THE DATASHEET OF

FBMH2012HM221-T

Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

Product Information in this Catalog

Product information in this catalog is as of January 2021. All of the contents specified herein and production status of the products listed in this catalog are subject to change without notice due to technical improvement of our products, etc. Therefore, please check for the latest information carefully before practical application or use of our products.

Please note that TAIYO YUDEN shall not be in any way responsible for any damages and defects in products or equipment incorporating our products, which are caused under the conditions other than those specified in this catalog or individual product specification sheets.

Approval of Product Specifications

Please contact TAIYO YUDEN for further details of product specifications as the individual product specification sheets are available. When using our products, please be sure to approve our product specifications or make a written agreement on the product specification with TAIYO YUDEN in advance.

Pre-Evaluation in the Actual Equipment and Conditions

Please conduct validation and verification of our products in actual conditions of mounting and operating environment before using our products.

Limited Application

1. Equipment Intended for Use

The products listed in this catalog are intended for general-purpose and standard use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC) and other equipment specified in this catalog or the individual product specification sheets.

TAIYO YUDEN has the line-up of the products intended for use in automotive electronic equipment, telecommunications infrastructure and industrial equipment, or medical devices classified as GHTF Classes A to C (Japan Classes I to III). Therefore, when using our products for these equipment, please check available applications specified in this catalog or the individual product specification sheets and use the corresponding products.

2. Equipment Requiring Inquiry

Please be sure to contact TAIYO YUDEN for further information before using the products listed in this catalog for the following equipment (excluding intended equipment as specified in this catalog or the individual product specification sheets) which may cause loss of human life, bodily injury, serious property damage and/or serious public impact due to a failure or defect of the products and/or malfunction attributed thereto.

(1) Transportation equipment (automotive powertrain control system, train control system, and ship control system, etc.)
(2) Traffic signal equipment
(3) Disaster prevention equipment, crime prevention equipment
(4) Medical devices classified as GHTF Class C (Japan Class III)
(5) Highly public information network equipment, data-processing equipment (telephone exchange, and base station, etc.)
(6) Any other equipment requiring high levels of quality and/or reliability equal to the equipment listed above

3. Equipment Prohibited for Use

Please do not incorporate our products into the following equipment requiring extremely high levels of safety and/or reliability.

(1) Aerospace equipment (artificial satellite, rocket, etc.)
(2) Aviation equipment *1
(3) Medical devices classified as GHTF Class D (Japan Class IV), implantable medical devices *2
(4) Power generation control equipment (nuclear power, hydroelectric power, thermal power plant control system, etc.)
(5) Undersea equipment (submarine repeating equipment, underwater work equipment, etc.)
(6) Military equipment
(7) Any other equipment requiring extremely high levels of safety and/or reliability equal to the equipment listed above

*Notes:

1. There is a possibility that our products can be used only for aviation equipment that does not directly affect the safe operation of aircraft (e.g., in-flight entertainment, cabin light, electric seat, cooking equipment) if such use meets requirements specified separately by TAIYO YUDEN. Please be sure to contact TAIYO YUDEN for further information before using our products for such aviation equipment.
2. Implantable medical devices contain not only internal unit which is implanted in a body, but also external unit which is connected to the internal unit.

4. Limitation of Liability

Please note that unless you obtain prior written consent of TAIYO YUDEN, TAIYO YUDEN shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this catalog for any equipment that is not intended for use by TAIYO YUDEN, or any equipment requiring inquiry to TAIYO YUDEN or prohibited for use by TAIYO YUDEN as described above.

Safety Design

When using our products for high safety and/or reliability-required equipment or circuits, please fully perform safety and/or reliability evaluation. In addition, please install (i) systems equipped with a protection circuit and a protection device and/or (ii) systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault for a failsafe design to ensure safety.

Intellectual Property Rights

Information contained in this catalog is intended to convey examples of typical performances and/or applications of our products and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of TAIYO YUDEN or any third parties nor grant any license under such rights.

Limited Warranty

Please note that the scope of warranty for our products is limited to the delivered our products themselves and TAIYO YUDEN shall not be in any way responsible for any damages resulting from a failure or defect in our products. Notwithstanding the foregoing, if there is a written agreement (e.g., supply and purchase agreement, quality assurance agreement) signed by TAIYO YUDEN and your company, TAIYO YUDEN will warrant our products in accordance with such agreement.

TAIYO YUDEN's Official Sales Channel

The contents of this catalog are applicable to our products which are purchased from our sales offices or authorized distributors (hereinafter "TAIYO YUDEN's official sales channel"). Please note that the contents of this catalog are not applicable to our products purchased from any seller other than TAIYO YUDEN's official sales channel.

Caution for Export

Some of our products listed in this catalog may require specific procedures for export according to "U.S. Export Administration Regulations", "Foreign Exchange and Foreign Trade Control Law" of Japan, and other applicable regulations. Should you have any questions on this matter, please contact our sales staff.

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

WAVE REFLOW

■PARTS NUMBER

*Operating Temp. : −40〜+125℃ (Including self-generated heat)

F	B	△	M	J	3	2	1	6	H	S	8	0	0	—	T	△
①			②	③	④				⑤		⑥			⑦	⑧	⑨

△=Blank space

①Series name

Code	Series name
FB	Ferrite bead

②Shape

Code	Shape
M	Rectangular chip

③Characteristics

Code	Characteristics
J	Standard
H	High Impedance type

④Dimensions (L×W)

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

⑤Material

Code	Material
HS	Refer to impedance curves for material differences
HM	
HL	

⑥Nominal impedance

Code (example)	Nominal impedance [Ω]
330	33
221	220
102	1000

⑦Impedance tolerance

Code	Impedance tolerance
—	±25%
N	±30%

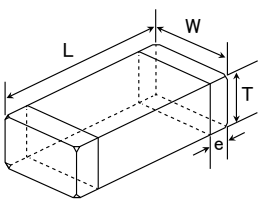
⑧Packaging

Code	Packaging
T	Taping

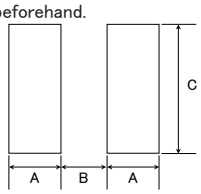
⑨Internal code

Code	Internal code
△	Standard

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



Recommended Land Patterns
Surface Mounting
・Mounting and soldering conditions should be checked beforehand.



