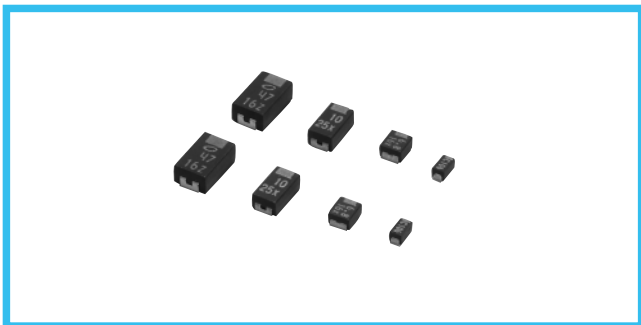


F97

Resin-molded Chip,  
High Reliability  
(High temperature /  
moisture resistance) Series



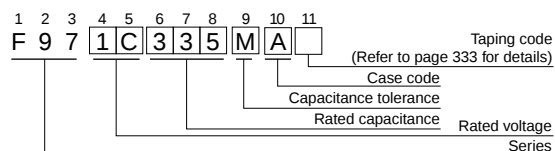
- Compliant to the RoHS directive (2002/95/EC).
- Compliant to AEC-Q200.



### Applications

- Automotive electronics (Engine ECU)
- Industrial equipment

### Type numbering system (Example : 16V 3.3μF)



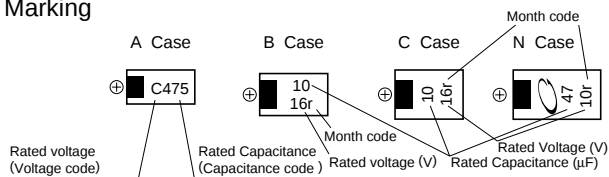
### Drawing



### 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   | 6.3   | 10          | 16        | 20      | 25      | 35      |
|-----------|-----|-------|-------------|-----------|---------|---------|---------|
| Code      | OJ  | 1A    | 1C          | 1D        | 1E      | 1V      |         |
| 0.47      | 474 |       |             |           |         | A       | A       |
| 0.68      | 684 |       |             |           | A       | A       | A       |
| 1         | 105 |       |             |           | A       | A       | (A)     |
| 1.5       | 155 |       |             | A         | A       |         | (A) · B |
| 2.2       | 225 |       | A           | A         | A       | (A) · B | B       |
| 3.3       | 335 | A     | A           | A         | B       | B       | (B) · C |
| 4.7       | 475 | A     | A · B       | A · B     | A · B   | (B) · C | C       |
| 6.8       | 685 | A · B | B           | B         | (B) · C | C       | (C) · N |
| 10        | 106 |       | A · B       | A · B · C | (B) · C | C · N   | N       |
| 15        | 156 | B     | B           | (B) · C   | N       | (C) · N |         |
| 22        | 226 | A · B | A · B       | B · C · N | C · N   | (N)     |         |
| 33        | 336 | A · C | B · C · N   | B · C · N |         | (N)     |         |
| 47        | 476 | B · C | (B) · C · N | (C) · N   |         |         |         |
| 68        | 686 | N     | N           |           |         |         |         |
| 100       | 107 | N     | (C) · (N)   |           |         |         |         |

### Specifications

| Item                              | Performance Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category Temperature Range        | -55 to +125°C (Rated temperature : +85°C)                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Capacitance Tolerance             | ± 20%, ± 10% (at 120Hz)                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Dissipation Factor                | 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 85°C, 85% R.H., For 1000 hours (No voltage applied)<br>Capacitance Change ..... Within ±10% of the initial value<br>Dissipation Factor ..... Initial specified value or less<br>Leakage Current ..... 125% or less than the initial specified value                                                                                                                                                                                                                  |
| Load Humidity                     | After 500 hour's application of rated voltage in series with a 33Ω resistor at 60°C, 90 to 95% R.H., capacitors meet the characteristics requirements table below.<br>Capacitance Change ..... Within ±10% of the initial value<br>Dissipation Factor ..... Initial specified value or less<br>Leakage Current ..... 125% or less than the initial specified value                                                                                                      |
| Temperature Cycles                | At -55°C / +125°C, For 30 minutes each, 1000 cycles<br>Capacitance Change ..... Within ±5% of the initial value<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 ..... Within ±5% of the initial value<br>Dissipation Factor ..... Initial specified value or less<br>Leakage Current ..... Initial specified value or less                                                                                                                                                                                                                              |
| Solderability                     | After immersing capacitors completely into a solder pot at 245°C for 2 to 3 seconds, more than 3/4 of their electrode area shall remain covered with new solder.                                                                                                                                                                                                                                                                                                        |
| Surge*                            | After application of surge 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 ..... Within ±5% of the initial value<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 ..... Within ±10% of the initial value<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.                                                                                                                                                                                                    |
| 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 the substrate so that substrate may bend by 1mm as illustrated. Then, there shall be found no remarkable abnormality on the capacitor terminals.                                                                      |

