

## Aluminum Capacitors + 105 °C, Snap-In

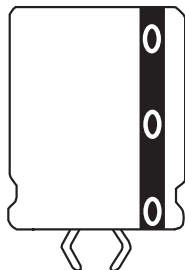


Fig.1 Component Outlines

### FEATURES

- Operating temperature to + 105 °C
- High ripple current capability
- Low ESR



| QUICK REFERENCE DATA                      |                                                                                                                                   |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| DESCRIPTION                               | VALUE                                                                                                                             |
| Nominal case size<br>Ø D x L in mm        | 0.87" x 1.00" (22.0 x 25.0)<br>to 1.38" x 3.15" (35.0 x 80.0)                                                                     |
| Operating temperature                     | - 40 °C to + 105 °C                                                                                                               |
| Rated capacitance<br>range C <sub>R</sub> | 68 µF to 47 000 µF                                                                                                                |
| Capacitance tolerance                     | ± 20 %                                                                                                                            |
| Voltage rating                            | 16 WVDC to 400 WVDC                                                                                                               |
| Termination                               | Snap mount                                                                                                                        |
| Life validation test<br>at 105 °C         | 2000 h: Δ CAP ≤ 15 % from initial<br>measurement. Δ ESR ≤ 1.3 x initial<br>specified limit. Δ DCL ≤ initial specified<br>limit    |
| Shelf life at 85 °C                       | 500 h: Δ CAP ≤ 15 % from initial<br>measurement. Δ ESR ≤ 1.3 x initial<br>specified limit. Δ DCL ≤ 2 x initial<br>specified limit |
| DC leakage current                        | $I = K \sqrt{CV}$<br>K = 4.0 at + 25 °C<br>I in µA, C in µF, V in Volts                                                           |

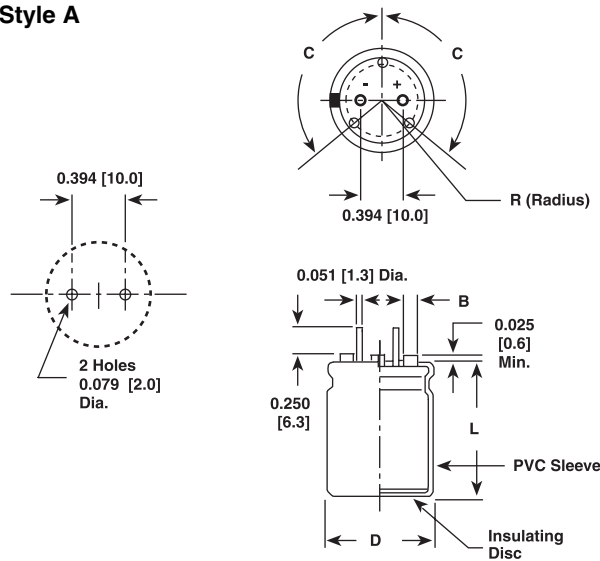
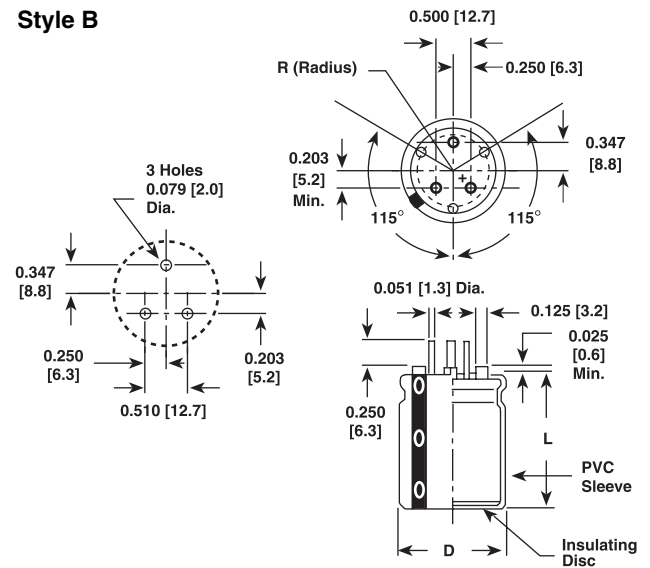
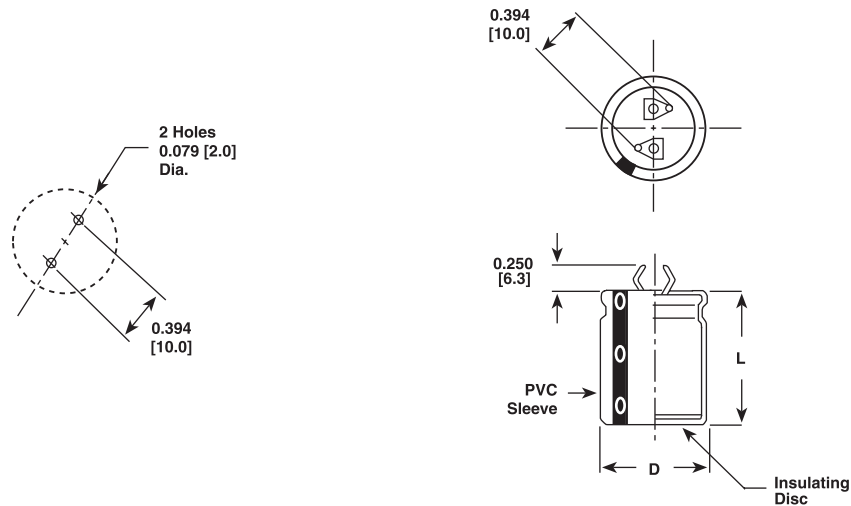
| RIPPLE CURRENT MULTIPLIERS              |                |                |                |                |
|-----------------------------------------|----------------|----------------|----------------|----------------|
| TEMPERATURE                             |                |                |                |                |
| AMBIENT TEMPERATURE                     |                | MULTIPLIERS    |                |                |
| + 55 °C                                 |                | 1.6            |                |                |
| + 65 °C                                 |                | 1.4            |                |                |
| + 75 °C                                 |                | 1.2            |                |                |
| + 85 °C                                 |                | 1.0            |                |                |
| + 95 °C                                 |                | 0.70           |                |                |
| + 105 °C                                |                | 0.50           |                |                |
| FREQUENCY (Hz)                          |                |                |                |                |
| WVDC                                    | 50 TO 60       | 300 TO 1000    | 1000 AND UP    |                |
| 0 - 49                                  | 0.85           | 1.10           | 1.15           |                |
| 50 - 199                                | 0.83           | 1.15           | 1.20           |                |
| 200 - 250                               | 0.80           | 1.30           | 1.40           |                |
| ESL (TYPICAL VALUES AT 1 MHz TO 10 MHz) |                |                |                |                |
| Nominal Diameter                        | 0.87<br>(22.0) | 0.98<br>(25.0) | 1.18<br>(30.0) | 1.38<br>(35.0) |
| Typical ESL (nH)                        | 6.0            | 8.0            | 10.0           | 12.0           |

