TivaWare for C Series
SW-TM4C-RLN-2.1.1.71

Release Notes

Literature Number: SPMU299B
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1.1 Summary

This version of TivaWare™ for C Series adds support for the TM4C129x Rev 3.

Tool chains used:

- IAR EW-ARM® 7.30
- Keil RV-MDK v4.72
- Texas Instruments Code Composer Studio™ 6.0.1

1.2 Bug Fixes in TivaWare Bootloader

1.2.1 TM4C129x Support Added to boot_loader

TM4C129x support was broken for the flash-based bootloader. This has now been updated.

1.3 New Features in TivaWare Peripheral Driver Library

1.3.1 Added GPIOPinTypeComparatorOutput() API for Configuring Comparator Output Pin

A new API, GPIOPinTypeComparatorOutput(), for configuring the Comparator Output pin was added to the GPIO driver.

1.3.2 Added OneWire Hardware Definition File

The OneWire hardware definition file was missing in the inc folder. This has now been added. Also, the OneWire peripheral driver has been included in the pre-compiled library.

1.3.3 Updates to ROM Header File

TM4C129x rev 3 support added to ROM header file.

1.4 Bug Fixes in TivaWare Peripheral Driver Library

1.4.1 ADCIntRegister() and ADCIntUnregister() APIs Registered and Unregistered Wrong Interrupt

The internal function _ADCIntNumberGET() always returned ADC0 interrupt number for TM4C123x devices. This resulted in ADCIntRegister() and ADCIntUnregister() APIs registering and unregistering ADC0 interrupt even when ADC1 was requested. This has now been fixed.

1.4.2 Incorrect ASSERT in ADCClockConfigSet() API

In the ADCClockConfigSet() API, the check for the clock divisor is not correct. This has been fixed in this release.

1.4.3 Incorrect Configuration Option for CRCConfigSet() API

One of the configuration options to the CRCConfigSet() API, CRC_CFG_ENDIAN_SBHW, has a wrong value defined in the CRC driver header file. This has now been fixed.

1.4.4 Incorrect ASSERT in GPIOPinConfigure() API

The Assert condition in GPIOPinConfigure() API of GPIO driver does not perform a check for ports R, S and T on TM4C129x devices. This has now been fixed.

1.4.5 Incorrect Assert in I2CMasterBurstLengthSet() API

In the I2CMasterBurstLengthSet() API, the check on burst transfer value argument is incorrect. This has now been fixed.

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1.4.6 ROM_ADCIntClearEx() Clears all Active Interrupts

The ROM_ADCIntClearEx() function contains an error which clears all ADC interrupts marked as active rather than only those specified by the caller. This has been fixed in TivaWare and the function (ADCIntClearEx) now only clears interrupts described in the ui32IntFlags parameter. The ROM_ADCIntClearEx() function has been removed from the rom header file (rom.h).

1.4.7 ROM_EMACInt() Does Not Disable MMC Interrupts in Revision 1

The MMC interrupts of Ethernet MAC peripheral (on TM4C129x) are enabled by default in hardware and must be explicitly disabled. The EMACInit() API in TivaWare and the ROM_EMACInit() function in silicon revision 2 disables these interrupts. But ROM_EMACInit() function on silicon revision 1 does not disable these interrupts. Hence it has been removed from the rom header file for silicon revision 1.

1.4.8 SSIConfigSetExpClk() API Does Not Use Output Disable in Slave Mode

The SSIConfigSetExpClk() API in SSI driver does not use SSI_MODE_SLAVE_OD as a parameter when configuring the SSI controller in slave mode.

1.4.9 SysCtlClockGet() API Never Returns 80 MHz

SysCtlClockGet() API returns 66 MHz even though system clock is set to 80 MHz. This has now been fixed.

1.4.10 SysCtlClockFreqSet() Documentation Updated

The SysCtlClockFreqSet() documentation has been updated to include information about the pre-defined values that can be used to set the frequency when external crystal is used.

1.4.11 Wrong SysClk Frequency to Flash Memory Timing Parameters Mapping in SYSCTL Driver

For TM4C129x devices, the mapping of system clock frequency to flash memory timing parameters is wrong for 40MHz system clock in SYSCTL driver. This has now been fixed.

1.4.12 Missing Check for TIMER6 and TIMER7 in SYSCTL Driver

In the SYSCTL driver, the check for valid peripherals has TIMER6 and TIMER7 missing for TM4C129x devices. This has now been fixed.

1.4.13 Missing TIMER6 and TIMER7 Base Address Check on TM4C129x Devices in Timer Driver

The base address check function _TimerBaseValid() in Timer driver does not have the macro for TIMER6 and TIMER7. This has now been fixed.

1.4.14 Incorrect ASSERT in uDMAChannelAssign() API

In the uDMAChannelAssign() API, the ASSERT statement was not checking for channels from 5 to 8. This has now been fixed.

1.5 New Features in TivaWare Sensor Library

1.5.1 Added Slave Address Encoding and Interrupt Acknowledge Function to Capella CM3218

The Capella CM3218 uses alternate salve address to acknowledge an interrupt request. A function to acknowledge the interrupt is added along with the salve address encoding.

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1.6 Bug Fixes in Third Party Packages

1.6.1 Fat File System Port for TM4C129x Devices Updated for Port Configuration

The fat file system port for ek-tm4c1294 board used incomplete pin configuration with QSSI-0 controller. It now uses the QSSI-1 controller with complete port and peripheral configuration for sd-card reference design.

1.6.2 Memory Leak Due to Bug in TM4C129x lwIP Driver

lwIP driver for TM4C129x device causes a pbuf memory leak, because of which the TM4C129x device stops responding to Ethernet traffic while receiving lots of packets. This driver has been updated to fix the issue.

1.7 New Features in TivaWare USB Library

1.7.1 Added Application Callback Function to USB Device Stack

Application call back function added to the USB device stack to inform the application about device configuration changes.

