

SPECIFICATIONS

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

New Released, Revised]

SPEC No.: **SZ1001200000**

【This SPEC is total 14 pages including specifications and appendix.】

【ROHS, Halogen-Free and SVHC Compliant Parts】

Approved By	Checked By	Issued By

Shenzhen Sunlord Electronics Co., Ltd.

Address: Sunlord Industrial Park, Dafuyuan Industrial Zone, Baoan, Shenzhen, China 518110

Tel: 0086-755-29832333

Fax: 0086-755-82269029

E-Mail: sunlord@sunlordinc.com

【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 SZ series of multi-layer ferrite chip beads.

2. Product Description and Identification (Part Number)

- 1) Description:
SZ series of Multi-layer ferrite chip beads.
- 2) Product Identification (Part Number)

SZ ※※※※ ○ XXX ◎ F
 ① ② ③ ④ ⑤ ⑥

①	Type
SZ	For High Speed Signal

③	Material Code
	F, G, K, B

⑤	Packing
T	Tape Carrier Package

⑥	HSF Products
	Hazardous Substance Free Products

②	External Dimensions (L X W)[mm]
0603[0201]	0.6 X 0.3
1005 [0402]	1. 0X 0.5
1608 [0603]	1.6 X 0.8
2012 [0805]	2.0 X 1.25

④	Nominal Impedance
Example	Nominal Value
300	30Ω
121	120Ω

3. Electrical Characteristics

Please refer to Appendix A (Page 9~14).

- 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.

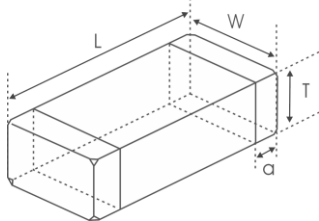


Fig. 4-1

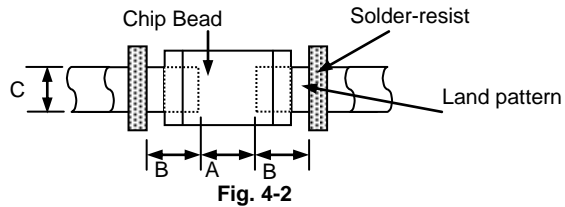


Fig. 4-2

[Table 4-1]

Unit: mm [inch]

Type	L	W	T	a	A	B	C
0603 [0201]	0.6±0.05 [.024±0.002]	0.3±0.05 [.012±.002]	0.3±0.05 [.012±.002]	0.15±0.05 [.006±.002]	0.2~0.3	0.2~0.3	0.3~0.35
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]	1.6±0.15 [0.063±0.006]	0.8±0.15 [0.031±0.006]	0.8±0.15 [0.031±0.006]	0.3±0.2 [0.012±0.008]	0.60~0.80	0.60~0.80	0.60~0.80
2012 [0805]	2.0 (+0.3, -0.1) [0.079(+0.012,-0.004)]	1.25±0.2 [0.049±0.008]	0.85±0.2 [0.033±0.008]	0.5±0.3 [0.020±0.012]	0.80~1.20	0.80~1.20	0.90~1.60

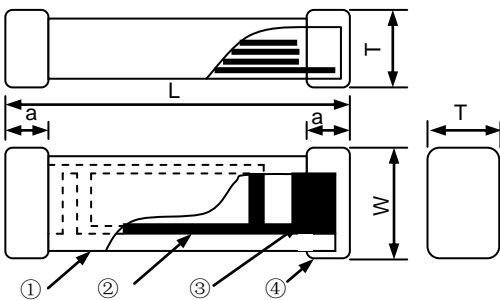


Fig. 4-3

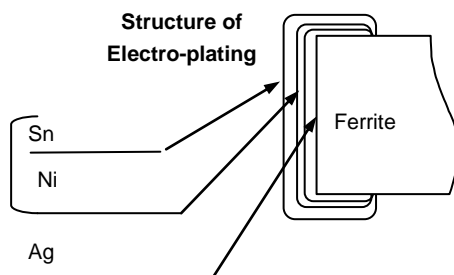


Fig. 4-4

- 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:

- Ambient Temperature: $20 \pm 15^\circ\text{C}$
- Relative Humidity: $65 \pm 20\%$
- Air Pressure: 86kPa to 106kPa

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

- Ambient Temperature: $20 \pm 2^\circ\text{C}$
- Relative Humidity: $65 \pm 5\%$
- Air Pressure: 86kPa to 106kPa

5.2 Visual Examination

- Inspection Equipment: 20x magnifier

5.3 Electrical Test

5.3.1 DC Resistance (DCR)

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

5.3.2 Impedance (Z)

- Refer to **Appendix A**.
- Test equipment: High Accuracy RF Impedance/Material Analyzer-E4991A or equivalent.
Test fixture: HP16197A for 0603; HP16192A for 1005, 1608, 2012.
Test signal: -20dBm or 50mV.
- Test frequency refers to **Appendix A**.

