Standard Process for Developing Custom Products

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

Customer	Planning of new model	Study	Request for circuit design estimate	Evaluation and approval of verification testing, registration of standards	Ordering decision, agreement
	Inquiry / Visit	Proposal	Sample order	Sample submission	Order for mass production
Nichicon	Inquiry	Design, product proposal	Sample order receipt and production, price quote	Sample delivery, preparation of delivery specifications document	Fulfill mass-production order
	Response: Sales locations	Response: Factory technology departments	Response: Factory technology departments, sales locations	Response: Factory technology departments, quality assurance departments, sales locations	Response: Factory manufacturing departments, sales locations

Please contact your local Nichicon sales office if you require qualification data based on AEC-Q200.

Note: Please confirm product development details with your dealer.

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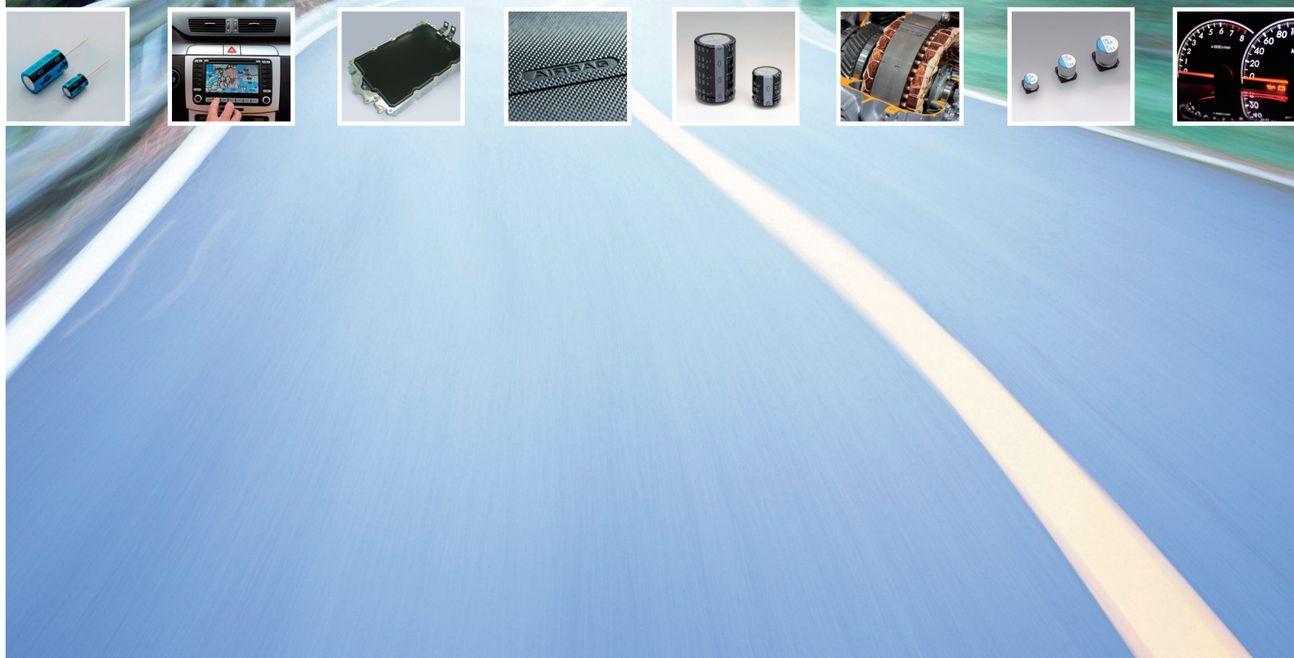
nichicon

Automotive Application Catalog

2015.3

Automotive Application



Recommended Series for Automotive Applications

ECUs

- UBT — High reliability
- UBX — Ultra-high temperature (150°C)
- UBW — High reliability (135°C)
- TBE — Axial lead type of high temperature(125°C)

Automotive Electric Pumps (EWPs and EOPs)

- UBC — Vibration resistance, high temperature (150°C)
- UCX — Vibration resistance, high temperature (135°C)
- UCZ — Chip type, high reliability low temperature ESR specification
- PCR — Conductive polymer with high capacitance and long life
- PCX — Conductive polymers that have high reliability and high voltage
- UUE — vibration resistance (125°C)

Power Steering EPS

- UBT — High reliability
- PCR — Conductive polymer with high capacitance and long life

