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SE Host Services API

Version 1.103.0

SERVICES Library 0.50.3



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SERVICES Version	SES Version	NOTES

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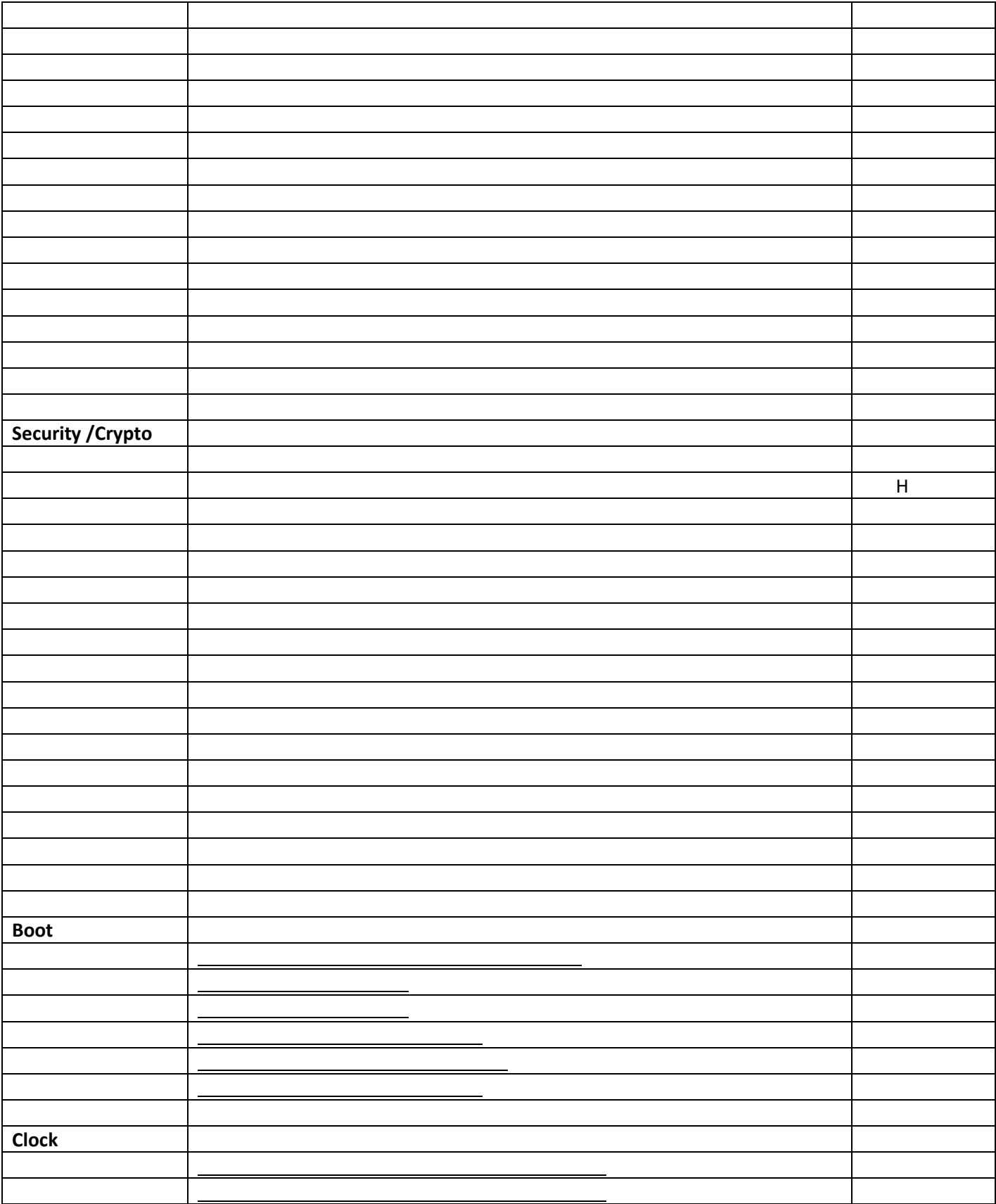


