

## Aluminum Capacitors +125 °C, Miniature, Radial Lead



### FEATURES

- +125 °C performance
- Suitable for tantalum foil replacement applications
- Low DC leakage currents
- Very stable, long life
- Case sizes through 0.709" x 1.417" [18.0 mm x 36.0 mm]
- Optional third lead on diameters  $\geq 0.492"$  [12.5 mm]
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

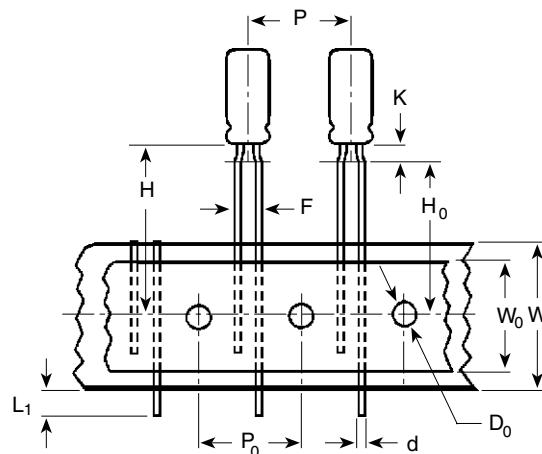


QUICK REFERENCE DATA	
DESCRIPTION	VALUE
Nominal case size Ø D x L in mm	0.236" x 0.433" [6.0 x 11.0] to 0.709" x 1.417" [18.0 x 36.0]
Operating temperature	-40 °C to +125 °C
Rated capacitance range, $C_R$	1.0 $\mu$ F to 6800 $\mu$ F
Tolerance on $C_R$	$\pm 20\%$
Rated voltage range, $U_R$	6.3 WV <sub>DC</sub> to 63 WV <sub>DC</sub>
Termination	2 and 3 radial leads
Life validation test at 125 °C	2000 h: $\Delta C_{AP} \leq 15\%$ (6.3 WV <sub>DC</sub> to 10 WV <sub>DC</sub> ), $\leq 10\%$ (16 WV <sub>DC</sub> to 63 WV <sub>DC</sub> ) from initial measurement. $\Delta D_{F} \leq 1.25 \times$ initial specified limit. $\Delta D_{CL} \leq$ initial specified limit.
Shelf life at 105 °C	500 h: $\Delta C_{AP} \leq 12\%$ from initial measurement. $\Delta D_{F} \leq 1.25 \times$ initial specified limit. $\Delta D_{CL} \leq 2.0 \times$ initial specified limit.
DC leakage current (after 2 min charge)	$I = 0.01$ CV I in $\mu$ A, C in $\mu$ F, V in Volts

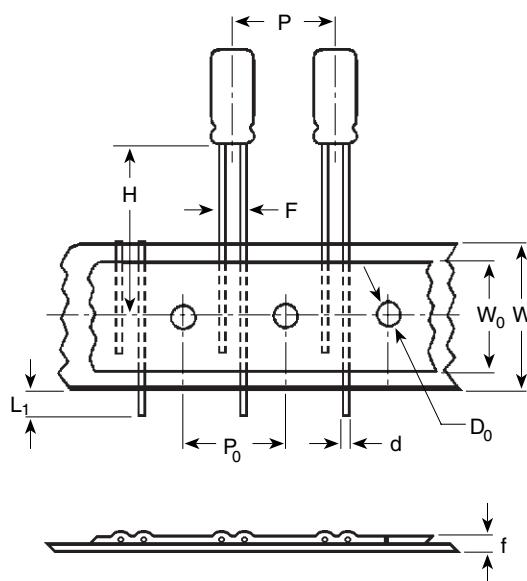
RIPPLE CURRENT MULTIPLIERS				
TEMPERATURE				
AMBIENT TEMPERATURE		MULTIPLIERS		
+125 °C		0.4		
+105 °C		1.0		
+85 °C		1.41		
+75 °C		1.58		
$\leq +65$ °C		,73		
FREQUENCY (Hz)				
FREQUENCY (Hz)	50 TO 60	100 TO 120	300 TO 400	1K AND UP
MULTIPLIERS	0.85	1.00	1.05	1.10
	0.80	1.00	1.30	1.40

