

Overview

KEMET's ALS32/33 Series of screw terminal capacitors meets the requirements of the Asian market. This range offers high CV per unit volume coupled with high ripple currents and long-life performance.

Applications

KEMET's ALS32/33 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

- · Case sizes and terminals for the Asian 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	2	Α	391	D2C	350
Series	Stud Option	Termination	Capacitance Code (μF)	Size Code	Rated Voltage (VDC)
Screw Terminal Aluminum Electrolytic	2 = Plain Can 3 = Threaded mounting stud	See Termination Table	First two digits represent significant figures. Third digit specifies number of zeros.	See Dimension Table	350 = 350 400 = 400 450 = 450 500 = 500



Performance Characteristics

Item		Performance Characteristics						
Capacitance Range	220 – 18,000 μF							
Rated Voltage	350 - 500 VDC	350 - 500 VDC						
Operating Temperature	-40 to +85°C							
Storage Temperature Range	-55 to +85°C	-55 to +85°C						
Capacitance Tolerance	±20% at 100 Hz/+20°C							
	D (mm)	Rated Voltage and Ripple Current at +85°C (hours)	Rated Voltage at +85°C (hours)					
	36	11,000	22,000					
Operational Lifetime	51	18,000	36,000					
	63.5	19,000	38,000					
	77.90	20,000	40,000					
End of Life Requirement	Δ C/C < ±10%, ESR < 2 x initial ESF	Δ C/C < ±10%, ESR < 2 x initial ESR value, IL < initial specified limit						
Shelf Life	2,000 hours at +85°C or 30,000 hours at +40°C 0 VDC							
Laskana Quimant	I = 0.006 CV or 6,000 (μA, whichever is smaller)							
Leakage Current	C = rated capacitance (μ F), V = rated voltage (VDC). Voltage applied for 5 minutes at +20°C.							
		Procedure	Requirements					
Vibration Test Specifications	Case Length < 220 mm	0.75 mm displacement amplitude or 10 g maximum acceleration. Vibration applied for three 2-hour sessions at 10 – 55 Hz (Capacitor clamped by body).	No leakage of electrolyte or other visible damage. Deviations in capacitance from					
	Case Length ≥ 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).	initial measurements must not exceed: Δ C/C < 5%					
Standards	IEC 60384-4 long life grade 40/8	5/56						

Surge Voltage

Condition	Voltage (VDC)				
Condition	350 400 450 5				
≤ 30s Surge followed by a no load period of 330 s, 1,000 cycles at +85°C	385	440	495	550	
≤ 500 ms surge, 100 cycles at 20°C, occurring randomly throughout the life of the capacitor	500	520	550	600	

Test Method & Performance

Endurance Life Test							
Conditions	Perfor	Performance					
Temperature	+85°C						
Test Duration	5,000 hours	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						
Performance	The following specifications will be satisfied when the capacitor is tested at +20°C:						
Osmasitana ohanna	≤ 160 V	Within 15% of the initial value					
Capacitance Change	> 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						

Termination Tables

Termination Code	٨	C
Diameter (mm)	A	Ŭ
34.9	•	
50.8	•	
63.5	•	•
76.2	•	•
88.9	•	•

Termination	Thread	Termination	т	DT	Thread Depth (TD)	Z			
Code	Thread	Style	±0.5	±0.5	Minimum	Nominal			
	Standard Termination Option								
A (D = 36)	M5	Round	7.14	8	10				
A (D > 36)	M5	Oval	5.5	13	10	10			
	Other Termination Options								
С	M6	Round	5.5	13	10				
	Dimensions in mm								

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).

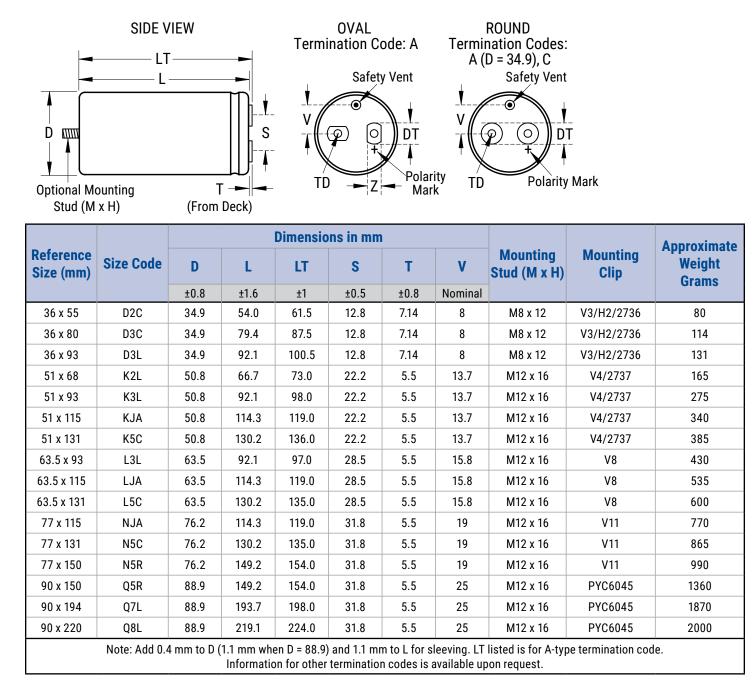
Terminations

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.

© KEMET Electronics Corporation • KEMET Tower • One East Broward Boulevard Fort Lauderdale, FL 33301 USA • 954-766-2800 • www.kemet.com 3



Dimensions – Millimeters



Downloaded from Arrow.com.



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^{λt} where R(t) is the probability that the component will perform satisfactorily for time t, and λ 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 1×10^{-9} failures per hour. Failure rate is also expressed as a percentage of failures per 1,000 hours.

e.g., 100 FIT = 1 x 10⁻⁷ failures per hour = 0.01%/1,000 hours

End of Life Definition

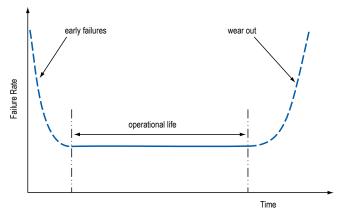
Catastrophic Failure: short circuit, open circuit or safety vent operation Parametric Failure:

- Change in capacitance > ±10%
- Leakage current > specified limit
- ESR > 2 x 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 (λ_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 x 10⁻⁹ failures per hour. Failure rate per hour includes both catastrophic and parametric failures.

TageFailure Rate per Hour85°C250 FIT40°C12 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.

