

MDK, Metallized Polyester Film, Dual In-Line, Low ESR/ESL, 50 – 630 VDC

Overview

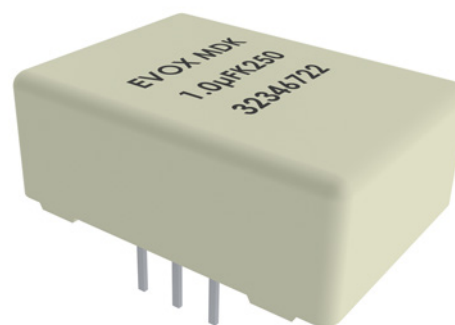
Dual in-line (DIL) metallized polyester (PET) film capacitor is encapsulated in a self-extinguishing material, meeting the requirements of UL 94 V-0.

Applications

Typical applications include high frequency switched-mode power supplies, DC/DC converters and input/output filtering.

Benefits

- Rated voltage: 50 – 630 VDC
- Rated voltage: 30 – 220 VAC
- Capacitance range: 0.033 – 15 μ F
- Capacitance tolerance: \pm 5%, \pm 10%, other tolerances on request
- Climatic category: 55/125/56
- RoHS compliant
- Lead-free terminations
- Operating temperature range of -55°C to $+125^{\circ}\text{C}$



Customer Part Number

MDK	10	333	K	50	A52	P3	TUBE
Series	Lead Spacing (mm)	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Size Code	Number of Leads per Side	Packaging
Dual In-Line, Metallized Polyester	10 15	First two digits indicate the two most significant digits of the capacitance value in picofarads. The third digit is the number of following zeros.	J = \pm 5% K = \pm 10% Other tolerances on request	50 100 250 400 630	See Dimension Table	P3 = 3 leads P4 = 4 leads P5 = 5 leads P7 = 7 leads P8 = 8 leads	See Ordering Options Table

KEMET Internal Part Number

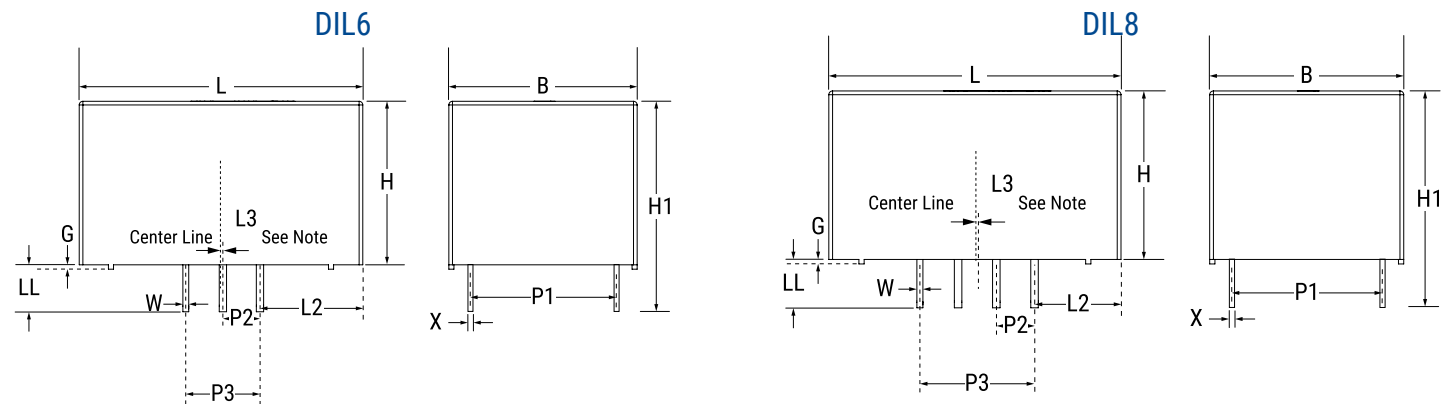
F	68	3	A	A	333	K	050	T
Capacitor Class	Series	Number of Leads per Side	Lead Spacing (mm)	Size Code	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Packaging
F = Film	Dual In-Line, Metallized Polyester	3 = 3 leads 4 = 4 leads 5 = 5 leads 7 = 7 leads 8 = 8 leads	A = 10 B = 15	A = Standard box size	First two digits indicate the two most significant digits of the capacitance value in picofarads. The third digit is the number of following zeros.	J = \pm 5% K = \pm 10% Other tolerances on request	050 = 50 100 = 100 250 = 250 400 = 400 630 = 630	See Ordering Options Table