Airbag Controls

- UCM — Low impedance
- UCL — Low impedance
- UPW — Miniature sized, low impedance
- UCD — Low impedance

Instruments, Lighting, Power Seats, Meters

Power Sliding Doors (PSDs) Power Back Doors (PBDs) Blower Motors

- UCM — Low impedance
- UCL — Low impedance

Navigation, Drive Recorders, e-Latches

- UCD — Low impedance
- JUM — Electrical double layer, high voltage
- JUK — Electrical double layer, low resistance
- UUD — Chip type, Low impedance

Door Locks Door Mirrors

- UST — 7mmL, wide temperature range
- ZPC — For overcurrent protection

Audio

- UKA — 105°C high grade

Wipers

- UCD — Low impedance
- USP — 7mmL, bi-polarized
- UVP — Standard, bi-polarized

HLB Primary and Secondary Lights, HID Lights

- ULT — High voltage, ballast response
- UBT — High reliability
- UUB — Chip type, high reliability
- UCZ — Chip type, high reliability, low temperature ESR specification
- PCX — High reliability conductive polymer products with high voltage
- PCV — Conductive polymer products with high voltage and long life
- PCR — Conductive polymer products with high capacitance and long life

Heaters

High reliability products for ZPDs and ZPS EVs/PHVs

ECUs, DC–DC Converter/Inverter Controls Inverters for EV Motors

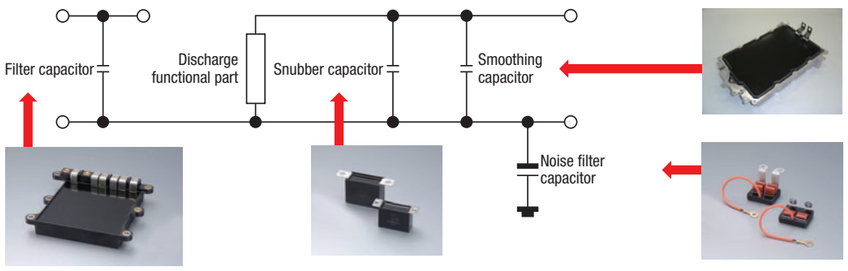
- PLV — Conductive polymer products with high voltage and long life
- PLX — Conductive polymers that have high reliability and high voltage

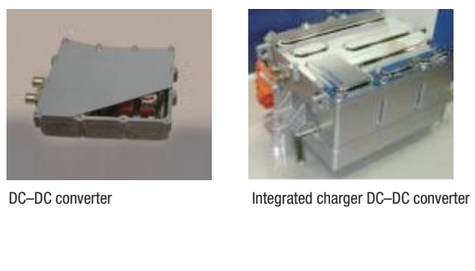
EV/HV Batteries/ Battery Unit Controls/ Monitoring

- UUX — Larger case sizes with high voltage
- ULV — High voltage
- ULR — High voltage

