

# ATC 100 E Series Porcelain High RF Power Multilayer Capacitors

- Case E Size (.380" x .380")
- High Q
- Low ESR/ESL
- High RF Power
- Extended WVDC up to 7200 VDC
- Capacitance Range 1 pF to 5100 pF
- Ultra-Stable Performance
- High RF Current/Voltage
- High Reliability
- Available with Encapsulation Option\*

ATC, the industry leader, offers new improved ESR/ESL performance for the 100 E Series RF Capacitors. This high Q multilayer capacitor is ultra-stable under high RF current and voltage applications. High density porcelain construction provides a rugged, hermetic package.

ATC offers an encapsulation option for applications requiring extended protection against arc-over and corona.

Typical functional applications: Bypass, Coupling, Tuning, Impedance Matching and DC Blocking.

Typical circuit applications: HF/RF Power Amplifiers, Transmitters, Antenna Tuning, Plasma Chambers and Medical (MRI coils).

\*For leaded styles only

## ENVIRONMENTAL TESTS

ATC 100 E Series Capacitors are designed and manufactured to meet and exceed the requirements of EIA-198, MIL-PRF-55681 and MIL-PRF-123.

### THERMAL SHOCK:

MIL-STD-202, Method 107, Condition A.

### MOISTURE RESISTANCE:

MIL-STD-202, Method 106.

### LOW VOLTAGE HUMIDITY:

MIL-STD-202, Method 103, Condition A, with 1.5 Volts DC applied while subjected to an environment of 85°C with 85% relative humidity for 240 hours min.

### LIFE TEST:

MIL-STD-202, Method 108, for 2000 hours, at 125°C.

Voltage applied.

200% of WVDC for capacitors rated at 500 volts DC or less.

120% of WVDC for capacitors rated at 1250 volts DC or less.

100% of WVDC for capacitors rated above 1250 volts DC.



## ELECTRICAL AND MECHANICAL SPECIFICATIONS

### QUALITY FACTOR (Q):

Greater than 10,000 (1 pF to 1000 pF) @ 1 MHz.

Greater than 10,000 (1100 pF to 5100 pF) @ 1 KHz.

### TEMPERATURE COEFFICIENT OF CAPACITANCE (TCC):

+90 ±30 PPM/°C (-55°C to +125°C)

### INSULATION RESISTANCE (IR):

1 pF to 5100 pF:

10<sup>5</sup> Megohms min. @ +25°C at 500 VDC.

10<sup>4</sup> Megohms min. @ +125°C at 500 VDC.

### WORKING VOLTAGE (WVDC):

See Capacitance Values Table, page 2.

### DIELECTRIC WITHSTANDING VOLTAGE (DWV):

250% of WVDC for capacitors rated at 500 volts DC or less for 5 seconds.

150% of WVDC for capacitors rated at 1250 volts DC or less for 5 seconds.

120% of WVDC for capacitors rated above 1250 volts DC for 5 seconds.

**RETRACE:** Less than ±(0.02% or 0.02 pF), whichever is greater.

**AGING EFFECTS:** None

**PIEZOELECTRIC EFFECTS:** None

(No capacitance variation with voltage or pressure).

**CAPACITANCE DRIFT:** ±(0.02% or 0.02 pF), whichever is greater.

### OPERATING TEMPERATURE RANGE:

From -55°C to +125°C (No derating of working voltage).

### TERMINATION STYLES:

Available in various surface mount and leaded styles.

See Mechanical Configurations, page 3.

**TERMINAL STRENGTH:** Terminations for chips and pellets withstand a pull of 10 lbs. min., 25 lbs. typical, for 5 seconds in direction perpendicular to the termination surface of the capacitor. Test per MIL-STD-202, method 211.



