

MICROSAR 4

Product Information

Version 1.00.03

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1 Introduction

All modules and options are described in the [general Product Information](#) (please refer to the link “Product Descriptions”).

In addition to the general Product Information, this document provides additional details to the offered items.

2 General Information

**Note**

This chapter provides important information that applies for using MICROSAR basic software.

2.1 Compiler Warnings

Due to the use of standard software modules for a huge number of different hardware platforms and different compilers it is not possible to avoid compiler warnings completely. Vector tries to keep its software free of warnings, but in some cases it is not possible or it may decrease performance.

Vector provides a list of known compiler warnings with each delivery of a Production SIP.

2.2 Delivery of Stub Modules

The delivery (SIP) may include implementations for BSW modules which are only sample code and only intended to illustrate an example of a possible BSW implementation (“Stub-Modules”).

- > Stub-Modules are not part of the ordered BSW modules and have been added by Vector voluntarily and free of charge solely in order to provide to the customer additional support by facilitating a preliminary assembly and test of the ordered BSW modules.
- > Stub-Modules have not passed any quality control measures at Vector and are not intended for use in production.
- > Stub-Modules may only be used as a starting point for an own implementation if
 - > the Stub-Modules are modified by the customer to the extent necessary; and
 - > the complete implementation, including the Stub-Modules and any other parts provided by Vector, are executed and tested by the customer with diligent care.
- > Stub-Modules can be identified by the comment section “SAMPLE CODE ONLY” in the implementation files. The implementation of Stub-Modules can be found in BSW\<Msn>_Stub. Generated files are located in the generator “Source” folder using the naming convention <Msn>_Stub.c/h.

2.3 Scope of Delivery

Each delivery contains the ordered software modules including their generators as well as the corresponding documentation. In addition there will be the following items included or available.

2.3.1 Test Report

Each delivery of a Production SIP includes a report about executed tests and their results.

Test specifications are not part of a delivery, but they can be reviewed at Vector upon request.

2.3.2 MISRA

The offered basic software modules will be checked for compliance with the MISRA rules (MISRA-C:2004, QAC 7.0) based on typical configurations. On request we will send you the list of exceptions.

A test report based on the customer's configuration has to be ordered explicitly.

2.4 Test of External Hardware

Delivery tests are able to incorporate testing of external hardware such as EEPROM, watchdog or transceiver devices, which are connected to the micro controller e.g. through SPI or DIO pins.

As DIO driver and SPI driver controlling the external devices are part of the MCAL, it is a prerequisite to order the SIP position "MCAL Integration" when external devices shall be tested during delivery tests.

2.5 Test of 3rd Party Modules

As part of the integration 3rd party modules are configured, compiled and linked with the test and/or demo setup. Runtime integration tests focus on Vector's modules. Therefore the functionality of the 3rd party modules is only tested implicitly, as far as needed for Vector's modules to run properly.

2.6 Usage of Features that are not Licensed

BSW features that are not explicitly listed in the order confirmation are not licensed. If the BSW configuration enables a feature that has not been licensed a warning message will be shown or the build or generation process will abort with an error. (e.g. issued at code generation time).

In case of a warning message the feature remain fully functional. The license violation will be communicated in the format "License Violation" and an additional description that describes the kind of violation.

If the build or generation process yields such a "License Violation" the feature may be used for evaluation purposes but must not be used for serial production as:

- > the feature is not licensed for serial production purposes
- > the feature may include code that is incomplete and/or only partly tested
- > there will be no issue tracking, no remedy of defects and no liability for the feature

To avoid the "License Violation" for serial production either:

- > Contact Vector and request an update which includes the license for the feature.
- > Modify the configuration in such a way that does not violate the license.

2.7 Issue Tracking

As long as the SIP is under maintenance, Vector provides an active issue reporting for the delivered BSW modules and the RTE including their code generators. The issue report contains all open issues and is sent periodically to the provided email contacts.

