

CHIP FERRITE INDUCTORS

Features

1. Perfect for high density surface mount applications since magnetic shield eliminates crosstalk.
2. Highly reliable in wide temperature and humidity range. Superior Q characteristics in wide frequency.
3. Terminal electrode has excellent solder heat resistance.

Applications

1. Prevention of electromagnetic interference to signals on the secondary side of electronic equipment.

Ordering Information

$\frac{FI}{(1)}$ - $\frac{A}{(2)}$ $\frac{1608}{(3)}$ - $\frac{680}{(4)}$ $\frac{K}{(5)}$ $\frac{J}{(6)}$ $\frac{T}{(7)}$

(1) Series

(2) Material & Design

(3) Dimensions

The first two digits : length(mm)

The last two digits : width(mm)

(4) Inductance

(5) Tolerance

J : ± 5%

K : ± 10%

M : ± 20%.

(6) Termination

J : Nickel barrier

(7) Packing

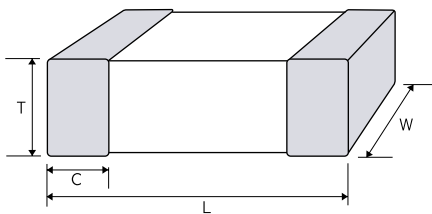
B : Bulk Pack

T : Tape & Reel (" 178mm [7 inches])

L : Tape & Reel (" 254mm [10 inches])

Shape and Dimensions

unit : mm[inches]



Type	L	W	T	C(max.)
FI- 1608-	1.6±0.15 [.063±.006]	0.8±0.15 [.031±.006]	0.8±0.15 [.031±.006]	0.5 [.019]
FI- 2012-	2.0±0.2 [.079±.008]	1.25±0.2 [.049±.008]	1.25±0.2 [.049±.008]	0.6 [.024]
FI- 3216-	3.2±0.2 [.126±.008]	1.6±0.2 [.063±.008]	1.3±0.2 [.051±.008]	0.7 [.028]

Specifications

FI1608

Part No.	Inductance		Q		L,Q test frequency (MHz)	SRF(MHz)		DCR(m Ω)		Rated Current (mA) max.
	μ H	Tolerance	min.	typ.		min.	typ.	max.	typ.	
FI-A1608-270	0.027	$\pm 10\%$ $\pm 20\%$	10	45	50	260	350	90	60	200
FI-A1608-470	0.047		10	45	50	260	320	150	100	200
FI-A1608-560	0.056		10	45	50	255	300	200	90	200
FI-A1608-680	0.068		10	45	50	250	290	200	90	200
FI-A1608-820	0.082		10	45	50	245	280	250	120	200
FI-A1608-101	0.10	$\pm 5\%$ $\pm 10\%$ $\pm 20\%$	15	30	25	240	270	250	140	200
FI-A1608-121	0.12		15	30	25	205	260	300	150	200
FI-A1608-151	0.15		15	30	25	180	250	350	180	200
FI-A1608-181	0.18		15	30	25	165	220	400	190	200
FI-A1608-221	0.22		15	30	25	150	200	400	190	200
FI-A1608-271	0.27		15	30	25	136	190	500	270	200
FI-A1608-331	0.33		15	30	25	125	180	550	280	150
FI-A1608-391	0.39		15	30	25	110	170	600	300	150
FI-A1608-471	0.47		15	30	25	105	160	700	390	150
FI-A1608-561	0.56		15	30	25	95	150	900	500	150
FI-A1608-681	0.68		15	30	25	80	140	900	500	150
FI-A1608-821	0.82		15	30	25	75	130	1600	800	100
FI-B1608-102	1.0		35	50	10	70	95	500	250	100
FI-B1608-122	1.2		35	50	10	60	80	500	250	100
FI-B1608-152	1.5		35	50	10	55	70	600	300	50
FI-B1608-182	1.8	35	50	10	50	70	700	350	50	
FI-B1608-222	2.2	35	50	10	45	60	900	450	50	
FI-B1608-272	2.7	35	50	10	40	55	1000	600	50	