6



Table 1 – Ratings & Part Number Reference

128 Hz D + L (mn) 128 Hz 20 Hz 120 Hz 22 C (m) 22 Hz 22 Hz 350 340 DDC 38 x 55 2.8 5.2 352 352 227 ALS(17)/2941 350 470 DDC 36 x 60 3.5 5.7 231 118 ALS(17)/2941 350 660 DDC 36 x 60 4.1 7.7 203 112 ALS(17)/2941 350 660 DDC 36 x 63 4.8 8.8 110 4.5 x 12(12)/214 350 1500 K2L 51 x 68 5.8 9.9 94 66 ALS(17)/124 350 1500 K2L 51 x 68 5.8 9.9 94 66 ALS(17)/124 350 1500 K2L 51 x 68 5.8 9.9 94 66 ALS(17)/124 350 1500 K2L 51 x 131 10.4 157 52 34 ALS(17)/124 350 1500	VDO	Rated Capacitance	Circ Oada	Case Size	Ripple Current		ESR Maximum	Impedance Maximum			
Jone Dot Disk vass Si	VDC	-	Size Code		120 Ц~	100.11-	100.11-	20 611-			Part Number
350 470 932 35.8 5.7 291 187 ALSC(1)2471 350 566 D3C 35 x 80 3.8 7.2 245 158 ALSC(1)2161 350 680 D3C 35 x 80 4.1 7.7 203 112 ALSC(1)2161 350 1000 D3L 36 x 33 5.2 9.3 141 92 ALSC(1)217 350 1100 K2L 51 x 68 5.3 8.9 110 75 ALSC(1)217 350 1100 K2L 51 x 68 5.3 8.9 110 75 ALSC(1)217 350 1100 K3L 51 x 13 8.1 12 x 5 75 50 ALSC(1)217 350 5000 MAA 77 x 115 10.8 153 36 93 ALSC(1)217 350 5000 MAA 77 x 115 10.8 153 49 ALSC(1)217 350 100000 Q5R 99 x 150 <				D x L (mm)				-			
350 560 032 35 x 80 38 72 245 158 ALSXI/2611 350 660 036 35 x 80 4.1 77 203 132 ALSXI/2611 350 1000 031 35 x 93 4.8 8.8 170 110 ALSXI/2611 350 1000 031 35 x 93 4.8 8.8 170 110 ALSXI/2711 350 1000 K21 51 x 68 5.8 8.9 199 66 ALSXI/2711 350 1500 K31 51 x 51 10.4 167 52 44 ALSXI/2711 350 3500 K5C 51 x 131 10.4 167 22.6 23 ALSXI/2712 350 3500 K5C 51 x 131 10.4 167 23.6 23 ALSXI/2712 350 5600 MAC 77 x 131 18.2 23.6 23.8 21 ALSXI/2712 350 6600									ALS3(1)(2)391D2C350		
350 680 D3C 35 x 83 44 8 8 770 110 ALSX(1)/261 350 1000 03L 35 x 93 5.2 9.3 141 92 ALSX(1)/212 350 11000 K2L 51 x 68 5.5 8.3 116 75 ALSX(1)/212 350 11000 K2L 51 x 68 5.8 8.9 99 66 ALSX(1)/212 350 11000 K3L 51 x 93 8.2 12.5 78 50 ALSX(1)/212 380 2000 K3C 51 x 131 10.4 16.7 52 34 ALSX(1)/212 380 3000 K5C 77 x 115 11.8 2.7 39 21 ALSX(1)/212 380 5000 NAA 77 x 115 14.2 2.7 39 21 ALSX(1)/212 380 10000 058 90 x 150 2.5 3.5 18 13 ALSX(1)/212 380 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>ALS3(1)(2)471D3C350</td></td<>									ALS3(1)(2)471D3C350		
350 320 DBL 36 × 3 4.8 8.8 170 110 ALS3(0)2102 350 1000 K2L 51 × 68 5.5 8.9 116 75 ALS3(0)2102 350 1500 K2L 51 × 68 5.5 8.9 116 75 ALS3(0)2102 350 1500 K3L 51 × 73 7.7 12.5 78 50 ALS3(0)2102 350 2200 K3L 51 × 73 7.7 12.5 78 50 ALS3(0)2102 350 3200 K3C 51 × 131 10.4 16.7 52 34 ALS3(0)2102 350 3200 K3C 51 × 131 10.4 16.7 52 34 ALS3(0)2102 350 1500 1000 K3C 77 × 113 18.4 23.6 24 14 13 14.33(0)2162 350 15000 07.7 160 12.5 35.5 35 12.7 ALS3(0)21733									ALS3(1)(2)561D3C350		
350 1000 DB. 36 × 3 5.2 9.3 111 9.2 ALS3(12)122 350 1500 K2L 51 × 68 5.5 8.9 99 66 ALS3(12)122 350 1500 K3L 51 × 68 5.5 8.9 99 66 ALS3(12)132 350 2200 K3L 51 × 68 7.7 12.5 67 44 ALS3(12)132 350 2200 K3C 51 × 131 11.1 16.8 45 30 ALS3(12)322 350 3000 LJA 63 × 115 10.8 15.3 38 22 1.4 K33(12)322 350 5000 NJA 77 × 131 18.2 2.3 5 2.4 18 ALS3(12)323 350 10000 QSR 90 × 150 2.5 9 32.4 18 12 4.3 K3(12)123 350 10000 QSR 90 × 150 2.5 9 32.4 18 12 4.3 K3(12)121 350 1											
350 1200 K2L 51 x 68 5.5 8.9 116 75 ALS210/2152 350 1800 K2L 51 x 68 5.8 8.9 99 66 ALS210/2152 350 2200 K3L 51 x 33 7.7 12.5 78 50 ALS210/2152 350 2200 K3L 51 x 31 10.4 16.7 52 34 ALS210/2132 350 3000 LJA 63 x 113 10.8 15.3 38 25 ALS210/2132 350 3000 LJA 67.7 x 131 18.2 23.6 28 21 ALS310/2132 350 6000 NSC 77 x 131 18.2 23.6 28 11 ALS310/2132 350 10000 QSR 90 x 160 23.5 33.5 18 13 ALS310/2132 350 10000 QSR 90 x 160 23.6 9 29 4.453(112) 350 10000 QSR									ALS3(1)(2)102D3L350		
350 1500 K2L 51 × 88 5.8 8.9 99 66 ALS3(0)2182 350 12000 K3L 51 × 93 8.2 12.5 67 44 ALS3(0)2182 350 2200 K3C 51 × 131 11.1 16.8 45 30 ALS3(0)2182 350 3300 K5C 51 × 131 11.1 16.8 45 30 ALS3(0)2182 350 5600 NJA 77 × 113 18.4 22.7 30 21 ALS3(0)2182 350 6600 NSC 77 × 130 19.9 25.5 24 18 ALS3(0)2182 350 12000 058 90 × 150 25.9 32.4 16 12 ALS3(0)2183 350 12000 058 90 × 150 2.6 5.4 351 2.7 ALS3(0)2183 350 12000 071 90 × 150 2.6 5.4 351 2.7 ALS3(0)2183 350 15000									ALS3(1)(2)122K2L350		
