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Document Change History

Date	Version	Changed by	Change Description
13.11.2007	2.2.0	AUTOSAR Administration	• Chapter 8.2: "AUTOSAR supports for compiler and target implementation only 2 complement arithmetic" • Chapter 12.10: changed the basic type for *_least types (optimized types) from 'int' to 'long' for SHx processors • Removal the explicit cast to boolean in the precompile definition (#define) for macros TRUE and FALSE ("#define TRUE ((boolean) 1)" has become "#define TRUE 1") • Document meta information extended • Small layout adaptations made
31.01.2007	2.1.0	AUTOSAR Administration	• Boolean type has been defined as an eight bit long unsigned integer • Legal disclaimer revised • Release Notes added • “Advice for users” revised • “Revision Information” added
12.07.2006	2.0.0	AUTOSAR Administration	Second release
30.06.2005	1.0.0	AUTOSAR Administration	Initial Release

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Table of Contents

1 Introduction and functional overview

This document specifies the AUTOSAR platform types header file. It contains all platform dependent types and symbols. Those types must be abstracted in order to become platform and compiler independent.

It is required that all platform types files are unique within the AUTOSAR community to guarantee unique types per platform and to avoid type changes when moving a software module from platform A to B.

2 Acronyms and abbreviations

Acronyms and abbreviations that have a local scope are not contained in the AUTOSAR glossary. These must appear in a local glossary.

Acronym:	***Description:***
Rollover mechanism	The following example sequence is called ‘rollover’: • An unsigned char has the value of 255 • It is incremented by 1 • The result is 0
SDU	Service Data Unit (payload)

Abbreviation:	***Description:***
int	Integer

3 Related documentation

3.1 Input documents

[1] General Requirements on Basic Software Modules,
AUTOSAR_SRS_BSWGeneral.pdf

[2] Basic Software Module Description Template,
AUTOSAR_TPS_BSWModuleDescriptionTemplate.pdf

[3] List of Basic Software Modules
AUTOSAR_TR_BSWModuleList.pdf

[4] Cosmic C Cross Compiler User's Guide for Motorola MC68HC12, V4.5

[5] ARM ADS compiler manual

[6] Greenhills MULTI for V850 V4.0.5:
Building Applications for Embedded V800, V4.0, 30.1.2004

[7] TASKING for ST10 V8.5:
C166/ST10 v8.5 C Cross-Compiler User's Manual, V5.16
C166/ST10 v8.5 C Cross-Assembler, Linker/Locator,
Utilities User's Manual, V5.16

[8] Wind River (Diab Data) for PowerPC Version 5.2.1:
Wind River Compiler for Power PC - Getting Started, Edition 2, 8.5.2004
Wind River Compiler for Power PC - User's Guide, Edition 2, 11.5.2004

[9] TASKING for TriCore TC1796 V2.1R1:
TriCore v2.0 C Cross-Compiler, Assembler, Linker User's Guide, V1.2

[10] Metrowerks CodeWarrior 4.0 for Freescale HC9S12X/XGATE (V5.0.25):
Motorola HC12 Assembler, 2.6.2004
Motorola HC12 Compiler, 2.6.2004
Smart Linker, 2.4.2004

[11] General Specification of Basic Software Modules
AUTOSAR_SWS_BSWGeneral.pdf

3.2 Related standards and norms

[12] ISO/IEC 9899:1990 Programming Language – C

[13] MISRA-C 2004: Guidelines for the use of the C language in critical systems, October 2004

3.3 Related specification

AUTOSAR provides a General Specification on Basic Software modules [11] (SWS BSW General), which is also valid for Platform Types.

Thus, the specification SWS BSW General shall be considered as additional and required specification for Platform Types.

4 Constraints and assumptions

4.1 Limitations

No limitations.

4.2 Applicability to car domains

No restrictions.

4.3 Applicability to safety related environments

The AUTOSAR `boolean` type may be used if the correct usage (see SWS_Platform_00027) is proven by a formal code review or a static analysis by a validated static analysis tool.

The optimized AUTOSAR integer data types (`*_least`) may be used if the correct usage (see chapter 7.4) is proven by a formal code review or a static analysis by a validated static analysis tool.

5 Dependencies to other modules

None.

5.1 File structure

5.1.1 Code file structure

None

5.1.2 Header file structure

Two header file structures are applicable. One is depending on communication related basic software modules and the second is depending on non-communication related basic software modules.

5.1.2.1 Communication related basic software modules

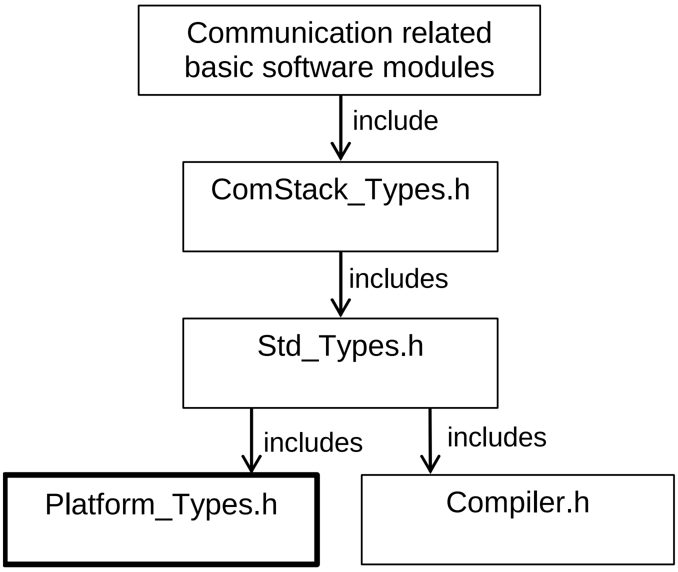

Figure 1: Include File Structure for communication related basic software modules

- If existing, `<mab>_Types.h` shall include `ComStack_Types.h` where <`mab>` (module abbreviation) is a communication related basic software module (e.g. Com, PduR, Can…).

The existence and purpose of `<mab>_Types.h` is specified in the module specific SWS document.

5.1.2.2 Non-communication related basic software modules

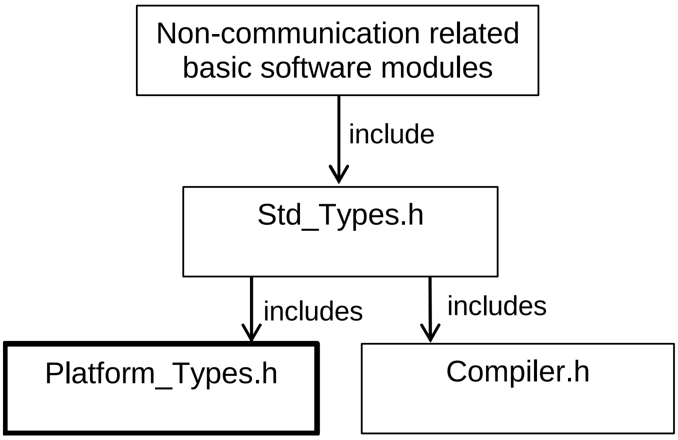

Figure 2: Include File Structure for non-communication related basic software modules

- `<mab>_Types.h` shall include `Std_Types.h` where <mab> (module abbreviation) is a non-communication related basic software module (e.g. Mcu, WdgM ...)

