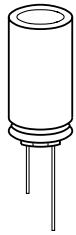
Aluminum electrolytic capacitors
Alu-X product lines

Single-ended capacitors

Series/Type: **B41022**
Date: August 2008

© EPCOS AG 2008. Reproduction, publication and dissemination of this publication and the information contained therein without EPCOS' prior express consent is prohibited.

General-purpose grade capacitors



Applications

- Car radio, EDP systems

Features

- RoHS-compatible
- Ultra compact – height up to 7 mm
- Load life of 1000 h at 105 °C

Construction

- Radial leads
- Aluminum case, fully insulated
- Charge-discharge proof
- Minus pole marking on the insulating sleeve
- Case with safety vent from diameter 8 mm

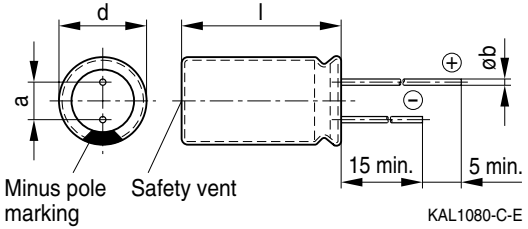
Delivery mode

- Bulk
- Taped, Ammo pack
- Cut
- Kinked

Specifications and characteristics in brief

Rated voltage V_R	6.3 … 63 V DC							
Operating temperature range	–40 °C … +105 °C							
Rated capacitance C_R (20 °C, 120 Hz)	0.1 … 220 µF							
Capacitance tolerance	±20% ≙ M							
Load life (105 °C, V_R, $I_{AC,R}$)	1000 h	Requirements: ΔC/C ≤ ±20% of initial value tan δ ≤ 2 times initial specified value I_{leak} ≤ initial specified limit						
Dissipation factor tan δ (20 °C, 120 Hz)	For capacitance higher than 1000 µF add 0.02 for every increase of 1000 µF							
	V_R (V DC)	6.3	10	16	25	35	50	63
	tan δ	0.24	0.20	0.16	0.14	0.12	0.10	0.08
Leakage current I_{leak} (20 °C, after 2 minutes)	$I_{leak} \leq 0.01\ \mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{V_R}{V}\right)$ or 3 µA, whichever is greater							
Low temperature stability (impedance ratio) (120 Hz)	V_R (V DC)			6.3	10 ... 16		25 ... 63	
	$\frac{Z(-40\ °C)}{Z(+20\ °C)}$			7	5		4	
Shelf life	After storage for 500 h at 105 °C, the capacitors shall meet the requirement of load life test after reforming process. After test: V_R to be applied for 30 minutes, 24 to 48 hours before measurement.							
Frequency multiplier for rated ripple current				50 Hz	120 Hz	1 kHz	≥10 kHz	
	6.3 V ... 16 V			0.68	1.00	1.28	1.38	
	25 V ... 35 V			0.48	1.00	1.27	1.59	
	50 V ... 63 V			0.45	1.00	1.40	2.00	
Temperature multiplier for rated ripple current	+50 °C	+70 °C		+85 °C		+105 °C		
	2.10	1.78		1.40		1.00		

Dimensional drawing



Safety vent for diameter ≥ 8 mm.

Case dimensions

d × l mm	$d_{max} \times l_{max}$ mm	a mm	b mm
4 × 7	4.5 × 8.0	1.5 ±0.5	0.45 ±0.05
5 × 7	5.5 × 8.0	2.0 ±0.5	0.45 ±0.05
6.3 × 7	6.8 × 8.0	2.5 ±0.5	0.45 ±0.05
8 × 7	8.5 × 8.0	3.5 ±0.5	0.50 ±0.05

