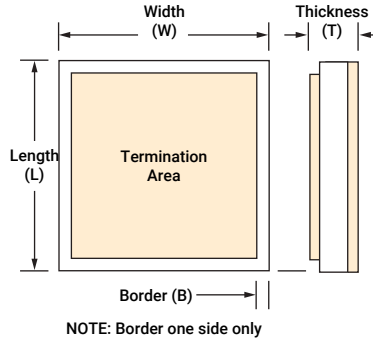
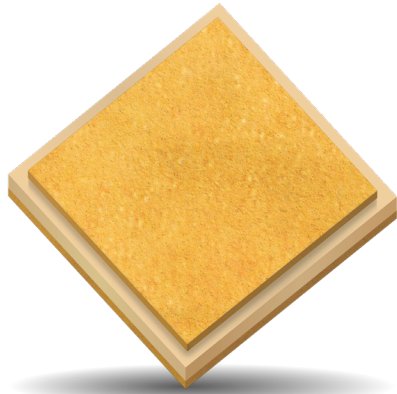


Microwave SLCs

GP/GH Series – SLC's With Borders

Single Sided Recessed Metalization



GP SERIES SINGLE RECESSED METALIZATION SLCs – have been designed to minimize potential shorting resulting from epoxy or solder attachments. Contact KYOCERA AVX for further information.

FEATURES

- Capacitance Range: 0.05 pF to 1800 pF
- Exposed Borders for: Automated Visual Equipment, Solder Resist Area to Reduce Shorts
- Operating Frequency up to 100 GHz

APPLICATIONS

- Microwave Integrated Circuits
- Automated MIC Construction
- Chip and Wire Construction
- Matching and Filtering Circuits
- Bypass and Coupling

Case Size		GP15			GP20			GP25			GP30			GP35			GP40			GP50		
Dimensions (L&W nom.)		0.015 (0.381) ± 0.002 (0.0508)			0.020 (0.508) ± 0.002 (0.0508)			0.025 (0.635) ± 0.002 (0.0508)			0.030 (0.762) ± 0.002 (0.0508)			0.035 (0.889) ± 0.002 (0.0508)			0.040 (1.016) ± 0.002 (0.0508)			0.050 (1.270) ± 0.002 (0.0508)		
Recessed Metallization (LW)		+ 0 / - 0.003 (0.0762)			+ 0 / - 0.003 (0.0762)			+ 0 / - 0.003 (0.0762)			+ 0 / - 0.003 (0.0762)			+ 0 / - 0.003 (0.0762)			+ 0 / - 0.003 (0.0762)			+ 0 / - 0.003 (0.0762)		
Min. Thickness (T)		0.0045 (0.114)			0.0045 (0.114)			0.0045 (0.114)			0.0045 (0.114)			0.0045 (0.114)			0.0045 (0.114)			0.0045 (0.114)		
Max. Thickness (T)		0.012 (0.305)			0.012 (0.305)			0.012 (0.305)			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	0.06	0.1	A	0.2	0.2	A, B	0.2	0.3	A, B	0.3	0.4	A, B	0.4	0.6	A, B	0.5	0.9	B, C	0.8	1.3	B, C
1	31	0.2	0.2	A, B	0.3	0.4	B, C	0.4	0.7	B, C	0.6	1.0	B, C, D	0.8	1.5	C, D	1.1	2.0	C, D	1.8	3.0	C, D
2	60	0.3	0.4	B, C	0.5	0.8	C, D	0.8	1.3	C, D	1.2	2.0	C, D	1.6	3	C, D	2.2	3.9	C, D	3.6	6.2	D, K, M
3	130	0.6	0.9	C, D	1.0	1.8	C, D	1.8	3	D, M	2.4	4.3	D, K, M	3.6	6.2	D, K, M	4.7	8.2	K, M	7.5	13	K, M
5	165	0.7	1.2	C, D	1.3	2.2	D	2.2	3.9	D, M	3.3	5.6	D, K, M	4.3	7.5	K, M	5.6	10	K, M	9.1	16	K, M
4	200	0.9	1.3	D, M	1.5	2.7	D, M	2.7	4.7	M	3.9	6.8	K, M	5.1	9.1	K, M	6.8	13	K, M	11	20	K, M
7	420	1.5	2.4	D, M	2.7	4.7	M	4.7	8.2	M	6.8	12	K, M	9.1	16	K, M	12	22	K, M	20	36	K, M
Y	650	2.7	4.7	M	4.7	9.1	M	8.2	15	M	12	22	K, M	18	30	K, M	22	39	K, M	36	62	K, M
6	650	2.7	4.7	M	4.7	9.1	M	8.2	15	M	12	22	K, M	18	30	K, M	22	39	K, M	36	62	K, M
J	1100	4.7	7.5	M	8.2	15	M	15	24	M	22	36	K, M	30	51	K, M	39	68	K, M	62	110	K, M
F	2000	9.1	13	M	16	27	M	27	47	M	39	68	K, M	51	91	K, M	68	120	K, M	110	200	K, M
C	4000	20	33	M	36	62	M	56	100	M	91	150	K, M	120	200	K, M	160	270	K, M	270	430	K, M
G	6000	27	43	M	47	82	M	75	130	M	120	200	M	160	270	M	220	360	M	330	620	M
K	9000	39	56	M	68	110	M	120	180	M	180	270	M	240	390	M	330	510	M	510	820	M
L	16000	68	100	M	120	180	M	200	300	M	300	470	M	390	620	M	510	820	M	820	1800	M

