

Data Sheet

Customer:

Product: Multilayer Ceramic Chip Capacitor – MC Series

Part No.: MCRF05BTN2516R8

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Multilayer Ceramic Chip Capacitor

■ Features

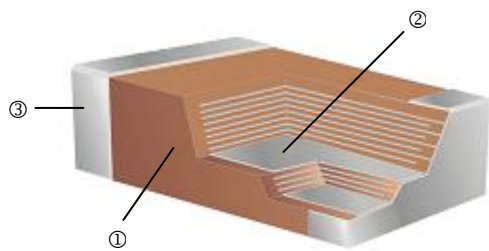
- High Q and low ESR performance at high frequency
- Ultra low capacitance to 0.1pF
- Quality improvement of telephone calls for low power loss and better performance

■ Applications

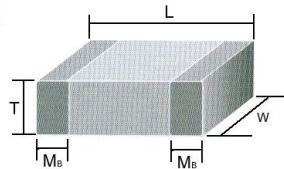
- Telecommunication products & equipments : Mobile phone, WLAN, Base station.
- RF module : Power amplifier, VCO.
- Tuners



■ Construction



①	Ceramic Material	③	Termination
②	Inner Electrodes		



■ Dimensions

Type	Size (Inch)	L (mm)	W (mm)	T / Symbol (mm)		M _B (mm)	Packaging (7" Reel)	
							Paper tape	Plastic tape
05	0805	2.00±0.20	1.25±0.20	0.85±0.10	T	0.50±0.20	4K	-

■ Part Numbering

MCRF	05	B	T	N	251	6R8
Product Type	Dimensions (LxW)	Capacitance Tolerance	Packaging	Dielectric	Voltage (VDCW)	Capacitance
MCRF: Ultra High Q and Low ESR (RF)	05: 0805	B: ±0.1pF	T: Taping Reel	N: NPO	251: 250V	6R8: 6.8pF

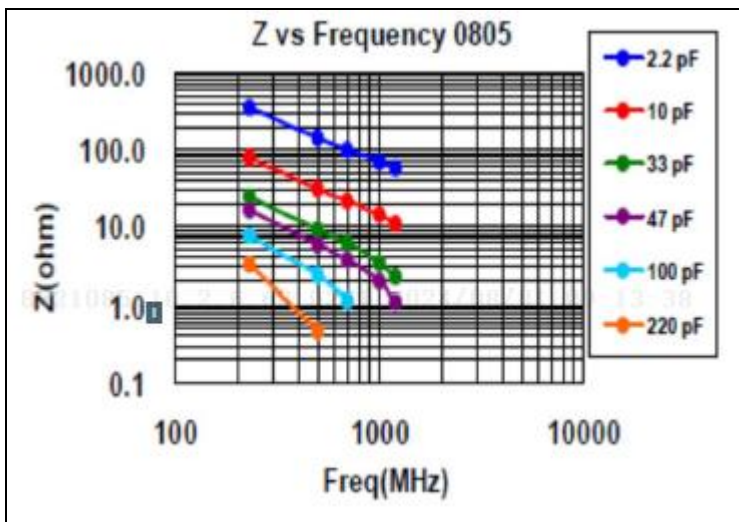
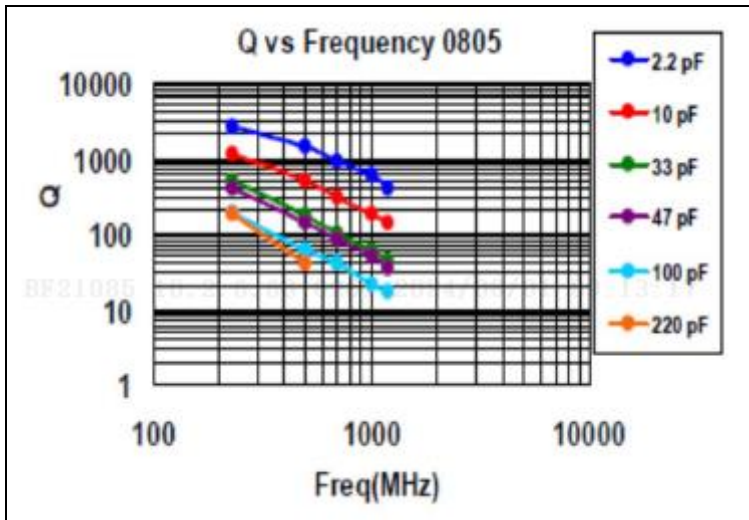
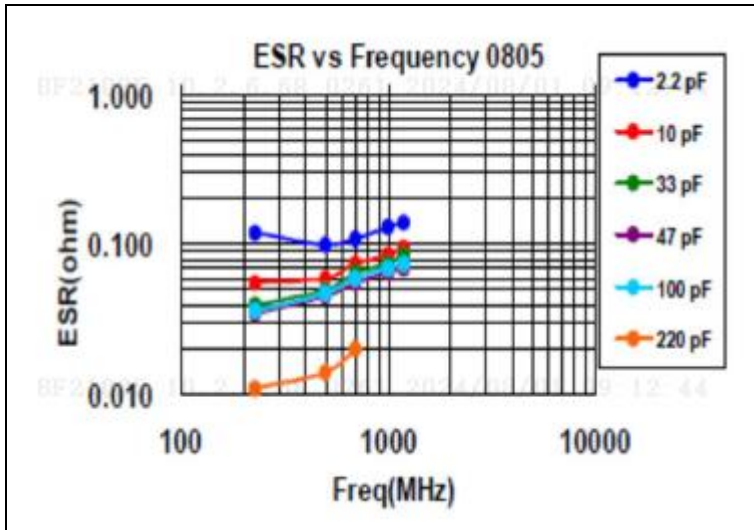
■ Electrical Data

