

# Multi Layer Ferrite Chip Beads

## Type CZB

ISO 9001:2000  
TS-16949

### 1. General

- Designed to reduce noise at high frequencies
- Standard EIA Packages: 1E, 1J, 2A, 2B
- Nickel barrier with solder overcoat for excellent solderability
- Magnetically shielded

### 2. Dimensions

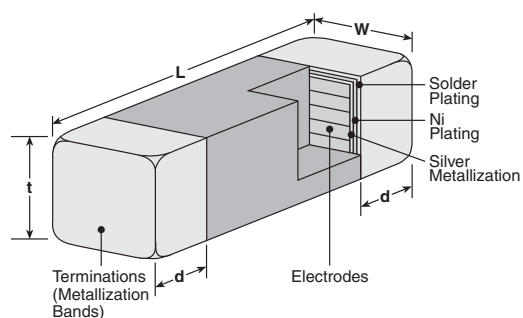


Table 1

| Dimensions - inches (mm)   |                            |                            |                            |                            |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Part                       | L                          | W                          | t                          | d                          |
| <b>1E</b><br><b>(0402)</b> | 0.039±0.004<br>(1.00±0.10) | 0.020±0.004<br>(0.50±0.10) | 0.020±0.004<br>(0.50±0.10) | 0.010±0.004<br>(0.25±0.10) |
| <b>1J</b><br><b>(0603)</b> | 0.063±0.006<br>(1.60±0.15) | 0.031±0.006<br>(0.80±0.15) | 0.031±0.006<br>(0.80±0.15) | 0.014±0.006<br>(0.36±0.15) |
| <b>2A</b><br><b>(0805)</b> | 0.079±0.008<br>(2.00±0.20) | 0.049±0.008<br>(1.25±0.20) | 0.035±0.008<br>(0.90±0.20) | 0.020±0.010<br>(0.51±0.25) |
| <b>2B</b><br><b>(1206)</b> | 0.126±0.008<br>(3.20±0.20) | 0.063±0.008<br>(1.60±0.20) | 0.043±0.008<br>(1.10±0.20) | 0.020±0.010<br>(0.51±0.25) |

### 3. Type Designation

The type designation shall be in the following form:

| <b>CZB</b> | <b>1E</b>            | <b>G</b>          | <b>T</b>             | <b>TP</b>                                                                                                                                                                                                           | <b>120</b>                                 | <b>P</b>  |
|------------|----------------------|-------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------|
| Type       | Size                 | Permeability Code | Termination Material | Packaging                                                                                                                                                                                                           | Impedance                                  | Tolerance |
|            | 1E<br>1J<br>2A<br>2B | F<br>G<br>S       | T: Sn                | TP: 7" Paper Tape<br>(1E only - 10,000 pcs/reel)<br>TD: 7" Paper Tape<br>(1J - 4,000 pcs/reel)<br>(2A - 0.70Ω-2.02Ω - 4,000<br>pcs/reel; 2.22Ω - 2,000 pcs/reel<br>TE: 7" Embossed Plastic<br>(2B - 3,000 pcs/reel) | 2 significant<br>figures + 1<br>multiplier | P: ±25%   |

## 4. Standard Applications

| Part Designation | Impedance<br>@ 100MHz †<br>(Ω) | DC Resistance<br>Maximum ††<br>(Ω) | Allowable<br>DC Current<br>Maximum<br>(mA) | Operating<br>Temperature<br>Range |
|------------------|--------------------------------|------------------------------------|--------------------------------------------|-----------------------------------|
| CZB1EGTTP100P    | 10                             | 0.05                               | 500                                        | -55°C to +125°C                   |
| CZB1EGTTP700P    | 70                             | 0.40                               | 200                                        |                                   |
| CZB1EGTTP121P    | 120                            | 0.50                               |                                            |                                   |
| CZB1EGTTP221P    | 220                            | 0.70                               |                                            |                                   |
| CZB1EGTTP301P    | 300                            | 0.80                               |                                            |                                   |
| CZB1EGTTP451P    | 450                            | 0.90                               | 100                                        |                                   |
| CZB1EGTTP601P    | 600                            | 1.00                               |                                            |                                   |
| CZB1EGTTP102P    | 1000                           | 1.50                               | 50                                         |                                   |
| CZB1JGTTD300P    | 30                             | 0.10                               | 400                                        | -55°C to +125°C                   |
| CZB1JGTTD400P    | 40                             |                                    |                                            |                                   |
| CZB1JGTTD600P    | 60                             | 0.20                               | 300                                        |                                   |
| CZB1JGTTD800P    | 80                             |                                    |                                            |                                   |
| CZB1JGTTD900P    | 90                             |                                    |                                            |                                   |
| CZB1JGTTD101P    | 100                            |                                    |                                            |                                   |
| CZB1JGTTD121P    | 120                            | 0.30                               |                                            |                                   |
| CZB1JGTTD141P    | 140                            |                                    |                                            |                                   |
| CZB1JGTTD151P    | 150                            |                                    | 300                                        |                                   |
| CZB1JGTTD181P    | 180                            |                                    |                                            |                                   |
| CZB1JGTTD221P    | 220                            |                                    |                                            |                                   |
| CZB1JGTTD301P    | 300                            | 0.35                               | 250                                        |                                   |
| CZB1JGTTD421P    | 420                            | 0.40                               | 210                                        |                                   |
| CZB1JGTTD451P    | 450                            |                                    | 250                                        |                                   |
| CZB1JGTTD601P    | 600                            | 0.45                               | 210                                        |                                   |
| CZB1JGTTD102P    | 1000                           | 0.60                               | 200                                        |                                   |
| CZB1JGTTD152P    | 1500                           | 0.70                               | 100                                        |                                   |
| CZB1JGTTD202P    | 2000                           | 0.80                               | 50                                         |                                   |
| CZB1JSTTD180P    | 18                             | 0.10                               | 400                                        |                                   |
| CZB1JSTTD300P    | 30                             | 0.25                               |                                            |                                   |
| CZB1JSTTD600P    | 60                             | 0.30                               | 300                                        |                                   |
| CZB1JSTTD121P    | 120                            | 0.40                               |                                            |                                   |
| CZB1JSTTD151P    | 150                            |                                    |                                            |                                   |
| CZB1JSTTD221P    | 220                            |                                    |                                            |                                   |
| CZB1JSTTD301P    | 300                            | 0.35                               |                                            |                                   |
| CZB1JSTTD421P    | 420                            |                                    | 200                                        |                                   |
| CZB1JSTTD601P    | 600                            | 0.65                               |                                            |                                   |
| CZB1JSTTD102P    | 1000                           | 0.60                               |                                            |                                   |
| CZB2AFTTD070P    | 7                              | 0.10                               | 800                                        | -55°C to +125°C                   |
| CZB2AFTTD110P    | 11                             |                                    |                                            |                                   |
| CZB2AFTTD170P    | 17                             |                                    |                                            |                                   |
| CZB2AFTTD300P    | 30                             |                                    |                                            |                                   |
| CZB2AFTTD400P    | 40                             |                                    |                                            |                                   |
| CZB2AFTTD500P    | 50                             |                                    |                                            |                                   |
| CZB2AFTTD600P    | 60                             |                                    |                                            |                                   |
| CZB2AFTTD800P    | 80                             | 0.15                               | 600                                        |                                   |
| CZB2AGTTD101P    | 100                            |                                    |                                            |                                   |

