

WIRE BONDABLE BURIED SINGLE LAYER CAPACITORS

PRESIDIO ADVANTAGE

- ◆ Presidio's patented thick film technology buries electrodes into the ceramic body (Fig. 1) allowing a 10:1 advantage over a conventional construction (Fig. 2). It offers the designer: (a) more bandwidth through increased device capacitance, (b) more stable capacitance over temperature and (c) more capacitance in smaller case sizes for increased board density.

Filled vias connect the buried electrodes with the outside top and bottom metallization pads; 99.95% pure Au is standard for all metal connections allowing proven wire bond techniques with AuSn or conductive epoxy die attach techniques.

- ◆ Excellent low loss performance for high Q applications as demonstrated with a 10 pF NPO capacitor shown in Fig. 6 below.
- ◆ Ease of dielectric material selection: Presidio offers 3 ceramic materials while most other suppliers offer more than 15.
- ◆ RoHS compliant.

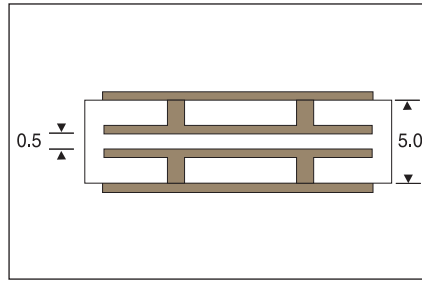


Fig. 1. Construction of Buried Electrodes

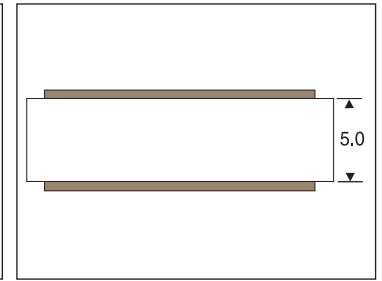


Fig. 2. Conventional Single Layer Capacitor

KENT SIMULATOR

Using the KENT SIMULATOR (Fig. 3), a designer can obtain commonly needed RF capacitor parameters in graphical format for popular Presidio Components RF capacitors. In addition, S-parameters for selected capacitors can be saved in S2P format. All device parameters are derived from a series transmission line model developed by Dr. Gordon Kent and available at www.presidiocomponents.com. A technical discussion of the simulation used in the Kent Simulator is presented by Gordon Kent in the "Summary of the Capacitor Simulator."

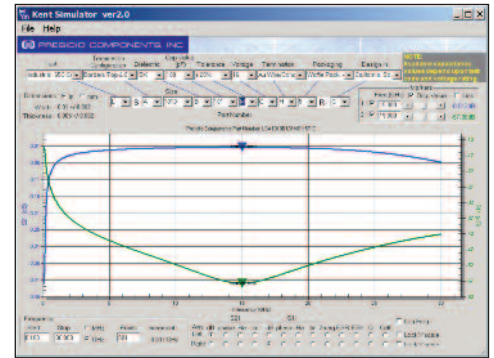


Fig. 3. Kent Simulator Version 2.0
LSA1010B101MGH5C-

TYPICAL APPLICATIONS

FILTER CAPACITOR

A filter design requires a specific capacitance value, C_F , and at the upper end of the filter response, f_F , the effective capacity must not exceed C_F by more than a specified amount of ΔC . Once C_F is determined, case size, voltage rating and temperature characteristics can be selected. Typically, lower loss Class I materials like NPQ and NPO are first choice. See Fig. 4.

RESONANCE-FREE BROADBAND COUPLING/DECOUPLING CAPACITOR

Class II "BX" dielectric is typical for DC block or RF bypass applications to operate resonance free over a specified broad frequency range. Low impedance is typically more important than the capacitance value which should be large enough to cover the 3 dB low edge of the bandwidth. See Fig. 5.

MINIMUM LOSS, FINITE BAND COUPLING CAPACITOR

When minimum loss is required, e.g. a low noise circuit, a high Q capacitor with Class I dielectric (NPQ or NPO) is recommended. Any parallel resonance frequency of the capacitor should be outside of the use frequency band. The best capacitor choice puts the series resonance at the band center (approximately $f_0 / 2$). See Fig. 6.

