

# Impregnated Metallized Paper EMI Suppression Capacitors

## SMP253, Class Y2, 250 VAC Surface Mount Device

### Overview

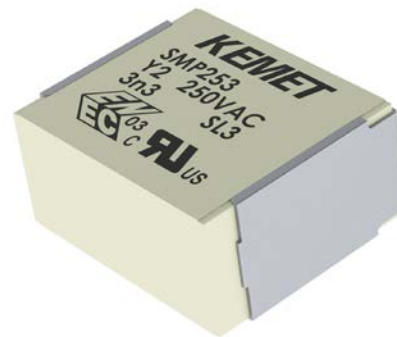
Multilayer, metallized paper, encapsulated and impregnated in self-extinguishing material that meets the requirements of UL 94 V-0.

### Applications

For worldwide use as an electromagnetic interference suppressor in all Y2 applications, line-to-earth.

### Benefits

- High dv/dt capability
- Impregnated paper that ensures excellent stability and reliability properties, particularly in applications with continuous operation
- Approvals: ENEC, cULus
- Rated voltage: 250 VAC 50/60 Hz, maximum recommended DC voltage 1,500 VDC
- Capacitance range: 0.001 – 0.0047  $\mu$ F
- Size code: 5045, 12.7 mm
- Capacitance tolerance:  $\pm$ 20%



### Customer Part Number System

SMP253	M	A	4100	M	TR24
Series	Rated Voltage (VAC)	Chip Length (mm)	Capacitance Code (pF)	Capacitance Tolerance	Packaging
Y2, Metallized Paper	M = 250	A = 12.7	The last three digits represent significant figures. The first digit specifies the total number of digits.	M = $\pm$ 20%	See Table 1

### KEMET Internal Part Number System

P	101	AA	102	M	250	V
Capacitor Class	Series	Chip Size	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VAC)	Packaging
P = Paper	Y2, Metallized Paper	See Dimension Table	First two digits represent significant figures. Third digit specifies number of zeros.	M = $\pm$ 20%	250 = 250	See Ordering Options Table

**Built Into Tomorrow**

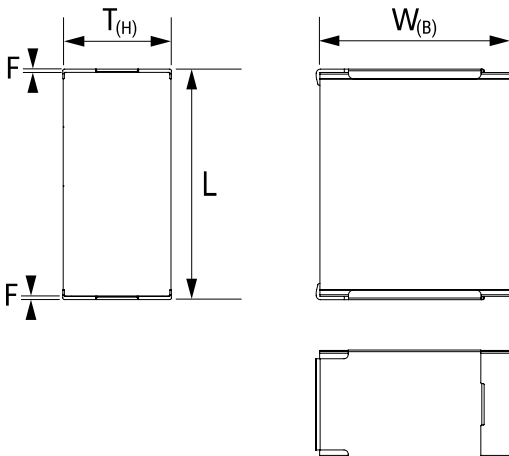
## Benefits cont.

- Climatic category: 40/100/56/B, IEC 60068-1
- Tape & Reel packaging in accordance with IEC 60286-3
- RoHS compliance and lead-free terminations
- Operating temperature range of -40°C to +100°C
- 100% screening factory test at 3,000 VDC
- Highest possible safety regarding active and passive flammability
- Excellent self-healing properties ensure long life, even when subjected to frequent overvoltages
- Good resistance to ionization due to impregnated dielectric
- High dv/dt capability
- Impregnated paper that ensures excellent stability and reliability, particularly in applications with continuous operation

## Ordering Options Table

Packaging Type	KEMET Packaging Code	Legacy Packaging Code
<b>Standard Lead and Packaging Options</b>		
Tape & Reel (Standard Reel)	V	TR24
Bulk (Bag)	A	BULK
<b>Other Lead and Packaging Options</b>		
Tape & Reel (Vertical Orientation Standard Reel)	Y	TV24

## Dimensions – Millimeters



Chip Size	W		T		L		F	
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
5045	11.5	-0/+0.6	6.5	-0/+0.4	12.7	-0/+0.4	0.5	Nominal

