Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

- Product information in this catalog is as of October 2010. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

  Please note that Taiyo Yuden Co., Ltd. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

- Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.

- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.

- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,(automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance.
  Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

  In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN's official sales channel").
  It is only applicable to the products purchased from any of TAIYO YUDEN's official sales channel.

- Please note that Taiyo Yuden Co., Ltd. shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from your usage of products in this catalog. Taiyo Yuden Co., Ltd. grants no license for such rights.

- Caution for export
  Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.

MULTILAYER FERRITE CHIP BEADS (BK SERIES)

WAVE* REFLOW

*Except for BK0402, BK0603, BK1005

FEATURES

- Internal silver printed layer creates a closed circuit which acts as a magnetic shield minimizing heat generation and crosstalk.
- No need for grounding provides greater circuit design flexibility.
- Several material types and a broad range of impedance values provide noise countermeasures for various applications.
  - HS : With low R-XL cross point frequency characteristics and large resistance part working as damping function, suppresses unnecessary resonance and keeps signal integrity.
  - HW : With a lower R-XL cross point frequency characteristics than those of HS, strongly suppresses unnecessary resonance.
  - TS : Low DC resistance HS version. For power supply lines .
  - HM : Resistance part rising exceeding from 20MHz. For general usage, especially effective for video signal lines.
  - HR : Resistance part rising exceeding from 10MHz. For general usage, Wider effective range than that of HM.
  - LM : With larger impedance set at around 200MHz considering for noise regulation.
  - LL : Resistance part steeply rising exceeding from 100MHz. For high speed signal line, good for clock line, sharply cutting noise off.
- The small case size lineup with 01005 inch size.

APPLICATIONS

- High frequency noise countermeasure in personal computers, digital cameras and other information system products. For use on digital product clock lines and general signal lines.
- Radiated noise suppression in computer or printer interfaces and harness connectors.
- Noise suppression in video and other AV products.
- Prevents interference between circuits in cellular phones(PHS, PDC, etc.)
- Due to the closed internal circuit which acts as a magnetic shield, the TS material is extremely effective as a noise filter on LSI power supply lines where downsizing of components is needed.

OPERATING TEMP.

- −55～125℃

ORDERING CODE

B K 1 6 0 8 H S 1 2 1 — T ○

❶Type

BK	Multilayer Ferrite Chip Beads

❷External Dimensions (L×W) [mm]

0402(01005)	0.4×0.2
0603(0201)	0.6×0.3
1005(0402)	1.0×0.5
1608(0603)	1.6×0.8
2125(0805)	2.0×1.25

❸Material

HW	Refer to impedance curves for material differences
HS	
HR	
HM	
LM	
LL	
TS	

❹Impedance [Ω]

example	
150	15
101	100
102	1000

❺Characteristics

—	Standard Products

❻Packaging

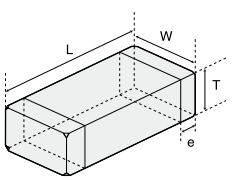
T	Tape & Reel

❼Internal code

△	Standard Products

△=Blank Space

EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	L	W	T	e	Standard Quantity [pcs] Paper Tape	Standard Quantity [pcs] Embossed Tape
BK0402 (01005)	0.40±0.02 (0.016±0.001)	0.20±0.02 (0.008±0.001)	0.20±0.02 (0.008±0.001)	$0.10^{+0.04}_{-0.03}$ ($0.004^{+0.002}_{-0.001}$)	20000	—
BK0603 (0201)	0.60±0.03 (0.024±0.001)	0.30±0.03 (0.012±0.001)	0.30±0.03 (0.012±0.001)	0.15±0.05 (0.006±0.002)	15000	—
BK1005 (0402)	1.00±0.05 (0.039±0.002)	0.50±0.05 (0.020±0.002)	0.50±0.05 (0.020±0.002)	0.25±0.10 (0.010±0.004)	10000	—
BK1608 (0603)	1.6±0.15 (0.063±0.006)	0.8±0.15 (0.031±0.006)	0.8±0.15 (0.031±0.006)	0.3±0.2 (0.012±0.008)	4000	—
BK2125 (0805)	$2.0^{+0.3}_{-0.1}$ ($0.079^{+0.012}_{-0.004}$)	1.25±0.2 (0.049±0.008)	0.85±0.2 (0.033±0.008)	0.5±0.3 (0.020±0.012)	4000	—
			1.25±0.2 (0.049±0.008)		—	2000

Unit : mm(inch)

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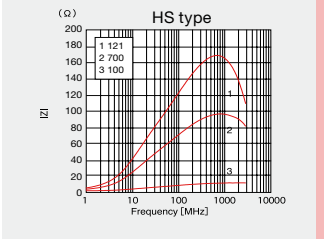
AVAILABLE MATERIALS

BK0402



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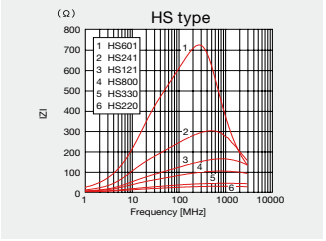
BK0603



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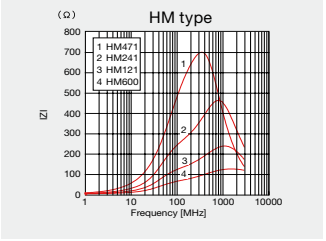

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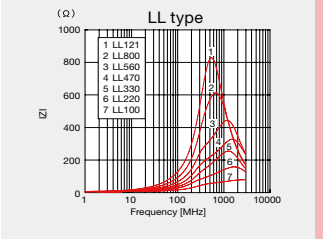

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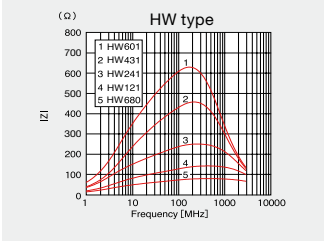
BK1005



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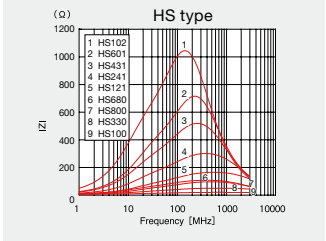

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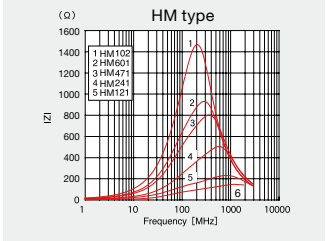

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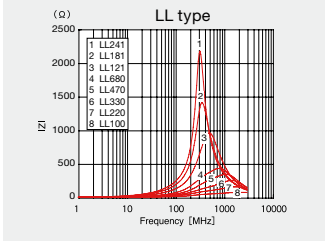

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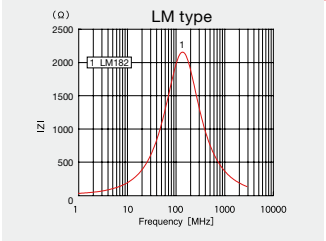

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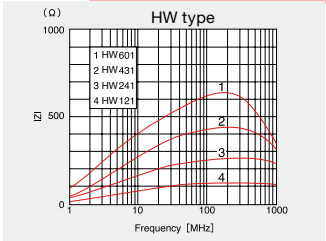
BK1608



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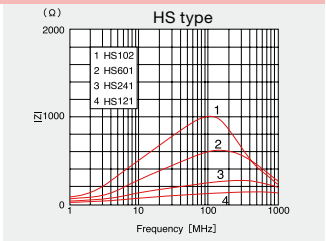

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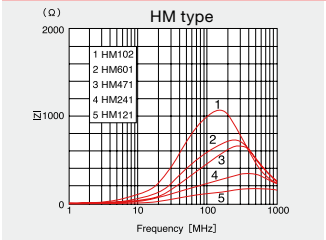

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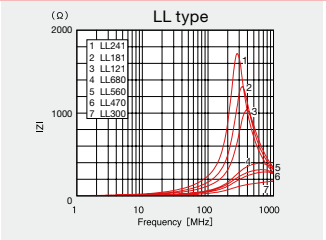

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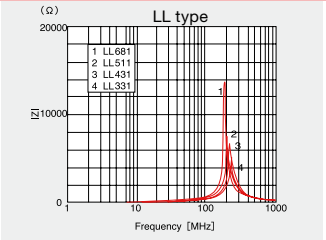

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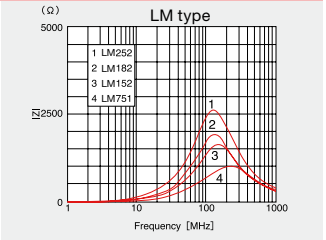

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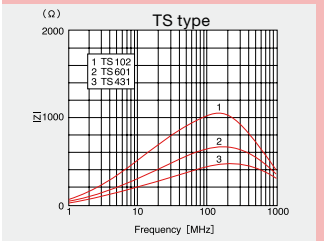
BK2125



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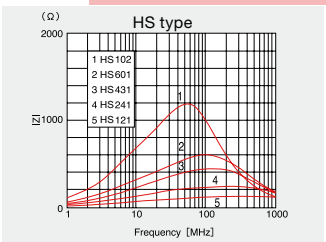

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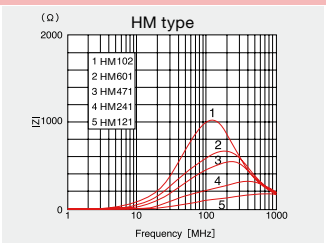

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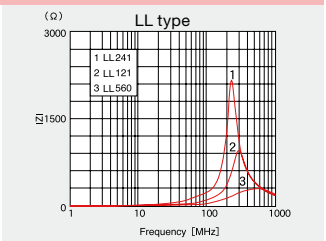

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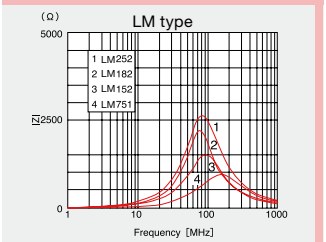

I max=200～400mA

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PART NUMBERS

BK0402

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (Ω) (max.)	Rated current (mA) (max.)	Thickness (mm) (inch)
BK 0402 HS 100		RoHS	10±5	100	0.10	540	0.20±0.02 (0.008±0.001)
BK 0402 HS 700		RoHS	70±25%		0.37	280	
BK 0402 HS 121		RoHS	120±25%		0.53	240	

BK0603

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (Ω) (max.)	Rated current (mA) (max.)	Thickness (mm) (inch)
BK 0603 HS 220		RoHS	22±25%	100	0.065	500	0.30±0.03 (0.012±0.001)
BK 0603 HS 330		RoHS	33±25%		0.070	500	
BK 0603 HS 800		RoHS	80±25%		0.40	200	
BK 0603 HS 121		RoHS	120±25%		0.45	200	
BK 0603 HS 241		RoHS	240±25%		0.65	200	
BK 0603 HS 601		RoHS	600±25%		1.20	150	
BK 0603 HM 600		RoHS	60±25%		0.25	200	
BK 0603 HM 121		RoHS	120±25%		0.40	200	
BK 0603 HM 241		RoHS	240±25%		0.80	200	
BK 0603 HM 471		RoHS	470±25%		1.05	100	
BK 0603 LL 100		RoHS	10±25%		0.25	200	
BK 0603 LL 220		RoHS	22±25%		0.45	200	
BK 0603 LL 330		RoHS	33±25%		0.55	150	
BK 0603 LL 470		RoHS	47±25%		0.70	150	
BK 0603 LL 560		RoHS	56±25%		1.00	100	
BK 0603 LL 800		RoHS	80±25%		1.30	100	
BK 0603 LL 121		RoHS	120±25%		1.50	100	

BK1005

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (Ω) (max.)	Rated current (mA) (max.)	Thickness (mm) (inch)
BK 1005 HW 680		RoHS	68±25%	100	0.17	500	0.50±0.05 (0.020±0.002)
BK 1005 HW 121		RoHS	120±25%		0.24	450	
BK 1005 HW 241		RoHS	240±25%		0.31	400	
BK 1005 HW 431		RoHS	430±25%		0.50	350	
BK 1005 HW 601		RoHS	600±25%		0.60	300	
BK 1005 HS 100		RoHS	10±5		0.03	1000	
BK 1005 HS 330		RoHS	33±25%		0.06	700	
BK 1005 HS 680		RoHS	68±25%		0.10	700	
BK 1005 HS 800		RoHS	80±25%		0.10	700	
BK 1005 HS 121		RoHS	120±25%		0.20	500	
BK 1005 HS 241		RoHS	240±25%		0.30	400	
BK 1005 HS 431		RoHS	430±25%		0.45	350	
BK 1005 HS 601		RoHS	600±25%		0.55	300	
BK 1005 HS 102		RoHS	1000±25%		0.58	300	
BK 1005 HR 601		RoHS	600±25%		0.60	300	
BK 1005 HM 750		RoHS	75±25%		0.18	350	
BK 1005 HM 121		RoHS	120±25%		0.18	300	
BK 1005 HM 241		RoHS	240±25%		0.30	300	
BK 1005 HM 471		RoHS	470±25%		0.45	250	
BK 1005 HM 601		RoHS	600±25%		0.50	250	
BK 1005 HM 102		RoHS	1000±25%		0.70	150	
BK 1005 LL 100		RoHS	10±25%		0.11	500	
BK 1005 LL 220		RoHS	22±25%		0.18	400	
BK 1005 LL 330		RoHS	33±25%		0.25	400	
BK 1005 LL 470		RoHS	47±25%		0.33	350	
BK 1005 LL 680		RoHS	68±25%		0.31	400	
BK 1005 LL 121		RoHS	120±25%		0.45	350	
BK 1005 LL 181		RoHS	180±25%		0.50	300	
BK 1005 LL 241		RoHS	240±25%		0.70	250	
BK 1005 LM 182		RoHS	1800±25%		0.90	120	

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PART NUMBERS

BK1608

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (Ω) (max.)	Rated current (mA) (max.)	Thickness (mm) (inch)
BK 1608 HW121		RoHS	120±25%	100	0.15	600	0.80±0.15 (0.031±0.006)
BK 1608 HW241		RoHS	240±25%		0.25	450	
BK 1608 HW431		RoHS	430±25%		0.30	400	
BK 1608 HW601		RoHS	600±25%		0.40	300	
BK 1608 HS 220		RoHS	22±25%		0.05	1500	
BK 1608 HS 330		RoHS	33±25%		0.08	1200	
BK 1608 HS 470		RoHS	47±25%		0.10	900	
BK 1608 HS 600		RoHS	60±25%		0.10	800	
BK 1608 HS 800		RoHS	80±25%		0.10	600	
BK 1608 HS 121		RoHS	120±25%		0.18	500	
BK 1608 HS 241		RoHS	240±25%		0.25	400	
BK 1608 HS 601		RoHS	600±25%		0.45	350	
BK 1608 HS 102		RoHS	1000±25%		0.60	300	
BK 1608 HM121		RoHS	120±25%		0.20	350	
BK 1608 HM241		RoHS	240±25%		0.35	300	
BK 1608 HM471		RoHS	470±25%		0.45	250	
BK 1608 HM601		RoHS	600±25%		0.60	250	
BK 1608 HM102		RoHS	1000±25%		0.70	200	
BK 1608 LL 300		RoHS	30±25%		0.20	500	
BK 1608 LL 470		RoHS	47±25%		0.30	400	
BK 1608 LL 560		RoHS	56±25%		0.30	400	
BK 1608 LL 680		RoHS	68±25%		0.35	300	
BK 1608 LL 121		RoHS	120±25%		0.50	300	
BK 1608 LL 181		RoHS	180±25%		0.65	250	
BK 1608 LL 241		RoHS	240±25%		0.80	250	
BK 1608 LL 331		RoHS	330±25%		0.85	200	
BK 1608 LL 431		RoHS	430±25%		0.85	200	
BK 1608 LL 511		RoHS	510±25%		0.90	200	
BK 1608 LL 681		RoHS	680±25%		1.00	150	
BK 1608 LM 751		RoHS	750±25%		0.60	300	
BK 1608 LM 152		RoHS	1500±25%		0.75	250	
BK 1608 LM 182		RoHS	1800±25%		0.85	200	
BK 1608 LM 252		RoHS	2500±25%		1.10	200	
BK 1608 TS 431		RoHS	430±25%		0.21±30%	400	
BK 1608 TS 601		RoHS	600±25%		0.27±30%	350	
BK 1608 TS 102		RoHS	1000±25%		0.30±30%	300	

BK2125

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (Ω) (max.)	Rated current (mA) (max.)	Thickness (mm) (inch)
BK 2125 HS 150		RoHS	15±25%	100	0.05	1200	0.85±0.2 (0.033±0.008)
BK 2125 HS 220		RoHS	22±25%		0.05	1200	
BK 2125 HS 330		RoHS	33±25%		0.05	1200	
BK 2125 HS 470		RoHS	47±25%		0.05	1000	
BK 2125 HS 750		RoHS	75±25%		0.10	1000	
BK 2125 HS 101		RoHS	100±25%		0.10	900	
BK 2125 HS 121		RoHS	120±25%		0.15	800	
BK 2125 HS 241		RoHS	240±25%		0.20	600	
BK 2125 HS 431		RoHS	430±25%		0.25	500	
BK 2125 HS 601		RoHS	600±25%		0.30	500	
BK 2125 HS 102		RoHS	1000±25%		0.40	300	
BK 2125 HM121		RoHS	120±25%		0.15	800	
BK 2125 HM241		RoHS	240±25%		0.20	600	
BK 2125 HM471		RoHS	470±25%		0.25	500	
BK 2125 HM601		RoHS	600±25%		0.25	500	
BK 2125 HM102		RoHS	1000±25%		0.35	400	
BK 2125 LL 560		RoHS	56±25%		0.20	600	
BK 2125 LL 121		RoHS	120±25%		0.30	400	
BK 2125 LL 241		RoHS	240±25%		0.35	300	
BK 2125 LM 751		RoHS	750±25%		0.30	400	
BK 2125 LM 152		RoHS	1500±25%		0.35	400	
BK 2125 LM 182		RoHS	1800±25%		0.45	300	1.25±0.2 (0.049±0.008)
BK 2125 LM 252		RoHS	2500±25%		0.75	200	

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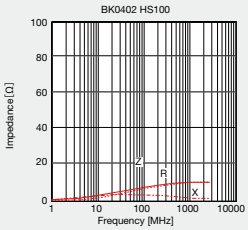
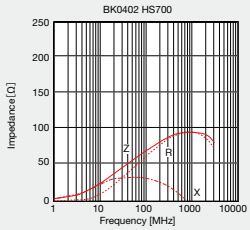
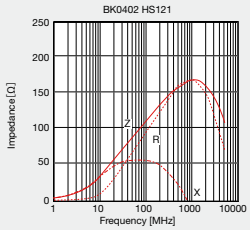
ELECTRICAL CHARACTERISTICS

BK0402







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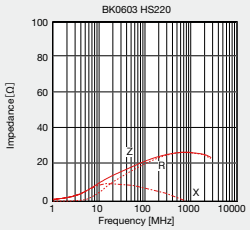

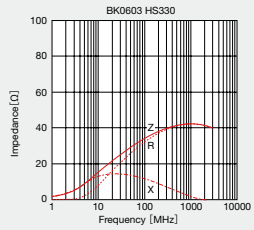

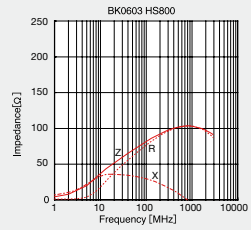

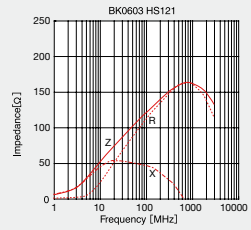

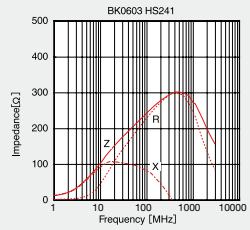

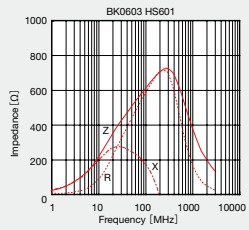

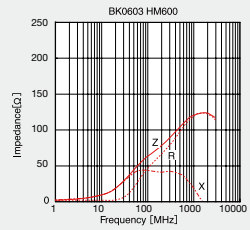

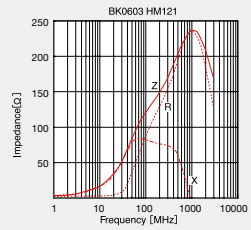

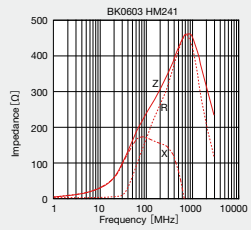

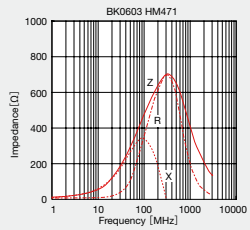

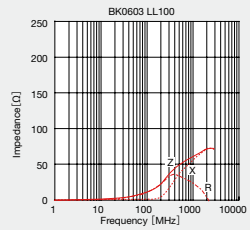

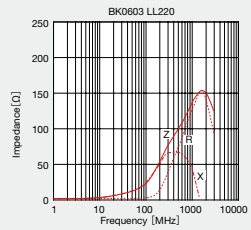

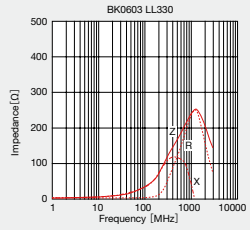

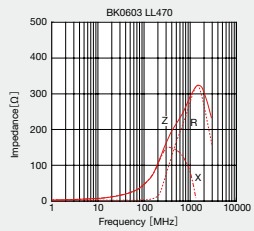

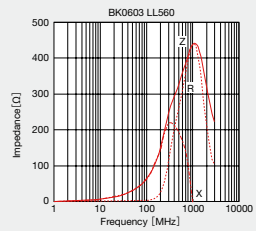

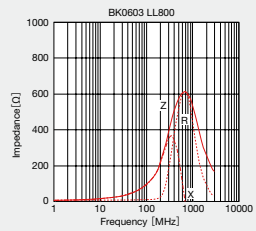

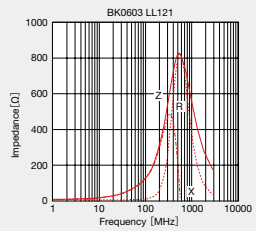

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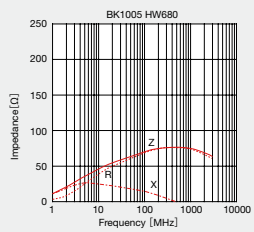

