|  |  |
| --- | --- |
| **APP SW Detailed Design** | |
| **Summary** | Software Detailed Design Document of the APP Component |

|  |  |  |
| --- | --- | --- |
| **Author** | **Review** | **Approval** |
| Title: Andreea Suiu | See Project Master Document for the roles and Project Members List for the name of people | See Project Master Document for the roles and Project Members List for the name of people |
|  |  |  |
| **Distribution** | | |
| See Project Master Document for the roles and Project Members List for the name of people | See Project Master Document for the roles and Project Members List for the name of people | See Project Master Document for the roles and Project Members List for the name of people |

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# General Information

## Revision history \*

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision** | **Date** | **Author(s)** | **Description/comment** |
| 1.0. | 12.08.2022 | Andreea Suiu | First revision. |
| 1.1 | 21.12.2022 | Andreea Suiu | Second revision. |
|  |  |  |  |

*\* Template history is found in the CM tool used for templates*

## Purpose and Scope

The purpose of this document is to provide an overview of the APP SW Component operation principle, and to present the implementation choices in terms of module and function splitting.

## Referenced documents

### External documents

|  |  |  |
| --- | --- | --- |
| **Id** | **Title** | **Reference** |
|  |  |  |
|  |  |  |
|  |  |  |

### Internal Documents

|  |  |  |
| --- | --- | --- |
| **Id** | **Title** | **Reference** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

## Terminology and definitions

The generic acronyms are available in the [AEM process and method wiki](https://alvteams.alv.autoliv.int/sites/aeuaeequalityassurance/AEM%20Process%20wiki/acronyms.aspx)

|  |  |
| --- | --- |
| **Terminology** | **Meaning** |
| AAU | Atomic architectural unit |
| SW | software |
|  |  |

# SW Module Detailed Design

## Overview

The aim of the APP component is to make all preparations to guarantee trouble-free programming operation. In this process, it should initialize all layers of the complete stack, to enable and disable interrupts, to implement the unlock flash routine, to indicate the diagnostic session status.

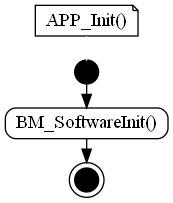
## Traceability

# Features

## Services

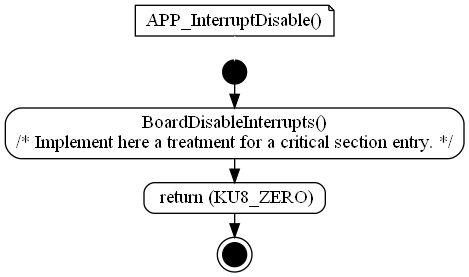
### APP\_Init

|  |  |  |  |
| --- | --- | --- | --- |
| Object | | | |
| Init function of APP SW Component. Here can be found all init API's of entire bootloader. This function initializes all layers of the complete STACK. EB\_Init is called in this API. It shall be called only once at ECU startup. | | | |
| **Prototype** | | | |
| void APP\_Init (void) | | | |
| **Detailed Design Requirement** | | | |
| DSG\_APP\_APP\_Init | | | |
| **Architecture Requirement** | | | |
| ARCH\_SW\_APP\_APP\_Init | | | |
| **Input parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Output parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Return value** | | | |
| Type | Description | | |
| NA | NA | | |
| **Dynamic aspect** | | | |
| Who(callers) | Description | | |
| BM\_Prg module. | Called in BM\_BootStartUp function. | | |
| **Static aspect** | | | |
| \* | | | |
| **Constrains** | | | |
|  | | | |



