

C2000Ware v5.04.00.00 Release Notes

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Introduction

C2000Ware is a cohesive set of development tools for C2000 real-time controllers. It includes device-specific drivers, bit-fields, libraries (math, DSP, Control, Signal Generation), peripheral examples, utilities, hardware files, and documentation. Application specific software and hardware files are delivered through additional Software Development Kits (SDK).

Device Support

The following devices are supported with this release

- MCU's
 - F28P55x
 - F28P65x
 - F280015x
 - F280013x
 - F28003x
 - F28002x
 - F2838x
 - F28004x
 - F28x7x
 - Prior to F28x7x
- Hardware Platforms
 - ControlCARDs and Launchpads

What Is Supported

- Driverlib:
 - Driverlib for F28P55x, F28P65x, F280015x, F280013x, F28003x, F28002x and F2838x - All content in EABI only
 - Driverlib for C28x and CM (F2838x) peripherals
 - F28004x and F28x7x - All contents in both COFF and EABI. Recommendation is to use EABI for all new development.
- SysConfig:
 - Support for Control Peripherals
 - Support for Analog Peripherals
 - Support for System Peripherals
 - Support for Communication Peripherals
 - Support for C2000 and Third Party Libraries
 - Support for Board View (Launchpad and ControlCard)
 - Support for Custom Board Migration
 - Support for Device to Device Auto-Migration
- Universal Project Support Examples (Easy migration support across C2000 using SysCfg)
 - Universal , timer_ex1, led_ex1_blinky, gpio_ex2_toggle, i2c_ex1_loopback, spi_ex1_loopback, spi_ex2_loopback_fifo_interrupts, spi_ex3_external_loopback, spi_ex4_external_loopback_fifo_interrupts, spi_ex5_loopback_dma, sci_ex1_loopback, baud_tune_via_uart, lin_ex5, dma_ex1_gsransfer
- Bitfields :
 - Headers and examples for F28P55x, F28P65x, F280015x, F280013x, F28003x, F28002x and F2838x - All content in EABI only
 - F28004x and F28x7x - In COFF only
- Kernel
 - FreeRTOS kernel for C28x and demos on F2838x, F28002x, F28003x , F280013x, F280015x , F28P65x ,F28P55x, F2837xs, F28004x
- EtherCAT:
 - CPU1/CM EtherCAT HAL drivers and test examples for F2838x and F28P65x
 - CPU1/CM Stack Configuration file for Beckhoff's Slave Stack Code Tool for F2838x and F28P65x
 - CPU1/CM Slave Stack demo examples for F2838x and F28P65x
 - EtherCAT - FoE example for C28x and CM
- FPU DSP and FastRTS Library
 - Single Precision FPU DSP library consisting of various optimized FFT, filter, math and vector assembly routines
 - Double Precision FPU DSP library consisting of various optimized FFT, filter and vector assembly routines

- Examples demonstrating the usage of single (F28002x/F2838x) and double precision (F2838x) FPU DSP assembly routines including those running with ADC
 - Single and double precision FastRTS libraries consisting of various optimized math routines
 - Examples demonstrating the usage of single (F28002x/F2838x) and double (F2838x) precision FastRTS math routines
 - RAM, FLASH and ROMTABLE configurations are supported for examples
 - F2837xD examples are also supported same as in the previous release without any modification.
- IQMath Library:
 - Examples on F2837x – COFF and EABI support
 - Examples on F28002x, F2838x , F28003x , F280013x , F280015x and F28P65x - EABI support
- FASTINTDIV :
 - F28003x, F28002x, F2838x and F280013x examples to showcase the usage of fast division intrinsic
- Scale Factor Optimization (SFO) Library
 - Migrated to use driverlibs instead of bitfields
- Fixed Point DSP Library
- VCRC Library and examples
 - Examples demonstrating library capabilities
- Digital Control Library (DCL)
 - Examples demonstrating library capabilities
- Crypto Software Library
 - Publicly available software AES, SHA256, SHA384, RSA .
- PMBus slave stack
 - F28P55x, F28P65x, F280015x, F28003x, F28004x, F2838x, F28002x: Master/slave example demonstrating PMBus v1.2 capability
 - PMBus over I2C support for F28P55x, F28P65x, F280015x, F28003x, F28004x, F2838x, F28002x.
- Flash API
- Tools and Utilities
 - SysConfig support for C2000 analog and digital modules
 - CLB Tool for F28P55x, F28P65x, F28003x, F28002x, F2838x, F28004x and F28x7x
 - DCSM security tool
 - Linker CMD Tool
 - MCU Mission Control and Transfer Tool (BETA)
- Software Diagnostic Library
 - Library and examples for F28003x, F28004x, F28002x, F2838x, F280013x, F280015x, F28P65x and F28P55x.
 - Demonstrates software diagnostics and software tests of hardware diagnostics

