ASR1603 Brief Specification

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Product Overview

ASR1603 is a highly cost-efficient System on Chip (SoC) device which integrates application processing subsystem, communication subsystem, audio codec, and embedded pSRAM + flash to enable the most compact single-chip LTE/GSM multi-mode data module, POC, POS, and other IoT solutions. The communication subsystem integrates LTE CAT1/1bis/ GSM modem baseband and RF transceiver to cover 450MHz~2.7GHz bands for worldwide roaming. The application subsystem runs on a Cortex-R5 processor with integrated interface for 300K pixel camera and SPI LCD, as well as audio codec with VAD.

In addition, an extensive set of interfaces and connectivity peripherals are included to interface to cameras, displays, sensors, GPS, Bluetooth, etc.

The highlighted SoC device block diagram is shown in Figure 1.

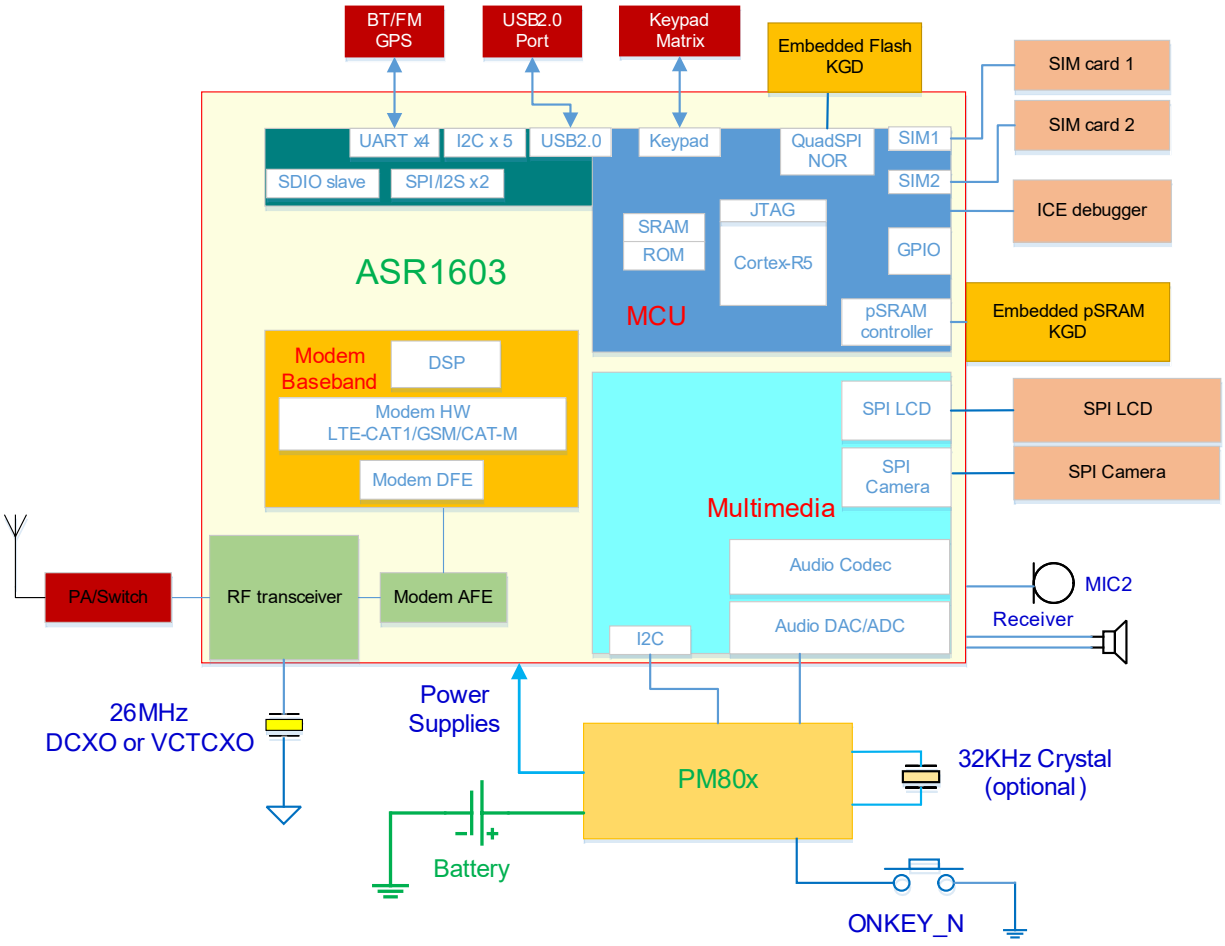

Figure 1 ASR1603 Block Diagram

SoC Device Features

Platform Features

- General
  - 22nm process, BGA package with 0.4mm pitch.
  - Operation temperature: -20~70 (C grade), -40~85 (I grade)
- Application Processor
  - ARM Cortex-R5 up to 614MHz clock
    - 32K I-Cache
    - 32K D-Cache
    - 64KB ATCM and 64KB BTCM
  - 64KB ROM and 64KB on-chip SRAM for application usage
- Memory
  - Embedded 8bit Octal-SPI pSRAM at 200MHz, support DDR mode. Up to 400Mbyte/s bandwidth.
  - Embedded flash with XIP (eXecute In Place) and QPI mode support, up to 102MHz.
- Peripheral Controllers
  - Keypad controller:
    - Support 4x4 keypad with hardware scanner and internal pull-up resistors.
    - Support multiple key press for gaming
    - Support direct key with build-in de-bouncing
  - GPIO (×32)
    - Pull-up/pull-down programmable
    - 1.8V IO
  - UART (×4)
