

Capacitor Array (IPC)

BENEFITS OF USING CAPACITOR ARRAYS

AVX capacitor arrays offer designers the opportunity to lower placement costs, increase assembly line output through lower component count per board and to reduce real estate requirements.

Reduced Costs

Placement costs are greatly reduced by effectively placing one device instead of four or two. This results in increased throughput and translates into savings on machine time. Inventory levels are lowered and further savings are made on solder materials, etc.

Space Saving

Space savings can be quite dramatic when compared to the use of discrete chip capacitors. As an example, the 0508 4-element array offers a space reduction of >40% vs. 4 x 0402 discrete capacitors and of >70% vs. 4 x 0603 discrete capacitors. (This calculation is dependent on the spacing of the discrete components.)

Increased Throughput

Assuming that there are 220 passive components placed in a mobile phone:

A reduction in the passive count to 200 (by replacing discrete components with arrays) results in an increase in throughput of approximately 9%.

A reduction of 40 placements increases throughput by 18%.

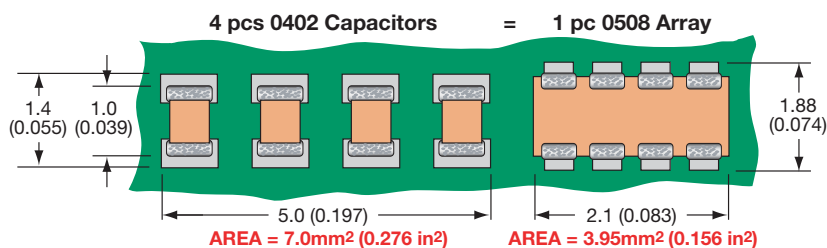
For high volume users of cap arrays using the very latest placement equipment capable of placing 10 components per second, the increase in throughput can be very significant and can have the overall effect of reducing the number of placement machines required to mount components:

If 120 million 2-element arrays or 40 million 4-element arrays were placed in a year, the requirement for placement equipment would be reduced by one machine.

During a 20Hr operational day a machine places 720K components. Over a working year of 167 days the machine can place approximately 120 million. If 2-element arrays are mounted instead of discrete components, then the number of placements is reduced by a factor of two and in the scenario where 120 million 2-element arrays are placed there is a saving of one pick and place machine.

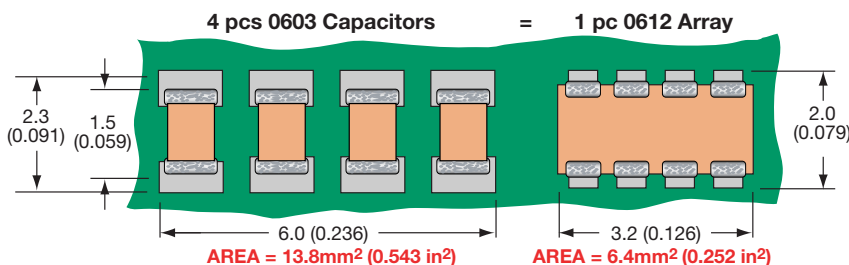
Smaller volume users can also benefit from replacing discrete components with arrays. The total number of placements is reduced thus creating spare capacity on placement machines. This in turn generates the opportunity to increase overall production output without further investment in new equipment.

W2A (0508) Capacitor Arrays



The 0508 4-element capacitor array gives a PCB space saving of over 40% vs four 0402 discretes and over 70% vs four 0603 discrete capacitors.

W3A (0612) Capacitor Arrays

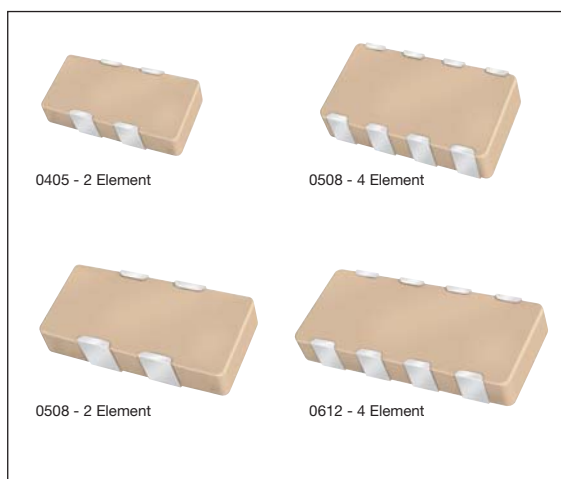


The 0612 4-element capacitor array gives a PCB space saving of over 50% vs four 0603 discretes and over 70% vs four 0805 discrete capacitors.

