

# ALS40 Series 105°C

**RoHS**  
Compliant

- Compact Size
- Long Life, 9000 hours at 105°C (U<sub>R</sub>, I<sub>R</sub> applied)
- High ripple current
- Excellent surge voltage capability
- Optimized designs available on request

## APPLICATION

Smoothing, energy storage, or pulse operation in telecommunication demanding power supplies, process control, AC-motor control, traction, welding and measuring.

## BASIC DESIGN

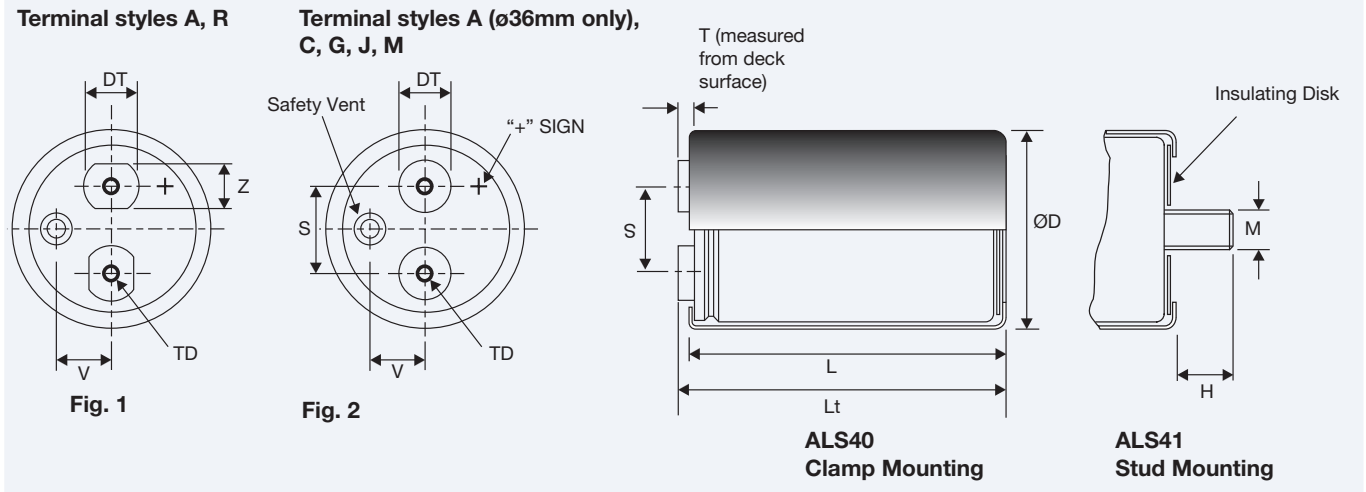
The ALS40/41 series of screw terminal capacitors feature the same high ripple currents and long life characteristics as the ALS30/31 series but can operate at higher temperatures. They are similarly suited for high reliability and long life applications

such as frequency converters, UPS systems and switch mode power supplies, but the extended temperature range allows increased ripple currents at lower temperatures.