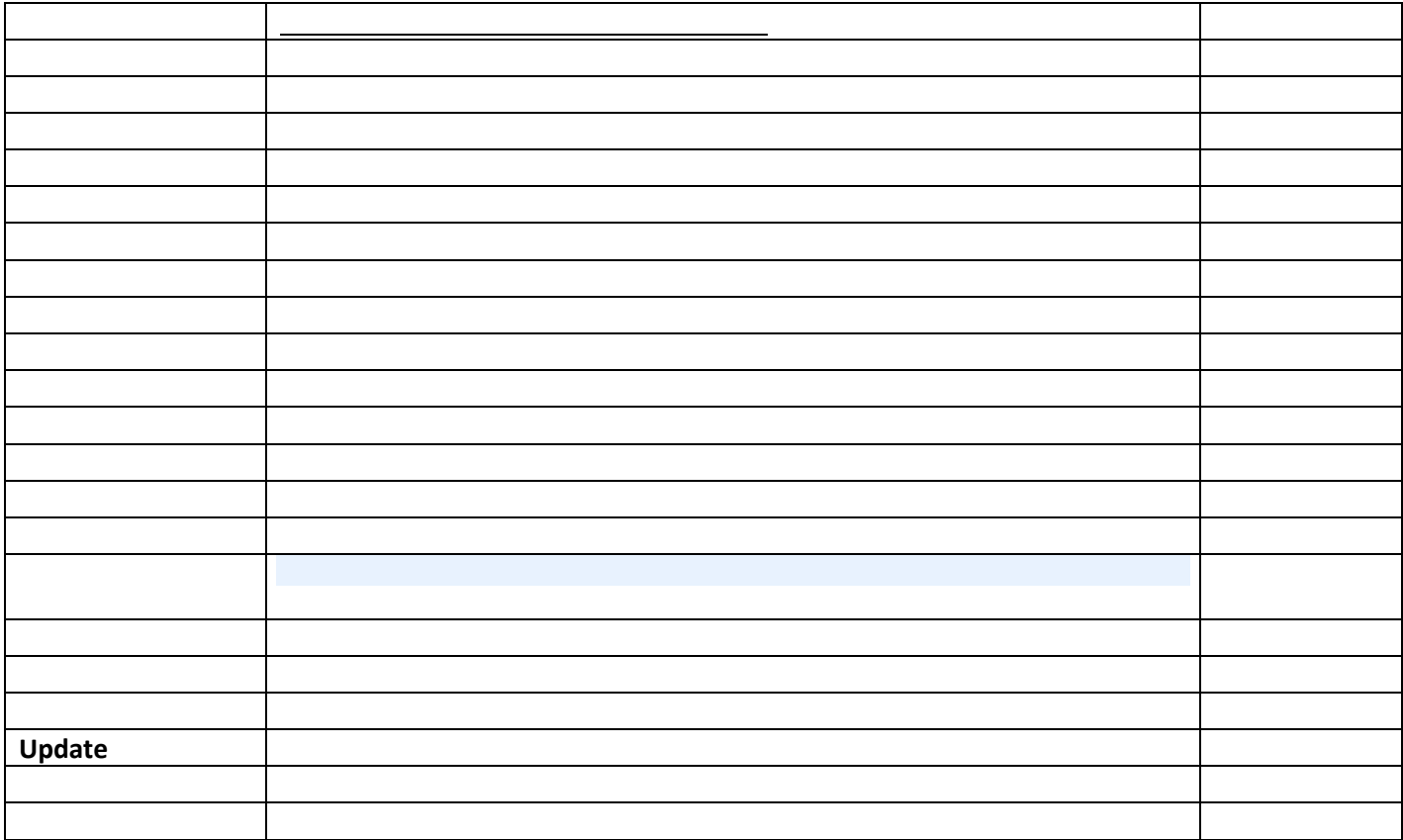
R fft

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Service Group		Notes
Maintenance		
System Management		
Application / Pin mux management		
Power		

