Embedded Processor Software Toolkit for Medical Imaging

Version 2.0

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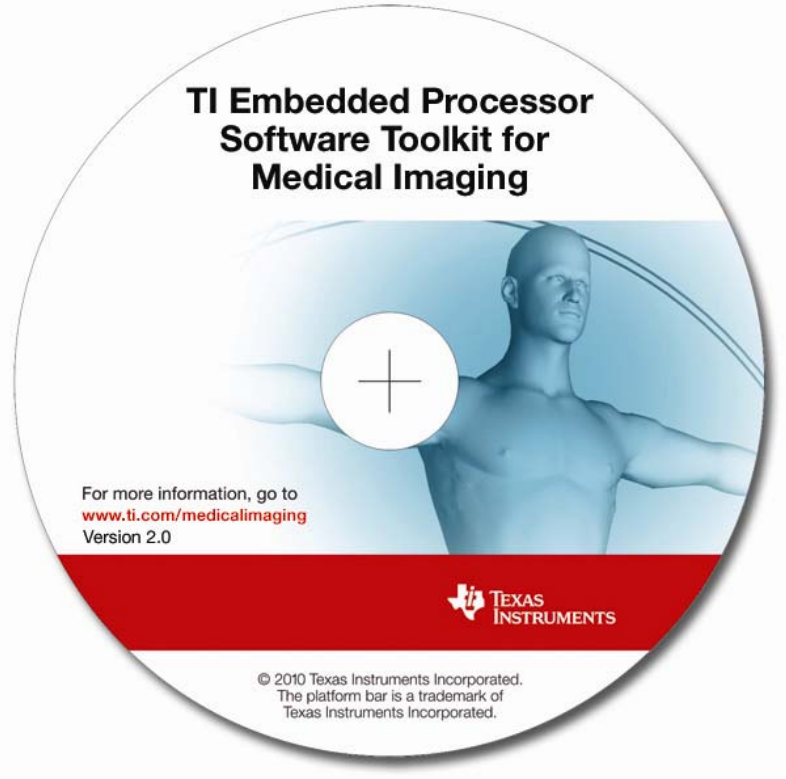
Texas Instruments

Agenda

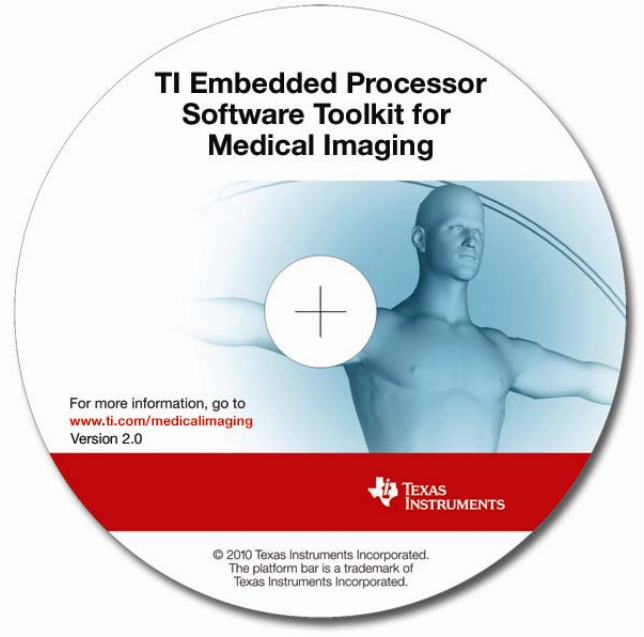
- **Product Announcement**
  - **Embedded Processor Software Toolkit for Medical Imaging**
    - Description
    - Contents
    - Features/Benefits
    - Documentation
  - **DSP Starter Kit for Medical Imaging**
  - **C6472 Evaluation Module**
  - **OMAP3530 Demo**
  - **More Information and Support**
  - **Questions**

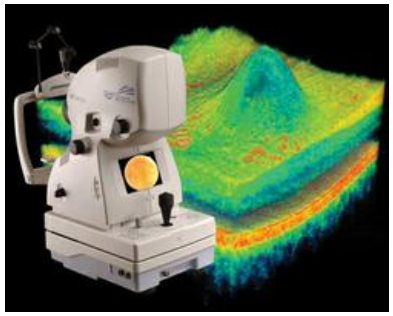
Embedded Processor Software Toolkit for Medical Imaging



