

NOVOSENSE

NOVOSENSE Automotive Solution

Enable the Electrification and Intellectualization of Car



NOVOSENSE
Company Brochure



NOVOSENSE
Product Selection Guide



NOVOSENSE
Automotive Solution



NOVOSENSE
Renewable Energy &
Power Supply Application
Solution



NOVOSENSE
Industrial
Control Solution

NOVOSENSE Microelectronics

✉ sales@novosns.com

🌐 www.novosns.com

🌐 NOVOSENSE Microelectronics

📺 NOVOSENSE Microelectronics

Release Date: September 2024



NOVOSENSE: Highly Robust and Reliable Analog and Mixed Signal Chip Company

- Robust
- Reliable
- Keep Learning
- Persist in Long-term Value



NOVOSENSE Microelectronics (NOVOSENSE, SSE Stock Code 688052) is a highly robust & reliable analog and mixed signal Chip company. Since its establishment in 2013, the company has been focusing on sensor, signal chain, and power management, providing comprehensive semiconductor products and solutions, which are widely used in automotive, industrial, information communication and consumer electronics markets.

With the mission of "Sense & Drive the Future, Build a Green, Smart and Connected World with Semiconductors" , the company is committed to providing chip-level solutions to link the digital world and the real world.

For more information and sample application, please visit: www.novosns.com

2013
Establishment

~900
Employees

~USD182 Million
Revenue
(2023)

A provider for
all-category analog
& mixed signal chips

A leading chip
provider for automotive
applications

A leading provider
for digital isolators
and sensors

NOVOSENSE Automotive Solution Overview

Intelligent Connected/Autonomous/In-vehicle Experience

- SerDes
- Class D
- A2B
- High-side & low-side switch
- SBC
- Seat air bag MEMS pressure sensor
- Temperature & humidity sensor
- High current pre-driver
- Digital relay
- Large screen rear light driver
- General power Buck/LDO
- Antenna/camera load protection
- Voltage supervisor

Body Electronics & Lighting

- High-side & low-side switch
- eFuse
- Antenna/camera load protection
- Multichannel half-bridge driver, pre-driver
- BDC/BLDC/stepping motor driver
- General power Buck/LDO
- Voltage supervisor
- Magnetic switch position sensor
- Magnetic angle sensor
- Digital relay
- Rear light & headlight driver
- Ambient lighting driver
- Interior lighting driver
- Stepping motor driver

Chassis Control & Safety

- MEMS pressure sensor
- Magnetic angle sensor
- Magnetic switch position sensor
- Wheel speed sensor
- Antenna combiner controller
- eFuse

Fuel/Hybrid Powertrain

- Engine intake manifold MEMS pressure sensor
- Fuel vapor MEMS pressure sensor
- Crankshaft ventilator MEMS pressure sensor
- Canister desorption MEMS pressure sensor
- GPF/DPF differential pressure MEMS pressure sensor

Inverter/Powertrain

- Smart ISO drive/functional safety driver
- Digital isolator
- CAN/LIN/MiniSBC interface
- Magnetic current sensor
- Rotary transformer drive power amplifier
- Vacuum boost servo MEMS pressure sensor

Battery Management System

- ISO digital relay
- Digital isolator
- ISO & non-ISO OP Amps
- CAN/LIN/MiniSBC interface
- BPS battery pack thermal runaway MEMS pressure sensor
- ISO power supply
- Hall current sensor
- ISO & non-ISO power drive
- ISO current and voltage sensing

OBC/DC-DC/PDU

- ISO & non-ISO power drive
- Digital isolator
- ISO & non-ISO OP Amps
- Magnetic current sensor
- ISO current and voltage sensing
- Current sensing amplifier
- High-side & low-side /Motor driver
- CAN/LIN/MiniSBC interface
- General power Buck/LDO
- Power device - SiC

Thermal Management System

- CAN/LIN/MiniSBC interface
- ISO & non-ISO power drive
- Digital isolator
- Electronic water valve, water pump and fan special motor drive
- Magnetic angle sensor
- Magnetic switch position sensor
- Multichannel half-bridge driver, pre-driver
- BDC/BLDC/stepping motor driver
- Pressure sensor signal conditioning chip
- Automotive micro&special motor driver SoC
- Power device - SiC

NOVOSENSE
is committed to being your
preferred automotive supply
chain partner.



By the first half of 2024, the shipment of NOVOSENSE automotive chips reached **133 million pcs**; Automotive Business accounts for **33.51%** of the company revenue.



As a member of the Component Technical Committee of the AEC (Automotive Electronics Council), NOVOSENSE supports the development of automotive chip technology.



Certified by TÜV Rheinland:ISO 26262
Functional Safety Management System ASIL D

System-level
understanding and
holistic solutions

- Products: Isolation (Isolator, Sensing, Interface, ISO-Power), Driver (Gate, Motor, LED), Sensor (Magnetic, Pressure, Temperature, Humidity), Sensor Signal Conditioning, ASSP, Power (Protection Path, High/Low side switch), SoC

Help customers improve
their differentiated
competitiveness

- Chip customization service and experience
- Flexible and timely localized support

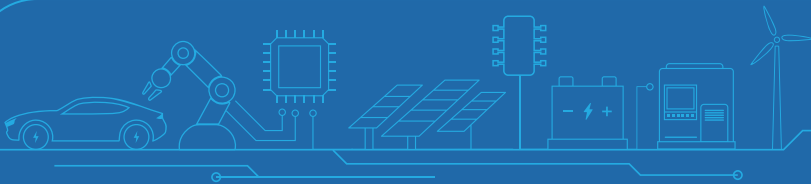
Excellent quality
performance based on
years of experience in
automotive mass
production

- Launched the first automotive chip in 2016
- Products are used in most of today's new energy vehicles
- VDE Premium Quality Award

**NOVOSENSE empowers the
electrification and intelligence of vehicles.**

Overview of NOVOSENSE Products in Automotive Applications

Automotive Application	Digital Isolator	CAN /LIN	Isolated Driver	Non-isolated Driver	Isolated Power	Motor Driver	Motor Control SoC	High & Low-side Switch	Oring & Hotswap	eFuse	Photomos	LED Driver	DC-DC Switching Converter	LDO	Tracking LDO	LDO/ Antenna LDO	Isolated Sensing	Hall Current Sensor	Operational Amplifier	Pressure Sensor	Position Sensor	Wheel Speed Sensor	Temperature Sensor	Voltage Reference	Supervisor & Reset IC	Class-D Audio Amplifier	SerDes
Traction Inverter	✓	✓	✓	✓				✓					✓	✓	✓		✓	✓	✓				✓	✓	✓		
OBC	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓		✓	✓	✓				✓	✓	✓		
DC-DC	✓	✓	✓	✓				✓	✓				✓	✓	✓		✓	✓	✓				✓	✓	✓		
BMS	✓	✓			✓			✓	✓		✓		✓	✓	✓		✓	✓	✓	✓			✓	✓	✓		
BCM		✓				✓	✓	✓	✓	✓		✓	✓	✓					✓	✓	✓		✓	✓	✓		
ESP		✓				✓							✓	✓							✓	✓					
Seat		✓				✓	✓	✓					✓	✓	✓							✓					
Lighting		✓				✓		✓		✓		✓	✓	✓	✓												
Door/Roof		✓				✓	✓	✓					✓	✓								✓					
Air Conditioning	✓	✓	✓	✓		✓	✓	✓					✓	✓	✓		✓	✓	✓	✓			✓	✓	✓		
PTC	✓	✓	✓	✓				✓					✓	✓			✓	✓	✓	✓	✓		✓	✓	✓		
Valve/Pump/ Vent Control		✓				✓	✓	✓					✓	✓							✓		✓				
IVI		✓						✓		✓			✓	✓	✓	✓									✓	✓	✓
Cockpit		✓						✓		✓			✓	✓	✓	✓					✓				✓		
T-BOX		✓											✓	✓					✓								
Radar/Camera		✓		✓				✓					✓	✓		✓											





NOVOSENSE Automotive Solutions

CONTENTS

③ Automotive Solution Overview

• Automotive Traction Inverter, OBC/DC-DC, BMS Solution

- ⑫ Traction Inverter
- ⑬ On-board Charger (OBC)
- ⑭ DC-DC Charger
- ⑮ Battery Management System (BMS)

• Automotive Thermal Management System

- ⑰ Thermal Management Controller
- ⑱ PTC
- ⑲ E-Compressor

• Automotive LED Driver Solution

- ⑳ Rear Light System
- ㉑ Headlight System

• Body Control Module (BCM) Solution

- ㉒ Body Control Modules (BCM)

