Embedded Target for the TI TMS320C2000™ DSP Platform Release Notes

Contents

Summary by Version

This table provides quick access to what's new in each version. For clarification, see "About Release Notes" on page 1.

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Latest Version V2.0 (R2006a)	Yes Details	No	Bug Reports at Web site	Printable Release Notes: PDF V2.0 (R2006a) product documentation
V1.3 (R14SP3)	Yes Details	No	Bug Reports at Web site	No
V1.2.1 (R14SP2)	Yes Details	No	Bug Reports at Web site	No
V1.2 (R14SP1+)	Yes Details	No	Fixed bugs	No
V1.1.1 (R14SP1)	No	No	Fixed bugs	No
V1.1 (R14)	Yes Details	No	Fixed bugs	No
V1.0 (R13SP1+)	Yes See the V1.0 (R13SP1+) product documentation			V1.0 (R13SP1+) product documentation

About Release Notes

Use release notes when upgrading to a newer version to learn about new features and changes, and the potential impact on your existing files and practices. Release notes are also beneficial if you use or support multiple versions.

If you are not upgrading from the most recent previous version, review release notes for all interim versions, not just for the version you are installing. For example, when upgrading from V1.0 to V1.2, review the New Features and Changes, Version Compatibility Considerations, and Bug Reports for V1.1 and V1.2.

New Features and Changes

These include

- New functionality

- Changes to existing functionality

- Changes to system requirements (complete system requirements for the current version are at the MathWorks Web site)

- Any version compatibility considerations associated with each new feature or change

Version Compatibility Considerations

When a new feature or change introduces a known incompatibility between versions, its description includes a **Compatibility Considerations** subsection that details the impact. For a list of all new features and changes that have compatibility impact, see the "Compatibility Summary for Embedded Target for the TI TMS320C2000™ DSP Platform" on page 21.

Compatibility issues that become known after the product has been released are added to Bug Reports at the MathWorks Web site. Because bug fixes can sometimes result in incompatibilities, also review fixed bugs in Bug Reports for any compatibility impact.

Fixed Bugs and Known Problems

MathWorks Bug Reports is a user-searchable database of known problems, workarounds, and fixes. The MathWorks updates the Bug Reports database as new problems and resolutions become known, so check it as needed for the latest information.

Access Bug Reports at the MathWorks Web site using your MathWorks Account. If you are not logged in to your MathWorks Account when you link

to Bug Reports, you are prompted to log in or create an account. You then can view bug fixes and known problems for R14SP2 and more recent releases.

The Bug Reports database was introduced for R14SP2 and does not include information for prior releases. You can access a list of bug fixes made in prior versions via the links in the summary table.

Related Documentation at Web Site

Printable Release Notes (PDF). You can print release notes from the PDF version, located at the MathWorks Web site. The PDF version does not support links to other documents or to the Web site, such as to Bug Reports. Use the browser-based version of release notes for access to all information.

Product Documentation. At the MathWorks Web site, you can access complete product documentation for the current version and some previous versions, as noted in the summary table.

Version 2.0 (R2006a) Embedded Target for the TI TMS320C2000™ DSP Platform

This table summarizes what's new in Version 2.0 (R2006a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports at Web site	Printable Release Notes: PDF V2.0 (R2006a) product documentation

New features and changes introduced in this version are

- "Asynchronous Interrupt Scheduling Support for C280x and C281x" on page 4
- "Expanded Support for C2000 Targets" on page 5
- "C28x Blocks and Library Renamed" on page 5
- "Flash Memory Programming Support" on page 6
- "New C280x Chip Support Library" on page 6
- "New Demos and Demo Versions" on page 7
- "New Memory Management Features in Real-Time Workshop Embedded Coder" on page 7

Asynchronous Interrupt Scheduling Support for C280x and C281x

Asynchronous interrupt scheduling is now supported for C280x and C281x-based boards. The following new blocks are the result of the implementation of this feature:

- C280x Hardware Interrupt
- C281x Hardware Interrupt

- C281x Timer

- Idle Task

Additionally, many existing C281x blocks and new C280x blocks include a check box that lets you trigger an asynchronous interrupt when a specific processing event occurs.

Expanded Support for C2000 Targets

New Target Preferences blocks in the C2000 Target Preferences library provide support for an expanded range of boards. The new Target Preferences blocks include:

- F2808 eZdsp, which lets you target the F2808 eZdsp™ DSP board from Spectrum Digital.

