SPECIFICATIONS

Customer	
Product Name	**Multi-layer Chip Ferrite Bead**
Sunlord Part Number	**HFPZ Series**
Customer Part Number	

[☒New Released, ☐Revised] **SPEC No.: HFPZ0101200000**

【This SPEC is total 11 pages including specifications and appendix.】

【ROHS, Halogen-Free and SVHC Compliant Parts】

Approved By	Checked By	Issued By

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【For Customer approval Only】 Date:_____

Qualification Status: ☐ Full ☐ Restricted ☐ Rejected

Approved By	Verified By	Re-checked By	Checked By

Comments:

_____

【Version change history】

Rev.	Effective Date	Changed Contents	Change reasons	Approved By
01	/	New release	/	Hai Guo

Caution

All products listed in this specification are developed, designed and intended for use in general electronics equipment. The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require especially high reliability, or whose failure, malfunction or trouble might directly cause damage to society, person, or property. Please understand that we are not responsible for any damage or liability caused by use of the products in any of the applications below. Please contact us for more details if you intend to use our products in the following applications.

1. Aircraft equipment
2. Aerospace equipment
3. Undersea equipment
4. nuclear control equipment
5. military equipment
6. Power plant equipment
7. Medical equipment
8. Transportation equipment (automobiles, trains, ships,etc.)
9. Traffic signal equipment
10. Disaster prevention / crime prevention equipment
11. Data-processing equipment
12. Applications of similar complexity or with reliability requirements comparable to the applications listed in the above

1. Scope

This specification applies to HFPZ series of multi-layer ferrite chip bead.

2. Product Description and Identification (Part Number)

1) Description:

HFPZ series of multi-layer ferrite chip bead.

2) Product Identification (Part Number)

HFPZ	1608	○	XXX	□□□	◎	F	□□□
①	②	③	④	⑤	⑥	⑦	⑧

①	Type
HFPZ	For high frequency noise and large current

②	External Dimensions (L X W) (mm)
1005 [0402]	1.0 X 0.5
1608 [0603]	1.6 X 0.8

③	Material Code
G, D, E, U	

④	Nominal Impedance
Example	Nominal Value
600	60Ω
601	600Ω

⑤	Rate Current
R50	0.5A
1R5	1.5A

⑥	Packing
T	Tape Carrier Package

⑦	HSF Products
Hazardous Substance Free Products	

⑧	Design Code
□□□	Design Code (* Standard product is blank)

3. Electrical Characteristics

Please refer to **Appendix A** (Page 9~11).

1) Operating and storage temperature range (individual chip without packing): -55℃ ~ +125℃.

2) Storage temperature range (packaging conditions): -10℃~+40℃ and RH 70% (Max.).

4. Shape and Dimensions

1) Dimensions and recommended PCB pattern for reflow soldering: See **Fig.4-1**, **Fig.4-2** and **Table 4-1**.

2) Structure: See **Fig. 4-3** and **Fig. 4-4**.

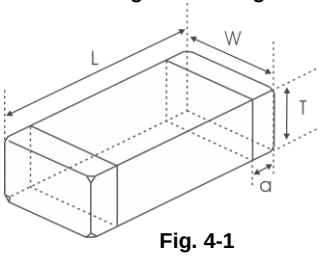


Fig. 4-1

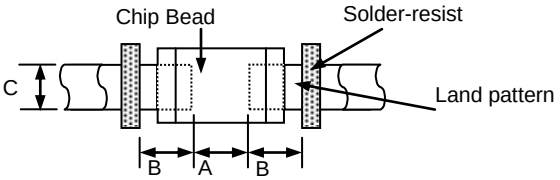


Fig. 4-2

[Table 4-1]

Unit: mm [inch]

Type	L	W	T	a	A	B	C
1005 [0402]	1.0±0.15 [0.039±0.006]	0.5±0.15 [0.020±0.006]	0.5±0.15 [0.020±0.006]	0.25±0.1 [0.010±0.004]	0.45~0.55	0.40~0.50	0.45~0.55
1608 [0603]	1.60±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]	0.60~0.80	0.60~0.80	0.60~0.80

