Security and convenience

NXP's keyless access, immobilization
and tire pressure monitoring solutions

NXP

founded by Philips

Security and convenience opportunities with NXP's RFID technologies

As electrical systems have assumed more and more important roles in the car, improvements have been realized in every area. Without a doubt some of the most important perceived benefits relate to security and convenience in and around the car. Take one look at NXP Semiconductors' automotive portfolio and you will see that we take these benefits very seriously, with products and technologies dedicated to enabling cost-efficient systems that make car travel safer and more convenient.

Two areas of major importance utilize NXP's advanced sensing and identification technology – TPMS (Tire Pressure Monitoring System) and keyless entry and immobilization.

NXP supports the use of RF technology in direct TPMS, and recent legislation confirms remote sensing as the safest solution for these applications. Through TPMS, drivers have constant and reliable tire pressure information without needing any direct physical action on their part. This helps avoid accidents and gives us all peace of mind.

Everyone appreciates the convenience of remotely activated 'central locking', but our leading range of highly integrated ICs take this several steps further with sophisticated functionality. Along with maximum security from immobilization capabilities, NXP's solutions offer you benefits such as passive keyless entry and keyless start, as well as extremely low power consumption.

Remote Keyless Entry
PCF 7946/47
PCF 7942/43/44
PCF 7x41/21
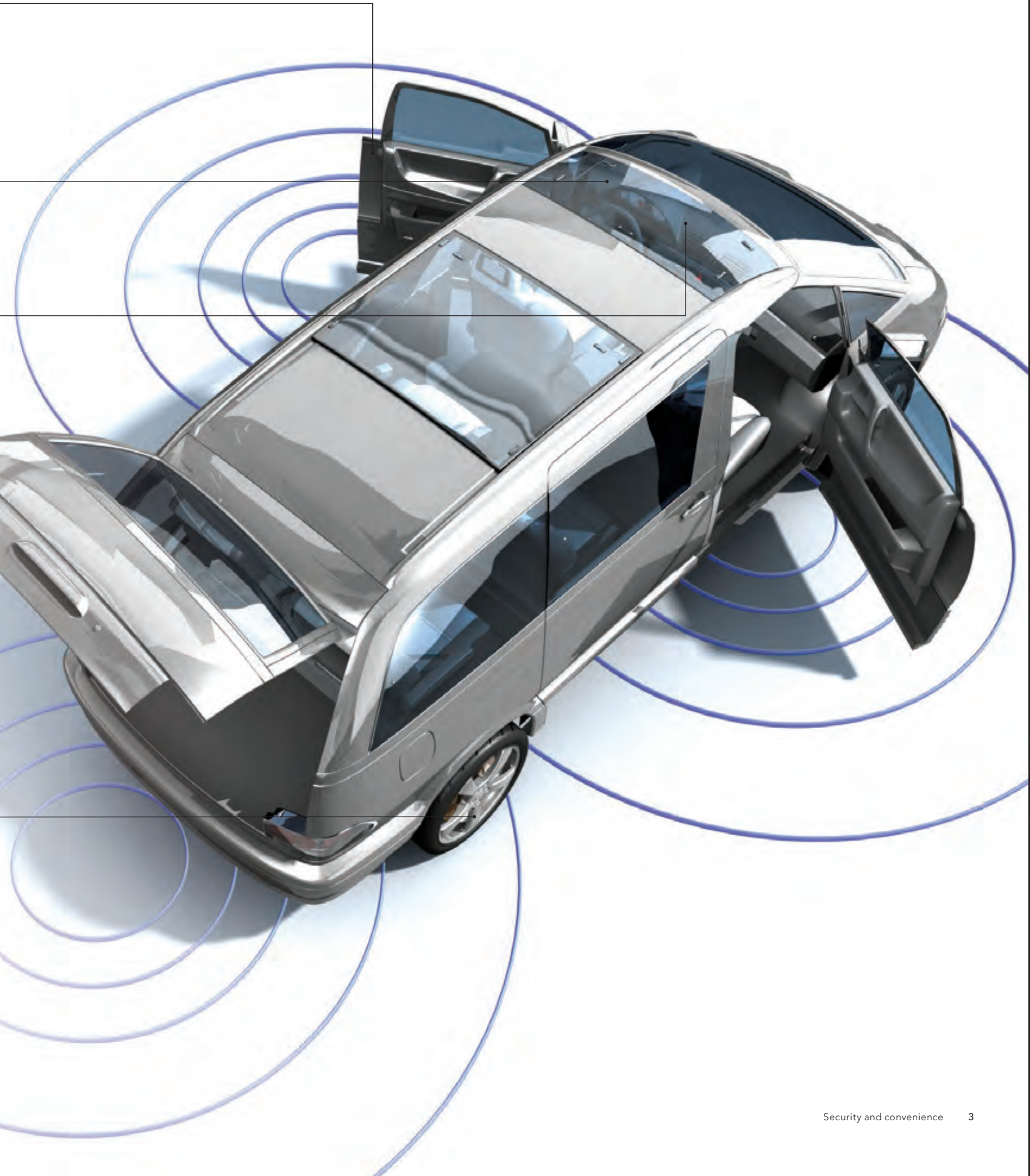PCF 7x45
PCF 7x61/22

