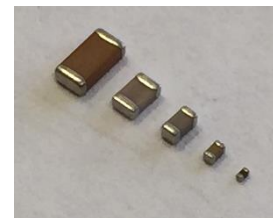
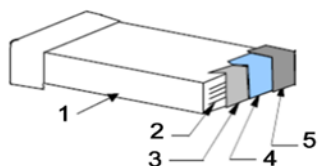


Features:

- -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
- 100% RoHS compliant and lead free without exemption
- Halogen free
- REACH compliant



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	50V	100V
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 < 10 pF: B = ± 0.1 pF may be available
Capacitance values ≥ 10 pF: 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	Max Working Voltage						
CML	Multilayer Ceramic	0402 0603 0805 1206 1210 1812	C0G	EIA Code	Capacitance	B	± 0.1 pF	T	7" Paper Reel 7" Plastic Tape	Refer to Packaging Specifications	50V 100V						
				0R1	0.1 pF	C	± 0.25 pF										
				100	10 pF	G	± 2%										
				101	100 pF	J	± 5%										
				102	1000 pF												
				103	0.01 uF												
				104	0.1 uF												

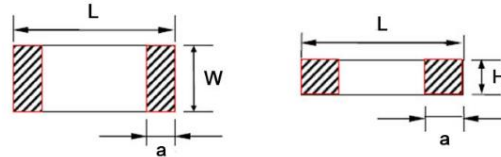
(*) Other tolerances may be available. Contact Stackpole.

Capacitance and Voltage Available

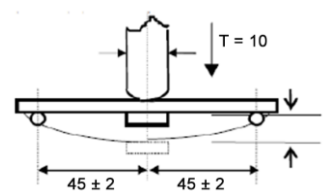
Dielectric		C0G												
EIA Code	Size	0402		0603		0805		1206		1210		1812		
	VDCW	50V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V
0R1	0.1 pF													
0R2	0.2 pF													
0R3	0.3 pF													
0R4	0.4 pF													
0R5	0.5 pF													
0R6	0.6 pF													
0R7	0.7 pF													
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 Code	Size	0402			0603			0805		1206		1210		1812	
	VDCW	50V	50V	100V	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	50V	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	50V - 100V	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	50V	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	0.079 ± 0.008	0.049 ± 0.008	0.031 ± 0.004	0.020 ± 0.008	inches	4000	-
		5600 pF - 8200 pF	2.00 ± 0.20	1.25 ± 0.20	0.80 ± 0.09	0.50 ± 0.20	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
	100V	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	50V	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
	100V	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	50V	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
	100V	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	50V	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
	100V	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		
		≤ 0.56%	Cr < 5 pF		
		1.5 [(150 / Cr) + 7] × 10 ⁻⁴	5 pF ≤ Cr < 50 pF		
		≤ 0.15%	50 pF ≤ Cr ≤ 1000 pF		
		≤ 0.15%	> 1000 pF		
Insulation Resistance	C0G (Class I)	C ≤ 10 nF, Ri ≥ 50000 MΩ 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: ≤ 50 mA		
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°C to 120°C, 10 ~ 30 seconds		
			Solder Temperature: 235°C ± 5% (Sn/Pb: 63/37) Duration: 2 ± 0.5 seconds		
			Solder Temperature: 245°C ± 5°C (Lead-free) Duration: 2 ± 0.5 seconds		
Resistance to Soldering Heat	Item	C0G	Preheating Conditions: 100°C to 200°C; 10 ± 2 minutes Solder Temperature: 265°C ± 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°C	30 ± 3
			2	Normal temp. (+20)	2 - 3
			3	Up-category temp. C0G: +125°C	30 ± 3
4	Normal temp. (+20°C)	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: $40^\circ\text{C} \pm 2^\circ\text{C}$ 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 (< 100V) 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: $100\text{V} \leq$ rated voltage < 500V: 2 multiple $500\text{V} \leq$ rated voltage $\leq 1000\text{V}$: 1.5 multiple > 1000V 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)

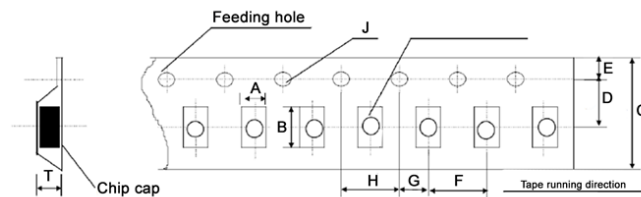
Reel Specifications								
Type/Code	A	B	C	D	E	F	G	Unit
CML_C0G (all sizes)	7.008 ± 0.079 178.00 ± 2.00	0.118 3.00	0.512 ± 0.020 13.00 ± 0.50	0.827 ± 0.031 21.00 ± 0.80	1.969 or more 50.00 or more	0.394 ± 0.059 10.00 ± 1.50	0.472 max 12.00 max	inches mm

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

RoHS Compliance

Stackpole Electronics has joined the worldwide effort to reduce the amount of lead in electronic components and to meet the various regulatory requirements now prevalent, such as the European Union's directive regarding "Restrictions on Hazardous Substances" (RoHS 3). As part of this ongoing program, we periodically update this document with the status regarding the availability of our compliant components. All our standard part numbers are compliant to EU Directive 2011/65/EU of the European Parliament as amended by Directive (EU) 2015/863/EU as regards the list of restricted substances.

RoHS Compliance Status

Standard Product Series	Description	Package / Termination Type	Standard Series RoHS Compliant	Lead-Free Termination Composition	Lead-Free Mfg. Effective Date (Std Product Series)	Lead-Free Effective Date Code (YY/MM)
CML	Multilayer Ceramic Chip Capacitor	SMD	YES	100% Matte Sn over Ni	Always	Always

“Conflict Metals” Commitment

We at Stackpole Electronics, Inc. are joined with our industry in opposing the use of metals mined in the “conflict region” of the eastern Democratic Republic of the Congo (DRC) in our products. Recognizing that the supply chain for metals used in the electronics industry is very complex, we work closely with our own suppliers to verify to the extent possible that the materials and products we supply do not contain metals sourced from this conflict region. As such, we are in compliance with the requirements of Dodd-Frank Act regarding Conflict Minerals.

Compliance to “REACH”

We certify that all passive components supplied by Stackpole Electronics, Inc. are SVHC (Substances of Very High Concern) free and compliant with the requirements of EU Directive 1907/2006/EC, “The Registration, Evaluation, Authorization and Restriction of Chemicals”, otherwise referred to as REACH. Contact us for complete list of REACH Substance Candidate List.

Environmental Policy

It is the policy of Stackpole Electronics, Inc. to protect the environment in all localities in which we operate. We continually strive to improve our effect on the environment. We observe all applicable laws and regulations regarding the protection of our environment and all requests related to the environment to which we have agreed. We are committed to the prevention of all forms of pollution.