

Overview

The PHE450 Series is a polypropylene dielectric with double metallized polyester film as electrodes. The capacitor is encapsulated in self-extinguishing resin, in a box of material meeting the requirements of UL 94 V-0.

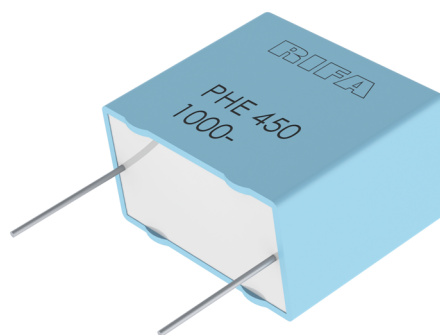
Applications

Typical applications include high frequency applications with high current stress, such as deflection circuits in televisions and protection circuits in switched mode power supply (SMPS) and electronic ballasts.

ATTENTION -- This series was replaced by the R76 series. Please click on the link to the R76 series datasheet [HERE](#).

Benefits

- Rated voltage: 250 – 3,000 VDC
- Rated voltage: 180 – 1,000 VAC
- Capacitance range: 0.00033 – 10 μ F
- Lead spacing: 7.5 – 37.5 mm
- Capacitance tolerance: \pm 5%, other tolerances on request
- Climatic category: 55/105/56, IEC 60068-1
- Tape & Reel packaging in accordance with IEC 60286-2
- RoHS Compliant and lead-free terminations
- Category temperature range of -55°C to +105°C



Customer Part Number

PHE450	P	B	5180	J	B04	R06
Series	Rated Voltage (VDC)	Lead Spacing (mm)	Capacitance Code (pF)	Capacitance Tolerance	Optional Box Code	Packaging
Metallized Polypropylene	H = 250 K = 400 M = 630 P = 1,000 R = 1,600 S = 2,000 T = 2,500 X = 3,000	K = 7.5 A = 10.0 B = 15.0 D = 22.5 F = 27.5 T = 27.5 low profile case R = 37.5	The last three digits represent significant figures. The first digit specifies the total number of digits.	J = \pm 5% Other tolerances on request	See Dimension Table	See Ordering Options Table

KEMET Internal Part Number

F	450	B	D	183	J	1K0	C
Capacitor Class	Series	Lead Spacing (mm)	Size Code	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Packaging
F = Film	Metallized Polypropylene	K = 7.5 A = 10.0 B = 15.0 D = 22.5 F = 27.5 T = 27.5 low profile case R = 37.5	See Dimension Table	First two digits represent significant figures. Third digit specifies number of zeros.	J = \pm 5% Other tolerances on request	250 = 250 400 = 400 630 = 630 1K0 = 1,000 1K6 = 1,600 2K0 = 2,000 2K5 = 2,500 3K0 = 3,000	See Ordering Options Table

Built Into Tomorrow

Ordering Options Table

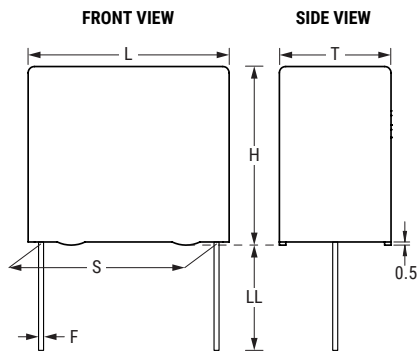
Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	KEMET Lead and Packaging Code	Legacy Lead and Packaging Code
7.5	Standard Lead and Packaging Options			
	Bulk (Bag) – Short Leads	5 +0/-1	C	R05
	Ammo Pack	$H_0 = 18.5 \pm 0.5$	R	R17TA
	Bulk (Bag) – Long Leads	17 +0/-1	A	R17
	Other Lead and Packaging Options			
	Bulk (Bag) – Maximum Length Leads	20 +5/-0	ALL0L	R20
	Tape & Reel (Standard Reel)	$H_0 = 18.5 \pm 0.5$	L	R17T0
	Tape & Reel (Large Reel)	$H_0 = 18.5 \pm 0.5$	P	R17T1
10	Standard Lead and Packaging Options			
	Bulk (Bag) – Short Leads	5 +0/-1	C	R05
	Bulk (Bag) – Long Leads	17 +0/-1	A	R17
	Other Lead and Packaging Options			
	Bulk (Bag) – Maximum Length Leads	20 +5/-0	ALL0L	R20
	Tape & Reel (Standard Reel)	$H_0 = 18.5 \pm 0.5$	L	R17T0
	Tape & Reel (Large Reel)	$H_0 = 18.5 \pm 0.5$	P	R17T1
15	Standard Lead and Packaging Options			
	Bulk (Bag) – Short Leads	6 +0/-1	C	R06
	Bulk (Bag) – Long Leads	17 +0/-1	A	R17*
	Other Lead and Packaging Options			
	Bulk (Bag) – Maximum Length Leads	25 +5/-0	ALR0L	R25
	Tape & Reel (Standard Reel)	$H_0 = 18.5 \pm 0.5$	L	R17T0
	Tape & Reel (Large Reel)	$H_0 = 18.5 \pm 0.5$	P	R17T1
Native 15 formed to 7.5	Ammo Pack	$H_0 = 18.5 \pm 0.5$	XLAF1	R25XA
	Tape & Reel (Standard Reel)	$H_0 = 18.5 \pm 0.5$	XLTF1	R25X2
22.5	Standard Lead and Packaging Options			
	Bulk (Tray) – Short Leads	6 +0/-1	C	R06L2
	Other Lead and Packaging Options			
	Bulk (Tray) – Maximum Length Leads	30 +5/-0	ALW0L	R30L2
	Tape & Reel (Standard Reel)	$H_0 = 18.5 \pm 0.5$	L	R17T0
	Tape & Reel (Large Reel)	$H_0 = 18.5 \pm 0.5$	P	R17T1

* Exception: F450BD222J2K0A: 30 +5/-0 mm bulk

Ordering Options Table cont.

Lead Spacing Nominal (mm)	Type of Leads and Packaging	Lead Length (mm)	KEMET Lead and Packaging Code	Legacy Lead and Packaging Code
27.5	Standard Lead and Packaging Options			
	Bulk (Tray) – Short Leads	6 +0/-1	C	R06L2
	Other Lead and Packaging Options			
	Bulk (Tray) – Maximum Length Leads	30 +5/-0	ALW0L	R30L2
	Tape & Reel (Large Reel)	H ₀ = 18.5 ±0.5	P	R17T1
37.5	Standard Lead and Packaging Options			
	Bulk (Tray) – Short Leads	6 +0/-1	C	R06L2
	Other Lead and Packaging Options			
	Bulk (Tray) – Maximum Length Leads	30 +5/-0	ALW0L	R30L2