Built Into Tomorrow

Ordering Options Table

Packaging Type		KEMET Packaging Code	Legacy Packaging Code
Standard Packaging Options			
Bulk (Tube)		T	TUBE
Case Size A53	Tape & Reel (Standard Reel)	VV687	TR32

Dimensions – Millimeters

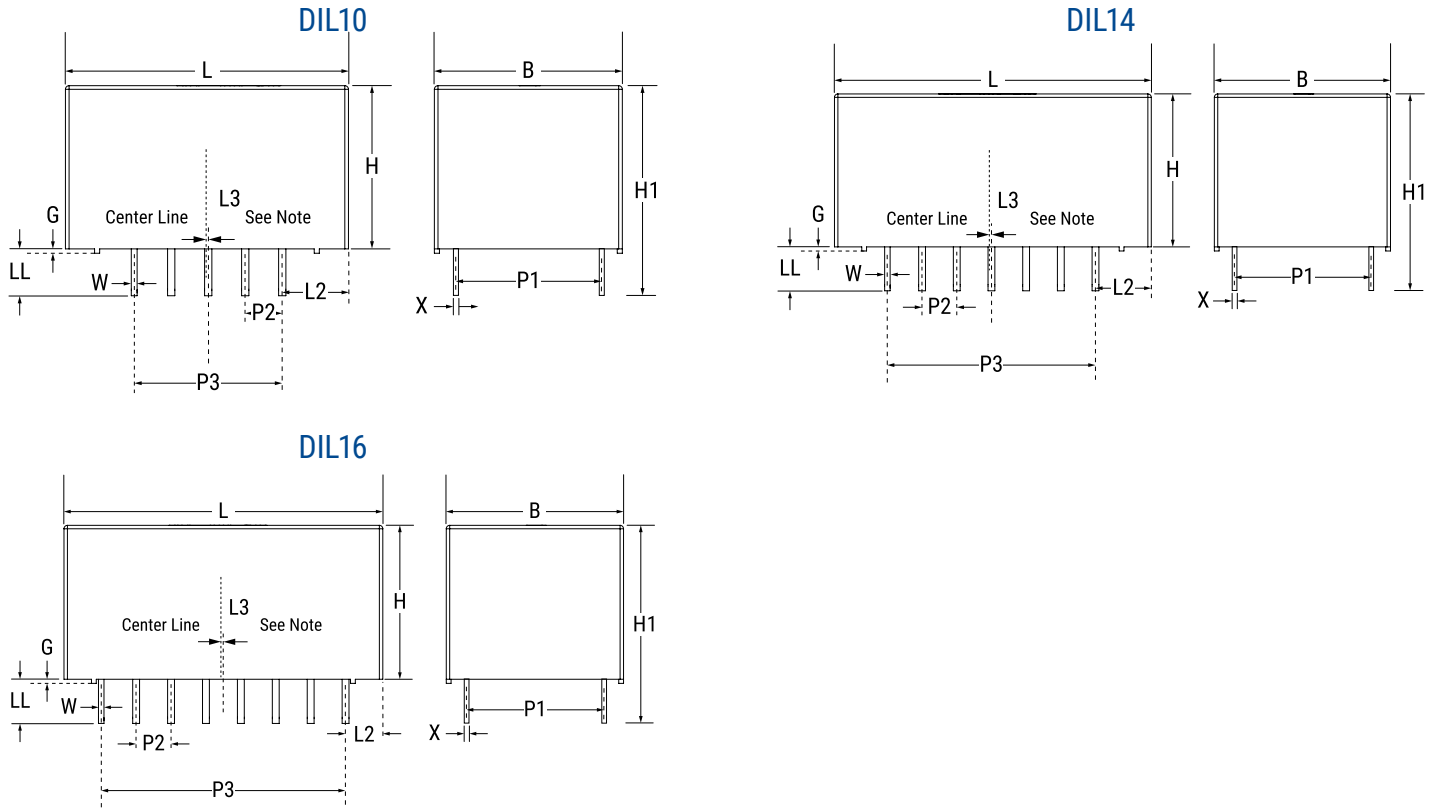


Legacy Size Code	Leads per Side	P1	P2	P3 ⁽¹⁾	B	H	L	H1	L2	L3 ⁽²⁾	W	X	LL	G
		±0.2	±0.2	±0.2	±0.2	±0.2	±0.2	+1	±0.2	Maximum	±0.05	±0.05	+1	Maximum
A52	3	10.0	2.54	5.08	12.2	6.05	11.0	9.25	2.96	0.2	0.5	0.35	3.2	0.3
A53	3	10.0	2.54	5.08	12.7	9.0	14.0	12.20	4.46	0.2	0.5	0.35	3.2	0.3
A54	3	10.0	2.54	5.08	12.2	6.05	13.5	9.25	4.21	0.2	0.5	0.35	3.2	0.3
A55	3	10.0	2.54	5.08	12.2	6.05	16.5	9.25	5.71	0.2	0.5	0.35	3.2	0.3
B53	3	15.0	2.54	5.08	16.5	6.05	11.0	9.25	2.96	0.2	0.5	0.35	3.2	0.3
B55	3	15.0	2.54	5.08	16.5	6.05	12.2	9.25	3.56	0.2	0.5	0.35	3.2	0.3
A53	4	10.0	2.54	7.62	12.7	9.0	14.0	12.20	3.19	0.2	0.5	0.35	3.2	0.3
A54	4	10.0	2.54	7.62	12.2	6.05	13.5	9.25	2.94	0.2	0.5	0.35	3.2	0.3
A55	4	10.0	2.54	7.62	12.2	6.05	16.5	9.25	4.44	0.2	0.5	0.35	3.2	0.3
B55	4	15.0	2.54	7.62	16.5	6.05	12.2	9.25	2.29	0.2	0.5	0.35	3.2	0.3
A55	5	10.0	2.54	10.16	12.2	6.05	16.5	9.25	3.17	0.2	0.5	0.35	3.2	0.3
A58	7	10.0	2.54	15.24	12.7	11.0	23.0	14.20	3.88	0.2	0.5	0.35	3.2	0.3
A58	8	10.0	2.54	17.78	12.7	11.0	23.0	14.20	2.61	0.2	0.5	0.35	3.2	0.3

