

**F93**Resin-molded Chip,  
Standard Series

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



### ■ Type numbering system (Example: 10V 10μF)



### ■ Drawing



### ■ Dimensions

| Case code | L         | W <sub>1</sub> | W <sub>2</sub> | 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



### ■ Standard Ratings

| Cap. (μF) | V   | 4           | 6.3       | 10        | 16          | 20    | 25    | 35    |
|-----------|-----|-------------|-----------|-----------|-------------|-------|-------|-------|
| Code      |     | 0G          | 0J        | 1A        | 1C          | 1D    | 1E    | 1V    |
| 0.68      | 684 |             |           |           |             |       |       | A     |
| 1         | 105 |             |           |           | A           |       | A     | A     |
| 1.5       | 155 |             |           |           |             |       | A     | A     |
| 2.2       | 225 |             |           |           | A           | A     | A     | A · B |
| 3.3       | 335 |             |           |           | A           | A     | A     | B     |
| 4.7       | 475 |             |           |           | A           | A · B | A · B | B · C |
| 6.8       | 685 |             |           | A         | A           | A · B |       | C     |
| 10        | 106 |             | A         | A         | A · B       | A · B | B · C | C     |
| 15        | 156 |             | A         | A         | 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           |           |           |             |       |       |       |

### ■ Specifications

| Item                              | Performance Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category                          | –55 to +125°C (Rated temperature : +85°C)                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Temperature Range                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Capacitance Tolerance             | ±20%, ±10% (at 120Hz)                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Dissipation Factor (120Hz)        | Refer to next page                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| ESR (100kHz)                      | Refer to next page                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Leakage Current                   | <ul style="list-style-type: none"> <li>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.</li> <li>After 1 minute's application of rated voltage, leakage current at 85°C is not more than 0.1CV or 5μA, whichever is greater.</li> <li>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.</li> </ul> |
| Capacitance Change by Temperature | +15% Max. (at +125°C)<br>+10% Max. (at +85°C)<br>–10% Max. (at –55°C)                                                                                                                                                                                                                                                                                                                                                                                             |
| Damp Heat (Steady State)          | At 40°C 90 to 95% R.H. 500 hours (No voltage applied)<br>Capacitance Change...Refer to next page (* 1)<br>Dissipation Factor...Initial specified value or less<br>Leakage Current...Initial specified value or less                                                                                                                                                                                                                                               |
| Temperature Cycles                | –55°C / +125°C 30 minutes each 5 cycles<br>Capacitance Change...Refer to next page (* 1)<br>Dissipation Factor...Initial specified value or less<br>Leakage Current...Initial specified value or less                                                                                                                                                                                                                                                             |
| Resistance to Soldering Heat      | 10 seconds reflow at 260°C, 5 seconds immersion at 260°C<br>Capacitance Change...Refer to next page (* 1)<br>Dissipation Factor...Initial specified value or less<br>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 shall meet the characteristic requirements table below.<br>Capacitance Change...Refer to next page (* 1)<br>Dissipation Factor...Initial specified value or less<br>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 shall meet the characteristic requirements table below.<br>Capacitance Change...Refer to next page (* 1)<br>Dissipation Factor...Initial specified value or less<br>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 a 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 capacitor, the pressure strength is applied with a specified jig at the center of 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 45 45 1mm                         |

\* As for the surge and derated voltage at 125°C, refer to page 332 for details.

We can supply the type of compliance to AEC-Q200.  
Please contact to your local Nichicon sales office when these series are being designed in your application.

( ) The series in parentheses are being developed.  
Please contact to your local Nichicon sales office when these series are being designed in your application.

CAT.8100B

## F93

## ■ Standard Ratings

| Rated Volt | Rated Capacitance (μF) | Case code | Part Number | Leakage Current (μA) | Dissipation 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            | *           |
| 6.3V       | 470                    | N         | F930G477MNC | 18.8                 | 16                           | 0.3            | *           |
|            | 680                    | N         | F930G687MNC | 27.2                 | 18                           | 0.3            | *           |
|            | 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            | *           |
| 10V        | 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            | *           |
| 16V        | 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            | *           |
|            | 22                     | A         | F931A226MAA | 2.2                  | 12                           | 2.5            | *           |
|            | 22                     | B         | 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            | *           |
| 20V        | 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            | *           |
| 25V        | 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            | *           |
| 35V        | 15                     | N         | F931V156MNC | 5.3                  | 6                            | 0.7            | *           |
|            | 22                     | N         | F931V226MNC | 7.7                  | 8                            | 0.7            | *           |
| 16V        | 1                      | A         | F931C105MAA | 0.5                  | 4                            | 7.5            | *           |
|            | 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         |
| 20V        | 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                  | 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            | *           |
| 25V        | 220                    | N         | F931C227MNC | 35.2                 | 25                           | 0.7            | ±10         |
|            | 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            | *           |
| 35V        | 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            | *           |
|            | 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            | *           |
| 35V        | 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            | *           |
|            | 0.68                   | A         | F931V684MAA | 0.5                  | 4                            | 7.6            | *           |

\*1 : ΔC/C Marked "\*"

| Item                      | A · B · C · N Case (%) |
|---------------------------|------------------------|
| Damp Heat                 | ±10                    |
| Temperature cycles        | ±5                     |
| Resistance soldering heat | ±5                     |
| Surge                     | ±5                     |
| Endurance                 | ±10                    |

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



**Стандарт  
Электрон  
Связь**

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