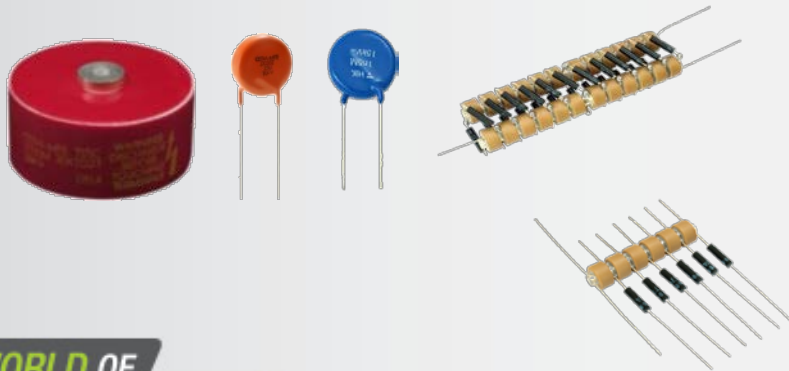




HIGH VOLTAGE CAPACITORS

715C, 615R/HIK, CASCADES



A **WORLD OF**
SOLUTIONS





HV CAPACITORS

715C SERIES (HOCKEY PUCK) FOR ULTRA-HIGH VOLTAGES



Features:

- Extremely high dielectric strength
- We offer customization and drop in-replacements
- Large variety of ceramic materials
- Manufactured in Germany

Rated voltage	10 – 50 kV _{DC}
Capacitance values	140 pF – 10 nF
Ceramic	N4700 and Y5U
Operating temperature	-30°C to +85°C

Customization options:

- Capacitance value
- Ceramic material and temperature coefficient
- Terminations (screw diameter, material...)
- Coating

SERIES

- 715C*KT* (class 1): [Datasheet](#)
- 715C*DK* (class 2): [Datasheet](#)

QUICK FACTS

- ASP: US\$10 – 50
- Lead-time: 8 – 10 weeks
- Market size: US\$42M
- Main competition (series): Murata (DHS), TDK (UHV, FHV, FD), AVX (HP, HD)

VISHAY ADVANTAGE

- Ultra-stable capacitors with high cap values
- Widest capacitance range in the market
- Customization also for low & medium volumes
- AC rating available
- 3D models available
- Free of charge sampling

SALES TOOLS

- Selector guide
- Crossfile
- Design registration

PROMINENT CUSTOMERS

Siemens, Vestas, Mlase, Rofin, Light Machinery



HV CAPACITORS

615R/HIK SERIES: RADIAL LEADED HV CAPACITORS



Features:

- Extremely high dielectric strength
- We offer customization and drop in-replacements
- Available up to 20kV_{DC}
- Large variety of ceramic materials
- Manufactured in Europe

Rated voltage	10 – 20 kV _{DC}
Capacitance values	100 pF – 3.3 nF
Ceramic	N4700, X5F, X7R, Y5R Y5U, Z5U
Operating temperature	Up to 125°C

SERIES

- 615R : [Datasheet](#)
- HIK: [Datasheet](#)

QUICK FACTS

- ASP: US\$1 – 3
- Lead-time: 8 – 10 weeks
- Market size: US\$45M
- Main competition (series): Murata (DHR)

VISHAY ADVANTAGE

- Ultra-stable capacitors with high cap values
- Widest capacitance range in the market
- 20kV_{DC} is unique in the market
- Highest dielectric strength in the market
- No aging effects (as compared to film caps)
- Free of charge sampling

