



MSM5100 Device Functional Block Diagram

Overview



At QUALCOMM CDMA Technologies (QCT), we strive to constantly improve the indispensable communication tools we all use every day. QCT creates state-of-the-art chipsets, system software, development tools and products — such as the Launchpad™ suite of technologies and software — that support the most advanced digital wireless features and functionality available for wireless devices and base stations — while continually reducing complexity, cost and board-space requirements.

With the acceleration towards 3G terminals and services and the demand for highly integrated entertainment, information and data-capable devices, QCT has developed the MSM5100™ Mobile Station Modem™ (MSM™) chipset and system software, a 3G CDMA2000® 1X solution for the IS-2000 standard. To facilitate faster design times, reduce production costs and leverage from proven IS-95A/B designs, the MSM5100 chipset is based on QCT's proven MSM3300™ IS-95A/B architecture. The MSM5100 baseband processor is the heart of the CDMA2000 1X chipset solution and interfaces directly with QCT's IFR3300™, RFR3300™, RFT3100™ RF

MSM5100™ CHIPSET SOLUTION

devices, and the PM1000™ power management device. The MSM5100 chipset and system software is enabling a new generation of 3G CDMA handsets and data devices with rich feature sets and industry-leading 3G performance. With initial data rates that exceed the ITU requirement for full wide-area mobility, the MSM5100 solution will support up to 153 kilobits per second (kbps) simultaneously in both forward and reverse links. As with QCT's other CDMA2000 1X MSM solutions, the MSM5100 device also enables a doubling of overall IS-95A/B voice capacity and new higher data rate services. The MSM5100 solution is feature- and pin-compatible with the MSM3300 IS-95A/B device and includes advanced technologies such as position location and Bluetooth®, as well as multimedia features such as JPEG and MIDI-based multimedia software. Along with an optimized software solution for the CDMA modem, QCT offers system development software, verification, test, debug, calibration, manufacturing and field-test support using the CDMA Designer™ development tools, which reduce time-to-market for a complete CDMA handset.

The MSM5100 device supports both digital and analog functions. Its implementation in deep submicron silicon technology enables low-power, low-cost implementations of dedicated CDMA building blocks, an ARM7TDMI® RISC microprocessor and QCT's powerful QDSP2000™, which enables a host of advanced multimedia features with the 3G CDMA2000 1X modem engine.

The MSM5100 device will be available in the same 208-ball Fine Pitch Ball Grid Array (FBGA) production package as the MSM3300 solution.

MSM5100 System Solution

The MSM5100 device is the centerpiece of the 3G CDMA2000 1X chipset, which consists of the MSM5100 modem; the RFT3100 analog-baseband-to-RF upconverter; the IFR3300 and RFR3300 IF-to-baseband down converter and RF-to-IF downconverter, respectively; and PM1000 power management device. The MSM5100 device performs baseband digital signal processing and executes the subscriber unit system software. It is the central interface device in the subscriber unit, connecting RF and baseband circuits as well as memory and user interface features.

The user interface of a subscriber unit typically includes the keypad, LCD display, ringer, microphone and earpiece. The MSM5100 device also contains complete digital modulation and demodulation systems for both CDMA and AMPS cellular standards as specified in IS-2000, IS-95A and IS-95B. The subscriber unit system software controls most of the functionality and activates the features of the subscriber unit. System software is executed by an embedded ARM7TDMI microprocessor within the MSM5100 device.

QCT also supplies system software and development tools to minimize the development time of a subscriber unit. With the release of the MSM5100 solution, an optimized version of Dual-Mode Subscriber Software™ (DMSS™) is available with device drivers to support the new functionality of the MSM5100 chipset. The Subscriber Unit Reference Design (SURF5100™ board) for the MSM5100 chipset is also available, offering a baseline hardware platform for additional software development.