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ATC # 001-809 Rev. M, 9/14

# ATC 100 E Capacitance Values

| CAP. CODE | CAP. (pF) | TOL.      | RATED WVDC |      | CAP. CODE | CAP. (pF) | TOL.             | RATED WVDC |      | CAP. CODE | CAP. (pF) | TOL.             | RATED WVDC |      | CAP. CODE | CAP. (pF) | TOL.             | RATED WVDC |      |
|-----------|-----------|-----------|------------|------|-----------|-----------|------------------|------------|------|-----------|-----------|------------------|------------|------|-----------|-----------|------------------|------------|------|
|           |           |           | STD.       | EXT. |           |           |                  | STD.       | EXT. |           |           |                  | STD.       | EXT. |           |           |                  | STD.       | EXT. |
| 1R0       | 1.0       | B, C<br>D | 3600       | 7200 | 5R6       | 5.6       | B, C<br>D        | 3600       | 7200 | 470       | 47        | F, G, J,<br>K, M | 3600       | 7200 | 391       | 390       | F, G, J,<br>K, M | 3600       | N/A  |
| 1R1       | 1.1       |           |            |      | 6R2       | 6.2       |                  |            |      | 510       | 51        |                  |            |      | 431       | 430       |                  |            |      |
| 1R2       | 1.2       |           |            |      | 6R8       | 6.8       |                  |            |      | 560       | 56        |                  |            |      | 471       | 470       |                  |            |      |
| 1R3       | 1.3       |           |            |      | 7R5       | 7.5       |                  |            |      | 620       | 62        |                  |            |      | 511       | 510       |                  |            |      |
| 1R4       | 1.4       |           |            |      | 8R2       | 8.2       |                  |            |      | 680       | 68        |                  |            |      | 561       | 560       |                  |            |      |
| 1R5       | 1.5       |           |            |      | 9R1       | 9.1       |                  |            |      | 750       | 75        |                  |            |      | 621       | 620       |                  |            |      |
| 1R6       | 1.6       |           |            |      | 100       | 10        |                  |            |      | 820       | 82        |                  |            |      | 681       | 680       |                  |            |      |
| 1R7       | 1.7       |           |            |      | 110       | 11        |                  |            |      | 910       | 91        |                  |            |      | 751       | 750       |                  |            |      |
| 1R8       | 1.8       |           |            |      | 120       | 12        |                  |            |      | 101       | 100       |                  |            |      | 821       | 820       |                  |            |      |
| 1R9       | 1.9       |           |            |      | 130       | 13        |                  |            |      | 111       | 110       |                  |            |      | 911       | 910       |                  |            |      |
| 2R0       | 2.0       | B, C<br>D | 3600       | 7200 | 150       | 15        | F, G, J,<br>K, M | 3600       | 7200 | 121       | 120       | F, G, J,<br>K, M | 3600       | 5000 | 102       | 1000      | G, J,<br>K, M    | 1000       | N/A  |
| 2R1       | 2.1       |           |            |      | 160       | 16        |                  |            |      | 131       | 130       |                  |            |      | 112       | 1100      |                  |            |      |
| 2R2       | 2.2       |           |            |      | 180       | 18        |                  |            |      | 151       | 150       |                  |            |      | 122       | 1200      |                  |            |      |
| 2R4       | 2.4       |           |            |      | 200       | 20        |                  |            |      | 161       | 160       |                  |            |      | 152       | 1500      |                  |            |      |
| 2R7       | 2.7       |           |            |      | 220       | 22        |                  |            |      | 181       | 180       |                  |            |      | 182       | 1800      |                  |            |      |
| 3R0       | 3.0       |           |            |      | 240       | 24        |                  |            |      | 201       | 200       |                  |            |      | 222       | 2200      |                  |            |      |
| 3R3       | 3.3       |           |            |      | 270       | 27        |                  |            |      | 221       | 220       |                  |            |      | 272       | 2700      |                  |            |      |
| 3R6       | 3.6       |           |            |      | 300       | 30        |                  |            |      | 241       | 240       |                  |            |      | 302       | 3000      |                  |            |      |
| 3R9       | 3.9       |           |            |      | 330       | 33        |                  |            |      | 271       | 270       |                  |            |      | 332       | 3300      |                  |            |      |
| 4R3       | 4.3       |           |            |      | 360       | 36        |                  |            |      | 301       | 300       |                  |            |      | 392       | 3900      |                  |            |      |
| 4R7       | 4.7       | 390       | 39         | 331  | 330       | 472       | 4700             |            |      |           |           |                  |            |      |           |           |                  |            |      |
| 5R1       | 5.1       | 430       | 43         | 361  | 360       | 512       | 5100             |            |      |           |           |                  |            |      |           |           |                  |            |      |

