


# AMERICAN TECHNICAL CERAMICS

*QUICK  
REFERENCE*

# PRODUCT SELECTION GUIDE



 **THE  
ENGINEERS'  
CHOICE®**



**ISO 9001  
REGISTERED  
COMPANY**

## Corporate Profile

American Technical Ceramics Corp. (ATC) provides component and custom integrated packaging solutions for the RF, microwave and telecommunications industries. For over forty years we have been "The Engineer's Choice®".

ATC designs, develops, manufactures and markets Multilayer Capacitors, Single Layer Capacitors, Resistor Products, Inductors and Custom Thin Film Products for RF, microwave and millimeter-wave applications. Our products are primarily used in: wireless communications infrastructure, fiber optics, medical electronics, semiconductor manufacturing equipment, defense, aerospace, and satellite communications markets.



▲ ATC's Jacksonville Facility occupies approximately 100,000 sq. ft.

◀ ATC's New York Facility occupies approximately 90,000 sq. ft.

As part of our globalization initiative ATC has a wholly-owned subsidiary for European Direct Sales, Applications Support and Distribution, located in Kungens Kurva, Sweden. The Company's wholly-owned subsidiary offering Technical Support for Asia is located in Shenzhen, P.R. China. ATC also has local offices in Miesbach, Germany and Guildford, England.

### RLC Products

- Multilayer Ceramic Capacitors
- Capacitor Assemblies for Power Applications
- Single Layer Ceramic Capacitors
- Resistor Products
- Inductor Products

### Process and Packaging

- Thin Film Custom Products: metalization and patterned substrates for a broad range of hybrid circuit requirements

### Markets Served

- Wireless / Telecom Base Stations
- Semiconductor Manufacturing Equipment
- Medical Diagnostic Equipment
- Sattelite Systems
- Public Safety Radio
- Avionic Systems
- Military and Aerospace
- Commerical Broadcast Transmitters
- Fiber Optic Communications
- Automotive Electronics

### Facilities

- Huntington Station, New York – Sales, Applications Support, Manufacturing and Distribution Center
- Kungens Kurva, Sweden – European Operations and Distribution Center
- Jacksonville, Florida – Advanced Technology Center, Manufacturing Facility

**ATC's Quick Reference Product Selection Guide** is designed to help you navigate through our products and services. The following parameters, included in ATC's complete catalog, are highlights of each Product Series:

- Full electrical and mechanical specifications
- Power Handling Data
- Application Notes
- ESR, FSR, Q and TCC Performance Curves
- Design Software
- Thin Film Overview

Download complete pdf data sheets at  
**www.atceramics.com**

ATC's website includes a complete listing of technical articles in pdf format, as well as new product updates and design support software. As an added convenience, ATC Multilayer Capacitor Kits and Inductor Design Kits may be purchased online.



NOTE: Contact ATC's Applications Engineers for further technical information at (+1-631) 622-4700. To receive a full catalog, contact any ATC representative or call the factory.

**A M E R I C A N T E C H N I C A L C E R A M I C S**

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**ATC PRODUCTS BY FREQUENCY RANGE**

<b>▶ Frequency Range 1: Up to 30 MHz</b>				
Typical Applications	Capacitor Products	Power Capacitor Assemblies	Resistive Products	Inductor Products
Low Frequency Communication Systems, Switch Mode Power Supplies, AM Broadcast, Semiconductor Fabrication, HF Amplifiers, Medical (MRI)	<ul style="list-style-type: none"> <li>▶ ATC 100 Series Porcelain MLCs</li> <li>▶ ATC 700 Series NPO Porcelain and Ceramic MLCs</li> <li>▶ 800 Series NPO Ceramic MLCs</li> <li>▶ ATC 200 Series BX Ceramic MLCs</li> <li>▶ ATC 900 Series X7R Ceramic RF Power MLCs</li> <li>▶ ATC 520 / 530 / 545 Series / 550 Series</li> <li>▶ General Purpose</li> <li>▶ HP Series</li> <li>▶ CDR / QPL Approved MIL-PRF-55681</li> <li>▶ COTS</li> </ul>	<ul style="list-style-type: none"> <li>▶ Extended Capacitance Assemblies</li> <li>▶ Extended Voltage &amp; Current Assemblies</li> <li>▶ Matched Sets</li> <li>▶ Voltage Dividers</li> </ul>	<ul style="list-style-type: none"> <li>▶ Resistors</li> <li>▶ Terminations: SMT, Chip Leaded &amp; Flanged</li> <li>▶ Attenuators</li> <li>▶ Non-Magnetic Series CR1, LR1, FR1</li> </ul>	<ul style="list-style-type: none"> <li>▶ WL Chip Inductors - EIA Sizes 0402 0603 0805 1008 1206</li> </ul>

<b>▶ Frequency Range 2: &gt;30 MHz to 800 MHz</b>				
Typical Applications	Capacitor Products	Power Capacitor Assemblies	Resistive Products	Inductor Products
Medical (MRI), Aircraft, Marine, Public Safety, Military	<ul style="list-style-type: none"> <li>▶ ATC 100 Series Porcelain MLCs</li> <li>▶ ATC 700 Series NPO Porcelain and Ceramic MLCs</li> <li>▶ ATC 800 Series NPO Ceramic MLCs</li> <li>▶ ATC 200 Series BX Ceramic MLCs</li> <li>▶ ATC 900 Series X7R Ceramic RF Power MLCs</li> <li>▶ ATC 520 / 530 / 545 Series / 550 Series</li> <li>▶ General Purpose</li> <li>▶ HP Series</li> <li>▶ CDR / QPL Approved MIL-PRF-55681</li> <li>▶ COTS</li> </ul>	<ul style="list-style-type: none"> <li>▶ Extended Capacitance Assemblies</li> <li>▶ Extended Voltage &amp; Current Assemblies</li> <li>▶ Matched Sets</li> <li>▶ Voltage Dividers</li> </ul>	<ul style="list-style-type: none"> <li>▶ Resistors</li> <li>▶ Terminations: SMT Chip Leaded &amp; Flanged</li> <li>▶ Attenuators</li> <li>▶ Non-Magnetic Series CR1, LR1, FR1</li> </ul>	<ul style="list-style-type: none"> <li>▶ WL Chip Inductors - EIA Sizes 0402 0603 0805 1008 1206</li> </ul>

<b>▶ Frequency Range 3: &gt;800 MHz to 3.5 GHz</b>				
Typical Applications	Capacitor Products	Advanced Substrate Packaging	Resistive Products	Inductor Products
Wireless Infrastructure (Cellular / PCS / DCS / GPS / MMDS), Bluetooth, Wireless LAN (802.11)	<ul style="list-style-type: none"> <li>▶ ATC 100 Series Porcelain MLCs</li> <li>▶ ATC 700 Series NPO Porcelain and Ceramic MLCs</li> <li>▶ ATC 600 Series</li> <li>▶ ATC 800 Series NPO Ceramic MLCs</li> <li>▶ ATC 200 Series BX Ceramic MLCs</li> <li>▶ SLC</li> <li>▶ ATC 500 / 520 / 530 / 545 Series / 550 Series</li> <li>▶ General Purpose</li> <li>▶ HP Series</li> <li>▶ CDR / QPL Approved MIL-PRF-55681</li> <li>▶ COTS</li> </ul>	<ul style="list-style-type: none"> <li>▶ ATC // AVX Thin Film Technologies</li> </ul>	<ul style="list-style-type: none"> <li>▶ Resistors</li> <li>▶ Terminations: SMT Chip Leaded &amp; Flanged</li> <li>▶ Attenuators</li> <li>▶ Non-Magnetic Series CR1, LR1, FR1</li> </ul>	<ul style="list-style-type: none"> <li>▶ WL Chip Inductors - EIA Sizes 0402 0603 0805 1008 1206</li> </ul>

<b>▶ Frequency Range 4: &gt;3.5 GHz to 100 GHz</b>				
Typical Applications	Capacitor Products	Advanced Substrate Packaging	Resistive Products	Inductor Products
Satellite Communications, LMDS, Radar, High Speed Data	<ul style="list-style-type: none"> <li>▶ ATC 100 Series Porcelain MLCs</li> <li>▶ ATC 700 Series NPO Porcelain and Ceramic MLCs</li> <li>▶ ATC 600 Series</li> <li>▶ ATC 800 Series NPO Ceramic MLCs</li> <li>▶ SLC</li> <li>▶ ATC 500 / 520 / 530 / 545 Series / 550 Series</li> <li>▶ HP Series</li> <li>▶ CDR / QPL Approved MIL-PRF-55681</li> <li>▶ COTS</li> </ul>	<ul style="list-style-type: none"> <li>▶ ATC // AVX Thin Film Technologies</li> </ul>	<ul style="list-style-type: none"> <li>▶ Resistors</li> <li>▶ Terminations: SMT, Chip Leaded &amp; Flanged</li> <li>▶ Attenuators</li> <li>▶ Non-Magnetic Series CR1, LR1, FR1</li> </ul>	<ul style="list-style-type: none"> <li>▶ WL Chip Inductors - EIA Sizes 0402 0603 0805 1008 1206</li> </ul>

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## ► Frequency Range 1: Up to 30 MHz

### RESISTORS (page 10)



#### ATC HIGH POWER RF RESISTIVE PRODUCTS

ATC's complete line of high power resistive products are designed and manufactured in our ISO-9001 registered facility. These products are manufactured with non-toxic, cost effective, aluminum nitride based substrates and qualified to Mil-PRF-55342, MIL-STD 202, and ANSI J-STD-002 specifications.

ATC high power resistive products are suitable for many wireless and satellite communication applications including GSM, PCS, W-CDMA, 3G, WCS, ISM and Wireless LAN. Other applications include medical, industrial, military and aerospace. Typical circuit applications are splitter-combiner networks, power amplifiers, synthesizers, MRI coils, isolators and circulators.

#### DC and RF Specifications:

- Resistance value: 50Ω and 100Ω standard (10Ω to 200Ω available)
- Terminations: Typical VSWR from 1.05:1 to 1.20:1
- Resistors: Low parasitic capacitance (See catalog)
- Temperature Coefficient of Resistance (TCR) <150ppm/ °C typical
- Operating temperature range: -55°C to +150°C

#### Mechanical Specifications:

- Substrate – Aluminum Nitride; Resistive Film – Tantalum Nitride; Terminals – Silver
- Flangeless and Flanged tabs – 100% silver leads; Covers – Alumina
- Copper flanges – Nickel or Silver plated
- Lead-Free, RoHS compliant and BeO Free

#### Non-magnetic products available

#### ATC RESISTOR SERIES

##### ATC CR1 Chip Resistors

- Power handling: 5 watts to 250 watts

##### ATC CS1 and CW Surface Mount Resistors

- Power handling: 2 watts to 40 watts

##### ATC LR1 Leaded Chip Resistors

- Power handling: 30 watts to 250 watts

##### ATC FR1 Flanged Resistors

- Power handling: 15 watts to 250 watts

#### ATC TERMINATION SERIES

##### ATC CT1 Series Chip Terminations

- Power handling: 5 watts to 225 watts

##### ATC CZ1 Series Surface Mount Terminations

- Power handling: 10 watts to 40 watts

##### ATC LT1 Series Leaded Terminations

- Power handling: 12 watts to 225 watts

##### ATC FT1 Series Flanged Terminations

- Power handling: 15 watts to 225 watts

#### ATC ATTENUATOR SERIES

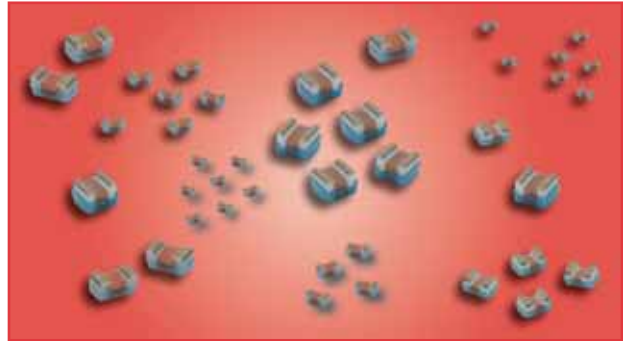
##### ATC LA1 Series Leaded Attenuators

- Power handling: up to 100 watts

##### ATC FA1 Series Flanged Attenuators

- Power handling: up to 100 watts

### INDUCTORS (page 11)



#### ATC WL SERIES INDUCTOR PRODUCTS

ATC's family of RF surface mount inductors is intended to compliment its high frequency ultra-low ESR capacitor products. The WL Series is constructed with a rugged high quality ceramic core and is available in traditional EIA case sizes, 0402, 0603, 0805, 1008 and 1206, with a range extending from 1 nH to 15,000 nH.

