Product Bulletin

TCS2100 GPRS Chipset Solution

Recently released to market by Texas Instruments (TI), the TCS2100 chipset solution represents a complete hardware and software platform for developing advanced 2.5 Generation (2.5G) global system mobile communication (GSM)/general packet radio service (GPRS) wireless handsets. The TCS2100 chipset solution, which builds on TI's 7-year history of providing complete and leading-edge GSM chipsets, gives handset designers a powerful, proven and comprehensive way of getting to market quickly with forward-looking GPRS designs. Based on TI's programmable digital signal processor (DSP) technology, the chipset solution provides manufacturers the performance and low power required to run next-generation wireless applications, and provides easy migration of application software to future chipset products based on OMAP™ architecture.

The TCS2100 chipset comes complete with a powerful dual-processor digital baseband, a highly integrated analog baseband with complete power management functions, a single-chip direct conversion RF transceiver, a complete GSM/GPRS protocol stack and a full-featured application software suite.

Key Benefits

- Complete hardware and software solution for GPRS handsets
- Three-chip hardware for high levels of integration
- Feature-rich software implementation:
  - Supports latest GPRS implementation
  - Full GPRS protocol stack
  - Bluetooth™ support
  - High-level, software development environment
- Complete support of Class 12 GPRS
- Backed by TI's system-level wireless expertise and design support
- Future-proof solution
- Short time-to-market thanks to reference design expertise
To ensure industry leading performance, the TCS2100 leverages TI's extensive system-level expertise gained through multiple generations of complete GSM solutions, producing a solution that strikes an optimal balance of hardware and software, in-turn increasing integration and reducing bill of materials (BOM) and development costs. The high-performance, dual-core digital baseband with fully integrated memory completely supports Class 12 GPRS, while simultaneously providing the processing headroom for designers to add their own value-added functions and features. For manufacturers requiring multimedia-rich application processing, the TCS2100 GPRS chipset can be paired with the OMAP1510 applications processing engine for power efficient, high performance support of applications such as streaming media and video conferencing on mobile devices. In addition, the TCS2100 delivers best-in-class stand-by time and power-off consumption with its innovative power-split technique.

The TCS2100 chipset features a rich software suite, including a complete protocol stack implementation that supports the most recent release of the GPRS standard; a full complement of audio software; Bluetooth™ support; and a high-level, easy-to-use software platform and development environment—TI's Wireless Software Foundation (WSF)—that allows easy integration of TI, user-developed or third-party embedded applications.

As one of the industry's most advanced and complete GPRS solutions, the TCS2100 chipset is also backed by a full-featured, manufacturing-quality handset reference design that brings together all of TI's capabilities to dramatically reduce time-to-market.

Complete and Proven Solution
The TCS2100 chipset solution is the latest product in TI's overall strategy to provide advanced and fully integrated building blocks for quickly introducing leading-edge wireless products to the market. The TCS2100 chipset leverages TI's system-level understanding of wireless design to deliver a complete and proven solution that eliminates the roadblocks to successful wireless development. TI's system-level wireless expertise yields many key advantages:

- **Integration**—Through advanced hardware and software partitioning techniques, the TCS2100 offers best-in-class BOM optimization that lowers development and system costs
- **Centralized system expertise**—With in-house understanding of every major wireless system block, TI serves as an invaluable resource for the speeding designs to market, lowering design risk and ensuring high-performance designs
- **Proven design methodology**—The TCS2100 chipset is built upon a time-tested design framework and is backed by proven GSM solutions in the field
- **World-class manufacturing**—TI backs its solutions with best-in-class manufacturing capabilities, ensuring leading-edge manufacturing processes and on-time supply

TI will support the complete range of leading wireless standards with chipset products over the next 3 years.
**TCS2100 Chipset Solution**

The highly integrated TCS2100 chipset is a three-chip solution that includes the TBB2100 digital baseband, the TLW3014 analog baseband and power management device, and the direct-conversion TRF6150 RF transceiver.

### TBB2100 Digital Baseband
The TBB2100 is a dual-core, high-performance digital baseband featuring a TMS320C54x DSP and an ARM7TDME™. Features include:
- 0.18 µm (current version) and 0.13 µm (later version) SIA full-static CMOS process technology
- 3.3-V I/Os and 1.8/1.5-V cores
- TMS320C54x DSP with all memory on-board
- ARM7TDME with internal SRAM
- Four-channel, two-port direct memory access (DMA) controller
- Memory protection unit
- Real-time clock
- GSM ultra-low-power device (ULPD)
- Hardware accelerator for GPRS encryption algorithms (GEA1&2)
- SCAN, BIST, PMT and JTAG boundary SCAN
- 2 UARTs, one of which has IRDA control capabilities
- Hosted in a 12 x 12 mm 179-pin MicroStar™ BGA