VRMS = 0.707 X WVDC

• SPECIAL VALUES, TOLERANCES, MATCHING, AND CAPACITOR ASSEMBLIES ARE AVAILABLE. • ATC'S CUSTOM POWER CAPACITOR ASSEMBLY CATALOG, ATC # 001-900 LISTS ASSEMBLY OPTIONS. • EXTENDED WORKING VOLTAGES ARE AVAILABLE FOR COMMERCIAL ORDERS ONLY. • ENCAPSULATION OPTION AVAILABLE. PLEASE CONSULT FACTORY.

## CAPACITANCE TOLERANCE

| Code | B       | C        | D       | F   | G   | J   | K    | M    |
|------|---------|----------|---------|-----|-----|-----|------|------|
| Tol. | ±0.1 pF | ±0.25 pF | ±0.5 pF | ±1% | ±2% | ±5% | ±10% | ±20% |

## ATC PART NUMBER CODE



The above part number refers to a 100 E Series (case size E) 390 pF capacitor,

K tolerance (±10%), 3600 WVDC, with W termination (Tin/Lead, Solder Plated over Nickel Barrier), laser marking and Waffle-packaging.

ATC accepts orders for our parts using designations *with* or *without* the "ATC" prefix. Both methods of defining the part number are equivalent, i.e., part numbers referenced with the "ATC" prefix are interchangeable to parts referenced without the "ATC" prefix. Customers are free to use either in specifying or procuring parts from American Technical Ceramics.

For additional information and catalogs contact your ATC representative or call direct at (+1-631) 622-4700.

Consult factory for additional performance data.

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# ATC 100 E Capacitors: Mechanical Configurations

| ATC SERIES & CASE SIZE | ATC TERM. CODE | CASE SIZE & TYPE<br>CASE SIZE & TYPE  | OUTLINES<br>W/T IS A TERMINATION SURFACE  | BODY DIMENSIONS INCHES (mm)                     |                               |                     | LEAD AND TERMINATION DIMENSIONS AND MATERIALS |   |
|------------------------|----------------|---|---|---|-------------------------------|---------------------|---|---|
|                        |                |   |   | LENGTH (L)                                      | WIDTH (W)                     | THICKNESS (T)       | OVERLAP (Y)                                   | MATERIALS   |
| 100E                   | W              | <br>E<br>Solder Plate              |    | .380<br>+.015 -.010<br>(9.65<br>+0.38<br>-0.25) | .380 ± 0.010<br>(9.65 ± 0.25) | .170 (4.32)<br>max. | .040 (1.02)<br>max.                           | Tin/Lead, Solder Plated over Nickel Barrier Termination   |
| 100E                   | P              | <br>E<br>Pellet                    |    | .380<br>+.040 -.010<br>(9.65<br>+1.02<br>-0.25) |                               |                     |   | Heavy Tin/Lead Coated, over Nickel Barrier Termination  |
| 100E                   | T              | <br>E<br>Solderable Nickel Barrier |    | .380<br>+.015 -.010<br>(9.65<br>+0.38<br>-0.25) |                               |                     |   | <b>RoHS Compliant</b><br>Tin Plated over Nickel Barrier Termination   |
| 100E                   | CA             | <br>E<br>Gold Chip                 |    | .380<br>+.015 -.010<br>(9.65<br>+0.38<br>-0.25) |                               |                     |   | <b>RoHS Compliant</b><br>Gold Plated over Nickel Barrier Termination  |
| 100E                   | MS             | <br>E<br>Microstrip              |   | .380<br>+.035 -.010<br>(9.65<br>+0.89<br>-0.25) | .380 ± 0.010<br>(9.65 ± 0.25) | .170 (4.32)<br>max. | N/A   | High Purity Silver Leads<br>L <sub>L</sub> = .750 (19.05) min.<br>W <sub>L</sub> = .350 ± 0.010<br>(8.89 ± 0.25)<br>T <sub>L</sub> = .010 ± .005<br>(0.25 ± 0.13)<br>Leads are Attached with High Temperature Solder. |
| 100E                   | AR             | <br>E<br>Axial Ribbon            |  |   |                               |                     |   | Silver-plated Copper Leads<br>Dia. = .032 ± .002<br>(.813 ± .051)<br>L <sub>L</sub> = 2.25 (57.2) min.  |
| 100E                   | AW             | <br>E<br>Axial Wire              |  |   |                               |                     |   | Silver-plated Copper Leads<br>Dia. = .032 ± .002<br>(.813 ± .051)<br>L <sub>L</sub> = 1.0 (25.4) min.   |
| 100E                   | RW             | <br>E<br>Radial Wire             |  |   |                               |                     |   |   |

