APPLICATION DATA

TRIPPING ACTION DUE TO OVERCURRENT

During normal operation, the PTCR remains in a low base resistance state **(Fig P-3, Region 1)**. However, if current in excess of hold current (I_H) is conducted, I^2R losses produce internal self heating. If the magnitude and time of the overcurrent event develops an energy input in excess of the device's ability to dissipate heat, the PTCR temperature will increase, thus reducing the current and protecting the circuit.

PTC current limiters are intended for service on telecom systems, automobiles, or the secondary of control transformers or in similar applications where energy available is limited by source impedance. They are not intended for application on AC line voltages where source energy may be high and source impedance low.

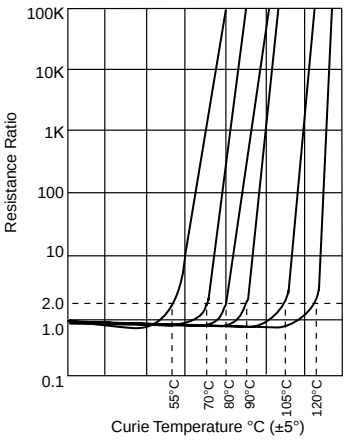
The current required to trip (I_T) is typically specified as two times the hold current ($2 \times I_H$). I_T is defined as the minimum rms conduction current required to guarantee thermistor switching into a high resistance state **(Fig P-3, Region 2)** at a 25°C ambient temperature.

Ambient temperature influences the ability of the PTCR to transfer heat via surface radiation and thermal conduction at the wire leads. At high ambient temperatures, less energy input (via I^2R) is required to reach the trip temperature. Low ambients require greater energy input. Approximate derating effects are shown in Fig P-2.

CERAMIC MATERIALS

The temperature at which the PTCR changes from the base resistance to high resistance region is determined by the PTCR ceramic material. Switching temperature (T_{SW}) described by the boundary between regions 1 & 2 **(Fig P-3)**, is the temperature point at which the PTCR has increased to two times its base resistance at 25°C ambient ($R_{SW} = 2 \times R_{25}$). Design flexibility is enhanced by Cera-Mite's wide selection of ceramic PTCR materials with different switching temperatures **(Fig P-4)**.

Fig P-4



Vishay Cera-Mite offers a wide selection of ceramic PTC materials providing flexibility for different ambient temperatures. Close protection levels are possible by designing resistance and physical size to meet specific hold current and trip current requirements.

SELF RESETTING - NON CYCLING - REPEATABLE

After tripping, the PTCR will remain latched in its high resistance state as long as voltage remains applied and sufficient trickle current is maintained to keep the device above the switching temperature. After voltage is removed, the PTCR resets (cools) back to its low resistance state and is again ready to provide protection.

Since the tripping operation is due to thermal change, there is a time-trip curve associated with each device. At relatively low magnitudes of overcurrent, it may take minutes for the device to trip. Higher current levels can result in millisecond response time. Trip time (t) can be calculated as follows

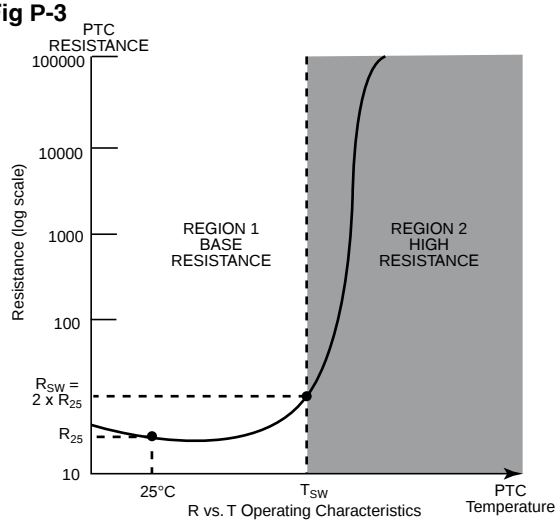
$$\text{Trip Time (t)} = \frac{kM(T_{SW} - T_A)}{I^2R - D(T_{SW} - T_A)}$$

Where: k = coefficient of heat absorption = 0.603 J/g/°C

M = mass of PTCR = volume x 5.27×10^{-3} g/mm^3

R = zero power resistance of PTCR at 25°C

Fig P-3



PHYSICAL DESIGN CONSIDERATIONS

Diameter (D) - Common diameters range from 4 to 22mm.

Thickness (T) - Typical thickness ranges from 1 to 5mm.

Curie (Switching) Temperature (T_{SW}) - **See Fig P-4.**

Resistivity (ρ) -

Determined during sintering process; combined with pellet geometry results in final resistance based on:

$$R_{25} \text{ = zero power resistance at 25°C} = \frac{\rho T}{\text{Area}}$$

Table 2

How Various Physical Parameters Influence a PTCs:		
PARAMETER	**VOLTAGE & CURRENT CAPABILITY**	**HOLD CURRENT & TRIP TIME**
Disc Diameter (D)	Increased diameter will increase voltage and current ratings.	Increased diameter will increase hold current and lengthen trip time.
Disc Thickness (T)	Increased thickness will increase voltage rating; may or may not increase current rating.	Increased thickness will increase hold current and lengthen trip time.
Curie (Switch) (T_{SW}) Temperature	Typically, lower switch temperature materials have higher voltage/ current capability.	Higher switch temperature materials increase hold current and lengthen trip time.
Resistance (R_{25})	Higher resistance will increase voltage capability.	Lower resistance will increase hold current and lengthen trip times.
Thermal Loading (Heat Sink)	Increased thermal loading typically reduces the maximum interrupting current.	Increased thermal loading increases hold current and lengthens trip times.
Wire Leads	Wire leads added to a PTCR pellet act as a thermal load resulting in reduced maximum interrupting current.	Depends on thermal conductivity of wire used. Copper will increase hold current and trip time.
Coating Material	Applying coating to a leaded PTCR has minimal effect on voltage/current ratings.	Applying coating to a leaded PTCR increases hold current/trip time 10-20%.

Fig P-5

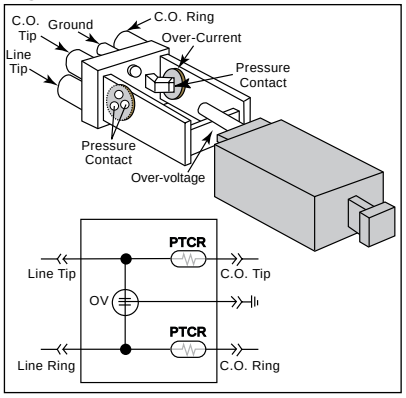
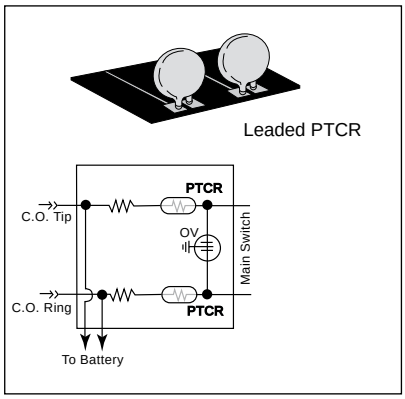


Fig P-6



PTC THERMISTORS FOR TELECOMMUNICATIONS

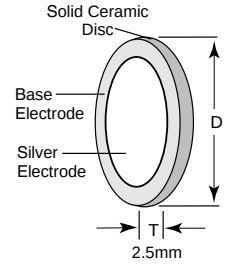
PTC Thermistors provide protection for large digital switches. Vishay Cera-Mite has pioneered this field with ceramic PTC thermistors working closely with major telephone equipment and telephone protection manufacturers. The requirements are dynamic, as switch makers continually strive to protect at lower levels. Vishay Cera-Mite participates with industry standard technical committees to establish common definitions and understanding of this new technology.

PTC THERMISTOR PELLETS FOR TELECOMMUNICATIONS

Table 2

HOLD (I_H) CURRENT mA	TRIP (I_T) CURRENT mA	RESISTANCE R_{25} Ohms	SWITCH TEMP. °C	SIZE (D) NOMINAL mm	VISHAY CERA-MITE PART NUMBER
110	220	30	105	6.5	307C1127
100	200	15	70	8	307C1128
100	200	20	80	8	307C1126
110	220	18	80	8	307C1268
120	240	15	80	8	307C1129
140	280	15	105	8	307C1435
110	220	15	70	9.5	307C1134
130	260	15	80	9.5	307C1130
140	280	9	70	9.5	307C1436
150	300	10	80	9.5	307C1437
Note 1		Note 2			Note 3

Fig P-7



Rated Voltage = 60 V_{DC}

Rated Current = 3A

Maximum Voltage = 220 Vrms

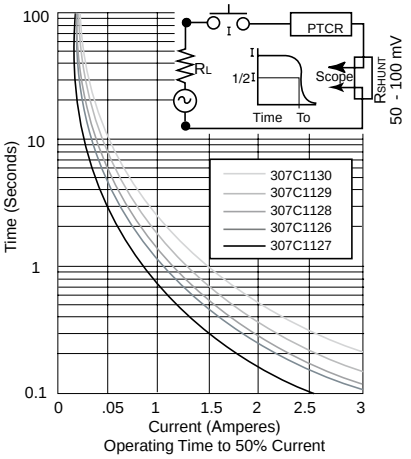
Note 1
Hold and trip currents are specified at 25°C ambient.

Note 2
R_{25} is nominal zero power resistance at 25°C with tolerance of ± 20%.

Note 3
All pellets have silver electrodes suitable for pressure contact mounting.

Fig P-8

Time-Trip Curves for Popular Telecom Pellets



INTERRUPTING CAPACITY ESTIMATES

Under unusual circumstances, telecommunication lines may be subjected to high surge currents as might occur from lightning effects or accidental crossing with power lines or transformer primaries.

Fig P-10 shows trip time curves for higher currents. Estimated interrupting capability data is also shown in Table 3 and is expressed as "I^2t Let Through" based on test data conducted in accordance with UL 497A and CSA 22.2 No. 0.7-M1985.

The data shown is for reference. Specific short circuit data or interrupting capability is partially determined by the mounting means and circuit application.

Fig P-9

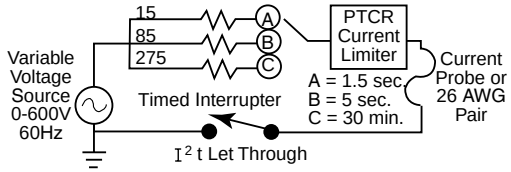
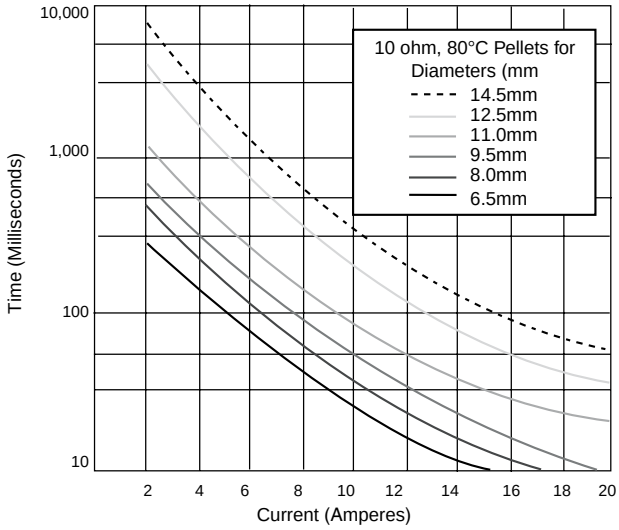


Fig P-10

Time VS. Current Curves for High Current Surges (25°C)



CUSTOM PTCR PELLET DESIGN CAPABILITY

- Vishay Cera-Mite will customize solid state overcurrent protector PTCRs to your exact requirements for telecommunication, power supply, or general electronic use. Providing great flexibility to establish specific voltage, hold current, time-trip characteristic, and ambient temperature values.
- Each device must be evaluated and ratings established per application. Mechanical packaging influences performance ratings.

Table 3

RATING CHART FOR CUSTOM PELLETS

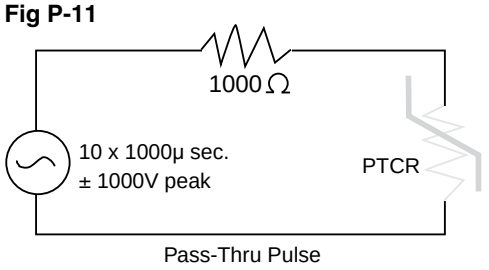
DISC DIAMETER (2.5mm THICK)	6.5mm	8mm	9.5mm	11mm	12.5mm	14.5mm
Continuous Voltage Rating (rms) (proportional to resistance)	100 – 300	100 – 300	100 – 300	100 – 300	100 – 300	50 - 300
Resistance Range @ 25°C (ohms)	10 to 35	7 to 25	5 to 20	4 to 17	2 to 15	1 to 10
Continuous Carry Current (mA) Ambient 25° to 50°C (inversely proportional to resistance)	60 – 120	75 – 175	100 – 200	110 – 250	130 – 400	150 – 600
Approximate Minimum Power to Trip or Reset (watts)	0.4	0.5	0.6	0.7	0.8	0.9
Interrupting Capability						
A. Repetitive (25 to 300 V_{RMS}) Peak power in watts	600	700	800	900	1000	1100
B. Non-repetitive (for 10 ohm pellet) I^2t Let Through	2.5	4.0	7.5	15	20	30
Maximum Safe Interrupting Voltage (rms) (voltage rating is proportional to resistance)	300	350	400	450	500	600

Rating applies to pellets with silver electrodes and pressure connections.

TRANSIENT VOLTAGE & CURRENT

Because of the thermal storage capacity of the ceramic PTCR, transient surges do not cause tripping. The PTCR is considered to be transparent to these low energy transients. **Fig P-11** shows a typical test circuit for such transients.

Fig P-11



Pass-Thru Pulse

WIRE LEADED PTC TELECOM THERMISTORS

Resettable current limiters featuring hold current and voltage ratings for telecommunication applications.

Fig P-12

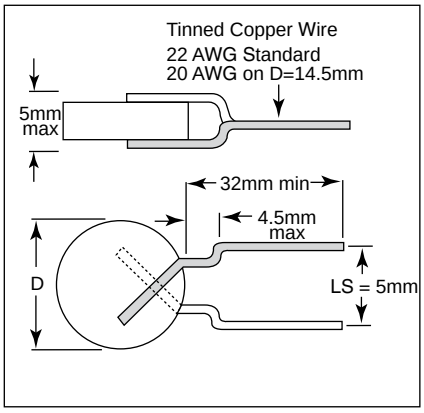


Table 4

TELECOM CURRENT LIMITERS

HOLD (I_H) CURRENT mA	TRIP (I_T) CURRENT mA	RESISTANCE R_{25} Ohms	TOL. %	SWITCH TEMP. °C	SIZE (D) NOMINAL mm	MAX. VOLTAGE V_{RMS}	VISHAY CERA-MITE PART NUMBER
70	140	100	25	120	6.5	265	307C1418
100	200	20	20	80	8	220	307C1305
100	200	30	20	105	8	220	307C1506
110	220	18	20	80	8	220	307C1354
110	220	25	20	105	8	220	307C1514
120	240	15	20	80	8	220	307C1129
120	240	20	20	105	8	220	307C1296
120	240	25	20	120	8	220	307C1470
130	260	13	20	80	8	120	307C1421
120	240	39	30	120	8.7	250	307C1505
120	240	25	25	105	8.7	250	307C1501
150	300	12	20	90	8.7	110	307C1439
120	240	15	25	80	9.5	220	307C1465
125	250	20	20	105	9.5	220	307C1507
135	270	10	25	80	9.5	220	307C1469
150	300	10	20	105	9.5	220	307C1233
170	340	10	20	105	11.2	220	307C1234
110	220	23	20	80	14.5	300	307C1262
125	250	18	25	80	14.5	265	307C1254
Note 1		Note 2					Note 3

Note 1
Hold and trip currents specified at 25°C ambient.

Note 2
R_{25} is nominal zero power resistance (± 25%) at 25°C.

Note 3
P/N suffix describes options including:
Tape & Reel
Wire Size
Wire Style & Length
Lead Spacing
Coating Material

Rated Voltage = 60Vdc; Rated Current = 3A at rated voltage.