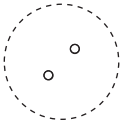
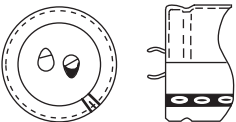
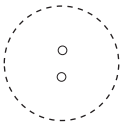
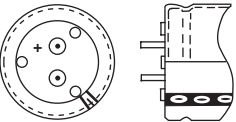
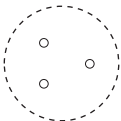
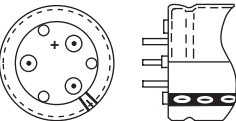
| DIMENSIONS in inches (millimeters) |                          |                |           |                          |                |
|------------------------------------|--------------------------|----------------|-----------|--------------------------|----------------|
| CASE CODE                          | DIAMETER                 | LENGTH         | CASE CODE | DIAMETER                 | LENGTH         |
|                                    | D + 0.04 - 0 (+ 1.0 - 0) | L ± 0.08 (2.0) |           | D + 0.04 - 0 (+ 1.0 - 0) | L ± 0.08 (2.0) |
| HA                                 | 0.87 (22.0)              | 1.00 (25.0)    | KC        | 1.18 (30.0)              | 1.38 (35.0)    |
| HB                                 | 0.87 (22.0)              | 1.18 (30.0)    | KD        | 1.18 (30.0)              | 1.57 (40.0)    |
| HD                                 | 0.87 (22.0)              | 1.57 (40.0)    | KE        | 1.18 (30.0)              | 2.00 (50.0)    |
| JA                                 | 1.00 (25.0)              | 1.00 (25.0)    | MB        | 1.38 (35.0)              | 1.18 (30.0)    |
| JB                                 | 1.00 (25.0)              | 1.18 (30.0)    | MC        | 1.38 (35.0)              | 1.38 (35.0)    |
| JC                                 | 1.00 (25.0)              | 1.38 (35.0)    | MD        | 1.38 (35.0)              | 1.57 (40.0)    |
| JD                                 | 1.00 (25.0)              | 1.57 (40.0)    | ME        | 1.38 (35.0)              | 2.00 (50.0)    |
| JE                                 | 1.00 (25.0)              | 2.00 (50.0)    | MF        | 1.38 (35.0)              | 2.50 (63.0)    |
| KA                                 | 1.18 (30.0)              | 1.00 (25.0)    | MG        | 1.38 (35.0)              | 3.18 (80.0)    |
| KB                                 | 1.18 (30.0)              | 1.18 (30.0)    |           |                          |                |