SALES TOOLS

- Selector guide
- Sample kits
- Design protection

PROMINENT CUSTOMERS

Spellman, Fiscan, United Imaging, Siemens, Hitek, Sirona Dental, Mindray

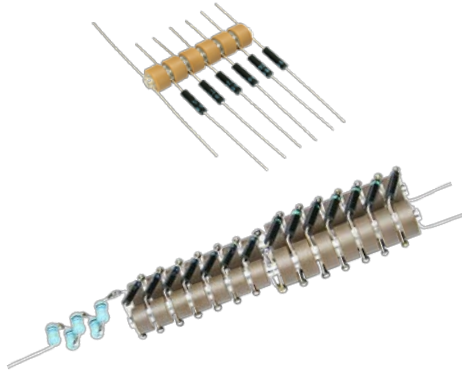
Customization options:

- Ceramic material and temperature coefficient
- Capacitance value
- Rated voltage (even higher voltages than 20 kVDC)
- Lead wire material and style



HV CAPACITORS

STACKS AND CASCADES



Features:

- Highest level of customization
- Single disc rating typically 8 to 10 kV_{DC}
- Typical output voltage up to 150 kV_{DC}
- Up to 14 multiplication stages
- Manufactured in Europe

Customization options:

- Construction (complete multiplier with diodes and resistors, stacks with diodes, bare capacitor stacks...)
- Ceramic material and temperature coefficient
- Capacitance values of the single capacitors (can also vary within one cascade)
- Output voltage and current
- Diodes can be chosen independently

SERIES

- RHK (cascade): [Datasheet](#)
- RHS (stack): [Datasheet](#)

QUICK FACTS

- ASP: US\$ 20 - 150
- Lead-time: 10 – 12 weeks
- Market size: US\$8M
- Main competition: Morgan, HVCA/CKE

VISHAY ADVANTAGE

- Complete solution in compact designs
- Long-time experience and expertise
- Market leader
- Highest quality and performance in the market
- Design support for HV power supply engineers
- 3D models available

SALES TOOLS

- Selector guide
- Close contact to Division
- Design protection

PROMINENT CUSTOMERS:

ITW/Gema, Dürr, Schnier, AGW Electronics, Sirona, GE Medical



HV CAPACITORS

APPLICATION BASICS

Application	Description	Vishay Series	Reference designs
HV power supplies	Medical and industrial X-Ray equipment	615R/HIK 715C RHK/RHS	Siemens, Spellman, Mindray, Fiscan, United Imaging, Hitek
Lasers	Pulsed gas lasers for medical and industrial applications	715C	Mlase, Rofin, Light Machinery
HV measurement sensors	Measuring the power grid voltages to detect voltage fluctuations	715C	SGE Padova, Ormazabal, PROAT
Renewable Energies	EMI filtering in wind turbines	715C	Vestas



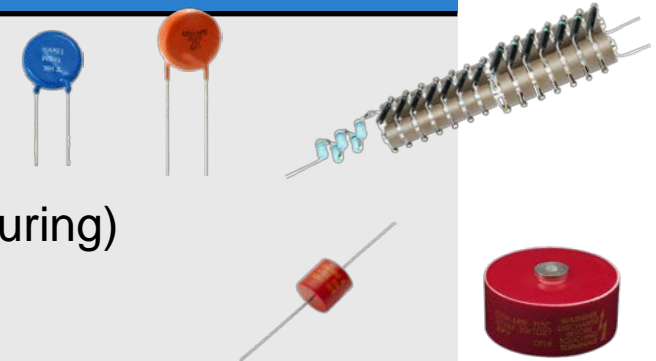


VISHAY HV CAPACITORS

APPLICATION DETAILS

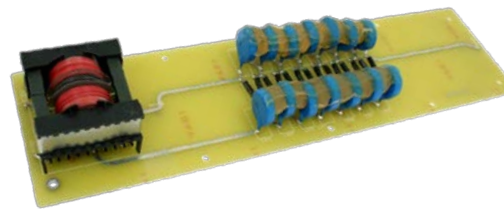
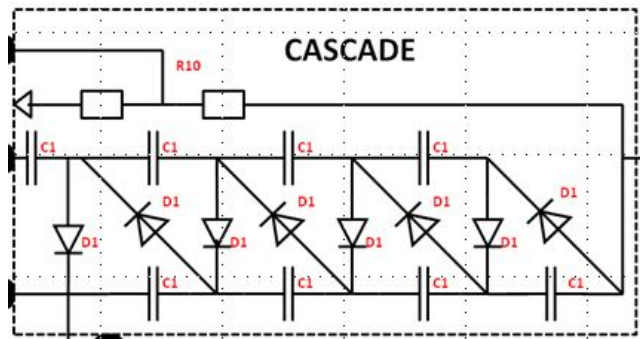
HV power supply

