



# **Breaking the mW/MHz Mindset: How to Navigate TI's Processor Portfolio**

Presenter: John Dixon











## Agenda

- TI's Embedded Processing Portfolio
- Identifying Low Power Markets
- Choosing the Right Processor
- TI's Recently Announced Low Power Processor Portfolio
- Sales Tools
  - Technology Calendar
  - Collateral
- Next Steps



# TI Embedded Processing Portfolio

Microcontrollers			ARM-Based		DSP
16-bit	32-bit Real-time	32-bit ARM	ARM+	ARM + DSP	DSP
<b>MSP430</b> Ultra-Low Power Up to 25 MHz Flash 1 KB to 256 KB Analog I/O, ADC, LCD, USB, RF Measurement, Sensing, General Purpose \$0.49 to \$9.00 	<b>C2000™</b> Fixed & Floating Point Up to 300 MHz Flash 32 KB to 512 KB PWM, ADC, CAN, SPI, I²C Motor Control, Digital Power, Lighting, Sensing \$1.50 to \$20.00 	<b>ARM</b> Industry Std Low Power <100 MHz Flash 64 KB to 1 MB USB, ENET, ADC, PWM, SPI Host Control \$2.00 to \$8.00 	<b>ARM9 Cortex A-8</b> Industry-Std Core, High-Perf GPP Accelerators MMU USB, LCD, MMC, EMAC Linux/WinCE User Apps \$8.00 to \$35.00 	<b>C64x+ plus ARM9/Cortex A-8</b> Industry-Std Core + DSP for Signal Proc. 4800 MMACs/1.07 DMIPS/MHz MMU, Cache VPSS, USB, EMAC, MMC Linux/Win + Video, Imaging, Multimedia \$12.00 to \$65.00 	<b>C647x, C64x+, C55x</b> Leadership DSP Performance 24,000 MMACS Up to 3 MB L2 Cache 1G EMAC, SRIO, DDR2, PCI-66 Comm, WiMAX, Industrial/Medical Imaging \$4.00 to \$99.00+ 

Analog Attach



Software & Dev. Tools





## Changing needs in the Marketplace

Need for low power to meet portability requirements

### High-precision portable

- Ease of development
- High precision, Dynamic range
- Peripheral integration
- Up to 8 hours battery life (AA battery)



### High performance portable

- More MMACs
- Lower system cost
- Peripheral integration
- Up to 8 hours battery life (AA battery)



### Very low power portable

- Parallel processing
- Memory integration
- Enhanced low power I/O
- Up to 16 hours battery life (AA battery)



Pricing is min \$10ku



# Complete Low Power Offering

Understanding where/how to hunt

← - - - - VLP - - - - - | - ULP - - - - - →

Plugged/ USB powered				<1 day				<2 weeks				>6 months			
Voice	Music	Comms	Data	Voice	Music	Comms	Data	Voice	Music	Comms	Data	Voice	Music	Comms	Data
Hands Free Car Kit				SDR				Music recorder				Smoke detectors			
CPE				Wireless Microphone				audio recorder				intelligent sensors			
GPS dongle				Musical instruments				stethoscope				port. data acquisition			
Speakerphone				Barcode Scanner				ebook				wireless authentication			
VOIP Phones				NR Headphones				Door lock fingerprint Auth				port. monitoring			
DECT phones				Hands Free Audio				Cochlear implants				Tire pressure monitoring			
Touchscreens				Wireless printers				single par. port. medical				medical monitoring			
Fingerprint Auth				Multi par. Port. Medical				Infusion pumps				Medical implants			
				intelligence occupancy								intelligent watches			
				Artificial respirators								in-shoe pedometer			
				Clinical Diagnostics								Hearing aid			
												Fitness meter			
				100-140Mu				Market 2010 TAM				150Mu+			
				OMAP-L1x/C674x/C5000/ ARM9&11/ BF5XX/ ASSPs				Market Players				MSP430/ Microchip/ ARM7			
				200MIPs - 600MIPS				Performance				<200MIPS			
				<250mW				Total Power				<10mW			
				<5mW				Standby Power				<0.01mW			
				\$4.00-20.00				Price				\$0.50 - 5.00			
				<12bit ADC/ LDO				Analog integration				ADC/ DAC/ LDO/ FLASH			

Normalized to AAA battery (1200mAh) battery life



goal:

Segment the markets different needs

standby versus Total

Performance

Existing versus future

Performance needs of different markets

Integration needed



# Choosing the Right Low Power Processor

High Integration



OMAP-L1x  
Military Radio,  
Bar Code  
scanners,  
industrial



Software  
Low  
Power  
Tools  
Support

Performance/  
Floating point



C674x  
Music  
Effects,  
industrial  
monitoring

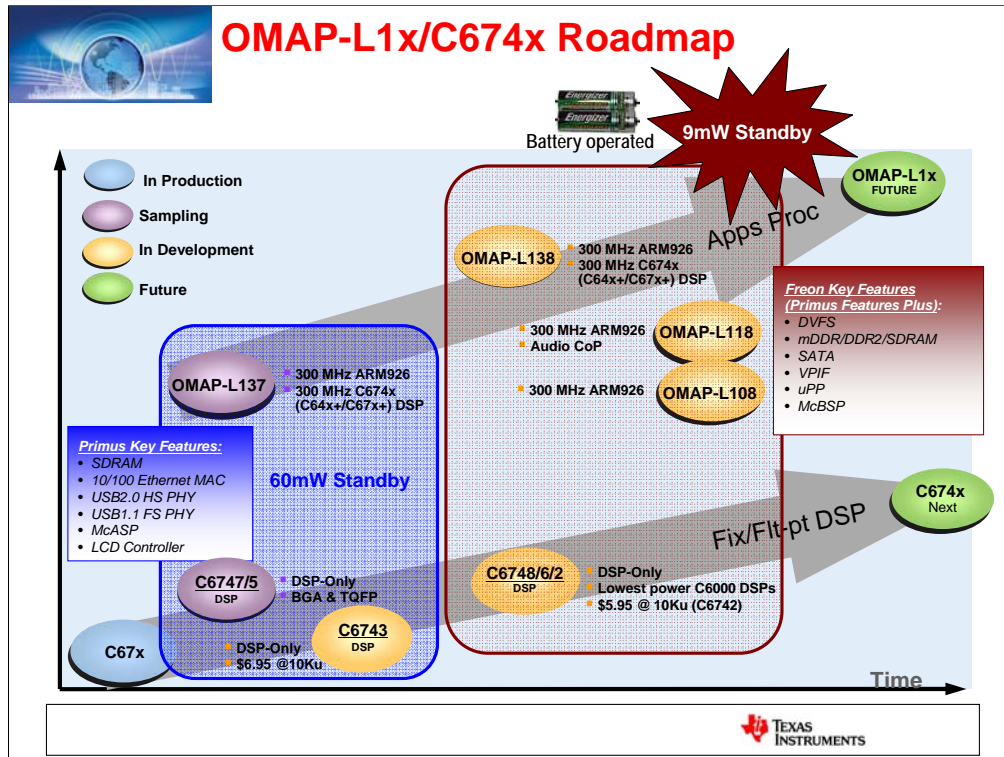


C550x  
Audio recording,  
medical  
monitoring,  
biometrics



Low Power/  
Performance

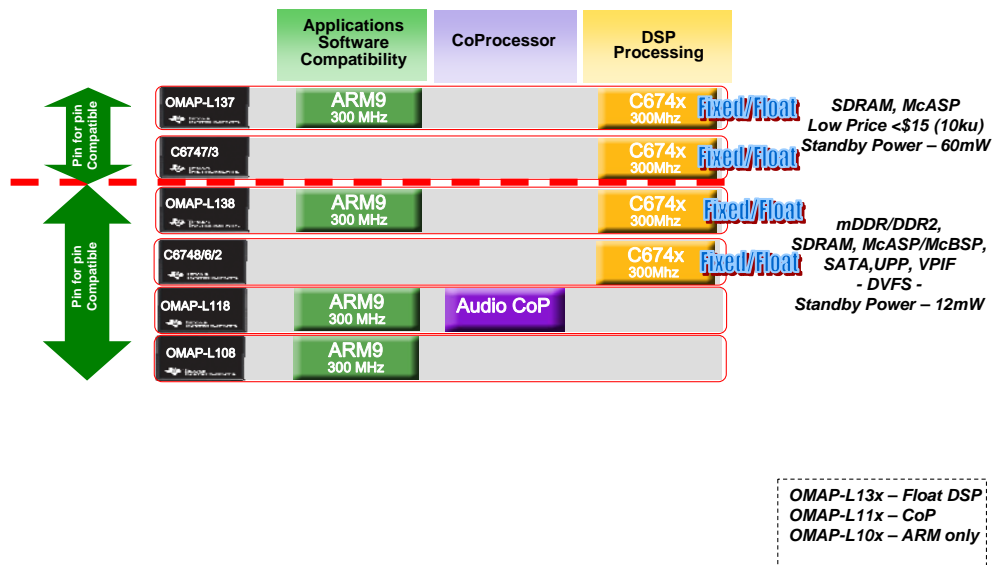




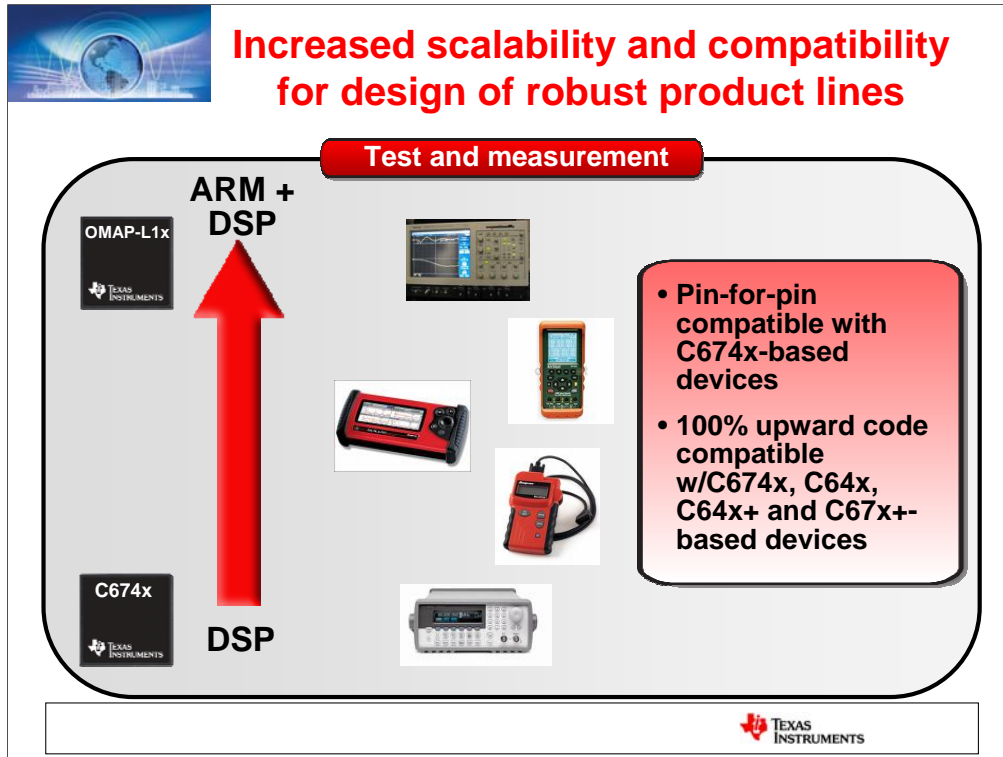
- OMAP3503 is the first in a line of OMAP35x solutions available to the general market it features a high performance Cortex-A8.
- OMAP3530, OMAP3525, and OMAP3515 are now sampling and include the Cortex-A8 as well as high performance graphics, DSP, and video accelerators as indicated.
- The OMAP35x devices in development are targeted to sample in 2009 and include the added features shown. These devices will remain as close to software and pin compatible as possible given the changes. They will not be 100% pin or software compatible and will not be drop in replacements due to the peripheral changes.
  - It is expected that these solutions will offer anywhere from \$2-3 in system BOM savings to as much as \$9 or \$10 depending on the then current memory pricing and additional features utilized
- OMAP NEXT will improve on the performance of the ARM core, increase video performance and add significant peripheral integration for broad markets.
- OMAP-L1x devices feature an ARM926EJ-S processor running at 300MHz.
- OMAP-L13x derivatives combine the ARM9 with a floating point 674x DSP
- OMAP-L12x derivatives combine the ARM9 with a fixed point C64x+ DSP
- All OMAP-L1x derivatives include a USB2.0 HS PHY, 10/100 Ethernet MAC, LCD Controller MMC/SD support and a host of additional peripherals. Some derivatives include a second USB1.1 PHY
- OMAP-L1x7 derivatives support SDRAM and are pin-for-pin compatible; while OMAP-L1x8 derivatives will support mDDR/DDR2 and SATA as shown above and are also pin-for-pin compatible.
- Pricing for the OMAP-L1x devices will be as low as \$7.95 in 10ku volumes.