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Name	Date modified	Type	Size
 a32_startup	7/11/2023 4:15 PM	File folder	
 build	7/7/2023 7:51 AM	File folder	
 drivers	7/7/2023 7:51 AM	File folder	
 example	7/11/2023 4:15 PM	File folder	
 include	7/11/2023 6:01 AM	File folder	
 lib	7/7/2023 7:51 AM	File folder	
 RTE	7/11/2023 4:15 PM	File folder	
 services_lib	7/11/2023 4:15 PM	File folder	
 A32_MRAM	7/11/2023 4:15 PM	Windows Script C...	
 A32_TCM	7/11/2023 4:15 PM	Windows Script C...	
 CMakeLists	7/11/2023 4:15 PM	Text Document	
 CMakePresets	7/11/2023 4:15 PM	JSON File	
 gcc_A32_MRAM	7/11/2023 4:15 PM	LD File	
 gcc_A32_TCM	7/11/2023 4:15 PM	LD File	
 gcc_M55_HE_MRAM	7/11/2023 4:15 PM	LD File	
 gcc_M55_HE_TCM	7/11/2023 4:15 PM	LD File	
 gcc_M55_HP_MRAM	7/11/2023 4:15 PM	LD File	
 gcc_M55_HP_TCM	7/11/2023 4:15 PM	LD File	
 License	7/7/2023 7:51 AM	Text Document	
 M55_HE_MRAM	7/11/2023 4:15 PM	Windows Script C...	
 M55_HE_TCM	7/11/2023 4:15 PM	Windows Script C...	
 M55_HP_MRAM	7/11/2023 4:15 PM	Windows Script C...	
 M55_HP_TCM	7/11/2023 4:15 PM	Windows Script C...	
 Makefile_linux	7/7/2023 7:51 AM	File	
 README	7/11/2023 4:15 PM	Markdown Source...	
 toolchain-armclang	7/11/2023 4:15 PM	CMake Source File	
 toolchain-gnu	7/11/2023 4:15 PM	CMake Source File	

Name	Purpose	Notes



fft fft

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JSON File	TCM	MRAM
	✓	
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	✓	✓

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l c c fft c fft al l fft c

l c l fft

A l r c R rc rc a c

R rc r fft

```
[SES] es0 ppu_isr=0x80
[SES] es0 ppu_aISR=0x2

[SES] es0 PPU PPU_PWRP=0x100 PPU_PWSR=0x108
[SES] es0 ppu_isr=0x80
[SES] es0 ppu_aISR=0x2

[SES] es0 PPU PPU_PWRP=0x100 PPU_PWSR=0x108
[SES] es0 ppu_isr=0x80
[SES] es0 ppu_aISR=0x2

[SES] es0 PPU PPU_PWRP=0x100 PPU_PWSR=0x108
[SES] es0 ppu_isr=0x80
[SES] es0 ppu_aISR=0x2

[SES] es0 PPU PPU_PWRP=0x100 PPU_PWSR=0x108
[SES] es0 ppu_isr=0x80
[SES] es0 ppu_aISR=0x2

[SES] es0 PPU PPU_PWRP=0x100 PPU_PWSR=0x108
[SES] es0 ppu_isr=0x80
[SES] es0 ppu_aISR=0x2
```

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l c c ffftrfft

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Al a l ffff

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Arc r ft c c c

c a rl ffrfft l rfft

Flag	Meaning

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fft fft

fft rftc

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fft fft rftc

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fft fft rftc

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fft fft fft r ftc l c c A

fft fft fft r ftc l c c RA

fft fft fft r ftc l c c A

P

fft fft fft r ftc l c c RA

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fft fft fft rftc A rc c c

fft fft l r c ftc R

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r f f t c c

r f f t c c r l f f c c r l a r f f t

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```
$ cmake .. -G "Unix Makefiles" -DENSEMBLE_CORE=M55_HE -DCMAKE_TOOLCHAIN_FILE=toolchain-armclang.cmake -DINSTALL_DIR=../junk
-- [INFO] Version=9
-- [INFO] installation override, using ../junk
-- The C compiler identification is ARMClang 6.18.2
-- The CXX compiler identification is ARMClang 6.18.2
-- The ASM compiler identification is ARMClang
-- Found Python3: /usr/bin/python3 (found version "3.9.2")
-- Configuring done
-- Generating done
-- Build files have been written to: /home/.../ALIF-M55-HE-2023-11-14/ARMClang-6.18.2/...
```



fft fftt A c fft c