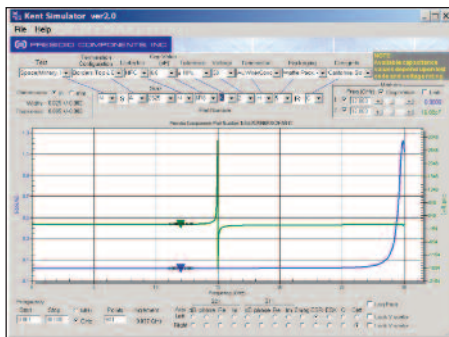


Fig. 4. Modeled ESR/50 and Ceff of part
NSA2525N6R8K2H5C-

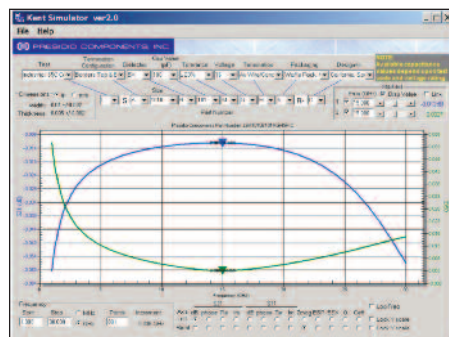


Fig. 5. Modeled S21 and Z/50 of part
LSA1010B101MGH5C-, Class II Dielectric

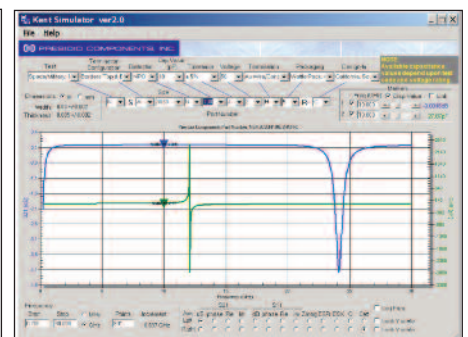


Fig. 6. Modeled S21 and Ceff of part
NSA3030N100J2H5C-, Class 1 Dielectric



GLOBAL PART NUMBER EXAMPLE (How to Order)

L	S	A	1010	B	101	M	G	H	5	C	-	*
Test Code	Product	Termination Configuration	Size (Pg. 5)	Dielectric	Capacitance Code	Capacitance Tolerance	Voltage	Termination	Packaging	RoHS Compliant	Hyphen Required	Design-In Code (See Page 14)