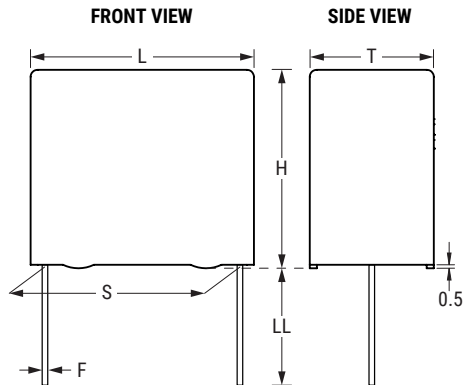
Dimensions – Millimeters



KEMET Size Code	Legacy Size Code	S		T		H		L		F	
		Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
KG	K01	7.5	±0.4	4	0/-0.5	8	0/-0.5	10	0/-0.5	0.6	±0.05
KK	K03	7.5	±0.4	5	0/-0.5	11	0/-0.5	10	0/-0.5	0.6	±0.05
KM	K04	7.5	±0.4	6	0/-0.5	12	0/-0.5	10.5	0/-0.5	0.6	±0.05
AG	A01	10	±0.4	4	0/-0.5	9	0/-0.5	13	0/-0.5	0.6	±0.05
AH	A02	10	±0.4	4.5	0/-0.5	10.5	0/-0.5	13	0/-0.5	0.6	±0.05
AK	A03	10	±0.4	5	0/-0.5	11	0/-0.5	13	0/-0.5	0.6	±0.05
AP	A04	10	±0.4	6	0/-0.5	12	0/-0.5	13	0/-0.5	0.6	±0.05
BD	B04	15	±0.4	5.5	0/-0.5	10.5	0/-0.5	18	0/-0.5	0.8	±0.05
BE	B05	15	±0.4	5.5	0/-0.5	12.5	0/-0.5	18	0/-0.5	0.8	±0.05

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

Dimensions – Millimeters cont.



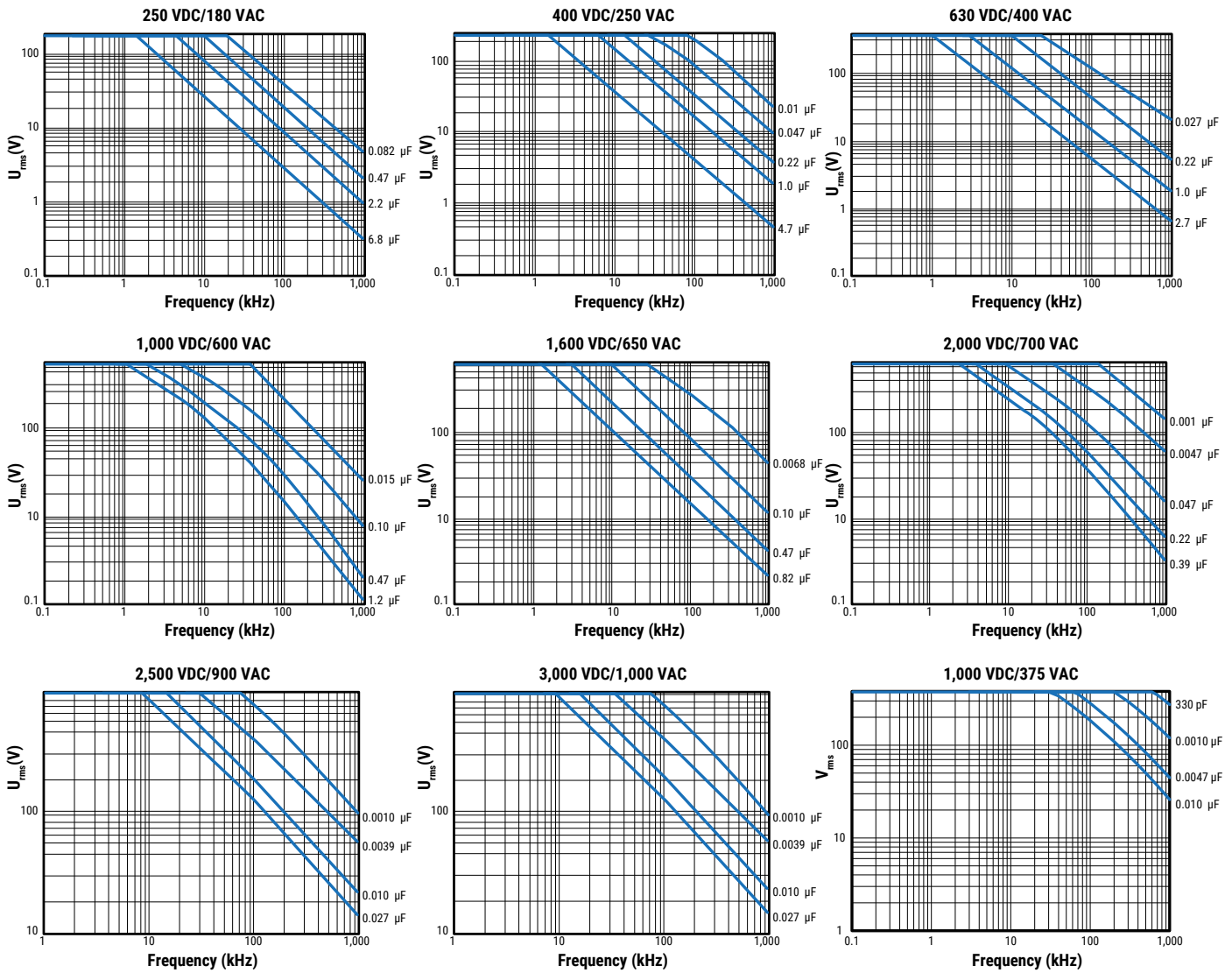
KEMET Size Code	Legacy Size Code	S		T		H		L		F	
		Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
BL	B06	15	±0.4	7.5	0/-0.5	14.5	0/-0.5	18	0/-0.5	0.8	±0.05
BJ	B10	15	±0.4	6.5	0/-0.5	12.5	0/-0.5	18	0/-0.5	0.8	±0.05
BQ	B11	15	±0.4	8.5	0/-0.5	16	0/-0.5	18	0/-0.5	0.8	±0.05
BM	B12	15	±0.4	8	0/-0.5	15	0/-0.5	18	0/-0.5	0.8	±0.05
BV	B14	15	±0.4	9.5	0/-0.5	17.5	0/-0.5	18	0/-0.5	0.8	±0.05
BY	B16	15	±0.4	11	0/-0.5	19	0/-0.5	18	0/-0.5	0.8	±0.05
DD	D13	22.5	±0.4	6.5	0/-0.5	14.5	0/-0.5	26	0/-0.5	0.8	±0.05
DH	D14	22.5	±0.4	8	0/-0.5	16	0/-0.5	26	0/-0.5	0.8	±0.05
DM	D15	22.5	±0.4	9	0/-0.5	18.5	0/-0.5	26	0/-0.5	0.8	±0.05
DT	D16	22.5	±0.4	11	0/-0.5	21.5	0/-0.5	26	0/-0.5	0.8	±0.05
DF	D17	22.5	±0.4	7	0/-0.5	16.5	0/-0.5	26	0/-0.5	0.8	±0.05
DR	D18	22.5	±0.4	10.5	0/-0.5	19	0/-0.5	26	0/-0.5	0.8	±0.05
DY	D19	22.5	±0.4	15.5	0/-0.5	24.5	0/-0.5	26	0/-0.5	0.8	±0.05
DW	D20	22.5	±0.4	13.5	0/-0.5	23	0/-0.5	26	0/-0.5	0.8	±0.05
FK	F03	27.5	±0.4	13.5	0/-0.7	23	0/-0.7	31.5	0/-0.7	0.8	±0.05
FE	F11	27.5	±0.4	10.5	0/-0.7	20.5	0/-0.7	31.5	0/-0.7	0.8	±0.05
FG	F12	27.5	±0.4	11.5	0/-0.7	22.5	0/-0.7	31.5	0/-0.7	0.8	±0.05
FM	F13	27.5	±0.4	14.5	0/-0.7	24.5	0/-0.7	31.5	0/-0.7	0.8	±0.05
FR	F14	27.5	±0.4	17.5	0/-0.7	28	0/-0.7	31.5	0/-0.7	0.8	±0.05
FS	F15	27.5	±0.4	19	0/-0.7	29	0/-0.7	31.5	0/-0.7	0.8	±0.05
FV	F16	27.5	±0.4	21	0/-0.7	30	0/-0.7	31.5	0/-0.7	0.8	±0.05
FH	F17	27.5	±0.4	21	0/-0.7	12.5	0/-0.7	31.5	0/-0.7	0.8	±0.05
FT	F18	27.5	±0.4	31	0/-0.7	19	0/-0.7	31.5	0/-0.7	0.8	±0.05
FQ	F19	27.5	±0.4	27.5	0/-0.7	16	0/-0.7	31.5	0/-0.7	0.8	±0.05
RK	R02	37.5	±0.4	16.5	0/-0.7	32	0/-0.7	41	0/-0.7	1	±0.05
RM	R03	37.5	±0.4	19	0/-0.7	36	0/-0.7	41	0/-0.7	1	±0.05
RH	R04	37.5	±0.4	15	0/-0.7	26	0/-0.7	41	0/-0.7	1	±0.05
RF	R05	37.5	±0.4	13	0/-0.7	24	0/-0.7	41	0/-0.7	1	±0.05
RP	R06	37.5	±0.4	21	0/-0.7	38	0/-0.7	41	0/-0.7	1	±0.05
RS	R08	37.5	±0.4	28	0/-0.7	43	0/-0.7	41	0/-0.7	1	±0.05

