Hi-Q Capacitors 0603

Description

The “High-Q-series” was designed for wireless communications and high frequency applications.

The “High-Q-Capacitors” have a class 1 dielectric ceramic and copper inner electrode. The class 1 dielectric ceramic used, HQM, is a very stable dielectric offering a temperature coefficient of capacitance (TCC) of 0± 60ppm/°C. The higher conductivity of copper give a lower ESR. These advantages mean a improved performance of matching circuits, lower power dissipation and less energy absorption.

Features

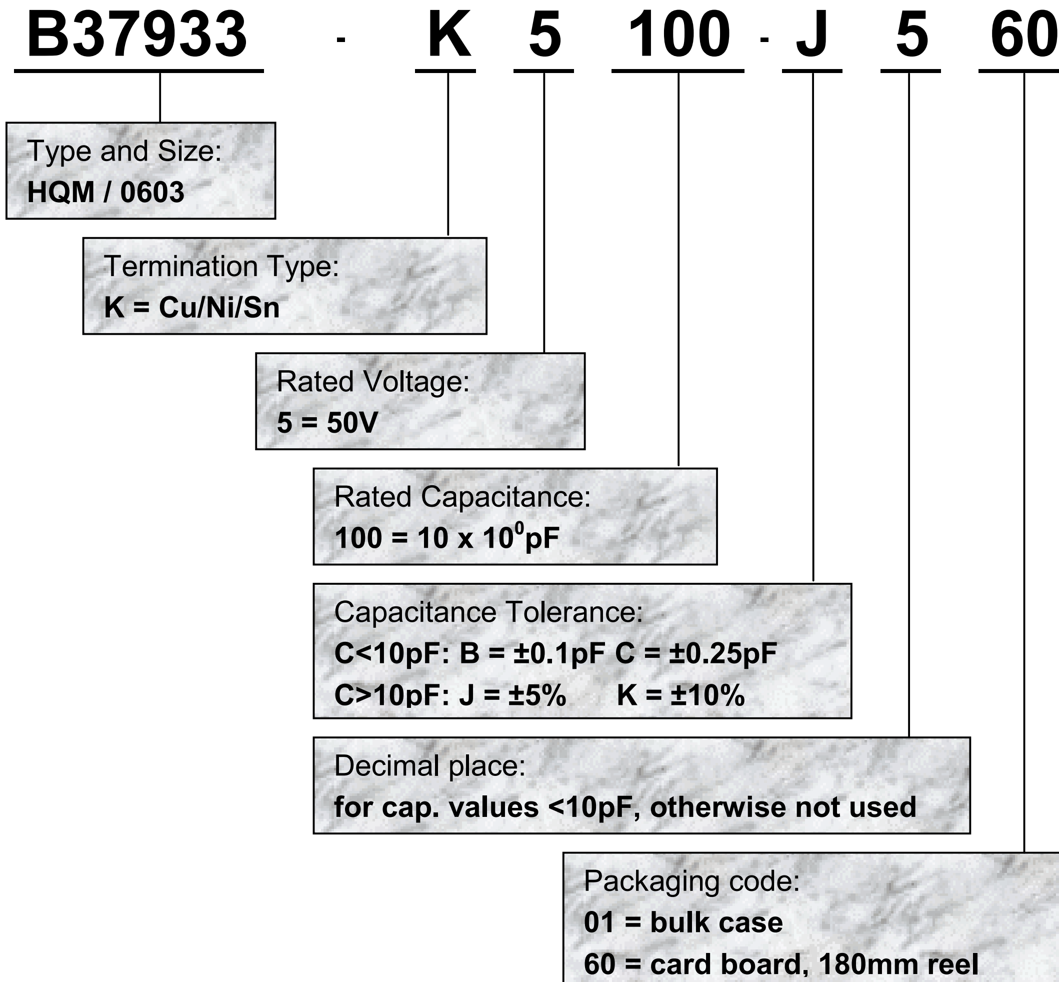
- Ultra low ESR and high Q-factor
- Tight capacitance tolerances
- Class 1 capacitor with Cu-inner-electrodes
- High stability with respect of time, temperature, frequency and voltage
- Excellent attenuation
- High self resonance frequency
- Lead free component
- AgNiSn (**Nickel Barrier**) Termination

