HARMcksL: ARM HAL toolbox (yet STM32 oriented)

0.6

Generated by Doxygen 1.8.11

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1 Class Index

1.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

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2 File Index

2.1 File List

Here is a list of all files with brief descriptions:

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3 Class Documentation

3.1 GPIO_in Struct Reference

GPIO input structure.

`#include <GPIO_ex.h>`

Public Attributes

- bool in
  Input value.
- eEdge edge
  Input edge.
- bool mem
  Memo value.
- bool done
  State change done.
- uint32_t hIn
  Filter time.

- struct {
  GPIO_TypeDef * GPIOx
  HAL GPIO instance.
  uint16_t GPIO_Pin
  HAL GPIO pin.
  uint16_t filt
  Filter time (ms)
  } cfg

3.1.1 Detailed Description

GPIO input structure.

3.1.2 Member Data Documentation

3.1.2.1 struct { ... } GPIO_in::cfg

3.1.2.2 bool GPIO_in::done

State change done.

3.1.2.3 eEdge GPIO_in::edge

Input edge.

3.1.2.4 uint16_t GPIO_in::filt

Filter time (ms)

3.1.2.5 uint16_t GPIO_in::GPIO_Pin

HAL GPIO pin.

3.1.2.6 GPIO_TypeDef* GPIO_in::GPIOx

HAL GPIO instance.

3.1.2.7 uint32_t GPIO_in::hln

Filter time.

3.1.2.8 bool GPIO_in::in

Input value.

3.1.2.9 bool GPIO_in::mem

Memo value.

The documentation for this struct was generated from the following file:

- GPIO_ex.h

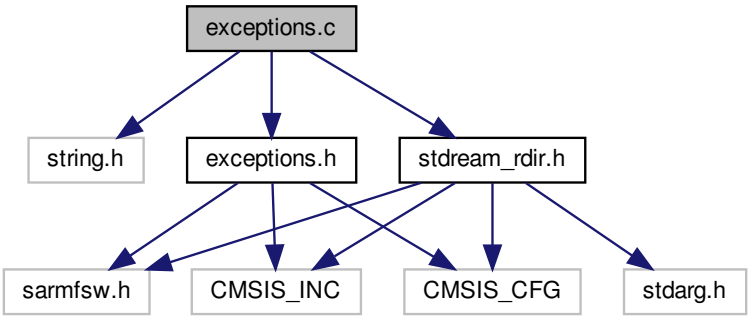
4 File Documentation

4.1 exceptions.c File Reference

Debug tool helpers functions.

```
#include <string.h>
#include "exceptions.h"
#include "stdream_rdir.h"
```

Include dependency graph for exceptions.c:



Functions

- void stackDump (uint32_t stack[ ])
- void HardFault_Handler_callback (uint32_t stack[ ])
- void Error_Handler_callback (uint32_t stack[ ])

4.1.1 Detailed Description

Debug tool helpers functions.

Author

SMFSW

Version

v0.6

Date

2017

Copyright

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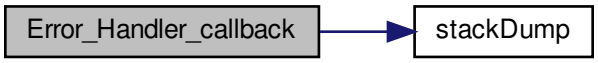
4.1.2 Function Documentation

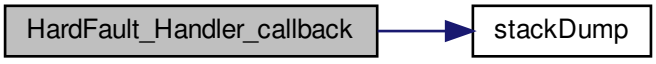
4.1.2.1 void Error_Handler_callback (uint32_t *stack[ ]*)

Here is the call graph for this function:



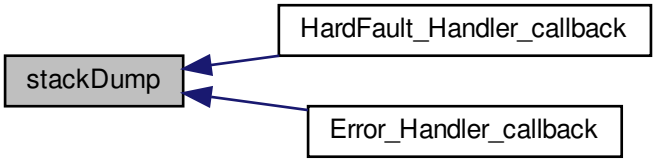
4.1.2.2 void HardFault_Handler_callback (uint32_t *stack[ ]*)

Here is the call graph for this function:



4.1.2.3 void stackDump (uint32_t *stack[ ]*)

Here is the caller graph for this function:

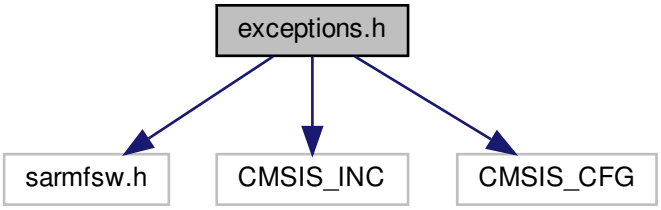


4.2 exceptions.h File Reference

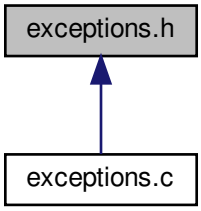
Debug tool and helpers declaration.

```
#include "sarmfsw.h"
#include <CMSIS_INC>
#include <CMSIS_CFG>
```

Include dependency graph for exceptions.h:



This graph shows which files directly or indirectly include this file:



Macros

- #define exception_Handler(e)

  *The exception_Handler should be called with corresponding exception name **e** as parameter.*
- #define dump_stack()

Functions

- void HardFault_Handler_callback (uint32_t stack[ ])
- void Error_Handler_callback (uint32_t stack[ ])

4.2.1 Detailed Description

Debug tool and helpers declaration.

Author

SMFSW

Version

v0.5

Date

2017

Copyright

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4.2.2 Macro Definition Documentation

4.2.2.1 #define dump_stack( )

Value:

```
__asm(  "tst lr, #4 \n"     \
            "ite EQ \n"         \
            "mrseq r0, MSP \n"  \
            "mrsne r0, PSP \n"  \
            "b stackDump \n")
```

4.2.2.2 #define exception_Handler(*e*)

Value:

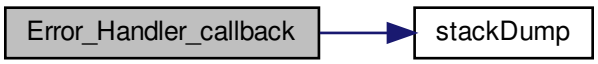
```
__asm(  "tst lr, #4 \n"                     \
            "ite EQ \n"                         \
            "mrseq r0, MSP \n"                  \
            "mrsne r0, PSP \n"                  \
            "b " #e "_Handler_callback \n")
```

The exception_Handler should be called with corresponding exception name **e** as parameter.

4.2.3 Function Documentation

4.2.3.1 void Error_Handler_callback (uint32_t *stack[ ]*)

Here is the call graph for this function:



4.2.3.2 void HardFault_Handler_callback (uint32_t *stack[ ]*)

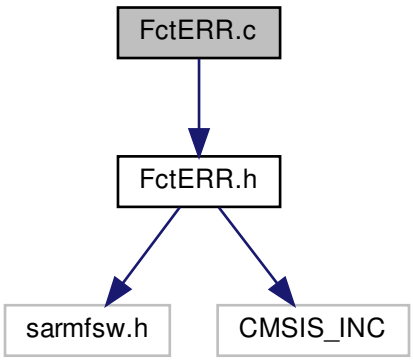
Here is the call graph for this function:

4.3 FctERR.c File Reference

errors to SMFSW FctERR code

```
#include "FctERR.h"
```

Include dependency graph for FctERR.c:



Functions

- FctERR HALERRtoFCTERR (HAL_StatusTypeDef st)
  Convert HAL_StatusTypeDef to FctERR.

4.3.1 Detailed Description

errors to SMFSW FctERR code

Author

SMFSW

Version

v0.6

Date

2017

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4.3.2 Function Documentation

4.3.2.1 FctERR HALERRtoFCTERR (HAL_StatusTypeDef *st*)

Convert HAL_StatusTypeDef to FctERR.

Parameters

in	*st*	- HAL_StatusTypeDef status

Returns

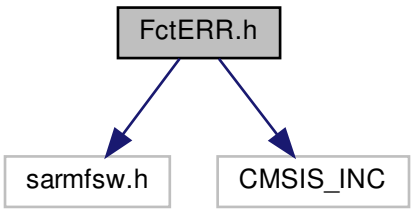
FctERR status

4.4 FctERR.h File Reference

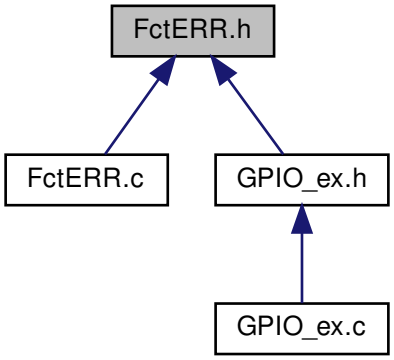
errors to SMFSW FctERR declarations

```
#include "sarmfsw.h"
#include <CMSIS_INC>
```

