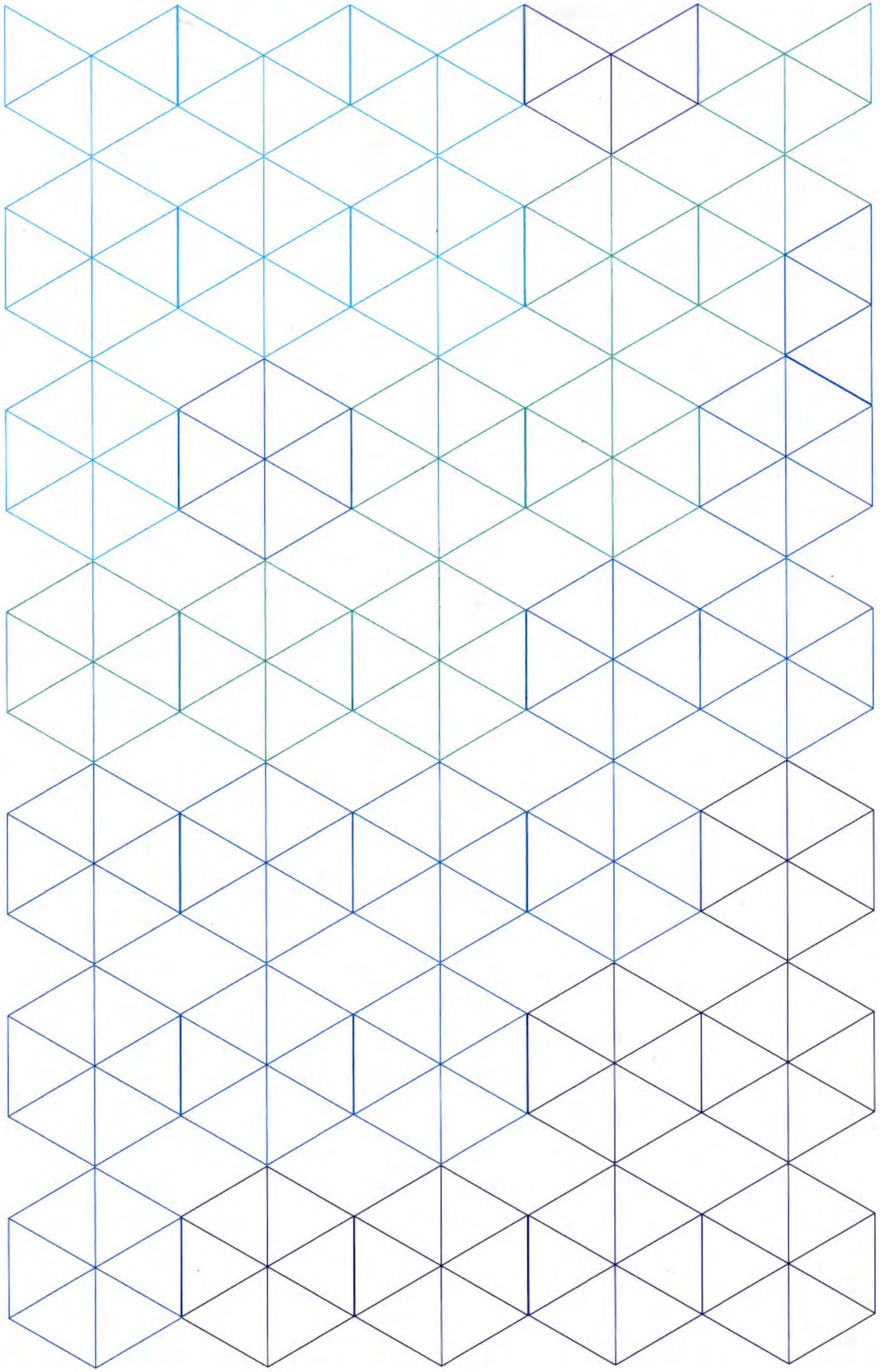



ilicon craft®

Table of Content

ODM

Silicon Craft has over time developed the competitive and successful ODM transponders within a short turn-around time through its extensive and qualified list of subcontractors.

We offer full turn-key service to minimize the time-to-market and increase our partner's competitive advantage.
We aim to provide the best user experience for users, based on over 10 years of market experience.

NFC
Transponder IC

NFC, or Near Field Communication, is the technology which allows the NFC-enabled devices and readers (e.g. Mobile phone) to communicate with each other or with an NFC transponder within short range. NFC is used widely for Payment, transportation, ticket-ing,Bluetooth or WiFi pairing, gaming, and many more.

HIGHLIGHT FEATURES OF SIC'S TRANSPONDER IC

Silicon Craft's NFC transponders provide NFC-tag capability, with additional features to expand the NFC to new markets such as metering, packaging, toys, or even personal healthcare monitoring.

- Transparent Mode
- RF Field Detection pin
- UART and GPIO Interface
- Tampering Detection
- Power Haverting up to 10 mA from NFC Device
- Product Authorization
- Event-Triggering Dynamic NDEF
- Sensor Interface

Smart Voucher and Product Authentication

Reading product's intrusion status with on-chip tampering detection

Tampering detection length ranges up to 2 meters of twisted-pair wire

Event-triggered rolling code helps to identify the product authentication via online back-end system

Batteryless NFC Connectivity

Connect the NFC-to-MCU communication channel with the commonly used UART interface

10-mA(max.) energy harvest-ing can provide enough power to the MCU and its peripherals for Batteryless operation

GPIO pin can directly connect to mechanical switch or LED according to user application

NFC-Sensor interface

The cheapest way to convey sensing information to mobile phone to process, display, or even relay to the internet

Supports both general resis-tive and/or capacitive sensor on SIC4340 and Chemical sensor on SIC4341

A passive NFC-Forum Type 2 Tag with event-triggered Dynamic NDEF and rolling code for smart voucher and coupon application.

SIC43NT is a passive NFC-Forum Type 2 Tag, which is fully compliant with ISO14443A. The chip is equipped with 144 bytes user memory, which can be configured to be compatible with NDEF format.

The NDEF message will automatically respond when the tag is triggered by an NFC field or in a tag-tampering event. A rolling code can be attached to the response NDEF message to ensure that the status of the tag after triggered by on NFC field or tampering detection.

Highlight Features

- NFC-Forum Type 2 Tag with 7-byte UID
- Conformed to ISO14443A @ 106kbps
- On-chip capacitance : 50pF

Memory

- 144-byte user memory area
- Anti-tearing protection for Lock Byte

Field Detection/ Tampering Detection Pin

- Configurable Field Detection/ Tampering Detection pin
  - RF field detection
  - Tamper evidence detection
  - Sleep mode

Rolling Code Operation Mode

Mode	TAMPERING WIRE IS **CONNECTED**	TAMPERING WIRE IS **DISCONNECTED**
COUPON MODE: Rolling code starts changing after tampering wire is torn	Rolling Code is **not changed**	Rolling Code **changes** every time tag is tapped
PACKAGE MODE: Rolling code stops changing after tampering wire is torn	Rolling Code **changes** every time tag is tapped	Rolling Code is **not changed**
UNIVERSAL MODE: Rolling code always changes	Rolling Code **changing** every time tag is tapped	

A passive NFC-Forum Type 2 tag with Dynamic NDEF and AES-security for high-security authentication application

SIC43S1 is a passive ISO14443A NFC-Forum Type 2 Tag, which is especially designed to secure NFC tag for tampering detection and product authentication. For that purpose, SIC43S1 is equipped with AES-128 (Advanced Encryption Standard) for secure authentication and data encryption. The response NDEF message is automatically updated by a triggered event e.g. the tampering detection wire has been disconnected.