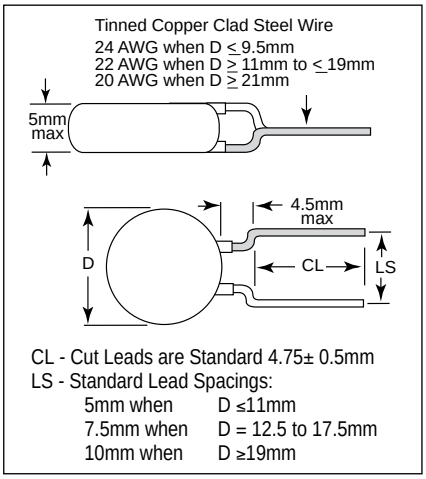
Table 5

GENERAL PURPOSE PTC THERMISTORS OVERCURRENT PROTECTORS								
RATED VOLTAGE VRMS	MAX. VOLTAGE VRMS	HOLD (I_H) CURRENT mA	TRIP (I_T) CURRENT mA	MAX. CURRENT A	RES R_{25} Ohms	SWITCH TEMP °C	D MAX. mm	VISHAY CERA-MITE PART NUMBER
12	15	130	260	1.1	13	120	5.5	307C1455
12	15	170	340	2.4	6	105	8	307C1308
12	15	600	1200	10	1.2	105	16	307C1311
24	30	130	260	2.3	10	105	8	307C1315
24	30	175	350	3.4	6	105	9.5	307C1429
24	30	600	1200	11	1.3	105	17.5	307C1318
50	60	60	120	0.8	50	105	6.5	307C1321
50	60	120	240	2	12	105	8	307C1323
50	60	150	300	2.6	10	105	9.5	307C1548
50	60	325	650	10	3.5	105	14.5	307C1325
50	60	475	950	12	2	105	17.5	307C1326
120	140	60	120	0.6	50	105	6.5	307C1329
120	140	85	170	0.8	30	105	8	307C1330
120	140	95	190	1.5	39	105	11	307C1302
120	140	115	230	2	27	105	12.5	307C1303
120	140	105	210	1	20	105	9.5	307C1331
120	140	350	700	5	4.5	105	19	307C1333
240	375	20	40	0.2	600	105	6.5	307C1335
240	340	28	56	0.3	300	105	6.5	307C1336
240	310	31	62	0.33	240	105	6.5	307C1337
240	265	34	68	0.34	200	105	6.5	307C1338
240	265	40	80	0.45	125	105	6.5	307C1340
240	320	45	90	0.4	150	105	9.5	307C1339
240	320	55	110	0.5	100	105	11	307C1341
240	265	65	130	0.6	70	105	9.5	307C1342
240	265	90	180	1	45	105	11	307C1343
		Note 1			Note 2			Note 3

GENERAL PURPOSE PTC CURRENT LIMITERS

- Designed as resettable current limiters, PTC thermistors offer an alternative to conventional over-current protection devices such as fuses or circuit breakers.
- A wide variety of sizes and current ranges are available for many electronic, industrial and automotive applications. Both standard parts and custom designs are offered.

Fig P-13



CL - Cut Leads are Standard 4.75± 0.5mm
LS - Standard Lead Spacings:

5mm when	D ≤11mm
7.5mm when	D = 12.5 to 17.5mm
10mm when	D ≥19mm

CUSTOM CURRENT LIMITER GUIDELINES

Table 6

RANGE CHART FOR CUSTOM WIRE LEADED DESIGN

MAX. D (mm) COATED	DESIGN LIMITS (APPROX.)		
	V_{RMS}	I_{HOLD}	OHMS
5.5	600	5 mA	2000
	15	150 mA	13
6.5	600	7 mA	1200
	15	200 mA	8
8	600	10 mA	850
	15	275 mA	6
9.5	600	13 mA	500
	15	350 mA	4
11	600	20 mA	350
	15	450 mA	2.5
12.5	600	22 mA	250
	15	500 mA	2.0
14.5	600	30 mA	200
	15	650 mA	1.5
16	600	35 mA	150
	15	800 mA	1.2

MAX. D (mm) COATED	DESIGN LIMITS (APPROX.)		
	V_{RMS}	I_{HOLD}	OHMS
17.5	600	40 mA	125
	15	950 mA	0.8
19	600	45 mA	100
	15	1.1 A	0.7
21	600	55 mA	80
	15	1.2 A	0.6
22.5	600	60 mA	70
	15	1.3 A	0.5
23.5	600	70 mA	60
	15	1.4 A	0.45
25	600	80 mA	50
	15	1.5 A	0.4

Resistance is proportional to voltage and inversely proportional to hold current (I_H)

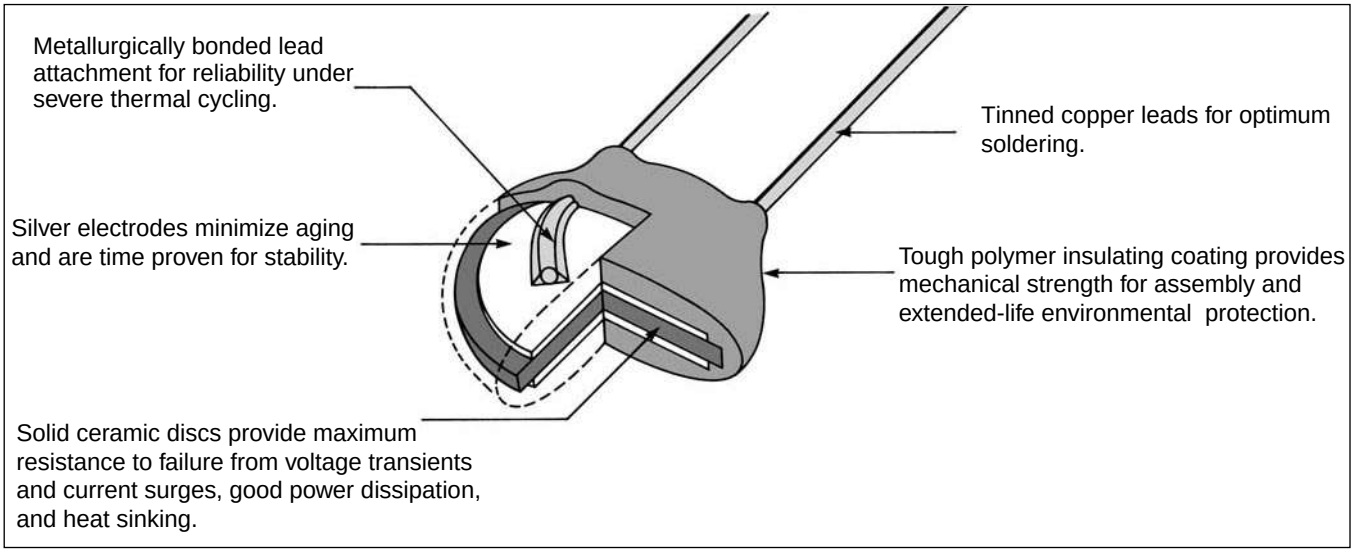
Conformal coating adds 1.5mm

APPLICATION CONSIDERATIONS:

- PTC current limiters are intended for service on telecom systems, automobiles, or the secondary of control transformers or in similar applications where energy available is limited by source impedance. They are not intended for application on AC line voltages where source energy may be high and source impedance low.
- Fuses and circuit breakers result in total circuit isolation after tripping. PTC thermistors provide a current limiting function by switching to a high resistance mode. Safety consideration must be given to the potential shock hazard caused by the steady state leakage current and voltage potential remaining in the circuit.
- Wire leaded PTC current limiting thermistors are intended for applications which expect a limited number of tripping operations. Actual life is a function of operating parameters. For high duty cycle applications, ceramic PTC pellets mounted in spring contact mechanical housings are preferred.
- Wire size, wire type and coating material can be used to precisely tailor required operating characteristics.
- Options Include: Tape & Reel; Wire Forms; Lead Spacings.

Application Data, Ceramic Disc Capacitors
1.0 Picofarad to 0.1 Microfarad

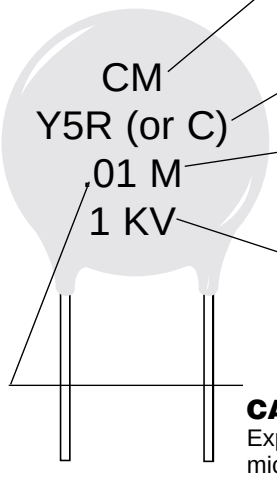
RELIABLE SOLUTIONS IN EMI/RFI, DECOUPLING, DV/DT & DI/DT, SNUBBERS, BY-PASS, ESR & ESL. EXCELLENT FOR HIGH VOLTAGE & SWITCHING POWER SUPPLIES.



MARKING INFORMATION

Wire leaded DC rated, disc capacitors are marked with a code identifying the manufacturer, capacitance, tolerance, voltage, and type of ceramic.

Specialty types such as AC rated are marked as described in those sections.



MANUFACTURER IDENTIFICATION
"Cera-Mite®" or the identification "CM."

TEMPERATURE COEFFICIENT
(See chart at right)

CAPACITANCE TOLERANCE

C = ± .25pF	M = ± 20%
D = ± .5pF	P = +100 – 0%
J = ± 5%	Y = –20 + 50%
K = ± 10%	Z = –20 + 80%

VOLTAGE
Rating normally DC volts. AC voltage rating marked AC or ~ ;. If no voltage is marked, part is 500VDC.

CAPACITANCE
Expressed in picofarads or microfarads.
Examples: 680 = 680 picofarads.
0047 = .0047 microfarads.

OPTIONAL MARKINGS
Lot Date Code and/or Customer Part Number are available options which may also be imprinted on the capacitor

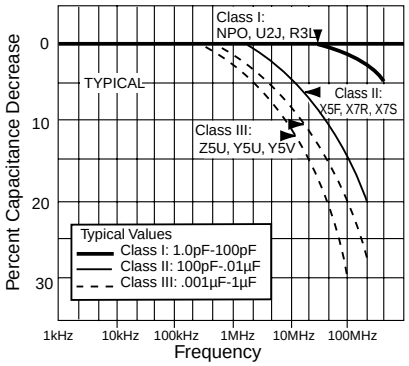
TYPE OF CERAMIC (Temperature Coefficient)

CAPACITANCE CHANGE OVER TEMP. RANGE PPM PER DEGREE C	MARKING CODE FOR TEMP. RANGE –55° TO +125°C				ALTERNATE MARKING CODE	DIELECTRIC CLASS
0 ± 30 (NPO)	C0G				A	I
–750 ± 120 (N750)	U2J				U	I
–1000 ± 250 (N1000)	M3K				V	I
–1500 ± 250 (N1500)	P3K				W	I
–2200 ± 500 (N2200)	R3L				X	I
–3300 ± 500 (N3300)	S3L				Y	I
–4700 ± 1000 (N4700)	T3M				Z	I & II*
MAX. % CHANGE	+ 10° + 85°C	– 30° + 85°C	– 55° + 85°C	– 55° + 125°C	–	–
± 4.7%	Z5E	Y5E	X5E	X7E	B	II
± 7.5%	Z5F	Y5F	X5F	X7F	B	II
± 10%	Z5P	Y5P	X5P	X7P	C	II
± 15%	Z5R	Y5R	X5R	X7R	C	II or IV**
± 22%	Z5S	Y5S	X5S	X7S	C	II or IV
+22 – 56%	Z5U	Y5U	X5U	X7U	E	III
+22 – 82%	Z5V	Y5V	X5V	X7V	F	III

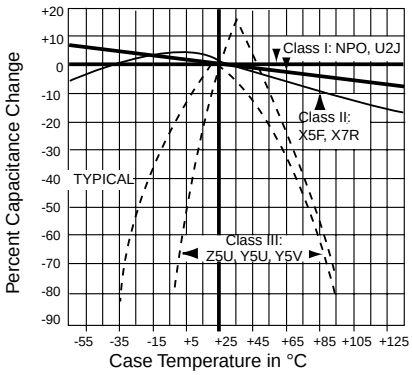
* N4700 is a transition material between Class I and II, and has characteristics of both. It is used for larger cap values: capacitance and DF measured at 1 kHz.

** Class IV uses same material as Class II, but is processed differently.

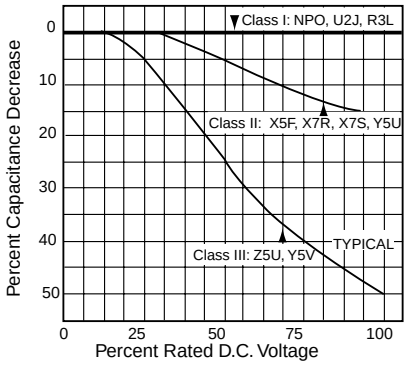
Capacitance Change vs. Frequency



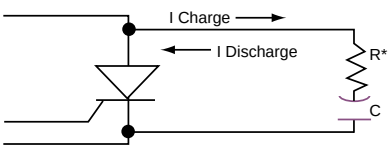
Capacitance Change vs. Temperature



Capacitance Decrease vs. D-C Voltage Bias



Ceramic Disc Capacitors as Snubbers



*Select R to limit dv/dt and di/dt to capacitor and semiconductor ratings. "Lossless" low dissipation factor discs are especially well suited for snubber service due to low self heating. See types 10TCU, 1DF0, 2DF0, and 3DF0.

CERAMIC DISC CAPACITOR APPLICATION NOTES

- **HIGH K:** For small size and higher values of capacitance, EIA 198D Class III, Z5U, Y5U, Y5V. This type is usually broad tolerance: ± 20% or + 80 – 20%.
- **MODERATELY HIGH K:** Materials are formulated to provide better capacitance stability against change in temperature and voltage, but may be larger in size than the HIGH K types, especially in the higher capacitance values, EIA 198D Class II, X5F, X7R, X7S. Usually tighter tolerance. ±10%at 25˚C. Higher dv/dt rating.
- **LOW K FORMULATIONS FOR PRECISION CAPACITORS:** Ultra stable capacitance over broadest temperature, frequency and voltage variation, EIA Class I, NP0, U2J, R3L and S3L. Usually ±5% tolerance. Highest dv/dt rating.
- **HYPERCON** construction gives highest capacitance density. Made by forming a thin dielectric barrier layer at each electrode surface. They exhibit very high capacitance and good temperature stability. Improvements have extended range to 100 VDC. EIA 198D Class IV.
- **CAPACITANCE MEASUREMENTS:** Class IV dielectric are conducted at 50 to 100 millivolts, 1000Hz. All others are measured at 1.0 volts, Class II & III at 1 kHz. Class I at 1 MHz.

FREQUENCY:

- Operating frequency range is determined primarily by capacitor value and self resonance due to lead inductance. This typically occurs at 500 MHz for 100 pF, decreasing to 50 MHz at .01 µF and 10 MHz at 0.1 µF.
- Class III and IV, typical applications are power and logic bus coupling and decoupling, and broad-band bypass filtering. Class I and II are chosen for frequency discriminating filters, d-c blocking, reference circuits, and similar circuits requiring close tolerance and stability.

TEMPERATURE:

- Capacitors are designed for service temperatures of –55˚C to +105˚C or greater. The limiting factor is the life of the polymer coating. Ceramic discs are not injured by short time exposure up to 125˚C.
- In applications where there is continuous heat dissipation in the capacitor, such as in snubber networks for power semiconductors, the case temperature rise should be limited to 30˚C. Class I, II and III may be used for snubber service. Low Dissipation Factor capacitors are especially well suited.

VOLTAGE:

- The extensive range of d-c voltage ratings available allows selection of the appropriate device to minimize d-c voltage effects in the circuit.
- A-C voltage ratings for capacitors up to 1000 volts applies to applications where energy and current are limited by circuit impedance. 1000 ohms impedance at the maximum a-c voltage rating is adequate.
- Ratings apply to 50 kHz. Above 50 kHz derate a-c voltage by $(\text{freq./50kHz})^2$.

CURRENT:

- **For sinusoidal applied voltages:** I_{RMS}= 7VfC where V = rms Voltage; f =frequency; C = farads. Power dissipation may be approximated by Watts = $(I_{RMS})^2$ x Effective Series Resistance (ESR).

Approximate ESR values:

Class I, ESR = $\frac{100}{C(pF)\ f(MHz)}$ Ex.: 10pF ESR = 10 ohms at 1 MHz

Class II or III, ESR = $\frac{1}{C(\mu F)\ f(kHz)}$ Ex.: .001 µF ESR = 100 ohms at 10kHz

Ex.: 100V, 50kHz, .001µF

$I_{RMS} = 7 \times 100 \times (50 \times 10^3) \times (.001 \times 10^{-6}) = 35$ mA

Power Dissipation = $(35 \times 10^{-3})^2 \times 20 = .024$ watts

- **For nonsinusoidal applied voltage** (repetitive transient pulses) limit on peak current is: $I_p = \frac{dv}{dt} \times C$ where V = volts; T = seconds; C = farads; approximate $\frac{dv}{dt}$ limits:

≤ 100pF = 10,000V/µs, Class I	100pF - 1,000pF =2,000V/µs, Class II & III
>100pF = 5,000V/µs, Class I	1000pF - 10,000pF = 1,000V/µs, Class II & III
<100pF = 5,000V/µs, Class II	>10,000pF = 500V/µs, Class II & III
	>10,000pF = 100V/µs, Class IV

Example: .001 µF, Class II; $I_p = \frac{1000}{10^{-6}} \times (.001 \times 10^{-6}) = 1$ ampere peak

Note: Above calculations are typical. Actual circuit conditions may allow more or less current and voltage. Actual circuit test is recommended

Lower Voltage Disc Capacitors

12V TO 1KV

Lower Voltage Capacitors are stocked in distribution. See “Packaging Options” section for other electrical and mechanical options, including Tape & Reel.