The WL Series is intended for RF and microwave applications and features high self-resonance, high Q, low DC resistance and stable temperature coefficient of inductance. These products are especially attractive for all 800 MHz to 3.4 GHz wireless applications, providing the best balance between cost and performance.

##### ATC WL (size = 0402)

- Inductance Range: 1.0 nH @ 250 MHz to 56 nH @ 250 MHz
- Tolerances: J (±5%), K (±10%)

##### ATC WL (size = 0603)

- Inductance Range: 1.6 nH @ 250 MHz to 390 nH @ 100 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 0805)

- Inductance Range: 3.3 nH @ 250 MHz to 2700 nH @ 25 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 1008)

- Inductance Range: 4.7 nH @ 50 MHz to 15,000 nH @ 7.9 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 1206)

- Inductance Range: 6.8 nH @ 100 MHz to 1200 nH @ 35 MHz
- Tolerances: J (±5%), K (±10%)

#### ATC MILLIMETER-WAVE / BROADBAND / ULTRA-BROADBAND SURFACE MOUNT CAPACITORS

##### ATC 520 L Series Broadband Capacitors

- 160 KHz to 16 GHz, 10 nF

##### ATC 530 L Series Broadband Capacitors

- 16 KHz to 18 GHz, 100 nF

##### ATC 545 L Series UBC™ Ultra-Broadband Capacitors

- 16 KHz to 40+ GHz, 100 nF

##### ATC 550 L Series UBC™ Ultra-Broadband Capacitors

- 16 KHz to 40+ GHz, 100 nF

#### ATC GENERAL PURPOSE MLC CAPACITORS FOR SURFACE MOUNT APPLICATIONS

ATC provides low cost general purpose capacitors which are not intended for precision designs but are suitable for many applications including DC blocking, coupling, bypassing, and filtering. Available in standard EIA case sizes.

#### HP SERIES HIGH PERFORMANCE CAPACITORS

ATC offers the new HP Series high performance family of MLC NPO ceramic capacitors. Built in a rugged ceramic SMT package, these products deliver high performance at the right price. The HP series is available in four popular EIA case sizes and is suitable for tuning, DC blocking, coupling and bypassing over the full range of wireless frequencies. All HP Series products are RoHS compliant.

- Case Size 0402: 0.2 to 30 pF, 50 WVDC
- Case Size 0603: 0.2 pF to 120 pF, up to 250 WVDC
- Case Size 0805: 1.0 pF to 160 pF, 250 WVDC
- Case Size 1210: 1.0 pF to 1000 pF, up to 500 WVDC

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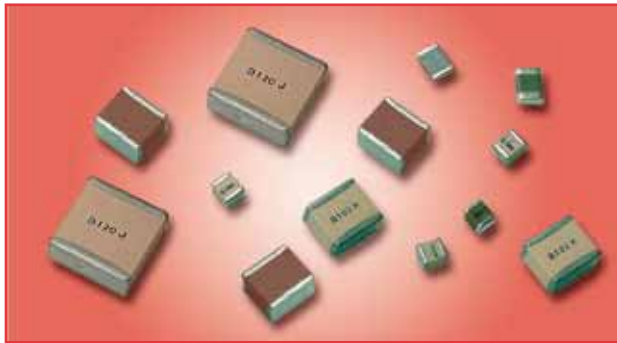
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▶ Frequency Range 1: Up to 30 MHz

**CAPACITORS** (page 12, 13,14)



**ATC 100 SERIES PORCELAIN SUPERCHIP® MLCS**

These capacitors feature High Q, low ESR / ESL, ultra-stable performance, low noise, high self-resonance and established reliability (OPL).

**Non-magnetic products available RoHS compliant terminations are standard. Refer to data sheets for other styles.**

**ATC 100 B (size = .110" x .110")** Capacitance Range 0.1 pF to 1000 pF  
• Available with encapsulation option for leaded styles only

**ATC 100 C (size = .250" x .250")** Capacitance Range 1 pF to 2700 pF  
• High RF Current/Voltage

**ATC 100 E (size = .380" x .380")** Capacitance Range 1 pF to 5100 pF  
• High RF Power  
• Extended WVDC up to 7200 VDC  
• High RF Current/Voltage  
• High Reliability

**ATC 700 SERIES NPO PORCELAIN AND CERAMIC MLCS**

This series features low ESR / ESL, low noise, ultra-stable NPO performance, high self-resonance and rugged construction. They meet established reliability standards. These capacitors are available with encapsulation option for leaded styles only.

**ATC 700 B (size = .110" x .110")** Capacitance Range 0.1 pF to 5100 pF

**ATC 700 C (size = .250" x .250")** Capacitance Range 1 pF to 2700 pF

**ATC 700 E (size = .380" x .380")** Capacitance Range 1 pF to 2200 pF

**ATC 800 SERIES NPO CERAMIC HIGH RF POWER MLCS**

Advantages of these MLCs include optimized form factor, lowest ESR at wireless frequencies, highest self resonance and superior thermal performance.

**ATC 800 C (size = .250" x .250")** Capacitance Range 2.2 pF to 3000 pF

**ATC 800 E (size = .380" x .380")** Capacitance Range 3.3 pF to 5100 pF

**ATC 200 SERIES BX CERAMIC MLCS**

This series features low ESR / ESL, rugged construction and high reliability.

**ATC 200 A (size = .055" x .055")** Capacitance Range 510 pF to 0.01 μF

**ATC 200 B (size = .110" x .110")** Capacitance Range 5000 pF to 0.1 μF  
• Available with encapsulation option for leaded styles only

**ATC 900 SERIES X7R CERAMIC RF POWER MLCS**

This series features low ESR/ESL, rugged construction, a mid-K, X7R dielectric, and high reliability.

**ATC 900 C (size = .250" x .250")** Capacitance Range 0.01 μF to 1 μF  
• Available with encapsulation option for leaded styles only

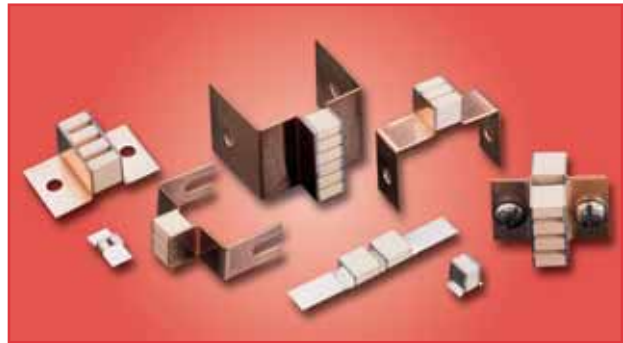
**ATC MILITARY (CDR) PRODUCTS**

ATC is a OPL approved supplier for MIL-PRF-55681/4 and /5 fixed, multilayer, unencapsulated, monolithic porcelain and ceramic dielectric capacitors.

**ATC COTS (COMMERCIAL OFF THE SHELF) PRODUCTS**

Cost-effective upscreening of standard products for enhanced reliability applications.

**POWER CAPACITOR ASSEMBLIES** (page 15)



**ATC POWER CAPACITOR ASSEMBLIES**

ATC power capacitor assemblies are manufactured to customer specifications using ATC's proven standard products. Benefits include:

**Reduced Assembly Steps / Handling Costs:** Combinations of capacitors pre-packaged in manageable mechanical configurations for customer specific "drop-in" applications.

**Enhanced Reliability:** Overall elements and assemblies are 100% pre-tested to customer's electrical requirements: – Capacitance – Q – IR – DWV (to 10kV max). Elements are 100% ESR tested.

**Reduced Purchasing Logistics:** Reduced inventory requirements in matched assemblies. This eliminates excess, wasted parts.

**Reduced Technical Labor:** Alleviate need for engineering and technician resources in selecting electrically matched elements.

**Guaranteed Performance:** ATC guarantees electrical / mechanical performance on an assembly level every time.

**Achieve Non-Standard Values and Ultra-Tight Tolerances:**

ATC will "mix and match" values from our extensive inventory via computer matching programs to achieve any capacitor value specified by the designer.

**Non-magnetic products available**

**ATC Parallel Assemblies: Extended capacitance**

Standard Designs	B Case	C Case	E Case
No. of caps	2	2 - 6	2 - 8
Lead Type	L Bracket	L Bracket	L Bracket
Lead Material	Silver	Silver	Silver or Copper
Lead Thickness	.004 or .010 (0.10 or 0.25)*	.004 or .010 (0.10 or 0.25)*	.010 or .020 (0.25 or 0.51)*
Lead Length (max.)	0.5 (12.7)*	0.75 (19.1)*	2.0 (50.8)*
No. of holes (max.)	None	1 per lead	1 per lead
Mtg. Configuration	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Capacitor Spacer (typ.)	.050 or .070 (1.27 or 1.78)*	.050 or .070 (1.27 or 1.78)*	.090 (2.29)*

\*inches (mm)

**ATC Series Assemblies: Extended voltage**

Standard Designs	C Case	E Case
No. of caps	2 - 3	2 - 3
Lead Type	L Bracket	L Bracket
Lead Material	Silver	Silver
Lead Thickness	.010*	.010*
Lead Length (max.)	0.75 (19.1)*	1.0 (25.4)*
No. of holes (max.)	1 per lead	1 per lead
Mtg. Configuration	Horizontal	Horizontal
Capacitor Spacer (typ.)	.050 (1.27)*	.050 (1.27)*

\*inches (mm)

**Matched Sets:** Series or Parallel configurations for non-standard values or very close tolerance capacitance values.

**Voltage Dividers:** based on capacitive reactance, provided to customers' specific capacitance ratio.

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## ► Frequency Range 2: >30 MHz to 800 MHz

### RESISTORS (page 10)



#### ATC HIGH POWER RF RESISTIVE PRODUCTS

ATC's complete line of high power resistive products are designed and manufactured in our ISO-9001 registered facility. These products are manufactured with non-toxic, cost effective, aluminum nitride base substrates and qualified to MIL-PRF-55342, MIL-STD 202, and ANSI J-STD-002 specifications.

ATC high power resistive products are suitable for many wireless and satellite communication applications including GSM, PCS, W-CDMA, 3G, WCS, ISM and Wireless LAN. Other applications include medical, industrial, military and aerospace. Typical circuit applications are splitter-combiner networks, power amplifiers, synthesizers, MRI coils, isolators and circulators.

#### DC and RF Specifications:

- Resistance value: 50Ω and 100Ω standard (10Ω to 200Ω available)
- Terminations: Typical VSWR from 1.05:1 to 1.20:1
- Resistors: Low parasitic capacitance (See catalog)
- Temperature Coefficient of Resistance (TCR) <150ppm/°C typical
- Operating temperature range: -55°C to +150°C

#### Mechanical Specifications:

- Substrate – Aluminum Nitride; Resistive Film – Tantalum Nitride; Terminals – Silver
- Flangeless and Flanged tabs – 100% silver leads; Covers – Alumina
- Copper flanges – Nickel or Silver plated
- Lead-Free, RoHS compliant and BeO Free

#### Non-magnetic products available

#### ATC RESISTOR SERIES

##### ATC CR1 Chip Resistors

- Power handling: 5 watts to 250 watts

##### ATC CS1 and CW Surface Mount Resistors

- Power handling: 2 watts to 40 watts

##### ATC LR1 Leaded Chip Resistors

- Power handling: 30 watts to 250 watts

##### ATC FR1 Flanged Resistors

- Power handling: 15 watts to 250 watts

#### ATC TERMINATION SERIES

##### ATC CT1 Series Chip Terminations

- Power handling: 5 watts to 225 watts

##### ATC CZ1 Series Surface Mount Terminations

- Power handling: 10 watts to 40 watts

##### ATC LT1 Series Leaded Terminations

- Power handling: 12 watts to 225 watts

##### ATC FT1 Series Flanged Terminations

- Power handling: 15 watts to 225 watts

#### ATC ATTENUATOR SERIES

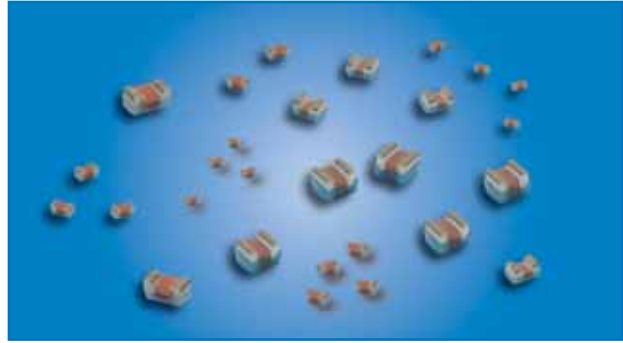
##### ATC LA1 Series Leaded Attenuators

- Power handling: up to 100 watts

##### ATC FA1 Series Flanged Attenuators

- Power handling: up to 100 watts

### INDUCTORS (page 11)



#### ATC WL SERIES INDUCTOR PRODUCTS

ATC's family of RF surface mount inductors is intended to compliment its high frequency ultra-low ESR capacitor products. The WL Series is constructed with a rugged high quality ceramic core and is available in traditional EIA case sizes, 0402, 0603, 0805, 1008 and 1206, with a range extending from 1 nH to 15,000 nH.

