

An Introduction to C55x Digital Signal Processors from Texas Instruments

Fixed-point DSP solutions designed for high-performance, ultra-low power applications.

C55x DSP Solutions: High Performance and Low Power








Single 50-200 MHz TMS320C55x Fixed-Point Digital Signal Processor (DSP) enables high performance and low power through increased parallelism and total focus on power savings.

Industry-leading active power enables computationally-intensive applications, such as voice triggering and encoding, to run on battery for extended period of time.

Development tools include the award-winning eXpressDSP, Code Composer Studio (CCS) Integrated Development Environment (IDE), DSP/BIOS, TI's algorithm standard, and the industry's largest third-party network.

C55x Product Family

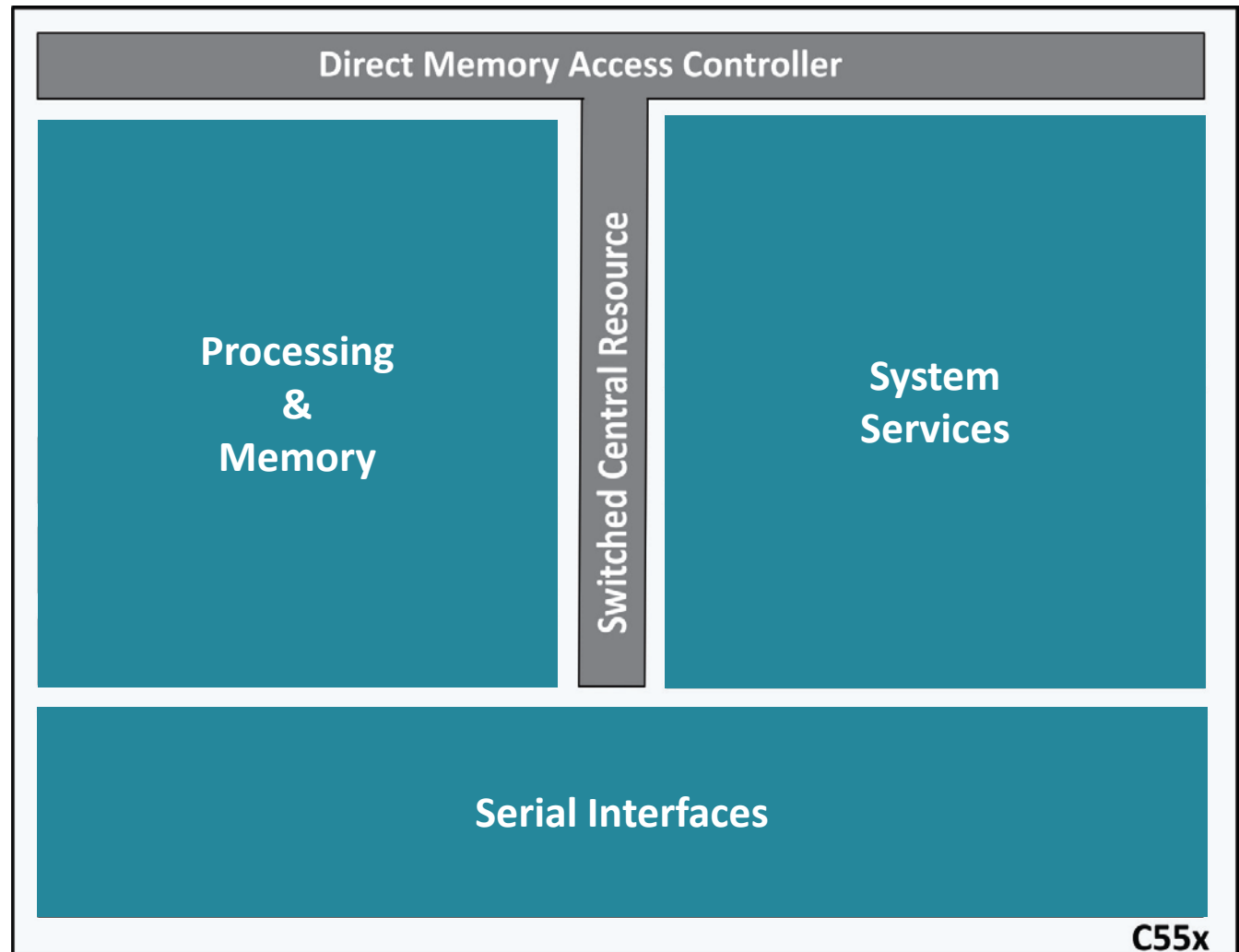
- C5545 brings the ultra-low power and optimized performance of the C55xx family to the smallest package ever offered.
- Even with the 7x7mm package, 4-layer boards are still possible without the use of high density interconnects (HDI) or other expensive fabrication techniques.