¡ /SRF : Self-Resonant Frequency. ¡ /DCR : DC Resistance

FI2012

Part No.	Inductance		Q		L,Q test frequency (MHz)	SRF(MHz)		DCR(m Ω)		Rated Current (mA) max.
	μ H	Tolerance	min.	typ.		min.	typ.	max.	typ.	
FI-A2012-470	0.047	$\pm 10\%$ $\pm 20\%$	20	60	50	320	400	100	50	300
FI-A2012-560	0.056		20	60	50	300	380	150	80	300
FI-A2012-680	0.068		20	60	50	280	350	200	80	300
FI-A2012-820	0.082		20	60	50	255	320	200	80	300
FI-A2012-101	0.10		25	50	25	235	300	200	90	250
FI-A2012-121	0.12	$\pm 5\%$ $\pm 10\%$ $\pm 20\%$	25	50	25	220	280	200	65	250
FI-A2012-151	0.15		25	50	25	200	250	200	60	250
FI-A2012-181	0.18		25	50	25	185	230	200	100	250
FI-A2012-221	0.22		25	50	25	170	220	250	100	250
FI-A2012-271	0.27		25	50	25	150	200	300	150	250
FI-A2012-331	0.33		25	50	25	145	180	300	150	250
FI-A2012-391	0.39		30	50	25	135	170	400	190	200
FI-A2012-471	0.47		30	50	25	125	160	400	190	200
FI-A2012-561	0.56		30	50	25	115	150	400	280	150
FI-A2012-681	0.68		30	50	25	105	135	500	300	150
FI-A2012-821	0.82		30	50	25	100	125	600	350	150
FI-B2012-102	1.0		45	75	10	75	105	300	120	100
FI-B2012-122	1.2		45	75	10	65	95	400	140	100
FI-B2012-152	1.5		45	75	10	60	85	400	140	100
FI-B2012-182	1.8		45	75	10	55	75	400	160	100
FI-B2012-222	2.2	45	80	10	50	70	400	200	50	
FI-B2012-272	2.7	45	80	10	45	65	500	250	50	
FI-B2012-332	3.3	45	80	10	40	55	500	270	50	
FI-B2012-392	3.9	45	80	10	38	50	1000	500	50	
FI-B2012-472	4.7	45	80	10	35	48	1400	700	50	

¡ /SRF : Self-Resonant Frequency. ¡ /DCR : DC Resistance

Specifications

FI2012

Part No.	Inductance		Q		L,Q test frequency (MHz)	SRF(MHz)		DCR(m Ω)		Rated Current (mA) max.
	∇ H	Tolerance	min.	typ.		min.	typ.	max.	typ.	
FI-C2012-562	5.6	± 5% ± 10% ± 20%	50	60	4	32	45	500	250	50
FI-C2012-682	6.8		50	60	4	29	40	600	330	25
FI-C2012-822	8.2		50	60	4	26	36	700	380	25
FI-C2012-103	10.0		50	60	2	24	33	800	450	25
FI-C2012-123	12.0		50	60	2	22	30	800	470	25
FI-D2012-153	15.0		30	40	1	19	27	1500	750	15
FI-D2012-183	18.0		30	40	1	18	25	1500	810	15
FI-D2012-223	22.0		30	40	1	16	22	700	350	5
FI-D2012-273	27.0		30	40	1	14	20	800	450	5
FI-D2012-333	33.0		30	40	0.4	13	18	1000	600	5

∫ /SRF : Self-Resonant Frequency. ∫ /DCR : DC Resistance

FI3216

Part No.	Inductance		Q		L,Q test frequency (MHz)	SRF(MHz)		DCR(m Ω)		Rated Current (mA) max.
	∇ H	Tolerance	min.	typ.		min.	typ.	max.	typ.	
FI-A3216-470	0.047	± 10% ± 20%	20	60	50	320	400	150	80	300
FI-A3216-560	0.056		20	60	50	300	360	150	80	300
FI-A3216-680	0.068		20	60	50	280	330	150	100	300
FI-A3216-820	0.082		20	60	50	255	300	150	100	300
FI-A3216-101	0.10		25	50	25	235	280	200	100	250
FI-A3216-121	0.12		25	50	25	220	260	200	100	250
FI-A3216-151	0.15		25	50	25	200	240	200	100	250
FI-A3216-181	0.18		25	50	25	185	220	200	100	250
FI-A3216-221	0.22		25	50	25	170	200	250	120	250
FI-A3216-271	0.27		25	50	25	150	180	250	120	250
FI-A3216-331	0.33	25	50	25	145	170	300	130	250	
FI-A3216-391	0.39	30	50	25	135	160	300	150	200	
FI-A3216-471	0.47	30	50	25	125	145	300	150	200	
FI-A3216-561	0.56	± 5% ± 10% ± 20%	30	50	25	115	135	350	170	150
FI-A3216-681	0.68		30	50	25	105	125	350	250	150
FI-A3216-821	0.82		30	50	25	100	115	400	300	150
FI-B3216-102	1.0		45	75	10	75	90	250	130	100
FI-B3216-122	1.2		45	75	10	65	80	300	150	100
FI-B3216-152	1.5		45	75	10	60	70	300	170	100
FI-B3216-182	1.8		45	75	10	55	66	500	250	100
FI-B3216-222	2.2		45	80	10	50	58	600	300	50
FI-B3216-272	2.7		45	80	10	45	53	600	300	50
FI-B3216-332	3.3		45	80	10	40	49	700	350	50
FI-B3216-392	3.9	45	80	10	38	45	800	400	50	
FI-B3216-472	4.7	45	80	10	35	41	800	400	50	
FI-C3216-562	5.6	± 5% ± 10% ± 20%	50	65	4	32	38	600	300	50
FI-C3216-682	6.8		50	65	4	29	34	600	300	50
FI-C3216-822	8.2		50	65	4	26	31	600	330	50
FI-C3216-103	10.0		50	65	2	24	28	700	380	50
FI-C3216-123	12.0		50	65	2	22	26	900	450	25
FI-C3216-153	15.0		35	45	1	19	23	1100	550	25
FI-C3216-183	18.0		35	45	1	18	21	1500	800	25
FI-C3216-223	22.0		35	45	1	16	19	1500	800	25
FI-C3216-273	27.0		35	45	1	14	17	1500	800	25
FI-C3216-333	33.0		35	45	0.4	13	16	1600	850	25