- Custom C280x Board, which lets you target custom boards based on several members of the C280x chip family.

- Custom C281x Board, which lets you target custom boards based on several members of the C281x chip family.

C28x Blocks and Library Renamed

With the introduction of support for C280x-based boards, the designations "C2800" and "C28x", which in the past had been used to refer primarily to the F2812 eZdsp™ DSP board, became ambiguous.

To avoid confusion that might result from this ambiguity, the block library `c2800dspchiplib` has been superseded by a new (and expanded) block library named `c281xdspchiplib`. Also, all references to blocks in this library have been changed from "C28x..." to "C281x...".

The `c281xdspchiplib` library features an improved layout with blocks organized into the following categories:

- Utilities

- Scheduling

- Control

- Communications

Note The introduction of the `c281xdspchiplib` block library should have no effect on backward compatibility. The old `c2800dspchiplib` block library is no longer included in the product, but when you open an existing model, the Simulink block forwarding mechanism will automatically remap your C28x blocks to the new block library.

Flash Memory Programming Support

The Target Preferences blocks for F2812 eZdsp and F2808 eZdsp boards now let you choose to burn generated code into on-board flash memory.

New C280x Chip Support Library

The new C280x Chip Support Library, `c280xdspchiplib`, includes the following blocks presented in functional categories as follows:

Utilities

- From Memory
- To Memory

Scheduling

- C280x Hardware Interrupt
- Idle Task

Control

- C280x ADC
- C280x ePWM
- C280x eQEP

Communications

- C280x eCAN Receive
- C280x eCAN Transmit

New Demos and Demo Versions

Several new demos, as well as new versions of existing demos, are included in this release:

- Permanent Magnet Synchronous Motor Field-Oriented Control

  This is a new demo. The following version is available:

    Spectrum Digital F2812 eZdsp: `c2812pmsmfoc.mdl`

- Asynchronous Scheduling

  This is a new demo. The following versions are available:

    Spectrum Digital F2812 eZdsp: `c2812asyncscheduling.mdl`
    Spectrum Digital F2808 eZdsp: `c2808asyncscheduling.mdl`

- PWM Duty Cycle Control via Period Change

  The following new version of this existing demo is available:

    Spectrum Digital F2808 eZdsp: `c2808pwmtest.mdl`

- ADC Control of PWM Duty Cycle

  The following new version of this existing demo is available:

    Spectrum Digital F2808 eZdsp: `c2808adcpwmtest.mdl`

- ADC-PWM Synchronization via ADC Interrupt

  This is a new demo. The following versions are available:

    Spectrum Digital F2812 eZdsp: `c2812adcpwmasynctest.mdl`
    Spectrum Digital F2808 eZdsp: `c2808adcpwmasynctest.mdl`

New Memory Management Features in Real-Time Workshop Embedded Coder

The Embedded Real-Time (ERT) target for the Embedded Target for the TI TMS320C2000 DSP Platform (`ti_C2000_ert.tlc`) offers new memory

7

management features that give you a way manage the performance of your code while working with limited memory resources. This option requires Real-Time Workshop Embedded Coder.

For more information on this, see the chapter on Memory Sections in the *Real-Time Workshop Embedded Coder User's Guide*.

Version 1.3 (R14SP3) Embedded Target for the TI TMS320C2000™ DSP Platform

This table summarizes what's new in Version 1.3 (R14SP3):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports at Web site	No

New features and changes introduced in this version are

- "Free-Running Scheduler" on page 9
- "Support for the C2407 Internal Memory Map" on page 10
- "New SCI Blocks" on page 10
- "New SPI Blocks" on page 10
- "New Ramp Control Block" on page 10
- "New Ramp Generator Block" on page 10
- "ADC Enhancements" on page 10
- "CAN Enhancements" on page 10
- "PWM Enhancements" on page 11
- "Simulation Stop Time" on page 11

Free-Running Scheduler

A new scheduler that does not use any interrupts has been added as an option to the L2407 and F2812 Target Preferences blocks under **CodeGeneration > Scheduler > Algorithm**. Tasks using this scheduler run in priority-based order and execution depends on how fast the task can run.

Support for the C2407 Internal Memory Map

The Internal Memory Map option on the C2407 Target Preferences is now supported. Note that only very small programs will fit into the internal memory of the C2407.