Include dependency graph for FctERR.h:



This graph shows which files directly or indirectly include this file:



Typedefs

- typedef enum EnumFctERR FctERR

Enumerations

- enum EnumFctERR {
  ERR_OK = 0U, ERR_SPEED = 1U, ERR_RANGE = 2U, ERR_VALUE = 3U,
  ERR_OVERFLOW = 4U, ERR_MATH = 5U, ERR_ENABLED = 6U, ERR_DISABLED = 7U,
  ERR_BUSY = 8U, ERR_NOTAVAIL = 9U, ERR_RXEMPTY = 10U, ERR_TXFULL = 11U,
  ERR_BUSOFF = 12U, ERR_OVERRUN = 13U, ERR_FRAMING = 14U, ERR_PARITY = 15U,
  ERR_NOISE = 16U, ERR_IDLE = 17U, ERR_FAULT = 18U, ERR_BREAK = 19U,
  ERR_CRC = 20U, ERR_ARBITR = 21U, ERR_PROTECT = 22U, ERR_UNDERFLOW = 23U,
  ERR_UNDERRUN = 24U, ERR_COMMON = 25U, ERR_LINSYNC = 26U, ERR_FAILED = 27U,
  ERR_QFULL = 28U, ERR_CMD = 29U, ERR_TIMEOUT = 30U, ERR_NOTIMPLEM = 31U,
  ERR_MEMORY = 32U, ERR_INSTANCE = 33U }

  Enum of high level functions return state.

Functions

- FctERR HALERRtoFCTERR (HAL_StatusTypeDef st)
  Convert HAL_StatusTypeDef to FctERR.

4.4.1 Detailed Description

errors to SMFSW FctERR declarations

Author

SMFSW

Version

v0.6

Date

2017

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4.4.2 Typedef Documentation

4.4.2.1 typedef enum EnumFctERR FctERR

4.4.3 Enumeration Type Documentation

4.4.3.1 enum EnumFctERR

Enum of high level functions return state.

Enumerator

ERR_OK OK.
ERR_SPEED This device does not work in the active speed mode.
ERR_RANGE Parameter out of range.
ERR_VALUE Parameter of incorrect value.
ERR_OVERFLOW Overflow.
ERR_MATH Overflow during evaluation.
ERR_ENABLED Device is enabled.
ERR_DISABLED Device is disabled.
ERR_BUSY Device is busy.
ERR_NOTAVAIL Requested value or method not available.
ERR_RXEMPTY No data in receiver.

ERR_TXFULL Transmitter is full.

ERR_BUSOFF Bus not available.

ERR_OVERRUN Overrun error is detected.

ERR_FRAMING Framing error is detected.

ERR_PARITY Parity error is detected.

ERR_NOISE Noise error is detected.

ERR_IDLE Idle error is detected.

ERR_FAULT Fault error is detected.

ERR_BREAK Break char is received during communication.

ERR_CRC CRC error is detected.

ERR_ARBITR A node lost arbitration. This error occurs if two nodes start transmission at the same time.

ERR_PROTECT Protection error is detected.

ERR_UNDERFLOW Underflow error is detected.

ERR_UNDERRUN Underrun error is detected.

ERR_COMMON Common error of a device.

ERR_LINSYNC LIN synchronization error is detected.

ERR_FAILED Requested functionality or process failed.

ERR_QFULL Queue is full.

ERR_CMD Command error is detected.

ERR_TIMEOUT Abort on timeout error.

ERR_NOTIMPLEM Function not implemented error.

ERR_MEMORY Memory error.

ERR_INSTANCE Instance error.

4.4.4 Function Documentation

4.4.4.1 FctERR HALERRtoFCTERR (HAL_StatusTypeDef *st*)

Convert HAL_StatusTypeDef to FctERR.

