SIC4341

236-Byte ISO14443A RFID/NFC Tag IC
with built in ADC and Potentiostat AFE
REV 1.5

Features Summary

Components

- **1.9V on chip regulator**
- **1.28V internal voltage reference**
- **Transimpedance Amplifier**
- **Built-in ADC**
  - Adjustable OSR 6-to-16-bit resolution
  - Conversion rate 0.1 sps upto 20 sps
- **Two 8-bit DACs for WE/RE Biasing**

Built-in Potentiostat AFE

- **Sensor Electrode Channel**
  - Selectable 2/3 electrode system
  - Configurable electrode channel
- **Bias Potential Range: -0.8 V to + 0.8 V**
  - VRE, VWE range 0.4 V to 1.2 V
  - Minimum step size 5 mV
- **Current Range**: Selectable
  - ± 2.5 µA full scale
  - ± 20 µA full scale
- **Current Accuracy**
  - ± 5 nA for ± 2.5 µA range
  - ± 20 nA for ± 20 µA range
- **Data Streaming** controlled from NFC mobile App or RFID reader software
  - Minimum time step 50 ms (depending on delay from mobile or reader)
- **Compatible Electrochemical Techniques**
  - Amperometry
  - Voltammetry

RF Interface

- Compliance with ISO14443A - 106 kbps
- NFC Forum tag type 2

Memory

- 236 bytes addressable EEPROM
- 48 bytes for calibration parameters (factory characterization information for software calibration for higher accuracy)
- 144 bytes user memory EEPROM
- EEPROM organization enabling NDEF format
- EEPROM zone for initializing register – automatically reload after power up
- Up to 100,000 erase/write cycles
- Up to 10 years memory retention at 70˚C

Operating Conditions

- Operating temperature: 0°C to 55°C
- Storage temperature: -40°C to 85°C

Package Information

- QFN 3x3 – 16 leads
- Au-bumped 12-inch die on wafer ring
- Pad size: 80 µm x 80 µm

Applications

- Chemical sensor NFC tag
- Biosensor NFC tag

Ordering Information

Part No.	Description	Package	Marking	Product Status
P40CDC60DU0UT4110R6	SIC4341-10, Potentiostat sensor interface with NFC type 2 DOWTB, UV sheet, Wafer ring, Dice	Die on Wafer	-	Released
P40CVQK4P20UT4110C2	SIC4341-10, Potentiostat sensor interface with NFC type 2 QFN 0.85 mm, Canister, IC	QFN	4341C	Released

Functional Overview

Typical operating system

The SIC4341 operating in an RFID Tags with 3-terminal chemical sensor is shown in Figure 1. Two external capacitors can be optionally connected to pin **HV** and **VDD** to enhance power stability. A loop antenna is directly connected from pin **RF1** and **RF2** for RFID/NFC communication. Chemical sensor is connected to pin **IO[0]** to **IO[2]** in which the pins can be flexibly remapped to Reference Electrode (RE), Working Electrode (WE) , and Counter Electrode (CE) of internal potentiostat circuit.

