AUTOMOTIVE APPLICATIONS

CERAMIC CAPACITORS | TANTALUM CAPACITORS | POLYMER CAPACITORS
NIOBium OXIDE | FILM CAPACITORS | CONNECTORS | Ntc THERMISTORS
MULTILAYER VARISTORS | ANTENNAS
TANTALUM CAPACITORS

KYOCERA AVX automotive tantalum capacitors offer excellent parameters stability over lifetime, resistance against thermo-mechanical stresses, and high surge robustness.

Capacitors are available in both standard and low ESR options. They are also available in a high temperature series up to +175°C which makes them suitable for a wide range of automotive control circuits in applications such as engine control units, ABS systems, MDPS, electronic gearboxes, TPMS, etc.

<table>
<thead>
<tr>
<th>Series</th>
<th>Operating Temp</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAJ</td>
<td>+125°C</td>
<td>6.3V – 50V /0.22µF – 680µF</td>
</tr>
<tr>
<td>F93-AJ6</td>
<td>+125°C</td>
<td>4V – 35V / 1µF – 680µF</td>
</tr>
<tr>
<td>TPS</td>
<td>+125°C</td>
<td>6.3V – 50V / 0.22µF – 680µF</td>
</tr>
<tr>
<td>F91-AJ6</td>
<td>+125°C</td>
<td>6.3V – 16V / 10µF – 220µF</td>
</tr>
<tr>
<td>TRJ</td>
<td>+125°C</td>
<td>4V / 0.1µF – 680µF</td>
</tr>
<tr>
<td>F97</td>
<td>+125°C</td>
<td>6.3V – 35V / 0.33µF – 150µF</td>
</tr>
<tr>
<td>TRM</td>
<td>+125°C</td>
<td>2.5V – 50V / 4.7µF – 150µF</td>
</tr>
<tr>
<td>F98-AJ6</td>
<td>+125°C</td>
<td>6.3V – 16V / 4.7µF – 150µF</td>
</tr>
<tr>
<td>F97-HT3</td>
<td>+135°C</td>
<td>6.3V – 35V / 0.33µF – 680µF</td>
</tr>
<tr>
<td>THJ</td>
<td>+175°C</td>
<td>6.3V – 50V / 0.1µF – 220µF</td>
</tr>
</tbody>
</table>

CONDUCTIVE POLYMER CAPACITORS

Automotive polymer series of low ESR capacitors. Qualified in accordance with AEC-Q200.

<table>
<thead>
<tr>
<th>Series</th>
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</tr>
</thead>
<tbody>
<tr>
<td>TCQ</td>
<td>+105/125°C</td>
<td>2.5V – 50V / 10µF – 470µF</td>
</tr>
<tr>
<td>TCO</td>
<td>+150°C</td>
<td>50V / 10µF</td>
</tr>
</tbody>
</table>

NIOBIUM OXIDE CAPACITORS

Niobium OxiCap® capacitors offer unique features - high reliability, non-burn and non-smoke technology, more resistance to overvoltage breakdown, lower recommended derating, and high resistance failure mode. OxiCap® capacitors suits application where reliability and safety is of primary focus.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>NOJ</td>
<td>+105°C</td>
<td>1.8V – 10V / 1µF – 1000µF</td>
</tr>
<tr>
<td>NOS</td>
<td>+125°C</td>
<td>1.8V – 8V / 10µF – 1000µF</td>
</tr>
<tr>
<td>NOM</td>
<td>+125°C</td>
<td>1.8V – 6.3V / 220µF – 680µF</td>
</tr>
</tbody>
</table>

FILM CAPACITORS

FILM CHIP CAPACITORS

The self-healing property of film dielectric provides an open failure mode capacitor with excellent reliability. The intrinsic characteristic of film provides a capacitor that exhibits low DC bias, excellent thermal behavior and thermal shock resistance, no piezo effect and low ESR, ESL and dissipation factor.

<table>
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<tr>
<th>Series</th>
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</tr>
</thead>
<tbody>
<tr>
<td>PPS</td>
<td>+125°C</td>
<td>16V – 50V / 1nF – 180µF</td>
</tr>
<tr>
<td>PEN</td>
<td>+125°C</td>
<td>25V – 630V / 0.01µF – 4.7µF</td>
</tr>
<tr>
<td>PEN-HT</td>
<td>+125°C</td>
<td>63V – 630V / 0.01µF – 4.7µF</td>
</tr>
</tbody>
</table>

MEDIUM POWER FILM & DC LINK FILM CAPACITORS

FFV, FFLI and Custom parts are medium power film capacitors for DC filtering, high rms current and high temperature automotive applications. FAV series are high reactive energy tuning capacitors for HEV/EV battery charging applications.

