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?99912

RoHS COMPLIANT
HALOGEN FREE
GREEN (5-2008) Available

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

For technical questions, contact: mlcc@vishay.com

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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	12 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”

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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

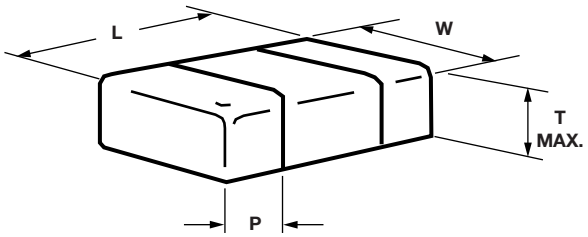
ENVIRONMENTAL STATUS

TERMINATION CODE	TERMINATION DESCRIPTION	RoHS COMPLIANT	VISHAY GREEN
X	Ni barrier 100 % tin plated matte finish	Yes	Yes
E	AgPd	Yes	Yes
B	Polymer layer, 100 % tin plated matte finish	Yes	No
F	AgPd	Yes	No

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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 ± 0.010 (3.20 ± 0.25)	0.063 ± 0.010 (1.60 ± 0.25)	0.067 (1.70)	0.010 (0.25)	0.028 (0.71)
1210	VJ1210	0.126 ± 0.010 (3.20 ± 0.25)	0.098 ± 0.010 (2.50 ± 0.25)	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)

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SELECTION CHART

DIELECTRIC		C0G (NP0)																			
STYLE		VJ0402			VJ0603			VJ0805				VJ1206 (1)					VJ1210 (1)				
CASE CODE		0402			0603			0805				1206					1210				
VOLTAGE (V_{DC})		25	50	100	50	100	200	50	100	200	500	50	100	200	500	630	50	100	200	500	630
VOLTAGE CODE		X	A	B	A	B	C	A	B	C	E	A	B	C	E	L	A	B	C	E	L
CAP. CODE	CAP.																				
1R0	1.0 pF	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••					
1R2	1.2 pF	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••					
1R5	1.5 pF	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••					
1R8	1.8 pF	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••					
2R2	2.2 pF	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••					
2R7	2.7 pF	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••					
3R3	3.3 pF	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••					
3R9	3.9 pF	••	••	••	••	••	••	••	••	••	••	••	••	••	••	••					
4R7	4.7 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				••			••	••	•		•	•	•	•	•	•	•	•	•	•
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																				

Notes

RoHS-compliant

•• Paper tape • Plastic tape

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

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SELECTION CHART

DIELECTRIC		C0G (NP0)													
STYLE		VJ1808 (1)					VJ1812 (1)					VJ1825 (1)			
CASE CODE		1808					1812					1825			
VOLTAGE (V_{DC})		50	100	200	500	1000	50	100	200	500	1000	50	100	200	500
VOLTAGE CODE		A	B	C	E	G	A	B	C	E	G	A	B	C	E
CAP. CODE	CAP.														
1R0	1.0 pF														
1R2	1.2 pF														
1R5	1.5 pF														
1R8	1.8 pF														
2R2	2.2 pF														
2R7	2.7 pF														
3R3	3.3 pF														
3R9	3.9 pF														
4R7	4.7 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	•	•	•	•	•	•	•	•	•	•				•
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														

Notes

RoHS-compliant

• Plastic tape

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

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SELECTION CHART

DIELECTRIC		C0G (NP0)										
STYLE		VJ2220 (1)						VJ2225 (1)				
CASE CODE		2220						2225				
VOLTAGE (V_{DC})		50	100	200	500	630	1000	50	100	200	500	1000
VOLTAGE CODE		A	B	C	E	L	G	A	B	C	E	G
CAP. CODE	CAP.											
1R0	1.0 pF											
1R2	1.2 pF											
1R5	1.5 pF											
1R8	1.8 pF											
2R2	2.2 pF											
2R7	2.7 pF											
3R3	3.3 pF											
3R9	3.9 pF											
4R7	4.7 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	•	•	•	•	•	•				•	•
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							•				

