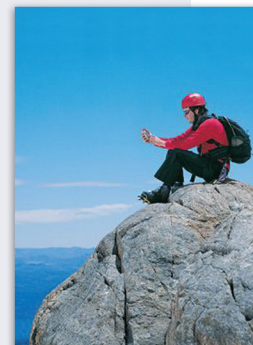# BCSM250 Mobile WiMAX Wave 2 / IEEE 802.16e Mobile Subscriber Station Solution

- **World's First 65 nm single-chip WiMAX solution** Based on 65 nm CMOS process and integrates RF, PHY, MAC, memory, host interfaces and power management functions all in one chip.
- **Extreme Performance** Support for Maximum Likelihood (ML) MIMO decoder which provides performance up to 40 Mbps while providing lowest possible power consumption.
- **Lowest Power Consumption** Extends battery life with under 1 mA idle mode current.
- **Widest Industry IOT Footprint** Simplifies and improves customer design-in success. Pre-testing with leading Base Station providers means customer can design-in once and re-use everywhere.
- **Dual RF Band Support** The only single-chip solution in the world to offer 2.3 GHz to 2.7 GHz and 3.3 GHz to 3.6 GHz support.

OVERVIEW

The Beceem BCSM250 is a single-chip, high-performance solution for implementing a full-featured WiMAX Wave 2 compliant mobile subscriber station based on the IEEE 802.16-2005 standard. Target applications for this device are embedded mobile WiMAX solutions in handsets, laptops, mobile internet devices (MIDs), and small form-factor PC accessories.

All WiMAX functionalities are integrated into the BCSM250. This includes a dual-band 1 X 2 RF transceiver (single transmit chain and dual receive chains), the entire baseband (PHY/MAC), the memory subsystem, all major host interfaces such as SDIO and USB PHY, and power management unit all in one 11 mm x 11 mm x 1.2 mm 292BGA package. Based on 65 nm process technology, the BCSM250 offers class-leading low power consumption up to 30% lower than the next best Wave 2 solution. Due to its high level of integration, the BCSM250 also represents a dramatic reduction in external BOM count over other existing solutions. In addition, the BCSM250 is designed to work with a number of third party Front End Module (FEM) suppliers to further simplify design, lower costs and decrease footprint.

The BCSM250 single-chip solution retains its proven and carrier-certified WiMAX Wave 2 baseband architecture from Beceem's previous Wave 2 BCS200-based solution. The same protocol stack that has been meticulously engineered and proven is also supported on the BCSM250. This ensures both current and new customers a seamless transition and reduced development times, respectively. In addition, the BCSM250 also incorporates notable advances in baseband technology. Built upon a true Maximum Likelihood (ML) MIMO decoder receiver, the BCSM250 also incorporates an improved interference cancellation, channel estimation,

and Logarithmic Likelihood-Ratio (LLR) selection. All these improvements provide best-in-class receiver performance up to 40 Mbps and improved indoor penetration performance. The BCSM250 integrates all necessary host interfaces such as USB HS (2.0) PHY, ULPI, 4-bit SDIO and high-speed SPI.

Another distinguishing feature of the BCSM250 is its support of a fully-featured, dual-band MIMO RF transceiver. This includes completely independent transmitters and receivers that cover the broadband wireless access bands in the 2.3 to 2.7 GHz and 3.3 to 3.6 GHz range. Furthermore, the programmable channel bandwidth architecture allows support for virtually all of today's WiMAX Forum certification band classes.

Products based on the BCSM250 solution can interoperate with any WiMAX Certified™ SISO or MIMO capable IEEE 802.16e/WiMAX Mobile base station. This fact is reinforced by Beceem's continual commitment to ensuring the widest possible base station Interoperability Testing (IOT) footprint for all of its chipset solutions.

