

Overview

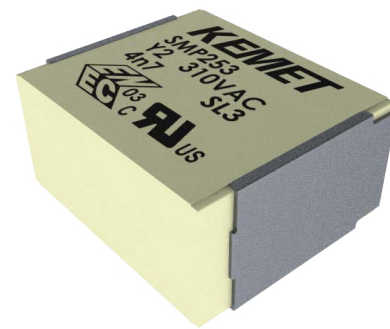
Multilayer, metallized paper, encapsulated and impregnated in self-extinguishing material that meets the requirements of UL 94 V-0.

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: 310 VAC 50/60 Hz, maximum recommended DC voltage 1,500 VDC
- Capacitance range: 0.001 – 0.068 μ F
- THB Grade IIB: 85°C, 85% RH, 500 hours at 310 VAC acc. to IEC 60384-14
- Automotive (AEC-Q200) grade



Customer Part Number System

SMP253	F	A	4100	M	B31	TR24
Series	Rated Voltage (VAC)	Chip Length (mm)	Capacitance Code (pF)	Capacitance Tolerance	Chip Size	Packaging
Y2, Metallized Paper	F = 310	A = 12.7 B = 16.5 C = 17.8	The last three digits represent significant figures. The first digit specifies the total number of digits.	M = $\pm 20\%$	B31 = 12.7 C31 = 16.5 D32 = 17.8	See Ordering Options Table

KEMET Internal Part Number System

P	101	YR	102	M	310	V
Capacitor Class	Series	Chip Length (mm)	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VAC)	Packaging
P = Paper	Y2, Metallized Paper	YR = 12.7 ZS = C31 FK = D32	First two digits represent significant figures. Third digit specifies number of zeros.	M = $\pm 20\%$	310 = 310 VAC	See Ordering Options Table

Class Y2

Impregnated Metallized Paper EMI Suppression Capacitors SMP253, Class Y2,
310 VAC Surface Mount Device (Automotive Grade)

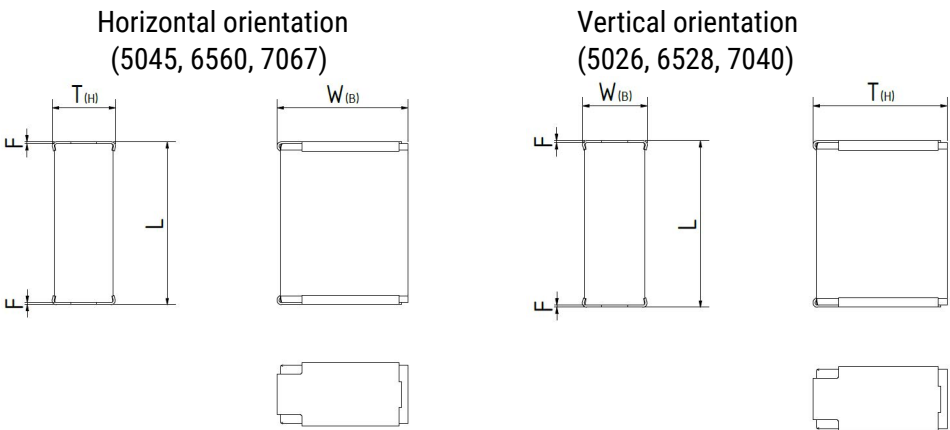
Benefits cont.