Vector's maintenance does not include issue tracking for 3rd party modules. This has to be handled by the 3rd party.

2.7.1 DaVinci Tools

Issues of the DaVinci tools are not part of the active issue reporting. The issue lists can be downloaded from our internet portal:

[DaVinci Developer Link](#)

[DaVinci Configurator Link](#)

2.8 Warranty

Vector grants warranty for all modules, which have been licensed by Vector. These are the modules developed by Vector. For modules developed by 3rd party vendors reduced warranty is granted. Please see below for details.

2.8.1 3rd Party Modules

Vector does not provide any warranty, liability or issue tracking for 3rd party modules. These topics have to be stipulated with the 3rd party supplier directly.

If the 3rd party modules are configured using DaVinci Configurator, warranty and issue tracking will be given only for the correct integration into the tool, i.e. correct mapping of GUI item to ECUC item and correct control of the generation process.

3 Modules and Options



Note

This chapter defines important constraints and limitations of MICROSAR BSW modules and options that may have been offered or delivered.

3.1 DBG

MICROSAR DBG (XCP based) uses XCP as communication protocol (unlike specified by AUTOSAR). This results in a more efficient implementation and allows usage of existing XCP standard tools such as CANoe.AMD or CANape. To make use of all features including Runtime Measurement (RTM), CANoe.AMD version 8.1 or higher is required.

3.2 DLT (XCP-based)

MICROSAR DLT (XCP-based) uses XCP as communication protocol (unlike specified by AUTOSAR). This results in a more efficient implementation and allows usage of existing XCP standard tools such as CANoe.AMD or CANape. To make use of all features including Runtime Measurement (RTM), CANoe.AMD version 8.1 or higher is required.

3.3 DLT (AUTOSAR)

MICROSAR DLT (AUTOSAR) implements the AUTOSAR DLT protocol. The DLT communication interface supports PDU transmission and reception through SOAD.

3.4 Drivers (CAN, LIN, FR, ETH, MCAL)

> Support of Different Modes

On those microcontrollers, which support different modes like user mode and privileged mode or supervisor mode, the driver's implementation is designed to run in privileged or supervisor mode. Rationale: Full access to all registers assigned to the corresponding hardware unit controller is required.

> Support of FR Controllers

Some platform derivatives include 2 FlexRay controllers. MICROSAR will explicitly support only one of the available FlexRay controllers, with up to 2 FlexRay channels.

3.5 FEE

Caused by physical restrictions of flash memory devices, MICROSAR FEE offers two alternative implementation concepts. Each has distinct advantages and drawbacks. At configuration time one has to be chosen per memory block:

> Single Sector Usage

This concept ensures robustness against a high number of reset events but requires a higher number of erase and write cycles on the flash memory device shortening its life time.

- > **Parallel Sector Usage**
This concept reduces the number of erase and write cycles but leaves a low risk of data loss.

3.6 IDM - Variant Handling / Post-Build Selectable

By default, MICROSAR supports the configuration variant Pre-Compile without variant handling. The option MICROSAR Identity Manager (IDM) implements post-build selectable which allows choosing between several ECU behaviors at startup time. Variants are defined pre-compile time.

If AUTOSAR variant handling is requested the option IDM lists the clusters that support variant handling.

Please note the following constraints when using the option (IDM):

- > **IDM (COM):** Transformers are excluded
- > **IDM (DIAG):** DCM supports the communication side only. Variance of diagnostic services is modelled as a superset in the input files. Using DCM APIs it is possible to enable/disable services at runtime.
- > **IDM (DIAG):** DEM allows enabling/disabling of DTCs and selected features to be variant specific.
- > It is assumed that all BSW modules are used in all variants. It is not possible to not use a module in one or more variants.

To ensure that the required use-cases are supported, please provide your use-cases to Vector.

