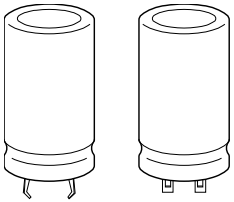
Aluminum electrolytic capacitors

Capacitors for pulse applications
with snap-in and solder lug terminals

Series/Type: **B43415, B43416**
Date: December 2006



B43416 B43415

Application

- Professional flash light generators

Features

- Compact design
- Outstanding reliability
- High charge/discharge proof, polar
- PAPR (protection against polarity reversal)

Construction

- Aluminum case, fully insulated
- Case with safety vent

Terminals

- Snap-in
- Solder lug

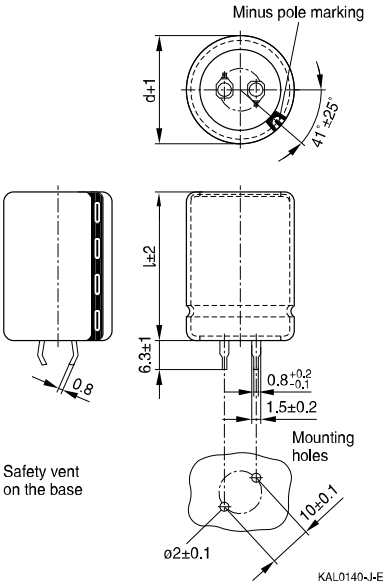
Overview

Temperature °C	Series	Useful life	Features	V_R V DC	C_R µF
+60	B43416 Snap-in	> 30000 flashes	– Compact – Easy PCB mounting – Outstanding reliability – Low leakage current – Low dissipation factor	300 ... 500	200 ... 1500
	B43415 Solder lug				1000 ... 6600

Specifications and characteristics in brief

Rated voltage	V_R	300 ... 500 V DC		
Discharge voltage	$V_{discharge}$	50 V DC		
Rated capacitance	C_R	200 ... 6600 µF		
Capacitance tolerance	ΔC_R	−10/+20%		
Leakage current (5 min, 20 °C)	I_{leak}	$I_{leak} \leq 0.3\ \mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{V_R}{V}\right)^{0.7} + 4\ \mu A$		
Dissipation factor	tan δ	15%		
Useful life		> 30000 flashes at:		Requirements:
		Case temperature	≤ 60 °C	$\Delta C/C$ ≤ ±30% of initial value
		Flash repetition rate	≥ 2 s	ESR ≤ 3 times initial specified limit
		Max. flashes per week	≤ 10000	I_{leak} ≤ initial specified limit
		Charge resistance	10 Ω	
		Discharge resistance	0.5 Ω	
Vibration resistance test		To IEC 60068-2-6, test Fc: Displacement amplitude 0.35 mm, frequency range 10 Hz ... 55 Hz, acceleration max. 5 *g*, duration 3 × 2 h. Capacitor mounted by its body which is rigidly clamped to the work surface.		
IEC climatic category		$V_R \leq 400$ V DC: 40/060/56 (−40 °C/+60 °C/56 days damp heat test) $V_R > 400$ V DC: 25/060/56 (−25 °C/+60 °C/56 days damp heat test)		

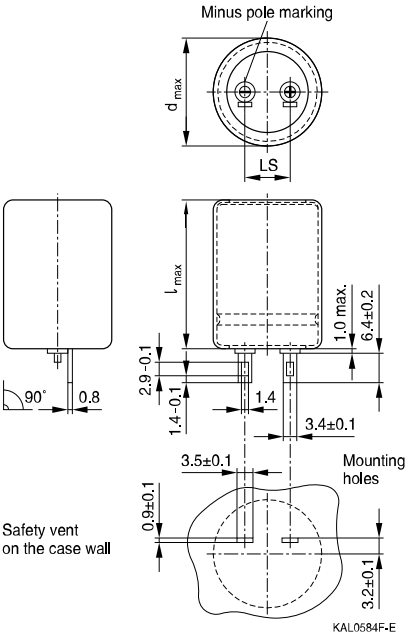
Dimensional drawing
B43416, snap-in terminals



Dimensions, weights and packing units

d × l mm	Approx. weight g	Packing units pcs.
25 × 45	25	130
30 × 40	36	80
30 × 50	46	80
35 × 45	56	60
35 × 50	70	60

Dimensional drawing
B43415, solder lug terminals



Dimensions, weights and packing units

$d_{max} \times l_{max}$ mm	Lead spacing (LS) mm	Approx. weight g	Packing units pcs.
35.8 × 55.8	10.0	66	59
35.8 × 65.8	10.0	82	59
40.8 × 65.8	10.0	115	42
40.8 × 70.8	10.0	130	42
40.8 × 80.8	10.0	150	42
40.8 × 90.8	10.0	160	42
40.8 × 105.8	10.0	180	42
40.8 × 110.8	10.0	190	42
50.8 × 80.8	20.0	230	28
50.8 × 100.8	20.0	270	28

