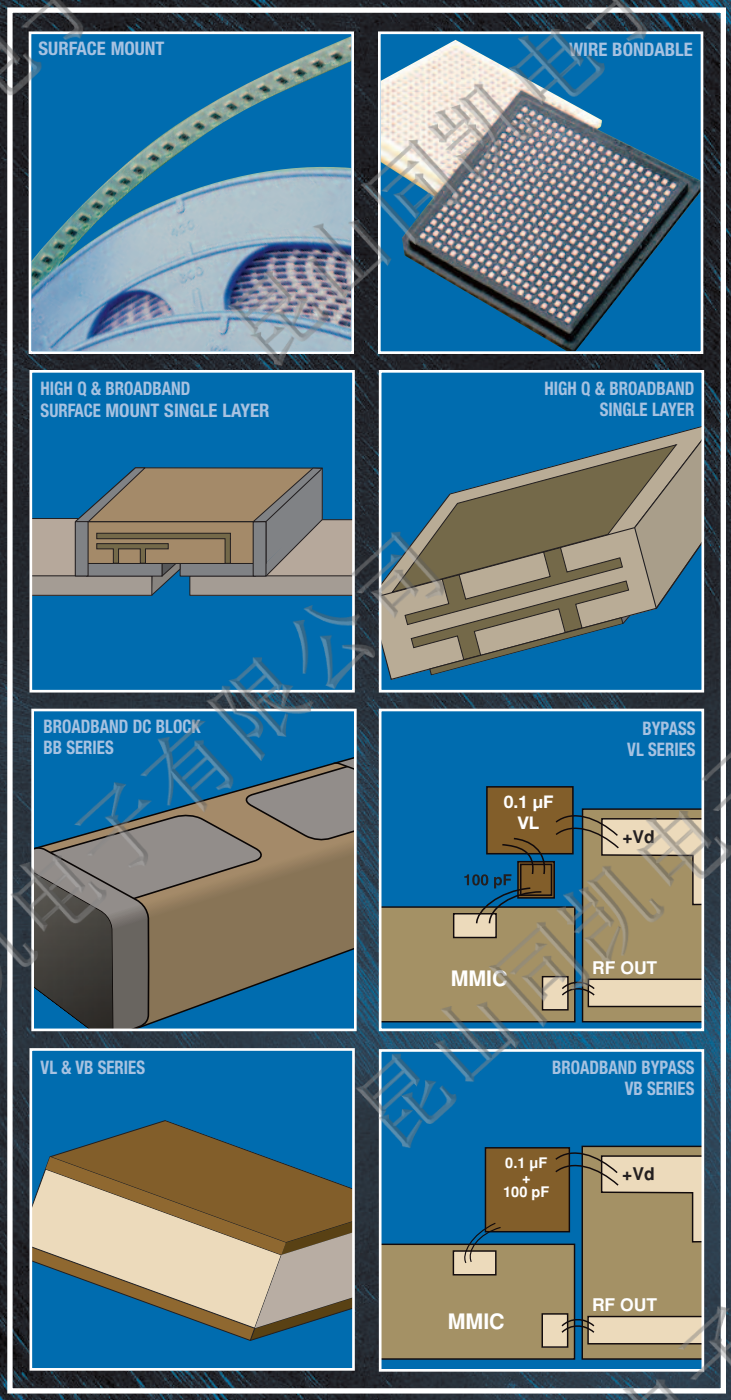
PRESIDIO COMPONENTS, INC.

CERAMIC CAPACITORS FOR RF ENGINEERS



Catalog 6100
Rev. F

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, 55,000 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 DSCC 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.

Presidio Components, Inc.
San Diego, California

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.

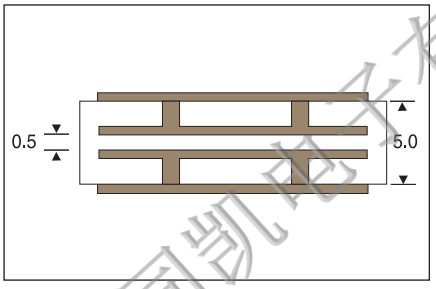


Fig. 1. Construction of Buried Electrodes

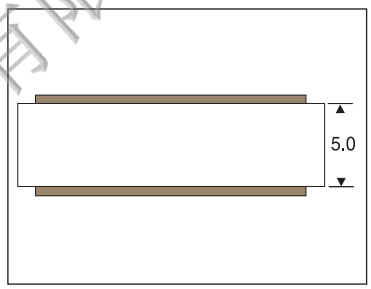


Fig. 2. Conventional Single Layer Capacitor

- 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.

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."

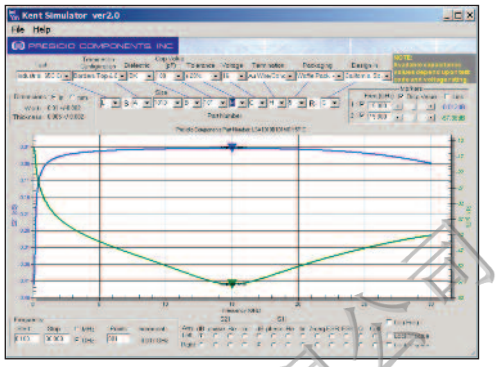


Fig. 3. Kent Simulator Version 2.0
LSA1010B101MGH5C–

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.

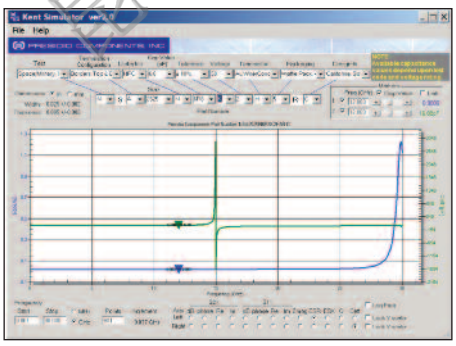


Fig. 4. Modeled ESR/50 and Ceff of part
NSA2525N6R8K2H5C–

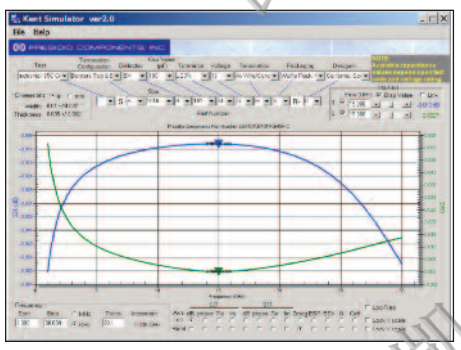


Fig. 5. Modeled S21 and Z/50 of part
LSA1010B101MGH5C–, Class II Dielectric

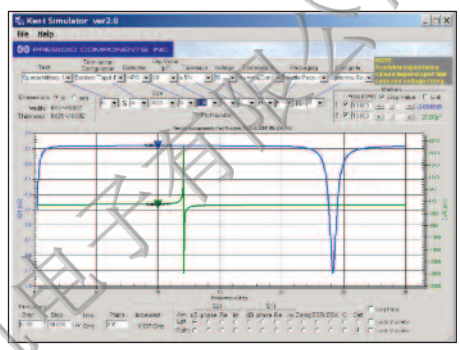


Fig. 6. Modeled S21 and Ceff of part
NSA3030N100J2H5C–, Class 1 Dielectric

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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 Back Page)