## Architecture, Software and Pin for Pin Compatibility







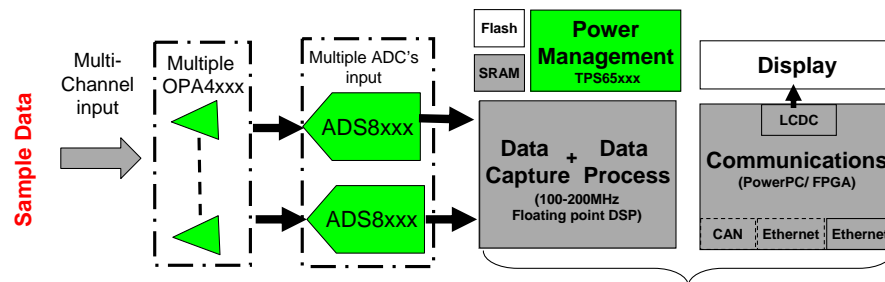
Test and measurement (scalable, car diagnostics, lots of different ones, one for car, one for truck, one for motorcycle)

(low end C6743, middle C6747, high end OMAPL137)

Robotics (low end C6743, middle C6747, high end OMAPL137)



## Existing solutions



### Approx. Cost

PowerPC ~ \$9 in 10ku  
Floating point DSP ~ \$15 in 10ku  
SRAM ~ \$2-4  
Total ~\$26-28

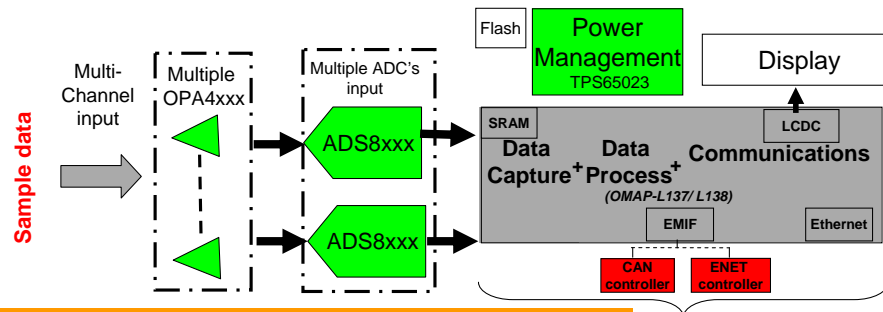
### Communication

2 x EMAC or  
1 x EMAC and 1 x CAN





## Benefits of OMAP-L137 solution



- **\$9-11 Savings over existing multi processor solutions**

- OMAP-L137 processor controls both Data capture/ data processing & communications

- **5x less power consumption**

- Existing multi-processor solutions take up to 2.5W, OMAP-L137 is less than 0.50W

- **Easy system networking**

- One OMAP-L137 can support 2 EMACs (1 on-chip and 1 through USB or EMIF)
- On chip peripherals (SPI, UART, etc) simplify interfacing with other systems

- **LCD support up to QVGA allows rich user interface**

### Approx. Cost

OMAP-L137 ~ \$14.45 in 10ku  
+ EMAC or CAN controller~\$3-4  
Total ~ \$17-18

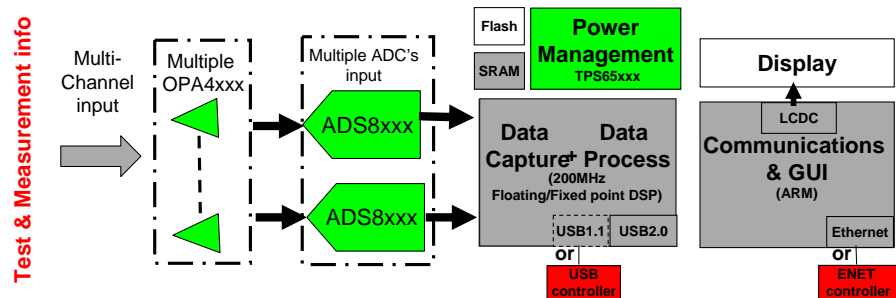
### Communication

2 x EMAC or  
1 x EMAC and 1 x CAN





## Existing solutions



### Approx. Cost (Option 1)

ARM9 (no EMAC) ~ \$6 in 10ku  
 DSP (1 USB2.0) ~ \$6 in 10ku  
 USB Controller ~ \$2-3  
 EMAC Controller ~\$3-4  
 SRAM ~ \$2-4  
 Total ~\$19-23