The WL Series is intended for RF and microwave applications and features high self-resonance, high Q, low DC resistance and stable temperature coefficient of inductance. These products are especially attractive for all 800 MHz to 3.4 GHz wireless applications, providing the best balance between cost and performance.

##### ATC WL (size = 0402)

- Inductance Range: 1.0 nH @ 250 MHz to 56 nH @ 250 MHz
- Tolerances: J (±5%), K (±10%)

##### ATC WL (size = 0603)

- Inductance Range: 1.6 nH @ 250 MHz to 390 nH @ 100 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 0805)

- Inductance Range: 3.3 nH @ 250 MHz to 2700 nH @ 25 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 1008)

- Inductance Range: 4.7 nH @ 50 MHz to 15,000 nH @ 7.9 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 1206)

- Inductance Range: 6.8 nH @ 100 MHz to 1200 nH @ 35 MHz
- Tolerances: J (±5%), K (±10%)

#### ATC MILLIMETER-WAVE / BROADBAND / ULTRA-BROADBAND SURFACE MOUNT CAPACITORS

##### ATC 520 L Series Broadband Capacitors

- 160 KHz to 16 GHz, 10 nF

##### ATC 530 L Series Broadband Capacitors

- 16 KHz to 18 GHz, 100 nF

##### ATC 545 L Series UBC™ Ultra-Broadband Capacitors

- 16 KHz to 40+ GHz, 100 nF

##### ATC 550 L Series UBC™ Ultra-Broadband Capacitors

- 16 KHz to 40+ GHz, 100 nF

#### ATC GENERAL PURPOSE MLC SURFACE MOUNT CAPACITORS

Low cost general purpose capacitors, not intended for precision designs but suitable for many applications including DC blocking, coupling, bypassing, and filtering. This offering consists of a variety of dielectric types from the most stable NPO to high K versions for maximum capacitance. Available in standard EIA case sizes.

#### HP SERIES HIGH PERFORMANCE CAPACITORS

ATC offers the new HP Series high performance family of MLC NPO ceramic capacitors. Built in a rugged ceramic SMT package, these products deliver high performance at the right price. The HP series is available in four popular EIA case sizes and is suitable for tuning, DC blocking, coupling and bypassing over the full range of wireless frequencies. All HP Series products are RoHS compliant.

- Case Size 0402: 0.2 to 30 pF, 50 WVDC
- Case Size 0603: 0.2 pF to 120 pF, up to 250 WVDC
- Case Size 0805: 1.0 pF to 160 pF, 250 WVDC
- Case Size 1210: 1.0 pF to 1000 pF, up to 500 WVDC

A M E R I C A N T E C H N I C A L C E R A M I C S

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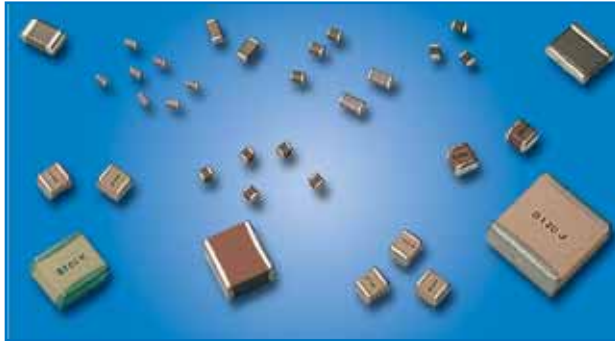
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► Frequency Range 2: >30 MHz to 800 MHz

CAPACITORS (page 12, 13,14)



**ATC 100 SERIES PORCELAIN SUPERCHIP® MLCS**  
 These capacitors feature High Q, low ESR / ESL and ultra-stable performance. They are available with an encapsulation option as noted below.

**Non-magnetic products available**  
**RoHS compliant terminations are standard.**  
**Refer to data sheets for other styles.**

**ATC 100 B (size = .110" x .110")**

- Capacitance Range 0.1 pF to 1000 pF
- Available with encapsulation option for leaded styles only

**ATC 100 C (size = .250" x .250")**

- Capacitance Range 1 pF to 2700 pF • High RF Current/Voltage

**ATC 100 E (size = .380" x .380")**

- Capacitance Range 1 pF to 5100 pF • Extended WVDC up to 7200 VDC
- High RF Power • High RF Current/Voltage
- High Reliability

**ATC 700 SERIES NPO PORCELAIN AND CERAMIC MLCS**

This series features low ESR / ESL, low noise, ultra-stable NPO performance, high self-resonance and rugged construction. They meet established reliability standards. These capacitors are available with encapsulation option for leaded styles only.

**ATC 700 B (size = .110" x .110")** Capacitance Range 0.1 pF to 5100 pF

**ATC 700 C (size = .250" x .250")** Capacitance Range 1 pF to 2700 pF

**ATC 700 E (size = .380" x .380")** Capacitance Range 1 pF to 2200 pF

**ATC 800 SERIES NPO CERAMIC HIGH RF POWER MLCS**

Advantages of these MLCs include optimized form factor, lowest ESR at wireless frequencies, highest self resonance and superior thermal performance.

**ATC 800 B (size = .110" x .110")** Capacitance Range 0.1 pF to 1000 pF

**ATC 800 R (size = .070" x .090")** Capacitance Range 1 pF to 100 pF

**ATC 800 C (size = .250" x .250")** Capacitance Range 2.2 pF to 3000 pF

**ATC 800 E (size = .380" x .380")** Capacitance Range 3.3 pF to 5100 pF

**ATC 200 SERIES BX CERAMIC MLCS**

This series features low ESR / ESL, rugged construction and high reliability.

**ATC 200 A (size = .055" x .055")**

- Capacitance Range 510 pF to 0.01 μF

**ATC 200 B (size = .110" x .110")**

- Capacitance Range 5000 pF to 0.1 μF
- Available with encapsulation option for leaded styles only

**ATC 900 SERIES X7R CERAMIC RF POWER MLCS**

Features low ESR/ESL, rugged construction, a mid-K, X7R dielectric, and high reliability.

**ATC 900 C (size = .250" x .250")**

- Capacitance Range 0.01 μF to 1 μF
- Available with encapsulation option for leaded styles only

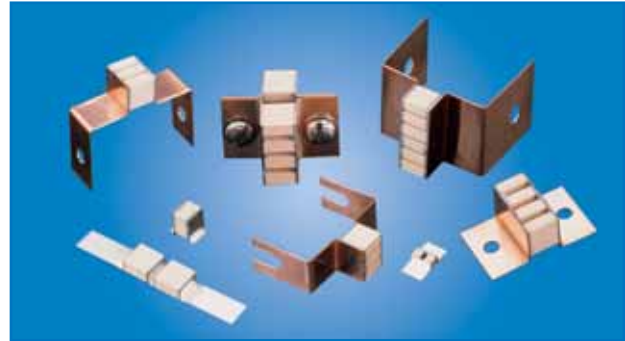
**ATC MILITARY (CDR) PRODUCTS**

ATC is a QPL approved supplier for MIL-PRF-55681/4 and /5 fixed, multilayer, unencapsulated, monolithic porcelain and ceramic dielectric capacitors.

**ATC COTS (COMMERCIAL OFF THE SHELF) PRODUCTS**

Cost-effective upscreening of standard products for enhanced reliability applications.

POWER CAPACITOR ASSEMBLIES (page 15)



**ATC POWER CAPACITOR ASSEMBLIES**

ATC power capacitor assemblies are manufactured to customer specifications using ATC's proven standard products. Benefits include:

**Reduced Assembly Steps / Handling Costs:** Combinations of capacitors pre-packaged in manageable mechanical configurations for customer specific "drop-in" applications.

**Enhanced Reliability:** Overall elements and assemblies are 100% pre-tested to customer's electrical requirements: – Capacitance – Q – IR – DWV (to 10kV max). Elements are 100% ESR tested.

**Reduced Purchasing Logistics:** Reduced inventory requirements in matched assemblies. This eliminates excess, wasted parts.

**Reduced Technical Labor:** Alleviate need for engineering and technician resources in selecting electrically matched elements.

**Guaranteed Performance:** ATC guarantees electrical / mechanical performance on an assembly level every time.

**Achieve Non-Standard Values and Ultra-Tight Tolerances:**

ATC will "mix and match" values from our extensive inventory via computer matching programs to achieve any capacitor value specified by the designer.

**Non-magnetic products available**

**ATC Parallel Assemblies: Extended capacitance**

Standard Designs	B Case	C Case	E Case
No. of caps	2	2 - 6	2 - 8
Lead Type	L Bracket	L Bracket	L Bracket
Lead Material	Silver	Silver	Silver or Copper
Lead Thickness	.004 or .010 (0.10 or 0.25)*	.004 or .010 (0.10 or 0.25)*	.010 or .020 (0.25 or 0.51)*
Lead Length (max.)	0.5 (12.7)*	0.75 (19.1)*	2.0 (50.8)*
No. of holes (max.)	None	1 per lead	1 per lead
Mtg. Configuration	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Capacitor Spacer (typ.)	.050 or .070 (1.27 or 1.78)*	.050 or .070 (1.27 or 1.78)*	.090 (2.29)*

\*inches (mm)

**ATC Series Assemblies: Extended voltage**

Standard Designs	C Case	E Case
No. of caps	2 - 3	2 - 3
Lead Type	L Bracket	L Bracket
Lead Material	Silver	Silver
Lead Thickness	.010*	.010*
Lead Length (max.)	0.75 (19.1)*	1.0 (25.4)*
No. of holes (max.)	1 per lead	1 per lead
Mtg. Configuration	Horizontal	Horizontal
Capacitor Spacer (typ.)	.050 (1.27)*	.050 (1.27)*

\*inches (mm)

**Matched Sets:** Series or Parallel configurations for non-standard values or very close tolerance capacitance values.

**Voltage Dividers:** based on capacitive reactance, provided to customers' specific capacitance ratio.

Frequency Range 2:  
>30 MHz to 800 MHz

## ► Frequency Range 3: >800 MHz to 3.5 GHz

### RESISTORS (page 10)



#### ATC HIGH POWER RF RESISTIVE PRODUCTS

ATC's complete line of high power resistive products are designed and manufactured in our ISO-9001 registered facility. These products are manufactured with non-toxic, cost effective, aluminum nitride base substrates and qualified to Mil-PRF-55342, MIL-STD 202, and ANSI J-STD-002 specifications.

ATC high power resistive products are suitable for many wireless and satellite communication applications including GSM, PCS, W-CDMA, 3G, WCS, ISM and Wireless LAN. Other applications include medical, industrial, military and aerospace. Typical circuit applications are splitter-combiner networks, power amplifiers, synthesizers, MRI coils, isolators and circulators.