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

Performance Characteristics

Sections	1	1	1	2	1	2	2	2	3	3
Voltage Range (VDC)	250	400	630	630	1,000	1,000	1,600	2,000	2,500	3,000
Voltage Range (VAC)	180	250	300	400	375	600	650	700	900	1,000
Capacitance Range (μF)	0.00033 – 0.033	0.00033 – 5.6	0.00033 – 0.039	0.01 – 3.3	0.00033 – 0.018	0.0039 – 2.2	0.0027 – 1	0.001 – 0.68	0.0010 – 0.33	0.001 – 0.033
Capacitance Values	In accordance with IEC E12 series									
Capacitance Tolerance	$\pm 5\%$, other tolerances on request									
Category Temperature Range	-55°C to $+105^{\circ}\text{C}$									
Rated Temperature	$+85^{\circ}\text{C}$									
Voltage Derating	The rated voltage is decreased with $1.3\%/^{\circ}\text{C}$ between $+85^{\circ}\text{C}$ and $+105^{\circ}\text{C}$									
Climatic Category	IEC 60068-1, 55/105/56/B									
Passive Flammability	Category B according to IEC 60065									
Maximum Pulse Steepness	dV/dt according to Table 1. For peak to peak voltages lower than rated voltage ($V_{pp} < V_R$), the specified dV/dt can be multiplied by the factor V_R/V_{pp} .									
Self-Inductance	Approximately 6 nH/cm for the total length of capacitor winding and the leads.									
Dissipation Factor $\tan\delta$	Maximum Values at $+23^{\circ}\text{C}$									
		$C \leq 0.1 \mu\text{F}$		$0.1 \mu\text{F} < C \leq 1.0 \mu\text{F}$		$C > 1.0 \mu\text{F}$				
	1 kHz	0.0003		0.0003		0.0003				
	10 kHz	0.0004		0.0006		–				
	100 kHz	0.0015		–		–				
Insulation Resistance	Measured at $+23^{\circ}\text{C}$, 100 VDC 60 seconds for $V_R < 500$ VDC and at 500 VDC for $V_R \geq 500$ VDC									
	Minimum Values Between Terminals									
	$C \leq 0.33 \mu\text{F}$					$\geq 100,000 \text{ M}\Omega$				
	$C > 0.33 \mu\text{F}$					$\geq 30,000 \text{ M}\Omega \cdot \mu\text{F}$				
	Minimum Values Between Terminals and Case									
					$\geq 100,000 \text{ M}\Omega$					

Derating of V_{rms} vs. Frequency, +85°C Ambient Temperature and 10°C Internal Heating, Typical Values



Environmental Test Data

Test	IEC Publication	Procedure	Requirements
Voltage Proof	60384-1 Clause 4.6	$1.6 \times V_R$ after 60 seconds	The capacitors must withstand the voltage without breakdowns or flashovers, and without decreased insulation resistance below the value in each detail specification. No visible damage.
	Clause 4.6 2.3	$2 \times V_R$ (minimum 400 VDC to case) after 60 seconds	As above
Vibration	60068-2-6 Test Fc	6 hours with 10 – 500 Hz and 0.75 mm amplitude or 98 m/s ² depending on frequency	No visible damage $\tan\delta \leq 1.2 \times$ stated value at 100 kHz $\Delta C/C \leq \pm 0.5\%$
Bump	60068-2-29 Test Eb	4,000 bumps with 390 m/s ² mounted on PCB	$\Delta C/C \leq \pm 0.5\%$ $\tan\delta \leq 1.2 \times$ stated value at 100 kHz Insulation resistance: $\geq 100,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 30,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$
Resistance to Soldering Heat	60068-2-20 Method 1A	Solder bath at $+260^\circ\text{C} \pm 5^\circ\text{C}$ with screening	Immersion of the terminations into the solder bath shall be completed in a time not exceeding 1 second and the terminations shall remain immersed to the specified depth for 10 + 1 second and then be withdrawn. $\Delta C/C \leq \pm 1.0\%$ $\tan\delta$ increase < 0.001 No visible damage
Climatic Sequence	60384-1 Paragraph 4:21	60068-2.2 dry heat 16 hours 60068-2-34 damp heat, one cycle 60068-2-1 Test Aa 2 hours	Insulation resistance: $\geq 100,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 30,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ $\Delta C/C \leq \pm 0.5\%$ $\tan\delta \leq 1.2 \times$ stated value at 100 kHz
Damp Heat Steady State	60068-2-3 Test Ca	$+40^\circ\text{C}$ and 90 – 95% RH	56 days no visible damage Insulation resistance: $\geq 50,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 15,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$ $\Delta C/C \leq \pm 1\%$ $\tan\delta \leq 1.2 \times$ stated value at 100 kHz
Endurance, AC		1,000 hours at $+85^\circ\text{C}$ and $1.25 \times V_R$ AC	No visible damage $\Delta C/C \leq \pm 3\%$ $\tan\delta \leq 1.5 \times$ stated value at 100 kHz Insulation resistance: $\geq 100,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 30,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$
Charge and Discharge	60384-17 Paragraph 4.13	10,000 pulses and with (2 x) dV/dt according to detail specification	$\tan\delta$ (100 kHz) $\leq 2 \times$ stated value (100 kHz) $\Delta C/C \leq \pm 0.5\%$ Insulation resistance: $\geq 50,000 \text{ M}\Omega$ for $C_R \leq 0.33 \mu\text{F}$ $\geq 15,000 \text{ M}\Omega, \mu\text{F}$ for $C_R > 0.33 \mu\text{F}$

Environmental Compliance

All KEMET pulse capacitors are RoHS Compliant.