Test Codes, Dielectric Codes and Specifications

					FIT*	FIT*	FIT*	Commercial Space	Similar to MIL-PRF-49464 Table VI	Similar to MIL-PRF-49464 Table VII	MIL-PRF-38534 Rev L		Cust. Spec.		
					65° C	85° C	100° C	J	A	B	Class H	Class K	D		
TEST CODES:					L	M	N	J	A	B	H	K	D		
Upgradable to Codes:					H	H, A	H, A, B, K								
ELECTRICAL SPECIFICATIONS		NPQ Dielectric Code Q	NPO Dielectric Code N	BX Dielectric Code B	Tested as per MIL-PRF-49464C	Test Samples			Test Samples	Test Samples	Tested as per MIL-PRF-38534 L	Test Samples			
Temperature Coefficient Limits	0 ± 25 ppm/°C	0 ± 30 ppm/°C	± 20%	Para. 4.8.10							Standard or Specification				
Temperature Coefficient Limit Cycle	-55° to +125° C	-55° to +125° C	-55° to +125° C	Para. 4.8.10											
Capacitance	1 MHz, 1 V AC RMS	1 MHz, 1 V AC RMS	1 kHz, 1 V AC RMS	Para. 4.8.4	100%	100%	100%	100%	100%	100%	202 Method 305	10	100%		
Dissipation Factor, maximum	0.1%	0.15%	100 & 50V : 2.5%	Para. 4.8.5	100%	100%	100%	100%	100%	100%	MIL-PRF-123	10	100%		
Dissipation Factor, maximum	0.1%	0.15%	16 & 25V : 3.5%	Para. 4.8.5	100%	100%	100%	100%	100%	100%	MIL-PRF-123	10	100%		
Dissipation Factor, maximum	0.1%	0.15%	10V : 5%	Para. 4.8.5	100%	100%	100%	100%	N/A	N/A	MIL-PRF-123	10	100%		
Dissipation Factor, maximum	0.1%	0.15%	6.3V : 7.5%	Para. 4.8.5	100%	100%	100%	100%	N/A	N/A	MIL-PRF-123	10	100%		
Dielectric Withstanding Voltage (DWV)	250% of WVDC	250% of WVDC	250% of WVDC	Para. 4.8.7	1% AQL	1% AQL	1% AQL	100%	100%	100%	202 Method 301	10	100%		
Insulation Resistance @+25°C at WVDC	100,000 MΩ min.	100,000 MΩ min.	100,000 MΩ min.	Para. 4.8.6	1% AQL	1% AQL	1% AQL	100%	100%	100%	202 Method 302	10	100%		
Insulation Resistance @+125°C at WVDC	10,000 MΩ min.	10,000 MΩ min.	10,000 MΩ min.	Para. 4.8.6					100%	100%	202 Method 302		100%		
Aging Effects	None	None	2.5% typ./decade hr.	Presidio Spec.											
VISUAL & MECHANICAL SPECIFICATIONS															
Visual, Workmanship	No slivers, cracks, demetalization				Para. 4.8.1	100%	100%	100%	100%	100%	100%	MIL-STD-883	22	100%	
Wirebond Strength, minimum	3 grams, 0.001" dia. Au wire				Para. 4.8.8										
Shear Strength, minimum	Size dependent	Size dependent	Size dependent	Para. 4.8.9							13	13	MIL-STD-883	10	10
Element Electrical															
Prohibited Material Inspection															
Physical Dimensions	See Page 5	See Page 5	See Page 5	Para. 4.8.1											
99.8% Gold Metalization, minimum	100 μm (2.5 μm)	100 μm (2.5 μm)	100 μm (2.5 μm)	Para. 1.2.1.7											
ENVIRONMENTAL TESTS (TEST CODES A, B, K)															
Thermal Shock	5 cycles/100 hr min.	5 cycles/100 hr min.	5 cycles/100 hr min.	Para. 4.8.3											
Destructive Physical Analysis (DPA)															
Voltage Conditioning															
Acoustic Imaging															
Temperature Coefficient Limits, 0 Volt	0 ± 25 ppm/°C	0 ± 30 ppm/°C	± 20%	Para. 4.8.10											
Immersion	0.5% or 0.5 pF cap. change		± 10% cap. change	Para. 4.8.11											
Humidity, Steady State, Low Voltage	240 hours minimum			Para. 4.8.12											
Life Test	2000 hours	2000 hours	2000 hours	Para. 4.8.13											
RoHS Compliant	Yes	Yes	Yes												

*FIT (Failure In Time) per billion hours. Calculations are based on assumed continuous operating temperatures 65° C, 85° C and 100° C

Termination Configuration Codes

Code	Description	A	B	C
A	Borders top and bottom			
B	Borders top, full metalization at bottom			
C	Fully metalized top and bottom			

Configurations A & B are the most commonly used and the most economical.

Capacitance Codes

First two digits = Significant figures of capacitance in picofarads
 Third digit = Additional number of zeros
 Example: 0R1 = 0.1 pF 100 = 10 pF
 1R0 = 1.0 pF 101 = 100 pF

Capacitance Tolerance Codes

Code	Tolerance	Cap Range	Dielectrics
A	± .05 pF	< 2.2 pF	NPQ, NPO
B	± .1 pF	< 10 pF	NPQ, NPO
C	± .25 pF	< 10 pF	NPQ, NPO
D	± .5 pF	< 10 pF	NPQ, NPO
G	± 2%	> 9.1 pF	NPQ, NPO
J	± 5%	> 9.1 pF	NPQ, NPO
K	± 10%	> 0.45 pF	all
M	± 20%	> 0.45 pF	all