Parameters

in	*st*	- HAL_StatusTypeDef status

Returns

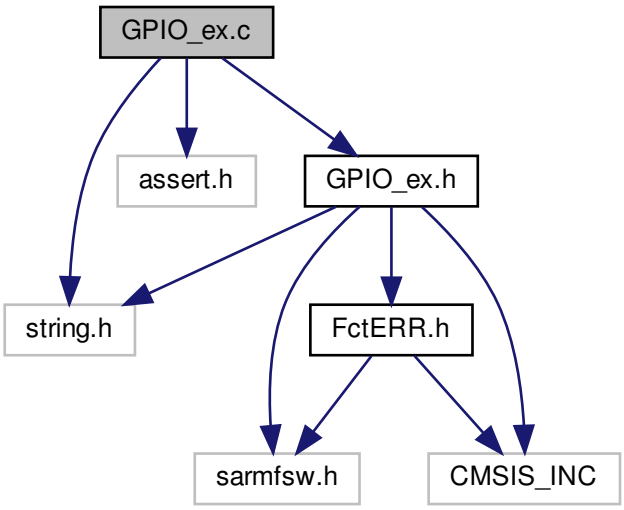
FctERR status

4.5 GPIO_ex.c File Reference

Simple extension for GPIOs.

```
#include <string.h>
#include <assert.h>
#include "GPIO_ex.h"
```

Include dependency graph for GPIO_ex.c:



Macros

- #define MAX_PINS_PORT 16

Functions

- void GPIO_in_init (GPIO_in ∗in, GPIO_TypeDef ∗GPIOx, uint16_t GPIO_Pin, uint16_t filter)
  Initialize GPIO_in instance.
- void GPIO_in_handler (GPIO_in ∗in)
  Handles GPIO_in read and treatment.
- FctERR str_GPIO_name (char ∗name, GPIO_TypeDef ∗GPIOx, uint16_t GPIO_Pin)
  Get name from Port, Pin.

4.5.1 Detailed Description

Simple extension for GPIOs.

Author

SMFSW

Version

v0.6

Date

2017

Copyright

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4.5.2 Macro Definition Documentation

4.5.2.1 #define MAX_PINS_PORT 16

4.5.3 Function Documentation

4.5.3.1 void GPIO_in_handler (GPIO_in * *in*)

Handles GPIO_in read and treatment.

Parameters

in,out	*in*	- input instance to handle

Returns

Nothing

4.5.3.2 void GPIO_in_init (GPIO_in * *in*, GPIO_TypeDef * *GPIOx*, uint16_t *GPIO_Pin*, uint16_t *filter*)

Initialize GPIO_in instance.

Parameters

in,out	*in*	- input instance to initialize
in	*GPIOx*	- port to write to
in	*GPIO_Pin*	- pin to write to
in	*filter*	- input filtering time

Returns

Nothing

4.5.3.3 FctERR str_GPIO_name (char * *name*, GPIO_TypeDef * *GPIOx*, uint16_t *GPIO_Pin*)

Get name from Port, Pin.

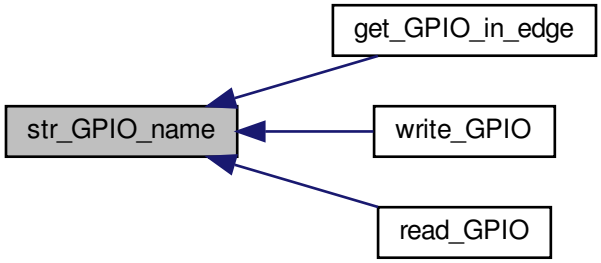
Parameters

in,out	*name*	- pointer to string for name
in	*GPIOx*	- port to write to
in	*GPIO_Pin*	- pin to write to

Returns

Error code

Here is the caller graph for this function:

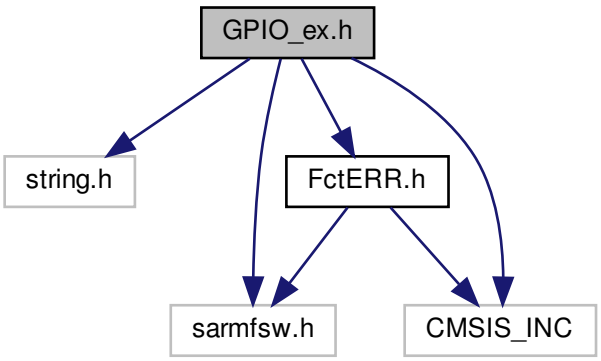


4.6 GPIO_ex.h File Reference

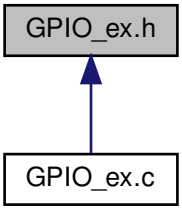
Simple extension for GPIOs.

```
#include <string.h>
#include "sarmfsw.h"
#include <CMSIS_INC>
#include "FctERR.h"
```

Include dependency graph for GPIO_ex.h:



This graph shows which files directly or indirectly include this file:



Classes

- struct GPIO_in

  GPIO input structure.

