Feature Document (FD)

Manual Low Beam

<<Feature>>
(F000998)

Document Type	**Feature Document (FD)**		
Template Version	**6.0 / FFSD7.1**		
SysML Report Template Version	**N (4/18/2019)**		
Document ID	**ffst01.10_featuredocument_sysmlreporttemplate**		
Document Location			
Document Owner	**Lukas Löhmann (lloehman)**		
Document Revision	**FD0**		
Document Status	**Draft**		
Date Issued	**2019-05-23**		
Date Revised	**2019-05-23**		
Document Classification	GIS1 Item Number:	**27.60/35**	
	GIS2 Classification:	**Confidential**	

Document Approval			
Person	Role	Email Confirmation	Date

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1 INTRODUCTION

1.1 Document Purpose

A Feature Document (FD) document specifies **what** the feature shall do and how it shall behave from customer perspective. It should also provide reasoning and background **why** we have the feature in the vehicle.

The FD also serves as an Item Definition as defined by ISO26262 for those features, which follow the Ford Functional Safety process.

To get more information about the concept of feature, function and component level abstraction refer to the Ford RE Wiki. For details on the Ford Functional Safety (ISO26262) process refer to the Ford Functional Safety Sharepoint.

1.2 Document Scope

This Feature Document (FD) specifies the following features:

Feature ID	Feature Name	Owner	Reference
F000998	Manual Low Beam (Program(s): Core)	Lukas Löhmann (lloehman)	

Table 1: Features described in this FD

1.3 Document Audience

The FD is written by the feature owner of Lukas Löhmann (lloehman). All Stakeholders, i.e., all people who have a valid interest in the feature should read and, if possible, review the FD. It needs to be guaranteed, that all stakeholders have access to the currently valid version of the FD.

*#**Hint:** The FD template has the IP Classification "Proprietary" by default. IP Classification "Confidential" might be required in some cases, e.g. by Ford Functional Safety.*

1.3.1 Stakeholder List

For the latest list of stakeholder of the feature and their influence refer to <Put VSEM Link here>.

*#**Hint:** Refer to Ford RE Wiki – Stakeholder List on how to create a stakeholder list. The stakeholder list should be stored in VSEM in the pseudo folder "General Data Artifacts" of the corresponding feature.*

1.4 Document Organization

1.4.1 Document Context

Refer to the Specification Structure page in the Ford RE Wiki to understand how the FD relates to other Ford Requirements Documents and Specifications.

1.4.2 Document Structure

The structure of this document is explained below:

Section 1 – Introduction how to use this document including responsibilities and requisite documents. Explains the terminology. Gives a clarification of the definitions, concepts and abbreviations used in the document.

Section 2 – Feature Description. States briefly the background and the purpose of the feature, feature variants and corresponding regions and markets. Also includes input requirements, assumptions and constraints.

Section 3 – Feature Context describes all external entities, which have an influence on the feature.

Section 4 – Feature Modeling. Contains Use Case, Driving Scenarios, State Charts to describe the functional behavior of the feature.

Section 5 – Safety. Lists System Behaviors and Safety Goals of the feature.

Section 6 – Feature Requirements. Lists functional and non-functional requirements of the feature.

Section 7 – Architecture. Shows the coarse architecture, which the feature requirements are deployed to. Describes the elements and the boundary of the feature as well as the decomposition and distribution of associated functions.

Section 8 – List of Open Concerns

Section 9 – Document Change History including a list of new or modified requirements. The requirements in this document are tagged, and this section contains different types of tables listing all, new, or changed requirements by their title and page no.

Section 10 – Appendix

*#**Hint:** All sections are mandatory, unless explicitly marked by the tag "#Classification" as "optional" or as applicable e.g. to certain domains like "Functional Safety".*

1.5 Document Conventions

1.5.1 Requirements Templates

Each requirement, use case or scenario in this specification shall follow the corresponding template given in the document template *Specification_Macros.dotm* at RE Wiki - Specification Templates.

1.5.1.1 Identification of requirements

1.5.1.2 Requirements Attributes

The templates provided by *Specification_Macros.dotm* define a list of attributes for each requirement. This helps to classify the requirement. The attributes are explained at RE Wiki - Requirements Attributes.

2 FEATURE OVERVIEW

2.1 Purpose and Description of Feature

*#**Hint:** Some descriptive text to explain the purpose and functionality of the feature.*

The primary goal of the Manual Low Beam feature is to illuminate the road for the driver to provide road visibility during the nighttime. Futher to indicate the presence of the vehicle by providing light at the front of the vehicle.

In an (semi-) autonomous vehicle it has also the purpose to support the sensor system at its best.

