

## Overview

KEMET's ALS36/37 Series of screw terminal capacitors meets the requirements of the North American market. This range offers high CV per unit volume coupled with high ripple currents and long-life performance.

## Applications

KEMET's ALS36/37 Series of capacitors is designed for industrial and commercial applications such as switch mode power supplies (SMPS), uninterruptible power supply (UPS) systems, variable speed drives, frequency inverters, welding equipment, and energy storage in pulse discharge applications.

## Benefits

- Imperial case sizes and terminals for the North American market
- Long life, up to 20,000 hours at +85°C ( $V_R, I_R$  applied)
- High ripple current
- Excellent surge voltage capability
- Optimized designs available upon request



## Part Number System

ALS3	6	A	153	D2C	025	
Series	Stud Option	Termination	Capacitance Code (μF)	Size Code	Rated Voltage (VDC)	
Screw Terminal Aluminum Electrolytic	6 = Plain Can 7 = Threaded mounting stud	See Termination Table	First two digits represent significant figures. Third digit specifies number of zeros.	See Dimension Table	025 = 25 040 = 40 050 = 50 063 = 63 075 = 75 100 = 100 160 = 160	200 = 200 250 = 250 350 = 350 400 = 400 450 = 450 500 = 500

## Performance Characteristics

Item	Performance Characteristics		
Capacitance Range	150 – 470,000 $\mu$ F		
Rated Voltage	25 – 500 VDC		
Operating Temperature	-40 to +85°C		
Storage Temperature Range	-55 to +85°C		
Capacitance Tolerance	-10/+30% at 120 Hz/+20°C		
Operational Lifetime	D (inch)	Rated Voltage and Ripple Current at +85°C (hours)	Rated Voltage at +85°C (hours)
	1.375	11,000	22,000
	2	18,000	36,000
	2.5	19,000	38,000
Operational Lifetime	3	20,000	40,000
	End of Life Requirement		
Shelf Life	$\Delta$ C/C < $\pm$ 10%, ESR < 2 x initial ESR value, IL < initial specified limit		
Leakage Current	2,000 hours at +85°C or 30,000 hours at +40°C 0 VDC		
	I = 0.006 CV or 6,000 ( $\mu$ A, whichever is smaller) C = rated capacitance ( $\mu$ F), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C.		
Vibration Test Specifications		Procedure	Requirements
	Case Length < 220 mm	0.75 mm displacement amplitude or 10 g maximum acceleration. Vibration applied for three 2-hour sessions at 10 – 500 Hz (capacitor clamped by body).	No leakage of electrolyte or other visible damage. Deviations in capacitance from initial measurements must not exceed: $\Delta$ C/C < 5%
Case Length $\geq$ 220 mm	0.35 mm displacement amplitude or 5 g maximum acceleration. Vibration applied for three 0.5-hour sessions at 10 – 55 Hz (capacitor clamped by body).		
Standards	IEC 60384-4 long life grade 40/85/56		

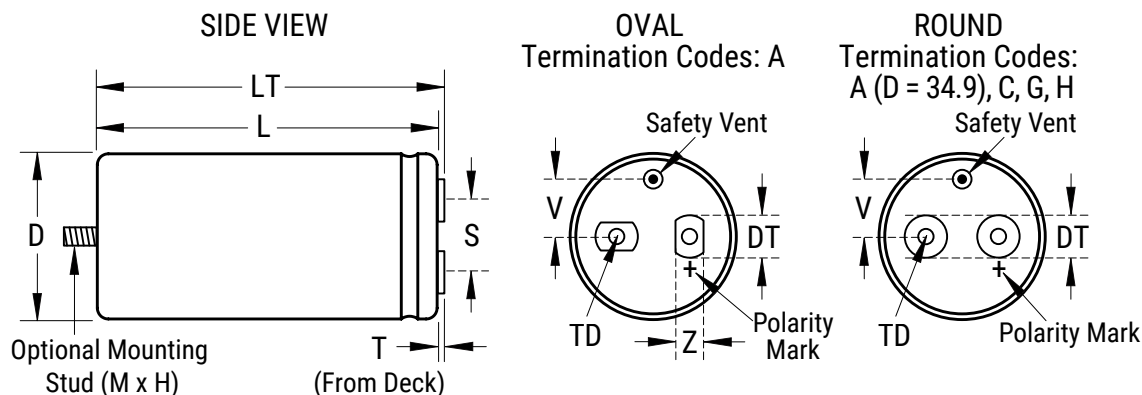
## Surge Voltage

Condition	Voltage (VDC)												
	25	40	50	63	75	100	160	200	250	350	400	450	500
$\leq$ 30 s surge, 1,000 cycles at 85°C	30	50	65	67	95	125	200	250	300	400	450	500	550
$\leq$ 500 ms surge, 100 cycles at 20°C								350	400	500	520	550	600

## Test Method & Performance

Endurance Life Test		
Conditions	Performance	
Temperature	+85°C	
Test Duration	5,000 hours	
Ripple Current	Rated ripple current in specified table	
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor	
<b>Performance</b>	<b>The following specifications will be satisfied when the capacitor is tested at +20°C:</b>	
Capacitance Change	≤ 160 V	Within 15% of the initial value
	> 160 V	Within 10% of the initial value
Equivalent Series Resistance	Does not exceed 200% of the initial value	
Leakage Current	Does not exceed leakage current limit	

