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# Nanjing CSM-IC Microelectronics Co., Ltd.

Innovator of Ultra-low Power IoT Chip

www.csm-ic.com

Innovator of Ultra-low Power IoT Chip

# Contents

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# About Us

- Company Introduction
- Development
- Honor

# Company Introduction

**Nanjing CSM-IC Microelectronics Co., Ltd.** is an fabless integrated circuit design company. It was founded by the Institute of Microelectronics of the Chinese Academy of Sciences, Nanjing Internet of Things Center and the returnees who studied in the United States at the end of 2012. At the end of 2015, it absorbed and merged Wuxi Zhongke Microelectronics Industrial Technology Research Institute Co., Ltd. In 2020, it became a subsidiary of EPOCH Technology, IMECAS, Co., LTD. The company and its wholly-owned subsidiaries have been recognized as national high-tech enterprises, and it is Nanjing Engineering Technology Research Center.

The company is located in Nanjing Internet of Things Center, Xuzhuang Software Park, Xuanwu District, Nanjing, focusing on the development and production of high integration, low power consumption, excellent performance, cost-effective wireless communication and Internet of Things core chips. The company's R&D team has strong technical strength. The R&D team has more than 50 people, and more than 70% of the staffs have a graduate degree or above.

**The main products** of the company include Ultra-low power 2.4GHz data communication chips, 2.4GHz active RFID chips, 13.56MHz contactless card reader chips and 125KHz low-frequency trigger chips, which have been recognized by many well-known customers in various fields, and the accumulative sales volume of the products has reached hundreds of millions. Among them, 2.4GHz data communication chips occupy a leading position in the domestic active RFID industry, and have been successfully applied to Smart campus, Smart street lamp, Anti-theft system of electric two-wheeler, Smart cold chain transportation management, Fixed asset management, etc., playing an important role in the realization of China's smart city construction process. With the goal of "Leading IC Enterprise in the Internet of Things Communication Industry", Nanjing CSM-IC Microelectronics is determined to become the world's top IC design company.

**14 years**
Industrialized Experience

**↓40%**
It saves more than 40% of the cost compared with the foreign products.

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NANJINGZHONGKEWEI

**50+**
Technical R&D

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# Company Philosophy

CSM-IC 奇迹硅功微，满意来源芯

**C**reativity
Innovative product design

**S**atisfaction
Meet the needs of the market

**M**iracle
Create a win-win miracle

## Company Vision

With the goal of "Leading IC Enterprise in the Internet of Things Communication Industry", Nanjing CSM-IC Microelectronics is determined to become the world's top IC design company.

# Development

**2012**

The company was established and launched the 2.4G transceiver - Si24R1

**2015**

Acquiring Wuxi Institute of Microelectronics Industry Technology Co., Ltd.

**2019**

13.56M card reader chip - Si522 is available in large quantities

**2020**

Becoming a subsidiary of EPOCH Technology, IMECAS, Co., LTD.

125K Low-Power Programmable ASK Receiver: Si3933

13.56M Ultra-low Power chip: Si522A

13.56M Small-size, Low-cost chip: Ci522, Ci523

**2021**

RISC-V MCU: CSM32RV20

Touch Chip: Si12T, Si14T

13.56M Ultra-low Power chip: Si523, Si512

**2023**

RISC-V Low-cost MCU: CSM32RV003

2.4G Wireless SoC: Si24R03

13.56M Wireless SoC: Si3262, CSM326

**2024/25**

125K&2.4G Transceiver SoC: Si24R05

13.56M Small-size, Ultra-low Power chip: Si502B

2.4G Wireless SoC: Ci24R02

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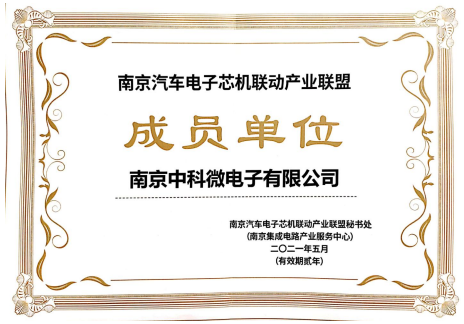
# Honor and Qualification (part)

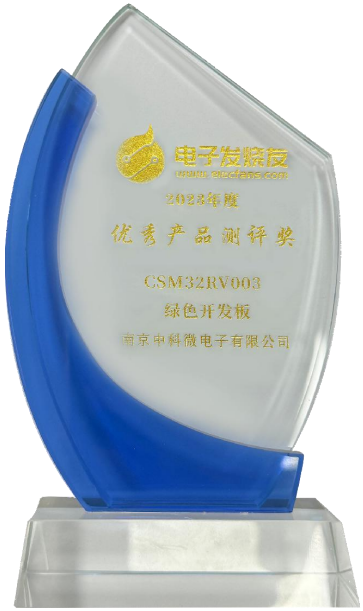










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02

# Main Products

- 2.4GHz Wireless RF Chip
- Wireless SoC
- MCU
- 13.56MHz Contactless Card Reader Chip
- Touch Chip
- 125KHz Low-Power Programmable ASK Receiver
- Car K-line Transceiver

