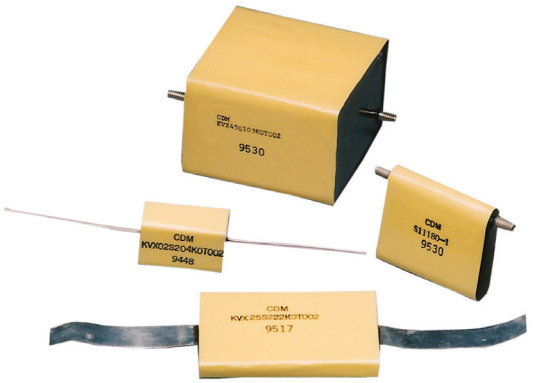
Type KVx High-Voltage and Pulse, Mica-Paper/Polymer Capacitors

KVx High-Voltage and Pulse Capacitors Ignite Your World



Voltage, Current and Temperature to New Heights

KaBOOM! Another exploding foil initiator successfully detonates a military smart bomb thanks to a KVx capacitor. Jet engines roar with KVx ignition capacitors. KVx will ignite your applications with its high reliability, high energy density, high peak current capability, and excellent mechanical properties.

Spanning voltages up to 150 kV, peak currents up to 100 kA, and temperatures from -55 °C to +200 °C, Type KVx capacitors are it for applications like pulse ignition, corona-free signal coupling, high-voltage energy storage and voltage division of high AC voltages.

Wide Selection of Capabilities

The Type KVx capacitor draws on an unprecendented selection of three dielectric systems, three impregnating systems, and three package types to deliver its superior capabilities.

The dielectric is high-purity mica plates, flexible reconstituted mica paper, or a polymer film/mica paper combination. Mica is the proven reliable dielectric for high voltage and temperature stress, even with continuous corona and radiation. We combine mica synergistically with polymer films to provide pulse capacitors of extremely high energy density (to over .1 J/cc).

High value with three impregnation systems: Epoxy—for best value operation through 125 °C; Polyester Resin—for continuous operation up to 200 °C.

Five Package Types Deliver Custom Fit

Package Type B: Bare sections-if you want to design your own package.

Package Type C: Metal Can-to be worked out individually.

Package Type T: For minimum size and quick avail-ability, the Type T package wraps the rectangular capacitor element with high temperature, heat-cured polyester tape and closes each end with a thick poured section of epoxy. The finished capacitor is sealed and is suitable for potted-in and many low humidity applications.

Package Type G: In applications requiring superior mechanical integrity, such as metal clamp mounting, moisture exposure, and mechanical vibration and shock, the Type G package adds that needed strength by vacuum potting the capacitor element in a laminated fiberglass epoxy tube.

Package Type M: For the ultimate in environmental protection and operation up to 150 kV, the Type M package provides a fully molded, vacuum-encapsulated system. The final capacitor shape can exactly meet your application mechanical requirements and fit where no other can.

Operating Life Guaranteed for 10 Years

KVx capacitors are not ordinary high voltage capacitors. Manufacturing processes developed and proven over 50 years of continuous manufacture of transmitting, pulse and high-voltage capacitors allow us to make a remark-able guarantee. Cornell Dubilier guarantees that KVx capacitors will operate ten years or more when operated within specified limits. Cornell Dubilier warrants that if KVx capacitor fails during normal use within 10 years of the date of purchase, it will replace the capacitor at no charge if CDE analysis confirms that the capacitor was not abused by operating beyond product limits for humidity, temperature, voltage, and current.

Specifications

Temperature Range	–55 °C to +125 °C standard, –55 ºC up to 200 ºC available
Rated Voltage Range	100 V to 150 kVdc Rated Voltage is the maximum peak voltage for actual use.
Capacitance Range	1 pF to 10 µF ±0.5% to ±20%, negligible capacitance change, all environments
Capacitor Size	Capacitor Size is determined by your choice of package, the capacitance and the rated voltage. For new designs, we will furnish your capacitor's size with our quotation. For a first estimate of capacitor size refer to the Ratings table.
Insulation Resistance	5 GΩµF min at 500 Vdc, 2 min Insulation Resistance is no less than the lesser of 100 GΩ and 5 GΩµF, when measured at 500 Vdc after 2 minutes, and at room temperature (1 GΩ or 25 MΩµF at 125 °C).