Keyless Entry/Go
PCF 7951
PCF 7952
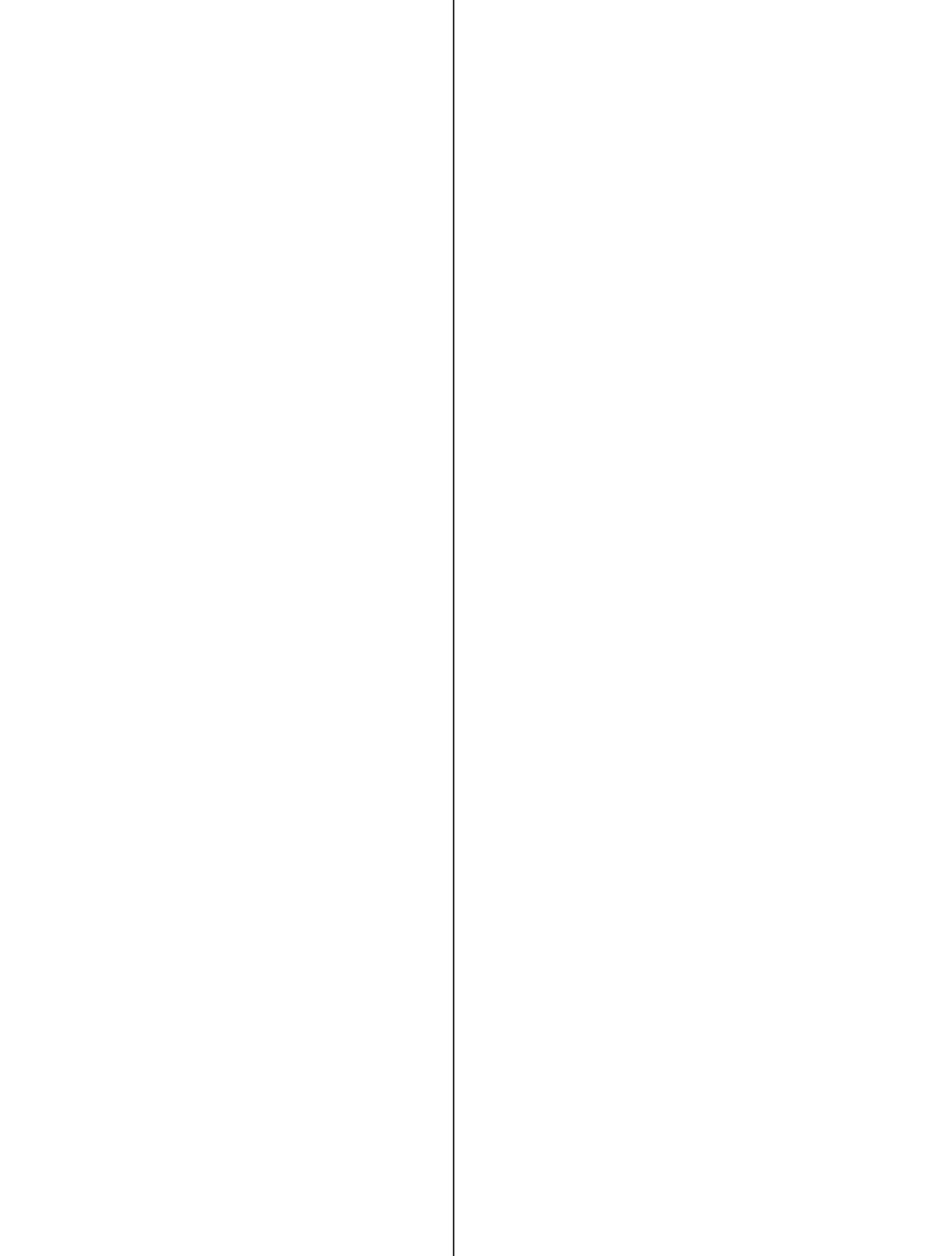PCF 7953
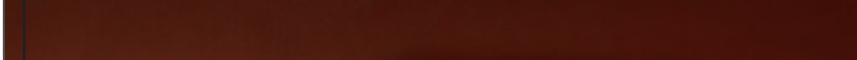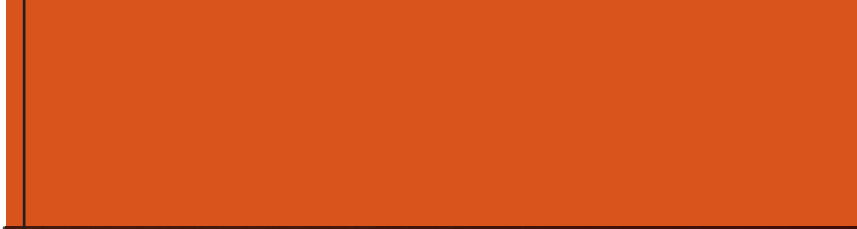
Immobilization
PCF 7936
PCF 7991
PCF 7992