LOW TEMPERATURE PERFORMANCE	
CAPACITANCE RATIO $C_{-55}^{\circ}\text{C} / C_{+25}^{\circ}\text{C}$ MINIMUM AT 120 Hz	
RATED VOLTAGE (WV <sub>DC</sub> )	CAPACITANCE REMAINING
6.3 to 10	75 %
16 to 25	80 %
36 to 63	85 %
ESR RATIO $ESR_{-55}^{\circ}\text{C} / ESR_{+25}^{\circ}\text{C}$ MAXIMUM AT 120 Hz	
RATED VOLTAGE (WV <sub>DC</sub> )	MULTIPLIER
6.3 to 10	35
16 to 25	30
36 to 63	25

DIMENSIONS in inches [millimeters]										
CASE CODE	NOMINAL		STYLES 2 AND 4		STYLES 3 AND 5		LEAD SPACING		LEAD DIAMETER	
	D	L	D (max.)	L (max.)	D (max.)	L (max.)	S $\pm 0.024$ [0.60]	T $\pm 0.020$ [0.50]	NOMINAL AWG NO.	
BB	0.315 [8.0]	0.472 [12.0]	0.335 [8.5]	0.512 [13.0]	0.335 [8.5]	0.551 [14.0]	0.138 [3.5]	n/a	0.025 [0.63]	22
BD	0.315 [8.0]	0.630 [16.0]	0.335 [8.5]	0.669 [17.0]	0.335 [8.5]	0.709 [18.0]	0.138 [3.5]	n/a	0.025 [0.63]	22
CC	0.394 [10.0]	0.512 [13.0]	0.413 [10.5]	0.563 [14.3]	0.413 [10.5]	0.630 [16.0]	0.197 [5.0]	n/a	0.025 [0.63]	22
CG	0.394 [10.0]	0.787 [20.0]	0.413 [10.5]	0.846 [21.5]	0.413 [10.5]	0.906 [23.0]	0.197 [5.0]	n/a	0.025 [0.63]	22
DG	0.492 [12.5]	0.787 [20.0]	0.512 [13.0]	0.846 [21.5]	0.512 [13.0]	0.906 [23.0]	0.197 [5.0]	0.098 [2.5]	0.028 [0.71]	20
DK	0.492 [12.5]	0.984 [25.0]	0.512 [13.0]	1.043 [26.5]	0.512 [13.0]	1.142 [29.0]	0.197 [5.0]	0.098 [2.5]	0.032 [0.81]	20
EN	0.630 [16.0]	1.260 [32.0]	0.650 [16.5]	1.319 [33.5]	0.650 [16.5]	1.417 [36.0]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20
ER	0.630 [16.0]	1.417 [36.0]	0.650 [16.5]	1.476 [37.5]	0.650 [16.5]	1.575 [40.0]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20
FR	0.709 [18.0]	1.417 [36.0]	0.728 [18.5]	1.476 [37.5]	0.728 [18.5]	1.575 [40.0]	0.295 [7.5]	0.150 [3.8]	0.032 [0.81]	20

**DIMENSIONS** in inches [millimeters] **AND AVAILABLE FORMS**
**Formed Leads**

**DIMENSIONS** in inches [millimeters] **AND PACKAGING QUANTITIES**

CASE SIZE	F LEAD SPACING	STD. QTY/REEL
0.236 x 0.433 [6.0 x 11.0]	0.197 [5.0]	800
0.315 x 0.472 [8.0 x 12.0]	0.197 [5.0]	700

**Unformed (Straight) Leads**

**DIMENSIONS** in inches [millimeters] **AND PACKAGING QUANTITIES**

CASE SIZE	F LEAD SPACING	STD. QTY/REEL
0.236 x 0.433 [6.0 x 11.0]	0.098 [2.5] <sup>(1)</sup>	800
0.315 x 0.472 [8.0 x 12.0]	0.140 [3.5] <sup>(1)</sup>	700
0.394 x 0.512 [10.0 x 13.0]	0.197 [5.0]	500
0.394 x 0.630 [10.0 x 16.0]	0.197 [5.0]	500
0.394 x 0.787 [10.0 x 20.0]	0.197 [5.0]	500