- Bug fixes and enhancements

Note: The minimum version of Code Composer Studio required is CCSv12.8 and compiler version is 22.6.1.LTS. Please refer to the Dependencies section for the download links.

What Is Not Supported

- In general, features or drivers not mentioned as part of "What Is Supported" section are not supported in this release.
- Driverlib & bitfields:
 - Bitfield examples in EABI for F28x7x and F28004x.
- SGEN

New In This Release

- AI enabler libraries (feature extraction and host-comms protocol) - for AI specific applications
 - Feature extraction library contains source code for the feature extraction process to be used in neural network (NN)/AI based user applications. The library contains three example projects to demonstrate its use in user specific applications (e.g. Arc fault detection, Motor fault classification)
 - Target-Host communication library contains the source code that implements a host (GUI)-target (MCU) communication protocol, also known as a "device agent". This can be used while executing any AI based application. This library also contains an example to demonstrate its use.
- New examples
 - EtherCAT CiA402 example on F28P65x
 - HRPWM duty control, AHC example on all gen3 devices (F2837xS, F2837xD, F2807x, F2838x, F28002x, F28003x, F28004x, F280013x, F280015x, F28P65x, F28P55x)
 - MCU Mission Control -New examples
 - Transfer_rtlog uses FSI to export data out of a device.
 - transfer_comslogger_rtlog_export_sci interprets the incoming FSI data frame and helps visualize the data through SCI to the PC using GUI Composer
- Removed ECDSA library support from C2000Ware. There is another optimized library that customers can request access from local sales team/FAEs since this is available through restricted secure download-
- Updated BootROM Symbols (secure zone and safe zone) for F28P65x device
 - VCU option is correctly mapped to VCRC for F28P65x device

- Added a script to create 128-bit aligned blocks in SCI8-formatted hex files when the application image contains a CMAC key generated by the C2000 Hex Utility. This avoids Flash API programming errors when programming such application images.

Fixed In This Release

Key	Summary	Severity
C2000WAREPKG-591	Duplicate PieVectTableFile section in cmd files	S3-Minor
C2000WAREPKG-588	Interrupt Vector Table Initialization	S1-Critical
C2000WAREPKG-585	Remove ECDSA crypto support from C2000Ware	S1-Critical
C2000WAREPKG-576	SYSCTL_CLBCLKCTL_CLBCLKDIV_M and SYSCTL_CLBCLKCTL_TILECLKDIV not defined with correct type	S3-Minor
C2000SYSCFG-353	Update flash bank 4 size for F28P55x in linker cmd tool	S3-Minor
C2000SYSCFG-352	fix HRPWM note in SysConfig regarding high-resolution deadband DBFEDHR/DBREDHR is not supported	S3-Minor
C2000SYSCFG-351	Syscfg generated device.c file has a bug for EMIF clock divider	S2-Major
C2000SYSCFG-344	fix HRPWM support for all devices	S2-Major
C2000SYSCFG-333	move SDFM module from communications to control in navigation bar of SysConfig GUI	S3-Minor
C2000DRIVERS-3065	Update the F28P65x boot example with updated VCU option as VCRC	S3-Minor
C2000DRIVERS-3064	Update the EPWM and CLB mux name for xbar	S3-Minor
C2000DRIVERS-3062	HRPWM_isBaseValid function incorrect on F28P55x	S1-Critical
C2000DRIVERS-3059	Reserved entry missing in f280013x_pievect.c file	S3-Minor

Known Issues And Limitations

There are few limitations and known issues associated with this release

Limitations

- F28P55x USB Host Mode examples - These cannot be run on the Control Card. The device gets detected but it is not enumerated successfully.
- Many examples for the libraries available in the “dsp” and “math” folders are not ported to F28P65x and will fail to compile for F28P65x. For FPU and FPUFASTRTS libraries, the "DEVICE" parameter has to be changed to "f28P65x" in .cproject and .project to port them for F28P65x
- Few examples cannot be exercised on ControlCARD due to specific peripherals/pin outs not being available on that platform - CM-UART echoback, CM-DCAN, Ethernet Rev-MII . HIC
- A few of the ECC related driverlib APIs and the message, Rx FIFO and Error Counter Status APIs have not been validated on F2838x.
- CM – Ethernet Driver: Auxiliary Time Stamp, Pulse Per Second Output features has not been validated on the driver.

