

Chip Beads & Inductors

Introduction

Chip Components Guide

SAMWHA's CB□, CBA□, CM□, CD□ series of chip components consist of compact, high performance beads and inductors. Their innovative components and case structures mean low DC resistance and outstanding highfrequency characteristics. These series are designed for a variety of applications, facilitating component selection for individual circuit requirements.

Products Guide

Product Name	Application	Material	Part Number	Impedance/ Inductance range	Dimensions
Chip Ferrite Beads	Signal Line (G)	General Frequency (A)	CB□GA□	10~4000Ω	1608 2012 3216
			CB□GK□	60~1000Ω	
	High Power Line (P)	Medium Frequency (K)	CB□GM□	5~1000Ω	
			CB□PA□	11~600Ω	
	Ultra High Power Line(U)	High Frequency (M)	CB□PM□	50~600Ω	
			CB□UM□	50~120Ω	
Chip Ferrite Beads Array	Signal Line	General Frequency (A)	CBA□GA□	30~1000Ω	3216
		Medium Frequency (K)	CBA□GK□	60~1000Ω	
		High Frequency (M)	CBA□GM□	30~1000Ω	
Chip Ferrite Inductors	Signal Line	Ferrite (F)	CM□F□	0.047~33μH	1608 2012
Chip Ceramic Inductors	Signal Line	Ceramic (C)	CD□C□	1.0~470nH	1005
					1608

Chip Beads & Inductors

Part Numbering

<u>CB</u>	<u>1608</u>	<u>G</u>	<u>A</u>	<u>102</u>	<u>T</u>	<u>CM</u>	<u>1608</u>	<u>F</u>	<u>R22</u>	<u>K</u>	<u>T</u>	
①	②	③	④	⑤	⑨	①	②	④	⑥	⑧	⑨	
<u>CBA</u>	<u>3216</u>	<u>G</u>	<u>A</u>	<u>102</u>	<u>N4</u>	<u>E</u>	<u>CD</u>	<u>1608</u>	<u>C</u>	<u>22N</u>	<u>J</u>	<u>T</u>
①	②	③	④	⑤	⑦	⑨	①	②	④	⑥	⑧	⑨

① Series

Mark	Product Name
CB	Chip Ferrite Beads
CBA	Chip Ferrite Beads Array
CM	Chip Ferrite Inductors
CD	Chip Ceramic Inductors

② Dimension

Mark	Dimension
1005	1.0mm × 0.5mm
1608	1.6mm × 0.8mm
2012	2.0mm × 1.25mm
3216	3.2mm × 1.6mm

③ Applications

Mark	Applications
G	Signal Line
P	High Power Line
U	Ultra High Power Line

④ Material

Mark	Material
A	General Frequency
K	Medium Frequency
M	High Frequency
F	Ferrite
C	Ceramic

⑤ Impedance

300 = 30Ω 201 = 200Ω
 601 = 600Ω 102 = 1000Ω

⑥ Inductance

22N = 22nH 3N3 = 3.3nH
 2R2 = 2.2μH R22 = 0.22μH

⑦ Number of circuits

N4 = 4 array

⑧ Inductance Tolerance

Mark	Tolerance
G	±2%
J	±5%
K	±10%
M	±20%
N	±30%
C	±0.2nH
S	±0.3nH
D	±0.5nH

⑨ Packaging Code

Mark	Packaging
B	Bulk Pack
T	Tape & Reel Pack
E	Embossed Tape Pack

Chip Ferrite Beads

Features

1. Good reliability (Monolithic structure)
2. High impedance characteristics
3. Flow/Reflow solder application

Applications

1. Computer and its peripherals
2. I/O port, DC power lines, signal lines
3. Digital TV/VCR
4. OA electronic equipment

Product Identifications

CB	1608	G	A	102	T
①	②	③	④	⑤	⑥

① Series Code

CB : Chip Ferrite Beads

② Dimension Code

The first two digits : length(mm)

The last two digits : width(mm)

③ Application Code

G : Signal Line

P : High power line

U : Ultra high power line

④ Material Code

A : General frequency

K : Medium frequency

M : High frequency

⑤ Impedance Value Code

The first two digits are significant

The last digit is the number of zeros following

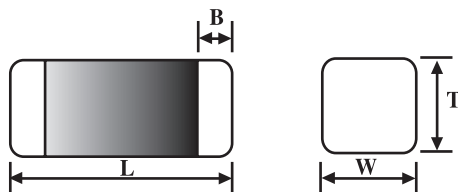
⑥ Packaging Code

T : Reel paper packaging

E : Reel embossed tape packaging

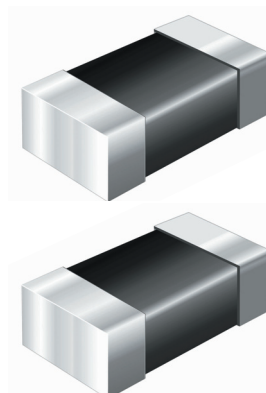
B : Bulk packaging

Shape and Dimensions



(Unit:mm)

Model	L	W	T	B
CB1608	1.6 ± 0.15	0.8 ± 0.15	0.8 ± 0.15	0.3 ± 0.2
CB2012	2.0 ± 0.2	1.25 ± 0.2	0.85 ± 0.2 1.25 ± 0.2	0.5 ± 0.3
CB3216	3.2 ± 0.2	1.6 ± 0.2	1.1 ± 0.2	0.5 ± 0.3



Chip Ferrite Beads

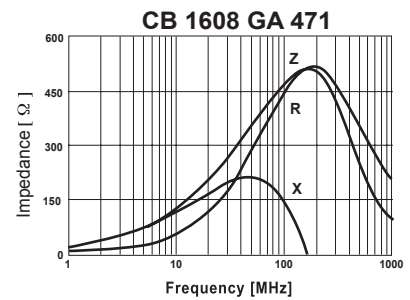
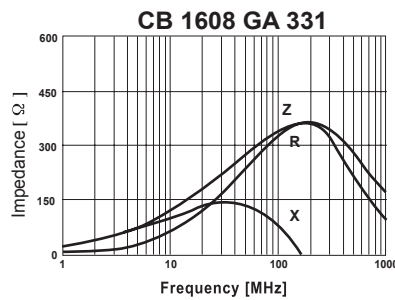
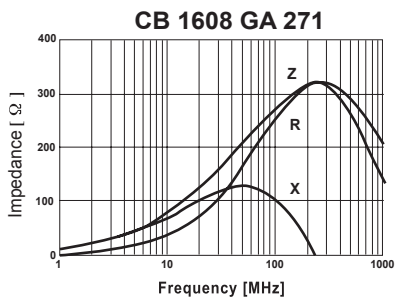
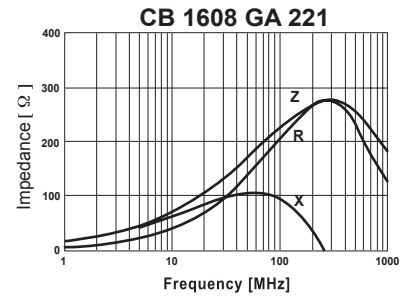
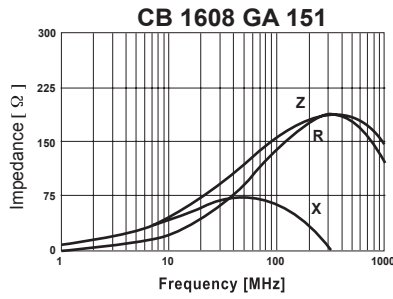
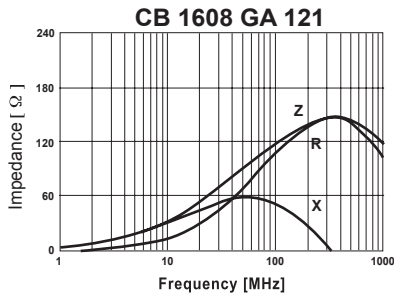
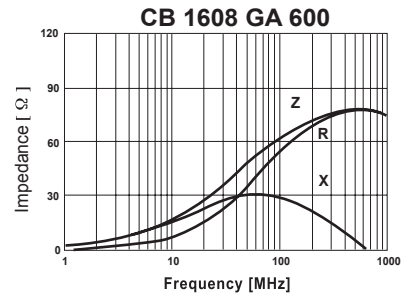
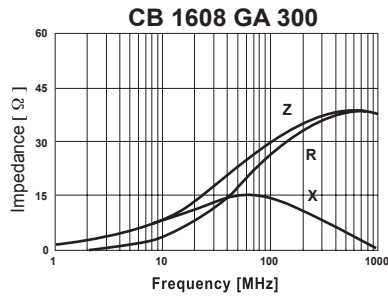
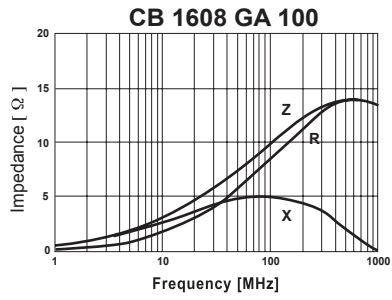
■ Specifications

