Features

CPU

- ✓ High-performance 32-bit ARM core
- ✓ 3-stage pipeline
- ✓ Little Endian
- ✓ CPU operating clock can be configured
  - Internal clock :7.5 MHz/15 MHz/30 MHz (nominal)
  - External clock: Contact smart card input CLK supply via C3 (ISO/IEC 7816)

Memory

- ➢ FLASH
  - ✓ Size:280 KB
  - ✓ Page size:512 bytes
  - ✓ Erase and program operation: Page Erase and Byte Program
  - ✓ Typical time: erasing 4ms, programming 30μs
  - ✓ Bit logic: 1b after erasing, 0b after programming to be 0b
  - ✓ Usage: data and code
- ➢ RAM
  - ✓ Size: 9 KB
  - ✓ Usage: data and code
- ➢ OTP
  - ✓ User OTP:224 bytes
  - ✓ SN:17 bytes

Algorithms and Peripherals

- ➢ Symmetric algorithms
  - ✓ DES/T-DES
- ➢ Peripherals
  - ✓ CRC: 16-bit CRC-CCITT
  - ✓ TRNG: True Random Number Generator, for secure transactions
  - ✓ Timer: Two 16-bit timers, one ETU timer

Interfaces

- ➢ ISO/IEC 7816-3 serial interface
  - ✓ UART supporting ISO/IEC 7816-3 T=0/T=1 protocol and 11 baud rates:
    F/D = 11H, 12H, 13H, 18H, 91H, 92H, 93H, 94H, 95H,96H,97H
  - ✓ ISO/IEC 7816 interface DMA support
  - ✓ Dedicated ETU Counter for Null byte (60H) generation
  - ✓ Support GSM power consumption standards, including Clock Stop mode

Security

- ✓ Scrambling data storage

THC80F09AD-B

Contact Smart Card IC

280KB FLASH

9 KB RAM

Beta

- ✓ High/low voltage and high/low clock frequency detectors
- ✓ CLK filter(ISO/IEC 7816 external clock)
- ✓ Security Certification Targeted: EAL4+

Operating Characteristics (Note 1)

Symbol	Name	Conditions	Min	Typical	Max	Unit
T_{DES}	Time for Executing 64-bit DES Encryption	Single DES		17		clock cycle
T_{PE}	Time for Erasing a Page		1	4	5	ms
T_{BP}	Time for Program a Byte		25	30	35	μs
T_{DR}	Data Retention		10			year
N_{PE}	Page Endurance		100000			Cycle
f_{EXT}	External Clock Freq.		1		5	MHz
f_{INT}	Internal Clock. Freq.		7.5		30	MHz
V_{CC}	Supply Voltage		1.62		5.5	V
I_{CC}	Supply Current	V_{CC}= 5.0V			10	mA
		V_{CC}= 3.0V			6(Note 2)	mA
		V_{CC}= 1.8V			4(Note 3)	mA
I_{SB}	Standby Current (Clock Stop)	V_{CC}= 5.0V			200	μA
		V_{CC}= 3.0V			100	μA
		V_{CC}= 1.8V			100	μA
T_{AMB}	Ambient Temperature		-25		85	°C
V_{ESD}	ESD Protection	HBM	4			kV

Note 1:This document is a Beta version, data and descriptions (including this table) can not be a formal evidence for performance and functions of the IC.
Note 2: When operating at external clock or 15MHz (or lower) internal clock.
Note 3: When operating at external clock or 7.5MHz (or lower) internal clock.

