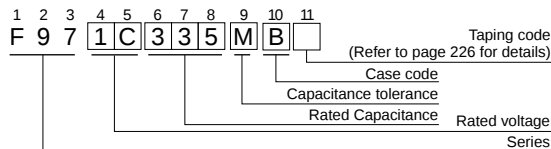
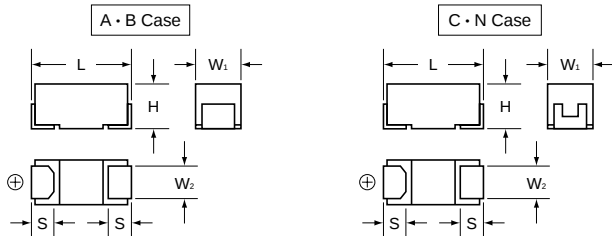


**F97**Resin-molded Chip,  
High Reliability  
(High temperature /  
moisture resistance) Series

## ■ Specifications

■ Type numbering system (Example : 16V 3.3  $\mu$ F)

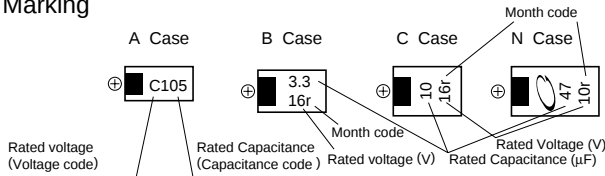
## ■ Drawing



## ■ 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. ( $\mu$ F) | V   | 4     | 6.3   | 10    | 16    | 20 | 25    | 35                  |
|-----------------|-----|-------|-------|-------|-------|----|-------|---------------------|
| Code            | 0G  | 0J    | 1A    | 1C    | 1D    | 1E | 1V    |                     |
| 0.1             | 104 |       |       |       |       |    |       | A* <sup>1</sup>     |
| 0.15            | 154 |       |       |       |       |    |       | A* <sup>1</sup>     |
| 0.22            | 224 |       |       |       |       |    |       | A* <sup>1</sup>     |
| 0.33            | 334 |       |       |       |       |    |       | A                   |
| 0.47            | 474 |       |       |       |       |    | A     | A · B* <sup>1</sup> |
| 0.68            | 684 |       |       |       |       | A  | A     | A · B* <sup>1</sup> |
| 1               | 105 |       |       |       | A     | A  | A     | B                   |
| 1.5             | 155 |       |       | A     | A     | A  | B     | B · C* <sup>1</sup> |
| 2.2             | 225 |       | A     | A     | A     | B  | B     | B · C* <sup>1</sup> |
| 3.3             | 335 | A     | A     | A     | B     | B  | B     | C                   |
| 4.7             | 475 | A     | A     | B     | B     | B  | C     | C · N* <sup>1</sup> |
| 6.8             | 685 | A     | B     | B     | B     | C  | C     | N                   |
| 10              | 106 | B     | B     | B     | C     | C  | C · N | N                   |
| 15              | 156 | B     | B     | C     | C     | N  | N     |                     |
| 22              | 226 | B     | C     | C     | C · N | N  |       |                     |
| 33              | 336 | C     | C     | C · N | N     |    |       |                     |
| 47              | 476 | C     | C · N | N     |       |    |       |                     |
| 68              | 686 | C · N | N     |       |       |    |       |                     |
| 100             | 107 | N     | N     |       |       |    |       |                     |
| 150             | 157 | N     |       |       |       |    |       |                     |

| Item                              | Performance Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category Temperature Range        | -55 ~ +125°C (Rated temperature : 85°C.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Capacitance Tolerance             | ±20%, ±10% (at 120Hz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Dissipation Factor                | Refer to P.233                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| E.S.R. (100kHz)                   | Refer to P.233                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 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 0.5<math>\mu</math>A, 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 5<math>\mu</math>A, 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 6.3<math>\mu</math>A, 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                         | At 85°C, 85% R.H.,For 1000 hours (No voltage applied)<br>Capacitance Change ..... Within ±10% of initial value<br>Dissipation Factor ..... Initial specified value or less<br>Leakage Current ..... 125% or less of initial specified value                                                                                                                                                                                                                                                                 |
| Load Humidity                     | After 500 hour's application of rated voltage in series with a 33 $\Omega$ resistor at 60°C,90~95% R.H.,capacitors meet the characteristics requirements listed below.<br>Capacitance Change ..... Within ±10% of initial value<br>Dissipation Factor ..... Initial specified value or less<br>Leakage Current ..... 125% or less of initial specified value                                                                                                                                                |
| Temperature Cycles                | At -55°C / +125°C,For 30 minutes each,1000 cycles<br>Capacitance Change ..... Within ±5% of initial value<br>Dissipation Factor ..... Initial specified value or less<br>Leakage Current ..... Initial specified value or less                                                                                                                                                                                                                                                                              |
| Resistance to Soldering Heat      | At 260°C,reflowing capacitors for 10 seconds Max.<br>Capacitance Change ..... Within ±5% of 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 2~3 seconds,more than 3/4 of their electrode area shall remain covered with new solder.                                                                                                                                                                                                                                                                                                                                                |
| Surge*                            | After application of surge in series with a 33 $\Omega$ 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.<br>Capacitance Change ..... Within ±5% of 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 3 $\Omega$ resistor at 85°C,or derated voltage in series with a 3 $\Omega$ resistor at 125°C,capacitors meet the characteristic requirements listed below.<br>Capacitance Change ..... Within ±10% of 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 an aluminum substrate,there shall be found neither exfoliation nor its sign at the terminal electrode.<br>5N (0.51kg · f)<br>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.<br>20N<br>45mm<br>1mm                                                                                                                                                             |

