SILICON CRAFT
TECHNOLOGY PLC

World's Leader and Provider of Innovative RFID and NFC IC Solutions

SHAPE THE WORLD OF SECURED
AND CONNECTED DEVICES WITH

INNOVATION & INTELLIGENCE

Established in 2002, SIC offers novel, custom, and standard design microchips for RFID applications and delivers products that carry high-value added features and superior overall systems performance.The products' quality is endorsed by years of lasting partnerships.

SIC is a world-class designer and provider of linear and mixed-signal integrated circuits, with experience and expertise in design and development work with top-tier foundries and semiconductor manufacturers.

Leading company for NFC
Anti-counterfeiting application

The leading spearhead in
NFC-Sensor interface for
Smart Health Care and
Environmental Chemical Sensing

Expert in low-power,
mixed-signal ASIC design

Proven expertise in
cryptographic RF communication

PRODUCTS & SERVICES

RFID/NFC Integrated Circuit for :
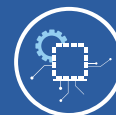
Animal ID

Immobilizer

Industrial IoT

NFC & Others

ASICs

Custom design to target
a wide range of applications
and use cases

APPLICATIONS

Automotive
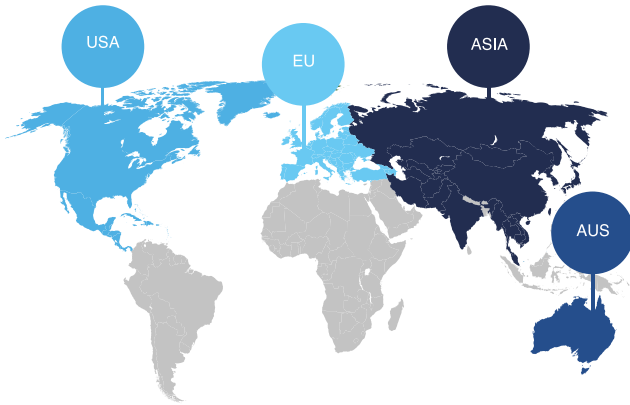
Livestock

Anti-Counterfeiting
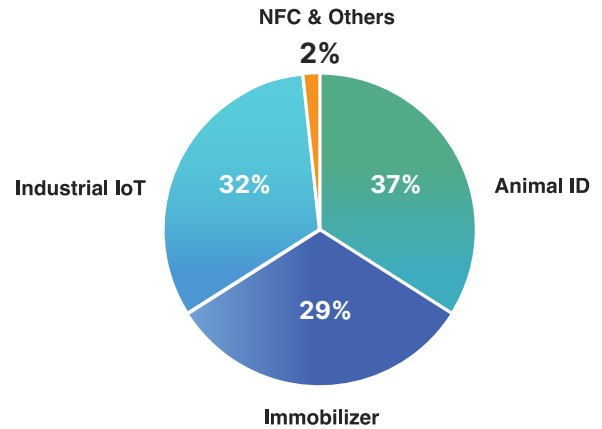
Smart Home
& Building

Medical Devices
and Healthcares

Toy&Game

Market Coverage

Our target strategic growth countries:
China, Japan, Korea, India, EU, USA, AUS

USA
EU
ASIA
AUS

Revenue Contribution

NFC & Others
2%

Industrial IoT **32%** **37%** Animal ID

29%

Immobilizer

RFID Product Line

Immobilizer

Animal ID

Industrial IoT

NFC & Others

- **LF Automotive Transponder IC**
  SIC61 Family
  - Automotive transponder with form, function and performance compatible with majority of motor vehicle sold worldwide.

- **LF FDX-B Transponder IC**
  SIC278
  - Best read range performance by SIC's boost-up technique.

- **LF HDX Transponder IC**
  SIC279
  - Best-in-class reading performance HDX Tag IC in the market with tunable capacitor.