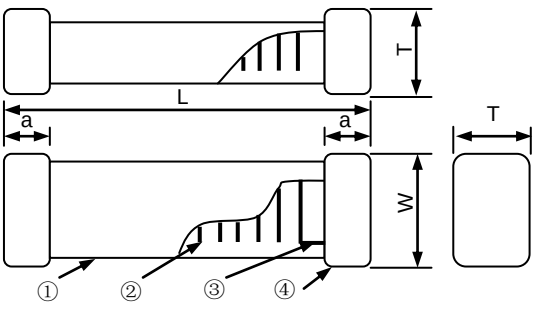


Fig. 4-3

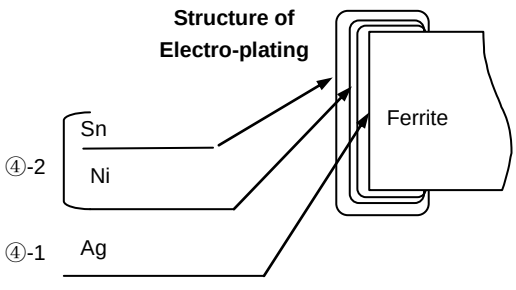


Fig. 4-4

① Ferrite for Bead Series

② Internal electrode (Ag)

③ Pull out electrode(Ag)

④-1 Terminal electrode: Inside (Ag)

④-2 Outside (Electro-plating Ni-Sn)

3) Material information: See **Table 4-2**.

[Table 4-2]

Code	Part Name	Material Name
①	Ferrite Body	Ferrite Powder
②	Inner Coils	Silver Paste
③	Pull-out Electrode (Ag)	Silver Paste
④-1	Terminal Electrode: Inside Ag	Termination Silver Composition
④-2	Electro-Plating: Ni/Sn plating	Plating Chemicals

5. Test and Measurement Procedures

5.1 Test Conditions

Unless otherwise specified, the standard atmospheric conditions for measurement/test as:

a. Ambient Temperature: 20±15℃
b. Relative Humidity: 65±20%
c. Air Pressure: 86kPa to 106kPa

If any doubt on the results, measurements/tests should be made within the following limits:

a. Ambient Temperature: 20±2℃
b. Relative Humidity: 65±5%
c. Air Pressure: 86kPa to 106kPa

5.2 Visual Examination

a. Inspection Equipment: 20× magnifier

5.3 Electrical Test

5.3.1 DC Resistance (DCR)

a. Refer to **Appendix A**.
b. Test equipment (Analyzer): High Accuracy Milliohmmeter-HP4338B or equivalent.

5.3.2 Impedance (Z)

a. Refer to **Appendix A**.
b. Test equipment: High Accuracy RF Impedance /Material Analyzer-E4991A or equivalent.
Test fixture: HP16192A
Test signal: -20dBm or 50mV
c. Test frequency refers to **Appendix A**.

5.3.3 Rated Current

a. Refer to **Appendix A**.
b. Test equipment (see **Fig. 5.3.3-1**): Electric Power, Electric current meter, Thermometer.
c. Measurement method (see **Fig. 5.3.3-1**):
1. Set test current to be 0mA.
2. Measure initial temperature of chip surface.
3. Gradually increase voltage and measure chip temperature for corresponding current.
d. Definition of Rated Current (Ir): Ir is direct electric current as chip surface temperature rose just 20℃ against chip initial surface temperature(Ta) (see **Fig. 5.3.3-2**).

