

Data Sheet

Customer:

Product: Flexible Terminal Multilayer Ceramic Chip Capacitor – MCFA Series

Sizes.: 0603/0805/1206

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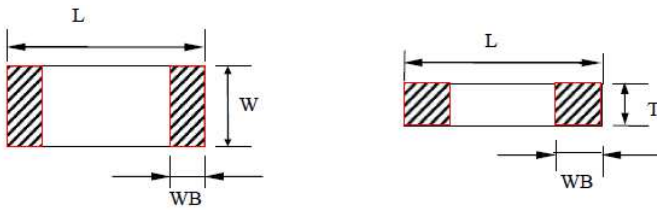
■ Features

- High mechanical performance able to withstand, 3mm bend test
- Increased temperature cycling performance, 3000 cycles and beyond
- Flexible termination system
- Reduction in circuit board flex failures

■ Applications

- High Flexure Stress Circuit Boards
- Variable Temperature Applications
- Automotive Applications

■ Dimensions



Unit: mm

Type	Size (Inch)	L	W	T	WB	Special Instructions
03	0603	1.60±0.10	0.80±0.10	0.80±0.10	0.30±0.10	All
05	0805	2.00±0.20	1.25±0.20	0.80±0.20	0.50±0.20	C<1uF
		2.00±0.20	1.25±0.20	1.25±0.20	0.50±0.20	1uF≤C≤4.7uF
06	1206	3.20±0.30	1.60±0.30	0.80±0.20	0.60±0.30	C≤1uF
		3.20±0.30	1.60±0.30	1.00±0.20	0.60±0.30	1uF<C≤2.2uF
		3.20±0.30	1.60±0.30	1.25±0.20	0.60±0.30	2.2uF<C<4.7uF
		3.20±0.30	1.60±0.30	1.60±0.30	0.60±0.30	C≥4.7uF

■ We can design according to customer special requirements

■ Part Numbering

MCFA	03	J	T	N	250	3R9
Product Type	Dimensions (L×W)	Capacitance Tolerance	Packaging	Dielectric	Voltage (VDCW)	Capacitance
MCFA: Flexible termination	03: 0603 05: 0805 06: 1206	J: ±5% K: ±10% M: ±20%	T: Taping Reel	N: NPO (COG) B: X7R	6V3: 6.3V 100: 10V 160: 16V 250: 25V 500: 50V 101: 100V 102: 1000V	3R9: 3.9pF 150: 15pF 181: 180pF 225: 2.2μF 106: 10μF

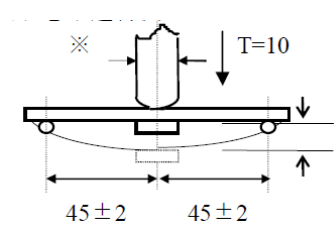
■ General Capacitance & Voltage

Size Code	Rated Voltage	Capacitance	
		NPO(COG)	X7R
0603	6.3V	0.1pF~4.7nF	100pF~2.2uF
	10V	0.1pF~4.7nF	100pF~2.2uF
	16V	0.1pF~4.7nF	100pF~2.2uF
	25V	0.1pF~4.7nF	100pF~1uF
	50V	0.1pF~4.7nF	100pF~470nF
0805	6.3V	0.3pF~10nF	100pF~4.7uF
	10V	0.3pF~10nF	100pF~4.7uF
	16V	0.3pF~10nF	100pF~4.7uF
	25V	0.3pF~10nF	100pF~2.2uF
	50V	0.3pF~10nF	100pF~1uF
1206	6.3V	0.5pF~33nF	100pF~10uF
	10V	0.5pF~33nF	100pF~10uF
	16V	0.5pF~33nF	100pF~10uF
	25V	0.5pF~33nF	100pF~4.7uF
	50V	0.5pF~12nF	100pF~4.7uF

