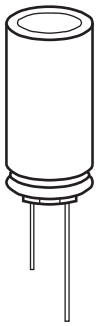
Aluminum electrolytic capacitors

Single-ended capaci or

Series/Type: **B43896**

Da e: December 2019

Long-life grade capacitors



Applications

- A omo i e elec ronic (pie o injec ion, DC-link con er er)
- High empera re en ironmen

Features

- High ol age de ign
- High ripple c rren capabili
- Wide empera re range
- Lo ESR a –40 °C
- RoHS-compa ible

Construction

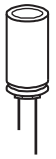
- Radial lead
- Charge-di charge proof, polar
- Al min m ca e i h PET in la ing lee e
- Min pole marking on he in la ing lee e
- S and-off r bber eal
- Ca e i h afe en

Delivery mode

Terminal config ra ion and packing:

- B lk
- Taped, Ammo pack
- C
- Kinked
- PAPR (Pro ec ion Again Polari Re er al):
  crimped lead , J lead , ben lead

Refer o chap er "Single-ended capaci or – Taping, packing and lead config ra ion " for f r her de ail .



Specifications and characteristics in brief

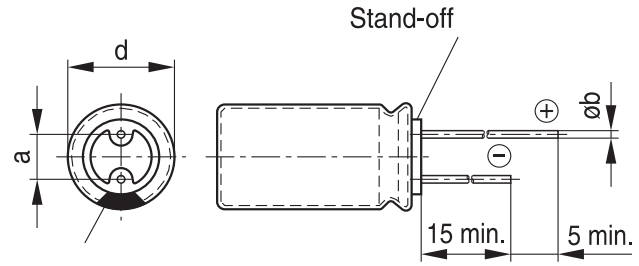
Ra ed ol age V_R S rge ol age V_S	160 ... 250 V DC 1.1 · V_R		
Ra ed capaci ance C_R Capaci ance olerance	33 ... 270 µF ±20% ≙ M		
Di ipa ion fac or an δ (20 °C, 120 H⌄)	an δ (ma .) = 0.20		
Leakage c rren I_{leak} (20 °C, 5 min)	$I_{leak} = 0.03\,\mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{V_R}{V}\right) + 15\,\mu A$		
Self-ind c ance ESL	Diame er (mm)	16	18
	ESL (nH)	26	34
U ef l life[1)] 125 °C; V_R; $I_{AC,R}$	> 4000 h		Req iremen : |ΔC/C| ≤ 30% of ini ial al e an δ ≤ 3 ime ini ial pecified limi I_{leak} ≤ ini ial pecified limi
Vol age end rance e 125 °C; V_R	4000 h		Po e req iremen : |ΔC/C| ≤ 25% of ini ial al e an δ ≤ 2 ime ini ial pecified limi I_{leak} ≤ ini ial pecified limi
Vibra ion re i ance e	To IEC 60068-2-6, e Fc: Freq enc range 10 H⌄ ... 2 kH⌄, di placemen ampli de ma . 1.5 mm, accelera ion ma . 20 *g,* d ra ion 3 × 2 h. Capaci or rigidl clamped b he al min m ca e e.g. ing o r andard fi re		
IEC clima ic ca egor	To IEC 60068-1: 40/125/56 (−40 °C/+125 °C/56 da damp hea e)		
Sec ional pecifica ion	IEC 60384-4		
Reference andard	AEC-Q200[2)]		

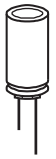
1) Refer o chap er "General echnical informa ion, 5 U ef l life" on ho o in erpre ef l life.
2) Refer o chap er "General echnical informa ion, 2.3 AEC-Q200 andard" for f r her de ail .

Dimensional drawing

With stand-off rubber seal

Diame er (mm): 16, 18

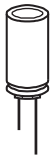




Overview of available types

O her ol age and capaci ance ra ing are a ailable pon req e .