1.8 Bug Fixes in TivaWare USB Library

1.8.1 USB Host Enumeration Hangs if USB Cable Disconnected

When the USB cable is unplugged during enumerations, the code gets stuck in USBHCDPipeRead() function in usbhostenum.c. This has now been fixed.

1.8.2 Workspace Void Pointer Used by USB Buffer Modified to Use Private Structure

The workspace void pointer element (pvWorksapce) of the USB buffer structure tUSBBuffer has been converted to a private structure in the file usbbuffer.c. Due to this modification all the application specific files that declare receive and transmit buffers, of type tUSBBuffer, are also changed.

1.9 Bug Fixes in TivaWare Utility Library

1.9.1 Update SMBusMasterI2CWriteRead() API to Handle State m/c Correctly

The SMBusMasterI2CWriteRead() API does not handle an "I2C Write Read" operation properly when the Write Length is one byte and the Read Length is one byte. The operation ends with a SMBUS_DATA_SIZE_ERROR. The API does not stage the SMB state machine properly for receiving of one byte. After the 1-byte write sequence, the SMB state machine should start at SMBUS_STATE_READ_ONE but it starts at SMBUS_STATE_READ_FIRST instead, where more than one byte is expected.

1.10 Bug Fixes in DK-TM4C129X Firmware Package

1.10.1 Calibrate Application Updated

The calibrate application for dk-tm4c129x board is updated to correctly interpret the touch screen calibration algorithm described by Carlos E. Videles.

1.10.2 enet_uip Application Modified to Use MAP_ APIs

enet_uip application for dk-tm4c129x kit is updated to use MAP_ APIs instead of ROM_ APIs.

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1.11 Bug Fixes in EK-TM4C123GXL Firmware Package

1.11.1 boostxl_battpack Application has Wrong Units for Voltage

The boostxl_battpack application for the ek-tm4c123gxl-boostxl-battpack and ek-tm4c1294xl-boostxl-battpack kits incorrectly displays the units of voltage as mV while the computation is done for V.

1.12 Bug Fixes in EK-TM4C1294XL Firmware Package

1.12.1 enet_uip Application Modified to Use MAP_ APIs

enet_uip application for ek-tm4c1294xl kit is updated to use MAP_ APIs instead of ROM_ APIs.

1.12.2 qs_iot Application Fails to Reconnect on Loss of IP Address

The qs_iot application for the ek-tm4c1294xl kit fails to reconnect to Exosite server after loss of IP address. This is because, after re-acquiring IP address, a request for a new socket returns bad pointer. This is now fixed by updating the Ethernet client module.

1.12.3 qs_iot Application Does Not Handle Continuous Error Codes From Exosite Server

The qs_iot application for the the ek-tm4c1294xl kit quits trying to send message to Exosite server once it receives continuous error codes from Exosite server. The qs_iot application is updated to handle these error codes in a more robust manner.

1.12.4 enet_io Application Has a Delay Loop in Interrupt Context

The enet_io application for the ek-tm4c1294xl board has a delay loop for animation LED in the function lwipHostTiemrHandler(). This results in autoip taking about 10 minutes to establish a connection. This loop has now been removed.

1.13 New Features in Peripheral Examples Firmware Package

1.13.1 Added TM4C129x Support for Peripheral Examples

All example codes kept in the examples and peripheral folder were hard coded for the TM4C123x device. Support for TM4C129x devices has now been added.

1.14 New Features in TivaWare Firmware Development Package

1.14.1 Updated Source Address of the Data Segment Initialization

The source address of the data segment initialization was updated to __data_load__ instead of __etext. The startup routine (ResetISR) in the GCC start up files copies data segment initializers from flash to RAM and it should be setting the source address to the __data_load__ symbol instead of __etext (because of the fact that the linker script allocates .rodata after __etext, and before __data_load__, so setting the source address as __etext incorrectly copies the .rodata as well).

1.14.2 Updated Linker Script File for CCS GCC

- The interrupt vector section name is updated as intvecs for CCS GCC.
- KEEP directive for some sections were removed to enable discarding of empty sections.
- Default GCC float support (-mfloat-abi) set to "hard" for Tiva™ devices.

1.15 Known Issues

1.15.1 qs-logger Example- Analog Values Were Not Correct for TM4c1294xl

The analog values shown on the display are not correlating with the actual input.

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2.1 Summary

This version of TivaWare for C Series adds support for the EK-TM4C1294XL kit.

Tool Chains Used:

- IAR EW-ARM 6.60.1
- Keil RV-MDK 4.72
- Texas Instruments CCS 5.40

2.2 New Features in TivaWare Peripheral Driver Library

2.2.1 ADCSequenceConfigure Can Now Select PWM Module for Triggers

Additional options have been added to the ui32Trigger parameter to ADCSequenceConfigure to allow the source of PWM triggers to be selected. In previous releases, PWM triggers were always configured to derive from PWM0. On parts containing multiple PWM modules triggers, however, this left the application having to use direct register access to configure triggers from PWM1. Applications may now OR ADC_TRIGGER_PWM_MOD0 or ADC_TRIGGER_PWM_MOD1 into the ui32Trigger parameter to determine the source of the PWM trigger in use.

2.2.2 Added Support to Set Sample/Hold Times to ADCSequenceStepConfigure()

The ADCSequenceStepConfigure() function now supports setting the Sample and Hold time for an ADC sequencer on TM4C129 Tiva devices. This API addition allows applications to control the sample period for an ADC sequencer in terms of ADC clocks.

2.2.3 SysCtlClockSet() Start Up Delay Reduced

The SysCtlClockSet() function was delaying longer than necessary causing longer than required delays before returning. This only effected cases where the main oscillator was in use. The function now checks for the main oscillator power up sequence and the large fixed delays have been removed.

2.2.4 Add New Deep Sleep Settings to SysCtlDeepSleepPowerSet()

Deep sleep modes have been added to support the new deep sleep settings available on the TM4C129 devices. The new options are to put the LDO into a sleep mode when entering deep sleep and allowing the temperature sensor to be put in a low power mode when entering deep sleep.