350 2200 K3C 51 x 131 10.4 16.7 52 34 ALS3(1)2222 350 3300 KSC 51 x 131 11.1 16.8 45 30 ALS3(1)2223 350 3900 LJA 65.5 x 15 10.8 15.3 38 25 ALS3(1)2323 350 6600 NJA 77 x 15 16.4 22.7 30 21 ALS3(1)21822 350 6600 NSC 77 x 150 19.9 25.5 24 18 ALS3(1)21822 350 10000 Q5R 90 x 150 25.9 32.4 16 12 ALS3(1)21823 350 10000 Q7L 90 x 150 25.5 2.5 2.4 16 12 ALS3(1)(2183) 400 390 D3C 36 x 80 3.5 6.9 295 174 ALS3(1)(2183) 400 390 D3C 36 x 80 3.6 7 12 9 ALS3(1)(2181) 400									ALS3(1)(2)152K2L350		
350 2700 KSC 51 x 131 10.4 16.7 52 34 ALS3(1)[2]22 350 3900 LJA 63.5 x 115 10.8 15.3 38 25 ALS3(1)[2]22 350 5600 NJA 77 x 115 16.4 22.7 39 21 ALS3(1)[2]22 350 6600 NSC 77 x 115 18.2 23.6 28 21 ALS3(1)[2]22 350 10000 QSR 91 x 150 25.5 34.5 18 13 ALS3(1)[2]23 350 10000 QSR 91 x 150 25.5 34.5 18 13 ALS3(1)[2]33 400 350 15000 Q7. 91 x 150 25.4 16 12 ALS3(1)[2]341 400 360 D2C 36 x 55 2.6 5.4 351 207 ALS3(1)[2]341 400 470 D3C 36 x 80 3.6 7.5 246 14.6 ALS3(1)[2]241 400	350	1800	K3L	51 x 93	7.7	12.5	78	50	ALS3(1)(2)182K3L350		
350 3300 K5C 51 x131 11.1 16.8 45 30 ALSX1/12392 350 5600 NJA 77 x115 16.4 22.7 30 21 ALSX1/12392 350 6600 NJA 77 x155 16.4 22.7 30 21 ALSX1/12492 350 6600 NSC 77 x150 19.9 25.5 24 18 ALSX1/12192 350 10000 QSR 90 x150 25.5 33.5 18 13 ALSX1/12193 350 15000 QVR 90 x150 25.5 32.4 16 12 ALSX1/12193 400 330 DZC 36 x80 3.6 7.5 246 146 ALSX1/12193 400 300 DZC 36 x80 3.6 7.5 246 146 ALSX1/12194 400 500 DZC 36 x80 3.6 7.5 246 146 ALSX1/12194 400 500				51 x 93	8.2	12.5			ALS3(1)(2)222K3L350		
350 3900 LJA 63.5 × 115 10.8 15.3 38 25 ALS3(1)(2)52 350 56000 NSC 77 × 13 18.2 23.6 28 21 ALS3(1)(2)52 350 6600 NSC 77 × 13 18.2 23.6 28 21 ALS3(1)(2)52 350 12000 QSR 90 × 150 25.5 33.5 18 13 ALS3(1)(2)133 350 12000 QSR 90 × 150 25.5 32.4 16 12 ALS3(1)(2)133 350 15000 Q7L 90 × 150 25.6 5.4 351 10 ALS3(1)(2)133 400 330 D2C 36 × 80 3.6 7.5 246 146 ALS1(1)(2)134 400 470 D3C 36 × 93 4.5 8.7 182 112 ALS3(1)(2)134 400 200 D2L 51 × 68 5.2 9.0 132 84 ALS3(1)(2)124 400									ALS3(1)(2)272K5C350		
350 5600 NJA 77 x115 16.4 22.7 30 21 ALS3(1)[2562] 350 6600 NSC 77 x131 18.2 23.6 28 21 ALS3(1)[2562] 350 10000 OSR 99 x150 25.5 33.5 18 13 ALS3(1)[2133] 350 12000 OSR 99 x150 25.5 33.5 18 13 ALS3(1)[2133] 350 12000 OSR 99 x150 25.6 5.4 351 20.7 ALS3(1)[2133] 400 330 D2C 36 x55 2.6 5.4 351 20.7 ALS3(1)[2131] 400 470 D3C 35 x80 3.6 7.5 246 14.6 ALS1(1)[2131] 400 660 D31 35 x93 4.5 8.7 182 112 ALS3(1)[2131] 400 1000 K21 51 x 68 5.6 9.1 113 74 ALS3(1)[2124] 400									ALS3(1)(2)332K5C350		
350 6600 NSC 77 x131 18.2 23.6 28 21 ALS3(1)(2)(2) 350 16000 QSR 90 x150 25.5 33.5 18 13 ALS3(1)(2)(2) 350 12000 QSR 90 x150 25.5 33.5 18 13 ALS3(1)(2)(1)(2) 350 15000 QVL 90 x194 32.4 41.2 13 10 ALS3(1)(2)(1)(2) 400 330 D2C 36 x56 2.6 5.4 351 100 ALS3(1)(2)(3)(1) 400 330 D3C 36 x60 3.6 7.5 246 146 ALS3(1)(2)(3)(1) 400 470 D3C 36 x93 4.5 8.7 182 112 ALS3(1)(2)(2)(1) 400 660 D31 36 x93 4.5 8.7 182 4LS3(1)(2)(1)(2)(1) 400 1200 K21 51 x68 5.2 9.0 132 64 ALS3(1)(1)(1)(2)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)									ALS3(1)(2)392LJA350		
350 8200 MSR 77 x 150 19.9 25.5 24 18 ALS3(1)(2):03 350 10000 QSR 90 x 150 25.5 33.5 18 13 ALS3(1)(2):03 350 15000 QSR 90 x 150 25.9 32.4 16 12 ALS3(1)(2):13 400 330 D2C 38 x 55 2.6 5.4 351 20 ALS3(1)(2):13 400 330 D2C 38 x 50 3.2 6.9 295 17.4 ALS3(1)(2):14 400 470 D3C 38 x 80 3.9 8.0 208 12.3 ALS3(1)(2):51 400 660 D3L 38 x 93 4.9 9.2 152 94 ALS3(1)(2):51 400 1000 K2L 51 x 68 5.6 9.1 113 74 ALS3(1)(2):21 400 1200 K3L 51 x 93 7.8 12.5 76 50 ALS3(1)(2):22 400									ALS3(1)(2)562NJA350		
350 10000 0GR 90 x 150 25.5 33.5 18 13 ALS3(1)(2)133 350 15000 071 90 x 194 32.4 41.2 13 10 ALS3(1)(2)133 400 330 D2C 36 x 55 2.6 5.4 351 207 ALS3(1)(2)131 400 330 D3C 36 x 80 3.3 6.9 295 174 ALS3(1)(2)311 400 560 D3C 36 x 80 3.9 8.0 206 123 ALS3(1)(2)311 400 560 D3C 36 x 80 3.9 8.0 208 123 ALS3(1)(2)311 400 820 D31 36 x 93 4.5 8.7 182 112 ALS3(1)(2)124 400 1200 K2L 51 x 68 5.6 9.1 113 74 ALS3(1)(2)124 400 1200 K3L 51 x 93 7.3 12.4 89 57 ALS3(1)(2)172 400 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>											
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $											