Capacitor Array



Capacitor Array (IPC)



GENERAL DESCRIPTION

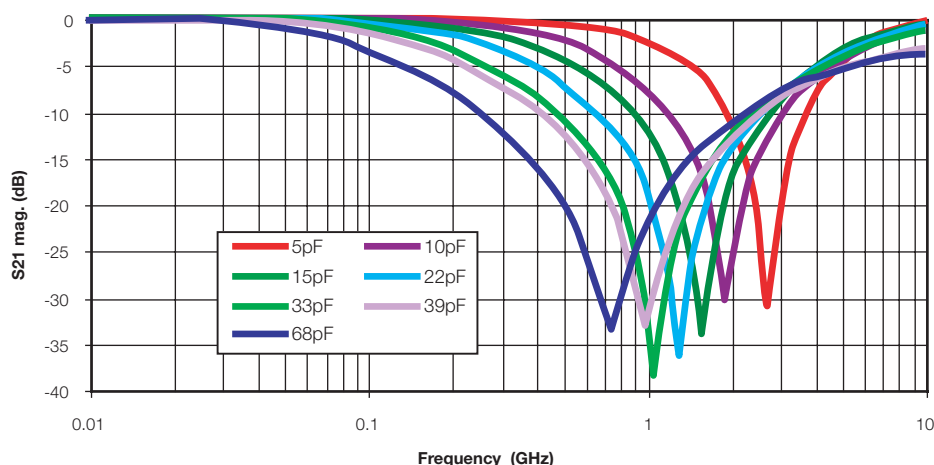
AVX is the market leader in the development and manufacture of capacitor arrays. The smallest array option available from AVX, the 0405 2-element device, has been an enormous success in the Telecommunications market. The array family of products also includes the 0612 4-element device as well as 0508 2-element and 4-element series, all of which have received widespread acceptance in the marketplace.

AVX capacitor arrays are available in X5R, X7R and NP0 (C0G) ceramic dielectrics to cover a broad range of capacitance values. Voltage ratings from 6.3 Volts up to 100 Volts are offered. AVX also now offers a range of automotive capacitor arrays qualified to AEC-Q200 (see separate table).

Key markets for capacitor arrays are Mobile and Cordless Phones, Digital Set Top Boxes, Computer Motherboards and Peripherals as well as Automotive applications, RF Modems, Networking Products, etc.

AVX Capacitor Array - W2A41A***K

S21 Magnitude



HOW TO ORDER

W	2	A	4	3	C	103	M	A	T	2A
Style	Case Size	Array	Number of Caps	Voltage	Dielectric	Capacitance Code	Capacitance Tolerance	Failure Rate	Termination Code	Packaging & Quantity Code
	1 = 0405 2 = 0508 3 = 0612			Z = 10V Y = 16V 3 = 25V 5 = 50V 1 = 100V	A = NP0 C = X7R D = X5R	2 Sig Digits + Number of Zeros	J = $\pm 5\%$ K = $\pm 10\%$ M = $\pm 20\%$	A = Commercial 4 = Automotive	T = Plated Ni and Sn** Z = FLEXITERM™** B = 5% min lead X = FLEXITERM™ with 5% min lead	2A = 7" Reel (4000) 4A = 13" Reel (10000) 2F = 7" Reel (1000)

**RoHS compliant

NOTE: Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers.

Capacitor Array

Capacitance Range – NP0/C0G

SIZE		0405			0508				0508				0612			
# Elements		2			2				4				4			
Soldering		Reflow Only			Reflow/Wave				Reflow/Wave				Reflow/Wave			
Packaging		All Paper			All Paper				Paper/Embossed				Paper/Embossed			
Length	MM	1.00 ± 0.15			1.30 ± 0.15				1.30 ± 0.15				1.60 ± 0.150			
	(in.)	(0.039 ± 0.006)			(0.051 ± 0.006)				(0.051 ± 0.006)				(0.063 ± 0.006)			
Width	MM	1.37 ± 0.15			2.10 ± 0.15				2.10 ± 0.15				3.20 ± 0.20			
	(in.)	(0.054 ± 0.006)			(0.083 ± 0.006)				(0.083 ± 0.006)				(0.126 ± 0.008)			
Max. Thickness	MM	0.66			0.94				0.94				1.35			
	(in.)	(0.026)			(0.037)				(0.037)				(0.053)			
WVDC		16	25	50	16	25	50	100	16	25	50	100	16	25	50	100
1R0	Cap															
1R2	(pF)															
1R5																
1R8																
2R2																
2R7																
3R3																
3R9																
4R7																
5R6																
6R8																
8R2																
100																
120																
150																
180																
220																
270																
330																
390																
470																
560																
680																
820																
101																
121																
151																
181																
221																
271																
331																
391																
471																
561																
681																
821																
102																
122																
152																
182																
222																
272																
332																
392																
472																
562																
682																
822																