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Package Type	Terminations available differ according to package type: **Package Type** **T** **G** **M** Ribbon leads X X X Wire leads X X X Threaded studs X X X Threaded inserts X X Turret terminals X X HV Connectors X X Quick Connect
Capacitance Within Tolerance	Capacitance is within tolerance when measured at 1 kHz (1 MHz if C <1000 pF). Standard tolerance: ±5% ≥10 kV ±10% ≥100 pF & 5 kV ±20% <100 pF & 5 kV
Dissipation Factor	Characteristic S –.5%, C –.05% Dissipation Factor is no more than 0.5%, S characteristic, when measured at 1 kHz (1 MHz if C<1000 pF) and room temperature. Lower dissi-pation factor specification is available, to 0.1% for mica-plate capacitors, charac-teristic C.
Life Test	Subject capacitors to rated maximum temperature ±3 °C with rated volt-age applied for 2000 (+72, -2) hours. There will be no visual damage and the capacitance will not have changed more than the greater of ±3% and ±1 pF.
Leads	Ribbon leads are typically tin-plated copper, 0.005" x 0.5"x2" on small units (<1 in3) and 0.020" x 0.987" x 2" or larger. Wire leads are typically bare AWG #18 or #20, 2" minimum.
Thread Studs	Threaded studs or inserts are standard from 4-40 to 1⁄4-20 and typically tin-plated brass.
Terminals	Turret terminals are brass with silver or tinplate.
Connectors	High voltage connectors are available with creepage, tracking and clear-ance distances to meet requirements up to 150 kV.
Markings	ID Marking includes manufacturer, CDM, capacitance in µF, rated voltage, identification number and date code YYWW (2 digit year and week of manufacture).
Life Test Vibration Resistance	Subject the capacitors to simple harmonic motion with an amplitude of 0.06 inches; vary the frequency uniformly from 10 to 55 Hz and return to 10 Hz, all in one minute. Repeat that cycle continuously for 2 hours in each of 3 mutually perpendicular directions. There will be no visual dam-age, the capacitance will not change more than the greater of ±3% and ±1 pF, and the insulation resistance will be no less than the lesser of 7.5 GΩ and 5 GΩµF.
Withstand Voltage	Apply a DC test voltage for 5 seconds with the charge and discharge current limited to one ampere and with the capacitor immersed in an insulating fluid when needed to prevent external arcing. Look up the test voltage as a multiple of the Rated Voltage below: Rated Voltage T est Voltage Rated Voltage T est Voltage 0 to 8 kV 200% 8.1 to 10 kV 175% 10.1 to 12 kV 150% 12.1 to 20 kV 140% 20.1 to 30 kV 130% 30.1 kV and up 120%
Moisture Resistance	Moisture Resistance: Subject G or M package capacitors to 40 ±2 °C at 90 to 95% humidity for 500 (+24, –0) hours. Return to room ambient for 24 hours. There will be no visual damage, the capacitance will not change more than the greater of ±4% or 1 pF, and the insulation resistance will be no less than the lesser of 7.5 GΩ and 5 GΩµF. Moisture resistance is not specified for T package capacitors and product warranty is void if used regularly beyond 50% relative humidity.

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Temperature Coefficient and Drift	Measure the capacitor's capacitance at 25 °C, –55 °C, 25 °C,125 °C, and at 25 °C all ±3 °C after stabilizing at each temperature The capacitance temperature coefficient will be less than or equal to ±500 ppm/°C, and the capacitance will not have changed more than ±(0.5%+0.1 pF).
Pulse Capability	Maximum achievable peak current is usually limited by the inductance of the discharge circuit, not by rise-time effects of the dielectric.For repetition-rated applications, use double the dc rating in the Typical Ratings table on the following page. In other words, for a 10 kV repetition-rated capacitor applicaiton, use a 20 kVdc rated capacitor. The Ratings table on the next page lists maximum pulse repetition frequency (PRF) and maximum peak current (IPEAK) at the maximum PRF at room temperature ambient conditions. To use higher peak current, derate the PRF as the square of the peak current ratio. For example, to use double the maximum rated peak current, use one-quarter of the maximum rated repetition rate. For higher rep rate applications, or to enable higher peak current without the above derating, contact us for alternatives. Also we can recommend active cooling strategies for your high energy density application. ±20% <100 pF & 5 kV
RoHS Compliant	