- **TI's Embedded Processor Software Toolkit for Medical Imaging Version 2.0 is an updated and expanded collection of standard processing functions optimized for TI's C64x+ DSP**
- **Goal: To make it easier for new customers to evaluate and develop medical imaging applications on TI DSPs**
  - **Demonstrate use and performance of TI DSP devices for medical imaging**
  - **Provide jump start in customer development and acceptance**
  - **Provide optimized code to shorten development time and increase customer efficiency on C64x+ platforms**

Improved Performance, Lower Development Costs

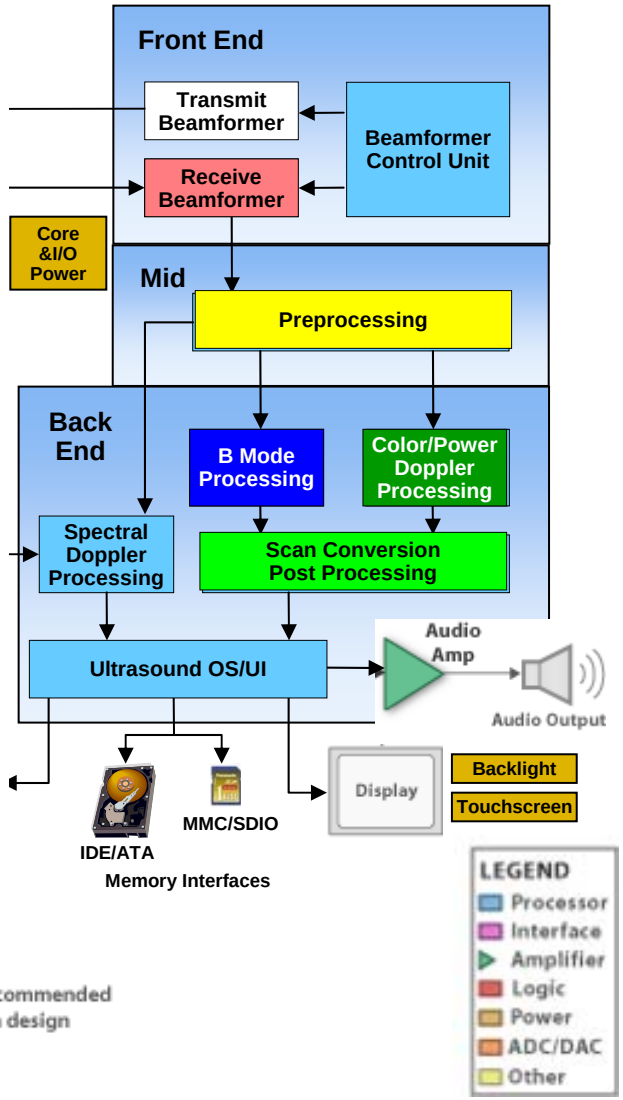




- ***Optimized*** **implementations of commonly used C64x+ DSP processing blocks**
- **Source Code:**
  - **Ultrasound:**
    - **B-mode (Envelop Detection & Compression)** ***New!***
    - **DAS Receive Beam-forming**
    - **Doppler Processing**
    - **RF Demodulation and Decimation**
    - **Scan Conversion**
  - **Optical Coherence Tomography**
    - **Cubic Spline Interpolation** ***New!***
    - **Optimized FFT** ***New!***
  - **3D Rendering**
    - **Affine Warp** ***New!***

Ultrasound Components

Component	Production
Delay and Sum (DAS) receive beam-forming	Source
RF demodulation and decimation	Source
B-Mode	Source
Wall Filter for Color Flow	Source
1D Color Flow	Source
2D Color Flow	Source
Power Estimator	Source
Scan Conversion	Source
Optimized math utilities	Source



