GENERAL INFORMATION

Multi-Cap Arrays can be manufactured with 2, 3, 4, 5 or 6 capacitors on one single layer ceramic substrate. These arrays are available in our Maxi and Maxi+ family of GBBL dielectrics and offer a broad range of capacitance values as detailed in the accompanying tables.

These arrays have advantages over single components in the form of smaller overall size, reduced handling and lower average unit costs. They are, therefore, a good choice for broad-band bypass applications where circuit board layouts can utilize these configurations.

The designs, shown along with the range of maximum capacitance values, represent typical parts. Since most applications require specific form factors, custom designs on all multi-cap arrays are available to meet individual customer requirements and are offered with quick turn around. No charge samples are generally shipped within two weeks of the design sign-off.

Both standard and custom designs are available with borders for those applications where conductive epoxy run up exposes the parts to the possibility of shorting. Maximum capacitance per pad for bordered devices will be necessarily somewhat lower than shown on the adjacent page.

2 and 3 cap arrays can be designed with different capacitance values per pad in circuit designs where identical values pad-to-pad are, for one reason or another, not altogether suitable.

Additionally, the dual-caps are available to match micro strip widths as dictated by circuit considerations. When mounted with the individual pads down, the need for wire bonding is eliminated. The maximum capacitance values indicated on the typical designs shown represent capacitance per pad. Mounted with both pads down puts two capacitors in series. The effective series capacitance (C_{Eff}), can be determined by $1/C_{Eff} = 1/C1 + 1/C2$.

Contact the factory or your local KYOCERA AVX representative.

HOW TO ORDER

GH B 5 5 8 102 P A 6N

Type Code

Array Code
B = 2 E = 5
C = 3 F = 8
D = 4

Size Code
2 = .020" W 4 = .040" W
Y = .025" W 5 = .050" W
3 = .030" W S = Special

Working Voltage Code
5 = 50VDC

Dielectric Code
8 = Maxi
9 = Maxi+

RoHS COMPLIANT

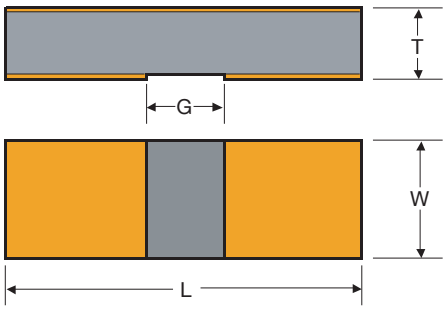
Cap Code
EIA Cap Code in pF

Cap Tolerance
P = +100% -0%
Z = +80% -20%
Dual-Caps
M = ±20% available

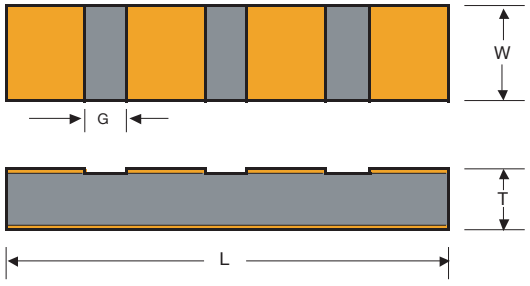
Termination Code
A = Au (100 µ-in min) over Ti/W (1000 Å nom) also available
N = Ti/W-Ni-Au

Packaging Code
6N = Antistatic Waffle Pack

DUAL-CAP



MULTI-CAP



GHB SERIES: DUAL CAP SINGLE LAYER CAPACITORS

DIMENSIONS: inches (millimeters)

	GHB2	GHBY	GHB3	GHB4	GHB5
(L) Length	.050±.010 (1.27±.254)	.080±.010 (2.03±.254)			
(W) Width	.020+.000,-.003 (.508+.000,-.076)	.025+.000,-.003 (.635+.000,-.076)	.030+.000,-.003 (.762+.000,-.076)	.040+.000,-.003 (1.02+.000,-.076)	.050+.000,-.003 (1.27+.000,-.076)
(T) Thickness	.008±.002 (.203±.051)				
(G) Gap	.005 min/.010 max (.127/.254)				