Notes

RoHS-compliant

• Plastic tape

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

For technical questions, contact: mlcc@vishay.com

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SELECTION CHART

DIELECTRIC		X7R/X5R [1]															
STYLE		VJ0402				VJ0603					VJ0805						
CASE CODE		0402				0603					0805						
VOLTAGE (V_{DC})		16	25	50	100	16	25	50	100	200	10	16	25	50	100	200	250
VOLTAGE CODE		J	X	A	B	J	X	A	B	C	Q	J	X	A	B	C	P
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										• X5R						
684	680 nF										• X5R						
824	820 nF										• X5R						
105	1.0 µF										• X5R						
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

RoHS-compliant

•• Paper tape • Plastic tape

(1) X5R (- 55 °C to + 85 °C TCC: ± 15 %) for all 0805/10 V ratings. All other values X7R.

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SELECTION CHART

DIELECTRIC		X7R															
STYLE		VJ1206 (1)								VJ1210 (1)							
CASE CODE		1206 (1)								1210 (1)							
VOLTAGE (V_{DC})		16	25	50	100	200	250	500	630	16	25	50	100	200	250	500	630
VOLTAGE CODE		J	X	A	B	C	P	E	L	J	X	A	B	C	P	E	L
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

RoHS-compliant

•• Paper tape • Plastic tape

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

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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

RoHS-compliant

• Plastic tape

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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

RoHS-compliant

• Plastic tape

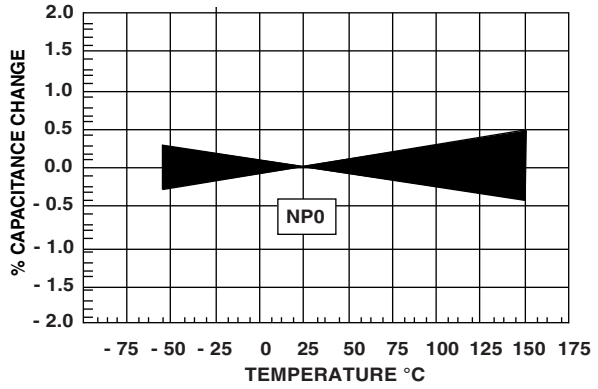
(1) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

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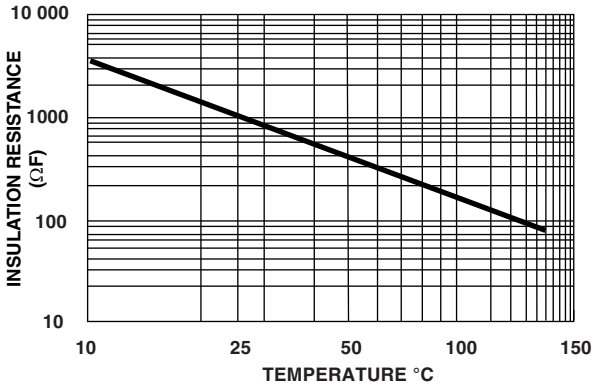
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C0G (NP0) DIELECTRIC - TYPICAL PARAMETERS