\* As for the surge and derated voltage at 125°C, refer to page 225 for details.

\*<sup>1</sup> is old series. Please choice another series for new design.

## F97

## ■ Standard ratings

| Rated Volt | Rated Capacitance (μF) | Case code | Part Number | Leakage Current (μA) | Dissipation Factor (%@120Hz) | E.S.R. (Ω@100kHz) |
|------------|------------------------|-----------|-------------|----------------------|------------------------------|-------------------|
| 4V         | 3.3                    | A         | F970G335MAA | 0.5                  | 6                            | 4.5               |
|            | 4.7                    | A         | F970G475MAA | 0.5                  | 6                            | 4.0               |
|            | 6.8                    | A         | F970G685MAA | 0.5                  | 6                            | 3.5               |
|            | 10                     | B         | F970G106MBA | 0.5                  | 6                            | 2.1               |
|            | 15                     | B         | F970G156MBA | 0.6                  | 6                            | 2.0               |
|            | 22                     | B         | F970G226MBA | 0.9                  | 6                            | 1.9               |
|            | 33                     | C         | F970G336MCC | 1.3                  | 6                            | 1.1               |
|            | 47                     | C         | F970G476MCC | 1.9                  | 6                            | 0.9               |
|            | 68                     | C         | F970G686MCC | 2.7                  | 6                            | 0.8               |
|            | 68                     | N         | F970G686MNC | 2.7                  | 6                            | 0.6               |
|            | 100                    | N         | F970G107MNC | 4.0                  | 8                            | 0.6               |
|            | 150                    | N         | F970G157MNC | 6.0                  | 8                            | 0.6               |
| 6.3V       | 2.2                    | A         | F970J225MAA | 0.5                  | 6                            | 5.0               |
|            | 3.3                    | A         | F970J335MAA | 0.5                  | 6                            | 4.5               |
|            | 4.7                    | A         | F970J475MAA | 0.5                  | 6                            | 4.0               |
|            | 6.8                    | B         | F970J685MBA | 0.5                  | 6                            | 2.5               |
|            | 10                     | B         | F970J106MBA | 0.6                  | 6                            | 2.1               |
|            | 15                     | B         | F970J156MBA | 0.9                  | 6                            | 2.0               |
|            | 22                     | C         | F970J226MCC | 1.4                  | 6                            | 1.1               |
|            | 33                     | C         | F970J336MCC | 2.1                  | 6                            | 1.1               |
|            | 47                     | C         | F970J476MCC | 3.0                  | 6                            | 0.9               |
|            | 47                     | N         | F970J476MNC | 3.0                  | 6                            | 0.7               |
|            | 68                     | N         | F970J686MNC | 4.3                  | 6                            | 0.6               |
|            | 100                    | N         | F970J107MNC | 6.3                  | 8                            | 0.6               |
| 10V        | 1.5                    | A         | F971A155MAA | 0.5                  | 4                            | 6.0               |
|            | 2.2                    | A         | F971A225MAA | 0.5                  | 6                            | 5.0               |
|            | 3.3                    | A         | F971A335MAA | 0.5                  | 6                            | 4.5               |
|            | 4.7                    | B         | F971A475MBA | 0.5                  | 6                            | 2.8               |
|            | 6.8                    | B         | F971A685MBA | 0.7                  | 6                            | 2.5               |
|            | 10                     | B         | F971A106MBA | 1.0                  | 6                            | 2.0               |
|            | 15                     | C         | F971A156MCC | 1.5                  | 6                            | 1.2               |
|            | 22                     | C         | F971A226MCC | 2.2                  | 6                            | 1.1               |
|            | 33                     | C         | F971A336MCC | 3.3                  | 6                            | 1.1               |
|            | 33                     | N         | F971A336MNC | 3.3                  | 6                            | 0.7               |
|            | 47                     | N         | F971A476MNC | 4.7                  | 6                            | 0.7               |
| 16V        | 1                      | A         | F971C105MAA | 0.5                  | 4                            | 7.5               |
|            | 1.5                    | A         | F971C155MAA | 0.5                  | 4                            | 6.3               |
|            | 2.2                    | A         | F971C225MAA | 0.5                  | 6                            | 5.0               |
|            | 3.3                    | B         | F971C335MBA | 0.5                  | 6                            | 3.1               |
|            | 4.7                    | B         | F971C475MBA | 0.8                  | 6                            | 2.8               |
|            | 6.8                    | B         | F971C685MBA | 1.1                  | 6                            | 2.5               |
|            | 10                     | C         | F971C106MCC | 1.6                  | 6                            | 1.5               |
|            | 15                     | C         | F971C156MCC | 2.4                  | 6                            | 1.2               |
|            | 22                     | C         | F971C226MCC | 3.5                  | 8                            | 1.1               |
|            | 22                     | N         | F971C226MNC | 3.5                  | 6                            | 0.7               |
|            | 33                     | N         | F971C336MNC | 5.3                  | 6                            | 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                  | 6                            | 6.7               |
|            | 2.2                    | B         | F971D225MBA | 0.5                  | 6                            | 3.8               |
|            | 3.3                    | B         | F971D335MBA | 0.7                  | 6                            | 3.1               |
|            | 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                     | N         | F971D226MNC | 4.4                  | 6                            | 0.7               |

