SOLID TANTALUM ELECTROLYTIC CAPACITORS

nichicon

F93

Resin-molded Chip, Standard Series

For SMD

Upgrade

● Adapted to the RoHS directive (2002/95/EC).

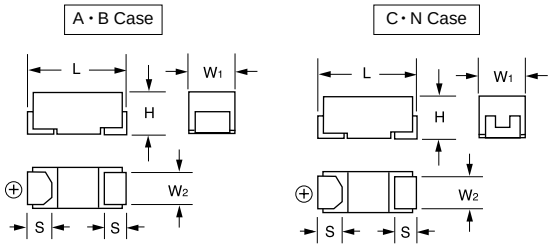


Type numbering system (Example: 10V 10µF)

1	2	3	4	5	6	7	8	9	10	11
F	9	3	1	A	1	0	6	M	A	

- 11: Taping code (Refer to page 267 for details)
- 10: Case code
- 9: Capacitance tolerance
- 8 7 6: Rated Capacitance
- 5 4: Rated voltage
- 3 2 1: Series

Drawing

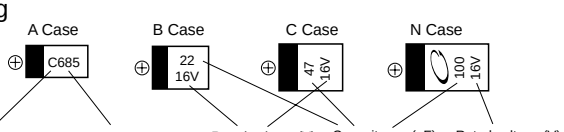


Dimensions

(mm)

Case code	L	W_1	W_2	H	S
A	3.2 ± 0.2	1.6 ± 0.2	1.2 ± 0.1	1.6 ± 0.2	0.8 ± 0.2
B	3.5 ± 0.2	2.8 ± 0.2	2.2 ± 0.1	1.9 ± 0.2	0.8 ± 0.2
C	6.0 ± 0.2	3.2 ± 0.2	2.2 ± 0.1	2.5 ± 0.2	1.3 ± 0.2
N	7.3 ± 0.2	4.3 ± 0.2	2.4 ± 0.1	2.8 ± 0.2	1.3 ± 0.2

Marking



2.5V	e	20V	D
4V	G	25V	E
6.3V	J	35V	V
10V	A		
16V	C		

Specifications

Item	Performance Characteristics
Category Temperature Range	−55 ~ +125°C (Rated temperature : +85°C)
Capacitance Tolerance	± 20%, ±10% (at 120Hz)
Dissipation Factor (120Hz)	Refer to next page
ESR (100kHz)	Refer to next page
Leakage Current	• After 1 minute's application of rated voltage, leakage current at 20°C is not more than 0.01CV or 0.5µA, whichever is greater. • After 1 minute's application of rated voltage, leakage current at 85°C is not more than 0.1CV or 5µA, whichever is greater. • After 1 minute's application of derated voltage, leakage current at 125°C is not more than 0.125CV or 6.3µA, whichever is greater.
Capacitance Change by Temperature	+15% Max. (at +125°C) +10% Max. (at +85°C) −10% Max. (at −55°C)
Damp Heat (No voltage applied)	At 40°C 90 ~ 95% R.H. 500 hours Capacitance Change Within ±10% of initial value Dissipation Factor·····Initial specified value or less Leakage Current·····Initial specified value or less
Temperature Cycles	−55°C / +125°C 30 minutes each 5 cycles Capacitance Change Within ±5% of initial value Dissipation Factor·····Initial specified value or less Leakage Current·····Initial specified value or less
Resistance to Soldering Heat	Test condition: 10 seconds reflow at 260°C , 5 seconds immersion at 260°C Capacitance Change Within ±5% of initial value Dissipation Factor·····Initial specified value or less Leakage Current·····Initial specified value or less
Surge*	After application of surge voltage in series with a 33Ω resistor at the rate of 30 seconds ON, seconds OFF, for 1000 sucessive test cycles at 85°C, capacitors meet the characteristics requirements listed below. Capacitance Change····Within ±5% of initial value Dissipation Factor·····Initial specified value or less Leakage Current·····Initial specified value or less
Endurance*	After 2000 hours' application of rated voltage in series with a 3Ω resistor at 85°C, or derated voltage in series with a 3Ω resistor at 125°C, capacitors meet the characteristic requirements listed below. Capacitance Change·····Within ±10% of initial value Dissipation Factor·····Initial specified value or less Leakage Current·····Initial specified value or less
Shear Test	After applying the pressure load of 5N for 10±1 seconds horizontally to the center of capacitor side body which has no electrode and has been soldered beforehand on an aluminum substrate, neigher exfoliation not its sign shall be found at the terminal electrode. 5N (0.51kg · f) For 10±1seconds
Terminal Strength	Keeping a capacitor surface-mounted on a substrate upside down and supporting the substrate at both of the opposite bottom points 45mm apart from the center of the capacitor, the pressure load is applied with a specified jig at the center of the substrate so that the substrate may bend by 1mm as illustrated. Then, there shall be found no remarkable abnormality on the capacitor terminals. R230 20 1mm 45 45