	DSP TMS320C55x	Integrated Peripherals	On-Chip Memory	Co- Processor	Integrated Power Management	Package
Software Compatible Pin-to-Pin Compatible	C5545  60/100 MHz	USB LCD SAR ADC	320KB	FFT	3 LDOs	7x7mm 0.5mm pitch
	C553x  50/100 MHz	USB LCD SAR ADC	64-320KB	FFT	1-3 LDOs	12x12mm 0.8mm pitch
	C5515  60/75/100/120 MHz	USB LCD SAR ADC EMIF	256-320KB	FFT	3 LDOs	10x10mm 0.65mm pitch
	C5505  60/75/100/120/150 MHz	USB LCD SAR ADC EMIF	256-320KB	FFT	1-3 LDOs	10x10mm 0.65mm pitch
	C5517  75/175/200 MHz	USB UHPI SAR ADC McSPI EMIF McBSP	256-320KB	FFT	3 LDOs	10x10mm 0.65mm pitch

For more information: www.ti.com/c55x

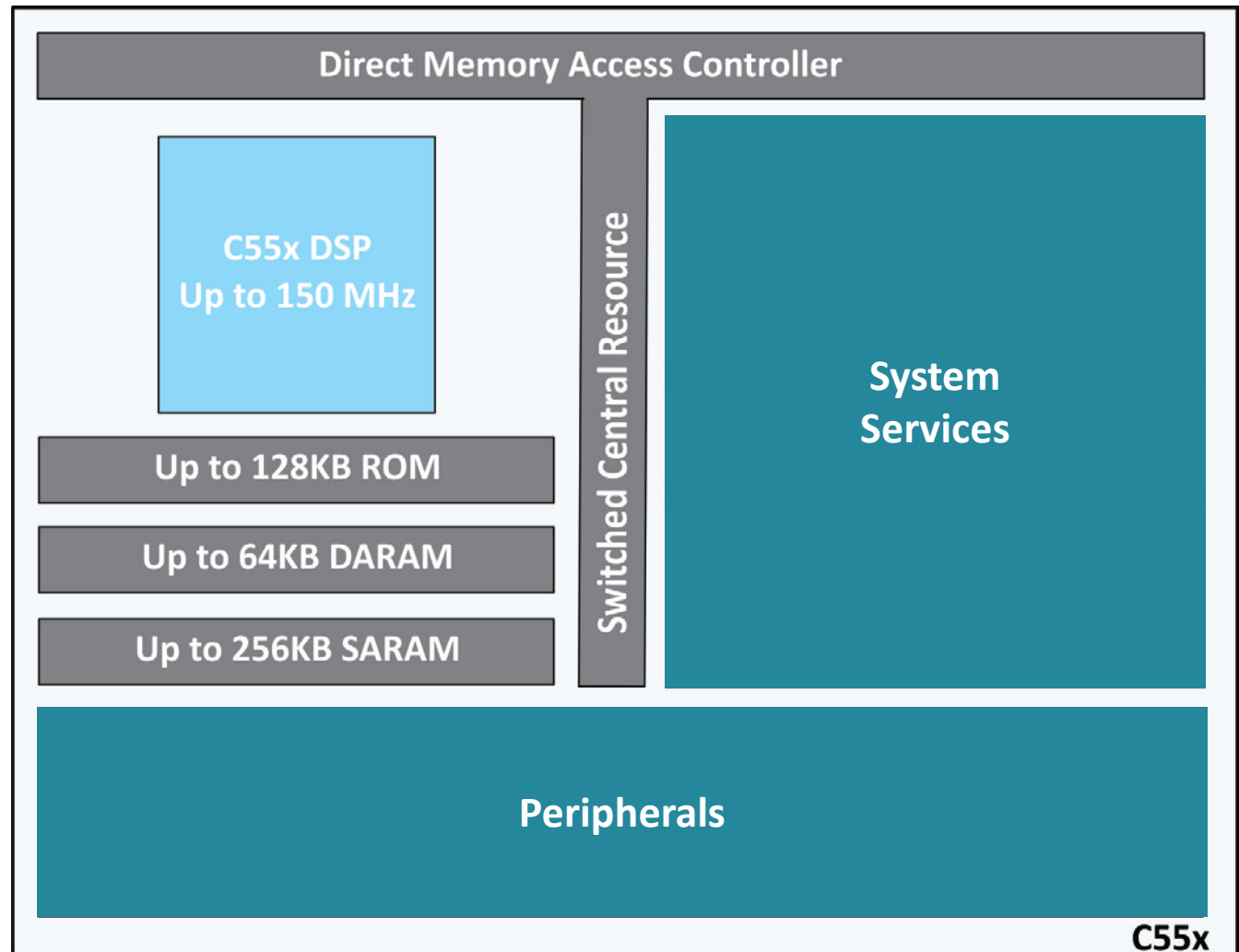
C55x Architecture

- The functional architecture presented here represents the broad set of capabilities supported across the C55x product family.
- The unique features of the C5517 functional architecture are covered later in this presentation.
- The availability of features varies depending on the device you choose.
- For more information, refer to the datasheets in the C55x product folders at www.ti.com/c55x.



C55x Architecture: Processing & Memory

- C55x Core: Highly optimized, pipelined engine for 16-bit DSP computations, including parallel execution of the frequently used operations such as Multiply and Accumulate.
- To prevent engine starvation, the C55xx family is designed with multiple data and address for up to four 16-bit data reads and two 16-bit data writes in a single cycle.
- The busses have access to the on-chip 320KB memory which is divided into single-access, Zero-Wait State RAM and 64KB of dual-access RAM that performs two accesses per cycle.
- Similarly, the 128KB of ROM is single-access containing bootloader code, FFT coprocessor routines, and useful constants, giving the application more available memory.

