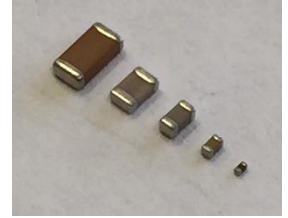
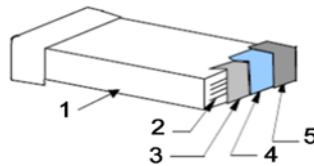


Features:

- Lead free, Halogen free, RoHS and REACH compliant
- -55 °C to 125 °C operating temperature range
- EIA sizes 0402, 0603, 0805, 1206, 1210 and 1812
- Capacitance offering from 0.1 pF to 0.1 uF



Construction



- 1 - Ceramic layers (dielectric)
- 2 - Inner electrodes
- 3 - Base termination
- 4 - Nickel plating layer
- 5 - Tin plating layer

Electrical Specifications

Type / Code	Dielectric Code	Standard Tolerance		Capacitance Range	
		Code	Description	50 V	100 V
CML0402	C0G	C	± 0.25 pF	0.1 pF - 8.2 pF	-
		J	± 5%	10 pF - 1000 pF	-
CML0603	C0G	C	± 0.25 pF	0.1 pF - 6.8 pF	0.5 pF - 8.2 pF
		J	± 5%	10 pF - 6800 pF	10 pF - 1000 pF
CML0805	C0G	C	± 0.25 pF	0.3 pF - 6.8 pF	0.5 pF - 8.2 pF
		J	± 5%	10 pF - 0.022 uF	10 pF - 3300 pF
CML1206	C0G	C	± 0.25 pF	0.3 pF - 8.2 pF	0.5 pF - 8.2 pF
		J	± 5%	10 pF - 3300 pF 3900 pF - 4700 pF	10 pF - 3300 pF -
CML1210	C0G	C	± 0.25 pF	-	1 pF - 8.2 pF
		J	± 5%	10 pF - 0.1 uF	10 pF - 6800 pF
CML1812	C0G	C	± 0.25 pF	-	3 pF - 8.2 pF
		J	± 5%	10 pF - 0.1 uF	10 pF - 0.01 uF

Note: Capacitance values < 10pF: B = ± 0.1 pF may be available
Capacitance values ≥ 10pF: G = ± 2% may be available

How to Order

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
C	M	L	0	4	0	2	C	0	G	1	0	0	J	T	5	0	V
Product Series		Size	Dielectric	Capacitance Range		Tolerance (*)		Packaging			Max Working Voltage						
Code	Description	Code		Code	0.1pF to 0.10uF (E12)	Code	Description	Code	Description	Size and Quantity							
CML	Multilayer Ceramic	0402	C0G	EIA Code	Capacitance	B	± 0.1 pF	T	7" Paper Reel	Refer to Packaging Specifications	50V						
		0603				C	± 0.25 pF		7" Plastic Tape		100V						
		0805				G	± 2%										
		1206				J	± 5%										
		1210															
		1812															

(*) Other tolerances may be available. Contact Stackpole.

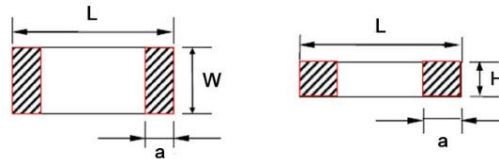
(*) Other tolerances may be available. Contact Stackpole.

Capacitance and Voltage Available												
Dielectric		C0G										
EIA	Size	0402	0603		0805		1206		1210		1812	
Code	VDCW	50V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V
0R1	0.1 pF											
0R2	0.2 pF											
0R3	0.3 pF											
0R4	0.4 pF											
0R5	0.5 pF											
0R6	0.6 pF											
0R7	0.7 pF											
0R8	0.8 pF											
0R9	0.9 pF											
1R0	1 pF											
1R2	1.2 pF											
1R5	1.5 pF											
1R8	1.8 pF											
2R0	2 pF											
2R2	2.2 pF											
2R7	2.7 pF											
3R0	3 pF											
3R3	3.3 pF											
3R9	3.9 pF											
4R7	4.7 pF											
5R0	5 pF											
5R6	5.6 pF											
6R8	6.8 pF											
8R2	8.2 pF											
100	10 pF											
120	12 pF											
150	15 pF											
180	18 pF											
220	22 pF											
270	27 pF											
330	33 pF											
390	39 pF											
470	47 pF											
560	56 pF											
680	68 pF											
820	82 pF											
101	100 pF											
121	120 pF											
151	150 pF											
181	180 pF											
221	220 pF											
271	270 pF											
331	330 pF											
391	390 pF											
471	470 pF											
561	560 pF											
681	680 pF											
751	750 pF											
821	820 pF											
102	1000 pF											
122	1200 pF											
152	1500 pF											
182	1800 pF											
222	2200 pF											
272	2700 pF											
332	3300 pF											
392	3900 pF											
472	4700 pF											
562	5600 pF											
682	6800 pF											
822	8200 pF											
103	0.01 uF											

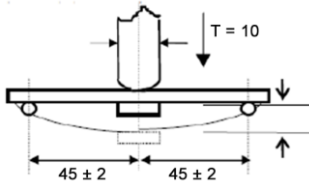
Capacitance and Voltage Available (cont.)