• Automotive Infotainment & Instrumentation Solution

- ㉔ Infotainment
- ㉕ Dashboard

• Fuel Powertrain & Fuel Supply System Solution

- ㉗ Fuel Powertrain & Fuel Supply System

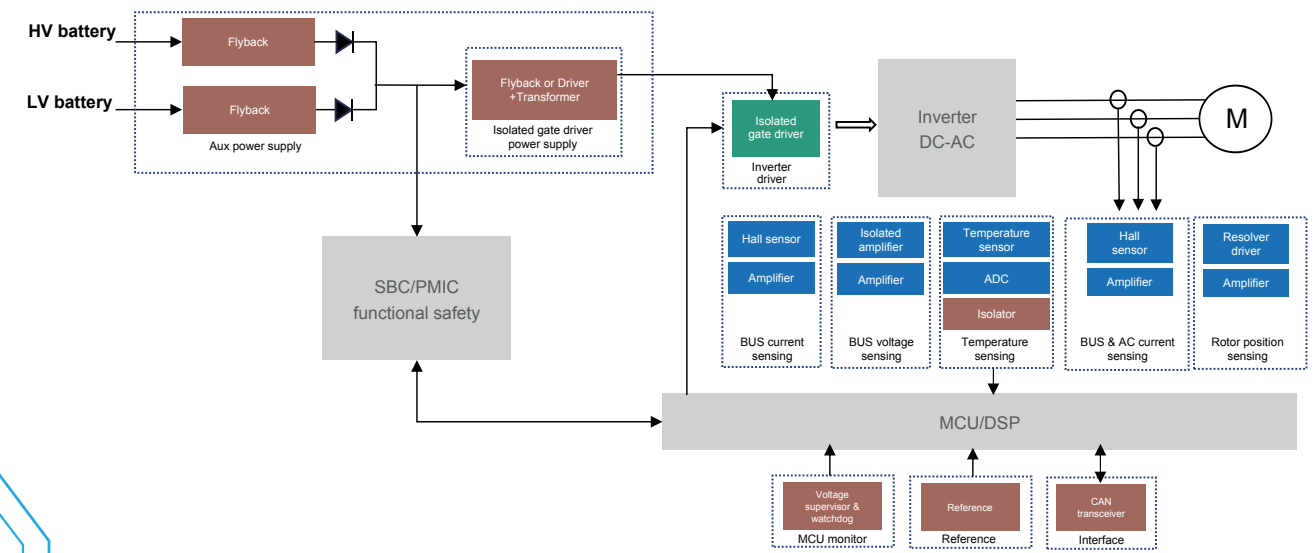
Automotive Traction Inverter, OBC/DC-DC, BMS Solution

- Traction Inverter
- On-board Charger (OBC)
- DC-DC Charger
- Battery Management System (BMS)

Traction Inverter

NOVOSENSE

The main drive inverter is a key component of an electric vehicle (EV), which is responsible for converting the DC from a high-voltage battery into the three-phase AC, and further to drive the motor. Its power determines the power performance of an EV, together with its efficiency further influence the cruising range of an EV. The inverter could also realize energy recovery when braking, which convert moving energy into high-voltage DC for power battery charging.



Current & voltage & temperature sensing

- Hall sensor (NSM203x, NSM2020)
- Temperature sensor (NST235-Q1, NST86-Q1, NST175-Q1)
- Isolated amplifier (NSI1300, NSI1311, NSI1200)
- Amplifier (NSOPA9xxx, NSOPA8xxx)

Gate driver & motor driver

- Isolated gate driver (NSI6611, NSI6651, NSI67xx, NSI6911)
- Non-isolated driver (NSD1026V)

Power management

- Flyback (NSR2240x/NSR2260x, NSR28C4x)
- LDO (NSR31xxx, NSR33xxx, NSR35xxx)

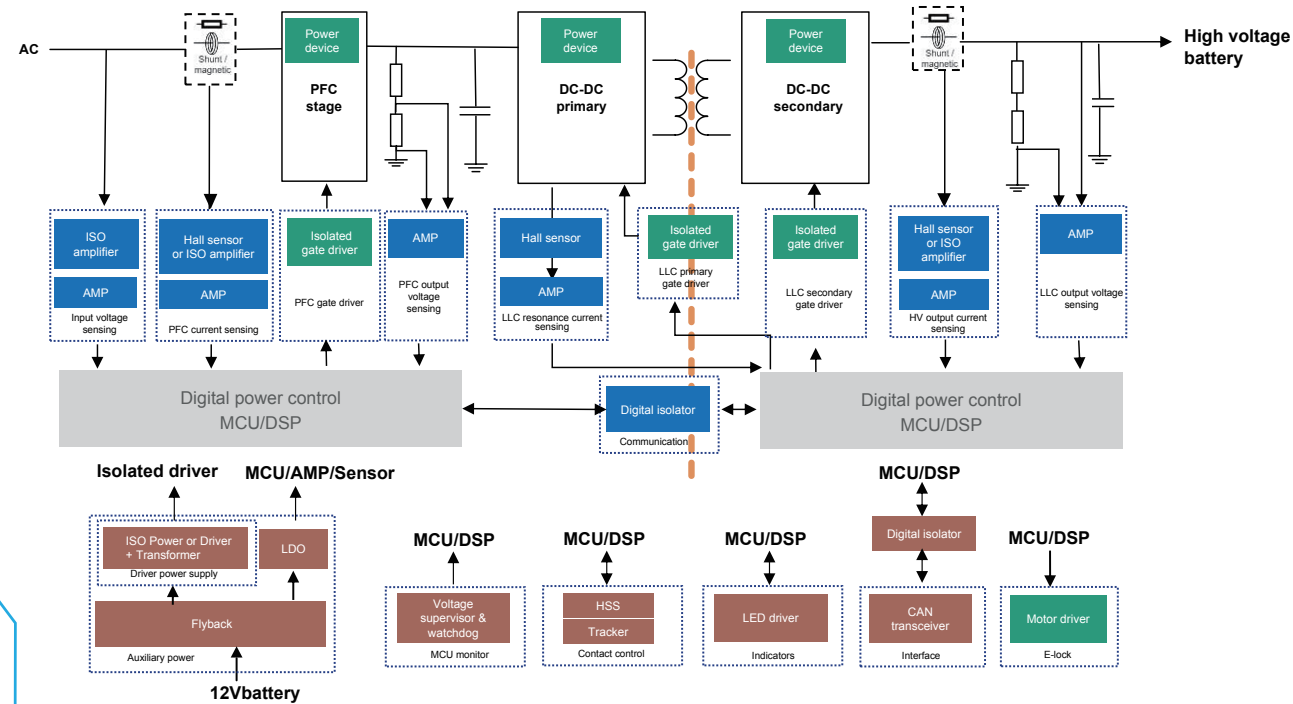
Interface & digital isolation

- CAN transceiver (NCA1043(B), NCA1145)
- Isolator (NSI824x, NSI822x)

Protection & reference & others

- Voltage supervisor (NSR7808)
- Reference (NSREF30xx, NSREF31xx)
- Resolver driver (NSOPA240x)

In an electric vehicle (EV), the OBC converts commercial power AC into DC to charge the power battery. It is a key component of EV power system, and its power also directly determines the charging speed of power battery. In addition, it can convert the DC from the power battery into AC to supply power to external loads, that is, V2L/V2H/V2G functions.