## SPECIFICATION

<b>Standards</b>	IEC 60384-4 Long Life Grade 40/105/56,																	
<b>Capacitance range</b>	150 – 680000 µF																	
<b>Capacitance tolerance</b>	–20 to +20%																	
<b>Rated voltage U<sub>R</sub></b>	25–450 VDC																	
<b>Surge voltage U<sub>S</sub></b>	1.15 x U <sub>R</sub> (for U <sub>R</sub> ≤ 250 VDC) 1.10 x U <sub>R</sub> (for U <sub>R</sub> ≥ 350 VDC)	Test Condition: ≤ 30s surge, 1000 cycles @ 105°C																
<b>Surge voltage U<sub>SS</sub> (Short duration)</b>	<table border="1"> <thead> <tr> <th>U<sub>R</sub></th> <th>U<sub>SS</sub></th> </tr> </thead> <tbody> <tr><td>200</td><td>350</td></tr> <tr><td>250</td><td>400</td></tr> <tr><td>350</td><td>500</td></tr> <tr><td>400</td><td>520</td></tr> <tr><td>415</td><td>530</td></tr> <tr><td>450</td><td>550</td></tr> <tr><td>500</td><td>600</td></tr> </tbody> </table>	U <sub>R</sub>	U <sub>SS</sub>	200	350	250	400	350	500	400	520	415	530	450	550	500	600	Test Condition: ≤ 500ms surge, 100 cycles @ 20°C
U <sub>R</sub>	U <sub>SS</sub>																	
200	350																	
250	400																	
350	500																	
400	520																	
415	530																	
450	550																	
500	600																	
<b>Leakage current I<sub>L</sub></b>	= 0.003 x C <sub>R</sub> x U <sub>R</sub> (µA) or 6mA whichever is the smaller. Note, C <sub>R</sub> is in µF.	Test Condition: U <sub>R</sub> , 5mins., 20°C																
<b>Operational life time +105°C, U<sub>R</sub>, I<sub>R</sub></b>	<table border="1"> <thead> <tr> <th>Can Diameter</th> <th>Life (hrs)</th> </tr> </thead> <tbody> <tr><td>36</td><td>6000</td></tr> <tr><td>51</td><td>7000</td></tr> <tr><td>66</td><td>8000</td></tr> <tr><td>77, 90</td><td>9000</td></tr> </tbody> </table>	Can Diameter	Life (hrs)	36	6000	51	7000	66	8000	77, 90	9000	End of Life requirement:  ΔC/C ≤ ±10% ESR ≤ 2 x initial ESR value I <sub>L</sub> ≤ initial specified limit						
Can Diameter	Life (hrs)																	
36	6000																	
51	7000																	
66	8000																	
77, 90	9000																	
<b>+105°C, U<sub>R</sub></b>	<table border="1"> <thead> <tr> <th>Can Diameter</th> <th>Life (hrs)</th> </tr> </thead> <tbody> <tr><td>36</td><td>10000</td></tr> <tr><td>51</td><td>11000</td></tr> <tr><td>66</td><td>13000</td></tr> <tr><td>77, 90</td><td>15000</td></tr> </tbody> </table>	Can Diameter	Life (hrs)	36	10000	51	11000	66	13000	77, 90	15000							
Can Diameter	Life (hrs)																	
36	10000																	
51	11000																	
66	13000																	
77, 90	15000																	
<b>Shelf Life</b>	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C																	
<b>Temperature range</b>	–40 to +105°C (Operating) –55°C to +105°C (Storage)																	

**SPECIFICATION**



**Terminals options**  
 \* preferred options in bold

Term. Style	Thread	Height T - mm ±0.5	Dia. - DT mm ±0.5	Thread depth TD - mm minimum	Drawing
<b>A*</b>	<b>M5</b>	<b>5.5</b>	<b>13</b>	<b>10</b>	<b>Fig.1 Z=10mm</b>
<b>A*</b>	<b>M5</b>	<b>7.14</b>	<b>8</b>	<b>10</b>	<b>Fig.2 ø36mm only</b>
C	M6	5.5	13	10	Fig.2
G	M6	6.35	17	11.8	Fig.2
J	M6	3.17	17	8.8	Fig.2
M	M5	7.14	8	10	Fig.2
R	M5	5.5	15	10	Fig.1 Z=13mm

**Terminations**

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

**Dimensions table ALS40 (sleeved) mm**

Case Code	D ±1	L ±2	Lt* ±1	S ±0.5	T ±0.5	V mm	M THREAD	H ±1	MOUNTING CLIP	WEIGHT grams nom.	Terminal Style
											A C G J M R
DA	36	52	58.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	75	•
DB	36	62	67.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	90	•
DE	36	82	87.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	115	•
DF	36	105	111.5	12.8	7.14	8	M8	12	V3/H2/UTE2736	140	•
KE	51	82	86.5	22.2	5.5	13.7	M12	16	V4/UTE2737	220	•
KF	51	105	110.5	22.2	5.5	13.7	M12	16	V4/UTE2737	300	•
MF	66	105	110.5	28.5	5.5	15.8	M12	16	V10/UTE2738	505	• •
ND	77	75	79.5	31.8	5.5	19	M12	16	V11	495	• • • • • •
NF	77	105	110.5	31.8	5.5	19	M12	16	V11	690	• • • • • •
NP	77	146	150.5	31.8	5.5	19	M12	16	V11	960	• • • • • •
NT	77	220	224.5	31.8	5.5	19	M12	16	V11	1450	• • • • • •
QC	90	67	71.5	31.8	5.5	25	M12	16	V90	615	• • •
QD	90	75	79.5	31.8	5.5	25	M12	16	V90	690	• • •
QH	90	98	103.5	31.8	5.5	25	M12	16	V90	900	• • •
QP	90	146	149.5	31.8	5.5	25	M12	16	V90	1345	• • •
QT	90	220	223.5	31.8	5.5	25	M12	16	V90	2000	• • •

