

# Type 944U Polypropylene, DC Link Capacitors

## High Current, Low Profile for Inverter Applications



Type 944U is specifically designed for use in high power DC filtering applications. The low inductance internal construction utilizes low loss metallized polypropylene for high ripple current capability. Male or female terminal options offer design flexibility in a rugged UL 94V0 rated flame retardant plastic case and resin fill. High current ratings and robust mounting flanges make the 944U suited for inverter applications in electric vehicle power inverters, wind power inverters and motor drives.

### Highlights

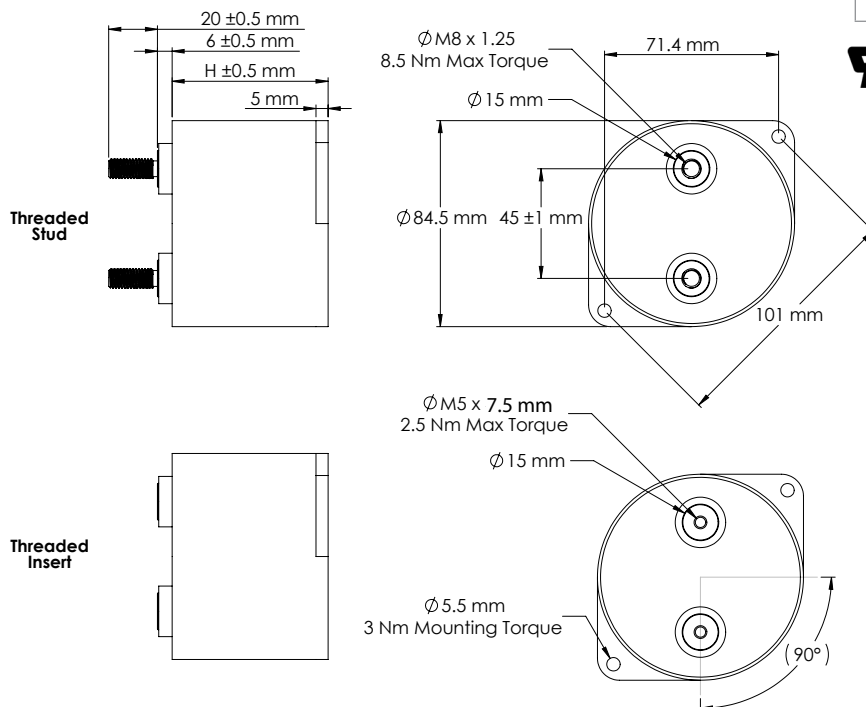
- Low Inductance
- Low Profile
- Low ESR
- High Ripple Current
- High Voltage Ratings

### Specifications

|   |   |
|---|---|
| Capacitance Range                                       | 33 to 220 $\mu$ F                       |
| Capacitance Tolerance                                   | $\pm$ 10% standard                      |
| Rated Voltage   | 800 to 1400 Vdc                         |
| Operating Temperature Range                             | -40 $^{\circ}$ C to 85 $^{\circ}$ C     |
| Maximum rms Current                                     | 74A @ 55 $^{\circ}$ C                   |
| Maximum rms Voltage                                     | 230 Vac                                 |
| Test Voltage between Terminal @ 25 $^{\circ}$ C         | 150% rated DC voltage for 10 s          |
| Test Voltage between Terminals & Case @ 25 $^{\circ}$ C | 4 kVac @ 50/60 Hz for 60 s              |
| Life Test   | 5000 h @ 85 $^{\circ}$ C, rated voltage |


RoHS Compliant

### Dimensions



### Construction Details

|                   |                   |
|-------------------|-------------------|
| Case Material     | Plastic UL94V-0   |
| Resin Material    | Dry Resin UL94V-0 |
| Terminal Material | Tin Plated Brass  |

 UL Recognized E128034 construction only - unprotected

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### Part Numbering System

|             |   |                  |   |                        |                            |                                      |
|-------------|---|------------------|---|------------------------|----------------------------|--------------------------------------|
| <b>944U</b> | <b>101</b>  | <b>K</b>         | <b>801</b>  | <b>A</b>               | <b>A</b>                   | <b>M</b>                             |
| <b>Type</b> | <b>Capacitance</b>  | <b>Tolerance</b> | <b>Voltage</b>  | <b>Diameter D (mm)</b> | <b>Height H (mm)</b>       | <b>Terminal</b>                      |
| 944U        | 101 = 100 $\mu$ F<br>700 = 70 $\mu$ F<br>470 = 47 $\mu$ F | K = $\pm$ 10%    | 801 = 800 Vdc<br>102 = 1000 Vdc<br>122 = 1200 Vdc<br>142 = 1400 Vdc | A = 84.5               | A = 40<br>B = 51<br>C = 64 | M = M8 Thd Stud<br>I = M5 Thd Insert |