HV, PHV and EV Products

Capacitor module equivalence circuit

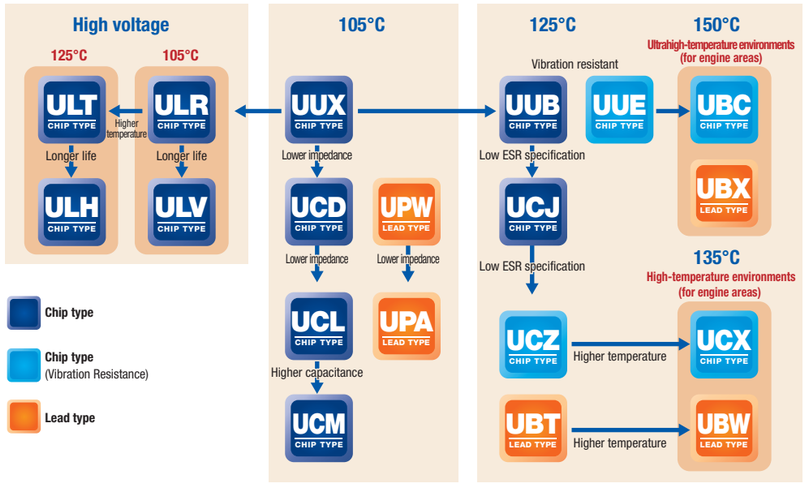




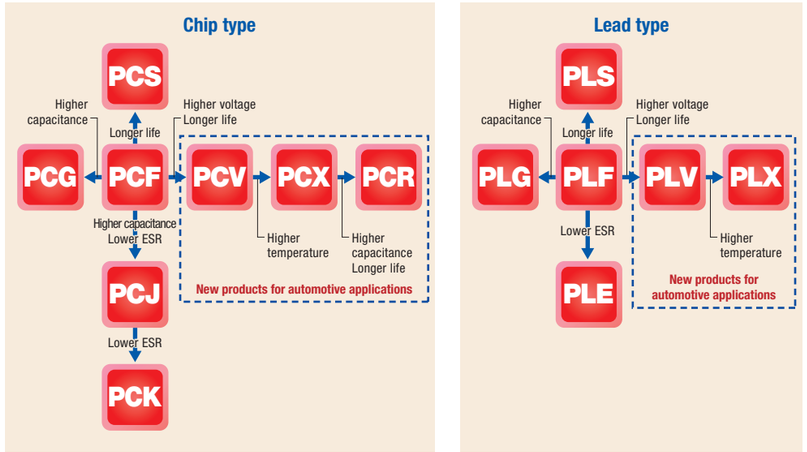
DC–DC converter

Integrated charger DC–DC converter

Series of Automotive Aluminum Electrolytic Capacitors



Series of Automotive Conductive Polymer Aluminum Solid Electrolytic Capacitors

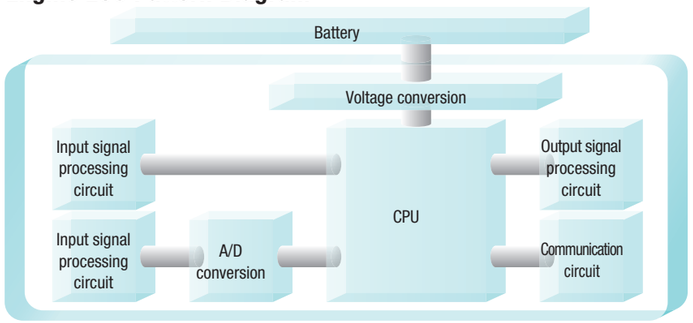


ISO/TS16949 Certification Numbers

Factory Name	Certification number	Date	Scope of Registration	Auditing Organization
NICHICON (OHNO) CORPORATION	JQA-AU0031	April 2004	The design, development and manufacture of aluminum electrolytic capacitors	JQA
	JQA-AU0031-2	February 2013	The design, development and manufacture of conductive polymer aluminum solid electrolytic capacitors (Site II)	
	JQA-AU0013	January 2004	The design and manufacture of aluminum electrolytic capacitors (Site III)	
NICHICON (IWATE) CORPORATION	JQA-AU0037	May 2004	The design, development and manufacture of aluminum electrolytic capacitors	JQA
NICHICON (MALAYSIA) SDN. BHD.	AR3641	May 2005	The design and manufacture of aluminum electrolytic capacitors	SIRIM
NICHICON ELECTRONICS (WUXI)CO., LTD	No.161012148	October 2012	The design, development and manufacture of aluminum electrolytic capacitors	DEKRA

Electronic Control Solutions

Engine ECU Pattern Diagram

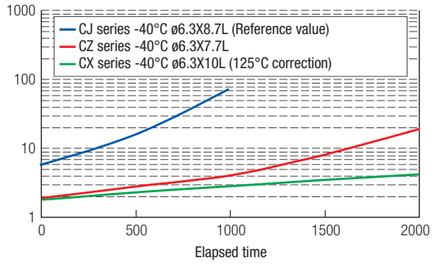


Low temperature ESR

Vibration resistance

High temperature

ESR Time Degradation Ratio (125°C Durability Test)



Point 1 Use of a Thin, Low-ESR-Function Separator
- Employs low-ESR-function electrolysis paper
- Increases electrode foil capacitance area through the use of electrolysis paper

Point 2 Use of Low-Transpiration Solvent (Optimized Solvent Composition)
- Ensures stable performance in high-temperature environments

Point 3 Optimization of Product Configuration
- Addition of ϕ6.3×10L (new size)
  ⇒ Use of a thicker sealing cuff to control degradation over time
- Optimized element configuration
  ⇒ Expands facing area and optimizes sealing cuff

UCZ

High reliability, low ESR specification
Compliant with products having vibration-resistant

Expanded

- Low-temperature ESR/post-durability-test
- Endurance 125°C 1,000 to 4,000hours
- Capacitance 10 to 3,300µF
- Category temperature -40 to 125°C
- Compliant to the RoHS directive(2011/65/EU)