### Communication

1 x EMAC and 2 USB

### Approx. Cost (Option 2)

ARM9 with EMAC ~ \$9 in 10ku  
 DSP (1 USB2.0)~ \$6 in 10ku  
 USB Controller ~ \$2-3  
 SRAM ~ \$2-4  
 Total ~\$19-22

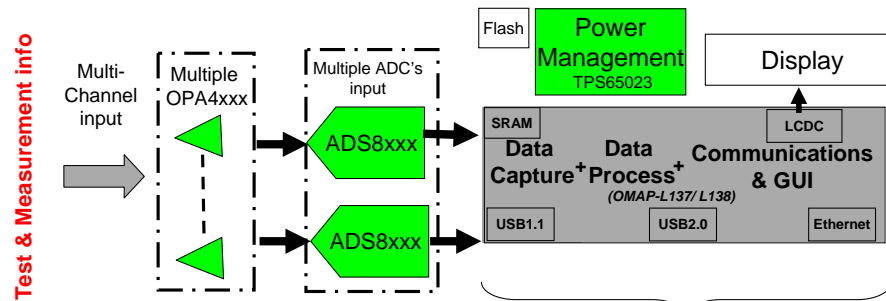
### Communication

1 x EMAC and 2 USB





## Benefits of OMAP-L137 solution



- **\$5-7 Savings over existing multi processor solutions**

- OMAP-L137 processor controls both Data capture/ data processing, communications and GUI

- **2x less processor power consumption**

- Existing multi-processor solutions with external controllers and memories take up to 1.0W, OMAP-L137 Total power is less than 0.50W (300MHz, 1.2V)

- **Easy system connectivity**

- One OMAP-L137 can support 1x EMACs and 2x USBs
- On chip peripherals (SPI, UART, etc) simplify interfacing with other systems

- **LCD support up to QVGA allows rich user interface**

- **Industrial temp. allows maximum product lifetime and reliability**

**Approx. Cost**

OMAP-L137 ~ \$14.45 in 10ku

Total ~ \$14.45

**Communication**

1 x EMAC and 2 x USB





## OMAP-L1x Applications Processors

Highest Peripherals Integration & Lowest System Cost ARM9-based SoCs

Product Attributes	NEW OMAP-L137	NEW OMAP-L138	NEW OMAP-L108	NEW OMAP-L118
Frequency (MHz); ARM/DSP	300/300	300/300	300	300
Peak MFLOPs	1800	1800	N/A	N/A
Peak MMACs	2400	2400	N/A	N/A
Total Power (25°C)	490mW <sup>1</sup>	440mW <sup>2</sup>	TBD	TBD
Standby Power (25°C)	62mW	11mW	TBD	TBD
Memory (L1 Cache)	64KB	64KB		
Memory (L2 Cache)	256KB	256KB		
Memory (L3)	128KB	128KB	128KB	128KB
SDR Memory	32/16-bit	16 bit	16 bit	16 bit
DDR Memory		16 bit	16 bit	16 bit
McASP	3	1	1	1
McBSP		2	2	2
EMAC	1	1	1	1
USB 2.0	1	1	1	1
USB 1.1	1	1	1	1
uPP		1	1	1
UART	3	3	3	3
SATA		1	1	1
PWM	3	2	2	2
LCDC	1	1	1	1
VPIF		1	1	1
Package (mm)	17x17 (BGA)	16x16 (BGA) 13x13 (nFPGA)	16x16 (BGA) 13x13 (nFPGA)	16x16 (BGA) 13x13 (nFPGA)
Pricing (1ku)	\$16.35	\$18.60	\$9.00	\$10.10
Availability	TMX-NOW	TMX-2Q09	TMX-3Q09	TMX-3Q09

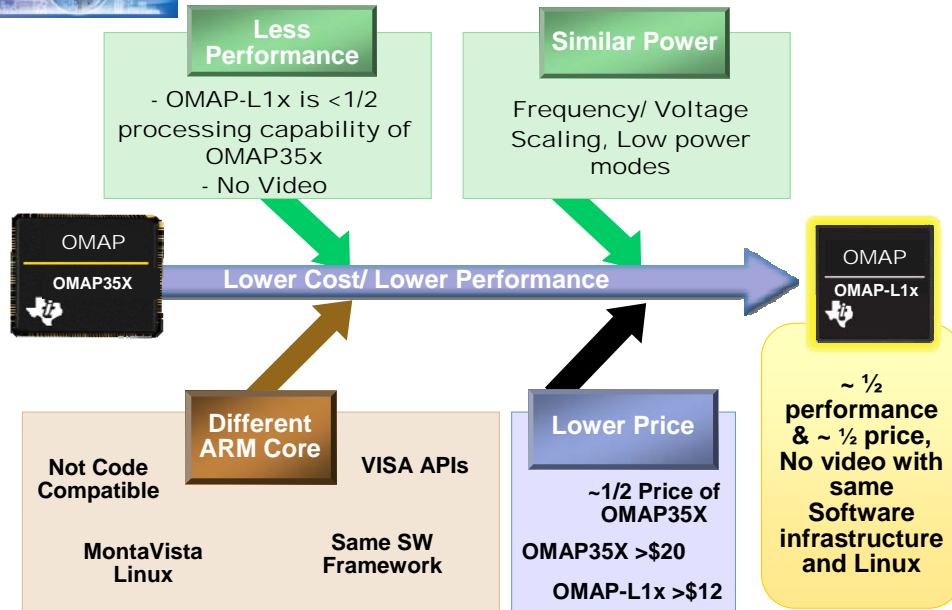


(1) At room temperature (25 °C) with the core voltage (CVDD) set to 1.2V. 70% DSP CPU utilization (300 MHz); EMIFB active at 50% utilization (133 MHz/16-bit); 25 MHz McASP Receive; SPI master at 50% utilization (27MHz); GPIOs at 50 utilization (33MHz).

