

ZSTAR3

Multiple wireless sensing triple-axis reference design

Overview

The ZSTAR3 system accommodates multiple analog and digital accelerometer boards, connected through an RF ZigBee® 2.4 GHz communication to a single USB node connected to a PC. The accelerometer boards measure acceleration in three axes using a pin compatible digital or, optionally, an analog sensor. The sensor sensitivity is defined by the selected accelerometer. The USB node is part of the ZSTAR design, equipped with dedicated software supporting multiple nodes.

The ZSTAR3 project offers a new PC software interface that shows all the basic accelerometer functions and utilizations. Freescale's RD3172MMA7456L ZSTAR3 can help you streamline your solution with the convenience of motion and wireless control. The ZSTAR3 is a small portable board design that utilizes the following products:

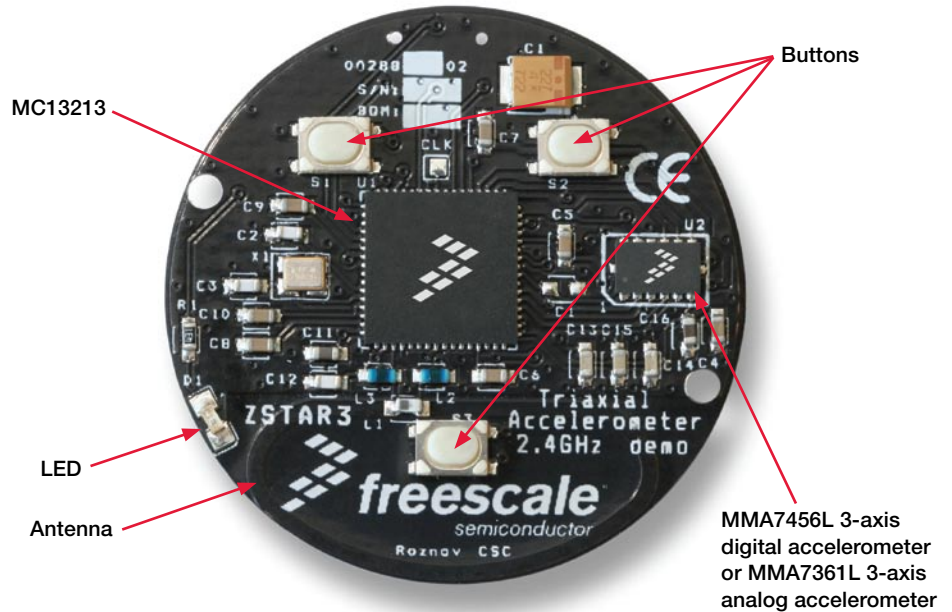
- MMA7361L analog or MMA7456L digital triple-axis accelerometer
- MC1321x 2.4 GHz low-power transceivers and an S08 MCU in one package

Target Applications

The ZSTAR3 design provides small portable boards with the capacity to demonstrate and evaluate various accelerometer applications that accommodate a cost-effective, low-power wireless connection. Applications include:

- Mobile phones
- Handheld gaming devices
- Portable media players
- MP3 players
- PDAs
- Personal computer peripherals
- GPS navigation devices
- Health care devices
- Toys
- Robotics

ZSTAR3 Hardware Design



Competitive Advantages

| Feature | Description |
|--|---|
| Multi-axis acceleration sensor | <ul style="list-style-type: none"> • Ultra small size • High sensitivity and selectable g-range of acceleration for multifunctional applications • Fast power-up response time |
| MC13213 (ZigBee-compliant platform—2.4 GHz low-power transceiver plus microcontroller) | <ul style="list-style-type: none"> • Cost-effective solution for fast time to market • ZigBee 2.4 GHz allows global deployment and mesh networks • System in package (SiP) means reduced PCB size of the solution and less external components |
| MC68HC908JW32 USB 2.0 full-speed 8-bit MCU | <ul style="list-style-type: none"> • Available with a variety of memory sizes and types, modules and packages • Easy to learn and use architecture • C-optimized architecture provides compact code |
| Low-power, low-current operation | <ul style="list-style-type: none"> • Battery life extension |