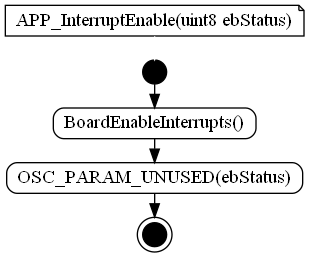
### APP\_InterruptDisable

|  |  |  |  |
| --- | --- | --- | --- |
| Object | | | |
| Interrupt disable function of APP SW Component. Interrupts must be suspended. | | | |
| **Prototype** | | | |
| uint8 APP\_InterruptDisable (void) | | | |
| **Detailed Design Requirement** | | | |
| DSG\_APP\_APP\_InterruptDisable | | | |
| **Architecture Requirement** | | | |
| ARCH\_SW\_APP\_APP\_InterruptDisable | | | |
| **Input parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Output parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Return value** | | | |
| Type | Description | | |
| uint8 | KU8\_ZERO = always return 0 (Tresos generated function). | | |
| **Dynamic aspect** | | | |
| Who(callers) | Description | | |
| Supplier Flash\_TS\_T40D2M7I0R0 module. | Called in FLASH\_LLD\_EraseSector function. | | |
| **Static aspect** | | | |
| \* | | | |
| **Constrains** | | | |
| None. | | | |



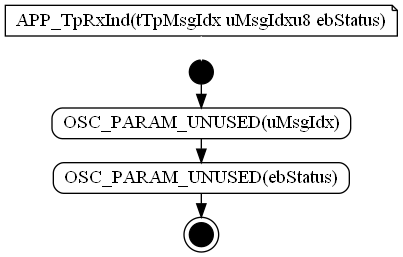
### APP\_InterruptEnable

|  |  |  |  |
| --- | --- | --- | --- |
| Object | | | |
| Interrupt enable function of APP SW Component. Interrupts must be resumed. | | | |
| **Prototype** | | | |
| void APP\_InterruptEnable (uint8 ebStatus) | | | |
| **Detailed Design Requirement** | | | |
| DSG\_APP\_APP\_InterruptEnable | | | |
| **Architecture Requirement** | | | |
| ARCH\_SW\_APP\_APP\_InterruptEnable | | | |
| **Input parameters** | | | |
| Name | Type | Description | Range |
| ebStatus | uint8 | parameter unused from Tresos-generated function |  |
| **Output parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Return value** | | | |
| Type | Description | | |
| NA | None. | | |
| **Dynamic aspect** | | | |
| Who(callers) | Description | | |
| Supplier Flash\_TS\_T40D2M7I0R0 module. | Called in FLASH\_LLD\_EraseSector function. | | |
| **Static aspect** | | | |
| \* | | | |
| **Constrains** | | | |
| None. | | | |



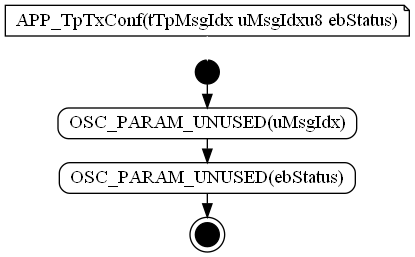
### APP\_TpRxInd

|  |  |  |  |
| --- | --- | --- | --- |
| Object | | | |
| Receiver function of APP SW Component (Tresos generated function definition). | | | |
| **Prototype** | | | |
| void APP\_TpRxInd (tTpMsgIdx uMsgIdx, u8 ebStatus) | | | |
| **Detailed Design Requirement** | | | |
| DSG\_APP\_APP\_TpRxInd | | | |
| **Architecture Requirement** | | | |
| ARCH\_SW\_APP\_APP\_TpRxInd | | | |
| **Input parameters** | | | |
| Name | Type | Description | Range |
| uMsgIdx | tTpMsgIdx | message ID |  |
| ebStatus | unit8 | status |  |
| **Output parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Return value** | | | |
| Type | Description | | |
| NA | None. | | |
| **Dynamic aspect** | | | |
| Who(callers) | Description | | |
| BlPduR module. | Called in BlPduR\_RxInd function. Callback is called: when a message reception is completed, successfully or not. | | |
| **Static aspect** | | | |
| \* | | | |
| **Constrains** | | | |
| None. | | | |