<sup>†</sup> Impedance test method: HP4291A

<sup>††</sup> DCR test method: Keithley 580

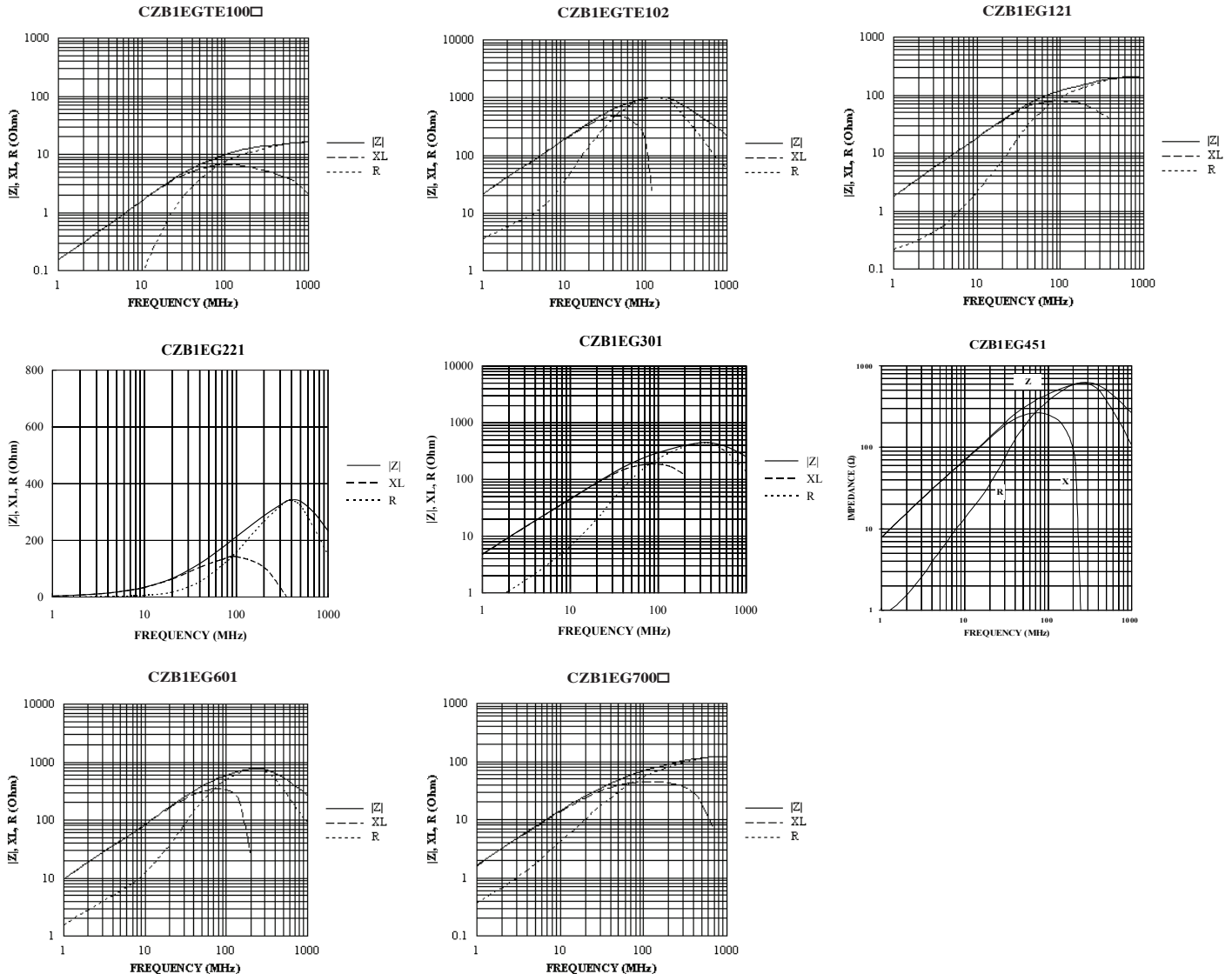
## 4. Standard Applications (continued)

| Part Designation | Impedance @ 100MHz † (Ω) | DC Resistance Maximum †† (Ω) | Allowable DC Current Maximum (mA) | Operating Temperature Range |                 |      |  |  |
|------------------|--------------------------|------------------------------|-----------------------------------|-----------------------------|-----------------|------|--|--|
| CZB2AGTTD121P    | 120                      | 0.15                         | 600                               | -55°C to +125°C             |                 |      |  |  |
| CZB2AGTTD151P    | 150                      | 0.25                         | 400                               |                             |                 |      |  |  |
| CZB2AGTTD201P    | 200                      | 0.30                         | 200                               |                             |                 |      |  |  |
| CZB2AGTTD221P    | 220                      |                              | 300                               |                             |                 |      |  |  |
| CZB2AGTTD301P    | 300                      |                              |                                   |                             |                 |      |  |  |
| CZB2AGTTD601P    | 600                      |                              |                                   |                             |                 |      |  |  |
| CZB2AGTTD601PV   | 600                      | 0.25                         | 500                               |                             |                 |      |  |  |
| CZB2AGTTD102P    | 1000                     | 0.40                         | 200                               |                             |                 |      |  |  |
| CZB2AGTTD152P    | 1500                     | 0.55                         |                                   |                             |                 |      |  |  |
| CZB2AGTTD202P    | 2000                     | 0.60                         |                                   |                             |                 |      |  |  |
| CZB2AGTTD222P    | 2200                     | 0.80                         |                                   |                             |                 |      |  |  |
| CZB2ASTTD300P    | 30                       | 0.20                         | 500                               |                             |                 |      |  |  |
| CZB2ASTTD600P    | 60                       |                              |                                   |                             |                 |      |  |  |
| CZB2ASTTD121P    | 120                      | 0.25                         | 300                               |                             |                 |      |  |  |
| CZB2ASTTD201P    | 200                      | 0.35                         |                                   |                             |                 |      |  |  |
| CZB2ASTTD221P    | 220                      | 0.25                         | 200                               |                             |                 |      |  |  |
| CZB2ASTTD301P    | 300                      | 0.35                         | 300                               |                             |                 |      |  |  |
| CZB2ASTTD601P    | 600                      | 0.40                         | 200                               |                             |                 |      |  |  |
| CZB2ASTTD102P    | 1000                     | 0.60                         |                                   |                             |                 |      |  |  |
| CZB2BFTTE190P    | 19                       | 0.10                         | 800                               |                             | -55°C to +125°C |      |  |  |
| CZB2BFTTE260P    | 26                       |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE300P    | 30                       |                              |                                   | 500                         |                 |      |  |  |
| CZB2BFTTE310P    | 31                       |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE500P    | 50                       |                              |                                   |                             |                 | 0.20 |  |  |
| CZB2BFTTE600P    | 60                       |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE700P    | 70                       |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE800P    | 80                       |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE900P    | 90                       |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE101P    | 100                      |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE121P    | 120                      | 0.15                         | 400                               |                             |                 |      |  |  |
| CZB2BFTTE151P    | 150                      |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE201P    | 200                      |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE301P    | 300                      |                              |                                   |                             |                 |      |  |  |
| CZB2BFTTE601P    | 600                      | 0.40                         | 300                               |                             |                 |      |  |  |
| CZB2BGTTE102P    | 1000                     | 0.60                         | 200                               |                             |                 |      |  |  |
| CZB2BGTTE152P    | 1500 @ 50MHz             | 0.70                         |                                   |                             |                 |      |  |  |
| CZB2BGTTE202P    | 2000 @ 30MHz             |                              |                                   |                             |                 |      |  |  |
| CZB2BGTTE222P    | 2200 @ 50MHz             |                              |                                   | 1.00                        |                 |      |  |  |
| CZB2BSTTE190P    | 19                       | 0.10                         | 600                               |                             |                 |      |  |  |
| CZB2BSTTE121P    | 120                      | 0.25                         | 300                               |                             |                 |      |  |  |
| CZB2BSTTE301P    | 300                      | 0.30                         | 250                               |                             |                 |      |  |  |
| CZB2BSTTE601P    | 600                      |                              |                                   |                             |                 |      |  |  |
| CZB2BSTTE102P    | 1000                     |                              |                                   | 0.55                        |                 | 200  |  |  |

