OMAP-Vox™
single-chip solution for affordable multimedia-rich phones

Texas Instruments

OMAPV1035 GSM/GPRS/EDGE

Building on the strength of Texas Instruments' OMAP-Vox family, the single-chip OMAPV1035 solution is the first to integrate GSM/GPRS/EDGE modem, digital RF and application processor functionality on the same silicon. The new single-chip platform builds on TI's LoCosto™ single-chip mobile phone solution and the multimedia capabilities of the OMAP-Vox™ platform in production today with the OMAPV1030 solution. OMAP-Vox products, including the OMAPV1035 solution, share a common software platform that can be re-used for faster and more cost-effective feature phone development in high-growth markets.

The DRP™ technology based-OMAPV1035 processor combines a high level of performance with significant cost savings, bringing compelling multimedia applications to low- and mid-range wireless devices.

As a scalable platform supported by portable software, manufacturers can base a range of wireless devices on the OMAPV1035 processor. The software environment consisting of application suites, protocol stacks, multimedia codecs and frameworks, and high-level and real-time operating systems is adaptable and re-usable among every member of the OMAP-Vox family. As a result, manufacturers have an effective migration path to next-generation platforms and a fast time-to-market for new handset devices.

Key features:

- Single-chip solution in 65 nanometer (nm) which leverages TI's innovative DRP™ process technology
- First ARM9® and DSP fully-integrated single-chip digital baseband, RF and application processor
- Powerful processing enables affordable EDGE multimedia devices
- Multimedia-rich capabilities:
  - Audio/video record, playback and streaming with screen quality up to QVGA at 30 frames-per-second (fps)
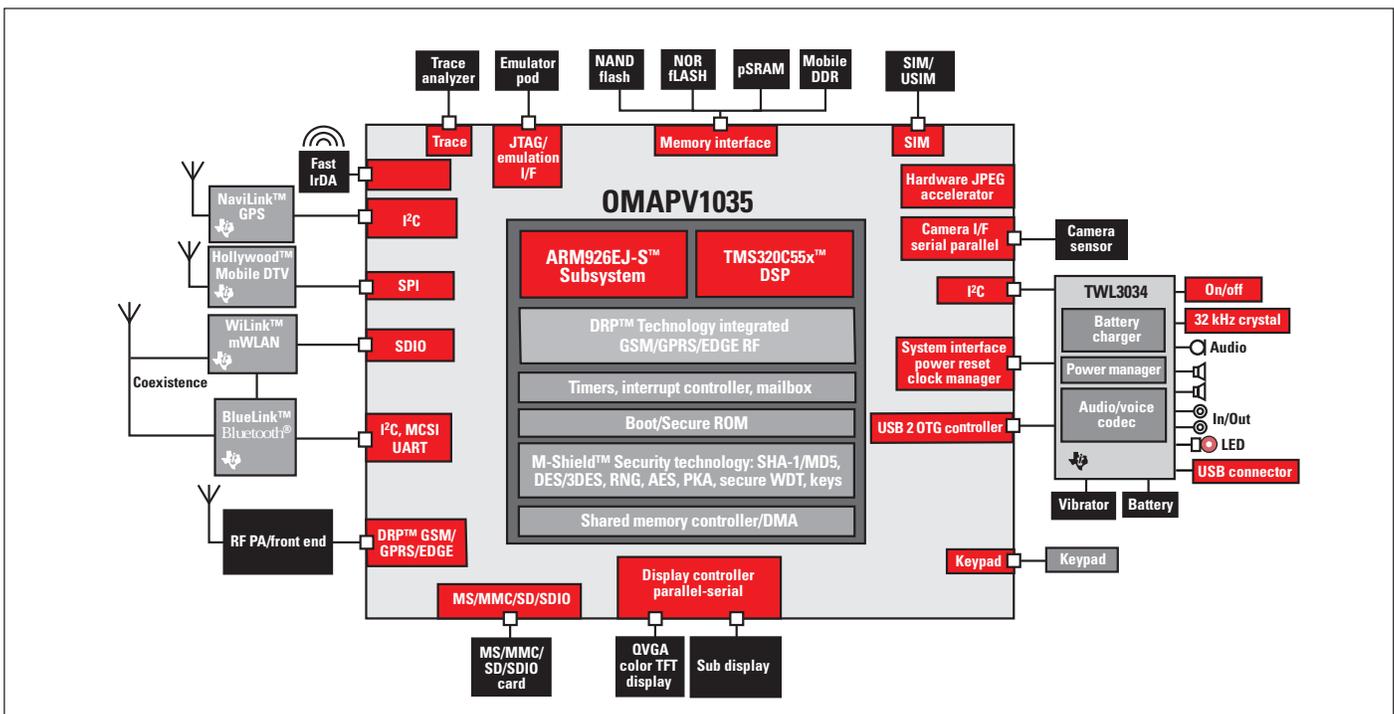
Enabling exciting multimedia in mobile devices