Typedefs

- typedef enum ActOut eActOut
- typedef struct GPIO_in GPIO_in

Enumerations

- enum ActOut { Reset = 0, Set, Toggle }

  Logic output possible actions enumeration.

Functions

- void GPIO_in_init (GPIO_in *in, GPIO_TypeDef *GPIOx, uint16_t GPIO_Pin, uint16_t filter)

  Initialize GPIO_in instance.
- void GPIO_in_handler (GPIO_in *in)

  Handles GPIO_in read and treatment.
- bool get_GPIO_in (GPIO_in *in)

  Get GPIO_in input value.
- bool get_GPIO_in_edge (GPIO_in *in)

  Get GPIO_in input edge.
- FctERR str_GPIO_name (char *name, GPIO_TypeDef *GPIOx, uint16_t GPIO_Pin)

  Get name from Port, Pin.
- void write_GPIO (GPIO_TypeDef *GPIOx, uint16_t GPIO_Pin, eActOut Act)

  Write GPIO.
- GPIO_PinState read_GPIO (GPIO_TypeDef *GPIOx, uint16_t GPIO_Pin)

  Read GPIO.

4.6.1 Detailed Description

Simple extension for GPIOs.

Author

SMFSW

Version

v0.6

Date

2017

Copyright

4.6.2 Typedef Documentation

4.6.2.1 typedef enum ActOut eActOut

4.6.2.2 typedef struct GPIO_in GPIO_in

4.6.3 Enumeration Type Documentation

4.6.3.1 enum ActOut

Logic output possible actions enumeration.

Enumerator

Reset Reset Output.

Set Set Output.

Toggle Toggle Output.

4.6.4 Function Documentation

4.6.4.1 bool get_GPIO_in (GPIO_in * *in*) [inline]

Get GPIO_in input value.

Parameters

in	*in*	- input instance

Returns

Input value

4.6.4.2 bool get_GPIO_in_edge (GPIO_in * *in*) [inline]

Get GPIO_in input edge.

Parameters

in	*in*	- input instance

Returns

Input edge

Here is the call graph for this function:

4.6.4.3 void GPIO_in_handler (GPIO_in * *in*)

Handles GPIO_in read and treatment.

Parameters

in,out	*in*	- input instance to handle

Returns

Nothing

4.6.4.4 void GPIO_in_init (GPIO_in * *in*, GPIO_TypeDef * *GPIOx*, uint16_t *GPIO_Pin*, uint16_t *filter*)

Initialize GPIO_in instance.

Parameters

in,out	*in*	- input instance to initialize
in	*GPIOx*	- port to write to
in	*GPIO_Pin*	- pin to write to
in	*filter*	- input filtering time

Returns

Nothing

4.6.4.5 GPIO_PinState read_GPIO (GPIO_TypeDef * *GPIOx*, uint16_t *GPIO_Pin*) [inline]

Read GPIO.

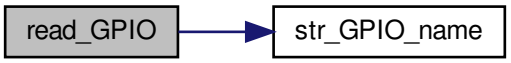
Parameters

in	*GPIOx*	- port to read from
in	*GPIO_Pin*	- pin to read from

Returns

Pin state

Here is the call graph for this function:



4.6.4.6 FctERR str_GPIO_name (char * *name*, GPIO_TypeDef * *GPIOx*, uint16_t *GPIO_Pin*)

Get name from Port, Pin.

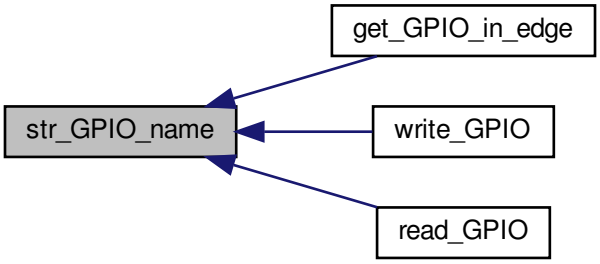
Parameters

in,out	*name*	- pointer to string for name
in	*GPIOx*	- port to write to
in	*GPIO_Pin*	- pin to write to

Returns

Error code

Here is the caller graph for this function:



4.6.4.7 void write_GPIO (GPIO_TypeDef * *GPIOx*, uint16_t *GPIO_Pin*, eActOut *Act*) [inline]

Write GPIO.