Capacitor Array



Capacitance Range – X7R/X5R

SIZE		0306				0405					0508						0508						0612					
# Elements		4				2					2						4						4					
Soldering		Reflow Only				Reflow Only					Reflow/Wave						Reflow/Wave						Reflow/Wave					
Packaging		All Paper				All Paper					All Paper						Paper/Embossed						Paper/Embossed					
Length	MM	1.60 ± 0.15				1.00 ± 0.15					1.30 ± 0.15						1.30 ± 0.15						1.60 ± 0.150					
	(in.)	(0.063 ± 0.006)				(0.039 ± 0.006)					(0.051 ± 0.006)						(0.051 ± 0.006)						(0.063 ± 0.006)					
Width	MM	0.81 ± 0.15				1.37 ± 0.15					2.10 ± 0.15						2.10 ± 0.15						3.20 ± 0.20					
	(in.)	(0.032 ± 0.006)				(0.054 ± 0.006)					(0.083 ± 0.006)						(0.083 ± 0.006)						(0.126 ± 0.008)					
Max. Thickness	MM	0.50				0.66					0.94						0.94						1.35					
	(in.)	(0.020)				(0.026)					(0.037)						(0.037)						(0.053)					
WVDC		6	10	16	25	6	10	16	25	50	6	10	16	25	50	100	6	10	16	25	50	100	6	10	16	25	50	100
101	Cap	100																										
121	(µF)	120																										
151		150																										
181		180																										
221		220																										
271		270																										
331		330																										
391		390																										
471		470																										
561		560																										
681		680																										
821		820																										
102		1000																										
122		1200																										
152		1500																										
182		1800																										
222		2200																										
272		2700																										
332		3300																										
392		3900																										
472		4700																										
562		5600																										
682		6800																										
822		8200																										
103	Cap	0.010																										
123	(µF)	0.012																										
153		0.015																										
183		0.018																										
223		0.022																										
273		0.027																										
333		0.033																										
393		0.039																										
473		0.047																										
563		0.056																										
683		0.068																										
823		0.082																										
104		0.10																										
124		0.12																										
154		0.15																										
184		0.18																										
224		0.22																										
274		0.27																										
334		0.33																										
474		0.47																										
564		0.56																										
684		0.68																										
824		0.82																										
105		1.0																										
125		1.2																										
155		1.5																										
185		1.8																										
225		2.2																										
335		3.3																										
475		4.7																										
106		10																										
226		22																										
476		47																										
107		100																										

☐ = Currently available X7R

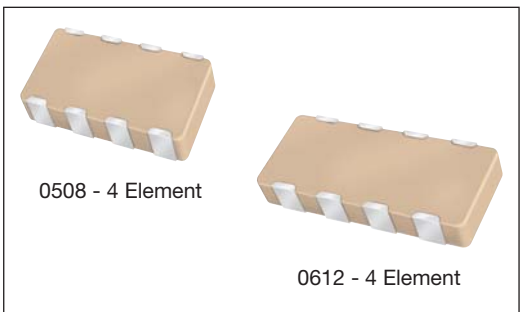
☐ = Currently available X5R

▨ = Under development X7R, contact factory for advance samples

▨ = Under development X5R, contact factory for advance samples



Automotive Capacitor Array (IPC)



As the market leader in the development and manufacture of capacitor arrays AVX is pleased to offer a range of AEC-Q200 qualified arrays to compliment our product offering to the Automotive industry. Both the AVX 0612 and 0508 4-element capacitor array styles are qualified to the AEC-Q200 automotive specifications.

AEC-Q200 is the Automotive Industry qualification standard and a detailed qualification package is available on request.

All AVX automotive capacitor array production facilities are certified to ISO/TS 16949:2002.