3.7 MCAL Integration Package

An MCAL integration is only possible if

- > the MCAL version is communicated to Vector as part of the answer to the Questionnaire Step II at the latest 6 weeks before the planned delivery date.
- > the specified MCAL is available in general.

On most HW platforms the MCAL integration will result in the delivery of two artefacts as part of the SIP:

- > **MCAL Integration Helper Tool:** This tool allows placing a 3rd party MCAL into the SIP as self-service as well as MCAL specific maintenance activities such as derivative selection and supports the user in up-grading or down-grading the MCAL version.
- > **Included 3rd party MCAL:** The Questionnaire Step II will contain an upload link where the customer can send MCAL files to Vector to proof ownership. If the customer sends the MCAL (which has to match the specified MCAL version from Questionnaire Step II and which must encompass all artefacts including implementation, tooling and license files) not later than 4 weeks before the planned delivery date, Vector will use these files during testing and also include them in the delivery. If the MCAL is not sent in time, the SIP will not contain an MCAL and the customer will have to include the MCAL using the MCAL Integration Helper Tool.

3.8 OS

3.8.1 Option: Multi-Core

MICROSAR BSW is running on a single core by default. Calls to other cores are not supported.

Additional Multi-core extensions for OS, BSW and RTE are available. If applicable, Multi-core extensions for MICROSAR are listed explicitly in the quote.

3.8.2 Option: Schedule Table Synchronization

Schedule table synchronization will be done with the accuracy of the system counter. If a better precision of the synchronization is required the operating system add-on “High Resolution Timer & Synchronization” has to be ordered.

3.9 PBL - Post-Build Loadable

By default, MICROSAR supports the configuration variant Pre-Compile, without the possibility to update the ECU configuration at post-build time. The option Post-Build Loadable (PBL) provides support for a post-build time update.

If post-build loadable is requested the option PBL lists the clusters that support a post-build time update of the configuration. Post-build loadable allows changing aspects of the ECU's communication matrix after the software has been downloaded to the ECU. The post-build time update process does not require the usage of a compiler. Only post-build configuration data (e.g. a dedicated flash page) are downloaded to the ECU.

Deliveries supporting post-build loadable include a license for the DaVinci Configurator that will allow the OEM to perform an update at post-build time without the need of own tool licenses.

Please note the following constraints when using the option PBL:

- > A check if the chosen compiler and compiler options are supported by the post-build time update process is performed as part of the Software Integration Package (SIP)
- > PBL (COM): Transformers are excluded
- > PBL (COM): Deleting signals at post-build time is only allowed for signals that have been added in a previous post-build loadable update.
- > PBL (ETH): Only selected features of SD and SOAD support PBL
- > PBL (DIAG): DCM supports an update of communication aspects only. Diagnostic services are excluded
- > PBL (DIAG): DEM allows enabling/disabling of DTCs and selected features at post-build time
- > The post-build loadable update of an ECU is typically performed by the OEM. As a prerequisite, the Tier1 needs to forward the MICROSAR SIP and his DaVinci ECU configuration project to the OEM. The forwarded SIP must not include any c-files which have to be deleted by the Tier1 in advance.
- > With respect to the System Description the following limitations apply:
 - > ComIPdu

- > Pdu.shortName has to be unique
- > The Pdu is referenced by only one PduToFrameMapping in a frame with only one triggering for each direction
- > ComSignal, ComSignalGroup, ComGroupSignal:
 - > ISignalToIPduMapping.shortName has to be unique
 - > Only one triggering for each direction

To ensure that the required use-cases are supported, please provide your use-cases to Vector.

3.10 RTE

The MICROSAR RTE uses the AUTOSAR 4.3 APIs Interrupt Source and Hardware Peripheral Access to allow hardware specific components to safely access peripherals. The MICROSAR OS provides these APIs. If a non MICROSAR OS is used, these APIs need to be provided either by the OS or by integrator code.

