

# CHIP CERAMIC INDUCTORS

## Features

1. SMD type chip inductors utilizing monolithic structure provide highly reliable surface mount application.
2. Superior Q characteristics is guaranteed over the wide frequency range to allow high frequency applications.
3. Terminal electrode has excellent solder heat resistance.

## Applications

1. RF module of telecommunication products.  
- cellular phone, cordless phone, pager etc.
2. GSM phone, PCS phone.
3. Computer communications, Radar detectors.
4. Automotive electronics, Keyless remote.

## Ordering Information

$\frac{CI}{(1)}$  -  $\frac{B}{(2)}$   $\frac{1608}{(3)}$  -  $\frac{120}{(4)}$   $\frac{K}{(5)}$   $\frac{J}{(6)}$   $\frac{T}{(7)}$

(1) Series

(2) Material & Design

(3) Dimensions

The first two digits : length(mm)  
The last two digits : width(mm)

(4) Inductance

The first two digits are significant.  
The last digit is the number of zeros following.  
N : a decimal point placed between first two digits.

(5) Tolerance

S :  $\pm 0.3nH$   
J :  $\pm 5\%$   
K :  $\pm 10\%$

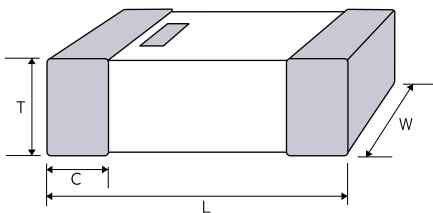
(6) Termination

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.)
CI- 1005-	1.0 $\pm$ 0.10 [.039 $\pm$ .004]	0.5 $\pm$ 0.10 [.020 $\pm$ .004]	0.5 $\pm$ 0.10 [.020 $\pm$ .004]	0.4 [.016]
CI- 1608-	1.6 $\pm$ 0.15 [.063 $\pm$ .006]	0.8 $\pm$ 0.15 [.031 $\pm$ .006]	0.8 $\pm$ 0.15 [.031 $\pm$ .006]	0.5 [.020]
CI- 2012-	2.0 $\pm$ 0.20 [.079 $\pm$ .008]	1.25 $\pm$ 0.20 [.049 $\pm$ .008]	1.0 $\pm$ 0.20 [.039 $\pm$ .008]	0.6 [.024]

$\pm$  The polarity mark can be provided upon customer request.

## Specifications

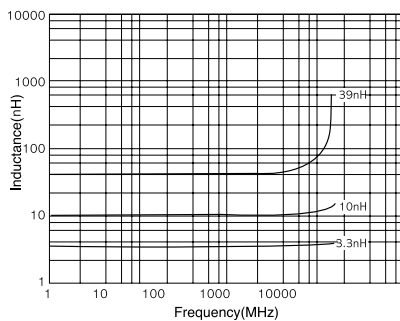
CI1005

Part No.	Inductance		Q 100MHz min.	Q 800MHz min.	Q 1.8GHz min.	SRF(MHz)		DCR (mΩ) max	Rated Current (mA) max.
	nH	Tolerance				min.	typ.		
CI-B1005-10N	1.0	±0.3nH	8	20	26	6000	13000	100	300
CI-B1005-12N	1.2		8	20	26	6000	10000	120	300
CI-B1005-15N	1.5		8	20	30	6000	10000	120	300
CI-B1005-18N	1.8		8	22	35	6000	9500	140	300
CI-B1005-22N	2.2		8	22	35	6000	9000	160	300
CI-B1005-27N	2.7		8	22	35	6000	9000	200	300
CI-B1005-33N	3.3		8	22	35	6000	8000	220	300
CI-B1005-39N	3.9		8	22	30	4000	6500	250	300
CI-B1005-47N	4.7		8	22	30	4000	5000	280	300
CI-B1005-56N	5.6		8	22	28	4000	5000	300	300
CI-B1005-68N	6.8		8	22	28	3900	4400	350	300
CI-B1005-82N	8.2		8	20	28	3600	4000	400	250
CI-B1005-100	10		8	20	24	3200	3500	450	250
CI-B1005-120	12	8	20	24	2700	3500	500	200	
CI-B1005-150	15	8	20	20	2300	3000	550	200	
CI-B1005-180	18	8	20	15	2100	2600	650	200	
CI-B1005-220	22	8	20	13	1900	2200	800	200	
CI-B1005-270	27	8	17	-	1600	1900	900	200	
CI-B1005-330	33	8	16	-	1300	1700	1100	200	
CI-B1005-390	39	8	16	-	1200	1600	1200	100	
CI-B1005-470	47	8	10	-	1000	1300	1300	100	
CI-B1005-560	56	8	-	-	750	900	1400	100	
CI-B1005-680	68	8	-	-	700	800	1400	100	
CI-B1005-820	82	8	-	-	600	700	1600	100	
CI-B1005-101	100	8	-	-	650	650	1600	100	