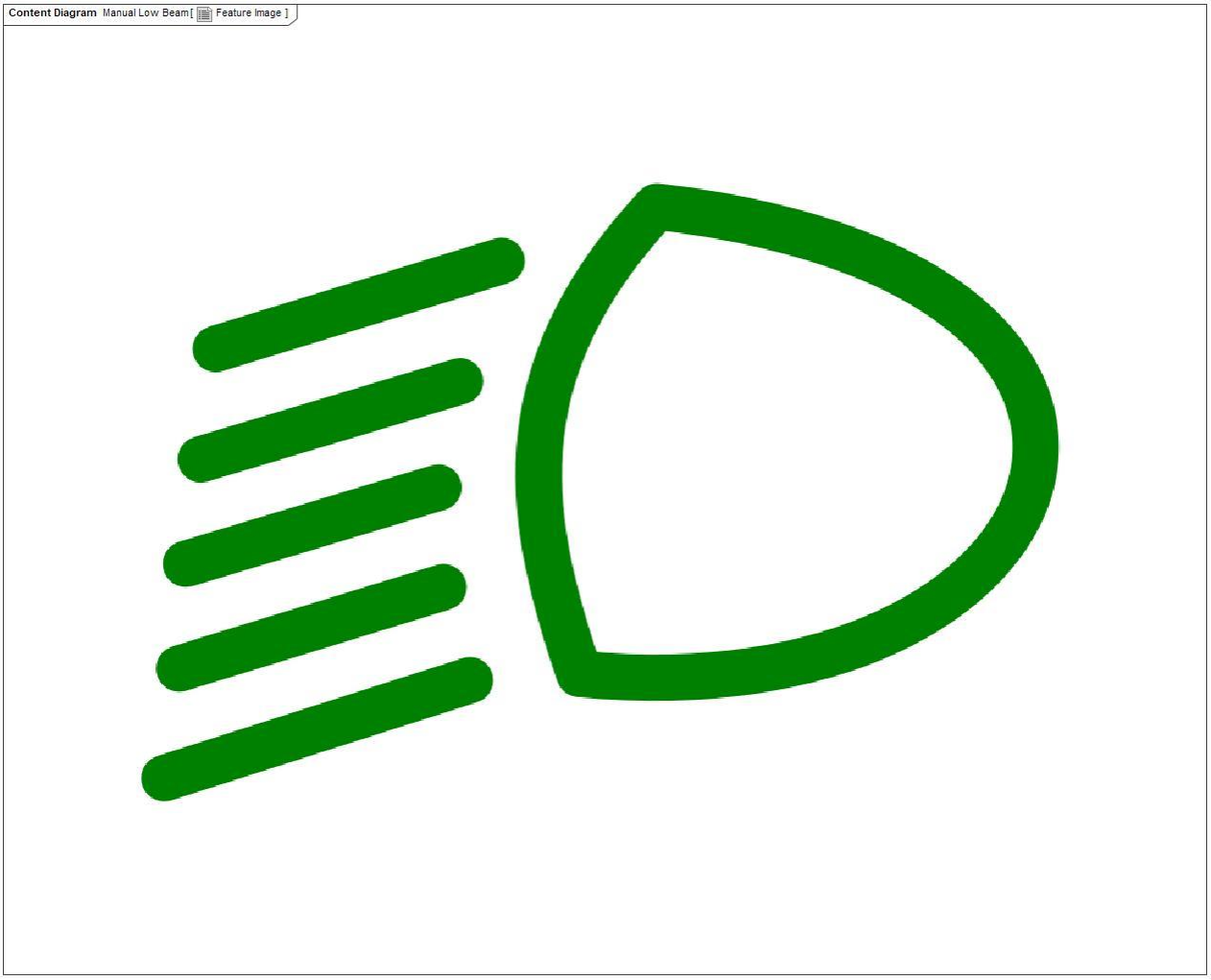


Figure 1: Feature Image

2.2 Feature Variants

*#**Hint:** Definitions for different variants of the feature (if applicable). Give each variant a descriptive name by which it can be referenced further on in the document. If no variant exists, state "No Feature Variants".*
The Variant Description should give a short informative text which describes the variants of the feature.

Variant Name	Variant Description	Remarks
Manual Low Beam	Describtion	

Table 2: Feature Variants

2.2.1 Regions & Markets

*#**Hint:** Description of purpose and functionality of the feature. If there is no variant, give feature name in first column.*

Market / Region / Variant Name	North America	South America	Europe	Middle East/Africa	Asia / Pacific	China
Manual Low Beam	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory

Table 3: Regions & Markets

2.3 Input Requirements

*#**Hint:** List all input requirements, which are relevant for the feature. Typically, attribute requirements, legal requirements as well as national and international standards have to be considered.*

2.3.1 Legal Requirements

- : ECE-R8
  - The feature shall be comliant with ECE-R8
- : ECE-R20
  - The feature shall be compliant with ECE-R20
- : ECE-R48
  - The feature shall be compliant with ECE-R48
- : ECE-R98
  - The feature shall be compliant with ECE-R98
- : ECE-R112
  - The feature shall be compliant with ECE-R112
- : ECE-R121
  - The feature shall be compliant with ECE-R121
- : ECE-R123
  - The feature shall be compliant with ECE-R123
- : FMVSS 108 and CMVSS 108
  - The feature shall be compliant with FMVSS (U.S.A) / CMVSS (Canada)
- : GB 4785 (China)
  - The feature shall be compliant with GB 4785

2.3.2 Attribute Requirements

- : Feature States
  - The Manual Low Beam feature shall be activated depending on other feature states.
- : Indicate Activation
  - When the Manual Low Beam is activated the activation shall be indicated.
- : Indicate Feature Failures
  - The Manual Low Beam feature shall indicate any possible failures.
- : Provide Illumination
  - The primary goal of the Manual Low Beam feature is to illuminate the road for the driver to provide road visibility during the nighttime. Futher to indicate the presence of the vehicle by providing light at the front of the vehicle.

2.4 References

2.4.1 Ford Documents

List here all Ford internal documents, which are directly related to the feature.

Reference	Title	Doc. ID	Document Location	Revision

Table 4: Ford internal Documents *(not specified in SysML model)*

2.4.2 External Documents and Publications

The list of external documents could include books, reports and online sources.
*#**Hint:** You may refer to IEEE Citation Reference on how to format a reference.*

Reference	Document / Publication	Document Location

Table 5: External documents and publications *(not specified in SysML model)*

2.5 Glossary

*#**Hint**: Terms, concepts and abbreviations used in the document shall be defined and illustrated here. Note that changes to terms and/or concepts described in this section tend to cause major updates to this document.*
The tables below have feature specific definitions and abbreviations. For additional, non-feature specific terms please refer to the RE Glossary

See Appendix for Definitions and Abbreviations.

2.5.1 Parameters / Values

Name	Description	Range / Resolution

Table 6: Parameters / Values used in this document *(Not supported by MagicDraw report generation)*

3 FEATURE CONTEXT

3.1 Feature Context Diagram

*#**Hint:** High level diagram of feature interactions with the environment, people or other feature or other external entities.*
*#**Link:** RE Wiki - Context Diagram*