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# Main Products


## 2.4GHz Wireless RF Chip

2.4GHz Data Transmitting Chip: Si24R1, Ci24R1, Si24R2

2.4GHz RFID Chip (Active Tag): Si24R2E, Si24R2F, Si24R2F+, Si24R2H

## 13.56MHz Contactless Reader Chip

**Ultra-low Power**：Si522A, Si523, Si512

**Ultra-low Cost**：

Small-size: Ci522, Ci523, Si502B

Universal-size: Ci520, Ci521

**Universal**：Si522

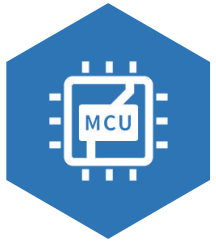
## Touch Chip

Si12T, Si14TP


## Wireless SoC

2.4G Wireless SoC: Si24R03, Si24R05, Ci2451, Ci2454, Ci24R02

13.56M Wireless SoC: Si3262




## MCU

CSM32RV20 、CSM32RV003

## 125KHz Low-Power Programmable ASK Receiver

Si3933

## Car K-line Transceiver

CSM9241

# 2.4GHz Wireless RF Chip

## 2.4GHz Wireless RF Chip

| 2.4GHz Data Transmitting Chip | | | | | | | Items | 2.4GHz RFID Chip (Active Tag) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Si24R1 | Si24R03 (Si24R1+CSM32RV003) | Ci24R1 | Ci24R02 (Ci24R1+CSM32RV003) | Ci2451 (Ci24R1+NY8A051F) | Si24R05(B) (Ci24R1+Si3933+CSM32RV003) | Si24R2 | | Si24R2E | Si24R2F | Si24R2F+ | Si24R2H | CSM2433 (Si24R2H+NY8A054E) |
|  |  |  |  |  |  |  | Package |  |  |  |  |  |
| QFN20 | QFN32 | SOP8/DFN8 | QFN16/QFN20 | ESOP8 | SOP16 TSSOP24 | QFN20 | | QFN20 | QFN20 | QFN20 | QFN32 | QFN32 |
| 2.4GHz | 2.4G,Touch +MCU | 2.4GHz,BLE | 2.4GHz,BLE | 2.4G +MCU | 2.4G,125K,Touch +MCU | 2.4GHz | Frequency | 2.4GHz | 2.4GHz | 2.4GHz | 2.4GHz,125KHz,BLE | 2.4GHz,125KHz,BLE +MCU |
| Transceiver | Transceiver | Transceiver | Transceiver | Transceiver | 2.4GHz Transceiver& 125KHz Receiver | Transmitter | Transmitter/ Transceiver | Transmitter | Transmitter | Transmitter | 2.4GHz Transmitter& 125KHz Receiver | 2.4GHz Transmitter& 125KHz Receiver |
| +7dBm | +7dBm | +9dBm | +9dBm | +9dBm | +7dBm | +7dBm | Maximum Transmis-sion Power | +7dBm | +12dBm | +7dBm | +14dBm | +14dBm |
| 1uA | 1.6uA | 2uA | 2uA | 2uA | 1.6uA | 300nA | Sleeping Current | 700nA | 500nA | 1uA | 1uA | 1uA |
| | | | 250K,1M,2M | | | | Air Data Rate | 250K,1M,2M | | | | |
| -83dBm@2Mbps | -83dBm@2Mbps | -80dBm@2Mbps | -80dBm@2Mbps | -80dBm@2Mbps | 2.4G:-80dBm@2Mbps 125K:80uVRMS | / | Receiver Sensitivity | / | / | / | 125KHz Receiver Sen: 60uVRMS | 125KHz Receiver Sen: 60uVRMS |
| Intelligent Student ID Card | Wireless Data Measurement and Control | Smart home,Toy | Intelligent-application | BLE PKE Key | Passive Keyless Enter | Intelligent Student ID Card | Application | Smart campus,Anti-theft system of electric two-wheeler | Fixed Asset Management | Intelligent Animal Husbandry Solutions | Cold-chain Logistics | BLE PKE Key |
| MCU Features | RISC-V RV32IMAC Core (2.6 CoreMark/MHz) Up to 32MHz | | RISC-V RV32IMAC Core (2.6 CoreMark/MHz) Up to 32MHz | 8bit RISC Up to 20MHz | RISC-V RV32IMAC Core (2.6 CoreMark/MHz) Up to 32MHz | | NVM Few-Time Programmable | 128 | 64 | 64 | 32 | 8bit RISC Up to 20MHz |
| | | | | | | | Multi-channel transmission | 1 or 3 channel(s) transmitting the same data | 1-4 channel(s),transmitting the same/different data | | | |
| | 4KB SRAM 32KB Flash 4.5KB NVM | | 4KB SRAM 32KB Flash 4.5KB NVM | 48 bytes SRAM 1K×14 bits EPROM | 4KB SRAM 32KB Flash 4.5KB NVM | | Low Voltage Alarm | √ | √ | √ | √ | 128 bytes SRAM 2K×14 bits EPROM |
| | | | | | | | Tamper Alarm | √ | √ | √ | √ | |
| | 2×TIMER 13×GPIO 2×UART 1×SPI 1×I2C | | 2×TIMER QFN16 10×GPIO QFN20 13×GPIO 2×UART 1×SPI 1×I2C | 2×TIMER 11阶LVD 4×GPIO | 2×TIMER R05 4×GPIO \| R05B 10×GPIO 2×UART 1×SPI 1×I2C | | Temperature Alarm | × | Integrated Temperature Sensor | NTC Thermistor for Temperature Measurement | Integrated Temperature Sensor, External NTC Thermistor/MLX90615/SHT21 | 3×TIMER 1×LVD 8×GPIO |
| | 1×13/14/15/16bit ADC, Up to 9×Channel 4×LPMODE,LP(min)< 0.6uA(WDT Run) | | 1×13/14/15/16bit ADC, Up to 10×Channel 4×LPMODE,LP(min)< 0.6uA(WDT Run) | 4×LPMODE, Halt Power 4uA (WDT Run) | 1×13/14/15/16bit ADC, 4×LPMODE,LP(min)< 0.6uA(WDT Run) | | Button Trigger | × | Several kinds of Trigger | | | Halt Power 4uA (WDT Run) |
| | | | | | | | Encryption | Forbidden for Data Reading | Encryption Algorithm | Encryption Algorithm | Encryption Algorithm and DES | |