V_R (V DC)	160	250
	Ca e dimen ion d × l (mm)	
C_R (µF)		
33		16 × 20
47		18 × 20
56		18 × 25
68	16 × 20	18 × 31.5
100	18 × 20	18 × 35
120	18 × 25	
140		18 × 40
180	18 × 31.5	
220	18 × 35	
270	18 × 40	



B43896

High voltage – 125 °C

Technical data and ordering codes

C_R 120 Hz 20 °C µF	Case dimension d × l mm	ESR_{max} 10 kHz −40 °C Ω	ESR_{max} 10 kHz 20 °C Ω	Z_{max} 100 kHz 20 °C Ω	$I_{AC,R}$ 100 kHz 125 °C mA	Ordering code (composition see below)
V_R = 160 V DC						
68	16 × 20	16.9	0.297	0.284	730	B43896D1686M***
100	18 × 20	14.3	0.250	0.239	920	B43896D1107M***
120	18 × 25	12.0	0.210	0.201	1160	B43896D1127M***
180	18 × 31.5	9.7	0.171	0.163	1410	B43896D1187M***
220	18 × 35	7.5	0.131	0.125	1650	B43896D1227M***
270	18 × 40	5.2	0.092	0.088	1900	B43896D1277M***
V_R = 250 V DC						
33	16 × 20	16.9	0.297	0.284	730	B43896D2336M***
47	18 × 20	14.3	0.250	0.239	920	B43896D2476M***
56	18 × 25	12.0	0.210	0.201	1160	B43896D2566M***
68	18 × 31.5	9.7	0.171	0.163	1410	B43896D2686M***
100	18 × 35	7.5	0.131	0.125	1650	B43896D2107M***
140	18 × 40	5.2	0.092	0.088	1900	B43896D2147M***

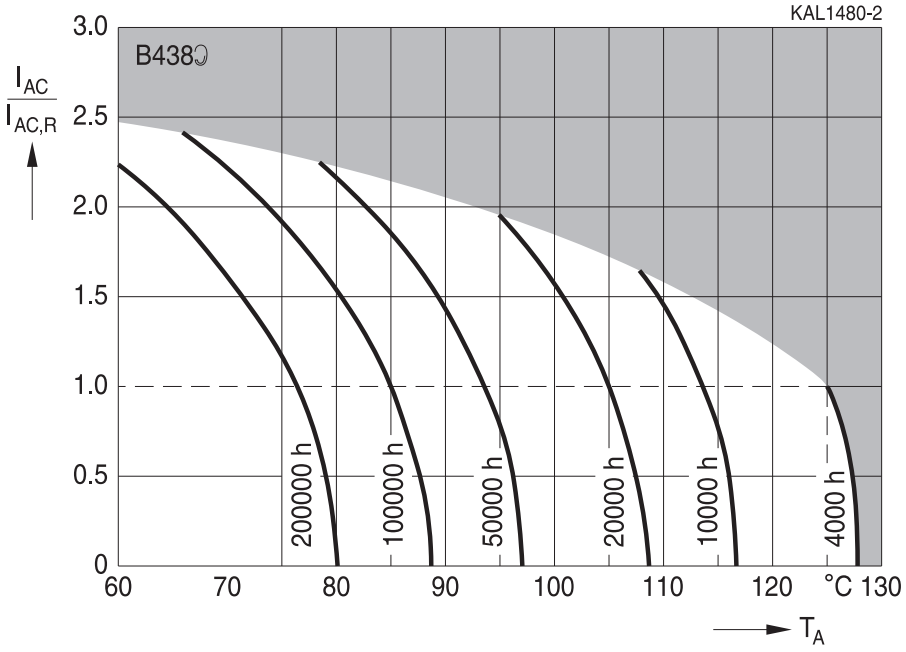
Composition of ordering code

*** = Version

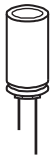
- 000 = for standard lead, bulk
- 001 = for kinked lead, bulk
- 002 = for cut lead, bulk
- 003 = for crimped lead, bling
- 004 = for J lead, bling (for all dimensions, excluding d × l = 18 × 40 mm)
- 009 = for taped lead, Ammo pack, lead spacing F = 7.5 mm
  (for all dimensions, excluding d × l = 18 × 35/40 mm)
- 012 = for bent 90° lead, bling

Useful life[1)]

depending on ambien empera re T_A nder ripple c rren opera ing condi ion



1) Refer o chap er "General echnical informa ion, 5 U ef l life" on ho o in erpre ef l life.



