CD-Rom, DVD-Rom, CD-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: walkman, walkdisc, digital still camera (DSC), sound system, HDTV, projector, DVD player, VCD player, tuner for TV, cable modem, etc.

To help designers in the trial and error process of finding the most suitable suppression component, we offer a sample box with a selection of products.

Ordering code: SAMPLEBOX12

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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: $1.0 \times 0.5 \times 0.5$ mm

0603: $1.6 \times 0.8 \times 0.8$ mm

0805: $2.0 \times 1.25 \times 0.9$ mm

1206: $3.2 \times 1.6 \times 1.1$ mm

1210: $3.2 \times 2.5 \times 1.3$ mm

1806: $4.5 \times 1.6 \times 1.6$ mm

1812: $4.5 \times 3.2 \times 1.5$ mm.

Impedance value

Expressed in ohms (Ω)

First two digits are significant figures

Last digit is the number of zeros to follow.

EXAMPLES

600: 60 Ω

101: 100 Ω

121: 120 Ω

151: 150 Ω

301: 300 Ω

102: 1000 Ω

Multilayer Suppressor MLS0603-4S7-600

TYPE	SIZE	INTERNAL CODE	IMPEDANCE
MLS	0603	4S7	60

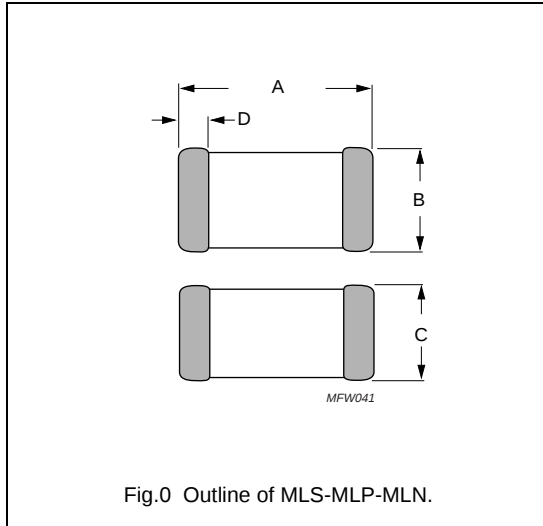
Multilayer Power Bead MLP0603-121

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	0.4 ± 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

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Product specifications Multilayer Suppressors MLS

SIZE	$ Z_{typ} $ at 100 MHz (Ω)	R_{DC} MAX. (Ω)	I MAX. (mA)	TYPE NUMBER
0402	$6 \pm 25\%$	0.05	500	MLS0402-4S4-060 
	$10 \pm 25\%$	0.05	500	MLS0402-4S4-100 
	$40 \pm 25\%$	0.3	300	MLS0402-4S4-400 
	$80 \pm 25\%$	0.4	200	MLS0402-4S4-800 
	$120 \pm 25\%$	0.5	200	MLS0402-4S4-121 
	$240 \pm 25\%$	0.5	200	MLS0402-4S4-241 
	$480 \pm 25\%$	0.8	100	MLS0402-4S4-481 
0603	$11 \pm 25\%$	0.05	500	MLS0603-4S4-110 
	$19 \pm 25\%$	0.08	500	MLS0603-4S4-190 
	$30 \pm 25\%$	0.1	400	MLS0603-4S7-300 
	$40 \pm 25\%$	0.1	400	MLS0603-4S7-400 
	$60 \pm 25\%$	0.1	300	MLS0603-4S7-600 
	$80 \pm 25\%$	0.15	300	MLS0603-4S7-800 
	$100 \pm 25\%$	0.25	250	MLS0603-4S7-101 
	$120 \pm 25\%$	0.3	250	MLS0603-4S7-121 
	$150 \pm 25\%$	0.3	250	MLS0603-4S7-151 
	$220 \pm 25\%$	0.3	200	MLS0603-4S7-221 
	$300 \pm 25\%$	0.35	230	MLS0603-4S7-301 
	$450 \pm 25\%$	0.5	200	MLS0603-4S7-451 
	$600 \pm 25\%$	0.45	210	MLS0603-4S7-601 
	$750 \pm 25\%$	0.7	200	MLS0603-4S7-751 
	$1000 \pm 25\%$	0.6	190	MLS0603-4S7-102 
	$1500 \pm 25\%$	1	50	MLS0603-4S4-152 
0805	$7 \pm 25\%$	0.1	600	MLS0805-4S4-070 
	$9 \pm 25\%$	0.1	600	MLS0805-4S4-090 
	$11 \pm 25\%$	0.1	600	MLS0805-4S4-110 
	$17 \pm 25\%$	0.1	500	MLS0805-4S4-170 
	$30 \pm 25\%$	0.1	600	MLS0805-4S4-300 
	$60 \pm 25\%$	0.1	600	MLS0805-4S4-600 
	$70 \pm 25\%$	0.15	500	MLS0805-4S7-700 
	$80 \pm 25\%$	0.15	500	MLS0805-4S7-800 
	$120 \pm 25\%$	0.2	400	MLS0805-4S7-121 
	$150 \pm 25\%$	0.25	200	MLS0805-4S7-151 
	$220 \pm 25\%$	0.3	300	MLS0805-4S7-221 
	$300 \pm 25\%$	0.3	200	MLS0805-4S7-301 
	$400 \pm 25\%$	0.3	300	MLS0805-4S7-401 
	$500 \pm 25\%$	0.4	300	MLS0805-4S7-501 
	$600 \pm 25\%$	0.3	200	MLS0805-4S7-601 
	$750 \pm 25\%$	0.5	200	MLS0805-4S4-751 

