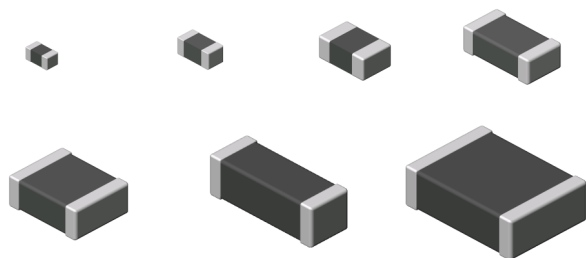


Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)



Product Identification:

MCB 0805 G 101 P T - T

(1) (2) (3) (4) (5) (6) (7)

- (1) **Series Code:** Multilayer Ferrite Chip Bead
- (2) **Size Code:** L x W (inch), the first two digits - L (length), the last two digits - W (width)
- (3) **Characteristic Code:** F, G
- (4) **Value Code:** Impedance (ohms at 100 MHz), The first two digits are significant. The last digit specifies the number of zeros to follow
- (5) **Tolerance Code:** P = $\pm 25\%$, Other tolerances may be available upon request
- (6) **Package Code:** T = Tape & Reel, B = Bulk
- (7) **Termination type Code:** T = 100% Sn plating

Applications:

- Noise suppression in computers and peripherals
- Noise suppression in telecommunications
- Noise suppression in data communications
- Noise suppression in consumer electronics

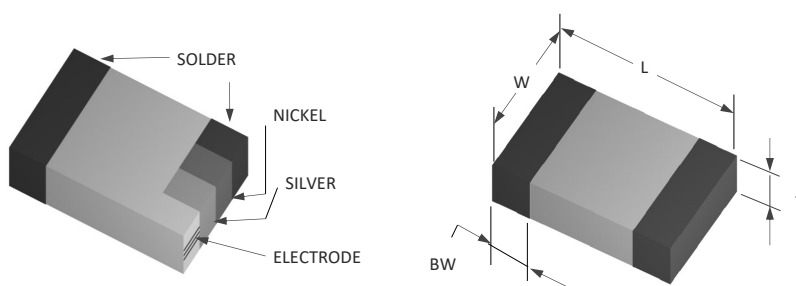
Operating Temperature:

- $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$

Features:

- Monolithic structure for closed magnetic path and high reliability
- Standard EIA/EIAJ chip sizes such as 0402/1005, 0603/1608, 0805/2012, and 1206/3216
- A complete set of ferrite and electrode materials providing a wide range of electrical properties
- Superior termination bonding strength
- Nickel barrier with solder over plated termination offering excellent solderability and solder leach resistance, suitable for both wave and reflow soldering processes
- RoHS compliant when -T option is specified

Shape and Dimensions:



Chip Size	L INCH (mm)	W INCH (mm)	T INCH (mm)	BW INCH (mm)
0402	0.039 ± 0.004 (1.00 ± 0.10)	0.020 ± 0.004 (0.50 ± 0.10)	0.020 ± 0.004 (0.50 ± 0.10)	0.010 ± 0.004 (0.25 ± 0.10)
0603	0.063 ± 0.006 (1.60 ± 0.15)	0.031 ± 0.006 (0.80 ± 0.15)	0.031 ± 0.006 (0.80 ± 0.15)	0.014 ± 0.006 (0.36 ± 0.15)
0805	0.079 ± 0.008 (2.00 ± 0.20)	0.049 ± 0.008 (1.25 ± 0.20)	0.035 ± 0.008 (0.90 ± 0.20)	0.020 ± 0.012 (0.51 ± 0.30)
1206	0.126 ± 0.008 (3.20 ± 0.20)	0.063 ± 0.008 (1.60 ± 0.20)	0.043 ± 0.008 (1.10 ± 0.20)	0.020 ± 0.012 (0.51 ± 0.30)

Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

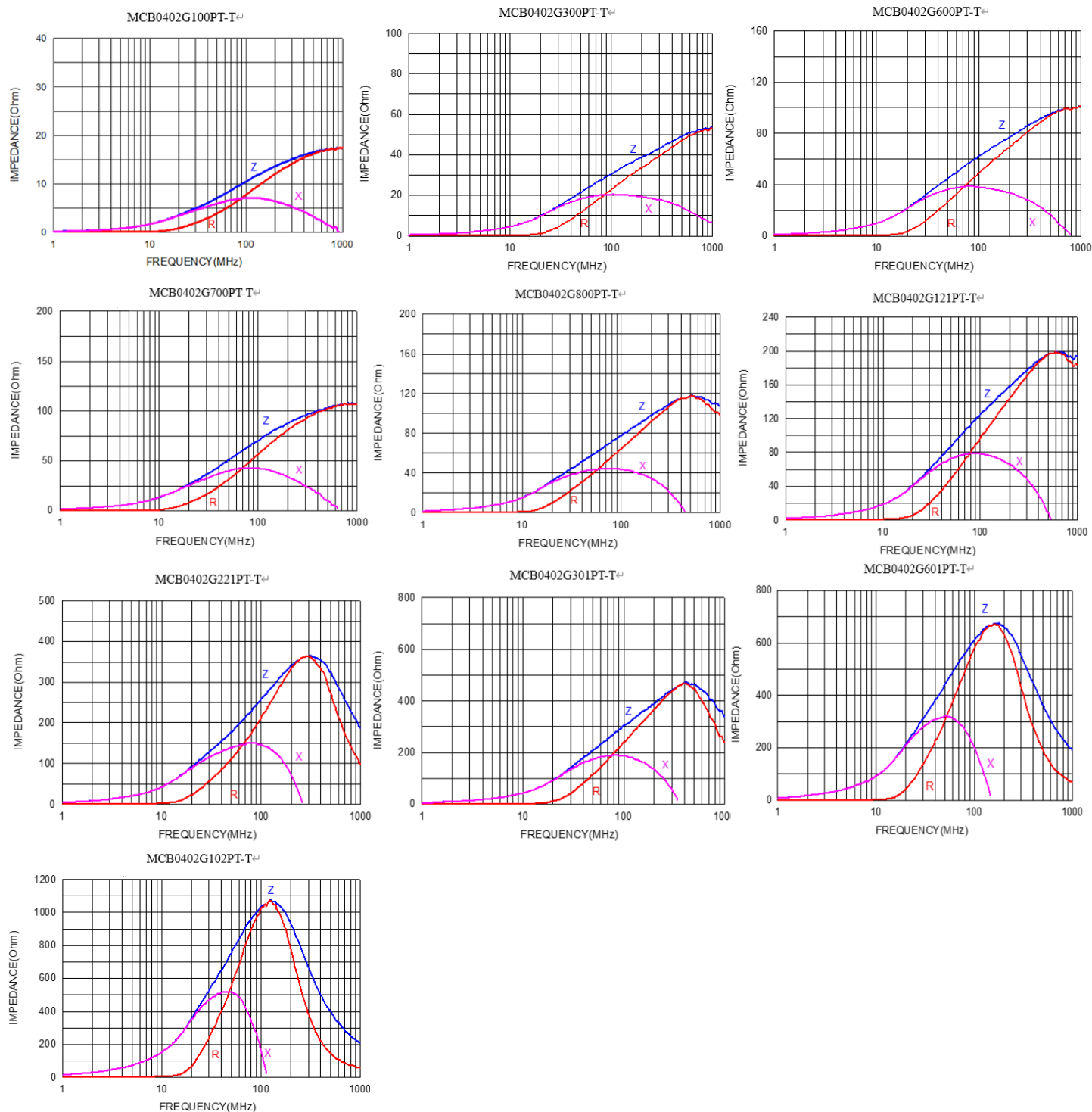
Ordering Information:

Part Number	Z@100M	Tolerance	Max. R _{DC}	Max. I	Part Number	Z@100M	Tolerance	Max. R _{DC}	Max. I
MCB0402G100PT-T	10	P	0.20	0.50	MCB0805F110PT-T	11	P	0.10	0.90
MCB0402G300PT-T	30	P	0.20	0.30	MCB0805F300PT-T	30	P	0.10	0.60
MCB0402G600PT-T	60	P	0.25	0.30	MCB0805F500PT-T	50	P	0.10	0.80
MCB0402G700PT-T	70	P	0.25	0.20	MCB0805F600PT-T	60	P	0.10	0.90
MCB0402G800PT-T	80	P	0.20	0.30	MCB0805F800PT-T	80	P	0.20	0.40
MCB0402G121PT-T	120	P	0.30	0.10	MCB0805G101PT-T	100	P	0.20	0.40
MCB0402G221PT-T	220	P	0.40	0.10	MCB0805G102PT-T	1000	P	0.40	0.50
MCB0402G301PT-T	300	P	0.60	0.05	MCB0805G121PT-T	120	P	0.20	0.80
MCB0402G601PT-T	600	P	0.80	0.08	MCB0805G151PT-T	150	P	0.20	0.80
MCB0402G102PT-T	1000	P	1.20	0.05	MCB0805G152PT-T	1500	P	0.50	0.35
MCB0603G300PT-T	30	P	0.20	0.70	MCB0805G201PT-T	200	P	0.30	0.20
MCB0603G400PT-T	40	P	0.20	0.40	MCB0805G222PT-T	2200	P	0.70	0.20
MCB0603G600PT-T	60	P	0.20	0.70	MCB0805G301PT-T	300	P	0.30	0.70
MCB0603G800PT-T	80	P	0.20	0.30	MCB0805G401PT-T	400	P	0.35	0.20
MCB0603G101PT-T	100	P	0.25	0.20	MCB0805G601PT-T	600	P	0.40	0.50
MCB0603G121PT-T	120	P	0.25	0.60	MCB1206F190PT-T	19	P	0.20	0.40
MCB0603G141PT-T	140	P	0.25	0.20	MCB1206F300PT-T	30	P	0.20	0.60
MCB0603G151PT-T	150	P	0.40	0.30	MCB1206F500PT-T	50	P	0.20	0.50
MCB0603G181PT-T	180	P	0.30	0.20	MCB1206F600PT-T	60	P	0.20	0.60
MCB0603G221PT-T	220	P	0.60	0.25	MCB1206F700PT-T	70	P	0.20	0.50
MCB0603G301PT-T	300	P	0.80	0.20	MCB1206F800PT-T	80	P	0.20	0.50
MCB0603G421PT-T	420	P	0.45	0.20	MCB1206F102PT-T	1000	P	0.60	0.30
MCB0603G451PT-T	450	P	0.45	0.20	MCB1206F121PT-T	120	P	0.15	0.90
MCB0603G601PT-T	600	P	1.20	0.15	MCB1206F151PT-T	150	P	0.15	0.90
MCB0603G102PT-T	1000	P	0.70	0.20	MCB1206F201PT-T	200	P	0.35	0.60
MCB0603G152PT-T	1500	P	1.00	0.20	MCB1206F301PT-T	300	P	0.35	0.70
MCB0603G202PT-T	2000	P	1.20	0.15	MCB1206G152PT-T	1500	P	0.70	0.30
MCB0603S121PT-T	120	P	0.40	0.30	MCB1206F260PT-T	26	P	0.20	0.50
MCB0603S221PT-T	220	P	0.60	0.25					
MCB0603S300PT-T	30	P	0.25	0.60					
MCB0603S600PT-T	60	P	0.30	0.60					

Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

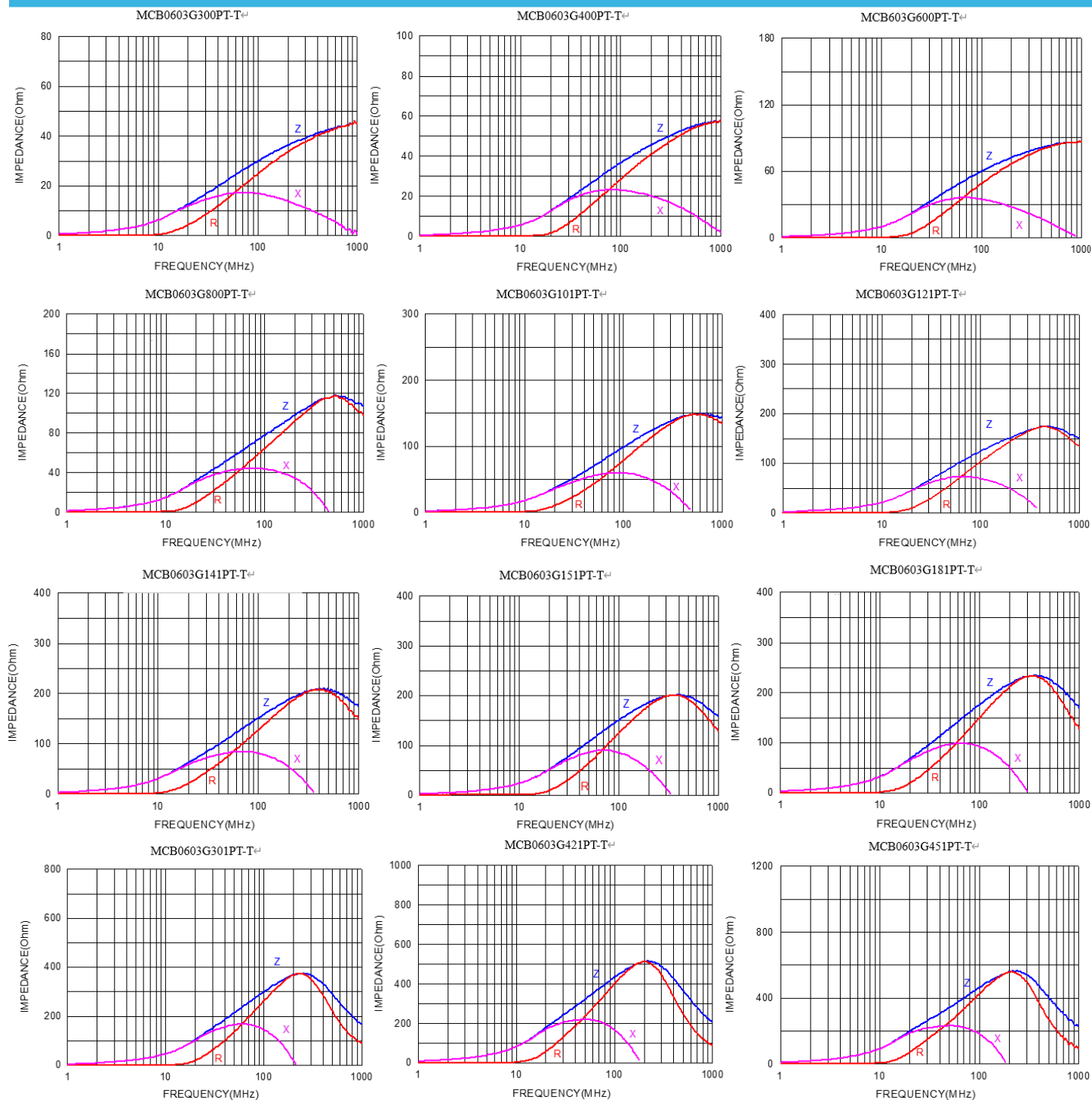
Electrical Characteristics :



Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

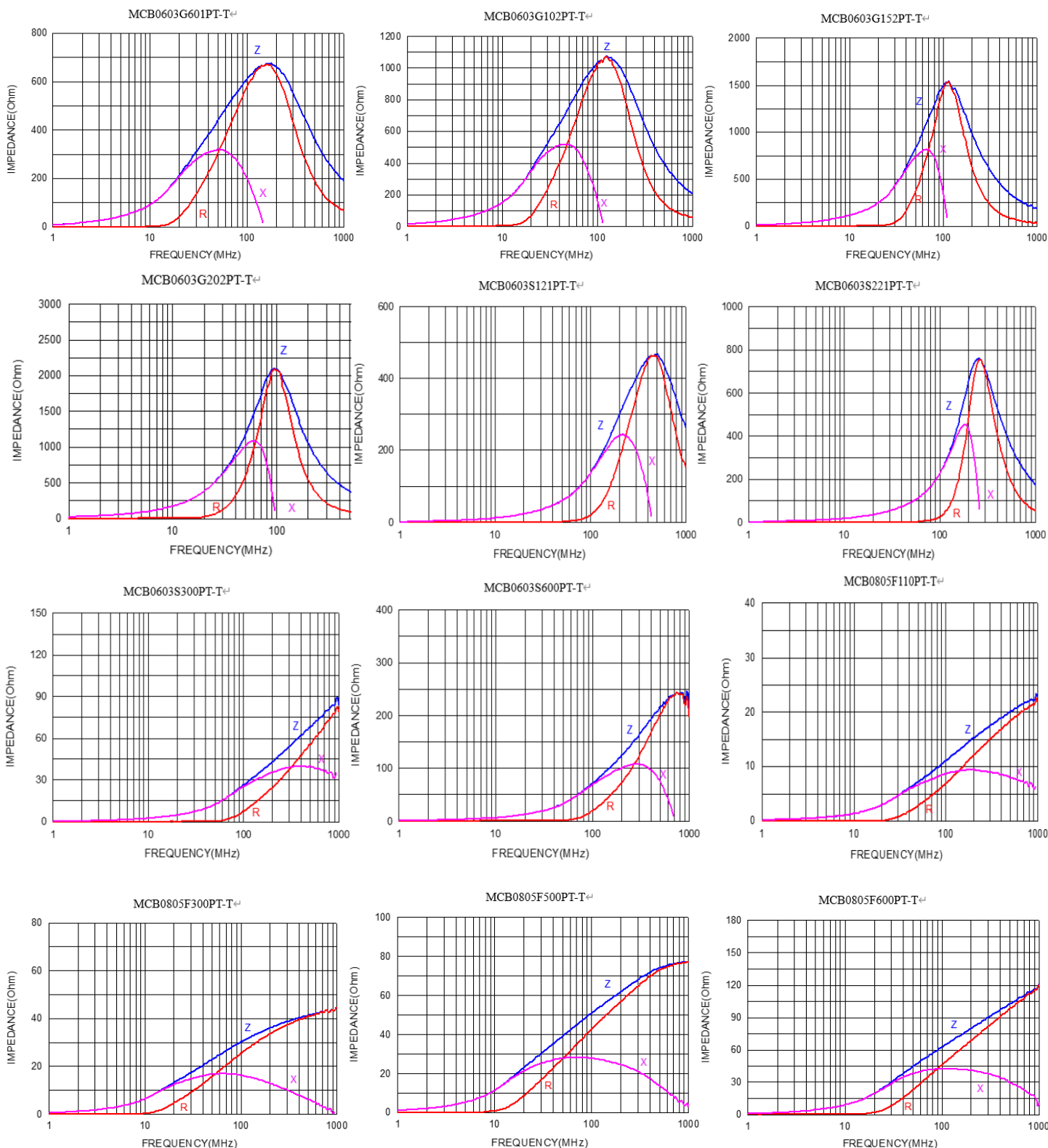
Electrical Characteristics :(continue)



Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

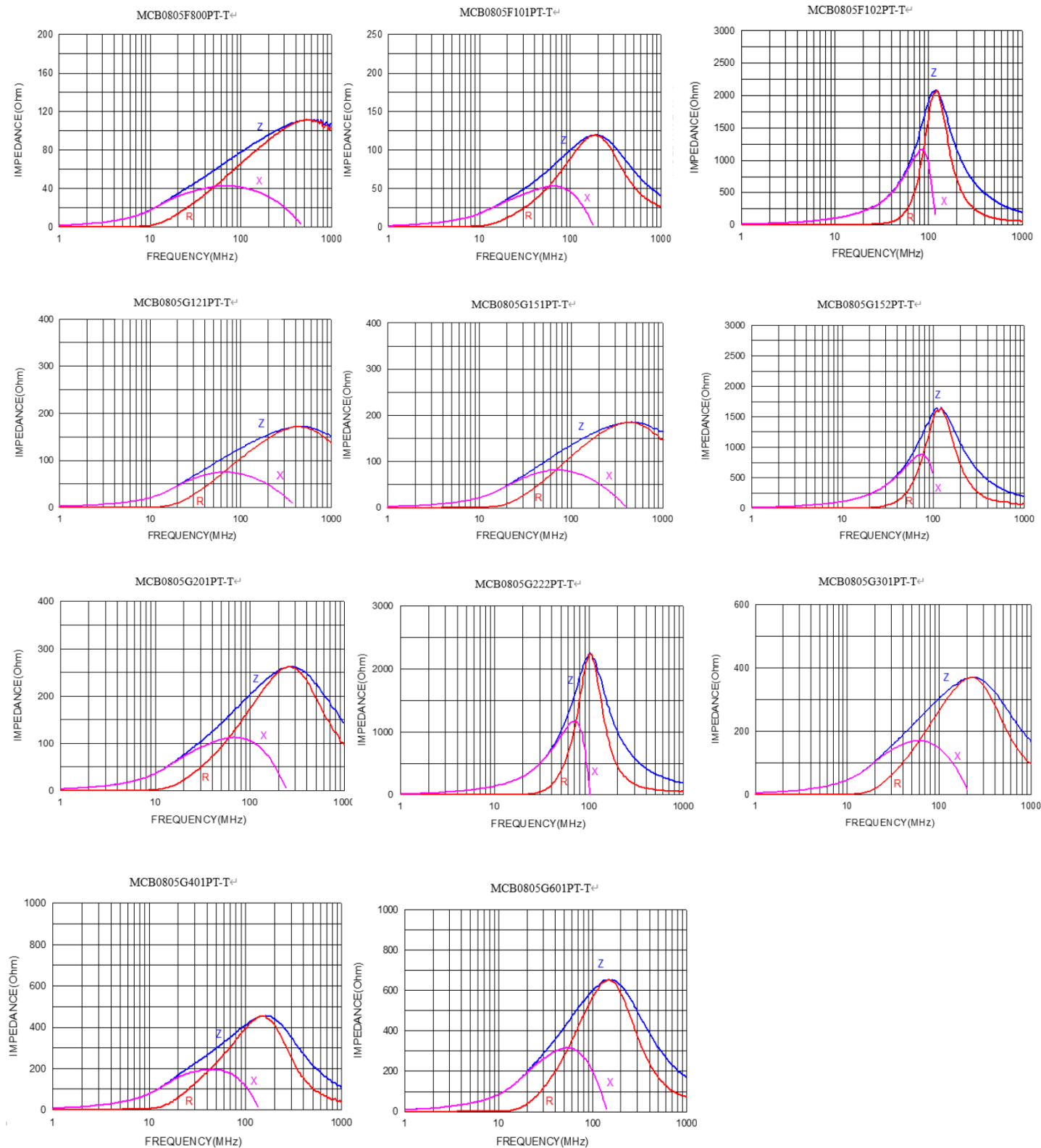
Electrical Characteristics :(continue)



Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

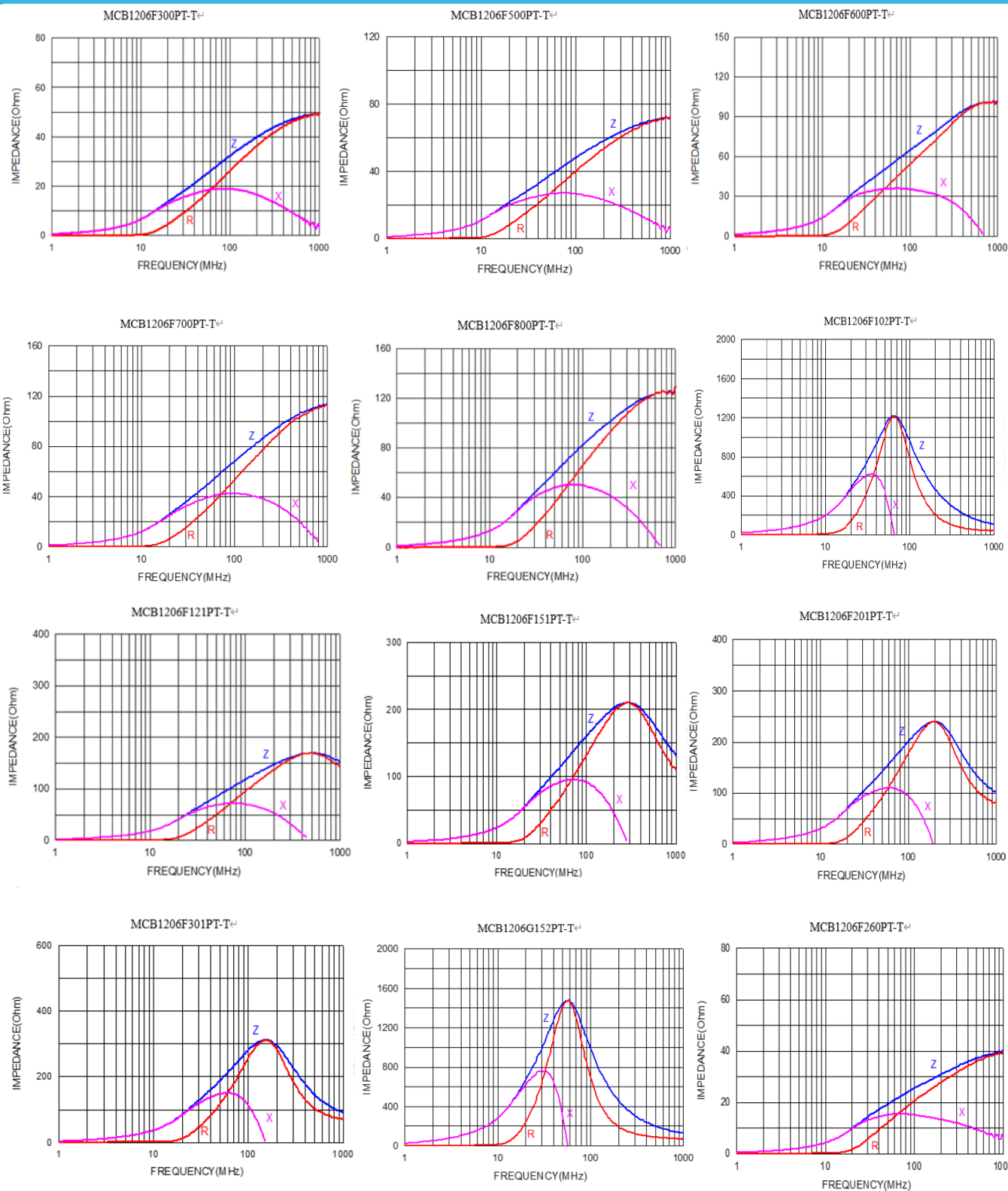
Electrical Characteristics :(continue)



Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

Electrical Characteristics :(continue)

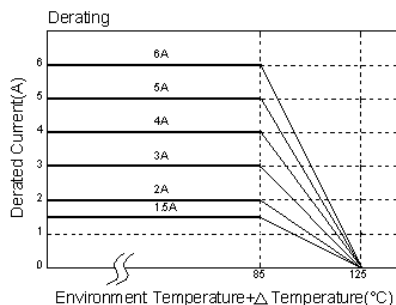


Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

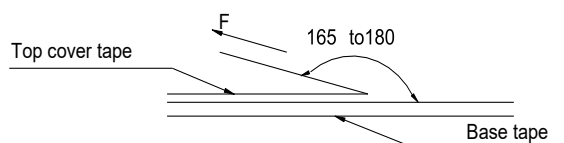
Temperature De-rating:

For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85°C, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.



Tearing Off Force :

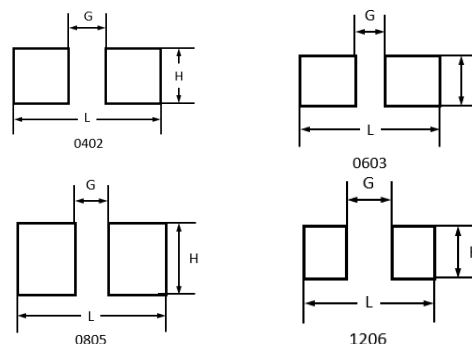
Room Temp. (°C)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300



The force for tearing off cover tape is 15 to 60 grams in the arrow direction under the following conditions.

Recommended Land Pattern:

Chip Size	L INCH (mm)	G INCH (mm)	H INCH (mm)
0402	0.063 (1.60)	0.016 (0.40)	0.024 (0.60)
0603	0.102 (2.60)	0.022 (0.55)	0.037 (0.94)
0805	0.118 (3.00)	0.026 (0.66)	0.057 (1.45)
1206	0.173 (4.40)	0.059 (1.50)	0.071 (1.80)



Packaging:

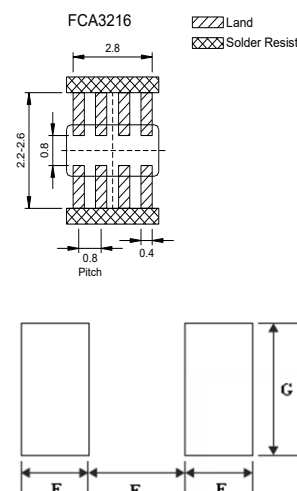
Chip Size	1206	0805	0603	0402
Chip / Reel	3,000	4,000	4,000	10,000
Inner box	15,000	20,000	20,000	50,000
Middle box	75,000	100,000	100,000	250,000
Carton	150,000	200,000	200,000	500,000

Soldering and Mounting

Recommended PC Board Pattern

Chip Size						Land Patterns For Reflow Soldering		
Series	Type	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	G(mm)
MCB	0402	1.0±0.10	0.50±0.10	0.50±0.10	0.25±0.10	0.50	0.40	0.60
	0603	1.6±0.15	0.80±0.15	0.80±0.15	0.30±0.20	0.80	0.85	0.95
	0805	2.0±0.20	1.25±0.20	0.85±0.20	0.50±0.30	1.05	1.00	1.45
		2.0±0.20	1.25±0.20	1.25±0.20	0.50±0.30			
	1206	3.2±0.20	1.60±0.20	1.10±0.20	0.50±0.30	1.05	2.20	1.80

PC board should be designed so that products can prevent damage from mechanical stress when warping the board.



Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

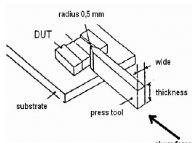
Reliability Tests:

No.	Item	Condition	Criteria
1	Operating Temperature	-55~+125℃ (Including self-temperature rise)	--
2	Transportation Storage Temperature	-55~+125℃ (on board)	For long storage conditions, please see the Application Notice
3	Impedance (Z)	Refer to standard electrical characteristics list	Agilent4291 Agilent E4991 Agilent4287 Agilent16192
4	DC Resistance		Agilent 4338
5	Rated Current		DC Power Supply Over Rated Current requirements, there will be some risk
6	Temperature Rise Test	Rated Current < 1A ΔT 20℃ Max Rated Current ≥ 1A ΔT 40℃ Max	1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer.
7	Life test	Appearance: no damage. Impedance: within±15%of initial value.	Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Temperature: 125±2℃ Applied current: rated current. Duration: 1000±12hrs. Measured at room temperature after placing for 24±2 hrs.
8	Load Humidity	RDC: within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Humidity: 85±2%R.H. Temperature: 85±2℃. Duration:1000hrsMin.Bead:with100%ratedcurrent , Inductance: with 10% rated current Measured at room temperature after placing for 24±2 hrs..
9	Thermal shock	Appearance: no damage. Impedance: within±15%of initial value. RDC: within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Condition for 1 cycle Step1: -55±2℃ 30±5 min. Step2: +125±2℃ ≤0.5min Step3: +125±2℃ 30±5min. Number of cycles: 500 Measured at room temperature after placing for 24±2 hrs.

Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

Reliability and Test Condition:

No.	Item	Condition	Criteria															
10	Vibration	Appearance : No damage. Impedance : within±15% of initial value RDC : within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Oscillation Frequency: 10Hz ~ 2KHz ~ 10Hz for 20 minutes Equipment: Vibration checker Total Amplitude:10g Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations)															
11	Bending	Appearance : No damage. Impedance : within±10% of initial value RDC : within ±15% of initial value and shall not exceed the specification value	Shall be mounted on a FR4 substrate of the following dimensions: >=0805inch(2012mm):40x100x1.2mm <0805inch(2012mm):40x100x0.8mm Bending depth: >=0805inch(2012mm):1.2mm <0805inch(2012mm):0.8mm Duration of 10 sec for a min.															
12	Shock	Appearance : No damage. Impedance : within±10% of initial value RDC : within ±15% of initial value and shall not exceed the specification value	Test condition: <table><tr><th>Type</th><th>Peak Value (g's)</th><th>Normal duration (D) (ms)</th><th>Wave form</th><th>Velocity change (Vi)ft/sec</th></tr><tr><td>SMD</td><td>50</td><td>11</td><td>Half-sine</td><td>11.3</td></tr><tr><td>Lead</td><td>50</td><td>11</td><td>Half-sine</td><td>11.3</td></tr></table>	Type	Peak Value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (Vi)ft/sec	SMD	50	11	Half-sine	11.3	Lead	50	11	Half-sine	11.3
Type	Peak Value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (Vi)ft/sec														
SMD	50	11	Half-sine	11.3														
Lead	50	11	Half-sine	11.3														
13	Solderability	More than 95% of the terminal electrode should be covered with solder.	a.Method B, 4 hrs @155°C dry heat @235°C±5°C Test time:5 +/-0.5 seconds. b. Method D category 3. (steam aging 8hours ± 15 min)@ 260°C±5°C Test time: 30 +/-0.5 seconds..															
14	Resistance to Soldering Heat	Appearance : No damage. Impedance : within±15% of initial value RDC : within ±15% of initial value and shall not exceed the specification value	Number of heat cycles: <table><tr><th>Temperature (°C)</th><th>Time (s)</th><th>Temperature ramp/ immersion and emersion rate</th></tr><tr><td>260 ±5 (solder temp)</td><td>10 ±1</td><td>25mm/s ±6 mm/s</td></tr></table> Depth: completely cover the termination	Temperature (°C)	Time (s)	Temperature ramp/ immersion and emersion rate	260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s									
Temperature (°C)	Time (s)	Temperature ramp/ immersion and emersion rate																
260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s																
15	Terminal strength	Appearance : No damage. Impedance : within±15% of initial value RDC : within ±15% of initial value and shall not exceed the specification value 	Preconditioning: Run through IR reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Component mounted on a PCB apply a force >0805inch (2012mm):1kg <=0805inch(2012mm):0.5kg to the side of a device being tested. This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to shock the component being tested.															

Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

Recommended Temperature Profile:

Soldering

Mildly activated rosin fluxes are preferred. AEM terminations are suitable for re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

IR Soldering Reflow:

Recommended temperature profiles for lead free re-flow soldering in Figure 1. Table 1.1&1.2 (J-STD-020E)

Soldering Iron:

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended. (Figure 2.)