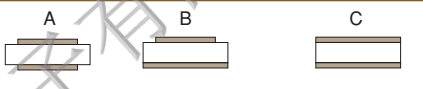
Test Codes, Dielectric Codes and Specifications

				FIT* 65° C	FIT* 85° C	FIT* 100° C	Mil-PRF-38534E Table C-III		MIL-PRF-49464 Tabl VI	MIL-PRF-49464 Table VII	Cust. Spec.
			TEST CODES:	L	M	N	H	K	A	B	D
			Upgradable to Codes:	H	H, K	H, K, A, B					
ELECTRICAL SPECIFICATIONS	**NPO Dielectric Code Q**	**NPO Dielectric Code N**	**BX Dielectric Code B**	**Tested as per MIL-PRF-49464C**	**Test Samples**			**Test Samples**		**Test Samples**	
Temperature Coefficient Limits	0 ± 25 ppm/ °C	0 ± 30 ppm/ °C	± 15%	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%	100%	
Dissipation Factor, maximum	0.1%	0.15%	100 & 50V : 2.5%	Para. 4.8.5	100%	100%	100%	100%	100%	100%	100%	
Dissipation Factor, maximum	0.1%	0.15%	16 & 25V : 3.5%	Para. 4.8.5	100%	100%	100%	100%	100%	100%	100%	
Dissipation Factor, maximum	0.1%	0.15%	10V : 5%	Para. 4.8.5	100%	100%	N/A	100%	100%	N/A	N/A	
Dissipation Factor, maximum	0.1%	0.15%	6.3V : 7.5%	Para. 4.8.5	100%	N/A	N/A	100%	N/A	N/A	N/A	
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%	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%	
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%	100%	
Aging Effects	None	None	2.5% typ./decade hr.	Presidio Specification								
VISUAL & MECHANICAL SPECIFICATIONS												
Visual, Workmanship	No slivers, cracks, demetalization	No slivers, cracks, demetalization	No slivers, cracks, demetalization	Para. 4.8.1	100%	100%	100%	100%	100%	100%	100%	
Bond Strength, minimum	3 grams, 0.001" dia. Au wire	3 grams, 0.001" dia. Au wire	3 grams, 0.001" dia. Au wire	Para. 4.8.8				10	10	13	13	
Shear Strength, minimum	Size dependent	Size dependent	Size dependent	Para. 4.8.9						13	13	
Physical Dimensions	See Page 5	See Page 5	See Page 5	Para. 4.8.1						13	13	
99.95% 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 K, A, B)												
Thermal Shock & Voltage Conditioning	5 cycles/100 hr min.	5 cycles/100 hr min.	5 cycles/100 hr min.	Para. 4.8.3					10	100%	100%	
Constant Acceleration				PRF-38534E					10			
Temperature Coefficient Limits, 0 Volt	0 ± 25 ppm/ °C	0 ± 30 ppm/ °C	± 15%	Para. 4.8.10						12	12	
Immersion	0.5% or 0.5 pF cap. change	0.5% or 0.5 pF cap. change	± 10% cap. change	Para. 4.8.11							12	
Humidity, Steady State, Low Voltage	240 hours min.	240 hours min.	240 hours min.	Para. 4.8.12							12	
Life Test	2000 hours	2000 hours	2000 hours	Para. 4.8.13							25	
RoHS Compliant	Yes	Yes	Yes									

*FIT (Failure In Time) Calculations are based on assumed CONTINUOUS operating temperatures 65° C, 85° C and 100° C

Termination Configuration Codes

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



Standard | High Reliability AuSn | Millimeterwave

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	WVCD
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 100 µin min. thickness	Au	Conductive Epoxy or AuSn

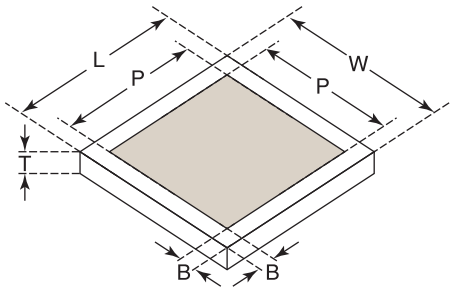
Packaging Codes

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

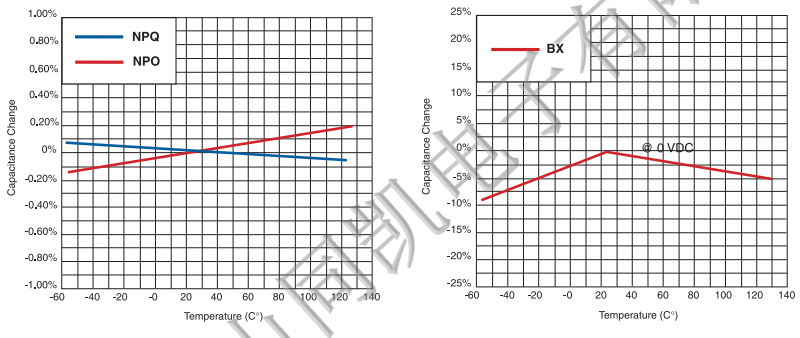
RoHS

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

Dimensions Diagram



Temperature Coeficient 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 (pF)	INDUSTRIAL Test Code L NPO (pF)	INDUSTRIAL Test Code L NPO (pF)	INDUSTRIAL Test Code L BX (pF)	MILITARY Test Code M NPO (pF)	MILITARY Test Code M NPO (pF)	MILITARY Test Code M BX (pF)	SPACE Test Code N NPO (pF)	SPACE Test Code N NPO (pF)	SPACE Test Code N BX (pF)	Modeled Performance Data & S2P Files
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)	50	Min:	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)	50	Min:	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)	100	Min:	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)	100	Min:	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)	100	Min:	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	300	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	—	—	—	
						6.3	Max:	—	—	1,200	—	—	—	—	—	—	
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)	100	Min:	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)	100	Min:	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)	100	Min:	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)	100	Min:	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) ± 0.002 (0.051)	0.031 (0.787)	0.001 (0.025)	100	Min:	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	820	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

Web Link

RECOMMENDED CAPACITANCE VALUES FOR NEW DESIGNS

± 5% Tolerance E24 Series	± 10% Tolerance E12 Series	± 20% Tolerance E6 Series
10	10	10
11		
12	12	
13		
15	15	15
16		
18	18	
20		
22	22	22
24		
27	27	
30		
33	33	33
36		
39	39	
43		
47	47	47
51		
56	56	
62		
68	68	68
75		
82	82	
91		