Overview of available types

V_R (V DC)	6.3	10	16	25
	Case dimensions d × l (mm)			
C_R (µF)				
3.3				4 × 7
4.7			4 × 7	4 × 7
6.8			4 × 7	5 × 7
10			4 × 7	5 × 7
15		4 × 7	4 × 7	6.3 × 7
22	4 × 7	5 × 7	5 × 7	6.3 × 7
33	5 × 7	5 × 7	6.3 × 7	6.3 × 7
47	5 × 7	6.3 × 7	6.3 × 7	6.3 × 7
68	6.3 × 7	6.3 × 7	6.3 × 7	8 × 7
100	6.3 × 7	6.3 × 7	8 × 7	8 × 7
220	8 × 7	8 × 7	8 × 7	

Overview of available types

V_R (V DC)	35	50	63
	Case dimensions d × l (mm)		
C_R (µF)			
0.1		4 × 7	4 × 7
0.15		4 × 7	4 × 7
0.22		4 × 7	4 × 7
0.33		4 × 7	4 × 7
0.47		4 × 7	4 × 7
0.68		4 × 7	4 × 7
1.0	4 × 7	4 × 7	4 × 7
1.5	4 × 7	4 × 7	4 × 7
2.2	4 × 7	4 × 7	4 × 7
3.3	4 × 7	4 × 7	5 × 7
4.7	4 × 7	5 × 7	6.3 × 7
6.8	4 × 7	6.3 × 7	
10	5 × 7	6.3 × 7	
15	6.3 × 7		
22	6.3 × 7		
33	6.3 × 7		

Technical data and ordering codes

V_R V DC	C_R 120 Hz 20 °C µF	Case dimensions d × l mm	$I_{AC,R}$ 120 Hz 105 °C mA	Ordering code (composition see below)
6.3	22	4 × 7	34	B41022A2226M***
	33	5 × 7	42	B41022A2336M***
	47	5 × 7	50	B41022A2476M***
	68	6.3 × 7	70	B41022A2686M***
	100	6.3 × 7	77	B41022A2107M***
	220	8 × 7	130	B41022A2227M***
10	15	4 × 7	28	B41022A3156M***
	22	5 × 7	38	B41022A3226M***
	33	5 × 7	47	B41022A3336M***
	47	6.3 × 7	59	B41022A3476M***
	68	6.3 × 7	77	B41022A3686M***
	100	6.3 × 7	96	B41022A3107M***
	220	8 × 7	155	B41022A3227M***
16	4.7	4 × 7	20	B41022A4475M***
	6.8	4 × 7	24	B41022A4685M***
	10	4 × 7	29	B41022A4106M***
	15	4 × 7	35	B41022A4156M***
	22	5 × 7	44	B41022A4226M***
	33	6.3 × 7	57	B41022A4336M***
	47	6.3 × 7	68	B41022A4476M***
	68	6.3 × 7	81	B41022A4686M***
	100	8 × 7	117	B41022A4107M***
	220	8 × 7	173	B41022A4227M***
25	3.3	4 × 7	16	B41022A5335M***
	4.7	4 × 7	19	B41022A5475M***
	6.8	5 × 7	25	B41022A5685M***
	10	5 × 7	33	B41022A5106M***
	15	6.3 × 7	42	B41022A5156M***
	22	6.3 × 7	51	B41022A5226M***
	33	6.3 × 7	63	B41022A5336M***
	47	6.3 × 7	78	B41022A5476M***
	68	8 × 7	92	B41022A5686M***
	100	8 × 7	111	B41022A5107M***

*** = Version
000 = for standard leads, bulk
001 = for kinked leads, bulk
002 = for cut leads, bulk
016 = for taped leads, Ammo pack, lead spacing a = 2.0 mm
007 = for taped leads, Ammo pack, lead spacing a = 2.5 mm
006 = for taped leads, Ammo pack, lead spacing a = 3.5 mm
008 = for taped leads, Ammo pack, lead spacing a = 5.0 mm

