ALSIC 20G

8 000 h / 105℃

10 V … 500 V	33 µF … 80 000 µF	Ø 18 (0,709) … Ø 35,5 (1,398)	− 55℃ + 105℃	Long life time

APPLICATIONS

- Automotive
- High frequency switched mode power supplies
- High ripple current
- Low inductance
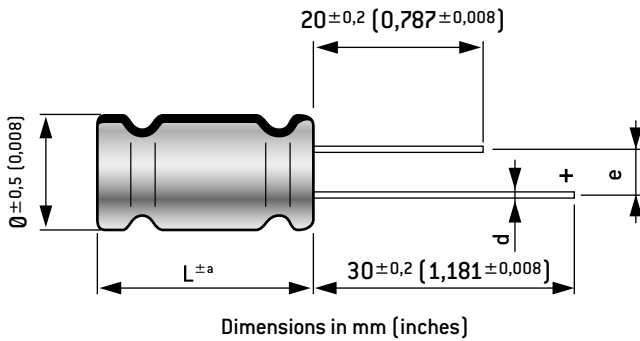- Low impedance

Insulating aluminum case
Tin coated leads
Negative pole marked

Tolerance on capacitance at 20℃   : ± 20 %
Operating temperature   : − 55℃ + 105℃

Dimensions in mm (inches)

DIMENSIONS in mm (inches)

Ø	e ± 0,5 (0,020)	d	b ± 2 (0,079)	± a	c ± 2 (0,079)
18 (0,709)	7,5 (0,295)	0,8 (0,031)	15 (0,591)	1 (0,039)	20 (0,787)
22,5 (0,886)	8,3 (0,327)	1,2 (0,047)	25 (0,984)	2 (0,079)	30 (1,181)
35,5 (1,398)					

RESISTANCE TO VIBRATIONS

	Standard
ƒ (Hz)	10 - 2000 Hz
Amplitude	1,5 (0,059)
Acceleration	20 g - 196 m/s²
t (h)	3 x 2 h

SPECIFICATIONS

NFC 83 110 - Long life
CECC 30 300
IEC 60 384-4 Long life
Standard endurance test at U_R: 5000h / 105℃
Climatic category GPF: − 55℃ + 105℃ / 56 days

WITHSTAND STRENGTH OF INSULATING SLEEVE

Insulation resistance at 20℃ between
leads and mounting hardware   : 100 MΩ
Test voltage at 50 Hz 1 min. between
terminals and mounting hardware   : 1 000 V
Fire resistance   : self extinguish 30 s
 (IEC 60 695-2-2)

ALSIC 20G

8 000 h / 105°C

Capacitance	Case				Tanδ max.	Z F(1)	I. leak +20°C	I~ +105°C	Code
	Ø mm (inches)		L mm (inches)						
(µF)					(%)	+20°C max. (Ω)	5 min. max. (mA)	100 Hz (A)	
Rated voltage/Peak voltage: 10 / 12 V									
15000	18	(0,709)	40	(1,575)	25	20	0,9	3,9	A776100
Rated voltage/Peak voltage: 16 / 18V									
8200	18	(0,709)	35	(1,378)	40	25	0,4	2,9	A776101
14000	18	(0,709)	40	(1,575)	25	20	1,3	3,9	A776102
66000	35,5	(1,398)	45	(1,772)	13	11	6,3	20	A776103
80000	35,5	(1,398)	50	(1,969)	13	11	8,1	20	A776104
Rated voltage/Peak voltage: 25 / 29V									
3700	22,5	(0,886)	40	(1,575)	35	25	0,6	3,7	A776105
Rated voltage/Peak voltage: 35 / 40V									
2200	18	(0,709)	35	(1,378)	40	30	0,42	2,9	A776106
2700	18	(0,709)	35	(1,378)	30	18	0,29	3,3	A776107
3300	18	(0,709)	30	(1,181)	35	26	0,35	2,9	A776108
4700	18	(0,709)	35	(1,378)	30	25	0,5	3,3	A776109
5800	18	(0,709)	40	(1,575)	30	25	1,2	3,5	A776110
Rated voltage/Peak voltage: 50 / 58V									
2200	18	(0,709)	35	(1,378)	40	27	0,33	2,9	A776111
2700	18	(0,709)	35	(1,378)	30	18	0,41	3,3	A776112
3000	18	(0,709)	35	(1,378)	40	27	0,45	2,9	A776113
3300	18	(0,709)	40	(1,575)	25	15	0,5	3,9	A776114
Rated voltage/Peak voltage: 63 / 72V									
600	22,5	(0,886)	25	(0,984)	75	33	0,3	2,1	A776115
2700	25,5	(1,004)	40	(1,575)	8	30	0,51	4,3	A776116
3000	18	(0,709)	40	(1,575)	30	20	0,57	3,5	A776117
4700	25,5	(1,004)	40	(1,575)	15	35	1,8	3,2	A776118
Rated voltage/Peak voltage: 100 / 115V									
2200	25,5	(1,004)	40	(1,575)	10	10	A776119		
Rated voltage: 160 V									
220	22,5	(0,886)	25	(0,984)	12	0,5	210	0,8	A776120
330	22,5	(0,886)	30	(1,181)	12	0,3	320	1,1	A776121
470	25,5	(1,004)	30	(1,181)	12	0,2	450	1,5	A776122
1000	25,5	(1,004)	40	(1,575)	12	0,1	960	2,3	A776123
2200	35,5	(1,398)	40	(1,575)	17	0,07	2100	3,4	A776124
Rated voltage: 200 V									
220	22,5	(0,886)	25	(0,984)	12	0,5	260	0,8	A776125
330	22,5	(0,886)	30	(1,181)	12	0,3	390	1,1	A776126
470	25,5	(1,004)	30	(1,181)	12	0,2	560	1,5	A776127
680	25,5	(1,004)	40	(1,575)	12	0,15	810	1,9	A776128
1000	25,5	(1,004)	50	(1,969)	12	0,1	1200	2,6	A776129
1500	30,5	(1,201)	50	(1,969)	15	0,09	1800	3	A776130
2200	35,5	(1,398)	50	(1,969)	15	0,055	2600	4,2	A776131
Rated voltage: 250 V									
100	22,5	(0,886)	25	(0,984)	12	0,8	150	0,62	A776132
150	22,5	(0,886)	25	(0,984)	12	0,6	220	0,72	A776133
220	22,5	(0,886)	30	(1,181)	12	0,4	330	1	A776134
330	25,5	(1,004)	30	(1,181)	12	0,25	500	1,3	A776135
390	22,5	(0,886)	40	(1,575)	12	0,22	600	1,4	A776136
470	25,5	(1,004)	40	(1,575)	12	0,16	700	1,8	A776137
680	25,5	(1,004)	50	(1,969)	12	0,13	1000	2,3	A776138
1000	30,5	(1,201)	50	(1,969)	12	0,1	1500	2,9	A776139
1500	35,5	(1,398)	50	(1,969)	12	0,07	2300	3,7	A776140