Optical Coherence Tomography (OCT) Components

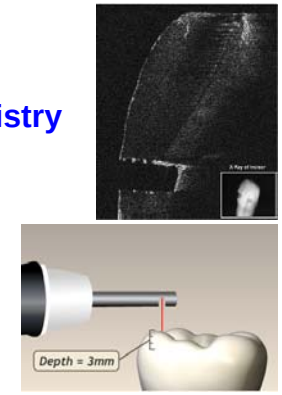
- Cross-sect images from coherent optical reflections
- Live sub-surface images to ~3mm depth
- Superior Resolution (<10um)

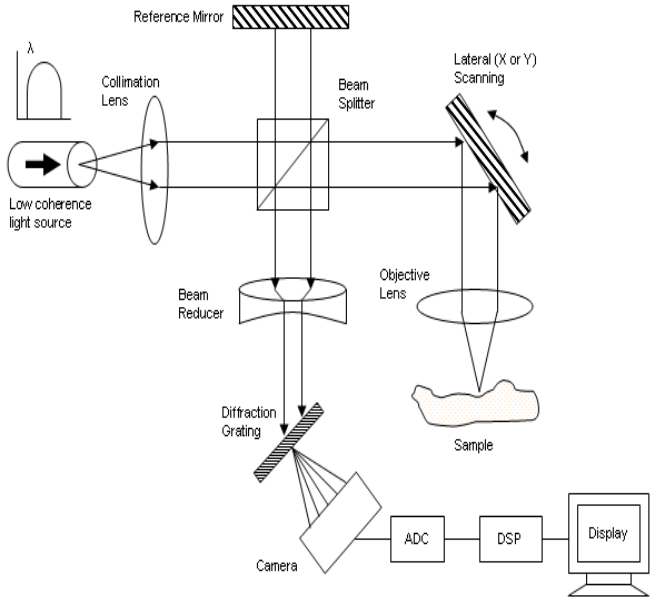
Ophthalmology

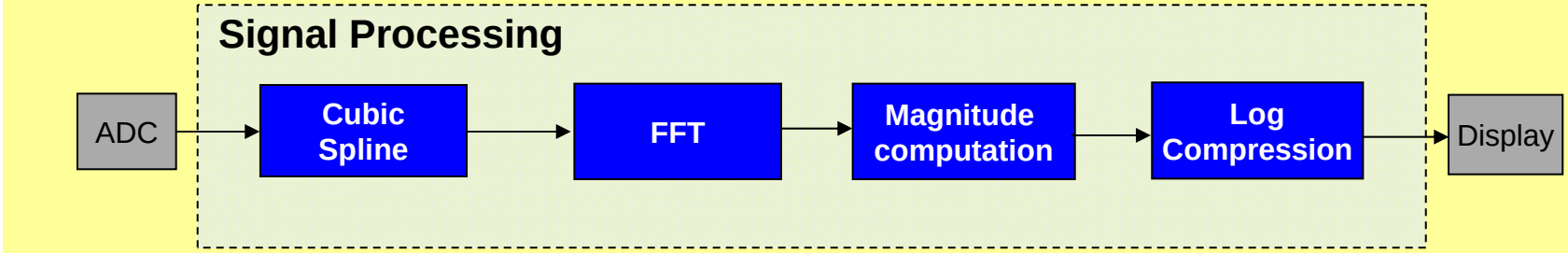
Topcon 3D OCT-1000

	OCT	Ultrasound	MRI	Fluoroscopy	Angioscopy
Resolution (µm)	1–15	80–120	80–300	100-200	<200
Probe Size (µm)	140	700	N/A	N/A	800
Ionizing Radiation	No	No	No	Yes	No