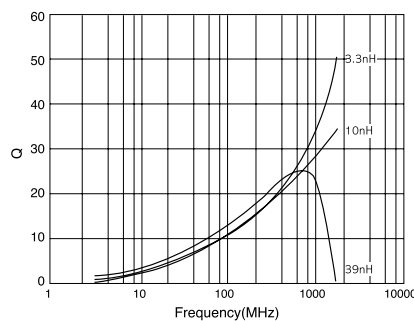
f<sub>s</sub> / SRF : Self-Resonant Frequency.      R<sub>d</sub> / DCR : DC Resistance

## Electrical Characteristics

Inductance Characteristics



Q Characteristics



## Specifications

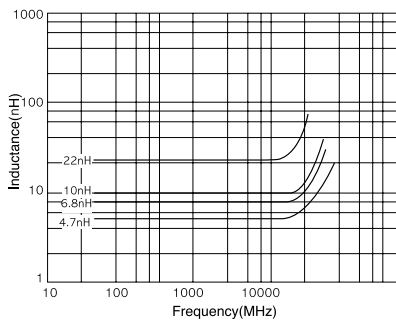
CI1608

Part No.	Inductance		Q min.	L,Q test frequency (MHz)	SRF(MHz)		DCR (mΩ) max	Rated Current (mA) max.
	nH	Tolerance			min.	typ.		
CI-B1608-10N	1.0	±0.3nH	8	100	4000	13000	100	300
CI-B1608-12N	1.2		8	100	4000	13000	100	300
CI-B1608-15N	1.5		8	100	4000	10000	100	300
CI-B1608-18N	1.8		8	100	3800	10000	120	300
CI-B1608-22N	2.2		8	100	3600	10000	160	300
CI-B1608-27N	2.7		8	100	3400	8000	200	300
CI-B1608-33N	3.3		10	100	3200	6000	220	300
CI-B1608-39N	3.9		10	100	3000	6000	250	300
CI-B1608-47N	4.7		10	100	2800	5000	280	300
CI-B1608-56N	5.6		10	100	2700	5000	290	300
CI-B1608-68N	6.8		10	100	2600	4000	300	300
CI-B1608-82N	8.2		10	100	2200	4000	330	300
CI-B1608-100	10		10	100	1800	3000	350	300
CI-B1608-120	12		10	100	1650	2500	400	300
CI-B1608-150	15	10	100	1350	2000	450	300	
CI-B1608-180	18	10	100	1350	2000	500	300	
CI-B1608-220	22	10	100	1100	1800	550	300	
CI-B1608-270	27	10	100	1100	1600	600	300	
CI-B1608-330	33	10	100	1000	1400	650	300	
CI-B1608-390	39	± 5% ± 10%	10	100	900	1300	700	300
CI-B1608-470	47		10	100	800	1300	900	300
CI-B1608-560	56		10	100	700	1100	1000	300
CI-B1608-680	68		10	100	650	1000	1200	300
CI-B1608-820	82		10	100	600	850	1500	300
CI-B1608-101	100		10	100	550	750	1700	300
CI-B1608-121	120		8	50	500	650	2000	250
CI-B1608-151	150		8	50	500	600	2400	200
CI-B1608-181	180		8	50	400	500	2700	200
CI-B1608-221	220		8	50	400	500	2800	200
CI-B1608-271	270	8	50	350	450	3100	200	