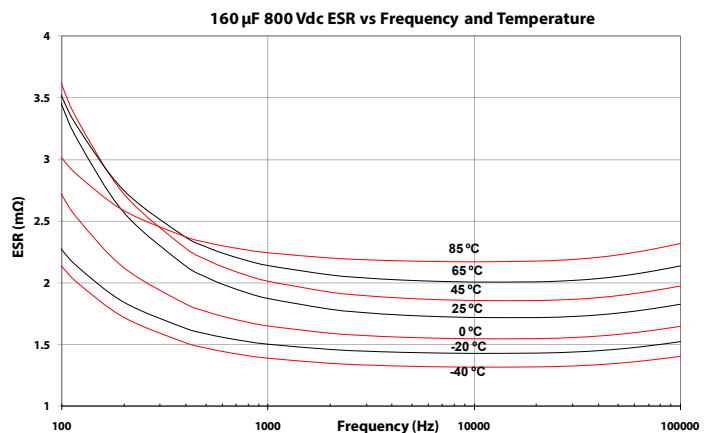
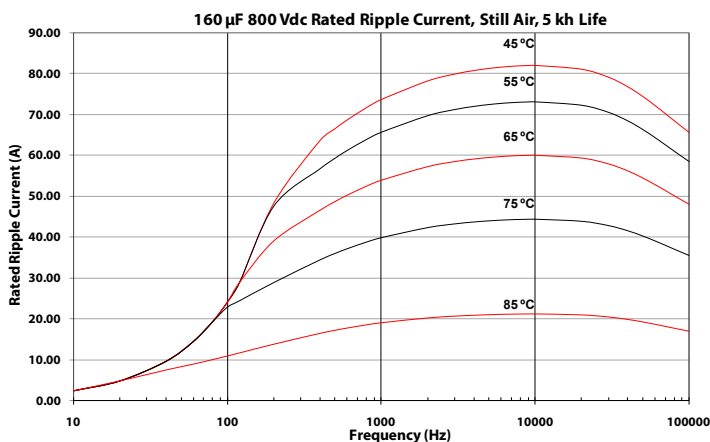
### Ratings

**NOTE:** Other ratings, sizes and performance specifications are available. Contact us.

| Catalog Part Number | Cap ( $\mu$ F) | Rated Voltage (Vdc) | H Height mm | Typical ESR 10kHz (m $\Omega$ ) | Typical ESL (nH) | Max Irms 55°C (A) | Thermal Resistance   |                      |
|---------------------|----------------|---------------------|-------------|---------------------------------|------------------|-------------------|----------------------|----------------------|
|                     |                |                     |             |                                 |                  |                   | $\Theta_{cc}$ (°C/W) | $\Theta_{ca}$ (°C/W) |
| 944U101K801AA*      | 100            | 800                 | 40          | 0.5                             | 20               | 74                | 2.8                  | 5.2                  |
| 944U161K801AB*      | 160            | 800                 | 51          | 0.8                             | 30               | 73                | 3.0                  | 4.5                  |
| 944U221K801AC*      | 220            | 800                 | 64          | 1.0                             | 40               | 72                | 3.1                  | 4.0                  |
| 944U660K102AA*      | 66             | 1000                | 40          | 0.6                             | 20               | 70                | 2.8                  | 5.2                  |
| 944U101K102AB*      | 100            | 1000                | 51          | 0.8                             | 30               | 68                | 3.0                  | 4.5                  |
| 944U141K102AC*      | 140            | 1000                | 64          | 1.0                             | 40               | 65                | 3.1                  | 4.0                  |
| 944U470K122AA*      | 47             | 1200                | 40          | 0.7                             | 20               | 67                | 2.8                  | 5.2                  |
| 944U700K122AB*      | 70             | 1200                | 51          | 1.0                             | 30               | 65                | 3.0                  | 4.5                  |
| 944U101K122AC*      | 100            | 1200                | 64          | 1.3                             | 40               | 64                | 3.1                  | 4.0                  |
| 944U330K142AA*      | 33             | 1400                | 40          | 0.8                             | 20               | 64                | 2.8                  | 5.2                  |
| 944U520K142AB*      | 52             | 1400                | 51          | 1.1                             | 30               | 60                | 3.0                  | 4.5                  |
| 944U700K142AC*      | 70             | 1400                | 64          | 1.4                             | 40               | 59                | 3.1                  | 4.0                  |