\* Dimensions Lt will change dependant on terminal style.

## ARTICLE TABLE ALS40 (105°C)

Cap ( $\mu$ F)	Case Size (mm)	ESR (m $\Omega$ ) at 20°C 100Hz (max)	Impedance (m $\Omega$ ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
<b>25 VDC (<math>U_R</math>)</b>						
15000	36x52	24	20	6.9	7.3	ALS4 -- 153DA025
22000	36x62	17	15	8.4	8.8	ALS4 -- 223DB025
33000	36x82	11	10	11.1	11.7	ALS4 -- 333DE025
47000	36x105	9	8	14.0	14.7	ALS4 -- 473DF025
68000	51x82	13	12	12.0	12.2	ALS4 -- 683KE025
100000	51x105	9	8	16.4	16.7	ALS4 -- 104KF025
150000	77x75	13	13	13.7	13.8	ALS4 -- 154ND025
150000	66x105	6	6	23.8	24.1	ALS4 -- 154MF025
150000	90x75	10	10	18.7	18.8	ALS4 -- 154QD025
220000	90x67	9	8	18.6	19.2	ALS4 -- 224QC025
220000	77x105	8	7	22.3	22.4	ALS4 -- 224NF025
330000	90x98	8	8	22.3	22.4	ALS4 -- 334QH025
330000	77x146	5	5	31.0	31.1	ALS4 -- 334NP025
470000	90x146	4	4	36.9	37.1	ALS4 -- 474QP025
470000	77x220	4	4	38.9	39.8	ALS4 -- 474NT025
680000	90x220	4	3	47.0	48.1	ALS4 -- 684QT025
<b>40 VDC (<math>U_R</math>)</b>						
10000	36x52	23	19	6.6	6.9	ALS4 -- 103DA040
10000	36x62	19	16	8.1	8.7	ALS4 -- 103DB040
15000	36x82	13	10	10.8	11.6	ALS4 -- 153DE040
22000	36x105	10	8	13.6	14.5	ALS4 -- 223DF040
33000	51x82	13	12	11.7	12.0	ALS4 -- 333KE040
47000	51x105	9	8	16.2	16.6	ALS4 -- 473KF040
68000	77x75	13	13	13.9	14.0	ALS4 -- 683ND040
100000	66x105	7	7	20.6	20.8	ALS4 -- 104MF040
100000	90x67	10	9	17.7	18.5	ALS4 -- 104QC040
100000	90x75	12	11	16.0	16.1	ALS4 -- 104QD040
100000	77x105	7	7	22.4	22.7	ALS4 -- 104NF040
150000	90x98	8	8	22.6	22.8	ALS4 -- 154QH040
150000	77x146	5	5	31.3	31.6	ALS4 -- 154NP040
220000	90x146	4	4	36.8	37.1	ALS4 -- 224QP040
220000	77x220	4	4	37.7	39.2	ALS4 -- 224NT040
330000	90x220	4	4	45.6	47.0	ALS4 -- 334QT040
<b>63 VDC (<math>U_R</math>)</b>						
3300	36x52	38	30	5.5	6.2	ALS4 -- 332DA063
4700	36x62	27	22	6.7	7.5	ALS4 -- 472DB063
6800	36x82	19	15	8.9	10.0	ALS4 -- 682DE063
10000	36x105	13	10	11.2	12.6	ALS4 -- 103DF063
15000	51x82	16	15	10.7	11.2	ALS4 -- 153KE063
22000	51x105	11	10	14.7	15.3	ALS4 -- 223KF063
22000	77x75	14	12	14.6	15.1	ALS4 -- 223ND063
33000	66x105	8	7	21.3	22.2	ALS4 -- 333MF063
33000	90x67	10	8	18.1	20.1	ALS4 -- 333QC063
33000	90x75	11	11	17.1	17.5	ALS4 -- 333QD063
47000	77x105	9	8	20.7	21.1	ALS4 -- 473NF063
47000	90x98	8	7	24.4	25.1	ALS4 -- 473QH063
68000	77x146	6	6	29.1	29.8	ALS4 -- 683NP063
100000	90x146	5	5	34.5	35.2	ALS4 -- 104QP063
100000	77x220	4	4	36.7	38.8	ALS4 -- 104NT063
150000	90x220	4	4	44.4	46.5	ALS4 -- 154QT063

