

# MULTILAYER CERAMIC CHIP SUPPRESSORS (CHIP BEADS)

## - FBU SERIES -

### FEATURES

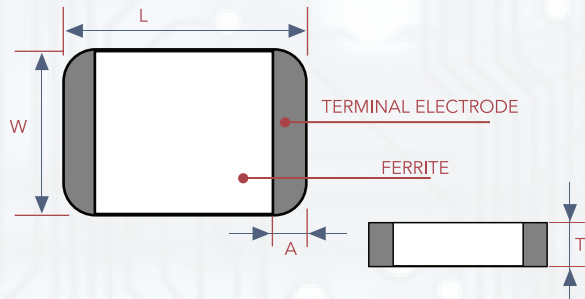
- FBU Series for DC Power Line
- Rated Current: 4-9 A
- Operating Temp -55 - 125°C
- The FBU series can be used on high current circuits due to its low DC resistance. It can match power lines to a maximum of 9 A DC.

### APPLICATIONS

- CD-ROM'S
- Hard Drives
- Modems
- Monitors
- Motherboards
- Printers

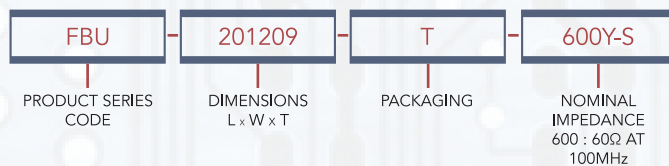


### SHAPES AND DIMENSIONS



SHAPE	L (MM)	W (MM)	T (MM)	A (MM)
160808 (0603)	1.6 ± 0.2	0.8 ± 0.2	0.8 ± 0.15	0.1~0.3
201209 (0805)	2.0 ± 0.2	1.25 ± 0.2	0.9+0.15/-0.2	0.2~0.8
321611 (1206)	3.2 ± 0.2	1.6 ± 0.2	1.1 ± 0.2	0.4~1.0
322513 (1210)	3.2 ± 0.2	2.5 ± 0.2	1.3 ± 0.2	0.6~1.0
451616 (1806)	4.5 ± 0.2	1.6 ± 0.2	1.6 ± 0.2	0.6~1.0
453215 (1812)	4.5 ± 0.2	3.2 ± 0.2	1.5 ± 0.2	0.6~1.0
453223 (1812)	4.5 +/- .25	3.2 +/- .25	2.3 +/- .25	0.6~1
565015 (2220)	5.59 ± 0.51	5.08 ± 0.25	1.5 ± 0.25	0.51~1.01
565018 (2220)	5.59 ± 0.51	5.08 ± 0.25	1.8 ± 0.25	0.51~1.01
565030 (2220)	5.59 ± 0.51	5.08 ± 0.25	3.05 ± 0.25	0.51~1.01
565032 (2220)	5.59 ± 0.51	5.08 ± 0.25	3.2 ± 0.25	0.51~1.01
565036 (2220)	5.59 ± 0.51	5.08 ± 0.25	3.6 ± 0.25	0.51~1.01

### ORDERING INFORMATION



### PACKAGING GUIDE

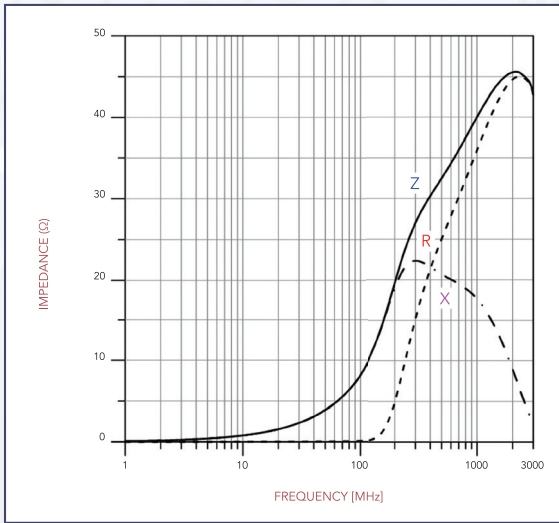
SERIES	PART NUMBER	PCS PER REEL
FBU	160808 (0603)	4000 /R
FBU	201209 (0805)	4000 /R
FBU	321611 (1206)	3000 /R
FBU	322513 (1210)	2000 /R
FBU	451616 (1806)	2000 /R
FBU	453215 (1812)	1000/R
FBU	453223 (1812)	2500/R
FBU	565015 (2220)	2000 /R
FBU	565018 (2220)	2000 /R
FBU	565030 (2220)	2000 /R
FBU	565032 (2220)	2000 /R
FBU	565036 (2220)	2000 /R



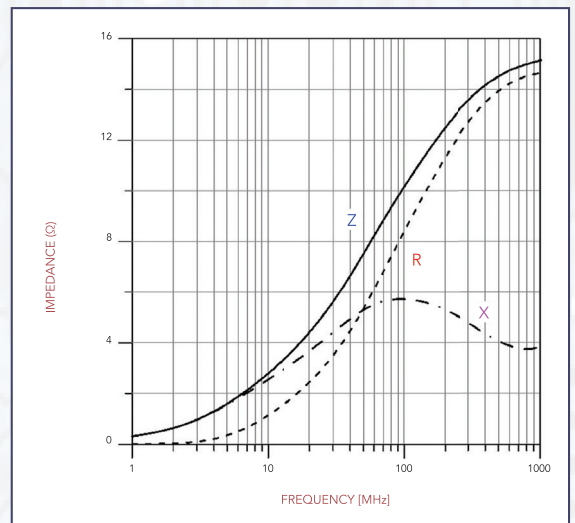
# ELECTRICAL CHARACTERISTICS & DATA - 160808