Fig 1

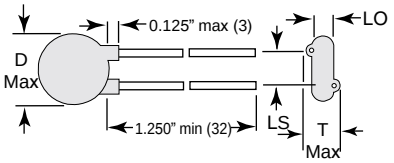


Fig 2

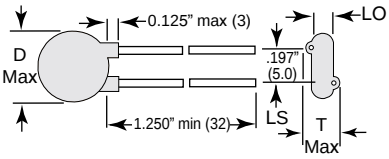
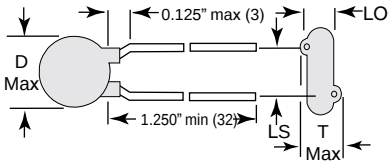


Fig 3



STANDARD WIRE SIZE:

- C and E Sizes - 24 gauge (.020") Tinned Copper Clad Steel Wire.
- F through Q Sizes - 22 gauge (.025") Tinned Copper Wire.

TAPE & REEL OPTIONS:

- Tape & Reel available on diameter sizes .250" to .680".
- To specify T & R, add two letter suffix to catalog number for example: TGS10 QA-suffix describes alternate wire lead forms & lead spacing options - see complete description in “Packaging Options” section.
- 10,000 piece minimum shipment for T & R.

SIZE CODE	DIAMETER “D” MAX		THICKNESS “T” MAX		LEAD SPACING “LS” FIG 1 & 3	
	in	mm	in	mm	in	mm
C	.250	6.4	.156	4.0	.250	6.4
E	.290	7.4	.156	4.0	.250	6.4
E_7	.330	8.4	.156	4.0	.250	6.4
F	.370	9.4	.156	4.0	.250	6.4
F_7	.400	10.2	.156	4.0	.250	6.4
G	.440	11.2	.156	4.0	.250	6.4
G_7	.460	11.7	.156	4.0	.250	6.4
H	.490	12.4	.156	4.0	.250	6.4
H_3	.490	12.4	.156	4.0	.375	9.5
H_7	.530	13.5	.156	4.0	.375	9.5
J	.560	14.2	.156	4.0	.375	9.5

SIZE CODE	DIAMETER “D” MAX		THICKNESS “T” MAX		LEAD SPACING “LS” FIG 1 & 3	
	in	mm	in	mm	in	mm
K	.630	16.0	.156	4.0	.375	9.5
L	.680	17.3	.156	4.0	.375	9.5
M	.760	19.3	.156	4.0	.375	9.5
P	.890	22.6	.156	4.0	.375	9.5
R	.510	13.0	.200	5.1	.375	9.5
T	.580	14.7	.200	5.1	.375	9.5
U	.640	16.3	.200	5.1	.375	9.5
W	.700	17.8	.200	5.1	.375	9.5
X	.770	19.6	.200	5.1	.375	9.5
Y	.900	22.9	.200	5.1	.375	9.5
Q	.950	24.1	.200	5.1	.375	9.5

VOLTAGE CLASS	LEAD OFFSET “LO” (nom)	
	in	mm
100	.040	1.0
500	.040	1.0
1000	.050	1.3

12/25/50/100V HYPERCON CONSTRUCTION HIGH-CAPACITANCE DISCS

- Application: Low Voltage Bulk Filter

563C Series
Class IV Dielectirc

12 VDC, Y5R, 2.5ΩF, 5% DF				
VALUE		CATALOG NUMBER	SIZE	
µF	TOL.		FIGURE	CODE
.05	Y	HY105	3	E
.10	M	HY110	1	G
.22	M	HY122	1	J
.47	M	HY147	1	P

25 VDC, Y5R, 5ΩF, 5% DF				
VALUE		CATALOG NUMBER	SIZE	
µF	TOL.		FIGURE	CODE
.01	M	HY820	3	C
.022	M	HY825	3	E
.033	M	HY530	3	E
.047	M	HY835	3	F
.10	M	HY850	1	G

50 VDC, Y5R, 25ΩF, 4% DF				
VALUE		CATALOG NUMBER	SIZE	
µF	TOL.		FIGURE	CODE
.01	M	HY920	3	C
.022	M	HY925	3	E
.047	M	HY935	1	G
.10	M	HY950	1	H

100 VDC, Y5S, 100ΩF, 3% DF				
VALUE		CATALOG NUMBER	SIZE	
µF	TOL.		FIGURE	CODE
.0022	M	HMMD22	2	C
.0047	M	HMMD47	2	C
.01	M	HMMS10	3	E
.10	M	HMMP10	1	L

100 VOLT GENERAL PURPOSE

- Application Range: Up to 250 VDC, 75 VAC RMS**
- Insulation Resistance: 10,000 MΩ minimum, 500ΩF
- Dissipation Factor: 3.0% maximum

562C Series
- Dielectric Strength: 750 VDC, 250 VAC RMS

VALUE		CATALOG NUMBER	SIZE		TEMP. COEF.
pF	TOL.		FIGURE	CODE	
10	D	TSQ10	2	C	NP0
22	J	TSQ22	2	C	NP0
33	K	TSQ33	2	C	U2J
47	K	TSQ47	2	C	U2J
100	K	TST10	2	C	X7R
220	K	TST22	2	C	X7R
330	K	TST33	2	C	X7R

VALUE		CATALOG NUMBER	SIZE		TEMP. COEF.
pF	TOL.		FIGURE	CODE	
470	K	TST47	2	C	X7R
1000	K	TSD10	2	C	X7R
2200	K	TSD22	2	F	X7R
3300	K	TSD33	2	F	X7R
4700	K	TSD47	2	G	X7S
6800	K	TSD68	2	H	X7S
0.01µF	K	TSS10	2	J	X7S

VALUE		CATALOG NUMBER	SIZE		TEMP. COEF.
µF	TOL.		FIGURE	CODE	
.005	M	TGD50	1	E	Z5U
.01	M	TGS10	1	F	Z5U
.02	M	TGS20	1	G	Z5U
.022	M	TSS22	1	T	X7S
.047	M	TGS47	1	R	Z5U
.050	M	TGS50	1	R	Z5U
.10	M	TGP10	1	W	Z5U

** See “Application Data” section for limits on AC voltage.

500 VOLT GENERAL PURPOSE

- Application Range: Up to 600 VDC, 100 VAC RMS**
- Insulation Resistance: 15,000 MΩ minimum, 750ΩF
- Dissipation Factor: 3.0% maximum

562C Series
- Dielectric Strength: 1500 VDC, 300 VAC RMS

VALUE pF	TOL.	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
1000	K	5TSD10	3	E	X7R
1000	M	5TSSD10	3	C	Y5U
1500	K	5TSD15	3	F	X7R
2200	K	5TSD22	3	F	X7R
3300	K	5TSD33	1	G	X7R
4700	K	5TSD47	1	H	X7R
5000	Z	5TSD50	1	F	Z5U

VALUE µF	TOL.	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
.0068	K	5TSD68	1	H	X7S
.01	K	5TSS10	1	J	X7S
.01	M	5GASS10	1	G	Z5U
.01	Z	5HKSS10	1	G	Z5U
.02	M	5GASS20	1	J	Z5U
.022	M	5TSS22	1	L	X7S
.033	M	5TSS33	1	X	X7S

VALUE µF	TOL.	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
.05	M	5GAS50	1	P	Z5U
.05	Z	5HKS50	1	T	Z5U
.10	M	5GAP10	1	X	Z5U
.10	Y	5HKSP10	1	Q	Y5V
.10	Z	5HKP10	1	X	Z5U
.15	Y	5GAP15	1	Y	Z5U
.20	M	5GAP20	1	Q	Z5U

1000 VOLT GENERAL PURPOSE

- Application Range: Up to 1000 VDC, 150 VAC RMS**
- Insulation Resistance: 20,000 MΩ minimum, 1000ΩF
- Dissipation Factor: 2.5% maximum

562C Series
- Dielectric Strength: 2500 VDC, 500 VAC RMS

VALUE pF	TOL.	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
10	M	5GAQ10	3	C	NP0
20	M	5GAQ20	3	C	NP0
33	M	5GAQ33	3	E	U2J
47	M	5GAQ47	3	E	U2J
100	M	5GAT10	3	C	X5F
150	M	5GAT15	3	C	X5F
200	M	5GAT20	3	C	X5F
220	M	5GAT22	3	C	X5F
330	M	5GAT33	3	C	X5F
470	M	5GAT47	3	C	X5F
500	M	5GAT50	3	C	X5F

VALUE pF	TOL.	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
1000	M	5GAD10	3	E	X7R
1000	P	5HKD10	3	E	Y5U
1200	M	5GAD12	3	E	Z5U
1500	M	5GAD15	3	E	Z5U
2000	M	5GAD20	3	E	Z5U
2200	M	5GAD22	3	E	Z5U
2500	M	5GAD25	3	E	Z5U
2700	M	5GAD27	3	E	Z5U
3000	M	5GAD30	3	E	Z5U
3300	M	5GAD33	3	E	Z5U
4700	M	5GAD47	1	F	Z5U

VALUE pF	TOL.	CATALOG NUMBER	SIZE FIGURE	SIZE CODE	TEMP. COEF.
5000	M	5GAD50	1	F	Z5U
6800	M	5GAD68	1	G	Z5U
8200	M	5GAD82	1	G	Z5U
0.01µF	M	5GAS10	1	H_3	Z5U
.01	M	5HKMS10	1	H	Z5U
.01	P	5HKS10	1	H_3	Z5U
.015	M	5GAS15	1	J	Z5U
.020	M	5GAS20	1	L	Z5U
.050	M	10HKS50	1	X	Z5U
.10	M	10GAP10	1	Q	Z5U
.15	M	10GAP15	1	Q	Y5V

1KV TEMP. & VOLTAGE STABILIZED, 10% TOL.

- Application Range: Up to 1250 VDC, 200 VAC RMS**
- Insulation Resistance: 50,000 MΩ minimum, 1000ΩF
- Dissipation Factor: 2.0% maximum

562C Series
- Dielectric Strength: 2500 VDC, 750 VAC RMS

VALUE pF	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
10	10TSQ10	3	C	NP0
25	10TSQ25	3	E	NP0
27	10TSQ27	3	C	U2J
30	10TSQ30	3	C	U2J
33	10TSQ33	3	E	U2J
39	10TSQ39	3	E	U2J
47	10TSQ47	3	E	U2J
50	10TSQ50	3	E	U2J
56	10TSQ56	3	C	X5F
68	10TSQ68	3	C	X5F

VALUE pF	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
75	10TSQ75	3	C	X5F
82	10TSQ82	3	C	X5F
100	10TST10	3	C	X5F
120	10TST12	3	C	X5F
150	10TST15	3	C	X5F
180	10TST18	3	C	X5F
200	10TST20	3	C	X5F
220	10TST22	3	C	X5F
250	10TST25	3	C	X5F

VALUE pF	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
270	10TST27	3	C	X5F
300	10TST30	3	C	X5F
330	10TST33	3	C	X5F
390	10TST39	3	C	X5F
470	10TST47	3	C	X5F
500	10TST50	3	C	X5F
560	10TST56	3	E	X5F
680	10TST68	3	E	X5F
750	10TST75	3	E	X5F

VALUE pF	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
820	10TST82	3	E	X5F
1000	10TSD10	3	E	X5F
1500	10TSD15	1	G	X5F
2000	10TSD20	1	H_3	X5F
2200	10TSD22	1	H_3	X5F
2700	10TSD27	1	J	X5F
3300	10TSD33	1	J	X5F
4700	10TSD47	1	L	X5F
.01µF	10TSS10	1	L	X5S

1KV NPO/N750 PRECISION DISC CAPACITORS, 5% TOL

- Application Range: Up to 1500 VDC, 300 VAC RMS**
- dv/dt up to 10,000 V/usec
- Insulation Resistance: 100,000 MΩ minimum, 1000ΩF
- Dielectric Strength: 2500 VDC, 750 VAC RMS
- High Q: 1000, Dissipation Factor: 0.1% max

561C Series
Temperature/Frequency/Voltage Stable
- Application: NP0 capacitors are used when the ultimate in stability is required
- N750/S3L are smaller & ideal for "lossless snubbers".

VALUE pF*	CATALOG NUMBER	SIZE FIG.	SIZE CODE
1.0	10TCCV10	3	C
2.2	10TCCV22	3	C
2.7	10TCCV27	3	C
3.0	10TCCV30	3	C
3.3	10TCCV33	3	C
3.9	10TCCV39	3	C
4.7	10TCCV47	3	C
5.0	10TCCV50	3	C
5.6	10TCCV56	3	C
6.8	10TCCV68	3	C
8.2	10TCCV82	3	C

VALUE pF	CATALOG NUMBER	SIZE FIG.	SIZE CODE
10	10TCCQ10	3	C
12	10TCCQ12	3	C
15	10TCCQ15	3	C
18	10TCCQ18	3	E
20	10TCCQ20	3	E
22	10TCCQ22	3	E
25	10TCCQ25	3	E
27	10TCCQ27	3	F
30	10TCCQ30	3	F
33	10TCCQ33	3	F
39	10TCCQ39	3	F

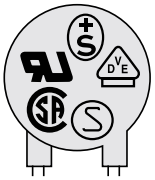
VALUE pF	CATALOG NUMBER	SIZE FIG.	SIZE CODE
47	10TCCQ47	1	G
50	10TCCQ50	1	G
56	10TCCQ56	1	G
68	10TCCQ68	1	H
82	10TCCQ82	1	H_3
100	10TCCT10	1	J
120	10TCCT12	1	J
150	10TCCT15	1	K
180	10TCCT18	1	L
220	10TCCT22	1	M
270	10TCCT27	1	P

VALUE pF	CATALOG NUMBER	SIZE FIG.	SIZE CODE	TEMP. COEF.
N750/S3L Disc Capacitors				
33	10TCUQ33	3	E	U
47	10TCUQ47	3	E	U
68	10TCUQ68	3	F	U
100	10TCUT10	3	F	U
220	10TCUT22	1	G	V
330	10TCUT33	1	H	V
470	10TCUT47	1	J	V
560	10TCUT56	1	J	V
680	10TCUT68	1	K	Y
1000	10TCUD10	1	L	Y

*1.0 to 10pF are D tolerance

**See "Application Data" section for limits on AC voltage.

AC Line Rated Disc Capacitors



X & Y EMI/RFI FILTER TYPES: ACROSS-THE-LINE, LINE-BY-PASS, ANTENNA COUPLING

Vishay Cera-Mite AC Line Rated Discs are rugged, high voltage capacitors specifically designed and tested for use on 125 Volt through 600 Volt AC power sources. Certified to meet demanding X & Y type worldwide safety agency requirements, they are applied in across-the-line, line-to-ground, and line-by-pass filtering applications. Vishay Cera-Mite offers the most complete selection in the industry—six product families—exactly tailored to your needs.

- Worldwide Safety Agency Recognition
  - Underwriters Laboratories - UL1414 & UL1283
  - Canadian Standards Association - CSA 22.2 No. 1 & No. 8
  - European EN132400 to IEC 384-14 Second Edition
- Required In AC Power Supply and Filter Applications
- Six Families Tailored To Specific Industry Requirements
- Complete Range of Capacitance Values

AC LINE RATED CERAMIC CAPACITOR SPECIFICATIONS

PERFORMANCE DATA / SERIES:	440L	30LV	30LVS	25Y	125L	20VL
Application Voltage Range (Vrms 50/60 Hz) (Note 1)	250/500	300/400	250/400	250/400	250	250
Dielectric Strength (Vrms 50/60 Hz for 1 minute)	4000	2500	2500	2500	2000	1250
Dissipation Factor (Maximum)	2%					
Insulation Resistance (Minimum)	1000 ΩF					
Mechanical Data	Service Temperature 125°C Maximum; Coating Material per UL94V0					
Temperature Characteristics	Y5U	Y5U	Y5U	Y5S	Y5V	Y5V
	See Part Number Detail for Temperature Characteristics					

SAFETY AGENCY RECOGNITION AND EMI/RFI FILTERING SUBCLASS

Series / Recognition / Voltage	440L	30LV	30LVS	25Y	125L	20VL
Underwriters Laboratories Inc.: (Note 2)						
UL 1414 Across-The-Line	Across-The-Line	Across-The-Line	—	—	—	—
UL 1414 Antenna Coupling	Antenna-Coupling	Antenna-Coupling	—	—	—	—
UL 1414 Line-By-Pass	Line-By-Pass	Line-By-Pass	Line-By-Pass	Line-By-Pass	Line-By-Pass	—
UL 1414 Rated Voltage	250 VAC	250 VAC	250 VAC	250 VAC	250 VAC	—
Electromagnetic Interference Filters	EMI Filters	EMI Filters	EMI Filters	EMI Filters	—	EMI Filters
UL1283 Rated Voltage	600 VAC	250 VAC	250 VAC	250 VAC	—	250 VAC
Canadian Standards Association:						
CSA 22.2 No.1 Across-The-Line	Across-The-Line	Across-The-Line	—	—	—	—
CSA 22.2 No.1 Isolation	Isolation	Isolation	Isolation	Isolation	Isolation	—
CSA 22.2 No. 1 Rated Voltage	250 VAC	250 VAC	250 VAC	250 VAC	125/250 VAC	—
CSA 22.2 No. 8 Line-to-Ground Capacitors	—	Line-To-Ground	Line-To-Ground	Line-To-Ground	—	Line-To-Ground
For Use in Certified EMI Filters	—	Certified EMI Filters	Certified EMI Filters	Certified EMI Filters	—	Certified EMI Filters
CSA 22.2 No. 8 Rated Voltage	—	400 VAC	400 VAC	400 VAC	—	250 VAC
European CENELEC Electronic Components Committee (CECC) EN 132 400 to Publication IEC 384-14 Table II, Edition 2:						
IEC 384-14 Second Edition Subclass Y: (Note 3)	**Y1**	**Y2**	**Y2**	**Y2**	**Y4**	—
Subclass Y Voltage (Vrms 50-60 Hz)	500 VAC	300 VAC	250 VAC	250 VAC	125 VAC	
Type of Insulation Bridged	Double or Reinforced	Basic or Supplementary	Basic or Supplementary	Basic or Supplementary	Basic or Supplementary	—
Peak Impulse Voltage Before Endurance Test	8 kV	5 kV	5 kV	5 kV	2.5 kV	—
IEC 384-14 Second Edition Subclass X: (Note 4)	**X1**	**X1**	**X1**	**X1**	**X1**	**X2**
Subclass X Voltage (Vrms 50-60 Hz)	400 VAC	400 VAC	400 VAC	400 VAC	400 VAC	400 VAC
Peak Impulse Voltage in Service	2.5 to 4.0 kV	2.5 to 4.0 kV	2.5 to 4.0 kV	2.5 to 4.0 kV	2.5 to 4.0 kV	To 2.5 kV
Application	High Pulse	High Pulse	High Pulse	High Pulse	High Pulse	Gen. Purpose
Damp Heat, Steady State Recognition	Code HKF - 25°C/ + 125°C/21 days					

Note 1

Voltage Ratings: All ratings are manufacturer's rating.