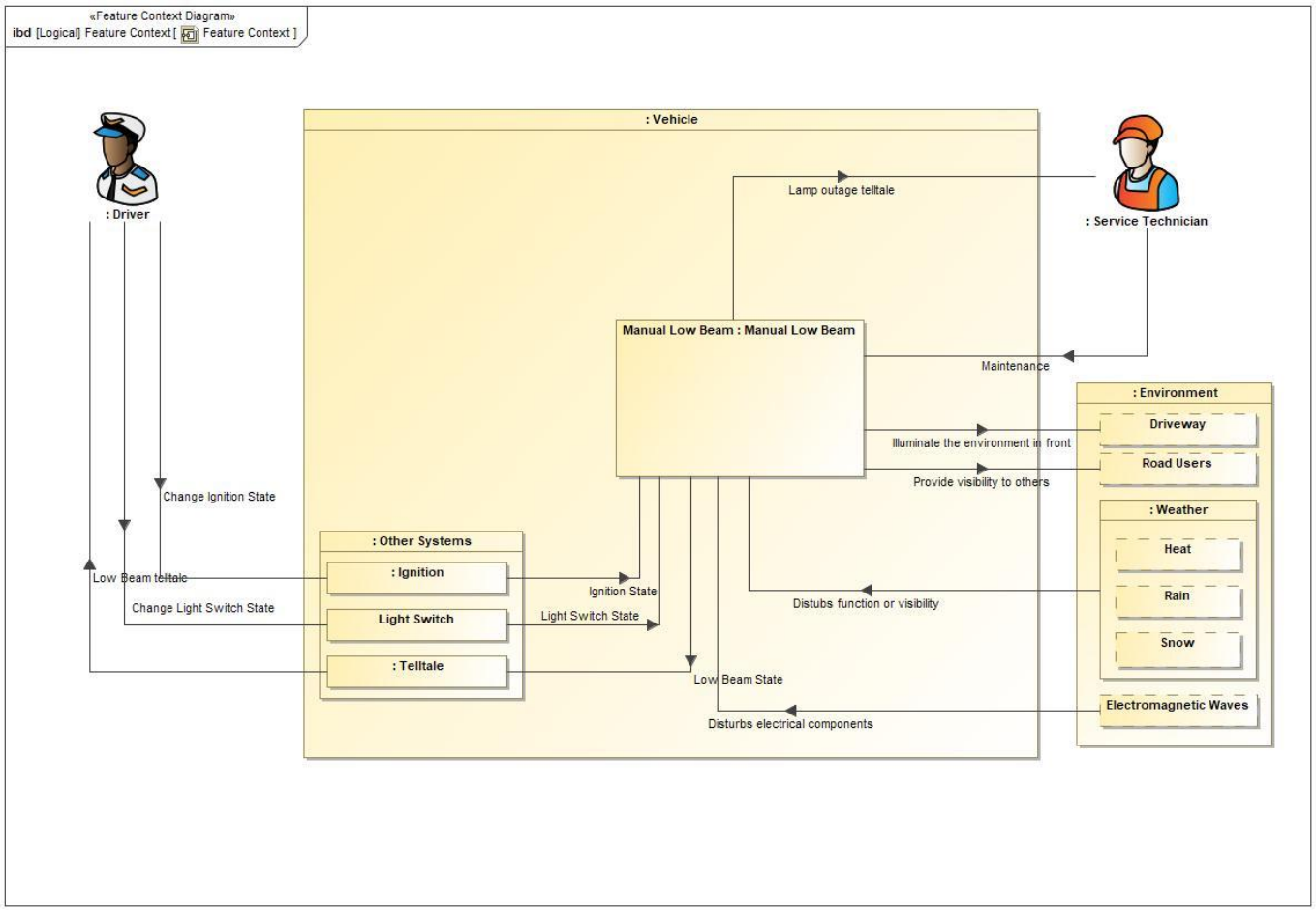


Figure 2: Feature Context

3.2 List of Influences

ID	External Entity	Influence Description
Change Ignition State	Driver To Ignition	The Manual Low Beam feature shall be enabled in all ignition states for FMVSS 108 and CMVSS 108 market.
Change Light Switch State	Driver To Light Switch	Light switch activates Manual Low Beam at value range "Low Beam". Value "Auto" deactivates the feature when Ignition is "Off".
Distubs function or visibility	Weather To Manual Low Beam (Manual Low Beam)	Weather might influence the functionality.
Disturbs electrical components	Environment To Manual Low Beam (Manual Low Beam)	EMC (=Electromagnetic Compability) needs to be considered as Electromagnetic waves might interfere with vehicle electronics.
Ignition State	Ignition To Manual Low Beam (Manual Low Beam)	

Illuminate the environment in front	Manual Low Beam (Manual Low Beam) To Environment	Environment in front must be illuminated.
Lamp outage telltale	Manual Low Beam (Manual Low Beam) To Feature Context	Lamp outage must be indicated by telltale.
Light Switch State	Light Switch To Manual Low Beam (Manual Low Beam)	
Low Beam State	Manual Low Beam (Manual Low Beam) To Telltale	Activated Low Beam must be indicated by telltale.
Low Beam telltale	Manual Low Beam (Manual Low Beam) To Driver	Activated Low Beam must be indicated by telltale.
	Telltale To Driver	Activated Low Beam must be indicated by telltale.
Maintenance	Feature Context To Manual Low Beam (Manual Low Beam)	Feature might get maintenance.
Provide visibility to others	Manual Low Beam (Manual Low Beam) To Environment	Feature enhances the visibility of the vehicle to others.

Table 7: List of Influences

4 FEATURE MODELING

4.1 Operation Modes and States

*#**Classification:** Optional (Mandatory for Functional Safety)*
*#**Link:** RE Wiki – State Charts*
*#**Hint:** State Charts are a popular means to express feature behavior in terms of states and modes. An advantage of this state machine like approach is that consistency can be easily verified.*

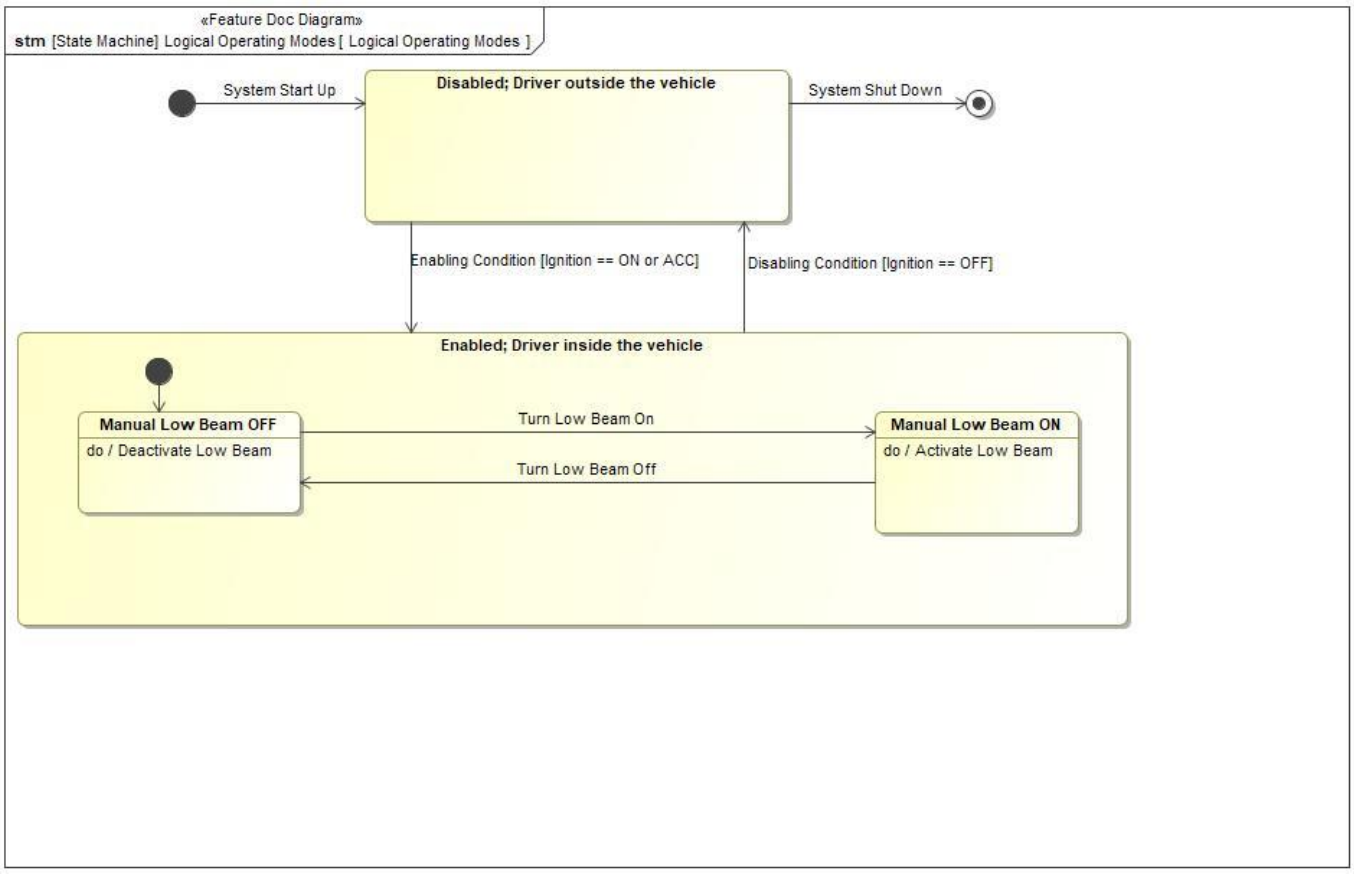


Figure 3: Logical Operating Modes

State	Description	Requirements Reference (optional)
Disabled; Driver outside the vehicle		
Enabled; Driver inside the vehicle		
Manual Low Beam OFF	Vehicle Secured is provided to allow the driver to secure the vehicle from movement once operating the vehicle is no longer desired. The primary method to secure the vehicle is to shift the vehicle to Park, but also the Electronic Park Brake can be applied as a secondary means. Usually the vehicle is turned off in this mode, but the vehicle may be secured from movement with the powertrain still active. Do behavior: Deactivate Low Beam	

