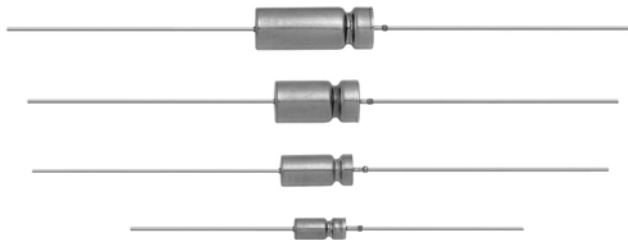


Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for -55 °C to +125 °C Operation, Low ESR



FEATURES

- Military specification MIL-PRF-39006/30 and 39006/31. model 136D capacitors are commercial equivalents of military style CLR90 and CLR91
- Capacitors to meet the MIL-specs must be ordered by M39006 part numbers shown in the relative specification
- Axial through-hole terminations: standard tin / lead (SnPb), 100 % tin (RoHS-compliant) available
- Standard and extended ratings
- Low ESR
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS*
Available

HALOGEN

FREE

GREEN

(5-2008)

Available

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

PERFORMANCE CHARACTERISTICS

Operating Temperature: -55 °C to +85 °C
(to +125 °C with voltage derating)

Capacitance Tolerance: at 120 Hz, +25 °C. $\pm 20\%$ standard. $\pm 10\%$, $\pm 5\%$ available as special.

DC Leakage Current (DCL Max.): at +25 °C and above: leakage current shall not exceed the values listed in the Standard Ratings Tables.

Life Test: capacitors are capable of withstanding a 2000 h life test at a temperature of +85 °C or +125 °C at the applicable rated DC working voltage.

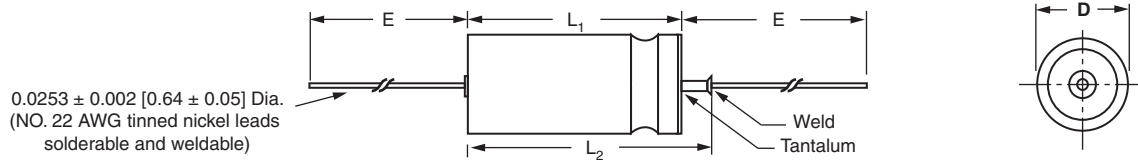
Following life test:

1. DCL, measured at +85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

ORDERING INFORMATION						
136D MODEL	306 CAPACITANCE	X0 CAPACITANCE TOLERANCE	006 DC VOLTAGE RATING AT +85 °C	C CASE CODE	2 STYLE NUMBER	E3 RoHS-COMPLIANT
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow	X0 = $\pm 20\%$ X9 = $\pm 10\%$ X5 = $\pm 5\%$	This is expressed in volts. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V)	See Ratings and Case Codes table	Std. temperature (max. +125 °C) 0 = no insulating sleeve 2 = polyester insulation sleeve 3 = high temperature film insulation	E3 = 100 % tin termination (RoHS-compliant design) Blank = SnPb termination (standard design)

Note

- Packaging: the use of formed plastic trays for packaging these axial lead components is standard. Tape and reel is not available due to the unit weight.

DIMENSIONS in inches [millimeters]


CASE CODE	DCLR 90 / 91 EQUIV.	D	L ₁	L ₂ (Max.)	E	WEIGHT (g) (Max.)
C	T1	0.188 ± 0.016 [4.78 ± 0.41]	0.453 + 0.031 / - 0.016 [11.51 + 0.79 / - 0.41]	0.734 [18.64]	1.500 ± 0.250 [38.10 ± 6.35]	2.6
F	T2	0.281 ± 0.016 [7.14 ± 0.41]	0.641 + 0.031 / - 0.016 [16.28 + 0.79 / - 0.41]	0.922 [23.42]	2.250 ± 0.250 [57.15 ± 6.35]	6.2
T	T3	0.375 ± 0.016 [9.53 ± 0.41]	0.766 + 0.031 / - 0.016 [19.46 + 0.79 / - 0.41]	1.047 [26.59]	2.250 ± 0.250 [57.15 ± 6.35]	11.6
K	T4	0.375 ± 0.016 [9.53 ± 0.41]	1.062 + 0.031 / - 0.016 [26.97 + 0.79 / - 0.41]	1.343 [34.11]	2.250 ± 0.250 [57.15 ± 6.35]	17.7

Note

- For insulated parts, add 0.015" [0.38] to the diameter. The insulation shall lap over the ends of the capacitor body.