5.3.3 Rated Current

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

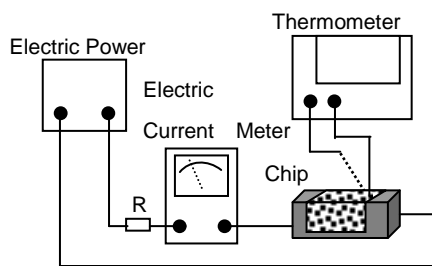


Fig. 5.3.3-1

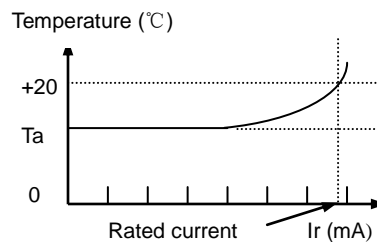
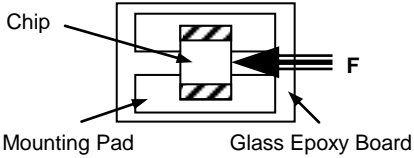
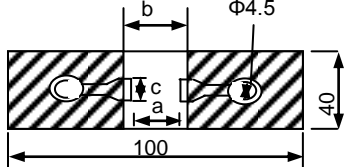
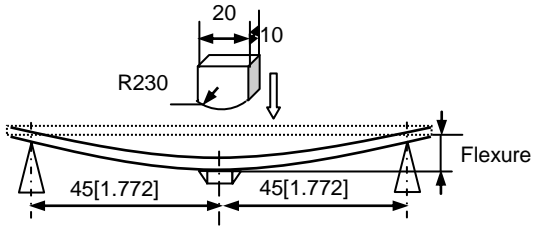
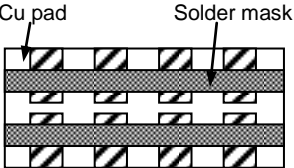
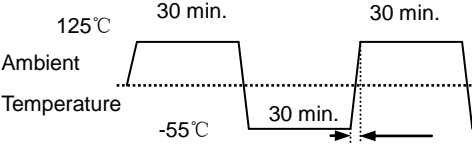


Fig. 5.3.3-2

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 2N force for 0603 series ③ 5N force for 1005 and 1608 series ④ 10N force for 2012 series ⑤ Keep time: 10±1s ⑥ Speed: 1.0mm/s																				
5.4.2 Resistance to Flexure	No visible mechanical damage. Unit: mm [inch] <table border="1" data-bbox="354 568 783 792"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>0603[0201]</td> <td>0.25</td> <td>0.8</td> <td>0.3</td> </tr> <tr> <td>1005[0402]</td> <td>0.4</td> <td>1.5</td> <td>0.5</td> </tr> <tr> <td>1608[0603]</td> <td>1.0</td> <td>3.0</td> <td>1.2</td> </tr> <tr> <td>2012[0805]</td> <td>1.2</td> <td>4.0</td> <td>1.65</td> </tr> </tbody> </table>  Fig. 5.4.2-1	Type	a	b	c	0603[0201]	0.25	0.8	0.3	1005[0402]	0.4	1.5	0.5	1608[0603]	1.0	3.0	1.2	2012[0805]	1.2	4.0	1.65	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
Type	a	b	c																			
0603[0201]	0.25	0.8	0.3																			
1005[0402]	0.4	1.5	0.5																			
1608[0603]	1.0	3.0	1.2																			
2012[0805]	1.2	4.0	1.65																			
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 1.5 mm, 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°C.	Temperature range: -55°C ~ 125°C. Reference temperature: +20°C.																				
5.4.6 Solderability	① No visible mechanical damage. ② Wetting shall exceed 75% coverage for 0603 series; exceed 95% for others	① Solder temperature: 240±2°C 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 75% coverage for 0603 series; exceed 95% for others ③ Impedance change: within ±20%.	① Solder temperature: 260±3°C 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°C for 30±3 min→125°C for 30±3min. ② Transforming interval: Max. 20 sec. 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 mechanical damage. ② Impedance change: within $\pm 20\%$.	① Temperature: $-55\pm 2^\circ\text{C}$ 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 visible mechanical damage. ② Impedance change: within $\pm 20\%$.	① Temperature: $125\pm 2^\circ\text{C}$ 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 $\pm 20\%$.	① Temperature: $60\pm 2^\circ\text{C}$. 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 $\pm 20\%$.	① Temperature: $60\pm 2^\circ\text{C}$. 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 $\pm 20\%$.	① Temperature: $125\pm 2^\circ\text{C}$ 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

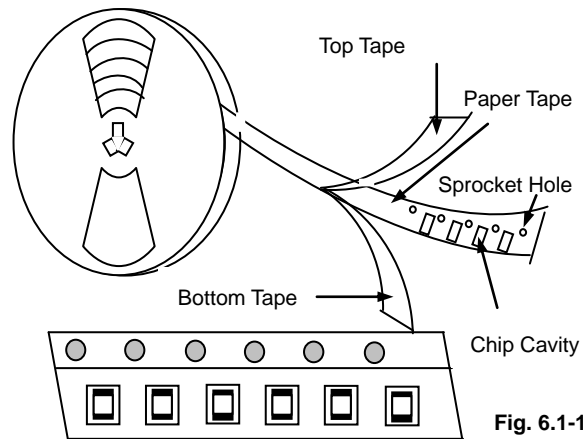
Tape Carrier Packaging:

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	0603[0201]	1005[0402]	1608[0603]	2012[0805]
T(mm)	0.3 ± 0.15	0.5 ± 0.15	0.8 ± 0.15	0.85 ± 0.2
Tape	Paper Tape	Paper Tape	Paper Tape	Paper Tape
Quantity	15K	10K	4K	4K