2.2.5 TimerUpdateMode() API Added to Allow Synchronous Update of Timers

The default behavior for updates to timer load and match values using TimerLoadSet(), TimerLoad-Set64() TimerMatchSet(), and TimerMatchset64() is to update the values immediately. However, the timers also allow for synchronous updates of the load and match values when the timer hits the timeout value. The TimerUpdateMode() API was added to allow these updates to happen when the time reaches a timeout value of zero. This allows for predictable changes to the timers when running in PWM mode and adjusting the duty cycle or period of the waveform.

2.2.6 SysCtlClockFreqSet() Memory Timings Updated

The table used by SysctlClockFreqSet() to set the flash and memory timings has been updated for the TM4C129 class devices. The ROM version is still valid and can be used by applications, but the updated flash version has been modified to produce slightly more efficient flash memory timings at higher speeds.

2.2.7 OneWire Driver Added to DriverLib

A driver for the OneWire peripheral found on several TM4C129 devices has been added to the Peripheral Driver Library.

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2.3 Bug Fixes in TivaWare Peripheral Driver Library

2.3.1 Added ADCClockConfigSet() and ADCClockConfigGet() APIs

The ADCClockConfigSet() and ADCClockConfigGet() have been added to replace the now deprecated SysCtlADCSpeedSet() and SysCtlADCSpeedGet() APIs which are no longer valid for any Tiva C class devices. The new ADCClockConfigSet() function allows for complete control over the clocking and conversion rates of the ADC peripherals.

2.3.2 SysCtlLDOConfigSet() Removed

The function SysCtlLDOConfigSet() has been removed from the Peripheral Driver Library API. This function accessed a register that is no longer present in any Tiva C devices.

2.3.3 SysCtlAltClkConfig() Had Invalid Clocking Options

The options available to the SysCtlAltClkConfig() had unsupported and invalid encodings for some options. The SYSCTL_ALTCLKCFG_ALTCLK_HIBRTC is now more accurately called SYSCTL_ALTCLKCFG_ALTCLK_RTCOSC to match the definitions in the datasheet and the SYSCTL_ALTCLKCFG_ALTCLK_LFIOSC option now has the correct value for the LFIOSC encoding.

2.3.4 Updates to ROM Header Files

The following Peripheral Driver Library APIs have been updated in the ROM header files.

SysCtlADCSpeedSet() and SysCtlADCSpeedGet(). These functions have been moved to the ADC module. The System Control APIs in the ROM header files are no longer valid and not supported.

SysCtlGPIOAHBEnable() and SysCtlGPIOAHBEnable(). These APIs are are not valid for TM4C129 devices and have been removed from the ROM header files for these devices.

64-Bit Timer APIs have been removed from the ROM header files for TM4C129 devices.

USBLPMEndpointGet() - This API has been removed from the ROM header files.

2.3.5 Removed Redundant LCD_DMA_PRIORITY_x Options From LCD Driver

Labels of the form LCD_DMA_PRIORITY_x have been removed from lcd.c and lcd.h. These labels were documented as being valid in calls to LCDDMAConfigSet and allegedly allowed the DMA priority for the LCD controller to be modified. The priority is, however, fixed in TM4C129x parts so these flags had no effect.

2.3.6 SysCtlADCSpeedSet() Removed

The function SysCtlADCSpeedSet() has been removed from the Peripheral Driver Library API. This function should have been removed in the StellarisWare to TivaWare transition but was accidentally left in the release. It accesses a register no longer present in Tiva devices and attempts to use it could cause problems with the system clock configuration. Applications needing to set the ADC sampling rate should call the function ADCClockConfigSet() instead.

2.3.7 HibernateIntStatus() Documentation Updated

The HibernateIntStatus() documentation has been updated to reflect the correct values returned for Tiva TM4C129 devices.

2.3.8 EEPROMInit() Reworked

On advice from our hardware designers, the sequence of operations performed during the EEPROMInit() function has been changed slightly. The prior sequence contained code that checked for errors that are not actually reported by the hardware and could cause problems in some error recovery situations. As a result of this change, customers are advised to use the flash-based version of EEPROMInit() and not the version in ROM that, obviously, implements the older sequence.

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2.3.9 EEPROM_RC_INVPL Has Been Deprecated

The return code EEPROM_RC_INVPL which was intended to indicate an EEPROM programming error due to invalid programming voltage has been deprecated and should no longer be used. No current Tiva part provides this information in its EEDONE register so the flag is redundant.

2.3.10 SysCtlClockGet() Does Not Return Correct Values for All System Divisors

The SysCtlClockGet() function does not return the correct system frequency when the system divisor is limited by the hardware. SysCtlClockSet() allows the user to request invalid system divisors that can put the system clock above its maximum value. The hardware automatically limits the system divisor to a valid value, but SysCtlClockGet() did not recognize this and returned frequency above the actual operating system frequency. This only affected system divisors when using the PLL.

2.3.11 Remove Invalid System Control Settings

Remove the following from the list of system control interrupt sourdce: SYSCTL_INT_CUR_LIMIT, SYSCTL_INT_IOSC_FAIL, SYSCTL_INT_PO, and SYSCTL_INT_PLL_FAIL. These are not valid for any Tiva C class devices. There were also two peripherals enables(SYSCTL_PERIPH_COMP1 and SYSCTL_PERIPH_COMP2) that are not present in Tiva C class devices that needed to be removed as well. These still exist but are not enabled/disabled in the same way as non Tiva C devices.

2.3.12 MCU Class Names Replaced by Part Numbers

Previous releases of TivaWare used MCU class names, Blizzard and Snowflake, within the source. These names are no longer used within the datasheets and so have been removed from TivaWare too. This affects two sets of labels that are used in customer applications. The previous ROM-selection labels TARGET_IS_BLIZZARD_REVxx and TARGET_IS_SNOWFLAKE_REVxx have been replaced with TARGET_IS_TM4C123_REVxx and TARGET_IS_TM4C129_REVxx respectively. Also, the macros used to determine the class of silicon on which an application is running, as defined in inc/hw_types.h, have been renamed from CLASS_IS_BLIZZARD and CLASS_IS_SNOWFLAKE to CLASS_IS_TM4C123 and CLASS_IS_TM4C129, respectively.