STANDARD RATINGS

CAPACITANCE (μF)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μA) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE 40 kHz I _{RMS} (mA)
			AT +25 °C 120 Hz (Ω)	AT -55 °C 120 Hz (Ω)	+25 °C	+85 °C +125 °C	-55 °C	+85 °C	+125 °C	
6 V_{DC} AT +85 °C; 4 V_{DC} AT +125 °C										
30	C	136D306X0006C2	1.99	100	1	2	-40	+10.5	+12	820
68	C	136D686X0006C2	1.58	60	1	2	-40	+14	+16	960
140	F	136D147X0006F2	0.99	40	1	3	-40	+14	+16	1200
270	F	136D277X0006F2	1.11	25	1	6.5	-44	+17.5	+20	1375
330	T	136D337X0006T2	0.73	20	2	7.9	-44	+14	+16	1800
560	T	136D567X0006T2	0.65	25	2	13	-64	+17.5	+20	1900
1200	K	136D128X0006K2	0.50	20	3	14	-80	+25	+25	2265
8 V_{DC} AT +85 °C; 5 V_{DC} AT +125 °C										
25	C	136D256X0008C2	1.99	100	1	2	-40	+10.5	+12	820
56	C	136D566X0008C2	1.66	59	1	2	-40	+14	+16	900
120	F	136D127X0008F2	1.11	50	1	2	-44	+17.5	+20	1230
220	F	136D227X0008F2	1.12	30	1	7	-44	+17.5	+20	1370
290	T	136D297X0008T2	0.78	25	2	6	-64	+17.5	+20	1770
430	T	136D437X0008T2	0.71	25	2	14	-64	+17.5	+20	1825
850	K	136D857X0008K2	0.47	22	4	16	-80	+25	+25	2330
10 V_{DC} AT +85 °C; 7 V_{DC} AT +125 °C										
20	C	136D206X0010C2	1.99	175	1	2	-32	+10.5	+12	820
47	C	136D476X0010C2	1.84	100	1	2	-36	+14	+16	855
100	F	136D107X0010F2	0.99	60	1	4	-36	+14	+16	1200
180	F	136D187X0010F2	1.11	40	1	7	-36	+14	+16	1365
250	T	136D257X0010T2	0.80	30	2	10	-40	+14	+16	1720
390	T	136D397X0010T2	0.75	25	2	16	-64	+17.5	+20	1800
750	K	136D757X0010K2	0.44	23	4	16	-80	+25	+25	2360