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

( ) The series in parentheses are being developed.

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

## F97

## ■ Standard Ratings

| Rated Volt | Rated Capacitance (μF) | Case code | Part Number | Leakage Current (μA) | Dissipation Factor (%@120Hz) | ESR (Ω@100kHz) |
|------------|------------------------|-----------|-------------|----------------------|------------------------------|----------------|
| 6.3V       | 3.3                    | A         | F970J335MAA | 0.5                  | 4                            | 4.5            |
|            | 4.7                    | A         | F970J475MAA | 0.5                  | 6                            | 4.0            |
|            | 6.8                    | A         | F970J685MAA | 0.5                  | 6                            | 3.5            |
|            | 6.8                    | B         | F970J685MBA | 0.5                  | 6                            | 2.5            |
|            | 15                     | B         | F970J156MBA | 0.9                  | 6                            | 2.0            |
|            | 22                     | A         | F970J226MAA | 1.4                  | 12                           | 2.5            |
|            | 22                     | B         | F970J226MBA | 1.4                  | 8                            | 1.9            |
|            | 33                     | A         | F970J336MAA | 2.1                  | 12                           | 2.5            |
|            | 33                     | C         | F970J336MCC | 2.1                  | 6                            | 1.1            |
|            | 47                     | B         | F970J476MBA | 3.0                  | 8                            | 1.0            |
|            | 47                     | C         | F970J476MCC | 3.0                  | 6                            | 0.9            |
|            | 68                     | N         | F970J686MNC | 4.3                  | 6                            | 0.6            |
|            | 100                    | N         | F970J107MNC | 6.3                  | 8                            | 0.6            |
| 10V        | 2.2                    | A         | F971A225MAA | 0.5                  | 4                            | 5.0            |
|            | 3.3                    | A         | F971A335MAA | 0.5                  | 4                            | 4.5            |
|            | 4.7                    | A         | F971A475MAA | 0.5                  | 6                            | 4.0            |
|            | 4.7                    | B         | F971A475MBA | 0.5                  | 6                            | 2.8            |
|            | 6.8                    | B         | F971A685MBA | 0.7                  | 6                            | 2.5            |
|            | 10                     | A         | F971A106MAA | 1.0                  | 6                            | 3.0            |
|            | 10                     | B         | F971A106MBA | 1.0                  | 6                            | 2.0            |
|            | 15                     | B         | F971A156MBA | 1.5                  | 6                            | 2.0            |
|            | 22                     | A         | F971A226MAA | 2.2                  | 15                           | 3.0            |
|            | 22                     | B         | F971A226MBA | 2.2                  | 8                            | 1.9            |
|            | 33                     | B         | F971A336MBA | 3.3                  | 8                            | 1.9            |
|            | 33                     | C         | F971A336MCC | 3.3                  | 6                            | 1.1            |
|            | 33                     | N         | F971A336MNC | 3.3                  | 6                            | 0.7            |
|            | 47                     | C         | F971A476MCC | 4.7                  | 8                            | 0.9            |
|            | 47                     | N         | F971A476MNC | 4.7                  | 6                            | 0.7            |
|            | 68                     | N         | F971A686MNC | 6.8                  | 6                            | 0.6            |
| 16V        | 1.5                    | A         | F971C155MAA | 0.5                  | 4                            | 6.3            |
|            | 2.2                    | A         | F971C225MAA | 0.5                  | 4                            | 5.0            |
|            | 3.3                    | A         | F971C335MAA | 0.5                  | 4                            | 4.5            |
|            | 4.7                    | A         | F971C475MAA | 0.8                  | 8                            | 4.0            |
|            | 4.7                    | B         | F971C475MBA | 0.8                  | 6                            | 2.8            |
|            | 6.8                    | B         | F971C685MBA | 1.1                  | 6                            | 2.5            |
|            | 10                     | A         | F971C106MAA | 1.6                  | 8                            | 3.5            |
|            | 10                     | B         | F971C106MBA | 1.6                  | 6                            | 2.1            |
|            | 10                     | C         | F971C106MCC | 1.6                  | 6                            | 1.5            |
|            | 15                     | C         | F971C156MCC | 2.4                  | 6                            | 1.2            |
|            | 22                     | B         | F971C226MBA | 3.5                  | 8                            | 1.9            |
|            | 22                     | C         | F971C226MCC | 3.5                  | 8                            | 1.1            |
|            | 22                     | N         | F971C226MNC | 3.5                  | 6                            | 0.7            |
|            | 33                     | B         | F971C336MBA | 5.3                  | 10                           | 2.1            |
|            | 33                     | C         | F971C336MCC | 5.3                  | 8                            | 1.1            |
|            | 33                     | N         | F971C336MNC | 5.3                  | 6                            | 0.7            |
|            | 47                     | N         | F971C476MNC | 7.5                  | 8                            | 0.7            |
| 20V        | 0.68                   | A         | F971D684MAA | 0.5                  | 4                            | 7.6            |
|            | 1                      | A         | F971D105MAA | 0.5                  | 4                            | 7.5            |
|            | 1.5                    | A         | F971D155MAA | 0.5                  | 4                            | 6.7            |
|            | 2.2                    | A         | F971D225MAA | 0.5                  | 6                            | 6.3            |
|            | 3.3                    | B         | F971D335MBA | 0.7                  | 4                            | 3.1            |
|            | 4.7                    | A         | F971D475MAA | 0.9                  | 8                            | 4.0            |
|            | 4.7                    | B         | F971D475MBA | 0.9                  | 6                            | 2.8            |
|            | 6.8                    | C         | F971D685MCC | 1.4                  | 6                            | 1.8            |
|            | 10                     | C         | F971D106MCC | 2.0                  | 6                            | 1.5            |
|            | 15                     | N         | F971D156MNC | 3.0                  | 6                            | 0.7            |
|            | 22                     | C         | F971D226MCC | 4.4                  | 8                            | 1.1            |
|            | 22                     | N         | F971D226MNC | 4.4                  | 6                            | 0.7            |

