

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:420 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: 9KB
 - ✓ Usage: data and code
- OTP
 - ✓ User OTP:224bytes
 - ✓ 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



THC80F09AD Contact Smart Card IC

420 KB FLASH
9 KB RAM

Beta



- ✓ Scrambling data storage
- ✓ 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
TDES	Time for Executing 64-bit DES Encryption	Single DES		17		clock cycle
TPE	Time for Erasing a Page		1	4	5	ms
TBP	Time for Program a Byte		25	30	35	μs
TDR	Data Retention		10			year
NPE	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

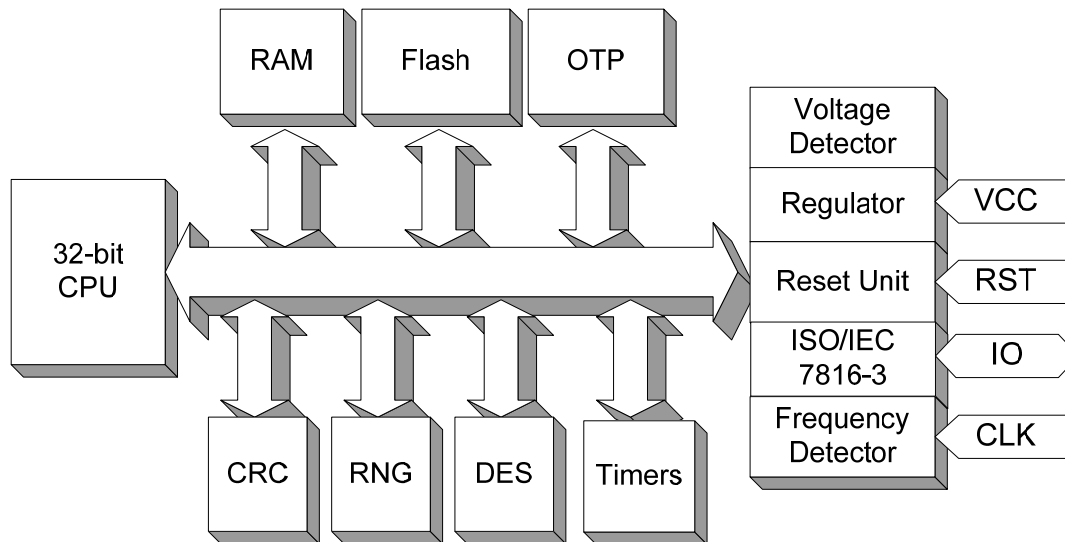
THC80F09AD is a 32-bit CPU contact smart card IC with a total of 420 KB FLASH and hardware DES/TRNG/CRC, suitable for general IC card applications, such as SIM, Banking Card, Pay-TV Card, Campus Card, City Card, etc.

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., 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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