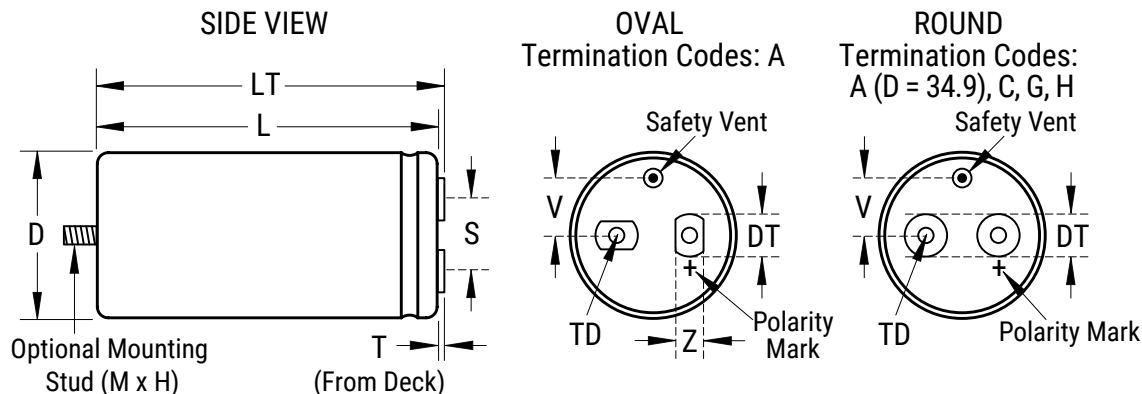
## Dimensions – Inches



Size Code	Dimensions in Inches					Mounting Stud (M x H)	Mounting Clip	Approximate Weight Ounces
	D	L	LT	S	V			
	±0.031	±0.062	±0.039	±0.019	Nominal			
D2C	1.375	2.125	2.420	0.5	0.315	M8 x 0.472	V3/H2/2736	2.8
D2L	1.375	2.625	2.930	0.5	0.315	M8 x 0.472	V3/H2/2736	3.3
D3C	1.375	3.125	3.440	0.5	0.315	M8 x 0.472	V3/H2/2736	4
D3L	1.375	3.625	3.960	0.5	0.315	M8 x 0.472	V3/H2/2736	4.6
D4C	1.375	4.125	4.430	0.5	0.315	M8 x 0.472	V3/H2/2736	5.3
D4L	1.375	4.625	4.940	0.5	0.315	M8 x 0.472	V3/H2/2736	5.8
D5C	1.375	5.125	5.450	0.5	0.315	M8 x 0.472	V3/H2/2736	6.5

Note: Add 0.015 inches to D and 0.045 inches to L for Sleeving 3.5 inch diameter cans available upon request. LT listed is for A-type termination code. Information for other termination codes is available upon request.

## Dimensions – Inches cont'd



Size Code	Dimensions in Inches						Mounting Clip	Approximate Weight Ounces
	D	L	LT	S	V	Mounting Stud (M x H)		
	±0.031	±0.062	±0.039	±0.019	Nominal	±0.039		
D5L	1.375	5.625	5.960	0.5	0.315	M8 x 0.472	V3/H2/2736	7.2
K2C	2	2.125	2.420	0.875	0.539	M12 x 0.63	V4/2737	5.8
K2L	2	2.625	2.930	0.875	0.539	M12 x 0.63	V4/2737	7.1
K3C	2	3.125	3.440	0.875	0.539	M12 x 0.63	V4/2737	8.5
K3L	2	3.625	3.960	0.875	0.539	M12 x 0.63	V4/2737	9.7
K4C	2	4.125	4.430	0.875	0.539	M12 x 0.63	V4/2737	11.1
K4L	2	4.625	4.940	0.875	0.539	M12 x 0.63	V4/2737	12.3
K5C	2	5.125	5.410	0.875	0.539	M12 x 0.63	V4/2737	13.6
K5L	2	5.625	5.960	0.875	0.539	M12 x 0.63	V4/2737	15
L3C	2.5	3.125	3.370	1.125	0.622	M12 x 0.63	V8	13.1
L3L	2.5	3.625	3.880	1.125	0.622	M12 x 0.63	V8	15.2
L4C	2.5	4.125	4.390	1.125	0.622	M12 x 0.63	V8	17.1
L4L	2.5	4.625	4.900	1.125	0.622	M12 x 0.63	V8	19.2
L5L	2.5	5.625	5.890	1.125	0.622	M12 x 0.63	V8	23.3
N3L	3	3.625	3.880	1.25	0.748	M12 x 0.63	V11	21.7
N4C	3	4.125	4.390	1.25	0.748	M12 x 0.63	V11	24.7
N4L	3	4.625	4.900	1.25	0.748	M12 x 0.63	V11	27.5
N5C	3	5.125	5.370	1.25	0.748	M12 x 0.63	V11	30.5
N5L	3	5.625	5.890	1.25	0.748	M12 x 0.63	V11	33.5
N6L	3	6.625	6.870	1.25	0.748	M12 x 0.63	V11	45.2
N8L	3	8.625	8.880	1.25	0.748	M12 x 0.63	V11	51.1

Note: Add 0.015 inches to D and 0.045 inches to L for Sleeving 3.5 inch diameter cans available upon request. LT listed is for A-type termination code. Information for other termination codes is available upon request.

## Termination Tables

Termination Code	A	C	E	G	H
Diameter (in)					
1.375	•				•
2	•				•
2.5	•	•	•	•	•
3	•	•	•	•	•

Termination Code	Thread	Termination Style	T	DT	Thread Depth (TD)	Z
			±0.031	±0.019	Minimum	Nominal
Standard Termination Option						
H	10 – 32 UNF class 2B	Round	0.281	0.315	0.394	
Other Termination Options						
A (D = 1.375)	M5	Round	0.281	0.315	0.394	
A (D > 1.375)	M5	Oval	0.217	0.512	0.394	0.394
C	M6	Round	0.217	0.512	0.394	
E	1/4 – 28 UNF class 2B	Round	0.25	0.67	0.465	
G	M6	Round	0.25	0.67	0.465	
<b>Dimensions in inches</b>						

### Case Polarity

Due to the presence of electrolyte in the capacitor, the aluminum can and stud mounting will essentially be at the same polarity as the negative terminal. We recommend that the stud and can be insulated (see accessories for insulating nuts).