Taping

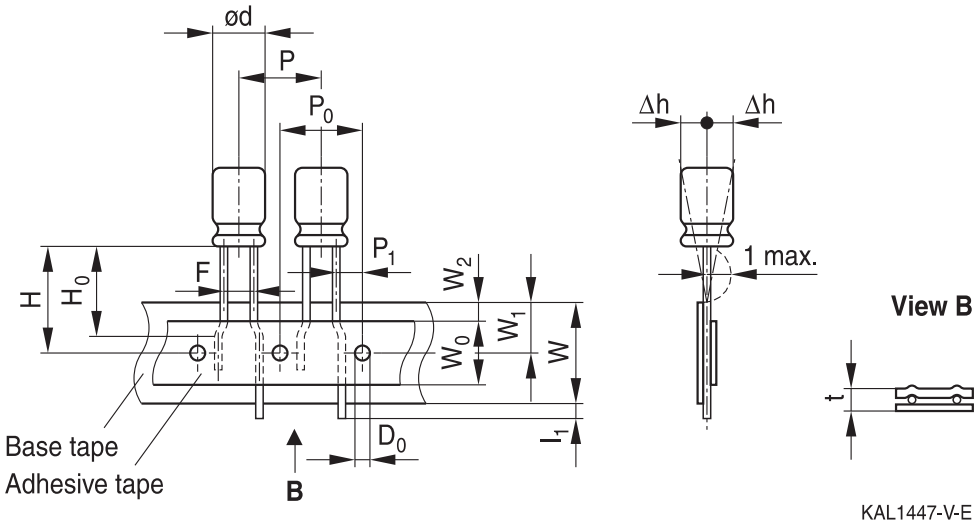
Single-ended capacitors are available taped in Ammo pack from diameter 8 to 18 mm as follows:

Lead spacing F = 3.5 mm (∅ d = 8 mm)
Lead spacing F = 5.0 mm (∅ d = 8 ... 12.5 mm)
Lead spacing F = 7.5 mm (∅ d = 16 ... 18 mm).

The dimensions for F, P_1 and 1 max. are specified with reference to the center of the terminal wire.

Lead spacing 3.5 mm (∅ d = 8 mm)

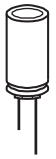
Last 3 digits of ordering code: 006



Dimensions in mm

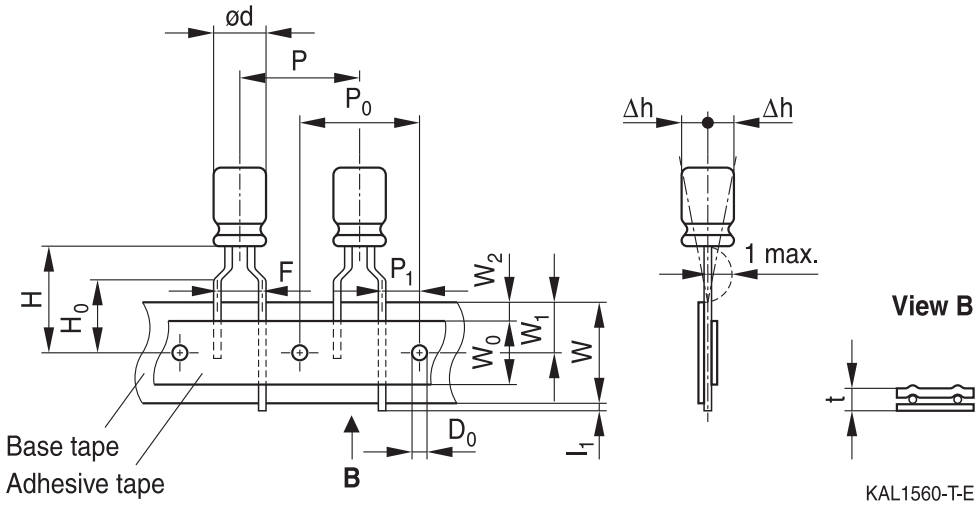
∅ d	F	H	W	W_0	W_1	W_2	P	P_0	P_1	I_1		Δh	D_0
8	3.5	18.5	18.0	9.5	9.0	3.0	12.7	12.7	4.6	1.0	0.7	1.0	4.0
Tolerance	+0.8 −0.2	±1.0	±0.5	min.	±0.5	max.	±1.0	±0.3	±0.6	max.	±0.2	max.	±0.2

Lead can also run straight through the taping area.