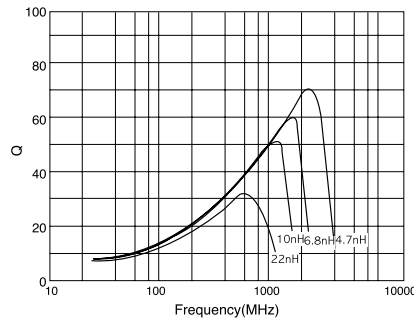
$f_s$  / SRF : Self-Resonant Frequency.  $R_{DC}$  / DCR : DC Resistance

## Electrical Characteristics

Inductance Characteristics

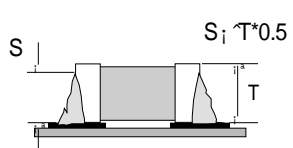
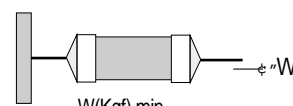
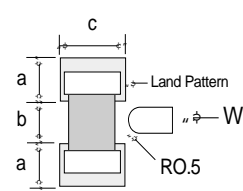
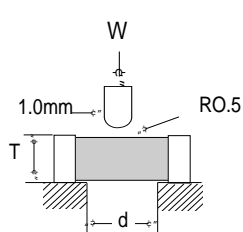


Q Characteristics



# 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;">  </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;">unit:Kgf (W)</div>				
	W	-	1.0	2.0	2.5
Adhesion of terminal electrode (Flexure strength)	1. No mechanical damage <div style="text-align: right;">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;">unit: mm (d) , Kgf (W)</div>				
	d	-	1.3	1.3	2.0
	W	-	2.0	3.0	4.0

## CHIP FERRITE / CERAMIC INDUCTORS

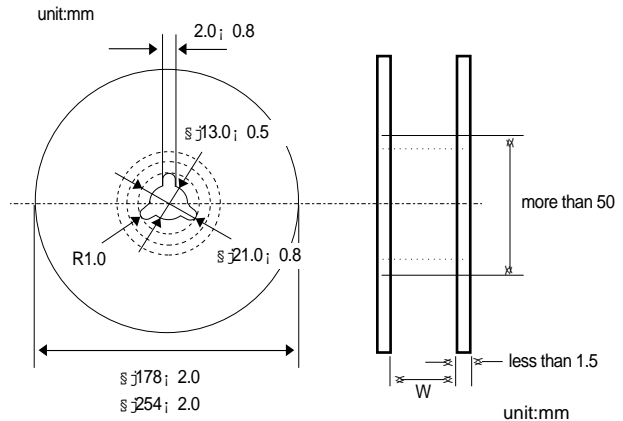
ITEM	REQUIREMENTS				TEST CONDITION
	1005	1608	2012	3216	
Drop	1. No mechanical damage				Drop 10 times on a concrete floor from a height of 91 cm.
Vibration	1. No mechanical damage				Frequency : 10~55~10Hz Amplitude : 1.52 mm Direction and time : X,Y,Z directions for 2 hours
Thermal shock (Temperature 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 <sub>i</sub> (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

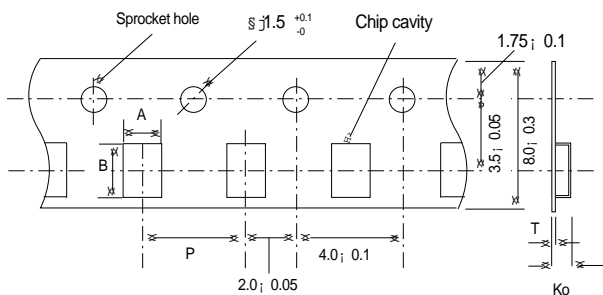


Type	W[mm]
0603, 1005, 1608, 2012, 3216 Array	9.0 ± 0.3
4516, 4532, 5750	13.0 ± 0.3

