

**Reliability
Proven
ETC chip
for China**

THOTH-III

The THOTH-III is an unique MCU that allows you to configure the essential features required for the vehicle's automotive grade ETC OBU at the minimum cost. It enables you to design full - performance ETC OBU with minimal number of external parts at lower power consumption and at smaller size and the highest reliability. You can easily start develop inexpensive but high-performing ETC OBU with AEC-Q100 Grade 2 certified THOTH-III chip.



High-performance CPU and small size

THOTH-III's Cortex-M3 100MHz high-performance CPU and 512KB of S-Flash for boot code and 8MB of S-Flash for voice storage are built-in in small PKG size.



Chinese standard compliant security co-processor

THOTH-III fully implements DES/3DES, SM4, and TRNG in hardware to support fast and complete ETC security functions using minimal CPU resources.



Highest performance DSRC modem & RF transceiver

THOTH-III receives data stably despite preamble loss and severe duty change due to Doppler shift and multipath fading that may occur in an automobile environment running at 160 km/h. In addition, it supports various test modes that can be conveniently used for ITSC certification, and it is equipped with an RSU function to communicate with the OBU, making it possible to build communication inspection facilities (ex, RSU) at low cost when mass-producing OBUs.



Simple removal detection & minimum power consumption

The THOTH-III operates on a single power source of 3.3V. Removal detection technology using SCPD(Super Cap Power Domain) can be applied to minimize the auxiliary power capacity of the OBU for detection of removal with small power consumption of 3uA or less.



THoPACK audio Lossless & high-efficiency compression

THoPACK, independently developed by Ranix, minimizes the memory capacity for voice storage with lossless, high-efficiency compression and high-quality audio output, and supports DMA function to display OBU operation status and billing results through AUDIO DAC without burdening the CPU. With voice guidance, the driver can conveniently and safely check the operation status of the OBU.



Various peripheral interfaces

THOTH-III has built-in UART, I2C, SPI, I2S, SCI, GPIO, ADC, WDT, PWM, TIMER, etc. including USB1.1, CAN and can easily interface with various peripheral devices.



Automotive-optimized, high reliability and affordable ETC OBU solution

THOTH-III is not only AEC-Q100 Grade2(-40°C to +105°C) certified to guarantee the electrical and environmental reliability required for automobiles but also it is possible to realize a high-performance in-vehicle ETC OBU at the lowest cost.

SPECIFICATIONS & FEATURES

CPU & Memory

- Core : Cortex-M3 (100Mhz) High performance CPU
- Internal 32KB SRAM
- External S-FLASH interface (512KB) for boot code
- External S-FLASH interface (8MB) for voice storage

High-Performance DSRC Modem

- GB/T-20851.x Chinese ETC Standard compatible
- Symbol Frequency-offset Tracking
- Ensuring Dynamic range & Frequency Offset margin
- Support OBU and RSU mode
- WAKE-UP signal (14KHz square-wave) generation support for RSU mode

Security co-processor

- DES/3DES, SM4, TRNG embedded

Audio

- Support excellent quality audio : THoPACK* with lossless codec and included I2S can be reduced memory size for audio.

* THoPACK is a audio compression format providing lossless, high-quality lossy, and a unique hybrid compression mode by RANIX.

Analog

- Internal POR / BOR
- Dual PLLs (System, USB)
- ADC : 2CH

RF

- Frequency Range : 5.79 to 5.84GHz
- Tx Power : max 10dBm
- Rx sensitivity : ≤ -80 dBm
- Wakeup Sensitivity : ≤ -50 dBm

Peripherals

- SCI : 2CH (Smartcard & ESAM) ISO7816-3 Interface
- USB : 1CH (v1.1 Device, 12Mbps)
- SPI : 2CH
- I2C : 2CH
- UART : 2CH
- I2S : 1CH
- GPIOs : 46EA (Dedicated: 6EA, multiplexed 40EA)
- WDT : 1EA
- PWM : 2CH
- Timer : 3CH
- Wakeup Source : 5EA (External INT)
- CAN: 1CH (2.0b & FD)

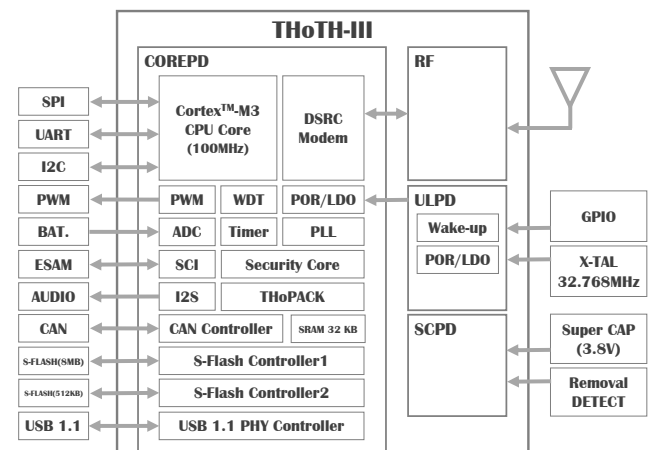
Auxiliary Functions

- Removal detector Integrated
- Internal LDOs (Core & Smartcard)
- JTAG & Serial wire debug(SWD) support

Power

- Single Power : CPU 3.3V only
- Supercap voltage for Removal detector : 3.8V

Block Diagram



General Availability : 2022. 1Q

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