FHC DC link capacitors are designed for use in conjunction with HEV/EV vehicles IGBT modules.

<table>
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<tr>
<th>Series</th>
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</tr>
</thead>
<tbody>
<tr>
<td>FFV Series (PET/PPY)</td>
<td>+105°C</td>
<td>300V – 1900V / 22µF – 400µF</td>
</tr>
<tr>
<td>FFLI (PPY)</td>
<td>+95°C</td>
<td>800V – 1400V / 105µF – 3mF</td>
</tr>
<tr>
<td>Custom Parts (PPY)</td>
<td>+105°C</td>
<td>75V – 1400V / 300µF – 1.5mF</td>
</tr>
<tr>
<td>FHC (PPY)</td>
<td>+105°C</td>
<td>410V – 900V / 410µF – 900µF</td>
</tr>
</tbody>
</table>

THIN FILM CAPACITORS

Very low-loss (high-Q) SMT capacitors, especially for the wireless communications market at frequencies up to and above 5.8GHz. Accu-P® is unique in its ability to offer very low capacitance values (0.05 pF) and ultra tight capacitance tolerances (±0.01 pF).
### ABOUT KYOCERA AVX

KYOCERA AVX is a worldwide leading supplier of passive electronic components, connectors, passive and active antennas, sensors and control units. We offer a wide range of components manufactured to the highest quality and reliability standards. Our worldwide manufacturing capability includes facilities located in seventeen countries in four continents, allowing us to continue meeting customer needs on a global basis.

Our products include ceramic, tantalum, niobium oxide, conductive polymer and film capacitors, varistors, thermistors, filters, connectors, antennas, sensors and control units.

Our long track record and more than 30 years of expertise in automotive products enable customers to rely on KYOCERA AVX as the one stop source for passive components needs.

As a technology leader, KYOCERA AVX will continue to add to its product portfolio on a regular basis. Details of new devices being offered and their specifications will be shown on the KYOCERA AVX website, [www.KYOCERA AVX.com](http://www.KYOCERA AVX.com).

### AUTOMOTIVE OVERVIEW

#### SAFETY
- Camera System
- Airbag
- Anti-Lock Brake System
- Crash Avoidance Circuit
- Tire Pressure
- Traction Control (ESP)
- Seat Weight Sensor
- Telematics Control Unit (eCall, V2X)
- Small Motor Drives
- Communication Bus (Lon, CAN, FlexRay)
- Transponders
- Dashboard Systems
- Car Alarm
- Lamp / LED Driver
- HID Lighting
- Windshield Wipers
- Rain Sensor
- Light Sensor
- Engine Control Unit (ECU)
- Electronic Clutch
- Fuel Pump

#### BODY ELECTRONICS
- Transmission Control Unit
- Turbo Charger
- Underhood Modules
- Seat Heating
- Air Conditioning
- GPS Location System
- Electric Seat Controls
- Electric Window Controls
- Electric Mirror Controls
- Parking Assistant
- Infotainment
- Satellite Radio
- Keyless System
- Cruise Control
- Remote Start
- DC/DC Converters
- Regenerative Braking
- Start/Stop System
- Electric Drive
- Battery Management (Charging)
- Battery Cell Temperature Monitoring

### CERAMIC CAPACITORS
- NP0
- X7R
- X7R High Voltage
- High Temp. X7R
- FLEXITEMP®
- FLEXISAFE™
- U Series
- IPC Array
- ESD-Safe™
- Radial & Axial
- X7R Feedthru

### TANTALUM CAPACITORS
- TAJ / F93-AJ6
- TPS / F91-AJ6
- TRJ / F97
- TRM
- TMJ
- F98-AJ6
- F97-HT3
- THJ

### CONDUCTIVE POLYMER CAPACITORS
- TCQ
- TCO

### NIOBUM OXIDE - OXICAP®
- NOJ
- NOS
- NOM

### FILM CAPACITORS
- PPS Film Chip
- PEN Film Chip
- PET-HT Film Chip
- FF7 / FFL7 / Custom

### CIRCUIT PROTECTION
- Automotive Varistors

### NTC THERMISTORS
- SMT Thermistors
- Leadted Thermistors

### CONNECTORS
- IDC
- Custom Automotive

### ANTENNAS
- Antennas
### SAFETY BODY ELECTRONICS
- Camera System
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- Fuel Pump
- Water Pump
- Electric Oil Pump
- Gear Box Sensors
- Electric Power Steering
- Engine Cooling Fan
- Temperature Sensor
- Transmission Control Unit
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KYOCERA AVX Ceramic Capacitors exhibit low parasitics and excellent EMI filtering capabilities. KYOCERA AVX MLC Capacitors are available in wide range of values, styles, voltage ratings and dielectrics.