	Cap/Pad (pF)		Cap/Pad (pF)		Cap/Pad (pF)		Cap/Pad (pF)		Cap/Pad (pF)	
Dielectric	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Z	25	220	54	500	65	600	88	770	100	960
Maxi	200	350	430	780	520	940	700	1200	870	1500
Maxi+	270	450	600	1000	730	1200	980	1500	1200	1900

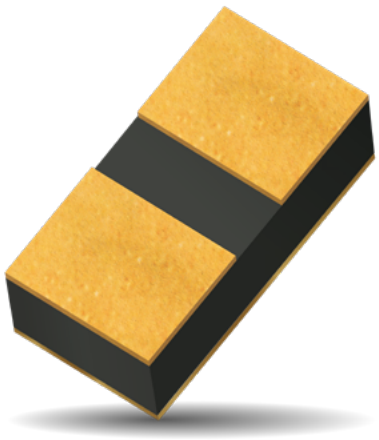
GH-SERIES: MULTI-CAP ARRAY SINGLE LAYER CAPACITORS

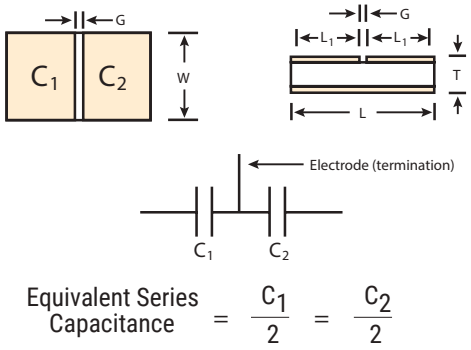
DIMENSIONS: inches (millimeters)

	GH*2	GH*Y	GH*3	GH*6
Length - Code (C) - 3 Caps	.065±.010 (1.65±.254)			
Length - Code (D) - 4 Caps	.090±.010 (2.29±.254)			
Length - Code (E) - 5 Caps	.115±.010 (2.92±.254)			
Length - Code (F) - 6 Caps	.140±.010 (3.56±.254)			
(W) Width	.020±.005 (.508±.127)	.025±.005 (.635±.127)	.030±.005 (.762±.127)	.040±.005 (1.02±.127)
(T) Thickness	.008±.002 (.203±.051)			
Pad Size (nominal)	.020x.015 (.508x.381)	.025x.015 (.635x.381)	.030x.015 (.762x.381)	.040x.015 (1.02x.381)
(G) Gap (All Arrays)	.005 min/.010 max (.127/.254)			

	Cap/Pad (pF)		Cap/Pad (pF)		Cap/Pad (pF)		Cap/Pad (pF)	
Dielectric	Min	Max	Min	Max	Min	Max	Min	Max
Z	20	120	25	150	30	180	40	250
Maxi	140	200	170	250	210	300	280	400
Maxi+	200	300	250	370	300	450	400	600

Microwave SLCs
GM Series – TWIN CAP® SLC's
Dual Cap Arrays

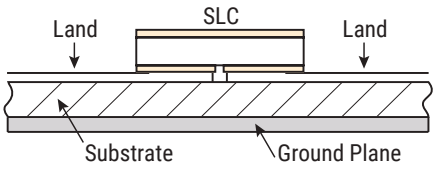




$$\text{Equivalent Series Capacitance} = \frac{C_1}{2} = \frac{C_2}{2}$$

Terminations C1 and C2 may be mounted directly to the microstrip line or with the top electrode (termination) facing down in the flip chip configuration.

The unique configuration of the GM Series Twin Cap® provides a wide range of capacitance values with a 100 WVDC rating in a low profile pack-age. The low insertion loss and extremely high self-resonant frequencies of the GM Series make it ideal for RF / microwave and millimeter wave applications.