| Rated Volt | Rated Capacitance (μF) | Case code | Part Number | Leakage Current (μA) | Dissipation Factor (%@120Hz) | ESR (Ω@100kHz) |
|------------|------------------------|-----------|-------------|----------------------|------------------------------|----------------|
| 25V        | 0.68                   | A         | F971E684MAA | 0.5                  | 4                            | 7.6            |
|            | 1                      | A         | F971E105MAA | 0.5                  | 4                            | 7.5            |
|            | 2.2                    | B         | F971E225MBA | 0.6                  | 4                            | 3.8            |
|            | 3.3                    | B         | F971E335MBA | 0.8                  | 4                            | 3.5            |
|            | 4.7                    | C         | F971E475MCC | 1.2                  | 6                            | 1.8            |
|            | 6.8                    | C         | F971E685MCC | 1.7                  | 6                            | 1.8            |
|            | 10                     | C         | F971E106MCC | 2.5                  | 6                            | 1.6            |
|            | 10                     | N         | F971E106MNC | 2.5                  | 6                            | 1.0            |
|            | 15                     | N         | F971E156MNC | 3.8                  | 6                            | 0.7            |
| 35V        | 0.47                   | A         | F971V474MAA | 0.5                  | 4                            | 10.0           |
|            | 0.68                   | A         | F971V684MAA | 0.5                  | 4                            | 7.6            |
|            | 1.5                    | B         | F971V155MBA | 0.5                  | 4                            | 4.0            |
|            | 2.2                    | B         | F971V225MBA | 0.8                  | 4                            | 3.8            |
|            | 3.3                    | C         | F971V335MCC | 1.2                  | 4                            | 2.0            |
|            | 4.7                    | C         | F971V475MCC | 1.6                  | 6                            | 1.8            |
|            | 6.8                    | N         | F971V685MNC | 2.4                  | 6                            | 1.0            |
|            | 10                     | N         | F971V106MNC | 3.5                  | 6                            | 1.0            |

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

## Данный компонент на территории Российской Федерации

**Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9