SIEMENS

Ceramic Capacitors

Data Book 1986/87

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Table of Contents
Index of Ordering Codes

Table of Contents

Table of Contents

Index of Ordering Codes

Multilayer chip capacitors

Ordering Code	Rated voltage	Version	Material	Size	Page
B37871-K...	63 V	untaped	CG, C0G	1206	40
B37871-K...	100 V	untaped	CG, C0G	1206	42
B37871-K...	63 V	taped	CG, C0G	1206	54
B37871-K...	100 V	taped	CG, C0G	1206	56
B37872-K...	63 V	untaped	X7R	1206	44
B37872-K...	100 V	untaped	X7R	1206	46
B37872-K...	63 V	taped	X7R	1206	58
B37872-K...	100 V	taped	X7R	1206	60
B37872-L...	63 V	untaped	2C1	1206	48
B37872-L...	100 V	untaped	2C1	1206	50
B37872-L...	63 V	taped	2C1	1206	62
B37872-L...	100 V	taped	2C1	1206	64
B37873-K...	63 V	untaped	Z5U, 2F4	1206	52
B37873-K...	63 V	taped	Z5U, 2F4	1206	66
B37940-K...	63 V	untaped	CG, C0G	0805	40
B37940-K...	100 V	untaped	CG, C0G	0805	42
B37940-K...	63 V	taped	CG, C0G	0805	54
B37940-K...	100 V	taped	CG, C0G	0805	56
B37941-K...	63 V	untaped	X7R	0805	44
B37941-K...	100 V	untaped	X7R	0805	46
B37941-K...	63 V	taped	X7R	0805	58
B37941-K...	100 V	taped	X7R	0805	60
B37941-L...	63 V	untaped	2C1	0805	48
B37941-L...	100 V	untaped	2C1	0805	50
B37941-L...	63 V	taped	2C1	0805	62
B37941-L...	100 V	taped	2C1	0805	64
B37942-K...	63 V	untaped	Z5U, 2F4	0805	52
B37942-K...	63 V	taped	Z5U, 2F4	0805	66
B37949-K...	63 V	untaped	CG, C0G	1210	41
B37949-K...	100 V	untaped	CG, C0G	1210	43
B37949-K...	63 V	taped	CG, C0G	1210	55
B37949-K...	100 V	taped	CG, C0G	1210	57
B37950-K...	63 V	untaped	X7R	1210	44
B37950-K...	100 V	untaped	X7R	1210	46
B37950-K...	63 V	taped	X7R	1210	58
B37950-K...	100 V	taped	X7R	1210	60
B37950-L...	63 V	untaped	2C1	1210	48
B37950-L...	100 V	untaped	2C1	1210	51
B37950-L...	63 V	taped	2C1	1210	62
B37950-L...	100 V	taped	2C1	1210	64

Index of Ordering Codes

Ordering code	Rated voltage	Version	Material	Size	Page
B37951-K...	63 V	untaped	Z5U, 2F4	1210	52
B37951-K...	63 V	taped	Z5U, 2F4	1210	66
B37952-K...	63 V	untaped	CG, C0G	1812	41
B37952-K...	100 V	untaped	CG, C0G	1812	43
B37952-K...	63 V	taped	CG, C0G	1812	55
B37952-K...	100 V	taped	CG, C0G	1812	57
B37953-K...	63 V	untaped	X7R	1812	45
B37953-K...	100 V	untaped	X7R	1812	47
B37953-K...	63 V	taped	X7R	1812	59
B37953-K...	100 V	taped	X7R	1812	61
B37953-L...	63 V	untaped	2C1	1812	49
B37953-L...	100 V	untaped	2C1	1812	51
B37953-L...	63 V	taped	2C1	1812	63
B37953-L...	100 V	taped	2C1	1812	65
B37954-K...	63 V	untaped	Z5U, 2F4	1812	52
B37954-K...	63 V	taped	Z5U, 2F4	1812	66
B37955-K...	63 V	untaped	CG, C0G	2220	41
B37955-K...	100 V	untaped	CG, C0G	2220	43
B37955-K...	63 V	taped	CG, C0G	2220	55
B37955-K...	100 V	taped	CG, C0G	2220	57
B37956-K...	63 V	untaped	X7R	2220	45
B37956-K...	100 V	untaped	X7R	2220	47
B37956-K...	63 V	taped	X7R	2220	59
B37956-K...	100 V	taped	X7R	2220	61
B37956-L...	63 V	untaped	2C1	2220	49
B37956-L...	100 V	untaped	2C1	2220	51
B37956-L...	63 V	taped	2C1	2220	63
B37956-L...	100 V	taped	2C1	2220	65
B37957-K...	63 V	untaped	Z5U, 2F4	2220	52
B37957-K...	63 V	taped	Z5U, 2F4	2220	66

Index of Ordering Codes

Multilayer capacitors, radial leaded

Ordering code	Rated voltage	Material	Lead spacing	Page
B37900-K...	63 V	CG	5,08	75
B37900-K...	100 V	CG	5,08	77
B37900-N...	63 V	C0G	5,08	71
B37900-N...	100 V	C0G	5,08	73
B37901-K...	63 V	2C1	5,08	83
B37901-K...	100 V	2C1	5,08	85
B37901-M...	63 V	X7R	5,08	79
B37901-M...	100 V	X7R	5,08	81
B37902-K...	63 V	2F4	5,08	87
B37902-N...	63 V	Z5U	5,08	86
B37979-D...	63 V	CG	5,08	74
B37979-D...	100 V	CG	5,08	76
B37979-G...	63 V	C0G	5,08	70
B37979-G...	100 V	C0G	5,08	72
B37979-K...	63 V	CG	2,54	74
B37979-K...	100 V	CG	2,54	76
B37979-N...	63 V	C0G	2,54	70
B37979-N...	100 V	C0G	2,54	72
B37981-D...	63 V	2C1	5,08	82
B37981-D...	100 V	2C1	5,08	84
B37981-F...	63 V	X7R	5,08	78
B37981-F...	100 V	X7R	5,08	80
B37981-K...	63 V	2C1	2,54	82
B37981-K...	100 V	2C1	2,54	84
B37981-M...	63 V	X7R	2,54	78
B37981-M...	100 V	X7R	2,54	80
B37982-D...	63 V	2F4	5,08	87
B37982-G...	63 V	Z5U	5,08	86
B37982-K...	63 V	2F4	2,54	87
B37982-N...	63 V	Z5U	2,54	86
B37983-K...	63 V	CG	5,08	75
B37983-K...	100 V	CG	5,08	77
B37983-N...	63 V	C0G	5,08	71
B37983-N...	100 V	C0G	5,08	73
B37984-K...	63 V	2C1	5,08	83
B37984-K...	100 V	2C1	5,08	85
B37984-M...	63 V	X7R	5,08	79
B37984-M...	100 V	X7R	5,08	81
B37985-K...	63 V	2F4	5,08	87
B37985-N...	63 V	Z5U	5,08	86
B37986-D...	63 V	CG	5,08	74
B37986-D...	100 V	CG	5,08	76

Index of Ordering Codes

Ordering code	Rated voltage	Material	Lead spacing	Page
B37986-G...	63 V	C0G	5,08	70
B37986-G...	100 V	C0G	5,08	72
B37986-K...	63 V	CG	2,54	74
B37986-K...	100 V	CG	2,54	76
B37986-N...	63 V	C0G	2,54	70
B37986-N...	100 V	C0G	2,54	72
B37987-D...	63 V	2C1	5,08	82
B37987-D...	100 V	2C1	5,08	84
B37987-F...	63 V	X7R	5,08	78
B37987-F...	100 V	X7R	5,08	80
B37987-K...	63 V	2C1	2,54	82
B37987-K...	100 V	2C1	2,54	84
B37987-M...	63 V	X7R	2,54	78
B37987-M...	100 V	X7R	2,54	80
B37988-D...	63 V	2F4	5,08	87
B37988-G...	63 V	Z5U	5,08	86
B37988-K...	63 V	2F4	2,54	87
B37988-N...	63 V	Z5U	2,54	86

SIBATIT 50 000 capacitors

Ordering code	Rated voltage	Material	Lead spacing	Page
B37447-...	63 V	SIBATIT 50 000	20	96
B37448-...	63 V	SIBATIT 50 000	2,54	94
B37449-...	63 V	SIBATIT 50 000	5,08	95

General Technical Information

1 Introduction

The term ceramic capacitors covers a large group of capacitors. Although they feature various properties, they all have the oxide ceramic dielectric in common.

Ceramic generally means that an inorganic, polycrystalline body is formed by sintering at high temperatures.

With special production methods thin layers can be manufactured from ceramic materials. These layers are used to design capacitors whose electrical and mechanical properties meet stringent requirements.

The multilayer capacitors consist of a monolithic ceramic block with comblike sintered electrodes. They come to the surface at the front ends of the ceramic block where they are joined by sintered metal layers.

1.1 Type classification and applications

The following classification of ceramic capacitors is based on the chemical composition of their ceramic dielectrics which determine their main electrical properties.

Class 1 capacitors

The dielectric ($\varepsilon > 100$) consists mainly of a combination of metal oxides (e.g. oxides of lanthanide elements and titanic oxide).
Defined linear temperature coefficient with reversible temperature dependence, no voltage dependence of capacitance. Low losses up to the UHF range, high insulation resistance.
For use in resonant circuits, filters, timing circuits.

Class 2 capacitors

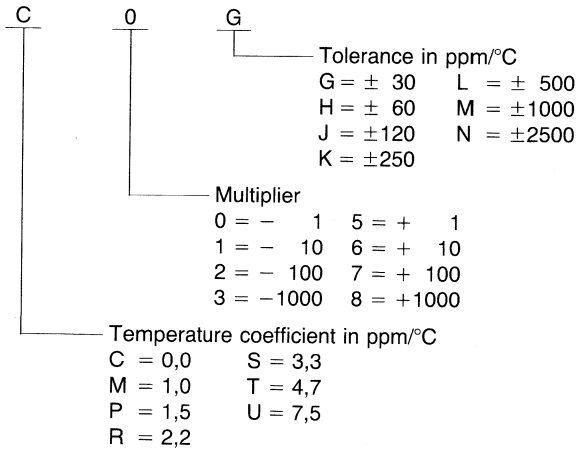
The dielectric consists mainly of titanates (barium, calcium, strontium) and zirconates with perovskite structure (ε = 1000 to 10 000).
Nonlinear dependence of capacitance on temperature and voltage. Somewhat higher losses and lower insulation resistance than class 1 capacitors. Capacitance decreases following a logarithmic law (ageing). Relatively high capacitance values of small-size capacitors.
Used in coupling, blocking, filtering applications.

Junction capacitors (SIBATIT® 50 000)

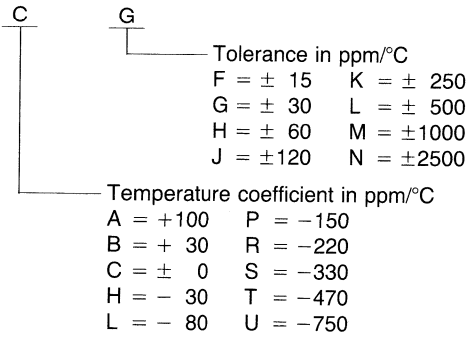
Dielectric with barium titanate (ε = 35 000 to 50 000).
Nonlinear dependence of capacitance on temperature and voltage. Strong frequency dependence, low insulation resistance, high capacitance per unit volume.
Used in decoupling and filtering applications which do not call for high capacitance stability.

1.2 Designation of class 1 capacitors

In acc. with EIA standard RS 198 B



In acc. with CECC standard 30 600 or IEC standard 384-9



1.3 Designation of class 2 capacitors

In acc. with EIA standard RS 198 B

Example: X 7 R

1. Code letter
lower category temperature
in °C
Z + 10
Y − 30
X − 55

2. Number
upper category temperature
in °C
4 + 65
5 + 85
6 + 105
7 + 125

3. Code letter
max. deviation
of the capacitance value
in %
referred to 25 °C

A	± 1,0	P	± 10,0
B	± 1,5	R	± 15,0
C	± 2,2	S	± 22,0
D	± 3,3	T	+ 22/− 33
E	± 4,7	U	+ 22/− 56
F	± 7,5	V	+ 22/− 82

In acc. with CECC standard 30 700 or IEC standard 384-9

Example: 2 F 4

1. Number
Type 2
capacitors

2. Code letter
max. deviation
of the capacitance value
in %
referred to 20 °C

A	± 5	D	+ 20/− 30
B	± 10	E	+ 20/− 55
C	± 20	F	+ 30/− 80

3. Number
Code for
temperature range
in °C
1 −55 to +125
2 −55 to + 85
3 −40 to + 85
4 −25 to + 85
5 −10 to + 70
6 + 5 to + 70

1.4 DIN IEC climatic category

The climatic category according to DIN IEC 68-1 is expressed by a combination of three numbers:

Example: 55/125/56

1st number:
lower category temperature (cold test)

2nd number:
upper category temperature (heat test)

3rd number:
number of days of damp heat test with 93 % relative humidity at 40 °C.

The climatic category in accordance with DIN 40040 specifies the environmental conditions for which a component is designed. It is determined by three code letters as shown in the table below.

1st code letter	Lower category temperature T_{min}
F	−55 °C
G	−40 °C
H	−25 °C

2nd code letter	Upper category temperature T_{max}
K	+125 °C
P	+ 85 °C

3rd code letter	Limits of rel. humidity (max. values) Annual average	for 30 days per year continuously[1])	for 60 days per year continuously	for the remaining days occasionally[2])	Remarks
F	≦75 %	95 %	—	85 %	no dew precipitation
G	≦65 %	—	85 %	75 %	

1.5 Standards

DIN 40 040	Climatic categories and reliability
DIN IEC 68	Environmental testing procedures
DIN 41 426	Preferred number series, E series
DIN 41 290	Ceramic dielectric capacitors up to 1000 Vdc
CECC 30 600	Harmonized system of quality assessment for electronic components Sectional specification: fixed ceramic capacitors, class 1
CECC 30 601	Type specification for CG material
CECC 30 700	Harmonized system of quality assessment for electronic components Sectional specification: fixed ceramic capacitors, class 2
CECC 30 701	Type specification for 2C1 and 2F4 material
MIL STD 202	Test and measuring conditions

[1]) These days should be spread in a natural way throughout the year.
[2]) Within the limits set by the annual average.

2 Electrical characteristics

2.1 Brief data of multilayer capacitors

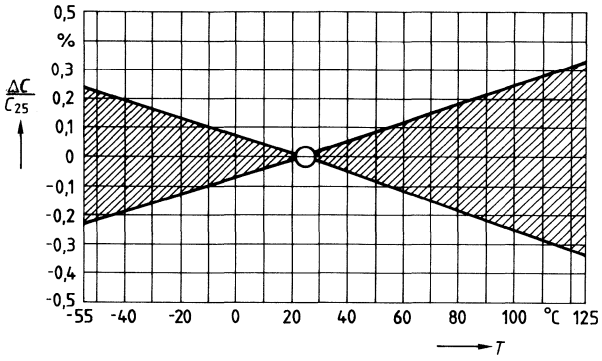
Ceramic type IEC/CECC designation[1]) EIA designation		CG C0G	– X7R	2C1 –	– Z5U	2F4 –
Dielectric		Class 1	Class 2			
Temperature range		−55 ... +125 °C	−55 ... +125 °C		+10 ... +85 °C	−25 ... +85 °C
Max. capacitance change $\Delta C/C_{25}$[1]) throughout the temperature range	with V_{meas}	±30 · 10^{-6}/K	±15 %	±20 %	+22/−56 %	+30/−80 %
	with V_R		–	+20/−30 %	–	+30/−90 %
Voltage test		2,5 × V_R/5 s				
Dissipation factor tan δ in 10^{-3} (limit value)	>50 pF	<1,5	<25		<30	
	≤50 pF	$<1{,}5 \times \left(\frac{15}{C} + 0{,}7\right)$				
Insulation resistance R_{is}[2])	at 25 °C	>10^5 MΩ	>10^5 MΩ		>10^4 MΩ	
	at 125 °C	>10^4 MΩ	>10^4 MΩ		–	
Time constant τ[2]) (MΩ · µF)	at 25 °C	>1000 s	>1000 s		>500 s	
	at 125 °C	> 100 s	> 100 s		–	
Ageing (typical value) Capacitance change for each logarithmic time decade		–	−2 %		−5 %	
Capacitance values available		E12	E12		E6	

[1]) The reference temperature in acc. with CECC std. is 20 °C.
[2]) The lower value applies.