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SIZE	$ Z_{typ} $ at 100 MHz (Ω)	R_{DC} MAX. (Ω)	I MAX. (mA)	TYPE NUMBER	
0805	$1000 \pm 25\%$	0.5	200	MLS0805-4S7-102	des
	$1500^{(1)} \pm 25\%$	0.6	200	MLS0805-4S7-152	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
	$30 \pm 25\%$	0.1	600	MLS1206-4S4-300	des
	$50 \pm 25\%$	0.1	500	MLS1206-4S4-500	des
	$60 \pm 25\%$	0.1	500	MLS1206-4S4-600	des
	$70 \pm 25\%$	0.1	600	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
	$1000 \pm 25\%$	0.4	200	MLS1206-4S7-102	des
	$1200^{(1)} \pm 25\%$	0.4	200	MLS1206-4S7-122	des
	$2000^{(2)} \pm 25\%$	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	des
	$80 \pm 25\%$	0.1	600	MLS1806-4S4-800	des
	$100 \pm 25\%$	0.3	500	MLS1806-4S4-101	des
	$150 \pm 25\%$	0.2	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

1. at 50 MHz
2. 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

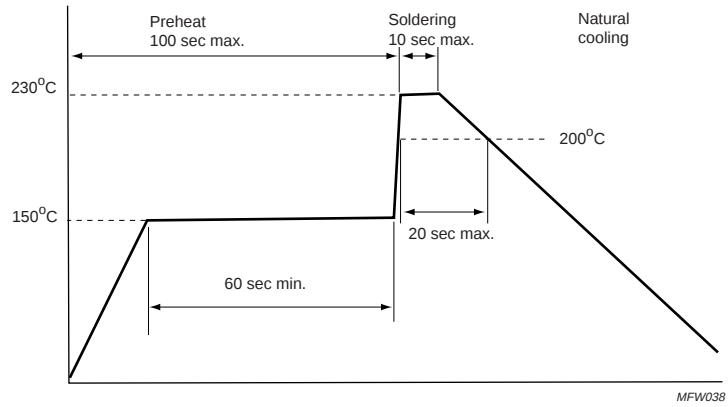
SIZE	$ Z_{typ} $ at 100 MHz (Ω)	R_{DC} MAX. (Ω)	I MAX. (mA)	TYPE NUMBER
0603	11 $\pm$ 25%	0.02	4000	MLP0603-110 
	25 $\pm$ 25%	0.03	3000	MLP0603-250 
	40 $\pm$ 25%	0.035	3000	MLP0603-400 
	60 $\pm$ 25%	0.04	2500	MLP0603-600 
	120 $\pm$ 25%	0.05	1800	MLP0603-121 
	300 $\pm$ 25%	0.1	2000	MLP0603-301 
	500 $\pm$ 25%	0.15	1500	MLP0603-501 
	600 $\pm$ 25%	0.2	1000	MLP0603-601 
	1000 $\pm$ 25%	0.25	800	MLP0603-102 
0805	11 $\pm$ 25%	0.01	6000	MLP0805-110 