**Note**
<sup>(1)</sup> Available as special order.

<b>DIMENSIONS</b> in inches [millimeters]					
<b>ITEM</b>	<b>CASE SIZE (Diameter x Length)</b>				
	<b>0.236 x 0.433 [6.0 x 11.0]</b>	<b>0.315 x 0.472 [8.0 x 12.0]</b>	<b>0.394 x 0.512 [10.0 x 13.0]</b>	<b>0.394 x 0.630 [10.0 x 16.0]</b>	<b>0.394 x 0.787 [10.0 x 20.0]</b>
d - Lead-wire diameter	0.025 [0.63]	0.025 [0.63]	0.025 [0.63]	0.025 [0.63]	0.025 [0.63]
P - Pitch of component	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]
P <sub>0</sub> - Feed hole pitch	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]	0.500 [12.7]
F - Lead-to-lead distance	0.197 [5.0]	0.197 [5.0]	0.197 [5.0]	0.197 [5.0]	0.197 [5.0]
K - Clinch height	0.098 [2.5]	0.157 [4.0]	n/a	n/a	n/a
H - Height of component from tape center	0.728 [18.5]	0.787 [20.0]	0.906 [23.0]	0.906 [23.0]	0.906 [23.0]
H <sub>0</sub> - Lead-wire clinch height	0.630 [16.0]	0.630 [16.0]	n/a	n/a	n/a
W - Tape width	0.709 [18.0]	0.709 [18.0]	0.709 [18.0]	0.709 [18.0]	0.709 [18.0]
W <sub>0</sub> - Hold down tape width	0.591 [15.0]	0.591 [15.0]	0.591 [15.0]	0.591 [15.0]	0.591 [15.0]
D <sub>0</sub> - Feed hole diameter	0.157 [4.0]	0.157 [4.0]	0.157 [4.0]	0.157 [4.0]	0.157 [4.0]
t - Total tape thickness	0.028 [0.7]	0.028 [0.7]	0.028 [0.7]	0.028 [0.7]	0.028 [0.7]
L <sub>1</sub> - Maximum lead protrusion	0.118 [3.0]	0.118 [3.0]	0.118 [3.0]	0.118 [3.0]	0.118 [3.0]

**Note**

- Positive leader is standard. Negative leader is available by special order.

**ORDERING EXAMPLE**

Electrolytic capacitor 510DX series: 510DX 227 M 050 DG 2 D

<b>DESCRIPTION</b>	
<b>CODE</b>	<b>EXPLANATION</b>
510DX	Product type
227	Capacitance value (220 $\mu$ F)
M	Tolerance (M = $\pm$ 20 %)
050	Voltage rating at 105 °C (050 = 50 V)
DG	Can size (see "Dimensions" table)
2	Sleeve and sealing (2 = polyester sleeve)
D	Packaging (D = bulk; straight leads)

**Note**

- For lead (Pb)-free / RoHS compliant products add suffix "E3" to part number.  
Example: 510DX227M050DG2DE3

<b>ELECTRICAL DATA AND ORDERING INFORMATION</b>							
<b>CAPACITANCE (<math>\mu</math>F)</b>	<b>PART NUMBER<sup>(1)</sup></b>	<b>NOMINAL CASE SIZE D x L IN INCHES (mm)</b>	<b>MAX. ESR AT +25 °C (m<math>\Omega</math>)</b>		<b>MAX. RIPPLE AT +105 °C (A)</b>		<b>MAX. Z AT +25 °C (m<math>\Omega</math>) 100 Hz</b>
			120 Hz	20 kHz TO 40 kHz	120 Hz	20 kHz TO 40 kHz	
<b>6.3 WV<sub>DC</sub> AT 125 °C, SURGE = 8 V</b>							
330.0	510DX337M6R3CC2D	0.394 x 0.512 [10.0 x 13.0]	1206.0	507.0	0.294	0.454	457.0
1000.0	510DX108M6R3DG2D	0.492 x 0.787 [12.5 x 20.0]	398.0	201.0	0.697	0.984	181.0
1500.0	510DX158M6R3DK2D	0.492 x 0.984 [12.5 x 25.0]	265.0	133.0	0.931	1.313	121.0
4700.0	510DX478M6R3ER2D	0.630 x 1.417 [16.0 x 36.0]	85.0	40.0	2.193	3.193	36.0
<b>10 WV<sub>DC</sub> AT 125 °C, SURGE = 13 V</b>							
150.0	510DX157M010BB2D	0.315 x 0.472 [8.0 x 12.0]	2210.0	948.0	0.182	0.278	854.0
220.0	510DX227M010BD2D	0.315 x 0.630 [8.0 x 16.0]	1507.0	528.0	0.247	0.417	475.0
1200.0	510DX128M010DK2D	0.492 x 0.984 [12.5 x 25.0]	276.0	138.0	0.911	1.287	124.0
4700.0	510DX478M010FR2D	0.709 x 1.417 [18.0 x 36.0]	71.0	37.0	2.582	3.576	33.0
<b>16 WV<sub>DC</sub> AT 125 °C, SURGE = 20 V</b>							
150.0	510DX157M016BD2D	0.315 x 0.630 [8.0 x 16.0]	1415.0	549.0	0.255	0.409	494.0
470.0	510DX477M016DG2D	0.492 x 0.787 [12.5 x 20.0]	451.0	216.0	0.654	0.946	194.0
2200.0	510DX228M016ER2D	0.630 x 1.417 [16.0 x 36.0]	96.0	43.0	2.060	3.078	39.0