F(1): Ø ≤ 18 mm = 100 kHz
        Ø > 18 mm = 10 kHz

RADIAL LEADED

ALSIC 20G

8 000 h / 105℃

Capacitance	Case				Tanδ max.	Z F(1)	I. leak +20℃	I~ +105℃	Code
(µF)	Ø mm (inches)		L mm (inches)		(%)	+20°C max. (Ω)	5 min. max. (mA)	100 Hz (A)	
Rated voltage: 350V									
100	22,5	(0,886)	25	(0,984)	12	0,7	210	0,67	A776141
220	22,5	(0,886)	40	(1,575)	12	0,35	460	1,2	A776142
470	30,5	(1,201)	40	(1,575)	12	0,15	1000	2,1	A776143
680	35,5	(1,398)	40	(1,575)	12	0,11	1400	2,7	A776144
Rated voltage: 400V									
68	22,5	(0,886)	25	(0,984)	10	1,2	650	0,51	A776145
100	22,5	(0,886)	30	(1,181)	10	0,9	800	0,64	A776146
150	22,5	(0,886)	40	(1,575)	10	0,6	1000	0,89	A776147
220	25,5	(1,004)	40	(1,575)	10	0,4	1200	1,3	A776148
330	30,5	(1,201)	40	(1,575)	10	0,3	1500	1,5	A776149
470	30,5	(1,201)	50	(1,969)	10	0,2	1800	2	A776150
680	35,5	(1,398)	50	(1,969)	12	0,15	2100	2,5	A776151
Rated voltage: 450V									
33	18	(0,709)	35	(1,378)	5	1,8	730	0,43	A776152
47	18	(0,709)	25	(0,984)	10	2	600	0,33	A776153
47	18	(0,709)	35	(1,378)	10	2	600	0,41	A776154
47	22,5	(0,886)	25	(0,984)	10	1,7	600	0,43	A776155
68	22,5	(0,886)	25	(0,984)	10	1,2	700	0,51	A776156
100	22,5	(0,886)	40	(1,575)	10	1,1	800	0,65	A776157
150	22,5	(0,886)	40	(1,575)	10	0,7	1000	0,82	A776158
220	25,5	(1,004)	50	(1,969)	10	0,4	1250	1,3	A776159
330	30,5	(1,201)	40	(1,575)	10	0,3	1500	1,5	A776160
470	35,5	(1,398)	40	(1,575)	10	0,2	1800	2	A776161
Rated voltage: 500V									
47	22,5	(0,886)	30	(1,181)	12	3	620	0,35	A776162
100	25,5	(1,004)	40	(1,575)	12	1,8	900	0,55	A776163
150	30,5	(1,201)	40	(1,575)	12	1	1100	0,82	A776164
220	30,5	(1,201)	50	(1,969)	12	0,4	1350	1,4	A776165
330	35,5	(1,398)	50	(1,969)	12	0,3	1600	1,8	A776166

F(1): Ø ≤ 18 mm = 100 kHz
Ø > 18 mm = 10 kHz

MAX ESR 100 Hz, 20℃
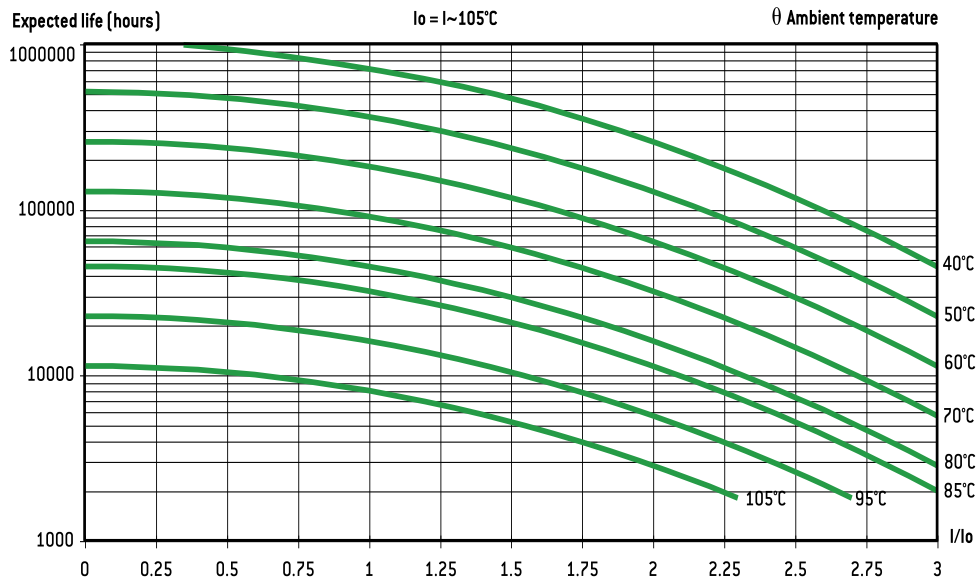
ESR max ≅ ESR typ. x 1.3

MAX IMPEDANCE 100 kHz, 20℃

Z max ≅ Z typ. x 1.3

EXPECTED LIFE

As a function of temperature and ripple current.

PERMISSIBLE RIPPLE CURRENT I (R.M.S. VALUE)

versus frequency ƒ:
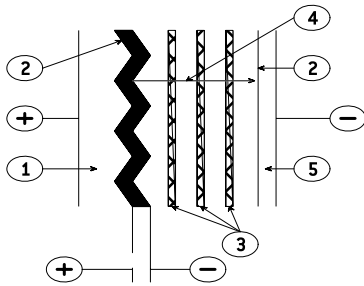I ~: permissible r.m.s. current at 100 Hz

ƒ(Hz)	50	100	300	600	1 000	10 000	≥ 50 000
I	0,8 x I~	I~	1,2 x I~	1,3 x I~	1,35 x I~	1,5 x I~	1,6 x I~

General technical data

1. BASIC CONSTRUCTION

Structure of an electrolytic aluminum capacitor is shown hereunder:

1. Anode: aluminum foil
2. Dielectric: aluminum oxide
3. Papers spacers impregnated with electrolyte
4. Ionic conduction assumed by electrolyte
5. Cathode: aluminum foil

The positive plate is an etched aluminum foil covered with alumina which is the dielectric of the capacitor.

The negative plate is constituted by a second aluminum foil which serves as a current supply, and by electrolyte-impregnated papers layers.

The metal used for anode is a $\geq 99,98$ % grade aluminum.

The dielectric has a thickness of 13 Å / V.

The aluminum used for the cathode is a ≥ 98 % grade aluminum covered with a dielectric layer with a thickness of about 40 Å.