DESIGN NOTES

WIRE BONDABLE VERTICAL ELECTRODE CAPACITORS

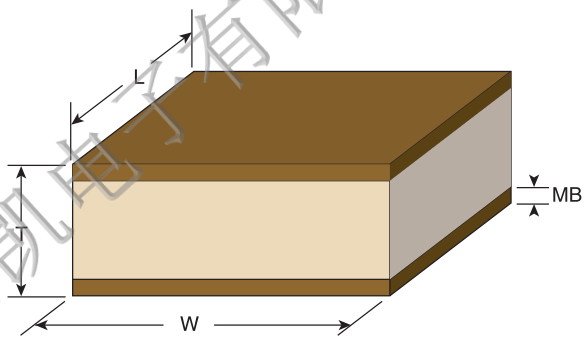
PRESIDIO ADVANTAGE

VL SERIES

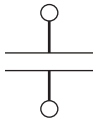
- Wire Bondable Bypass Capacitors for MMIC's

VB SERIES

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



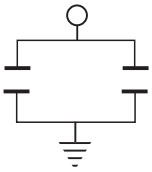
VL:



Multi-Layer
High
Capacitance

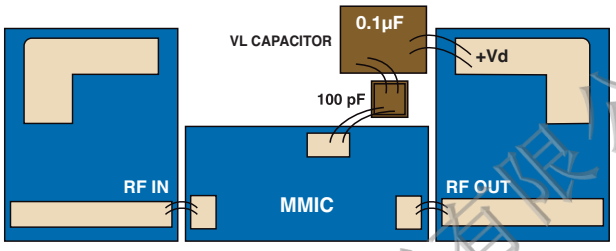
VB:

Single Layer
Low
Capacitance



Multi-Layer
High
Capacitance

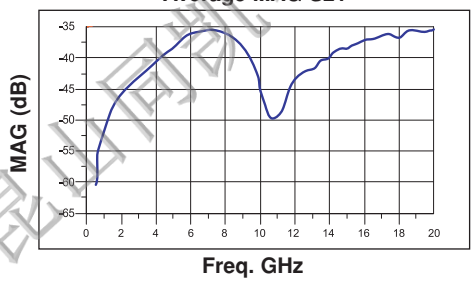
VL SERIES



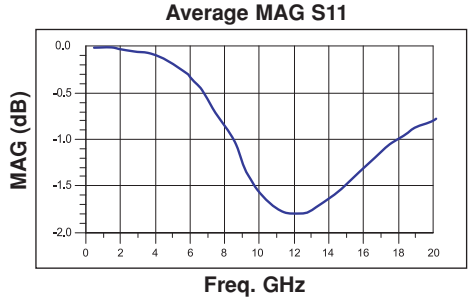
MVL4080X104MGH5C–_* (Bond Wires Included)

Data in Shunt

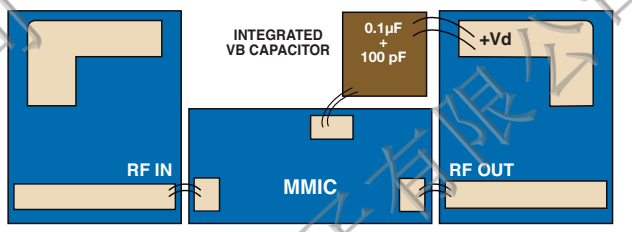
Average MAG S21



Average MAG S11



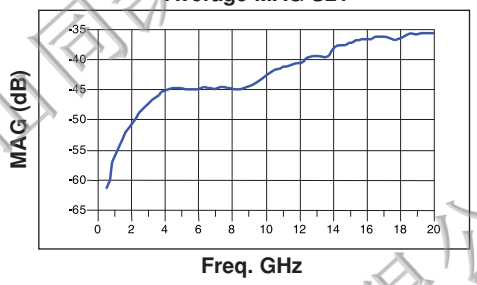
VB SERIES



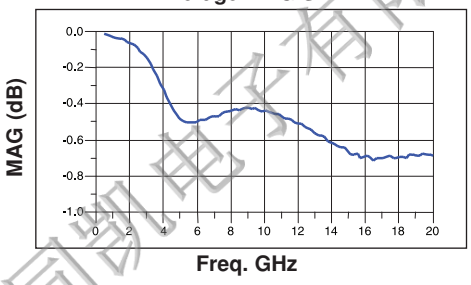
MVB4080X104ZGH5C3_* (Bond Wires Included)

Data in Shunt

Average MAG S21



Average MAG S11



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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 Back Page)

Test Codes, Dielectric Codes and Specifications

				FIT* 85° C	FIT* 100° C	Mil-PRF-38534E Table C-III		-55681 Similar	-123 Similar	Cust. Spec.
			TEST CODES:	M	N	H	K	C	S	D
			Upgradable to Codes:	H, K, C	H, K, C, S					
ELECTRICAL SPECIFICATIONS	**X7R Dielectric Code X**	**Y5V Dielectric Code Y**	**Testing Method**	**Test Samples**		**Test Samples**		**Test Samples**	**Test Samples**	
Temperature Coefficient Limits	± 15%	+ 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%	100%	
Dissipation Factor, maximum	5% max.	19% max.	Presidio Specification	100%	100%	100%	100%	100%	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%	100%	
Insulation Resistance @ +125° C at WVDC	100 MΩ - µF	Not Applicable	MIL-STD-202 Meth. 302					1% AQL	100%	
Dielectric Withstanding Voltage (DWV)	250% of WVDC	250% of WVDC	MIL-STD-202 Meth. 301	1% AQL	1% AQL	100%	100%	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%	100%	
Bond Strength, minimum	3 grams, 0.001" dia. Au wire	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	
Metalization, minimum	100 µin (2.5 µm)	100 µin (2.5 µm)	Presidio Specification							
ENVIRONMENTAL TESTS, LEVEL I (TEST CODES K AND C)										
Voltage Conditioning	100 Hours	100 Hours	MIL-STD-202 Meth. 108, A				10	100%		
Constant Acceleration	3,000g's, Y1 Direction	3,000g's, Y1 Direction	STD-883 Method 2001				10			
ENVIRONMENTAL TESTS, LEVEL II (TEST CODE S)										
Thermal Shock & Voltage Conditioning	20 cycles/168 hr. min.	Not Applicable	MIL-STD-202 Meth. 107						100%	
Destructive Physical Analysis Report		Not Applicable	EIA-469 +MIL-PRF-123						Included	
Temperature Coeff. of Capacitance, 0 Volt	± 15%	Not Applicable	Presidio Specification						12	
Life Test	1000 Hours Each Lot	Not Applicable	MIL-STD-202 Meth. 108						25 min.	
Humidity, Steady State, Low Voltage	240 hours min.	Not Applicable	MIL-STD-202 Meth. 103, A						12	
RoHS Compliant, Yes or No	Specify	Not Applicable								

*FIT (Failure In Time) 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

Capacitance Tolerance

Code	Tol.
M	± 20%
Z	-20%, +80%

Packaging

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

Working Voltage (See Page 9)