PART NUMBER	IMPEDANCE ( $\Omega$ ) $\pm 25\%$ [100MHz]	DC RESISTANCE $\Omega$ (MAX)	RATED CURRENT mA (MAX)
FBU160808T-070Y-S	7	0.025	4000
FBU160808T-100Y-S	10	0.01	6000
FBU160808T-220Y-S	22	0.008	6000
FBU160808T-260Y-S	26	0.007	6000
FBU160808T-300Y-S	30	0.01	5000
FBU160808T-300Y-S-H	30	0.008	6000
FBU160808T-330Y-S	33	0.008	6000
FBU160808T-600Y-S	60	0.03	4000

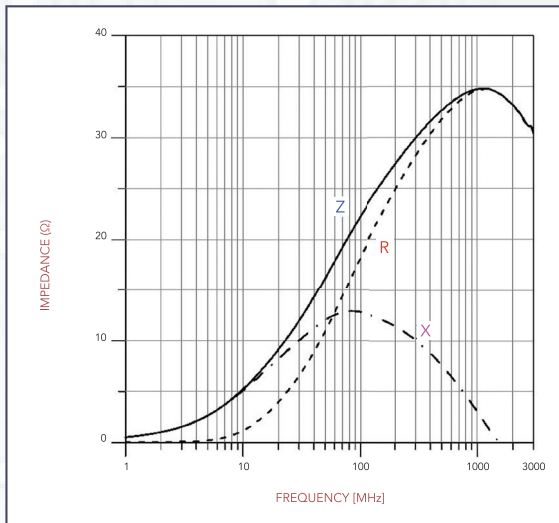
- FBU160808-070Y-S



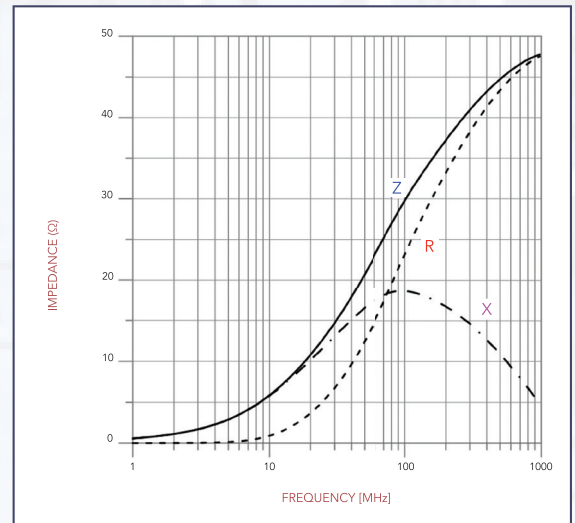
- FBU160808-100Y-S



- FBU160808-220Y-S

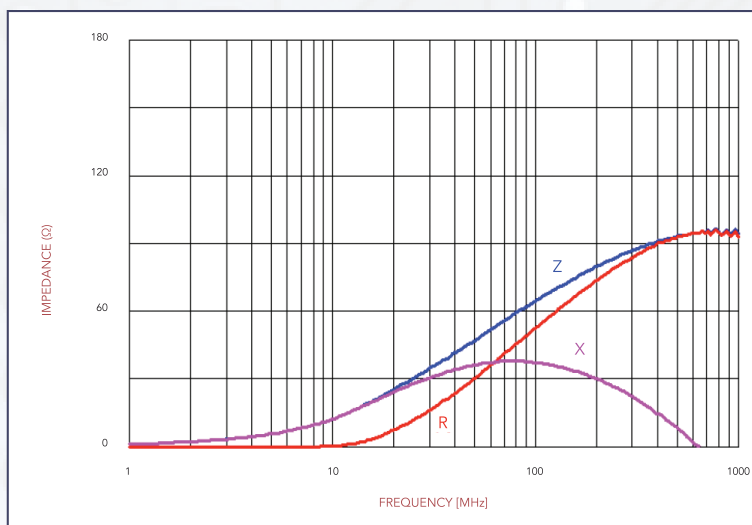


- FBU160808-300Y-S



**ELECTRICAL CHARACTERISTICS & DATA - 160808**

- FBU160808-600Y-S

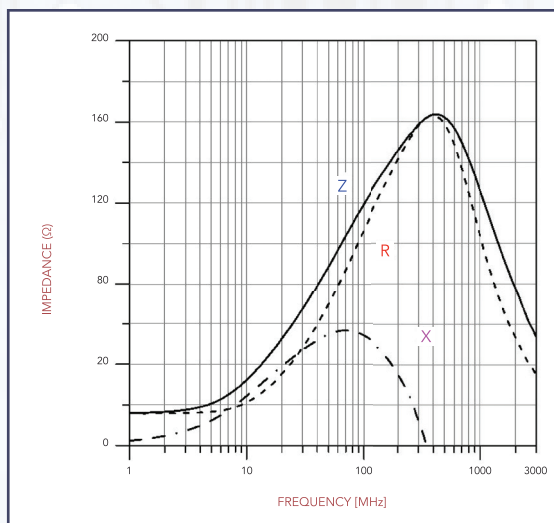
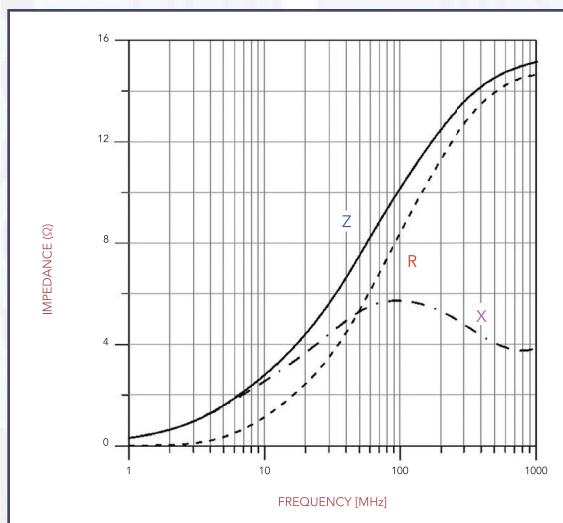


