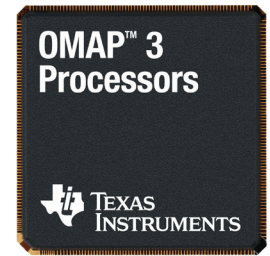# OMAP™ 3 family of multimedia applications processors

Texas Instruments

Revolutionizing entertainment and productivity in wireless handheld commuications

Product Bulletin

The OMAP™ 3 family of multimedia applications processors from Texas Instruments (TI) introduces a new level of performance that enables laptop-like productivity and advanced entertainment in multimedia-enabled handsets. OMAP 3 devices support all levels of handsets, from the entry-level multimedia-enabled handsets to high-end Mobile Internet Devices (MIDs).

Entry-level multimedia-enabled handsets	Mid-level multimedia-enabled handsets	High-end multimedia-enabled handsets
OMAP3410 OMAP3610	OMAP3420 OMAP3620	OMAP3430/3440 OMAP3630/3640

TI's OMAP 3 family of applications processors integrate the ARM Cortex-A8 superscalar microprocessor core, delivering up to 3x the performance of ARM11-based processors. This processor family leverages industry-leading technologies to provide outstanding mobile phone battery life with the performance needed for laptop-comparable productivity software, along with an audio-video experience equivalent to that of consumer electronics devices.

Overview

The OMAP 3 family of processors opens new areas for compelling mobile applications that will revolutionize handheld communications in both work and play. The OMAP34x processor family includes the industry's first applications processor to be designed in a 65-nanometer (nm) CMOS process technology, reflecting TI's commitment to providing advanced silicon technology to drive a revolution in mobile communications.

These devices can operate at a higher frequency than previous-generation OMAP processors, while lowering the core voltage and required power with features to prolong battery life.

For OEMs and ODMs looking for even greater processor performance and lower power consumption, TI's new OMAP36x processor family provides the same or better features as OMAP34x processors, but with increased processor performance and decreased power consumption.

For example, multimedia applications benefit from faster, high-quality image capture and processing for cameras; exceptional audio/video performance; innovative user interfaces; and enhanced support for external displays and high-speed connectivity inter-faces. Also, extensive mobile security guards the increasingly important role of wireless handsets in e-commerce, while still being compatible with a wide range of modems.

Key features

- Combines mobile entertainment and high-performance productivity applications.
- Integrates the advanced Superscalar ARM Cortex-A8 RISC core, enabling up to 3x gain in performance versus ARM11.
- Designed in 45-nm (OMAP36x platform) and 65-nm (OMAP34x platform) CMOS process technologies for less power consumption and increased device performance.
- Includes integrated IVA hardware accelerators to enable multi-standard encode decode up to HD resolution.
- Available integrated image signal processor (ISP) enables faster, higher quality image capture, lower system cost and lower power consumption.
- Provides seamless connectivity to hard diskdrive (HDD) devices for mass storage.
- Leverages SmartReflex™ technologies for advanced power reduction.
- Assures mobile security with M-Shield™ mobile security technology capability enhanced with ARM TrustZone support.
- Shares fully scalable software solution with all OMAP 2 processors.
- Supports all high-level OSs for customizable interfaces, including Linux, Microsoft Windows Mobile, Open Handset Alliance Android and Symbian.
- Packaging: 12 mm x 12 mm or 14 mm x 14 mm MicroStar BGA™ integrated circuit packages, memory-stackable.

The OMAP 3 processor family fully supports memory stacking through package-on-package technology, with stackable 12 mm x 12 mm or 14 mm x 14 mm, 515 lead ball-grid array (BGA) packages.

