Driving new car innovations through the Distribution channel

Automotive ICs and system solutions

The right partner for automotive

At NXP, we're driving the car innovations of tomorrow, creating new ways to make automobiles cleaner, safer, more comfortable, and more fun.

Our automotive solutions address the need for cost-effective transportation, and focus on environmental sustainability, the desire for increased safety and comfort, and seamless connectivity. Our in-vehicle networking technologies and sensor systems improve vehicle dynamics while helping to save fuel and improve reliability, and our keyless entry and connected key solutions add convenience and security.

Our continuously increased market share in automotive is the direct result of our focus on strengthening leadership positions in areas where our technology expertise delivers real customer value. We have many number-one positions in car entertainment products, in-vehicle networking, magnetic sensors, immobilizers and keyless entry. Based on our core competencies in these areas, and our overall systems expertise, we help you and your automotive customers increase functionality and significantly reduce system cost.

To support future growth, we've significantly increased our automotive R&D spend over the last years and consistently deliver the next-generation solutions that take our automotive partners where they want to go.

Operational excellence and quality

The vehicle environment, with its high temperatures, complex electronics, and multi-layered safety requirements – combined with car-buyer demands for reliable operation – put critical demands on quality and require performance of the highest grade. We meet the challenge, with a relentless commitment to quality and excellence.

Our Automotive Quality Highway, a program tailored to automotive quality requirements, keeps us focused on defect elimination and our Design for Excellence strategy ensures fast and efficient design of our top-class solutions.

It is this unique combination – bringing together innovation, commitment, and quality – that makes us a preferred partner for the long term.

NXP is #1 in

- In-vehicle networking
- ABS sensors
- Immobilization and keyless entry/go
- DSPs and tuners for car radios

Our commitment to distribution

We consider distribution a vital part in the automotive value chain. The distribution channel plays a crucial role in adding value to the automotive industry, especially in business creation, design-in support and supply chain solutions. We are committed to our distribution partners for automotive semiconductors and provide an extensive set of resources to help you turn opportunities into design-ins.

We've highlighted key products in this brochure. For more about the automotive market and the products that best suit its requirements, go to DistiNet (https://extranet.nxp.com) or visit the NXP public website (www.nxp.com).

Comprehensive support for distribution

Training	Hands-on, accredited FAE training and refresher packs
DistiNet (https://extranet.nxp.com)	Prime information source, dedicated to our distributor network
Marketing	Presentations, videos, case studies, eBroadcasts, business creation workshops, journals
Documentation on the NXP website (http://www.nxp.com/products/automotive/index.html#preview)	Leaflets, datasheets, application notes, and more
eSamples desk (https://extranet.nxp.com)	Accessed via DistiNet or through your local sales office
Software tools	Development kits, demo boards, reference designs, and more
Application-specific design kits	Complete kits, with development board, application notes, samples, specific tools, and collateral
Support programs for focus products	Dedicated training, materials, events and effective marketing tools

Automotive networking

Our advanced in-vehicle networking (IVN) technologies enable a suite of systems that take safety, convenience, and performance to new levels. We are a recognized market leader in all the major networking protocols, including CAN, LIN, and FlexRay.

CAN

CAN

We've played a leading role in establishing CAN (Controller Area Network) as the automotive networking standard. Our portfolio covers all the physical layer options, and includes automotive-grade implementations of high-speed and fault-tolerant transceivers as well as a standalone protocol controller.

lin
LOCAL INTERCONNECT NETWORK

LIN

LIN (Local Interconnect Network) decentralizes local functionality in applications like door and seat control, and is a popular choice for IVN because it reduces cost while increasing flexibility. Our LIN portfolio extends functionality and reduces system cost via dedicated LIN System Basis Chips (SBCs). A family of one-chip-node LIN slave products is in development.