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$											
350 18000 08L 90.220 38.5 47.6 12 9 ALS3(1)(2)313 400 330 D2C 36.85 2.6 5.4 351 207 ALS3(1)(2)314 400 370 D3C 36.80 3.5 6.9 295 174 ALS3(1)(2)471 400 470 D3C 36.80 3.6 7.5 246 146 ALS3(1)(2)561 400 660 D3L 36.83 4.5 8.7 182 112 ALS3(1)(2)561 400 680 D3L 36.83 4.9 9.2 152 94 ALS3(1)(2)162 400 1200 K2L 51.66 5.1 113 74 ALS3(1)(2)124 400 1200 K3L 51.833 7.8 12.5 76 50 ALS3(1)(2)124 400 2700 L3L 63.5 x 13 13.2 21.1 40 26 ALS3(1)(2)124 400 3000 LAC									ALS3(1)(2)153Q7L350		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$									ALS3(1)(2)183Q8L350		
	400	330	D2C	36 x 55	2.6	5.4	351	207	ALS3(1)(2)331D2C400		
400 560 D3C 3 5 x 80 3.9 8.0 208 123 ALS3(1)(2)681 400 680 D3L 36 x 93 4.5 8.7 182 112 ALS3(1)(2)881 400 1000 K2L 51 x 68 5.2 9.0 132 84 ALS3(1)(2)821 400 1200 K2L 51 x 68 5.2 9.0 132 84 ALS3(1)(2)122 400 1500 K3L 51 x 93 7.3 12.4 89 57 ALS3(1)(2)122 400 1500 K3L 51 x 93 7.3 12.4 89 57 ALS3(1)(2)122 400 2200 K5C 51 x 131 9.8 16.4 59 37 ALS3(1)(2)222 400 3900 L5C 63.5 x 131 14.6 22.1 37 25 ALS3(1)(2)422 400 3900 L5C 63.5 x 131 17.6 23.7 30 21 ALS3(1)(2)422 400	400	390	D3C	36 x 80				174	ALS3(1)(2)391D3C400		
400 680 D3L 36 x 93 4.5 8.7 182 112 ALS3(1)(2)621 400 820 D3L 36 x 93 4.9 9.2 152 94 ALS3(1)(2)821 400 1000 K2L 51 x 68 5.6 9.0 132 84 ALS3(1)(2)122 400 1200 K2L 51 x 68 5.6 9.1 113 74 ALS3(1)(2)122 400 1800 K3L 51 x 93 7.8 12.5 76 50 ALS3(1)(2)122 400 2200 K5C 51 x 131 9.8 16.4 59 37 ALS3(1)(2)22 400 3300 LJA 63.5 x 131 14.6 22.1 37 25 ALS3(1)(2)32 400 4700 NJA 77 x 115 15.9 22.7 32 21 ALS3(1)(2)42 400 6600 N5C 77 x 131 17.6 23.7 30 21 ALS3(1)(2)62 400									ALS3(1)(2)471D3C400		
400 820 D3L 36 x 93 4.9 9.2 152 94 ALS3(1)(2)821 400 1000 K2L 51 x 66 5.2 9.0 132 84 ALS3(1)(2)102 400 1500 K3L 51 x 66 5.6 9.1 113 74 ALS3(1)(2)102 400 1500 K3L 51 x 93 7.3 12.4 89 57 ALS3(1)(2)122 400 2200 K5C 51 x 131 9.8 16.4 59 37 ALS3(1)(2)222 400 3300 LJA 63 5 x 93 11.3 18.3 49 31 ALS3(1)(2)222 400 3000 LSC 63 5 x 13 14.6 22.1 37 25 ALS3(1)(2)322 400 3000 LSC 63 5 x 13 14.6 22.1 37 30 21 ALS3(1)(2)322 400 5600 NSC 77 x 131 17.6 23.7 30 21 ALS3(1)(2)522									ALS3(1)(2)561D3C400		
400 1000 K2L 51 x 68 5.2 9.0 132 84 ALS3(1)(2)102 400 1200 K2L 51 x 68 5.6 9.1 113 74 ALS3(1)(2)122 400 1800 K3L 51 x 93 7.8 12.5 76 50 ALS3(1)(2)122 400 2200 K5C 51 x 131 9.8 16.4 59 37 ALS3(1)(2)227 400 2200 L3L 63.5 x 131 18.3 49 31 ALS3(1)(2)227 400 3300 LJA 63.5 x 115 13.2 2.1.1 40 26 ALS3(1)(2)247 400 3300 LJA 63.5 x 115 13.2 2.7.3 32 21 ALS3(1)(2)427 400 5600 N5C 77 x 131 17.6 23.7 30 21 ALS3(1)(2)427 400 6800 N5R 77 x 150 19.3 25.6 25 18 ALS3(1)(2)4271 400 10000<									ALS3(1)(2)681D3L400		
400 1200 K2L 51 x 68 5.6 9.1 113 74 ALS3(1)(2)122 400 1500 K3L 51 x 93 7.3 12.4 89 57 ALS3(1)(2)122 400 2200 K5C 51 x 131 9.8 16.4 59 37 ALS3(1)(2)122 400 2200 L3L 63.5 x 93 11.3 18.3 49 31 ALS3(1)(2)222 400 3300 LJA 63.5 x 115 13.2 21.1 40 26 ALS3(1)(2)322 400 3900 LSC 65.5 x 113 14.6 22.1 37 25 ALS3(1)(2)472 400 5600 NSC 77 x 131 17.6 23.7 30 21 ALS3(1)(2)622 400 6800 NSR 77 x 150 19.3 25.6 25 18 ALS3(1)(2)622 400 10000 QSR 90 x 150 26.5 35.6 16 11 ALS3(1)(2)133 450 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ALS3(1)(2)821D3L400</td>									ALS3(1)(2)821D3L400		
400 1500 K3L 51 x 93 7.3 12.4 89 57 ALS3(1)(2)152 400 1800 K3L 51 x 93 7.8 12.5 76 50 ALS3(1)(2)152 400 2200 K5C 51 x 131 9.8 16.4 59 37 ALS3(1)(2)222 400 2700 L3L 63.5 x 93 11.3 18.3 49 31 ALS3(1)(2)222 400 3300 LJA 63.5 x 115 13.2 21.1 40 26 ALS3(1)(2)222 400 4700 NJA 77 x 115 15.9 22.7 32 21 ALS3(1)(2)62 400 6600 N5C 77 x 131 17.6 23.7 30 21 ALS3(1)(2)62 400 6800 N5R 77 x 150 19.3 25.6 25 18 ALS3(1)(2)62 400 12000 Q7L 90 x 150 25.5 5.4 383 215 ALS3(1)(2)133 450									ALS3(1)(2)102K2L400		
400 1800 K3L 51 x 131 7.8 12.5 7.6 50 ALS3(1)(2)222 400 2200 K5C 51 x 131 9.8 16.4 59 37 ALS3(1)(2)222 400 3300 LJA 63.5 x 115 13.2 21.1 40 2.6 ALS3(1)(2)222 400 3300 LJA 63.5 x 115 13.2 21.1 40 2.6 ALS3(1)(2)322 400 3900 L5C 63.5 x 131 14.6 22.1 37 25 ALS3(1)(2)472 400 5600 NSC 77 x 131 17.6 23.7 30 21 ALS3(1)(2)622 400 6600 NSC 77 x 131 17.6 23.7 30 21 ALS3(1)(2)622 400 10000 QSR 90 x 150 25.6 36.3 18 12 ALS3(1)(2)622 400 10000 QSR 90 x 150 25.5 5.4 383 215 ALS3(1)(2)271 <											