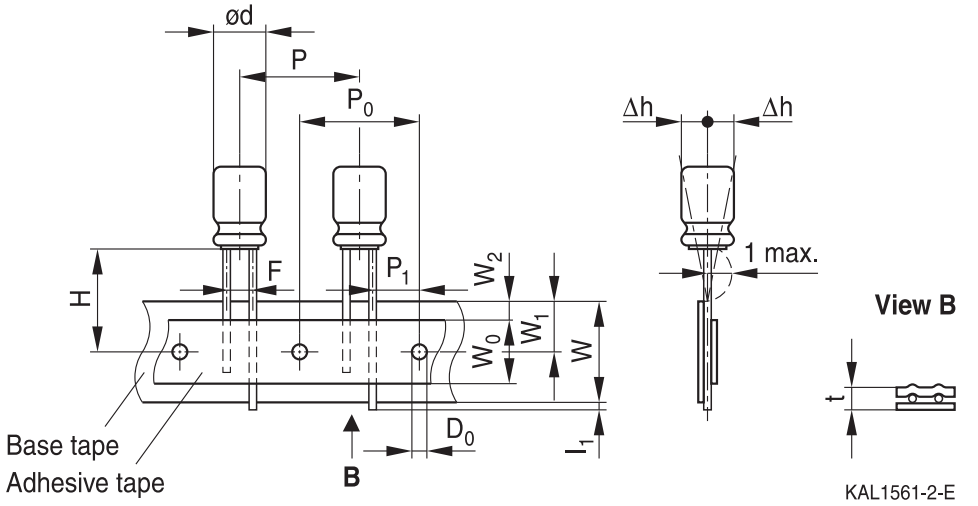
Lead spacing 5.0 mm (∅ d = 8 mm)

La 3 digi of ordering code: 008



Lead spacing 5.0 mm (∅ d = 10 ... 12.5 mm)

La 3 digi of ordering code: 008



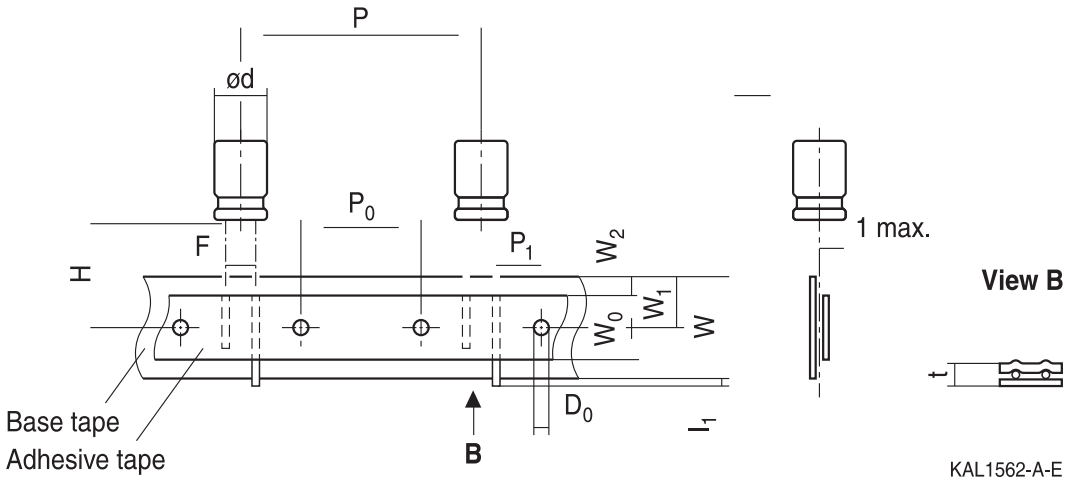
Dimensions in mm

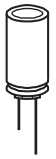
∅ d	F	H	W	W_0	W_1	W_2	H_0	P	P_0	P_1	I_1		Δh	D_0
8		20.0		9.5			16.0	12.7	12.7	3.85				
10	5.0	19.0	18.0	9.5	9.0	1.5	−	12.7	12.7	3.85	1.0	0.6	1.0	4.0
12.5		19.0		11.5			−	15.0	15.0	5.0				
Toler-ance	+0.8 −0.2	±0.75	±0.5	min.	±0.5	ma .	±0.5	±1.0	±0.2	±0.5	ma .	+0.3 −0.2	ma .	±0.2

Taping i a ailable p o dimen ion d × l = 12.5 × 25 mm.

