

## Construction

Series winding of metallized polyester, encapsulated in self-extinguishing material meeting the requirements of UL 94V-0.

## Benefits

- Approvals: ENEC, UL, cUL
- Rated Voltage: 300VAC 50/60Hz
- Capacitance Range: 0.01–2.2 $\mu$ F
- Pitch: 15.0–37.5 mm
- Capacitance Tolerance:  $\pm$  20% standard,  $\pm$  10% option,  $\pm$  5% on request
- Climatic category 40/100/56, IEC 60068-1
- Tape and reel in accordance with IEC 60286-2
- RoHS-compliant and lead-free terminations
- Operating temperature range of -40°C to +100°C
- 100% screening factory test at 2150VDC

## Applications

For worldwide use in electromagnetic interference suppression in all X2 and across-the-line applications.



## Ordering Information

PHE820	M	B	5100	M	R17
Series	Rated Voltage	Pitch	Capacitance Code (pF)	Capacitance Tolerance	Packing Option and Leadform
X2, Metallized Polyester	M = 275VAC E = 300VAC	B = 15.0 D = 22.5 F = 27.5 R = 37.5	Digits 2-4 indicate the first three digits of the capacitance value. First digit indicates the total number of digits in the capacitance value	J = $\pm$ 5% K = $\pm$ 10% M = $\pm$ 20%	see Ordering Options Table

## Ordering Options Table

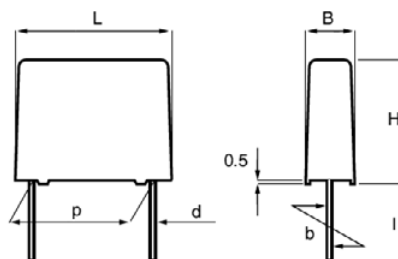
Standard Packaging Style	Lead Length	Ordering Code
	(mm)	
Ammo Pack		R17TA
Tape & Reel 360 mm		R17T0
Tape & Reel 500 mm		R17T1
Loose, Short Leads	4 <sup>+0/-1</sup>	R04
Loose, Long Leads	17 <sup>+0/-1</sup>	R17
Loose, Long Leads	30 <sup>+5</sup>	R30
Other options available on request		

## Dimension Table

Box	Lead Space	Outer Dimension		
		B	H	L
B04	15	5.5	10.5	18.0
B05	15	5.5	12.5	18.0
B06	15	7.5	14.5	18.0
B10	15	6.5	12.5	18.0
B11	15	8.5	16.0	18.0
D13	22.5	6.5	14.5	26.0
D14	22.5	8.0	16.0	26.0
D15	22.5	9.0	18.5	26.0
D16	22.5	11.0	21.5	26.0
F12	27.5	11.5	22.5	31.5
F13	27.5	14.5	24.5	31.5
F14	27.5	17.5	28.0	31.5
R02	37.5	16.5	32.0	41.0
R03	37.5	19.0	36.0	41.0

## Leadspacing Table

p	d	std l	max l	b
15.0 ± 0.4	0.8	17	30	± 0.4
22.5 ± 0.4	0.8	6	30	± 0.4
27.5 ± 0.4	0.8	6	30	± 0.4
37.5 ± 0.4	1.0	6	30	± 0.7
Tolerance in Lead Length	< 30mm +0 / -1			
	30mm +5 / -0			



## Technical Data

Rated Voltage	300 VAC 50/60Hz	
Capacitance Range	0.01–2.2 $\mu$ F	
Capacitance Tolerance	$\pm$ 20% standard, $\pm$ 10% option, $\pm$ 5% on request	
Temperature Range	-40 to +100°C	
Climatic Category	40/100/56	
Approvals	ENEC, UL, cUL	
Dissipation Factor	Maximum Values at +23°C	
	1 kHz	1.0%
Test Voltage Between Terminals	The 100% screening factory test is carried out at 2150VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test. It is not permitted to repeat this test as there is a risk to damage the capacitor. KEMET is not liable in such case for any failures.	
Insulation Resistance	C $\leq$ 0.33 $\mu$ F: $\geq$ 30 000 M $\Omega$	
	C > 0.33 $\mu$ F : $\geq$ 10 000 s	
In DC applications	Recommended Voltage $\leq$ 760 VDC	