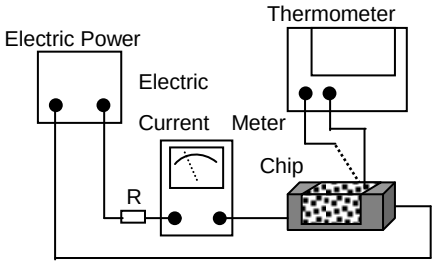


Fig. 5.3.3-1

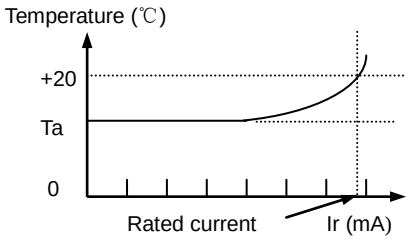
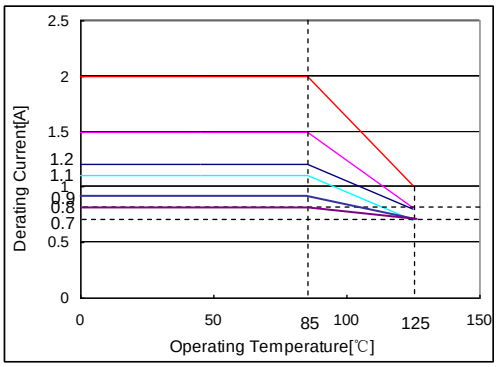
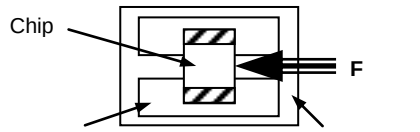
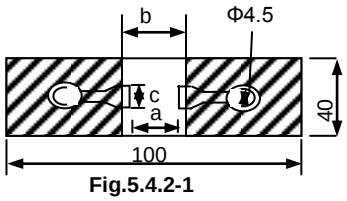
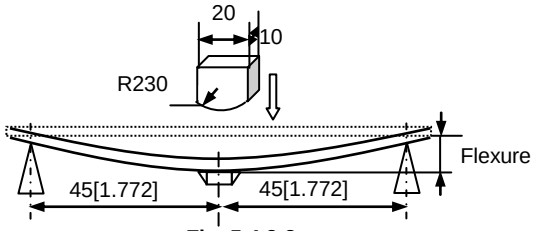
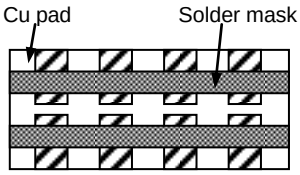


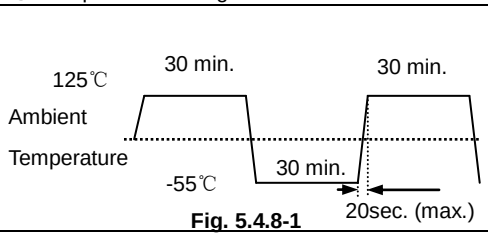
Fig. 5.3.3-2

e. In operating temperatures exceeding +85℃, derating of current is necessary for chip ferrite beads for which rated current is 800mA and over. Please apply the derating curve shown in chart according to the operating temperature.



5.4 Reliability Test

Items	Requirements	Test Methods and Remarks
5.4.1 Terminal Strength	No removal or split of the termination or other defects shall occur.  **Fig.5.4.1-1**	① Solder the bead to the testing jig (glass epoxy board shown in **Fig. 5.4.1-1**) using leadfree solder. Then apply a force in the direction of the arrow. ② 5N force for 1005 and 1608 series. ③ Keep time: 10±1s. ④ Speed: 1.0mm/s.
5.4.2 Resistance to Flexure	No visible mechanical damage. Unit: mm [inch] Type / a / b / c 1005[0402] / 0.4 / 1.5 / 0.5 1608[0603] / 1.0 / 3.0 / 1.2  **Fig.5.4.2-1**	① Solder the bead to the test jig (glass epoxy board shown in **Fig. 5.4.2-1**) Using a leadfree solder. Then apply a force in the direction shown **Fig. 5.4.2-2.** ② Flexure: 2mm. ③ Pressurizing Speed: 0.5mm/sec. ④ Keep time: 30 sec.  **Fig. 5.4.2-2**
5.4.3 Vibration	① No visible mechanical damage. ② Impedance change: within ±20%.  **Fig. 5.4.3-1**	① Solder the bead to the testing jig (glass epoxy board shown in **Fig.6.4.3-1**) using leadfree solder. ② The bead shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).
5.4.4 Dropping	① No visible mechanical damage. ② Impedance change: within ±20%.	Drop chip bead 10 times on a concrete floor from a height of 100 cm.
5.4.5 Temperature	Impedance change should be within ±20% of initial value measuring at 20℃.	Temperature range: -55℃ ~ +125℃ Reference temperature: +20℃
5.4.6 Solderability	① No visible mechanical damage. ② Wetting shall exceed 95% coverage.	① Solder temperature: 240±2℃ ② Duration: 3 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight.
5.4.7 Resistance to Soldering Heat	① No visible mechanical damage. ② Wetting shall exceed 95% coverage. ③ Impedance change: within ±20%.	① Solder temperature: 260±3℃ ② Duration: 5 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

