

## Data Sheet

**Customer:**

**Product:** Multilayer Ferrite Chip Inductor-ML Series

**Sizes.:** 0603/0805/0806/1008/1206

**Issued Date:** 6-Jun-13

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## Multilayer Ferrite Chip Inductor



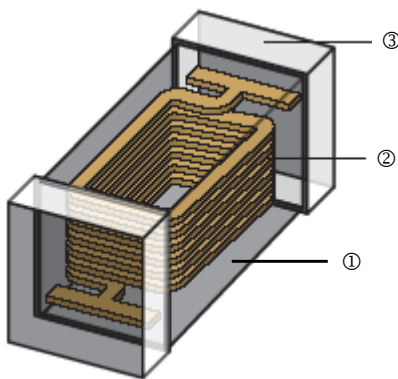
### ■ Features

- Closed magnetic circuit avoids crosstalk
- Suitable for high density installation and re-flow soldering
- Sizes 0603 / 0805 / 1206

### ■ Applications

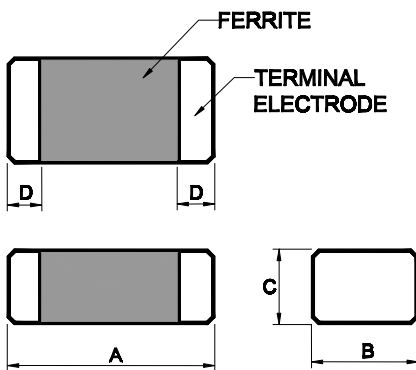
- Personal Computers
- Portable Equipment
- CD-ROM, Hard Disk, Modem, Printers
- DC-DC Converters
- DSC, DVC, PDA, DVD and HDD

### ■ Construction



① Ferrite	② Internal Electrode	③ Electrode Plating (Ag/Ni/Sn)
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### ■ Dimensions



Unit: mm

Type	Size (Inch)	A	B	C	D	Weight (g) (1000pcs)
ML03	0603	1.60±0.20	0.80±0.20	0.80±0.20	0.30±0.20	6.2
ML05 (≤2.2μH)	0805	2.00±0.20	1.25±0.20	0.90±0.20	0.50±0.30	10
ML05 (≥2.7μH)	0805	2.00±0.20	1.25±0.20	1.25±0.20	0.50±0.30	10
ML06	1206	3.20±0.20	1.60±0.20	1.10±0.20	0.50±0.30	30
MLH05	0805	2.00±0.20	1.25±0.20	0.90±0.10	0.50±0.20	10
MLH06	0806	2.00±0.15	1.60±0.15	0.90±0.10	0.50±0.20	12
MLH08	1008	2.50±0.20	2.00±0.20	0.90±0.10	0.60±0.20	21

**Part Numbering**

ML	05	K	T	1R0
Product Type	Dimensions	Inductance Tolerance	Packaging Code	Inductance
ML :Standard MLH :High Current	03: 0603 05: 0805 06: 0806 08: 1008 06: 1206	K: $\pm 10\%$ M: $\pm 20\%$	T: Taping Reel	10N: 10nH R27: 270nH 1R0: 1000nH