SELECTION GUIDE

Case Size		GM15			GM20			GM25			GM30			GM35			GM40			GM50		
Width (W)		0.015 (0.381) ± 0.003 (0.076)			0.020 (0.508) ± 0.003 (0.076)			0.025 (0.635) ± 0.003 (0.076)			0.030 (0.762) ± 0.003 (0.076)			0.035 (0.889) ± 0.003 (0.076)			0.040 (1.016) ± 0.003 (0.076)			0.050 (1.270) ± 0.003 (0.076)		
Length (L)		0.040 (1.016) max.			0.050 (1.270) max.			0.080 (2.032) max.			0.080 (2.032) max.			0.080 (2.032) max.			0.080 (2.032) max.			0.080 (2.032) max.		
Gap Width (G)		0.008 (0.203)			0.008 (0.203)			0.020 (0.508)			0.020 (0.508)			0.020 (0.508)			0.020 (0.508)			0.020 (0.508)		
Min. Thickness (T)		0.005 (0.127)			0.005 (0.127)			0.005 (0.127)			0.005 (0.127)			0.006 (0.152)			0.006 (0.152)			0.006 (0.152)		
Max. Thickness (T)		0.010 (0.254)			0.010 (0.254)			0.010 (0.254)			0.012 (0.305)			0.012 (0.305)			0.012 (0.305)			0.012 (0.305)		
Dielectric	K	Capacitance (pF)			Capacitance (pF)			Capacitance (pF)			Capacitance (pF)			Capacitance (pF)			Capacitance (pF)			Capacitance (pF)		
		Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.
A	14	-	-	-	0.05	0.08	B,C	0.08	0.1	B,C	0.08	0.1	B	0.1	0.2	B	0.1	0.2	B	0.2	0.2	B
1	31	0.05	0.1	B,C	0.1	0.1	B,C	0.2	0.2	B,C	0.2	0.3	B	0.3	0.4	B	0.3	0.5	B	0.3	0.6	B
2	60	0.2	0.2	B,C	0.2	0.3	B,C	0.4	0.6	B,C	0.4	0.6	B	0.5	0.8	B	0.6	1	C	0.8	1.2	C
3	130	0.3	0.4	B,C	0.4	0.8	C,D	0.8	1.5	C,D	0.8	1.5	C	1	1.8	C	1.2	2.2	C,D	1.5	3	D
4	200	0.5	0.6	C,D	1	1.2	C,D	1.8	2.2	D	1.8	2.2	D	2.2	3.3	D	2.7	3.6	D	3.3	4.7	D
7	420	0.8	1.2	C,D	1.5	2.2	D	2.7	4.7	M	2.7	4.7	M	3.6	5.6	M	3.9	6.8	M	5.1	8.2	K,M
Y	650	1.5	1.8	C,D	2.7	3.9	M	5.1	6.8	M	5.1	6.8	M	6.8	10	M	8.2	12	M	10	15	K,M
6	650	1.5	1.8	C,D	2.7	3.9	M	5.1	6.8	M	5.1	6.8	M	6.8	10	M	8.2	12	M	10	15	K,M
J	1100	2.2	3.3	M	4.7	6.8	M	8.2	12	M	8.2	12	M	12	15	M	15	18	M	18	22	M
F	2000	3.6	6.8	M	8.2	12	M	15	22	M	15	22	M	18	30	M	20	33	M	27	39	M
C	4000	8.2	12	M	15	22	M	27	51	M	27	51	M	33	68	M	39	82	M	47	100	M
G	6000	15	18	M	30	39	M	56	62	M	56	68	M	68	82	M	100	120	M	120	130	M

HOW TO ORDER

GM — **Type Code**
GM = TWIN CAP®

25 — **Case Code**
15
20
25
30
35
40

1 — **Rated Voltage Code**
1 = 100WVDC

J — **Dielectric Code**
See Table

200 — **Capacitance Value**
See Table

M — **Capacitance Tolerance**
A = ±0.05pF
B = ±0.1pF
C = ±0.25pF
D = ±0.5pF
G = ±2%
J = ±5%
K = ±10%
M = ±20%

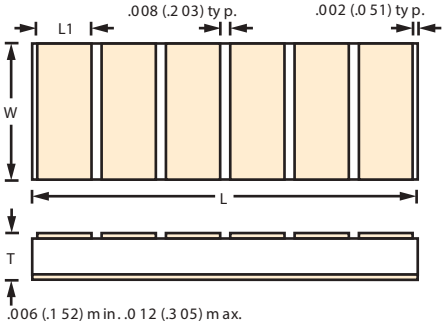
A — **Termination Code**
N = Ti/W-Ni-Au
Au (100µ-in min)
over
Ni (1500Å nom)
over
Ti/W (500Å nom)
A = TiW-Au

6N — **Packaging Code**
6N = Waffle Pack

RoHS COMPLIANT

NOTE: "2" Dielectric is not RoHS

Microwave SLCs
GA Series – Multiple Pad SLC's
Multi-Cap Arrays



GA SERIES MULTIPLE PAD SLCs are ideal for circuits such as MMIC devices requiring multiple capacitance applications, i.e., bypassing and bias circuits. The GA Multicaps in the Selection Guide below are listed using KAVX's GA and K dielectrics, with a pad length of .015 (.380). However, other array designs are possible. Please consult factory.