Tire Pressure Monitoring
PCH 7970
PCH 737x

Keyless entry and immobilization solutions

Combining secure operation, convenience and flexibility, our range of highly integrated ICs for vehicle access and immobilization applications provides you with ideal solutions for today's compact key designs.

Passive Keyless Entry (PKE) family

NXP's dedicated PKE chipsets utilize RF identification technology to deliver the ultimate in secure and convenient access, automatically unlocking the car without any direct action by the key holder.

Our family of 3D keyless entry/start active tag ICs with embedded processor enable a range of convenience and security features, including one-touch ignition. With multi-functional operation, excellent LF sensitivity, sophisticated wake-up detection and ultra-low power consumption – drawing only 5 µA current from a single lithium cell – these highly integrated 3D LF and RISC controller ICs deliver a cost-effective solution for access applications requiring entry, start and theft prevention via immobilization.
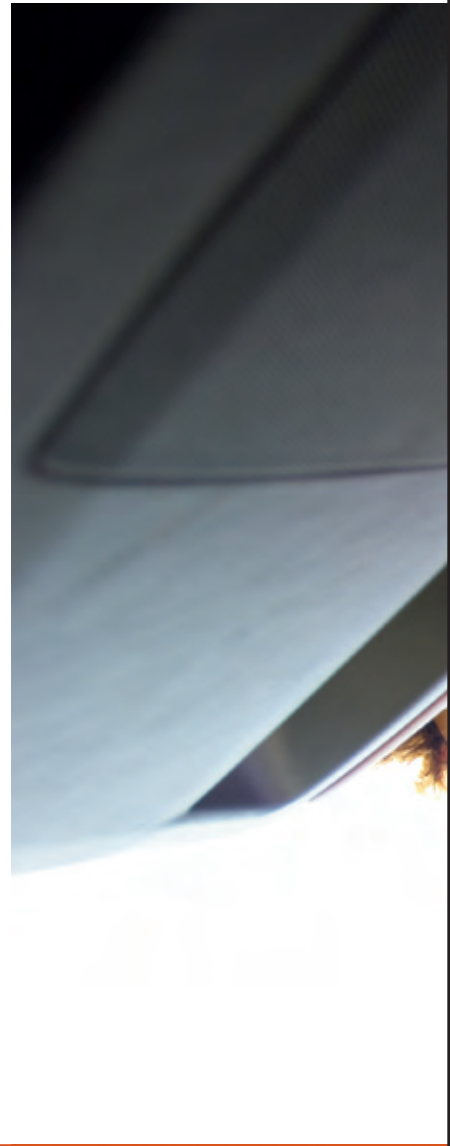
Remote keyless entry family

These highly integrated devices are true single-chip transponder and remote keyless entry ICs, and feature a built-in UHF transmitter. Powered by a single lithium cell, they offer extensive programmability, a full suite of on-chip memories and up to seven command inputs. A range of functions and models ensures you can choose exactly the performance you need for your application.

Tire Pressure Monitoring System (TPMS) solutions

P2SC signal conditioning chip family

Ideal for TPMS, our high performance P2SC remote sensing and signal conditioning ICs deliver extremely robust and accurate operation. They are also highly flexible and cost-effective solutions, incorporating many features such as low power RISC microcontroller, several general-purpose I/Os and 12-bit ADC.