- Applications
- X-ray equipment
 - ➔ Electrostatic powder coating
 - Scanning electron microscopes
 - Ion implantation (semiconductor manufacturing)
 - Mass spectrometry
 - Antistatic equipment



Function HV caps are used to build up the voltage multiplier and in the output filter

Product series All HV capacitors, also cascades



Built by customer using Vishay leaded HV caps



We offer the complete solution



HV CAPACITORS

APPLICATION DETAILS

Laser

Applications Industrial CO₂ laser for welding, cutting, etc.
Excimer laser for eye surgery

Function Discharge capacitor

Product series Hockey pucks

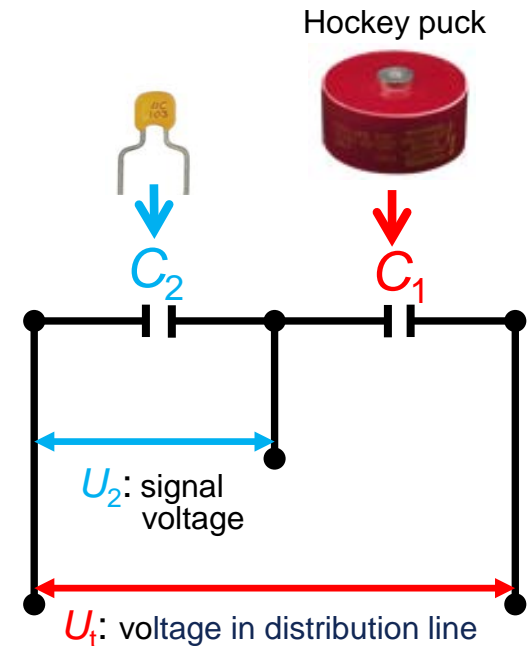


Smart Grid

Applications Capacitive voltage divider for detecting voltage fluctuations

Function Series connection of HV and LV caps to break down the high grid voltage

Product series Hockey pucks



SELECTOR GUIDE

- www.vishay.com/doc?49175
- www.vishay.com

→ Useful Links

→ Product Literature

→ Capacitors, Ceramic

→ Ceramic High Voltage Capacitors



VISHAY INTERTECHNOLOGY, INC.
CERAMIC CAPACITORS
 Ceramic High-Voltage Capacitors

Ceramic High-Voltage Capacitors

	Product Family	Series	Rated Voltage	Capacitance	Tolerance	Class	Temperature Characteristics	Dissipation Factor		
Ring Style		HR	2.0 kV _{DC} to 5.6 kV _{DC}	100 pF	± 20 %	1	U2J (N750)	0.07 %		
				2.0 nF to 5.0 nF				2	Y5U	0.5 %
				750 pF to 1.5 nF	+ 50 %/- 20 %		Z5U	2.5 %		
Axial Screw Terminals, Lead Lead		HPD	20 kV _{DC}	15 kV _{RMS} up to 120 Hz	350 pF to 5.0 nF	± 20 %	2	Z5U	0.5 %	
Axial Screw Solderable Stripped Coating		HEC	20 kV _{DC}	15 kV _{RMS} up to 120 Hz	350 pF to 5.0 nF	± 20 %	2	Z5U	0.5 %	
Disc Capacitors		660AZ	10 kV _{DC}	3.5 kV _{RMS}	470 pF to 2.0 nF	± 20 %	1	T3M (N4700)	0.2 %	
			15 kV _{DC}	5.3 kV _{RMS}	390 pF to 1.5 nF					
			20 kV _{DC}	7.0 kV _{RMS}	220 pF to 1.0 nF					
				30 kV _{DC}	10.6 kV _{RMS} up to 60 Hz	180 pF to 680 pF				
				10 kV _{DC}	3.5 kV _{RMS}	1.0 nF to 10 nF	± 20 %	2	X7R Z5U	2.0%
				15 kV _{DC}	5.3 kV _{RMS}	680 pF to 6.8 nF				
			20 kV _{DC}	7.0 kV _{RMS}	470 pF to 5.0 nF					
			30 kV _{DC}	10.6 kV _{RMS} up to 60 Hz	330 pF to 3.3 nF					
