



MSM3100 Device Functional Block Diagram

## Overview

The tri-mode code division multiple access and advanced mobile phone system (CDMA/AMPS) cellular telephone is a complex consumer communications instrument that relies heavily upon digital signal processing. To enable faster design times for all configurations of 1900 MHz CDMA PCS, 800 MHz CDMA and 800 MHz AMPS, and reduce the production cost of the subscriber unit, QUALCOMM has developed its sixth-generation CDMA chipset and system software solution. The heart of the chipset solution is QUALCOMM's Mobile Station Modem (MSM™) single-chip baseband processor modem, the MSM3100, that interfaces directly with the IFR3000™, RFR3100™, RFT3100™, and PM1000™ devices. Along with an optimized software solution for the whole modem, QUALCOMM offers system development software,

verification, test, debug, calibration, manufacturing and field test support using the CDMA Designer™ development tools, which enable reduced time to market for a complete CDMA handset.

The MSM3100 device integrates both digital and analog functions on a single chip. The low-power, low-cost MSM3100 device includes proprietary CDMA building blocks, an ARM7TDMI™ Thumb RISC microprocessor, and QUALCOMM's powerful QDSP2000™ digital signal processor core, enabling a host of advanced features. The MSM3100 device also integrates various other functions such as an audio voice codec, PLL, Transmit DACs, ADCs, memories, USB device controller, voltage regulators, increased number of GPIOs, peripheral interfaces, and an enhanced clock and power management architecture.

### MSM3100 Interfaces



The MSM3100 device demodulates Rx digital baseband data from the IFR3000/RFR3100 devices. The IFR3000 device converts the modulated IF signal from the RF section of the subscriber unit into digital baseband data. For transmission, the MSM3100 device modulates and sends analog I and Q data to the RFT3100 device. The Tx signal path of the RFT3100 device converts Tx analog baseband data into modulated RF. The MSM3100 device communicates with the external RF and analog baseband circuitry of the subscriber unit to control signal gain in the RF Rx and Tx signal paths, reduce baseband offset errors and tune the system frequency reference. The MSM3100 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 MSM3100 device also contains complete digital modulation and demodulation systems for both CDMA and AMPS cellular standards, as specified in 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 ARM® microprocessor within the MSM3100 device.

### MSM3100 Device Enhancements

- Embedded QDSP2000 Digital Signal Processor Core which provides higher performance than previous MSM embedded DSPs. The

QDSP2000 core enables a comprehensive set of features such as voice recognition, voice memo, initial position location, speech compression, acoustic echo cancellation, noise suppression and audio enhancement. Acoustic echo cancellation support within the QDSP2000 core eliminates the need for an additional DSP within a car-kit resulting in cost savings.

- The high level of integration in the MSM3100 chip simplifies handset design by reducing the total number of components as well as cost. The higher level of integration also reduces the overall power consumption and extends battery life.
- Tri-mode software for all configurations of 1900 MHz CDMA PCS, 800 MHz CDMA and 800 MHz AMPS supports CDMA handset manufacturers in development of North American nationwide roaming on CDMA Digital Cellular, PCS and analog networks.
- The MSM3100 device includes an integrated Universal Serial Bus (USB) device controller for fast and simple PC interconnect. With the popularity of USB in the PC marketplace, the USB interface is ideal for plug-and-play mobile phone connections.
- Enhanced Low-Power Sleep Controller increases phone standby time up to 300 hours.
- Simplifies handset design with the choices of multiple serial interfaces including Universal Asynchronous Receive Transmits (UART) for data communications as well as diagnostic monitoring, and QUALCOMM's proprietary Serial Bus Interface (SBI) for low speed control of RF/IF and peripheral devices for power management.
- The MSM3100 device supports a wide voltage range (2.3 V to 3.0 V), allowing it to interface with existing and future lower-voltage peripheral devices.



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