Lab6_RTOS_OLED

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Chapter 1

README

In this lab work, a graphic editor is implemented using the OLED display, buttons, a switch on the chipkit WiFire Basic I/0 Shield board, and data transfer via the SPI interface.Added RTOS.Used 2 tasks to control painting. At the beginning of the program, the text is displayed and the initial coordinates for drawing are set. Using the buttons, you can move 1 pixel up, down, right or left. With the switch, the pixel color is set to black or white.

Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

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Chapter 3

File Documentation

3.1 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/ChrFont0.c File Reference

```
#include <stdint.h>
#include "OLED.h"
```

Variables

- const BYTE rgbOledFont0 [ ]

3.1.1 Variable Documentation

3.1.1.1 rgbOledFont0

```
const BYTE rgbOledFont0[]
```

3.2 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/ConfigPerformance.c File Reference

```
#include "FreeRTOS.h"
#include "ConfigPerformance.h"
```

Macros

- #define hwUNLOCK_KEY_0 (0xAA996655UL)
- #define hwUNLOCK_KEY_1 (0x556699AAUL)

Functions

- void vHardwareConfigurePerformance (void)
- void vHardwareUseMultiVectoredInterrupts (void)

3.2.1 Macro Definition Documentation

3.2.1.1 hwUNLOCK_KEY_0

```
#define hwUNLOCK_KEY_0 ( 0xAA996655UL )
```

3.2.1.2 hwUNLOCK_KEY_1

```
#define hwUNLOCK_KEY_1 ( 0x556699AAUL )
```

3.2.2 Function Documentation

3.2.2.1 vHardwareConfigurePerformance()

```
void vHardwareConfigurePerformance (
            void  )
```

3.2.2.2 vHardwareUseMultiVectoredInterrupts()

```
void vHardwareUseMultiVectoredInterrupts (
            void  )
```

3.3 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/ConfigPerformance.h File Reference

Functions

- void vHardwareConfigurePerformance (void)
- void vHardwareUseMultiVectoredInterrupts (void)

3.3.1 Function Documentation

3.3.1.1 vHardwareConfigurePerformance()

```
void vHardwareConfigurePerformance (
            void  )
```

3.3.1.2 vHardwareUseMultiVectoredInterrupts()

```
void vHardwareUseMultiVectoredInterrupts (
            void  )
```

3.4 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/FillPat.c File Reference

```
#include <stdint.h>
#include "OLED.h"
```

Variables

- const BYTE rgbFillPat [ ]

3.4.1 Variable Documentation

3.4.1.1 rgbFillPat

```
const BYTE rgbFillPat[]
```

Initial value:

```
= {
    0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
    0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF, 0xFF,
    0xAA, 0x55, 0xAA, 0x55, 0xAA, 0x55, 0xAA, 0x55,
    0x11, 0x44, 0x00, 0x11, 0x44, 0x00, 0x11, 0x44,
    0x92, 0x45, 0x24, 0x92, 0x45, 0x24, 0x92, 0x45,
    0x49, 0x92, 0x24, 0x49, 0x92, 0x24, 0x49, 0x92,
    0x22, 0x11, 0x22, 0x00, 0x22, 0x11, 0x22, 0x00,
    0x11, 0x22, 0x11, 0x00, 0x11, 0x22, 0x11, 0x00
}
```

3.5 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/flop_mz.c File Reference

```
#include <stdlib.h>
#include <math.h>
#include "FreeRTOS.h"
#include "task.h"
#include "flop_mz.h"
```

Macros

- #define mathSTACK_SIZE (configMINIMAL_STACK_SIZE + 100)
- #define mathNUMBER_OF_TASKS (8)

Functions

- void vStartMathTasks (unsigned portBASE_TYPE uxPriority)
- portBASE_TYPE xAreMathsTaskStillRunning (void)

3.5.1 Macro Definition Documentation

3.5.1.1 mathNUMBER_OF_TASKS

```
#define mathNUMBER_OF_TASKS ( 8 )
```

3.5.1.2 mathSTACK_SIZE

```
#define mathSTACK_SIZE (configMINIMAL_STACK_SIZE + 100)
```

3.5.2 Function Documentation

3.5.2.1 vStartMathTasks()

```
void vStartMathTasks (
            unsigned portBASE_TYPE uxPriority )
```

3.5.2.2 xAreMathsTaskStillRunning()

```
portBASE_TYPE xAreMathsTaskStillRunning (
            void  )
```

3.6 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/flop_mz.h File Reference

Functions

- void vStartMathTasks (unsigned portBASE_TYPE uxPriority)
- portBASE_TYPE xAreMathsTaskStillRunning (void)

3.6.1 Function Documentation

3.6.1.1 vStartMathTasks()

```
void vStartMathTasks (
            unsigned portBASE_TYPE uxPriority )
```

3.6.1.2 xAreMathsTaskStillRunning()

```
portBASE_TYPE xAreMathsTaskStillRunning (
            void  )
```

3.7 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/FreeRTOSConfig.h File Reference

```
#include <xc.h>
```

Macros

- #define configUSE_PREEMPTION 1
- #define configUSE_PORT_OPTIMISED_TASK_SELECTION 1
- #define configUSE_QUEUE_SETS 1
- #define configUSE_IDLE_HOOK 0
- #define configUSE_TICK_HOOK 1
- #define configTICK_RATE_HZ ((TickType_t) 1000)
- #define configCPU_CLOCK_HZ (200000000UL)
- #define configPERIPHERAL_CLOCK_HZ (40000000UL)
- #define configMAX_PRIORITIES (8UL)
- #define configMINIMAL_STACK_SIZE (190)
- #define configISR_STACK_SIZE (400)
- #define configTOTAL_HEAP_SIZE ((size_t) 60000)
- #define configMAX_TASK_NAME_LEN (16)
- #define configUSE_TRACE_FACILITY 0
- #define configUSE_16_BIT_TICKS 0
- #define configIDLE_SHOULD_YIELD 1
- #define configUSE_MUTEXES 1
- #define configCHECK_FOR_STACK_OVERFLOW 3 /∗ Three also checks the system/interrupt stack. ∗/
- #define configQUEUE_REGISTRY_SIZE 0
- #define configUSE_RECURSIVE_MUTEXES 1
- #define configUSE_MALLOC_FAILED_HOOK 0
- #define configUSE_APPLICATION_TASK_TAG 0
- #define configUSE_COUNTING_SEMAPHORES 1
- #define configGENERATE_RUN_TIME_STATS 0
- #define configUSE_CO_ROUTINES 0
- #define configMAX_CO_ROUTINE_PRIORITIES (2)
- #define configUSE_TIMERS 1
- #define configTIMER_TASK_PRIORITY (2)
- #define configTIMER_QUEUE_LENGTH 5
- #define configTIMER_TASK_STACK_DEPTH (configMINIMAL_STACK_SIZE ∗ 2)
- #define INCLUDE_vTaskPrioritySet 1
- #define INCLUDE_uxTaskPriorityGet 1
- #define INCLUDE_vTaskDelete 1
- #define INCLUDE_vTaskCleanUpResources 0
- #define INCLUDE_vTaskSuspend 1
- #define INCLUDE_vTaskDelayUntil 1
- #define INCLUDE_vTaskDelay 1
- #define INCLUDE_uxTaskGetStackHighWaterMark 1
- #define INCLUDE_eTaskGetState 1
- #define INCLUDE_xTimerPendFunctionCall 1
- #define configKERNEL_INTERRUPT_PRIORITY 0x01
- #define configMAX_SYSCALL_INTERRUPT_PRIORITY 0x03
- #define configASSERT(x) if((x) == 0) vAssertCalled(__FILE__, __LINE__)

Functions

- void vAssertCalled (const char ∗pcFile, unsigned long ulLine)

3.7.1 Macro Definition Documentation

3.7.1.1 configASSERT

```
#define configASSERT(
             x ) if( ( x ) == 0 ) vAssertCalled( __FILE__, __LINE__ )
```

3.7.1.2 configCHECK_FOR_STACK_OVERFLOW

```
#define configCHECK_FOR_STACK_OVERFLOW 3 /* Three also checks the system/interrupt stack.  */
```

3.7.1.3 configCPU_CLOCK_HZ

```
#define configCPU_CLOCK_HZ ( 200000000UL )
```

3.7.1.4 configGENERATE_RUN_TIME_STATS

```
#define configGENERATE_RUN_TIME_STATS 0
```

3.7.1.5 configIDLE_SHOULD_YIELD

```
#define configIDLE_SHOULD_YIELD 1
```

3.7.1.6 configISR_STACK_SIZE

```
#define configISR_STACK_SIZE ( 400 )
```

3.7.1.7 configKERNEL_INTERRUPT_PRIORITY

```
#define configKERNEL_INTERRUPT_PRIORITY 0x01
```

3.7.1.8 configMAX_CO_ROUTINE_PRIORITIES

```
#define configMAX_CO_ROUTINE_PRIORITIES ( 2 )
```

3.7.1.9 configMAX_PRIORITIES

```
#define configMAX_PRIORITIES ( 8UL )
```

3.7.1.10 configMAX_SYSCALL_INTERRUPT_PRIORITY

```
#define configMAX_SYSCALL_INTERRUPT_PRIORITY 0x03
```

3.7.1.11 configMAX_TASK_NAME_LEN

```
#define configMAX_TASK_NAME_LEN ( 16 )
```

3.7.1.12 configMINIMAL_STACK_SIZE

```
#define configMINIMAL_STACK_SIZE ( 190 )
```

3.7.1.13 configPERIPHERAL_CLOCK_HZ

```
#define configPERIPHERAL_CLOCK_HZ ( 40000000UL )
```