SELECTION GUIDE

Style	Total Width (W) +- 0.003 (0.076)	Total Length (L) +- 0.005 (0.127)	W x L Per Pad	Cap Value (pF)		Number of Pads	Part Number "C"	Part Number "K"
				C	K			
C	0.015 (0.381)	0.065 (1.650)	0.015 (0.381) X 0.015 (0.381)	33	70	3	GACC1C990MN6N	GACC1K211MN6N
D	0.020 (0.508)	0.065 (1.650)	0.020 (0.508) x 0.015 (0.381)	40	90	3	GACD1C121MN6N	GACD1K271MN6N
E	0.025 (0.635)	0.065 (1.650)	0.025 (0.635) x 0.015 (0.381)	50	110	3	GACE1C151MN6N	GACE1K331MN6N
E	0.025 (0.635)	0.090 (2.290)	0.025 (0.635) x 0.015 (0.381)	50	110	4	GADE1C201MN6N	GADE1K441MN6N
F	0.030 (0.762)	0.065 (1.650)	0.030 (0.762) x 0.015 (0.381)	60	130	3	GACF1C181MN6N	GACR1K391MN6N
F	0.030 (0.762)	0.090 (2.290)	0.030 (0.762) x 0.015 (0.381)	60	130	4	GADF1C241MN6N	GADF1K521MN6N
G	0.035 (0.889)	0.065 (1.650)	0.035 (0.889) x 0.015 (0.381)	80	140	3	GACG1C241MN6N	GACG1K421MN6N
G	0.035 (0.889)	0.090 (2.290)	0.035 (0.889) x 0.015 (0.381)	80	140	4	GADG1C321MN6N	GADG1K561MN6N
G	0.035 (0.889)	0.135 (3.430)	0.035 (0.889) x 0.015 (0.381)	80	140	6	GAFG1C481MN6N	GAFG1K841MN6N
H	0.040 (1.020)	0.065 (1.650)	0.040 (1.020) x 0.015 (0.381)	90	150	3	GACH1C271MN6N	GACH1K451MN6N
H	0.040 (1.020)	0.090 (2.290)	0.040 (1.020) x 0.015 (0.381)	90	150	4	GADH1C361MN6N	GADH1K601MN6N
H	0.040 (1.020)	0.135 (3.430)	0.040 (1.020) x 0.015 (0.381)	90	150	6	GAFH1C541MN6N	GAFH1K901MN6N
I	0.045 (1.140)	0.065 (1.650)	0.045 (1.140) x 0.015 (0.381)	100	200	3	GACI1C301MN6N	GACI1K601MN6N
I	0.045 (1.140)	0.090 (2.290)	0.045 (1.140) x 0.015 (0.381)	100	200	4	GADI1C401MN6N	GADI1K801MN6N
I	0.045 (1.140)	0.135 (3.430)	0.045 (1.140) x 0.015 (0.381)	100	200	6	GAFI1C601MN6N	GAFI1K122MN6N
J	0.050 (1.270)	0.065 (1.650)	0.050 (1.270) x 0.015 (0.381)	110	220	3	GACJ1C331MN6N	GACJ1K661MN6N
J	0.050 (1.270)	0.090 (2.290)	0.050 (1.270) x 0.015 (0.381)	110	220	4	GADJ1C441MN6N	GADJ1K881MN6N
J	0.050 (1.270)	0.135 (3.430)	0.050 (1.270) x 0.015 (0.381)	110	220	6	GAFJ1C661MN6N	GAFJ1K132MN6N

Thickness (T): .006 (0.15) min.; .012 (0.30) max.
Gap between pads: .008 (.203) typical.
Note: Other sizes and configurations are available using any dielectric in this catalog.

