

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 2011. 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.

CHIP BEAD INDUCTORS FOR POWER LINES (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

OPERATING TEMP.

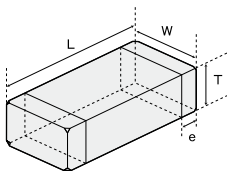
- 40~125°C (Including self-generated heat)

ORDERING CODE

Ordering Code Example: **F B △ M J 3 2 1 6 H S 8 0 0 - T ○**

1	2	3	4	5	6	7	8	9
1 Type FB Ferrite bead	2 Shape M Rectangular chip	3 Product characteristics J Standard type H High Impedance type	4 External 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	5 Material code HS Refer to impedance curves for material difference HM HL	6 Nominal Impedance [Ω] example 330 33 111 110 132 1300	7 Impedance Tolerance - ±25% N ±30%	8 Packaging T Tape & Reel	9 Internal code △ Standard product △ = Blank space

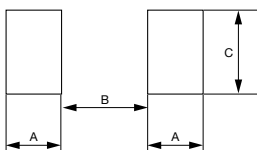
EXTERNAL DIMENSIONS/STANDARD QUANTITY



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



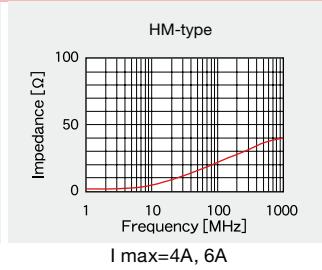
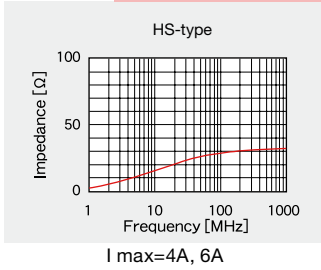
Parts Number	Dimensions (mm)		
	A	B	C
FB MJ1608 type	1.0	1.0	1.0
FB MJ2125 type	1.4	1.2	1.65
FB MJ3216 type	1.4	2.2	2.0
FB MJ4516 type	1.75	3.5	2.0
FB MH1608 type	1.0	1.0	1.0
FB MH2012 type	1.4	1.2	1.65

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

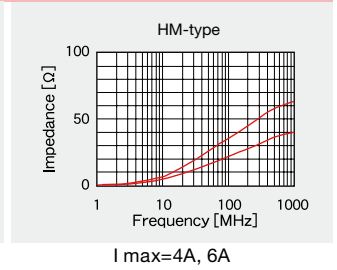
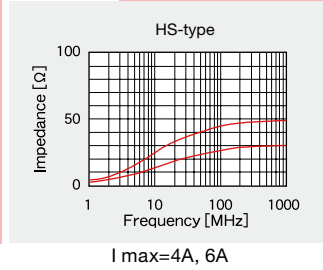
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● Standard Type

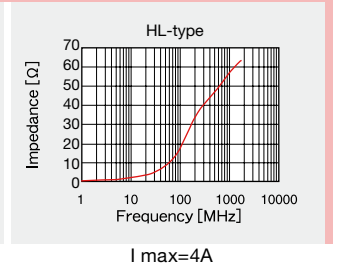
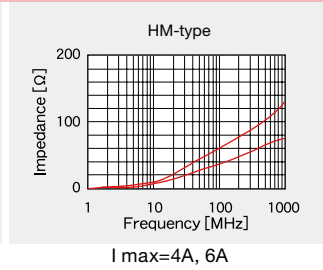
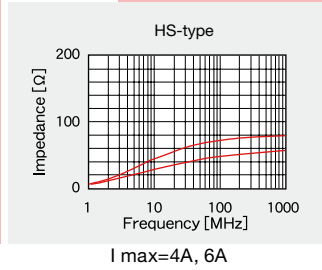
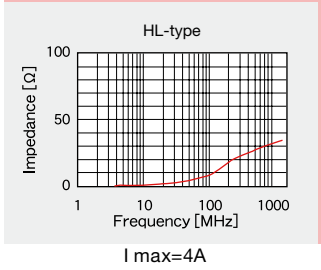
■ FBMJ1608



