Automotive Application

We propose the best products for our customers, based on application, size and a variety of other design needs.

<table>
<thead>
<tr>
<th>Customer</th>
<th>NICHCORE CORPORATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning of new model</td>
<td>Inquiry</td>
</tr>
<tr>
<td>Study</td>
<td>Design, product proposal</td>
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<tr>
<td></td>
<td>Sample order receipt and production, price quote</td>
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<tr>
<td></td>
<td>Sample delivery, preparation of delivery specifications document</td>
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<td>Order for mass production</td>
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Note: Please confirm product development details with your dealer.
### Recommended Series for Automotive Applications

#### ECU
- **CHIP TYPE**: UUB, UCL, UBV, UBX, UBT, UBC, UCX, UCZ, UCD
- **Vibration Resistance**: Higher vibration resistance
- **Chip type**: High reliability
- **Temperature**: 125°C, 105°C, 150°C
- **ECUs, DC–DC Converter/Inverter Controls**: Longer life

#### Automotive Electric Pumps (EWP and EOPs)
- **CHIP TYPE**: UUB, UCL, UBV, UBX, UBT, UBC, UCX, UCZ, UCD
- **Vibration Resistance**: Higher vibration resistance
- **Chip type**: High reliability
- **Temperature**: 125°C, 105°C, 150°C
- **Power Steering EPS**: Longer life

#### Power Steering EPS
- **CHIP TYPE**: UUB, UCL, UBV, UBX, UBT, UBC, UCX, UCZ, UCD
- **Vibration Resistance**: Higher vibration resistance
- **Chip type**: High reliability
- **Temperature**: 125°C, 105°C, 150°C
- **Power Steering EPS**: Longer life

#### Door Locks
- **CHIP TYPE**: UUB, UCL, UBV, UBX, UBT, UBC, UCX, UCZ, UCD
- **Vibration Resistance**: Higher vibration resistance
- **Chip type**: High reliability
- **Temperature**: 125°C, 105°C, 150°C
- **Door Locks**: Longer life

#### Door Mirrors
- **CHIP TYPE**: UUB, UCL, UBV, UBX, UBT, UBC, UCX, UCZ, UCD
- **Vibration Resistance**: Higher vibration resistance
- **Chip type**: High reliability
- **Temperature**: 125°C, 105°C, 150°C
- **Door Mirrors**: Longer life

#### Airbag Controls
- **CHIP TYPE**: UUB, UCL, UBV, UBX, UBT, UBC, UCX, UCZ, UCD
- **Vibration Resistance**: Higher vibration resistance
- **Chip type**: High reliability
- **Temperature**: 125°C, 105°C, 150°C
- **Airbag Controls**: Longer life

#### DC–DC Converter/Iverter Controls
- **CHIP TYPE**: UUB, UCL, UBV, UBX, UBT, UBC, UCX, UCZ, UCD
- **Vibration Resistance**: Higher vibration resistance
- **Chip type**: High reliability
- **Temperature**: 125°C, 105°C, 150°C
- **DC–DC Converter/Iverter Controls**: Longer life

#### EV Power Supplies
- **CHIP TYPE**: UUB, UCL, UBV, UBX, UBT, UBC, UCX, UCZ, UCD
- **Vibration Resistance**: Higher vibration resistance
- **Chip type**: High reliability
- **Temperature**: 125°C, 105°C, 150°C
- **EV Power Supplies**: Longer life

### Series of Automotive Aluminum Electrolytic Capacitors

#### High Voltage
- **Temperature**: 125°C, 105°C
- **Chip type**: Higher capacitance, lower ESR
- **Temperature**: 125°C, 105°C, 150°C
- **Chip type**: Higher capacitance, lower ESR

#### Low ESR
- **Temperature**: 125°C, 105°C, 150°C
- **Chip type**: Higher capacitance, lower ESR
- **Temperature**: 125°C, 105°C, 150°C
- **Chip type**: Higher capacitance, lower ESR