Working Voltage

Code	WVDC	Code	WVDC
3	100	G	16
2	50	F	12
1	25	E	10
		C	6.3

Termination Codes

Code	Material	Wire	Attachment
H	99.8% Au	Au	Conductive Epoxy or AuSn

100 μm min. thickness

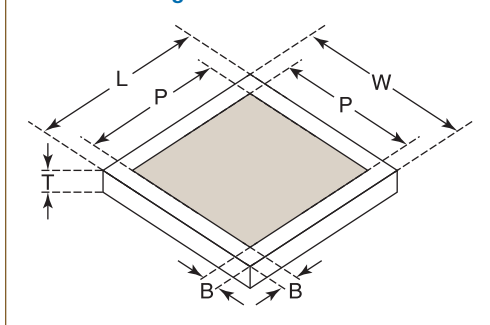
Packaging Codes

Code	Description
5	Waffle Pack, 400 max/waffle
F	Grip Ring, 6.0" diameter standard (low tack)

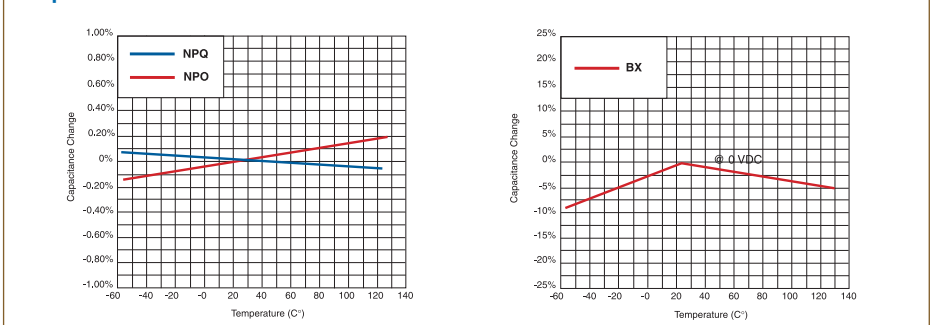
RoHS

Code	Compliant
N	No
R	Legacy, ended 2012
C	Yes, started January 2013

Dimensions Diagram



Temperature Coefficient Limits



SELECTION TABLE: BURIED SINGLE LAYER CAPACITORS — WIRE BONDABLE

SIZE CODE	W inch (mm)	L inch (mm)	T inch (mm)	Nominal P inch (mm)	Minimum B inch (mm)	Working Voltage (WVDC) Max. Capacitance	INDUSTRIAL Test Code L			MILITARY Test Code M			SPACE EM: Test Code N FM: Test Code J, B, K			Modeled Performance Data & S2P Files
							CAPACITANCE (pF)			CAPACITANCE (pF)			CAPACITANCE (pF)			
							NPQ	NPO	BX	NPQ	NPO	BX	NPQ	NPO	BX	
1010	0.010 (0.254) ± 0.003 (0.076)	0.010 (0.254) ± 0.003 (0.076)	0.005 (0.127) ± 0.002 (0.051)	0.007 (0.178)	0.0005 (0.013)	Min: (1)	0.5	1.5	6.2	0.3	1.0	6.2	—	—	—	
						50* Max:	0.7	2.2	68	0.5	1.5	47	—	—	—	
						25* Max:	0.8	2.4	82	0.6	1.8	56	—	—	—	
						16* Max:	0.9	2.7	100	0.7	2.2	68	—	—	—	
						10* Max:	1.3	3.9	120	0.8	2.4	82	—	—	—	
						6.3 Max:	—	—	300	—	—	—	—	—	—	
1212	0.012 (0.305) ± 0.002 (0.051)	0.012 (0.305) ± 0.002 (0.051)	0.005 (0.127) ± 0.002 (0.051)	0.009 (0.229)	0.0005 (0.013)	Min: (1)	0.8	2.4	10	0.5	1.5	10	0.1	0.6	6.2	
						50* Max:	1.0	3.3	100	0.8	2.4	75	0.5	1.5	56	
						25* Max:	1.2	3.9	120	0.9	2.7	91	0.8	2.4	75	
						16* Max:	1.5	4.3	150	1.0	3.3	100	0.9	2.7	82	
						10 Max:	2.0	6.2	180	1.2	3.9	120	—	—	—	
						6.3 Max:	—	—	—	—	—	—	—	—	—	
1515	0.015 (0.381) ± 0.002 (0.051)	0.015 (0.381) ± 0.002 (0.051)	0.005 (0.127) ± 0.002 (0.051)	0.011 (0.279)	0.001 (0.025)	Min: (1)	0.1	0.6	15	0.1	0.6	15	0.1	0.6	15	
						100* Max:	1.5	4.7	150	1.0	3.0	82	0.5	1.5	47	
						50* Max:	2.2	6.8	200	1.5	4.7	100	1.0	3.0	82	
						25* Max:	2.4	7.5	240	1.8	5.6	120	1.5	4.7	100	
						16* Max:	2.7	8.2	270	2.2	6.8	150	1.8	5.6	120	
						10* Max:	3.9	12	330	2.4	7.5	180	—	—	—	
						6.3 Max:	—	—	680	—	—	—	—	—	—	
1717	0.017 (0.432) ± 0.002 (0.051)	0.017 (0.432) ± 0.002 (0.051)	0.005 (0.127) ± 0.002 (0.051)	0.013 (0.330)	0.001 (0.025)	Min: (1)	0.2	0.7	18	0.2	0.7	18	0.2	0.7	18	
						100* Max:	1.8	5.6	180	1.2	3.9	100	0.6	2.0	62	
						50* Max:	2.7	8.2	270	1.8	5.6	150	1.2	3.9	100	
						25* Max:	3.0	10	300	2.2	6.8	180	1.8	5.6	120	
						16* Max:	3.6	12	360	2.7	8.2	220	2.2	6.8	150	