- Tape & Reel packaging in accordance with IEC 60286-3
 - RoHS compliance and lead-free terminations
 - Operating temperature range of -40°C to +125°C
 - 100% screening factory test at 3,200 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
 - Size code: 5045 (12.7 mm), 6560 (16.5 mm), 7067 (17.8 mm)
 - Capacitance tolerance: ±20%
 - Climatic category: 40/125/56/B, IEC 60068-1

Ordering Options Table

Chip Size (EIA)	Packaging Type	KEMET Packaging Code	Legacy Packaging Code
5045, 6560, 7067	Bulk	A	BULK
5045	Tape & Reel (Horizontal)	V	TR24
5026	Tape & Reel (Vertical)	Y	TV24
6560	Tape & Reel (Horizontal)	V	TR24
6528	Tape & Reel (Vertical)	Y	TV44
7067	Tape & Reel (Horizontal)	V	TR32
7040	Tape & Reel (Vertical)	Y	TV32

Dimensions – Millimeters



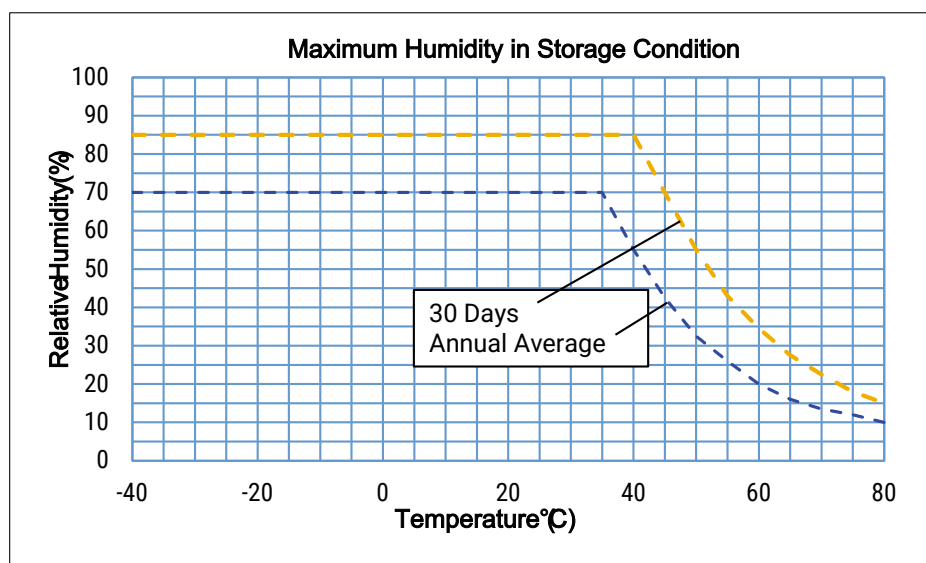
Chip Size	W		T		L		F	
	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
5045	11.5	-0/+0.6	6.5	-0/+0.4	12.7	-0/+0.4	0.5	Nominal
5026	6.5	-0/+0.6	11.5	-0/+0.4	12.7	-0/+0.4	0.5	Nominal
6560	15.0	-0/+0.6	7.0	-0/+0.4	16.5	-0/+0.4	0.5	Nominal
6528	7.0	-0/+0.6	15.0	-0/+0.4	16.5	-0/+0.4	0.5	Nominal
7067	17.0	-0/+0.6	10.2	-0/+0.4	17.8	-0/+0.4	0.5	Nominal
7040	10.2	-0/+0.6	17.0	-0/+0.4	17.8	-0/+0.4	0.5	Nominal

Class Y2

Impregnated Metallized Paper EMI Suppression Capacitors SMP253, Class Y2, 310 VAC Surface Mount Device (Automotive Grade)

Performance Characteristics

Rated Voltage	310 VAC 50/60 Hz
Capacitance Range	0.001 – 0.068 μ F
Capacitance Tolerance	$\pm 20\%$ (at room temperature)
Operating Temperature Range	-40°C to +125°C
Rated Temperature	+125°C
Climatic Category	40/125/56/B
Approvals	ENEC, cULus
Storage Conditions	Storage time: ≤ 24 months from the date marked on the label package
	Average relative humidity per year $\leq 70\%$
	RH $\leq 85\%$ for 30 days randomly distributed throughout the year
	Dew is absent
	Temperature: -40 to 80°C (see "Maximum Humidity in Storage Conditions" graph below)
Dissipation Factor ($\tan\delta$) at 1 kHz	Maximum Values at +23°C
	$\leq 1.3\%$
Test Voltage Between Terminals	The 100% screening factory test is carried out at 3,200 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
	$\geq 12,000$ M Ω
Voltage proof between terminals	1510Vac, 60s according to IEC 60384-14 standard.
Voltage proof between terminal and case	2120Vac, 60s according IEC 60384-14 standard.