Dielectric		C0G										
EIA	Size	0402	0603		0805		1206		1210		1812	
Code	VDCW	50V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V
123	0.012 uF											
153	0.015 uF											
183	0.018 uF											
223	0.022 uF											
273	0.027 uF											
333	0.033 uF											
473	0.047 uF											
563	0.056 uF											
683	0.068 uF											
823	0.082 uF											
104	0.1 uF											

Mechanical Specifications and Packaging Specifications



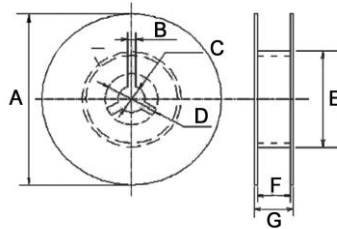
Type / Code	Voltage	Capacitance Value	L	W	H	a	Unit	Packaging (7" Reel) Qty.	
								Paper Tape	Plastic Tape
CML0402C0G	50 V	0.1 pF - 1000 pF	0.039 ± 0.008 1.00 ± 0.20	0.020 ± 0.008 0.50 ± 0.20	0.020 ± 0.002 0.50 ± 0.05	0.010 ± 0.004 0.25 ± 0.10	inches mm	10000	-
CML0603C0G	50 V - 100 V	0.1 pF - 6800 pF	0.063 ± 0.008 1.60 ± 0.20	0.031 ± 0.008 0.80 ± 0.20	0.031 ± 0.004 0.80 ± 0.10	0.012 ± 0.004 0.30 ± 0.10	inches mm	4000	-
CML0805C0G	50 V	0.3 pF - 1500 pF 4700 pF	0.079 ± 0.008 2.00 ± 0.20	0.049 ± 0.008 1.25 ± 0.20	0.028 ± 0.002 0.70 ± 0.05	0.020 ± 0.008 0.50 ± 0.20	inches mm	4000	-
		1800 pF - 3900 pF 5600 pF - 8200 pF	0.079 ± 0.008 2.00 ± 0.20	0.049 ± 0.008 1.25 ± 0.20	0.031 ± 0.004 0.80 ± 0.09	0.020 ± 0.008 0.50 ± 0.20	inches mm	4000	-
		0.01 uF - 0.022 uF	0.079 ± 0.008 2.00 ± 0.20	0.049 ± 0.008 1.25 ± 0.20	0.047 ± 0.004 1.20 ± 0.10	0.020 ± 0.008 0.50 ± 0.20	inches mm	-	2000
	100 V	0.5 pF - 3300 pF	0.079 ± 0.008 2.00 ± 0.20	0.049 ± 0.008 1.25 ± 0.20	0.031 ± 0.004 0.80 ± 0.10	0.020 ± 0.008 0.50 ± 0.20	inches mm	4000	-
CML1206C0G	50 V	0.3 pF - 8200 pF	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.012 1.60 ± 0.30	0.028 ± 0.002 0.70 ± 0.05	0.024 ± 0.012 0.60 ± 0.30	inches mm	4000	-
		0.01 uF - 0.1 uF	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.012 1.60 ± 0.30	0.063 ± 0.004 1.60 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
	100 V	0.5 pF - 3300 pF	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.012 1.60 ± 0.30	0.031 ± 0.004 0.80 ± 0.09	0.024 ± 0.012 0.60 ± 0.30	inches mm	4000	-
CML1210C0G	50 V	10 pF - 0.1 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	3000
	100 V	1 pF - 6800 pF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
CML1812C0G	50 V	10 pF - 0.1 uF	0.177 ± 0.016 4.50 ± 0.40	0.126 ± 0.012 3.20 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	1000
	100 V	3 pF - 0.01 uF	0.177 ± 0.016 4.50 ± 0.40	0.126 ± 0.012 3.20 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	1000