5.4.8 Thermal Shock	① No mechanical damage. ② Impedance change: Within ±20%  **Fig. 5.4.8-1**	① Temperature, Time: (See **Fig.5.4.8-1**). -55℃ for 30±3 min→ 125℃ for 30±3min. ② Transforming interval: 20 sec. Max. ③ Tested cycle: 100 cycles. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.9 Resistance to Low Temperature	① No visible mechanical damage. ② Impedance change: within ±20%.	① Temperature: -55±2℃ ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.10 Resistance to High Temperature	① No mechanical damage. ② Impedance change: within ±20%.	① Temperature: 125±2℃ ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.11 Damp Heat (Steady States)	① No visible mechanical damage. ② Impedance change: within ±20%.	① Temperature: 60±2℃. ② Humidity: 90% to 95% RH. ③ Duration: 1000^{+24} hours. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.12 Loading Under Damp Heat	① No visible mechanical damage. ② Impedance change: within ±20%.	① Temperature: 60±2℃. ② Humidity: 90% to 95% RH. ③ Duration: 1000^{+24} hours. ④ Applied current: Rated current. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
5.4.13 Loading at High Temperature (Life Test)	① No visible mechanical damage. ② Impedance change: within ±20%.	① Temperature: 85±2℃ ② Duration: 1000^{+24} hours. ③ Applied current: Rated current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

6. Packaging and Storage

6.1 Packaging

Tape Carrier Packaging:

Packaging code: T

a. Tape carrier packaging are specified in attached figure **Fig. 6.1-1~3**

b. Tape carrier packaging quantity please see the following table:

Type	1005[0402]	1608[0603]
T(mm)	0.5±0.15	0.8±0.15
Tape	Paper Tape	Paper Tape
Quantity	10K	4K

(1) Taping Drawings (Unit: mm)

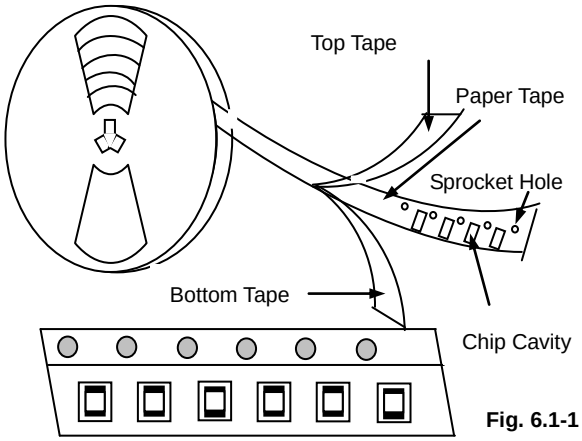


Fig. 6.1-1

Remark: The sprocket holes are to the right as the tape is pulled toward the user.