### Terminations

Aluminum inserts with M5 threads as standard, maximum torque 2NM. Optional M6 threaded inserts have a maximum torque 4NM. Maximum torque for stud mounting M8:4NM and M12:8NM.

## Shelf Life

The capacitance, ESR and impedance of a capacitor will not change significantly after extended storage periods, however the leakage current will very slowly increase. KEMET products are particularly stable and allow a shelf life in excess of three years at 40°C. See sectional specification under each product series for specific data.

## Re-age (Reforming) Procedure

Apply the rated voltage to the capacitor at room temperature for a period of one hour, or until the leakage current has fallen to a steady value below the specified limit. During re-aging a maximum charging current of twice the specified leakage current or 5 mA (whichever is greater) is suggested.

## Reliability

The reliability of a component can be defined as the probability that it will perform satisfactorily under a given set of conditions for a given length of time.

In practice, it is impossible to predict with absolute certainty how any individual component will perform; thus, we must utilize probability theory. It is also necessary to clearly define the level of stress involved (e.g. operating voltage, ripple current, temperature and time). Finally, the meaning of satisfactory performance must be defined by specifying a set of conditions which determine the end of life of the component.

Reliability as a function of time,  $R(t)$ , is normally expressed as:  $R(t) = e^{-\lambda t}$

where  $R(t)$  is the probability that the component will perform satisfactorily for time  $t$ , and  $\lambda$  is the failure rate.

## Failure Rate

The failure rate is the number of components failing per unit time. The failure rate of most electronic components follows the characteristic pattern:

- Early failures are removed during the manufacturing process.
- The operational life is characterized by a constant failure rate.
- The wear out period is characterized by a rapidly increasing failure rate.

The failures in time (FIT) are given with a 60% confidence level for the various type codes. By convention, FIT is expressed as  $1 \times 10^{-9}$  failures per hour. Failure rate is also expressed as a percentage of failures per 1,000 hours.

e.g., 100 FIT =  $1 \times 10^{-7}$  failures per hour = 0.01%/1,000 hours

## End of Life Definition

Catastrophic Failure: short circuit, open circuit or safety vent operation

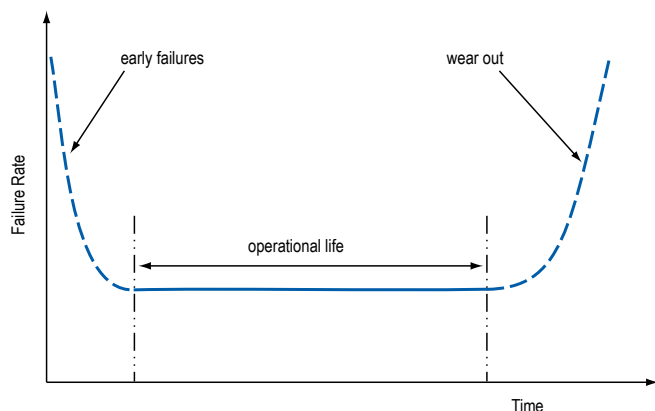
Parametric Failure:

- Change in capacitance  $> \pm 10\%$
- Leakage current  $>$  specified limit
- ESR  $> 2 \times$  initial ESR value

## MTBF

The mean time between failures (MTBF) is simply the inverse of the failure rate.

$$MTBF = 1/\lambda$$



The failure rate is derived from our periodic test results. The failure rate ( $\lambda_R$ ) is, therefore, only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT =  $1 \times 10^{-9}$  failures per hour. Failure rate per hour includes both catastrophic and parametric failures.

$T_a$	Failure Rate per Hour
85°C	250 FIT
40°C	12 FIT

## Environmental Compliance

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environmental effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas like China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electronic equipment. All products in this catalog are produced to help our customers' obligations to guarantee their products and fulfill these legislative requirements. The only material of concern in our products has been lead (Pb), which has been removed from all designs to fulfill the requirement of containing less than 0.1% of lead in any homogeneous material. KEMET will closely follow any changes in legislation world wide and makes any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in electrode coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging labels for RoHS compatible capacitors.

Because of customer requirements, there may appear additional markings such as LF = Lead Free or LFW = Lead Free Wires on the label.