(2) At room temperature (25 °C) with the core voltage (CVDD) set to 1.2V. 70% DSP CPU utilization (300 MHz); DDR2/mDDR Controller active at 50% utilization (133 MHz/16-bit); 25 MHz McASP Receive; SPI master at 50% utilization (27MHz); GPIOs at 50 utilization (33MHz).



## OMAP35x scaling down to OMAP-L1x






## TI's ARM + DSP Product Comparison

	Davinci (SOC)	OMAP35X	OMAP-L1X
DSP	C64X+ (600MHz)	C64X+ (430MHz)	C674X or C64x (300MHz)
ARM	ARM9 (300MHz)	CortexA8 (600MHz)	ARM9 (300MHz)
Processing type	Video/ Imaging	General purpose application/ Graphics	General purpose
Power	>1W	>750mW	<400mW
Price	\$22-\$60	\$20-\$40	\$12-\$18
Applications	IP camera/ DVR/ machine vision Telecom video infrastructure	Signage/ handheld computers/ POS Infotainment	SDR/ Barcode scanning/ pro audio ????????
Operating system	BIOS/ Linux/ WinCE	BIOS/ Linux/ WinCE	BIOS/ Linux/ WinCE
Tools	EVM (1500\$)	EVM (<1000\$)/ Beagle board (<\$150)	Starter Kit (395\$)
Framework	Codec Engine	Codec Engine	Codec Engine
Codec availability	Video/ Imaging - ASP	Video/ Imaging - ASP	Audio/ Comms - Third party
Positioning	High Performance Video SOC's/ Software Code integration	High performance Application Processing/ Mini computer	Low Cost/ Low power processing at low price point






## TMS320C674x DSPs


Highest Peripherals Integration and Low Cost Fixed/Floating Point Devices & Lowest System Cost Options

Product Attributes	Floating Pt C671x	Floating Pt C672x	Fixed Pt C6410	Fixed Pt C6421-400	NEW C6743	NEW C6745	NEW C6747	NEW C6742	NEW C6746	NEW C6748
DSP Frequency (MHz)	300	350	400	400	300/200	300/200	300/200	200	300	300
ARM Frequency (MHz)										
Peak MFLOP/MMACs	1800	2100	3200	3200	1800/2400	1800/2400	1800/2400	1800/2400	1800/2400	1800/2400
Total Power (25°C)	1.6W <sup>1</sup>	977mW <sup>2</sup>	973mW <sup>2</sup>	555mW <sup>2</sup>	470mW <sup>2</sup>	470mW <sup>2</sup>	470mW <sup>2</sup>	420mW <sup>4</sup>	420mW <sup>4</sup>	420mW <sup>4</sup>
Standby Power (25°C)	1.1W	230mW	471mW	136mW	60mW	60mW	60mW	11mW	11mW	11mW
Memory (L1 Cache)	8KB	32KB (Prog)	32 KB	64 KB	64KB	64KB	64KB	64KB	64KB	64KB
Memory (L2 Cache)	256KB	256KB	128 KB	64 KB	128 KB	256KB	256KB	64KB	256KB	256KB
Memory (L3)							128KB			128KB
SDR Memory		32/16-bit	32/16-bit		16/8-bit	16/8-bit	32/16-bit	32/16-bit	32/16-bit	32/16-bit
DDR Memory				16/8-bit				32/16-bit	32/16-bit	32/16-bit
McASP	2	3	2	1	2	2	3	1	1	1
McBSP			2	1				1	2	2
EMAC				1	1	1	1		1	1
USB 2.0						1	1		1	1
USB 1.1							1			1
UHP1	1	1	1	1			1	1	1	1
uPP									1	1
UART				2	2	3	3	1	3	3
SATA										1
PWM				3	3	3	3	3	3	3
MMC/SD					1	1	1		2	2
LCDC							1			1
Package (mm)	27x27 (BGA) 28x28 (PYP)	17x17 (BGA) 20x20 (QFP)	23x23 (BGA)	16x16 (BGA)	17x17 (BGA) 24x24 (QFP)	24x24 (QFP)	17x17 (BGA)		16x16 (BGA) 13x13 (nFPGA)	
Pricing (1ku)	\$36.60	\$32.50	\$19.58	\$11.73	\$9.00	\$11.25	\$12.95	\$6.70	\$13.50	\$15.20
Availability	NOW	NOW	NOW	NOW	TMX2Q09 TMS-1H09	TMX-NOW TMS-1Q09			TMX-1H09 TMS-3Q09	


**Typical Applications**




Sound/Music generation




Audio conferencing



Test and measurement





### Power Use Models

- (1) At room temperature (25 °C) with the core voltage (CVDD) set to 1.4V. 70% DSP CPU utilization (300 MHz); EMIF active at 50% utilization (100 MHz/16-bit); 25 MHz McBSP
- (2) At room temperature (25 °C) with the core voltage (CVDD) set to 1.2V. 70% DSP CPU utilization (300 MHz); EMIF active at 50% utilization (100 MHz/16-bit); 25 MHz McASP; SPI at 50% utilization (10MHz)
- (3) At room temperature (25 °C) with the core voltage (CVDD) set to 1.2V. 70% DSP CPU utilization (300 MHz); EMIFB active at 50% utilization (133 MHz/16-bit); 25 MHz McASP Receive; SPI master at 50% utilization (27MHz); GPIOs at 50 utilization (33MHz).
- (4) At room temperature (25 °C) with the core voltage (CVDD) set to 1.2V. 70% DSP CPU utilization (300 MHz); DDR2/mDDR Controller active at 50% utilization (133 MHz/16-bit); 25 MHz McASP Receive; SPI master at 50% utilization (27MHz); GPIOs at 50 utilization (33MHz).