```
[SES] CM0+ frequency is 100 MHz
[SES] os Kernel 010.4.2
[SES] Main Task - looping forever...
[SRU] RX<- STD= 0x0CE, Receiver ID=4, Address=0x9083FFA8
[TTV] SERVICES version 0.0.6
[TTV] ** TEST heartbeat error_code=SERVICES_REQ_SUCCESS service_resp=0x00000000
[TTV] ** TEST pinmux error_code=SERVICES_REQ_SUCCESS service_resp=0x00000000
[TTV] ** TEST padcontrol error_code=SERVICES_REQ_SUCCESS service_resp=0x00000000
[TTV] ** TEST crypto TRNG 64 error_code=SERVICES_REQ_SUCCESS 64-bit Random value = 0x1cfed9edc1501c20 service_resp=0
[TTV] ** TEST crypto TRNG 32 error_code=SERVICES_REQ_SUCCESS 32-bit Random value = 0xa479c88f service_resp=0
[TTV] ** TEST crypto TRNG 64 error_code=SERVICES_REQ_SUCCESS 64-bit Random value = 0xhc3fcf15f8479420 service_resp=0
[TTV] ** TEST crypto TRNG 32 error_code=SERVICES_REQ_SUCCESS 32-bit Random value = 0xScfbb70c service_resp=0
[TTV] ** TEST crypto LCS error_code=SERVICES_REQ_SUCCESS LCS State 0x0 service_resp=0
[TTV] ** TEST get ATOC error_code=SERVICES_REQ_SUCCESS Application TOC number = 0 service_resp=0x00000000
[TTV] ** TEST TOC via name HE error_code=SERVICES_REQ_SUCCESS service_resp=0x00000000
[TTV] ** TEST TOC via name HP error_code=SERVICES_REQ_SUCCESS service_resp=0x00000000
[TTV] ** TEST TOC via cpuid error_code=SERVICES_REQ_SUCCESS id HE_DBG flags 63 1 0 0 service_resp=0x00000000
[TTV] ** TEST TOC via cpuid error_code=SERVICES_REQ_SUCCESS id HE_DBG flags 63 1 0 0 service_resp=0x00000000
[TTV] ** TEST soc id error_code=SERVICES_REQ_SUCCESS Device number 0xA100 service_resp=0x00000000
[TTV] ** TEST Boot TOC A32 error_code=SERVICES_REQ_SUCCESS service_resp=0x00000000
:
```

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services-cmsis.rteconfig					
main.c					
services_lib_interface.c					
M55_HE.sct					
Components					
Resolve					
Software Components	Sel.	Variant	Vendor	Version	Description
AE722F80F55D5AE:M55_H			Alif Semiconductor		ARM Cortex-M55 160 MHz, 13824 KB RAM, 5632 KB ROM
▼ CMSIS					Cortex Microcontroller Software Interface Components
CORE	<input checked="" type="checkbox"/>		ARM	5.5.0	CMSIS-CORE for Cortex-M, SC000, SC300, ARMv8-M, ARMv8.1-M
DSP	<input type="checkbox"/>	Source	ARM	1.9.0-dev	CMSIS-DSP Library for Cortex-M, SC000, and SC300
NN Lib	<input type="checkbox"/>		ARM	3.0.0	CMSIS-NN Neural Network Library
> RTOS (API)				1.0.0	CMSIS-RTOS API for Cortex-M, SC000, and SC300
> RTOS2 (API)				2.1.3	CMSIS-RTOS API for Cortex-M, SC000, and SC300
> CMSIS Driver					Unified Device Drivers compliant to CMSIS-Driver Specifications
> Device					Startup, System Setup
Startup	<input checked="" type="checkbox"/>	C Startup	AlifSemiconductor	1.0.0	System and Startup for M55_HE device
> RTOS		FreeRTOS	ARM	10.3.1.1	FreeRTOS Real Time Kernel
Validation Output			Description		

Components					
Resolve					
Software Components	Sel.	Variant	Vendor	Version	Description
AE722F80F55D5AE:M55_H			Alif Semiconductor		ARM Cortex-M55 160 MHz, 13824 KB RAM, 5632 KB ROM
> BSP					
> CMSIS					Cortex Microcontroller Software Interface Components
> CMSIS Driver					Unified Device Drivers compliant to CMSIS-Driver Specifications
> Device					Startup, System Setup
> OSPI XIP					
> SE Services					
MHU Driver	<input checked="" type="checkbox"/>		AlifSemiconductor	0.63.0	Message Handling Unit driver for Alif Soc
SE RunTime services	<input checked="" type="checkbox"/>	Lib	AlifSemiconductor	0.63.0	SE runtime Services library for RTSS cores
> SOC Peripherals					
Startup	<input checked="" type="checkbox"/>	C Startup	AlifSemiconductor	1.0.0	System and Startup for M55_HE device
> FreeRTOS					
> RTOS		AzureRTOS	AlifSemiconductor	0.2.1	Alif Semiconductor port of AzureRTOS for its M55 device
Validation Output			Description		



ffft D A r l l ffftr ffftr al c

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l r c ffftr ffftr

Component	Description

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l r c ffc fft rc d ac l rfft c

A fft

A c ft c c rl c

l r c ffc fft c

A ffffffffc

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A c co c r

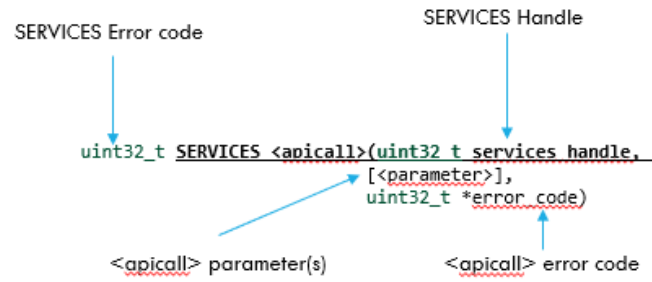
A c a c a a

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l r A fft

l r A fft r l l d A A



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l r c fct fft rc fft c c r rfft

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typedef struct

