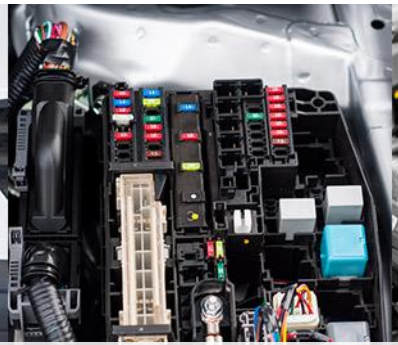
Bourns® Automotive Product Focus

Automotive Components

BOURNS® *Automotive Division*

Automotive Component Applications



Comfort & Positioning
Window Lifts, Seat Positioning

Instrumentation, Infotainment & Telematics
Dashboards, GPS, In-Car Cameras, In-Car Televisions

Vehicle Lighting
HID, LED

Vehicle Networks
CAN, Flexray, Ethernet, LIN

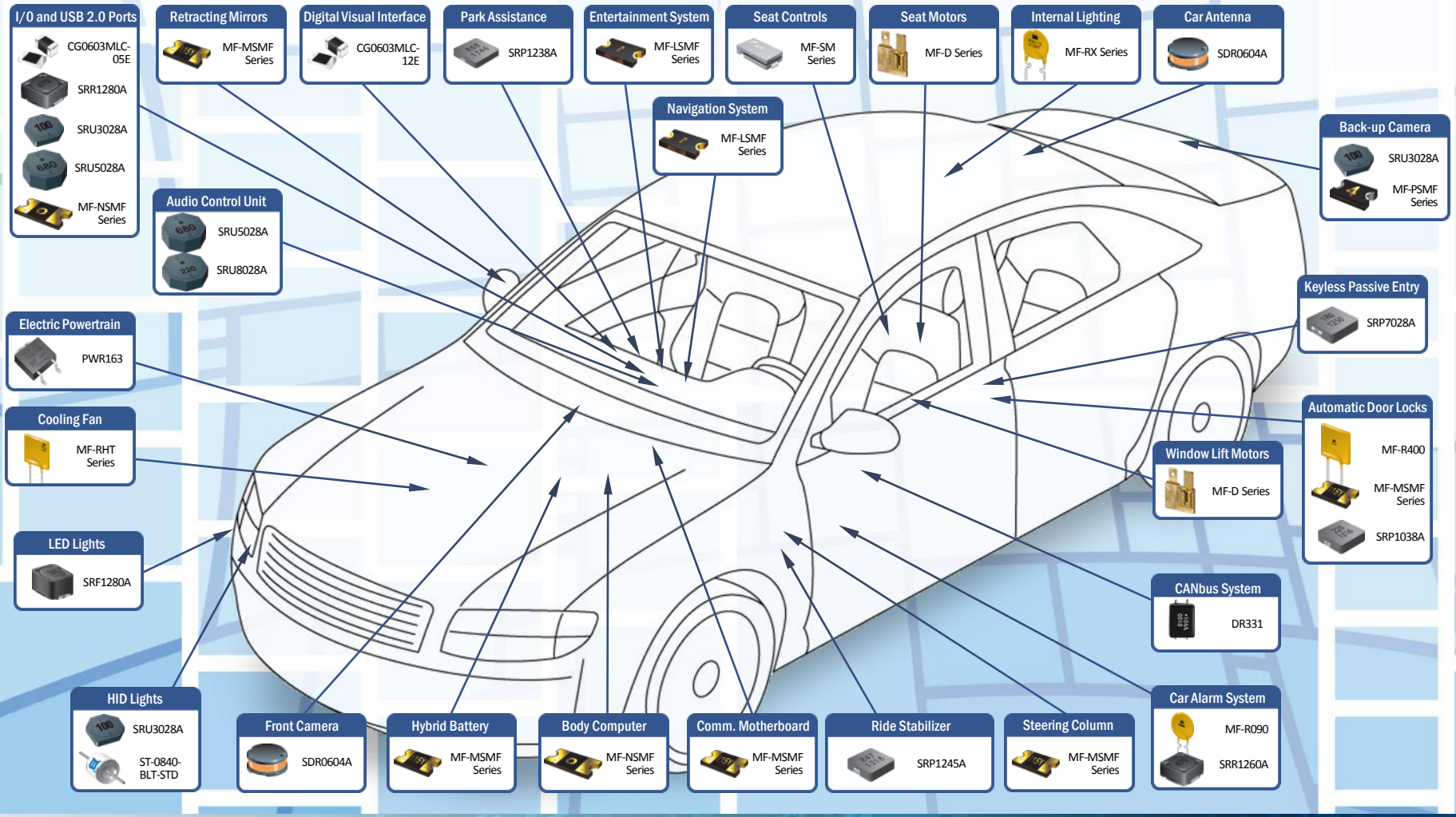
Electrification of Powertrain
Fuel Pumps, Start Stop Module, High Power DC/DC Convertors, Battery Chargers