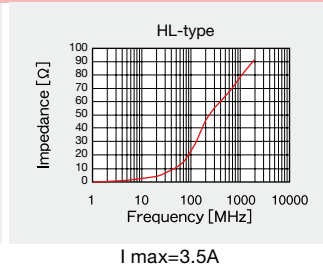
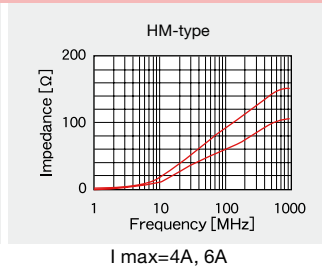
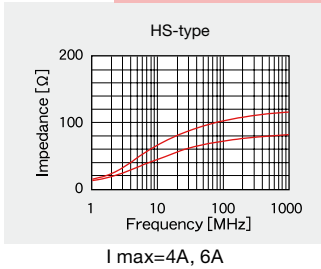
■ FBMJ2125



■ FBMJ3216

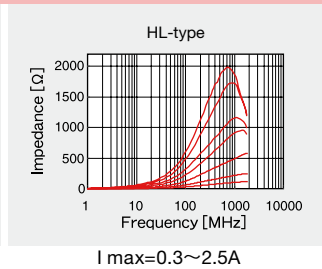
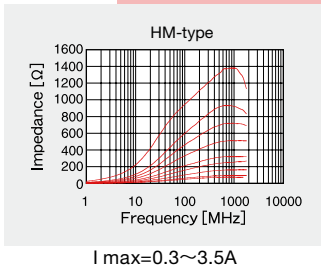


■ FBMJ4516

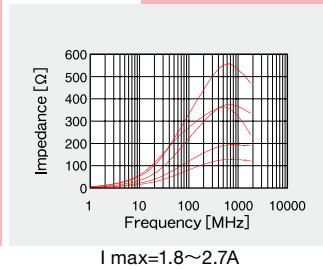


● High impedance Type

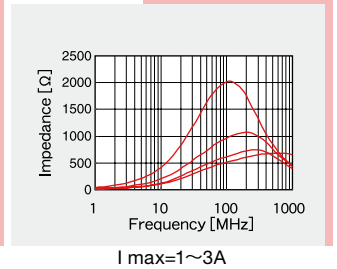
■ FBMH1608



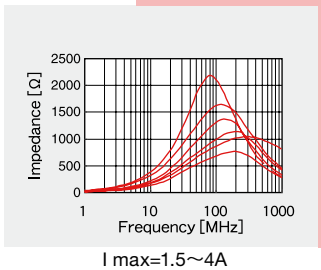
■ FBMH2000



■ FBMH3200



■ FBMH4500



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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 $\pm$ 30%	100	0.007	4.0	0.8 $\pm$ 0.2 (0.031 $\pm$ 0.008)
FB MJ1608HM230NT		RoHS	23 $\pm$ 30%				
FB MJ1608HS280NTR		RoHS	28 $\pm$ 30%	100	0.006	6.0	0.8 $\pm$ 0.2 (0.031 $\pm$ 0.008)
FB MJ1608HM230NTR		RoHS	23 $\pm$ 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 $\pm$ 25%	100	0.008	4.0	0.85 $\pm$ 0.2 (0.033 $\pm$ 0.008)
FB MJ2125HS250NT		RoHS	25 $\pm$ 30%		0.004	6.0	
FB MJ2125HMM330-T		RoHS	33 $\pm$ 25%		0.008	4.0	
FB MJ2125HMM210NT		RoHS	21 $\pm$ 30%		0.004	6.0	
FB MJ2125HLL8R0NT		RoHS	8 $\pm$ 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 $\pm$ 25%	100	0.010	4.0	1.1 $\pm$ 0.2 (0.043 $\pm$ 0.008)
FB MJ3216HS480NT		RoHS	48 $\pm$ 30%		0.005	6.0	
FB MJ3216HMM600-T		RoHS	60 $\pm$ 25%		0.010	4.0	
FB MJ3216HMM380NT		RoHS	38 $\pm$ 30%		0.005	6.0	
FB MJ3216HLL160NT		RoHS	16 $\pm$ 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 $\pm$ 25%	100	0.014	4.0	1.1 $\pm$ 0.2 (0.043 $\pm$ 0.008)
FB MJ4516HS720NT		RoHS	72 $\pm$ 30%		0.007	6.0	
FB MJ4516HMM900-T		RoHS	90 $\pm$ 25%		0.014	4.0	
FB MJ4516HMM560NT		RoHS	56 $\pm$ 30%		0.007	6.0	
FB MJ4516HLL230NT		RoHS	23 $\pm$ 30%		0.014	3.5	