2. DIAGRAM OF THE EQUIVALENT CIRCUIT
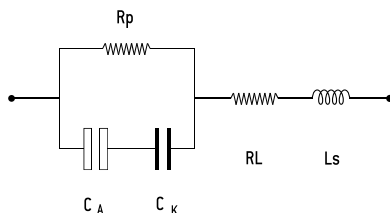
CA = Capacitance of the anode
CK = Capacitance of the cathode
Rp = Parallel resistance due to the aluminum oxide f llms.
RL = Series resistance of connections, plates and impregnated spacer.
Ls = Inductance of winding and connections.

A standard simplified diagram is.
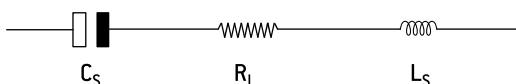
Cs is the series capacitance of both anode and cathode capacitances. Electrolytic aluminum capacitors are naturally polarized because of the insulating f llm on the anode. Given the very thin aluminum oxide layer, a reversed voltage should not exceed 1.5 V when there is energy supply.

Short duration reverse voltages can be absorbed by special construction, second anode replacing the former cathode.

3. CAPACITORS MARKING

3.1. ARTICLE CODE (ON EACH PACKAGING)

A followed by 6 figures number. First 3 positions are specific of the range. (Ex. A 745xxx for a FELSIC 85 BD)

140	FELSIC in bank	741	FELSIC 125 FRS BD (ex 731)
701	PRORELSIC 125	742	PRORELSIC 105 TFRS
703	PRORELSIC 125	743	PRORELSIC 105 TFRS
704	SNAPSIC	744	FELSIC 85 BC
705	SNAPSIC 105		FELSIC 85 LP
706	FELSIC HP BC – BD	745	FELSIC 85 BD
708	PRORELSIC 145	746	FELSIC 85 M BC
710	CUBISIC	747	FELSIC 85 M BD
711	PROMISIC 031	748	SICAL CO 42 - SICAL
712	CUBISIC LP	749	SICAL CO 42 - SICAL
713	SNAPSIC 105 LP	750	CUBISIC 125
714	SNAPSIC 4P	756	FELSIC 105 BC
715	SNAPSIC 105 4P		FELSIC 105 LP
716	SNAPSIC HV	757	FELSIC 105 BD
717	SNAPSIC HC	760	FELSIC HC BC
718	SNAPSIC 125	761	FELSIC HC BD
721	RELSIC 033	762	FELSIC 105 TFRS BC
722	CI FRS	763	FELSIC 105 TFRS BD
723	CI FRS	764	FELSIC HV BC
728	FELSIC 039 (ex 727)	765	FELSIC HV BD
	FELSIC DI	775	VACSIC
738	FELSIC 037 (ex 737)	774	VACSIC 150
740	FELSIC 125 FRS BC (ex 731)	776	ALSIC 20G
			ALSIC 145 20G

In FELSIC ranges, article code without first letter A, is printed on each capacitor.
a Figure 9 in fourth position shows a special product.

3.2. BATCH (ON EACH CAPACITOR).
3 figures or 6 figures

3.3. DATE (ON EACH CAPACITOR IF APPLICABLE)
4 figures (year-week)

4. ELECTRICAL CHARACTERISTICS

4.1. RATED CAPACITANCE C_R
The rated capacitance is defined at 100 Hz and at ambient temperature.

4.2. RATED VOLTAGE U_R
U_R is the maximum DC voltage which may be applied in continuous operation.
When applying a superimposed alternating voltage, the peak value of the resulting waveform should not exceed the rated voltage.

4.3. PEAK VOLTAGE U_P
Up is the maximum repetitive voltage which can be applied within short periods.
Defined in CECC 30 300 and IEC 60 384-4:

1000 cycles of 30 s charge followed by a no load period of 5 min. 30 s with upper category temperature.
$$Up \leq 1,15 \ U_R \ (U_R \leq 315 \ V)$$
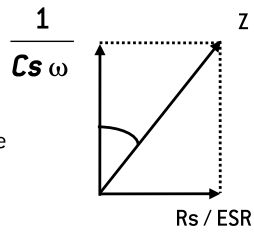$$Up \leq 1,10 \ U_R \ (U_R > 315 \ V)$$

General technical data

4.4. DISSIPATION FACTOR TANδ

The dissipation or loss factor is defined by its tangent Tanδ

$$Tg\delta = Rs \ Cs \ \omega$$
$$(\omega = 2\pi F)$$

ESR Capacitor Equivalent Series Resistance
Cs Capacitor capacitance
F Frequency (100 Hz)
Z Capacitor impedance
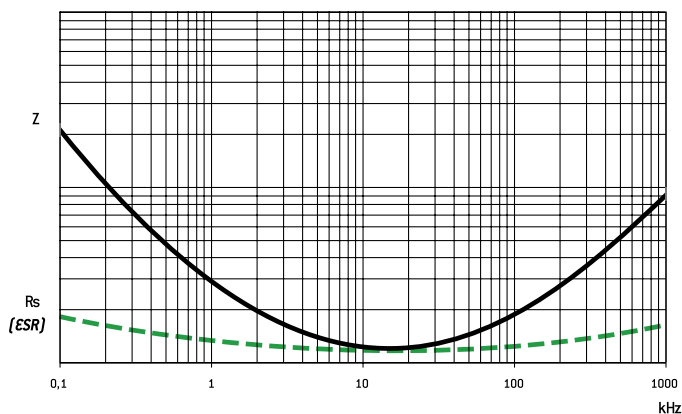
4.5. EQUIVALENT SERIES RESISTANCE ESR

The relation between ESR and dissipation factor Tanδ is given in § 4.4.

4.6. IMPEDANCE Z - INDUCTANCE L

The impedance is given by:

$$Z = \sqrt{R^2 + (L\omega - \frac{1}{C\omega})^2}$$

L inductance. Generally L = 5 to 20 nH

Z and ESR as function of frequency typically follows the chart:

4.7. PERMISSIBLE RIPPLE CURRENT (I r.m.s.) I~

The current is defined at the maximum climatic category and at 100 Hz. It is the root mean square value r.m.s. The value I_0 is the rated value for calculations of expected life up to 3 I_0.