3.11 WDGM

The default implementation of the WDGM supports only “Alive Supervision”. In case “Deadline Supervision” or “Logical Supervision” (control flow monitoring) functionality is required (e.g. in safety projects due to IEC 61508 or ISO26262), it is supported by the SafeWatchdog module.

4 SIP Extensions

The following extensions are available as product services, carried out by Vector.

4.1 Customer Hardware

Integration and test of the Software Integration Package (SIP) is done on the customer specific hardware instead of an evaluation board. Prerequisite is the provision of the complete development environment:

- > ECU or Customer Hardware
- > Additionally required hardware, e.g. wiring harness, etc.
- > IDE/compiler, linker and workbench incl. license (if not available at Vector)
- > debugger (incl. license) & connector (if not available at Vector)

It is the customer's responsibility to ensure that the hardware is running. This may require that necessary software has to be handed over to Vector. All required drivers to setup the hardware must be available for integration. In case the SIP includes generic drivers (e.g. Transceiver, SBC, etc.) it is the responsibility of the customer to provide the concrete software implementation for such hardware. In case the software drivers are not available in time or do not work properly, Vector will not be able to setup the system and will not be able to perform the required tests.

At project start, the detailed requirements will be clarified with the customer.

After initial operation of the hardware has been achieved, the different software modules are integrated and the integration tests are performed.

Please be aware that the SIP lead time is based on the following milestones:

- > to provide the development environment within 2 weeks after purchase order
- > to get the development environment running within 1 week.

4.2 Start Application

The initial delivery of a project includes a free of charge Start Application (including the complete build environment). The Start Application is based on the ECU specific input data for communication (e.g. ECU Extract) and diagnostics (e.g. ECUC). It demonstrates basic SIP functionality based on the ordered modules. Some examples are listed below.

- > Communication: The SWCs included in the Start Application demonstrate the reception and transmission of one signal on runnable level. The BSW is configured in a way that the system gets initialized and communicates on all communication busses defined in the input data.
- > Diagnostics: The SWCs included in the Start Application will be extended by a sample implementation of an RDBI/WDBI service on runnable level. Moreover it offers the possibility to trigger a DTC.

- > Memory: The SWCs included in the Start Application will be extended by a sample implementation to store data in a NV-Block.

Preconditions

A Start Application can be provided by Vector if the following preconditions are met:

- > The order contains a complete MICROSAR Basic Software stack (incl. 3rd party MCAL & MICROSAR RTE)
- > The customer provides the databases for communication & diagnostics prior to the project start.

Deliverables

- > SIP Modules
- > Start Application

Test reports

- > Vector test reports

5 Definition of SLP/HLP/SIP, Maintenance and Release Types



Caution

The programs are fully operative programs. However there are program parts (features) not thoroughly tested yet (beta feature).

These beta features are documented in chapter 2.4 of the issue report provided with the delivery. For each beta feature the issue report contains information how to handle (deactivate) this beta feature.

With regard to the fact that the program includes features as beta-version, Vector's liability shall be expressly excluded in cases of ordinary negligence, to the extent admissible by law or statute.

5.1 Software License Package (SLP)

The SLP includes the license and usage rights (see quotation) for a hardware-independent module (e.g. a COM layer) based on a defined specification.

Depending on the type of module, the software will be based on the following technical specifications:

- > AUTOSAR, ASAM, OSEK/VDX, ISO, HIS, etc.
- > OEM requirements (for OEM-specific deliveries)
- > Customer-specific requirements (optional)

The following work products are licensed by purchase of an SLP:

- > The module as source code
- > Detailed technical documentation
- > Generator plug-in to generate ANSI C code
- > Configuration files for convenient configuration with Vector configuration tools

The module will be tested using a component test suite on a standard hardware platform (CANoe Emulation). Integration testing on the specific μ Controller and delivery will be performed when a SIP is purchased (see section 5.3).