HOW TO ORDER

GA	F	H	1	C	154	M	A	6N
Type Code GA = Cap Array	**Array Code** C = 3 D = 4 F = 6	**Style** See Table	**Rated Voltage Code** 1 = 100WVDC	**Dielectric Code** C K	**Capacitance Value** See Table	**Tolerance** A - M TX	**Termination Code** **N = Ti/W-Ni-Au** Au (100µ-in min) over Ni (1500Å nom) over Ti/W (500Å nom) **A = TiW-Au**	**Packaging Code** 6N = Waffle Pack

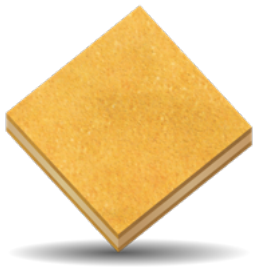
RoHS COMPLIANT

TABLE I - Dielectric Codes, Types & Product Styles

Dielectric Type & Code		Dielectric Constant	Temperature Coefficient	Temperature Range	Min Q at 1MHz	Max. DF (%)*		IR (Min) 25°C
						1 MHz	1 kHz	
NPO	A	14	+90±30PPM/°C	-55°C to +125°C	10,000	0.01	N/A	10^5 Mohms
	1	31	0±30PPM/°C		660	0.15	N/A	
	2**	60	0±30PPM/°C		660	0.15	N/A	
Temp Comp	3	130	-750±200PPM/°C	-55°C to +125°C	660	0.15	N/A	10^5 Mohms
	5	165	-1500±500PPM/°C		400	0.25	N/A	
	4	200	±7.5% (non-linear)		400	0.25	N/A	
	7	420	-2000±500PPM/°C		200	0.70	0.30	
	Y	650	-4700±1500PPM/°C		400	0.30	0.30	
	6	650	±10% (non-linear)		60	1.50	1.50	
X7R	J	1,100	+5% to -15% (non-linear)	-55°C to +125°C	40	2.50	2.00	10^5 Mohms
	F	2,000	±15% (non-linear)		40	2.50	2.00	
	C	4,000	±15%		25	4.00***	2.00***	
	G	6,000	+10% to -75% max. change (non-linear)		40	2.50	2.00	
	K	9,000	0% to -92% max. change (non-linear)		25	6.00	2.00	
	L	16,000	0/-92%		30	3.50	2.00	
X7S	Z	5,000-18,000	±22%	-55°C to +125°C	30	NA	2.5	10^4 Mohms
X7R	8	20,000	±15%	-55°C to +125°C	30	NA	2.5	10^4 Mohms
	9	30,000	±15%					
	0	60,000	±15%					

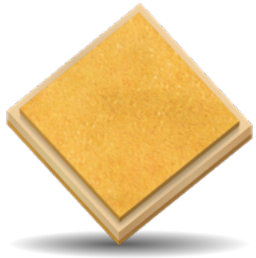
*Capacitance & DF are measured at 1MHz for values ≤100pF and 1 KHz for capacitance values >100pF
**NOTE: Code 2 DIELECTRIC IS NOT RoHS COMPLIANT
***DF for the GP, GM, and the GA series with C dielectric is 6.5%

GH SERIES



GB SERIES

GP SERIES



GN SERIES

TABLE II

MIL Reference	Parameter	Method or Paragraph
MIL-STD-883	Bond Strength	2011.7
MIL-STD-883	Shear Strength	2019
MIL-PRF-49464	Thermal Shock	4.8.3
MIL-PRF-49464	Voltage Conditioning	4.8.3
MIL-PRF-49464	Temperatue Coefficient	4.8.10
MIL-STD-202	Low Voltage Humidity	103 A
MIL-STD-202	Life Test	108

COTS

Commercial Off The Shelf

High Reliability Certification Program

The COTS Program provides a cost efficient approach to qualifying standard products for enhanced reliability applications. This flexible program offers standard screening packages with options to support specifics of customer-driven program requirements.