New SCI Blocks

The C24x and C28x libraries now include blocks for receiving and transmitting data via the serial communications interface. Note that, as of Version 2.0, the C28x library has been renamed to C281x.

New SPI Blocks

The C24x and C28x libraries now include blocks for receiving and transmitting data via the serial peripheral interface. Note that, as of Version 2.0, the C28x library has been renamed to C281x.

New Ramp Control Block

A new Ramp Control block for creating a ramp up or ramp down function has been added to the Digital Motor Control library.

New Ramp Generator Block

A new Ramp Generator block for generating ramp output has been added to the Digital Motor Control library.

ADC Enhancements

Support for the following has been added to the ADC blocks:

- Simultaneous sampling mode for c281x-based boards

- Oversampling mode for c281x- and c240x-based boards

CAN Enhancements

Support for nonblocking transmit mode has been added to the CAN blocks.

PWM Enhancements

Support for the following has been added to the PWM blocks:

- Ability to change PWM waveform control logic in real time

- Ability to change deadband period value in real time

- Ability to select units (CPU clock cycles, seconds, or percentages) for PWM period and duty cycle

Simulation Stop Time

In generated code, the Simulink simulation stop time is no longer supported. A simulation stop via a Stop block, however, is honored in the generated code.

Version 1.2.1 (R14SP2) Embedded Target for the TI TMS320C2000™ DSP Platform

This table summarizes what's new in Version 1.2.1 (R14SP2):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports at Web site	No

New features and changes introduced in this version are described here:

CAP Blocks

Two blocks for capturing transitions on the capture unit pins have been added — C24x CAP and C28x CAP.

Version 1.2 (R14SP1+) Embedded Target for the TI TMS320C2000™ DSP Platform

This table summarizes what's new in Version 1.2 (R14SP1+):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Fixed bugs	No

New features and changes introduced in this version are

- "RTDX" on page 13

- "VectorCAN" on page 13

- "DC Motor Speed Control Demo" on page 13

- "Fixed Bugs" on page 14

RTDX

Two blocks for real-time data exchange (RTDX) support in generated code have been added — From RTDX and To RTDX. RTDX enables data exchange between the host, which hosts TI Code Composer Studio and the target, which hosts your DSP program.

VectorCAN

Blocks for VectorCAN and CAN message packing and unpacking have been added. VectorCAN blocks configure, read, and transmit CAN channels for use with Vector-Informatik drivers. CAN message packing blocks pack signals into CAN messages.

DC Motor Speed Control Demo

The new 2812 eZdsp DC Motor Speed Control demo requires the Signal Processing Blockset.

Fixed Bugs

The Embedded Target for the TI TMS320C2000 DSP Platform includes several bug fixes made since Version 1.1.1. This section describes a particularly important Version 1.2 bug fix.

To Memory Block and Contiguous Data

The To Memory block now verifies that data at its input port is contiguous.

Version 1.1.1 (R14SP1) Embedded Target for the TI TMS320C2000™ DSP Platform

This table summarizes what's new in Version 1.1.1 (R14SP1):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
No	No	Fixed bugs	No

New features and changes introduced in this version are described here:

Fixed Bugs

The Embedded Target for the TI TMS320C2000 DSP Platform includes several bug fixes made since Version 1.1. This section describes the particularly important Version 1.1.1 bug fixes.

CCS Warnings About Custom Data Types

During code compilation for the C2400, Code Composer Studio now processes custom data types defined in the tmwtypes.h file correctly, without issuing warnings.

Custom Code Options in RTW Configuration Parameters Now Supported

The Custom Code options in the RTW Configuration parameters are now supported. This allows additional files and paths to be added into the build process. It also supports inserting custom C-code into specific sections of your code.

Deadband Theoretical Results Updated in TI Documentation

The deadband values (settable via the PWM Blocks) were not explained sufficiently in the Texas Instruments documentation. This information has been updated on page 2-4 of Texas Instruments document SPRU065B, TMS320F28x Event Manager (EV) Peripheral Reference Guide. This

15

document can be downloaded from the Texas Instruments Web site
http://www.ti.com/.

First Time Opening Target Preference Block Shows Correct Inspector GUI

When you double-click the Target Preference block for the first time in a given
model, the Inspector page now appears correctly.

