

## Ceramic Singlelayer DC Disc Capacitors, 1 kV<sub>DC</sub> General Purpose


**RoHS**  
COMPLIANT

### FEATURES

- High capacitance in small sizes
- Low losses
- Wide range of different lead styles
- Material categorization:  
for definitions of compliance please see  
[www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### APPLICATIONS

- Lighting ballasts
- Switching power supplies
- Bypassing, coupling and decoupling
- DC blocking

### 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 5.0 mm or 7.5 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	1      2
Ceramic Dielectric	N750, Y5T, Y5U, Y5V
Voltage (V <sub>DC</sub> )	1000
Min. Capacitance (pF)	10      47
Max. Capacitance (pF)	680      22 000
Mounting	Radial

### OPERATING TEMPERATURE RANGE

-40 °C to +85 °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

Class 1: N750

Class 2: Y5T, Y5U, Y5V

### SECTIONAL SPECIFICATIONS

Climatic category (according to EN 60068-1):  
40 / 085 / 21

### CAPACITANCE RANGE

10 pF to 22 nF

### RATED VOLTAGE

1000 V<sub>DC</sub>

### DIELECTRIC STRENGTH

1750 V<sub>DC</sub>, 2 s      Component test

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

≥ 10 000 MΩ (60 s)

### TOLERANCE ON CAPACITANCE

± 10 %, ± 20 %, -20 % +50 %

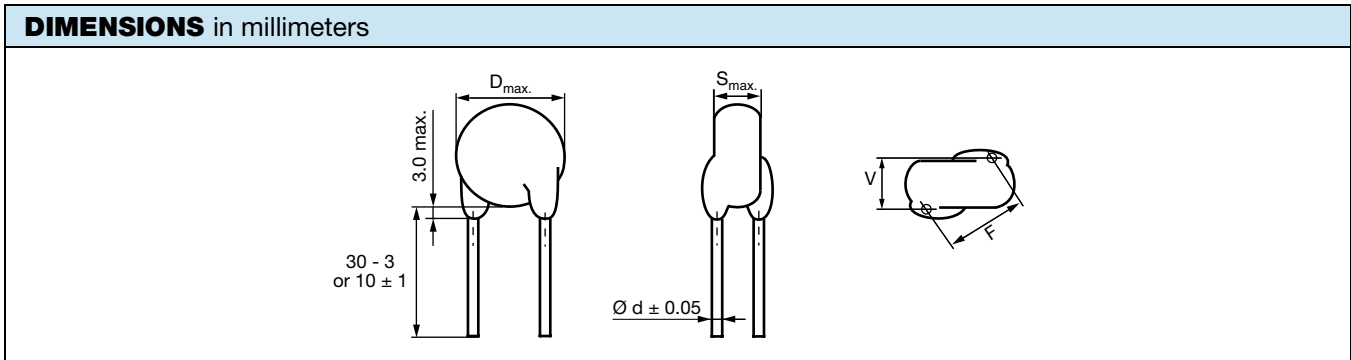
### DISSIPATION FACTOR

Class 1:

$C < 30 \text{ pF: } \left( \frac{100 \text{ pF}}{C} + 0.7 \right) \times 10^{-4} \text{ max. (1 MHz)}$

$C \geq 30 \text{ pF: } \text{max. 0.1 \% (1 MHz)}$

Class 2:      max. 2.5 % (1 kHz)



ORDERING INFORMATION													
CAPACITANCE (pF)	TOLERANCE (%)	BODY DIAMETER D <sub>max.</sub> (mm)	BODY THICKNESS S <sub>max.</sub> (mm)	LEAD SPACING (1) F (mm) ± 1 mm	LEAD DIAMETER (1) d (mm) ± 0.05 mm	WIDTH (1) V (mm) ± 0.5 mm	ORDERING CODE MISSING DIGITS SEE ORDERING CODE BELOW						
<b>N750</b>													
10	± 10	7.0	3.0	7.5	0.6	1.4	HAU100KBA###KR						
15							HAU150KBA###KR						
22							HAU220KBA###KR						
33							HAU330KBA###KR						
47							HAU470KBA###KR						
68							HAU680KBA###KR						
82		8.0	3.5	7.5	0.6	1.4	HAU820KBA###KR						
100							HAU101KBA###KR						
150							HAU151KBA###KR						
220							HAU221KBA###KR						
330							HAU331KBA###KR						
470							HAU471KBA###KR						
560							HAU561KBA###KR						
680							HAU681KBA###KR						
<b>Y5T</b>													
47							± 10, ± 20	7.0	3.0	5.0	0.6	1.2	HAZ470#BA###KR
56	HAZ560#BA###KR												
68	HAZ680#BA###KR												
82	HAZ820#BA###KR												
100	HAZ101#BA###KR												
150	HAZ151#BA###KR												
220	HAZ221#BA###KR												
330	HAZ331#BA###KR												
470	HAZ471#BA###KR												
680	HAZ681#BA###KR												
1000	9.0	3.0	7.5	0.6	1.2	HAZ102#BA###KR							
1500						HAZ152#BA###KR							
2200						HAZ222#BA###KR							
3300						HAZ332#BA###KR							
4700						HAZ472#BA###KR							
<b>Y5U</b>													
1000	± 20	7.0	3.0	5.0	0.6	1.2	HAE102MBA###KR						
1500		9.0					HAE152MBA###KR						
2200		11.0					HAE222MBA###KR						
3300		13.0					HAE332MBA###KR						
4700		15.0					HAE472MBA###KR						
6800								7.5	HAE682MBA###KR				
10 000						HAE103MBA###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>Y5V</b>							
2200	- 20 / + 50 <sup>(2)</sup>	7.0	3.0	5.0	0.6	1.2	HAX222#BA###KR
3300		9.0					HAX332#BA###KR
4700		12.0					HAX472#BA###KR
6800		7.5		17.0			HAX682#BA###KR
10 000				18.0			HAX103#BA###KR
15 000				HAX153#BA###KR			
22 000				HAX223#BA###KR			

**Notes**

- <sup>(1)</sup> Standard lead configuration, other lead spacing and diameter available on request
- <sup>(2)</sup> ± 20 % available on request

ORDERING CODE							
#	7 <sup>th</sup> digit	Capacitance tolerance	± 10 % = K, ± 20 % = M, - 20 % / + 50 % = S				
###	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>HAU</b>	<b>101</b>	<b>K</b>	<b>BA</b>	<b>BFG</b>	<b>K</b>	<b>R</b>
	Series	Capacitance value	Tolerance code	Voltage code	Lead configuration	Internal code	RoHS compliant

MARKING			
 33p K 1 kV U	 n56 K	 2n2 S 1 kV	 HAX 10n S
HAU 10 pF to 330 pF HAZ 47 pF to 2.2 nF HAE 1.0 nF to 4.7 nF	HAU 470 pF to 680 pF HAZ 3.3 nF to 4.7 pF HAE 6.8 nF to 10 nF	HAX 2.2 nF to 6.8 nF	HAX 10 nF to 22 nF

**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**

SOLDERING SPECIFICATIONS		
Soldering test for capacitors with wire leads: (according to IEC 60068-2-20, solder bath method)		
	SOLDERABILITY	RESISTANCE TO SOLDERING HEAT
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.

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



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.