Applications Engine-control ECUs, DC–DC converters, inverters, headlight ballast secondary, automotive water pumps, automotive oil pumps

ESR (Ω) MAX.at-40°C, 100kHz

Product size ϕ×L	Rated voltage 10 to 35V			Rated voltage 50V			Rated voltage 63V			Rated voltage 80V			Rated voltage 100V		
	Initial	Guaranteed time 2000h	Guaranteed time 3000h	Initial	Guaranteed time 2000h	Guaranteed time 3000h	Initial	Guaranteed time 2000h	Guaranteed time 3000h	Initial	Guaranteed time 2000h	Guaranteed time 3000h	Initial	Guaranteed time 2000h	Guaranteed time 3000h
6.3×5.8	24	—	—	42	—	—									
6.3×7.7	5	40	—	5	40	—	100	—	—						
8×10	3	4.5	—	3.5	6	—	35	—	—	50	—	—	50	—	—
10×10	2	3.5	—	2.5	4.5	—	25	—	—	35	—	—	35	—	—
12.5×13.5	0.40	3.0	—	0.44	4.0	—	1.3	14	—	1.9	14	—	1.9	22	—
16×16.5	0.28	1.4	—	0.34	2.6	—	0.9	4.8	—	1.4	4.8	—	1.4	4.8	—
18×16.5	0.23 (35V:0.28)	1.3 (35V:1.4)	—	0.32	2.6	—	0.82	3.9	—	1.1	3.9	—	1.1	3.9	—
16×21.5	0.20	—	0.60	0.22	—	1.50	0.46	—	2.0	0.8	—	2.6	0.8	—	2.6
18×21.5	0.16	—	0.50	0.20	—	1.50	0.44	—	1.8	0.7	—	2.4	0.7	—	2.4

UCX

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

- Low-temperature ESR/post-durability-test
- Endurance 135°C 2,000hours
- Capacitance 47 to 3,300µF
- Category temperature -40 to 135°C
- Compliant to the RoHS directive(2011/65/EU)

Applications Engine-control ECUs, DC–DC converters, inverters, headlight ballast secondary, automotive water pumps, automotive oil pumps

ESR (Ω) MAX.at-40°C, 100kHz

Product size ϕ×L	Rated voltage 10 to 35V		Rated voltage 50V	
	Initial	Guaranteed time 1000h	Initial	Guaranteed time 1000h
6.3×10	4	15	—	—
8×10	3	12	3.5	15
10×10	2	10	2.5	12
12.5×13.5	1.0	5.0	1.3	6.5
16×16.5	0.50	2.5	0.70	3.5
18×16.5	0.50	2.5	0.70	3.5
16×21.5	0.32	1.6	0.40	2.0
18×21.5	0.28	1.4	0.32	1.6

Aluminum Electrolytic Capacitors with Optimal Lead Shapes for Engine Areas (High-Temperature Environments)

UBW

High temperature, High reliability (135°C)

- Products with high-temperature stability, guaranteed for 1,000 to 3,000 hours at 135°C
- Suited for automobile electronics where heavy duty services are indispensable
- Compliant to the RoHS directive (2011/65/EU)

High temperature **Applications** Engine controls

Rated voltage	10 to 100V
Capacitance	1 to 4,700 μF
Endurance	1,000 to 3,000 hours at 135°C
Product size	ϕ8×11.5L to ϕ16×31.5L

UBX

Ultra-high temperature suited for automotive electronics

- Laminated case series
- Products suited for ultra-high temperatures (150°C)
- Suited for automobile electronics where heavy duty services are indispensable
- Compliant to the RoHS directive (2011/65/EU)

Ultra-high temperature **Applications** Engine controls

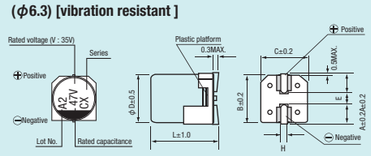
Rated voltage	10 to 400V
Capacitance	1 to 4,700 μF
Endurance	1,000 to 2,000 hours at 150°C
Product size	ϕ10×12.5L to ϕ18×40L

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

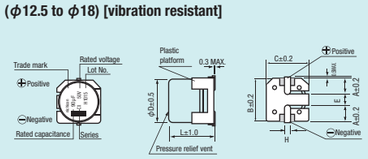
Smaller, high reliability : Surface mounting technology, anti-vibration capabilities: 30G (10 to 2,000Hz)