Manual Low Beam ON	Driving Mode is the primary state provided to allow the driver to operate the vehicle. This includes accelerating, decelerating, cruising, sailing, and stopping. Do behavior: Activate Low Beam	

Table 8: Operation Modes and States on Logical Operating Modes

Transition ID	Description	Requirements Reference (optional)
T1		
T2	Trigger signal: Turn Low Beam On	
T3	Trigger signal: System Start Up	
T4	Guard: =Ignition == ON or ACC Trigger signal: Enabling Condition	
T5	Guard: =Ignition == OFF Trigger signal: Disabling Condition	
T6	Trigger signal: System Shut Down	
T7	Trigger signal: Turn Low Beam Off	

Table 9: Transitions between Operation Modes and States on Logical Operating Modes

4.2 Use Cases

*#**Classification:** Optional*
*#**Link:** RE Wiki – Use Cases*

4.2.1 Use Case Diagram

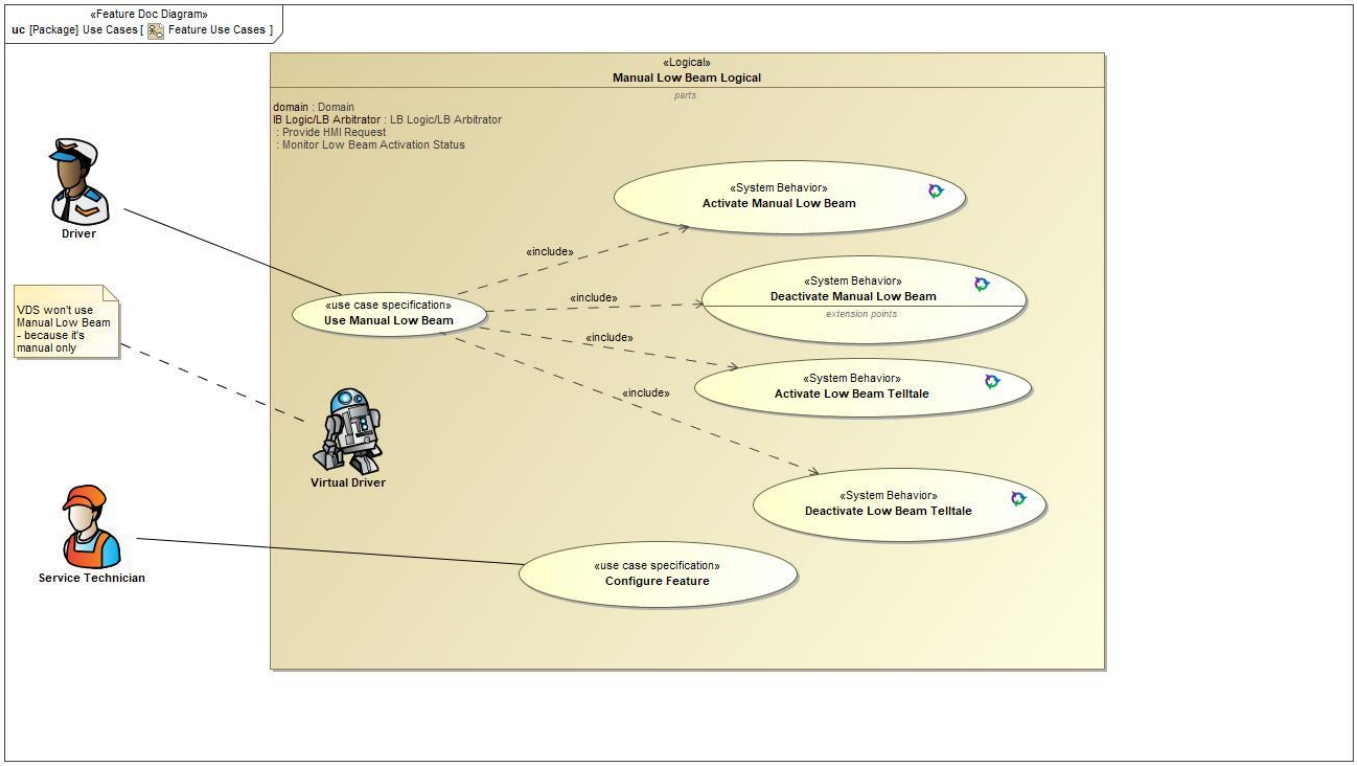


Figure 4: Feature Use Cases

4.2.2 Actors

Actor	Description
Driver	Human individual controlling the vehicle.
Service Technician	Human individual doing maintenance and service to vehicle / feature.

Table 10: List of Actors

4.2.3 Use Case Descriptions

*#**Classification:** Optional*

Activate Low Beam Telltale

Actors		
Subject		Manual Low Beam Logical
Description		
Preconditions		

Activate Manual Low Beam

Actors		
Subject		Manual Low Beam Logical
Description		
Preconditions		

Configure Feature

Actors		Service Technician
Subject		Manual Low Beam Logical
Description		
Preconditions	PreC1	Required Tools present
	PreC2	Vehicle accessible for Service Technician

Deactivate Low Beam Telltale

Actors		
Subject		Manual Low Beam Logical
Description		
Preconditions		

Deactivate Manual Low Beam

Actors		
Subject		Manual Low Beam Logical
Description		
Preconditions		

Use Manual Low Beam

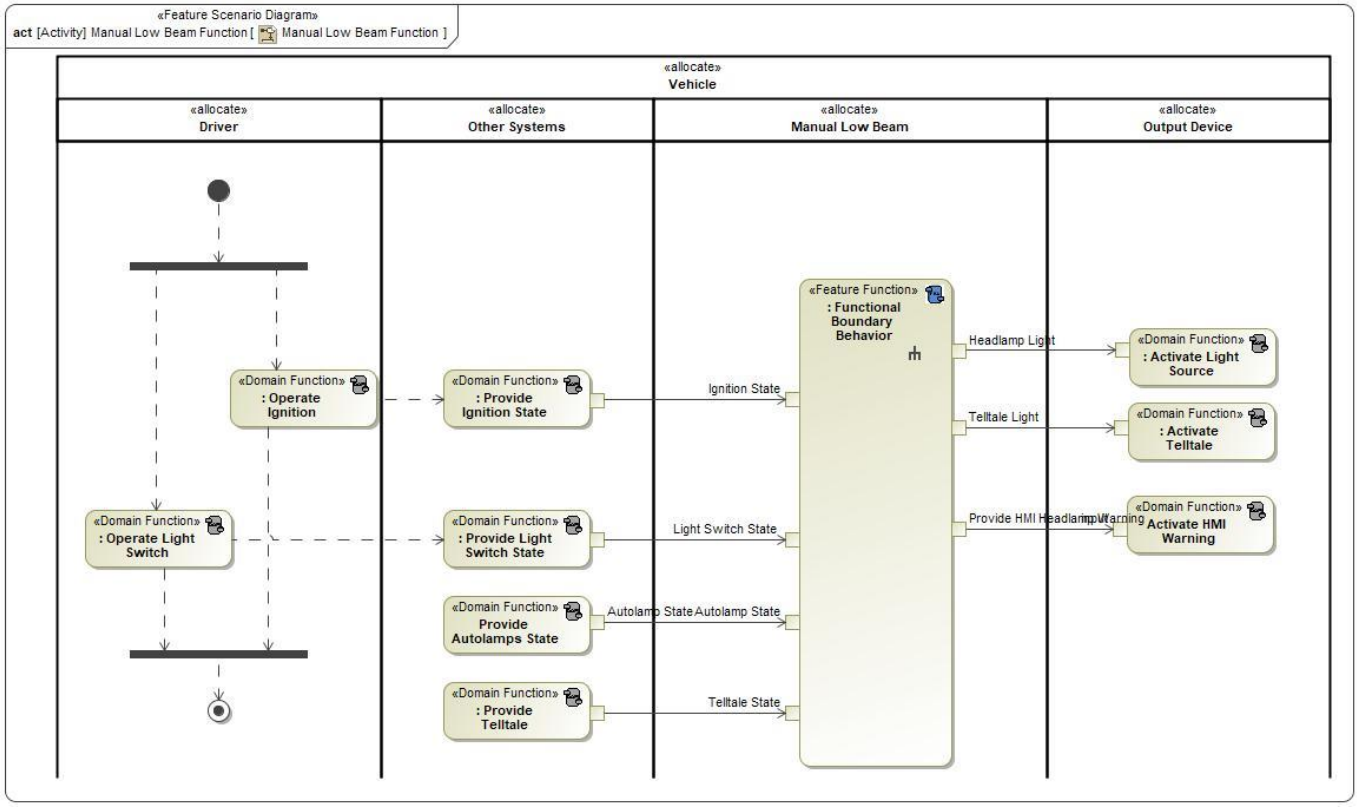
Actors		Driver
Subject		Manual Low Beam Logical

