



EIA Low ESR
Multi-Layer Ceramic Capacitors

1111N (0.110" x 0.110")

Product Features

- High Q
- High Power
- Low ESR/ESL
- Low Noise
- High Self-Resonance
- Ultra Stable Performance
- Capacitance Range:
0.2pF to 1000pF
- Working Voltage: 500V

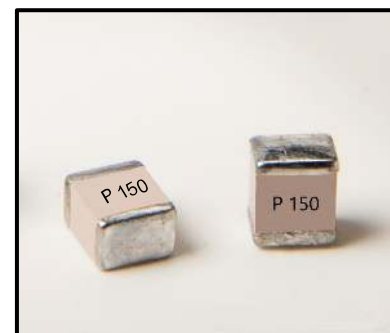
Product Applications

Typical Functional Applications:

- Tuning • Bypass • Coupling
- Feedback • D.C. Blocking
- Impedance Matching

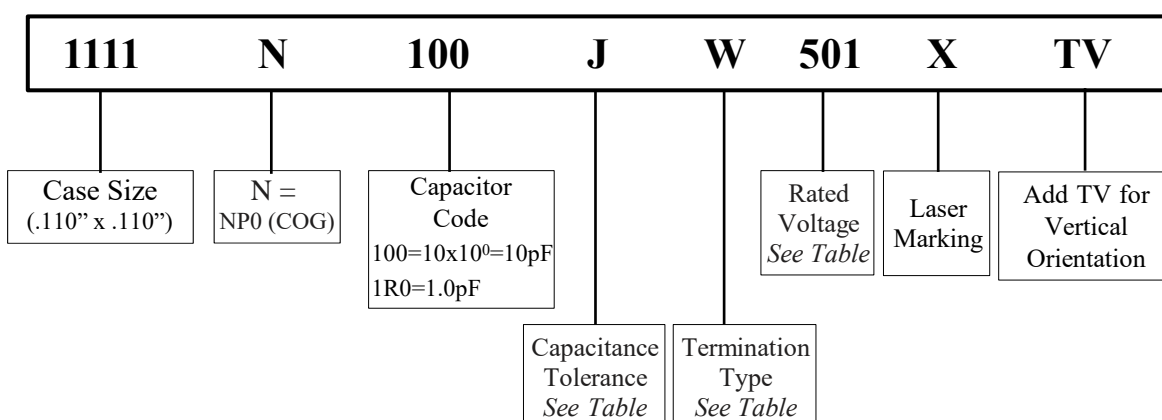
Typical Circuit Applications:

- UHF/Microwave RF Power Amplifiers
- Mixers • Oscillators • Filter Networks
- Low Noise Amplifiers • Timing Circuits and Delay Lines



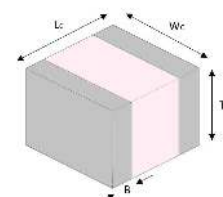
Marking shown for illustration purposes only.
Actual marking may differ.

Part Numbering



Capacitor Dimensions Unit: inch (mm)

Code		Length		Width	Thickness	Overlap
		Lc		Wc	Tc	B
W	Chip	0.11	+0.020 -0.010	0.110 ± 0.015	0.10 max	0.015 max
		(2.79	+0.51 -0.25)	(2.79 ± 0.38)	(2.60 max)	(0.025 max)



Capacitance Tolerance Codes


Code	A	B	C	D	F	G	J	K
Tol.	±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%	±10%



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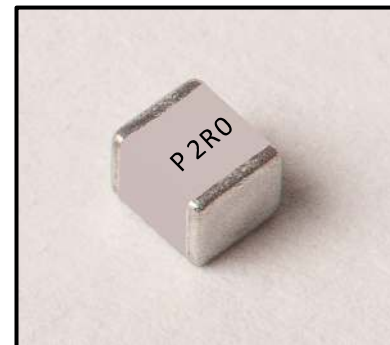
1111N (0.110" x 0.110")

Terminations Types and Codes

Termination Code	Termination
W 	100% Tin Solder over Nickel Barrier
L	90%Tin/10%Lead Solder over Nickel Barrier

Voltage Code

Voltage	Code
100V	101
200V	201
500V	501
1000V	102



Marking shown for illustration purposes only.
Actual marking may differ.

1111N Capacitance Values

For special capacitances, tolerances and WVDC, please contact PPI.