Type	A	B	C
FB MJ1608	1.0	1.0	1.0
FB MJ2125	1.4	1.2	1.65
FB MJ3216	1.4	2.2	2.0
FB MJ4516	1.75	3.5	2.0
FB MH1608	1.0	1.0	1.0
FB MH2012	1.4	1.2	1.65
FB MH2016	1.4	1.2	2.0
FB MH3216	1.4	2.2	2.0
FB MH3225	1.4	2.2	2.9
FB MH4516	1.75	3.5	2.0
FB MH4525	1.75	3.5	2.9
FB MH4532	1.75	3.5	3.7

Unit: mm

Type	L	W	T	e	Standard quantity [pcs]	
					Paper tape	Embossed tape
FB MJ1608 (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	—
FB MJ2125 (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	—
FB MJ3216 (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
FB MJ4516 (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
FB MH1608 (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	—
FB MH2012 (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	—
FB MH2016 (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
FB MH3216 (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
FB MH3225 (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
FB MH4516 (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
FB MH4525 (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
FB MH4532 (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)

■PARTS NUMBER

Standard type

●FB MJ1608

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MJ1608HS280NT	RoHS	28	±30%	100	0.007	4.0	0.8 ±0.2
FB MJ1608HM230NT	RoHS	23	±30%	100	0.007	4.0	0.8 ±0.2

●FB MJ2125

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MJ2125HS250NT	RoHS	25	±30%	100	0.004	6.0	0.85 ±0.2
FB MJ2125HS420-T	RoHS	42	±25%	100	0.008	4.0	0.85 ±0.2
FB MJ2125HM210NT	RoHS	21	±30%	100	0.004	6.0	0.85 ±0.2
FB MJ2125HM330-T	RoHS	33	±25%	100	0.008	4.0	0.85 ±0.2
FB MJ2125HL8R0NT	RoHS	8	±30%	100	0.008	4.0	0.85 ±0.2

●FB MJ3216

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MJ3216HS480NT	RoHS	48	±30%	100	0.005	6.0	1.1 ±0.2
FB MJ3216HS800-T	RoHS	80	±25%	100	0.010	4.0	1.1 ±0.2
FB MJ3216HM380NT	RoHS	38	±30%	100	0.005	6.0	1.1 ±0.2
FB MJ3216HM600-T	RoHS	60	±25%	100	0.010	4.0	1.1 ±0.2
FB MJ3216HL160NT	RoHS	16	±30%	100	0.012	4.0	1.1 ±0.2

●FB MJ4516

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MJ4516HS720NT	RoHS	72	±30%	100	0.007	6.0	1.1 ±0.2
FB MJ4516HS111-T	RoHS	110	±25%	100	0.014	4.0	1.1 ±0.2
FB MJ4516HM560NT	RoHS	56	±30%	100	0.007	6.0	1.1 ±0.2
FB MJ4516HM900-T	RoHS	90	±25%	100	0.014	4.0	1.1 ±0.2
FB MJ4516HL230NT	RoHS	23	±30%	100	0.014	3.5	1.1 ±0.2

High impedance type　　GHz Band

●FB MH1608

Parts number	EHS	Nominal impedance Measuring frequency 100[MHz]		Nominal impedance Measuring frequency 1[GHz]		DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
		(Ω)	tolerance	(Ω)	tolerance			
FB MH1608HM470-T	RoHS	47	±25%	75	±40%	0.020	3.5	0.8 ±0.1
FB MH1608HM600-T	RoHS	60	±25%	100	±40%	0.025	3.0	0.8 ±0.1
FB MH1608HM101-T	RoHS	100	±25%	170	±40%	0.035	2.5	0.8 ±0.1
FB MH1608HM151-T	RoHS	150	±25%	270	±40%	0.050	2.1	0.8 ±0.1
FB MH1608HM221-T	RoHS	220	±25%	370	±40%	0.070	1.8	0.8 ±0.1
FB MH1608HM331-T	RoHS	330	±25%	520	±40%	0.130	1.2	0.8 ±0.1
FB MH1608HM471-T	RoHS	470	±25%	750	±40%	0.150	1.0	0.8 ±0.1
FB MH1608HM601-T	RoHS	600	±25%	900	±40%	0.170	0.9	0.8 ±0.1
FB MH1608HM102-T	RoHS	1000	±25%	1200	±40%	0.350	0.6	0.8 ±0.1
FB MH1608HL300-T	RoHS	30	±25%	120	±40%	0.028	2.6	0.8 ±0.1
FB MH1608HL600-T	RoHS	60	±25%	220	±40%	0.045	2.1	0.8 ±0.1
FB MH1608HL121-T	RoHS	120	±25%	540	±40%	0.130	1.2	0.8 ±0.1
FB MH1608HL221-T	RoHS	220	±25%	950	±40%	0.170	0.9	0.8 ±0.1
FB MH1608HL331-T	RoHS	330	±25%	1200	±40%	0.210	0.8	0.8 ±0.1
FB MH1608HL471-T	RoHS	470	±25%	1500	±40%	0.350	0.6	0.8 ±0.1
FB MH1608HL601-T	RoHS	600	±25%	1800	±40%	0.450	0.5	0.8 ±0.1

