Capacitor Array

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%.

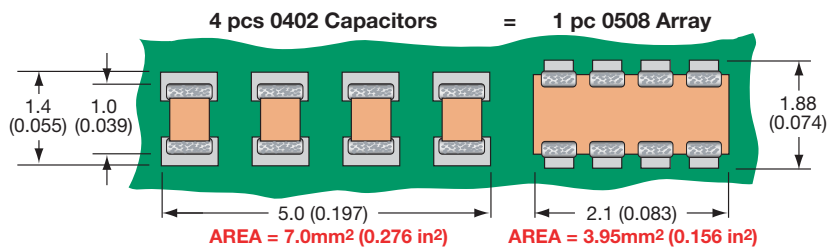A reduction of 40 placements increases throughput by 18%.

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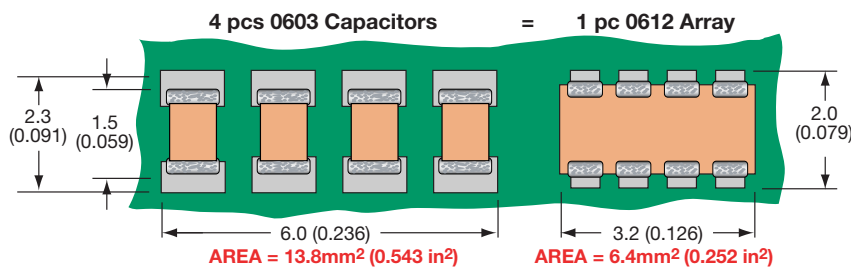
Smaller volume users can also benefit from replacing discrete components with arrays. The total number of placements is reduced thus creating spare capacity on placement machines. This in turn generates the opportunity to increase overall production output without further investment in new equipment.

W2A (0508) Capacitor Arrays

4 pcs 0402 Capacitors   =   1 pc 0508 Array

1.4 (0.055)   1.0 (0.039)   5.0 (0.197)   **AREA = 7.0mm² (0.276 in²)**

1.88 (0.074)   2.1 (0.083)   **AREA = 3.95mm² (0.156 in²)**

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

4 pcs 0603 Capacitors   =   1 pc 0612 Array

2.3 (0.091)   1.5 (0.059)   6.0 (0.236)   **AREA = 13.8mm² (0.543 in²)**

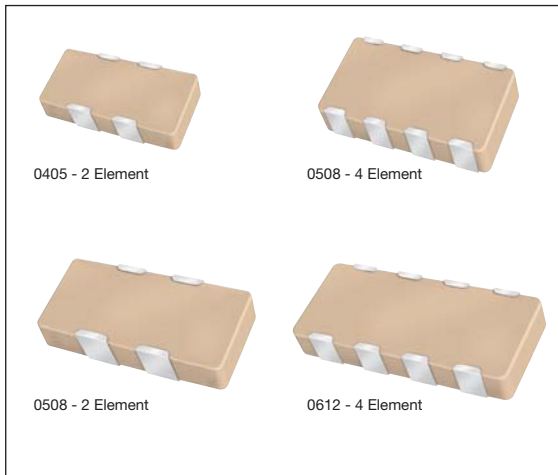2.0 (0.079)   3.2 (0.126)   **AREA = 6.4mm² (0.252 in²)**

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)