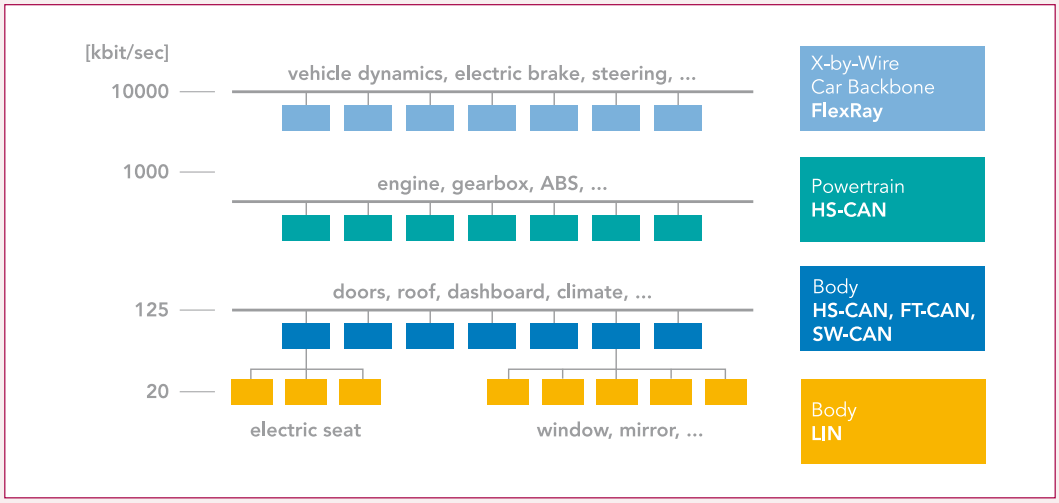
FlexRay™

FlexRay

FlexRay delivers the network performance, reliability, and flexibility demanded by modern vehicle electronics. We were first to deliver a FlexRay transceiver and continue to expand the family while helping customers to migrate their applications to FlexRay.

System Basis Chips

System Basis Chips (SBCs) combine one or several bus transceivers, voltage regulators, I/O pins and optionally the functionality of a watchdog in a single IC. The combination of these integrated functions offers advanced low-power mode control and smart fail-safe behavior. Pin-compatible family devices with different transceiver options support the design of ECUs that can be adapted to different projects by simply changing the population of the printed circuit board.



Representive applications of LIN, CAN and FlexRay

FlexRay products

TJA1080A	FlexRay transceiver (node and star function)
TJA1081	FlexRay node transceiver with sleep mode
TJA1082	FlexRay node transceiver with standby mode

SBCs

UJA1061	Fault-tolerant CAN, LIN 2.x, LDO 120 mA
UJA1065	High-speed CAN, LIN 2.x, LDO 120 mA
UJA1066	High-speed CAN, LDO 120 mA
UJA1069	LIN 2.x, LDO 120 mA
UJA1075	High-speed CAN, LIN 2.x, LDO 250 mA, Enhanced ESD
UJA1076	High-speed CAN, LDO 250 mA, Enhanced ESD
UJA1078	High-speed CAN, two LIN 2.x, LDO 250 mA, Enhanced ESD
UJA1079	LIN 2.x, LDO 250 mA, Enhanced ESD

LIN products

TJA1020	Standalone LIN transceiver
TJA1021	Standalone LIN 2.x transceiver in SO8 or HVSON8 package
UJA1023	LIN I/O slave

CAN products

High Speed CAN	
PCA82C250	With standby mode
PCA82C251	With standby mode, 24 V systems
TJA1050	Basic HS-CAN transceiver with silent function
TJA1051	Basic HS-CAN transceiver (like TJA1050) with silent function plus enhanced ESD, EMC performance and usable for 24 V systems'
TJA1051/3	TJA1051 performance with microcontroller interface 3 to 5 V (Vio pin)
TJA1040	HS-CAN transceiver with standby mode
TJA1042	HS-CAN transceiver with standby mode (like TJA1040) plus enhanced ESD, EMC performance and usable for 24 V systems
TJA1042/3	TJA1042 performance with microcontroller interface 3 to 5 V (Vio pin)
TJA1041	HS-CAN transceiver with standby and sleep mode, microcontroller interface 3 to 5 V (Vio pin)
TJA1041A	TJA1041 plus enhanced bus wake-up filter
TJA1043	HS-CAN transceiver with standby mode and sleep mode (like TJA1041A) plus enhanced ESD, EMC performance, usable for 24 V systems and microcontroller interface 3 to 5 V (Vio pin)
Fault Tolerant CAN	
TJA1054	With standby and sleep
TJA1054A	With standby, sleep, and improved ESD
TJA1055	With standby, sleep, and improved ESD, plus low sleep current
TJA1055/3	With standby, sleep, and improved ESD, plus microcontroller interface (3 to 5 V)
CAN controller	
SJA1000	Standalone CAN controller

Automotive sensors

In several regions around the world, governments are introducing stricter requirements for emissions and fuel consumption, including tighter regulations for CO_2 and NO_X emissions.

