# PME271E Series Metallized Impregnated Paper, Class X1, 300 VAC



#### **Overview**

The PME271E Series consists of multilayer metallized paper, encapsulated and impregnated in self-extinguishing material meeting the requirements of UL 94 V–0.

### **Applications**

Typical applications include worldwide use as an electromagnetic interference suppressor in all X1 and across-the-line applications.

#### **Benefits**

· Approvals: ENEC, UL

Rated voltage: 300 VAC 50/60 Hz
Capacitance range: 0.01 – 0.22 µF
Lead spacing: 15.2 – 25.4 mm

- Capacitance tolerance:  $\pm 20\%$  for C  $\leq$  0.1  $\mu$ F,  $\pm 10\%$  for C > 0.1  $\mu$ F
- Climatic category: 40/110/56/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 +110°C
- 100% screening factory test at 2,150 VDC
- Highest possible safety regarding active and passive flammability



### **Legacy Part Number System**

PME271	E	(D)	510(0)	M	R30
Series	Rated Voltage (VAC)	Lead Spacing (mm)	Capacitance Code (pF)	Capacitance Tolerance	Packaging
X1, Metallized Paper	E = 300	Blank = Standard D = 22.5	The last three digits represent significant figures. The first digit specifies the total number of digits.	M = $\pm 20\%$ (for C $\leq 0.1$ μF) K = $\pm 10\%$ (for C $> 0.1$ μF)	See Ordering Options Table

### **New KEMET Part Number System**

Р	277	Q	Е	103	M	300	Α
Capacitor Class	Series	Lead Spacing (mm)	Size Code	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VAC)	Packaging
P = Paper	X1, Metallized Paper	Q = 15.2 C = 20.3 S = 22.5 E = 25.4	See Dimension Table	First two digits represent significant figures. Third digit specifies number of zeros.	M = $\pm 20\%$ (for C $\leq 0.1$ μF) K = $\pm 10\%$ (for C $> 0.1$ μF)	300 = 300	See Ordering Options Table



#### Benefits cont'd

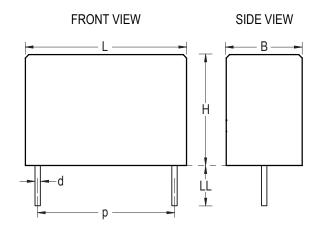
- Excellent self-healing properties which ensure long life even when subjected to frequent over-voltages
- Good resistance to ionization due to impregnated paper dielectric
- High dV/dt capability
- Impregnated paper ensures excellent stability and reliability properties, particularly in applications with continuous operation

### **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
	Standard Lead and Packaging Options			
	Bulk (Bag) – Short Leads	6 +0/-1	С	R06
45.0	Bulk (Bag) – Max Length Leads	30 +5/-0	Α	R30
15.2	Tape & Reel (Standard Reel)	H <sub>0</sub> = 18.5 +/-0.5	L	R19T0
	Other Lead and Packaging Options			
	Tape & Reel (Large Reel)	H <sub>0</sub> = 18.5 +/-0.5	Р	R19T1
	Standard Lead and Packaging Options			
	Bulk (Tray) – Short Leads	6 +0/-1	С	R06
20.3	Bulk (Bag) – Max Length Leads	30 +5/-0	Α	R30
20.0	Tape & Reel (Standard Reel)	H <sub>0</sub> = 18.5 +/-0.5	L	R19T0
	Other Lead and Packaging Options			
	Tape & Reel (Large Reel)	H <sub>0</sub> = 18.5 +/-0.5	Р	R19T1
	Other dead to add and Deader size a Outland			
	Standard Lead and Packaging Options	2 2/1		700
	Bulk (Tray) – Short Leads	6 +0/-1	С	R06
22.5	Bulk (Bag) – Max Length Leads	30 +5/-0	Α .	R30
	Tape & Reel (Standard Reel)	H <sub>0</sub> = 18.5 +/-0.5	L	R19T0
	Other Lead and Packaging Options			
	Tape & Reel (Large Reel)	$H_0 = 18.5 + -0.5$	Р	R19T1
	Standard Lead and Packaging Options			
25.4	Bulk (Tray) – Short Leads	6 +0/-1	С	R06
	Bulk (Bag) – Max Length Leads	30 +5/-0	А	R30



