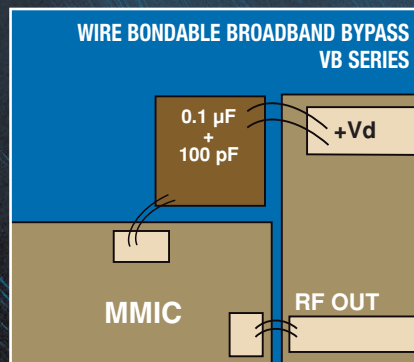
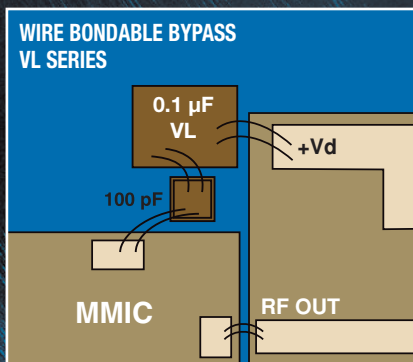
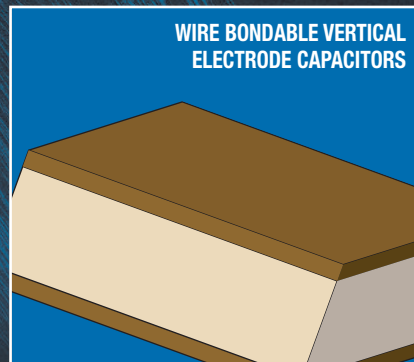
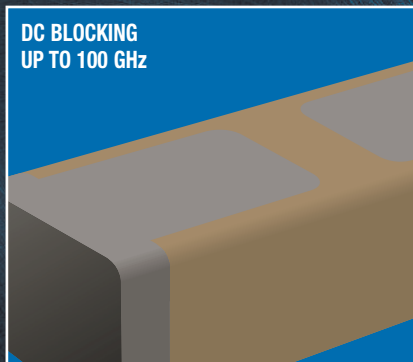
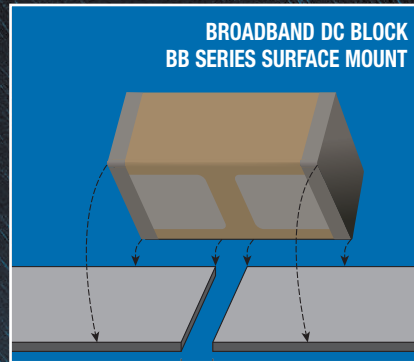
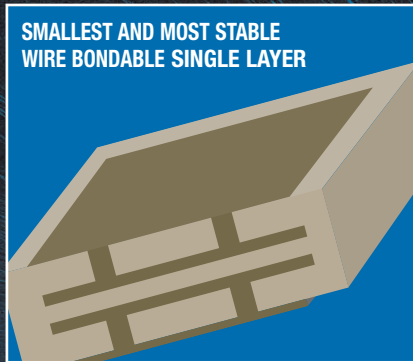
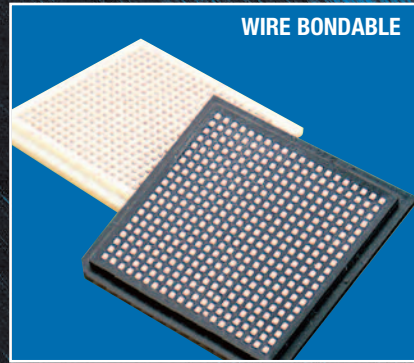
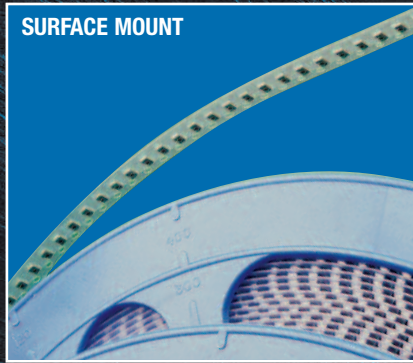


CERAMIC CAPACITORS FOR RF ENGINEERS



PRESIDIO COMPONENTS, INC.

HIGH PERFORMANCE, HIGH RELIABILITY CERAMIC CAPACITORS

ABOUT PRESIDIO

Presidio Components has been an industry leader in the design and manufacture of ceramic capacitors since 1980. We are dedicated to excellence in manufacturing, process control and customer service. All products are manufactured and tested in our state-of-the-art, 80,000 square foot facility in San Diego, California, allowing for immediate response to your business needs. We have numerous patents, and hundreds of years of combined engineering experience. We can formulate the right product for your application.



For more information about Presidio's products visit our website: www.presidiocomponents.com

TESTING & RELIABILITY

Presidio Components was initially qualified to Mil-PRF-55681 in 1984. Since then we have upgraded our processing line to obtain the highest established reliability of 'S' level. We are also qualified on two additional space level applications, Mil-PRF-123 and Mil-PRF-49470 'T' level. Presidio Components is also proud to be the first QPL supplier to Mil-PRF-49467, the high voltage ceramic capacitor specification. All QPL testing per Mil-STD-202 is done on site at our DLA approved test lab. For a list of environmental test capabilities, consult the factory.

CUSTOMER SERVICE

At Presidio Components we work hard to build positive, long-term relationships with our customers and we will go the extra distance to ensure customer satisfaction. If you cannot find a part anywhere else, call Presidio Components. With more than 100 million parts in inventory, we have many commercial and military parts in stock. Our patented ceramic capacitors are typically used in low noise, filter, tuning, broadband DC blocking, and RF bypass applications.

**MIL-STD-790 DLA APPROVED
FACILITY AND TEST LAB
CAGE CODE: 60212**

Presidio Components, Inc.
San Diego, California



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www.presidiocomponents.com • info@presidiocomponents.com

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.

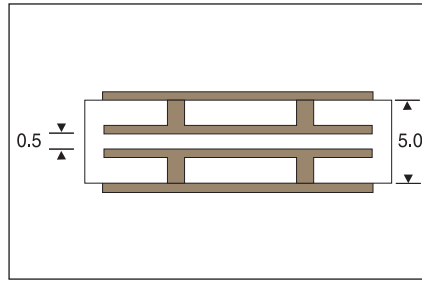


Fig. 1. Construction of Buried Electrodes

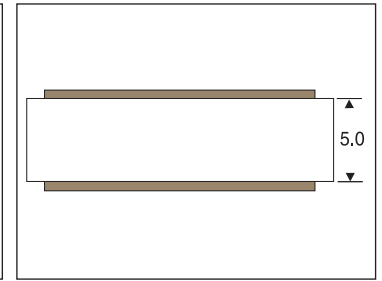


Fig. 2. Conventional Single Layer Capacitor

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."

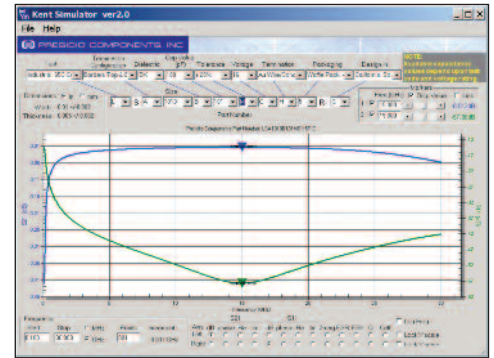


Fig. 3. Kent Simulator Version 2.0 LSA1010B101MGH5C-

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.