Mounting Style 0=plain or 1=stud   
Termination Style A,C,G,J,M or R 

## ARTICLE TABLE ALS40 (105°C)

Cap ( $\mu$ F)	Case Size (mm)	ESR (m $\Omega$ ) at 20°C 100Hz (max)	Impedance (m $\Omega$ ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
<b>100 VDC (<math>U_R</math>)</b>						
1500	36x52	79	62	3.9	4.5	ALS4 -- 152DA100
2200	36x62	56	44	4.8	5.5	ALS4 -- 222DB100
3300	36x82	37	29	6.4	7.4	ALS4 -- 332DE100
4700	36x105	26	21	8.1	9.3	ALS4 -- 472DF100
6800	51x82	32	28	8.0	8.4	ALS4 -- 682KE100
10000	51x105	21	18	10.9	11.5	ALS4 -- 103KF100
15000	77x75	28	26	9.7	9.9	ALS4 -- 153ND100
15000	66x105	14	12	15.8	16.7	ALS4 -- 153MF100
15000	90x75	20	18	12.9	13.4	ALS4 -- 153QD100
22000	90x67	17	16	14.3	15.2	ALS4 -- 223QC100
22000	77x105	15	13	15.5	16.0	ALS4 -- 223NF100
22000	90x98	13	11	18.4	19.0	ALS4 -- 223QH100
33000	77x146	10	10	21.6	22.2	ALS4 -- 333NP100
47000	90x146	9	8	25.9	26.5	ALS4 -- 473QP100
47000	77x220	7	6	35.4	36.6	ALS4 -- 473NT100
100000	90x220	6	6	37.2	37.9	ALS4 -- 104QT100
<b>200 VDC (<math>U_R</math>)</b>						
680	36x52	195	154	2.9	4.0	ALS4 -- 681DA200
680	36x62	188	147	3.3	4.6	ALS4 -- 681DB200
1000	36x82	128	100	4.3	6.1	ALS4 -- 102DE200
1500	36x105	86	67	5.6	7.8	ALS4 -- 152DF200
2200	51x82	71	58	6.8	8.0	ALS4 -- 222KE200
3300	51x105	47	38	9.1	10.9	ALS4 -- 332KF200
4700	77x75	48	42	8.7	9.4	ALS4 -- 472ND200
6800	66x105	27	23	12.9	14.5	ALS4 -- 682MF200
6800	90x67	37	28	11.8	15.9	ALS4 -- 682QC200
6800	90x75	36	32	10.9	11.7	ALS4 -- 682QD200
6800	77x105	29	25	13.4	14.8	ALS4 -- 682NF200
10000	90x98	23	20	15.4	16.6	ALS4 -- 103QH200
10000	77x146	19	16	19.3	21.5	ALS4 -- 103NP200
15000	90x146	14	12	24.2	26.5	ALS4 -- 153QP200
22000	77x220	11	10	29.5	31.6	ALS4 -- 223NT200
33000	90x220	10	8	34.3	36.4	ALS4 -- 333QT200
<b>250 VDC (<math>U_R</math>)</b>						
470	36x52	235	174	2.5	3.9	ALS4 -- 471DA250
680	36x62	164	122	3.2	4.8	ALS4 -- 681DB250
1000	36x82	111	83	4.2	6.3	ALS4 -- 102DE250
1000	36x105	108	79	4.7	7.5	ALS4 -- 102DF250
1500	51x82	83	64	6.2	8.2	ALS4 -- 152KE250
2200	51x105	56	42	8.3	11.1	ALS4 -- 222KF250
3300	77x75	52	42	8.5	9.7	ALS4 -- 332ND250
4700	66x105	30	24	12.3	15.0	ALS4 -- 472MF250
4700	90x67	42	30	10.9	16.3	ALS4 -- 472QC250
4700	90x75	38	32	10.7	12.1	ALS4 -- 472QD250
6800	77x105	30	25	12.1	13.4	ALS4 -- 682NF250
6800	90x98	25	20	15.1	17.3	ALS4 -- 682QH250
10000	77x146	19	16	17.5	19.5	ALS4 -- 103NP250
15000	90x146	14	12	21.9	23.9	ALS4 -- 153QP250
15000	77x220	12	10	29.2	33.0	ALS4 -- 153NT250
22000	90x220	11	9	34.1	38.2	ALS4 -- 223QT250