## Environmental Test Data

Test	IEC Publication	Procedure
Endurance	EN/IEC 60384-14	1.25 x UR VAC 50Hz, once every hour increase to 1000 VAC for 0.1 s, 1000 h 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 98m/s <sup>2</sup>
Bump	IEC 60068-2-29 Test Eb	1000 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	UR + 20 surge pulses at 2.5 kV (pulse every 5 s)
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 90 - 95% R.H., 56 days

## Environmental Compliance



All KEMET EMI capacitors are RoHS compliant and Halogen Free.



RoHS Compliant



## Approvals

Mark	Specification	File Number
	EN/IEC 60384-14	SE/0140-12B
	UL 1414 (up to 1µF, 85°C, 250VAC)	E73869
	CSA - C22.2 No.1 (up to 1µF, 85°C, 250VAC)	E73869
	UL 1283 (310VAC)	E100117
	CSA - C22.2 No. 8 (310VAC)	E100117

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

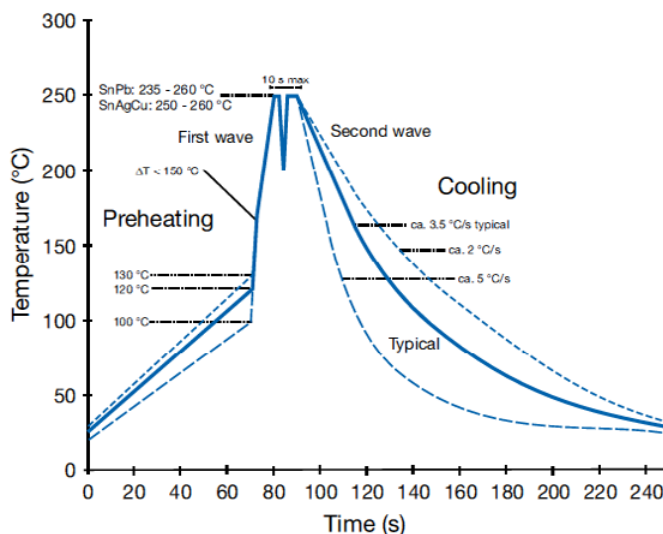
Lead Space	Cap Value (µF)	B (mm)	H (mm)	L (mm)	dV/dt (V/µsec)	F Article Code	Part Number
15	0.010	5.5	10.5	18.0	100	F720BD103M300A	PHE820EB5100MR17
15	0.015	5.5	10.5	18.0	100	F720BD153M300A	PHE820EB5150MR17
15	0.022	5.5	10.5	18.0	100	F720BD223M300A	PHE820EB5220MR17
15	0.033	5.5	12.5	18.0	100	F720BE333M300A	PHE820EB5330MR17
15	0.047	6.5	12.5	18.0	100	F720BJ473M300A	PHE820EB5470MR17
15	0.068	7.5	14.5	18.0	100	F720BL683M300A	PHE820EB5680MR17
15	0.10	8.5	16.0	18.0	100	F720BQ104M300A	PHE820EB6100MR17
22.5	0.10	6.5	14.5	26.0	100	F720DD104M300C	PHE820ED6100MR06L2
22.5	0.15	8.0	16.0	26.0	100	F720DH154M300C	PHE820ED6150MR06L2
22.5	0.22	9.0	18.5	26.0	100	F720DM224M300C	PHE820ED6220MR06L2
22.5	0.33	11.0	21.5	26.0	100	F720DT334M300C	PHE820ED6330MR06L2
27.5	0.33	10.5	20.5	31.5	100	F720FE334M300C	PHE820EF6330MR06L2
27.5	0.47	11.5	22.5	31.5	100	F720FG474M300C	PHE820EF6470MR06L2
27.5	0.68	14.5	24.5	31.5	100	F720FM684M300C	PHE820EF6680MR06L2
27.5	1.0	17.5	28.0	31.5	100	F720FR105M300C	PHE820EF7100MR06L2
37.5	1.5	16.5	32.0	41.0	100	F720RK155M300C	PHE820ER7150MR06L2
37.5	2.2	19.0	36.0	41.0	100	F720RM225M300C	PHE820ER7220MR06L2
Lead Space	Cap Value (µF)	B (mm)	H (mm)	L (mm)	dV/dt (V/µsec)	F Article Code	Part Number