## Performance Characteristics

Rated Voltage	250 VAC 50/60 Hz	
Capacitance Range	0.001 – 0.0047 $\mu$ F	
Capacitance Tolerance	$\pm$ 20%	
Temperature Range	-40°C to +100°C	
Climatic Category	40/100/56/B	
Approvals	ENEC, cULus	
Dissipation Factor	Maximum Values at +23°C	
	1 kHz	1.3%
Test Voltage Between Terminals	The 100% screening factory test is carried out at 3,000 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. This test may not be repeated due to potential capacitor damage. KEMET is not liable for any failures that result from repeating the test.	
Insulation Resistance	Between Terminals	
	12,000 M $\Omega$	

## Cleaning/Storage and Moisture Recommendations

### Cleaning Suggestions

To clean the PCB assembly KEMET recommends to use a suitable solvent like Isopropyl alcohol, deionized water or neutral pH detergents. Aggressive solvents shall not be used. For any different cleaning solvent used please contact KEMET Technical Services to analyze the potential impact on KEMET products.



### Storage and Moisture Recommendations

KEMET SMD film capacitors are supplied in a moisture barrier bag (MBB) Class 1. We can guarantee a 24 month shelf life (temperature  $\leq$  40°C/relative humidity  $\leq$  90%). After the MBB has been opened, components may stay in areas with controlled temperature and humidity (temperature  $\leq$  30°C/relative humidity  $\leq$  60%) for 168 hours (MSL 3). For longer periods of time and/or higher temperature and/or higher relative humidity values, it is absolutely necessary to protect the components against humidity. If the reel inside the MBB is partially used, KEMET recommends to re-use the same MBB or to avoid areas without controlled temperature and humidity (see above). If the above conditions are not respected, components require baking (minimum time: 48 hours at 55  $\pm$ 5°C,  $\leq$  5% RH) before the reflow.

## Environmental Test Data

Test	IEC Publication	Procedure
Impulse Voltage and Endurance	IEC 60384-14	1.7 x V <sub>R</sub> VAC 50 Hz, once every hour increase to 1,000 VAC for 0.1 second, 1,000 hours at upper rated temperature.
Vibration	IEC 60068-2-6 Test Fc	3 directions at 2 hours each 10 – 500 Hz at 0.75 mm or 98 m/s <sup>2</sup>
Bump	IEC 60068-2-27 Test Eb	4,000 bumps at 390 m/s <sup>2</sup>
Rapid Change of Temperature	IEC 60068-2-14 Test Na	Upper and lower rated temperature 5 cycles
Active Flammability	IEC 60384-14	V <sub>R</sub> + 20 surge pulses at 5 kV (pulse every 5 seconds)
Passive Flammability	IEC 60384-14 IEC 60695-11-5	Needle-flame test
Humidity	IEC 60068-2-3 Test Ca	+40°C and 90 – 95% R.H.
Damp Heat Steady State	IEC 60068-2-78 Test Cab	+40 ±2°C and 93 ±3% R.H., 56 days

## Approvals

Certification Body	Mark	Specification	File Number
IMQ S.p.A.		EN/IEC 60384-14	CA08.00226
UL		UL 60384 and CAN/CSA E60384-14	E97797

## Environmental Compliance

All KEMET EMI capacitors are RoHS compliant.



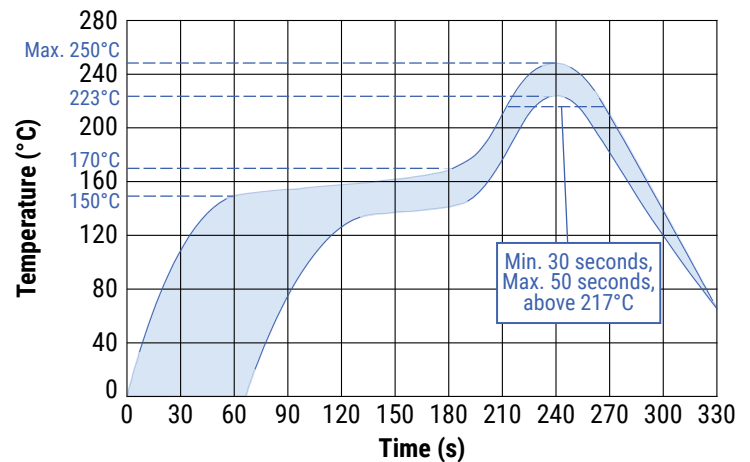
**Table 1 – Ratings & Part Number Reference**