\* M = M8 Stud I = M5 Insert

### Typical Performance Curves



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### Expected Lifetime Predictions

|                                     |  |
|-------------------------------------|--|
| Capacitance:                        | $C$ ( $\mu\text{F}$ )                                |
| Equivalent Series Resistance:       | ESR ( $\text{m}\Omega$ )                             |
| Frequency:                          | $f$ (kHz)  |
| Ripple Current:                     | $I$ ( $\text{A}_{\text{rms}}$ )                      |
| Ambient Temperature:                | $T_A$ ( $^{\circ}\text{C}$ )                         |
| Core Temperature:                   | $T_C$ ( $^{\circ}\text{C}$ )                         |
| Total Thermal Resistance:           | $\Theta$ ( $^{\circ}\text{C}/\text{W}$ )             |
| Thermal Resistance case-to-ambient: | $\Theta_{\text{CA}}$ ( $^{\circ}\text{C}/\text{W}$ ) |
| Thermal Resistance core-to-case:    | $\Theta_{\text{CC}}$ ( $^{\circ}\text{C}/\text{W}$ ) |
| Airflow Speed:                      | $v$ (m/s)  |
| Applied Voltage:                    | $V_A$ ( $\text{V}_{\text{DC}}$ )                     |
| Rated Voltage:                      | $V_R$ ( $\text{V}_{\text{DC}}$ )                     |

#### Determine ESR at Operating Frequency

Use the 10 kHz ESR from the ratings tables.

For operation below 10 kHz, the ESR will need to be adjusted using the following equation:  $\text{ESR} - 31.83/(10C) + 31.83/(fC)$ .

#### Determine Thermal Resistance at Operating Frequency and Air Flow

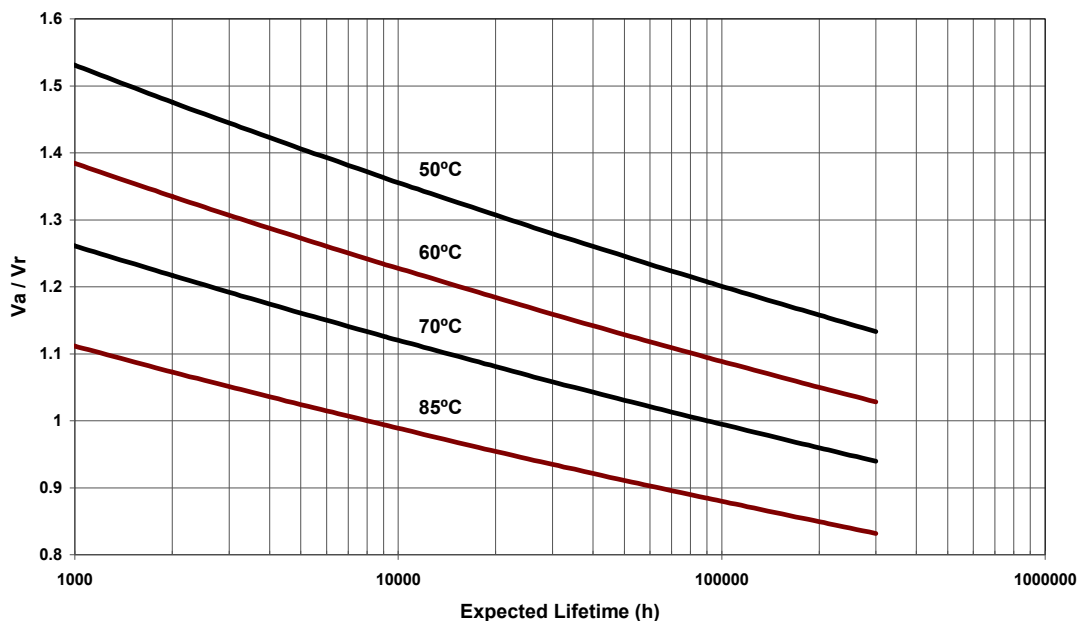
Compute  $\Theta = \Theta_{\text{CC}} + \Theta_{\text{CA}}$ . In the ratings tables,  $\Theta_{\text{CA}}$  is for still air. For  $v = 0$  to 5 m/s, multiply  $\Theta_{\text{CA}}$  by  $[(5 + 17.6(0.1^{0.66})) / (5 + 17.6(v + 0.1)^{0.66})]$

#### Determine Expected Lifetime

Look up Expected Lifetime on the graph using  $V_A/V_R$  and  $T_C = T_A + I^2 (\text{ESR}/1000) \Theta$

The maximum allowed temperature rise is 40  $^{\circ}\text{C}$  and the maximum allowed core temperature is 95  $^{\circ}\text{C}$ .

Expected Lifetime vs Hot Spot Temperature and Applied DC Voltage



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