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

VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum		Part Number
	120 Hz 25°C (µF)		D x L (inch)	120 Hz 85°C (A)	20 kHz 85°C (A)	120 Hz 25°C (mΩ)	20 kHz 25°C (mΩ)	
25	15000	D2C	1.375 x 2.125	9.2	11.4	38	32	ALS3(1)(2)153D2C025
25	22000	D2L	1.375 x 2.625	11.4	13.7	27	23	ALS3(1)(2)223D2L025
25	33000	D3C	1.375 x 3.125	13.5	15.8	20	17	ALS3(1)(2)333D3C025
25	33000	K2C	2 x 2.125	10.6	11.5	27	24	ALS3(1)(2)333K2C025
25	47000	D4C	1.375 x 4.125	15.7	17.7	15	13	ALS3(1)(2)473D4C025
25	47000	K2L	2 x 2.625	13.2	14.4	19	17	ALS3(1)(2)473K2L025
25	68000	D5L	1.375 x 5.625	16.7	18.3	12	11	ALS3(1)(2)683D5L025
25	68000	K3C	2 x 3.125	16.3	17.6	14	12	ALS3(1)(2)683K3C025
25	100000	K4C	2 x 4.125	19.6	20.9	11	10	ALS3(1)(2)104K4C025
25	100000	L3C	2.5 x 3.125	22.5	24.1	10	9	ALS3(1)(2)104L3C025
25	150000	K5L	2 x 5.625	22.4	23.4	9	8	ALS3(1)(2)154K5L025
25	150000	L3L	2.5 x 3.625	25.4	26.7	8	7	ALS3(1)(2)154L3L025
25	220000	L5L	2.5 x 5.625	31.4	32.8	6	6	ALS3(1)(2)224L5L025
25	220000	N3L	3 x 3.625	25.6	26.3	8	8	ALS3(1)(2)224N3L025
25	330000	N5L	3 x 5.625	33.2	34.0	7	6	ALS3(1)(2)334N5L025
25	470000	N8L	3 x 8.625	45.6	46.5	6	5	ALS3(1)(2)474N8L025
40	10000	D2C	1.375 x 2.125	9.2	11.7	31	25	ALS3(1)(2)103D2C040
40	15000	D3C	1.375 x 3.125	12.5	15.7	21	17	ALS3(1)(2)153D3C040
40	22000	D4C	1.375 x 4.125	14.8	17.7	16	13	ALS3(1)(2)223D4C040
40	22000	K2C	2 x 2.125	10.0	11.2	29	25	ALS3(1)(2)223K2C040
40	33000	D5L	1.375 x 5.625	16.1	18.3	13	11	ALS3(1)(2)333D5L040
40	33000	K2L	2 x 2.625	12.4	13.9	20	17	ALS3(1)(2)333K2L040
40	47000	K3C	2 x 3.125	15.5	17.1	15	13	ALS3(1)(2)473K3C040
40	68000	K4C	2 x 4.125	18.8	20.4	11	10	ALS3(1)(2)683K4C040
40	68000	L3C	2.5 x 3.125	21.4	23.6	10	9	ALS3(1)(2)683L3C040
40	100000	K5L	2 x 5.625	21.7	23.1	9	8	ALS3(1)(2)104K5L040
40	100000	L4C	2.5 x 4.125	27.0	29.3	7	7	ALS3(1)(2)104L4C040
40	150000	N3L	3 x 3.625	24.5	25.5	9	8	ALS3(1)(2)154N3L040
40	220000	N5L	3 x 5.625	32.2	33.3	7	7	ALS3(1)(2)224N5L040
40	330000	N8L	3 x 8.625	44.4	45.6	6	6	ALS3(1)(2)334N8L040
50	6800	D2C	1.375 x 2.125	8.6	11.7	34	26	ALS3(1)(2)682D2C050
50	10000	D3C	1.375 x 3.125	11.7	15.6	24	18	ALS3(1)(2)103D3C050
50	15000	D4C	1.375 x 4.125	14.1	17.7	17	14	ALS3(1)(2)153D4C050
50	15000	K2C	2 x 2.125	9.8	11.4	31	26	ALS3(1)(2)153K2C050
50	22000	D5L	1.375 x 5.625	15.4	18.3	14	11	ALS3(1)(2)223D5L050
50	22000	K2L	2 x 2.625	12.2	14.2	21	18	ALS3(1)(2)223K2L050
50	33000	K3C	2 x 3.125	15.2	17.3	15	13	ALS3(1)(2)333K3C050
50	33000	L3C	2.5 x 3.125	21.2	24.2	11	9	ALS3(1)(2)333L3C050
50	47000	K4C	2 x 4.125	18.5	20.6	12	10	ALS3(1)(2)473K4C050
50	47000	L3L	2.5 x 3.625	24.4	27.1	9	7	ALS3(1)(2)473L3L050
50	68000	K5C	2 x 5.125	21.1	22.9	10	9	ALS3(1)(2)683K5C050
50	68000	L4C	2.5 x 4.125	26.0	28.1	7	7	ALS3(1)(2)683L4C050
50	68000	N3L	3 x 3.625	25.3	27.0	9	8	ALS3(1)(2)683N3L050
50	100000	N4L	3 x 4.625	27.8	29.1	8	7	ALS3(1)(2)104N4L050
50	150000	N6L	3 x 6.625	36.6	37.9	6	6	ALS3(1)(2)154N6L050
63	4700	D2C	1.375 x 2.125	8.1	11.7	37	27	ALS3(1)(2)472D2C063
63	6800	D2L	1.375 x 2.625	10.1	13.8	27	20	ALS3(1)(2)682D2L063
63	10000	D3L	1.375 x 3.625	12.9	17.0	20	15	ALS3(1)(2)103D3L063
63	10000	K2C	2 x 2.125	9.5	11.4	32	26	ALS3(1)(2)103K2C063
63	15000	D5C	1.375 x 5.125	14.9	18.4	15	11	ALS3(1)(2)153D5C063
63	15000	K2L	2 x 2.625	11.8	14.1	22	18	ALS3(1)(2)153K2L063
63	22000	K3C	2 x 3.125	14.7	17.2	16	13	ALS3(1)(2)223K3C063
63	22000	L3C	2.5 x 3.125	20.5	24.5	11	9	ALS3(1)(2)223L3C063
63	33000	K4C	2 x 4.125	18.0	20.4	12	10	ALS3(1)(2)333K4C063
63	33000	L3L	2.5 x 3.625	23.8	27.2	9	7	ALS3(1)(2)333L3L063
63	47000	K5C	2 x 5.125	20.6	22.7	10	9	ALS3(1)(2)473K5C063
63	47000	L4C	2.5 x 4.125	25.6	28.2	8	7	ALS3(1)(2)473L4C063
63	47000	N3L	3 x 3.625	25.0	27.1	9	8	ALS3(1)(2)473N3L063
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR		Part Number