**ELECTRICAL CHARACTERISTICS & DATA - 201209**

PART NUMBER	IMPEDANCE (Ω) ±25% [100MHz]	DC RESISTANCE Ω (MAX)	RATED CURRENT mA (MAX)
FBU201209T-070Y-S	7	0.008	6000
FBU201209T-100Y-S	10	0.01	6000
FBU201209T-110Y-S	11	0.008	6000
FBU201209T-170Y-S	17	0.008	6000
FBU201209T-190Y-S	19	0.008	6000
FBU201209T-220Y-S	22	0.008	6000
FBU201209T-260Y-S	26	0.008	6000
FBU201209T-300Y-S	30	0.008	6000
FBU201209T-310Y-S	31	0.015	6000
FBU201209T-390Y-S	39	0.008	6000
FBU201209T-400Y-S	40	0.03	4000
FBU201209T-600Y-S	60	0.01	5000
FBU201209T-800Y-S	80	0.02	5000
FBU201209T-121Y-S	120	0.02	4000
FBU201209T-121Y-S-H	120	0.015	5000
FBU201209T-181Y-S	180	0.03	4000

- FBU201209T-100Y-S

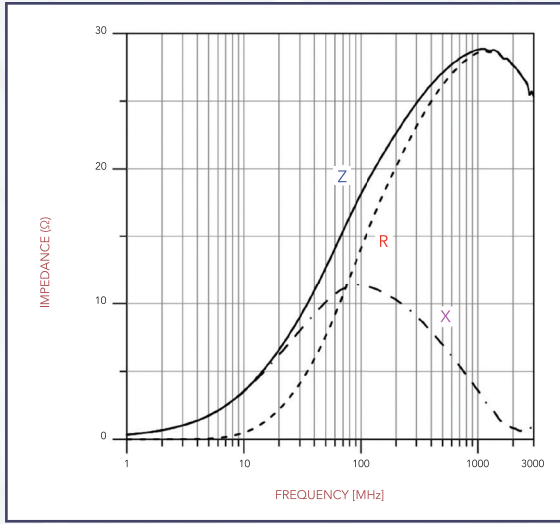
- FBU201209T-121Y-S



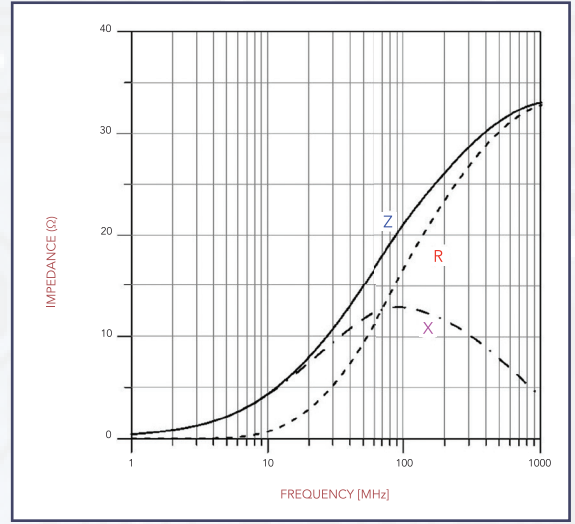


ELECTRICAL CHARACTERISTICS & DATA - 201209

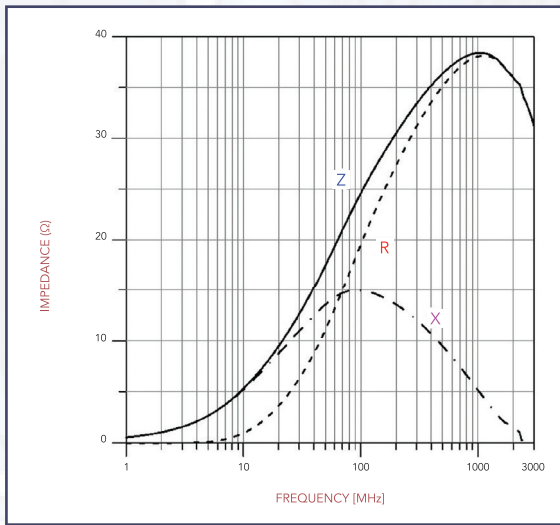
- FBU201209T-190Y-S



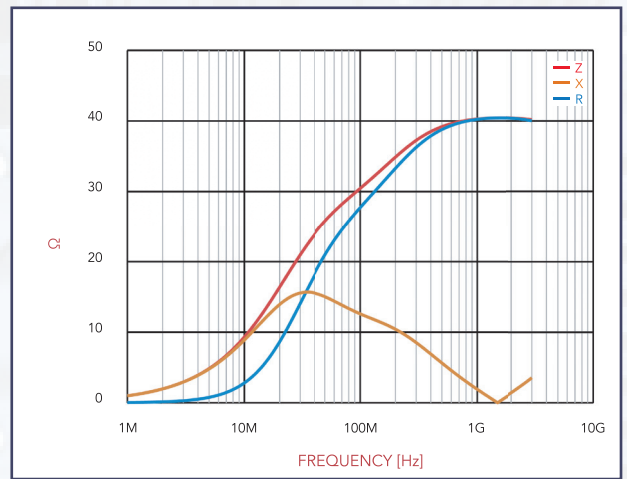
- FBU201209T-220Y-S