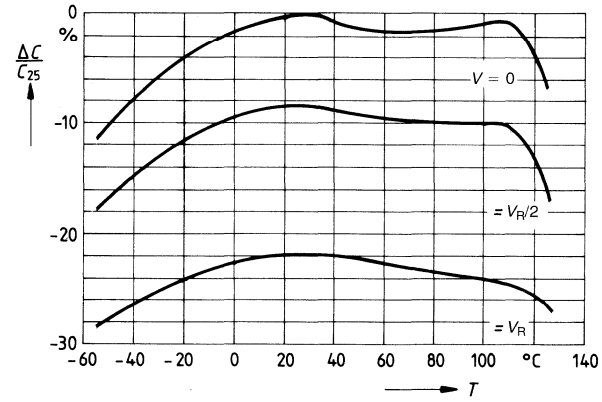
2.2 Capacitance change versus temperature and voltage for multilayer capacitors

(typ. values)

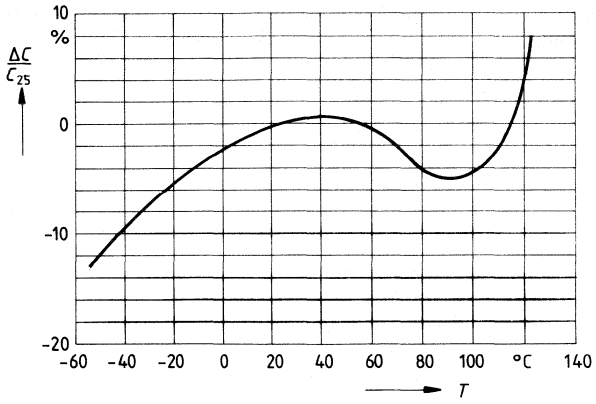
CG, C0G capacitors
Tolerance field



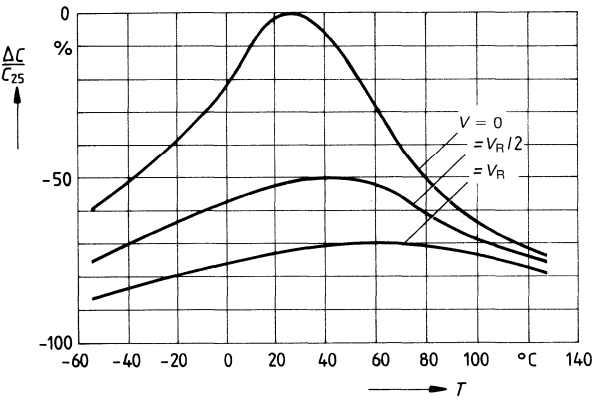
2C1 capacitors
(parameter: applied dc voltage)



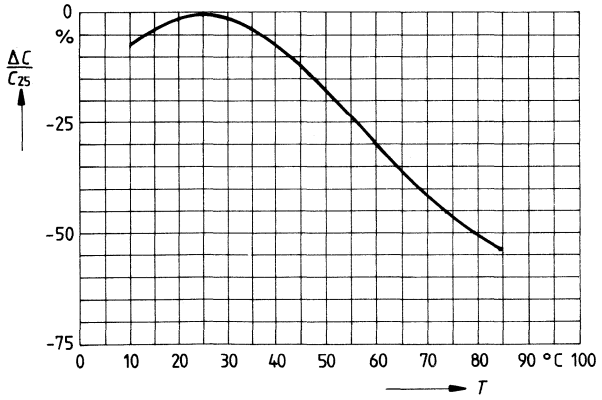
X7R capacitors



2F4 capacitors
(parameter: applied
dc voltage)

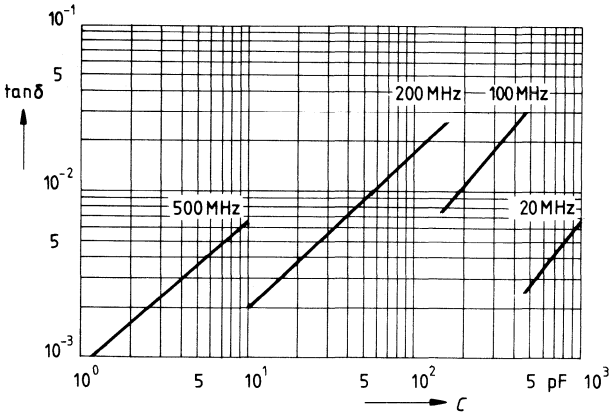


Z5U capacitors



2.3 Dissipation factor versus capacitance for multilayer capacitors

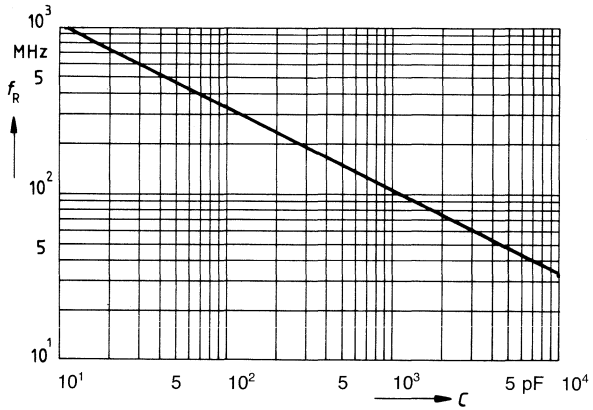
(typ. values)



Parameter: Measuring frequency

Note: The measurement results largely depend on the measuring method and test setup used.
Details upon request.

2.4 Series resonant frequency versus capacitance for multilayer chip capacitors

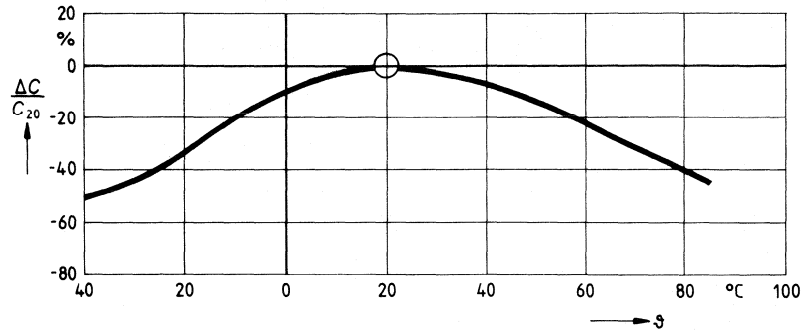


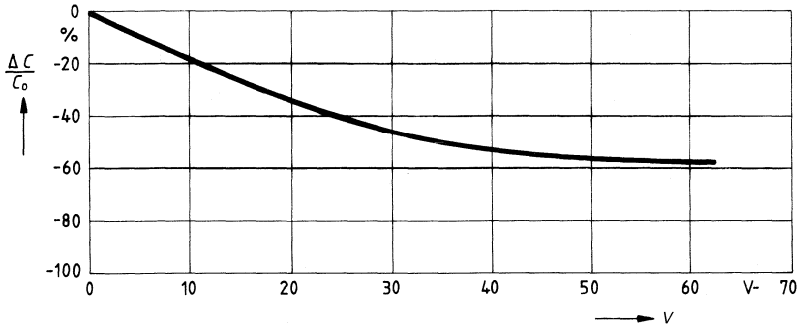
2.5 AC voltage loading capability

In case of sinusoidal ac voltages, 50/60 Hz, the maximum permissible rms value of the voltage is $V_R/\sqrt{2}$.

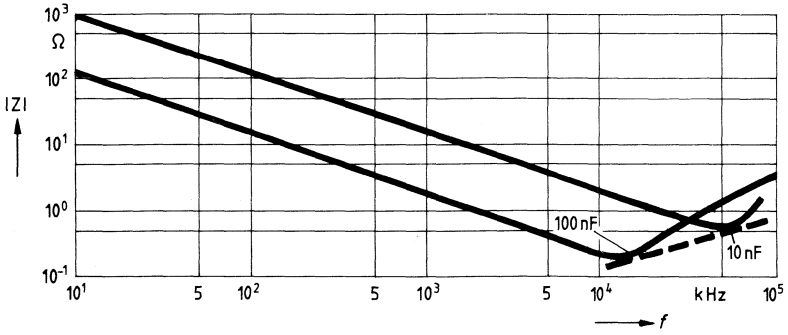
The sum of the applied dc voltage and the peak value of the superimposed ac voltage must not exceed the rated voltage.

2.6 Capacitance change versus temperature and voltage for SIBATIT 50 000 capacitors
(typ. values)





2.7 Impedance versus frequency for SIBATIT 50 000 capacitors
(typ. values)



2.8 Ageing

The capacitance of class 2 and SIBATIT capacitors decreases with time. This process known as "ageing" follows a logarithmic law which is expressed in terms of an ageing constant. The ageing constant is defined as the percentage loss of capacitance during a "time decade", i.e. a period of time in which the capacitor increases its age tenfold, for example from 1 h to 10 h.
The law of capacitance ageing is expressed by the following equation:

$$C_t = C_1 \left(1 - \frac{k}{100} \cdot \log_{10} t\right)$$

Symbol	Unit	Remark
C_t	nF	Capacitance t hours after start of ageing
C_1	nF	Capacitance 1 h after start of ageing
k	%	Ageing constant (capacitance decrease per decade)
t	h	Time in hours from start of ageing

Due to the ageing process, it is necessary to specify an age for reference measurements at which the capacitance will be within the prescribed tolerance. This age is fixed at 1000 h since for practical purposes there is no further loss of capacitance after this time.

For many tests it is necessary to avoid the interfering effect of ageing. For this purpose, capacitors are maintained at the upper category temperature for 1 h followed by 24 h at test conditions.

3 Mechanical features

3.1 Multilayer chip capacitors

3.1.1 Metallization

For cementing:
Silver palladium terminals (AgPd)

For soldering:
Silver palladium terminals (AgPd)
Silver nickel tin terminals (AgNiSn)

Capacitors with these forms of metallization are standard versions.

For further details refer to "Ceramic Multilayer Capacitors with Soldering Areas Resistant to Solder Leaching", reprint from Siemens Components, ordering code B4-2942.

3.1.2 Wetting capability (acc. to DIN IEC 68-2-20)

Pretreatment: fluxing with F-SW 32.
Test criterion: wetting of soldering areas $\geq 95\,\%$.

Metallization	Solder	Solder bath temperature °C	Dwell time s
AgPd	SnPbAg 62/36/2	235 ± 5	2
AgNiSn	SnPb 60/40	215 ± 5	6

3.1.3 Resistance to soldering heat (acc. to DIN IEC 68-2-20)

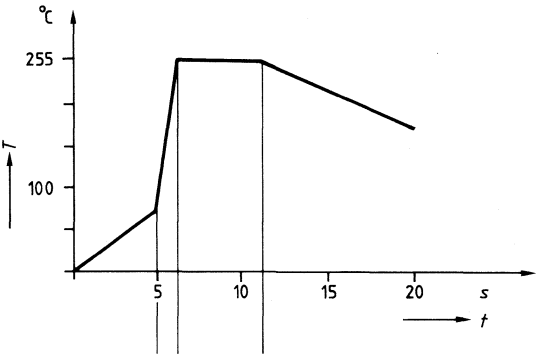
Pretreatment: fluxing with F-SW 32.
Test criterion: no solder leaching of terminals.

Metallization	Solder	Solder bath temperature °C	Dwell time s
AgPd	SnPbAg 62/36/2	260 ± 5	5
AgNiSn	SnPb 60/40	260 ± 5	10

3.1.4 Mounting instructions for chip capacitors

Wave soldering:

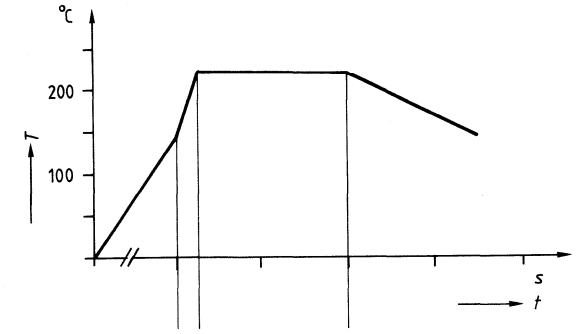
The dual wave is widely and successfully used. The first turbulent wave flushes the components and solders them. The second laminar wave removes excess tin.



Temperature/time diagram of wave soldering.

Reflow soldering:

The assembled PC board is heated in a reflow oven where the components are gradually heated to 200 °C.



Temperature/time diagram of reflow soldering.

Conductive adhesion:

The conductive adhesion method is rarely employed nowadays. As regards the mounting possibilities with this method, the component terminals and the PC boards have to fulfil special requirements.
For attaching components to PC boards, a large number of epoxy and polyamide adhesives is available.

3.1.5 Cleaning

Freon, trichlorethane or perchlorethylene are suitable cleaning agents. Ultrasonic cleaning should be carried out with great caution. Too high an ultrasonic power can impair the adhesive strength of the metallization.

3.1.6 Storage of chip capacitors

The components should be used within 6 months, if possible. They are to be left in the original packing in order to avoid soldering problems caused by oxidized terminals.

The storage temperature should not exceed 40 °C.

3.1.7 Marking of chip capacitors

Stamping on request.

3.2 Leaded ceramic capacitors

Two lead configurations are available:
kinked leads
straight leads

3.2.1 Resistance to soldering heat (acc. to DIN IEC 68-2-20)

Pretreatment: fluxing with F-SW 32.

Solder	Solder bath temperature °C	Dwell time s
SnPb 60/40	260 ± 5	10

3.2.2 Mechanical robustness of the leads

The leads may not be bent closer than 1 mm to their outlets. Conditions acc. to IEC 68-2-21:

Tensile strength: 10 N

Bending strength: 2 bendings at 90° with 5 N

3.2.3 Cleaning

Freon, trichlorethane and perchlorethylene are suitable cleaning agents.

3.2.4 Flammability

The epoxy resin encapsulation is flame-retardant in acc. with UL 94 V-O.

Measuring and Test Conditions
Quality

1 Measuring and test conditions for multilayer capacitors

1.1 Capacitance

Capacitance measuring conditions in acc. with MIL-STD-202 F, method 305

Measuring frequency f_{meas}	1 MHz ± 0.2 MHz for capacitances ≤1000 pF 1 kHz ± 0.2 kHz for capacitances >1000 pF
Measuring voltage V_{rms}	1 Vac ± 0.2 V for C0G and X7R capacitors 0.5 Vac ± 0.1 V for Z5U capacitors
Measuring temperature T_{meas}	25 °C ± 1 °C

1.2 Dissipation factor

The measuring conditions for the dissipation factor are identical to those for the capacitance.

1.3 Insulation resistance

The measuring conditions comply with MIL-STD-202 F, method 302.

The test voltage is equal to the rated voltage. The charge current may not exceed 50 mA, test duration is max. 2 min.

In case of high capacitances, the time constant of the insulation is stated $\tau = C \cdot R_{is}$.

Common units for the time constant: s, MΩ · µF or Ω · F.

1.4 Dielectric withstand-voltage test

Test conditions in acc. with MIL-STD-202 F, method 301.
Test voltage: 2.5 × rated voltage.
The charge current may not exceed 50 mA. Test duration: 5 s.

1.5 Resistance to soldering heat

Chip capacitors:
Test conditions in acc. with DIN IEC 68-2-20 (refer to page 25).

Capacitance change	
C0G, CG	≤1 % or 0.5 pF (the higher value applies)
X7R, 2C1	≤−5/+10 %
Z5U, 2F4	≤+20 %

Radial leaded capacitors:
Test conditions in acc. with DIN IEC 68-2-20 (refer to page 26).

Capacitance change	
C0G, CG	≤1 % or 0.5 pF (the higher value applies)
X7R,	≤−5/+10 %
Z5U, 2F4	≤±20 %

1.6 Humidity test

Test conditions in acc. with MIL-STD-202 F, method 103 B, test condition D (constant humidity):

Test temperature	(40 ± 2) °C
Relative humidity	93 +2/−3 %
Test voltage	rated voltage
Permissible changes:	
Capacitance changes	
C0G, CG	≤2 % or 1 pF (the higher value applies)
X7R, 2C1	≤±10 %
Z5U, 2F4	≤±20 %
tan δ changes	
C0G, CG	$\leq 3 \cdot 10^{-3}$
X7R, 2C1	$\leq 50 \cdot 10^{-3}$
Z5U, 2F4	$\leq 70 \cdot 10^{-3}$
Insulation resistance	
C0G, CG	$\geq 5 \cdot 10^{3}$ MΩ
X7R, 2C1	$\geq 10^{3}$ MΩ or time constant $\tau \geq 25$ s (the lower value applies)
Z5U, 2F4	$\geq 10^{3}$ MΩ or time constant $\tau \geq 25$ s (the lower value applies)

1.7 Life test

Test conditions in acc. with MIL-STD-202 F, method 108 A.

Test temperature	max. catagory temperature
Test voltage	1.5 · rated voltage
Test duration	1000 hrs
Permissible changes:	
Capacitance changes	
C0G, CG	≤2 % or 1 pF (the higher value applies)
X7R, 2C1	≤±10 %
Z5U, 2F4	≤±20 %
tan δ changes	
C0G, CG	$\leq 3 \cdot 10^{-3}$
X7R, 2C1	$\leq 50 \cdot 10^{-3}$
Z5U, 2F4	$\leq 70 \cdot 10^{-3}$
Insulation resistance	
C0G, CG	$\geq 10^{4}$ MΩ
X7R, 2C1	$\geq 2 \cdot 10^{3}$ MΩ or time constant $\tau \geq 50$ s (the lower value applies)
Z5U, 2F4	$\geq 2 \cdot 10^{3}$ MΩ or time constant $\tau \geq 50$ s (the lower value applies)

1.8 General note

The capacitance of class 2 capacitors changes with voltage and/or temperature. If the measurements are carried out immediately after a voltage test, an insulation test or a test involving thermal stress, the capacitance tolerance may be exceeded.

2 Measuring and test conditions for SIBATIT 50 000 capacitors

2.1 Dry heat

In accordance with DIN 40 046, Part 4 or IEC Publ. 68-2-2.

Test temperature	(85 ± 2) °C
Test duration	1000 h
Test voltage	63 V
Capacitance change	≤20 %
tan δ change	≤1.5 · limit value
Insulation resistance	≥100 MΩ or time constant τ ≥5 s (the lower value applies)

2.2 Damp heat

In accordance with DIN 40 046, Part 5, or IEC Publ. 68-2-3.

