

SMD Metallized Polyphenylene Sulphide Film Capacitor

Related Document: IEC 60384-20

MAIN APPLICATIONS:

Filtering, timing and memory applications. Good stability.
Suitable for high temperature operation.

SIZE CODES:

2220, 2824, 4036, 5045, 6560

MARKING:

Type/ C-value/ rated voltage/ tolerance/ date of manufacture
(chip length $\geq 7.3\text{mm}$)

DIELECTRIC:

Polyphenylene Sulphide (PPS)

ELECTRODES:

Vacuum deposited aluminum

COATING:

Flame retardant plastic case material
(UL-class 94 V-0), color white, epoxy resin sealed

CONSTRUCTION:

Metallized PPS film

CONTACTS:

Tinned terminals

IEC TEST CLASSIFICATION:

55/125/56, according to IEC 60068

OPERATING TEMPERATURE RANGE:

- 55°C to + 125°C for temperatures up to 150°C please
consult Vishay

CAPACITANCE RANGE:

1000pF to 3.3 μF

CAPACITANCE TOLERANCES:

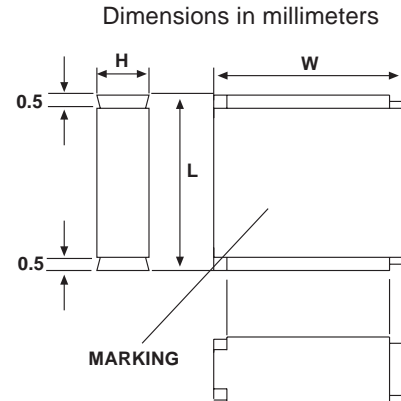
$\pm 5\%$ (J), $\pm 2.5\%$ (H), $\pm 2\%$ (G)

RATED VOLTAGES (U_R):

50VDC, 100VDC, 250VDC

DISSIPATION FACTOR TAN δ :

MEASURED AT	$C \leq 0.1\mu\text{F}$	$0.1\mu\text{F} < C \leq 1.0\mu\text{F}$	$C > 1.0\mu\text{F}$
1kHz	1.5×10^{-3}	1.5×10^{-3}	1.5×10^{-3}
10kHz	2.5×10^{-3}	2.5×10^{-3}	3×10^{-3}
100kHz	5×10^{-3}	6×10^{-3}	
Maximum values at + 23°C			



Components may be vertically mounted for decreased footprint. See page 6 (tape packaging information).

PERMISSIBLE AC VOLTAGES (RMS) UP TO 60Hz:

30VAC, 63VAC, 160VAC

TEST VOLTAGE:

$1.6 \times U_R$ for 60 s

INSULATION RESISTANCE:

Measured at + 20°C acc. to IEC 60384-20

for $C \leq 0.33\mu\text{F}$ and $U_R > 100\text{VDC}$

30 000 M Ω minimum value

for $C \leq 0.33\mu\text{F}$ and $U_R \leq 100\text{VDC}$

15 000 M Ω minimum value

TIME CONSTANT:

Measured at + 20°C acc. to IEC 60384-20

for $> 0.33\mu\text{F}$ and $U_R > 100\text{VDC}$

10 000 s minimum value

for $C > 0.33\mu\text{F}$ and $U_R \leq 100\text{VDC}$

5000 s minimum value

DERATING FOR DC AND AC
CATEGORY VOLTAGE U_C :

1.25% per °C starting at + 100°C

MAXIMUM PULSE RISE TIME:

Values refer to table. If the max. pulse voltage is less than the rated voltage, the specified dv/dt can be multiplied by U_R/U .