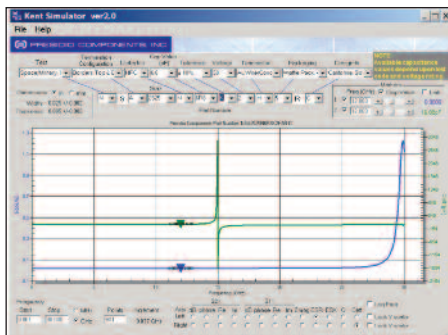


Fig. 4. Modeled ESR/50 and Ceff of part NSA2525N6R8K2H5C-

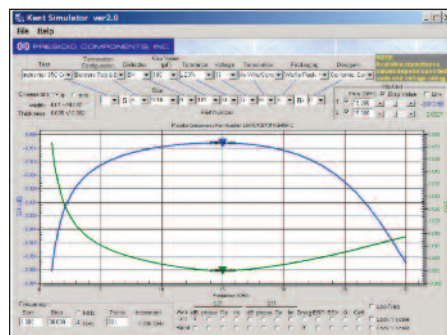


Fig. 5. Modeled S21 and Z/50 of part LSA1010B101MGH5C-, Class II Dielectric

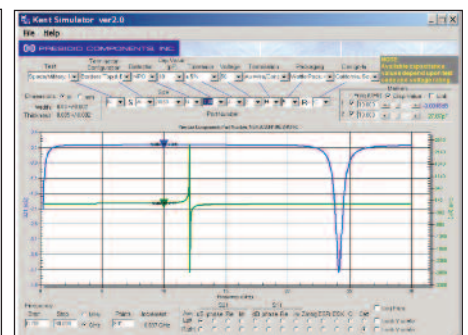


Fig. 6. Modeled S21 and Ceff of part NSA3030N100J2H5C-, Class 1 Dielectric



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 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											
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							13	13	MIL-STD-883	10	10
Shear Strength, minimum	Size dependent	Size dependent	Size dependent	Para. 4.8.9							13	13			
Element Electrical													Measure&Record	10	25/80/125
Prohibited Material Inspection													MIL-STD-1580		5
Physical Dimensions	See Page 5	See Page 5	See Page 5	Para. 4.8.1							13	13			
99.8% Gold Metalization, minimum	100 μin (2.5 μm)	100 μin (2.5 μm)	100 μin (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							100%	100%	MIL-STD-202		100%
Destructive Physical Analysis (DPA)												Included	EIA 469 Except §6.1.3		Included
Voltage Conditioning											100%	100%	MIL-PRF-123		100%
Acoustic Imaging													ECIA EIA-469		100%
Temperature Coefficient Limits, 0 Volt	0 ± 25 ppm/°C	0 ± 30 ppm/°C	± 20%	Para. 4.8.10							12	12			
Immersion	0.5% or 0.5 pF cap. change		± 10% cap. change	Para. 4.8.11								12			
Humidity, Steady State, Low Voltage	240 hours minimum			Para. 4.8.12								12	MIL-PRF-123		12
Life Test	2000 hours	2000 hours	2000 hours	Para. 4.8.13								25	MIL-PRF-123		25/80/125
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

Packaging Codes

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

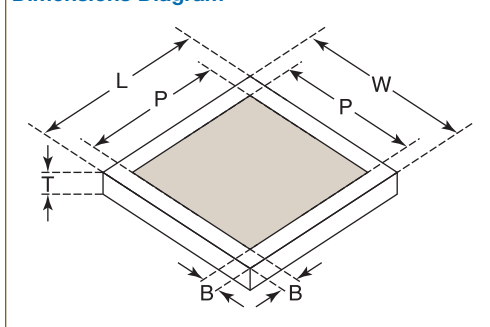
Termination

Code	Description
H	99.8% Au Top and Bottom 100 μin min. thickness Suitable for Conductive Epoxy or AuSn
U	100% Au Top and Bottom Oxide Free Surface Suitable for Conductive Epoxy or AuSn

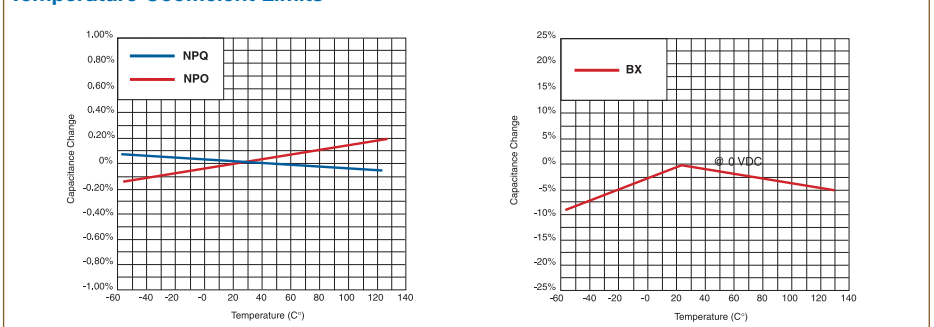
RoHS

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	—	—	—	
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	—	—	—	
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	
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	
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	
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	
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	
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.

DESIGN NOTES



PRESIDIO COMPONENTS, INC.

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www.presidiocomponents.com • info@presidiocomponents.com

WIRE BONDABLE VERTICAL ELECTRODE CAPACITORS

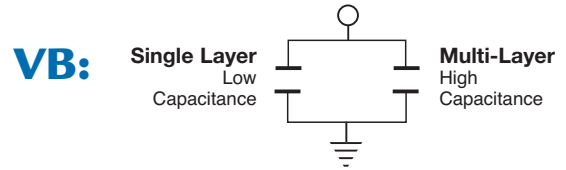
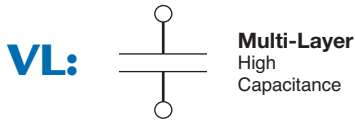
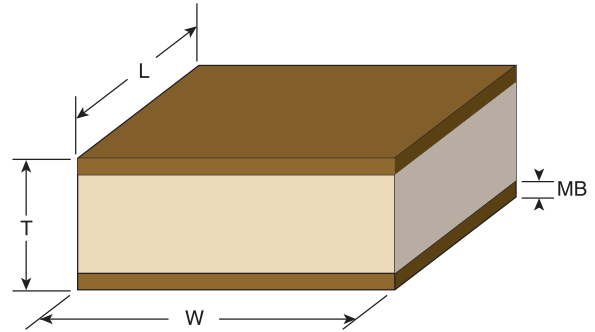
PRESIDIO ADVANTAGE

VL SERIES

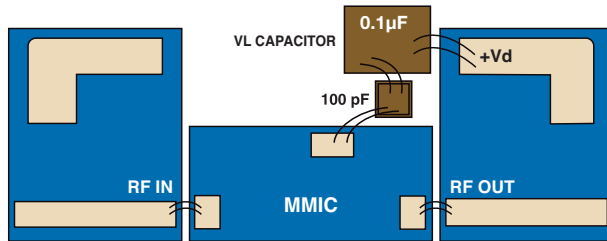
- Wire Bondable Bypass Capacitors for MMIC's

VB SERIES

- Wire Bondable Integrated Broadband Bypass Capacitors for MMIC's up to Millimeter Frequencies
- Low Profile