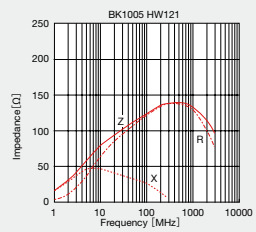

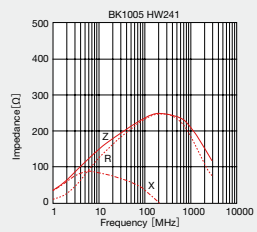

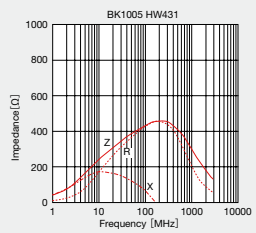

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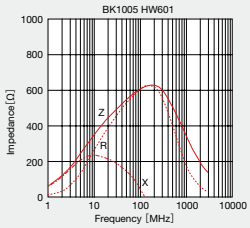

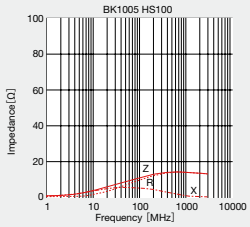

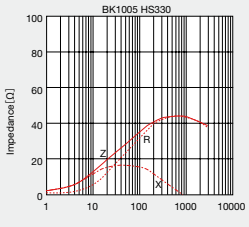

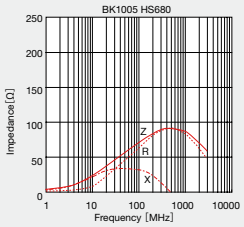

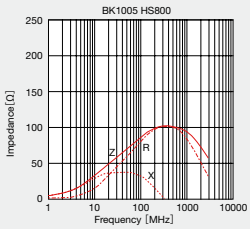

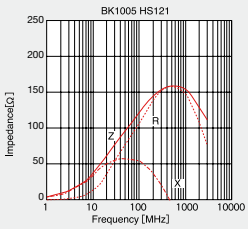

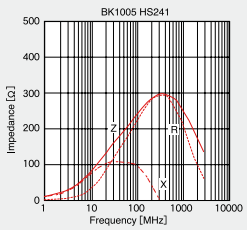

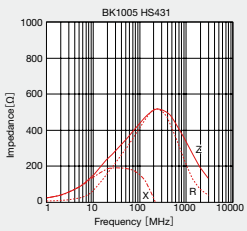

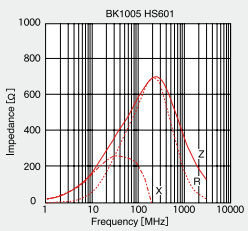

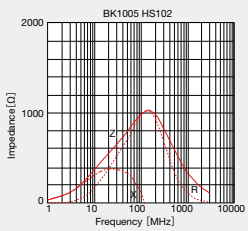

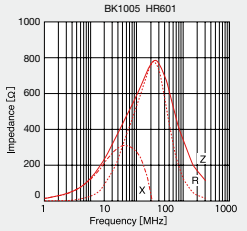

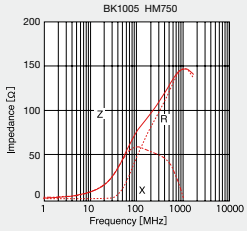

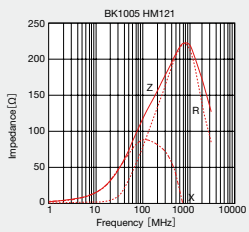

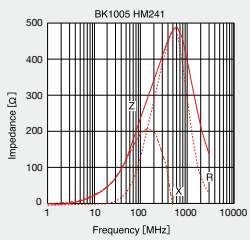

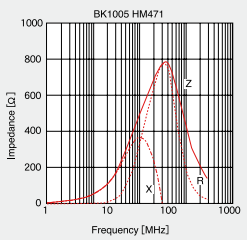

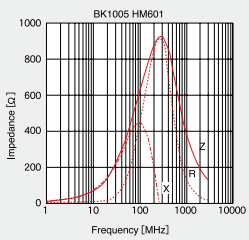

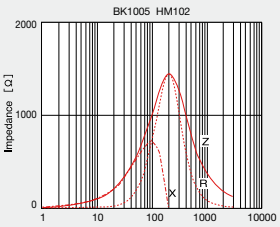

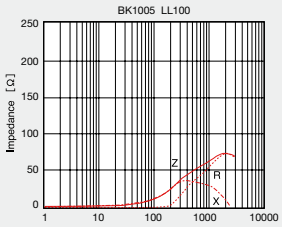

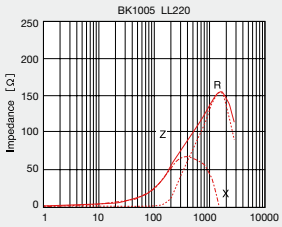

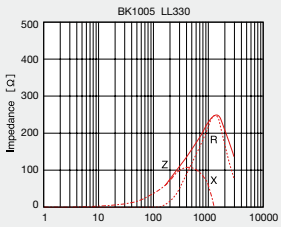

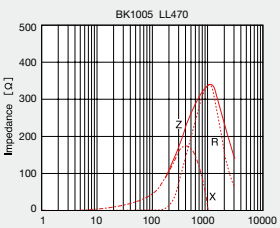

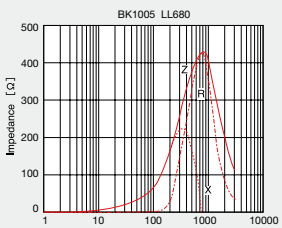

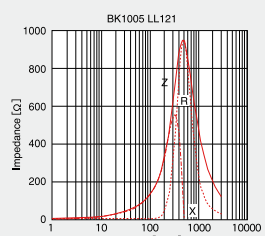

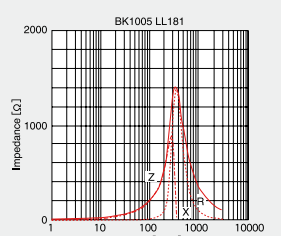

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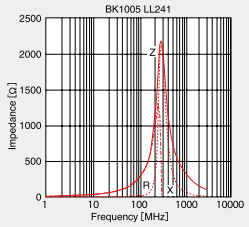

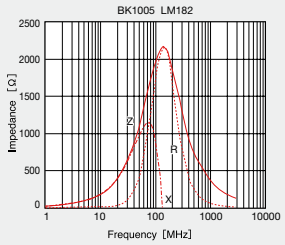

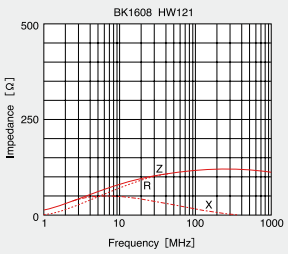

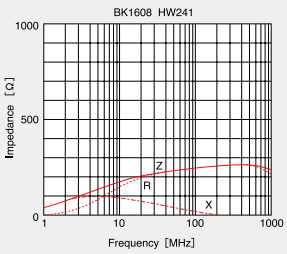

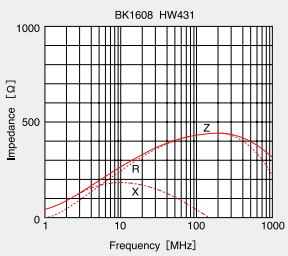

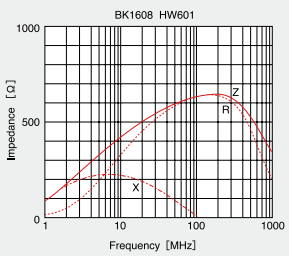

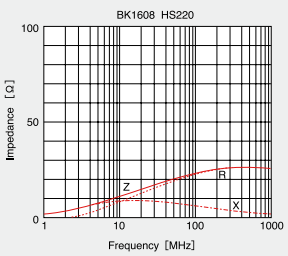

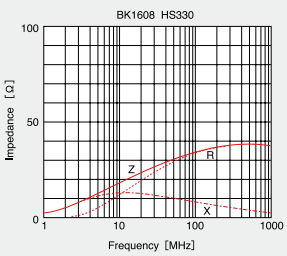

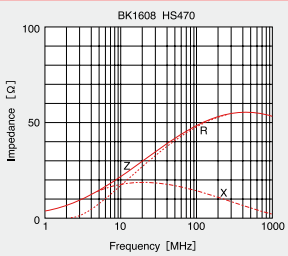

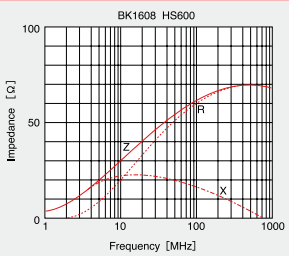

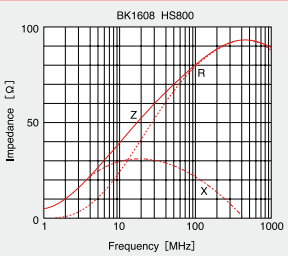

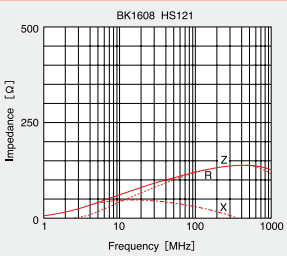

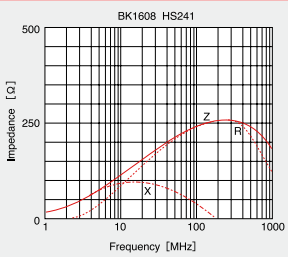

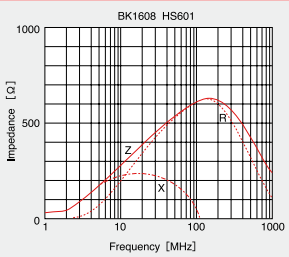

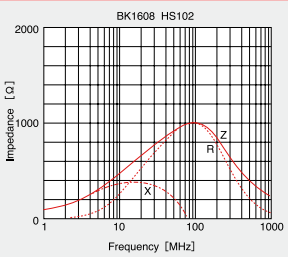

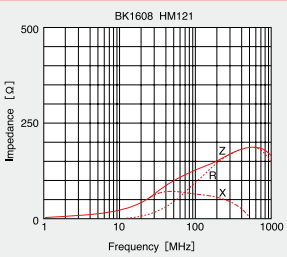

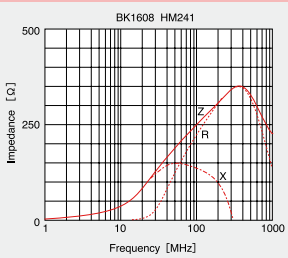

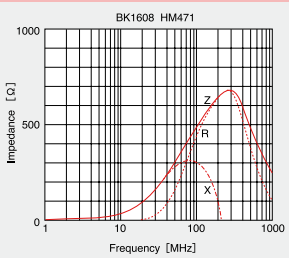

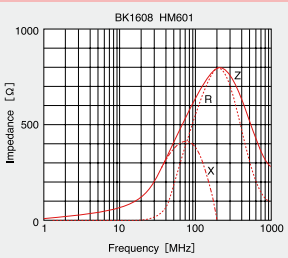

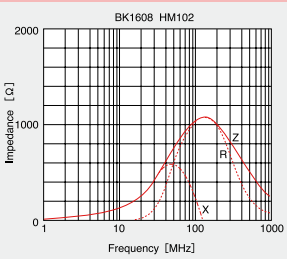

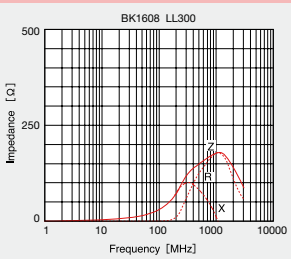

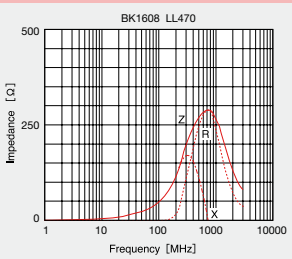

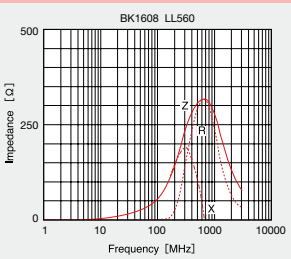

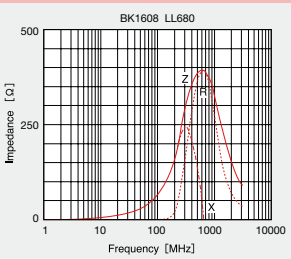

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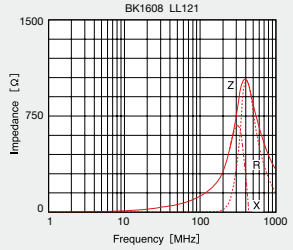
BK1608 LL121



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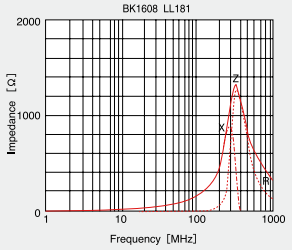

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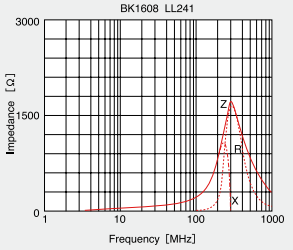

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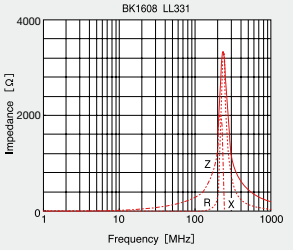

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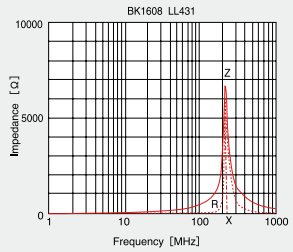

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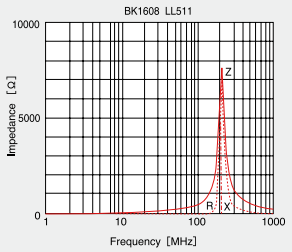

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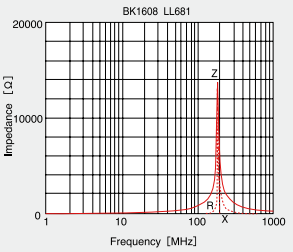

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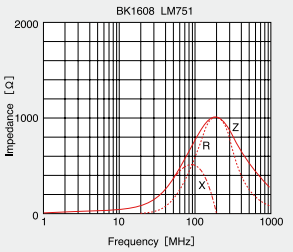

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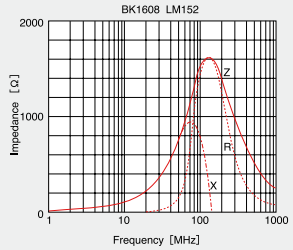

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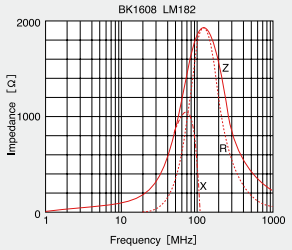

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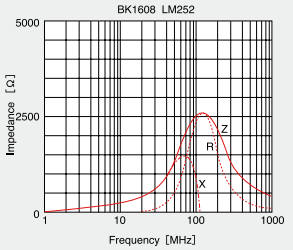
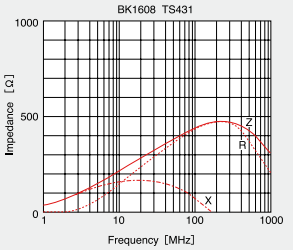


BK1608 TS431



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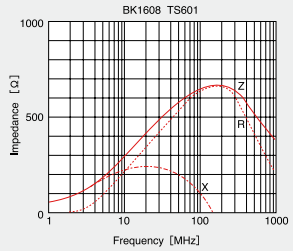

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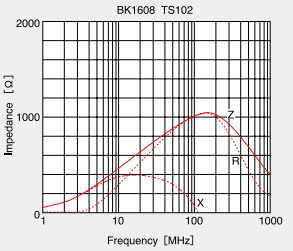
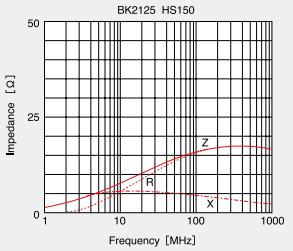


BK2125

BK2125 HS150



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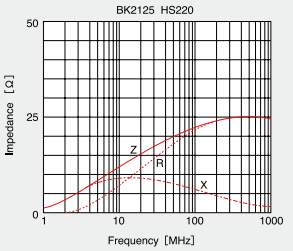
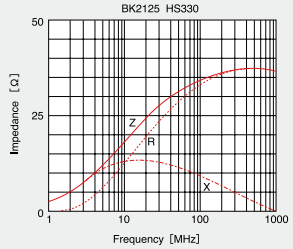


BK2125 HS330



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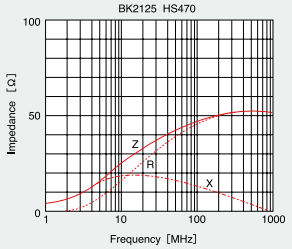

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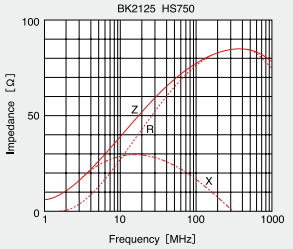

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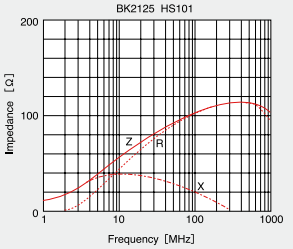

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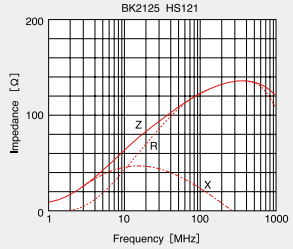

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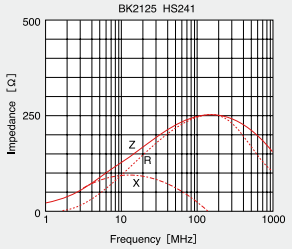

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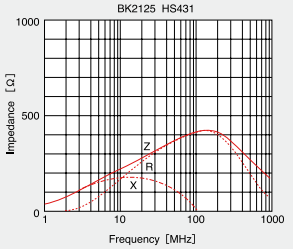

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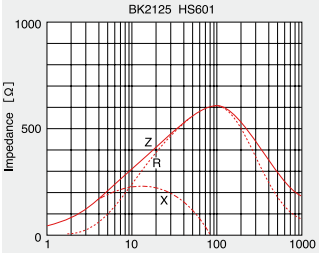

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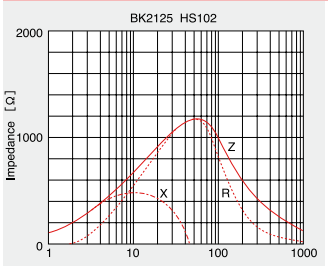
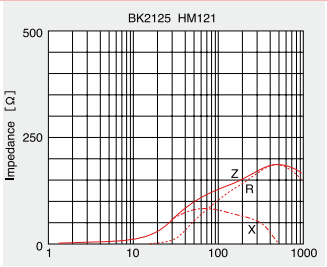
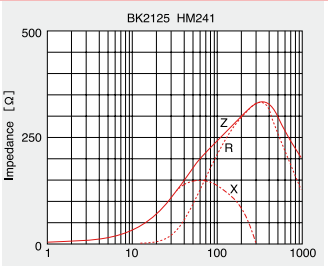
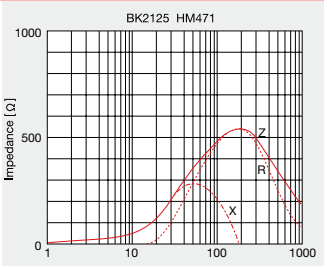
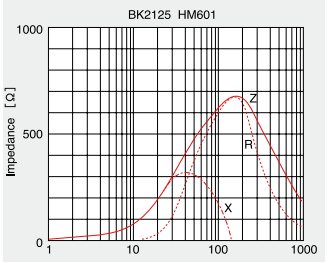
ELECTRICAL CHARACTERISTICS

