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Product Brief

Toshiba ApP Lite™ Series: TZ1000 One-Chip Solution for Sensor Devices

Highlights

- Integrates an ARM®-based microcontroller (MCU) and Bluetooth® Low Energy (BLE) functionality in a small System in Package (SiP) for sensor devices.
- Incorporates an ultra-low power, high-performance Cortex® M4F with digital signal processing and a floating point unit. The device has best-in class[1] μA/MHz.
- Easy to use for early prototyping of wearable devices on a reference module.
- Quick Starter Kits are available.

Description

With a push to connect everything to the internet, Toshiba ApP Lite processors not only enable raw data such as images and audio to be feed to the cloud, but also carry out high-performance signal processing using popular ARM® Cortex® processors. The TZ1000 is an application processor for wearable devices and integrates BLE wireless communications with optional sensors (accelerometer, gyroscope, and magnetometer), Flash memory and a processor in a single chip contributing to smaller and more compact devices. Furthermore, up to 20 additional external sensors can be connected.

Applications

- Wearables: Smart wristband, T-shirt, smart watch
- Machine-to-machine: Location tracking, environmental sensing and tracking
- Medical: Sleep diagnosis, tumble detection in hospitals
- Infrastructure: Lifetime diagnosis, non-destructive check
- Biometric identification: Uses biometric information to replace other forms of identification such as passwords, security badges, credit card numbers, etc.

TZ1000 Specification

CPU	ARM Cortex-M4F 48 MHz
Memory	288 KB
I/O	USB 2.0, I²C UART SPI 12 bit AD 24 bit ⊿ΣAD GPIO (PWM, etc.)
Storage	8 Mbit Flash
Security	128/192/256 bits key length AES engine, true number generator
Sensors *	3-Axis Accelerometer 3-Axis Gyroscope 3-Axis Magnetometer
Communication	Bluetooth low energy Receiver sensitivity –87 dBm Transmitter output Max 0 dBm

Notes. TZ1001: 3 axis-accelerometer TZ1011: 9 axis-(Acc, Gyro, Mag)
TZ1031: 6 axis-(Acc, Gyro) TZ1021: MCU and Flash Only

Middleware

Activity Meter:

- Estimate walking steps, distance and activity load combing data acquired using the accelerometer, gyroscope and pressure meter.
- Estimate the type of activity the user is doing, for example, walking, playing, eating, etc.
- Accurately calculate consumed calories.

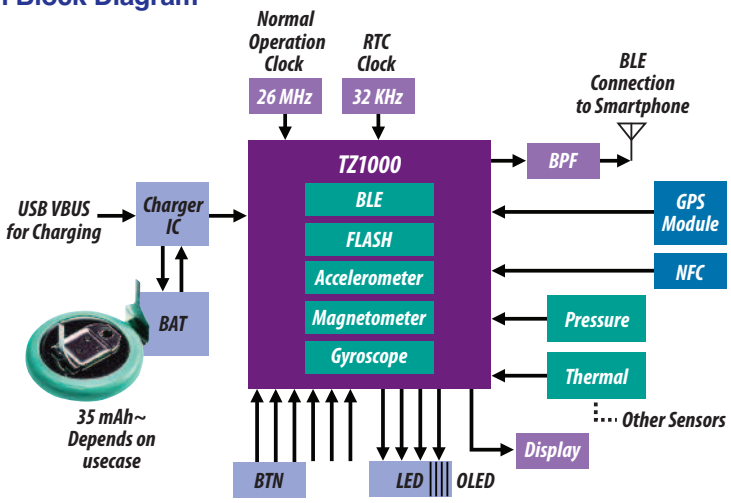
Sleep Analyzer:

- Determine if the user is awake or not using the accelerometer.
- Determine the sleep stage.

Healthcare & Biometric:

- Algorithm to sense heart rate, Electrocardiogram (ECG), body temperature, etc.

Application Block Diagram



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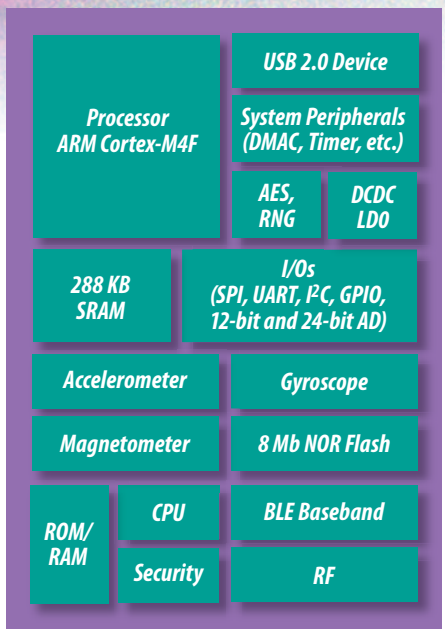
Block Diagram



Deliverables

- TZ1000 SoC
- Configurable package option for the TZ1001 (3-axis), TZ1011 (9-axis), or TZ1021 (no sensor), TZ1031 (6-axis) SoC with system development support of sample CMSIS drivers with RTOS, schematics, and documents (datasheet of MCU/BLE/sensor devices, SDK manuals for sample drivers and tool chain, and hardware design guides). The sample iOS application is bundled in the SDK so that the user can quickly make their own application to track sensing data over BLE on an iPhone®.
- Middleware: Activity meter, sleep analyzer and additional middleware packages will be provided by Toshiba and certified third parties.
- Reference Module PKG: Very small footprint reference module with schematics and Gerber data for manufacturing. These deliverables enable the user to build their own demo for field testing and mass production.
- Integrated development environmental support packages for:
- ARM Keil™, µVision™
- IAR Embedded Workbench®
- Rowley CrossWorks®
- Eclipse™

[1]As of 8/2014, based on Toshiba Research

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