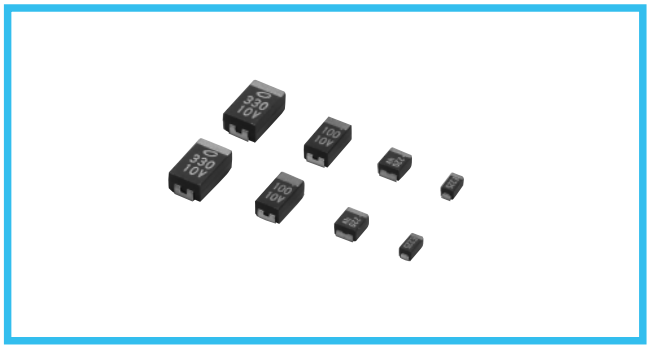
nichicon

F93

Resin-molded Chip, Standard Series

For SMD

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

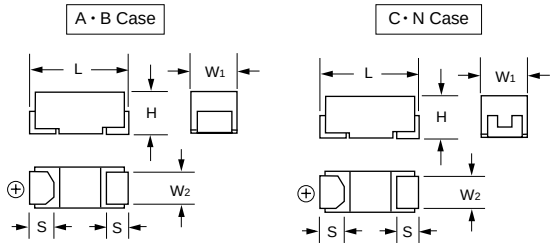


Type numbering system (Example: 10V 10µF)

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

- Taping code (Refer to page 309 for details)
- Case code
- Capacitance tolerance
- Rated capacitance
- Rated voltage
- Series

Drawing

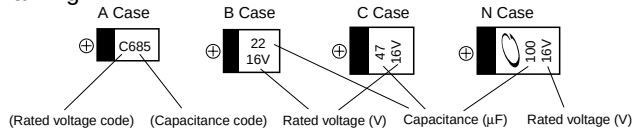


Dimensions

(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 to +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 (Steady State)	At 40°C 90 to 95% R.H. 500 hours (No voltage applied) Capacitance Change···Refer to next page (* 1) 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···Refer to next page (* 1) 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···Refer to next page (* 1) 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, 30 seconds OFF, for 1000 successive test cycles at 85°C, capacitors meet the characteristics requirements listed below. Capacitance Change·····Refer to next page (* 1) 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·····Refer to next page (* 1) 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, there shall be found neither exfoliation nor its sign at the terminal electrode. 5N (0.51kg・f) For 10±1 seconds
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 strength 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 308 for details.

Standard Ratings

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

* : Products which are scheduled to be discontinued. Not recommended for new designs.

F93

■ Standard Ratings

Rated Volt	Rated Capacitance (μF)	Case code	Part Number	Leakage Current (μA)	Disspation Factor (%@120Hz)	ESR (Ω@100kHz)	*1 ΔC/C (%)
4V	22	A	F930G226MAA	0.9	6	2.5	*
	33	A	F930G336MAA	1.3	8	2.5	*
	47	A	F930G476MAA	1.9	18	2.5	*
	68	A	F930G686MAA	2.7	24	2.5	*
	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	*
	470	N	F930G477MNC	18.8	16	0.3	*
	680	N	F930G687MNC	27.2	18	0.3	*
6.3V	4.7	A(*2)	F930J475MAA	0.5	6	4.0	*
	6.8	A(*2)	F930J685MAA	0.5	6	3.5	*
	10	A	F930J106MAA	0.6	6	3.0	*
	15	A	F930J156MAA	0.9	6	2.9	*
	22	A	F930J226MAA	1.4	8	2.5	*
	33	A	F930J336MAA	2.1	8	2.5	*
	47	A	F930J476MAA	3.0	18	2.5	*
	47	B	F930J476MBA	3.0	6	1.0	*
	68	A	F930J686MAA	4.3	20	2.0	*
	68	B	F930J686MBA	4.3	8	1.0	*
	100	A	F930J107MAA	6.3	35	2.0	±15
	100	B	F930J107MBA	6.3	14	0.9	*
	100	C	F930J107MCC	6.3	8	0.7	*
	150	B	F930J157MBA	9.5	18	0.9	*
	150	C	F930J157MCC	9.5	12	0.7	*
	220	B	F930J227MBA	13.9	30	1.2	±15
	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	4.7	A(*2)	F931A475MAA	0.5	6	4.0	*
	6.8	A	F931A685MAA	0.7	6	3.5	*
	10	A	F931A106MAA	1.0	6	3.0	*
	15	A	F931A156MAA	1.5	8	2.9	*
	15	B(*2)	F931A156MBA	1.5	6	2.0	*
	22	A	F931A226MAA	2.2	12	2.5	*
	22	B(*2)	F931A226MBA	2.2	6	1.9	*
	33	A	F931A336MAA	3.3	18	2.5	*
	33	B	F931A336MBA	3.3	8	1.4	*
	47	A	F931A476MAA	4.7	40	2.0	±15
	47	B	F931A476MBA	4.7	8	1.0	*
	47	C	F931A476MCC	4.7	6	0.9	*
	68	B	F931A686MBA	6.8	12	0.9	±15
	68	C	F931A686MCC	6.8	8	0.8	*
	100	B	F931A107MBA	10.0	18	1.2	±15
	100	C	F931A107MCC	10.0	10	0.7	*
	100	N	F931A107MNC	10.0	8	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	*
16V	1.5	A(*2)	F931C155MAA	0.5	4	6.0	*
	2.2	A	F931C225MAA	0.5	4	5.0	*
	3.3	A	F931C335MAA	0.5	4	4.5	*
	4.7	A	F931C475MAA	0.8	6	4.0	*
	6.8	A	F931C685MAA	1.1	6	3.5	*
	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	6	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	*

Rated Volt	Rated Capacitance (μF)	Case code	Part Number	Leakage Current (μA)	Disspation Factor (%@120Hz)	ESR (Ω@100kHz)	*1 ΔC/C (%)
16V	33	B	F931C336MBA	5.3	8	1.9	*
	33	C	F931C336MCC	5.3	6	1.1	*
	47	C	F931C476MCC	7.5	8	0.9	*
	47	N	F931C476MNC	7.5	6	0.7	*
	68	N	F931C686MNC	10.9	6	0.6	*
	100	C	F931C107MCC	16.0	15	0.7	±10
	100	N	F931C107MNC	16.0	10	0.6	*
	150	N	F931C157MNC	24.0	15	0.6	*
	220	N	F931C220MNC	35.2	25	0.7	±10
20V	2.2	A	F931D225MAA	0.5	4	5.0	*
	3.3	A	F931D335MAA	0.7	4	4.5	*
	4.7	A	F931D475MAA	0.9	6	3.0	*
	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	B	F931D226MBA	4.4	8	1.9	*
	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	C	F931D476MCC	9.4	10	1.1	*
	47	N	F931D476MNC	9.4	8	0.7	*
25V	0.68	A(*2)	F931E684MAA	0.5	4	7.6	*
	1	A	F931E105MAA	0.5	4	7.5	*
	1.5	A	F931E155MAA	0.5	4	6.7	*
	2.2	A	F931E225MAA	0.6	6	6.3	*
	3.3	A	F931E335MAA	0.8	6	6.0	*
	4.7	A	F931E475MAA	1.2	8	4.0	*
	4.7	B	F931E475MBA	1.2	6	2.8	*
	10	B	F931E106MBA	2.5	12	1.9	*
	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(*2)	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	4	3.8	*
	3.3	B	F931V335MBA	1.2	4	3.5	*
	4.7	B	F931V475MBA	1.6	8	3.1	*
	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

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

*2 : Products which are scheduled to be discontinued.
Not recommended for new designs.