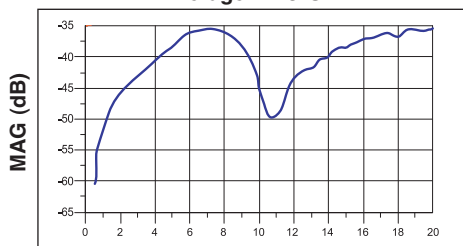


VL SERIES

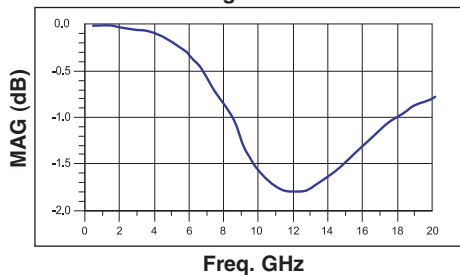


MVL4080X104MGH5C-_* (Bond Wires Included)

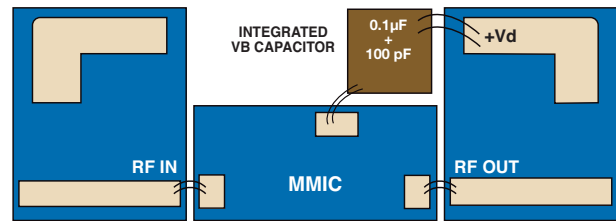
Data in Shunt
Average MAG S21



Average MAG S11

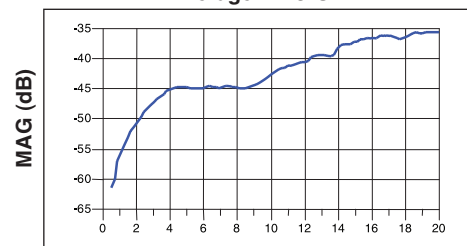


VB SERIES

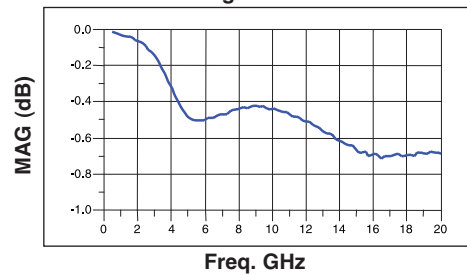


MVB4080X104ZGH5C3_* (Bond Wires Included)

Data in Shunt
Average MAG S21



Average MAG S11



GLOBAL PART NUMBER EXAMPLE (How to Order)

M	VB	3030	X	103	M	G	H	5	C	1	*
Test Code	VB = Vertical Broadband VL = Vertical Layer	Size (Pg. 9)	Dielectric	Capacitance	Capacitance Tolerance	Voltage	Termination	Packaging	RoHS Compliant	VB – Special Code VL – Hyphen Required	Design-In Code (See Page 14)

Test Codes, Dielectric Codes and Specifications

				FIT* 85° C	FIT* 100° C	Commercial Space	Similar -55681	Similar -123	Mil-PRF-38534 Rev. L Class H	Class K	Cust. Spec.
TEST CODES:				M	N	J	C	S	H	K	D
Upgradable to Codes:				H, C	H, C, S, K						
ELECTRICAL SPECIFICATIONS	X7R Dielectric Code X	Y5V Dielectric Code Y	Testing Method	Test Samples		Test Samples	Test Samples		Test Samples		
Temperature Coefficient Limits	± 20%	+ 22%, -82%	Presidio Specification								
Temperature Coefficient Limit Cycle	-55° to +125° C	-30° to +85° C	Presidio Specification								
Capacitance	1 kHz, 1.0 V AC RMS	1 kHz, 1.0 V AC RMS	MIL-STD-202 Meth. 305	100%	100%	100%	100%	100%	10	100%	
Dissipation Factor, maximum	5% max.	19% max.	Presidio Specification	100%	100%	100%	100%	100%	10	100%	
Dielectric Withstanding Voltage (DWV)	250% of WVDC	250% of WVDC	MIL-STD-202 Meth. 301	1% AQL	1% AQL	100%	100%	100%	10	100%	
Insulation Resistance @ +25° C at WVDC	1000 MΩ - μF	50 MΩ - μF	MIL-STD-202 Meth. 302	1% AQL	1% AQL	100%	100%	100%	10	100%	
Insulation Resistance @ +125° C at WVDC	100 MΩ - μF	Not Applicable	MIL-STD-202 Meth. 302				1% AQL	100%		100%	
Aging Effects	2.5% typ./decade hr.	5% typ./decade hr.	Presidio Specification								
VISUAL & MECHANICAL SPECIFICATIONS											
Visual, Workmanship			Presidio Specification	100%	100%	100%	100%	100%	22	100%	
Element Electrical			Measure & Record						10	25/80/125	
Wire Bond Evaluation	3 grams, 0.001" dia. Au wire		STD-883 Method 2011					10	10	10	10
Shear Strength, minimum	Size dependent	Size dependent	STD-883 Method 2019					10	10		
Physical Dimensions	See Page 9	See Page 9	Presidio Specification					20	20		
Prohibited Material Inspection			MIL-STD-1580							5	
Acoustic Imaging			ECIA EIA-469							100%	
Metalization, minimum	100 μin (2.5 μm)	100 μin (2.5 μm)	Presidio Specification								
ENVIRONMENTAL TESTS, LEVEL I (TEST CODE C)											
Voltage Conditioning	100 Hours	100 Hours	MIL-STD-202 Meth. 108, A								
ENVIRONMENTAL TESTS, LEVEL II (TEST CODE S)											
Thermal Shock & Voltage Conditioning	20 cycles/168 hr. min.	Not Applicable	MIL-STD-202 Meth. 107						100%	100%	
Destructive Physical Analysis Report		Not Applicable	EIA 469 Except §6.1.3						Included	Included	
Temperature Coeff. of Capacitance, 0 Volt	± 20%	Not Applicable	Presidio Specification						12		
Life Test	1000 Hours Each Lot	Not Applicable	MIL-STD-202 Meth. 108						25 min.	25/80/125	
Humidity, Steady State, Low Voltage	240 hours min.	Not Applicable	MIL-STD-202 Meth. 103, A						12	12	
RoHS Compliant, Yes or No	Specify	Not Applicable									

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

-3dB CUT OFF FREQUENCY	
pF	kHz
330,000	< 10
180,000	10
100,000	16
68,000	25
47,000	35
43,000	40
30,000	55
22,000	75
20,000	80
15,000	105
10,000	160
8,200	195
4,700	340

Capacitance Codes

First Two Digits = Significant figures of capacitance in picofarads

Third Digit = Additional number of zeros

Example: 100 = 10 pF
102 = 1,000 pF
104 = 100,000 pF

Working Voltage (See Page 9)

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

Termination

VL/VB	Description
H	99.8% Au Top and Bottom Suitable for Conductive Epoxy
U	100% Au Top and Bottom Oxide Free Surface Suitable for Conductive Epoxy
K	99.8% Au Top, PdAg Bottom Conductive Epoxy or Solder

100 Microinches minimum thickness on both sides

Capacitance Tolerance

Code	Tol.
M	± 20%
Z	-20%, +80% for all Y5V dielectric

Packaging

5 = Waffle Pack (standard)
F = Grip Ring, 6.0" diameter standard

RoHS

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

Special Code

VB Series: Single Layer Capacitance Value:
1 = 100 pF
3 = 1800 pF

VL Series: Hyphen Required



SELECTION TABLE: VERTICAL ELECTRODE CAPACITORS – WIRE BONDABLE

Feel free to contact factory to discuss your screening requirements.

