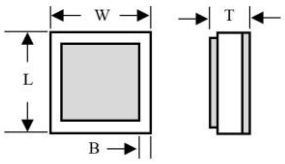
Single Layer Capacitors

Border Cap

Product Features

Border Caps have the topside electrode withdrawn from the edges in order to increase the distance between electrodes and dramatically decrease the possibilities of shorting when epoxy die-mounting. This style is also widely used for optical recognition-based assembly.

Increased margin sizes and special terminations are available for high power LC filter applications. Border Caps can be customized to any sized square or rectangle. Contact PPI for more information.



Part Numbering

PP B – FS1 – 29×19 × 6 – D4 – 1R0 – K – 3 W

- PP = Passive Plus
- Capacitor Style *B = Border*
- Dielectric Code *See Table*
- Length & Width (mils)
- Thickness (mils)
- Metallization *See Table*
- Capacitance Value *See Table*
- Tolerance *See Table*
- Voltage *See Table*
- Packaging W = Waffle Pack (Standard)

Thicknesses (mils)

Length & Width	L or W Tolerance	Margin Nominal	Thickness
≤ .010	± .002	0.001	± .0015
.011 - .029	± .002	0.002	
≥ .030	± .003	0.002	

All dimensions given are inches

Metallization Codes

Code	Description
D4	Ti/Pt/Au Titanium/Platinum/Gold **(70 µin Gold)**
S7	Ti/Pt/Ag Titanium/Platinum/Silver **(20 µin Silver)**
K2	Ta/Pd/Au Tantalum/Palladium/Gold **(75 µin Gold)**
L3	Ta/Pd/Au Tantalum/Palladium/Gold **(100 µin Gold)**

Contact PPI for available metallizations.

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Substrates

Substrates can be supplied as follows:

• **Bare**	
• **Metallized:**	• Gold over Platinum, Palladium, or Nickel • Silver over Platinum • Custom schemes and patterns to Customer specifications
Thickness Range	3 mils +
Length and Width	Up to 4” depending on material

Standard Electrode Metallizations

Gold (D4)	This metallization consists of a minimum of 70 micro-inches of Gold over Platinum or Nickel which is ideal for all wirebonding methodologies.
Silver (S7)	This metallization consists of 20 micro-inches of Silver over Platinum which is ideal for all solder applications whenever the use of Gold is unacceptable.

Capacitance Tolerance Codes

Class I Dielectrics: AS1 - KS2			
Tolerance	**Code**	**Tolerance**	**Code**
± .50pF	D	± 20%	M
± .25pF	C	± 15%	L
±.10pF	B	± 10%	K
± .05pF	A	± 5%	J
± .01pF	P	± 3%	H
		± 2%	G

Class II Dielectrics: MS1 – ZS6			
Tolerance	**Code**	**Tolerance**	**Code**
-10% thru +40%	Y	± 20%	M
-20% thru +80%	Z	± 15%	L
0% thru +100%	V	± 10%	K
Guaranteed Min. Value	GMV	± 5%	J

Capacitance Codes

Value	Code
<10pF	1R0 = 1.0pF
>10pF	101 = 100pF

Rated Voltage Codes

Code	Voltage	Dielectric Thickness
2	50V	4 mils
3	100V	6 mils

Packaging

PPI SLCs are available in Waffle Packs (Standard).
Other packaging options may be available.
Please contact PPI.

Dielectric Materials – Class I

Dielectrics below consist of material exhibiting very low losses, extremely low or closely controlled temperature coefficients, negligible voltage and frequency coefficients, negligible aging effects and high insultation and dielectric breakdown.

Type	IR Min @ 25°C	Temperature Coefficient (-25 to 125°C)	Dissipation Factor (@ 10GHz)	Dielectric Constant (K)	Material
AS1	10^{12}	Negligible	0.0001	3.8	Quartz
AS2	10^{12}	Negligible	0.0001	3.9	Si
AS3	10^{12}	Negligible	0.0001	6.6	BeO
AS6	10^{12}	P120 ± 25ppm	0.0001	8.7	AlN
AS7	10^{12}	P180 ± 50ppm	0.0006	9.6	Alumina 96
AS8	10^{12}	P180 ± 50ppm	0.0006	9.8	Alumina 99.6
BS2	10^{12}	NP0 ± 30ppm	0.0001	12.6	Titanate
CS1	10^{12}	0 ± 30ppm	0.001	20	Titanate
ES1	10^{12}	0 ± 30ppm	0.002	40	Titanate
FS1	10^{12}	0 ± 30ppm	0.005	50	Titanate
IS1	10^{15}	0 ± 30ppm	0.005	84	Titanate
KS3	10^{6}	N1500 ± 500ppm	0.0025	160	Titanate

Dielectric Materials – Class II

Dielectrics below are characterized by high dielectric constants, increased losses and higher temperature coefficients. These properties are inherent with this class of material but the high dielectric constants permit the use of smaller size to achieve low series inductance and meet dimensional requirements. Capacitors made with these materials are often used for coupling of microstrip line circuits where a small chip is necessary. Used as a bypass capacitor, the small size provides low series inductance and dielectric losses are typically of little concern.