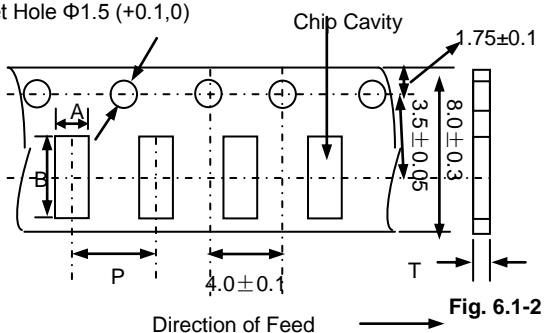
(1) Taping Drawings (Unit: mm)



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

(2) Taping Dimensions (Unit: mm)

Sprocket Hole $\Phi 1.5 (+0.1, 0)$



Paper Tape

Type	A	B	P	T max
0603[0201]	0.40 ± 0.1	0.70 ± 0.1	2.0 ± 0.1	0.55
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
2012[0805]	1.5 ± 0.2	2.3 ± 0.2	4.0 ± 0.1	1.1

(3) Reel Dimensions (Unit: mm)

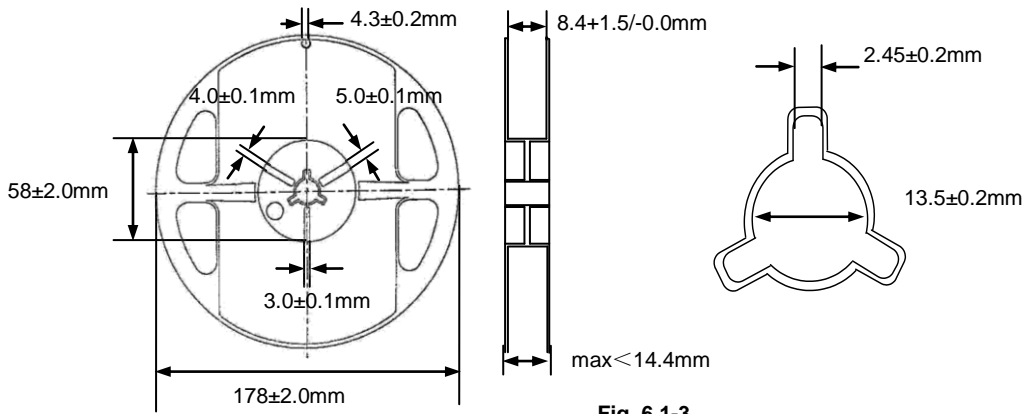


Fig. 6.1-3

6.2 Storage

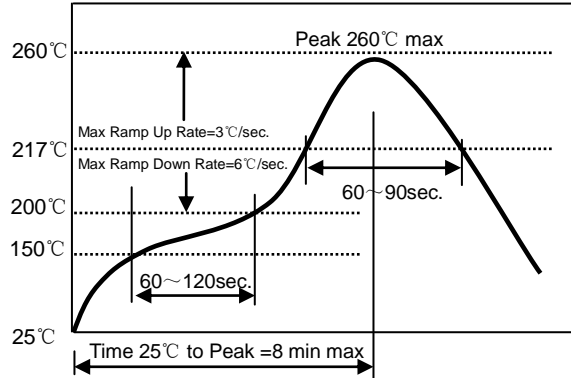
- a. The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Package must be stored at 40°C or less and 70% RH or less.
- b. The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust of harmful gas (e.g. HCl, sulfurous gas of H₂S).
- c. Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.
- d. Minimum packages, such as polyvinyl heat-seal packages shall not be opened until they are used. If opened, use the reels as soon as possible.
- e. Solderability of the products with external dimensions as 0603[0201] specified in **Clause 5.4.6** shall be guaranteed for 6months from the date of delivery on condition that they are stored at the environment specified in **Clause 3**. For those parts, which passed more than 6 months shall be checked solder-ability before use.
- f. Solderability of the products, except ones with external dimensions as 0603[0201], specified in **Clause 5.4.6** 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 than 12 months shall be checked solder-ability before use.

7. Recommended Soldering Technologies

7.1 Re-flowing Profile:

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

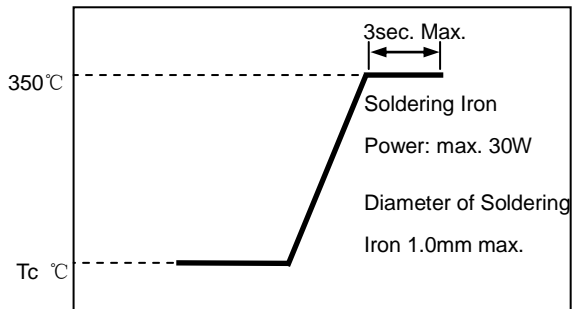
[Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.]