6 Requirements traceability

Requirement	Description	Satisfied by
-	-	SWS_Platform_00002
-	-	SWS_Platform_00006
-	-	SWS_Platform_00007
-	-	SWS_Platform_00008
-	-	SWS_Platform_00009
-	-	SWS_Platform_00010
-	-	SWS_Platform_00011
-	-	SWS_Platform_00019
-	-	SWS_Platform_00038
-	-	SWS_Platform_00039
-	-	SWS_Platform_00041
-	-	SWS_Platform_00042
-	-	SWS_Platform_00043
-	-	SWS_Platform_00044
-	-	SWS_Platform_00045
-	-	SWS_Platform_00046
-	-	SWS_Platform_00048
-	-	SWS_Platform_00049
-	-	SWS_Platform_00050
-	-	SWS_Platform_00051
-	-	SWS_Platform_00054
-	-	SWS_Platform_00055
-	-	SWS_Platform_00056
-	-	SWS_Platform_00057
-	-	SWS_Platform_00058
-	-	SWS_Platform_00059
-	-	SWS_Platform_00060
-	-	SWS_Platform_00061
-	-	SWS_Platform_00064
-	-	SWS_Platform_00066
-	-	SWS_Platform_00067
BSW00420	-	SWS_Platform_00063
SRS_BSW_00005	Modules of the æC Abstraction Layer (MCAL) may not have hard coded horizontal interfaces	SWS_Platform_00063
SRS_BSW_00007	All Basic SW Modules written	SWS_Platform_00063

	in C language shall conform to the MISRA C 2004 Standard.	
SRS_BSW_00009	All Basic SW Modules shall be documented according to a common standard.	SWS_Platform_00063
SRS_BSW_00010	The memory consumption of all Basic SW Modules shall be documented for a defined configuration for all supported platforms.	SWS_Platform_00063
SRS_BSW_00101	The Basic Software Module shall be able to initialize variables and hardware in a separate initialization function	SWS_Platform_00063
SRS_BSW_00158	All modules of the AUTOSAR Basic Software shall strictly separate configuration from implementation	SWS_Platform_00063
SRS_BSW_00159	All modules of the AUTOSAR Basic Software shall support a tool based configuration	SWS_Platform_00063
SRS_BSW_00160	Configuration files of AUTOSAR Basic SW module shall be readable for human beings	SWS_Platform_00063
SRS_BSW_00161	The AUTOSAR Basic Software shall provide a microcontroller abstraction layer which provides a standardized interface to higher software layers	SWS_Platform_00063
SRS_BSW_00162	The AUTOSAR Basic Software shall provide a hardware abstraction layer	SWS_Platform_00063
SRS_BSW_00164	The Implementation of interrupt service routines shall be done by the Operating System, complex drivers or modules	SWS_Platform_00063
SRS_BSW_00167	All AUTOSAR Basic Software Modules shall provide configuration rules and constraints to enable plausibility checks	SWS_Platform_00063
SRS_BSW_00168	SW components shall be tested by a function defined in a common API in the Basis-SW	SWS_Platform_00063
SRS_BSW_00170	The AUTOSAR SW Components shall provide information about their dependency from faults, signal qualities, driver demands	SWS_Platform_00063

SRS_BSW_00171	Optional functionality of a Basic-SW component that is not required in the ECU shall be configurable at pre-compile-time	SWS_Platform_00063
SRS_BSW_00172	The scheduling strategy that is built inside the Basic Software Modules shall be compatible with the strategy used in the system	SWS_Platform_00063
SRS_BSW_00300	All AUTOSAR Basic Software Modules shall be identified by an unambiguous name	SWS_Platform_00063
SRS_BSW_00301	All AUTOSAR Basic Software Modules shall only import the necessary information	SWS_Platform_00063
SRS_BSW_00302	All AUTOSAR Basic Software Modules shall only export information needed by other modules	SWS_Platform_00063
SRS_BSW_00304	-	SWS_Platform_00013, SWS_Platform_00014, SWS_Platform_00015, SWS_Platform_00016, SWS_Platform_00017, SWS_Platform_00018, SWS_Platform_00020, SWS_Platform_00021, SWS_Platform_00022, SWS_Platform_00023, SWS_Platform_00024, SWS_Platform_00025
SRS_BSW_00305	Data types naming convention	SWS_Platform_00063
SRS_BSW_00306	AUTOSAR Basic Software Modules shall be compiler and platform independent	SWS_Platform_00063
SRS_BSW_00307	Global variables naming convention	SWS_Platform_00063
SRS_BSW_00308	AUTOSAR Basic Software Modules shall not define global data in their header files, but in the C file	SWS_Platform_00063
SRS_BSW_00309	All AUTOSAR Basic Software Modules shall indicate all global data with read-only purposes by explicitly assigning the const keyword	SWS_Platform_00063
SRS_BSW_00310	API naming convention	SWS_Platform_00063
SRS_BSW_00312	Shared code shall be reentrant	SWS_Platform_00063
SRS_BSW_00314	All internal driver modules shall separate the interrupt frame definition from the service routine	SWS_Platform_00063
SRS_BSW_00321	The version numbers of AUTOSAR Basic Software Modules shall be enumerated according specific rules	SWS_Platform_00063
SRS_BSW_00323	All AUTOSAR Basic Software	SWS_Platform_00063

	Modules shall check passed API parameters for validity	
SRS_BSW_00325	The runtime of interrupt service routines and functions that are running in interrupt context shall be kept short	SWS_Platform_00063
SRS_BSW_00326	-	SWS_Platform_00063
SRS_BSW_00327	Error values naming convention	SWS_Platform_00063
SRS_BSW_00328	All AUTOSAR Basic Software Modules shall avoid the duplication of code	SWS_Platform_00063
SRS_BSW_00329	-	SWS_Platform_00063
SRS_BSW_00330	It shall be allowed to use macros instead of functions where source code is used and runtime is critical	SWS_Platform_00063
SRS_BSW_00331	All Basic Software Modules shall strictly separate error and status information	SWS_Platform_00063
SRS_BSW_00333	For each callback function it shall be specified if it is called from interrupt context or not	SWS_Platform_00063
SRS_BSW_00334?	-	SWS_Platform_00063
SRS_BSW_00335	Status values naming convention	SWS_Platform_00063
SRS_BSW_00336	Basic SW module shall be able to shutdown	SWS_Platform_00063
SRS_BSW_00337	Classification of development errors	SWS_Platform_00063
SRS_BSW_00338	-	SWS_Platform_00063
SRS_BSW_00339	Reporting of production relevant error status	SWS_Platform_00063
SRS_BSW_00341	Module documentation shall contains all needed informations	SWS_Platform_00063
SRS_BSW_00342	It shall be possible to create an AUTOSAR ECU out of modules provided as source code and modules provided as object code, even mixed	SWS_Platform_00063
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SRS_BSW_00345	BSW Modules shall support pre-compile configuration	SWS_Platform_00063