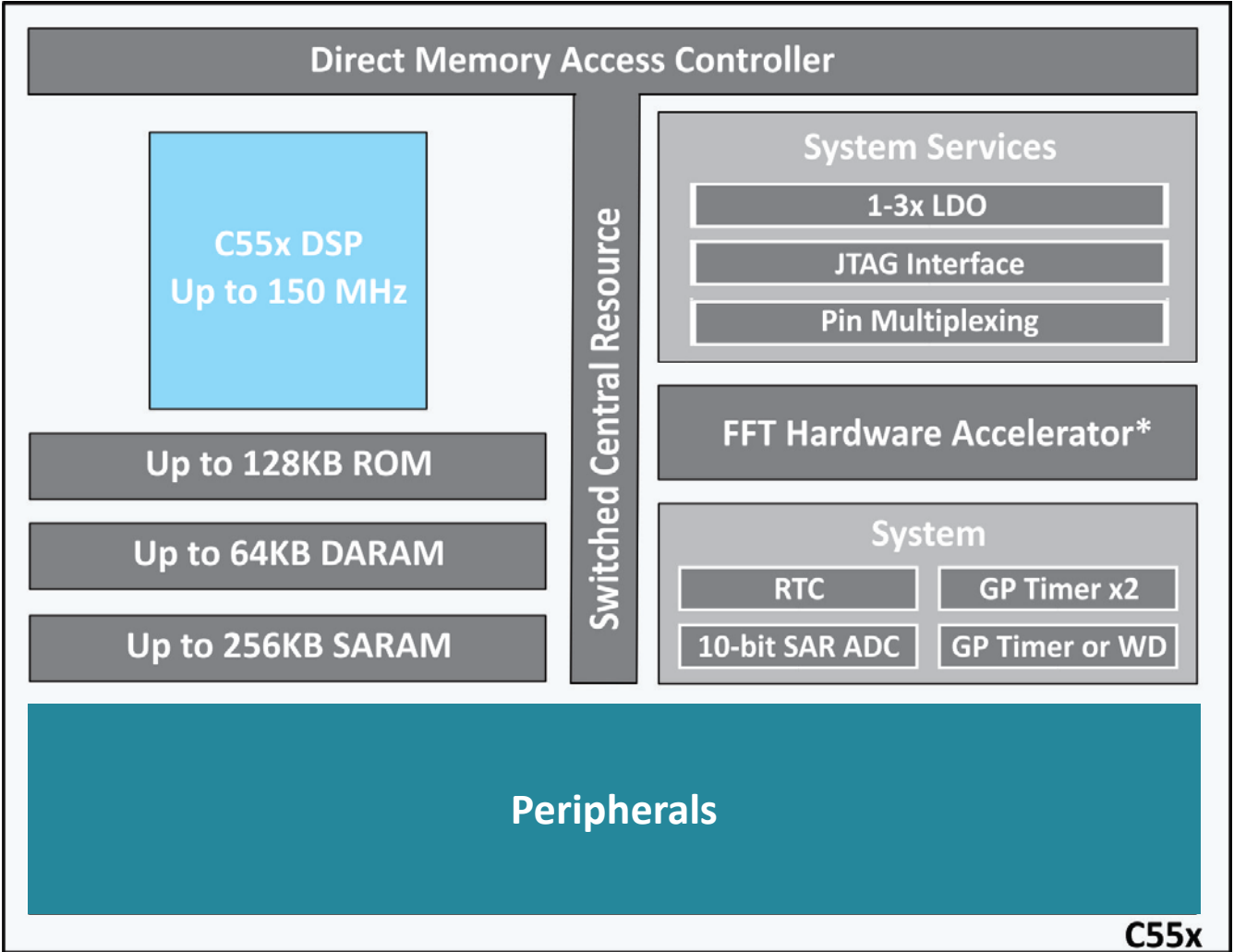


* Availability of features varies by device. Refer to the data sheet.

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C55x Architecture: System Services & FFT

- The core and memory is connected to the rest of the system through a switched central resource and DMA which allows for parallel, behind the scenes data transfer.
- On-chip LDOs save BOM cost and offer integrated power-on-reset monitoring and RTC-only functionality.
- With the hardware accelerator, FFT conversions upto 1024 points are 4 to 6 times more energy efficient and compute 2.2 to 3.8 times faster than when performed on the already optimized core.
- Real-time clock supports RTC-only mode for **169 microwatt** consumption.
- Many combinations of peripherals available through pin muxing enable you to tailor fit to any application.