Anti-Vibration Points
- Adjust height of resin seating plate collar, control vibration of capacitor itself
- Improved adhesion of auxiliary electrode to resin seating plate

(ϕ6.3) [vibration resistant]



(ϕ12.5 to ϕ18) [vibration resistant]



Note: ϕ6.3×10L : vibration resistant type only ▭Aid electrode

UBC

Vibration resistance, high temperature

- Highly dependable reliability withstanding load life of 1,000 hours at +150°C
- Suited for automobile electronics where heavy duty services are indispensable
- Compliant to the RoHS directive (2011/65/EU)

Durability **Applications** Engine control, automotive water pumps, automotive oil pumps

Product size	ϕ8×10L to ϕ18×21.5L
Endurance	1,000 hours at 150°C
Rated voltage	10 to 50V
Capacitance	33 to 3,300 μF
Category temperature	-55 (–40) to +150°C

UUE

Vibration Resistance

- SMD type guaranteed for 2,000 to 5,000 hours at 125°C
- Ideal for automotive electrical components
- Compliant to the RoHS directive (2011/65/EU)

Applications Power steering, automotive water pumps, automotive oil pumps

Product size	ϕ8×10L to ϕ18×21.5L
Endurance	5,000 hours at 125°C (ϕ8, ϕ10: 2,000 hours)
Rated voltage	10 to 50V
Capacitance	33 to 4,700 μF
Category temperature	-55 to +125°C (ϕ12.5 to 20), -40 to +125°C (ϕ8, ϕ10)

TBE

High temperature range(02 type)

- High reliability withstanding load life of 2,000 hours at 125°C
- Optimal for automotive electrical components
- Compliant to the RoHS directive (2011/65/EU)

Applications Engine–control ECUs

Product size	ϕ6.3×16L to ϕ16×31.5L
Endurance	2,000 hours at 125°C
Rated voltage	10 to 50V
Capacitance	0.47 to 470 μF
Category temperature	-40 to +125°C (ϕ8, ϕ10)

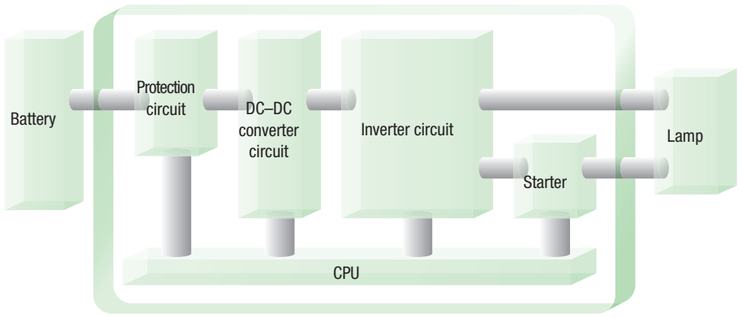
Note: UUE also applies to control solution specifications.

Mounting Examples Engine ECUs, hybrid vehicle ECUs, “idling stop,” automotive water pumps, electric oil pumps

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

Control Solutions

Headlight Ballast Pattern Diagram

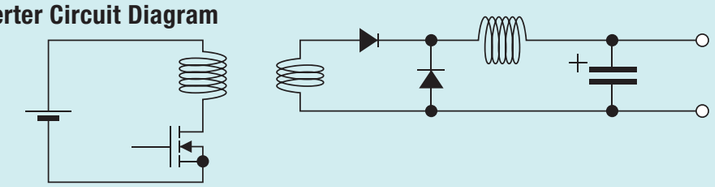


Suited for high temperature

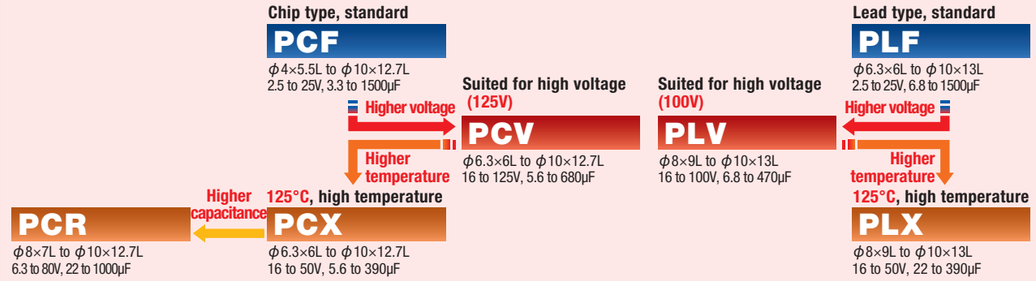
Large-surface mounting

Suited for high voltage

DC–DC Converter Circuit Diagram



Automotive Conductive Polymer Aluminum Solid Electrolytic Capacitors



Automotive Aluminum Electrolytic Capacitors

UUX — SMD type, larger size

- SMD type, larger size
- Compliant to the RoHS directive (2011/65/EU)

