ECM3532: Ultra-low-power 32-bit Arm® Cortex®-M3, NXP CoolFlux 16-bit DSP, 512kB Flash and 256kB + 96kB SRAM

Features:

- **Arm Cortex-M3 32-bit CPU**
  - Operating frequency up to 100MHz
    - Full CVFS self-timed core
  - < 1µA sleep mode with RTC on
  - < 5µA/MHz run mode

- **System Memory**
  - 512kB embedded FLASH
  - 256kB SRAM
  - 8kB BootROM + secure bootloader

- **CoolFlux DSP16**
  - Ultra-low power 16-bit DSP
  - Operating frequency up to 100MHz
    - Full CVFS self-timed core
  - Dual 16x16 MAC
  - 32kB Program, 64kB Data Memory

- **Clocks**
  - Integrated 32kHz, 16MHz oscillator
  - Integrated 8MHz RC oscillator

- **Always On Real time clock**
  - Time of Day/Month/Year + 2 alarms
  - Watchdog timer (interrupt or reset)
  - 16-bit Timer

- **32 GPIOs**
  - Bidirectional + open drain
  - Optional integrated pull up or down
  - Interrupts

- **OS Timer**
  - 64-bit counter
  - 4 comparators + overflow with interrupts

- **8 channel PWM**
  - Supports frequencies up to 1MHz

- **UART (2X)**
  - Supports baud rate up to 460,800
  - Optional Hardware flow control (RTS/CTS)

- **SPI master (3X)**
  - Supports frequencies up to 4MHz
  - SPI modes: 0,1,2,3 (LSB or MSB)

- **SPI slave (3X)**
  - Supports frequencies up to 2MHz

- **I2C master (3X)**
  - Supports standard (100kb/s) and full (400kb/s) transfer rates

- **I2S**
  - Supports mono or stereo input and output at 8, 16, or 32kSPS
  - 16 or 32-bit sample sizes

- **PDM (2X engines, 4X microphones)**
  - Supports input at 8 and 16kSPS

- **Power on reset**
  - Reset_n pin
  - Wake pin

- **Temperature sensor**

- **2 channel 12-bit 200kSPS ADC**
  - 1uW typical power consumption for 200kSPS continuous conversion

- **Ultra-high efficiency buck converters**
  - Supports both voltage mode and frequency mode operation
  - 1.6V to 3.6V power supply

- **5x5mm BGA Package**

V0p40

Eta Compute

Description:

ECM3532 is a system on chip (SoC) realized with an Arm Cortex-M3 processor and a CoolFlux DSP, 512kB of Flash, 352kB of SRAM, and supporting peripherals.

ECM3532 is implemented using Eta Compute's proprietary CVFS (Continuous Voltage Frequency Scaling) technology with near threshold voltage operation. It is intended to support ultra-low power artificial intelligence for the internet of things.

ECM3532 is a versatile AI platform that can interface with most sensors and implement many algorithms: sound classification, keyword spotting, object detection, people detection, people counting, activity classification, context awareness, defect detection and others.

ECM3532 is ideal for IoT applications that are battery operated or powered by energy harvesting such as:
- Low power embedded vision
- Wearable and hearable devices
- Asset tracking, asset monitoring
- Gesture, image and voice-based user interfaces
- IoT sensor nodes for security and building
- IoT sensor nodes for retail and inventory management
- Preventive maintenance and Industrial IoT

The ECM3532 also integrates an ADC to reduce the power for external sensing. With multiple methods of acquiring audio samples from microphones this chip is ideal for audio AI applications:

- PDM for digital MEMs microphones
- I2S for audio codec connections
- ADC for analog MEMs microphones

The chip includes on-chip power management which simplifies the use of CVFS with high-efficiency buck (step-down) converters that generate the required internal voltages for the chip.

The ECM3532 uses various flash memory techniques to implement debugger lockouts, flash read protection, flash write protection, etc. This allows the generation of a secure bootloader with hardware root of trust capabilities.

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Eta Compute