Bourns Value Proposition

- AEC-Q200 qualification – PPTC, inductors, resistors & MLVs
- TS 16949 quality system
- Application test lab

Automotive Board Level Components

AEC-Q200 qualified



Automotive Circuit Conditioning

Applications

- Start-stop
- Networking
- Electronic control Modules/ECU
- Infotainment, telematics, navigation, connected car
- DC/DC & AC/DC power supplies
- Lighting
- Body control
- Diagnostic tools
- Battery management
- Instrument cluster

Features

- AEC-Q200 qualified
- TS 16949 factory produced
- Automotive temperature capable
- High quality and reputation

Types Available

- Inductors
- Common mode filters
- Power resistors
- Metal alloy shunts

Inductors & Transformer

Applications

- **Automotive (AEC-Q200 qualified)**
- Battery chargers
- CD players
- Data communication
- DC/DC converters
- Global positioning systems
- Internet equipment
- LED drivers
- Local area networks
- Monitoring equipment
- Portable radios
- Portable tools
- SSD (Solid State Drives)
- Switch mode power supplies
- Test equipment
- Televisions
- Video conferencing equipment
- Telecommunications
- Wearables

Features

- Standard inductance values from 1.0 nH to 500 mH
- 14 models of chip inductors
- More than 110 models of surface mount power inductors
- More than 50 models of through-hole power inductors
- Available in a wide range of sizes
- Low profile down to 0.9 mm
- Operating temperature as high as 200 ° C
- Sealed and open construction
- Saturation current up to 118 A
- **AEC-Q200 qualified**
- RoHS compliant*

Types Available

Power Inductors

- Non-shielded
- Semi-shielded
- Shielded
- High current toroids
- Dual chokes
- Flat wirewound

Chip Beads

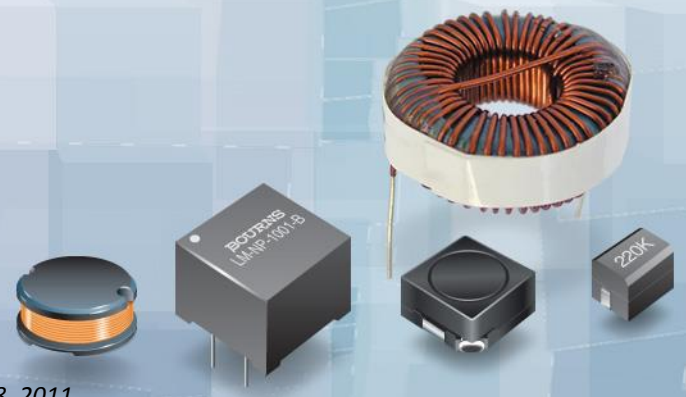
- High current
- High impedance

Chip Inductors

- Molded wirewound
- Multilayer ceramic
- Multilayer ferrite
- Open wirewound

Transformers

- Line matching
- Wideband
- ISDN
- xDSL
- LAN
- PoE/VoIP



**RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.*

Current Sense, Pulse Power & High Power Resistors

Applications

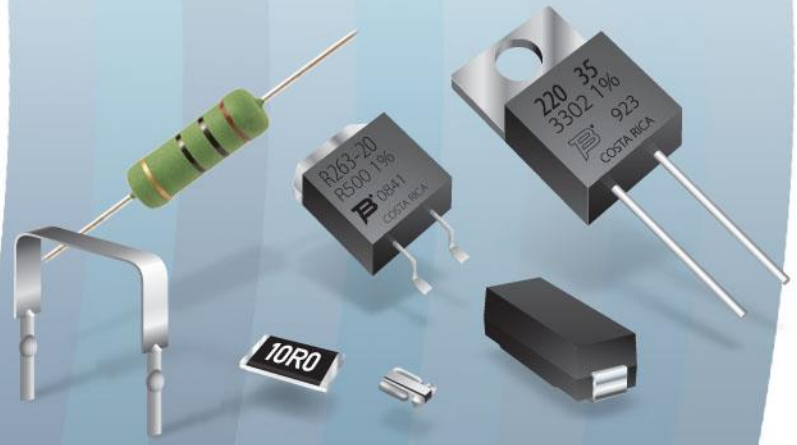
- **Automotive**
- AC power supplies
- Battery controls
- Combiners
- Isolators
- Motor controllers
- LED lighting
- Renewable energy
- Smart meters
- Surge protection
- White goods
- Capacitor discharging
- Current sensing