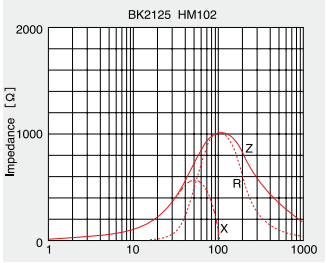


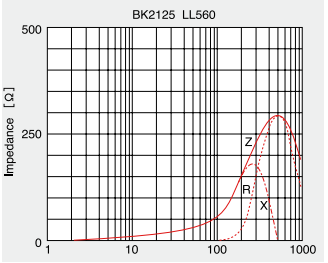


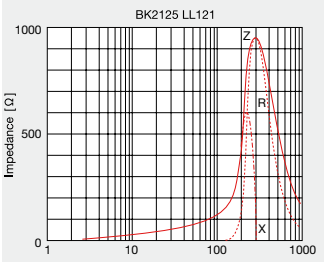


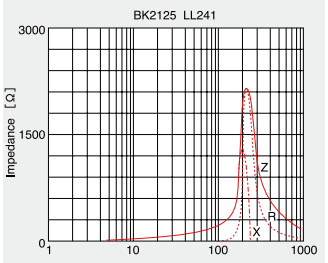


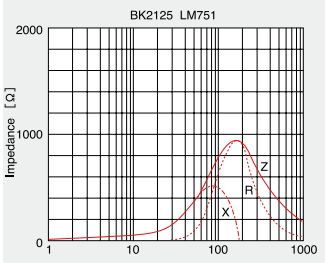


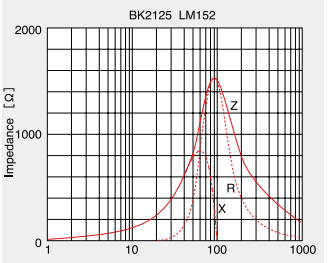


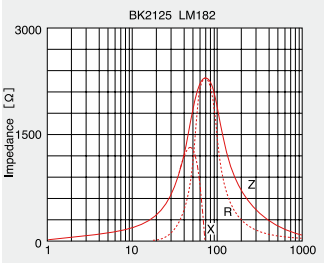


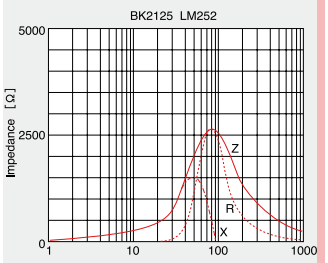












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MULTILAYER FERRITE CHIP BEADS (BK SERIES P TYPE)

WAVE* REFLOW

*Except for BKP0603, BKP1005

FEATURES

- Low Rdc value can lower the power consumption and extend the life of batteries. That stands on the high advanced green sheet and printing technologies.
- No need for grounding provides greater flexibility in circuit design.

HS : With low R-XL cross point frequency characteristics and large resistance part working as damping function, suppresses unnecessary resonance and keeps signal integrity.
HM : Resistance part rising exceeding from 20MHz. For general usage.
TS : Low DC resistance HS version. For power supply lines.
TM : Low DC resistance HM version.

APPLICATIONS

- High frequency noise debug on the DC power supply line in personal computers and other information system products.
- Noise suppression in USB and IEEE1394 interface.
- Prevents interference between circuits in mobile systems (PDC, PHS, PDA)

OPERATING TEMP.

- −55℃~85℃

ORDERING CODE

B K P 1 6 0 8 H S 1 8 1 − T ○

❶Type	
BKP	Multilayer Ferrite Chip Beads (For Power Supply Lines)

❷External Dimensions (L×W) [mm]	
0603(0201)	0.6×0.3
1005(0402)	1.0×0.5
1608(0603)	1.6×0.8
2125(0805)	2.0×1.25

❸Material	
HS	Refer to impedance Curves for material differrences
HM	

❹Impedance [Ω]	
example	
330	33
101	100
391	390

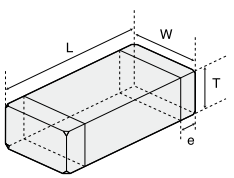
❺Characteristics	
−	Standard Products

❻Packaging	
T	Tape & Reel

❼Internal code	
△	Standard Products

△=Blank Space

EXTERNAL DIMENSIONS/STANDARD QUANTITY

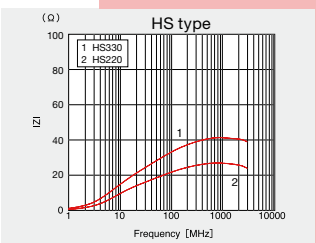


Type	L	W	T	e	Standard Quantity [pcs]	
					Paper Tape	Embossed Tape
BKP0603 (0201)	0.6±0.03 (0.024±0.001)	0.3±0.03 (0.012±0.001)	0.3±0.03 (0.012±0.001)	0.15±0.05 (0.006±0.002)	15000	−
BKP1005 (0402)	1.00±0.05 (0.039±0.002)	0.50±0.05 (0.020±0.002)	0.50±0.05 (0.020±0.002)	0.25±0.10 (0.010±0.004)	10000	−
BKP1608 (0603)	1.6±0.15 (0.063±0.006)	0.8±0.15 (0.031±0.006)	0.8±0.15 (0.031±0.006)	0.3±0.2 (0.012±0.008)	4000	−
BKP2125 (0805)	$2.0^{+0.3}_{-0.1}$ ($0.079^{+0.012}_{-0.004}$)	1.25±0.2 (0.049±0.008)	0.85±0.2 (0.033±0.008)	0.5±0.3 (0.020±0.012)	4000	−

Unit : mm(inch)

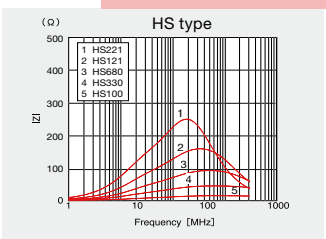
AVAILABLE MATERIALS

BKP0603

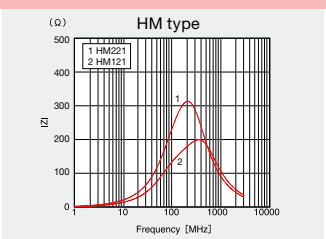


I max=1.0A

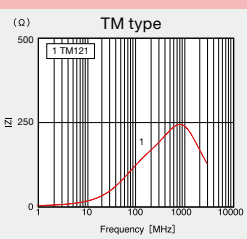
BKP1005



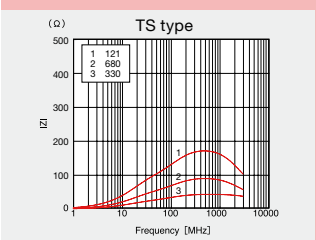
I max=0.8~2.0A



I max=0.9~1.1A

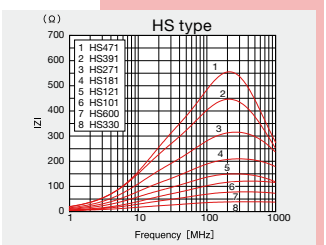


I max=1.3A



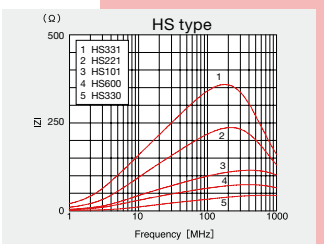
I max=1.3~1.7A

BKP1608



I max=1~3A

BKP2125



I max=1.5~4A

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PART NUMBERS

BKP0603

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (mΩ) (max.)	Rated current (A) (max.)	Thickness (mm) (inch)
BKP0603 HS 220		RoHS	22±25%	100	65	1.0	0.30±0.03 (0.012±0.001)
BKP0603 HS 330		RoHS	33±25%		70	1.0	

BKP1005

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (mΩ) (max.)	Rated current (A) (max.)	Thickness (mm) (inch)
BKP1005 HS 100		RoHS	10±5	100	30	2.0	0.50±0.05 (0.02±0.002)
BKP1005 HS 330		RoHS	33±25%		50	1.7	
BKP1005 HS 680		RoHS	68±25%		75	1.5	
BKP1005 HS 121		RoHS	120±25%		140	1.0	
BKP1005 HS 221		RoHS	220±25%		200	0.8	
BKP1005 HM 121		RoHS	120±25%		120	1.1	
BKP1005 HM 221		RoHS	220±25%		180	0.9	
BKP1005 TS 330		RoHS	33±25%		39±30%	1.7	
BKP1005 TS 680		RoHS	68±25%		55±30%	1.5	
BKP1005 TS 121		RoHS	120±25%		70±30%	1.3	
BKP1005 TM 121		RoHS	120±25%		100	1.3	

BKP1608

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (mΩ) (max.)	Rated current (A) (max.)	Thickness (mm) (inch)
BKP1608 HS 330		RoHS	33±25%	100	25	3.0	0.80±0.15 (0.031±0.006)
BKP1608 HS 600		RoHS	60±25%		40	2.5	
BKP1608 HS 101		RoHS	100±25%		50	1.7	
BKP1608 HS 121		RoHS	120±25%		35	2.7	
BKP1608 HS 181		RoHS	180±25%		75	1.5	
BKP1608 HS 271		RoHS	270±25%		110	1.2	
BKP1608 HS 391		RoHS	390±25%		140	1.0	
BKP1608 HS 471		RoHS	470±25%		180	1.0	

BKP2125

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω)	Measuring frequency (MHz)	DC resistance (mΩ) (max.)	Rated current (A) (max.)	Thickness (mm) (inch)
BKP2125 HS 330		RoHS	33±25%	100	20	4.0	0.85±0.2 (0.033±0.008)
BKP2125 HS 600		RoHS	60±25%		25	3.0	
BKP2125 HS 101		RoHS	100±25%		40	2.5	
BKP2125 HS 221		RoHS	220±25%		50	2.0	
BKP2125 HS 331		RoHS	330±25%		75	1.5	

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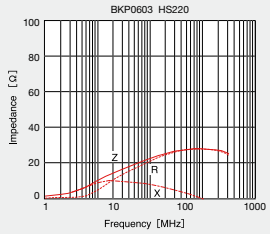
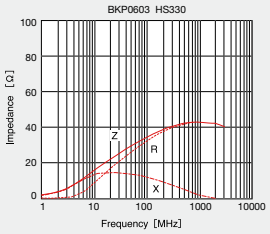
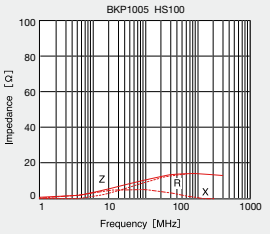
ELECTRICAL CHARACTERISTICS

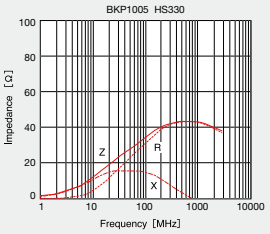
BKP0603

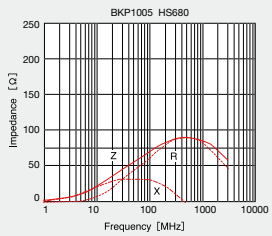


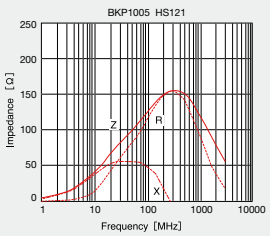


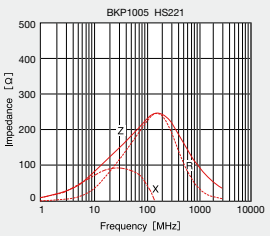
BKP1005

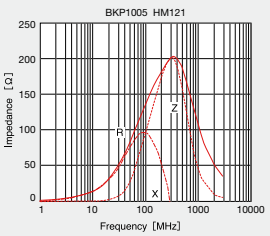


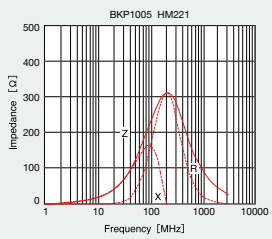


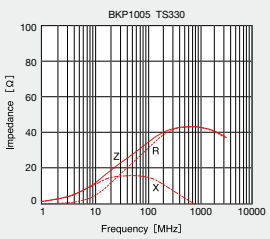


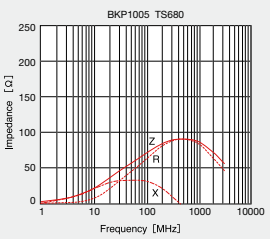


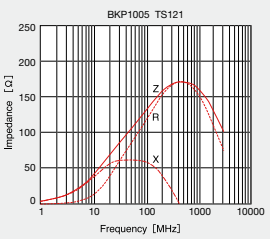


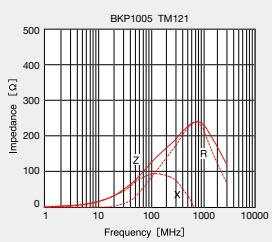




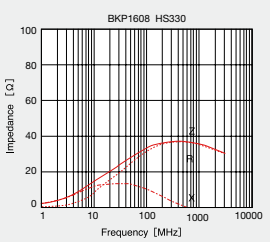


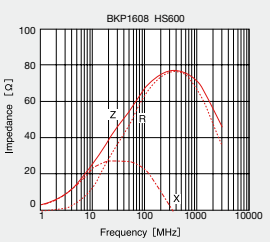


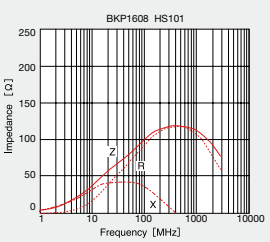


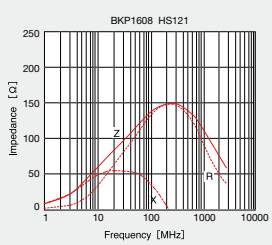


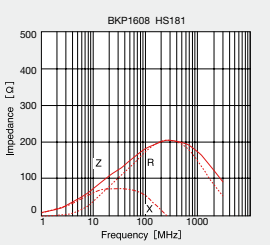
BKP1608

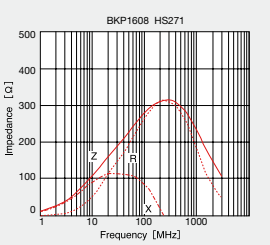


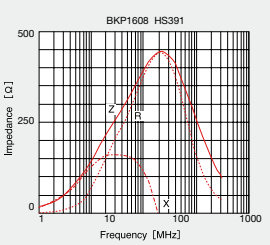












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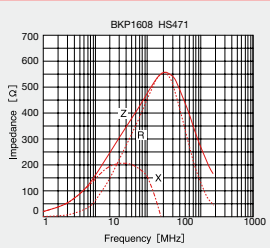

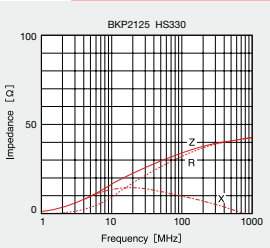

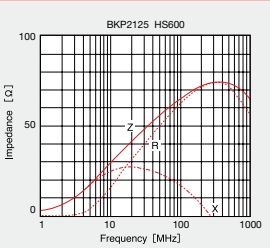

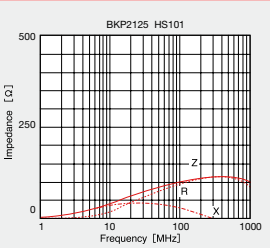

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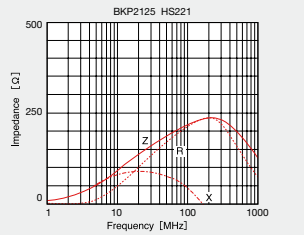

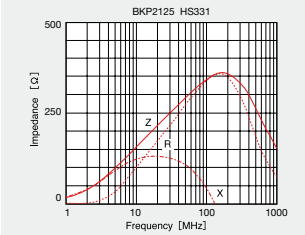

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MULTILAYER FERRITE CHIP BEAD ARRAY (BK ARRAY SERIES)

REFLOW

FEATURES

- Available in a wide range of frequency characteristics and impedance values providing excellent suppression of various noise.
- 4 line action in one chip is available for mounting with higher density and efficiency.
- Heat generation and crosstalk between adjacent circuits are minimized.

APPLICATIONS

- Radiated noise suppression in note-PC, LCD module and other portable equipment.
- Radiated noise suppression in interfaces and harness connecting parts.

OPERATING TEMP.

- −55～125℃

ORDERING CODE

B K 3 2 1 6 4 S 6 0 1 — T ○

❶Type	
BK	Multilayer ferrite chip beads

❷External Dimension (L×W) [mm]	
2010 (0804)	2.0×1.0
3216 (1206)	3.2×1.6

❸Material	
4W	Refer to impedance curves for material difference
4S	
4M	
4L	

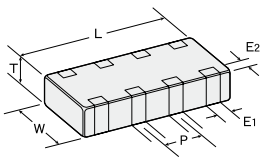
❹Nominal Impedance (Ω)	
example	
601	600
102	1000

❺Packaging	
—T	Tape & Reel

❻Internal code	
△	Standard Products

△=Blank Space

EXTERNAL DIMENSIONS/STANDARD QUANTITY

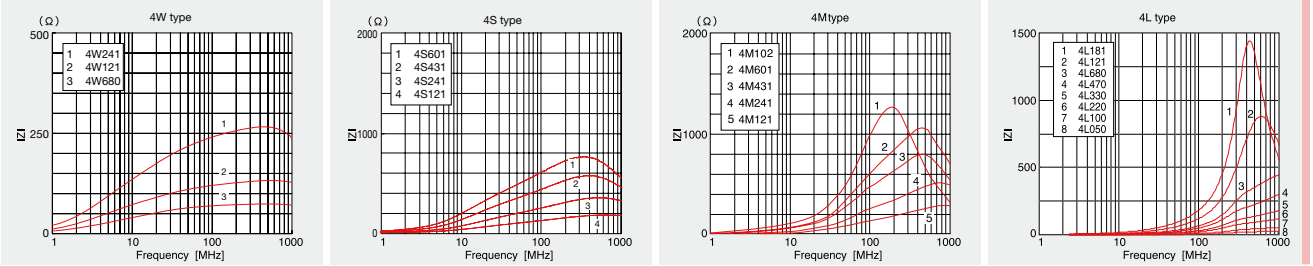


Type	Material	L	W	T	E1	E2	P	Standard Quantity [pcs]	
								Paper Tape	Embossed Tape
BK2010 (0804)	4W, 4S, 4M, 4L	2.0±0.15 (0.079±0.006)	1.0±0.15 (0.039±0.006)	0.45±0.05 (0.018±0.002)	$0.25^{+0.15}_{-0.1}$ ($0.010^{+0.006}_{-0.004}$)	0.25±0.15 (0.010±0.006)	0.5±0.1 (0.020±0.004)	4000	—
BK3216 (1206)	4W, 4S, 4M, 4L	3.2±0.2 (0.126±0.008)	1.6±0.2 (0.063±0.008)	0.8±0.1 (0.031±0.004)	0.35±0.2 (0.014±0.008)	0.3±0.2 (0.012±0.008)	0.8±0.1 (0.031±0.004)	—	4000

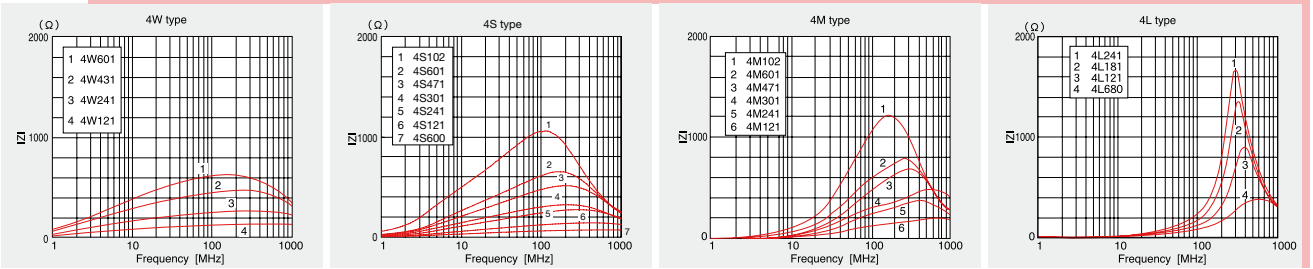
Unit : mm (inch)

