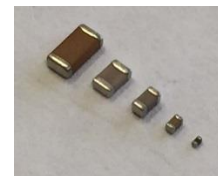
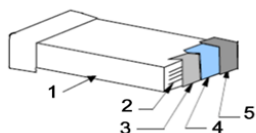


### Features:

- -30°C to 85°C operating temperature range
- EIA sizes 0402, 0603, 0805, 1206, 1210 and 1812
- Capacitance offering from 1000 pF to 22 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	10V	16V	25V	50V	100V	
CML0402	Y5V	Z	+80% / -20%	1000 pF - 0.1 uF					-
				0.12 uF - 0.18 uF			-		-
				0.12 uF - 0.47 uF			-		-
				0.12 uF - 1 uF			-		-
CML0603	Y5V	Z	+80% / -20%	10000 pF - 0.1 uF					-
				10000 pF - 0.82 uF			-		-
CML0805	Y5V	Z	+80% / -20%	0.012 uF - 0.1 uF					-
				1 uF - 4.7 uF			-		-
CML1206	Y5V	Z	+80% / -20%	10000 pF - 1 uF					-
				2.2 uF - 4.7 uF			-		-
CML1210	Y5V	Z	+80% / -	10 uF	-	-	-	0.015 uF - 1 uF	
CML1812	Y5V	Z	+80% / -	-	-	-	-	0.15 uF - 2.2 uF	

Note: M = ±20% tolerance may be available

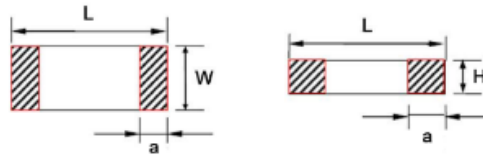
### How to Order

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	Y	5	V	1	0	3	Z	T	5	0	V
Product Series		Size	Dielectric	Capacitance Range		Tolerance (*)		Packaging				Max Working Voltage					
Code	Description	Code	Code	0.1pF to 0.10uF (E6)		Code	Description	Code	Description	Size	Quantity						
CML	Multilayer Ceramic	0402	Y5V	EIA Code	Capacitance	M	± 20%	T	7" Paper Reel	Refer to Packaging Specifications		10V					
		0603		102	1000 pF	Z	+80%/-20%		7" Plastic Tape			16V					
		0805		103	0.01 uF	(*) Other tolerances may be available. Contact						25V					
		1206		104	0.1 uF							50V					
		1210		105	1 uF							100V					
		1812		106	10 uF												

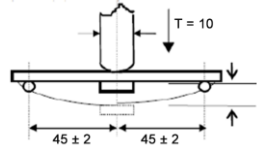
**Capacitance and Voltage Available**

Dielectric		Y5V																					
EIA	Size	0402				0603					0805					1206					1210	1812	
Code	VDCW	10V	16V	25V	50V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	
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																						
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																						
224	0.22 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																						
135	1.3 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																						