Capacitance Value (μF)	Maximum Dimensions in mm			dV/dt (V/μs)	KEMET Part Number	Customer Part Number
	W -0/+0.6	T -0/+0.4	L -0/+0.4			
0.0010	11.5	6.5	12.7	2,000	P101AA102M250(1)	SMP253MA4100M(1)
0.0015	11.5	6.5	12.7	2,000	P101AA152M250(1)	SMP253MA4150M(1)
0.0022	11.5	6.5	12.7	2,000	P101AA222M250(1)	SMP253MA4220M(1)
0.0025	11.5	6.5	12.7	2,000	P101AA252M250(1)	SMP253MA4250M(1)
0.0033	11.5	6.5	12.7	2,000	P101AA332M250(1)	SMP253MA4330M(1)
0.0039	11.5	6.5	12.7	2,000	P101AA392M250(1)	SMP253MA4390M(1)
0.0047	11.5	6.5	12.7	2,000	P101AA472M250(1)	SMP253MA4470M(1)
Capacitance Value (μF)	W (mm)	T (mm)	L (mm)	dV/dt (V/μs)	KEMET Part Number	Customer Part Number

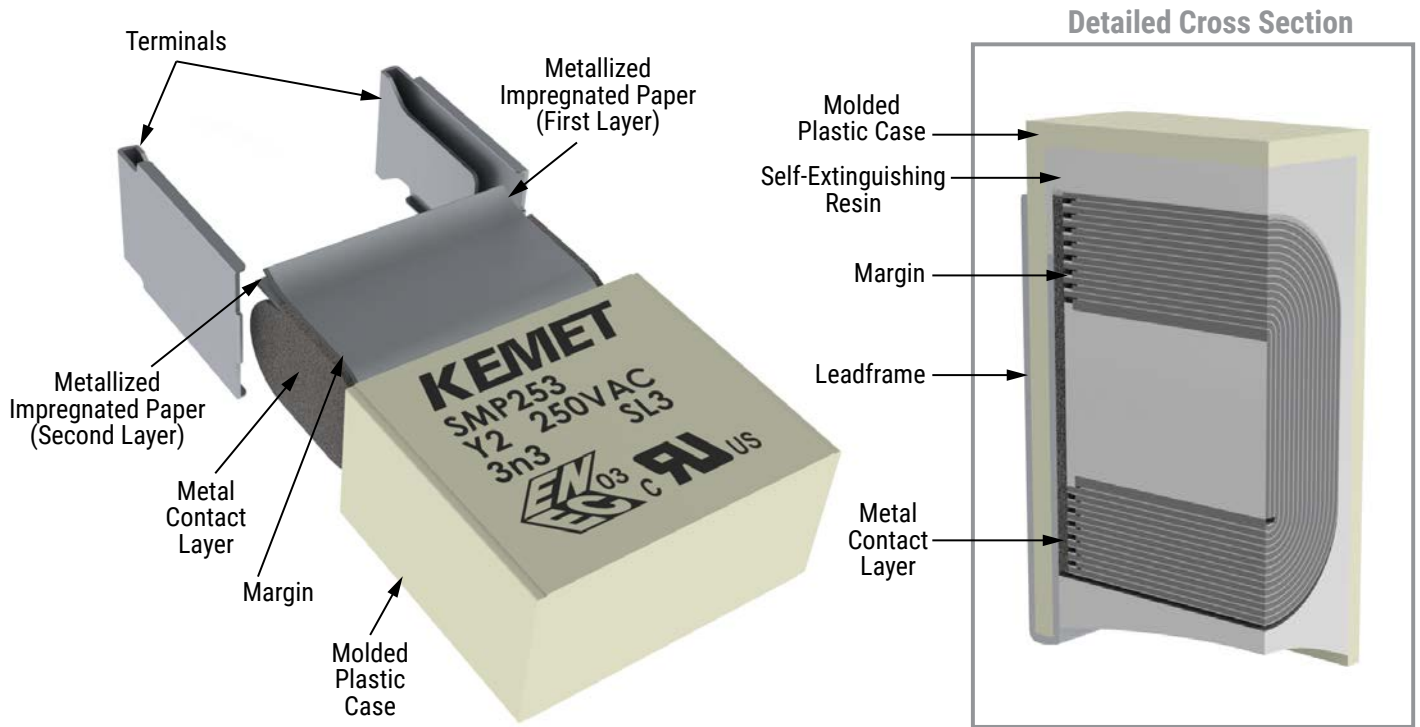
(1) Insert packaging code. See Ordering Options Table for available options.