SRS_BSW_00346	All AUTOSAR Basic Software Modules shall provide at least a basic set of module files	SWS_Platform_00063
SRS_BSW_00347	A Naming seperation of different instances of BSW drivers shall be in place	SWS_Platform_00063
SRS_BSW_00348	All AUTOSAR standard types and constants shall be placed and organized in a standard type header file	SWS_Platform_00063
SRS_BSW_00350	All AUTOSAR Basic Software Modules shall apply a specific naming rule for enabling/disabling the detection and reporting of development errors	SWS_Platform_00063
SRS_BSW_00355	-	SWS_Platform_00063
SRS_BSW_00357	For success/failure of an API call a standard return type shall be defined	SWS_Platform_00063
SRS_BSW_00358	The return type of init() functions implemented by AUTOSAR Basic Software Modules shall be void	SWS_Platform_00063
SRS_BSW_00359	All AUTOSAR Basic Software Modules callback functions shall avoid return types other than void if possible	SWS_Platform_00063
SRS_BSW_00360	AUTOSAR Basic Software Modules callback functions are allowed to have parameters	SWS_Platform_00063
SRS_BSW_00361	All mappings of not standardized keywords of compiler specific scope shall be placed and organized in a compiler specific type and keyword header	SWS_Platform_00063
SRS_BSW_00369	All AUTOSAR Basic Software Modules shall not return specific development error codes via the API	SWS_Platform_00063
SRS_BSW_00370	-	SWS_Platform_00063
SRS_BSW_00371	The passing of function pointers as API parameter is forbidden for all AUTOSAR Basic Software Modules	SWS_Platform_00063
SRS_BSW_00373	The main processing function of each AUTOSAR Basic Software Module shall be named according the defined convention	SWS_Platform_00063
SRS_BSW_00374	All Basic Software Modules	SWS_Platform_00063

	shall provide a readable module vendor identification	
SRS_BSW_00375	Basic Software Modules shall report wake-up reasons	SWS_Platform_00063
SRS_BSW_00376	-	SWS_Platform_00063
SRS_BSW_00377	A Basic Software Module can return a module specific types	SWS_Platform_00063
SRS_BSW_00378	AUTOSAR shall provide a boolean type	SWS_Platform_00026, SWS_Platform_00027, SWS_Platform_00034
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SRS_BSW_00384	The Basic Software Module specifications shall specify at least in the description which other modules they require	SWS_Platform_00063
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SRS_BSW_00386	The BSW shall specify the configuration for detecting an error	SWS_Platform_00063
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SRS_BSW_00389	Containers shall have names	SWS_Platform_00063
SRS_BSW_00390	Parameter content shall be unique within the module	SWS_Platform_00063
SRS_BSW_00391	-	SWS_Platform_00063
SRS_BSW_00392	Parameters shall have a type	SWS_Platform_00063
SRS_BSW_00393	Parameters shall have a range	SWS_Platform_00063
SRS_BSW_00394	The Basic Software Module specifications shall specify the scope of the configuration	SWS_Platform_00063

	parameters	
SRS_BSW_00395	The Basic Software Module specifications shall list all configuration parameter dependencies	SWS_Platform_00063
SRS_BSW_00396	The Basic Software Module specifications shall specify one classe (of the three) to be supported	SWS_Platform_00063
SRS_BSW_00397	The configuration parameters in pre-compile time are fixed before compilation starts	SWS_Platform_00063
SRS_BSW_00398	The link-time configuration is achieved on object code basis in the stage after compiling and before linking	SWS_Platform_00063
SRS_BSW_00399	Parameter-sets shall be located in a separate segment and shall be loaded after the code	SWS_Platform_00063
SRS_BSW_00400	Parameter shall be selected from multiple sets of parameters after code has been loaded and started	SWS_Platform_00063
SRS_BSW_00401	Documentation of multiple instances of configuration parameters shall be available	SWS_Platform_00063
SRS_BSW_00404	BSW Modules shall support post-build configuration	SWS_Platform_00063
SRS_BSW_00405	BSW Modules shall support multiple configuration sets	SWS_Platform_00063
SRS_BSW_00406	A static status variable denoting if a BSW module is initialized shall be initialized with value 0 before any APIs of the BSW module is called	SWS_Platform_00063
SRS_BSW_00407	Each BSW module shall provide a function to read out the version information of a dedicated module implementation	SWS_Platform_00063
SRS_BSW_00408	All AUTOSAR Basic Software Modules configuration parameters shall be named according to a specific naming rule	SWS_Platform_00063
SRS_BSW_00409	All production code error ID symbols are defined by the Dem module and shall be retrieved by the other BSW modules from Dem configuration	SWS_Platform_00063

SRS_BSW_00410	Compiler switches shall have defined values	SWS_Platform_00063
SRS_BSW_00411	All AUTOSAR Basic Software Modules shall apply a naming rule for enabling/disabling the existence of the API	SWS_Platform_00063
SRS_BSW_00412	References to c-configuration parameters shall be placed into a separate h-file	SWS_Platform_00063
SRS_BSW_00413	An index-based accessing of the instances of BSW modules shall be done	SWS_Platform_00063
SRS_BSW_00414	The init function may have parameters	SWS_Platform_00063
SRS_BSW_00415	Interfaces which are provided exclusively for one module shall be separated into a dedicated header file	SWS_Platform_00063
SRS_BSW_00416	The sequence of modules to be initialized shall be configurable	SWS_Platform_00063
SRS_BSW_00417	Software which is not part of the SW-C shall report error events only after the DEM is fully operational.	SWS_Platform_00063
SRS_BSW_00419	If a pre-compile time configuration parameter is implemented as "const" it should be placed into a separate c-file	SWS_Platform_00063
SRS_BSW_00422	Pre-de-bouncing of error status information is done within the DEM	SWS_Platform_00063
SRS_BSW_00423	BSW modules with AUTOSAR interfaces shall be describable with the means of the SW-C Template	SWS_Platform_00063
SRS_BSW_00429	BSW modules shall be only allowed to use OS objects and/or related OS services	SWS_Platform_00063
SRS_BSW_00432	Modules should have separate main processing functions for read/receive and write/transmit data path	SWS_Platform_00063

7 Functional specification

7.1 General issues

[SWS_Platform_00002] ⌈It is not allowed to add any extension to this file. Any extension invalidates the AUTOSAR conformity. ⌋ ( )

7.2 CPU Type

[SWS_Platform_00044] ⌈For each platform the register width of the CPU used shall be indicated by defining CPU_TYPE. ⌋ ( )

[SWS_Platform_00045] ⌈According to the register width of the CPU used, CPU_TYPE shall be assigned to one of the symbols CPU_TYPE_8, CPU_TYPE_16 or CPU_TYPE_32. ⌋ ( )

7.3 Endianess

The pattern for bit, byte and word ordering in native types, such as integers, is called endianess.