- CB 1608 series -

Part No.	Impedance [Ω]	DC Resistance [Ω]max.	Rated Current (mA)max.	Test Frequency [MHz]
CB1608GA100	10 ± 25%	0.05	500	100
CB1608GA300	30 ± 25%	0.08	500	
CB1608GA600	60 ± 25%	0.15	200	
CB1608GA121	120 ± 25%	0.20	200	
CB1608GA151	150 ± 25%	0.25	200	
CB1608GA221	220 ± 25%	0.30	200	
CB1608GA271	270 ± 25%	0.35	200	
CB1608GA331	330 ± 25%	0.45	200	
CB1608GA471	470 ± 25%	0.50	200	
CB1608GA601	600 ± 25%	0.50	200	
CB1608GA102	1000 ± 25%	0.70	100	
CB1608GK600	60 ± 25%	0.20	700	
CB1608GK121	120 ± 25%	0.25	600	
CB1608GK151	150 ± 25%	0.25	600	
CB1608GK221	220 ± 25%	0.30	550	
CB1608GK471	470 ± 25%	0.45	350	
CB1608GK601	600 ± 25%	0.50	350	
CB1608GK102	1000 ± 25%	0.70	200	
CB1608GM300	30 ± 25%	0.06	200	
CB1608GM470	47 ± 25%	0.08	200	
CB1608GM121	120 ± 25%	0.12	200	
CB1608GM221	220 ± 25%	0.20	200	
CB1608GM301	300 ± 25%	0.30	200	
CB1608GM471	470 ± 25%	0.40	200	
CB1608GM601	600 ± 25%	0.40	200	
CB1608GM102	1000 ± 25%	0.60	150	

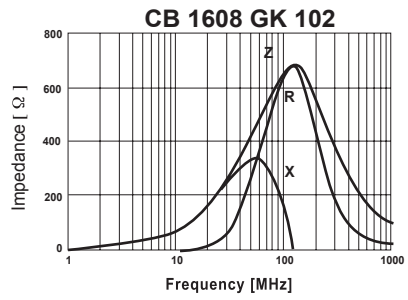
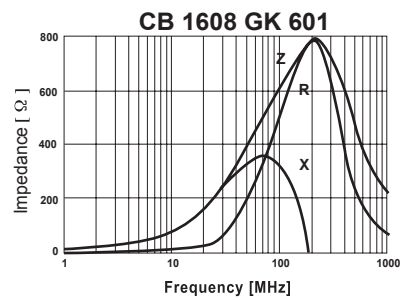
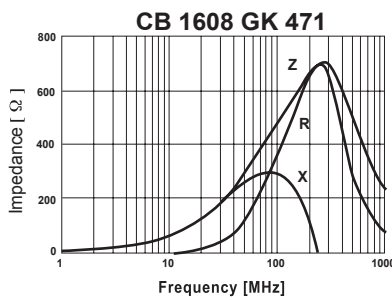
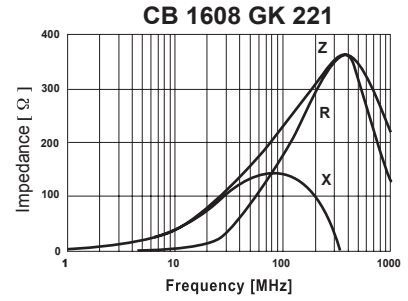
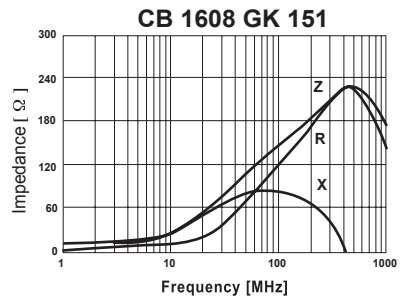
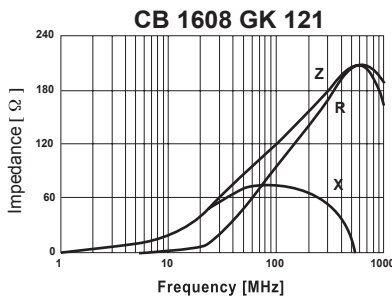
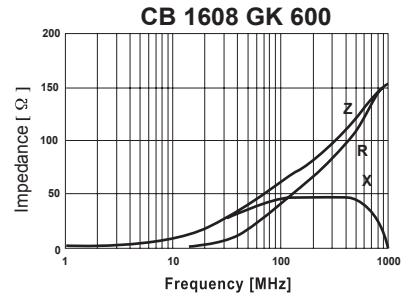
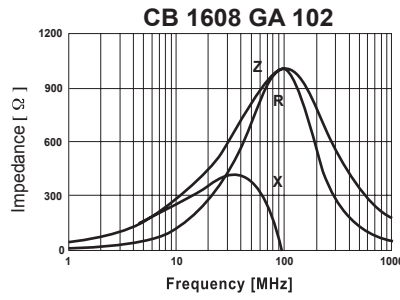
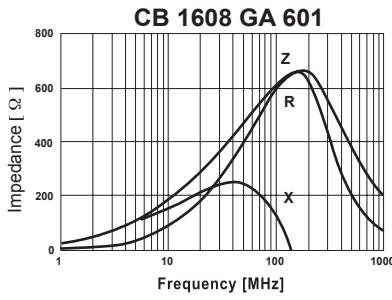
Chip Ferrite Beads

Electrical Characteristics



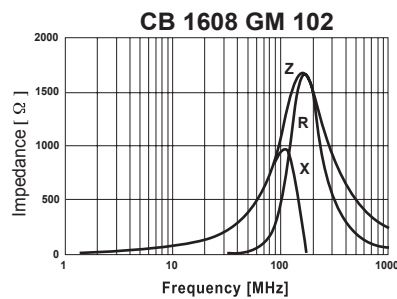
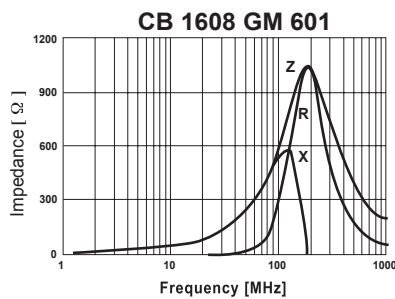
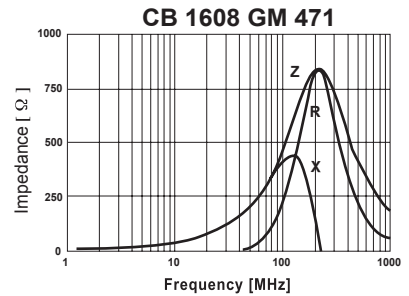
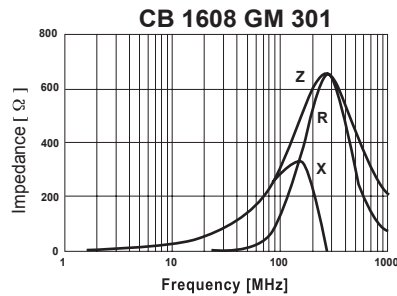
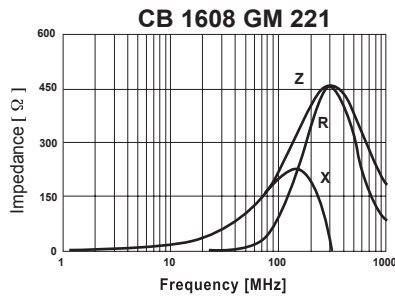
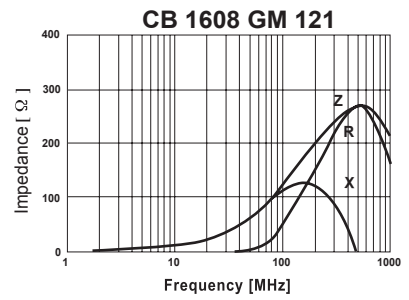
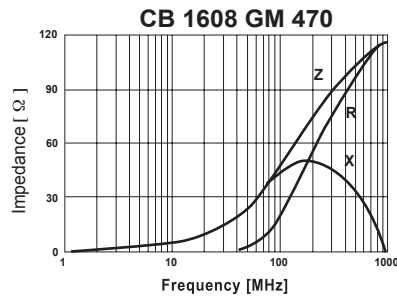
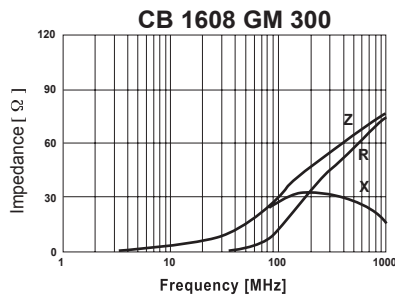
Chip Ferrite Beads