### **Dimensions – Millimeters**



Sino Codo	р		В		Н		L		d	
Size Code	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
QE	15.2	+/-0.4	5.2	Maximum	10.5	Maximum	18.5	Maximum	0.8	+/-0.05
QN	15.2	+/-0.4	7.3	Maximum	13	Maximum	19	Maximum	0.8	+/-0.05
QS	15.2	+/-0.4	8.5	Maximum	14.3	Maximum	18.5	Maximum	0.8	+/-0.05
CE	20.3	+/-0.4	7.6	Maximum	14	Maximum	24	Maximum	0.8	+/-0.05
СР	20.3	+/-0.4	11.3	Maximum	16.5	Maximum	24	Maximum	0.8	+/-0.05
SJ	22.5	+/-0.4	8	Maximum	17	Maximum	27	Maximum	0.8	+/-0.05
SP	22.5	+/-0.4	10	Maximum	19	Maximum	27	Maximum	0.8	+/-0.05
SU	22.5	+/-0.4	12	Maximum	22	Maximum	27	Maximum	0.8	+/-0.05
EE	25.4	+/-0.4	10.6	Maximum	16.1	Maximum	30.5	Maximum	1	+/-0.05
EJ	25.4	+/-0.4	12.1	Maximum	19	Maximum	30.5	Maximum	1	+/-0.05
			Note: See Ord	ering Ontions	Table for lead	lenath (LL) onti	ions	,	,	



### **Performance Characteristics**

In DC Applications	Recommended voltage ≤ 630 VDC					
	C > 0.33 µF	≥ 4,000 MΩ • µF				
Insulation Resistance	C ≤ 0.33 µF	≥ 12,000 MΩ				
	Minimum Values E	Between Terminals				
Test Voltage Between Terminals	The 100% screening factory test is of voltage level is selected to meet the equipment standards. All electrical of test. It is not permitted to repeat this the capacitor. KEMET is not liable in	requirements in applicable characteristics are checked after the test as there is a risk to damage				
Dissipation Factor	1 kHz	1.3%				
	Maximum Values at +23°C					
Approvals	ENEC, UL					
Climatic Category	40/110/56/B					
Temperature Range	-40°C to +110°C					
Capacitance Tolerance	$\pm 20\%$ for C ≤ 0.1 µF, $\pm 10\%$ for C > 0.1 µF					
Capacitance Range	0.01 – 0.22 μF					
Rated Voltage	300 VAC 50/60 Hz					

### **Environmental Test Data**

Test	IEC Publication	Procedure
Endurance	IEC 60384-14	1.25 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 – 55 Hz at 0.75 mm or 98 m/s <sup>2</sup>
Bump	IEC 60068-2-29 Test Eb	1,000 bumps at 390 m/s <sup>2</sup>
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 2.5 kV (pulse every 5 seconds)
Passive Flammability	IEC 60384-14	IEC 60384-1, IEC 60695-11-5 Needle-flame test
Damp Heat Steady State	IEC 60068-2-78 Test Cab	+40°C and 93% RH, 56 days



### **Approvals**

Mark	Specification	File Number		
	EN/IEC 60384-14	SE/0140-15C		
c <b>FLL</b> us	UL 1283 (310 VAC)	E100117		

### **Environmental Compliance**

All KEMET EMI capacitors are RoHS Compliant.