Environmental Characteristics					
Test	Test Specification		Test Condition		
Capacitance	Should be within the specified tolerance.		C0G: (Class I) Cap ≤ 1000 pF 1.0 ± 0.2 Vrms, 1 MHz ± 10% Cap > 1000 pF 1.0 ± 0.2 Vrms, 1 KHz ± 10%		
Dissipation Factor (DF)	C0G (Class I)	DF	Capacitance	Measuring Frequency	1 ± 0.2 Vrms
		≤ 0.56%	Cr < 5 pF	1 MHz ± 10%	
		1.5 [(150 / Cr) + 7] x 10 - 4	5 pF ≤ Cr < 50 pF		
		≤ 0.15%	50 pF ≤ Cr ≤ 1000 pF		
		≤ 0.15%	> 1000 pF	1 KHz ± 10%	
Insulation Resistance	C0G (Class I)	C ≤ 10 nF, Ri ≥ 50000 M Ω C > 10 nF, Ri*CR ≥ 500 S	Measuring Voltage: Rated Voltage (Max 500V) Duration: 60 ± 5 seconds Test Humidity: ≤ 75% Test Temperature: 25 °C ± 5 °C Test Current: ≤ 50mA		
Dielectric Withstanding Voltage	No breakdown or damage.		Measuring voltage: Class I: 300% rated voltage Duration: 1 ~ 5 seconds Charge/Discharge Current: 50 mA max.		
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 ~ 30 seconds		
			Solder Temperature: 235 ± 5% (Sn/Pb: 63/37) Duration: 2 ± 0.5 seconds		
			Solder Temperature: 245 ± 5 °C (Lead-free) Duration: 2 ± 0.5 seconds		
Resistance to Soldering Heat	Item	C0G	Preheating Conditions: 100 to 200 °C; 10 ± 2 minutes Solder Temperature: 265 ± 5 °C Duration: 10 ± 1 seconds Clean the capacitor with solvent and examine it with a 10X (min.) microscope. Recovery Time: 24 ± 2 hours Recovery Condition: Room temperature.		
	Δ C/C	≤ ± 0.5% or ± 0.5 pF whichever is larger			
	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. Δ C/C: ≤ ± 10%		Test Board: Al2O3 or PCB Warp: 1 mm Speed: 0.5 mm / second The measurement should be made with the board in the bending position.  Unit: mm		
Termination Adhesion	No visible damage		Applied Force: 5 N Duration: 10 ± 1 seconds		
Temperature Cycle	C0G: Δ C/C: ≤ ± 1% or ± 1 pF, whichever is larger		Preheating Conditions: up-category Temperature: 1 hour Recovery Time: 24 ± 1 hours Initial Measurement Cycling times: 5 times, 1 cycle, 4 steps:		
			Step	Temp. (°C)	Time (min.)
			1	Low-category temp. C0G: -55	30 ± 3
			2	Normal temp. (+20)	2 - 3
			3	Up-category temp. C0G: +125	30 ± 3
			4	Normal temp. (+20)	2 - 3
			Recovery time after test: 24 ± 2 hours		

Environmental Characteristics (cont.)

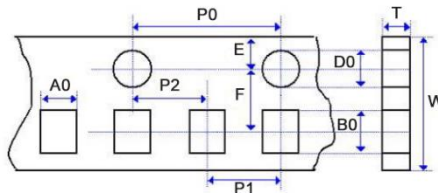
Test	Test Specification	Test Condition
Moisture Resistance	C0G: $\Delta C/C: \leq \pm 2\%$ or ± 1 pF, whichever is larger DF: Not more than twice of initial value. IR: C0G: $R_i \geq 2500$ M Ω or $R_i \cdot CR \geq 25$ S whichever is smaller Appearance: No visible damage	Temperature: 40 ± 2 °C Humidity: 90 ~ 95% R.H. Duration: 500 hours Recovery Conditions: Room temperature Recovery Time: 24 hours (Class I)
Life Test	C0G: $\Delta C/C: \leq \pm 2\%$ or ± 1 pF, whichever is larger DF: Not more than twice of initial value. IR: C0G: $R_i \geq 4000$ M Ω or $R_i \cdot CR \geq 40$ S whichever is smaller Appearance: No visible damage	Low-voltage (< 100 V) Applied Voltage: 1.5 x rated voltage Duration: 1000 hours Temperature: 125 °C (C0G) Charge/Discharge Current: 50 mA max. Recovery Conditions: Room temperature Recovery Time: 24 hours (Class I)
Middle and High Voltage Life Test	C0G: $\Delta C/C: \leq \pm 2\%$ or ± 1 pF, whichever is larger DF: Not more than twice of initial value. IR: C0G: $R_i \geq 4000$ M Ω or $R_i \cdot CR \geq 40$ S whichever is smaller Appearance: No visible damage	Applied voltage: 100 V $\leq$ rated voltage < 500 V: 2 multiple 500 V $\leq$ rated voltage ≤ 1000 V: 1.5 multiple > 1000 V rated voltage: 1.2 multiple Duration: 1000 hours Charge/Discharge Current: 50 mA max. Temperature: 125 °C (C0G) Recovery Conditions: Room temperature Recovery Time: 24 hours (Class I)