Size Code	L inch (mm)	W inch (mm)	T Max. inch (mm)	MB Max. inch (mm)	Working Voltage (WVDC) Max.	Capacitance (pF)	INDUSTRIAL & MILITARY Test Code M				SPACE TEST CODES EM: Code N FM: Code J, S or K	Performance Curves	S2P Files "VB"	
							X7R (pF)	Y5V (pF)	VB SERIES PART NUMBER	VL SERIES PART NUMBER				X7R (pF)
2020	0.020 (0.508) ± 0.003 (0.076)	0.020 (0.508) ± 0.003 (0.076)	0.015 (0.381)	0.003 (0.076)	100	Max:	390			MVL2020X391M3 *5C-*				
					50	Max:	1,000			MVL2020X102M2 *5C-*	1,000			
					25	Max:	2,700			MVL2020X272M1 *5C-*				
					16	Max:	5,100			MVL2020X512MG *5C-*				
					10	Max:	10,000			MVL2020X103ME *5C-*				
					6.3	Max:				LVB2020X103MC *5C1*				
2040	0.020 (0.508) ± 0.003 (0.076)	0.040 (1.016) ± 0.004 (0.102)	0.017 (0.432)	0.005 (0.127)	100	Max:	1,000			MVB2040X102M3 *5C1*	MVL2040X102M3 *5C-*	1,000		
					50	Max:	2,200			MVB2040X222M2 *5C1*	MVL2040X222M2 *5C-*			
					25	Max:	5,100			MVB2040X512M1 *5C1*	MVL2040X512M1 *5C-*			
					16	Max:	10,000			MVB2040X103MG *5C1*	MVL2040X103MG *5C-*			
					10	Max:	22,000			MVB2040X223ME *5C1*	MVL2040X223ME *5C-*			
2741	0.027 (0.686) ± 0.004 (0.102)	0.041 (1.041) ± 0.004 (0.102)	0.033 (0.838)	0.005 (0.127)	16	Max:	100,000			MVB2741X104MG *5C1*	MVL2741X104MG *5C-*			
3030	0.030 (0.762) ± 0.003 (0.076)	0.030 (0.762) ± 0.003 (0.076)	0.022 (0.559)	0.005 (0.127)	100	Max:	4,700			MVB3030X472M3 *5C1*	MVL3030X472M3 *5C-*			
					50	Max:	10,000			MVB3030X103M2 *5C1*	MVL3030X103M2 *5C-*	6,800		
					25	Max:	15,000			MVB3030X153M1 *5C1*	MVL3030X153M1 *5C-*			
					16	Max:	22,000			MVB3030X223MG *5C1*	MVL3030X223MG *5C-*	10,000	PDF	WEB
					16	Max:		100,000			MVL3030Y104ZG *5C-*			
					10	Max:	43,000			MVB3030X433ME *5C1*	MVL3030X433ME *5C-*			
3060	0.030 (0.762) ± 0.003 (0.076)	0.060 (1.524) ± 0.004 (0.102)	0.017 (0.432)	0.005 (0.127)	100	Max:	8,200			MVB3060X822M3 *5C1*	MVL3060X822M3 *5C-*			
					50	Max:	20,000			MVB3060X203M2 *5C1*	MVL3060X203M2 *5C-*			
					25	Max:	30,000			MVB3060X303M1 *5C1*	MVL3060X303M1 *5C-*			
					16	Max:	47,000			MVB3060X473MG *5C1*	MVL3060X473MG *5C-*			
					10	Max:	100,000			MVB3060X104ME *5C1*	MVL3060X104ME *5C-*	100,000 (VL)		
4040	0.040 (1.016) ± 0.004 (0.102)	0.040 (1.016) ± 0.004 (0.102)	0.025 (0.635)	0.005 (0.127)	100	Max:	8,200			MVB4040X822M3 *5C1*	MVL4040X822M3 *5C-*			
					50	Max:	20,000			MVB4040X203M2 *5C1*	MVL4040X203M2 *5C-*	10,000		
					25	Max:	30,000			MVB4040X303M1 *5C1*	MVL4040X303M1 *5C-*			
					16	Max:	47,000			MVB4040X473MG *5C1*	MVL4040X473MG *5C-*	47,000 (VL)		
					10	Max:	100,000			MVB4040X104ME *5C1*	MVL4040X104ME *5C-*			
3080	0.030 (0.762) ± 0.003 (0.076)	0.080 (2.032) ± 0.004 (0.102)	0.025 (0.635)	0.005 (0.127)	50	Max:	15,000			MVL3080X153M2 *5C-*				
					16	Max:	100,000			MVL3080X104MG *5C-*				
4080 VB			0.017 (0.432)	0.005 (0.127)				Primarily for Legacy Designs. Please contact factory at info@presidiocomponents.com						
4080 VL	0.042 (1.067) ± 0.004 (0.102)	0.083 (2.108) ± 0.004 (0.102)	0.025 (0.635)	0.005 (0.127)	100	Max:	15,000			MVL4080X153M3 *5C-*				
					50	Max:	30,000			MVL4080X303M2 *5C-*	20,000			
					25	Max:	68,000			MVL4080X683M1 *5C-*				
					16	Max:	100,000			MVL4080X104MG *5C-*				
4280 VB			0.025 (0.635)	0.005 (0.127)	100	Max:	15,000			MVB4280X153M3 *5C1*				
					50	Max:	30,000			MVB4280X303M2 *5C1*	20,000			
					25	Max:	68,000			MVB4280X683M1 *5C1*				
					16	Max:	100,000			MVB4280X104MG *5C3*	100,000	PDF	WEB	
5080	0.050 (1.270) ± 0.004 (0.102)	0.083 (2.108) ± 0.004 (0.102)	0.025 (0.635)	0.005 (0.127)	100	Max:	30,000			MVB5080X303M3 *5C1*	MVL5080X303M3 *5C-*			
					50	Max:	100,000			MVB5080X104M2 *5C1*	MVL5080X104M2 *5C-*	68,000 (VL) 47,000 (VB)		
					25	Max:	100,000			MVB5080X104M1 *5C1*	MVL5080X104M1 *5C-*	100,000 (VL)		
					16	Max:	180,000			MVB5080X184MG *5C1*	MVL5080X184MG *5C-*			
					12	Max:				NVB5080X104MF *5N3*		100,000		
					10	Max:	220,000			MVB5080X224ME *5C1*	MVL5080X224ME *5C-*			

* Insert codes for termination (Page 8) and design-in location (Page 14)



PRESIDIO COMPONENTS, INC.

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www.presidiocomponents.com • info@presidiocomponents.com

WIRE BONDABLE VERTICAL ELECTRODE CAPACITORS

SURFACE MOUNT BURIED BROADBAND CAPACITORS

For DC Blocking up to 100 GHz

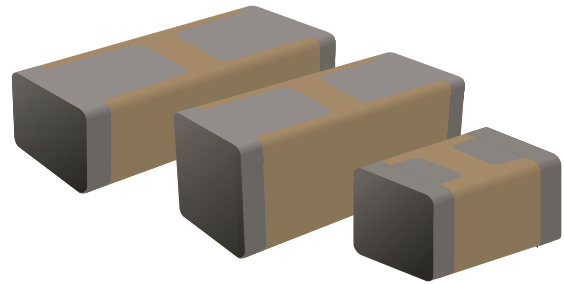
PRESIDIO ADVANTAGE

KEY FEATURES

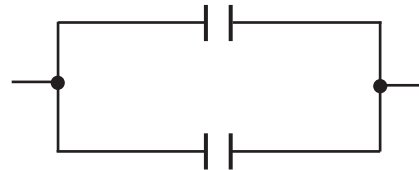
- ◆ -0.2 dB insertion loss at 10 GHz (OC192)
- ◆ Resonant free at critical 1.6 to 1.8 GHz
- ◆ $\pm 15\%$ capacitance change over temperature (X7R dielectric)
- ◆ Patented integration of high and low frequency capacitors
- ◆ Free equivalent circuit capacitor model for easy design
- ◆ Sizes 0805, 0603, 0502, 0402, 0302, and 0201
- ◆ Rugged monolithic body for easy pick and place