[SWS_Platform_00043] ⌈For each platform the appropriate bit order on register level shall be indicated in the platform types header file using the symbol CPU_BIT_ORDER. ⌋ ( )

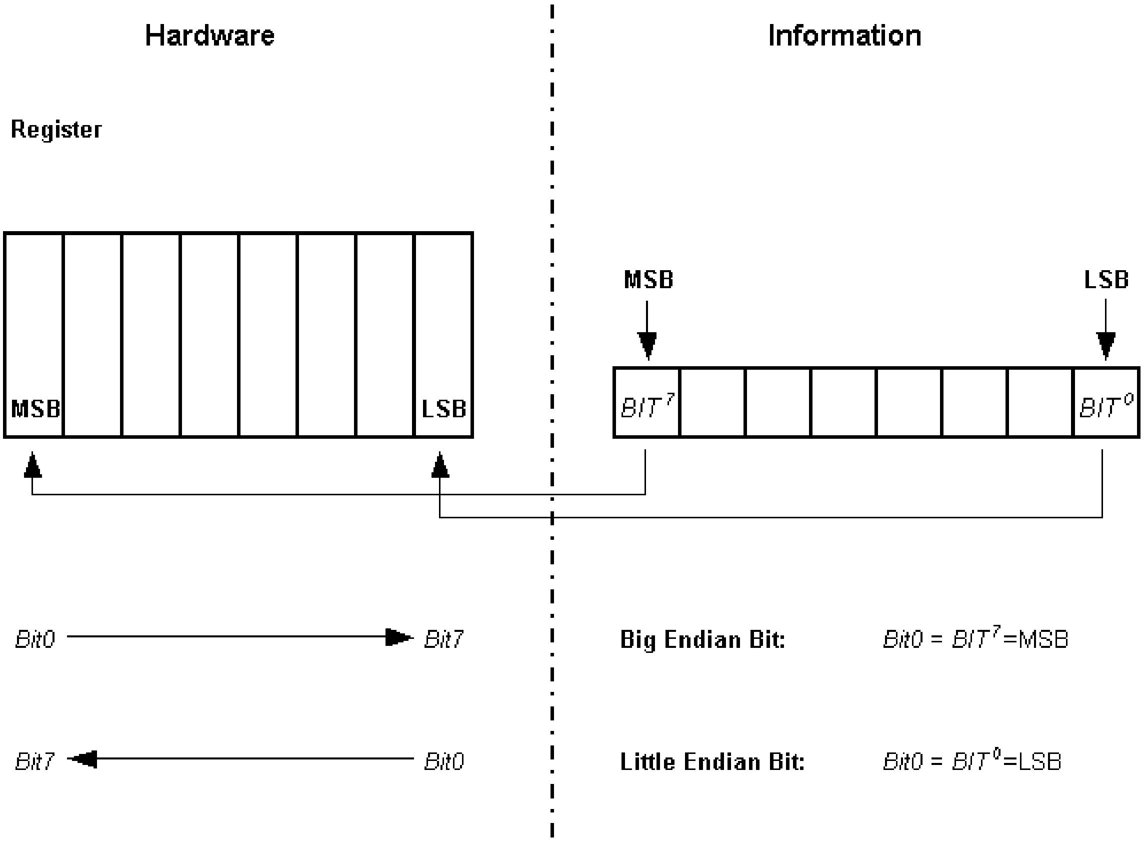
[SWS_Platform_00046] ⌈For each platform the appropriate byte order on memory level shall be indicated in the platform types header file using the symbol CPU_BYTE_ORDER. ⌋ ( )

7.3.1 Bit Ordering (Register)

[SWS_Platform_00048] ⌈In case of big endian bit ordering CPU_BIT_ORDER shall be assigned to MSB_FIRST in the platform types header file. ⌋ ( )

[SWS_Platform_00049] ⌈In case of little endian bit ordering CPU_BIT_ORDER shall be assigned to LSB_FIRST in the platform types header file. ⌋ ( )

Illustrations:



Important Note:
The *naming* convention Bit0, Bit1, etc. and the bit's *significance* within a byte, word, etc. are different topics and shall not be mixed. The counting scheme of bits in Motorola µC-architecture's (Big Endian Bit Order) starts with Bit0 indicating the Most Significant Bit, whereas all other µC using Little Endian Bit Order assign Bit0 to be the Least Significant Bit!

The MSB in an accumulator is always stored as the left-most bit regardless of the CPU type. Hence, big and little endianess bit orders imply different bit-naming conventions.

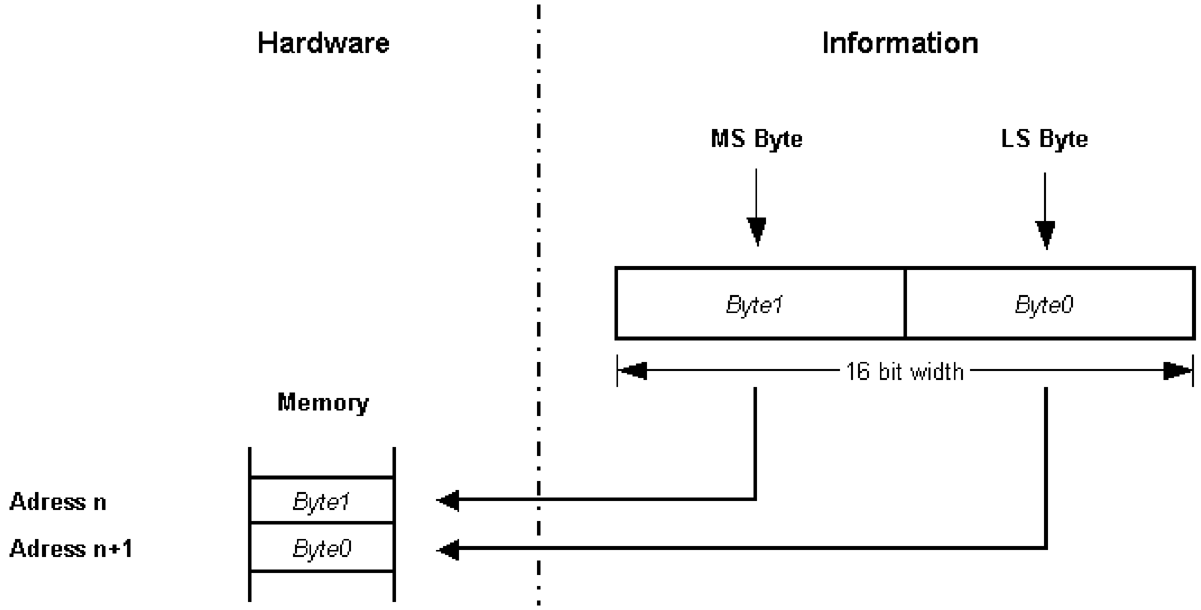
7.3.2 Byte Ordering (Memory)