### TLW3014 Analog Baseband
By integrating a complete analog baseband and all power management functions into a single device, the TLW3014 greatly reduces board-space requirements, chip count and development costs. Features include:
- Voiceband and baseband codecs
- Low-dropout voltage regulators for entire baseband with programmable voltage
- Battery charger interface
- SIM interface (3.3-V and 1.8-V compliant)
- Headset audio interface and LED drivers
- Hosted in a 10 x 10 mm 100-pin MicroStar™ BGA

### TRF6150 RF Transceiver
This highly integrated RF IC is based on a direct conversion architecture that offers a BOM reduction of about 30% versus super-heterodyne architectures. Features include:
- Single-chip, dual-band/tri-band receiver
- Direct-conversion receiver with front-end filters only
- GPRS Class 12-compliant
- Single external VCO solution
- N-fractional synthesizer
- PA control loop
- On-chip voltage regulators
- Frequency plan compatible with Bluetooth and GPS
- RF BICMOS2™ process (25 GHz FT, 0.35 µm)
- 64-pin TQFP package

- Complete reference designs—With complete handset reference designs built on TI’s “antenna-to-applications” chipset solutions, designers can reduce development time and time-to-market by up to 8 months.

**Future-Proof Architecture**
Developed within the context of TI’s forward-looking wireless architecture, the TCS2100 chipset solution is powerful and future-proof from a complete system perspective. The chipset leverages TI’s industry leading DSP technology and is built on a dual-core architecture, including a high-performance TMS320C54x™ DSP, an ARM® RISC processor and a powerful shared memory architecture. As a result, it is the industry’s first to support multi-slot GPRS Class 12 with the corresponding high-speed data throughput, while simultaneously providing the processing headroom for designers to add their own value-added functionality. The TCS2100s innovative powersplit technique enables best-in-class stand-by time and power-off current consumption.

In addition, the chipset future proofs handset designs by supporting the full and latest GPRS ETSI release (SMG32), allowing easy implementation of new features as they become available.

**Complete Wireless Software Suite and Open Development Environment**
The TCS2100 GPRS chipset combines a rich software portfolio that includes full GPRS protocol software support with a full implementation of the latest GPRS ETSI release, an array of audio applications, an advanced embedded software foundation for application support and a high-level, Windows®-based development environment.

The software features multi-band support. It supports multiple vocoders, including FR, HR, EFR and adaptive multi rate as well as circuit-switched data up to 14.4 Kbps.

Audio features include voice recognition, voice memo, acoustic echo cancellation, speech enhancement and a melody generator that is compatible with MIDI format. The TCS2100 chipset’s broad software library base also includes Bluetooth protocol stack and profiles, WAP,
microbrowser and Java.

In addition to these applications, the TCS2100 solution’s flexible WSF and Windows-based development environment eases design by allowing users to develop and integrate their own applications. Furthermore, the WSF platform and tools allow developers to port existing code into TI’s future higher functionality GPRS architectures with additional processors and memory configurations, while also providing portability to future TI chipset products that support other wireless standards.

Development Tools and Reference Design
TI’s wireless chipset products mean total solutions, including all the complementary hardware and software development tools required to take products from concept to production. And since TI develops and delivers its own software and hardware technologies, customers are assured of a single resource for assistance in optimizing their application. Designers can choose from a full line of software development tools, including C compilers, assemblers, linkers, simulators, emulators and high-level-language (HLL) debuggers.

In addition, TI supports the TCS2100 with a complete reference design that can reduce development time by more than half a year, speeding time-to-market and reducing the need for design engineering resources. The reference design is a complete wireless handset that is ready to be manufactured and put into final plastics. The reference design offering includes:
- A fully type-approved reference design
- A complete BOM
- Complete software suite, including MMI and production test software
- Board design and layout
- Best-in-class and worldwide customer support structure, with locations in Europe, USA, Shanghai and Taipei, to assist from design start to full-scale production.

TI provides wireless handset reference designs for all of its chipset solutions, thus enabling rapid handset development for all leading 2G, 2.5G and 3G wireless standards. TI wireless reference designs provide the following key benefits and features:
- Manufacturing quality with competitive BOM costs
- Reference designs tailored to phone segmentation, addressing low-end voice-centric phones, GPRS data-pump terminals and high-end PDA
- Low power consumption
- Complete software suite
  - Communications protocol stacks
  - Mobile OS support and TI portable embedded development environment
  - Reference UI ready for OEM and carrier customization
  - Multimedia and PIM applications.

Building on TI’s GSM Legacy
The TCS2100 GPRS chipset builds on TI’s rich heritage of delivering the industry’s most advanced solutions for GSM wireless terminals. With 7 years of GSM chipset development, four generations of complete chipsets and volume production since 1997, TI has the system-level knowledge, the production know-how and the support to help customers develop high-performance end products.

For More Information
To learn more about how you can use the TCS2100 for your high-performance GPRS wireless design, please contact your local TI field sale representative. Or visit: www.ti.com/sc/wirelesschipset