Note

- (1) Part numbers listed are for units with ± 20 % capacitance tolerance insulated capacitors. For ± 10 % tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for ± 5 %, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE
			AT +25 °C 120 Hz (Ω)	AT -55 °C 120 Hz (Ω)	AT		-55 °C	+85 °C	+125 °C	40 kHz I_{RMS} (mA)
15 V_{DC} AT +85 °C; 10 V_{DC} AT +125 °C										
15	C	136D156X0015C2	1.99	155	1	2	-24	+10.5	+12	780
33	C	136D336X0015C2	1.66	90	1	2	-28	+14	+16	820
70	F	136D706X0015F2	1.11	75	1	4	-28	+14	+16	1150
120	F	136D127X0015F2	1.12	50	1	7	-28	+17.5	+20	1450
170	T	136D177X0015T2	0.78	35	2	10	-32	+14	+16	1480
270	T	136D277X0015T2	0.71	30	2	16	-56	+17.5	+20	1740
540	K	136D547X0015K2	0.47	23	6	24	-80	+25	+25	2330
25 V_{DC} AT +85 °C; 15 V_{DC} AT +125 °C										
10	C	136D106X0025C2	2.66	220	1	2	-16	+8	+9	715
22	C	136D226X0025C2	1.99	140	1	2	-20	+10.5	+12	800
50	F	136D506X0025F2	1.46	70	1	2	-28	+13	+15	1130
100	F	136D107X0025F2	0.99	50	1	10	-28	+13	+15	1435
120	T	136D127X0025T2	1.16	38	2	6	-32	+13	+15	1450
180	T	136D187X0025T2	0.96	32	2	18	-48	+13	+15	1525
350	K	136D357X0025K2	0.67	24	7	28	-70	+25	+25	1970
30 V_{DC} AT +85 °C; 20 V_{DC} AT +125 °C										
8	C	136D805X0030C2	3.32	275	1	2	-16	+8	+12	640
15	C	136D156X0030C2	2.21	175	1	2	-20	+10.5	+12	780
40	F	136D406X0030F2	1.66	65	1	5	-24	+10.5	+12	1120
68	F	136D686X0030F2	1.27	60	1	8	-24	+13	+15	1285
100	T	136D107X0030T2	1.13	40	2	12	-28	+10.5	+12	1450
150	T	136D157X0030T2	1.02	35	2	18	-48	+13	+15	1525
300	K	136D307X0030K2	0.69	25	8	32	-60	+25	+25	1950
35 V_{DC} AT +85 °C; 22 V_{DC} AT +125 °C										
15	C	136D156X0035C2	3.10	175	0.75	1.5	-20	+10.5	+12	660
68	F	136D686X0035F2	1.45	60	1	2	-24	+13	+15	1195
270	K	136D277X0035K2	0.70	26	3	12	-58	+25	+25	1950
50 V_{DC} AT +85 °C; 30 V_{DC} AT +125 °C										
5	C	136D505X0050C2	3.98	400	1	2	-16	+5	+6	580
10	C	136D106X0050C2	2.66	250	1	2	-24	+8	+9	715
25	F	136D256X0050F2	2.13	95	1	5	-20	+10.5	+12	1005
47	F	136D476X0050F2	1.56	70	1	9	-28	+13	+15	1155
60	T	136D606X0050T2	1.33	45	2	12	-16	+10.5	+12	1335
82	T	136D826X0050T2	1.22	45	2	16	-32	+13	+15	1400
160	K	136D167X0050K2	0.71	27	8	32	-50	+25	+25	1900

Note

(1) Part numbers listed are for units with $\pm 20\%$ capacitance tolerance insulated capacitors. For $\pm 10\%$ tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for $\pm 5\%$, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