Other part number options:

- (1) Where the 14th character equal to, J ( $\pm 5\%$  tolerance), K ( $\pm 10\%$  tolerance) and M ( $\pm 20\%$  tolerance).
- (2) Refer to Ordering Options Table for Ordering Code.

## Soldering Process

The implementation of RoHS Directive has forced to select SnAuCu (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. This means that the heat stress to components, even in wave soldering, has increased considerably due to higher pre-heat and wave temperatures. The Polypropylene Capacitors are especially sensitive to heat (melting point of Polypropylene is 160–170°C). The wave soldering can be destructive especially for mechanically small Polypropylene Capacitors (lead spacings 5-10 mm), and great care has to be taken when soldering them. The recommended solder profiles from KEMET should be used. In case of doubt, KEMET should be consulted. In general the wave soldering curve from IEC Publication 61760-1 edition 2 gives a good guideline for successful soldering.



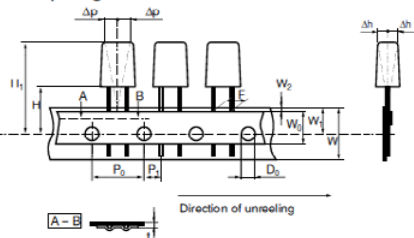
## Marking

- Manufacturer's logo
- Article series
- Rated capacitance
- Capacitance tolerance
- Rated voltage
- Capacitor class
- Approval marks
- Manufacturing date code
- IEC climatic category
- Passive flammability class
- Manufacturing date code
- Manufacturing plant

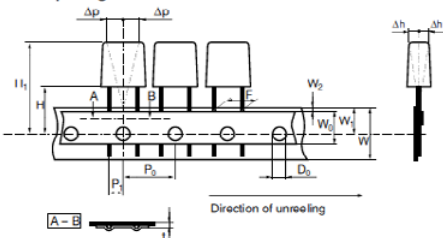
## Packaging

The taping is carried out in accordance with IEC 60286-2.