(1) Mounting Code: 6 = plain can, 7 = threaded mounting stud

(2) Termination Code: See Termination Tables for available options



**Table 1 – Ratings & Part Number Reference cont'd**

VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum		Part Number
	120 Hz 25°C (µF)		D x L (inch)	120 Hz 85°C (A)	20 kHz 85°C (A)	120 Hz 25°C (mΩ)	20 kHz 25°C (mΩ)	
63	68000	N4C	3 x 4.125	26.4	28.0	8	7	ALS3(1)(2)683N4C063
63	100000	N6L	3 x 6.625	36.6	38.4	6	6	ALS3(1)(2)104N6L063
75	3300	D2C	1.375 x 2.125	7.1	9.4	55	43	ALS3(1)(2)332D2C075
75	4700	D2L	1.375 x 2.625	8.8	11.3	40	32	ALS3(1)(2)472D2L075
75	4700	K2C	2 x 2.125	7.9	9.3	50	42	ALS3(1)(2)472K2C075
75	6800	D3C	1.375 x 3.125	10.6	13.2	29	24	ALS3(1)(2)682D3C075
75	6800	K2L	2 x 2.625	10.0	11.7	34	28	ALS3(1)(2)682K2L075
75	10000	D4L	1.375 x 4.625	13.2	16.0	21	17	ALS3(1)(2)103D4L075
75	10000	K3C	2 x 3.125	12.6	14.6	24	20	ALS3(1)(2)103K3C075
75	15000	K3L	2 x 3.625	13.5	14.9	21	18	ALS3(1)(2)153K3L075
75	22000	K4L	2 x 4.625	16.3	17.7	15	14	ALS3(1)(2)223K4L075
75	22000	L3C	2.5 x 3.125	16.6	18.0	16	14	ALS3(1)(2)223L3C075
75	33000	L4C	2.5 x 4.125	21.6	23.3	11	10	ALS3(1)(2)333L4C075
75	33000	N3L	3 x 3.625	20.7	21.9	13	12	ALS3(1)(2)333N3L075
75	47000	N4C	3 x 4.125	21.9	22.9	12	11	ALS3(1)(2)473N4C075
75	68000	N6L	3 x 6.625	31.7	32.9	9	8	ALS3(1)(2)683N6L075
75	100000	N8L	3 x 8.625	38.2	39.3	8	7	ALS3(1)(2)104N8L075
100	2200	D2C	1.375 x 2.125	6.6	9.3	61	46	ALS3(1)(2)222D2C100
100	3300	D2L	1.375 x 2.625	8.3	11.3	43	33	ALS3(1)(2)332D2L100
100	3300	K2C	2 x 2.125	7.7	9.3	52	42	ALS3(1)(2)332K2C100
100	4700	D3C	1.375 x 3.125	10.1	13.2	31	24	ALS3(1)(2)472D3C100
100	6800	D4C	1.375 x 4.125	12.2	15.2	23	18	ALS3(1)(2)682D4C100
100	6800	K2L	2 x 2.625	9.5	10.8	32	27	ALS3(1)(2)682K2L100
100	10000	D5L	1.375 x 5.625	13.7	16.4	18	14	ALS3(1)(2)103D5L100
100	10000	K3C	2 x 3.125	12.0	13.5	23	20	ALS3(1)(2)103K3C100
100	15000	K4C	2 x 4.125	15.0	16.5	17	15	ALS3(1)(2)153K4C100
100	15000	L3C	2.5 x 3.125	16.5	18.3	16	14	ALS3(1)(2)153L3C100
100	22000	L4C	2.5 x 4.125	21.5	23.8	11	10	ALS3(1)(2)223L4C100
100	22000	N3L	3 x 3.625	20.8	22.5	13	12	ALS3(1)(2)223N3L100
100	33000	N4C	3 x 4.125	21.9	23.1	12	11	ALS3(1)(2)333N4C100
100	47000	N6L	3 x 6.625	31.7	33.3	9	8	ALS3(1)(2)473N6L100
100	68000	N8L	3 x 8.625	38.4	39.8	8	7	ALS3(1)(2)683N8L100
160	1000	D2C	1.375 x 2.125	4.1	7.4	149	94	ALS3(1)(2)102D2C160
160	1500	D2L	1.375 x 2.625	5.3	9.2	101	65	ALS3(1)(2)152D2L160
160	1500	K2C	2 x 2.125	5.4	8.3	111	74	ALS3(1)(2)152K2C160
160	2200	D3L	1.375 x 3.625	7.0	11.9	70	45	ALS3(1)(2)222D3L160
160	2200	K2L	2 x 2.625	6.8	10.5	76	50	ALS3(1)(2)222K2L160
160	3300	D4L	1.375 x 4.625	8.7	13.8	49	32	ALS3(1)(2)332D4L160
160	3300	K3C	2 x 3.125	8.7	13.1	52	35	ALS3(1)(2)332K3C160
160	4700	K3L	2 x 3.625	10.3	14.2	40	28	ALS3(1)(2)472K3L160
160	6800	K4L	2 x 4.625	12.7	17.0	29	21	ALS3(1)(2)682K4L160
160	6800	L3C	2.5 x 3.125	13.1	17.4	29	21	ALS3(1)(2)682L3C160
160	10000	L4C	2.5 x 4.125	17.2	22.7	20	15	ALS3(1)(2)103L4C160
160	10000	N3L	3 x 3.625	17.2	21.8	22	16	ALS3(1)(2)103N3L160
160	15000	N4C	3 x 4.125	19.2	22.8	17	14	ALS3(1)(2)153N4C160
160	22000	N5L	3 x 5.625	23.3	26.4	15	12	ALS3(1)(2)223N5L160
200	680	D2C	1.375 x 2.125	3.4	5.9	241	165	ALS3(1)(2)681D2C200
200	1000	D2L	1.375 x 2.625	4.4	7.5	166	114	ALS3(1)(2)102D2L200
200	1000	K2C	2 x 2.125	4.6	7.2	175	123	ALS3(1)(2)102K2C200
200	1500	D3C	1.375 x 3.125	5.6	9.3	112	78	ALS3(1)(2)152D3C200
200	1500	K2L	2 x 2.625	5.8	9.1	117	83	ALS3(1)(2)152K2L200
200	2200	D4L	1.375 x 4.625	7.4	11.7	78	55	ALS3(1)(2)222D4L200
200	2200	K3C	2 x 3.125	7.5	11.5	81	57	ALS3(1)(2)222K3C200
200	3300	K4C	2 x 4.125	9.8	14.5	55	40	ALS3(1)(2)332K4C200
200	4700	K4L	2 x 4.625	11.3	15.7	42	31	ALS3(1)(2)472K4L200
200	4700	L3C	2.5 x 3.125	11.7	16.1	42	31	ALS3(1)(2)472L3C200
200	6800	L4C	2.5 x 4.125	15.4	21.1	29	22	ALS3(1)(2)682L4C200
200	6800	N3L	3 x 3.625	15.7	20.6	31	23	ALS3(1)(2)682N3L200
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR		Part Number