CAPACITANCE	CAPACITANCE CODE	50VDC/30VAC VOLTAGE CODE 05 CHIP LENGTH 5.7mm SIZE CODE A					50VDC/30 VAC VOLTAGE CODE 05 CHIP LENGTH 7.3mm SIZE CODE B					50VDC/30VAC VOLTAGE CODE 05 CHIP LENGTH 10.2, 12.7 AND 16.5mm SIZE CODE C, D AND E				
		Dim (mm) ±0.2			Qty	max du/dt	Dim (mm) ±0.2			Qty	max du/dt	Dim (mm) ±0.2			Qty	max du/dt
		W	H	L	Reel	V/μs	W	H	L	Reel	V/μs	W	H	L	Reel	V/μs
1000pF	-210	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
1500pF	-215	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
2200pF	-222	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
3300pF	-233	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
4700pF	-247	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
6800pF	-268	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
0.01μF	-310	5.0	2.5	5.7	3100	20	6.0	2.5	7.3	3100	20	9.1	5.5	10.2	800	4
0.015μF	-315	5.0	2.5	5.7	3100	15	6.0	2.5	7.3	3100	20	9.1	5.5	10.2	800	4
0.022μF	-322	5.0	2.5	5.7	3100	15	6.0	2.5	7.3	3100	20	9.1	5.5	10.2	800	4
0.033μF	-333	5.0	2.5	5.7	3100	15	6.0	2.5	7.3	3100	15	9.1	5.5	10.2	800	4
0.047μF	-347	5.0	3.0	5.7	2400	6	6.0	2.5	7.3	3100	15	9.1	5.5	10.2	800	4
0.068μF	-368	5.0	4.0	5.7	2100	6	6.0	2.5	7.3	3100	15	9.1	5.5	10.2	800	4
0.10μF	-410	5.0	4.0	5.7	2100	6	6.0	3.0	7.3	2500	6	9.1	5.5	10.2	800	4
0.15μF	-415	-	-	-	-	-	6.0	3.5	7.3	2300	6	9.1	5.5	10.2	800	4
0.22μF	-422	-	-	-	-	-	6.0	4.5	7.3	1700	6	9.1	5.5	10.2	800	4
0.33μF	-433	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	4
0.47μF	-447	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	4
0.68μF	-468	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	4
1.0μF	-510	-	-	-	-	-	-	-	-	-	-	11.5	6.5	12.7	600	3
1.5μF	-515	-	-	-	-	-	-	-	-	-	-	11.5	6.5	12.7	600	3
2.2μF	-522	-	-	-	-	-	-	-	-	-	-	15.0	7.0	16.5	500	2
3.3μF	-533	-	-	-	-	-	-	-	-	-	-	15.0	7.0	16.5	500	2

Further C-values upon request

ORDERING CODES

EQUIVALENT SIZE CODES	HORIZONTAL MOUNTING			VERTICAL MOUNTING (OPTIONAL)		
	ORDERING SIZE CODES	BOX SIZE		ORDERING SIZE CODE	BOX SIZE	
		W	L		W	L
2220	A	5.0	5.7	-	-	-
2824	B	6.0	7.3	-	-	-
4036	C	9.1	10.2	CV	5.5	10.2
5045	D	11.5	12.7	DV	6.5	12.7
6560	E	15.0	16.5	EV	7.0	16.5

Dimensions in mm

Ordering code examples

Packaging for horizontal mounting:

MKI 1810-510-055-D

Packaging for vertical mounting:

MKI 1810-510-055-DV



CAPACITANCE	CAPACITANCE CODE	100VDC/63VAC VOLTAGE CODE 01 CHIP LENGTH 5.7mm SIZE CODE A					100VDC/63 VAC VOLTAGE CODE 01 CHIP LENGTH 7.3mm SIZE CODE B					100VDC/63VAC VOLTAGE CODE 01 CHIP LENGTH 10.2, 12.7 AND 16.5mm SIZE CODE C, D AND E				
		Dim (mm) ±0.2			Qty	max du/dt	Dim (mm) ±0.2			Qty	max du/dt	Dim (mm) ±0.2			Qty	max du/dt
		W	H	L	Reel	V/μs	W	H	L	Reel	V/μs	W	H	L	Reel	V/μs
1000pF	-210	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
1500pF	-215	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
2200pF	-222	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
3300pF	-233	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
4700pF	-247	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
6800pF	-268	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
0.01μF	-310	5.0	2.5	5.7	3100	20	6.0	2.5	7.3	3100	20	9.1	5.5	10.2	800	6
0.015μF	-315	5.0	2.5	5.7	3100	15	6.0	2.5	7.3	3100	20	9.1	5.5	10.2	800	6
0.022μF	-322	5.0	3.0	5.7	2400	15	6.0	2.5	7.3	3100	20	9.1	5.5	10.2	800	6
0.033μF	-333	5.0	4.0	5.7	2100	15	6.0	3.0	7.3	2500	15	9.1	5.5	10.2	800	6
0.047μF	-347	-	-	-	-	-	6.0	3.5	7.3	2300	15	9.1	5.5	10.2	800	6
0.068μF	-368	-	-	-	-	-	6.0	4.5	7.3	1700	15	9.1	5.5	10.2	800	6
0.10μF	-410	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	6
0.15μF	-415	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	6
0.22μF	-422	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	6
0.33μF	-433	-	-	-	-	-	-	-	-	-	-	11.5	6.5	12.7	600	5
0.47μF	-447	-	-	-	-	-	-	-	-	-	-	11.5	6.5	12.7	600	5
0.68μF	-468	-	-	-	-	-	-	-	-	-	-	15.0	7.0	16.5	500	3
1.0μF	-510	-	-	-	-	-	-	-	-	-	-	15.0	7.0	16.5	500	3
1.5μF	-515	-	-	-	-	-	-	-	-	-	-	15.0	7.0	16.5	500	3

