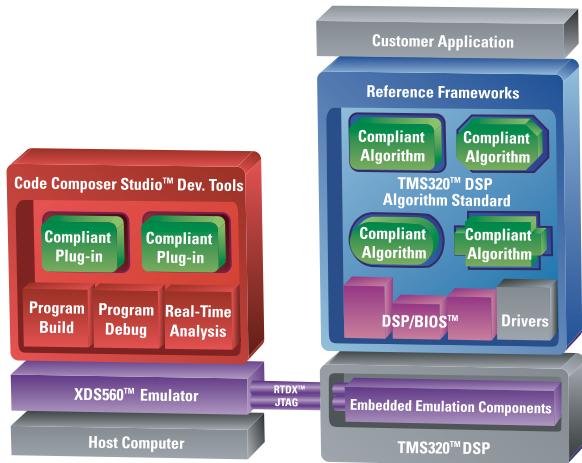


eXpressDSP™ Software and Development Tools

The eXpressDSP Software and Development Tools environment from Texas Instruments (TI) accelerates time-to-market for real-time, TMS320™ DSP- and OMAP™-based applications. This leading-edge technology consists of host tools and target run-time software for simplified real-time based application development while enabling optimum design performance.

eXpressDSP Software and Development Tools



The integration of host tools and target software and services capitalizes on the underlying DSP technology to simplify development and accelerate time-to-market, allowing you to create more innovative, powerful and power-efficient systems.

The eXpressDSP environment consists of industry-proven *real-time software* for DSP applications; powerful, simple-to-use host tools; as well as products from over 600 TI DSP Third Party Network members. This environment creates the foundation to innovate and create your own unique application.

The host tools running on your development PC and the real-time DSP target-side software enables you to move quickly through all stages of the application development process.

The eXpressDSP host tools provide an integrated development environment consisting of:

- **Code Composer Studio (CCStudio) Development Tools** – a powerful set of integrated development tools that can be enhanced with TI and third-party plug-ins. With all these tools in one integrated environment, CCStudio boosts your effectiveness and productivity.

The eXpressDSP real-time target-side software saves valuable time by providing:

- **DSP/BIOS Kernel** – a proven, scalable, real-time software kernel including chip support libraries that create the foundation for software development work, eliminating many low-level coding tasks and greatly simplifies real-time task scheduling.
- **TMS320 DSP Algorithm Standard** – an interoperability coding standard that facilitates the reuse of software components from your previous projects, other developers and outside sources.
- **eXpressDSP Reference Frameworks** – a set of open source, C-based starterware templates optimized for multiple application parameters. Designed to be simple to modify, enabling you to be up and running with production-ready code very quickly.

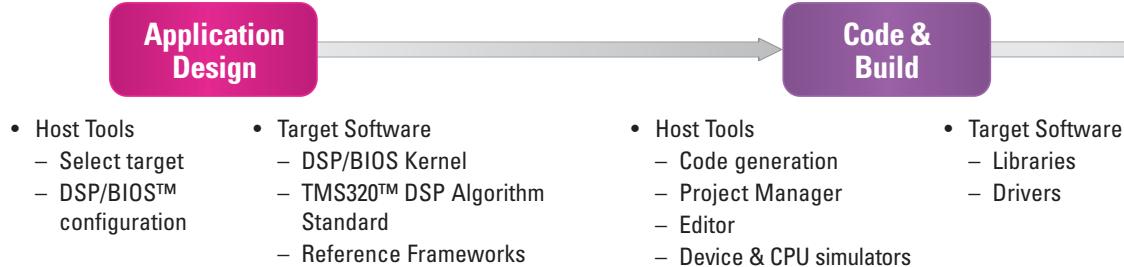
The world's largest DSP Third Party Network

- **Over 600** TI DSP Third Party Network members who provide a rich library of TMS320 DSP-based software modules and host tools plug-ins that are easily integrated to fit the needs of your application. This network also provides hardware platforms, emulators and consultant services.

What's New in CCStudio v2.2

- Fast simulators provide deeper visibility for precise problem resolution
- Analysis Toolkit boosts performance and simplifies tedious guesswork
- Enhanced pipeline analysis highlights pipeline stalls
- XDS560 device drivers leverage TI's high speed emulator
- Real-Time Data Exchange (RTDX™) status viewer better manages RTDX channels
- Improved integrated development environment (IDE) usability

TI's Development Tools and Software



The tight integration of CCStudio with eXpressDSP™ Software and the TMS320 DSP and OMAP families of devices speed your design through each stage of the design cycle. Take advantage of the many features of eXpressDSP products to become more productive and accelerate time-to-market.

Application Design

Host Tools

Quickly setup and configure your application with CCStudio. The drag-and-drop setup utility enables you to quickly select and setup hardware systems and initialize the CCStudio environment. Even a system with multiple boards and CPUs can be configured in a few seconds.

Configure DSP/BIOS resources during application design with the graphical DSP/BIOS configuration tool. View, create and configure DSP/BIOS objects used by your program and eliminate resource contention at this early stage.