Type	IR (MEG-OHMs) 100VDC @ 25°C	Temperature Coefficient (-55 to 125°C)	Dissipation Factor (@ 1 MHz)	Aging (%) HR/Decade	Dielectric Constant (K)
MS1	10^5	5 to -10	0.010	2.0	300
PS1	10^4	± 10%	0.025	3.0	700
SS3	10^5	3 to -10	0.015	3.5	2,200
US1	10^5	0 to -35	0.020	3.0	4,000
US3	10^5	3.0	0.025	3.0	5,000
RS2	10^4	± 10%	0.025	3.0	1250
ZS1	10^5	0 to -80	0.025	3.0	11,000
ZS4	*Contact PPI*	15 to -15	0.035	3.0	25,000
ZS6	*Contact PPI*	15 to -15	0.035	3.0	35,000
US3	10^5	± 15%	0.030	3.0	4500

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Capacitance, Case Size & Dielectric Availability - Class I Dielectrics

Cap (pF)	Size mils (mm)																	
	10x10 (.254 x .254)		12x12 (.305 x .305)		15x15 (.381 x .381)		20x20 (.508 x .508)		25x25 (.635 x .635)		30x30 (.762 x .762)		35x35 (.889 x .889)		40x40 (1.016 x 1.016)		50x50 (1.270 x 1.270)	
	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness
0.04	AS7	4	AS7	4	AS7	5	AS1	5										
0.06	ES1	10	AS7	4	AS7	6	AS1	5	AS1	8	AS1	10						
0.08	ES1	7	ES1	10	AS7	5	AS7	10	AS1	6	AS1	8	AS1	11				
0.1	ES1	6	ES1	9	AS7	4	AS7	7	AS1	5	AS1	7	AS1	10				
0.2	IS1	4	ES1	4	ES1	5	AS7	4	AS7	5	AS7	7	AS1	4	AS1	5	AS1	10
0.3	KS2	6	IS1	5	ES1	4	ES1	8	AS7	4	AS7	5	AS7	7	AS1	4	AS1	6
0.4	KS2	4	IS1	4	IS1	6	ES1	6	ES1	10	AS7	4	AS7	5	AS7	7	AS1	5
0.5	MS1	5	KS2	4	IS1	5	ES1	4	ES1	7	ES1	10	AS7	4	AS7	6	AS7	10
0.6	MS1	5	KS2	5	IS1	4	ES1	4	ES1	6	ES1	10	AS7	4	AS7	5	AS7	7
0.8	MS1	5	MS1	5	KS2	5	IS1	6	ES1	5	ES1	7	ES1	10	AS7	4	AS7	6
1.0	MS1	4	MS1	5	KS2	4	IS1	5	ES1	4	ES1	6	ES1	8	ES1	10	AS7	5
1.2	RS1	6	MS1	5	MS1	7	IS1	4	IS1	7	ES1	5	ES1	7	ES1	10	AS7	4
1.5	RS1	7	MS1	4	MS1	6	KS2	6	IS1	6	IS1	8	ES1	6	ES1	7	ES1	15
1.8	RS1	6	MS1	4	MS1	5	KS2	5	IS1	5	IS1	7	ES1	5	ES1	7	ES1	10
2.0	RS1	6	RS1	8	MS1	4	KS2	5	IS1	5	IS1	6	ES1	4	ES1	6	ES1	10
2.2	RS1	5	RS1	7	MS1	4	MS1	7	KS2	7	IS1	6	ES1	4	ES1	5	ES1	10
2.7	RS1	5	RS1	6	MS1	4	MS1	6	KS2	6	IS1	6	IS1	8	ES1	5	ES1	8
3.3	SS3	6	RS1	6	RS1	8	MS1	5	KS2	5	IS1	4	IS1	6	IS1	7	ES1	6
3.9	SS3	5	RS1	5	RS1	7	MS1	4	KS2	4	KS2	6	IS1	5	IS1	6	ES1	5
4.7	SS3	5	RS1	5	RS1	7	MS1	4	MS1	6	KS2	5	IS1	4	IS1	5	IS1	8
5.6	SS3	5	SS3	6	RS1	5	MS1	4	MS1	5	KS2	4	KS2	6	IS1	5	IS1	7
6.8	US1	5	SS3	6	RS1	5	RS1	8	MS1	5	MS1	7	KS2	5	KS2	7	IS1	6
8.2	US1	4	SS3	5	RS1	4	RS1	7	MS1	4	MS1	6	KS2	4	KS2	5	IS1	5
10	US1	5	SS3	4	SS3	6	RS1	6	MS1	4	MS1	5	MS1	6	KS2	5	IS1	4
12	US1	5	US1	6	SS3	5	RS1	5	RS1	8	MS1	4	MS1	6	KS2	4	KS2	6
15	US1	4	US1	5	SS3	5	RS1	5	RS1	7	MS1	4	MS1	5	MS1	6	KS2	5
18	VS1	4	VS1	6	US1	7	SS3	7	RS1	5	RS1	9	MS1	4	MS1	5	KS2	4
20	ZS1	5	VS1	5	US1	6	SS3	6	RS1	5	RS1	8	MS1	4	MS1	5	KS2	4