3.7.1.14 configQUEUE_REGISTRY_SIZE

```
#define configQUEUE_REGISTRY_SIZE 0
```

3.7.1.15 configTICK_RATE_HZ

```
#define configTICK_RATE_HZ ( ( TickType_t ) 1000 )
```

3.7.1.16 configTIMER_QUEUE_LENGTH

```
#define configTIMER_QUEUE_LENGTH 5
```

3.7.1.17 configTIMER_TASK_PRIORITY

```
#define configTIMER_TASK_PRIORITY ( 2 )
```

3.7.1.18 configTIMER_TASK_STACK_DEPTH

```
#define configTIMER_TASK_STACK_DEPTH ( configMINIMAL_STACK_SIZE * 2 )
```

3.7.1.19 configTOTAL_HEAP_SIZE

```
#define configTOTAL_HEAP_SIZE ( ( size_t ) 60000 )
```

3.7.1.20 configUSE_16_BIT_TICKS

```
#define configUSE_16_BIT_TICKS 0
```

3.7.1.21 configUSE_APPLICATION_TASK_TAG

```
#define configUSE_APPLICATION_TASK_TAG 0
```

3.7.1.22 configUSE_CO_ROUTINES

```
#define configUSE_CO_ROUTINES 0
```

3.7.1.23 configUSE_COUNTING_SEMAPHORES

```
#define configUSE_COUNTING_SEMAPHORES 1
```

3.7.1.24 configUSE_IDLE_HOOK

```
#define configUSE_IDLE_HOOK 0
```

3.7.1.25 configUSE_MALLOC_FAILED_HOOK

```
#define configUSE_MALLOC_FAILED_HOOK 0
```

3.7.1.26 configUSE_MUTEXES

```
#define configUSE_MUTEXES 1
```

3.7.1.27 configUSE_PORT_OPTIMISED_TASK_SELECTION

```
#define configUSE_PORT_OPTIMISED_TASK_SELECTION 1
```

3.7.1.28 configUSE_PREEMPTION

```
#define configUSE_PREEMPTION 1
```

3.7.1.29 configUSE_QUEUE_SETS

```
#define configUSE_QUEUE_SETS 1
```

3.7.1.30 configUSE_RECURSIVE_MUTEXES

```
#define configUSE_RECURSIVE_MUTEXES 1
```

3.7.1.31 configUSE_TICK_HOOK

```
#define configUSE_TICK_HOOK 1
```

3.7.1.32 configUSE_TIMERS

```
#define configUSE_TIMERS 1
```

3.7.1.33 configUSE_TRACE_FACILITY

```
#define configUSE_TRACE_FACILITY 0
```

3.7.1.34 INCLUDE_eTaskGetState

```
#define INCLUDE_eTaskGetState 1
```

3.7.1.35 INCLUDE_uxTaskGetStackHighWaterMark

```
#define INCLUDE_uxTaskGetStackHighWaterMark 1
```

3.7.1.36 INCLUDE_uxTaskPriorityGet

```
#define INCLUDE_uxTaskPriorityGet 1
```

3.7.1.37 INCLUDE_vTaskCleanUpResources

```
#define INCLUDE_vTaskCleanUpResources 0
```

3.7.1.38 INCLUDE_vTaskDelay

```
#define INCLUDE_vTaskDelay 1
```

3.7.1.39 INCLUDE_vTaskDelayUntil

```
#define INCLUDE_vTaskDelayUntil 1
```

3.7.1.40 INCLUDE_vTaskDelete

```
#define INCLUDE_vTaskDelete 1
```

3.7.1.41 INCLUDE_vTaskPrioritySet

```
#define INCLUDE_vTaskPrioritySet 1
```

3.7.1.42 INCLUDE_vTaskSuspend

```
#define INCLUDE_vTaskSuspend 1
```

3.7.1.43 INCLUDE_xTimerPendFunctionCall

```
#define INCLUDE_xTimerPendFunctionCall 1
```

3.7.2 Function Documentation

3.7.2.1 vAssertCalled()

```
void vAssertCalled (
            const char * pcFile,
            unsigned long ulLine )
```

3.8 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/IntQueueTimer.c File Reference

```
#include "FreeRTOS.h"
#include "IntQueueTimer.h"
#include "IntQueue.h"
```

Macros

- #define timerINTERRUPT3_FREQUENCY (2000UL)
- #define timerINTERRUPT4_FREQUENCY (2001UL)

Functions

- void vT3InterruptHandler (void)
- void vT4InterruptHandler (void)
- void __attribute__ ((interrupt(IPL0AUTO), vector(_TIMER_3_VECTOR)))

3.8.1 Macro Definition Documentation

3.8.1.1 timerINTERRUPT3_FREQUENCY

```
#define timerINTERRUPT3_FREQUENCY ( 2000UL )
```

3.8.1.2 timerINTERRUPT4_FREQUENCY

```
#define timerINTERRUPT4_FREQUENCY ( 2001UL )
```

3.8.2 Function Documentation

3.8.2.1 __attribute__()

```
void __attribute__ (
            (interrupt(IPL0AUTO), vector(_TIMER_3_VECTOR))  )
```

3.8.2.2 vT3InterruptHandler()

```
void vT3InterruptHandler (
            void  )
```

3.8.2.3 vT4InterruptHandler()

```
void vT4InterruptHandler (
            void  )
```

3.9 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/IntQueueTimer.h File Reference

Functions

- void vInitialiseTimerForIntQueueTest (void)
- portBASE_TYPE xTimer0Handler (void)
- portBASE_TYPE xTimer1Handler (void)

3.9.1 Function Documentation

3.9.1.1 vInitialiseTimerForIntQueueTest()

```
void vInitialiseTimerForIntQueueTest (
            void  )
```

3.9.1.2 xTimer0Handler()

```
portBASE_TYPE xTimer0Handler (
            void  )
```

3.9.1.3 xTimer1Handler()

```
portBASE_TYPE xTimer1Handler (
            void  )
```

3.10 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/ISR_Support.h File Reference

```
#include "FreeRTOSConfig.h"
```

Macros

- #define portCONTEXT_SIZE 160
- #define portEPC_STACK_LOCATION 152
- #define portSTATUS_STACK_LOCATION 156
- #define portFPCSR_STACK_LOCATION 0
- #define portTASK_HAS_FPU_STACK_LOCATION 0
- #define portFPU_CONTEXT_SIZE 264

Functions

- macro portSAVE_FPU_REGS base sdc1 offset (\base) sdc1 $f30
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw portSTATUS_STACK_LOCATION (sp) srl k0
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw portEPC_STACK_LOCATION (s5) sw $1
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 mfhi $ac1 sw s5 mflo $ac1 sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0 sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo $ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo $ac0 lw s5 mthi $ac0 s5 lw s5 di ehb la uxInterruptNesting lw k0 addiu sw k0 lw portSTATUS_STACK_LOCATION (s5) lw k1

Variables

- macro portSAVE_FPU_REGS offset
- macro portSAVE_FPU_REGS base sdc1 $f31
- macro portSAVE_FPU_REGS base sdc1 base ldc1 $f0
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu sp
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 k1
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw s7
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw s6
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw s5
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw k0
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins zero
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw ra
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s8
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw t9
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw t8
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw t7
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw t6

- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw t5
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw t4
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw t3
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw t2
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw t1
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw t0
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw a3
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw a2
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw a1
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw a0
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw v1
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw v0
- macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0↩ _STATUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISRStackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 mfhi $ac1 sw s5 mflo $ac1 sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0 sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo $ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo $ac0 lw s5 mthi $ac0 lw

3.10.1 Macro Definition Documentation

3.10.1.1 portCONTEXT_SIZE

```
#define portCONTEXT_SIZE 160
```

3.10.1.2 portEPC_STACK_LOCATION

```
#define portEPC_STACK_LOCATION 152
```

3.10.1.3 portFPCSR_STACK_LOCATION

```
#define portFPCSR_STACK_LOCATION 0
```

3.10.1.4 portFPU_CONTEXT_SIZE

```
#define portFPU_CONTEXT_SIZE 264
```

3.10.1.5 portSTATUS_STACK_LOCATION

```
#define portSTATUS_STACK_LOCATION 156
```

3.10.1.6 portTASK_HAS_FPU_STACK_LOCATION

```
#define portTASK_HAS_FPU_STACK_LOCATION 0
```

3.10.2 Function Documentation

3.10.2.1 offset()

```
macro portSAVE_FPU_REGS base sdc1 offset (
             \ base )
```

3.10.2.2 portEPC_STACK_LOCATION()

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 di ehb la uxInterruptNesting lw k0 addiu sw
k0 lw portEPC_STACK_LOCATION (
            s5  )
```

3.10.2.3 portSTATUS_STACK_LOCATION() [1/2]

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STATUS
sw sp sw sp sw sp sw portSTATUS_STACK_LOCATION (
            sp  )
```

3.10.2.4 portSTATUS_STACK_LOCATION() [2/2]

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 di ehb la uxInterruptNesting lw k0 addiu sw
k0 lw portSTATUS_STACK_LOCATION (
            s5  )
```

3.10.3 Variable Documentation

3.10.3.1 $f0

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 $f0
```

3.10.3.2 $f31

```
macro portSAVE_FPU_REGS base sdc1 $f31
```

3.10.3.3 a0

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw a0
```

3.10.3.4 a1

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw a1
```

3.10.3.5 a2

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw a2
```

3.10.3.6 a3

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw a3
```

3.10.3.7 k0

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 di ehb la uxInterruptNesting lw k0 addiu sw
k0 lw s5 lw sp addiu portCONTEXT_SIZE mtc0 k0
```

3.10.3.8 k1

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 di ehb la uxInterruptNesting lw k0 addiu sw
k0 lw s5 lw sp addiu portCONTEXT_SIZE mtc0 _CP0_STATUS mtc0 k1
```