## Soldering Process

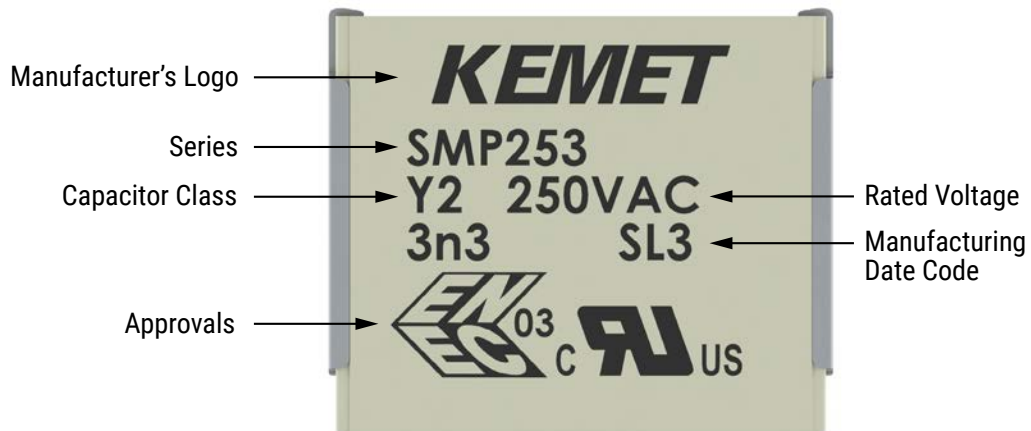
Reflow soldering temperature is measured on the top body surface of the component. Use the recommended soldering profiles for convection reflow ovens and IR reflow ovens. If a vapor phase reflow oven is used, consult KEMET. Exceeding the manufacturer's process recommendations may harm the component. KEMET is not liable for any defect caused by exceeding recommendations. According to international standards, the maximum temperature capability must be measured on the top surface of a component. The international standards do not define how the thermocouple should be fastened on the component. Our recommendation for attaching the thermocouple to the top surface of the component is to glue it with high-temperature resistant glue.