**Standard Electrical Specifications**

ML03 Multilayer Ferrite Chip Inductors Type

Codes	Inductance (nH)	Tolerance	L/Q Freq. (MHz)	Q min.	SRF (MHz) min.	DCR ( $\Omega$ ) max.	IDC (mA) max.
10N	10	$\pm 20\%$	50MHz, 200mV	10	300	0.20	50
33N	33	$\pm 20\%$	50MHz, 200mV	10	270	0.20	50
47N	47	$\pm 20\%$	50MHz, 200mV	10	260	0.30	50
56N	56	$\pm 20\%$	50MHz, 200mV	10	255	0.30	50
68N	68	$\pm 20\%$	50MHz, 200mV	10	250	0.30	50
82N	82	$\pm 20\%$	50MHz, 200mV	10	245	0.30	50
R10	100	$\pm 10, \pm 20\%$	25MHz, 200mV	15	240	0.50	50
R12	120	$\pm 10, \pm 20\%$	25MHz, 200mV	15	205	0.50	50
R15	150	$\pm 10, \pm 20\%$	25MHz, 200mV	15	180	0.60	50
R18	180	$\pm 10, \pm 20\%$	25MHz, 200mV	15	165	0.60	50
R22	220	$\pm 10, \pm 20\%$	25MHz, 200mV	15	150	0.80	50
R27	270	$\pm 10, \pm 20\%$	25MHz, 200mV	15	136	0.80	50
R33	330	$\pm 10, \pm 20\%$	25MHz, 200mV	15	125	0.85	35
R39	390	$\pm 10, \pm 20\%$	25MHz, 200mV	15	110	1.00	35
R47	470	$\pm 10, \pm 20\%$	25MHz, 200mV	15	105	1.35	35
R56	560	$\pm 10, \pm 20\%$	25MHz, 200mV	15	95	1.55	35
R68	680	$\pm 10, \pm 20\%$	25MHz, 200mV	15	85	1.70	35
R82	820	$\pm 10, \pm 20\%$	25MHz, 200mV	15	75	2.10	35
1R0	1000	$\pm 10, \pm 20\%$	10MHz, 200mV	35	65	0.60	25
1R2	1200	$\pm 10, \pm 20\%$	10MHz, 200mV	35	60	0.80	25
1R5	1500	$\pm 10, \pm 20\%$	10MHz, 200mV	35	55	0.80	25
1R8	1800	$\pm 10, \pm 20\%$	10MHz, 200mV	35	50	0.95	25
2R2	2200	$\pm 10, \pm 20\%$	10MHz, 200mV	35	45	1.55	15
2R7	2700	$\pm 10, \pm 20\%$	10MHz, 200mV	35	40	1.35	15
3R3	3300	$\pm 10, \pm 20\%$	10MHz, 200mV	35	38	1.55	15
3R9	3900	$\pm 10, \pm 20\%$	10MHz, 200mV	35	35	1.70	15
4R7	4700	$\pm 10, \pm 20\%$	10MHz, 200mV	35	33	2.10	15
5R6	5600	$\pm 10, \pm 20\%$	4MHz, 200mV	35	22	1.55	5
6R8	6800	$\pm 10, \pm 20\%$	4MHz, 200mV	35	20	1.70	5
8R2	8200	$\pm 10, \pm 20\%$	4MHz, 60 mV	30	18	2.10	5
100	10000	$\pm 10, \pm 20\%$	2MHz, 60mV	30	17	2.55	5