- **ISO14443A HF Reader IC**
  RA10
  - Support transmitter supply up to 7V

- **Multi-Protocol HF Reader IC**
  RE31
  - Support ISO14443A/B and ISO15693
  - Support transmitter supply up to 7V

- **Multi-Protocol HF reader IC**
  with JIS-X-6319-4
  RE41
  - Fully compatible RE31 with additional support JIS-X-6319-4

- **Multi-Protocol HF reader IC**
  with Low Power Card Detection mode
  RA12
  - Support ISO14443A/B and ISO15693
  - Consumes only 4.7 µA in card detection mode

- **Multipage HDX Transponder for Industrial Application**
  SIC73F1
  - LF HDX transponder with EEPROM 1,360 bits in 17 pages read/write memory

- **NFC for Connectivity with UART interface**
  SIC4310/SIC4311
  - NFC-UART data transferring and energy harvesting

- **NFC for Authentication with on-chip encryption engine**
  SIC43S1/SIC43NT/SIC43NTG2
  - NFC Tag IC with Dynamic NDEF for Web-based authentication.

- **NFC for Sensor interface with on-chip sensor biasing and 12-bit ADC**
  SIC4340/SIC4341/SIC4343
  - Single-chip with NFC to sensor connection which can be used in batteryless application
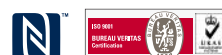
SENSOR INTERFACE PRODUCTS

- SIC4340
- SIC4341
- SIC824B
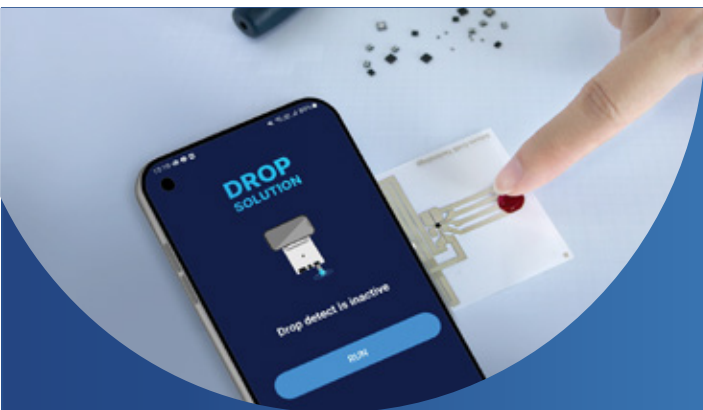- SIC4343

SIC4340, SIC4341, SIC824B and SIC4343 are sensor products from Silicon Craft Technology.

SIC4340 is NFC type 2 tag IC with galvanostat sensor interface where current is biased from built-in current source and voltage is measured through built-in ADC.

SIC4341 and SIC824B are potentiostat sensor for electrochemical measurement.
SIC4341 use NFC type 2 tag whereas SIC824B use BLE 5.2 as communication interface.
Voltage is biased and current is measured through potentiostat analog front end (AFE).

SIC4343 is NFC type 2 tag IC with built-in DACs and ADC for voltage measurement.
Voltage is biased from DACs and voltage is measured through ADC.

Features Summary

- Wireless communication channel with smartphone
- Built-in DACs 8-bit
- Built-in ADC
- 1.9V on chip regulator
- 1.28V internal voltage reference
- 236 bytes addressable EEPROM
- 144 bytes user memory
- Galvanostat sensor interface (SIC4340)
- Potentiostat sensor interface (SIC4341, SIC824B)
- Voltage sensor interface (SIC4343)

Applications

- Disposable point-of-care-testing (POCT)
- Chemical or biochemical sensor
- Resistance or capacitance sensor

GALVANOSTAT
SENSOR FAMILY

▌SIC4340

NFC type 2 tag IC with built-in current source and ADC for galvanostat measurement.