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

RoHS

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

Termination

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

100 Microinches minimum thickness on both sides

Special Code

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

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SELECTION TABLE: VERTICAL ELECTRODE CAPACITORS — WIRE BONDABLE

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 Code N	VB SERIES PART NUMBER	VL SERIES PART NUMBER	Performance Curves	S2P Files "VB"
							X7R (pF)	Y5V (pF)	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				MVL2020X391M3H5C–*		
					50	Max:	1,000				MVL2020X102M2H5C–*		
					25	Max:	2,700				MVL2020X272M1H5C–*		
					16	Max:	5,100				MVL2020X512MGH5C–*		
					10	Max:	10,000				MVL2020X103MEH5C–*		
					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*	MVL2040X102M3H5C–*		
					50	Max:	2,200			MVB2040X222M2 *5C1*	MVL2040X222M2H5C–*		
					25	Max:	5,100			MVB2040X512M1 *5C1*	MVL2040X512M1H5C–*		
					16	Max:	10,000			MVB2040X103MG *5C1*	MVL2040X103MGH5C–*		
					10	Max:	22,000			MVB2040X223ME *5C1*	MVL2040X223MEH5C–*		
2741	0.027 (0.686) ± 0.004 (0.102)	0.041 (1.041) ± 0.004 (0.102)	.033 (0.838)	0.005 (0.127)	16	Max.	100,000			MVB2741X104MG *5C1*	MVL2741X104MGH5C–*		
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*	MVL3030X472M3H5C–*		
					50	Max:	10,000			MVB3030X103M2 *5C1*	MVL3030X103M2H5C–*		
					50	Max:			6,800		NVL3030X682M2H5N–*		
					25	Max:	15,000			MVB3030X153M1 *5C1*	MVL3030X153M1H5C–*		
					16	Max:	22,000			MVB3030X223MG *5C1*	MVL3030X223MGH5C–*		
					16	Nominal	10,000			MVB3030X103MG *5C1*	MVL3030X103MGH5C–*	PDF	WEB
					16	Max:		100,000			MVL3030Y104ZGH5C–*		
					10	Max:	43,000			MVB3030X433ME *5C1*	MVL3030X433MEH5C–*		
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*	MVL3060X822M3H5C- *		
					50	Max:	20,000			MVB3060X203M2 *5C1*	MVL3060X203M2H5C- *		
					25	Max:	30,000			MVB3060X303M1 *5C1*	MVL3060X303M1H5C- *		
					16	Max:	47,000			MVB3060X473MG *5C1*	MVL3060X473MGH5C- *		
					10	Max:	100,000			MVB3060X104ME *5C1*	MVL3060X104MEH5C- *		
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*	MVL4040X822M3H5C- *		
					50	Max:	20,000			MVB4040X203M2 *5C1*	MVL4040X203M2H5C- *		
					25	Max:	30,000			MVB4040X303M1 *5C1*	MVL4040X303M1H5C- *		
					25	Max:			10,000	NVB4040X103M1 *5N1*	NVL4040X103M1H5N-*		
					16	Max:	47,000			MVB4040X473MG *5C1*	MVL4040X473MGH5C-*		
					10	Max:	100,000			MVB4040X104ME *5C1*	MVL4040X104MEH5C- *		
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				MVL3080X153M2H5C-*		
					16	Max:	100,000				MVL3080X104MGH5C -*		
4080	0.042 (1.067) ± 0.004 (0.102)	0.083 (2.108) ± 0.004 (0.102)	**VB** 0.017 (0.432) **VL** 0.025 (0.635)	0.005 (0.127)	100	Max:	15,000			MVB4080X153M3 *5C1*	MVL4080X153M3H5C- *		
					50	Max:	30,000			MVB4080X303M2 *5C1*	MVL4080X303M2H5C- *		
					25	Max:	68,000			MVB4080X683M1 *5C1*	MVL4080X683M1H5C- *		
					16	Max:	100,000			MVB4080X104MG *5C3*	MVL4080X104MGH5C- *	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*	MVL5080X303M3H5C- *		
					50	Max:	68,000			MVB5080X683M2 *5C1*	MVL5080X683M2H5C- *		
					25	Max:			100,000		NVL5080X104M1H5N-*		
					16	Max:	180,000			MVB5080X184MG *5C1*	MVL5080X184MGH5C- *		
					12	Max:			100,000	NVB5080X104MF *5N3*			
					10	Max:	220,000			MVB5080X224ME *5C1*	MVL5080X224MEH5C-*		

* Insert codes for termination (Page 8) and design-in location (Page 16)

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SURFACE MOUNT
BURIED SINGLE LAYER CAPACITORS

GLOBAL PART NUMBER EXAMPLE (How to Order)

L	Q	E	2040	N	120	K	1	T	5	C	–	*
Test Code	Product	Termination Configuration	Size (Pg. 11)	Dielectric	Capacitance Code	Capacitance Tolerance	Voltage	Termination	Packaging	RoHS Compliant	Hyphen Required	Design-In Code (See Back Page)

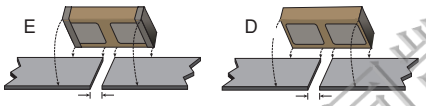
Test Codes, Dielectric Codes and Specifications

					FIT* 65° C	FIT* 85° C	Mil-PRF-38534E Table C-III		Cust. Spec.
TEST CODES:					L	M	H	K	D
Upgradable to Codes:					H	H, 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**		
Temperature Coefficient Limits	0 ± 25 ppm/ °C	0 ± 30 ppm/ °C	± 15%	Para. 4.8.10					
Operating Temperature Range	-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%	
Dissipation Factor, maximum	0.1%	0.15%	100 & 50V : 2.5%	Para. 4.8.5	100%	100%	100%	100%	
Dissipation Factor, maximum	0.1%	0.15%	16 & 25V : 3.5%	Para. 4.8.5	100%	100%	100%	100%	
Dissipation Factor, maximum	0.1%	0.15%	10V : 5%	Para. 4.8.5	100%	100%	100%	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	100%	100%	
Dielectric Withstanding Voltage (DWV)	250% of WVDC	250% of WVDC	250% of WVDC	Para. 4.8.7	1% AQL	1% AQL	100%	100%	
Aging Effects	None	None	2.5% typ./decade hr.	Presidio Specification					
VISUAL & MECHANICAL SPECIFICATIONS									
Visual, Workmanship	No slivers, cracks, demetalization	No slivers, cracks, demetalization	No slivers, cracks, demetalization	Presidio Specification	100%	100%	100%	100%	
Bond Strength, minimum	3 grams, 0.001" dia. Au wire	3 grams, 0.001" dia. Au wire	3 grams, 0.001" dia. Au wire	Para. 4.8.8			10	10	
Physical Dimensions	See Page 11	See Page 11	See Page 11	Presidio Specification					
99.95% 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									
Thermal Shock & Voltage Conditioning	5 cycles/100 hr min.	5 cycles/100 hr min.	5 cycles/100 hr min.	Para. 4.8.3				10	
Constant Acceleration				PRF-38534E, Class K				10	
RoHS Compliant	Yes	Yes	Yes						