2.3.13 USBLPMEndpointGet() Returning the Wrong Data Type

The USBLPMEndpointGet() function was returning the index of the endpoint and not the USB_EP_[0-7] value that is used by all other USB APIs. The function now returns the correctly formatted value so that the return value can be used with other USB APIs.

2.3.14 Correct GPIO Drive Strength Register Write Order in GPIOPadConfigSet()

For Tiva parts that support GPIO drive strengths of 6mA/10mA/12mA, the GPIOPC[EDMn] value must be set prior to writing the drive strength registers. GPIOPadConfigSet() wrote this register last and thus attempting to set drive strengths of 10mA or 12mA provided no improvement over 6mA. The GPIOPC[EDMn] encoding is now written first. Along with this register order change, the GPIO_STRENGTH_8MA and GPIO_STRENGTH_8MA_SC defines were adjusted to use a GPIOPC[EDMn] setting of 0x3. This define change has no impact on Tiva parts that do no support GPIOPC[EDMn] encodings.

2.3.15 Removed Legacy EPI General-Purpose Mode Configuration Options

The EPI general purpose configuration API EPIConfigGPModeSet() accepted several legacy or invalid options that are not appropriate for Tiva MCUs. These options have been removed and include: EPI_GPMODE_FRAMEPIN, EPI_GPMODE_READ2CYCLE, EPI_GPMODE_RDYEN and EPI_GPMODE_WORD_ACCESS. As a part of these changes, the EPIConfigGPModeSet() ui32MaxWait parameter is no longer used.

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2.3.16 Count Limit for EPIDMATxCount Has Been Corrected

In previous releases, function EPIDMATxCount() limited the ui32Count parameter to values less than 255 even though the uDMA controller is capable of transfers up to 1024 units and the underlying EPI transmit count register is 16-bits wide. This limit has now been increased to 1024 to allow transfers whose length matches the maximum imposed by the uDMA controller.

2.3.17 Deprecated uDMAChannelSelectDefault() and uDMAChannelSelect- Secondary()

Functions uDMAChannelSelectDefault() and uDMAChannelSelectSecondary() are redundant for all Tiva parts and have been deprecated. New software should call uDMAChannelAssign() instead to perform the same function.

2.3.18 Ethernet Descriptor Fields Now Volatile

Various fields in the Ethernet MAC DMA descriptor structure are modified by the hardware during packet transmission or reception but were not declared as “volatile” in the structure definition. As a result, compilers may have optimized out accesses to the descriptors in some cases resulting in incorrect software operation. These fields have now been modified to correctly include the “volatile” modifier.

2.4 New Features in TivaWare Graphics Library

2.4.1 Graphics Driver Test Tool Added

A new example, grlib_driver_test, has been added to the dk-tm4c129x release. This tool is intended to be used by developers of display drivers for the TivaWare graphics library and offers commandline access to low level graphics primitives and various test patterns intended to highlight problems in new display driver implementations.

2.5 Bug Fixes in TivaWare Graphics Library

2.5.1 Fixed Naming Error in SliderVerticalSet

An errant script renamed the graphics library macro SliderVerticalSet to SliderVerticai32Set in the previous release. This problem has now been fixed and the correct macro name restored.

2.5.2 GrTransparentImageDraw Could Generate Incorrect Output in Some Cases

Previously, GrTransparentImageDraw could generate incorrect output with some display drivers if the first line of the image being drawn contained only transparent pixels. This bug has now been fixed.

2.6 Bug Fixes in TivaWare Sensor Library

2.6.1 BMP180DataPressureGetFloat() Issue in Data Conversion to Floating Point

Fixed an issue in the conversion from raw sensor reading to floating point. The error created a condition where a sensor reading was erroneously interpreted as negative.

2.7 Bug Fixes in Third Party Packages

2.7.1 Redundant libusb-win32 Files Removed

A redundant group of libusb-win32 driver files have been removed from the third_party/windows directory of the TivaWare release. These have not been used in StellarisWare or TivaWare for several years. Although these files are no longer redistributed, anyone needing libusb-win32 is encouraged to download the files they need from the project site at http://sourceforge.net/apps/trac/libusb-win32/wiki.

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2.8 New Features in TivaWare USB Library

2.8.1 USB Device PowerStatusSet() Functions Replaced With USDCDFeatureSet()

The various USB device mode classes had individual methods for setting the same power status information using APIs at the USB device class level. These functions have been deprecated and replaced by the USDCDFeatureSet() API using the USBLIB_FEATURE_POWER feature option. These APIs are not typically used by applications but could be used by custom USB devices classes which should switch to the USDCDFeatureSet() API.

2.9 Bug Fixes in TivaWare USB Library

2.9.1 USBHCDPipeWrite() Hangs With Certain Data Sizes

If USBHCDPipeWrite() is called with a data size that is greater than 64 and not a multiple of 64 and the USB pipe is not using DMA then the call incorrectly attempted to send the full number of bytes requested. This also caused the call to USBHCDPipeWrite() to hang waiting for more bytes than can be sent. The call now correctly sends only the remaining bytes and returns correctly.

2.9.2 USB Device Enumeration Failed With Descriptors Larger Than 256 Bytes

The USB library failed to enumerate when a device is created with a descriptor that is larger than 256 bytes. The library was using an 8-bit index for the descriptors and now has been fixed to use a 16-bit index allowing for descriptors of up to 65536 bytes in size.

2.9.3 USB Library not Properly Handling DMA With All Packet Sizes

The USB library was not handling all cases of DMA transfer sizes which could cause USB pipes that use DMA to not complete transfers. This was effecting isochronous audio transfers that can send variable sized data packets that were smaller than the initial DMA request. These requests are now handled properly and the DMA transfer is reset with the smaller transfer if needed.