Surrounding the core processing capabilities of the OMAPV1035 processor is a comprehensive collection of connectivity and user-interface options that are critical to providing a rich multimedia experience. For example, the OMAPV1035 processor supports up to a QVGA screen with 30-fps video and a full 256-K palette of colors.

The OMAPV1035 processor enables a digital camera connection offering high-quality imaging up to 3 megapixels in resolution as well as superb user responsiveness with a shot-to-shot delay as low as 0.3 seconds at 2 megapixels of resolution.

Central to the high-performance multimedia processing of the OMAPV1035 solution are hardware-based accelerators in the DSP for advanced video capabilities such as MPEG4 encode/decode, H.263 as well as acceler- ated JPEG for still image capture. The gaming capabilities of the OMAPV1035 processor offer graphics comparable to that of many video portable consoles. To ensure vibrant gaming graphics, the OMAPV1035 processor has high-speed hardware-accelerated Java™ and 3D graphics processing up to 100-K polygons-per-second with rasterization rates in excess of 2.5 million pixels-per-second.
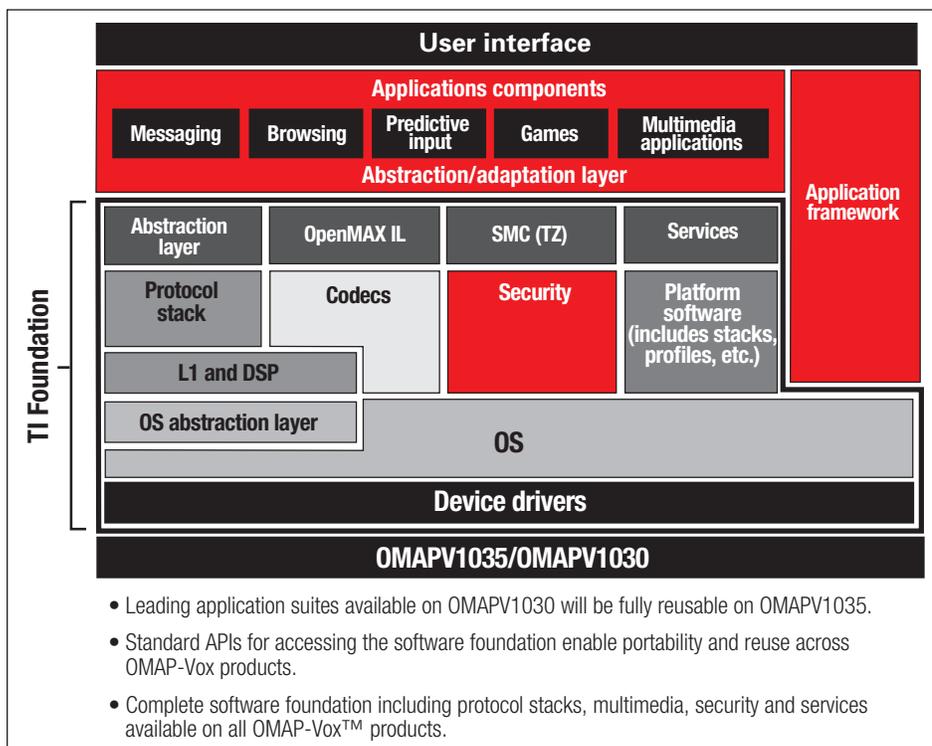
Mobile phone customization

Emerging markets are evolving beyond voice- centric, basic multimedia applications requiring the integration of more advanced multimedia features in TI's single-chip mobile phone solutions. The OMAPV1035 single-chip solution allows customers currently using the LoCosto platform and OMAP-Vox processors the ability to easily expand their handset portfolio with competitive, affordable multimedia-rich handsets. With the LoCosto platform ramping into volume production today TI is extending its DRP technology, dramatically lowering system costs of advanced multimedia handsets. Because the OMAPV1030 and new OMAPV1035 solutions share a common software platform, manufacturers can reuse their applications and modem software investments for faster, more cost-effective multimedia-rich feature phone development across market segments, enabling a wide range of device capabilities. TI works with leading applica- tion software providers to further boost rapid integration of multimedia applications into handsets.