Lead spacing 7.5 mm (∅ d = 16 ...18 mm)

La 3 digi of ordering code: 009





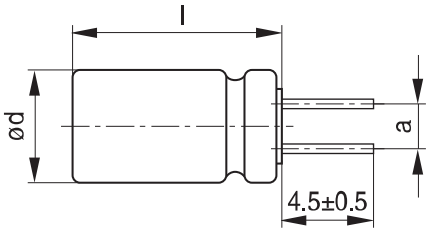
Cut or kinked leads

Single-ended capaci or are a ailable i h c or kinked lead . O her lead config ra ion al o a ailable pon req e .

Cut leads

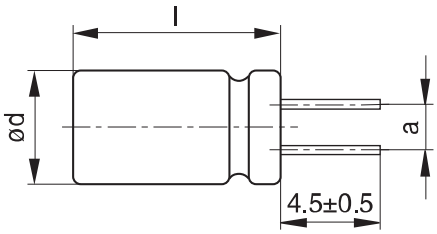
La 3 digi of ordering code: 002

With stand-off rubber seal



KAL1085-I

With flat rubber seal



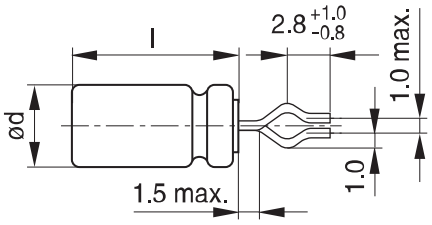
KAL1086-R

Ca e i e d × l (mm)	Dimen ion (mm) a ±0.5
10 × 12.5	5.0
10 × 16	5.0
10 × 20	5.0
12.5 × 20	5.0
12.5 × 25	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	7.5
18 × 40	7.5

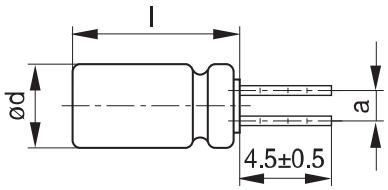
Kinked leads

La 3 digi of ordering code: 001

With stand-off rubber seal



KAL1081-K



KAL1083-2

Ca e i e d × l (mm)	Dimen ion (mm) a ±0.5
10 × 20	5.0
12.5 × 20	5.0
12.5 × 25	5.0
16 × 20	7.5
16 × 25	7.5
16 × 31.5	7.5

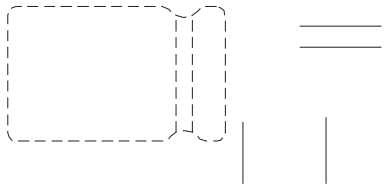
PAPR leads (Pro ec ion Again Polari Re er al)

The e lead config ra ion en re correc placemen of he capaci or on he PCB i h regard o polari . PAPR lead are a ailable for diame er from 10 mm p o 18 mm.
There are hree config ra ion a ailable: Crimped lead , J lead , ben 90° lead .