Description		Driver is going to drive with the vehicle at any day/nighttime condition and request LB.
Preconditions	PreC1	HMI Light switch in OFF position.
	PreC2	HMI Light switch installed with OFF, POS, LB, (AUTO position if installed)
	PreC3	Headlamp installed on vehicle.
Main Flow Description		Low Beam turns on to provide illumination and visibility
Main Flow	M1	Driver uses HMI to request >>Feature Manual Low Beam<<LB
	M2	Host Vehicle switches Manual Low Beam on
Alternative Flow Description		Driver uses HMI to request ignition RUN position
Alternative Flow Description		Driver uses HMI to request >>Feature Manual Low Beam<<LB
Alternative Flow Description		Host Vehicle switches Manual Low Beam on

4.3 Driving and Operation Scenarios

*#**Classification:** Optional (Mandatory for Functional Safety)*
*#**Functional Safety:** Driving and operating scenarios which impact the functionality of the feature can be used to check, if the situation analysis in the HARA is complete*
*#**Link:** RE Wiki – Driving Scenarios*

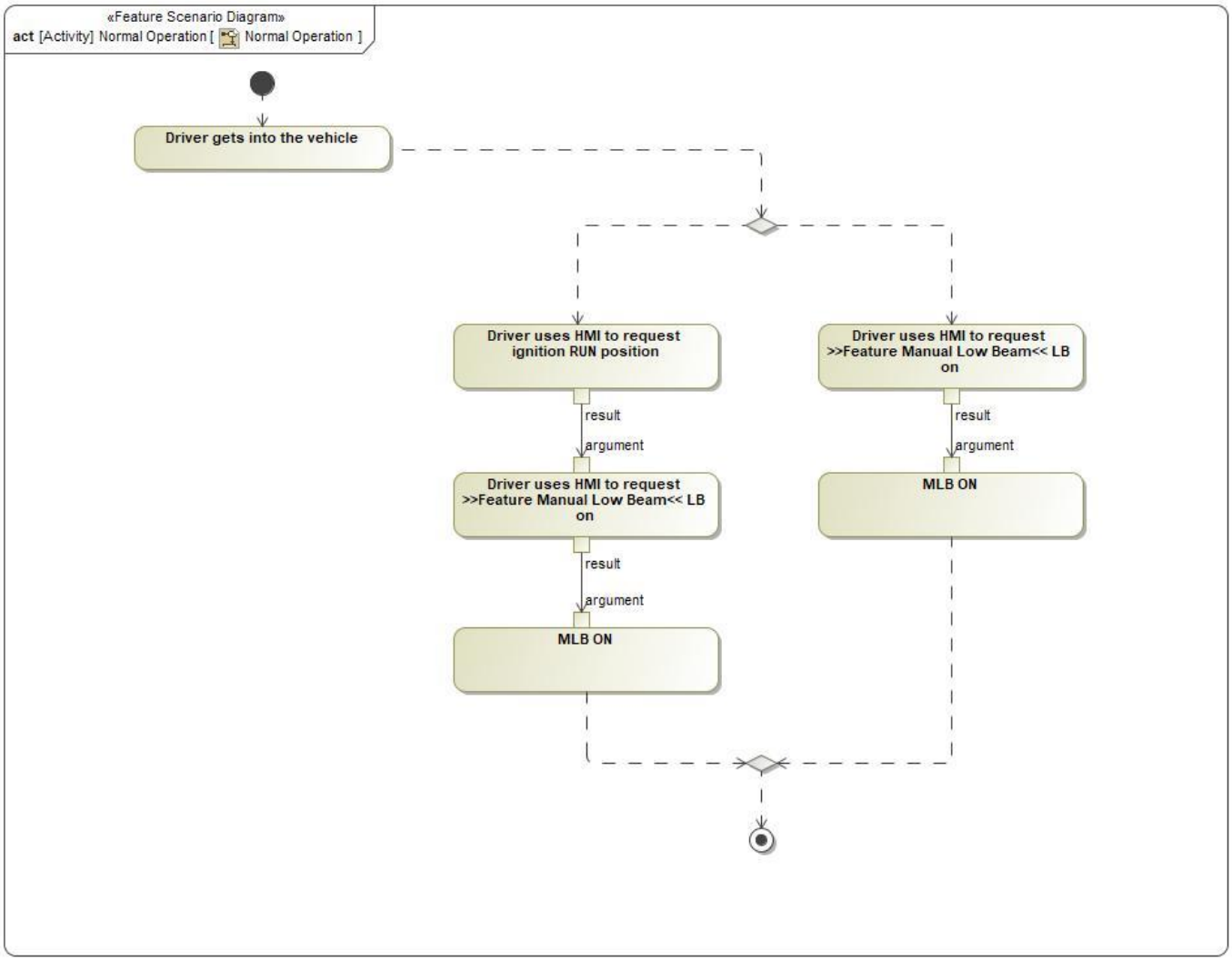
Manual Low Beam Function



Flow of Actions	
1	
2	
3	
4	

Normal Operation

Description of the scenario in the Documentation field on the Feature Scenario Diagram.



Flow of Actions	
1	Driver gets into the vehicle

4.4 Decision Tables

*#**Classification:** Optional*
*#**Link:** RE Wiki – Decision Tables.*
*#**Hint:** Use decision table, if behavior is not state based (in that case prefer state chart from ch. 4.1) and based purely on current inputs.*

Not supported by MagicDraw report generation.

5 FEATURE REQUIREMENTS

*#**Functional Safety:** In general, safety requirements are not listed here. However, it is possible that later in the development process, a non-safety requirement becomes a safety requirement. In such a case it may remain on this list.*
*#**Link:** RE Wiki – How to write good requirements.*

5.1 Functional Requirements

FMVSS/CMVSS: MLB photometric compliance

The Manual Low Beam feature shall meet all legal photometric light requirements for FMVSS 108 and CMVSS 108 market.