Applications

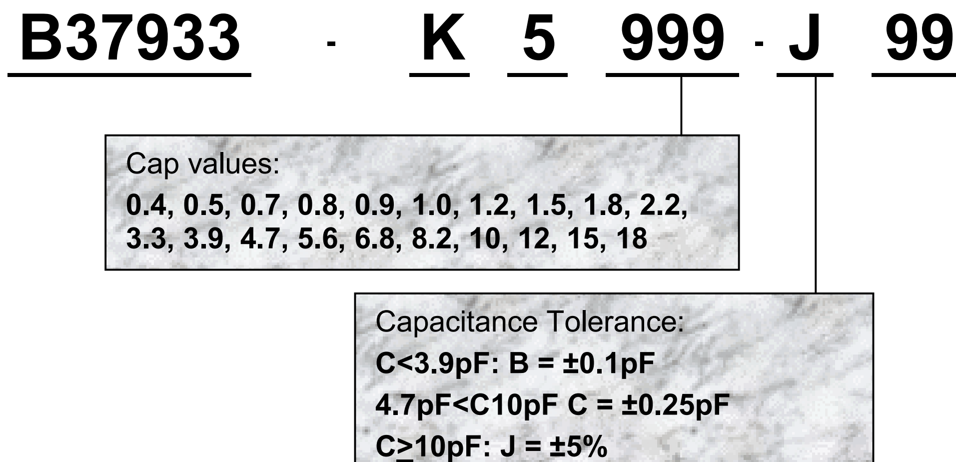
- Cellular Communication
- Bluetooth
- DECT
- Cable TV
- Satellite TV (LNB)
- GPS
- Vehicle Location Systems
- Paging
- Test and Measurement
- Filters
- RF Amplifiers
- VCO´s
- HIPERLAN

Ordering Code

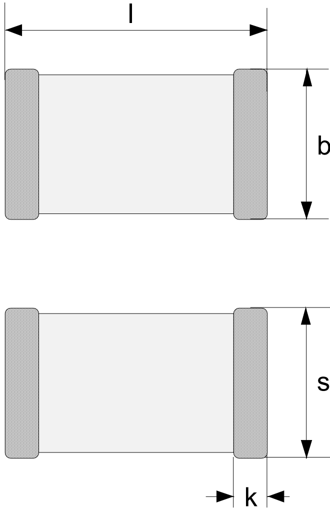
Chip



Sample Kit



Figure



Symbol	Min	Max	Unit
l	1.45	1.75	mm
b	0.70	0.90	mm
s	0.70	0.90	mm
k	0.25	0.50	mm

Dimensions and tolerances in accordance with CECC 32101-801

Electrical Data

Capacitance Test Conditions

Test frequency:	1.0 MHz ± 0,2 MHz
Test voltage:	1.0 V ± 0.2 V
Reference Temperature	25°C ± 1°C (EIA)
Dissipation factor tan δ (limit value):	$< 1.0 \times 10^{-3}$
Insulation Resistance:	$> 10^{5}$ MΩ
Ageing:	none
Temperature coefficient (tolerance)	$0 \pm 60 \cdot 10^{-6}$ 1/K
Operating Temperature Range:	-55°C ... +125°C
Climatic category (IEC 68-1):	55/125/56
Capacitance Range:	**0.4 ... 82pF (up from 1pF Series E12)**

RF Measuring Systems Performance

S-Parameter Measuring Configuration:	Impedance Measuring Configuration:
■ HP 8753D (30kHz – 6GHz)	■ Agilent E 4991A (1MHz – 3GHz)
■ HP 8722D (1MHz – 40GHz)	■ Test fixture 16197A
■ samples soldered on microstrip PCB’s	■ parts not soldered
■ Measuring Direction: Shunt	■

