1 Key Message

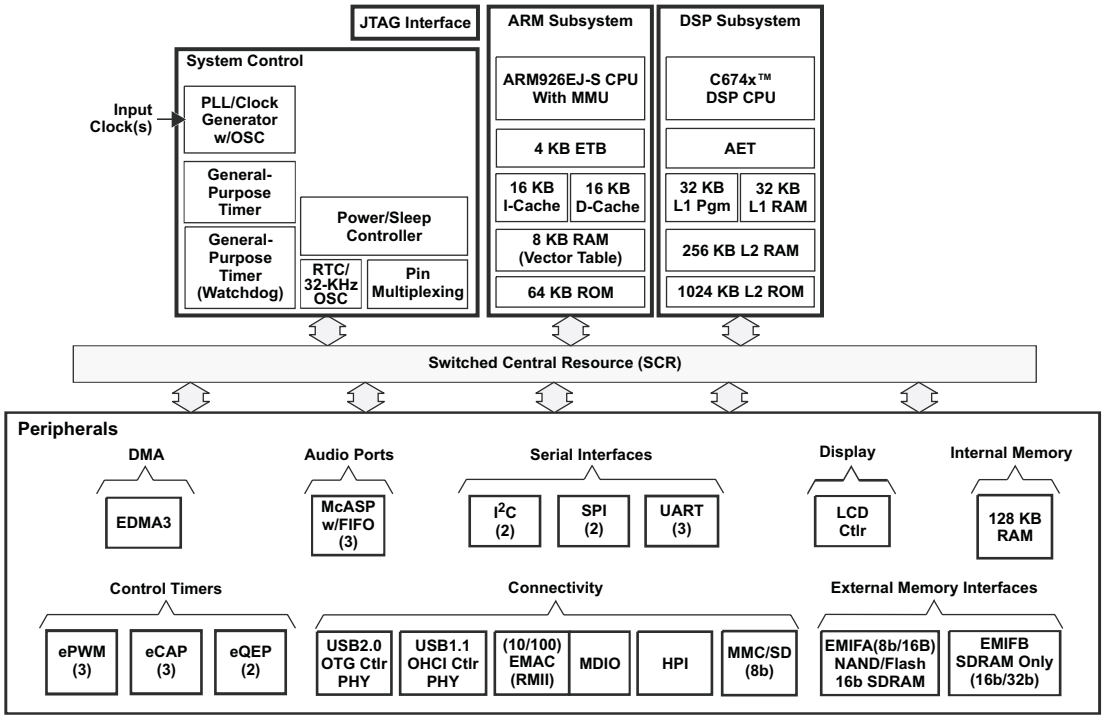
OMAP-L13x are the latest OMAP Processors combining floating-point high-precision processing, networking and GUI capabilities with scalability, system intergration and low-power consumption.

1.1 Key Features

- **Power Management / Power Savings**
  - **Supports Individual Clock Enable/Disable Control for DSP and Peripherals**
  - **Real Time Clock (RTC) With Crystal Input, Separate Clock Domain, Separate Power Supply**
- **ARM926EJ-S Core**
  - **32-Bit and 16-Bit (Thumb®) Instructions**
  - **DSP Instruction Extensions**
  - **Single Cycle MAC**
  - **ARM® Jazelle® Technology**
  - **EmbeddedICE-RT™ for Real-Time Debug**
- **300-MHz C674x™ Floating Point VLIW DSP Core**
  - **8 Highly Independent Functional Units**
  - **64 General-Purpose Registers (32 Bit)**
  - **Instruction Packing Reduces Code Size**
  - **Hardware Support for Modulo Loop Operation**
  - **Protected Mode Operation**
- **C674x Instruction Set Features**
  - **Superset of the C67x+™ and C64x+™ ISAs**
  - **2400/1800 C674x MIPS/MFLOPS**
  - **Byte-Addressable (8-/16-/32-/64-Bit Data)**
  - **8-Bit Overflow Protection**
  - **Bit-Field Extract, Set, Clear**
  - **Normalization, Saturation, Bit-Counting**
  - **Compact 16-Bit Instructions**
- **C674x Two Level Cache Memory Architecture**
  - **Flexible RAM/Cache Partition (L1 and L2)**
- **128K-Byte Internal RAM Shared Memory**
- **Comprehensive System-Wide Security**
- **Applications: Range from Networked Industrial Equipment to Networked Medical Equipment**

PRODUCT PREVIEW

1.2 OMAP-L137 Functional Block Diagram



Note: Not all peripherals are available at the same time due to multiplexing.