0405 - 2 Element
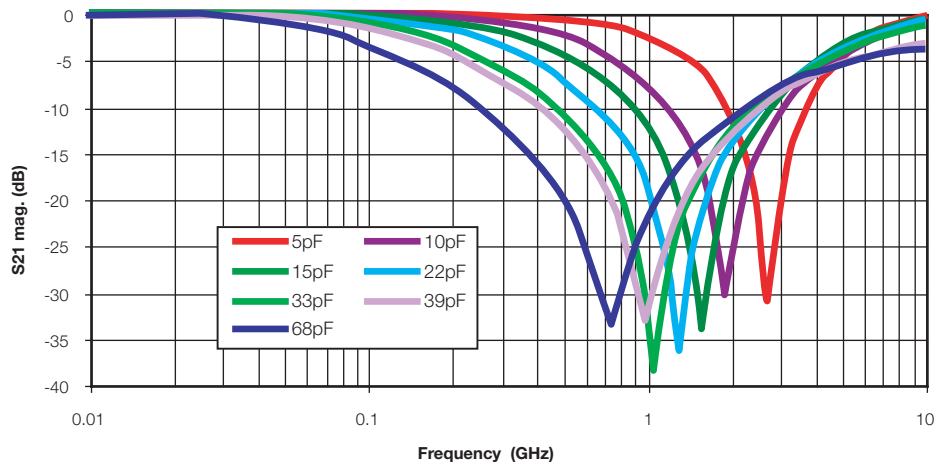
0508 - 4 Element

0508 - 2 Element

0612 - 4 Element

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

Legend: 5pF, 10pF, 15pF, 22pF, 33pF, 39pF, 68pF

X-axis: Frequency (GHz) — 0.01, 0.1, 1, 10
Y-axis: S21 mag. (dB) — 0 to -40

HOW TO ORDER

W	2	A	4	3	C	103	M	A	T	2A
Style W = RoHS L = SnPb	**Case Size** 1 = 0405 2 = 0508 3 = 0612	**Array**	**Number of Caps**	**Voltage** Z = 10V Y = 16V 3 = 25V 5 = 50V 1 = 100V	**Dielectric** A = NP0 C = X7R D = X5R	**Capacitance Code** 2 Sig Digits + Number of Zeros	**Capacitance Tolerance** J = ±5% K = ±10% M = ±20%	**Failure Rate** A = Commercial 4 = Automotive	**Termination Code** T = Plated Ni and Sn** Z = FLEXITERM®** B = 5% min lead X = FLEXITERM® with 5% min lead	**Packaging & Quantity Code** 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 (in.)	1.00 ± 0.15 (0.039 ± 0.006)			1.30 ± 0.15 (0.051 ± 0.006)				1.30 ± 0.15 (0.051 ± 0.006)				1.60 ± 0.150 (0.063 ± 0.006)			
Width mm (in.)	1.37 ± 0.15 (0.054 ± 0.006)			2.10 ± 0.15 (0.083 ± 0.006)				2.10 ± 0.15 (0.083 ± 0.006)				3.20 ± 0.20 (0.126 ± 0.008)			
Max. Thickness mm (in.)	0.66 (0.026)			0.94 (0.037)				0.94 (0.037)				1.35 (0.053)			
WVDC	16	25	50	16	25	50	100	16	25	50	100	16	25	50	100

Code	Cap (pF)
1R0	1.0
1R2	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

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 (in.)	1.60 ± 0.15 (0.063 ± 0.006)				1.00 ± 0.15 (0.039 ± 0.006)					1.30 ± 0.15 (0.051 ± 0.006)						1.30 ± 0.15 (0.051 ± 0.006)						1.60 ± 0.150 (0.063 ± 0.006)					
Width mm (in.)	0.81 ± 0.15 (0.032 ± 0.006)				1.37 ± 0.15 (0.054 ± 0.006)					2.10 ± 0.15 (0.083 ± 0.006)						2.10 ± 0.15 (0.083 ± 0.006)						3.20 ± 0.20 (0.126 ± 0.008)					
Max. Thickness mm (in.)	0.50 (0.020)				0.66 (0.026)					0.94 (0.037)						0.94 (0.037)						1.35 (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

Code	Cap (µF)
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
103	0.010
123	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

Legend:
- = Currently available X7R
- = Currently available X5R
- = Under development X7R, contact factory for advance samples
- = Under development X5R, contact factory for advance samples

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Automotive Capacitor Array (IPC)