Current & voltage & temperature sensing

- Hall sensor (NSM201x, NSM211x, NSM2020)
- Isolated amplifier (NSI1300, NSI1200, NSI1311)
- Isolated ADC (NSI1306)
- Isolated comparator (NSI22C12, NSI22C11)
- Amplifier (NSOPA9xxx, NSOPA8xxx)
- Temperature sensor (NST235-Q1, NST86-Q1, NST175-Q1)

Power device

- 650V family of SiC MOSFET (NPC060N065A, 650V, 60mohm)
- 1200V family of SiC MOSFET (NPC0X0N120A, 1200V, 40/60/80mohm)

Interface & digital isolation

- CAN transceiver (NCA1043(B), NCA1145)
- Digital isolator (NSI824x, NSI822x)

Gate driver & motor driver

- Half bridge isolated driver (NSI6602V, NSI6602M)
- Single channel isolated driver (NSI6601M)
- Non-isolated driver (NSD1026V)
- Motor driver (NSD731x)

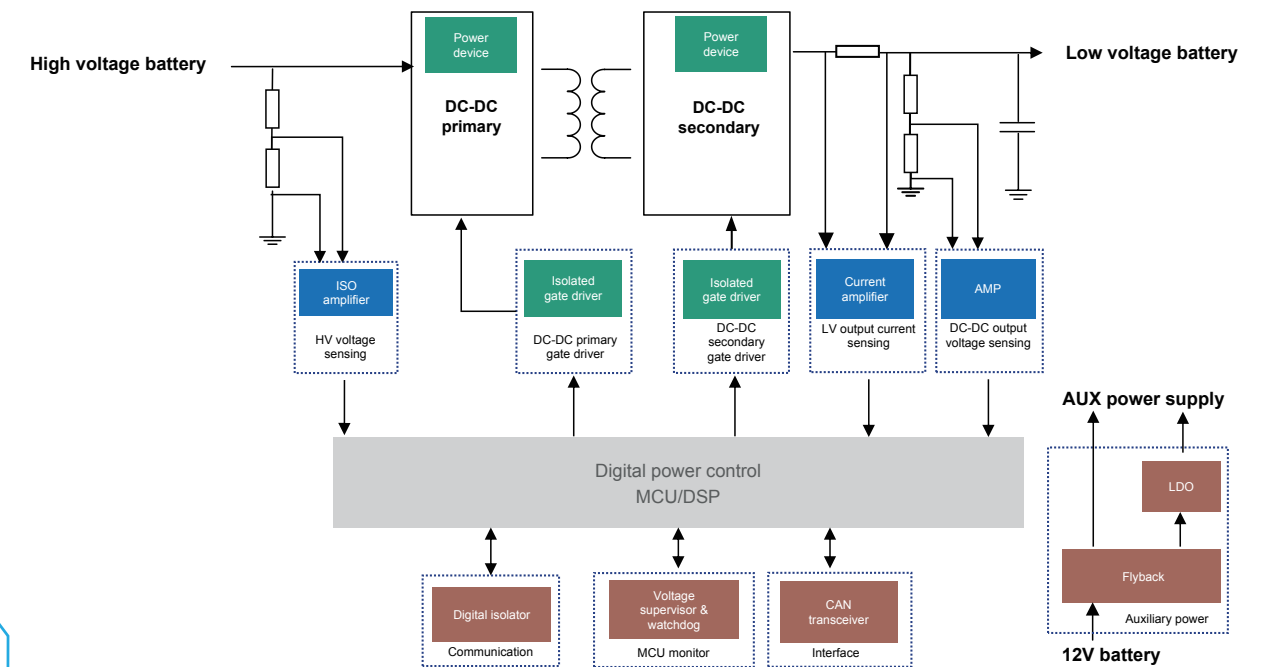
Power management

- Flyback (NSR2240x, NSR2260x)
- LDO (NSR31xxx, NSR33xxx, NSR35xxx)
- ISO Power (NSIP3266-Q1)

Protection & reference & others

- Voltage supervisor (NSR7808)
- High side switch (NSE34050)
- LED driver (NSL2161x, NSL2163x)
- Reference (NSREF30xx)
- Tracking LDO (NSE425x)

In an electric vehicle (EV), the DC-DC charger, as a key component of EV power system, which is responsible for converting the HV DC from the power battery into LV DC for 12V battery.



Current & voltage & temperature sensing

- Hall sensor (NSM2020)
- Isolated amplifier (NSI1300, NSI1311, NSI1200)
- Isolated comparator (NSI22C12, NSI22C11)
- Current sensing (NSCSA21x, NSCSA24x)
- Amplifier (NSOPA9xxx, NSOPA8xxx)
- Temperature sensor (NST235-Q1, NST86-Q1, NST175-Q1)

Power device

- 650V family of SiC MOSFET (NPC060N065A, 650V, 60mohm)
- 1200V family of SiC MOSFET (NPC0X0N120A, 1200V, 40/80mohm)

Interface & digital isolation

- CAN transceiver (NCA1043(B), NCA1145)
- Digital isolator (NSI824x, NSI822x)

Gate driver & motor driver

- Half bridge isolated driver (NSI6602V, NSI6622V)
- Single channel isolated driver (NSI6601, NSI6601M, NSI6801)
- Non-isolated driver (NSD1026V)

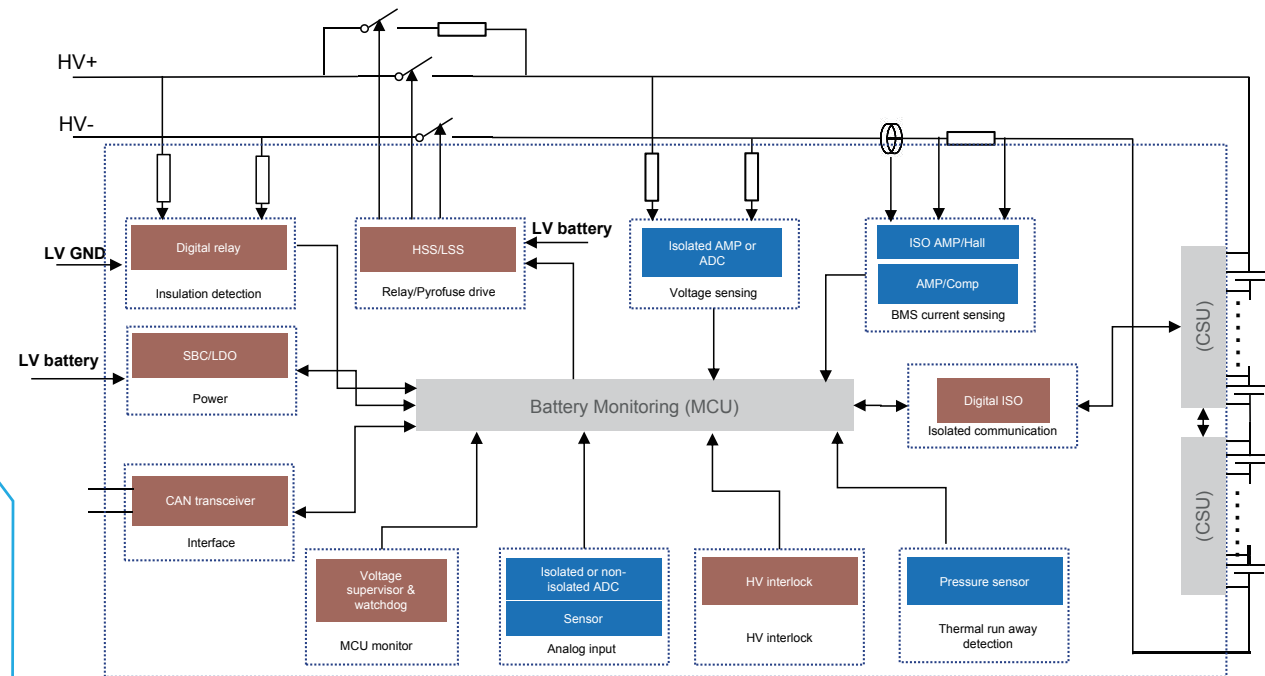
Power management

- Flyback (NSR2240x, NSR2260x)
- LDO (NSR31xxx, NSR33xxx, NSR35xxx)

Protection & reference & others

- Voltage supervisor (NSR7808)
- Reference (NSREF30xx)

The battery management system (BMS) is the "center" of the entire battery pack, which is responsible for monitoring the running status of each battery cell in the pack to ensure its safe and reliable operation. It monitors and collects the running parameters of the battery in real time for SOx analysis and calculation, and realize effective control of the battery based on specific protection control strategies, so as to ensure the safe and reliable operation of the entire battery system. At the same time, BMS interacts with other external devices through its own interface to establish linkage control of other systems and ensure the safe, reliable and efficient operation of the power supply system.