400 2200 K5C 51 x 131 9.8 16.4 59 37 ALS3(1)(2)222 400 2700 L3L 63.5 x 135 11.3 18.3 49 31 ALS3(1)(2)222 400 3300 LJA 63.5 x 131 14.6 22.1 37 25 ALS3(1)(2)232 400 4700 NJA 77 x 115 15.9 22.7 32 21 ALS3(1)(2)242 400 6800 N5C 77 x 13 17.6 23.7 30 21 ALS3(1)(2)242 400 6800 N5R 77 x 150 19.3 25.6 25 18 ALS3(1)(2)242 400 8200 Q5R 90 x 150 26.5 35.6 16 11 ALS3(1)(2)233 400 12000 Q7L 90 x 194 30.9 40.7 14 10 ALS3(1)(2)2134 450 330 D3C 36 x 80 3.7 7.9 21 125 ALS3(1)(2)134 450 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>											
400 2700 L3L 63.5 x 93 11.3 18.3 49 31 ALS3(1)(2)272 400 3300 LJA 63.5 x 115 13.2 21.1 40 26 ALS3(1)(2)322 400 3900 L5C 63.5 x 131 14.6 22.1 37 25 ALS3(1)(2)4721 400 5600 N5C 77 x 131 17.6 23.7 30 21 ALS3(1)(2)4721 400 6600 NSR 77 x 150 19.3 25.6 25 18 ALS3(1)(2)222 400 10000 QSR 90 x 150 25.6 36.3 18 12 ALS3(1)(2)232 400 10000 QSR 90 x 150 26.5 35.6 16 11 ALS3(1)(2)233 400 12000 Q7L 90 x 140 30.9 40.7 14 10 ALS3(1)(2)331 450 270 D2C 36 x 55 2.5 5.4 383 215 ALS3(1)(2)231 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>ALS3(1)(2)222K5C400</td></td<>									ALS3(1)(2)222K5C400		
400 3300 LJA 63.5 x 115 13.2 21.1 40 26 ALS3(1)(2)322 400 3900 L5C 63.5 x 131 14.6 22.1 37 25 ALS3(1)(2)322 400 4700 NJA 77 x 115 15.9 22.7 32 21 ALS3(1)(2)622 400 6800 NSC 77 x 150 19.3 25.6 25 18 ALS3(1)(2)622 400 8200 Q5R 90 x 150 26.5 35.6 16 11 ALS3(1)(2)822 400 10000 Q5R 90 x 150 26.5 35.6 16 11 ALS3(1)(2)133 400 12000 Q7L 90 x 194 30.9 40.7 14 10 ALS3(1)(2)331 450 270 D2C 36 x 55 2.5 5.4 383 215 ALS3(1)(2)313 450 390 D3C 36 x 80 3.4 7.4 265 149 ALS3(1)(2)311 450 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ALS3(1)(2)272L3L400</td>									ALS3(1)(2)272L3L400		
400 4700 NJA 77 x 115 15.9 22.7 32 21 ALS3(1)(2)4721 400 5600 N5C 77 x 131 17.6 23.7 30 21 ALS3(1)(2)622 400 6800 N5R 77 x 150 19.3 25.6 25 18 ALS3(1)(2)622 400 10000 Q5R 90 x 150 25.6 35.6 16 11 ALS3(1)(2)822 400 10000 Q5R 90 x 150 26.5 35.6 16 11 ALS3(1)(2)822 400 12000 Q7L 90 x 194 30.9 40.7 14 10 ALS3(1)(2)133 450 270 D2C 36 x 55 2.5 5.4 383 215 ALS3(1)(2)311 450 330 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)311 450 470 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)471 450	400	3300				21.1	40	26	ALS3(1)(2)332LJA400		
400 5600 N5C 77 x 131 17.6 23.7 30 21 ALS3(1)(2)5621 400 6800 N5R 77 x 150 19.3 25.6 25 18 ALS3(1)(2)6521 400 8200 Q5R 90 x 150 25.6 36.3 18 12 ALS3(1)(2)621 400 10000 Q5R 90 x 150 26.5 35.6 16 11 ALS3(1)(2)123 400 15000 Q8L 90 x 220 37.4 47.7 12 9 ALS3(1)(2)133 450 270 D2C 36 x 55 2.5 5.4 383 215 ALS3(1)(2)1133 450 330 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)311 450 470 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)311 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)611 450	400	3900	L5C	63.5 x 131	14.6	22.1	37	25	ALS3(1)(2)392L5C400		
400 6800 N5R 77 x 150 19.3 25.6 25 18 ALS3(1)(2)6821 400 8200 Q5R 90 x 150 25.6 36.3 18 12 ALS3(1)(2)822 400 10000 Q5R 90 x 150 26.5 35.6 16 11 ALS3(1)(2)123 400 12000 Q7L 90 x 150 26.5 35.6 16 11 ALS3(1)(2)133 400 15000 Q8L 90 x 220 37.4 47.7 12 9 ALS3(1)(2)311 450 330 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)311 450 330 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)471 450 470 D3C 36 x 93 4.6 9.2 163 96 ALS3(1)(2)611 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)811 450	400	4700	NJA	77 x 115	15.9				ALS3(1)(2)472NJA400		
400 8200 Q5R 90 x 150 25.6 36.3 18 12 ALS3(1)(2)8224 400 10000 Q5R 90 x 150 26.5 35.6 16 11 ALS3(1)(2)133 400 12000 Q7L 90 x 194 30.9 40.7 14 10 ALS3(1)(2)133 400 15000 Q8L 90 x 220 37.4 47.7 12 9 ALS3(1)(2)271 450 270 D2C 36 x 55 2.5 5.4 383 215 ALS3(1)(2)271 450 330 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)471 450 390 D3C 36 x 80 3.4 7.4 265 149 ALS3(1)(2)471 450 470 D3C 36 x 93 4.2 8.6 196 115 ALS3(1)(2)471 450 560 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)5811 450									ALS3(1)(2)562N5C400		