HOW TO ORDER

GP	15	1	A	0R5	B	N	6N
Type Code	Case Code	Rated Voltage Code* 1 = 100WVDC	Dielectric Code See Table	Capacitance Value EIA Cap Code in pF First two digits = significant figures or "R" for decimal place. Third digit = number of zeros or after "R" significant figures.	Capacitance Tolerance A = ±0.05pF B = ±0.1pF C = ±0.25pF D = ±0.5pF G = ±2% J = ±5% K = ±10% M = ±20%	Termination Code A = Ti/W-Au Ti/W (1000A nom)- Au (100 u-in min) N = Ti/W-Ni-Au Ti/W (500A nom) - Ni (1500A nom)- Au (100u-in min)	Packaging Code 6N = Waffle Pack

*Other voltages available. Contact factory for details.

Microwave SLCs

GP/GH Series – SLC's Without Borders

NP0, Temp Compensating & X7R Dielectrics



GENERAL INFORMATION

In addition to the standard SLC products shown below, KYOCERA AVX is now able to offer bordered versions in these same dielectric families as detailed on the opposing page utilizing micron resolution photolithography and etching processes.

With borders precisely defined, these parts will be beneficial in those applications that require enhanced visual definition during placement and wire bonding. Additionally, bordered devices have proven effective in reducing susceptibility to conductive epoxy electrode bridging.

Custom designs to meet stringent circuit trace width matching requirements are available upon request.

GH SERIES: SINGLE LAYER CAPACITORS WITHOUT BORDERS

NP0, TEMPERATURE COMPENSATING & X7R DIELECTRICS

	GH16			GH18			GH26			GH35		
(L) Length / (W) Width	0.015±0.003 (0.381±0.076)			0.018±0.003 (0.457±0.076)			0.025±0.005 (0.635±0.127)			0.035±0.005 (0.889±0.127)		
(T) Thickness	0.0045-0.012 (0.114-0.305)											
	Cap (pF)			Cap (pF)			Cap (pF)			Cap (pF)		
Dielectric	Min	Max	Tol	Min	Max	Tol	Min	Max	Tol	Min	Max	Tol
A	0.06	0.2	A	0.08	0.2	A	0.2	0.4	A,B	0.4	0.9	A,B,C
1	0.2	0.5	A,B	0.2	0.5	A,B	0.4	1	A,B,C	0.7	2	A,B,C,D
2	0.3	1	B,C	0.4	1.1	A,B,C,D	0.8	2	B,C,D	1.5	3.9	B,C,D
3	0.6	2	C,D	0.8	2.2	B,C,D	1.5	4.3	C,D	3	8.2	C,D
5	0.7	2.7	C,D	1	2.7	C,D	2	5.6	C,D	3.9	11	D,J,K,M
4	0.8	3	C,D	1.2	3.6	C,D	2.4	6.8	C,D	4.7	13	D,J,K,M
7	1.5	5.6	D,K,M	2.2	6.2	D,J,K,M	4.3	12	D,J,K,M	8.2	22	J,K,M
Y	2.7	10	K,M	4.3	11	D,J,K,M	7.5	22	J,K,M	15	43	J,K,M
6	2.7	10	K,M	4.3	11	D,J,K,M	7.5	22	J,K,M	15	43	J,K,M
J	4.7	18	K,M	6.8	18	J,K,M	13	36	J,K,M	27	75	J,K,M
F	8.2	33	K,M	13	36	J,K,M	24	68	J,K,M	47	130	J,K,M
C	18	55	K,M	30	75	J,K,M	56	150	J,K,M	110	250	J,K,M
G	27	91	M	39	100	M	75	200	M	150	390	M
K	36	130	M	56	130	M	110	270	M	220	510	M
L	62	220	M	91	20	M	180	510	M	390	1000	M