∫ /SRF : Self-Resonant Frequency. ∫ /DCR : DC Resistance

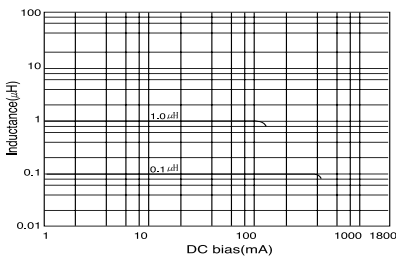
∫ Test equipment : HP4291A + HP16192A

: HP4295A + HP16334A

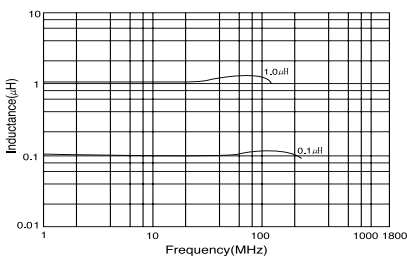
Electrical Characteristics

1608

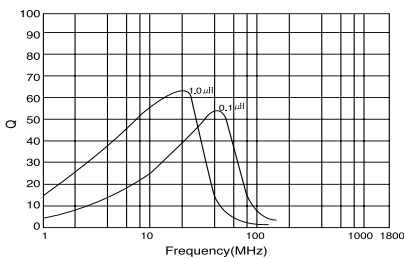
DC bias characteristics



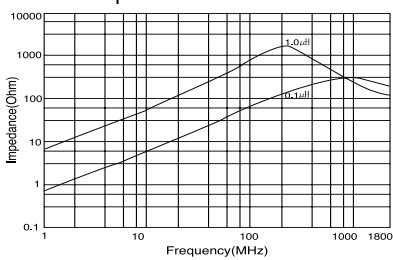
Inductance characteristics



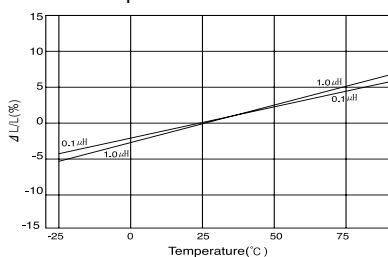
Q characteristics



Impedance characteristics

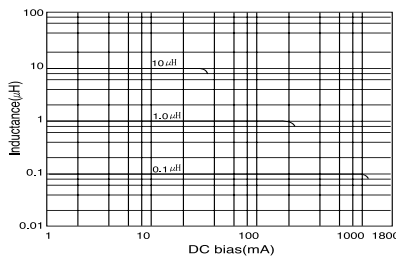


Temperature characteristics

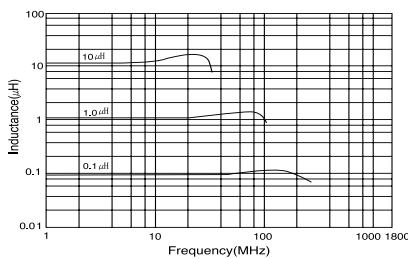


2012

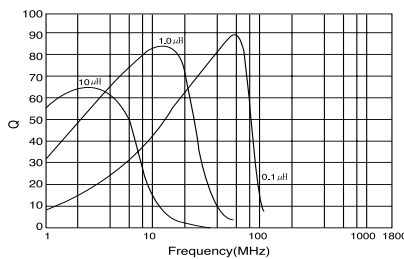
DC bias characteristics



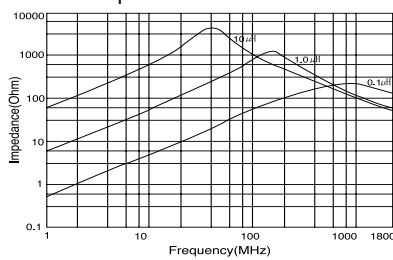
Inductance characteristics



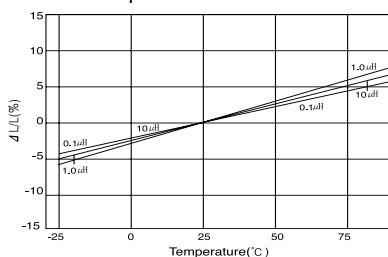
Q characteristics



Impedance characteristics

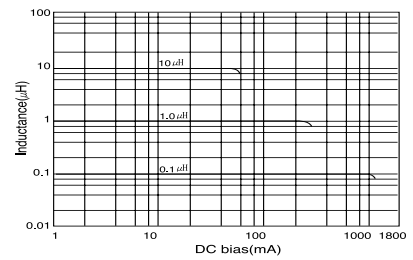


Temperature characteristics

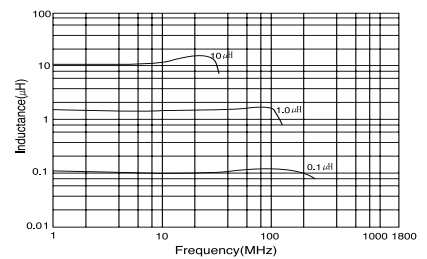


3216

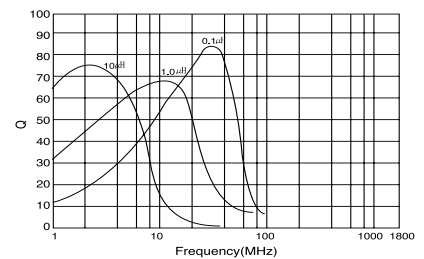
DC bias characteristics



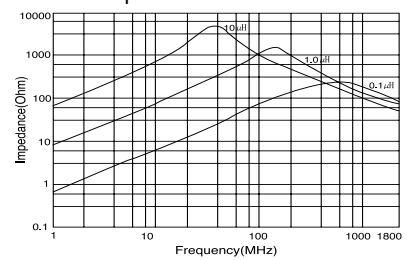
Inductance characteristics



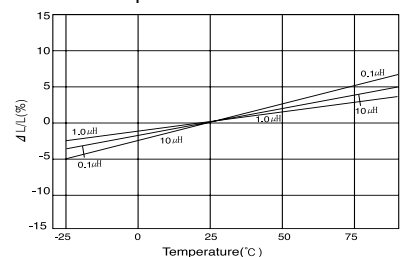
Q characteristics



Impedance characteristics

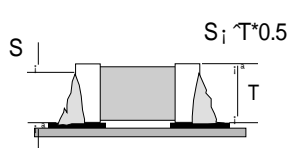
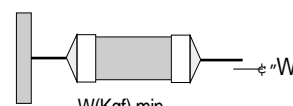
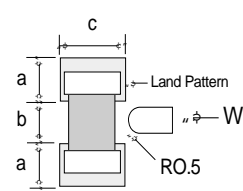
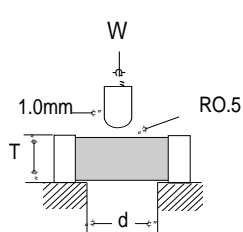


Temperature characteristics



RELIABILITY AND TEST CONDITIONS

CHIP FERRITE / CERAMIC INDUCTORS

ITEM	REQUIREMENTS				TEST CONDITION	
	1005	1608	2012	3216		
Operating temp. range	-55 ; ~+125 ;				—	
Storage temp. & humidity range	40 ; max. , 70% RH max.				at packing condition	
