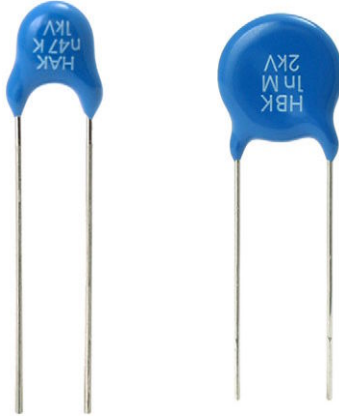


## Ceramic Singlelayer DC Disc Capacitors, Class 2, Low Loss (0.5 %), 1 kV<sub>DC</sub>, 2 kV<sub>DC</sub>, 3 kV<sub>DC</sub>


**FEATURES**

- Low losses
- High stability
- Low DF minimizes self heating at HF
- Ideal for switching to 100 kHz
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

**APPLICATIONS**

In electronic circuits where low losses and high capacitance per volume are essential, for example:

- HF ballast
- Switching power supplies
- Snubber and HV circuits

**DESIGN**

The capacitors consist of a ceramic disc which is silver plated on both sides. Connection leads are made of tinned copper having diameters of 0.6 mm or 0.8 mm.

The capacitors may be supplied with straight or kinked leads having a lead spacing of 7.5 mm or 10.0 mm.

Coating is made of blue colored flame retardant epoxy resin in accordance with UL 94 V-0.

QUICK REFERENCE DATA			
DESCRIPTION	VALUE		
Ceramic Class	2		
Ceramic Dielectric	Y5S		
Voltage (V <sub>DC</sub> )	1000	2000	3000
Min. Capacitance (pF)	100	100	100
Max. Capacitance (pF)	4700	4700	3300
Mounting	Radial		

**OPERATING TEMPERATURE RANGE**

 -40 °C to +125 °C <sup>(1)</sup>
**Note**

<sup>(1)</sup> For explanation about the difference of operating temperature range and temperature characteristic of capacitance please see [www.vishay.com/doc?48299](http://www.vishay.com/doc?48299)

**TEMPERATURE CHARACTERISTICS**

Y5S

**SECTIONAL SPECIFICATIONS**

Climatic category (according to EN 60068-1):  
40 / 125 / 21

**CAPACITANCE RANGE**

100 pF to 4700 pF

**RATED DC VOLTAGE**

- 1 kV<sub>DC</sub>
- 2 kV<sub>DC</sub>
- 3 kV<sub>DC</sub>

**DIELECTRIC STRENGTH**

- 2000 V<sub>AC</sub>, 50 Hz, 2 s Component test
- 3000 V<sub>AC</sub>, 50 Hz, 2 s Component test
- 4000 V<sub>AC</sub>, 50 Hz, 2 s Component test

**INSULATION RESISTANCE AT 500 V<sub>DC</sub>**

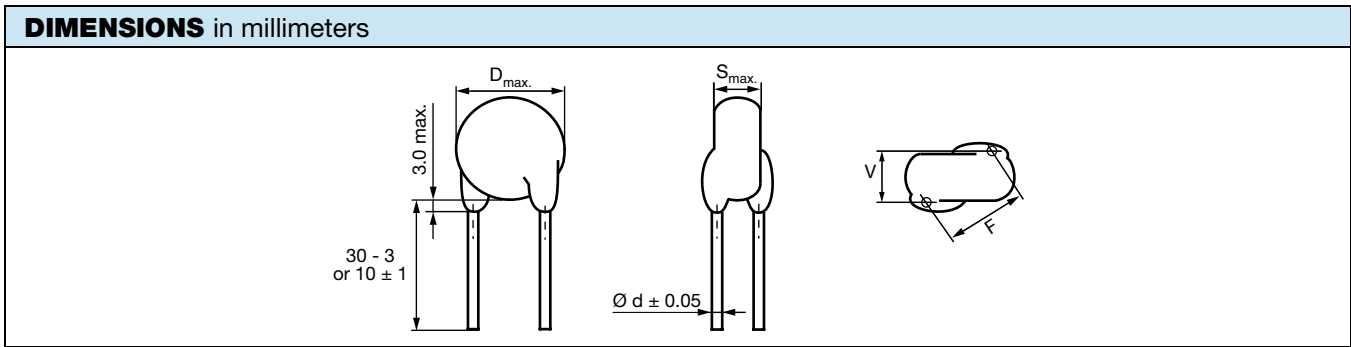
≥ 10 000 MΩ (60 s)

**TOLERANCE ON CAPACITANCE**

± 20 % (± 10 % available on request)

**DISSIPATION FACTOR**

Max. 0.5 % (1 kHz)