Applications [High voltage] Batteries in EVs and HVs/battery unit control/monitoring
[Low voltage] Electrical systems, measurement systems

Product size	φ8×6.2L to φ10×10L
Endurance	2,000 hours at 105°C (160 to 400V: 3,000 hours)
Rated voltage	6.3 to 400V
Capacitance	1 to 1,000μF
Category temperature	-55 to +105°C (6.3 to 100V), -40 to +105°C (160 to 400V)

UUB — High reliability

- 125°C
- Compliant to the RoHS directive (2011/65/EU)

Applications [High voltage] HLB primary
[Low voltage] Engine control, automotive electric water pumps (EWPs), electric oil pumps (EOP)

Product size	φ8×6.2L to φ10×10L
Endurance	2,000 hours at 125°C (φ8×6.2L: 1,000 hours)
Rated voltage	10 to 400V
Capacitance	1 to 330μF
Category temperature	-40 to +125°C

UBT — High reliability (125°C)

- Stable high-temperature products guaranteed for 2,000 to 10,000 hours at 125°C
- Suited for automobile electronics where heavy duty services are indispensable
- Compliant to the RoHS directive (2011/65/EU)

Applications Automotive compressors, HID lights, power steering, EPSs, ECUs

Product size	φ8×11.5L to φ18×35.5L
Endurance	2,000 to 10,000 hours at 125°C (50V or less, φ8: 2,000 hours, φ10: 5,000 hours, φ12.5 above: 10,000 hours), (63 to 100V, φ8: 2,000 hours, φ10: 3,000 hours, φ12.5: 5,000 hours), (160V or more: 2,000 hours)
Rated voltage	10 to 450V
Capacitance	1 to 4,700μF
Category temperature	-40 to +125°C (10 to 250V), -25 to +125°C (350 to 450V)

UKA — Wide temperature range, for audio equipment High-grade type

- 105°C high quality capacitors for audio equipment
- Selected materials to create superior acoustic sound
- Compliant to the RoHS directive (2011/65/EU)

Applications For automotive audio

Product size	φ5×11L to φ18×40L
Endurance	2,000 hours at 105°C
Rated voltage	6.3 to 50V
Capacitance	22 to 22,000μF
Category temperature	-55 to +105°C

PCV — High voltage, long life

- High voltage (to 125V), low ESR, high ripple current
- Long life of 3,000 hours at 105°C
  SMD type : Lead free reflow soldering condition at 260°C peak correspondence
- Compliant to the RoHS directive (2011/65/EU)

Product size	φ6.3×6L to φ10×12.7L
Endurance	3,000 hours at 105°C
Rated voltage	16 to 125V
Capacitance	5.6 to 680μF
Category temperature	-55 to +105°C

Applications ECUs, DC–DC converters, lights

PCX — High reliability

- High reliability, low ESR, high ripple current
- Long life of 1,500 to 3,000 hours at 125°C
  SMD type : Lead free reflow soldering condition at 260°C peak correspondence
- Compliant to the RoHS directive (2011/65/EU)

Product size	φ6.3×6L to φ10×12.7L
Endurance	3,000 hours at 125°C (φ6.3: 1,500 hours)
Rated voltage	16 to 50V
Capacitance	5.6 to 390μF
Category temperature	-55 to +125°C

Applications DC–DC converters, lights, electric water pumps (EWPs), electric oil pumps (EOPs), inverters for EV motors, ECUs

PLV — High voltage, long life

- High voltage (to 100V), low ESR, high ripple current
- Long life of 3,000 hours at 105°C
- Radial lead type : Lead free flow soldering condition correspondence
- Compliant to the RoHS directive (2011/65/EU)

Product size	φ8×9L to φ10×13L
Endurance	3,000 hours at 105°C
Rated voltage	16 to 100V
Capacitance	6.8 to 470μF
Category temperature	-55 to +105°C