| <b>DIMENSIONS</b> in inches (millimeters)              |           |             |              |      |              |
|--------------------------------------------------------|-----------|-------------|--------------|------|--------------|
| CIRCUIT BOARD MOUNT TERMINAL DIMENSIONS <sup>(1)</sup> |           |             |              |      |              |
| DIAMETER                                               |           | STYLE A     |              |      | STYLE B      |
| D                                                      | CASE CODE | B           | R            | C    | R            |
| 1.00 (25.0)                                            | J         | 0.093 (2.4) | 0.301 (7.6)  | 140° | N/A          |
| 1.18 (30.0)                                            | K         | 0.125 (3.2) | 0.363 (9.2)  | 120° | 0.391 (9.9)  |
| 1.38 (35.0)                                            | M         | 0.125 (3.2) | 0.458 (11.6) | 120° | 0.458 (11.6) |

**Note**

<sup>(1)</sup> Style A and B not available in 0.87" (22.0 mm) diameter units

**DIMENSIONS AND AVAILABLE FORMS**
**Style A**

**Style B**

**Style D**


| TERMINAL CONFIGURATION (numbers in brackets indicate millimeters) |                                                        |                                                                                   |                                                                                    |                                                                          |                                        |
|-------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------|
| LEAD CODE                                                         | DESCRIPTION                                            | OUTLINE DRAWINGS                                                                  |                                                                                    | AVAILABLE DIAMETERS                                                      | AVAILABLE VOLTAGES AND TYPES           |
|                                                                   |                                                        | MOUNTING CONFIGURATION                                                            | TERMINAL CONFIGURATION                                                             |                                                                          |                                        |
| D                                                                 | Standard<br>2 pin snap-in                              |  |  | 0.87 (22.0) - H<br>0.98 (25.0) - J<br>1.18 (30.0) - K<br>1.38 (35.0) - M | All voltages<br>81D, 81DA<br>82D, 82DA |
| A                                                                 | 2 straight wire lead<br>molded cover with<br>standoffs |  |  | 0.98 (25.0) - J<br>1.18 (30.0) - K<br>1.38 (35.0) - M                    | All voltages<br>82D, 82DA              |
|                                                                   |                                                        |                                                                                   |                                                                                    |                                                                          | $V \leq 250 V_{DC}$<br>81D, 81DA       |
| B                                                                 | 3 straight wire lead<br>molded cover with<br>standoffs |  |  | 1.18 (30.0) - K<br>1.38 (35.0) - M                                       | All voltages<br>82D, 82DA              |
|                                                                   |                                                        |                                                                                   |                                                                                    |                                                                          | $V \leq 250 V_{DC}$<br>81D, 81DA       |

**ORDERING EXAMPLE**

Electrolytic capacitor 81D series:

81D 221 M 250 HD 2 D E3

| DESCRIPTION |                                    |
|-------------|------------------------------------|
| CODE        | EXPLANATION                        |
| 81D         | product type                       |
| 221         | capacitance value (220 $\mu F$ )   |
| M           | tolerance (M = $\pm 20\%$ )        |
| 250         | voltage rating at 105 °C (250 V)   |
| HD          | can size (see dimensions table)    |
| 2           | pvc insulating sleeve              |
| D           | terminal style (D = 2 pin snap-in) |
| E3          | RoHS compliant                     |