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

Capacitance	acitance Maximum Dimensions in mm		Maximum Dimensions in mm		f	dV/dt	New KEMET Part	Legacy Part
Value (µF)	В	Н	L	Spacing (p)	(MHz)	(V/µs)	Number	Number
0.010	5.2	10.5	18.5	15.2	16	1200	P277QE103M300(1)	PME271E510M(1)
0.015	5.2	10.5	18.5	15.2	13	1200	P277QE153M300(1)	PME271E515M(1)
0.022	7.3	13	18.5	15.2	9.8	1200	P277QN223M300(1)	PME271E522M(1)
0.033	7.3	13	18.5	15.2	7	1200	P277QN333M300(1)	PME271E533M(1)
0.047	8.5	14.3	18.5	15.2	6.4	1200	P277QS473M300(1)	PME271E547M(1)
0.068	7.6	14	24	20.3	5.2	600	P277CE683M300(1)	PME271E568M(1)
0.1	11.3	16.5	24	20.3	4.1	600	P277CP104M300(1)	PME271E610M(1)
0.068	8	17	27	22.5	4.7	600	P277SJ683M300(1)	PME271ED5680M(1)
0.1	8	17	27	22.5	4.1	600	P277SJ104M300(1)	PME271ED6100M(1)
0.15	10	19	27	22.5	3.2	600	P277SP154K300(1)	PME271ED6150K(1)
0.22	12	22	27	22.5	2.5	600	P277SU224K300(1)	PME271ED6220K(1)
0.15	10.6	16.1	30.5	25.4	3.3	400	P277EE154K300(1)	PME271E615K(1)
0.22	12.1	19	30.5	25.4	2.6	400	P277EJ224K300(1)	PME271E622K(1)
Capacitance Value (µF)	B (mm)	H (mm)	L (mm)	Lead Spacing (p)	f <sub>o</sub> (MHz)	dV/dt (V/μs)	New KEMET Part Number	Legacy Part Number

<sup>(1)</sup> Insert lead and packaging code. See Ordering Options Table for available options.



### **Soldering Process**

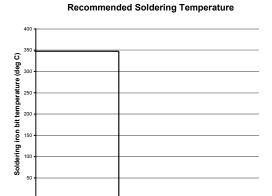
The implementation of the RoHS directive has resulted in the selection of SnAgCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. Polypropylene capacitors are especially sensitive to heat (the melting point of polypropylene is 160 – 170°C). Wave soldering can be destructive, especially for mechanically small polypropylene capacitors (with lead spacing of 5 mm to 15 mm), and great care has to be taken during soldering. The recommended solder profiles from KEMET should be used. Please consult KEMET with any questions. In general, the wave soldering curve from IEC Publication 61760-1 Edition 2 serves as a solid guideline for successful soldering. Please see Figure 1.

Reflow soldering is not recommended for through-hole film capacitors. Exposing capacitors to a soldering profile in excess of the above the recommended limits may result to degradation or permanent damage to the capacitors.

Do not place the polypropylene capacitor through an adhesive curing oven to cure resin for surface mount components. Insert through-hole parts after the curing of surface mount parts. Consult KEMET to discuss the actual temperature profile in the oven, if through-hole components must pass through the adhesive curing process. A maximum two soldering cycles is recommended. Please allow time for the capacitor surface temperature to return to a normal temperature before the second soldering cycle.

#### Manual Soldering Recommendations

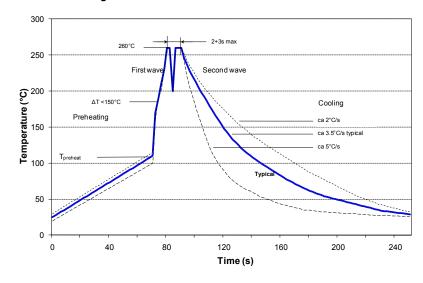
Following is the recommendation for manual soldering with a soldering iron.



The soldering iron tip temperature should be set at 350°C (+10°C maximum) with the soldering duration not to exceed more than 3 seconds.