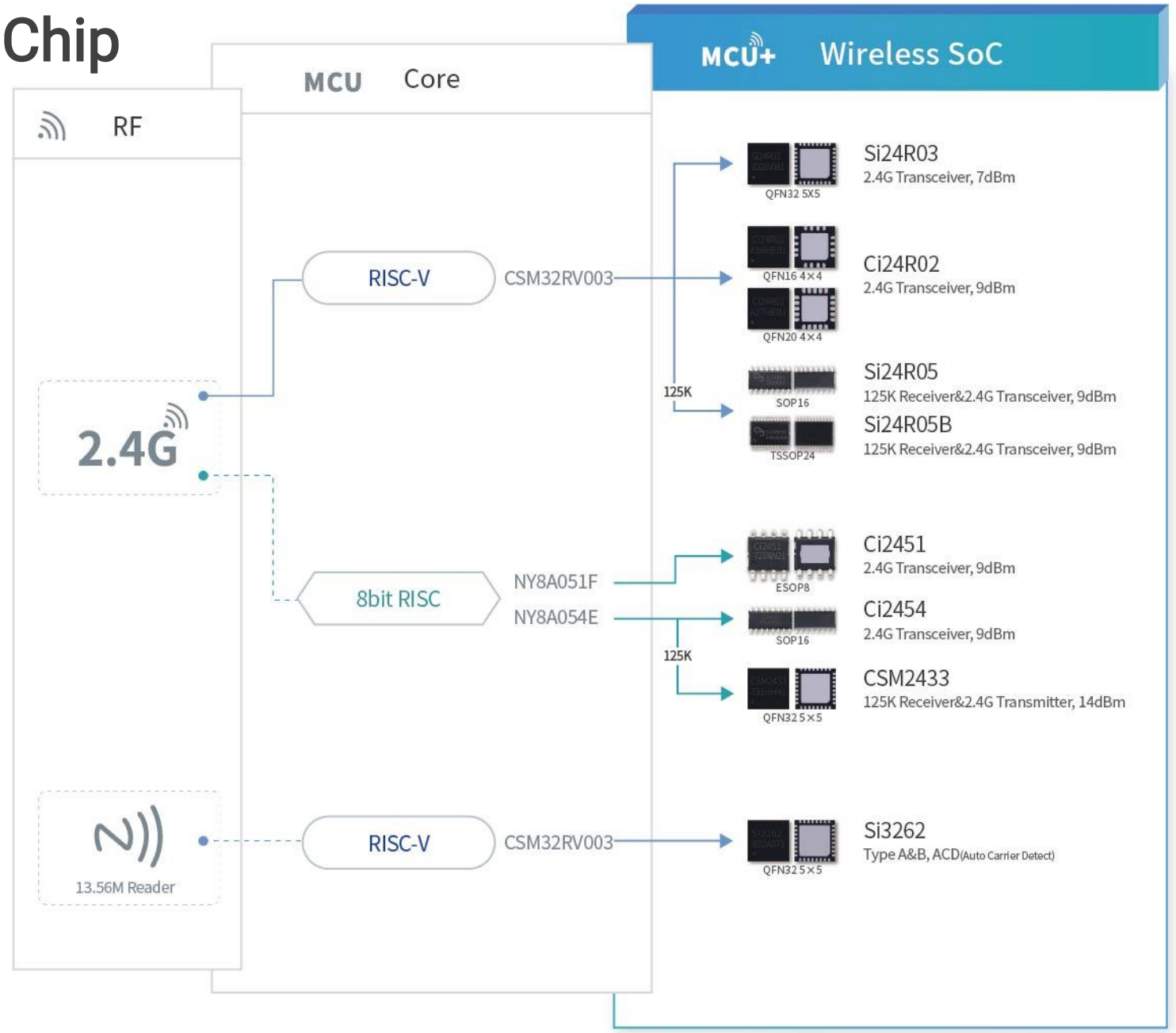
# Wireless SoC Chip

## Wireless SoC Chip

The "RF +MCU" - wireless SoC chip (MCU+) simplifies system design.

With only a few peripheral components, users can achieve product development, effectively reducing the occupied area of PCB boards and the overall product size, lowering BOM costs, and facilitating industrial iteration and upgrading for cost-sensitive applications.

RF users can put products into the market faster, shorten the development cycle, improve the overall competitiveness in the field of the vertical segmentation.



# RISC-V MCU/SOC

RISC-V is an open-source instruction set architecture (ISA) based on the principle of Reduced Instruction Set Computing (RISC). V is expressed as the fifth generation of RISC.

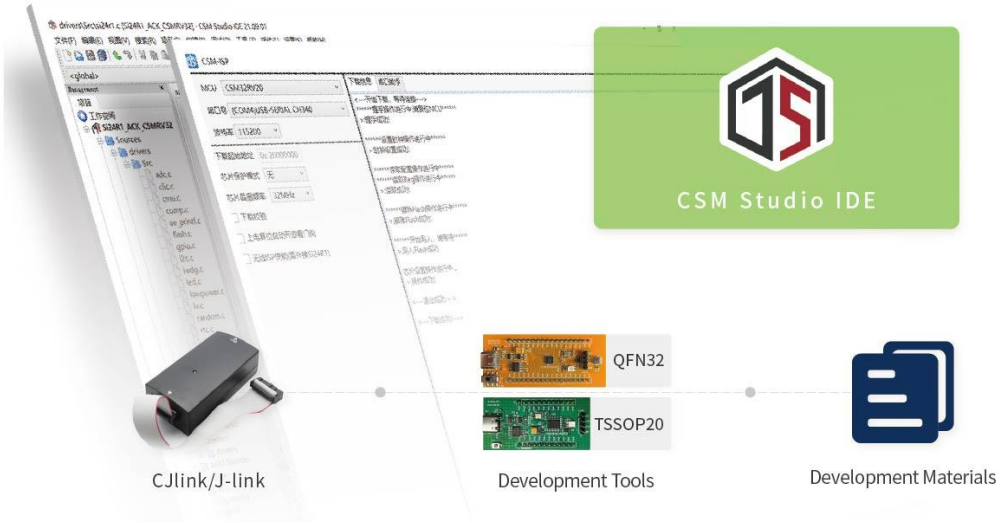