**Multilayer Ferrite Chip Inductor**

ML05 Multilayer Ferrite Chip Inductors Type

Codes	Inductance (nH)	Tolerance	L/Q Freq. (MHz)	Q min.	SRF (MHz) min.	DCR (Ω) max.	IDC (mA) max.
47N	47	±20%	50MHz, 200mV	20	320	0.20	300
56N	56	±20%	50MHz, 200mV	20	320	0.20	300
68N	68	±20%	50MHz, 200mV	20	280	0.20	300
82N	82	±20%	50MHz, 200mV	20	255	0.20	300
R10	100	±10, ±20%	25MHz, 200mV	20	235	0.30	250
R12	120	±10, ±20%	25MHz, 200mV	20	220	0.30	250
R15	150	±10, ±20%	25MHz, 200mV	20	200	0.40	250
R18	180	±10, ±20%	25MHz, 200mV	20	185	0.40	250
R22	220	±10, ±20%	25MHz, 200mV	20	170	0.50	250
R27	270	±10, ±20%	25MHz, 200mV	20	150	0.50	250
R33	330	±10, ±20%	25MHz, 200mV	20	145	0.55	250
R39	390	±10, ±20%	25MHz, 200mV	25	135	0.65	200
R47	470	±10, ±20%	25MHz, 200mV	25	125	0.65	200
R56	560	±10, ±20%	25MHz, 200mV	25	115	0.75	150
R68	680	±10, ±20%	25MHz, 200mV	25	105	0.80	150
R82	820	±10, ±20%	25MHz, 200mV	25	100	1.00	150
1R0	1000	±10, ±20%	10MHz, 200mV	45	75	0.40	50
1R2	1200	±10, ±20%	10MHz, 200mV	45	65	0.50	50
1R5	1500	±10, ±20%	10MHz, 200mV	45	60	0.50	50
1R8	1800	±10, ±20%	10MHz, 200mV	45	55	0.60	50
2R2	2200	±10, ±20%	10MHz, 200mV	45	50	0.65	30
2R7	2700	±10, ±20%	10MHz, 200mV	45	45	0.75	30
3R3	3300	±10, ±20%	10MHz, 200mV	45	41	0.80	30
3R9	3900	±10, ±20%	10MHz, 200mV	45	38	0.90	30
4R7	4700	±10, ±20%	10MHz, 200mV	45	35	1.00	30
5R6	5600	±10, ±20%	4MHz, 200mV	45	32	0.90	15
6R8	6800	±10, ±20%	4MHz, 200mV	45	29	1.00	15
8R2	8200	±10, ±20%	4MHz, 200mV	45	26	1.10	15
100	10000	±10, ±20%	2MHz, 60mV	45	24	1.15	15
120	12000	±10, ±20%	2MHz, 60mV	45	22	1.25	15
150	15000	±10, ±20%	1MHz, 60mV	30	19	0.80	5
180	18000	±10, ±20%	1MHz, 60mV	30	18	0.90	5
220	22000	±10, ±20%	1MHz, 60mV	30	16	1.10	5

**Multilayer Ferrite Chip Inductor**

ML06 Multilayer Ferrite Chip Inductors Type

Codes	Inductance (nH)	Tolerance	L/Q Freq. (MHz)	Q min.	SRF (MHz) min.	DCR (Ω) max.	IDC (mA) max.
47N	47	±20%	50MHz, 200mV	20	320	0.15	300
56N	56	±20%	50MHz, 200mV	20	280	0.25	300
68N	68	±20%	50MHz, 200mV	20	280	0.25	300
82N	82	±20%	50MHz, 200mV	20	250	0.25	300
R10	100	±10, ±20%	25MHz, 200mV	20	235	0.25	250
R12	120	±10, ±20%	25MHz, 200mV	20	220	0.30	250
R15	150	±10, ±20%	25MHz, 200mV	20	200	0.30	250
R18	180	±10, ±20%	25MHz, 200mV	20	185	0.40	250
R22	220	±10, ±20%	25MHz, 200mV	20	170	0.40	250
R27	270	±10, ±20%	25MHz, 200mV	20	150	0.50	250
R33	330	±10, ±20%	25MHz, 200mV	20	145	0.60	250
R39	390	±10, ±20%	25MHz, 200mV	25	135	0.50	200
R47	470	±10, ±20%	25MHz, 200mV	25	125	0.60	200
R56	560	±10, ±20%	25MHz, 200mV	25	115	0.70	150
R68	680	±10, ±20%	25MHz, 200mV	25	105	0.80	150
R82	820	±10, ±20%	25MHz, 200mV	25	100	0.90	150
1R0	1000	±10, ±20%	10MHz, 200mV	45	75	0.40	100
1R2	1200	±10, ±20%	10MHz, 200mV	45	65	0.50	100
1R5	1500	±10, ±20%	10MHz, 200mV	45	60	0.50	80
1R8	1800	±10, ±20%	10MHz, 200mV	45	55	0.50	70
2R2	2200	±10, ±20%	10MHz, 200mV	45	50	0.60	60
2R7	2700	±10, ±20%	10MHz, 200mV	45	45	0.60	60
3R3	3300	±10, ±20%	10MHz, 200mV	45	41	0.70	60
3R9	3900	±10, ±20%	10MHz, 200mV	45	38	0.80	50
4R7	4700	±10, ±20%	10MHz, 200mV	45	35	0.90	50
5R6	5600	±10, ±20%	4MHz, 200mV	45	32	0.70	25
6R8	6800	±10, ±20%	4MHz, 200mV	45	29	0.80	25
8R2	8200	±10, ±20%	4MHz, 200mV	45	26	0.90	25
100	10000	±10, ±20%	2MHz, 60mV	45	24	1.00	25
120	12000	±10, ±20%	2MHz, 60mV	45	22	1.05	15
150	15000	±10, ±20%	1MHz, 60mV	35	19	0.70	5
180	18000	±10, ±20%	1MHz, 60mV	35	18	0.75	5
220	22000	±10, ±20%	1MHz, 60mV	35	16	0.90	5
270	27000	±10, ±20%	1MHz, 60mV	35	14	0.90	5
330	33000	±10, ±20%	1MHz, 60mV	35	13	1.05	5