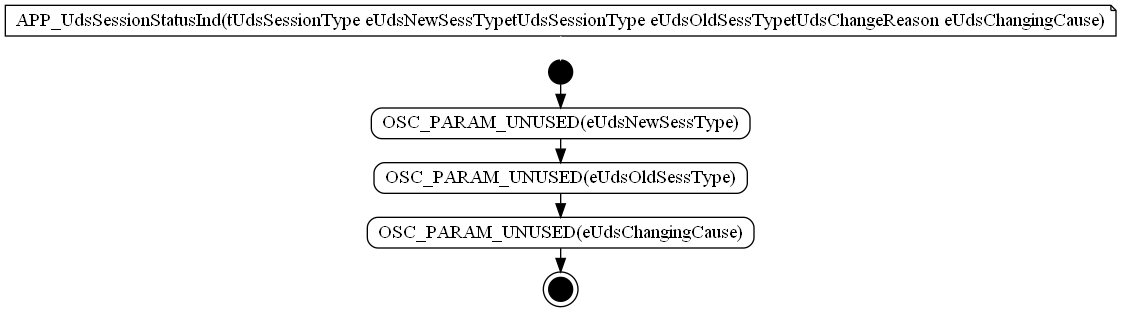
### APP\_TpTxConf

|  |  |  |  |
| --- | --- | --- | --- |
| Object | | | |
| Transmitter function of APP SW Component (Tresos generated function definition). | | | |
| **Prototype** | | | |
| void APP\_TpTxConf (tTpMsgIdx uMsgIdx, u8 ebStatus) | | | |
| **Detailed Design Requirement** | | | |
| DSG\_APP\_APP\_TpTxConf | | | |
| **Architecture Requirement** | | | |
| ARCH\_SW\_APP\_APP\_TpTxConf | | | |
| **Input parameters** | | | |
| Name | Type | Description | Range |
| uMsgIdx | tTpMsgIdx | message ID |  |
| ebStatus | unit8 | status |  |
| **Output parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Return value** | | | |
| Type | Description | | |
| NA | None. | | |
| **Dynamic aspect** | | | |
| Who(callers) | Description | | |
| BlPduR module. | Called in BlPduR\_TxConf function. Callback is called: when a message reception is completed, successfully or not. | | |
| **Static aspect** | | | |
| \* | | | |
| **Constrains** | | | |
| None. | | | |



### APP\_UdsSessionStatusInd

|  |  |  |  |
| --- | --- | --- | --- |
| Object | | | |
| UDS Session status function of APP SW Component (Tresos generated function definition). | | | |
| **Prototype** | | | |
| void APP\_UdsSessionStatusInd (tUdsSessionType eUdsNewSessType, tUdsSessionType eUdsOldSessType, tUdsChangeReason eUdsChangingCause) | | | |
| **Detailed Design Requirement** | | | |
| DSG\_APP\_APP\_UdsSessionStatusInd | | | |
| **Architecture Requirement** | | | |
| ARCH\_SW\_APP\_APP\_UdsSessionStatusInd | | | |
| **Input parameters** | | | |
| Name | Type | Description | Range |
| eUdsNewSessType | tUdsSessionType | new session | NA |
| eUdsOldSessType | tUdsSessionType | old session | NA |
| aubUdsData | uint8 | pointer on received data | NA |
| eUdsChangingCause | tUdsChangeReason | the reason of the changing session | NA |
| **Output parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Return value** | | | |
| Type | Description | | |
| NA | None. | | |
| **Dynamic aspect** | | | |
| Who(callers) | Description | | |
| BlPduR module. | Called in UDS\_SessionStatusInd function. | | |
| **Static aspect** | | | |
| \* | | | |
| **Constrains** | | | |
| None. | | | |