			10 kV _{DC}	3.5 kV _{RMS}	560 pF to 8.0 nF	± 20 %	1	T3M (N4700)	0.2 %	
			15 kV _{DC}	5.3 kV _{RMS}	370 pF to 5.3 nF					
			20 kV _{DC}	7.0 kV _{RMS}	280 pF to 4.0 nF					
			30 kV _{DC}	10.6 kV _{RMS} up to 60 Hz	190 pF to 2.7 nF					
			40 kV _{DC}	14.0 kV _{RMS} up to 60 Hz	140 pF to 2.0 nF					
			15 kV _{DC}	5.3 kV _{RMS}	1.3 nF to 10 nF	+ 80 %/- 20 %	2	X6E Y5U	2.0 %	
			20 kV _{DC}	7.0 kV _{RMS}	470 pF to 10 nF					
			30 kV _{DC}	10.6 kV _{RMS}	500 pF to 4.7 nF					
			40 kV _{DC}	14.0 kV _{RMS} up to 60 Hz	100 pF to 3.5 nF					
Radial Leads Epoxy Coating		615GA	10 kV _{DC}		250 pF to 3.3 nF	± 20 %	1	T3M (N4700)	0.2 %	
			15 kV _{DC}		100 pF to 2.5 nF					
				15 kV _{DC}		100 pF to 1.5 nF	± 20 %	2	Y5T	0.5 %
		IEL	25 kV _{DC}		12 pF to 38 pF	± 20 %	1	U2J (N750), R3L (N2200)	0.5 %	

Note
 * 4th digit: RoHS Indicator "C" = Standard type; "R" = RoHS compliant type

One of the World's Largest Manufacturers of Discrete Semiconductors and Passive Components



SELECTOR GUIDE

1/2

VMN-SG2170-1409

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000



SAFETY CAPACITORS

(VY/AY2 SERIES)



A **WORLD OF**
SOLUTIONS



CERAMIC SAFETY CAP PRODUCT LINES

■ Draloric/Roederstein

- Series: W1X, WYO, WKO, VKO, WKP, VKP
- Mature
- Many customized products available



■ Cera-Mite

- Series: 20VL, 25Y, 30LV, 30LVS, 125L, 440L
- Mature
- Many unique designs (e.g. 440LS10-R: Y1/10nF)



■ BCc

- Series: VY1, VY1*C, VY2, AY2
- Increasing
- Latest and most competitive safety caps
- **Recommended for new designs**





SAFETY CAPACITORS

NEW VY1*C SERIES (X1/Y1 SAFETY CAPACITOR)



Features:

- X1/Y1 safety cap acc. to IEC 60384-14
- Redesign of existing VY1 series
- Changed from Ag to Cu electrodes
- Reduced size (compact design)
- Can pass 10kV pulses

Rated voltage	(X1): 760V _{AC} (Y1): 500V _{AC}
Capacitance values	470 pF – 4.7 nF
Ceramic	Y5U
Operating temperature	-40°C to +125°C



SERIES

- VY1*C series: [Datasheet](#)

QUICK FACTS

- ASP: US\$0.03 – 0.10
- Lead-time: 8 weeks
- Market size: US\$50M [est. for Y1 only]
- Main competition (series):
Murata (DE1), TDK (CD), Kemet (C9*)