*FIT (Failure In Time) Calculations are based on assumed CONTINUOUS operating temperatures 65° C, 85° C and 100° C

Termination Configuration

Code	Description	Attachment
E	Termed and Plated	Solder Attach
D	Bottom side only	Conductive Epoxy or AuSn



Capacitance Codes

First two digits = Significant figures of capacitance in picofarads

Third digit = Additional number of zeros

Example:
- 0R1 = 0.1 pF
- 1R0 = 1.0 pF
- 100 = 10 pF
- 101 = 100 pF

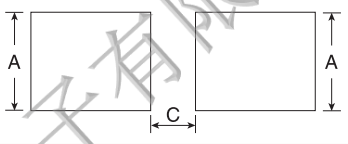
Capacitance Tolerance Codes

Code	Tolerance	Cap Range	Dielectrics
A	± .05 pF	< 2.2 pF	NPQ, NPO
D	± .5 pF	< 10 pF	NPQ, NPO
J	± 5%	> 2.0 pF	NPQ, NPO
K	± 10%	> 0.45 pF	all
M	± 20%	> 0.45 pF	all

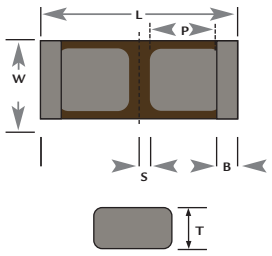
Recommended Mounting Pads

INCHES (mm)

Size	Min. A	Min.C
1020	0.010 (0.254)	0.003 (0.076)
1224	0.012 (0.305)	0.003 (0.076)
1530	0.015 (0.381)	0.005 (0.127)
1734	0.017 (0.432)	0.005 (0.127)
2040	0.020 (0.508)	0.005 (0.127)
2244	0.022 (0.559)	0.005 (0.127)
2550	0.025 (0.635)	0.005 (0.127)
2754	0.027 (0.686)	0.005 (0.127)
3060	0.030 (0.762)	0.005 (0.127)



Size (See Page 11)



Working Voltage (See Page 11)

Code	WVDC	Code	WVCD
3	100	G	16
2	50	E	10
1	25		

See standard available capacitance values and voltage ratings on page 11. Contact Presidio Components for higher and lower voltage ratings.

Termination

Code	Description	Configuration	RoHS Code*	RoHS Compliant
H	99.8% Au	D	C	Yes
N	90/10 Tin/Lead over Ni, Term.	E	N	No
T	100% Tin	E	C	Yes
P	Palladium Silver	E	C	Yes

* Code R, Legacy, ended 2012
Code C, Started Jan. 2013

Packaging Codes

Code	Description
5	Waffle Pack
1	Tape & Reel (Call Factory)

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SELECTION TABLE: BURIED SINGLE LAYER CAPACITORS — SURFACE MOUNT

SIZE CODE	W inch (mm)	L inch (mm)	T inch (mm)	Nominal P inch (mm)	Minimum B inch (mm)	Nominal S inch (mm)	Working Voltage (WVDC) Max.	Capacitance (pF)	INDUSTRIAL Test Code L NPQ (pF)	INDUSTRIAL Test Code L NPO (pF)	INDUSTRIAL Test Code L BX (pF)	MILITARY Test Code M NPQ (pF)	MILITARY Test Code M NPO (pF)	MILITARY Test Code M BX (pF)	Modeled Performance Data & S2P Files
1020	0.010 (0.254) ± 0.002 (0.051)	0.020 (0.508) ± 0.003 (0.076)	0.005 (0.127) ± 0.002 (0.051)	0.007 (0.178)	0.0005 (0.013)	0.0015 (0.038)	50	Min:	0.5	1.5	6.2	0.3	1.0	6.2	Contact Presidio for Performance Data
							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	
1224	0.012 (0.305) ± 0.002 (0.051)	0.024 (0.609) ± 0.003 (0.076)	0.006 (0.152) ± 0.002 (0.051)	0.009 (0.229)	0.0005 (0.013)	0.0015 (0.038)	50	Min:	0.8	2.4	10	0.5	1.5	10	
							50	Max:	1.0	3.3	100	0.8	2.4	75	
							25	Max:	1.2	3.9	120	0.9	2.7	91	
							16	Max:	1.5	4.3	150	1.0	3.3	100	
							10	Max:	2.0	6.2	180	1.2	3.9	120	
1530	0.015 (0.381) ± 0.002 (0.051)	0.030 (0.762) ± 0.002 (0.051)	0.007 (0.178) ± 0.002 (0.051)	0.011 (0.279)	0.001 (0.025)	0.0025 (0.064)	100	Min:	0.1	0.6	15	0.1	0.6	15	
							100	Max:	1.5	4.7	150	1.0	3.0	82	
							50	Max:	2.2	6.8	200	1.5	4.7	100	
							25	Max:	2.4	7.5	240	1.8	5.6	120	
							16	Max:	2.7	8.2	270	2.2	6.8	150	
							10	Max:	3.9	12	330	2.4	7.5	180	
1734	0.017 (0.432) ± 0.002 (0.051)	0.034 (0.864) ± 0.003 (0.076)	0.008 (0.203) ± 0.002 (0.051)	0.013 (0.330)	0.001 (0.025)	0.0025 (0.064)	100	Min:	0.2	0.7	18	0.2	0.7	18	
							100	Max:	1.8	5.6	180	1.2	3.9	100	
							50	Max:	2.7	8.2	270	1.8	5.6	150	
							25	Max:	3.0	10	300	2.2	6.8	180	
							16	Max:	3.6	12	360	2.7	8.2	220	
							10	Max:	5.1	15	430	3.0	10	240	
2040	0.020 (0.508) ± 0.002 (0.051)	0.040 (1.016) ± 0.003 (0.076)	0.010 (0.254) ± 0.002 (0.051)	0.016 (0.406)	0.001 (0.025)	0.0025 (0.064)	100	Min:	0.2	1.0	22	0.2	1.0	22	
							100	Max:	2.7	8.2	240	1.8	5.6	150	
							50	Max:	3.9	10	360	2.7	8.2	220	
							25	Max:	4.3	12	390	3.3	9.1	240	
							16	Max:	4.7	15	510	3.9	10	300	
							10	Max:	6.8	22	560	4.3	12	330	
2244	0.022 (0.559) ± 0.002 (0.051)	0.044 (1.118) ± 0.003 (0.076)	0.011 (0.279) ± 0.002 (0.051)	0.018 (0.457)	0.001 (0.025)	0.0025 (0.064)	100	Min:	0.2	1.2	24	0.2	1.2	24	
							100	Max:	3.0	9.1	270	2.0	5.6	200	
							50	Max:	4.3	12	390	3.0	9.1	270	
							25	Max:	4.7	15	430	3.6	10	330	
							16	Max:	5.1	18	620	4.3	12	390	
							10	Max:	7.5	24	750	4.7	15	470	
2550	0.025 (0.635) ± 0.002 (0.051)	0.050 (1.270) ± 0.003 (0.076)	0.012 (0.305) ± 0.002 (0.051)	0.021 (0.533)	0.001 (0.025)	0.0025 (0.064)	100	Min:	0.3	1.5	30	0.3	1.5	30	
							100	Max:	3.6	10	330	2.4	6.8	270	
							50	Max:	5.1	15	470	3.6	10	360	
							25	Max:	5.6	18	620	4.3	12	430	
							16	Max:	6.2	20	820	5.1	15	510	
							10	Max:	9.1	30	1,000	5.6	18	560	
2754	0.027 (0.686) ± 0.002 (0.051)	0.054 (1.372) ± 0.003 (0.076)	0.013 (0.330) ± 0.002 (0.051)	0.023 (0.584)	0.001 (0.025)	0.0025 (0.064)	100	Min:	0.3	1.5	33	0.3	1.5	33	
							100	Max:	3.9	12	360	2.4	7.5	330	
							50	Max:	5.6	18	560	3.9	12	430	
							25	Max:	6.2	20	750	4.7	15	510	
							16	Max:	6.8	22	1,000	5.6	18	620	
							10	Max:	10	33	1,200	6.2	20	680	
3060	0.030 (0.762) ± 0.002 (0.051)	0.060 (1.524) ± 0.003 (0.076)	0.015 (0.381) ± 0.002 (0.051)	0.026 (0.660)	0.001 (0.025)	0.0025 (0.064)	100	Min:	0.6	2.4	51	0.6	2.4	51	
							100	Max:	6.8	20	620	4.3	12	390	
							50	Max:	9.1	30	910	6.8	20	560	
							25	Max:	10	33	1,000	7.5	24	680	
							16	Max:	12	39	1,200	9.1	30	820	
							10	Max:	18	56	1,500	10	33	910	