Custom lead styles and lengths are available; consult factory. All leads are high purity silver attached with high temperature solder and are **RoHS** compliant.

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# ATC 100 E Capacitors: Non-Magnetic Mechanical Configurations

| ATC SERIES & CASE SIZE | ATC TERM. CODE | CASE SIZE & TYPE                | OUTLINES<br>W/T IS A TERMINATION SURFACE | BODY DIMENSIONS INCHES (mm)                     |   |                     | LEAD AND TERMINATION DIMENSIONS AND MATERIALS |   |
|------------------------|----------------|---------------------------------|--|---|---|---------------------|---|---|
|                        |                |                                 |  | LENGTH (L)                                      | WIDTH (W)                                       | THICKNESS (T)       | OVERLAP (Y)                                   | MATERIALS   |
| 100E                   | WN             | E<br>Non-Mag Solder Plate       |  | .380<br>+.015 -.010<br>(9.65<br>+0.38<br>-0.25) |   |                     | .040 (1.02)<br>max.                           | Tin/Lead, Solder Plated over Non-Magnetic Barrier Termination   |
| 100E                   | PN             | E<br>Non-Mag Pellet             |  | .380<br>+.040 -.010<br>(9.65<br>+1.02<br>-0.25) |   |                     |   | Heavy Tin/Lead Coated, over Non-Magnetic Barrier Termination  |
| 100E                   | TN             | E<br>Non-Mag Solderable Barrier |  | .380<br>+.015 -.010<br>(9.65<br>+0.38<br>-0.25) |   |                     |   | <b>RoHS Compliant</b><br>Tin Plated over Non-Magnetic Barrier Termination   |
| 100E                   | MN             | E<br>Non-Mag Microstrip         |  |   | .380<br>+.015 -.010<br>(9.65<br>+0.38<br>-0.25) | .170 (4.32)<br>max. | N/A   | High Purity Silver Leads<br>$L_L = .750 (19.05) \text{ min.}$<br>$W_L = .350 \pm .010 (8.89 \pm 0.25)$<br>$T_L = .010 \pm .005 (0.25 \pm 0.13)$<br>Leads are Attached with High Temperature Solder. |
| 100E                   | AN             | Non-Mag Axial Ribbon            |  |   | .380<br>+.035 -.010<br>(9.65<br>+0.89<br>-0.25) |                     |   | Silver-plated Copper Leads<br>Dia. = $.032 \pm .002 (.813 \pm .051)$<br>$L_L = 2.25 (57.2) \text{ min.}$  |
| 100E                   | BN             | E<br>Non-Mag Axial Wire         |  |   |   |                     |   | Silver-plated Copper Leads<br>Dia. = $.032 \pm .002 (.813 \pm .051)$<br>$L_L = 1.0 (25.4) \text{ min}$  |
| 100E                   | RN             | E<br>Non-Mag Radial Wire        |  |   |   |                     |   |   |

Custom lead styles and lengths are available; consult factory. All leads are high purity silver attached with high temperature solder and are **RoHS** compliant.