Soldering time (sec)

#### **Wave Soldering Recommendations**





### **Soldering Process cont'd**

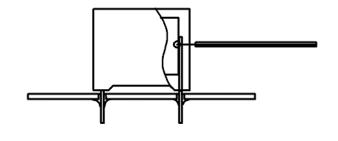
#### Wave Soldering Recommendations cont'd

1. The table indicates the maximum set-up temperature of the soldering process Figure 1

Dielectric		imum Pre emperatu	Maximum Peak Soldering Temperature		
Film Material	Pitch Pitch		Capacitor Pitch > 15 mm	Capacitor Pitch ≤ 15 mm	Capacitor Pitch > 15 mm
Polyester	130°C	130°C	130°C	270°C	270°C
Polypropylene	100°C	110°C	130°C	260°C	270°C
Paper	130°C 130°C		140°C	270°C	270°C
Polyphenylene Sulphide	150°C	150°C	160°C	270°C	270°C

The maximum temperature measured inside the capacitor:Set the temperature so that inside the element the maximum temperature is below the limit:

Dielectric Film Material	Maximum temperature measured inside the element				
Polyester	160°C				
Polypropylene	110°C				
Paper	160°C				
Polyphenylene sulphide	160°C				



Temperature monitored inside the capacitor.

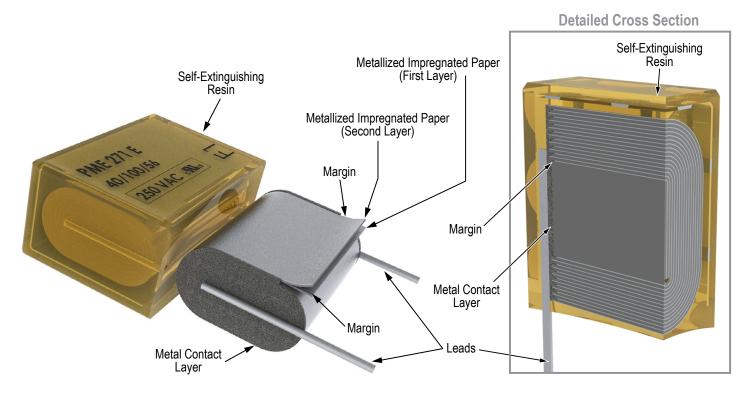
#### **Selective Soldering Recommendations**

Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is preheated and transported over the solder bath as in normal flow soldering without touching the solder. When the board is over the bath, it is stopped and pre-designed solder pots are lifted from the bath with molten solder only at the places of the selected components, and pressed against the lower surface of the board to solder the components.

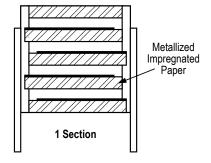
The temperature profile for selective soldering is similar to the double wave flow soldering outlined in this document, **however**, **instead of two baths**, **there is only one bath with a time from 3 to 10 seconds**. In selective soldering, the risk of overheating is greater than in double wave flow soldering, and great care must be taken so that the parts are not overheated.