0508 - 4 Element
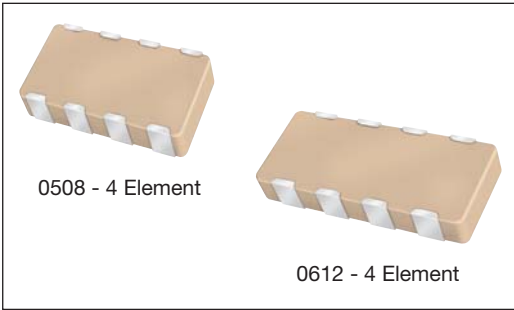
0612 - 4 Element

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

Field	Description
Style	W = RoHS, L = SnPb
Case Size	1 = 0405, 2 = 0508, 3 = 0612
Array	
Number of Caps	
Voltage	6 = 6.3V, Z = 10V, Y = 16V, 3 = 25V, 5 = 50V, 1 = 100V
Dielectric	A = NP0, C = X7R, F = X8R
Capacitance Code (In pF)	Significant Digits + Number of Zeros e.g. 10µF=106
Capacitance Tolerance	*J = ±5%, *K = ±10%, M = ±20%
Failure Rate	4 = Automotive
Terminations	T = Plated Ni and Sn**, Z = FLEXITERM®**, B = 5% min lead, X = FLEXITERM® with 5% min lead
Packaging & Quantity Code	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/C0G

SIZE	0405	0508	0508				0612			
No. of Elements	2	2	4				4			
WVDC	50	50	16	25	50	100	16	25	50	100
1R0 / 1R2 / 1R5 Cap 1.0 / 1.2 / 1.5 (pF)										
1R8 / 2R2 / 2R7 1.8 / 2.2 / 2.7										
3R3 / 3R9 / 4R7 3.3 / 3.9 / 4.7										
5R6 / 6R8 / 8R2 5.6 / 6.8 / 8.2										
100 / 120 / 150 10 / 12 / 15										
180 / 220 / 270 18 / 22 / 27										
330 / 390 / 470 33 / 39 / 47										
560 / 680 / 820 56 / 68 / 82										
101 / 121 / 151 100 / 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										

■ = Under development

X7R / X8R

SIZE	0508					0508				0612					X8R 0405
No. of Elements	2					4				4					2
WVDC	10	16	25	50	100	16	25	50	100	10	16	25	50	100	16
101 / 121 / 151 Cap 100 / 120 / 150 (pF)															
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 / 0.012 / 0.015 (µF)															
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															
224 0.22															

□ = X7R
■ = X8R
■ = Under development

RoHS COMPLIANT

Capacitor Array

Multi-Value Capacitor Array (IPC)

AVX

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
						1st Value	**2nd Value**			

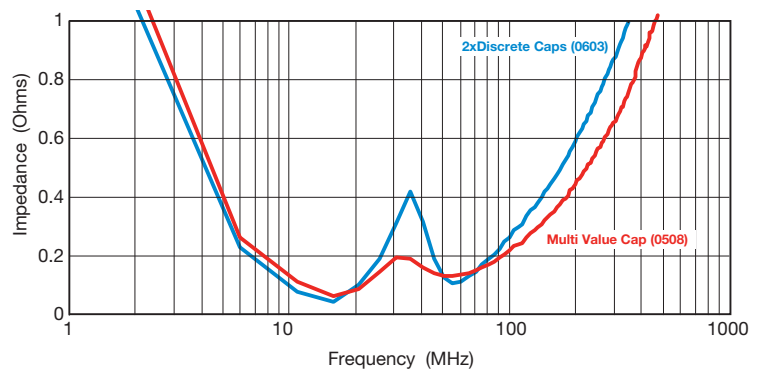| Style	Case Size	Array	Number of Caps	Voltage	Dielectric	Capacitance Code (In pF)	Capacitance Tolerance	Failure Rate	Terminations	Packaging & Quantity Code
	1 = 0405			Z = 10V	A = NP0	2 Sig. Digits +	K = ±10%		T = Plated Ni and Sn**	2A = 7" Reel (4000)
	2 = 0508			Y = 16V	C = X7R	No. of Zeros	M = ±20%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