3.10.3.9 lw

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 lw
```

3.10.3.10 offset

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 offset
```

3.10.3.11 ra

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw ra
```

3.10.3.12 s5

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 di ehb la uxInterruptNesting lw k0 addiu sw
k0 lw s5 lw s5
```

3.10.3.13 s6

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s6
```

3.10.3.14 s7

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s7
```

3.10.3.15 s8

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s8
```

3.10.3.16 sp

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 di ehb la uxInterruptNesting lw k0 addiu sw
k0 lw s5 lw sp addiu sp
```

3.10.3.17 t0

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw t0
```

3.10.3.18 t1

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw t1
```

3.10.3.19 t2

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw t2
```

3.10.3.20 t3

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
t3
```

3.10.3.21 t4

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw t4
```

3.10.3.22 t5

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw t5
```

3.10.3.23 t6

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw t6
```

3.10.3.24 t7

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw t7
```

3.10.3.25 t8

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw t8
```

3.10.3.26 t9

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw t9
```

3.10.3.27 v0

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw v0
```

3.10.3.28 v1

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw v1
```

3.10.3.29 zero

```
macro portSAVE_FPU_REGS base sdc1 base ldc1 _CP0_CAUSE addiu portCONTEXT_SIZE mfc0 _CP0_STA↩
TUS sw sp sw sp sw sp sw ins srl ins ins add sp la uxInterruptNesting lw k0 bne nop la xISR↩
StackTop lw sw k0 mfc0 _CP0_EPC mtc0 _CP0_STATUS sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw
s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 sw s5 mfhi $ac1 sw s5 mflo $ac1
sw s5 mfhi $ac2 sw s5 mflo $ac2 sw s5 mfhi $ac3 sw s5 mflo $ac3 sw s5 rddsp s6 sw s5 mfhi $ac0
sw s5 mflo $ac0 sw s5 la uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer sw
uxInterruptNesting lw s6 addiu bne nop la uxSavedTaskStackPointer lw s5 mthi $ac1 lw s5 mtlo
$ac1 lw s5 mthi $ac2 lw s5 mtlo $ac2 lw s5 mthi $ac3 lw s5 mtlo $ac3 lw s5 wrdsp s6 lw s5 mtlo
$ac0 lw s5 mthi $ac0 s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw
s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 lw s5 di ehb la uxInterruptNesting lw k0 addiu sw
k0 lw zero
```

3.11 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/ISRTriggeredTask.c File Reference

```
#include <stdio.h>
#include "FreeRTOS.h"
#include "task.h"
#include "semphr.h"
#include "ParTest.h"
```

Macros

- #define mainISR_TRIGGERED_LED (1)
- #define mainT5PRESCALAR (6)
- #define mainT5_SEMAPHORE_RATE (31250)

Functions

- void __attribute__ ((interrupt(IPL3AUTO), vector(_TIMER_5_VECTOR)))
- void vT5InterruptHandler (void)

3.11.1 Macro Definition Documentation

3.11.1.1 mainISR_TRIGGERED_LED

```
#define mainISR_TRIGGERED_LED ( 1 )
```

3.11.1.2 mainT5_SEMAPHORE_RATE

```
#define mainT5_SEMAPHORE_RATE ( 31250 )
```

3.11.1.3 mainT5PRESCALAR

```
#define mainT5PRESCALAR ( 6 )
```

3.11.2 Function Documentation

3.11.2.1 __attribute__()

```
void __attribute__ (
            (interrupt(IPL3AUTO), vector(_TIMER_5_VECTOR))  )
```

3.11.2.2 vT5InterruptHandler()

```
void vT5InterruptHandler (
            void  )
```

3.12 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/main.c File Reference

```
#include "FreeRTOS.h"
#include "task.h"
#include "semphr.h"
#include "queue.h"
#include "user.h"
#include "OLED.h"
#include "OLED/OledChar.h"
#include "OLED/OledGrph.h"
#include "UART.h"
#include "ConfigPerformance.h"
```

Functions

- int main (void)
- void vApplicationStackOverflowHook (TaskHandle_t pxTask, char *pcTaskName)
- void vApplicationTickHook (void)
- void vAssertCalled (const char *pcFile, unsigned long ulLine)
- void _general_exception_handler (void)

3.12.1 Function Documentation

3.12.1.1 _general_exception_handler()

```
void _general_exception_handler (
            void  )
```

3.12.1.2 main()

```
int main (
              void  )
```

3.12.1.3 vApplicationStackOverflowHook()

```
void vApplicationStackOverflowHook (
              TaskHandle_t pxTask,
              char * pcTaskName )
```

3.12.1.4 vApplicationTickHook()

```
void vApplicationTickHook (
              void  )
```

3.12.1.5 vAssertCalled()

```
void vAssertCalled (
              const char * pcFile,
              unsigned long ulLine )
```

3.13 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/main_blinky.c File Reference

```
#include <stdio.h>
#include "FreeRTOS.h"
#include "task.h"
#include "queue.h"
#include "timers.h"
#include "partest.h"
#include "semphr.h"
```

Macros

- #define mainQUEUE_SEND_TASK_PRIORITY (tskIDLE_PRIORITY + 1)
- #define mainQUEUE_RECEIVE_TASK_PRIORITY (tskIDLE_PRIORITY + 2)
- #define mainQUEUE_SEND_FREQUENCY_MS (200 / portTICK_PERIOD_MS)
- #define mainQUEUE_LENGTH (1)
- #define mainQUEUE_SEND_PARAMETER (0x1111UL)
- #define mainQUEUE_RECEIVE_PARAMETER (0x22UL)
- #define mainBLINKY_TIMER_PERIOD (50 / portTICK_PERIOD_MS)
- #define mainTASKS_LED (1)
- #define mainTIMER_LED (2)
- #define mainDONT_BLOCK (0)

Functions

- void main_blinky (void)

3.13.1 Macro Definition Documentation

3.13.1.1 mainBLINKY_TIMER_PERIOD

```
#define mainBLINKY_TIMER_PERIOD ( 50 / portTICK_PERIOD_MS )
```

3.13.1.2 mainDONT_BLOCK

```
#define mainDONT_BLOCK ( 0 )
```

3.13.1.3 mainQUEUE_LENGTH

```
#define mainQUEUE_LENGTH ( 1 )
```

3.13.1.4 mainQUEUE_RECEIVE_PARAMETER

```
#define mainQUEUE_RECEIVE_PARAMETER ( 0x22UL )
```

3.13.1.5 mainQUEUE_RECEIVE_TASK_PRIORITY

```
#define mainQUEUE_RECEIVE_TASK_PRIORITY ( tskIDLE_PRIORITY + 2 )
```

3.13.1.6 mainQUEUE_SEND_FREQUENCY_MS

```
#define mainQUEUE_SEND_FREQUENCY_MS ( 200 / portTICK_PERIOD_MS )
```

3.13.1.7 mainQUEUE_SEND_PARAMETER

```
#define mainQUEUE_SEND_PARAMETER ( 0x1111UL )
```

3.13.1.8 mainQUEUE_SEND_TASK_PRIORITY

```
#define mainQUEUE_SEND_TASK_PRIORITY ( tskIDLE_PRIORITY + 1 )
```

3.13.1.9 mainTASKS_LED

```
#define mainTASKS_LED ( 1 )
```

3.13.1.10 mainTIMER_LED

```
#define mainTIMER_LED ( 2 )
```

3.13.2 Function Documentation

3.13.2.1 main_blinky()

```
void main_blinky (
            void  )
```

3.14 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/main_full.c File Reference

```
#include "FreeRTOS.h"
#include "task.h"
#include "queue.h"
#include "semphr.h"
#include "timers.h"
#include "partest.h"
#include "blocktim.h"
#include "flash_timer.h"
#include "semtest.h"
#include "GenQTest.h"
#include "QPeek.h"
#include "IntQueue.h"
#include "countsem.h"
#include "dynamic.h"
#include "QueueOverwrite.h"
#include "QueueSet.h"
#include "recmutex.h"
#include "EventGroupsDemo.h"
#include "flop_mz.h"
```

Macros

- #define mainCHECK_TIMER_PERIOD_MS (3000UL / portTICK_PERIOD_MS)
- #define mainERROR_CHECK_TIMER_PERIOD_MS (200UL / portTICK_PERIOD_MS)
- #define mainSEM_TEST_PRIORITY (tskIDLE_PRIORITY + 1)
- #define mainBLOCK_Q_PRIORITY (tskIDLE_PRIORITY + 2)
- #define mainCOM_TEST_PRIORITY (tskIDLE_PRIORITY + 2)
- #define mainINTEGER_TASK_PRIORITY (tskIDLE_PRIORITY)
- #define mainGEN_QUEUE_TASK_PRIORITY (tskIDLE_PRIORITY)
- #define mainQUEUE_OVERWRITE_TASK_PRIORITY (tskIDLE_PRIORITY)
- #define mainFLOP_TASK_PRIORITY (tskIDLE_PRIORITY)
- #define mainCHECK_LED (2)
- #define mainNUM_FLASH_TIMER_LEDS (1)
- #define mainDONT_BLOCK (0)
- #define mainTEST_INTERRUPT_FREQUENCY (20000)

Functions

- void vStartISRTriggeredTask (void)
- int main_full (void)

Variables

- volatile unsigned long ulRegTest1Cycles = 0
- volatile unsigned long ulRegTest2Cycles = 0

3.14.1 Macro Definition Documentation

3.14.1.1 mainBLOCK_Q_PRIORITY

```
#define mainBLOCK_Q_PRIORITY ( tskIDLE_PRIORITY + 2 )
```