(2) Taping Dimensions (Unit: mm)

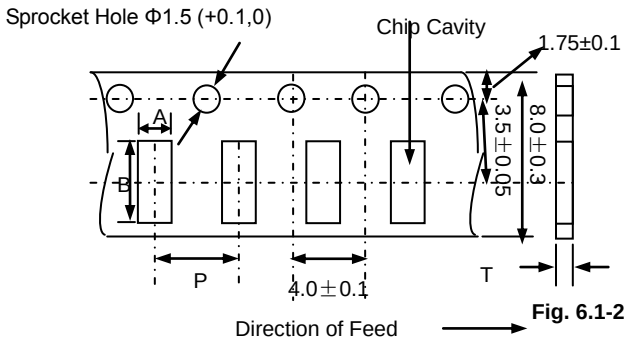


Fig. 6.1-2

Paper Tape

Type	A	B	P	T max
1005[0402]	0.65±0.1	1.15±0.1	2.0±0.05	0.8
1608[0603]	1.0±0.2	1.8±0.2	4.0±0.1	1.1

(3) Reel Dimensions (Unit: mm)

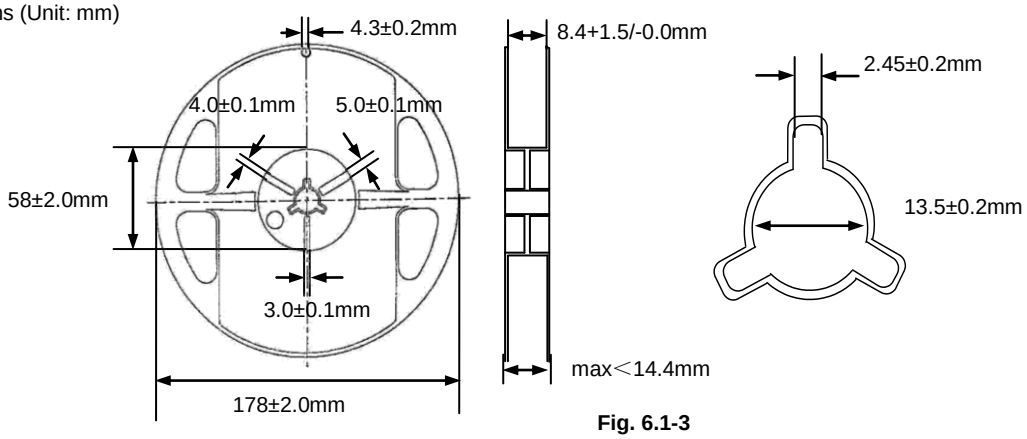


Fig. 6.1-3

6.2 Storage

a. The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Package must be stored at 40℃ or less and 70% RH or less.

b. The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust of harmful gas (e.g. HCl, sulfurous gas of H_2S).

c. Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.

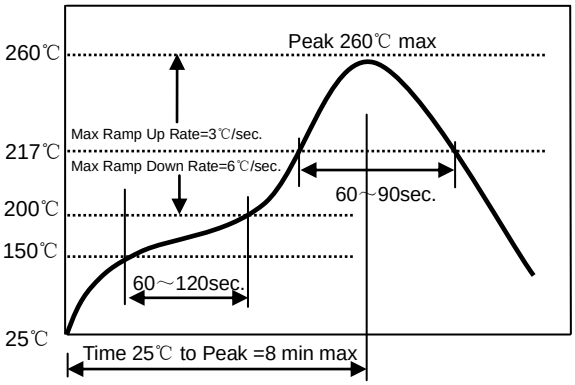
d. Solderability specified in **Clause 5.4.7** shall be guaranteed for 12 months from the date of delivery on condition that they are stored at the environment specified in **Clause 3** .For those parts, which passed more than12 months shall be checked solder-ability before use.