Technical data and ordering codes

V_R V DC	C_R 120 Hz 20 °C µF	Case dimensions d × l mm	$I_{AC,R}$ 120 Hz 105 °C mA	Ordering code (composition see below)
35	1.0	4 × 7	11	B41022A7105M***
	1.5	4 × 7	13	B41022A7155M***
	2.2	4 × 7	16	B41022A7225M***
	3.3	4 × 7	20	B41022A7335M***
	4.7	4 × 7	24	B41022A7475M***
	6.8	4 × 7	29	B41022A7685M***
	10	5 × 7	36	B41022A7106M***
	15	6.3 × 7	47	B41022A7156M***
	22	6.3 × 7	57	B41022A7226M***
	33	6.3 × 7	72	B41022A7336M***
50	0.1	4 × 7	1.0	B41022A6104M***
	0.15	4 × 7	1.2	B41022A6154M***
	0.22	4 × 7	2.3	B41022A6224M***
	0.33	4 × 7	4.7	B41022A6334M***
	0.47	4 × 7	5.0	B41022A6474M***
	0.68	4 × 7	8.2	B41022A6684M***
	1.0	4 × 7	10	B41022A6105M***
	1.5	4 × 7	12	B41022A6155M***
	2.2	4 × 7	19	B41022A6225M***
	3.3	4 × 7	24	B41022A6335M***
	4.7	5 × 7	29	B41022A6475M***
	6.8	6.3 × 7	36	B41022A6685M***
	10	6.3 × 7	44	B41022A6106M***
63	0.1	4 × 7	1.3	B41022A8104M***
	0.15	4 × 7	1.5	B41022A8154M***
	0.22	4 × 7	2.5	B41022A8224M***
	0.33	4 × 7	5.0	B41022A8334M***
	0.47	4 × 7	5.5	B41022A8474M***
	0.68	4 × 7	9.0	B41022A8684M***
	1.0	4 × 7	11	B41022A8105M***
	1.5	4 × 7	14	B41022A8155M***
	2.2	4 × 7	20	B41022A8225M***
	3.3	5 × 7	25	B41022A8335M***
	4.7	6.3 × 7	32	B41022A8475M***

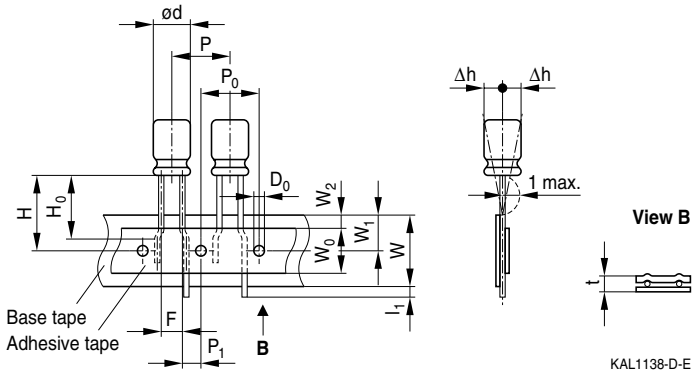
*** = Version
000 = for standard leads, bulk
001 = for kinked leads, bulk
002 = for cut leads, bulk
016 = for taped leads, Ammo pack, lead spacing a = 2.0 mm
007 = for taped leads, Ammo pack, lead spacing a = 2.5 mm
006 = for taped leads, Ammo pack, lead spacing a = 3.5 mm
008 = for taped leads, Ammo pack, lead spacing a = 5.0 mm

Taping, packing and lead configurations of single-ended capacitors

Single-ended capacitors are available taped in Ammo pack from diameter 4 to 10 mm as follows:

Lead spacing 2.0 mm (∅ d = 4 ... 5 mm)