    - With hardware flow-control, up to 3.6Mbps
    - One UART support Full 8-wire connection
  - USB 2.0(×1)
  - SDIO Device Controller for high bandwidth host CPU connection
  - I2C (×5)
    - Modes: 100KHz/400KHz/1MHz/3.4MHz
  - General SSP interface(×3)
    - Support both master and slave mode
    - Can be configured to SPI, PCM, I2S and Microwire format.
  - PWM (×4)
  - Dual SIM/USIM card controller
- Wireless connection interfaces
  - Bluetooth 5.0, FM， GNSS
- Security System
  - True Random Number Generator
  - 512bits OTP for security key
  - Secure Boot/Strap/Bonding
- Auxiliary analog inputs
  - 16x3 Auxiliary ADC with 2 input
  - PMIC may provide up to 5 analog input (depending on PMIC choice)

- Audio Codec
  - Integrated High quality audio codec and audio front-end
- Debug System
  - JTAG for CPU & DSP sub-system
  - UARTs and USB
- Boot System
  - Initial AP boot from UART/USB/SPI NAND
  - Strap pin & OTP for boot control
  - 64KB BootROM

Modem Features

- Modem baseband
  - FDD/TDD LTE CAT1/1bis/ CAT-M/ GSM
  - Support VoLTE
- Integrated RF transceiver
  - Cover frequency bands from 450MHz to 2.7GHz
  - Support both DCXO and external VCTCXO
- 32Kless
- Ultralow power

Multimedia Features

- Camera & ISP
  - Camera support up to 300K pixel sensor
  - Support 1/2 bit SPI interface
- LCD controller
  - Support standard SPI LCD module up to 320x240 resolution
- Audio Codec
  - Integrated High quality audio codec and audio front-end
    - ADC: 90dB SNR@20~20kHz
    - DAC: 95dB SNR@20~20kHz
  - single MIC input
  - Audio content sampling rates: 8kHz to 48kHz
  - Quad vocoders for adaptive multi-rate (AMR)
  - Noise suppression and echo cancellation
  - Digital side tone generator with programmable gain
  - Voice power amplifier with programmable gain