Target Software

Get started faster and eliminate many low-level coding tasks up front by using ready-to-go eXpressDSP Software.

Jump start development with eXpressDSP Reference Frameworks. Choose the framework which best fits your application: RF1 "Compact," RF3 "Flexible" or RF5 "Extensive." Built on the foundation of DSP/BIOS and the TMS320 DSP Algorithm Standard, this solid production-quality base code can get your applications off the ground quickly.

Get productive faster and eliminate the need to design and validate your own scheduler. Take advantage of the industry-proven scalable DSP/BIOS real-time kernel to perform time scheduling and synchronization. Use the built-in host-to-target communications and real-time instrumentation for real-time analysis in later stages of development. The kernel includes pre-emptive multi-threading, hardware abstraction, real-time analysis, configuration tools and chip support libraries so you can spend time on more innovative and productive activities.

Explore whether you need to **make, buy or reuse software**. Utilize the TMS320 DSP Algorithm Standard to make your code reusable and to take advantage of the rich offering of eXpressDSP-compliant algorithms ready to drop into your application.

Code and Build

Host Tools

Manage your project effectively using the visual Project Manager. It provides fast access and manipulation of single or multiple project files with drag-and-drop as well as double-click edit capabilities. The Project Manager also can integrate with a number of industry-standard source control systems, giving development teams better control of their project.

Reduce coding errors with CCStudio editor's CodeMaestro™ technology. CodeMaestro includes a dynamic library of terms and understands C and C++ constructs as well as the DSP/BIOS library calls. It can recognize when certain characters are being typed and can provide suggestions to complete a variable name, a function name or other recognized word. It also includes advanced capabilities such as "auto-parameter" and "auto-member" recommendations to help you correctly call a function.

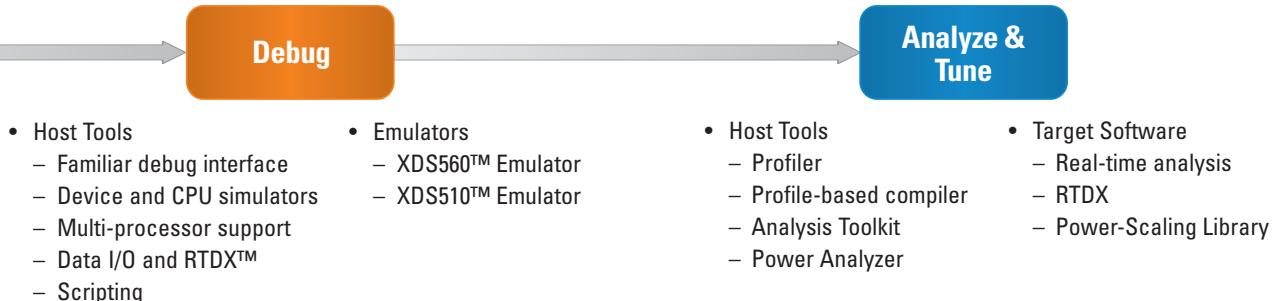
Generate efficient DSP code. CCStudio supports C/C++ and Assembly language coding. TI's compile tools are co-developed with the DSP architecture, offering you best-in-class performance with industry-leading global view analysis and architecture-specific optimizations that include interactive profiling, tuning and feedback.

Start software development earlier using TI's fast simulators to do more coding and validation. Start before your hardware system is ready. A wide array of simulators provide options to determine how much of the device to simulate: CPU only, CPU and memory or full device simulators.

Target Software

Chip support libraries and drivers **reduce the need to open a data book** to correctly configure TMS320 DSP device peripherals.

Available Throughout Design Cycle



TI's Third Parties are a valuable resource: In addition to eXpressDSP™-compliant algorithms, the TI DSP Third Party Network provides target boards, application starter kits, consultant services, as well as software tools, CCStudio plug-ins and additional hardware tools to help you through each stage of the design flow.

Debug

Host Tools

CCStudio's integrated debugger with a familiar easy-to-use interface has many features you would expect in a traditional debugger as well as many DSP-specific and multi-processor design capabilities.

Control execution of your code with regular breakpoints or with hardware and conditional breakpoints which can evaluate a C expression, a local variable or a CPU register location. Use global breakpoints to synchronize the debug of multiple processors on a multi-processor system.

Input and output data on your target with Probe Points™ to control when data displays are updated. Use Graph Options to display data in useful formats such as FFTs, eye diagrams, constellation plots and images.

Examine your data and program during run-time with the watch window or simply roll your cursor over a variable in the editor to use the ToolTip feature to see its value.

Navigate your code with CCStudio's symbol browser, which has detailed knowledge of your application and displays all associated files, functions, global variables, types and labels of a loaded COFF output file (*.out).

Automate repetitive tasks using CCStudio Scripting and CCStudio GEL language. Use familiar languages such as Perl or Visual Basic to automate debug, testing and validation of applications with CCStudio.