7.2 Iron Soldering Profile.

- △ Iron soldering power: Max.30W
- △ Pre-heating: 150 °C/60 sec.
- △ Soldering Tip temperature: 350°C 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. SZ0603 Series

Part Number	Impedance (Ω)	Z Test Freq. (MHz)	DCR (Ω) Max.	I _r (mA) Max.	Thickness (mm)[inch]
SZ0603G100TF	10 \pm 25%	100	0.25	200	0.3 \pm 0.05 [.012 \pm .002]
SZ0603G220TF	22 \pm 25%	100	0.45	200	
SZ0603G330TF	33 \pm 25%	100	0.55	150	
SZ0603G470TF	47 \pm 25%	100	0.70	150	
SZ0603G560TF	56 \pm 25%	100	1.00	100	
SZ0603G800TF	80 \pm 25%	100	1.30	100	
SZ0603G121TF	120 \pm 25%	100	1.50	100	

II SZ1005 Series

Part Number	Impedance (Ω)	Z Test Freq. (MHz)	DCR (Ω) Max.	I _r (mA) Max.	Thickness (mm)[inch]
SZ1005F050TF	0~10	100	0.10	300	0.5 \pm 0.15 [.020 \pm .006]
SZ1005F100TF	5~15	100	0.20	300	
SZ1005F330TF	33 \pm 25%	100	0.40	300	
SZ1005G050TF	0~15	100	0.15	600	
SZ1005G300TF	30 \pm 25%	100	0.15	600	
SZ1005G750TF	75 \pm 25%	100	0.30	600	
SZ1005G121TF	120 \pm 25%	100	0.40	400	
SZ1005G221TF	220 \pm 25%	100	0.70	200	
SZ1005K750TF	75 \pm 25%	100	0.30	600	
SZ1005K121TF	120 \pm 25%	100	0.40	400	
SZ1005K221TF	220 \pm 25%	100	0.70	200	
SZ1005K301TF	300 \pm 25%	100	0.80	200	
SZ1005K421TF	420 \pm 25%	100	1.00	150	
SZ1005K601TF	600 \pm 25%	100	1.10	100	
SZ1005K102TF	1000 \pm 25%	100	1.20	100	
SZ1005K152TF	1500 \pm 25%	100	1.40	100	
SZ1005K182TF	1800 \pm 25%	100	1.80	50	

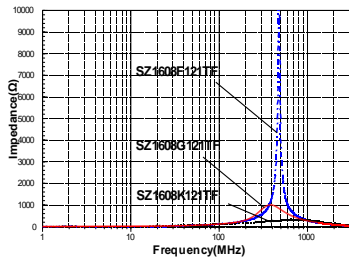
III . SZ1608 Series

Part Number	Impedance (Ω)	Z Test Freq. (MHz)	DCR (Ω) Max.	I _r (mA) Max.	Thickness (mm)[inch]
SZ1608F050TF	0~10	100	0.20	500	0.8 \pm 0.15 [.031 \pm .006]
SZ1608F100TF	5~15	100	0.25	500	
SZ1608F220TF	22 \pm 25%	100	0.35	500	
SZ1608F470TF	47 \pm 25%	100	0.55	300	
SZ1608F750TF	75 \pm 25%	100	0.70	300	
SZ1608F121TF	120 \pm 25%	100	0.90	200	
SZ1608G050TF	0~15	100	0.10	800	
SZ1608G220TF	22 \pm 25%	100	0.20	800	
SZ1608G600TF	60 \pm 25%	100	0.30	600	
SZ1608G121TF	120 \pm 25%	100	0.45	600	
SZ1608G221TF	220 \pm 25%	100	0.55	500	
SZ1608G331TF	330 \pm 25%	100	0.70	500	
SZ1608G471TF	470 \pm 25%	100	0.80	400	
SZ1608G601TF	600 \pm 25%	100	1.10	200	
SZ1608G102TF	1000 \pm 25%	100	1.20	150	
SZ1608K121TF	120 \pm 25%	100	0.40	600	
SZ1608K221TF	220 \pm 25%	100	0.45	500	
SZ1608K331TF	330 \pm 25%	100	0.50	500	
SZ1608K421TF	420 \pm 25%	100	0.55	400	
SZ1608K471TF	470 \pm 25%	100	0.55	400	
SZ1608K601TF	600 \pm 25%	100	0.60	200	
SZ1608K102TF	1000 \pm 25%	100	0.80	200	
SZ1608K152TF	1500 \pm 25%	100	0.80	200	
SZ1608K202TF	2000 \pm 25%	100	1.00	200	
SZ1608K222TF	2200 \pm 25%	100	1.00	200	
SZ1608K252TF	2500 \pm 25%	100	1.20	200	
SZ1608K272TF	2700 \pm 25%	100	1.40	200	