Automotive sensors play an important role in meeting these requirements, since they can optimize fuel efficiency in Internal Combustion Engines (ICEs) and enable next-generation, low-emissions power trains in Hybrid Electric Vehicles (HEVs).

Magneto-resistive (MR) position and speed sensors

Contactless sensor systems improve fuel economy, reduce emissions, and improve the vehicle's safety and comfort. Precise and reliable performance make our MR sensors ideal for engine-management functions like Electronic Throttle Control (ETC), Variable Valve Timing (VVT), and Exhaust Gas Recirculation (EGR). MR sensors are also used in systems for Electric Power Steering (EPS) and wiper and pedal positioning, and they appear in rotational speed applications like ABS, ESP, and transmission.

Temperature sensors

Our silicon-based temperature sensors, which offer a virtually linear characteristic over their entire operating range, ensure highly accurate measurement with a long operating life. The KTY series can be used in systems throughout the vehicle, including oil temperature, oil module, transmission, engine cooling, fuel injection, climate control, overheating protection, and heating control. Used throughout the car, they contribute considerably to a more efficient, safe, and more comfortable ride.

Angular sensors

Type number	Package	Supply voltage	Angle range	Output value	Output type
KMZ41	SO8	5 - 9 V	180°	78 mVpeak (5 V)	sin/cos
KMZ43	SO8	5 - 9 V	180°	67 mVpeak (5 V)	sin/cos
X3T-KMZ43	Die	5 - 9 V	180°	67 mVpeak (5 V)	sin/cos
KMA199	SOT880	4.5 - 5.5 V	180°	0.5 - 4.5 V	analog linear
KMA200	SOT637	4.5 - 5.5 V	180°	0.5 - 4.5 V	4 analog linear/ 2 digital

Speed sensors

Type number	Sensing distance (typ)	Tooth frequency	Target	Interface
KMI15/1	0.9 to 2.9 mm	0 to 25.000 Hz	Ferrous	Current
KMI15/2	0.5 to 2.7 mm	0 to 25.000 Hz	Magnetized	Current
KMI15/4	0.5 to 2.3 mm	0 to 25.000 Hz	Ferrous	Current
KMI18/1	0.9 to 2.9 mm	0 to 25.000 Hz	Ferrous	Open collector
KMI18/2	0.5 to 2.7 mm	0 to 25.000 Hz	Magnetized	Open collector
KMI18/4	0.5 to 2.3 mm	0 to 25.000 Hz	Ferrous	Open collector

* + 1mm dynamic reserve

Temperature sensors

Type number	Package	R24	Available tolerances	Temperature Range
KTY81-1	SOD70	1,000 Ω	±1 to ±5%	-55 to +150 °C
KTY81-2	SOD70	2,000 Ω	±1 to ±5%	-55 to +150 °C
KTY82-1	SOT23	1,000 Ω	±1 to ±5%	-55 to +150 °C
KTY82-2	SOT23	2,000 Ω	±1 to ±5%	-55 to +150 °C
KTY83-1	SOD68	1,000 Ω	±1 to ±5%	-55 to +175 °C
KTY84-1	SOD68	1,000 Ω (R100)	±3 to ±5%	-40 to +300 °C

Power management and control

We are a global leader in discrete power MOSFETs for automotive systems. Our power solutions deliver the flexibility today's cars need, whether they're driving a simple lamp or controlling a sophisticated system that includes engine, body, and chassis applications.

Automotive TrenchMOS

We offer more than 300 standard part numbers for automotive power, and often create unique, customer-specific offerings. Our power MOSFETs achieve field return rates of below 1 ppm, meeting the zero-defects target that automotive customers expect.

TrenchPLUS

TrenchPLUS is a range of standard MOSFETs with added protection features, including current and temperature sensing components, overvoltage clamps, and gate protection (ESD) diodes. Using data gathered by these sensors, the system microcontroller can implement cost-effective protection features, so there's no need to design with protected power devices. Each standard product is equipped with one or more PLUS features. For high-volume applications, custom versions can also be made available.