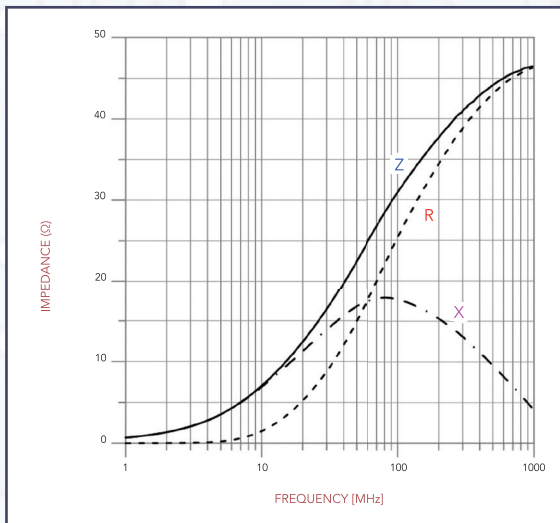
- FBU201209T-260Y-S



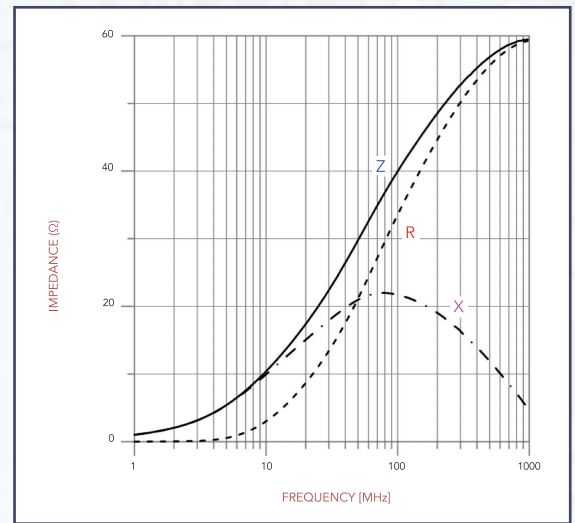
- FBU201209T-300Y-S-H



- FBU201209T-310Y-S

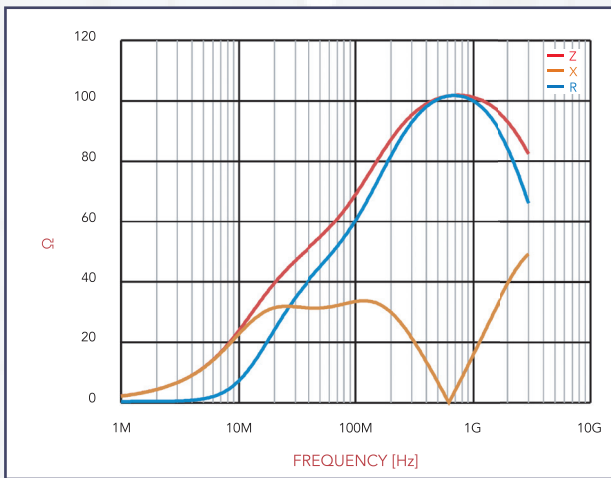


- FBU201209T-390Y-S



## ELECTRICAL CHARACTERISTICS & DATA - 201209

- FBU201209T-700Y-S



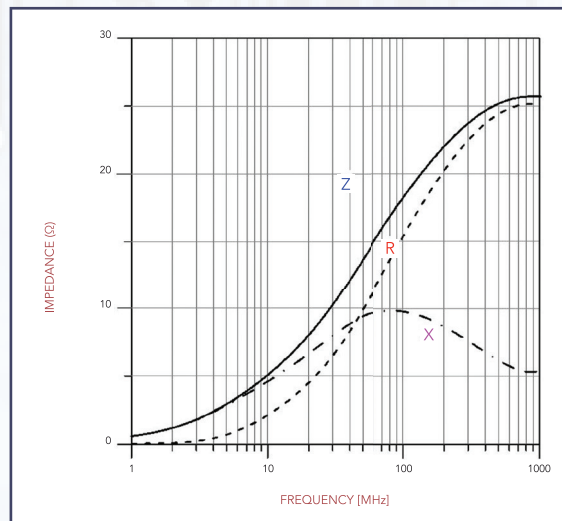
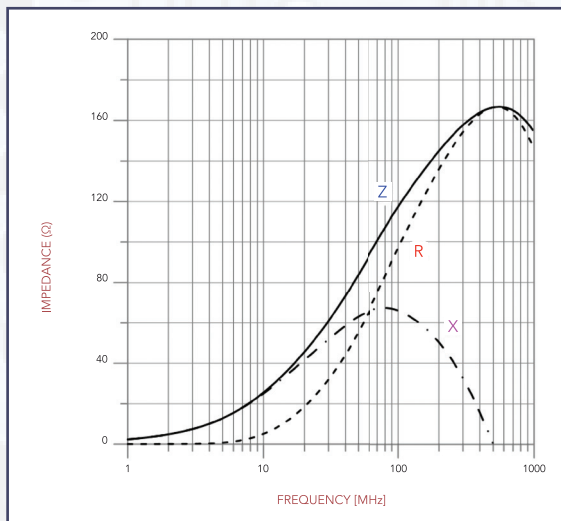
## ELECTRICAL CHARACTERISTICS & DATA - 321611

PART NUMBER	IMPEDANCE ( $\Omega$ ) $\pm 25\%$ [100MHz]	DC RESISTANCE $\Omega$ (MAX)	RATED CURRENT mA (MAX)
FBU321611T-190Y-S	19	0.006	6000
FBU321611T-260Y-S	26	0.006	6000
FBU321611T-300Y-S	30	0.006	6000
FBU321611T-310Y-S	31	0.006	6000
FBU321611T-330Y-S	33	0.006	6000
FBU321611T-380Y-S	38	0.020	5000
FBU321611T-400Y-S	40	0.040	4000
FBU321611T-500Y-S	50	0.015	6000
FBU321611T-520Y-S	52	0.008	6000
FBU321611T-600Y-S	60	0.010	6000
FBU321611T-800Y-S	80	0.020	4000
FBU321611T-121Y-S	120	0.020	4000
FBU321611T-121Y-S-H	120	0.010	6000