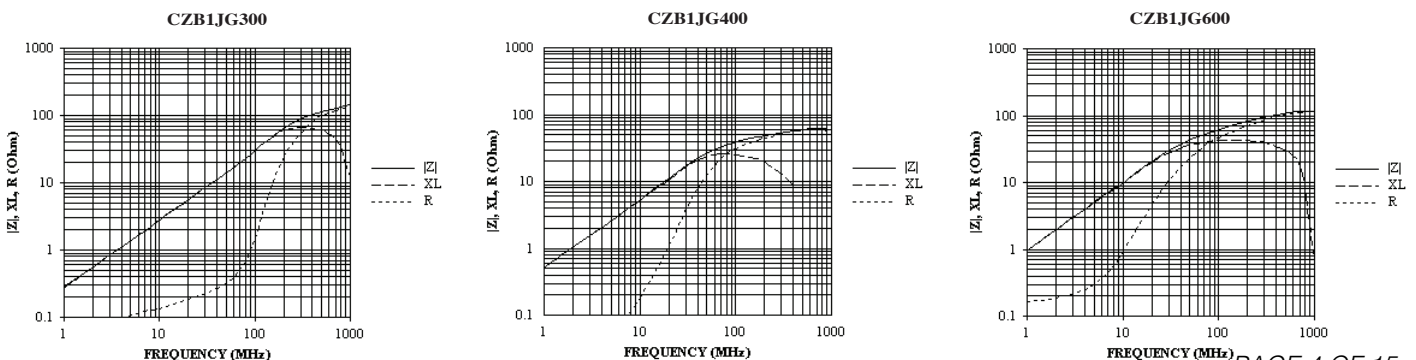
<sup>†</sup> Impedance test method: HP4291A

<sup>††</sup> DCR test method: Keithley 580

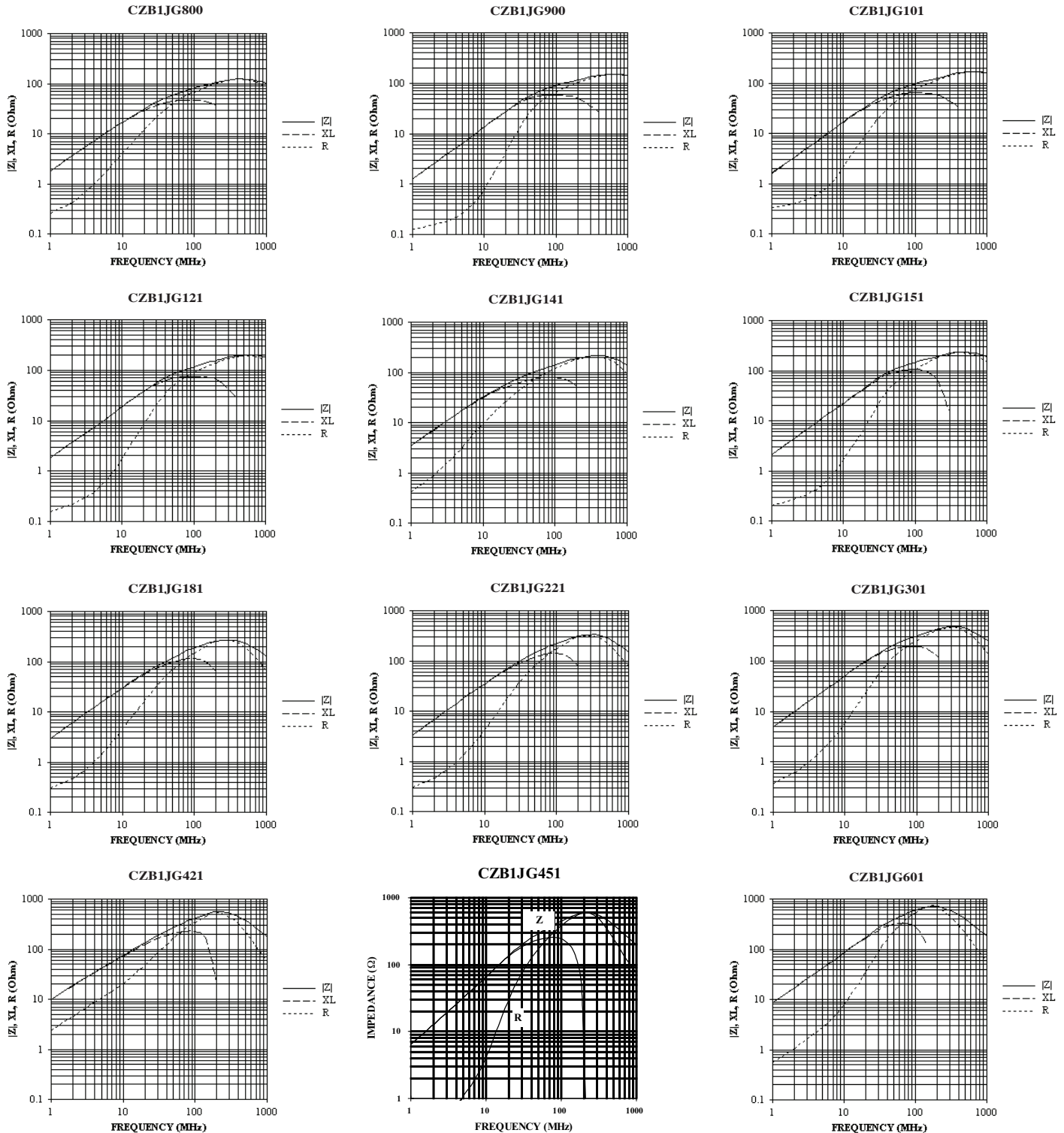
## 5. 0402 Graphs



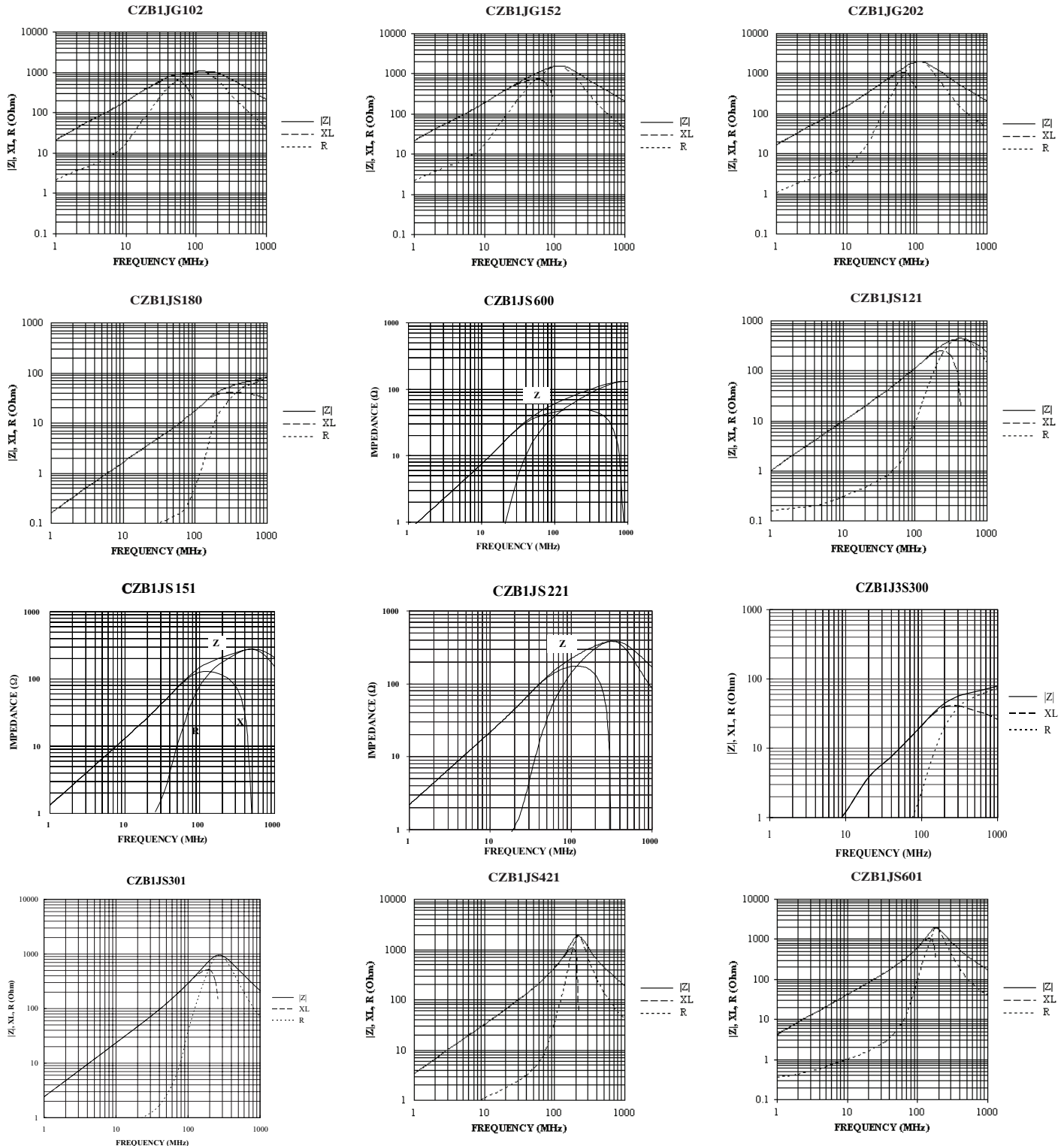
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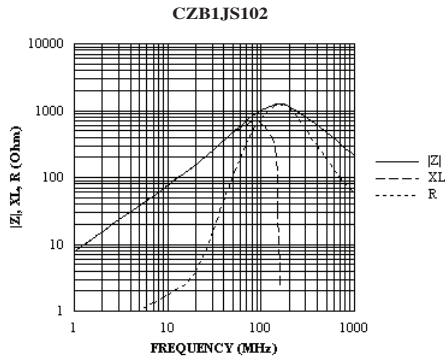
## 5. 0603 Graphs (continued)