AVAILABLE MATERIALS

BK2010



BK3216



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PART NUMBERS

BK2010

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω) ±25%	Measuring Frequency (MHz)	DC Resistance (Ω) (max.)	Rated current (mA) (max.)
BK2010 4W680		RoHS	68	100	0.35	100
BK2010 4W121		RoHS	120		0.40	
BK2010 4W241		RoHS	240		0.50	
BK2010 4S121		RoHS	120		0.30	
BK2010 4S241		RoHS	240		0.45	
BK2010 4S431		RoHS	430		0.55	
BK2010 4S601		RoHS	600		0.70	
BK2010 4M121		RoHS	120		0.30	
BK2010 4M241		RoHS	240		0.45	
BK2010 4M431		RoHS	430		0.55	
BK2010 4M601		RoHS	600		0.70	
BK2010 4M102		RoHS	1000		0.80	
BK2010 4L050		RoHS	5		0.10	
BK2010 4L100		RoHS	10		0.15	
BK2010 4L220		RoHS	22		0.20	
BK2010 4L330		RoHS	33		0.30	
BK2010 4L470		RoHS	47		0.40	
BK2010 4L680		RoHS	68		0.50	
BK2010 4L121		RoHS	120		0.70	
BK2010 4L181		RoHS	180		0.90	

BK3216

Ordering code		EHS (Environmental Hazardous Substances)	Impedance (Ω) ±25%	Measuring Frequency (MHz)	DC Resistance (Ω) (max.)	Rated current (mA) (max.)
BK3216 4W121		RoHS	120	100	0.15	100
BK3216 4W241		RoHS	240		0.25	100
BK3216 4W431		RoHS	430		0.35	100
BK3216 4W601		RoHS	600		0.40	100
BK3216 4S600		RoHS	60		0.18	200
BK3216 4S121		RoHS	120		0.18	200
BK3216 4S241		RoHS	240		0.30	200
BK3216 4S301		RoHS	300		0.40	200
BK3216 4S471		RoHS	470		0.40	200
BK3216 4S601		RoHS	600		0.45	200
BK3216 4S102		RoHS	1000		0.68	100
BK3216 4M121		RoHS	120		0.20	150
BK3216 4M241		RoHS	240		0.35	150
BK3216 4M301		RoHS	300		0.45	150
BK3216 4M471		RoHS	470		0.50	150
BK3216 4M601		RoHS	600		0.60	100
BK3216 4M102		RoHS	1000		0.80	100
BK3216 4L680		RoHS	68		0.35	200
BK3216 4L121		RoHS	120		0.55	200
BK3216 4L181		RoHS	180		0.65	150
BK3216 4L241		RoHS	240		0.75	150

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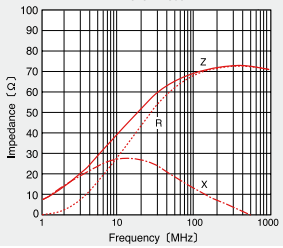
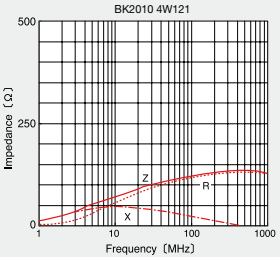
ELECTRICAL CHARACTERISTICS

BK2010

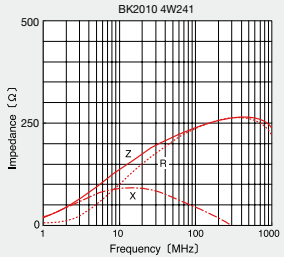
BK2010 4W680



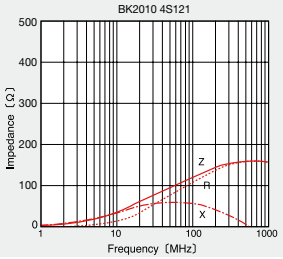
BK2010 4W121



BK2010 4W241



BK2010 4S121



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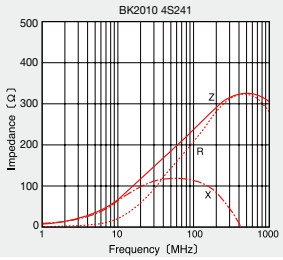

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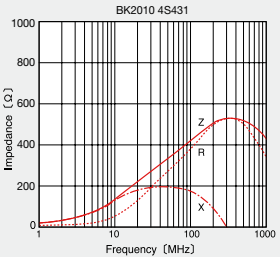

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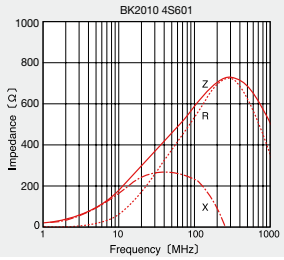

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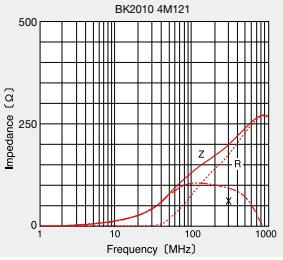

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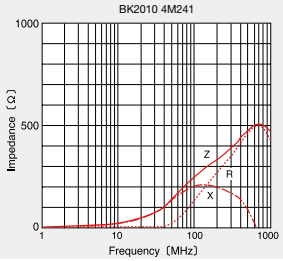

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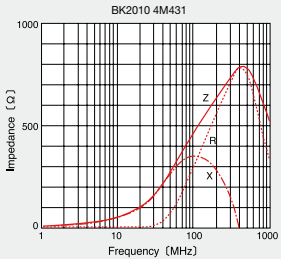

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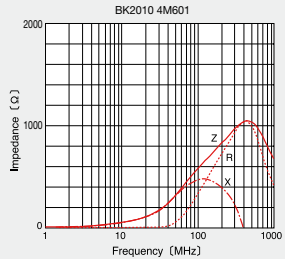

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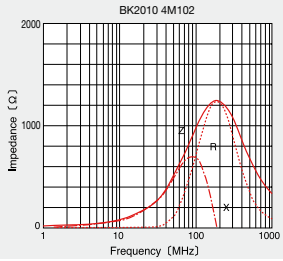

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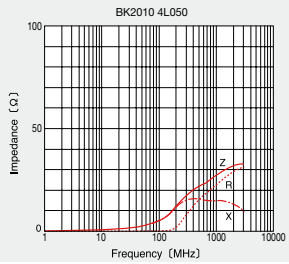

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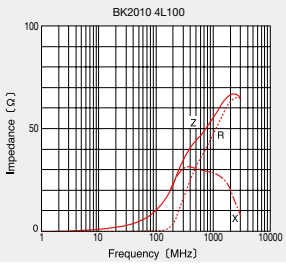

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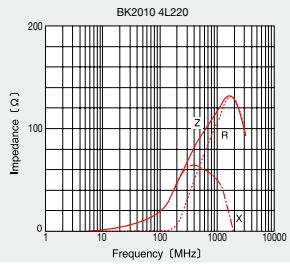

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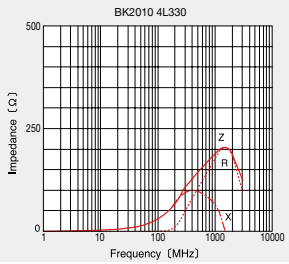

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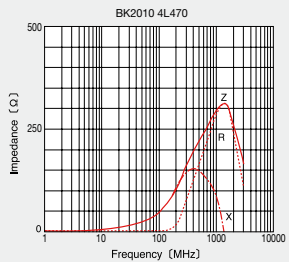

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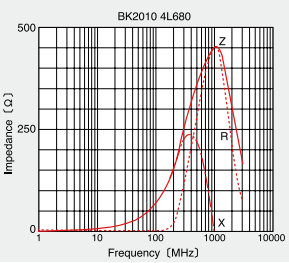
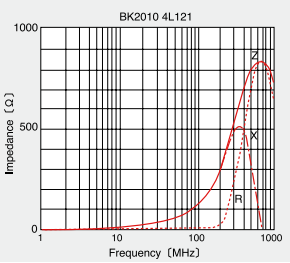
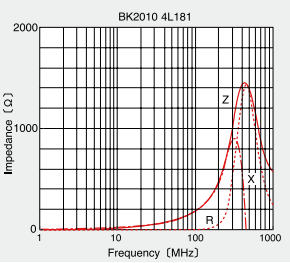


BK2010 4L121



BK2010 4L181



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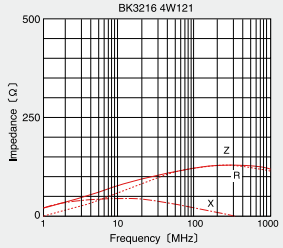
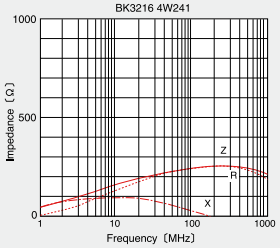
BK3216

BK3216 4W121



BK3216 4W241



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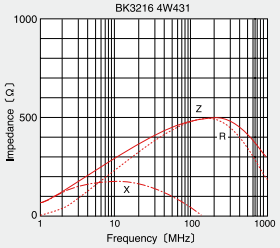

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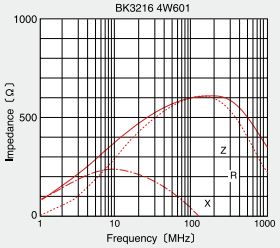

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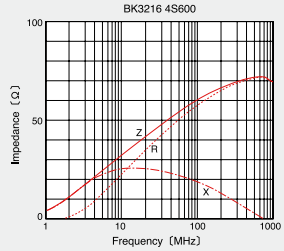

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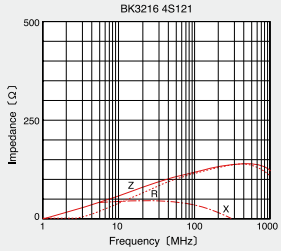

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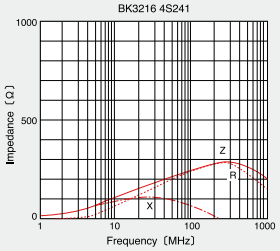

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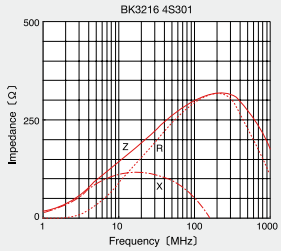

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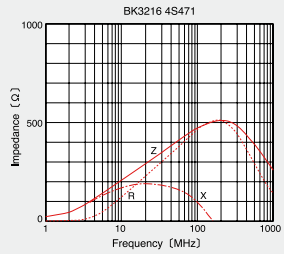

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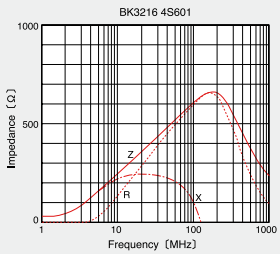

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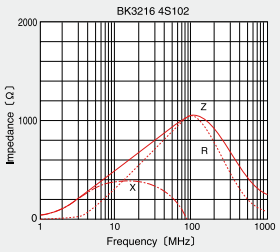

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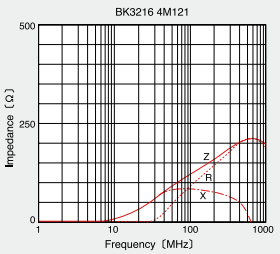

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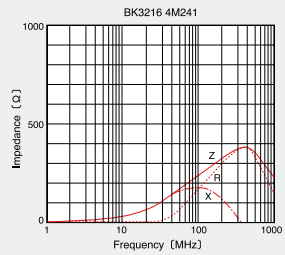

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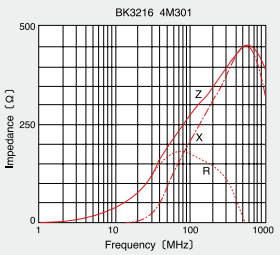

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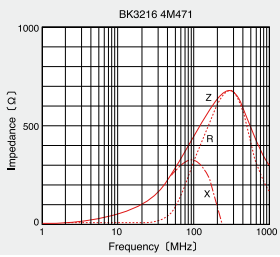

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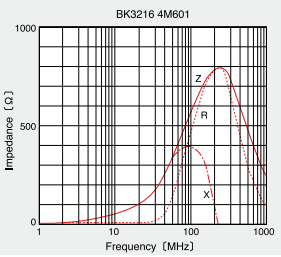

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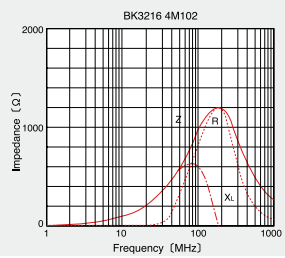

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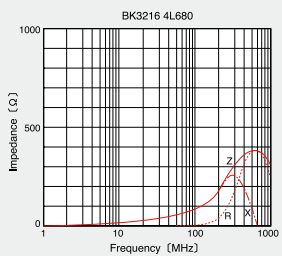

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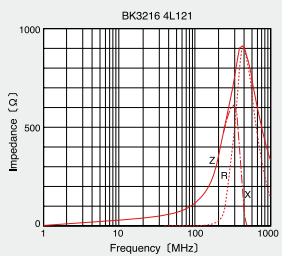

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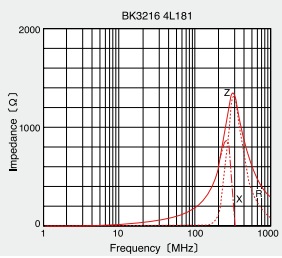

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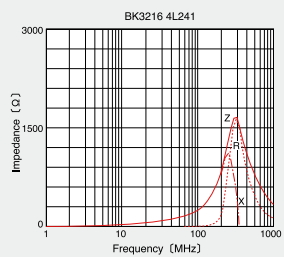

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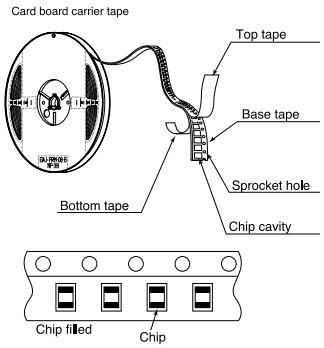
PACKAGING

①Minimum Quantity

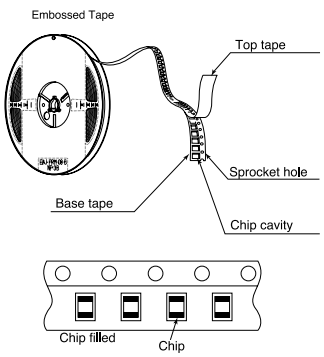
● Tape & Reel Packaging

Type	Thickness [mm] (inch)	Standard Quantity [pcs]	
		Paper Tape	Embossed Tape
CK1608(0603)	0.8 (0.031)	4000	—
CK2125(0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
CKS2125(0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
CKP2012(0805)	0.9 (0.035)	—	3000
CKP2016(0806)	0.9 (0.035)	—	3000
CKP2520(1008)	0.7 (0.028)	—	3000
	0.9 (0.035)	—	3000
	1.1 (0.043)	—	2000
NM2012(0805)	0.9 (0.035)	—	3000
NM2520(1008)	1.1 (0.043)	—	2000
LK1005(0402)	0.5 (0.020)	10000	—
LK1608(0603)	0.8 (0.031)	4000	—
LK2125(0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
HK0603(0201)	0.3 (0.012)	15000	—
HK1005(0402)	0.5 (0.020)	10000	—
HK1608(0603)	0.8 (0.031)	4000	—
HK2125(0805)	0.85 (0.033)	—	4000
	1.0 (0.039)	—	3000
HKQ0603S(0201)	0.3 (0.012)	15000	—
AQ105(0402)	0.5 (0.020)	10000	—
BK0402(01005)	0.2 (0.008)	20000	—
BK0603(0201)	0.3 (0.012)	15000	—
BK1005(0402)	0.5 (0.020)	10000	—
BK1608(0603)	0.8 (0.031)	4000	—
BK2125(0805)	0.85 (0.033)	4000	—
	1.25 (0.049)	—	2000
BK2010(0804)	0.45 (0.018)	4000	—
BK3216(1206)	0.8 (0.031)	—	4000
BKP0603(0201)	0.3 (0.012)	15000	—
BKP1005(0402)	0.5 (0.020)	10000	—
BKP1608(0603)	0.8 (0.031)	4000	—
BKP2125(0805)	0.85 (0.033)	4000	—

②Taping material



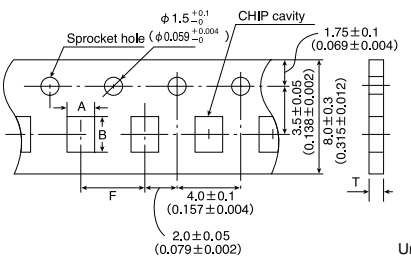
CK	1608
CK	2125
CKS	2125
LK	1005
LK	1608
LK	2125
HK	0603
HK	1005
HK	1608
HKQ	0603
AQ	105
BK	0402
BK	0603
BK	1005
BK	1608
BK	2125
BK	2010
BKP	0603
BKP	1005
BKP	1608
BKP	2125



CK	2125
CKS	2125
CKP	2012
CKP	2016
CKP	2520
NM	2012
NM	2520
LK	2125
HK	2125
BK	2125
BK	3216

③Taping Dimensions

● Paper tape (0.315 inches wide)



Unit : mm (inch)

Type	Thickness (mm) (inch)	Chip cavity		Insertion Pitch	Tape Thickness
		A	B	F	T
CK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
CK2125(0805)	0.85 (0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
CKS2125(0805)	0.85 (0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
LK1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
LK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
LK2125(0805)	0.85 (0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
HK0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
HK1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
HK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
HKQ0603S(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
AQ105(0402)	0.5 (0.020)	0.75±0.1 (0.030±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
BK0402(01005)	0.2 (0.008)	0.25±0.04 (0.010±0.002)	0.45±0.04 (0.018±0.002)	2.0±0.05 (0.079±0.002)	0.36max (0.014max)
BK0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)

To next page

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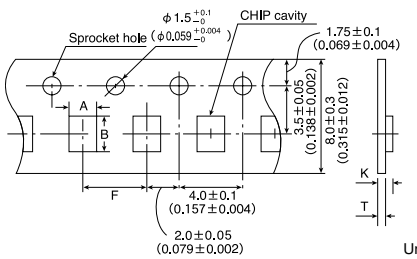
PACKAGING

Type	Thickness (mm) (inch)	Chip cavity		Insertion Pitch	Tape Thickness
		A	B	F	T
BK1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
BK1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BK2125(0805)	0.85 (0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BK2010(0804)	0.45 (0.018)	1.2±0.1 (0.047±0.004)	2.17±0.1 (0.085±0.004)	4.0±0.1 (0.157±0.004)	0.8max (0.031max)
BKP0603(0201)	0.3 (0.012)	0.40±0.06 (0.016±0.002)	0.70±0.06 (0.028±0.002)	2.0±0.05 (0.079±0.002)	0.45max (0.018max)
BKP1005(0402)	0.5 (0.020)	0.65±0.1 (0.026±0.004)	1.15±0.1 (0.045±0.004)	2.0±0.05 (0.079±0.002)	0.8max (0.031max)
BKP1608(0603)	0.8 (0.031)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)
BKP2125(0805)	0.85 (0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.1max (0.043max)

Unit : mm (inch)

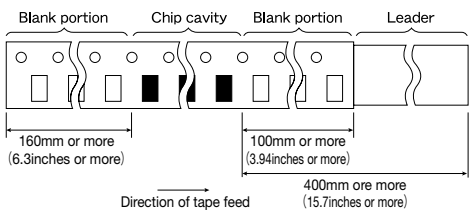
●Embossed Tape (0.315 inches wide)



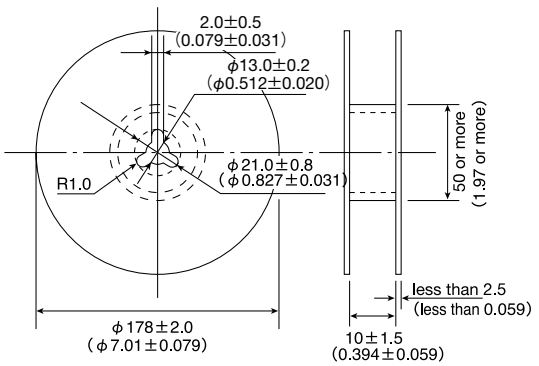
Unit : mm (inch)

Type	Thickness (mm) (inch)	Chip cavity		Insertion Pitch	Tape Thickness	
		A	B	F	K	T
CK2125(0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
CKS2125(0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
CKP2012(0805)	0.9 (0.035)	1.55±0.2 (0.061±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.3 (0.012)
CKP2016(0806)	0.9 (0.035)	1.8±0.1 (0.071±0.004)	2.2±0.1 (0.087±0.004)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.25 (0.01)
CKP2520(1008)	0.7 (0.028)	2.3±0.1 (0.091±0.004)	2.8±0.1 (0.110±0.004)	4.0±0.1 (0.157±0.004)	1.4 (0.055)	0.3 (0.012)
	0.9 (0.035)				1.4 (0.055)	
	1.1 (0.043)				1.7 (0.067)	
NM2012(0805)	0.9 (0.035)	1.55±0.2 (0.061±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.3 (0.051)	0.3 (0.012)
NM2520(1008)	1.1 (0.043)	2.3±0.1 (0.091±0.004)	2.8±0.1 (0.110±0.004)	4.0±0.1 (0.157±0.004)	1.7 (0.067)	0.3 (0.012)
LK2125(0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
HK2125(0805)	0.85 (0.033)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	1.5 (0.059)	0.3 (0.012)
	1.0 (0.039)				2.0 (0.079)	
BK2125(0805)	1.25 (0.049)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.1 (0.157±0.004)	2.0 (0.079)	0.3 (0.012)
BK3216(1206)	0.8 (0.031)	1.9±0.1 (0.075±0.004)	3.5±0.1 (0.138±0.004)	4.0±0.1 (0.157±0.004)	1.4 (0.055)	0.3 (0.012)

④LEADER AND BLANK PORTION

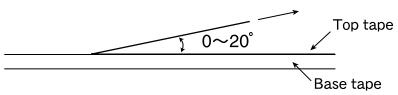


⑤Reel Size



⑥Top tape strength

The top tape requires a peel-off force of 0.1～0.7N in the direction of the arrow as illustrated below.