Part Numbering System

KV^{X} — **Type**

10 — **Rated Voltage**
- **10** = 10 kV
- **05** = 5 kV

S — **Characteristic**
- **S** = Standard Performance
- **C** = High Current, <5% tol.
- **E** = High Energy Density

473 — **Capacitance**
- **471** = 470 pF
- **472** = 4700 pF
- **4732** = 47300 pF
- **47R3** = 47.3 pF

J — **Tolerance**
- **E** = ±0.5%
- **F** = ±1%
- **G** = ±2%
- **J** = ±5%
- **K** = ±10%
- **M** = ±20%

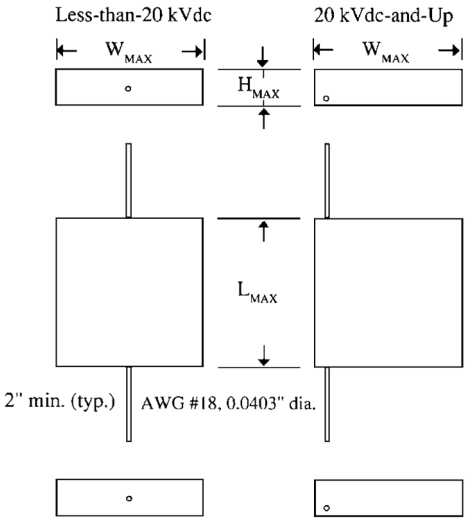
O — **Temperature**
- **0 =** –55 °C to 125 °C
- **5 =** –55 °C to 155 °C
- **6 =** –55 °C to 200 °C

T — **Package**
- **T =** Tape wrap/end fill
- **M =** Molded, vacuum
- **G =** Glass/epoxy tube
- **B =** Bare element

001 — **Standard Catalog Part**

Order by complete Part Number. For capacitors with special requirements we will assign you a new number at order entry. Use Outline Drawings and Typical Ratings as a capability guide. They are for mica-paper capacitors in Type T packages with S characteristic. Standard leads are AWG #18 centered on the ends for less than 20 kVdc and offset as shown for 20 kVdc and up. See Terminations for optional leads and terminals. We invite you to challenge us with your special requirements for high-voltage and pulse capacitors. Also feel free to request custom shapes for G and M package units. Those packages can deliver unique shapes and configurations and are not limited to the simple, rectangular shapes shown here.

Outline Drawing



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Ratings

Cap. (µF)	Catalog Part Number	Case Dimensions (in) Length L_{MAX}	Width W_{MAX}	Height H_{MAX}	Max. PRF	Max. I_{PEAK}
1 kVdc (500 V repetitive)						
0.047	KVX01S473K0T001	1.81	1.02	0.14	14000	40
0.1	KVX01S104K0T001	1.81	1.47	0.17	9500	50
0.22	KVX01S224K0T001	2.06	1.74	0.24	6000	60
0.47	KVX01S474K0T001	3.06	1.98	0.24	4500	100
0.68	KVX01S684K0T001	3.56	2.04	0.27	3800	150
1	KVX01S105K0T001	3.81	2.19	0.35	3100	300
2.2	KVX01S225K0T001	4.56	3.04	0.41	2300	700
3.3	KVX01S335K0T001	4.56	3.29	0.55	1700	1000
4.7	KVX01S475K0T001	4.56	3.09	0.84	1300	1500
6.8	KVX01S685K0T001	3.06	3.07	1.93	900	2000
2 kVdc (1 kV repetitive)						
0.033	KVX02S333K0T001	1.56	1.07	0.18	4800	70
0.68	KVX02S684K0T001	3.56	1.96	0.40	1000	200
1	KVX02S105K0T001	3.81	2.41	0.47	900	500
3.3	KVX02S335K0T001	4.56	2.79	0.91	430	1000
4.7	KVX02S475K0T001	3.56	2.37	2.06	320	1500
3 kVdc (1.5 kV repetitive)						
0.01	KVX03S103K0T001	1.31	1.10	0.19	6200	130
0.022	KVX03S223K0T001	1.56	1.24	0.20	3700	150
0.33	KVX03S334K0T001	3.81	2.24	0.34	1000	200
0.47	KVX03S474K0T001	3.56	2.41	0.50	800	300
1	KVX03S105K0T001	3.56	2.08	1.15	450	600
3.3	KVX03S335K0T001	3.81	2.80	2.25	250	1500
4 kVdc (2 kV repetitive)						
0.0068	KVX04S682K0T001	1.56	1.32	0.15	6700	60
0.01	KVX04S103K0T001	1.81	1.32	0.15	5300	70
0.1	KVX04S104K0T001	3.06	2.00	0.26	1400	700
0.22	KVX04S224K0T001	4.06	2.47	0.30	1000	800
1	KVX04S105K0T001	3.81	2.85	1.04	330	1000
2.2	KVX04S225K0T001	3.81	2.81	2.32	220	1500
5 kVdc (2.5 kV repetitive)						
0.0047	KVX05S472K0T001	1.81	1.24	0.14	6700	60
0.01	KVX05S103K0T001	2.06	1.26	0.17	3700	100
0.068	KVX05S683K0T001	3.56	1.82	0.25	1400	500
0.1	KVX05S104K0T001	2.06	1.78	0.65	720	1100
1	KVX05S105K0T001	4.56	2.84	1.27	260	2000
6 kVdc (3 kV repetitive)						
0.01	KVX06S103K0T001	2.06	1.30	0.19	2700	120
0.022	KVX06S223K0T001	2.06	1.60	0.25	1600	140
0.1	KVX06S104K0T001	3.06	2.22	0.38	720	1000
1	KVX06S105K0T001	4.56	2.94	1.57	210	2000