Test temperature	(40 ± 2) °C
Relative humidity	93 +2/−3 %
Test duration	56 days
Test voltage	32 V
Capacitance change	≤20 %
tan δ change	≤1.5 · limit value
Insulation resistance	≥100 MΩ or time constant τ ≥5 s (the lower value applies)

2.3 Capacitance

Measuring frequency	(1 ± 0.2) kHz
Measuring voltage	≤0.2 V
Measuring temperature	15 to 33 °C
Relative humidity	45 to 75 %

2.4 Dissipation factor

0.022 to 0.1 µF	1 kHz
0.01 µF	100 kHz

For remaining measuring conditions see capacitance measuring conditions.

2.5 Insulation resistance

Test temperature	(20 ± 5) °C
Relative humidity	≤75 % relative humidity (drying is possible in accordance with DIN 41 046, sheet 2)
Test duration	(60 ± 5) s
Test voltage	(10 ± 1) V

The time constant τ of the insulation ($\tau = C \cdot R_{is}$) is indicated.

2.6 Dielectric withstand-voltage test

Test voltage	130 V
Charge current	≤50 mA
Test duration	1 s

2.7 Resistance to soldering heat

Test Tb in accordance with DIN IEC 68-2-20.

Test temperature	260 °C max.
Soldering duration	6 s max.
Capacitance change	≤20 %
tan δ change	≤1.5 · limiting value
Insulation resistance:	≥100 MΩ or time constant τ ≥25 s (the lower value applies)

3 Delivery quality

The term "delivery quality" is taken to mean conformance with agreed data at the time of delivery.

3.1 Random sampling

The given AQL values (AQL = acceptable quality level) are based on the sampling inspection regulation DIN 40080 (contents correspond to MIL-STD 105 D and IEC 410), single sampling inspection plan for normal inspection, inspection level II. The sampling instructions of this standard are such that a delivered lot will be accepted with a probability of higher than 90 % if the percentage of defectives does not exceed the specified AQL level. Generally, the percentage of defectives delivered lies significantly below the AQL value.

3.2 Classification of defects

A defect exists if a component characteristic does not correspond to the specifications stated in the data sheets or in an agreed delivery specification. Defects which generally exclude the functional use of the component (inoperatives) are classified separately from less significant defects.

With ceramic capacitors **inoperatives** include:
- short circuit or open circuit
- component, housing, leads or encapsulation broken
- incorrect marking
- mixing with other types

Other defects are divided as follows:
- exceeding of limiting values of electrical parameters
- mechanical defects, e.g. incorrect dimensions, damaged housings, illegible marking, bent leads.

3.3 AQL values

The following AQL values apply to the quoted defects:

– for inoperatives (electrical and mechanical)	0.065
– for the total number of electrical defectives	0.25
– for the total number of mechanical defectives	0.25

The values for the total number of defectives include the related inoperatives.

(Grouping into "major defects" and "minor defects" according to DIN 40080 is intentionally avoided here because these terms are mainly defined with respect to the application and not to the specification. In contrast, the classes of defects used by us are clearly defined by the specification and the stated inoperatives.)

3.4 Incoming inspection

The use of a sampling inspection plan according to DIN 40080 (contents conform to MIL-STD-105 D and IEC 410) is recommended for the implementation of an incoming inspection. The employed inspection methods must be agreed between the customer and the supplier.

The following information is required for the assessment of possible claims: test circuit, sample size, quantity of defectives found, sample defectives and packing slip.

Single sampling inspection plan for normal inspection – inspection level II (excerpt)

N \ Sampling inspection plan	AQL 0,065	AQL 0,10	AQL 0,15	AQL 0,25	AQL 0,40	AQL 0,65	AQL 1,0	AQL 1,5	AQL 2,5	AQL 4,0
2 ... 8	N	N	N	N	N	N	N	N	N or 5- 0	N or 3- 0
9 ... 15	N	N	N	N	N	N	N or 13- 0	8- 0	5- 0	3- 0
16 ... 25	N	N	N	N	N	N or 20- 0	13- 0	8- 0	5- 0	3- 0
26 ... 50	N	N	N	N	N or 32- 0	20- 0	13- 0	8- 0	5- 0	13- 1
51 ... 90	N	N	N or 80-0	50-0	32- 0	20- 0	13- 0	8- 0	20- 1	13- 1
91 ... 150	N	N or 125-0	80-0	50-0	32- 0	20- 0	13- 0	32- 1	20- 1	20- 2
151 ... 280	N or 200-0	125-0	80-0	50-0	32- 0	20- 0	50- 1	32- 1	32- 2	32- 3
281 ... 500	200-0	125-0	80-0	50-0	32- 0	80- 1	50- 1	50- 2	50- 3	50- 5
501 ... 1 200	200-0	125-0	80-0	50-0	125- 1	80- 1	80- 2	80- 3	80- 5	80- 7
1 201 ... 3 200	200-0	125-0	80-0	200-1	125- 1	125- 2	125- 3	125- 5	125- 7	125-10
3 201 ... 10 000	200-0	125-0	315-1	200-1	200- 2	200- 3	200- 5	200- 7	200-10	200-14
10 001 ... 35 000	200-0	500-1	315-1	315-2	315- 3	315- 5	315- 7	315-10	315-14	315-21
35 001 ... 150 000	800-1	500-1	500-2	500-3	500- 5	500- 7	500-10	500-14	500-21	315-21
150 001 ... 500 000	800-1	800-2	800-3	800-5	800- 7	800-10	800-14	800-21	500-21	315-21
> 500 000	1250-2	1250-3	1250-5	1250-7	1250-10	1250-14	1250-21	800-21	500-21	315-21

N = lot size
Columns 2 to 11: left figure = sample size, right figure = admissible defects

Defect criteria:
Inoperatives (short circuit, open circuit) and changes in characteristics that will lead to failure of the functional unit in the majority of applications.

4 Failure rate

For the equipment manufacturer the failure rate of components serves as the basis for reliability forecasts and allows him to estimate the scope of servicing required.

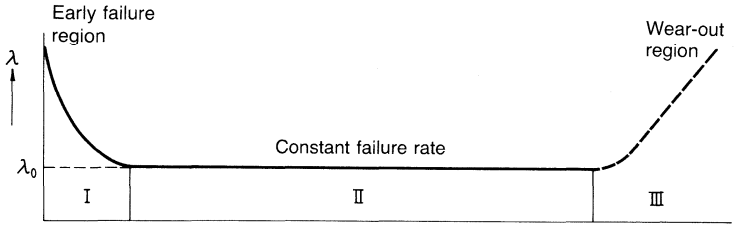
If, of a large number N of identical components, percentage ΔN fails in time Δt, $\lambda = \frac{\Delta N}{N \cdot \Delta t}$

expresses the failure rate (averaged over time Δt). It depends on the failure criteria, the stress and the operating time.

The failure rate is expressed as a reciprocal period. The customary unit is 10^{-9}/h = fit (**f**ailures **i**n **t**ime).

4.1 Failure periods

The number of failures, plotted as a function of the time t, would form a step-function curve since only integral changes could occur. If N is a large number, this step-curve can be approximated by a continuous curve with a high degree of accuracy. This offers the advantage that λ can also be specified for any small periods of time (in form of a differential quotient $dN/N \cdot dt$) and can thus be plotted as a function of time. Usually, three regions are identified.



Component failure periods versus operating hours

For components the existence of a "duty phase" (phase II) is assumed. Thus, stating the (virtually) constant failure rate λ_0 in this phase is considered to be sufficient.

4.2 Reference conditions

Unless other agreements have been reached, the information on failure rates of ceramic capacitors refers to the conditions stated below. These reference conditions correspond to average conditions occurring in most applications.

Electrical load
Operation at 50 % of the upper category values for voltage.

Environmental conditions
Ambient temperature 40 °C/104 °F, humidity category F in accordance with DIN 40 040, no aggressive atmosphere.

4.3 Typical failure rate value

A typical value for the failure rate of ceramic capacitors is 10 fit.

5 Supplementary notes

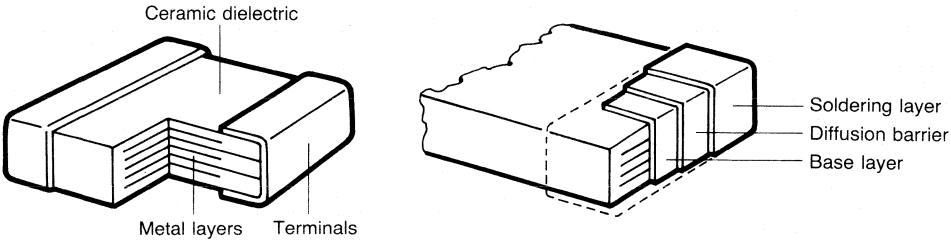
The statement of quality data – which always refer to a fairly large number of components – is no legal guarantee of characteristics. The agreement of such data does however mean that the customer can claim replacement for defective ceramic capacitors under the terms of delivery. No liability, especially for the consequences of component failures, can be accepted beyond this.

Multilayer Chip Capacitors

untaped

taped

Multilayer Chip Capacitors "SMD"
General, Survey



Metallization structure of ceramic multilayer chip capacitors

For CG, 2C1 and 2F4 chips, a quality assessment in acc. with CECC 31X02 is at present in preparation. Production is already in accordance with CECC specs.

Features

- Very small dimensions
- High capacitance per unit volume
- Good solderability with wave and reflow soldering
- Cementable
- High reliability and damp heat resistance (56 days in acc. with IEC)
- Low inductance
- Non-polar
- Suitable for automatic assembly

Applications

- Data processing
- Communications engineering
- Clock-making industry and photo industry
- Space technology
- Military electronics
- Automotive electronics
- Medical engineering

Ceramic type	Size	CG, C0G	X7R, 2C1	Z5U	2F4
Capacitance range	0805	1 pF to 560 pF	470 pF to 15000 pF	10000 pF to 47000 pF	
	1206	1 pF to 1000 pF	1000 pF to 33000 pF	10000 pF to 0,10 µF	
	1210	330 pF to 3300 pF	8200 pF to 0,12 µF	0,10 µF to 0,22 µF	
	1812	1000 pF to 6800 pF	33000 pF to 0,27 µF	0,22 µF to 0,47 µF	
	2220	1500 pF to 15000 pF	47000 pF to 0,68 µF	0,47 µF to 1,50 µF	
Capacitance tolerance		±0,25 pF ±0,50 pF ± 5 % ±10 %	±10 % ±20 %	±20 %	
Rated voltage		63 Vdc 100 Vdc	63 Vdc 100 Vdc	63 Vdc	
Temperature range		−55 to +125 °C	−55 to +125 °C	−10 to +85 °C	+25 to +85 °C

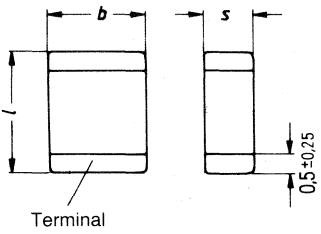
CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

Dielectric	class 1
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	1.0 pF to 15 000 pF
Capacitance values available	E12 series
Terminals	silver nickel tin: for ordering code refer to table silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J"; example: B37940-**J**...
Taping	all sizes are also available in taped version. For information on taping see page 53.

Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	5,0 ±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_N	Ordering code[1]) B37940-	B37871-	B37949-	B37952-	B37955-
S 1,0 pF	-K5010-+1	-K5010-+1			
S 1,2 pF	-K5010-+201	-K5010-+201			
S 1,5 pF	-K5010-+501	-K5010-+501			
S 1,8 pF	-K5010-+801	-K5010-+801			
S 2,2 pF	-K5020-+201	-K5020-+201			
S 2,7 pF	-K5020-+701	-K5020-+701			
S 3,3 pF	-K5030-+301	-K5050-+601			
S 3,9 pF	-K5030-+901	-K5060-+801			
S 4,7 pF	-K5040-+701	-K5080-+201			
S 5,6 pF	-K5050-+601	-K5100-+1			
S 6,8 pF	-K5060-+801	-K5120-+1			
S 8,2 pF	-K5080-+201	-K5150-+1			
S 10 pF	-K5100-+1	-K5180-+1			
S 12 pF	-K5120-+1	-K5220-+1			
S 15 pF	-K5150-+1	-K5270-+1			
S 18 pF	-K5180-+1	-K5330-+1			
S 22 pF	-K5220-+1	-K5390-+1			
S 27 pF	-K5270-+1	-K5470-+1			
S 33 pF	-K5330-+1	-K5560-+1			
S 39 pF	-K5390-+1	-K5680-+1			
S 47 pF	-K5470-+1	-K5820-+1			
S 56 pF	-K5560-+1	-K5101-+1			
S 68 pF	-K5680-+1	-K5121-+1			
S 82 pF	-K5820-+1	-K5151-+1			
S 100 pF	-K5101-+1				
S 120 pF	-K5121-+1				
S 150 pF	-K5151-+1				

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for C_R <10 pF: C ≙ ±0,25 pF, D ≙ ±0,5 pF; for C_R ≥10 pF: J ≙ ±5 %, K ≙ ±10 %

S Preferred types (see page 4)



Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37940-	B37871-	B37949-	B37952-	B37955-
S 180 pF	-K5181-+1	-K5181-+1			
S 220 pF	-K5221-+1	-K5221-+1			
S 270 pF	-K5271-+1	-K5271-+1			
S 330 pF	-K5331-+1	-K5331-+1			
S 390 pF	-K5391-+1	-K5391-+1			
S 470 pF	-K5471-+1	-K5471-+1			
S 560 pF	-K5561-+1	-K5561-+1			
S 680 pF		-K5681-+1			
S 820 pF		-K5821-+1	-K5821-+1		
S 1000 pF		-K5102-+1	-K5102-+1		
S 1200 pF			-K5122-+1	-K5122-+1	
S 1500 pF			-K5152-+1	-K5152-+1	
S 1800 pF			-K5182-+1	-K5182-+1	
S 2200 pF			-K5222-+1	-K5222-+1	
S 2700 pF			-K5272-+1	-K5272-+1	
S 3300 pF			-K5332-+1	-K5332-+1	-K5332-+1
S 3900 pF				-K5392-+1	-K5392-+1
S 4700 pF				-K5472-+1	-K5472-+1
S 5600 pF				-K5562-+1	-K5562-+1
S 6800 pF				-K5682-+1	-K5682-+1
S 8200 pF					-K5822-+1
S 10000 pF					-K5103-+1
S 12000 pF					-K5123-+1
S 15000 pF					-K5153-+1

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for $C_R \geq 10$ pF: J ≙ ±5 %, K ≙ ±10 %

S Preferred types (see page 4)

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

Dielectric class 1

DIN climatic category FKF

IEC climatic category 55/125/56

Capacitance range 1.0 pF to 10 000 pF

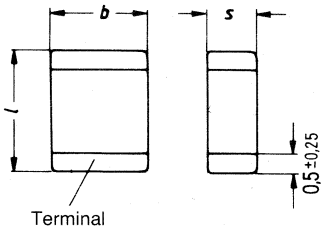
Capacitance values available E 12 series

Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J";
example: B37940-**J**...

Taping all sizes are also available in taped version. For information on taping see page 53.

Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37940-	B37871-	B37949-	B37952-	B37955-
1,0 pF	-K1010-+1	-K1010-+1			
1,2 pF	-K1010-+201	-K1010-+201			
1,5 pF	-K1010-+501	-K1010-+501			
1,8 pF	-K1010-+801	-K1010-+801			
2,2 pF	-K1020-+201	-K1020-+201			
2,7 pF	-K1020-+701	-K1020-+701			
3,3 pF	-K1030-+301	-K1030-+301			
3,9 pF	-K1030-+901	-K1030-+901			
4,7 pF	-K1040-+701	-K1040-+701			
5,6 pF	-K1050-+601	-K1050-+601			
6,8 pF	-K1060-+801	-K1060-+801			
8,2 pF	-K1080-+201	-K1080-+201			
10 pF	-K1100-+1	-K1100-+1			
12 pF	-K1120-+1	-K1120-+1			
15 pF	-K1150-+1	-K1150-+1			
18 pF	-K1180-+1	-K1180-+1			
22 pF	-K1220-+1	-K1220-+1			
27 pF	-K1270-+1	-K1270-+1			
33 pF	-K1330-+1	-K1330-+1			
39 pF	-K1390-+1	-K1390-+1			
47 pF	-K1470-+1	-K1470-+1			
56 pF	-K1560-+1	-K1560-+1			
68 pF	-K1680-+1	-K1680-+1			
82 pF	-K1820-+1	-K1820-+1			
100 pF	-K1101-+1	-K1101-+1			
120 pF	-K1121-+1	-K1121-+1			
150 pF	-K1151-+1	-K1151-+1			

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for C_R <10 pF: C ≙ ±0,25 pF, D ≙ ±0,5 pF;
for C_R ≥10 pF: J ≙ ±5 %, K ≙ ±10 %



Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37940-	B37871-	B37949-	B37952-	B37955-
180 pF	-K1181-+1	-K1181-+1			
220 pF	-K1221-+1	-K1221-+1			
270 pF	-K1271-+1	-K1271-+1			
330 pF		-K1331-+1	-K1331-+1		
390 pF		-K1391-+1	-K1391-+1		
470 pF		-K1471-+1	-K1471-+1		
560 pF			-K1561-+1		
680 pF			-K1681-+1		
820 pF			-K1821-+1		
1000 pF			-K1102-+1	-K1102-+1	
1200 pF			-K1122-+1	-K1122-+1	
1500 pF			-K1152-+1	-K1152-+1	-K1152-+1
1800 pF			-K1182-+1	-K1182-+1	-K1182-+1
2200 pF				-K1222-+1	-K1222-+1
2700 pF				-K1272-+1	-K1272-+1
3300 pF				-K1332-+1	-K1332-+1
3900 pF					-K1392-+1
4700 pF					-K1472-+1
5600 pF					-K1562-+1
6800 pF					-K1682-+1
8200 pF					-K1822-+1
10000 pF					-K1103-+1

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for $C_R \geq 10$ pF: J ≙ ±5 %, K ≙ ±10 %

Dielectric class 2

DIN climatic category FKF

IEC climatic category 55/125/56

Capacitance range 470 pF to 0.68 µF

Capacitance values available E 12 series

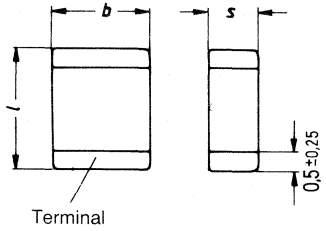
Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J";
example: B37941-**J**...

