



Use this Guide to select the best computer grade capacitor for your application. The six columns in the middle rank CDE capacitors by characteristic. Those Types that are superior in a given category are indicated by a star ★. The best have two stars ★★. Consider these for your most important criteria and then compare final specifications before making your selection.

CDE Type	Page	Temp. °C Range	Vdc Range	Life Test Hours	@ °C	High Cap	Low ESR	Low Hi-Freq Imped	High Ripple	Long Life	Low Cost	Comment
DCMX	90	-40 +85	6.3 - 450	1000	+85	★	★	★	★		★★	Max Cap, Best Value, Standard Life & Ripple
500X	94	-40 +95	6.3 - 450	2000	+95	★★		★	★		★	Max Cap, Long Life, Max Ripple, Low ESR
550	100	-40 +105	200 - 400	1000	+105	★	★	★	★	★	★	Motor Control, Ultra High Ripple, High Voltage
101X	102	-55 +105	6.3-55	2000	+105	★	★	★	★	★	★	Wide Temp Range, MIL-C-39018/04, 06, 10 equivalent
139R	99	-55 +85	6.3 - 55	1000	+85		★★	★★			★	Lowest ESR
125	105	-55 +125	6.3 - 40	2000	+125		★	★		★★		Highest Temp, Highest Reliability, Longest Life

**Capacitance:** Use capacitance bridge with a maximum rms signal voltage of 1 Volt at 120Hz. Capacitance is within tolerance at +25°C.

**Equivalent Series Resistance (ESR):** Use ESR bridge (with accuracy of ±2% at +25°C) at 120Hz. ESR to be no more than value in table.

**DC Leakage Current (DCL):** Pre-condition within 24-48 hours of test by applying rated Vdc for 30 minutes (minimum). Measure at +25°C with rated voltage applied through a current limiting resistor. Measure DCL 5 minutes after capacitor reaches rated Vdc. DCL must not exceed specified maximum value.

**Storage:** From -55°C to maximum operating temperature up to 200,000 feet above sea level.

**Surge Test:** Connect capacitor in series with resistor as follows:

C=0-2500µF R=1000Ω

C=2500-25kµF R=500Ω

C≥ 25,001µF R=100Ω

Subject the series combination to rated surge voltage. For capacitors rated at +85°C, apply surge voltage for 30 seconds. Allow capacitor to discharge through resistor. Apply voltage again after 9.5 minutes. Repeat 10 minute cycle for 24 hours. For capacitors rated at +105°C, apply voltage for 30 seconds and off for 5.5 minutes for 1,000 cycles. Following surge test allow capacitors to cool to room temperature and measure DCL. DCL is not to increase from initial requirement and no electrolyte shall have leaked.

**Load Life Test:** Use a circulating air oven set to capacitor(s) maximum operating temperature. Separate capacitors to maintain temperature -0°C +3°C. Apply rated Vdc for rated life ±12 hours using regulated power supply free from turn-on/turn-off voltage transients. At end of test, return capacitors to room temperature for 24 hours (min).

DCL is not to exceed initial requirement.

Capacitance must not be less than 85% of initial measured value.

ESR must not be greater than:

Type	% of Initial Requirement
DCMX	175
500X/550	175
101X	100
139R	175
125	175

**Full Ripple Life Test:** Use a circulating air oven as in Load Life Test. Apply DC voltage with rated ripple current from AC source and reduce DC voltage unit sum of DC voltage and peak AC voltage equals capacitor's rated voltage. At end of life test return capacitors to room temperature for 24 hours (min). Capacitance, ESR and DCL must meet Load Life Test requirements.

**Shelf Life Test:** Use a circulating air oven as above for rated shelf life ±6 hours. Allow capacitors to cool to room temperature and stabilize for a minimum of 16 hours. Capacitance, ESR and DCL will meet initial requirements.

**Vibration:** Clamp capacitor to a vibrating platform and subject it to a simple harmonic motion with a maximum peak-to-peak amplitude of 0.06" and maximum acceleration of 10g. Vary the frequency linearly between 10 and 55Hz. Entire range of 10-55Hz must be traversed in one minute. Vibrate capacitor for 1-1/2 hours with the direction of motion being parallel to the axis of the capacitor. Then move the capacitor so the direction of motion is perpendicular

to the axis of the capacitor and continue the vibration for an additional 1-1/2 hours. During the last 30 minutes of the test connect the capacitor to a bridge and observe for 3 minutes. There will be no evidence of loosening of the capacitor element within the case when shaken by hand following the test. No indication of intermittent contact, open or shorting is allowed during the 3 minute observation period.