Crimped leads

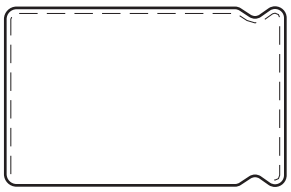
La 3 digi of ordering code: 003

With stand-off rubber seal



J leads

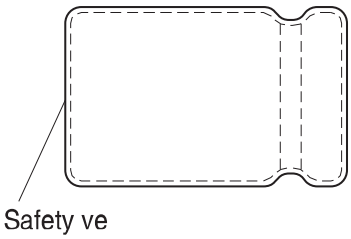
La 3 digi of ordering code: 004



KAL1091-S-E

Bent 90° leads for horizontal mounting pinning

La 3 digi of ordering code: 012

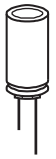


Safety ve

Packing units and box dimensions

Ammo pack

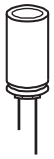
K



Overview of packing units and code numbers

							PAPR		
Case size d × l mm	Standard, bulk pcs.	Taped, Ammo pack pcs.			Kinked lead, bulk pcs.	Cut lead, bulk pcs.	Crimped lead, bulk pcs.	J lead, bulk pcs.	Bent 90° lead, bulk pcs.
8 × 11.5	1000	1000			–	–	–	–	
10 × 12.5	1000	750			–	1000	–	900	
10 × 16	1000	500			–	1000	–	675	
10 × 20	500	500			500	500	–	500	
12.5 × 20	350	500			350	350	–	300	1)
12.5 × 25	250	500			500	500	–	225	1)
16 × 20	250	300			200	200	200	200	420
16 × 25	250	300			200	200	216	216	216
16 × 31.5	200	300			250	250	180	180	180
16 × 35.5	100	–			100	100	150	150	150
16 × 40	125	–			100	100	72	72	72
18 × 20	175	250			175	175	200	200	420
18 × 25	150	250			150	150	200	200	200
18 × 31.5	100	250			100	100	150	150	150
18 × 35	100	–			100	100	150	150	150
18 × 40	125	–			100	100	72	–	72
The last three digits of the complete ordering code state the lead configuration	**000**	Code	F (mm)	d (mm)	**001**	**002**	**003**	**004**	**012**
		006	3.5	8					
		008	5	8...12.5					
		009	7.5	16...18					

1) Available on request



B43896

High voltage – 125 °C

Cautions and warnings

Personal safety

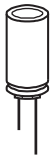
The elec rol e ed ha e been op imi ed bo h i h a ie o he in ended applica ion and i h regard o heal h and en ironmen al compa ibili . The do no con ain an ol en ha are de rimen al o heal h, e.g. dime h l formamide (DMF) or dime h l ace amide (DMAC).
F r hermore, ome of he high- ol age elec rol e ed are elf-e ing i hing.

A far a po ible, e do no e an dangero chemical or compo nd o prod ce opera ing elec rol e , al ho gh in e cep ional ca e , ch ma erial m be ed in order o achie e pecific ph ical and elec rical proper ie beca e no al erna i e ma erial are c rren l kno n. We do, ho e er, re ric he amo n of dangero ma erial ed in o r prod c o an ab ol e minim m.

Ma erial and chemical ed in o r al min m elec rol ic capaci or are con in o l adap ed in compliance i h he TDK Elec ronic Corpora e En ironmen al Polic and he la e EU reg la ion and g ideline ch a RoHS, REACH/SVHC, GADSL, and ELV.

MDS (Ma erial Da a Shee) are a ailable on o r eb i e for all pe li ed in he da a book.
MDS for c omer pecific capaci or are a ailable pon req e .
MSDS (Ma erial Safe Da a Shee) are a ailable for o r elec rol e pon req e .

Ne er hele , he follo ing r le ho ld be ob er ed hen handling al min m elec rol ic capaci or : No elec rol e ho ld come in o con ac i h e e or kin. If elec rol e doe come in o con ac i h he kin, a h he affec ed area immedia el i h r nning a er. If he e e are affec ed, rin e hem for 10 min e i h plen of a er. If mp om per i , eek medical rea men . A oid inhaling elec rol e apor or mi . Workplace and o her affec ed area ho ld be ell en ila ed. Clo hing ha ha been con amina ed b elec rol e m be changed and rin ed in a er.



Product safety

The able belo mmari e he afe in r c ion ha m be ob er ed i ho fail. A de ailed de crip ion can be fo nd in he rele an ec ion of epera e file chap er "General echnical informa ion".

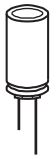
Topic	Safe informa ion	Reference chap er "General echnical informa ion"
Polari	Make re ha polar capaci or are connec ed i h he righ polari .	1 "Ba ic con r c ion of al min m elec rol ic capaci or "
Re er e ol age	Vol age of oppo i e polari ho ld be pre en ed b connec ing a diode.	3.1.6 "Re er e ol age"
Mo n ing po i ion of cre - erminal capaci or	Scre erminal capaci or m no be mo n ed i h erminal facing do n nle o her i e pecified.	11.1. "Mo n ing po i ion of capaci or i h cre erminal "
Rob ne of erminal	The follo ing ma im m igh ening orq e m no be e ceeded hen connec ing cre erminal : M5: 2.5 Nm M6: 4.0 Nm	11.3 "Mo n ing orq e "
Mo n ing of ingle-ended capaci or	The in ernal r c re of ingle-ended capaci or migh be damaged if e ce i e force i applied o he lead ire . A oid an compre i e, en ile or fle ral re . Do no mo e he capaci or af er oldering o PC board. Do no pick p he PC board b he oldered capaci or. Do no in er he capaci or on he PC board i h a hole pace differen o he lead pace pecified.	11.4 "Mo n ing con idera ion for ingle-ended capaci or "
Soldering	Do no e ceed he pecified ime or empera re limi d ring oldering.	11.5 "Soldering"
Soldering, cleaning agen	Do no allo halogena ed h drocarbon o come in o con ac i h al min m elec rol ic capaci or .	11.6 "Cleaning agen "
Upper ca egor empera re	Do no e ceed he pper ca egor empera re.	7.2 "Ma im m permi ible opera ing empera re"
Pa i e flammabili	A oid e ernal energ , e.g. fire.	8.1 "Pa i e flammabili "