7. Recommended Soldering Technologies

7.1 Re-flowing Profile:

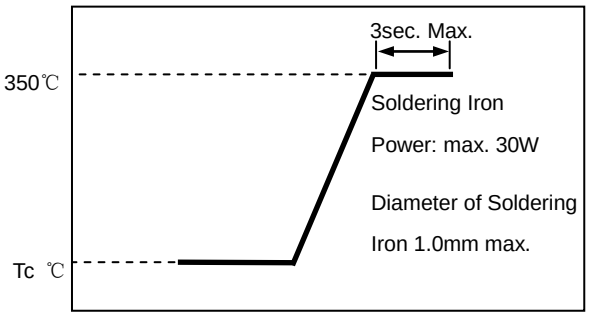
△ Preheat condition: 150 ~200℃/60~120sec.
△ Allowed time above 217℃: 60~90sec.
△ Max temp: 260℃
△ Max time at max temp: 10sec.
△ Solder paste: Sn/3.0Ag/0.5Cu
△ Allowed Reflow time: 2x max

[Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.]



△ Pre-heating: 150 ℃ / 60sec.
△ Soldering Tip temperature: 350℃ Max.
△ Soldering time: 3sec Max.
△ Solder paste: Sn/3.0Ag/0.5Cu
△ Max.1 times for iron soldering

[Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.]



Appendix A: Electrical Characteristics

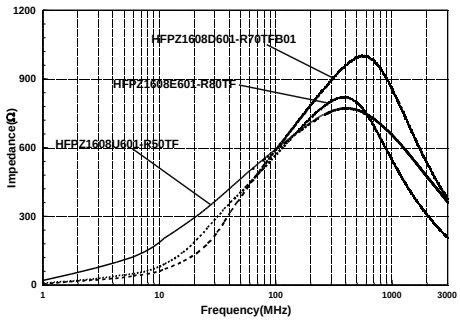
I. HFPZ1005 Series

Part Number	Impedance (Ω)		DCR (Ω) Max.	Ir (mA) Max.	Thickness (mm) [inch]
	@100MHz	@1GHz (Min.)			
HFPZ1005D121-R60TF	120±25%	100	0.25	600	0.5±0.15 [0.020±0.006]
HFPZ1005D221-R50TF	220±25%	300	0.38	500	
HFPZ1005U121-1R1TF	120±25%	100	0.13	1100	
HFPZ1005U221-R70TF	220±25%	250	0.25	700	

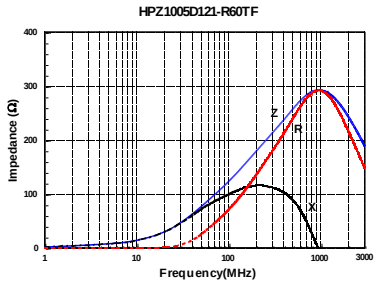
II. HFPZ1608 Series

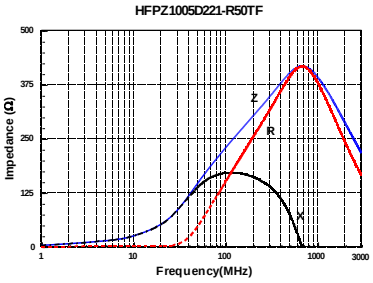
Part Number	Impedance (Ω)		DCR (Ω) Max.	Ir (mA) Max.	Thickness (mm) [inch]
	@100MHz	@1GHz (Min.)			
HFPZ1608G121-R90TFB01	120±25%	500	0.13	900	0.8±0.15 [0.031±0.006]
HFPZ1608D121-1R5TF	120±25%	200	0.07	1500	
HFPZ1608D151-1R5TF	150±25%	200	0.07	1500	
HFPZ1608D221-1R2TF	220±25%	300	0.12	1200	
HFPZ1608D331-R90TFB01	330±25%	380	0.15	900	
HFPZ1608D391-R70TF	390±25%	600	0.18	700	
HFPZ1608D471-R70TFB02	470±25%	550	0.22	700	
HFPZ1608D601-R70TFB01	600±25%	1000	0.24	700	
HFPZ1608D102-R60TF	1000±25%	1000	0.35	600	
HFPZ1608E601-R80TF	600±25%	500	0.25	800	
HFPZ1608E102-R60TF	1000±25%	600	0.35	600	
HFPZ1608E152-R50TF	1500±25%	1000	0.5	500	
HFPZ1608U101-2R0TF	100±25%	100	0.055	2000	
HFPZ1608U121-2R0TF	120±25%	110	0.055	2000	
HFPZ1608U221-R60TF	220±25%	220	0.25	600	
HFPZ1608U471-R50TF	470±25%	400	0.32	500	
HFPZ1608U601-R50TF	600±25%	450	0.35	500	
HFPZ1608U102-R15TF	1000±25%	750	0.9	150	