Table 1 – Ratings & Part Number Reference cont.

VDC	VAC	Cap Value (µF)	Dimensions in mm			Lead Spacing (S)	dV/dt (V/µs)	Size Code (New/Legacy)	R _{thha} °C/W 85°C 0.2m/s	Kemet Part Number	Legacy Part Number
			T	H	L						
400	250	0.56	10.5	20.5	31.5	27.5	500	FE/F11	38	F450FE564J400(1)	PHE450KF6560J(1)
400	250	0.68	10.5	20.5	31.5	27.5	500	FE/F11	38	F450FE684J400(1)	PHE450KF6680J(1)
400	250	0.68	21.0	12.5	31.5	27.5	500	FH/F17	38	F450FH684J400(1)	PHE450KT6680J(1)
400	250	0.82	11.5	22.5	31.5	27.5	500	FG/F12	34	F450FG824J400(1)	PHE450KF6820J(1)
400	250	1.0	13.5	23.0	31.5	27.5	500	FK/F03	32	F450FK105J400(1)	PHE450KF7100J(1)
400	250	1.2	14.5	24.5	31.5	27.5	500	FM/F13	30	F450FM125J400(1)	PHE450KF7120J(1)
400	250	1.5	17.5	28.0	31.5	27.5	500	FR/F14	27	F450FR155J400(1)	PHE450KF7150J(1)
400	250	1.5	27.5	16.0	31.5	27.5	500	FQ/F19	27	F450FQ155J400(1)	PHE450KT7150J(1)
400	250	1.8	19.0	29.0	31.5	27.5	500	FS/F15	25	F450FS185J400(1)	PHE450KF7180J(1)
400	250	2.2	21.0	30.0	31.5	27.5	500	FV/F16	24	F450FV225J400(1)	PHE450KF7220J(1)
400	250	2.2	31.0	19.0	31.5	27.5	500	FT/F18	24	F450FT225J400(1)	PHE450KT7220J(1)
400	250	1.0	13.0	24.0	41.0	37.5	300	RF/R05	27	F450RF105J400(1)	PHE450KR7100J(1)
400	250	1.2	13.0	24.0	41.0	37.5	300	RF/R05	27	F450RF125J400(1)	PHE450KR7120J(1)
400	250	1.5	13.0	24.0	41.0	37.5	300	RF/R05	27	F450RF155J400(1)	PHE450KR7150J(1)
400	250	1.8	15.0	26.0	41.0	37.5	300	RH/R04	25	F450RH185J400(1)	PHE450KR7180J(1)
400	250	2.2	16.5	32.0	41.0	37.5	300	RK/R02	22	F450RK225J400(1)	PHE450KR7220J(1)
400	250	2.7	16.5	32.0	41.0	37.5	300	RK/R02	22	F450RK275J400(1)	PHE450KR7270J(1)
400	250	3.3	19.0	36.0	41.0	37.5	300	RM/R03	19	F450RM335J400(1)	PHE450KR7330J(1)
400	250	3.9	19.0	36.0	41.0	37.5	300	RM/R03	19	F450RM395J400(1)	PHE450KR7390J(1)
400	250	4.7	21.0	38.0	41.0	37.5	300	RP/R06	17	F450RP475J400(1)	PHE450KR7470J(1)
400	250	5.6	28.0	43.0	41.0	37.5	300	RS/R08	17	F450RS565J400(1)	PHE450KR7560J(1)
630	300	0.00039	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG391J630(1)	PHE450MK3390J(1)
630	300	0.00047	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG471J630(1)	PHE450MK3470J(1)
630	300	0.00056	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG561J630(1)	PHE450MK3560J(1)
630	300	0.00068	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG681J630(1)	PHE450MK3680J(1)
630	300	0.00082	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG821J630(1)	PHE450MK3820J(1)
630	300	0.0010	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG102J630(1)	PHE450MK4100J(1)
630	300	0.0012	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG122J630(1)	PHE450MK4120J(1)
630	300	0.0015	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG152J630(1)	PHE450MK4150J(1)
630	300	0.0018	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG182J630(1)	PHE450MK4180J(1)
630	300	0.0022	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG222J630(1)	PHE450MK4220J(1)
630	300	0.0027	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG272J630(1)	PHE450MK4270J(1)
630	300	0.0033	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG332J630(1)	PHE450MK4330J(1)
630	300	0.0039	4.0	8.0	10.0	7.5	2,000	KG/K01	160	F450KG392J630(1)	PHE450MK4390J(1)
630	300	0.0047	4.0	8.0	10.0	7.5	1,400	KG/K01	160	F450KG472J630(1)	PHE450MK4470J(1)
630	300	0.0056	4.0	8.0	10.0	7.5	1,400	KG/K01	160	F450KG562J630(1)	PHE450MK4560J(1)
630	300	0.0068	4.0	8.0	10.0	7.5	1,400	KG/K01	160	F450KG682J630(1)	PHE450MK4680J(1)
630	300	0.0082	4.0	8.0	10.0	7.5	1,400	KG/K01	160	F450KG822J630(1)	PHE450MK4820J(1)
630	300	0.010	5.0	11.0	10.0	7.5	1,400	KK/K03	160	F450KK103J630(1)	PHE450MK5100J(1)
630	300	0.012	5.0	11.0	10.0	7.5	1,400	KK/K03	160	F450KK123J630(1)	PHE450MK5120J(1)
630	300	0.015	5.0	11.0	10.0	7.5	1,400	KK/K03	160	F450KK153J630(1)	PHE450MK5150J(1)
630	300	0.018	5.0	11.0	10.0	7.5	1,400	KK/K03	160	F450KK183J630(1)	PHE450MK5180J(1)
630	300	0.022	6.0	12.0	10.5	7.5	1,400	KM/K04	160	F450KM223J630(1)	PHE450MK5220J(1)
630	300	0.0010	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG102J630(1)	PHE450MA4100J(1)
630	300	0.0012	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG122J630(1)	PHE450MA4120J(1)
630	300	0.0015	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG152J630(1)	PHE450MA4150J(1)
630	300	0.0018	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG182J630(1)	PHE450MA4180J(1)
630	300	0.0022	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG222J630(1)	PHE450MA4220J(1)
630	300	0.0027	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG272J630(1)	PHE450MA4270J(1)
630	300	0.0033	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG332J630(1)	PHE450MA4330J(1)
630	300	0.0039	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG392J630(1)	PHE450MA4390J(1)
630	300	0.0047	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG472J630(1)	PHE450MA4470J(1)
630	300	0.0056	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG562J630(1)	PHE450MA4560J(1)
630	300	0.0068	4.0	9.0	13.0	10	1,400	AG/A01	142	F450AG682J630(1)	PHE450MA4680J(1)
630	300	0.0082	4.0	9.0	13.0	10	1,200	AG/A01	142	F450AG822J630(1)	PHE450MA4820J(1)
630	300	0.010	4.0	9.0	13.0	10	1,200	AG/A01	142	F450AG103J630(1)	PHE450MA5100J(1)
630	300	0.012	4.0	9.0	13.0	10	1,200	AG/A01	142	F450AG123J630(1)	PHE450MA5120J(1)
630	300	0.015	4.0	9.0	13.0	10	1,200	AG/A01	142	F450AG153J630(1)	PHE450MA5150J(1)
630	300	0.018	4.5	10.5	13.0	10	1,200	AH/A02	122	F450AH183J630(1)	PHE450MA5180J(1)

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

Table 1 – Ratings & Part Number Reference cont.