- Preheat circuit and products to 150°C
- Never contact the ceramic with the iron tip
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- 350°C tip temperature (max)
- 1.0mm tip diameter (max)
- Limit soldering time to 4~5sec

Fig.1 IR Soldering Reflow

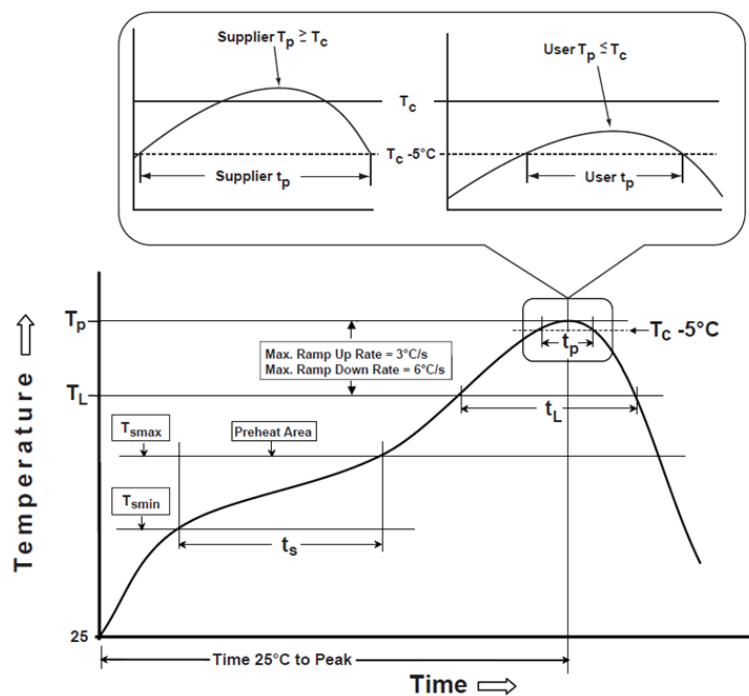
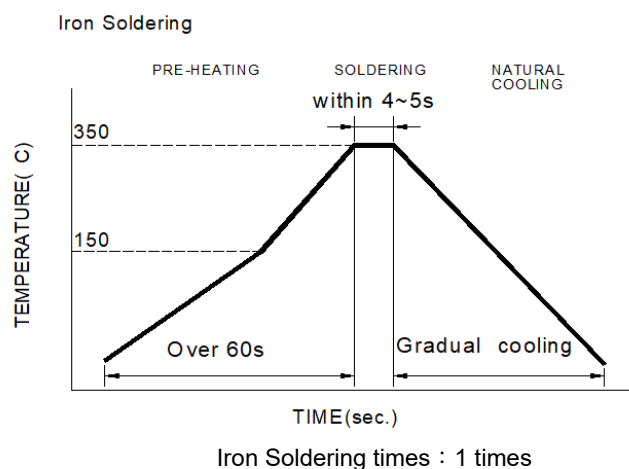


Fig.2 Iron soldering temperature profiles



Multilayer Ferrite Chip Beads

MCB Series (0402 ~ 1206 Sizes)

Recommended Temperature Profile:

Table (1.1): Reflow Profiles

Profile Type:	Pb-Free Assembly
Preheat	
-Temperature Min(T_{smin})	150°C
-Temperature Max(T_{smax})	200°C
-Time(t_s)from(T_{smin} to T_{smax})	60-120seconds
Ramp-up rate(T_L to T_p)	3°C/second max.
Liquidus temperature(T_L)	217°C
Time(t_L)maintained above T_L	60-150 seconds
Classification temperature(T_c)	See Table (1.2)
Time(t_p) at $T_c - 5^\circ\text{C}$ (T_p should be equal to or less than T_c)	< 30 seconds
Ramp-down rate(T_p to T_L)	6°C /second max.
Time 25°C to peak temperature	8 minutes max.

T_p : maximum peak package body temperature, **T_c** : the classification temperature.

For user (customer) **T_p** should be equal to or less than **T_c** .

Table (1.2) Package Thickness/Volume and Classification Temperature (T_c)

	Package Thickness	Volume mm ³	Volume mm ³ 350-2000	Volume mm ³
PB-Free Assembly	<1.6mm	260°C	260°C	260°C
	1.6-2.5mm	260°C	250°C	245°C
	≥2.5mm	250°C	245°C	245°C

Reflow is referred to standard IPC/JEDEC J-STD-020E

Application Notice

- Storage Conditions (component level)

To maintain the solder ability of terminal electrodes:

1. AEM products meet IPC/JEDEC J-STD-020E standard-MSL, level 1.
2. Temperature and humidity conditions: Less than 40°C and 60% RH.
3. Recommended products should be used within 12 months from the time of delivery.
4. The packaging material should be kept where no chlorine or sulfur exists in the air.

- Transportation

1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.

Disclaimer

Specifications are subject to change without notice. AEM products are designed for specific applications and should not be used for any purpose (including, without limitation, automotive, aerospace, medical, life-saving applications, or any other application which requires especially high reliability for the prevention of such defect as may directly cause damage to the third party's life, body or property) not expressly set forth in applicable AEM product documentation. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Warranties granted by AEM shall be deemed void for products used for any purpose not expressly set forth in applicable AEM product documentation. AEM shall not be liable for any claims or damages arising out of products used in applications not expressly intended by AEM as set forth in applicable AEM product documentation. The sale and use of AEM products is subject to AEM terms and conditions of sale. Please refer to AEM's website for updated catalog and terms and conditions of sale.



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Email: sales@aemcomponents.com