Class I Dielectrics

Shaded cells indicate Class II Dielectrics

Capacitance, Case Size & Dielectric Availability – Class II Dielectrics

Cap (pF)	Size mils (mm)																	
	10x10 (.254 x .254)		12x12 (.305 x .305)		15x15 (.381 x .381)		20x20 (.508 x .508)		25x25 (.635 x .635)		30x30 (.762 x .762)		35x35 (.889 x .889)		40x40 (1.016 x 1.016)		50x50 (1.270 x 1.270)	
	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness	Dielectric	Thickness
22	ZS1	7	VS1	4	US1	5	SS3	6	RS1	5	RS1	7	RS1	10	MS1	4	MS1	6
27	ZS1	6	VS1	4	VS1	5	SS3	5	RS1	4	RS1	6	RS1	8	MS1	4	MS1	5
33	ZS1	5	ZS1	6	VS1	4	SS3	4	SS3	6	RS1	5	RS1	7	RS1	9	MS1	5
39	ZS1	4	ZS1	5	VS1	4	US1	6	SS3	6	RS1	4	RS1	6	RS1	8	MS1	4
47	ZS4	8	ZS1	5	ZS1	6	US1	5	SS3	5	SS3	7	RS1	5	RS1	7	RS1	11
56	ZS4	6	ZS1	4	ZS1	5	VS1	5	SS3	4	SS3	6	RS1	4	RS1	6	RS1	9
68	ZS4	5	ZS4	8	ZS1	5	VS1	4	US1	6	SS3	5	RS1	4	RS1	5	RS1	7
82	ZS6	6	ZS4	6	ZS1	4	VS1	4	US1	5	SS3	4	SS3	6	RS1	4	RS1	6
100	ZS6	5	ZS4	6	ZS1	4	ZS1	6	VS1	5	US1	6	SS3	5	SS3	7	RS1	5
120			ZS4	5	ZS4	6	ZS1	5	VS1	4	VS1	6	SS3	4	SS3	5	RS1	4
150			ZS4	6	ZS4	6	ZS1	4	ZS1	7	VS1	5	VS1	7	SS3	4	SS3	7
180			ZS6	5	ZS4	5	ZS1	4	ZS1	6	VS1	4	VS1	6	SS3	4	SS3	6
200					ZS6	5	ZS1	4	ZS1	6	VS1	4	VS1	5	US1	6	SS3	5
220					ZS6	5	ZS4	8	ZS1	5	VS1	4	VS1	5	US1	5	SS3	5
270					ZS6	5	ZS4	6	ZS1	4	ZS1	7	VS1	4	VS1	6	SS3	4
330							ZS4	5	ZS1	4	ZS1	5	ZS1	7	VS1	5	US1	6
390							ZS4	5	ZS4	6	ZS1	5	ZS1	6	VS1	4	US1	5
470							ZS4	4	ZS4	6	ZS1	4	ZS1	5	ZS1	7	VS1	5
560							ZS6	5	ZS6	6	ZS1	4	ZS1	5	ZS1	6	VS1	4
680									ZS6	6	ZS4	6	ZS1	4	ZS1	5	ZS1	8
820									ZS6	5	ZS4	5	ZS4	8	ZS1	4	ZS1	7
1000											ZS6	6	ZS4	6	ZS4	8	ZS1	6
1200											ZS6	5	ZS4	5	ZS4	7	ZS1	5
1500													ZS6	6	ZS4	5	ZS1	4
1800													ZS6	5	ZS6	6	ZS4	7
2200															ZS6	5	ZS4	6
2700															ZS6	5	ZS4	5
3300																	ZS6	5

Typical Temperature Characteristics