2.9.4 USB Host Keyboard Class Issues With Multiple Keys Pressed

The USB library's host HID keyboard class was not properly handling multiple key presses causing multiple press events for most cases where more than one key was pressed. This has been fixed and the library can now handle up to six keys down at a time.

2.10 Bug Fixes in TivaWare Utility Library

2.10.1 smbus.c typo When Configuring I2C6

Under "case I2C6_BASE" there is a macro typo regarding TM4C129X devices. MAP_IntEnable(INT_I2C7_SNOWFLAKE) was changed to MAP_IntEnable(INT_I2C6_SNOWFLAKE).

2.11 New Features in DK-TM4C129X Firmware Package

2.11.1 New Button Driver Added

The dk-tm4c129x board now has a button driver similar to the other development boards. This provides button de-bouncing and handles reading the three separate GPIO ports for the buttons. The application has the choice of which buttons that it wants to enable as well.

2.11.2 Added usb_host_keyboard Example to Release

Added a USB host keyboard example to the examples for the dk-tm4c129x development board.

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2.11.3 Added USB Device Mouse Example to dk-tm4c129x

This release adds a USB device mouse example to the dk-tm4c129x board examples. This uses the touch screen of the dk-tm4c129x as a touch pad mouse in device mode.

2.11.4 Added a USB Composite Device Example

Added a USB composite device example the dk-tm4c129x kit software. This example enumerates as a composite HID device with both mouse and keyboard interfaces. The touch screen is used as the input for both keyboard and mouse.

2.11.5 Added usb_host_audio Example

Added the usb_host_audio example to demonstrate the use of an isochronous audio device in host mode on the dk-tm4c129x.

2.11.6 Added usb_host_audio_in Example

Added the usb_host_audio_in example to demonstrate the use of an isochronous audio device input device in host mode on the dk-tm4c129x.

2.11.7 Graphics Driver Test Tool Added

A new example, grlib_driver_test, has been added to the dk-tm4c129x release. This tool is intended to be used by developers of display drivers for the TivaWare graphics library and offers commandline access to low level graphics primitives and various test patterns intended to highlight problems in new display driver implementations.

2.11.8 Added USB Serial Device Example to dk-tm4c129x

This release adds a USB serial device example to the dk-tm4c129x board examples.

2.11.9 Extended Peripheral Interface SDRAM Example Added

An example illustrating configuration of the TM4C129's Extended Peripheral Interface (EPI) for use with SDRAM memory has been added to the examples/peripherals/epi directory.

2.11.10 CC3000 WiFi BoosterPack and EM Support Added

Support for the CC3000 WiFi BoosterPack and Evaluation Module has been added to TivaWare. The host-side drivers and stack code can be found in the cc3000 directory at the top level of the TivaWare installation. Example applications for each supported board include a firmware patch programmer, an SSID scanner and a basic, command-line driven tool allowing connection to access points and transfer of data via TCP or UDP packets.

2.12 Bug Fixes in DK-TM4C129X Firmware Package

2.12.1 qs-weather Application Fails to Display Temperatures Correctly

The qs-weather application for the dk-tm4c129x kit incorrectly displays temperatures when the temperatures go into the negative Celcius range. The temperature conversion has been corrected to properly handle negative values.

2.12.2 qs-weather not Updating After Lost Ethernet Link

The qs-weather application was failing to continue updating if the Ethernet link was lost while updating city information. The application now properly resets the update state for cities that were had requests in progress when the Ethernet link was lost.

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2.12.3 MCU Class Names Replaced by Part Numbers

Previous releases of TivaWare used MCU class names, Blizzard and Snowflake, within the source. These names are no longer used within the datasheets and so have been removed from TivaWare too. This affects two sets of labels that are used in customer applications. The previous ROM-selection labels TARGET_IS_BLIZZARD_REVxx and TARGET_IS_SNOWFLAKE_REVxx have been replaced with TARGET_IS_TM4C123_REVxx and TARGET_IS_TM4C129_REVxx respectively. Also, the macros used to determine the class of silicon on which an application is running, as defined in inc/hw_types.h, have been renamed from CLASS_IS_BLIZZARD and CLASS_IS_SNOWFLAKE to CLASS_IS_TM4C123 and CLASS_IS_TM4C129, respectively.

2.12.4 Korean Translation Correction

The lang_demo example has been updated to correct an error in the Korean translation of one string.

2.13 New Features in DK-TM4C123G Firmware Package

2.13.1 CC3000 WiFi BoosterPack and EM Support Added

Support for the CC3000 WiFi BoosterPack and Evaluation Module has been added to TivaWare. The host-side drivers and stack code can be found in the cc3000 directory at the top level of the TivaWare installation. Example applications for each supported board include a firmware patch programmer, an SSID scanner and a basic, command-line driven tool allowing connection to access points and transfer of data via TCP or UDP packets.

2.14 Bug Fixes in DK-TM4C123G Firmware Package

2.14.1 MCU Class Names Replaced by Part Numbers

Previous releases of TivaWare used MCU class names, Blizzard and Snowflake, within the source. These names are no longer used within the datasheets and so have been removed from TivaWare too. This affects two sets of labels that are used in customer applications. The previous ROM-selection labels TARGET_IS_BLIZZARD_REVxx and TARGET_IS_SNOWFLAKE_REVxx have been replaced with TARGET_IS_TM4C123_REVxx and TARGET_IS_TM4C129_REVxx respectively. Also, the macros used to determine the class of silicon on which an application is running, as defined in inc/hw_types.h, have been renamed from CLASS_IS_BLIZZARD and CLASS_IS_SNOWFLAKE to CLASS_IS_TM4C123 and CLASS_IS_TM4C129, respectively.