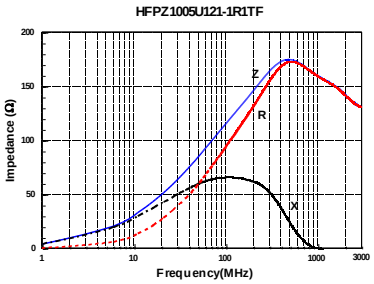
Impedance Frequency Characteristics



HFPZ1005 Series

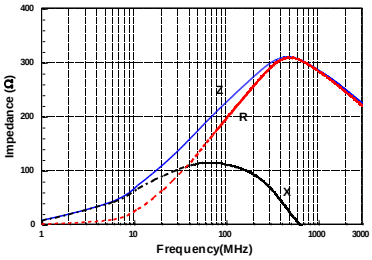






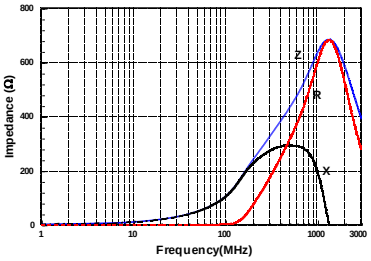
HFPZ1005 Series

HFPZ1005U221-R70TF

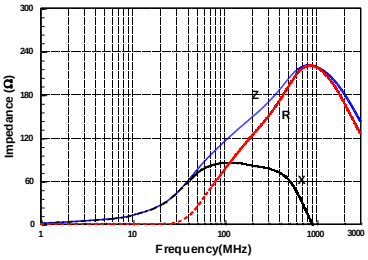


HFPZ1608 Series

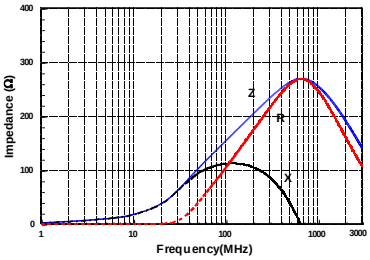
HFPZ1608G121-R90TFB01



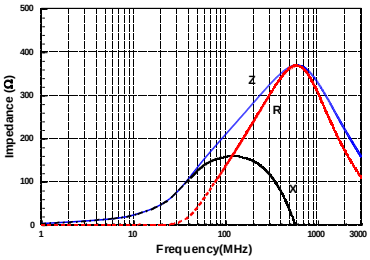
HFPZ1608D121-1R5TF



HFPZ1608D151-1R5TF



HFPZ1608D221-1R2TF



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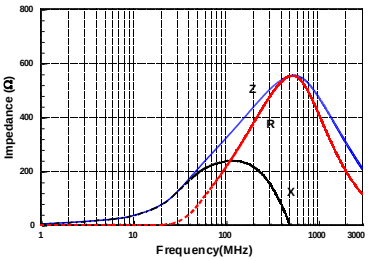

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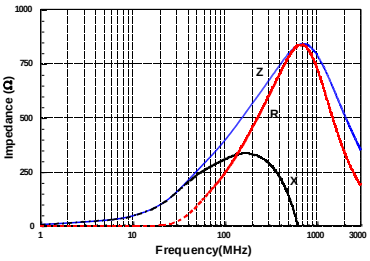