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RELIABILITY DATA

Multilayer chip inductors and beads

1. Operating Temperature Range		
BK0402		−55～+125℃
BK0603		
BK1005		
BK1608		
BK2125		
ARRAY	BK2010	
	BK3216	
BKP0603		−55～+85℃
BKP1005		
BKP1608		
BKP2125		
CK1608		−40～+85℃
CK2125		
CKS2125		
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		
LK1608		
LK2125		
HK0603		−55～+125℃
HK1005		
HK1608		−40～+85℃
HK2125		
HKQ0603S		−55～+125℃
AQ105		

2. Storage Temperature Range		
BK0402		−55～+125℃
BK0603		
BK1005		
BK1608		
BK2125		
ARRAY	BK2010	
	BK3216	
BKP0603		−55～+85℃
BKP1005		
BKP1608		
BKP2125		
CK1608		−40～+85℃
CK2125		
CKS2125		
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		
LK1608		
LK2125		
HK0603		−55～+125℃
HK1005		
HK1608		−40～+85℃
HK2125		
HKQ0603S		−55～+125℃
AQ105		

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RELIABILITY DATA

Multilayer chip inductors and beads

3. Rated Current		
BK0402		240～540mA DC
BK0603		100～500mA DC
BK1005		120～1000mA DC
BK1608		150～1500mA DC
BK2125		200～1200mA DC
ARRAY	BK2010	100mA DC
	BK3216	100～200mA DC
BKP0603		1.0A DC
BKP1005		800～2000mA DC
BKP1608		1.0～3.0A DC
BKP2125		1.5～4.0A DC
CK1608		50～60mA DC
CK2125		60～500mA DC
CKS2125		110～280mA DC
CKP2012		0.7～1.2A DC
CKP2016		0.9～1.6A DC
CKP2520		1.1～1.8A DC
NM2012		0.8～1.5A DC
NM2520		0.9～1.1A DC
LK1005		20～25mA DC
LK1608		1～150mA DC
LK2125		5～300mA DC
HK0603		60～470mA DC
HK1005		110～300mA DC
HK1608		150～300mA DC
HK2125		300mA DC
HKQ0603S		130～600mA DC
AQ105		280～710mA DC

Definition of rated current:
- In the CK, CKS and BK Series, the rated current is the value of current at which the temperature of the element is increased within 20℃.
- In the BK Series P type and CK Series P type, NM Series the rated current is the value of current at which the temperature of the element is increased within 40℃.
- In the LK,HK,HKQ,and AQ Series, the rated current is either the DC value at which the internal L value is decreased within 5% with the application of DC bias, or the value of current at which the temperature of the element is increased within 20℃.

4. Impedance		
BK0402		10～120Ω ±25%
BK0603		10～600Ω ±25%
BK1005		10～1800Ω ±25%
BK1608		22～2500Ω ±25%
BK2125		15～2500Ω ±25%
ARRAY	BK2010	5～1000Ω ±25%
	BK3216	68～1000Ω ±25%
BKP0603		22～33Ω ±25%
BKP1005		10～220Ω ±25%
BKP1608		33～470Ω ±25%
BKP2125		33～330Ω ±25%
CK1608		—
CK2125		
CKS2125		
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		
LK1608		
LK2125		
HK0603		
HK1005		
HK1608		
HK2125		
HKQ0603S		
AQ105		

【Test Methods and Remarks】
BK0402 Series
Measuring frequency : 100±1MHz
Measuring equipment : HP4991A(or its equivalent)
Measuring jig : 16196D(or its equivalent)
BK0603 Series, BKP0603 Series
Measuring frequency : 100±1MHz
Measuring equipment : HP4291A(or its equivalent)
Measuring jig : 16193A(or its equivalent)
BK1005 Series, BKP1005 Series
Measuring frequency : 100±1MHz
Measuring equipment : HP4291A(or its equivalent)
Measuring jig : 16192A(or its equivalent), 16193A(or its equivalent)
BK1608・2125 Series, BKP1608・2125 Series
Measuring frequency : 100±1MHz
Measuring equipment : HP4291A(or its equivalent), HP4195A(or its equivalent)
Measuring jig : 16092A(or its equivalent) or 16192A(or its equivalent)/HW
BK2010・3216 Series
Measuring frequency : 100±1MHz
Measuring equipment : HP4291A(or its equivalent) , HP4195A(or its equivalent)
Measuring jig : 16192A(or its equivalent)

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RELIABILITY DATA

Multilayer chip inductors and beads

5. Inductance	
BK0402	——
BK0603	
BK1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	4.7～10.0μH：±20%
CK2125	0.1～10.0μH：±20%
CKS2125	1.0～10.0μH：±20%
CKP2012	0.47～4.7μH：±20%
CKP2016	0.47～4.7μH：±20%
CKP2520	0.47～4.7μH：±20%
NM2012	0.82～1.0μH：±20%
NM2520	1.0～2.2μH：±20%
LK1005	0.12～2.2μH：±10%　Q 0.12～2.2μH：±30%
LK1608	0.047～33.0μH：±20%　0.10～12.0μH：±10%　Q 0.12～2.2μH：±30%
LK2125	0.047～33.0μH：±20%　0.10～12.0μH：±10%　Q 0.12～2.2μH：±30%
HK0603	1.0～6.2nH：±0.3nH　6.8～100nH：±5%
HK1005	1.0～6.2nH：±0.3nH　6.8～270nH：±5%
HK1608	1.0～5.6nH：±0.3nH　6.8～470nH：±5%
HK2125	1.5～5.6nH：±0.3nH　6.8～470nH：±5%
HKQ0603S	0.6～6.2nH：±0.3nH　6.8～22nH：±5%
AQ105	1.0～6.2nH：±0.3nH　6.8～15nH：±5%

【Test Methods and Remarks】
CK Series：
Measuring frequency：2 to 4MHz（CK1608）
Measuring frequency：2 to 25MHz（CK2125）
Measuring frequency：2 to 10MHz（CKS2125）
LK Series：
Measuring frequency：10 to 25MHz（LK1005）
Measuring frequency：1 to 50MHz（LK1608）
Measuring frequency：0.4 to 50MHz（LK2125）
CKP Series, NM Series：
Measuring frequency：1MHz(CKP2012, CKP2016, CKP2520, NM2012・NM2520)
Measuring equipment, jig：・HP4194A+16085B+16092A(or its equivalent)
・HP4195A+41951+16092A(or its equivalent)
・HP4294A+16192A(or its equivalent)
・HP4291A+16193A(or its equivalent)/LK1005
・HP4285A+42841A+42842C+42851−61100(CKP2012・CKP2016・CKP2520・NM2012・NM2520)
Measuring current：・1mA rms(0.047 to 4.7μH)　・0.1mA rms(5.6 to 33μH)
HK、HKQ、AQ Series：
Measuring frequency：100MHz(HK0603・HK1005・AQ105)
Measuring frequency：50/100MHz(HK1608・HK2125)
Measuring frequency：500MHz(HKQ0603S)
Measuring equipment, jig：・HP4291A+16197A(or its equivalent)/HK0603・AQ105
・HP4291A+16193A(or its equivalent)/HK1005
・E4991A+16197A(or its equivalent)/HKQ0603S
・HP4291A+16092+in-house made jig(or its equivalent)/HK1608・HK2125

RELIABILITY DATA

Multilayer chip inductors and beads

6. Q	
BK0402	—
BK0603	
BK1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	20 min.
CK2125	15～20 min.
CKS2125	—
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	10～20 min.
LK1608	10～35 min.
LK2125	15～50 min.
HK0603	4～5 min.
HK1005	8 min.
HK1608	8～12 min.
HK2125	10～18 min.
HKQ0603S	10～13 min.
AQ105	8 min.

【Test Methods and Remarks】
CK Series：
Measuring frequency：2 to 4MHz（CK1608）
Measuring frequency：2 to 25MHz（CK2125）
LK Series：
Measuring frequency：10 to 25MHz（LK1005）
Measuring frequency：1 to 50MHz（LK1608）
Measuring frequency：0.4 to 50MHz（LK2125）
Measuring equipment, jig：・HP4194A+16085B+16092A（or its equivalent）
・HP4195A+41951+16092A（or its equivalent）
・HP4294A+16192A（or its equivalent）
・HP4291A+16193A（or its equivalent）/LK1005
Measuring current：・1mA rms（0.047 to 4.7μH）　・0.1mA rms（5.6 to 33μH）
HK、HKQ、AQ Series：
Measuring frequency：100MHz（HK0603・HK1005・AQ105）
Measuring frequency：50/100MHz（HK1608・HK2125）
Measuring frequency：500MHz（HKQ0603S）
Measuring equipment, jig：・HP4291A+16197A（or its equivalent）/HK0603・AQ105
・HP4291A+16193A（or its equivalent）/HK1005
・E4991A+16197A（or its equivalent）/HKQ0603S
・HP4291A+16092A+ in-house made jig（or its equivalent）/HK1608・HK2125

7. DC Resistance	
BK0402	0.10～0.53Ω max.
BK0603	0.065～1.50Ω max.
BK1005	0.03～0.80Ω max.
BK1608	0.05～1.10Ω max.
BK2125	0.05～0.75Ω max.
ARRAY BK2010	0.10～0.90Ω max.
ARRAY BK3216	0.15～0.80Ω max.
BKP0603	0.065～0.070Ω max.
BKP1005	0.030～0.20Ω max.
BKP1608	0.025～0.18Ω max.
BKP2125	0.020～0.075Ω max.
CK1608	0.45～0.85Ω（±30%）
CK2125	0.16～0.65Ω max.
CKS2125	0.09～0.40Ω typ.
	0.12～0.52Ω max.
CKP2012	0.10～0.28Ω max.
CKP2016	0.08～0.20Ω max.
CKP2520	0.05～0.16Ω max.
NM2012	0.10～0.19Ω max.
NM2520	0.13～0.22Ω max.
LK1005	0.41～1.16Ω max.
LK1608	0.2～2.2Ω max.
LK2125	0.1～1.1Ω max.
HK0603	0.11～3.74Ω max.
HK1005	0.08～4.8Ω max.
HK1608	0.05～2.6Ω max.
HK2125	0.10～1.5Ω max.
HKQ0603S	0.06～1.29Ω max.
AQ105	0.07～0.45Ω max.

【Test Methods and Remarks】
Measuring equipment：VOAC-7412（made by Iwasaki Tsushinki）　VOAC-7512（made by Iwasaki Tsushinki）

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RELIABILITY DATA

Multilayer chip inductors and beads

8. Self Resonance Frequency (SRF)		
BK0402		—
BK0603		
BK1005		
BK1608		
BK2125		
ARRAY	BK2010	
	BK3216	
BKP0603		
BKP1005		
BKP1608		
BKP2125		
CK1608		17～25MHz min.
CK2125		24～235MHz min.
CKS2125		—
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		40～180MHz min.
LK1608		9～260MHz min.
LK2125		13～320MHz min.
HK0603		900～10000MHz min.
HK1005		400～10000MHz min.
HK1608		300～10000MHz min.
HK2125		200～4000MHz min.
HKQ0603S		1900～10000MHz min.
AQ105		2300～10000MHz min.

【Test Methods and Remarks】
LK Series :
Measuring equipment : HP4195A (or its equivalent)
Measuring jig : 41951+16092A (or its equivalent)
HK、HKQ、AQ Series :
Measuring equipment : HP8719C (or its equivalent) ・HP8753D (or its equivalent)/HK2125

9. Temperature Characteristic		
BK0402		—
BK0603		
BK1005		
BK1608		
BK2125		
ARRAY	BK2010	
	BK3216	
BKP0603		
BKP1005		
BKP1608		
BKP2125		
CK1608		
CK2125		
CKS2125		
CKP2012		
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		
LK1608		
LK2125		
HK0603		Inductance change : Within ±10%
HK1005		
HK1608		
HK2125		
HKQ0603S		
AQ105		

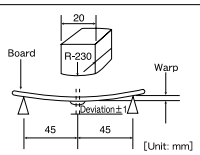
【Test Methods and Remarks】
HK、HKQ、AQ Series : Temperature range : −30 to +85℃
Reference temperature : +20℃

RELIABILITY DATA

Multilayer chip inductors and beads

10. Resistance to Flexure of Substrate	
BK0402	No mechanical damage.
BK0603	
BK1005	
BK1608	
BK2125	
ARRAY	BK2010
	BK3216
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	
CK2125	
CKS2125	
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	
LK1608	
LK2125	
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
AQ105	

【Test Methods and Remarks】
Warp : 2mm (BK Series without 0402size, BKP, CK, CKS, CKP, NM, LK, HK, HKQ, AQ Series)
: 1mm (BK0402 Series)
Testing board : glass epoxy-resin substrate
Thickness : 0.8mm



11. Solderability	
BK0402	At least 75% of terminal electrode is covered by new solder.
BK0603	
BK1005	
BK1608	
BK2125	
ARRAY	BK2010
	BK3216
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	At least 75% of terminal electrode is covered by new solder.
CK2125	
CKS2125	
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	
LK1608	
LK2125	
HK0603	
HK1005	
HK1608	
HK2125	
HKQ0603S	
AQ105	

【Test Methods and Remarks】
Solder temperature : 230±5℃
Duration : 4±1 sec.

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RELIABILITY DATA

Multilayer chip inductors and beads

12. Resistance to Soldering	
BK0402	Appearance : No significant abnormality. Impedance change : Within ±30%
BK0603	
BK1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Remaining terminal electrode : 70% min. Inductance change R10～4R7 : Within ±10% 6R8～100 : Within ±15% CKS2125 : Within ±20% CKP2012、CKP2016、CKP2520、NM2012、NM2520 : Within ±30%
CK2125	
CKS2125	
CKP2012	
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage. Remaining terminal electrode : 70% min. Inductance change : Within ±15%
LK1608	No mechanical damage. Remaining terminal electrode : 70% min. Inductance change 47N～4R7 : Within ±10% 5R6～330 : Within ±15%
LK2125	
HK0603	No mechanical damage. Remaining terminal electrode : 70% min. Inductance change : Within ±5%
HK1005	
HK1608	
HK2125	
HKQ0603S	
AQ105	

【Test Methods and Remarks】
Solder temperature : 260±5℃
Duration : 10±0.5 sec.
Preheating temperature : 150 to 180℃
Preheating time : 3 min.
Flux : Immersion into methanol solution with colophony for 3 to 5 sec.
Recovery : 2 to 3 hrs of recovery under the standard condition after the test.(See Note 1)

13. Thermal Shock	
BK0402	Appearance : No significant abnormality. Impedance change : Within ±30%
BK0603	
BK1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Inductance change : Within ±20% Q change : Within ±30% Inductance change : Within ±20% (CKS2125)
CK2125	
CKS2125	
CKP2012	No mechanical damage. Inductance change : Within ±30%
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage. Inductance change : Within ±10% Q change : Within ±30%
LK1608	
LK2125	
HK0603	No mechanical damage. Inductance change : Within ±10% Q change : Within ±20%
HK1005	
HK1608	
HK2125	
HKQ0603S	
AQ105	

【Test Methods and Remarks】
Conditions for 1 cycle
Step 1 : Minimum operating temperature $^{+0}_{-3}$℃ 30±3 min.
Step 2 : Room temperature 2 to 3 min.
Step 3 : Maximum operating temperature $^{+3}_{-0}$℃ 30±3 min.
Step 4 : Room temperature 2 to 3 min.
Number of cycles : 5
Recovery : 2 to 3 hrs of recovery under the standard condition after the test.(See Note 1)

(Note 1) When there are questions concerning mesurement result ; measurement shall be made after 48±2 hrs of recovery under the standard condition.

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For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

Multilayer chip inductors and beads

14. Damp Heat (Steady state)		
BK0402		Appearance : No significant abnormality. Impedance change : Within ±30%
BK0603		
BK1005		
BK1608		
BK2125		
ARRAY	BK2010	
	BK3216	
BKP0603		
BKP1005		
BKP1608		
BKP2125		
CK1608		No mechanical damage. Inductance change : Within ±20%　Q change : Within ±30%
CK2125		
CKS2125		Inductance change : Within ±20%
CKP2012		No mechanical damage.　Inductance change : Within ±30%
CKP2016		
CKP2520		
NM2012		
NM2520		
LK1005		No mechanical damage. Inductance change : Within ±10%　Q change : Within ±30%
LK1608		
LK2125		No mechanical damage.　Inductance change : Within ±20%　Q change : Within ±30%
HK0603		No mechanical damage. Inductance change : Within ±10%　Q change : Within ±20%
HK1005		
HK1608		
HK2125		
HKQ0603S		
AQ105		

【Test Methods and Remarks】
BK Series :
Temperature : 40±2℃
Humidity : 90 to 95%RH
Duration : 500^{+24}_{0} hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

LK、CK、CKS、CKP、NM、HK、HKQ、AQ Series :
Temperature : 40±2℃ (LK、CK、CKS、CKP、NM Series)
: 60±2℃ (HK、HKQ、AQ Series)
Humidity : 90 to 95%RH
Duration : 500±12 hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

RELIABILITY DATA

Multilayer chip inductors and beads

15. Loading under Damp Heat	
BK0402	Appearance : No significant abnormality. Impedance change : Within ±30%
BK0603	
BK1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Inductance change : Within ±20%　Q change : Within ±30%
CK2125	
CKS2125	No mechanical damage.　Inductance change : Within ±20%
CKP2012	No mechanical damage.　Inductance change : Within ±30%
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage.　Inductance change : Within ±10%　Q change : Within ±30%
LK1608	No mechanical damage. Inductance change : 0.047 to 12.0μH : Within ±10%　15.0 to 33.0μH : Within ±15%　Q change : Within ±30%
LK2125	No mechanical damage.　Inductance change : Within ±20%　Q change : Within ±30%
HK0603	No mechanical damage. Inductance change : Within ±10%　Q change : Within ±20%
HK1005	
HK1608	
HK2125	
HKQ0603S	
AQ105	

【Test Methods and Remarks】
BK Series :
Temperature : 40±2℃
Humidity : 90 to 95%RH
Applied current : Rated current
Duration : 500^{+24}_{-0} hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

LK、CK、CKS、CKP、NM、HK、HKQ、AQ Series :
Temperature : 40±2℃ (LK、CK、CKS、CKP、NM Series)
: 60±2℃ (HK、HKQ、AQ Series)
Humidity : 90 to 95%RH
Applied current : Rated current
Duration : 500±12 hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

Note on standard condition: "standard condition" referred to herein is defined as follows:
5 to 35℃ of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.
When there are questions concerning measurement results:
In order to provide correlation data, the test shall be conducted under condition of 20±2℃ of temperature, 60 to 70% relative humidity, and 86 to 106kPa of air pressure.
Unless otherwise specified, all the tests are conducted under the "standard condition."

(Note 1) Measurement shall be made after 48±2 hrs of recovery under the standard condition.

RELIABILITY DATA

Multilayer chip inductors and beads

16. Loading at High Temperature	
BK0402	Appearance : No significant abnormality Impedance change : Within ±30%
BK0603	
BK1005	
BK1608	
BK2125	
ARRAY BK2010	
ARRAY BK3216	
BKP0603	
BKP1005	
BKP1608	
BKP2125	
CK1608	No mechanical damage. Inductance change : Within ±20%　Q change : Within ±30%
CK2125	
CKS2125	No mechanical damage.　Inductance change : Within ±20%
CKP2012	No mechanical damage.　Inductance change : Within ±30%
CKP2016	
CKP2520	
NM2012	
NM2520	
LK1005	No mechanical damage.　Inductance change : Within ±10%　Q change : Within ±30%
LK1608	No mechanical damage. Inductance change : 0.047 to 12.0μH : Within ±10%　15.0 to 33.0μH : Within ±15%　Q change : Within ±30%
LK2125	No mechanical damage.　Inductance change : Within ±20%　Q change : Within ±30%
HK0603	No mechanical damage. Inductance change : Within ±10%　Q change : Within ±20%
HK1005	
HK1608	
HK2125	
HKQ0603S	
AQ105	

【Test Methods and Remarks】
BK Series :
Temperature : 125±3℃
Applied current : Rated current
Duration : 500^{+24}_{0} hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.(See Note 1)

LK、CK、CKS、CKP、NM、HK、HKQ、AQ、BKP Series :
Temperature : 85±2℃ (LK、CK、CKS、CKP、NM、BKP Series)
: 85±2℃ (HK1608, 2125)
: 85±2℃ (HK1005, AQ105 operating temperature range −55 to +85℃)
: 125±2℃ (HK0603, HK1005, HKQ0603S, AQ105 operating temperature range −55 to +125℃)
Applied current : Rated current
Duration : 500±12 hrs
Recovery : 2 to 3 hrs of recovery under the standard condition after the test.(See Note 1)

Note on standard condition: "standard condition" referred to herein is defined as follows:
5 to 35℃ of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.
When there are questions concerning measurement results:
In order to provide correlation data, the test shall be conducted under condition of 20±2℃ of temperature, 60 to 70% relative humidity, and 86 to 106kPa of air pressure. Unless otherwise specified, all the tests are conducted under the "standard condition."