| ELECTRICAL DATA AND ORDERING INFORMATION |                |                             |                        |              |                            |              |
|------------------------------------------|----------------|-----------------------------|------------------------|--------------|----------------------------|--------------|
| CAPACITANCE<br>(μF)                      | PART NUMBER    | NOMINAL CASE SIZE<br>D x L  | MAX. ESR at 25 °C (mΩ) |              | MAX. RIPPLE at + 85 °C (A) |              |
|                                          |                |                             | 120 Hz                 | 20 to 40 kHz | 120 Hz                     | 20 to 40 kHz |
| 16 WVDC at + 105 °C, SURGE = 20 V        |                |                             |                        |              |                            |              |
| 15 000.0                                 | 81D153M016JC2D | 0.984 x 1.378 (25.0 x 35.0) | 58.0                   | 43.0         | 4.72                       | 5.47         |
| 22 000.0                                 | 81D223M016KB2D | 1.181 x 1.181 (30.0 x 30.0) | 53.7                   | 41.0         | 5.24                       | 5.94         |
| 33 000.0                                 | 81D333M016MC2D | 1.378 x 1.378 (35.0 x 35.0) | 28.0                   | 21.0         | 8.42                       | 9.71         |
| 47 000.0                                 | 81D473M016MD2D | 1.378 x 1.575 (35.0 x 40.0) | 23.0                   | 17.0         | 9.70                       | 11.20        |
| 25 WVDC at + 105 °C, SURGE = 30 V        |                |                             |                        |              |                            |              |
| 3300.0                                   | 81D332M025HA2D | 0.866 x 0.984 (22.0 x 25.0) | 110.0                  | 76.0         | 2.81                       | 3.38         |
| 4700.0                                   | 81D472M025JA2D | 0.984 x 0.984 (25.0 x 25.0) | 86.0                   | 60.0         | 3.44                       | 4.15         |
| 6800.0                                   | 81D682M025KA2D | 1.181 x 0.984 (30.0 x 25.0) | 71.0                   | 54.0         | 4.25                       | 4.91         |
| 10 000.0                                 | 81D103M025KB2D | 1.181 x 1.181 (30.0 x 30.0) | 54.0                   | 41.0         | 5.24                       | 5.94         |
| 15 000.0                                 | 81D153M025KD2D | 1.181 x 1.575 (30.0 x 40.0) | 36.4                   | 27.0         | 7.07                       | 8.16         |
| 22 000.0 <sup>(1)</sup>                  | 81D223M025MD2D | 1.378 x 1.575 (35.0 x 40.0) | 23.0                   | 17.0         | 9.41                       | 11.20        |

