Security & Chip Card ICs

SLF9000 Terminal IC

Terminal IC for Contactless Chip Cards
according ISO 14443- Type A and B

Short Product Information 05.00

SLF9000 Short Product Information
This document contains preliminary information on a new product under development. Details are subject to change without notice.
Revision History: Current Version 05.00
Previous Releases: 03/99, 09/99 (former product name: ISO-CLL)

Page	Subjects (changes since last revision)
2	Contact phone and fax number changed
8	Package type description

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Attention please!

The information herein is given to describe certain components and shall not be considered as warranted characteristics.

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Infineon Technologies is an approved CECC manufacturer.

Information

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office in Germany or our Infineon Technologies Representatives world-wide (see address list).

Warnings

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office.

Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Terminal IC for Contactless Chip Cards according ISO 14443- Type A/ B with multiplexed/ demultiplexed 8- bit parallel interface

Features

- **Carrier freq. 13.56 MHz**

- **Data rate 106 Kbit/s**

- **Data transparent**

- **Register driven operation**

- **all ISO 14443 protocols supported**

- **additional other protocol (e.g. type B2 -fast Siemens)**

- **Frame length up to 128 bytes**

- **Type A (e.g. Mifare), deterministic anticollision procedures supported by HW**

- **8-bit parallel interface with three selectable modes:**

  - non-multiplexed

  - multiplexed (Intel compatible)

  - Enhanced Parallel Port (EPP) interface

- **128 Byte FIFO for burstwise data transmission/ reception**

- **Transmission error detection by CRC according ISO 3309 and CCITT-16 with programmable CRC modes**

- **Optional odd parity handling**

- **Supports inexpensive external single Analog Interface (AIF)**

- **Free programmable 16 bit hardware timer
  e.g. for real time operation**
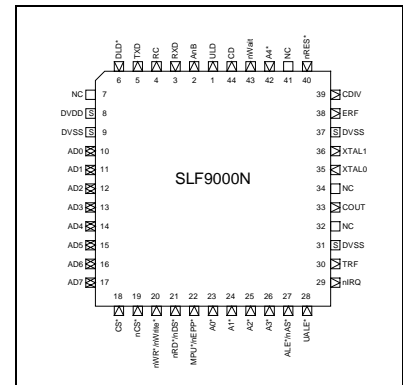
Encoders

- **Transaction speed: 106 Kbit/s according to ISO 14443**
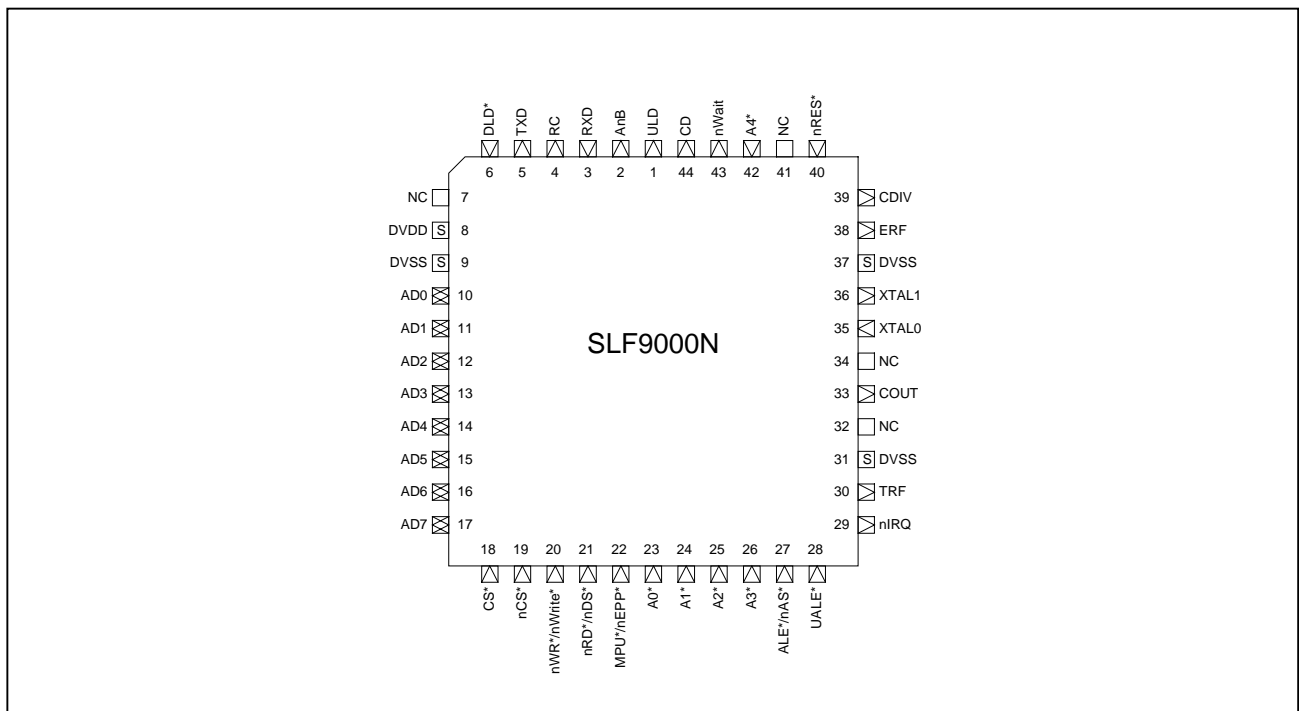
- **Cascade level operation supported**