## Clickable Typical End Applications

System Block Diagrams	Processor	Processor	Processor	Processor
<a href="#">Barcode Scanner</a>	OMAP1X			
<a href="#">Software Defined Radio (SDR)</a>	OMAP1x	C640X	C550x	C674x
<a href="#">Personal Digital Assistant (PDA)</a>	OMAP1x			
<a href="#">Portable Media Player</a>	OMAP1x			
<a href="#">Full-Duplex Speakerphone</a>	C674X	C640X		
<a href="#">Residential Gateway Solutions</a>	C674x	C640X		
<a href="#">AV Receivers</a>	C674X			
<a href="#">Audio Dock: Performance</a>	C674X			
<a href="#">Integrated Access Device</a>	C674x			
<a href="#">Magnetic Resonance Imaging (MRI)</a>	C674x			
<a href="#">Pro Audio Mixer</a>	C674X			
<a href="#">Process Automation and Control</a>	C674X			
<a href="#">Radar/Sonar</a>	C674x			

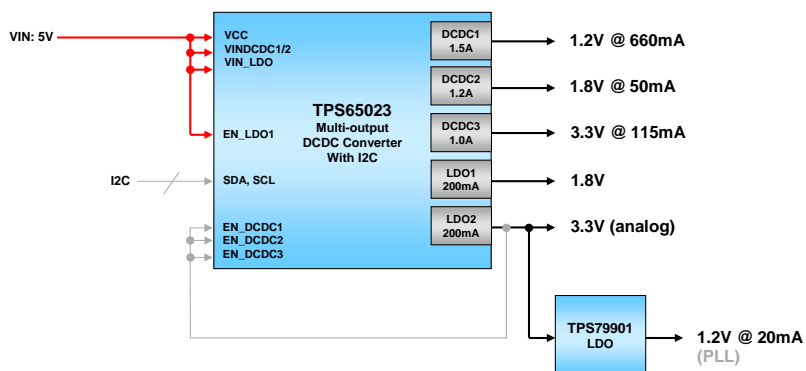


## Clickable Typical End Applications

System Block Diagrams	Processor	Processor	Processor	Processor
<a href="#">Portable Blood Gas Analyzer</a>	C640X	C674x		
<a href="#">MP3 Player/Recorder (Portable Audio)</a>	C640X	C550x	C55x	
<a href="#">GPS: Personal Navigation Device</a>	C640X	C550x		
<a href="#">Hands Free Kit</a>	C640X	C550x		
<a href="#">Fingerprint Biometrics</a>	C640X	C550x		
<a href="#">Military Target Detection and Recognition</a>	C640X			
<a href="#">PABX Telephony Multi-Processing</a>	C640X			
<a href="#">Portable Medical Instruments</a>	C550x	C674X		
<a href="#">VoIP Solutions</a>	C550x	C674x		
<a href="#">Active Noise Cancellation (ANC)</a>	C550x			
<a href="#">Audio Dock: Basic</a>	C550x			
<a href="#">Audio Dock: Portable</a>	C550x			
<a href="#">Automated External Defibrillator</a>	C550x			
<a href="#">ECG Electrocardiogram</a>	C550x			
<a href="#">Pulse Oximetry</a>	C550x			
<a href="#">USB Phone</a>	C550x			
<a href="#">USB Speakers</a>	C550x			
<a href="#">Weigh Scale / Bridge Sensor</a>	C550x			
<a href="#">IP Phone: Wireless</a>	C550x	C674x		



## Power Management Solution C6747/ C6745/ OMAP-L137

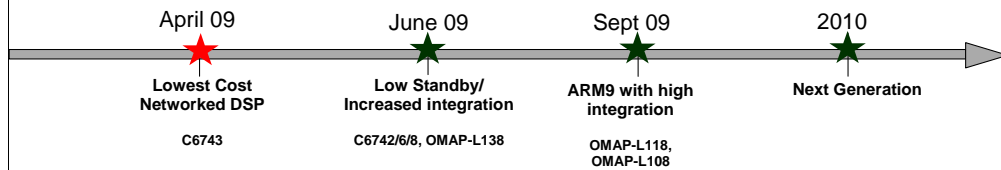


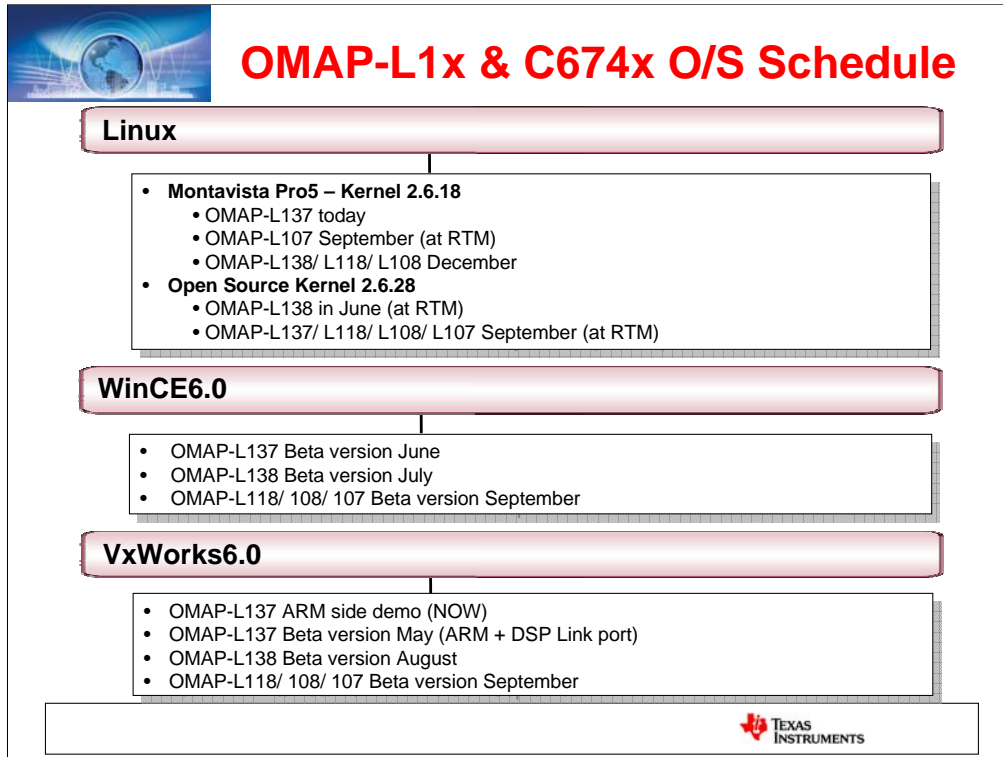
The TPS65023 is capable of providing all of your system power depending on your system's architecture.