3.14.1.2 mainCHECK_LED

```
#define mainCHECK_LED ( 2 )
```

3.14.1.3 mainCHECK_TIMER_PERIOD_MS

```
#define mainCHECK_TIMER_PERIOD_MS ( 3000UL / portTICK_PERIOD_MS )
```

3.14.1.4 mainCOM_TEST_PRIORITY

```
#define mainCOM_TEST_PRIORITY ( tskIDLE_PRIORITY + 2 )
```

3.14.1.5 mainDONT_BLOCK

```
#define mainDONT_BLOCK ( 0 )
```

3.14.1.6 mainERROR_CHECK_TIMER_PERIOD_MS

```
#define mainERROR_CHECK_TIMER_PERIOD_MS ( 200UL / portTICK_PERIOD_MS )
```

3.14.1.7 mainFLOP_TASK_PRIORITY

```
#define mainFLOP_TASK_PRIORITY ( tskIDLE_PRIORITY )
```

3.14.1.8 mainGEN_QUEUE_TASK_PRIORITY

```
#define mainGEN_QUEUE_TASK_PRIORITY ( tskIDLE_PRIORITY )
```

3.14.1.9 mainINTEGER_TASK_PRIORITY

```
#define mainINTEGER_TASK_PRIORITY ( tskIDLE_PRIORITY )
```

3.14.1.10 mainNUM_FLASH_TIMER_LEDS

```
#define mainNUM_FLASH_TIMER_LEDS ( 1 )
```

3.14.1.11 mainQUEUE_OVERWRITE_TASK_PRIORITY

```
#define mainQUEUE_OVERWRITE_TASK_PRIORITY ( tskIDLE_PRIORITY )
```

3.14.1.12 mainSEM_TEST_PRIORITY

```
#define mainSEM_TEST_PRIORITY ( tskIDLE_PRIORITY + 1 )
```

3.14.1.13 mainTEST_INTERRUPT_FREQUENCY

```
#define mainTEST_INTERRUPT_FREQUENCY ( 20000 )
```

3.14.2 Function Documentation

3.14.2.1 main_full()

```
int main_full (
             void  )
```

3.14.2.2 vStartISRTriggeredTask()

```
void vStartISRTriggeredTask (
             void  )
```

3.14.3 Variable Documentation

3.14.3.1 ulRegTest1Cycles

```
volatile unsigned long ulRegTest1Cycles = 0
```

3.14.3.2 ulRegTest2Cycles

```
volatile unsigned long ulRegTest2Cycles = 0
```

3.15 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/OLED.c File Reference

```
#include "OLED.h"
#include "user.h"
```

Macros

- #define cmdOledDisplayOn 0xAF
- #define cmdOledDisplayOff 0xAE
- #define cmdOledSegRemap 0xA1
- #define cmdOledComDir 0xC8
- #define cmdOledComConfig 0xDA

Functions

- void OledHostInit ()
- void OledDspInit ()
- void OledDvrInit ()
- void OledUpdate ()
- void OledHostTerm ()
- void OledDevTerm ()

Variables

- BYTE rgbOledFont0 [ ]
- BYTE rgbOledFontUser [ ]
- BYTE rgbFillPat [ ]
- int xchOledMax
- int ychOledMax
- int xcoOledCur
- int ycoOledCur
- BYTE * pbOledCur
- int bnOledCur
- BYTE clrOledCur
- BYTE * pbOledPatCur
- int fOledCharUpdate
- int dxcoOledFontCur
- int dycoOledFontCur
- BYTE * pbOledFontCur
- BYTE * pbOledFontUser
- SemaphoreHandle_t xMutexOLED

3.15.1 Macro Definition Documentation

3.15.1.1 cmdOledComConfig

```
#define cmdOledComConfig 0xDA
```

3.15.1.2 cmdOledComDir

```
#define cmdOledComDir 0xC8
```

3.15.1.3 cmdOledDisplayOff

```
#define cmdOledDisplayOff 0xAE
```

3.15.1.4 cmdOledDisplayOn

```
#define cmdOledDisplayOn 0xAF
```

3.15.1.5 cmdOledSegRemap

```
#define cmdOledSegRemap 0xA1
```

3.15.2 Function Documentation

3.15.2.1 OledDevTerm()

```
void OledDevTerm ( )
```

3.15.2.2 OledDspInit()

```
void OledDspInit ( )
```

3.15.2.3 OledDvrInit()

```
void OledDvrInit ( )
```

3.15.2.4 OledHostInit()

```
void OledHostInit ( )
```

Function:

Summary:

Description:

Remarks:

3.15.2.5 OledHostTerm()

```
void OledHostTerm ( )
```

3.15.2.6 OledUpdate()

```
void OledUpdate ( )
```

3.15.3 Variable Documentation

3.15.3.1 bnOledCur

```
int bnOledCur
```

3.15.3.2 clrOledCur

```
BYTE clrOledCur
```

3.15.3.3 dxcoOledFontCur

```
int dxcoOledFontCur
```

3.15.3.4 dycoOledFontCur

```
int dycoOledFontCur
```

3.15.3.5 fOledCharUpdate

```
int fOledCharUpdate
```

3.15.3.6 pbOledCur

```
BYTE* pbOledCur
```

3.15.3.7 pbOledFontCur

```
BYTE* pbOledFontCur
```

3.15.3.8 pbOledFontUser

```
BYTE* pbOledFontUser
```

3.15.3.9 pbOledPatCur

```
BYTE* pbOledPatCur
```

3.15.3.10 rgbFillPat

```
BYTE rgbFillPat[]
```

3.15.3.11 rgbOledFont0

```
BYTE rgbOledFont0[]
```

3.15.3.12 rgbOledFontUser

```
BYTE rgbOledFontUser[]
```

3.15.3.13 xchOledMax

```
int xchOledMax
```

3.15.3.14 xcoOledCur

```
int xcoOledCur
```

3.15.3.15 xMutexOLED

```
SemaphoreHandle_t xMutexOLED
```

3.15.3.16 ychOledMax

```
int ychOledMax
```

3.15.3.17 ycoOledCur

```
int ycoOledCur
```

3.16 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/OLED.h File Reference

```
#include <xc.h>
#include <stdint.h>
#include "FreeRTOS.h"
#include "semphr.h"
```

Macros

- #define MASK(x) (1<<(x))
- #define prtVddCtrl PORTD
- #define bitVddCtrl MASK(12)
- #define prtVbatCtrl PORTD
- #define bitVbatCtrl MASK(15)
- #define prtDataCmd PORTD
- #define bitDataCmd MASK(14)
- #define prtReset PORTG
- #define bitReset MASK(9)
- #define cbOledDispMax 512
- #define ccolOledMax 128
- #define crowOledMax 32
- #define cpagOledMax 4
- #define cbOledChar 8
- #define chOledUserMax 0x20
- #define cbOledFontUser (chOledUserMax∗cbOledChar)
- #define modOledSet 0
- #define modOledOr 1
- #define modOledAnd 2
- #define modOledXor 3

Typedefs

- typedef uint8_t BYTE

Functions

- void OledInit ()
- void OledDvrInit ()
- void OledTerm ()
- void OledDisplayOn ()
- void OledDisplayOff ()
- void OledClear ()
- void OledClearBuffer ()
- void OledUpdate ()
- void OledHostInit ()
- void OledDspInit ()

Variables

- SemaphoreHandle_t xMutexOLED
- BYTE rgbOledBmp [cbOledDispMax]

3.16.1 Macro Definition Documentation

3.16.1.1 bitDataCmd

```
#define bitDataCmd MASK(14)
```

3.16.1.2 bitReset

```
#define bitReset MASK(9)
```

3.16.1.3 bitVbatCtrl

```
#define bitVbatCtrl MASK(15)
```

3.16.1.4 bitVddCtrl

```
#define bitVddCtrl MASK(12)
```

3.16.1.5 cbOledChar

```
#define cbOledChar 8
```

3.16.1.6 cbOledDispMax

```
#define cbOledDispMax 512
```

3.16.1.7 cbOledFontUser

```
#define cbOledFontUser (chOledUserMax*cbOledChar)
```

3.16.1.8 ccolOledMax

```
#define ccolOledMax 128
```

3.16.1.9 chOledUserMax

```
#define chOledUserMax 0x20
```

3.16.1.10 cpagOledMax

```
#define cpagOledMax 4
```

3.16.1.11 crowOledMax

```
#define crowOledMax 32
```

3.16.1.12 MASK

```
#define MASK(
              x ) (1<<(x))
```

3.16.1.13 modOledAnd

```
#define modOledAnd 2
```

3.16.1.14 modOledOr

```
#define modOledOr 1
```

3.16.1.15 modOledSet

```
#define modOledSet 0
```

3.16.1.16 modOledXor

```
#define modOledXor 3
```

3.16.1.17 prtDataCmd

```
#define prtDataCmd PORTD
```

3.16.1.18 prtReset

```
#define prtReset PORTG
```

3.16.1.19 prtVbatCtrl

```
#define prtVbatCtrl PORTD
```

3.16.1.20 prtVddCtrl

```
#define prtVddCtrl PORTD
```

3.16.2 Typedef Documentation

3.16.2.1 BYTE

```
typedef uint8_t BYTE
```

3.16.3 Function Documentation

3.16.3.1 OledClear()

```
void OledClear ( )
```

3.16.3.2 OledClearBuffer()

```
void OledClearBuffer ( )
```

3.16.3.3 OledDisplayOff()

```
void OledDisplayOff ( )
```

3.16.3.4 OledDisplayOn()

```
void OledDisplayOn ( )
```

3.16.3.5 OledDspInit()

```
void OledDspInit ( )
```

3.16.3.6 OledDvrInit()

```
void OledDvrInit ( )
```

3.16.3.7 OledHostInit()

```
void OledHostInit ( )
```

Function:

Summary:

Description:

Remarks:

3.16.3.8 OledInit()

```
void OledInit ( )
```

Function prototype:

Summary:

Description:

Precondition:

Parameters:

Returns:

Example:

Remarks:

3.16.3.9 OledTerm()

```
void OledTerm ( )
```

3.16.3.10 OledUpdate()

```
void OledUpdate ( )
```

3.16.4 Variable Documentation

3.16.4.1 rgbOledBmp

```
BYTE rgbOledBmp[cbOledDispMax]
```

3.16.4.2 xMutexOLED

```
SemaphoreHandle_t xMutexOLED
```

3.17 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/OledChar.c File Reference

```
#include <inttypes.h>
#include "OLED.h"
#include "OledChar.h"
#include "OledGrph.h"
```

Functions

- void OledDrawGlyph (char ch)
- void OledAdvanceCursor ()
- void OledSetCursor (int xch, int ych)
- void OledGetCursor (int *pxch, int *pych)
- int OledDefUserChar (char ch, BYTE *pbDef)
- void OledSetCharUpdate (int f)
- int OledGetCharUpdate ()
- void OledPutChar (char ch)
- void OledPutString (char *sz)

Variables

- int xcoOledCur
- int ycoOledCur
- BYTE * pbOledCur
- BYTE mskOledCur
- int bnOledCur
- int fOledCharUpdate
- BYTE rgbOledBmp [ ]
- int dxcoOledFontCur
- int dycoOledFontCur
- BYTE * pbOledFontCur
- BYTE * pbOledFontUser
- int xchOledCur
- int ychOledCur
- int xchOledMax
- int ychOledMax
- BYTE * pbOledFontExt
- BYTE rgbOledFontUser [cbOledFontUser]

3.17.1 Function Documentation

3.17.1.1 OledAdvanceCursor()

```
void OledAdvanceCursor ( )
```

3.17.1.2 OledDefUserChar()

```
int OledDefUserChar (
            char ch,
            BYTE * pbDef )
```

3.17.1.3 OledDrawGlyph()

```
void OledDrawGlyph (
            char ch )
```

3.17.1.4 OledGetCharUpdate()

```
int OledGetCharUpdate ( )
```

3.17.1.5 OledGetCursor()

```
void OledGetCursor (
            int * pxch,
            int * pych )
```

3.17.1.6 OledPutChar()

```
void OledPutChar (
            char ch )
```

3.17.1.7 OledPutString()

```
void OledPutString (
            char * sz )
```

3.17.1.8 OledSetCharUpdate()

```
void OledSetCharUpdate (
            int f )
```

3.17.1.9 OledSetCursor()

```
void OledSetCursor (
            int xch,
            int ych )
```

3.17.2 Variable Documentation

3.17.2.1 bnOledCur

```
int bnOledCur
```

3.17.2.2 dxcoOledFontCur

```
int dxcoOledFontCur
```

3.17.2.3 dycoOledFontCur

```
int dycoOledFontCur
```

3.17.2.4 fOledCharUpdate

```
int fOledCharUpdate
```

3.17.2.5 mskOledCur

```
BYTE mskOledCur
```

3.17.2.6 pbOledCur

```
BYTE* pbOledCur
```

3.17.2.7 pbOledFontCur

```
BYTE* pbOledFontCur
```

3.17.2.8 pbOledFontExt

```
BYTE* pbOledFontExt
```

3.17.2.9 pbOledFontUser

```
BYTE* pbOledFontUser
```

3.17.2.10 rgbOledBmp

```
BYTE rgbOledBmp[]
```

3.17.2.11 rgbOledFontUser

```
BYTE rgbOledFontUser[cbOledFontUser]
```

3.17.2.12 xchOledCur

```
int xchOledCur
```

3.17.2.13 xchOledMax

```
int xchOledMax
```

3.17.2.14 xcoOledCur

```
int xcoOledCur
```

3.17.2.15 ychOledCur

```
int ychOledCur
```

3.17.2.16 ychOledMax

```
int ychOledMax
```

3.17.2.17 ycoOledCur

```
int ycoOledCur
```

3.18 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/OledChar.h File Reference

Functions

- void OledSetCursor (int xch, int ych)
- void OledGetCursor (int ∗pxcy, int ∗pych)
- int OledDefUserChar (char ch, uint8_t ∗pbDef)
- void OledSetCharUpdate (int f)
- int OledGetCharUpdate ()
- void OledPutChar (char ch)
- void OledPutString (char ∗sz)

3.18.1 Function Documentation

3.18.1.1 OledDefUserChar()

```
int OledDefUserChar (
            char ch,
            uint8_t * pbDef )
```

3.18.1.2 OledGetCharUpdate()

```
int OledGetCharUpdate ( )
```

3.18.1.3 OledGetCursor()

```
void OledGetCursor (
            int * pxcy,
            int * pych )
```

3.18.1.4 OledPutChar()

```
void OledPutChar (
            char ch )
```

3.18.1.5 OledPutString()

```
void OledPutString (
            char * sz )
```

3.18.1.6 OledSetCharUpdate()

```
void OledSetCharUpdate (
            int f )
```

3.18.1.7 OledSetCursor()

```
void OledSetCursor (
            int xch,
            int ych )
```

3.19 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/OledGrph.c File Reference

```
#include <stdint.h>
#include "OLED.h"
```

Functions

- void OledMoveDown ()
- void OledMoveUp ()
- void OledMoveRight ()
- void OledMoveLeft ()
- BYTE OledRopSet (BYTE bPix, BYTE bDsp, BYTE mskPix)
- BYTE OledRopOr (BYTE bPix, BYTE bDsp, BYTE mskPix)
- BYTE OledRopAnd (BYTE bPix, BYTE bDsp, BYTE mskPix)
- BYTE OledRopXor (BYTE bPix, BYTE bDsp, BYTE mskPix)
- int OledClampXco (int xco)
- int OledClampYco (int yco)
- void OledMoveTo (int xco, int yco)
- void OledGetPos (int *pxco, int *pyco)
- void OledSetDrawColor (BYTE clr)
- BYTE * OledGetStdPattern (int ipat)
- void OledSetFillPattern (BYTE *pbPat)
- void OledSetDrawMode (int mod)
- int OledGetDrawMode ()
- void OledDrawPixel ()
- BYTE OledGetPixel ()
- void OledLineTo (int xco, int yco)
- void OledDrawRect (int xco, int yco)
- void OledFillRect (int xco, int yco)
- void OledGetBmp (int dxco, int dyco, BYTE *pbBits)
- void OledPutBmp (int dxco, int dyco, BYTE *pbBits)
- void OledDrawChar (char ch)
- void OledDrawString (char *sz)

Variables

- int xcoOledCur
- int ycoOledCur
- BYTE * pbOledCur
- BYTE rgbOledBmp [ ]
- BYTE rgbFillPat [ ]
- int bnOledCur
- BYTE clrOledCur
- BYTE * pbOledPatCur
- BYTE * pbOledFontUser
- BYTE * pbOledFontCur
- int dxcoOledFontCur
- int dycoOledFontCur
- BYTE(* pfnDoRop)(BYTE bPix, BYTE bDsp, BYTE mskPix)
- int modOledCur

3.19.1 Function Documentation

3.19.1.1 OledClampXco()

```
int OledClampXco (
            int xco )
```

3.19.1.2 OledClampYco()

```
int OledClampYco (
            int yco )
```

3.19.1.3 OledDrawChar()

```
void OledDrawChar (
            char ch )
```

3.19.1.4 OledDrawPixel()

```
void OledDrawPixel ( )
```

3.19.1.5 OledDrawRect()

```
void OledDrawRect (
            int xco,
            int yco )
```

3.19.1.6 OledDrawString()

```
void OledDrawString (
            char * sz )
```

3.19.1.7 OledFillRect()

```
void OledFillRect (
            int xco,
            int yco )
```

3.19.1.8 OledGetBmp()

```
void OledGetBmp (
            int dxco,
            int dyco,
            BYTE * pbBits )
```

3.19.1.9 OledGetDrawMode()

```
int OledGetDrawMode ( )
```

3.19.1.10 OledGetPixel()

```
BYTE OledGetPixel ( )
```

3.19.1.11 OledGetPos()

```
void OledGetPos (
            int * pxco,
            int * pyco )
```

3.19.1.12 OledGetStdPattern()

```
BYTE* OledGetStdPattern (
            int ipat )
```

3.19.1.13 OledLineTo()

```
void OledLineTo (
            int xco,
            int yco )
```

3.19.1.14 OledMoveDown()

```
void OledMoveDown ( )
```

3.19.1.15 OledMoveLeft()

```
void OledMoveLeft ( )
```

3.19.1.16 OledMoveRight()

```
void OledMoveRight ( )
```

3.19.1.17 OledMoveTo()

```
void OledMoveTo (
            int xco,
            int yco )
```

3.19.1.18 OledMoveUp()

```
void OledMoveUp ( )
```

3.19.1.19 OledPutBmp()

```
void OledPutBmp (
            int dxco,
            int dyco,
            BYTE * pbBits )
```

3.19.1.20 OledRopAnd()

```
BYTE OledRopAnd (
            BYTE bPix,
            BYTE bDsp,
            BYTE mskPix )
```

3.19.1.21 OledRopOr()

```
BYTE OledRopOr (
            BYTE bPix,
            BYTE bDsp,
            BYTE mskPix )
```

3.19.1.22 OledRopSet()

```
BYTE OledRopSet (
            BYTE bPix,
            BYTE bDsp,
            BYTE mskPix )
```