[SWS_Platform_00050] ⌈In case of big endian byte ordering `CPU_BYTE_ORDER` shall be assigned to `HIGH_BYTE_FIRST` in the platform types header file. ⌋ ( )

[SWS_Platform_00051] ⌈In case of little endian byte ordering `CPU_BYTE_ORDER` shall be assigned to `LOW_BYTE_FIRST` in the platform types header file. ⌋ ( )

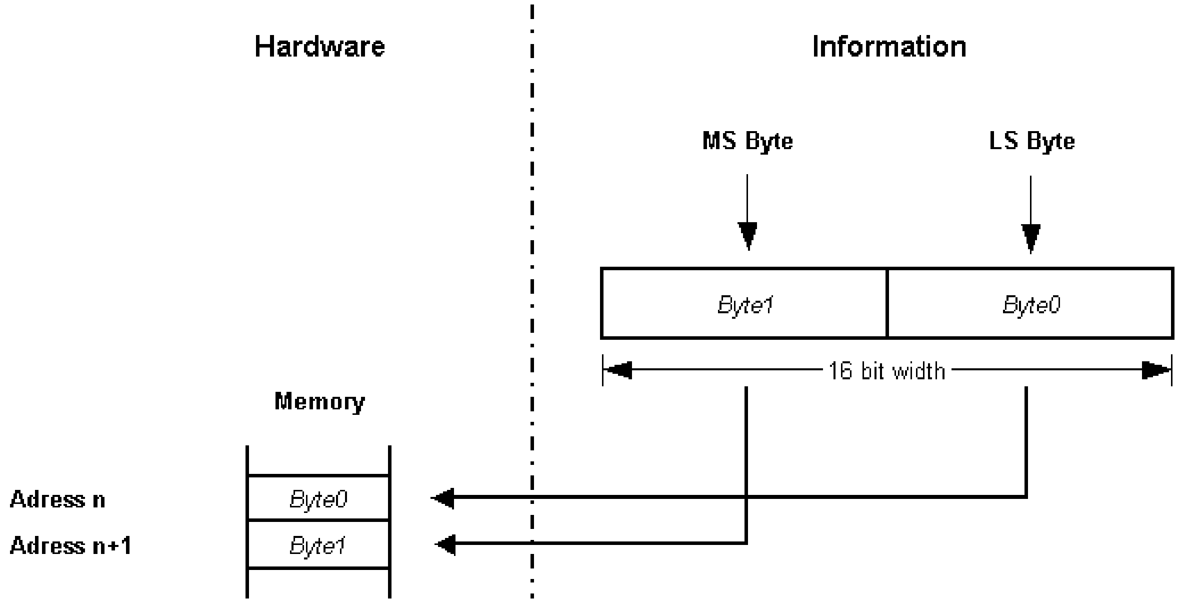
Naming convention for illustration:
The Most Significant Byte within a 16 bit wide data is named Byte1.
The Least Significant Byte within a 16 bit wide data is named Byte0.

Big Endian (HIGH_BYTE_FIRST)



Address	Data	Order
n	Byte1	Most Significant Byte (HIGH_BYTE_FIRST)
n+1	Byte0	Least Significant Byte

Little Endian (LOW_BYTE_FIRST)



Address	Data	Order
n	Byte0	Least Significant Byte (LOW_BYTE_FIRST)
n+1	Byte1	Most Significant Byte

Important Note:
The naming convention Byte0 and Byte1 is not unique and may be different in the manufacturer’s reference documentation for a particular µC.

7.4 Optimized integer data types

For details refer to the Chapter 7.1.18.2.1 “AUTOSAR Integer Data Types” in SWS_BSWGeneral

Examples of usage:

- Loop counters (e.g. maximum loop count = 124 → use uint8_least)
- Switch case arguments (e.g. maximum number of states = 17 → use uint8_least)

7.5 Boolean data type

[SWS_Platform_00027] ⌈The standard AUTOSAR type boolean shall be implemented as an unsigned integer with a bit length that is the shortest one natively supported by the platform (in general 8 bits). ⌋ (SRS_BSW_00378)

[SWS_Platform_00034] ⌈The standard AUTOSAR type boolean shall only be used in conjunction with the standard symbols TRUE and FALSE. For value assignments of variables of type boolean no arithmetic or logical operators (+, ++, -, --, *, /, %, <<, >>, ~, &) must be used. The only allowed form of assignment is

```
boolean var = TRUE;
…
var = TRUE;
var = FALSE;
var = (a < b)    /* same for ">", "<=", ">=" */
var = (c && d)   /* same for "!", "||" */
var = (e != f)   /* same for "==" */
```

The only allowed forms of comparison are

```
boolean var = FALSE;
…
if (var == TRUE) …
if (var == FALSE) …
if (var != TRUE) …
if (var != FALSE) …
if (var) …
if (!var) …
```

⌋ (SRS_BSW_00378)

8 API specification

8.1 Imported types

Not applicable.

8.2 Type definitions

[SWS_Platform_00061] ⌈Concerning the signed integer types, AUTOSAR supports for compiler and target implementation only 2 complement arithmetic. This directly impacts the chosen ranges for these types. ⌋ ( )

8.2.1 boolean

[SWS_Platform_00026]
⌈

Name:	boolean		
Type:	uint		
Range:	FALSE	0	--
	TRUE	1	--
Description:	This standard AUTOSAR type shall only be used together with the definitions TRUE and FALSE.		

⌋ (SRS_BSW_00378)

See SWS_Platform_00027 for implementation and usage.

