

Surface Mount Multilayer Ceramic Chip Capacitors for Commercial Applications



FEATURES

- C0G (NP0) and X7R/X5R dielectrics offered
- C0G (NP0) is an ultra-stable dielectric offering a very low Temperature Coefficient of Capacitance (TCC)
- C0G (NP0) offers low dissipation
- Excellent aging characteristics
- Ideal for decoupling and filtering (X7R)
- Ideal for surge suppression and high voltage applications
- Wide range of case sizes, voltage ratings and capacitance values
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Material categorization: For definitions of compliance please see www.vishay.com/doc?999912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Timing and tuning circuits
- Sensor and scanner applications
- Decoupling and filtering
- Surge suppression

ELECTRICAL SPECIFICATIONS

C0G (NP0) DIELECTRIC

GENERAL SPECIFICATION

Note

Electrical characteristics at + 25 °C unless otherwise specified

Operating Temperature: - 55 °C to + 150 °C
(above + 125 °C changed characteristics)

Capacitance Range: 1 pF to 56 nF

Voltage Range: 25 V_{DC} to 1000 V_{DC}

Temperature Coefficient of Capacitance (TCC):
0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C

Dissipation Factor (DF):

0.1 % maximum at 1.0 V_{RMS} and
1 MHz for values ≤ 1000 pF
0.1 % maximum at 1.0 V_{RMS} and
1 kHz for values > 1000 pF

Insulating Resistance:

At + 25 °C 100 000 MΩ min. or 1000 ΩF whichever is less
At + 125 °C 10 000 MΩ min. or 100 ΩF whichever is less

Aging Rate: 0 % maximum per decade

Dielectric Strength Test:

Performed per method 103 of EIA 198-2-E

Applied test voltages

≤ 200 V _{DC} -rated:	250 % of rated voltage
500 V _{DC} -rated:	200 % of rated voltage
630 V _{DC} , 1000 V _{DC} -rated:	150 % of rated voltage

X5R, X7R DIELECTRIC

GENERAL SPECIFICATION

Note

Electrical characteristics at + 25 °C unless otherwise specified

Operating Temperature: - 55 °C to + 150 °C
(X5R above + 85 °C changed characteristics)
(X7R above + 125 °C changed characteristics)

Capacitance Range: 120 pF to 6.8 μF

Voltage Range: 10 V_{DC} to 1000 V_{DC}

Temperature Coefficient of Capacitance (TCC):

X5R: ± 15 % from - 55 °C to + 85 °C, with 0 V_{DC} applied
X7R: ± 15 % from - 55 °C to + 125 °C, with 0 V_{DC} applied

Dissipation Factor (DF):

10 V ratings: 5 % maximum at 1.0 V_{RMS} and 1 kHz
16 V/25 V ratings: 3.5 % maximum at 1.0 V_{RMS} and 1 kHz
> 25 V ratings: 2.5 % maximum at 1.0 V_{RMS} and 1 kHz

Insulating Resistance:

At + 25 °C 100 000 MΩ min. or 1000 ΩF whichever is less
At + 125 °C 10 000 MΩ min. or 100 ΩF whichever is less

Aging Rate: 1 % maximum per decade

Dielectric Strength Test:

Performed per method 103 of EIA 198-2-E.

Applied test voltages

≤ 250 V _{DC} -rated:	250 % of rated voltage
500 V _{DC} -rated:	min. 150 % of rated voltage
630 V _{DC} , 1000 V _{DC} -rated:	150 % of rated voltage



QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0402	100	1.0 pF	220 pF
	0603	200	1.0 pF	1.0 nF
	0805	500	1.0 pF	4.7 nF
	1206	630	1.0 pF	10 nF
	1210	630	56 pF	22 nF
	1808	1000	18 pF	10 nF
	1812	1000	39 pF	22 nF
	1825	500	100 pF	39 nF
	2220	1000	270 pF	47 nF
	2225	1000	270 pF	56 nF
X5R	0805	10	560 nF	1.0 μF
X7R	0402	100	120 pF	47 nF
	0603	200	330 pF	150 nF
	0805	250	330 pF	470 nF
	1206	630	330 pF	1.0 μF
	1210	630	390 pF	1.0 μF
	1808	1000	470 pF	270 nF
	1812	1000	1.0 nF	1.0 μF
	1825	1000	10 nF	2.7 μF
	2220	500	15 nF	2.2 μF
	2225	1000	33 nF	4.7 μF
	3640	500	27 nF	6.8 μF

Note

- Detail ratings see selection chart

ORDERING INFORMATION								
VJ0805 ⁽³⁾	Y	102	K	X	A	A	T	### ⁽²⁾
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING ⁽¹⁾	MARKING	PACKAGING	PROCESS CODE
0402 0603 0805 1206 1210 1808 1812 1825 2220 2225 3640	A = C0G (NP0) Y = X7R G = X5R ⁽⁴⁾	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples 1R8 = 1.8 pF 102 = 1000 pF	B = ± 0.10 pF C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Note: C0G (NP0): B, C, D < 10 pF F, G, J, K ≥ 10 pF X7R/X5R: J, K, M	X = Ni barrier 100 % tin plated matte finish F, E = AgPd B = Polymer 100 % tin plated matte finish ⁽⁵⁾	Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V C = 200 V P = 250 V E = 500 V L = 630 V G = 1000 V	A = Unmarked M = Marked Note: Marking is only available for 0805 and 1206 with termination code "X"	C = 7" reel/paper tape T = 7" reel/plastic tape P = 11 1/4"/13" reel/paper tape R = 11 1/4"/13" reel/plastic tape O = 7" reel/flamed paper tape I = 11 1/4"/13" reel/flamed paper tape Note: "I" and "O" are used for "F", "E" termination size 0402/0603/0805	

Notes

- (1) DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: mlcc@vishay.com
- (2) Process code may be added with up to three digits, used to control non-standard products and/or special requirements
- (3) Case size designator may be replaced by four digit drawing number used to control non-standard products and/or special requirements
- (4) Selected values for X5R, see selection chart
- (5) Selected values available, contact mlcc@vishay.com for list of released ratings
- (6) Termination code "E" is for conductive epoxy assembly



DIMENSIONS in inches (millimeters)



CASE CODE	STYLE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION (P)	
					MINIMUM	MAXIMUM
0402	VJ0402	0.040 + 0.004/- 0.002 (1.00 + 0.10/- 0.05)	0.020 + 0.004/- 0.002 (0.50 + 0.10/- 0.05)	0.024 (0.60)	0.004 (0.10)	0.016 (0.41)
0603	VJ0603	0.063 ± 0.006 (1.60 ± 0.15)	0.031 ± 0.006 (0.80 ± 0.15)	0.036 (0.92)	0.012 (0.30)	0.018 (0.46)
0805	VJ0805	0.079 ± 0.008 (2.00 ± 0.20)	0.049 ± 0.008 (1.25 ± 0.20)	0.057 (1.45)	0.010 (0.25)	0.028 (0.71)
1206	VJ1206	0.126 ± 0.008 (3.20 ± 0.20)	0.063 ± 0.008 (1.60 ± 0.20)	0.067 (1.70)	0.010 (0.25)	0.028 (0.71)
1210	VJ1210	0.126 ± 0.008 (3.20 ± 0.20)	0.098 ± 0.008 (2.50 ± 0.20)	0.067 (1.70)	0.010 (0.25)	0.028 (0.71)
1808	VJ1808	0.180 ± 0.012 (4.57 ± 0.30)	0.080 ± 0.010 (2.03 ± 0.25)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
1812	VJ1812	0.177 ± 0.012 (4.50 ± 0.30)	0.126 ± 0.008 (3.20 ± 0.20)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
1825	VJ1825	0.177 ± 0.012 (4.50 ± 0.30)	0.252 ± 0.010 (6.40 ± 0.25)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
2220	VJ2220	0.220 ± 0.010 (5.59 ± 0.25)	0.200 ± 0.010 (5.08 ± 0.25)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
2225	VJ2225	0.220 ± 0.010 (5.59 ± 0.25)	0.250 ± 0.010 (6.35 ± 0.25)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
3640	VJ3640	0.360 ± 0.015 (9.14 ± 0.38)	0.400 ± 0.015 (10.20 ± 0.38)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)