2 Peripherals

Table 2-1. Peripheral Description

Peripherals (1)	No	Description
EMIFB	1	32-Bit or 16-Bit SDRAM with 256MB address space.
EMIFA	1	NOR, NAND (8-/16-Bit-Wide Data), 16-Bit SDRAM with 128MB address space.
Flash Card Interface	1	Multi Media Cards (MMC), Secure Digital Cards (SD) and SDIO interfaces supported.
EDMA3	1	32 independent DMA channels, 8 Quick DMA (QDMA) channels, 2 Transfer controllers, Programmable transfer burst size ((16/32/64 bytes).
Timers	2	64-Bit General Purpose (configurable as 2 separate 32-bit timers, 1 configurable as Watch Dog).
UART	3	One with RTS and CTS flow control
SPI	2	Each with one hardware chip select, Master/Slave. Supports 3-, 4-, and 5- pin operation.
I^2C	2	Both Master/Slave. Supports up to 400 Kbps.
Multichannel Audio Serial Port [McASP]	3	Each with transmit/receive, FIFO buffer, 16/12/4 serializers
10/100 Ethernet MAC [EMAC] with Management Data I/O [MDIO]	1	RMII Interface
Enhanced Pulse Width Modulator (ePWM)	3	6 Single Edge, 6 Dual Edge Symmetric, or 3 Dual Edge Asymmetric Outputs.
Enhanced Capture Module [eCAP]	3	32-bit capture inputs or 3 32-bit auxiliary PWM outputs.
Enhanced Quaduature Encoded Pulse Module [eQEP]	2	32-bit QEP channels with 4 inputs/channel.
Universal Host Port Interface (UHPI)	1	16-bit multiplexed address/data
USB 2.0	1	High-Speed OTG Controller with on-chip OTG PHY (supports Host, Device and OTG modes).
USB 1.1	1	Full-Speed OHCI (as host) with on-chip PHY.
General-Purpose Input/Output Port	1	Up to 128 GPIO pins
LCD Controller	1	Supports low end 8-bit character based displays, mid-range, 1/4 VGA color, rasterized graphical displays and high end LCD display
RTC	1	Real Time Clock with 32 KHz oscillator and seperate power rail. Provides time and date tracking and alarm capability.
PLL Controller 0	1	Supplies the clocks to the ARM and DSP subsystems as well as most of the system peripherals.

(1) Not all peripheral pins are available at the same time due to multiplexing.

3 Key Electrical Characteristics

			MIN	NOM	MAX	UNIT
CVDD	Supply voltage, Core (CVDD, RTC_CVDD, PLL0_VDDA , USB0_VDDA12, RVDD)		1.14	1.2 or 1.26	1.32	V
DVDD	Supply voltage, I/O, 1.8V (USB0_VDDA18, USB1_VDDA18)		1.71	1.8	1.89	V
	Supply voltage, I/O, 3.3V (DVDD, USB0_VDDA33, USB1_VDDA33)		3.15	3.3	3.45	V
VSS	Supply ground (VSS, USB0_VSSA33, USB0_VSSA, PLL0_VSSA, OSCVSS)		0	0	0	V
P_{Typ}	Typical Power Consumption. Includes static and active power for both Core and I/O supplies	Use Case 1 : 300 MHz; ARM and DSP at 1.2 CVDD.		503(1)		mW
T_A	Operating ambient temperature range	Default	0		70	°C
		A version	-40		105	°C
T_J	Operating junction temperature range	Default	0		90	°C
		A version	-40		125	
$F_{SYSCLK1,6}$	DSP and ARM Operating Frequency (SYSCLK1,6)	Default	0		300	MHz
		A version	0		300	MHz

(1) These are preliminary pre-silicon design estimates and hence are subject to change.

3.1 Power Use Case Details

- **Use Case 1:** At room temperature (25 °C) with the core voltage (CVDD) set to 1.2V. 70% DSP CPU utilization (300 MHz); ARM doing typical activity (peripheral configurations, other housekeeping activities); EMIFB active at 50% utilization (133 MHz/16-bit); 25 MHz McASP Receive; SPI master at 50% utilization (27MHz); GPIOs at 50 utilization (33MHz). The actual current draw varies across manufacturing processes and is highly application-dependent.