WIMAX WORKS!™

Beceem's end-to-end ecosystem, WiMAX WORKS!™, enables customers to design once and deploy their products to virtually every WiMAX operator in the world. The BCSM250 is the latest addition to this initiative, and allows interoperability with not only base station providers but also with leading conformance test equipment and manufacturing test vendors as well. This provides our customers with proven test tools for rapid product development and qualification.
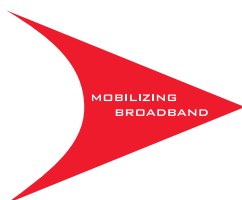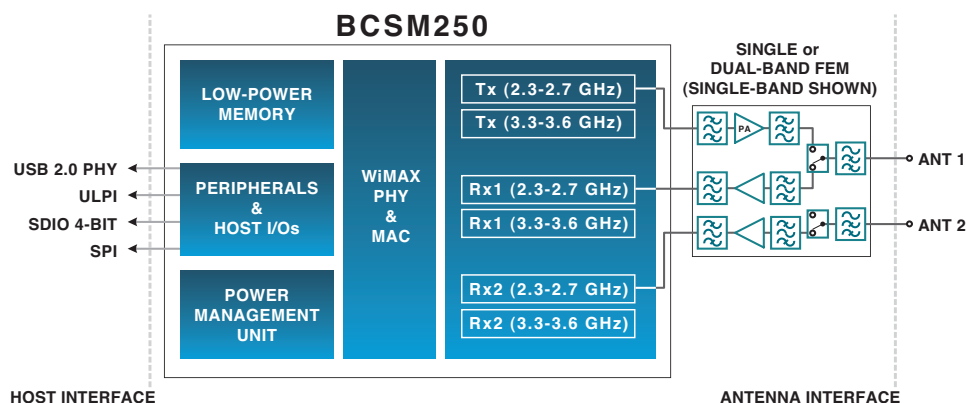
BCSM250
shown
actual
size

BCSM250 Mobile WiMAX Wave 2 / IEEE 802.16e Mobile Subscriber Station Solution

BCSM250 MOBILE WIMAX / IEEE 802.16-2005 SINGLE-CHIP SOLUTION

REFERENCE DESIGN SUPPORT

Beceem offers a large number of complete reference designs kits (RDKs) for various product market segments and supports a wide variety of interfaces including USB, and SDIO. Every RDK includes:

- Evaluation reference boards
- API Library software
- Device drivers
- Development tools
- Documentation Application notes
- Local customer support
- Bring-up and test tools

RF FEATURES

- Multi-band support: 2.3 to 2.4 GHz, 2.5 to 2.7 GHz, and 3.3 to 3.6 GHz
- Two receive and one transmit
- Flexible dynamically adjustable channel bandwidths: 5, 7, 8.75, and 10 MHz
- No external SAW required
- High-blocker rejection
- Low noise MIMO receivers
- Low-peak EVM

- Integrated synthesizers: <5 Hz frequency resolution
- Dynamic range 76 dB (2.5 to 2.7 GHz) and 70 dB (3.4 to 3.6 GHz)
- Better than 6 dB noise figure
- Reference designs with up to +24 dBm at antenna connector
- Interface to 3rd party FEMs

BASEBAND (PHY AND MAC) FEATURES

- Scalable OFDMA PHY
- Maximum Likelihood (ML) MIMO receiver architecture for best-in-class performance
- Interference cancellation
- Improved channel estimation and LLR selection
- Modulations supported: 64-QAM, 16-QAM, QPSK
- Full MIMO and Beamforming support: Matrix A, Matrix B, AMC
- Forward Error Correction
- Fast feedback channel

- TDD with configurable uplink / downlink split
- Quality of Service (QoS) classes supporting tiered data, voice, and video applications
- Flexible ARQ and Hybrid Automatic Repeat Request (H-ARQ) ensure low latency
- Ultra low-power Idle and Sleep Modes
- AES encryption and EAP based authentication schemes
- Support for IPv6 and header compression
- Embedded 128 Mbit low-power memory

HOST I/O AND OTHER FEATURES

- Internal power management unit
- USB HS (2.0) PHY and ULPI
- 4-bit, 25 MHz SDIO

- High-speed SPI
- USIM/UICC controller
- 11 mm x 11 mm x 1.2 mm 292 BGA package

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