IV. SZ2012 Series

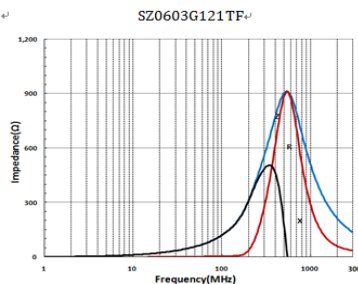
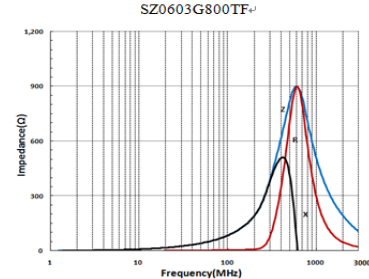
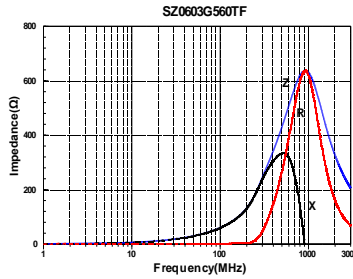
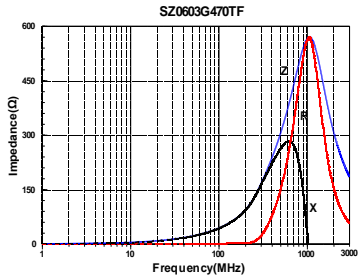
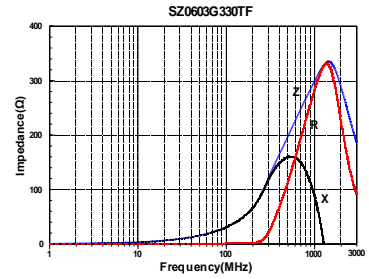
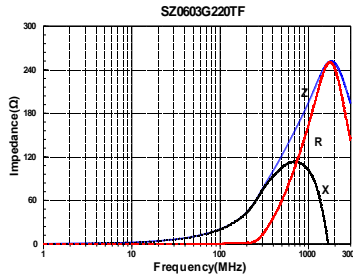
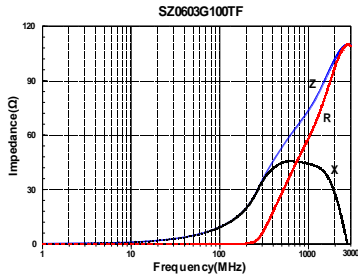
Part Number	Impedance (Ω)	Z Test Freq. (MHz)	DCR (Ω) Max.	I _r (mA) Max.	Thickness (mm)[inch]
SZ2012G050TF	0~15	100	0.07	1000	0.85±0.2 [0.033±0.008]
SZ2012G300TF	30±25%	100	0.10	1000	
SZ2012G600TF	60±25%	100	0.20	800	
SZ2012G121TF	120±25%	100	0.25	600	
SZ2012G221TF	220±25%	100	0.30	600	
SZ2012G421TF	420±25%	100	0.40	600	
SZ2012G601TF	600±25%	100	0.45	600	
SZ2012G102TF	1000±25%	100	0.50	500	
SZ2012K121TF	120±25%	100	0.20	600	
SZ2012K221TF	220±25%	100	0.25	600	
SZ2012K301TF	300±25%	100	0.30	600	
SZ2012K601TF	600±25%	100	0.35	600	
SZ2012K102TF	1000±25%	100	0.40	500	
SZ2012K152TF	1500±25%	100	0.45	200	
SZ2012K222TF	2200±25%	100	0.60	200	
SZ2012K252TF	2500±25%	100	0.70	200	
SZ2012K272TF	2700±25%	100	0.80	200	

