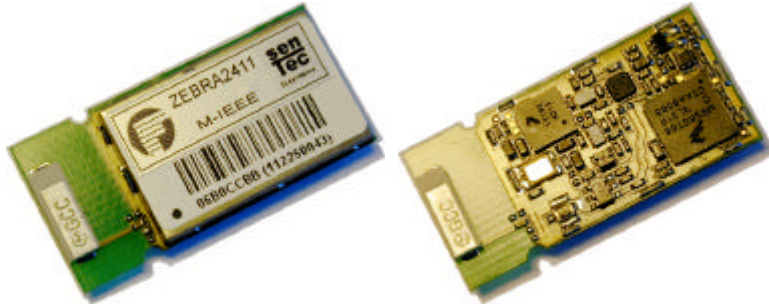


# ZEBRA

## ZigBee™ Enabled Board for Radio Applications

Preliminary Product Information 1.4: 2005/08/09



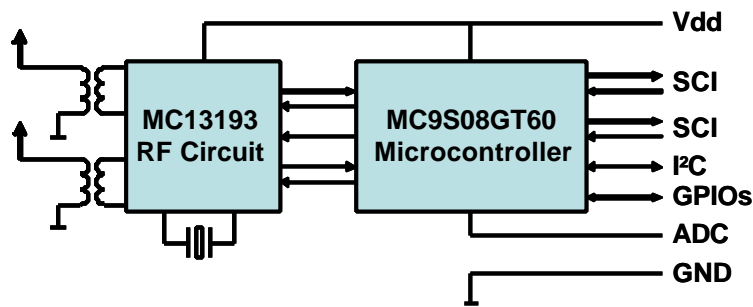
### Module Hardware Features:

- Wireless communication module for use in embedded applications
- Worldwide available 2.4 GHz frequency band: 2.4000 - 2.4835 GHz
- 16 channels with 5 MHz spacing (not overlapping)
- DSSS (Direct Sequence Spread Spectrum)
- Gross data rate 250 kbps
- RF output power max. of 17 dBm (50 mW),
- Receive sensitivity of -92 dB (typical)
- Link range 10 m - 500 m (depending on the actual environment)
- Antennas integrated on the module
- Freescale MC13193 or MC13192 RF front end
- Freescale HCS08 base band controller with 60 kByte flash
- 50 pins HIROSE connector or BGA SMT footprint
- Operating voltage 2.0 - 3.4 V
- Mechanical dimensions 16 mm x 33 mm
- Metallic shielding
- Starter kit available
- Several software options, including ZigBee™ network stack

### Typical Applications:

- Wireless sensor networks
- Automation
- Industrial control
- Measurement equipment
- Data logging
- Medical devices and applications

## ZEBRA Module Block Diagram:



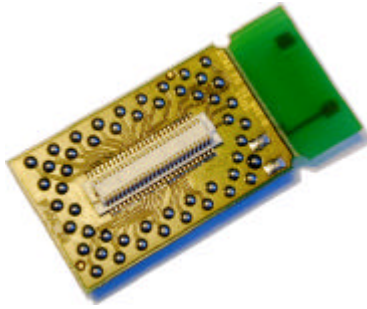
## Software Options:

Option	Features
SMAC Simple Media Access Control (standard)	Simple data frame structure No storage of data packets, no retransmission Bi-directional or peer-to-peer operation Very little resources required No licenses or royalties
IEEE 802.15.4™ PHY and MAC software (delivery option)	Standardized protocol for reliable delivery of data Storage and retransmission of data packets CSMA-CA radio channel access Optional superframe structure with beacons Optional guaranteed time slots All devices have unique 64-bit IEEE addresses Star or cluster-tree wireless network No licenses or royalties
ZigBee™ network stack (delivery option)	Based on the IEEE 802.15.4 data transfer mechanism Standard user profiles offer interoperability Cluster-tree and mesh networks Security and data encryption ZigBee™ software stack license required

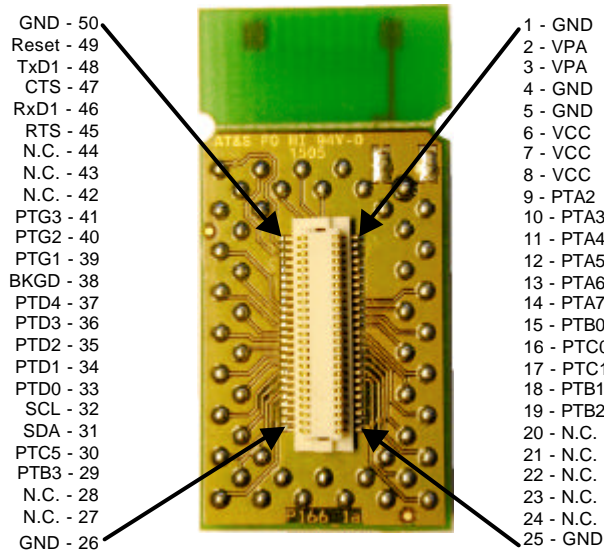
The ZEBRA Module is delivered with the SMAC (Simple Media Access Control) and example software. The SMAC requires only very little resources and leaves plenty of space for a customer specific application software. An embedded boot loader allows easy reload of the customized application.