MSM5100 Features

Key features of the MSM5100 device include:

- Pin compatible with the MSM3300 chip
- IS-2000 Revision 0 compliant to support 153 kbps high-speed packet data
- Backward compatible with IS-95A/B standards
- Position location processor based on gpsOne® technology
- Embedded Bluetooth baseband processor
 - Compliant with Bluetooth 1.1 standard
- Audio enhancement technology support (Qtunes™ and CMX™ software)
- Integrated mass-storage device (MMC) controller
- Integrated Removable User Identity Module (R-UIM) controller
- Integrated Universal Serial Bus (USB) controller
- 2.3 to 3.0 V I/O
- 16-bit wide Flash and SRAM support
- 208-ball Fine-Pitch Ball Grid Array (FBGA) package

gpsOne™ Technology On The MSM5100 Chipset

QUALCOMM is incorporating its breakthrough gpsOne position location technology in the MSM5100 solution. The new gpsOne technology merges Global Positioning System (GPS) satellite and network information to provide a high-availability solution that offers industry-leading accuracy and performance. This solution not only meets the FCC E911 mandate under the most challenging conditions, but also provides a ubiquitous platform for location-based applications. The mobile station (MS) collects measurements from the GPS constellation and the cellular/PCS network, then sends the information to the Position Determination Entity, which optimizes the position location calculation based on existing information. gpsOne technology will enable consumer-priced, position-capable CDMA handsets. The block diagram illustrates the baseline architecture for the MSM5100 and CDMA/GPS receiver devices.

MSM5100 Bluetooth Solution

Bluetooth is a Global Specification for Wireless Connectivity. Bluetooth technology allows replacement of the various proprietary cables that connect one device to another with one universal, short-range radio link. For example, Bluetooth radio technology built into both a cellular telephone and a laptop would replace the cumbersome cable used today to connect a laptop to a cellular telephone. Printers, PDAs, desktops, fax machines, keyboards, joysticks and virtually any other digital device can be part of the Bluetooth system. In addition to untethering devices by replacing the cables, Bluetooth radio technology provides a universal bridge to existing data networks, a peripheral interface, and a mechanism to form small, private ad hoc groupings of connected devices away from fixed network infrastructures.

The Bluetooth air interface is a frequency-hopping Gaussian Frequency Shift Keying (GFSK) modulation in the unlicensed 2.4 GHz ISM band. The modulation rate is 1 Mbps, and its architecture offers a low-cost, simple radio solution. The Bluetooth baseband functionality is incorporated into the MSM5100 solution. The Bluetooth RF device is

contained in the physically separate RF device that can reside on the same circuit card as the MSM5100 device. In addition to pursuing an optimal design to minimize cost, size, power dissipation, etc., QCT is designing Bluetooth baseband processing to be operational at the same time as the CDMA baseband processing to facilitate dial-up networking. The block diagram illustrates the baseline architecture for the MSM5100 and Bluetooth RF device.

Multimedia Features on the MSM5100 Chipset

As 3G mobile phones and data services gain acceptance, they will become more of an entertainment tool. The MSM5100 solution supports optional software from QCT that enables advanced features such as MP3 music and MIDI-based multimedia applications. MP3 (MPEG1 Layer3) is a standard audio file format for compressing a sound sequence into about one-twelfth the size of the original file with minimal loss in sound quality. The MSM5100 solution integrates a mass storage device controller, such as an MMC (multimedia card) interface, which provides an effective connection to much larger memory space to store CD-quality music data or mapping data from a geographical navigation service.

Key CDMA 2000 1X Features Supported by MSM5100 Device

- Fast 800 Hz forward power control
- Quasi-Orthogonal functions
- Increased number of available forward link channels
- Supplemental Channel (SCH) support
- IS-2000 Quick Paging Channel (F-QPCH) support
- Convolutional and turbo codes on SCH
- ITU 144 kbps requirement achieved
- 153.6 kbps SCH forward link and reverse link simultaneously
- Forward dedicated control channel (F-DCCH)
- Reverse dedicated control channel (R-DCCH)
- Radio Link Protocol (RLP3)
- P2 Mode
- Secure Sockets Layer (SSL) support

QUALCOMM's Complete Solution — Our Commitment to Our Partners

QUALCOMM CDMA Technologies is enabling the future of communications. We work closely with our manufacturer and operator partners to develop solutions that meet market needs today and provide the technology foundation for the wireless communications of tomorrow. Our world-class CDMA engineers create detailed reference designs to accelerate testing and deployment for our partners. And our chipsets and system software are fully integrated and able to bring advanced features and functionality to today's wireless devices. With QUALCOMM CDMA Technologies, manufacturers and operators can offer sophisticated wireless solutions that succeed in the global marketplace.



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