#### DC and RF Specifications:

- Resistance value: 50Ω and 100Ω standard (10Ω to 200Ω available)
- Terminations: Typical VSWR from 1.05:1 to 1.20:1
- Resistors: Low parasitic capacitance (See catalog)
- Temperature Coefficient of Resistance (TCR) <150ppm/°C typical
- Operating temperature range: -55°C to +150°C

#### Mechanical Specifications:

- Substrate – Aluminum Nitride; Resistive Film – Tantalum Nitride; Terminals – Silver
- Flangeless and Flanged tabs – 100% silver leads; Covers – Alumina
- Copper flanges – Nickel or Silver plated
- Lead-Free, RoHS compliant and BeO Free

#### Non-magnetic products available

#### ATC RESISTOR SERIES

##### ATC CR1 Chip Resistors

- Power handling: 5 watts to 250 watts

##### ATC CS1 and CW Surface Mount Resistors

- Power handling: 2 watts to 40 watts

##### ATC LR1 Leaded Chip Resistors

- Power handling: 30 watts to 250 watts

##### ATC FR1 Flanged Resistors

- Power handling: 15 watts to 250 watts

#### ATC TERMINATION SERIES

##### ATC CT1 Series Chip Terminations

- Power handling: 5 watts to 225 watts

##### ATC CZ1 Series Surface Mount Terminations

- Power handling: 10 watts to 40 watts

##### ATC LT1 Series Leaded Terminations

- Power handling: 12 watts to 225 watts

##### ATC FT1 Series Flanged Terminations

- Power handling: 15 watts to 225 watts

#### ATC ATTENUATOR SERIES

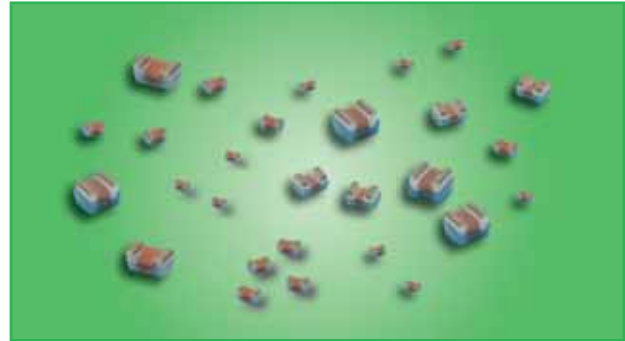
##### ATC LA1 Series Leaded Attenuators

- Power handling: up to 100 watts

##### ATC FA1 Series Flanged Attenuators

- Power handling: up to 100 watts

### INDUCTORS (page 11)



#### ATC WL SERIES INDUCTOR PRODUCTS

ATC's family of RF surface mount inductors is intended to compliment its high frequency ultra-low ESR capacitor products. The WL Series is constructed with a rugged high quality ceramic core and is available in traditional EIA case sizes, 0402, 0603, 0805, 1008 and 1206, with a range extending from 1 nH to 15,000 nH.

The WL Series is intended for RF and microwave applications and features high self-resonance, high Q, low DC resistance and stable temperature coefficient of inductance. These products are especially attractive for all 800 MHz to 3.4 GHz wireless applications, providing the best balance between cost and performance.

##### ATC WL (size = 0402)

- Inductance Range: 1.0 nH @ 250 MHz to 56 nH @ 250 MHz
- Tolerances: J (±5%), K (±10%)

##### ATC WL (size = 0603)

- Inductance Range: 1.6 nH @ 250 MHz to 390 nH @ 100 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 0805)

- Inductance Range: 3.3 nH @ 250 MHz to 2700 nH @ 25 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 1008)

- Inductance Range: 4.7 nH @ 50 MHz to 15,000 nH @ 7.9 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 1206)

- Inductance Range: 6.8 nH @ 100 MHz to 1200 nH @ 35 MHz
- Tolerances: J (±5%), K (±10%)

#### ATC MILLIMETER-WAVE / BROADBAND / ULTRA-BROADBAND SURFACE MOUNT CAPACITORS

##### ATC 500 S Series Millimeter-Wave Capacitors

- Low insertion loss and ultra-high self resonance surface mount millimeter-wave capacitors

##### ATC 520 L Series Broadband Multilayer Capacitors

- 160 KHz to 16 GHz, 10 nF

##### ATC 530 L Series Broadband Multilayer Capacitors

- 16 KHz to 18 GHz, 100 nF

##### ATC 545 L Series UBC™ Ultra-Broadband Multilayer Capacitors

- 16 KHz to 40+ GHz, 100 nF

##### ATC 550 L Series UBC™ Ultra-Broadband Multilayer Capacitors

- 16 KHz to 40+ GHz, 100 nF

#### ATC GENERAL PURPOSE MLC SURFACE MOUNT CAPACITORS

Low cost general purpose capacitors, not intended for precision designs but suitable for many applications including DC blocking, coupling, bypassing, and filtering. This offering consists of a variety of dielectric types from the most stable NPO to high K versions for maximum capacitance. Available in standard EIA case sizes.

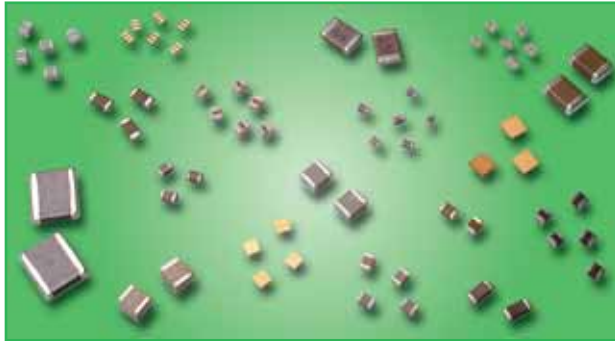
#### HP SERIES HIGH PERFORMANCE CAPACITORS

ATC offers the new HP Series high performance family of MLC NPO ceramic capacitors. Built in a rugged ceramic SMT package, these products deliver high performance at the right price. The HP series is available in four popular EIA case sizes and is suitable for tuning, DC blocking, coupling and bypassing over the full range of wireless frequencies. All HP Series products are RoHS compliant.

- Case Size 0402: 0.2 to 30 pF, 50 WVDC
- Case Size 0603: 0.2 pF to 120 pF, up to 250 WVDC
- Case Size 0805: 1.0 pF to 160 pF, 250 WVDC
- Case Size 1210: 1.0 pF to 1000 pF, up to 500 WVD

► Frequency Range 3: >800 MHz to 3.5 GHz

**CAPACITORS** (page 12, 13, 14)



**ATC 100 SERIES PORCELAIN SUPERCHIP® MLCs**

These capacitors feature High Q, low ESR / ESL, ultra-stable performance, low noise, high self-resonance and established reliability (OPL).

**Non-magnetic products available**  
**RoHS compliant terminations are standard.**  
**Refer to data sheets for other styles.**

**ATC 100 A (size = .055" x .055")**

- Capacitance Range 0.1 pF to 100 pF

**ATC 100 B (size = .110" x .110")**

- Capacitance Range 0.1 pF to 1000 pF
- Available with encapsulation option for leaded styles only

**ATC 700 SERIES NPO PORCELAIN AND CERAMIC MLCs**

This series features low ESR / ESL, low noise, ultra-stable NPO performance, high self-resonance and rugged construction. They meet established reliability standards.

**ATC 700 A (size = .055" x .055")**

- Capacitance Range 0.1 pF to 1000 pF

**ATC 700 B (size = .110" x .110")**

- Capacitance Range 0.1 pF to 5100 pF
- Available with encapsulation option for leaded styles only

**ATC 600 SERIES ULTRA-LOW ESR HIGH Q MICROWAVE CAPACITORS**

Feature ultra-low ESR and high self-resonance. Environmentally safe terminations meet or exceed MIL-PRF-55681. Operating temperature is -55°C to +125°C

**ATC 600 L (size = 0402)**

- Capacitance Range 0.1 pF to 27 pF
- Voltage Rating: 200 WVDC

**ATC 600 S (size = 0603)**

- Capacitance Range 0.1 pF to 100 pF
- Voltage Rating: 250 WVDC

**ATC 600 F (size = 0805)**

- Capacitance Range 0.1 pF to 240 pF
- Voltage Rating: 250 WVDC

**ATC 800 SERIES NPO CERAMIC HIGH RF POWER MLCs**

Advantages of these MLCs include optimized form factor, lowest ESR at wireless frequencies, highest self resonance and superior thermal performance.

**ATC 800 A (size = .055" x .055")**

- Capacitance Range 0.1 pF to 100 pF

**ATC 800 B (size = .110" x .110")**

- Capacitance Range 0.1 pF to 1000 pF

**ATC 800 R (size = .070" x .090")**

- Capacitance Range 1 pF to 100 pF

**ATC SINGLE LAYER CAPACITORS**

For applications with operating frequencies up to 100 GHz. Capacitance range 0.04 pF to 10,000 pF, case sizes from 10 mils to 90 mils. "Design your own" option (custom sizes.)

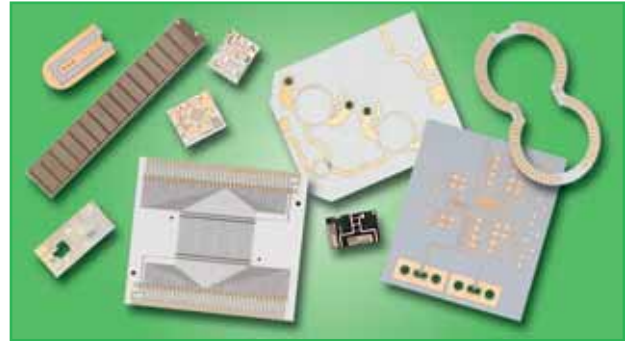
**ATC MILITARY (CDR) PRODUCTS**

ATC is a QPL approved supplier for MIL-PRF-55681/4 and /5 fixed, multilayer, unencapsulated, monolithic porcelain and ceramic dielectric capacitors.

**ATC COTS (COMMERCIAL OFF THE SHELF) PRODUCTS**

Cost-effective upscreening of standard products for enhanced reliability applications.

**THIN FILM** (page 16, 17)



**ATC // AVX THIN FILM TECHNOLOGIES**

**Combined Capabilities**

- Design: Modeling (HFSS), simulation (Genesys) and CAD (Tanner)
  - Substrates: 1 inch square to 6 inch round (150 mm) wafers
  - Typical materials: Alumina, Aluminum Nitride, Beryllium Oxide, Silicon, (N, P, and N+), Quartz, Glass, Glass-Ceramic, Sapphire, Ferrites and Titanates
  - Metalizations:
    - Sputtered: Al, Au, Cr, Cu, Ni(V), Pd, Pt, TaN, Ti and TiW
    - Plated: Electrolytic Cu, Ni, Au; Electroless Cu, Au
  - Resistors: High Ohmic SiCr and TaN resistors in laser trimmable designs
  - Capacitors: SiO<sub>2</sub>, SiON and BCB dielectrics in laser trimmable designs
  - Inductors: Multilevel and multiturn copper and gold inductors
  - Routing: True Air Bridges and Dielectric Crossovers
  - Passivation Materials: SiON, Si<sub>3</sub>N<sub>4</sub>, BCB and polyimide
  - Vias: Sputtered, enhanced plated, filled and castellations
  - I/Os: BGA, LGA, edge wrap, through via and wire or ribbon bond
  - Machining:
    - CO<sub>2</sub> cutting, drilling, and scribing
    - Diamond-saw dicing
    - Back grinding and polishing
  - Assembly:
    - High precision 0201 or larger pick and place
    - Attachment via wire or ribbon bonding, BGA, LGA or surface mount reflow
    - Encapsulation
  - Testing:
    - MIL-STD-105D level II sampling
    - MIL-STD-883 100% visual inspection
    - Capacitance, insulation resistance and resistivity
    - RF testing to 40 GHz
- Primary Markets and Applications**
- Military, Aerospace and Space:
    - RF and Microwave filters
    - Precision resistors
    - MOS capacitors
    - Circulators, Splitters
    - Specialized modules
  - Medical and Instrumentation:
    - Precision resistor networks and arrays
    - In-circuit trimmed designs
    - Telemetry filters
    - Miniature circuits and assemblies
  - Broadband infrastructure:
    - Laser diode mounts and heat sinks
    - Optoelectronic converters
    - RF and DC fan-outs
  - Instrumentation:
    - Ultra-precision reference capacitors and resistors
  - Solar:
    - Interposers and heat sinks

Frequency Range 3:  
>800 MHz to 3.5 GHz

## ► Frequency Range 4: >3.5 GHz to 100 GHz

### RESISTORS (page 10)



#### ATC HIGH POWER RF RESISTIVE PRODUCTS

ATC's complete line of high power resistive products are designed and manufactured in our ISO-9001 registered facility. These products are manufactured with non-toxic, cost effective, aluminum nitride base substrates and qualified to Mil-PRF-55342, MIL-STD 202, and ANSI J1-STD-002 specifications.