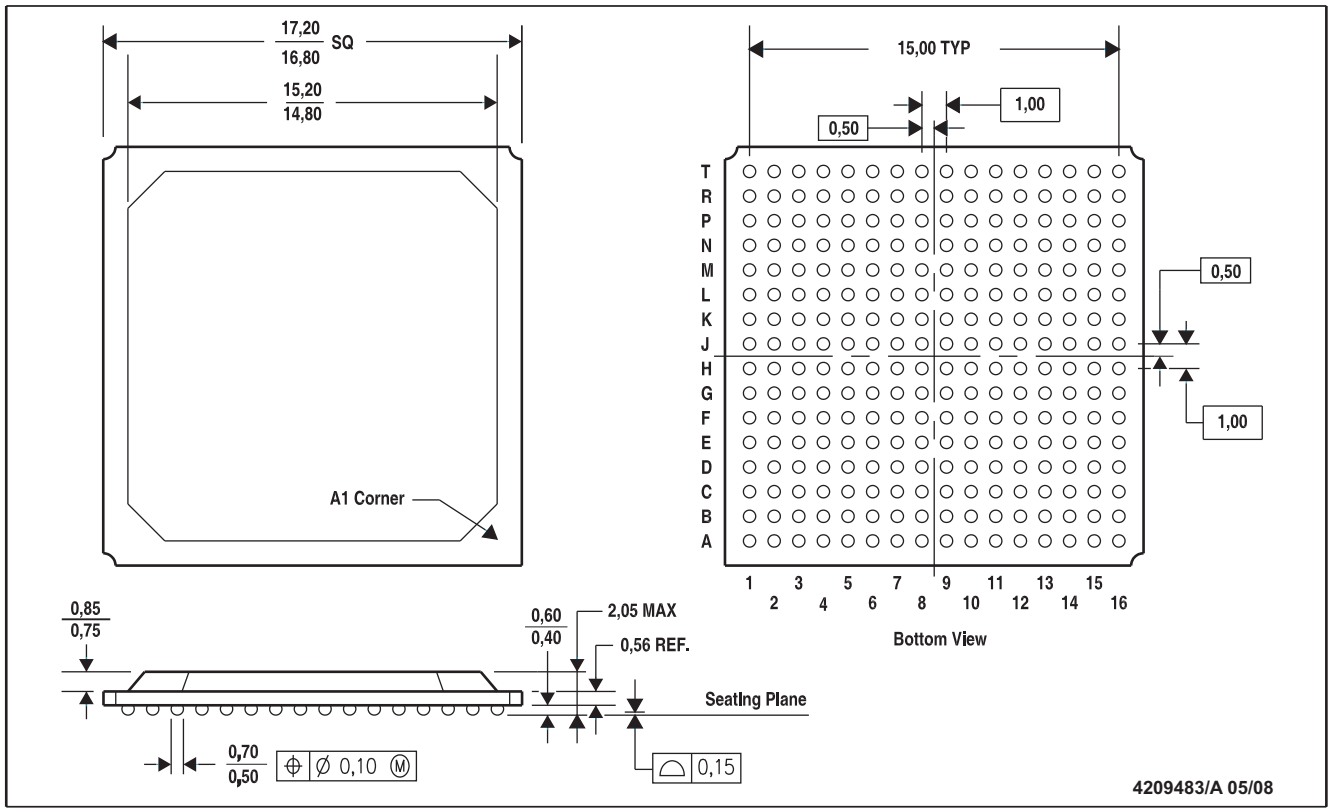
4 Tools and Software Support

The OMAP-L137 supports the following tools and software:

- Code Composer Studio™ 3.3
- DSP/BIOS™ 5.3
- DSP/BIOS™ 5.3 based Peripheral Device Drivers
- DSP Chip Support Library (CSL)
- MontaVista™ Linux Pro 5 for ARM
- Linux based Peripheral Drivers
- OMAP-L137 Development Kit

5 Mechanical Drawing

ZKB (S-PBGA-N256) **PLASTIC BALL GRID ARRAY**



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. This is a lead-free solder ball design.

The OMAP-L137 processor is pin for pin compatible with TMS320C6747.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DLP® Products	www.dlp.com	Broadband	www.ti.com/broadband
DSP	dsp.ti.com	Digital Control	www.ti.com/digitalcontrol
Clocks and Timers	www.ti.com/clocks	Medical	www.ti.com/medical
Interface	interface.ti.com	Military	www.ti.com/military
Logic	logic.ti.com	Optical Networking	www.ti.com/opticalnetwork
Power Mgmt	power.ti.com	Security	www.ti.com/security
Microcontrollers	microcontroller.ti.com	Telephony	www.ti.com/telephony
RFID	www.ti-rfid.com	Video & Imaging	www.ti.com/video
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265