AC Line EMI Suppression and RC Networks

PME295 Series Metallized Impregnated Paper, Class Y1, 440 VAC/480 VAC

Overview

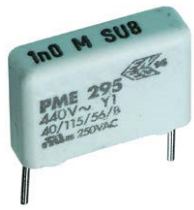
The PME295 Series is constructed of multilayer metallized paper encapsulated and impregnated in self-extinguishing material meeting the requirements of UL 94 V–0.

Applications

Typical applications include safety capacitors for bridging of double or reinforced insulation applications requiring voltage test up to 4,000 VAC at 60 seconds. PME295 Series capacitors can be left in place during this test.

Benefits

- Approvals: ENEC, UL, cUL
- Rated voltage: 440 VAC/480 VAC 50/60 Hz
- Capacitance range: 470 – 4700 pF
- Lead spacing: 15.0 mm
- Capacitance tolerance: ±20%
- Climatic category: 40/115/56/B, IEC 60068–1
- Tape and reel packaging in accordance with IEC 60286–2
- RoHS Compliant and lead-free terminations
- Operating temperature range of -40˚C to +115˚C
- 100% screening factory test at 4,000 VAC, 50 Hz, 2 seconds
- Highest possible safety regarding active and passive flammability
- Excellent self-healing properties ensure long life even when subjected to frequent over voltages
- Good resistance to ionization due to impregnated dielectric
- High dV/dt capability
- Impregnated paper provides excellent stability and reliability properties, particularly in applications with continuous operation



Legacy Part Number System

PME295	R	B	3470	M	R30
Series	Rated Voltage (VAC)	Lead Spacing (mm)	Capacitance Code (pF)	Capacitance Tolerance	Lead and Packaging Code
Y1, Metallized Paper	R = 440	B = 15.0	Digits 2 – 4 (3) indicate the first three digits of the capacitance value. Digit 1 indicates the total number of digits in the capacitance value.	M = ±20%	See Ordering Options Table

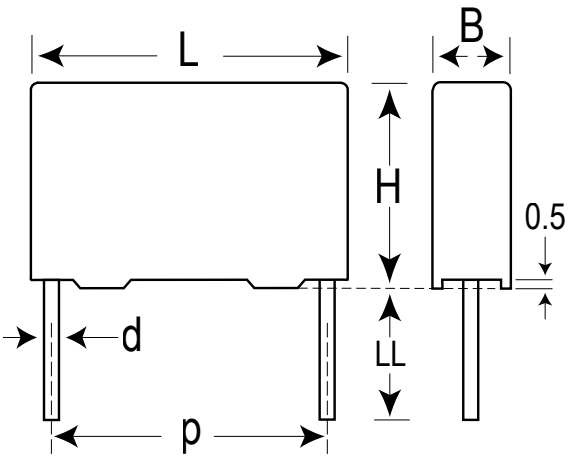
New KEMET Part Number System

P	295	B	E	471	M	440	A
Capacitor Class	Series	Lead Spacing (mm)	Size Code	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VAC)	Lead and Packaging Code
P = Paper	Y1, Metallized Paper	B = 15.0	See Dimension Table	First two digits indicate the two most significant digits of the capacitance value in picofarads. The third digit is the number of following zeros.	M = ±20%	440 = 440	See Ordering Options Table

Ordering Options Table

Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	KEMET Lead and Packaging Code	Legacy Lead and Packaging Code
15	**Standard Lead and Packaging Options**			
	Bulk (Bag) – Short Leads	6 +0/-1	C	R06
	Bulk (Bag) – Max Length Leads	30 +5/-0	A	R30
	Tape & Reel (Standard Reel)	H_0= 18.5 +/-0.5	L	R19T0
	Other Lead and Packaging Options			
	Tape & Reel (Large Reel)	H_0= 18.5 +/-0.5	P	R19T1
Native 15 formed to 7.5	Ammo Pack	H_0= 16.5 +/-0.5	LAF3	R30XA
	Tape & Reel (Standard Reel)	H_0= 16.5 +/-0.5	XLTF1	R25X2

