

VNR / VXR

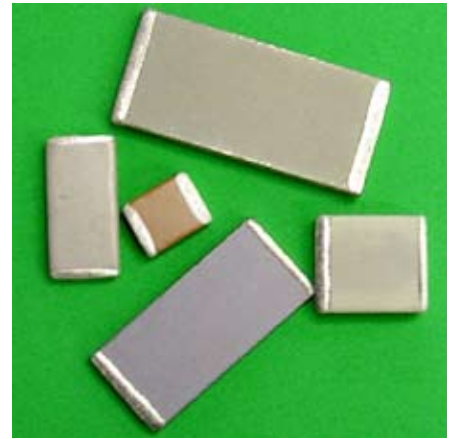
High Voltage, High Reliability DC COG(NPO)/X7R Ceramic Chip Capacitors

Features

- Capacitance Range: 10pF to 2.5μF
- Operating Temperature Range: -55°C to 125°C
- Voltage Range: 500 Volt to 5KV
- COG (NPO) and X7R Dielectric

VNR/VXR series is high voltage multilayer ceramic chip capacitors for use in high reliability commercial, industrial and military applications. These capacitors are designed in accordance with MIL-PRF-49467 and can be

supplied to NPO and X7R voltage temperature limits. Each capacitor is 100% tested physically and electrically* and can be screened to Group A and B performance criteria as defined in MIL-PRF-49467.



Applications

Typical applications include filtering of high voltage power supplies, high voltage multipliers, transient protection and noise suppression. Custom designs, extended thickness and test protocols to customer Source Control Drawings (SCD's) are available upon request.*

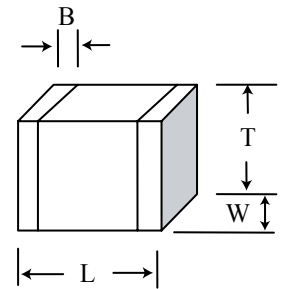
* See Test Option pages at the end of the catalog.

AFM Part Number Code

V Product Series: V: High Voltage	N Product Type: R: Chip	R Product Type: R: Chip	15 Chip Size: (see table)	W Termination Code: C: Pd/Ag Term G: Ag Term, Ni P: Solder Dipped W Term in 60/40 Sn/Pb T: Ag Term, Ni/100% Sn Plated. (Pb Free) W: Ag Term, Ni Barrier, 90/10 Sn/Pb Plated	101 Capacitance Code: 1st two digits are significant: Third digit denotes number of zero(s); R=Decimal point 2R0=2.0pF 101=100pF	J Tolerance: F: ±1%* G: ±2%* J: ±5% K: ±10% M: ±20% *VNR Only	L Voltage: J: 500 Vdc L: 1000 Vdc O: 2000 Vdc Q: 3000 Vdc S: 4000 Vdc T: 5000 Vdc	C Test Code: C: Commercial Test S: Special (Customer Defined) M: Hi-Rel	B Marking: B: Not Marked M: Marked (per description) S: Special Marking	B Packaging: B: Bulk T: Tape & Reel W: Waffle Pack
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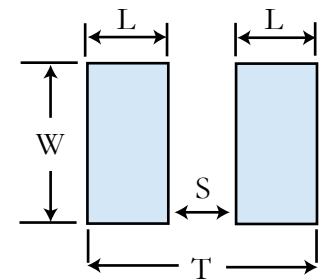
Chip Capacitor Dimensions and Tolerances