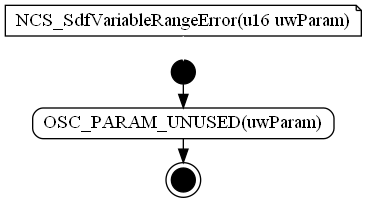
### APP\_UnlockFlash

|  |  |  |  |
| --- | --- | --- | --- |
| Object | | | |
| Unlock Flash function of APP SW Component. | | | |
| **Prototype** | | | |
| tUdsStatus APP\_UnlockFlash (PduLengthType \* pulLen, uint8 \* aubUdsData) | | | |
| **Detailed Design Requirement** | | | |
| DSG\_APP\_APP\_UnlockFlash | | | |
| **Architecture Requirement** | | | |
| ARCH\_SW\_APP\_APP\_UnlockFlash | | | |
| **Input parameters** | | | |
| Name | Type | Description | Range |
| aubUdsData | uint8 | pointer on request data | NA |
| pulLen | PduLengthType | pointer on data length | NA |
| **Output parameters** | | | |
| Name | Type | Description | Range |
| pulLen | PduLengthType | pointer on data length | NA |
| aubUdsData | uint8 | pointer on received data | NA |
| **Return value** | | | |
| Type | Description | | |
| tUdsStatus | u8ret = Respond with acknowledge code or NRC code. | | |
| **Dynamic aspect** | | | |
| Who(callers) | Description | | |
| Tresos\_BSW\_generated module. | Tresos\_BSW\_generated - UDS\_Cfg. | | |
| **Static aspect** | | | |
| \* | | | |
| **Constrains** | | | |
| None. | | | |



### NCS\_SdfVariableRangeError

|  |  |  |  |
| --- | --- | --- | --- |
| Object | | | |
| Variable range error check function of APP SW Component (Tresos generated function definition). | | | |
| **Prototype** | | | |
| void NCS\_SdfVariableRangeError (u16 uwParam) | | | |
| **Detailed Design Requirement** | | | |
| DSG\_APP\_NCS\_SdfVariableRangeError | | | |
| **Architecture Requirement** | | | |
| ARCH\_SW\_APPNCS\_SdfVariableRangeError | | | |
| **Input parameters** | | | |
| Name | Type | Description | Range |
| uwParam | uint16 | parameter unused from Tresos-generated function | NA |
| **Output parameters** | | | |
| Name | Type | Description | Range |
| NA | NA | NA | NA |
| **Return value** | | | |
| Type | Description | | |
| NA | None. | | |
| **Dynamic aspect** | | | |
| Who(callers) | Description | | |
| Uds\_TS\_TxDxM3I17R0 module. | Called in UDS\_Prg. | | |
| **Static aspect** | | | |
| \* | | | |
| **Constrains** | | | |
| None. | | | |



## Variabiles

### stNoIntShareVar

|  |  |  |
| --- | --- | --- |
| Type | Value |  |
| tNoInitShareVar stNoIntShareVar | NA | |
| **Description** | | |
| Shared variable between bootloader and application. Shall be stored in a NoInit area known by both software. | | |
| **Definition** | | |
| tNoInitShareVar stNoIntShareVar [extern] | | |

### stNVMBootloaderData

|  |  |  |
| --- | --- | --- |
| Type | Value |  |
| tNVMBootloaderData stNVMBootloaderData | NA | |
| **Description** | | |
| NVM Bootloader Data (RAM structure of NVM mirror). | | |
| **Definition** | | |
| tNVMBootloaderData stNVMBootloaderData [extern] | | |

## Macros

### NVM\_PRESENT

|  |  |
| --- | --- |
| Name | Value |
| NVM\_PRESENT | STD\_OFF |
| **Definition** | |
| #define NVM\_PRESENT STD\_OFF | |
| **Description** | |
| Values used to set if NvM is present. | |

### KU8\_DATA\_ARRAY\_LENGTH

|  |  |
| --- | --- |
| Name | Value |
| KU8\_DATA\_ARRAY\_LENGTH | (12U) |
| **Definition** | |
| #define KU8\_DATA\_ARRAY\_LENGTH (12U) | |
| **Description** | |
| KU8\_DATA\_ARRAY\_LENGTH Value definition. | |

### KU8\_DATA\_ARRAY\_START\_INDEX

|  |  |
| --- | --- |
| Name | Value |
| KU8\_DATA\_ARRAY\_START\_INDEX | (4U) |
| **Definition** | |
| #define KU8\_DATA\_ARRAY\_START\_INDEX (4U) | |
| **Description** | |
| KU8\_DATA\_ARRAY\_START\_INDEX Value definition. | |