## ELECTRICAL CHARACTERISTICS & DATA - 321611

- FBU321611T-121Y-SH

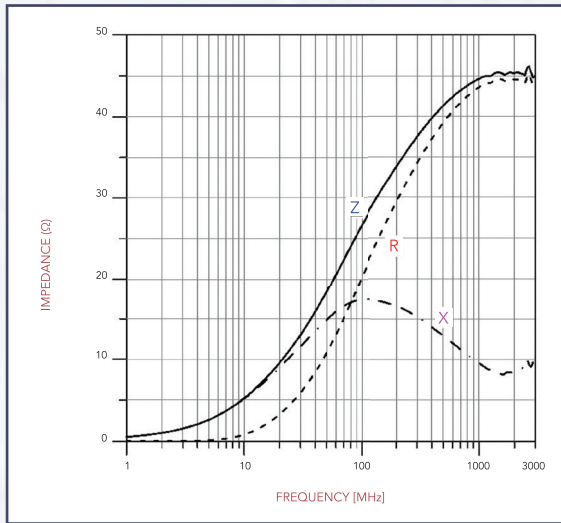
- FBU321611T-190Y-S



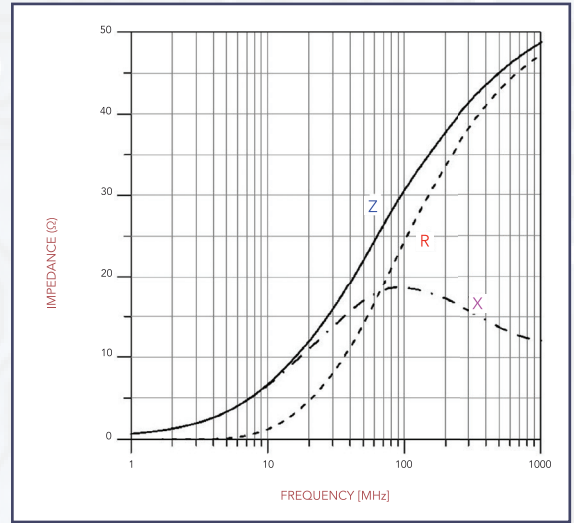


ELECTRICAL CHARACTERISTICS & DATA - 321611

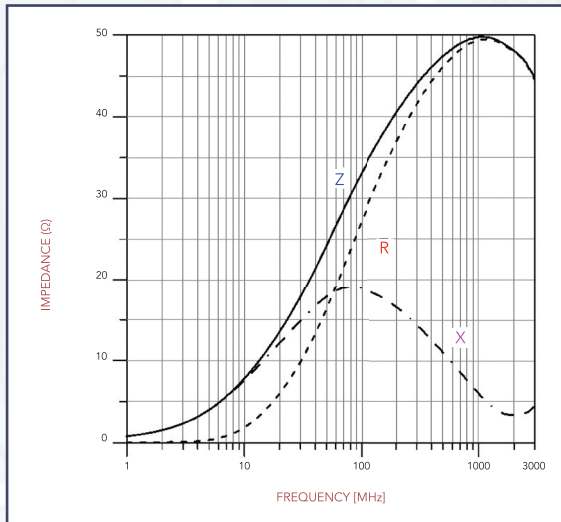
- FBU321611T-260Y-S



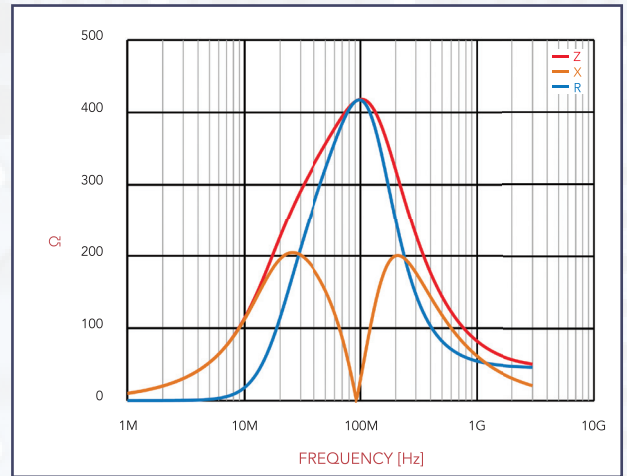
- FBU321611T-300Y-S



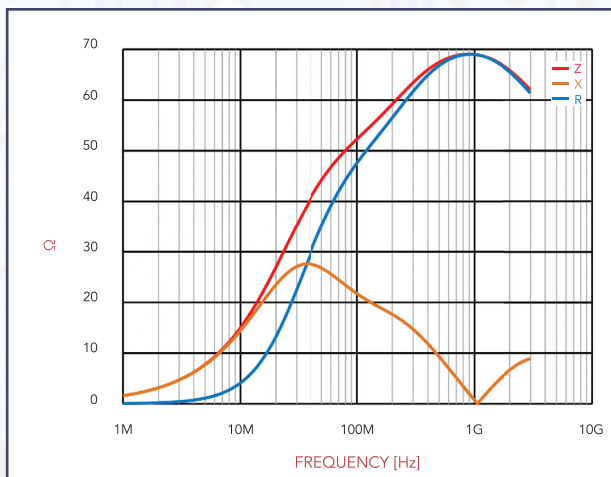
- FBU321611T-330Y-S



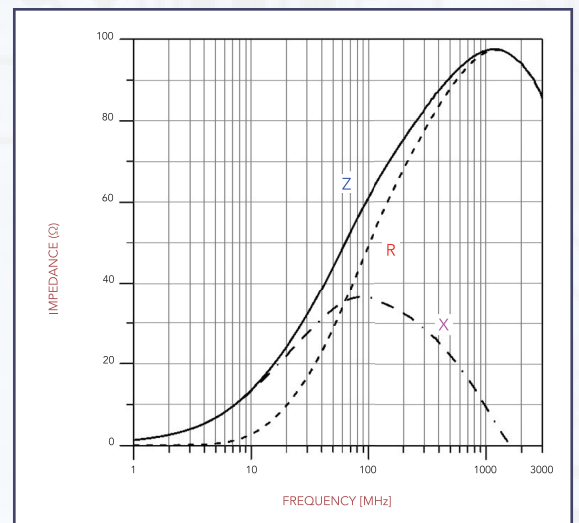
- FBU321611T-471Y-S



- FBU321611T-500Y-S-H



- FBU321611T-600Y-S



## ELECTRICAL CHARACTERISTICS - 322513

PART NUMBER	IMPEDANCE ( $\Omega$ ) $\pm 25\%$ [100MHz]	DC RESISTANCE $\Omega$ (MAX)	RATED CURRENT mA (MAX)
FBU322513T-520Y-S	52	0.008	6000
FBU322513T-600Y-S	60	0.008	6000