STANDARD RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE
			AT +25 °C 120 Hz (Ω)	AT -55 °C 120 Hz (Ω)	AT		-55 °C	+85 °C	+125 °C	40 kHz I_{RMS} (mA)
60 V_{DC} AT +85 °C; 40 V_{DC} AT +125 °C										
4	C	136D405X0060C2	4.65	550	1	2	-16	+5	+6	525
8.2	C	136D825X0060C2	3.24	275	1	2	-24	+8	+9	625
20	F	136D206X0060F2	2.32	105	1	5	-16	+8	+12	930
39	F	136D396X0060F2	1.70	90	1	9	-28	+10.5	+12	1110
50	T	136D506X0060T2	1.33	50	2	12	-16	+10.5	+12	1330
68	T	136D686X0060T2	1.27	50	2	16	-32	+10.5	+15	1365
140	K	136D147X0060K2	0.76	28	8	32	-40	+20	+20	1850
75 V_{DC} AT +85 °C; 50 V_{DC} AT +125 °C										
3.5	C	136D355X0075C2	4.74	650	1	2	-16	+5	+6	525
6.8	C	136D685X0075C2	3.42	300	1	2	-20	+8	+9	610
15	F	136D156X0075F2	2.66	150	1	5	-16	+10.5	+9	890
33	F	136D336X0075F2	2.01	90	1	10	-24	+10.5	+15	1000
40	T	136D406X0075T2	1.50	60	2	12	-16	+10.5	+12	1250
56	T	136D566X0075T2	1.31	60	2	17	-28	+10.5	+15	1335
110	K	136D117X0075K2	0.73	29	9	36	-35	+20	+20	1850
100 V_{DC} AT +85 °C; 65 V_{DC} AT +125 °C										
2.5	C	136D255X0100C2	5.31	950	1	4	-16	+8	+8	505
4.7	C	136D475X0100C2	4.24	500	1	2	-16	+7	+8	565
11	F	136D116X0100F2	3.02	200	1	4	-16	+7	+8	835
22	F	136D226X0100F2	2.26	100	1	9	-16	+7	+8	965
25	T	136D256X0100T2	1.60	93	2	13	-16	+7	+8	1200
30	T	136D306X0100T2	1.55	80	2	12	-16	+8	+8	1240
43	T	136D436X0100T2	1.31	70	2	17	-20	+8	+8	1335
56	K	136D566X0100K2	0.80	32	10	40	-25	+15	+15	1800
86	K	136D866X0100K2	0.77	30	9	36	-25	+15	+15	1800
125 V_{DC} AT +85 °C; 85 V_{DC} AT +125 °C										
1.7	C	136D175X0125C2	7.81	1250	1	2	-16	+7	+8	415
3.6	C	136D365X0125C2	4.98	600	1	2	-16	+7	+8	520
9	F	136D905X0125F2	3.69	240	1	5	-16	+7	+8	755
14	F	136D146X0125F2	2.85	167	1	7	-16	+7	+8	860
18	T	136D186X0125T2	1.85	129	2	9	-16	+7	+8	1130
25	T	136D256X0125T2	1.59	93	2	13	-16	+7	+8	1200
56	K	136D566X0125K2	0.77	32	10	40	-25	+15	+15	1800

Note

(1) Part numbers listed are for units with $\pm 20\%$ capacitance tolerance insulated capacitors. For $\pm 10\%$ tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for $\pm 5\%$, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