## Suggested Mounting Pad Dimensions

Horizontal Electrode Orientation

Vertical Electrode Orientation

Case E

|                  | Pad Size     | A Min. | B Min. | C Min. | D Min. |
|------------------|--------------|--------|--------|--------|--------|
| Vertical Mount   | Normal       | .185   | .050   | .325   | .425   |
|                  | High Density | .165   | .030   | .325   | .385   |
| Horizontal Mount | Normal       | .405   | .050   | .325   | .425   |
|                  | High Density | .385   | .030   | .325   | .385   |

Dimensions are in inches.

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# ATC 100 E Performance Data

**ESR VS. CAPACITANCE  
ATC SERIES 100, CASE E**



**Q VS. CAPACITANCE  
ATC SERIES 100, CASE E**



**ESR VS. CAPACITANCE  
ATC SERIES 100, CASE E**



**Q VS. CAPACITANCE  
ATC SERIES 100, CASE E**



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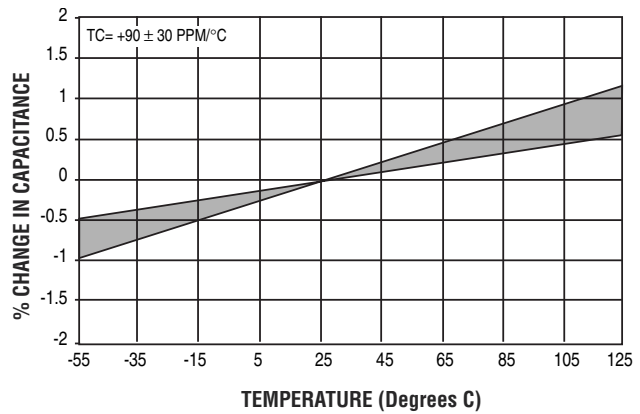
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# ATC 100 E Performance Data

**SERIES RESONANCE VS. CAPACITANCE  
ATC SERIES 100, CASE E**



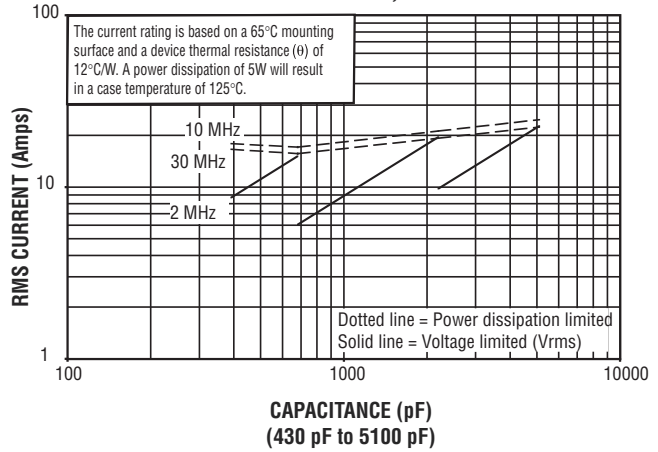
**CAPACITANCE CHANGE VS. TEMPERATURE  
ATC SERIES 100, CASE E**



**CURRENT RATING VS. CAPACITANCE  
ATC SERIES 100, CASE E**



**CURRENT RATING VS. CAPACITANCE  
ATC SERIES 100, CASE E**



**CURRENT RATING VS. CAPACITANCE  
ATC SERIES 100, CASE E, EXTENDED VOLTAGE**



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