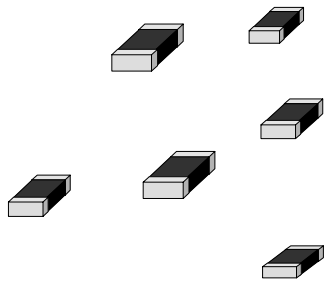
MULTILAYER CHIP INDUCTORS SMI SERIES

Introductions



The SMI series are chip inductors widely used in the communication applications such as cellular phones, pagers , computers and and other elecronic devices. The device features in magnetic shielding which avoids cross coupling and cross-talk.

Features

* Operating temperature -40 °C to + 85 °C.
* Excellent solderability and resistance to soldering heat .
* Suitable for flow and reflow soldering..
* Good dimensions, high reliability, and easy surface mount assembly.
* At least 3 types of materials provide wide range of inductance value for flexible needs.

Part Number Code

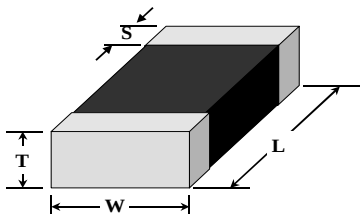
SMI	0603	C	T	3N3	J	□□
1	2	3	TAPING	4	5	Internal Code

1. Product Type SMI Series : Multilayer

2. Chip Dimension

Size (inch) mm	Length (L) (inch) mm	Width (W) (inch) mm	Thickness (T) (inch) mm	Terminal (S) (inch) mm
SMI 0603 160808	(0.063 ± 0.008) 1.60 ± 0.20	(0.031 ± 0.008) 0.80 ± 0.20	(0.031 ± 0.008) 0.80 ± 0.20	(0.016 ± 0.004) 0.30 ± 0.10
SMI 0805 201209	(0.080 ± 0.008) 2.00 ± 0.20	(0.050 ± 0.008) 1.25 ± 0.20	(0.035 ± 0.008) 0.90 ± 0.20	(0.016 ± 0.004) 0.40 ± 0.10
SMI 0805 201211	(0.080 ± 0.008) 2.00 ± 0.20	(0.050 ± 0.008) 1.25 ± 0.20	(0.043 ± 0.008) 1.10 ± 0.20	(0.016 ± 0.004) 0.40 ± 0.10
SMI 1206 321611	(0.126 ± 0.008) 3.20 ± 0.20	(0.063 ± 0.008) 1.60 ± 0.20	(0.043 ± 0.008) 1.05 ± 0.20	(0.02 ± 0.012) 0.50 ± 0.30

SMI SERIES



3. Material Type

C : Ceramic F : Ferrite

4. Inductance Value

3N3 = 3.3 nH	R33 = 330 nH	330 = 33 uH
33N = 33 nH	3R3 = 3.3 uH	331 = 330 uH

5. Tolerance

J = ± 5 % K = ± 10 % M = ± 20 %

CHIP INDUCTOR
MULTILAYER TYPE

SMI 0603 FERRITE SERIES (1608)