F, G, K Material Comparison

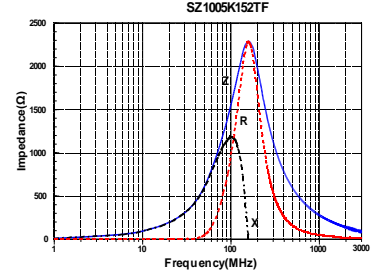
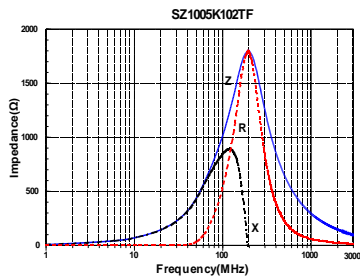
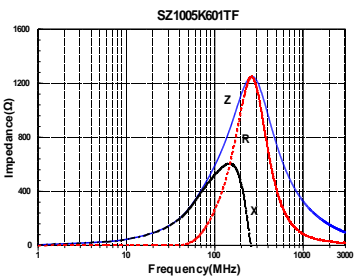
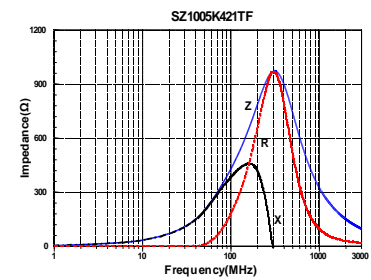
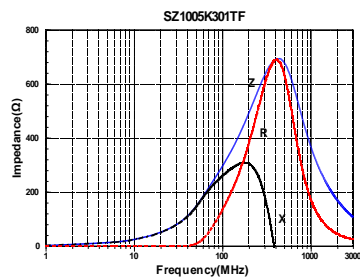
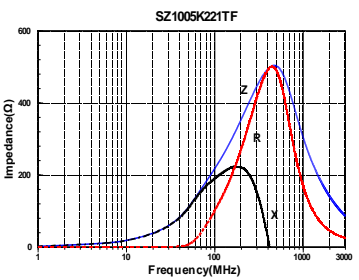
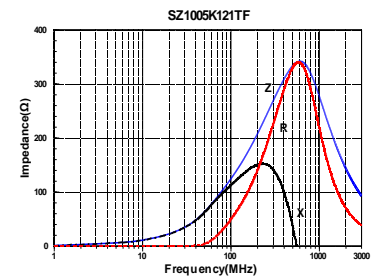
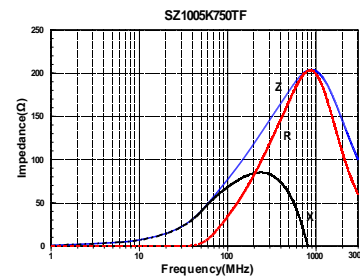
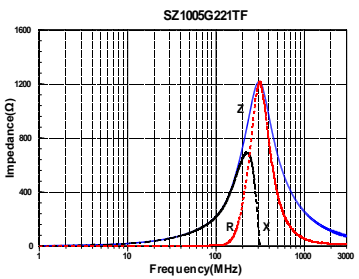
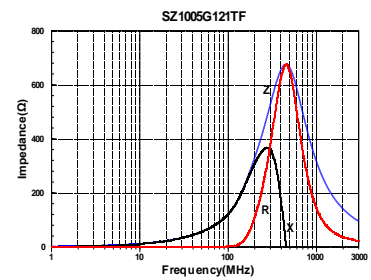
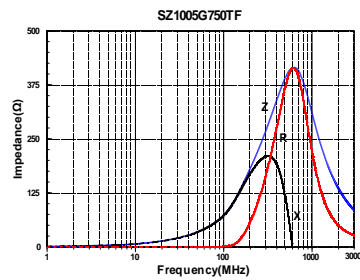
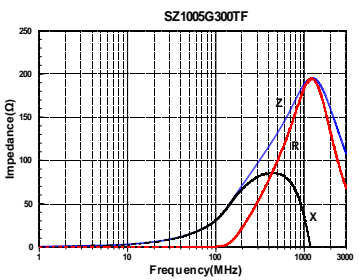
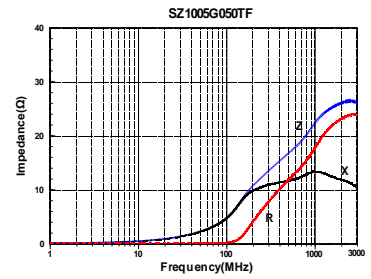
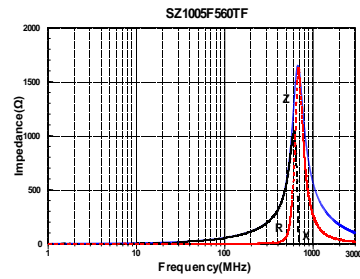
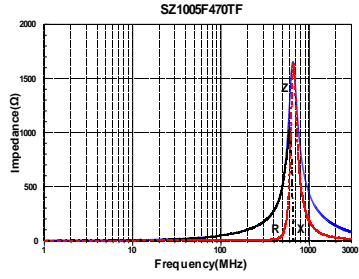
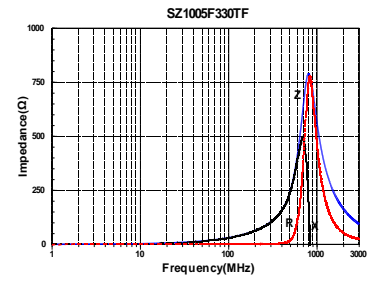
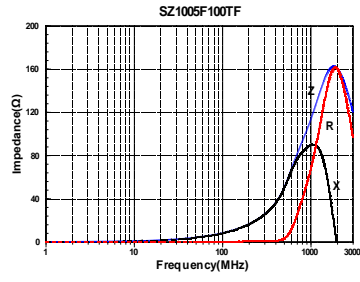
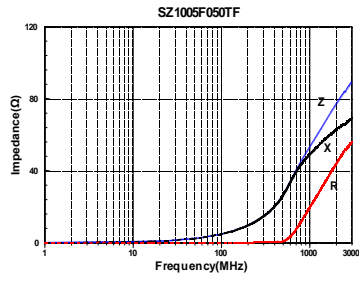