Resistance to solder heat	1. No damage such as cracks should be caused in chip element. 2. More than 75% of the terminal electrode shall be covered with new solder. 3. Inductance change : ; within 5% 4. Quality factor change : ; within 30%				Preheat temperature : 100 to 150 ; Preheat time : 1min. Solder temperature : 260 ; 10 ; Dipping time : 10 ; 0.5sec.	
Solderability	1. More than 90% of the terminal electrode shall be covered with new solder. 2. Inductance change : ; within 5% 3. Quality factor change : ; within 30%				Preheat temperature : 100 to 150 ; Preheat time : 1min. Solder temperature : 230 ; 10 ; Dipping time : 3 ; 1sec.	
Reflow soldering	1. More than 50% of the terminal electrode shall be covered with new solder. <div style="text-align: center; margin-top: 10px;">  </div>				Preheat temperature : 150 ; Preheat time : 1min. Solder temperature : 230 ; Soldering time : 10 sec. max. (Reflow soldering profile)	
Tensile strength (Terminal strength)	1. No mechanical damage <div style="text-align: right; margin-top: 10px;">unit:Kgf (W)</div>				 W(Kgf) min.	
Adhesion of terminal electrode (Flexure strength)	1. No mechanical damage <div style="text-align: right; margin-top: 10px;">unit: mm (a,b,c) , Kgf (W)</div>					
	a	-	1.0	1.0		1.3
	b	-	0.8	1.0		1.5
	c	-	1.3	1.3		3.0
	W	-	2.0	4.0		5.0
Body strength (Bending strength)	1. The body shall not be damaged by forces applied on the right. <div style="text-align: right; margin-top: 10px;">unit: mm (d) , Kgf (W)</div>					
d	-	1.3	1.3	2.0		
W	-	2.0	3.0	4.0		