Class Y2

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Qualification

Automotive grade products meet or exceed the requirements outlined by the Automotive Electronics Council. Details regarding test methods and conditions are referenced in document AEC-Q200, Stress Test Qualification for Passive Components. For additional information regarding the Automotive Electronics Council and AEC-Q200, please visit their website at www.aecouncil.com.

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 $\leq 40^{\circ}\text{C}$ /relative humidity $\leq 90\%$). After the MBB has been opened, components may stay in areas with controlled temperature and humidity (temperature $\leq 30^{\circ}\text{C}$ /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 $55 \pm 5^{\circ}\text{C}$, $\leq 5\%$ RH) before the reflow.

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Environmental Test Data

Test	Publication	Procedure
Impulse Voltage and Endurance	IEC 60384-14	$1.7 \times V_R$ 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 ²
Bump	IEC 60068-2-27- Test Eb	4,000 bumps at 390 m/s ²
Rapid Change of Temperature	IEC 60068-2-14 Test Na	Upper and lower rated temperature 5 cycles
Active Flammability	IEC 60384-14	$V_R + 20$ surge pulses at 5 kV (pulse every 5 seconds)
Passive Flammability	IEC 60384-14 IEC 60695-11-5	Needle-flame test
Damp Heat Steady State	IEC 60068-2-78 Test Cab	+40 ±2°C and 93 ±3% R.H., 56 days
Dielectric Strength Between Terminals	IEC 60384-14	1510Vac, 60s according IEC 60384-14 standard.
Dielectric Strength Terminal to Case	IEC 60384-14	2120Vac, 60s according IEC 60384-14 standard.
Operational Life Test	AEC-Q200: MIL-STD-202 Method 108	100% of rated voltage above 85°C. 1,000h/125°C
Humidity Bias Test	AEC-Q200: MIL-STD-202 Method 103	Rated voltage. 1,000h. 40°C/93%RH
Temperature Cycling Test	AEC-Q200: JESD22-A104	Unpowered. 1,000 cycles. 125°C/-40°C

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.



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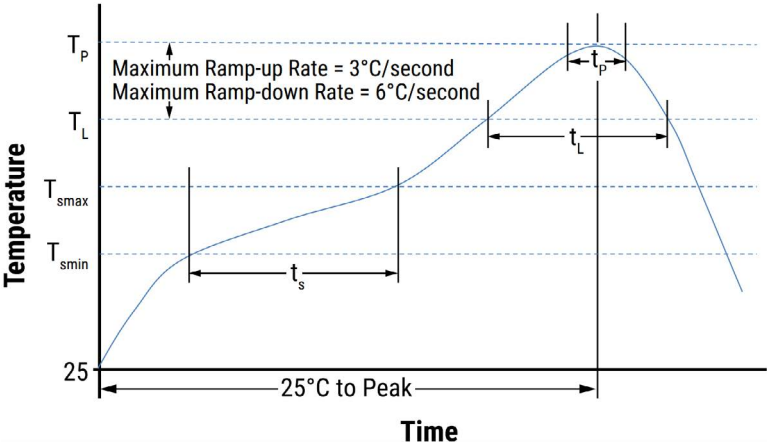
Table 1 – Ratings & Part Number Reference