Reel Specifications



Type / Code	A	B	C	D	E	F	G	Unit
CML_C0G (all sizes)	7.008 ± 0.079 178.00 ± 2.00	0.118 3.00	0.512 ± 0.020 13.00 ± 0.50	0.827 ± 0.031 21.00 ± 0.80	1.969 or more 50.00 or more	0.394 ± 0.059 10.00 ± 1.50	0.472 max 12.00 max	inches mm

Paper Tape Specifications

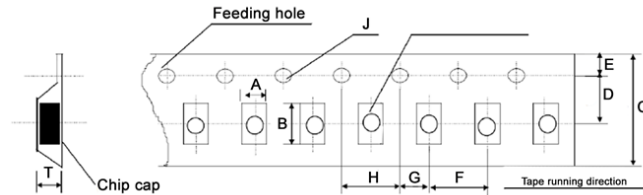


Type / Code	A ₀	B ₀	T	W	P ₀	Unit
CML0402C0G	0.026 ± 0.004 0.65 ± 0.10	0.045 ± 0.004 1.15 ± 0.10	0.031 below 0.80 below	0.315 ± 0.004 8.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	inches mm
CML0603C0G	0.043 ± 0.004 1.10 ± 0.10	0.075 ± 0.004 1.90 ± 0.10	0.043 max 1.10 max	0.315 ± 0.004 8.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	inches mm
CML0805C0G	0.057 ± 0.006 1.45 ± 0.15	0.091 ± 0.006 2.30 ± 0.15	0.043 max 1.10 max	0.315 ± 0.006 8.00 ± 0.15	0.157 ± 0.004 4.00 ± 0.10	inches mm
CML1206C0G	0.071 ± 0.008 1.80 ± 0.20	0.134 ± 0.008 3.40 ± 0.20	0.043 max 1.10 max	0.315 ± 0.008 8.00 ± 0.20	0.157 ± 0.004 4.00 ± 0.10	inches mm

Paper Tape Specifications (cont.)

Type / Code	P ₁	P ₂	D ₀	E	F	Unit
CML0402C0G	0.079 ± 0.002 2.00 ± 0.05	0.079 ± 0.002 2.00 ± 0.05	0.059-0/+0.004 1.5-0/+0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
CML0603C0G	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.002 4.00 ± 0.05	0.059-0/+0.004 1.5-0/+0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
CML0805C0G	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
CML1206C0G	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm

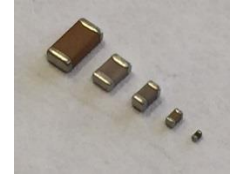
Plastic Tape Specifications



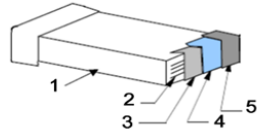
Type / Code	A	B	C	D	E	Unit
CML0805C0G	0.061 ± 0.008 1.55 ± 0.20	0.093 ± 0.008 2.35 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.138 ± 0.002 3.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
CML1206C0G	0.077 ± 0.008 1.95 ± 0.20	0.142 ± 0.008 3.60 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.138 ± 0.002 3.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
CML1210C0G	0.106 ± 0.004 2.70 ± 0.10	0.135 ± 0.004 3.42 ± 0.10	0.315 ± 0.004 8.00 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
CML1812C0G	0.144 ± 0.004 3.66 ± 0.10	0.195 ± 0.004 4.95 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
Type / Code	F	G	H	J	T	Unit
CML0805C0G	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.059 max 1.50 max	inches mm
CML1206C0G	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.073 max 1.85 max	inches mm
CML1210C0G	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.126 max 3.20 max	inches mm
CML1812C0G	0.315 ± 0.004 8.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.157 max 4.00 max	inches mm

Features:

- Lead free, Halogen free, RoHS and REACH compliant
- -55 °C to 125 °C operating temperature range
- EIA sizes 0402, 0603, 0805, 1206, 1210 and 1812
- Capacitance offering from 100 pF to 47 uF



Construction



- 1 - Ceramic layers (dielectric)
- 2 - Inner electrodes
- 3 - Base termination
- 4 - Nickel plating layer
- 5 - Tin plating layer