```
{
    service_header_t header;
    volatile uint32_t send_<param>;    /*!< Send    parameter */
    volatile uint32_t resp_<param>;    /*!< Return parameter */
    volatile uint32_t resp_error_code; /*!< Call error code */
} example_service_t;
```

void SERVICES example_call(services_req_t *service)

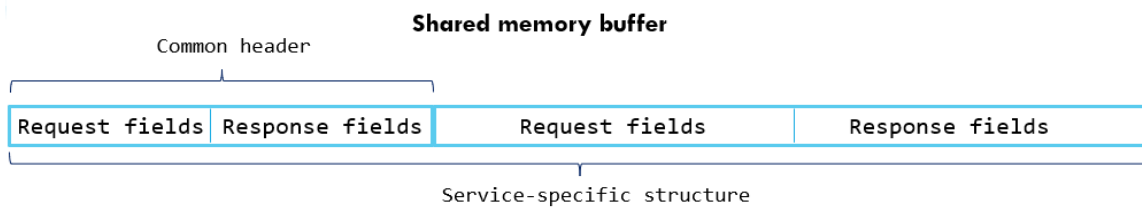
```
{
    example_service_t *p_svc =
        (example_service_t *)service->pkt buffer address; /* services request */
    uint32_t error_code;
    uint32_t local result;

    error_code = function call(p_svc->send_<param>, &local result);

    p_svc->resp_<param>    = local result;
    p_svc->resp_error_code = error_code;

    SERVICES send response code(service, SERVICES_REQ_SUCCESS);
}
```

l r c fct fft l r lrlal cr fft



Common header format

Service ID: req
Flags: req
Error Code: resp
Padding

```
typedef struct
{
    uint16_t send_sid;
    uint16_t send_flags;
    uint16_t resp_error_code; // transport
    layer error code
    uint16_t none_padding;
} service_header_t;
```

Service-specific structure example