Aluminum Capacitors  
+ 105 °C, Snap-In

Vishay Sprague

| ELECTRICAL DATA AND ORDERING INFORMATION |                |                             |                        |              |                            |              |
|------------------------------------------|----------------|-----------------------------|------------------------|--------------|----------------------------|--------------|
| CAPACITANCE<br>(μF)                      | PART NUMBER    | NOMINAL CASE SIZE<br>D x L  | MAX. ESR at 25 °C (mΩ) |              | MAX. RIPPLE at + 85 °C (A) |              |
|                                          |                |                             | 120 Hz                 | 20 to 40 kHz | 120 Hz                     | 20 to 40 kHz |
| 35 WVDC at + 105 °C, SURGE = 40 V        |                |                             |                        |              |                            |              |
| 4700.0                                   | 81D472M035KA2D | 1.181 x 0.984 (30.0 x 25.0) | 75.0                   | 54.0         | 4.13                       | 4.84         |
| 6800.0                                   | 81D682M035KB2D | 1.181 x 1.181 (30.0 x 30.0) | 57.0                   | 41.0         | 5.10                       | 5.94         |
| 12 000.0                                 | 81D123M035KD2D | 1.181 x 1.575 (30.0 x 40.0) | 37.7                   | 27.0         | 6.92                       | 8.16         |
| 10 000.0                                 | 81D103M035MB2D | 1.378 x 1.181 (35.0 x 30.0) | 36.0                   | 24.0         | 7.04                       | 8.63         |
| 50 WVDC at + 105 °C, SURGE = 63 V        |                |                             |                        |              |                            |              |
| 1200.0                                   | 81D122M050HA2D | 0.866 x 0.984 (22.0 x 25.0) | 148.0                  | 79.0         | 2.41                       | 3.29         |
| 2200.0                                   | 81D222M050JB2D | 0.984 x 1.181 (25.0 x 30.0) | 85.0                   | 48.0         | 3.69                       | 4.93         |
| 4700.0                                   | 81D472M050KC2D | 1.181 x 1.378 (30.0 x 35.0) | 53.0                   | 33.0         | 5.51                       | 7.05         |
| 6800.0 <sup>(1)</sup>                    | 81D682M050KE2D | 1.181 x 1.969 (30.0 x 50.0) | 33.0                   | 22.0         | 8.04                       | 9.74         |
| 63 WVDC at + 105 °C, SURGE = 79 V        |                |                             |                        |              |                            |              |
| 1000.0                                   | 81D102M063HA2D | 0.866 x 0.984 (22.0 x 25.0) | 151.0                  | 75.0         | 2.39                       | 3.39         |
| 1500.0                                   | 81D152M063HB2D | 0.866 x 1.181 (22.0 x 30.0) | 118.0                  | 59.0         | 2.87                       | 4.06         |
| 2200.0                                   | 81D222M063JC2D | 0.984 x 1.378 (25.0 x 35.0) | 72.0                   | 38.0         | 4.21                       | 5.78         |
| 4700.0                                   | 81D472M063KD2D | 1.181 x 1.575 (30.0 x 40.0) | 44.0                   | 27.0         | 6.32                       | 8.16         |
| 100 WVDC at + 105 °C, SURGE = 125 V      |                |                             |                        |              |                            |              |
| 470.0                                    | 81D471M100HB2D | 0.866 x 1.181 (22.0 x 30.0) | 258.0                  | 114.0        | 1.94                       | 2.93         |
| 680.0                                    | 81D681M100JB2D | 0.984 x 1.181 (25.0 x 30.0) | 188.0                  | 86.0         | 2.48                       | 3.67         |
| 1000.0                                   | 81D102M100KB2D | 1.181 x 1.181 (30.0 x 30.0) | 136.0                  | 66.0         | 3.28                       | 4.69         |
| 1500.0                                   | 81D152M100KC2D | 1.181 x 1.378 (30.0 x 35.0) | 106.0                  | 52.0         | 3.90                       | 5.59         |
| 2200.0 <sup>(1)</sup>                    | 81D222M100KE2D | 1.181 x 1.969 (30.0 x 50.0) | 66.0                   | 33.0         | 5.69                       | 8.05         |
| 200 WVDC at + 105 °C, SURGE = 250V       |                |                             |                        |              |                            |              |
| 220.0                                    | 81D221M200JA2D | 0.984 x 0.984 (25.0 x 25.0) | 625.0                  | 272.0        | 1.37                       | 2.08         |
| 330.0                                    | 81D331M200KA2D | 1.181 x 0.984 (30.0 x 25.0) | 498.0                  | 192.0        | 1.71                       | 2.77         |
| 470.0                                    | 81D471M200KB2D | 1.181 x 1.181 (30.0 x 30.0) | 294.0                  | 136.0        | 2.39                       | 3.51         |
| 1000.0                                   | 81D102M200KE2D | 1.181 x 1.969 (30.0 x 50.0) | 142.0                  | 67.0         | 4.09                       | 5.95         |
| 820.0                                    | 81D821M200MC2D | 1.378 x 1.378 (35.0 x 35.0) | 189.0                  | 93.0         | 3.47                       | 4.94         |
| 1000.0 <sup>(1)</sup>                    | 81D102M200MD2D | 1.378 x 1.575 (35.0 x 40.0) | 149.0                  | 74.0         | 4.07                       | 5.78         |
| 250 WVDC at + 105 °C, SURGE = 300V       |                |                             |                        |              |                            |              |
| 220.0                                    | 81D221M250HD2D | 0.866 x 1.575 (22.0 x 40.0) | 558.0                  | 166.0        | 1.57                       | 2.89         |
| 330.0                                    | 81D331M250JD2D | 0.984 x 1.575 (25.0 x 40.0) | 382.0                  | 121.0        | 2.12                       | 3.81         |
| 470.0                                    | 81D471M250JE2D | 0.984 x 1.969 (25.0 x 25.0) | 243.0                  | 93.0         | 2.81                       | 4.54         |
| 680.0                                    | 81D681M250KE2D | 1.181 x 1.969 (30.0 x 50.0) | 198.0                  | 67.0         | 3.47                       | 5.99         |
| 1000.0 <sup>(1)</sup>                    | 81D102M250ME2D | 1.378 x 1.969 (35.0 x 50.0) | 132.0                  | 58.0         | 4.69                       | 7.07         |
| 400 WVDC at + 105 °C, SURGE = 450V       |                |                             |                        |              |                            |              |
| 68.0                                     | 81D680M400HB2D | 0.866 x 1.181 (22.0 x 30.0) | 3550.0                 | 1890.0       | 0.536                      | 0.707        |
| 100.0                                    | 81D101M400JB2D | 0.984 x 1.181 (25.0 x 30.0) | 2920.0                 | 1550.0       | 0.683                      | 0.902        |
| 150.0                                    | 81D151M400JD2D | 0.984 x 1.575 (25.0 x 40.0) | 1650.0                 | 880.0        | 1.000                      | 1.1329       |
| 220.0                                    | 81D221M400KD2D | 1.181 x 1.575 (30.0 x 40.0) | 1110.0                 | 580.0        | 1.476                      | 1.781        |
| 330.0                                    | 81D331M400MD2D | 1.378 x 1.575 (35.0 x 40.0) | 730.0                  | 390.0        | 1.695                      | 2.257        |

## Note

<sup>(1)</sup> These ratings are normally stocked



### Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.