Connecting to compelling applications

The connectivity options of the OMAPV1035 solution ensure support for all contemporary

- Leading application suites available on OMAPV1030 will be fully reusable on OMAPV1035.
- Standard APIs for accessing the software foundation enable portability and reuse across OMAP-Vox products.
- Complete software foundation including protocol stacks, multimedia, security and services available on all OMAP-Vox™ products.

and emerging applications. With 802.11 wire- less local area networking (WLAN) connectivity, Voice-over-IP (VoIP), video or audio streaming from the Internet and other applications are possible via a WLAN connection. In addition, Unlicensed Mobile Access/Internet Multimedia Subsystem (UMA/IMS) capabilities ensure that service providers will have the ability to offer fixed-mobile convergence (FMC) applications. FMC promises anytime/anywhere connectivity with user-transparent handovers between Wi-Fi® and GSM/GPRS/EDGE networks.

The OMAPV1035 processor ports are all optimized for interfacing with TI's single-chip wireless solutions including BlueLink™ *Bluetooth*® solutions, WiLink™ WLAN solutions, Hollywood™ DTV solutions and NaviLink™ GPS solution for high-performance data throughput rates. The USB 2.0 OTG port on the OMAPV1035 processor is particularly effective in many personal multimedia applications, such as instantaneously downloading music and video files from a PC to a mobile wireless device. Other interfaces include FM radio, infrared data communications (IrDA) and external memory cards.

Configuration flexibility for a range of market segments

The OMAPV1035 has been equipped with the processing and connectivity capabilities that can enable a range of handset price points across a broad segment of the marketplace. The common denominator for all these implementations will be powerful multimedia-rich processing.

For lower tier segments where consumers are more value-conscious, the OMAPV1035 processor can be connected to a more limited selection of peripheral capabilities. This configuration reduces system cost and brings value handsets to the masses. Such a wireless device would still support extensive multimedia functionality, such as a 1.3-megapixel digital camera, QCIF/QCIF+ display screen, video and audio playback, strong security and video games.

For market segments requiring greater functionality, the OMAPV1035 processor will support a fuller selection of multimedia-rich and connectivity capabilities. In this case, a low-cost wireless device based on the OMAPV1035 could still offer consumers a higher-resolution 3-megapixel digital camera, video and audio playback, recording and streaming, a more vibrant QVGA screen display, an external memory card interface and greater connectivity options such as WLAN, *Bluetooth* and mobile DTV.

The configuration flexibility inherent in the OMAPV1035 processor enables a range of exciting multimedia use case scenarios that previously have not been available in the more cost-sensitive market segments. For example, an OMAPV1035 wireless device could support video sharing through a "see what I see" application. While on a voice call, one party could stream a video clip to the person at the other end of the call and together they could

Possible phone configurations using OMAPV1035 architecture	• GSM/GPRS/EDGE Rel5 • SMS/MMS/E-mail/WAP • Up to 3-megapixel camera • QVGA screen • Video playback, record, streaming (30 fps) • SWIS (15 fps) • Audio playback, record	• MIDI64, MP3, MMA • DRM OMA 2.0 support • Java, 3D games (100 kΔ/s) • USB HS, IrDA, FM, *Bluetooth* • Memory card • WLAN (optional) • 700 h stby, 4.5 h talk, 19 h mp3 • VoIP (optional)

both experience the same video at the same time. In addition, with WLAN connectivity, FMC applications that make use of UMA/IMS capabilities are well within the reach of subscribers using low and mid-level handsets.

Low power, strong security

The OMAPV1035 processor is complemented by the TWL3034 power management and audio control device. Both the OMAPV1035 and the TWL3034 incorporate TI's SmartReflex™ low-power and performance management technology. SmartReflex technology is particularly critical at deeper submicron geometries where power leakage becomes a larger portion of the system's power budget. Traditional power management techniques such as dynamic voltage and frequency scaling (DVFS), low-power modes and clock gating are part and parcel of SmartReflex technologies, but aggressive new solutions have also been developed to address both the power and performance requirements of mobile wireless devices.

Because security issues have taken on even greater importance for consumers, service providers, network operators, financial institutions and application providers, TI has

developed M-Shield technology, a hardware- and software-based security environment that offers the utmost protection for all OMAP-Vox and OMAP™ platforms. From digital rights management (DRM) for on-device security to over-the-air encryption standards, M-Shield technology offers a comprehensive selection of protection options to best meet all of the specific needs of manufactures, service providers and consumers.