3.19.1.23 OledRopXor()

```
BYTE OledRopXor (
            BYTE bPix,
            BYTE bDsp,
            BYTE mskPix )
```

3.19.1.24 OledSetDrawColor()

```
void OledSetDrawColor (
            BYTE clr )
```

3.19.1.25 OledSetDrawMode()

```
void OledSetDrawMode (
            int mod )
```

3.19.1.26 OledSetFillPattern()

```
void OledSetFillPattern (
            BYTE * pbPat )
```

3.19.2 Variable Documentation

3.19.2.1 bnOledCur

```
int bnOledCur
```

3.19.2.2 clrOledCur

```
BYTE clrOledCur
```

3.19.2.3 dxcoOledFontCur

```
int dxcoOledFontCur
```

3.19.2.4 dycoOledFontCur

```
int dycoOledFontCur
```

3.19.2.5 modOledCur

```
int modOledCur
```

3.19.2.6 pbOledCur

```
BYTE* pbOledCur
```

3.19.2.7 pbOledFontCur

```
BYTE* pbOledFontCur
```

3.19.2.8 pbOledFontUser

```
BYTE* pbOledFontUser
```

3.19.2.9 pbOledPatCur

```
BYTE* pbOledPatCur
```

3.19.2.10 pfnDoRop

```
BYTE(* pfnDoRop) (BYTE bPix, BYTE bDsp, BYTE mskPix)
```

3.19.2.11 rgbFillPat

```
BYTE rgbFillPat[]
```

3.19.2.12 rgbOledBmp

```
BYTE rgbOledBmp[]
```

3.19.2.13 xcoOledCur

```
int xcoOledCur
```

3.19.2.14 ycoOledCur

```
int ycoOledCur
```

3.20 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/OledGrph.h File Reference

Functions

- void OledSetDrawColor (uint8_t clr)
- void OledSetDrawMode (int mod)
- int OledGetDrawMode ()
- uint8_t * OledGetStdPattern (int ipat)
- void OledSetFillPattern (uint8_t *pbPat)
- void OledMoveTo (int xco, int yco)
- void OledGetPos (int *pxco, int *pyco)
- void OledDrawPixel ()
- uint8_t OledGetPixel ()
- void OledLineTo (int xco, int yco)
- void OledDrawRect (int xco, int yco)
- void OledFillRect (int xco, int yco)
- void OledGetBmp (int dxco, int dyco, uint8_t *pbBmp)
- void OledPutBmp (int dxco, int dyco, uint8_t *pbBmp)
- void OledDrawChar (char ch)
- void OledDrawString (char *sz)

3.20.1 Function Documentation

3.20.1.1 OledDrawChar()

```
void OledDrawChar (
            char ch )
```

3.20.1.2 OledDrawPixel()

```
void OledDrawPixel ( )
```

3.20.1.3 OledDrawRect()

```
void OledDrawRect (
            int xco,
            int yco )
```

3.20.1.4 OledDrawString()

```
void OledDrawString (
            char * sz )
```

3.20.1.5 OledFillRect()

```
void OledFillRect (
            int xco,
            int yco )
```

3.20.1.6 OledGetBmp()

```
void OledGetBmp (
            int dxco,
            int dyco,
            uint8_t * pbBmp )
```

3.20.1.7 OledGetDrawMode()

```
int OledGetDrawMode ( )
```

3.20.1.8 OledGetPixel()

```
uint8_t OledGetPixel ( )
```

3.20.1.9 OledGetPos()

```
void OledGetPos (
            int * pxco,
            int * pyco )
```

3.20.1.10 OledGetStdPattern()

```
uint8_t* OledGetStdPattern (
            int ipat )
```

3.20.1.11 OledLineTo()

```
void OledLineTo (
            int xco,
            int yco )
```

3.20.1.12 OledMoveTo()

```
void OledMoveTo (
            int xco,
            int yco )
```

3.20.1.13 OledPutBmp()

```
void OledPutBmp (
            int dxco,
            int dyco,
            uint8_t * pbBmp )
```

3.20.1.14 OledSetDrawColor()

```
void OledSetDrawColor (
            uint8_t clr )
```

3.20.1.15 OledSetDrawMode()

```
void OledSetDrawMode (
            int mod )
```

3.20.1.16 OledSetFillPattern()

```
void OledSetFillPattern (
            uint8_t * pbPat )
```

3.21 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/ParTest.c File Reference

```
#include "FreeRTOS.h"
#include "partest.h"
```

Macros

- #define ptOUTPUT 0
- #define ptALL_OFF 0
- #define ptNUM_LEDS 3

Functions

- void vParTestInitialise (void)
- void vParTestSetLED (unsigned portBASE_TYPE uxLED, signed portBASE_TYPE xValue)
- void vParTestToggleLED (unsigned portBASE_TYPE uxLED)

3.21.1 Macro Definition Documentation

3.21.1.1 ptALL_OFF

```
#define ptALL_OFF 0
```

3.21.1.2 ptNUM_LEDS

```
#define ptNUM_LEDS 3
```

3.21.1.3 ptOUTPUT

```
#define ptOUTPUT 0
```

3.21.2 Function Documentation

3.21.2.1 vParTestInitialise()

```
void vParTestInitialise (
             void  )
```

3.21.2.2 vParTestSetLED()

```
void vParTestSetLED (
             unsigned portBASE_TYPE uxLED,
             signed portBASE_TYPE xValue )
```

3.21.2.3 vParTestToggleLED()

```
void vParTestToggleLED (
             unsigned portBASE_TYPE uxLED )
```

3.22 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/port.c File Reference

```
#include <xc.h>
#include <string.h>
#include "FreeRTOS.h"
#include "task.h"
```

Macros

- #define portTIMER_PRESCALE 8
- #define portPRESCALE_BITS 1
- #define portIE_BIT (0x00000001)
- #define portEXL_BIT (0x00000002)
- #define portMX_BIT (0x01000000) /* Allow access to DSP instructions. */
- #define portCU1_BIT (0x20000000) /* enable CP1 for parts with hardware. */
- #define portFR_BIT (0x04000000) /* Enable 64 bit floating point registers. */
- #define portCORE_SW_0 (0x00000100)
- #define portCORE_SW_1 (0x00000200)
- #define portINITIAL_SR (portIE_BIT | portEXL_BIT | portMX_BIT)
- #define portINITIAL_FPSCR (0x1000000) /* High perf on denormal ops */
- #define configTICK_INTERRUPT_VECTOR _TIMER_1_VECTOR
- #define configCLEAR_TICK_TIMER_INTERRUPT() IFS0CLR = _IFS0_T1IF_MASK
- #define portTASK_RETURN_ADDRESS prvTaskExitError
- #define portCHECK_ISR_STACK()

Functions

- __attribute__ ((aligned(8)))
- StackType_t * pxPortInitialiseStack (StackType_t *pxTopOfStack, TaskFunction_t pxCode, void *pv↩ Parameters)
- __attribute__ ((weak))
- void vPortEndScheduler (void)
- BaseType_t xPortStartScheduler (void)
- void vPortIncrementTick (void)
- UBaseType_t uxPortSetInterruptMaskFromISR (void)
- void vPortClearInterruptMaskFromISR (UBaseType_t uxSavedStatusRegister)

Variables

- volatile UBaseType_t uxInterruptNesting = 0x01
- UBaseType_t uxSavedTaskStackPointer = 0
- const StackType_t *const xISRStackTop = &(xISRStack[(configISR_STACK_SIZE & ~portBYTE_ALIG↩ NMENT_MASK) - 8])

3.22.1 Macro Definition Documentation

3.22.1.1 configCLEAR_TICK_TIMER_INTERRUPT

```
#define configCLEAR_TICK_TIMER_INTERRUPT( ) IFS0CLR = _IFS0_T1IF_MASK
```

3.22.1.2 configTICK_INTERRUPT_VECTOR

```
#define configTICK_INTERRUPT_VECTOR _TIMER_1_VECTOR
```

3.22.1.3 portCHECK_ISR_STACK

```
#define portCHECK_ISR_STACK( )
```

3.22.1.4 portCORE_SW_0

```
#define portCORE_SW_0 ( 0x00000100 )
```

3.22.1.5 portCORE_SW_1

```
#define portCORE_SW_1 ( 0x00000200 )
```

3.22.1.6 portCU1_BIT

```
#define portCU1_BIT ( 0x20000000 ) /* enable CP1 for parts with hardware.  */
```

3.22.1.7 portEXL_BIT

```
#define portEXL_BIT ( 0x00000002 )
```

3.22.1.8 portFR_BIT

```
#define portFR_BIT ( 0x04000000 ) /* Enable 64 bit floating point registers.  */
```

3.22.1.9 portIE_BIT

```
#define portIE_BIT ( 0x00000001 )
```

3.22.1.10 portINITIAL_FPSCR

```
#define portINITIAL_FPSCR (0x1000000) /* High perf on denormal ops */
```

3.22.1.11 portINITIAL_SR

```
#define portINITIAL_SR ( portIE_BIT | portEXL_BIT | portMX_BIT )
```

3.22.1.12 portMX_BIT

```
#define portMX_BIT ( 0x01000000 ) /* Allow access to DSP instructions.  */
```

3.22.1.13 portPRESCALE_BITS

```
#define portPRESCALE_BITS 1
```

3.22.1.14 portTASK_RETURN_ADDRESS

```
#define portTASK_RETURN_ADDRESS prvTaskExitError
```

3.22.1.15 portTIMER_PRESCALE

```
#define portTIMER_PRESCALE 8
```

3.22.2 Function Documentation

3.22.2.1 __attribute__() [1/2]

```
__attribute__ (
             (aligned(8))  )
```