Style	EIA Size	Length (L) Inches (mm)	Width (W) Inches (mm)	Thickness (T) Inches (mm)	Bandwidth (B) Inches
12	1210	.120±.010 (3.05±.25)	.100 ± .010 (2.54±.25)	.100 (2.54)	.008-.025
15	1515	.150 ± .015 (3.81 ±.38)	.150 ± .015 (3.81 ±.38)	.140 (3.55)	.010-.030"
18	1812	.180 ± .020 (4.57 ±.51)	.120 ± .015 (3.05 ±.38)	.100 (2.54)	.010-.040"
19	1825	.180 ± .020 (4.57 ±.51)	.250 ± .020 (6.35 ±.51)	.160 (4.06)	.010-.040"
20	2020	.200 ± .020 (5.08 ±.51)	.200 ± .020 (5.08 ±.51)	.180 (4.57)	.010-.040"
22	2225	.220 ± .020 (5.59 ±.51)	.250 ± .020 (6.35 ±.51)	.200(5.08)	.010-.040"
25	2520	.250 ± .020 (6.35 ±.51)	.200 ± .020 (5.08 ±.51)	.180 (4.57)	.030-.060"
33	3333	.330 ± .030 (8.38 ±.76)	.330 ± .030 (8.38 ±.76)	.220 (5.59)	.030-.060"
35	3530	.350 ± .030 (8.89 ±.76)	.300 ± .030 (7.62 ±.76)	.220 (5.59)	.030-.060"
40	4040	.400 ± .030 (10.16±.76)	.400 ± .030 (10.16±.76)	.220 (5.59)	.030-.060"
45	4540	.450 ± .030 (11.43±.76)	.400 ± .030 (10.16±.76)	.220 (5.59)	.030-.060"
54	5440	.540 ± .030 (13.72±.76)	.400 ± .030 (10.16±.76)	.220 (5.59)	.030-.060"
55	5550	.550 ± .030 (13.97±.76)	.500 ± .030 (12.70±.76)	.220 (5.59)	.030-.060"
65	6560	.650 ± .030 (16.51±.76)	.600 ± .030 (15.24±.76)	.220 (5.59)	.030-.060"



Recommended Pad Dimensions

Style	Chip Size	Total Length (T)		Separation (S)		Pad Width (W)		Pad Length (L)	
		Inches	mm	Inches	mm	Inches	mm	Inches	mm
12	1210	0.177	4.50	0.060	1.52	0.115	2.92	0.060	1.52
15	1515	0.205	5.20	0.075	1.91	0.171	4.34	0.065	1.65
18	1812	0.232	5.89	0.091	2.31	0.146	3.71	0.071	1.80
19	1825	0.232	5.89	0.091	2.31	0.272	6.91	0.071	1.80
20	2020	0.256	6.50	0.110	2.79	0.221	5.61	0.073	1.85
22	2225	0.276	7.01	0.130	3.30	0.268	6.81	0.073	1.85
25	2520	0.342	8.69	0.196	4.98	0.221	5.61	0.073	1.85
33	3333	0.430	10.92	0.280	7.11	0.365	9.27	0.075	1.91
35	3530	0.453	11.51	0.300	7.62	0.335	8.51	0.077	1.96
40	4040	0.507	12.88	0.350	8.89	0.435	11.05	0.079	2.01
45	4540	0.559	14.20	0.400	10.16	0.435	11.05	0.080	2.03
54	5440	0.650	16.51	0.410	10.41	0.435	11.05	0.120	3.05
55	5550	0.745	18.92	0.505	12.83	0.535	13.59	0.120	3.05
65	6560	0.780	19.81	0.520	13.21	0.635	16.13	0.130	3.30



Soldering Process

VNR/VXR chips should not be soldered using wave soldering process. Solder reflow hand solder methods are acceptable. Contact factory for Soldering Tech Bulletin.

COG (NPO) Dielectric Capacitance Ranges*

Style	EIA Size	500 Vdc		1000 Vdc		2000 Vdc		3000 Vdc		4000 Vdc		5000 Vdc	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
12	1210	10pF	2200pF	10pF	820pF	10pF	270pF						
15	1515	27pF	4700pF	27pF	1500pF	12pF	680pF	12pF	150pF	10pF	100pF		
18	1812	27pF	2700pF	27pF	1200pF	12pF	470pF	12pF	120pF	10pF	100pF		
19	1825	39pF	8200pF	39pF	3900pF	22pF	820pF	22pF	560pF	22pF	390pF		
20	2020	39pF	8200pF	39pF	3900pF	22pF	820pF	22pF	560pF	22pF	390pF		
22	2225	47pF	.012μF	47pF	8200pF	27pF	1200pF	27pF	680pF	27pF	470pF		
25	2050	47pF	.010μF	47pF	6800pF	27pF	1200pF	27pF	680pF	27pF	470pF		
33	3333	120pF	.015μF	120pF	.012μF	47pF	2700pF	47pF	1200pF	27pF	680pF		
35	3530	120pF	.022μF	120pF	.018μF	47pF	3300pF	47pF	1500pF	27pF	680pF		
40	4040	220pF	.039μF	220pF	.022μF	100pF	5600pF	100pF	2200pF	18pF	1200pF		
45	4540	220pF	.056μF	220pF	.033μF	100pF	6800pF	100pF	3900pF	18pF	1500pF	18pF	1000pF
54	5440	390pF	.082μF	390pF	.033μF	150pF	8200pF	150pF	3300pF	27pF	2200pF	22pF	1500pF
55	5550	390pF	.068μF	390pF	.047μF	150pF	.010μF	150pF	6800pF	27pF	2200pF	27pF	2200pF
65	6560	470pF	.100μF	470pF	.068μF	270pF	.022μF	270pF	6800pF	47pF	3900pF	47pF	2700pF