## TAPING DIMENSION / 8mm wide

Embossing Tape

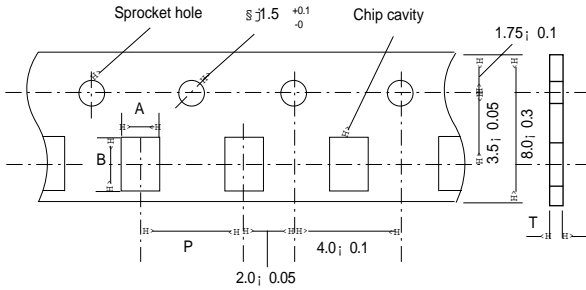
unit:mm



PRODUCT	Type	A <sub>i</sub> 0.1	B <sub>i</sub> 0.1	P <sub>i</sub> 0.1	Ko <sub>i</sub> 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	3216	1.90	3.60	4.0	1.00	0.3
CHIP COMMON MODE FILTER						
CHIP FEEDTHRU	3216	1.90	3.60	4.0	1.35	0.3
CHIP VARISTOR						
CHIP VARISTOR ARRAY						
CHIP SURGE ABSORBER						

; Paper Tape

unit:mm

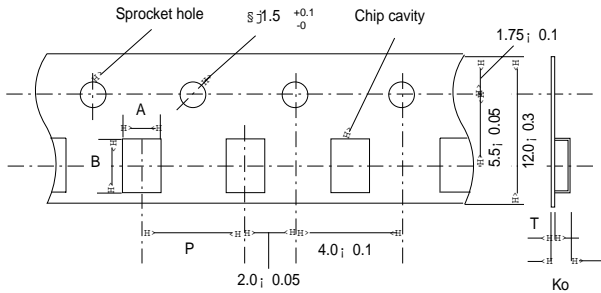


PRODUCT	Type	A <sub>i</sub> 0.1	B <sub>i</sub> 0.1	P <sub>i</sub> 0.1	T(max.)
MICRO INDUCTOR CHIP BEADS CHIP INDUCTOR CHIP VARISTOR CHIP SURGE ARRAY	0603	0.37 ±0.02	0.67 ±0.02	4.0 ±0.1	0.45
	1005	0.65 ±0.1	1.15 ±0.1	2.0 ±0.1	0.8
	1608	1.00 ±0.1	1.8 ±0.1	2.0 ±0.1	1.1

TAPING DIMENSION / 12mm wide

; Embossing Tape

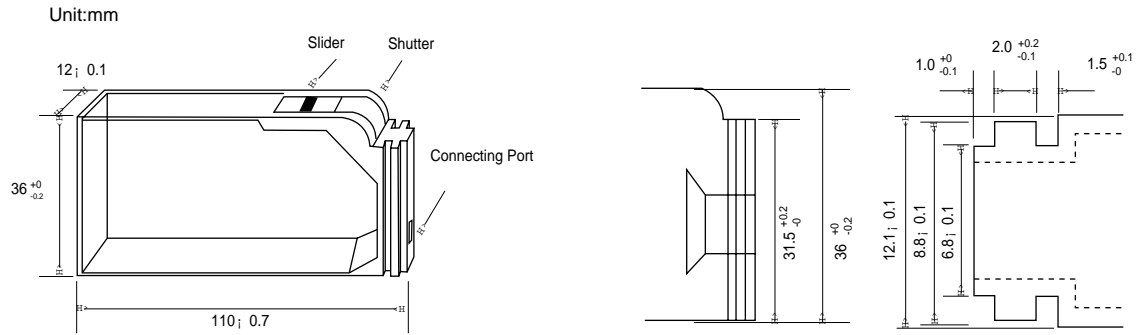
unit:mm



unit ; mm

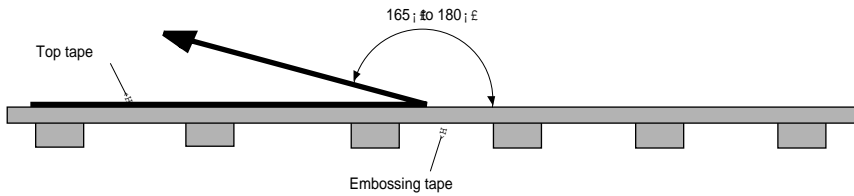
PRODUCT	Type	A <sub>i</sub> 0.1	B <sub>i</sub> 0.1	P <sub>i</sub> 0.1	Ko <sub>i</sub> 0.1	T(max.)
CHIP BEADS CHIP FEEDTHRU	4516	1.90	4.90	4.0	1.00	0.3
	4516	1.90	4.90	4.0	1.35	0.3
	4532	3.60	4.90	8.0	1.40	0.3
	5750	5.20	6.10	8.0	2.05	0.3