(1) Mounting Code: 6 = plain can, 7 = threaded mounting stud

(2) Termination Code: See Termination Tables for available options

**Table 1 – Ratings & Part Number Reference cont'd**

VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum		Part Number
	120 Hz 25°C (µF)		D x L (inch)	120 Hz 85°C (A)	20 kHz 85°C (A)	120 Hz 25°C (mΩ)	20 kHz 25°C (mΩ)	
200	10000	N4C	3 x 4.125	17.8	22.1	24	18	ALS3(1)(2)103N4C200
200	15000	N5L	3 x 5.625	22.0	25.8	19	16	ALS3(1)(2)153N5L200
200	22000	N6L	3 x 6.625	25.9	29.2	15	13	ALS3(1)(2)223N6L200
250	680	D2C	1.375 x 2.125	3.5	6.3	206	134	ALS3(1)(2)681D2C250
250	1000	D3C	1.375 x 3.125	4.9	8.8	140	91	ALS3(1)(2)102D3C250
250	1000	K2C	2 x 2.125	4.7	7.3	154	105	ALS3(1)(2)102K2C250
250	1500	D4C	1.375 x 4.125	6.3	10.9	95	63	ALS3(1)(2)152D4C250
250	1500	K2L	2 x 2.625	5.9	9.2	103	70	ALS3(1)(2)152K2L250
250	2200	D5L	1.375 x 5.625	7.6	12.5	67	45	ALS3(1)(2)222D5L250
250	2200	K3C	2 x 3.125	7.7	11.7	71	49	ALS3(1)(2)222K3C250
250	3300	L3C	2.5 x 3.125	10.8	16.2	48	33	ALS3(1)(2)332L3C250
250	4700	K5L	2 x 5.625	12.5	17.7	36	25	ALS3(1)(2)472K5L250
250	4700	L3L	2.5 x 3.625	13.3	19.0	35	25	ALS3(1)(2)472L3L250
250	6800	L5L	2.5 x 5.625	17.7	24.7	25	18	ALS3(1)(2)682L5L250
250	6800	N3L	3 x 3.625	15.5	19.9	29	22	ALS3(1)(2)682N3L250
250	10000	N5L	3 x 5.625	21.4	26.9	20	15	ALS3(1)(2)103N5L250
250	15000	N6L	3 x 6.625	25.4	30.1	17	13	ALS3(1)(2)153N6L250
350	330	D2C	1.375 x 2.125	2.7	5.1	366	230	ALS3(1)(2)331D2C350
350	470	D2L	1.375 x 2.625	3.4	6.5	258	163	ALS3(1)(2)471D2L350
350	470	K2C	2 x 2.125	3.7	6.7	254	158	ALS3(1)(2)471K2C350
350	680	D3C	1.375 x 3.125	4.3	8.0	180	114	ALS3(1)(2)681D3C350
350	680	K2L	2 x 2.625	4.6	8.4	175	109	ALS3(1)(2)681K2L350
350	1000	D4C	1.375 x 4.125	5.5	10.0	124	79	ALS3(1)(2)102D4C350
350	1000	K3C	2 x 3.125	5.9	10.7	120	75	ALS3(1)(2)102K3C350
350	1500	D5L	1.375 x 5.625	6.8	11.7	85	55	ALS3(1)(2)152D5L350
350	1500	K3L	2 x 3.625	7.5	12.4	84	54	ALS3(1)(2)152K3L350
350	2200	K4L	2 x 4.625	9.3	15.1	58	38	ALS3(1)(2)222K4L350
350	2200	L3C	2.5 x 3.125	9.7	15.6	59	38	ALS3(1)(2)222L3C350
350	3300	L4C	2.5 x 4.125	12.9	20.3	40	26	ALS3(1)(2)332L4C350
350	4700	N3L	3 x 3.625	14.3	19.1	35	25	ALS3(1)(2)472N3L350
350	6800	N5L	3 x 5.625	19.8	26.0	25	18	ALS3(1)(2)682N5L350
350	10000	N6L	3 x 6.625	23.9	29.7	19	14	ALS3(1)(2)103N6L350
400	330	D2C	1.375 x 2.125	2.7	5.2	355	227	ALS3(1)(2)331D2C400
400	470	D3C	1.375 x 3.125	3.7	7.2	249	159	ALS3(1)(2)471D3C400
400	470	K2C	2 x 2.125	3.7	6.5	262	171	ALS3(1)(2)471K2C400
400	680	D4C	1.375 x 4.125	4.8	8.9	174	111	ALS3(1)(2)681D4C400
400	680	K2L	2 x 2.625	4.6	8.1	181	118	ALS3(1)(2)681K2L400
400	1000	D5C	1.375 x 5.125	5.8	10.5	120	78	ALS3(1)(2)102D5C400
400	1000	K3C	2 x 3.125	6.0	10.4	124	81	ALS3(1)(2)102K3C400
400	1500	K4C	2 x 4.125	7.9	13.2	84	56	ALS3(1)(2)152K4C400
400	1500	L3C	2.5 x 3.125	8.5	14.5	83	55	ALS3(1)(2)152L3C400
400	2200	K5C	2 x 5.125	10.0	15.9	60	40	ALS3(1)(2)222K5C400
400	2200	L3L	2.5 x 3.625	10.8	17.5	59	39	ALS3(1)(2)222L3L400
400	3300	L4L	2.5 x 4.625	13.4	20.4	41	28	ALS3(1)(2)332L4L400
400	3300	N3L	3 x 3.625	13.3	19.1	43	30	ALS3(1)(2)332N3L400
400	4700	N5C	3 x 5.125	17.3	23.6	32	23	ALS3(1)(2)472N5C400
400	6800	N5L	3 x 5.625	20.1	26.2	22	16	ALS3(1)(2)682N5L400
450	220	D2C	1.375 x 2.125	2.5	5.1	398	243	ALS3(1)(2)221D2C450
450	330	D3C	1.375 x 3.125	3.5	7.1	266	163	ALS3(1)(2)331D3C450
450	330	K2C	2 x 2.125	3.5	6.4	279	175	ALS3(1)(2)331K2C450
450	470	D3L	1.375 x 3.625	4.4	8.6	189	116	ALS3(1)(2)471D3L450
450	470	K2L	2 x 2.625	4.4	8.0	195	122	ALS3(1)(2)471K2L450
450	680	D5C	1.375 x 5.125	5.4	10.3	132	82	ALS3(1)(2)681D5C450
450	680	K3C	2 x 3.125	5.6	10.2	136	85	ALS3(1)(2)681K3C450
450	1000	K4C	2 x 4.125	7.4	13.0	94	59	ALS3(1)(2)102K4C450
450	1000	L3C	2.5 x 3.125	8.0	14.3	93	58	ALS3(1)(2)102L3C450
450	1500	K5C	2 x 5.125	9.5	15.8	65	42	ALS3(1)(2)152K5C450
450	1500	L3L	2.5 x 3.625	10.2	17.4	64	41	ALS3(1)(2)152L3L450
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR		Part Number

