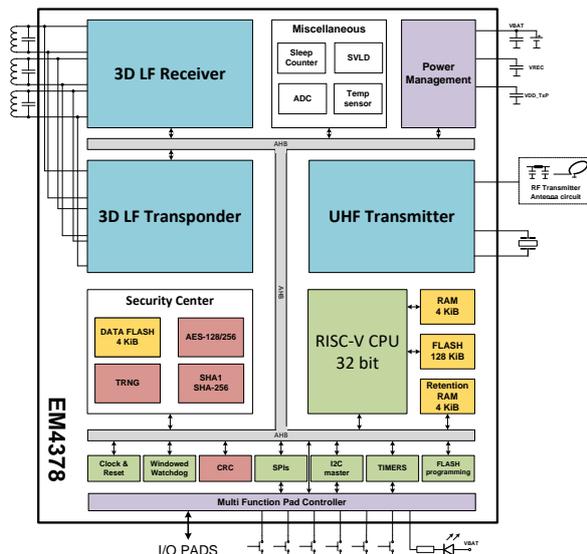


EM4378

SINGLE CHIP MULTI-PROTOCOL KEY FOB PLATFORM

DESCRIPTION

The EM4378 is a single chip solution designed for next generation key fob products as well as for the aftermarket application. Thanks to high integration and tiny size, the device is also suitable for wearable and smartwatch applications. This device serves as a central unit in a key fob to provide PKG/PKE/RKE systems and to control peripheral devices such as BLE, NFC, and UWB, through the serial interface buses. The EM4378 product supports ISO14223 and EM protocols at 125kHz carrier frequency. The IC meets AEC-Q100 Grade 3 automotive qualification.



To support these protocols, the device incorporates a 3D LF interface for bidirectional communication and a UHF Transmitter covering all IMS frequency bands. The device features a powerful 32 bit RISC-V CPU with 128 KiB flash memory for feature-rich applications. For keyless entry and go operations, the transponder allows user-defined software based algorithms to be employed to define data communication protocols. Furthermore, the device could be programmed over the field. The EM4378 is delivered in the QFN48 package.

OPERATING CONDITIONS

- Single Lithium Battery: 2.0V – 3.6 V
- Operation temperature range: -40 °C to +85 °C
- ESD: HBM = ±4 kV, CDM = ±1.5 kV
- Package: QFN 48 (7mm x 7mm)

FEATURES

- **3D LF wake up receiver @ 125 kHz**
 - 125 kHz load modulated reception (OOK/ASK)
 - High sensitivity (down to 300uVp)
 - Low power consumption on 3 channels (8.0uA)
 - 3-channel high accuracy RSSI (typ 1% accuracy)
 - High wireless charging noise rejection (40dB)
 - On-chip 3D antenna tuning (frequency and Q-factor)
- **3D secure transponder @ 125 kHz**
 - ISO14223 and EM protocols support
 - ASK forward link, ASK(FDX)/BPSK(HDX) return link
 - Shared antenna with LF receiver (on-chip 3D tuning)
- **UHF Transmitter (315/434/868/915 MHz)**
 - OOK/FSK/GFSK modulation support
 - Programmable Tx output power
 - Antenna auto-tuning to deliver maximum power
- **Low power consumption in listening/stand-by/storage**
- **RISC-V 32 bit CPU @ 12 MHz**
- **128 KiB Program flash with ECC and scrambling**
- **4 KiB of data flash & 4 KiB of Data SRAM with ECC**
- **2x LED drive with programmable current**
- **28 GPIOs**
- **2x SPI Master/Slave, 1x I2C master interface**
- **JTAG interface for programming and debugging**
- **Supply voltage level detection**
- **Security center with true random number generator**
- **Hardware accelerated AES-128/256, SHA1/256**
- **2x universal timers, 2x interval timers, sleep timer**
- **CRC calculator with configurable polynomial**
- **10 bit ADC**
- **Temperature sensor**
- **6x external voltage measurement through ADC**
- **Button matrix controller, watchdog, RTC, OTP**

APPLICATIONS

- Remote Keyless Entry (RKE)
- Passive Keyless Entry (PKE)
- Passive Keyless Go (PKG)
- Door Access Control
- Wearable and Smartwatch application