Dentistry





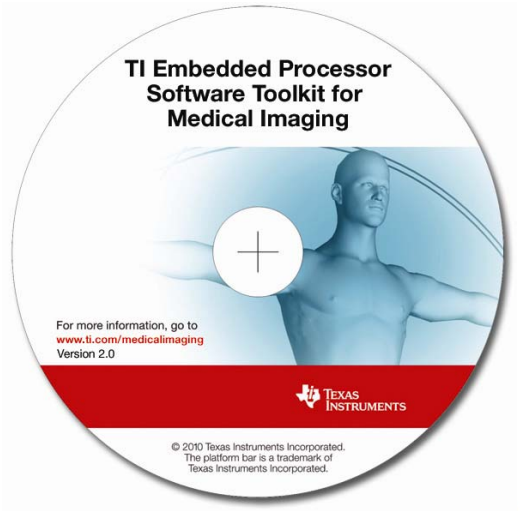


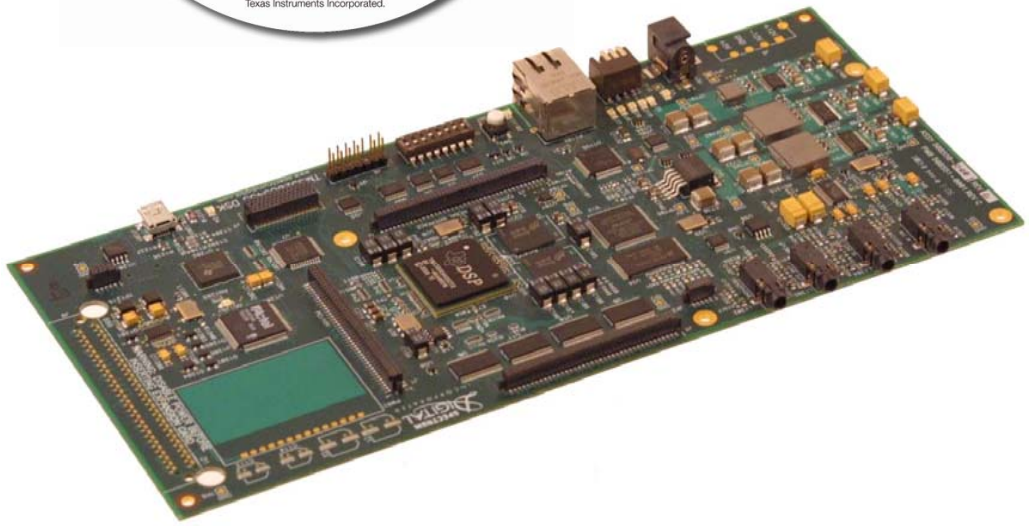
Contained in STK 2.0

Software Toolkit - Key Features/Benefits

- Optimized building blocks
  - Reduce development effort
  - Shorten time to market
  - Create a more efficient system.
- Full source code
  - Provides full visibility
  - Enables customization
  - Enables differentiation
- Well defined APIs
  - Provides abstraction
  - Simplifies development
  - Eases integration
- Complete benchmarks
  - Quick & easy evaluation
  - Comparison to other architectures
- Test benches
  - Assures module functionality
  - Aides in eval & development
  - Easily expandable
- Full documentation
  - Provides coding illustrations
  - Serves as optimization model

C6455 DSP Starter Kit for Medical Imaging





- **TI is also offering a DSP Starter Kit for Medical Imaging, a low-cost development platform ideal for evaluating the STK 2.0**
- **Re-packaged C6455 DSK (1.2GHz)**
- **STK CD includes collateral:**
  - **Medical Applications Guide**
  - **App notes**
  - **White papers**
  - **Embedded Processors for Medical Imaging Brochure**
  - **Analog data sheets**
  - **DSP data sheets**
- **Available now through e-Store**

C6472 DSP EVM for Multicore Medical Imaging

C6472 Evaluation Module

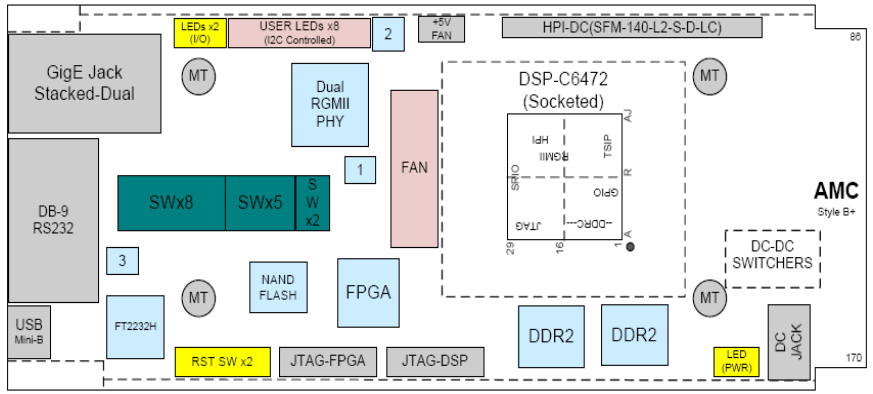
Software debug platform for high performance application development