M-Shield™ technology features in TI wireless chipsets

Hardware feature set
- Secure control of platform debug, test and trace capabilities
- Secure flashing/booting support
- Cryptographic accelerators
  – DES/3DES
  – AES
  – SHA-1 & MD5
  – PKA
- FIPS compliant true hardware RNG
- Secure on-chip keys
  – Root public key hash (RSA authentication)
  – Random key (binding, secure storage)
  – Customer key (OEM-specific use)

Silicon IP

SmartReflex™ Technology	Description
Retention SRAM and logic	SRAM and logic retention cells support dynamic power switching without state loss, lowering voltage and reducing leakage
Dual-threshold voltages	Higher threshold for lower leakage and lower threshold for higher performance
Power management cell library	Switching, isolation and level shifters support multiple domains in SOC implementations
Process and temperature sensor	Adapts voltage dynamically in response to silicon processes and temperature variations
Design flow support	Complete, nonintrusive support for easily integrating SmartReflex technologies

- Secure environment hardware
- Secure DMA channels
- Secure chip-interconnect
- Expanded feature support in future generations, including ARM TrustZone™ support

ROM code feature set
- Secure flashing
- Secure booting
- Secure environment software
  - Secure environment entry and exit mechanism
  - Secure environment interrupt handling
  - Load manager to load and verify protected applications in Secure RAM prior to execution
  - Storage manager to encrypt and store sensitive data belonging to protected applications in NoVo memory
  - Secure run-time services for protected applications, including cryptographic libraries
- Expanded feature support in future generations, including ARM TrustZone™ support

Quickly delivering the right devices to the right segment

All of TI's OMAP-Vox and OMAP platforms, including the OMAPV1035 processor, come with a wide range of support mechanisms that ensures rapid development and an accelerated time to market. For example, a complete yet flexible reference design features a full BOM that includes the TWL3034 power management device. The OMAPV1035 processor has a board support package (BSP) with accelerated Java support and the Nucleus® real-time operating system. Manufacturers have access to a wide range of development tools as well as TI's comprehensive selection of support programs that begin with design and follow a system through volume production.

The OMAP ecosystem

TI is working with leading application software providers to offer a scalable, integrated application suite for delivery of affordable feature phones to the market. Partner application suites are integrated onto TI's OMAP-Vox product family for a highly customizable application solution that greatly reduces the overall handset development cycle.

Application software developers, system integrators, providers of development tools and other types of technology suppliers have joined the OMAP ecosystem and are actively supporting OMAP manufacturers with products and services. In many cases, wireless device manufacturers can rapidly deploy technologies readily available through the third-party partner application suites, freeing manufacturer resources for developing functionality that will differentiate the product and make it more competitive in the marketplace. Independent OMAP Technology Centers are located strategically throughout the world and offer front-line support services.

OMAPV1035 processor features and specifications

- Integrated single-chip cell phone solution including digital baseband and applications processing combining ARM926EJ, TMS320C55x™ DSP and DRP technology
- GSM/GPRS/EDGE class 12
- 65-nm CMOS process reduces costs, power consumption and board space
- System software re-usable among all OMAP-Vox solutions
  - GSM/GPRS/EDGE protocol stack
  - Nucleus BSP with drivers
  - Multimedia codecs
  - Khronos OpenMax IL interface
- Optimized for low- and mid-range handset price-points while providing rich multimedia not available in these market segments
  - Audio/video playback, record and streaming at 30 fps on QCIF or QVGA screens

- Digital camera up to 3 megapixels with shot-to-shot delay of less than a second
- 2D/3D gaming graphics processing
- Complete codecs offering:
  - Audio: AMR NB/WB, MP3, AAC, AAC+, e AAC+, MIDI64, WMA
  - Video: H.263 baseline, MPEG-4 SP, H.264 baseline encode/decode, WMV9, AVS-M decode
  - Imaging: Hardware-accelerated JPEG encode, GIF, PNG, WBMP
- Enhanced connectivity options:
  - WiLink WLAN solutions
  - BlueLink *Bluetooth* solutions
  - NaviLink GPS solutions
  - Hollywood DTV solutions
  - FM radio
  - Camera
  - IrDA
  - Memory interface
  - USB 2.0 OTG
  - TV out
- SmartReflex low-power, performance-enhancing technology
- M-Shield hardware and software-based security protection
- Complementary power management and audio control chip

For more information

To learn more about the OMAPV1035 GSM/GPRS/EDGE solution as well as other leading wireless products from TI, visit
www.ti.com/omapv1035