Specification

Part No.	Inductance [1] (uH)	Percent Tolerance	Q [2] Min	S.R.F. [3] Min (MHZ)	RDC [4] Max (OHM)	IDC [5] Max (MA)
SMI 0603 FT 47N □□□	0.047 @ 50 MHZ	**M**	20 @ 50 MHZ	260	0.30	50
SMI 0603 FT 68N □□□	0.068 @ 50 MHZ	**M**	20 @ 50 MHZ	250	0.30	50
SMI 0603 FT 82N □□□	0.082 @ 50 MHZ	**M**	20 @ 50 MHZ	245	0.30	50
SMI 0603 FT R10 □□□	0.10 @ 25 MHZ	**K,** M	30 @ 25 MHZ	240	0.50	50
SMI 0603 FT R12 □□□	0.12 @ 25 MHZ	**K,** M	30 @ 25 MHZ	205	0.50	50
SMI 0603 FT R15 □□□	0.15 @ 25 MHZ	**K,** M	30 @ 25 MHZ	180	0.60	50
SMI 0603 FT R18 □□□	0.18 @ 25 MHZ	**K,** M	30 @ 25 MHZ	165	0.60	50
SMI 0603 FT R22 □□□	0.22 @ 25 MHZ	**K,** M	30 @ 25 MHZ	150	0.80	50
SMI 0603 FT R27 □□□	0.27 @ 25 MHZ	**K,** M	30 @ 25 MHZ	136	0.80	50
SMI 0603 FT R33 □□□	0.33 @ 25 MHZ	**K,** M	30 @ 25 MHZ	125	0.85	35
SMI 0603 FT R39 □□□	0.39 @ 25 MHZ	**K,** M	30 @ 25 MHZ	110	1.00	35
SMI 0603 FT R47 □□□	0.47 @ 25 MHZ	**K,** M	30 @ 25 MHZ	105	1.35	35
SMI 0603 FT R56 □□□	0.56 @ 25 MHZ	**K,** M	30 @ 25 MHZ	95	1.55	35
SMI 0603 FT R68 □□□	0.68 @ 25 MHZ	**K,** M	30 @ 25 MHZ	85	1.70	35
SMI 0603 FT R82 □□□	0.82 @ 25 MHZ	**K,** M	30 @ 25 MHZ	75	2.10	35
SMI 0603 FT 1R0 □□□	1.0 @ 10 MHZ	**K,** M	35 @ 10 MHZ	65	0.60	25
SMI 0603 FT 1R2 □□□	1.2 @ 10 MHZ	**K,** M	35 @ 10 MHZ	60	0.80	25
SMI 0603 FT 1R5 □□□	1.5 @ 10 MHZ	**K,** M	35 @ 10 MHZ	55	0.80	25
SMI 0603 FT 1R8 □□□	1.8 @ 10 MHZ	**K,** M	35 @ 10 MHZ	50	0.95	25
SMI 0603 FT 2R2 □□□	2.2 @ 10 MHZ	**K,** M	35 @ 10 MHZ	45	1.15	15
SMI 0603 FT 2R7 □□□	2.7 @ 10 MHZ	**K,** M	35 @ 10 MHZ	40	1.35	15
SMI 0603 FT 3R3 □□□	3.3 @ 10 MHZ	**K,** M	35 @ 10 MHZ	38	1.55	15
SMI 0603 FT 3R9 □□□	3.9 @ 10 MHZ	**K,** M	35 @ 10 MHZ	36	1.70	15
SMI 0603 FT 4R7 □□□	4.7 @ 10 MHZ	**K,** M	35 @ 10 MHZ	33	2.10	15
SMI 0603 FT 5R6 □□□	5.6 @ 4 MHZ	**K,** M	35 @ 4 MHZ	22	1.55	5
SMI 0603 FT 6R8 □□□	6.8 @ 4 MHZ	**K,** M	35 @ 4 MHZ	20	1.70	5
SMI 0603 FT 8R2 □□□	8.2 @ 4 MHZ	**K,** M	30 @ 4 MHZ	18	2.10	5
SMI 0603 FT 100 □□□	10 @ 2 MHZ	**K,** M	30 @ 2 MHZ	17	2.55	5
SMI 0603 FT 120 □□□	12 @ 2 MHZ	**K,** M	30 @ 2 MHZ	15	2.10	3
SMI 0603 FT 150 □□□	15 @ 1 MHZ	**K,** M	20 @ 1 MHZ	14	1.70	1
SMI 0603 FT 180 □□□	18 @ 1 MHZ	**K,** M	20 @ 1 MHZ	13	1.85	1
SMI 0603 FT 220 □□□	22 @ 1 MHZ	**K,** M	20 @ 1 MHZ	11	2.10	1
SMI 0603 FT 270 □□□	27 @ 1 MHZ	**K,** M	20 @ 1 MHZ	10	2.75	1
SMI 0603 FT 330 □□□	33 @ 1 MHZ	**K,** M	20 @ 1 MHZ	9	2.95	1