| SPECIFICATIONS	SIC4340 Galvanostat Sensor Interface
Communication Interface	NFC Type 2 Tag
Product Form Factor	QFN, Sawn Wafer with Bump
Biasing Current Range	1 - 63 µA with 1 µA / Step 8 - 504 µA with 8 µA / Step
Bias Wave Form	● DC ● Square Wave with Selectable Frequency 300 Hz - 50 kHz
Voltage Measurement Range	0.2 to 1.2 V
Measurement Accuracy	± 1.2 mV
Voltage Limiter	1.28 V
Multiplexing	3 Channels
Application Example	Resistive Sensor Capacitive Sensor Temperature Sensor Water TDS (Total Dissolved Solid)

DEVELOPMENT KIT

SIC4340 Development Kit:
P40CK492PB0S14010EB
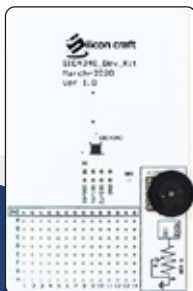
DEVELOPMENT KIT
SUPPORT MATERIAL

● Demo iOS/android application
● Reference PCB design and schematic diagram
● Reference antenna and antenna design tool
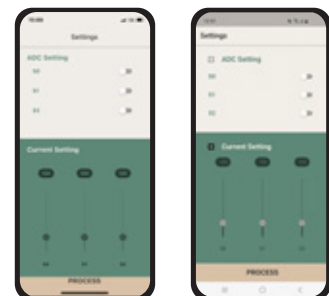
POTENTIOSTAT
SENSOR FAMILY

SIC4341

NFC Type 2 tag IC with built-in ADC and potentiostat sensor interface for electrochemical measurement
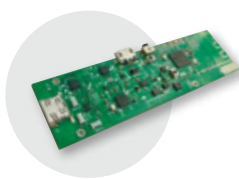
SIC824B

Potentiostat sensor module with bluetooth® 5.2 for electrochemical measurement

SPECIFICATIONS	SIC4341 Potentiostat Sensor Interface	SIC824B Potentiostat Sensor Module
Communication Interface	NFC Type 2 Tag	Bluetooth® 5.2
Product Form Factor	QFN, Sawn Wafer with Bump	PCB
Bias Voltage Range	- 0.8 to + 0.8 V	- 1.6V to 1.6V (1.6V Dynamic Range) ● - 1.6 to 0 V ● - 0.8 to + 0.8 V ● 0 to + 1.6 V
Bias Voltage Resolution	5 mV/Step	5 mV/Step
Current Measurement Range	Selectable ± 2.5 µA ± 20 µA	Hardware fix Customizable Maximum ± 500 µA
Pin Configuration	Configurable WE, RE, CE	Fixed Position
Measurement Accuracy	± 5 nA for ± 2.5 µA Range ± 20 nA for ± 20 µA Range	± 0.1% of Current Range
Compatible Analysis Technique	Amperometry Voltammetry	Amperometry Voltammetry Open Circuit Potential (OCP)
Application Example	Chemical Sensor Biochemical Sensor	Chemical Sensor Biochemical Sensor Potentiometric Sensor

DEVELOPMENT KIT

SIC4341 Development Kit :
P40CFSCREF0HW41C1EB

DEVELOPMENT KIT
SUPPORT MATERIAL

- Demo android application
- Reference PCB design and schematic diagram
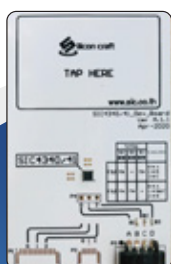- Reference antenna and antenna design tool

VOLTAGE MEASUREMENT
SENSOR FAMILY

SIC4343

NFC type 2 tag IC with built-in DACs and ADC for voltage measurement which can be configured to single-ended or differential-ended mode.