Note

- Polymer (B-termination) have increased dimensions:
Length 0.006"(0.15 mm)



SELECTION CHART table with columns for Dielectric, Style, Case Code, Voltage (Vdc), Voltage Code, and Capac. Code/Cap., and rows for various capacitor values from 1.0 pF to 56 nF.

Notes

(1) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

- Paper tape • Plastic tape



SELECTION CHART table with columns: DIELECTRIC, STYLE, CASE CODE, VOLTAGE (VDC), VOLTAGE CODE, CAP. CODE, CAP., and COG (NP0) sub-columns for VJ1808, VJ1812, and VJ1825 series.

Notes

(1) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034
• Plastic tape



SELECTION CHART																					
DIELECTRIC		X7R																			
STYLE		VJ1808 ⁽¹⁾					VJ1812 ⁽¹⁾								VJ1825 ⁽¹⁾						
CASE CODE		1808					1812								1825						
VOLTAGE (V _{DC})		50	100	200	500	1000	25	50	100	200	250	500	630	1000	25	50	100	200	250	500	1000
VOLTAGE CODE		A	B	C	E	G	X	A	B	C	P	E	L	G	X	A	B	C	P	E	G
CAP. CODE	CAP.																				
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																				
821	820 pF																				
102	1.0 nF																				
122	1.2 nF																				
152	1.5 nF																				
182	1.8 nF																				
222	2.2 nF																				
272	2.7 nF																				
332	3.3 nF																				
392	3.9 nF																				
472	4.7 nF																				
562	5.6 nF																				
682	6.8 nF																				
822	8.2 nF																				
103	10 nF																				
123	12 nF																				
153	15 nF																				
183	18 nF																				
223	22 nF																				
273	27 nF																				
333	33 nF																				
393	39 nF																				
473	47 nF																				
563	56 nF																				
683	68 nF																				
823	82 nF																				
104	100 nF																				
124	120 nF																				
154	150 nF																				
184	180 nF																				
224	220 nF																				
274	270 nF																				
334	330 nF																				
394	390 nF																				
474	470 nF																				
564	560 nF																				
684	680 nF																				
824	820 nF																				
105	1.0 μF																				
125	1.2 μF																				
155	1.5 μF																				
185	1.8 μF																				
225	2.2 μF																				
275	2.7 μF																				
335	3.3 μF																				
395	3.9 μF																				
475	4.7 μF																				
565	5.6 μF																				
685	6.8 μF																				