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source	FMVSS 108			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	
Req. Template Version 6.0					End of Requirement

ECE: MLB photometric compliance

The Manual Low Beam feature shall meet all legal photometric light requirements for ECE market.

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source	ECE R48, 98, 112			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	
Req. Template Version 6.0					End of Requirement

FMVSS/CMVSS: MLB enabling ignition state

The Manual Low Beam feature shall be enabled in all ignition states for FMVSS 108 and CMVSS 108 market.

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source	FMVSS 108			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	
Req. Template Version 6.0					End of Requirement

Immediate Operation

Switching OFF of Headlamps must be immediate.

Requirement ID:			
Rationale	ECE R48 6.1.7.3.		
Acceptance Criteria			
Notes			
Source	ECE R48 6.1.7.3.	**Owner**	
Source Req.		**V&V Method**	

Type		Priority		Status	

Req. Template Version 6.0 End of Requirement

ECE: MLB enabling ignition state

The Manual Low Beam feature shall be enabled in ignition state RUN/ ON.

Requirement ID:

Rationale					
Acceptance Criteria					
Notes					
Source	ECE R48, 98, 112			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

ECE Telltale

The Manual Low Beam feature shall comply to legal requirement for ECE for Identification of controls, tell-tales and indicators.

Requirement ID:

Rationale					
Acceptance Criteria					
Notes					
Source	ECE R121			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

ECE: MLB cut-off line requirements

The Manual Low Beam feature shall meet the cut-off line performance requirements for ECE.

Requirement ID:

Rationale					
Acceptance Criteria					
Notes					
Source	ECE R48			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

ECE: MLB legal compliance

The Manual Low Beam feature shall comply to legal requirement for ECE for position and size and marking.

Requirement ID:

Rationale					
Acceptance Criteria					
Notes					
Source	ECE R48			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

MLB functionality over vehicle lifetime

The Manual Low Beam feature (LED use) shall meet the vehicle livetime requirement of 10 year and/ or 150,000 miles (240.000 km)

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	
Req. Template Version 6.0					End of Requirement

List of related SDS EXTLGT Reliability Requirements

RQT-170000-011038 FORWARD LIGHTING LIGHT SOURCE CHART
RQT-170000-011049 SIGNAL LIGHTING LIGHT SOURCE SELECTION CHART

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	
Req. Template Version 6.0					End of Requirement

FMVSS/CMVSS: MLB legal compliance for position, size and marking

The Manual Low Beam feature shall comply to legal requirement for FMVSS108/ CMVSS108 6.1.3 following for position, size and marking.

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source	FMVSS 108			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	
Req. Template Version 6.0					End of Requirement

List of related SDS EXTLGT Performance Requirements

RQT-170000-010968 EXTERIOR LIGHTING RESISTANCE TO SUNLOAD WARPAGE
RQT-170000-010971 VIBRATION ENDURANCE
RQT-170000-010972 RESISTANCE TO THERMAL CYCLE
RQT-170000-010974 RESISTANCE TO CHEMICAL EXPOSURE
RQT-170000-010975 RESISTANCE TO HEAT WARPAGE
RQT-170000-010976 CORROSION RESISTANCE
RQT-170000-011017 WATER INGRESS AND CONDENSATION PREVENTION
RQT-170000-011019 EXTERIOR LIGHTING INTERNAL DUST PREVENTION
RQT-170000-011069 FORD GLOBAL BEAM PATTERN
RQT-170000-019306 LED FUNCTION PHOTOMETRIC TESTING
RQT-170000-019577 FUNCTIONAL CONFIRMATION

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	
Req. Template Version 6.0					End of Requirement

Not supported by MagicDraw report generation.

5.2 HMI Requirements

*#**Hint:** Requirements in this section could specify details of e.g. the icons, the GUI or the sounds.*

Submenus are not allowed

The Driver must be able to switch the condition of Headlamps without the need of sub-menus.

Requirement ID:					
Rationale	ECE R48 6.1.7.3.				
Acceptance Criteria					
Notes					
Source	ECE R48 6.1.7.3.			**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

Lamp Switch HMI

The Manual Low Beam feature shall be activated by selecting "On" position of Light Switch.

Requirement ID:					
Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

5.3 Other Requirements

5.3.1 Design Requirements

*#**Hint:** Requirements of a Logical Function should be typically agnostic of their SW/HW implementation. If for specific reasons the function owner needs to define explicitly design constraints on the solution, it can be done in this chapter.*

Not supported by MagicDraw report generation.

5.3.2 Service Requirements

*#**Hint:** Requirements in this section could specify, e.g. what needs to be considered, if individual ECUs are replaced or new SW is flashed to ECUs (parameter set in non-volatile memory might get inconsistent and needs also to be updated).*

List of related SDS EXTLGT Service Requirements

RQT-170000-010994 BULB REPLACEMENT TIME
RQT-170000-011032 HEADLAMP AND FOGLAMP ADJUSTER ACCESS
RQT-170000-011050 SERVICE RELEASE

Requirement ID:	
Rationale	
Acceptance Criteria	
Notes	

Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	

Req. Template Version 6.0 End of Requirement

6 FUNCTIONAL SAFETY

*#**Classification**: Functional Safety only*
*#**Hint:** This section is dedicated to the Ford Functional Safety (ISO26262) process. For details of this process refer*
*#**Link:** Ford Functional Safety Sharepoint*
*#**Contact:** RE Wiki Roles & Responsibilites page – Role: Application Functional Safety Engineer*

6.1 System Behaviors for HARA

*#**Classification**: Functional Safety only*
*#**Hint:** List of selected system behaviors is an input to the Hazard Analysis and Risk Assessment (HARA). There needs to be a rationale why other system behaviors / functions are not considered.*

ID	Name
	Activate Low Beam Telltale
	Deactivate Manual Low Beam
	Activate Manual Low Beam
	Deactivate Low Beam Telltale

Table 11: System Behaviors for HARA

6.2 Safety Assumptions

*#**Hint:** Copy the assumptions from the document "FFSD 02 Hazard Analysis and Risk Assessment", Tab. "2 - Assumptions" with "Ref/ID", "Name", "Category", "Description", "Purpose". In this document, additionally a reference to the requirement ID is inserted.*
*#**Link:** Functional Safety Sharepoint – HARA*

ID	Assumption	
	Name	A2.1 Driver Responsibility
	Description	The driver is responsible to be in full control of the vehicle and the driving situation at any time.
	Purpose	Misuse example: Using mobile phone while driving
	Category	Behavioral
	Related Requirements IDs	
	Name	A3.1 Low Beam Design
	Description	Each headlamp is designed to fulfil the feature low beam on its own.
	Purpose	
	Category	Vehicle
	Related Requirements IDs	
	Name	A1.1 Low Beam on before driving
	Description	The driver is supposed to activate low beam before driving. The driver is able to control the situation. A fault activation will be detected by the driver and he is supposed not to use the vehicle.
	Purpose	Contollability classification
	Category	Controllability
	Related Requirements IDs	

Table 12: Functional Safety Assumptions

6.3 Safety Goals

*#**Classification**: Functional Safety only*

*#**Hint:** The list of Functional Safety Goals is an output of the Hazard Analysis and Risk Assessment (HARA) and therefore not required during the initial creation of the Feature Document.*
*#**Link:** Functional Safety Sharepoint – HARA*