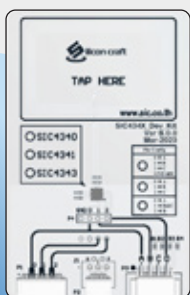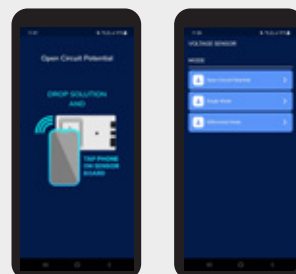| SPECIFICATIONS	Single Ended Voltage Sensor Interface Chip	Differential Ended Voltage Sensor Interface Chip
Communication Interface	NFC Type 2 Tag	
Product Form Factor	QFN, Sawn wafer with bump	
DAC Resolution	8-bit	
Bias Voltage	0.2 to 1.2 V	
Measurement Method	Measure voltage with respect to GND	Measure voltage between 2 pins
Voltage Measurement Range		
Input Buffer is Enabled	0.2 to 1.2 V	-1 to +1 V
Input Buffer is Disabled	0 to 1.2 V	-1.2 to +1.2 V
Measurement Accuracy	± 1.2 mV	
Sampling Rate	10 sps	
Application Example	Industrial Sensor Chemical Sensor Biochemical Sensor	

DEVELOPMENT KIT

SIC4343 Development Kit

DEVELOPMENT KIT
SUPPORT MATERIAL

- Demo android application
- Reference PCB design and schematic diagram
- Reference antenna and antenna design tool

NFC FORUM TYPE 2 TAG
FOR ITEM-LEVEL AUTHENTICATION

SIC43S1, SIC43NT, SIC43NTG2 are the passive NFC forum type 2 tag, which are fully compliant to ISO14443A.

The user memory of both chips supports NDEF updating with a unique value for each tap which allows App-less NFC authentication.

For higher security purpose, SIC43S1 contains an AES-128 encryption engine, which is designed for using with mutual authentication and encrypted communication schemes.

APPLICATIONS

- Item-Level NFC Label or Sticker with Authentication Function
- Smart Packaging
- Vouchers and Coupons
- Access Control Card with Authentication Function

FEATURES SUMMARY

- NFC forum type 2 tag
- Dynamic NDEF message which contains UID, and a secured authenticated code (SAC) or rolling-code for authorization
- ISO14443A ,106kbps
- 50pF input capacitance

- Secured tamper detection and verification via SAC or rolling-code
- Pin configurable to be RF field detection or tamper detection (SIC43NT / SIC43NTG2)
- Operating temperature : -40 to 85 ℃
- Package : Sawn wafer with bump

NFC TAG FOR
ITEM-LEVEL AUTHENTICATION

SIC43S1	NFC Forum T2T with AES-128 encryption

SIC43NT SIC43NTG2	NFC Forum T2T with Secured Rolling-Code

COMPARISON TABLE

| FEATURES	SIC43S1	SIC43NT	SIC43NTG2
Standard	NFC Type 2 Tag		
Memory			
User Memory Size [bytes]	816	144	144
Retention	10 years		
Write cycle [times]	100k	100k	500k
Memory Protection	AES-128 Mutual Authentication	32-bit Password protection	32-bit Password protection
Dynamic NDEF			
UID	14 bytes (ASCII)		
Tamper Status	-	2 bytes (ASCII)	2 bytes (ASCII)
Timestamp	8 bytes (ASCII)		
RLC/SAC	32 bytes (ASCII)	8 bytes (ASCII)	8 bytes (ASCII)
Security			
Mutual Authentication	Yes, AES-128	No	No
Encrypted Communication	Yes, AES-128	No	No
I/O Function			
RF Detection	No	Yes	Yes
Tampering Detection	No	Yes	Yes
Others			
On-chip Capacitor	50pF		
Target Package	Sawn wafer with bump	Sawn wafer with bump, DFN	Sawn wafer with bump

DEVELOPMENT KITS

- SIC43S1 Development Kit: PS1BK00000000S1D0CB
- SIC43NT Development Kit: PNTGK100PB0S1NTD0CB