Emulators

CCStudio supports TI's next-generation XDS560 Emulator. The XDS560 Emulator reaches real-time data rates of over 2 MB/second on enabled high-speed RTDX processors to provide an unparalleled level of real-time debug. The XDS560 Emulator is fully upward compatible with TI's XDS510 Emulator.

Analyze and Tune

Host Tools and Target Software

Get insight into your running application and determine how to maximize performance, minimize footprint, manage power consumption and/or make your code more robust.

Examine operation of your system in real time – find glitches and bottlenecks that may only show up in real-time operation. This is made possible by the advanced RTDX and DSP/BIOS™ technologies integrated with CCStudio which allow you to get data from your application while it runs in real time.

Get continuous visibility and communicate with your target application without halting the processor using RTDX data transfers between host and target. With real-time data rates of over 2 MB/second, some processors can transfer large data files such as video images in real time.

Analyze task interaction with DSP/BIOS run-time services on your running application to determine if tasks are well integrated and if your application is best utilizing resources.

Optimize application performance by using the CCStudio profiler to get insight into which sections of code are running the slowest or taking up most of your CPU time.

Optimize power consumption for power-sensitive applications. CCStudio's power analyzer and power-scaling library allow developers to visualize power consumption across the DSP, I/O or system. Use the power-scaling library to automatically scale the frequency and voltage of power-hungry functions, resulting in lower power consumption for the full application.

Get deeper visibility for precise problem resolution by modeling system interactions using CCStudio's advanced simulator and Analysis Toolkit. With the fast simulator, you can simplify code analysis, eliminate tedious guesswork and boost application performance. The profiler will enable visualization of cycle counts and profiling of many additional events such as cache conflicts, pipeline conflicts and source-code coverage.

Code Composer Studio Features and Benefits

| DSP | Features: CCStudio Development Tools | | | | | | | | | | | | | Analysis Toolkit** | | | | |
|-------------|--------------------------------------|--------------------|-----------|--------|------------------------|-------|------------------|------------|----------------|-------------------------|---|-------------------|------------------------|--------------------|-------------|------------------|----------------------|---------------|
| | Integrated Development Environment | C/C++ and Assembly | DSP/BIOS™ | XDAIS™ | Reference Frameworks** | RTDX™ | Fast Simulators* | Simulators | Update Advisor | Chip Support Libraries* | Parallel Debug Manager (Multiple Processor Debug) | Pipeline Analysis | Profile-Based Compiler | Scripting*** | Flashburn** | Power Analyzer** | Multi-Event Profiler | Code Coverage |
| TMS320C54x™ | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| TMS320C55x™ | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| TMS320C62x™ | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| TMS320C67x™ | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| TMS320C64x™ | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| TMS320C24x™ | X | X | | X | | X | | X | X | X | | | | | | | | |
| TMS320C28x™ | X | X | X** | X | | X | | X | X | | X | X | | | | | | |
| OMAP™ | X | X | | X | | X | | X | X | X | | | | X | | X | | |

*Note: Available on selected devices within the DSP platform.

**Note: Available on the Update Advisor for users with active CCStudio subscription.

CCStudio Key Benefits

- Quick start with familiar tools and interfaces
- Easily manage large multi-user, multi-site and multi-processor projects
- Utilize fast code creation, optimization and debugging tools
- Maximize reuse and portability for faster code development
- Run complex DSP simulation in minutes instead of hours
- Perform real-time analysis enabled by RTDX and DSP/BIOS technologies

Update Advisor

All CCStudio registered users with a valid subscription have access to CCStudio's live update capability. The Update Advisor is a web-based application designed to allow you to keep your system efficient and up-to-date. The Update Advisor is aware of every CCStudio component installed on your system, and it is able to compare this information with the available CCStudio updates. It then compiles a custom list of available, easy-to-install system updates. This allows you to keep your system up-to-date with the latest software from TI and also gives you access to valuable resources on the web to cut your development time.

eXpressDSP Resources

Learn more about CCStudio and the eXpressDSP Software capability with the online tutorial, multimedia demos and built-in context-sensitive help. Go to CCStudio's Help Menu to access these resources. In addition, there are a number of other web-based resources available.

- **DSP Information:** www.dspvillage.com
- **Technical Documentation:** www.ti.com/dsptechdocs
- **Online Training:** www.ti.com/dsptraining
- **Workshops:** www.ti.com/dspworkshops

- **eStore:** www.ti.com/dspestore
- **Knowledge Base:** www.ti.com/dspkbbase
- **Discussion Groups:** www.ti.com/dspdiscussgroups
- **Third Party Catalog:** www.ti.com/thirdpartycatalog

The black/red banner, Real World Signal Processing, TMS320C24x, TMS320C28x, TMS320C54x, TMS320C55x, TMS320C62x, TMS320C64x, TMS320C67x, Code Composer Studio, DSP/BIOS, eXpressDSP, OMAP, Probe Points, RTDX, TMS320, XDS510 and XDS560 are trademarks of Texas Instruments.

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