CRX14

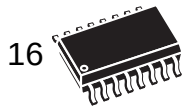
Low Cost 13.56MHz / I²C Short Range Contactless Coupler Chip with anti-collision, CRC management and anti-clone function

DATA BRIEFING

FEATURES SUMMARY

- Single 5V ±500mV Supply Voltage
- SO16N package
- External Oscillator
  - 13.56MHz Quartz
  - 32.768kHz Quartz with Frequency Multiplier
- Contactless Communication
  - 13.56MHz Carrier Frequency
  - ISO 14443B - 2 Air Interface Compliant
  - ISO 14443B - 3 Frame Format Compliant
  - Support Frame Answer with/without SOF/ EOF
  - CRC generation and check
  - France Telecom Proprietary Anti-Clone Function
  - Automated ST anti-collision exchange
- I²C Communication
  - Two Wire I²C Serial Interface
  - Supports 400 kHz Protocol
  - 3 Chip Enable pin
  - Up to 8 CRX14 connected on the same bus

Figure 1. Packages



SO16 (MQ)
150 mil width

Complete data available under NDA.

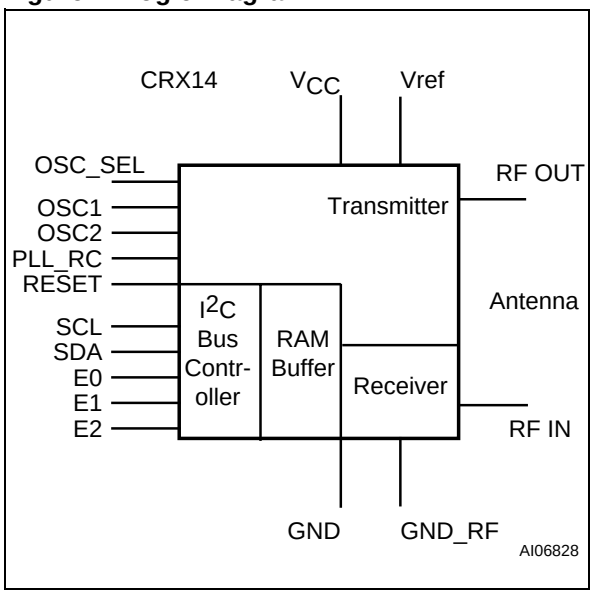
SUMMARY DESCRIPTION

The CRX14 is a contactless coupler, compliant with the short range ISO14443B standard controlled, using the two wire I²C bus.

The CRX14 generates a 13.56MHz signal on an external antenna. Transmitted data are modulated using Amplitude Shift Keying (ASK) modulation. Received data are demodulated from the tag load variation signal, generated on the antenna, using Bit Phase Shift Keying (BPSK) coding of an 847kHz sub-carrier. The Transmitted ASK wave is 10% modulated. The Data transfer rate between the CRX14 and the tag is 106Kbit/s in both transmission and reception modes.

The CRX14 follows the ISO 14443 part 2 type B recommendation for the radio-frequency power and signal interface.

Figure 2. Logic Diagram

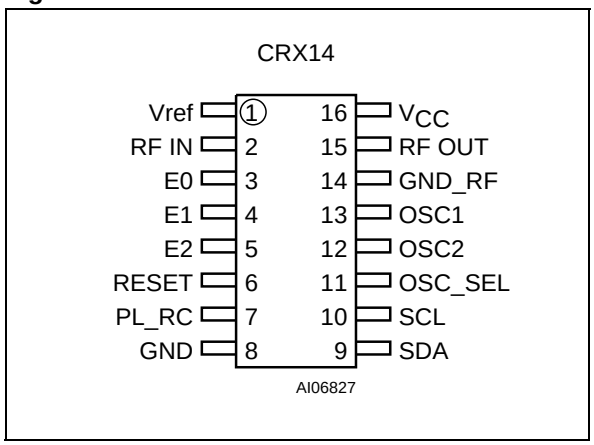


The CRX14 targets short range applications which need disposable or secure and re-usable products. The CRX14 includes an automated anti-collision mechanism that allows it to detect and select tags present at the same time within range of the CRX14. The anti-collision is based on the STMicroelectronics probabilistic scanning methodology. The CRX14 provides an anti-clone function from FRANCE TELECOM which allows tag authentication. With the use of the single chip coupler CRX14, it is easy to design a reader with the authentication capability and to build a system with a high level of security at low cost.

Table 1. Signal Names

RF OUT	Antenna Output Driver
RF IN	Antenna Input Filter
VCC / GND	Power Supply & Ground
GND_RF	Ground for RF circuitry
OSC1 / OSC2	Oscillator input
PLL_RC	PLL RC filter Input
Vref	Transmitter Reference Voltage
OSC_SEL	13.56MHz/32.768kHz osc select
RESET	Reset
SCL	I²C Clock
SDA	I²C Bi-Directional Data
E0	I²C Chip Enable
E1	I²C Chip Enable
E2	I²C Chip Enable

Figure 3. SO Connections



The CRX14 provides a complete analog interface, compliant with the ISO/IEC 14443 recommendations for a radio-frequency power and signal interface. It allows the ISO 14443-2 type B proximity tag to be powered and to have control data transmitted, via a simple antenna. The CRX14 is fabricated with STMicroelectronics High Endurance Single Polysilicon CMOS technology.

The CRX14 is organized in four blocks:

– The I²C bus controller handles the serial connection with the application host. It is compliant with the 400kHz I²C bus specification and it controls the read/write access to all the CRX14 registers.
– The RAM buffer is bi-directional. It stores all the request frame bytes to be transmitted to the tag and all received bytes send by the tag on the answer frame.
– The transmitter powers all the contactless tags, within range, by generating a RF magnetic field at 13.56MHz on an external antenna. The field is 10% modulated using ASK (amplitude shift keying) modulation for outgoing data.
– The receiver demodulates the signal generated on the antenna by the load variation of the contactless tag. The resulting signal is decoded by a 847KHz BPSK (binary phase shift keying) sub-carrier decoder.

The CRX14 is designed to be connected to a digital host (Microcontroller or ASIC) which has to manage all the communication protocol in both transmit and receive mode through the I²C serial bus.

CRX14 DEVICE OPERATION

The CRX14 chip coupler provides four volatile registers. They control all the behaviour of the device and are described in Table 2.

Table 2. CRX14 Control Registers

I2C Address		Access	Purpose
00h	Parameters register	W	Set parameter register
		R	Read parameter register
01h	Input/Output frame register	W	Store and send request frame to the tag. Store tag answer frame
		R	Transfer register content to Host
02h	Authenticate register	W	Start the Authenticate process
		R	Get the Authenticate status
03h	Slot Marker register	W	Launch the automated anti-collision process
		R	Not Applicable. Return data FFh.

PART NUMBERING

For a list of available options (speed, package, etc.) or for further information on any aspect of this device, please contact your nearest ST Sales Office.

Table 3. Ordering Information Scheme

Example: CRX14 – MQ / XX

Device Type
CRX14

Package
MQ = SO16 (150 mil width)

Customer Code
XX = Given by the issuer

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