■ Middle and High Voltage

Size Code	Rated Voltage	Capacitance	
		NPO(COG)	X7R
0603	100V	0.5pF~820pF	150pF~22nF
	200V	0.5pF~470pF	150pF~10nF
	250V	0.5pF~470pF	150pF~10nF
0805	100V	0.5pF~1.5nF	150pF~100nF
	200V	0.1pF~1.5nF	150pF~22nF
	250V	0.1pF~1.5nF	150pF~22nF
	500V	0.1pF~560pF	150pF~12nF
	630V	0.1pF~560pF	150pF~12nF
	1000V	0.1pF~100pF	—
1206	100V	0.5pF~3.3nF	150pF~330nF
	200V	0.1pF~2.7nF	150pF~120nF
	250V	0.1pF~2.7nF	150pF~100nF
	500V	0.1pF~1.5nF	150pF~33nF
	630V	0.1pF~1.5nF	150pF~33nF
	1000V	0.1pF~1nF	150pF~10nF
	2000V	0.1pF~270pF	150pF~2.7nF

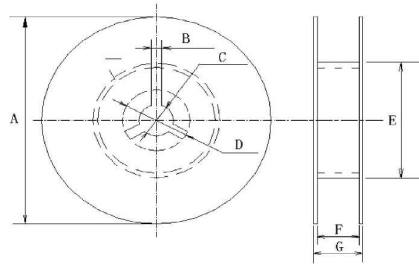
Environmental Characteristics

Item	Requirement						Test Method		
Capacitance	Should be within the specified tolerance						NPO: (Class I) Cap ≤ 1000pF 1.0±0.2Vrms, 1MHz±10% Cap > 1000pF 1.0±0.2Vrms, 1KHz±10% X7R, X5R, Y5V: (Class II) Cap ≤ 10uF 1.0±0.2Vrms, 1KHz±10% Cap > 10uF 0.5±0.1Vrms, 120Hz±24Hz		
(DF, tanδ) Dissipation Factor	NPO (Class I)	DF					Capacitance	Measuring Frequency	Measuring Voltage
		≤0.56%					Cr < 5 pF	1MHz±10 %	1.0±0.2Vrms
		1.5[(150/Cr)+7]×10 ⁻⁴					5pF ≤ Cr < 50 pF		
		≤0.15%					50pF ≤ Cr ≤ 1000 pF		
	≤0.15%					> 1000 pF	1KHz±10%		
X7R, X5R, Y5V: (Class II)	X7R	≥50V	25V	16V	10V	6.3V	Cap ≤ 10uF 1.0±0.2Vrms, 1KHz±10% Cap > 10uF 0.5±0.1Vrms, 120Hz±10%		
	X5R	≤2.5%	≤3.5%(C<0.47uF) ≤10.0%(C≥0.47uF)		≤5%(C<0.15uF) ≤10.0%(C≥0.15uF)				
	X7R Y5V (<0402)	≤3.5%	≤5.0%	≤5.0%(C<0.047uF) ≤10.0%(C≥0.047uF)		≤7.5%(C<0.047uF) ≤10.0%(C≥0.047uF)			
Y5V	25V		16V	10V	6.3V				
		≤7.0%(C<1.0uF) ≤9.0%(C≥1.0uF)		≤15%	≤15%	≤15%			
Insulation Resistance	NPO (Class I)	C ≤ 10 nF, Ri ≥ 50000MΩ C > 10 nF, Ri · CR ≥ 500S					Measuring Voltage: Rated Voltage (Max 500V) Duration: 60±5s Test Humidity: ≤75% Test Temperature: 25°C±5°C Test Current: ≤50mA		
	X7R, X5R: (Class II)	C ≤ 25 nF, Ri ≥ 10000MΩ C > 25 nF, Ri · CR > 100S							
	Y5V (Class II)	C ≤ 25 nF, Ri ≥ 4000MΩ C > 25 nF, Ri · CR > 100S							
Dielectric Withstanding Voltage	No breakdown or damage						Measuring Voltage: Class I : 300% Rated voltage Class II : 250% Rated voltage Duration: 1 ~ 5s Charge/ Discharge Current: 50mA max. (This method excludes high-voltage MLCC)		
Solderability	At least 95% of the terminal electrode is covered by new solder. Visual Appearance: No visible damage.						Preheating conditions: 80 to 120°C; 10~30s.		
							Solder Temperature: 235±5°C Duration: 2±0.5s	Solder Temperature: 245±5°C Duration: 2±0.5s	
Resistance to Soldering Heat	Item	NPO to SL		X7R / X5R	Y5V		Preheating conditions: 100 to 200°C; 10±2min. Solder Temperature: 265±5°C Duration: 10±1s Clean the capacitor with solvent and examine it with a 10X(min.) microscope. Recovery Time: 24±2h Recovery condition: Room temperature		
	ΔC/C	≤±0.5% or ±0.5pF whichever is larger		-5~+10%	-10~+20%				
	DF	Same to initial value							
	IR	Same to initial value							
Appearance : No visible damage. At least 95% of the terminal electrode is covered by new solder.									
Resistance to Flexure of Substrate (Bending Strength)	Appearance: No visible damage ΔC/C: ≤±10%						Test Board: Al2O3 or PCB Warp: 3mm Speed: 0.5mm/sec. Unit: mm The measurement should be made with the board in the bending position.		
									