ORDERING INFORMATION							
CAPACITANCE (pF)	TOLERANCE (%)	BODY DIAMETER $D_{max.}$ (mm)	BODY THICKNESS $S_{max.}$ (mm)	LEAD SPACING <sup>(1)</sup> F (mm) $\pm 1 \text{ mm}$	LEAD DIAMETER <sup>(1)</sup> d (mm) $\pm 0.05 \text{ mm}$	WIDTH <sup>(1)</sup> V (mm) $\pm 0.5 \text{ mm}$	ORDERING CODE MISSING DIGITS SEE ORDERING CODE BELOW
<b>1 kV<sub>DC</sub></b>							
100	$\pm 20$ <sup>(2)</sup>	7.0	5.0	7.5	0.6	1.1	HAK101#BA###KR
150							HAK151#BA###KR
220							HAK221#BA###KR
270							HAK271#BA###KR
330							HAK331#BA###KR
390							HAK391#BA###KR
470							HAK471#BA###KR
560							HAK561#BA###KR
680							HAK681#BA###KR
820							HAK821#BA###KR
1000		HAK102#BA###KR					
1200		HAK122#BA###KR					
1500		HAK152#BA###KR					
1800		HAK182#BA###KR					
2200		HAK222#BA###KR					
2700		HAK272#BA###KR					
3300		HAK332#BA###KR					
3900		HAK392#BA###KR					
4700		HAK472#BA###KR					
<b>2 kV<sub>DC</sub></b>							
100	$\pm 20$ <sup>(2)</sup>	7.0	5.0	7.5	0.6	1.6	HBK101#BB###KR
150							HBK151#BB###KR
220							HBK221#BB###KR
270							HBK271#BB###KR
330							HBK331#BB###KR
390							HBK391#BB###KR
470							HBK471#BB###KR
560							HBK561#BB###KR
680							HBK681#BB###KR
820							HBK821#BB###KR
1000		HBK102#BB###KR					
1200		HBK122#BB###KR					
1500		HBK152#BB###KR					
1800		HBK182#BB###KR					
2200		HBK222#BB###KR					
2700		HBK272#BB###KR					
3300		HBK332#BB###KR					
3900		HBK392#BB###KR					
4700		HBK472#BB###KR					



ORDERING INFORMATION							
CAPACITANCE (pF)	TOLERANCE (%)	BODY DIAMETER D <sub>max.</sub> (mm)	BODY THICKNESS S <sub>max.</sub> (mm)	LEAD SPACING <sup>(1)</sup> F (mm) ± 1 mm	LEAD DIAMETER <sup>(1)</sup> d (mm) ± 0.05 mm	WIDTH <sup>(1)</sup> V (mm) ± 0.5 mm	ORDERING CODE MISSING DIGITS SEE ORDERING CODE BELOW
<b>3 kV<sub>DC</sub></b>							
100	± 20 <sup>(2)</sup>	7.0	5.0	10.0	0.6	1.6	HCK101#BC###KR
150							HCK151#BC###KR
220							HCK221#BC###KR
270							HCK271#BC###KR
330							HCK331#BC###KR
390							HCK391#BC###KR
470		HCK471#BC###KR					
560		HCK561#BC###KR					
680		HCK681#BC###KR					
820		HCK821#BC###KR					
1000		HCK102#BC###KR					
1200		HCK122#BC###KR					
1500		HCK152#BC###KR					
1800		HCK182#BC###KR					
2200		HCK222#BC###KR					
2700		HCK272#BC###KR					
3300		HCK332#BC###KR					

**Notes**

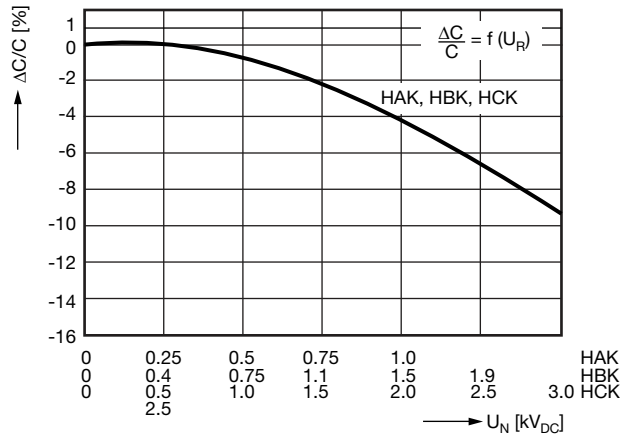
<sup>(1)</sup> Standard lead configuration, other lead spacing and diameter available on request