| Rated Volt | Rated Capacitance (μF) | Case code | Part Number               | Leakage Current (μA) | Dissipation Factor (%@120Hz) | E.S.R. (Ω@100kHz) |
|------------|------------------------|-----------|---------------------------|----------------------|------------------------------|-------------------|
| 25V        | 0.47                   | A         | F971E474MAA               | 0.5                  | 4                            | 10.0              |
|            | 0.68                   | A         | F971E684MAA               | 0.5                  | 4                            | 7.6               |
|            | 1                      | A         | F971E105MAA               | 0.5                  | 4                            | 7.5               |
|            | 1.5                    | B         | F971E155MBA               | 0.5                  | 4                            | 4.0               |
|            | 2.2                    | B         | F971E225MBA               | 0.6                  | 6                            | 3.8               |
|            | 3.3                    | B         | F971E335MBA               | 0.8                  | 6                            | 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        | 0.1                    | A         | F971V104MAA <sup>*1</sup> | 0.5                  | 4                            | 15.0              |
|            | 0.15                   | A         | F971V154MAA <sup>*1</sup> | 0.5                  | 4                            | 15.0              |
|            | 0.22                   | A         | F971V224MAA <sup>*1</sup> | 0.5                  | 4                            | 12.0              |
|            | 0.33                   | A         | F971V334MAA               | 0.5                  | 4                            | 12.0              |
|            | 0.47                   | A         | F971V474MAA               | 0.5                  | 4                            | 10.0              |
|            | 0.47                   | B         | F971V474MBA <sup>*1</sup> | 0.5                  | 4                            | 5.0               |
|            | 0.68                   | A         | F971V684MAA               | 0.5                  | 4                            | 7.6               |
|            | 0.68                   | B         | F971V684MBA <sup>*1</sup> | 0.5                  | 4                            | 5.0               |
|            | 1                      | B         | F971V105MBA               | 0.5                  | 4                            | 4.0               |
|            | 1.5                    | B         | F971V155MBA               | 0.5                  | 6                            | 4.0               |
|            | 1.5                    | C         | F971V155MCC <sup>*1</sup> | 0.5                  | 4                            | 2.0               |
|            | 2.2                    | B         | F971V225MBA               | 0.8                  | 6                            | 3.8               |
|            | 2.2                    | C         | F971V225MCC <sup>*1</sup> | 0.8                  | 6                            | 2.0               |
|            | 3.3                    | C         | F971V335MCC               | 1.2                  | 6                            | 2.0               |
|            | 4.7                    | C         | F971V475MCC               | 1.6                  | 6                            | 1.8               |
|            | 4.7                    | N         | F971V475MNC <sup>*1</sup> | 1.6                  | 6                            | 1.0               |
|            | 6.8                    | N         | F971V685MNC               | 2.4                  | 6                            | 1.0               |
|            | 10                     | N         | F971V106MNC               | 3.5                  | 6                            | 1.0               |

\*1 is old series. Please choice another series for new design.