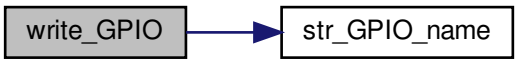
Parameters

in	*GPIOx*	- port to write to
in	*GPIO_Pin*	- pin to write to
in	*Act*	- type of write

Returns

Nothing

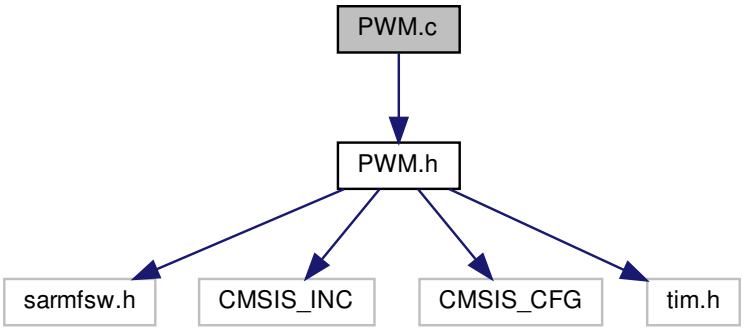
Here is the call graph for this function:



4.7 PWM.c File Reference

Simple PWM handling.

```
#include "PWM.h"
```
Include dependency graph for PWM.c:



Functions

- HAL_StatusTypeDef set_PWM_Freq (TIM_HandleTypeDef ∗pTim, uint32_t freq)
  Set TIM module PWM frequency for channel.
- HAL_StatusTypeDef set_PWM_Duty_Scaled (TIM_HandleTypeDef ∗pTim, uint32_t chan, uint16_t duty, uint16_t scale)
  Set TIM module PWM duty cycle (scaled)

4.7.1 Detailed Description

Simple PWM handling.

Author

SMFSW

Version

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Date

2017

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4.7.2 Function Documentation

4.7.2.1 HAL_StatusTypeDef set_PWM_Duty_Scaled (TIM_HandleTypeDef ∗ *pTim,* uint32_t *chan,* uint16_t *duty,* uint16_t *scale*)

Set TIM module PWM duty cycle (scaled)

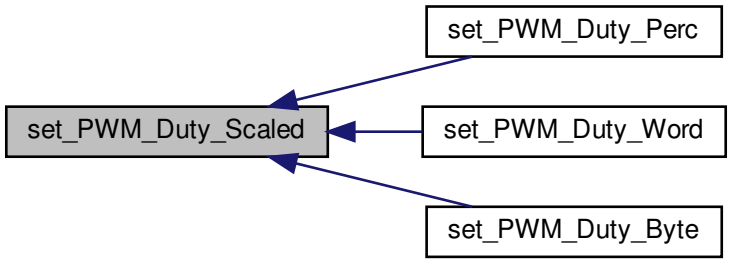
Parameters

in,out	*pTim*	- pointer to TIM instance for PWM generation
in	*chan*	- Channel to write
in	*duty*	- Scaled duty cycle value to write
in	*scale*	- Full scale value

Returns

HAL Status

Here is the caller graph for this function:



4.7.2.2 HAL_StatusTypeDef set_PWM_Freq (TIM_HandleTypeDef * *pTim*, uint32_t *freq*)

Set TIM module PWM frequency for channel.

Parameters

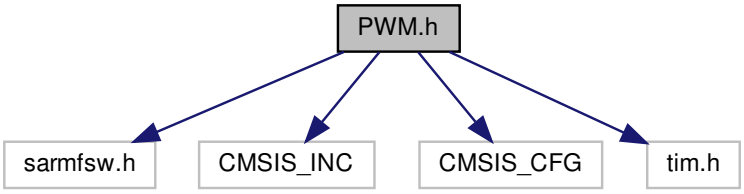
in,out	*pTim*	- pointer to TIM instance for PWM generation
in	*freq*	- Desired PWM frequency

4.8 PWM.h File Reference

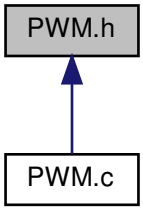
Simple PWM handling.

```
#include "sarmfsw.h"
#include <CMSIS_INC>
#include <CMSIS_CFG>
#include "tim.h"
```

Include dependency graph for PWM.h:



This graph shows which files directly or indirectly include this file:



Functions

- HAL_StatusTypeDef set_PWM_Freq (TIM_HandleTypeDef ∗pTim, uint32_t freq)

  Set TIM module PWM frequency for channel.
- HAL_StatusTypeDef set_PWM_Duty_Scaled (TIM_HandleTypeDef ∗pTim, uint32_t chan, uint16_t duty, uint16_t scale)

  Set TIM module PWM duty cycle (scaled)
- HAL_StatusTypeDef set_PWM_Duty_Perc (TIM_HandleTypeDef ∗pTim, uint32_t chan, uint16_t duty)

  Set TIM module PWM duty cycle (percents)
- HAL_StatusTypeDef set_PWM_Duty_Word (TIM_HandleTypeDef ∗pTim, uint32_t chan, uint16_t duty)

  Set TIM module PWM duty cycle (u16-bit value)
- HAL_StatusTypeDef set_PWM_Duty_Byte (TIM_HandleTypeDef ∗pTim, uint32_t chan, uint8_t duty)

  Set TIM module PWM duty cycle (u8-bit value)

4.8.1 Detailed Description

Simple PWM handling.

Author

SMFSW

Version

v0.6

Date

2017

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4.8.2 Function Documentation

4.8.2.1 HAL_StatusTypeDef set_PWM_Duty_Byte (TIM_HandleTypeDef * *pTim*, uint32_t *chan*, uint8_t *duty*) [inline]

Set TIM module PWM duty cycle (u8-bit value)

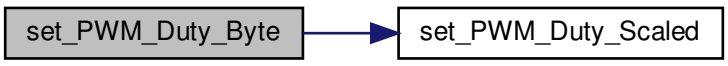
Parameters

in,out	*pTim*	- pointer to TIM instance for PWM generation
in	*chan*	- Channel to write
in	*duty*	- Scaled duty cycle value to write

Returns

HAL Status

Here is the call graph for this function:



4.8.2.2 HAL_StatusTypeDef set_PWM_Duty_Perc (TIM_HandleTypeDef * *pTim*, uint32_t *chan*, uint16_t *duty*) [inline]

Set TIM module PWM duty cycle (percents)

Parameters

in,out	*pTim*	- pointer to TIM instance for PWM generation
in	*chan*	- Channel to write
in	*duty*	- Scaled duty cycle value to write

Returns

HAL Status

Here is the call graph for this function:

4.8.2.3 HAL_StatusTypeDef set_PWM_Duty_Scaled (TIM_HandleTypeDef * *pTim*, uint32_t *chan*, uint16_t *duty*, uint16_t *scale*)

Set TIM module PWM duty cycle (scaled)

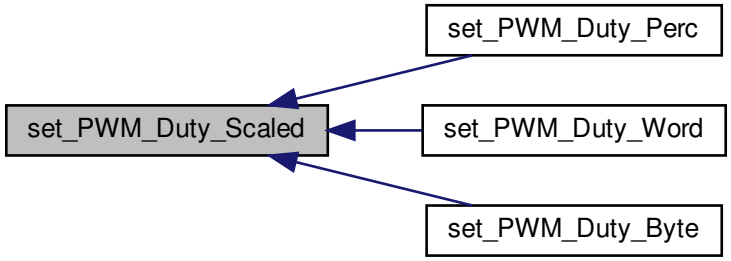
Parameters

in,out	*pTim*	- pointer to TIM instance for PWM generation
in	*chan*	- Channel to write
in	*duty*	- Scaled duty cycle value to write
in	*scale*	- Full scale value

Returns

HAL Status

Here is the caller graph for this function:



4.8.2.4 HAL_StatusTypeDef set_PWM_Duty_Word (TIM_HandleTypeDef * *pTim*, uint32_t *chan*, uint16_t *duty*) [inline]

Set TIM module PWM duty cycle (u16-bit value)

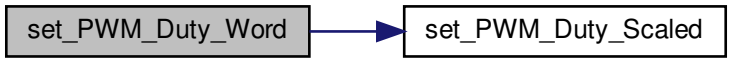
Parameters

in,out	*pTim*	- pointer to TIM instance for PWM generation
in	*chan*	- Channel to write
in	*duty*	- Scaled duty cycle value to write

Returns

HAL Status

Here is the call graph for this function:



4.8.2.5 HAL_StatusTypeDef set_PWM_Freq (TIM_HandleTypeDef * *pTim*, uint32_t *freq*)

Set TIM module PWM frequency for channel.