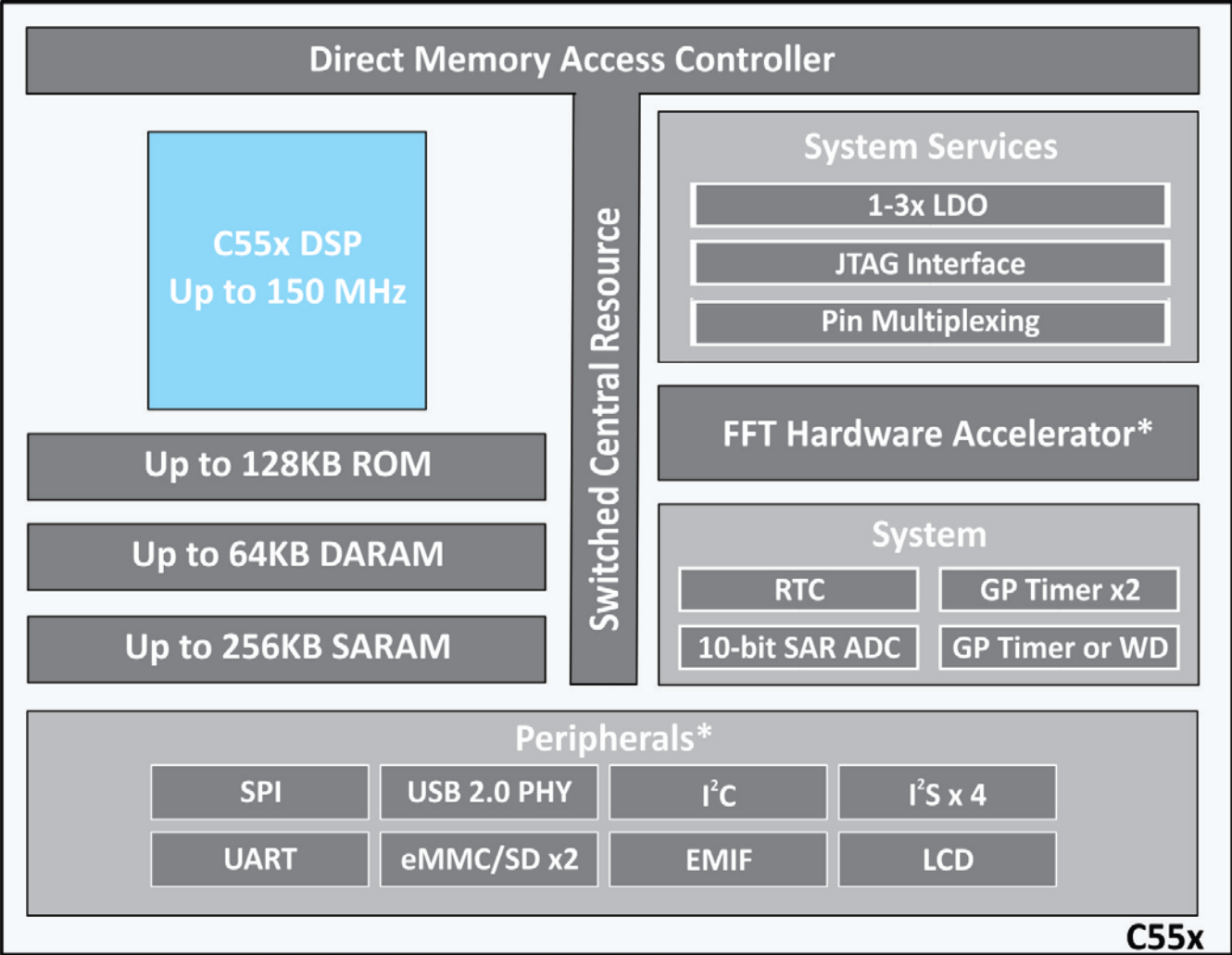


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For more information: www.ti.com/c55x

C55x Architecture: Peripherals

- Data gets passed to the DSP through many serial peripherals.
- I²S handles streaming audio from CODECs or ADC/DAC.
- SPI, eMMC/SD, UART, and I²C handle bootloading, storing data, or communicating with other processors.