400 10000 Q5R 90 x 150 26.5 35.6 16 11 ALS3(1)(2)103(2) 400 12000 Q7L 90 x 194 30.9 40.7 14 10 ALS3(1)(2)123(2) 400 15000 Q8L 90 x 220 37.4 47.7 12 9 ALS3(1)(2)153(2) 450 270 D2C 36 x 55 2.5 5.4 383 215 ALS3(1)(2)311 450 330 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)311 450 390 D3C 36 x 80 3.4 7.4 265 149 ALS3(1)(2)4711 450 470 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)4711 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)4711 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)2121 450 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ALS3(1)(2)682N5R400</td>									ALS3(1)(2)682N5R400		
400 12000 Q7L 90 x 194 30.9 40.7 14 10 ALS3(1)(2)123(2)123(2)123(2)123(2)123(2)15(2)123(2)123(2)15(2)123(2)123(2)12)15(2)15(2)123(2)12)15(2)15(2)12)15(2)15(2)15(2)12)15(2)15(ALS3(1)(2)822Q5R400		
400 15000 Q8L 90 x 220 37.4 47.7 12 9 ALS3(1)(2)153 450 270 D2C 36 x 55 2.5 5.4 383 215 ALS3(1)(2)2711 450 330 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)371 450 390 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)371 450 470 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)471 450 560 D3L 36 x 93 4.2 8.6 196 115 ALS3(1)(2)471 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)611 450 820 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)122 450 1000 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)122 450 100									ALS3(1)(2)103Q5R400		
450 270 D2C 36 x 55 2.5 5.4 383 215 ALS3(1)(2)2710 450 330 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)311 450 390 D3C 36 x 80 3.4 7.4 265 149 ALS3(1)(2)391 450 470 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)4711 450 560 D3L 36 x 93 4.2 8.6 196 115 ALS3(1)(2)611 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)611 450 820 K2L 51 x 68 5.0 9.0 142 86 ALS3(1)(2)122 450 1000 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)122 450 1500 KJA 51 x 13 9.3 16.3 63 38 ALS3(1)(2)122 450 1800											
450 330 D3C 36 x 80 3.2 6.9 312 175 ALS3(1)(2)3310 450 390 D3C 36 x 80 3.4 7.4 265 149 ALS3(1)(2)3910 450 470 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)4710 450 560 D3L 36 x 93 4.2 8.6 196 115 ALS3(1)(2)5611 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)6811 450 820 K2L 51 x 68 5.0 9.0 142 86 ALS3(1)(2)821 450 1000 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)122 450 1000 K3L 51 x 93 6.9 12.3 94 56 ALS3(1)(2)1521 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)222 450 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>ALS3(1)(2)153Q8L400 ALS3(1)(2)271D2C450</td></td<>									ALS3(1)(2)153Q8L400 ALS3(1)(2)271D2C450		
450 390 D3C 36 x 80 3.4 7.4 265 149 ALS3(1)(2)3910 450 470 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)4710 450 560 D3L 36 x 93 4.2 8.6 196 115 ALS3(1)(2)5611 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)6811 450 820 K2L 51 x 68 5.0 9.0 142 86 ALS3(1)(2)8211 450 1000 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)1221 450 1000 K2L 51 x 93 6.9 12.3 94 56 ALS3(1)(2)1521 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1521 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)222 450									ALS3(1)(2)331D3C450		
450 470 D3C 36 x 80 3.7 7.9 221 125 ALS3(1)(2)4710 450 560 D3L 36 x 93 4.2 8.6 196 115 ALS3(1)(2)5611 450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)6811 450 820 K2L 51 x 68 5.0 9.0 142 86 ALS3(1)(2)8211 450 1000 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)1221 450 1200 K3L 51 x 93 6.9 12.3 94 56 ALS3(1)(2)1521 450 1500 KJA 51 x 115 8.1 14.5 75 445 ALS3(1)(2)1521 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)222 450 2200 L3L 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450									ALS3(1)(2)391D3C450		
450 680 D3L 36 x 93 4.6 9.2 163 96 ALS3(1)(2)6811 450 820 K2L 51 x 68 5.0 9.0 142 86 ALS3(1)(2)8211 450 1000 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)1221 450 1200 K3L 51 x 93 6.9 12.3 94 56 ALS3(1)(2)1221 450 1500 KJA 51 x 115 8.1 14.5 75 45 ALS3(1)(2)1221 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1221 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1222 450 2200 L3L 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450 2700 LJA 63.5 x 115 12.5 21.1 43 26 ALS3(1)(2)3221 450			D3C	36 x 80	3.7	7.9			ALS3(1)(2)471D3C450		