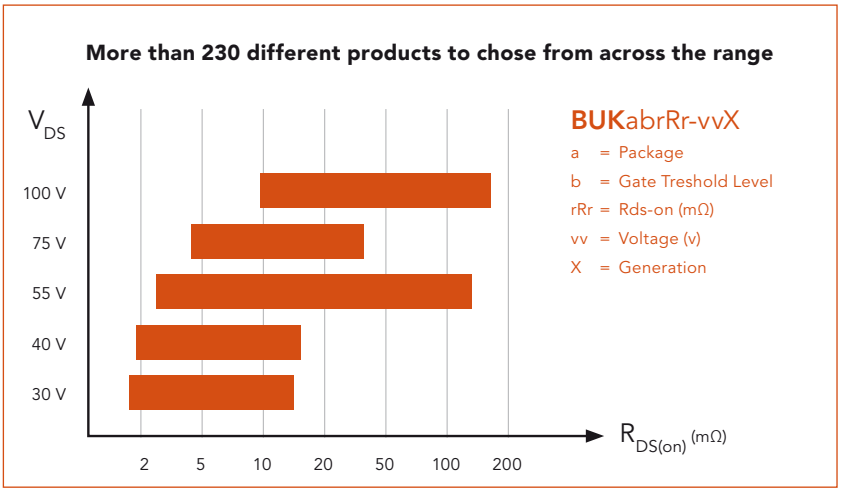
Light Position Controller

The TDA3629 Light position controller (Leucht Weiten Steller, LWS) is a monolithic integrated circuit intended to be used in passenger cars. This device adapts the elevation of the light beam of the head light of the car to a state defined by the car driver using a potentiometer on the dashboard (in manual leveling) or by light leveling controller according to sensor input (in automatic leveling).

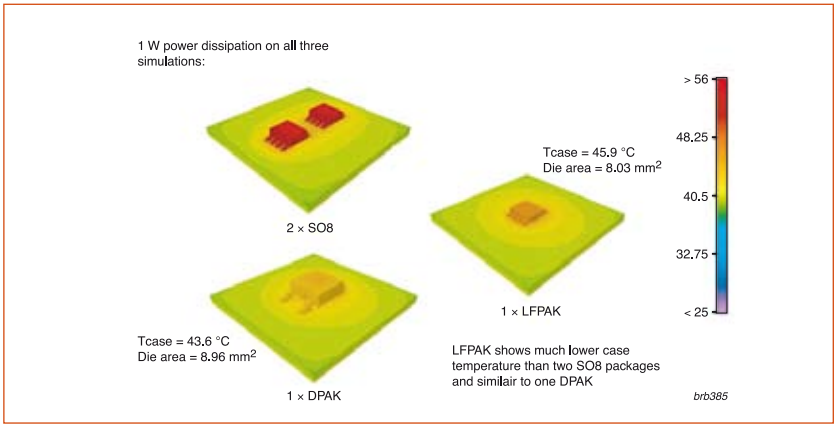
LFPAK

This innovative packaging technology supports more complex body electronics, minimizing board space. It delivers twice the power density of conventional SO8 packages, so there's more room to add circuitry that increases functionality, safety, and comfort.

Automotive MOSFET range – 300+ devices

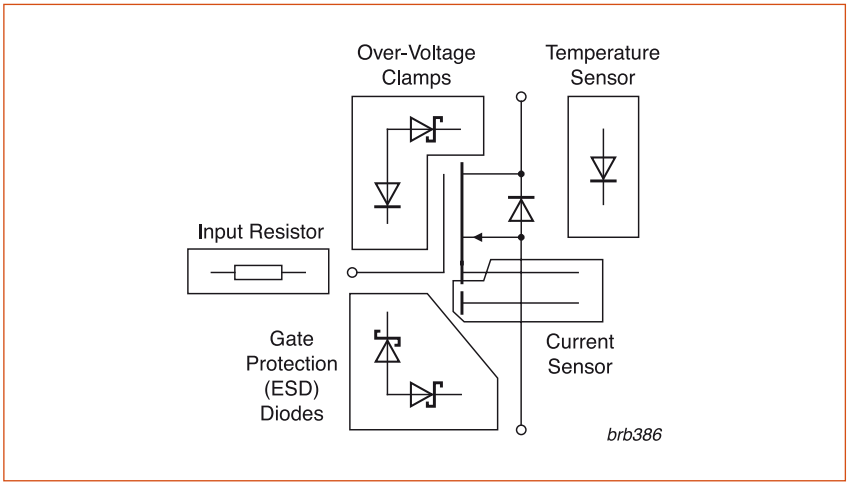


Thermal comparison: LFPAK vs SO8 and DPAK



The compact LFPAK footprint minimizes board space, while delivering thermal performance comparable to a single DPAK or two SO8 packages

TrenchPLUS for built-in protection



Car audio amplifiers and connecti

Our audio and connectivity solutions meet the strict cost, quality, and application requirements of today's automobiles. We are an industry leader in audio amplifiers and offer a portfolio that reflects our comprehensive understanding of technology. That includes highly efficient Class-D amplifiers, based on our own advanced silicon processes, and the industry's first high volume produce IPAS (Integrated Power and Amplifier Solution).