**Mechanical Specifications and Packaging Specifications**



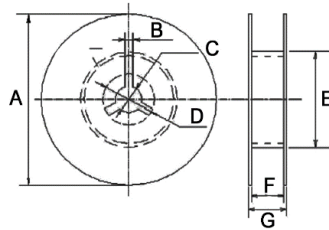
Type / Code	Voltage	Capacitance Range	L	W	H	a	Unit	Packaging (7" Reel) Qty.	
								Paper Tape	Plastic Tape
CML0402Y5V	10V - 50V	1000 pF - 1 uF	0.039 ± 0.008 1.00 ± 0.20	0.020 ± 0.008 0.50 ± 0.20	0.020 ± 0.002 0.50 ± 0.05	0.010 ± 0.004 0.25 ± 0.10	inches mm	10000	-
CML0603Y5V	10V - 100V	1000 pF - 10 uF	0.063 ± 0.008 1.60 ± 0.20	0.031 ± 0.008 0.80 ± 0.20	0.031 ± 0.004 0.80 ± 0.09	0.012 ± 0.004 0.30 ± 0.10	inches mm	4000	-
CML0805Y5V	10V	1000 pF - 0.22 uF	0.079 ± 0.008 2.00 ± 0.20	0.049 ± 0.008 1.25 ± 0.20	0.028 ± 0.020 0.70 ± 0.50	0.020 ± 0.008 0.50 ± 0.20	inches mm	4000	-
		0.33 uF - 2.2 uF	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	-
		3.3 uF - 22 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	-	3000
	16V	1000 pF - 0.22 uF	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	-
		0.33 uF - 2.2 uF	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	-
		3.3 uF - 10 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	-	3000
	25V	1000 pF - 0.22 uF	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	-
		0.33 uF - 2.2 uF	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	-
		3.3 uF - 4.7 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	-	3000
	50V	1000 pF - 0.22 uF	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	-
		0.33 uF - 2.2 uF	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	-
	100V	0.01 uF - 0.1 uF	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	-
CML1206Y5V	10V - 16V	1000 pF - 10 uF	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.012 1.60 ± 0.30	0.031 ± 0.004 0.80 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	4000	-
		22 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
	25V	1000 pF - 10 uF	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.012 1.60 ± 0.30	0.031 ± 0.004 0.80 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	4000	-
	50V - 100V	1000 pF - 4.7 uF	0.126 ± 0.012 3.20 ± 0.30	0.063 ± 0.012 1.60 ± 0.30	0.031 ± 0.004 0.80 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	4000	-
CML1210Y5V	100V	0.015 uF - 1 uF	0.126 ± 0.012 3.20 ± 0.30	0.098 ± 0.012 2.50 ± 0.30	0.039 ± 0.004 1.00 ± 0.10	0.024 ± 0.012 0.60 ± 0.30	inches mm	-	2000
CML1812Y5V	100V	0.15 uF - 2.2 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

Environmental Characteristics						
Test	Test Specification			Test Condition		
Capacitance	Should be within the specified tolerance.			Y5V: (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)	Y5V (Class II)	≥ 25V ≤ 7% (C < 1uF) ≤ 9% (C ≥ 1uF)	16V ≤ 15%	10V ≤ 15%	Cap ≤ 10uF 1.0 ± 0.2 Vrms, 1 KHz ± 10% Cap > 10uF 0.5 ± 0.1 Vrms, 120 Hz ± 10%	
Insulation Resistance	Y5V (Class II)	C ≤ 25 nF, Ri ≥ 4,000 MΩ C > 25 nF, Ri*CR > 100 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 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°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	Y5V		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	-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. 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	Y5V: Δ C/C: ≤ ± 20%			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. Y5V: -25 °C	30 ± 3
				2	Normal temp. (+20°C)	2 - 3
				3	Up-category temp. Y5V: +85°C	30 ± 3
				4	Normal temp. (+20°C)	2 - 3
Recovery time after test: 24 ± 2 hours						

**Environmental Characteristics (cont.)**

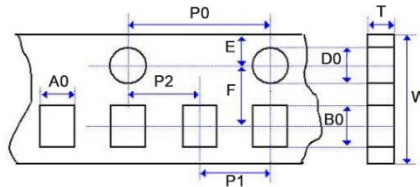
Test	Test Specification	Test Condition
Moisture Resistance	Y5V: $\Delta C/C: \leq \pm 30\%$ DF: Not more than twice of initial value. IR: Y5V: $R_i \geq 1000 \text{ M}\Omega$ or $R_i \cdot CR \geq 25 \text{ S}$ whichever is smaller Appearance: No visible damage	Temperature: $40^\circ\text{C} \pm 2^\circ\text{C}$ Humidity: 90 ~ 95% R.H. Duration: 500 hours Recovery Conditions: Room temperature Recovery Time: 48 hours (Class II)
Life Test	Y5V: $\Delta C/C: \leq \pm 30\%$ DF: Not more than twice of initial value. IR: Y5V: $R_i \geq 2000 \text{ M}\Omega$ or $R_i \cdot CR \geq 50 \text{ S}$ whichever is smaller Appearance: No visible damage	Low-voltage (<100V) Applied Voltage: 1.5 x rated voltage Duration: 1000 hours Temperature: $85^\circ\text{C}$ (Y5V) Charge/Discharge Current: 50mA max. Recovery Conditions: Room temperature Recovery Time: 48 hours (Class II)
Middle and High Voltage Life Test	Y5V: $\Delta C/C: \leq \pm 30\%$ DF: Not more than twice of initial value. IR: Y5V $R_i \geq 2000 \text{ M}\Omega$ or $R_i \cdot CR \geq 50 \text{ S}$ whichever is smaller Appearance: No visible damage	Applied voltage: $100 \text{ V} \leq \text{rated voltage} < 500 \text{ V}$ : 2 multiple $500\text{V} \leq \text{rated voltage} \leq 1000 \text{ V}$ : 1.5 multiple > 1000V rated voltage: 1.2 multiple Duration: 1000 hours Charge/Discharge Current: 50 mA max. Temperature: $85^\circ\text{C}$ (Y5V) Recovery Conditions: Room temperature Recovery Time: 48 hours (Class II)