Chip Capacitance (nF)	Maximum Dimensions in mm			dV/dt (V/μs)	KEMET Part Number	Customer Part Number
	L -0/+0.4	W -0/+0.6	T -0/+0.4			
1.0	12.7	11.5	6.5	2000	P101YR102M310V	SMP253FA4100MB31TR24
1.0	12.7	6.5	11.5	2000	P101YR102M310Y	SMP253FA4100MB31TV24
1.5	12.7	11.5	6.5	2000	P101YR152M310V	SMP253FA4150MB31TR24
1.5	12.7	6.5	11.5	2000	P101YR152M310Y	SMP253FA4150MB31TV24
2.2	12.7	11.5	6.5	2000	P101YR222M310V	SMP253FA4220MB31TR24
2.2	12.7	6.5	11.5	2000	P101YR222M310Y	SMP253FA4220MB31TV24
2.5	12.7	11.5	6.5	2000	P101YR252M310V	SMP253FA4250MB31TR24
2.5	12.7	6.5	11.5	2000	P101YR252M310Y	SMP253FA4250MB31TV24
3.3	12.7	11.5	6.5	2000	P101YR332M310V	SMP253FA4330MB31TR24
3.3	12.7	6.5	11.5	2000	P101YR332M310Y	SMP253FA4330MB31TV24
3.9	12.7	11.5	6.5	2000	P101YR392M310V	SMP253FA4390MB31TR24
3.9	12.7	6.5	11.5	2000	P101YR392M310Y	SMP253FA4390MB31TV24
4.7	12.7	11.5	6.5	2000	P101YR472M310V	SMP253FA4470MB31TR24
4.7	12.7	6.5	11.5	2000	P101YR472M310Y	SMP253FA4470MB31TV24
5.6	12.7	11.5	6.5	2000	P101YR562M310V	SMP253FA4560MB31TR24
5.6	12.7	6.5	11.5	2000	P101YR562M310Y	SMP253FA4560MB31TV24
6.8	12.7	11.5	6.5	2000	P101YR682M310V	SMP253FA4680MB31TR24
6.8	12.7	6.5	11.5	2000	P101YR682M310Y	SMP253FA4680MB31TV24
8.2	12.7	11.5	6.5	2000	P101YR822M310V	SMP253FA4820MB31TR24
8.2	12.7	6.5	11.5	2000	P101YR822M310Y	SMP253FA4820MB31TV24
10	12.7	11.5	6.5	2000	P101YR103M310V	SMP253FA5100MB31TR24
10	12.7	6.5	11.5	2000	P101YR103M310Y	SMP253FA5100MB31TV24
12	16.5	15.0	7.0	1400	P101ZS123M310V	SMP253FB5120MC31TR24
12	16.5	7.0	15.0	1400	P101ZS123M310Y	SMP253FB5120MC31TV44
15	16.5	15.0	7.0	1400	P101ZS153M310V	SMP253FB5150MC31TR24
15	16.5	7.0	15.0	1400	P101ZS153M310Y	SMP253FB5150MC31TV44
18	16.5	15.0	7.0	1400	P101ZS183M310V	SMP253FB5180MC31TR24
18	16.5	7.0	15.0	1400	P101ZS183M310Y	SMP253FB5180MC31TV44
22	16.5	15.0	7.0	1400	P101ZS223M310V	SMP253FB5220MC31TR24
22	16.5	7.0	15.0	1400	P101ZS223M310Y	SMP253FB5220MC31TV44
27	16.5	15.0	7.0	1400	P101ZS273M310V	SMP253FB5270MC31TR24
27	16.5	7.0	15.0	1400	P101ZS273M310Y	SMP253FB5270MC31TV44
33	17.8	17.0	10.2	1000	P101FK333M310V	SMP253FC5330MD32TR32
33	17.8	10.2	17.0	1000	P101FK333M310Y	SMP253FC5330MD32TV32
39	17.8	17.0	10.2	1000	P101FK393M310V	SMP253FC5390MD32TR32
39	17.8	10.2	17.0	1000	P101FK393M310Y	SMP253FC5390MD32TV32
47	17.8	17.0	10.2	1000	P101FK473M310V	SMP253FC5470MD32TR32
47	17.8	10.2	17.0	1000	P101FK473M310Y	SMP253FC5470MD32TV32
56	17.8	17.0	10.2	1000	P101FK563M310V	SMP253FC5560MD32TR32
56	17.8	10.2	17.0	1000	P101FK563M310Y	SMP253FC5560MD32TV32
68	17.8	17.0	10.2	1000	P101FK683M310V	SMP253FC5680MD32TR32
68	17.8	10.2	17.0	1000	P101FK683M310Y	SMP253FC5680MD32TV32
Capacitance Value (nF)	L (mm)	W (mm)	T (mm)	dV/dt (V/μs)	KEMET Part Number	Customer Part Number