2.15 Bug Fixes in EK-LM4F232 Firmware Package

2.15.1 MCU Class Names Replaced by Part Numbers

Previous releases of TivaWare used MCU class names, Blizzard and Snowflake, within the source. These names are no longer used within the datasheets and so have been removed from TivaWare too. This affects two sets of labels that are used in customer applications. The previous ROM-selection labels TARGET_IS_BLIZZARD_REVxx and TARGET_IS_SNOWFLAKE_REVxx have been replaced with TARGET_IS_TM4C123_REVxx and TARGET_IS_TM4C129_REVxx respectively. Also, the macros used to determine the class of silicon on which an application is running, as defined in inc/hw_types.h, have been renamed from CLASS_IS_BLIZZARD and CLASS_IS_SNOWFLAKE to CLASS_IS_TM4C123 and CLASS_IS_TM4C129, respectively.

2.16 New Features in EK-TM4C123GXL Firmware Package

2.16.1 Added a USB HID Gamepad Example

This release added a new example for the USB device HID gamepad class. The example acts as a USB HID gamepad device with 2 buttons and 3 axis.

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2.16.2 Added a USB HID Gamepad Example

This release added a new example for the USB device HID gamepad class. The example acts as a USB HID gamepad device with 3 buttons and 2 axis using the on board buttons as well as the touch screen for the X and Y axis.

2.16.3 CC3000 WiFi BoosterPack and EM Support Added

Support for the CC3000 WiFi BoosterPack and Evaluation Module has been added to TivaWare. The host-side drivers and stack code can be found in the cc3000 directory at the top level of the TivaWare installation. Example applications for each supported board include a firmware patch programmer, an SSID scanner and a basic, command-line driven tool allowing connection to access points and transfer of data via TCP or UDP packets.

2.17 Bug Fixes in EK-TM4C123GXL Firmware Package

2.17.1 MCU Class Names Replaced by Part Numbers

Previous releases of TivaWare used MCU class names, Blizzard and Snowflake, within the source. These names are no longer used within the datasheets and so have been removed from TivaWare too. This affects two sets of labels that are used in customer applications. The previous ROM-selection labels TARGET_IS_BLIZZARD_REVxx and TARGET_IS_SNOWFLAKE_REVxx have been replaced with TARGET_IS_TM4C123_REVxx and TARGET_IS_TM4C129_REVxx respectively. Also, the macros used to determine the class of silicon on which an application is running, as defined in inc/hw_types.h, have been renamed from CLASS_IS_BLIZZARD and CLASS_IS_SNOWFLAKE to CLASS_IS_TM4C123 and CLASS_IS_TM4C129, respectively.

2.18 New Features in EK-TM4C1294XL Firmware Package

2.18.1 CC3000 WiFi BoosterPack and EM Support Added

Support for the CC3000 WiFi BoosterPack and Evaluation Module has been added to TivaWare. The host-side drivers and stack code can be found in the cc3000 directory at the top level of the TivaWare installation. Example applications for each supported board include a firmware patch programmer, an SSID scanner and a basic, command-line driven tool allowing connection to access points and transfer of data via TCP or UDP packets.

2.19 Bug Fixes in EK-TM4C1294XL Firmware Package

2.19.1 Korean Translation Correction

The lang_demo example has been updated to correct an error in the Korean translation of one string.

2.20 New Features in TivaWare Firmware Development Package

2.20.1 FreeRTOS Update to Version 7.6.0

Updated third_party/freertos/ to version 7.6.0. For more information, see http://www.freertos.org/History.txt.

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3.1 Summary

This version of TivaWare for C Series adds support for the new TM4C129 series of devices (the Snowflake class) and the DK-TM4C129X development kit.

Tool chains used:

- IAR EW-ARM 6.60.1
- Keil RV-MDK 4.72
- Mentor CodeBench 2011.07-52
- Texas Instruments CCS 5.40

3.2 New Features in TivaWare Peripheral Driver Library

3.2.1 Add New System Control Sleep and Deep Sleep APIs

The system control APIs were missing support for some LDO and power settings related to sleep and deep sleep. The following APIs were added to allow support for these features: SysCtlLDOSleepSet(), SysCtlLDOSleepGet(), SysCtlLDODeepSleepSet(), SysCtlLDODeepSleep- Get(), SysCtlSleepPowerSet(), and SysCtlDeepSleepPowerSet().

3.3 Bug Fixes in TivaWare Peripheral Driver Library

3.3.1 EPI Functions Added as TM4C129 Erratum Workaround

A collection of functions intended to aid applications storing data in external memory mapped to the 0x10000000 EPI aperture has been added to the DriverLib API. These functions, EPIWorkaround-ByteRead(), EPIWorkaroundByteWrite(), EPIWorkaroundHWordRead(), EPIWorkaroundHWord- Write(), EPIWorkaroundWordRead() and EPIWorkaroundWordWrite() can be used by applications to safely read and write memory in the 0x10000000 aperture on TM4C129 parts affected by an erratum which can cause data corruption in some cases. Note that these access functions need not be used if external memory is mapped to the 0x60000000 aperture.

3.4 New Features in TivaWare Graphics Library

3.4.1 Added Raster Mode LCD Controller Example Drivers

An example application illustrating how to use the TM4C129 LCD controller with raster-mode display panels has been added along with TivaWare Graphics Library drivers supporting 1, 4, 8 and 16bpp frame buffers for raster devices. The new code can be found installed under examples/ peripherals/lcd.

3.5 New Features in TivaWare USB Library

3.5.1 Added USB HID gamepad Support to USB Library

The USB library now has USB HID gamepad support in device mode. This allows Tiva C devices to act as USB HID gamepad devices when connected to a host controller. The HID gamepad support provides a default 3 axis 8 button gamepad, but also enables full customization of the HID descriptor to allow for any types of inputs available to a HID gamepad.

3.6 Bug Fixes in TivaWare USB Library

3.6.1 Registering Tick Handlers Allocating Incorrectly

The InternalUSBRegisterTickHandler() was allocating all handlers when a request was made to allocate a single handler. This could have affected applications that used more than one device class.

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3.6.2 Incorrect ASSERT() in uDMAUSBUnitSizeSet()

The ASSERTs in uDMAUSBUnitSizeSet() were incorrectly using define values for a DriverLib API and not the correct numerical values in the ASSERT. This affected any builds of the USB library with DEBUG defined.