EVM highlights:

- **Single C6472 processor**
- **256MB of 533MHz DDR2**
- **64MB Nand Flash**
- **1Mb I2C EEPROM for local boot (remote boot possible)**
- **2 RGMII 10/100/1000 Ethernet ports with MDIO**
- **RS232 UART**
- **Single module 170-pin AMC expansion for SRIO, TSIP, EMAC1 and I2C**
- **C6455 EVM pin-compatible HPI daughtercard connector**
- **2 user programmable LEDs and DIP SWs**
- **14-pin JTAG emulator header**
- **Embedded JTAG emulation with USB Host interface (Provided as upgrade Option)**
- **Board-specific Code Composer Studio™ Integrated Development Environment**
- **Simple setup**
- **Includes design files such as Orcad and Gerber**
- **Board support library accelerates software development on the EVM**

Support:

- **Broad market support: Product Information Center - FAE - Community forums - Documentation - Training**

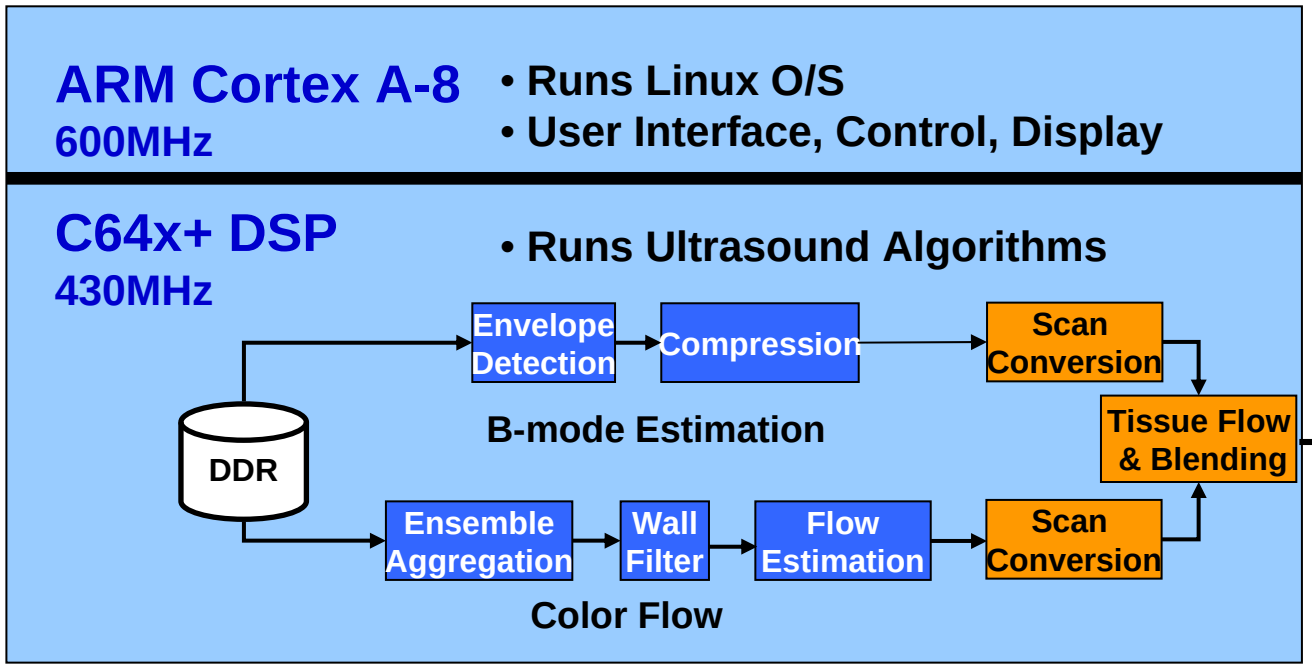


TMDXEVM6472: Available now through e-Store

SW – CCSv4, BSP, CSL, POST, NDK