Applications ECUs, DC–DC converters

PLX — High reliability

- High reliability low ESR, high ripple current
- Long life of 3,000 hours at 125°C
- Radial lead type : Lead free flow soldering condition correspondence
- Compliant to the RoHS directive (2011/65/EU)

Product size	φ8×9L to φ10×13L
Endurance	3,000 hours at 125°C
Rated voltage	16 to 50V
Capacitance	22 to 390μF
Category temperature	-55 to +125°C

Applications ECUs, DC–DC converters, motor inverters

PCR — High reliability

- High reliability with high voltage (to 80V), low ESR, high allowable ripple current
- Long life of 4,000 hours at 125°C
- SMD type: Lead free reflow soldering condition at 260°C peak correspondence
- ESR after endurance at -40°C
- Compliant to the RoHS directive (2011/65/EU)

Product size	φ8×7L to φ10×12.7L
Endurance	4,000 hours at 125°C
Rated voltage	16 to 80V
Capacitance	22 to 1,000μF
Category temperature	-55 to +125°C

“Ever CAP” Automotive Electric Double-Layer Capacitors

JUM — High voltage

- 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)

Product size	φ8×11.5L to φ18×40L
Endurance	1,000 hours at 70°C
Rated voltage	2.7V
Capacitance	1 to 47F
Category temperature	-25 to +70°C

Applications
Navigation systems, Drive Recorders, e–latches

JUK — Lower resistance

- Lower resistance type of UM series
- Lower temperature range(–40 to +70°C)
- Compliant to the RoHS directive (2011/65/EU)

Product size	φ12.5×31.5L to φ18×40L
Endurance	1,000 hours at 70°C
Rated voltage	2.5V
Capacitance	6.8 to 27F
Category temperature	-40 to +70°C

Applications
Navigation systems, Drive Recorders, e–latches

“Posi-R” Automotive Positive Thermistors

ZPD/ZPS — High reliability

Applications
HV/EV/PHV heaters

ZPC — High reliability

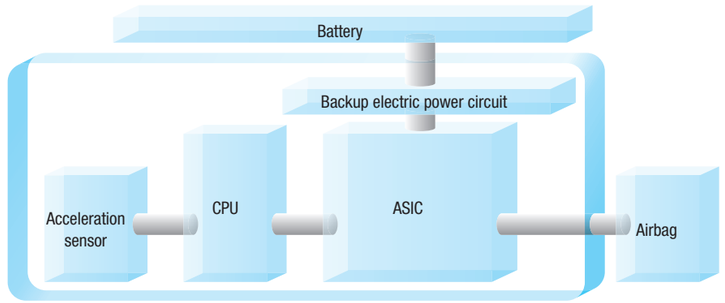
Applications
Door locks, door mirrors, optical leveling, car audio

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.

Safety Solutions

Airbag ECU Pattern Diagram



High voltage

High reliability

Long life

UCL — Low impedance

- SMD type, low impedance
- Compliant to the RoHS directive (2011/65/EU)

Product size	φ4×5.8L to φ10×13.5L
Endurance	2,000 hours at 105°C
Rated voltage	6.3 to 50V
Capacitance	10 to 2,200μF
Category temperature	–55 to +105°C

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)

Product size	φ4×5.8L to φ18×16.5L
Endurance	2,000 to 5,000 hours at 105°C (50V or less and less than 10L: 2,000 hours, 63V or more and 10L or less: 2,000 hours)
Rated voltage	6.3 to 100V
Capacitance	1 to 3,300μF
Category temperature	–55 to +105°C

Applications
Navigation, car audio, wipers, airbags, electrical leak detection, collating ECUs, gateway ECUs, instruments, EPSs, DCMs, lighting, compact drive trains, power seat meters

Note: The same product number also meets ECU solution specifications.