3.22.2.2 __attribute__() [2/2]

```
__attribute__ (
             (weak)  )
```

3.22.2.3 pxPortInitialiseStack()

```
StackType_t* pxPortInitialiseStack (
             StackType_t * pxTopOfStack,
             TaskFunction_t pxCode,
             void * pvParameters )
```

3.22.2.4 uxPortSetInterruptMaskFromISR()

```
UBaseType_t uxPortSetInterruptMaskFromISR (
             void  )
```

3.22.2.5 vPortClearInterruptMaskFromISR()

```
void vPortClearInterruptMaskFromISR (
             UBaseType_t uxSavedStatusRegister )
```

3.22.2.6 vPortEndScheduler()

```
void vPortEndScheduler (
             void  )
```

3.22.2.7 vPortIncrementTick()

```
void vPortIncrementTick (
             void  )
```

3.22.2.8 xPortStartScheduler()

```
BaseType_t xPortStartScheduler (
             void  )
```

3.22.3 Variable Documentation

3.22.3.1 uxInterruptNesting

```
volatile UBaseType_t uxInterruptNesting = 0x01
```

3.22.3.2 uxSavedTaskStackPointer

```
UBaseType_t uxSavedTaskStackPointer = 0
```

3.22.3.3 xISRStackTop

```
const StackType_t* const xISRStackTop = &( xISRStack[ ( configISR_STACK_SIZE & ~portBYTE_ALI↩
GNMENT_MASK ) - 8 ] )
```

3.23 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/portmacro.h File Reference

```
#include <xc.h>
```

Macros

- #define portCHAR char
- #define portFLOAT float
- #define portDOUBLE double
- #define portLONG long
- #define portSHORT short
- #define portSTACK_TYPE uint32_t
- #define portBASE_TYPE long
- #define portMAX_DELAY (TickType_t) 0xffffffffUL
- #define portTICK_TYPE_IS_ATOMIC 1
- #define portBYTE_ALIGNMENT 8
- #define portSTACK_GROWTH -1
- #define portTICK_PERIOD_MS ((TickType_t) 1000 / configTICK_RATE_HZ)
- #define portIPL_SHIFT (10UL)
- #define portALL_IPL_BITS (0x7FUL << portIPL_SHIFT)
- #define portSW0_BIT (0x01 << 8)
- #define portDISABLE_INTERRUPTS()
- #define portENABLE_INTERRUPTS()
- #define portCRITICAL_NESTING_IN_TCB 1
- #define portENTER_CRITICAL() vTaskEnterCritical()
- #define portEXIT_CRITICAL() vTaskExitCritical()
- #define portSET_INTERRUPT_MASK_FROM_ISR() uxPortSetInterruptMaskFromISR()
- #define portCLEAR_INTERRUPT_MASK_FROM_ISR(uxSavedStatusRegister) vPortClearInterruptMask↩FromISR(uxSavedStatusRegister)
- #define configUSE_PORT_OPTIMISED_TASK_SELECTION 1
- #define portRECORD_READY_PRIORITY(uxPriority, uxReadyPriorities) (uxReadyPriorities) |= (1UL << (uxPriority))
- #define portRESET_READY_PRIORITY(uxPriority, uxReadyPriorities) (uxReadyPriorities) &= ~(1UL << (uxPriority))
- #define portGET_HIGHEST_PRIORITY(uxTopPriority, uxReadyPriorities) uxTopPriority = (31UL - _clz((uxReadyPriorities)))
- #define portYIELD()
- #define portASSERT_IF_IN_ISR() configASSERT(uxInterruptNesting == 0)
- #define portNOP() __asm volatile ("nop")
- #define portTASK_FUNCTION_PROTO(vFunction, pvParameters) void vFunction(void *pvParameters) ↩__attribute__((noreturn))
- #define portTASK_FUNCTION(vFunction, pvParameters) void vFunction(void *pvParameters)
- #define portEND_SWITCHING_ISR(xSwitchRequired)

Typedefs

- typedef portSTACK_TYPE StackType_t
- typedef long BaseType_t
- typedef unsigned long UBaseType_t
- typedef uint32_t TickType_t

Functions

- void vTaskEnterCritical (void)
- void vTaskExitCritical (void)
- UBaseType_t uxPortSetInterruptMaskFromISR ()
- void vPortClearInterruptMaskFromISR (UBaseType_t)

Variables

- volatile UBaseType_t uxInterruptNesting

3.23.1 Macro Definition Documentation

3.23.1.1 configUSE_PORT_OPTIMISED_TASK_SELECTION

```
#define configUSE_PORT_OPTIMISED_TASK_SELECTION 1
```

3.23.1.2 portALL_IPL_BITS

```
#define portALL_IPL_BITS ( 0x7FUL << portIPL_SHIFT )
```

3.23.1.3 portASSERT_IF_IN_ISR

```
#define portASSERT_IF_IN_ISR( ) configASSERT( uxInterruptNesting == 0 )
```

3.23.1.4 portBASE_TYPE

```
#define portBASE_TYPE long
```

3.23.1.5 portBYTE_ALIGNMENT

```
#define portBYTE_ALIGNMENT 8
```

3.23.1.6 portCHAR

```
#define portCHAR char
```

3.23.1.7 portCLEAR_INTERRUPT_MASK_FROM_ISR

```
#define portCLEAR_INTERRUPT_MASK_FROM_ISR(
              uxSavedStatusRegister ) vPortClearInterruptMaskFromISR( uxSavedStatusRegister )
```

3.23.1.8 portCRITICAL_NESTING_IN_TCB

```
#define portCRITICAL_NESTING_IN_TCB 1
```

3.23.1.9 portDISABLE_INTERRUPTS

```
#define portDISABLE_INTERRUPTS( )
```

Value:

```
{                                                                       \
    uint32_t ulStatus;                                                  \
                                                                        \
        /* Mask interrupts at and below the kernel interrupt priority. */   \
        ulStatus = _CP0_GET_STATUS();                                   \
        ulStatus &= ~portALL_IPL_BITS;                                  \
        _CP0_SET_STATUS( ( ulStatus | ( configMAX_SYSCALL_INTERRUPT_PRIORITY
       << portIPL_SHIFT ) ) ); \
    }
```

3.23.1.10 portDOUBLE

```
#define portDOUBLE double
```

3.23.1.11 portENABLE_INTERRUPTS

```
#define portENABLE_INTERRUPTS( )
```

Value:

```
{                                                                   \
uint32_t ulStatus;                                                  \
                                                                    \
    /* Unmask all interrupts. */                                    \
    ulStatus = _CP0_GET_STATUS();                                   \
    ulStatus &= ~portALL_IPL_BITS;                                  \
    _CP0_SET_STATUS( ulStatus );                                    \
}
```

3.23.1.12 portEND_SWITCHING_ISR

```
#define portEND_SWITCHING_ISR(
              xSwitchRequired )
```

Value:

```
if( xSwitchRequired )   \
                                                    {                       \
                                                        portYIELD();        \
                                                    }
```

3.23.1.13 portENTER_CRITICAL

```
#define portENTER_CRITICAL( ) vTaskEnterCritical()
```

3.23.1.14 portEXIT_CRITICAL

```
#define portEXIT_CRITICAL( ) vTaskExitCritical()
```

3.23.1.15 portFLOAT

```
#define portFLOAT float
```

3.23.1.16 portGET_HIGHEST_PRIORITY

```
#define portGET_HIGHEST_PRIORITY(
              uxTopPriority,
              uxReadyPriorities ) uxTopPriority = ( 31UL - _clz( ( uxReadyPriorities ) ) )
```

3.23.1.17 portIPL_SHIFT

```
#define portIPL_SHIFT ( 10UL )
```

3.23.1.18 portLONG

```
#define portLONG long
```

3.23.1.19 portMAX_DELAY

```
#define portMAX_DELAY ( TickType_t ) 0xffffffffUL
```

3.23.1.20 portNOP

```
#define portNOP( ) __asm volatile ( "nop" )
```

3.23.1.21 portRECORD_READY_PRIORITY

```
#define portRECORD_READY_PRIORITY(
              uxPriority,
              uxReadyPriorities ) ( uxReadyPriorities ) |= ( 1UL << ( uxPriority ) )
```

3.23.1.22 portRESET_READY_PRIORITY

```
#define portRESET_READY_PRIORITY(
              uxPriority,
              uxReadyPriorities ) ( uxReadyPriorities ) &= ~( 1UL << ( uxPriority ) )
```

3.23.1.23 portSET_INTERRUPT_MASK_FROM_ISR

```
#define portSET_INTERRUPT_MASK_FROM_ISR( ) uxPortSetInterruptMaskFromISR()
```

3.23.1.24 portSHORT

```
#define portSHORT short
```

3.23.1.25 portSTACK_GROWTH

```
#define portSTACK_GROWTH -1
```

3.23.1.26 portSTACK_TYPE

```
#define portSTACK_TYPE uint32_t
```

3.23.1.27 portSW0_BIT

```
#define portSW0_BIT ( 0x01 << 8 )
```

3.23.1.28 portTASK_FUNCTION

```
#define portTASK_FUNCTION(
              vFunction,
              pvParameters ) void vFunction( void *pvParameters )
```

3.23.1.29 portTASK_FUNCTION_PROTO

```
#define portTASK_FUNCTION_PROTO(
              vFunction,
              pvParameters ) void vFunction( void *pvParameters ) __attribute__((noreturn))
```

3.23.1.30 portTICK_PERIOD_MS

```
#define portTICK_PERIOD_MS ( ( TickType_t ) 1000 / configTICK_RATE_HZ )
```