### KU8\_DATA\_STATUS\_POSITION

|  |  |
| --- | --- |
| Name | Value |
| KU8\_DATA\_STATUS\_POSITION | (5U) |
| **Definition** | |
| #define KU8\_DATA\_STATUS\_POSITION (5U) | |
| **Description** | |
| KU8\_DATA\_STATUS\_POSITION Value definition. | |

### KU8\_FLASH\_ADRESS\_POSITION

|  |  |
| --- | --- |
| Name | Value |
| KU8\_FLASH\_ADRESS\_POSITION | (3U) |
| **Definition** | |
| #define KU8\_FLASH\_ADRESS\_POSITION (3U) | |
| **Description** | |
| KU8\_FLASH\_ADRESS\_POSITION Value definition. | |

### KU8\_FLASH\_ADRESS\_VALUE

|  |  |
| --- | --- |
| Name | Value |
| KU8\_FLASH\_ADRESS\_VALUE | (0x45u) |
| **Definition** | |
| #define KU8\_FLASH\_ADRESS\_VALUE (0x45u) | |
| **Description** | |
| KU8\_FLASH\_ADRESS\_VALUE Value definition. | |

### KU8\_RECEIVED\_DATA\_LENGTH

|  |  |
| --- | --- |
| Name | Value |
| KU8\_RECEIVED\_DATA\_LENGTH | (12u) |
| **Definition** | |
| #define KU8\_RECEIVED\_DATA\_LENGTH (12u) | |
| **Description** | |
| KU8\_RECEIVED\_DATA\_LENGTH Value definition. | |

### PROG\_BLOCK\_INVALID

|  |  |
| --- | --- |
| Name | Value |
| PROG\_BLOCK\_INVALID | (0x00U) |
| **Definition** | |
| #define PROG\_BLOCK\_INVALID (0x00U) | |
| **Description** | |
| PROG\_BLOCK\_INVALID Value definition. | |

### PROG\_BLOCK\_NBR

|  |  |
| --- | --- |
| Name | Value |
| PROG\_BLOCK\_NBR | (4U) |
| **Definition** | |
| #define PROG\_BLOCK\_NBR (4U) | |
| **Description** | |
| PROG\_BLOCK\_NBR Value definition. | |

### PROG\_BLOCK\_VALID

|  |  |
| --- | --- |
| Name | Value |
| PROG\_BLOCK\_VALID | (0x01U) |
| **Definition** | |
| #define PROG\_BLOCK\_VALID (0x01U) | |
| **Description** | |
| PROG\_BLOCK\_VALID Value definition. | |

### PROG\_COHERENCY\_ERR\_INVALID\_BLOCK

|  |  |
| --- | --- |
| Name | Value |
| PROG\_COHERENCY\_ERR\_INVALID\_BLOCK | (4U) |
| **Definition** | |
| #define PROG\_COHERENCY\_ERR\_INVALID\_BLOCK (4U) | |
| **Description** | |
| PROG\_COHERENCY\_ERR\_INVALID\_BLOCK Value definition. | |

### PROG\_COHERENCY\_OK

|  |  |
| --- | --- |
| Name | Value |
| PROG\_COHERENCY\_OK | (0U) |
| **Definition** | |
| #define PROG\_COHERENCY\_OK (0U) | |
| **Description** | |
| PROG\_COHERENCY\_OK Value definition. | |

### PROG\_ECUPROGINFO\_CONSISTENT

|  |  |
| --- | --- |
| Name | Value |
| PROG\_ECUPROGINFO\_CONSISTENT | (0x40U) |
| **Definition** | |
| #define PROG\_ECUPROGINFO\_CONSISTENT (0x40U) | |
| **Description** | |
| PROG\_ECUPROGINFO\_CONSISTENT Value definition. | |

### PROG\_ECUPROGINFO\_INCONSISTENT

|  |  |
| --- | --- |
| Name | Value |
| PROG\_ECUPROGINFO\_INCONSISTENT | (0x44U) |
| **Definition** | |
| #define PROG\_ECUPROGINFO\_INCONSISTENT (0x44U) | |
| **Description** | |
| PROG\_ECUPROGINFO\_INCONSISTENT Value definition. | |