Technical data and ordering codes – B43416

C_R 100 Hz 20 °C µF	Case dimensions d × l mm	$I_{leak,max}$ 5 min. 20 °C mA	Ordering code
V_R = 300 V DC			
1000	30 × 50	2.0	B43416A3108A000
1500	35 × 50	2.7	B43416A3158A000
V_R = 330 V DC			
1000	35 × 45	2.2	B43416A8108A000
1200	35 × 50	2.5	B43416A8128A000
V_R = 360 V DC			
560	30 × 40	1.5	B43416A9567A000
1100	35 × 50	2.6	B43416A9118A000
V_R = 400 V DC			
330	25 × 45	1.2	B43416A9337A000
700	35 × 45	2.0	B43416A9707A000
V_R = 500 V DC			
200	25 × 45	0.9	B43416A6207A000
560	35 × 50	2.0	B43416A6567A000

Technical data and ordering codes – B43415

C_R 100 Hz 20 °C µF	Case dimensions $d_{max} \times l_{max}$ mm	$I_{leak,max}$ 5 min. 20 °C mA	Ordering code
V_R = 300 V DC			
2100	35.8 × 65.8	3.4	B43415A3218A000
3000	40.8 × 70.8	4.4	B43415A3308A000
4700	40.8 × 105.8	6.0	B43415A3478A000
6600	50.8 × 100.8	7.7	B43415A3668A000
V_R = 330 V DC			
2100	40.8 × 65.8	3.7	B43415A8218A000
3000	40.8 × 80.8	4.7	B43415A8308A000
3800	40.8 × 105.8	5.6	B43415A8388A000
5600	50.8 × 100.8	7.3	B43415A8568A000
V_R = 360 V DC			
2100	40.8 × 65.8	3.9	B43415A9218A000
3000	40.8 × 90.8	5.0	B43415A9308A000
3800	40.8 × 110.8	5.9	B43415A9388A000
V_R = 400 V DC			
1000	35.8 × 55.8	2.5	B43415A9108A000
2100	40.8 × 80.8	4.2	B43415B9218A000
3000	40.8 × 110.8	5.4	B43415B9308A000
3800	50.8 × 100.8	6.4	B43415B9388A000
V_R = 500 V DC			
1000	40.8 × 65.8	2.9	B43415A6108A000
2100	50.8 × 80.8	4.9	B43415A6218A000

Packing of snap-in capacitors

Packing of solder lug capacitors

For ecological reasons the packing is pure cardboard.

General technical information

Capacitance

The DC capacitance is the decisive factor for the energy yield. This characteristic is approximately 1.2 times the AC capacitance. Since the loss angle can only be determined using alternating currents and the AC capacitance is measured together with this value, it is usual to state the AC capacitance. The values are measured at a frequency of 100 Hz.

Leakage current (measuring conditions)

The leakage current value limits quoted by EPCOS apply to the capacitors in new condition. When the leakage current is determined, the current is measured after the capacitor has been connected, for a period of five minutes, via a 1 kΩ resistor to a stabilized power supply set to the rated voltage.

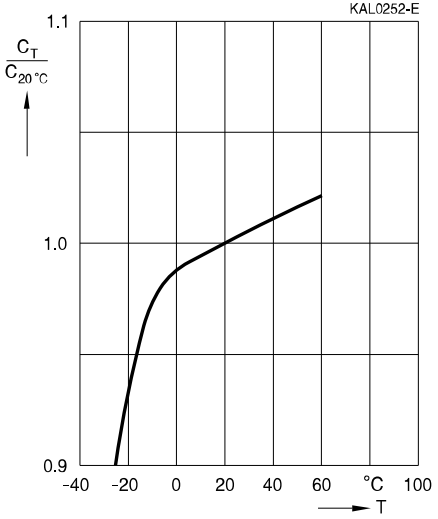
Temperature

The attached diagram shows the temperature dependence of the leakage current. In order to prevent thermal instabilities, switching loads that can lead to overtemperatures of more than 15 K shall not be applied.