Highlight Features

- NFC-Forum Type 2 tag
- Event-triggered Dynamic NDEF format
- AES-128 for authenticity verification and data encryption
- Anti-tearing mechanism for writing AES keys
- Brute-force attack protection

Memory

- EEPROM organization enabling NDEF format
- 1 Kbytes EEPROM
  - Public memory area supporting dynamic NDEF
  - Secure memory area avialable after authentication

Interface and Peripheral

- Fully compliant with ISO14443A
- Anti-collision
- RF read distance up to 10 cm depending on readers
- On-chip capacitance 50 pF

SIC43NT AND SIC43S1 DEMO-KIT

Applications

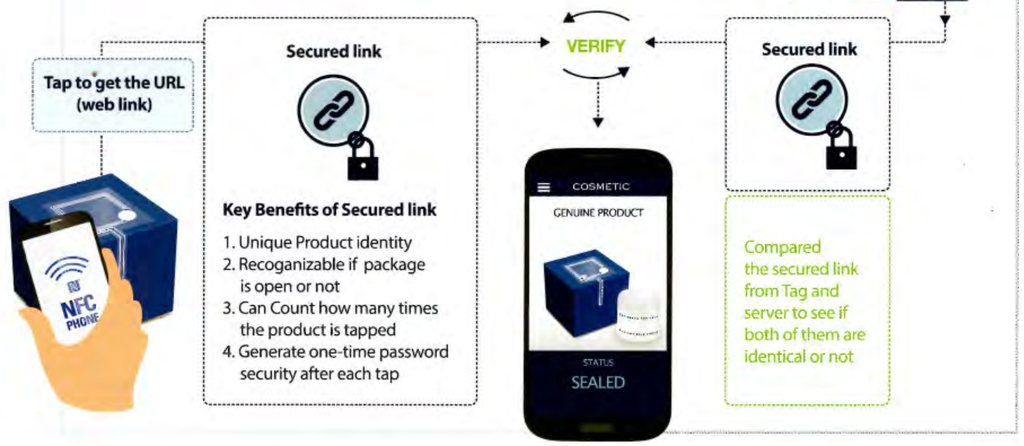
Anti Counterfeiting Concept

Tag Side

When the NFC-enabled phone is tapped to the NFC tag, it will generate a secured link to verify with the server via mobile internet

Server Side

Already have pre-calculated secured link to verify with the NFC tag



Proof-of-purchase Concept

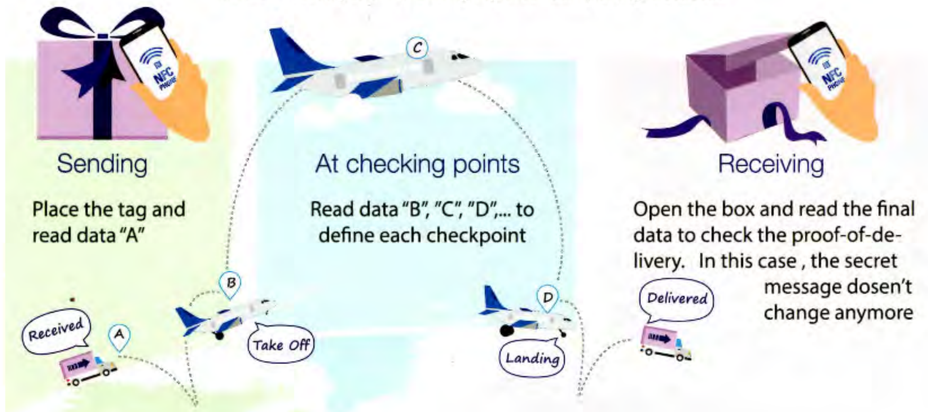
PRICE TAG /COUPON MODE

Secret messages start changing after tampering detected

Proof-of-Delivery Concept

PARCEL MODE

Secret messages stop changing after tampering detected



E-card For Online gaming

USE AS A LOGIN CARD

LOGIN

FREE ITEM

NFC Transponder IC with
UART and GPIO Interface

SIC4310 is a passive NFC Type 2 Tag IC with UART and GPIO interface. It features battery-less operation which is able to harvest power from NFC devices up to 10mA and allows external devices to operate passively.

SIC4311 is a special version of transponder IC designed for battery-operated devices. With its added feature of 40nA standby current, the SIC4311 can enable portable devices to extend their battery life up to 15%.

Highlight Features

- Write/read through NFC smartphone/ NFC or RFID reader device
- Direct data transfer from RFID to UART or vice versa
- Operating from either RFID power or external DC
- 3.3-V On-chip regulator for power harvesting mode
- Up to 10 mA sourcing capability to power external circuit (Depending on harvested power from RF)
- Compatible with NFC Forum Type 2 Tag
- ±2% 1.8432 MHz on-chip factory-trimmed oscillator

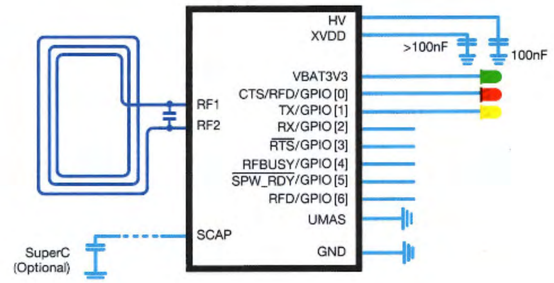
Memory

- 228-byte EEPROM accessible from RF and UART
- 196-byte user memory
- EEPROM organization enabling NDEF format

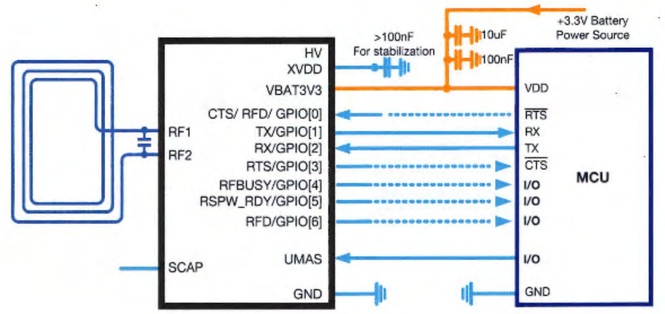
Interface and Peripheral

- RF interface based on ISO14443A - 106 kbps
- UART interface speed from 9600 to 115200 bps
- UART interface with hand-shaking option
- Activity indicator pins
  - RF detect
  - RF busy
  - Reserve power is ready