- Part markings are governed by agency rules and customer requirements.
- Parts are marked 250 VAC unless otherwise requested.

Note 2

UL1414 Across-The-Line, Antenna Coupling, and Line-By-Pass Capacitors:

- Across-The-Line—A capacitor connected either across a supply circuit or between one side of a supply circuit and a conductive part that may be connected to earth ground.
- Antenna-Coupling—A capacitor connected from an antenna terminal to circuits within an appliance.
- Line-By-Pass—A capacitor connected between one side of a supply circuit and an accessible conductive part.

Note 3

IEC 384-14 Subclass Y Capacitors:

- A capacitor of a type suitable for use in situations where failure of the capacitor could lead to danger of electric shock.
- Class Y capacitors are divided into sub- classes based on type of insulation bridged and voltage ranges.
- For definitions of basic, supplementary, double and reinforced insulation, see IEC Publication 536.
- Subclass Y capacitors may be used in applications which require a Subclass X rating.

Note 4

IEC 384-14 Subclass X Capacitors:

- A capacitor of a type suitable for use in situations where failure of the capacitor would not lead to danger of electric shock.
- Class X capacitors are divided into subclasses according to the peak impulse test voltage superimposed on the main voltage

Note 5

AC Leakage Current:

- For all Series (except 125L) - AC Leakage Current (mA) specified at 250 Vrms, 60 Hz.
- For 125L Series - AC Leakage Current (mA) specified at 125 Vrms, 60Hz.

Note 6

Alternate Lead Spacings of 7.5mm and 10mm are available bulk or tape & reel.

- European Required Minimum Lead Clearance (Prevents Use of Inside Crimp) .315" (8mm) on 440L Series; 0.118" (3mm) on all other series.

INTERNATIONAL AGENCY APPROVALS

UL · VDE · CSA · SEV · SEMKO · NEMKO · DEMKO · FIMKO

Fig 5 TYPICAL FILTER SHOWING X & Y TYPES

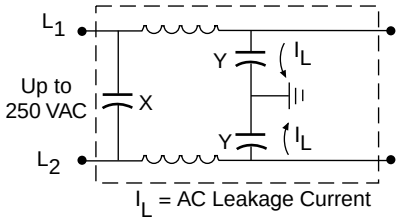
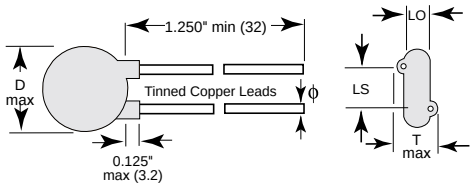


Fig 6 WIRE LEAD OFFSET



Series	"LO" typ. in	mm
440L	.158"	(4.0)
30LV	.132"	(3.4)
30LVS	.125"	(3.2)
25Y	.060"	(1.5)
125L	.110"	(2.8)
20VL	.077"	(2.0)

440L SERIES
AC RATED CERAMIC DISC CAPACITORS

Rugged, High Dielectric Strength, Full UL Recognition, X1 & Y1 Applications

UL 1414	UL 1283	CSA 22.2	IEC 384-14
Across-The-Line	EMI Filters	No. 1 - Across-The-Line	2nd Edition
Antenna Coupling		No. 1 - Isolation	Y1 - 500 VAC
Line-By-Pass			X1 - 400 VAC

VALUE pF	TOL.	VISHAY CERA-MITE NUMBER	AC LEAKAGE I_L mA	TEMP CHAR.	D DIAMETER (in/mm)	T THICKNESS (in/mm)	LS LEAD SPACE (in/mm)	ϕ WIRE SIZE (AWG/in/mm)
10	K	440LQ10	1.3 uA	COG	.330 (8.4)	.195 (5.0)	.375 (9.5)	20 .032 (.81)
15	K	440LQ15	2.0 uA	U2J	.330 (8.4)	.210 (5.3)	.375 (9.5)	20 .032 (.81)
22	K	440LQ22	3.0 uA	P3K	.330 (8.4)	.190 (4.8)	.375 (9.5)	20 .032 (.81)
33	K	440LQ33	4.4 uA	R3L	.330 (8.4)	.200 (5.1)	.375 (9.5)	20 .032 (.81)
47	K	440LQ47	6.3 uA	R3L	.330 (8.4)	.180 (4.6)	.375 (9.5)	20 .032 (.81)
68	K	440LQ68	0.01	X7R	.330 (8.4)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
100	K	440LT10	0.02	X7R	.330 (8.4)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
150	K	440LT15	0.03	X7R	.330 (8.4)	.235 (6.0)	.375 (9.5)	20 .032 (.81)
220	K	440LT22	0.04	X7R	.330 (8.4)	.235 (6.0)	.375 (9.5)	20 .032 (.81)
330	K	440LT33	0.05	X7R	.330 (8.4)	.225 (5.7)	.375 (9.5)	20 .032 (.81)
470	M	440LT47	0.07	Y5U	.330 (8.4)	.230 (5.8)	.375 (9.5)	20 .032 (.81)
560	M	440LT56	0.08	Y5U	.330 (8.4)	.230 (5.8)	.375 (9.5)	20 .032 (.81)
680	M	440LT68	0.10	Y5U	.330 (8.4)	.235 (6.0)	.375 (9.5)	20 .032 (.81)
1000	M	440LD10	0.15	Y5U	.365 (9.3)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
1500	M	440LD15	0.23	Y5U	.365 (9.3)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
2000	M	440LD20	0.30	Y5U	.400 (10.2)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
2200	M	440LD22	0.34	Y5U	.430 (10.9)	.225 (5.7)	.375 (9.5)	20 .032 (.81)
2700	M	440LD27	0.41	Y5U	.460 (11.7)	.225 (5.7)	.375 (9.5)	20 .032 (.81)
2800	M	440LD28	0.43	Y5U	.460 (11.7)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
3000	M	440LD30	0.46	Y5U	.490 (12.4)	.225 (5.7)	.375 (9.5)	20 .032 (.81)
3200	M	440LD32	0.49	Y5U	.490 (12.4)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
3300	M	440LD33	0.50	Y5U	.490 (12.4)	.215 (5.5)	.375 (9.5)	20 .032 (.81)
3900	M	440LD39	0.59	Y5U	.530 (13.5)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
4000	M	440LD40	0.61	Y5U	.530 (13.5)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
4700	M	440LD47	0.71	Y5U	.620 (15.7)	.230 (5.8)	.375 (9.5)	20 .032 (.81)
5000	M	440LD50	0.76	Y5U	.620 (15.7)	.225 (5.7)	.375 (9.5)	20 .032 (.81)
5500	M	440LD55	0.84	Y5U	.680 (17.3)	.230 (5.8)	.375 (9.5)	20 .032 (.81)
5600	M	440LD56	0.85	Y5U	.680 (17.3)	.230 (5.8)	.375 (9.5)	20 .032 (.81)
6800	M	440LD68	1.04	Y5U	.720 (18.3)	.235 (6.0)	.375 (9.5)	20 .032 (.81)
8000	M	440LD80	1.22	Y5U	.720 (18.3)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
9000	M	440LD90	1.37	Y5U	.790 (20.1)	.225 (5.7)	.375 (9.5)	20 .032 (.81)
.01µF	M	440LS10	1.52	Y5U	.850 (21.6)	.230 (5.8)	.375 (9.5)	20 .032 (.81)
			Note 5				Note 6	

30LV SERIES
AC RATED CERAMIC DISC CAPACITORS

Full UL 1414 Recognition, X1 & Y2 Applications

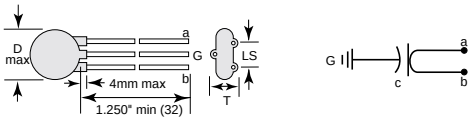
UL 1414	UL 1283	CSA 22.2	IEC 384-14
Across-The-Line	EMI Filters	No. 1 - Across-The-Line	2nd Edition
Antenna Coupling		No. 1 - Isolation	Y2 - 300 VAC
Line-By-Pass		No. 8 - EMI Filters	X1 - 400 VAC

VALUE pF	TOL.	VISHAY CERA-MITE NUMBER	AC LEAKAGE I_L mA	TEMP CHAR.	D DIAMETER (in/mm)	T THICKNESS (in/mm)	LS LEAD SPACE (in/mm)	F WIRE SIZE (AWG/in/mm)
10	K	30LVQ10	1.3 uA	COG	.330 (8.4)	.185 (4.7)	.250 (6.4)	22 .025 (.64)
15	K	30LVQ15	2.0 uA	U2J	.330 (8.4)	.200 (5.1)	.250 (6.4)	22 .025 (.64)
22	K	30LVQ22	3.0 uA	P3K	.330 (8.4)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
33	K	30LVQ33	4.4 uA	R3L	.330 (8.4)	.190 (4.8)	.250 (6.4)	22 .025 (.64)
47	K	30LVQ47	6.3 uA	R3L	.330 (8.4)	.170 (4.3)	.250 (6.4)	22 .025 (.64)
68	K	30LVQ68	0.01	S3L	.330 (8.4)	.175 (4.4)	.250 (6.4)	22 .025 (.64)
100	K	30LVT10	0.02	X7R	.330 (8.4)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
150	K	30LVT15	0.03	X7R	.330 (8.4)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
220	K	30LVT22	0.04	X7R	.330 (8.4)	.195 (5.0)	.250 (6.4)	22 .025 (.64)
330	K	30LVT33	0.05	X7R	.330 (8.4)	.195 (5.0)	.250 (6.4)	22 .025 (.64)
470	K	30LVT47	0.08	X7R	.330 (8.4)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
560	K	30LVT56	0.09	X7R	.330 (8.4)	.200 (5.1)	.250 (6.4)	22 .025 (.64)
680	K	30LVTT68	0.11	X7R	.330 (8.4)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
680	M	30LVT68	0.10	Y5U	.330 (8.4)	.220 (5.6)	.250 (6.4)	22 .025 (.64)
1000	K	30LVTD10	0.16	X7R	.365 (9.3)	.185 (4.7)	.250 (6.4)	22 .025 (.64)
1000	M	30LVD10	0.15	Y5U	.330 (8.4)	.215 (5.5)	.250 (6.4)	22 .025 (.64)
1500	K	30LVTD15	0.24	X7R	.460 (11.7)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
1500	M	30LVD15	0.23	Y5U	.330 (8.4)	.195 (5.0)	.250 (6.4)	22 .025 (.64)
2000	M	30LVD20	0.31	Y5U	.400 (10.2)	.210 (5.3)	.250 (6.4)	22 .025 (.64)
2200	M	30LVD22	0.34	Y5U	.400 (10.2)	.200 (5.1)	.250 (6.4)	22 .025 (.64)
2700	M	30LVD27	0.41	Y5U	.430 (10.9)	.200 (5.1)	.250 (6.4)	22 .025 (.64)
2800	M	30LVD28	0.43	Y5U	.430 (10.9)	.200 (5.1)	.250 (6.4)	22 .025 (.64)
3000	M	30LVD30	0.46	Y5U	.460 (11.7)	.205 (5.2)	.250 (6.4)	22 .025 (.64)
3200	M	30LVD32	0.49	Y5U	.460 (11.7)	.200 (5.1)	.250 (6.4)	22 .025 (.64)
3300	M	30LVD33	0.50	Y5U	.460 (11.7)	.195 (5.0)	.250 (6.4)	22 .025 (.64)
3900	M	30LVD39	0.59	Y5U	.490 (12.4)	.200 (5.1)	.250 (6.4)	22 .025 (.64)
4000	M	30LVD40	0.61	Y5U	.530 (13.5)	.210 (5.3)	.250 (6.4)	22 .025 (.64)
4700	M	30LVD47	0.72	Y5U	.620 (15.7)	.220 (5.6)	.375 (9.5)	20 .032 (.81)
5000	M	30LVD50	0.76	Y5U	.620 (15.7)	.215 (5.5)	.375 (9.5)	20 .032 (.81)
5500	M	30LVD55	0.84	Y5U	.560 (14.2)	.195 (5.0)	.375 (9.5)	20 .032 (.81)
5600	M	30LVD56	0.85	Y5U	.560 (14.2)	.195 (5.0)	.375 (9.5)	20 .032 (.81)
6800	M	30LVD68	1.04	Y5U	.680 (17.3)	.205 (5.2)	.375 (9.5)	20 .032 (.81)
8000	M	30LVD80	1.22	Y5U	.680 (17.3)	.195 (5.0)	.375 (9.5)	20 .032 (.81)
9000	M	30LVD90	1.37	Y5U	.720 (18.3)	.200 (5.1)	.375 (9.5)	20 .032 (.81)
.01µF	M	30LVS10	1.52	Y5U	.790 (20.1)	.190 (4.8)	.375 (9.5)	20 .032 (.81)
.015µF	M	30LVS15*	2.28	Y5U	.900 (22.9)	.200 (5.1)	.375 (9.5)	20 .032 (.81)
			Note 5				Note 6	

* 30LVS15 not available with UL 1414 recognition.

Fig 7 Optional 3-Leaded Style

An optional 3-leaded construction is available. It consists of a single capacitor with the two outside leads attached to one electrode, and the center lead attached to the other electrode. Used in feed-thru or line-to-ground applications, it allows a short ground lead for enhanced high frequency performance.