ATC high power resistive products are suitable for many wireless and satellite communication applications including GSM, PCS, W-CDMA, 3G, WCS, ISM and Wireless LAN. Other applications include medical, industrial, military and aerospace applications. Typical circuit applications are splitter-combiner networks, power amplifiers, synthesizers, MRI coils, isolators and circulators.

#### DC and RF Specifications:

- Resistance value: 50Ω and 100Ω standard (10Ω to 200Ω available)
- Terminations: Typical VSWR from 1.05:1 to 1.20:1
- Resistors: Low parasitic capacitance (See catalog)
- Temperature Coefficient of Resistance (TCR) <150ppm/ °C typical
- Operating temperature range: -55°C to +150°C

#### Mechanical Specifications:

- Substrate – Aluminum Nitride; Resistive Film – Tantalum Nitride; Terminals – Silver
- Flangeless and Flanged tabs – 100% silver leads; Covers – Alumina
- Copper flanges – Nickel or Silver plated
- Lead-Free, RoHS compliant and BeO Free

#### Non-magnetic products available

#### ATC RESISTOR SERIES

##### ATC CR1 Chip Resistors

- Power handling: 5 watts to 250 watts

##### ATC CS1 and CW Surface Mount Resistors

- Power handling: 2 watts to 40 watts

##### ATC LR1 Leaded Chip Resistors

- Power handling: 30 watts to 250 watts

##### ATC FR1 Flanged Resistors

- Power handling: 15 watts to 250 watts

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##### ATC CT1 Series Chip Terminations

- Power handling: 5 watts to 225 watts

##### ATC CZ1 Series Surface Mount Terminations

- Power handling: 10 watts to 40 watts

##### ATC LT1 Series Leaded Terminations

- Power handling: 12 watts to 225 watts

##### ATC FT1 Series Flanged Terminations

- Power handling: 15 watts to 225 watts

#### ATC ATTENUATOR SERIES

##### ATC LA1 Series Leaded Attenuators

- Power handling: up to 100 watts

##### ATC FA1 Series Flanged Attenuators

- Power handling: up to 100 watts

### INDUCTORS (page 11)



#### ATC WL SERIES INDUCTOR PRODUCTS

ATC's family of RF surface mount inductors is intended to compliment its high frequency ultra-low ESR capacitor products. The WL Series is constructed with a rugged high quality ceramic core and is available in traditional EIA case sizes, 0402, 0603, 0805, 1008 and 1206, with a range extending from 1 nH to 15,000 nH.

The WL Series is intended for RF and microwave applications and features high self-resonance, high Q, low DC resistance and stable temperature coefficient of inductance. These products are especially attractive for all 800 MHz to 3.4 GHz wireless applications, providing the best balance between cost and performance.

##### ATC WL (size = 0402)

- Inductance Range: 1.0 nH @ 250 MHz to 56 nH @ 250 MHz
- Tolerances: J (±5%), K (±10%)

##### ATC WL (size = 0603)

- Inductance Range: 1.6 nH @ 250 MHz to 390 nH @ 100 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 0805)

- Inductance Range: 3.3 nH @ 250 MHz to 2700 nH @ 25 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 1008)

- Inductance Range: 4.7 nH @ 50 MHz to 15,000 nH @ 7.9 MHz
- Tolerances: G (±2%), J (±5%), K (±10%)

##### ATC WL (size = 1206)

- Inductance Range: 6.8 nH @ 100 MHz to 1200 nH @ 35 MHz
- Tolerances: J (±5%), K (±10%)

#### ATC MILLIMETER-WAVE / BROADBAND / ULTRA-BROADBAND SURFACE MOUNT CAPACITORS

##### ATC 500 S Series Millimeter-Wave Capacitors

- Low insertion loss and ultra-high self resonance surface mount millimeter-wave capacitors

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- Case Size 0402: 0.2 to 30 pF, 50 WVDC
- Case Size 0603: 0.2 pF to 120 pF, up to 250 WVDC
- Case Size 0805: 1.0 pF to 160 pF, 250 WVDC
- Case Size 1210: 1.0 pF to 1000 pF, up to 500 WVDC

► Frequency Range 4: >3.5 GHz to 100 GHz

**CAPACITORS** (page 12, 13, 14)



**ATC 100 SERIES PORCELAIN SUPERCHIP® MLCs**

These capacitors feature High Q, low ESR / ESL and ultra-stable performance. They are available with an encapsulation option as noted below.

**ATC 100 A (size = .055" x .055")**

- Capacitance Range 0.1 pF to 100 pF

**Non-magnetic products available**

**RoHS compliant terminations are standard.**

**Refer to data sheets for other styles.**

**ATC 700 SERIES NPO PORCELAIN AND CERAMIC MLCs**

This series features low ESR / ESL, low noise, ultra-stable NPO performance, high self-resonance and rugged construction. Meets established reliability standards.

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Feature ultra-low ESR and high self-resonance. Environmentally safe terminations meet or exceed MIL-PRF-55681. Operating temperature is -55°C to +125°C

**ATC 600 L (size = 0402)**

- Capacitance Range 0.1 pF to 27 pF
- Voltage Rating: 200 WVDC

**ATC 600 S (size = 0603)**

- Capacitance Range 0.1 pF to 100 pF
- Voltage Rating: 250 WVDC

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- Capacitance Range 0.1 pF to 240 pF
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- Capacitance Range 0.1 pF to 100 pF

**ATC SINGLE LAYER CAPACITORS**

For applications with operating frequencies up to 100 GHz Capacitance range 0.03 pF to 6200 pF, case sizes from 10 mils to 90 mils. "Design your own" option (custom sizes.)

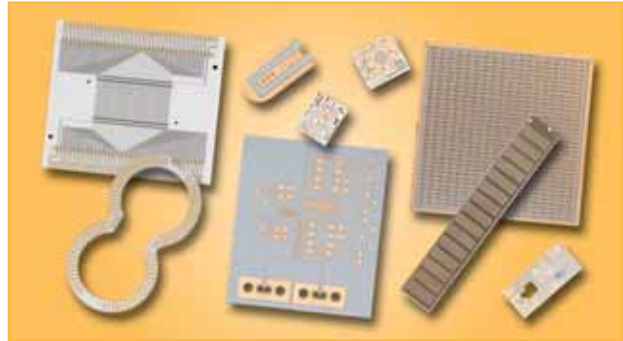
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- Design: Modeling (HFSS), simulation (Genesys) and CAD (Tanner)
- Substrates: 1 inch square to 6 inch round (150 mm) wafers
- Typical materials: Alumina, Aluminum Nitride, Beryllium Oxide, Silicon, (N, P, and N+), Quartz, Glass, Glass-Ceramic, Sapphire, Ferrites and Titanates
- Metalizations:
  - Sputtered: Al, Au, Cr, Cu, Ni(V), Pd, Pt, TaN, Ti and TiW
  - Plated: Electrolytic Cu, Ni, Au; Electroless Cu, Au
- Resistors: High Ohmic SiCr and TaN resistors in laser trimmable designs
- Capacitors: SiO<sub>2</sub>, SiON and BCB dielectrics in laser trimmable designs
- Inductors: Multilevel and multiturn copper and gold inductors
- Routing: True Air Bridges and Dielectric Crossovers
- Passivation Materials: SiON, Si<sub>3</sub>N<sub>4</sub>, BCB and polyimide
- Vias: Sputtered, enhanced plated, filled and castellations
- I/Os: BGA, LGA, edge wrap, through via and wire or ribbon bond
- Machining:
  - CO<sub>2</sub> cutting, drilling, and scribing
  - Diamond-saw dicing
  - Back grinding and polishing
- Assembly:
  - High precision 0201 or larger pick and place
  - Attachment via wire or ribbon bonding, BGA, LGA or surface mount reflow
  - Encapsulation
- Testing:
  - MIL-STD-105D level II sampling
  - MIL-STD-883 100% visual inspection
  - Capacitance, insulation resistance and resistivity
  - RF testing to 40 GHz

**Primary Markets and Applications**

- Military, Aerospace and Space:
  - RF and Microwave filters
  - Precision resistors
  - MOS capacitors
  - Circulators, Splitters
  - Specialized modules
- Medical and Instrumentation:
  - Precision resistor networks and arrays
  - In-circuit trimmed designs
  - Telemetry filters
  - Miniature circuits and assemblies
- Broadband infrastructure:
  - Laser diode mounts and heat sinks
  - Optoelectronic converters
  - RF and DC fan-outs
- Instrumentation:
  - Ultra-precision reference capacitors and resistors
- Solar:
  - Interposers and heat sinks

Frequency Range 4:  
>3.5 GHz to 100 GHz



## ATC High Power RF Resistive Products

ATC's complete line of high powered resistive products are designed and manufactured in our ISO-9001 facility using non-toxic, cost effective, Aluminum Nitride base substrates. All products are manufactured and qualified to Mil-PRF-55342, MIL-STD 202, and ANSI /J-STD-002 specifications. Leaded and flanged devices are available. Non-Magnetic styles are available in CR1, LR1 and FR1 Series. Please consult factory.

ATC High powered resistive products are used in all wireless & satellite communication applications. Communication bands include GSM, PCS, W-CDMA, 3G, WCS, ISM Wireless LAN. They are also used in medical, industrial, military and aerospace applications. Typical applications include splitter/combiner networks, power amplifiers, feed forward amplifiers, RF Generators, MRI devices, isolators & circulators.



### DC and RF Specifications:

- Resistance value: 50  $\Omega$  and 100  $\Omega$  standard (10  $\Omega$  to 200  $\Omega$  available)
- Terminations: Typical VSWR (Voltage Standard Wave Ratio) 1.05:1 to 1.20:1
- Resistors: Low parasitic capacitance
- Temperature Coefficient of Resistance TCR Typical <150 ppm/°C
- Operating temperature range: -55° to +150°C
- Frequency Range: DC to 18 GHz

### Mechanical Specifications:

- Substrate – Aluminum Nitride
- Resistive Film – Tantalum Nitride
- Terminals – Silver
- Flangeless and Flanged tabs – 100% silver leads
- Covers – Alumina
- Copper flanges – Nickel or Silver plated
- **Lead-Free, RoHS compliant**
- **BeO Free**

Visit ATC's website for Leaded and Flanged devices.

Order Resistive Product Design Kits Online at [www.atceramics.com](http://www.atceramics.com)

## Resistive Products Overview

ATC High Power RF Resistive Products	Sizes/Flange Options	Power	Capacitance/VSWR
LA1 High Power Leaded Chip Attenuators	3740	150w	Attenuation: 1 dB thru 30 dB
FA1 High Power Flange Mount Attenuators	2 hole	100w	Attenuation: 1 dB thru 30 dB
CS1 Series Surface Mount Chip Resistors	2010 thru 3737	10w thru 40w	.95pf thru 3.5pf
CW1 Series Surface Mount Chip Resistors	2010 thru 3737	2w thru 10w	.95pf thru 3.5pf
CR1 Series Chip Resistors	1005 thru 3737	5w thru 250w	.75pf thru 6pf
LR1 Series Leaded Chip Resistors	2010 thru 3737	5w thru 250w	.75pf thru 6pf
FR1 Series Flange Resistors	1 hole, 2 hole	12w thru 225w	.75pf thru 6pf
CZ1 Series Surface Mount Chip Terminations Freq. range DC-4 GHz	2010 thru 3737	10w thru 40w	1.10:1 thru 1.25:1
CT1 Series Chip Terminations Freq. range DC-18 GHz	2010 thru 3737	20w thru 225w	1.10:1 thru 1.25:1
LT1 Series Leaded Chip Terminations Freq range DC-18GHz	2010 thru 3737	5w thru 225w	1.10:1 thru 1.30:1
FT1 Series Flange Terminations Freq. range DC-18GHz	1 hole, 2 hole	12w thru 200w	1.10:1 thru 1.30:1

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## ATC WL Series Wire Wound Chip Inductors

ATC's family of RF surface mount inductor components is intended to complement their high frequency ultra-low ESR capacitor products. The WL Series wire wound chip inductor products have been designed to provide excellent performance at competitive prices.