EXTENDED RATINGS											
CAPACITANCE (μ F)	CASE CODE	PART NUMBER (1)	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX.	
			AT +25 °C	AT -55 °C	AT		(% AT)			RIPPLE	
			120 Hz	120 Hz	+25 °C	+85 °C	-55 °C	+85 °C	+125 °C	40 kHz	
			(Ω)	(Ω)		+125 °C				I_{RMS}	
										(mA)	
6 V_{DC} AT +85 °C; 4 V_{DC} AT +125 °C											
220	C	136D227X0006C2	1.50	36	2	9	-64	+13	+16	1000	
560	F	136D567X0006F2	1.25	21	3	9	-77	+16	+20	1500	
820	F	136D827X0006F2	1.25	18	3	14	-88	+16	+20	1500	
1200	T	136D128X0006T2	0.75	18	5	18	-88	+20	+25	1900	
1500	T	136D158X0006T2	0.75	18	5	20	-90	+20	+25	1900	
2200	K	136D228X0006K2	0.50	13	6	24	-90	+25	+30	2300	
8 V_{DC} AT +85 °C; 5 V_{DC} AT +125 °C											
180	C	136D187X0008C2	1.50	45	2	9	-60	+13	+16	1000	
680	F	136D687X0008F2	1.25	22	3	14	-83	+16	+20	1500	
1500	T	136D158X0008T2	0.75	18	5	20	-90	+20	+25	1900	
1800	K	136D188X0008K2	0.50	14	7	25	-90	+25	+30	2300	
10 V_{DC} AT +85 °C; 7 V_{DC} AT +125 °C											
120	C	136D127X0010C2	1.60	54	2	6	-40	+14	+16	900	
150	C	136D157X0010C2	1.50	54	2	9	-55	+13	+16	900	
390	F	136D397X0010F2	1.25	27	3	9	-66	+16	+20	1450	
560	F	136D567X0010F2	1.25	27	3	16	-77	+16	+20	1450	
1200	T	136D128X0010T2	0.75	18	5	20	-88	+20	+25	1850	
1500	K	136D158X0010K2	0.50	15	7	25	-88	+25	+30	2300	
15 V_{DC} AT +85 °C; 10 V_{DC} AT +125 °C											
82	C	136D826X0015C2	0.95	72	2	6	-35	+12	+16	900	
100	C	136D107X0015C2	0.95	72	2	9	-44	+13	+16	900	
270	F	136D277X0015F2	1.25	31	3	9	-62	+16	+15	1450	
390	F	136D397X0015F2	1.25	31	3	16	-66	+16	+20	1450	
680	T	136D687X0015T2	0.90	22	6	18	-74	+20	+25	1800	
820	T	136D827X0015T2	0.90	22	6	24	-77	+20	+25	1800	
1000	K	136D108X0015K2	0.60	17	8	32	-77	+25	+30	2330	
25 V_{DC} AT +85 °C; 15 V_{DC} AT +125 °C											
47	C	136D476X0025C2	2.60	100	2	6	-23	+12	+15	800	
56	C	136D566X0025C2	2.15	90	2	6	-25	+12	+15	850	
68	C	136D686X0025C2	2.15	90	2	9	-40	+12	+15	850	
180	F	136D187X0025F2	1.35	33	3	9	-54	+13	+15	1400	
270	F	136D277X0025F2	1.35	33	3	16	-62	+13	+16	1400	
470	T	136D477X0025T2	0.90	24	6	18	-65	+18	+25	1750	
560	T	136D567X0025T2	0.90	24	7	28	-72	+20	+25	1750	
680	K	136D687X0025K2	0.60	19	8	32	-72	+25	+30	2100	
30 V_{DC} AT +85 °C; 20 V_{DC} AT +125 °C											
47	C	136D476X0030C2	2.60	100	2	6	-23	+12	+15	800	
56	C	136D566X0030C2	2.60	100	2	9	-38	+12	+15	800	
150	F	136D157X0030F2	1.25	36	3	9	-42	+13	+15	1200	
220	F	136D227X0030F2	1.25	36	3	16	-60	+13	+16	1200	
390	T	136D397X0030T2	0.90	25	6	18	-55	+18	+25	1500	
470	T	136D477X0030T2	0.90	25	8	32	-65	+20	+25	1500	
560	K	136D567X0030K2	0.65	20	9	36	-65	+25	+30	2000	

Note

(1) Part numbers listed are for units with $\pm 20\%$ capacitance tolerance insulated capacitors. For $\pm 10\%$ tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for $\pm 5\%$, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