### PROG\_FINGERPRINT\_LENGTH

|  |  |
| --- | --- |
| Name | Value |
| PROG\_FINGERPRINT\_LENGTH | (9U) |
| **Definition** | |
| #define PROG\_FINGERPRINT\_LENGTH (9U) | |
| **Description** | |
| PROG\_FINGERPRINT\_LENGTH Value definition. | |

### PROG\_INFO\_MEMORY\_STATUS

|  |  |
| --- | --- |
| Name | Value |
| PROG\_INFO\_MEMORY\_STATUS | (0x08U) |
| **Definition** | |
| #define PROG\_INFO\_MEMORY\_STATUS (0x08U) | |
| **Description** | |
| PROG\_INFO\_MEMORY\_STATUS Value definition. | |

### PROG\_INFO\_REPROG\_STATE\_ERASED\_END

|  |  |
| --- | --- |
| Name | Value |
| PROG\_INFO\_REPROG\_STATE\_ERASED\_END | (0x20U) |
| **Definition** | |
| #define PROG\_INFO\_REPROG\_STATE\_ERASED\_END (0x20U) | |
| **Description** | |
| PROG\_INFO\_REPROG\_STATE\_ERASED\_END Value definition. | |

### PROG\_INFO\_REPROG\_STATE\_ERASED\_START

|  |  |
| --- | --- |
| Name | Value |
| PROG\_INFO\_REPROG\_STATE\_ERASED\_START | (0x10U) |
| **Definition** | |
| #define PROG\_INFO\_REPROG\_STATE\_ERASED\_START (0x10U) | |
| **Description** | |
| PROG\_INFO\_REPROG\_STATE\_ERASED\_START Value definition. | |

### PROG\_INFO\_REPROG\_STATE\_MASK

|  |  |
| --- | --- |
| Name | Value |
| PROG\_INFO\_REPROG\_STATE\_MASK | (0x70U) |
| **Definition** | |
| #define PROG\_INFO\_REPROG\_STATE\_MASK (0x70U) | |
| **Description** | |
| PROG\_INFO\_REPROG\_STATE\_MASK Value definition. | |

### PROG\_INFO\_REPROG\_STATE\_REPROG\_START

|  |  |
| --- | --- |
| Name | Value |
| PROG\_INFO\_REPROG\_STATE\_REPROG\_START | (0x30U) |
| **Definition** | |
| #define PROG\_INFO\_REPROG\_STATE\_REPROG\_START (0x30U) | |
| **Description** | |
| PROG\_INFO\_REPROG\_STATE\_REPROG\_START Value definition. | |

### PROG\_MAX\_NBR\_SEG

|  |  |
| --- | --- |
| Name | Value |
| PROG\_MAX\_NBR\_SEG | (5U) |
| **Definition** | |
| #define PROG\_MAX\_NBR\_SEG (5U) | |
| **Description** | |
| PROG\_MAX\_NBR\_SEG Value definition. | |

### PROG\_REPROG\_FLAG\_START\_SEC\_VAR\_NO\_INIT\_8

|  |  |
| --- | --- |
| Name | Value |
| PROG\_REPROG\_FLAG\_START\_SEC\_VAR\_NO\_INIT\_8 | NA |
| **Definition** | |
| #define PROG\_REPROG\_FLAG\_START\_SEC\_VAR\_NO\_INIT\_8 | |
| **Description** | |
| Constant with external linkage. | |

### PROG\_REPROG\_FLAG\_STOP\_SEC\_VAR\_NO\_INIT\_8

|  |  |
| --- | --- |
| Name | Value |
| PROG\_REPROG\_FLAG\_STOP\_SEC\_VAR\_NO\_INIT\_8 | NA |
| **Definition** | |
| #define PROG\_REPROG\_FLAG\_STOP\_SEC\_VAR\_NO\_INIT\_8 | |
| **Description** | |
| Constant with external linkage. | |

# EEPROM

# Configuration

# Compilation Options