CHIP FERRITE / CERAMIC INDUCTORS

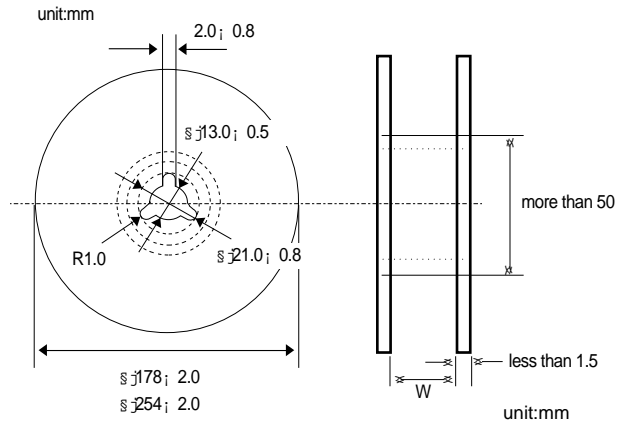
ITEM	REQUIREMENTS				TEST CONDITION
	1005	1608	2012	3216	
Drop	1. No mechanical damage				Drop 10 times on a concrete floor from a height of 91 cm.
Vibration	1. No mechanical damage				Frequency : 10~55~10Hz Amplitude : 1.52 mm Direction and time : X,Y,Z directions for 2 hours
Thermal shock (Temperature cycle)	1. No mechanical damage 2. Inductance change : \pm within 5% 3. Quality factor change : \pm within 30%				Step1. -40 \pm 3 ; 30 \pm 3min. Step2. 85 \pm 3 ; 30 \pm 3min. Number of cycle : 100 times
Heat load resistance	1. No mechanical damage 2. Inductance change : \pm within 5% 3. Quality factor change : \pm within 30%				Temperature : 85 \pm 2; Applied current : rated current Time : 1,000 hours Measured at room ambient temperature after placing for 24 hours
Low temp. resistance	1. No mechanical damage 2. Inductance change : \pm within 5% 3. Quality factor change : \pm within 30%				Temperature : -40 \pm 5; Time : 1,000 hours Measured at room ambient temperature after placing for 24 hours
Humidity resistance	1. No mechanical damage 2. Inductance change : \pm within 5% 3. Quality factor change : \pm within 30%				Temperature : 40 \pm 2; Humidity : 90~95% RH Time : 500 hours Measured at room ambient temperature after placing for 24 hours
Humidity load resistance	1. No mechanical damage 2. Inductance change : \pm within 5% 3. Quality factor change : \pm within 30%				Temperature : 40 \pm 2; Humidity : 90~95% RH Applied current : rated current Time : 500 hours Measured at room ambient temperature after placing for 24 hours

PACKING

STANDARD QUANTITY

Type	Q _i (PCS)	REMARKS
0603	15,000	
	10,000	
1005	50,000	BULK CASSETTE
	10,000	
1608	4,000	4mm pitch
	8,000	
2012	3,000	
	7,000	254mm
3216	3,000	
	7,000	254mm
4516	3,000	
4532	1,500	
5750	1,000	

REEL DIMENSION

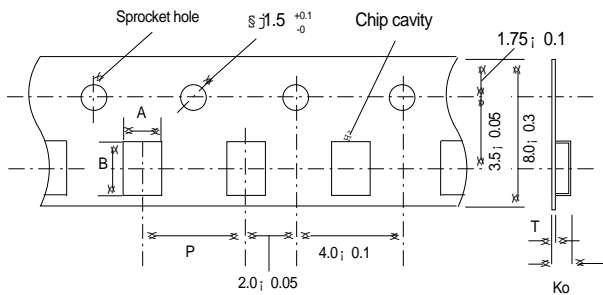


Type	W[mm]
0603, 1005, 1608, 2012, 3216 Array	9.0 ± 0.3
4516, 4532, 5750	13.0 ± 0.3