Current & voltage & pressure sensing

- Linear current sensor (NSM203x)
- Isolated amplifier (NSI1300, NSI1311)
- Isolated ADC(NSI1306)
- Non-isolated ADC(NSAD1248)
- Amplifier (NSOPA9xxx, NSOPA8xxx)
- Pressure sensor (NSPADx, NSPASx)

Power management

- LDO (NSR31xxx, NSR33xxx, NSR35xxx)
- Isolated transformer driver (NSIP605x)

Interface & digital isolation

- CAN transceiver (NCA1042B/NCA1044, NCA1043(B), NCA1051A, NCA1145)
- Digital isolator (NSI824x, NSI822x)

Protection & others

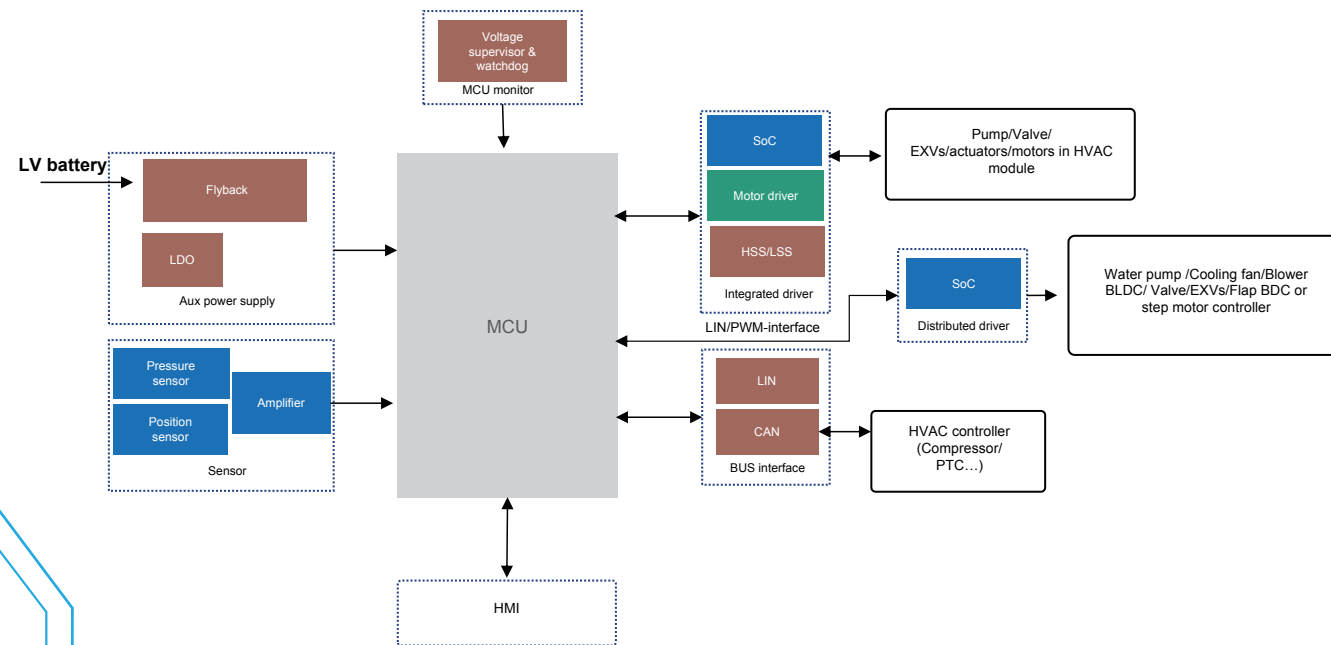
- High side switch (NSE34050)
- Low side switch (NSE11409, NSD12409, NSD11/2416)
- Voltage supervisor (NSR7808)
- Digital relay (NSI7258)



Automotive Thermal Management System

- Thermal Management Controller
- PTC
- E-Compressor

The thermal management controller (TMC) regulates thermal management devices (electric pumps, coolant valves, expansion devices, etc.) by controlling several motors (BDC, BLDC, bipolar stepper motors), and is connected to zone controller via CAN-FD to realize thermal management of the battery, electric drive, and passenger compartment of the electric vehicle.



Pressure & position sensing

- Amplifier (NSOPA9xxx, NSOPA8xxx)
- Pressure sensor (NSC9262, NSC9260x, NSC9264)
- Position sensor (NSM1013, NSM3012, NSM3011)

Motor driver

- DC motor driver (NSD731X)
- Pre-driver (NSD3602, NSD3604, NSD3608)
- Stepper (NSD8381)
- Multi-channel 1/2 half-bridge driver (NSD8308, NSD8306, NSD8312)
- Relay & Solenoid (NSD56008)

Interface & digital isolation

- CAN transceiver (NCA1043(B), NCA1042B/NCA1044)
- LIN transceiver (NCA1021S)

SoC

- SoC (NSUC1602, NSUC1610)

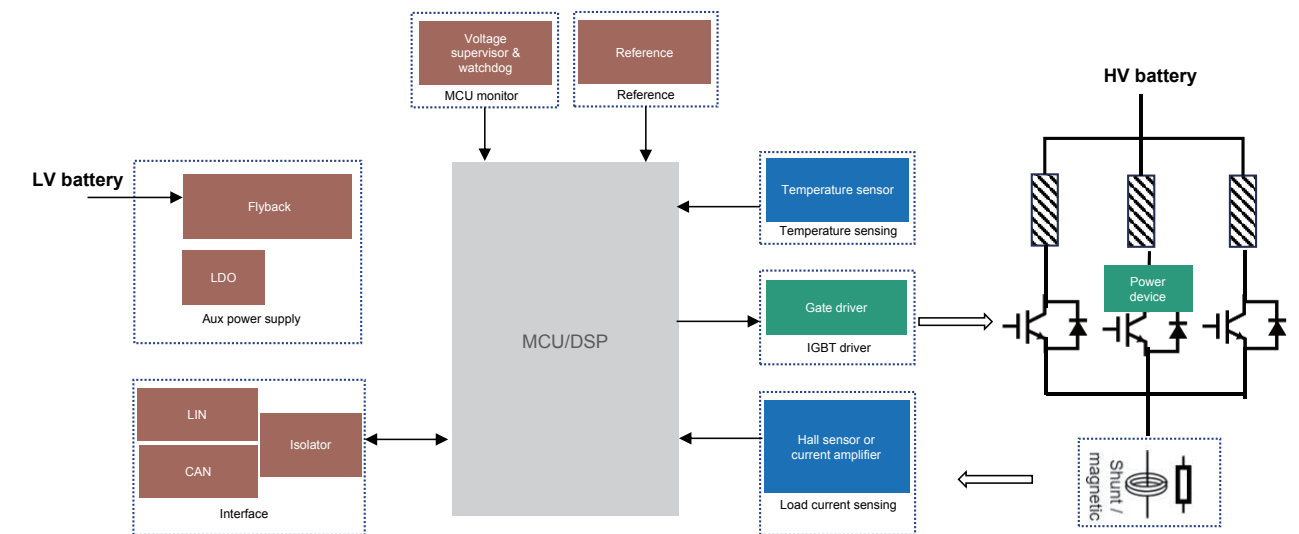
Power management

- Flyback (NSR2240x, NSR28C4x)
- LDO (NSR31xxx, NSR33xxx, NSR35xxx)

Protection & reference & others

- High side switch (NSE34050)
- Low side switch (NSE11409, NSD12409, NSD11/2416)
- Voltage supervisor (NSR7808)

PTC stands for Positive Temperature Coefficient. In an electric vehicle, PTC will adjust the required heat of vehicle automatically by energizing positive temperature coefficient thermal materials such as resistance wire/ceramic etc., and further to ensure the energy efficiency and safety of the EV.



Current & voltage & temperature sensing

- Hall sensor (NSM2011, NSM2013, NSM2015, NSM2017, NSM2019, NSM2113)
- Isolated amplifier (NSI1300, NSI1311)
- Temperature sensor (NST20, NST175)
- Amplifier (NSOPA9xxx, NSOPA8xxx)
- Current amplifier (NSCSA21x, NSCSA24x)

Power device

- 1200V family of IGBT (NPI040N120A, 1200V, 40A)

Interface & digital isolation

- CAN transceiver (NCA1043NCA1043(B), NCA1042B/NCA1044)
- LIN transceiver (NCA1021S)
- Digital isolator (NSI822x)

Gate driver & motor driver

- Single channel isolated driver (NSI6601, NSI6601M)
- Dual-channel isolated driver (NSI6602V)
- Non-isolated driver (NSD1026V)