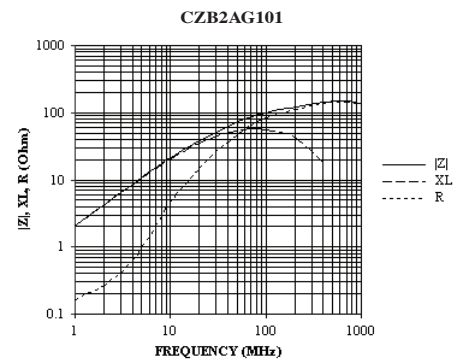
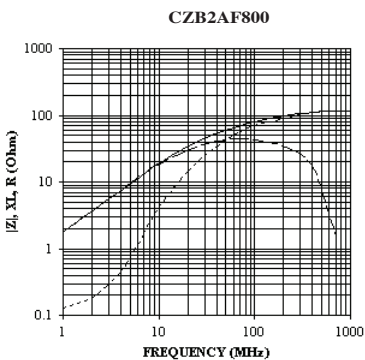
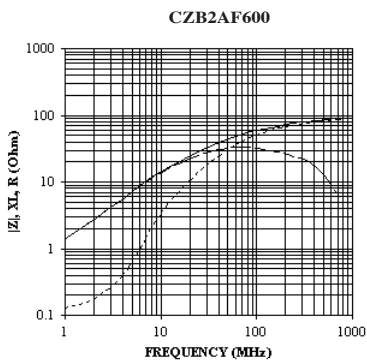
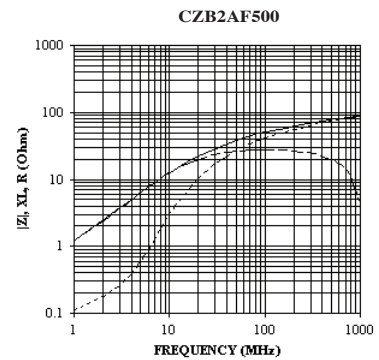
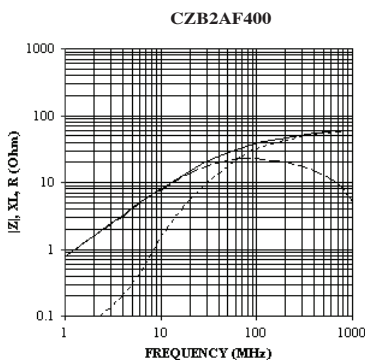
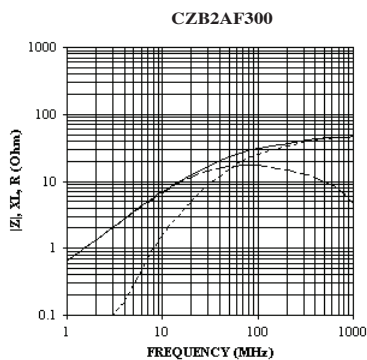
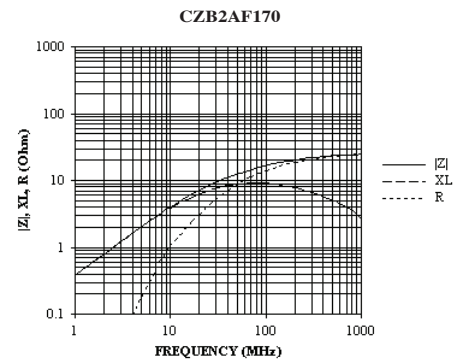
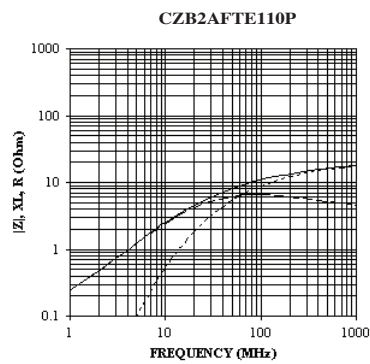
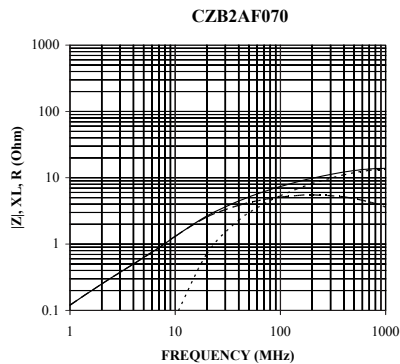
## 5. 0603 Graphs (continued)