Further C-values upon request

ORDERING CODES

EQUIVALENT SIZE CODES	HORIZONTAL MOUNTING			VERTICAL MOUNTING (OPTIONAL)		
	ORDERING SIZE CODES	BOX SIZE		ORDERING SIZE CODE	BOX SIZE	
		W	L		W	L
2220	A	5.0	5.7	-	-	-
2824	B	6.0	7.3	-	-	-
4036	C	9.1	10.2	CV	5.5	10.2
5045	D	11.5	12.7	DV	6.5	12.7
6560	E	15.0	16.5	EV	7.0	16.5

Dimensions in mm

Ordering code examples

Packaging for horizontal mounting:

MKI 1810-410-015-C

Packaging for vertical mounting:

MKI 1810-410-015-CV

CAPACITANCE	CAPACITANCE CODE	250VDC/160VAC VOLTAGE CODE 25 CHIP LENGTH 5.7mm SIZE CODE A					250VDC/160VAC VOLTAGE CODE 25 CHIP LENGTH 7.3mm SIZE CODE B					250VDC/160VAC VOLTAGE CODE 25 CHIP LENGTH 10.2, 12.7 AND 16.5mm SIZE CODE C, D AND E				
		Dim (mm) ±0.2			Qty	max du/dt	Dim (mm) ±0.2			Qty	max du/dt	Dim (mm) ±0.2			Qty	max du/dt
		W	H	L	Reel	V/μs	W	H	L	Reel	V/μs	W	H	L	Reel	V/μs
1000pF	-210	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
1500pF	-215	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
2200pF	-222	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
3300pF	-233	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
4700pF	-247	5.0	2.5	5.7	3100	20	-	-	-	-	-	-	-	-	-	-
6800pF	-268	5.0	3.0	5.7	2400	20	-	-	-	-	-	-	-	-	-	-
0.01μF	-310	5.0	4.0	5.7	2100	20	6.0	3.0	7.3	2500	20	9.1	5.5	10.2	800	10
0.015μF	-315	-	-	-	-	-	6.0	3.0	7.3	2500	20	9.1	5.5	10.2	800	10
0.022μF	-322	-	-	-	-	-	6.0	3.5	7.3	2300	20	9.1	5.5	10.2	800	10
0.033μF	-333	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	10
0.047μF	-347	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	10
0.068μF	-368	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	10
0.10μF	-410	-	-	-	-	-	-	-	-	-	-	9.1	5.5	10.2	800	10
0.15μF	-415	-	-	-	-	-	-	-	-	-	-	11.5	6.5	12.7	600	8
0.22μF	-422	-	-	-	-	-	-	-	-	-	-	15.0	7.0	16.5	500	5
0.33μF	-433	-	-	-	-	-	-	-	-	-	-	15.0	7.0	16.5	500	5
0.47μF	-447	-	-	-	-	-	-	-	-	-	-	15.0	7.0	16.5	500	5

Further C-values upon request

ORDERING CODES

EQUIVALENT SIZE CODES	HORIZONTAL MOUNTING			VERTICAL MOUNTING (OPTIONAL)		
	ORDERING SIZE CODES	BOX SIZE		ORDERING SIZE CODE	BOX SIZE	
		W	L		W	L
2220	A	5.0	5.7	-	-	-
2824	B	6.0	7.3	-	-	-
4036	C	9.1	10.2	CV	5.5	10.2
5045	D	11.5	12.7	DV	6.5	12.7
6560	E	15.0	16.5	EV	7.0	16.5