	GH50			GH70			GH90		
(L) Length / (W) Width	0.050±0.010 (1.27±0.254)			0.070±0.010 (1.78±0.254)			0.090±0.010 (2.29±0.254)		
(T) Thickness	0.0045-0.012 (0.114-0.305)								
	Cap (pF)			Cap (pF)			Cap (pF)		
Dielectric	Min	Max	Tol	Min	Max	Tol	Min	Max	Tol
A	0.6	2	A,B,C	1.3	3.8	A,B,C	2.2	5.6	A,B,C
1	1.5	4.7	B,C,D	3	8.2	B,C,D	5.1	13	C,D
2	2.7	9.1	C,D	6.2	16	D,G,J,K,M	10	25	G,J,K,M
3	5.6	20	D,G,J,K,M	12	36	G,J,K,M	22	56	G,J,K,M
5	6.8	24	D,G,J,K,M	15	43	G,J,K,M	27	68	G,J,K,M
4	8.2	30	G,J,K,M	20	55	G,J,K,M	33	82	G,J,K,M
7	15	51	G,J,K,M	33	91	G,J,K,M	56	150	G,J,K,M
Y	27	100	G,J,K,M	62	180	G,J,K,M	110	270	G,J,K,M
6	27	100	G,J,K,M	62	180	G,J,K,M	110	270	G,J,K,M
J	47	160	J,K,M	100	300	J,K,M	180	470	J,K,M
F	82	300	J,K,M	220	550	J,K,M	330	820	J,K,M
C	180	600	J,K,M	430	1000	J,K,M	750	1700	J,K,M
G	240	910	M	560	1600	M	1000	2400	M
K	360	1200	M	910	2200	M	1500	3300	M
L	620	2200	M	1500	3900	M	2400	6200	M

DIMENSIONS: inches (millimeters)

HOW TO ORDER

GH	16	5	A	6R8	M	N	6N
Type Code GH = w/o borders	Case Code	Rated Voltage Code* 5 = 50WVDC 1 = 100WVDC	Dielectric Code See Table	Capacitance Value EIA Cap Code in pF First two digits = significant figures or "R" for decimal place. Third digit = number of zeros or after "R" significant figures.	Capacitance Tolerance A = ±0.05pF B = ±0.1pF C = ±0.25pF D = ±0.5pF G = ±2% J = ±5% K = ±10% M = ±20%	Termination Code A=Ti/W-Au Ti/W (1000A nom)- Au (100 u-in min) N = Ti/W-Ni-Au Ti/W(500A nom) - Ni (1500A nom)- Au (100u-in min)	Packaging Code 6N = Waffle Pack

* Other voltages available. Contact factory for details.