| | Frequency | Memory | | | Interface | | | | | | Power & Safe | | Timer | 8B_DATA ALWAYS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SRAM | Flash | NVM | UART | SPI | I2C | GPIO | ADC | COMP | LP MODE | IWDG | | |
| CSM32RV20 QFN32 | 32MHz | 4KB | 40KB | 512B | 4 | 2 | 1 | 30 | 1 | 3 | 4 | ✓ | 2 | ✓ |
| CSM32RV20 TSSOP20 | | | | | 4 | 1 | 1 | 18 | 1 | - | 4 | ✓ | 2 | ✓ |
| CSM32RV20 QFN20 | | | | | 4 | 1 | 1 | 19 | 1 | 1 | 4 | ✓ | 2 | ✓ |
| CSM32RV003 TSSOP20 | 32MHz | 4KB | 32KB | 4.5KB | 2 | 1 | 1 | 18 | 1 | - | 4 | ✓ | 2 | - |

*具体参数可参看单个芯片介绍页或数据手册

Development Environment

## IDE: CSM Studio

Nanjing CSM-IC has developed a cross-platform supported C/C++ integrated development environment for RISC-V series SOC/MCU embedded projects, providing a complete set of development resources including an editor, C compiler, macro assembler, linker, library manager, simulation debugger and downloader.