(1) P3 represents the cumulative tolerance of all leads.

(2) L3 represents the extent to which the center line of the leads misaligns with the center line of the body. Dimension shown is the maximum such misalignment allowed.

Dimensions – Millimeters cont.



Legacy Size Code	Leads per Side	P1	P2	P3 ⁽¹⁾	B	H	L	H1	L2	L3 ⁽²⁾	W	X	LL	G
		±0.2	±0.2	±0.2	±0.2	±0.2	±0.2	±0.2	+1	±0.2	Maximum	±0.05	±0.05	+1
A52	3	10.0	2.54	5.08	12.2	6.05	11.0	9.25	2.96	0.2	0.5	0.35	3.2	0.3
A53	3	10.0	2.54	5.08	12.7	9.0	14.0	12.20	4.46	0.2	0.5	0.35	3.2	0.3
A54	3	10.0	2.54	5.08	12.2	6.05	13.5	9.25	4.21	0.2	0.5	0.35	3.2	0.3
A55	3	10.0	2.54	5.08	12.2	6.05	16.5	9.25	5.71	0.2	0.5	0.35	3.2	0.3
B53	3	15.0	2.54	5.08	16.5	6.05	11.0	9.25	2.96	0.2	0.5	0.35	3.2	0.3
B55	3	15.0	2.54	5.08	16.5	6.05	12.2	9.25	3.56	0.2	0.5	0.35	3.2	0.3
A53	4	10.0	2.54	7.62	12.7	9.0	14.0	12.20	3.19	0.2	0.5	0.35	3.2	0.3
A54	4	10.0	2.54	7.62	12.2	6.05	13.5	9.25	2.94	0.2	0.5	0.35	3.2	0.3
A55	4	10.0	2.54	7.62	12.2	6.05	16.5	9.25	4.44	0.2	0.5	0.35	3.2	0.3
B55	4	15.0	2.54	7.62	16.5	6.05	12.2	9.25	2.29	0.2	0.5	0.35	3.2	0.3
A55	5	10.0	2.54	10.16	12.2	6.05	16.5	9.25	3.17	0.2	0.5	0.35	3.2	0.3
A58	7	10.0	2.54	15.24	12.7	11.0	23.0	14.20	3.88	0.2	0.5	0.35	3.2	0.3
A58	8	10.0	2.54	17.78	12.7	11.0	23.0	14.20	2.61	0.2	0.5	0.35	3.2	0.3

(1) P3 represents the cumulative tolerance of all leads.