Electrical Specifications

Type / Code	Dielectric Code	Standard Tolerance		Capacitance Range						
		Code	Description	10 V	16 V	25 V	50 V	100 V		
CML0402	X7R	K	± 10%	120 pF - 0.039 uF					-	
				0.012 uF - 0.1 uF			-			
CML0603	X7R	K	± 10%	150 pF - 0.1 uF						
				0.012 uF - 0.18 uF					-	
				0.12 uF - 0.33 uF			-			
				0.12 uF - 2.2 uF		-				
CML0805	X7R	K	± 10%	150 pF - 0.1 uF						
				0.12 uF - 0.39 uF					-	
				-	0.12 uF - 2.2 uF			-		
CML1206	X7R	K	± 10%	150 pF - 1 uF						
				2.2 uF - 4.7 uF					-	
CML1210	X7R	K	± 10%	-					150 pF - 2.2 uF	
				220 pF - 10 uF					-	
				-	22 uF			-		
				47 uF	-					
CML1812	X7R	K	± 10%	-					270 pF - 1 uF	
				-	470 pF - 4.7 uF				-	
				-	6.8 uF			-		

Note: J = 5% tolerance may be available

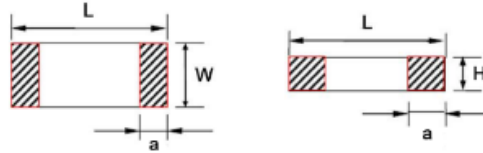
How to Order

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
C	M	L	0	4	0	2	X	7	R	1	0	3	K	T	5	0	V
Product Series		Size		Dielectric	Capacitance Range		Tolerance (*)		Packaging				Max Working Voltage				
Code	Description	Code	Code		0.1pF to 0.10uF (E12)		Code	Description	Code	Description	Size	Quantity					
CML	Multilayer Ceramic	0402	X7R		EIA Code	Capacitance	J	± 5%	T	7" Paper Reel	Refer to Packaging Specifications		10 V				
		0603			101	100 pF	K	± 10%		7" Plastic Tape			16 V				
		0805			102	1000 pF								25 V			
		1206			103	0.01 uF								50 V			
		1210			104	0.1 uF								100 V			
		1812			105	1 uF											
					106	10 uF											
(*) Other tolerances may be available. Contact Stackpole.																	

(*) Other tolerances may be available. Contact Stackpole.

		Capacitance and Voltage Available																											
Dielectric		X7R																											
EIA Code	Size	0402				0603				0805				1206				1210				1812							
	VDCW	10V	16V	25V	50V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	16V	25V	50V	100V
101	100 pF																												
121	120 pF																												
151	150 pF																												
181	180 pF																												
201	200 pF																												
221	220 pF																												
271	270 pF																												
331	330 pF																												
391	390 pF																												
471	470 pF																												
561	560 pF																												
681	680 pF																												
751	750 pF																												
821	820 pF																												
102	1000 pF																												
122	1200 pF																												
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272	2700 pF																												
332	3300 pF																												
392	3900 pF																												
472	4700 pF																												
562	5600 pF																												
682	6800 pF																												
822	8200 pF																												
103	0.01 uF																												
123	0.012 uF																												
153	0.015 uF																												
183	0.018 uF																												
223	0.022 uF																												
273	0.027 uF																												
333	0.033 uF																												
393	0.039 uF																												
473	0.047 uF																												
563	0.056 uF																												
683	0.068 uF																												
823	0.082 uF																												
104	0.1 uF																												
124	0.12 uF																												
154	0.15 uF																												
184	0.18 uF																												
224	0.22 uF																												
274	0.27 uF																												
334	0.33 uF																												
394	0.39 uF																												
474	0.47 uF																												
564	0.56 uF																												
684	0.68 uF																												
824	0.82 uF																												
105	1 uF																												
125	1.2 uF																												
155	1.5 uF																												
225	2.2 uF																												
335	3.3 uF																												
475	4.7 uF																												
685	6.8 uF																												
106	10 uF																												
226	22 uF																												
476	47 uF																												

Mechanical Specifications and Packaging Specifications



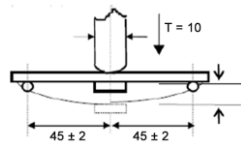
Type / Code	Voltage	Capacitance Range	L	W	H	a	Unit	Packaging (7" Reel) Qty.	
								Paper Tape	Plastic Tape
CML0402X7R	10 V - 50 V	100 pF - 0.47 μ F	0.039 $\pm$ 0.008 1.00 $\pm$ 0.20	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	0.020 $\pm$ 0.002 0.50 $\pm$ 0.05	0.010 $\pm$ 0.004 0.25 $\pm$ 0.10	inches mm	10000	-
CML0603X7R	10 V - 100 V	150 pF - 2.2 μ F	0.063 $\pm$ 0.008 1.60 $\pm$ 0.20	0.031 $\pm$ 0.008 0.80 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.012 $\pm$ 0.004 0.30 $\pm$ 0.10	inches mm	4000	-
CML0805X7R	10 V	150 pF - 0.33 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.47 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.56 μ F - 0.68 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		0.82 μ F - 1 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.039 $\pm$ 0.004 1.00 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		1.5 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		2.2 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		3.3 μ F - 10 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	2000
	16 V	150 pF - 0.33 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.47 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.56 μ F - 0.68 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		0.82 μ F - 1 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.039 $\pm$ 0.004 1.00 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		1.5 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		2.2 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		3.3 μ F - 4.7 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	2000
	25 V	150 pF - 0.33 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.47 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.56 μ F - 0.68 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		0.82 μ F - 1 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.039 $\pm$ 0.004 1.00 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		1.5 μ F - 2.2 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	2000
		3.3 μ F - 4.7 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	2000