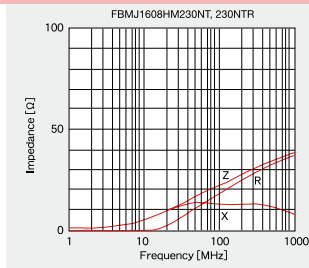
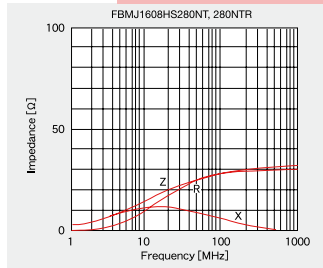
High impedance Type

Ordering code		EHS (Environmental Hazardous Substances)	Impedance [Ω]	Measuring frequency [MHz]	DC Resistance [Ω] max.	Rated current [A] max.	Thickness [mm] (inch)
FB MH1608HMM470-T		RoHS	47 $\pm$ 25%	100	0.020	3.5	0.8 $\pm$ 0.1 (0.031 $\pm$ 0.004)
FB MH1608HMM600-T		RoHS	60 $\pm$ 25%		0.025	3.0	
FB MH1608HMM101-T		RoHS	100 $\pm$ 25%		0.035	2.0	
FB MH1608HMM151-T		RoHS	150 $\pm$ 25%		0.050	2.0	
FB MH1608HMM221-T		RoHS	220 $\pm$ 25%		0.070	1.5	
FB MH1608HMM331-T		RoHS	330 $\pm$ 25%		0.130	0.9	
FB MH1608HMM471-T		RoHS	470 $\pm$ 25%		0.150	0.7	
FB MH1608HMM601-T		RoHS	600 $\pm$ 25%		0.170	0.7	
FB MH1608HMM102-T		RoHS	1000 $\pm$ 25%		0.350	0.5	
FB MH1608HLL300-T		RoHS	30 $\pm$ 25%		0.028	2.5	
FB MH1608HLL600-T		RoHS	60 $\pm$ 25%		0.045	1.8	
FB MH1608HLL121-T		RoHS	120 $\pm$ 25%		0.130	0.9	
FB MH1608HLL221-T		RoHS	220 $\pm$ 25%		0.170	0.7	
FB MH1608HLL331-T		RoHS	330 $\pm$ 25%		0.210	0.6	
FB MH1608HLL471-T		RoHS	470 $\pm$ 25%		0.350	0.5	
FB MH1608HLL601-T		RoHS	600 $\pm$ 25%		0.450	0.4	
FB MH2012HMM800-T		RoHS	80 $\pm$ 25%		0.025	2.7	0.85 $\pm$ 0.2 (0.033 $\pm$ 0.008)
FB MH2012HMM121-T		RoHS	120 $\pm$ 25%		0.032	2.5	
FB MH2012HMM221-T		RoHS	220 $\pm$ 25%		0.060	2.0	
FB MH2012HMM331-T		RoHS	330 $\pm$ 25%		0.080	1.8	
FB MH2016HMM251NT		RoHS	250 $\pm$ 30%		0.050	2.0	1.6 $\pm$ 0.2 (0.063 $\pm$ 0.008)
FB MH3216HMM501NT		RoHS	500 $\pm$ 30%		0.070	2.0	
FB MH4516HMM851NT		RoHS	850 $\pm$ 30%		0.100	1.5	2.5 $\pm$ 0.3 (0.098 $\pm$ 0.012)
FB MH3225HMM601NT		RoHS	600 $\pm$ 30%		0.042	3.0	
FB MH3225HMM102NT		RoHS	1000 $\pm$ 30%		0.100	2.0	
FB MH3225HMM202NT		RoHS	2000 $\pm$ 30%		0.130	1.2	
FB MH4525HMM102NT		RoHS	1000 $\pm$ 30%		0.060	3.0	3.2 $\pm$ 0.3 (0.126 $\pm$ 0.012)
FB MH4525HMM162NT		RoHS	1600 $\pm$ 30%		0.130	2.0	
FB MH4532HMM681-T		RoHS	680 $\pm$ 25%		0.028	4.0	
FB MH4532HMM132-T		RoHS	1300 $\pm$ 25%		0.060	3.0	
FB MH4532HMM202-T		RoHS	2000 $\pm$ 25%		0.130	1.3	