(2) L3 represents the extent to which the center line of the leads misaligns with the center line of the body. Dimension shown is the maximum such misalignment allowed.

Performance Characteristics

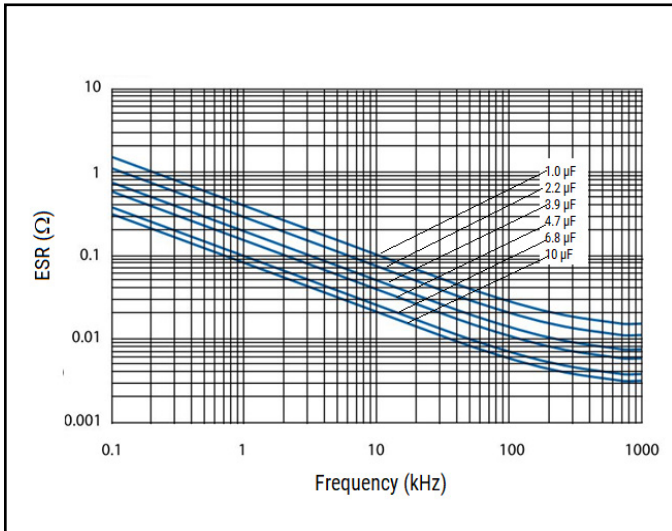
Rated Voltage (VDC)	50	100	250	400	630
Rated Voltage (VAC)	30	63	160	200	220
Capacitance Range (μF)	0.033 – 15	0.033 – 10	0.033 – 1.5	0.033 – 0.47	0.033 – 0.18
Capacitance Tolerance	$\pm 5\%$, $\pm 10\%$, other tolerances on request				
Category Temperature Range	-55°C to +125°C				
Rated Temperature	+85°C				
Voltage Derating	The rated voltage should be decreased by 1.25%/°C from +85°C to +125°C				
Climatic Category	55/125/56				
Test Voltage	$1.6 \times V_R$ 60 seconds				
Insulation Resistance	Measured at +20°C according to IEC 60384-2				
	Minimum Value Between Terminals				
		$C \leq 0.33 \mu\text{F}$		$C > 0.33 \mu\text{F}$	
	$V_R \leq 100$	15,000 M Ω		5,000 M $\Omega \cdot \mu\text{F}$	
	$V_R > 100$	30,000 M Ω		10,000 M $\Omega \cdot \mu\text{F}$	
Dissipation Factor	Maximum Values at +23°C				
		$C \leq 0.1 \mu\text{F}$	$0.1 < C < 3.3 \mu\text{F}$	$3.3 \leq C \leq 10 \mu\text{F}$	$C > 10 \mu\text{F}$
	1 kHz	0.8%	0.8%	0.8%	0.8%
	10 kHz	1.5%	1.5%	1.5%	2.0%
	100 kHz	2.5%	5.0%		
Self Inductance	Approximately 4 nH				

Environmental Compliance

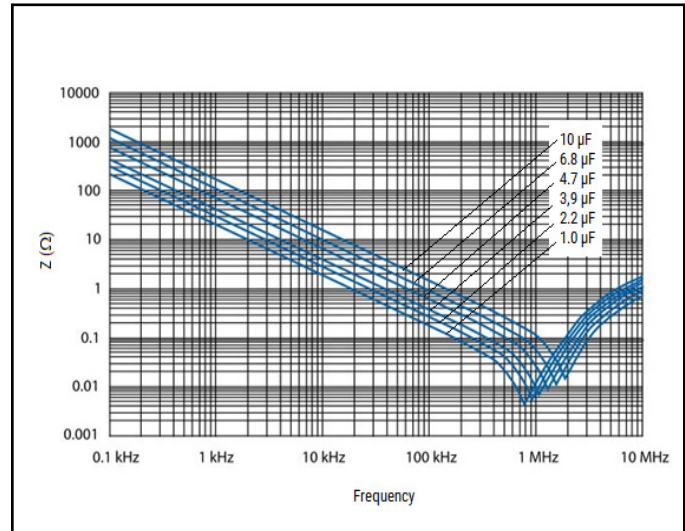
All KEMET surface mount capacitors are RoHS compliant.