## Announcement Calendar (next 12 months)

Product announcements built momentum and deliver on roadmap forecasts





4) This is all about DaVinci, same development environment



## OMAP-L137/ C6747 Starter Kit

### Fully Integrated Out-of-Box Development Kit

#### OMAP-L137/ C6747 Starter Kit



Part Number: TMDXOSKL137

Available Sept. 08

**\$395**

#### Hardware

##### EVM board

- OMAP-L137/ C6747
- USB Interface
- AIC32 Stereo Codec
- Supports SD and other media interfaces

##### Emulation

- On-board XDS510 JTAG controller

##### Connectors

- Daughter Card connectors
- Expansion Port connectors

#### Software

- Development tools software including Montavista Linux 2.6.18, C6000 start Kit Code Composer Studio™, DSP/BIOS™ RTOS, Compiler, Assembler, and Linker
- Foundation software
- Full set of Linux and DSP drivers





# OMAP-L138 Development Tools

## Community Board Includes:

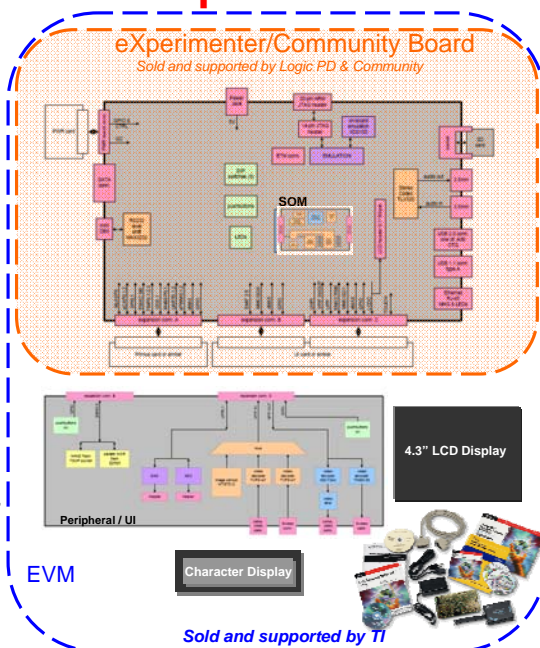
- SOM (OMAP-L138, 0.65mm ZCE)
- Baseboard w/limited peripherals
  - USB2.0, SATA, Audio Codec, MMC/SD, Ethernet
  - XDS100 JTAG Emulator
  - LCD & Expansion Connectors
- Estimated SRP \$169US
- Available July 2009 from LogicPD and authorized distributors
- Optional boards from Logic
  - 4.3" LCD Display
  - DSP-Only (C6748) Freon SOM – availability TBD

## EVM Includes:

- Community Boards (SOM+Baseboard)
- UI Board
- 4.3" LCD Display & Character Display
- Printed documentation
- Software CDs
- SRP TBD

## Open Source Software Community:

- Linux Drivers provided using DaVinci GIT Tree
- DSP/BIOS drivers provided using "MyRegisteredSoftware.com" TI portal
- Community board (similar to "beagleboard.org") is being investigated
- Wiki pages already available for preliminary device and SW information







## Choosing the right TI processor

- demo



# Backup



## NEW OMAP-L137 (C674x DSP + ARM9)

Schedule: TMX – NOW; TMS – 1Q09

### Features

#### ■ CPU Cores

- ARM926EJ-S™ (MPU) up to 300 MHz
- C674x DSP Core up to 300MHz

#### ■ Memory

- ARM: 16K I\$, 16K D\$, 64K ROM
- DSP: 32K L1D, 32K L1P, 256K L2 Cache, 128K RAM
- 1MB ROM

#### ■ Peripherals (1.8/ 3.3V IOs)

- 10/100 Ethernet MAC
- EMIF1 – Supports 133 MHz SDRAM (16/32-bit)
- EMIF2 – Supports Async/NAND Flash (8/16 bit)
- USB 2.0 - USB OTG
- USB 1.1 – USB Full speed (OHCI)
- UHPI, McASP (3), UART(2), I<sup>2</sup>C (2), SPI (2), RTC, Timers (3), MMC/SD (2), LCD Controller, GPIO

- Package - 17 x 17mm BGA (1.0mm pitch) ~256pins

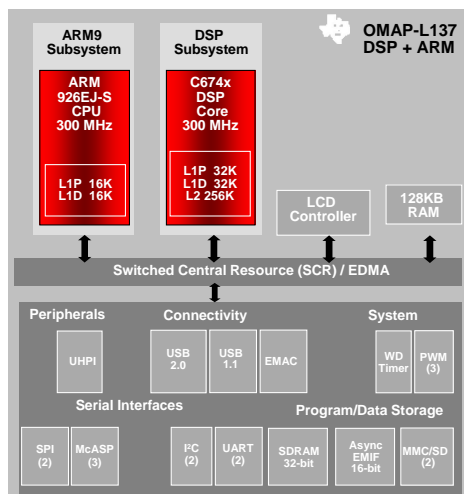
- Pin-to-pin compatible with C6747

- Power (1.2V Core, 3.3V IOs)

- Active < 490 mW @ 300MHz/1.2V/25C (estimate)
- Standby < 58 mW @ 300MHz/1.2V/25C (estimate)