4.8. LEAKAGE CURRENT Il

Il is measured at 20°C after a 5 min. polarization under rated voltage.
For C_R in μF and U_R in V:
Il ≤ 0,01 C_R U_R or 1 μA*
when C_R U_R ≤ 1000 μC
Il ≤ 0,006 C_R U_R + 4 μA
when C_R U_R > 1000 μC
For U_R > 350 V_{DC} it can be specified:
with K = 4, 6 or 8
or
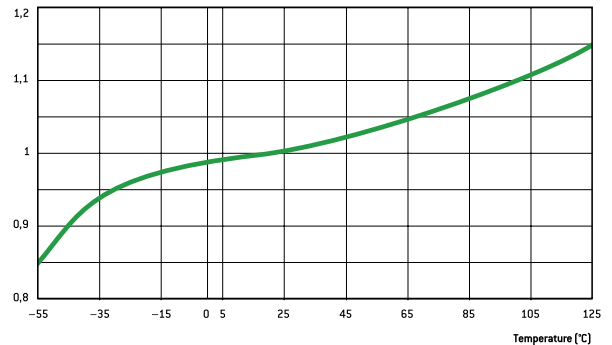Il ≤ 0,3 $(C_R U_R)^{0,7}$ + 4 μA (CECC 30 300)
* Whichever is the greater

4.9. CHARACTERISTICS

Versus temperature (typical values).
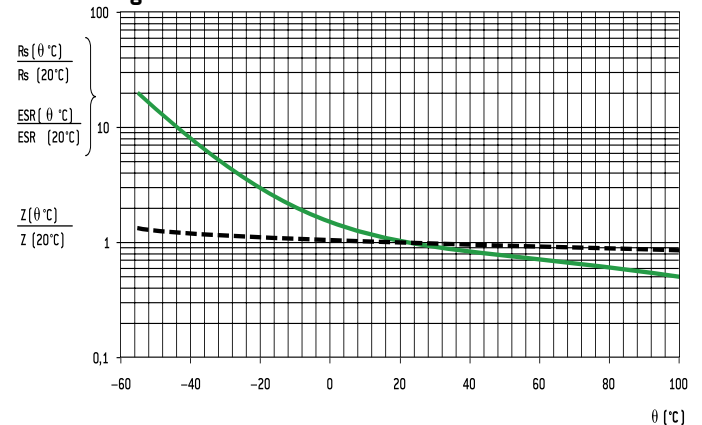
4.9.1. Capacitance drift
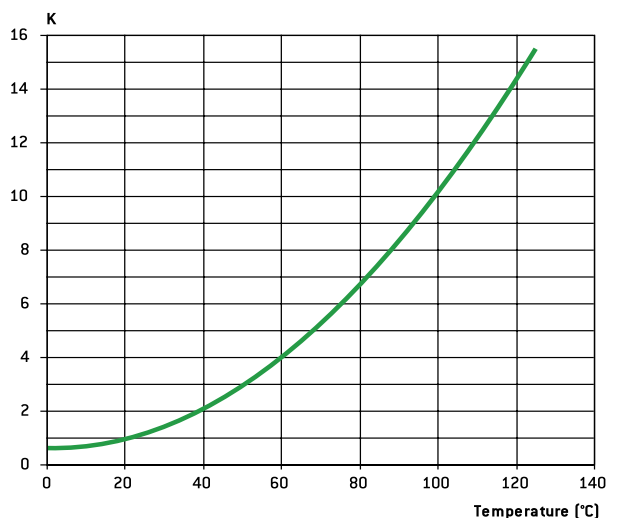
Versus temperature

4.9.2. ESR and Z drifts at 100 Hz

Versus temperature

4.9.3 Leakage current drift

Versus temperature

General technical data

5. SPECIFICATION TO APPLY

Electrolytic aluminum capacitors are defined in:

- NF and UTE French national standard
- CECC European specifications
- IEC international specifications

Quality insurance procedures are described in these specifications.

	French	European	International
Generic specification Fixed capacitors	NF C 83 100	CECC 30 000 EN 130 000	IEC 60 384 -1 QC 300 000
Sectional specification Electrolytic aluminum capacitors	NF C 83 110	CECC 30 300	IEC 60 384 - 4 C 300 300
Blank deta ll specification - Electrolytic aluminum capacitors with non solid electrolyte.	UTE 83 110	CECC 30 301	IEC 60 384 - 4 -1 QC 300 301
Blank deta ll specifications	CECC 30 301- 017 to CECC 30 301- 062 CO 31 to CO 55	CECC 30 301- 017 to CECC 30 301- 062 CECC 30 301- 802 to CECC 30 301- 811	

6. ENDURANCE TESTS / LIFE TIME

6.1. STANDARD ENDURANCE TEST
at max category temperature:

Temperature	Endurance test			
	Grade I - Long life			Grade II - General purpose
	10 000 h	5 000 h	2 000 h	1 000 h
125℃			•	
105℃		•	•	•
85℃	•	•	•	•

Standard endurance tests do not exceed 2000 hours at 125℃. However, present EXXELIA technologies concerning liquid electrolytes have led to endurance tests up to 5000 hours at 125℃ (PRORELSIC 125 - FELSIC 125 RS) and even 20000 hours at 125℃ (PRORELSIC 145 - ALSIC 145)

6.2. PERFORMANCE REQUIREMENTS ON STANDARD ENDURANCE TESTS.
Permissible capacitance drift $\Delta C/C$ (%)
Permissible increase factors on Tanδ, ESR, Z and ll initial values

U_R	Endurance test			
	Grade I			Grade II
	10 000 h	5 000 h	2 000 h	1 000 h
6,3 V			+15 −30	+25 −40
10 V - 35 V	+15 −20	±15	±15	±30
40 V - 160 V	±15	±15	±15	±30
> 160 V	±15	±10	±10	±15

	Endurance test			
	Grade I			Grade II
	10 000 h	5 000 h	2 000 h	1 000 h
Tanδ or ESR (1)	1,5	1,3	1,3	1,5
Z (2)	3	2	2	3
ll	Standard values			

(1) Tanδ or ESR: for initial value, take standard value.
(2) Z: for initial value, take specified value (see data sheet).

Specific requirements can be taken into consideration with regards to initial values of dissipation factor or equivalent series resistance and impedance.

6.3. FAILURE CRITERIA FOR ELECTROLYTIC CAPACITORS.
Failure criteria are defined in CECC 30 301

- Non measurable defaults leading to complete failure.
- Measurable defaults leading to adjustment losses of the load circuit (failure due to variations).

6.3.1. Non measurable defaults.
They might be summed up as:

- Open circuit
- Short circuit
- Operation of pressure relief device
- Severely damaged insulation
- Unusable terminations

6.3.2. Measurable defaults.
Variations exceeding the values given below characterize a default.

- Capacitance drift $\Delta C/C$ (%): 3 times the limit for standard endurance testing or 50 % (whichever is the smallest).
- Tanδ or ESR: 3 times standard max initial values.
- Z: 3 times standard max initial values.
- ll: initial limit (under load conditions).

Specific requirements can be taken into consideration with regards to lower drifts.

6.4. INFLUENCE OF MAIN PARAMETER ON OPERATIONAL LIFE.

6.4.1. Temperature.
The capacitors operational life is highly dependent upon its internal temperature Θi and therefore upon the ambient temperature and the ripple current.

Knowing ESR and dissipated power values (§ 6.4.3.) one can figure out, the internal temperature rise and then determine the capacitors expected life.

With present high boiling point electrolytes (§ 8.6)
Θi max = 125 to 185℃ depending on styles.

6.4.2. Ripple current.
The ripple current flowing through the capacitor increase the internal temperature through power dissipation.

Standards define the permissible current at 100 Hz and generally consider a temperature rise of 5 to 10℃ of max category temperature.