Parameters

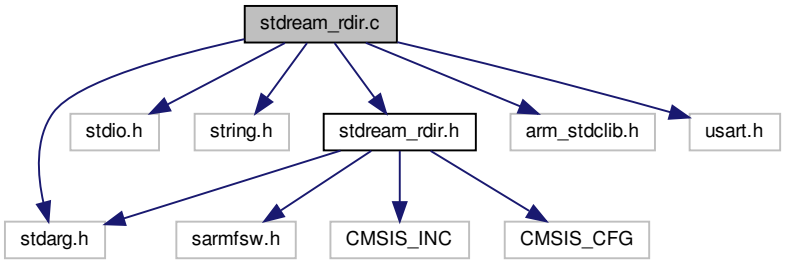
in,out	*pTim*	- pointer to TIM instance for PWM generation
in	*freq*	- Desired PWM frequency

4.9 stdream_rdir.c File Reference

Stream redirection.

```
#include <stdarg.h>
#include <stdio.h>
#include <string.h>
#include "stdream_rdir.h"
#include "arm_stdclib.h"
#include "usart.h"
```

Include dependency graph for stdream_rdir.c:



Functions

- void print_itm_port (int port, const char *msg, int len)
- int printf_ITM (char *string,...)
- int vprintf_ITM (char *string, va_list args)
- int printf_rdir (char *string,...)
- int vprintf_rdir (char *string, va_list args)

4.9.1 Detailed Description

Stream redirection.

Author

SMFSW

Version

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Date

2017

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4.9.2 Function Documentation

4.9.2.1 void print_itm_port (int *port*, const char * *msg*, int *len*)

4.9.2.2 int printf_ITM (char * *string*, ...)

4.9.2.3 int printf_rdir (char * *string*, ...)

4.9.2.4 int vprintf_ITM (char * *string*, va_list *args*)

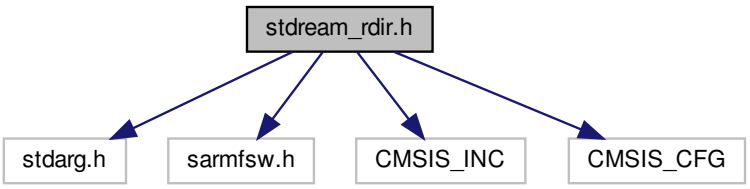
4.9.2.5 int vprintf_rdir (char * *string*, va_list *args*)

4.10 stdream_rdir.h File Reference

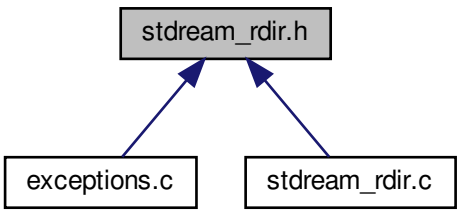
Stream redirection header.

```
#include <stdarg.h>
#include "sarmfsw.h"
#include <CMSIS_INC>
#include <CMSIS_CFG>
```

Include dependency graph for stdream_rdir.h:



This graph shows which files directly or indirectly include this file:



Macros

- #define printf printf_rdir
  Shadowing printf use.
- #define vprintf vprintf_rdir
  Shadowing vprintf use.

Functions

- void print_itm_port (int port, const char ∗msg, int len)
- int printf_ITM (char ∗string,...)
- int vprintf_ITM (char ∗string, va_list args)
- int printf_rdir (char ∗string,...)
- int vprintf_rdir (char ∗string, va_list args)

4.10.1 Detailed Description

Stream redirection header.

Author

SMFSW

Version

v0.6

Date

2017

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4.10.2 Macro Definition Documentation

4.10.2.1 #define printf printf_rdir

Shadowing printf use.

4.10.2.2 #define vprintf vprintf_rdir

Shadowing vprintf use.

4.10.3 Function Documentation

4.10.3.1 void print_itm_port (int *port*, const char ∗ *msg*, int *len*)

4.10.3.2 int printf_ITM (char ∗ *string*, ...)

4.10.3.3 int printf_rdir (char ∗ *string*, ...)

4.10.3.4 int vprintf_ITM (char ∗ *string*, va_list *args*)

4.10.3.5 int vprintf_rdir (char ∗ *string*, va_list *args*)

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