Electrical Characteristics



Chip Ferrite Beads

Electrical Characteristics



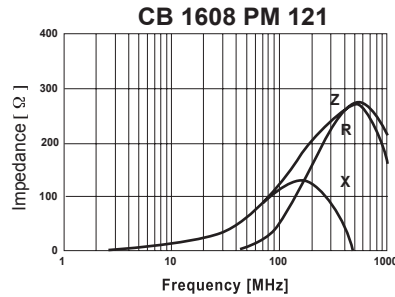
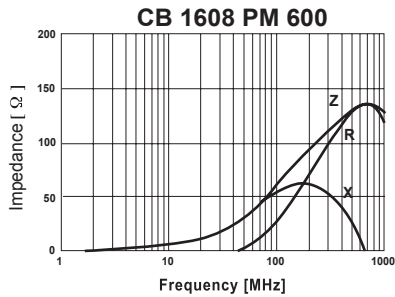
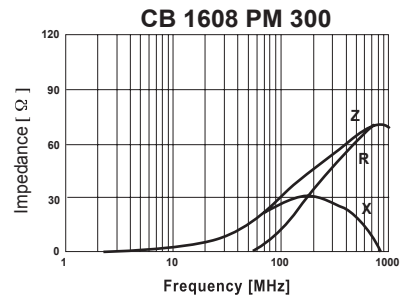
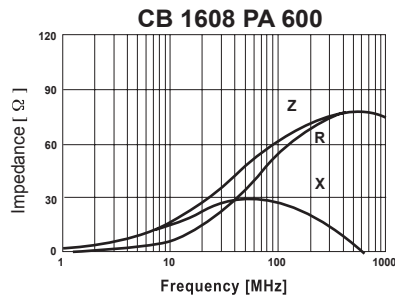
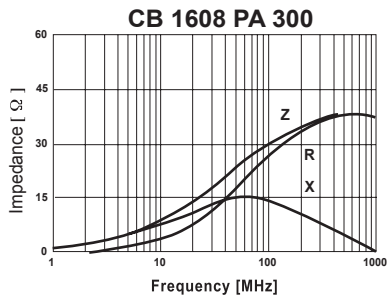
Chip Ferrite Beads

Specifications

- CB 1608 series -

Part No.	Impedance [Ω]	DC Resistance [Ω]max.	Rated Current (mA)max.	Test Frequency [MHz]
CB1608PA300	$30 \pm 25\%$	0.05	1000	100
CB1608PA600	$60 \pm 25\%$	0.10	500	
CB1608PM300	$30 \pm 25\%$	0.05	1000	
CB1608PM600	$60 \pm 25\%$	0.08	1000	
CB1608PM121	$120 \pm 25\%$	0.08	1000	

Electrical Characteristics



Chip Ferrite Beads

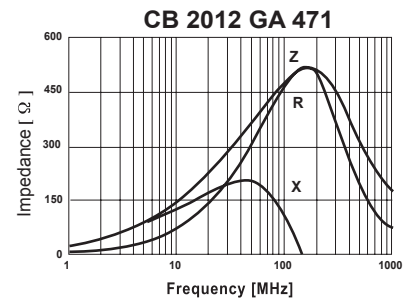
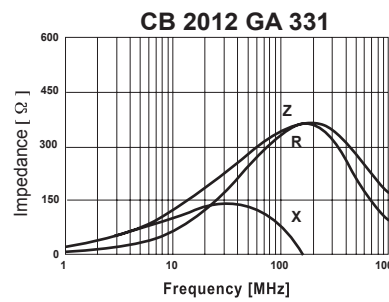
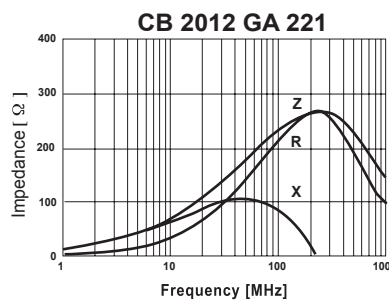
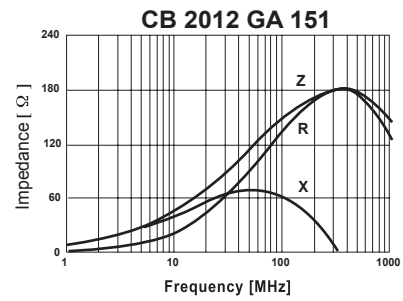
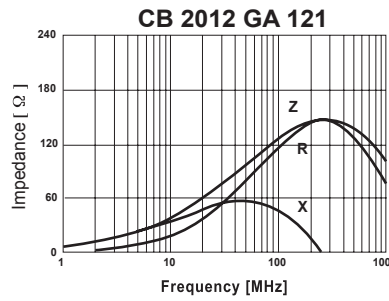
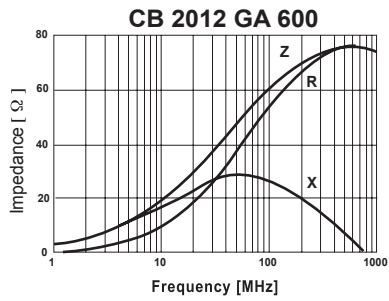
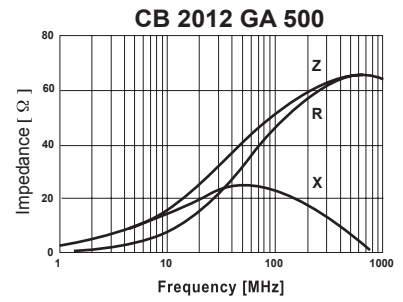
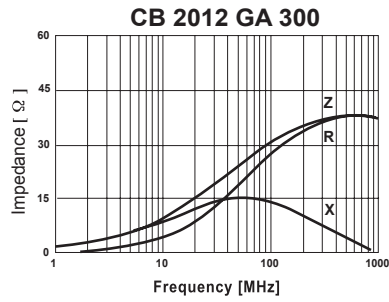
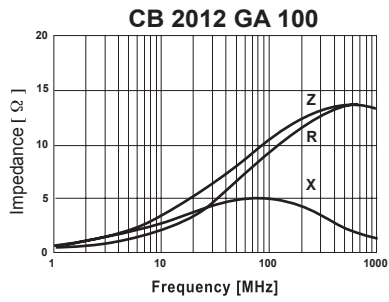
■ Specifications