Low power consumption is further reduced by inclusion of a power-down mode. And taking functionality to the next level, we are developing a cost-effective P2SC solution with on-chip UHF transmitter, offering a high degree of integration for upcoming vehicle programs.

www.nxp.com

founded by

PHILIPS

Driver Entry Area

Passenger Entry Area

Trunk Access Area

Passive Keyless Entry (PKE) solutions

Secure access that does not need the touch of a button

Passive Keyless Entry systems are the next step in automotive security and access. Offering the same high level of secure access that NXP Semiconductors' complete RF ID portfolio provides across all markets, our dedicated PKE chipset provides the security drivers demand while also enabling a range of convenience features such as one-touch ignition.

Features

▸ Single chip 3D LF and RISC controller chip
▸ NXP's product family compatible transponder operation
▸ Low power RISC programmable device operation
▸ Excellent LF sensitivity on the 3D LF channel
▸ Programmable and sophisticated LF wake-up detection
▸ LF RSSI feature for indoor/outdoor detection
▸ Proven solution with several design-ins

Benefits

▸ Low power consumption
▸ Highly integrated – minimum board space required
▸ Cost-efficient solution with low Bill of Materials
▸ Fully aligned with NXP's product family
▸ Easy application

Convenient vehicle security is often a primary consideration for both drivers and the automotive industry. RF Identification technology has been providing the security aspect with immobilization systems for some time, and now with the latest developments in Passive Keyless Entry controlled access could not be more convenient. PKE systems allow drivers to enter their vehicles without any explicit action to unlock them, as authorization is granted simply by carrying the appropriate ID device, or tag.

Passive Keyless Entry in action

As the driver enters the operating area of the PKE system and places their hand on the door handle, the ID device receives a low-frequency signal from the vehicle and if this signal matches the data stored the ID device is 'woken up'. This procedure ensures random noise or another signal cannot wake the device while also extending battery lifetime, and a 3 dimensional antenna input circuit guarantees the device can detect the wake-up signal no matter what its orientation.

founded by Philips

Once woken, the ID device analyzes the 'challenge' signal from the vehicle and sends back a 'response' signal, encrypted to increase security. The vehicle then compares the response with internally stored information and, if authentication is successful, unlocks the door. As the entire process, from wake up to unlocking the door takes only a few milliseconds, drivers do not notice any delay between touching the handle and opening the door.

Once inside the car, the engine can be started by simply pressing the start button. The system first checks that the ID device is inside the car and not on the roof for example, then the same authentication procedure takes place and the engine is started. After leaving the vehicle, it can be locked by simply pressing the door handle – an inside/outside check is performed followed by authentication, before the vehicle is locked.

A lithium cell within the ID device provides power for wake up and the UHF response signal. The combination of LF challenge and UHF response gives a low power consumption and long battery life. A back-up mode enables the use of the PKE system even when the battery is low, with power being supplied to the ID device via the LF signal; the device's response is then transmitted by modulation of the vehicles own LF signal. When being used in this back-up mode, the ID device must be placed close to the door antenna for entry and exit, or in a special area on the dashboard to start the vehicle.

Dedicated chipset for the securest solution

Drawing upon our world-class contactless ID transponder knowledge, NXP has developed a low power, highly integrated PKE solution with a well-defined operating range and minimal interference on other systems. This dedicated PKE chip incorporates a highly sensitive 3D LF front-end, sophisticated wake-up processor, immobilizer and Keyless Entry microcontroller. Based on our field proven 8-bit MICRO RISC KERNAL (MRK II) architecture, the PCF7952 features a hardware immobilizer security algorithm and supports the use of Receive Signal Strength Indication (RSSI) to determine the position of the ID device. Due to its high level of integration it reduces costs and making PKE systems an option for all model ranges.