OMAP34x processors

Features	OMAP3430 OMAP3440	OMAP3420	OMAP3410
General-purpose processor	ARM Cortex-A8 RISC core		
Image, video, audio accelerator (IVA)	IVA 2+	IVA 2	IVA 2
2D/3D graphics accelerator	POWERVR SGX™	POWERVR SGX™	N/A
Integrated image-signal processor	✔	✔	✔
Camera resolution (megapixel)	12	5	3
Display resolution	XGA/WXGA	XGA/WXGA	XGA/WXGA
TV out	Composite, S-video	Composite, S-video	Composite, S-video
Multimedia class	DVD/HD	VGA	VGA
M-Shield™ mobile security	Available in all		
SmartReflex™ technology	Available in all		
Packaging	12 mm x 12 mm BGA memory-stackable package 14 mm x 14 mm BGA memory-stackable package		

OMAP36x processors

| Features	OMAP3630 OMAP3640	OMAP3620	OMAP3610
General-purpose processor	ARM Cortex-A8 RISC core		
Image, video, audio accelerator (IVA)	IVA 2+	IVA 2	IVA 2
2D/3D graphics accelerator	POWERVR SGX™	POWERVR SGX™	N/A
Integrated image-signal processor	✔	✔	✔
Camera resolution (megapixel)	12	12	12
Display resolution	XGA/WXGA	XGA/WXGA	XGA/WXGA
TV out	Composite, S-video	Composite, S-video	Composite, S-video
Multimedia class	DVD/HD	VGA/DVD	VGA/DVD
M-Shield™ mobile security	Available in all		
SmartReflex™ technology	Available in all		
Packaging	12 mm x 12 mm BGA memory-stackable package 14 mm x 14 mm BGA memory-stackable package		

A new level of performance

The OMAP3430/3440 and OMAP3630/3640 processors are the first processors in the industry to integrate the superscalar ARM Cortex-A8 core . With features such as deeper pipelines, a dedicated level-2 cache and execution of up to twice as many instructions per clock cycle, the high-performance ARM processor provides the processing power to support high-quality productivity applications and faster user interfaces.

Mobile workers will be able to access databases, work on spreadsheets and presentations, use e-mail, send instant messages, browse and download content from the Web, attend videoconferences and play audio-video clips faster. Outstanding graphics capabilities will also be possible, thanks to the ARM's integrated vector floating-point acceleration working with the OMAP3x platform's dedicated 2D/3D graphics hardware accelerator. This feature makes innovative user interfaces and console-quality gaming possible.

In addition, OMAP3430/3440/3630/3640 processors integrate advanced IVA 2+ acceleration with new support for critical-coded functions. A second-generation, power-optimized version of the imaging, video and audio accelerator used in TI's DaVinci™ technology, IVA 2+ improves multimedia processing up to 4x from previous OMAP processors.

The increased capabilities of IVA 2+ enable multi-standard (MPEG-4, H.264, Windows Media Video) encode and decode at DVD, up to HD resolutions. With the advanced multimedia capabilities of these OMAP processors, a multi-standard DVD- or HD-quality camcorder can be added to a phone for the first time. In addition, IVA 2+ advances video teleconferencing by providing H.264-based video at greater than CIF resolutions.