**High Current Electrical Specifications**

MLH05 Multilayer Ferrite Chip Inductors Type

Codes	Inductance (uH)	Tolerance	Test Freq.	SRF (MHz) min.	DCR (Ω)	IDC (mA) max.
R47	0.47	±20%	1MHz, 250mV	100	0.10±25%	1100
R68	0.68	±20%	1MHz, 250mV	100	0.12±25%	1000
R82	0.82	±20%	1MHz, 250mV	90	0.14±25%	900
1R0	1.0	±20%	1MHz, 250mV	90	0.16±25%	800
1R2	1.2	±20%	1MHz, 250mV	80	0.16±25%	800
1R5	1.5	±20%	1MHz, 250mV	70	0.22±25%	700
1R8	1.8	±20%	1MHz, 250mV	60	0.22±25%	700
2R2	2.2	±20%	1MHz, 250mV	50	0.25±25%	600
3R3	3.3	±20%	1MHz, 250mV	40	0.22±25%	500
4R7	4.7	±20%	1MHz, 250mV	30	0.30±25%	500

MLH06 Multilayer Ferrite Chip Inductors Type

Codes	Inductance (uH)	Tolerance	Test Freq.	SRF (MHz) min.	DCR (Ω)	IDC (mA) max.
R47	0.47	±20%	1MHz, 250mV	100	0.14±30%	1500
R68	0.68	±20%	1MHz, 250mV	90	0.15±30%	1500
R82	0.82	±20%	1MHz, 250mV	80	0.16±30%	1500
1R0	1.0	±20%	1MHz, 250mV	60	0.16±30%	1400
1R2	1.2	±20%	1MHz, 250mV	60	0.16±30%	1400
1R5	1.5	±20%	1MHz, 250mV	50	0.20±30%	1200
1R8	1.8	±20%	1MHz, 250mV	50	0.20±30%	1200
2R2	2.2	±20%	1MHz, 250mV	40	0.22±30%	1200
3R3	3.3	±20%	1MHz, 250mV	30	0.24±30%	1100
4R7	4.7	±20%	1MHz, 250mV	20	0.30±30%	1100

MLH08 Multilayer Ferrite Chip Inductors Type

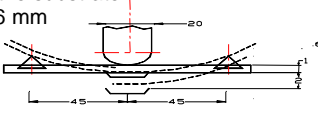
Codes	Inductance (uH)	Tolerance	Test Freq.	SRF (MHz) min.	DCR (Ω)	IDC (mA) max.
R47	0.47	±20%	1MHz, 250mV	100	0.07±25%	1800
R68	0.68	±20%	1MHz, 250mV	90	0.09±25%	1700
R82	0.82	±20%	1MHz, 250mV	80	0.10±25%	1700
1R0	1.0	±20%	1MHz, 250mV	60	0.11±25%	1600
1R2	1.2	±20%	1MHz, 250mV	60	0.11±25%	1600
1R5	1.5	±20%	1MHz, 250mV	50	0.13±25%	1500
1R8	1.8	±20%	1MHz, 250mV	50	0.13±25%	1500
2R2	2.2	±20%	1MHz, 250mV	40	0.17±25%	1300
3R3	3.3	±20%	1MHz, 250mV	30	0.16±25%	1200
4R7	4.7	±20%	1MHz, 250mV	25	0.20±25%	1100