Topic	Safe informa ion	Reference chap er "General echnical informa ion"
Ac i e flammabili	A oid o erload of he capaci or .	8.2 "Ac i e flammabili "
Main enance	Make periodic in pec ion of he capaci or . Before he in pec ion, make re ha he po er ppl i rned off and caref ll di charge he capaci or . Do no appl e ce i e mechanical re o he capaci or erminal hen mo n ing.	10 "Main enance"
S orage	Do no ore capaci or a high empera re or high h midi . Capaci or ho ld be ored a +5 o +35 °C and a rela i e h midi of ≤ 75%.	7.3 "Shelf life and orage condi ion "
		Reference chap er "Capaci or i h cre erminal "
Breakdo n reng h of in la ing lee e	Do no damage he in la ing lee e, e peciall hen ring clip are ed for mo n ing.	"Scre erminal – acce orie "

Display of ordering codes for TDK Electronics products

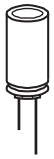
The ordering code for one and he ame prod c can be repre en ed differen l in da a hee , da a book , o her p blica ion , on he compan eb i e, or in order-rela ed doc men ch a hipping no e , order confirma ion and prod c label . The ar ing repre en a ion of he ordering code are d e o differen proce e emplo ed and do no affec he pecifica ion of he repec i e prod c .

De ailed informa ion can be fo nd on he In erne nder
. dk-elec ronic . dk.com/orderingcode .



Symbols and terms

S mbol	Engli h	German
C	Capaci ance	Kapa ̵i
C_R	Ra ed capaci ance	Nennkapa ̵i
C_S	Serie capaci ance	Serienkapa ̵i
$C_{S,T}$	Serie capaci ance a empera re T	Serienkapa ̵i bei Tempera r T
C_f	Capaci ance a freq enc f	Kapa ̵i bei Freq en ̵ f
d	Ca e diame er, nominal dimen ion	Geh ed rchme er, Nennma
d_{ma}	Ma im m ca e diame er	Ma imaler Geh ed rchme er
ESL	Self-ind c ance	Eigenind k i i
ESR	Eq i alen erie re i ance	Er a ̵ erien ider and
ESR_f	Eq i alen erie re i ance a freq enc f	Er a ̵ erien ider and bei Freq en ̵ f
ESR_T	Eq i alen erie re i ance a empera re T	Er a ̵ erien ider and bei Tempera r T
f	Freq enc	Freq en ̵
I	C rren	S rom
I_{AC}	Al erna ing c rren (ripple c rren)	Wech el rom
$I_{AC,RMS}$	Roo -mean- q are al e of al erna ing c rren	Wech el rom, Effek i er
$I_{AC,f}$	Ripple c rren a freq enc f	Wech el rom bei Freq en ̵ f
$I_{AC,ma}$	Ma im m permi ible ripple c rren	Ma imal ̵ l iger Wech el rom
$I_{AC,R}$	Ra ed ripple c rren	Nenn ech el rom
I_{leak}	Leakage c rren	Re rom
$I_{leak,op}$	Opera ing leakage c rren	Be rieb re rom
l	Ca e leng h, nominal dimen ion	Geh el nge, Nennma
l_{ma}	Ma im m ca e leng h (i ho erminal and mo n ing d)	Ma imale Geh el nge (ohne An chl e nd Ge indebol ̵en)
R	Re i ance	Wider and
R_{in}	In la ion re i ance	I ola ion ider and
R_{mm}	Balancing re i ance	S mme rier ider and
T	Tempera re	Tempera r
ΔT	Tempera re difference	Tempera rdifferen ̵
T_A	Ambien empera re	Umgeb ng empera r
T_C	Ca e empera re	Geh e empera r
T_B	Capaci or ba e empera re	Tempera r de Geh eboden
	Time	Zei
Δ	Period	Zei ra m
$_b$	Ser ice life (opera ing ho r)	Bra chbarkei da er (Be rieb ̵ei)