- CB 2012 series -

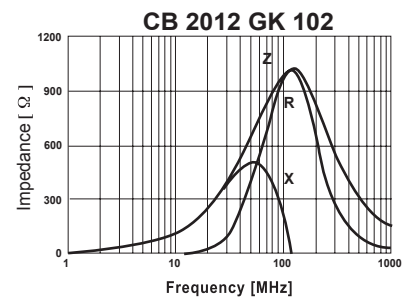
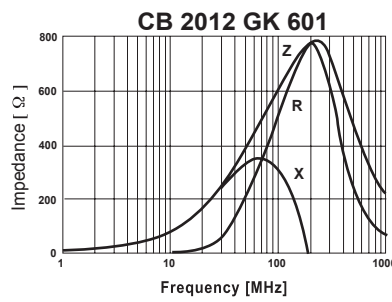
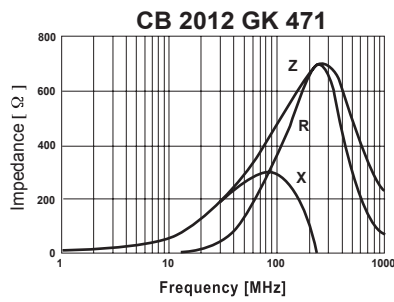
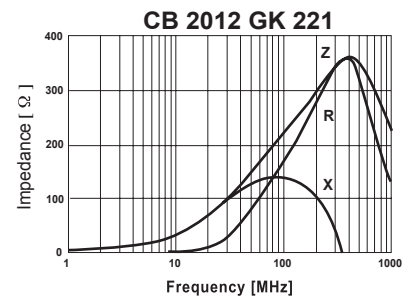
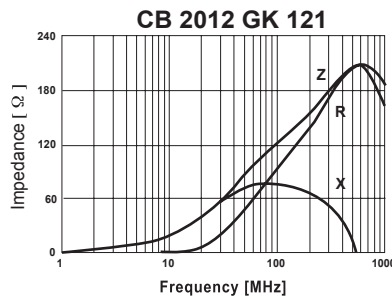
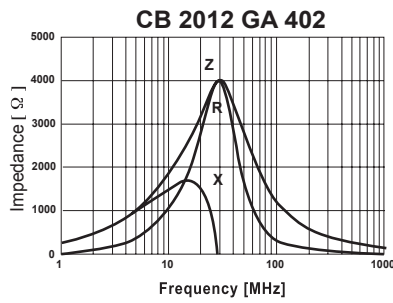
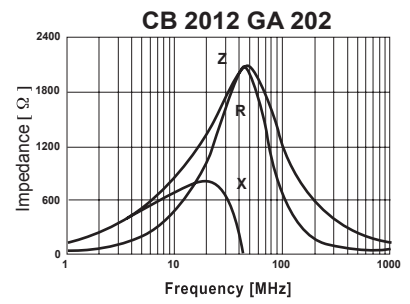
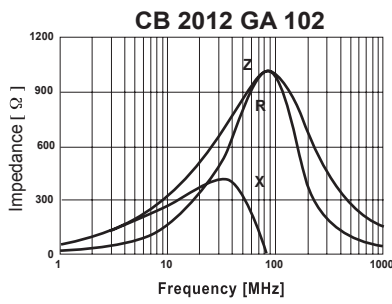
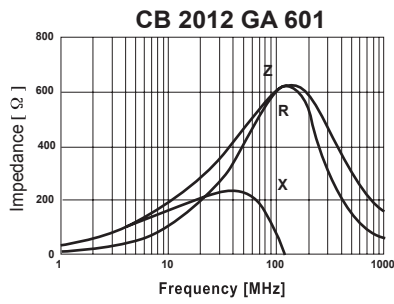
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CB2012GA100	10 ± 25%	0.010	200	100
CB2012GA300	30 ± 25%	0.025	200	
CB2012GA500	50 ± 25%	0.06	200	
CB2012GA600	60 ± 25%	0.06	200	
CB2012GA121	120 ± 25%	0.15	200	
CB2012GA151	150 ± 25%	0.15	200	
CB2012GA221	220 ± 25%	0.20	200	
CB2012GA331	330 ± 25%	0.25	200	
CB2012GA471	470 ± 25%	0.25	200	
CB2012GA601	600 ± 25%	0.30	200	
CB2012GA102	1000 ± 25%	0.45	200	
CB2012GA202	2000 ± 25%	0.60	150	40
CB2012GA402	4000 ± 25%	1.50	50	30
CB2012GK121	120 ± 25%	0.20	800	100
CB2012GK151	150 ± 25%	0.20	800	
CB2012GK221	220 ± 25%	0.30	750	
CB2012GK301	300 ± 25%	0.30	700	
CB2012GK471	470 ± 25%	0.35	700	
CB2012GK601	600 ± 25%	0.40	500	
CB2012GK102	1000 ± 25%	0.45	400	

Chip Ferrite Beads

Electrical Characteristics



Electrical Characteristics



Chip Ferrite Beads

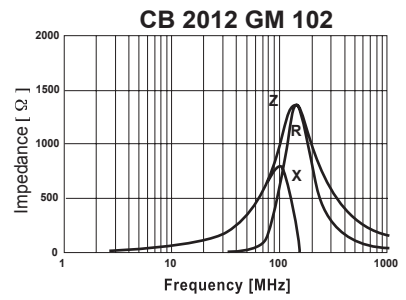
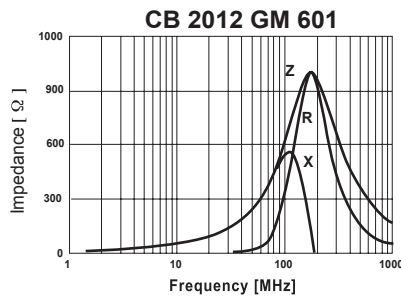
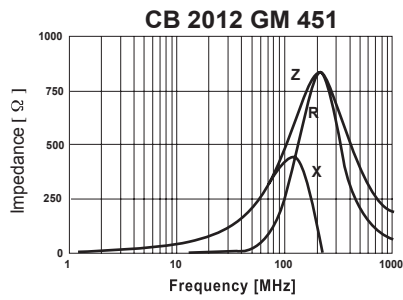
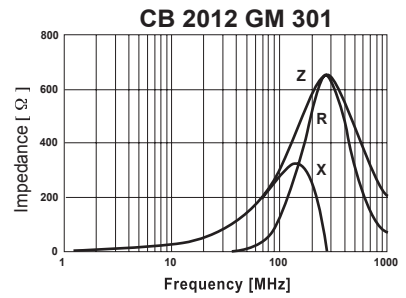
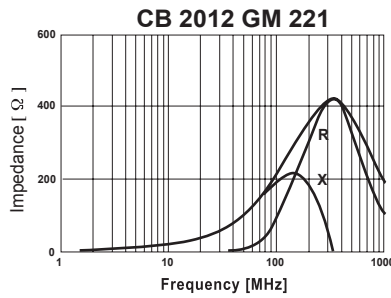
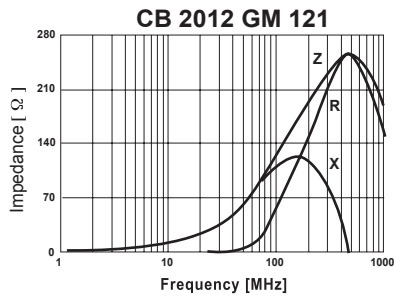
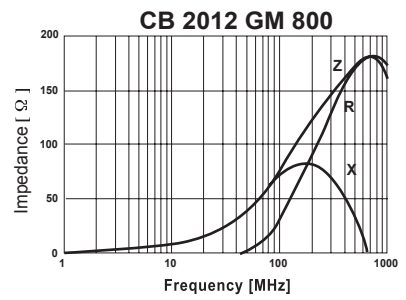
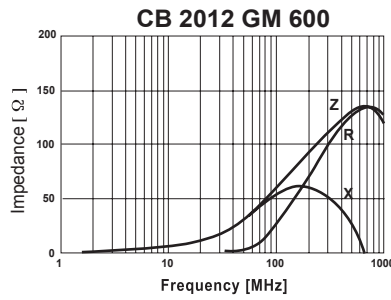
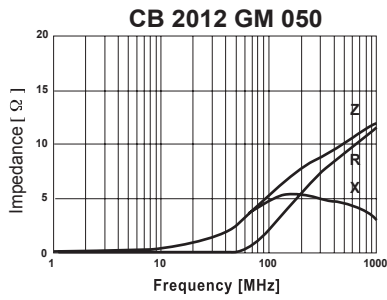
■ Specifications