* As for the surge and derated voltage at 125°C, refer to page 266 for details.

Standard ratings

Cap. (µF) \ V	2.5	4	6.3	10	16	20	25	35
Code	0E	0G	0J	1A	1C	1D	1E	1V
0.47 474								A
0.68 684							A	A
1 105					A	A	A	A
1.5 155					A	A	A	A
2.2 225			A	A	A	A	A	A・B
3.3 335			A	A	A	A	A・B	B
4.7 475		A	A	A	A	A・B	A・B	(B)・C
6.8 685		A	A	A	A・B	A・B	C	C
10 106		A	A	A・B	A・B	A・B	(B)・C	C
15 156		A	A・B	A・B	A・B	C	C	N
22 226		A・B	A・B	A・B	A・B・C	(B)・C	C・N	N
33 336		A・B	A・B	A・B・C	B・C	C・N	N	
47 476	A	A・B	A・B	(A)・B・C	C・N	N	N	
68 686	A	A・B	A・B・C	(B)・C・N	N	(N)		
100 107	B	A・B	(A)・B・C	C・N	(C)・N			
150 157	B	B	B・C	C・N				
220 227	(A)・B	(A)・B・C	(B)・C・N	N	(N)			
330 337	(B)・C	C・N	N	N				
470 477	C・N	N	N					
680 687		N						

( ) The series in parentheses are being developed.

Please contact to your local Nichicon sales office when these series are being designed in your application.