Class-AB amplifiers

For Class-AB audio amplification, our range includes high-power quad and dual standalone audio power amplifiers covering all in-car listening experiences.

Class-D amplifiers

Since Class-D power amplifiers improve the sound performance for everyone inside the car, they're increasingly important to consumers. Our Class-D solutions support more drive channels from the head unit radio, with less heat consumption.

vity

Integrated power amplifiers and stabilizer

By combining a high-power audio amplifier with multiple-output voltage regulators, the Class-D IPAS is a simple idea that offers substantial benefits, including shorter design-in cycles and reduced system cost. IPAS ICs offer extra functions, too, like protections and diagnostics and flexible controlled voltage.

Type Number	Function	Output power at 4 (2) Ω	Diag-nostic	Differen-tial Input	Cluster
TDA15661TH	Stereo/Mono 1 Ω	2x28 W (2x38 W)	I²C	Yes	Class-AB I²C (4 Ch)
TDA8561Q/TH	Stereo/Quad	2x24 W, 4x7 W (4x12 W)			Class-AB (4 Ch)
TDA8566Q/TH	Stereo	2x25 W (2x40 W)		Yes	Class-AB (4 Ch)
TDA8567Q	Quad	4x22 W			Class-AB (4 Ch)
TDA8569Q	Quad	4x24 W (4x40 W)			Class-AB (4 Ch)
TDA8579T	Line receiver				Class-AB (4 Ch)
TDA8594J	Quad 28 W legacy	4x28 W (4x46 W)	I²C		Class-AB I²C (4 Ch)
TDA8595J/SD/TH	Quad 25 W legacy	4x26 W (4x41 W)	I²C		Class-AB I²C (4 Ch)
TDA8596TH	Quad 25 W legacy	4x26 W (4x41 W)	I²C	Yes	Class-AB I²C (4 Ch)
TDF8590TH	Stereo/Bridge	2x80 W (8 Ω) 2x60 W (2 Ω, ±18 V)		Yes	Class-D High (2 Ch)
TDF8591TH	Stereo/Bridge	2x100 W (4 Ω) 2x130 W (2 Ω, ±28 V)		Yes	Class-D High (2 Ch)
TDF8599TD/TH	Stereo/Bridge	2x26 W (2x43 W)	I²C	Yes	Class-D Batt (2 Ch)
TDF8599ATD/TH	Stereo/Bridge	2x26 W (2x130 W, 35 V)	I²C	Yes	Class-D High (2 Ch)
TDF8599BTD/TH	Stereo/Bridge	2x26 W (2x70 W, 24 V)	I²C	Yes	Class-D High (2 Ch)

USB connectivity

Today's cars offer a host of great infotainment applications, but, unfortunately, most of them work independently. Connectivity options, especially USB via the NXP SAF1562HL, create a simple way to let drivers and passengers plug their own personal devices directly into the car's infotainment system.

For more information on car radio solutions please check out the dedicated Automotive page on DistiNet via https://extranet.nxp.com
➞ Marketing programs ➞ Automotive

RF solutions for car access

Our automotive RF solutions for the ISM band offer the low power consumption demanded by handheld devices and, for reduced system cost, deliver a high level of integration.

Fractional-N based PLL synthesizer (FraNTIC)

This sophisticated, fully integrated UHF transmitter IC uses a Franctional-N based PLL synthesizer. It's designed for low-cost, short-range transmission applications operating in common ISM frequency bands (315 / 434 / 868 / 915 MHz).

Low-power, single-chip transceiver (LoPSTer)

The highly integrated, single-chip transceiver PQJ7980 (LoPSTer), with its programmable Fractional-N PLL, is ideally suited to keyless entry and similar telemetry applications that operate in the ISM/SRD bands. The small form factor, low power consumption, and wide supply voltage range make it an excellent choice for battery-powered, handheld devices and their counterparts.

To support autonomous operation and reduce system current consumption, it features an integrated polling timer with a signal-signature recognition unit and preamble pattern recognition.