High impedance type

●FB MH2012

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MH2012HM800-T	RoHS	80	±25%	100	0.025	2.7	0.85 ±0.2
FB MH2012HM121-T	RoHS	120	±25%	100	0.032	2.5	0.85 ±0.2
FB MH2012HM221-T	RoHS	220	±25%	100	0.060	2.0	0.85 ±0.2
FB MH2012HM331-T	RoHS	330	±25%	100	0.080	1.8	0.85 ±0.2

●FB MH2016

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MH2016HM121NT	RoHS	120	±30%	100	0.015	4.5	1.6 ±0.2
FB MH2016HM251NT	RoHS	250	±30%	100	0.050	2.0	1.6 ±0.2

●FB MH3216

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MH3216HM221NT	RoHS	220	±30%	100	0.020	4.0	1.6 ±0.2
FB MH3216HM501NT	RoHS	500	±30%	100	0.070	2.0	1.6 ±0.2

●FB MH3225

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MH3225HM601NT	RoHS	600	±30%	100	0.042	3.0	2.5 ±0.3
FB MH3225HM102NT	RoHS	1000	±30%	100	0.100	2.0	2.5 ±0.3
FB MH3225HM202NT	RoHS	2000	±30%	100	0.130	1.2	2.5 ±0.3

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■PARTS NUMBER

●FB MH4516

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MH4516HM851NT	RoHS	850	±30%	100	0.100	1.5	1.6 ±0.2

●FB MH4525

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MH4525HM102NT	RoHS	1000	±30%	100	0.060	3.0	2.5 ±0.3
FB MH4525HM162NT	RoHS	1600	±30%	100	0.130	2.0	2.5 ±0.3

●FB MH4532

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MH4532HM681-T	RoHS	680	±25%	100	0.028	4.0	3.2 ±0.3
FB MH4532HM132-T	RoHS	1300	±25%	100	0.060	3.0	3.2 ±0.3
FB MH4532HM202-T	RoHS	2000	±25%	100	0.130	1.3	3.2 ±0.3

●High current type

Parts number	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω] (max.)	Rated current [A] (max.)	Thickness [mm]
FB MJ1608HS220NTR	RoHS	22	±30%	100	0.004	7.5	0.8 ±0.2
FB MJ1608HS280NTR	RoHS	28	±30%	100	0.006	6.0	0.8 ±0.2
FB MJ1608HM180NTR	RoHS	18	±30%	100	0.004	7.5	0.8 ±0.2
FB MJ1608HM230NTR	RoHS	23	±30%	100	0.006	6.0	0.8 ±0.2

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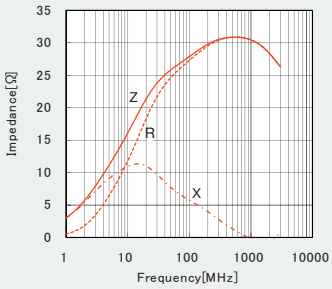
■ELECTRICAL CHARACTERISTICS

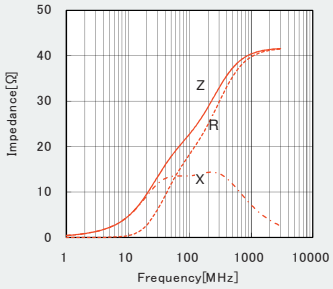
Standard type

■FB MJ1608

FB MJ1608HS280NT

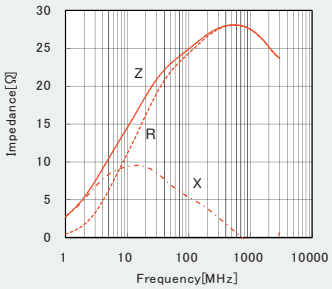


FB MJ1608HM230NT



■FB MJ2125

FB MJ2125HS250NT



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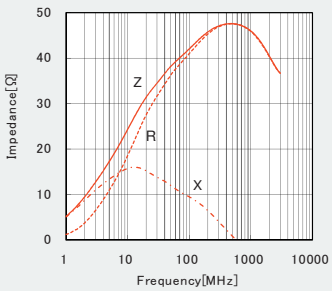

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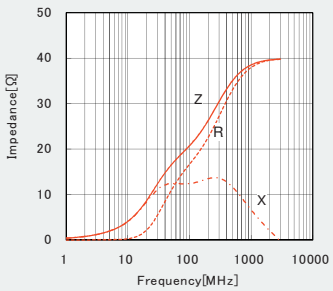
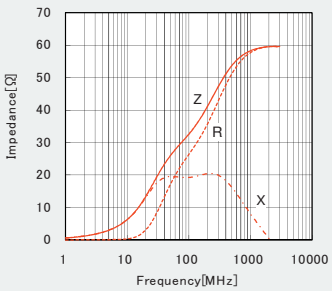
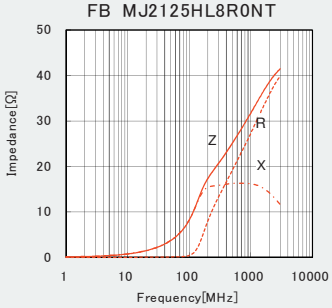