Features

- Through-hole and surface mount
- 2-terminal / 4-terminal chip resistors
- 0.0005 ohms to 130k ohms
- 0.25 watts to 35 watts
- 0.5 % to 5 % tolerances
- Operating temperature up to +275 ° C
- AEC-Q200 qualified (Metal Strip Chip, TO-220 and DPAK packaged resistors)
- Excellent surge performance
- RoHS compliant*

Types Available

- Bare metal open air shunts
- High surge withstand and UL1412 listed safety fusible wirewound resistors
- Shunt resistors
- Surface mount wirewound resistors
- Surface mount and through-hole TO-220 and DPAK packaged resistors
- Thick film chip resistors
- Metal strip chip resistors



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Automotive Fixed Resistor Portfolio

Metal Strip Chip

CRA Series
CRE Series
CRF Series

0805 – 2512
0,5 – 3W
1 – 100 mΩ

CST 0612 Series
(4 Terminal)

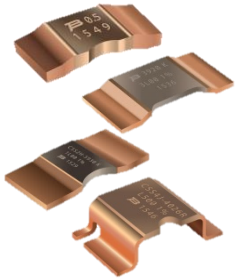
High Power Thick Film

PWR163/263 Series
PWR220/221 Series

SMT DPAK/TO220
20 – 35 W
20 mΩ – 130 kΩ

EB-welded Metal Strip

CSM Series
7036, 8518, 6918
36 – 50 W
0,05 – 0,1 mΩ



CSS Series
2512, 3920, 5930
4026 (4 Terminal)
2 – 12 W
0,2 – 5 mΩ

Anti Sulfur Thick Film Chip

CRM-A Series
CRS-A Serie
0.125 – 2 W
0,05 mΩ to 1MΩ

- *AEC-Q200 qualified*
- *Battery control management*
- *Capacitor discharging*
- *Climate controls*
- *Converters*
- *Current sensing*

ChipGuard® ESD Suppressors

Applications

- Applications requiring IEC 61000-4-2
- IC supply lines
- MOSFET gate protection
- Digital control Lines
- USB 2.0
- HDMI
- DVI
- LVDS
- Ethernet ports
- RS232/485 ports
- **Automotive electronics**
- PDA
- Tablets

Features

- Bi-directional protection
- High reliability
- Fast response times (<1 ns)
- Multi-strike capabilities
- Low capacitance versions
- Low insertion Loss
- Low leakage

Types Available

- MLA Series- Multilayered Varistor Technology (0402, 0603, 0805)
- MLD Series-Multilayered Varistor Technology (0402, 0603)
- MLE Series-Multilayered Varistor Technology (0402, 0603)
- MLC Series-Variable Voltage Polymer Technology (0402, 0603, 1206)
- Automotive MLC Series-Variable Voltage Polymer Technology (0402, 0603)
- MLU/Low Cap MLC Series-Air Gap Technology (0402, 0603)

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BDEC Power Magnetics

Bourns (Dongguan) Electronics Co., Ltd

The portfolio of Transtek magnetic components acquired by Bourns includes custom transformers, inductors and coils for a variety of applications such as electrical isolation and voltage conversion in power electronics circuitry.

Power Magnetics

- Main Transformer
- Power Inductors
- Common Mode Chokes
- Current Sensors
- PFC Chokes
- Output Chokes
- Gate Driver Transformers

HV/HEV/EV Custom Magnetics

- On Board Charger
- DC/DC Converter
- DC/AC Inverter
- Battery Management
- High Voltage Junction Box
- Portable Charger

Electromechanical Parts

- Linear Solenoids
- Actuators
- Solenoid for Fluid Controls
- Electromagnetics
- Custom Design