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■ Standard ratings

Rated Volt	Rated Capacitance (μF)	Case code	Part Number	Leakage Current (μA)	Disspation Factor (%@120Hz)	ESR (Ω@100kHz)	*1 ΔC/C (%)
2.5V	47	A	F930E476MAA	1.2	12	2.5	*
	68	A	F930E686MAA	1.7	18	2.5	*
	100	B	F930E107MBA	2.5	14	0.9	*
	150	B	F930E157MBA	3.8	14	0.7	*
	220	B	F930E227MBA	5.5	18	0.7	*
	330	C	F930E337MCC	8.3	16	0.7	*
	470	C	F930E477MCC	11.8	18	0.5	*
	470	N	F930E477MNC	11.8	12	0.3	*
4V	4.7	A	F930G475MAA	0.5	6	4.0	*
	6.8	A	F930G685MAA	0.5	6	3.5	*
	10	A	F930G106MAA	0.5	6	3.0	*
	15	A	F930G156MAA	0.6	6	2.9	*
	22	A	F930G226MAA	0.9	8	2.5	*
	22	B	F930G226MBA	0.9	6	1.9	*
	33	A	F930G336MAA	1.3	8	2.5	*
	33	B	F930G336MBA	1.3	6	1.4	*
	47	A	F930G476MAA	1.9	18	2.5	*
	47	B	F930G476MBA	1.9	8	1.0	*
	68	A	F930G686MAA	2.7	24	2.5	*
	68	B	F930G686MBA	2.7	8	0.8	*
	100	A	F930G107MAA	4.0	30	2.0	*
	100	B	F930G107MBA	4.0	14	0.9	*
	150	B	F930G157MBA	6.0	16	0.7	*
	220	B	F930G227MBA	8.8	18	0.7	*
	220	C	F930G227MCC	8.8	12	0.7	*
	330	C	F930G337MCC	13.2	14	0.7	*
	330	N	F930G337MNC	13.2	10	0.5	*
	470	N	F930G477MNC	18.8	16	0.3	*
	680	N	F930G687MNC	27.2	18	0.3	*
6.3V	2.2	A	F930J225MAA	0.5	6	5.0	*
	3.3	A	F930J335MAA	0.5	6	4.5	*
	4.7	A	F930J475MAA	0.5	6	4.0	*
	6.8	A	F930J685MAA	0.5	6	3.5	*
	10	A	F930J106MAA	0.6	6	3.0	*
	15	A	F930J156MAA	0.9	8	2.9	*
	15	B	F930J156MBA	0.9	6	2.0	*
	22	A	F930J226MAA	1.4	8	2.5	*
	22	B	F930J226MBA	1.4	6	1.9	*
	33	A	F930J336MAA	2.1	8	2.5	*
	33	B	F930J336MBA	2.1	8	1.4	*
	47	A	F930J476MAA	3.0	18	2.5	*
	47	B	F930J476MBA	3.0	8	1.0	*
	68	A	F930J686MAA	4.3	20	2.0	*
	68	B	F930J686MBA	4.3	8	1.0	*
	68	C	F930J686MCC	4.3	8	0.8	*
	100	B	F930J107MBA	6.3	14	0.9	*
	100	C	F930J107MCC	6.3	10	0.7	*
	150	B	F930J157MBA	9.5	18	0.9	*
	150	C	F930J157MCC	9.5	12	0.7	*
	220	C	F930J227MCC	13.9	14	0.7	*
	220	N	F930J227MNC	13.9	10	0.5	*
	330	N	F930J337MNC	20.8	14	0.5	*
	470	N	F930J477MNC	29.6	16	0.3	*
10V	2.2	A	F931A225MAA	0.5	6	5.0	*
	3.3	A	F931A335MAA	0.5	6	4.5	*
	4.7	A	F931A475MAA	0.5	6	4.0	*
	6.8	A	F931A685MAA	0.7	6	3.5	*
	10	A	F931A106MAA	1.0	6	3.0	*
	10	B	F931A106MBA	1.0	6	2.1	*
	15	A	F931A156MAA	1.5	8	2.9	*
	15	B	F931A156MBA	1.5	6	2.0	*
	22	A	F931A226MAA	2.2	12	2.5	*
	22	B	F931A226MBA	2.2	8	1.9	*
	33	A	F931A336MAA	3.3	18	2.5	*
	33	B	F931A336MBA	3.3	8	1.4	*
	33	C	F931A336MCC	3.3	6	1.1	*
	47	B	F931A476MBA	4.7	8	1.0	*
	47	C	F931A476MCC	4.7	8	0.9	*
	68	C	F931A686MCC	6.8	8	0.8	*
	68	N	F931A686MNC	6.8	6	0.6	*
	100	C	F931A107MCC	10.0	10	0.7	*
	100	N	F931A107MNC	10.0	10	0.6	*
	150	C	F931A157MCC	15.0	14	0.7	*
	150	N	F931A157MNC	15.0	10	0.6	*
	220	N	F931A227MNC	22.0	12	0.5	*
	330	N	F931A337MNC	33.0	18	0.5	*