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 or with thermo tape specified for reflow profiling. Compliant to lead-free reflow soldering process.

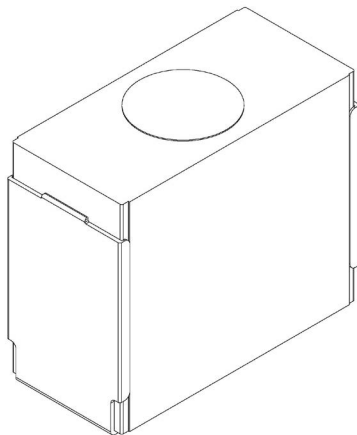
Profile Feature	Termination Finish
	100% Matte Sn
Preheat/Soak	
Temperature Minimum (T_{Smin})	150°C
Temperature Maximum (T_{Smax})	200°C
Time (t_s) from T_{Smin} to T_{Smax}	60 - 120 seconds
Ramp-Up Rate (T_L to T_p)	3°C/second maximum
Liquidous Temperature (T_L)	217°C
Time Above Liquidous (t_L)	60 - 150 seconds (chip size 5045/5026)
	60 - 70 seconds (chip size 6560/6528)
	60 seconds (chip size 7067/7040)
Peak Temperature (T_p)	245°C
Time Within 5°C of Maximum Peak Temperature (t_p)	30 seconds maximum
Ramp-Down Rate (T_p to T_L)	6°C/second maximum
Time 25° to Peak Temperature	8 minutes maximum



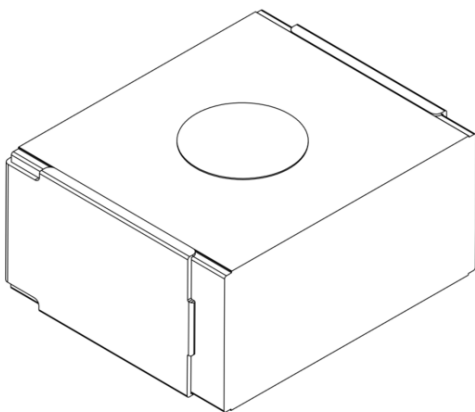
Note: All temperatures refer to the center of the package, measured on the capacitor body surface that is facing up during assembly reflow.

Temperature Sensor Position in Reflow Profiling

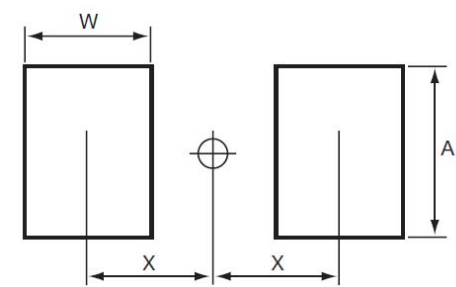
For vertical capacitors profiling



For horizontal capacitors profiling



Soldering Land Dimensions



L	Case Size		W		Ah		Av		X	
	Horizontal	Vertical	mils	mm	mils	mm	mils	mm	mils	mm
12.7	5045	5026	100	2.5	455	11.6	260	6.6	276	7.0
16.5	6560	6528	120	3.0	590	15.0	280	7.1	355	9.0
17.8	7067	7040	140	3.5	670	17.0	405	10.3	374	9.5