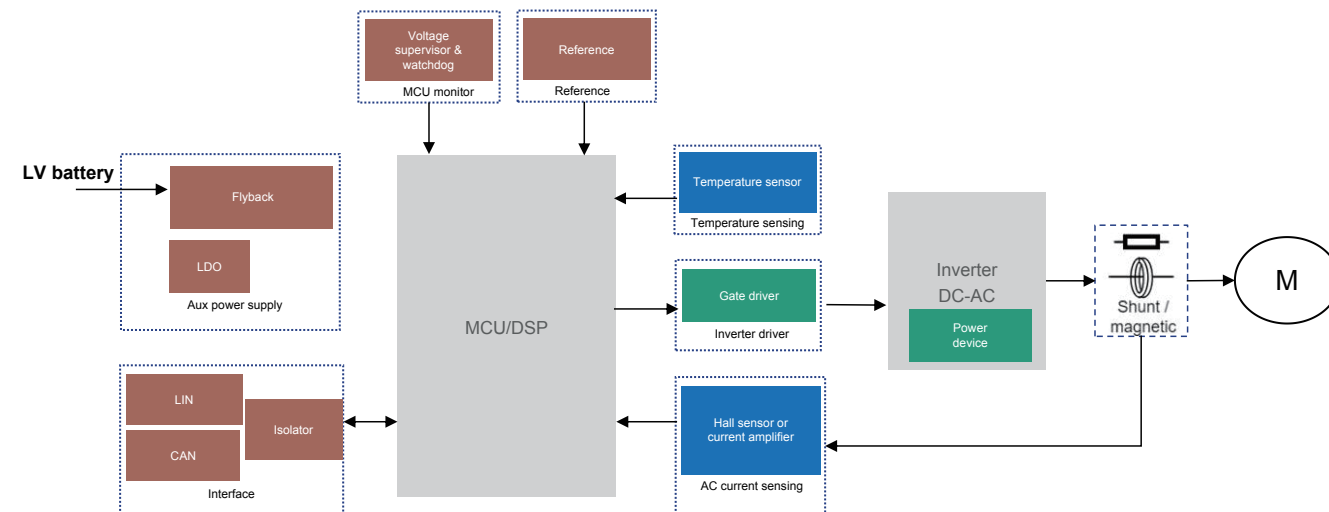
Power management

- Flyback (NSR2240x, NSR28C4x)
- LDO (NSR31xxx, NSR33xxx, NSR35xxx)

Protection & reference & others

- Voltage supervisor (NSR7808)
- Reference (NSREF30xx, NSREF31xx)

In an electric vehicle (EV), the electric compressor is an integral part of the HVAC system. Its primary function is to adjust temperature per needed, contains cabin and drivetrain cooling, and cabin and battery heating in cold weather.



Current & voltage & temperature sensing

- Hall sensor (NSM2011, NSM2013, NSM2015, NSM2017, NSM2019, NSM2113)
- Isolated amplifier (NSI1300, NSI1311)
- Temperature sensor (NST20, NST175)
- Amplifier (NSOPA9xxx, NSOPA8xxx)
- Current amplifier (NSCSA21x, NSCSA24x)

Gate driver & motor driver

- Single channel isolated driver (NSI6601M)
- Half bridge isolated driver (NSI6602V)
- Non-isolated half bridge driver (NSD1624)
- Non-isolated driver (NSD1026V)

Power device

- 1200V family of SiC MOSFET (NPC0X0N120A, 1200V, 40/60/80mohm)
- 650V family of IGBT (NPI0X0N065A, 650V, 30A)
- 1200V family of IGBT (NPI0X0N120A, 1200V, 40A)

Power management

- Flyback (NSR2240x, NSR28C4x)
- LDO (NSR31xxx, NSR33xxx, NSR35xxx)

Interface & digital isolation

- CAN transceiver (NCA1043(B), NCA1042B/NCA1044)
- LIN transceiver (NCA1021S)
- Digital isolator (NSI822x)

Protection & reference & others

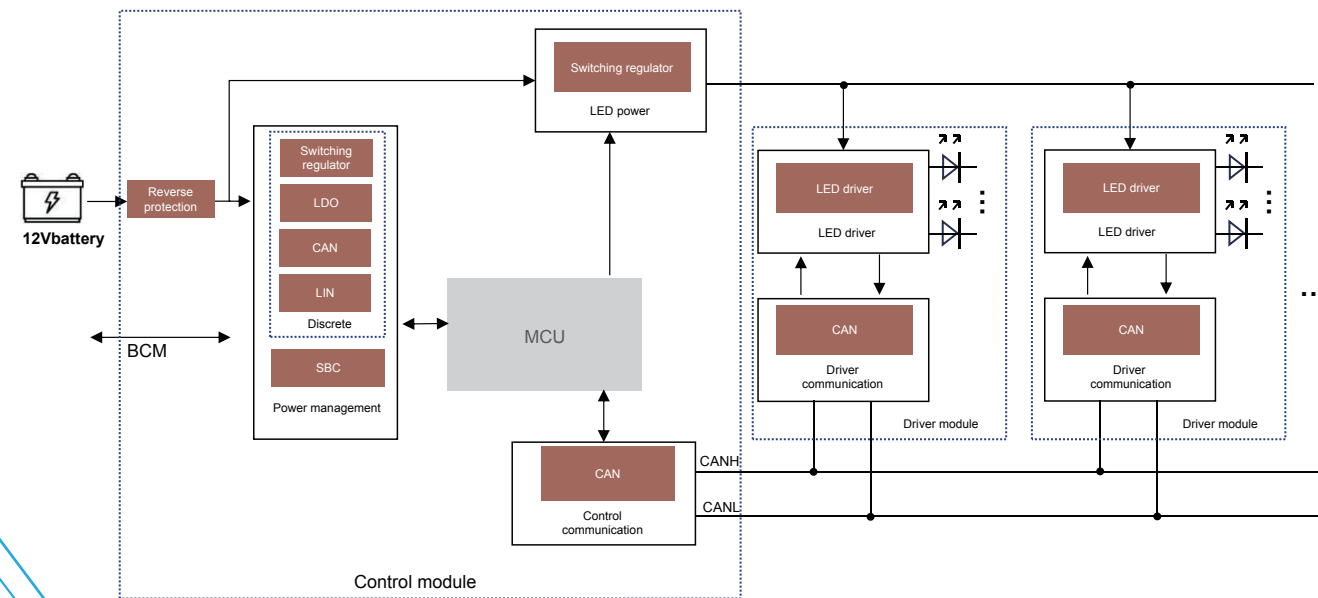
- Voltage supervisor (NSR7808)
- Reference (NSREF30xx, NSREF31xx)



Automotive LED Driver Solution

- Rear Light System
- Headlight System

The rear light is an important part of the vehicle's lighting system, which is composed of brake lights, reverse lights, turn signals and fog lights. The main function of the rear lights is to remind the behind vehicles and convey the front vehicle's driving status to it. At present, the mainstream rear light system basically uses LED lighting, generally composed of MCU + LED driver chip.



Power management

- Buck (NSR114xx)
- LDO (NSR31xxx, NSR33xxx, NSR35xxx)

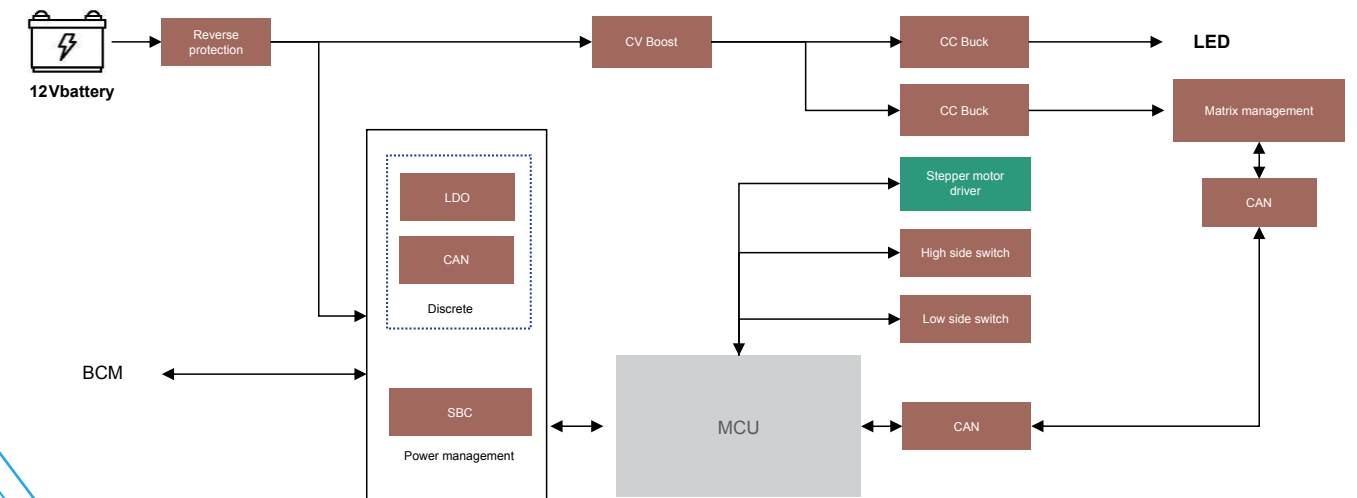
LED driver

- LED driver (NSL2161x, NSL2163x, NSL21912, NSL23916, NSL23924, NSL23716x)

Interface & digital isolation

- CAN transceiver (NCA1043(B), NCA1042B/NCA1044, NCA1145, NCA1169)
- LIN (NCA1021S)

The automotive headlight system is one of the most crucial parts of the automotive lighting system, capable of illuminating the road ahead during night-time or low visibility conditions, ensuring driving safety. The new intelligent headlight system includes Adaptive Front-lighting System (AFS), Adaptive Driving Beam (ADB), etc., which can flexibly control the brightness and angle of the headlights according to the actual scene to improve driving safety. Currently, the mainstream headlight systems primarily uses LED lighting, and generally composed of MCU, LED driver, power management ICs, stepper motor driver, etc.