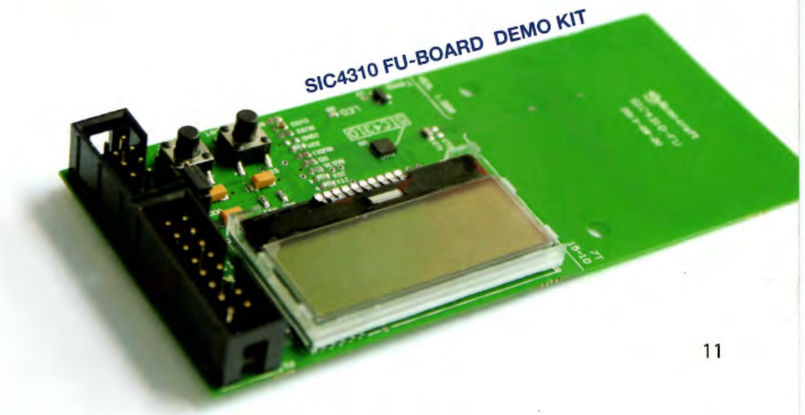
Basic Circuit



SIC4310 Basic configuration with LED indicator



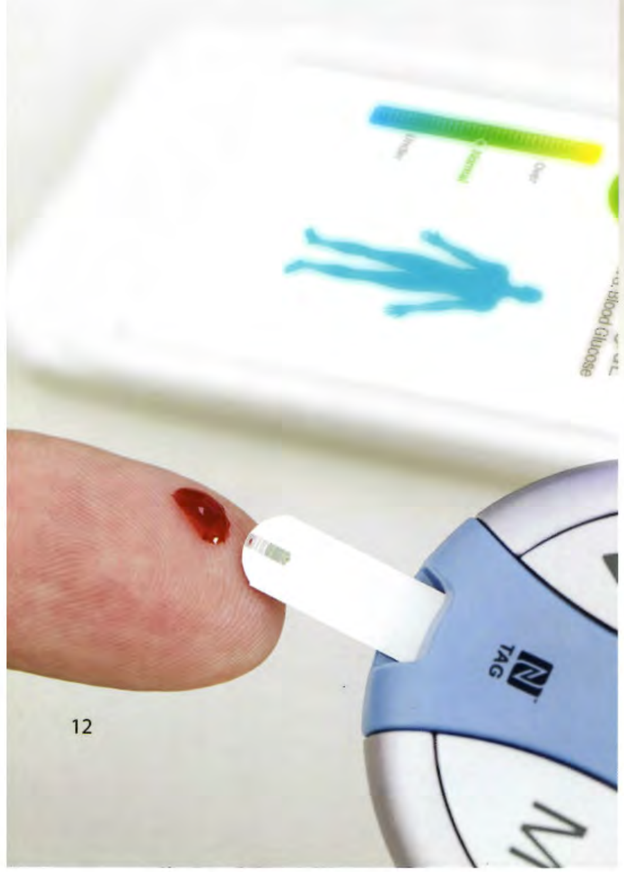
SIC4311 RF-powered configuration for firmware upgrade
(Power harvesting)



Applications

NFC bridge for medical devices

Transfer information stored in the medical device to the mobile phone by backing up data for faster doctor diagnosis



NFC bridge for metering

Provide additional passive communication channel to the household meter such as water meter or gas meter. Even after running out of electricity, the meter can still be connected to the system with the help of the NFC and mobile internet.

Wireless diagnosis and upgrade for electrical appliances and embedded systems

UART interface of SIC4310/4311 establishes the communication channel between the mobile phone and the electrical appliances. This NFC-to UART channel can be used for online diagnosis and upgrading via the cloud server. Therefore, users can check and upgrade their appliances easily by themselves without any help of technicians.

Smart toy

With GPIOs and power harvesting, the new-generations of NFC toys can play with mobile phone games without requiring any battery. Moreover, it can also perform light & sound with the harvested power from the NFC.

228-Byte NFC Tag Type 2 with
Built-in Sensor Interface

SIC4340 is a 228-byte ISO14443A passive NFC-Forum Type 2 Tag, which has the capability to connect with many kinds of analog sensors. With 12-bit-output-sigma-delta ADC (10-bit ENOB), SIC4340 can acquire the sensor's voltage response at a specific time after biasing by the adjustable current source, the adjustable sensor-biasing frequency generator and the voltage limiter.

The sensor can be either resistive, capacitive or combination of them. By relying on the computing power given in mobile devices and NFC communication, the SIC4340 becomes the mediator offering the cheapest method conveying sensing information to display in mobile phone or even relay to internet.

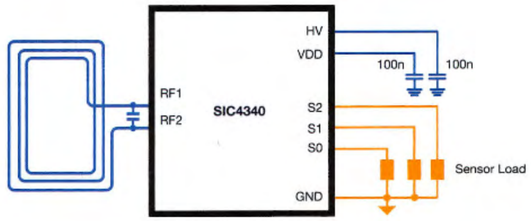
Highlighted Features

- NFC-Forum Type 2 Tag with 7-byte UID
- Resistive/Capacitive Sensor Interface
  - Adjustable current source with voltage limiter
  - Built-in ADC
    - 12-bit (10 bit ENOB) @ 1.28V Full scale
    - Output bit selectable : 8, 10, 12 bit
  - Adjustable sensor biasing frequency: 300Hz – 50kHz
  - Adjustable warmup clock
  - 0.0 to 1.27 V biasing protection with 5mV resolution