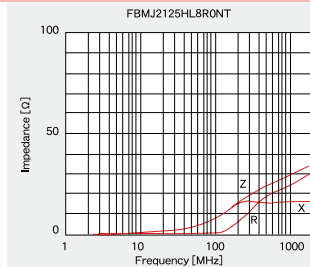
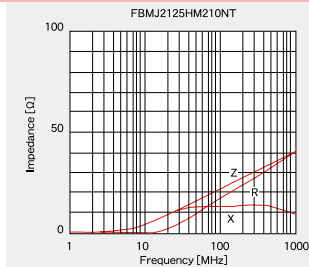
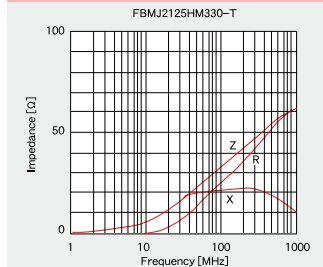
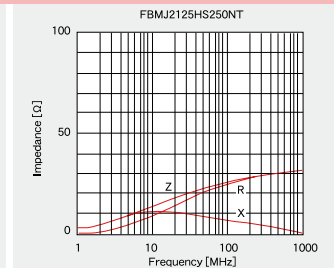
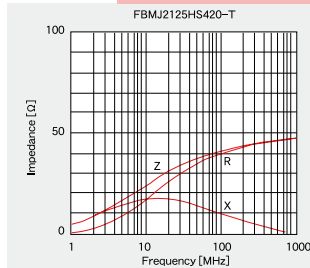
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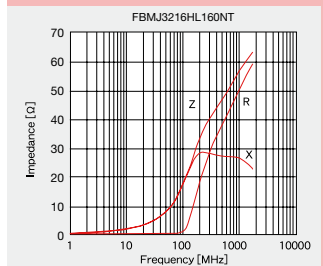
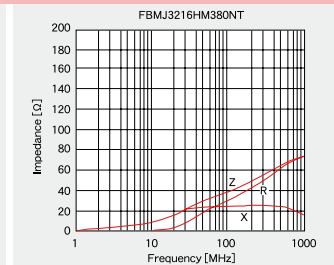
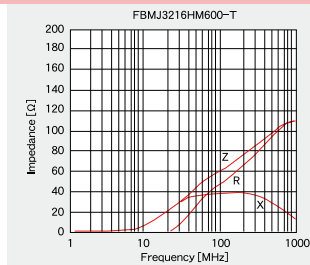
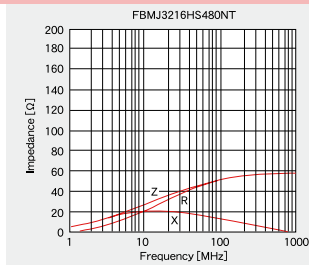
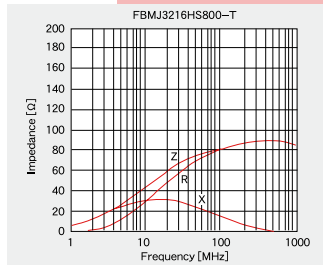
FBMJ1608