Typical RF Performance

Capacitance [pF]	f_{res} [1] [MHz]	ESR@ 1GHz [2] [mΩ]	Q@ 1GHz [2]	ESR@ f_{res} [2] [mΩ]
0.4	17800	445	860	595
0.5	17100	400	805	540
0.6	13600	385	755	510
0.7	12200	345	635	440
0.8	11400	325	595	410
0.9	10600	315	560	390
1.0	9600	300	525	365
1.2	8800	275	455	335
1.5	7900	250	395	300
1.8	6900	240	360	285
2.2	5750	215	305	250
2.7	5100	200	270	235
3.3	4700	185	235	210
3.9	4150	175	210	200
4.7	3550	165	185	185
5.6	3130	150	160	170
6.8	2850	140	135	155
8.2	2730	130	115	140
10	2580	120	96	130
12	2400	110	76	118
15	2150	102	62	108
18	2050	96	50	100
22	1870	88	34	90
27	1780	80	26	82

Capacitance [pF]	f_{res} [1] [MHz]	ESR@ 300MHz [2] [mΩ]	Q@ 300MHz [2]	ESR@ f_{res} [2] [mΩ]
82	930	52	105	52

[1] Impedance Analyser E 4991A, parts not soldered
[2] Network Analyser HP 8753D, parts soldered

Fig. 1: Typical ESR for different Frequencies vs. Capacitance [3]

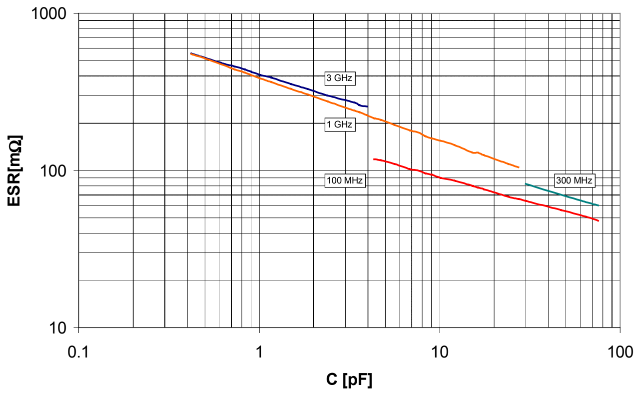


Fig. 2: Typical Q Factor for different Frequencies vs. Capacitance [3]

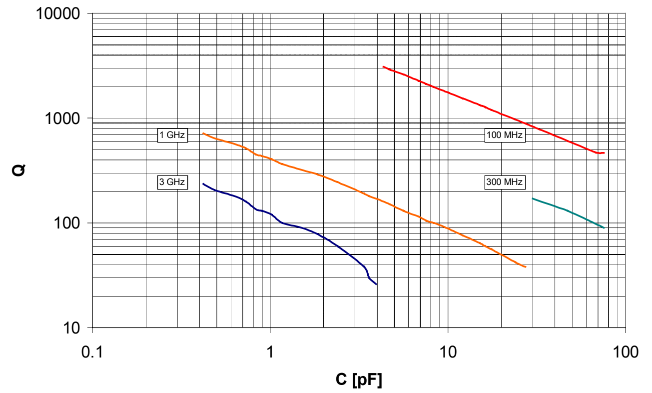


Fig. 3: Typical Self Resonant Frequencies vs. Capacitance [3]

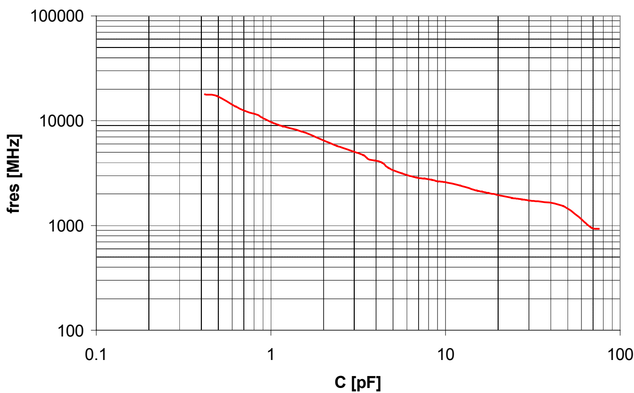


Fig. 4: Typical ESR at Resonant Frequencies for soldered parts vs. Capacitance [4]

