

**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.                      20N                                       |

\* 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            | *           |
| 10V        | 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            | *           |
| 10V        | 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            | *           |

\*1 : ΔC/C Marked "\*"

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

| Rated Volt | Rated Capacitance (μF) | Case code | Part Number | Leakage Current (μA) | Dissipation Factor (%@120Hz) | ESR (Ω@100kHz) | *1 ΔC/C (%) |
|------------|------------------------|-----------|-------------|----------------------|------------------------------|----------------|-------------|
| 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         |
| 16V        | 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            | *           |
| 20V        | 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            | *           |
| 25V        | 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            | *           |
| 25V        | 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        | 0.68                   | 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            | *           |

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



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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- Поставка более 17-ти миллионов наименований электронных компонентов;
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- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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