Cap. pF	Cap Code	Tol.	Rated WVDC Std.	Rated WVDC Ext.	Cap. pF	Cap Code	Tol.	Rated WVDC Std.	Rated WVDC Ext.	Cap. pF	Cap Code	Tol.	Rated WVDC Std.	Rated WVDC Ext.	Cap. pF	Cap Code	Tol.	Rated WVDC Std.	Rated WVDC Ext.
0.2	0R2				2.7	2R7				22	220				180	181	F,G, J,K	500V	1000V
0.3	0R3				3.0	3R0				24	240				200	201			
0.4	0R4				3.3	3R3	A,B, C,D	500V	1000V	27	270				220	221			
0.5	0R5				3.6	3R6				30	300				240	241			
0.6	0R6				3.9	3R9				33	330				270	271	F,G, J,K	200V	500V
0.7	0R7				4.3	4R3				36	360				300	301			
0.8	0R8				4.7	4R7				39	390				330	331			
0.9	0R9				5.1	5R1				43	430				360	361			
1.0	1R0				5.6	5R6				47	470				390	391			
1.1	1R1				6.2	6R2	B,C, D	500V	1000V	51	510				430	431	G,J, K	200V	500V
1.2	1R2	A,B, C,D	500V	1000V	6.8	6R8				56	560	F,G, J,K	500V	1000V	470	471			
1.3	1R3				7.5	7R5				62	620				510	511	G,J, K	100V	500V
1.4	1R4				8.2	8R2				68	680				560	561			
1.5	1R5				9.1	9R1				75	750				620	621			
1.6	1R6				10	100				82	820				680	681			
1.7	1R7				11	110				91	910				750	751	G,J, K	50V	N/A
1.8	1R8				12	120				100	101				820	821			
1.9	1R9				13	130	F,G, J,K	500V	1000V	110	111				910	911			
2.0	2R0				15	150				120	121				1000	102			
2.1	2R1				16	160				130	131								
2.2	2R2				18	180				150	151								
2.4	2R4				20	200				160	161								



Electrical Specifications

Quality Factor (Q)	2,000 at 1 MHz min.
Insulation Resistance (IR)	10 ⁵ Megaohms min. @ +25°C rated WVDC 10 ⁴ Megaohms min. @ +125°C rated WVDC
Rated Voltage	See Rated Voltage Table
Dielectric Withstanding Voltage (WVDC)	250% of Rated Voltage of 5 seconds, Rated Voltage ≤ 500VDC 150% of Voltage for 5 seconds, 500VDC < Rated Voltage ≤ 1250 VDC 120% of Voltage for 5 seconds, Rated Voltage > 1250 VDC
Operating Temperature Range	-55°C to 175°C
Temperature Coefficient (TC)	0±30ppm/°C
Capacitance Drift	±0.02% or ±0.02pF, whichever is greater
Piezoelectric Effects	None

Environmental Specifications

Specification		Test Parameters
Thermal Shock	No mechanical damage Capacitance Change: ±0.5% or 0.5pF max IR: >1 G Ohms Q>500	MIL-STD-202, Method 107, Condition A. At the maximum rated temperature (-55°C and 175°C) stay 30 minutes, the time of removing shall not be more than 3 minutes. Perform five cycles.
Moisture Resistance	Breakdown Voltage: 2.5x WVDC	MIL-STD-202, Method 106
Humidity (Steady State)	No mechanical damage Capacitance Change: ±0.5% or 0.5pF max IR: >1 G Ohms Q>300 Breakdown Voltage: 2.5x WVDC	MIL-STD-202, Method 103, Condition A With 1.5Volts DC applied while subjected to an environment of 85°C with 85% relative humidity for 240 hours minimum.
Life	No mechanical damage Capacitance Change: ±2.0% or 0.5pF max IR: >1 G Ohms Q>500 Breakdown Voltage: 2.5x WVDC	MIL-STD-202, Method 108. For 1000 hours, at 175°C. 200% of Voltage for Capacitors, Rated Voltage ≤ 500VDC; 120% of Voltage for Capacitors, 500VDC < Rated Voltage ≤ 1250VDC; 100% for Voltage for Capacitors, Rated Voltage > 1250VDC
Terminal Adhesion	Termination should not pull off. Ceramic should remain undamaged	Linear pull force exerted on axial leads soldered to each terminal. 2.0lbs.
Resistance to Soldering Heat	No mechanical damage Capacitance Change: -1.0%~+2.0 IR: >1 G Ohms Q>500 Breakdown Voltage: 2.5x WVDC	Preheat device to 150°C -180°C for 60 seconds. Dip in 260°C ±5C solder for 10 ±1 second. Measure after 24± 2 hour cooling period.