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 withstanding 2,000 to 8,000 hours at 105°C
- Compliant to the RoHS directive (2011/65/EU)

Product size	φ4×7L to φ25×50L
Endurance	2,000 to 8,000 hours at 105°C (φ4, 5, 6.3: 2,000 hours, φ8: 3,000 hours, φ10: 5,000 hours, φ12.5: 7,000 hours)
Rated voltage	6.3 to 450V
Capacitance	0.47 to 15,000μF
Category temperature	-55 to +105°C (6.3 to 100V), -40 to +105°C (160 to 400V), -25 to +105°C (450V)

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

- SMD type, high voltage
- Compliant to the RoHS directive (2011/65/EU)

Applications EV/HV batteries, battery unit control, and monitoring

ULV — High voltage, long life — Expanded

- SMD type, high voltage and long life
- Load life of 10,000 hours at 105°C
- Compliant to the RoHS directive (2011/65/EU)

Applications EV/HV batteries, battery unit control, monitoring

ULT — SMD type, high voltage, high temperature — Expanded

- SMD type, high voltage and high temperature
- Load life of 2,000 hours at 125°C
- Compliant to the RoHS directive (2011/65/EU)

Applications Headlight ballast primary

ULH — SMD type, high voltage and high reliability

- SMD type, high voltage and high reliability
- Load life of 4,000 hours at 125°C
- Compliant to the RoHS directive (2011/65/EU)

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

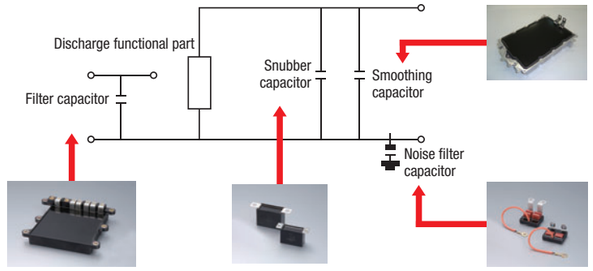
(μF)

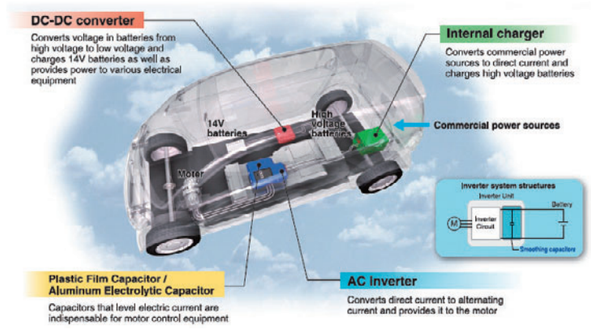
		Lineup											
		ULR			ULV			ULT			ULH		
Size (mm)	Diameter	8	10		8	10		8	10		8	10	
	Height	10	10	13.5	10	10	13.5	10	10	13.5	10	10	13.5
Rated voltage	160V	15	27	39	15	22	33	15	22	33	12	18	27
	200V	12	22	33	12	18	27	12	18	27	10	15	22
	250V	10	15	22	8.2	15	18	8.2	15	18	7.5	12	15
	400V	4.7	8.2	12	3.9	6.8	10	3.9	6.8	10	3.3	5.6	7.5
	450V	3.9	6.8	10	3.3	5.6	7.5	3.3	5.6	7.5	2.2	3.9	5.6
	500V	2.7	3.9	5.6	1.8	3.3	4.7	1.8	3.3	4.7	—	—	—

Film Capacitors for EVs/HVs/PHVs

Sample Uses for Inverter with Booster Function

Capacitor Module Equivalence Circuit





Film Capacitors

Providing Film Capacitors with Superior Electrical Characteristics and Flexible Exterior and Electrode Configurations for Use in Automobiles, trains and other vehicles

High-Frequency Characteristics
- Sharp high-frequency characteristics (excellent filtering effects)
- Lower loss, energy-saving

Stable Characteristics
- Steady changes in capacitance in response to temperature variations

Withstand Current Characteristics
- High ripple current withstand volume (high current density per unit volume)

High Reliability, Safety Performance
- Self-healing type
- With automatic shutoff security mechanism

Long Life
- Maintenance-free for 10 years or more even in challenging temperature conditions

Shape Freedom
- Flexible exterior shapes (square, cylindrical)
- Flexible terminal shapes

Integrated Design
- Integrated design enables use for smoothing and filtering

Inverter System Diagram

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 IEC61851-1 mode 2, mode 3
- CE mark compliant

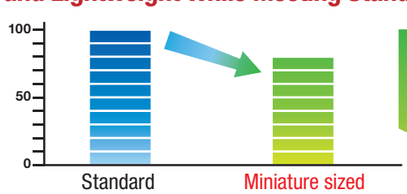
Specifications

Charger
- Input voltage: AC100 to 264V
- Output power: Max. 2.8kW
- Output voltage: 180 to 370V
- Efficiency: MAX. 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

More Compact and Lightweight While Meeting Standard Specifications

Size



Approximately 20% more compact