MSE084
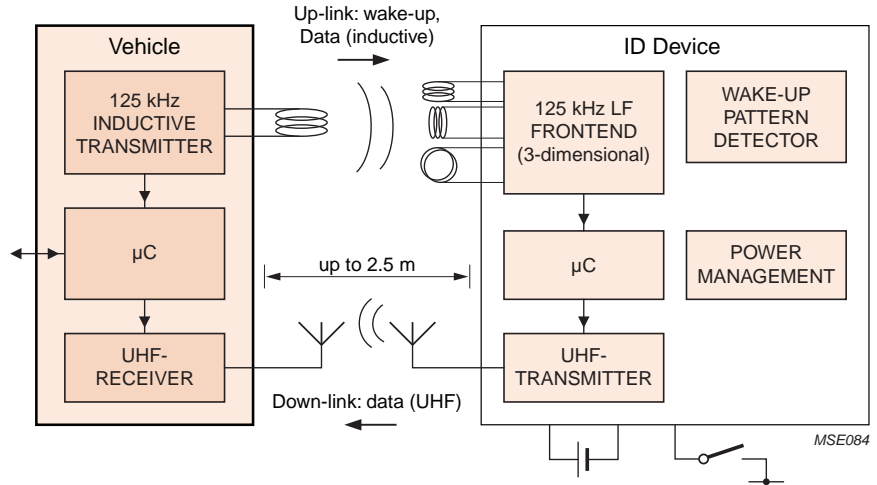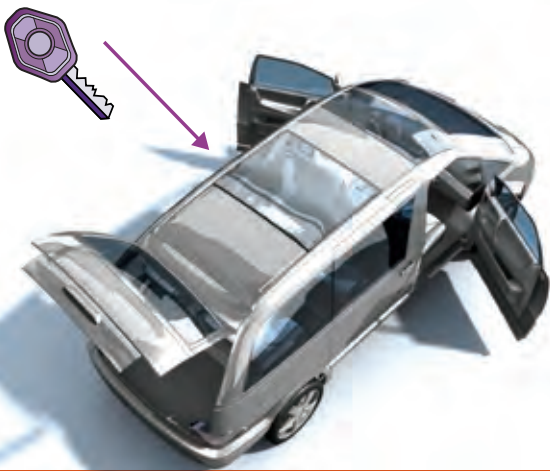
Remote keyless entry
transponder family PCF7x61

The height of convenience
for vehicle access

NXP Semiconductors' leading portfolio of vehicle security solutions now includes a true 'single-chip' remote keyless entry family. Ideal for today's advanced vehicle access applications, the PCF7x61 security transponder, microcontroller and radio transmitter ICs fit compact key designs and offer cost-effective answers to all your remote access and immobilization needs.

Features
▸ Single-chip security transponder and keyless entry solution with on-chip UHF transmitter
▸ PCF7936 family compatible transponder operation
▸ Low power RISC programmable device operation
▸ On-chip PLL based UHF transmitter (315/434 MHz)
▸ Programmable ASK/FSK modulation characteristics
▸ Up to seven command button inputs
▸ Programmable 'battery low' detection
▸ Full suite of on-chip memory
  - 4/8 Kbytes E-ROM, 4 Kbytes ROM, 512 bytes EEPROM, 192 bytes RAM
▸ Factory programmed serial number (32-bit)

▸ Single lithium cell operation (2.1 to 3.6 V)
▸ 20-pin TSSOP package (SOT360-1)

Benefits
▸ Low power consumption
▸ Highly integrated – minimum board space required
▸ Cost-efficient solution with low Bill of Materials
▸ Fully aligned with NXP's product family
▸ Easy application

The development of remote keyless entry systems significantly improved passenger and driver convenience in today's cars. NXP continues to drive forward the introduction of keyless entry and immobilization systems with the highly integrated PCF7x61 family.

Combining security transponder, RISC controller and UHF transmitter, this family delivers a true single-chip solution for a range of functions and models.

Based on NXP's low power 8-bit MICRO RISC KERNAL (MRK II), the family performs command button scanning and data framing according to application requirements. RISC timing is derived from an on-chip low tolerance RC oscillator with a programmable system clock as fast as 2 MHz. 'Keyless Entry Code hopping' generation can employ the hard-wired transponder Calculation Unit or any software based algorithm, while synchronization can be achieved via the contactless transponder interface.

founded by Philips

Except for reference crystal and loop antenna matching circuitry, the on-chip UHF transmitter requires no other external components. The RISC controller directly controls the UHF transmitter and supports ASK and FSK modulation with data rates up to 20 kbit/s (Manchester).

Powered by an external single-cell lithium battery, the device features a power down mode, minimizing quiescent current.

The programmable power amplifier stabilizes the output power to minimize carrier, over temperature and battery voltage variations. Security transponder operation is compatible with the PCF7936 family simplifying system upgrade, and does not require any battery supply so full transponder operation is guaranteed in the event of a 'battery low' condition.
A complete suite of on-chip memory is available providing sufficient storage for all application software

and firmware. Extended data storage is provided by 512 bytes of on-chip EEPROM, with access control defined by the application. The 4 Kbytes of ROM is intended for device firmware and library, while the 4 or 8 Kbytes of E-ROM (or ROM) supports user application code. The PCF7961 features FLASH-like programming of the application code for easy system upgrade and a dedicated ROM code version, PCF7361, for high volume purposes is also available.