1. Inductance is measured in HP-4287A RF LCR meter with HP-16192 fixture.
2. Q is measured in HP-4287A RF LCR meter with HP-16192 fixture.
3. SRF is measured in HP-8753E RF network analyzer with HP-16192 fixture.
4. RDC is measured in HP-4338B millohmeter.
5. For 15 °C Rise.

CHIP INDUCTOR
MULTILAYER TYPE

SMI 1206 (3216) FERRITE SERIES

Specification

Part No.	Inductance [1] (uH)	Percent Tolerance	Q [2] Min	S.R.F. [3] Min (MHZ)	RDC [4] Max (OHM)	IDC [5] Max (MA)
SMI 1206 FT 47N □□□	0.047 @ 50 MHZ	**M**	25 @ 50 MHZ	320	0.15	300
SMI 1206 FT 68N □□□	0.068 @ 50 MHZ	**M**	25 @ 50 MHZ	280	0.25	300
SMI 1206 FT 82N □□□	0.082 @ 50 MHZ	**M**	25 @ 50 MHZ	250	0.25	300
SMI 1206 FT R10 □□□	0.10 @ 25 MHZ	**K,** M	30 @ 25 MHZ	235	0.25	250
SMI 1206 FT R12 □□□	0.12 @ 25 MHZ	**K,** M	30 @ 25 MHZ	220	0.30	250
SMI 1206 FT R15 □□□	0.15 @ 25 MHZ	**K,** M	30 @ 25 MHZ	200	0.30	250
SMI 1206 FT R18 □□□	0.18 @ 25 MHZ	**K,** M	30 @ 25 MHZ	185	0.40	250
SMI 1206 FT R22 □□□	0.22 @ 25 MHZ	**K,** M	30 @ 25 MHZ	170	0.40	250
SMI 1206 FT R27 □□□	0.27 @ 25 MHZ	**K,** M	30 @ 25 MHZ	150	0.50	250
SMI 1206 FT R33 □□□	0.33 @ 25 MHZ	**K,** M	30 @ 25 MHZ	145	0.60	250
SMI 1206 FT R39 □□□	0.39 @ 25 MHZ	**K,** M	30 @ 25 MHZ	135	0.60	200
SMI 1206 FT R47 □□□	0.47 @ 25 MHZ	**K,** M	30 @ 25 MHZ	125	0.60	200
SMI 1206 FT R56 □□□	0.56 @ 25 MHZ	**K,** M	30 @ 25 MHZ	115	0.70	150
SMI 1206 FT R68 □□□	0.68 @ 25 MHZ	**K,** M	30 @ 25 MHZ	105	0.80	150