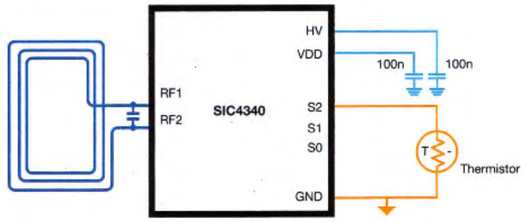
Application

- Chemical sensor
- Resistor/Capacitor measurement

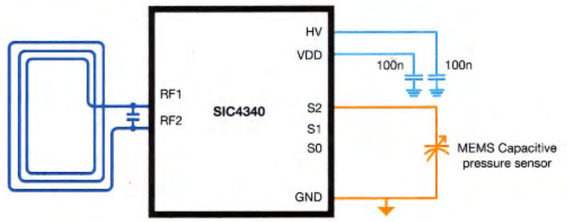
Basic Circuit



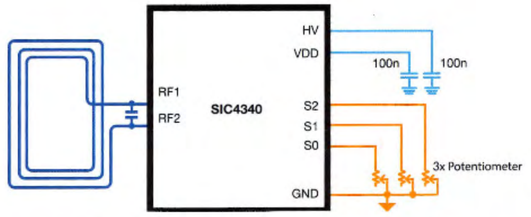
SIC4310 Basic circuit



SIC4340 connected with thermistor
For temperature-sensing NFC tag



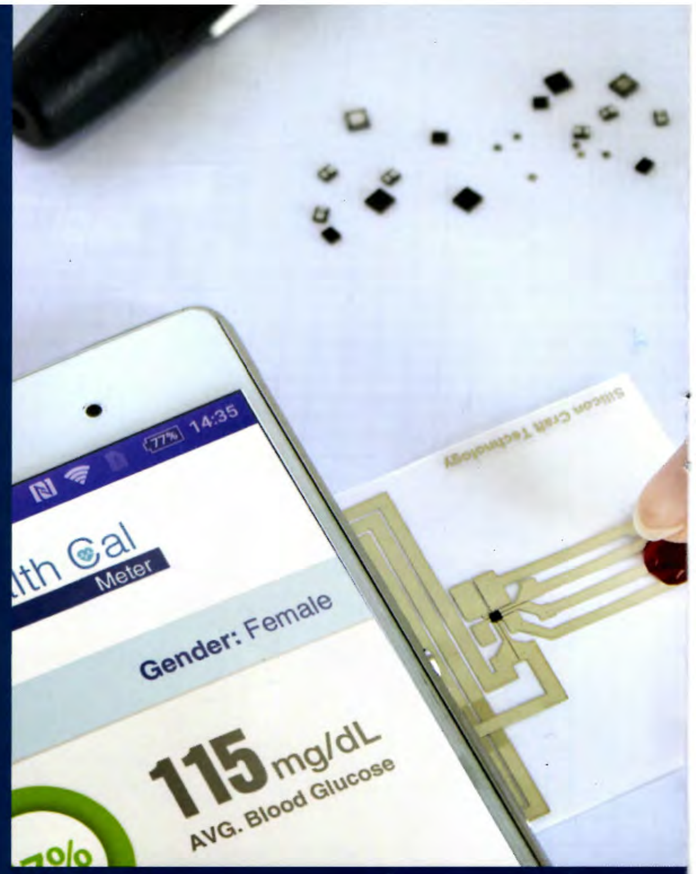
SIC4340 connected with MEMS capacitive pressure sensor
For pressure-sensing NFC tag



SIC4340 with 3x Potentiometer for Action Figure Toy

228-Byte NFC Tag Type 2 with Potentiostat sensor interface

SIC4341 is a 228-byte ISO14443A passive NFC-Forum Type 2 Tag, which has the capability to connect with a potentiostat-type sensor. SIC4341 can acquire the sensor's measuring value by the Built-in ADC and supports both Amperometric and Cyclic Voltammetry topologies. By relying on the computing power given in the mobile devices and NFC communication, the SIC4340 becomes the mediator offering the cheapest method conveying sensing information from a chemical sensor to display mobile phone or even relay to internet.



Highlighted Features

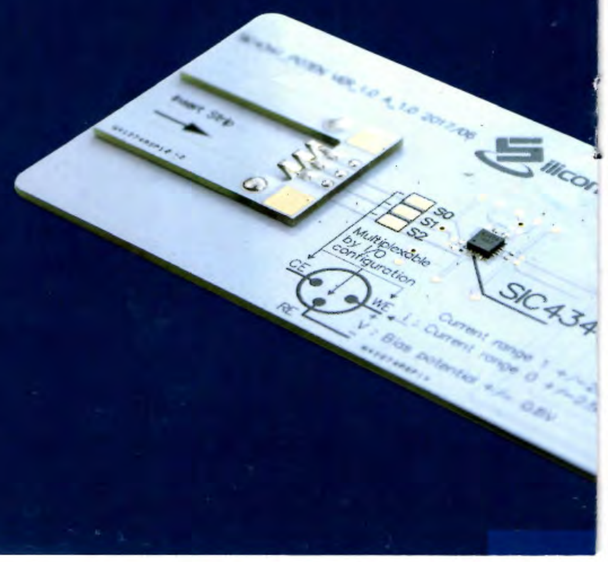
- NFC-Forum Type 2 Tag with 7-byte UID
- Potentiostat Sensor Interface
  - Supports both 2 and 3 electrodes measurement

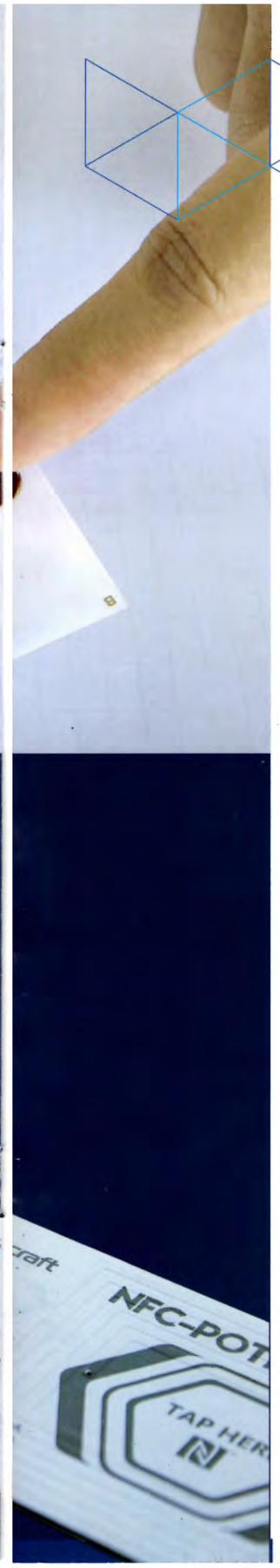
Memory

- 228-byte addressable EEPROM
- EEPROM organization enabling NDEF format
- EEPROM erase/write cycle up to 100,000 times
- EEPROM for initializing register
  - Automatically reload after power up

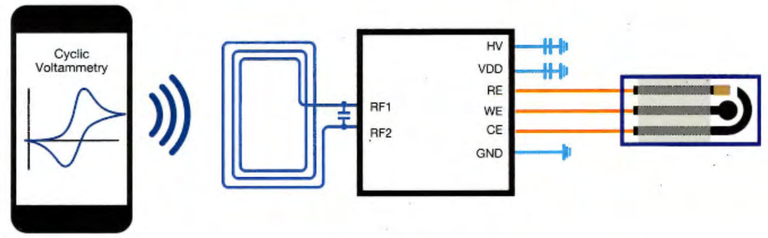
Interface and Peripheral

- RF interface based on ISO14443A - 106 kbps
- True anti-collision

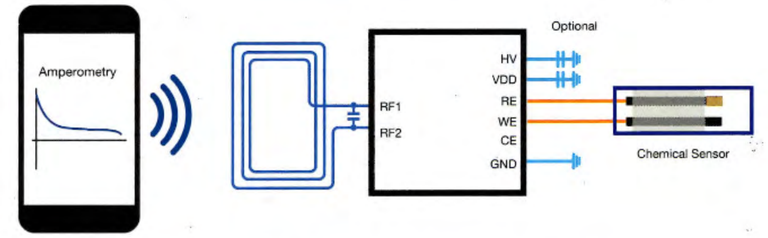




Basic Circuit

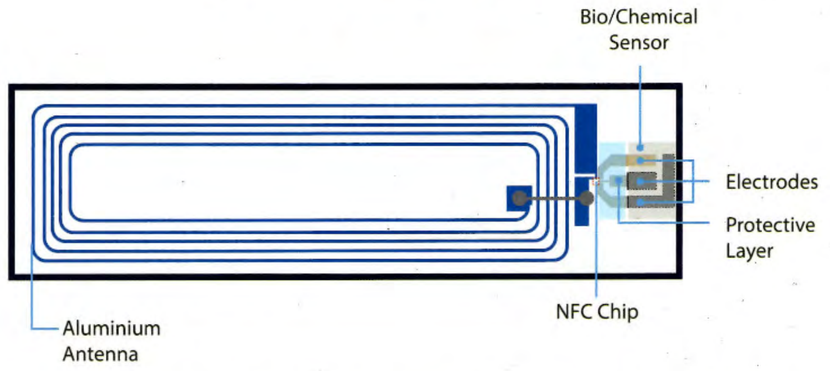


SIC4341 Operating Circuit Diagram in 3 electrode configuration



SIC4341 Operating Circuit Diagram in 2 electrode configuration

Basic Sensor Concept



Example of chemical sensor product by SIC4341 flipped on aluminum inlay

13.56 MHz Full-Standard
Reader IC

RE41

A new generation of multiprotocol reader IC which supports secured card and mobile with Near Field Communication (NFC) payments, allowing