Dielectric	NPO
Size	0805
Capacitance*	6.8pF
Capacitance tolerance**	B(±0.1pF)
Rated voltage (VDCW)	250V
Q *	Cap<30pF:Q≥800+20C; Cap≥30pF:Q≥1400
Insulation resistance at Ur	≥10GΩ or RxC≥100Ω-F whichever is smaller.
Operating temperature	-55 to +125°C
Capacitance	±30ppm/°C
Termination	Ni/Sn (lead-free termination)

■ **Measured at the conditions of 25°C ambient temperature and 30~70% related humidity

■ Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤ 1000pF; 1.0KHz±10% for Cap>1000pF

■ Electrical Characteristics



Multilayer Ceramic Chip Capacitor

■ Environmental Characteristics

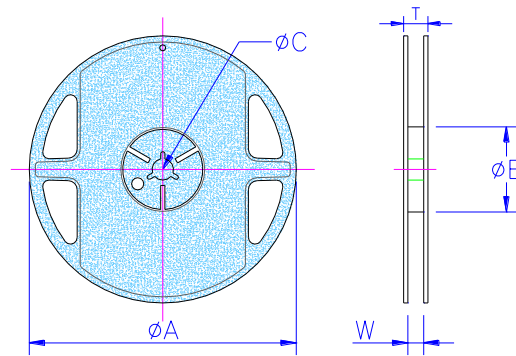
Item	Requirement	Test Method															
External Appearance	No remarkable defect. Dimensions to confirm to individual specification sheet.	Visual inspection & Dimension measurement															
Capacitance	Shall not exceed the limits given in the detailed spec.	Class I : (NP0) Cap.≤1000pF, 1.0±0.2Vrms, 1MHz±10%. Cap.>1000pF, 1.0±0.2Vrms, 1KHz±10%. At 25°C ambient temperature.															
Q/D.F. (Dissipation Factor)	Cap.<30pF : Q≥800+20C; Cap.≥30pF : Q≥1400																
Temperature Coefficient	Capacitance change: within ±30ppm/°C;	With no electrical load NPO:-55~125°C at 25°C															
Insulation Resistance	≥10GΩ or RxC≥100Ω-F, whichever is smaller	≤100V : To apply rated voltage for max. 120 sec ≥200V :To apply rated voltage (500V max.) for 60 sec.															
Dielectric Strength	No evidence of damage or flash over during test.	To apply voltage : ≤100V : 250% of rated voltage. 200V ~ 300V : 200% of rated voltage. 500V ~ 999V : 150% of rated voltage. 1000V ~ 3000V : 120% of rated voltage. 4000V : 110% of rated voltage. Duration : 1 to 5 sec. Charge & discharge current less than 50mA															
Solderability	95% min. coverage of all metalized area	Solder temperature : 235±5°C. Dipping time : 2±0.5 sec															
Resistance to Soldering Heat	No remarkable damage. Cap. change : Within ±2.5% or ±0.25pF whichever is larger. Q/D.F., I.R. and dielectric strength : To meet initial requirements. 25% max. leaching on each edge.	Solder temperature : 260±5°C. Dipping time : 10±1 sec. Preheating : 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.															