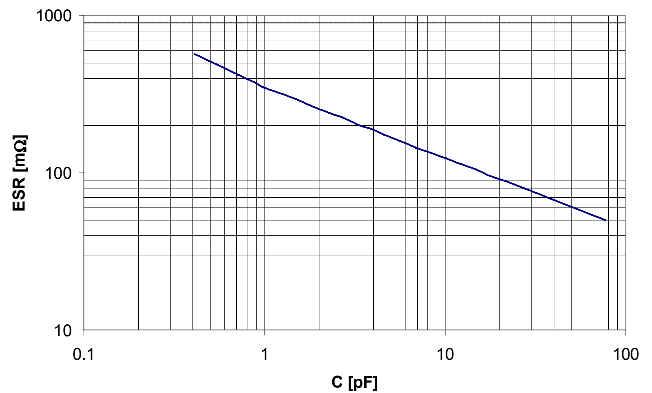


Fig. 5: Typical ESR for different Capacitances vs. Frequency [3]

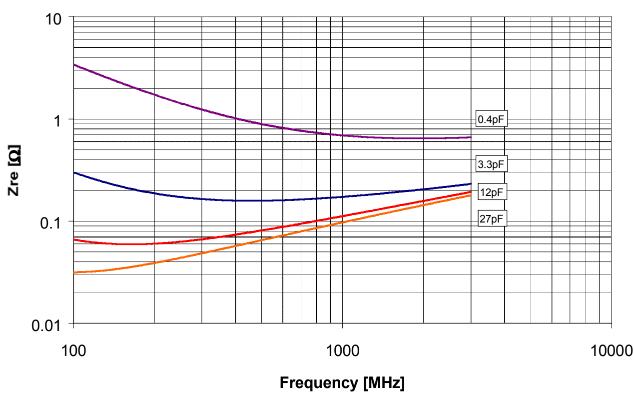
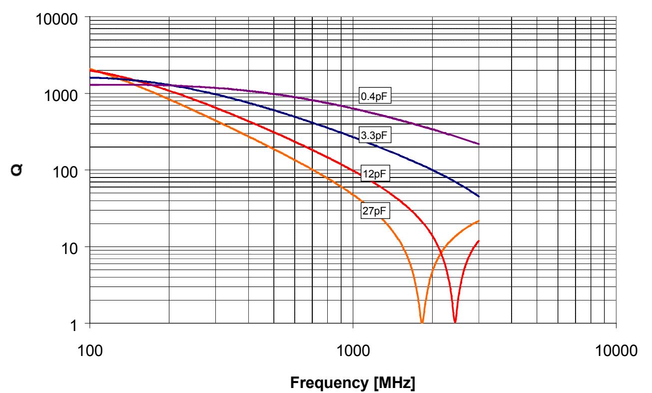


Fig. 6: Typical Q Factor for different Capacitances vs. Frequency [3]



[3] Impedance Analyser E 4991A, parts not soldered
[4] Network Analyser HP 8753D, parts soldered

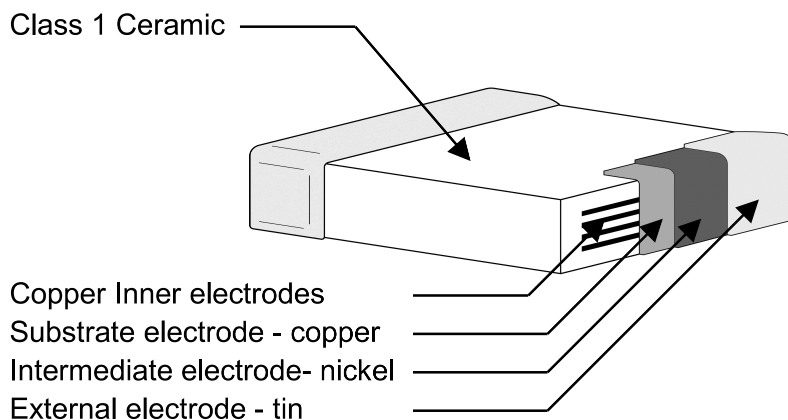
RF Experiences

The proporties of Hi-Q capacitors depend on soldering conditions and pad sizes. In general soldered parts show a better RF behaveour then not soldered parts. The resonant frequency decreases with bigger pad sizes.