<sup>(2)</sup> ± 10 % available on request

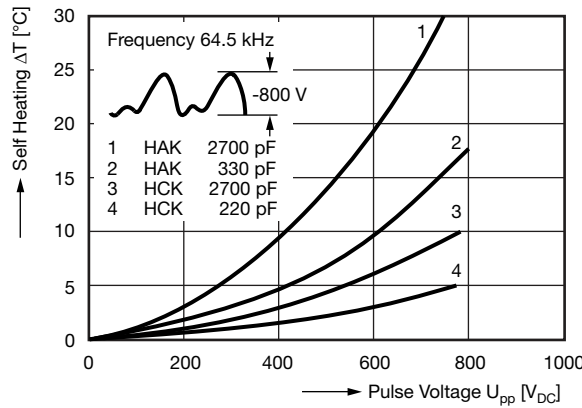
ORDERING CODE							
#	7 <sup>th</sup> digit	Capacitance tolerance		± 10 % = K, ± 20 % = M			
###	10 <sup>th</sup> to 12 <sup>th</sup> digit	Lead configuration		See "General Information" <a href="http://www.vishay.com/doc?22001">www.vishay.com/doc?22001</a>			
<b>Example</b>	<b>HCK</b>	<b>02</b>	<b>M</b>	<b>BC</b>	<b>DF0</b>	<b>K</b>	<b>R</b>
	Series	Capacitance value	Tolerance code	Voltage code	Lead configuration	Internal code	RoHS compliant

MARKING	
<p>D<sub>max.</sub> ≤ 10 mm</p>	<p>D<sub>max.</sub> ≥ 11 mm</p>

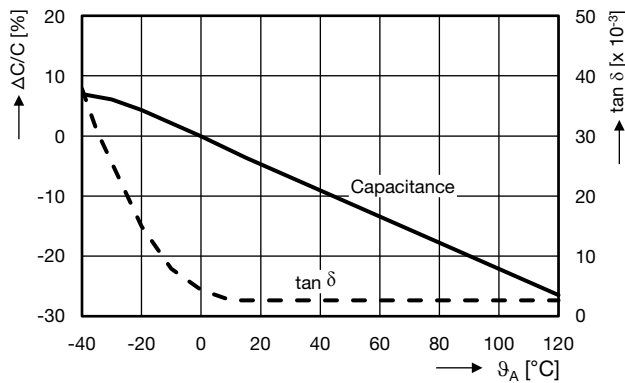
**CAPACITANCE CHANGE VS. VOLTAGE (Typical)**



**SELF HEATING (Typical)**



**CAPACITANCE CHANGE AND DISSIPATION FACTOR VS. TEMPERATURE (Typical)**





**STORAGE**

The capacitors must not be stored in a corrosive atmosphere, where sulphide or chloride gas, acid, alkali or salt are present. Exposure of the components to moisture, should be avoided. The solderability of the leads is not affected by storage of up to 24 months (temperature +10 °C to +35 °C, relative humidity up to 60 %). Class 2 ceramic dielectric capacitors are also subject to aging, see [www.vishay.com/doc?22001](http://www.vishay.com/doc?22001).

**SOLDERING**

<b>SOLDERING SPECIFICATIONS</b>		
Soldering test for capacitors with wire leads: (according to IEC 60068-2-20, solder bath method)		
	<b>SOLDERABILITY</b>	<b>RESISTANCE TO SOLDERING HEAT</b>
Soldering temperature	235 °C ± 5 °C	260 °C ± 5 °C
Soldering duration	2 s ± 0.5 s	10 s ± 1 s
Distance from component body	≥ 2 mm	≥ 5 mm

**SOLDERING RECOMMENDATIONS**

Soldering of the component should be achieved using a Sn60/40 type or a silver-bearing Sn62/36/2Ag type solder. Ceramic capacitors are very sensitive to rapid changes in temperature (thermal shock) therefore the solder heat resistance specification (see Soldering Specifications table) should not be exceeded. Subjecting the capacitor to excessive heating may result in thermal shocks that can crack the ceramic body. Similarly, excessive heating can cause the internal solder junction to melt.

**CLEANING**

The components should be cleaned immediately following the soldering operation with vapor degreasers.

**SOLVENT RESISTANCE**

The coating and marking of the capacitors are resistant to the following test method: IEC 60068-2-45 (method XA).

**MOUNTING**

If a defined product stop is required for mounting on a PCB, a mechanically formed product stop (kinked or inline wire) or a mounting tool should be used.

We do not recommend modifying the lead terminals, e.g. bending or cropping. This action could break the coating or crack the ceramic insert. If however, the lead must be modified in any way, we recommend support of the lead with a clamping fixture next to the coating.

**OPERATING VOLTAGE**

In case the voltage is applied to the circuit, starting as well as stopping, may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

**OPERATING TEMPERATURE AND SELF-GENERATED HEAT**

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high frequency, pulse, or similar application, it may have self-generated heat due to dielectric dissipation.

Temperature increase due to self-generated heating should not exceed 20 °C while operating at an atmosphere temperature of 25 °C.

When measuring, the surface temperature, make sure that the capacitor is not affected by radiant, conductive and convective heat by its surroundings. Excessive heat may lead to thermo-mechanical deterioration of the capacitor's characteristics and reliability.

<b>RELATED DOCUMENTS</b>	
General Information	<a href="http://www.vishay.com/doc?22001">www.vishay.com/doc?22001</a>



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