HOW TO ORDER

W	3	A	4	Y	C	104	K	4	T	2A
Style	Case Size	Array	Number of Caps	Voltage	Dielectric	Capacitance Code (In pF)	Capacitance Tolerance	Failure Rate	Terminations	Packaging & Quantity Code
	2 = 0508 3 = 0612			6 = 6.3V Z = 10V Y = 16V 3 = 25V 5 = 50V 1 = 100V	A = NP0 C = X7R	Significant Digits + Zeros e.g. 10µF=106	*J = ±5% *K = ±10% M = ±20%	4 = Automotive	T = Plated Ni and Sn** Z = FLEXITERM™** B = 5% min lead X = FLEXITERM™ with 5% min lead	2A = 7" Reel (4000) 4A = 13" Reel (10000) 2F = 7" Reel (1000)
									**RoHS compliant	

*Contact factory for availability by part number for K = ±10% and J = ±5% tolerance.

NP0/COG

SIZE	0508	0508				0612			
No. of Elements	2	4				4			
WVDC	100	16	25	50	100	16	25	50	100
1R0	Cap 1.0								
1R2	(pF) 1.2								
1R5	1.5								
1R8	1.8								
2R2	2.2								
2R7	2.7								
3R3	3.3								
3R9	3.9								
4R7	4.7								
5R6	5.6								
6R8	6.8								
8R2	8.2								
100	10								
120	12								
150	15								
180	18								
220	22								
270	27								
330	33								
390	39								
470	47								
560	56								
680	68								
820	82								
101	100								
121	120								
151	150								
181	180								
221	220								
271	270								
331	330								
391	390								
471	470								
561	560								
681	680								
821	820								
102	1000								
122	1200								
152	1500								
182	1800								
222	2200								
272	2700								
332	3300								
392	3900								
472	4700								
562	5600								
682	6800								
822	8200								

NP0/COG

X7R

SIZE	0508				0508				0612				
No. of Elements	2				4				4				
WVDC	16	25	50	100	16	25	50	100	10	16	25	50	100
101 121 151	Cap 100 (pF)	120	150										
181 221 271	180	220	270										
331 391 471	330	390	470										
561 681 821	560	680	820										
102 122 152	1000	1200	1500										
182 222 272	1800	2200	2700										
332 392 472	3300	3900	4700										
562 682 822	5600	6800	8200										
103 123 153	Cap 0.010 (μF)	0.012	0.015										
183 223 273	0.018	0.022	0.027										
333 393 473	0.033	0.039	0.047										
563 683 823	0.056	0.068	0.082										
104 124 154	0.10	0.12	0.15										

X7R



Capacitor Array

Multi-Value Capacitor Array (IPC)

GENERAL DESCRIPTION

A recent addition to the array product range is the Multi-Value Capacitor Array. These devices combine two different capacitance values in standard 'Cap Array' packages and are available with a maximum ratio between the two capacitance values of 100:1. The multi-value array is currently available in the 0405 and 0508 2-element styles and also in the 0612 4-element style.

Whereas to date AVX capacitor arrays have been suited to applications where multiple capacitors of the same value are used, the multi-value array introduces a new flexibility to the range. The multi-value array can replace discrete capacitors of different values and can be used for broadband decoupling applications. The 0508 x 2 element multi-value array would be particularly recommended in this application. Another application is filtering the 900/1800 or 1900MHz noise in mobile phones. The 0405 2-element, low capacitance value NP0, (C0G) device would be suited to this application, in view of the space saving requirements of mobile phone manufacturers.

ADVANTAGES OF THE MULTI-VALUE CAPACITOR ARRAYS

Enhanced Performance Due to Reduced Parasitic Inductance

When connected in parallel, not only do discrete capacitors of different values give the desired self-resonance, but an additional unwanted parallel resonance also results. This parallel resonance is induced between each capacitor's self-resonant frequencies and produces a peak in impedance response. For decoupling and bypassing applications this peak will result in a frequency band of reduced decoupling and in filtering applications reduced attenuation.

The multi-value capacitor array, combining capacitors in one unit, virtually eliminates the problematic parallel resonance, by minimizing parasitic inductance between the capacitors, thus enhancing the broadband decoupling/filtering performance of the part.

Reduced ESR

An advantage of connecting two capacitors in parallel is a significant reduction in ESR. However, as stated above, using discrete components brings with it the unwanted side effect of parallel resonance. The multi-value cap array is an excellent alternative as not only does it perform the same function as parallel capacitors but also it reduces the uncertainty of the frequency response.