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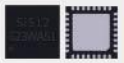
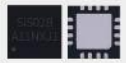
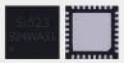
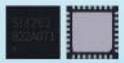
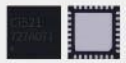
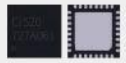
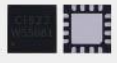
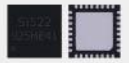
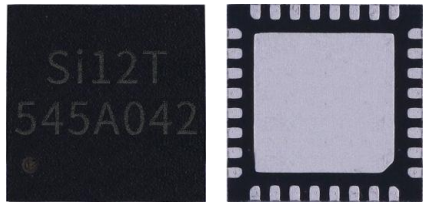
# 13.56MHz Contactless Reader Chip

## 13.56MHz Contactless Reader Chip

| Protocol | Ultra-low Power | | | Ultra-low Cost | | | Universal |
|---|---|---|---|---|---|---|---|
| | QFN32/5*5mm | 13.56M+MCU | Small-volume QFN16/3*3mm | QFN32/5*5mm | Small-volume QFN16/3*3mm | ESOP16/9.9*6mm | |
| ISO14443A & B & NFCIP-1 (Type A & Type B & Felica) |  *Si512 | |  *Si502B | | | | |
| ISO14443A & B (Type A & Type B) |  *Si523 |  *Si3262 | |  Ci521 |   Ci523 | | |
| ISO14443A (Type A) |  *Si522A | | |  Ci520 |   Ci522 | |  Si522 |
| Host Interface | SPI/UART/I2C | | | SPI | | | SPI/UART/I2C |
| Touch Channel | – | I2C | | – | – | – | – |
| Memory | – | 4KB SRAM<br>32KB Flash<br>4.5KB NVM | | – | – | – | – |
| | *ACD (Auto Carrier Detect)<br>-Detect external RF fields and RF cards automatically<br>-No need for MCU intervention<br>-Crystal oscillator failure Detection | | | | | | |
| Touch Chip | Si12T, Si14TP | | | | | | |

# Touch Chip

## Si12T




QFN32/ 5*5*0.8mm

### Low Power 12-channels Capacitive Touch Sensor

·Power-on reset

·12-channel capacitive sensor with automatic calibration sensitivity function

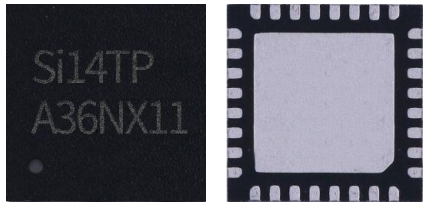
·Optional output mode

·Pin SCT: external touch enable

·8 kinds of sensitivity are independently adjustable

·Support I2C serial interface

## Si14TP




QFN32/ 5*5*0.8mm

### Low Power 14-channels Capacitive Touch Sensor

·Power-on reset

·14-channel capacitive sensor with automatic calibration sensitivity function

·Optional output mode

·Pin SCT: external touch enable

·8 kinds of sensitivity are independently adjustable

·Support I2C serial interface

## Application

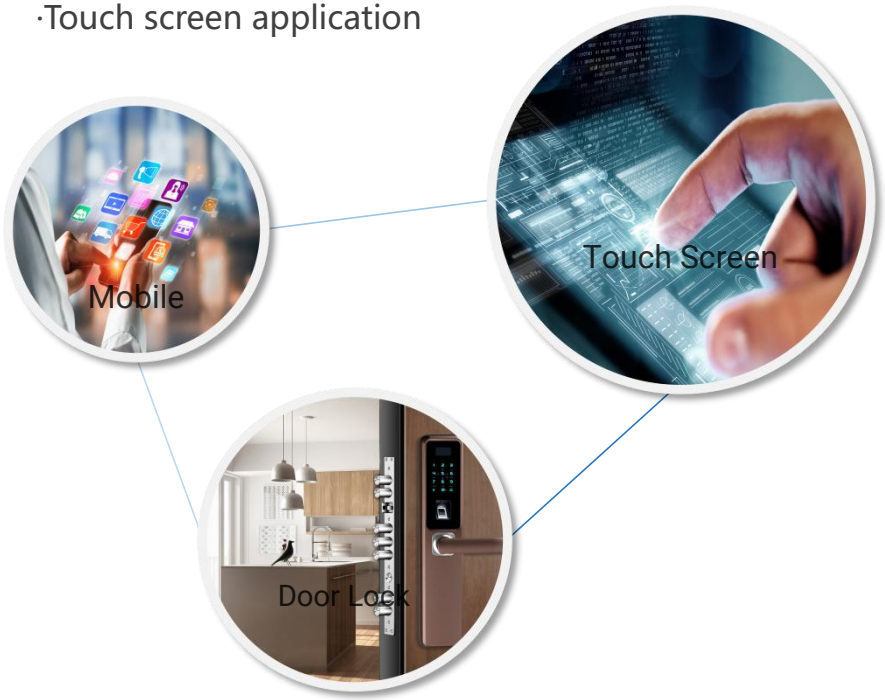
·Mobile applications (mobile phone/PDA/PMP, etc)

