

Features

CPU

- ✓ High-performance 8051-compatible 8-bit CPU
 - 1 instruction = 1~3 machine cycle(s)
 - 1 machine cycle = 4 clock cycles (typical)
- ✓ System clock frequency can be configured
 - Internal clock: 4MHz, 8MHz, 16MHz
 - External clock: contact interface clock and contactless interface clock

Memories

- ROM
 - ✓ Size: 32 KB, to store user program
- FLASH
 - ✓ Size: 80 KB
 - ✓ Page size: 128 bytes
 - ✓ Erase and program operation: page erase and page program
 - Page Erase is mandatory before a Page Program operation (consecutive Page Program is NOT supported)
 - ✓ Typical time: erase 2.5ms, program 2.5ms
 - ✓ Bit logic: random values after erasing, 1b/0b after programming 1b/0b
 - ✓ Usage: data and code
 - Support CODE Banking and XDATA Banking
- RAM
 - ✓ Size: 4.5KB
 - 256 bytes, IDATA
 - 4096 bytes, XDATA
 - 256 bytes, RF communication buffer
- OTP
 - ✓ 8 bytes SN
 - ✓ 10 bytes UID

Algorithms and Peripherals

- Symmetric algorithms
 - ✓ DES/T-DES
 - ✓ SM1
 - ✓ SSF33
- Peripherals
 - ✓ CRC: 16-bit CRC-CCITT
 - ✓ TRNG: True Random Number Generator, for secure transactions
 - ✓ DMA: Data block copy or comparison
 - ✓ Timer: 2 timers

Interfaces

- ISO/IEC 7816 Slave interface
 - ✓ Support T=0/T=1 protocol



THD20F06BD Dual Interface Smart Card IC

32 KB ROM

80 KB FLASH

4.5 KB RAM

Beta



- ✓ Support 10 baud rates: F/D = 11H, 12H, 13H, 18H, 91H, 92H, 93H, 94H, 95H, 96H
- ✓ 3BH and 60H are sent automatically by hardware
- ✓ Contactless interface and contact interface (T=0) can work simultaneously
 - When contactless transaction is in progress, contact interface can automatically cache the contact command header and send the NULL byte 60H
- ISO/IEC 14443 interface
 - ✓ Compatible with ISO/IEC 14443 Type A and Type B
 - ✓ Type A and Type B auto-adaption
 - ✓ Support baud rates:
 - Normal rate: 106 kbit/s
 - Enhanced rates: 212 kbit/s, 424 kbit/s
 - ✓ TR1, SOF, EOF, EGT in Type B response frame can be configured by software
 - ✓ Support Crypto1

Security

- Electrical Environment Detectors:
 - ✓ High/low clock frequency detector
 - ✓ High/low voltage detector
- SPA/DPA attacks protection
- Power on reset and power off reset
- Watch Dog Timer
- EAL4+ security certification

Work parameters

Symbol	Name	Conditions	Min	Max	Unit
TPE	Time to Erase a page		2.0	2.5	ms
TPP	Time to Program a page		2.0	2.5	ms
TDR	Data Retention		10		year
NPE	Page Endurance		100 k		Cycle
f _{INT}	Internal Clock Freq.		4	16	MHz
T _{AMB}	Ambient Temperature		-40	85	°C
V _{ESD}	ESD Protection	HBM		4	kV
f _{EXT}	External Clock Freq. of Contact interface		1	5	MHz
V _{CC}	Contact interface Voltage		2.7	5.5	V
I _{CC}	Contact interface: Supply current	VCC= 5.0V		10	mA
		VCC= 3.0V		6	mA
I _{SB}	Contact interface: Standby current	VCC= 5.0V	Clock Stop	200	uA
		VCC= 3.0V	Clock Stop	100	uA

Descriptions

THD20F06BD is an 8-bit CPU dual interface smart card IC with ROM, FLASH, RAM memory, and hardware DES / TRNG / CRC / SM1 / SSF33. It is suitable for contactless and/or contact smart card applications, such as ID Card, City Card, Campus Card, Oil card, etc.

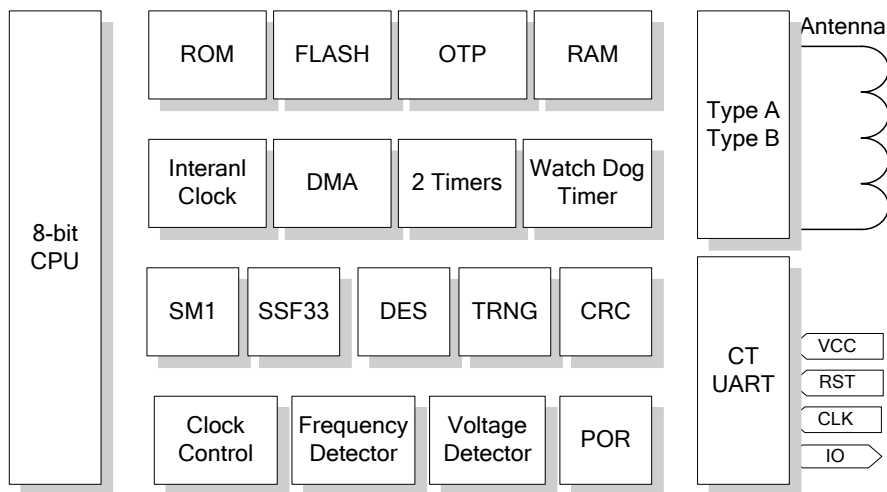
Compatible with ISO/IEC14443 part 1/2/3 Type A and Type B protocol, the card can be operated by a standard Type A or Type B reader at a distance up to 10 cm. Software can configure the card to be automatically adaptable to Type A and Type B protocol, or to be only Type A or Type B.

It is also compatible with ISO/IEC 7816 part 1/2/3 T=0 and T=1 protocol. The ISO/IEC 7816 command header can be received automatically and the NULL byte (60H) can be transmitted automatically, while contactless interface is busy in contactless transaction. Therefore, the contactless interface and the contact interface (ISO/IEC 7816 T=0) can work simultaneously.

For software development convenience, the IC provides hardware DES/ TRNG/ CRC/SM1/SSF33 to efficiently cut software code size and to save transaction time. The IC support DMA to copy data by hardware to accelerate data copy, data comparison, FLASH reading and writing, and cryptographic algorithms.

For better security and reliability, the IC provides enhanced security features, e.g., Electrical Environment Detectors, and Anti-SPA/DPA protections.

Chip Structure



Development Toolkits

- ✓ SCDS series Hardware Emulator (Target board inside)
- ✓ IDE: Keil uVision2/3/4
- ✓ Demo project and API (Application Program Interface) codes
- ✓ User Manual and Application Notes
- ✓ The UDVG software tool to generate COS downloading script with customized format



Package and Pin Definitions

Package:

Package	Remark	Application
Wafer	8-inch	Any
Module	Contact/contactless/ dual-interface	Smart card
Card	Contact/contactless/ dual-interface	Smart card
SOP8	-	
DIP18	-	

Pin definitions for a dual-interface card package.

Contact defined in ISO/IEC 7816-2	Signal Name	Function Descriptions
C1	VCC	Power Supply Voltage
C2	RST	Reset Signal Input
C3	CLK	Clock Input
C5	GND	Ground
C7	I/O	Data Input/Output
C4, C6, C8		Not Connected
--	VA	Contactless card antenna interface
--	VB	Contactless card antenna interface



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