*For Extended Capacitance Values Please Contact Our Factory

Dielectric Characteristics COG (NPO)

Capacitance Range	10pF to .100μF
Capacitance Tolerances	F±1%, G±2%, J±5%, K±10%, M±20%
Dissipation Factor	0.15% Max (25°C, 1 KHz) 1Vrms ±0.2V
Temperature Range	-55°C to +125°C
Temperature Coefficient	0±30ppm/°C
Insulation Resistance 1000 V or Rated V at 25°C (Whichever is less)	100GΩ min or 1000MΩμF Whichever is Less
Insulation Resistance 1000 V or Rated V at 125°C (Whichever is less)	10GΩ min or 100MΩμF Whichever is Less
Voltage Range	500V to 5kV (See Table)
Dielectric Withstand	1.2 x Rated Voltage 5 Second Min
Aging	None

Marking

Chips are supplied unmarked. Marking, if required is an additional charge. Styles 12-15 will be laser marked with EIA capacitance code, and tolerance (821K). Styles 18 and up will be marked with an insulating ink and will contain AFM, capacitance code, tolerance code and lot code.

Packaging

Bulk packaging in plastic bags is standard. Please contact factory for optional waffle packaging or tape and reel.

X7R Dielectric Capacitance Ranges*

Style	EIA Size	500 Vdc		1000 Vdc		2000 Vdc		3000 Vdc		4000 Vdc		5000 Vdc	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
12	1210	270pF	.033μF										
15	1515	680pF	.068μF	680pF	.022μF								
18	1812	680pF	.056μF	680pF	.018μF	270pF	2500pF						
19	1825	1200pF	.180μF	1200pF	.047μF	560pF	8200pF	560pF	2700pF				
20	2020	1200pF	.180μF	1200pF	.068μF	560pF	8200pF	560pF	3900pF				
22	2225	1200pF	.220μF	1200pF	.082μF	680pF	.018μF	680pF	5600pF				
25	2520	1200pF	.220μF	1200pF	.068μF	680pF	.015μF	680pF	4700pF				
33	3333	3300pF	.470μF	3300pF	.250μF	1200pF	.027μF	1200pF	.012μF				
35	3530	3300pF	.560μF	3300pF	.270μF	1200pF	.033μF	1200pF	.015μF	270pF	6800pF		
40	4040	6800pF	.860μF	6800pF	.390μF	2700pF	.047μF	2700pF	.018μF	470pF	8600pF		
45	4540	6800pF	1.20μF	6800pF	.470μF	2700pF	.068μF	2700pF	.033μF	470pF	.010μF	470pF	6800pF
54	5440	.010μF	1.50μF	.010μF	.680μF	3900pF	.056μF	3900pF	.012μF	680pF	.010μF		
55	5550	.010μF	1.80μF	.010μF	.820μF	3900pF	.120μF	3900pF	.039μF	680pF	.015μF	680pF	.010μF
65	6560	.015μF	2.50μF	.015μF	1.00μF	6800pF	.180μF	6800pF	.082μF	1200pF	.027μF	1200pF	.015μF

*For Extended Capacitance Values Please Contact Our Factory

Dielectric Characteristics X7R

Capacitance Range	270pF to 2.5μF
Capacitance Tolerances	J±5%, K±10%, M±20%
Dissipation Factor	2.5% Max (25°C, 1 KHz) 1V _{rms} ±0.2V
Temperature Range	-55°C to +125°C
Temperature Coefficient	±15%
Insulation Resistance 1000 V or Rated V at 25°C (Whichever is less)	100GΩ min or 1000MΩμF Whichever is Less
Insulation Resistance 1000 V or Rated V at 125°C (Whichever is less)	10GΩ min or 100MΩμF Whichever is Less
Voltage Range	500V to 5kV (See Table)
Dielectric Withstand	1.2 x Rated Voltage 5 Second Min
Aging	None

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