VISHAY ADVANTAGE

- First Y1 safety cap in the market which can pass 10kV pulses
- Widest operating temperature
- Thinnest disc
- Highest reliability

SALES TOOLS:

- Sample and sample kits
- [Productsheet](#)
- Crossfiles
- Selector guide

PROMINENT CUSTOMERS:

Siemens, GE, Bose, ABB, Itron, Landis & Gyr, APC, Delta, Hisense, Welco, Belfuse, Simatelex

Customization options:

- Different packaging and lead configurations



SAFETY CAPACITORS

NEW AY2 SERIES (X1/Y2 AUTOMOTIVE GRADE SAFETY CAPACITOR)



Features:

- X1/Y2 safety cap acc. to IEC 60384-14
- AEC-Q200 qualified
- Can pass 3.000 temperature cycles (from -55°C to +125°C)
- Halogen free & green



Rated voltage	(X1): 440V _{AC} (Y2): 300V _{AC}
Capacitance values	10 pF – 4.7 nF
Ceramic	U2J, Y5U, Y5S
Operating temperature	-55°C to +125°C



SERIES

- AY2 series: [Datasheet](#)

QUICK FACTS:

- ASP: US\$0.04 – 0.14
- Lead-time: 8 weeks
- Market size: US\$ 3M [only automotive]
US\$60M [incl. industrial]
- Main competition (series):
Murata (DE2, DE6), TDK (CS), Y2 Film caps

VISHAY ADVANTAGE

- Outstanding technical performance
- Superior robustness proven by AEC-Q200
- Widest operating temperature
- Extremely long lifetime
- Thinnest disc

SALES TOOLS

- Sample and sample kits
- [Productsheet](#)
- Crossfiles
- SUPER 12

PROMINENT AUTOMOTIVE CUSTOMERS

Delta, Tesla, BYD, Delphi, Fuji Electric, Martek,

Customization options:

- Additional 3.000VDC test (on request)
- Different packaging and lead configurations



SAFETY CAPACITORS







APPLICATION DETAILS

Application	Description	Vishay Series	Reference Designs
Power supplies	Input filter in all kinds of power supplies	VY1*C VY2	Siemens, Delta, Friwo, Inpotron, Belfuse
Smart meters	High quality requirements (85/85 test, temperature cycles)	VY1*C AY2	GE, Landis&Gyr, Itron, Sagem, Vision Metering
Solar inverter	Many temperature cycles, high humidity	VY1*C AY2	ABB, Advanced Energy, Fronius
Consumer/ White goods	Mainly for high end consumer products	VY1*C VY2	BSH, Miele, Whirlpool, BOSE, Hisense, Simatelex
EV charger	On board charger in e-cars	AY2	Delta, Martek, Tesla, BYD, Delphi, Fuji Electric
Lighting	Mainly used in lighting ballasts	VY1*C VY2	Osram, Philips, Cree, Lutron, Acuity Brands



FOCUS PRODUCT VY

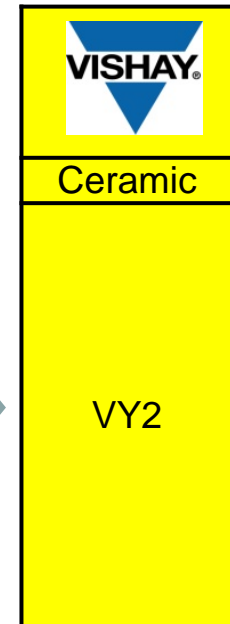
- Cross reference ceramic capacitors

Classification Test Voltage			CERA-MITE				
X1 / Y1 4000 Vac	WKP VKP	VY1 VY1...C	440L	KX KD	61V	CD	NS-A
X1 / Y2 2500 Vac	WKO VKO	VY2 AY2	30LV 30 LVS 25Y	KC KH	620	CS	TS
X1 / Y2 1500 Vac	WYO			KY	<i>obsolete</i>		BE
X1 / Y4 2000 Vac			125L				<i>obsolete</i>
X1 4000 Vac	W1X						
X2 1250 Vac			20VL				