450 820 K2L 51 x 68 5.0 9.0 142 86 ALS3(1)(2)8211 450 1000 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)1021 450 1200 K3L 51 x 93 6.9 12.3 94 56 ALS3(1)(2)1221 450 1500 KJA 51 x 115 8.1 14.5 75 45 ALS3(1)(2)1221 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1221 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1824 450 2200 L3L 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450 2700 LJA 63.5 x 115 12.5 21.1 43 26 ALS3(1)(2)3224 450 3300 L5C 63.5 x 131 14.6 24.1 36 22 ALS3(1)(2)3324 450<									ALS3(1)(2)561D3L450		
450 1000 K2L 51 x 68 5.3 9.1 120 75 ALS3(1)(2)1021 450 1200 K3L 51 x 93 6.9 12.3 94 56 ALS3(1)(2)1221 450 1500 KJA 51 x 115 8.1 14.5 75 45 ALS3(1)(2)1524 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1524 450 2200 L3L 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450 2700 LJA 63.5 x 115 12.5 21.1 43 26 ALS3(1)(2)272 450 3300 L5C 63.5 x 131 14.6 24.1 36 22 ALS3(1)(2)322 450 3900 NJA 77 x 115 15.3 22.7 33 22 ALS3(1)(2)322 450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)4724 450									ALS3(1)(2)681D3L450		
450 1200 K3L 51 x 93 6.9 12.3 94 56 ALS3(1)(2)1221 450 1500 KJA 51 x 115 8.1 14.5 75 45 ALS3(1)(2)1221 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1221 450 2200 L3L 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450 2700 LJA 63.5 x 115 12.5 21.1 43 26 ALS3(1)(2)272 450 3300 L5C 63.5 x 131 14.6 24.1 36 22 ALS3(1)(2)322 450 3900 NJA 77 x 115 15.3 22.7 33 22 ALS3(1)(2)322 450 3900 NJA 77 x 115 18.0 26.5 28 18 ALS3(1)(2)322 450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)4724 45									ALS3(1)(2)821K2L450		
450 1500 KJA 51 x 115 8.1 14.5 75 45 ALS3(1)(2)1524 450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1524 450 2200 L3L 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450 2700 LJA 63.5 x 115 12.5 21.1 43 26 ALS3(1)(2)222 450 3300 L5C 63.5 x 131 14.6 24.1 36 22 ALS3(1)(2)322 450 3900 NJA 77 x 115 15.3 22.7 33 22 ALS3(1)(2)322 450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)4721 450 5600 N5R 77 x 150 19.7 28.4 24 16 ALS3(1)(2)5621									ALS3(1)(2)102K2L450		
450 1800 K5C 51 x 131 9.3 16.3 63 38 ALS3(1)(2)1824 450 2200 L3L 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450 2700 LJA 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450 3700 LJA 63.5 x 115 12.5 21.1 43 26 ALS3(1)(2)272 450 3300 L5C 63.5 x 131 14.6 24.1 36 22 ALS3(1)(2)322 450 3900 NJA 77 x 115 15.3 22.7 33 22 ALS3(1)(2)3921 450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)4721 450 5600 N5R 77 x 150 19.7 28.4 24 16 ALS3(1)(2)5621									ALS3(1)(2)122K3L450		
450 2200 L3L 63.5 x 93 10.7 18.3 53 32 ALS3(1)(2)222 450 2700 LJA 63.5 x 115 12.5 21.1 43 26 ALS3(1)(2)222 450 3300 L5C 63.5 x 131 14.6 24.1 36 22 ALS3(1)(2)322 450 3900 NJA 77 x 115 15.3 22.7 33 22 ALS3(1)(2)3921 450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)4721 450 5600 N5R 77 x 150 19.7 28.4 24 16 ALS3(1)(2)5621									ALS3(1)(2)152KJA450 ALS3(1)(2)182K5C450		
450 2700 LJA 63.5 x 115 12.5 21.1 43 26 ALS3(1)(2)2721 450 3300 L5C 63.5 x 131 14.6 24.1 36 22 ALS3(1)(2)322 450 3900 NJA 77 x 115 15.3 22.7 33 22 ALS3(1)(2)322 450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)4721 450 5600 N5R 77 x 150 19.7 28.4 24 16 ALS3(1)(2)5621									ALS3(1)(2)182K3C430 ALS3(1)(2)222L3L450		
450 3300 L5C 63.5 x 131 14.6 24.1 36 22 ALS3(1)(2)322 450 3900 NJA 77 x 115 15.3 22.7 33 22 ALS3(1)(2)392 450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)472 450 5600 N5R 77 x 150 19.7 28.4 24 16 ALS3(1)(2)562									ALS3(1)(2)272LJA450		
450 3900 NJA 77 x 115 15.3 22.7 33 22 ALS3(1)(2)3921 450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)4721 450 5600 N5R 77 x 150 19.7 28.4 24 16 ALS3(1)(2)5621									ALS3(1)(2)332L5C450		
450 4700 N5C 77 x 131 18.0 26.5 28 18 ALS3(1)(2)4721 450 5600 N5R 77 x 150 19.7 28.4 24 16 ALS3(1)(2)5621									ALS3(1)(2)392NJA450		
Pated .						26.5			ALS3(1)(2)472N5C450		
	450	5600	N5R	77 x 150	19.7	28.4	24	16	ALS3(1)(2)562N5R450		
VDC Rated Size Code Case Size Ripple Current ESR Impedance Part Num	VDC	Rated Capacitance	Size Code	Case Size	Ripple	Current	ESR	Impedance	Part Number		