Dimensions in mm

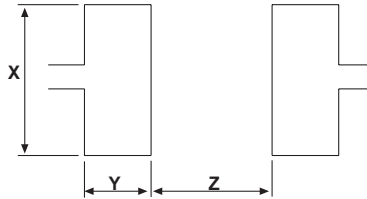
Ordering code examples

Packaging for horizontal mounting: MKI 1810-433-255-E

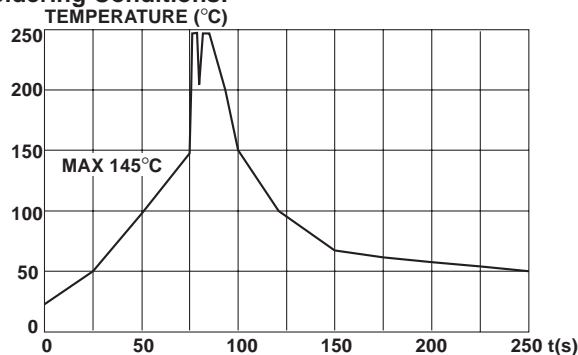
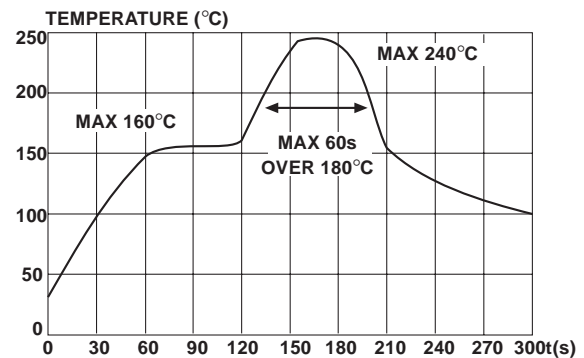
Packaging for vertical mounting: MKI 1810-433-255-EV

SOLDERING OF SMD CAPACITORS

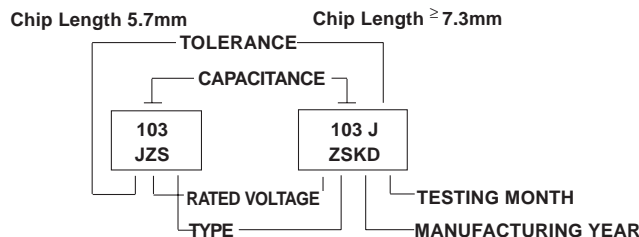
Recommended soldering pad sizes:



HORIZONTAL MOUNTING						VERTICAL MOUNTING (OPTIONAL)					
ORDERING SIZE CODE	BOX SIZE		LANDING PADS			ORDERING SIZE CODE	BOX SIZE		LANDING PADS		
	W	L	X	Y	Z		W	L	X	Y	Z
A	5.0	5.7	1.7-5.0	1.5	4.5	-	-	-	-	-	
B	6.0	7.3	2.0-6.0	1.5	6.0	-	-	-	-	-	
C	9.1	10.2	3.0-9.1	2.0	9.0	CV	5.5	10.2	1.9-5.5	2.0	9.0
D	11.5	12.7	4.0-11.5	2.5	11.5	DV	6.5	12.7	2.2-6.5	2.5	11.5
E	15.0	16.5	5.0-15.0	3.0	15.0	EV	7.0	16.5	2.4-7.0	3.0	15.0

Soldering Conditions:

 RECOMMENDED WAVE SOLDERING PROFILE,
 TOTAL TIME IN SOLDER WAVE <5S


RECOMMENDED REFLOW SOLDERING PROFILE

MARKING OF SMD CAPACITORS

 The nominal **capacitance** value is given with 3 digits.

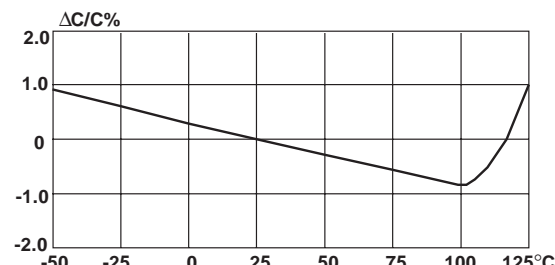
 Example: 103 = $10 \times 10^3 \text{ pF} = 10000 \text{ pF} = 10 \text{ nF} = 0.01 \mu\text{F}$

 The capacitance **tolerance** is expressed with letter codes:
 $\pm 5\%$ (J), $\pm 2.5\%$ (H), $\pm 2\%$ (G),

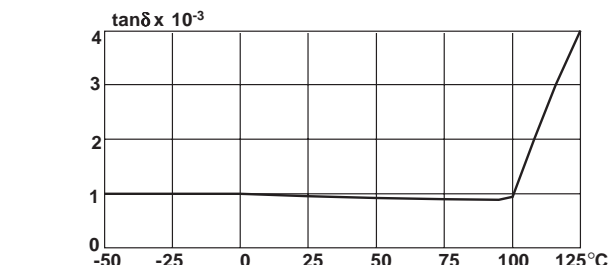
 The **rated voltage** is expressed with letter codes:
 50VDC (Z), 100VDC (D), 250VDC (H)

 The capacitors **type** codes are as follows: MKI1810(S)

 The **manufacturing year** and the **testing month** are expressed according to IEC 60062.