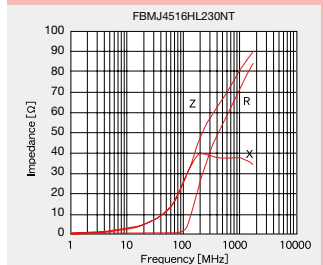
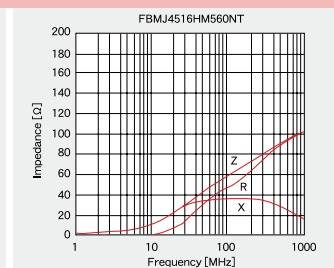
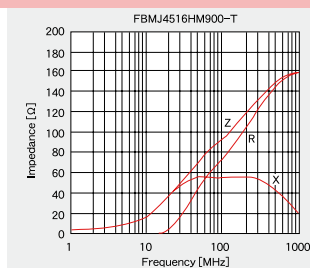
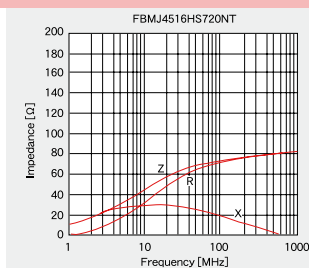
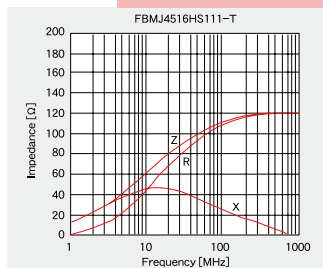
FBMJ2125