OMAP3430 and OMAP3630 System architecture
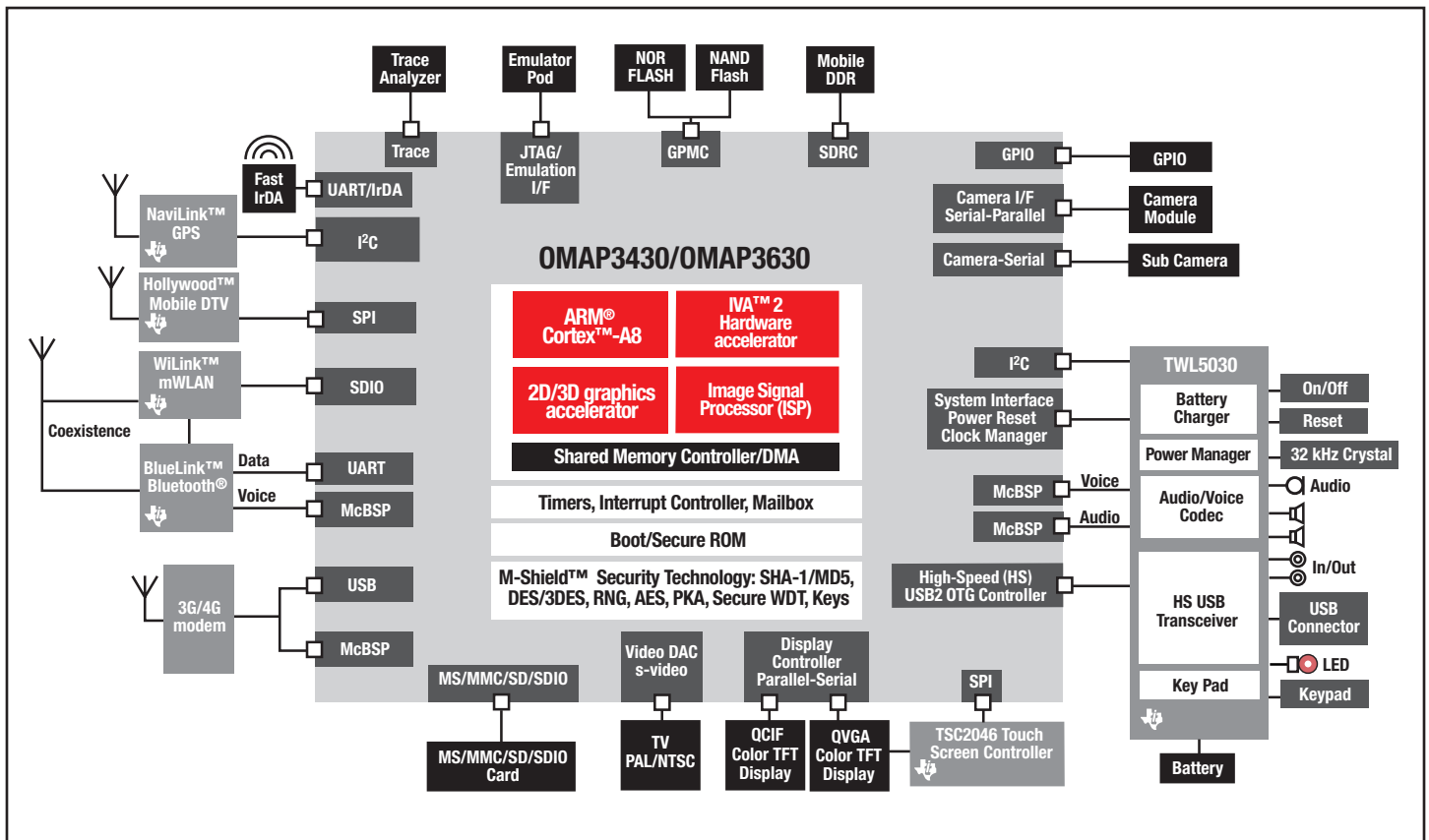
OMAP3440 and OMAP 3640 processors

Device features

- IVA Hardware accelerator
  - IVA 2+ accelerator enables multi-standard (MPEG-4, H.264) encode/decode and WMV9 encode at D1 (720 x 480 pixels), 30 fps
  - Up to 720p HD resolution
- Imagination Technologies' POWERVR™ SGX architecture supports OpenGL ES1.1, OpenGL ES2.0 and OpenVG
- Integrated image signal processor (ISP) enables up to 12 megapixels of still image capture
- Flexible system support:
  - Composite and S-video TV output
  - Up to XGA (1024 x 768 pixels) / WXGA (1280 x 800), 24-bit, 16-million color display support

- MIPI® and FlatLink™ low-voltage differential signal (LVDS) transmitter/receiver 3G-compliant serial/parallel display support.
  - OMAP3630/3640 processors do not support FlatLink3G
- Four high-speed USB 2.0 host ports:
  - One high-speed USB 2.0 On-The-Go (OTG) port
  - Three high-speed USB 2.0 TLL interfaces
- HLOS support for customizable interfaces: Linux, Microsoft Windows Mobile, Open Handset Alliance Android and Symbian
- Optimized audio and energy-management companion chip: TWL5030

OMAP3420/3620 processors meet the needs of multimedia-enabled handsets

OMAP3420/3620 processors are designed to meet the needs of the multimedia-enabled handsets market, including up to VGA/DVD quality video record and playback, up to 12-megapixel still image capture, music playback and 3D gaming.

OMAP3420/3620 processors share many of the advanced productivity and multimedia technologies present in other OMAP 3 devices, including 65-nm (OMAP34x platform) or 45-nm (OMAP36x platform) CMOS process technology, the ARM Cortex-A8 superscalar microprocessor core, and the IVA 2 accelerator.

