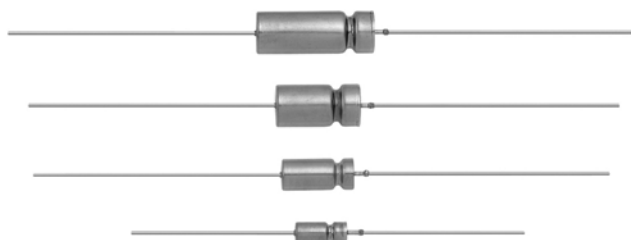


Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal for -55 °C to +125 °C Operation, Low ESR



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:

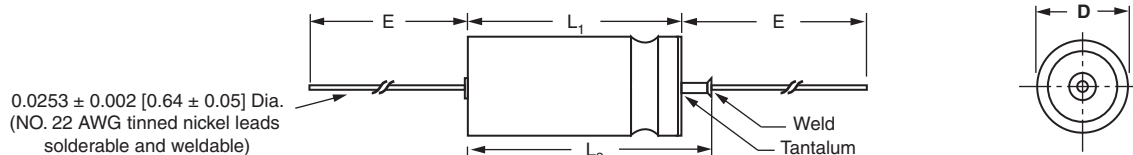
1. DCL, measured at +85 °C rated voltage, shall not be in excess of the original requirement.
2. The equivalent series resistance shall not exceed 150 % of the initial requirement.
3. Change in capacitance shall not exceed 10 % from the initial measurement.

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 AT +25 °C 120 Hz (Ω)	MAX. IMP. AT -55 °C 120 Hz (Ω)	MAX. DCL (μA) AT		MAX. CAPACITANCE CHANGE (%) AT			MAX. RIPPLE 40 kHz I _{RMS} (mA)
					+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)	+25 °C	+85 °C +125 °C	-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 (μF)	CASE CODE	PART NUMBER ⁽¹⁾	MAX. ESR	MAX. IMP.	MAX. DCL (μA)		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	
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 ± 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".

**EXTENDED RATINGS**

CAPACITANCE (μF)	CASE CODE	PART NUMBER ⁽¹⁾	MAX. ESR	MAX. IMP.	MAX. DCL (μA)		MAX. CAPACITANCE CHANGE			MAX. RIPPLE 40 kHz I _{RMS} (mA)
			AT +25 °C 120 Hz (Ω)	AT -55 °C 120 Hz (Ω)	AT		(%) AT			
			+25 °C	+85 °C +125 °C	-55 °C	+85 °C	+125 °C			
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 (%) AT			MAX. RIPPLE 40 kHz I_{RMS} (mA)
			AT +25 °C 120 Hz (Ω)	AT -55 °C 120 Hz (Ω)	AT		-55 °C	+85 °C	+125 °C	
					+25 °C	+85 °C +125 °C				
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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