**Container Seal:** Following the vibration test, test each capacitor for seal tightness as follows: Subject the capacitors to two successive temperature cycles in circulating air. One temperature cycle is:

A. 85°C for 30 minutes; B. 25°C for 30 minutes;

C. -40°C for 30 minutes; D. 25°C for 30 minutes.

Following the second cycle, immerse the capacitor in 90-95°C water for five minutes. A failure is a continuous chain of bubbles when immersed.

**Vent Test:** Apply reverse DC voltage to a capacitor at 15-25 Amperes. If the capacitor is open or shorts and the vent has not operated, test additional capacitors. The vent must operate and there must be no explosion.

**Low Temperature Performance:** Measure capacitors at 120Hz and at these low temperatures. The maximum multiple of the 25°C impedance is:

CDE Type	Test Temp -°C	Rated Vdc	Cap % of 25°C	Max Multiple of 25°C Impedance
DCMX/	20	0-10	60	20
500X/		11-50	65	8
		51-100	70	4
		>100	70	3
101X/	55	0-9	65	6
139R/		10-40	75	3
125		40	80	2

**Ripple Current:** Ripple current is the AC current flowing through the capacitor. Maximum ripple is determined by the core temperature rise of the capacitor. The ability of a capacitor to handle AC current is also limited by the voltage rating, external surface area and the current carrying capability of the electrode connections of the capacitor. The heat energy warming the capacitor core is  $I^2R$  where "R" is the ESR. The maximum permitted ripple current at operating temperature is:

$$I = \sqrt{\Delta T / \Theta ESR}$$

Where: I = Max Ripple Current, rms Amperes

$\Delta T$  = Max permitted core temperature rise over Ambient Temperature

$\Theta$  = Thermal resistance between core and case and case to Ambient in °C/W.

CDE Computer Grade capacitors have low thermal resistance from core to case because the capacitor section is pressed against the top and bottom of the case and securely anchored with integral spikes. Unlike conventional construction using pitch or wax for anchoring, thermal resistance between core and case can often be neglected. The case temperature at the bottom of the capacitor can be considered to be the core temperature. Use the ripple current multipliers that follow as a guide and make sure case temperature does not exceed rated temperature in high-ripple applications. The multipliers are based on the above relationship and change in ESR with frequency.

*Ripple Current Multiplier Table appears on page 107.*





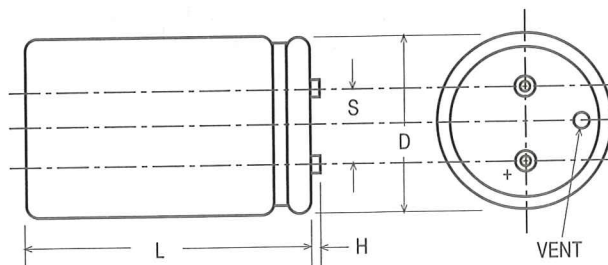
Ordering Information for Type DCMX

Cap. μF	Catalog Number	ESR Max mΩ @25°C 120 Hz 20kHz	Ripple A @85°C 120Hz 20kHz	Nominal Size (in.) D x L
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500Vdc - 550 Vdc Surge (continued)

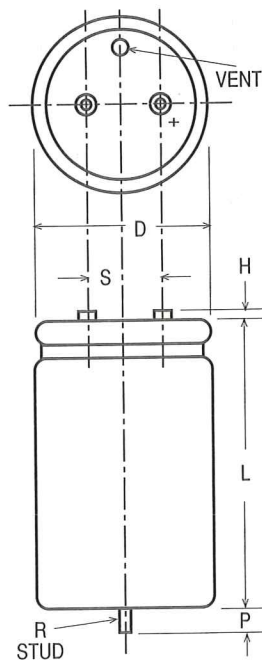
1,200	DCMX122U500CB2B	218	195	3.1	3.4	2 1/2 x 3 1/8
1,300	DCMX132U500EF2B	187	165	3.4	3.8	1 3/4 x 5 5/8
1,300	DCMX132U500BD2B	192	170	3.3	3.7	2 x 4 5/8
1,500	DCMX152U500BE2B	168	148	3.7	4.1	2 x 5 1/8
1,500	DCMX152U500CJ2B	172	153	3.6	4.1	2 1/2 x 3 5/8
1,700	DCMX172U500BF2B	149	132	4.0	4.5	2 x 5 5/8
1,800	DCMX182U500CC2B	142	126	4.2	4.7	2 1/2 x 4 1/8
2,100	DCMX212U500CD2B	121	108	4.8	5.3	2 1/2 x 4 5/8
2,200	DCMX222U500D2B	124	111	4.8	5.4	3 x 3 5/8
2,400	DCMX242U500CE2B	106	94.1	5.3	6.0	2 1/2 x 5 1/8
2,700	DCMX272U500CF2B	93.9	83.5	5.9	6.6	2 1/2 x 5 5/8
2,700	DCMX272U500DC2B	103	91.8	5.6	6.3	3 x 4 1/8
3,100	DCMX312U500DD2B	87.4	78.4	6.3	7.0	3 x 4 5/8
3,600	DCMX362U500DE2B	76.3	68.4	7.0	7.8	3 x 5 1/8
4,100	DCMX412U500DF2B	67.8	60.8	7.7	8.6	3 x 5 5/8
6,900	DCMX692U500DG2B	41.0	36.9	11.9	13.2	3 x 8 5/8