Mechanical Specifications and Packaging Specifications (cont.)

Type / Code	Voltage	Capacitance Range	L	W	H	a	Unit	Packaging (7" Reel) Qty.	
								Paper Tape	Plastic Tape
CML0805X7R	50 V	150 pF - 0.33 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.47 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.56 μ F - 0.68 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		0.82 μ F - 1 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.039 $\pm$ 0.004 1.00 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
		1.5 μ F - 2.2 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
	100 V	100 pF	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.028 $\pm$ 0.020 0.70 $\pm$ 0.50	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		150 pF - 0.047 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	4000	-
		0.056 μ F - 0.1 μ F	0.079 $\pm$ 0.008 2.00 $\pm$ 0.20	0.049 $\pm$ 0.008 1.25 $\pm$ 0.20	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.020 $\pm$ 0.008 0.50 $\pm$ 0.20	inches mm	-	3000
CML1206X7R	10 V	200 pF - 0.33 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	4000	-
		0.47 μ F - 0.68 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	3000
		0.82 μ F - 1.5 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	4000	-
		2.2 μ F - 3.3 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	3000
		4.7 μ F - 22 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.063 $\pm$ 0.004 1.60 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	2000
	16 V - 25 V	200 pF - 0.33 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	4000	-
		0.47 μ F - 0.68 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	3000
		0.82 μ F - 1.5 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	4000	-
		2.2 μ F - 3.3 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	3000
		4.7 μ F - 10 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.063 $\pm$ 0.004 1.60 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	2000
	50 V	200 pF - 0.33 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	4000	-
		0.47 μ F - 0.68 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	3000
		0.82 μ F - 1.5 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	4000	-
		2.2 μ F - 3.3 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	3000
		4.7 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.063 $\pm$ 0.004 1.60 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	2000
	100 V	150 pF - 0.056 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.031 $\pm$ 0.004 0.80 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	4000	-
		0.068 μ F - 0.33 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.047 $\pm$ 0.004 1.20 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	3000
		0.47 μ F - 1 μ F	0.126 $\pm$ 0.012 3.20 $\pm$ 0.30	0.063 $\pm$ 0.012 1.60 $\pm$ 0.30	0.063 $\pm$ 0.004 1.60 $\pm$ 0.10	0.024 $\pm$ 0.012 0.60 $\pm$ 0.30	inches mm	-	2000

Mechanical Specifications and Packaging Specifications (cont.)

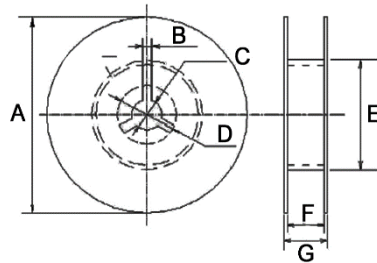
Type / Code	Voltage	Capacitance Range	L	W	H	a	Unit	Packaging (7" Reel) Qty.	
								Paper Tape	Plastic Tape
CML1210X7R	10 V	220 pF - 0.47 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		0.68 uF - 1 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.063 ± 0.004 1.60 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		4.7 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		10 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.071 ± 0.004 1.80 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		47 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.098 ± 0.010 2.50 ± 0.25	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	500
	16 V - 25 V	220 pF - 0.47 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		0.68 uF - 1 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.063 ± 0.004 1.60 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		4.7 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		10 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.071 ± 0.004 1.80 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		22 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.098 ± 0.010 2.50 ± 0.25	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	500
	50 V	220 pF - 0.47 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.047 ± 0.004 1.20 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		0.68 uF - 1 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.063 ± 0.004 1.60 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		4.7 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.071 ± 0.004 1.80 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		10 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.098 ± 0.010 2.50 ± 0.25	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	500
	100 V	150 pF - 0.22 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.055 ± 0.004 1.40 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
		0.33 uF - 2.2 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.063 ± 0.004 1.60 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
CML1812X7R	16 V - 25 V	470 pF - 1 uF	0.177 ± 0.016 4.50 ± 0.40	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.004 1.60 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	1000
		1.5 uF - 6.8 uF	0.177 ± 0.016 4.50 ± 0.40	0.126 ± 0.012 3.20 ± 0.30	0.071 ± 0.004 1.80 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	1000
	50 V	470 pF - 1 uF	0.177 ± 0.016 4.50 ± 0.40	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.004 1.60 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	1000
		1.5 uF - 4.7 uF	0.177 ± 0.016 4.50 ± 0.40	0.126 ± 0.012 3.20 ± 0.30	0.071 ± 0.004 1.80 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	1000
	100 V	270 pF - 0.56 uF	0.177 ± 0.016 4.50 ± 0.40	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.004 1.60 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	1000
		0.68 uF - 1 uF	0.177 ± 0.016 4.50 ± 0.40	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.009 1.60 ± 0.24	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	500