SMI 1206 FT R82 □□□	0.82 @ 25 MHZ	**K,** M	30 @ 25 MHZ	100	0.90	150
SMI 1206 FT 1R0 □□□	1.0 @ 10 MHZ	**K,** M	45 @ 10 MHZ	75	0.40	100
SMI 1206 FT 1R2 □□□	1.2 @ 10 MHZ	**K,** M	45 @ 10 MHZ	65	0.50	100
SMI 1206 FT 1R5 □□□	1.5 @ 10 MHZ	**K,** M	45 @ 10 MHZ	60	0.50	80
SMI 1206 FT 1R8 □□□	1.8 @ 10 MHZ	**K,** M	45 @ 10 MHZ	55	0.50	70
SMI 1206 FT 2R2 □□□	2.2 @ 10 MHZ	**K,** M	45 @ 10 MHZ	50	0.60	60
SMI 1206 FT 2R7 □□□	2.7 @ 10 MHZ	**K,** M	45 @ 10 MHZ	45	0.60	60
SMI 1206 FT 3R3 □□□	3.3 @ 10 MHZ	**K,** M	45 @ 10 MHZ	41	0.70	60
SMI 1206 FT 3R9 □□□	3.9 @ 10 MHZ	**K,** M	45 @ 10 MHZ	38	0.80	50
SMI 1206 FT 4R7 □□□	4.7 @ 10 MHZ	**K,** M	45 @ 10 MHZ	35	0.90	50
SMI 1206 FT 5R6 □□□	5.6 @ 4 MHZ	**K,** M	45 @ 4 MHZ	32	0.70	25
SMI 1206 FT 6R8 □□□	6.8 @ 4 MHZ	**K,** M	45 @ 4 MHZ	29	0.80	25
SMI 1206 FT 8R2 □□□	8.2 @ 4 MHZ	**K,** M	45 @ 4 MHZ	26	0.90	25
SMI 1206 FT 100 □□□	10 @ 2 MHZ	**K,** M	45 @ 2 MHZ	24	1.00	25
SMI 1206 FT 120 □□□	12 @ 2 MHZ	**K,** M	45 @ 2 MHZ	22	1.05	15
SMI 1206 FT 150 □□□	15 @ 1 MHZ	**K,** M	35 @ 1 MHZ	19	0.70	5
SMI 1206 FT 180 □□□	18 @ 1 MHZ	**K,** M	35 @ 1 MHZ	18	0.75	5
SMI 1206 FT 220 □□□	22 @ 1 MHZ	**K,** M	35 @ 1 MHZ	16	0.90	5
SMI 1206 FT 270 □□□	27 @ 1 MHZ	**K,** M	35 @ 1 MHZ	14	0.90	5
SMI 1206 FT 330 □□□	33 @ 0.4 MHZ	**K,** M	35 @ 0.4 MHZ	13	1.05	5
SMI 1206 FT 390 □□□	39 @ 2 MHZ	**K,** M	40 @ 2 MHZ	11	3.00	10
SMI 1206 FT 470 □□□	47 @ 2 MHZ	**K,** M	40 @ 2 MHZ	10	3.40	10