KEY APPLICATIONS

- ◆ Broadband DC Blocking Up to 100 GHz
- ◆ OC192, OC768 Transponders and Transceivers
- ◆ Broadband Microwave
- ◆ Broadband Test Equipment



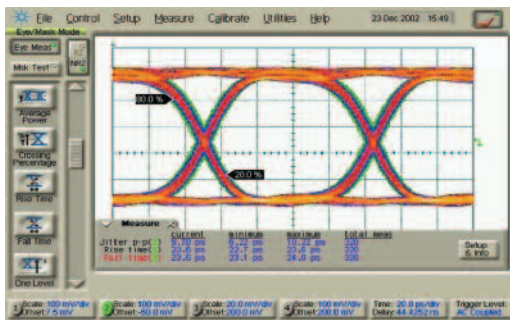
Single Layer Capacitor: GHz Range



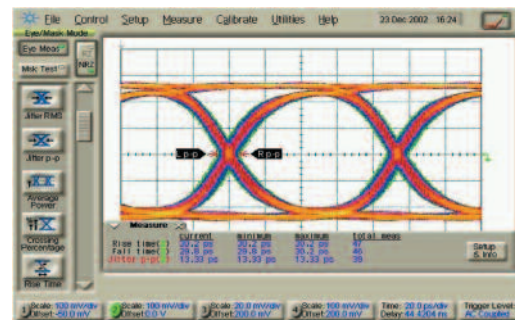
Multilayer Capacitor: kHz-MHz Range

EYE DIAGRAM COMPARISON

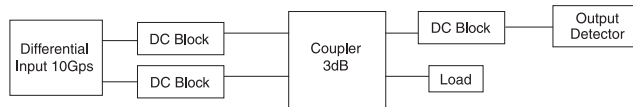
Presidio Components, Inc.
MBB0502X104MGP DC Block



Generic MLC
0402 X7R100nF DC Block

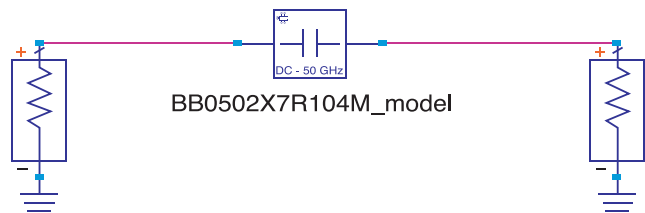
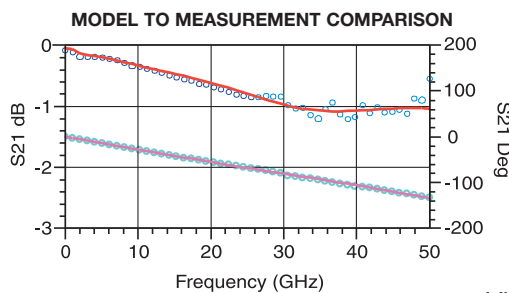


Test Setup



Courtesy of Phyworks

FREE MODEL DOWNLOAD



Modeling services by **Modelithics**

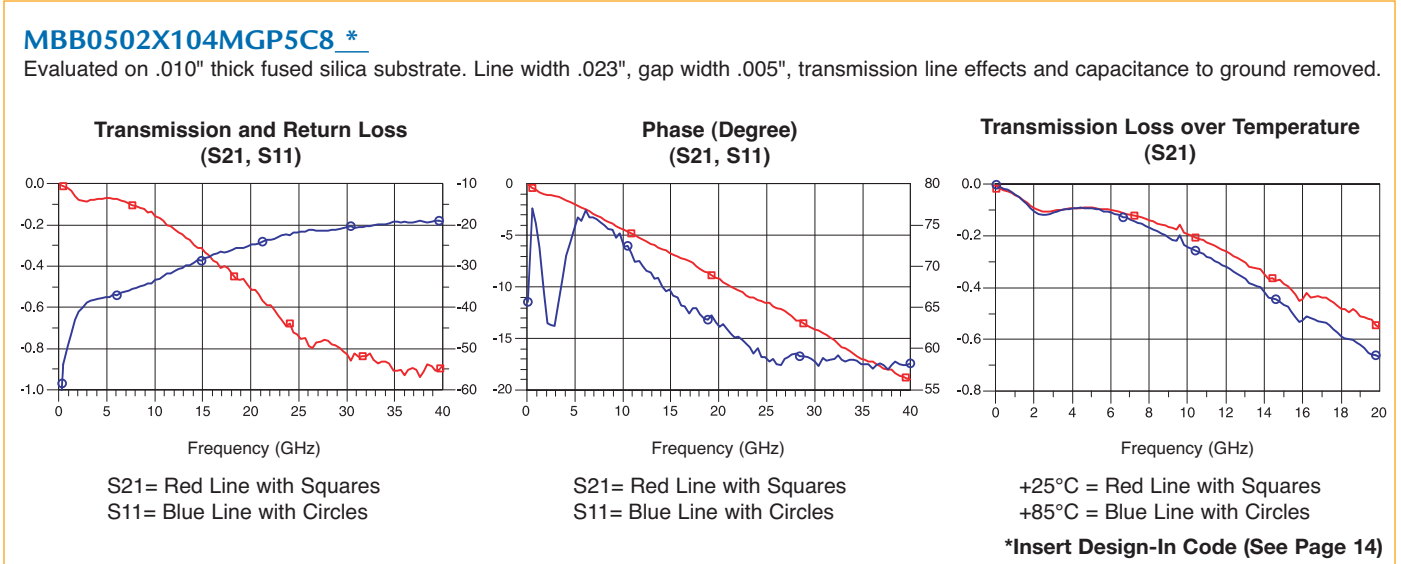
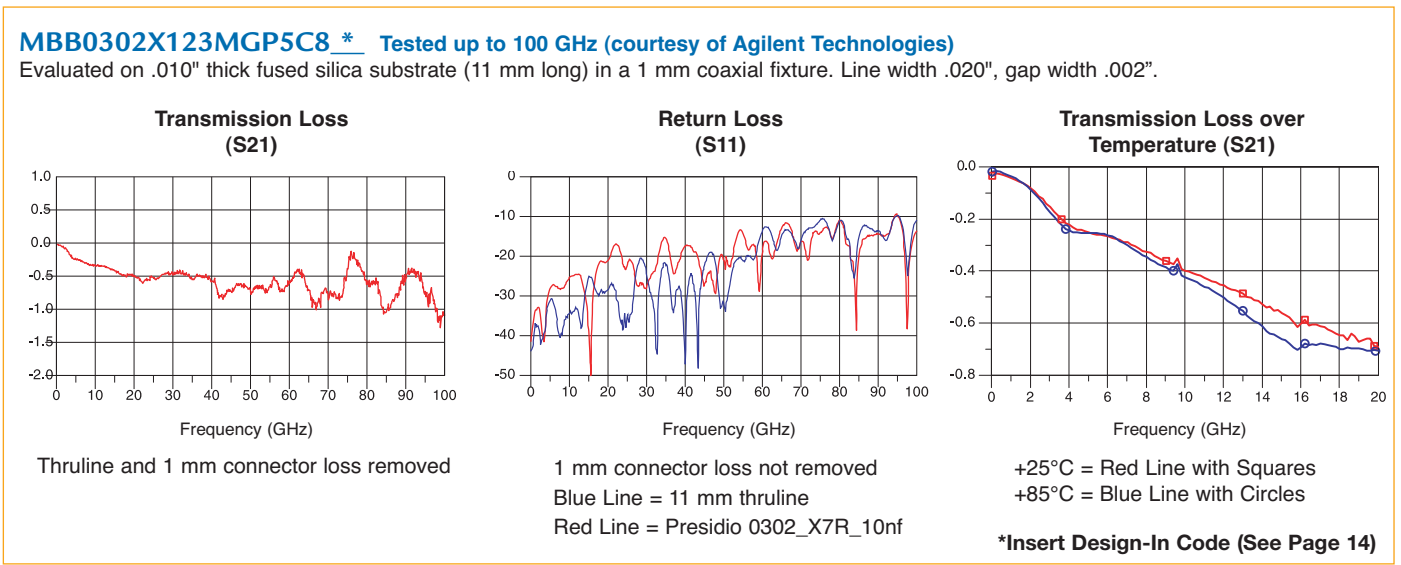
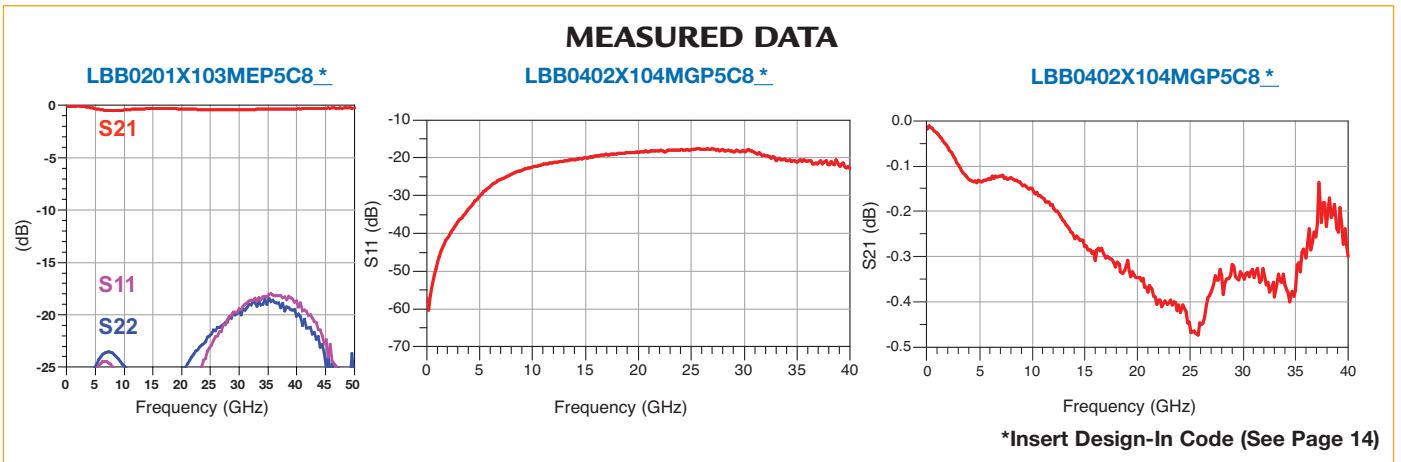
<http://www.presidiocomponents.com/BB/BB-models.html>