ESR vs. Frequency



Impedance vs. Frequency



Maximum V_{rms} (V) vs. Frequency

Value	Rated Voltage	Case Size	1 kHz	10 kHz	100 kHz	500 kHz	1 MHz
1.0 μF	250 V	A57	150.0	36.0	9.2	2.9	1.3
2.2 μF	100 V	A52	50.0	25.0	5.0	1.2	0.6
3.9 μF	100 V	A52	50.0	18.0	4.0	1.0	0.3
4.7 μF	100 V	A54	50.0	16.0	3.5	0.7	0.2
6.8 μF	100 V	A57	50.0	15.5	2.2	0.5	0.2
10 μF	100 V	A58	50.0	15.0	2.0	0.4	0.2

Maximum I_{rms} (V) vs. Frequency

Value	Rated Voltage	Case Size	1 kHz	10 kHz	100 kHz	500 kHz	1 MHz
1.0 μF	250 V	A57	1.0	2.2	5.5	9.0	10.0
2.2 μF	100 V	A52	1.5	2.3	6.0	7.5	10.0
3.9 μF	100 V	A52	2.0	4.0	10.0	11.0	11.5
4.7 μF	100 V	A54	2.0	4.5	10.0	12.5	12.5
6.8 μF	100 V	A57	3.0	6.0	11.0	13.0	13.5
10 μF	100 V	A58	4.0	9.0	13.0	14.0	14.5

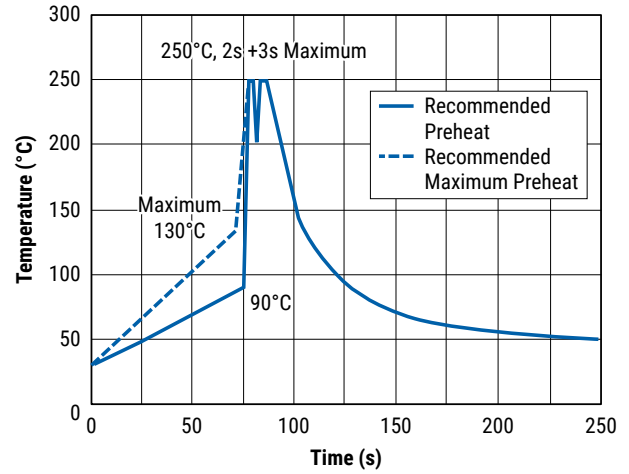
Table 1 – Ratings & Part Number Reference cont.