ID	Goal		
SG01	**Goal Name**	SG01 Ensure Low Beam is not deactivated unintendently	
	Description	Deactivation of low beam means both low beams are deactivated simultaniousely	
	Safety Goal Concept	Safety Goal Concept: Warning & Recovery Concept:	
	ASIL	B	**FTTI**
	Related FSR IDs	• LB-F-S-Req1 • LB-F-S-Req8 • LB-F-S-Req9 • LB-F-S-Req10 • LB-F-S-Req11 • LB-F-S-Req12 • LB-F-S-Req13 • LB-F-S-Req14 • LB-F-S-Req15 • LB-F-S-Req24	
SG02	**Goal Name**	SG02 Ensure Low Beam is activated when requested	
	Description	Activation means both low beams are activated simultaneously	
	Safety Goal Concept	Safety Goal Concept: Warning & Recovery Concept:	
	ASIL	QM	**FTTI**
	Related FSR IDs	• LB-F-S-Req16	
SG03	**Goal Name**	SG03 Prevent intermittent low beam activation	
	Description	Avoid repeated on off cycles in a short time period.	
	Safety Goal Concept	Safety Goal Concept: Warning & Recovery Concept:	
	ASIL	A	**FTTI**
	Related FSR IDs	• LB-F-S-Req17 • LB-F-S-Req18 • LB-F-S-Req19 • LB-F-S-Req20 • LB-F-S-Req21 • LB-F-S-Req22 • LB-F-S-Req23	

Table 13: Functional Safety Goals

6.4 Functional Safety Requirements

*#**Classification**: Functional Safety only*
*#**Hint:** The section lists the Functional Safety Requirements (FSRs) derived from*
*- a Safety Goal (list in subsections **Error! Reference source not found.** and following)*
in this case each FSR should trace back to a safety goal in ch. 6.3
*- and Assumptions (list in subsection **Error! Reference source not found.**).*
in this case each FSR should trace back to an assumption in ch. 6.2.
*In section **Error! Reference source not found.** "**Error! Reference source not found.**" the initial FSRs from chapters **Error! Reference source not found.** to **Error! Reference source not found.** may be decomposed, if required.*
*#**Link:** Functional Safety Sharepoint – Functional Safety Concept*

RE Wiki - Requirements Attributes
*#**Classification**: Functional Safety only*
*#**Hint:** The section lists the Functional Safety Requirements (FSRs) derived from a Safety Goal and Assumptions.*
The following should be noted for the use of the attribute fields for FSRs
- The "Source Req" trace link field in each FSR should have a reference to
- a safety goal in ch. 6.3 "Safety Goals" or
- an assumption in ch. 6.2 "Safety Assumptions"
*#**Link:** Functional Safety Sharepoint – Functional Safety Concept*
RE Wiki - Requirements Attributes

6.4.1 Safety Goal: SG01 SG01 Ensure Low Beam is not deactivated unintendently

Name: SG01 Ensure Low Beam is not deactivated unintendently
Purpose:
Text: Deactivation of low beam means both low beams are deactivated simultaniousely
ASIL: B

6.4.1.1 Safety Goal Concept

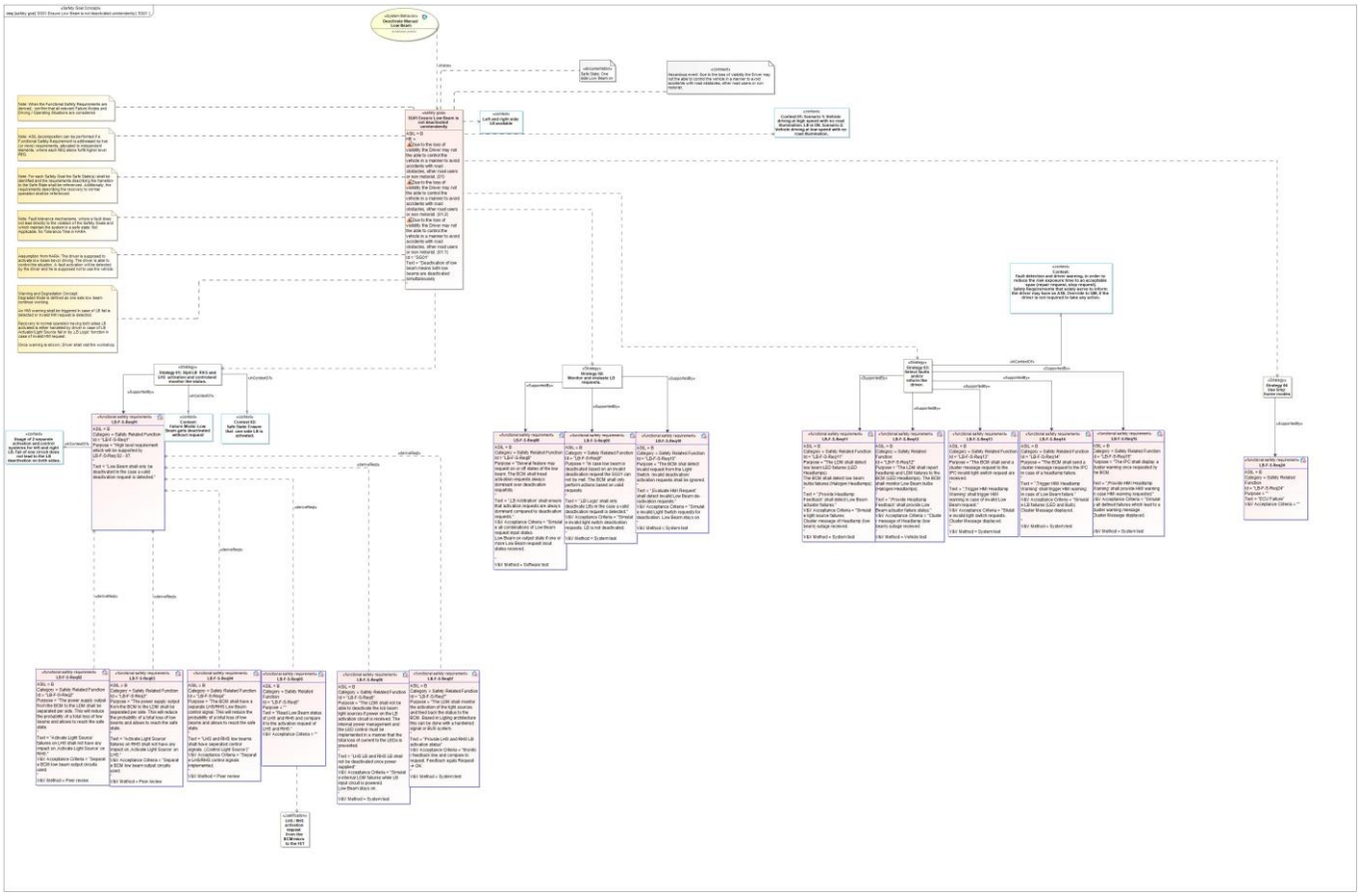


Figure 1: SG01 – SG01 Ensure Low Beam is not deactivated unintendently

Note: The authoritative source for the Safety Goals is document "FFSD 02 Hazard Analysis and Risk Assessment". The documentation of Safety Goals in this chapter (In the Argumentation for Safety Goal achievement) is for information purposes only.
The authoritative source for the Functional Safety Requirements is section 2.1.x.3: of this document. The documentation of Functional Safety Requirements in the following chapter (complete or summarised) is for information purposes only.