Mounting Style 0=plain or 1=stud   
Termination Style A,C,G,J,M or R 

## ARTICLE TABLE ALS40 (105°C)

Cap ( $\mu$ F)	Case Size (mm)	ESR ( $m\Omega$ ) at 20°C 100Hz (max)	Impedance ( $m\Omega$ ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
<b>350 VDC (<math>U_R</math>)</b>						
220	36x52	457	303	1.8	4.5	ALS4 -- 221DA350
330	36x62	307	204	2.4	5.7	ALS4 -- 331DB350
470	36x82	215	143	3.0	7.2	ALS4 -- 471DE350
680	36x105	149	99	3.9	8.9	ALS4 -- 681DF350
1000	51x82	113	78	5.0	10.0	ALS4 -- 102KE350
1500	51x105	75	52	6.8	12.5	ALS4 -- 152KF350
2200	77x75	66	49	8.3	13.7	ALS4 -- 222ND350
2200	66x105	51	35	9.8	17.9	ALS4 -- 222MF350
2200	90x67	74	52	9.1	16.4	ALS4 -- 222QC350
2200	90x75	56	40	9.4	17.8	ALS4 -- 222QD350
3300	77x105	41	30	11.7	19.7	ALS4 -- 332NF350
4700	90x98	31	23	14.6	23.2	ALS4 -- 472QH350
4700	77x146	27	20	15.7	23.6	ALS4 -- 472NP350
6800	90x146	19	14	20.3	29.7	ALS4 -- 682QP350
6800	77x220	23	17	25.4	35.7	ALS4 -- 682NT350
10000	90x220	21	16	31.0	42.7	ALS4 -- 103QT350
<b>400 VDC (<math>U_R</math>)</b>						
220	36x52	542	349	2.0	4.9	ALS4 -- 221DA400
220	36x62	537	344	2.1	5.4	ALS4 -- 221DB400
470	36x82	254	164	3.2	7.8	ALS4 -- 471DE400
470	36x105	251	161	3.5	8.5	ALS4 -- 471DF400
680	51x82	183	121	4.2	9.8	ALS4 -- 681KE400
1000	51x105	124	81	5.6	12.3	ALS4 -- 102KF400
1500	77x75	93	64	7.6	13.9	ALS4 -- 152ND400
2200	66x105	60	41	9.7	18.1	ALS4 -- 222MF400
2200	90x67	63	44	9.4	15.9	ALS4 -- 222QC400
2200	90x75	67	47	10.0	17.5	ALS4 -- 222QD400
2200	77x105	62	42	10.6	19.8	ALS4 -- 222NF400
3300	90x98	44	31	13.6	23.4	ALS4 -- 332QH400
4700	77x146	33	23	15.4	22.6	ALS4 -- 472NP400
6800	90x146	23	17	20.0	28.3	ALS4 -- 682QP400
6800	77x220	21	15	23.5	33.3	ALS4 -- 682NT400
10000	90x220	18	14	29.0	40.3	ALS4 -- 103QT400
<b>415 VDC (<math>U_R</math>)</b>						
220	36x52	530	331	2.0	5.0	ALS4 -- 221DA415
220	36x62	524	325	2.1	5.4	ALS4 -- 221DB415
330	36x82	349	217	2.8	7.1	ALS4 -- 331DE415
470	36x105	245	152	3.5	8.7	ALS4 -- 471DF415
680	51x82	180	115	4.4	9.9	ALS4 -- 681KE415
1000	51x105	122	77	5.8	12.3	ALS4 -- 102KF415
1500	77x75	95	65	7.6	13.8	ALS4 -- 152ND415
2200	66x105	60	39	9.7	18.1	ALS4 -- 222MF415
2200	90x67	61	43	9.4	15.8	ALS4 -- 222QC415
2200	90x75	67	47	10.0	17.3	ALS4 -- 222QD415
2200	77x105	61	41	10.7	19.7	ALS4 -- 222NF415
3300	90x98	44	30	13.6	23.3	ALS4 -- 332QH415
3300	77x146	40	27	14.2	23.6	ALS4 -- 332NP415
4700	90x146	29	19	18.5	29.8	ALS4 -- 472QP415
6800	77x220	21	14	23.0	32.5	ALS4 -- 682NT415
10000	90x220	18	14	28.3	39.3	ALS4 -- 103QT415