(1) Mounting Code: 6 = plain can, 7 = threaded mounting stud

(2) Termination Code: See Termination Tables for available options

**Table 1 – Ratings & Part Number Reference cont'd**

VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR Maximum		Part Number
	120 Hz 25°C (µF)		D x L (inch)	120 Hz 85°C (A)	20 kHz 85°C (A)	120 Hz 25°C (mΩ)	20 kHz 25°C (mΩ)	
450	2200	N3L	3 x 3.625	12.7	19.2	47	31	ALS3(1)(2)222N3L450
450	3300	N4C	3 x 4.125	14.8	20.8	34	24	ALS3(1)(2)332N4C450
450	4700	N5L	3 x 5.625	18.8	24.8	27	20	ALS3(1)(2)472N5L450
450	6800	N6L	3 x 6.625	22.5	29.1	23	17	ALS3(1)(2)682N6L450
500	150	D2C	1.375 x 2.125	2.2	3.7	732	547	ALS3(1)(2)151D2C500
500	220	D2L	1.375 x 2.625	2.8	4.8	501	375	ALS3(1)(2)221D2L500
500	330	D3L	1.375 x 3.625	3.8	6.4	335	251	ALS3(1)(2)331D3L500
500	330	K2C	2 x 2.125	3.7	6.1	273	188	ALS3(1)(2)331K2C500
500	470	D4L	1.375 x 4.625	4.7	7.8	237	178	ALS3(1)(2)471D4L500
500	470	K2L	2 x 2.625	4.6	7.7	191	131	ALS3(1)(2)471K2L500
500	680	K4C	2 x 4.125	6.3	10.0	174	133	ALS3(1)(2)681K4C500
500	680	L3C	2.5 x 3.125	6.8	10.9	173	132	ALS3(1)(2)681L3C500
500	1000	K5C	2 x 5.125	8.6	14.4	90	62	ALS3(1)(2)102K5C500
500	1000	L3L	2.5 x 3.625	8.7	13.6	119	91	ALS3(1)(2)102L3L500
500	1500	L4C	2.5 x 4.125	10.7	15.9	82	63	ALS3(1)(2)152L4C500
500	1500	N3L	3 x 3.625	11.1	16.2	83	65	ALS3(1)(2)152N3L500
500	2200	N4L	3 x 4.625	13.7	19.1	59	46	ALS3(1)(2)222N4L500
500	3300	N6L	3 x 6.625	19.8	26.7	41	32	ALS3(1)(2)332N6L500
500	4700	N8L	3 x 8.625	26.4	34.7	24	18	ALS3(1)(2)472N8L500
VDC	Rated Capacitance	Size Code	Case Size	Ripple Current		ESR		Part Number

(1) Mounting Code: 6 = plain can, 7 = threaded mounting stud

(2) Termination Code: See Termination Tables for available options

## Mechanical Data

### Polarity and Reversed Voltage

Aluminium Electrolytic capacitors manufactured for use in DC applications contain an anode foil and a cathode foil. As such, they are polarized devices and must be connected with the +ve to the anode foil and the -ve to the cathode foil. If this were to be reversed then the electrolytic process that took place in forming the oxide layer on the anode would be recreated in trying to form an oxide layer on the cathode. In forming the cathode foil in this way, heat would be generated and gas given off within the capacitor, usually leading to catastrophic failure.

The cathode foil already possesses a thin stabilized oxide layer. This thin oxide layer is equivalent to a forming voltage of approximately 2 V. As a result, the capacitor can withstand a voltage reversal of up to 2 V for short periods. Above this voltage, the formation process will commence. Aluminium Electrolytic capacitors can also be manufactured for use in intermittent AC applications by using two anode foils in place of one anode and one cathode.