Motor driver

- Stepper motor driver (NSD8381)

Protection & others

- High side switch (NSE34xxx, NSE35xxx)
- Low side switch (NSE11409, NSD12409, NSD11/2416)
- Reverse protection (NSE14700/14500)

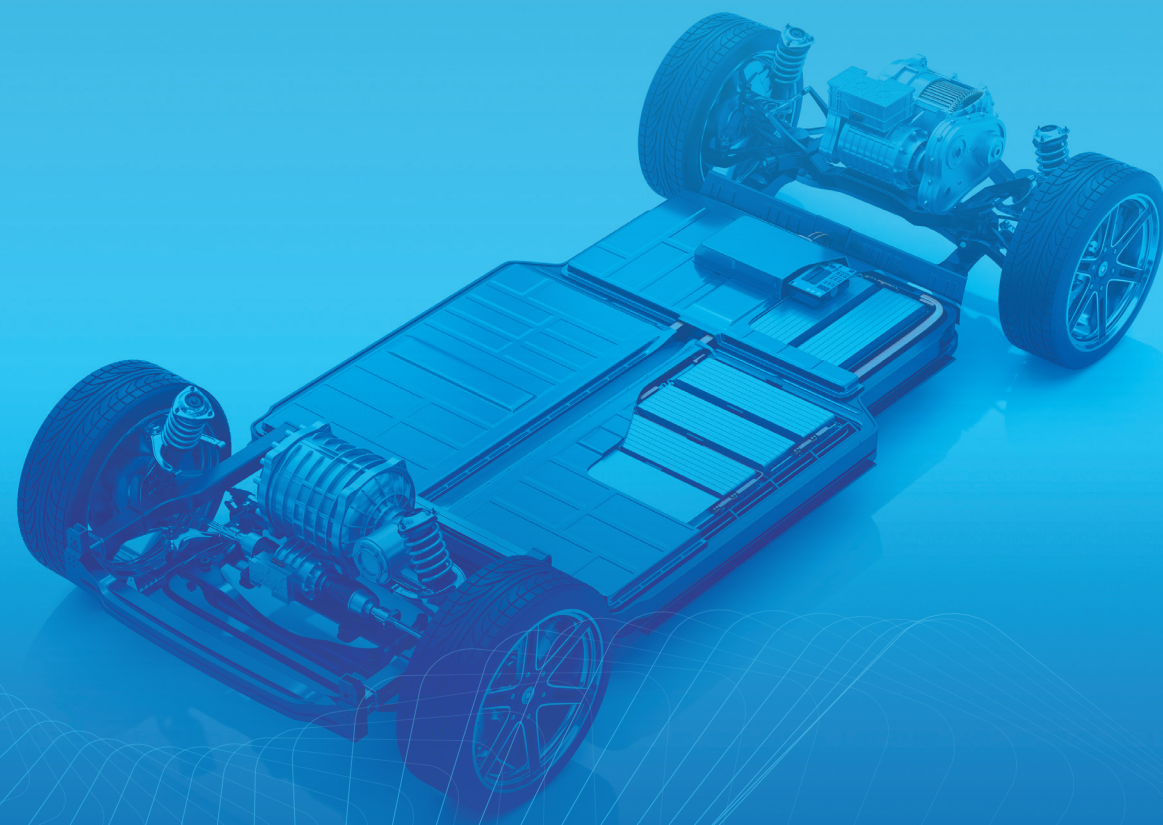
Power management

- LED driver CC Buck (NSL31520)
- CV Boost (NSL31682)
- LDO (NSR31xxx, NSR33xxx, NSR35xxx)
- SBC (NSR926x)

Protection & others

- CAN transceiver (NCA1043(B), NCA1145)

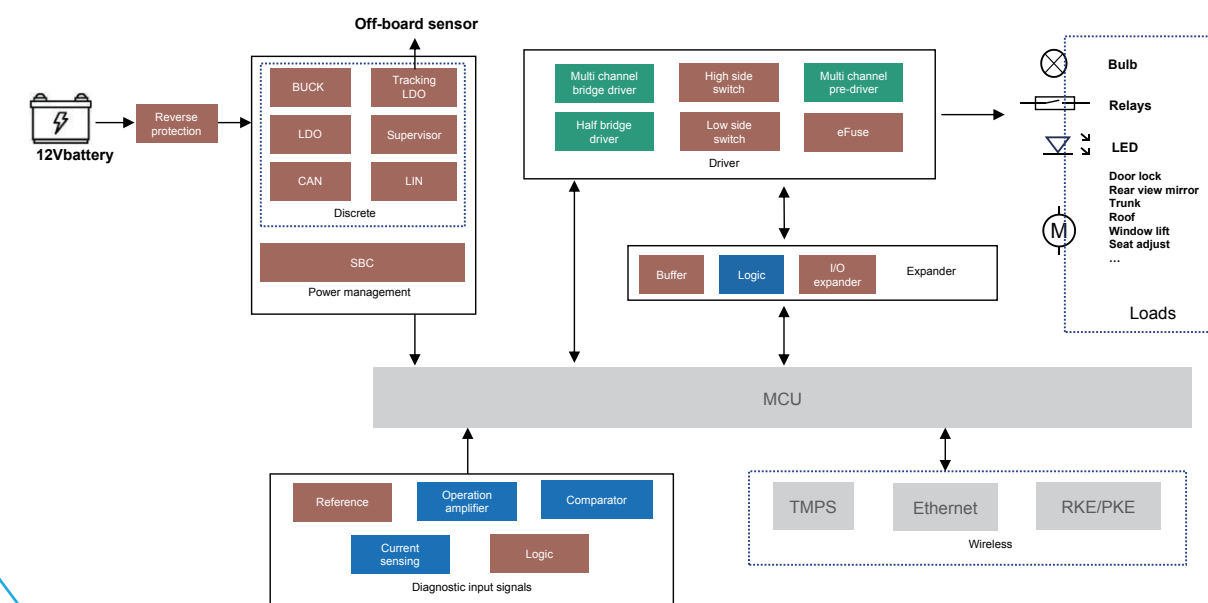
Body Control Module (BCM)



Body Control Modules (BCM)

NOVOSENSE

The Body Control Module (BCM) is an electronic control unit used to control the body electrical system. Through CAN/LIN bus or hard wire, the BCM realizes vehicle body control such as internal and external lights, windows, keyless entry and start system, anti-theft alarm control, wiper washing control etc., further enhance the safety, comfort and convenience of a vehicle.