Applications:

- **Ruggedized Commercial**

(Medical, Industrial, Telecommunications)

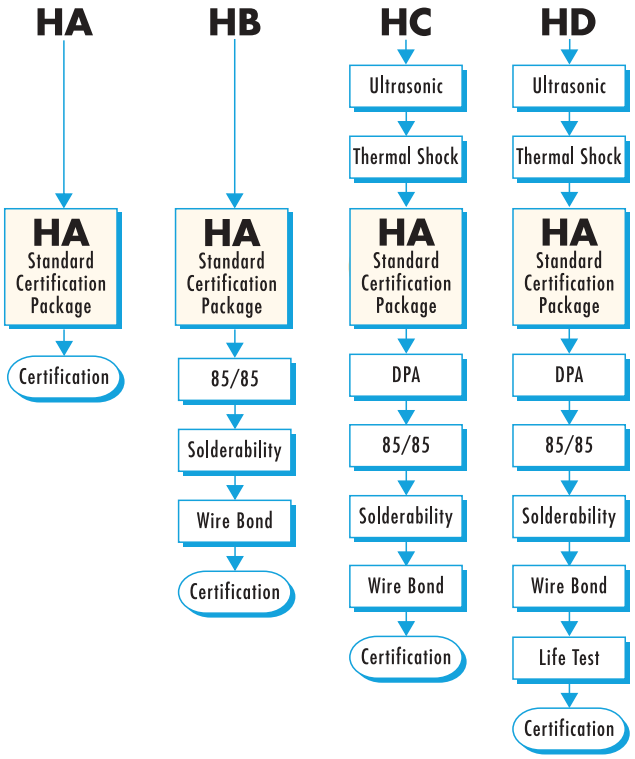
- **Military**

(Ground, Naval, Airborne)

- **Space/Satellite**

Availability:

Contact KYOCERA AVX for more information regarding which parts are eligible for high reliability screening and any custom options.



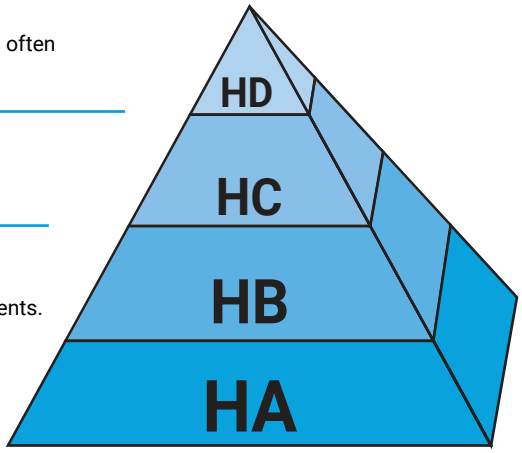
COTS Screening Options

HD: Highest Screening Level
The highest screening option adds life testing as an assurance in mission critical applications and is often used as an alternative in space qualified applications.

HC: Airborne Applications
Often used in airborne applications, this profile closely models the military specifications.

HB: Additional Sample Testing
Built upon our standard HA Screening, this program provides additional sample testing to certify the termination for attachment integrity and the ability to survive and perform in high humidity environments.

HA: Standard Upscreen Package
KYOCERA AVX's Standard Hi Rel certification screening profile is typically used as a lower cost means to certify product reliability. HA screening is used throughout the industry in ground based military applications as well as stringent commercial applications.



P/N Prefix				Evaluation Operation	Sample Size
HA	HB	HC	HD		
		X	X	Ultrasonic Screening†	100%
		X	X	Thermal Shock (5 Cycles for HC and 20 Cycles for HD)	100%
X	X	X	X	Standard Hi-Rel Certification Package (HA)	100%
		X	X	Destructive Physical Analysis	see table*
	X	X	X	85/85 (Low Voltage Moisture Humidity)	13 units*
	X	X	X	Solderability (Solderable or Solder Coated Only)	5 units*
	X	X	X	Wire Bond Test (Gold Terminated Chips Only)	13 units*
			X	Life Test (2000)	25 units*

DPA Sample Table	
Lot Size	Sample
1 - 500	14
501 - 10,000	32
10,001 - 35,000	50
35,001 and up	80

* Additional sample units required that have passed the 100% testing along with the deliverable (flight) quantity.
† Ultrasonic Screening does not apply to SLC products.