FB MJ2125HM330-T

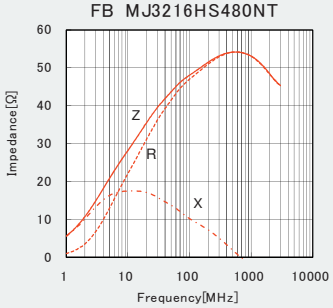


FB MJ2125HL8R0NT

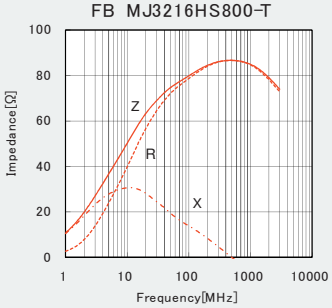


■FB MJ3216

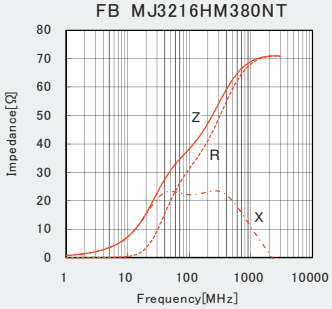
FB MJ3216HS480NT



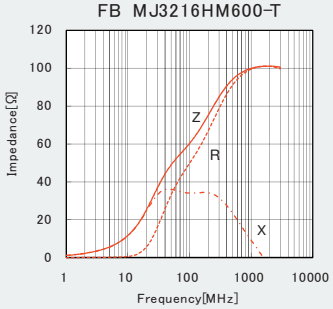
FB MJ3216HS800-T



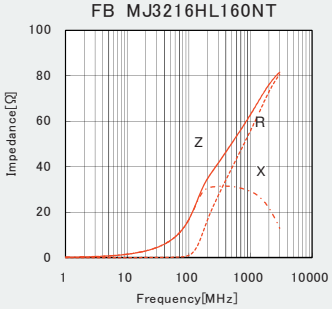
FB MJ3216HM380NT



FB MJ3216HM600-T

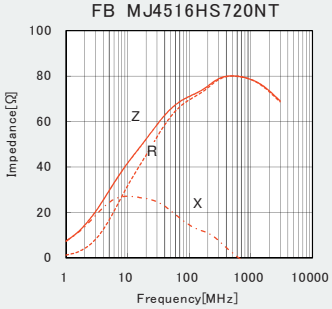


FB MJ3216HL160NT



■FB MJ4516

FB MJ4516HS720NT



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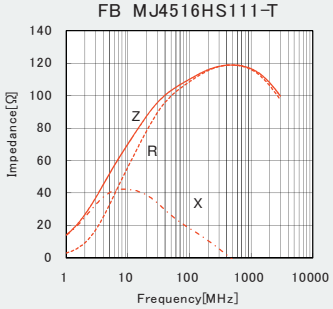
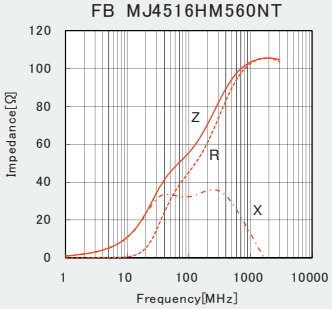


FB MJ4516HM560NT



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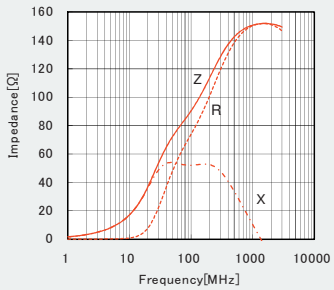
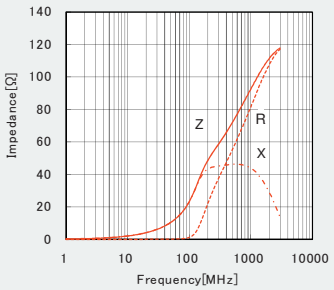
■ELECTRICAL CHARACTERISTICS

FB MJ4516HM900-T



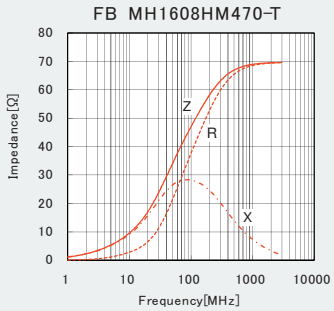
FB MJ4516HL230NT



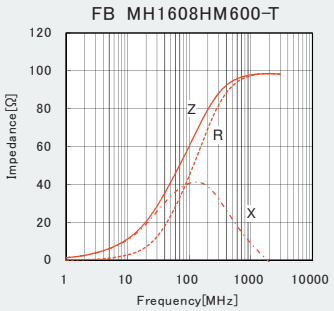
High impedance type GHz Band

■FB MH1608

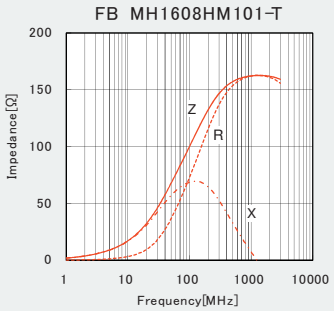
FB MH1608HM470-T



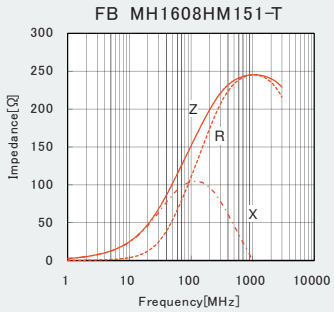
FB MH1608HM600-T



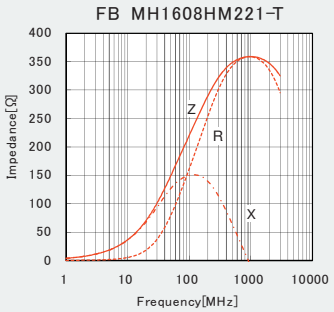
FB MH1608HM101-T



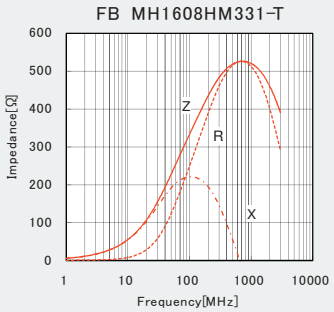
FB MH1608HM151-T



FB MH1608HM221-T



FB MH1608HM331-T



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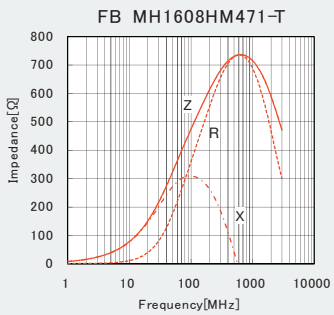