MMA7456L—Digital Accelerometer

- Digital output (I²C/SPI) for processor system performance
- Small, low-profile 3 mm x 5 mm x 1 mm 14-pin LGA package
- XYZ: three axes of sensitivity in one device (2g, 4g, 8g)
- Low current consumption: 400 μ A
- Standby mode: 5 μ A
- Low-voltage operation: 2.4V to 3.6V
- Programmable threshold interrupt output
- Level detection for motion recognition (shock, vibration, freefall)
- Single or double click (pulse) recognition
- High sensitivity
 - 64 LSB/g at 2g
 - 64 LSB/g at 8g in 10-bit mode

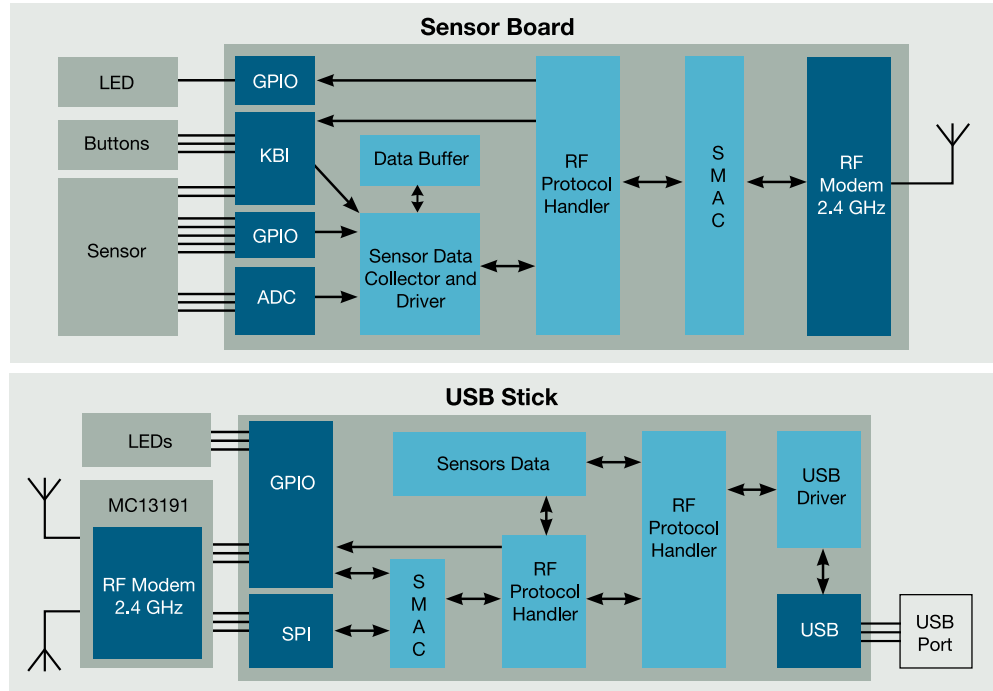
MMA7361L—Analog Accelerometer

- Small, low-profile 3 mm x 5 mm x 1 mm 14-pin LGA package
- Low current consumption: 400 μ A
- Sleep mode: 3 μ A
- Low voltage operation: 2.2V to 3.6V
- High sensitivity (800 mV/g at 1.5g)
- Fast turn-on time: 1 ms
- Enable response time: 0.5 ms
- Self test for freefall detect diagnosis
- 0g-detect for freefall protection

MC13213 ZigBee Platform

- IEEE 802.15.4 standard compliant on-chip transceiver/modem
- 2.4 GHz
- 16 selectable channels
- Programmable output power
- Multiple power saving modes
- 2V to 3.4V operating voltage with on-chip voltage regulators
- 9 mm x 9 mm x 1 mm 71-pin LGA package

ZSTAR3 Software Concepts



Sensing Triple Axis Reference Design (STAR) Family of Development Tools

| Part Number | Description |
|-------------------------|--|
| RD3172MMA7456L (ZSTAR3) | Multiple Wireless Sensing Triple-Axis Reference Design |
| D3172MMA7361L | Analog sensor only from the ZSTAR3 |
| D3172MMA7456L | Digital sensor only from the ZSTAR3 |
| RD3473MMA7360L (ZSTAR2) | MMA7360L Accelerometer – Wireless Sensing Triple Axis Reference Design |
| RD3152MMA7260Q (ZSTAR) | MMA7260Q Accelerometer – Wireless Sensing Triple Axis Reference Design |
| RD3112MMA7260Q (STAR) | MMA7260Q Accelerometer – Sensing Triple Axis Reference Design |

ZSTAR3 Wireless Network Topology



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