INTERNATIONAL SAFETY AGENCY APPROVALS

Agency Files/ Licenses	440L	30LV	30LVS	25Y	125L	20VL
Underwriters Laboratories Inc.						
UL 1414 Antenna-Coupling Components	E99264	E99264	—	—	—	—
UL 1414 Line-By-Pass Components	—	—	E99264	E99264	E99264	—
UL 1283 Electromagnetic Interference Filters	E128046	E99264	E128046	E99264	—	E128046
Canadian Standards Association:						
CSA 22.2 No.1 Across-The-Line, Isolation	LR62016	LR62016	—	—	—	—
CSA 22.2 No.1 Isolation	—	—	LR62016	LR62016	LR62016	—
CSA 22.2 No. 8 EMI Filters	—	LR62016	LR62016	LR62016	—	LR62016
European CENELEC Electronic Components Committee (CECC)						
Country Certifications:	**Specification EN 132 400 to Publication IEC 384-14 Table 11, Edition 2 (1993)**					
VDE	14239 - 4670	14239 - 4670	14239 - 4670	14239 - 4670	14239 - 4670	14239 - 4670
SEV	95,771173	95,771173	95,771173	95,771173	95,771173	95,771173
SEMKO	954311001	961416201	961416301	954311601	954310601	9543108801
NEMKO	P95104257	P96101228	P96101227	P95104253	P95104252	P95104254
DEMKO	304885	304886	304887	304883	304882	304884
FIMKO	187550 - 01	190061 - 01	190059 - 01	187547 - 01	187548 - 01	187549 - 01

30LVS SERIES
AC RATED CERAMIC DISC CAPACITORS

Compact Size for EMI Filtering, X1 & Y2 Applications

UL 1414	UL 1283	CSA 22.2	IEC 384-1
Line-By-Pass	EMI Filters	No. 1 - Isolation	2nd Edition
		No. 8 - EMI Filters	Y2 - 250 VAC
			X1 - 400 VAC

VALUE pF	TOL.	VISHAY CERA-MITE NUMBER	AC LEAK. I_L mA	TEMP CHAR.	D DIAMETER (in/mm)	T THICK. (in/mm)	LS LEAD SPACE (in/mm)	F WIRE SIZE (AWG/in/mm)
1000	M	30LVSD10	0.15	Y5U	.330 (8.4)	.195 (5.0)	.250 (6.4)	22 .025 (.64)
1500	M	30LVSD15	0.23	Y5U	.330 (8.4)	.185 (4.7)	.250 (6.4)	22 .025 (.64)
2000	M	30LVSD20	0.31	Y5U	.330 (8.4)	.175 (4.4)	.250 (6.4)	22 .025 (.64)
2200	M	30LVSD22	0.34	Y5U	.330 (8.4)	.170 (4.3)	.250 (6.4)	22 .025 (.64)
2700	M	30LVSD27	0.41	Y5U	.365 (9.3)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
2800	M	30LVSD28	0.43	Y5U	.365 (9.3)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
3000	M	30LVSD30	0.46	Y5U	.400 (10.2)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
3200	M	30LVSD32	0.49	Y5U	.400 (10.2)	.175 (4.4)	.250 (6.4)	22 .025 (.64)
3300	M	30LVSD33	0.50	Y5U	.400 (10.2)	.175 (4.4)	.250 (6.4)	22 .025 (.64)
3900	M	30LVSD39	0.59	Y5U	.460 (11.7)	.185 (4.7)	.250 (6.4)	22 .025 (.64)
4000	M	30LVSD40	0.61	Y5U	.490 (12.4)	.185 (4.7)	.250 (6.4)	22 .025 (.64)
4700	M	30LVSD47	0.72	Y5U	.490 (12.4)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
4700	M	30LVSVD47	0.72	Y5V	.430 (10.9)	.185 (4.7)	.250 (6.4)	22 .025 (.64)
5000	M	30LVSD50	0.76	Y5U	.530 (13.5)	.180 (4.6)	.250 (6.4)	22 .025 (.64)
5500	M	30LVSD55	0.84	Y5U	.530 (13.5)	.185 (4.7)	.250 (6.4)	22 .025 (.64)
6800	M	30LVSD68	1.04	Y5U	.620 (15.7)	.200 (5.1)	.375 (9.5)	20 .032 (.81)
.010µF	M	30LVSS10	1.52	Y5U	.720 (18.3)	.200 (5.1)	.375 (9.5)	20 .032 (.81)
.010µF	M	30LVSVS10	1.52	Y5V	.620 (15.7)	.200 (5.1)	.375 (9.5)	20 .032 (.81)
			Note 5				Note 6	

125L SERIES
AC RATED CERAMIC DISC CAPACITORS

Economical, Line-by-Pass, X1 & Y4 Applications

UL 1414	CSA 22.2	IEC 384-14 2nd Edition
Line-By-Pass	No. 1 - Isolation	Y4 - 125 VAC
		X1 - 400 VAC

VALUE pF	TOL.	VISHAY CERA-MITE NUMBER	AC LEAK. I_L mA	TEMP CHAR.	D DIAMETER (in/mm)	T THICKNESS (in/mm)	LS LEAD SPACE (in/mm)	Φ WIRE SIZE (AWG/in/mm)
1000	M	125LD10	0.07	Y5V	.330 (8.4)	.195 (5.0)	.250 (6.4)	20 .032 (.81)
1500	M	125LD15	0.11	Y5V	.330 (8.4)	.195 (5.0)	.250 (6.4)	20 .032 (.81)
2000	M	125LD20	0.15	Y5V	.330 (8.4)	.185 (4.7)	.250 (6.4)	20 .032 (.81)
2200	M	125LD22	0.17	Y5V	.330 (8.4)	.180 (4.6)	.250 (6.4)	20 .032 (.81)
3300	M	125LD33	0.25	Y5V	.365 (9.3)	.195 (5.0)	.250 (6.4)	20 .032 (.81)
4700	M	125LD47	0.36	Y5V	400 (10.2)	.185 (4.7)	.250 (6.4)	20 .032 (.81)
5000	M	125LD50	0.38	Y5V	430 (10.9)	.195 (5.0)	.375 (9.5)	20 .032 (.81)
6800	M	125LD68	0.52	Y5V	490 (12.4)	.190 (4.8)	.375 (9.5)	20 .032 (.81)
8200	M	125LD82	0.63	Y5V	530 (13.5)	.190 (4.8)	.375 (9.5)	20 .032 (.81)
.010µF	M	125LS10	0.76	Y5V	560 (14.2)	.190 (4.8)	.375 (9.5)	20 .032 (.81)
.015µF	M	125LS15	1.14	Y5V	720 (18.3)	.205 (5.2)	.375 (9.5)	20 .032 (.81)
.018µF	M	125LS18	1.37	Y5V	790 (20.1)	.205 (5.2)	.375 (9.5)	20 .032 (.81)
.020µF	M	125LS20	1.52	Y5V	620 (15.7)	.240 (6.1)	.375 (9.5)	22 .025 (.64)
.022µF	M	125LS22	1.67	Y5V	900 (22.9)	.185 (4.7)	.375 (9.5)	20 .032 (.81)
.030µF	M	125LS30	2.28	Y5V	720 (17.3)	.240 (6.1)	.375 (9.5)	22 .025 (.64)
.050µF	M	125LS50	3.80	Y5V	900 (22.9)	.240 (6.1)	.375 (9.5)	22 .025 (.64)
			Note 5				Note 6	

25Y SERIES
AC RATED CERAMIC DISC CAPACITORS

Temperature Stable Y5S (-30°C to +85°C ±22%), X1 & Y2 Applications

UL 1414	UL 1283	CSA 22.2	IEC 384-14
Line-By-Pass	EMI Filters	No. 1 - Isolation	2nd Edition
		No. 8 - EMI Filters	Y2 - 250 VAC
			X1 - 400 VAC

VALUE pF	TOL.	VISHAY CERA-MITE NUMBER	AC LEAK. I_L mA	TEMP CHAR.	D DIAMETER (in/mm)	T THICKNESS (in/mm)	LS LEAD SPACE (in/mm)	Φ WIRE SIZE (AWG/in/mm)
1000	M	25YD10	0.17	Y5S	.330 (8.4)	.170 (4.3)	.250 (6.4)	22 .025 (.64)
1500	M	25YD15	0.25	Y5S	.400 (10.2)	.175 (4.4)	.250 (6.4)	22 .025 (.64)
2000	M	25YD20	0.33	Y5S	.430 (10.9)	.170 (4.3)	.250 (6.4)	22 .025 (.64)
2200	M	25YD22	0.36	Y5S	.460 (11.7)	.170 (4.3)	.250 (6.4)	22 .025 (.64)
2700	M	25YD27	0.45	Y5S	.490 (12.4)	.170 (4.3)	.250 (6.4)	22 .025 (.64)
2800	M	25YD28	0.46	Y5S	.530 (13.5)	.175 (4.4)	.250 (6.4)	22 .025 (.64)
3000	M	25YD30	0.50	Y5S	.530 (13.5)	.175 (4.4)	.250 (6.4)	22 .025 (.64)
3200	M	25YD32	0.53	Y5S	.560 (14.2)	.185 (4.7)	.375 (9.5)	20 .032 (.81)
3300	M	25YD33	0.55	Y5S	.560 (14.2)	.185 (4.7)	.375 (9.5)	20 .032 (.81)
3900	M	25YD39	0.64	Y5S	.620 (15.7)	.185 (4.7)	.375 (9.5)	20 .032 (.81)
4000	M	25YD40	0.66	Y5S	.620 (15.7)	.185 (4.7)	.375 (9.5)	20 .032 (.81)
4700	M	25YD47	0.78	Y5S	.680 (17.3)	.185 (4.7)	.375 (9.5)	20 .032 (.81)
5000	M	25YD50	0.83	Y5S	.680 (17.3)	.185 (4.7)	.375 (9.5)	20 .032 (.81)
5500	M	25YD55	0.91	Y5S	.720 (18.3)	.190 (4.8)	.375 (9.5)	20 .032 (.81)
5600	M	25YD56	0.92	Y5S	.720 (18.3)	.190 (4.8)	.375 (9.5)	20 .032 (.81)
6800	M	25YD68	1.12	Y5S	.790 (20.1)	.185 (4.7)	.375 (9.5)	20 .032 (.81)
8000	M	25YD80	1.32	Y5S	.900 (22.9)	.200 (5.1)	.375 (9.5)	20 .032 (.81)
			Note 5				Note 6	

20VL SERIES
AC RATED CERAMIC DISC CAPACITORS

High Cap Valve, Compact Size, X2 Applications

UL 1283	CSA 22.2	IEC 384-14 2nd Edition
EMI Filters	No. 8 - EMI Filters	X2 - 400 VAC

VALUE µF	TOL.	VISHAY CERA-MITE NUMBER	TEMP CHAR.	D DIAMETER (in/mm)	T THICKNESS (in/mm)	LS LEAD SPACE (in/mm)	Φ WIRE SIZE (AWG/in/mm)
.009	M	20VLD90	Y5V	.530 (13.5)	.150 (3.8)	.375 (9.5)	22 .025 (.64)
.010	M	20VLS10	Y5V	.620 (15.7)	.150 (3.8)	.375 (9.5)	22 .025 (.64)
.010	Z	20VLSS10	Z5U	.530 (13.5)	.160 (4.1)	.250 (6.4)	22 .025 (.64)
.020	Z	20VLS20	Y5V	.720 (18.3)	.150 (3.8)	.375 (9.5)	22 .025 (.64)
.100	M	20VLP10 *	Y5V	.940 (23.9)	.240 (6.1)	.375 (9.5)	22 .025 (.64)
						Note 6	

* 20VLP10 not available with CSA 22.2 No. 8 recognition.

Low Dissipation Factor Disc Capacitors

FEATURES

- Ideal for High Voltage Switching to 100 kHz
- Low DF Minimizes Self Heating at High Frequencies.
- Application Voltages: 500, 1000 and 1500 Vac.
- Economical Alternative to Film Capacitors.

The 1DFO, 2DFO, and 3DFO Series are designed to operate up to 500, 1000, and 1500 V_{RMS}, respectively. Their low dissipation factor (DF) and stable temperature characteristics are well suited for operation at elevated frequency. Operating limits are governed by a suggested 30°C maximum case temperature rise as controlled by applied voltage and frequency dependent current. Power-rating charts covering the entire series provide operating guidelines for higher frequency applications.

APPLICATIONS:

- Fluorescent Ballasts
- Industrial Electronic Systems
- Switching Power Supplies
- Snubber Networks

GENERAL SPECIFICATIONS

Series:	1DFO	2DFO	3DFO
Application Voltage:	500 Vrms 1000 Vdc	1000 Vrms 2000 Vdc	1500 Vrms 3000 Vdc
Dielectric Strength:	1200 Vrms 2500 Vdc	2000 Vrms 4000 Vdc	3000 Vrms 6000 Vdc
Dissipation Factor:	0.1% Maximum at 1 kHz and 25°C		
Maximum Service Temperature:	125°C		
Power Rating:	(Note 1) Limit to 30°C Case Temperature Rise		
Insulation Resistance:	50,000 MΩ Minimum		

1DFO SERIES - LOW DISSIPATION FACTOR

561C Series

Application Range: 500 Vrms; 1000 Vdc

Value pF	Tol.	Catalog Number	Temp Char.	D Diameter (in / mm)	T Thickness (in / mm)	LS Lead Space (in / mm)
10	J	1DF0Q10	NP0	.250 (6.4)	.156 (4.0)	.250 (6.4)
12	J	1DF0Q12	NP0	.250 (6.4)	.156 (4.0)	.250 (6.4)
15	J	1DF0Q15	N1500	.250 (6.4)	.156 (4.0)	.250 (6.4)
18	J	1DF0Q18	N1500	.250 (6.4)	.156 (4.0)	.250 (6.4)
22	J	1DF0Q22	N1500	.250 (6.4)	.156 (4.0)	.250 (6.4)
27	J	1DF0Q27	N2200	.250 (6.4)	.156 (4.0)	.250 (6.4)
33	J	1DF0Q33	N2200	.250 (6.4)	.156 (4.0)	.250 (6.4)
39	J	1DF0Q39	N2200	.250 (6.4)	.156 (4.0)	.250 (6.4)
47	J	1DF0Q47	N1500	.250 (6.4)	.156 (4.0)	.250 (6.4)
56	J	1DF0Q56	N1500	.250 (6.4)	.156 (4.0)	.250 (6.4)
68	J	1DF0Q68	N1500	.250 (6.4)	.156 (4.0)	.250 (6.4)
82	J	1DF0Q82	N1500	.250 (6.4)	.156 (4.0)	.250 (6.4)
100	K	1DF0T10	N2000	.250 (6.4)	.156 (4.0)	.250 (6.4)
120	K	1DF0T12	N2000	.250 (6.4)	.156 (4.0)	.250 (6.4)
150	K	1DF0T15	N2000	.250 (6.4)	.156 (4.0)	.250 (6.4)
180	K	1DF0T18	N2000	.250 (6.4)	.156 (4.0)	.250 (6.4)
220	K	1DF0T22	N2500	.250 (6.4)	.156 (4.0)	.250 (6.4)
270	K	1DF0T27	N2500	.250 (6.4)	.156 (4.0)	.250 (6.4)
330	K	1DF0T33	N2800	.250 (6.4)	.156 (4.0)	.250 (6.4)
390	K	1DF0T39	N2800	.250 (6.4)	.156 (4.0)	.250 (6.4)
470	K	1DF0T47	N2800	.290 (7.4)	.156 (4.0)	.250 (6.4)
560	K	1DF0T56	N2800	.290 (7.4)	.156 (4.0)	.250 (6.4)
680	K	1DF0T68	N2800	.290 (7.4)	.156 (4.0)	.250 (6.4)
820	K	1DF0T82	N2800	.290 (7.4)	.156 (4.0)	.250 (6.4)
1000	K	1DF0D10	N2800	.370 (9.4)	.156 (4.0)	.250 (6.4)
1200	K	1DF0D12	N2800	.370 (9.4)	.156 (4.0)	.250 (6.4)
1500	K	1DF0D15	N2800	.405 (10.3)	.156 (4.0)	.250 (6.4)
1800	K	1DF0D18	N2800	.440 (11.2)	.156 (4.0)	.250 (6.4)
2200	K	1DF0D22	N2800	.460 (11.7)	.156 (4.0)	.250 (6.4)
2300	K	1DF0D23	N2800	.460 (11.7)	.156 (4.0)	.250 (6.4)
2400	K	1DF0D24	N2800	.460 (11.7)	.156 (4.0)	.250 (6.4)
2500	K	1DF0D25	N2800	.460 (11.7)	.156 (4.0)	.250 (6.4)
2700	K	1DF0D27	N2800	.490 (12.5)	.156 (4.0)	.250 (6.4)
3300	K	1DF0D33	N2800	.530 (13.5)	.156 (4.0)	.250 (6.4)
3900	K	1DF0D39	N2800	.560 (14.2)	.156 (4.0)	.375 (9.5)
4700	K	1DF0D47	N2800	.630 (16.0)	.156 (4.0)	.375 (9.5)
5600	K	1DF0D56	N2800	.680 (17.3)	.156 (4.0)	.375 (9.5)
6800	K	1DF0D68	N2800	.760 (19.3)	.156 (4.0)	.375 (9.5)

Note 3

Note 1

Power ratings are based on still air 60°C ambient with additional 30°C rise due to self heating. Thermal effects such as forced air cooling, component encapsulation or other heat-sinking techniques will alter ratings. Actual circuit test is recommended.