```
typedef struct
{
    service_header_t header;
    uint8_t send_port_num;
    uint8_t send_pin_num;
    uint8_t send_config_data;
    uint8_t resp_error_code; // service-specific
    error code
} pinmux_svc_t;
```

l r c fct fft l r l Al c

l r c fct fft l fft

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l r c fct fft c l ft fft

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l r c f

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Syntax:

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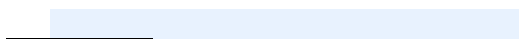
Parameters:

Returns:

Restrictions:

Example:

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Syntax:

Description:

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Returns:

Restrictions:

Example:

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A c ffitc aft c

Syntax:

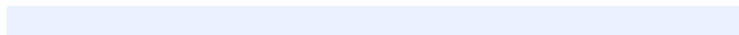
Description:

Parameters:

Returns:

Restrictions:

Example:



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A c c a cr dtc

Syntax:

Description:

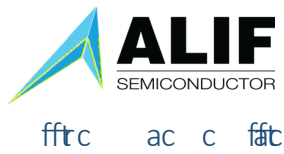
Parameters:

Returns:

Restrictions:

Example:

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A ftc r c r

Syntax:

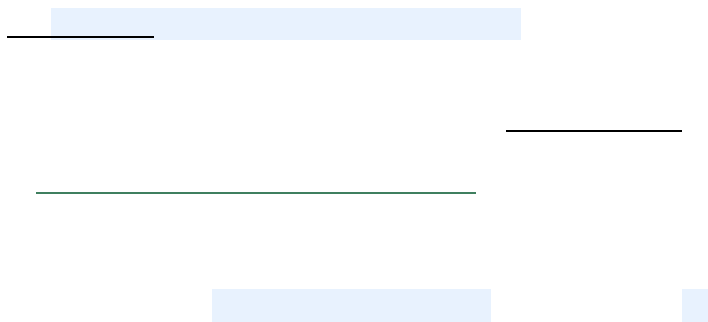
Description:

Parameters:

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Restrictions:

Example:



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A aft l fft fft c

Syntax:

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Parameters:

Returns:

Restrictions:

Example:



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Syntax:

Description:

Parameters:

Returns:

Restrictions:

Example:


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A r c c l r

Syntax:

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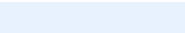
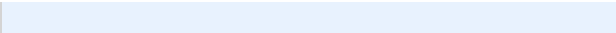
Description:


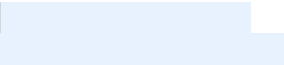
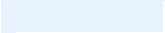

Parameters:

Returns:

Restrictions:

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Restrictions:

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Description:

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Parameters:

Returns:

Restrictions:

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Arc rla c

Syntax:

Description:

Parameters:

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Restrictions:

Example:

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Arc rla c fft

Syntax:

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Restrictions:

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Arc rla ft c

Syntax:

Description:

Parameters:

Returns:

Restrictions:

Example:

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Arc rla fft a fft

Syntax:

Description:

Parameters:

Returns:

Restrictions:

Example:

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Arcrcrcffcrrc

Syntax:

Description:

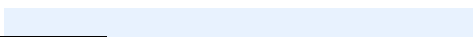
Parameters:

Returns:

0x0000B200

Restrictions:

Example:

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Arc cr c ffr

Syntax:

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Parameters:

Returns:

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Example:

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A cr c c fffft

Syntax:

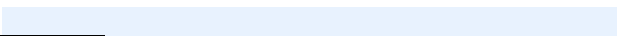
Description:

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Restrictions:

Example:

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A rc cr c ffc rc fft

Syntax:

Description:

Parameters:

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Restrictions:

Example:

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`fft rfft c fft`

`A r fft`

Syntax:

Description:

Parameters:

None

Returns:

Restrictions:

Example:

```
1  # Create a 1D array of random values
2  x = np.random.randn(1000)
3
4  # Compute the FFT
5  X = np.fft.fft(x)
6
7  # Compute the inverse FFT
8  x_reconstructed = np.fft.ifft(X)
9
10 # Print the original and reconstructed arrays
11 print(x)
12 print(x_reconstructed)
```

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Syntax:

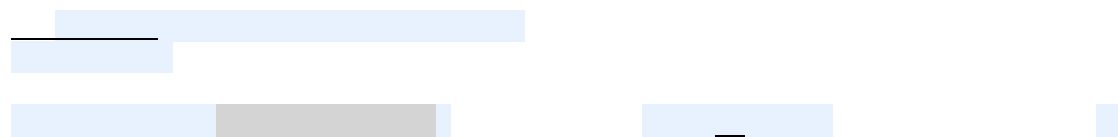
Description:

Parameters:

Returns:

Restrictions:

Example:



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Syntax:

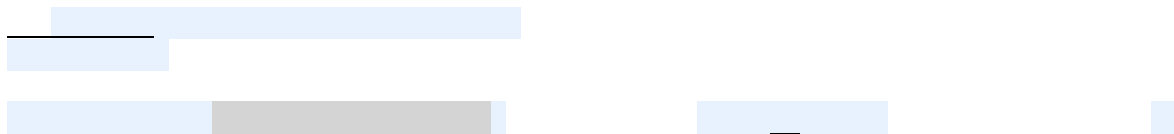
Description:

Parameters:

Returns:

Restrictions:

Example:



A fâtrfft l fft ffc c

Syntax:

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Parameters:

Returns:

Restrictions:

Example:

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A l c r l l c co c r

Syntax:

Description:

Parameters:

Returns:

Restrictions:

Example:

$$\begin{array}{c} \text{H} \\ \text{H} \end{array}$$



A l c c f a t a l d f t

Syntax:

Description:

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Returns:

Restrictions:

Example:

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A l c c a l d f t

Syntax:

Description:

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Example:

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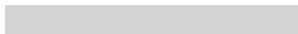


A l c c c r c r i f f t a l d f f t

Syntax:

Description:

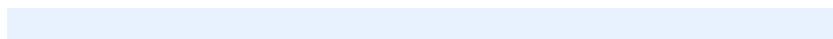
Parameters:



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Returns:



Restrictions:

Example:





A l c f t c r l c

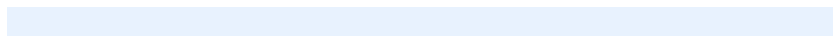
Syntax:

Description:

Parameters:



Returns:



Restrictions:

Example:

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A l c f t r l c

Syntax:

Description:

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Restrictions:

Example:

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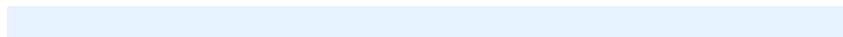
A l c r l c r l c

Syntax:

Description:

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Returns:



Restrictions:

Example:



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A | c c | c o

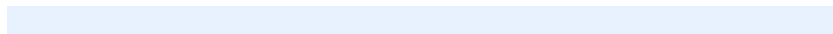
Syntax:

Description:

NOTE

Parameters:

Returns:



Restrictions:

Example:



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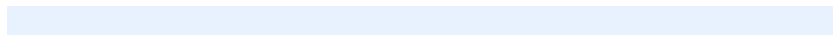
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Syntax:

Description:

Parameters:

Returns:



Restrictions:

Example:

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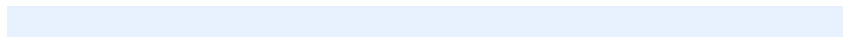


Syntax:

Description:

Parameters:

Returns:



Restrictions:

Example:

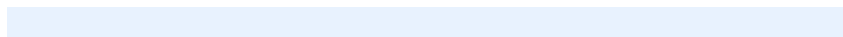


Syntax:

Description:

Parameters:

Returns:



Restrictions:

Example:



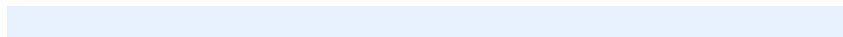
A cr l d ad

Syntax:

Description:

Parameters:

Returns:



Restrictions:

Example:

H
H



A l c a a l r c a l r l

Syntax:

Description:

Parameters:

Returns:

Restrictions:

Example:

A l c l l r c a l r l

Syntax:

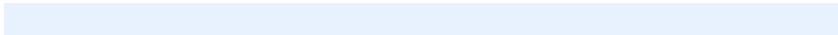
H
H



Description:

Parameters:

Returns:



`A = l_c_crrfft_al_dfft_c`

Syntax:

Description:

Parameters:

Returns:

`H`
`H`



A | c crrfft cr

Syntax:

Description:

H

Parameters:

Returns:

H
H



Al a c ffc

Al a dco c a cdfccfffc

RC
RC
XO
XO

H
H

H
H
H
H
H
H
H
H

A a l a c c a r l a l a c

Syntax:

Description:

Type definitions:

H
H
H

Parameters:

H
H



Returns:

H
H



A a l a c c a r l a c

Syntax:

Description:

Type definitions:

H
H
H
H
H
H
H