Medical Ultrasound Demo Rev. 2

All B-Mode, Color Flow, and Scan Conversion Processing on OMAP3530



TI OMAP3530 Mistral EVM

Display 640x480 @20fps

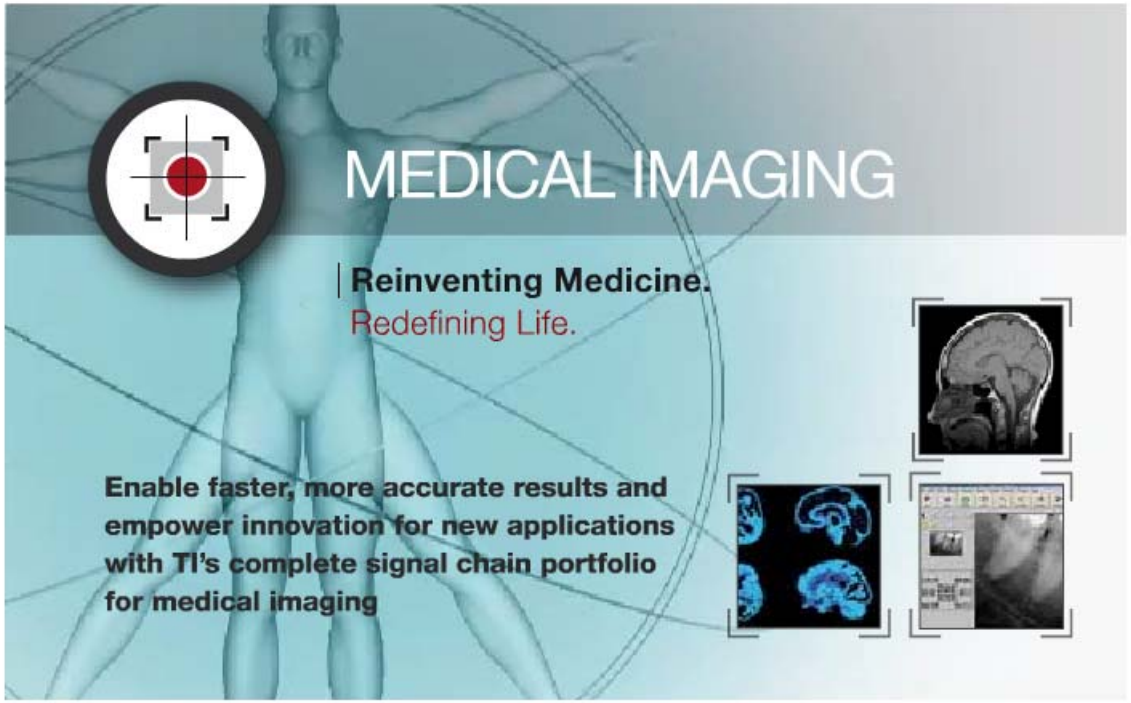
Input Data Size (Post RF Demod)	Scan Lines	Samples/ Scan Line	Bytes/ Sample	Ensemble	kB/ frame
B-mode + Scan Conversion	128	416	4	-	208
Color Flow + Scan Conversion	64	256	4	8	512

Loading	DSP	ARM	ms/fm
B-Mode	19%	6%	15
B-Mode+ Color Flow	46%	21%	28

More Information and Support

- **STK-MED tool folder:**
  http://focus.ti.com/docs/toolsw/folders/print/s2meddus.html
- **DSP starter kit tool folder:**
  http://focus.ti.com/docs/toolsw/folders/print/tmdsmdsk6455.html
- **TMS320C6472 EVM folder:**
  http://focus.ti.com/docs/toolsw/folders/print/tmdsevm6472.html
- **Medical ultrasound demo on OMAP3530:**
  https://gstreamer.ti.com/gf/project/med_ultrasound/
- **TI's medical imaging portfolio: www.ti.com/medicalimaging**

Questions?



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