As a delivery option the ZEBRA Module can be loaded with a ZigBee™ network stack. This enables interoperability due to standardized application profiles. To implement a true ZigBee™ application, the user has to obtain a license for the ZigBee™ software stack and the appropriate compiler. Alternatively, senTec Elektronik is able to develop the ZigBee™ application based on the customer's specification, since we have purchased a ZigBee™ stack license and are experienced in embedded software.

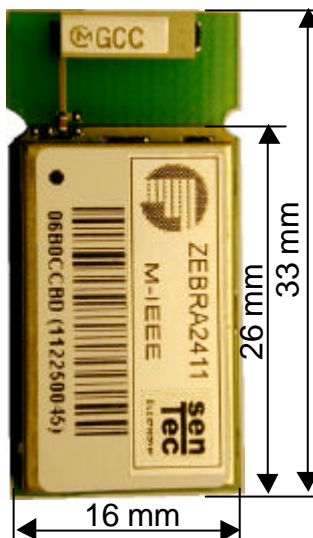
## ZEBRA Module Connector Layout and Pin-Out Options:



50-Pin HIROSE Receptacle: DF12C (3.0)-50DS-0.5V (standard delivery).  
The SMT BGA footprint is a delivery option, pin-out is available on request.

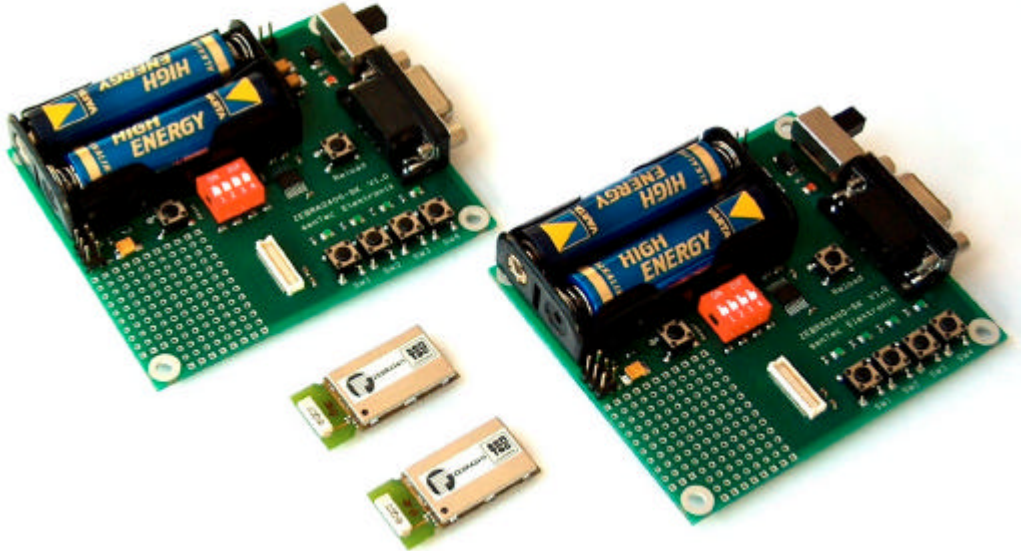


## ZEBRA Module Mechanical Dimensions:



## ZEBRA Module Starter Kit:

Contains 2 modules, 2 base boards and detailed documentation:



## Ordering Information:

**ZEBRA2411-SM:** Wireless Communication Module with 50-pin receptacle

**ZEBRA2412-SM:** Wireless Communication Module with SMT BGA footprint

**ZEBRA2400-SK:** Starter Kit

Product status: development finished, product available

© Copyright senTec Elektronik GmbH 2005. All rights reserved.

senTec Elektronik GmbH  
Ehrenbergstr. 11  
98693 Ilmenau, Germany  
<http://www.sentec-elektronik.de>

Phone: +49 3677 66 83 41  
Fax: +49 3677 66 83 48  
Email: [info@sentec-elektronik.de](mailto:info@sentec-elektronik.de)

senTec Elektronik is a member of the  
Freescale Design Alliance Program



**ZigBee™** is the trademark of the ZigBee Alliance.

**IEEE®** is the registered trademark of the Institute of Electrical and Electronic Engineers, Inc.