Item	Requirement	Test Method															
Termination Adhesion	No visible damage	Applied Force: 5N Duration: 10±1S															
Temperature Cycle	NPO: $\Delta C/C: \leq \pm 1\%$ or $\pm 1pF$, whichever is larger. X7R/X5R: $\Delta C/C: \leq \pm 10\%$ Y5V: $\Delta C/C: \leq \pm 20\%$	Preheating conditions: up-category temperature, 1h Recovery time: 24±1h Initial Measurement Cycling Times: 5 times, 1 cycle, 4 steps: <table border="1" data-bbox="1050 405 1532 678"> <thead> <tr> <th>Step</th> <th>Temp.(°C)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low- category temp NPO/X7R : -55 Y5V: -25</td> <td>30</td> </tr> <tr> <td>2</td> <td>Normal temp. (+20)</td> <td>2-3</td> </tr> <tr> <td>3</td> <td>Up- category temp NPO/X7R : -125 Y5V: -85</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Normal temp. (+20)</td> <td>2-3</td> </tr> </tbody> </table> Recovery time after test: 24±2h	Step	Temp.(°C)	Time(min)	1	Low- category temp NPO/X7R : -55 Y5V: -25	30	2	Normal temp. (+20)	2-3	3	Up- category temp NPO/X7R : -125 Y5V: -85	30±3	4	Normal temp. (+20)	2-3
Step	Temp.(°C)	Time(min)															
1	Low- category temp NPO/X7R : -55 Y5V: -25	30															
2	Normal temp. (+20)	2-3															
3	Up- category temp NPO/X7R : -125 Y5V: -85	30±3															
4	Normal temp. (+20)	2-3															
Moisture Resistance	NPO: $\Delta C/C: \leq \pm 2\%$ or $\pm 1pF$, whichever is larger. X7R/X5R: $\Delta C/C: \leq \pm 10\%$ Y5V: $\Delta C/C: \leq \pm 30\%$ DF: Not more than twice of initial value. IR: NPO: $R_i \geq 2500M\Omega$ 或 $R_i \cdot CR \geq 25S$ whichever is smaller X7R/X5R/Y5V: $R_i \geq 1000M\Omega$ 或 $R_i \cdot CR \geq 25S$ whichever is smaller. Appearance: No visible damage	Temperature : 40±2°C Humidity : 90~95%RH Duration : 500h Recovery conditions : Room temperature Recovery Time : 24h (Class1) or 48h (Class2)															
Life Test	NPO: $\Delta C/C: \leq \pm 2\%$ or $\pm 1pF$, whichever is larger. X7R/X5R $\Delta C/C \leq \pm 20\%$ Y5V: $\Delta C/C \leq \pm 30\%$ DF: Not more than twice of initial value. IR: NPO: $R_i \geq 4000M\Omega$ 或 $R_i \cdot CR \geq 40S$ whichever is smaller X7R/X5R/Y5V: $R_i \geq 2000M\Omega$ 或 $R_i \cdot CR \geq 50S$ whichever is smaller. Appearance: No visible damage	Low-Voltage ($\leq 100V$) Applied Voltage: 1.5 × Rated Voltage Duration: 1000h Temperature : 125°C (NPO, X7R) 85°C (X5R, Y5V) Charge/ Discharge Current: 50mA max. Recovery Conditions: Room Temperature Recovery Time: 24h (Class I), or 48h (Class II)															
Middle & high voltage Life Test	NPO: $\Delta C/C: \leq \pm 2\%$ or $\pm 1pF$, whichever is larger. X7R/X5R $\Delta C/C \leq \pm 20\%$ Y5V: $\Delta C/C \leq \pm 30\%$ DF: Not more than twice of initial value. IR: NPO: $R_i \geq 4000M\Omega$ 或 $R_i \cdot CR \geq 40S$ whichever is smaller X7R/X5R/Y5V: $R_i \geq 2000M\Omega$ 或 $R_i \cdot CR \geq 50S$ whichever is smaller. Appearance: No visible damage	Applied Voltage: $100V \leq \text{Rated Voltage} < 500V$: 2 Multiple $500V \leq \text{Rated Voltage} \leq 1000V$: 1.5 Multiple $> 1000V$ Rated Voltage : 1.2 Multiple Duration: 1000h Charge/ Discharge Current: 50mA max. Temperature : 125°C (NPO X7R) ; 85°C (X5R, Y5V) Recovery Conditions: Room Temperature Recovery Time: 24h (Class I), or 48h (Class II)															