Impedance Frequency Characteristics

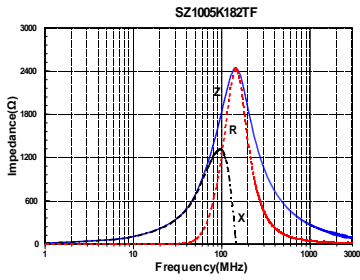
SZ0603 Series



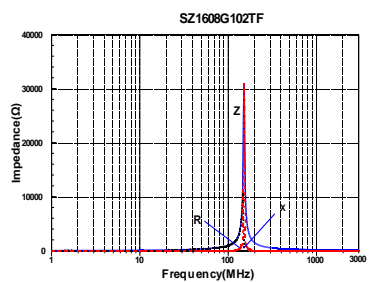
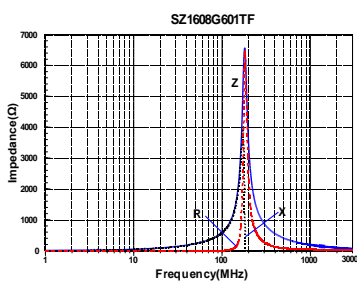
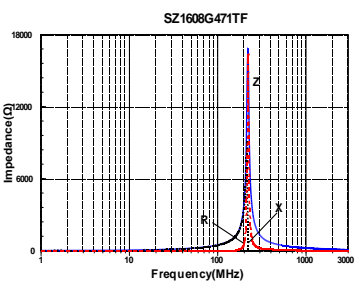
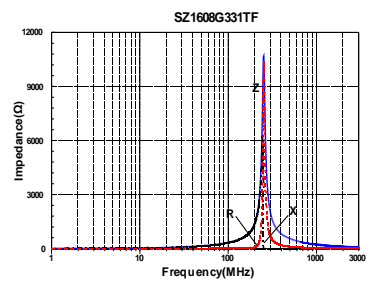
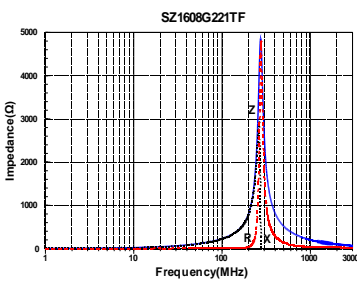
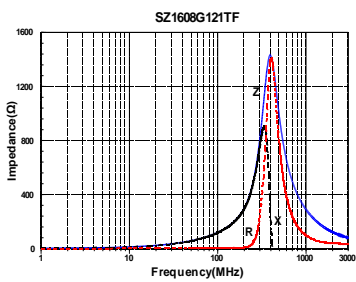
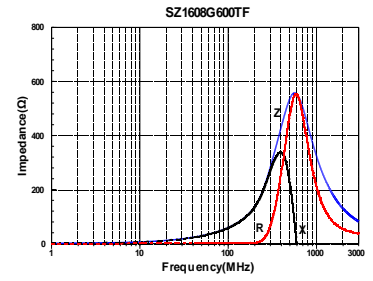
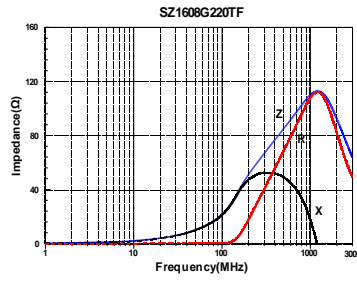
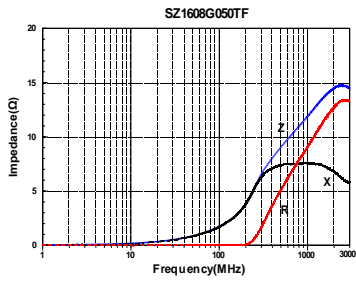
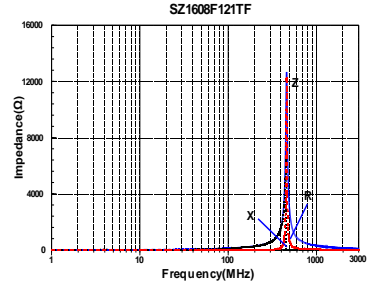
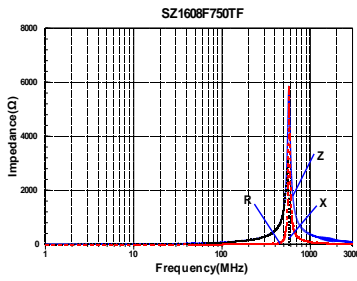
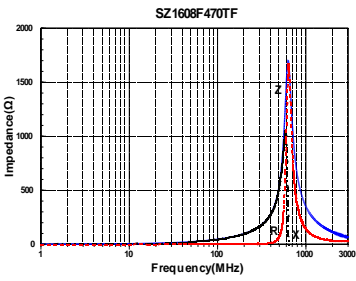
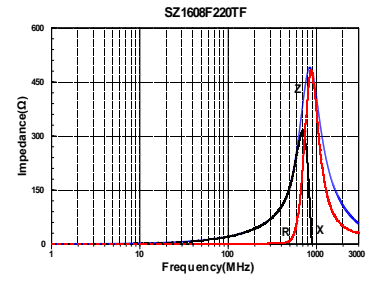
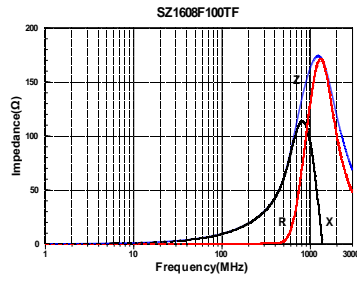
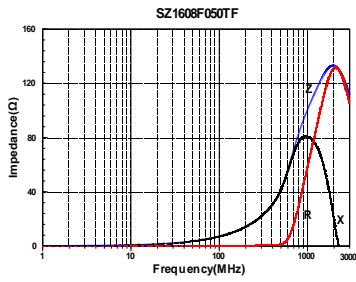
SZ1005 Series