·Door lock application

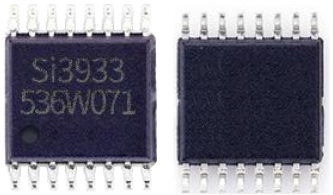
·Membrane switch

·Control panel, keyboard

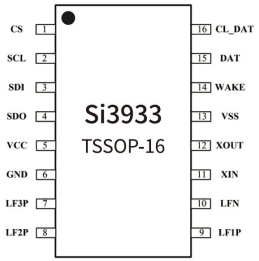
·Touch screen application

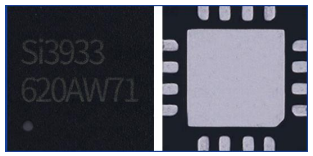


# 南京中科微 125KHz Low-Power Programmable ASK Receiver-Si3933 Car K-line Transceiver-CSM9241

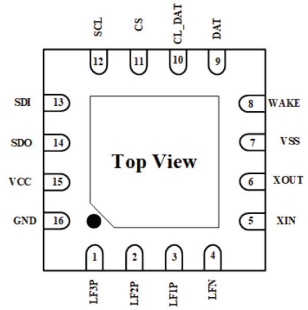



TSSOP16/ 5*6.4*1.2mm



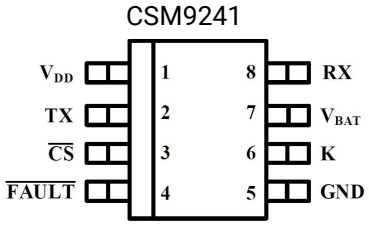




QFN16/ 4*4*0.8mm





SOP8 / 5*6*1.8mm




## PKE (Passive Keyless Entry)

**Si3933** is a 3-channel low power ASK receiver that is able to generate a wake-up upon detection of a data signal which uses a LF carrier frequency between 15-150 kHz. The integrated correlator can be used for detection of a programmable 16-bit or 32-bit Manchester wake-up pattern.

## Automobile Electronic Diagnostic Instrument

**CSM9241** is a monolithic bus transceiver designed to provide bidirectional serial communication in automotive diagnostic systems. CSM9241 can be either in transmit or receive mode and it contains over temperature, and short circuit detection circuits.