VDC	VAC	Cap Value (µF)	Size Code (New/Legacy)	Dimensions in mm			Lead Spacing (p)	ESR 500 kHz (mΩ)	New KEMET Part Number	Legacy Part Number
				B	H	L				
400	200	0.27	AA/A58	12.7	11.0	23.0	10	47	F68(4)AA274(1)400T	MDK10274(1)400A58P(4)TUBE
400	200	0.33	AA/A58	12.7	11.0	23.0	10	39	F68(4)AA334(1)400T	MDK10334(1)400A58P(4)TUBE
400	200	0.39	AA/A58	12.7	11.0	23.0	10	33	F68(4)AA394(1)400T	MDK10394(1)400A58P(4)TUBE
400	200	0.47	AA/A58	12.7	11.0	23.0	10	30	F68(4)AA474(1)400T	MDK10474(1)400A58P(4)TUBE
400	200	0.033	BA/B53	16.5	6.05	11.0	15	390	F683BA333(1)400T	MDK15333(1)400B53P3TUBE
400	200	0.039	BA/B53	16.5	6.05	11.0	15	330	F683BA393(1)400T	MDK15393(1)400B53P3TUBE
400	200	0.047	BA/B53	16.5	6.05	11.0	15	270	F683BA473(1)400T	MDK15473(1)400B53P3TUBE
400	200	0.056	BA/B53	16.5	6.05	11.0	15	230	F683BA563(1)400T	MDK15563(1)400B53P3TUBE
400	200	0.068	BA/B53	16.5	6.05	11.0	15	190	F683BA683(1)400T	MDK15683(1)400B53P3TUBE
400	200	0.082	BA/B53	16.5	6.05	11.0	15	160	F683BA823(1)400T	MDK15823(1)400B53P3TUBE
400	200	0.10	BA/B53	16.5	6.05	11.0	15	130	F683BA104(1)400T	MDK15104(1)400B53P3TUBE
400	200	0.12	BA/B53	16.5	6.05	11.0	15	110	F683BA124(1)400T	MDK15124(1)400B53P3TUBE
400	200	0.15	BA/B53	16.5	6.05	11.0	15	85	F683BA154(1)400T	MDK15154(1)400B53P3TUBE
400	200	0.18	BA/B53	16.5	6.05	11.0	15	70	F683BA184(1)400T	MDK15184(1)400B53P3TUBE
400	200	0.22	BA/B53	16.5	6.05	11.0	15	58	F683BA224(1)400T	MDK15224(1)400B53P3TUBE
400	200	0.27	BA/B53	16.5	6.05	11.0	15	47	F683BA274(1)400T	MDK15274(1)400B53P3TUBE
400	200	0.33	BA/B55	16.5	6.05	12.2	15	39	F68(2)BA334(1)400T	MDK15334(1)400B55P(2)TUBE
630	220	0.033	AA/A52	12.2	6.05	11.0	10	390	F683AA333(1)630T	MDK10333(1)630A52P3TUBE
630	220	0.039	AA/A52	12.2	6.05	11.0	10	330	F683AA393(1)630T	MDK10393(1)630A52P3TUBE
630	220	0.047	AA/A52	12.2	6.05	11.0	10	270	F683AA473(1)630T	MDK10473(1)630A52P3TUBE
630	220	0.056	AA/A52	12.2	6.05	11.0	10	230	F683AA563(1)630T	MDK10563(1)630A52P3TUBE
630	220	0.068	AA/A54	12.2	6.05	13.5	10	190	F68(2)AA683(1)630T	MDK10683(1)630A54P(2)TUBE
630	220	0.082	AA/A58	12.7	11.0	23.0	10	160	F68(4)AA823(1)630T	MDK10823(1)630A58P(4)TUBE
630	220	0.10	AA/A58	12.7	11.0	23.0	10	130	F68(4)AA104(1)630T	MDK10104(1)630A58P(4)TUBE
630	220	0.12	AA/A58	12.7	11.0	23.0	10	110	F68(4)AA124(1)630T	MDK10124(1)630A58P(4)TUBE
630	220	0.15	AA/A58	12.7	11.0	23.0	10	85	F68(4)AA154(1)630T	MDK10154(1)630A58P(4)TUBE
630	220	0.18	AA/A58	12.7	11.0	23.0	10	70	F68(4)AA184(1)630T	MDK10184(1)630A58P(4)TUBE
630	220	0.033	BA/B53	16.5	6.05	11.0	15	390	F683BA333(1)630T	MDK15333(1)630B53P3TUBE
630	220	0.039	BA/B53	16.5	6.05	11.0	15	330	F683BA393(1)630T	MDK15393(1)630B53P3TUBE
630	220	0.047	BA/B53	16.5	6.05	11.0	15	270	F683BA473(1)630T	MDK15473(1)630B53P3TUBE
630	220	0.056	BA/B53	16.5	6.05	11.0	15	230	F683BA563(1)630T	MDK15563(1)630B53P3TUBE
630	220	0.068	BA/B53	16.5	6.05	11.0	15	190	F683BA683(1)630T	MDK15683(1)630B53P3TUBE
630	220	0.082	BA/B53	16.5	6.05	11.0	15	160	F683BA823(1)630T	MDK15823(1)630B53P3TUBE
630	220	0.10	BA/B53	16.5	6.05	11.0	15	130	F683BA104(1)630T	MDK15104(1)630B53P3TUBE
VDC	VAC	Cap Value (µF)	Size Code (New/Legacy)	B (mm)	H (mm)	L (mm)	Lead Spacing (p)	ESR 500 kHz (mΩ)	New KEMET Part Number	Legacy Part Number