TAPING DIMENSION / 8mm wide

Embossing Tape

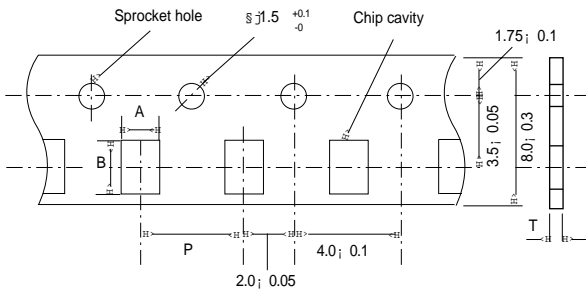
unit:mm



PRODUCT	Type	A _i 0.1	B _i 0.1	P _i 0.1	Ko _i 0.1	T(max.)
CHIP BEADS	1608	1.00	1.80	4.0	0.95	0.3
CHIP BEADS ARRAY						
CHIP FERRITE INDUCTOR	2012	1.45	2.25	4.0	0.08	0.3
CHIP EMI SUPPRESSION FILTER					1.00	
CHIP EMI FILTER ARRAY	2012	1.90	2.25	4.0	1.35	0.3
CHIP LC FILTER						
CHIP COMMON MODE FILTER	3216	1.90	3.60	4.0	1.00	0.3
CHIP FEEDTHRU						
CHIP VARISTOR	3216	1.90	3.60	4.0	1.35	0.3
CHIP VARISTOR ARRAY						
CHIP SURGE ABSORBER						

; Paper Tape

unit:mm

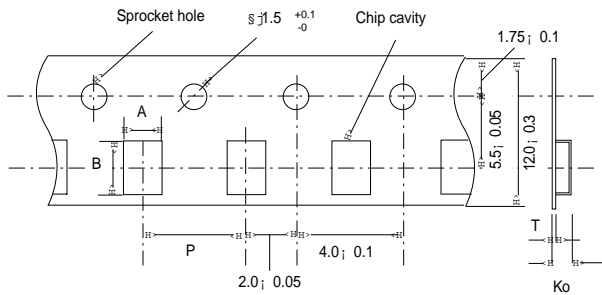


PRODUCT	Type	$A_i \pm 0.1$	$B_i \pm 0.1$	$P_i \pm 0.1$	T(max.)
MICRO INDUCTOR CHIP BEADS CHIP INDUCTOR CHIP VARISTOR CHIP SURGE ARRAY	0603	0.37 ± 0.02	0.67 ± 0.02	4.0 ± 0.1	0.45
	1005	0.65 ± 0.1	1.15 ± 0.1	2.0 ± 0.1	0.8
	1608	1.00 ± 0.1	1.8 ± 0.1	2.0 ± 0.1	1.1

TAPING DIMENSION / 12mm wide

; Embossing Tape

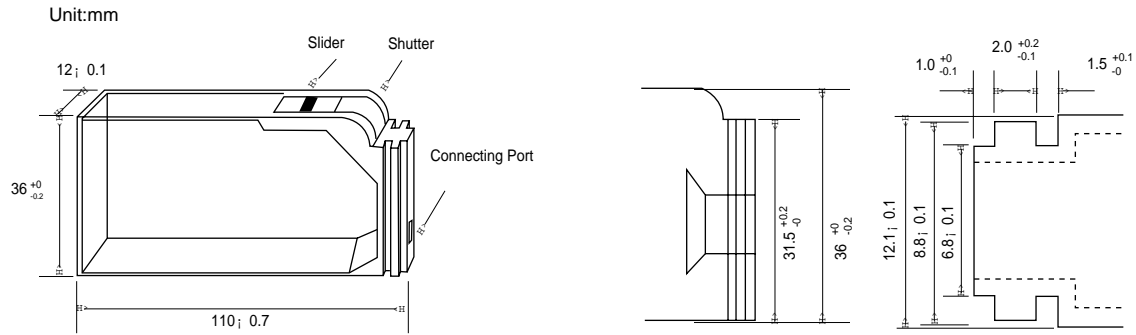
unit:mm



unit ; mm

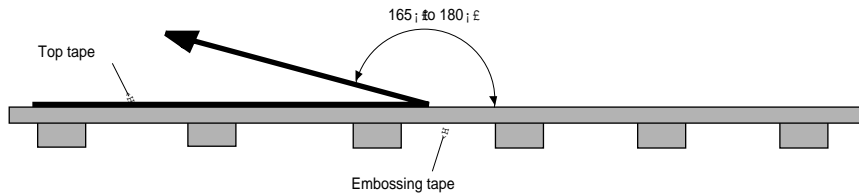
PRODUCT	Type	$A_i \pm 0.1$	$B_i \pm 0.1$	$P_i \pm 0.1$	$Ko_i \pm 0.1$	T(max.)
CHIP BEADS CHIP FEEDTHRU	4516	1.90	4.90	4.0	1.00	0.3
	4516	1.90	4.90	4.0	1.35	0.3
	4532	3.60	4.90	8.0	1.40	0.3
	5750	5.20	6.10	8.0	2.05	0.3