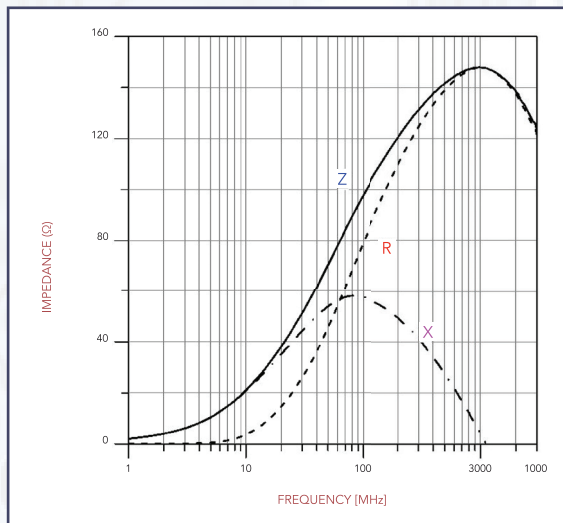
## ELECTRICAL CHARACTERISTICS - 451616

PART NUMBER	IMPEDANCE ( $\Omega$ ) $\pm 25\%$ [100MHz]	DC RESISTANCE $\Omega$ (MAX)	RATED CURRENT mA (MAX)
FBU451616T-600Y-S	60	0.008	6000
FBU451616T-720Y-S	72	0.01	6000
FBU451616T-750Y-S	75	0.008	6000

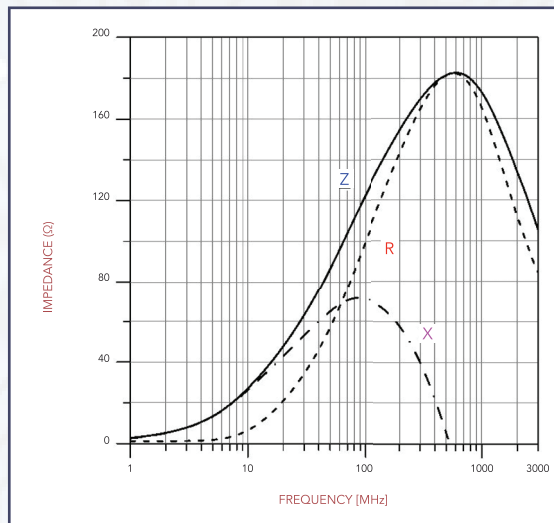
## ELECTRICAL CHARACTERISTICS & DATA - 453215

PART NUMBER	IMPEDANCE ( $\Omega$ ) $\pm 25\%$ [100MHz]	DC RESISTANCE $\Omega$ (MAX)	RATED CURRENT mA (MAX)
FBU453215T-600Y-S	60	0.008	6000
FBU453215T-800Y-S	80	0.004	9000
FBU453215T-101Y-S	100	0.007	8000
FBU453215T-121Y-S	120	0.02	4000
FBU453215T-121Y-S-H	120	0.015	6000
FBU453215T-151Y-S	150	0.02	4000
FBU453215T-681Y-S	680	0.03	4000

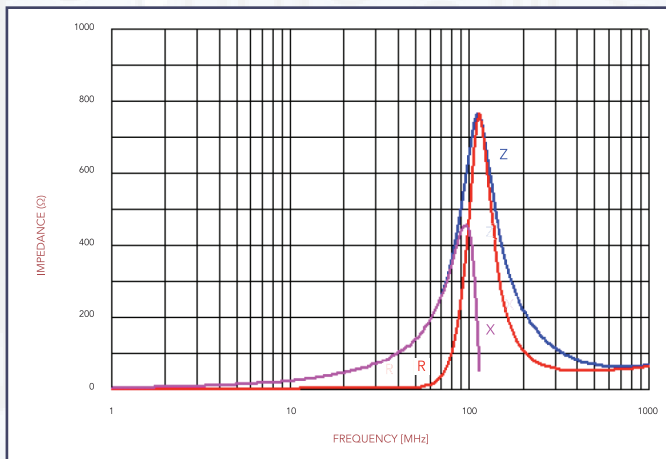
- FBU453215T-101Y-S



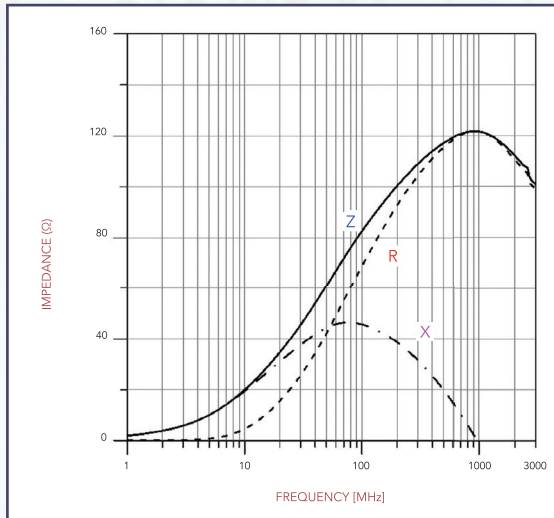
- FBU453215T-121Y-S



- FBU453215T-681Y-S



- FBU453215T-800Y-S



## ELECTRICAL CHARACTERISTICS - 53223

PART NUMBER	IMPEDANCE ( $\Omega$ ) $\pm 25\%$ [100MHz]	DC RESISTANCE $\Omega$ (MAX)	RATED CURRENT mA (MAX)
FBU453223T-101Y-S	100	0.007	8000