VDC	VAC	Cap Value (µF)	Dimensions in mm			Lead Spacing (S)	dV/dt (V/µs)	Size Code (New/Legacy)	R _{thha} °C/W 85°C 0.2m/s	Kemet Part Number	Legacy Part Number
			T	H	L						
2500	900	0.027	11.0	21.5	26.0	22.5	1,800	DT/D16	45	F450DT273J2K5(1)	PHE450TD5270JD16(1)
2500	900	0.033	13.5	23.0	26.0	22.5	1,800	DW/D20	38	F450DW333J2K5(1)	PHE450TD5330JD20(1)
2500	900	0.039	13.5	23.0	26.0	22.5	1,800	DW/D20	38	F450DW393J2K5(1)	PHE450TD5390JD20(1)
2500	900	0.047	15.5	24.5	26.0	22.5	1,800	DY/D19	35	F450DY473J2K5(1)	PHE450TD5470JD19(1)
2500	900	0.027	10.5	20.5	31.5	27.5	1,300	FE/F11	38	F450FE273J2K5(1)	PHE450TF5270JF11(1)
2500	900	0.033	10.5	20.5	31.5	27.5	1,300	FE/F11	38	F450FE333J2K5(1)	PHE450TF5330JF11(1)
2500	900	0.039	11.5	22.5	31.5	27.5	1,300	FG/F12	36	F450FG393J2K5(1)	PHE450TF5390JF12(1)
2500	900	0.047	13.5	23.0	31.5	27.5	1,300	FK/F03	35	F450FK473J2K5(1)	PHE450TF5470JF03(1)
2500	900	0.056	13.5	23.0	31.5	27.5	1,300	FK/F03	35	F450FK563J2K5(1)	PHE450TF5560JF03(1)
2500	900	0.068	14.5	24.5	31.5	27.5	1,300	FM/F13	34	F450FM683J2K5(1)	PHE450TF5680JF13(1)
2500	900	0.027	17.5	28.0	31.5	27.5	1,300	FR/F14	30	F450FR273J2K5(1)	PHE450TF5270JF14(1)
2500	900	0.10	19.0	29.0	31.5	27.5	1,300	FS/F15	28	F450FS104J2K5(1)	PHE450TF6100JF15(1)
2500	900	0.12	21.0	30.0	31.5	27.5	1,300	FV/F16	25	F450FV124J2K5(1)	PHE450TF6120JF16(1)
2500	900	0.068	13.0	24.0	41.0	37.5	800	RF/R05	28	F450RF683J2K5(1)	PHE450TR5680JR05(1)
2500	900	0.082	13.0	24.0	41.0	37.5	800	RF/R05	28	F450RF823J2K5(1)	PHE450TR5820JR05(1)
2500	900	0.10	15.0	26.0	41.0	37.5	800	RH/R04	27	F450RH104J2K5(1)	PHE450TR6100JR04(1)
2500	900	0.12	15.0	26.0	41.0	37.5	800	RH/R04	27	F450RH124J2K5(1)	PHE450TR6120JR04(1)
2500	900	0.15	16.5	32.0	41.0	37.5	800	RK/R02	25	F450RK154J2K5(1)	PHE450TR6150JR02(1)
2500	900	0.18	19.0	36.0	41.0	37.5	800	RM/R03	20	F450RM184J2K5(1)	PHE450TR6180JR03(1)
2500	900	0.22	19.0	36.0	41.0	37.5	800	RM/R03	20	F450RM224J2K5(1)	PHE450TR6220JR03(1)
2500	900	0.22	21.0	38.0	41.0	37.5	800	RP/R06	19	F450RP224J2K5(1)	PHE450TR6220J(1)
2500	900	0.27	21.0	38.0	41.0	37.5	800	RP/R06	19	F450RP274J2K5(1)	PHE450TR6270JR06(1)
2500	900	0.33	28.0	43.0	41.0	37.5	800	RS/R08	19	F450RS334J2K5(1)	PHE450TR6330JR08(1)
3000	1000	0.0010	5.5	10.5	18.0	15	2,500	BD/B04	98	F450BD102J3K0(1)	PHE450XB4100JB04(1)
3000	1000	0.0012	5.5	10.5	18.0	15	2,500	BD/B04	98	F450BD122J3K0(1)	PHE450XB4120JB04(1)
3000	1000	0.0015	5.5	12.5	18.0	15	2,500	BE/B05	92	F450BE152J3K0(1)	PHE450XB4150JB05(1)
3000	1000	0.0018	5.5	12.5	18.0	15	2,500	BE/B05	90	F450BE182J3K0(1)	PHE450XB4180JB05(1)
3000	1000	0.0022	6.5	12.5	18.0	15	2,500	BJ/B10	87	F450BJ222J3K0(1)	PHE450XB4220JB10(1)
3000	1000	0.0027	7.5	14.5	18.0	15	2,500	BL/B06	80	F450BL272J3K0(1)	PHE450XB4270JB06(1)
3000	1000	0.0033	8.0	15.0	18.0	15	2,500	BM/B12	75	F450BM332J3K0(1)	PHE450XB4330JB12(1)
3000	1000	0.0039	8.5	16.0	18.0	15	2,500	BQ/B11	70	F450BQ392J3K0(1)	PHE450XB4390JB11(1)
3000	1000	0.0047	9.5	17.5	18.0	15	2,500	BV/B14	61	F450BV472J3K0(1)	PHE450XB4470JB14(1)
3000	1000	0.0056	9.5	17.5	18.0	15	2,500	BV/B14	60	F450BV562J3K0(1)	PHE450XB4560JB14(1)
3000	1000	0.0068	11.0	19.0	18.0	15	2,500	BY/B16	55	F450BY682J3K0(1)	PHE450XB4680JB16(1)
3000	1000	0.0047	6.5	14.5	26.0	22.5	1,800	DD/D13	58	F450DD472J3K0(1)	PHE450XD4470JD13(1)
3000	1000	0.0056	6.5	14.5	26.0	22.5	1,800	DD/D13	58	F450DD562J3K0(1)	PHE450XD4560JD13(1)
3000	1000	0.0068	7.0	16.5	26.0	22.5	1,800	DF/D17	55	F450DF682J3K0(1)	PHE450XD4680JD17(1)
3000	1000	0.0082	8.0	16.0	26.0	22.5	1,800	DH/D14	54	F450DH822J3K0(1)	PHE450XD4820JD14(1)
3000	1000	0.010	9.0	18.5	26.0	22.5	1,800	DM/D15	50	F450DM103J3K0(1)	PHE450XD5100JD15(1)
3000	1000	0.012	10.5	19.0	26.0	22.5	1,800	DR/D18	49	F450DR123J3K0(1)	PHE450XD5120JD18(1)
3000	1000	0.015	11.0	21.5	26.0	22.5	1,800	DT/D16	44	F450DT153J3K0(1)	PHE450XD5150JD16(1)
3000	1000	0.018	11.0	21.5	26.0	22.5	1,800	DT/D16	44	F450DT183J3K0(1)	PHE450XD5180JD16(1)
3000	1000	0.022	13.5	23.0	26.0	22.5	1,800	DW/D20	38	F450DW223J3K0(1)	PHE450XD5220JD20(1)
3000	1000	0.027	15.5	24.5	26.0	22.5	1,800	DY/D19	35	F450DY273J3K0(1)	PHE450XD5270JD19(1)
3000	1000	0.033	15.5	24.5	26.0	22.5	1,800	DY/D19	35	F450DY333J3K0(1)	PHE450XD5330JD19(1)
VDC	VAC	Cap Value (µF)	T (mm)	H (mm)	L (mm)	Lead Spacing (S)	dV/dt (V/µs)	Size Code (New/Legacy)	R _{thha} °C/W 85°C 0.2m/s	KEMET Part Number	Legacy Part Number