Notes

⁽¹⁾ See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

- Plastic tape



SELECTION CHART																
DIELECTRIC		X7R														
STYLE		VJ2220 ⁽¹⁾				VJ2225 ⁽¹⁾						VJ3640 ⁽¹⁾				
CASE CODE		2220				2225						3640				
VOLTAGE (V _{DC})		50	100	200	500	25	50	100	200	500	1000	25	50	100	200	500
VOLTAGE CODE		A	B	C	E	X	A	B	C	E	G	X	A	B	C	E
CAP. CODE	CAP.															
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															
821	820 pF															
102	1.0 nF															
122	1.2 nF															
152	1.5 nF															
182	1.8 nF															
222	2.2 nF															
272	2.7 nF															
332	3.3 nF															
392	3.9 nF															
472	4.7 nF															
562	5.6 nF															
682	6.8 nF															
822	8.2 nF															
103	10 nF															
123	12 nF															
153	15 nF				•											
183	18 nF				•											
223	22 nF				•											
273	27 nF				•										•	•
333	33 nF				•	•	•	•	•	•	•				•	•
393	39 nF				•	•	•	•	•	•	•				•	•
473	47 nF				•	•	•	•	•	•	•				•	•
563	56 nF				•	•	•	•	•	•	•				•	•
683	68 nF				•	•	•	•	•	•	•				•	•
823	82 nF				•	•	•	•	•	•	•				•	•
104	100 nF			•	•	•	•	•	•	•	•				•	•
124	120 nF			•	•	•	•	•	•	•	•				•	•
154	150 nF			•	•	•	•	•	•	•	•				•	•
184	180 nF			•	•	•	•	•	•	•	•	•	•	•	•	•
224	220 nF		•	•	•	•	•	•	•	•	•	•	•	•	•	•
274	270 nF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
334	330 nF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
394	390 nF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
474	470 nF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
564	560 nF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
684	680 nF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
824	820 nF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
105	1.0 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
125	1.2 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
155	1.5 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
185	1.8 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
225	2.2 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
275	2.7 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
335	3.3 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
395	3.9 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
475	4.7 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
565	5.6 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
685	6.8 µF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Notes

- (1) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034
- Plastic tape



COG (NP0) DIELECTRIC - TYPICAL PARAMETERS





X7R/X5R DIELECTRIC - TYPICAL PARAMETERS

TEMPERATURE COEFFICIENT OF CAPACITANCE



INSULATION RESISTANCE VS. TEMPERATURE



DISSIPATION FACTOR VS. TEMPERATURE



AGING RATE



RATED VOLTAGE VS. TEMPERATURE



VOLTAGE COEFFICIENT OF CAPACITANCE



DISSIPATION FACTOR VS. VOLTAGE



DISSIPATION FACTOR VS. VOLTAGE





STANDARD PACKAGING QUANTITIES (1)(2)(3)					
CASE CODE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	
		PAPER TAPE PACKAGING CODE "C"/"O"	PLASTIC TAPE PACKAGING CODE "T"	PAPER TAPE PACKAGING CODE "P"/"I"	PLASTIC TAPE PACKAGING CODE "R"
0402	8 mm	5000	n/a	10 000	n/a
0603 (4)	8 mm	4000	4000	10 000	10 000
0805 (4)	8 mm	3000	3000	10 000	10 000
1206 (4)	8 mm	3000	3000/2500	10 000	10 000/9000
1210 (4)	8 mm	n/a	3000/2500/2000	n/a	10 000/9000
1808	12 mm	n/a	2000	n/a	10 000
1812	12 mm	n/a	1000	n/a	4000
1825	12 mm	n/a	1000	n/a	4000
2220	12 mm	n/a	1000	n/a	4000
2225	12 mm	n/a	1000	n/a	4000
3640	16 mm	n/a	500	n/a	n/a

Notes

- (1) Vishay Vitramon uses embossed plastic carrier tape
- (2) REFERENCE: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"
- (3) N/A = Not available
- (4) Packaging "C"/"P"/"O"/"I" and "T"/"R" or lower quantities can depend from product thickness

STORAGE AND HANDLING CONDITIONS
<p>(1) Store the components at 5 °C to + 40 °C ambient temperature and ≤ 70 % related humidity conditions.</p> <p>(2) The product is recommended to be used within a time-frame of 2 years after shipment. Check solderability in case extended shelf life beyond the expiry date is needed.</p> <p>Precautions:</p> <ul style="list-style-type: none"> a. Do not store products in an environment containing corrosive elements, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. This may cause corrosion or oxidization of the terminations, which can easily lead to poor soldering. b. Store products on the shelf and avoid exposure to moisture or dust. c. Do not expose products to excessive shock, vibration, direct sunlight and so on.



RoHS COMPLIANCE UPDATE

The RoHS compliance of the parts in this datasheet is currently under review. For more information, please contact your local Vishay sales representative.



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Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

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- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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