This Series includes the most widely used traditional EIA case sizes – 0402, 0603, 0805, 1008 and 1206. With an inductance range of 1 nH to 15,000 nH, these products have an operating temperature of -40°C to +125°C and a temperature coefficient of inductance (TCL) of +25 to +125 ppm/°C typical from -40°C to +125°C.



The WL inductor product line is intended for RF and microwave applications and features high self-resonant frequencies (SRF), high Q, and low DC resistance. These products are manufactured on a rugged core made of high quality ceramic material that exhibits high Q at high operating frequencies.

The WL Series is especially attractive for all 800 MHz to 3.4 GHz wireless applications where cost and performance are major factors. These applications include but are not limited to: cellular base stations, broadband wireless services, point-to-point and point-to-multipoint radio as well as other RF and microwave telecommunications systems.

All WL Series inductor products are supplied in tape and reel (2000 to 4000 parts per reel depending on case size) as standard, making them ideal for automated pick and place manufacturing applications. The terminations consist of a barrier layer with a lead-free, tin-plated finish that exhibits excellent solderability for trouble-free attachments.

### Inductor Product Overview

Case Size Code	Inductance Value (nH)	Tolerance Code	Q min.	SRF (MHz) typ.	RDC (Ohms) max.	IDC (mA) max.
0402	1.0 @ 250 MHz	J, K	16	>6000	0.045	1360
	10 @ 250 MHz	G, J, K	21	3900	0.195	480
	100 @ 250 MHz	G, J, K	22	1620	1.120	100
0603	1.6 @ 250 MHz	J, K	16	12,500	0.040	700
	22 @ 250 MHz	G, J, K	38	3000	0.190	700
	470 @ 100 MHz	G, J, K	23	600	3600	80
0805	2.7 @ 250 MHz	J, K	80 @ 1500	7900	0.060	800
	100 @ 150 MHz	G, J, K	65 @ 500	1200	0.460	400
	4700 @ 7.9 MHz	G, J, K	15 @ 7.9	40	6.400	90
1008	5.6 @ 50 MHz	J, K	50 @ 1500	4000	0.15	1000
	330 @ 25 MHz	G, J, K	45 @ 100	570	1.05	450
	15000 @ 2.52 MHz	G, J, K	15 @ 7.96	15	11.5	120

Visit our website for individual values and specifications.



Order Inductor Design Kits Online at [www.atceramics.com](http://www.atceramics.com)

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## ATC Multilayer High Q RF Capacitors

ATC Series	Case Size Footprint in. (mm)	Cap Value Range (pF)*	Working Voltage WVDC (volts) max.	Dielectric Material	TCC -55°/+125°C (ppm/°C)
100A	.055 x .055 (1.40 x 1.40)	0.1 to 100	250	Porcelain (P90)	+90 ± 20
100B	.110 x .110 (2.79 x 2.79)	0.1 to 1000	1500	Porcelain (P90)	+90 ± 20
100C	.250 x .250 (6.35 x 6.35)	1 to 2700	2500	Porcelain (P90)	+90 ± 30
100E	.380 x .380 (9.65 x 9.65)	1 to 5100	7200	Porcelain (P90)	+90 ± 30
700A	.055 x .055 (1.40 x 1.40)	0.1 to 1000	250	Porcelain and Ceramic (NPO)	0 ± 30
700B	.110 x .110 (2.79 x 2.79)	0.1 to 5100	1500	Porcelain and Ceramic (NPO)	0 ± 30
700C	.250 x .250 (6.35 x 6.35)	1 to 2700	2500	Porcelain (NPO)	0 ± 30
700E	.380 x .380 (9.65 x 9.65)	1 to 2200	7200	Porcelain (NPO)	0 ± 30
600L	.040 x .020 (1.02 x .51)	0.1 to 27	200	Ultra-Low ESR, High Q (NPO)	0 ± 30
600S	.063 x .032 (1.60 x .81)	0.1 to 100	250	Ultra-Low ESR, High Q (NPO)	0 ± 30
600F	.079 x .049 (2.00 x 1.25)	0.1 to 240	250	Ultra-Low ESR, High Q (NPO)	0 ± 30
800A	.055 x .055 (1.40 x 1.40)	0.1 to 100	250	NPO Ceramic	0 ± 30
800B	.110 x .110 (2.79 x 2.79)	0.1 to 1000	500	NPO Ceramic	0 ± 30
800C	.250 x .250 (6.35 x 6.35)	2.2 to 3000	3600	NPO Ceramic	0 ± 30
800E	.380 x .380 (9.65 x 9.65)	3.3 to 5100	7200	NPO Ceramic	0 ± 30
800R	.070 x .090 (1.78 x 2.29)	1 to 100	500	NPO Ceramic	0 ± 30
200A	.055 x .055 (1.40 x 1.40)	510 to 10,000	50	BX Ceramic	±15%
200B	.110 x .110 (2.79 x 2.79)	5000 to 100,000	50	BX Ceramic	±15%
900C	.230 x .250 (5.84 x 6.35)	.01 µF to 1 µF	300	X7R Ceramic	±15%

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ATC Series	Typical ESR (Ohms) Cap (pF)					Series Resonance (MHz)
	Cap (pF)	30 MHz	150 MHz	500 MHz	1000 MHz	
100A	1	-	0.170	0.280	0.390	9110
	10	-	0.067	0.119	0.168	3020
	100	-	0.028	0.051	0.072	1000
100B	10	-	0.047	0.082	0.115	2030
	100	-	0.033	0.060	0.085	680
	1000	-	0.015	0.027	-	230
100C	10	0.072	0.139	0.251	0.355	1457
	100	0.026	0.057	0.103	-	475
	1000	0.010	0.023	-	-	155
	2700	0.007	0.016	-	-	95
100E	10	0.076	0.147	0.266	0.376	1110
	100	0.030	0.065	0.119	-	365
	1000	0.018	0.040	-	-	120
	5100	0.010	0.022	-	-	55
700A	1	-	0.186	0.308	0.429	9110
	10	-	0.073	0.130	0.184	3020
	100	-	0.031	0.056	0.080	1000
	1000	-	0.035	0.064	-	330
700B	10	-	0.051	0.090	0.126	1840
	100	-	0.036	0.066	0.093	620
	1000	-	0.038	0.069	-	210
	5100	0.011	0.025	-	-	100
700C	10	0.072	0.139	0.251	0.355	1457
	100	0.026	0.057	0.103	-	475
	1000	0.010	0.023	-	-	155
	2700	0.007	0.016	-	-	95
700E	10	0.076	0.147	0.266	0.376	1110
	100	0.030	0.065	0.119	-	365
	1000	0.018	0.040	0.073	-	120
	2200	0.014	0.030	0.055	-	82
600L	1	-	-	0.074	0.074	11,310
	10	-	-	0.054	0.072	4230
	27	-	-	0.063	0.086	2780
600S	1	-	-	0.120	0.117	10,500
	10	-	-	0.058	0.070	5150
	100	-	0.034	0.043	0.070	1200
600F	1	-	-	0.070	0.084	9050
	10	-	-	0.062	0.078	3910
	100	-	-	0.055	0.078	2010
	240	-	-	-	-	-
800A	1	-	0.072	0.078	0.081	10,000
	10	-	0.040	0.048	0.064	4000
	100	-	0.032	0.048	0.071	1200
800B	10	-	0.038	0.047	0.064	5300
	100	-	0.027	0.041	0.060	2000
	1000	-	0.024	0.051	-	700
	10	0.058	0.042	-	-	-
800C	39	0.030	0.023	-	-	-
	2700	0.007	0.015	-	-	-
	10	0.063	0.053	-	-	-
800E	47	0.018	0.026	-	-	-
	1	-	-	.057	.055	10,800
800R	10	-	.032	.032	.048	3600
	100	-	.026	.032	.044	1500
	510	1.010	2.238	-	-	341
200A	1000	0.553	1.226	-	-	247
	10,000	0.071	0.157	-	-	82
	5000	0.202	0.450	-	-	89
200B	10,000	0.133	0.296	-	-	63
	100,000	0.033	-	-	-	20
	10,000	0.059	-	-	-	50
900C	100,000	0.034	-	-	-	16
	1 μF	0.020	-	-	-	5

ATC's products are supported by fully certified in-house RF and QA Labs with test capability from DC to Millimeter-wave Frequencies

**Standard Electrical Testing:**

- ▶ Capacitors: Capacitance, Dissipation Factor, Dielectric Withstanding Voltage, Insulation Resistance
- ▶ Inductors: Inductance, Q, SRF, RDC, IDC
- ▶ Resistors: Resistance, RF Power, VSWR, Shunt Capacitance

**Hi-Reliability Testing (MIL-PRF-55681, MIL-PRF-123) and COTS Upscreening Program:**

- ▶ Full Burn In and Life Test Capability
- ▶ Electrical, Environmental and Mechanical (MIL-STD-202, MIL-STD-883)

**Specialized RF Power Testing:**

- ▶ High RF Power: CW and pulsed
- ▶ Thermal Characterization
- ▶ High RF Voltage: Corona, Internal and external breakdown, Partial discharge
- ▶ Specialized test fixtures designed in-house to support a full range of customer requirements

**Frequency Range: 2 MHz to 1 GHz**

**POPULAR TEST FREQUENCIES: APPLICATIONS:**

13.56 MHz	Semiconductor Manufacturing
64 MHz	1.5 Tesla MRI Systems
128 MHz	3 Tesla MRI Systems
1 GHz	Telecommunications & Cellular Systems
ISM	Unlicensed Wireless Devices

**Small Signal RF Testing:**

- ▶ Equivalent Series Resistance (ESR) from 10 MHz to 2 GHz
- ▶ Impedance vs. Frequency: 1 MHz to 1.8 GHz
- ▶ S-Parameters: Four-receiver architecture, full two-port TRL calibration to 40 GHz

**Design Support For Capacitor, Inductor, & Resistive Products:**

- ▶ Comprehensive electrical, mechanical and environmental data available
- ▶ S-Parameters
- ▶ Tech-Select™ RF Design Software
- ▶ Applications Support Team of Experienced RF Engineers





## ATC Single Layer Capacitor Products

ATC's extensive line of Single Layer Capacitor (SLC) products offers solutions to the most demanding microwave and millimeter wave requirements. Broadband applications with operating frequencies up to 100 GHz are achievable with ATC's SLC products.

- Capacitance Range: 0.04 to 10,000 pF
- Wide selection of dielectrics with K's of 14 to 25,000
- Ultra-high Q
- Up to 100 WVDC rating
- Standard case sizes from 10 mils.
- "Design Your Own" option
- Manufacturing facilities certified to ISO 9001
- Custom Design Kits available online at [www.atceramics.com](http://www.atceramics.com)



Stable K Dielectrics	Dielectric Code	Dielectric Const. (K)	TCC (-55°C to +125°C)	Cap. Range (pF)	Max. DF @ 1 MHz (%)		Q
					@ 1 MHz	@ 1 KHz	
	A	14	+90 ±30 PPM/°C	0.04 to 5.6	0.01	-	11,000 @ 6.4 GHz
	BB	31	0 ±30 PPM/°C	0.06 to 13	0.15	-	950 @ 4.5 GHz
	CA	60	0 ±30 PPM/°C	0.1 to 27	0.15	-	770 @ 5 GHz

Mid-K Dielectrics	Dielectric Code	Dielectric Const. (K)	TCC (-55°C to +125°C)	Cap. Range (pF)	Max. DF (%)*		Q @ Freq.
					@ 1 MHz	@ 1 KHz	
	CC	130	-750 ±220 PPM/°C	0.3 to 56	0.15	-	2310 @ 5 GHz
	DA	165	-1500 ±500 PPM/°C	0.4 to 68	0.25	-	500 @ 1.8 GHz
	DB	200	±7.5% max. change (non-linear)	0.5 to 82	0.25	-	29 @ 5 GHz
	HC	420	-2000 ±500 PPM/°C	1.1 to 180	0.7	0.3	-
	EA	650	-4700 ±1500 PPM/°C	1.5 to 270	0.3	0.3	-

High-K Dielectrics	Dielectric Code	Dielectric Const. (K)	TCC (-55°C to +125°C)	Cap. Range (pF)	Max. DF (%)*	
					@ 1 MHz	@ 1 KHz
	EC	650	±10% max. change (non-linear)	1.5 to 270	1.5	1.5
	J	1100	+5% to -15% max. change (non-linear)	2.4 to 470	2.5	2.0
	F	2000	±15% max. change (non-linear)	4.3 to 820	2.5	2.0
	GA	4000	±15%	10 to 1800	3.0	2.0

Ultra High-K Dielectrics	Dielectric Code	Dielectric Const. (K)	TCC (+10°C to +85°C)	Cap. Range (pF)	Max. DF (%)*	
					@ 1 MHz	@ 1 KHz
	G	6000	±10% to -75% max. change (non-linear)	13 to 2400	2.5	2.0
	K	9000	0% to -92% max. change (non-linear)	20 to 3300	4.0	2.0
	L	16,000	0/-92%	33 to 6200	3.5	2.0

\*Capacitance and DF are measured at 1MHz for capacitance values ≤ 1,000 pF and 1 KHz for capacitance values > 1,000 pF.