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SELECTED PERFORMANCE DATA

Disclaimer: The results are only valid as per described test set up. Other configurations will lead to different results.



GLOBAL PART NUMBER EXAMPLE (How to Order)

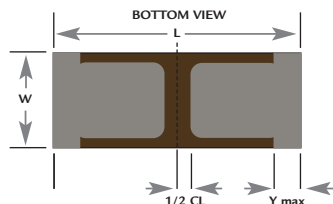
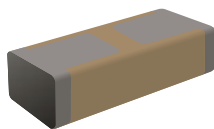
M	BB	0502	X	104	M	G	P	5	C	8	*
Test Code	Product Code	Size (Pg. 13)	Dielectric	Capacitance	Capacitance Tolerance	Voltage	Termination	Packaging	RoHS Compliant	Special Code 2nd Cap Value	Design-In Code (See Page 14)

Test Codes, Dielectric Codes and Specifications

					FIT*	FIT*	FIT*	Commercial Space	Similar -55681	Similar -123	Mil-PRF-38534 Rev. L Class H	Mil-PRF-38534 Rev. L Class K	Cust. Spec.	
					65° C	85° C	100° C	J	C	S	H	K	D	
					TEST CODES:			L	M	N				
					Upgradable to Codes:			H	H, C	H,C,S,K				
ELECTRICAL SPECIFICATIONS		NPO Dielectric Code N	X7R Dielectric Code X	Y5V Dielectric Code Y	Test Method MIL-STD-	Test Samples			Test Samples	Test Samples	Test Samples	Test Samples		
Temperature Coefficient Limit	0 ± 30 ppm/°C	± 20%	+22%, -82%	Presidio Specification										
Temperature Coefficient Limit Cycle	-55° to +125° C	-55° to +125° C	-30° to +85° C	Presidio Specification										
Capacitance	1 MHz, 1 V AC RMS	1 kHz, 1 V AC RMS	1 kHz, 1 V AC RMS	202 Method 305	100%	100%	100%	100%	100%	100%	10	100%		
Dissipation Factor, maximum	0.15% max.	16V or below: 7.5% max. Above 16V: 5% max.	19% max.	Presidio Specification	100%	100%	100%	100%	100%	100%	10	100%		
Dielectric Withstanding Voltage (DWV)	250% of WVDC	250% of WVDC	250% of WVDC	202 Method 301	1% AQL	1% AQL	1% AQL	100%	100%	100%	10	100%		
Insulation Resistance @ +25° C at WVDC	100,000 MΩ min.	1000 MΩ - μF	50 MΩ - μF	202 Method 302	1% AQL	1% AQL	1% AQL	100%	100%	100%	10	100%		
Insulation Resistance @ +125° C at WVDC	10,000 MΩ min.	100 MΩ - μF	Not Applicable	202 Method 302					1% AQL	100%		100%		
Aging Effects	None	2.5% typ./decade hr.	5% typ./decade hr.	Presidio Specification										
VISUAL & MECHANICAL SPECIFICATIONS														
Visual Inspection, Workmanship				Presidio Specification	100%	100%	100%	100%	100%	100%	22	100%		
Solderability (solderable terminations only)				202 Method 208	13	13	13				13	13	5	10
Element Electrical				Measure & Record							10	25/80/125		
Prohibited Material Inspection				MIL-STD-1580									5	
Acoustic Imaging													100%	
Physical Dimensions	See Page 13	See Page 13	See Page 13	Presidio Specification							20	20		
ENVIRONMENTAL TESTS, LEVEL 1														
Voltage Conditioning	100 hours	100 hours	100 hours	202 Method 108							100%	N/A	N/A	
ENVIRONMENTAL TESTS, LEVEL II (SPACE)														
Thermal Shock & Voltage Conditioning	20 cycles/168 hr. min.	20 cycles/168 hr. min.	Not Applicable	202 Methods 107 & 108								100%	100%	
Destructive Physical Analysis Report			Not Applicable	EIA 469 Except §6.1.3								Included	Included	
Temperature Coefficient Limits, 0 Volt	± 30 ppm/°C	± 20%	Not Applicable	Presidio Specification								12		
Life Test	1000 hrs. each lot	1000 hrs. each lot	Not Applicable	202 Method 108								25 min.	25/80/125	
Humidity, Steady State, Low Voltage	240 hrs. min.	240 hrs. min.	Not Applicable	202 Method 103, A								12	12	
RoHS Compliant, Yes or No	Specify	Specify	Not Applicable											