## Construction



## Marking

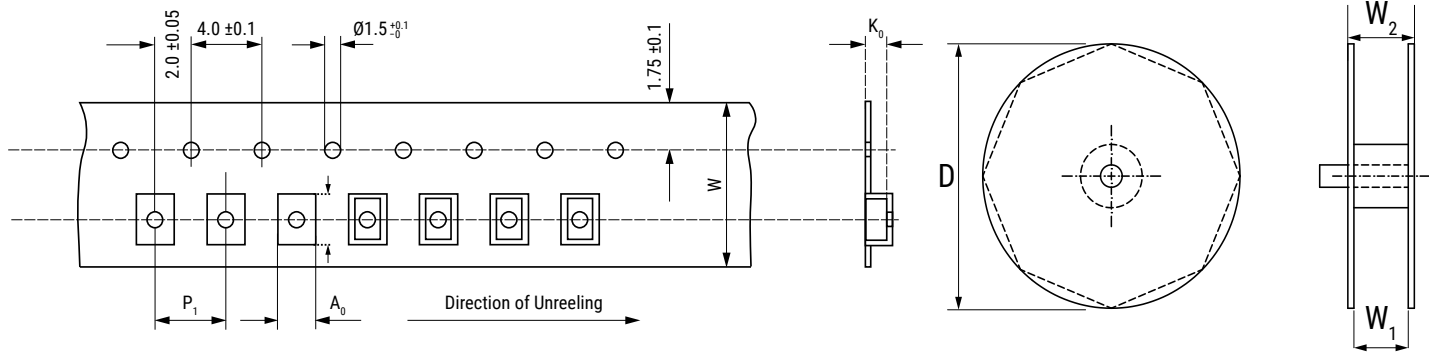


## Packaging Quantities

Chip Size EIA	Thickness (mm)	Height (mm)	Length (mm)	Standard Reel (330 mm)	
				Horizontal Orientation	Vertical Orientation
5045	11.5	6.5	12.7	600	400

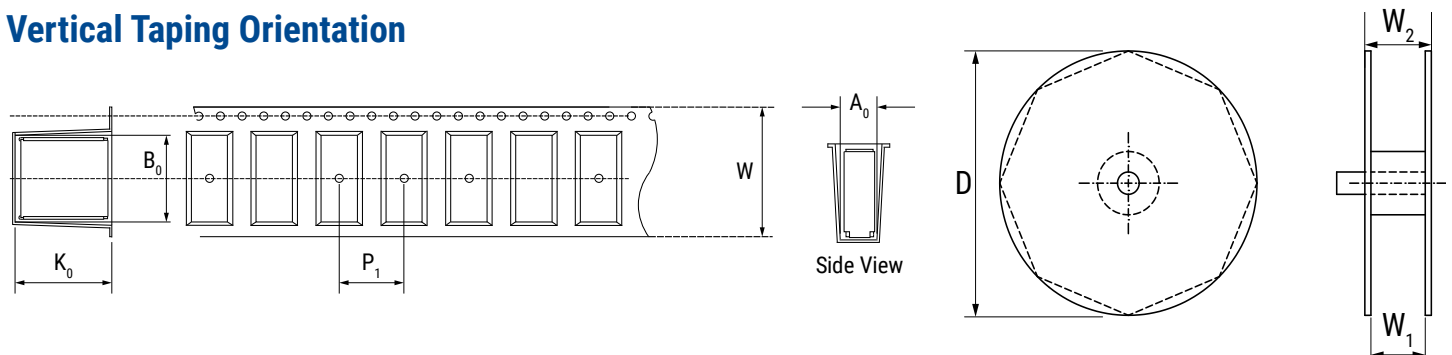
## Carrier Taping & Packaging (IEC 60286-2)

### Horizontal Taping Orientation



EIA Size Code Horizontal Mounting	Dimensions in mm			Taping Specification							
	B	H	L	W	P <sub>1</sub>	A <sub>0</sub>	B <sub>0</sub>	K <sub>0</sub>	D	W <sub>1</sub>	W <sub>2</sub>
	Nominal	Nominal	Nominal	-0/+0.3	+/-0.1	Nominal	Nominal	Nominal	±2.0	-0/+2	Maximum
5045	11.5	6.5	12.7	24.0	16.0	11.9	13.1	6.8	330	24.4	30.0

### Vertical Taping Orientation



EIA Size Code Vertical Mounting	Dimensions in mm			Taping Specification							
	B	H	L	W	P <sub>1</sub>	A <sub>0</sub>	B <sub>0</sub>	K <sub>0</sub>	D	W <sub>1</sub>	W <sub>2</sub>
	Nominal	Nominal	Nominal	-0/+0.3	+/-0.1	Nominal	Nominal	Nominal	±2.0	-0/+2	Maximum
5026 (5045)	12.7	6.5	11.5	24.0	16.0	6.9	13.1	11.8	330	24.4	30.0

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