[SWS_Platform_00060] ⌈The boolean type shall always be mapped to a platform specific type where pointers can be applied to in order to enable a passing of parameters via API.
There are specific BIT types of some HW platforms which are very efficient but where no pointers can point to. ⌋ ( )

8.2.2 uint8

[SWS_Platform_00013]
⌈

Name:	uint8		
Type:	uint		
Range:	8 bit	--	0..255 0x00..0xFF
Description:	This standard AUTOSAR type shall be of 8 bit unsigned.		

⌋ (SRS_BSW_00304)

8.2.3 uint16

[SWS_Platform_00014]

⌈

Name:	uint16		
Type:	uint		
Range:	16 bit	--	0..65535 0x0000..0xFFFF
Description:	This standard AUTOSAR type shall be of 16 bit unsigned.		

⌋ (SRS_BSW_00304)

8.2.4 uint32

[SWS_Platform_00015]

⌈

Name:	uint32		
Type:	uint		
Range:	32 bit	--	0..4294967295 0x00000000..0xFFFFFFFF
Description:	This standard AUTOSAR type shall be 32 bit unsigned.		

⌋ (SRS_BSW_00304)

8.2.5 uint64

[SWS_Platform_00066]

⌈

Name:	uint64		
Type:	uint		
Range:	64 bit	--	0..18446744073709551615 0x0000000000000000..0xFFFFFFFFFFFFFFFF
Description:	This standard AUTOSAR type shall be 64 bit unsigned.		

⌋ ()

8.2.6 sint8

[SWS_Platform_00016]

⌈

Name:	sint8		
Type:	sint		
Range:	7 bit + 1 bit sign	--	-128..+127 0x80..0x7F
Description:	This standard AUTOSAR type shall be of 8 bit signed.		

⌋ (SRS_BSW_00304)

8.2.7 sint16

[SWS_Platform_00017]
⌈

Name:	sint16		
Type:	sint		
Range:	15 bit + 1 bit sign	--	-32768..+32767 0x8000..0x7FFF
Description:	This standard AUTOSAR type shall be of 16 bit signed.		

⌋ (SRS_BSW_00304)

8.2.8 sint32

[SWS_Platform_00018]
⌈

Name:	sint32		
Type:	sint		
Range:	31 bit + 1 bit sign	--	-2147483648..+2147483647 0x80000000..0x7FFFFFFF
Description:	This standard AUTOSAR type shall be 32 bit signed.		

⌋ (SRS_BSW_00304)

8.2.9 sint64

[SWS_Platform_00067]
⌈

Name:	sint64		
Type:	sint		
Range:	63 bit + 1 bit sign	--	-9223372036854775808..9223372036854775807 0x8000000000000000..0x7FFFFFFFFFFFFFFF
Description:	This standard AUTOSAR type shall be 64 bit signed.		

⌋ ( )

8.2.10 uint8_least

[SWS_Platform_00020]
⌈

Name:	uint8_least		
Type:	uint		
Range:	At least 8 bit	--	At least 0..255
Description:	This optimized AUTOSAR type shall be at least 8 bit unsigned.		

⌋ (SRS_BSW_00304)

See chapter 7.4 for implementation and usage.

8.2.11 uint16_least

[SWS_Platform_00021]
⌈

Name:	uint16_least		
Type:	uint		
Range:	At least 16 bit	--	At least 0..65535 0x0000..0xFFFF
Description:	This optimized AUTOSAR type shall be at least 16 bit unsigned.		

⌋ (SRS_BSW_00304)

See chapter 7.4 for implementation and usage.

8.2.12 uint32_least

[SWS_Platform_00022]
⌈

Name:	uint32_least		
Type:	uint		
Range:	At least 32 bit	--	At least 0..4294967295 0x00000000..0xFFFFFFFF
Description:	This optimized AUTOSAR type shall be at least 32 bit unsigned.		

⌋ (SRS_BSW_00304)

See chapter 7.4 for implementation and usage.

8.2.13 sint8_least

[SWS_Platform_00023]
⌈

Name:	sint8_least		
Type:	sint		
Range:	At least 7 bit + 1 bit sign	--	At least -128..+127 0x80..0x7F
Description:	This optimized AUTOSAR type shall be at least 8 bit signed.		

⌋ (SRS_BSW_00304)

See chapter 7.4 for implementation and usage.

8.2.14 sint16_least

[SWS_Platform_00024]

⌈

Name:	sint16_least		
Type:	sint		
Range:	At least 15 bit + 1 bit sign	--	At least -32768..+32767 0x8000..0x7FFF
Description:	This optimized AUTOSAR type shall be at least 16 bit signed.		

⌋ (SRS_BSW_00304)

8.2.15 sint32_least

[SWS_Platform_00025]

⌈

Name:	sint32_least		
Type:	sint		
Range:	At least 31 bit + 1 bit sign	--	At least -2147483648..+2147483647 0x80000000..0x7FFFFFFF
Description:	This optimized AUTOSAR type shall be at least 32 bit signed.		

⌋ (SRS_BSW_00304)

See chapter 7.4 for implementation and usage.

8.2.16 float32

[SWS_Platform_00041]

⌈

Name:	float32		
Type:	float		
Range:	32 bit	--	--
Description:	This standard AUTOSAR type shall be at least 32 bit float.		

⌋ ( )

8.2.17 float64

[SWS_Platform_00042]

⌈

Name:	float64		
Type:	double		
Range:	64 bit	--	--
Description:	This standard AUTOSAR type shall be at least 64 bit float.		

⌋ ( )

8.3 Symbol definitions

8.3.1 CPU_TYPE

[SWS_Platform_00064]
⌈

Name:	CPU_TYPE	
Type:	Enumeration	
Range:	CPU_TYPE_8	Indicating a 8 bit processor
	CPU_TYPE_16	Indicating a 16 bit processor
	CPU_TYPE_32	Indicating a 32 bit processor
Description:	This symbol shall be defined as #define having one of the values CPU_TYPE_8, CPU_TYPE_16 or CPU_TYPE_32 according to the platform.	

⌋ ( )

8.3.2 CPU_BIT_ORDER

[SWS_Platform_00038]
⌈

Name:	CPU_BIT_ORDER	
Type:	Enumeration	
Range:	MSB_FIRST	The most significant bit is the first bit of the bit sequence.
	LSB_FIRST	The least significant bit is the first bit of the bit sequence.
Description:	This symbol shall be defined as #define having one of the values MSB_FIRST or LSB_FIRST according to the platform.	

⌋ ( )

8.3.3 CPU_BYTE_ORDER

[SWS_Platform_00039]
⌈

Name:	CPU_BYTE_ORDER	
Type:	Enumeration	
Range:	HIGH_BYTE_FIRST	Within uint16, the high byte is located before the low byte.
	LOW_BYTE_FIRST	Within uint16, the low byte is located before the high byte.
Description:	This symbol shall be defined as #define having one of the values HIGH_BYTE_FIRST or LOW_BYTE_FIRST according to the platform.	