3.6.3 USB Device MSC not Responding Correctly When Media Ejected

The USB library mass storage class device mode was not responding correctly when the removable media was not present. The library now responds by failing Test Unit Ready requests when the media is not present.

3.7 New Features in TivaWare Utility Library

3.7.1 Updated lwIP Wrapper Module to Support FreeRTOS

The lwIP wrapper module is updated to support FreeRTOS. To use FreeRTOS, define NO_SYS to 0 and RTOS_FREERTOS to 1 in lwipopts.h project- specific file.

3.8 Bug Fixes in DK-TM4C129X Firmware Package

3.8.1 Checksum Offload Enabled in lwIP Examples Applications

An error in the lwipopts.h configuration header used by the enet_lwip, enet_io and qs_weather example applications resulted in the lwIP TCP/IP stack using software to calculate all IP, UDP, TCP and ICMP packet checksums even though the hardware was also configured to calculate and insert these values. This resulted in a reduction in performance but, more seriously, caused all ICMP packets to be transmitted with 0 inserted as their checksum. As a result, attempts to “ping” boards running these example applications would fail.

Following this fix, all lwIP examples now perform checksum calculations only in hardware and ICMP packets are now correct.

3.8.2 DMA Transactions are Now Stopped When udma_demo ends

In the previous version of udma_demo, DMA transactions continued even after the application indicated that it was finished. The example has now been updated to stop the transactions when the application ends.

3.8.3 Minor Text Clipping Fixed in lang_demo

A minor widget sizing error caused the bottom line of German and Italian text in the lang_demo example to be clipped. This problem has now been fixed.

3.8.4 UART Baud Rate Corrected

Various example applications in the previous build instructed the user to set the UART to 115000bps when, in fact, 115200bps is the correct value. These have been updated to show the expected rate.

3.9 New Features in DK-TM4C123G Firmware Package

3.9.1 Graphics Library Example Application Added

A new example application, grlib_demo, has been added to the dk-tm4c123g release of TivaWare. This example illustrates the use of the low level graphics primitive functions in the TivaWare Graphics Library.

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4.1 Summary

This version of TivaWare for C Series adds support for the new TM4C129 series of devices (the Snowflake class) and the DK-TM4C129X development kit.

Tool chains used:

- IAR EW-ARM 6.60.1
- Keil RV-MDK 4.72
- Mentor CodeBench 2011.07-52
- Texas Instruments CCS 5.40

4.2 New Features in TivaWare Peripheral Driver Library

4.2.1 Added Support for the TM4C129 Family

Drivers have been added and updated to support the new TM4C129 family of microcontrollers. New drivers have been added for the EPI, Ethernet, LCD, and CCM modules.

4.2.2 Added Support for Tamper Feature of Hibernate Module

To support the Tamper feature on TM4C129 family, new APIs have been added to the hibernate driver.

4.3 New Features in TivaWare Graphics Library

4.3.1 Add On-Screen Keyboard to Graphics Library

There is a new configurable on screen keyboard to the graphics library. The current keyboard supports only a US keyboard mapping, but is customizable to any number of keys in any size or mapping. This allows an application to define its own keyboard or simply use the standard keyboard provided with the graphics library. Details on using and customizing the keyboard are provided in the graphics library documentation.

4.4 New Features in TivaWare Sensor Library

4.4.1 Added Driver for the TMP100

Add a driver for the Texas Instruments TMP100 digital temperature sensor.

4.5 Bug Fixes in TivaWare USB Library

4.5.1 Bulk Only Mass Storage Reset Issue

The USB library was not properly handling the USB Bulk Only Mass Storage Reset and causing mass storage devices to not enumerate. The USB library now responds to this and has added better support to stall unknown requests to non-zero endpoints.

4.5.2 USB Library Not Properly Resetting Data Toggle

The USB library was not properly resetting the data toggle when re-assigning USB pipes to new devices. The library now always resets the data toggle when allocating a new USB data pipe.

4.5.3 USB_EVENT_UNKNOWN_CONNECTED Event Returning Incorrect Data

The USB library was returning incorrect data when the USB_EVENT_UNKNOWN_CONNECTED event occurred. The USB_EVENT_UNKNOWN_CONNECTED now returns instance data that can be used with other USB library APIs.

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4.5.4 USB Library Incorrectly Clearing Endpoint Status

The USB library was incorrectly clearing Host IN status bits when clearing Host OUT endpoint status. The library now properly masks off only the IN or OUT status bits depending on which type of request is being handled.

4.5.5 USB Library Not Releasing Configuration Descriptor on Disconnect

The USB library is not releasing the configuration descriptor when a device is disconnected from the controller in host mode. This caused devices with larger configuration descriptors to not enumerate after devices with smaller configuration descriptors were already connected.

4.6 New Features in DK-TM4C129X Firmware Package

4.6.1 Added DK-TM4C129X Development Kit

Board support and example applications have been added for the new DK-TM4C129X development board.

4.7 Bug Fixes in EK-TM4C123GXL Firmware Package

4.7.1 usb_dev_serial Does Not Enumerate

The usb_dev_serial example was not properly configuring the USB library to operate in device only mode. This caused the application to fail to enumerate when attached to a USB host controller.

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5.1 Summary

This version of TivaWare for C Series adds support for the DK-TM4C123G development kit.

Tool chains used:

- IAR EW-ARM 6.60.1
- Keil RV-MDK 4.72
- Mentor CodeBench 2011.07-52
- Texas Instruments CCS 5.40

5.2 New Features in TivaWare Bootloader

5.2.1 CRC Checking Option Added to boot_loader

A new feature has been added to the bootloader that allows an image's embedded CRC32 to be verified on each system reset. When CHECK_CRC is defined in bl_config.h, the boot loader only transfers control to a main application image if it can find a header structure above the application vector table and if the CRC32 value embedded in that header matches the value calculated for the image by the boot loader. For more details, see the *Stellaris® Boot Loader Users' Guide* (SPMU134).