#### Construction

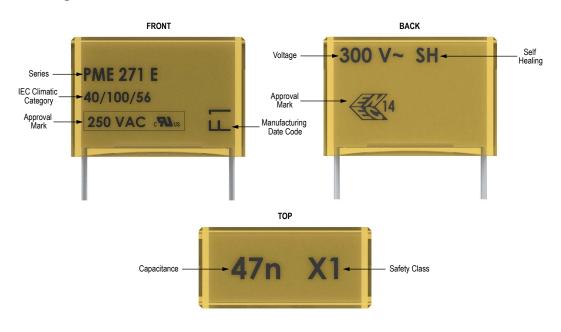


### **Winding Scheme**





### Marking



### **Packaging Quantities**

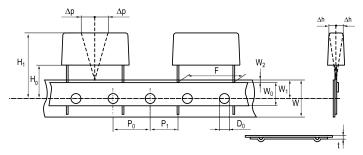
Lead Spacing (mm)	Thickness (mm)	Height (mm)	Length (mm)	Bulk Short Leads	Bulk Long Leads	Standard Reel ø 360 mm	Large Reel ø 500 mm
	5.5	12.5	18	1000	500	600	
	6.5	12.5	18	600	400	400	
	7.5	14.5	18	600	400	400	
	8.5	16	18	400	250	400	
45.0	5.2	10.5	18.5	1000	500	600	
15.2	5.5	11	18.5	1000	500	500	
	6	12.5	18.5	600	400	400	
	7.3	13	18.5	600	400	400	800
	7.8	13.5	18.5	600	400	400	
	8.5	14.3	18.5	500	300	350	
	7.0	44	0.4	4500	050	050	500
	7.6	14	24	1500	250	250	500
20.3	8.4	14	24	1200	200	250	500
	9	15	24	1500	200	250	
	11.3	16.5	24	1000	150	180	400
	8	17	27	1200	200		
22.5	10	19	27	1000	150	200	
22.0	12	22	27	800	100	180	350
					Y	,	
	10.6	16.1	30.5	1000	150		
25.4	10.5	17.3	30.5	1000	100		
25.4	12.1	19	30.5	800	100		
	15.3	22	30.5	600	75		



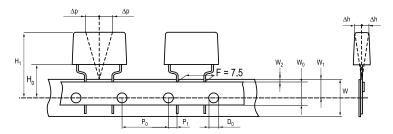
### Lead Taping & Packaging (IEC 60286-2)

### 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										
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 <sub>1</sub>	9	9	9	9	9	g+0.75/-0.5			
Distance between tapes	Maximum	W <sub>2</sub>	3	3	3	3	3	3			
Sprocket hole diameter	+/-0.2	D <sub>0</sub>	4	4	4	4	4	4			
Feed hole lead spacing	+/-0.3	P <sub>0</sub> <sup>(1)</sup>	12.7(4)	12.7	12.7	12.7	12.7	12.7			
Distance lead – feed hole	+/-0.7	P <sub>1</sub>	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 <sup>MAX</sup>	0.9 <sup>MAX</sup>			
Sprocket hole/cap body	Nominal	H <sub>0</sub> <sup>(2)</sup>	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 <sub>1</sub> <sup>(3)</sup>	35	35	35	35	58	58 <sup>MAX</sup>			

<sup>(1)</sup> Maximum cumulative feed hole error, 1 mm per 20 parts.

<sup>(2) 16.5</sup> mm available on request.

<sup>(3)</sup> Depending on case size.

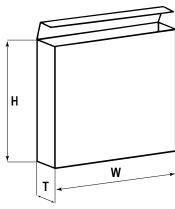
<sup>(4) 15</sup> mm available on request.



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

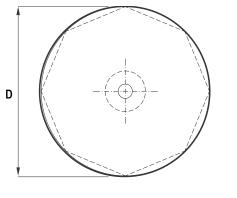
### **Ammo Specifications**

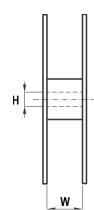
Series	Dimensions (mm)		
Series	Н	W	Т
R4x, R4x+R, R7x, RSB			
F5A, F5B, F5D	360	340	59
F6xx, F8xx			
PHExxx, PMExxx, PMRxxx	330	330	50



### **Reel Specifications**

Carias	Dimensions (mm)		
Series	D	Н	W
R4x, R4x+R, R7x, RSB	055	00	
F5A, F5B, F5D	355 500	30 25	55 (Max)
F6xx, F8xx	300		
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	Р	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	0		
2010	Α	November	N		
2011	В	December	D		
2012	С				
2013	D				
2014	E				
2015	F				
2016	Н				
2017	J				
2018	K				
2019	L				
2020	M				



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