(Note 1) Measurement shall be made after 48±2 hrs of recovery under the standard condition.

PRECAUTIONS

Precautions on the use of Multilayer chip Inductors, Multilayer chip inductors for high frequency, Multilayer ferrite chip beads

1. Circuit Design

Precautions

◆Verification of operating environment, electrical rating and performance

1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications. As such, any inductors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly differentiated from components used in general purpose applications.

◆Operating Current (Verification of Rated current)

1. The operating current for inductors must always be lower than their rated values.
2. Do not apply current in excess of the rated value because the inductance may be reduced due to the magnetic saturation effect.

2. PCB Design

Precautions

◆Pattern configurations (Design of Land-patterns)

1. When inductors are mounted on a PCB, the size of land patterns and the amount of solder used (size of fillet) can directly affect inductor performance. Therefore, the following items must be carefully considered in the design of solder land patterns:
   (1) The amount of solder applied can affect the ability of chips to withstand mechanical stresses which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads which in turn determines the amount of solder necessary to form the fillets.
   (2) When more than one part is jointly soldered onto the same land or pad, the pad must be designed so that each component's soldering point is separated by solder-resist.
   (3) The larger size of land patterns and amount of solder, the smaller Q value after mounting on PCB. It makes higher the Q value to design land patterns smaller than terminal electrode of chips.

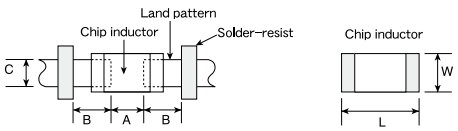
◆Pattern configurations (Inductor layout on panelized [breakaway] PC boards)

1. After inductors have been mounted on the boards, chips can be subjected to mechanical stresses in subsequent manufacturing processes (PCB cutting, board inspection, mounting of additional parts, assembly into the chassis, wave soldering the reflow soldered boards etc.) For this reason, planning pattern configurations and the position of SMD inductors should be carefully performed to minimize stress.

Technical consider-ations

◆Pattern configurations (Design of Land-patterns)

1. The following diagrams and tables show some examples of recommended patterns to prevent excessive solder amounts (larger fillets which extend above the component end terminations). Examples of improper pattern designs are also shown.
   (1) Recommended land dimensions for a typical chip inductor land patterns for PCBs



Recommended land dimensions for wave-soldering

Type		1608	2125	3216
Size	L	1.6	2.0	3.2
	W	0.8	1.25	1.6
A		0.8~1.0	1.0~1.4	1.8~2.5
B		0.5~0.8	0.8~1.5	0.8~1.7
C		0.6~0.8	0.9~1.2	1.2~1.6

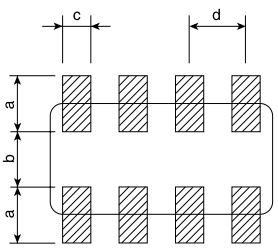
(Unit : mm)

Recommended land dimensions for reflow-soldering

Type		0402	0603	1005	105	1608	2012	2125	2016	3216	2520
Size	L	0.4	0.6	1.0	1.0	1.6	2.0	2.0	2.0	3.2	2.5
	W	0.2	0.3	0.5	0.6	0.8	1.25	1.25	1.6	1.6	2.0
A		0.15~0.25	0.20~0.30	0.45~0.55	0.50~0.55	0.8~1.0	0.8~1.2	0.8~1.2	0.8~1.2	1.8~2.5	1.0~1.4
B		0.10~0.20	0.20~0.30	0.40~0.50	0.30~0.40	0.6~0.8	0.8~1.2	0.8~1.2	0.8~1.2	0.6~1.5	0.6~1.0
C		0.15~0.30	0.25~0.40	0.45~0.55	0.60~0.70	0.6~0.8	0.9~1.6	0.9~1.6	1.2~2.0	1.2~2.0	1.8~2.2

(Unit : mm)

Excess solder can affect the ability of chips to withstand mechanical stresses. Therefore, please take proper precautions when designing land-patterns.

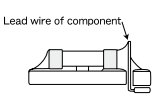
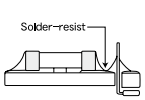
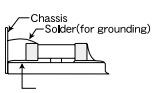
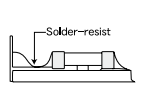
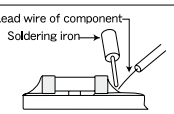
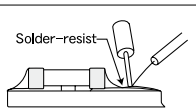
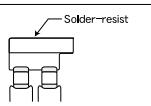


Recommended land dimension for Reflow-soldering

Type		3216	2010
Size	L	3.2	2.0
	W	1.6	1.0
a		0.7~0.9	0.5~0.6
b		0.8~1.0	0.5~0.6
c		0.4~0.5	0.2~0.3
d		0.8	0.5

(Unit : mm)

(2) Examples of good and bad solder application

Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

To next page

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PRECAUTIONS

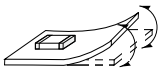
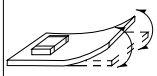
Precautions on the use of Multilayer chip Inductors, Multilayer chip inductors for high frequency, Multilayer ferrite chip beads

2. PCB Design

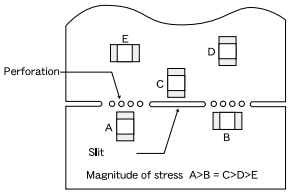
Technical considerations

◆Pattern configurations (Inductor layout on panelized [breakaway] PC boards)

1-1. The following are examples of good and bad inductor layout; SMD inductors should be located to minimize any possible mechanical stresses from board warp or deflection.

Item	Not recommended	Recommended
Deflection of the board		 Position the component at a right angle to the direction of the mechanical stresses that are anticipated.

1-2. To layout the inductors for the breakaway PC board, it should be noted that the amount of mechanical stresses given will vary depending on inductor layout. An example below should be counted for better design.



1-3. When breaking PC boards along their perforations, the amount of mechanical stress on the inductors can vary according to the method used. The following methods are listed in order from least stressful to most stressful: push-back, slit, V-grooving, and perforation. Thus, any ideal SMD inductor layout must also consider the PCB splitting procedure.

3. Considerations for automatic placement

Precautions

◆Adjustment of mounting machine

1. Excessive impact load should not be imposed on the inductors when mounting onto the PC boards.
2. The maintenance and inspection of the mounter should be conducted periodically.

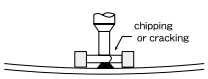
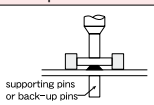
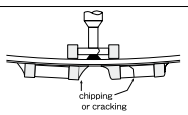
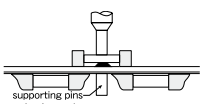
◆Selection of Adhesives

1. Mounting inductors with adhesives in preliminary assembly, before the soldering stage, may lead to degraded inductor characteristics unless the following factors are appropriately checked; the size of land patterns, type of adhesive, amount applied, hardening temperature and hardening period. Therefore, it is imperative to consult the manufacturer of the adhesives on proper usage and amounts of adhesive to use.

Technical considerations

◆Adjustment of mounting machine

1. If the lower limit of the pick-up nozzle is low, too much force may be imposed on the inductors, causing damage. To avoid this, the following points should be considered before lowering the pick-up nozzle:
   (1) The lower limit of the pick-up nozzle should be adjusted to the surface level of the PC board after correcting for deflection of the board.
   (2) The pick-up pressure should be adjusted between 1 and 3N static loads.
   (3) To reduce the amount of deflection of the board caused by impact of the pick-up nozzle, supporting pins or back-up pins should be used under the PC board. The following diagrams show some typical examples of good pick-up nozzle placement:

Item	Improper method	Proper method
Single-sided mounting		
Double-sided mounting		

2. As the alignment pin wears out, adjustment of the nozzle height can cause chipping or cracking of the inductors because of mechanical impact on the inductors. To avoid this, the monitoring of the width between the alignment pin in the stopped position, and maintenance, inspection and replacement of the pin should be conducted periodically.

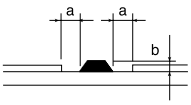
Technical considerations

◆Selection of Adhesives

1. Some adhesives may cause reduced insulation resistance. The difference between the shrinkage percentage of the adhesive and that of the inductors may result in stresses on the inductors and lead to cracking. Moreover, too little or too much adhesive applied to the board may adversely affect component placement, so the following precautions should be noted in the application of adhesives.
   (1) Required adhesive characteristics
      a. The adhesive should be strong enough to hold parts on the board during the mounting & solder process.
      b. The adhesive should have sufficient strength at high temperatures.
      c. The adhesive should have good coating and thickness consistency.
      d. The adhesive should be used during its prescribed shelf life.
      e. The adhesive should harden rapidly.
      f. The adhesive must not be contaminated.
      g. The adhesive should have excellent insulation characteristics.
      h. The adhesive should not be toxic and have no emission of toxic gasses.
   (2) When using adhesives to mount inductors on a PCB, inappropriate amounts of adhesive on the board may adversely affect component placement. Too little adhesive may cause the inductors to fall off the board during the solder process. Too much adhesive may cause defective soldering due excessive flow of adhesive on to the land or solder pad.

[Recommended conditions]

Amount of adhesives



After inductors are bonded

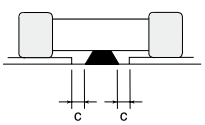


Figure	0805 case sizes as examples
a	0.3mm min
b	100～120μm
c	Area with no adhesive

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Precautions on the use of Multilayer chip Inductors, Multilayer chip inductors for high frequency, Multilayer ferrite chip beads

4. Soldering

Precautions

◆Selection of Flux

1. Since flux may have a significant effect on the performance of inductors, it is necessary to verify the following conditions prior to use;
   (1) Flux used should be with less than or equal to 0.1 wt% (Chlorine conversion method) of halogenated content. Flux having a strong acidity content should not be applied.
   (2) When soldering inductors on the board, the amount of flux applied should be controlled at the optimum level.
   (3) When using water-soluble flux, special care should be taken to properly clean the boards.

◆Soldering

1. Temperature, time, amount of solder, etc. are specified in accordance with the following recommended conditions, **and please contact us about peak temperature when you use lead-free paste.**

Technical considerations

◆Selection of Flux

1-1. When too much halogenated substance (Chlorine, etc.) content is used to activate the flux, or highly acidic flux is used, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the Inductor.

1-2. Flux is used to increase solderability in flow soldering, but if too much is applied, a large amount of flux gas may be emitted and may detrimentally affect solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.

1-3. Since the residue of water-soluble flux is easily dissolved by water content in the air, the residue on the surface of Inductor in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux.

◆Soldering

1-1. Preheating when soldering

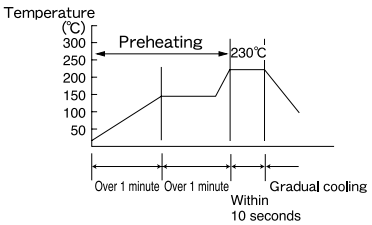
Heating: Chip inductor components should be preheated to within 100 to 130℃ of the soldering. Cooling: The temperature difference between the components and cleaning process should not be greater than 100℃.

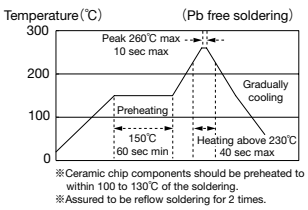
Chip inductors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with a great care so as to prevent malfunction of the components due to excessive thermal shock.

Recommended conditions for soldering

[Reflow soldering]

Temperature profile

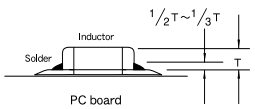




※Ceramic chip components should be preheated to within 100 to 130℃ of the soldering.
※Assured to be reflow soldering for 2 times.

Caution

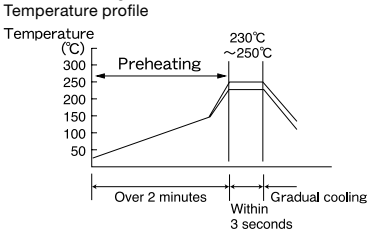
1. The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3 of the thickness of the inductor, as shown below:

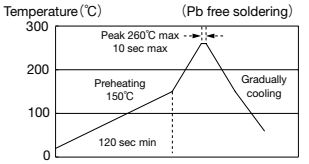


2. Because excessive dwell times can detrimentally affect solderability, soldering duration should be kept as close to recommended times as possible.

[Wave soldering]

Temperature profile





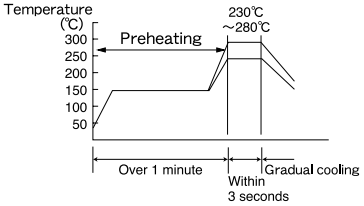
※Ceramic chip components should be preheated to within 100 to 130℃ of the soldering.
※Assured to be wave soldering for 1 time.
※Except for reflow soldering type.

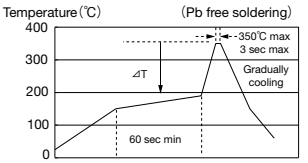
Caution

1. Make sure the inductors are preheated sufficiently.
2. The temperature difference between the inductor and melted solder should not be greater than 100 to 130℃.
3. Cooling after soldering should be as gradual as possible.
4. Wave soldering must not be applied to the inductors designated as for reflow soldering only.

[Hand soldering]

Temperature profile





(※ΔT190℃ (3216Type max), ΔT≦130℃ (3225 Type ming)
※It is recommended to use 20W soldering iron and the tip is 1φ or less.
※The soldering iron should not directly touch the components.
※Assured to be soldering iron for 1 time.

Note: The above profiles are the maximum allowable soldering condition, therefore these profiles are not always recommended.

Caution

1. Use a 20W soldering iron with a maximum tip diameter of 1.0 mm.
2. The soldering iron should not directly touch the inductor.

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PRECAUTIONS

Precautions on the use of Multilayer chip Inductors, Multilayer chip inductors for high frequency, Multilayer ferrite chip beads

5. Cleaning	
Precautions	◆Cleaning conditions 1. When cleaning the PC board after the Inductors are all mounted, select the appropriate cleaning solution according to the type of flux used and purpose of the cleaning(e.g. to remove soldering flux or other materials from the production process.) 2. Cleaning conditions should be determined after verifying, through a test run, that the cleaning process does not affect the inductor's characteristics.
Technical consider-ations	◆Cleaning conditions 1. The use of inappropriate solutions can cause foreign substances such as flux residue to adhere to the inductor, resulting in a degradation of the inductor's electrical properties(especially insulation resistance). 2. Inappropriate cleaning conditions(insufficient or excessive cleaning)may detrimentally affect the performance of the inductors. (1) Excessive cleaning a. In the case of ultrasonic cleaning, too much power output can cause excessive vibration of the PC board which may lead to the cracking of the inductor or the soldered portion, or decrease the terminal electrodes' strength. Thus the following conditions should be carefully checked; Ultrasonic output Below 20W/ℓ Ultrasonic frequency Below 40kHz Ultrasonic washing period 5 min. or less

6. Post cleaning processes	
Precautions	◆Application of resin coatings, moldings, etc. to the PCB and components. 1. With some type of resins a decomposition gas or chemical reaction vapor may remain inside the resin during the hardening period or while left under normal storage conditions resulting in the deterioration of the inductor's performance. 2. When a resin's hardening temperature is higher than the inductor's operating temperature, the stresses generated by the excess heat may lead to inductor damage or destruction. 3. Stress caused by a resin's temperature generated expansion and contraction may damage inductors. The use of such resins, molding materials etc. is not recommended.

7. Handling	
Precautions	◆Breakaway PC boards(splitting along perforations) 1. When splitting the PC board after mounting inductors and other components, care is required so as not to give any stresses of deflection or twisting to the board. 2. Board separation should not be done manually, but by using the appropriate devices. ◆General handling precautions 1. Always wear static control bands to protect against ESD. 2. Keep the inductors away from all magnets and magnetic objects. 3. Use non-magnetic tweezers when handling inductors. 4. Any devices used with the inductors (soldering irons, measuring instruments) should be properly grounded. 5. Keep bare hands and metal products(i.e., metal desk)away from chip electrodes or conductive areas that lead to chip electrodes. 6. Keep inductors away from items that generate magnetic fields such as speakers or coils. ◆Mechanical considerations 1. Be careful not to subject the inductors to excessive mechanical shocks. (1) If inductors are dropped on the floor or a hard surface they should not be used. (2) When handling the mounted boards, be careful that the mounted components do not come in contact with or bump against other boards or components.

8. Storage conditions	
Precautions	◆Storage 1. To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible. Recommended conditions Ambient temperature Below 40℃ Humidity Below 70% RH The ambient temperature must be kept below 30℃. Even under ideal storage conditions inductor electrode solderability decreases as time passes, so inductors should be used within 6 months from the time of delivery. *The packaging material should be kept where no chlorine or sulfur exists in the air.
Technical consider-ations	◆Storage 1. If the parts are stocked in a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place. For this reason, components should be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the inductors.

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RECTANGULAR FERRITE CHIP BEADS (HIGH CURRENT FB SERIES M TYPE)

WAVE REFLOW

FEATURES

- Power supply units:
  - ・Withstand large current (allowable current: up to 6A)
  - ・Resistance to high energy
  - ・High reliability
- There are several variations of the FBMJ type
  - HS : For broadband applications
  - HM : For upper MHz range applications
  - HL : For GHz range applications
- The FBMH type is optimal for circuit designs which require high impedances and large currents to combat radiated noise on power lines, etc.