Note
1. Button inputs or generic I/O, however external p'up resp. p'down required
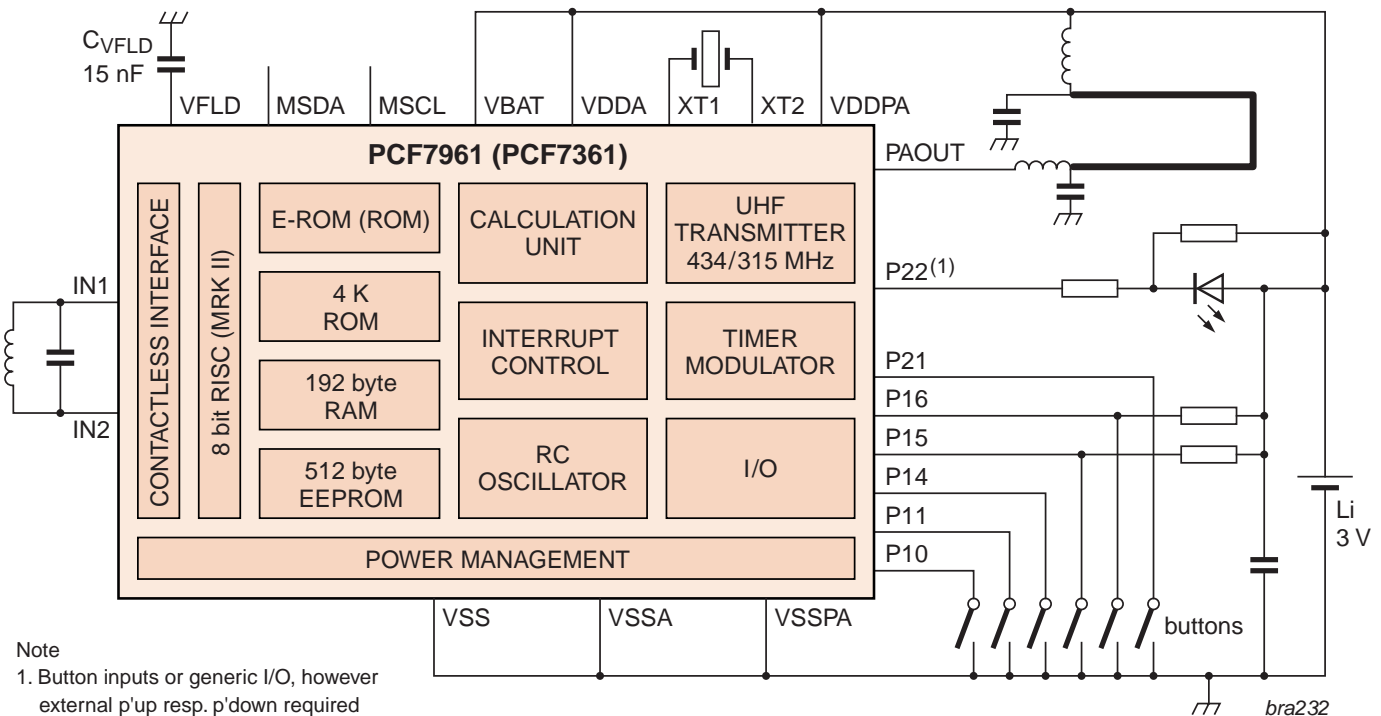
3D keyless entry/start
PCF7952

The compact solution for keyless entry/start and vehicle security

NXP's leading car security portfolio includes the new, highly integrated 3D keyless entry/start active tag IC with processor solutions. Ideal for today's compact key designs, the PCF7952 is the second device in this multi-functional IC family and provides a cost-effective answer for vehicle access applications requiring entry, start and theft prevention via immobilization.

Features

▸ Single chip 3D LF and RISC controller chip
▸ PCF7936 family compatible transponder operation
▸ Low power RISC programmable device operation
▸ Excellent LF sensitivity (< 2.5 mVPP)
▸ Ultra low power consumption (5 μA)
▸ Fast RSSI with 12-bit resolution per LF input
▸ Up to seven command button inputs
▸ Programmable battery low detection
▸ Full suite of on-chip memory
  - 4 Kbytes E-ROM, 8 Kbytes ROM, 512 bytes EEPROM, 196 bytes RAM

▸ Factory programmed serial number (32-bit)
▸ Single lithium cell operation (2.1 to 3.6 V)
▸ 24-pin TSSOP package (SOT355-1)

Benefits

▸ Cost-efficient solution with low Bill of Materials
▸ Ultra low power consumption for long battery lifetime
▸ Easy system upgrade via software
▸ Fully aligned with NXP's product family

In the drive to provide greater driver and passenger convenience and vehicle security, NXP has developed the highly integrated PCF7952.