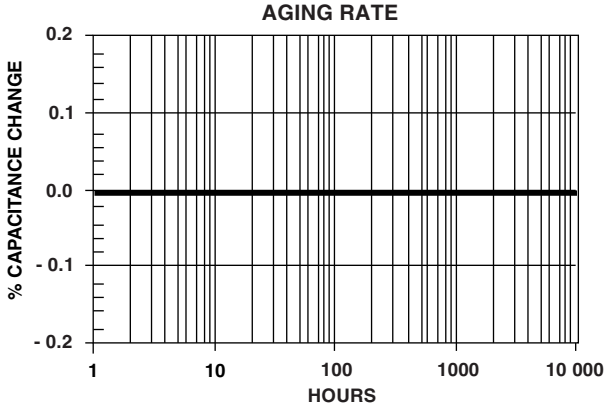
TEMPERATURE COEFFICIENT OF CAPACITANCE



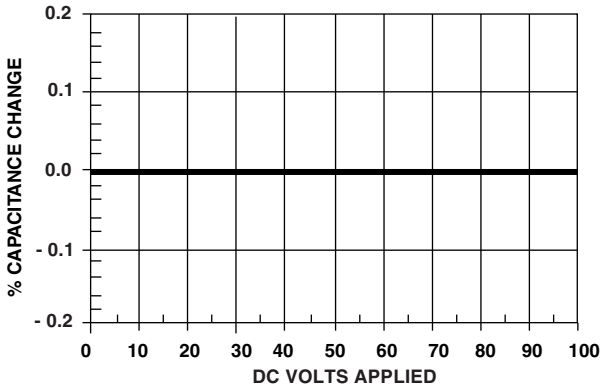
INSULATION RESISTANCE VS. TEMPERATURE



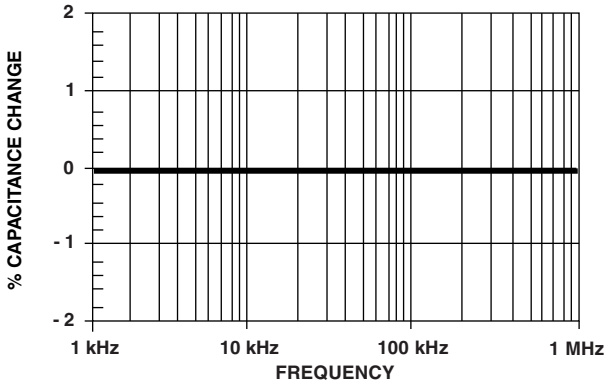
AGING RATE



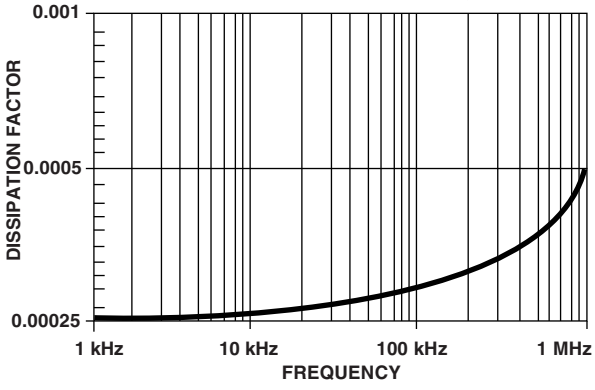
VOLTAGE COEFFICIENT OF CAPACITANCE



CHANGE OF CAPACITANCE WITH FREQUENCY



DISSIPATION FACTOR VS. FREQUENCY

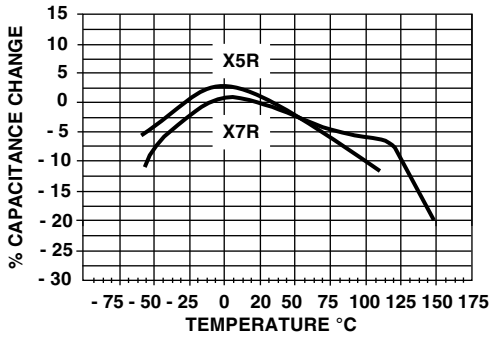


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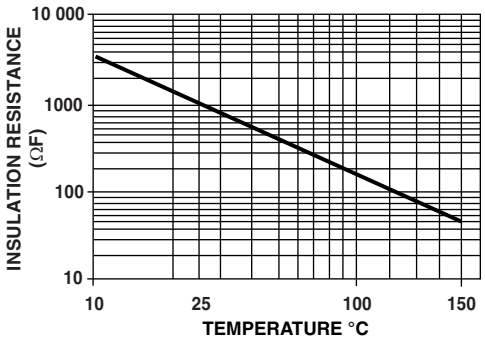
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X7R/X5R DIELECTRIC - TYPICAL PARAMETERS