New Known Issues

Key	Summary	Workaround	Severity
C2000WAREPKG-579	XCMP Sysconfig Bug		S2-Major
C2000SYSCFG-350	1.21 Syscfg Analog Pinmux incompatibility		S2-Major
C2000DRIVERS-3057	Clock tree- F2838xD AUXPLL uses same OSCCLKFREQ as SYSPLL		S2-Major
C2000DRIVERS-3052	Incorrect order of operations in SysCtl_setClock() for F28004x		S3-Minor

Existing Known Issues

Key	Summary	Workaround	Severity
VCUDSP-40	Viterbi Decoder Example Not Working (VCU0)		S2-Major
VCUDSP-31	Build issues with VCU0 examples when using newer versions of compiler	None.	S2-Major
F2838x-159	FlashPumpSemaphoreRegs structure is missing from header file	The register is present in the IPC section. In case of bitfields, it is not possible to expose the same register in 2 different structs. It would cause linker errors. It is recommended to use the register from the IPC struct. Another workaround is to define FlashPumpSemaphoreRegs as a macro of Cpu1toCpu2IpcRegs in one of the common header files <pre>#define FlashPumpSemaphoreRegs Cpu1toCpu2IpcRegs</pre> So, any legacy code that refers to the register as FlashPumpSemaphoreRegs.PUMPREQUEST gets converted to Cpu1toCpu2IpcRegs.PUMPREQUEST.	S2-Major
IQMATH-31	Indexed library will result in build failure for	None	S3-Minor

	some legacy device projects		
IQMATH-20	script to view wave forms of example (setupDebugEnv.js) not correct	view the Dlog variables using the graph on CCS and provide the start and end address of the variables to be plotted.	S2-Major
FPUDSP-75	rfft_adc_f32, rfft_alt_f32. rfft_alt_f32_windowed failures due to tolerance mismatch	rfft_adc_f32, rfft_alt_f32 – examples will indicate fail = 1, pass = 513. 1 failure is due to phase being computed as 0 while we are looking for 6.28 (is same as phase 0). rfft_alt_f32_windowed - pass 334/fail 51 - the tolerance have to be made 0.012 to make the fail to pass.	S3-Minor
FPUDSP-74	cffft_f32_windowed,irfft_f32, rfft_adc_f32_windowed ,rfft_alt_f32_unaligned examples do not work	cffft_f32_windowed - use the RAM_ROMTABLES configuration. irfft_f32 - use the RAM_EABI configuration. rfft_alt_f32_unaligned - use the RAM_EABI configuration.	S3-Minor
FPUDSP-73	Benchmarks results in the User guide don't match with measured values		S2-Major
FPDSP-46	Magnitude of FFT is being scaled compared to the input waveform amplitude		S2-Major
FPDSP-45	FIR16 and FIR32 Flash configurations and FIR32_Alt example do not work	Please use the RAM_EABI configuration for FIR16 and FIR32 examples.	S3-Minor

FPDSP-43	Latest compiler tools will result in build failure for some legacy 2833x Fixed point DSP Projects	None.	S3-Minor
F28X7X-441	SDFM_configComparat or incorrect input in C2000Ware example 1		S3-Minor
F28X7X-400	flash_programming_dcs m example doesn't work for f2837xS	Customers can refer to f2837xS flash_programming example for changes required.	S3-Minor
F28002X-19	FSI: Issue in Flash configuration of driverlib example fsi_ex3_loopback_epw mtrigger	Optimization updated to level 0 for flash configuration	S2-Major
CLAMATH-47	Linker error with F2838x CLAMath examples when VCRC enabled due to Rev 0 ROM		S2-Major
CLAMATH-46	CLA Library and FFT functions does not support EABI. Update documentation for FFT functions.		S2-Major
C28XECAT-126	Potential WORD_ALIGN Bug for CM Examples		S3-Minor
C2000WAREPKG-528	#pragma diag_error in F28x_Project.h switches off the errors 70,770 and 232.		S2-Major
C2000WAREPKG-524	C2000Ware Mac OS Installer does not work	When an application gets downloaded from any source other than those	S2-Major