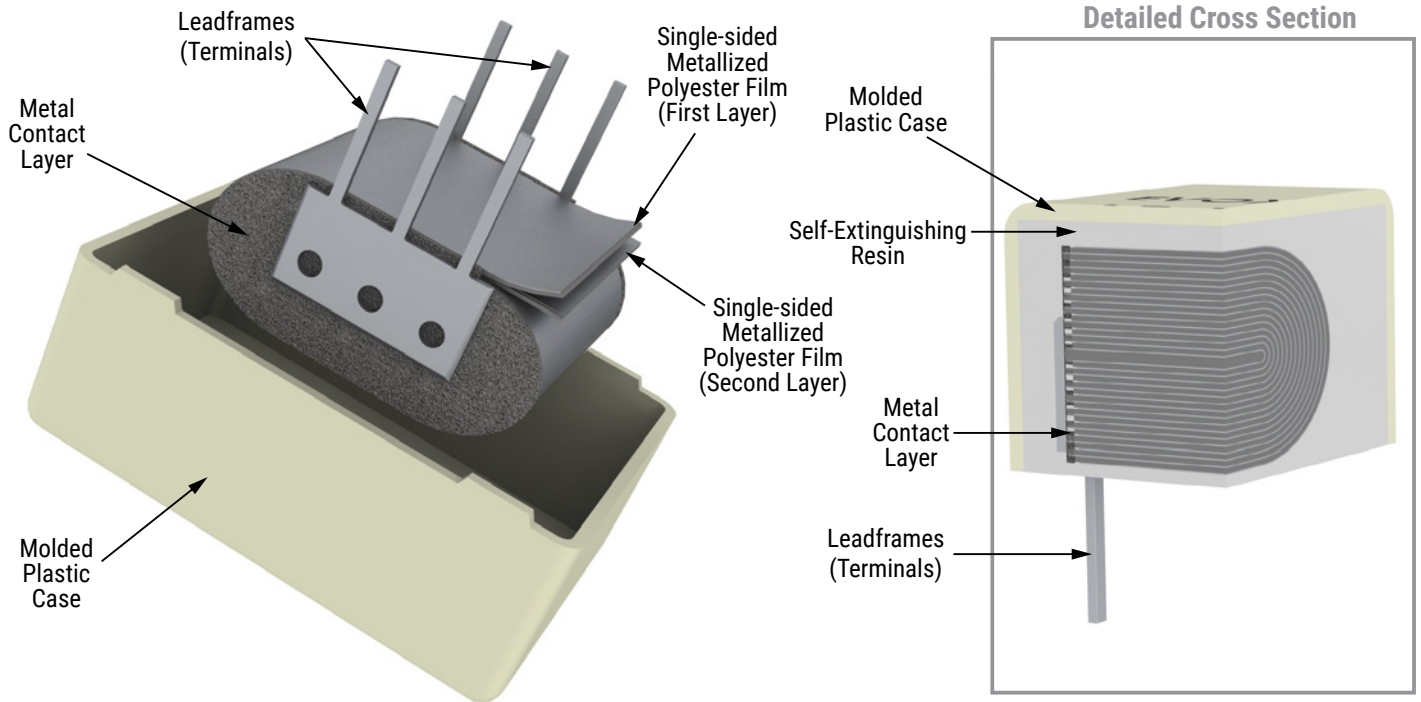
- (1) J = ±5%, K = ±10%, other tolerances on request.
- (2) = Number of leads per side, 3 or 4.
- (3) = Number of leads per side, 3, 4 or 5.
- (4) = Number of leads per side, 7 or 8.

Soldering Process

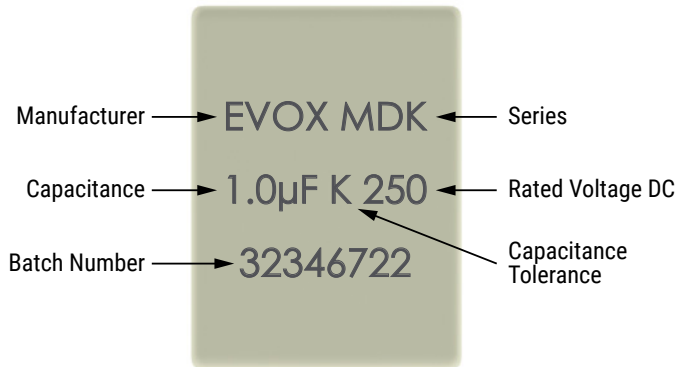
Wave soldering: The recommended preheating temperature is 90°C (130°C maximum). The peak temperature 250°C may be applied for 2 – 5 seconds maximum. KEMET recommends wave soldering for parts with up to 2 mm height.