HOW TO ORDER (Multi-Value Capacitor Array - IPC)

W	2	A	2	Y	C	102M	104M	A	T	2A
Style	Case Size	Array	Number of Caps	Voltage	Dielectric	1st Value	2nd Value	Failure Rate	Terminations	Packaging & Quantity Code
	1 = 0405 2 = 0508 3 = 0612			Z = 10V Y = 16V 3 = 25V 5 = 50V 1 = 100V	A = NP0 C = X7R D = X5R	Capacitance Code (In pF) 2 Sig. Digits + No. of Zeros	Capacitance Tolerance K = $\pm 10\%$ M = $\pm 20\%$		T = Plated Ni and Sn** Z = FLEXITERM™** B = 5% min lead X = FLEXITERM™ with 5% min lead	2A = 7" Reel (4000) 4A = 13" Reel (10000) 2F = 7" Reel (1000)

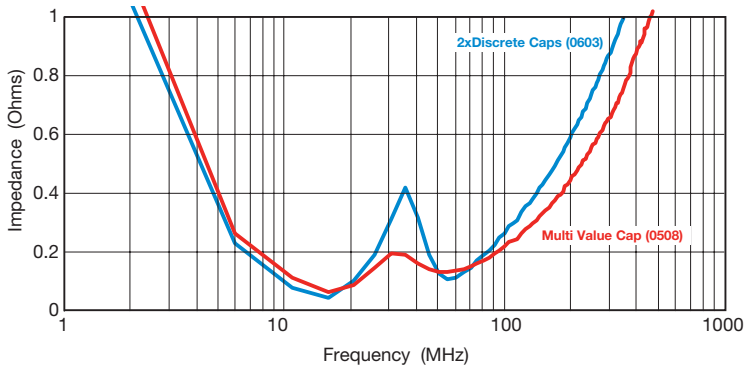
NOTE: Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers.

**RoHS compliant

	Cap (Min/Max)	
	NP0	X5R/X7R
0612 4-element	100/471	221/104
0508 2-element	100/471	221/104
0405 2-element	100/101	101/103

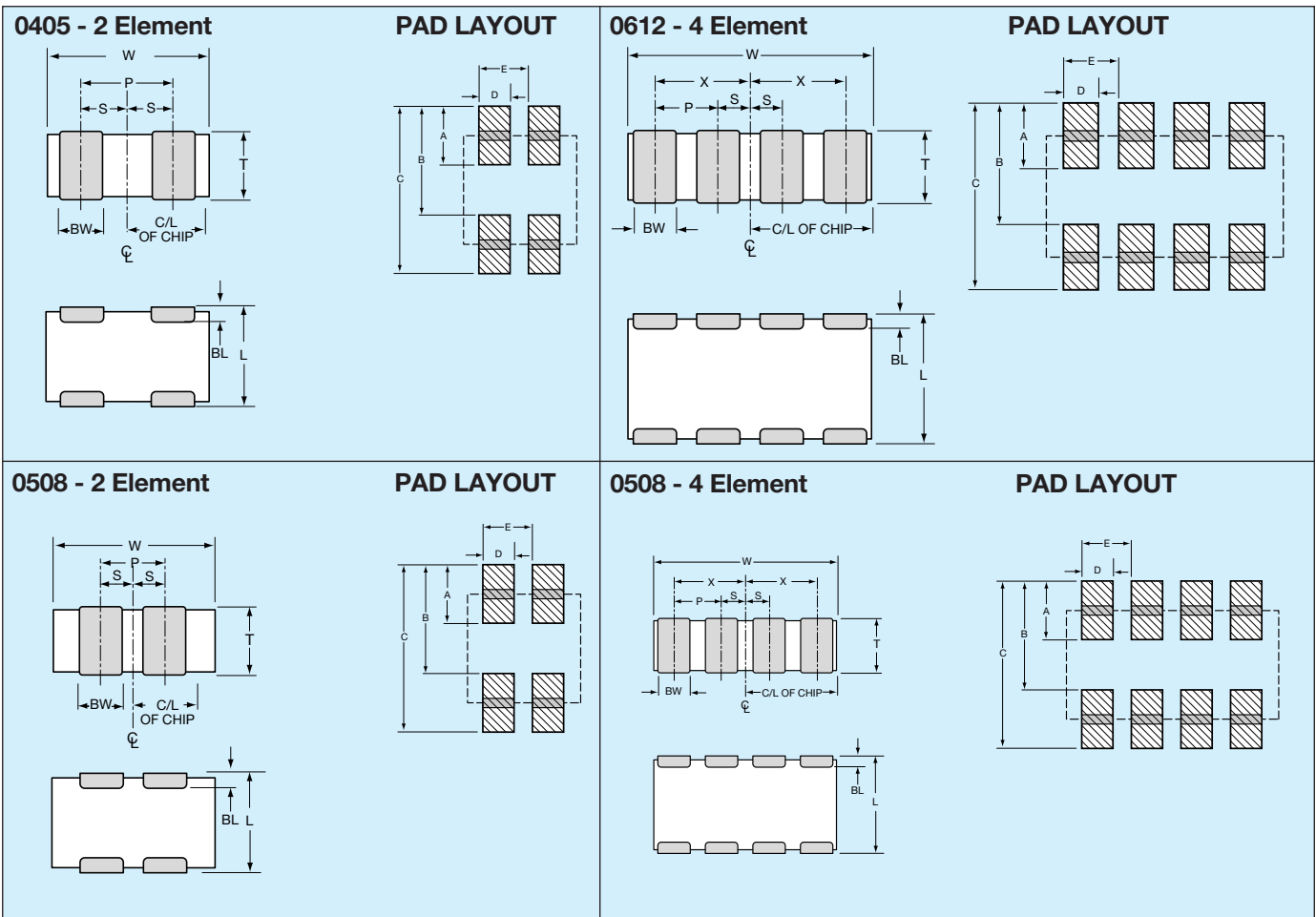
- Max. ratio between the two cap values is 1:100.
- The voltage of the higher capacitance value dictates the voltage of the multi-value part.
- Only combinations of values within a specific dielectric range are possible.