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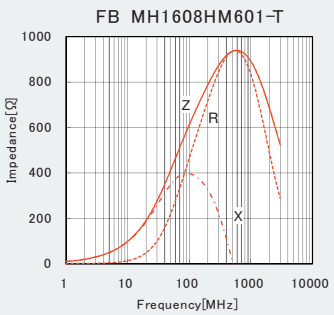
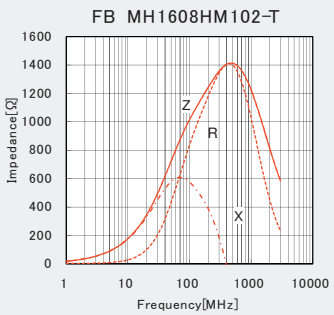
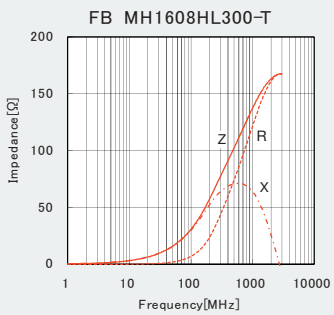


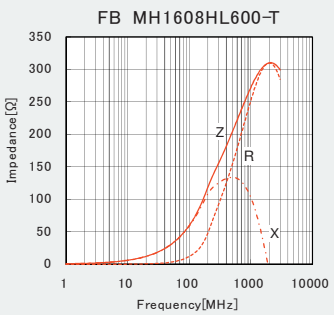
FB MH1608HM102-T



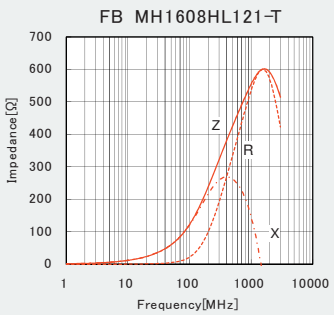
FB MH1608HL300-T



FB MH1608HL600-T



FB MH1608HL121-T



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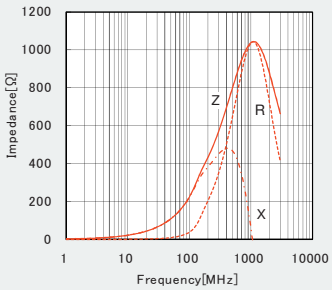
■ELECTRICAL CHARACTERISTICS

FB MH1608HL221-T



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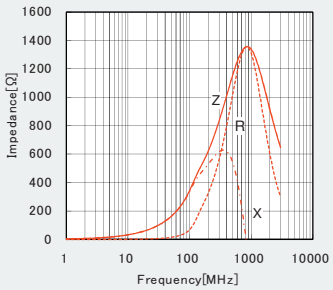

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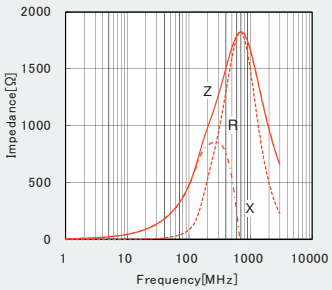

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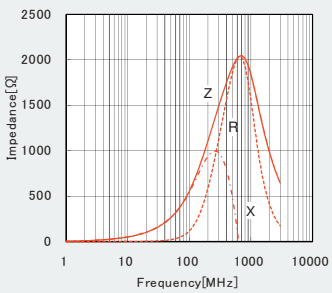
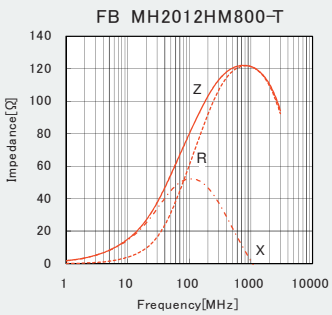


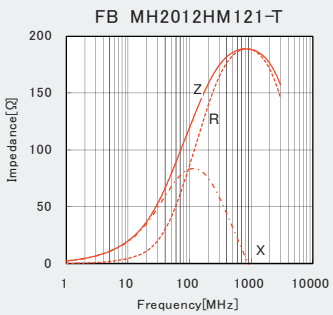
High impedance type

■FB MH2012

FB MH2012HM800-T



FB MH2012HM121-T



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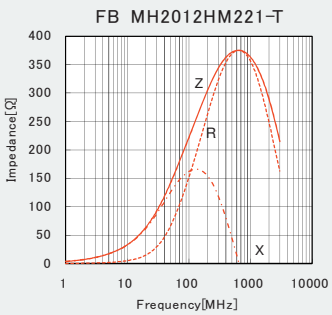

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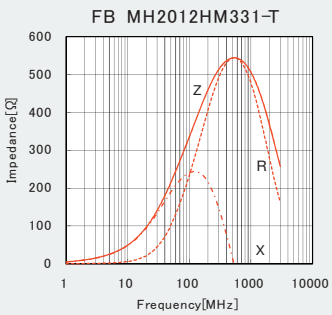
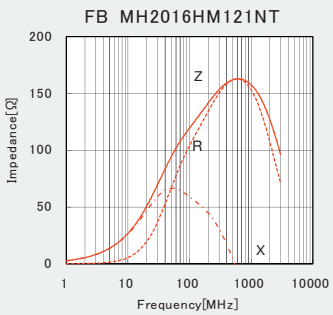
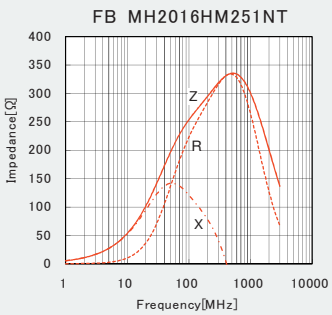