SURFACE MOUNT
BURIED BROADBAND CAPACITORS

For DC Blocking up to 100 GHz

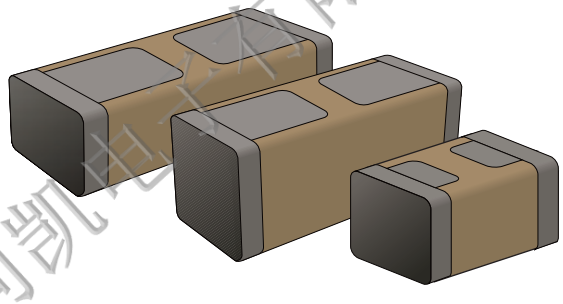
PRESIDIO ADVANTAGE

KEY FEATURES

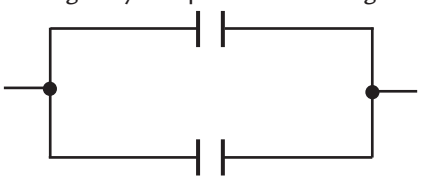
- -0.2 dB insertion loss at 10 GHz (OC192)
- Resonant free at critical 1.6 to 1.8 GHz
- ± 15% capacitance change over temperature (X7R dielectric)
- Patented integration of high and low frequency capacitors
- Free equivalent circuit capacitor model for easy design
- Sizes 0805, 0603, 0502, 0402, 0302,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



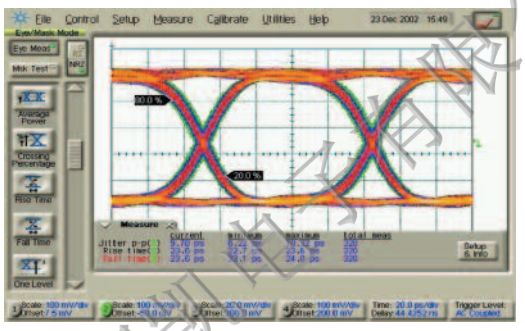
Single Layer Capacitor: GHz Range



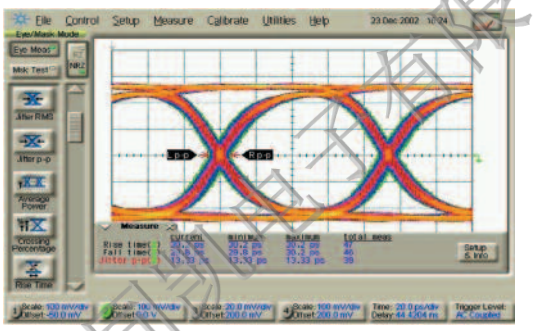
Multilayer Capacitor: kHz–MHz Range

EYE DIAGRAM COMPARISON

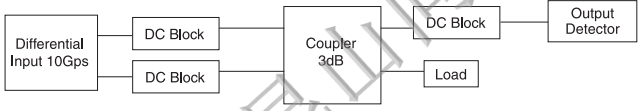
Presidio Components, Inc.
MBB0502X104MGP DC Block



Generic MLC
0402 X7R100nF DC Block



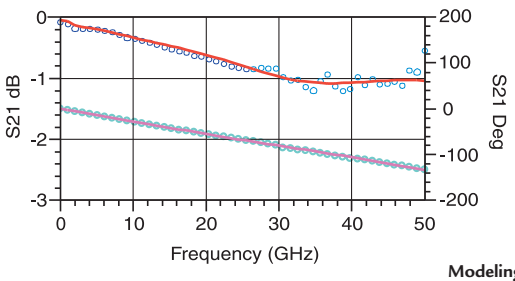
Test Setup

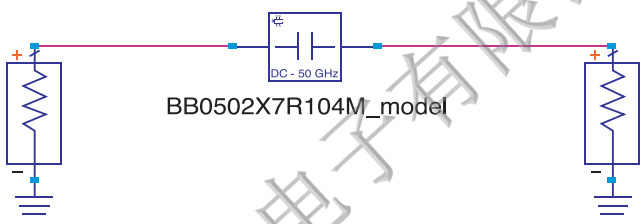


Courtesy of Phyworks

FREE MODEL DOWNLOAD

MODEL TO MEASUREMENT COMPARISON





Modeling services by Modelithics

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

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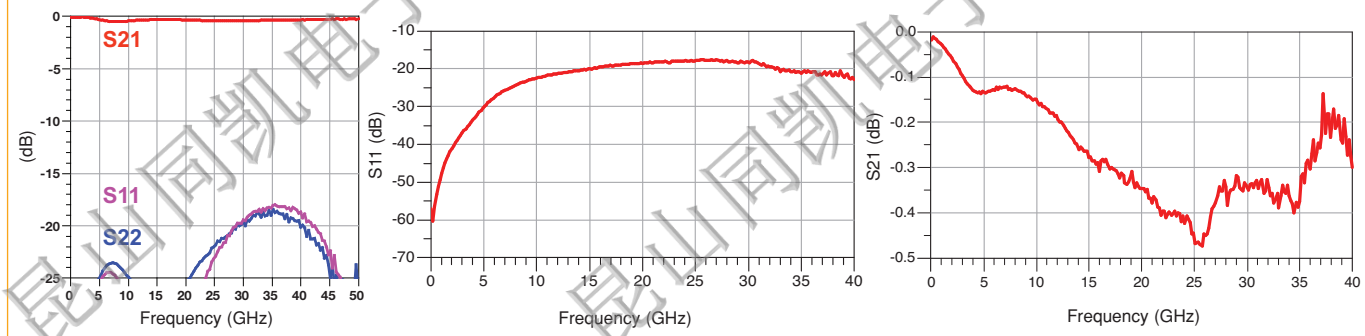
www.presidiocomponents.com • info@presidiocomponents.com