5.2 Hardware License Package (HLP)

The HLP includes the license and usage rights (see quotation) for a hardware-dependent module (e.g. CAN Driver) and is valid for a combination of compiler (version independent), microcontroller family and relevant hardware (e.g. CAN cell).

Depending on the type of module, the software will be based on the following technical specifications:

- > AUTOSAR, ASAM, OSEK, ISO, HIS, etc.

- > OEM requirements (for OEM-specific deliveries)
- > Customer-specific requirements (optional)
- > Specification of microcontroller and compiler

The following work products are licensed by purchase of an HLP:

- > The module as source code
- > Detailed technical documentation
- > Generator plug-in to generate ANSI C code
- > Configuration files for convenient configuration with Vector configuration tools.

The module will be tested using a component test suite on a derivative of the microcontroller family which is defined by Vector. Integration testing on the specific μ Controller and delivery will be performed when a SIP is purchased (see section 5.3).

5.3 Software Integration Package (SIP)

The SIP includes integration, test, release and delivery of the modules that are licensed by an SLP and/or an HLP.

To perform integration and closely test the customer's use case, the following must be defined in accordance with the customer:

- > Microcontroller derivative
- > Compiler, compiler version, and compiler options
- > Use case (e.g. number of CAN channels)
- > Car manufacturer (regarding communication description, pre-configuration...)

For each SIP, all delivered work products will be added to a configuration management system, thus allowing redeliveries for a minimum of 10 years (excluding the Beta SIPs).

5.4 Mini SIP

The Mini SIP includes the delivery of individual modules. The software is tested on module level. The delivery is not tested on the target hardware and compiler. But Vector provides remedy of defects if they are based on defined processor and compiler mentioned in the quote.

5.5 SIP Types

5.5.1 Beta

A Beta SIP can only be ordered in combination with a Production SIP. Depending on the agreement with the customer, the software may include the complete or reduced functionality. The software is only preliminary integrated and tested. The usage of a Beta SIP for serial production is prohibited. The Beta SIP software may only be used for test purposes. Vector grants no warranty and/or liability to the extent permitted by law or statute.

5.5.2 Production

A Production SIP is a package which includes the release for serial production.

5.5.3 Update

An Update SIP is a package which replaces a previous Production SIP. An Update SIP is necessary if an additional delivery is needed because of modified requirements (compiler version, options, functionality, etc.). The delivery will be performed according to the existing contractual agreement and must be scheduled with Vector.

5.5.4 Prototype

A Prototype SIP is a special package which may only be purchased by a Tier 1. The use is limited to a defined application area, e.g. prototyping. The software is only preliminary integrated and tested. The SIP is only available for platforms which are already supported by Vector. License packages (HLP, SLP) are not necessary. An upgrade to a Production SIP is only possible if identical technical features are used and the Prototype SIP is not older than one year. Vector grants no warranty and/or liability to the extent permitted by law or statute.

5.5.5 Overview SIP Types

The following table lists the scope of services, deliverables and release types for each SIP Type

SIP Type / Mini SIP		Beta	Production	Update	Prototype
Scope of Services	Integration and test of selected modules	■	■	■	■
	Delivery	■	■	■	■
	Remedy of defects		■	■	
Deliverables	Software (Source or object code dependent on the contractual agreement - NDA)	■	■	■	■
	Documentation	■ ¹	■	■	■ ¹
	Test report		■ ⁴	■	
	Demo application	■ ²	■ ^{2,4}		
Release Types ³	Quickfix	■			
	Development	■		■	■
	Pre Production		■	■	
	Production		■	■	
	Production (Safe)		■	■	

¹ The documentation is not necessarily complete

² Depends on the OEM package

³ Release Types are described in detail on page 6

⁴ Not part of the Mini SIP

Table 5-1 Overview SIP Types

5.6 Maintenance

Maintenance of Vector embedded software is available for the SLP, HLP and SIP. Maintenance generally includes bug-fixing.

**Note**

Only the latest delivered version will be maintained.