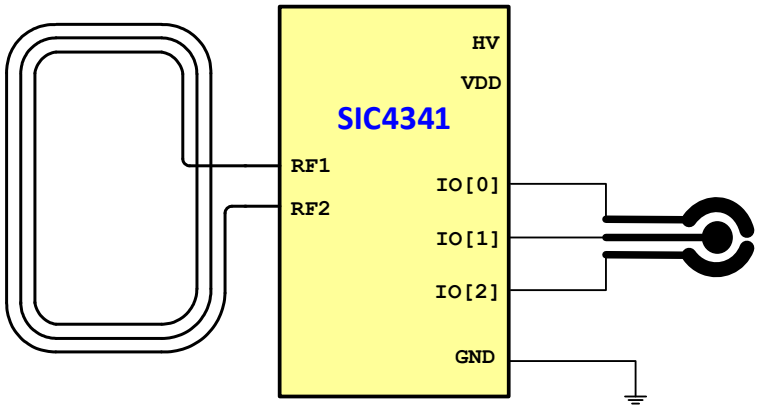

Figure 1: Basic connection of the SIC4341 with 3-electrode chemical sensor

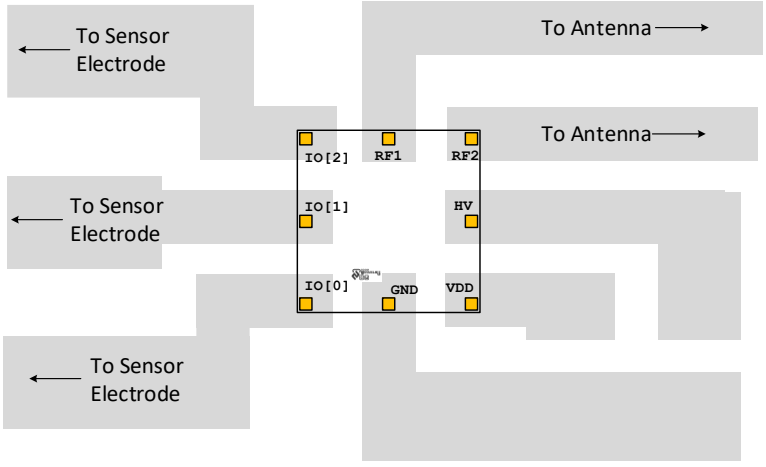

Figure 2: Example of inlay design for flipped chip with antenna and sensor interface (SIC4341 is flipped into inlay)

Die and Package

Die information

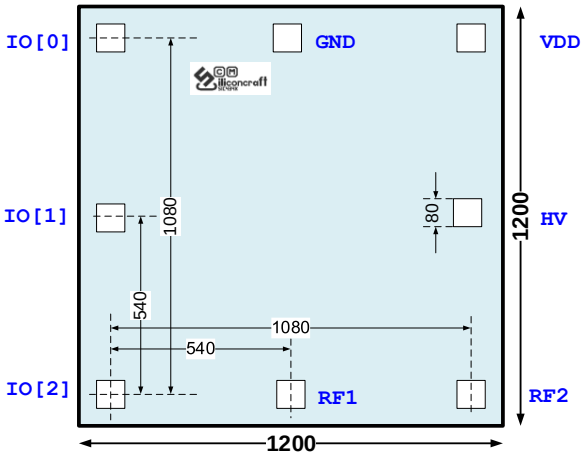

Figure 3: Die pad information view from die surface (dimension in µm)

Table 1: Pad description

Pad	Symbol	Type	Description
1	IO[0]	Analog	Sensor electrode connection Pad 0
2	IO[1]	Analog	Sensor electrode connection Pad 1
3	IO[2]	Analog	Sensor electrode connection Pad 2
4	RF1	Power	RF-Coil Connection Pad 1
5	RF2	Power	RF-Coil Connection Pad 2
6	HV	Power	Unregulated power supply to connect with external decoupling cap
7	VDD	Power	ADC power supply to connect with external decoupling cap
8	GND	Power	Ground

QFN pin configuration

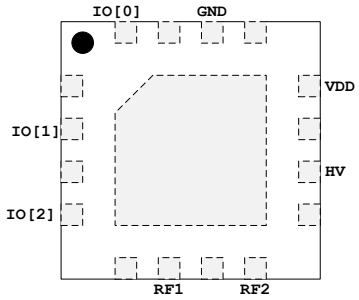

Figure 4: QFN 3x3-16 Pin configuration (Top View)

Table 2: QFN Pin description

Pin No.	Symbol	Type	Description
2	IO[1]	Analog	Sensor electrode connection Pin 1
4	IO[2]	Analog	Sensor electrode connection Pin 2
6	RF1	Power	RF-Coil Connection Pin1
8	RF2	Power	RF-Coil Connection Pin2
10	HV	Power	Unregulated power supply to connect with external decoupling cap
12	VDD	Power	ADC power supply to connect with external decoupling cap
14	GND	Power	Ground
16	IO[0]	Analog	Sensor electrode connection Pin 0