3.23.1.31 portTICK_TYPE_IS_ATOMIC

```
#define portTICK_TYPE_IS_ATOMIC 1
```

3.23.1.32 portYIELD

```
#define portYIELD( )
```

Value:

```
{                                                   \
uint32_t ulCause;                                   \
                                                    \
    /* Trigger software interrupt. */               \
    ulCause = _CP0_GET_CAUSE();                     \
    ulCause |= portSW0_BIT;                          \
    _CP0_SET_CAUSE( ulCause );                      \
}
```

3.23.2 Typedef Documentation

3.23.2.1 BaseType_t

```
typedef long BaseType_t
```

3.23.2.2 StackType_t

```
typedef portSTACK_TYPE StackType_t
```

3.23.2.3 TickType_t

```
typedef uint32_t TickType_t
```

3.23.2.4 UBaseType_t

```
typedef unsigned long UBaseType_t
```

3.23.3 Function Documentation

3.23.3.1 uxPortSetInterruptMaskFromISR()

```
UBaseType_t uxPortSetInterruptMaskFromISR ( )
```

3.23.3.2 vPortClearInterruptMaskFromISR()

```
void vPortClearInterruptMaskFromISR (
            UBaseType_t  )
```

3.23.3.3 vTaskEnterCritical()

```
void vTaskEnterCritical (
            void  )
```

3.23.3.4 vTaskExitCritical()

```
void vTaskExitCritical (
            void  )
```

3.23.4 Variable Documentation

3.23.4.1 uxInterruptNesting

```
volatile UBaseType_t uxInterruptNesting
```

3.24 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/README.md File Reference

3.25 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/SPI.c File Reference

```
#include <stdint.h>
#include "OLED.h"
```

Functions

- void OledPutBuffer (int cb, BYTE *rgbTx)
- BYTE Spi2PutByte (BYTE bVal)

3.25.1 Function Documentation

3.25.1.1 OledPutBuffer()

```
void OledPutBuffer (
            int cb,
            BYTE * rgbTx )
```

Function:

Summary:

Description:

Remarks:

3.25.1.2 Spi2PutByte()

```
BYTE Spi2PutByte (
            BYTE bVal )
```

3.26 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/timertest.c File Reference

```
#include "FreeRTOS.h"
```

Macros

- #define timerMAX_COUNT 0xffff

Functions

- void __attribute__ ((interrupt(IPL0AUTO), vector(_TIMER_2_VECTOR)))
- void vT2InterruptHandler (void)

3.26.1 Macro Definition Documentation

3.26.1.1 timerMAX_COUNT

```
#define timerMAX_COUNT 0xffff
```

3.26.2 Function Documentation

3.26.2.1 __attribute__()

```
void __attribute__ (
             (interrupt(IPL0AUTO), vector(_TIMER_2_VECTOR))  )
```

3.26.2.2 vT2InterruptHandler()

```
void vT2InterruptHandler (
             void  )
```

3.27 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/timertest.h File Reference

Functions

- void vSetupTimerTest (unsigned short usFrequencyHz)

3.27.1 Function Documentation

3.27.1.1 vSetupTimerTest()

```
void vSetupTimerTest (
            unsigned short usFrequencyHz )
```

3.28 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/UART.c File Reference

```
#include "FreeRTOS.h"
#include "task.h"
#include "semphr.h"
#include "queue.h"
#include "UART.h"
#include <sys/attribs.h>
#include "user.h"
```

Functions

- void UART4_init (void)
- void UART4_putc (char c)
- void UART4_puts (char *s)

3.28.1 Function Documentation

3.28.1.1 UART4_init()

```
void UART4_init (
            void  )
```

Function prototype:

Summary:

Description:

Precondition:

Parameters:

Returns:

Example:

Remarks:

3.28.1.2 UART4_putc()

```
void UART4_putc (
            char c )
```

3.28.1.3 UART4_puts()

```
void UART4_puts (
            char * s )
```

3.29 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/UART.h File Reference

```
#include <xc.h>
#include "FreeRTOS.h"
#include "task.h"
#include "semphr.h"
#include "queue.h"
```

Functions

- void UART4_init (void)
- void UART4_putc (char c)
- void UART4_puts (char *s)

3.29.1 Function Documentation

3.29.1.1 UART4_init()

```
void UART4_init (
            void  )
```

Function prototype:

Summary:

Description:

Precondition:

Parameters:

Returns:

Example:

Remarks:

3.29.1.2 UART4_putc()

```
void UART4_putc (
            char c )
```

3.29.1.3 UART4_puts()

```
void UART4_puts (
            char * s )
```

3.30 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/user.c File Reference

```
#include <xc.h>
#include <stdint.h>
#include <sys/attribs.h>
#include "FreeRTOS.h"
#include "task.h"
#include "semphr.h"
#include "user.h"
#include "OLED.h"
#include "OledChar.h"
#include "OledGrph.h"
#include "UART.h"
```

Functions

- void InitGPIO (void)
- void InitBIOSGPIO (void)
- void InitApp (void)
- void Task1 (void *pvParameters)
- void Task2 (void *pvParameters)
- void DelayMs (int t)

3.30.1 Function Documentation

3.30.1.1 DelayMs()

```
void DelayMs (
            int t )
```

3.30.1.2 InitApp()

```
void InitApp (
             void  )
```

3.30.1.3 InitBIOSGPIO()

```
void InitBIOSGPIO (
             void  )
```

3.30.1.4 InitGPIO()

```
void InitGPIO (
             void  )
```

3.30.1.5 Task1()

```
void Task1 (
             void * pvParameters )
```

3.30.1.6 Task2()

```
void Task2 (
             void * pvParameters )
```

3.31 D:/GIT/TheConnectedMCU_Labs/bkarachok/Lab6_RTOS_OLED/user.h File Reference

```
#include "FreeRTOS.h"
#include "semphr.h"
```

Macros

- #define LD1_PORT_BIT LATGbits.LATG6
- #define LD2_PORT_BIT LATDbits.LATD4
- #define LD3_PORT_BIT LATBbits.LATB11
- #define LD4_PORT_BIT LATGbits.LATG15
- #define BIOS_LD1_PORT_BIT LATEbits.LATE0
- #define BIOS_LD2_PORT_BIT LATEbits.LATE1
- #define BIOS_LD3_PORT_BIT LATEbits.LATE2
- #define BIOS_LD4_PORT_BIT LATEbits.LATE3
- #define BIOS_LD5_PORT_BIT LATEbits.LATE4
- #define BIOS_LD6_PORT_BIT LATEbits.LATE5
- #define BIOS_LD7_PORT_BIT LATEbits.LATE6
- #define BIOS_LD8_PORT_BIT LATEbits.LATE7
- #define SW1 PORTEbits.RE8
- #define SW2 PORTEbits.RE9
- #define BTN1 PORTAbits.RA3
- #define BTN2 PORTDbits.RD5
- #define BTN3 PORTFbits.RF1
- #define BTN4 PORTAbits.RA2

Functions

- void InitApp (void)
- void Task1 (void ∗pvParameters)
- void Task2 (void ∗pvParameters)
- void DelayMs (int t)
- void ClockTask (void ∗pvParameters)

Variables

- SemaphoreHandle_t xSemTrigger

3.31.1 Macro Definition Documentation

3.31.1.1 BIOS_LD1_PORT_BIT

```
#define BIOS_LD1_PORT_BIT LATEbits.LATE0
```

3.31.1.2 BIOS_LD2_PORT_BIT

```
#define BIOS_LD2_PORT_BIT LATEbits.LATE1
```

3.31.1.3 BIOS_LD3_PORT_BIT

```
#define BIOS_LD3_PORT_BIT LATEbits.LATE2
```

3.31.1.4 BIOS_LD4_PORT_BIT

```
#define BIOS_LD4_PORT_BIT LATEbits.LATE3
```

3.31.1.5 BIOS_LD5_PORT_BIT

```
#define BIOS_LD5_PORT_BIT LATEbits.LATE4
```

3.31.1.6 BIOS_LD6_PORT_BIT

```
#define BIOS_LD6_PORT_BIT LATEbits.LATE5
```

3.31.1.7 BIOS_LD7_PORT_BIT

```
#define BIOS_LD7_PORT_BIT LATEbits.LATE6
```

3.31.1.8 BIOS_LD8_PORT_BIT

```
#define BIOS_LD8_PORT_BIT LATEbits.LATE7
```

3.31.1.9 BTN1

```
#define BTN1 PORTAbits.RA3
```

3.31.1.10 BTN2

```
#define BTN2 PORTDbits.RD5
```

3.31.1.11 BTN3

```
#define BTN3 PORTFbits.RF1
```

3.31.1.12 BTN4

```
#define BTN4 PORTAbits.RA2
```

3.31.1.13 LD1_PORT_BIT

```
#define LD1_PORT_BIT LATGbits.LATG6
```

3.31.1.14 LD2_PORT_BIT

```
#define LD2_PORT_BIT LATDbits.LATD4
```

3.31.1.15 LD3_PORT_BIT

```
#define LD3_PORT_BIT LATBbits.LATB11
```

3.31.1.16 LD4_PORT_BIT

```
#define LD4_PORT_BIT LATGbits.LATG15
```

3.31.1.17 SW1

```
#define SW1 PORTEbits.RE8
```

3.31.1.18 SW2

```
#define SW2 PORTEbits.RE9
```

3.31.2 Function Documentation

3.31.2.1 ClockTask()

```
void ClockTask (
            void * pvParameters )
```

3.31.2.2 DelayMs()

```
void DelayMs (
            int t )
```

3.31.2.3 InitApp()

```
void InitApp (
            void  )
```

3.31.2.4 Task1()

```
void Task1 (
            void * pvParameters )
```

3.31.2.5 Task2()

```
void Task2 (
            void * pvParameters )
```

3.31.3 Variable Documentation

3.31.3.1 xSemTrigger

```
SemaphoreHandle_t xSemTrigger
```

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