5.6.1 SLP Maintenance

The maintenance of the SLP includes the adaptation of the appropriate working products (components, documentation, generators ...). The SLP Maintenance includes:

- > Adaptations caused by “minor” or “patch”-version modifications of the related AUTOSAR specification. In case of new functions, the extension of the licensed functionality has to be discussed with Vector.
- > Adaptations caused by comparable changes of other specifications based on Vector’s assessment.
- > Registered RfCs for the AUTOSAR Specification are included as far as they are required by the OEM.

Deliveries are not included as part of SLP maintenance; they are part of SIP maintenance.

The SLP maintenance period begins with the first delivery.

5.6.2 HLP Maintenance

The maintenance of the HLP includes the adaptation of the appropriate work products (components, documentation, generators ...). The HLP maintenance includes:

- > Adaptations caused by “minor” or “patch”-version modifications of the related AUTOSAR specification. In case of new functions, the extension of the licensed functionality has to be discussed with Vector.
- > Adaptation caused by comparable changes of other specifications based on Vector’s assessment.
- > Adaptation caused by minor hardware changes based on Vector’s assessment.
- > The implementation of simple workarounds for hardware issues.

Deliveries are not included as part of HLP maintenance; they are part of the SIP maintenance.

The HLP maintenance period begins with the first delivery.

5.6.3 SIP Maintenance

The SIP Standard Maintenance includes:

- > Reporting about known issues (“Active Issue Reporting”).
- > One delivery per year (Update SIP or update of a Beta SIP)

**Note**

This update will be delivered on customer request.

- > If a bug-fix delivery is needed on short notice such a delivery will be performed without comprehensive tests. In this case the status of the delivery will be a Beta or Pre Production (see Release Types in chapter 5.7).
A Production Release has to be scheduled with Vector separately.

The SIP maintenance period starts with the first delivery of the product (Beta SIP or Production SIP).

In addition to the SIP Standard Maintenance, Vector offers SIP Extended Maintenance and SIP Production Maintenance.

SIP Extended Maintenance contains the same features as SIP Standard Maintenance. It includes one further delivery per year (Update SIP or Beta SIP).

SIP Production Maintenance only includes reporting about known issues ("Active Issue Reporting"). But Vector provides remedy of defects in case of high or critical issues. SIP Production Maintenance requires Standard or Extended Maintenance for more than 2 years.

5.6.4 Differentiation of warranty versus maintenance

The table shows the scope of services depending on validity of warranty and/or maintenance:

	SIP Maintenance running	SIP Maintenance expired
Warranty period running	Bugfixing ✓	Bugfixing ✓
	Issue reporting ✓	Issue reporting ✓
Warranty period expired	Bugfixing ✓	Bugfixing ✗
	Issue reporting ✓	Issue reporting ✗

Table 5-2 Scope of services

5.7 Release Types

The release type gives information about the scope of function, quality and application field restrictions of the delivered software. The release type depends on the delivered Software Integration Package and is defined in the delivery description.

5.7.1 QuickFix

A QuickFix delivery is an immediate reaction on customer requests. The content of a QuickFix delivery is individually agreed with the customer. Only available as supplement to a development release.

5.7.2 Development

The software includes operational standard functions. Feature extensions of the software are not verified finally and the development process is not fully implemented. The usage of the software is intended for development phase or prototyping.

5.7.3 Pre Production

The software is operational but verification measures have not been completed. The usage of the software is intended for development and preproduction phase.

5.7.4 Production

For all features included in the software planned verification measures have been completed and all known issues are documented. The usage for serial production is allowed if the documented issues are considered.

5.7.5 Production (Safe)

For all features included in the software planned verification measures have been completed and all known issues are documented. Modules needed in a defined ASIL have been included. The usage for serial production is allowed if the documented issues are considered. Delivery includes Safety Case documentation.

**Note**

To reach this release type, the Safety Case has to be ordered separately.