APPLICATIONS

- Deals with power line radiated and conducted noise.
- Provides waveform correction of digital signals and high frequency noise countermeasures in various types of digital equipment.
- Automotive
- Computer Peripherals
- Differential transmission line on USB and similar products
- Mobile devices which require lower power consumption

ORDERING CODE

F B M J 3 2 1 6 H S 8 0 0 — T ○

❶Type	
FB	Ferrite bead

❷Shape	
M	Rectangular chip

❸Product characteristics	
J	Standard type
H	High Impedance type

❹External Dimensions (L×W) [mm]	
1608(0603)	1.6×0.8
2125(0805)	2.0×1.25
2012(0805)	2.0×1.25
2016(0806)	2.0×1.6
3216(1206)	3.2×1.6
3225(1210)	3.2×2.5
4516(1806)	4.5×1.6
4525(1810)	4.5×2.5
4532(1812)	4.5×3.2

❺Material code	
HS	Refer to impedance curves for material difference
HM	
HL	

❻Nominal Impedance [Ω]	
example	
330	33
111	110
132	1300

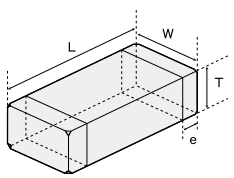
❼Impedance Tolerance	
—	±25%
N	±30%

❽Packaging	
T	Tape & Reel

❾Internal code	
△	Standard product

△=Blank space

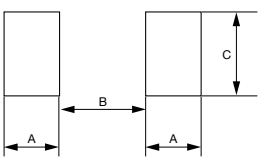
EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	L	W	T	e	Standard Quantity [pcs]	
					Paper Tape	Embossed Tape
FBMJ1608 (0603)	1.6±0.2 (0.063±0.008)	0.8±0.2 (0.031±0.008)	0.8±0.2 (0.031±0.008)	0.3±0.2 (0.012±0.008)	4000	—
FBMJ2125 (0805)	2.0±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	0.85±0.2 (0.033±0.008)	0.5±0.3 (0.020±0.012)	4000	—
FBMJ3216 (1206)	3.2±0.3 (0.126±0.012)	1.6±0.2 (0.063±0.008)	1.1±0.2 (0.043±0.008)	0.5±0.3 (0.020±0.012)	—	2000
FBMJ4516 (1806)	4.5±0.3 (0.177±0.012)	1.6±0.2 (0.063±0.008)	1.1±0.2 (0.043±0.008)	0.5±0.3 (0.020±0.012)	—	2000
FBMH1608 (0603)	1.6±0.1 (0.063±0.004)	0.8±0.1 (0.031±0.004)	0.8±0.1 (0.031±0.004)	0.3±0.15 (0.012±0.006)	4000	—
FBMH2012 (0805)	2.0±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	0.85±0.2 (0.033±0.008)	0.5±0.3 (0.020±0.012)	4000	—
FBMH2016 (0806)	2.0±0.2 (0.079±0.008)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.3 (0.020±0.012)	—	2000
FBMH3216 (1206)	3.2±0.3 (0.126±0.012)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.3 (0.020±0.012)	—	2000
FBMH3225 (1210)	3.2±0.3 (0.126±0.012)	2.5±0.3 (0.098±0.012)	2.5±0.3 (0.098±0.012)	0.5±0.3 (0.020±0.012)	—	1000
FBMH4516 (1806)	4.5±0.3 (0.177±0.012)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.3 (0.020±0.012)	—	2000
FBMH4525 (1810)	4.5±0.4 (0.177±0.016)	2.5±0.3 (0.098±0.012)	2.5±0.3 (0.098±0.012)	0.9±0.6 (0.035±0.024)	—	1000
FBMH4532 (1812)	4.5±0.4 (0.177±0.016)	3.2±0.3 (0.126±0.012)	3.2±0.3 (0.126±0.012)	0.9±0.6 (0.035±0.024)	—	2000

Unit : mm(inch)

Recommended Land Pattern Dimensions



Parts Number	Dimensions (mm)		
	A	B	C
FB MJ1608 type	1.0	1.0	1.0
FB MJ2125 type	1.4	1.2	1.65
FB MJ3216 type	1.4	2.2	2.0
FB MJ4516 type	1.75	3.5	2.0
FB MH1608 type	1.0	1.0	1.0
FB MH2012 type	1.4	1.2	1.65

Parts Number	Dimensions (mm)		
	A	B	C
FB MH2016 type	1.4	1.2	2.0
FB MH3216 type	1.4	2.2	2.0
FB MH4516 type	1.75	3.5	2.0
FB MH3225 type	1.4	2.2	2.9
FB MH4525 type	1.75	3.5	2.9
FB MH4532 type	1.75	3.5	3.7

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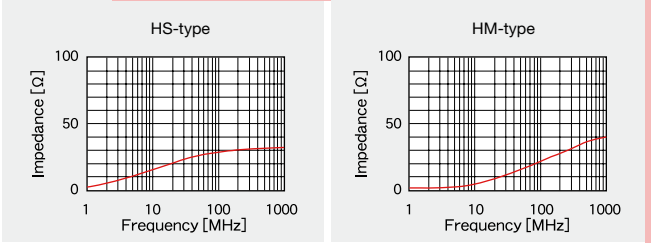
AVAILABLE MATERIALS

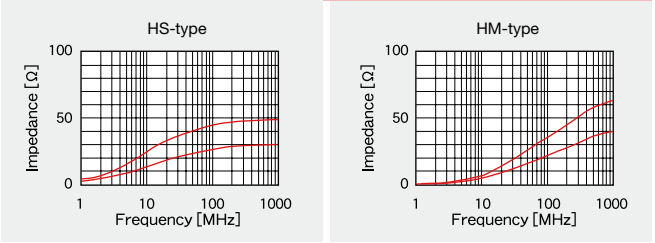
Standard Type

FBMJ1608



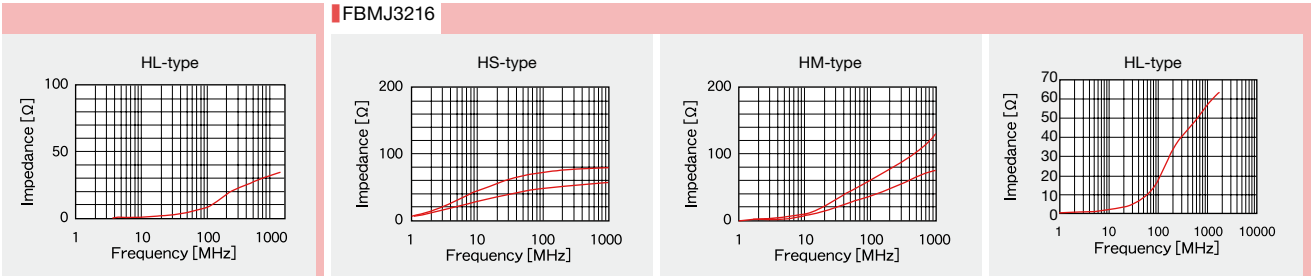
I max=4A　　I max=4A

FBMJ2125



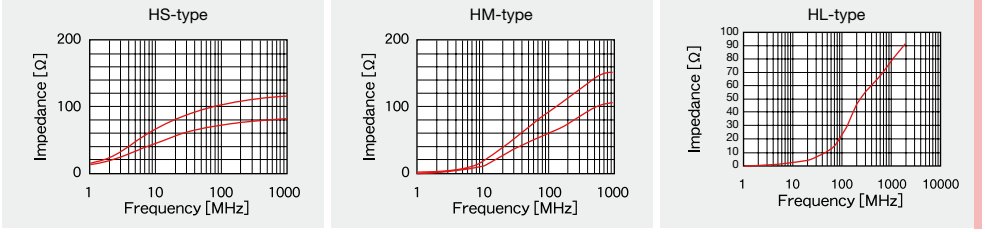
I max=4～6A　　I max=4～6A

FBMJ3216



I max=4A　　I max=4～6A　　I max=4～6A　　I max=4.0A

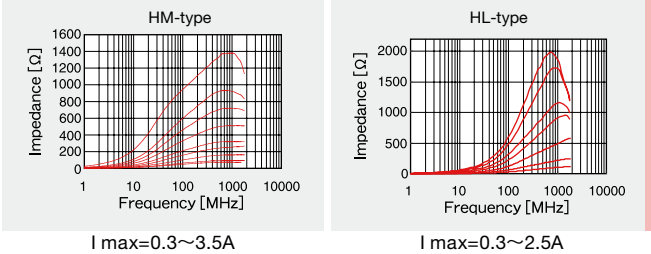
FBMJ4516



I max=4～6A　　I max=4～6A　　I max=3.5A

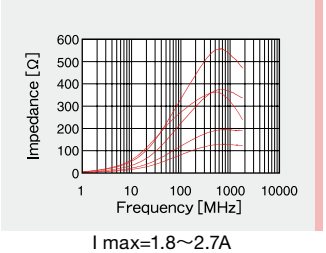
High impedance Type

FBMH1608



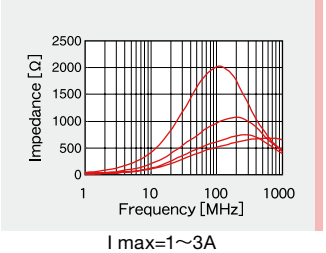
I max=0.3～3.5A　　I max=0.3～2.5A

FBMH20○○



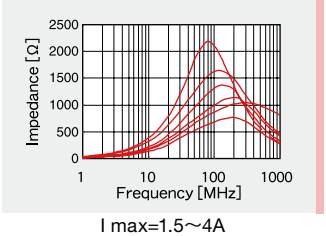
I max=1.8～2.7A

FBMH32○○



I max=1～3A

FBMH45○○



I max=1.5～4A

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PART NUMBERS

Standard Type

●FBMJ1608

Ordering code		EHS (Environmental Hazardous Substances)	Impedance 〔Ω〕	Measuring frequency 〔MHz〕	DC Resistance 〔Ω〕 max.	Rated current 〔A〕 max.	Thickness 〔mm〕 (inch)
FB MJ1608HS280NT		RoHS	28±30%	100	0.007	4.0	0.8±0.2 (0.031±0.008)
FB MJ1608HM230NT		RoHS	23±30%				

●FBMJ2125

Ordering code		EHS (Environmental Hazardous Substances)	Impedance 〔Ω〕	Measuring frequency 〔MHz〕	DC Resistance 〔Ω〕 max.	Rated current 〔A〕 max.	Thickness 〔mm〕 (inch)
FB MJ2125HS420-T		RoHS	42±25%	100	0.008	4.0	0.85±0.2 (0.033±0.008)
FB MJ2125HS250NT		RoHS	25±30%		0.004	6.0	
FB MJ2125HM330-T		RoHS	33±25%		0.008	4.0	
FB MJ2125HM210NT		RoHS	21±30%		0.004	6.0	
FB MJ2125HL8R0NT		RoHS	8±30%		0.008	4.0	

●FBMJ3216

Ordering code		EHS (Environmental Hazardous Substances)	Impedance 〔Ω〕	Measuring frequency 〔MHz〕	DC Resistance 〔Ω〕 max.	Rated current 〔A〕 max.	Thickness 〔mm〕 (inch)
FB MJ3216HS800-T		RoHS	80±25%	100	0.010	4.0	1.1±0.2 (0.043±0.008)
FB MJ3216HS480NT		RoHS	48±30%		0.005	6.0	
FB MJ3216HM600-T		RoHS	60±25%		0.010	4.0	
FB MJ3216HM380NT		RoHS	38±30%		0.005	6.0	
FB MJ3216HL160NT		RoHS	16±30%		0.012	4.0	

●FBMJ4516

Ordering code		EHS (Environmental Hazardous Substances)	Impedance 〔Ω〕	Measuring frequency 〔MHz〕	DC Resistance 〔Ω〕 max.	Rated current 〔A〕 max.	Thickness 〔mm〕 (inch)
FB MJ4516HS111-T		RoHS	110±25%	100	0.014	4.0	1.1±0.2 (0.043±0.008)
FB MJ4516HS720NT		RoHS	72±30%		0.007	6.0	
FB MJ4516HM900-T		RoHS	90±25%		0.014	4.0	
FB MJ4516HM560NT		RoHS	56±30%		0.007	6.0	
FB MJ4516HL230NT		RoHS	23±30%		0.014	3.5	

High impedance Type

Ordering code		EHS (Environmental Hazardous Substances)	Impedance 〔Ω〕	Measuring frequency 〔MHz〕	DC Resistance 〔Ω〕 max.	Rated current 〔A〕 max.	Thickness 〔mm〕 (inch)
FB MH1608HM470-T		RoHS	47±25%	100	0.020	3.5	0.8±0.1 (0.031±0.004)
FB MH1608HM600-T		RoHS	60±25%		0.025	3.0	
FB MH1608HM101-T		RoHS	100±25%		0.035	2.0	
FB MH1608HM151-T		RoHS	150±25%		0.050	2.0	
FB MH1608HM221-T		RoHS	220±25%		0.070	1.5	
FB MH1608HM331-T		RoHS	330±25%		0.130	0.9	
FB MH1608HM471-T		RoHS	470±25%		0.150	0.7	
FB MH1608HM601-T		RoHS	600±25%		0.170	0.7	
FB MH1608HM102-T		RoHS	1000±25%		0.350	0.5	
FB MH1608HL300-T		RoHS	30±25%		0.028	2.5	
FB MH1608HL600-T		RoHS	60±25%		0.045	1.8	
FB MH1608HL121-T		RoHS	120±25%		0.130	0.9	
FB MH1608HL221-T		RoHS	220±25%		0.170	0.7	
FB MH1608HL331-T		RoHS	330±25%		0.210	0.6	
FB MH1608HL471-T		RoHS	470±25%		0.350	0.5	
FB MH1608HL601-T		RoHS	600±25%		0.450	0.4	
FB MH2012HM800-T		RoHS	80±25%		0.025	2.7	0.85±0.2 (0.033±0.008)
FB MH2012HM121-T		RoHS	120±25%		0.032	2.5	
FB MH2012HM221-T		RoHS	220±25%		0.060	2.0	
FB MH2012HM331-T		RoHS	330±25%		0.080	1.8	
FB MH2016HM251NT		RoHS	250±30%		0.050	2.0	1.6±0.2 (0.063±0.008)
FB MH3216HM501NT		RoHS	500±30%		0.070	2.0	
FB MH4516HM851NT		RoHS	850±30%		0.100	1.5	
FB MH3225HM601NT		RoHS	600±30%		0.042	3.0	2.5±0.3 (0.098±0.012)
FB MH3225HM102NT		RoHS	1000±30%		0.100	2.0	
FB MH3225HM202NT		RoHS	2000±30%		0.130	1.2	
FB MH4525HM102NT		RoHS	1000±30%		0.060	3.0	
FB MH4525HM162NT		RoHS	1600±30%		0.130	2.0	
FB MH4532HM681-T		RoHS	680±25%		0.028	4.0	3.2±0.3 (0.126±0.012)
FB MH4532HM132-T		RoHS	1300±25%		0.060	3.0	
FB MH4532HM202-T		RoHS	2000±25%		0.130	1.3	

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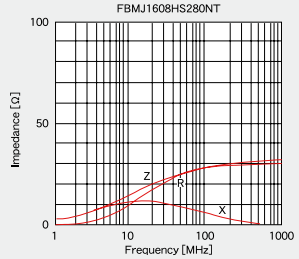
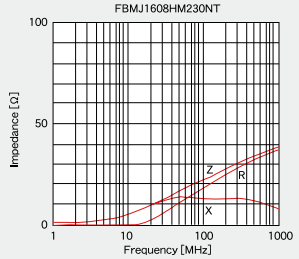
Standard Type

FBMJ1608

FBMJ1608HS280NT

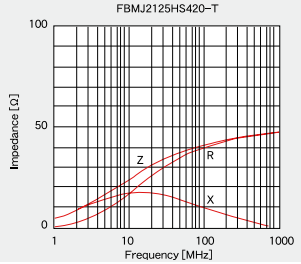


FBMJ1608HM230NT

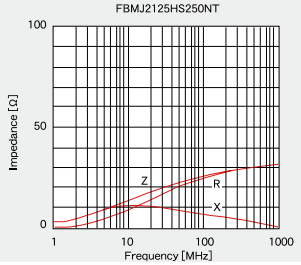


FBMJ2125

FBMJ2125HS420−T



FBMJ2125HS250NT



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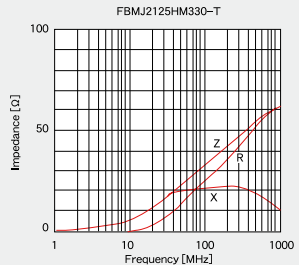

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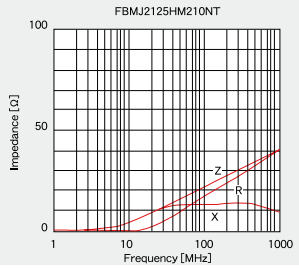

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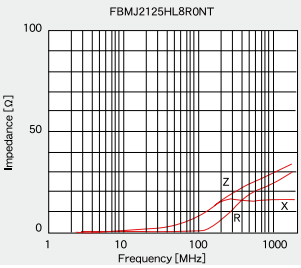
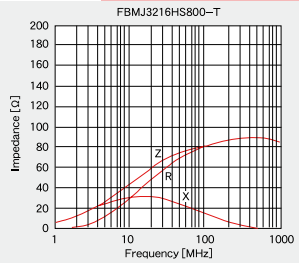


FBMJ3216

FBMJ3216HS800−T



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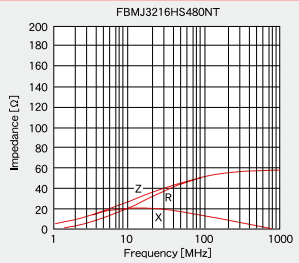

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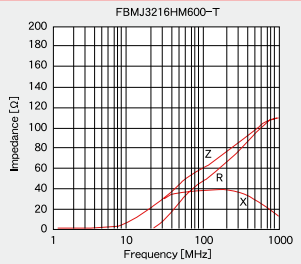

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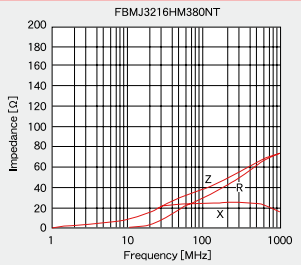

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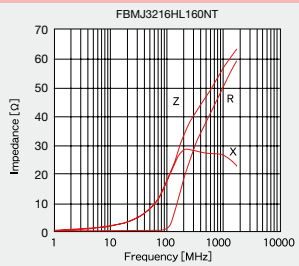
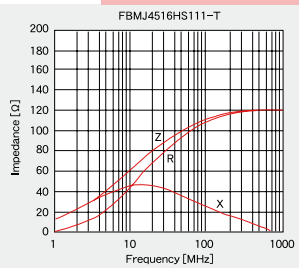


FBMJ4516

FBMJ4516HS111−T



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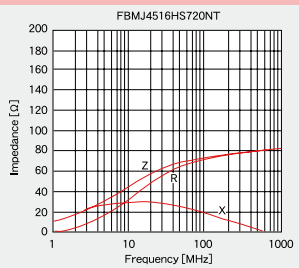
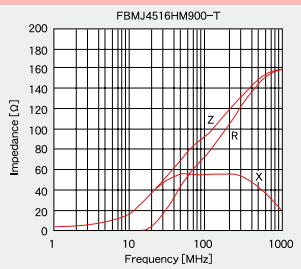


FBMJ4516HM900−T



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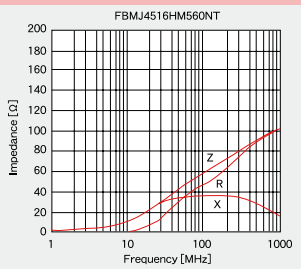
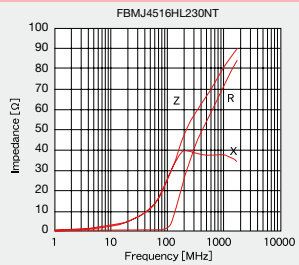


FBMJ4516HL230NT



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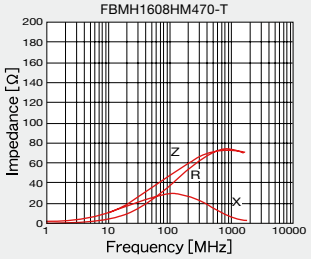
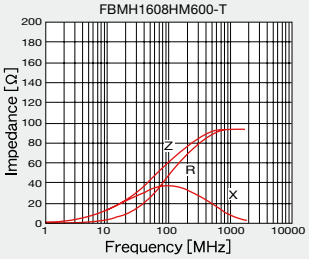
ELECTRICAL CHARACTERISTICS

High impedance Type

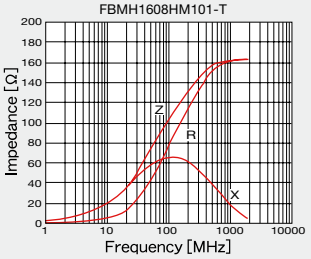
FBMH1608HM470-T



FBMH1608HM600-T



FBMH1608HM101-T



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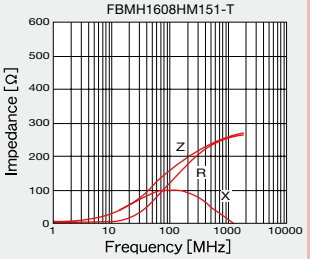
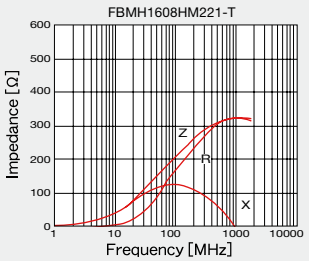


FBMH1608HM221-T



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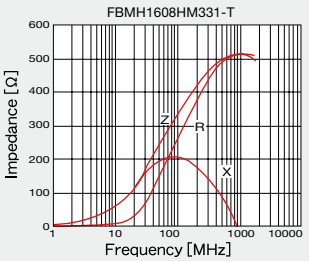

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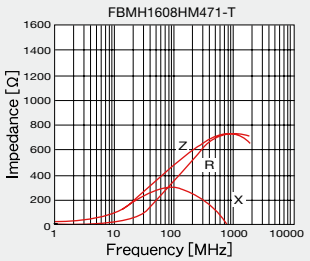

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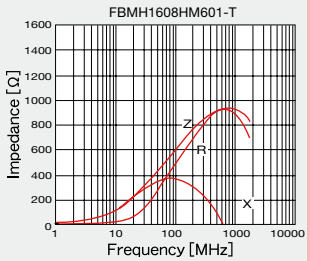

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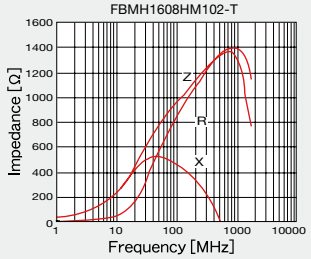

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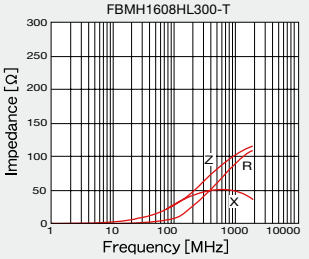

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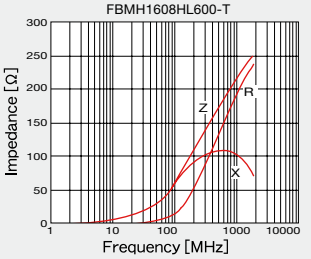

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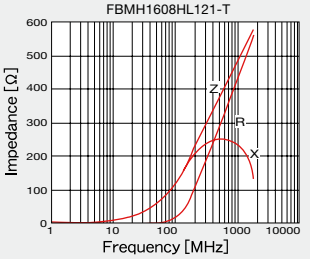
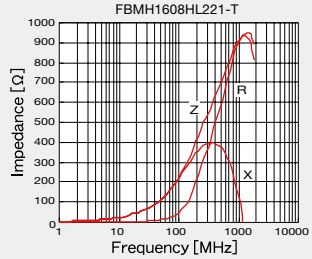