Environmental Characteristics									
Test	Test Specification						Test Condition		
Capacitance	Should be within the specified tolerance.						X7R: (Class II) Cap ≤ 10uF 1.0 ± 0.2 Vrms, 1 KHz ± 10% Cap > 10uF 0.5 ± 0.1 Vrms, 120 Hz ± 10%		
Dissipation Factor (DF)	X7R (Class II)	X7R (≥ 0402)	≥ 50V ≤ 2.5%	25V ≤ 3.5% (C < 0.47uF) ≤ 10.0% (C ≥ 0.47uF)	16V ≤ 5% (C < 0.15uF) ≤ 10.0% (C ≥ 0.15 uF)	10V	Cap ≤ 10uF 1.0 ± 0.2 Vrms, 1 KHz ± 10% Cap > 10uF 0.5 ± 0.1 Vrms, 120 Hz ± 10%		
Insulation Resistance	X7R (Class II)	C ≤ 25nF, Ri ≥ 10000M Ω C > 25nF, Ri*CR > 100S					Measuring Voltage: Rated Voltage (Max 500 V) Duration: 60 ± 5 seconds Test Humidity: ≤ 75% Test Temperature: 25 °C ± 5 °C Test Current: ≤ 50 mA		
Dielectric Withstanding Voltage	No breakdown or damage.						Measuring voltage: Class II: 250% rated voltage Duration: 1 ~ 5 seconds Charge/Discharge Current: 50 mA max.		
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 ~ 30 seconds		
							Solder Temperature: 235 ± 5% (Sn/Pb: 63/37) Duration: 2 ± 0.5 seconds		
							Solder Temperature: 245 ± 5 °C (Lead-free) Duration: 2 ± 0.5 seconds		
Resistance to Soldering Heat	Item	X7R					Preheating Conditions: 100 to 200 °C; 10 ± 2 minutes Solder Temperature: 265 ± 5 °C Duration: 10 ± 1 seconds Clean the capacitor with solvent and examine it with a 10X (min.) microscope. Recovery Time: 24 ± 2 hours Recovery Condition: Room temperature.		
	Δ C/C	-5 ~ + 10%							
	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. Δ C/C: ≤ ± 10%						Test Board: Al2O3 or PCB Warp: 1 mm Speed: 0.5mm / second The measurement should be made with the board in the bending position. Unit: mm 		
Termination Adhesion	No visible damage						Applied Force: 5 N Duration: 10 ± 1 seconds		
Temperature Cycle	X7R: Δ C/C: ≤ ± 10%						Preheating Conditions: up-category temperature 1 hour Recovery Time: 24 ± 1 hours Initial Measurement Cycling times: 5 times, 1 cycle, 4 steps:		
							Step	Temp. (°C)	Time (min.)
							1	Low-category temp. X7R: -55	30 ± 3
							2	Normal temp. (+20)	2 - 3
							3	Up-category temp. X7R: +125	30 ± 3
							4	Normal temp. (+20)	2 - 3
							Recovery time after test: 24 ± 2 hours		

Environmental Characteristics (cont.)