Decoders

- **Slot marker operation possible**

- **Decoding algorithm parameters adjustable**

- **Any number of time slots supported**
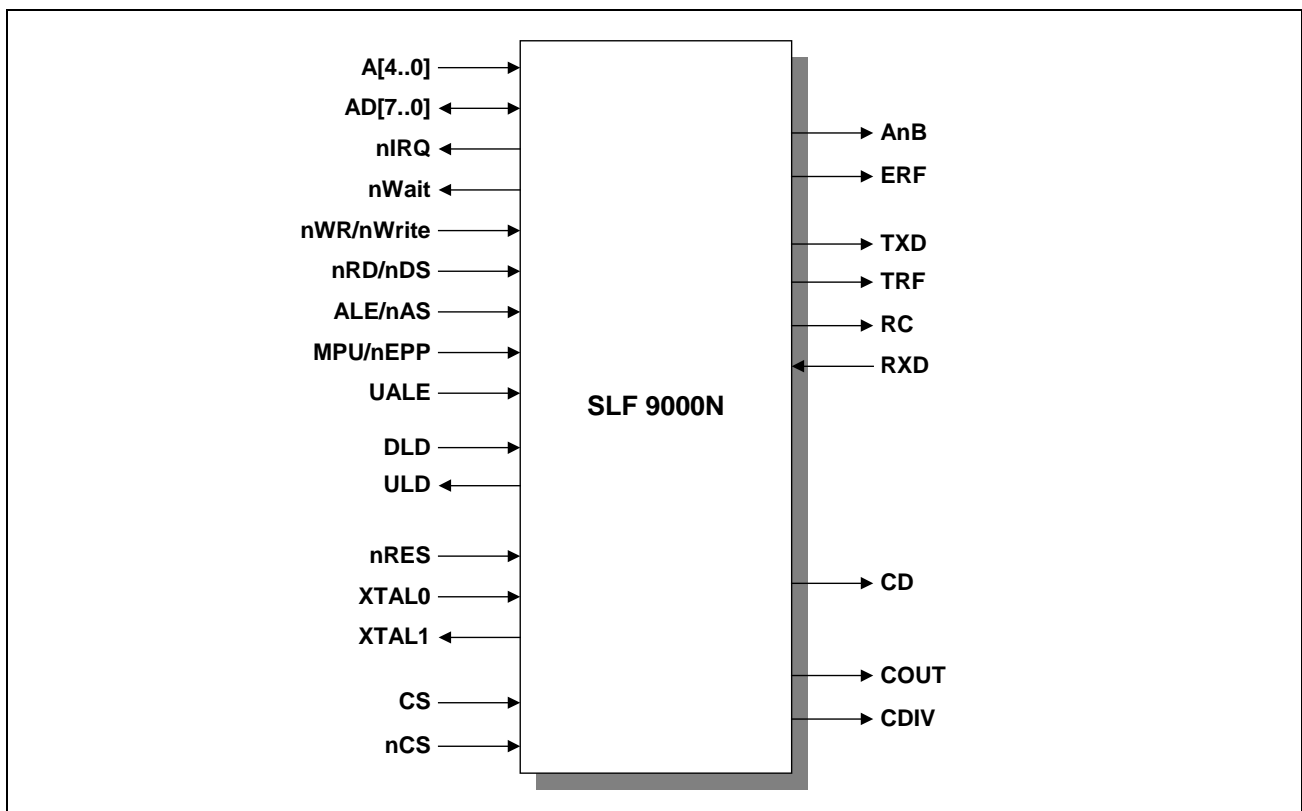
Table 1   Ordering Information

Type	Package	Option
SLF9000N	PLCC 44	Q67100-Z3104

1 Pin Description

Figure 1   Pin Configuration (top view)