FBMJ3216

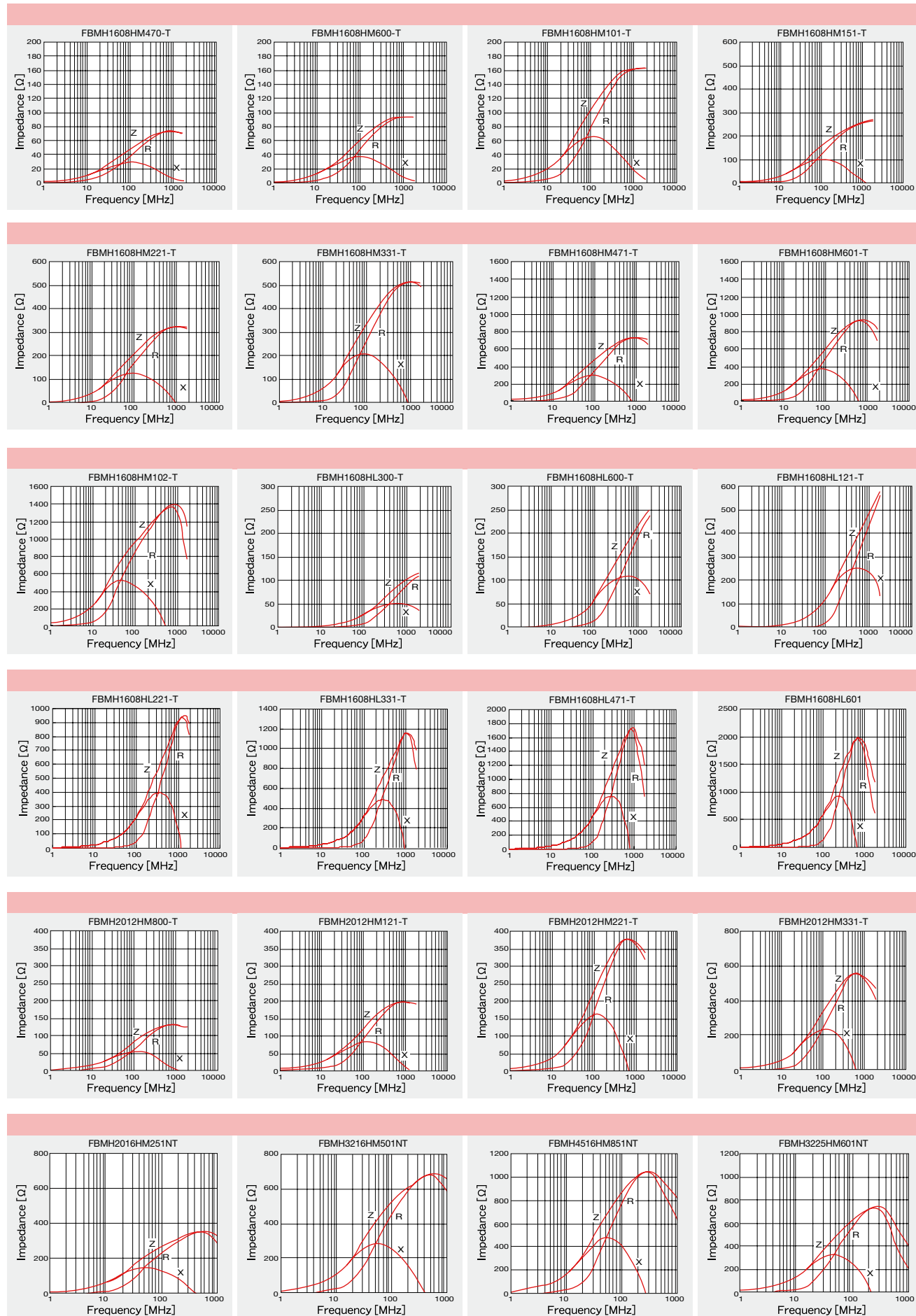


FBMJ4516



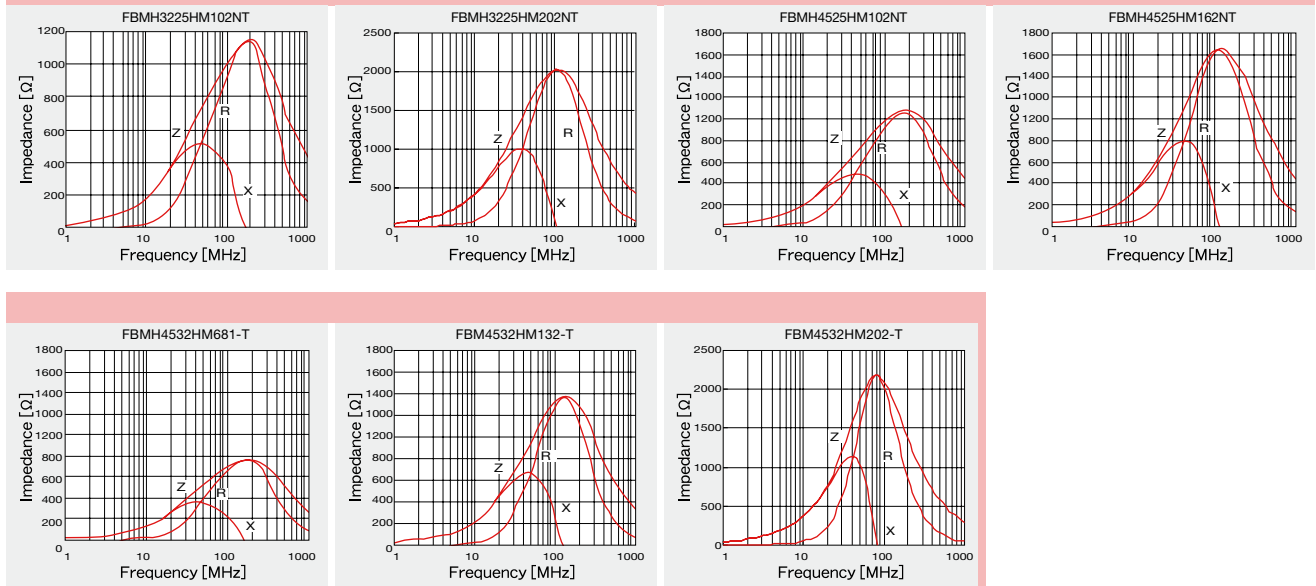
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High impedance Type



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High impedance Type



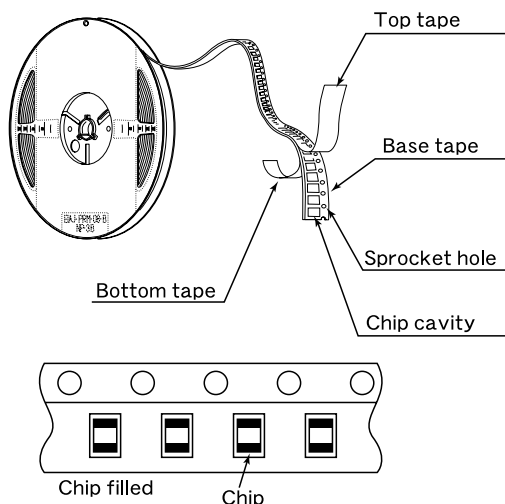
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① Minimum Quantity