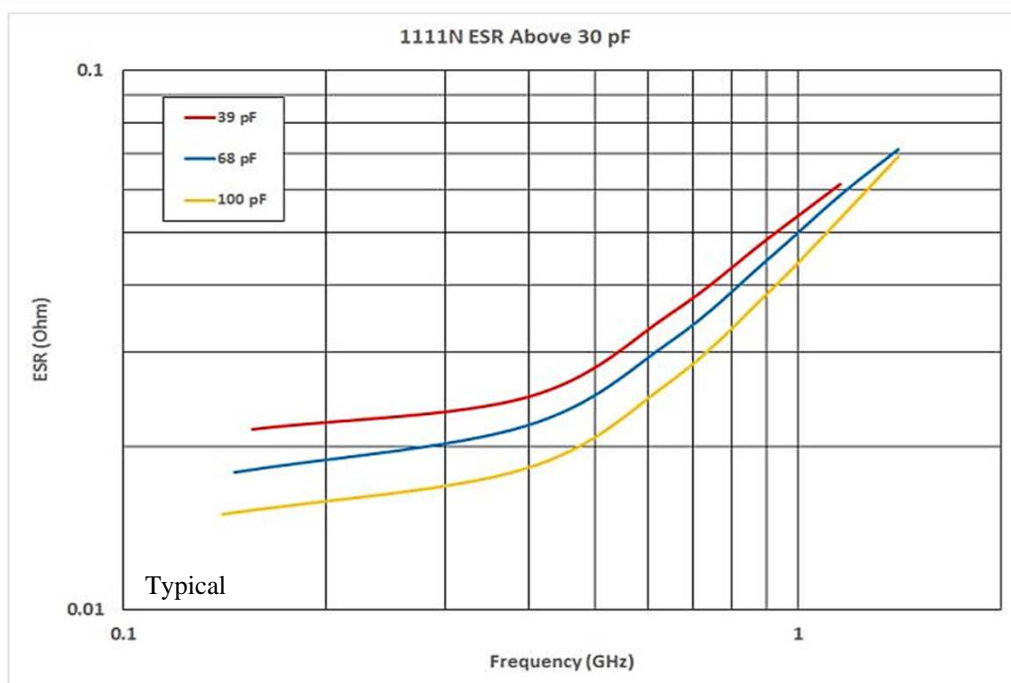
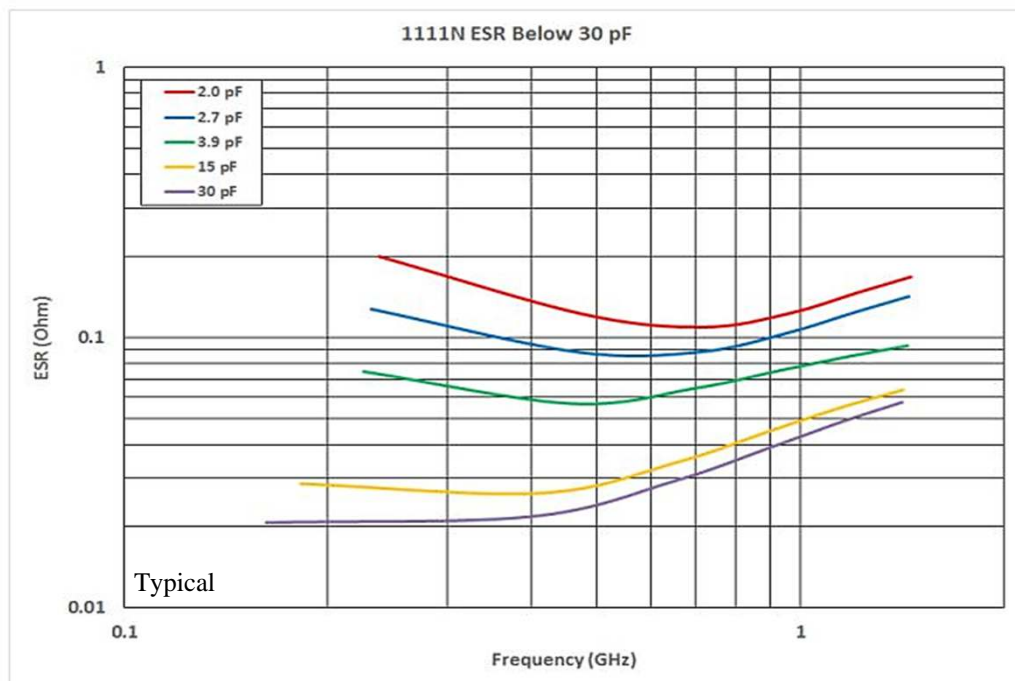
Capacitors are designed and manufactured to meet the requirements of MIL-PRF-55681 and MIL-PRF-123.