Dimensions – Millimeters



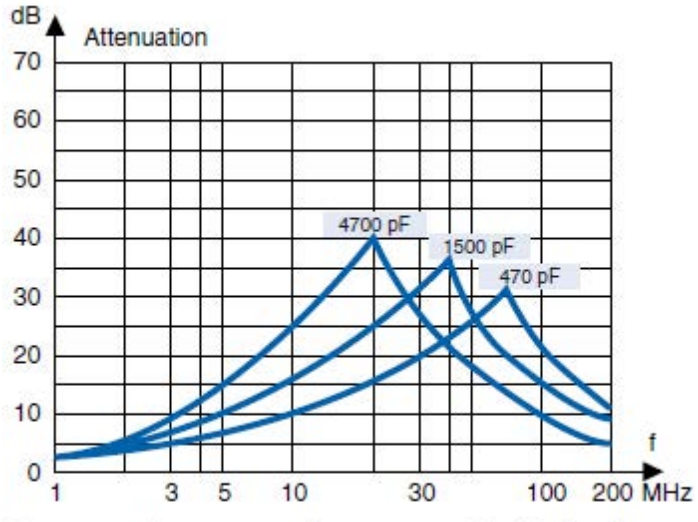
p		B		H		L		d	
Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
15	+/-0.4	5.5	Maximum	12.5	Maximum	18	Maximum	0.8	+/-0.05
15	+/-0.4	6.5	Maximum	12.5	Maximum	18	Maximum	0.8	+/-0.05
15	+/-0.4	7.5	Maximum	14.5	Maximum	18	Maximum	0.8	+/-0.05
15	+/-0.4	8.5	Maximum	16	Maximum	18	Maximum	0.8	+/-0.05

Note: See Ordering Options Table for lead length (LL) options.

Performance Characteristics

Rated Voltage	440 VAC 50/60 Hz (ENEC)	
	480 VAC 50/60 Hz (UL, cUL)	
Capacitance Range	0.00047 – 0.0047 µF	
Capacitance Tolerance	±20%	
Temperature Range	-40°C to +115°C	
Climatic Category	40/115/56/B	
Approvals	ENEC, UL, cUL	
Dissipation Factor	Maximum Values at +23°C	
	1 kHz	1.3%
Test Voltage Between Terminals	The 100% screening factory test is carried out at 4,000 VAC, 50 Hz, 2 seconds. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test.	
Insulation Resistance	Measured at 500 VDC after 60 seconds, +23°C	
	Minimum Value Between Terminals	
	≥ 12,000 MΩ	
In DC Applications	Recommended voltage ≤ 1,500 VDC	
Resonance Frequency	Tabulated self-resonance frequencies f_0 refer to 5 mm lead length	

Suppression vs. Frequency, Typical Values



Environmental Test Data

Test	IEC Publication	Procedure
Vibration	IEC 60068–2–6 Test Fc	3 directions at 2 hours each 10–500 Hz at 0.75 mm or 98m/s^2
Bump	IEC 60068–2–29 Test Eb	4000 bumps at 390 m/s^2
Solderability	IEC 60068–2–20 Test Ta	Solder globule method
Passive Flammability	IEC 60384–14	IEC 60384-1, IEC 60695-11-5 Needle flame test
Humidity	IEC 60068–2–3 Test Ca	+40°C and 90-95% RH, 56 days

Approvals

Certification Body	Mark	Specification	File Number
Intertek Semko AB		EN/IEC 60384-14 (440 VAC)	SE/0140–13C
UL		UL 60384-14 CAN/ CSA-E60384-14-09	E73869

Environmental Compliance

All KEMET EMI capacitors are RoHS Compliant.