## ATC 500 S, 530 L, 520 L, 545 L, 550L Broadband SMT Capacitors

Best Broadband and Ultra-Broadband Options for Reliability and Widest Frequency Coverage.



### Attributes

- SMT Broadband Devices
- Optoelectronics
- Low Insertion Loss
- High speed data
- Flat Frequency Response
- Sonet
- One Piece Construction
- Broadband Wireless Communications
- Orientation Insensitive
- Microwave/Millimeter-Wave
- Tape and Reel, Surface Mountable
- Rugged Ceramic Construction
- RoHS Compliant
- Unit-to-Unit Performance Repeatability

### Applications/Markets

- Optoelectronics
- High speed data
- Sonet
- Broadband Wireless Communications
- Microwave/Millimeter-Wave

ATC Series	Frequency Response	Insertion Loss	Capacitance	Voltage Ratings	Termination Options
500	1 GHz to 40 GHz	1 dB typ.	0.1 pF to 10 pF	100 V	Gold
520	160 KHz to 16 GHz	1 dB max.	10 nF	16 V	RoHS compatible
530	16 KHz to 18 GHz	1 dB max.	100 nF	16 V	RoHS compatible
545	16 KHz to 40+ GHz	< 0.5 dB	100 nF	16 V	RoHS/Tin-Lead/Gold
550	16 KHz to 40+ GHz	< 0.5 dB	100 nF	16 V	RoHS/Tin/Gold

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## ATC Power Capacitor Assemblies

ATC standard & custom Power Assemblies are fabricated from PARALLEL and SERIES combinations of industry-respected ATC catalog products.

Customer requirements are addressed by a variety of computer matching and assembly techniques which have enabled ATC to extend voltage, current, ESR, Q, and tolerance parameters beyond what is normally available in the industry.

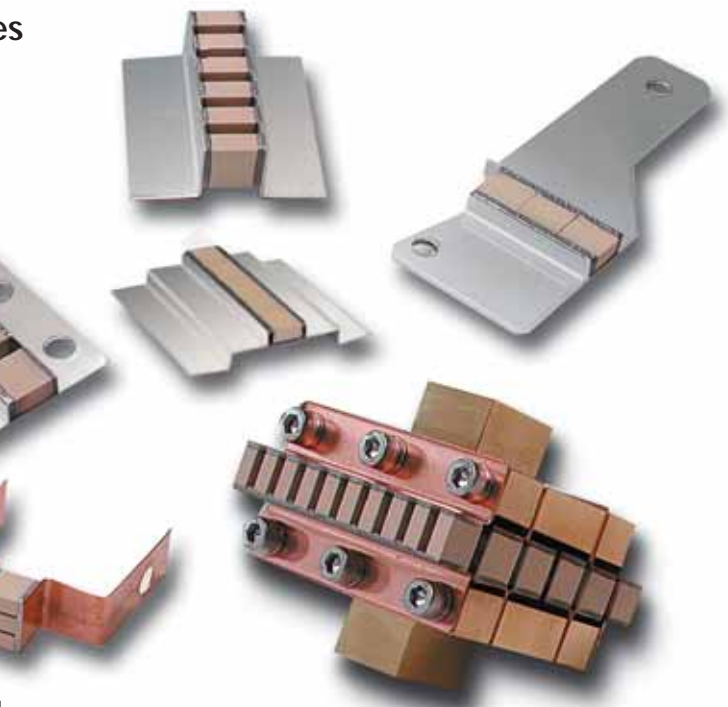
ATC Power Assemblies offer distinct advantages over purchasing standard components "in the general ballpark" and trying "hit & miss" approaches to configure & match these in a circuit environment. ATC's strong tradition of quality and customer service enables us to work closely with design engineers to meet critical specifications.

Assemblies of parallel grouped capacitors not only increase the capacitance but will exhibit ultra-low ESR. Assemblies of series grouped capacitors will allow both tighter tolerances and higher working voltages. Combinations of Parallel and Series assemblies can realize an increase in both capacitance and voltage rating. Assemblies can be composed of multiple capacitors in horizontal, vertical or multi-level mounting configurations.

### MATCHED SETS: SERIES OR PARALLEL CONFIGURATIONS

For customers requiring non-standard values or very close tolerance capacitance values, ATC can select a set of capacitors (2 or more) to achieve the desired results. Available tolerances appear in table at right.

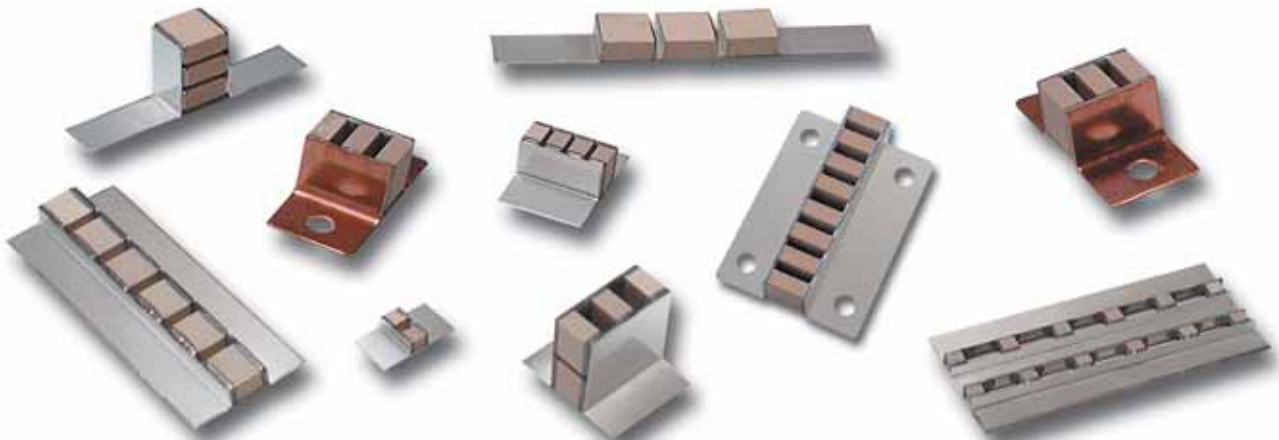
**VOLTAGE DIVIDERS:** Voltage dividers based on capacitive reactance can be provided to customers' specific capacitance ratio. Ratios can be provided within 1.0%.



Series	Capacitance Range	Tolerance
100A/700A	1 pF to 6.2 pF 6.8 pF to 1000 pF	0.1 pF 0.5%
100B/700B	0.1 pF to 6.2 pF 6.8 pF to 5100 pF	0.1 pF 0.5%
100C	1 pF to 2700 pF	0.5%
100E	1 pF to 5100 pF	0.5%

### ASSEMBLIES ARE DESIGNED TO MEET CUSTOMER NEEDS. ATC OFFERS THE FOLLOWING OPTIONS:

- Lead designs to customer specifications
- Non-magnetic assemblies for MRI applications
- Coatings to enhance high voltage operation
- Marking: Assemblies can be marked with ATC or customer part numbers
- Special Test Options (enhanced screening) for high reliability requirements: (a) Accelerated Life Testing and Voltage Conditioning: Individual parts are tested for 100 hours at elevated voltages and at 125° C. (b) Burn-in at elevated temperatures and voltages to insure reliability



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## ATC // AVX Thin Film Technologies

### Engineered Thin Film Solutions

ATC // AVX is pleased to introduce the combined resources of ATC's Jacksonville, Florida and AVX's Myrtle Beach, South Carolina Thin Film product groups. This allows us to offer a wide range of custom hybrid circuits along with thin film resistors, capacitors, inductors, as well as lumped element and distributed filters, integrated passives, modules, heat sinks, and other unique thin film microelectronic solutions.

### Design, Fabrication, Assembly, and RF Testing Services

#### Jacksonville Thin Film Products

Since 1993, ATC Thin Film Products, located in Jacksonville, FL, has been supplying a broad spectrum of high reliability metalized hybrid circuits. Designers can select from a wide variety of substrate materials, as well as vias, crossovers and bridges. Whether built to print or designed to a performance specification, the experienced engineering staff is available to assist in optimizing your product. In addition, two-sided assembly and RF testing to 40 GHz are value-added services. AS-9100 certification ensures conformance with existing military and aerospace requirements.

#### Myrtle Beach Thin Film Products

AVX Thin Film operations, located in Myrtle Beach, SC, offers an array of thin film passives including networked resistors, capacitors, inductors, along with integrated passive LC and RC filters and modules. Six inch (150 mm) wafer technology offers the designer build-to-print or custom designs based on 3D HFSS modeling from 500 MHz to 40 GHz. These products will meet the most demanding requirements of circuit miniaturizations, tolerance and signal integrity applications that involve a wide frequency spectrum from MHz to GHz.

### Combined Capabilities

- Design: Modeling (HFSS), simulation (Genesys) and CAD (Tanner)
- Substrates: 1 inch square to 6 inch round (150 mm) wafers
- Typical materials: Alumina, Aluminum Nitride, Beryllium Oxide, Silicon, (N, P, and N+), Quartz, Glass, Glass-Ceramic, Sapphire, Ferrites and Titanates
  - Metalizations:
    - Sputtered: Al, Au, Cr, Cu, Ni(V), Pt, TaN, Ti and TiW
    - Plated: Electrolytic Cu, Ni, Au; Electroless Cu, Au



- Resistors: High Ohmic SiCr and TaN resistors in laser trimmable designs
- Capacitors: SiO<sub>2</sub>, SiON and BCB dielectrics in laser trimmable designs
- Inductors: Multilevel and multiturn copper and gold inductors
- Routing: True Air Bridges and Dielectric Crossovers
- Passivation Materials: SiON, Si<sub>3</sub>N<sub>4</sub>, BCB and polyimide
- Vias: Sputtered, enhanced plated, filled and castellations
- I/Os: BGA, LGA, edge wrap, through via and wire or ribbon bond
- Machining:
  - CO<sub>2</sub> cutting, drilling, and scribing
  - Diamond-saw dicing
  - Back grinding and polishing
- Assembly:
  - High precision 0201 or larger pick and place
  - Attachment via wire or ribbon bonding, BGA, LGA or surface mount reflow
  - Encapsulation
- Testing:
  - MIL-STD-105D level II sampling
  - MIL-STD-883 100% visual inspection
  - Capacitance, insulation resistance and resistivity
  - RF testing to 40 GHz

### Primary Markets and Applications

- Military, Aerospace and Space:
  - RF and Microwave filters
  - Precision resistors
  - MOS capacitors
  - Circulators, Splitters
  - Specialized modules
- Medical and Instrumentation:
  - Precision resistor networks and arrays
  - In-circuit trimmed designs
  - Telemetry filters
  - Miniature circuits and assemblies
- Broadband infrastructure:
  - Laser diode mounts and heat sinks
  - Optoelectronic converters
  - RF and DC fan-outs
- Instrumentation:
  - Ultra-precision reference capacitors and resistors
- Solar:
  - Interposers and heat sinks