■ Packaging

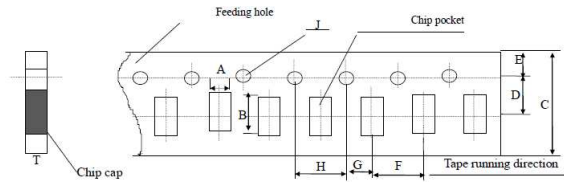
Packaging Quantity & Reel Specifications



Unit: mm

Type	A	B	C	D	E	F	G	Paper tape	Plastic tape
0603	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max	4K	—
0805								4K	3K
1206								4K	T ≤ 1.35mm 3K T > 1.35mm 2K

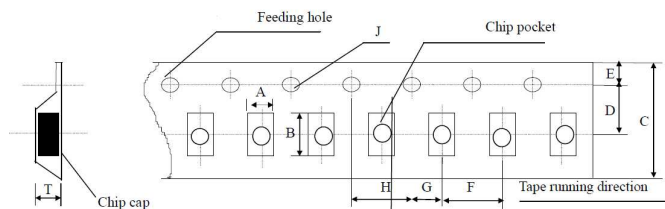
Paper Tape Size Specification



Unit: mm

Type	A	B	C	D	E	F	G	H	J	T
0603	1.10±0.10	1.90±0.15	8.00±0.10	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.1	1.10 max
0805	1.45±0.15	2.30±0.15	8.00±0.15	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.1	1.10 max
1206	1.80±0.20	3.40±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.1	1.10 max

Plastic Tape Size Specification



Unit: mm

Type	A	B	C	D	E	F	G	H	J	T
0805	1.55±0.20	2.35±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.1	1.50 max
1206	1.95±0.20	3.60±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.10	4.00±0.10	1.50-0/+0.1	1.85 max