■FB MH2016

FB MH2016HM121NT

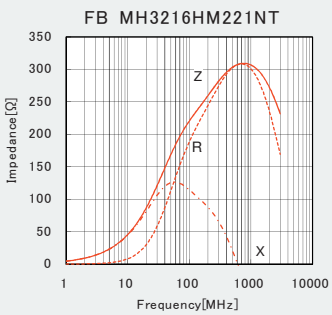


FB MH2016HM251NT

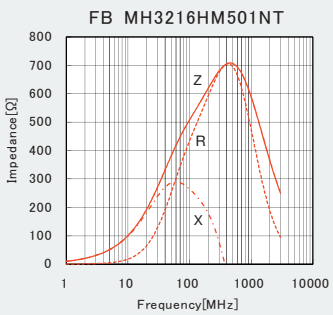


■FB MH3216

FB MH3216HM221NT

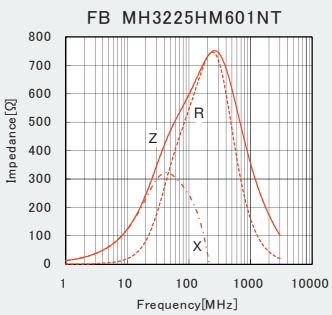


FB MH3216HM501NT



■FB MH3225

FB MH3225HM601NT



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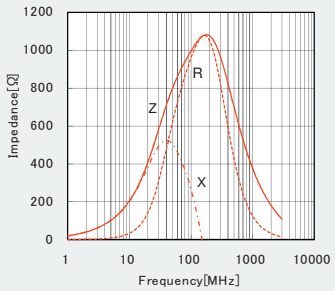
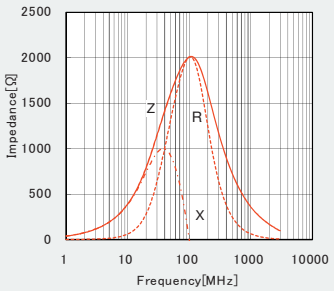
■ELECTRICAL CHARACTERISTICS

FB MH3225HM102NT

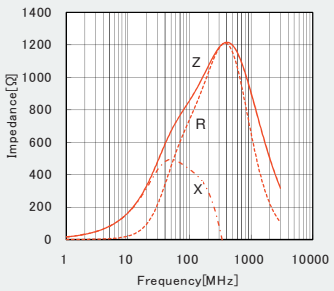


FB MH3225HM202NT



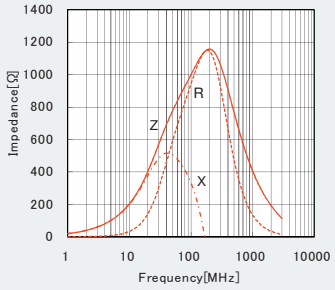
■FB MH4516

FB MH4516HM851NT



■FB MH4525

FB MH4525HM102NT



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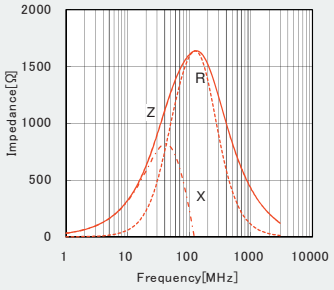
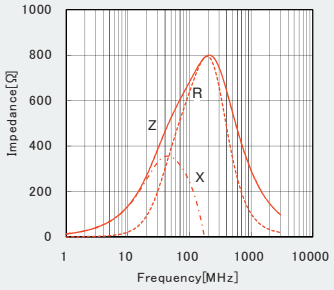
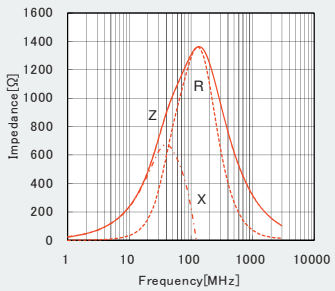


■FB MH4532

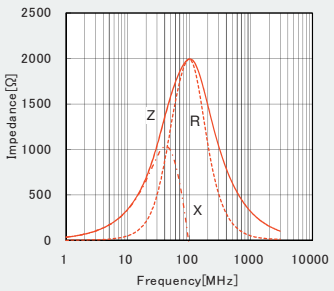
FB MH4532HM681-T



FB MH4532HM132-T

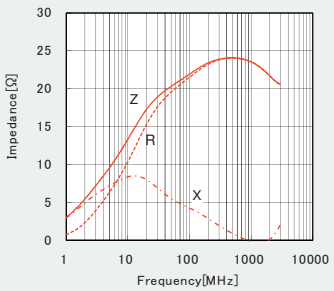


FB MH4532HM202-T

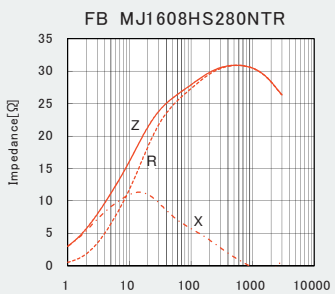


■High current type

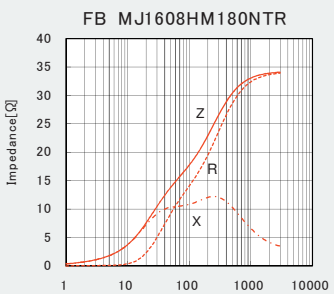
FB MJ1608HS220NTR



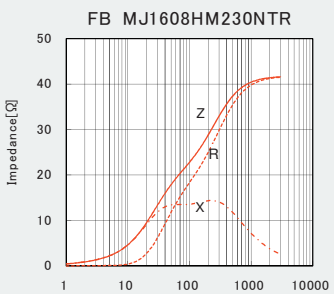
FB MJ1608HS280NTR



FB MJ1608HM180NTR



FB MJ1608HM230NTR



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CHIP BEAD INDUCTORS FOR POWER LINES (FB SERIES M TYPE / T TYPE)