DEVELOPMENT KIT
SUPPORT MATERIALS

- Demo Android APP and Source Code
- Reference PCB Design and Schematic Diagram
- Reference Antenna and Antenna Design Tool

ilicon craft®
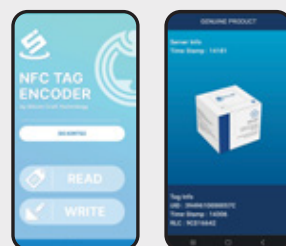
NFC TYPE 2 TAG
WITH UART INTERFACE AND ENERGY HARVESTING FUNCTION

Energy Harvesting
10 mA

UART & GPIO Interface

SIC4310 and SIC4311 are NFC type 2 tags with UART interface that bridge data transfer between NFC devices and UART-connected devices such as MCUs.

In addition, SIC4310 and SIC4311 can harvest energy for peripheral circuit up to 10mA from desktop RFID readers or up to 7mA from typical NFC phones. This energy harvesting enables "batteryless" applications that instantly operate when an NFC device is tapped without a battery inside.

Applications

- Shared facility (e.g. washing machine, coffee maker, or printer) personalization and controlling via NFC
- NFC energy harvesting module
- Zero-energy emergency data transfer channel for electricity, water or gas metering
- NFC bridge for medical devices
- Interactive packaging

Features Summary

- NFC Forum type 2 tag with additional commands
- Direct data transfer from NFC to UART or vice versa
- Using NFC harvesting energy for self-operation or sourcing externally
- 3.3V on-chip regulator for energy-harvesting output
- NFC Energy harvesting : Up to 10mA capability to power external circuit (depending on output power of NFC device)
- 196 bytes user memory

CONNECTIVITY AND
ENERGY-HARVESTING NFC TAG IC
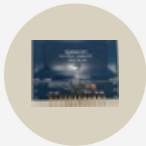
SIC4310
NFC Forum T2T with UART interface and 8 GPIOs

SIC4311
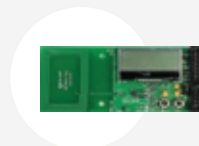NFC Forum T2T with UART interface, 7 GPIOs, and VBAT3V3 pin

COMPARISON TABLE

| SPECIFICATIONS	SIC4310	SIC4311
Communication		
Standard	ISO14443A, NFC T2T	ISO14443A, NFC T2T
Data Rate (kbps)	106	106
Interface	UART	UART
Buffer Size(byte)	64	64
Memory		
Memory Size (byte)	196	196
Data Retention (year)	10	10
Write Cycle (times)	100,000	100,000
Operating Condition		
Operating Temperature	-40 to 85°C	-40 to 85°C
Maximum Standby Current	80µA (use XVDD pin)	0.1µA (use VBAT3V3 pin)
External Input Supply Voltage	2.7V to 3.6V (use XVDD pin)	3.0V to 10.0V (use VBAT3V3 pin)
Maximum Harvesting Current		
Harvest from Mobile Phone	7.82mA @3V	7.82mA @3V
Harvest from Desktop Reader	10.2 mA @2.87V	10.2 mA @2.87V
Pinouts and Peripherals		
GPIO pins	8	7
On-chip Capacitor (pF)	30.3	30.3
Package	QFN3×3 -16 pins	QFN3×3 -16 pins

DEVELOPMENT KIT
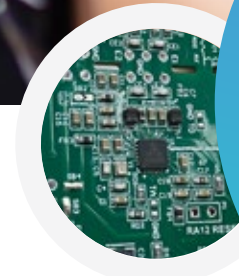
- SIC4310-HV Development Kit : P10CK081PB0S110D0CBA
- SIC4310-FU Development Kit : P10CSECR000SN10D1CB

