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:360 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-A Contact Smart Card IC

**360 KB 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-A is a 32-bit CPU contact smart card IC with a total of 360 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
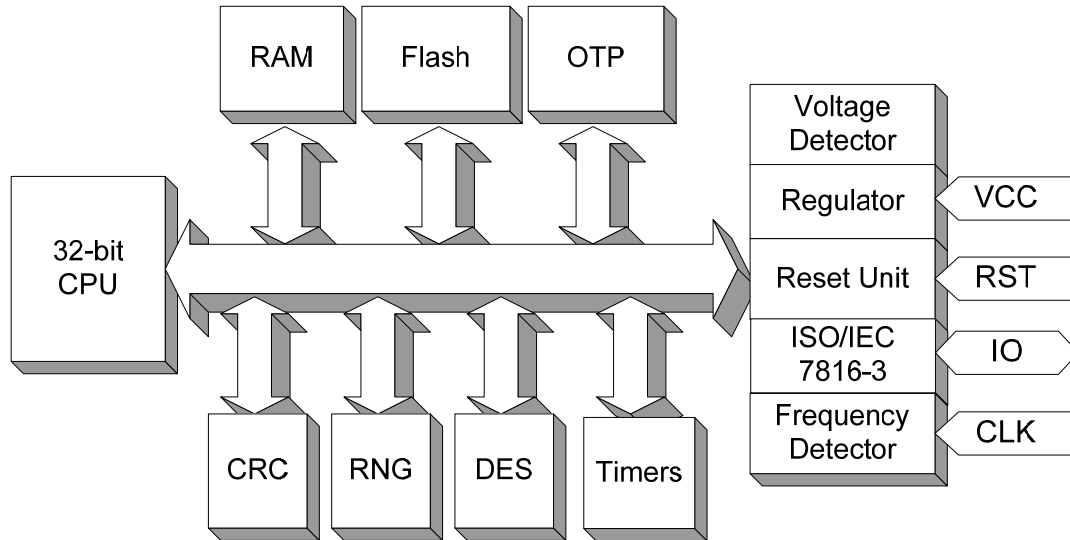
Development Toolkits

- ✓ 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

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