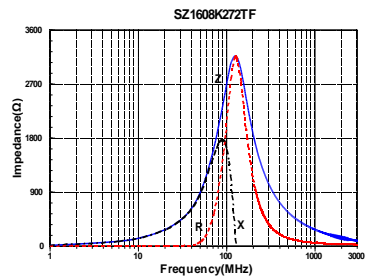
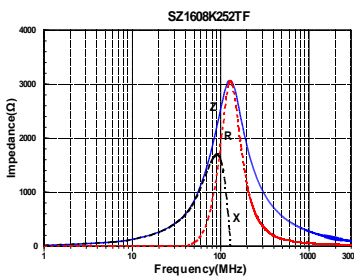
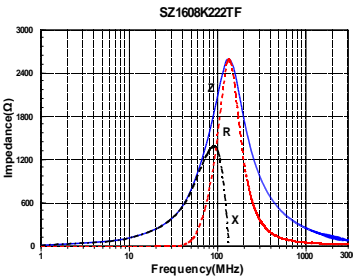
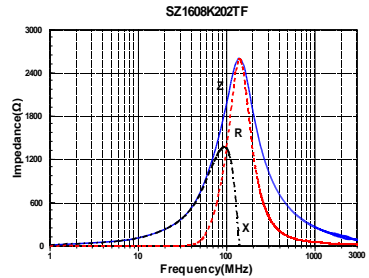
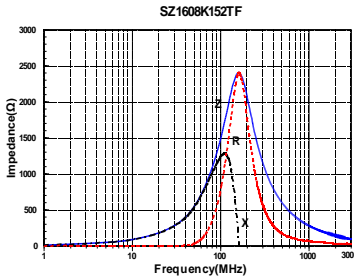
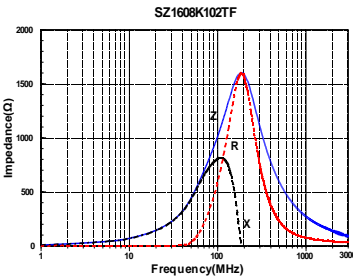
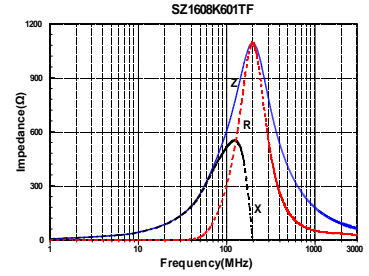
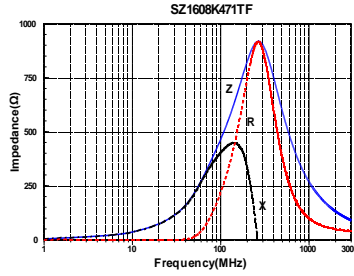
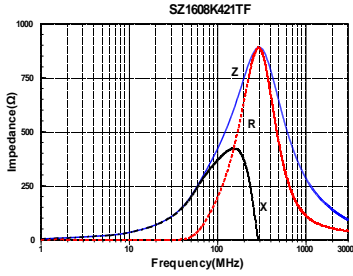
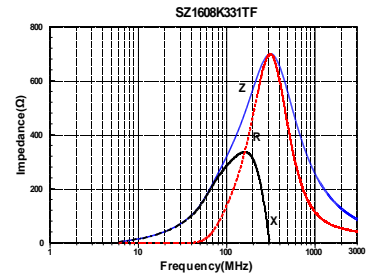
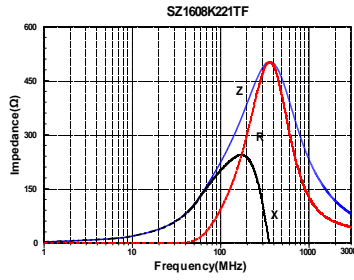
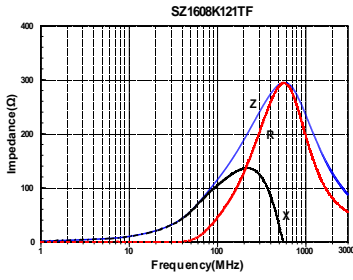
SZ1005 Series



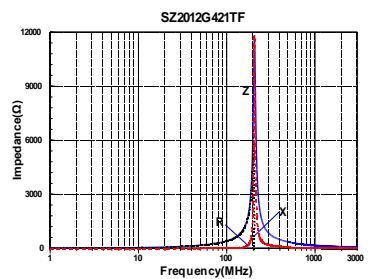
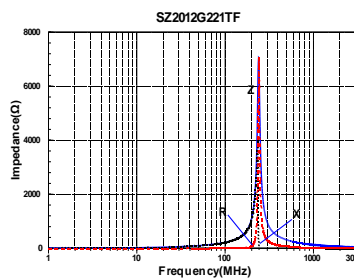
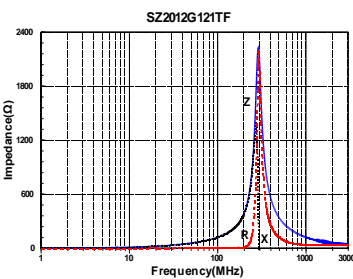
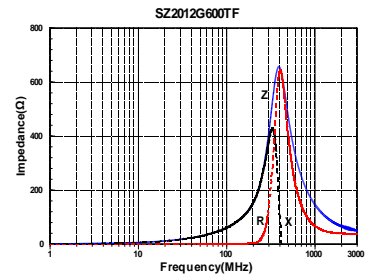
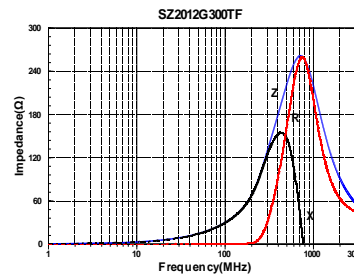
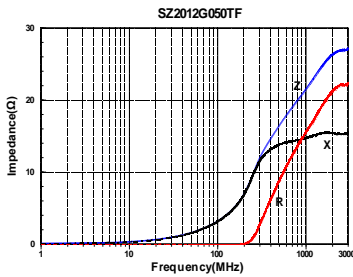
SZ1608 Series



SZ1608 Series



SZ2012 Series



SZ2012 Series