DEVELOPMENT KIT
SUPPORT MATERIAL

- Firmware Source Code (SIC4310-FU)
- Demo Android/iOS APP and Source Code
- Reference PCB Design and Schematic Diagram
- Reference Antenna and Antenna Design Tool
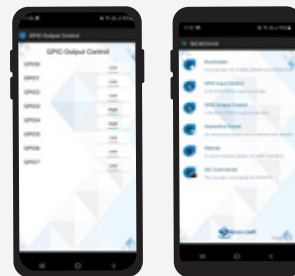
HF RFID READER IC

Silicon Craft's HF RFID reader IC is a single-chip solution that supports major standards of 13.56MHz contactless communication, including ISO14443A/B, ISO15693, and JIS-X-6319-4

The IC offer fast communication speeds of up to 848 kbps and provides excellent reading performance while consuming minimal power in power-down mode. In addition, the IC supports low-power card detection mode (LPCD) *,enabling the microcontroller to enter deep sleep, further minimizing power consumption.

*RA12 only

APPLICATIONS

- Secured access control
- Digital door lock
- Handheld or desktop RFID reader
- Smart toys
- Electricity / Gas metering

FEATURES SUMMARY

- Support standard
- HF RFID protocols
  - ISO14443A
  - ISO14443B
  - ISO15693
  - JIS-X-6319-4
- Support NFC type 1,2,3,4,5 tags
- SPI interface
- 64-byte send and receive FIFO buffer
- Consume minimal power (<1.0µA) in power down mode.
- Support low power card detection mode (RA12 only)

READER IC FAMILY

RA10
ISO14443A

RA12
ISO14443A
ISO14443B
ISO15693
with Low Power Card
Detection

RE31
ISO14443A
ISO14443B
ISO15693
Support 7V TVDD

RE41
ISO14443A
ISO14443B
ISO15693
JIS-X-6319-4
Support 7V TVDD

COMPARISON TABLE/ORDERING INFORMATION

FEATURES	RA10	RA12	RE31	RE41
	PI3AVQO7P20UT1001E1	PI6BVQL5P60UT1201T1	PI5AVQO7P20UT3101E1	PI5AVQO7P20UT3201E1
Ordering Part Number Protocol				
ISO14443A, Up to 848 Kbps (NFC Tag Type 1,2,4A)	●	●	●	●
ISO14443B, Up to 848 Kbps (NFC Tag Type 4B)	–	●	●	●
ISO15693, 1 and 2 Subcarrier (NFC Tag Type 5)	–	●	●	●
JIS-X-6319-4 (NFC Tag Type 3)	–	"Unsecured Memory Only (Need MCU to decoder)"		"Unsecured Memory Only (On-chip HW decoder)"
Operating Condition				
Receiver Voltage	2.7 - 3.3 V	2.7 - 3.6 V	2.7 - 3.3 V	2.7 - 3.3 V
Transmitter Voltage	2.7 - 7 V	2.7 - 5.5 V	2.7 - 7 V	2.7 - 7 V
Operating Temperature	-40 - 85°C	-40 - 85°C	-40 - 85°C	-40 - 85°C
Maximum Driving Current	200 mA @5V TVDD	250 mA @5V TVDD	300 mA @5V TVDD	300 mA @5V TVDD
Other Features				
Interface	SPI	SPI	SPI	SPI
EEPROM (Byte)	–	–	256	256
IRQ Pin	●	●	●	●
Low Power Card Detection Function	–	●	–	–
Low Power Consumption on Power Down Mode	1µA	0.6µA	1µA	1µA
Package	QFN32(5×5)	QFN24(4×4)	QFN32(5×5)	QFN32(5×5)

DEVELOPMENT KIT

- RA12 Development Kit : PI6BK200M10S112B1CB
- RE41 Development Kit : PI5AK200M10S132B1CB

DEVELOPMENT KIT
SUPPORT MATERIAL

- Firmware Source Code with Command-Line Instruction via UART
- Demo PC Software (Windows based)
- Reference PCB Design and Schematic Diagram
- Reference Antenna and Antenna Design Tool

SIC73F1
LF INDUSTRIAL TAG

SIC73F1 is a 32mm RFID glass transponder with 1,360-bit multipage read/write memory operating through 134.2 kHz half-duplex protocol. The transponder is robust and well-suited for various industrial tracking applications.