2DFO SERIES - LOW DISSIPATION FACTOR

564C Series

Application Range: 1000 Vrms; 2000 Vdc

Value pF	Tol.	Catalog Number	Temp Char.	D Diameter (in / mm)	T Thickness (in / mm)	LS Lead Space (in / mm)
10	J	2DF0Q10	NP0	.290 (7.4)	.160 (4.1)	.250 (6.4)
12	J	2DF0Q12	N1500	.290 (7.4)	.170 (4.3)	.250 (6.4)
15	J	2DF0Q15	N2200	.290 (7.4)	.185 (4.7)	.250 (6.4)
18	J	2DF0Q18	N2200	.290 (7.4)	.170 (4.3)	.250 (6.4)
22	J	2DF0Q22	N2200	.290 (7.4)	.170 (4.3)	.250 (6.4)
27	J	2DF0Q27	N1500	.290 (7.4)	.220 (5.6)	.250 (6.4)
33	J	2DF0Q33	N1500	.290 (7.4)	.195 (5.0)	.250 (6.4)
39	J	2DF0Q39	N1500	.290 (7.4)	.180 (4.6)	.250 (6.4)
47	J	2DF0Q47	N1500	.290 (7.4)	.170 (4.3)	.250 (6.4)
56	J	2DF0Q56	N2000	.290 (7.4)	.210 (5.3)	.250 (6.4)
68	J	2DF0Q68	N2000	.290 (7.4)	.190 (4.8)	.250 (6.4)
82	J	2DF0Q82	N2000	.290 (7.4)	.175 (4.5)	.250 (6.4)
100	K	2DF0T10	N2000	.290 (7.4)	.170 (4.3)	.250 (6.4)
120	K	2DF0T12	N2500	.290 (7.4)	.185 (4.7)	.250 (6.4)
150	K	2DF0T15	N2500	.290 (7.4)	.170 (4.3)	.250 (6.4)
180	K	2DF0T18	N2800	.290 (7.4)	.185 (4.7)	.250 (6.4)
220	K	2DF0T22	N2800	.290 (7.4)	.170 (4.3)	.250 (6.4)
270	K	2DF0T27	N2500	.330 (8.4)	.170 (4.3)	.250 (6.4)
330	K	2DF0T33	N2800	.330 (8.4)	.185 (4.7)	.250 (6.4)
390	K	2DF0T39	N2800	.330 (8.4)	.175 (4.5)	.250 (6.4)
470	K	2DF0T47	N2500	400 (10.2)	.170 (4.3)	.250 (6.4)
560	K	2DF0T56	N2800	400 (10.2)	.185 (4.7)	.250 (6.4)
680	K	2DF0T68	N2800	400 (10.2)	.170 (4.3)	.250 (6.4)
820	K	2DF0T82	N2800	430 (10.9)	.175 (4.5)	.250 (6.4)
1000	K	2DF0D10	N2800	460 (11.7)	.170 (4.3)	.250 (6.4)
1200	K	2DF0D12	N2800	490 (12.5)	.170 (4.3)	.250 (6.4)
1500	K	2DF0D15	N2800	530 (13.5)	.170 (4.3)	.250 (6.4)
1800	K	2DF0D18	N2800	560 (14.2)	.170 (4.3)	.375 (9.5)
2200	K	2DF0D22	N2800	680 (17.3)	.180 (4.6)	.375 (9.5)
2300	K	2DF0D23	N2800	680 (17.3)	.175 (4.5)	.375 (9.5)
2400	K	2DF0D24	N2800	680 (17.3)	.175 (4.5)	.375 (9.5)
2500	K	2DF0D25	N2800	680 (17.3)	.170 (4.3)	.375 (9.5)
2700	K	2DF0D27	N2800	680 (17.3)	.170 (4.3)	.375 (9.5)
3300	K	2DF0D33	N2800	720 (18.3)	.170 (4.3)	.375 (9.5)
3900	K	2DF0D39	N2800	790 (20.1)	.170 (4.3)	.375 (9.5)
4700	K	2DF0D47	N2800	900 (22.9)	.180 (4.6)	.375 (9.5)
5600	K	2DF0D56	N2800	900 (22.9)	.170 (4.3)	.375 (9.5)
6800	K	2DF0D68	N2800	950 (24.1)	.170 (4.3)	.375 (9.5)

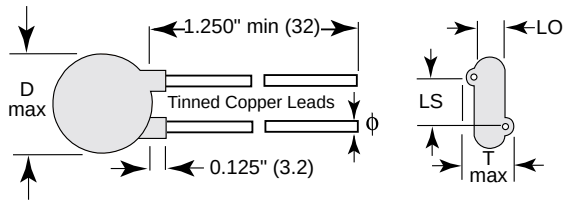
Note 3

Note 2

For convenience, power rating charts are shown to 100 kHz. Higher frequency operation is permissible with appropriate derating.

Consult factory for application suggestions.

Fig 8



WIRE LEAD INFORMATION

SERIES	Φ WIRE SIZE AWG / in / mm	"LO" TYP LEAD OFFSET in / mm
1DFO	22 .025 (.64)	.045 (1.2)
2DFO	20 .032 (.81)	.075 (1.8)
3DFO	20 .032 (.81)	.095 (2.4)

3DFO SERIES - LOW DISSIPATION FACTOR

564C Series

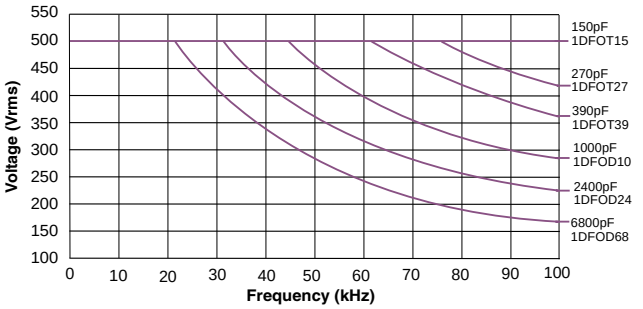
Application Range: 1500 Vrms, 3000 VDC

VALUE pF	TOL.	CATALOG NUMBER	TEMP CHAR.	D DIAMETER (in / mm)	T THICKNESS (in / mm)	LS LEAD SPACE (in / mm)
10	5%	3DF0Q10	N1500	.290 (7.4)	.185 (4.7)	.250 (6.4)
12	5%	3DF0Q12	N2200	.290 (7.4)	.210 (5.3)	.250 (6.4)
15	5%	3DF0Q15	N2200	.290 (7.4)	.185 (4.7)	.250 (6.4)
18	5%	3DF0Q18	N2200	.290 (7.4)	.185 (4.7)	.250 (6.4)
22	5%	3DF0Q22	N2200	.330 (8.4)	.210 (5.3)	.250 (6.4)
27	5%	3DF0Q27	N1500	.290 (7.4)	.220 (5.6)	.250 (6.4)
33	5%	3DF0Q33	N1500	.290 (7.4)	.195 (5.0)	.250 (6.4)
39	5%	3DF0Q39	N1500	.290 (7.4)	.190 (4.8)	.250 (6.4)
47	5%	3DF0Q47	N1500	.330 (8.4)	.225 (5.7)	.250 (6.4)
56	5%	3DF0Q56	N2000	.290 (7.4)	.210 (5.3)	.250 (6.4)
68	5%	3DF0Q68	N2000	.290 (7.4)	.190 (4.8)	.250 (6.4)
82	5%	3DF0Q82	N2000	.290 (7.4)	.185 (4.7)	.250 (6.4)
100	10%	3DF0T10	N2500	.290 (7.4)	.205 (5.2)	.250 (6.4)
120	10%	3DF0T12	N2500	.290 (7.4)	.190 (4.8)	.250 (6.4)
150	10%	3DF0T15	N2800	.290 (7.4)	.200 (5.1)	.250 (6.4)
180	10%	3DF0T18	N2800	.290 (7.4)	.190 (4.8)	.250 (6.4)
220	10%	3DF0T22	N2500	.330 (8.4)	.190 (4.8)	.250 (6.4)
270	10%	3DF0T27	N2800	.330 (8.4)	.205 (5.2)	.250 (6.4)
330	10%	3DF0T33	N2800	.330 (8.4)	.190 (4.8)	.250 (6.4)
390	10%	3DF0T39	N2800	.400 (10.2)	.215 (5.5)	.250 (6.4)
470	10%	3DF0T47	N2800	.400 (10.2)	.195 (5.0)	.250 (6.4)
560	10%	3DF0T56	N2800	.430 (10.9)	.200 (5.1)	.250 (6.4)
680	10%	3DF0T68	N2800	.460 (11.7)	.195 (5.0)	.250 (6.4)
820	10%	3DF0T82	N2800	.490 (12.5)	.195 (5.0)	.250 (6.4)
1000	10%	3DF0D10	N2800	.530 (13.5)	.190 (4.8)	.250 (6.4)
1200	10%	3DF0D12	N2800	.560 (14.2)	.190 (4.8)	.375 (9.5)
1500	10%	3DF0D15	N2800	.620 (15.8)	.190 (4.8)	.375 (9.5)
1800	10%	3DF0D18	N2800	.680 (17.3)	.190 (4.8)	.375 (9.5)
2200	10%	3DF0D22	N2800	.720 (18.3)	.190 (4.8)	.375 (9.5)
2300	10%	3DF0D23	N2800	.720 (18.3)	.190 (4.8)	.375 (9.5)
2400	10%	3DF0D24	N2800	.790 (20.1)	.195 (5.0)	.375 (9.5)
2500	10%	3DF0D25	N2800	.790 (20.1)	.195 (5.0)	.375 (9.5)
2700	10%	3DF0D27	N2800	.790 (20.1)	.190 (4.8)	.375 (9.5)
3300	10%	3DF0D33	N2800	.900 (22.9)	.200 (5.1)	.375 (9.5)
3900	10%	3DF0D39	N2800	.900 (22.9)	.190 (4.8)	.375 (9.5)
4700	10%	3DF0D47	N2800	.950 (24.1)	.185 (4.7)	.375 (9.5)
						Note 3

Note 3

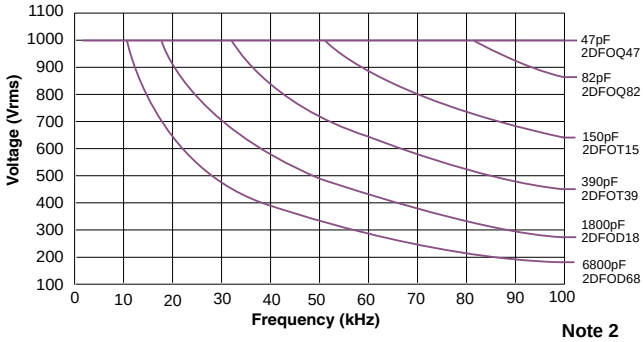
Alternate lead spacing of 5mm, 7.5mm, and 10mm are available bulk or tape & reel.

Power Rating - 1DFO Series 500 Vrms Low DF - Note 1



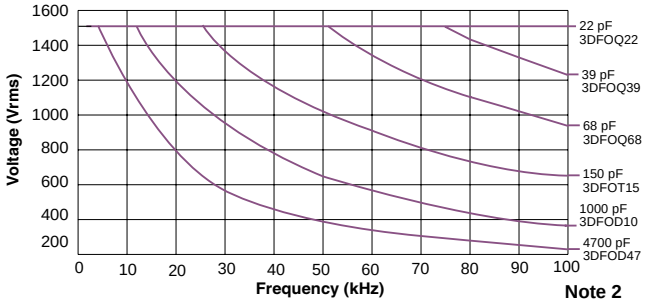
Note 2

Power Rating - 2DFO Series 1000 Vrms Low DF - Note 1



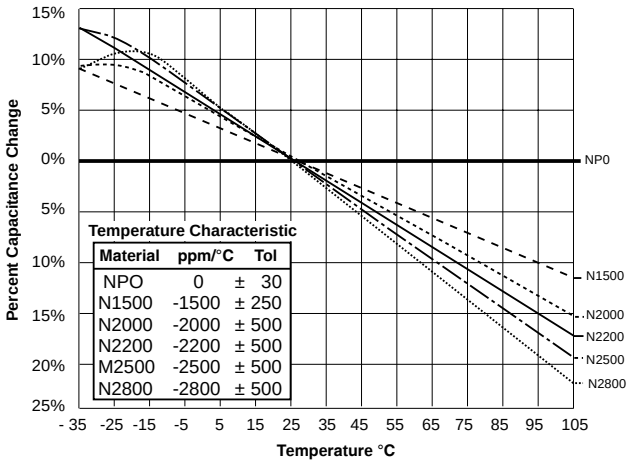
Note 2

Power Rating - 3DFO Series 1500 Vrms Low DF - Note 1



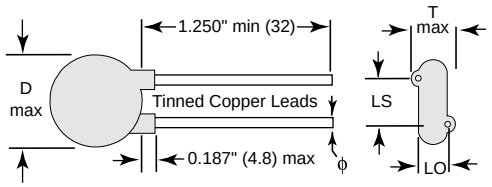
Note 2

Temperature Characteristics for 1DFO, 2DFO & 3DFO Series



High Voltage Disc Capacitors

Radial Lead Style - 2000 to 15,000 VDC
Axial Lead Style - 10,000 to 30,000 VDC



ϕ - 20 AWG .032" (.81) except per Note 1.
LO ~ (Thk - .100") except per Note 1.

Note 1
#22 AWG .025" (.64) wire leads used on:
20GAP10 (LO = .07")
30GASS20 (LO = .08")
30GASS33 (LO = .10")

Vishay Cera-Mite High Voltage Capacitors are the choice of discriminating designers throughout the world. Our reputation for product quality and reliability is a result of continuous research in fine electrical ceramics, high temperature coatings, process controls and rigorous production testing.

The 2 and 3 kV parts are widely used in demanding applications such as snubbers, EMI/RFI filters, and switching power supplies. High voltage capacitors are also specified in lower voltage applications to withstand transient voltage and energy surges in accordance with FCC and IEEE standards.

APPLICATIONS:

- Lighting Ballasts
- Telecommunications
- Power Supplies

2000 VOLT, 10% AND 20% TOLERANCE

- Application Range: Up to 2500 VDC, 600 VRMS
- Insulation Resistance: 10,000 MΩ minimum
- Dissipation Factor: 2.0% maximum

564C Series
- Dielectric Strength: 3500 VDC, 1000 VRMS

VALUE pF	TOL.	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
100	K	20TST10	.330	.190	.250	X7R
220	K	20TST22	.330	.180	.250	X7R
330	K	20TST33	.330	.180	.250	X7R
470	K	20TST47	.330	.170	.250	X7R
560	K	20TST56	.330	.185	.250	X7R
680	K	20TST68	.330	.170	.250	X7R
1000	M	20GAD10	.330	.170	.250	Y5U
1000	M	20TSSD10	.330	.175	.250	Y5S
1000	K	20TSD10	.400	.175	.250	X7R
1500	M	20GAD15	.330	.170	.250	Y5U
1500	M	20TSSD15	.400	.170	.250	Y5S
1500	K	20TSD15	.430	.160	.250	X7R
1800	M	20GAD18	.360	.170	.250	Z5U
1800	M	20TSSD18	.430	.170	.250	Y5S
1800	K	20TSD18	.460	.170	.250	X7R
2200	M	20GAD22	.400	.175	.250	Z5U
2200	M	20TSSD22	.460	.170	.250	Y5S
2200	K	20TSD22	.460	.170	.250	X7R
2700	M	20GAD27	.430	.175	.250	Z5U
2700	M	20TSSD27	.530	.175	.250	Y5S
2700	K	20TSD27	.530	.170	.250	X7R
3300	M	20GAD33	.430	.175	.250	Z5U
3300	M	20TSSD33	.530	.175	.250	Y5S
3300	K	20TSD33	.530	.160	.250	X7R
3900	M	20GAD39	.490	.175	.250	Z5U
3900	M	20TSSD39	.620	.175	.250	Y5S
3900	K	20TSD39	.680	.170	.250	X7R
4700	M	20GAD47	.490	.170	.250	Z5U
4700	M	20TSSD47	.680	.175	.375	Y5S
4700	K	20TSD47	.680	.170	.375	X7R
5600	M	20TSSD56	.680	.170	.375	Y5S
6800	M	20GAD68	.560	.170	.375	Z5U
6800	M	20TSSD68	.720	.170	.375	Y5S
.01uF	M	20GAS10	.680	.170	.375	Z5U
.01uF	M	20GASS10	.620	.170	.375	Y5V
.10uF	M	20GAP10	.950	.240	.375	Y5V

3000 VOLT, 10% AND 20% TOLERANCE

- Application Range: Up to 4000 VDC, 1000 VRMS
- Insulation Resistance: 50,000 MΩ minimum
- Dissipation Factor: 2.0% maximum