Current waveforms and frequencies make it difficult to clearly determine the capacitors internal temperature rise, which defines the operationally life.
Experiments confirm following relationship:
$$\Theta i = \Theta a + (\Theta c - \Theta a) K$$

Where:

- Θi = Internal hot spot temperature
- Θa = Ambient temperature
- Θc = Case temperature
- K = Parameter depending upon case diameter and cooling
  $\emptyset \geq 51\ k = 2^{\pm 0,5}$
 $\emptyset < 51\ k = 1,5^{\pm 0,5}$ (air cooling - 0,2 m/s)

General technical data

r.m.s. value according to current waveform.

Function	Mean value	R.m.s. value	Function	Mean value	R.m.s. value	Function	Mean value	R.m.s. value
	$A\,(t_0/T)$	$A\sqrt{t_0/T}$		$A/2$	$A\sqrt{3}$		$2A/\pi$	$A/\sqrt{2}$
	$A\,(t_1/T)$	$A\sqrt{2t_1/3T}$		$2A/\pi\,(t_0/T)$	$A\sqrt{t_0/2T}$		$A/2$	$A/\sqrt{3}$
	$A/2\,(t_0/T)$	$A\sqrt{t_0/3T}$		$A/2\,(t_0/T)$	$A\sqrt{t_0/3T}$		0	A

6.4.3. Dissipated power versus case dimension

For calculations of ripple currents, considering an internal temperature rise of 10℃
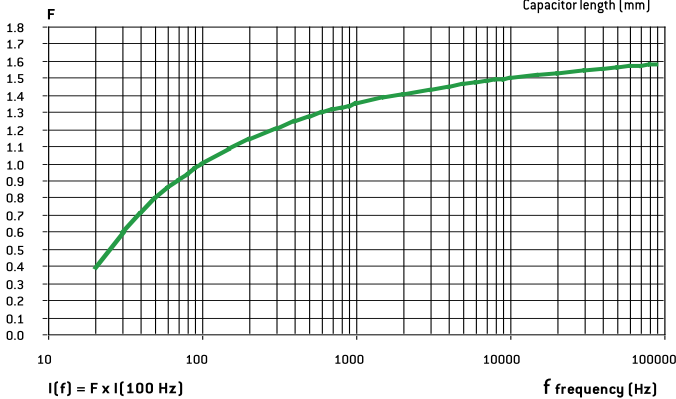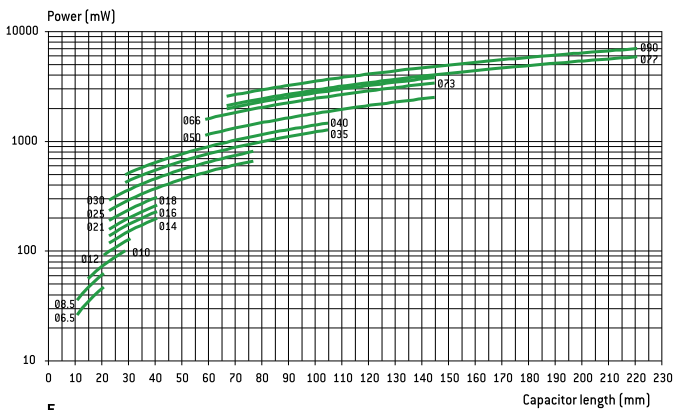
$P = ESR.I^2$
$P = $ Dissipated power (mW)
$(\Theta i - \Theta a = 10℃)$
ESR: Equivalent series resistance (100 Hz 20℃)
I: Ripple current (r.m.s. value at 100 Hz)
For different frequencies from 100 Hz, I must be multiplied by the factor F, according to above chart.:

6.4.4. Thermal resistance Rth and air cooling

Rth is static thermal resistance (without cooling) between capacitor central hot spot and ambient temperature measured at a distance of one capacitor diameter
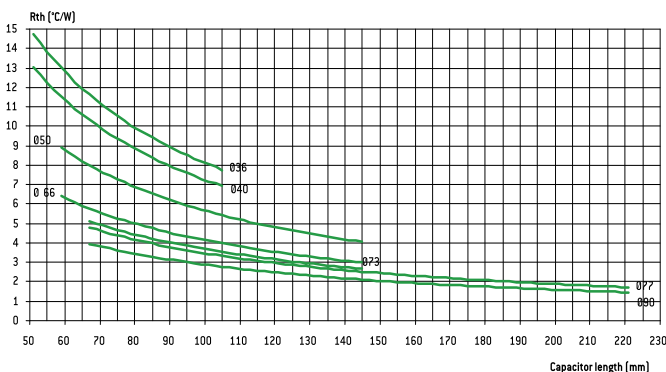
Forced or not cooling air can lead to a significant decrease of these values.
Consequently, r.m.s. ripple current can be increased as a function of air cooling speed:

Ø mm (inches)	≤ 0,5 m/s	1 m/s	2 m/s	3 m/s	≥ 4 m/s
66 - 90	I~	1,1 I~	1,2 I~	1,25 I~	1,3 I~
36 - 51	I~	1,2 I~	1,4 I~	1,45 I~	1,5 I~

This parameter shall be applied to one capacitor alone.
For capacitors in bank, ambient temperature must be strictly equal around all capacitors.

6.4.5. Quality guaranty

We guarantee products manufactured during 2 years from the data of shipment against defaults of material and assembly.

This guaranty can be involved by the buyer only if our products are used within normal conditions, always according to the state of the art and taking in account storage conditions.

The equipment design should take into consideration possible failures of our capacitors and related effects in order to avoid them.

Guaranty is not applicable for damages occurred by surge voltage, irregular use, polarity inversion or maintenance default.

Guaranty is exclusively limited to the replacement of individual defective capacitors within the terms of delivery. This rule applied to all cases and particularly to any further consequence of failures.

6.4.6. Reliability

Failure rate:

$$FR = \frac{\text{Number of components tested x test duration}}{\text{Number of failures}}$$
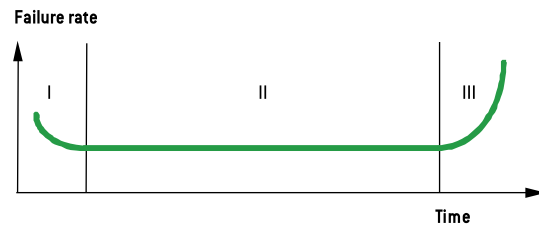
Failure rate is measured in FIT (failure in time = 10^{-9} / hour).
The failure rate is set up during the life time of the capacitor (phase II)
I. Early failure phase (generally excluded during ageing process).
II. Operational life time of the capacitors
III. End of life