**■ Environmental Characteristics**

Electrical Performance Test

Item	Requirement	Test Method
Inductance	Refer to standard electrical characteristic spec.	HP4291B
Q		HP4291B
SRF		HP4291B
DC Resistance RDC		Agilent 34401A
Rated Current IDC		Applied the current to coils, The inductance change should be less than 10% to initial value

Mechanical Performance Test

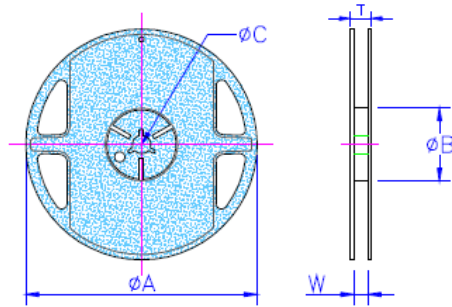
Item	Requirement	Test Method
Resistance to Soldering Heat	Appearance: No damage More than 75% of the terminal. Electrode should be covered with solder. Inductance: within $\pm 15\%$ of initial value Q: within $\pm 30\%$ of initial value Inductance: within $\pm 20\%$ of initial value (0603 over 12uH)	Pre-heating: 150°C, 1min. Solder Composition: Sn/Ag3.0/Cu0.5 (Pb-Free) Solder Temperature: 260 $\pm$ 5°C (Pb-Free) Immersion Time: 10 $\pm$ 1 sec.
Solderability	The electrodes shall be at least 90% covered with new solder coating	Pre-heating: 150°C, 1min. Solder Composition: Sn/Ag3.0/Cu0.5 (Pb-Free) Solder Temperature: 245 $\pm$ 5°C (Pb-Free) Immersion Time: 4 $\pm$ 1 sec.
Flexure Strength	The forces applied on the right conditions must not damage the terminal electrode and the ferrite.	Test device shall be soldered on the substrate Substrate Dimension: 100x40x1.6 mm Deflection: 2.0 mm Keeping Time: 30 sec. 
Vibration		*For 0402, substrate dimension is 100x40x0.8 mm Test device shall be soldered on the substrate Oscillation Frequency: 10 to 55 to 10Hz for 1 min. Amplitude: 1.5 mm Time: 2 hrs for each axis (X, Y & Z), total 6 hrs

Climatic Test

Item	Requirement	Test Method															
Damp Heat with Load	Appearance: No damage L change: within $\pm 10\%$ of initial value Q change: within $\pm 30\%$ of initial value	Temperature: 40 $\pm$ 2°C Relative Humidity: 90 ~ 95% Time: 1000 hrs Measured after exposure in the room condition for 24 hrs															
Temperature Cycle		One cycle: <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25<math>\pm</math>3</td> <td>30</td> </tr> <tr> <td>2</td> <td>25<math>\pm</math>2</td> <td>3</td> </tr> <tr> <td>3</td> <td>85<math>\pm</math>3</td> <td>30</td> </tr> <tr> <td>4</td> <td>25<math>\pm</math>2</td> <td>3</td> </tr> </tbody> </table> Total: 100 cycles Measured after exposure in the room condition for 24 hrs	Step	Temperature (°C)	Time (min.)	1	-25 $\pm$ 3	30	2	25 $\pm$ 2	3	3	85 $\pm$ 3	30	4	25 $\pm$ 2	3
Step		Temperature (°C)	Time (min.)														
1		-25 $\pm$ 3	30														
2	25 $\pm$ 2	3															
3	85 $\pm$ 3	30															
4	25 $\pm$ 2	3															
High Temperature Resistance	Temperature: 85 $\pm$ 3°C Relative Humidity: 20% Applied Current: Rated Current Time: 1000 hrs Measured after exposure in the room condition for 24 hrs																
Low Temperature Resistance	Temperature: -25 $\pm$ 3°C Relative Humidity: 0% Time: 1000 hrs Measured after exposure in the room condition for 24 hrs																