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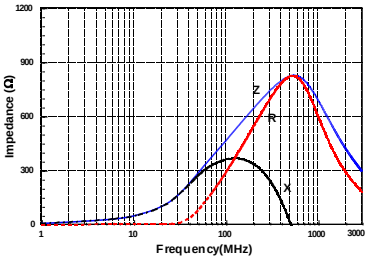

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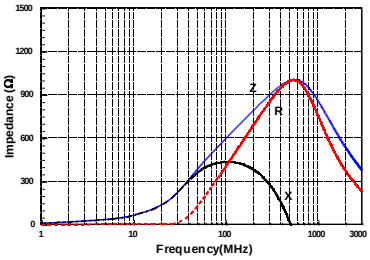

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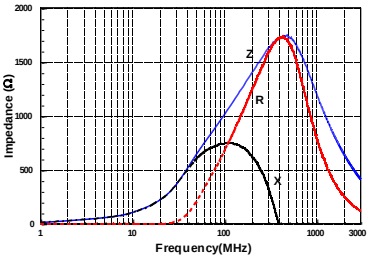

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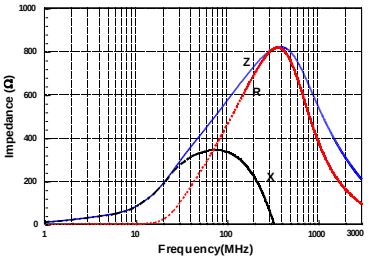

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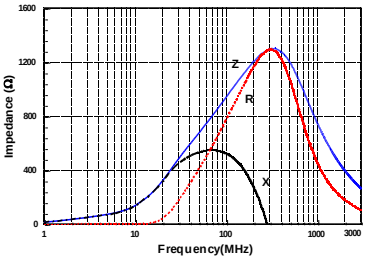

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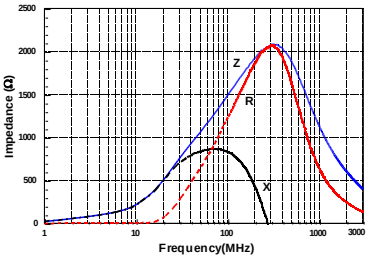

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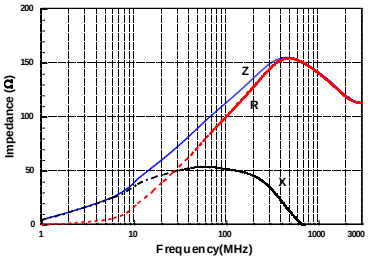

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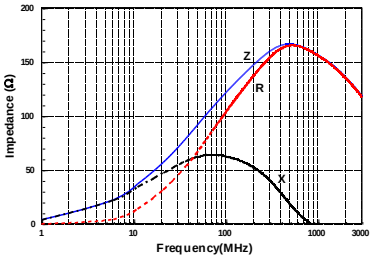

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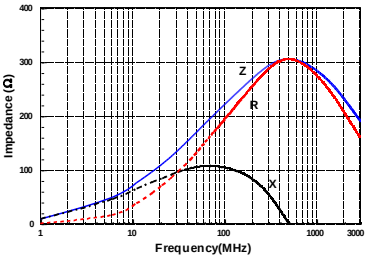

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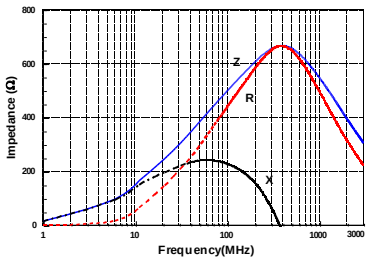

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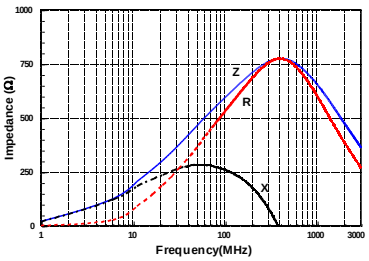

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