Construction



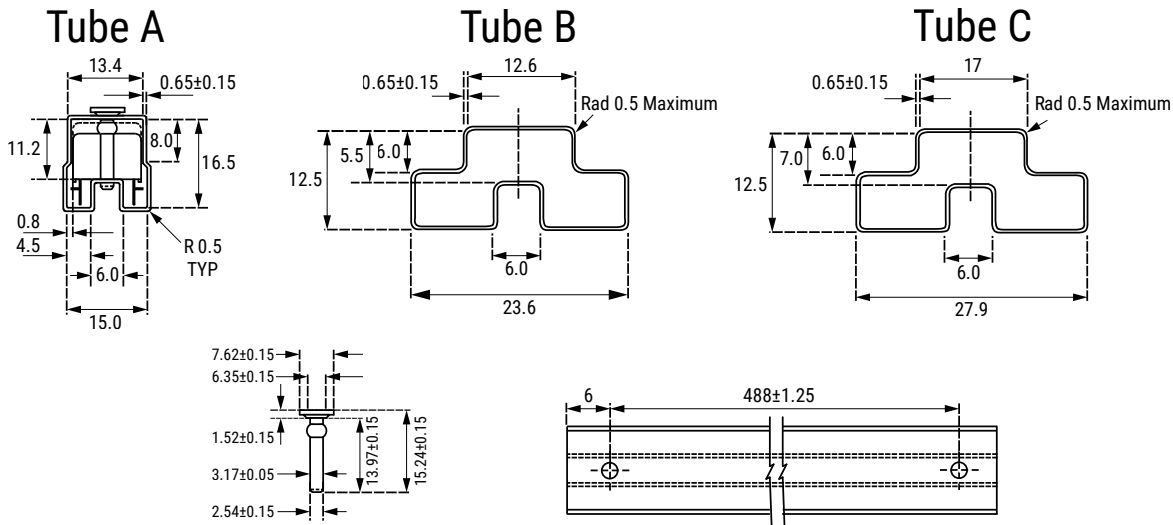
Marking



Packaging Quantities

Size Code	Lead Spacing	Base (mm)	Height (mm)	Length (mm)	Bulk	Reel
A52	10.0	12.2	6.05	11.0	43	
A53		12.7	9.0	14.0	34	200
A54		12.2	6.05	13.5	35	
A55		12.2	6.05	16.5	28	
A58		12.7	11.0	23.0	21	
B53	15.0	16.5	6.05	11.0	43	
B55		16.5	6.05	12.2	39	

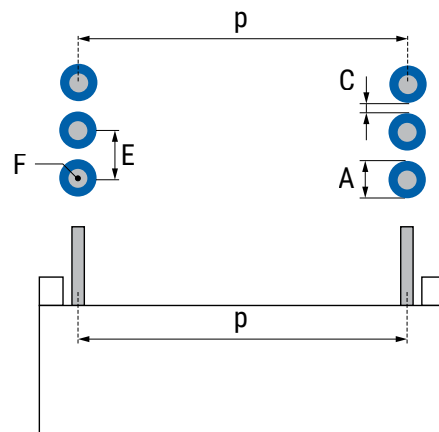
Tube Packaging



Size Code	Dimensions in mm	Tube
A52	10.0 – 12.2 x 6.05 x 11.0	Tube B
A53	10.0 – 12.7 x 9.0 x 14.0	Tube A
A54	10.0 – 12.2 x 6.05 x 13.5	Tube B
A55	10.0 – 12.2 x 6.05 x 16.5	Tube B
A58	10.0 – 12.7 x 11.0 x 23.0	Tube A
B53	15.0 – 16.5 x 6.05 x 11.0	Tube C
B55	15.0 – 16.5 x 6.05 x 12.2	Tube C

Landing

Size	Dimensions in mm				
	p	A	C	E	F
A52	10	2	0.54	2.54	0.7
A53	10	2	0.54	2.54	0.7
A54	10	2	0.54	2.54	0.7
A55	10	2	0.54	2.54	0.7
A58	10	2	0.54	2.54	0.7
B53	15	2	0.54	2.54	0.7
B55	15	2	0.54	2.54	0.7



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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.

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