Mounting Style 0=plain or 1=stud   
Termination Style A,C,G,J,M or R 

## ARTICLE TABLE ALS40 (105°C)

Cap ( $\mu$ F)	Case Size (mm)	ESR (m $\Omega$ ) at 20°C 100Hz (max)	Impedance (m $\Omega$ ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
<b>450 VDC (<math>U_R</math>)</b>						
150	36x52	721	360	1.8	4.5	ALS4 - - 151DA450
150	36x62	715	356	1.9	4.8	ALS4 - - 151DB450
220	36x82	487	242	2.5	6.2	ALS4 - - 221DE450
330	36x105	325	162	3.2	7.9	ALS4 - - 331DF450
470	51x82	239	123	4.1	9.0	ALS4 - - 471KE450
680	51x105	164	84	5.3	11.3	ALS4 - - 681KF450
1000	77x75	125	69	7.0	13.2	ALS4 - - 102ND450
1500	66x105	79	42	8.9	17.1	ALS4 - - 152MF450
1500	90x67	78	57	8.7	15.3	ALS4 - - 152QC450
1500	90x75	87	49	9.3	16.7	ALS4 - - 152QD450
1500	77x105	80	43	9.8	18.7	ALS4 - - 152NF450
2200	90x98	58	32	12.5	22.5	ALS4 - - 222QH450
2200	77x146	54	29	13.1	22.9	ALS4 - - 222NP450
3300	77x146	38	27	14.6	22.0	ALS4 - - 332NP450
3300	90x146	37	20	17.4	28.9	ALS4 - - 332QP450
4700	77x220	27	15	21.9	32.0	ALS4 - - 472NT450
6800	90x220	19	15	23.5	39.2	ALS4 - - 682QT450

Mounting Style 0=plain or 1=stud   
Termination Style A,C,G,J,M or R 

## OPERATIONAL DATA

**Operational Lifetime**

Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

## RELIABILITY

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 x 10<sup>-9</sup> failures per hour. Failure rates include both catastrophic and parametric failures

$T_a$	Failure rate per hour
85°C	220 FIT
40°C	10 FIT

## MECHANICAL DATA

**Mounting position**

The capacitor can be mounted in any position so 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 instigated 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**

10Hz to 55Hz at 0.75mm or 10g for 3x2hrs duration. Except 220mm long cans 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration.

**Insulating resistance**

≥ 100 Mohms at 100V d.c., across insulating sleeve.

**Voltage Proof**

≥ 2500V d.c., across insulating sleeve.

**Safety vent**

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

Statements of suitability for certain applications are based on our knowledge of typical operating conditions for such applications, but are not intended to constitute – and we specifically disclaim – any warranty concerning suitability for a specific customer application or use. This 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 us with reference to the use of our products is given gratis, and we assume no obligation or liability for the advice given or results obtained.