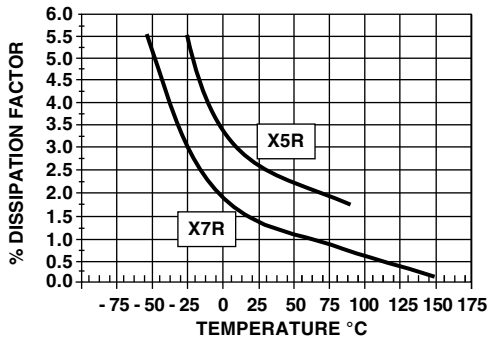
TEMPERATURE COEFFICIENT OF CAPACITANCE



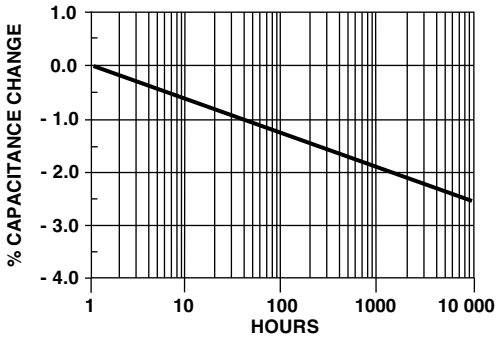
INSULATION RESISTANCE VS. TEMPERATURE



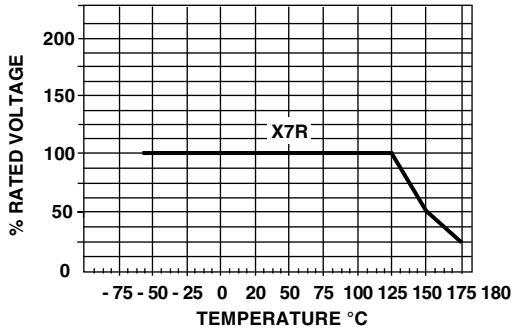
DISSIPATION FACTOR VS. TEMPERATURE



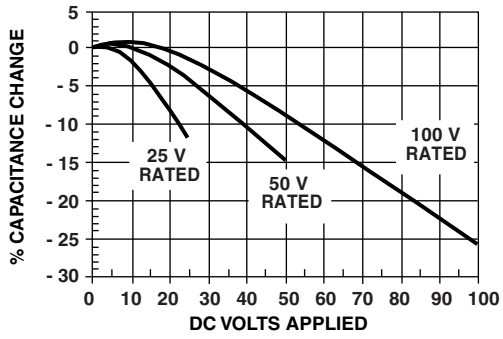
AGING RATE



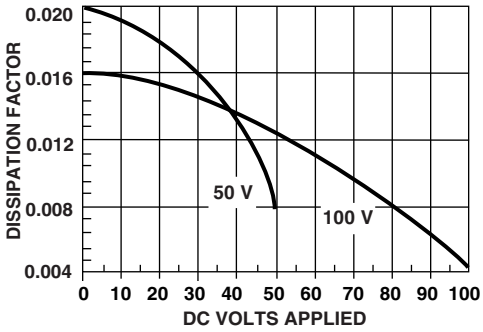
RATED VOLTAGE VS. TEMPERATURE



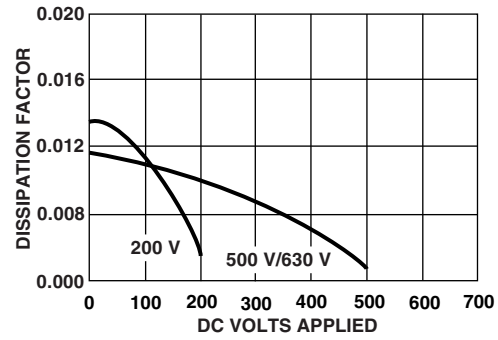
VOLTAGE COEFFICIENT OF CAPACITANCE



DISSIPATION FACTOR VS. VOLTAGE



DISSIPATION FACTOR VS. VOLTAGE



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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

(1) Store the components at 5 °C to + 40 °C ambient temperature and ≤ 70 % related humidity conditions.
(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.

Precautions:

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.

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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.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.