### ISO/TS16949 Certification Numbers

<table>
<thead>
<tr>
<th>Factory Name</th>
<th>Certification number</th>
<th>Date</th>
<th>Scope of Registration</th>
<th>Auditing Organization</th>
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<tr>
<td>NICHICON (OHIO) CORPORATION</td>
<td>JQA-A00301</td>
<td>April 2004</td>
<td>The design, development and manufacture of aluminum electrolytic capacitors</td>
<td>JQA</td>
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<td>NICHICON (OHIO) CORPORATION</td>
<td>JQA-A00302</td>
<td>February 2013</td>
<td>The design, development and manufacture of aluminum electrolytic capacitors (Series II)</td>
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<td>AR01401</td>
<td>May 2004</td>
<td>The design and manufacture of aluminum electrolytic capacitors</td>
<td>JQA</td>
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<tr>
<td>NICHICON ELECTRONICS (HUNG) CORPORATION</td>
<td>AR1012</td>
<td>October 2012</td>
<td>The design and manufacture of aluminum electrolytic capacitors</td>
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<td>October 2012</td>
<td>The design and manufacture of aluminum electrolytic capacitors</td>
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## Nichicon Automotive Application Catalog

### Electronic Control Solutions

#### Engine ECU Pattern Diagram

- **Battery**
- **Input signal processing circuit**
- **CPU**
- **Output signal processing circuit**
- **A/D Conversion**
- **Communication circuit**

#### Capacitance

<table>
<thead>
<tr>
<th>Category</th>
<th>Temperature</th>
<th>Rated Voltage</th>
<th>Endurance</th>
<th>Product Size</th>
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</thead>
<tbody>
<tr>
<td>High temperature</td>
<td>0 to 100V</td>
<td>5,000 hours at 125°C (–40°C x 100kHz)</td>
<td>18×40L</td>
<td>18×21.5L</td>
</tr>
<tr>
<td>Ultra-high temperature</td>
<td>78 to 480V</td>
<td>1,000 to 2,000 hours at 135°C</td>
<td>18×21.5L</td>
<td>18×40L</td>
</tr>
</tbody>
</table>

#### Low temperature ESR

- **ECR**

#### Vibration resistance

- **UBW**
  - High temperature, high reliability (135°C)
  - Products with high-temperature stability, guaranteed for 1,000 to 5,000 hours at 135°C
  - Suited for automotive electronic products
  - Compliant to the RoHS directive (2011/65/EU)

- **UBX**
  - Ultra-high temperature suited for automotive electronics

- **UUE**
  - SMD type guaranteed for 2,000 to 5,000 hours at 135°C
  - Ideal for automotive electronic components
  - Compliant to the RoHS directive (2011/65/EU)

- **TBE**
  - High reliability, withstand load life of 2,000 hours at 135°C
  - Optimal for automotive electronic components
  - Compliant to the RoHS directive (2011/65/EU)

#### High temperature

- **UCZ**
  - Low-temperature ESR/post-durability-test
  - Low-temperature products meeting ESR specifications
  - 125°C
  - Compliant to the RoHS directive (2011/65/EU)

- **UCX**
  - 135°C-guaranteed low-temperature ESR specification
  - Compatible with products having vibration-resistant structures

#### Optimization of Product Configuration

- Use of a Thin, Low-ESR-Function Separator
  - Optimizes sealing area and improves sealing performance

- Use of Low-Transpiration Solvent (Optimized Solvent Composition)
  - Adjusts film capacitance and maintains positive film

- Use of a Thin, Low-ESR-Function Separator
  - Optimizes sealing area and improves sealing performance

- Use of a Thicker Sealing Cuff
  - Controls degradation over time

- Use of Low-ESR-Function Electrolysis Paper
  - Improves durability and stability

#### Applications

- **Engine control, automotive water pumps, automotive oil pumps**
- **Electronic control, DC-DC converters, inverters, headlight ballast secondary, automotive water pumps, automotive oil pumps**
- **Engine control, automotive water pumps, automotive oil pumps**

#### Improved Anti-Vibration Surface-Mounted Products Optimized for Engine Areas (High-temperature Environments, Vibrations)

- **UCZ**
  - Vibration resistance, high temperature
  - Suitable for ultra-high temperatures (150°C)

- **UCX**
  - Ultra-high temperature, high reliability (150°C)
  - Products suited for ultra-high temperatures (150°C)
  - SMD type guaranteed for 1,000 to 3,000 hours at 135°C

#### Mounting Examples

- Engine ECU, hybrid vehicle ECUs, “idling stop,” automotive water pumps, electric oil pumps