FOCUS PRODUCT VY

- Cross reference to Y2 film capacitors up to 10 nF

Supplier	Epcos	Kemet		Panasonic	Wima
Technology	Film	Film		Film	Film
Series	B32021*	F881K* F881A*	PME271Y* PME271YA*	ECQU*	MKY2*



SELECTOR GUIDE

- www.vishay.com/doc?49177
- www.vishay.com



Useful Links



Product Literature



Capacitors, Ceramic



AC Rated Ceramic Disc Capacitors



VISHAY INTERTECHNOLOGY, INC.

CERAMIC CAPACITORS

Single-Layer Capacitors

AC Rated Ceramic Disc Capacitors, Safety Rated

	Product Family	Series	Voltage		Capacitance	Tolerance	Class	Temperature Characteristics
			X rating	Y rating				
X1/Y1	Vishay BCComponents	YY1	760 V _{AC}	500 V _{AC}	10 pF to 22 pF 33 pF to 4.7 nF	± 10 % ± 20 %	1 2	U2J (N750) Y5S Y5U
	Vishay Draloric	WKP	760 V _{AC}	500 V _{AC}	470 pF to 4.7 nF	± 10 % ± 20 %	1	U2J (N750)
		WKP	760 V _{AC}	500 V _{AC}	33 pf 47 pF to 4.7 nF		2	Y5S Y5T Y5U
	Vishay Cera-Mite	440L	400 V _{AC}	500 V _{AC}	10 pF to 47 pF	± 10 %	1	COG (P100) U2J (N750) P3K (N1500) R3L (N2000)
			760 V _{AC}		68 pF to 10 nF	± 10 % ± 20 %	2	X7R Y5U
	X1/Y2	Vishay BCComponents	YY2	440 V _{AC}	300 V _{AC}	10 pF to 47 pF 68 pF to 10 nF	± 10 % ± 20 %	1 2
AEC-Q200 Qualified AY2			440 V _{AC}	300 V _{AC}	10 pF to 47 pF 68 pF to 4.7 nF	± 10 % ± 20 %	1 2	U2J (N750) Y5S Y5U
Vishay Draloric			WYO	440 V _{AC}	250 V _{AC}	1.0 nF to 12 nF	± 20 %	2
Vishay Draloric		WKO	440 V _{AC}	300 V _{AC}	1.0 nF to 4.7 nF	± 10 % ± 20 %	2	Y5U
		WKO	440 V _{AC}	300 V _{AC}	33 pF to 47 pF 68 pF to 4.7 nF	± 10 % ± 20 %	1 2	U2J (N750) Y5S Y5T Y5U
Vishay Cera-Mite		2EY	400 V _{AC}	250 V _{AC}	1.0 nF to 8.0 nF	± 20 %	2	Y5S
	30LVS	400 V _{AC}	250 V _{AC}	1.0 nF to 10 nF	± 20 %	2	Y5U Y5V	
	30LV	400 V _{AC}	300 V _{AC}	10 pF to 68 pF 100 pF to 15 nF	± 10 % ± 20 %	1 2	COG (P100) U2J (N750) P3K (N1500) R3L (N2000) S3L (N3300) X7R Y5U	
X1/Y4	Vishay Cera-Mite	125L	400 V _{AC}	125 V _{AC}	1.0 nF to 50 nF	± 20 %	2	Y5V
X1	Vishay Draloric	W1X	275 V _{AC}	-	4.7 nF to 22 nF	± 20 %	2	Y5V
X2	Vishay Cera-Mite	20VL	400 V _{AC}	-	9.0 nF to 100 nF	± 20 %	2	Y5V Z5U

One of the World's Largest Manufacturers of Discrete Semiconductors and Passive Components