Automotive Coils

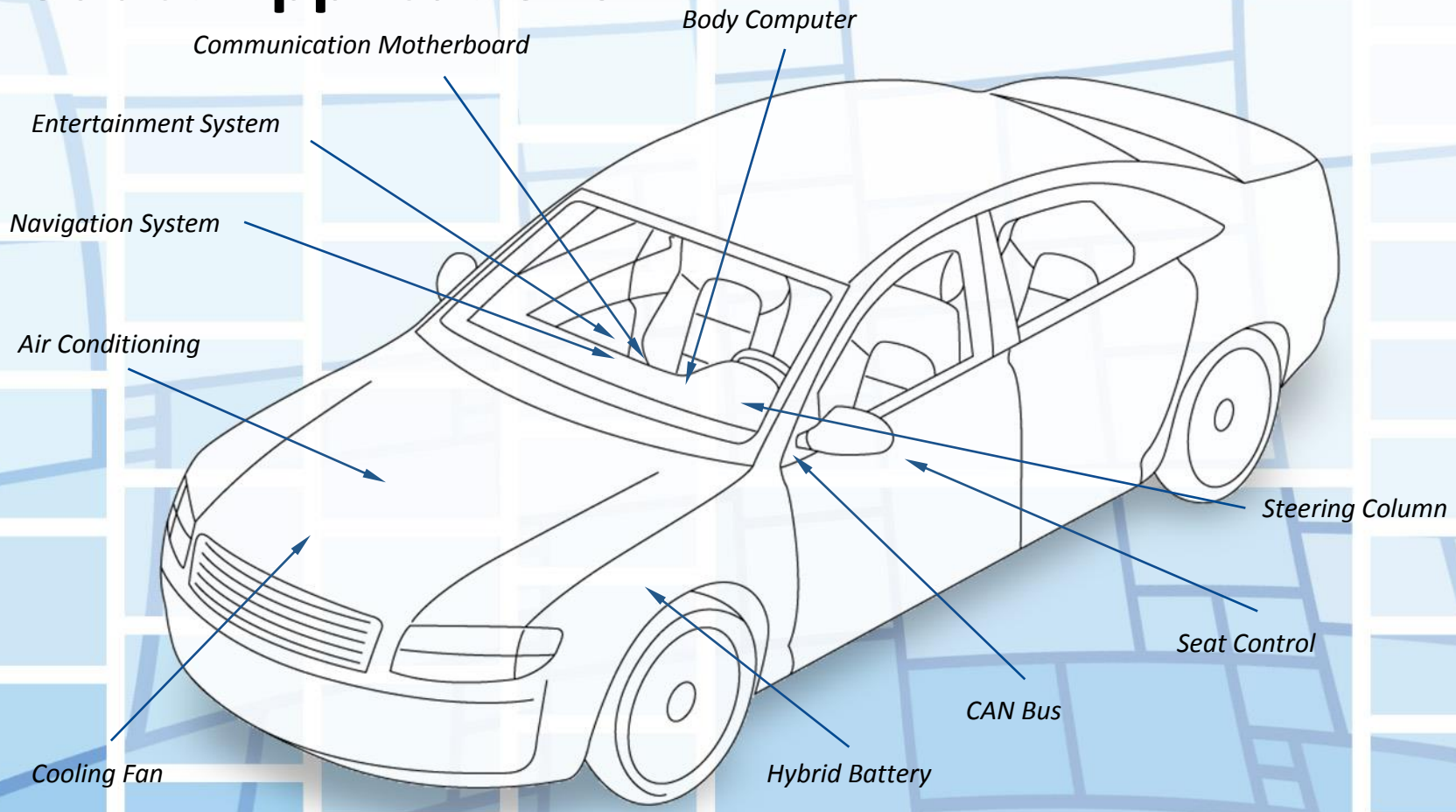
- Up to AWG #50 Fine Wire Size
- High Numbers of Turns
- Full Automation
- Multiple Applications

BDEC Overview

Bourns (Dongguan) Electronics Co., Ltd

- Assets acquired from Transtek in November 2016
  - Sales team located in US, China, Taiwan and Japan
  - Factory in Dongguan, China with 700+ personnel
  - 30-strong design team, including Electrical, Mechanical, Manufacturing and Test engineers
- Main focus: Highly customized products
  - To support customers designers with close collaboration, quick sampling and AEC level controls
  - Automotive products currently are >80% of the factory's output
- AEC-Q200 test facility
- Combined with Bourns' strong standard range of products, this offers a complete magnetics solution to customers

Multifuse® PPTC Resettable Fuses
Product Applications



Standard Multifuse® PPTC Resettable Fuses

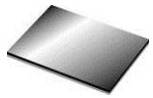
- Polymer PTC resettable fuses for:
  - Overcurrent Protection
  - Overtemperature Protection
- 6 to 90 V operating voltages
- Hold currents from 50 mA to 11.0 A
- AEC-Q200-Rev C
- Agency listings/approvals - UL, CSA & TÜV

- High temperature polymers available with operating temperatures between –40 °C to +125 °C
- Built in TS-16949 facility
- RoHS compliant standard*; halogen free upon request**
- Designed to protect a wide range of cabin & under the hood electronics

* RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

** Bourns follows the prevailing definition of “halogen free” in the industry. Bourns considers a product to be “halogen free” if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

Multifuse® PPTC Resettable Fuses for DC Motor Protection



- Resettable fuses to protect DC motors in:
  - Window lift modules
  - Electric Seats
  - Central locking
  - Sun roofs & convertible roofs
  - Mirrors
- Devices are designed & tested to meet the requirements of each individual motor

- Dedicated DC motor test lab & technicians
- Devices available as:
  - Lead frame or non-lead frame package
  - High temperature or standard temperature polymers