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

Soldering Process

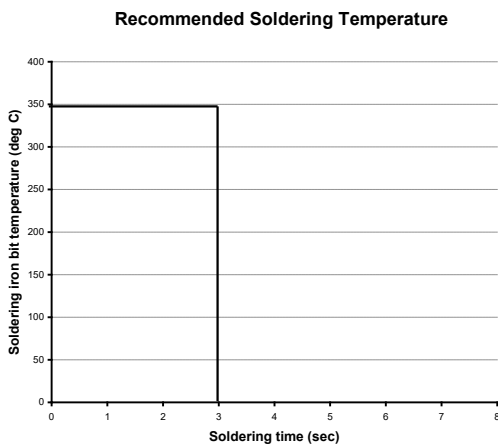
The implementation of the RoHS directive has resulted in the selection of SnAgCu (SAC) alloys or SnCu alloys as primary solder. This has increased the liquidus temperature from that of 183°C for SnPb eutectic alloy to 217 – 221°C for the new alloys. As a result, the heat stress to the components, even 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.

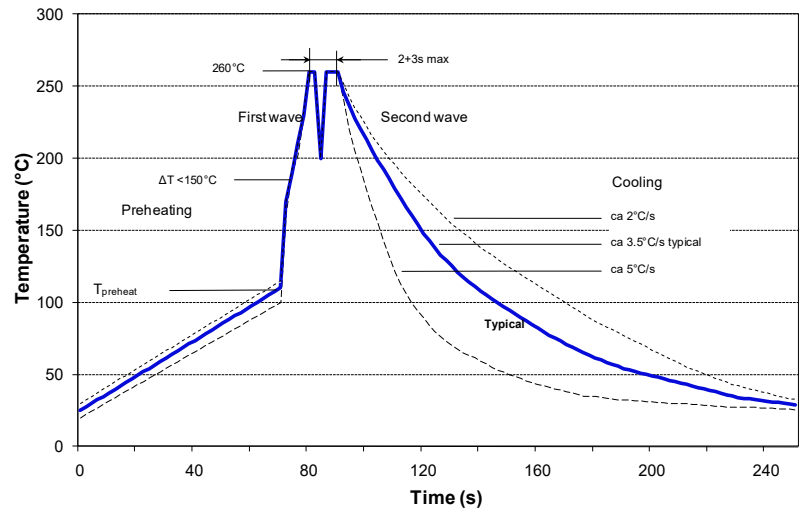
Manual Soldering Recommendations

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.

Wave Soldering Recommendations



Soldering Process cont.

Wave Soldering Recommendations cont.

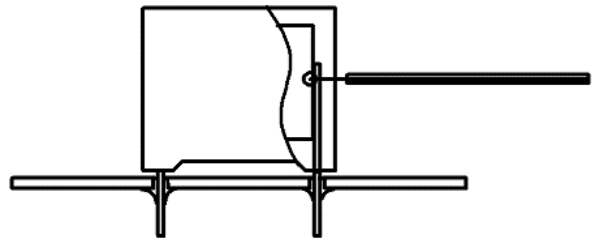
1. The table indicates the maximum set-up temperature of the soldering process
Figure 1

Dielectric Film Material	Maximum Preheat Temperature			Maximum Peak Soldering Temperature	
	Capacitor Pitch ≤ 10 mm	Capacitor Pitch = 15 mm	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

2. 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



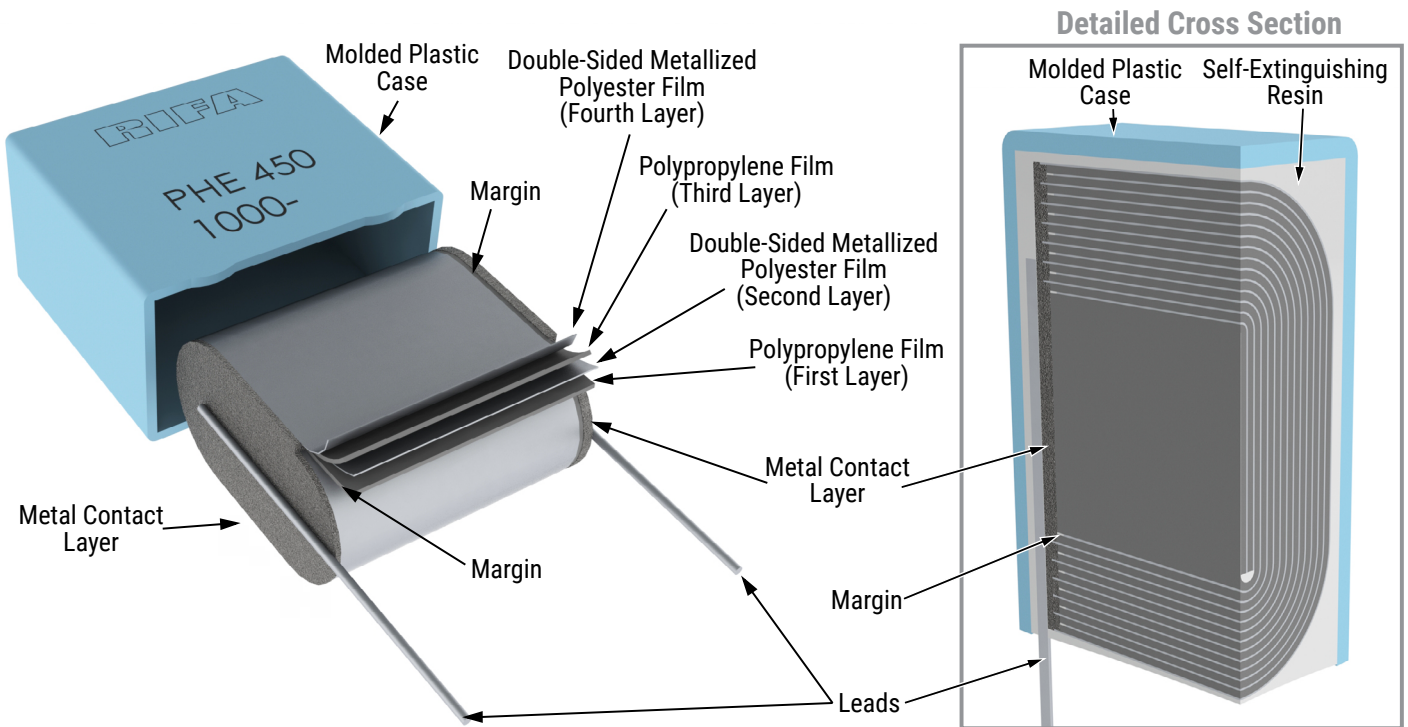
Temperature monitored inside the capacitor.