Current & position sensing

- Position sensor (NSM1013, NSM1030, NSM301x)
- Amplifier (NSOPA9xxx, NSOPA8xxx)
- Current sensing (NSCSA21x, NSCSA24x)

Motor driver

- Half bridge driver (NSD7315, NSD7312, NSD7314)
- Multi-channel bridge driver (NSD8306, NSD8308, NSD8310, NSD8312)
- Multi-channel pre-driver (NSD3608, NSD3604, NSD3602)

Protection & reference & others

- High side switch (NSE34xxx/NSE35xxx)
- Low side switch (NSE11409, NSD12409, NSD11/2416, NSD56008)
- eFuse (NSE1048)
- Tracking LDO (NSE425x)
- Voltage supervisor (NSR7808, NSR7850)
- Reference (NSREF30xx, NSREF31xx)
- I/O expander (NCA9555)
- Reverse protection (NSE14700/NSE14500)

Power management

- LDO (NSR31xxx, NSR33xxx, NSR35xxx)
- BUCK (NSR104xx, NSR106xx, NSR114xx, NSR1103x)
- SBC (NSR926x)

Interface & digital isolation

- CAN transceiver (NCA1043(B), NCA1042B /NCA1044, NCA1462, NCA1145)
- LIN transceiver (NCA1021S)
- Buffer (NCA8244)

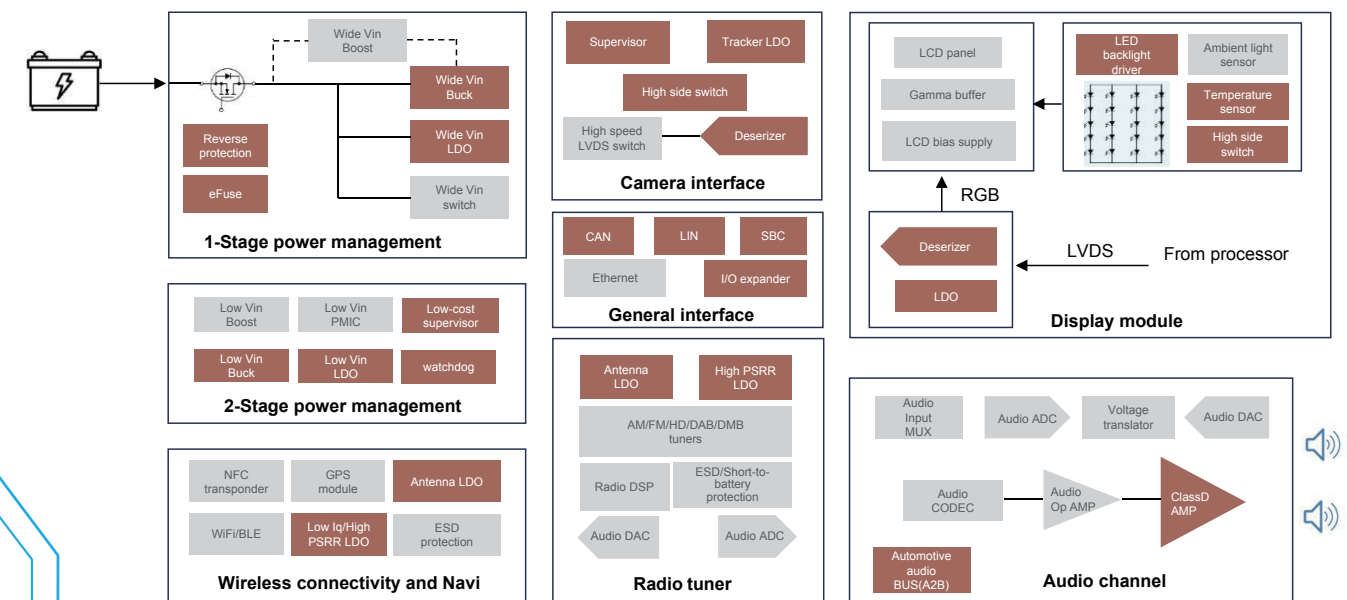
Automotive Infotainment & Instrumentation Solution

- Infotainment
- Dashboard

Infotainment

NOVOSENSE

In-Vehicle Infotainment (IVI) is an in-vehicle integrated information processing system which is mainly formed based on a dedicated in-vehicle central processor, body bus system and Internet services. IVI coordinates and controls the entire in-vehicle infotainment equipments through a dedicated in-vehicle processor and operating system, providing users with professional geographic information services, multimedia entertainment services and intelligent transportation services, which greatly enhances the safety and comfort of driving.



Power management

- LDO (NSR31xxx, NSR33xxx, NSR35xxx)
- Antenna LDO (NSE5701, NSE5702)
- LV LDO (NSR30xxx)
- BUCK (NSR104xx, NSR106xx, NSR114XX, NSR1103x)
- LED backlighting (NSL610x)

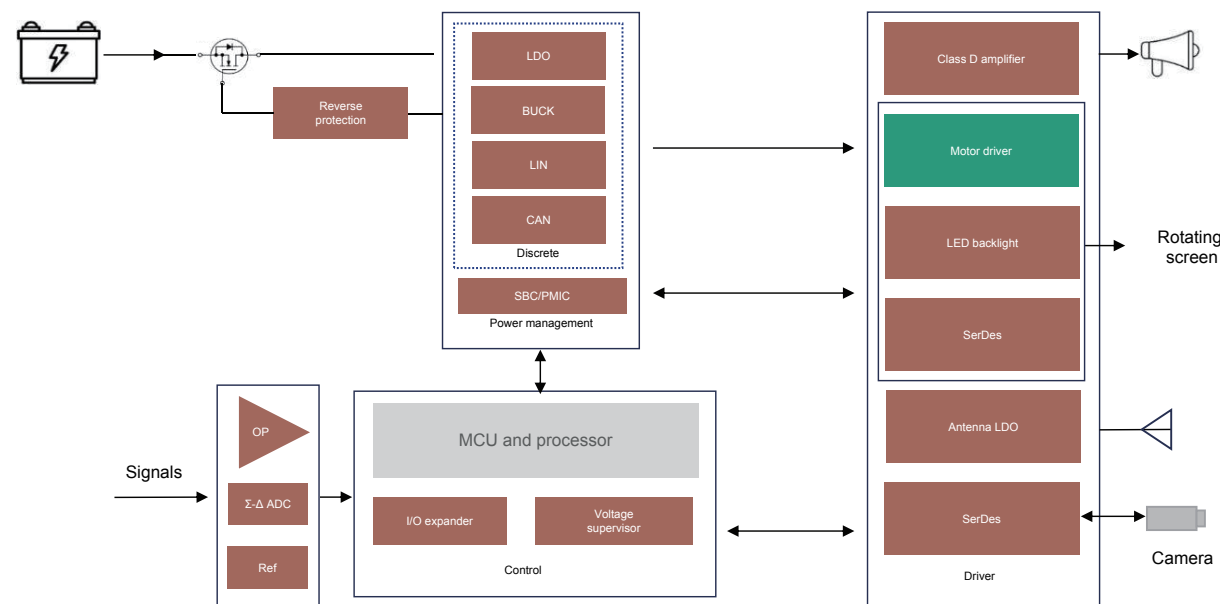
Interface & digital isolation

- CAN transceiver (NCA1043(B), NCA1042B /NCA1044, NCA1145, NCA1169)
- LIN transceiver (NCA1021S)

Protection & others

- High side switch (NSE34xxx/35xxx)
- eFuse (NSE1048)
- Tracking LDO (NSE4250)
- Voltage supervisor (NSR7808)
- Watchdog (NSR7850)
- I/O expander (NCA9539)
- Reverse protection (NSE14700/NSE14500)

The instrument panel is an important part of an intelligent cabin, integrating to display vehicle status, road condition information, navigation settings, controlling and other important information.



Power management

- LDO (NSR30xxx, NSR31xxx, NSR33xxx, NSR35xxx)
- Antenna LDO (NSE5701, NSE5702)
- BUCK (NSR104xx, NSR106xx, NSR114xx, NSR1103x)
- LED backlighting (NSL610x)