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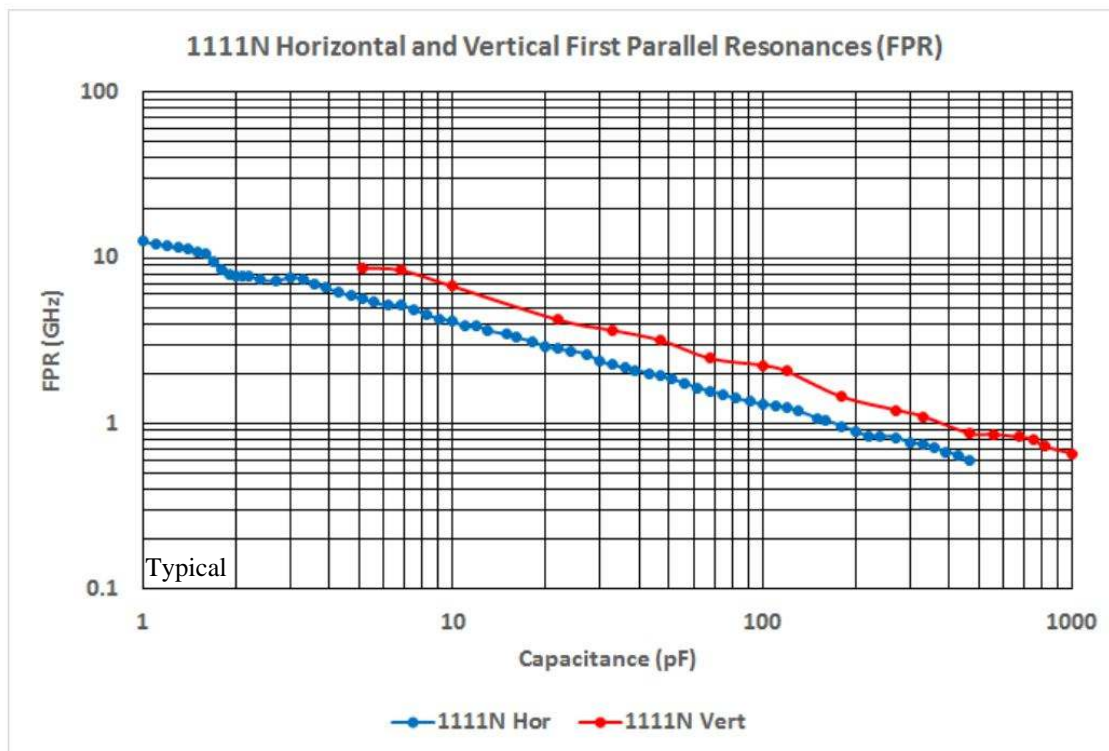
1111N (0.110" x 0.110")