## ELECTRICAL CHARACTERISTICS - 565015

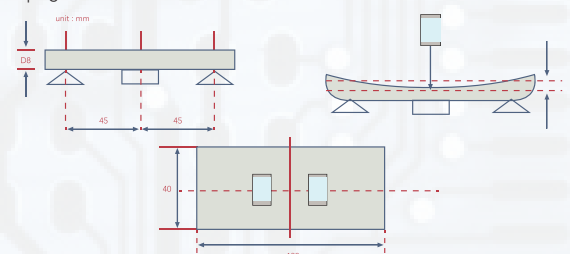
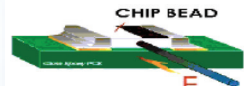
PART NUMBER	IMPEDANCE ( $\Omega$ ) $\pm 25\%$ [100MHz]	DC RESISTANCE $\Omega$ (MAX)	RATED CURRENT mA (MAX)
FBU565015T-171Y-S	170	0.03	4000
FBU565018T-101Y-S	100	0.006	6000
FBU565018T-151Y-S	150	0.015	5000
FBU565018T-181Y-S	180	0.02	5000
FBU565018T-251Y-S	250	0.015	4000
FBU565032T-271Y-S	270	0.035	4000
FBU565032T-401Y-S	400	0.03	4500
FBU565030T-801Y-S	800	0.01	8000
FBU565036T-801Y-S	800	0.01	8000

## ENVIRONMENTAL CHARACTERISTICS

### ELECTRICAL PERFORMANCE TEST

ITEM	SPECIFICATION	TEST METHODS
Impedance	Refer to standard electrical spec.	- HP4286A
DCR		- HP 4338 digital mili-ohm meter

### MECHANICAL PERFORMANCE TEST

ITEM	SPECIFICATION	TEST METHODS
Substrate Bending Test	<ul style="list-style-type: none"> <li>- Without deformation cases</li> <li>- Impedance: within <math>\pm 30\%</math> of initial value</li> <li>- DC Resistance shall be satisfied</li> </ul>	<ul style="list-style-type: none"> <li>- Test device shall be soldered on the substrate</li> <li>- Substrate Dimension: 100x40x0.8mm</li> <li>- Deflection: 3.0mm</li> <li>- Keeping Time: 10sec and then return</li> </ul> 
Vibration	<ul style="list-style-type: none"> <li>- Appearance: No damage</li> <li>- Impedance: within <math>\pm 30\%</math> of initial value</li> <li>- DC Resistance shall be satisfied</li> </ul>	<ul style="list-style-type: none"> <li>- Test device shall be soldered on the substrate</li> <li>- Oscillation Frequency : 10 to 55 to 10Hz for 1min</li> <li>- Amplitude : 1.5mm(peak-peak)</li> <li>- Time : 2hrs for each axis (X,Y&amp;Z), total 6hrs</li> </ul>
Resistance to Soldering Heat	<ul style="list-style-type: none"> <li>- No visible damage</li> <li>- Electrical characteristics and mechanical characteristics shall be satisfied</li> </ul>	<ul style="list-style-type: none"> <li>- Solder temp: 265<math>\pm</math>5°C</li> <li>- Immersion time: 6<math>\pm</math>1sec</li> <li>- Preheating: 100°C to 150°C, 1 minute</li> <li>- Measured after exposure in the room condition for 24hrs</li> <li>- Solder: Sn-3Ag-0.5Cu</li> </ul>
Solderability	<ul style="list-style-type: none"> <li>- Without deformation cases</li> <li>- Impedance: within <math>\pm 30\%</math> of initial value</li> <li>- DC Resistance shall be satisfied</li> </ul>	<ul style="list-style-type: none"> <li>- Solder chip on PCB and applied 10N (1.02KgF) for 10 sec</li> </ul> 
Temperature Cycle	<ul style="list-style-type: none"> <li>- Appearance: No damage</li> <li>- Impedance: within <math>\pm 30\%</math> of initial value DC Resistance shall be satisfied</li> </ul>	<ul style="list-style-type: none"> <li>One cycle:</li> <li>- One cycle/step1: -55<math>\pm</math>3°C for 30<math>\pm</math>3min</li> <li>step2: standard atmospheric conditions 5s or less</li> <li>step3: 125<math>\pm</math>2°C for 30<math>\pm</math>3min</li> <li>step4: standard atmospheric conditions 5s or less</li> <li>- Total: 100cycles</li> <li>- Measured after exposure in the room condition for 24hrs</li> </ul>
Humidity Resistance		<ul style="list-style-type: none"> <li>- Temperature: 60<math>\pm</math>2°C</li> <li>- Relative Humidity: 90 ~ 95%</li> <li>- Applied Current: Rated Current(maximum value)</li> <li>- Time: 1008<math>\pm</math>12hrs</li> <li>- Measured after exposure in the room condition for 24hrs</li> </ul>



- Operating Temperature: -55°C ~ 125°C  
 - Storage Temperature: 15~28°C ; Humidity < 80%RH



# ENVIRONMENTAL CHARACTERISTICS

## MECHANICAL PERFORMANCE TEST

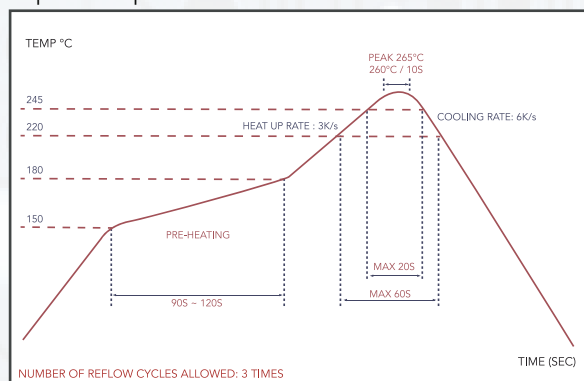
ITEM	SPECIFICATION	TEST METHODS
High Temperature Resistance	- Appearance: No damage - Impedance: within $\pm 30\%$ of initial value DC Resistance shall be satisfied	- Temperature: $125 \pm 2^\circ\text{C}$ - Applied Current: Rated Current(maximum value) - Time: $1008 \pm 12\text{hrs}$ - Measured after exposure in the room condition for 24hrs
Low Temperature Storage Life Test		- Temperature: $-55 \pm 2^\circ\text{C}$ - Time: $1008 \pm 12\text{hrs}$ - Measured after exposure in the room condition for 24hrs
Thermal Shock		- $-55^\circ\text{C} \sim 125^\circ\text{C}$ kept stabilized for 30 minutes each for 100 cycles - Measured after exposure in the room condition for 24hrs