AC capacitance versus temperature

V_R = 350 V DC

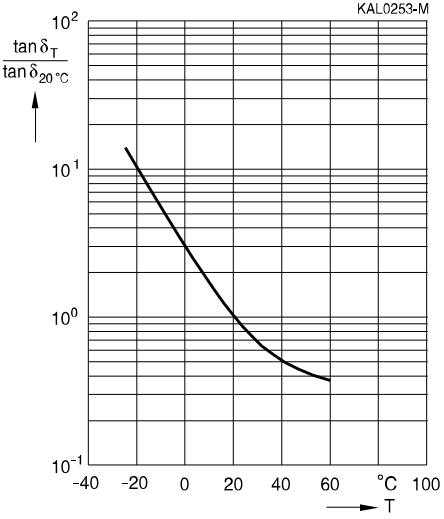
Typical behaviour



Dissipation factor tan δ versus temperature

V_R = 350 V DC, measuring frequency = 120 Hz

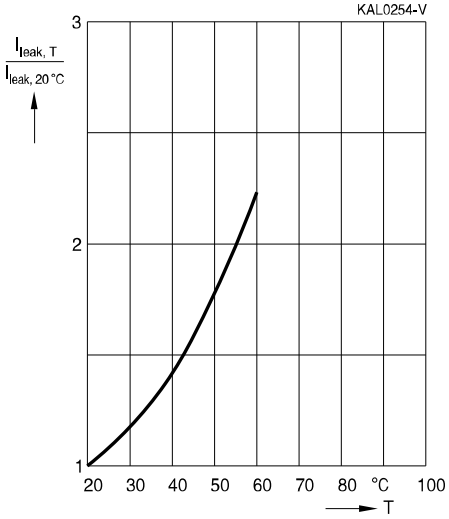
Typical behaviour



Leakage current I_{leak} versus temperature

Measurement duration = 5 minutes

Typical behaviour



Questionnaire

Please use the questionnaire when having other, improved or additional technical requirements which cannot be covered by our standard series.
The characteristic data listed in the questionnaire below are essentially the most important information for determining design dimensions of electrolytic capacitors for professional photo flash applications.

Rated capacitance per capacitor _____ µF

Rated voltage per capacitor _____ V DC

Charge/discharge voltage _____ / _____ V

Required dimensions: Diameter (max.) _____ mm

Length (max.) _____ mm

Style of terminals _____

Ambient temperature _____ ° C

Method of cooling _____

Discharge conditions

Internal resistance of the discharge tube (if applicable) _____ Ω

Charging resistance (series resistance) _____ Ω

No. of capacitors in series _____

No. of capacitors in parallel _____

Flash sequence _____

Pause periods _____

Other special operating conditions _____

Expected useful life _____ flashes

Annual demand of capacitors _____

For any further support, please contact your nearest EPCOS representative.

Cautions and warnings

Personal safety

The electrolytes used by EPCOS have not only been optimized with a view to the intended application, but also with regard to health and environmental compatibility. They do not contain any solvents that are detrimental to health, e.g. dimethyl formamide (DMF) or dimethyl acetamide (DMAC).

Furthermore, part of the high-voltage electrolytes used by EPCOS are self-extinguishing. They contain flame-retarding substances which will quickly extinguish any flame that may have been ignited.

As far as possible, EPCOS does not use any dangerous chemicals or compounds to produce operating electrolytes. However, in exceptional cases, such materials must be used in order to achieve specific physical and electrical properties because no safe substitute materials are currently known. However, the amount of dangerous materials used in our products has been limited to an absolute minimum. Nevertheless, the following rules should be observed when handling Al electrolytic capacitors:

- Any escaping electrolyte should not come into contact with eyes or skin.
- If electrolyte does come into contact with the skin, wash the affected parts immediately with running water. If the eyes are affected, rinse them for 10 minutes with plenty of water. If symptoms persist, seek medical treatment.
- Avoid breathing in electrolyte vapor or mists. Workplaces and other affected areas should be well ventilated. Clothing that has been contaminated by electrolyte must be changed and rinsed in water.

Product safety

The table below summarize the safety instructions that must be observed without fail. A detailed description can be found in the relevant sections of chapter "General technical information".

Topic	Safety information	Reference Chapter "General technical information"
Polarity	Make sure that polar capacitors are connected with the right polarity.	1 "Basic construction of aluminum electrolytic capacitors"
Reverse voltage	Voltages polarity classes should be prevented by connecting a diode.	3.1.6 "Reverse voltage"
Upper category temperature	Do not exceed the upper category temperatur.	7.2 "Maximum permissible operating temperature"
Maintenance	Make periodic inspections of the capacitors. Before the inspection, make sure that the power supply is turned off and carefully discharge the electricity of the capacitors. Do not apply any mechanical stress to the capacitor terminals.	10 "Maintenance"
Mounting position of screw terminal capacitors	Do not mount the capacitor with the terminals (safety vent) upside down.	11.1. "Mounting positions of capacitors with screw terminals"
Mounting of single-ended capacitors	The internal structure of single-ended capacitors might be damaged if excessive force is applied to the lead wires. Avoid any compressive, tensile or flexural stress. Do not move the capacitor after soldering to PC board. Do not pick up the PC board by the soldered capacitor. Do not insert the capacitor on the PC board with a hole space different to the lead space specified.	11.4 "Mounting considerations for single-ended capacitors"
Robustness of terminals	The following maximum tightening torques must not be exceeded when connecting screw terminals: M5: 2 Nm M6: 2.5 Nm	11.3 "Mounting torques"
Soldering	Do not exceed the specified time or temperature limits during soldering.	11.5 "Soldering"

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Compact – up to 60 °C

Topic	Safety information	Reference Chapter "General technical information"
Soldering, cleaning agents	Do not allow halogenated hydrocarbons to come into contact with aluminum electrolytic capacitors.	11.6 "Cleaning agents"
Passive flammability	Avoid external energy, such as fire or electricity.	8.1 "Passive flammability"
Active flammability	Avoid overload of the capacitors.	8.2 "Active flammability"
		Reference Chapter "Capacitors with screw terminals"
Breakdown strength of insulating sleeves	Do not damage the insulating sleeve, especially when ring clips are used for mounting.	"Screw terminals - accessories"

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of a passive electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of a passive electronic component.
3. **The warnings, cautions and product-specific notes must be observed**.
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as "hazardous")**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
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