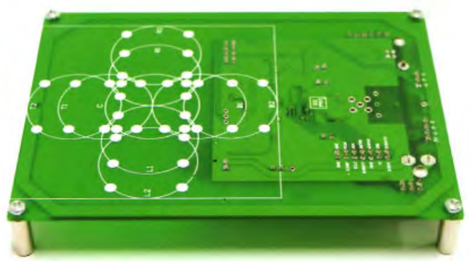
The device moves beyond basic transaction to customer interactive payments all in one unique product.

Highlighted Features

- ISO14443A/B, ISO15693 FeliCa (non-secure memory only)
- All NFC tag types
- Maximum transmitter current up to 400 mA
- 256-byte EEPROM
- 5.5 uA in 'power down' mode

Application

- Contactless payment systems
- Access control systems
- PC peripheral devices
- Handheld RFID readers



Interface and Peripheral

- SPI interface up to 10 Mbps
- 64-byte send and receive FIFO-buffer
- User-configurable registers
- 112-byte EEPROM
- Interrupt (IRQ) PIN
- Programmable timer
- Programmable clock divider for external MCU
- Low jitter on-chip oscillator buffer
- On-chip dual 80 mA 3.3V regulators

Pi941 EMV
Multiprotocol Reader Interface design
for payment application

13.56-MHz Multi-Standard
Reader IC

RE31

is a long-ranged reader IC for all major 13.56MHz RFID standards. RE31 provides a hi-speed SPI host interface with built-in 64-byte FIFO for supporting high-speed transactions. Furthermore, RE31's long read distance performance based on its high-current transmitter and high-sensitivity receiver, can ensure that each transaction is completely processed.

Interface and Peripheral

- SPI interface up to 10 Mbps
- 64-byte send and receive FIFO-buffer
- 64-byte addressing
- User-configurable registers
- 256-byte EEPROM
- Interrupt (IRQ) PIN
- Programmable timer
- Programmable clock divider for external MCU
- Low jitter on-chip oscillator buffer
- On-Chip dual 80 mA 3.3V regulators

Highlighted Features

- ISO14443A and B (all bit rates), ISO15693, NFC Type 1,2,3,4,5 tags
- Outstanding read range with maximum transmission current up to 400mA
- On-chip framing codec and framing handler with high noise immunity
- 256-Byte EEPROM
- Power consumption is only 5.5uA in power down mode

Applications

- Access control systems
- PC peripheral devices
- Handheld RFID readers
- NFC tag readers

13.56-MHz ISO14443A
RFID Reader IC

RA10

RA10 is the new generation of contactless reader IC which supports secure card and mobile with Near Field Communications (NFC), which is based on ISO14443A standard. The RA10 is highly suitable for various applications especially for handheld RFID readers, secure access control and door lock. The RA10 is equipped with built-in frame decoder for smoother integration, reduce external components to make devices compact, reliable and competitive.

Applications

- Contactless payment systems
- Secure access control cards
- PC peripheral devices
- Handheld RFID readers

Highlighted Features

- ISO14443A (all bit rates), NFC type 1, 2 and type 4 (NFC-A only)
- Outstanding read range with maximum transmission current up to 300mA
- 1mVpp receiver sensitivity
- On-chip framing codec and framing handler
- 256-Byte EEPROM
- Power consumption is only 5.5uA in power-down mode

Interface and Peripheral

- SPI interface up to 10 Mbps
- 64-byte send and receive FIFO-buffer
- 64-byte addressing
- User-configurable registers
- 256-byte EEPROM
- Interrupt (IRQ) PIN
- Programmable timer
- Programmable clock divider for external MCU
- Low jitter on-chip oscillator buffer
- On-Chip dual 80 mA 3.3V regulators

Reader Demo Kit

Pi941-MD

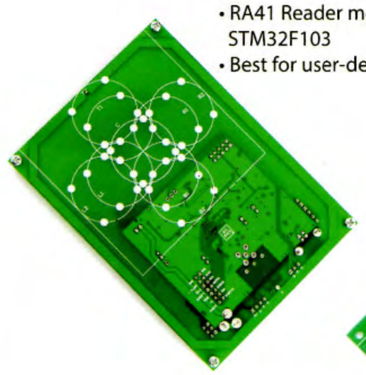
- RA41 Reader module with STM32F103
- Best for user-design antenna

Pi941-XA5

- RA41 Reader evaluation kit /reference design with 14 x 14 cm PCB antenna
- Best for medium-to-long read distance applications with multi-tag reading

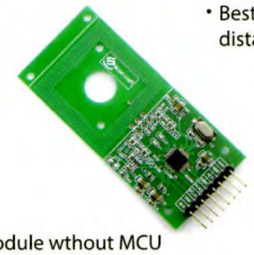
Pi941-EMV

- RA41 Reader module with STM32F103
- Best for user-design antenna



Pi941-X34CC

- RA41 Reader evaluation kit / reference design with 5 x 3.5 cm PCB antenna
- Best for short to medium read distance application



FES41D1

- RA41 Reader Module wthout MCU
- Best for customer perferred MCU

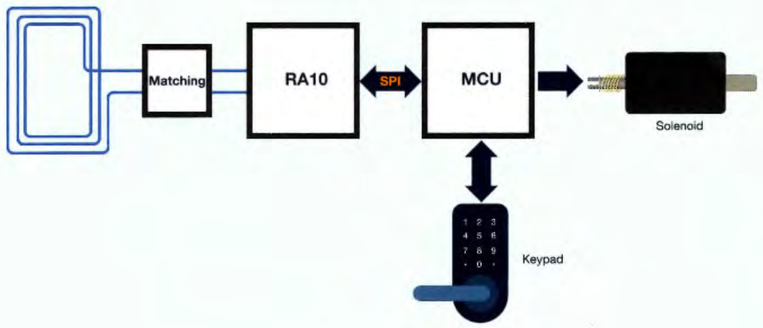
Doorlock Application

In door lock application, the most two parameters that being considered are the capabilities to read the card and the power consumption. For reading the card, the RFID reader chip must provide high transmitting power to read the tag at the long distance. Moreover, the reader chip must consume very low power while it is in power down mode. With this, user doesn't have to change the battery frequently.