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03

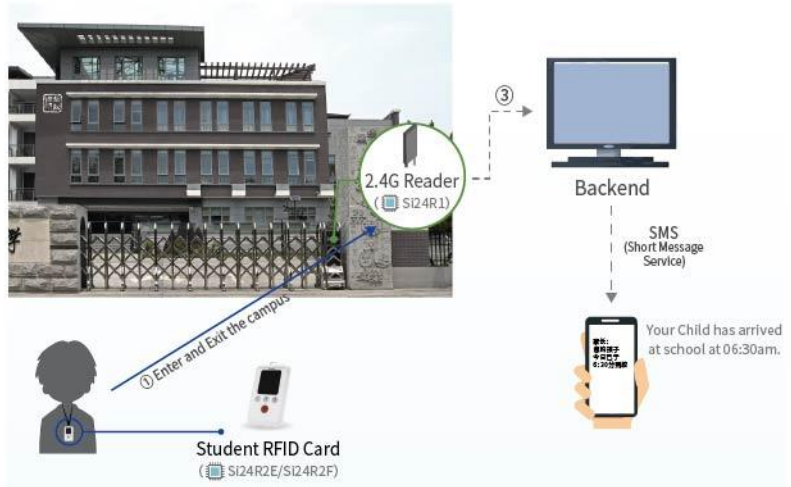
# Applications

# Applications

## Ultra-low Power Application Scenarios


Fixed asset management

Automotive Electronics



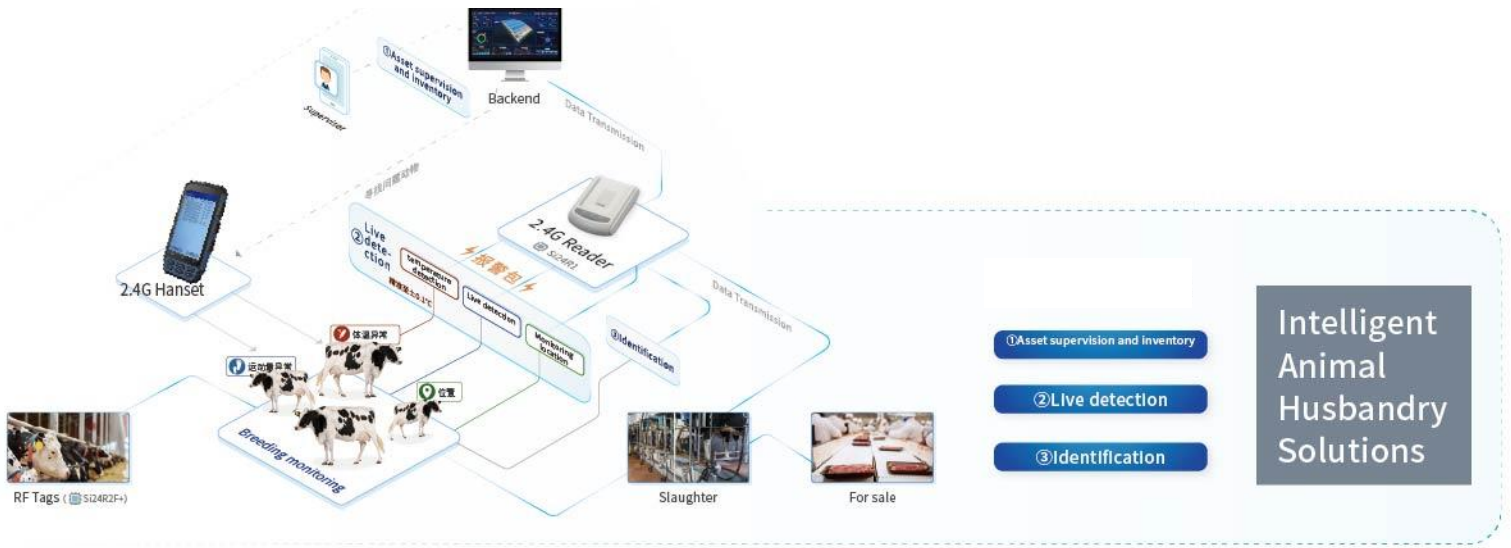

Smart campus

ACD (Auto Carrier Detect)
-Detect external RF fields and RF cards automatically
-No need for MCU intervention
-Crystal oscillator failure Detection



- NFC Swipe to unlock
  (SI522A/523/512)
- Touch button password to unlock
  (SI12T/14TP)
- Doorbell
  (SI24R1)