TYPICAL PARAMETERS


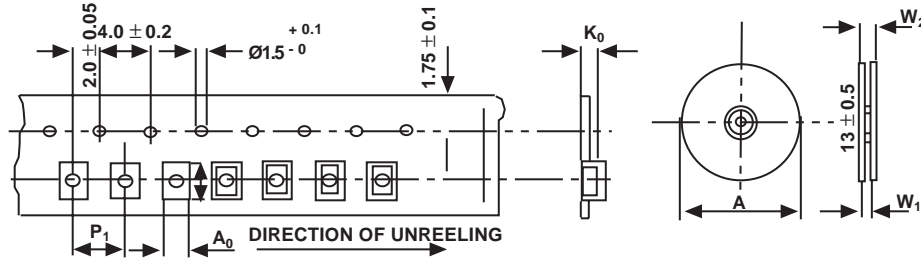
CAPACITANCE VERSUS TEMPERATURE AT 1kHz



DISSIPATION FACTOR VERSUS TEMPERATURE 1kHz

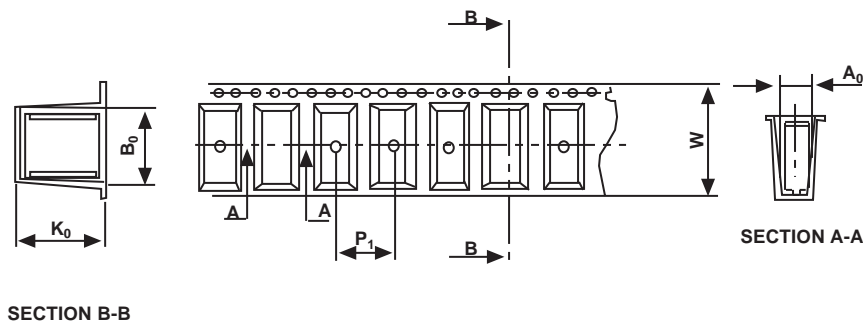
TAPE PACKAGING OF SMD CAPACITORS

Standard taping:



EIA SIZE CODE	SIZE OF CAPACITOR			TAPING DIMENSIONS								
	L	W	H	W + 0.3	P ₁ ± 0.1	A ₀	B ₀	K ₀	A ± 2.0	W ₁ + 2	W ₂ MAX	QTY/PCS
2220	5.7	5.0	2.5	12.0	8.0	5.5	6.0	2.8	330	12.4	22.0	3100
2220	5.7	5.0	3.0	12.0	8.0	5.5	6.0	3.3	330	12.4	22.0	2400
2220	5.7	5.0	4.0	12.0	8.0	5.5	6.0	4.3	330	12.4	22.0	2100
2824	7.3	6.0	2.5	12.0	8.0	6.5	7.5	2.8	330	12.4	22.0	3100
2824	7.3	6.0	3.0	12.0	8.0	6.5	7.5	3.3	330	12.4	22.0	2500
2824	7.3	6.0	3.5	12.0	8.0	6.5	7.5	3.8	330	12.4	22.0	2300
2824	7.3	6.0	4.5	12.0	8.0	6.5	7.5	4.8	330	12.4	22.0	1700
4036	10.2	9.1	5.5	16.0	16.0	9.5	10.5	5.8	330	16.4	22.0	800
5045	12.7	11.5	6.5	24.0	16.0	11.9	13.1	6.8	330	24.4	30.0	600
6560	16.5	15.0	7.0	24.0	20.0	15.4	16.8	7.3	330	21.4	30.0	500

Vertical taping (optional):



EIA SIZE CODE	SIZE OF CAPACITOR			TAPING DIMENSIONS								
	L	W	H	W + 0.3	P ₁ ± 0.1	A ₀	B ₀	K ₀	A ± 2.0	W ₁ + 2	W ₂ MAX	QTY/PCS
4022	10.2	9.1	5.5	24.0	16.0	6.0	10.5	9.3	330	24.5	30.0	500
5026	12.7	11.5	6.5	24.0	16.0	6.9	13.1	11.8	330	24.5	30.0	400
6528	16.5	15.0	7.0	44.0	20.0	7.5	17.0	15.3	330	44.5	49.5	250