Interface

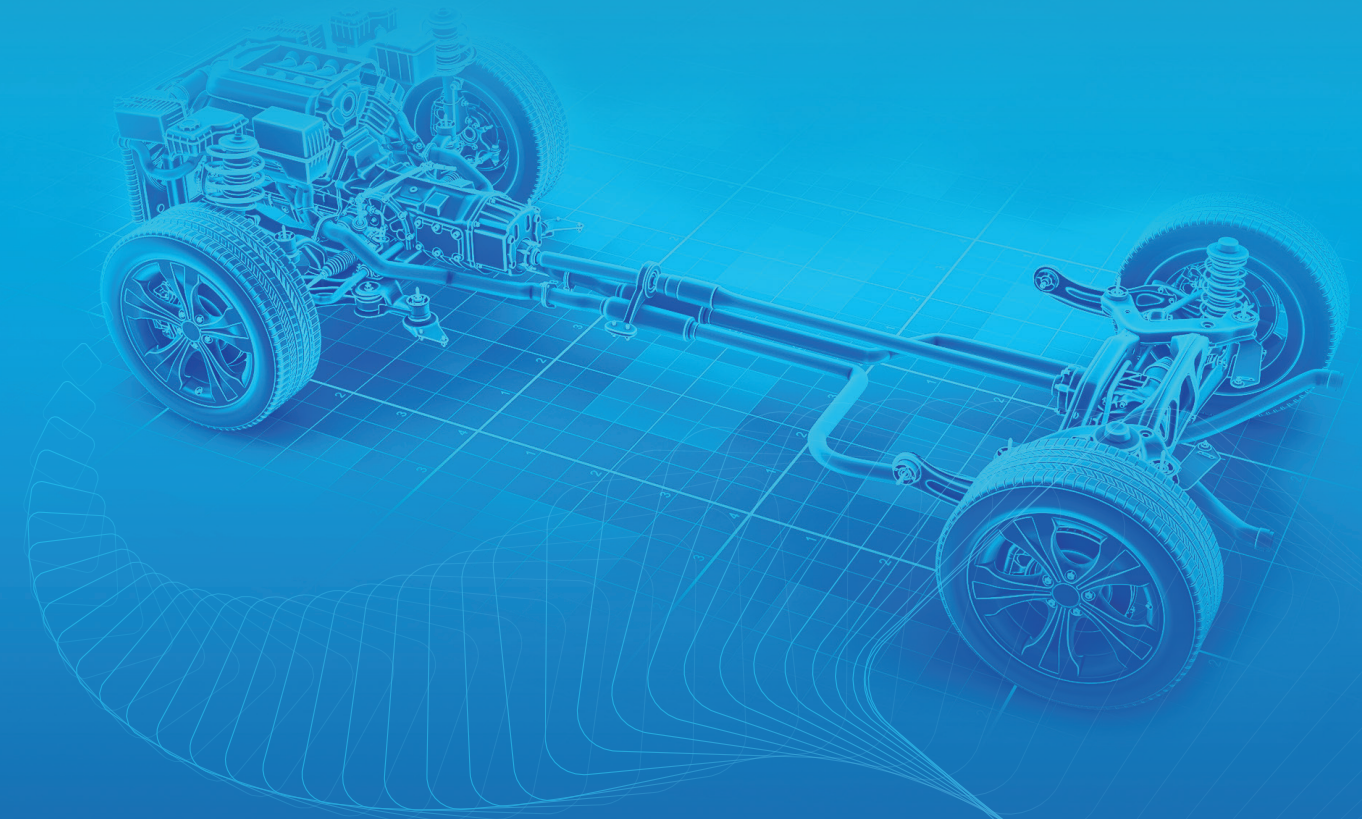
- CAN transceiver (NNCA1043(B), NCA1042B /NCA1044, NCA1145, NCA1169)
- LIN transceiver (NCA1021S)

Protection & others

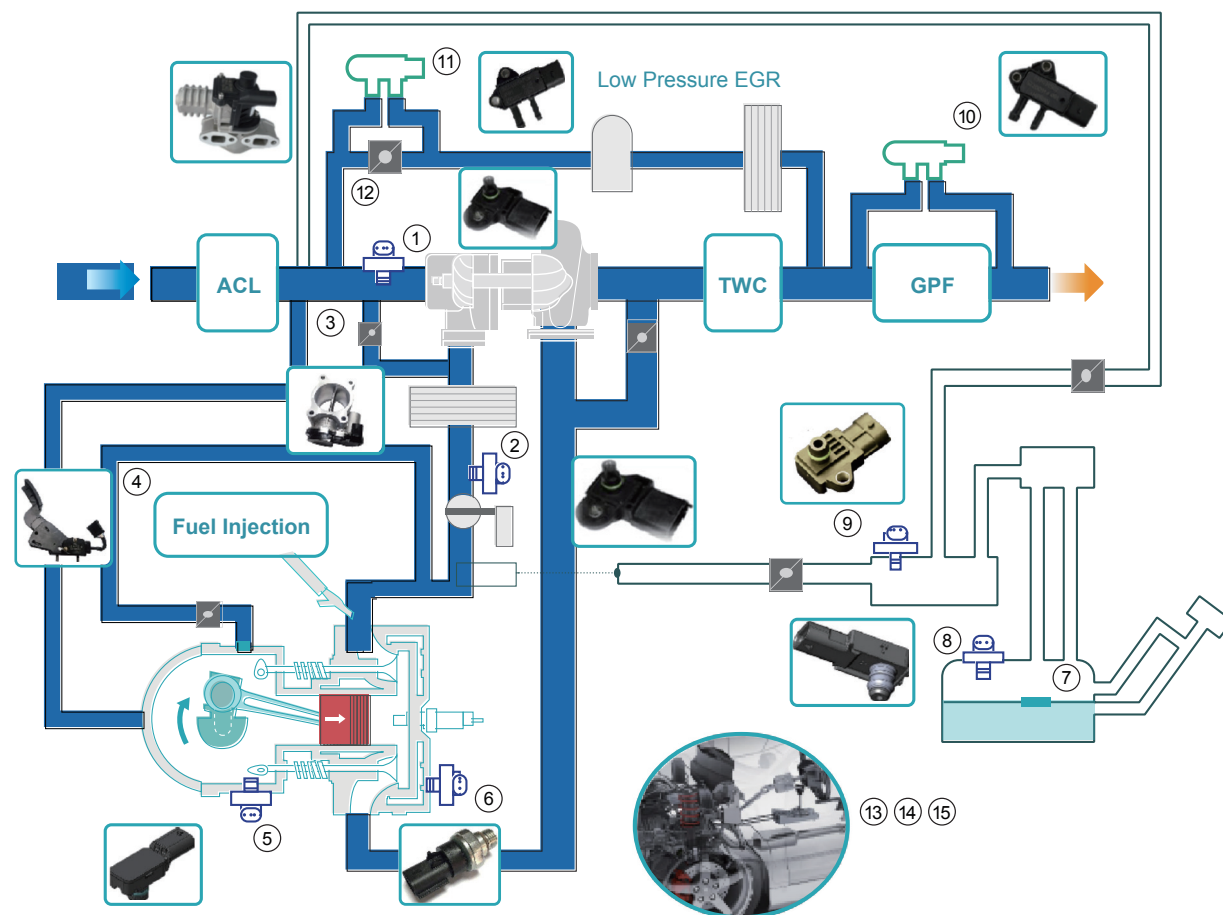
- High side switch (NSE34xxx/35xxx)
- Low side switch (NSE11409, NSD12409, NSD11/2416, NSD56008)
- eFuse (NSE1048)
- Tracking LDO (NSE4250)
- Voltage supervisor (NSR7808)
- Watchdog (NSR7850)
- I/O expander (NCA9555)
- Reverse protection (NSE14700/NSE14500)

Motor driver

- DC motor driver (NSD731x)
- Stepper (NSD8381)
- Multi-channel 1/2 half-bridge driver (NSD8308, NSD8306, NSD8312)
- Multi-channel pre-driver (NSD3608, NSD3604, NSD3602)



Fuel Powertrain & Fuel Supply System Solution



NOVOSENSE Solution

1. Intake manifold pressure sensor
2. EGR-TMAP pressure sensor
3. Throttle position sensor
4. Accelerator pedal position sensor
5. Positive crankcase ventilation pressure sensor
6. Oil pressure sensor
7. Oil tank level detection sensor
8. EVAP/FTPS pressure sensor
9. Canister desorption pressure sensor
 - Pressure sensor IC: NSPAS1, NSPAS3
 - Pressure sensor MEMS: NSP1630/1, NSP1632 (Pt)
 - Signal conditioning ASIC: NSA/C9260x (analog), NSA/C9264 (SENT)
10. GPF/DPF differential pressure sensor
11. EGR valve differential pressure sensor
 - Pressure sensor module: NSPGM1, NSPGM2, NSPDC1
 - Pressure sensor MEMS: NSP1831, NSP1832(Pt)
 - Signal conditioning ASIC: NSA/C9260x (analog), NSA/C9264(SENT)
12. Exhaust gas circulation valve position sensor
 - Magnetic angle sensor IC: NSM3011/12
13. VBS Vacuum boost pressure sensor
 - Pressure sensor IC: NSPAS1, NSPAS3
 - Pressure sensor module: NSPGM1, NSPGM2
 - Signal conditioning ASIC: NSA/C9260x (analog), NSA/C9264 (SENT)
14. Brake pressure sensor
 - Signal conditioning ASIC: NSA/C9260x (analog), NSA/C9264 (SENT)
15. ECU atmospheric pressure sensor (BAP)

Robust

Reliable

Keep Learning

Persist in Long-term Value