**Reel Specifications**



Type/Code	A	B	C	D	E	F	G	Unit
CML_Y5V (all sizes)	$7.008 \pm 0.079$ $178.00 \pm 2.00$	0.118 3.00	$0.512 \pm 0.020$ $13.00 \pm 0.50$	$0.827 \pm 0.031$ $21.00 \pm 0.80$	1.969 or more 50.00 or more	$0.394 \pm 0.059$ $10.00 \pm 1.50$	0.472 max 12.00 max	inches mm

**Paper Tape Specifications**

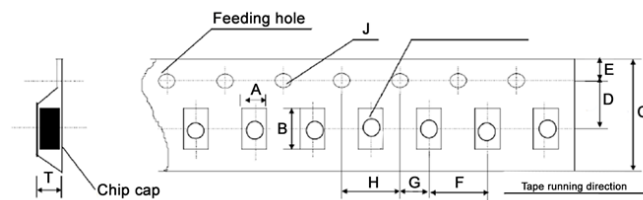


Type/Code	A0	B0	T	W	P0	Unit
CML0402Y5V	$0.026 \pm 0.004$ $0.65 \pm 0.10$	$0.045 \pm 0.004$ $1.15 \pm 0.10$	0.031 below 0.80 below	$0.315 \pm 0.004$ $8.00 \pm 0.10$	$0.157 \pm 0.004$ $4.00 \pm 0.10$	inches mm
CML0603Y5V	$0.043 \pm 0.004$ $1.10 \pm 0.10$	$0.075 \pm 0.004$ $1.90 \pm 0.10$	0.043 max 1.10 max	$0.315 \pm 0.004$ $8.00 \pm 0.10$	$0.157 \pm 0.004$ $4.00 \pm 0.10$	inches mm
CML0805Y5V	$0.057 \pm 0.006$ $1.45 \pm 0.15$	$0.091 \pm 0.006$ $2.30 \pm 0.15$	0.043 max 1.10 max	$0.315 \pm 0.006$ $8.00 \pm 0.15$	$0.157 \pm 0.004$ $4.00 \pm 0.10$	inches mm
CML1206Y5V	$0.071 \pm 0.008$ $1.80 \pm 0.20$	$0.134 \pm 0.008$ $3.40 \pm 0.20$	0.043 max 1.10 max	$0.315 \pm 0.008$ $8.00 \pm 0.20$	$0.157 \pm 0.004$ $4.00 \pm 0.10$	inches mm

**Paper Tape Specifications (cont.)**

Type/Code	P1	P2	D0	E	F	Unit
CML0402Y5V	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
CML0603Y5V	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
CML0805Y5V	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
CML1206Y5V	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
CML0805Y5V	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
CML1206Y5V	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
CML1210Y5V	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
CML1812Y5V	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
CML0805Y5V	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
CML1206Y5V	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
CML1210Y5V	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
CML1812Y5V	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/MW)
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.