1005 BULK CASSETTE DIMENSION



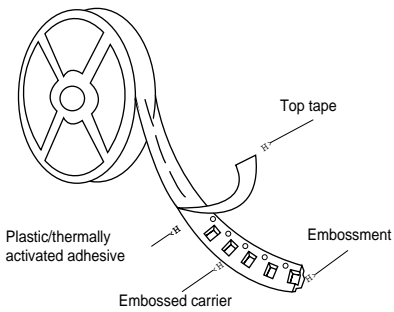
TOP TAPE STRENGTH

The force for tearing off top tape is 20 to 70 grams in the arrow direction.

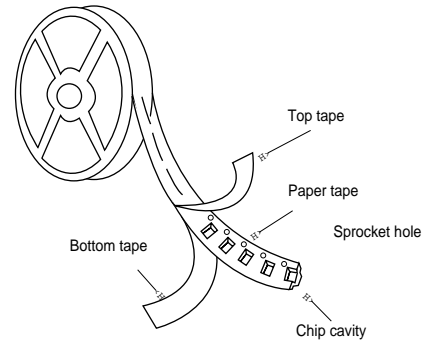


TAPING MATERIAL

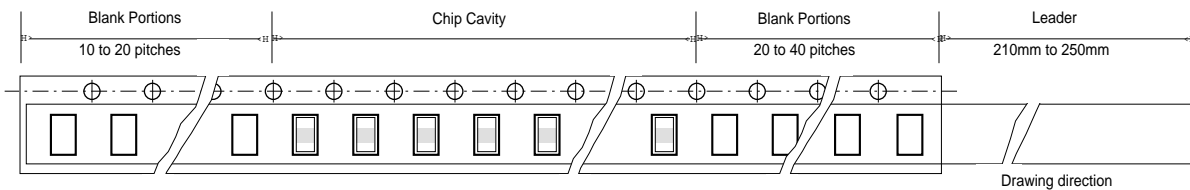
Embossed Tape



Paper Tape



LEADER AND BLANK PORTION

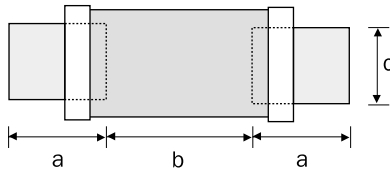


The pitch holes shift within ± 0.3 mm for cumulative 10 pitches.

LAND PATTERN DESIGN

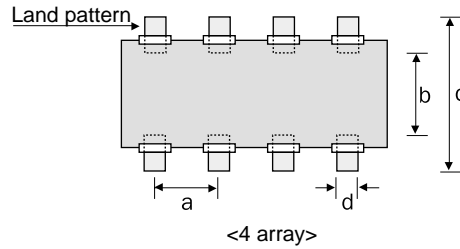
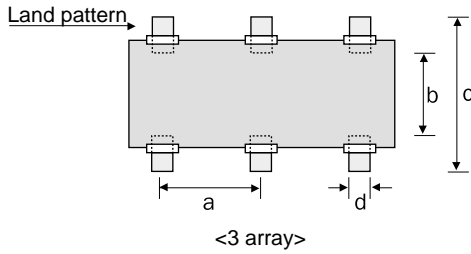
BEAD, INDUCTOR, VARISTOR, SURGE ABSORBER

unit ; mm



SIZE	a	b	c
0603	0.22	0.25	0.32
1005	0.7	0.4	0.5
1608	1.0	0.6	0.8
2012	1.0	1.0	1.0
3216	1.1	2.2	1.4
4516	1.5	3.0	1.4
4532	1.8	3.0	3.0
5750	2.0	4.0	5.8