Temperature Cycle	No remarkable damage. Cap. change : Within ±2.5% or ±0.25pF, whichever is larger. Q/D.F., I.R. and dielectric strength : To meet initial requirements	Conduct the five cycles according to the temperatures and time. <table border="1"> <thead> <tr> <th>Step</th> <th>Temp.(°C)</th> <th>Time(min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>2-3</td> </tr> <tr> <td>3</td> <td>Max. operating temp. +3/-0</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temp</td> <td>2-3</td> </tr> </tbody> </table> Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.	Step	Temp.(°C)	Time(min.)	1	Min. operating temp. +0/-3	30±3	2	Room temp.	2-3	3	Max. operating temp. +3/-0	30±3	4	Room temp	2-3
Step	Temp.(°C)	Time(min.)															
1	Min. operating temp. +0/-3	30±3															
2	Room temp.	2-3															
3	Max. operating temp. +3/-0	30±3															
4	Room temp	2-3															
Humidity (Damp Heat) Steady State	No remarkable damage. Cap. change : Within ±5.0% or ±0.5pF, whichever is larger. Q/D.F. value : Cap.>30pF, Q≥350. 10pF≤Cap.≤30pF, Q≥275+2.5C. Cap.<10pF, Q≥200+10C. I.R. : ≥1GΩ.	Test temp. : 40±2°C. Humidity : 90~95% RH. Test time : 500 +24/-0hrs. Cap./DF(Q) Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp															
Humidity (Damp Heat) Load	No remarkable damage. Cap. change : Within ±7.5% or ±0.75pF, whichever is larger. Q/D.F. value : Cap.≥30pF, Q≥200; Cap.<30pF, Q≥100+10/3C. I.R. : ≥500MΩ	Test temp. : 40±2°C. Humidity : 90~95%RH. Test time : 500 +24/-0hrs. To apply voltage : Rated voltage (500Vdc max.). Cap./DF(Q) Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.															
High Temperature Load (Endurance)	No remarkable damage. Cap. change : Within ±3.0% or ±0.3pF, whichever is larger. Q/D.F. value : Cap.>30pF, Q≥350. 10pF≤Cap.≤30pF, Q≥275+2.5C. Cap.<10pF, Q≥200+10C. I.R. : ≥1GΩ.	Test temp. : NPO: 125±3°C To apply voltage : (1) 10V≤Ur<500V : 200% of rated voltage. (2) ≤6.3V or 500V : 150% of rated voltage. (3) Ur≥630V : 120% of rated voltage. Test time : 1000 +24/-0 hrs. Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.															
Adhesive Strength of Termination	No remarkable damage or removal of the terminations.	Pressurizing force : 01005 : 1N / 0201 : 2N. 0402 to 0603 : 5N / >0603 : 10N. Test time : 10±1 sec.															