**ELECTRICAL DATA AND ORDERING INFORMATION**

CAPACITANCE ( $\mu$ F)	PART NUMBER <sup>(1)</sup>	NOMINAL CASE SIZE D x L IN INCHES (mm)	MAX. ESR AT +25 °C (m $\Omega$ )		MAX. RIPPLE AT +105 °C (A)		MAX. Z AT +25 °C (m $\Omega$ ) 100 Hz
			120 Hz	20 kHz TO 40 kHz	120 Hz	20 kHz TO 40 kHz	
<b>25 WV<sub>DC</sub> AT 125 °C, SURGE = 32 V</b>							
100.0	510DX107M025BD2D	0.315 x 0.630 [8.0 x 16.0]	1459.0	571.0	0.251	0.401	514.0
100.0	510DX107M025CC2D	0.394 x 0.512 [10.0 x 13.0]	1459.0	571.0	0.268	0.428	514.0
330.0	510DX337M025DG2D	0.492 x 0.787 [12.5 x 20.0]	442.0	224.0	0.661	0.927	202.0
470.0	510DX477M025DK2D	0.492 x 0.984 [12.5 x 25.0]	310.0	150.0	0.859	1.238	135.0
1500.0	510DX158M025ER2D	0.630 x 1.417 [16.0 x 36.0]	97.0	45.0	2.049	3.009	40.0
<b>35 WV<sub>DC</sub> AT 125 °C, SURGE = 44 V</b>							
47.0	510DX476M035BB2D	0.315 x 0.472 [8.0 x 12.0]	2822.0	1067.0	0.161	0.262	960.0
100.0	510DX107M035CC2D	0.394 x 0.512 [10.0 x 13.0]	1326.0	593.0	0.281	0.421	534.0
220.0	510DX227M035CG2D	0.394 x 0.787 [10.0 x 20.0]	603.0	248.0	0.496	0.774	223.0
470.0	510DX477M035DK2D	0.492 x 0.984 [12.5 x 25.0]	282.0	156.0	0.901	1.214	140.0
1200.0	510DX128M035EN2D	0.630 x 1.260 [16.0 x 32.0]	111.0	58.0	1.826	2.527	52.0
1500.0	510DX158M035ER2D	0.630 x 1.417 [16.0 x 36.0]	88.0	47.0	2.151	2.944	42.0
<b>50 WV<sub>DC</sub> AT 125 °C, SURGE = 63 V</b>							
220.0	510DX227M050DG2D	0.492 x 0.787 [12.5 x 20.0]	543.0	243.0	0.597	0.892	218.0
330.0	510DX337M050DK2D	0.492 x 0.984 [12.5 x 25.0]	362.0	162.0	0.796	1.191	146.0
1000.0	510DX108M050ER2D	0.630 x 1.417 [16.0 x 36.0]	119.0	49.0	1.847	2.883	44.0
<b>63 WV<sub>DC</sub> AT 125 °C, SURGE = 79 V</b>							
47.0	510DX476M063BD2D	0.315 x 0.630 [8.0 x 16.0]	1975.0	642.0	0.215	0.378	578.0
47.0	510DX476M063CC2D	0.394 x 0.512 [10.0 x 13.0]	1975.0	642.0	0.231	0.404	578.0
220.0	510DX227M063DK2D	0.492 x 0.984 [12.5 x 25.0]	422.0	168.0	0.737	1.167	151.0
1000.0	510DX108M063FR2D	0.709 x 1.417 [18.0 x 36.0]	93.0	45.0	2.256	3.243	41.0

Statements about product lifetime are based on calculations and internal testing. They should only be interpreted as estimations. Also due to external factors, the lifetime in the field application may deviate from the calculated lifetime. In general, nothing stated herein shall be construed as a guarantee of durability.

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