RoHS Compliant

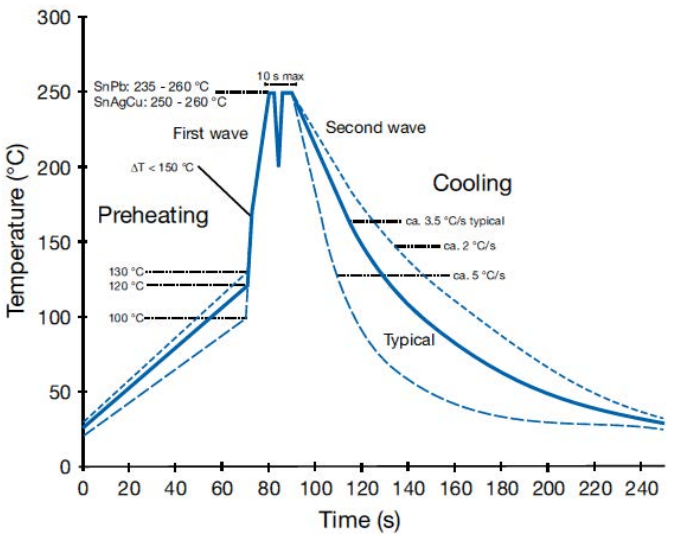
Table 1 – Ratings & Part Number Reference

Capacitance Value (µF)	Maximum Dimensions in mm			Lead Spacing (p)	f_o (MHz)	dV/dt (V/µs)	New KEMET Part Number	Legacy Part Number
	B	H	L					
0.00047	5.5	12.5	18	15	64	2000	P295BE471M440(1)	PME295RB3470M(1)
0.00056	5.5	12.5	18	15	59	2000	P295BE561M440(1)	PME295RB3560M(1)
0.00068	5.5	12.5	18	15	54	2000	P295BE681M440(1)	PME295RB3680M(1)
0.00082	5.5	12.5	18	15	49	2000	P295BE821M440(1)	PME295RB3820M(1)
0.001	5.5	12.5	18	15	46	2000	P295BE102M440(1)	PME295RB4100M(1)
0.0012	6.5	12.5	18	15	43	2000	P295BJ122M440(1)	PME295RB4120M(1)
0.0015	6.5	12.5	18	15	40	2000	P295BJ152M440(1)	PME295RB4150M(1)
0.0018	6.5	12.5	18	15	37	2000	P295BJ182M440(1)	PME295RB4180M(1)
0.0022	6.5	12.5	18	15	33	2000	P295BJ222M440(1)	PME295RB4220M(1)
0.0025	7.5	14.5	18	15	31	2000	P295BL252M440(1)	PME295RB4250M(1)
0.0027	7.5	14.5	18	15	30	2000	P295BL272M440(1)	PME295RB4270M(1)
0.0033	7.5	14.5	18	15	27	2000	P295BL332M440(1)	PME295RB4330M(1)
0.0039	8.5	16	18	15	24	2000	P295BQ392M440(1)	PME295RB4390M(1)
0.0047	8.5	16	18	15	22	2000	P295BQ472M440(1)	PME295RB4470M(1)
Capacitance Value (µF)	**B (mm)**	**H (mm)**	**L (mm)**	**Lead Spacing (p)**	**f_o (MHz)**	**dV/dt (V/µs)**	**New KEMET Part Number**	**Legacy Part Number**

(1) Insert ordering code for lead type and packaging. See Ordering Options Table for available options.

Soldering Process

The implementation of the RoHS Directive has required the use of SnAgCu (SAC) or SnCu alloys as primary solder. These alloys require a higher liquidus temperature (217ºC – 221ºC) as compared to SnPb eutectic alloy (183ºC). Due to the higher pre-heat and wave temperatures, the heat stress to components has increased considerably. Polypropylene capacitors are especially sensitive to soldering temperature due to the relatively low melting point of polypropylene material (160ºC – 170ºC). As a result, wave soldering can be destructive, especially to mechanically small polypropylene capacitors with lead spacings of 5 –10 mm. For more information, please refer to KEMET's Recommended Soldering Profiles or contact a KEMET representative. IEC Publication 61760–1 Edition 2 may also be consulted for general guidelines.