Descriptions

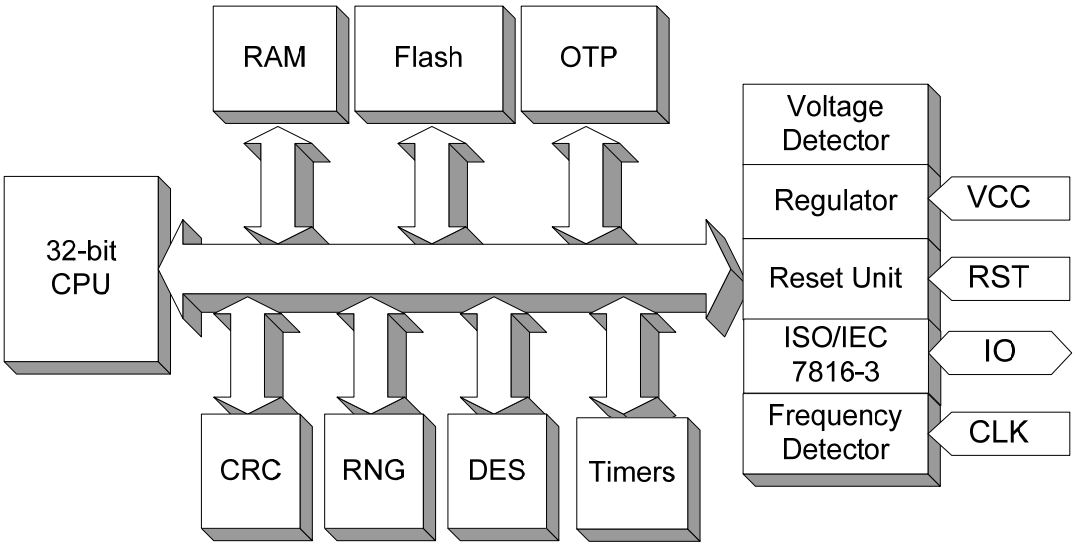
THC80F09AD-B is a 32-bit CPU contact smart card IC with a total of 280 KB FLASH and hardware DES/TRNG/CRC, suitable for general IC card applications, such as SIM, Banking Card, Pay-TV Card, Campus Card, City Card, etc.

The developers can divide the memory into different parts and size for different priority.

To facilitate software development, the IC embeds hardware DES/ TRNG/ CRC. COS developers can enjoy smaller code size and less execution time.

For better security and reliability, the IC offers many hardware security features, e.g., Write-protection for a configurable FLASH area, High/low voltage and high/low clock frequency detection, etc.

Structure



Development Toolkits

- ✓ AK100 Emulator
- ✓ TMC Hardware Emulator
- ✓ IDE:Keil uVision3/4
- ✓ Demo project and API(Application Program Interface)codes
- ✓ User Manual and Application Notes
- ✓ The UDVG software tool to generate COS downloading script with user desired format

Package and Pin Definitions

Different packages are available, e.g., wafer / module / card, etc.

Listed are pin definitions for a card package.

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

Important Notice

The publication must be encrypted and e-mailed to the qualified customer (person / organization) whose official e-mail address has been water-printed as signature. Other kinds of delivery are forbidden, and Beijing Tongfang Microelectronics Co. Ltd. (TMC is short for the company name hereinafter) reserves the right to pursue this matter through legal channels.

TMC reserves the right to make changes to its product specifications and this document without notice; customer could get the latest version of product specifications and this document by contacting the contact point mentioned in the end page. TMC assumes no responsibility, for any loss, harm or other consequences resulting from the use of information contained herein.

TMC recommends the product described in this document being used for the application it is designed to; detailed qualification is recommended before the judgment of suitability. TMC makes no warranty or guarantee regarding the suitability of its products for any particular purpose, includes but not limited to aircraft, space, military, medical and life-support system; and TMC assumes no responsibility for such use.

This document could not be the evidence to transfer intellectual property mentioned herein, includes but not limited to patent, trade mark or software copyright.

Contact Us

Beijing Tongfang Microelectronics Co., Ltd
Address: Floor 18th, Building D, Tsinghua Tongfang Hi-tech Plaza,
No.1 Wangzhuang Road,
Haidian District,
Beijing 100083,
P.R.China
Tel.: +86-10-82351818
Fax: +86-10-82357168
Email: support@tsinghuaic.com