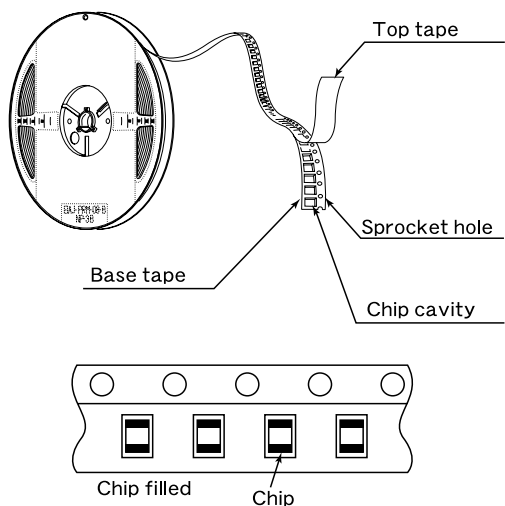
Type	Standard Quantity [pcs]	
	Paper Tape	Embossed Tape
1608(0603)	4000	—
2125(0805)	4000	—
2012(0805)	4000	—
2016(0806)	—	2000
3216(1206)	—	2000
4516(1806)	—	2000
3225(1210)	—	1000
4525(1810)	—	1000
4532(1812)	—	2000

② Tape Material

Card board carrier tape

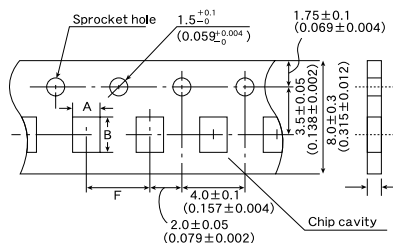


Embossed Tape



③ Taping Dimensions

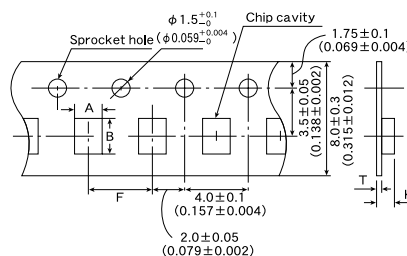
● Paper tape (0.315 inches wide)



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 FBMH2125 (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)

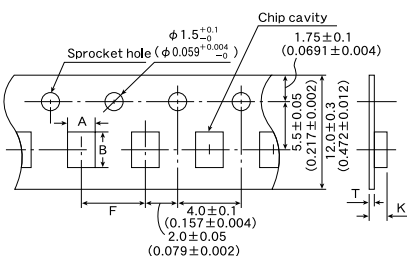
● Embossed tape (0.315 inches wide)



Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
FBMJ2016 (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)
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)	2.6max (0.102max)	0.6max (0.024max)
FBMJ3225 (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)

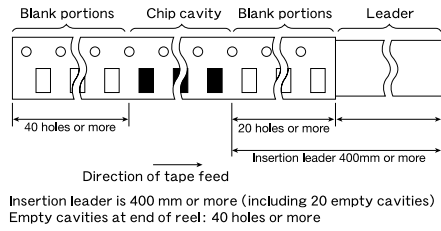


Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
FBMJ4516 (1806)	1.9±0.2 (0.075±0.008)	4.9±0.2 (0.193±0.008)	4.0±0.2 (0.157±0.008)	1.5max (0.059max)	0.3max (0.012max)
FBMJ4516 (1806)	1.9±0.2 (0.075±0.008)	4.9±0.2 (0.193±0.008)	4.0±0.2 (0.157±0.008)	2.6max (0.102max)	0.6max (0.024max)
FBMJ4525 (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)
FBMJ4532 (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)