- The ultra-low-power C55 makes a great bus-powered USB device for communication to a host.
- USB is also a common way to charge up the battery.
- C5505/15 and C5517 devices come equipped with an EMIF to communicate with off-chip, parallel memories like NOR, NAND, SRAM, and SDRAM or FPGAs.



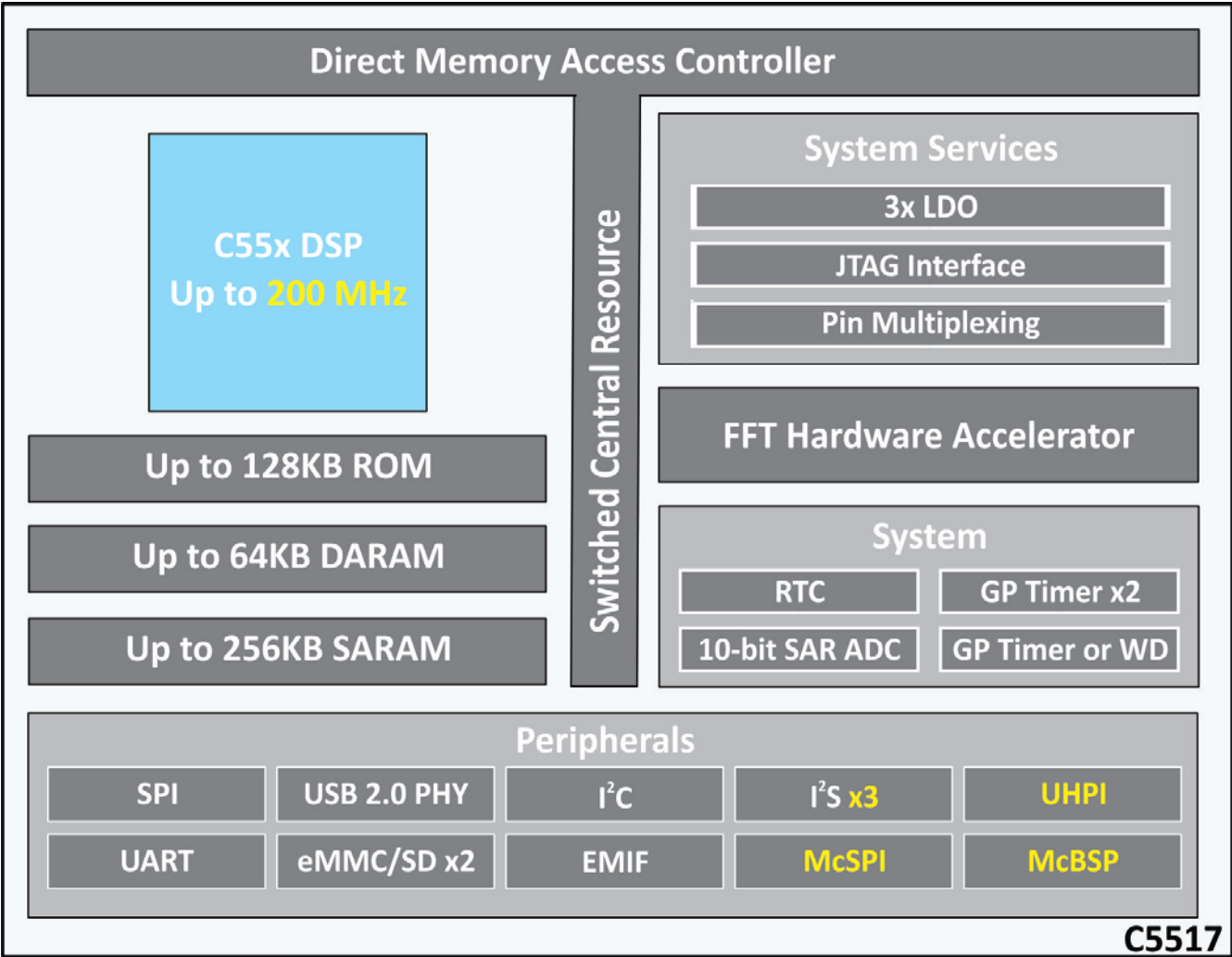
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For more information: www.ti.com/c55x