General technical data

Mean time between failures MTBF = 1/FR mesured in years

Range	Failure rate for a failure percentage not exceeding 1% with a confidence level of 60 %
FELSIC 85 >350 V FELSIC HC > 350 V SNAPSIC - SNAPSIC HC > 350 V SNAPSIC 4P > 350 V PROMISIC 031 Ø = 6,5 SICAL CO 42 - SICAL > 350 V	50 FIT - (MTBF = 2280)
FELSIC 037 - 039 FELSIC 85 ≤ 350 V FELSIC HC ≤ 350 V CUBISIC CI FRS SNAPSIC 105 - SNAPSIC 105 4P SNAPSIC 105 LP - SNAPSIC HV SNAPSIC - SNAPSIC 4P ≤ 350 V SNAPSIC HC ≤ 350 V ALSIC IR - ALSIC 145 - ALSIC HV - VACSIC 150 - VACSIC SICAL CO 42 - SICAL ≤ 350 V PRORELSIC 125 Ø = 6,5 RELSIC 033 PROMISIC 031 Ø > 6,5	25 FIT - (MTBF = 4560)
FELSIC 125 FRS - SNAPSIC 125 FELSIC HV - FELSIC 105	10 FIT - (MTBF = 11410)
PRORELSIC 125 Ø > 6,5 PRORELSIC 145	5 FIT - (MTBF = 22820)

Multiplying factor of FR with voltage and temperature

	Temperature (°C)							
	≤ 40	50	60	70	85	105 (1)	125 (1)	145 (1)
Factor	1	1,5	2,3	3,4	6,3	14	32	72

(1) Only for permitted capacitors

	Percentage of rated voltage (2)		
	100 %	80 %	50 %
Factor	1	0,8	0,5

(2) This voltage has to be constant

Environ-ment	Without vibration		Ground with vibrations or mob Ile			
	Ground, fix Controlled air	Ground, fix	PRORELSIC SNAPSIC 20 g FELSIC 20 g	FELSIC 10 g PROMISIC SICAL Ø ≤14	CI FRS - SNAPSIC RELSIC SICAL Ø >14	ALSIC
Factor	1	2	2	4	6	12

7. MANUFACTURING FLOW CHART
Process controls

Check metal / metal welding

Visual and dimensions — — — WINDING

Check conductivity pH
Sparking voltage — — — ELECTROLYTE PREPARING

DRYING — IMPREGNATION

Check metal / metal welding — — — TAB/TERMINATION CONNECTION

Check sealing — — — ENCAPSULATION

Check leakage current — — — AGEING

100 % ELECTRICAL TEST C, Rs, Z, IF

Visual — — — MARKING

Visual — — — PACKING

Check sampling
Special tests — — — QUALITY CONFORMANCE

RAW MATERIALS

INCOMING CHECK — ANODE - CATHODE CONNECTIONS - PAPERS — CHEMICALS — CANS - LIDS...

General technical data

8. INFORMATION ON APPLICATION

8.1. CLEANING SOLVENTS
Use aliphatic alcohols, such as denatured ethyl alcohol, isopropanol, or butylacetate, or else alkaline d lluted solutions. Avoid incompatible solvents (halogenous for example).

8.2. SHELF LIFE
There is no electrical characteristics variation for long periods of storage except leakage current which can increase.

It is caused by chemical reactions between the dielectric alumina and the electrolyte. These reactions are reversible when switched on. Capacitors can generally be stored at temperature between −5° and +50℃ without reforming for the following periods of time:

- For $U_R \leq 100$ V, storage time: ....5 years
  (up to 10 years under specific conditions)
- For 100 V $< U_R \leq 360$ V storage time: ....3 years
- For 360 V $< U_R < 500$ V storage time: ....1 year
- For $U_R \leq 500$ V, storage time: .... 6 months

Generally when these periods are overstepped, one hour at rated voltage causes the decrease of leakage current under the specified limits. An other way to avoid this leakage current increase problem is to always limit ava llable power through capacitor during first seconds or minutes after storage or transport, according to the following chart:
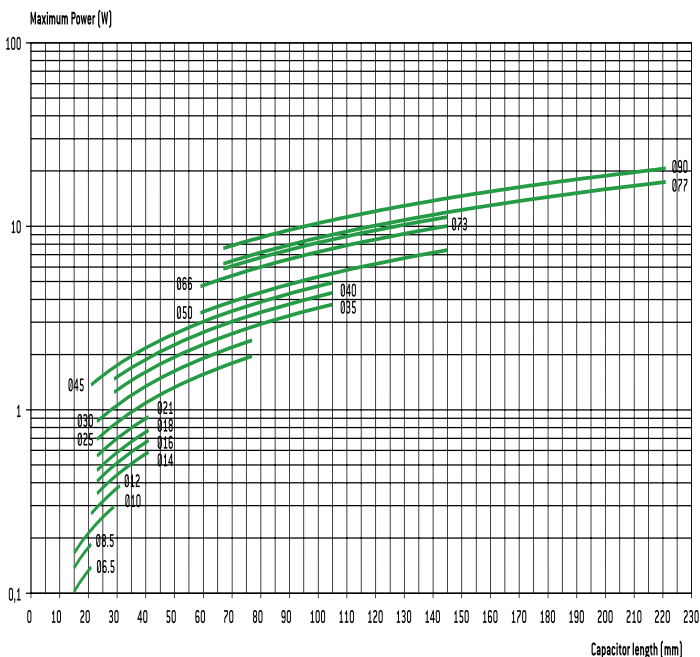

8.3. LOW PRESSURE RESISTANCE
EXXELIA capacitors can be used with ambient low pressure decreasing up to 10 mbar (altitude 28000 m – 92000 feet).

8.4. MOUNTING SCREW TERMINALS CAPACITORS (FELSIC)
Capacitors may be used vertically (terminals on top) or horizontally. When used horizontally, the following position in relation to the safety vent, is recommended:

Mounting capacitors in series may be used for operating voltage exceeding U_R. See FELSIC in bank.

Prominent negative polarity indicator [except Ø90 (3,543)]
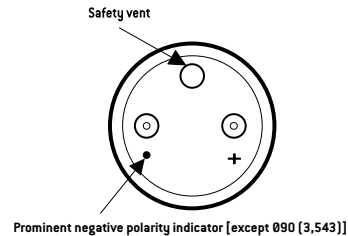
8.5. MOUNTING SOLDER TYPE CAPACITORS.
They may be used in any position. During mounting, avoid applying excessive force to capacitor pins or wires. There is a risk of damaging internal connections.
After soldering and for the same reasons, do not try to move the capacitor's body.

8.6. ELECTROLYTES: SAFETY RULES.
Electrolytes used in EXXELIA capacitors are manufactured by EXXELIA. Main solvents are generally γ butyrolactone and ethylene glycol, very stable high boiling point solvents. Ionic conductive salts in electrolyte induce a very weak acidity (pH 5 to 7).

8.7. ENVIRONMENT.
In aluminium capacitors with liquid electrolyte there is no component showing a pollution risk, in small amounts, of air or water. EXXELIA is always involved in this security field particularly in using chemicals for electrolyte, without well-known risks.

- Dimethylformamide (DMF) dangerous solvent forbidden in several uses is completely excluded by EXXELIA,since 1990.