H

Parameters:

Returns:

H
H



A a l a c c a l a

Syntax:

Description:

Type definitions:

Parameters:

Returns:

H
H



A a | a cr dco c a

Syntax:

Description:

Parameters:

Returns:

A a | a cr dco c a

Syntax:

Description:

Parameters:

Returns:

H
H



A a l a c c a r l a c

Syntax:

Description:

Type definitions:

H

Parameters:

Returns:

H
H



A a l a c c a r a l a c

Syntax:

Description:

Type definitions:

H

Parameters:

Returns:

H
H



Syntax:

Description:

Type definitions:

Parameters:

Returns:

H
H



Syntax:

Description:

H

Parameters:

Returns:

H
H



A l a c r d c o c a

Syntax:

Description:

H

Parameters:

Returns:

H
H



A ala cr cd dco c a

Syntax:

Description:

H

H
H



Returns:

H
H



A r r r

Syntax:

Description:

Parameters:

Returns:

A r rl

Syntax:

Description:

Parameters:

Returns:

H
H



Syntax:

Description:

Parameters:

Returns:

A a r r

Syntax:

Description:

Parameters:

Returns:

H
H



Syntax:

Description:

Parameters:

Returns:

A a f f t l a c

Syntax:

Description:

Parameters:

Returns:

A f f f f f f t f f t

Syntax:

Description:

Parameters:

H
H



Returns:

`A cfft`

Syntax:

Description:

Parameters:

Returns:

`llr cfft`

`A llr lacrlacr`

Syntax:

Description:

Parameters:

`H
H`



Returns:

Restrictions:

A l l r a

Syntax:

Description:

Parameters:

Returns:

Restrictions:

H
H



A l l r c r l

Syntax:

Description:

H

Parameters:

Returns:

Restrictions:

A l l r c c r a

Syntax:

Description:

H

Parameters:

Returns:

Restrictions:

H

H



Syntax:

Description:

Parameters:

Returns:

Restrictions:

H
H



A l l r c c r l a

Syntax:

Description:

Parameters:

Returns:

Restrictions:

H
H



A r l c ffc

A a r l a c c r

Syntax:

Description:

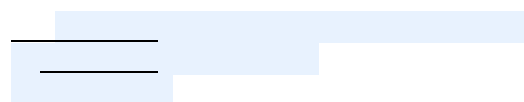
Parameters:

None

Returns:

Restrictions:

Example:



H
H

A a r l a c c r a

Syntax:

Description:

Parameters:

Returns:

Restrictions:

Example:



These Services are not intended to be used directly by applications

SERVICES_cryptocell_mbedtls_hardware_poll

Syntax:

Description:

SERVICES_cryptocell_mbedtls_aes_init

Syntax:

Description:

SERVICES_cryptocell_mbedtls_aes_set_key

Syntax:

H
H



Description:

SERVICES_cryptocell_mbedtls_aes_crypt

Syntax:

Description:

SERVICES_cryptocell_mbedtls_sha_starts

Syntax:

Description:

H
H



SERVICES_cryptocell_mbedtls_sha_process

Syntax:

Description:

SERVICES_cryptocell_mbedtls_sha_update

Syntax:

Description:

SERVICES_cryptocell_mbedtls_sha_finish

Syntax:

Description:

H
H



SERVICES_cryptocell_mbedtls_ccm_gcm_set_key

Syntax:

Description:

SERVICES_cryptocell_mbedtls_ccm_gcm_crypt

Syntax:

Description:

H

SERVICES_cryptocell_mbedtls_chacha20_crypt

Syntax:

Description:

H

H



SERVICES_cryptocell_mbedtls_chachapoly_crypt

Syntax:

Description:

SERVICES_cryptocell_mbedtls_poly1305_crypt

Syntax:

Description:

SERVICES_cryptocell_mbedtls_cmac_init_setkey

Syntax:

Description:

H
H



SERVICES_cryptocell_mbedtls_cmac_update

Syntax:

Description:

SERVICES_cryptocell_mbedtls_cmac_finish

Syntax:

Description:

SERVICES_cryptocell_mbedtls_cmac_reset

Syntax:

Description:



Rrc c ffc

Arc rla

Syntax:

Description:

-
-
-
-

Parameters:

H

Returns:

H		
H		

Restrictions:

H
H



H
H



rc rc c ffc

llr cr

#define

#define

#define

typedef struct

-
- H
-

A llr cr la

Syntax:

Description:

H H

H

H



Parameters:

Returns:

Restrictions:

H
H



A f t r l c r l a

Syntax:

Description:

Parameters:

Returns:

Restrictions:

H
H

Version	Change Log