## § 1005 BULK CASSETTE DIMENSION



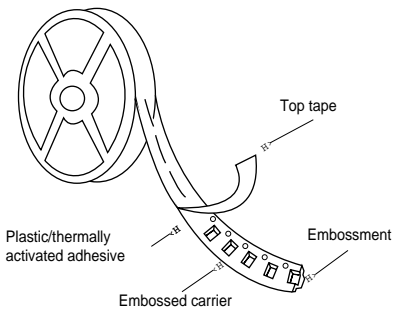
## § TOP TAPE STRENGTH

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

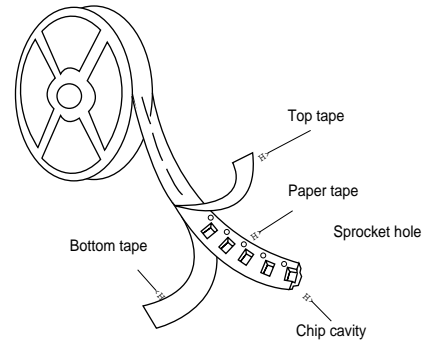


## § TAPING MATERIAL

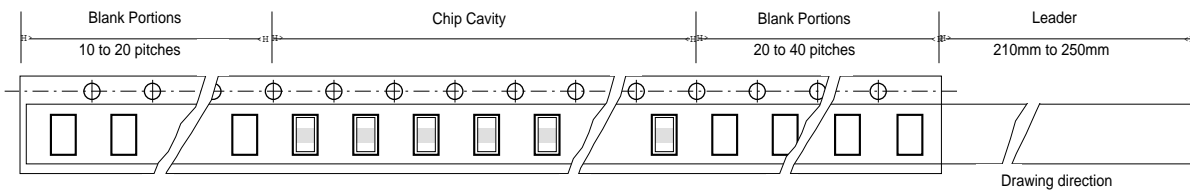
⌋ Embossed Tape



⌋ Paper Tape



## § LEADER AND BLANK PORTION



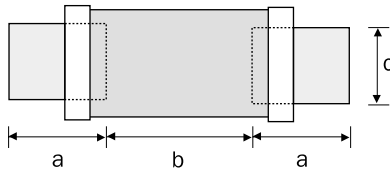
⌋ The pitch holes shift within  $\pm 0.3$ mm for cumulative 10 pitches.



# LAND PATTERN DESIGN

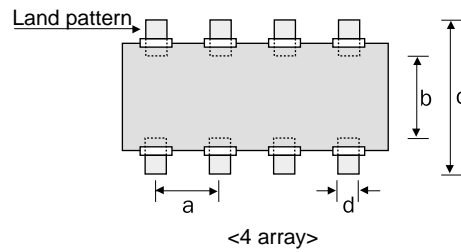
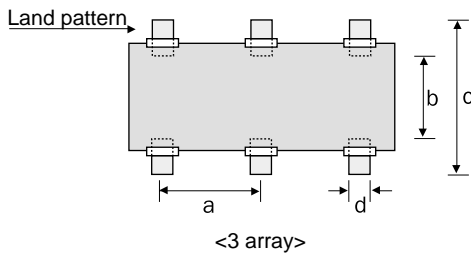
## BEAD, INDUCTOR, VARISTOR, SURGE ABSORBER