- There is no halogen compound such as chlorofluorocarbon (CFC or FCKW in german) or polychlorobiphenyl (PCBPyralene) or pentabromodiphenylether or octabromodiphenylether.

There is neither benzene, toluene or phenyl compound nor explosive such as picric acid, nor asbestos in plastic covers. All the capacitors made by EXXELIA since 1991, can be scrapped or used in raw materials recycling processes without special care in compliance with Community rules.

EXXELIA aluminium capacitors with non-solid electrolyte are particularly suitable for different kinds of environment taking in account severity increasing laws.

European directives 2003/11/EC, 2002/96/EC (WEEE) and 2002/95/EC (RoHS) applies to all EXXELIA capacitors including every solder type, manufactured with pure tin coated pins or wires, since at least January 2006.
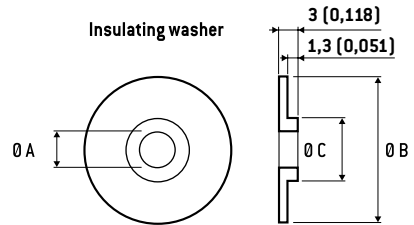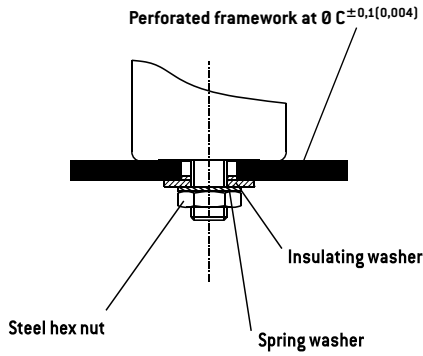
Mounting and insulating parts

STUD FIXING: FELSIC BD
Steel nut, spring washer and insulating washer are delivered loosely with the capacitor.
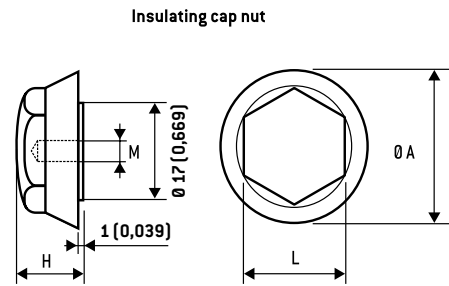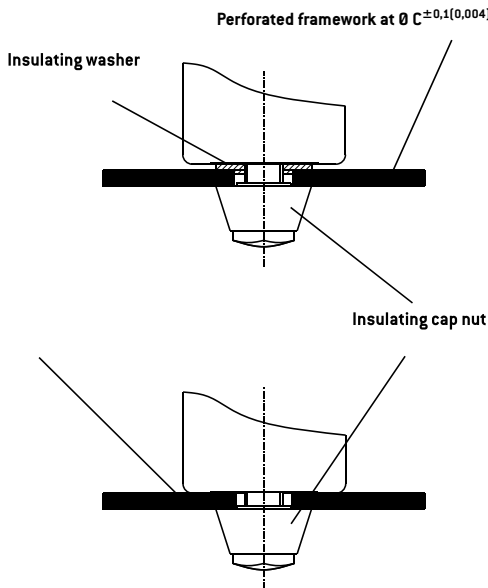
STANDARD MOUNTING WITH:
Insulating washer and steel nut

Insulating washer

Ø Capacitor	DIMENSIONS in mm (inches)				
	M	Ø A	Ø B	Ø C	Code
36	8	8,4	25	18,5	A 691060
51 - 77	12	12,5	30	21,5	A 691061
90	12	12,5	35	21,5	A 691062

Insulating plastic nut with or without insulating washer

Insulating cap nut

DIMENSIONS in mm (inches)					
M	Ø A	H	L	Max. torque	Code
8 (0,315)	25 (0,984)	15 (0,591)	17 (0,669)	3 Nm	A 691070
12 (0,472)	30 (1,181)	20 (0,787)	19 (0,748)	7 Nm	A 691071

Ring - clip mounting: FELSIC LP
Ring clips shall be ordered separately.
Tightening screws and nuts are supplied loosely.

Plastic cap on bracket
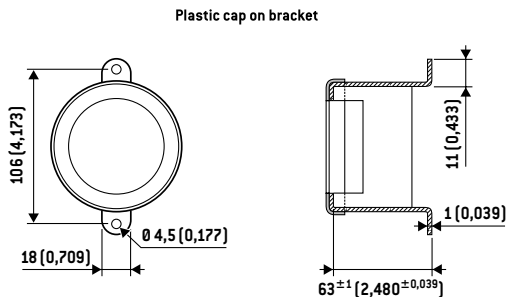
FELSIC 85 LP FELSIC 105 LP	Code
Metal bracket	A691055
Plastic cap	A691065

General technical data

Ring - clip mounting: FELSIC BC

Ring clips shall be ordered separately.
Tightening screws and nuts are supplied loosely.
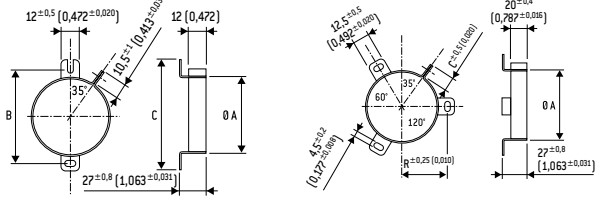
FELSIC BC - Metal ring-clips

| Ø A Cap.	B	C	Code	Ø A Cap.	B	C	Code
36 (1,417)	54 (2,126)	63 (2,480)	A 691901	51 (2,008)	33,5 (1,319)	11,8 (0,465)	A 691905
				66 (2,598)	39 (1,535)	10,5 (0,413)	A 691913
				73 (2,874)	44 (1,732)	10,5 (0,413)	A 691914
				77 (3,031)	44,5 (1,752)	10,5 (0,413)	A 691907
				90 (3,543)	53,3 (2,098)	11,8 (0,465)	A 691915

Stirrup mounting: CUBISIC LP

Stirrups shall be ordered separately.
Tightening screws and nuts are supplied loosely
Salt mist endurance of screws and mounting accessories:
minimum 96 h (IEC 600 68-2-11)

CUBISIC /CUBISIC LP - Metal bracket
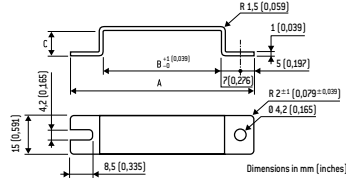
Ø A Cap.	A		B		C		Code
45x12 (1,772x 0,472)	69	(2,717)	45	(1,772)	10	(0,394)	A 691057
35x16 (1,378x 0,630)	59	(2,323)	35	(1,378)	14	(0,551)	A 691059