						10 Max:	5.1	15	430	3.0	10	240	—	—	—	
2020	0.020 (0.508) ± 0.002 (0.051)	0.020 (0.508) ± 0.002 (0.051)	0.005 (0.127) ± 0.002 (0.051)	0.016 (0.406)	0.001 (0.025)	Min: (1)	0.2	1.0	22	0.2	1.0	22	0.2	1.0	22	
						100* Max:	2.7	8.2	240	1.8	5.6	150	0.9	2.7	82	
						50* Max:	3.9	10	360	2.7	8.2	220	1.8	5.6	150	
						25* Max:	4.3	12	390	3.3	9.1	240	2.7	8.2	180	
						16* Max:	4.7	15	510	3.9	10	300	3.3	9.1	270	
						10* Max:	6.8	22	560	4.3	12	330	—	—	—	
2222	0.022 (0.559) ± 0.002 (0.051)	0.022 (0.559) ± 0.002 (0.051)	0.005 (0.127) ± 0.002 (0.051)	0.018 (0.457)	0.001 (0.025)	Min: (1)	0.2	1.2	24	0.2	1.2	24	0.2	1.2	24	
						100* Max:	3.0	9.1	270	2.0	5.6	200	1.0	3.0	91	
						50* Max:	4.3	12	390	3.0	9.1	270	2.0	5.6	180	
						25* Max:	4.7	15	430	3.6	10	330	3.0	9.1	270	
						16* Max:	5.1	18	620	4.3	12	390	3.6	10	330	
						10 Max:	7.5	24	750	4.7	15	470	—	—	—	
2525	0.025 (0.635) ± 0.002 (0.051)	0.025 (0.635) ± 0.002 (0.051)	0.005 (0.127) ± 0.002 (0.051)	0.021 (0.533)	0.001 (0.025)	Min: (1)	0.3	1.5	30	0.3	1.5	30	0.3	1.5	30	
						100* Max:	3.6	10	330	2.4	6.8	270	1.2	3.6	100	
						50* Max:	5.1	15	470	3.6	10	360	2.4	6.8	270	
						25* Max:	5.6	18	620	4.3	12	430	3.6	10	330	
						16* Max:	6.2	20	820	5.1	15	510	4.3	12	390	
						10 Max:	9.1	30	1,000	5.6	18	560	—	—	—	
2727	0.027 (0.686) ± 0.002 (0.051)	0.027 (0.686) ± 0.002 (0.051)	0.005 (0.127) ± 0.002 (0.051)	0.023 (0.584)	0.001 (0.025)	Min: (1)	0.3	1.5	33	0.3	1.5	33	0.3	1.5	33	
						100* Max:	3.9	12	360	2.4	7.5	330	1.2	3.9	120	
						50* Max:	5.6	18	560	3.9	12	430	2.4	7.5	330	
						25* Max:	6.2	20	750	4.7	15	510	3.9	12	390	
						16* Max:	6.8	22	1,000	5.6	18	620	4.7	15	430	
						10 Max:	10	33	1,200	6.2	20	680	—	—	—	
3030	0.030 (0.762) ± 0.002 (0.051)	0.030 (0.762) ± 0.002 (0.051)	0.007 (0.178) ± 0.002 (0.051)	0.026 (0.660)	0.001 (0.025)	Min: (1)	0.6	2.4	51	0.6	2.4	51	0.6	2.4	51	
						100* Max:	6.8	20	620	4.3	12	390	2.2	6.8	200	
						50* Max:	9.1	30	910	6.8	20	560	4.3	12	430	
						25* Max:	10	33	1,000	7.5	24	680	6.8	20	470	
						16* Max:	12	39	1,200	9.1	30	820	7.5	24	750	
						10 Max:	18	56	1,500	10	33	910	—	—	—	
3535	0.035 (0.889) ± 0.002 (0.051)	0.035 (0.889) ± 0.002 (0.051)	0.007 (0.178) ± 0.003 (0.076)	0.031 (0.787)	0.001 (0.025)	Min: (1)	0.8	3.3	75	0.8	3.3	75	0.8	3.3	75	
						100* Max:	9.1	30	910	6.2	20	560	3.0	10	300	
						50* Max:	12	43	1,200	9.1	30	1,000	6.2	20	620	
						25* Max:	15	47	1,500	10	36	1,000	9.1	30	680	
						16* Max:	18	56	1,800	12	43	1,200	10	36	1,000	
						10 Max:	24	75	2,200	15	47	1,500	—	—	—	