Ultra-low power smart door lock

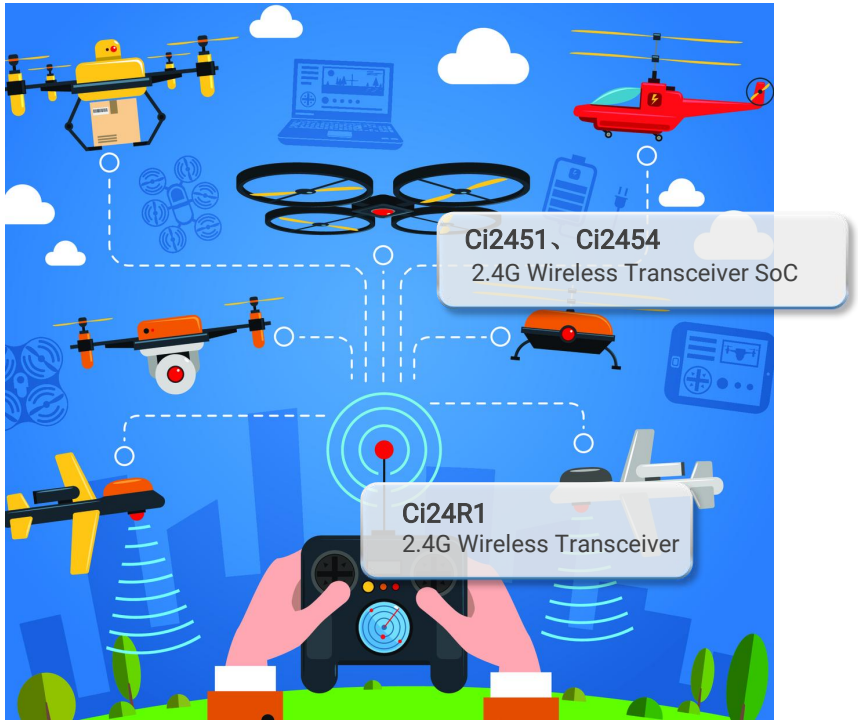


# Ultra-low Cost Prodoct Application Scenarios


## Swipe card to unlock

**Ci522/Ci523**（13.56M Ultra low-cost, small-size Reader Chip）

## 2.4G Wireless Remote Control Toy



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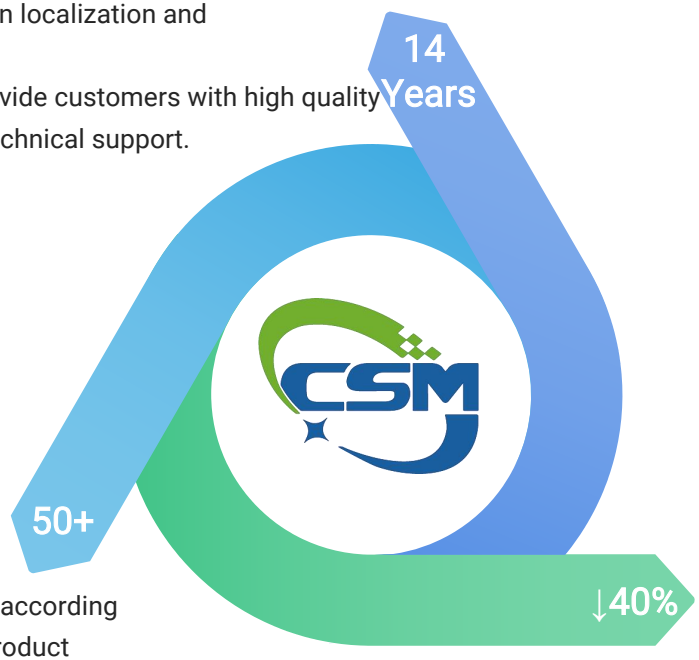
04

# Contact Us

# Innovator of Ultra-low Power IoT Chip

14 years experience in localization and industrialization
Fast response, to provide customers with high quality of the solution and technical support.




50+ Technical R&D
A stable technical team, according to the market demand product updates iteration.

**Nanjing CSM-IC** has been committed to the research and development of ultra-low power IoT chips. The current of the chips it develops is mostly at the nA and uA levels (the lowest current as low as 300nA), which is particularly suitable for battery-powered scenarios. It can extend the entire battery life, reduce the frequency of battery replacement, respond to energy conservation and environmental protection, and enhance the competitiveness of users' products.

It saves more than 40% of the cost compared with the same series of foreign products.

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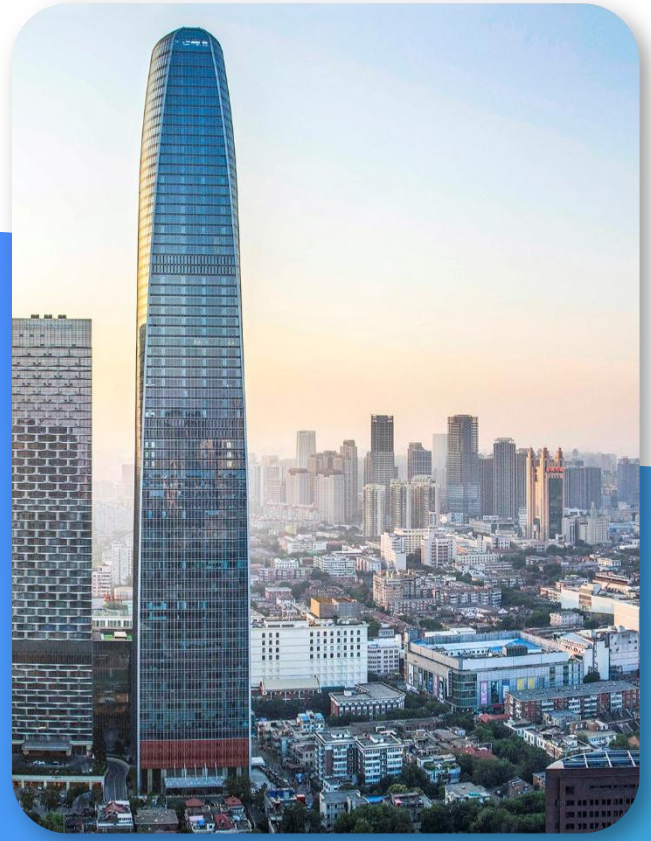
# Contact Us



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# End

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