Note: For detailed specifications, please refer to Nichicon’s general catalog of electronics.
**Headlight Ballast Pattern Diagram**

**DC–DC Converter Circuit Diagram**

**Automotive Aluminum Electrolytic Capacitors**

### UUX
- **SMD type, larger size**
- **Compliant to the RoHS directive (2011/65/EU)**
- **Suitable for high temperature**

**Applications**
- High-voltage filters in EIS and auxiliary circuits for monitoring, low-voltage (Electric systems, measurement systems)

**Specifications**
- **Product size:** 8.0 x 11.5L to 12.0 x 13.5L
- **Endurance:** 2,000 hours at 65°C (100V or less), 200 hours at 100°C (160 to 400V)
- **Max. ripple current:** 1.5 to 2.0A
- **Capacitance:** 0.05 to 100µF
- **Category temperature:** 25 to +125°C

### UUB
- **High reliability**
- **Suitable for high temperature**

**Applications**
- High-voltage filters in EIS and auxiliary circuits for monitoring, low-voltage (Electric systems, measurement systems)

**Specifications**
- **Product size:** 8.0 x 11.5L to 12.0 x 13.5L
- **Endurance:** 2,000 hours at 65°C (100V or less), 200 hours at 100°C (160 to 400V)
- **Max. ripple current:** 1.5 to 2.0A
- **Capacitance:** 0.05 to 100µF
- **Category temperature:** 25 to +125°C

### UBT
- **High reliability (125°C)**

**Applications**
- Automotive compressors, HID lights, power steering, GPSs, EGSs

**Specifications**
- **Product size:** 8.0 x 11.5L to 12.0 x 13.5L
- **Endurance:** 1,000 hours at 85°C (22 to 220°C), 500 hours at 100°C
- **Max. ripple current:** 1.5 to 2.0A
- **Capacitance:** 0.05 to 100µF
- **Category temperature:** 25 to +125°C

### UKA
- **Wide temperature range, for audio equipment high-grade type**

**Applications**
- For automotive audio

**Specifications**
- **Product size:** 4.5 x 5L to 6.0 x 6L
- **Endurance:** 2,000 hours at 105°C (5.0 to 160V)
- **Max. ripple current:** 1.5 to 2.0A
- **Capacitance:** 0.05 to 100µF
- **Category temperature:** -55 to +125°C

**Solutions**

- **Control Battery**
- **Nichicon Automotive Application Catalog**

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**Automotive Conductive Polymer Aluminum Solid Electrolytic Capacitors**

### PCV
- **High reliability, low ESR, high ripple current**
- **Suitable for high voltage (125V)**

**Applications**
- ECUs, DC–DC converters, lights

**Specifications**
- **Product size:** 8.0 x 11.5L to 10.0 x 13.5L
- **Endurance:** 3,000 hours at 125°C
- **Max. ripple current:** 1.5 to 2.0A
- **Capacitance:** 0.01 to 300µF
- **Category temperature:** -55 to +125°C

### PLV
- **High reliability, low ESR, high ripple current**
- **Suitable for high voltage (100V)**

**Applications**
- ECUs, DC–DC converters, lights

**Specifications**
- **Product size:** 8.0 x 11.5L to 10.0 x 13.5L
- **Endurance:** 3,000 hours at 125°C
- **Max. ripple current:** 1.5 to 2.0A
- **Capacitance:** 0.01 to 300µF
- **Category temperature:** -55 to +125°C

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**Nichicon Automotive Application Catalog**
“Ever CAP” Automotive Electric Double-Layer Capacitors

**JUM**
- **High voltage**
- Product size: 4.5x3.3x0.5mm (SMD type)
- Applications: Navigation systems, Drive Recorders, e-latches
  - High voltage (2.7V)
  - Suitable for quick charge and discharge
  - Wide temperature range (-25 to +70°C)
  - Compliant to the RoHS directive (2011/65/EU)

**JUK**
- **Lower resistance**
- Product size: 4.5x3.3x0.5mm (SMD type)
- Applications: Navigation systems, Drive Recorders, e-latches
  - Lower resistance type of UM series
  - Lower temperature range (-40 to +70°C)
  - Compliant to the RoHS directive (2011/65/EU)

“Posi-R” Automotive Positive Thermistors

**ZPD/ZPS**
- **High reliability**
- Applications: HVAC, PM, heaters
  - High reliability

**ZPC**
- **High reliability**
- Applications: Door locks, door mirrors, optical leveling, car audio
  - Door locks, door mirrors, optical leveling, car audio

Mounting Examples: Motor inverters, hybrid automotive DC-DC converters, power steering, navigation systems

Note: For detailed specifications on the product numbers above, please refer to Nichicon’s general catalog of electronics.