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

AVX

Capacitor Array

PART & PAD LAYOUT DIMENSIONS

<div align="right">millimeters (inches)</div>

0405 - 2 Element | PAD LAYOUT
0612 - 4 Element | PAD LAYOUT

0508 - 2 Element | PAD LAYOUT
0508 - 4 Element | PAD LAYOUT
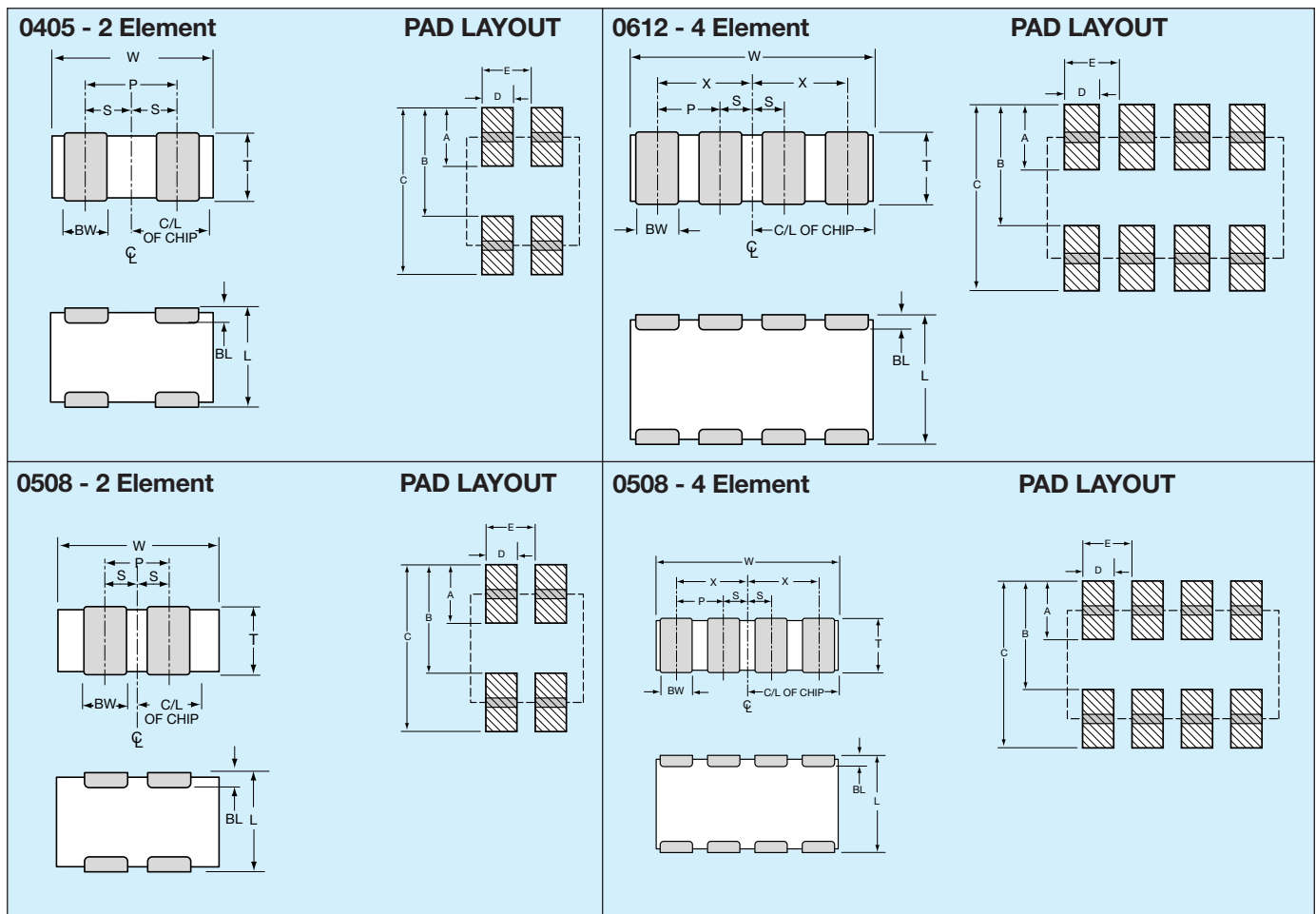
PART DIMENSIONS

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 +0.25 -0.08 (0.007 +0.010 -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)