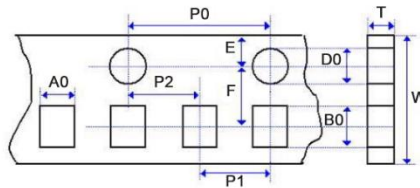
Test	Test Specification	Test Condition
Moisture Resistance	X7R: $\Delta C/C: \leq \pm 10\%$ DF: Not more than twice of initial value. IR: X7R: $R_i \geq 1000M \Omega$ or $R_i \cdot CR \geq 25S$ whichever is smaller Appearance: No visible damage	Temperature: $40 \pm 2^\circ C$ Humidity: 90 ~ 95% R.H. Duration: 500 hours Recovery Conditions: Room temperature Recovery Time: 48 hours (Class II)
Life Test	X7R: $\Delta C/C: \leq \pm 20\%$ DF: Not more than twice of initial value. IR: X7R: $R_i \geq 2000M \Omega$ or $R_i \cdot CR \geq 50 S$ whichever is smaller Appearance: No visible damage	Low-voltage ($< 100 V$) Applied Voltage: 1.5 x rated voltage Duration: 1000 hours Temperature: $125^\circ C$ (X7R) Charge/Discharge Current: 50 mA max. Recovery Conditions: Room temperature Recovery Time: 48 hours (Class II)
Middle and High Voltage Life Test	X7R: $\Delta C/C: \leq \pm 20\%$ DF: Not more than twice of initial value. IR: X7R: $R_i \geq 2000M \Omega$ or $R_i \cdot CR \geq 50 S$ whichever is smaller Appearance: No visible damage	Applied voltage: $100 V \leq \text{rated voltage} < 500 V$: 2 multiple $500V \leq \text{rated voltage} \leq 1000 V$: 1.5 multiple $> 1000 V$ rated voltage: 1.2 multiple Duration: 1000 hours Charge/Discharge Current: 50 mA max. Temperature: $125^\circ C$ (X7R) Recovery Conditions: Room temperature Recovery Time: 48 hours (Class II)

Reel Specifications



Type / Code	A	B	C	D	E	F	G	Unit
CML_X7R (all sizes)	7.008 ± 0.079 178.00 ± 2.00	0.118 3.00	0.512 ± 0.020 13.00 ± 0.50	0.827 ± 0.031 21.00 ± 0.80	1.969 or more 50.00 or more	0.394 ± 0.059 10.00 ± 1.50	0.472 max 12.00 max	inches mm

Paper Tape Specifications

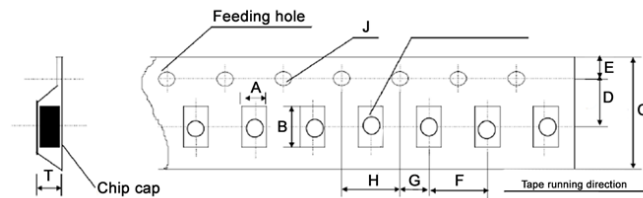


Type / Code	A0	B0	T	W	P0	Unit
CML0402X7R	0.026 ± 0.004 0.65 ± 0.10	0.045 ± 0.004 1.15 ± 0.10	0.031 below 0.80 below	0.315 ± 0.004 8.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	inches mm
CML0603X7R	0.043 ± 0.004 1.10 ± 0.10	0.075 ± 0.004 1.90 ± 0.10	0.043 max 1.10 max	0.315 ± 0.004 8.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	inches mm
CML0805X7R	0.057 ± 0.006 1.45 ± 0.15	0.091 ± 0.006 2.30 ± 0.15	0.043 max 1.10 max	0.315 ± 0.006 8.00 ± 0.15	0.157 ± 0.004 4.00 ± 0.10	inches mm
CML1206X7R	0.071 ± 0.008 1.80 ± 0.20	0.134 ± 0.008 3.40 ± 0.20	0.043 max 1.10 max	0.315 ± 0.008 8.00 ± 0.20	0.157 ± 0.004 4.00 ± 0.10	inches mm

Paper Tape Specifications (cont.)

Type / Code	P1	P2	D0	E	F	Unit
CML0402X7R	0.079 ± 0.002 2.00 ± 0.05	0.079 ± 0.002 2.00 ± 0.05	0.059-0/+0.004 1.5-0/+0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
CML0603X7R	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.002 4.00 ± 0.05	0.059-0/+0.004 1.5-0/+0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
CML0805X7R	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.069 ± 0.002 1.75 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	inches mm
CML1206X7R	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm

Plastic Tape Specifications



Type / Code	A	B	C	D	E	Unit
CML0805X7R	0.061 ± 0.008 1.55 ± 0.20	0.093 ± 0.008 2.35 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.138 ± 0.002 3.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
CML1206X7R	0.077 ± 0.008 1.95 ± 0.20	0.142 ± 0.008 3.60 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.138 ± 0.002 3.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
CML1210X7R	0.106 ± 0.004 2.70 ± 0.10	0.135 ± 0.004 3.42 ± 0.10	0.315 ± 0.004 8.00 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
CML1812X7R	0.144 ± 0.004 3.66 ± 0.10	0.195 ± 0.004 4.95 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
Type / Code	F	G	H	J	T	Unit
CML0805X7R	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.059 max 1.50 max	inches mm
CML1206X7R	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.073 max 1.85 max	inches mm
CML1210X7R	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.126 max 3.20 max	inches mm
CML1812X7R	0.315 ± 0.004 8.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.059-0/+0.004 1.5-0/+0.10	0.157 max 4.00 max	inches mm