	17 $\pm$ 25%	0.02	5000	MLP0805-170 
	30 $\pm$ 25%	0.02	4000	MLP0805-300 
	60 $\pm$ 25%	0.03	3000	MLP0805-600 
	80 $\pm$ 25%	0.04	3000	MLP0805-800 
	120 $\pm$ 25%	0.04	3000	MLP0805-121 
	200 $\pm$ 25%	0.05	2500	MLP0805-201 
	300 $\pm$ 25%	0.08	2000	MLP0805-301 
	600 $\pm$ 25%	0.1	2000	MLP0805-601 
	1000 $\pm$ 25%	0.12	1500	MLP0805-102 
1206	19 $\pm$ 25%	0.015	6000	MLP1206-190 
	32 $\pm$ 25%	0.015	4000	MLP1206-320 
	50 $\pm$ 25%	0.02	4000	MLP1206-500 
	70 $\pm$ 25%	0.025	3000	MLP1206-700 
	80 $\pm$ 25%	0.025	3000	MLP1206-800 
	100 $\pm$ 25%	0.03	2500	MLP1206-101 
	300 $\pm$ 25%	0.06	2000	MLP1206-301 
	600 $\pm$ 25%	0.1	1800	MLP1206-601 
	1000 ⁽¹⁾ $\pm$ 25%	0.15	1500	MLP1206-102 
	1200 ⁽¹⁾ $\pm$ 25%	0.18	1500	MLP1206-122 
	1500 ⁽¹⁾ $\pm$ 25%	0.2	1200	MLP1206-152 
1210	60 $\pm$ 25%	0.025	4000	MLP1210-600 
	90 $\pm$ 25%	0.025	3000	MLP1210-900 
1806	50 $\pm$ 25%	0.02	6000	MLP1806-500 
	60 $\pm$ 25%	0.02	5000	MLP1806-600 
	80 $\pm$ 25%	0.025	4000	MLP1806-800 
	150 $\pm$ 25%	0.1	2000	MLP1806-151 
1812	70 $\pm$ 25%	0.03	6000	MLP1812-700 
	120 $\pm$ 25%	0.03	4000	MLP1812-121 

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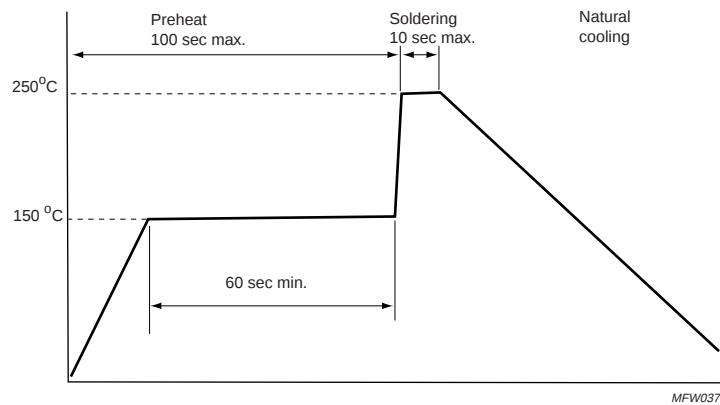
Product specifications Multilayer Narrow Band MLN

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

MOUNTING**Soldering profiles**

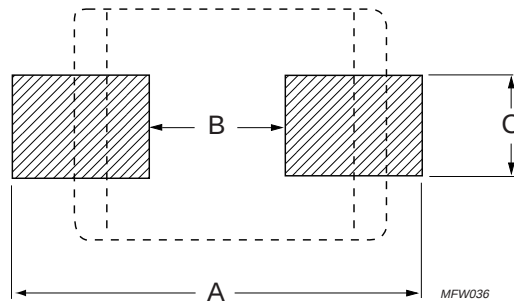
Typical values (solid line).
Process limits (dotted lines).