EXTENDED RATINGS										
CAPACITANCE (μ F)	CASE CODE	PART NUMBER ⁽¹⁾	MAX. ESR	MAX. IMP.	MAX. DCL (μ A)		MAX. CAPACITANCE CHANGE			MAX.
			AT +25 °C	AT -55 °C	AT		(%) AT			RIPPLE
			120 Hz	120 Hz	+25 °C	+85 °C	-55 °C	+85 °C	+125 °C	40 kHz
			(Ω)	(Ω)		+125 °C				I _{RMS}
										(mA)
35 V_{DC} AT +85 °C; 22 V_{DC} AT +125 °C										
39	C	136D396X0035C2	2.05	61	2	6	-22	+12	+14	820
120	F	136D127X0035F2	1.25	31	3	10	-40	+13	+15	1315
330	T	136D337X0035T2	0.90	20	6	18	-50	+16	+25	1640
370	K	136D377X0035K2	0.65	15	9	36	-60	+25	+30	2040
40 V_{DC} AT +85 °C; 25 V_{DC} AT +125 °C										
39	C	136D396X0040C2	2.05	61	2	6	-22	+12	+14	820
50 V_{DC} AT +85 °C; 30 V_{DC} AT +125 °C										
33	C	136D336X0050C2	2.50	135	2	9	-29	+10	+12	700
100	F	136D107X0050F2	1.40	49	4	12	-36	+13	+15	1200
120	F	136D127X0050F2	1.25	49	4	24	-42	+12	+15	1200
270	T	136D277X0050T2	1.00	30	8	32	-46	+20	+25	1450
330	K	136D337X0050K2	0.75	30	9	36	-46	+25	+30	1900
60 V_{DC} AT +85 °C; 40 V_{DC} AT +125 °C										
18	C	136D186X0060C2	3.50	160	2	12	-20	+7	+8	700
27	C	136D276X0060C2	2.51	144	3	12	-24	+10	+12	700
82	F	136D826X0060F2	1.45	54	4	16	-30	+15	+15	1100
100	F	136D107X0060F2	1.25	54	4	20	-36	+12	+15	1100
220	T	136D227X0060T2	0.90	29	8	32	-40	+16	+20	1400
270	K	136D277X0060K2	0.70	23	9	36	-45	+20	+25	1850
330	K	136D337X0060K2	0.65	31	10	40	-72	+25	+25	1850
63 V_{DC} AT +85 °C; 40 V_{DC} AT +125 °C										
100	F	136D107X0063F2	1.25	54	2	12	-36	+12	+15	1100
75 V_{DC} AT +85 °C; 50 V_{DC} AT +125 °C										
12	C	136D126X0075C2	2.55	157	3	12	-19	+10	+12	600
22	C	136D226X0075C2	2.57	157	3	12	-19	+10	+12	600
68	F	136D686X0075F2	1.50	63	4	16	-25	+12	+15	1000
82	F	136D826X0075F2	1.23	63	4	24	-30	+12	+15	1000
180	T	136D187X0075T2	0.90	30	9	36	-35	+16	+20	1300
220	K	136D227X0075K2	1.12	24	10	40	-40	+20	+25	1800
300	K	136D307X0075K2	0.90	32	12	48	-60	+22	+22	2000
100 V_{DC} AT +85 °C; 65 V_{DC} AT +125 °C										
10	C	136D106X0100C2	2.99	200	3	12	-17	+10	+12	800
39	F	136D396X0100F2	1.77	80	5	24	-20	+12	+15	1300
56	T	136D566X0100T2	1.22	50	5	20	-25	+12	+12	1400
68	T	136D686X0100T2	1.11	40	10	40	-30	+14	+16	1600
120	K	136D127X0100K2	1.38	30	12	48	-35	+15	+17	2000
125 V_{DC} AT +85 °C; 85 V_{DC} AT +125 °C										
6.8	C	136D685X0125C2	5.86	300	3	12	-14	+10	+12	700
27	F	136D276X0125F2	1.77	90	5	24	-18	+12	+15	1200
47	T	136D476X0125T2	1.12	50	10	40	-26	+14	+16	1500
56	T	136D566X0125T2	1.11	50	10	40	-26	+14	+16	1500
68	K	136D686X0125K2	1.10	32	11	44	-28	+15	+16	1850
82	K	136D826X0125K2	1.41	32	12	48	-30	+15	+17	1900

Note

⁽¹⁾ Part numbers listed are for units with $\pm 20\%$ capacitance tolerance insulated capacitors. For $\pm 10\%$ tolerance capacitors, change the digit following the letter "X" from "0" to "9"; for $\pm 5\%$, change the digit following the letter "X" from "0" to "5". For capacitors without outer polyester-film insulation, change the last digit in the part number from "2" to "0". For capacitors with a high temperature insulating sleeve, change the last digit in the part number from "2" to "3". For RoHS compliant add "E3".



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