Taping all sizes are also available in taped version. For information on taping see page 53.

Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
S 470 pF	-K5471-+1				
560 pF	-K5561-+1				
S 680 pF	-K5681-+1				
820 pF	-K5821-+1				
S 1000 pF	-K5102-+1	-K5102-+1			
1200 pF	-K5122-+1	-K5122-+1			
S 1500 pF	-K5152-+1	-K5152-+1			
1800 pF	-K5182-+1	-K5182-+1			
S 2200 pF	-K5222-+1	-K5222-+1			
2700 pF	-K5272-+1	-K5272-+1			
S 3300 pF	-K5332-+1	-K5332-+1			
3900 pF	-K5392-+1	-K5392-+1			
S 4700 pF	-K5472-+1	-K5472-+1			
5600 pF	-K5562-+1	-K5562-+1			
S 6800 pF	-K5682-+1	-K5682-+1			
8200 pF	-K5822-+1	-K5822-+1	-K5822-+1		
S 10000 pF	-K5103-+1	-K5103-+1	-K5103-+1		
12000 pF	-K5123-+1	-K5123-+1	-K5123-+1		
S 15000 pF	-K5153-+1	-K5153-+1	-K5153-+1		
18000 pF		-K5183-+1	-K5183-+1		
S 22000 pF		-K5223-+1	-K5223-+1		
27000 pF		-K5273-+1	-K5273-+1		
S 33000 pF		-K5333-+1	-K5333-+1		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

S Preferred types (see page 4)



Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_n	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
39000 pF			-K5393-+1		
S 47000 pF			-K5473-+1	-K5473-+1	
56000 pF			-K5563-+1	-K5563-+1	
S 68000 pF			-K5683-+1	-K5683-+1	
82000 pF			-K5823-+1	-K5823-+1	
S 0,10 µF			-K5104-+1	-K5104-+1	
0,12 µF			-K5124-+1	-K5124-+1	
S 0,15 µF				-K5154-+1	
0,18 µF				-K5184-+1	-K5184-+1
S 0,22 µF				-K5224-+1	-K5224-+1
0,27 µF				-K5274-+1	-K5274-+1
S 0,33 µF					-K5334-+1
0,39 µF					-K5394-+1
S 0,47 µF					-K5474-+1
0,56 µF					-K5564-+1
S 0,68 µF					-K5684-+1

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

S Preferred types (see page 4)

Dielectric class 2

DIN climatic category FKF

IEC climatic category 55/125/56

Capacitance range 470 pF to 0.15 μF

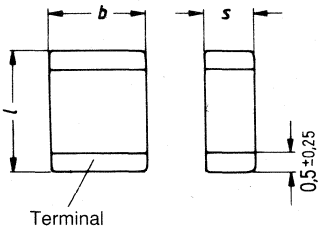
Capacitance values available E 12 series

Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J";
example: B37941-**J**...

Taping all sizes are also available in taped version. For information on taping see page 53.

Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
470 pF	-K1471-+1				
560 pF	-K1561-+1				
680 pF	-K1681-+1				
820 pF	-K1821-+1				
1000 pF	-K1102-+1	-K1102-+1			
1200 pF	-K1122-+1	-K1122-+1			
1500 pF	-K1152-+1	-K1152-+1			
1800 pF	-K1182-+1	-K1182-+1			
2200 pF	-K1222-+1	-K1222-+1			
2700 pF	-K1272-+1	-K1272-+1			
3300 pF	-K1332-+1	-K1332-+1			
3900 pF	-K1392-+1	-K1392-+1			
4700 pF		-K1472-+1			
5600 pF		-K1562-+1			
6800 pF		-K1682-+1			
8200 pF		-K1822-+1	-K1822-+1		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %



Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
10000 pF		-K1103-+1	-K1103-+1		
12000 pF			-K1123-+1		
15000 pF			-K1153-+1		
18000 pF			-K1183-+1		
22000 pF			-K1223-+1		
27000 pF			-K1273-+1		
33000 pF			-K1333-+1	-K1333-+1	
39000 pF				-K1393-+1	
47000 pF				-K1473-+1	-K1473-+1
56000 pF				-K1563-+1	-K1563-+1
68000 pF				-K1683-+1	-K1683-+1
82000 pF				-K1823-+1	-K1823-+1
0,10 µF					-K1104-+1
0,12 µF					-K1124-+1
0,15 µF					-K1154-+1

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

Dielectric class 2

DIN climatic category FKF

IEC climatic category 55/125/56

Capacitance range 470 pF to 0.68 µF

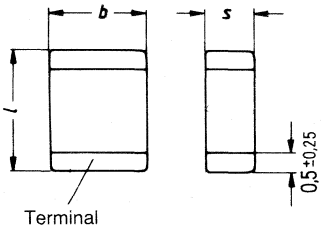
Capacitance values available E 12 series

Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "L", the 7th digit of the ordering code, must be replaced by "J";
example: B37941-**J**...

Taping all sizes are also available in taped version. For information on taping see page 53.

Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
470 pF	-L5471-+1				
560 pF	-L5561-+1				
680 pF	-L5681-+1				
820 pF	-L5821-+1				
1000 pF	-L5102-+1	-L5102-+1			
1200 pF	-L5122-+1	-L5122-+1			
1500 pF	-L5152-+1	-L5152-+1			
1800 pF	-L5182-+1	-L5182-+1			
2200 pF	-L5222-+1	-L5222-+1			
2700 pF	-L5272-+1	-L5272-+1			
3300 pF	-L5332-+1	-L5332-+1			
3900 pF	-L5392-+1	-L5392-+1			
4700 pF	-L5472-+1	-L5472-+1			
5600 pF	-L5562-+1	-L5562-+1			
6800 pF	-L5682-+1	-L5682-+1			
8200 pF	-L5822-+1	-L5822-+1	-L5822-+1		
10000 pF	-L5103-+1	-L5103-+1	-L5103-+1		
12000 pF	-L5123-+1	-L5123-+1	-L5123-+1		
15000 pF	-L5153-+1	-L5153-+1	-L5153-+1		
18000 pF		-L5183-+1	-L5183-+1		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %



Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1] B37941-	B37872-	B37950-	B37953-	B37956-
22000 pF		-L5223-+1	-L5223-+1		
27000 pF		-L5273-+1	-L5273-+1		
33000 pF		-L5333-+1	-L5333-+1		
39000 pF			-L5393-+1		
47000 pF			-L5473-+1	-L5473-+1	
56000 pF			-L5563-+1	-L5563-+1	
68000 pF			-L5683-+1	-L5683-+1	
82000 pF			-L5823-+1	-L5823-+1	
0,10 µF			-L5104-+1	-L5104-+1	
0,12 µF			-L5124-+1	-L5124-+1	
0,15 µF				-L5154-+1	
0,18 µF				-L5184-+1	-L5184-+1
0,22 µF				-L5224-+1	-L5224-+1
0,27 µF				-L5274-+1	-L5274-+1
0,33 µF					-L5334-+1
0,39 µF					-L5394-+1
0,47 µF					-L5474-+1
0,56 µF					-L5564-+1
0,68 µF					-L5684-+1

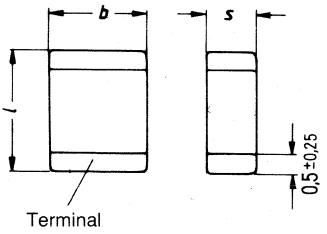
[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

Dielectric	class 2
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	470 pF bis 0.15 μF
Capacitance values available	E 12 series
Terminals	silver nickel tin: for ordering code refer to table silver palladium: the letter "L", the 7th digit of the ordering code, must be replaced by "J"; example: B37941-**J**...
Taping	all sizes are also available in taped version. For information on taping see page 53.

Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
470 pF	-L1471-+1				
560 pF	-L1561-+1				
680 pF	-L1681-+1				
820 pF	-L1821-+1				
1000 pF	-L1102-+1	-L1102-+1			
1200 pF	-L1122-+1	-L1122-+1			
1500 pF	-L1152-+1	-L1152-+1			
1800 pF	-L1182-+1	-L1182-+1			
2200 pF	-L1222-+1	-L1222-+1			
2700 pF	-L1272-+1	-L1272-+1			
3300 pF	-L1332-+1	-L1332-+1			
3900 pF	-L1392-+1	-L1392-+1			
4700 pF		-L1472-+1			
5600 pF		-L1562-+1			
6800 pF		-L1682-+1			

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %



Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
8200 pF		-L1822-+1	-L1822-+1		
10000 pF		-L1103-+1	-L1103-+1		
12000 pF			-L1123-+1		
15000 pF			-L1153-+1		
18000 pF			-L1183-+1		
22000 pF			-L1223-+1		
27000 pF			-L1273-+1		
33000 pF			-L1333-+1	-L1333-+1	
39000 pF				-L1393-+1	
47000 pF				-L1473-+1	-L1473-+1
56000 pF				-L1563-+1	-L1563-+1
68000 pF				-L1683-+1	-L1683-+1
82000 pF				-L1823-+1	-L1823-+1
0,10 µF					-L1104-+1
0,12 µF					-L1124-+1
0,15 µF					-L1154-+1

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

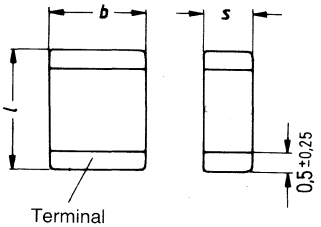
Dielectric class 2

DIN climatic category HPF

IEC climatic category 25/085/56

Capacitance range 10 000 pF to 1.5 µF

Capacitance values available E 6 series



Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J";
example: B37942-**J**...

Taping all sizes are also available in taped version. For information on taping see page 53.

Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2±0,2	3,2±0,2	4,5±0,2	5,7±0,2
b mm	1,25±0,15	1,6±0,15	2,5±0,2	3,2±0,2	5,0±0,2
s mm	1,25 max.	1,3 max.	1,7 max.	1,7 max.	1,7 max.
Rated capacitance[1])	Ordering code				
C_R	B37942-	B37873-	B37951-	B37954-	B37957-
S 10000 pF	-K5103-M1	-K5103-M1			
15000 pF	-K5153-M1	-K5153-M1			
S 22000 pF	-K5223-M1	-K5223-M1			
33000 pF	-K5333-M1	-K5333-M1			
S 47000 pF	-K5473-M1	-K5473-M1			
68000 pF		-K5683-M1			
S 0,10 µF		-K5104-M1	-K5104-M1		
0,15 µF			-K5154-M1		
S 0,22 µF			-K5224-M1	-K5224-M1	
0,33 µF				-K5334-M1	
S 0,47 µF				-K5474-M1	-K5474-M1
0,68 µF					-K5684-M1
S 1,0 µF					-K5105-M1
1,5 µF					-K5155-M1

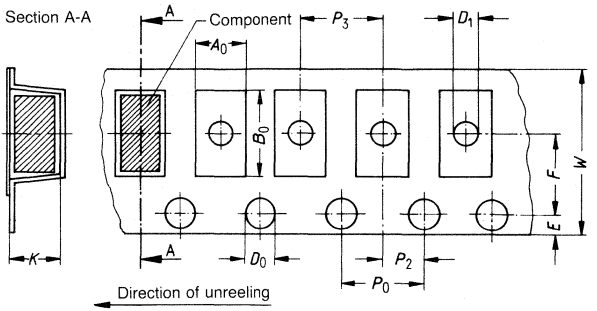
[1]) Capacitance tolerance ±20 %

S Preferred types (see page 4)

Taping Multilayer Chip Capacitors 63 and 100 Vdc

Dimensions and tolerances

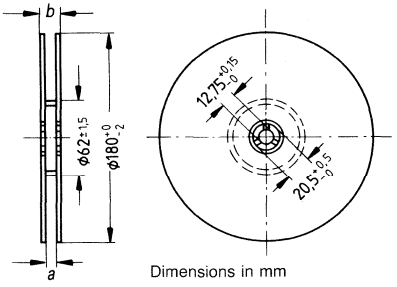
Depending on the size, the chips are available in 8-mm or 12-mm blister tape. The dimensions of these plastic tapes conform to DIN IEC 286-3 (at present in preparation).



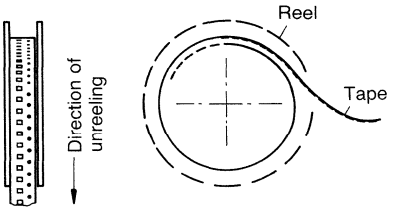
Dimension (symbols)	Size (8-mm tape) in mm			Size (12-mm tape)		Tolerance
	0805	1206	1210	1812	2220	
$A_0 \times B_0$	1,6 × 2,4	1,9 × 3,5	2,8 × 3,5	3,5 × 4,8	5,1 × 6,0	± 0,2
K	0,9; 1,3			1,3		max.
D_0	1,5			1,5		+0,1/−0
D_1	1,0			1,0		±0,1
P_0	4,0			4,0		±0,1 (≤±0,05 mm per 10 sprocket holes)
P_2	2,0			2,0		±0,05
P_3	4,0			8,0		±0,2
W	8,0			12,0		±0,3
E	1,75			1,75		±0,1
F	3,5			5,5		±0,05

Packaging

Tapes are wound and delivered on reels as illustrated below:



Dimensions in mm



Dimensions	*a*	*b*
8-mm tape	8,4 + 1,5/−0	14,4 max.
12-mm tape	12,4 + 1,5/−0	18,4 max.

Packaging units

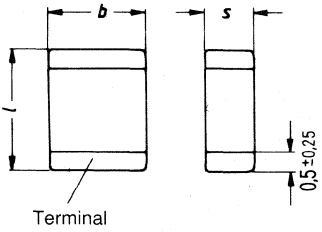
Size	0805, 1206, 1210	1812, 2220
Dim. K = 0,9 mm	4000 items/reel	–
Dim. K = 1,3 mm	2000 items/reel	1500 items/reel

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

Dielectric	class 1	**Terminals**	silver nickel tin: for ordering code refer to table; silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J"; example: B37940-**J**...
DIN climatic category	FKF		
IEC climatic category	55/125/56		
Capacitance range	1 pF to 15 000 pF		
Capacitance values available	E12 series		

Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37940-	B37871-	B37949-	B37952-	B37955-
1,0 pF	-K5010-+62	-K5010-+62			
1,2 pF	-K5010-+262	-K5010-+262			
1,5 pF	-K5010-+562	-K5010-+562			
1,8 pF	-K5010-+862	-K5010-+862			
2,2 pF	-K5020-+262	-K5020-+262			
2,7 pF	-K5020-+762	-K5020-+762			
3,3 pF	-K5030-+362	-K5030-+362			
3,9 pF	-K5030-+962	-K5030-+962			
4,7 pF	-K5040-+762	-K5040-+762			
5,6 pF	-K5050-+662	-K5050-+662			
6,8 pF	-K5060-+862	-K5060-+862			
8,2 pF	-K5080-+262	-K5080-+262			
10 pF	-K5100-+62	-K5100-+62			
12 pF	-K5120-+62	-K5120-+62			
15 pF	-K5150-+62	-K5150-+62			
18 pF	-K5180-+62	-K5180-+62			
22 pF	-K5220-+62	-K5220-+62			
27 pF	-K5270-+62	-K5270-+62			
33 pF	-K5330-+62	-K5330-+62			
39 pF	-K5390-+62	-K5390-+62			
47 pF	-K5470-+62	-K5470-+62			
56 pF	-K5560-+62	-K5560-+62			
68 pF	-K5680-+62	-K5680-+62			
82 pF	-K5820-+62	-K5820-+62			
100 pF	-K5101-+62	-K5101-+62			
120 pF	-K5121-+62	-K5121-+62			
150 pF	-K5151-+62	-K5151-+62			

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for C_R <10 pF: C ≙ ±0,25 pF, D ≙ ±0,5 pF; for C_R ≥10 pF: J ≙ ±5 %, K ≙ ±10 %



Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37940-	B37871-	B37949-	B37952-	B37955-
180 pF	-K5181-+62	-K5181-+62			
220 pF	-K5221-+62	-K5221-+62			
270 pF	-K5271-+62	-K5271-+62			
330 pF	-K5331-+62	-K5331-+62			
390 pF	-K5391-+62	-K5391-+62			
470 pF		-K5471-+62			
560 pF		-K5561-+62			
680 pF		-K5681-+62			
820 pF		-K5821-+62	-K5821-+62		
1000 pF		-K5102-+62	-K5102-+62		
1200 pF			-K5122-+62	-K5122-+62	
1500 pF			-K5152-+62	-K5152-+62	
1800 pF			-K5182-+62	-K5182-+62	
2200 pF			-K5222-+62	-K5222-+62	
2700 pF			-K5272-+62	-K5272-+62	
3300 pF			-K5332-+62	-K5332-+62	-K5332-+62
3900 pF				-K5392-+62	-K5392-+62
4700 pF				-K5472-+62	-K5472-+62
5600 pF				-K5562-+62	-K5562-+62
6800 pF				-K5682-+62	-K5682-+62
8200 pF					-K5822-+62
10000 pF					-K5103-+62
12000 pF					-K5123-+62
15000 pF					-K5153-+62

[1]) +: Insert appropriate code letter for requested capacitance tolerance: J ≙ ±5 %; K ≙ ±10 %

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

Dielectric class 1

DIN climatic category FKF

IEC climatic category 55/125/56

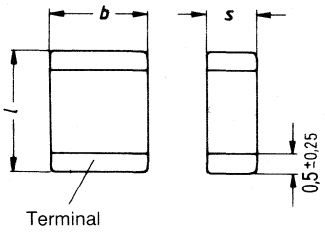
Capacitance range 1 pF to 10 000 pF

Capacitance values available E12 series

Terminals silver nickel tin: for ordering code refer to table; silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J"; example: B37940-**J**...

Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37940-	B37871-	B37949-	B37952-	B37955-
1,0 pF	-K1010-+62	-K1010-+62			
1,2 pF	-K1010-+262	-K1010-+262			
1,5 pF	-K1010-+562	-K1010-+562			
1,8 pF	-K1010-+862	-K1010-+862			
2,2 pF	-K1020-+262	-K1020-+262			
2,7 pF	-K1020-+762	-K1020-+762			
3,3 pF	-K1030-+362	-K1030-+362			
3,9 pF	-K1030-+962	-K1030-+962			
4,7 pF	-K1040-+762	-K1040-+762			
5,6 pF	-K1050-+662	-K1050-+662			
6,8 pF	-K1060-+862	-K1060-+862			
8,2 pF	-K1080-+262	-K1080-+262			
10 pF	-K1100-+62	-K1100-+62			
12 pF	-K1120-+62	-K1120-+62			
15 pF	-K1150-+62	-K1150-+62			
18 pF	-K1180-+62	-K1180-+62			
22 pF	-K1220-+62	-K1220-+62			
27 pF	-K1270-+62	-K1270-+62			
33 pF	-K1330-+62	-K1330-+62			
39 pF	-K1390-+62	-K1390-+62			
47 pF	-K1470-+62	-K1470-+62			
56 pF	-K1560-+62	-K1560-+62			
68 pF	-K1680-+62	-K1680-+62			
82 pF	-K1820-+62	-K1820-+62			
100 pF	-K1101-+62	-K1101-+62			
120 pF	-K1121-+62	-K1121-+62			
150 pF	-K1151-+62	-K1151-+62			

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for C_R <10 pF: C ≙ ±0,25 pF, D ≙ ±0,5 pF; for C_R ≥10 pF: J ≙ ±5 %, K ≙ ±10 %



Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37940-	B37871-	B37949-	B37952-	B37955-
180 pF	-K1181-+62	-K1181-+62			
220 pF	-K1221-+62	-K1221-+62			
270 pF	-K1271-+62	-K1271-+62			
330 pF		-K1331-+62	-K1331-+62		
390 pF		-K1391-+62	-K1391-+62		
470 pF		-K1471-+62	-K1471-+62		
560 pF			-K1561-+62		
680 pF			-K1681-+62		
820 pF			-K1821-+62		
1000 pF			-K1102-+62	-K1102-+62	
1200 pF			-K1122-+62	-K1122-+62	
1500 pF			-K1152-+62	-K1152-+62	-K1152-+62
1800 pF				-K1182-+62	-K1182-+62
2200 pF				-K1222-+62	-K1222-+62
2700 pF				-K1272-+62	-K1272-+62
3300 pF				-K1332-+62	-K1332-+62
3900 pF					-K1392-+62
4700 pF					-K1472-+62
5600 pF					-K1562-+62
6800 pF					-K1682-+62
8200 pF					-K1822-+62
10000 pF					-K1103-+62

[1]) +: Insert appropriate code letter for requested capacitance tolerance: J ≙ ±5 %; K ≙ ±10 %

Dielectric class 1

DIN climatic category FKF

IEC climatic category 55/125/56

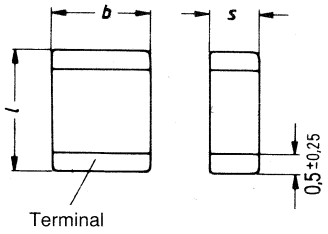
Capacitance range 470 pF to 0.56 µF

Capacitance values available E12 series

Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J";
example: B37941-**J**...

Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
470 pF	-K5471-+62				
560 pF	-K5561-+62				
680 pF	-K5681-+62				
820 pF	-K5821-+62				
1000 pF	-K5102-+62	-K5102-+62			
1200 pF	-K5122-+62	-K5122-+62			
1500 pF	-K5152-+62	-K5152-+62			
1800 pF	-K5182-+62	-K5182-+62			
2200 pF	-K5222-+62	-K5222-+62			
2700 pF	-K5272-+62	-K5272-+62			
3300 pF	-K5332-+62	-K5332-+62			
3900 pF	-K5392-+62	-K5392-+62			
4700 pF	-K5472-+62	-K5472-+62			
5600 pF	-K5562-+62	-K5562-+62			
6800 pF	-K5682-+62	-K5682-+62			
8200 pF	-K5822-+62	-K5822-+62	-K5822-+62		
10000 pF	-K5103-+62	-K5103-+62	-K5103-+62		
12000 pF		-K5123-+62	-K5123-+62		
15000 pF		-K5153-+62	-K5153-+62		
18000 pF		-K5183-+62	-K5183-+62		
22000 pF		-K5223-+62	-K5223-+62		
27000 pF		-K5273-+62	-K5273-+62		
33000 pF		-K5333-+62	-K5333-+62		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %



Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
39000 pF			-K5393-+62		
47000 pF			-K5473-+62	-K5473-+62	
56000 pF			-K5563-+62	-K5563-+62	
68000 pF			-K5683-+62	-K5683-+62	
82000 pF			-K5823-+62	-K5823-+62	
0,10 µF			-K5104-+62[2])	-K5104-+62	
0,12 µF				-K5124-+62	
0,15 µF				-K5154-+62	
0,18 µF				-K5184-+62	-K5184-+62
0,22 µF				-K5224-+62	-K5224-+62
0,27 µF				-K5274-+62	-K5274-+62
0,33 µF					-K5334-+62
0,39 µF					-K5394-+62
0,47 µF					-K5474-+62
0,56 µF					-K5564-+62

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %
[2]) Chip thickness for the capacitor with 0.1 µF is 1.1 ±0.2 mm.

Dielectric class 2

DIN climatic category FKF

IEC climatic category 55/125/56

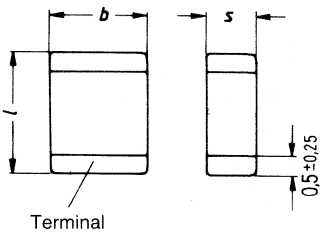
Capacitance range 470 pF to 0.15 µF

Capacitance values available E12 series

Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by „J";
example: B37941-**J**...

Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
470 pF	-K1471-+62				
560 pF	-K1561-+62				
680 pF	-K1681-+62				
820 pF	-K1821-+62				
1000 pF	-K1102-+62	-K1102-+62			
1200 pF	-K1122-+62	-K1122-+62			
1500 pF	-K1152-+62	-K1152-+62			
1800 pF	-K1182-+62	-K1182-+62			
2200 pF	-K1222-+62	-K1222-+62			
2700 pF	-K1272-+62	-K1272-+62			
3300 pF	-K1332-+62	-K1332-+62			
3900 pF		-K1392-+62			
4700 pF		-K1472-+62			
5600 pF		-K1562-+62			
6800 pF		-K1682-+62			
8200 pF		-K1822-+62	-K1822-+62		
10000 pF		-K1103-+62	-K1103-+62		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %



Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
12000 pF			-K1123-+62		
15000 pF			-K1153-+62		
18000 pF			-K1183-+62		
22000 pF			-K1223-+62		
27000 pF			-K1273-+62		
33000 pF			-K1333-+62	-K1333-+62	
39000 pF				-K1393-+62	
47000 pF				-K1473-+62	-K1473-+62
56000 pF				-K1563-+62	-K1563-+62
68000 pF				-K1683-+62	-K1683-+62
82000 pF				-K1823-+62	-K1823-+62
0,10 µF					-K1104-+62
0,12 µF					-K1124-+62
0,15 µF					-K1154-+62

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

Dielectric class 2

DIN climatic category FKF

IEC climatic category 55/125/56

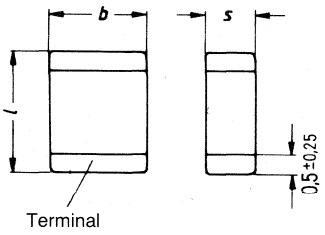
Capacitance range 470 pF to 0.56 μF

Capacitance values available E 12 series

Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "L", the 7th digit of the ordering code, must be replaced by "J";
example: B37941-**J**...

Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1] B37941-	B37872-	B37950-	B37953-	B37956-
470 pF	-L5471-+62				
560 pF	-L5561-+62				
680 pF	-L5681-+62				
820 pF	-L5821-+62				
1000 pF	-L5102-+62	-L5102-+62			
1200 pF	-L5122-+62	-L5122-+62			
1500 pF	-L5152-+62	-L5152-+62			
1800 pF	-L5182-+62	-L5182-+62			
2200 pF	-L5222-+62	-L5222-+62			
2700 pF	-L5272-+62	-L5272-+62			
3300 pF	-L5332-+62	-L5332-+62			
3900 pF	-L5392-+62	-L5392-+62			
4700 pF	-L5472-+62	-L5472-+62			
5600 pF	-L5562-+62	-L5562-+62			
6800 pF	-L5682-+62	-L5682-+62			
8200 pF	-L5822-+62	-L5822-+62	-L5822-+62		
10000 pF	-L5103-+62	-L5103-+62	-L5103-+62		
12000 pF		-L5123-+62	-L5123-+62		
15000 pF		-L5153-+62	-L5153-+62		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %



Tape width W	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1] B37941-	B37872-	B37950-	B37953-	B37956-
18000 pF		-L5183-+62	-L5183-+62		
22000 pF		-L5223-+62	-L5223-+62		
27000 pF		-L5273-+62	-L5273-+62		
33000 pF		-L5333-+62	-L5333-+62		
39000 pF			-L5393-+62		
47000 pF			-L5473-+62	-L5473-+62	
56000 pF			-L5563-+62	-L5563-+62	
68000 pF			-L5683-+62	-L5683-+62	
82000 pF			-L5823-+62	-L5823-+62	
0,10 µF			-L5104-+62[2]	-L5104-+62	
0,12 µF				-L5124-+62	
0,15 µF				-L5154-+62	
0,18 µF				-L5184-+62	-L5184-+62
0,22 µF				-L5224-+62	-L5224-+62
0,27 µF				-L5274-+62	-L5274-+62
0,33 µF					-L5334-+62
0,39 µF					-L5394-+62
0,47 µF					-L5474-+62
0,56 µF					-L5564-+62

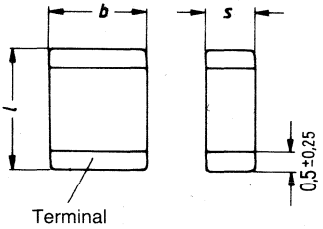
[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %
[2]) Chip thickness for the capacitor with 0.1 µF is 1.1 ±0.2 mm.

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

Dielectric	class 2
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	470 pF to 0.15 µF
Capacitance values available	E 12 series
Terminals	silver nickel tin: for ordering code refer to table silver palladium: the letter "L", the 7th digit of the ordering code, must be replaced by "J"; example: B37941-**J**...

Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
470 pF	-L1471-+62				
560 pF	-L1561-+62				
680 pF	-L1681-+62				
820 pF	-L1821-+62				
1000 pF	-L1102-+62	-L1102-+62			
1200 pF	-L1122-+62	-L1122-+62			
1500 pF	-L1152-+62	-L1152-+62			
1800 pF	-L1182-+62	-L1182-+62			
2200 pF	-L1222-+62	-L1222-+62			
2700 pF	-L1272-+62	-L1272-+62			
3300 pF	-L1332-+62	-L1332-+62			
3900 pF		-L1392-+62			
4700 pF		-L1472-+62			
5600 pF		-L1562-+62			
6800 pF		-L1682-+62			
8200 pF		-L1822-+62	-L1822-+62		
10000 pF		-L1103-+62	-L1103-+62		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %



Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37941-	B37872-	B37950-	B37953-	B37956-
12000 pF			-L1123-+62		
15000 pF			-L1153-+62		
18000 pF			-L1183-+62		
22000 pF			-L1223-+62		
27000 pF			-L1273-+62		
33000 pF			-L1333-+62	-L1333-+62	
39000 pF				-L1393-+62	
47000 pF				-L1473-+62	-L1473-+62
56000 pF				-L1563-+62	-L1563-+62
68000 pF				-L1683-+62	-L1683-+62
82000 pF				-L1823-+62	-L1823-+62
0,10 µF					-L1104-+62
0,12 µF					-L1124-+62
0,15 µF					-L1154-+62

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

CECC version (quality assessment in acc. with CECC 31X02 at present in preparation)

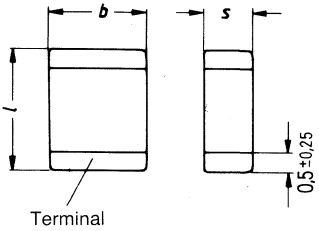
Dielectric class 2

DIN climatic category HPF

IEC climatic category 25/085/56

Capacitance range 10 000 pF bis 1.5 µF

Capacitance values available E 6 series



Terminals silver nickel tin: for ordering code refer to table
silver palladium: the letter "K", the 7th digit of the ordering code, must be replaced by "J";
example: B37942-**J**...

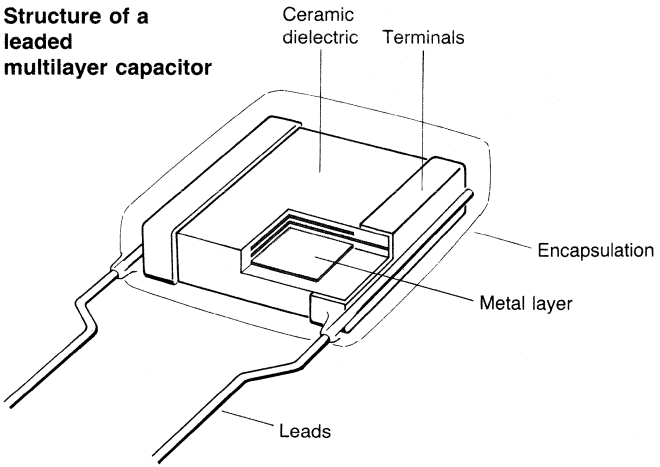
Tape width *W*	8 mm			12 mm	
Size	0805	1206	1210	1812	2220
l mm	2,0 ±0,2	3,2 ±0,2	3,2 ±0,2	4,5 ±0,2	5,7 ±0,2
b mm	1,25±0,15	1,6 ±0,15	2,5 ±0,2	3,2 ±0,2	4,8 ±0,2
s mm	0,75±0,15	0,75±0,15	0,75±0,15	1,1 ±0,2	1,1 ±0,2
Rated capacitance C_R	Ordering code[1]) B37942-	B37873-	B37951-	B37954-	B37957-
10000 pF	-K5103-+62	-K5103-+62			
15000 pF	-K5153-+62	-K5153-+62			
22000 pF	-K5223-+62	-K5223-+62			
33000 pF		-K5333-+62			
47000 pF		-K5473-+62			
68000 pF		-K5683-+62			
0,10 µF		-K5104-+62	-K5104-+62		
0,15 µF			-K5154-+62		
0,22 µF			-K5224-+62	-K5224-+62	
0,33 µF				-K5334-+62	
0,47 µF				-K5474-+62	-K5474-+62
0,68 µF					-K5684-+62
1,0 µF					-K5105-+62
1,5 µF					-K5155-+62

[1]) Capacitance tolerance: ±20 %

Leaded Multilayer Capacitors	**untaped**
	taped

Multilayer Capacitors, Radial Leaded
General, Survey

Structure of a leaded multilayer capacitor



The capacitors are delivered with quality assessment in accordance with
CECC 30601-016 for CG material (≙ C0G, NPO)
CECC 30701-033 for 2C1 material
CECC 30701-032 for 2F4 material (≙ Z5U)

For identification self-adhesive labels with the CECC symbol are attached to the package (bulk and taped parts).