Figure 2   Pad Configuration

Table 2   Pin Definitions and Functions

| Pin	Symbol	Function	
8	DVDD	Digital supply voltage (+ 3.3/5V)	
9, 31, 37	DVSS	Digital ground (GND)	
40	nRES	Reset input, low-active	
35	XTAL0	Xtal input: oscillating signal of a simple 13.56 MHz crystal here or external oscillator sqaure wave	
36	XTAL1	Xtal driver: crystal driver output , left open if external oscillator used	
33	COUT	Clock out: 13.56 MHz clock output signal (e.g. for AIF)	
39	CDIV	Clock divisions: 13.56 MHz clock divided by multiples of 2 or 3 for environmental circuits (divider rate adjustable by internal register settings)	
29	nIRQ	Interrupt output, allows interrupt operation (active level adjustable by reg.)	
2	AnB	Type A not B: type selection output to AIF; type A when high, B when low	
38	ERF	Enable RF: directs AIF to switch on/off RF signal	
5	TXD	Transmit- signal to Analog Interface (AIF)	
30	TRF*	TXD with RF: signal shape of TXD combined with 13.56 MHz	
4	RC*	Residual carrier; type B residual carrier to drive small RF units directly	
3	RXD	Receive- signal from AIF	
44	CD	Collision detected: extra line to monitor a collision in serial operation	
1	ULD	Uplink data: serial digital output of decoded data from the AIF	
6	DLD	Downlink data: serial digital input to the encoder for direct mode operation	
22	MPU/nEPP	MPU mode when high	enable EPP mode when low
42,26,25,24,23	A[4..0]	5-bit address bus for non multiplexed mode (see UALE)	---
17,16,15,14,13,12,11,10	AD[7..0]	Data (and address; see UALE) bus, 8 bit	Multiplexed address / data bus
28	UALE	use ALE; multiplexed MPU interface when high	**-chip test mode-**
27	ALE/nAS	Address latch enable;strobe for the internal address latch when using a multiplexed MPU inter-face (see UALE), high active	Address strobe, low active; latch AD bus into internal address latch
43	nWait	---	EPP Port ready when high
20	nWR/nWrite	Write strobe in MPU mode; register selected by addresses A[4..0]	Write on selected address when low, Read from when high

Pin	Symbol	Function	
21	nRD/nDS	Read strobe, low active	data strobe, low active; AD pattern is data
18	CS	Chip select: enables MPU IF when high (functional AND wired to nCS)	---
19	nCS	not chip select: enables the MPU IF when low (functional AND wired to CS)	---

n..: active low   **...*: high load output signals**

2 Description

The SLF9000 (ISO14443 compatible Contactless Logic- IC) is a transparent contactless terminal IC. It features as a link between an analog interface (AIF) for RF based contactless chip cards (PICC) and a given host system.
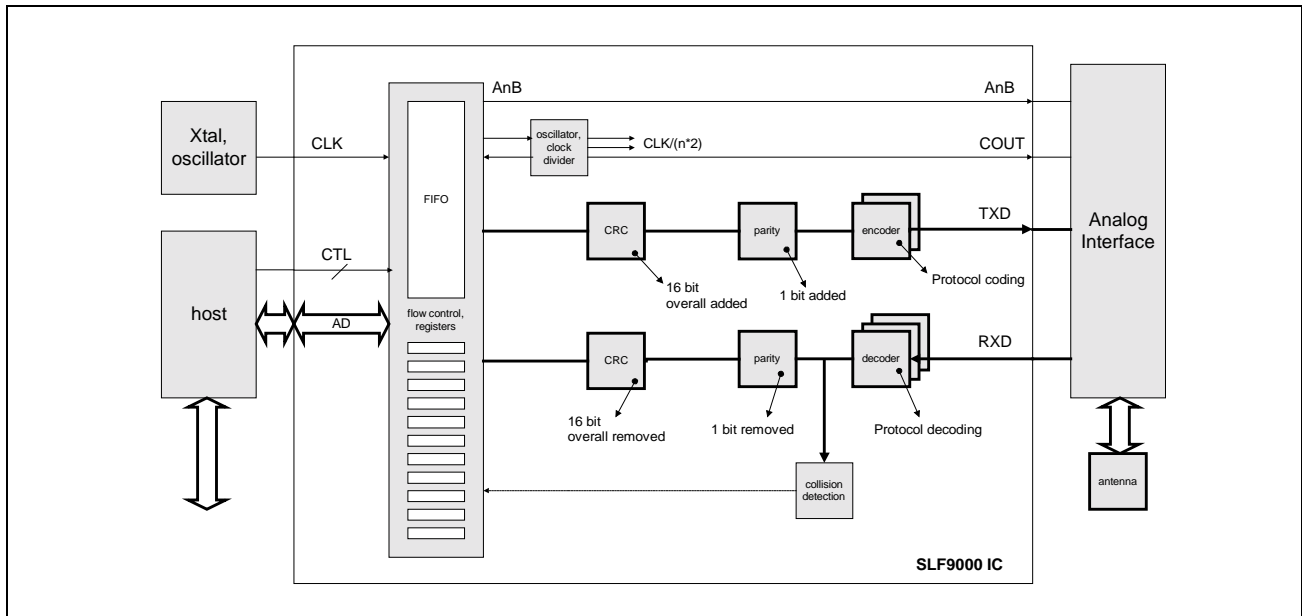
Figure 3   Block Diagram