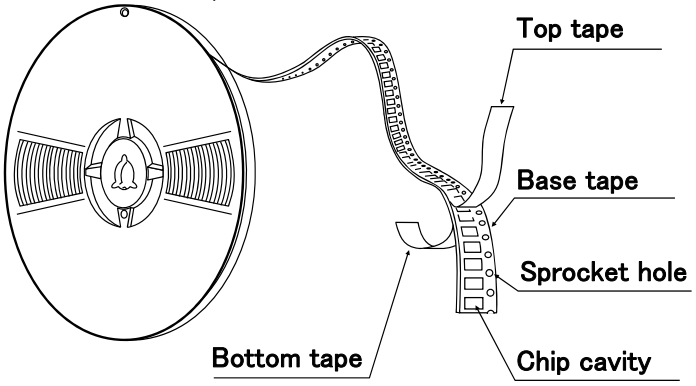
■PACKAGING

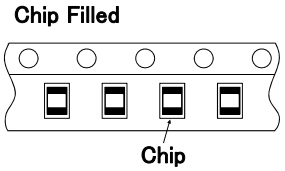
①Minimum Quantity

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

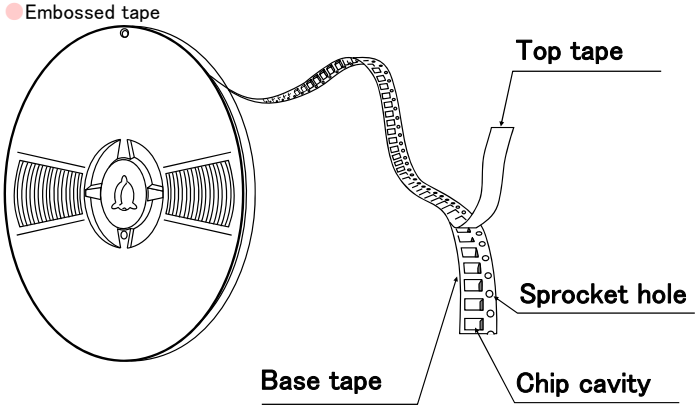
②Tape Material

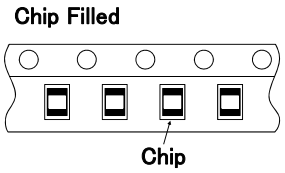
●Card board carrier tape





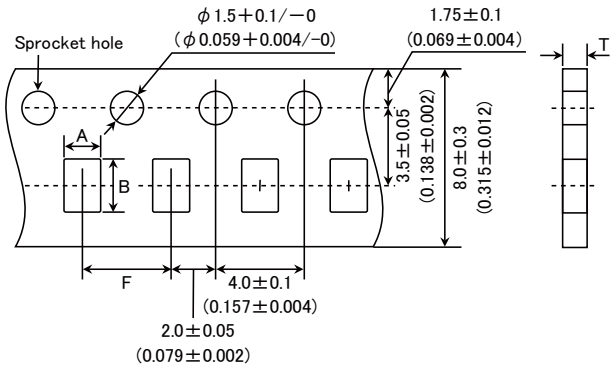
●Embossed tape





③Taping Dimensions

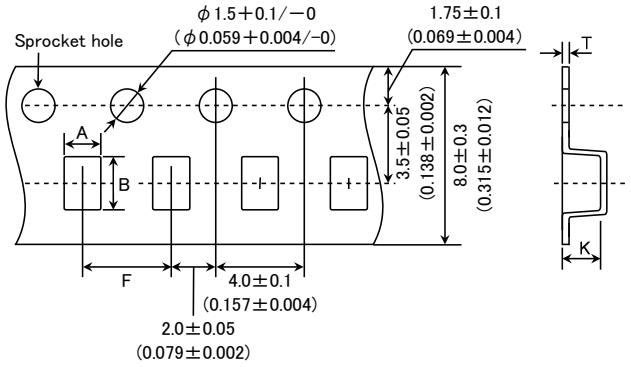
●Paper tape (0.315 inches wide)



Type	Chip Cavity		Insertion Pitch	Tape Thickness
	A	B	F	T
FB MJ1608 FB MH1608 FB TH1608 (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)
FB MJ2125 FB MH2012 (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)

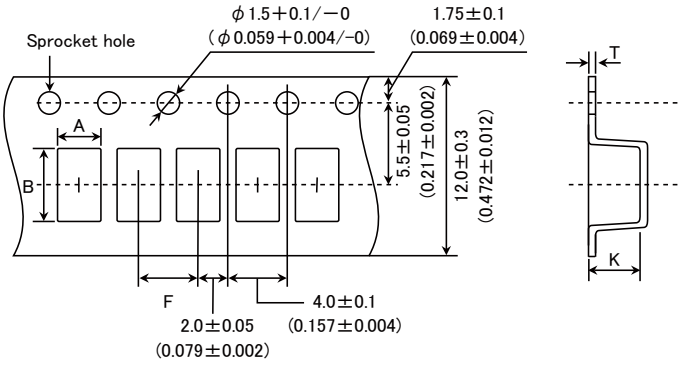
● Embossed tape (0.315 inches wide)



Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
FB MH2016 (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)
FB MJ3216 (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)
FB MH3216 (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)
FB MH3225 (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)