Type: DCMX-----  
 Capacitance: 100 = 10μF; 101 = 100μF-----  
 492 = 4900μF; 433 = 43,000μF  
 Tolerance: M = ±20%; U = -10% +75%; T = -10% + 50%--  
 Voltage: 6R3 = 6.3Vdc; 063 = 63Vdc; 100 = 100Vdc-----  
 Case Code: See table-----  
 Insulation: 0 = None; 1 = Polyester; 2 = PVC-----  
 Terminal: A = Low Post; B = High Post;-----  
 D = High Current, Low Post; E = High Current, High Post  
 Can Style: Blank = Standard Can; S = Stud Bottom-----  
 (See drawing)



95

With Stud-Mount Feature



Case Diam	R Thread	P ± 0.039" (± 1.0 mm)
A*	M8	0.047" (12.0)
B*	M12	0.630" (16.0)
C*	M12	0.630" (16.0)
D*	M12	0.630" (16.0)
E*	NA	NA

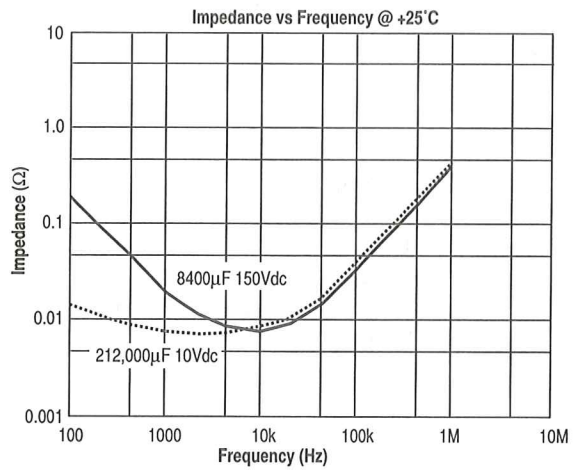
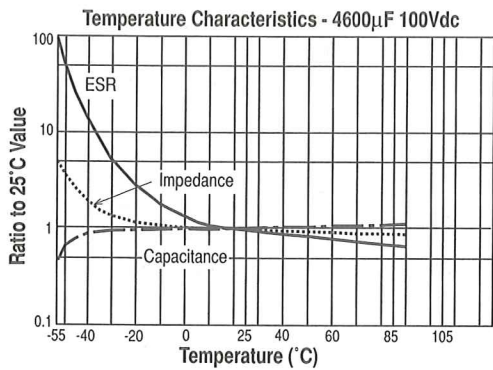
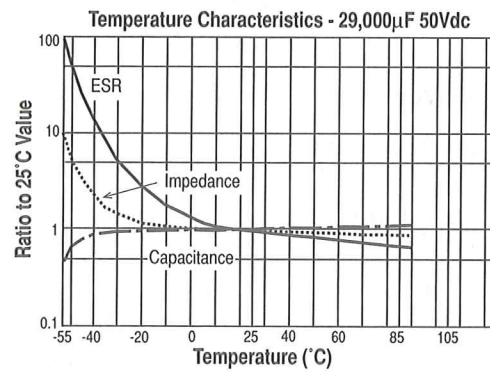
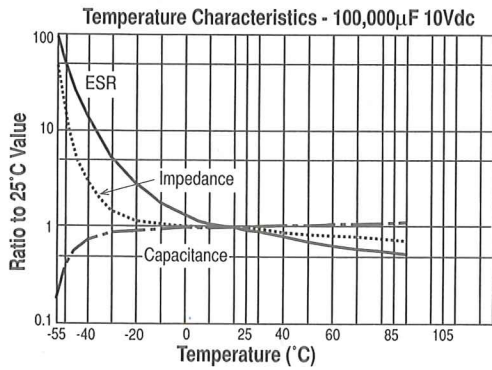
\*Add Case Height Code from table  
 Note: With the stud-mount feature an insulating disk is inserted in the bottom under the outer insulating sleeve (if any).