FBMH1608HL221-T



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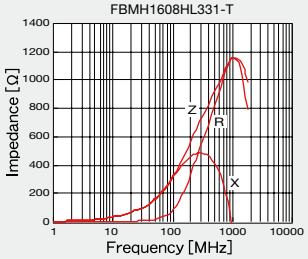

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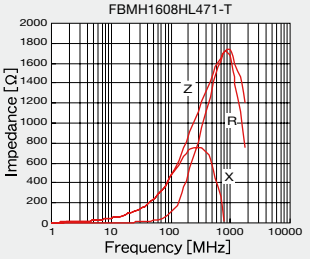

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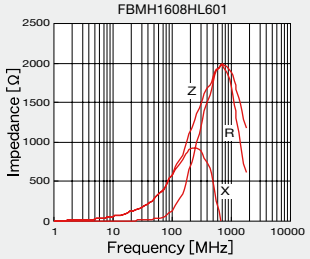

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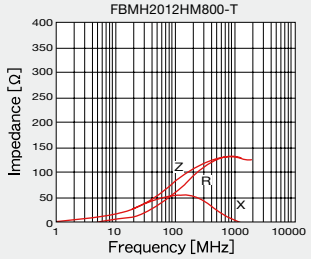

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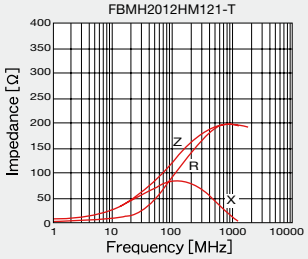

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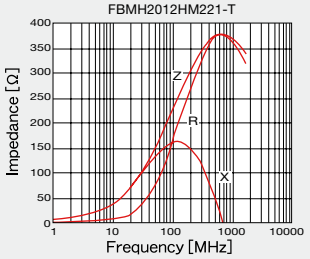
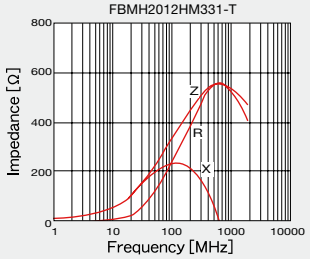
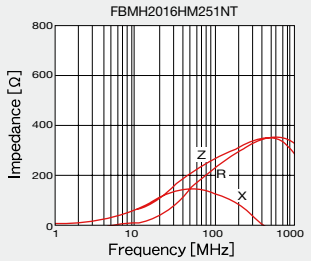


FBMH2012HM331-T



FBMH2016HM251NT



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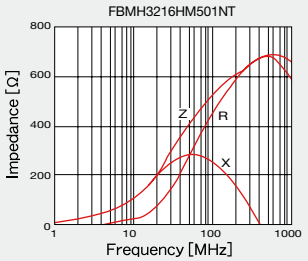

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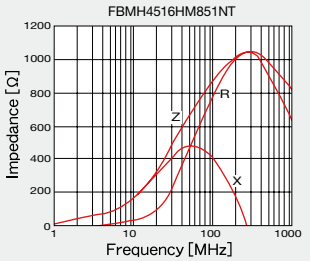
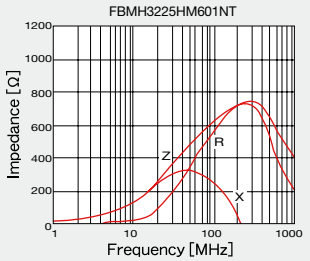


FBMH3225HM601NT



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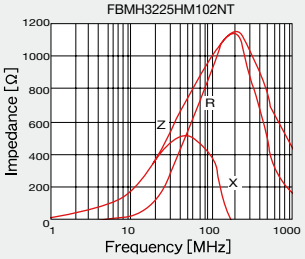
High impedance Type

FBMH3225HM102NT



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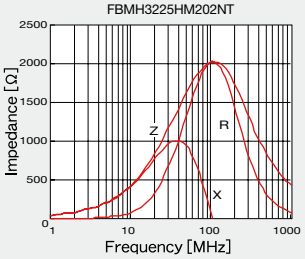

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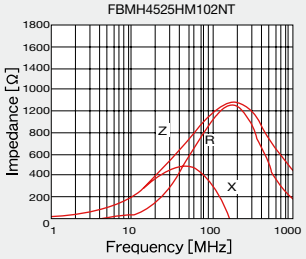
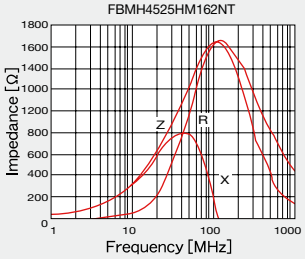
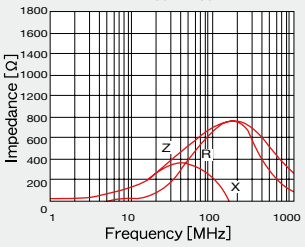


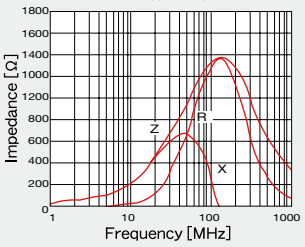
FBMH4525HM162NT



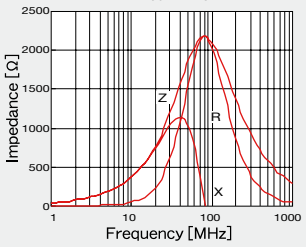
FBMH4532HM681-T



FBM4532HM132-T



FBM4532HM202-T



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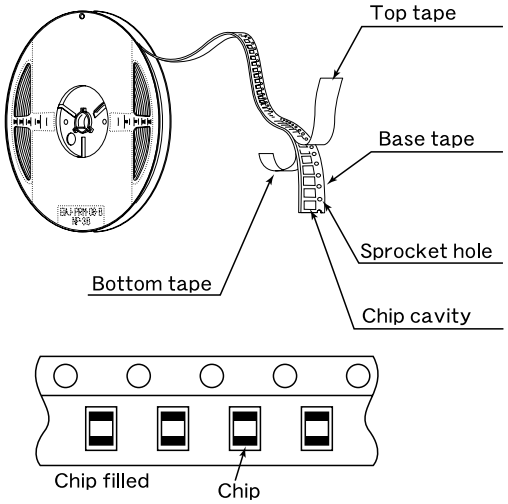
PACKAGING

①Minimum Quantity

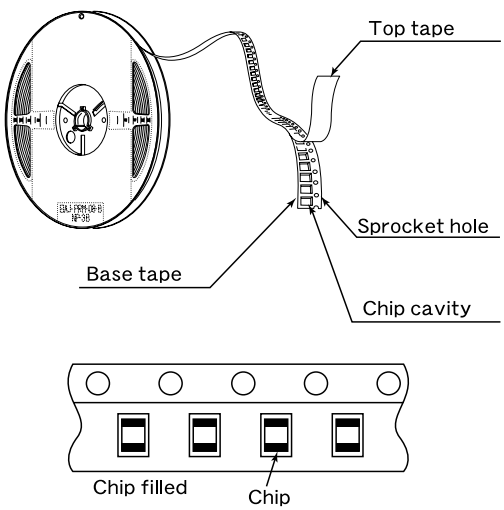
Type	Standard Quantity [pcs]	
	Paper Tape	Embossed Tape
1608(0603)	4000	—
2125(0805)	4000	—
2012(0805)	4000	—
2016(0806)	—	2000
3216(1206)	—	2000
4516(1806)	—	2000
3225(1210)	—	1000
4525(1810)	—	1000
4532(1812)	—	2000

②Tape Material

Card board carrier tape

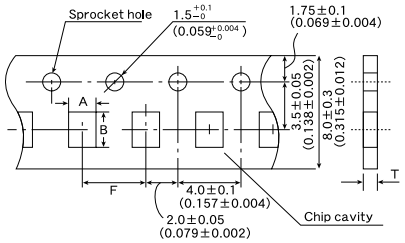


Embossed Tape



③Taping Dimensions

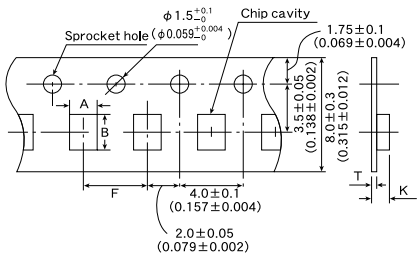
● Paper tape (0.315 inches wide)



Type	Chip Cavity		Insertion Pitch	Tape Thickness
	A	B	F	T
FBMJ1608 FBMH1608 (0603)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.2 (0.157±0.008)	1.1max (0.043max)
FBMJ2125 FBMH2012 (0805)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.2 (0.157±0.008)	1.1max (0.043max)

Unit : mm (inch)

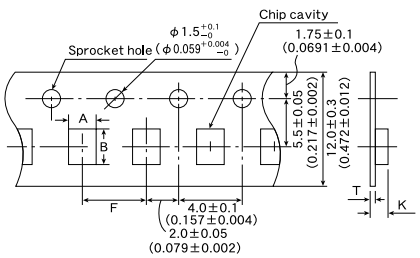
● Embossed tape (0.315 inches wide)



Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
FBMH2016 (0806)	1.8±0.2 (0.071±0.008)	2.2±0.2 (0.087±0.008)	4.0±0.2 (0.157±0.008)	2.6max (0.102max)	0.6max (0.024max)
FBMJ3216 (1206)	1.9±0.2 (0.075±0.008)	3.5±0.2 (0.138±0.008)	4.0±0.2 (0.157±0.008)	1.5max (0.059max)	0.3max (0.012max)
FBMH3216 (1206)	1.9±0.2 (0.075±0.008)	3.5±0.2 (0.138±0.008)	4.0±0.2 (0.157±0.008)	2.6max (0.102max)	0.6max (0.024max)
FBMH3225 (1210)	2.8±0.2 (0.110±0.008)	3.5±0.2 (0.138±0.008)	4.0±0.2 (0.157±0.008)	4.0max (0.157max)	0.6max (0.024max)

Unit : mm (inch)

● Embossed tape (0.472 inches wide)



Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
FBMJ4516 (1806)	1.9±0.2 (0.075±0.008)	4.9±0.2 (0.193±0.008)	4.0±0.2 (0.157±0.008)	1.5max (0.059max)	0.3max (0.012max)
FBMH4516 (1806)	1.9±0.2 (0.075±0.008)	4.9±0.2 (0.193±0.008)	4.0±0.2 (0.157±0.008)	2.6max (0.102max)	0.6max (0.024max)
FBMH4525 (1810)	2.9±0.2 (0.114±0.008)	4.9±0.2 (0.193±0.008)	4.0±0.2 (0.157±0.008)	4.0max (0.157max)	0.6max (0.024max)
FBMH4532 (1812)	3.6±0.2 (0.142±0.008)	4.9±0.2 (0.193±0.008)	8.0±0.2 (0.315±0.008)	4.0max (0.157max)	0.6max (0.024max)

Unit : mm (inch)

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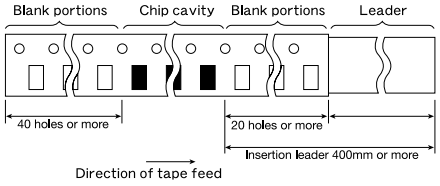
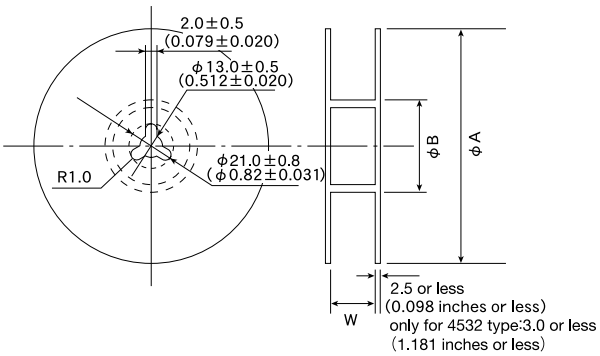
PACKAGING

④Leader and Blank portion



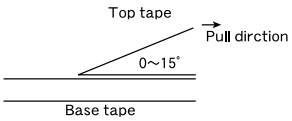
Insertion leader is 400 mm or more (including 20 empty cavities)
Empty cavities at end of reel: 40 holes or more

⑤Reel size



Type	φA [mm] (inch)	φB [mm] (inch)	W [mm] (inch)
FBMJ1608	180^{+0}_{-3} ($7.09^{+0}_{-0.118}$)	60^{+1}_{-0} ($2.36^{+0.039}_{-0}$)	10.0±1.5 (0.394±0.047)
FBMJ2125			
FBMJ3216			
FBMJ4516			14.0±1.5 (0.551±0.059)
FBMH1608			10.0±1.5 (0.394±0.047)
FBMH2012			
FBMH2016			
FBMH3216			
FBMH3225			
FBMH4516			14.0±1.5 (0.551±0.059)
FBMH4525			
FBMH4532	330±2.0 (12.99±0.080)	100±1.0 (3.94±0.039)	14±2.0 (0.551±0.080)

⑥Top tape strength



The top tape requires a peel-off force of 0.1 to 0.7N in the direction of the arrow as illustrated below.

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RELIABILITY DATA

RECTANGULAR FERRITE CHIP BEADS (HIGH CURRENT) FB series M type

1. Operating Temperature Range	
Specified Value	−40℃～+85℃

2. Storage Temperature Range	
Specified Value	−40℃～+85℃

【Test Methods and Remarks】
*Note: 0 to +40℃ in taped packaging

3. Impedance	
Specified Value	Within the specified tolerance

【Test Methods and Remarks】
Measuring equipment : Impedance analyzer (HP4291A) or its equivalent
Measuring frequency : 100±1 MHz

4. DC Resistance	
Specified Value	Within the specified range

【Test Methods and Remarks】
Four-terminal method
Measuring equipment : Milliohm High-Tester 3226 (Hioki Denki) or its equivalent

5. Rated Current	
Specified Value	Within the specified range

6. Vibration	
Specified Value	Appearance : No significant abnormality Impedance change : Within ±30% of the initial value

【Test Methods and Remarks】
According to JIS C 0040.
Vibration type : A
Time : 2 hrs each in X,Y, and Z directions Total: 6 hrs
Frequency range : 10 to 55 to 10Hz (/min.)
Amplitude : 1.5 mm (shall not exceed acceleration 196m/s^2)
Mounting method : Soldering onto PC board

7. Solderability	
Specified Value	90% or more of immersed surface of terminal electrode shall be covered with fresh solder.

【Test Methods and Remarks】
Solder temperature : 230±5℃
Immersion time : 4±1 sec.
Preconditioning : Immersion into flux.
Immersion and Removal speed : 25mm/sec.

8. Resistance to Soldering Heat	
Specified Value	Appearance : No significant abnormality Impedance change : Within ±30% of the initial value

【Test Methods and Remarks】
Preheating : 150℃ for 3 min.
Resistance to Soldering Heat : 260±5℃
Duration : 10±0.5 sec.
Preconditioning : Immersion into flux.
Immersion and Removal speed : 25mm/sec.
Recovery : 2 to 3 hrs of recovery under the standard condition after the test.

9. Thermal Shock	
Specified Value	Appearance : No significant abnormality Impedance change : Within $^{+50}_{-10}$% of the initial value

【Test Methods and Remarks】
According to JIS C 0025.
Conditions for 1 cycle

Step	Temperature (℃)	Duration (min.)
1	−40±3℃	30±3
2	Room Temperature	Within 3
3	85±2℃	30±3
4	Room Temperature	Within 3

Number of cycles : 100
Mounting method : Soldering onto PC board
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.

10. Resistance to Humidity (steady state)	
Specified Value	Appearances : No significant abnormality Impedance change : Within ±30% of the initial value

【Test Methods and Remarks】
Temperature : 40±2℃
Humidity : 90 to 95% RH
Duration : 500^{+24}_{-0} hrs
Mounting method : Soldering onto PC board
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.

11. Loading under Damp Heat	
Specified Value	Appearances : No significant abnormality Impedance change : Within ±30% of the initial value

【Test Methods and Remarks】
Temperature : 40±2℃
Humidity : 90 to 95%RH
Applied current : Rated current
Duration : 500^{+24}_{-0} hrs
Mounting method : Soldering onto PC board
Recovery : 2 to 3hrs of recovery under the standard condition after the removal from test chamber.

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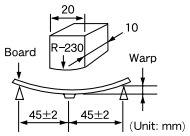
RECTANGULAR FERRITE CHIP BEADS (HIGH CURRENT) FB series M type

12. High Temperature Loading Test	
Specified Value	Appearance : No significant abnormality Impedance change : Within ±30% of the initial value

【Test Methods and Remarks】
Temperature : 85±2℃
Duration : 500^{+24}_{0} hrs
Applied current : Rated current
Mounting method : Soldering onto PC board
Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.

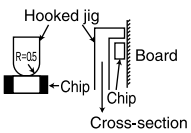
13. Bending Strength	
Specified Value	Appearance : No mechanical damage.

【Test Methods and Remarks】
Warp : 2mm
Testing board : Glass epoxy-resin substrate
Thickness : 0.8mm



14. Adhesion of Electrode	
Specified Value	No separation or indication of separation of electrode.

【Test Methods and Remarks】
Applied force : 5N
Duration : 10 sec.



Note on standard condition: "standard condition" referred to herein is defined as follows:
5 to 35℃ of temperature, 45 to 85% relative humidity and 86 to 106kPa of air pressure.
When there are questions concerning measurement results:
In order to provide correlation data, the test shall be conducted under condition of 20±2℃ of temperature, 60 to 70% relative humidity and 86 to 106kPa of air pressure. Unless otherwise specified, all the tests are conducted under the "standard condition."

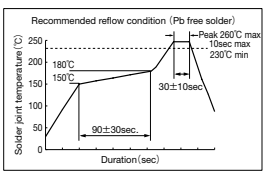
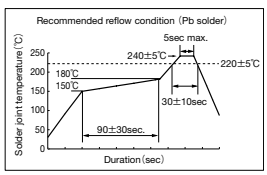
PRECAUTIONS

FBM Type

1. Circuit Design	
Precautions	◆Operating environment 1. The products described in this specification are intended for use in general electronic equipment, (office supply equipment, telecommunications systems, measuring equipment, and household equipment). They are not intended for use in mission-critical equipment or systems requiring special quality and high reliability (traffic systems, safety equipment, aerospace systems, nuclear control systems and medical equipment including life-support systems,) where product failure might result in loss of life, injury or damage. For such uses, contact TAIYO YUDEN Sales Department in advance. ◆Rated current 1. Rated current of this product is shown in this catalogue, but please be sure to have the base board designed with adequate inspection in case of the generation of heat becomes high within the rated current range when the base board is in high resistance or in bad heating conditions.

2. PCB Design	
Precautions	◆Land pattern design 1. Please refer to a recommended land pattern.

3. Considerations for automatic placement	
Precautions	◆Adjustment of mounting machine 1. Excessive impact load should not be imposed on the products when mounting onto the PC boards. 2. Mounting and soldering conditions should be checked beforehand.
Technical consider-ations	◆Adjustment of mounting machine 1. When installing products, care should be taken not to apply distortion stress as it may deform the products.

4. Soldering	
Precautions	◆Wave soldering 1. Please refer to the specifications in the catalog for a wave soldering. ◆Reflow soldering 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified. ◆Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, etc. sufficiently. ◆Preheating when soldering Heating : The temperature difference between soldering and remaining heat should not be greater than 150℃. Cooling : The temperature difference between the components and cleaning process should not be greater than 100℃. ◆Recommended conditions for using a soldering iron Put the soldering iron on the land-pattern. Soldering iron's temperature - Below 350℃ Duration - 3 seconds or less The soldering iron should not directly touch the inductor.
Technical consider-ations	◆Wave, Reflow, Lead free soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products.   ◆Preheating when soldering 1. There is a case that products get damaged by a heat shock. ◆Recommended conditions for using a soldering iron 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products.

5. Handling	
Precautions	◆Handling 1. Keep the inductors away from all magnets and magnetic objects. ◆Setting PC boards 1. When setting a chip mounted base board, please make sure that there is no residual stress to the chip by distortion in the board or at screw part. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting inductors, care should be taken not to give any stresses of deflection or twisting to the board. 2. Board separation should not be done manually, but by using the appropriate devices. ◆Mechanical considerations 1. Please do not give the inductors any excessive mechanical shocks.
Technical consider-ations	◆Handling 1. There is a case that a characteristic varies with magnetic influence. ◆Setting PC boards 1. There is a case that a characteristic varies with residual stress. ◆Breakaway PC boards (splitting along perforations) 1. Planning pattern configurations and the position of products should be carefully performed to minimize stress. ◆Mechanical considerations 1. There is a case to be damaged by a mechanical shock.

6. Storage conditions	
Precautions	◆Storage 1. To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. ・Recommended conditions Ambient temperature 0～40℃ Humidity Below 70% RH The ambient temperature must be kept below 30℃. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, inductors should be used within 6 months from the time of delivery.
Technical consider-ations	◆Storage 1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.

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