Airbag ECU Pattern Diagram

**High voltage**
- High voltage
- Engine controls, PSDs, PBDs, collating ECUs, blower motors, gateway ECUs, DCMs, airbag control

**High reliability**
- High reliability
- Navigation, car audio, wipers, airbags, electrical leak detection, collating ECUs, gateway ECUs, instruments, EPIS, DCMs, lighting, compact drive trains, power seat motors

**Long life**
- Long life
- Note: The same product number also meets ECU solution specifications.

**UCL**
- **Low impedance**
  - SMD type, low impedance
  - Compliant to the RoHS directive (2011/65/EU)
  - Applications: Engine controls, PSDs, PBDs, collating ECUs, blower motors, gateway ECUs, DCMs, airbag control

**UCD**
- **Low impedance**
  - SMD type, low impedance
  - Compliant to the RoHS directive (2011/65/EU)
  - Applications: Navigation, car audio, wipers, airbags, electrical leak detection, collating ECUs, gateway ECUs, instruments, EPIS, DCMs, lighting, compact drive trains, power seat motors

**UPW**
- **Miniature sized, low impedance for switching power supplies**
  - Miniature sized, low impedance
  - Capacitance ranges available based on the numerical values in E-12
  - High reliability withstands 2,000 to 6,000 hours at 105°C
  - Compliant to the RoHS directive (2011/65/EU)
  - Applications: Power steering, turn signals, airbags

Note: The same product numbers also apply to control solution specifications.

Mounting Examples: Airbags, automotive cameras, Drive Recorders, ABS systems

Note: For detailed specifications, please refer to Nichicon’s general catalog of electronics.
Eco-Car Solutions

Aluminum Electrolytic Capacitors for Battery Management

**ULR**
- High Voltage
- High temperature
- Compliant to the RoHS directive (2011/65/EU)
- Applications: HEV/ER batteries, battery unit control, and monitoring

**ULV**
- High voltage, long life
- Applications: HEV/ER batteries, battery unit control, monitoring

**ULT**
- SMD type, high voltage, high temperature
- Applications: Headlight ballast primary

**ULH**
- SMD type, high voltage and high reliability
- Applications: Headlight ballast primary

ULR: Surface-mount standard, mid- to high voltage guaranteed for 3,000 hours at 105°C
ULV: Long life surface-mount mid- to high voltage guaranteed for 10,000 hours at 105°C
ULT: High-temperature surface-mount mid- to high voltage guaranteed for 2,000 hours at 125°C
ULH: Highly reliable surface-mount mid- to high voltage guaranteed for 4,000 hours at 125°C

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Film Capacitors for EVs/HVs/PHVs

**Sample Uses for Inverter with Booster Function**

**Film Capacitors**
- Providing Film Capacitors with Superior Electrical Characteristics and Reliable Exterior and Electrode Configurations for Use in Automobiles, Buses, and other Vehicles
- High-Frequency Characteristics
- Stable Characteristics

**Film Capacitors**
- Voltage: ±50V to ±250V
- Capacitor: ±0.1 to ±470μF

**Integrated Design**
- Integrated design enables use for inverting and filtering

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**DC–DC Converter with integrated charger for EVs**

**Features**
- Compatible with power sources worldwide
- Operates using CAN communications, transmits various types of information
- Compatible with IEC/IEEE 1851-1 model 2, mode 3
- CE mark compliant

**Specifications**

**Charger**
- Input voltage: AC100 to 264V
- Output power: Max. 2.8kW
- Output voltage: 180 to 370V
- Efficiency: 91%
- Cooling system: Water cooled

**Charging DC–DC converter**
- Input voltage: 180 to 370V
- Output voltage: 14V
- Output current: 80A
- Efficiency: 92%
- Cooling system: Water cooled

**Size**
- Approximately 20% more compact
- More compact and lightweight while meeting standard specifications