Cap. (µF)	Catalog Part Number	Case Dimensions (in) Length L_{MAX}	Width W_{MAX}	Height H_{MAX}	Max. PRF	Max. I_{PEAK}
8 kVdc (4 kV repetitive)						
0.0033	KVX08S332K0T001	2.06	1.54	0.16	5200	80
0.01	KVX08S103K0T001	3.06	1.50	0.20	2500	250
0.022	KVX08S223K0T001	3.06	2.08	0.23	1600	500
0.1	KVX08S104K0T001	3.06	2.14	0.76	480	900
0.68	KVX08S684K0T001	4.56	2.97	1.94	190	1700
10 kVdc (5 kV repetitive)						
0.001	KVX10S102K0T001	1.81	1.48	0.13	9100	25
0.0022	KVX10S222K0T001	2.81	1.46	0.13	6200	75
0.01	KVX10S103K0T001	3.56	1.69	0.19	2100	250
0.047	KVX10S473K0T001	4.56	2.84	0.28	940	500
0.33	KVX10S334K0T001	4.56	2.88	1.64	225	1000
12 kVdc (6 kV repetitive)						
0.01	KVX12S103K0T001	4.06	1.89	0.20	1800	300
0.033	KVX12S333K0T001	4.56	2.82	0.27	920	600
0.33	KVX12S334K0T001	4.56	3.63	1.93	200	1100
15 kVdc (7.5 kV repetitive)						
0.00047	KVX15S471K0T001	2.06	1.81	0.14	12000	30
0.00068	KVX15S681K0T001	2.06	1.25	0.17	6000	40
0.001	KVX15S102K0T001	3.06	1.64	0.15	7500	50
0.01	KVX15S103K0T001	4.31	2.10	0.26	1400	300
0.22	KVX15S224K0T001	4.56	3.76	2.15	210	2000
20 kVdc (10 kV repetitive)						
0.00033	KVX20S331K0T001	1.81	1.60	0.18	7800	30
0.001	KVX20S102K0T001	3.06	1.66	0.19	4400	70
0.01	KVX20S103K0T001	3.81	2.24	0.42	810	1100
0.047	KVX20S473K0T001	4.31	2.86	1.02	310	1500
25 kVdc (12.5 kV repetitive)						
0.0001	KVX25S101K0T001	2.06	1.16	0.17	14000	20
0.00022	KVX25S221K0T001	2.06	1.23	0.25	7200	30
0.0047	KVX25S471K0T001	3.06	1.24	0.27	5000	50
0.001	KVX25S102K0T001	3.06	2.29	0.20	3800	120
0.0022	KVX25S222K0T001	3.06	1.59	0.45	1500	300
0.0033	KVX25S332K0T001	3.06	2.02	0.49	1200	350
0.0047	KVX25S472K0T001	3.06	2.45	0.53	1000	600
0.01	KVX25S103K0T001	4.06	2.35	0.55	610	1000
0.033	KVX25S333K0T001	4.56	2.49	1.29	290	2000
30 kVdc (15 kV repetitive)						
0.0001	KVX30S101K0T001	2.06	1.58	0.22	13000	30
0.001	KVX30S102K0T001	3.06	1.70	0.30	2200	150
0.01	KVX30S103K0T001	4.81	2.78	0.55	580	1200
0.022	KVX30S223K0T001	4.81	2.89	1.11	330	1800