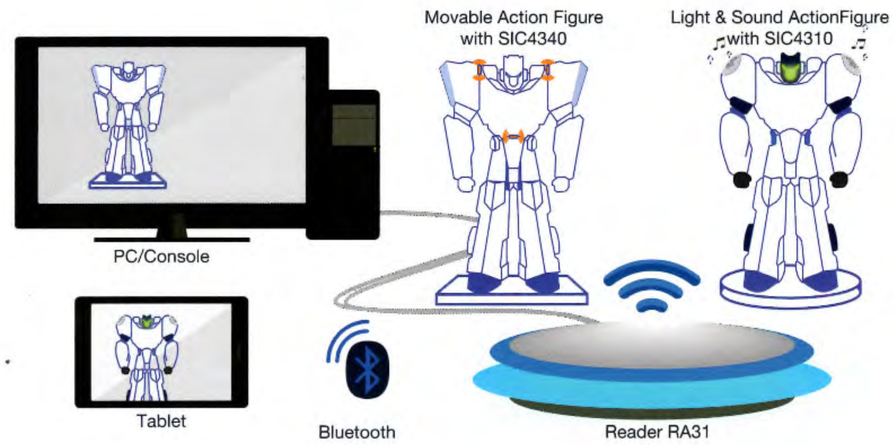
SIC's reader chip RA10 provides many benefits to ensure that the communication will be stable, makes battery life last longer, and also reduce the BOM so overall cost is reducing.

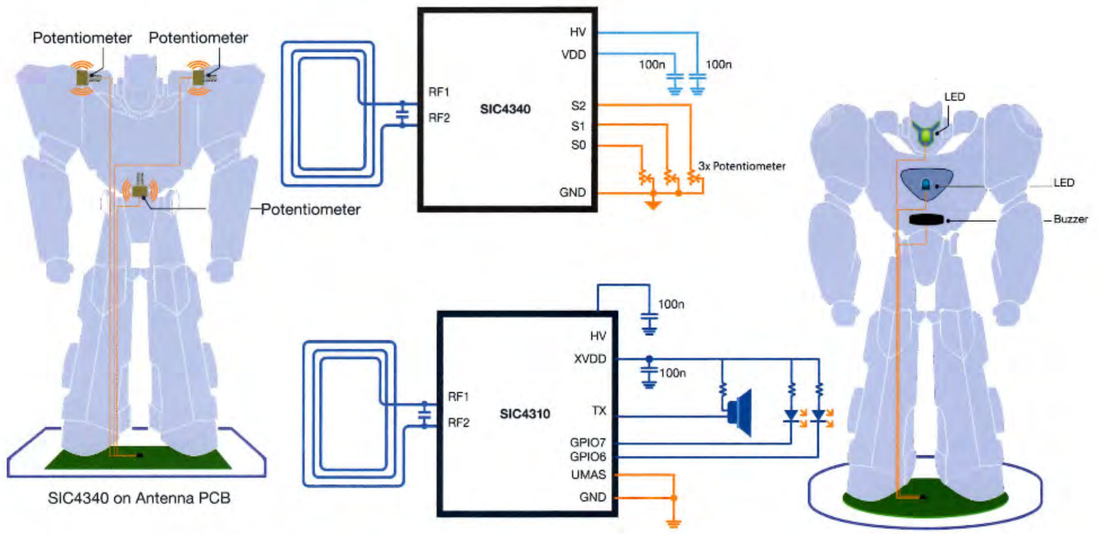
- **High transmission power** makes longer read distance and easy for product designing
- **Consumes only 5.5uA** when power down to make the battery life lasts longer
- **2x On-chip 3.3V regulator can reduce BOM cost**
- **Closely FAE support** for user's customized designing from the beginning to the en

RA10 Operating Circuit Diagram in doorlock configuration



Toys Application





Enhances NFC toy concept capabilities

- Increase fun and player activity involvement with interactive action figure
  - SIC4310 provides up to 10mA power harvesting for battery-less light & sound figure
  - More playable features by the Sensor-interface circuit within SIC4340 e.g. parameter change by the sensor's value

Ultra-FDX Transponder IC

SIC7888

SIC7888 is a read/write low frequency FDX RFID microchip intentionally designed to maximize the read range. The on-chip 1184-bits EEPROM allows additional information to be stored for user applications or on-site database. The chip contains 32-bit unique identification number for anti-collision and 64-bit traceability data for optional identification.

Memory

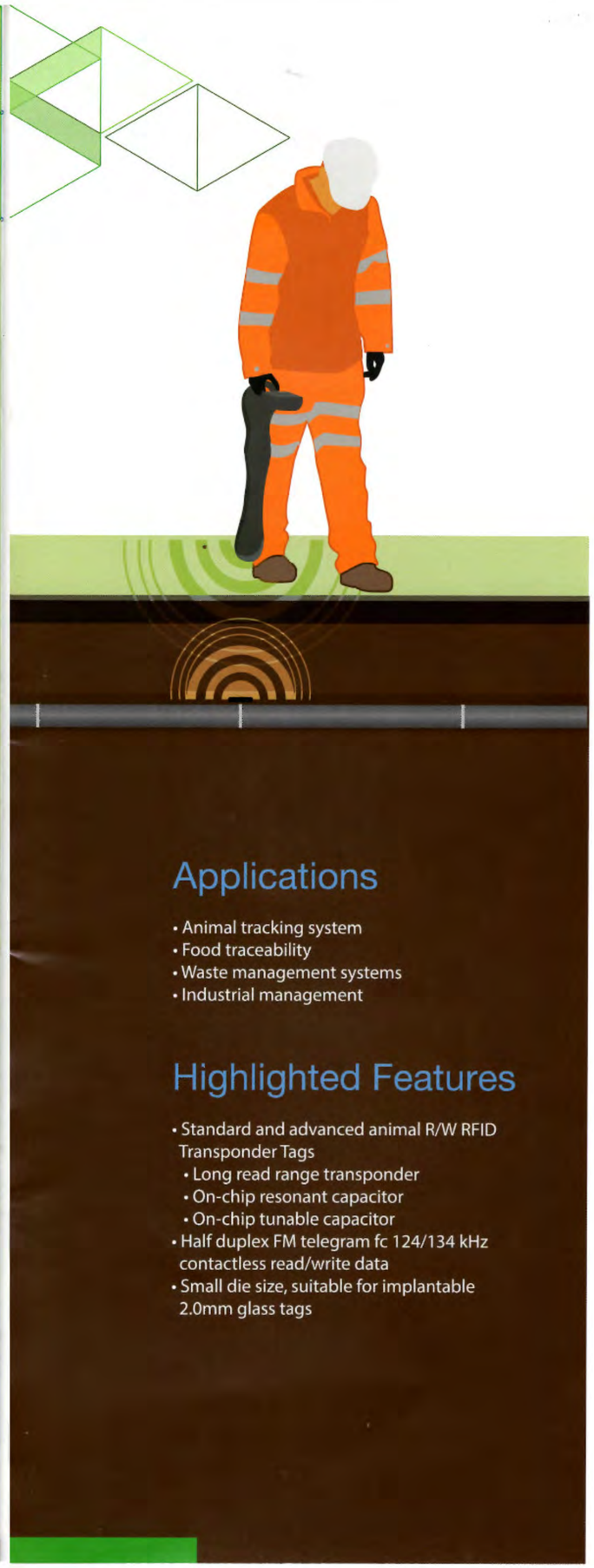
- 1408-bit (44 x 32) EEPROM
- 1184-bit (37 x 32) in user memory area
- More than 100,000 erase/write cycles
- 10-year non-volatile data retention
- Secure memory lock functionality
- 32-bit unique identification number (UID)
- 64-bit traceability data

Applications

- Livestock management
- Animal identification
- Automation industries
- Item tracking systems
- Logistic management
- Access control systems
- Vending machines
- Sport systems

Highlighted Features

- Best read range performance by SIC's C-boost technology
- Compatible with ISO11784/85 animal ID data structure
- Resonant and fine-tuning capacitor array on chip
- Anti-collision support
- Two levels of password authorization
- Low power consumption



Ultra-HDX Transponder IC

SIC279

134.2-kHz HDX transponder IC for advanced animal electronic tagging, is designed by taking advantage of SIC's patented `Energy Harvesting technique' engendering a ground-breaking result of 15% increase in read range compared to the previous SIC7900 product.