Combining multiple functions on a single chip, it offers a cost effective solution to car manufacturers for all compact vehicle key designs used in vehicle access applications featuring keyless entry, keyless start and vehicle immobilization.

Incorporating security transponder, very highly sensitive 3D LF interface and RISC controller in a compact 24-pin package, it requires a minimum of external components to deliver a complete solution. Powered by an external single-cell lithium battery, the device features programmable 'battery low' detection, as well as a power down mode to minimize quiescent current.

founded by Philips

Keyless Entry authentication can employ the hard-wired transponder Calculation Unit or any software based algorithm, while synchronization can be achieved via the contactless transponder interface.

Security transponder operation is compatible with the PCF7936 family and does not require any battery supply: Full transponder operation is effected in the event of a 'battery low' condition. The PCF7952 incorporates NXP's low power 8-bit MICRO RISC KERNAL (MRK II), which performs command button scanning and data framing according to application requirements.

RISC timing is derived from an on-chip low tolerance RC oscillator with a programmable system clock as fast as 2 MHz.

Device wake-up is achieved by the ultra low power 3D LF interface circuitry. A unique pre-processor circuit autonomously monitors for wake-up identifiers, and when one is received it powers up the RISC controller for further data processing. The wake-up identifier pattern and length is fully programmable, while the signal field strength at the individual LF inputs may be measured with 12-bit resolution for key localization reasons.

A complete suite of on-chip memory is available providing sufficient storage for all application software and firmware. Extended data storage is provided by 512 bytes of on-chip EEPROM, with access control defined by the application. The 8 Kbytes of ROM is intended for device firmware and library, while the 4 Kbytes of E-ROM supports user application code. The PCF7952 also features FLASH-like programming of the application code for easy system upgrade.

bra231
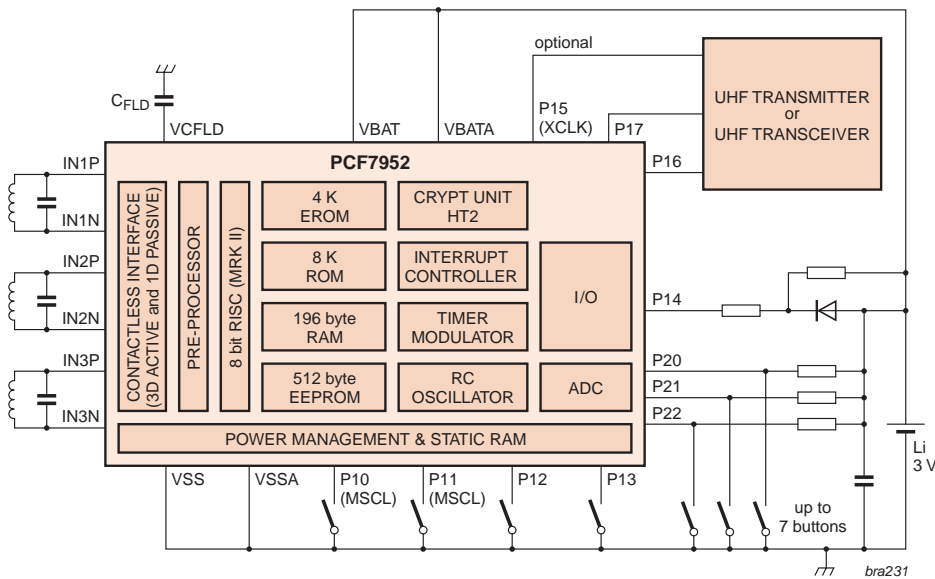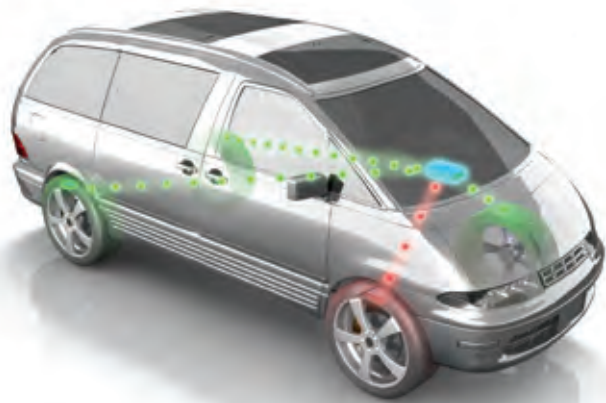
P2SC Signal Conditioning Chip family

Designed for tire pressure monitoring

A true world leader in RF identification technologies, NXP is spearheading the innovative use of this technology in Tire Pressure Monitoring Systems (TPMS). Designed for all remote sensing and signal conditioning applications, the P2SC family provides an extremely robust and accurate solution, which is also highly convenient, flexible and cost-effective.