# SOLDERING CONDITION

## IR Reflow Soldering

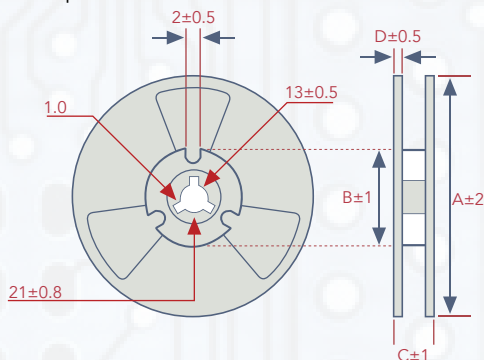
(1) Time of IR reflow soldering at maximum temperature point  $260^\circ\text{C}$ : 10s

(2) Time of soldering iron at maximum temperature point  $280^\circ\text{C}$  : 3s

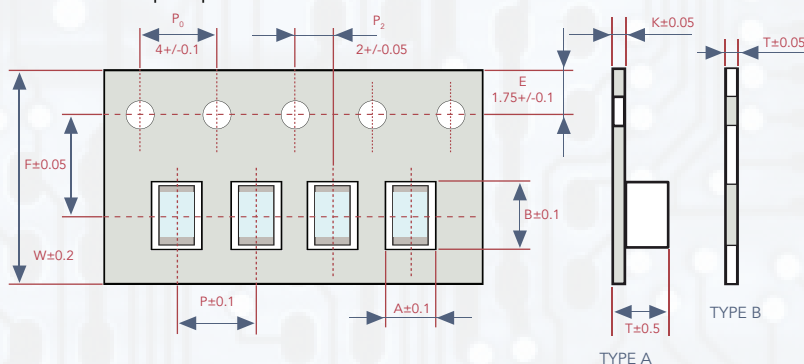


# PACKAGING

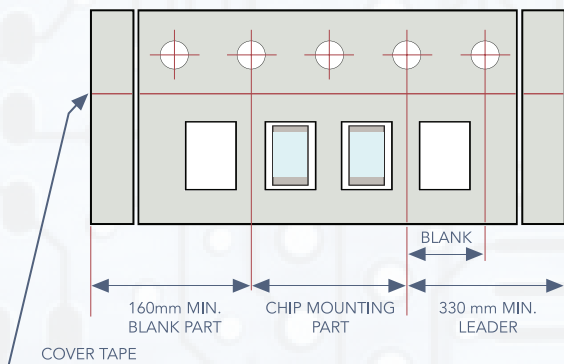
## - Reel Specifications



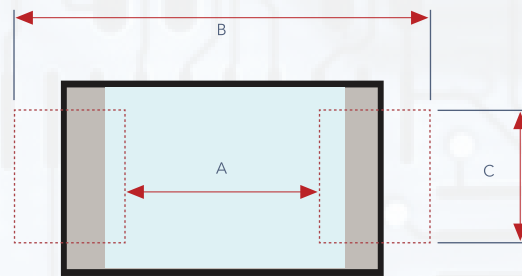
## - Tape Specifications



## - Tape Material



## - Recommended Pattern



**PACKAGING**

TYPE	TAPE DIMENSIONS								REEL DIMENSIONS				RECOMMENDED PATTERN			QUANTITY (EA)
	A	B	T	W	P	F	K	TAPE TYPE	A	B	C	D	A	B	C	
FBU160808	1.10	1.90	1.10	8.0	4.0	3.5	-	B	178	60	10	2	0.60	2.60	0.80	4000
FBU201209	1.55	2.30	1.20	8.0	4.0	3.5	-	B	178	60	10	2	0.66	3.23	1.47	4000
FBU321611	1.90	3.50	1.40	8.0	4.0	3.5	0.2	A	178	60	10	2	2.20	4.40	2.06	3000
FBU321616	1.88	3.64	1.90	8.0	4.0	3.5	0.2	A	178	60	10	2	2.20	4.2-5.2	1.2	2000
FBU322513	2.90	3.60	1.70	8.0	4.0	3.5	0.2	A	178	60	10	2	2.13	4.06	2.74	2000
FBU451616	2.90	4.90	1.40	12	4.0	5.5	0.3	A	178	60	14	2	2.70	5.70	2.24	2000
FBU453215	3.60	4.90	2.05	12	8.0	5.5	0.3	A	178	60	14	2	2.57	5.90	4.22	1000
FBU453223	3.51	4.78	2.73	12	8	5.5	0.33	A	330	60	14	2	2.57	5.90	4.22	2500
FBU565015	5.4	5.95	2.28	12	8	5.5	0.33	A	330	60	12	2	3.05	9.19	6.1	2000
FBU565018	5.4	5.95	2.28	12	8	5.5	0.33	A	330	60	12	2	3.05	9.19	6.1	2000
FBU565030	5.25	6.15	3.2	12	8	5.5	0.3	A	330	99	12.7	6.1	4.07	8.10	5.30	2000
FBU565032	5.4	5.95	3.32	12	8	5.5	0.33	A	330	60	12	2	3.05	9.19	6.1	2000
FBU565036	5.36	5.77	3.73	12	8	5.5	0.31	A	330	60	12	2	3.05	9.19	6.1	2000