⚡ ESR vs. Frequency





≠ First Parallel Resonance



≠ Definitions and Measurement Conditions

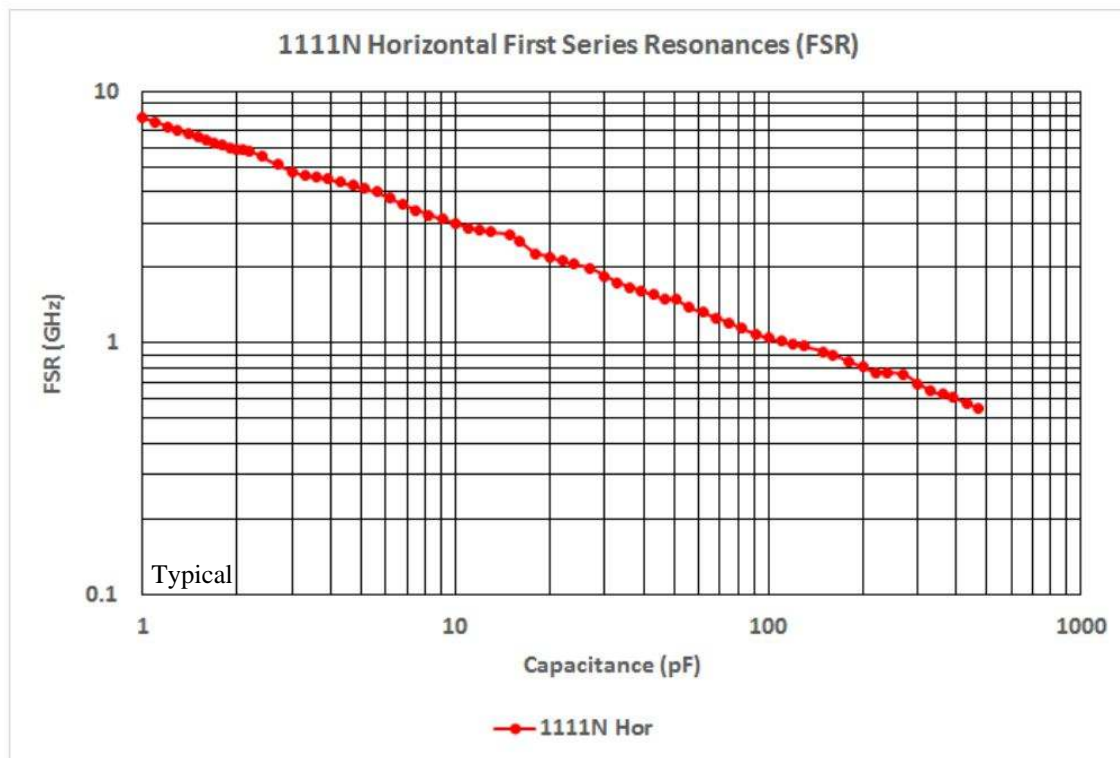
The **First Parallel Resonance, FPR**, is defined as the lowest frequency at which a suckout or notch appears in $|S_{21}|$. It is generally independent of substrate thickness or dielectric constant, but does depend on capacitor orientation. A horizontal orientation means the capacitor electrode planes are parallel to the plane of the substrate; a vertical orientation means the electrode planes are perpendicular to the substrate.

The definitions on the cards are for a capacitor in a series configuration, i.e., mounted across a gap in a microstrip trace with a 50-Ohm termination. The measurement conditions are: substrate – Rogers RO4350; substrate dielectric constant = 3.48; horizontal mount substrate thickness (mils) = 55; vertical mount substrate thickness (mils) = 45; gap in microstrip trace (mils) = 61.1; horizontal mount microstrip trace width (mils) = 123.7; vertical mount microstrip trace width (mils) = 101.0. Reference planes at sample edges.

All data has been derived from electrical models created by Modelithics, Inc., a specialty vendor contracted by PPI. The models are derived from measurements on a large number of parts disposed on several different substrates.



⚡ First Series Resonance



⚡ Definitions and Measurement Conditions

The **First Series Resonance, FSR**, is defined as the lowest frequency at which the imaginary part of the input impedance, $\text{Im}[Z_{in}]$, equals zero. Should $\text{Im}[Z_{in}]$ or the real part of the input impedance, $\text{Re}[Z_{in}]$, not be monotonic with frequency at frequencies lower than those at which $\text{Im}[Z_{in}] = 0$, the FSR shall be considered as undefined (represented as a gap in the plot). FSR is dependent on internal capacitor structure; substrate thickness and dielectric constant; capacitor orientation, as defined alongside the FPR plot; and mounting pad dimensions.

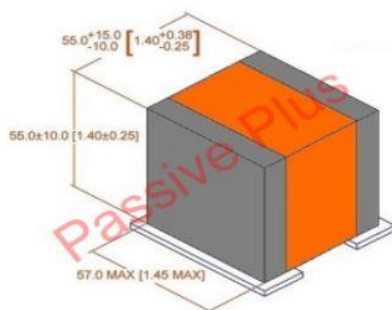
The definitions on the carts are for a capacitor in a series configuration, i.e., mounted across a gap in a microstrip trace with a 50-Ohm termination. The measurement conditions are: substrate – Rogers RO4350; substrate dielectric constant = 3.48; horizontal mount substrate thickness (mils) = 55; vertical mount substrate thickness (mils) = 45; gap in microstrip trace (mils) = 61.1; horizontal mount microstrip trace width (mils) = 123.7; vertical mount microstrip trace width (mils) = 101.0. Reference planes at sample edges.