⌋ ( )

8.3.4 TRUE, FALSE

[SWS_Platform_00056]
⌈

Name:	TRUE_FALSE	
Type:	Enumeration	
Range:	TRUE	1
	FALSE	0
Description:	The symbols TRUE and FALSE shall be defined as follows: #ifndef TRUE #define TRUE 1 #endif #ifndef FALSE #define FALSE 0 #endif	

⌋ ( )

[SWS_Platform_00054] ⌈In case of in-built compiler support of the symbols, redefinitions shall be avoided using a conditional check. ⌋ ( )

[SWS_Platform_00055] ⌈These symbols shall only be used in conjunction with the `boolean` type defined in Platform_Types.h. ⌋ ( )

8.4 Function definitions

Not applicable.

8.5 Call-back notifications

Not applicable.

8.6 Scheduled functions

Not applicable.

8.7 Expected Interfaces

Not applicable.

9 Sequence diagrams

Not applicable.

10 Configuration specification

10.1 Published parameters

For details refer to the chapter 10.3 “Published Information” in *SWS_BSWGeneral*

11 Annex

11.1 Type definitions – general

[SWS_Platform_00057] ⌈The platform type files for all platforms shall contain the following symbols:

```
#define CPU_TYPE_8        8
#define CPU_TYPE_16       16
#define CPU_TYPE_32       32

#define MSB_FIRST         0
#define LSB_FIRST         1

#define HIGH_BYTE_FIRST   0
#define LOW_BYTE_FIRST    1
```

⌋ ( )

11.2 Type definitions – S12X

[SWS_Platform_00006] ⌈The platform types for Freescale S12X shall have the following mapping to the ANSI C types:

Symbols:

```
#define CPU_TYPE             CPU_TYPE_16
#define CPU_BIT_ORDER        LSB_FIRST
#define CPU_BYTE_ORDER       HIGH_BYTE_FIRST
```

Types:

```
typedef unsigned char        boolean;

typedef signed char          sint8;
typedef unsigned char        uint8;
typedef signed short         sint16;
typedef unsigned short       uint16;
typedef signed long          sint32;
typedef signed long long     sint64;
typedef unsigned long        uint32;
typedef unsigned long long   uint64;

typedef signed char          sint8_least;
typedef unsigned char        uint8_least;
typedef signed short         sint16_least;
typedef unsigned short       uint16_least;
typedef signed long          sint32_least;
typedef unsigned long        uint32_least;

typedef float                float32;
typedef double               float64;
```

⌋ ( )

11.3 Type definitions – ST10

[SWS_Platform_00007] ⌈The platform types for ST Microelectronics ST10 shall have the following mapping to the ANSI C types:

Symbols:

```
#define CPU_TYPE            CPU_TYPE_16
#define CPU_BIT_ORDER       LSB_FIRST
#define CPU_BYTE_ORDER      LOW_BYTE_FIRST
```

Types:

```
typedef unsigned char       boolean;

typedef signed char         sint8;
typedef unsigned char       uint8;
typedef signed short        sint16;
typedef unsigned short      uint16;
typedef signed long         sint32;
typedef signed long long    sint64;
typedef unsigned long       uint32;
typedef unsigned long long  uint64;

typedef unsigned short      uint8_least;
typedef unsigned short      uint16_least;
typedef unsigned long       uint32_least;
typedef signed short        sint8_least;
typedef signed short        sint16_least;
typedef signed long         sint32_least;

typedef float               float32;
typedef double              float64;
```

⌋ ()

11.4 Type definitions – ST30

[SWS_Platform_00008] ⌈The platform types for STMicroelectronics ST30 shall have the following mapping to the ANSI C types:

Symbols:

```
#define CPU_TYPE            CPU_TYPE_32
#define CPU_BIT_ORDER       LSB_FIRST
#define CPU_BYTE_ORDER      LOW_BYTE_FIRST
```

Types:

```
typedef unsigned char       boolean;

typedef signed char         sint8;
typedef unsigned char       uint8;
typedef signed short        sint16;
typedef unsigned short       uint16;
typedef signed long          sint32;
typedef signed long long     sint64;
typedef unsigned long        uint32;
typedef unsigned long long   uint64;

typedef unsigned long        uint8_least;
typedef unsigned long        uint16_least;
typedef unsigned long        uint32_least;
typedef signed long          sint8_least;
typedef signed long          sint16_least;
typedef signed long          sint32_least;

typedef float                float32;
typedef double               float64;
```

⌋ ()

11.5 Type definitions – V850

[SWS_Platform_00009] ⌈The platform types for NEC V850 shall have the following mapping to the ANSI C types:

Symbols:

```
#define CPU_TYPE             CPU_TYPE_32
#define CPU_BIT_ORDER        LSB_FIRST
#define CPU_BYTE_ORDER       LOW_BYTE_FIRST
```

Types:

```
typedef unsigned char        boolean;

typedef signed char          sint8;
typedef unsigned char        uint8;
typedef signed short         sint16;
typedef unsigned short       uint16;
typedef signed long          sint32;
typedef signed long long     sint64;
typedef unsigned long        uint32;
typedef unsigned long long   uint64;

typedef unsigned long        uint8_least;
typedef unsigned long        uint16_least;
typedef unsigned long        uint32_least;
typedef signed long          sint8_least;
typedef signed long          sint16_least;
typedef signed long          sint32_least;

typedef float                float32;
typedef double               float64;
```

⌋ ()

11.6 Type definitions – MPC5554

[SWS_Platform_00010] ⌈The platform types for Freescale MPC5554 shall have the following mapping to the ANSI C types:

Symbols:

```
#define CPU_TYPE            CPU_TYPE_32
#define CPU_BIT_ORDER       MSB_FIRST
#define CPU_BYTE_ORDER      HIGH_BYTE_FIRST
```

Types:

```
typedef unsigned char       boolean;

typedef signed char         sint8;
typedef unsigned char       uint8;
typedef signed short        sint16;
typedef unsigned short      uint16;
typedef signed long         sint32;
typedef signed long long    sint64;
typedef unsigned long       uint32;
typedef unsigned long long  uint64;

typedef unsigned long       uint8_least;
typedef unsigned long       uint16_least;
typedef unsigned long       uint32_least;
typedef signed long         sint8_least;
typedef signed long         sint16_least;
typedef signed long         sint32_least;

typedef float               float32;
typedef double              float64;
```

⌋ ()

11.7 Type definitions – TC1796/TC1766

[SWS_Platform_00011] ⌈The platform types for Infineon TC1796/TC1766 shall have the following mapping to the ANSI C types:

Symbols:

```
#define CPU_TYPE            CPU_TYPE_32
#define CPU_BIT_ORDER       LSB_FIRST
#define CPU_BYTE_ORDER      LOW_BYTE_FIRST
```

Types:

```
typedef unsigned char       boolean;

typedef signed char         sint8;
typedef unsigned char       uint8;
typedef signed short        sint16;
typedef unsigned short      uint16;
typedef signed long         sint32;
typedef signed long long    sint64;
typedef unsigned long       uint32;
typedef unsigned long long  uint64;

typedef unsigned long       uint8_least;
typedef unsigned long       uint16_least;
typedef unsigned long       uint32_least;
typedef signed long         sint8_least;
typedef signed long         sint16_least;
typedef signed long         sint32_least;

typedef float               float32;
typedef double              float64;
```

⌋ ()

11.8 Type definitions – MB91F

[SWS_Platform_00019] ⌈The platform types for Fujitsu MB91F shall have the following mapping to the ANSI C types:

Symbols:

```
#define CPU_TYPE            CPU_TYPE_32
#define CPU_BIT_ORDER       LSB_FIRST
#define CPU_BYTE_ORDER      HIGH_BYTE_FIRST
```

Types:

```
typedef unsigned char       boolean;

typedef signed char         sint8;
typedef unsigned char       uint8;
typedef signed short        sint16;
typedef unsigned short      uint16;
typedef signed long         sint32;
typedef signed long long    sint64;
typedef unsigned long       uint32;
typedef unsigned long long  uint64;

typedef unsigned long       uint8_least;
typedef unsigned long       uint16_least;
typedef unsigned long       uint32_least;
typedef signed long         sint8_least;
typedef signed long         sint16_least;
typedef signed long         sint32_least;

typedef float               float32;
typedef double              float64;
```

⌋ ()

11.9 Type definitions – M16C/M32C

[SWS_Platform_00058] ⌈The platform types for Renesas M16C and M32C shall have the following mapping to the ANSI C types:

Symbols:
```
#define CPU_TYPE            CPU_TYPE_16
#define CPU_BIT_ORDER       LSB_FIRST
#define CPU_BYTE_ORDER      LOW_BYTE_FIRST
```

Types:
```
typedef unsigned char       boolean;

typedef signed char         sint8;
typedef unsigned char       uint8;
typedef signed short        sint16;
typedef unsigned short      uint16;
typedef signed long         sint32;
typedef signed long long    sint64
typedef unsigned long       uint32;
typedef unsigned long long  uint64;

typedef unsigned short      uint8_least;
typedef unsigned short      uint16_least;
typedef unsigned long       uint32_least;
typedef signed short        sint8_least;
typedef signed short        sint16_least;
typedef signed long         sint32_least;

typedef float               float32;
typedef double              float64;
```
⌋ ()

11.10 Type definitions – SHx

[SWS_Platform_00059] ⌈The platform types for Renesas SHx shall have the following mapping to the ANSI C types:

Symbols:
```
#define CPU_TYPE            CPU_TYPE_32
#define CPU_BIT_ORDER       LSB_FIRST
#define CPU_BYTE_ORDER      HIGH_BYTE_FIRST
```

Types:
```
typedef unsigned char       boolean;

typedef signed char         sint8;
typedef unsigned char       uint8;
typedef signed short        sint16;
typedef unsigned short      uint16;
typedef signed int          sint32;
typedef signed long long    sint64;
typedef unsigned int        uint32;
typedef unsigned long long  uint64;

typedef unsigned long       uint8_least;
typedef unsigned long       uint16_least;
typedef unsigned long       uint32_least;
typedef signed long         sint8_least;
typedef signed long         sint16_least;
typedef signed long         sint32_least;

typedef float               float32;
typedef double              float64;
```

⌋()

12 Not applicable requirements

[SWS_Platform_00063] ⌈These requirements are not applicable to this specification. ⌋ (SRS_BSW_00344, SRS_BSW_00404, SRS_BSW_00405, SRS_BSW_00345, SRS_BSW_00159, SRS_BSW_00167, SRS_BSW_00171, SRS_BSW_00170, SRS_BSW_00380, SRS_BSW_00419, SRS_BSW_00381, SRS_BSW_00412, SRS_BSW_00383, SRS_BSW_00384, SRS_BSW_00387, SRS_BSW_00388, SRS_BSW_00389, SRS_BSW_00390, SRS_BSW_00391, SRS_BSW_00392, SRS_BSW_00393, SRS_BSW_00394, SRS_BSW_00395, SRS_BSW_00396, SRS_BSW_00397, SRS_BSW_00398, SRS_BSW_00399, SRS_BSW_00400, SRS_BSW_00375, SRS_BSW_00101, SRS_BSW_00416, SRS_BSW_00406, SRS_BSW_00168, SRS_BSW_00407, SRS_BSW_00423, SRS_BSW_00429, SRS_BSW_00432, SRS_BSW_00336, SRS_BSW_00337, SRS_BSW_00338, SRS_BSW_00369, SRS_BSW_00339, SRS_BSW_00422, BSW00420, SRS_BSW_00417, SRS_BSW_00323, SRS_BSW_00409, SRS_BSW_00385, SRS_BSW_00386, SRS_BSW_00161, SRS_BSW_00162, SRS_BSW_00005, SRS_BSW_00415, SRS_BSW_00164, SRS_BSW_00325, SRS_BSW_00326, SRS_BSW_00342, SRS_BSW_00343, SRS_BSW_00160, SRS_BSW_00007, SRS_BSW_00300, SRS_BSW_00413, SRS_BSW_00347, SRS_BSW_00305, SRS_BSW_00307, SRS_BSW_00310, SRS_BSW_00373, SRS_BSW_00327, SRS_BSW_00335, SRS_BSW_00350, SRS_BSW_00408, SRS_BSW_00410, SRS_BSW_00411, SRS_BSW_00346, SRS_BSW_00158, SRS_BSW_00314, SRS_BSW_00370, SRS_BSW_00348, SRS_BSW_00361, SRS_BSW_00301, SRS_BSW_00302, SRS_BSW_00328, SRS_BSW_00312, SRS_BSW_00357, SRS_BSW_00377, SRS_BSW_00355, SRS_BSW_00306, SRS_BSW_00308, SRS_BSW_00309, SRS_BSW_00371, SRS_BSW_00358, SRS_BSW_00414, SRS_BSW_00376, SRS_BSW_00359, SRS_BSW_00360, SRS_BSW_00329, SRS_BSW_00330, SRS_BSW_00331, SRS_BSW_00009, SRS_BSW_00401, SRS_BSW_00172, SRS_BSW_00010, SRS_BSW_00333, SRS_BSW_00374, SRS_BSW_00379, SRS_BSW_00321, SRS_BSW_00341, SRS_BSW_00334⌋ ( )