Fig.1 Reflow soldering.



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

Fig.2 Double wave soldering.

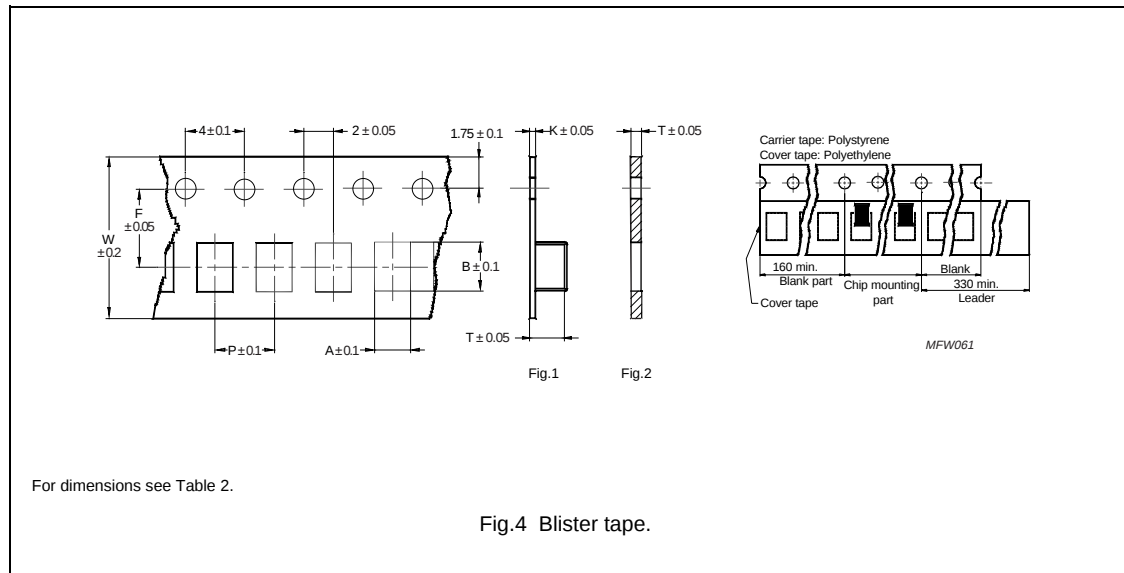
Dimensions of solderlands

For dimensions see Table 1.

Fig.3 Recommended dimensions of solder lands.

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

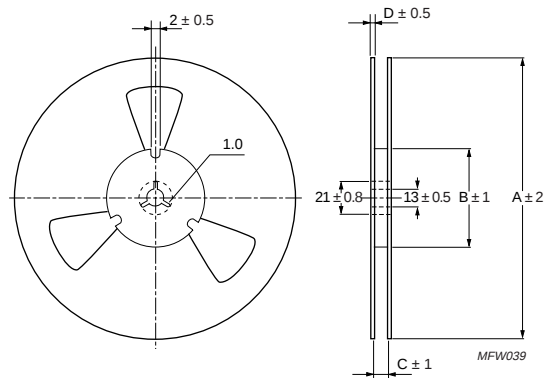
MATERIAL BLISTER TAPE:

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

MATERIAL COVER FILM:

- Polyethylene

EMI-suppression products



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

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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
Prototype		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.
Design-in		These products are recommended for new designs.
Preferred		These products are recommended for use in current designs and are available via our sales channels.
Support		These products are not recommended for new designs and may not be available through all of our sales channels. Customers are advised to check for availability.