Last 3 digits of ordering code: 016

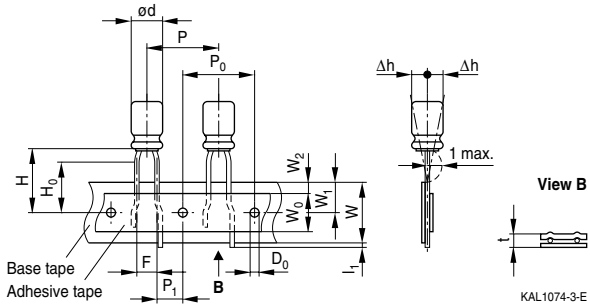


Dimensions in mm

∅ d	F	H	W	W_0	W_1	W_2	P	P_0	P_1	l_1	t	Δh	D_0
4 ... 5	2.0	18.5	18.0	7.0	9.0	3.0	12.7	12.7	5.10	1.0	0.7	1	4.0
	–0.2	±0.75	±0.5	min.	±0.5	max.	±1.0	±0.3	±0.7	max.	±0.2	±1.0	±0.2

Lead spacing 2.5 mm (∅ d = 4 ... 6.3 mm)

Last 3 digits of ordering code: 007

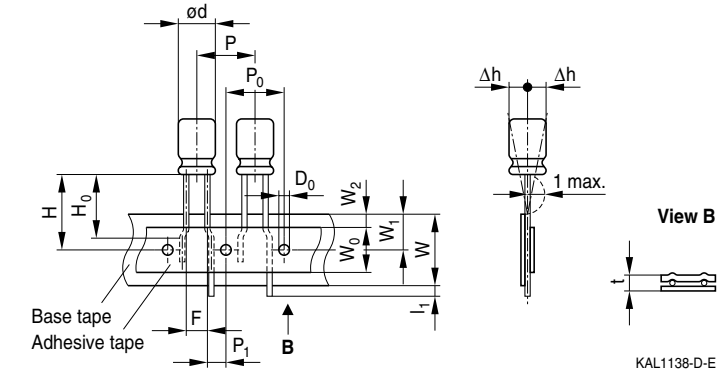


Dimensions in mm

∅ d	F	H	H_0	W	W_0	W_1	W_2	P	P_0	P_1	l_1	t	Δh	D_0
4 ... 6.3	2.5	18.5	16.0	18.0	7.0	9.0	3.0	12.7	12.7	5.10	1.0	0.7	0	4.0
Tolerance	–0.2	±0.75	±0.5	±0.5	min.	±0.5	max.	±1.0	±0.3	±0.7	max.	±0.2	±1.0	±0.2

Lead spacing 3.5 mm (∅ d = 8 mm)

Last 3 digits of ordering code: 006

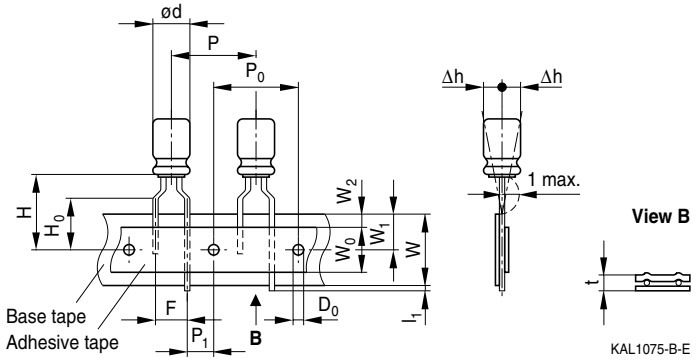


Dimensions in mm

∅ d	F	H	W	W_0	W_1	W_2	P	P_0	P_1	l_1	t	Δh	D_0
8	3.5	18.5	18.0	10	9.0	3.0	12.7	12.7	5.10	1.0	0.7	1	4.0
Tolerance	±0.5	±0.75	±0.5	min.	±0.5	max.	±1.0	±0.3	±0.7	max.	±0.2	max.	±0.2