Features

- High capacitance per unit volume
- Suitable for automatic assembly in acc. with IEC std.
- High reliability and damp heat resistance (56 days in acc. with IEC 68)
- Non-polar
- Low-loss
- Pulse strength

Applications

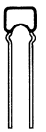
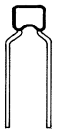
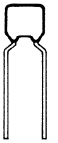
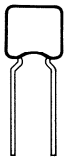
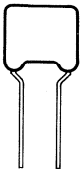
- Data processing
- Communications engineering
- Measuring and control equipment
- Photo industry
- Entertainment industry
- Medical engineering
- Automotive electronics
- Military electronics
- Space technology

Ceramic type	C0G; CG				X7R; 2C1				Z5U; 2F4	
CECC specification	30601-016				30701-033[1]				30701-032	
Rated voltage	63 Vdc		100 Vdc		63 Vdc		100 Vdc		63 Vdc	
Lead spacing (mm)	2,54	5,08	2,54	5,08	2,54	5,08	2,54	5,08	2,54	5,08
Capacitance range pF	100 to 4700	100 to 47000	4,7 to 1500	4,7 to 22000	3300 to 0,15 µF	3300 to 1 µF	220 to 39000	220 to 0,33 µF	10000 to 0,33 µF	10000 to 2,2 µF
Capacitance tolerance	±0,25 pF; ±0,5 pF; ±5 %; ±10 %				±10 %; ±20 %				±20 %	
Temperature range	−55 ... +125 °C				−55 ... +125 °C				−25 ... +85 °C[2]	

[1]) Contrary to CECC specification 30701, the capacitance deviation from the voltage is not defined for X7R.
[2]) Z5U: +10 ... +85 °C.

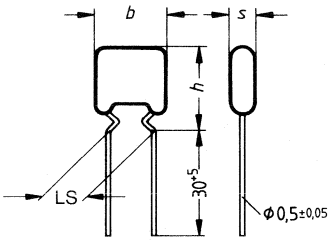
Multilayer Capacitors, C0G
Radial Leaded — 63 Vdc

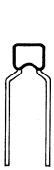
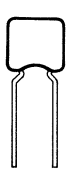
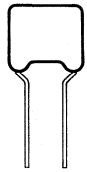
Dielectric	class 1
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	100 pF bis 47 000 pF
Capacitance values available	E 12 series
Leads	Fe wires, copper-covered and tinned
Marking	rated capacitance, tolerance, trademark, ceramic material, voltage
Taping	all types are also available in taped version. For information on taping refer to page 88.

Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	5,0	5,0	5,0	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	5,0
						
Rated capacitance C_R	Ordering code[1]) B37979-	B37986-	B37979-	B37986-	B37983-	B37900-
S 100 pF	-N5101-+		-G5101-+			
S 120 pF	-N5121-+		-G5121-+			
S 150 pF	-N5151-+		-G5151-+			
S 180 pF	-N5181-+		-G5181-+			
S 220 pF	-N5221-+		-G5221-+			
S 270 pF	-N5271-+		-G5271-+			
S 330 pF	-N5331-+		-G5331-+			
S 390 pF	-N5391-+		-G5391-+			
S 470 pF	-N5471-+		-G5471-+			
S 560 pF	-N5561-+		-G5561-+			
S 680 pF		-N5681-+		-G5681-+		
S 820 pF		-N5821-+		-G5821-+		
S 1000 pF		-N5102-+		-G5102-+		
S 1200 pF		-N5122-+		-G5122-+		
S 1500 pF		-N5152-+		-G5152-+		
S 1800 pF		-N5182-+		-G5182-+		

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for C_R <10 pF: D ≙ ±0,5 pF, F ≙ ±1 pF; for C_R ≥10 pF; J ≙ ±5 %, K ≙ ±10 %

S Preferred types (see page 4)

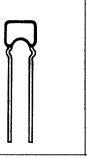
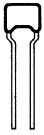
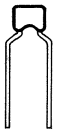
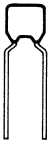
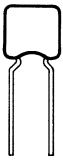
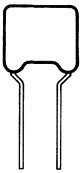


Dimensions (mm)	Lead spacing 2,54 mm		Lead spacing 5,08 mm			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	5,0	5,0	5,0	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	5,0
						
Rated capacitance C_R	Ordering code[1]) B37979-	B37986-	B37979-	B37986-	B37983-	B37900-
S 2200 pF		-N5222-+		-G5222-+		
S 2700 pF		-N5272-+		-G5272-+		
S 3300 pF		-N5332-+		-G5332-+		
S 3900 pF		-N5392-+		-G5392-+		
S 4700 pF		-N5472-+		-G5472-+		
S 5600 pF					-N5562-+	
S 6800 pF					-N5682-+	
S 8200 pF					-N5822-+	
S 10000 pF					-N5103-+	
S 12000 pF					-N5123-+	
S 15000 pF					-N5153-+	
S 18000 pF					-N5183-+	
S 22000 pF					-N5223-+	
S 27000 pF					-N5273-+	
S 33000 pF						-N5333-+
S 39000 pF						-N5393-+
S 47000 pF						-N5473-+

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for $C_R \geq 10$ pF: J ≙ ±5 %, K ≙ ±10 %

S Preferred types (see page 4)

Dielectric	class 1
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	4.7 pF to 22 000 pF
Capacitance values available	E 12 series

Dimensions (mm)		**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)		5,5	6,5	5,5	6,5	9,0	11,5
b (max.)		5,0	5,0	5,0	5,0	7,5	10,0
s (max.)		2,5	3,1	2,5	3,1	3,8	5,0
							
Rated capacitance C_R		Ordering code[1]) B37979-	B37986-	B37979-	B37986-	B37983-	B37900-
S	4,7 pF	-N1040-+700		-G1040-+700			
S	5,6 pF	-N1050-+600		-G1050-+600			
S	6,8 pF	-N1060-+800		-G1060-+800			
S	8,2 pF	-N1080-+200		-G1080-+200			
S	10 pF	-N1100-+		-G1100-+			
S	12 pF	-N1120-+		-G1120-+			
S	15 pF	-N1150-+		-G1150-+			
S	18 pF	-N1180-+		-G1180-+			
S	22 pF	-N1220-+		-G1220-+			
S	27 pF	-N1270-+		-G1270-+			
S	33 pF	-N1330-+		-G1330-+			
S	39 pF	-N1390-+		-G1390-+			
S	47 pF	-N1470-+		-G1470-+			
S	56 pF	-N1560-+		-G1560-+			
S	68 pF	-N1680-+		-G1680-+			
S	82 pF	-N1820-+		-G1820-+			
S	100 pF	-N1101-+		-G1101-+			
S	120 pF	-N1121-+		-G1121-+			
S	150 pF	-N1151-+		-G1151-+			
S	180 pF	-N1181-+		-G1181-+			
S	220 pF		-N1221-+		-G1221-+		
S	270 pF		-N1271-+		-G1271-+		
S	330 pF		-N1331-+		-G1331-+		
S	390 pF		-N1391-+		-G1391-+		

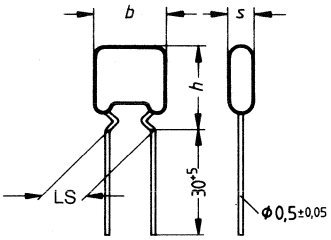
[1]) +: Insert appropriate code letter for requested capacitance tolerance; for C_R <10 pF: D ≙ ±0,5 pF, F ≙ ±1 pF; for C_R ≥10 pF; J ≙ ±5 %, K ≙ ±10 %

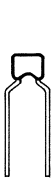
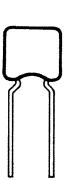
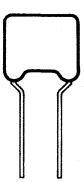
S Preferred types (see page 4)

Leads Fe wires, copper-covered and tinned

Marking rated capacitance, tolerance, trademark, ceramic material, voltage

Taping all types are also available in taped version. For information on taping refer to page 88.



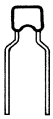
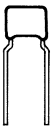
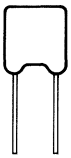
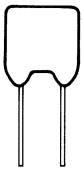
Dimensions (mm)	Lead spacing 2,54 mm		Lead spacing 5,08 mm			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	5,0	5,0	5,0	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	5,0
						
Rated capacitance C_R	Ordering code[1]) B37979-	B37986-	B37979-	B37986-	B37983-	B37900-
S 470 pF		-N1471-+		-G1471-+		
S 560 pF		-N1561-+		-G1561-+		
S 680 pF		-N1681-+		-G1681-+		
S 820 pF		-N1821-+		-G1821-+		
S 1000 pF		-N1102-+		-G1102-+		
S 1200 pF		-N1122-+		-G1122-+		
S 1500 pF		-N1152-+		-G1152-+		
S 1800 pF					-N1182-+	
S 2200 pF					-N1222-+	
S 2700 pF					-N1272-+	
S 3300 pF					-N1332-+	
S 3900 pF					-N1392-+	
S 4700 pF					-N1472-+	
S 5600 pF					-N1562-+	
S 6800 pF					-N1682-+	
S 8200 pF					-N1822-+	
S 10000 pF					-N1103-+	
S 12000 pF						-N1123-+
S 15000 pF						-N1153-+
S 18000 pF						-N1183-+
S 22000 pF						-N1223-+

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for $C_R \geq 10$ pF: J ≙ ±5 %, K ≙ ±10 %

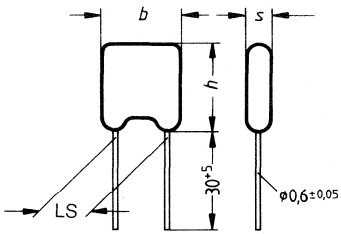
S Preferred types (see page 4)

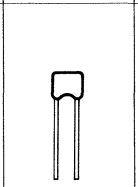
With quality assessment in acc. with CECC 30601-016

Dielectric	class 1
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	100 pF to 47 000 pF
Capacitance values available	E 12 series
Leads	Cu wires, tinned
Marking	rated capacitance, tolerance, trademark, ceramic material, voltage
Taping	all types are also available in taped version. For information on taping refer to page 88.

Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance C_R	Ordering code[1]) B37979-	B37986-	B37979-	B37986-	B37983-	B37900-
100 pF	-K5101-+		-D5101-+			
120 pF	-K5121-+		-D5121-+			
150 pF	-K5151-+		-D5151-+			
180 pF	-K5181-+		-D5181-+			
220 pF	-K5221-+		-D5221-+			
270 pF	-K5271-+		-D5271-+			
330 pF	-K5331-+		-D5331-+			
390 pF	-K5391-+		-D5391-+			
470 pF	-K5471-+		-D5471-+			
560 pF	-K5561-+		-D5561-+			
680 pF		-K5681-+		-D5681-+		
820 pF		-K5821-+		-D5821-+		
1000 pF		-K5102-+		-D5102-+		
1200 pF		-K5122-+		-D5122-+		
1500 pF		-K5152-+		-D5152-+		
1800 pF		-K5182-+		-D5182-+		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: J ≙ ±5 %, K ≙ ±10 %

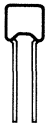
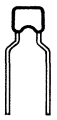
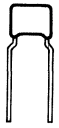
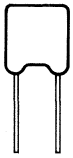
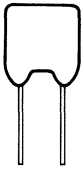


Dimensions (mm)	Lead spacing 2,54 mm		Lead spacing 5,08 mm			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance C_R	Ordering code[1]) B37979-	B37986-	B37979-	B37986-	B37983-	B37900-
2200 pF		-K5222-+		-D5222-+		
2700 pF		-K5272-+		-D5272-+		
3300 pF		-K5332-+		-D5332-+		
3900 pF		-K5392-+		-D5392-+		
4700 pF		-K5472-+		-D5472-+		
5600 pF					-K5562-+	
6800 pF					-K5682-+	
8200 pF					-K5822-+	
10000 pF					-K5103-+	
12000 pF					-K5123-+	
15000 pF					-K5153-+	
18000 pF					-K5183-+	
22000 pF					-K5223-+	
27000 pF					-K5273-+	
33000 pF						-K5333-+
39000 pF						-K5393-+
47000 pF						-K5473-+

[1]) +: Insert appropriate code letter for requested capacitance tolerance: J ≙ ±5 %, K ≙ ±10 %

With quality assessment in acc. with CECC 30601-016

Dielectric	class 1
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	4.7 pF to 22 000 pF
Capacitance values available	E 12 series

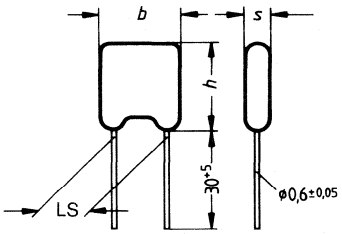
Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance C_R	Ordering code[1]) B37979-	B37986-	B37979-	B37986-	B37983-	B37900-
4,7 pF	-K1040-+700		-D1040-+700			
5,6 pF	-K1050-+600		-D1050-+600			
6,8 pF	-K1060-+800		-D1060-+800			
8,2 pF	-K1080-+200		-D1080-+200			
10 pF	-K1100-+		-D1100-+			
12 pF	-K1120-+		-D1120-+			
15 pF	-K1150-+		-D1150-+			
18 pF	-K1180-+		-D1180-+			
22 pF	-K1220-+		-D1220-+			
27 pF	-K1270-+		-D1270-+			
33 pF	-K1330-+		-D1330-+			
39 pF	-K1390-+		-D1390-+			
47 pF	-K1470-+		-D1470-+			
56 pF	-K1560-+		-D1560-+			
68 pF	-K1680-+		-D1680-+			
82 pF	-K1820-+		-D1820-+			
100 pF	-K1101-+		-D1101-+			
120 pF	-K1121-+		-D1121-+			
150 pF	-K1151-+		-D1151-+			
180 pF	-K1181-+		-D1181-+			
220 pF		-K1221-+		-D1221-+		
270 pF		-K1271-+		-D1271-+		
330 pF		-K1331-+		-D1331-+		
390 pF		-K1391-+		-D1391-+		

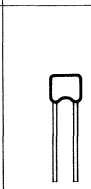
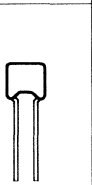
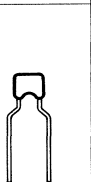
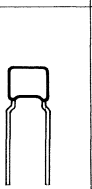
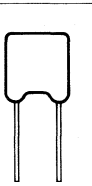
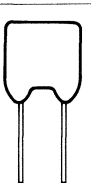
[1]) +: Insert appropriate code letter for requested capacitance tolerance; for C_R <10 pF: D ≙ ±0,5 pF, F ≙ ±1 pF; for C_R ≥10 pF; J ≙ ±5 %, K ≙ ±10 %

Leads Cu wires, tinned

Marking rated capacitance, tolerance, trademark, ceramic material, voltage

Taping all types are also available in taped version. For information on taping refer to page 88.



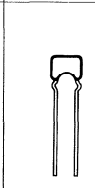
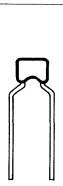
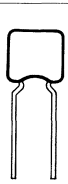
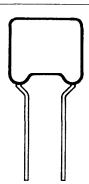
Dimensions (mm)	Lead spacing 2,54 mm		Lead spacing 5,08 mm			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance C_R	Ordering code[1]) B37979-	B37986-	B37979-	B37986-	B37983-	B37900-
470 pF		-K1471-+		-D1471-+		
560 pF		-K1561-+		-D1561-+		
680 pF		-K1681-+		-D1681-+		
820 pF		-K1821-+		-D1821-+		
1000 pF		-K1102-+		-D1102-+		
1200 pF		-K1122-+		-D1122-+		
1500 pF		-K1152-+		-D1152-+		
1800 pF					-K1182-+	
2200 pF					-K1222-+	
2700 pF					-K1272-+	
3300 pF					-K1332-+	
3900 pF					-K1392-+	
4700 pF					-K1472-+	
5600 pF					-K1562-+	
6800 pF					-K1682-+	
8200 pF					-K1822-+	
10000 pF					-K1103-+	-K1123-+
12000 pF						-K1153-+
15000 pF						-K1183-+
18000 pF						-K1223-+
22000 pF						

[1]) +: Insert appropriate code letter for requested capacitance tolerance; for $C_R \geq 10$ pF: J ≙ ±5 %, K ≙ ±10 %

Multilayer Capacitors, X7R
Radial Leaded

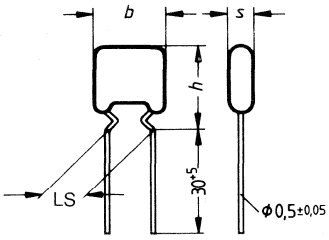
63 Vdc

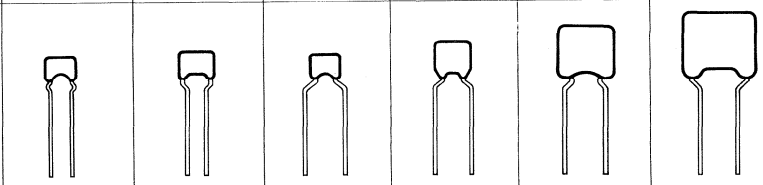
Dielectric	class 1
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	3300 pF to 1.0 µF
Capacitance values available	E 12 series
Leads	Fe wires, copper-covered and tinned
Marking	rated capacitance, tolerance, trademark, ceramic material, voltage
Taping	all types are also available in taped version. For information on taping refer to page 88.

Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	5,0	5,0	5,0	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	5,0
						
Rated capacitance C_R	Ordering code[1]) B37981-	B37987-	B37981-	B37987-	B37984-	B37901-
S 3300 pF	-M5332-+		-F5332-+			
3900 pF	-M5392-+		-F5392-+			
S 4700 pF	-M5472-+		-F5472-+			
5600 pF	-M5562-+		-F5562-+			
S 6800 pF	-M5682-+		-F5682-+			
8200 pF	-M5822-+		-F5822-+			
S 10000 pF	-M5103-+		-F5103-+			
12000 pF	-M5123-+		-F5123-+			
S 15000 pF	-M5153-+		-F5153-+			
18000 pF	-M5183-+		-F5183-+			
S 22000 pF	-M5223-+		-F5223-+			
27000 pF		-M5273-+		-F5273-+		
S 33000 pF		-M5333-+		-F5333-+		
39000 pF		-M5393-+		-F5393-+		
S 47000 pF		-M5473-+		-F5473-+		
56000 pF		-M5563-+		-F5563-+		

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %, M ≙ ±20 %

S Preferred types (see page 4)



Dimensions (mm)	Lead spacing 2,54 mm		Lead spacing 5,08 mm			
h (max.)	5,5	6,5	5,5	6,5	9.0	11,5
b (max.)	5,0	5,0	5,0	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	5,0
						
Rated capacitance C_R	Ordering code[1]) B37981-	B37987-	B37981-	B37987-	B37984-	B37901-
S 68000 pF		-M5683-+		-F5683-+		
82000 pF		-M5823-+		-F5823-+		
S 0,10 µF		-M5104-+		-F5104-+		
0,12 µF		-M5124-+		-F5124-+		
S 0,15 µF		-M5154-+		-F5154-+		
0,18 µF					-M5184-+	
S 0,22 µF					-M5224-+	
0,27 µF					-M5274-+	
S 0,33 µF					-M5334-+	
0,39 µF					-M5394-+	
S 0,47 µF					-M5474-+	
0,56 µF					-M5564-+	
S 0,68 µF					-M5684-+	
0,82 µF						-M5824-+
S 1,00 µF						-M5105-+

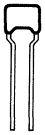
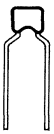
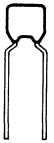
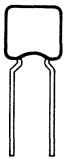
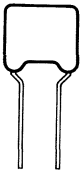
[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %, M ≙ ±20 %

S Preferred types (see page 4)

Multilayer Capacitors, X7R
Radial Leaded

100 Vdc

Dielectric	class 2
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	220 pF to 0.33 µF
Capacitance values available	E 12 series

Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	5,0	5,0	5,0	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	5,0
						
Rated capacitance C_R	Ordering code[1]) B37981-	B37987-	B37981-	B37987-	B37984-	B37901-
S 220 pF	-M1221-+		-F1221-+			
270 pF	-M1271-+		-F1271-+			
S 330 pF	-M1331-+		-F1331-+			
390 pF	-M1391-+		-F1391-+			
S 470 pF	-M1471-+		-F1471-+			
560 pF	-M1561-+		-F1561-+			
S 680 pF	-M1681-+		-F1681-+			
820 pF	-M1821-+		-F1821-+			
S 1000 pF	-M1102-+		-F1102-+			
1200 pF	-M1122-+		-F1122-+			
S 1500 pF	-M1152-+		-F1152-+			
1800 pF	-M1182-+		-F1182-+			
S 2200 pF	-M1222-+		-F1222-+			
2700 pF	-M1272-+		-F1272-+			
S 3300 pF	-M1332-+		-F1332-+			
3900 pF	-M1392-+		-F1392-+			
S 4700 pF	-M1472-+		-F1472-+			
5600 pF		-M1562-+		-F1562-+		
S 6800 pF		-M1682-+		-F1682-+		
8200 pF		-M1822-+		-F1822-+		
S 10000 pF		-M1103-+		-F1103-+		
12000 pF		-M1123-+		-F1123-+		
S 15000 pF		-M1153-+		-F1153-+		
18000 pF		-M1183-+		-F1183-+		

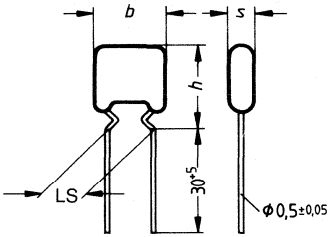
[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

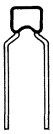
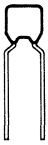
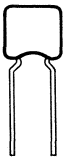
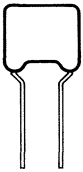
S Preferred types (see page 4)

Leads Fe wires, copper-covered and tinned

Marking rated capacitance, tolerance, trademark, ceramic material, voltage

Taping all types are also available in taped version. For information on taping refer to page 88.



Dimensions (mm)		Lead spacing 2,54 mm		Lead spacing 5,08 mm			
h (max.)		5,5	6,5	5,5	6,5	9,0	11,5
b (max.)		5,0	5,0	5,0	5,0	7,5	10,0
s (max.)		2,5	3,1	2,5	3,1	3,8	5,0
							
Rated capacitance C_R		Ordering code[1]) B37981-	B37987-	B37981-	B37987-	B37984-	B37901-
S	22000 pF		-M1223-+		-F1223-+		
	27000 pF		-M1273-+		-F1273-+		
S	33000 pF		-M1333-+		-F1333-+		
	39000 pF		-M1393-+		-F1393-+		
S	47000 pF					-M1473-+	
	56000 pF					-M1563-+	
S	68000 pF					-M1683-+	
	82000 pF					-M1823-+	
S	0,10 µF					-M1104-+	
	0,12 µF					-M1124-+	
S	0,15 µF					-M1154-+	
	0,18 µF					-M1184-+	
S	0,22 µF						-M1224-+
	0,27 µF						-F1274-+
S	0,33 µF						-F1334-+

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

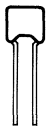
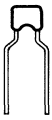
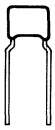
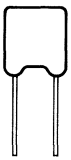
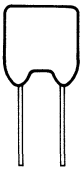
S Preferred types (see page 4)

Multilayer Capacitors, 2C1
Radial Leaded

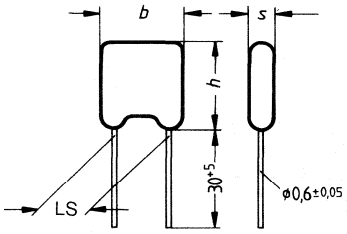
63 Vdc

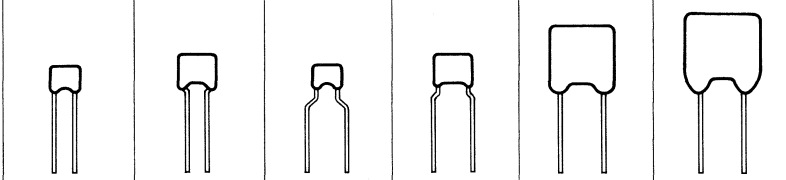
With quality assessment in acc. with CECC 30701-033

Dielectric	class 2
DIN climatic category	FKF
IEC climatic category	55/125/56
Capacitance range	3300 pF bis 1.0 µF
Capacitance values available	E 12 series
Leads	Cu wires, tinned
Marking	rated capacitance, tolerance, trademark, ceramic material, voltage
Taping	all types are also available in taped version. For information on taping refer to page 88.

Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance C_R	Ordering code[1]) B37981-	B37987-	B37981-	B37987-	B37984-	B37901-
3300 pF	-K5332-+		-D5332-+			
3900 pF	-K5392-+		-D5392-+			
4700 pF	-K5472-+		-D5472-+			
5600 pF	-K5562-+		-D5562-+			
6800 pF	-K5682-+		-D5682-+			
8200 pF	-K5822-+		-D5822-+			
10000 pF	-K5103-+		-D5103-+			
12000 pF	-K5123-+		-D5123-+			
15000 pF	-K5153-+		-D5153-+			
18000 pF		-K5183-+		-D5183-+		
22000 pF		-K5223-+		-D5223-+		
27000 pF		-K5273-+		-D5273-+		
33000 pF		-K5333-+		-D5333-+		
39000 pF		-K5393-+		-D5393-+		
47000 pF		-K5473-+		-D5473-+		
56000 pF		-K5563-+		-D5563-+		

[1]) +: Insert appropriate code letter for request capacitance tolerance: K ≙ ±10 %, M ≙ ±20 %



Dimensions (mm)	Lead spacing 2,54 mm		Lead spacing 5,08 mm			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance C_R	Ordering code[1]) B37981-	B37987-	B37981-	B37987-	B37984-	B37901-
68000 pF		-K5683-+		-D5683-+		
82000 pF		-K5823-+		-D5823-+		
0,10 µF		-K5104-+		-D5104-+		
0,12 µF					-K5124-+	
0,15 µF					-K5154-+	
0,18 µF					-K5184-+	
0,22 µF					-K5224-+	
0,27 µF					-K5274-+	
0,33 µF					-K5334-+	
0,39 µF					-K5394-+	
0,47 µF					-K5474-+	
0,56 µF					-K5564-+	
0,68 µF						-K5684-+
0,82 µF						-K5824-+
1,00 µF						-K5105-+

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %, M ≙ ±20 %

With quality assessment in acc. with CECC 30701-033

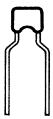
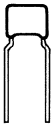
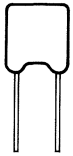
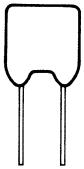
Dielectric class 2

DIN climatic category FKF

IEC climatic category 55/125/56

Capacitance range 220 pF to 0.33 µF

Capacitance values available E 12 series

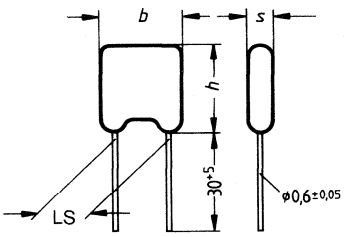
Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance C_R	Ordering code[1]) B37981-	B37987-	B37981-	B37987-	B37984-	B37901-
220 pF	-K1221-+		-D1221-+			
270 pF	-K1271-+		-D1271-+			
330 pF	-K1331-+		-D1331-+			
390 pF	-K1391-+		-D1391-+			
470 pF	-K1471-+		-D1471-+			
560 pF	-K1561-+		-D1561-+			
680 pF	-K1681-+		-D1681-+			
820 pF	-K1821-+		-D1821-+			
1000 pF	-K1102-+		-D1102-+			
1200 pF	-K1122-+		-D1122-+			
1500 pF	-K1152-+		-D1152-+			
1800 pF	-K1182-+		-D1182-+			
2200 pF	-K1222-+		-D1222-+			
2700 pF	-K1272-+		-D1272-+			
3300 pF	-K1332-+		-D1332-+			
3900 pF	-K1392-+		-D1392-+			
4700 pF	-K1472-+		-D1472-+			
5600 pF		-K1562-+		-D1562-+		
6800 pF		-K1682-+		-D1682-+		
8200 pF		-K1822-+		-D1822-+		
10000 pF		-K1103-+		-D1103-+		
12000 pF		-K1123-+		-D1123-+		
15000 pF		-K1153-+		-D1153-+		
18000 pF		-K1183-+		-D1183-+		

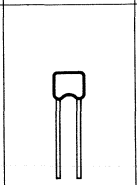
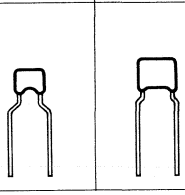
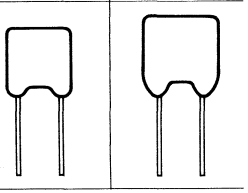
[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

Leads Cu wires, tinned

Marking rated capacitance, tolerance, trademark, ceramic material, voltage

Taping all types are also available in taped version. For information on taping refer to page 88.



Dimensions (mm)	Lead spacing 2,54 mm		Lead spacing 5,08 mm			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance C_R	Ordering code[1]) B37981-	B37987-	B37981-	B37987-	B37984-	B37901-
22000 pF		-K1223-+		-D1223-+		
27000 pF		-K1273-+		-D1273-+		
33000 pF		-K1333-+		-D1333-+		
39000 pF		-K1393-+		-D1393-+		
47000 pF					-K1473-+	
56000 pF					-K1563-+	
68000 pF					-K1683-+	
82000 pF					-K1823-+	
0,10 µF					-K1104-+	
0,12 µF					-K1124-+	
0,15 µF					-K1154-+	
0,18 µF					-K1184-+	
0,22 µF						-K1224-+
0,27 µF						-K1274-+
0,33 µF						-K1334-+

[1]) +: Insert appropriate code letter for requested capacitance tolerance: K ≙ ±10 %; M ≙ ±20 %

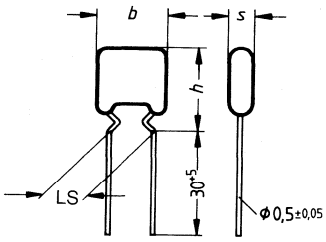
Dielectric class 2

DIN climatic category HPF

IEC climatic category 25/085/56

Capacitance range 10 000 pF to 2.2 µF

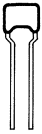
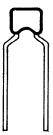
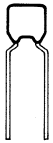
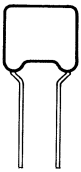
Capacitance values available E 6 series



Leads Fe wires, copper-covered and tinned

Marking rated capacitance, tolerance, trademark, ceramic material, voltage

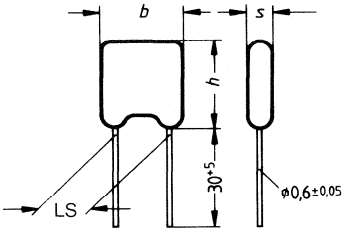
Taping all types are also available in taped version. For information on taping refer to page 88.

Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	5,0	5,0	5,0	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	5,0
						
Rated capacitance[1]) C_R	Ordering code B37982-	B37988-	B37982-	B37988-	B37985-	B37902-
10000 pF	-N5103-M		-G5103-M			
15000 pF	-N5153-M		-G5153-M			
22000 pF	-N5223-M		-G5223-M			
33000 pF	-N5333-M		-G5333-M			
47000 pF	-N5473-M		-G5473-M			
68000 pF		-N5683-M		-G5683-M		
0,10 µF		-N5104-M		-G5104-M		
0,15 µF		-N5154-M		-G5154-M		
0,22 µF		-N5224-M		-G5224-M		
0,33 µF		-N5334-M		-G5334-M		
0,47 µF					-N5474-M	
0,68 µF					-N5684-M	
1,0 µF					-N5105-M	
1,5 µF					-N5155-M	
2,2 µF						-N5225-M

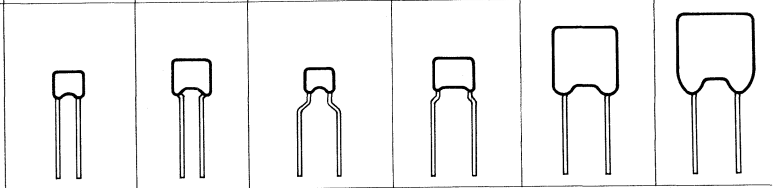
[1]) Capacitance tolerance: ±20 %

S Preferred types (see page 4)

With quality assessment in acc. with CECC 30701-032



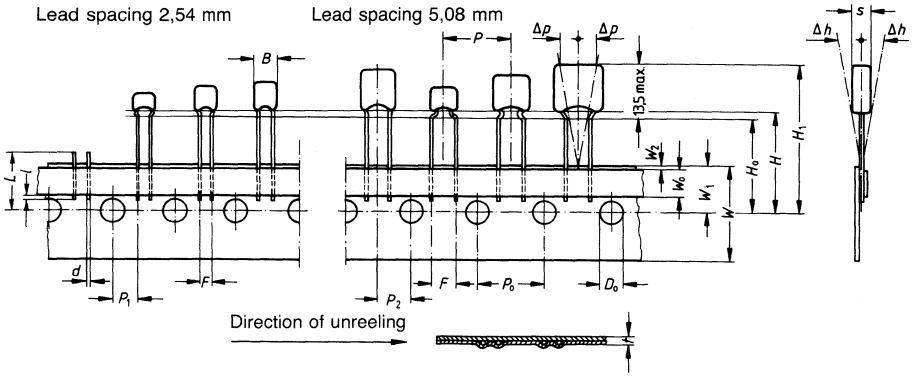
Dielectric	class 2
DIN climatic category	HPF
IEC climatic category	25/085/56
Capacitance range	10 000 pF to 2.2 µF
Capacitance values available	E 6 series
Leads	Cu wires, tinned
Marking	rated capacitance, tolerance, trademark, ceramic material, voltage
Taping	all types are also available in taped version. For information on taping refer to page 88.

Dimensions (mm)	**Lead spacing 2,54 mm**		**Lead spacing 5,08 mm**			
h (max.)	5,5	6,5	5,5	6,5	9,0	11,5
b (max.)	3,8	5,0	3,8	5,0	7,5	10,0
s (max.)	2,5	3,1	2,5	3,1	3,8	3,8
						
Rated capacitance[1]) C_R	Ordering code B37982-	B37988-	B37982-	B37988-	B37985-	B37902-
10000 pF	-K5103-M		-D5103-M			
15000 pF	-K5153-M		-D5153-M			
22000 pF	-K5223-M		-D5223-M			
33000 pF	-K5333-M		-D5333-M			
47000 pF	-K5473-M		-D5473-M			
68000 pF		-K5683-M		-D5683-M		
0,10 µF		-K5104-M		-D5104-M		
0,15 µF		-K5154-M		-D5154-M		
0,22 µF		-K5224-M		-D5224-M		
0,33 µF		-K5334-M		-D5334-M		
0,47 µF					-K5474-M	
0,68 µF					-K5684-M	
1,0 µF					-K5105-M	
1,5 µF					-K5155-M	
2,2 µF						-K5225-M

[1]) Capacitance tolerance: ±20 %

Taping Multilayer Capacitors
Radial Leaded

Dimensions and tolerances (DIN IEC 286-2, at present only draft)

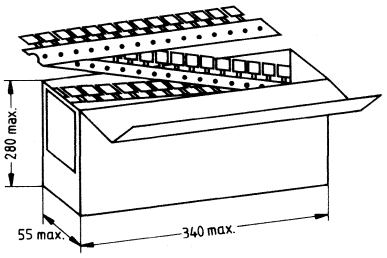


Designation	Symbol	Dimensions (mm)		
		LS 2,54	LS 5,08	Tolerance
Head width	B	11	11	max.
Head thickness	s	3,5	5	max.
Lead diameter	d	0,5/0,6	0,5/0,6	±0,05
Distance between component centers	P	12,7	12,7	±1,0
Pitch of sprocket holes	P_0	12,7	12,7	±0,2[1])
Distance between hole center and lead center	P_1	5,1	3,85	±0,7
Distance between component center and hole center	P_2	6,35	6,35	±1,3
Lead spacing	F	2,54	5,08	+0,6/−0,1
Slope of capacitor	Δh	0	0	±2,0[2])
Slope of capacitor	Δp	0	0	±1,3
Carrier tape width	W	18	18	±0,5
Fixing tape width	W_0	5,5	5,5	min.[3])
Position of sprocket holes	W_1	9	9	±0,5
Position of fixing tape	W_2	1	1	−0,5
Distance between hole center and kink	H_0	16	16	±0,5
Distance between hole center and bottom plane of component body	H	18	18	+2,0/−0
Distance between hole center and top of component body	H_1	32,2	32,2	max.
Sprocket hole diameter	D_0	4	4	±0,2
Tape thickness	t	0,7	0,7	+0,2
Projecting lead	l	1	1	max.
Length of cut leads	L	11	11	max.