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Typical Substrate Properties

Properties Nominal	Al <sub>2</sub> O <sub>3</sub> 99.6%	Al <sub>2</sub> O <sub>3</sub> 96.0%	Fused Silica	BeO 99.5%	AlN	Glass Borosilicate	Glass Ceramic	P-Silicon Boron Doped	N <sup>+++</sup> -Silicon Arsenic Doped	FZ-Silicon Arsenic Doped
Thickness Range (mil)	4-50	10-50	4-25	10-60	10-60	20	20	2-25	4-25	4-25
As Fired (Surface finish)	3μ"	No	No	6μ"	No	10 Å	NA			
Lapped (Surface finish) μ"	<20	No	No	<20	<20	NA				
Polished (Surface finish) μ"	<2	<4	<1	<3	<3	<.04	<0.6	<.04		
Dielectric Constant @ 10 GHz	9.8	9.6	3.8	6.6	8.7	5.1	NA			
Loss Tangent @ 10 GHz	0.0002	0.0002	0.0001	0.0003	0.001	0.003	NA			
CTE (PPM/°C)	6.7	8.2	0.5	7.5	4.5	3.2	11.5	2.6		
Thermal Conductivity (W/mK)	25.5	24.7	1.38	280	170	1.16	2.7	150		
Volume Resistivity (ohm-cm)	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	15	0.002	10 <sup>4</sup>
Dielectric Strength (KV/mm)	8.7	8.3	100	14	>10	NA				

Sputtered and Electroplated Materials

Materials	Sputtered	Comment
Al	150-40000 Å	AlSi (<1%) and AlCu (2%) available, Typical 2000 – 15000
Au	1000-65000 Å	Typical 3000 – 10000
Cr	150-5000 Å	Typical 600
Cu	2000-65000 Å	NA
LSCO	300-1200 Å	Typical 600
Ni(V)	500-10000 Å	NA
Pt	1000-4000 Å	Typical 2500
TaN	300-1500 Å	Barrier Layer
Ti	500-5000 Å	Typical 600
TiW	300-1500 Å	Typical 500
Plated Material	Electrolytic μm and (μin)	Electroless μm and (μin)
Au	0.5 – 50 (20-2000)	1-10 (40-400)
Cu	5 – 150 (200-6000)	2-4 (80-160)
Ni	1.25 – 5 (50-200)	NA

Resistor Technology

Thin Film Resistors	SiCr	TaN	NiCr
Process	High Ohmic, High Voltage, Ultra-stable	High process temperature (no diffusion); Resistance to harsh environment	Low TCR
Typical Sheet Resistivity (ohm/sq)	300-1300	10-200	5-200
TCR (ppm/°C -25 to 125°C)	±50; 0 to -150	-100 to -150	0 to 100
Stability (Change after 1000 hours @ 125°C)	0.2%	0.2%	0.2%
Maximum Stabilization Temperature (°C)	500	450	350
Recommended Device Environment	Ambient Atmosphere	Ambient Atmosphere	Ambient with Passivation or Inert Atmosphere
Maximum Device Processing Temperature	Up to 1 hr. @ 400 °C	Up to 1/2 hr. @ 350 °C	Up to 1/2 hr. @ 260 °C
Tolerance (the greater of)	0.05% or 0.1 Ω	0.05% or 0.1 Ω	0.05% or 0.1 Ω

Capacitor Materials

Material	SiON	SiO <sub>2</sub>	BCB	PI
pF/mm <sup>2</sup> Typical	55	35	25	30
Range	1-500 pF	1-500 pF	1-50 pF	0.5-10 pF
Trimmmable	Yes	No	Yes	No
Tolerance; <i>NOTE: value dependent</i>	≥ 0.5%; or ≥ 0.05 pF	≥ 0.5%; or ≥ 0.05 pF	≥ 0.5%; or ≥ 0.05 pF	20%
Stability	±60 ppm/°C	±30 ppm/°C	±42 ppm/°C	±100 ppm/°C
Rated Voltage	≤ 100	≤ 100	≤ 25	≤ 25
BDV (v/μm)	600	1000	300	200
DF	≤ 0.1%	≤ 0.1%	≤ 0.1%	≤ 0.2%
Performance	K 5.8; TCC 60	K 4.0; TCC 30	K 2.7; TCC 42	K 3.3; TCC

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## NEW! ATC 100 A/B and 700 A/B MLCs Extended Voltage Ratings to 1500 WVDC

ATC now offers 100A/B Porcelain Superchips® and 700A/B Porcelain and NPO Multilayer Capacitors with extended voltage ratings, providing the widest range of capacitance values with extended voltage ratings available.

### 100A / 700A

Capacitance Range	Standard WVDC	Extended WVDC
0.1 to 56 pF	150 WVDC	250 WVDC
62 to 100 pF	150 WVDC	200 WVDC

### 100B / 700B

Capacitance Range	Standard WVDC	Extended WVDC
0.1 to 47 pF	500 WVDC	1500 WVDC
51 to 100 pF	500 WVDC	1000 WVDC
110 to 200 pF	300 WVDC	1000 WVDC



## NEW! ATC 800 Series High RF Power Multilayer Capacitors

- Optimized Form Factor
- Lowest ESR @ Wireless Frequencies
- Highest Self Resonance
- Rugged, Reliable NPO Dielectric
- IR: 105 MΩ @ 25°C
- High RF Power Applications
- Superior Thermal Performance
- Ideal for Large and Small Signal Applications
- Available with non-magnetic terminations
- TCC: 0 ±30 PPM/°C

800 SERIES Case A	Capacitance Range	Electrical Specifications
• .055" x .055" (1.4 mm x 1.4 mm)	• 0.1 pF to 100 pF	• Voltage Rating: Up to 250 WVDC
800 SERIES Case B	Capacitance Range	Electrical Specifications
• .110" x .110" (2.79 mm x 2.79 mm)	• 0.1 pF to 1000 pF	• Voltage Rating: Up to 500 WVDC
800 SERIES Case R	Capacitance Range	Electrical Specifications
• .070" x .090" (1.79 mm x 2.29 mm)	• 1 pF to 100 pF	• Voltage Rating: Up to 500 WVDC
800 SERIES Case C	Capacitance Range	Electrical Specifications
• .250" x .250" (6.35 mm x 6.35 mm)	• 2.2 pF to 3000 pF	• Voltage Rating: Up to 3600 WVDC
800 SERIES Case E	Capacitance Range	Electrical Specifications
• .380" x .380" (9.65 mm x 9.65 mm)	• 3.3 pF to 5100 pF	• Voltage Rating: Up to 7200 WVDC



## ATC 500 S, 530 L, 520 L, 545 L, 550 L Broadband SMT Capacitors

*Your best broadband and ultra-broadband options for reliability.*

- Widest Frequency Coverage
- SMT Broadband Capacitors
- Ultra-Low Insertion Loss
- Flat Frequency Response
- One Piece Construction
- Orientation insensitive\*
- Tape & Reel, Surface Mountable
- Rugged Ceramic Construction
- RoHS Compliant
- Unit to Unit Performance Repeatability

ATC Series	Operating Frequency	Insertion Loss	Capacitance	Voltage Rating (WVDC)	Termination Options
500 S	1 GHz to 40 GHz	1db max.	0.1 pF to 10 pF	0.1 to 4.7 pF: 100 V 5.1 to 10 pF: 50 V	Platinum/Gold
520 L	160 KHz to 16 GHz	1db max.	10 nF	16 V	Tin
530 L	16 KHz to 18 GHz	1db max.	100 nF	16 V	Tin
545 L	16 KHz to 40+ GHz	<0.5db	100 nF	16 V	Tin, Solder, Gold
550 L	16 KHz to 40+ GHz	<0.5db	100 nF	16 V	Tin, Gold



## ATC 600 Series Ultra-Low ESR, NPO, EIA MLCs

*Excellent for RF and Microwave Transmit and Receive Wireless Applications.*

- Lowest ESR in Class
- Higher power handling capability
- Highest voltage rating in class for greater design margin
- High Self Resonance
- Reduces thermal noise (KTB) and improves signal to noiseratio (SNR) in receiver applications
- Improves PA reliability by operating cooler
- Wireless / Telecom Base Stations
- Satellite Systems
- Wireless Communications
- Microwave Communications Systems
- WiMAX
- Approved Supplier to DSCC Drawings
- Available with non-magnetic terminations

\*Horizontal Mount for 500 S

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**ATC's Design Support Software –  
New Enhanced 2011 Version**

Tech Select® is a design support tool that provides access to all electrical and mechanical parameters for ATC products. Included are Smith charts, S-Parameters, RF current and voltage, ESR, Q, impedances and more. RF parameters can be achieved at frequencies entered by the user.

By selecting and sorting on the most critical parameters this program generates a complete list of product options with part numbers. View and print datasheets for the selected products. Download size is 8.9 MB.

Tech-Select is compatible with Windows XP, Vista or Windows 7.



These measurement-based models, available for selected ATC components, are both substrate and part-value scalable, and represent high-order resonant effects and accurate effective series resistance. Each model includes complete documentation detailing the test fixtures used, measurement conditions, range of validity, and model-to-measurement data comparisons.



**100 A and 100 B Series S-Parameter Data**

Scattering parameters of ATC Series A / B as well as 180 R Series Capacitors measured in vertical orientation on alumina. 'Readme' file provides details of measurement conditions.

**700 A and 700 B Series S-Parameter Data**

Scattering parameters of ATC 700 Series A / B Series Capacitors measured in vertical orientation on alumina. 'Readme' file provides details of measurement conditions.

**600 L, 600 S and 600 F Series S-Parameter Data**

Scattering parameters of ATC 600 Series Ultra-Low ESR Capacitors measured on Rogers R04350 softboard. 'Readme' file provides details of measurement conditions.

**NEW! 545 L Series UBC™ Ultra-Broadband and 530 L, 520 L and 500 S Series Broadband Capacitor S-Parameter Data**

Measured on 10-mil thick Rogers R04350 microstrip board, with the exception of 500 S Capacitors which are measured on 25 mil alumina 'Readme' file provides details of measurement conditions.

**NEW! 800 A and 800 B Series S-Parameter Data**

Scattering parameters of ATC 800 A / B Series Ultra-Low ESR Capacitors, measured on Rogers R04350 softboard. 800 A measured in horizontal and vertical orientation; 800 B measured in vertical orientation. 'Readme' file provides details of measurement conditions.

**WL Series Inductors S-Parameter Data**

Scattering parameters of ATC WL Series Chip Inductors measured in horizontal orientation on Rogers R04350 softboard. 'Readme' file provides details of measurement conditions.

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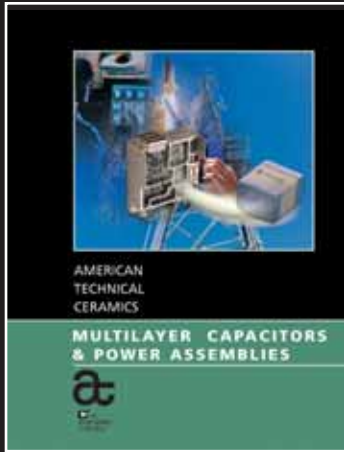
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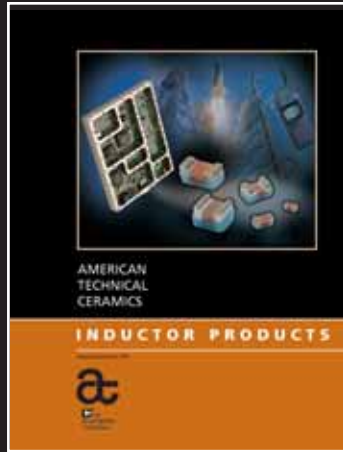
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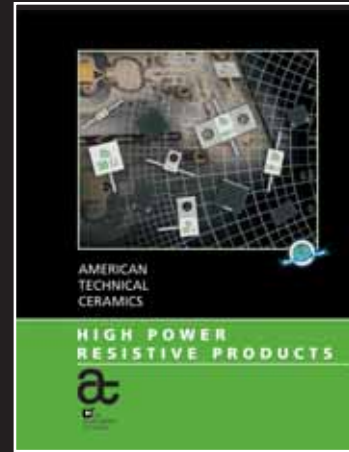
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