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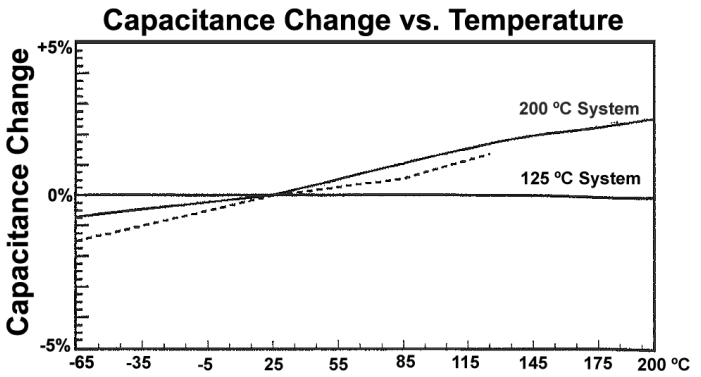
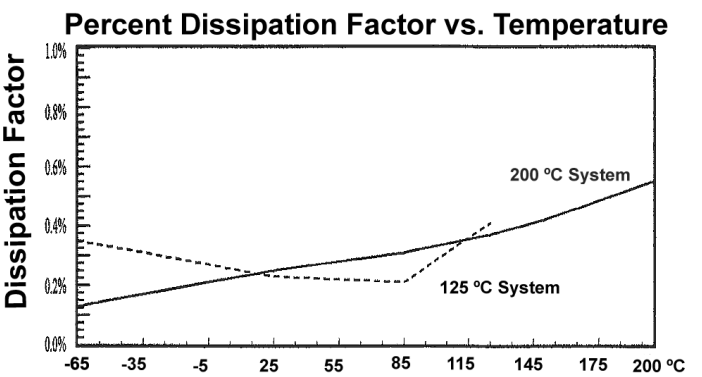
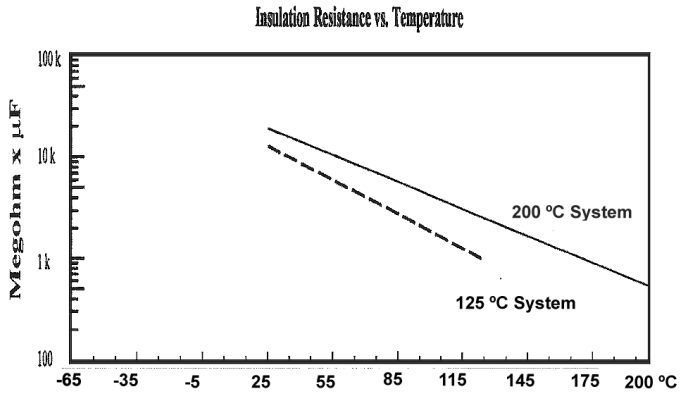
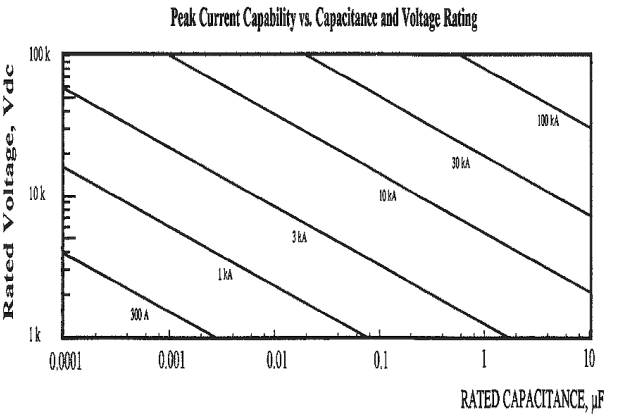
Typical Performance Curves









These are typical curves for KV^{X} capacitors with mica-paper dielectric. Other dielectric systems are available with improved characteristics. Please contact us for informaiton.