The SLF9000 is fully register controlled. It performs the encoding and decoding of data according ISO 14443 (Type A and B). Additionally CRC- and parity bits may be added by setting the dedicated control registers. These settings are widely independent and adjustable by software: coding style (Miller/NRZ), error correction (CRC/ Parity), anticollision (Mifare® deterministic/ slotted aloha), decoder type (Manchester/ BPSK).

The SLF9000 offers two kinds of host interfaces. The Enhanced Parallel Port (EPP) Interface is dedicated for evaluation and debugging purposes or lowest cost solutions. The parallel port of a standard personal computer can be used to directly address and supply the registers of the SLF9000 with data (multiplexed 8bit-data/address bus). The MPU Interface opens a variety of system integrated solutions with serial (e.g. RS232, RS 422) or bus oriented (e.g. RS485, USB, Firewire, IIC, PCI, ISA) interfaces to the host system. It serves mass production and stand alone PCDs (PCD = Proximity Coupling Device).

The SLF9000 supports low cost external single Analog Interface (AIF) for modulation and demodulation of type A and B systems with a carrier frequency of 13.56 MHz. The SLF9000 provides ample information on the current status of the contactless interface. As many cards operate on antennas the information may be used to perform collision detection and to handle transmission errors by software.

The SLF9000 does not perform security functions by hardware. All authentication may be for example a task of the host system. Accordingly, all security information is kept centrally on the host system. Security attacks against the terminals have no effect.
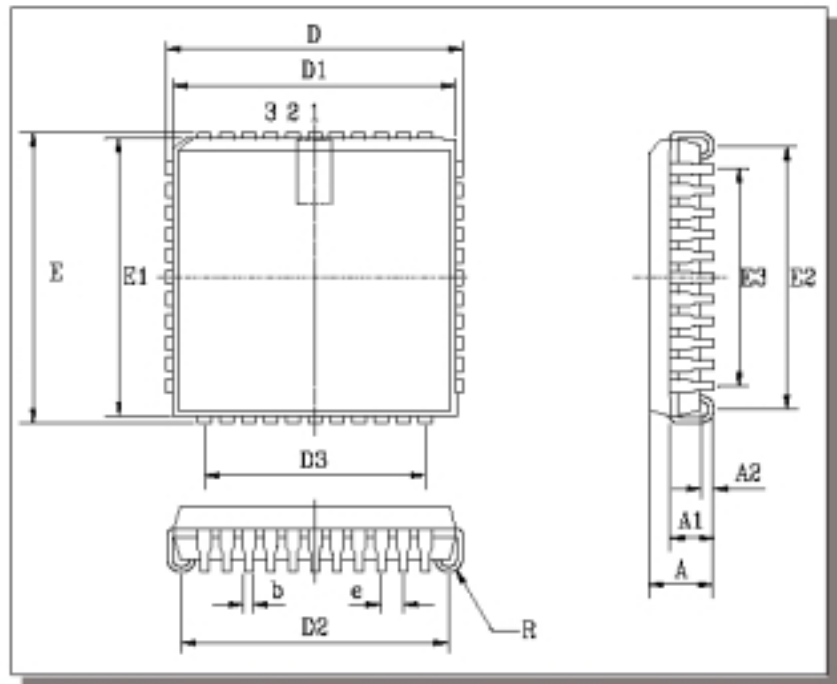
3   Package and Dimensions

Figure 4   PLCC44

Table 3   Chip Dimensions (inch)

Plastic Leaded Chip Carrier (PLCC)

PLCC 44

Package Type		D/E	D1/E1	D2/E2	D3/E3	A	A1	A2	e	b	R
PLCC 44	min	0.685	0.650	0.590	0.500	0.165	0.090	0.020	0.050	0.013	0.025
	max	0.695	0.656	0.630		0.180	0.120			0.021	0.045

Dimension: inch, coplanarity < 0.04'', original dimension: inch

Table 4   Chip Dimensions (mm)

Plastic Leaded Chip Carrier (PLCC)

PLCC 44

Package Type		D/E	D1/E1	D2/E2	D3/E3	A	A1	A2	e	b	R
PLCC 44	min	17.40	16.51	14.99	12.70	4.20	2.29	0.51	1.27	0.33	0.64
	max	17.65	16.66	16.00		4.57	3.04			0.53	1.14

Dimension: inch, coplanarity < 0.1 mm, original dimension: inch