564C Series
- Dielectric Strength: 5250 VDC, 1500 VRMS

VALUE pF	TOL.	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
10	M	30GAQ10	.330	.210	.250	U2J
12	M	30GAQ12	.330	.205	.250	U2J
15	M	30GAQ15	.330	.180	.250	U2J
22	M	30GAQ22	.330	.200	.250	R3L
27	M	30GAQ27	.330	.190	.250	R3L
33	M	30GAQ33	.330	.170	.250	R3L
47	M	30GAQ47	.330	.230	.250	X7R
56	M	30GAQ56	.330	.190	.250	X7R
68	M	30GAQ68	.330	.200	.250	X7R
100	M	30GAT10	.330	.180	.250	X7R
150	M	30GAT15	.330	.190	.250	X7R
220	M	30GAT22	.330	.175	.250	X7R
270	M	30GAT27	.330	.180	.250	X7R
330	M	30GAT33	.330	.175	.250	X7R
390	M	30GAT39	.330	.175	.250	X7R
470	M	30GAT47	.330	.175	.250	X7R
680	M	30GAT68	.330	.175	.250	Y5U
680	K	30TST68	.330	.180	.250	X7R
1000	M	30GAD10	.330	.195	.250	Z5U
1000	M	30TSSD10	.400	.190	.250	Y5S
1000	K	30TSD10	.400	.175	.250	X7R
1500	M	30GAD15	.360	.190	.250	Z5U
1500	M	30TSSD15	.460	.190	.250	Y5S
1500	K	30TSD15	.490	.185	.250	X7R
1800	M	30GAD18	.400	.190	.250	Z5U
1800	M	30TSSD18	.490	.190	.250	Y5S
1800	K	30TSD18	.530	.185	.250	X7R
2200	M	30GAD22	.430	.190	.250	Z5U
2200	M	30TSSD22	.530	.190	.250	Y5S
2200	K	30TSD22	.530	.180	.250	X7R
2700	M	30GAD27	.460	.200	.250	Z5U
2700	M	30TSSD27	.560	.185	.250	Y5S
2700	K	30TSD27	.620	.185	.250	X7R
3300	M	30GAD33	.490	.185	.250	Z5U
3300	M	30TSSD33	.620	.185	.375	Y5S
3300	K	30TSD33	.620	.170	.375	X7R
3900	M	30GAD39	.530	.185	.375	Z5U
3900	M	30TSSD39	.680	.185	.375	Y5S
3900	K	30TSD39	.720	.185	.375	X7R
4700	M	30GAD47	.620	.195	.375	Z5U
4700	M	30TSSD47	.680	.185	.375	Y5S
4700	K	30TSD47	.720	.175	.375	X7R
5600	M	30TSSD56	.790	.190	.375	Y5S
6800	M	30GAD68	.680	.185	.375	Z5U
6800	M	30TSSD68	.900	.205	.375	Y5S
6800	K	30TSD68	.900	.185	.375	X7R
8200	M	30GAD82	.680	.185	.375	Z5U
.01uF	M	30GAS10	.790	.185	.375	Z5U
.01uF	M	30GASS10	.720	.185	.375	Y5V
.02uF	M	30GASS20	.720	.240	.375	Z5U
.033uF	M	30GASS33	.900	.240	.375	Z5U

6000 VOLT, 20% TOLERANCE

- Application Range: Up to 6000 VDC, 1500 VRMS
- Insulation Resistance: 75,000 MΩ minimum
- Dissipation Factor: 2.0% maximum

564C Series
- Dielectric Strength: 10,500 VDC, 3000 VRMS

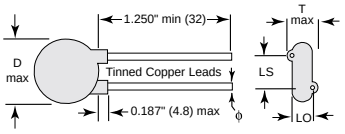
VALUE pF	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
10	60GAQ10	.400	.220	.375	NP0
22	60GAQ22	.460	.240	.375	U2J
33	60GAQ33	.400	.230	.375	R3L
47	60GAQ47	.460	.205	.375	R3L
100	60GAT10	.400	.240	.375	X5F
220	60GAT22	.400	.265	.375	X5F
330	60GAT33	.400	.260	.375	X5S
470	60GAT47	.400	.265	.375	Y5U
560	60GAT56	.400	.240	.375	Y5U
1000	60GAD10	.400	.270	.375	Z5U
1500	60GAD15	.460	.280	.375	Z5U
2200	60GAD22	.530	.240	.375	Z5U
3300	60GAD33	.620	.260	.375	Z5U
4700	60GAD47	.790	.260	.375	Z5U
.01uF	60GAS10	.950	.250	.375	Z5U

High Voltage Disc Capacitors

Radial Lead Style - 2000 to 15,000 VDC
Axial Lead Style -10,000 to 30,000 VDC

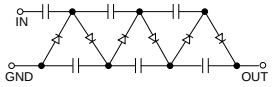
HIGH VOLTAGE APPLICATIONS:

- Televisions, Monitors and Oscilloscopes
- High Voltage Power Supplies and Lasers
- Electronic Air Cleaners
- X-Ray Equipment



LO ≃ (Thk - .100") ϕ - 20 AWG .032" (.81)

TRIPLER



564C Series

7500 VDC, 2000 VRMS, 60 HZ

VALUE pF	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
100	75GAT10	.530	.310	.500	X5F
470	75GAT47	.620	.270	.500	X5F
1000	75GAD10	.620	.320	.500	Y5U
2500	75GAD25	.620	.280	.500	Z5U

10,000 VDC, 3000 VRMS, 60 HZ

VALUE pF	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
100	100GAT10	.680	.370	.500	X5F
100	100GAST10	.490	.330	.375	Y5R
250	100GAT25	.680	.300	.500	X5F
250	100GATT25	.490	.290	.375	N4700
250	100GAST25	.490	.340	.375	Y5R
500	100GAT50	.680	.345	.500	X5F
500	100GATT50	.680	.320	.500	N4700
500	100GAST50	.490	.310	.375	Y5R

615C Series

VALUE pF	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
680	100GATT68	.750	.300	.500	N4700
820	100GATT82	.810	.300	.500	N4700
1000	100GAD10	.750	.320	.500	Y5R
1000	100GATD10	.980	.320	.500	N4700
1000	100GASD10	.680	.330	.500	Y5U
2500	100GAD25	.750	.350	.500	Z5U
2500	100GATD25	.980	.330	.500	Y5R
3000	100GAD33	.980	.390	.500	Z5U

15,000 VDC, 4500 VRMS, 60 HZ

VALUE pF	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
100	150GAST10	.490	.490	.500	Y5R
100	150GAT10	.670	.430	.750	X5F
100	150GATT10	.490	.470	.500	N4700
250	150GAST25	.490	.480	.500	Y5R
250	150GAT25	.670	.455	.750	X5F

VALUE PF	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
250	150GATT25	.670	.430	.750	N4700
390	150GATT39	.750	.425	.750	N4700
500	150GAST50	.490	.375	.500	Y5U
500	150GAT50	.670	.430	.750	Y5R
500	150GATT50	.810	.410	.750	N4700

615C Series

VALUE pF	CATALOG NUMBER	MECHANICAL (in) DIA.	THK.	L.S.	TEMP. CHAR.
750	150GATT75	.980	.350	.750	N4700
1000	150GAD10	.670	.420	.750	Y5U
1000	150GATD10	.980	.460	.750	Y5R
2200	150GAD22	.980	.510	.750	Z5U
2500	150GAD25	1.150	.450	.750	Z5U

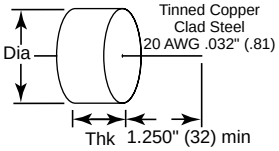
PERFORMANCE DATA - 7500 TO 15KV SERIES

- **Operating Temperature:** -25° to +105°C
- **Capacitance Tolerance:** ±20% (X5F, Y5R, N4700); + 80/- 20% (Y5U, Z5U).
- **Dissipation Factor:** 0.2%, (N4700); 1.5 & 2.0% (X5F, Y5U, Y5R, Z5U).
- **Dielectric Strength:** 150% of VDC (dielectric fluid), charging current limit to 50 mA max.
- **Insulation Resistance:** 200,000 MΩ minimum @ 180 VDC, 1000 ΩF.
- **Corona:** 100 picocoulombs at rated AC voltage.
- **Power Dissipation:** Limit to 25°C case rise above ambient, 105°C max.
- **Peak Current:** dv/dt limit approx. 2000 V/µs. Application to be tested and confirmed by user.

Axial Leaded High Voltage Capacitors, Molded Case, High Temperature, Epoxy Construction

FEATURES

- Greater lead-to-lead arcing distance, without costly encapsulation.
- Longer life at elevated temperatures (up to 125°C); extended thermal cycling.
- Low corona (10 picocoulombs) at rated AC voltage.



660C Series

SIZE CODES-AXIAL LEADED

DIA	in / mm	THK	in / mm
A	0.83 (21)	1	0.50 (13)
C	1.18 (30)	2	0.60 (15)
D	1.45 (37)	3	0.80 (20)
		4	0.95 (24)

10,000 VDC/3,000 V_{rms}

VALUE pF	TOL.	CATALOG NUMBER	SIZE CODE	TEMP. COEF.
470	M	10AZT47	A1	N4700
1000	M	10AZD10	C1	N4700
1500	Z	10AED15	A1	Z5U
2000	M	10AZD20	D1	N4700
2200	Z	10AED22	A1	Z5U
3300	Z	10AED33	C1	Z5U
3300	M	10ACD33	C2	X7R
4700	Z	10AED47	C1	Z5U
4700	M	10ACD47	D2	X7R
6800	Z	10AED68	C1	Z5U
10000	Z	10AES10	D1	Z5U

15,000 VDC/5,000 V_{rms}

VALUE pF	TOL.	CATALOG NUMBER	SIZE CODE	TEMP. COEF.
390	M	15AZT39	A1	N4700
820	M	15AZT82	C1	N4700
1000	Z	15AED10	A1	Z5U
1500	Z	15AED15	A1	Z5U
1500	M	15ACD15	C2	X7R
1500	M	15AZD15	D1	N4700
2200	Z	15AED22	C1	Z5U
2200	M	15ACD22	C1	X7R
3300	Z	15AED33	C1	Z5U
3300	M	15ACD33	D2	X7R
3900	M	15ACD39	D2	X7R
4700	Z	15AED47	C1	Z5U
6800	Z	15AED68	D1	Z5U

20,000 VDC/6,000 V_{rms}

VALUE pF	TOL.	CATALOG NUMBER	SIZE CODE	TEMP. COEF.
220	M	20AZT22	A2	N4700
680	Z	20AET68	A2	Z5U
680	M	20AZT68	C2	N4700
1000	Z	20AED10	A2	Z5U
1000	M	20ACD10	C3	X7R
1000	M	20AZD10	D2	N4700
1500	Z	20AED15	A2	Z5U
1500	M	20ACD15	C3	X7R
2200	Z	20AED22	C2	Z5U
2200	M	20ACD22	D3	X7R
2500	M	20ACD25	D3	X7R
2700	M	20ACD27	D3	X7R
3300	Z	20AED33	C2	Z5U
4700	Z	20AED47	D2	Z5U
5000	Z	20AED50	D2	Z5U

30,000 VDC/10,000 V_{RMS}

VALUE pF	TOL.	CATALOG NUMBER	SIZE CODE	TEMP. COEF.
180	M	30AZT18	A3	N4700
330	M	30ACT33	A4	X7R
470	M	30AZT47	C3	N4700
470	Z	30AET47	A3	Z5U
680	M	30AZT68	D3	N4700
680	Z	30AET68	A3	Z5U
820	Z	30AET82	A3	Z5U
1000	M	30ACD10	C4	X7R
1000	Z	30AED10	C3	Z5U
1200	Z	30AED12	C3	Z5U
1500	M	30ACD15	D4	X7R
1500	Z	30AED15	C3	Z5U
1800	Z	30AED18	D3	Z5U
2000	Z	30AED20	D3	Z5U
2200	Z	30AED22	D3	Z5U
2500	Z	30AED25	D3	Z5U
3000	Z	30AED30	D3	Z5U
3300	Z	30AED33	D3	Z5U

SPECIFICATIONS:

- **Application Range:** Up to 30,000 VDC,10,000Vrms
- **Dielectric Strength:** 150% of rated voltage (in dielectric fluid) charging current limited to 50mA.
- **Temperature Characteristcs:** N4700 (T3M), X7R, Z5U
- **Insulation Resistance:** 200,000 MΩ, minimum @ 180 VDC,1000 ΩF.
- **Dissipation Factor:** 0.2% (N4700); 2% max (X7R, Z5U).

561 AND 564 CLASS I SERIES ELECTRICAL OPTIONS (Precision and over 50 kHz)

CERAMIC TYPE	RANGE OF CAPACITANCE VALUES (PICOFARADS)				
	500 VOLT .250" TO .680" (6.4 TO 17mm)	1000 VOLT .250" TO .760" (6.4 TO 19mm)	2000 VOLT .330" TO .900" (8.4 TO 23mm)	3000 VOLT .330" TO .900" (8.4 TO 23mm)	TOLERANCE CODES
NP0	10 - 390	1 - 330	1 - 270	1 -180	C, D, J, K
N750	47 - 680	22 - 470	10 - 330	10 - 270	J, K
N1000	56 - 820	33 - 560	15 - 390	10 - 330	J, K
N2200	68 - 750	56 - 680	33 - 560	22 - 470	J, K
N3300	100 -1000	75 - 820	47 - 750	33 - 560	J, K
N4700	n/A	330-5600	220-4700	100-3300	K, M

Note: Vishay Cera-Mite also offers capacitors in N030, N080, N150, N220, N330, and N470 characteristics to serve special applications requiring TC matching. Values are available in the same range as NP0.

CUSTOM DISCS

Vishay Cera-Mite's most popular 12 Volt to 6,000 Volt values and constructions are shown as standard part numbers in this catalog. Many other values and lead styles are available. Complete capacitance ranges for various Class I, II and III ceramic materials are shown in the tables below. Various wire lead forms and packaging options are detailed on the next pages. Part numbers for custom capacitors consist of an 18-character designator assigned by our application engineering group. Vishay Cera-Mite will provide a certified outline drawing and complete part number covering custom options specified. Customer approval of the outline is usually requested to guarantee satisfaction.

All performance characteristics shown in this catalog apply to the options unless otherwise stated on the outline drawing.

562 AND 564 CLASS II & III SERIES ELECTRICAL OPTIONS

(General Purpose)

CERAMIC TYPE	RANGE OF CAPACITANCE VALUES (PICOFARADS)							
	500 Volt .250" to .950" (6.4 to 24mm)	1000 Volt .250" to .950" (6.4 to 24mm)	2000 Volt .330" to .950" (8.4 to 24mm)	3000 Volt .330" to .950" (8.4 to 24mm)	6000 Volt .400" to .900" (10.2 to 23mm)	TOLERANCE CODES 500 V	1000 V	2 to 6 KV
X5F	200 - 22,000	100 - 20,000	68 - 12,000	47 - 8,200	47 - 2200	K, M	K, M	K, M
X5S	400 - 22,000	300 - 25,000	470 - 22,000	390 -15,000	220 - 3900	M	K, M	K, M
X7R	500 - 22,000	390 - 28,000	390 - 22,000	290 - 15,000	560 - 3900	K, M	K, M	K, M
Y5U	1000 - 50,000	750 - 50,000	560 - 33,000	390 - 33,000	470 - 6800	M	M	M, Y
Z5U	1500 - 100,000	1000 -100,000	1000 - 47,000	680 - 33,000	820 - 8200	M, Z	M, Z	M, Z
Y5V	2000 - 200,000	1500 -150,000	1500 -100,000	1000 - 50,000	N/A	Y, Z	M, Z	M, Z

Note: 100 Volt ratings are available in same ranges as 500 Volt.

CUSTOM PART NUMBER DESIGNATOR

General Method Used To Describe Radial Leaded Custom Disc Capacitors

562C X5F BA 102 E C 151 K

- **CAPACITANCE TOLERANCE** - See Application Data (Marking Information) for code letters.
- **CAPACITANCE (pF)** - First two digits are significant numbers. Last digit specifies number of zeros (151 = 150 pF). Values below 10 pF, use letter R for decimal point (2R2 = 2.2 pF).
- **BODY SIZE** - Disc diameter code letter as specified by Cera-Mite Engineering.
- **COATING MATERIAL** - E = Epoxy, A = Phenolic.
- **WORKING VOLTAGE** - First two digits are significant numbers. Last digit specifies number of zeros (102 = 1000 Volts).
- **WIRE LEAD STYLE & PACKAGING** - See two-letter Option Code tables on following pages.
- **TEMPERATURE CHARACTERISTIC** - See Application Data (Temp Coefficient table) for code letters.
- **VISHAY CERA-MITE PRODUCT CODE** -
  - 561C: Precision Capacitors
  - 562C: General Application Discs - Diameter .250" thru .900"
  - 565C: 100 thru 1000 Volt Dual Parallel Discs - Diameter .510" thru .950"
  - 563C: Low Voltage (12 thru 100 Volt) Hypercon High Cap Density Discs
  - 564C: High Voltage Disc Capacitors (2000 thru 7500 Volt)
  - 615C: High Voltage Disc Capacitors (10,000 Volt and 15,000 Volt)

Packaging Options

BULK PACKAGING

Inner cardboard boxes will be either 6 x 6 x 2 inches (15 x 15 x 5cm); or 6 x 6 x 3.5 inches (15 x 15 x 9cm) and are labeled as shown. In certain circumstances, sealed plastic bags may be used as an alternate.

Outer corrugated cardboard shipping cartons range in size from 6.5 x 7 x 8 inches (17 x 18 x 20cm) to 12.5 x 15 x 7 inches (32 x 38 x 18cm) and are labeled as follows:

CUSTOMER	VISHAY CERA-MITE
• Name • Purchaser Order Number • Part Number & Rev. • Item Number	• Part No. & Descriptor Code • Order Number • Lot Number • Quantity & Date Code
Vishay Cera-Mite Corporation • Grafton, WI 53024 • USA	

Vishay Cera-Mite Corporation 1327 6th Avenue Grafton, WI 53024	OR	Vishay Cera-Mite Corporation 6150 Van Hecke Avenue Oconto, WI 54153	
Customer PO#	Customer Part #	Quantity	Box __ of __
Customer Name		Customer Address	

WIRE LEAD OPTIONS

- Radial leaded capacitors may be ordered with various wire lead options by adding appropriate suffix code to the catalog part number.