**■Packaging**

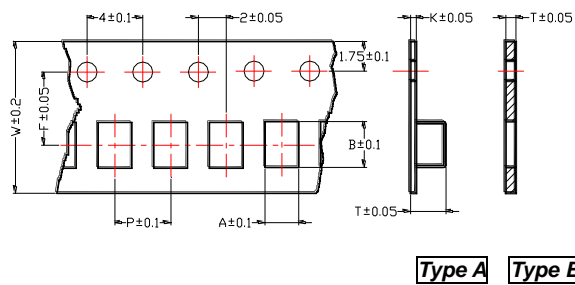
Reel Specifications



Unit: mm

Type	A	B	C	W	T	Quantity (EA)	
						Paper Tape (Type B)	Polystyrene Tape (Type A)
ML03	178±1	60.0+0.5	13.0±0.2	9.00±0.5	12.0±0.15	4,000	-
ML05(≤2.2uH)	178±1	60.0+0.5	13.0±0.2	9.00±0.5	12.0±0.15	4,000	-
ML05(≥2.7uH)	178±1	60.0+0.5	13.0±0.2	9.00±0.5	12.0±0.15	-	3,000
ML06	178±1	60.0+0.5	13.0±0.2	9.00±0.5	12.0±0.15	-	3,000
MLH05	178±1	60.0+0.5	13.0±0.2	9.00±0.5	12.0±0.15	4,000	-
MLH06	178±1	60.0+0.5	13.0±0.2	9.00±0.5	12.0±0.15	-	3,000
MLH08	178±1	60.0+0.5	13.0±0.2	9.00±0.5	12.0±0.15	-	3,000

Tape Specifications

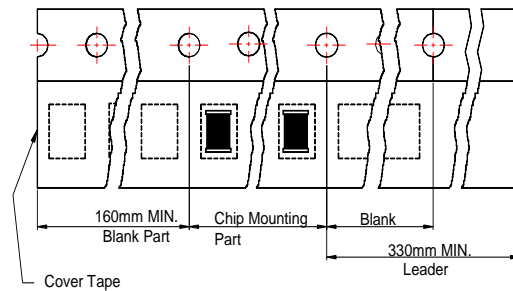


Tape Material

Carrier tape : Polystyrene for 0805(≤2.2uH) 1206

Paper for 0603 0805(≥2.7uH)

Cover type : Polystyrene



Unit: mm

Type	A	B	T	W	P	F	K	Tape Type
ML03	1.05	1.85	0.95	8.0	4.0	3.5	-	B
ML05(≤2.2uH)	1.50	2.42	0.95	8.0	4.0	3.5	-	B
ML05(≥2.7uH)	1.50	2.35	1.45	8.0	4.0	3.5	0.22	A
ML06	1.88	3.50	1.27	8.0	4.0	3.5	0.22	A
MLH05	1.45	2.25	0.95	8.0	4.0	3.5	-	B
MLH06	1.88	2.40	1.23	8.0	4.0	3.5	0.23	A
MLH08	2.20	2.85	1.40	8.0	4.0	3.5	0.23	A

**Note:**

- Please make sure that your product is has been evaluated and confirmed against your specifications when our product is mounted to your product.
- Do not knock nor drop.
- All the items and parameters in this product specification have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product deviating from such agreement.