(1) Mounting Code: 2 = plain can, 3 = threaded mounting stud

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

@ KEMET Electronics Corporation \bullet KEMET Tower \bullet One East Broward Boulevard Fort Lauderdale, FL 33301 USA \bullet 954-766-2800 \bullet www.kemet.com



Table 1 – Ratings & Part Number Reference cont.

VDC	Rated Capacitance	Size Code	ze Code Case Size Ripple Current	Ripple Current		Case Size Ripple Current	Ripple Current		Impedance Maximum	Part Number
	120 Hz 25°C (μF)		D x L (mm)	120 Hz 85°C (A)	20 kHz 85°C (A)	120 Hz 25°C (mΩ)	20 kHz 25°C (mΩ)			
450	6800	Q5R	90 x 150	24.6	36.3	19	13	ALS3(1)(2)682Q5R450		
450	8200	Q5R	90 x 150	25.7	35.8	17	12	ALS3(1)(2)822Q5R450		
450	10000	Q7L	90 x 194	30.0	40.7	15	10	ALS3(1)(2)103Q7L450		
450	12000	Q8L	90 x 220	35.7	46.9	14	10	ALS3(1)(2)123Q8L450		
500	220	D2C	36 x 55	2.3	4.1	602	427	ALS3(1)(2)221D2C500		
500	270	D3C	36 x 80	2.9	5.3	489	347	ALS3(1)(2)271D3C500		
500	330	D3C	36 x 80	3.2	5.8	402	285	ALS3(1)(2)331D3C500		
500	390	D3C	36 x 80	3.5	6.2	341	243	ALS3(1)(2)391D3C500		
500	470	D3L	36 x 93	3.9	6.8	303	221	ALS3(1)(2)471D3L500		
500	560	D3L	36 x 93	4.3	7.3	256	187	ALS3(1)(2)561D3L500		
500	680	K2L	51 x 68	4.6	7.4	219	162	ALS3(1)(2)681K2L500		
500	820	K2L	51 x 68	4.9	7.7	186	138	ALS3(1)(2)821K2L500		
500	1000	K3L	51 x 93	6.4	10.3	146	107	ALS3(1)(2)102K3L500		
500	1200	KJA	51 x 115	7.2	11.0	142	109	ALS3(1)(2)122KJA500		
500	1500	K5C	51 x 131	8.4	12.7	114	88	ALS3(1)(2)152K5C500		
500	1800	L3L	63.5 x 93	9.9	15.3	83	61	ALS3(1)(2)182L3L500		
500	2200	LJA	63.5 x 115	11.6	17.8	68	51	ALS3(1)(2)222LJA500		
500	2700	L5C	63.5 x 131	13.2	19.3	65	50	ALS3(1)(2)272L5C500		
500	3300	NJA	77 x 115	14.2	19.7	56	44	ALS3(1)(2)332NJA500		
500	3900	N5C	77 x 131	16.9	23.5	42	32	ALS3(1)(2)392N5C500		
500	4700	N5R	77 x 150	18.5	25.3	35	27	ALS3(1)(2)472N5R500		
500	5600	Q5R	90 x 150	23.1	32.2	29	22	ALS3(1)(2)562Q5R500		
500	6800	Q5R	90 x 150	24.1	32.3	25	19	ALS3(1)(2)682Q5R500		
500	8200	Q7L	90 x 194	28.6	37.8	21	16	ALS3(1)(2)822Q7L500		
500	10000	Q8L	90 x 220	34.4	44.3	18	14	ALS3(1)(2)103Q8L500		
VDC	Rated Capacitance	Size Code	Case Size	Ripple	Current	ESR	Impedance	Part Number		

(1) Mounting Code: 2 = plain can, 3 = threaded mounting stud

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

8



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.

Vibration

10 - 55 Hz at 0.75 mm or 10 g for 3 x 2 hours duration, except 220 mm long cans 10 - 55 Hz at 0.35 mm or 5 g for 3 x 0.5 hours duration. Custom designs can be made in a 66 mm diameter (M6 deck), with a vibration capability of 20 g (10 - 56 Hz at 0.75 mm and 56 - 500 Hz 20 g for 3 x 0.5 hours duration)

Insulating Resistance

 \geq 100 M Ω at 100 VDC across insulating sleeve. UL recognized sleeving is available for custom parts in this range, upon request.

(UL No. E358957)

Voltage Proof

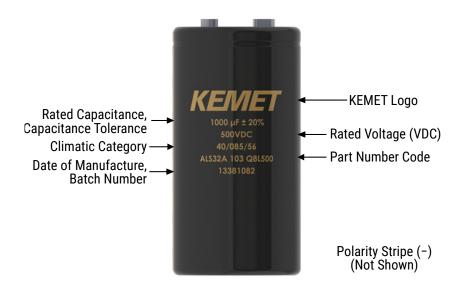
≥ 2,500 VDC across insulating sleeve

Safety Vent

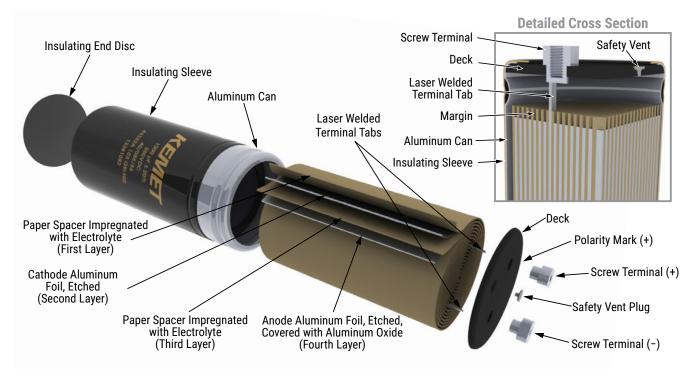
A safety vent for overpressure is featured on terminal deck. This is in the form of a rubber plug designed to relieve build-up of internal pressure due to overstress or catastrophic failure.



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

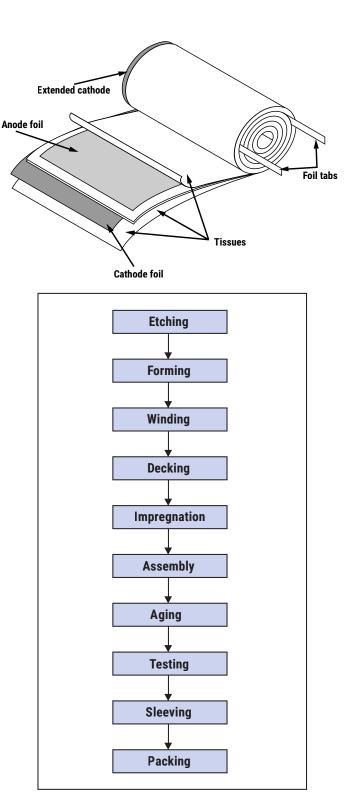
A sample from each batch is taken by the quality department after completion of the production process. This sample size is controlled by the use of recognized sampling tables defined in BS 6001.

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





KEMET Electronics Corporation Sales Offices

For a complete list of our global sales offices, please visit www.kemet.com/sales.

Disclaimer

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed. All Information given herein is believed to be accurate and reliable, but it is presented without guarantee, warranty, or responsibility of any kind, expressed or implied.

Statements of suitability for certain applications are based on KEMET Electronics Corporation's ("KEMET") knowledge of typical operating conditions for such applications, but are not intended to constitute – and KEMET specifically disclaims – any warranty concerning suitability for a specific customer application or use. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by KEMET with reference to the use of KEMET's products is given gratis, and KEMET assumes no obligation or liability for the advice given or results obtained.

Although KEMET designs and manufactures its 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 indicted or that other measures may not be required.

KEMET is a registered trademark of KEMET Electronics Corporation.