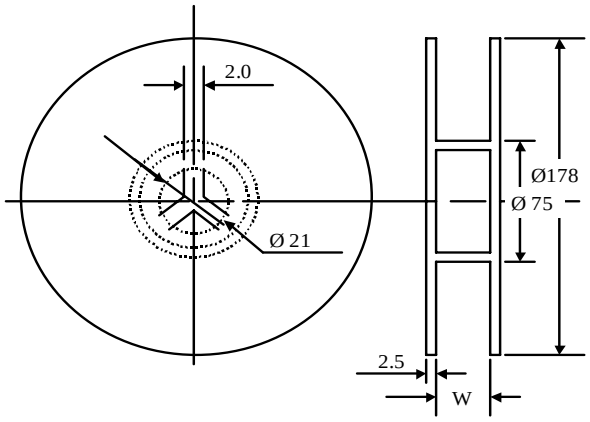
1. Inductance is measured in HP-4287A RF LCR meter with HP-16192 fixture.
2. Q is measured in HP-4287A RF LCR meter with HP-16192 fixture.
3. SRF is measured in HP-8753E RF network analyzer with HP-16192 fixture.
4. RDC is measured in HP-4338B millohmeter.
5. For 15 °C Rise.

PACKAGING INFORMATION

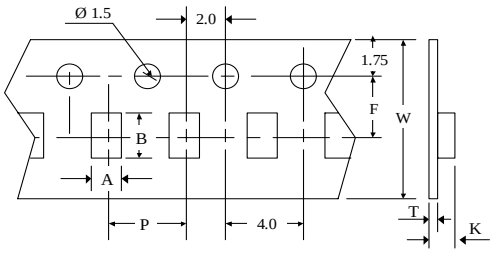
Packing Quantity

TYPE	PCS / REEL
SMI 0603	4,000
SMI 0805	4,000

Reel Dimensions

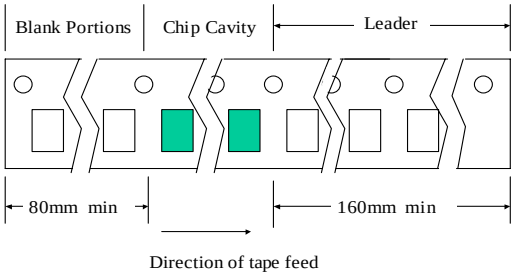


Tape Dimension



Dimensions (unit: m/m)

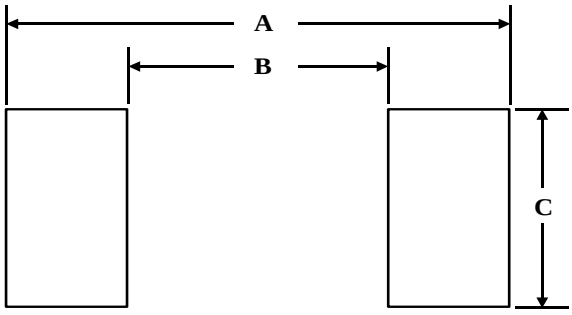
TYPE	A	B	T
SMI 0603	1.10	1.90	1.10
SMI 0805	1.55	2.30	1.20



Dimensions (unit: m/m)

TYPE	A	B	C
SMI 0603	2.10	1.00	0.80
SMI 0805	2.60	1.20	1.20

Recommended Pattern



Remark: 1) Blank length: 200 mm minimum for loading.
2) Blank length: 160 mm minimum for unloading.

RELIABILITY SPECIFICATION

1. Scope

This specification applies to fixed inductors of the following types used in electronic equipment :

Ceramic Type : For lower inductance with high Q factor at high frequency and stable circuit requirement.

Ferrite Type : For higher inductance at lower frequency circuit requirement and also for all types of chip beads.

2. Construction

Configuration & Dimension : Please refer to the attached figures and tables.

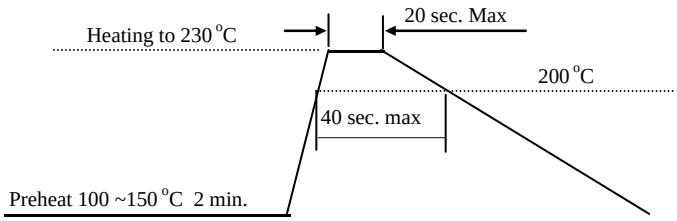
Terminals : SPI series shall consist of copper followed by solder platting.
SWI series shall consist of MoMn alloy or PdAg alloy followed by Nickel, then Au or solder platting.
SMI/FBM series shall consist of Ag followed by Nickel, then solder plating.
SCI/SAI series shall consist of copper wire followed by solder plating.

3. Operating Temperature Range

Operating Temperature Range is the scope of ambient temperature at which the inductor can be operated continuously at rated current.

Temp. Range : - 40 °C to + 85 °C

4. Recommended Soldering Conditions



5 Characteristics

Standard Atmospheric Conditions

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows :

Ambient Temperature : 25 °C (20 °C) ± 2 °C

Relative Humidity : 60% to 70%

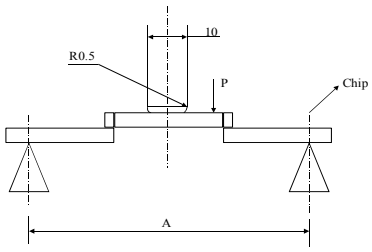
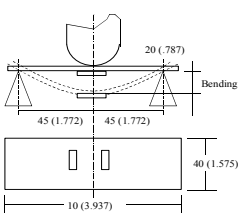
Air Pressure : 86 Kpa to 106 Kpa