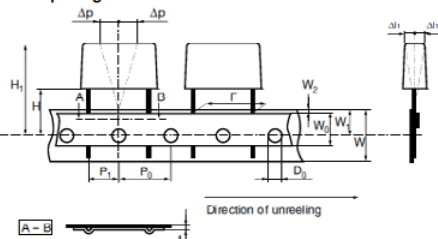
### Lead spacing 5 mm



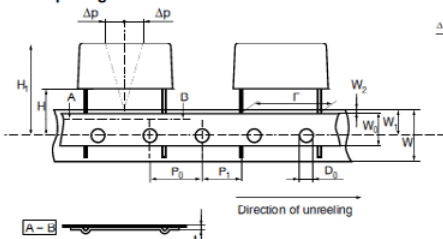
### Lead spacing 7.5 mm



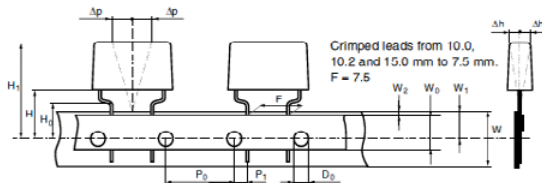
### Lead spacing 10 and 15 mm



### Lead spacing 22.5 and 27.5 mm



### Crimped leads



## Taping Specification

	Dimensions in mm					Standard IEC 60286-2
Lead spacing, (Tol. +0.6/-0.1)	F	5.0/7.5	7.5 Crimped Leads	10.0/15.0	22.5/27.5	F
Carrier tape width, ±0.5	W	18	18	18	18	18 (+1.0/-0.5)
Hold-down tape width, ±0.3	W <sub>0</sub>	9	12	12	12	
Position of sprocket hole, ±0.5	W <sub>1</sub>	9	9	9	9	9 (+0.75/-0.5)
Distance between tapes, max.	W <sub>2</sub>	3	3	3	3	3
Sprocket hole diameter, ±0.2	D <sub>0</sub>	4	4	4	4	4
Feed hole pitch, ±0.3	P <sub>0</sub> <sup>1)</sup>	12.7	15/12.7	12.7	12.7	12.7/15
Distance lead – feed hole, ±0.7	P <sub>1</sub>	3.85/3.75	3.75	7.7/5.2	5.3	P <sub>1</sub>
Max deviation tape – plane	Δp	1.3	1.3	1.3	1.3	1.3
Max lateral deviation	Δh	2	2	2	2	2
Total thickness, ±0.2	t	0.7	0.7	0.7	0.9 max	0.9 max
Sprocket hole/cap body	H <sup>2)</sup>	18.5 ±0.5 16.5 ±0.5		18.5 ±0.5 16.5 ±0.5	18.5 ±0.5	18.0 (+2/-0)
Sprocket hole/crimped leads	H <sub>0</sub> <sup>2)</sup>		16 ±0.5 18 ±0.5			16 ±0.5
Sprocket hole/top of cap body, max	H <sub>1</sub> <sup>3)</sup>	32/31 max	40 max	43 max	58	58 max

<sup>1)</sup> Cumulative pitch error

<sup>2)</sup> Alternatives for different insertion machines

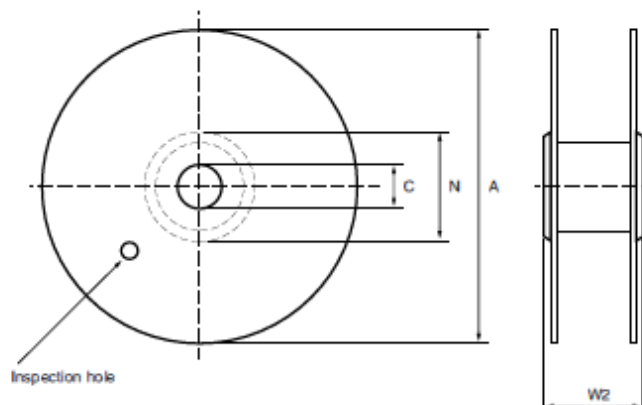
<sup>3)</sup> Depending on case size

Note: Crimped leads available on request

## Reel Specification

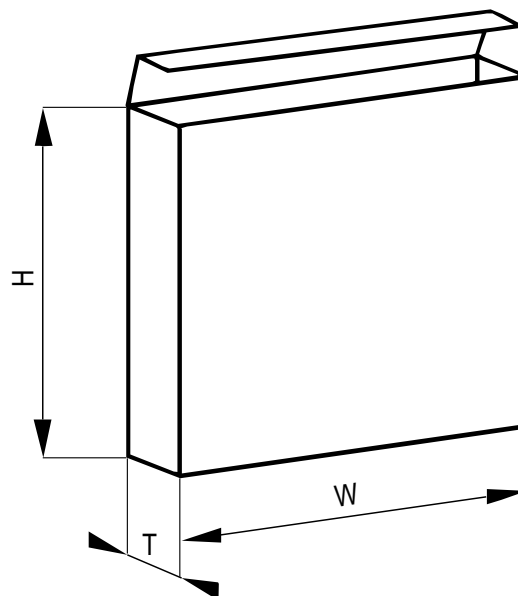
Dimensions in mm			Tolerance
Reel diameter	A	360/500	max
Hub diameter	N	80	min
Arbor hole	C	30	±1
Total reel width measured at hub	W2	58	max

The standard packing for lead space ≤15 mm is 360 mm reel and for lead space >15 mm 500 mm reel.