		that Apple seems suited, the application gets an extended attribute "com.apple.Quarantine". This triggers the message: "<application> is damaged and can't be opened. You should move it to the Bin." Remove the attribute and you can launch the C2000Ware installer . To do this, open a terminal and type:\$ xattr -c <path/to/C2000Ware_5_01_00_00_setup.app>	
C2000WAREPKG-480	Clocking Issue with CM EtherCAT Example		S3-Minor
C2000WAREPKG-237	indexed library leads to build issues for 28035 (2803x), 28069 (2806x), 28235 (2823x), 28335(2833x) projects	C example 2803x – delete the index library IQmath.lib and rename the coff library IQmath_coff.lib as the IQmath.lib C example 2806x – delete the index library IQmath_fpu32.lib and rename the coff library IQmath_fpu32_coff.lib as the IQmath_fpu32.lib C example 2823x – delete the index library IQmath.lib and rename the coff library IQmath_coff.lib as the IQmath.lib	S3-Minor

		C example 2833x – delete the index library IQmath_fpu32.lib and rename the coff library IQmath_fpu32_coff.lib as the IQmath_fpu32.lib C++ example 2803x - delete the index library IQmath.lib and rename the coff library IQmath_coff.lib as the IQmath.lib C++ example 2806x – build fails	
C2000WAREPKG-198	TIREX: Build failure for 28035_IQsampleCpp	C example 2802x – delete the index library IQmath.lib and rename the coff library IQmath_coff.lib as the IQmath.lib C example 2803x – delete the index library IQmath.lib and rename the coff library IQmath_coff.lib as the IQmath.lib C example 2806x – delete the index library IQmath.lib and rename the coff library IQmath_coff.lib as the IQmath.lib Cpp example 2833x – delete the index library IQmath_fpu32.lib and rename the coff library IQmath_fpu32_coff as the IQmath_fpu32.lib	S3-Minor
C2000SYSCFG-338	SysConfig file not updating when we		S2-Major

	disable a module after enabling it		
C2000SYSCFG-327	CMD unable to have same section names for different profiles		S2-Major
C2000SYSCFG-243	EPWMCLKDIV is not working in CLOCKTREE Tool		S2-Major
C2000SYSCFG-239	Update the CLA compiler section when we choose RAMLSx memory as CLA Program Memory		S2-Major
C2000DRIVERS-3040	LAUNCHXL Build Configurations do not work for F28P65X EtherCAT Examples		S2-Major
C2000DRIVERS-2538	[DCAN] ISR entered twice for every event		S2-Major
C2000DRIVERS-2040	Reference interrupt handlers provided in driverlib can be in infinite loop	None. The interrupt handler to be updated to avoid this condition	S2-Major
C2000BROM-740	F28002x ROM CAN bootloader alternate modes point to default mode		S2-Major

Dependencies

This release has dependency on the following tools

- [CCS v12.8](#)
- [TI C2000 Compiler v22.6.1.LTS](#)
- [TI ARM Compiler v20.2.7.LTS](#)

References

1. Getting Started with C2000™ Software, get an overview of Software development and various Software releases available - [C2000™ Software Guide](#)
2. C28x Software development and optimization guide – [C2000™ C28x optimization Guide](#)
3. Adding SYSCONFIG support to C2000 Driverlib Projects - [E2E FAQ](#)
4. Control Law Accelerator Software development – [C2000™ CLA Software Development Guide](#)
5. [C2000 EABI Migration](#)
6. [C28x Compiler v22.6.1 LTS User's Guide](#)
7. [C28x Assembler Tools v22.6.1 LTS User's Guide](#)
8. [ARM Compiler v20.2.7 LTS User's Guide](#)
9. [ARM Assembler Tools v20.2.7 LTS User's Guide](#)
10. [controlSUITE To C2000Ware Transition Guide](#)
11. [Programming TMS320x28xx and 28xxx Peripherals in C/C++](#)

Technical Support

[C2000 microcontroller e2e forum](#)