INTERFACE

- Compliant with ISO 11784/11785 HDX Animal Tag ID data
- Support to SEMI E144-0312
- Uplink Modulation: FSK (Frequency Shift Keying)

MEMORY

- 1,360 bits EEPROM
- 17 Pages Read/Write Memory
- 100,000 Erase/Write Cycles
- 10 Years Non-Volatile Data Retention

HIGHLIGHT FEATURES

- Half-Duplex Contactless Read/Write Data Transmission
- Multipage Transponder (MPT)
- Drop-in Replacement of RFID Tag for Wafer Carrier
- Robust and High Quality Built

APPLICATIONS

- Wafer Carrier Tracking
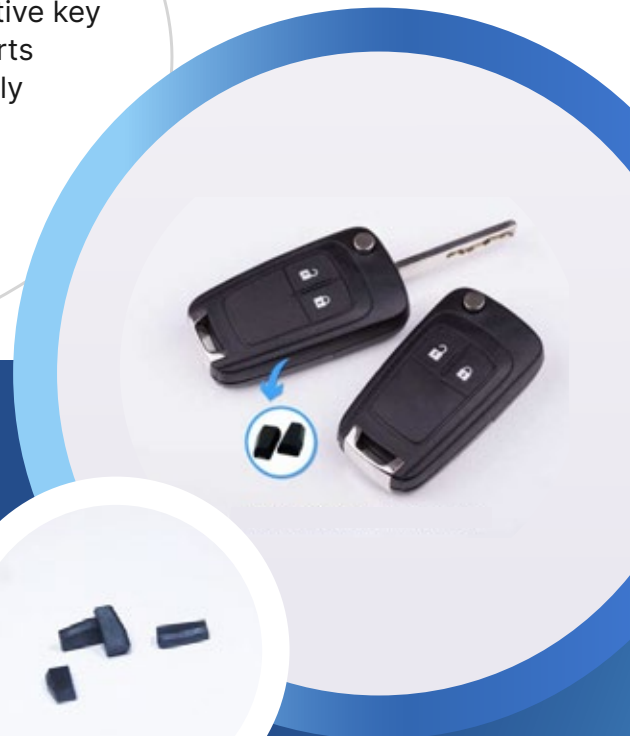- Industrial
- Access Control

SIC61AU
UNIVERSAL IMMOBILIZER KEY

SIC61AU is a universal immobilizer transponder for automotive key operating at the low-frequency (LF) range. SIC61AU supports 4 families of LF communication protocol: A, N, S and T family with 14 classical transponder types supported.

HIGHLIGHT FEATURES

- Universally support transponders in the market both HDX and FDX
- Best-in-class reading performance
- Compatible with 4 families and 13 types of conventional immobilizer transponder
- Simple step to transform transponder to each type
- High-Quality and robust transponder package
- Simplify transponders inventory management to handle fluctuating demand in car service center or locksmiths shop

SUPPORT PRODUCT FAMILY

FAMILY	TYPE	MARKET NAME
N	Full Duplex 125 kHz	ID46
		ID46 +EE
		ID46 Ext.
		ID47
		ID4A
		ID49
T	Half Duplex 134.2 kHz	ID4C
		ID4E
		ID4D
		ID8A
S	Full Duplex 125 kHz	T5
		ID48
A		ID88
		ID8C

ORDERING **INFORMATION**

Part No : PAUDW503EP0SUAU30C3

Description : SIC61AU-30 Universal immobilizer LF FDX & HDX with multiple encryption wedge 134.2/125kHz,Canister, RFID Tag

Package : Wedge (6.0 mm H x 3.0 mm W x 12.0 mm L, Standard size with OEM)