Applications

- Animal tracking system
- Food traceability
- Waste management systems
- Industrial management

Highlighted Features

- Standard and advanced animal R/W RFID Transponder Tags
  - Long read range transponder
  - On-chip resonant capacitor
  - On-chip tunable capacitor
- Half duplex FM telegram fc 124/134 kHz contactless read/write data
- Small die size, suitable for implantable 2.0mm glass tags

Memory

- R/W user data memory of 6X32 (192 bits) for database management
- Supporting user access for factory unique ROM ID (UID), preventing chips from cloning
- Write endurance > 100,000 R/W cycles
- Memory retention > 20 years
- Direct Access/Write Mode
- Protected Direct Access/Write Mode
- Write Mode
- Read-Only Animal ID sections when no command received
- Read/Write or OTP Configuration
- Supporting cascade commands
- Comprehensive error logging reports

The LF FDX Automotive Glass Transponder IC with 128-bit AES Encryption

XES128F

The XES128F is the highest security LF FDX transponder IC , which integrates AES128-bit with SIC proprietary protocol. The XES128F performs 128-bit mutual authentication. The memory can be accessed and written by SIC proprietary protocols with unencrypted or encrypted telegram (optional). The encrypted telegram is implemented in order to increase security of read/write operation.

The XES128F memory organizes in 3 parts: (A) 32-bit unique ID which is pre-configurated prohibit user from changing, (B) 128-bit AES Secret key which uses for AES encryption process and also encrypts the communication protocol, and (C) 128-bit R/W user memory.

The XES128F is an integrated the on-chip air-tunable capacitor, automatically tuning the transponder frequency to 125 kHz which covers ±10% variation of production. Moreover, the package has small size which is suitable for implanting in 2.0-mm glass tag form factor.

Applications

- DX immobilizer keys
- LF access control systems

Highlighted Features

- Low-frequency FDX transponder ideal for car immobilizer applications.
- 128-bit AES the highest security encryption R/W immobilizer
- Mutual authentication
- Encrypted communication (optional)
- On-chip resonant capacitor and calibration array
- Easy for production (covers ±10% variation of antenna inductance)
- Small package size, suitable for implantable 2.0 mm glass tag
- Contactless and batteryless

	TN-01	TM-01	TD-01
TAG TYPE	Fixed-code	Encryption	LF RFID encryption
COMMUNICATION TECHNOLOGY	FDX		HDX
MODULATION	ASK		–
DOWNLINK (Reader to tag)	–		ASK (PWM and PPM)
UPLINK (Tag to Read)	–		FSK
DATA ENCODING	Manchester		NRZ
	Differential Bi-phase		
FREQUENCY	130 kHz	125 kHz	134.7 kHz
	64/128-bit fixed code	Two-way authentication	Authentication
	16-bit of password	96-bit of secret key	Fast authentication
		32-bit of PIN Code	Mutual authentication
			40/80 bits of secret key
DATARATE	RF/32		RF/16
	RF/40		
	RF/64		
MEMORY	Write endurance 200,000 R/W cycles		8-bit selective address
	Memory retention > 20 years		32-bit programmable identification (manufacturing code and ID)
	128-bit of user memory (R/W)	96-bit of user memory (R/W)	
	16-bit of device configuration(R/W)	32-bit of device Identification (read only)	
	16-bit of password (write only)	32-bit of PIN (write only)	40/80 bit secret ket
		96-bit of secret key (write only)	336-bit user memory
			800-bit extended memory

The Encrypted Low-frequency FDX/HDX Automotive Glass Transponder IC

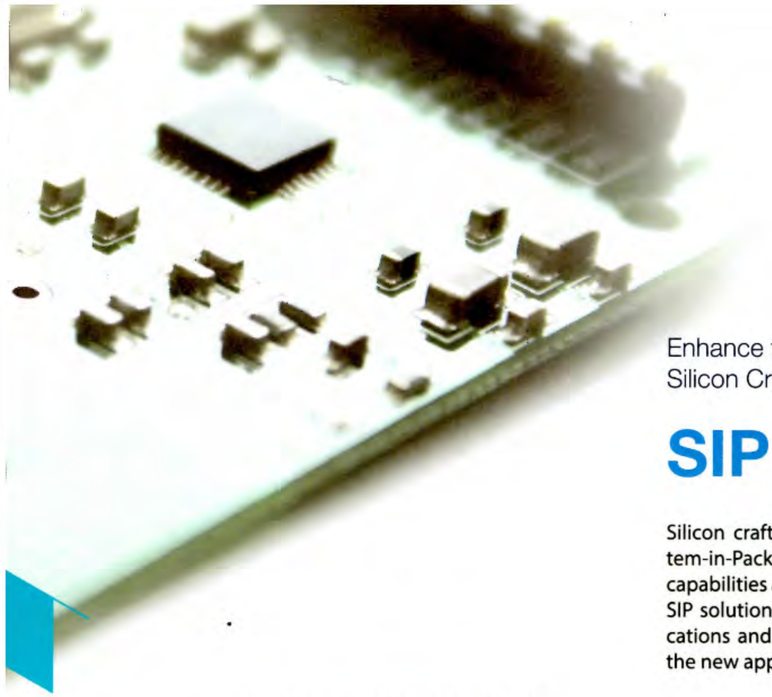
TM-01/TN-01/TD-01

The TM-01,TN-01and TD-01 are the encrypted low frequency FDX automotive transponder ICs, which adopts the advance technology from SIC.

TM-01is the FDX encryption type, and fully compliant with M-2 transponders. It features 96-bit secret key, and 32-bit PIN code for the encryption. TN-01 is the fixed-code type, with 16-bit of password for security purpose instead.

Moreover, TD-01 is the HDX transponder IC with 40/80 bit secret key encryption .

TM-01,TN-01and TD-01 are provided with the ID programmable feature that can be operated by utilizing the general write command. Moreover, all of them are implemented with the on-chip capacitor for ensuring that every single IC can perform well on the resonance frequency.