Simulation Stop Times Match in Simulation and Generated Code

When the simulation stop time is less than infinity, the effective stop time in
simulation now matches the effective stop time in the generated code.

Upgrading from an Earlier Release

This section describes an upgrade issue involved in moving from the
Embedded Target for the TI TMS320C2000 DSP Platform 1.1 to Version 1.1.1.

Space Vector Generator Inputs Renamed

The input parameters to the Space Vector Generator block have been
renamed from Va and Vb to Ua and Ub, respectively. This change matches the
terminology used in Texas Instruments documentation.

Version 1.1 (R14) Embedded Target for the TI TMS320C2000™ DSP Platform

This table summarizes what's new in Version 1.1 (R14):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Fixed bugs	No

New features and changes introduced in this version are

- "New DMC Library" on page 17

- "New C28x Blocks" on page 18

- "New C24x Blocks" on page 18

- "Enhancements to Other Blocks" on page 18

- "Fixed Bugs" on page 18

New DMC Library

A new digital motor control (DMC) library has been added to support C28x boards. This library contains these blocks:

- Clarke Transformation — transforms three-phase into two-phase quadrature quantities

- Inverse Park Transformation — transforms rotating reference frame vectors to two-phase stationary reference frame

- Park Transformation — transforms two-phase stationary system vectors to rotating system vectors

- PID Controller — creates a digital PID controller

- Space Vector Generator — calculates duty ratios to generate stator reference voltage

- Speed Measurement — calculates motor speed

New C28x Blocks

The following new blocks have been added to support C28x boards:

- C28x GPIO Digital Input — configures the General Purpose I/O pin registers for digital input

- C28x GPIO Digital Output — configures the General Purpose I/O pin registers for digital output

- C28x QEP — configures the quadrature pulse encoder circuit

New C24x Blocks

The following new blocks have been added to support C24x boards:

- C24x GPIO Digital Input — configures the General Purpose I/O pin registers for digital input

- C24x GPIO Digital Output — configures the General Purpose I/O pin registers for digital output

- C24x QEP — configures the quadrature pulse encoder circuit

Enhancements to Other Blocks

The C24x and C28x ADC blocks have been enhanced by adding a triggering mode option which synchronizes the ADC with a PWM waveform generated by the same event manager module.

Fixed Bugs

The Embedded Target for the TI TMS320C2000 DSP Platform includes several bug fixes made since Version 1.0. This section describes the particularly important Version 1.1 bug fixes.

ADC Block Accuracy

When the C28x ADC high-speed peripheral clock rate was equal to the system clock rate, A/D conversion results were not accurate. This has been fixed by setting the ADC core clock divider to 1 to halve the high-speed peripheral clock rate.

EMIF Setting Changed to Reduce Wait States

When full memory map is used with the F2812 eZdsp, extra wait states were included for external memory banks. This did not allow for the fastest code execution speed possible with the external memory type used with the F2812 eZdsp. Unnecessary wait states have been removed to enable fastest code execution speed.

Multitasking Solver Mode Now Supported

In the previous version, only single-tasking solver mode was supported because the generated code did not allow preemption. Multitasking solver mode is now fully supported in the code generated by this version of the Embedded Target for TI C2000 DSPs.

Previously Unsupported Blocks Now Supported

The following Signal Processing Blockset blocks are now supported in this version:

- Digital Filter
- Discrete Impulse
- Dyadic Analysis Filter Bank
- Dyadic Synthesis Filter Bank
- FIR Decimation
- FIR Interpolation
- FIR Rate Conversion
- Median
- Multiphase Clock
- Multiport Selector
- Random Source
- Sort
- Two-Channel Analysis Subband Filter
- Two-Channel Synthesis Subband Filter

- Variable Fractional Delay
- Variable Integer Delay
- Wavelet Analysis
- Wavelet Synthesis

Previous versions of the above blocks are still not supported nor are these blocks:

- Integer Delay (available only in previous versions)
- Singular Value Decomposition (SVD) Solver

Compatibility Summary for Embedded Target for the TI TMS320C2000™ DSP Platform

This table summarizes new features and changes that might cause incompatibilities when you upgrade from an earlier version, or when you use files on multiple versions. Details are provided in the description of the new feature or change.

Version (Release)	New Features and Changes with Version Compatibility Impact
Latest Version V2.0 (R2006a)	None