- CB 2012 series -

Part No.	Impedance [Ω]	DC Resistance [Ω]max.	Rated Current (mA)max.	Test Frequency [MHz]
CB2012GM050	5 \pm 25%	0.03	500	100
CB2012GM600	60 \pm 25%	0.08	300	
CB2012GM800	80 \pm 25%	0.08	300	
CB2012GM121	120 \pm 25%	0.10	300	
CB2012GM151	150 \pm 25%	0.12	300	
CB2012GM221	220 \pm 25%	0.12	300	
CB2012GM301	300 \pm 25%	0.15	300	
CB2012GM451	450 \pm 25%	0.25	300	
CB2012GM601	600 \pm 25%	0.25	300	
CB2012GM102	1000 \pm 25%	0.30	300	

Chip Ferrite Beads

Electrical Characteristics



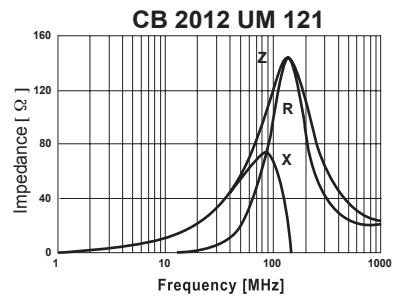
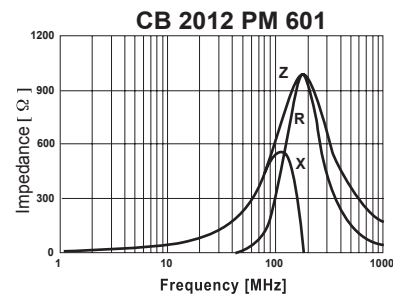
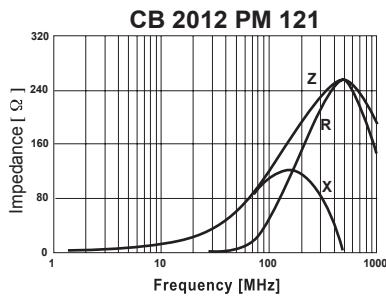
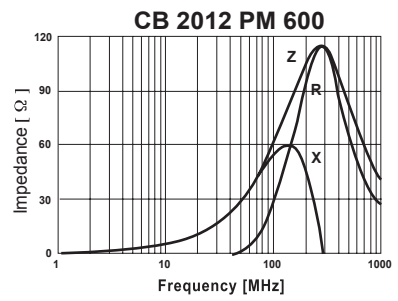
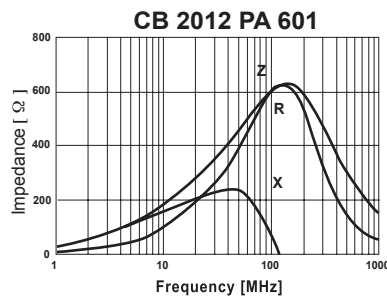
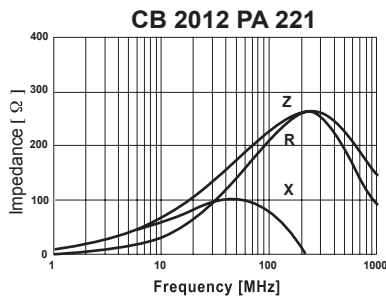
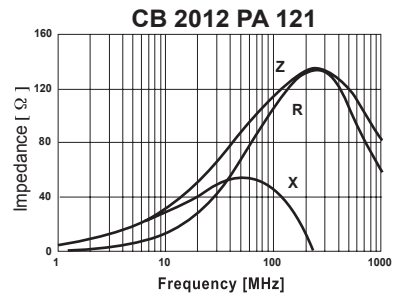
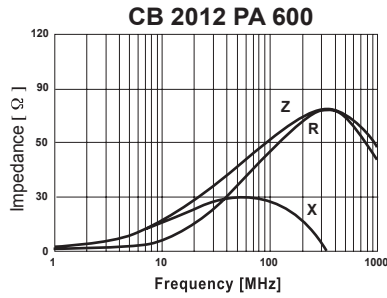
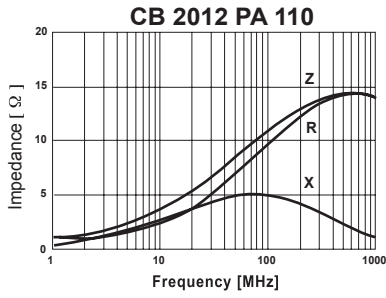
Chip Ferrite Beads

■ Specifications

- CB 2012 series -

Part No.	Impedance [Ω]	DC Resistance [Ω]max.	Rated Current (mA)max.	Test Frequency [MHz]
CB2012PA110	11 ± 25%	0.007	3000	100
CB2012PA300	30 ± 25%	0.015	3000	
CB2012PA500	50 ± 25%	0.025	3000	
CB2012PA600	60 ± 25%	0.025	3000	
CB2012PA121	120 ± 25%	0.050	2500	
CB2012PA221	220 ± 25%	0.050	2000	
CB2012PA601	600 ± 25%	0.130	1500	
CB2012PM600	60 ± 25%	0.020	3000	
CB2012PM800	80 ± 25%	0.040	3000	
CB2012PM121	120 ± 25%	0.050	2500	
CB2012PM221	220 ± 25%	0.050	2000	
CB2012PM301	300 ± 25%	0.070	2000	
CB2012PM601	600 ± 25%	0.130	1500	
CB2012UM600	60 ± 25%	0.020	5000	
CB2012UM800	80 ± 25%	0.020	5000	
CB2012UM121	120 ± 25%	0.020	5000	

Electrical Characteristics



Chip Ferrite Beads

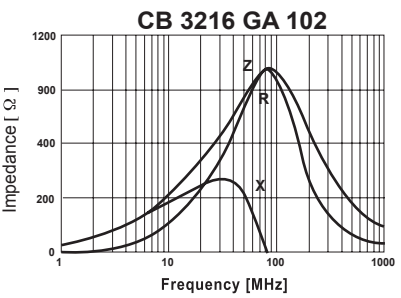
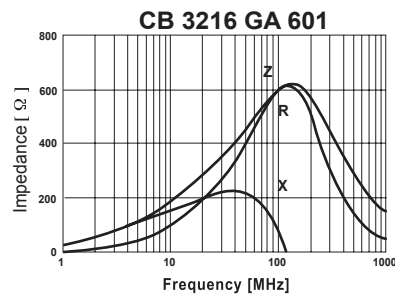
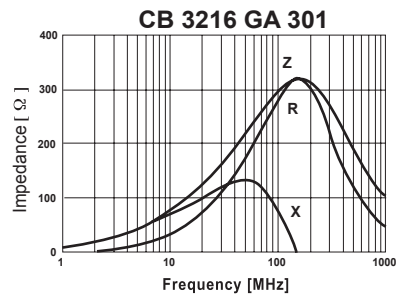
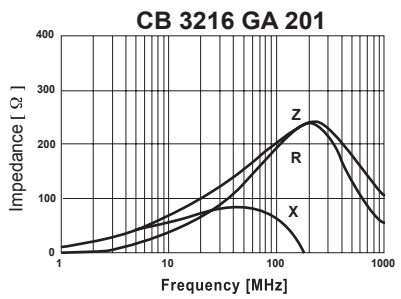
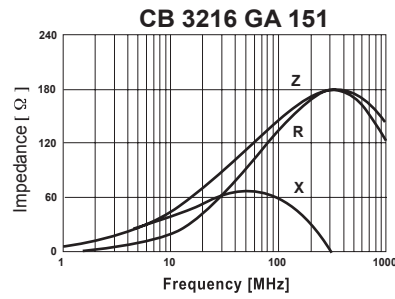
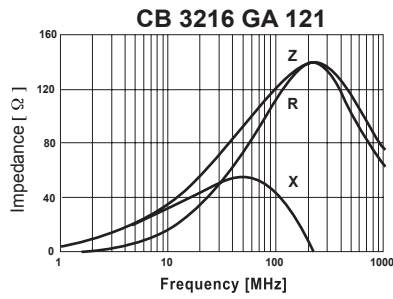
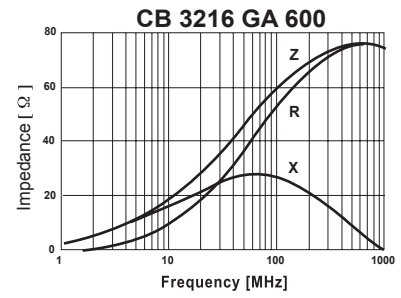
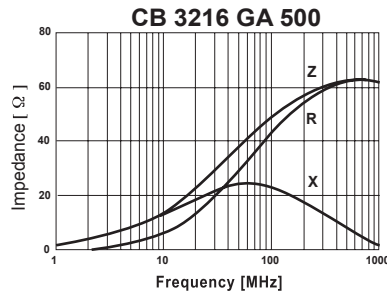
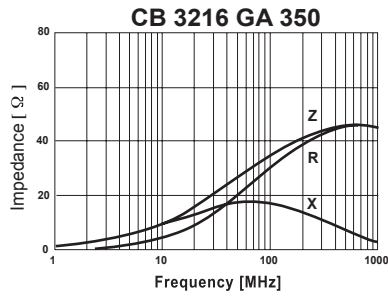
■ Specifications