### Applications

- SDR, Portable Catalog, Bar Code Scanners, Portable Communications, Portable Medical, Portable Audio



EVM Available





## TMS320C6747 DSP

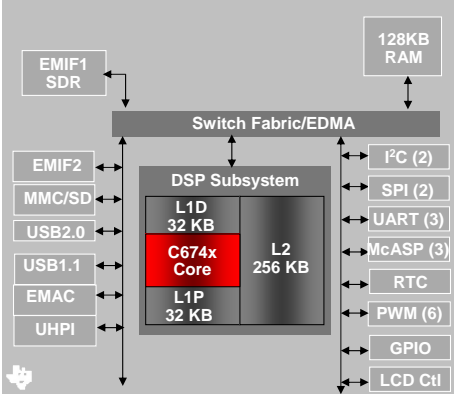
Schedule: TMX – NOW; TMS – 1Q09

### Features


- **New C674x Core**
  - Combines C64x+ & C67x+ cores
  - Up to 300 MHz
- **Memory**
  - 32 KB L1D, 32 KB L1P, 256 KB L2
  - 128KB RAM
- **Peripherals (3.3V I/Os)**
  - 10/100 Ethernet MAC (EMAC)
  - USB 2.0 – USB OTG
  - USB 1.1 – USB full speed (OHCI)
  - EMIF1 – Supports 133 MHz SDRAM (16/32-bit)
  - EMIF2 – Supports Async/NAND Flash (8/16 bit)
  - UHPI, McASP (3), UART (3), I<sup>2</sup>C(2), SPI(2), RTC, PWM(6), MMC/SD, LCD Controller, Timers (2), GPIO
- **Package**
  - 17 x 17mm BGA (1.0mm pitch) ~256 pins
  - Process: 0.065-mm
  - Extended Temperature Grade Options
- **Pin to pin compatible with OMAP-L137**
- **Power (1.2V Core, 3.3V IOs)**
  - Active < 470 mW @ 300MHz/1.2V/25C (estimate)
  - Standby < 58 mW @ 300MHz/1.2V/25C (estimate)

### Applications

- Portable Music effects, Audio Conferencing, Gaming, Industrial control, Catalog/General Purpose



EVM Available



C674x+ DSP based device with rich set of peripherals for networked audio/music applications as well as broader catalog market applications like communications, musical instruments etc.

The key features of the device are

- Up to 300 MHz C674x ISA that combines the C64x+ fixed point ISA as well as C67x+ floating point ISA
- Large L2 Cache along with dedicated 128 KB additional SRAM
- Efuse security for unique device ID feature
- Multiple connectivity options like EMAC, USB, UHPI and MMC/SD
- Two external memory ports – one for SDRAM and the other Asynch memory and NAND Flash
- Rich set of serial ports like I2C, UART, SPI, McASP
- Multiple Timers and PWM modules for reference clocks and pulses
- LCD controller for display control
- The device will support power consumption variance in application scenarios where full device performance is not required
- 3.3V IOs for efficient 3.3V system IO connectivity



## Where do I find Customer Opportunities?

### Existing opportunities

### Reasons why customers choose these processors

- ADI BlackFin customers
- DM644X customers with no video need
- PowerPC customers

OMAP-L1x



> \$14.34 (100u)

- They already have an ARM + DSP in system
- Need for Highly integrated scalable solution
- Want to add GUI to DSP based design
- Add network connectivity

- ADI Sharc customers
- C67X customers
- Professional Audio
- Industrial monitoring

C674x



> \$10.41 (100u)

- Need high precision/ Wide dynamic range DSP
- No DSP experience, want easy to program processor
- Want to add portability to product using floating point

- ADI BlackFin customers
- C5000 customers
- Wireless audio

C550x



> \$9.95 (100u)

- Want a low cost, ultra low power DSP
- Large amount of on-chip memory, don't want external memory

Take Out





## Introducing four new product lines yielding more than 15 new devices

Starting at 6.8 $\mu$ W and up to 2400 MMACs

New product generation



6mW – 435mW

High levels of integration and low power

Industry's lowest power ARM + DSP SoC

New product generation



6mW – 420mW

Industry's first low power floating-point DSP

20X lower standby power and 1/3 the power consumption of existing floating-point devices



Low power DSPs since 1995



6.8 $\mu$ W–18/46mW

Industry's lowest power fixed-point DSP

1/2 the power consumption of existing 34 C55x devices



Ultra-low power MCUs since 1991



2.7 $\mu$ W-660 $\mu$ W

World's lowest power MCU

1/3 the power consumption of existing MSP430F2xx devices  
Enables 10+ year battery life





**Backup**

# Add in selection tool



## C2000 compared to OMAP-L13x/ C674x

Decision Criteria	Delfino			Low Power Processors	
	C2833x	F2823x	F2833x	C674x	OMAP-L137
Cores	Microprocessor	Microprocessor	Microprocessor	DSP	ARM + DSP
Commercial O/S (VxWorks etc)	N	N	N	N	Y
Small footprint proprietary O/S (DSP BIOS)	Y	Y	Y	Y	Y
Integrated Internet connectivity (EMAC)	N	N	N	Y	Y
External EMAC controller connectivity (via EMIF)	Y	Y	Y	Y	Y
Network connectivity (CAN)	Y	Y	Y	N	N
On Chip FLASH	N	Y	Y	N	N
On Chip ADC	N	Y	Y	N	N
Total Power Consumption	600mW (25C)	770mW (worst case)	770mW (worst case)	435mW (25C)	485mW (25C)
Mhz	300	150	150	300	300/ 300
MFLOPS	600	300	300	1800	2400
Code density	High	High	High	Med	Med
Industrial Temp	Y	Y	Y	Y	Y
Price Range (1ku)	\$8.95-16.39	\$12.88-14.55	\$13.85-15.65	\$9.00-12.95	\$16.35