SELECTED PERFORMANCE DATA

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

MEASURED DATA

LBB0201X103MEP5C8_* | **LBB0402X104MGP5C8_*** | **LBB0402X104MGP5C8_***

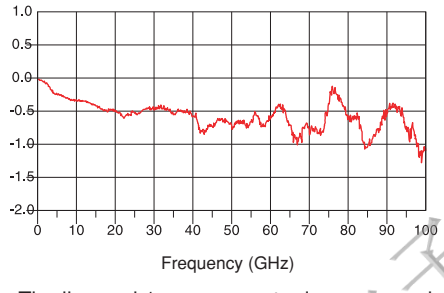


***Insert Design-In Code (See Page 16)**

MBB0302X123MGP5C8_* Tested up to 100 GHz (courtesy of Agilent Technologies)

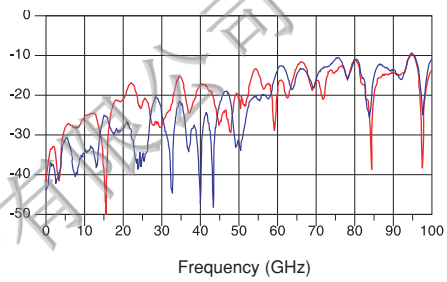
Evaluated on .010" thick fused silica substrate (11 mm long) in a 1 mm coaxial fixture. Line width .020", gap width .002".

Transmission Loss (S21)



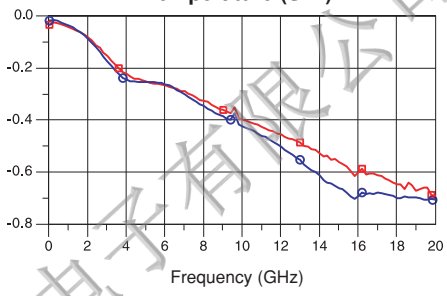
Thruline and 1 mm connector loss removed

Return Loss (S11)



1 mm connector loss not removed
Blue Line = 11 mm thruline
Red Line = Presidio 0302_X7R_10nf

Transmission Loss over Temperature (S21)



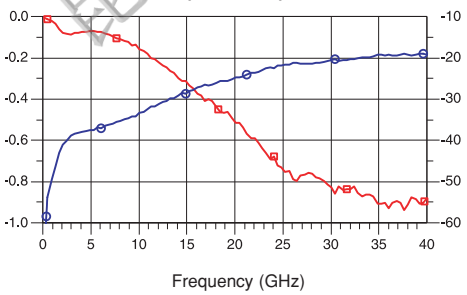
+25°C = Red Line with Squares
+85°C = Blue Line with Circles

***Insert Design-In Code (See Page 16)**

MBB0502X104MGP5C8_*

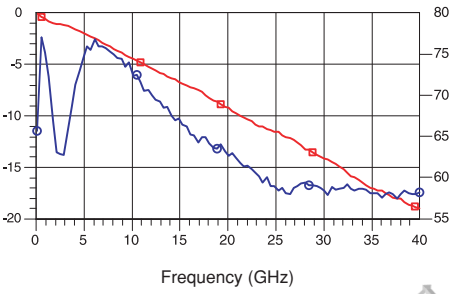
Evaluated on .010" thick fused silica substrate. Line width .023", gap width .005", transmission line effects and capacitance to ground removed.

Transmission and Return Loss (S21, S11)



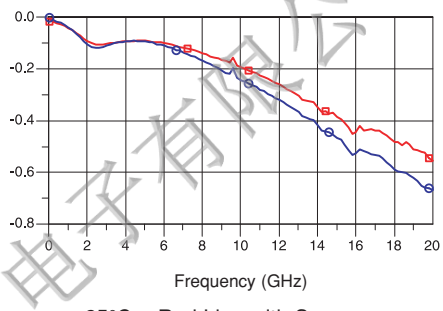
S21= Red Line with Squares
S11= Blue Line with Circles

Phase (Degree) (S21, S11)



S21= Red Line with Squares
S11= Blue Line with Circles

Transmission Loss over Temperature (S21)



+25°C = Red Line with Squares
+85°C = Blue Line with Circles

***Insert Design-In Code (See Page 16)**

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www.presidiocomponents.com • info@presidiocomponents.com

GLOBAL PART NUMBER EXAMPLE (How to Order)

M	BB	0502	X	104	M	G	P	5	C	8	*
Test Code	Product Code	Size (Pg. 15)	Dielectric	Capacitance	Capacitance Tolerance	Voltage	Termination	Packaging	RoHS Compliant	Special Code 2nd Cap Value	Design-In Code (See Back Page)

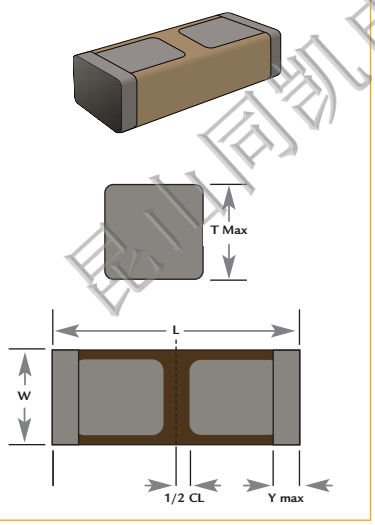
Test Codes, Dielectric Codes and Specifications