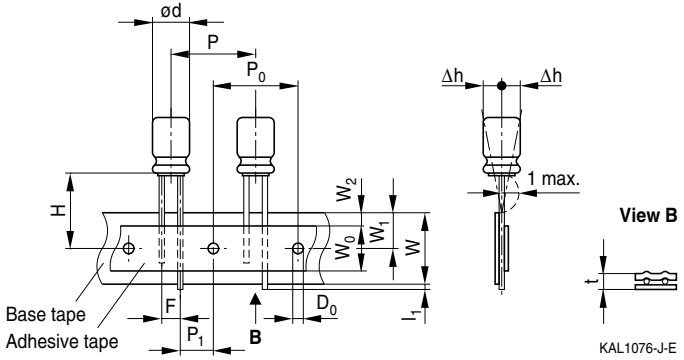
Lead spacing 5.0 mm (∅ d = 4 ... 8 mm)

Last 3 digits of ordering code: 008



Lead spacing 5.0 mm (∅ d = 10 mm)

Last 3 digits of ordering code: 008



Dimensions in mm

∅ d	F	H	H_0	W	W_0	W_1	W_2	P	P_0	P_1	L_1	t	Δh	D_0
4 ... 6.3	5.0	18.5	16	18.0	7.0	9.0	3.0	12.7	12.7	3.85	1.0	0.6	2.0	4.0
8	5.0	18.5	16	18.0	10	9.0	3.0	12.7	12.7	3.85	1.0	0.6	2.0	4.0
10	5.0	18.5	–	18.0	12.5	9.0	3.0	12.7	12.7	3.85	1.0	0.6	2.0	4.0
Tolerance	+0.6 −0.2	±0.75	±0.5	+1.0 −0.5	+1.0 −0	±0.5	max.	±0.5	±0.3	±0.7	max.	+0.3 −0.2	max.	±0.2

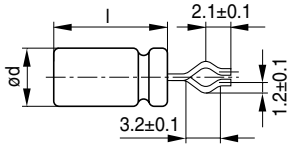
Taping is available up to dimensions d × l = 10 × 20 mm. For ∅ 12.5, 16 and 18 mm taping is not available.

Kinked or cut leads

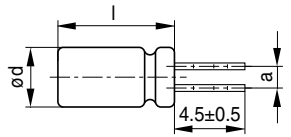
Single-ended capacitors are available with kinked or cut leads. Other lead configurations also available on request.

Kinked leads

Last 3 digits of ordering code: 001



KAL1137-5



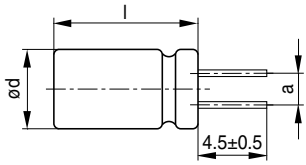
KAL1084-A

Case size d × l (mm)	a (mm)
4 × 7	1.5
5 × 7	2.0
5 × 11	2.0
6.3 × 7	2.5
6.3 × 11	2.5
6.3 × 15	2.5
8 × 7	3.5
8 × 11.5	3.5
8 × 15	3.5
8 × 20	3.5
10 × 12.5	5.0
10 × 16	5.0
10 × 20	5.0
10 × 25	5.0
10 × 31.5	5.0

Case size d × l (mm)	a (mm)
12.5 × 16	5.0
12.5 × 20	5.0
12.5 × 25	5.0
12.5 × 31.5	5.0
12.5 × 35.5	5.0
12.5 × 40	5.0
16 × 20	7.5
16 × 25	7.5
16 × 31.5	7.5
16 × 35.5	7.5
16 × 40	7.5
18 × 20	7.5
18 × 25	7.5
18 × 31.5	7.5
18 × 35.5	7.5
18 × 40	7.5

Cut leads

Last 3 digits of ordering code: 002



KAL1086-R

Case size d × l (mm)	a (mm)
4 × 7	1.5
5 × 7	2.0
5 × 11	2.0
6.3 × 7	2.5
6.3 × 11	2.5
6.3 × 15	2.5
8 × 7	3.5
8 × 11.5	3.5
8 × 15	3.5
8 × 20	5.0
10 × 12.5	5.0
10 × 16	5.0
10 × 20	5.0
10 × 25	5.0
10 × 31.5	5.0

Case size d × l (mm)	a (mm)
12.5 × 16	5.0
12.5 × 20	5.0
12.5 × 25	5.0
12.5 × 31.5	5.0
12.5 × 35.5	5.0
12.5 × 40	5.0
16 × 20	7.5
16 × 25	7.5
16 × 31.5	7.5
16 × 35.5	7.5
16 × 40	7.5
18 × 20	7.5
18 × 25	7.5
18 × 31.5	7.5
18 × 35.5	7.5
18 × 40	7.5

General

Also see “Important notes” on page 15.