Download
Kent
Simulator
from
Presidio's
Website



WIRE BONDABLE BURIED SINGLE LAYER CAPACITORS

* Lower voltages available.
(1) Lower capacitance values available but part will be thicker than nominal thickness. Contact factory.



A WORD TO THE DESIGN ENGINEER

After the design work is done, outsourcing manufacturing on a global basis is a management option. At Presidio Components, we are striving for complete customer satisfaction which includes “after” service for all of our products.

We added a “Design In” locator code for quick traceability, if needed. Please select your location from the list below and add the appropriate code at the end of the part number.

If you need assistance give us a call at **(858) 578-9390** or email us at **info@presidiocomponents.com**.

UNITED STATES

OUTSIDE THE UNITED STATES

USA	Code	USA	Code	Americas	Code	Europe	Code
Alabama	G	Nebraska	P	Canada	R	Austria	3
Alaska	P	Nevada, North	B	Mexico	R	Belgium	1
Arizona	D	Nevada, South	C	Caribbean	R	Denmark	5
Arkansas	P	New Hampshire	L	Central America	R	Finland	5
California, North	B	New Jersey	J	South America	R	France	2
California, South	C	New Mexico	D			Germany	3
Colorado	E	New York, Metro	J	Pacific Rim		Ireland	6
Connecticut	L	New York, Upstate	K	Australia	S	Italy	4
Delaware	I	North Carolina	G	China	T	Luxembourg	1
District of Columbia	H	North Dakota	O	Japan	U	Netherlands	1
Florida	G	Ohio	M	Korea, South	V	Norway	5
Georgia	G	Oklahoma	P	Malaysia	W	Sweden	5
Hawaii	P	Oregon	A	Singapore	X	Switzerland	3
Idaho	A	Pennsylvania	I	Other Pacific Rim Countries	Y	United Kingdom	6
Illinois	N	Rhode Island	L			Other European Countries	7
Indiana	M	South Carolina	G			Other	
Iowa	O	South Dakota	O			India	2
Kansas	P	Tennessee	G			Israel	8
Kentucky	M	Texas	F			Rest of World	9
Louisiana	P	Utah	E				
Maine	L	Vermont	L				
Maryland	H	Virginia	H				
Massachusetts	L	Washington	A				
Michigan	N	West Virginia	P				
Minnesota	O	Wisconsin, East	N				
Mississippi	G	Wisconsin, West	O				
Missouri	N	Wyoming	E				
Montana	A						