Selective Soldering Recommendations

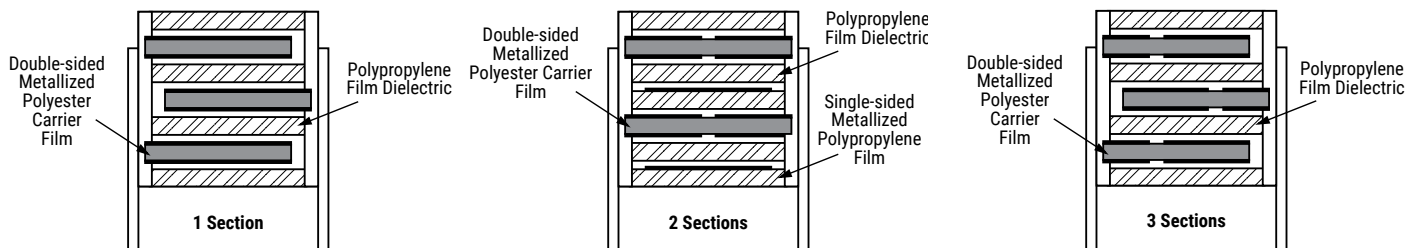
Selective dip soldering is a variation of reflow soldering. In this method, the printed circuit board with through-hole components to be soldered is preheated and transported over the solder bath as in normal flow soldering without touching the solder. When the board is over the bath, it is stopped and 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

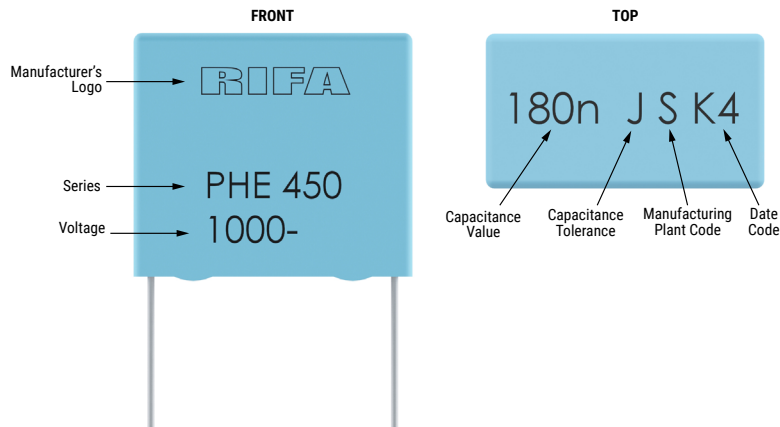


Winding Schemes

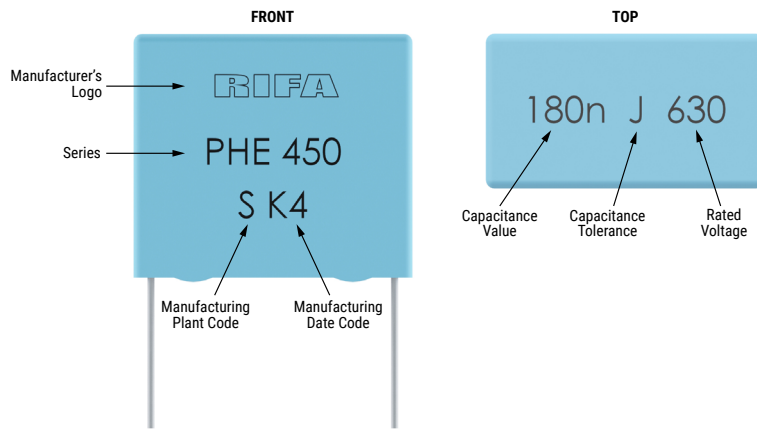


Marking

Variant 1, Pitch > 10 mm:



Variant 2, Pitch 7.5 to 27.5 mm:



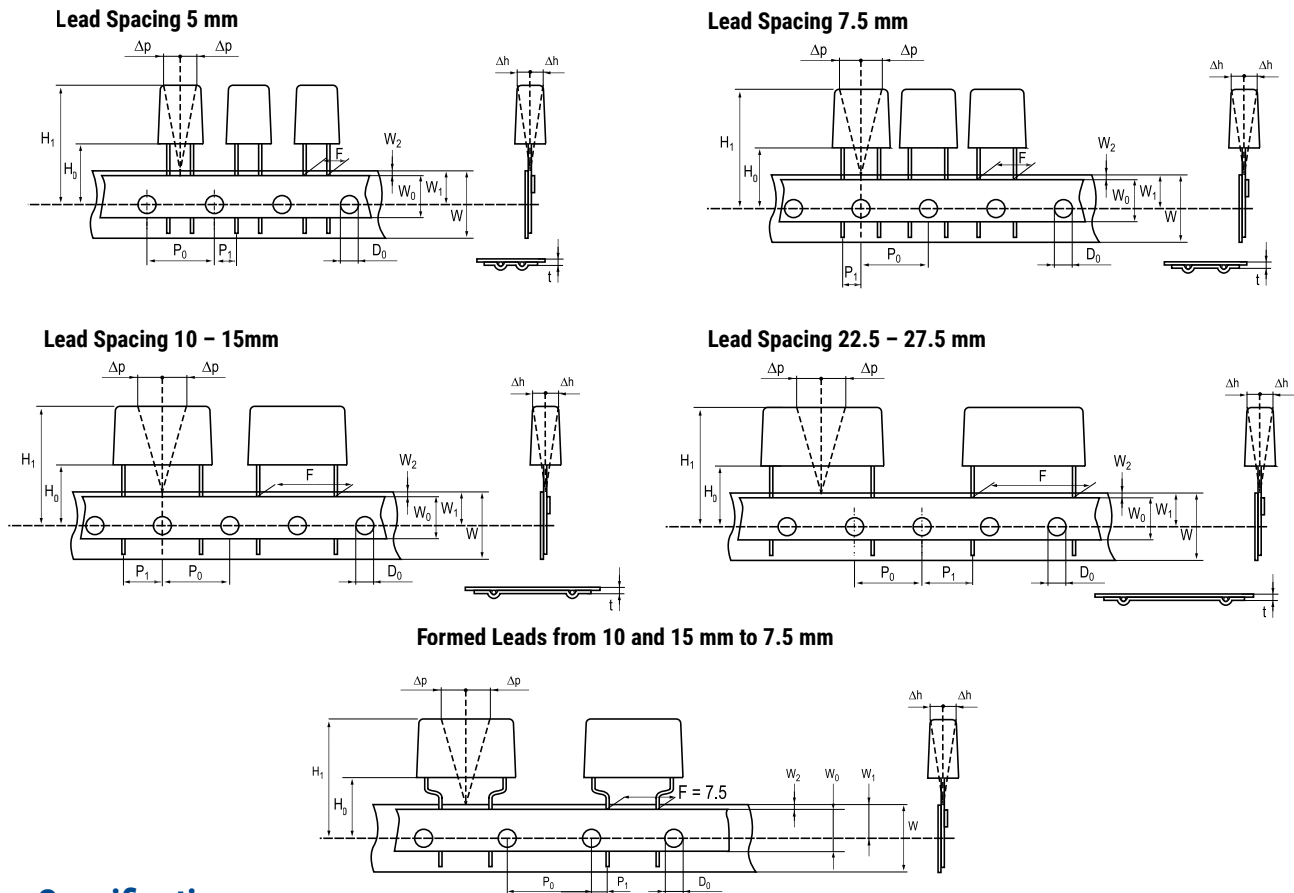
Packaging Quantities

KEMET Size Code	Legacy Size	Lead Spacing	Thickness (mm)	Height (mm)	Length (mm)	Bulk Short Leads	Bulk Long Leads	Standard Reel ø 360 mm	Large Reel ø 500 mm	Ammo	Pizza	Std Reel Formed	Ammo Formed
KE	K00	7.5	2.5	6	10	2,000	2,000	2,500	5,000	3,000			
KG	K01		4	8	10	1,000	1,000	1,700	3,400	1,900			
KK	K03		5	11	10	1,000	1,000	1,300	2,600	1,500			
KM	K04		6	12	10.5	1,000	1,000	1,000	2,000	1,200			
AG	A01	10	4	9	13	1,000	1,000	900	1,800				780
AH	A02		4.5	10.5	13	1,000	1,000	800	1,600				
AK	A03		5	11	13	800	800	700	1,400				
AP	A04		6	12	13	600	600	500	1,000				520
AL	A05		9.5	7.5	13	600	600	350	700				
AE	A06		4	8	13	1,000	1,000	900	1,800				

Packaging Quantities cont.

KEMET Size Code	Legacy Size	Lead Spacing	Thickness (mm)	Height (mm)	Length (mm)	Bulk Short Leads	Bulk Long Leads	Standard Reel ø 360 mm	Large Reel ø 500 mm	Ammo	Pizza	Std Reel Formed	Ammo Formed
BD	B04	15	5.5	10.5	18	1,000	800	600	1,200			550	570
BE	B05		5.5	12.5	18	1,000	800	600	1,200			550	570
BL	B06		7.5	14.5	18	800	400	400	800			350	378
BJ	B10		6.5	12.5	18	1,000	600	500	1,000			450	480
BQ	B11		8.5	16	18	600	400	400	800			350	324
BM	B12		8	15	18	600	400	400	800			350	351
BV	B14		9.5	17.5	18	500	300	350	700			250	297
BG	B15		6	12	18	1,000	800	500	1,000			450	520
BY	B16		11	19	18	450	250	300	600			250	252
BU	B17		13	12.5	18	400	300	250	500			200	216
DD	D13	22.5	6.5	14.5	26	234		300	600		440		
DH	D14		8	16	26	186		250	500		352		
DM	D15		9	18.5	26	308		250	500		308		
DT	D16		11	21.5	26	253		200	400		253		
DF	D17		7	16.5	26	216		300	600		396		
DR	D18		10.5	19	26	264		200	400		264		
DY	D19		15.5	24.5	26	176		110	250		176		
DW	D20		13.5	23	26	209		160	300		209		
FK	F03	27.5	13.5	23	31.5	171			250		171		
FE	F11		10.5	20.5	31.5	216			350		216		
FG	F12		11.5	22.5	31.5	198			300		198		
FM	F13		14.5	24.5	31.5	153			250		153		
FR	F14		17.5	28	31.5	126					126		
FS	F15		19	29	31.5	117					117		
FV	F16		21	30	31.5	108					108		
FH	F17		21	12.5	31.5	108					108		
FT	F18		31	19	31.5	72					72		
FQ	F19		27.5	16	31.5	81					81		
RK	R02	37.5	16.5	32	41	105					105		
RM	R03		19	36	41	91					91		
RH	R04		15	26	41	119					119		
RF	R05		13	24	41	140					140		
RP	R06		21	38	41	84					84		
RS	R08		28	43	41	54					63		

Lead Taping & Packaging (IEC 60286-2)



Taping Specification

Dimensions in mm										Standard IEC 60286-2
Lead Spacing	+0.6/-0.1	F	5	7.5	Formed 7.5	10	15	22.5	27.5	F
Carrier Tape Width	±0.5	W	18	18	18	18	18	18	18	18±1/-0.5
Hold-down Tape Width	Minimum	W_0	5	5	5	5	5	5	5	
Position of Sprocket Hole	±0.5	W_1	9	9	9	9	9	9	9	9+0.75/-0.5
Distance Between Tapes	Maximum	W_2	3	3	3	3	3	3	3	3
Sprocket Hole Diameter	±0.2	D_0	4	4	4	4	4	4	4	4
Feed Hole Lead Spacing	±0.3	P_0 (1)	12.7	12.7	12.7 (4)	12.7	12.7	12.7	12.7	12.7
Distance Lead - Feed Hole	±0.7	P_1	3.85	3.75	3.75	7.7	5.2	5.3	5.3	P1
Deviation Tape - Plane	Maximum	Δp	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Lateral Deviation	Maximum	Δh	2	2	2	2	2	2	2	2
Total Thickness	±0.2	t	0.7	0.7	0.7	0.7	0.7	0.9 Maximum	0.9 Maximum	0.9 Maximum
Sprocket Hole/Cap Body	Nominal	H_0 (2)	18.5±0.5	18.5±0.5	18.5±0.5	18.5±0.5	18.5±0.5	18.5±0.5	18.5±0.5	18.0±2/-0
Sprocket Hole/Top of Cap Body	Maximum	H_1 (3)	32	31	43	43	43	58	58	58 Maximum

(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.

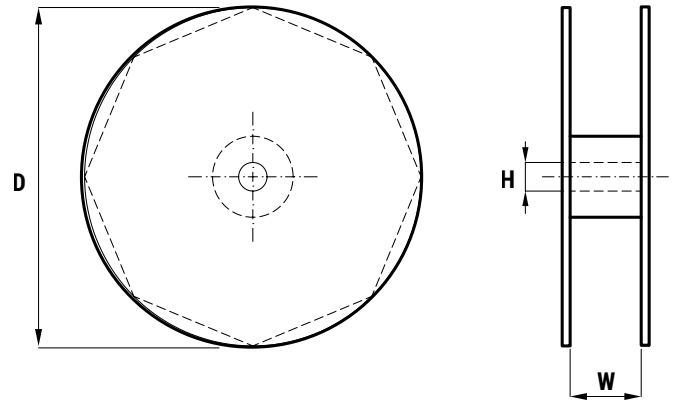
Ammo Specifications

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



Reel Specifications

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



Manufacturing Date Code (IEC-60062)

Y = Year, Z = Month			
Year	Code	Month	Code
2010	A	January	1
2011	B	February	2
2012	C	March	3
2013	D	April	4
2014	E	May	5
2015	F	June	6
2016	H	July	7
2017	J	August	8
2018	K	September	9
2019	L	October	0
2020	M	November	N
2021	N	December	D
2022	P		
2023	R		
2024	S		
2025	T		
2026	U		
2027	V		
2028	W		
2029	X		
2030	A		

KEMET Electronics Corporation Sales Offices

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