Multilayer Ceramic Chip Capacitor

Item	Requirement	Test Method
Bending Test	No remarkable damage. Cap change: within $\pm 5.0\%$ or $\pm 0.5\text{pF}$ whichever is larger. (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test)	The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5 ± 1 sec. Measurement to be made after keeping at room temp. for 24 ± 2 hrs.
Vibration Resistance	No remarkable damage. Cap. change and D.F. : To meet initial spec	Vibration frequency : 10~55 Hz/min. Total amplitude : 1.5mm. Test time : 6 hrs. (Two hrs each in three mutually perpendicular directions) Cap./DF(Q) Measurement to be made after de-aging at 150°C for 1hr then set for 24 ± 2 hrs at room temp.
ESR	0805: $0.3\text{pF} \leq \text{Cap.} \leq 1\text{pF} : <1500\text{m}\Omega$ $1\text{pF} < \text{Cap.} \leq 10\text{pF} : <250\text{m}\Omega$ $\text{Cap.} > 10\text{pF} : <200\text{m}\Omega$	The ESR should be measured at room temperature and tested at frequency 1 ± 0.1 GHz.

■ Packaging

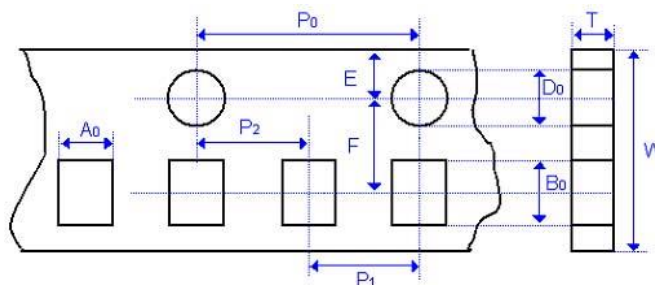
Packaging Quantity & Reel Specification



Unit: mm

Type	Thickness	øA	øB	øC	W	Paper tape
0805	0.80 ± 0.07	178 ± 1.0	$60+1/-0$	$13+0.5/-0.2$	$8.4+1.5/-0$	4K

Paper Tape Size Specification

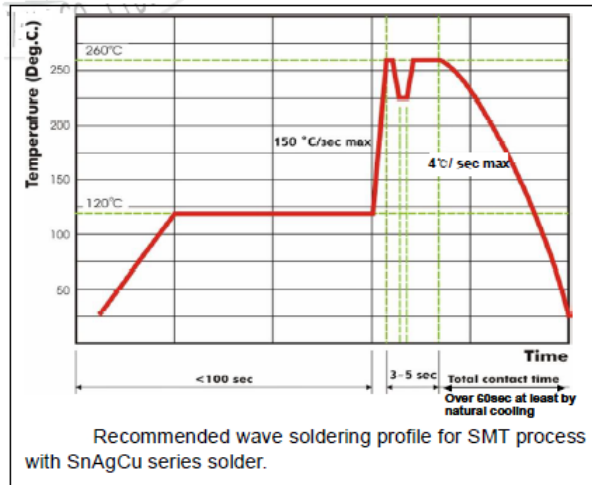
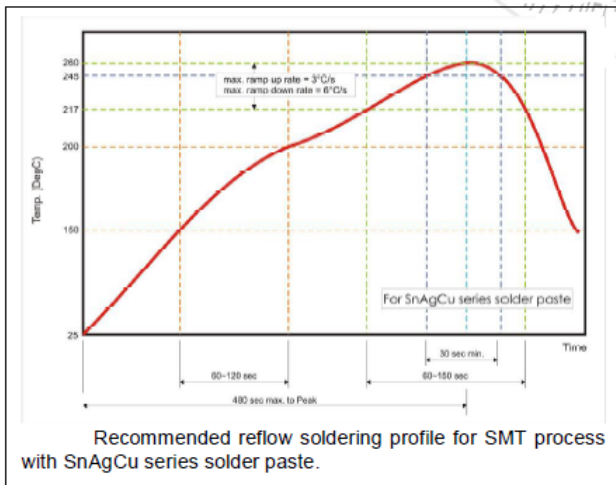


Type	A0	B0	T	W	P0	P1	P2	D0	E	F
0805	1.50 ± 0.20	2.30 ± 0.20	≤ 1.20	8.00 ± 0.30	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	$1.55+0.1/-0$	1.75 ± 0.10	3.50 ± 0.05

Multilayer Ceramic Chip Capacitor

Recommended Soldering Conditions

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N2 within oven are recommended.



Storage and Handling Conditions

- (1) To store products at 5 to 40 °C ambient temperature and 20 to 70% related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.
- c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to moisture.