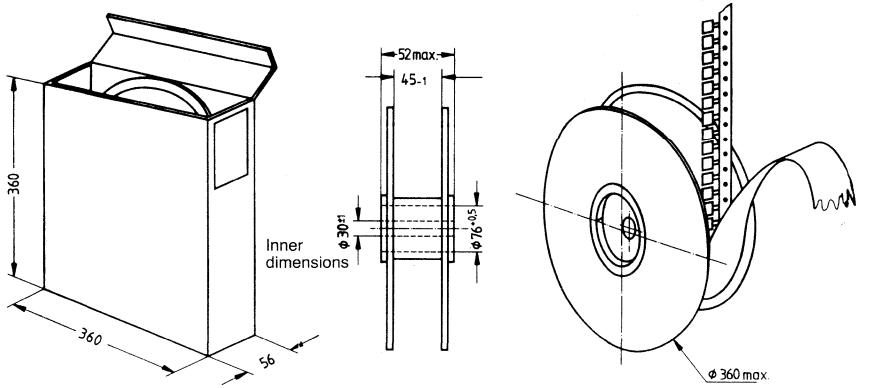
[1]) ±1 mm/20 hole pitches
[2]) measured at top of component body
[3]) Peel force ≥ 5 N

Kinds of packing

AMMO pack



Reel packing



Dimensions in mm

Taping Multilayer Capacitors
Radial Leaded

Ordering codes and packaging units (PU)

Radial leaded multilayer capacitors are available in reel packing or in AMMO pack.

Lead spacing	Ordering code for C0G, X7R, Z5U	Ordering code for CG, 2C1, 2F4		PU (items/box) Minimum order quantity
2,54 mm	B37979-N****-+5*		B37979-K****-+5*	2500
	B37981-M****-+5*		B37981-K****-+5*	2500
	B37982-N****-+5*		B37982-K****-+5*	2500
	B37986-N****-+5*		B37986-K****-+5*	2500
	B37987-M****-+5*		B37987-K****-+5*	2500
	B37988-N****-+5*		B37988-K****-+5*	2500
5,08 mm	B37979-G****-+5*	B37979-D****-+5*		2500
	B37981-F ****-+5*	B37981-D****-+5*		2500
	B37982-G****-+5*	B37982-D****-+5*		2500
	B37983-N****-+5*		B37983-K****-+5*	2000
	B37984-M****-+5*		B37984-K****-+5*	2000
	B37985-N****-+5*		B37985-K****-+5*	2000
	B37986-G****-+5*	B37986-D****-+5*		2500
	B37987-F ****-+5*	B37987-D****-+5*		2500
	B37988-G****-+5*	B37988-D****-+5*		2500
	B37900-N****-+5*		B37900-K****-+5*	2000
	B37901-M****-+5*		B37901-K****-+5*	2000
	B37902-N****-+5*		B37902-K****-+5*	2000
Code for taping and packing	****-+51 = reel packing ****-+54 = AMMO pack		****-+53 = reel packing ****-+55 = AMMO pack	

Replace **** by the appropriate numbers to be found in the respective data sheets.

Ordering code example for taped version

B37979-N1470-+5*

Ordering code according to data sheets

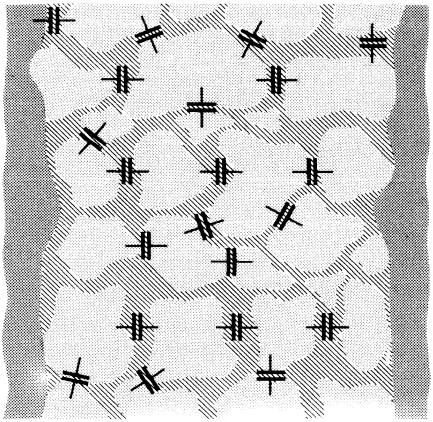
Code figure
1 or 3 = reel packing
4 or 5 = AMMO pack

SIBATIT
50 000
Capacitors

untaped

taped

SIBATIT 50 000 Capacitors
General



Inner structure
- Contacting
- Conducting zones
- Junction

Applications

Coupling and filter capacitors in
- Data processing
- Communications engineering
- Entertainment electronics
- Automotive electronics
- EMI suppression

Features

- High capacitance per unit volume
- High capacitance stability
- Small temperature drift
- Non-polar
- Taped versions in LS 2.54 and 5.08 mm for every automatic assembly system

The most common applications for capacitors in modern logic circuits are filtering high frequency noise from supply voltages and acting as supporting capacitors to bridge brief voltage drops.

The main requirement to be met by a capacitor of a defined rated capacitance is that its total impedance Z_c at high frequencies be markedly less than the characteristic impedance of the signal path. The capacitor's total impedance Z_c is determined by its capacitance C_c, its ohmic resistance R_c and its inductance L_c.

Additional requirements are compact dimensions, stable electrical performance and high reliability. Last but not least, the desired characteristics must be provided at a low price.

This catalog of requirements led to the capacitor family described here, which is made of the ceramic barrier material SIBATIT 50 000.

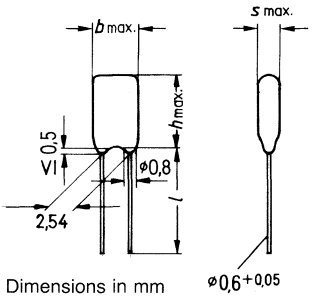
Characteristics in brief

Ceramic type	**S 50 000**
Temperature range	−40 (−25) °C ... +85 °C
Capacitance change $\Delta C/C_{20}$ within temperature range	+20/−55 %
Voltage test 1 s (max.)	$2 \cdot V_R$
Dissipation factor tan δ at f_{meas} = 1 kHz; V_{meas} ≤0.2 Vdc (for 0.022 ... 0.22 µF) at f_{meas} = 100 kHz; V_{meas} ≤0.2 Vdc (for 0.010 µF)	$\leq 60 \cdot 10^{-3}$
Time constant τ at t_{meas} = 1 min.; V_{meas} = 10 Vdc	≥ 50 s
Insulation resistance R_{is} (for 0.010 µF)	≥10 MΩ
Ageing (typical values) capacitance change for every logarithmic time decade	−2 %
Capacitance values available	0.010 to 0.22 µF

Lead spacing 2.54 mm

Rated capacitance	0.01 to 0.068 µF
Capacitance tolerance	+50/−20 %
Rated voltage	63 Vdc
DIN climatic category	GPF
IEC climatic category	40/085/56
Leads	tinned, two lead lengths available: 16^{+2} mm or 6_{-1} mm
Taping	refer to page 97

Rated capacitance C_R	Ordering code[1]) Dimensions $b \times h \times s$ (max.)
0,010 µF	B37448-N6103-S* 5,5×8×3
0,022 µF	B37448-F6223-S* 5,5×8×3
0,033 µF	B37448-F6333-S* 5,5×9×3
0,047 µF	B37448-F6473-S* 5,5×12×3
0,068 µF	B37448-F6683-S* 5,5×14×3



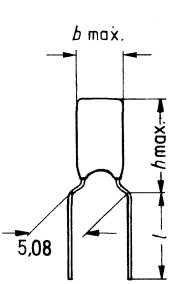
Dimensions in mm

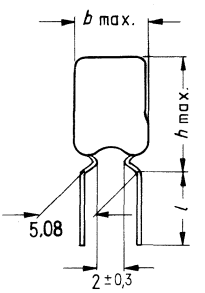
[1]) *: Insert appropriate code figure for requested lead length: code figure 2 ≙ 16^{+2} mm
code figure 7 ≙ 6_{-1} mm

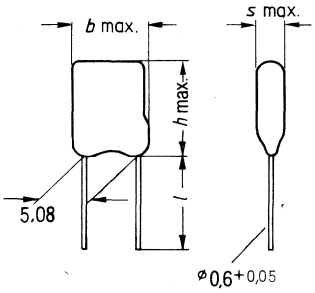
S Capacitors with 16^{+2} mm lead length are preferred products (see page 4)

Lead spacing 5.08 mm

Rated capacitance	0.01 bis 0.1 µF
Capacitance tolerance	+50/−20 %
Rated voltage	63 Vdc
DIN climatic category	GPF
IEC climatic category	40/085/56
Leads	tinned, two lead lengths available: 16^{+2} mm or 6_{-1} mm
Taping	refer to page 97





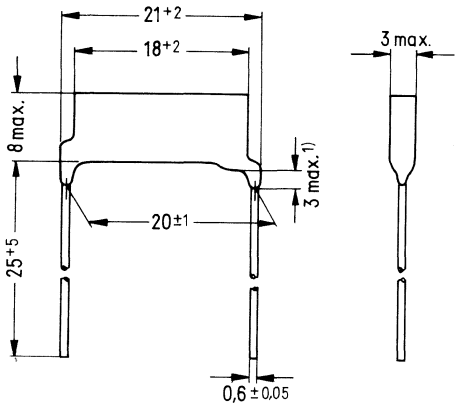


Rated capacitance C_R	Ordering code[1]) Dimensions $b \times h \times s$ (max.) in mm		
0,010 µF	B37449-N6103-S* 5,5×8,5×3		
0,022 µF	B37449-F6223-S* 5,5×8,5×3		
0,033 µF		B37449-F6333-S* 7,5×9×3	B37449-F6333-S* 7,5×8×3
0,047 µF		B37449-F6473-S* 7,5×10×3	B37449-F6473-S* 7,5×8×3
0,068 µF		B37449-F6683-S* 7,5×11×3	B37449-F6683-S* 7,5×11×3
0,1 µF		B37449-F6104-S* 7,5×13,5×3	B37449-F6104-S* 7,5×12×3
Code figure for lead length	16^{+2} mm = »1« S 6_{-1} mm = »8«	16^{+2} mm = »1« S 6_{-1} mm = »8«	16^{+2} mm = »2« 6_{-1} mm = »7«

[1]) *: Insert appropriate code figure for requested lead length

S Preferred types (see page 4)

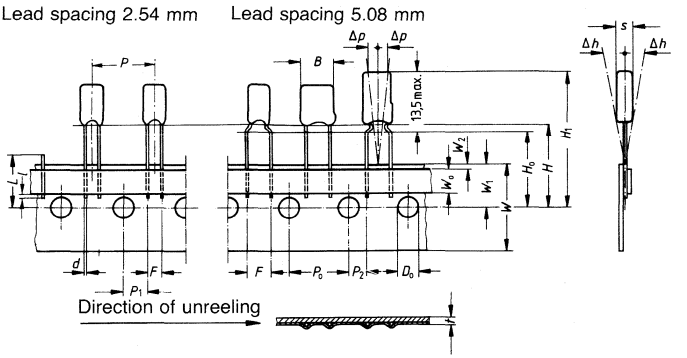
Rated capacitance	0.22 µF
Capacitance tolerance	+50/−20 %
Rated voltage	63 Vdc
DIN climatic category	HPG
IEC climatic category	25/085/04
Leads	tinned



Dimensions in mm

Ordering code: B37447-E6224-S2

Dimensions and tolerances (DIN IEC 286-2, at present only draft)

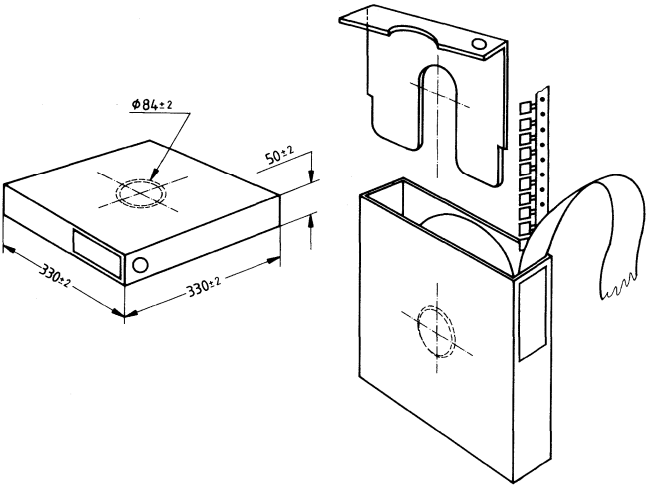


Designation	Symbol	Dimensions (mm)		
		LS 2,54	LS 5,08	Tolerance
Head width	B	11	11	max.
Head thickness	s	3,5	5	max.
Lead diameter	d	0,5/0,6	0,5/0,6	±0,05
Distance between component centers	P	12,7	12,7	±1,0
Pitch of sprocket holes	P_0	12,7	12,7	±0,2[1])
Distance between hole center and lead center	P_1	5,1	3,85	±0,7
Distance between component center and hole center	P_2	6,35	6,35	±1,3
Lead spacing	F	2,54	5,08	+0,6/−0,1
Slope of capacitor	Δh	0	0	±2,0[2])
Slope of capacitor	Δp	0	0	±1,3
Carrier tape width	W	18	18	±0,5
Fixing tape width	W_0	5,5	5,5	min.[3])
Position of sprocket holes	W_1	9	9	±0,5
Position of fixing tape	W_2	1	1	−0,5
Distance between hole center and kink	H_0	16	16	±0,5
Distance between hole center and bottom plane of component body	H	18	18	+2,0/−0
Distance between hole center and top of component body	H_1	32,2	32,2	max.
Sprocket hole diameter	D_0	4	4	±0,2
Tape thickness	t	0,7	0,7	+0,2
Projecting lead	l	1	1	max.
Length of cut leads	L	11	11	max.

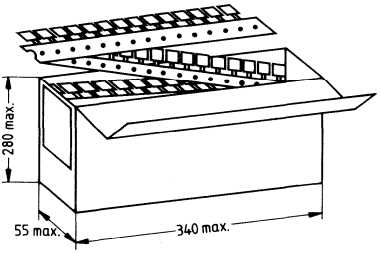
[1]) ±1 mm/20 hole pitches
[2]) measured at top of component body
[3]) Peel force ≥ 5 N

Kinds of packing

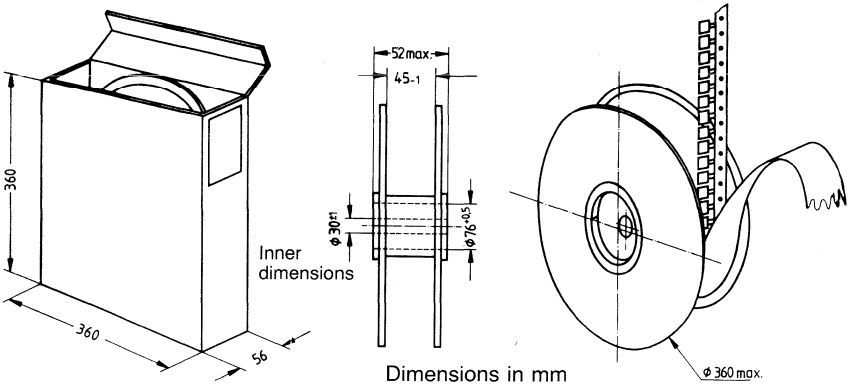
Cassette packing



AMMO pack



Reel packing



Dimensions in mm

Ordering codes and packaging units (PU) for taped SIBATIT 50 000 capacitors

Version	Capacitance range	Kind of packing	Ordering code[1])	PU (items/box) Minimum order quantity
LS 2,54 mm Straight leads	0,01 to 0,068 µF	Cassette	B37448-N6103-S50 B37448-F*****-S50	2000
		Reel	B37448-N6103-S51 B37448-F*****-S51	
		AMMO pack	B37448-N6103-S54 B37448-F*****-S54	
LS 5,08 mm Bent leads	0,01 and 0,022 µF	Cassette	B37449-N6103-S50 B37449-F6223-S50	2000
		Reel	B37449-N6103-S51 B37449-F6223-S51	
		AMMO pack	B37449-N6103-S54 B37449-F6223-S54	
LS 5,08 mm Kinked leads	0,033 to 0,1 µF	Cassette Reel AMMO pack	B37449-F*****-S50 B37449-F*****-S51 B37449-F*****-S54	2000
LS 5,08 mm Straight leads	0,033 to 0,1 µF	Cassette Reel	B37449-F*****-S52 B37449-F*****-S53	2000

[1]) Replace ***** by the appropriate numbers to be found in the respective data sheets.

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