Features
- Highly integrated single-chip solution
- Fully programmable, low-power RISC signal conditioning IC
- Two multiplexed, high-precision sensor inputs with programmable gain
- Smart power management with wake-up on demand from power down by port or 3D-LF interface
- 32-bit unique ID
- Digital Sensor Signal Processing
- 12-bit ADC
- On-chip temperature sensor and shutdown
- Wide operating temperature range -40 to +125 °C

Benefits
- Greater flexibility in system development
- Reduced time-to-market, bill of materials and development costs
- Easy, software upgrade of system
- One receiver for Remote Keyless Entry and Tire Pressure Monitoring
- Auto-localization of wheels after car maintenance
- Long product / battery life (10 years or more)
- Sensor module identification

The first member of the P2SC family is the PCH7970, a high performance device for signal conditioning and data framing in applications such as TPMS. This provides increased passenger and driver safety by constantly monitoring individual tire pressures directly, in line with recent legislation.

Based on a low power, 8-bit micro RISC kernel (MRKII), the PCH7970 features a number of general purpose I/Os to control external circuitry and a high precision 12-bit (11-bit and sign) ADC to read the output voltage of a piezo-resistive bridge sensor. Two multiplexed sensors may be connected to the device with both the sensor and ADC operating ratiometrically.

128 bytes of on-chip EEPROM stores

founded by Philips

the calibration data for the Digital Sensor Signal Processing (DSSP) and correction characteristics are determined by the RISC controller and user's program. The device also incorporates 128 bytes RAM and 4 Kbyte E-ROM, enabling Flash-like programming of application code for development and low volume applications. Furthermore the device features 4 kbyte ROM for device firmware and DSSP algorithm. A dedicated ROM version for high volume applications is available.

The device is powered by an external, single-cell battery and offers programmable low battery detection. The lifetime of the battery can be extended by use of the power down mode, which minimizes the quiescent current, and a 3D-LF interface, which enables on demand wake-up. An independent interval timer provides a programmable, periodic wake-up from power down mode.

P2SC: PCH7970 (737x, ROM)

* : subject to future integration

MSE083
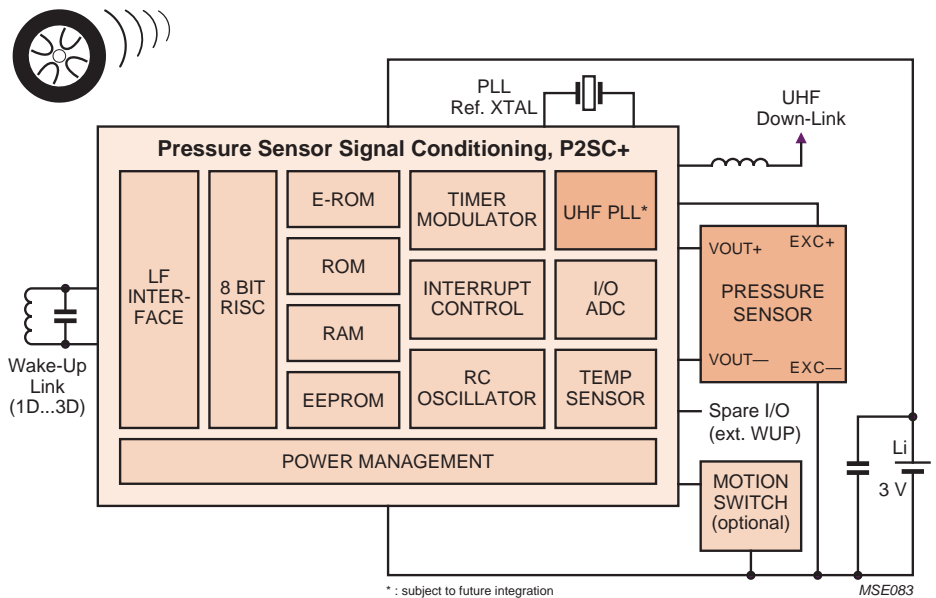
RISC controller

The 8-bit RISC (MRKII) controller at the heart of the PCH7970 features a single level interrupt architecture and low power consumption, operating at 400 µA and drawing currents of 30 µA and 200 nA in idle and power down modes. The controller is optimized for serial data processing, with instruction execution times as fast as 0.5 µs. Timing is governed by an on-chip, low tolerance RC oscillator with a programmable system clock capable of speeds up to 2 MHz.