Variable intelligent polling receiver (ViPER)

The PQJ7910 ViPER, based on the PQF7980. is an ISM-band receiver designed for car access and tire-pressure monitoring system (TPMS) applications. It provides a highly programmable state machine and includes a polling timer, so it can operate autonomously while waiting to receive signals from car keys or TPMS transmitters. The programmable channel filter enables optimum performance for all possible protocols and applications

RF solutions for car access

Type number	Description	Temperature range	Frequency range
PCH7900	Fractional-N based PLL synthesizer (FraNTIC)	-40 to +125 °C -40 to -85 °C	315 to 434 MHz 315 to 915 MHz
PQJ7980	Low-power, single-chip transceiver (LoPSTer)	-40 to +105 °C	315 or 434-915 MHz
PQJ7910	Variable intelligent polling receiver (ViPER)	-40 to +105 °C	315 or 434-915 MHz

Components that complete the

We support our automotive portfolio with an ever-expanding range of general application and standard ICs. The focus is on three key elements–innovation, automotive-grade quality, and secure supply.

There are literally hundreds of options to choose from, covering every aspect of design: I^2C devices, clocks, UARTs, configurable logic, RF analog, diodes, rectifiers, standard logic, low ohmic analog switches, low latency, low power voltage translators and more.

design

Small-signal transistors and diodes / rectifiers

We have a wide range of small-signal discretes optimized for use in the challenging automotive environment. The portfolio builds on our expertise in vehicle design, with advanced functionality in small footprints:

- ESD protection diodes
- Transient voltage suppressor diodes
- Shunt regulator TL431 series
- Low V_{CEsat} (BISS) transistors
- Low V_F (MEGA) Schottky rectifiers
- MEGA Schottky diode / BISS transistor modules
- Resistor-equipped transistors (RETs)
- BISS loadswitches
- MOSFET driver transistors
- Matched pair transistors

Display and timing

The number of displays in cars is increasing from model to model. NXP offers a large portfolio proven in Dashboards, climate control and car entertainment. The real time clocks are specially qualified to operate also up to 125°C as requested for some system critical blocks.

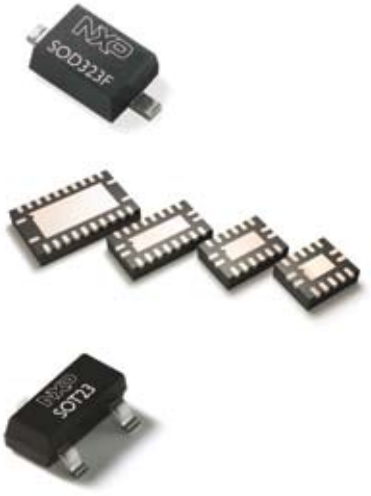
Interface products

PCF8562TT/S400/2	128-segment LCD driver
PCF8576DH/2	160-segment LCD driver
PCF8576DT/S400/2	160-segment LCD driver
PCA85133U/2DA/Q1	320-segment LCD driver
PCA8565TS/1	I^2C-bus Real time clock/ calendar
PCA21125T/Q900/1	SPI-bus Real time clock/ calendar

Logic, analog switches and voltage translators

NXP is a major supplier of standard logic devices to the majority of automotive customers. Devices in all logic families are released according to NXP QRS and AEC-Q100 standard. All NXP production facilities are ISO/TS16949 certified. In order to address different requirements of automotive sub systems, NXP offers the standard logic functions in many high and low voltage logic families. Other suitable products include analog switches and voltage translators. Standard logic functions are available in industry standard SO, SSOP and TSSOP packages and innovative smaller leadless DQFN packages. Single, dual and triple gate logic parts are also available in Picogate and leadless Micropak packages.

- Standard logic (AHC/T, VHC/T, HEF, LVC and HC/T etc, with different supply voltage range, propagation delay, switching thresholds and drive current capabilities to suit the application requirements)
- Low ohmic analog switches (NX3L series with ON-resistance lower than 0.75 Ω and the NX3V series with ON-resistance lower than 0.45 Ω)
- Voltage level translators (AVC, AUP and LVC families operate over a wide voltage range of 0.8 V – 5.5 V with a typical prop delay of 2-4n)
- PCA9701/PCA9702/PCA9703/PCA9704 (SPI General Purpose Input (GPI) interrupt with 18-V input)
- 74HC4851/74HCT4851 (analog multiplexer with injection-current effect control)



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