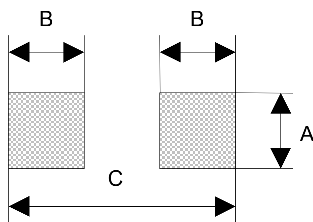
Measurand	Parts not soldered	Parts soldered
ESR@1GHz	see figure 1 and 5	lower
Q@1GHz	see figure 2 and 6	higher
ESR@fres	higher	see figure 4
fres	see figure 3	lower

Mounting Instructions

Copper/Nickel/Tin terminations



Geometry of solder pads



Recommended maximum dimensions:

A	B	C	Unit
1.0	**1.0**	**3.0**	**mm**

Recommended soldering profile

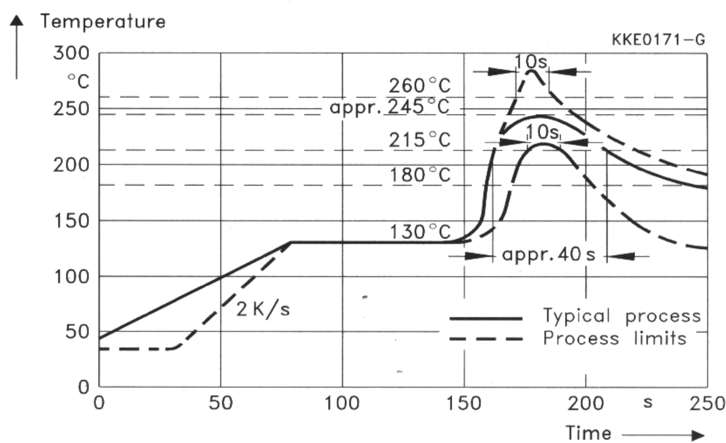
Test according IEC 68-2-58:

Wettability Test: 215°C ± 3°C / 3 sec ± 0,3sec (wetting of soldering area ≥ 95%)

Leaching Test: 260°C ± 5°C / 10sec ± 1sec (no leaching of contacts)

Soldering conditions:

- Reflow soldering conditions according to CECC 00802, temperature characteristics at terminals during infrared-reflow soldering



- Two reflow cycles and Pb free solder process admitted
- Manual hot gas soldering: (for rework only)*)
  - Max air temperature: 270 °C
  - Max air velocity: 10 m/s
  - Max exposure time: 30 s
- Manual soldering using soldering iron: (for rework only)*)
  - Max tip temperature: 270 °C
  - Max exposure time: 5 s
  - Antistatic protection not required

  *) Care must be taken that the MLCC is not damaged

- Additional heat treatment
  - In addition to the reflow cycles a heat treatment of 150°C±10°C is permitted for 5 minutes

Storage conditions:

Solderability is guaranteed for 12 months from date of delivery, provided that the components are stored in the original packages.

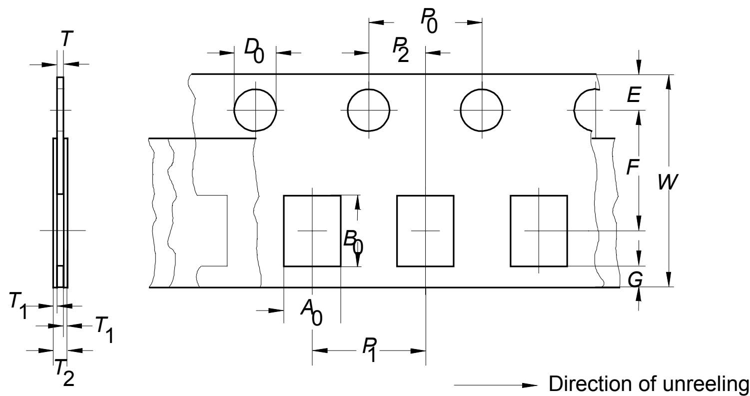
Storage temperature: -25 ... +45°C

Relative humidity: < 75% annual average, < 95% on max. 30 days in a year, dew precipitation and wetness are inadmissible.