					FIT* 65° C	FIT* 85° C	FIT* 100° C	Mil-PRF-38534E Table C-III		-55681 Similar	-123 Similar	Cust. Spec.
				TEST CODES:	L	M	N	H	K	C	S	D
				Upgradable to Codes:	H	H, K, C	H, K, C, S					
ELECTRICAL SPECIFICATIONS	**NPO Dielectric Code N**	**X7R Dielectric Code X**	**Y5V Dielectric Code Y**	**Test Method MIL-STD-**	**Test Samples**			**Test Samples**		**Test Samples**		
Temperature Coefficient Limit	0 ± 30 ppm/ °C	± 15%	+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%	100%	
Dissipation Factor, maximum	0.15% max.	5% max.	19% max.	Presidio Specification	100%	100%	100%	100%	100%	100%	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%	100%	
Insulation Resistance @ +125° C at WVDC	10,000 MΩ min.	100 MΩ - µF	Not Applicable	202 Method 302						1% AQL	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%	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%	100%	
Solderability (solderable terminations only)				202 Method 208	13	13	13	13	13	13	13	
Bond Strength (gold termination only)	3 grams, 0.001" dia. Au wire	3 grams, 0.001" dia. Au wire	3 grams, 0.001" dia. Au wire	883 Method 2011				10	10	10	10	
Shear Strength (gold termination only)				883 Method 2019						10	10	
Physical Dimensions	See Page 15	See Page 15	See Page 15	Presidio Specification						20	20	
ENVIRONMENTAL TESTS, LEVEL 1												
Voltage Conditioning	100 hours	100 hours	100 hours	202 Method 108					10	100%	N/A	
Constant Acceleration	3,000g's, Y1 direction	3,000g's, Y1 direction	3,000g's, Y1 direction	883 Method 2001					10			
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%	
Destructive Physical Analysis Report			Not Applicable	EIA-469 & MIL-PRF -123							Included	
Temperature Coefficient Limits, 0 Volt	± 30 ppm/°C	± 15%	Not Applicable	Presidio Specification							12	
Life Test	1000 hrs. each lot	1000 hrs. each lot	Not Applicable	202 Method 108							25 min.	
Humidity, Steady State, Low Voltage	240 hrs. min.	240 hrs. min.	Not Applicable	202 Method 103, A							12	
RoHS Compliant, Yes or No	Specify	Specify	Not Applicable									

*FIT (Failure In Time) Calculations are based on assumed CONTINUOUS operating temperatures 65° C, 85° C and 100° C

Size

BOTTOM VIEW



Capacitance Codes for Multilayer Capacitor

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

Standard Capacitance Tolerance

Code	Tolerance
M	± 20%

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 Non-Magnetic	Palladium-Silver	Cure Epoxy as per manufacturer's spec.
G	Yes	Conductive Epoxy, Wire Bondable	Palladium-Silver Nickel Barrier 100 µ" thick Gold typical	Cure Epoxy as per manufacturer's spec.

Working Voltage (See Page 15)

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

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

SELECTION TABLE: BURIED BROADBAND CAPACITORS — SURFACE MOUNT

Size Code	CERAMIC BODY DIMENSIONS W inch (mm)	L inch (mm)	T Max. inch (mm)	Y Max. inch (mm)	1/2 CL inch (mm)	Working Voltage (WVDC)	INDUSTRIAL Test Code L X7R (pF)	INDUSTRIAL & MILITARY Test Code M NPO (pF)	X7R (pF)	Y5V (pF)	SPACE Test Code N X7R (pF)	Part Numbers	Performance Curves	S2P Files
0201	0.012 (0.305) ± 0.002 (0.051)	0.025 (0.635) ± 0.003 (0.076)	0.018 (0.457)	0.005 (0.127)	0.0015 (0.038) ± 0.0005 (0.013)	10	10,000+82					LBB0201X103ME * * C8 *	PDF	WEB
0302	0.020 (0.508) ± 0.002 (0.051)	0.031 (0.787) ± 0.003 (0.076)	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 *	PDF	WEB
0402	0.023 (0.584) ± 0.003 (0.076)	0.045 (1.143) ± 0.003 (0.076)	0.032 (0.813)	0.008 (0.203)	0.0025 (0.064) ± 0.0010 (0.025)	16	100,000+82					LBB0402X104MG * * C8 *	PDF	
						75	20,000+82					LBB0402X203ML * * C8 *		
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 *	PDF	
						16			68,000+82			MBB0502X683MG * * C8 *		
						16			100,000+82			MBB0502X104MG * * C8 *	PDF	WEB
						16		820+1				MBB0502N821MG * * C4 *	PDF	
						16				220,000+82		MBB0502Y224MG * * C8 *	PDF	
						12					10,000+82	NBB0502X103MF * * N8 *		
0603	0.032 (0.813) ± 0.006 (0.152)	0.065 (1.651) ± 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 *	PDF	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 14), and design-in location (Page 16)

RECOMMENDED MOUNTING METHODS

PC Board Observations

(a) Soft boards are typically used at microwave frequencies. For lowest reflection loss fused silica substrates are recommended at millimeterwave frequencies.

(b) 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.

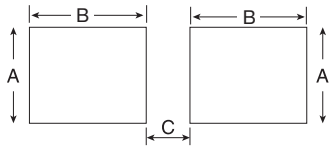
Option 2: 0.005" to 0.002" (0.127 mm to 0.051 mm) microstrip line gap for applications above 40 GHz.

Mounting Pad Dimensions (general recommendation*)

Case Size	INCHES A min	B min	C min*	MILLIMETERS 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	0.030	0.030	0.015	0.762	0.762	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

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

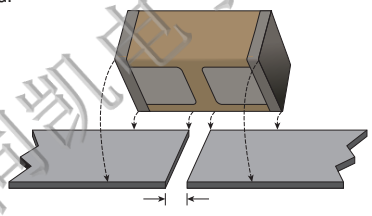
Typical temperature ramp guidelines for solder attachment:

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

(b) 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.



PRESIDIO COMPONENTS NEW GLOBAL PART NUMBERS

GLOBAL PART NUMBERS:

Thank you for considering Presidio Components. This brochure includes Presidio's new Global (shortened) part numbers. The Global part numbers are used by customers whose computer systems cannot handle our Manufacturing (longer) part numbers.

If you ordered parts from us in the past with a Manufacturing number, that number is still valid. However, if you would like to convert to our new Global part numbers, simply go to our website. A tool has been added to the site to assist in the conversion between Manufacturing and Global part numbers.

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.

We created our new Global part numbers with a "Design In" locator code for quick traceability, if needed. Please select your location from the table 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

USA	Code	USA	Code
Alabama	G	Nebraska	P
Alaska	P	Nevada, North	B
Arizona	D	Nevada, South	C
Arkansas	P	New Hampshire	L
California, North	B	New Jersey	J
California, South	C	New Mexico	D
Colorado	E	New York, Metro	J
Connecticut	L	New York, Upstate	K
Delaware	I	North Carolina	G
District of Columbia	H	North Dakota	O
Florida	G	Ohio	M
Georgia	G	Oklahoma	P
Hawaii	P	Oregon	A
Idaho	A	Pennsylvania	I
Illinois	N	Rhode Island	L
Indiana	M	South Carolina	G
Iowa	O	South Dakota	O
Kansas	P	Tennessee	G
Kentucky	M	Texas	F
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		

OUTSIDE THE UNITED STATES

Americas	Code
Canada	R
Mexico	R
Caribbean	R
Central America	R
South America	R
Pacific Rim	
Australia	S
China	T
Japan	U
Korea, South	V
Malaysia	W
Singapore	X
Other Pacific Rim Countries	Y

Europe	Code
Austria	3
Belgium	1
Denmark	5
Finland	5
France	2
Germany	3
Ireland	6
Italy	4
Luxembourg	1
Netherlands	1
Norway	5
Sweden	5
Switzerland	3
United Kingdom	6
Other European Countries	7
Other	
India	Z
Israel	8
Rest of World	9

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CHECK PRESIDIO'S WEBSITE FOR THE LATEST CATALOG REVISION

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