Rated Volt	Rated Capacitance (μF)	Case code	Part Number	Leakage Current (μA)	Disspation Factor (%@120Hz)	ESR (Ω@100kHz)	*1 ΔC/C (%)
16V	1	A	F931C105MAA	0.5	4	7.5	*
	1.5	A	F931C155MAA	0.5	6	6.0	*
	2.2	A	F931C225MAA	0.5	6	5.0	*
	3.3	A	F931C335MAA	0.5	6	4.5	*
	4.7	A	F931C475MAA	0.8	6	4.0	*
	6.8	A	F931C685MAA	1.1	6	3.5	*
	6.8	B	F931C685MBA	1.1	6	2.5	*
	10	A	F931C106MAA	1.6	6	3.0	*
	10	B	F931C106MBA	1.6	6	2.0	*
	15	A	F931C156MAA	2.4	10	3.0	*
	15	B	F931C156MBA	2.4	8	2.0	*
	22	A	F931C226MAA	3.5	15	3.0	±15
	22	B	F931C226MBA	3.5	8	1.9	*
	22	C	F931C226MCC	3.5	6	1.1	*
	33	B	F931C336MBA	5.3	8	1.9	*
	33	C	F931C336MCC	5.3	8	1.1	*
	47	C	F931C476MCC	7.5	8	0.9	*
	47	N	F931C476MNC	7.5	6	0.7	*
	68	N	F931C686MNC	10.9	8	0.6	*
	100	N	F931C107MNC	16.0	10	0.6	*
20V	1	A	F931D105MAA	0.5	4	7.5	*
	1.5	A	F931D155MAA	0.5	6	6.3	*
	2.2	A	F931D225MAA	0.5	6	5.0	*
	3.3	A	F931D335MAA	0.7	6	4.5	*
	4.7	A	F931D475MAA	0.9	6	4.0	*
	4.7	B	F931D475MBA	0.9	6	2.8	*
	6.8	A	F931D685MAA	1.4	6	3.5	*
	6.8	B	F931D685MBA	1.4	6	2.5	*
	10	A	F931D106MAA	2.0	8	3.5	*
	10	B	F931D106MBA	2.0	6	2.1	*
	15	C	F931D156MCC	3.0	6	1.2	*
	22	C	F931D226MCC	4.4	8	1.1	*
	33	C	F931D336MCC	6.6	8	1.1	*
	33	N	F931D336MNC	6.6	6	0.7	*
	47	N	F931D476MNC	9.4	8	0.7	*
25V	0.68	A	F931E684MAA	0.5	4	7.6	*
	1	A	F931E105MAA	0.5	4	7.5	*
	1.5	A	F931E155MAA	0.5	6	6.7	*
	2.2	A	F931E225MAA	0.6	6	6.3	*
	3.3	A	F931E335MAA	0.8	6	6.0	*
	3.3	B	F931E335MBA	0.8	6	3.1	*
	4.7	A	F931E475MAA	1.2	8	4.0	*
	4.7	B	F931E475MBA	1.2	6	2.8	*
	6.8	C	F931E685MCC	1.7	6	1.8	*
	10	C	F931E106MCC	2.5	6	1.5	*
	15	C	F931E156MCC	3.8	8	1.2	*
	22	C	F931E226MCC	5.5	8	1.1	*
	22	N	F931E226MNC	5.5	6	0.7	*
	33	N	F931E336MNC	8.3	8	0.7	*
	47	N	F931E476MNC	11.8	8	0.7	*
35V	0.47	A	F931V474MAA	0.5	4	10.0	*
	0.68	A	F931V684MAA	0.5	4	7.6	*
	1	A	F931V105MAA	0.5	4	7.5	*
	1.5	A	F931V155MAA	0.5	6	7.5	*
	2.2	A	F931V225MAA	0.8	6	7.0	*
	2.2	B	F931V225MBA	0.8	6	3.8	*
	3.3	B	F931V335MBA	1.2	6	3.5	*
	4.7	C	F931V475MCC	1.6	6	1.8	*
	6.8	C	F931V685MCC	2.4	6	1.8	*
	10	C	F931V106MCC	3.5	6	1.6	*
	15	N	F931V156MNC	5.3	6	0.7	*
	22	N	F931V226MNC	7.7	8	0.7	*

※ In case of capacitance tolerance ±10% type, K will be put at 9th digit of type numbering system.

*1 : ΔC/C

I t e m	A・B・C・N Case (%)
Damp Heat	±10
Tempereature cycles	±5
Resistance soldering heat	±5
Surge	±5
Endurance	±10