PACKAGING

1. PACKAGING AND WEIGHT UNITS.

1.1. Capacitor with screw terminals

Can DIMENSIONS in mm (inches)				Unit weight *
Ø	H			(g)
36 (1,417)	47 (1,850)	52 (2,047)	53 (2,087)	70
36 (1,417)	60 (2,362)			79
36 (1,417)	80 (3,150)	81 (3,189)		100
36 (1,417)	104 (4,094)	105 (4,134)		120
51 (2,008)	47 (1,850)			80
51 (2,008)	62 (2,441)	63 (2,480)		105
51 (2,008)	81 (3,189)	82 (3,228)		190
51 (2,008)	104 (4,094)	105 (4,134)		260
51 (2,008)	112 (4,409)			270
51 (2,008)	144 (5,669)			370
66 (2,598)	104 (4,094)	105 (4,134)		430
66 (2,598)	112 (4,409)			460
73 (2,874)	104 (4,094)	112 (4,409)		600
73 (2,874)	144 (5,669)			680
77 (3,031)	104 (4,094)	105 (4,134)		620
77 (3,031)	144 (5,669)	145 (5,709)		860
77 (3,031)	200 (7,874)			1300
77 (3,031)	220 (7,874)	221 (8,701)		1400
90 (3,543)	67 (2,638)			600
90 (3,543)	144 (5,669)	145 (5,709)		1400
90 (3,543)	200 (7,874)			1800

* Unit weight = typical values
Possible variations of = ± 25 % according to different voltage and capacitance.

1.2. Radial solder types

Can dimensions mm (inches)		ALSIC	SNAP-SIC	Can dimensions		ALSIC	SNAP-SIC
Ø	H	Weight* (g)		Ø	H	Weight* (g)	
10 (0,394)	16 (0,630)	1,8	-	35 (1,378)	30 (1,181)	-	50
				35 (1,378)	40 (1,575)	-	50
12,5 (0,492)	21 (0,827)	4,5	-	35 (1,378)	45 (1,772)	-	52
12,5 (0,492)	24 (0,945)	5		35 (1,378)	50 (1,969)	-	60
				35 (1,378)	75 (2,953)	-	95
16 (0,630)	25 (0,984)	8,2	-	35 (1,378)	100 (3,937)	-	125
22 (0,866)	25 (0,984)	-	15	40 (1,575)	40 (1,575)	-	65
22 (0,866)	30 (1,181)	-	17	40 (1,575)	50 (1,969)	-	100
22 (0,866)	40 (1,575)	-	18	40 (1,575)	75 (2,953)	-	130
				40 (1,575)	100 (3,937)	-	170
25 (0,984)	25 (0,984)	-	17	45 (1,772)	21 (0,827)	-	50
25 (0,984)	30 (1,181)	-	20	45 (1,772)	(0,984)	-	60
25 (0,984)	35 (1,378)	-	22	45 (1,772)	30 (1,181)	-	73
25 (0,984)	40 (1,575)	-	25	45 (1,772)	35 (1,378)	-	85
25 (0,984)	45 (1,772)	-	28	45 (1,772)	45 (1,772)	-	110
25 (0,984)	50 (1,969)	-	30	45 (1,772)	75 (2,953)	-	180
30 (1,181)	25 (0,984)	-	28	45 (1,772)	100 (3,937)	-	240
30 (1,181)	30 (1,181)	-	30				
30 (1,181)	35 (1,378)	-	30				
30 (1,181)	40 (1,575)	-	40				
30 (1,181)	45 (1,772)	-	45				
30 (1,181)	50 (1,969)	-	50				

Can DIMENSIONS in mm (inches)			CUBISIC
I	L	H	weight (g)
35 (1,378)	35 (1,378)	16 (0,630)	30
35 (1,378)	50 (1,969)	16 (0,630)	40
45 (1,772)	35 (1,378)	12 (0,472)	30
45 (1,772)	50 (1,969)	12 (0,472)	45
45 (1,772)	75 (2,953)	12 (0,472)	60

* Unit weight = typical values
Possible variations of = ± 25 % according to different voltage and capacitance.

1.3. Axial types

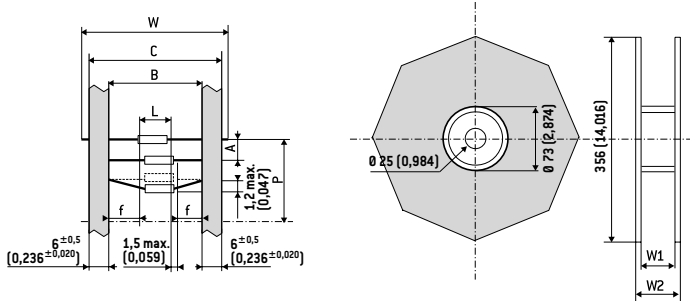| Can DIMENSIONS in mm (inches)		PRORELSIC RELSIC	PRORELSIC PROMISIC	SICAL CO 42 SICAL
Ø	H	Unit weight * (g)	Unit weight * (g)	Unit weight * (g)
6,5 (0,256)	15 (0,591)	-	1,6	-
6,5 (0,256)	19 (0,748)	-	1,8	1,8
8,5 (0,335)	19 (0,748)	-	2,3	2,3
10 (0,394)	19 (0,748)	-	2,8	2,8
10 (0,394)	25 (0,984)	-	3,5	3,5
10 (0,394)	28 (1,102)	-	3,8	-
12 (0,472)	25 (0,984)	-	5	-
12 (0,472)	30 (1,181)	-	5,4	5,4
14 (0,551)	30 (1,181)	-	6,9	6,9
14 (0,551)	41 (1,614)	-	9,5	-
(0,630)	30 (1,181)	7,7	-	7,7
18 (0,709)	35 (1,378)	13,6	-	-
18 (0,709)	40 (1,575)	15,3	-	15,3
21 (0,827)	40 (1,575)	19,5	-	19,5
25 (0,984)	40 (1,575)	28	-	28
25 (0,984)	50 (1,969)	35	-	35
25 (0,984)	75 (2,953)	56	-	56

* Unit weight = typical values
Possible variations of = ± 25 % according to different voltage and capacitance.

General technical data

2. PACKAGING ON TAPE

2.1. Axial types

Dimensions and tolerance in accordance with IEC 60 286-

DIMENSIONS in mm (inches)									
D	L max.	B	A	P	C max.	W₁	W₂ max.	W	n [2]
6,5 (0,256) 8,5 (0,335) [1]	20 (0,787)	73±1,5 (2,874±0,059)	10±1,5 (0,394±0,059)	± 2 (0,079)	87,5 (3,445)	93 (3,661)	106 (3,661)	85±1,5 (3,346±0,059)	1000 (39,370) 750 (29,528)
10 (0,394) [1] 12 (0,472) [1] 14 (0,551) [1]	32 (1,260)	73±1,5 (2,874±0,059)	15±1,5 (0,591±0,059)	± 3 (0,118)	87,5 (3,445)	93 (3,661)	106 (3,661)	85±1,5 (3,346±0,059)	400 (15,748) 400 (15,748) 200 (7,874)

(1) On tape only on request
(2) n = number of capacitors per reel.

White positive tape ƒ : > 20 mm (0,787 inches)
P: 10 space