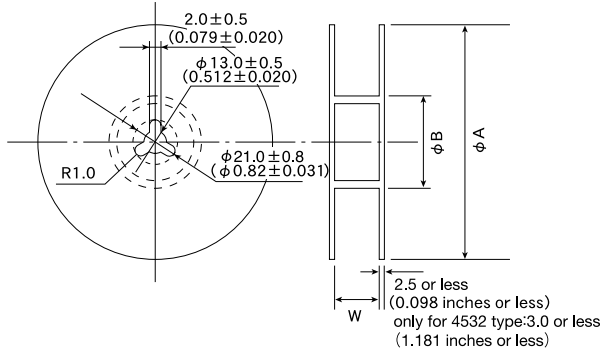
Unit : mm (inch)

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④ Leader and Blank portion

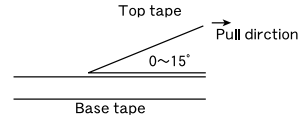


⑤ Reel size



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)

⑥ Top tape strength



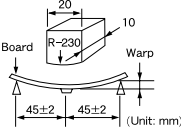
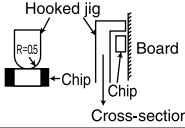
The top tape requires a peel-off force of 0.1 to 0.7N in the direction of the arrow as illustrated below.

CHIP BEAD INDUCTORS FOR POWER LINE (FB SERIES M TYPE)

1. Operating Temperature Range																	
Specified Value	-40℃~+125℃ Including self-generated heat																
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/s²) 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 $\begin{smallmatrix} +50 \\ -10 \end{smallmatrix}$ % of the initial value																
【Test Methods and Remarks】 According to JIS C 0025. Conditions for 1 cycle																	
<table><tr><td>Step</td><td>Temperature (℃)</td><td>Duration (min.)</td></tr><tr><td>1</td><td>-40±3℃</td><td>30±3</td></tr><tr><td>2</td><td>Room Temperature</td><td>Within 3</td></tr><tr><td>3</td><td>85±2℃</td><td>30±3</td></tr><tr><td>4</td><td>Room Temperature</td><td>Within 3</td></tr></table>			Step	Temperature (℃)	Duration (min.)	1	-40±3℃	30±3	2	Room Temperature	Within 3	3	85±2℃	30±3	4	Room Temperature	Within 3
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 $\begin{smallmatrix} +24 \\ -0 \end{smallmatrix}$ hrs Mounting method : Soldering onto PC board Recovery : 2 to 3 hrs of recovery under the standard condition after the removal from test chamber.																	

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CHIP BEAD INDUCTORS FOR POWER LINE (FB SERIES M TYPE)

11. Loading under Damp Heat	
Specified Value	Appearances : No significant abnormality Impedance change : Within $\pm 30\%$ of the initial value
[Test Methods and Remarks] Temperature : $40 \pm 2^\circ\text{C}$ Humidity : 90 to 95%RH Applied current : Rated current Duration : $500 \pm_{-0}^{+24}$ hrs Mounting method : Soldering onto PC board Recovery : 2 to 3hrs of recovery under the standard condition after the removal from test chamber.	
12. High Temperature Loading Test	
Specified Value	Appearance : No significant abnormality Impedance change : Within $\pm 30\%$ of the initial value
[Test Methods and Remarks] Temperature : $85 \pm 2^\circ\text{C}$ Duration : $500 \pm_{-0}^{+24}$ 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:

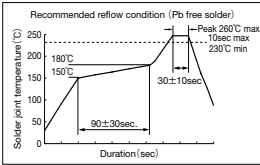
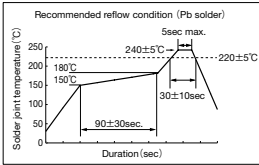
5 to 35°C of temperature, 45 to 85% relative humidity and 86 to 106kPa of air pressure.

When there are questions concerning measurement results:

In order to provide correlation data, the test shall be conducted under condition of $20 \pm 2^\circ\text{C}$ 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 considerations	◆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°C. Cooling: The temperature difference between the components and cleaning process should not be greater than 100°C. ◆Recommended conditions for using a soldering iron Put the soldering iron on the land-pattern. Soldering iron's temperature - Below 350°C Duration - 3 seconds or less The soldering iron should not directly touch the inductor.
Technical considerations	◆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 considerations	◆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°C - Humidity Below 70% RH - The ambient temperature must be kept below 30°C. 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 considerations	◆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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