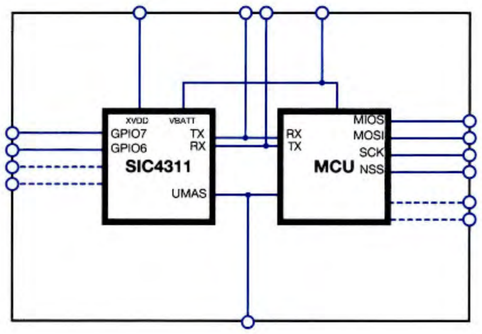


Enhance the capabilities of
Silicon Craft's IC by the SIC solutions

SIP Solutions

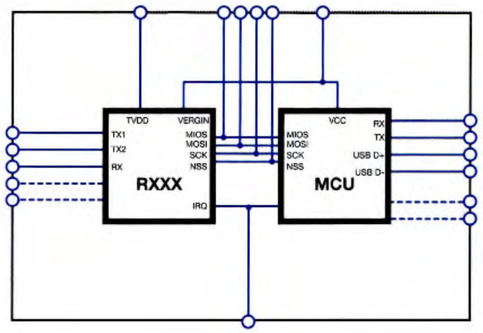
Silicon craft technology offers the SIP (System-in-Package) solutions for increasing the capabilities and features of our ICs. Moreover, SIP solution can match-up with many applications and can create more possibilities to the new applications.

EXAMPLE PRODUCT MATCHUP



SIC4311 + MCU

- More suitable for Data logging / Sensor Node/ Metering application
- All-in-one solution for communition -over-NFC solution
- Can be connected/SIP with SIC8630 to increase communication channel and can be setup network



RFID/NFC Reader IC+MCU

- Complete set for using RFID/NFC Reader IC with embedded firmware
- Robust and Easy-to-start solution

UHF Transceiver IC with Low Power RF Wake-up Mode

SIC8630 is UHF transceiver IC. It is designed to meet the lowest-power consumption by using RF wake-up receiver, which allows any battery-operated devices to retain the lowest power standby mode.

Moreover, the SIC8630 will wake the microcontroller unit up whenever it receives the wake-up signal (ONLY). This product is suitable for application that needs the sniff interval of 1 second and consumes less than 2uA.

Features Summary

- Ultra Low Power wake-up Receiver(OOK): 1mA @ -60dBm sensitivity
- Ultra Low Power RF sniff mode: 2uA for sniff interval of 1s
- Digital Antenna tuning
- Digital XTAL tuning
- Programmable multi-channel ISM bands 868/433MHz
- Highly Data Integrity with Data Packet Handler
- Programmable Data rate up to 100kBaud
- Programmable RF output power (-30 to -4dBm)
- 5.7mA Tx mode, -4dBm (OOK/FSK)
- 2mA Rx mode, -60dBm sensitivity (OOK)
- Low sleep current, data retained (800nA)
- Operating Voltage 2.4-3.6 V (suitable for standard coin cell battery 3V)
- SPI Interface

Highlighted Features

- Design to meet longest battery life (>5yrs) for mid-range communication
- 2uA power consumption in RF sniff mode
- Automatic antenna tuning
- Programmable multi-channel ISM bands 433/868MHz

Applications

- Walk-THRU access control
- Asset tracking
- Home automation systems
- Health care

NFC Product Selection guide

		NFC-ENABLER		PRODUCT AUTHENTICATION			SENSOR
		SIC4310	SIC4311	SIC43NT	SIC43S1	SIC4340	SIC4341
	NFC Forum tag type	TYPE 2					
	User memory(Bytes)	228	228	144	816	192	192
	Password Protection(pF)			x	x		
	Internal Resonant Capacitor	30.3	30.3	50	50	50	50
	Speacial Feature	UART and GPIO (8x GPIO Max.)	UART and GPIO (7x GPIO Max.)	Tampering Detection	Tampering Detection and Mutual authentication	ADC	Potentiostat Sensor Interface
RFD Pin Mode	RFD Pin						
	RF Detection	• Push-Pull • Open Drain - Field Present - Communication start					
	RF Detection Event	UID read					
	Tampering Detection			x	x		
	Sleep Mode			x	x		
Power Harvesting and consumption	Power Harvesting	Up to 10 mA	Up to 10 mA				
	Standby Current	80 uA	80 uA				
	GPIO Output Sincking Current	6 mA	6 mA				
	GPIO Output Sourcing Current	6 mA	6 mA				
	External Idle current consumption	80uA (XVDD pin)	0.1uA (VBAT pin)				
Tamper Feature	Max. Resistance of Tamper loop			200 kΩ	200 kΩ		
	Max. Tamper length*			2m	TBD		
	Tamper Status Mirror on NDEF			x	x		
	Tamper Status Size			1 byte	1 byte		
Dynamic Data	Event-triggering Dynamic NDEF			x	x		
	UID ASCII on NDEF			x	x		
	Rolling code mirror : Length			8bytes	45bytes		
	Rolling Code Generator Engine			Stream Cipher	OCB-AES		
	Encrypt Communication				x		
	Counter Size			32bits			
	Secret Key			80 bits	128bits		
Sensor Bias Characteristic	ADC Resolution					•10-bits ENOB •2x 8-bit DAC •0-1.275V	•10-bits ENOB •2x 8-bit DAC •0-1.275V
	Biasing current source					5mV/step	5mV/step
	Limited Voltage for measurement					0-1.27V	0-1.27V
	Reference Voltage					1.28V	1.28V
	Special function					3-channel multiplexed	Potentiostat Sensor interface
Package Information	Pin Count	16	16	4	4	16	16
	Package Available	QFN3x3	QFN3x3	DOW with bumped DFN	DOW with bumped DFN	QFN3x3	QFN3x3
	Application	•Wireless Firmware upgrading •Interactive Poster •Industrial Machine Interface •Smart Toys	•Wireless Firmware upgrading •Industrial Machine Interface •Metering /Vending Machine •Smart Toys	•Product Authentication •Tampering Detection •Electronics Product Label •OTP Card •Promotion •Coupon/Ticket	•Product Authentication •Tampering Detection •Secure NFC Tag •Small payment	•Sensor Interface •Voltage Measurement •Impedance(R-C) Measurement	•Potentiostat Type Sensor •Glucose Sensor

*Paired wire

		ACCESS CONTROL	PAYMENT	
		RA10	RE31	RE41
	Protocol			
	ISO14443A (106 to 848 kbps)	x	x	x
	ISO14443B (106 to 848 kbps)		x	x
	Felica Frame CODEC (212, 424 kbps)			x
	ISO15693, EPC Class-1 HF, ISO/IEC 18000-3		x	x
	Interface	SPI	SPI	SPI
	Rx Automatic Gain Control	x	x	x
	EMD Suppression	x	x	x
	BPSK Pattern Recognition Method for ISO14443B		x	x
	NFC Tag			
	Type1	x	x	x
	Type2	x	x	x
	Type3			x
	Type4	x (only NFC-A)	x	x
	Operating Voltage			
	TVDD	2.7-7V		
	AVDD	3.3V		
	DVTT	3.3V		
	Power Consumption			
	Transmittion Current	200 mA @ 5V 300 mA @ 7V		300 mA @ 5V 400 mA @ 7V
	Soft Power Down Mode	6.0 uA		
	Standby Mode	1.3 mA		
	Memory Information			
	EEPROM memory (Bytes)	-		256
	FIFO-buffer send and receive (Bytes)	64		64
	Memory Information			
	Package Avaliable	QFN32/TSSOP		
	Application	• Smart Toys • Secure access control	• Contactless payment system • Secure access control • Handheld RFID reader	• Contactless Payment Sysrem

Reader Selection guide