A new tool, binpack, has been added to the tools directory of the release that allows CRC32 values to be calculated and embedded into application images. This tool is described in greater detail in the tools user's guide (packaged as part of TivaWare).

5.3 New Features in TivaWare Peripheral Driver Library

5.3.1 Software CRC Module Moved Into DriverLib

The software CRC module has been moved from the utils directory into the Peripheral Driver Library.

5.4 Bug Fixes in TivaWare Peripheral Driver Library

5.4.1 SysCtlClockGet() Returns an Incorrect Value in Some Configurations

The SysCtlClockGet() function was not properly breaking out of the internal oscillator cases and returned the incorrect processor speed in some configurations. The two failing configurations occurred when SysCtlClockSet() is called with either the SYSCTL_RCC_OSCSRC_INT or SYSCTL_RCC_OSCSRC_INT4 parameter selected for the system clock.

5.4.2 Incorrect ASSERT in HibernateClockConfig()

The ASSERT in HibernateClockConfig was incorrectly causing a debug assert when valid values were passed in to the function. The values HIBERNATE_OSC_HIGHDRIVE and HIBERNATE_OSC_LOWDRIVE were also defined incorrectly and have been changed to match the correct hardware definitions.

5.5 New Features in TivaWare Sensor Library

5.5.1 Added Driver for the L3GD20H

Added a driver for the ST L3GD20H gyroscope.

5.5.2 Added Driver for the LSM303DLHC

Added a driver for the ST LSM303DLHC accelerometer/magnetometer.

5.5.3 Added Driver for the KXTI9

Added a driver for the Kionix KXTI9 accelerometer.

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5.5.4 Added Driver for the LSM303D

Added a driver for the ST LSM303D accelerometer/magnetometer.

5.5.5 Added Utility Functions for Working With Quaternions

Added functions for generating a quaternion from a set of Euler angles, calculating the inverse and magnitude of a quaternion, for multiplying two quaternions, and for finding the angle between two quaternions.

5.6 Bug Fixes in TivaWare Sensor Library

5.6.1 Fixed Soft Reset Sequence for MPU6050/MPU9150

The soft reset sequence in the MPU6050 and MPU9150 drivers have been made more robust.

5.6.2 Added Error Resiliency to CompDCM

The update function for the complementary DCM algorithm now checks for NaN (not a number) values in the resulting matrix and replaces the entire matrix with the unity matrix in this case. While the resulting attitude is momentarily incorrect, it recovers proper attitude estimation after a period of time. Previously, the NaN values would stick and the attitude estimation was forever invalid.

5.6.3 Corrected Error Handling in I2C Driver

The error handling in the I2C driver has been adjusted to be more robust and better handle the various error conditions that can occur during an I2C transaction.

5.6.4 Corrected Conversion Factors for ST L3GD20H Gyro

The conversion of raw angular velocity into radians per second was incorrect yielding angular velocities that were orders of magnitude too small. The effect of reporting incorrectly (small) rotations is a long settling time as the complimentary filter fusion algorithm corrects the device orientation with the accelerometer (assuming the gyro is weighted much heavier than the accelerometer).

5.7 New Features in TivaWare Host Tools

5.7.1 Tool, binpack, Added to Embed CRC32 Values Inside Application Binaries

A new utility, binpack, has been added to the tools directory of the TivaWare release. This tool can be used to embed CRC32 values into application images that are intended for use with CRCenabled boot loaders.

5.7.2 Added Tools Document

A document has been added that describes the contents of the tools directory within TivaWare. Previously, this content had been provided in the individual board documents.

5.8 Bug Fixes in TivaWare Host Tools

5.8.1 Cell Width Error in ftrasterize Corrected

The ftrasterize tool has been updated to fix a problem that could cause the font cell width to be reported as smaller than the widest character in the font. Because this change causes the reported dimensions of some fonts to change, a new switch, -x, has been added to revert to the old behavior. This new switch may be used by existing applications that rely upon the incorrectly reported sizes.

In addition, the -m option has been updated to allow monospaced fonts to be created in all supported output formats. Previously this option was limited to basic ASCII fonts created without the -r or -u switches.

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5.8.2 Memory Leak in lmusbdll Fixed

In previous versions of lmusbdll, calls to OpenDevice() or OpenDeviceByIndex() contained a memory leak, which would occur if no compatible device was connected. This has been corrected.

5.9 New Features in TivaWare USB Library

5.9.1 USB HID Vendor-Specific Usage Macros Added

Two new macros, UsageVendor() and UsagePageVendor(), have been added to usbdhid.h. These macros allow vendor-specific usages and usage pages to be easily included in a HID device's report descriptor.

5.10 Bug Fixes in TivaWare USB Library

5.10.1 Report Disconnect Events in Device Mode

Fixed an issue in the device mode code that prevented delivery of disconnect events.

5.11 New Features in TivaWare Utility Library

5.11.1 Added utils Document

An API document has been added that describes the contents of the utils directory within TivaWare. Previously, this content had been provided in the individual board documents.

5.12 New Features in DK-TM4C123G Firmware Package

5.12.1 Added Support for DK-TM4C123G

Support has been added for the DK-TM4C123G development kit.

5.13 New Features in TivaWare Firmware Development Package

5.13.1 Updated FatFS to Version 0.09

FatFS in third_party/fatfs has been updated to version 0.09.

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Release Notes for Version 1.0 (April 11, 2013)

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6.1 Summary

This is the initial version of TivaWare for C Series.

Tool chains used:

- IAR EW-ARM 6.40.1
- Keil RV-MDK 4.54
- Mentor CodeBench 2011.07-52
- Texas Instruments CCS 5.30

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References

- *Stellaris® Boot Loader Users' Guide* (SPMU134)
- libusb-win32: http://sourceforge.net/projects/libusb-win32/
- FreeRTOS Update to Version 7.6.0: http://www.FreeRTOS.org/

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Revision History

Changes from A Revision (August 2014) to B Revision	Page
• Added new Chapter 1. The existing chapters will increase by one.	8

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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