OMAP3420/3620 processors also embed Imagination Technologies' POWERVR SGX graphics core, supporting OpenGL ES 1.1, OpenGL ES 2.0 and OpenVG to deliver exceptional graphics performance. In addition, OMAP3420/3620 processors are software-

compatible with all OMAP 2 and OMAP 3 processors, allowing a fully software-scalable solution.

With the inclusion of IVA 2, one of TI's advanced hardware accelerators, OMAP3420 and OMAP3620 processors provide up

to VGA/DVD quality video camcorder and playback for all popular standards, such as MPEG-4, Windows Media Video 9, H.264 and RealVideo 10. In addition, the ARM's vector floating-point acceleration, coupled with the dedicated 2D/3D graphics hardware accelera-

tor, provides outstanding gaming capabilities as well as unique user interfaces. IVA 2 enables advancements in video teleconferencing with capabilities of performing MPEG-4 based video teleconferencing at greater than CIF resolutions.

OMAP3410 and OMAP3610 System architecture
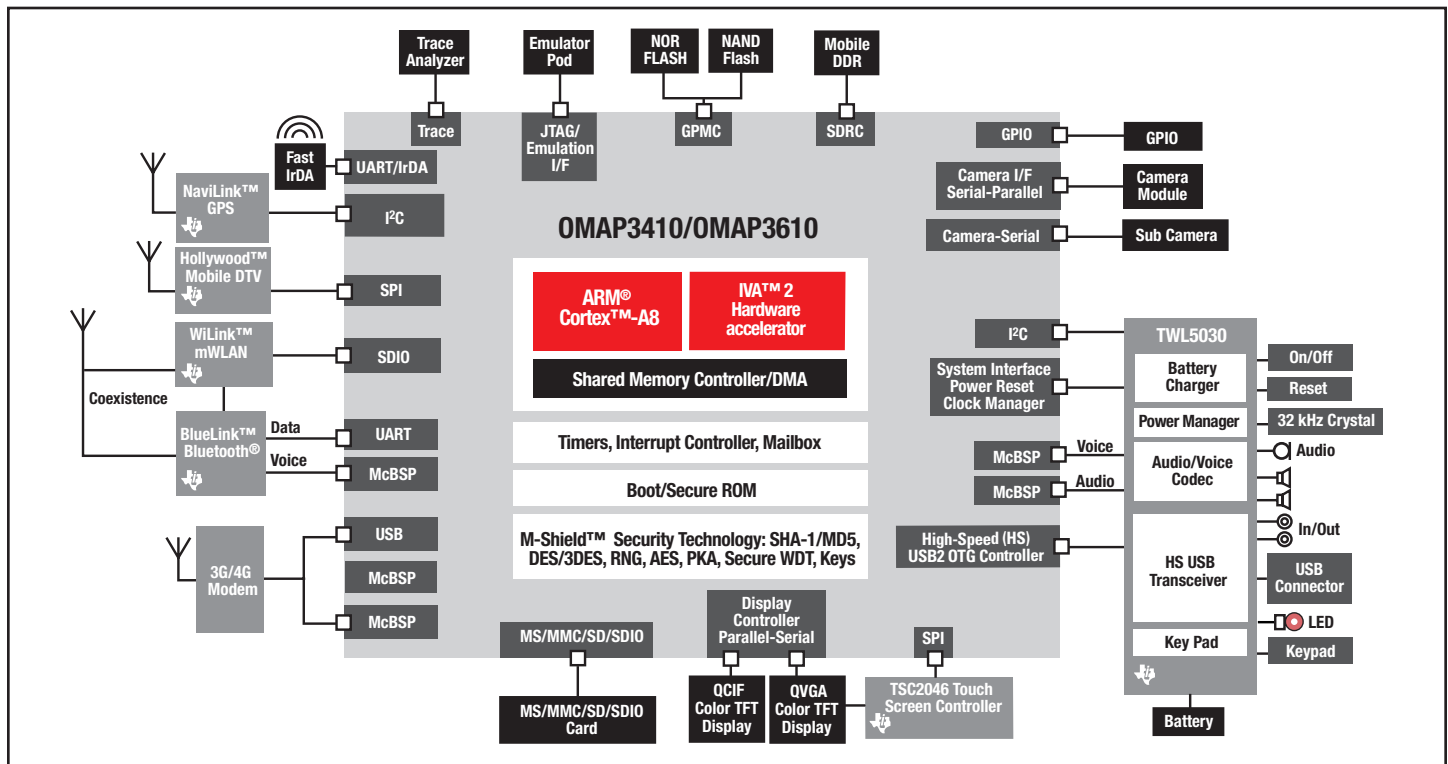
OMAP3420 OMAP3620 processors