Marking

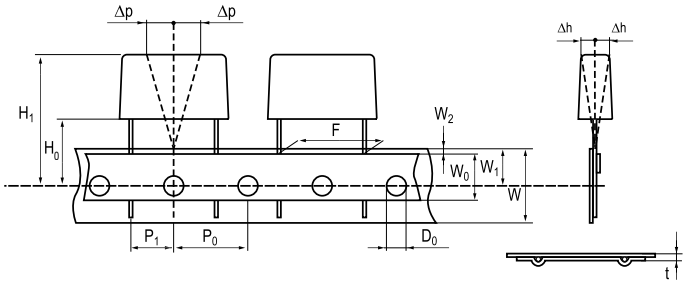
- KEMET's logo
- Series
- Capacitance
- Rated voltage
- Approval marks
- IEC climatic category
- Passive flammability class
- Manufacturing date code

Packaging Quantities

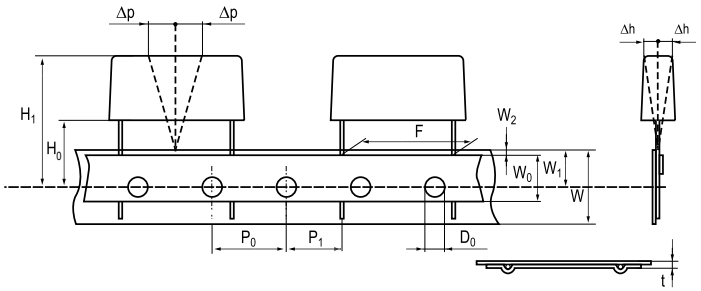
Lead Spacing (mm)	Thickness (mm)	Height (mm)	Length (mm)	Bulk Short Leads	Bulk Long Leads	Standard Reel ø 360 mm	Large Reel ø 500 mm	Standard Reel Formed	Ammo Formed
15	5.5	10.5	18	1000	800	600	1200	550	570
	5.5	12.5	18	1000	800	600	1200	550	570
	7.5	14.5	18	800	400	400	800	350	378
	6.5	12.5	18	1000	600	500	1000	450	480
	8.5	16	18	600	400	400	800	350	324
	8	15	18	600	400	400	800	350	351
	9.5	17.5	18	500	300	350	700	250	297
	6	12	18	1000	800	500	1000	450	520
	11	19	18	450	250	300	600	250	252
	13	12.5	18	400	300	250	500	200	216

Lead Taping & Packaging (IEC 60286–2)