Ah = horizontal mounting
Av = vertical mounting

Mounting

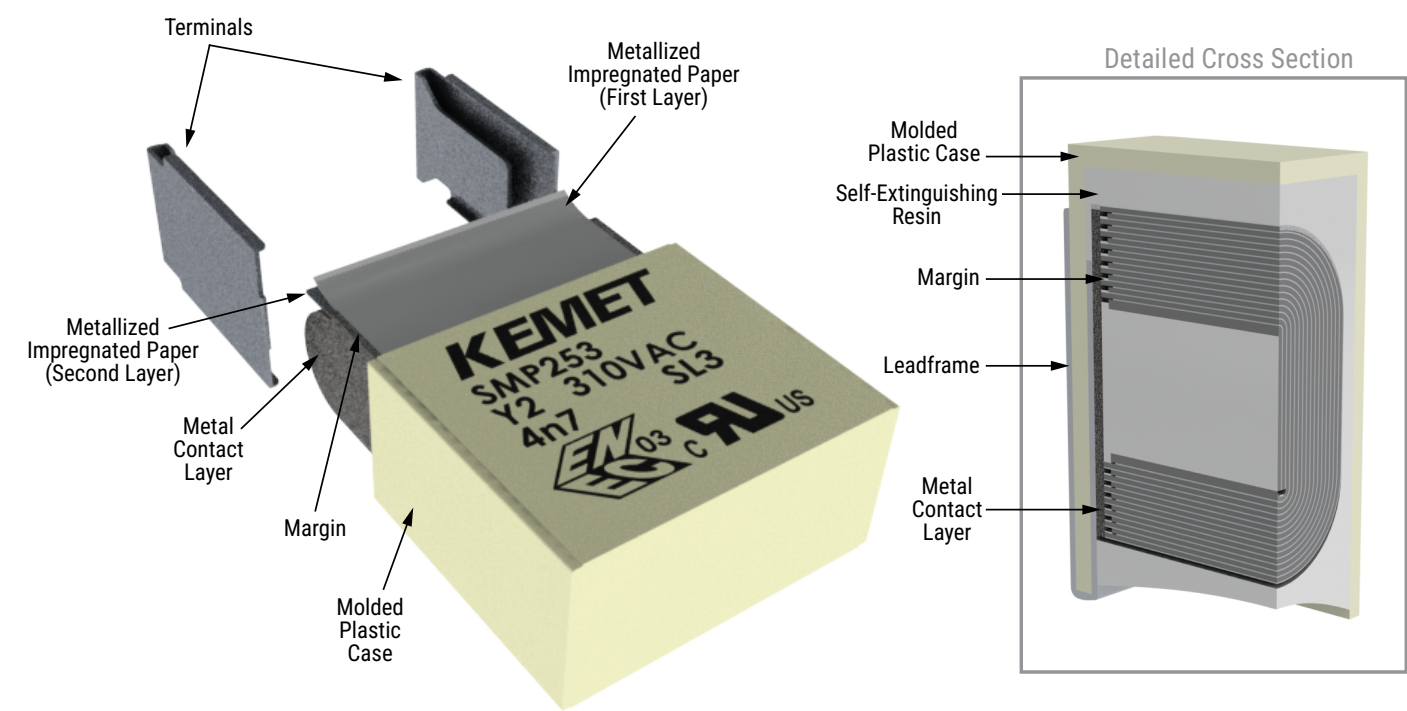
Resistance to Vibration and Mechanical Shock

AEC-Q200 Rev. E Mechanical Stress Tests:

Mechanical Shock	MIL-STD-202 Method 213	Figure 1 of Method 213 - THT: Condition C - SMD: Condition C - Tested per the Supplier’s recommended mounting method
Vibration	MIL-STD-202 Method 204	5 g for 20 minutes, 12 cycles each of 3 orientations - Tested per the Supplier’s recommended mounting method - Verification of transfer load: during setup, verify that with the selected PCB design (size, thickness and secure points), or an alternative mount, that the transferred load onto the component corresponds to the requested load. This verification can be achieved using a laser vibrometer or other adequate measuring device - Test from 10 Hz – 2,000 Hz.