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

Size



Capacitance Codes for Multilayer Capacitor

First Two Digits = Significant figures of capacitance in picofarads
Third Digit = Additional number of zeros
Example: 0R1 = 0.1 pF 102 = 1,000 pF
 1R0 = 1.0 pF 104 = 100,000 pF
 100 = 10 pF

Standard Capacitance Tolerance

Code	Tolerance
M	± 20%
Z	-20%, +80% for all Y5V Dielectric

Termination Codes

Code	RoHS Comp.	Typical Application	Termination Build up	Recommended Reflow Temp.
T	Yes	Solder Reflow	Palladium-Silver Nickel Barrier Plated 100% Tin	220°C to 260°C typical*
N	No	Solder Reflow	Palladium-Silver Nickel Barrier Plated 90/10 Tin Lead	220°C to 260°C typical*
P	Yes	Conductive Epoxy	Palladium-Silver Non-Magnetic	Cure Epoxy as per manufacturer's specification.
H	Yes	Conductive Epoxy Gold Wirebonding	Gold (Thick Film) Non-Magnetic	Cure Epoxy as per manufacturer's specification.

Other Terminations available. Please contact factory.

Working Voltage (See Page 13)

Code	WVDC	Code	WVDC
3	100	G	16
L	75	F	12
2	50	E	10
1	25	C	6.3
H	20	B	5

Packaging Codes

1 = Tape and Reel
 5 = Waffle Pack

RoHS

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

Special Codes for Second Cap Value

Code	Nominal Capacitance
8	82 pF
2	220 pF
4	1 pF



PRESIDIO COMPONENTS, INC.

SELECTION TABLE: BURIED BROADBAND CAPACITORS – SURFACE MOUNT

Size Code	CERAMIC BODY DIMENSIONS			Y Max. inch (mm)	1/2 CL inch (mm)	Working Voltage (WVDC) MAX.	INDUSTRIAL Test Code L	INDUSTRIAL & MILITARY Test Code M				SPACE TEST CODES EM: Code N FM: Code J, S, or K	Performance Curves	Web Link			
	W inch (mm)	L inch (mm)	T Max. inch (mm)					X7R (pF)	NPO (pF)	X7R (pF)	Y5V (pF)				Part Numbers	X7R (pF)	
0201	0.012 (0.305) ± 0.002 (0.051)	0.025 (0.635) ± 0.004 (0.102)	0.018 (0.457)	0.008 (0.203)	0.0015 (0.038) ± 0.0005 (0.013)	10	10,000+82					LBB0201X103ME ** C8 *		PDE	WEB		
						5						SBB0201X103MBN * N8*	10,000+82				
0302	0.020 (0.508) ± 0.002 (0.051)	0.031 (0.787) ± 0.004 (0.102)	0.020 (0.508)	0.008 (0.203)	0.00425 (0.108) ± 0.0015 (0.038)	50			3,900+82				MBB0302X392M2 ** C8 *				
						20	12,000+82					LBB0302X123MH ** C8 *					
						16			10,000+82			MBB0302X103MG ** C8 *					
						16			12,000+82			MBB0302X123MG ** C8 *		PDE	WEB		
0402	0.023 (0.584) ± 0.003 (0.076)	0.045 (1.143) ± 0.004 (0.102)	0.032 (0.813)	0.008 (0.203)	0.0025 (0.064) ± 0.0010 (0.025)	75	20,000+82						LBB0402X203ML ** C8 *				
						16	100,000+82					LBB0402X104MG ** C8 *		PDE	WEB		
						16			100,000+82			MBB0402X104MG ** N8 *					
						16						SBB0402X103MG ** N8 *	10,000+82				
						6.3						SBB0402X104MCN * N8 *	100,000+82				
0502	0.024 (0.610) ± 0.004 (0.102)	0.052 (1.321) ± 0.006 (0.152)	0.038 (0.965)	0.010 (0.254)	0.0050 (0.127) ± 0.0030 (0.076)	100			8,200+82				MBB0502X822M3 ** C8 *				
						75			10,000+82					MBB0502X103ML ** C8 *			
						50			27,000+82					MBB0502X273M2 ** C8 *			
						20	68,000+82							LBB0502X683MH ** C8 *			
						20	100,000+82							LBB0502X104MH ** C8 *			
						16			12,000+82					MBB0502X123MG ** C8 *		PDE	
						16			68,000+82					MBB0502X683MG ** C8 *			
						16			100,000+82					MBB0502X104MG ** C8 *		PDE	WEB
						16			820+1					MBB0502N821MG ** C4 *		PDE	
						12						220,000+82			MBB0502Y224ZG ** C8 *		
0603	0.032 (0.813) ± 0.006 (0.152)	0.070 (1.78) ± 0.006 (0.152)	0.038 (0.965)	0.015 (0.381)	0.006 (0.152) ± 0.004 (0.102)	50			4,000+220				MBB0603X402M2 ** C2 *				
						16			150,000+220				MBB0603X154MG ** C2 *		PDE	WEB	
0805	0.050 (1.27) ± 0.010 (0.254)	0.080 (2.032) ± 0.010 (0.254)	0.038 (0.965)	0.020 (0.508)	0.006 (0.152) ± 0.004 (0.102)	75			56,000+220				MBB0805X563ML ** C2 *				
						16			150,000+220				MBB0805X154MG ** C2 *				
0805	0.050 (1.27) ± 0.010 (0.254)	0.080 (2.032) ± 0.010 (0.254)	0.038 (0.965)	0.020 (0.508)	0.004 (0.102) ± 0.004 (0.102)	50			4,000+220				MBB0805X402M2 ** C2 *				

* Insert codes for termination and packaging (Page 12), and design-in location (Page 14)

RECOMMENDED MOUNTING METHODS

PC Board Observations

- Soft boards are typically used at microwave frequencies. For lowest reflection loss fused silica substrates are recommended at millimeterwave frequencies.
- Microstrip line width should match or come close to capacitor width to optimize capacitor performance. Fanning out the microstrip line to match the capacitor width may degrade capacitor loss at millimeterwave frequencies.

Microstrip Line Gap

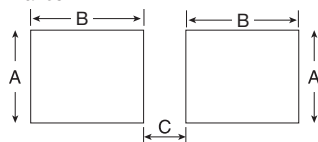
- Option 1: 0.015" to 0.010" (.381 mm to .254 mm) microstrip line gap for broadband performance at frequencies to 40 GHz.
- Option 2: 0.005" to 0.002" (0.127 mm to 0.051 mm) microstrip line gap for applications above 40 GHz.

Mounting Pad Dimensions (general recommendation*)

Case Size	INCHES			MILLIMETERS		
	A min	B min	C min*	A min	B min	C min*
0201						
0302	0.020	0.015	0.003	0.508	0.381	0.076
0402						
0502	0.023	0.025	0.010	0.584	0.635	0.254
0603	0.035	0.035	0.015	0.889	0.889	0.381
0805	0.060	0.040	0.020	1.524	1.016	0.508

Centerline of the capacitor should be located in the center of the gap in the microstrip line. Consult factory for application specific recommendations.