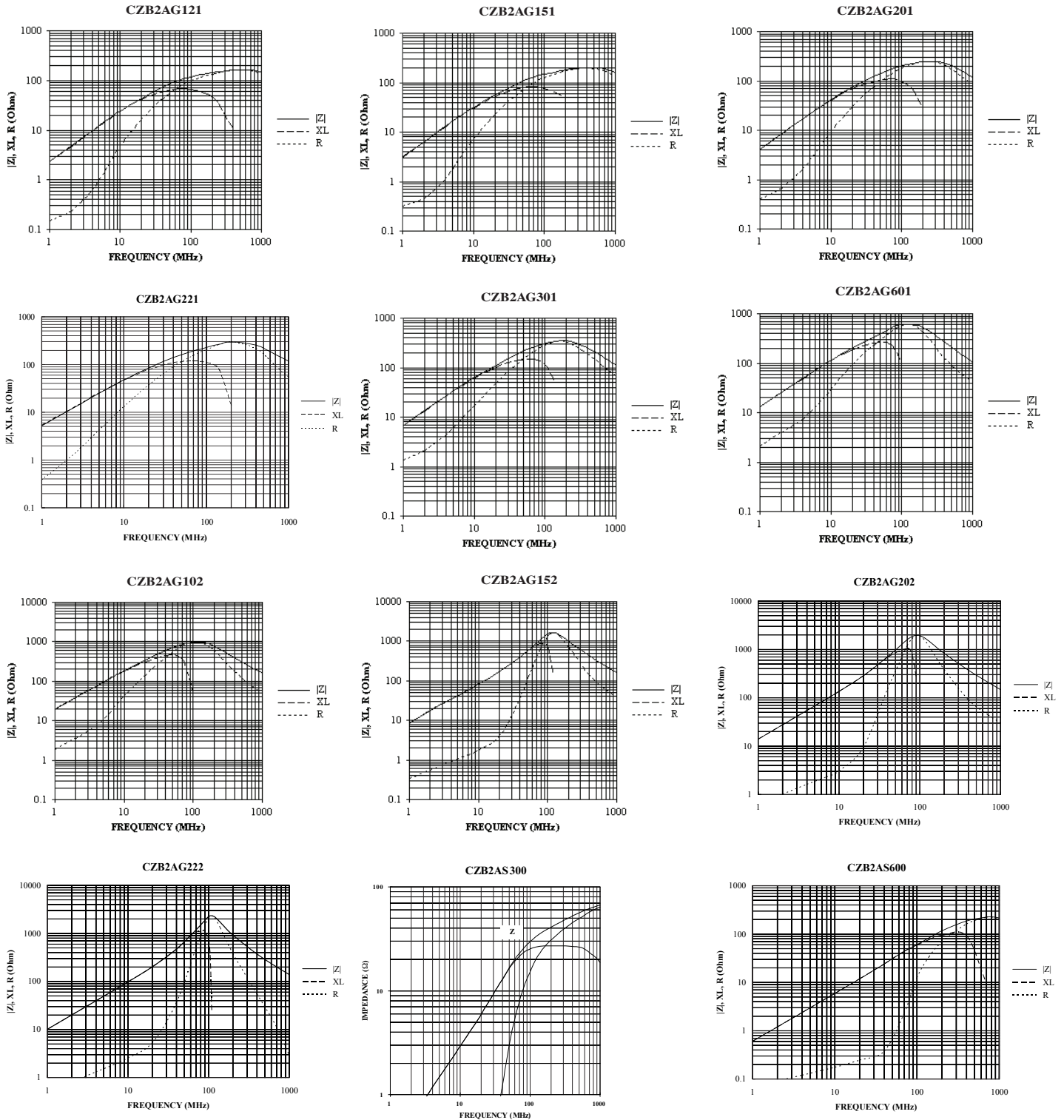
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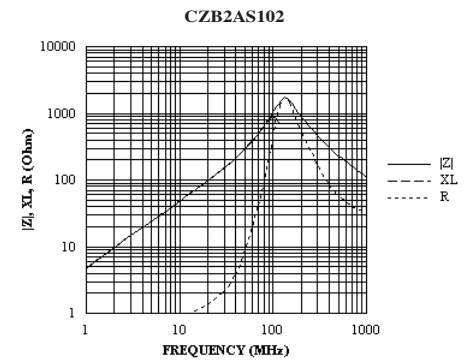
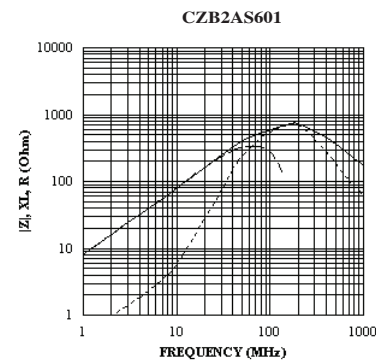
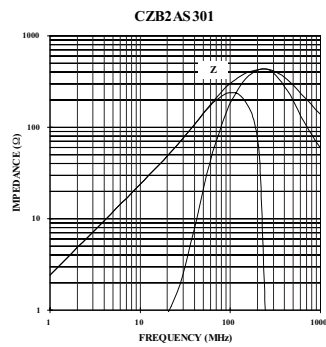
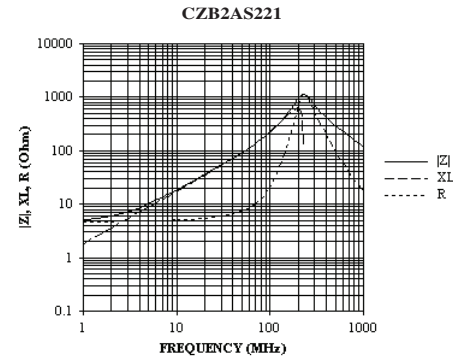
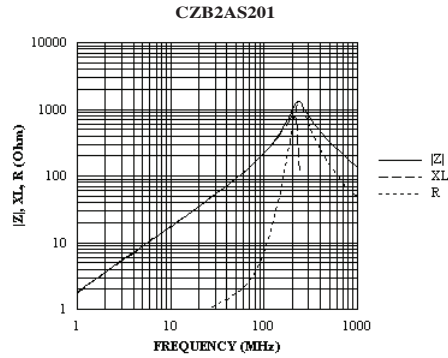
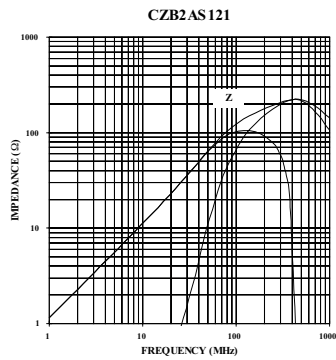
## 5. 0805 Graphs