Taping, Packing

Cardboard Taping

(in accordance with DIN IEC 286-3)

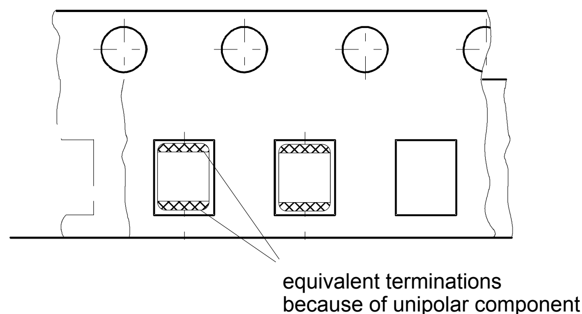


Dimensions and Tolerances:

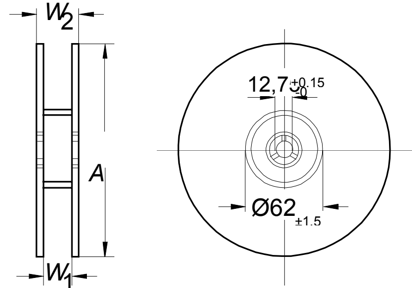
Definition	Symbol	Dimension (mm)	Tol. (mm)
Compartment width x Compartments length	A_0 x B_0	0.95 x 1.8	± 0.2
Compartment height	T	0.9	max.
Overall thickness	T_2	1.1	max.
Sprocket hole diameter	D_0	1.5	± 0.1
Sprocket hole pitch	P_0	4.0	± 0.1[1)]
Distance center hole to center compartment	P_2	2.0	± 0.05
Pitch of the component compartments	P_1	4.0	± 0.1
Tape width	W	8.0	± 0.3
Distance edge to center of hole	E	1.75	± 0.1
Distance center hole to center compartment	F	3.5	± 0.05

[1)] ≤ +0.2 mm over 10 sprocket holes.

Part orientation in tape pocket :



Reel Packaging



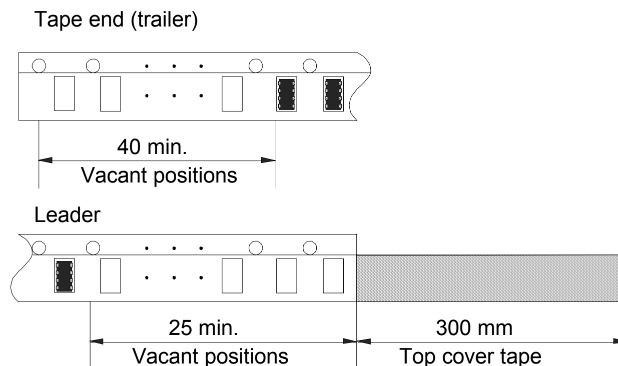
Package 8-mm Tape

Definition	Symbol	Dim. (mm)	Tol. (mm)	Dim. (mm)	Tol. (mm)
Reel diameter	A	180	-2/+0	330	± 2.0
Reel width (inside)	W1	8.4	+1.5/-0	8.4	+1.5/-0
Reel width (outside)	W2	14.4	max.	14.4	max.

Packing units

Size inch / mm	Chip thickness	Cardboard tape	Units /reel Ø 180mm	Units /bulk case
0603/1608	0.8 mm	8 mm	4000 pcs	15000 pcs

Leader, Trailer



Additional Taping Information

Reel material:	PS.
Tape material:	Cardboard
Tape break force:	min 10 N
Top cover tape strength:	min 10 N
Top cover tape peel force:	0.1-0.65 N at a peel speed of 300 mm/min, angle between top cover tape and the direction of feed during peel off: 165 -180°.
Tape peel angle:	Angle between top cover tape and the direction of feed during peel off: 165 -180°
Cavity play:	Each part rests in the cavity so that the angle between the part and cavity centreline is no more than 20°
Weight of component:	4.6 mg
Weight of loaded reel:	max. 1500 g

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