CHIP INDUCTOR
CHIP BEAD

RELIABILITY SPECIFICATION

	ITEM	CONDITION	SPECIFICATION
Electrical Characteristics	Inductance/ Impedance and Tolerance	Measuring Frequency : As shown in Product Table Measuring Temperature : + 25 °C	Within Specified Tolerance
	Quality Factor		
	Insulation Resistance	Measured at 100V DC between component terminals and center of case.	1000 megaohms minimum
	Dielectric Withstanding Voltage	Measured at 500V AC between component terminals and center of case for a maximum of 1 minute.	No damage occurs when the test voltage is applied.
	Temperature Coefficient of Inductance (TCL)	Over - 40 °C to + 85°C at frequency specified in Product Table.	+ 25 to + 500 ppm / °C TCL = $\frac{L1 - L2}{L1(T1-T2)} \times 10^6$ (ppm /°C)
Machemical Characteristics	Component Adhesion (Push Test)	Components shall be reflow soldered onto a P. C. Board (230 °C ± 5°C for 20 seconds). Then a dynometer force gauge shall be applied to any side of the component.	Components must withstand a minimum force of 1 Kg for Pt/Ag termination and 2 Kg for Mo/Mn termination without any failure of the termination to component attachment.
	Drop Test	Components shall be dropped two times on the concrete floor or the vinyl tile from 1M naturally.	Change In Inductance/Impedance: SPI/SWI: Within ± 5% or ± 0.3nH Others: Within ± 20%
	Thermal Shock Test	Each cycle shall consist of 30 minutes at -25 °C followed by 30 minutes at +85 °C with a 20-second maximum transition time between temperature extremes. Test duration is 10 cycles.	Change In Q: SPI/SWI: Within ± 10% Others: Within ± 30% Change In Appearance: Without distinct damage

RELIABILITY SPECIFICATION

	ITEM	CONDITION	SPECIFICATION
Endurance Characteristics	Solderability	Dip pads in flux and then in a solder pot (63Sn / 37Pb) at 230 °C ± 5°C for 5 seconds.	A minimum of 95% of the metalized area must be covered with solder.
	Resistance to Soldering Heat	Dip components into flux and then into a solder pot containing 63Sn / 37Pb at 260 °C ± 5 °C for 5 ± 1 seconds.	Change In L / Z (Inductance / Impedance): SPI / SWI Series: Within ± 5% or ± 0.3nH Other Series: Within ± 20% Change In Q: SPI/SWI: Within ± 10% Others: Within ± 30% Change In Appearance: Without distinct damage
	Vibration (Random)	Components shall be randomly vibrated at amplitude of 1.5mm and frequency of 10 - 55 Hz: 0.04 G / Hz for a minimum of 15 minutes per axis for each of the three axes.	
	Cold Temperature Storage	Components shall be stored at temperature of -40 °C ± 2 °C for 1000 ± 48 hours. Then components shall be subjected to standard atmospheric conditions for 1 hour. After that, measurement shall be made.	
	High Temperature Storage	Components shall be stored at temperature of +85 °C ± 2 °C for 1000 ± 48 hours. Then components shall be subjected to standard atmospheric conditions for 1 hour. After that, measurement shall be made.	
	Moisture Resistance	Components shall be stored in the chamber at 45 °C at 90 - 95 R. H. for 240 hours. Then components are to be tested after 2 hours at room temperature.	Components shall not have a shorted or open winding.
	High Temperature with Loaded	Components shall be stored in the chamber at +85 °C for 1000 hours with rated current applied. Components shall be tested at the beginning of test at 500 hours and 1000 hours. Then components are to be tested after 1 hour at room temperature.	
	Bending Strength		Components shall not be damaged by the forces conditions applied on the test specified as follows: Chip Size: 0402: >1Kg 0603/0805: >3Kg 1206/1210: >6Kg 1816/1812: >8Kg
	Flexure Strength		No Mechanical Damages.