B43896

High voltage – 125 °C

S mbol	Engli h	German
V	Vol age	Spann ng
V_F	Forming ol age	Formier pann ng
V_{op}	Opera ing ol age	Be rieb pann ng
V_R	Ra ed ol age, DC ol age	Nenn pann ng, Gleich pann ng
V_S	S rge ol age	Spi ⌟en pann ng
X_C	Capaci i e reac ance	Kapa⌟i i er Blind ider and
X_L	Ind c i e reac ance	Ind k i er Blind ider and
Z	Impedance	Schein ider and
Z_T	Impedance a empera re T	Schein ider and bei Tempera r T
an δ	Di ipa ion fac or	Verl fak or
λ	Fail re ra e	A fallra e
ε_0	Ab ol e permi i i	Elek ri che Feldkon an e
ε_r	Rela i e permi i i	Dielek ri⌟i ⌟ahl
ω	Ang lar eloci ; 2 · π · f	Krei freq en⌟; 2 · π · f

Note

All dimen ion are gi en in mm.

Important notes

The follo ing applie o all prod c named in hi p blica ion:

1. Some par of hi p blica ion con ain **statements about the suitability of our products for certain areas of application**. The e a emen are ba ed on o r kno ledge of pical re- q iremen ha are of en placed on o r prod c in he area of applica ion concerned. We ne er hele e pre l poin o **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. A a r le, e are ei her nfamiliar i h indi id al c omer applica ion or le familiar i h hem han he c omer hem el e . For he e rea on , i i al a l ima el inc mben on he c omer o check and decide he her a prod c i h he proper ie de cribed in he prod c pecifica ion i i able for e in a par ic lar c omer applica ion.
2. We al o poin o ha **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 c omer applica ion req iring a er high le el of opera ional afe and e peciall in c omer applica ion in hich he malf nc ion or fail re of an elec ronic componen co ld endanger h man life or heal h (e.g. in acciden pre en ion or life a ing em), i m herefore be en red b mean of i able de ign of he c omer applica ion or o her ac ion aken b he c omer (e.g. in alla ion of pro ec i e circ i r or red ndanc) ha no inj r or damage i ained b hird par ie in he e en of malf nc ion or fail re of an elec ronic componen .
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order o a i f cer ain echnical req iremen , **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)**. U ef l informa ion on hi ill be fo nd in o r Ma- erial Da a Shee on he In erne (. dk-elec ronic . dk.com/ma erial). Sho ld o ha e an more de ailed q e ion , plea e con ac o r ale office .
5. We con an l ri e o impro e o r prod c . Con eq en l , **the products described in this publication may change from time to time**. The ame i r e of he corre ponding prod c pecifica ion . Plea e check herefore o ha e en prod c de crip ion and pecifica ion con ained in hi p blica ion are ill applicable before or hen o place an order. We al o **reserve the right to discontinue production and delivery of products**. Con eq en l , e canno g aran ee ha all prod c named in hi p blica ion ill al a be a ailable. The aforemen ioned doe no appl in he ca e of indi id al agreemen de ia ing from he fore- going for c omer- pecific prod c .
6. Unle o her i e agreed in indi id al con rac , **all orders are subject to our General Terms and Conditions of Supply**.

7. **Our manufacturing sites serving the automotive business apply the IATF 16949 standard.** The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements (“CSR”) TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System.** For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.
8. The rade name EPCOS, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPla , CSMP, CTVS, Del aCap, DigiSiMic, E oCore, Fil erCap, FormFi , LeaXield, MiniBl e, MiniCell, MKD, MKK, Mo orCap, PCC, Pha eCap, Pha eC be, Pha eMod, PhiCap, Po erHap, PQSine, PQ ar, SIFERRIT, SIFI, SIKOREL, Sil erCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, ThermoF e, WindCap are **trademarks registered or pending** in E rope and in o her co n rie . F r her informa ion ill be fo nd on he In erne a . dk-elec ronic . dk.com/ rademark .

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