Ultra Low ESR NP0 - “U” dielectric parts are designed for RF applications requiring ultra-low ESR. NP0 parts are suitable for use in MHz range with very stable characteristics. X7R parts are suitable for use for use in general kHz range. X8R / X8L parts are designed for high temperature applications up to +150°C. (*Contact KYOCERA AVX for +150°C X7R option)

FLEXITERM®
FLEXITERM® MLC Capacitors equipped with an KYOCERA AVX flexible termination system. They have superior resistance to both mechanical stress (board flexure - 5mm bend test guaranteed) and thermal stress (increased temperature cycling performance, 3000 cycles and beyond).

(*Contact KYOCERA AVX for +150°C X7R option)

FLEXISAFE
Specifically designed with an industry leading set of safety features for safety critical applications. Combines FLEXITERM® layer in conjunction with the cascade design.

ESD SAFE
Enhanced MLC capacitor designed specifically for general ESD protection.

IPC ARRAY
Integrated Passive Component (IPC) and associates up to four capacitance elements in a single case, and is ideal for use in modern integrated circuits in automotive applications. It offers PCB space saving, increased assembly line output and better electrical performance thanks to small dimensions. Available also with FLEXITERM® for X7R and X8R range.

EMI FILTER
Capacitor with excellent filtering capability thanks to the feedthru L-C-T like filter design.

LEADED CERAMIC CAPACITORS

KYOCERA AVX leaded MLCCs offer excellent mechanical shock and vibration resistance in harsh environment applications. With a wide range of dielectric materials, capacitance values, voltage ratings and lead styles, leaded capacitors offer robust mechanical shock and vibration characteristics, exceptional thermal resistance and proven reliability and quality. Both dipped and molded configurations available.

Axial version of the leaded epoxy coated capacitors. Both dipped and molded configurations available.
AUTO SERIES MULTILAYER VARISTORS
Reliable bi-directional protection from voltage transients (ESD, inductive switching, automotive transients, etc.). Multiple strike capability, high reliability, and EMI/RFI filtering in the off-state. Available in wide range of ratings to suit various application needs from high energy/load dump to low capacitance or ultra-low leakage. AEC-Q200 qualified.

Case Sizes Operating Temp Range
0201 – 3220 Radial, Axial +125/150/175°C 3.3 – 85V | 0.8pF – 4.7µF

NTC VARISTORS
Parts are AEC-Q200 qualified and offer fast thermal response, excellent reliability in SMT, leaded and leadless configuration. High accuracy series available with tolerances from ±1%. Customized solutions are available.

Case Sizes Operating Temp Range
0603 – 1206 Radial +150°C 100 – 1MΩ B25/85: 3250 – 4840K

CONNECTORS

IDC
Provides reliable “Gas Tight” wire-to-board connections for high temperature, shock and vibration applications. Can also be used with Press-Fit pin technology as 1-piece solution to replace costly 2-piece connector solution.

Range
IDC : AWG 12-28, SMT and PTH IDC Press-Fit : AWG 18-24

CUSTOM AUTO CONNECTORS
Advanced component, process and automation technology provides high pin and component (Mechatronics) count connector and module solutions for emerging automotive systems, engine management, braking, steering, safety, environmental, etc.

Range
Based on customer requirements

ANTENNAS

ON BOARD
SMT antennas using different technologies for easy implementation and fast time to-market. Ceramic, PCB based, stamped metal, patch. PPAP documentation available.

EXTERNAL
Roof mounted, shark fin, aftermarket antennas. Waterproof IP67/68. PPAP documentation available.

CUSTOMER SPECIFIC
Custom antennas in different manufacturing technologies: LDS, two-shot molding, insert molding. Testing services: simulations and measurements in Automotive Chamber

Bands Frequency
GSM, 3G, LTE /4G, WiFi, BT, V2X, GNSS, UHF, ISM, LPWAN, Satellite, 5G 433, 868 MHz 700 MHz – 2.7 GHz 5.1 – 5.9 GHz; 20 – 67 GHz

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WWW.KYOCERA-AVX.COM