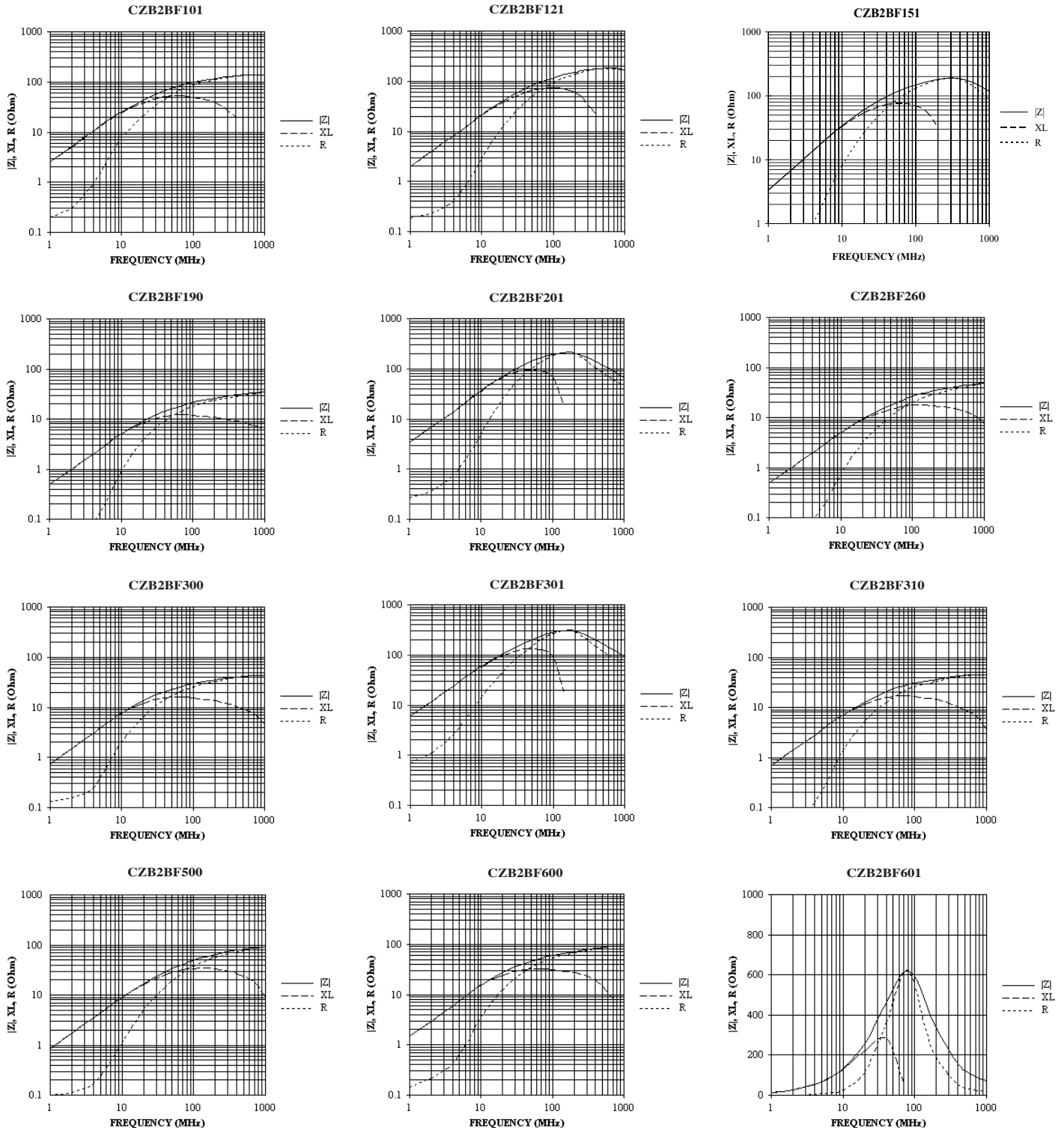
## 5. 0805 Graphs



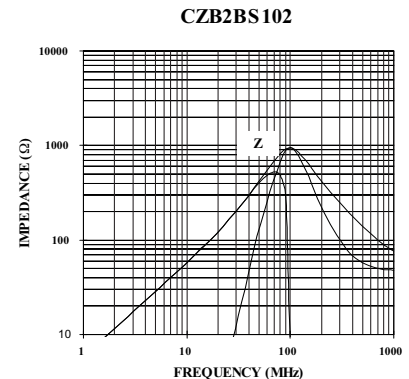
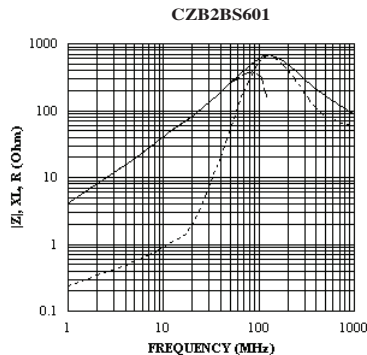
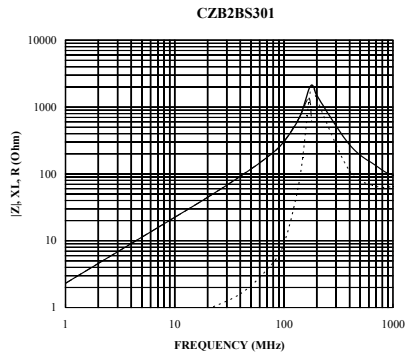
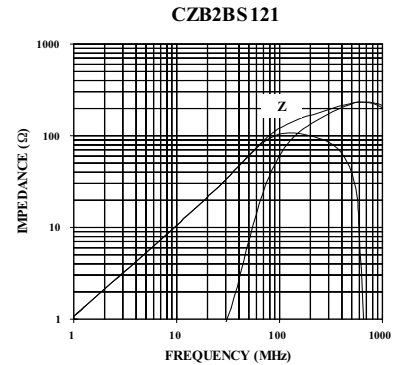
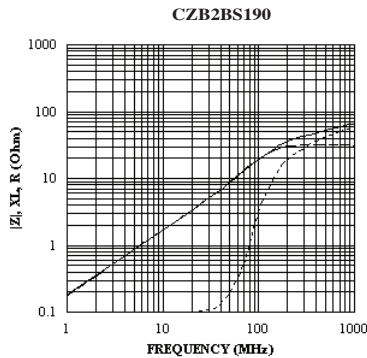
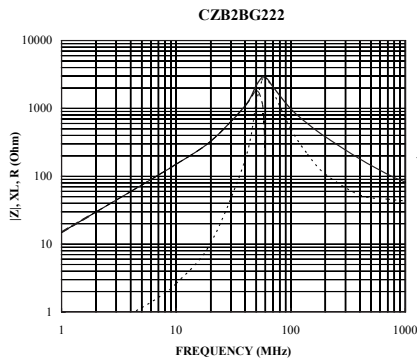
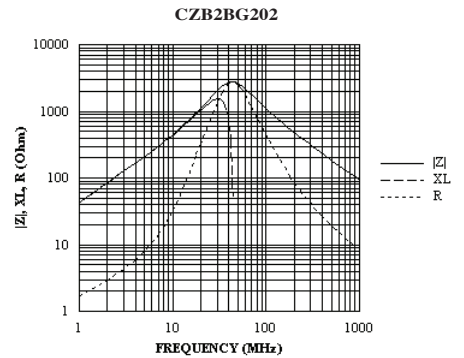
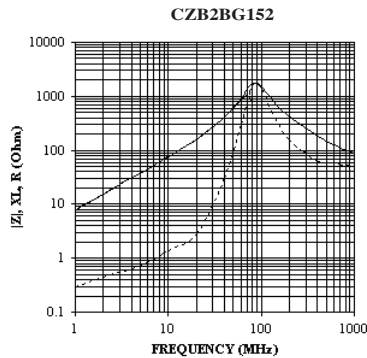
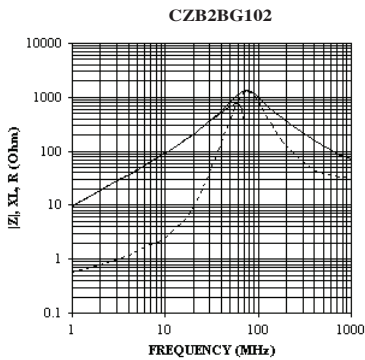
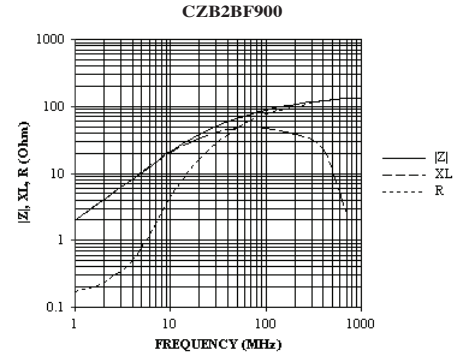
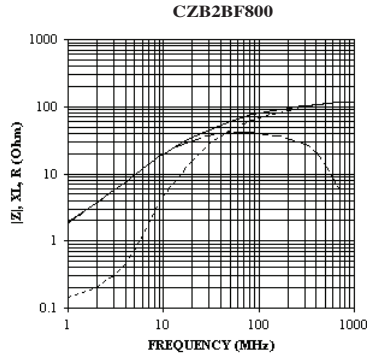
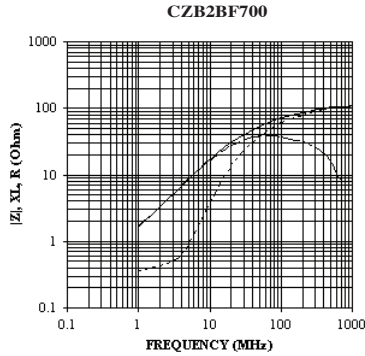
## 5. 0805 Graphs (continued)