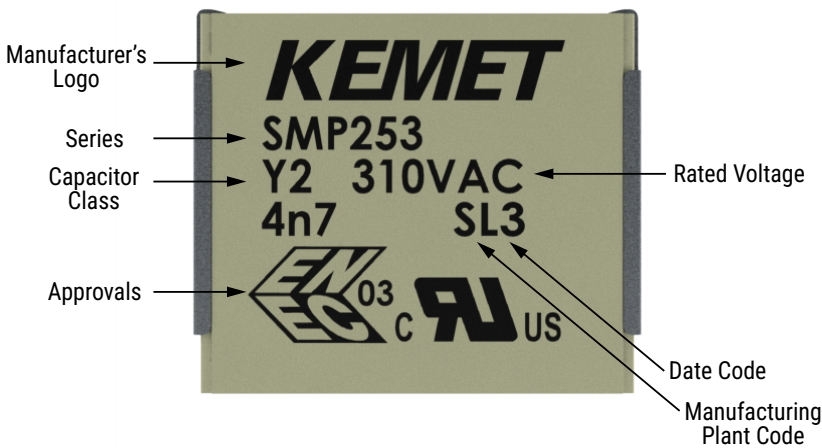
Class Y2
Impregnated Metallized Paper EMI Suppression Capacitors SMP253, Class Y2,
310 VAC Surface Mount Device (Automotive Grade)

Construction



Class Y2
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Marking



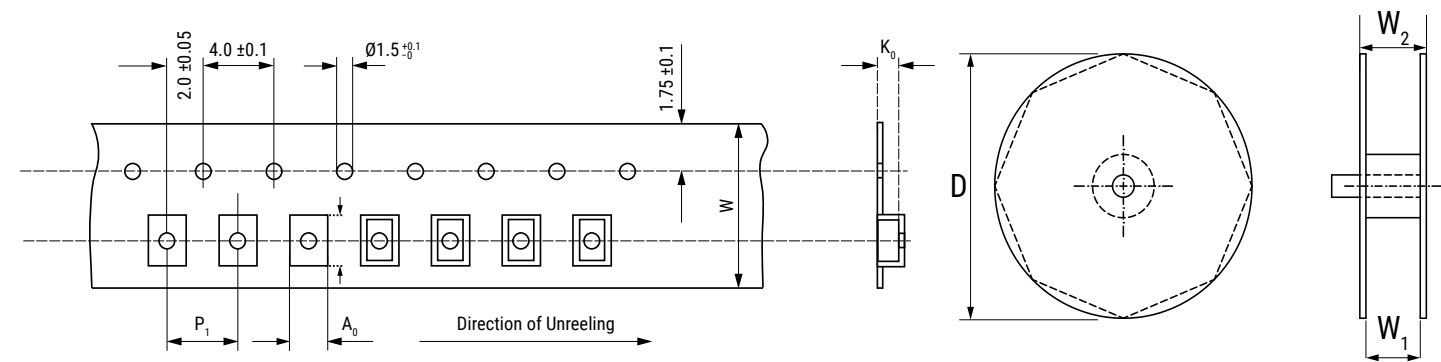
Manufacturing Plant & Date Code (IEC 60062)			
Year	Code	Month	Code
2020	M	January	1
2021	N	February	2
2022	P	March	3
2023	R	April	4
2024	S	May	5
2025	T	June	6
2026	U	July	7
2027	V	August	8
2028	W	September	9
2029	X	October	0
2030	A	November	N
2031	B	December	D
2032	C		
2033	D		
2034	E		
2035	F		
2036	H		
2037	J		
2038	K		
2039	L		
2040	M		