Example: 30GAD22 GJ (Suffix Code) specifies:

#20 AWG wire; LS = .375"; Inside Crimp; Short Cut Lead Length.

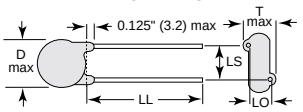
12 VOLT - 1000 VOLT CAPACITORS			SUFFIX CODES FOR VARIOUS LEAD SPACING (LS) AND WIRE SIZE (AWG)						
			.200" (5)		.250" (6.3)		.300" (7.5)	.375" (9.5)	.400" (10)
WIRE FORM DESCRIPTION	WIRE	LEAD LENGTH	#22 AWG	#24 AWG	#22 AWG	#24 AWG	#22 AWG	#22 AWG	#22 AWG
Straight Wire	Fig 11	Long "LL"	MA	PA	UB	UA	BK	BJ	BL
Steeple Wire	Fig 12	Long "LL" Cut "CL"	CL NB	PT PK	CJ NK	CH NG	CA NC	CK ND	CB NE
Step Wire	Fig 14	Long "LL" Cut "CL"	VD PG	VK PU	VB PR	PQ PL	VF PH	VG PS	VH PJ
Inside Crimp	Fig 15	Long "LL" Cut "CL"	JQ JA	JT JD	JC JK	JF JY	JL JR	JS JJ	JP JB

2000 AND 3000 VOLT CAPACITORS			SUFFIX CODES FOR VARIOUS LEAD SPACING (LS) AND WIRE SIZE (AWG)										
			.250" (6.3)		.300" (7.5)		.375" (9.5)		.400" (10)		.500" (12.7)		.750" (19)
WIRE FORM DESCRIPTION	WIRE	LEAD LENGTH	#20 AWG	#22 AWG	#20 AWG	#22 AWG	#20 AWG	#22 AWG	#20 AWG	#22 AWG	#20 AWG	#22 AWG	#20 AWG
Straight Wire	Fig 11	Long "LL"	AA	UB	AE	BK	AJ	BJ	AD	BL	AM	BM	AB
Inline Wire	Fig 13	Long "LL" Cut "CL"	XW XX	XY XZ	UC UD	UE UF	UG UH	UJ UK	UL UN	UM UP	UQ UR	US UT	— —
Inside Crimp	Fig 15	Long "LL" Cut "CL"	GB GE	JC JK	GC JH	JL JR	GN GJ	JS JJ	GD JG	JP JB	GF GM	JN JM	— —

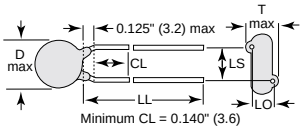
NOTE: Popular wire lead form options are described above; consult factory for other available forms.
NOTE: Practical consideration may limit wire options depending on capacitor size - verify special requirements with factory.

Wire Information : #20 AWG .032" (.81) Copper Wire
#22 AWG .025" (.64) Copper Wire
#24 AWG .020" (.51) Copper Clad Steel Wire

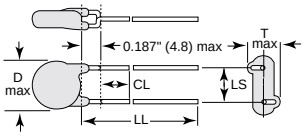
Straight Fig 11



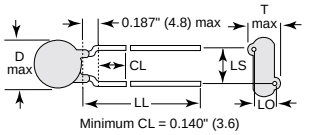
Steeple Fig 12



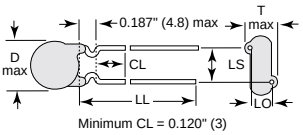
Inline High Voltage Fig 13



Step Low Voltage Fig 14



Inside Crimp Fig 15



PACKAGING OPTIONS:

- Parts will be BULK packaged in cartons or plastic bags unless optional packing is specified.
- Can be optionally TAPE & REELED per EIA-468B or Reverse Reeled. (Fig 16)
- Consult factory for other packaging options, such as Ammo Pack cartons.
- Bar coding is available.

LEAD LENGTH INFORMATION:

- Standard Long Lead "LL" Length = 1.250" (32mm) minimum.
- Cut Lead "CL" Length may be user specified; if unspecified Vishay Cera-Mite supplies 0.187" (4.8mm) EIA standard.
- Cut Lead Lengths are measured from bottom of wire seating plane (wire support point on circuit board).
- Minimum Cut Lead Lengths "CL min" are contained in wire figures 12 thru 15.
- Cut Lead Length Tolerance: +.031"/-.015" (0.8/-0.4mm).

TAPE & REEL OPTIONS

- Radial leaded parts may be ordered with Tape & Reel packaging by adding appropriate suffix code to part number.
  Example: TGS10 QR (Suffix Code) defines: #22 AWG wire; Straight Lead Form; LS = 5mm; Tape & Reel per EIA 468B.

TAPE & REEL PACKAGING- PART NUMBER SUFFIX CODES					TAPE & REEL SUFFIX CODES FOR VARIOUS WIRE FORMS & SIZES										
TAPE & REEL FIGURE	LEAD SPACING "LS"	MAX. CAP DIAMETER in.	mm	TAPE & REEL (NOTE 1)	FIG. 11 STRAIGHT WIRE #20 AWG	#22 AWG	#24 AWG	FIG. 12 STEEPLE WIRE #22 AWG	#24 AWG	FIG. 13 INLINE WIRE #20 AWG	#22 AWG	FIG. 14 STEP WIRE #22 AWG	#24 AWG	FIG. 15 INSIDE CRIMP WIRE #20 AWG	#22 AWG	#24 AWG
A	5mm	.490	12.4	C-M EIA	QG QH	QA QR	QB QD	TK TR	WK TX	XA XB	ZA XN	VC VZ	VQ VE	RA RC	RE RR	RB LA
B	7.5mm	.530	13.5	C-M EIA	QP QS	QK QF	— —	— —	— —	XG XH	ZC XR	— —	— —	RP RX	RK RL	— —
C	10mm	.708	18.0	C-M EIA	QQ AP	QM QX	— —	— —	— —	XJ XK	XS XT	— —	— —	RQ RJ	RM RU	— —
D	7.5mm	.708	18.0	C-M EIA	QW AQ	QN QE	— —	— —	— —	XL XM	XU XV	— —	— —	RW RV	RN RD	— —

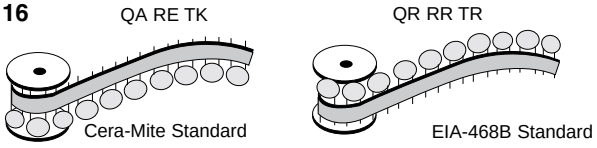
Wire Information : #20 AWG .032" (.81) Tinned Copper Wire
#22 AWG .025" (.64) Tinned Copper Wire
#24 AWG .020" (.51) Tinned Copper Clad Steel Wire

TAPE & REEL (EIA - 468-B)

ITEM (DIMENSIONS IN MM)	CODE	Tape & Reel Packaging FIG A LS=5mm P=12.7mm	FIG B LS=7.5mm P=15mm	FIG C LS=10mm P=25.4mm	FIG D LS=7.5mm P=30mm
Pitch of component	P	12.7	15.0	25.4	30.0
Pitch of sprocket hole	P_0	12.7 ± 0.3	15.0 ± 0.3	12.7 ± 0.3	15.0 ± 0.3
Lead spacing	F	5.0 + 0.8 - 0.2	7.5 ±1.0	10.0 ± 1.0	7.5 ± 1.0
Length from hole center to component center	P_2	6.35 ± 1.3	7.5 ± 1.5	—	7.5 ± 1.5
Length from hole center to lead	P_1	3.85 ± 0.7	3.75 ± 1.0	7.7 ± 1.5	3.75 ± 1.0
Body diameter	D	See individual product specification			
Deviation along tape, left/right	ΔS	0 ± 1.3	0 ± 2.0		
Carrier tape width	W	18.0 ± 0.5			
Position of sprocket hole	W_1	9.0 ± 0.5			
Height (Fig 11) straight wire	H	20 +1.5 - 1.0	20 +1.5 - 1.0	18 +2.0 - 1.0	20 +1.5 - 1.0
Height (Fig 12-15) seating plane	H	16 ± 0.5	16 ± 0.5	16 ± 0.5	16 ± 0.5
Protrusion length	P_3	3.0 Max.			
Dia. of sprocket hole	D_0	4.0 ± 0.2			
Total tape thickness	t_1	0.6 ± 0.3			
Total thickness, tape and lead wire	t_2	1.5 Maximum			
Portion to cut in case of defect	L	11 Maximum			
Hold down tape width	W_0	11.5 Minimum			
Hold down tape position	W_2	1.5 ± 1.5			

EIA lead spacings for tape and reel are based on multiples of .100" (2.5mm) to coordinate with automatic insertion machinery and boards using .100" grid convention.

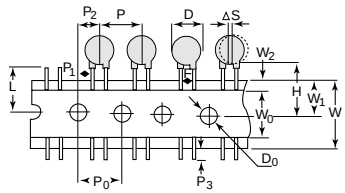
Fig 16



Note 1 Vishay Cera-Mite standard is a reverse reeled version of EIA 468B.

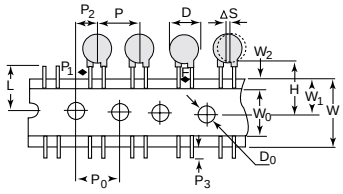
LEAD SPACE	PITCH	CAP DIA.	CAP FAMILY
5mm	12.7mm (0.5")	≤ 12.4mm	≤ 3KVDC

Fig A



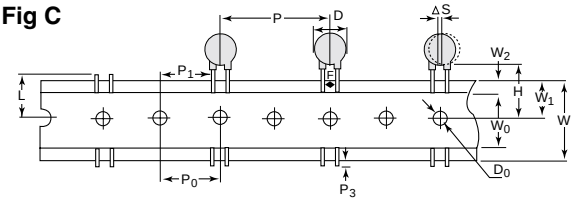
LEAD SPACE	PITCH	CAP DIA.	CAP FAMILY
7.5mm	15mm	≤ 13.5mm	≤ 3KVDC & AC Rated

Fig B



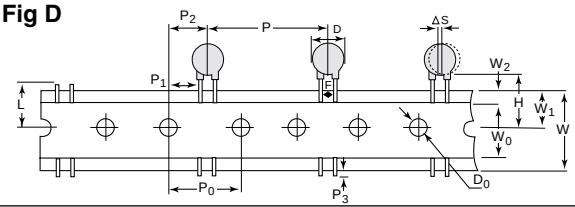
LEAD SPACE	PITCH	CAP DIA.	CAP FAMILY
10mm	25.4mm (1.0")	≤ 18mm	≤ 6KVDC & AC Rated

Fig C



LEAD SPACE	PITCH	CAP DIA.	CAP FAMILY
7.5mm	30mm	≤ 18mm	≤ 6KVDC & AC Rated

Fig D



Heavy Duty High Voltage Capacitors

10 TO 40KV MOLDED EPOXY CASE

DK GENERAL PURPOSE TYPE, EIA CLASS III

APPLICATIONS:

- High Voltage Power Supplies, CRTs, Lasers.
- Smallest Size Available.

KT SPECIAL PURPOSE TYPE, EIA CLASS I

APPLICATIONS:

- High Voltage Power Supplies, CRTs, Lasers.
- Greater Capacitance Stability.
- Features Low DF and Low Heating, Low DC & AC Voltage Coefficient.
- Tighter Tolerance On Capacitance.
- Highest AC Voltage Ratings.

PERFORMANCE CHARACTERISTICS:

Operating Temperature Range: -30°C to +85°C

Storage Temperature Range: -40°C to +100°C

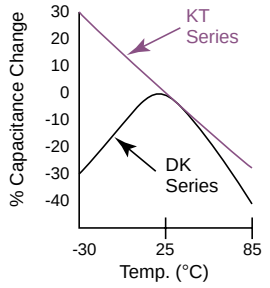
Dielectric Strength: 150% of rated voltage, charging current limited to 50mA.

Insulation Resistance: 200,000 megohms or 1000ΩF minimum at 25°C.

Corona Limit: 50 picocoulombs at rated AC voltage.

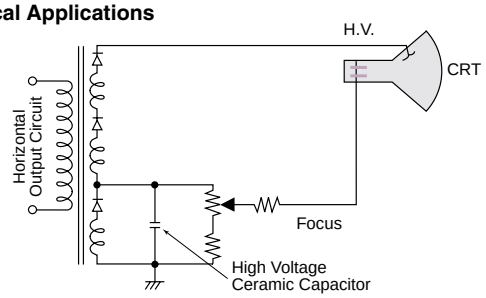
Self Resonant Frequency: Ranges from 50 MHz for small diameters to 10 MHz for large diameters.

Power Dissipation: Limit to 25°C rise above ambient, measured on case.



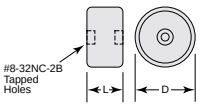
KT Series ceramic material is specially designed to handle AC current, due to low dissipation factor.

Typical Applications



Applications where high dv/dt is present will operate at high peak currents (I_p = dv/dt x C). Capacitors should be evaluated in the actual circuit for dv/dt greater than 2000V/ microsecond. If repetitive, it may be necessary to use a series resistor or other impedance to limit peak currents to safe values.

Fig 17



NOTE: Screw torque limit: 12 inch pounds. Use #8-32, 3/16" long screw to prevent bottoming.

D SIZE CODE	DIAMETER MAX. in.	mm
A	.880	22.4
B	1.05	26.7
C	1.30	33.0
D	1.55	39.4
E	1.80	45.7
F	2.13	54.1
G	2.30	58.4
H	2.42	61.5

L SIZE CODE	LENGTH MAX. in.	mm
J	.780	19.8
K	.900	22.9
L	1.00	25.4
M	1.18	30.0
N	1.36	34.5

715C Series

TYPE DK CAPACITOR

Class III Y5U Temp. Coefficient

Cap Tol. +80% - 20%

DF: 2% Max @ 1 kHz

15,000 VDC; 4,000 VRMS, 60HZ

CAP pF	CATALOG NUMBER	SIZE D CODE	L CODE
1500	15DKD15	B	K
2000	15DKD20	C	K
3300	15DKD33	D	K
4700	15DKD47	D	K
.01 uF	15DKS10	G	K

20,000 VDC; 5,000 VRMS, 60HZ

CAP pF	CATALOG NUMBER	SIZE D CODE	L CODE
500	20DKT50	A	L
1000	20DKD10	C	L
1300	20DKD13	C	L
2500	20DKD25	D	L
3300	20DKD33	E	L
4700	20DKD47	F	L
6800	20DKD68	H	L

30,000 VDC; 7,000 VRMS, 60HZ

CAP pF	CATALOG NUMBER	SIZE D CODE	L CODE
500	30DKT50	B	N
1000	30DKD10	C	M
2500	30DKD25	D	M
3300	30DKD33	F	M
4700	30DKD47	G	M

40,000 VDC; 9,000 VRMS, 60HZ

CAP pF	CATALOG NUMBER	SIZE D CODE	L CODE
300	40DKT30	A	N
500	40DKT50	B	N
780	40DKT78	C	N
1000	40DKD10	D	N
1600	40DKD16	E	N
2500	40DKD25	F	N
3300	40DKD33	G	N

TYPE KT CAPACITOR

Class I N4700 Temp. Coefficient

Cap Tol. ±20%

DF: 0.2% Max @ 1 kHz

10,000 VDC; 4,000 VRMS, 60HZ

CAP PF	CATALOG NUMBER	SIZE D CODE	L CODE
1000	10KTD10	C	J
2200	10KTD22	D	J
3900	10KTD39	F	J
4700	10KTD47	G	J

15,000 VDC; 6,000 VRMS, 60HZ

CAP pF	CATALOG NUMBER	SIZE D CODE	L CODE
820	15KTT82	C	K
1900	15KTD19	F	K
3300	15KTD33	G	K

20,000 VDC; 8,000 VRMS, 60HZ

CAP pF	CATALOG NUMBER	SIZE D CODE	L CODE
560	20KTT56	C	L
1000	20KTD10	D	L
1900	20KTD19	F	L
2700	20KTD27	H	L

30,000 VDC; 10,000 VRMS, 60HZ

CAP pF	CATALOG NUMBER	SIZE D CODE	L CODE
400	30KTT40	C	M
660	30KTT66	D	M
1200	30KTD12	F	M
1800	30KTD18	H	M

40,000 VDC; 13,000 VRMS, 60HZ

CAP pF	CATALOG NUMBER	SIZE D CODE	L CODE
300	40KTT30	C	N
640	40KTT64	E	N
1000	40KTD10	F	N
1300	40KTD13	H	N

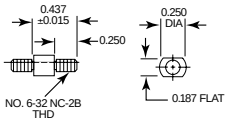
TERMINAL ADAPTORS

#8-32NC-2B Adapters.

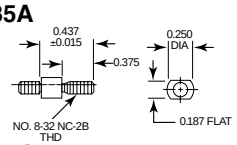
Order separately as required.

All tolerances ±0.010 unless specified.

75-134A



75-135A



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