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

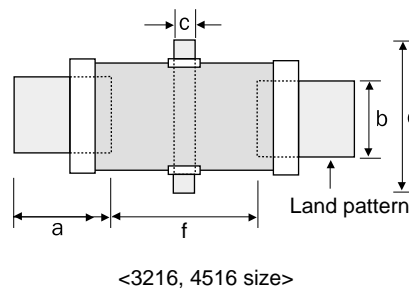
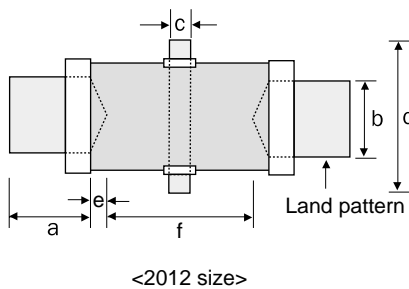
## ARRAY



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

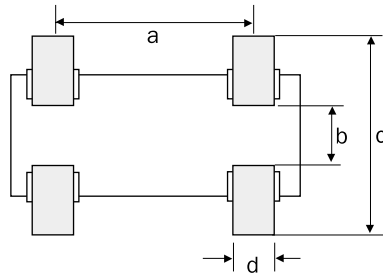


unit ; mm

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

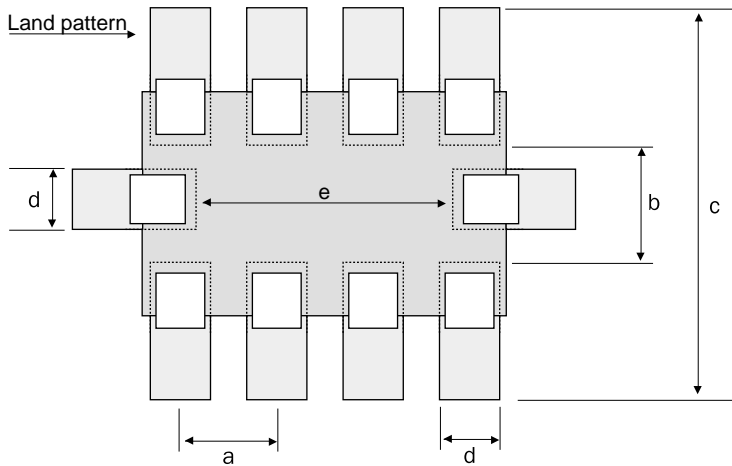
## COMMON MODE FILTER, VARISTOR ARRAY



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

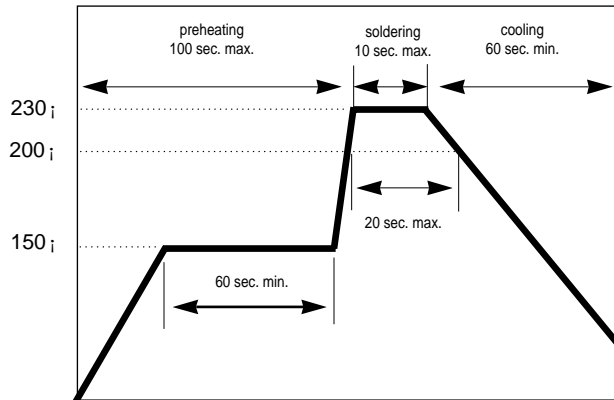


unit ; mm

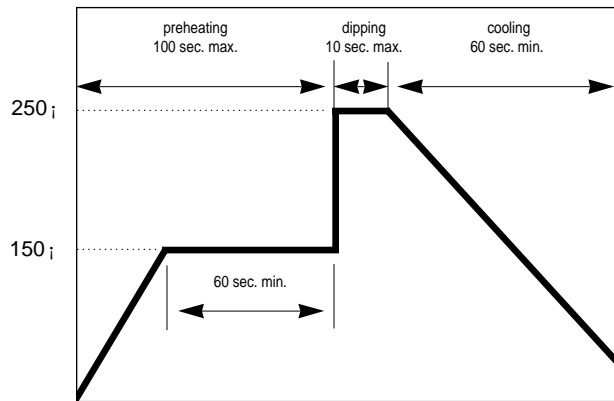
SIZE	POLE(Array)	a	b	c	d	e
3216	4 Array	0.8	0.8	3.0	0.4	2.4

# SOLDERING PROFILE

## REFLOW SOLERING PROFILE



## FLOW SOLDERING PROFILE



## MANUAL SOLDERING