- CB 3216 series -

Part No.	Impedance [Ω]	DC Resistance [Ω]max.	Rated Current (mA)max.	Test Frequency [MHz]
CB3216GA350	35 ± 25%	0.02	600	100
CB3216GA500	50 ± 25%	0.03	600	
CB3216GA600	60 ± 25%	0.04	600	
CB3216GA121	120 ± 25%	0.05	300	
CB3216GA151	150 ± 25%	0.05	300	
CB3216GA201	200 ± 25%	0.08	300	
CB3216GA301	300 ± 25%	0.09	200	
CB3216GA601	600 ± 25%	0.20	200	
CB3216GA102	1000 ± 25%	0.25	200	
CB3216GK121	120 ± 25%	0.15	900	
CB3216GK151	150 ± 25%	0.15	900	
CB3216GK221	220 ± 25%	0.35	700	
CB3216GK301	300 ± 25%	0.35	700	
CB3216GK471	470 ± 25%	0.35	400	
CB3216GK601	600 ± 25%	0.40	400	
CB3216GK102	1000 ± 25%	0.60	300	
CB3216GM121	120 ± 25%	0.05	300	
CB3216GM151	150 ± 25%	0.05	300	
CB3216GM201	200 ± 25%	0.08	300	
CB3216GM301	300 ± 25%	0.09	200	
CB3216GM601	600 ± 25%	0.20	200	
CB3216GM102	1000 ± 25%	0.25	200	

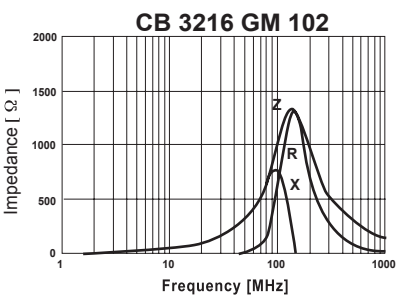
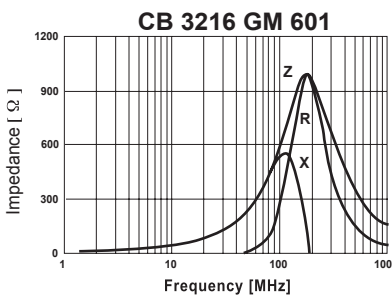
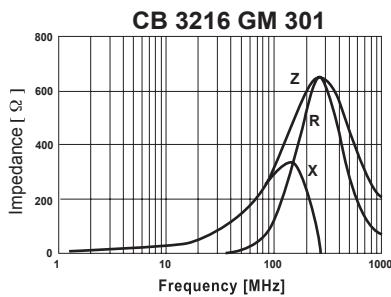
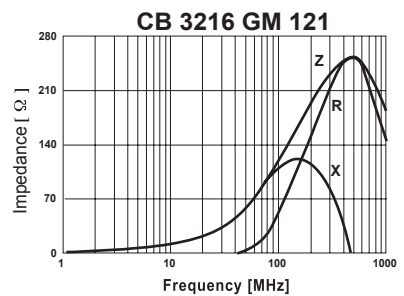
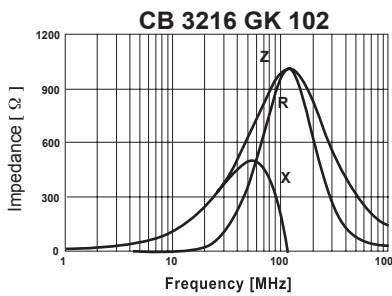
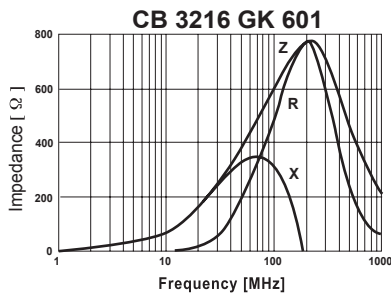
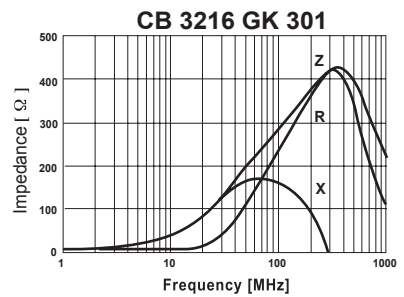
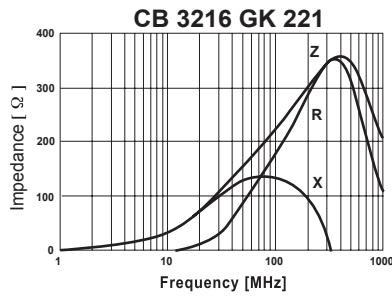
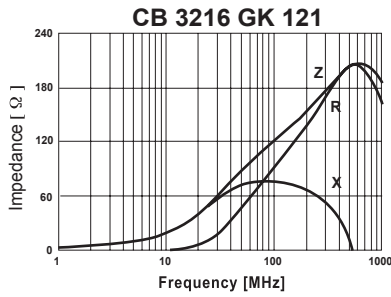
Chip Ferrite Beads

Electrical Characteristics



Chip Ferrite Beads

Electrical Characteristics



Chip Ferrite Beads

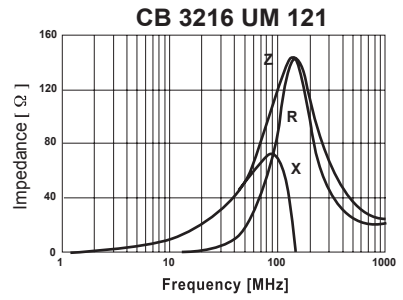
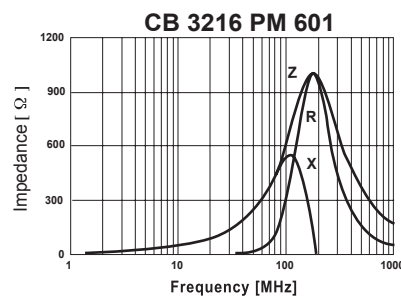
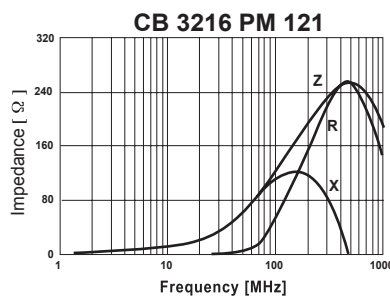
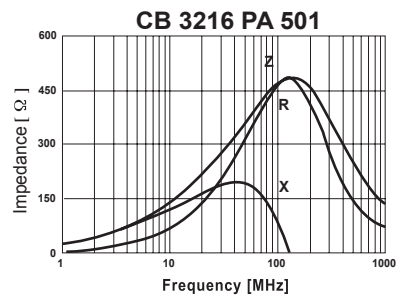
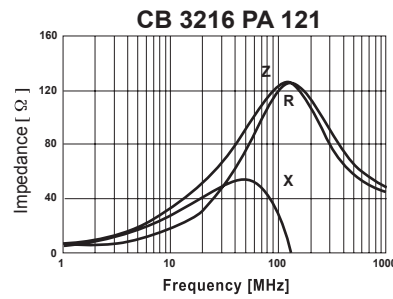
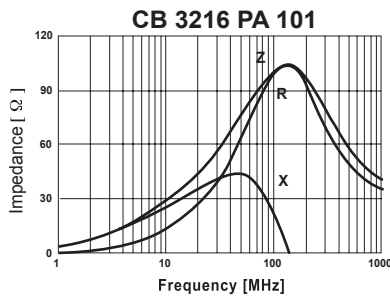
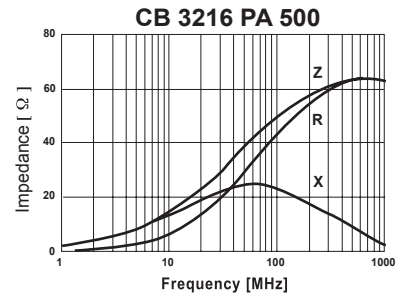
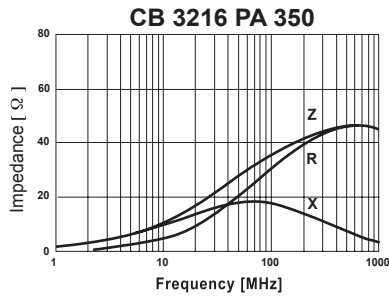
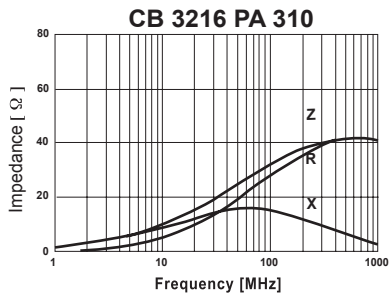
■ Specifications