### Mounting Position

The capacitor can be mounted in any position as long as the safety vent can operate. It is possible for some electrolyte to be expelled. As this is a conducting liquid, suitable precautions should be initiated by the system designer to avoid secondary short circuits.

The capacitors are designed to be mounted in free air and are not suitable for submersion in liquid.

### Insulating Resistance

≥ 100 MΩ at 100 VDC across insulating sleeve. UL recognized sleeving is available for custom parts in this range, upon request.

(UL No. E358957)

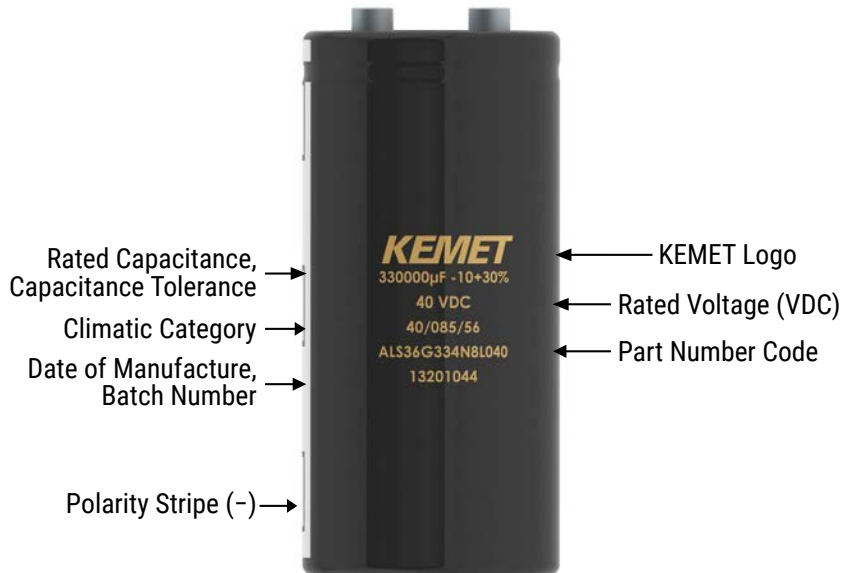
### Voltage Proof

≥ 2,500 VDC across insulating sleeve

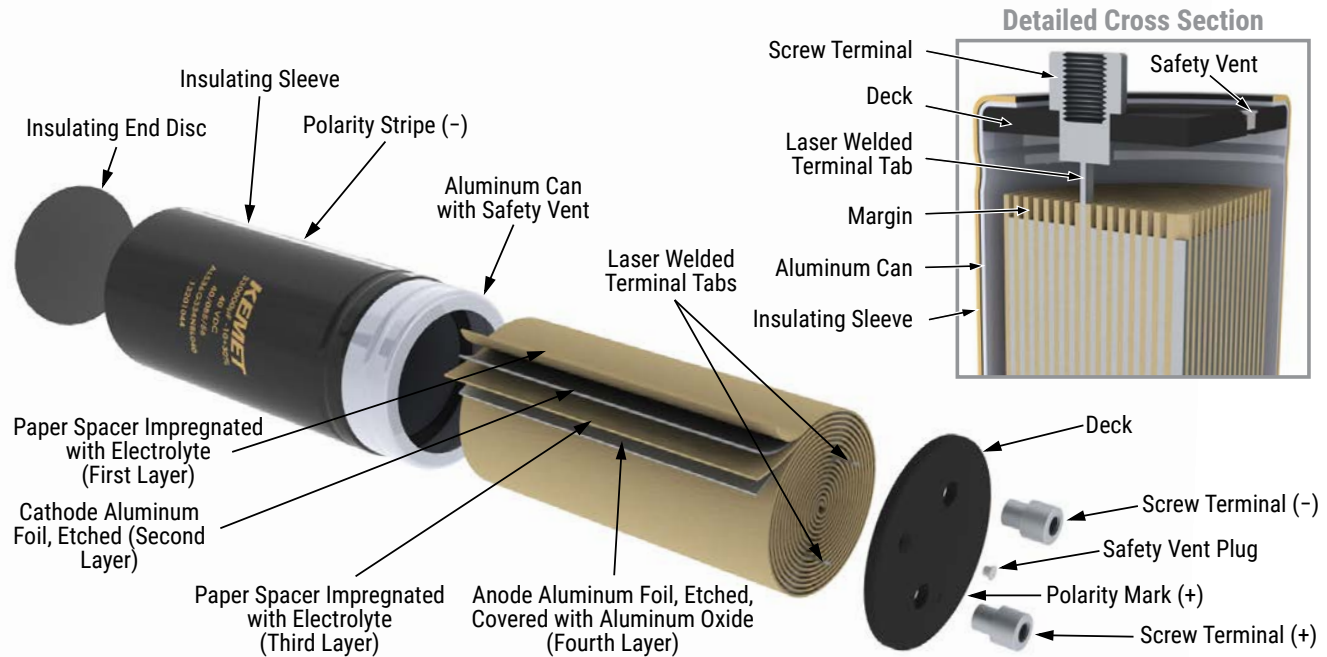
### Safety Vent

A safety vent for overpressure is featured on terminal deck. This is in the form of a rubber plug designed to relieve build-up of internal pressure due to overstress or catastrophic failure.

## Marking



## Construction



## Construction Data

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then “formed” to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.

The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being sleeved and packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete.

Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

A sample from each batch is taken by the quality department after completion of the production process. This sample size is controlled by the use of recognized sampling tables defined in BS 6001.

The following tests are applied and may be varied at the request of the customer. In this case the batch, or special procedure, will determine the course of action.

### Electrical:

- Leakage current
- Capacitance
- ESR
- Impedance
- Tan Delta

### Mechanical/Visual:

- Overall dimensions
- Torque test of mounting stud
- Print detail
- Box labels
- Packaging, including packed quantity



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