IMPEDANCE VS FREQUENCY



PART & PAD LAYOUT DIMENSIONS

millimeters (inches)



PART DIMENSIONS

0405 - 2 Element

L	W	T	BW	BL	P	S
1.00 ± 0.15 (0.039 ± 0.006)	1.37 ± 0.15 (0.054 ± 0.006)	0.66 MAX (0.026 MAX)	0.36 ± 0.10 (0.014 ± 0.004)	0.20 ± 0.10 (0.008 ± 0.004)	0.64 REF (0.025 REF)	0.32 ± 0.10 (0.013 ± 0.004)

0508 - 2 Element

L	W	T	BW	BL	P	S
1.30 ± 0.15 (0.051 ± 0.006)	2.10 ± 0.15 (0.083 ± 0.006)	0.94 MAX (0.037 MAX)	0.43 ± 0.10 (0.017 ± 0.004)	0.33 ± 0.08 (0.013 ± 0.003)	1.00 REF (0.039 REF)	0.50 ± 0.10 (0.020 ± 0.004)

0508 - 4 Element

L	W	T	BW	BL	P	X	S
1.30 ± 0.15 (0.051 ± 0.006)	2.10 ± 0.15 (0.083 ± 0.006)	0.94 MAX (0.037 MAX)	0.25 ± 0.06 (0.010 ± 0.003)	0.20 ± 0.08 (0.008 ± 0.003)	0.50 REF (0.020 REF)	0.75 ± 0.10 (0.030 ± 0.004)	0.25 ± 0.10 (0.010 ± 0.004)

0612 - 4 Element

L	W	T	BW	BL	P	X	S
1.60 ± 0.20 (0.063 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	1.35 MAX (0.053 MAX)	0.41 ± 0.10 (0.016 ± 0.004)	0.18 ± 0.08 (0.007 ± 0.003)	0.76 REF (0.030 REF)	1.14 ± 0.10 (0.045 ± 0.004)	0.38 ± 0.10 (0.015 ± 0.004)

PAD LAYOUT DIMENSIONS

0405 - 2 Element

A	B	C	D	E
0.46 (0.018)	0.74 (0.029)	1.20 (0.047)	0.30 (0.012)	0.64 (0.025)

0508 - 2 Element

A	B	C	D	E
0.68 (0.027)	1.32 (0.052)	2.00 (0.079)	0.46 (0.018)	1.00 (0.039)

0508 - 4 Element

A	B	C	D	E
0.56 (0.022)	1.32 (0.052)	1.88 (0.074)	0.30 (0.012)	0.50 (0.020)

0612 - 4 Element

A	B	C	D	E
0.89 (0.035)	1.65 (0.065)	2.54 (0.100)	0.46 (0.018)	0.76 (0.030)