- CB 3216 series -

Part No.	Impedance [Ω]	DC Resistance [Ω]max.	Rated Current (mA)max.	Test Frequency [MHz]
CB3216PA310	31 ± 25%	0.03	3000	100
CB3216PA350	35 ± 25%	0.03	3000	
CB3216PA500	50 ± 25%	0.03	3000	
CB3216PA600	60 ± 25%	0.03	3000	
CB3216PA101	100 ± 25%	0.03	3000	
CB3216PA121	120 ± 25%	0.03	3000	
CB3216PA301	300 ± 25%	0.06	2500	
CB3216PA501	500 ± 25%	0.06	2500	
CB3216PA601	600 ± 25%	0.06	2500	
CB3216PM121	120 ± 25%	0.03	3000	
CB3216PM601	600 ± 25%	0.06	2500	
CB3216UM500	50 ± 25%	0.01	6000	
CB3216UM121	120 ± 25%	0.20	6000	


Chip Ferrite Beads

Electrical Characteristics



Reliability and Test Conditions

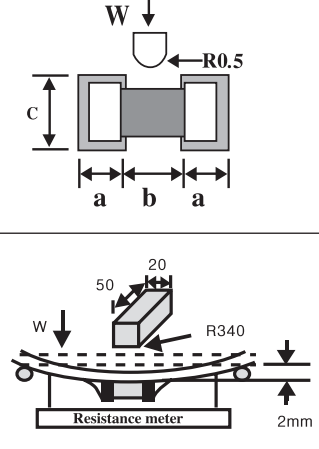
Chip Beads & Inductors

Item	Requirements	Test Conditions
Operating temperature range	-55°C ~ +125°C ○ -40°C ~ +85°C ●	-
Storage temperature range	40°C max., 70%RH max.	at packing condition
Solderability	More than 90% of the terminal electrode shall be covered with new solder	Preheat temperature : 100~150°C Preheat time : 60 sec. Solder temperature : 230 ± 10°C Soldering time : 4 ± 1 sec.
Resistance to Soldering 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. Impedance shall not change more than ± 30% ○	Preheat temperature : 100~150°C Preheat time : 60 sec. Solder temperature : 270 ± 10°C Soldering time : 10 ± 0.5 sec.
Reflow soldering	More than 50% of the terminal electrode shall be covered with new solder $ST \geq \frac{1}{2} CT$ 	Preheat temperature : 150°C Preheat time : 60 sec. Solder temperature : 230 ± 10°C Soldering time : 10 sec. max. (Reflow soldering profile)
High temperature resistance	1. No mechanical damage	Temperature : 85 ± 2°C Time : 500 ± 12 hours Measurement at room ambient temperature after placing for 24 hours
High temperature load resistance	2. Impedance shall not change more than ± 30% ○ 3. Inductance shall not change more than ± 10% ●	Temperature : 85 ± 2°C Applied current : rated current Time : 1000 ± 12 hours Measurement at room ambient temperature after placing for 24 hours
Humidity resistance	4. Q shall not change more than ± 20% ●	Temperature : 40 ± 2°C Humidity : 90 ± 2%RH Time : 500 ± 12 hours Measurement at room ambient temperature after placing for 24 hours

○ Chip Beads ● Chip Inductors

Reliability and Test Conditions

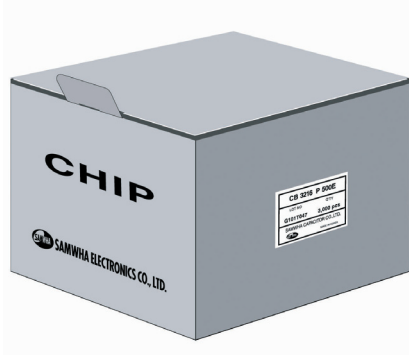
Chip Beads & Inductors

Item	Requirements	Test Conditions		
Humidity load resistance		Temperature : $40 \pm 2^\circ\text{C}$ Humidity : $90 \pm 2\%$ RH Applied current : rated current Time : 500 ± 12 hours Measurement at room ambient temperature after placing for 24hours		
Low temperature resistance	1. No mechanical damage	Temperature : $-40 \pm 5^\circ\text{C}$ Time : 1000 ± 12 hours Measurement at room ambient temperature after placing for 24hours		
Thermal shock	2. Impedance shall not change more than $\pm 30\%$ ○			
Vibration	3. Inductance shall not change more than $\pm 10\%$ ●	1. $-40 \pm 3^\circ\text{C}$ for 30 minutes 2. $85 \pm 3^\circ\text{C}$ for 30 minutes 3. repeat 100 cycle		
Drop	4. Q shall not change more than $\pm 20\%$ ●	Frequency : 10~55 Hz Amplitude : 1.5 mm Direction : X, T, Z Sweep time : 2 hours for each axis		
Flexure strength	No mechanical damage			
	Type	1608	2012	3216
	A [mm]	1.0	1.0	1.3
	B [mm]	0.8	1.0	1.5
	C [mm]	1.3	1.3	3.0
W [kgf]	2.0	4.0	5.0	
Bending strength	The terminal electrode shall be neither break off nor the chip damage			

○ Chip Beads ● Chip Inductors

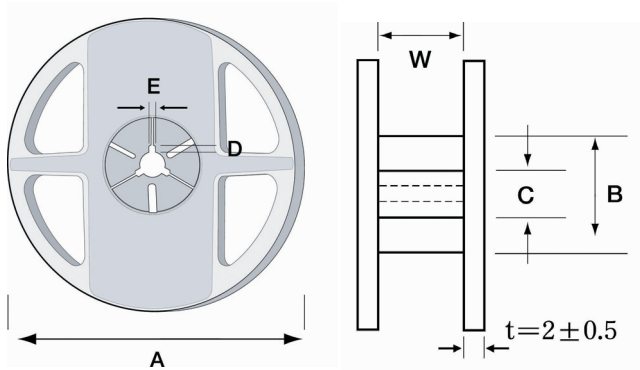
Packaging

Bulk packaging



Polybags / Box	Pcs / Polybag
5	1,000

Reel packaging

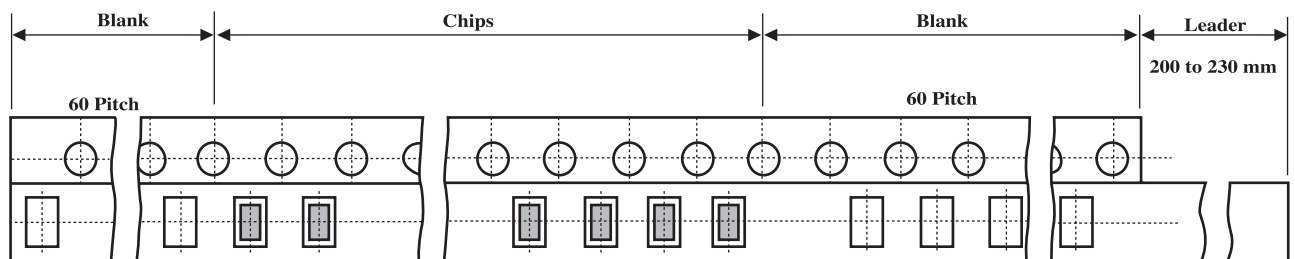


(Unit:mm)