Device features

- IVA 2 accelerator enables VGA (OMAP3420) to DVD OMAP3620 video content playback up to XGA/WXGA (OMAP3620) display resolutions
- Imagination Technologies' POWERVR™ SGX architecture supports OpenGL ES1.1, OpenGL ES2.0 and OpenVG
- Integrated ISP enables 5 megapixels (OMAP3420) to 12 megapixels (OMAP3620) of still image capture
- Flexible system support:
  - Composite and S-video TV output
  - Display support:
    - OMAP3420/3620: XGA (1024 x 768 pixels) / WXGA (1280 x 800 pixels), 24-bit, 16-million color display support

- MIPI and FlatLink 3G-compliant serial display, parallel display support
  - OMAP3620 do not support FlatLink3G
- Four high-speed USB 2.0 hosts:
  - One high-speed USB 2.0 On-The-go (OTG) port
  - Three high-speed USB 2.0 TLL interfaces
- HLOS support for customizable interfaces: Linux, Microsoft Windows Mobile, Open Handset Alliance Android and Symbian
- Optimized audio and energy-management companion chip: TWL5030
- Optimized cellular connectivity solutions with the WL127x WLAN + *Bluetooth* and NL55xx GPS + Bluetooth products

Basic multimedia-enabled handset performance needs met

OMAP3410/3610 processors meet the needs of mass-market multimedia-enabled handsets, which include CIF (OMAP3410) and up to DVD (OMAP3610 processor)-quality video record and playback, up to 12-megapixel still image capture, music playback and 3-D gaming.

The lowest cost member of the OMAP 3 family, OMAP3410/3610 processors share many of the technologies of other OMAP 3 devices, including 65-nm (OMAP3410 processor)/45-nm (OMAP3610) CMOS process technology, the ARM Cortex-A8 superscalar microprocessor core, and the IVA 2 hardware accelerator for a rich multimedia experience and targeted general-purpose processing.

In addition, OMAP3410/3610 processors are software-compatible with all OMAP 2 and OMAP 3 processors, allowing a fully software-scalable solution.

With the inclusion of IVA 2, one of TI's advanced hardware accelerators, the OMAP3410 processor provides VGA quality video camcorder and playback for all popular standards, such as MPEG-4, Windows Media Video 9, H.264 and RealVideo 10. The OMAP3610 processor is able to provide up to VGA/DVD quality video camcorder and playback for the same standards. Additionally, the IVA 2 accelerator on OMAP3410/3610 processors enables MPEG-4 quality video conferencing at greater than QCIF resolutions.

OMAP 3 processors' image capture, display and storage

An integrated image signal processor (ISP) offers a means for quality differentiation, PCB area savings, reduced BOM (bill-of-materials) costs, lower system power and design flexibility. The on-chip camera image pipeline eliminates the need for external circuitry for image capture and processing, while the image pipeline provides configurable quality for sharper, clearer pictures.

Camera sensors up to 12 megapixels in size can be accommodated for higher quality images with faster shot-to-shot performance. On-the-fly JPEG compression aids in throughput and storage, while power-reduction features save battery drain in preview mode. Support for serial and parallel sensors provides design flexibility.

OMAP 3 processors support high-quality outputs as well as inputs, enabling easy sharing of multimedia content. Composite and S-video outputs provide flexible connectivity options to extend to TV displays and projectors. For handheld displays, the OMAP 3 processor family can support up to XGA/WXGA resolutions and 16 million colors. The device can also interface to MIPI-compliant serial and parallel displays for use in mobile handsets.