Packaging Quantities

Chip Size EIA	Taping Orientation	Thickness (mm)	Height (mm)	Length (mm)	Packing Quantity
5045	Horizontal	6.5	11.5	12.7	600
5026	Vertical	11.5	6.5	12.7	400
6560	Horizontal	7.0	15.0	16.5	500
6528	Vertical	15.0	7.0	16.5	200
7067	Horizontal	10.2	17.0	17.8	270
7040	Vertical	17.0	10.2	17.8	200

Carrier Taping & Packaging (IEC 60286-3)

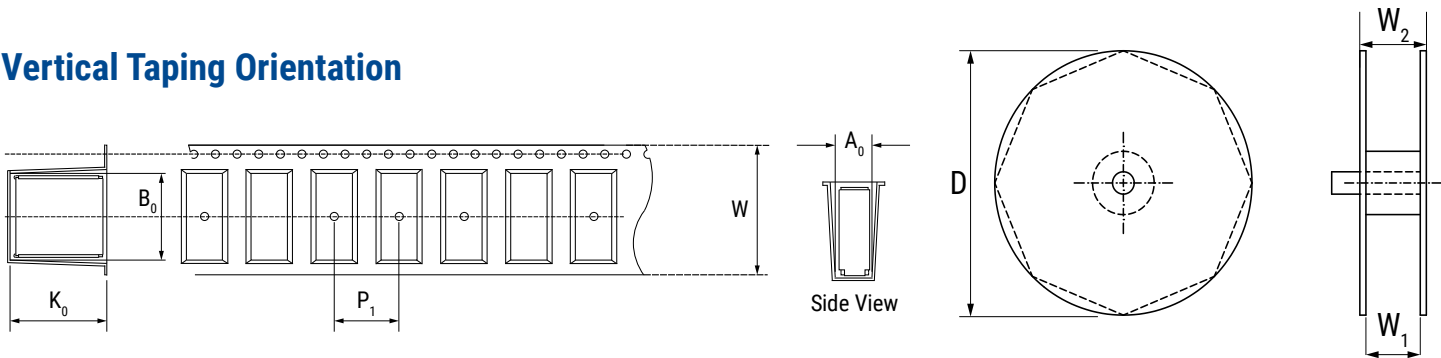
Horizontal Taping Orientation



EIA Size Code Horizontal Mounting	Dimensions in mm			Taping Specification							
	B	H	L	W	P ₁	A ₀	B ₀	K ₀	D	W ₁	W ₂
	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
6560	15.0	7.0	16.5	24.0	20.0	15.4	16.8	7.3	330	24.4	30.0
7067**	17.0	10.2	17.8	32.0	24.0	17.9	18.5	10.9	330	32.4	38.0

** Double sprocket holes

Vertical Taping Orientation



EIA Size Code Vertical Mounting	Dimensions in mm			Taping Specification							
	B	H	L	W	P ₁	A ₀	B ₀	K ₀	D	W ₁	W ₂
	Nominal	Nominal	Nominal	-0/+0.3	+/-0.1	Nominal	Nominal	Nominal	±2.0	-0/+2	Maximum
5026	6.5	11.5	12.7	24.0	16.0	6.9	13.1	11.8	330	24.4	30.0
6528**	7.0	15.0	16.5	44.0	20.0	7.5	17.0	15.3	330	44.4	50.0
7040**	10.2	17.0	17.8	32.0	20.0	10.9	18.5	19.9	330	32.4	38.0

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KEMET Electronics Corporation Sales Offices

For a complete list of our global sales offices, please visit <https://www.yageogroup.com/SalesResources/SalesOffices>

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Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

Additional information about production site flexibility can be found [here](#)

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