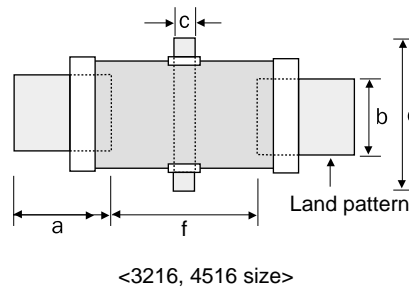
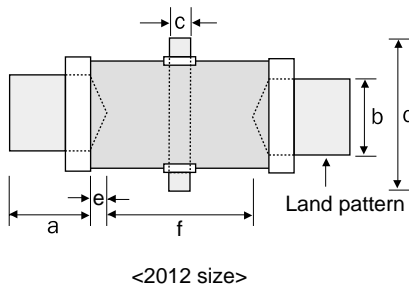
ARRAY



unit ; mm

SIZE	array	a	b	c	d
3216	3 array	1.0	0.8	3.0	0.5
3216	4 array	0.8	0.8	3.0	0.4

EMI SUPPRESSION FILTER, LC FILTER, FEEDTHRU CAPACITOR

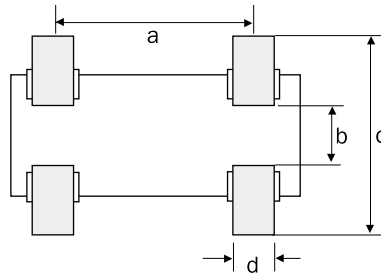


unit ; mm

SIZE	a	b	c	d	e	f
2012	1.0	1.0	0.4	2.0	0.1	1.4
3216	1.1	1.4	0.6	2.4	-	2.4
4516	1.5	1.4	0.8	2.4	-	3.4

LAND PATTERN DESIGN

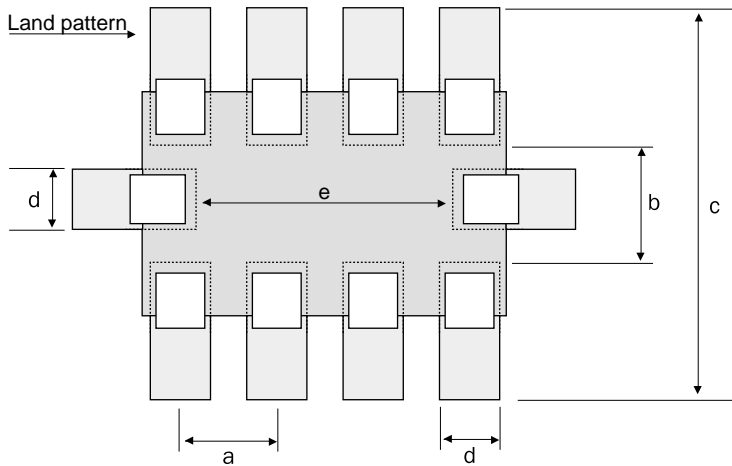
COMMON MODE FILTER, VARISTOR ARRAY



unit ; mm

SIZE	POLE(Array)	a	b	c	d
2012	2 POLE	1.20	0.60	2.60	0.40
2012	2 Array	0.76	0.38	2.16	0.46
3216	2 POLE	2.10	0.80	3.00	0.60
3216	2 Array	1.96	0.76	2.54	0.90

EMI FILTER ARRAY

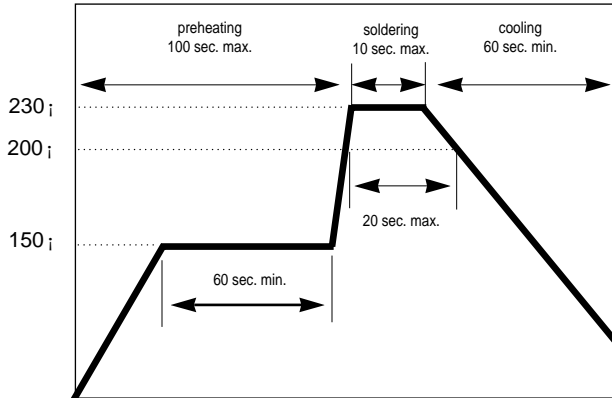


unit ; mm

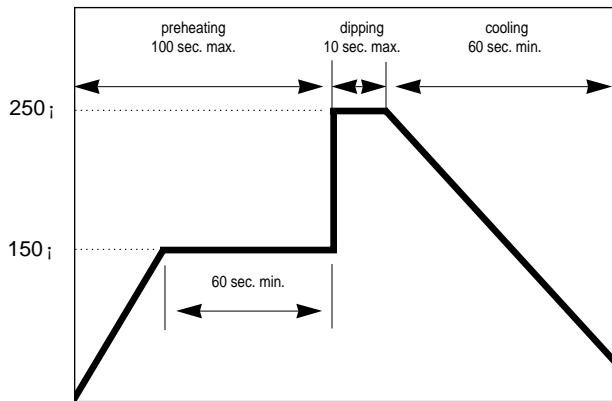
SIZE	POLE(Array)	a	b	c	d	e
3216	4 Array	0.8	0.8	3.0	0.4	2.4

SOLDERING PROFILE

REFLOW SOLERING PROFILE



FLOW SOLDERING PROFILE



MANUAL SOLDERING