## 5. 1206 Graphs



## 5. 1206 Graphs (continued)



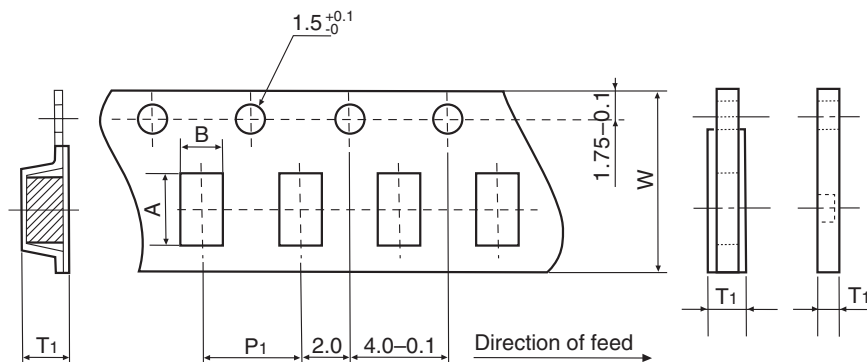
## 5. Characteristics

| Item                             | Requirement                                                                                                                                                                                                              | Conditions                                                                                                                                                                                                                                                                                                                                                                          |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|------|----|--|-----|----|-----|--------------------|----|-----|--------------------|----|-----|--------------------|
| Operating Temperature            | -55°C ~ +125°C                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                     |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| Storage Temperature              | 40°C @ 70% Humidity                                                                                                                                                                                                      | Sealed plastic bags with desiccant shall be used to reduce the potential of oxidation on the terminations during storage.                                                                                                                                                                                                                                                           |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| Resistance to Solder Heat        | <b>Change in Impedance:</b> Relative to value before test $\pm 20\%$ .<br><b>Appearance:</b> There shall be no cracking<br><b>Solder Coverage:</b> More than 75% of the terminal electrode shall be covered with solder. | <b>Flux:</b> 5-10 sec dip<br><b>After Flux:</b> Air dry for 15 sec<br><b>Preheat:</b> 150°C $\pm 10^\circ\text{C}$<br><b>Preheat Time:</b> 60 sec<br><b>Solder Temp:</b> 260°C $\pm 5^\circ\text{C}$<br><b>Dip Time:</b> 10 $\pm 1$ sec                                                                                                                                             |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| Solderability                    | <b>Solder Coverage:</b> More than 95% of the termination shall be covered with solder.                                                                                                                                   | <b>Flux:</b> 5-10 sec dip<br><b>After Flux:</b> Air dry for 15 sec<br><b>Solder Temp:</b> 245°C $\pm 5^\circ\text{C}$<br><b>Dip Time:</b> 5 $\pm 0.5$ sec                                                                                                                                                                                                                           |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| Leach Resistance                 | <b>Appearance:</b> There shall be no visible signs of physical or mechanical damage (i.e. no cracks)<br><b>Terminations:</b> Termination must not be leached away for more than 5%.                                      | The bead shall be subjected to the following 5 steps for the period of time shown below. The 5 steps constitute one (1) rotation. 4 rotations shall be carried out.<br>1) <b>Flux:</b> 5-10 sec<br>2) <b>After Flux:</b> Air dry for 15 sec<br>3) <b>Solder Temp:</b> 230°C $\pm 5^\circ\text{C}$<br>4) <b>Dip Time:</b> 5 $\pm 0.5$ sec<br>5) <b>Cool:</b> Air cool for 60 seconds |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| Insulation Resistance            | <b>Insulation Resistance:</b> Min 1G ohms                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                     |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| Solvent Resistance               | <b>Change in Impedance:</b> Relative to value before test $\pm 10\%$ .                                                                                                                                                   | Cleaning by:<br><b>Washer:</b> Ultrasonic washer (100W)<br><b>Solvent:</b> Isopropyl alcohol<br><b>Time:</b> 3 minutes                                                                                                                                                                                                                                                              |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| Terminal Strength (hanging test) | <b>Appearance:</b> The terminal electrode shall not break off, nor shall there be damage to the body.                                                                                                                    | <table> <tr> <th>Type</th><th>W(kgf)</th><th>Time</th></tr> <tr> <td>1E</td><td></td><td>N/A</td></tr> <tr> <td>1J</td><td>0.5</td><td>30 sec <math>\pm 2</math> sec</td></tr> <tr> <td>2A</td><td>1.0</td><td>30 sec <math>\pm 2</math> sec</td></tr> <tr> <td>2B</td><td>1.5</td><td>30 sec <math>\pm 2</math> sec</td></tr> </table>                                             | Type | W(kgf) | Time | 1E |  | N/A | 1J | 0.5 | 30 sec $\pm 2$ sec | 2A | 1.0 | 30 sec $\pm 2$ sec | 2B | 1.5 | 30 sec $\pm 2$ sec |
| Type                             | W(kgf)                                                                                                                                                                                                                   | Time                                                                                                                                                                                                                                                                                                                                                                                |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| 1E                               |                                                                                                                                                                                                                          | N/A                                                                                                                                                                                                                                                                                                                                                                                 |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| 1J                               | 0.5                                                                                                                                                                                                                      | 30 sec $\pm 2$ sec                                                                                                                                                                                                                                                                                                                                                                  |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| 2A                               | 1.0                                                                                                                                                                                                                      | 30 sec $\pm 2$ sec                                                                                                                                                                                                                                                                                                                                                                  |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| 2B                               | 1.5                                                                                                                                                                                                                      | 30 sec $\pm 2$ sec                                                                                                                                                                                                                                                                                                                                                                  |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| Terminal Strength (push test)    | <b>Appearance:</b> There shall be no evidence of mechanical degradations to terminals or body.                                                                                                                           | <table> <tr> <th>Type</th><th>W(kgf)</th><th>Time</th></tr> <tr> <td>1E</td><td></td><td>N/A</td></tr> <tr> <td>1J</td><td>1.4</td><td>60 sec</td></tr> <tr> <td>2A</td><td>1.8</td><td>60 sec</td></tr> <tr> <td>2B</td><td>2.3</td><td>60 sec</td></tr> </table>                                                                                                                  | Type | W(kgf) | Time | 1E |  | N/A | 1J | 1.4 | 60 sec             | 2A | 1.8 | 60 sec             | 2B | 2.3 | 60 sec             |
| Type                             | W(kgf)                                                                                                                                                                                                                   | Time                                                                                                                                                                                                                                                                                                                                                                                |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| 1E                               |                                                                                                                                                                                                                          | N/A                                                                                                                                                                                                                                                                                                                                                                                 |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| 1J                               | 1.4                                                                                                                                                                                                                      | 60 sec                                                                                                                                                                                                                                                                                                                                                                              |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| 2A                               | 1.8                                                                                                                                                                                                                      | 60 sec                                                                                                                                                                                                                                                                                                                                                                              |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |
| 2B                               | 2.3                                                                                                                                                                                                                      | 60 sec                                                                                                                                                                                                                                                                                                                                                                              |      |        |      |    |  |     |    |     |                    |    |     |                    |    |     |                    |