*Disclaimer: Gap dimension, substrate material and microstrip line width impact circuit performance.



Recommended Attachment to Substrate

- Solder Attach (wave reflow, vapor phase or convection tunnel oven).

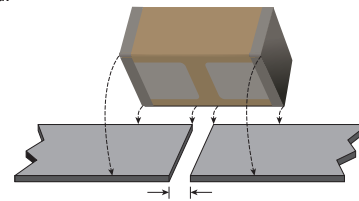
Typical temperature ramp guidelines for solder attachment:

Reflow: Preheating — 2°C/second up to 100 seconds
Soldering — 220°C to 260°C for 20 to 60 seconds

Gradual Cooling: Exit less than 100°C

- Conductive Epoxy

It is recommended that both mounting pads be bonded simultaneously and that the pre-heat, soldering or curing, and post-heat temperatures be controlled.



A WORD TO DESIGN ENGINEERS

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.

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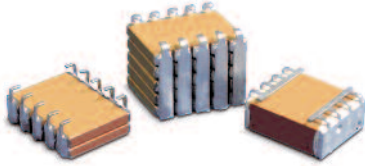
OUTSIDE THE UNITED STATES

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	Z
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						



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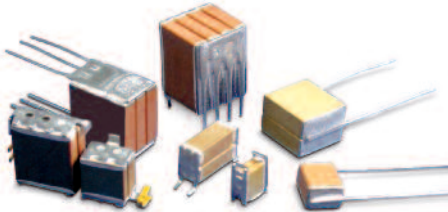


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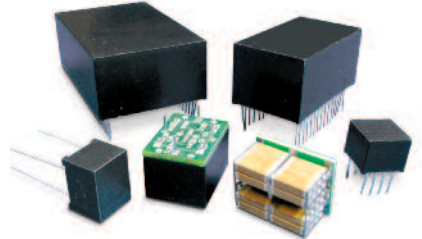


'S' LEAD STACKS



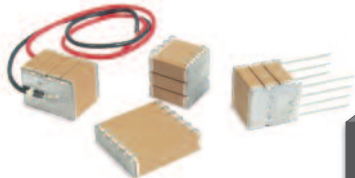
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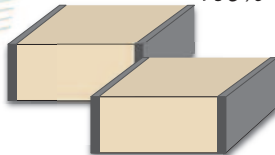
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Backed with numerous patents and hundred of years of combined experience, Presidio is well suited to offer a solution to your demanding applications. Please contact our engineering team to discuss your specific needs.

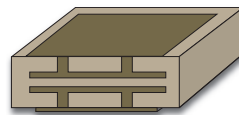


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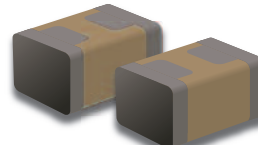
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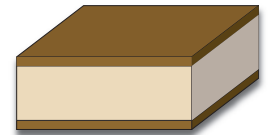
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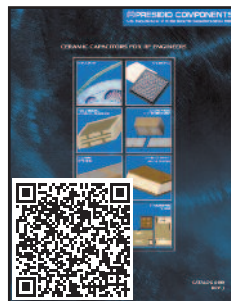
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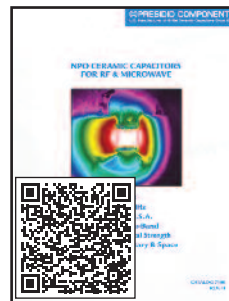
HIGH TEMPERATURE CERAMIC CAPACITORS



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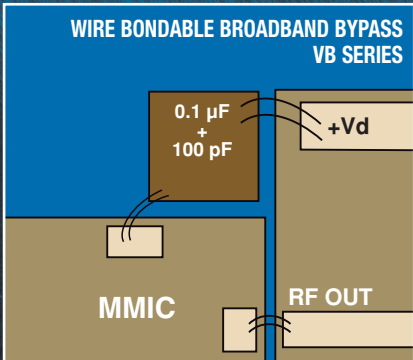
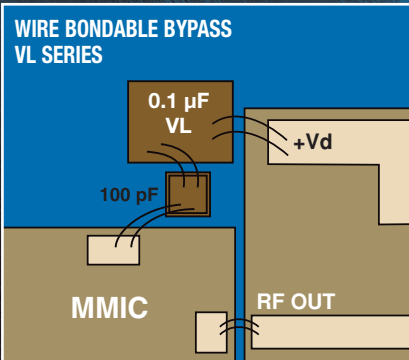
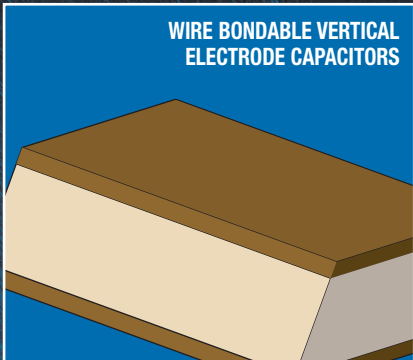
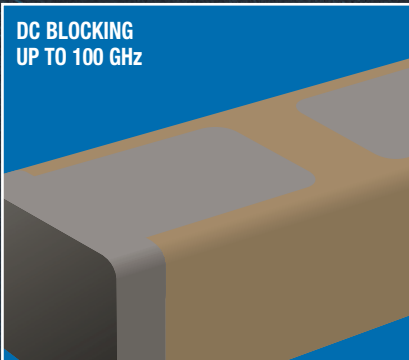
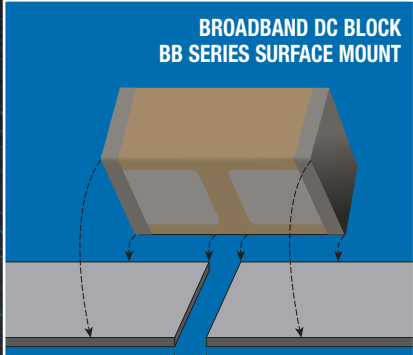
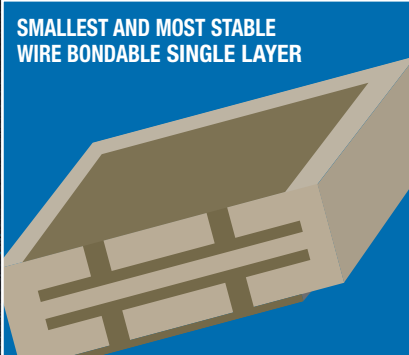
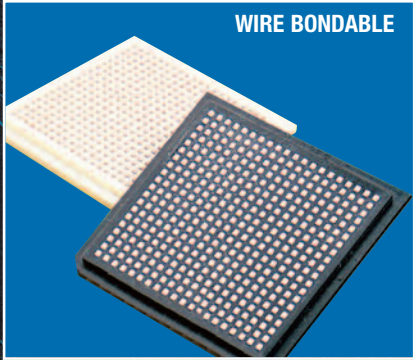
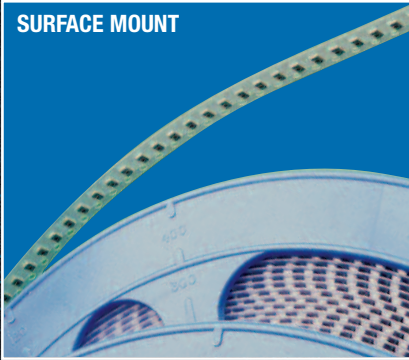


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