## Ammo Pack Specification

Dimensions in mm		Lead spacing, mm	
		5, 7.5, 10	15, 22.5, 27.5, 37.5
Height	H	330	(135 or 200 for CQ depending on capacitance value)
Width	W	330	(335 for CQ)
Thickness	T	50	



### The Manufacturing Date Code Y Z, according to IEC 60062

where Y = year, Z = month									
Year	Code	Year	Code	Year	Code	Month	Code	Month	Code
1991	B	2001	N	2011	B	Jan	1	July	7
1992	C	2002	P	2012	C	Febr	2	Aug	8
1993	D	2003	R	2013	D	March	3	Sept	9
1994	E	2004	S	2014	E	April	4	Oct	O
1995	F	2005	T	2015	F	May	5	Nov	N
1996	H	2006	U	2016	H	June	6	Dec	D
1997	J	2007	V	2017	J				
1998	K	2008	W	2018	K				
1999	L	2009	X	2019	L				
2000	M	2010	A	2020	M				

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Carmel, IN  
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### West

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Tel: 39-02-57518176

Rome, Italy  
Tel: 39-06-23231718

Madrid, Spain  
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Dortmund, Germany  
Tel: 49-2307-3619672

Kwidzyn, Poland  
Tel: 48-55-279-7025

### Northern Europe

Bishop's Stortford, United Kingdom  
Tel: 44-1279-757201

Weymouth, United Kingdom  
Tel: 44-1305-830747

Coatbridge, Scotland  
Tel: 44-1236-434455

Färjestaden, Sweden  
Tel: 46-485-563934

Espoo, Finland  
Tel: 358-9-5406-5000

## Asia

### Northeast Asia

Hong Kong  
Tel: 852-2305-1168

Shenzhen, China  
Tel: 86-755-2518-1306

Beijing, China  
Tel: 86-10-5829-1711

Shanghai, China  
Tel: 86-21-6447-0707

Taipei, Taiwan  
Tel: 886-2-27528585

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Singapore  
Tel: 65-6586-1900

Penang, Malaysia  
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Tel: 91-806-53-76817

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## Other KEMET Resources

Tools	
Resource	Location
Configure A Part: CapEdge	<a href="http://capacitoredge.kemet.com">http://capacitoredge.kemet.com</a>
SPICE & FIT Software	<a href="http://www.kemet.com/spice">http://www.kemet.com/spice</a>
Search Our FAQs: KnowledgeEdge	<a href="http://www.kemet.com/keask">http://www.kemet.com/keask</a>

Product Information	
Resource	Location
Products	<a href="http://www.kemet.com/products">http://www.kemet.com/products</a>
Technical Resources (Including Soldering Techniques)	<a href="http://www.kemet.com/technicalpapers">http://www.kemet.com/technicalpapers</a>
RoHS Statement	<a href="http://www.kemet.com/rohs">http://www.kemet.com/rohs</a>
Quality Documents	<a href="http://www.kemet.com/qualitydocuments">http://www.kemet.com/qualitydocuments</a>

Product Request	
Resource	Location
Sample Request	<a href="http://www.kemet.com/sample">http://www.kemet.com/sample</a>
Engineering Kit Request	<a href="http://www.kemet.com/kits">http://www.kemet.com/kits</a>

Contact	
Resource	Location
Website	<a href="http://www.kemet.com">www.kemet.com</a>
Contact Us	<a href="http://www.kemet.com/contact">http://www.kemet.com/contact</a>
Investor Relations	<a href="http://www.kemet.com/ir">http://www.kemet.com/ir</a>
Call Us	1-877-MyKEMET
Twitter	<a href="http://twitter.com/kemetcapacitors">http://twitter.com/kemetcapacitors</a>

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Although we design and manufacture our 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.