OMAP 3 processor power conservation

The OMAP 3 processor family leverages the most advanced and effective power management techniques in the market. The chips make exhaustive use of TI's SmartReflex™ technology for power and performance management, which include a broad range of intelligent and adaptive hardware and software techniques that dynamically control voltage, frequency and power based on device activity, modes of operation and temperature.

SmartReflex technology in OMAP 3 processors alleviates chip-level leakage power dissipation at 65 nm and 45 nm, allowing the device to have ultra-low active and standby current drain, thereby saving critical battery power.

A companion device to the OMAP 3 processors, the TWL5030 audio and energy management chip maximizes battery life and boosts system performance in mobile phones that use batteries based on lithium-ion, lithium-ion polymer or cobalt nickel manganese chemistries. The highly integrated TWL5030 combines SmartReflex technology-compliant voltage regulators and converters, a high-fidelity audio/voice codec, class-AB/D audio amplifiers, a high-speed USB 2.0 OTG transceiver and battery charger circuitry onto a single chip, significantly reducing board space and system cost while managing power consumption efficiently.

OMAP 3 platform security

TI's M-Shield™ mobile security technology enables robust protection of premium copyrighted digital media content, secure protocol applications and e-commerce applications such as ticketing, banking, brokering and shopping.

Enhanced with ARM TrustZone support, the OMAP 3 processor security offering is based on open APIs and provides an environment for secure applications that deliver robust performance, interoperability, greater development speed and large economies of scale.

As the advanced hardware and software security framework for the OMAP 3 processors, M-Shield technology enables new value-added services and increased terminal security, allowing operators, content providers and manufacturers to secure sensitive assets and usage rights for protection against revenue loss. Features include secure flashing and booting so that only authorized software can be loaded on the handset, while terminal identity protection makes stolen phones useless and network lock protection prevents users from arbitrarily switching networks on the Web.

OMAP 3 platform HLOS support

The OMAP 3 family of processors supports all high-level operating system (HLOS) platforms, including Linux, Microsoft Windows Mobile, Open Handset Alliance Android and Symbian operating systems. HLOS platforms enable manufacturers and mobile operators to differentiate their products through an easy-to-use, customizable interface and a robust, flexible architecture for applications and services. TI was the first wireless system vendor to offer all major HLOS platforms on mobile phones.

Complete systems expertise

TI's integrated, proven wireless connectivity solutions ensure multi-mode operation and access to a variety of wireless network connections for service any time and anywhere on a variety of wireless networks.

TI's highly integrated BlueLink™ semiconductor Bluetooth® technology, mobile WiLink™ WLAN and GPS hardware and software are developed with a full understanding of the complete mobile phone system to give handset manufacturers a distinct competitive advantage. TI is also looking to the future by driving development of future mobile connectivity features for mobile phones.

In-depth development support

The OMAP 3 family is backed by TI's extensive development support. Code compatibility with other OMAP processors makes it easy to port software, and a sophisticated development environment speeds programming for all on-chip processors. In addition, OMAP 3 processors are supported by the OMAP platform ecosystem, comprising the OMAP Developer Network and OMAP Technology Centers (OTC), as well as systems integrators, development tool providers and leading content providers worldwide.

The OTC program has been extended to include support for TI's WiLink WLAN and BlueLink Bluetooth technologies. TI's OTC

program provides a system-level approach with support for the OMAP platform and non-cellular wireless solutions to give handset manufacturers and developers access to a broad range of wireless systems expertise. For more information about independent OMAP Technology Centers (OTCs), TI's extensive net-work of specialized system integrators skilled in all aspects of HLOS porting and integration, see **www.ti.com/omapotcs**.

Availability disclaimer

The OMAP34x and OMAP36x processor families are intended for high-volume OEMs and ODMs and are not available through distributors. If your company meets this description, please see the following contact information.

For more information

To learn more about the OMAP3x processor family, including OMAP34x, OMAP36x or other OMAP applications processors from TI, see **www.ti.com/wireless.** Find out how OMAP 3 processors can open a revolutionary new world of compelling applications for your next product.

To learn more about OMAP 3 processors for outside the wireless market, see **www.ti.com/omap35x**.

TEXAS INSTRUMENTS