A	B	C
$\phi 178 \pm 2$	$\phi 50 \text{min.}$	$\phi 13 \pm 0.5$
D	E	W
4 ± 0.8	2 ± 0.2	9 ± 1.5

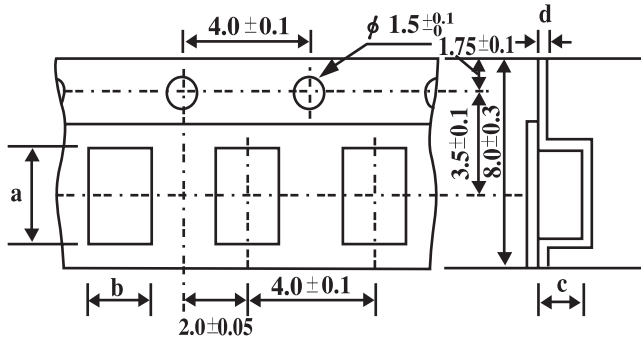
Type	1005	1608	2012		3216	Array
Q'TY(PCS)	10,000	4,000	(T)0.85 4,000	(T)1.25 3,000	3,000	3,000

Leader and Blank portion



Taping Dimension

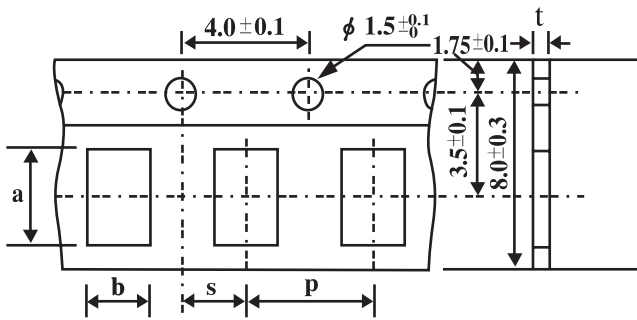
· Embossing Tape



Unit : mm

Type	A	B	C	D
	±0.1	±0.1	±0.1	±0.1
1608	1.80	1.00	0.95	0.23
2012	2.25	1.45	1.00	0.23
3216	3.50	1.85	1.25	0.23

· Paper Tape



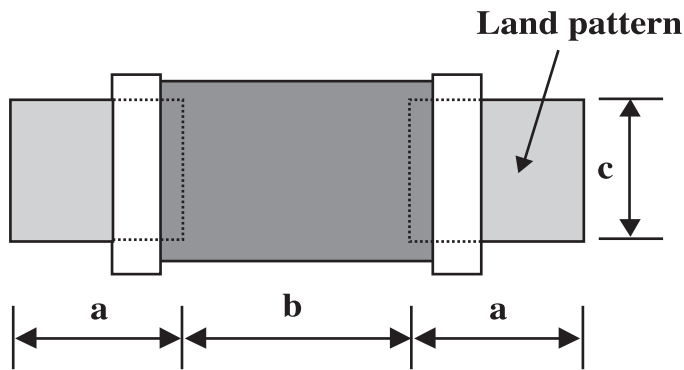
Unit : mm

Type	A	B	C	D	T
	±0.1	±0.1	±0.1	±0.05	(max)
1005	1.15	0.65	2.0	1.0	0.8
1608	1.80	1.00	4.0	2.0	1.1
2012	2.30	1.55	4.0	2.0	1.1

Land Pattern Design

Land Patten Design

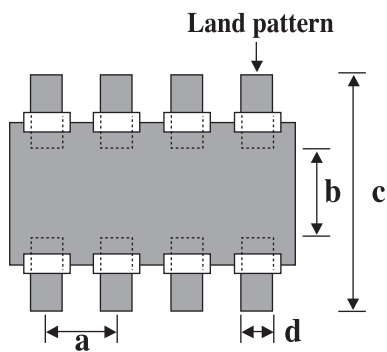
Chip Ferrite Beads, Chip Ceramic/Ferrite Inductors



Unit : mm

Type	A	B	C
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

Chip Ferrite Beads Array



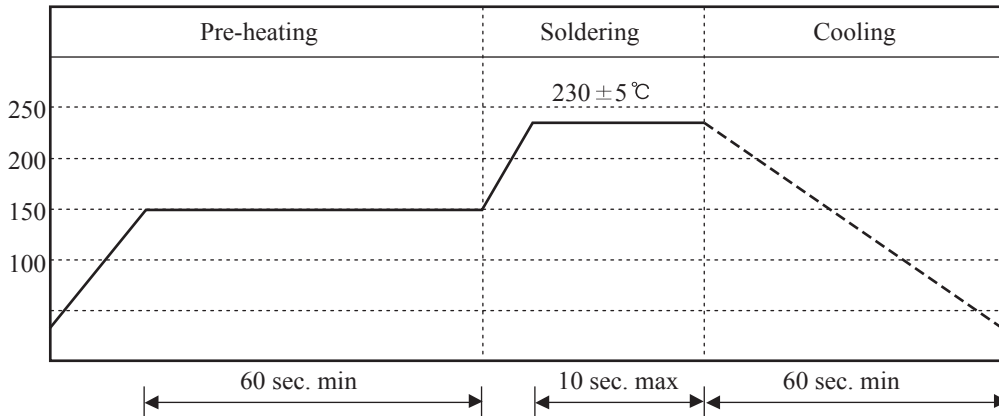
Unit : mm

Type	A	B	C	D
3216	0.8	0.8	3.0	0.4

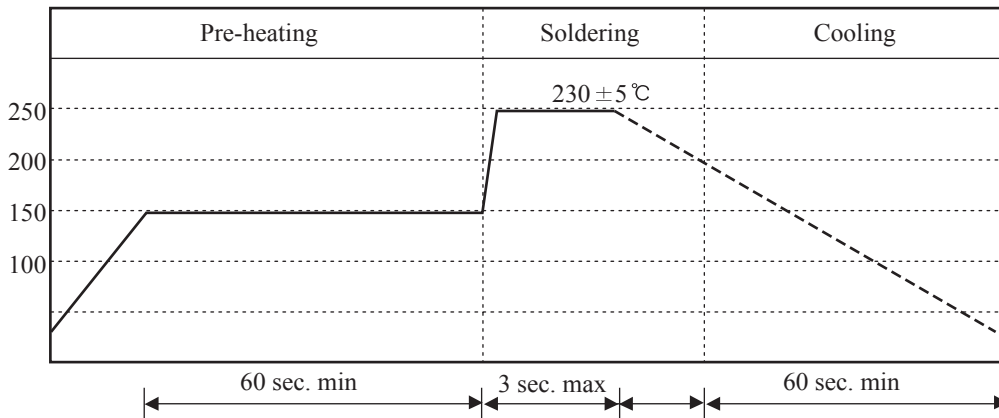
Soldering Profile

Soldering Profile

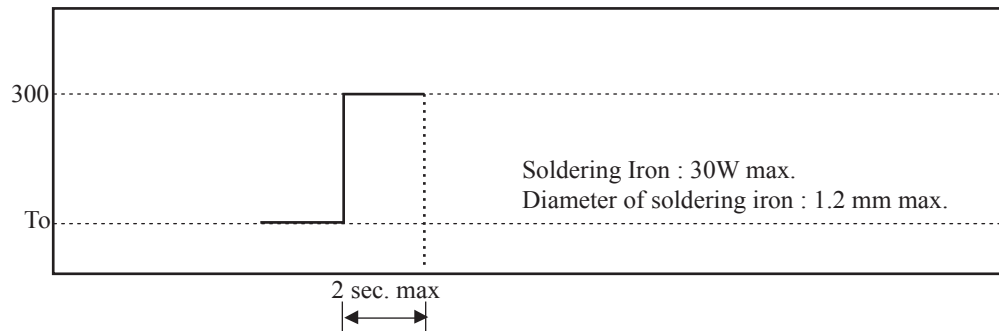
Reflow Soldering



Flow Soldering



Flow Soldering



⚠ Specifications which provide more details for the proper and safe use described product are available upon request. All specifications are subject to change without notice.