Table 2 - Terminals

Style	Code	H" (mm)	Thread	Max Amps
Low Post	A	0.094" (2.39)	10-32	30
High Post	B	0.281" (7.14)	10-32	30
High Current, Low Post	D	0.125" (3.18)	1/4-28	50
High Current, High Post	E	0.281" (7.14)	1/4-28	50

Uninsulated Case Dimensions for Types DCMX, 500X, 550, 101X, 139R & 125  
 For insulated case, add 0.24" (0.610 mm) to Diameter and 0.610" (0.762 mm) to height.

Case Code	Dimensions in Inches				Typ. Wt Oz	Dimensions in millimeters				Typ. Wt gr
	D ± .031	L ± .062	S ± .015	H max		D ± .78	L ± 1.57	S ± .78	H max	
AK	1.375	1.625	0.500	1.9	1.9	34.93	41.28	12.7	48.76	53.86
AA	1.375	2.125	0.500	2.0	2.0	34.93	53.98	12.7	51.81	56.70
AH	1.375	2.625	0.500	2.7	2.7	34.93	66.68	12.7	67.31	76.54
AB	1.375	3.125	0.500	3.3	3.3	34.93	79.38	12.7	80.01	93.55
AJ	1.375	3.625	0.500	3.8	3.8	34.93	92.08	12.7	92.71	107.73
AC	1.375	4.125	0.500	See Table	4.4	34.93	104.78	12.7	See Table	124.74
AD	1.375	4.625	0.500	5.1	5.1	34.93	117.48	12.7	118.11	144.58
AE	1.375	5.125	0.500	2	5.7	34.93	130.18	12.7	2	192.77
AF	1.375	5.625	0.500	6.4	6.4	34.93	142.88	12.7	143.51	229.63
EA	1.750	2.125	0.750	2.7	2.7	44.45	53.98	19.05	54.61	76.34
EH	1.750	2.625	0.750	3.8	3.8	44.45	68.68	19.05	69.31	107.73
EB	1.750	3.125	0.750	5.1	5.1	44.45	79.38	19.05	80.01	144.58
EJ	1.750	3.625	0.750	6.8	6.8	44.45	92.08	19.05	92.71	192.77
EC	1.750	4.125	0.750	8.1	8.1	44.45	104.78	19.05	105.41	229.63
ED	1.750	4.625	0.750	9.9	9.9	44.45	117.48	19.05	118.11	255.14
EE	1.750	5.125	0.750	9.5	9.5	44.45	130.18	19.05	130.81	269.32
EF	1.750	5.625	0.750	10.5	10.5	44.45	142.82	19.05	143.45	297.66
BA	2.000	2.125	0.875	2.7	2.7	50.80	53.98	22.23	54.61	153.08
BH	2.000	2.625	0.875	5.4	5.4	50.80	66.68	22.23	67.31	172.93
BB	2.000	3.125	0.875	6.1	6.1	50.80	79.38	22.23	80.01	192.77
BJ	2.000	3.625	0.875	6.8	6.8	50.80	92.08	22.23	92.71	232.46
BC	2.000	4.125	0.875	8.2	8.2	50.80	104.78	22.23	105.41	269.32
BD	2.000	4.625	0.875	9.6	9.6	50.80	117.48	22.23	118.11	292.00
BE	2.000	5.125	0.875	10.3	10.3	50.80	130.18	22.23	130.81	303.33
BF	2.000	5.625	0.875	13.0	13.0	50.80	142.88	22.23	143.51	368.54
CB	2.500	3.125	1.125	10.4	10.4	63.50	79.38	28.58	80.01	294.83
CJ	2.500	3.625	1.125	12.7	12.7	63.50	92.08	28.58	92.71	360.83
CC	2.500	4.125	1.125	15.0	15.0	63.50	104.78	28.58	105.41	425.24
CD	2.500	4.625	1.125	17.2	17.2	63.50	117.48	28.58	118.11	487.60
CE	2.500	5.125	1.125	19.3	19.3	63.50	130.18	28.58	130.81	547.14
CF	2.500	5.625	1.125	21.4	21.4	63.50	142.88	28.58	143.51	606.67
DJ	3.000	3.625	1.250	20.0	20.0	76.20	92.08	31.75	92.71	566.98
DC	3.000	4.125	1.250	22.2	22.2	76.20	104.78	31.75	105.41	629.35
DD	3.000	4.625	1.250	25.5	25.5	76.20	117.48	31.75	118.11	722.98
DE	3.000	5.125	1.250	30.0	30.0	76.20	130.18	31.75	130.81	850.47
DF	3.000	5.625	1.250	31.9	31.9	76.20	142.88	31.75	143.51	904.33
DP	3.000	5.875	1.250	32.9	32.9	76.20	149.23	31.75	150.86	931.26
DG	3.000	8.625	1.250	43.3	43.3	76.20	219.03	31.75	220.68	1227.49





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