Microwave SLCs

GP/GH Series – SLC's With Borders

Single Layer Ceramic Capacitors (SLC's)



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%		30			
	0	60,000	±15%		20			

*Capacitance & DF are measured at 1MHz for values ≤100pF and 1 KHz for capacitance values >100pF
 ***DF for the GP, GM, and the GA series with C dielectric is 6.5%

GH SERIES

GB SERIES

GP SERIES

GN SERIES

GD SERIES

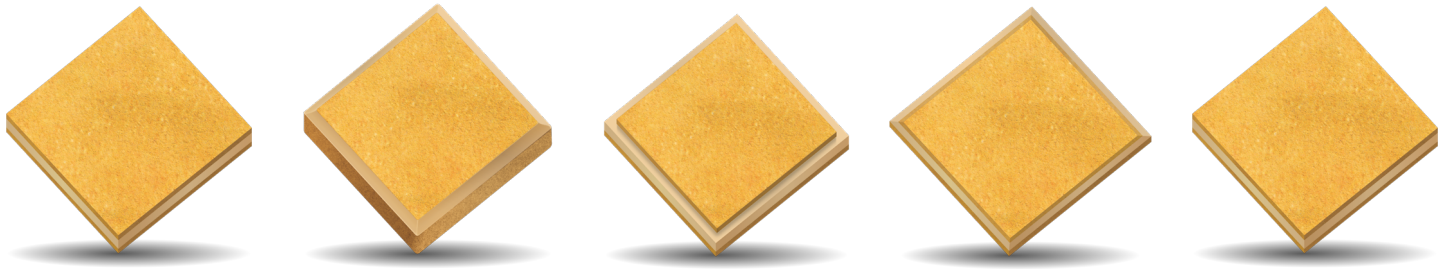


TABLE II – QUALIFICATION TESTING

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	Temperature Coefficient	4.8.10
MIL-STD-202	Low Voltage Humidity	103 A
MIL-STD-202	Life Test	108

KYOCERA AVX's Microcap products are designed and manufactured to meet or exceed the above requirements as detailed in MIL-STD-202 and MIL-PRF-49464

Microwave SLCs

GP/GH Series – SLC's With Borders

High Reliability Certification Program



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

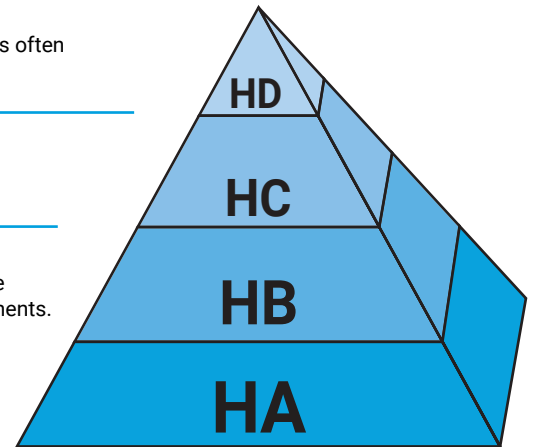
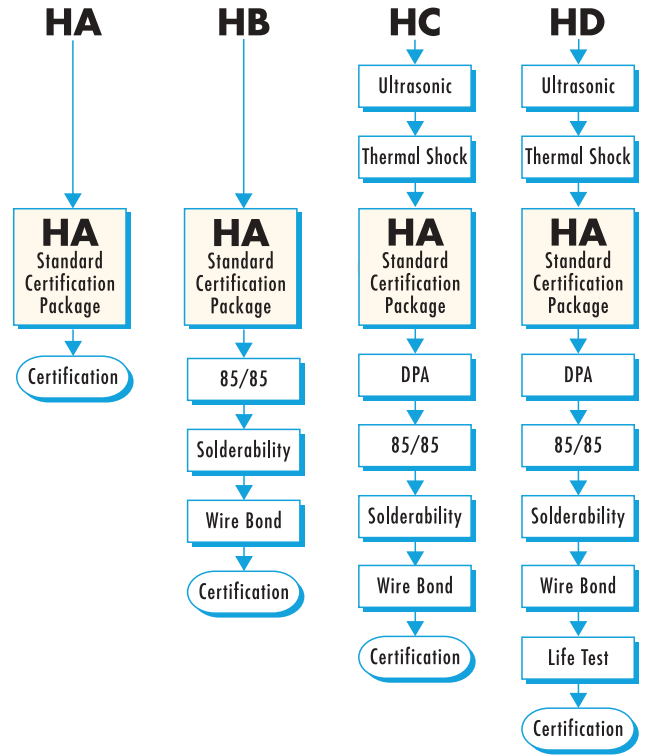
Often used in airborne applications, this profile closely models the military specifications.

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.