All data has been derived from electrical models created by Modelithics, Inc., a specialty vendor contracted by PPI. The models are derived from measurements on a large number of parts disposed on several different substrates.



≠ Capacitor Application Program

PPI's brand new online Capacitor Application Program (C.A.P.) helps Engineers and Designers select capacitors according to parameters such as cap value and frequency. C.A.P. allows engineers to insert capacitors requirements (Cap value, Frequency), producing Scattering Matrices (S2P) Charts while providing options (Case Size, Terminations, Mounting), and parameters (ESR, Q, Impedance) along with Datasheets. Once engineers have determined their capacitor requirements, C.A.P. also includes online Requests For Quotes (RFQs) and/or sample requests.



≠ Modelithics Vendor Program

PPI offers design engineers a Free 90-Day Trial license for the Modelithics PPI Component Library. This program provides engineers access to extremely accurate scalable simulation models for Passive Plus capacitors with advanced features that enable a more precise and rapid design process.

Microwave Global Models include every part value in a series and permit users to input substrate thickness, dielectric constant, and loss tangent, as well as mounting pad layout dimensions. Selected models also include capacitor orientation – vertical or horizontal – as an input. Engineers can request FREE use of the models by visiting the <https://www.modelithics.com/MVP/PPI>.



≠ Recommended Land Pattern Dimensions

Regarding Landing Patterns, please refer to IPC-7351B (table 3-5, 3-6).

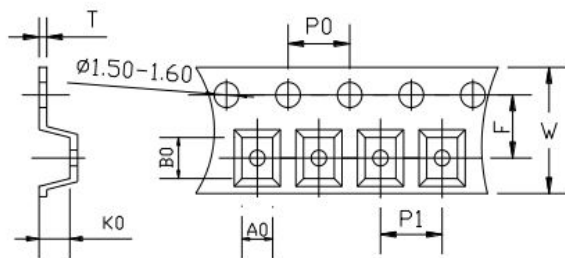


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1111N (0.110" x 0.110")

Tape & Reel Specifications

Orientation	Measurement Unit	W	P0	P1	T	F	Minimum Qty per Reel	Std Qty per Reel	Tape Material
H	in.	0.315	0.157	0.157	0.010	0.138	500	2000	Plastic
	mm	8.00	4.00	4.00	0.25	3.50			
V	in.	0.472	0.157	0.157	0.016	0.217	500	1500	
	mm	12.00	4.00	4.00	0.40	5.50			



A₀B₀K₀

- Determined by component size. Typical clearance between the cavity and the component is: .50 (.002) min to .65 (.026) max for 12mm tape.
- The component cannot rotate more than 20° within the determined cavity.

Engineering Design Kits

PPI offers Design Kits for engineers who are building and testing prototypes. Each kit contains 16 values; 10 pieces per value.

Kits are 100% RoHS compliant.



Kit Number	Value Range	Values	
DKD1111N01	1.0 - 10pF	1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2, 10pF	✓ RoHS
DKD1111N02	10 - 100pF	10, 12, 15, 18, 20, 22, 24, 27, 30, 33, 39, 47, 56, 68, 82, 100pF	✓ RoHS
DKD1111N03	100 - 1000pF	100, 120, 150, 180, 200, 220, 240, 270, 300, 330, 390, 470, 560, 680, 820, 1000pF	✓ RoHS

DKD1111N01

1111N Series 1.0 — 10pF
 Size: 0.110" x 0.110"
 TC = NP0 WVDC = 500V

Hi-Q Low ESR Capacitor Design Kit
www.passiveplus.com

DKD1111N02

1111N Series 10 — 100pF
 Size: 0.110" x 0.110"
 TC = NP0 WVDC = 500V

Hi-Q Low ESR Capacitor Design Kit
www.passiveplus.com

DKD1111N03

1111N Series 100 — 1000pF
 Size: 0.110" x 0.110"
 TC = NP0 WVDC = 500V

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www.passiveplus.com