C5517 Architecture

The software-compatible C5517:

- Boosts processing performance to 200 MHz (400 MMACs per sec)
- Supports additional peripherals:
 - 16-bit UHPI
 - McBSP
 - McSPI
- Provides a faster bootloader

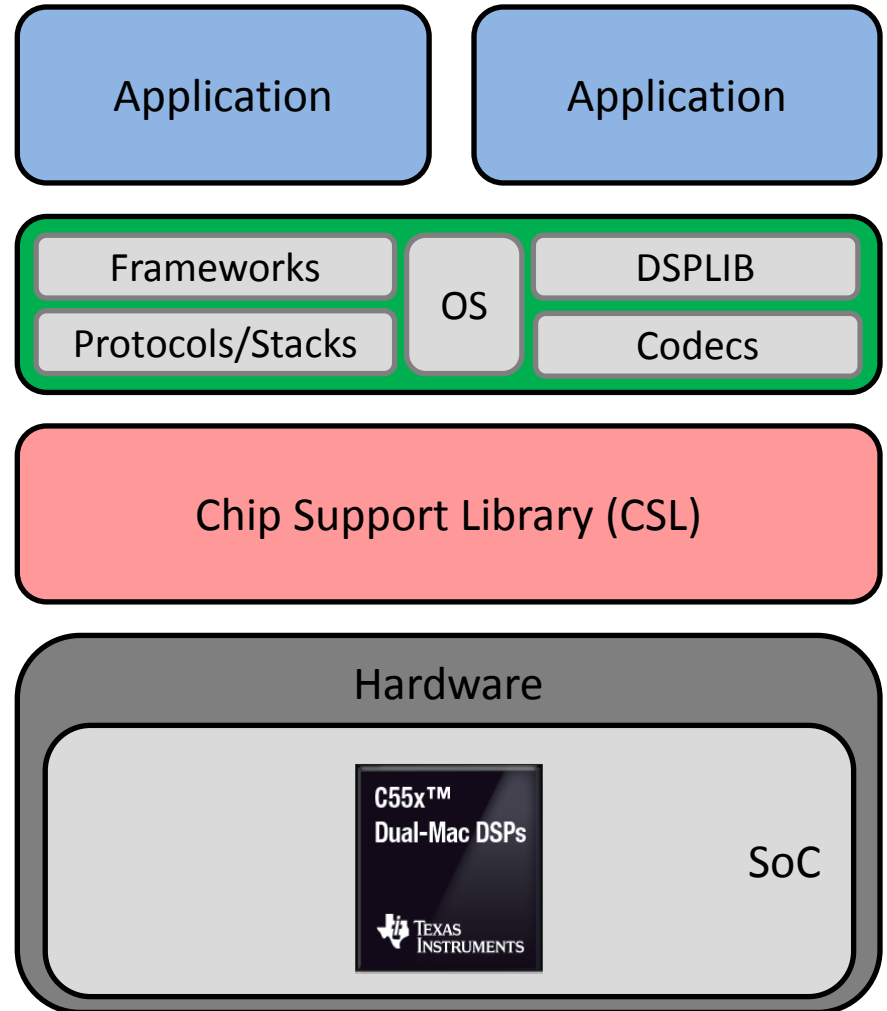


196-pin, 0.65mm package

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C55x Software Support

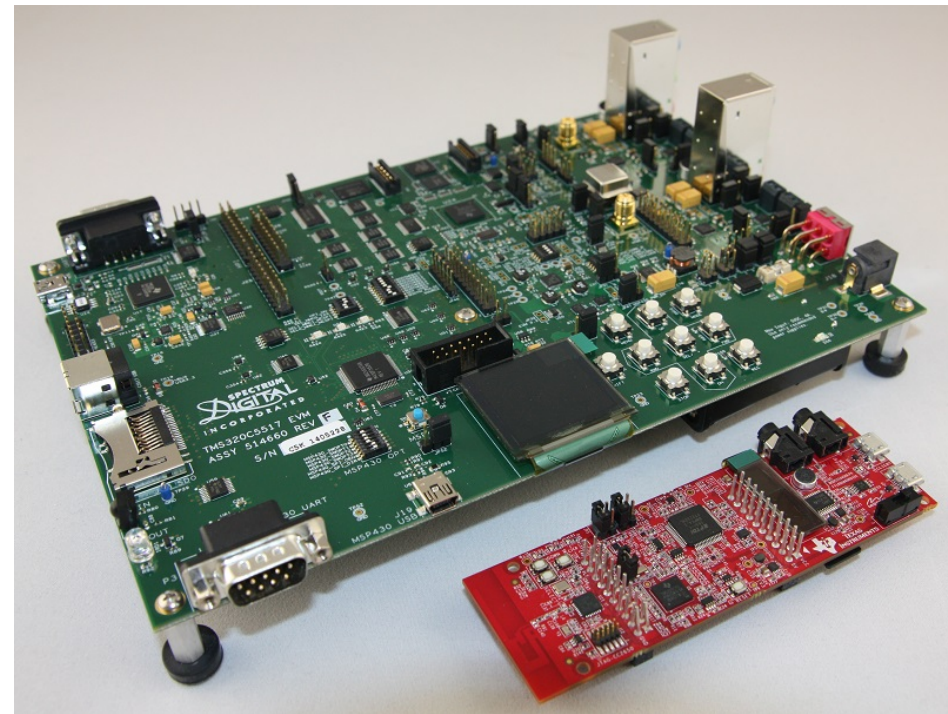
- C55x Chip Support Library (CSL)
 - Standard
 - Low Power
- C55x DSP Library (DSPLIB)
- Code Composer Studio (CCS)
Integrated Development Environment (IDE)
- C55x DSP Software Overview
Training: <http://training.ti.com/c55x-dsp-software-overview>



C55x Development Tools



C5517 EVM : <http://www.ti.com/tool/tmdsevm5517>



C5545 BoosterPack: Coming Soon

C5535 eZdsp:
<http://www.ti.com/tool/TMDX5535EZDSP>

For More Information

- C55x Product Folder: <http://www.ti.com/c55x>
- C55x CSL: <http://www.ti.com/tool/sprc133>
- C55x DSP Library (DSPLIB): <http://www.ti.com/tool/sprc100>
- C55x DSP Library (DSPLIB) Programmer's Reference: <http://www.ti.com/lit/spru422j>
- DSP/BIOS Real-Time Operating System (RTOS): <http://www.ti.com/tool/dspbios>
- C55x Tools with programmer, boot image creator, board support package, gel file, schematics, BOM, etc.:
 - C5505 eZdsp: <http://www.ti.com/tool/tmdx5505ezdsp>
 - C5515 EVM: <http://www.ti.com/tool/tmdxevm5515>
 - C5535 eZdsp: <http://www.ti.com/tool/TMDX5535EZDSP>
 - C5517 EVM : <http://www.ti.com/tool/tmdsevm5517>
- C55x DSP Training Series: <http://c55x-dsp-training-series>
- For questions regarding topics covered in this training, visit the support forums at the TI E2E Community website: <http://e2e.ti.com>