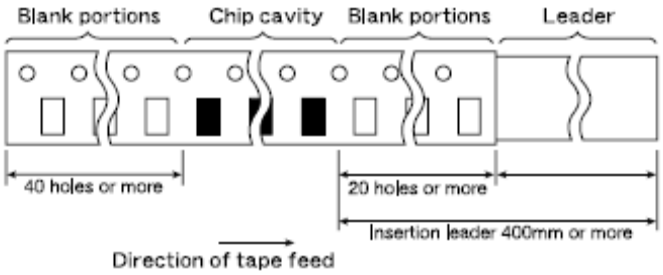
● Embossed tape (0.472 inches wide)



Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
FB MJ4516 (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)
FB MH4516 (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)
FB MH4525 (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)
FB MH4532 (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)

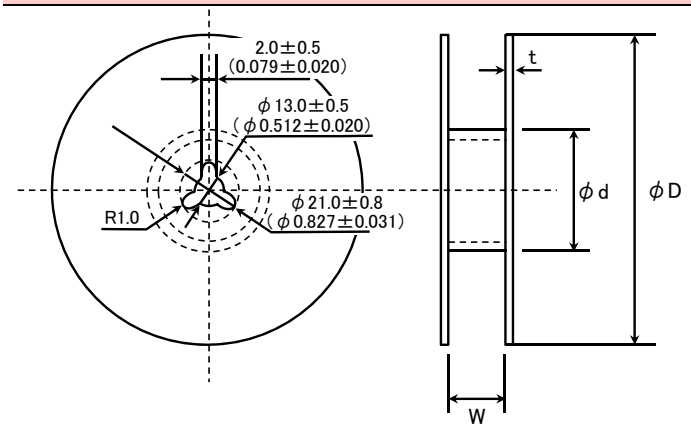
Unit : mm(inch)

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

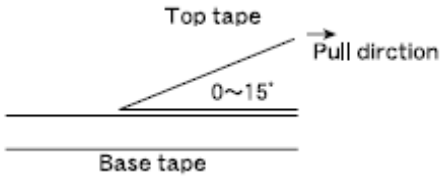
⑤Reel size



Type	φD	φd	W	t
FB MJ1608	180+0/−3 (7.09+0/−0.118)	60+1/−0 (2.36+0.039/−0)	10.0±1.5 (0.394±0.059)	2.5max (0.098max)
FB MJ2125				
FB MJ3216				
FB MJ4516			14.0±1.5 (0.551±0.059)	
FB MH1608			10.0±1.5 (0.394±0.059)	
FB MH2012				
FB MH2016				
FB MH3216				
FB MH3225				
FB MH4516			14.0±1.5 (0.551±0.059)	
FB MH4525				
FB MH4532	330±2.0 (12.99±0.080)	100±1.0 (3.94±0.039)	14.0±2.0 (0.551±0.080)	3.0max (1.181max)
FB TH1608	180+0/−3 (7.09+0/−0.118)	60+1/−0 (2.36+0.039/−0)	10.0±1.5 (0.394±0.059)	2.5max (0.098max)

Unit : mm(inch)

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.

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

■RELIABILITY DATA

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: −5 to ＋40℃ in taped packaging

3. Impedance	
Specified Value	Within the specified range
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	The test samples shall be soldered to the test board by the reflow. Then it shall be submitted to below test conditions.

Frequency	10～55Hz	
Overall Amplitude	1.5mm (Shall not exceed acceleration 196m/s^2)	
Sweeping Method	1min(10→55→10Hz)	
Time	X	2hours
	Y	
	Z	

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℃
Time	4±1 秒
Preconditioning	Immersion into flux.
Immersing Speed	25mm/s

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℃ 3min
Solder Temperature	260±5℃
Time	10±0.5sec
Preconditioning	Immersion into flux.
Immersing Speed	25mm/s

The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

9. Thermal Shock

Specified Value

Appearance : No significant abnormality
Impedance change : Within＋50/－10% of the initial value

Test Methods and Remarks

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
The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

10. Resistance to Humidity (steady state)

Specified Value

Appearances : No significant abnormality
Impedance change : Within ±30% of the initial value

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow.
The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table.

Temperature	40±2℃
Humidity	90～95%RH
Time	500＋24/－0 hour

The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

11. Loading under Damp Heat

Specified Value

Appearance No significant abnormality
Impedance change Within ±30% of the initial value

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow soldering.
The test samples shall be placed in thermostatic oven set at specified temperature, humidity, and applied the rated current continuously as shown in below table.

Temperature	40±2℃
Humidity	90～95%RH
Applied current	Rated current
Time	500＋24/－0 hour

The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

12. High Temperature Loading Test

Specified Value

Appearance : No significant abnormality
Impedance change : Within ±30% of the initial value

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow soldering.
The test samples shall be placed in thermostatic oven set at specified temperature and applied the rated current continuously as shown in below table.

Temperature	85±2℃
Applied current	Rated current
Time	500＋24/－0 hour

The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

13. Bending Strength

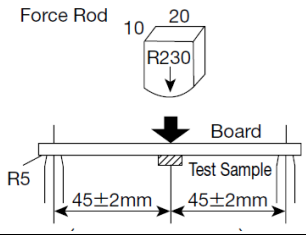
Specified Value

Appearance : No mechanical damage.

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow. As illustrated below, apply force in the direction of the arrow indicating until deflection of the test board reaches to 2 mm

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."

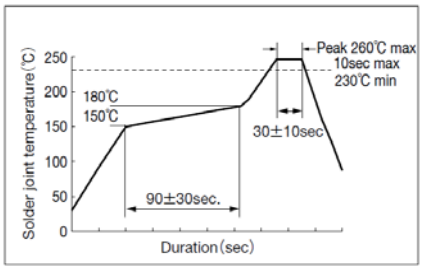
CHIP BEAD INDUCTORS FOR POWER LINE (FB SERIES M TYPE)

■PRECAUTIONS

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℃. 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 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. 【Recommended reflow condition】  ◆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 −5～40℃ 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 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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