## 5. Characteristics (continued)

| Item             | Requirement                                                                                                                                                                                                                                                                                                                                                        | Conditions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------|------|---------|-----------------------------|-------|--------|-----------------------------|--------------------|------------|-------|--------------|--------|------------------------------|--------------------|------------|-------|--------------|
| Bending Strength | <b>Appearance:</b> There shall be no physical or mechanical damage<br><b>Impedance:</b> Relative to initial value before test $\pm 10\%$                                                                                                                                                                                                                           | <b>Board:</b> 90x40x1.6mm<br><b>Bend:</b> 1mm<br><b>Time:</b> 5 sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| Mechanical Shock | <b>Appearance:</b> There shall be no physical or mechanical damage<br><b>Impedance:</b> Relative to initial value before test $\pm 10\%$                                                                                                                                                                                                                           | <b>Force:</b> 50G<br><b>Time:</b> 11 msec<br>There shall be 3 shocks in each of 6 directions (18 shocks total).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| Vibration        | <b>Impedance:</b> Relative to initial value $\pm 10\%$                                                                                                                                                                                                                                                                                                             | Only endurance conditioning by sweeping shall be made. The entire frequency range from 10-2,000Hz and return to 10Hz in 20 minutes (this shall constitute one cycle).<br>Amplitude: 1.5mm<br>The test shall have a 15G peak and shall be applied for a period of 4 hours (12 cycles) in each of 3 mutually perpendicular directions (a total of 36 cycles within a total of 12 hours).                                                                                                                                                                                                                                                                                               |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| Thermal Shock    | <b>Appearance:</b> There shall be no physical or mechanical damage.<br><b>Impedance:</b> Relative to initial value $\pm 20\%$ .<br><b>DCR:</b> The DCR shall not exceed initial specified value.<br><br>Testing of the parts will be made at 0 hours, 250 hours and 500 hours. Before testing the parts shall be allowed to cool to room temperature for 24 hours. | <table border="1"> <thead> <tr> <th>Step</th><th>Temperature</th><th>Time</th></tr> </thead> <tbody> <tr> <td>1-start</td><td>-40°C <math>\pm 2^\circ\text{C}</math></td><td>_____</td></tr> <tr> <td>2-hold</td><td>-40°C <math>\pm 2^\circ\text{C}</math></td><td>30 min <math>\pm 5</math> min</td></tr> <tr> <td>3-transfer</td><td>_____</td><td>0.5 min max.</td></tr> <tr> <td>4-hold</td><td>+105°C <math>\pm 2^\circ\text{C}</math></td><td>30 min <math>\pm 5</math> min</td></tr> <tr> <td>5-transfer</td><td>_____</td><td>0.5 min max.</td></tr> </tbody> </table><br>Steps 1 thru 5 constitute one complete cycle and the test shall consist of a total of 500 cycles. | Step | Temperature | Time | 1-start | -40°C $\pm 2^\circ\text{C}$ | _____ | 2-hold | -40°C $\pm 2^\circ\text{C}$ | 30 min $\pm 5$ min | 3-transfer | _____ | 0.5 min max. | 4-hold | +105°C $\pm 2^\circ\text{C}$ | 30 min $\pm 5$ min | 5-transfer | _____ | 0.5 min max. |
| Step             | Temperature                                                                                                                                                                                                                                                                                                                                                        | Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| 1-start          | -40°C $\pm 2^\circ\text{C}$                                                                                                                                                                                                                                                                                                                                        | _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| 2-hold           | -40°C $\pm 2^\circ\text{C}$                                                                                                                                                                                                                                                                                                                                        | 30 min $\pm 5$ min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| 3-transfer       | _____                                                                                                                                                                                                                                                                                                                                                              | 0.5 min max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| 4-hold           | +105°C $\pm 2^\circ\text{C}$                                                                                                                                                                                                                                                                                                                                       | 30 min $\pm 5$ min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| 5-transfer       | _____                                                                                                                                                                                                                                                                                                                                                              | 0.5 min max.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| Load Humidity    | <b>Appearance:</b> There shall be no physical or mechanical damage<br><b>Impedance:</b> Relative to initial value $\pm 15\%$<br><br>Measurements shall be taken at 0 hours, 250 hours, 500 hours and 1,000 hours and shall meet the conditions stated above.                                                                                                       | <b>Temperature:</b> 85°C $\pm 2^\circ\text{C}$<br><b>Relative Humidity:</b> 85%<br><b>Time:</b> 1,000 hours total<br><b>Apply:</b> 100% rated current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |
| Life Test        | <b>Appearance:</b> There shall be no physical or mechanical damage<br><b>Impedance:</b> Relative to initial value $\pm 15\%$<br><br>Measurements shall be taken at 0 hours, 250 hours, 500 hours and 1,000 hours and shall meet the conditions stated above.                                                                                                       | <b>Temperature:</b> 85°C $\pm 2^\circ\text{C}$<br><b>Time:</b> 1,000 hours total<br><b>Apply:</b> 100% rated current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |             |      |         |                             |       |        |                             |                    |            |       |              |        |                              |                    |            |       |              |

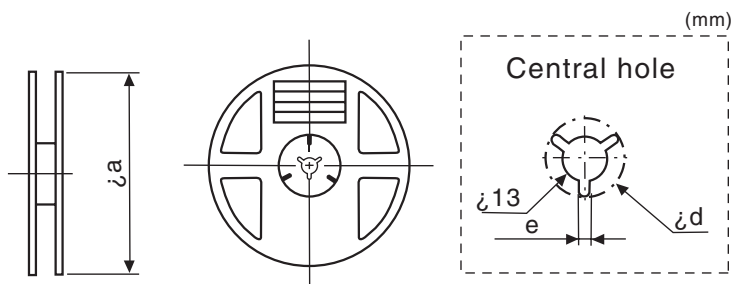
## 6. Dimensions - inches (mm)



Dimensions - inches (mm)

| Tape                     | A                         | B                         | W                         | P <sub>1</sub>            | T <sub>1</sub>            |
|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| <b>1E</b><br><b>0402</b> | 0.046±0.004<br>(1.17±0.1) | 0.026±0.004<br>(0.65±0.1) | 0.315±0.009<br>(8.0±0.22) | 0.079±0.009<br>(2.0±0.23) | 0.025±0.004<br>(0.63±0.1) |
| <b>1J</b><br><b>0603</b> | 0.075±0.002<br>(1.9±0.1)  | 0.043±0.002<br>(1.1±0.1)  | 0.318±0.002<br>(8.1±0.1)  | 0.157±0.004<br>(4.0±0.1)  | 0.043±0.002<br>(1.1±0.1)  |
| <b>2A</b><br><b>0805</b> | 0.093±0.002<br>(2.4±0.1)  | 0.063±0.002<br>(1.6±0.1)  | 0.318±0.002<br>(8.1±0.1)  | 0.157±0.004<br>(4.0±0.1)  | 0.046±0.002<br>(1.2±0.1)  |
| <b>2B</b><br><b>1206</b> | 0.138±0.002<br>(3.5±0.1)  | 0.071±0.002<br>(1.8±0.1)  | 0.318±0.002<br>(8.1±0.1)  | 0.157±0.004<br>(4.0±0.1)  | 0.071±0.002<br>(1.8±0.1)  |

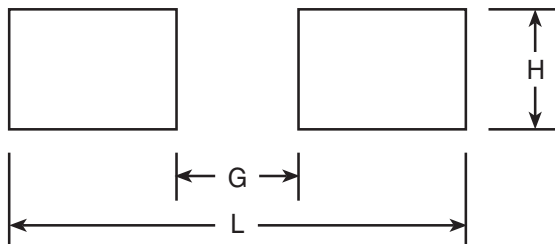
Dimensions - inches (mm)



| Tape                     | øa         | ød            | e              |
|--------------------------|------------|---------------|----------------|
| <b>1E</b><br><b>0402</b> | 7<br>(178) | 0.827<br>(21) | 0.079<br>(2.0) |
| <b>1J</b><br><b>0603</b> |            |               |                |
| <b>2A</b><br><b>0805</b> |            |               |                |
| <b>2B</b><br><b>1206</b> |            |               |                |

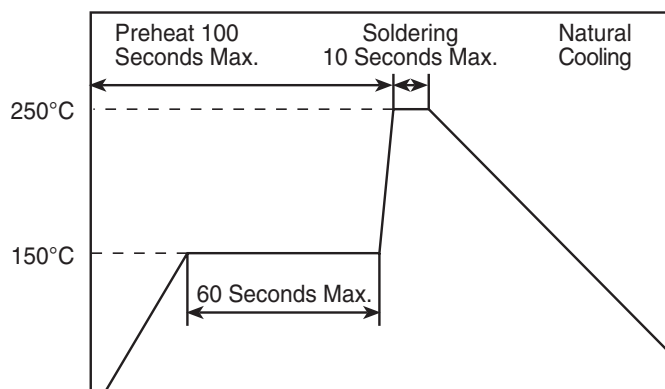
## 7. Recommended PC Board Land Patterns - mm (inches)

| Chip Size        | L           | G            | H            |
|------------------|-------------|--------------|--------------|
| <b>1E (0402)</b> | 1.6 (0.063) | 0.4 (0.016)  | 0.6 (0.024)  |
| <b>1J (0603)</b> | 2.6 (0.102) | 0.55 (0.022) | 0.94 (0.037) |
| <b>2A (0805)</b> | 3.0 (0.118) | 0.66 (0.026) | 1.45 (0.057) |
| <b>2B (1206)</b> | 4.4 (0.173) | 1.5 (0.059)  | 1.8 (0.071)  |



## 8. Recommended Temperature Profiles for Soldering

**Recommended Temperature Profile for Wave Soldering**



**Recommended Temperature Profile for Reflow Soldering**