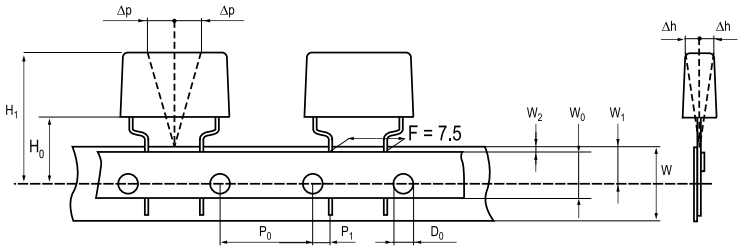
Lead Spacing 10.2 – 15.2 mm



Lead Spacing 20.3 – 22.5 mm



Formed Leads from 10.2 to 7.5 mm



Taping Specification

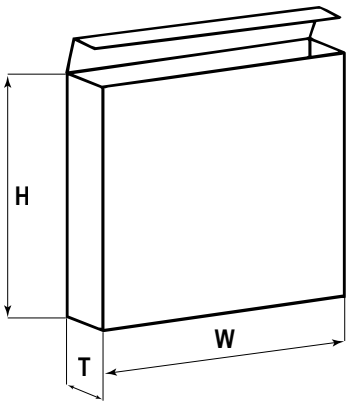
Dimensions in mm								Standard IEC 60286–2
Lead spacing	+6/-0.1	F	Formed 7.5	10.2	15.2	20.3	22.5	F
Carrier tape width	+/-0.5	W	18	18	18	18	18	$18^{+1/-0.5}$
Hold-down tape width	+/-0.3	W_0	9	12	12	12	12	
Position of sprocket hole	+/-0.5	W_1	9	9	9	9	9	$9^{+0.75/-0.5}$
Distance between tapes	Maximum	W_2	3	3	3	3	3	3
Sprocket hole diameter	+/-0.2	D_0	4	4	4	4	4	4
Feed hole lead spacing	+/-0.3	P_0 (1)	12.7(4)	12.7	12.7	12.7	12.7	12.7
Distance lead – feed hole	+/-0.7	P_1	3.75	7.6	5.1	8.9	5.3	P1
Deviation tape – plane	Maximum	Δp	1.3	1.3	1.3	1.3	1.3	1.3
Lateral deviation	Maximum	Δh	2	2	2	2	2	2
Total thickness	+/-0.2	t	0.7	0.7	0.7	0.7	0.9^{MAX}	0.9^{MAX}
Sprocket hole/cap body	Nominal	H_0 (2)	$18^{+2/-0}$	$18^{+2/-0}$	$18^{+2/-0}$	$18^{+2/-0}$	$18.5^{+/-0.5}$	$18^{+2/-0}$
Sprocket hole/top of cap body	Maximum	H_1 (3)	35	35	35	35	58	58^{MAX}

(1) Maximum cumulative feed hole error, 1 mm per 20 parts.
(2) 16.5 mm available on request.
(3) Depending on case size.
(4) 15 mm available on request.

Lead Taping & Packaging (IEC 60286–2) cont'd

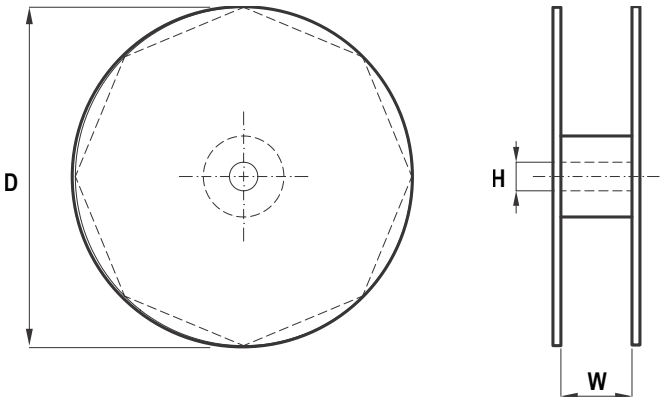
Ammo Specifications

Series	Dimensions (mm)		
	H	W	T
R4x, R4x+R, R7x, RSB	360	340	59
F5A, F5B, F5D			
F6xx, F8xx			
PHExxx, PMExxx, PMRxxx	330	330	50



Reel Specifications

Series	Dimensions (mm)		
	D	H	W
R4x, R4x+R, R7x, RSB	355 500	30 25	55 (Max)
F5A, F5B, F5D			
F6xx, F8xx			
PHExxx, PMExxx, PMRxxx	360 500	30	46 (Max)



Manufacturing Date Code (IEC–60062)

Y = Year, Z = Month			
Year	Code	Month	Code
2000	M	January	1
2001	N	February	2
2002	P	March	3
2003	R	April	4
2004	S	May	5
2005	T	June	6
2006	U	July	7
2007	V	August	8
2008	W	September	9
2009	X	October	O
2010	A	November	N
2011	B	December	D
2012	C		
2013	D		
2014	E		
2015	F		
2016	H		
2017	J		
2018	K		
2019	L		
2020	M		

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