1 Aluminum electrolytic capacitors have a bi-polar structure. This is marked on the body of the capacitor. A capacitor must not be mounted with reversed polarity. The application of an AC or reverse voltage may cause a short circuit or damage the capacitor. Bi-polar capacitors must not be used in AC applications, where the polarity may be reversed in the circuits or is unknown.

2 The DC voltage applied to the capacitor terminal must not exceed its rated operating voltage, as this will result in a rapid increase of the leakage current and may damage the capacitor. It is recommended to operate the capacitor at 70–80% of its rated voltage to optimize its service life.

3 The ripple current applied to the capacitor must be within the permitted range. An excessive ripple current leads to impaired electrical properties and may damage the capacitor. Note that the sum of the peak values of the ripple voltage and the DC operating voltage must not exceed the rated DC voltage.

4 Capacitors must be used within their permitted range of operating temperature. Operation at room temperature optimizes their service life.

5 Capacitors with case diameter ≥8 mm are equipped with a safety vent. In capacitors fitted with a lead or soldering lug, the safety vent is usually located at the base of the case. It needs sufficient space around it to operate optimally. The following dimensions are recommended: for case diameter d = 8 to 16 mm, more than 2 mm; for d = 18 to 35 mm, more than 3 mm; and for d = 42 mm or more, more than 5 mm.

6 Capacitors should not be mounted with the safety vent face down on the board. Do not locate any wire or copper trace near the safety vent. Do not reverse the voltage, as this may result in excess pressure and the leakage of electrolyte.

7 Gas is released through the safety vent when the pressure inside the capacitor is too high. A gaseous liquid around the safety vent does not indicate a leakage of electrolyte.

8 The capacitor should be stored under conditions of normal temperature and in a non-acid, non-alkali environment of normal humidity. Exposure to high temperatures, for example under direct sunlight, will reduce its operating life. If the capacitor is stored in an environment containing acids or alkalis, the solderability of the leads may be affected.

9 The leakage current of an aluminum electrolytic capacitor may increase after a long period of storage. After such storage, the capacitor must be aged by applying the rated operating voltage for 6–8 hours before use.

10 Manual soldering:

a Soldering must be performed within the specified conditions.
Bit temperature: 350 °C; application time of soldering iron: 3 seconds.

b Ensure that the soldering iron does not touch any part of the capacitor body.

11 Do not apply excessive force to the leads and terminals. Do not move the capacitor after soldering it onto the PC board and do not carry the PC board by gripping the capacitor. Observe the following rules to prevent undue stress to the capacitor:

a Do not tilt or bend the capacitor after soldering.
b Ensure that the terminal spacing matches the corresponding hole spacing on the PC board.

12 The aluminum case is not insulated from the cathode. Do not place a conductor under the aluminum capacitors on the PC board as this may cause a short circuit. The case and top of capacitors used in switched mode power supplies have a high-voltage-resistant heat shrink sleeve to ensure safe usage.

13 The leads of capacitors with a case diameter exceeding 14 mm cannot be used for fixing.

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 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 an 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 an 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.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.

   We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, BAOKE, Alu-X, CeraDiode, CSSP, CTVS, DSSP, MiniBlue, MKK, MLSC, MotorCap, PCC, PhaseCap, PhaseMod, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SIMID, SineFormer, SIOV, SIP5D, SIP5K, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.