6.4.1.2 Warning and Recovery Concept

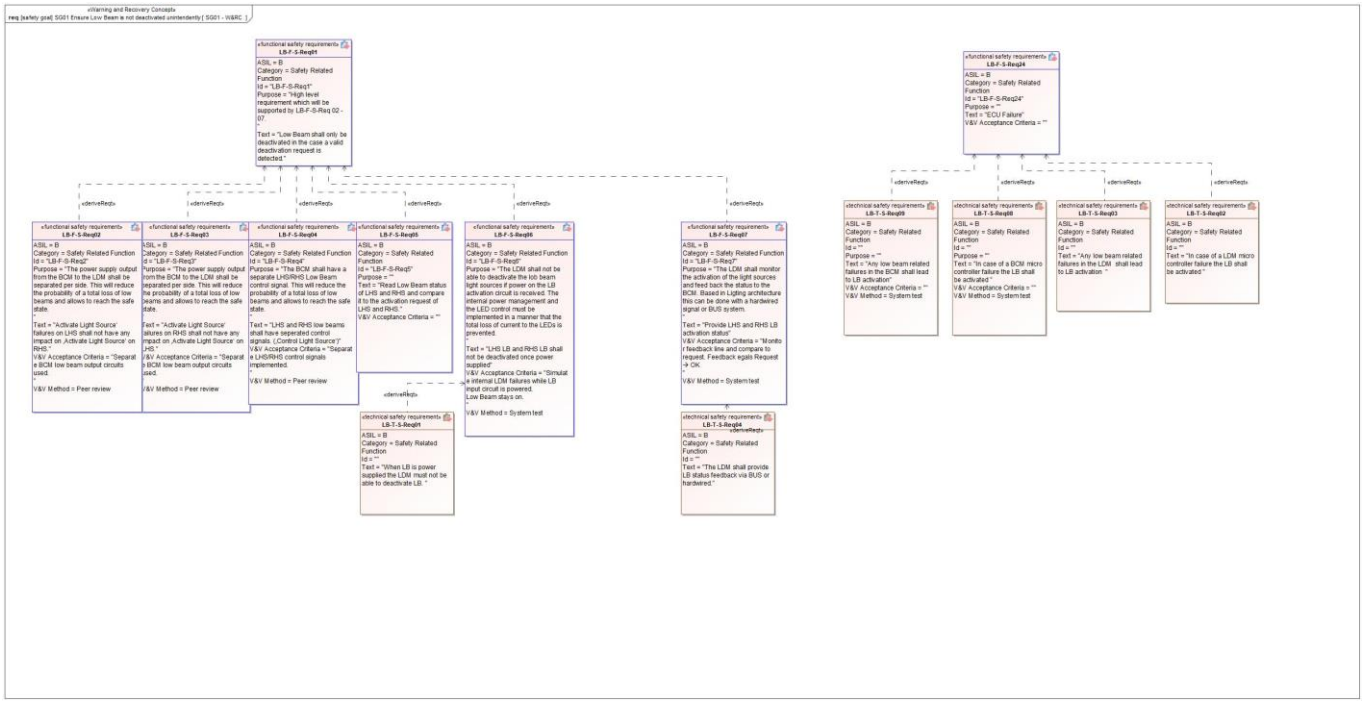


Figure 5: SG01 - W&RC – SG01 Ensure Low Beam is not deactivated unintendently

Figure 6: SG02 - W&RC – SG01 Ensure Low Beam is not deactivated unintendently

6.4.1.3 Functional Safety Requirements without Dedicated Diagram

***#Hint:** The following Functional Safety Requirements are not depicted on dedicated requirements diagrams and are therefore all listed here.*

LB-F-S-Req1 LB-F-S-Req01

Low Beam shall only be deactivated in the case a valid deactivation request is detected.

Satisfied by:

- Logicals:
  - Manual Low Beam Logical

Related to:

- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req1

Purpose	High level requirement which will be supported by LB-F-S-Req 02 - 07.				
V&V Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req2 LB-F-S-Req02

Activate Light Source‘ failures on LHS shall not have any impact on ‚Activate Light Source‘ on RHS.

Satisfied by:
- Logicals:
  - Control Light Source

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req2

Purpose	The power supply output from the BCM to the LDM shall be separated per side. This will reduce the probability of a total loss of low beams and allows to reach the safe state.				
V&V Acceptance Criteria	Separate BCM low beam output circuits used.				
Notes					
Source				**Owner**	
Source Req.	• LB-F-S-Req1 LB-F-S-Req01 • SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	Peer review
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req3 LB-F-S-Req03

Activate Light Source‘ failures on RHS shall not have any impact on ‚Activate Light Source‘ on LHS.

Satisfied by:
- Logicals:
  - Control Light Source

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:

- Enabled; Driver inside the vehicle
- Manual Low Beam ON

Requirement ID: LB-F-S-Req3

Purpose	The power supply output from the BCM to the LDM shall be separated per side. This will reduce the probability of a total loss of low beams and allows to reach the safe state.				
V&V Acceptance Criteria	Separate BCM low beam output circuits used.				
Notes					
Source				**Owner**	
Source Req.	• LB-F-S-Req1 LB-F-S-Req01 • SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	Peer review
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req4 LB-F-S-Req04

LHS and RHS low beams shall have seperated control signals. (‚Control Light Source‘)

Satisfied by:
- Logicals:
  - Control Light Source

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req4

Purpose	The BCM shall have a separate LHS/RHS Low Beam control signal. This will reduce the probability of a total loss of low beams and allows to reach the safe state.				
V&V Acceptance Criteria	Separate LHS/RHS control signals implemented.				
Notes					
Source				**Owner**	
Source Req.	• LB-F-S-Req1 LB-F-S-Req01 • SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	Peer review
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req5 LB-F-S-Req05

Read Low Beam status of LHS and RHS and compare it to the activation request of LHS and RHS.

Satisfied by:
- Logicals:
  - Evaluate HMI Request

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req5

Purpose					
V&V Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.	• LB-F-S-Req1 LB-F-S-Req01 • SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req6 LB-F-S-Req06

LHS LB and RHS LB shall not be deactivated once power supplied

Satisfied by:
- Logicals:
  - Control Light Source

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req6

Purpose	The LDM shall not be able to deactivate the lob beam light sources if power on the LB activation circuit is received. The internal power management and the LED control must be implemented in a manner that the total loss of current to the LEDs is prevented.				
V&V Acceptance Criteria	Simulate internal LDM failures while LB input circuit is powered. Low Beam stays on.				
Notes					
Source				**Owner**	
Source Req.	• LB-F-S-Req1 LB-F-S-Req01 • SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req7 LB-F-S-Req07

Provide LHS and RHS LB activation status

Satisfied by:
- Logicals:
  - Monitor Low Beam Activation Status

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req7

Purpose	The LDM shall monitor the activation of the light sources and feed back the status to the BCM. Based in Ligting architecture this can be done with a hardwired signal or BUS system.				
V&V Acceptance Criteria	Monitor feedback line and compare to request. Feedback egals Request □ OK				
Notes					
Source				**Owner**	
Source Req.	• LB-F-S-Req1 LB-F-S-Req01 • SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req8 LB-F-S-Req08

‚LB Arbitration' shall ensure that activation requests are always dominant compared to deactivation requests.

Satisfied by:
- Logicals:
  - Evaluate HMI Request

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req8

Purpose	Several feature may request on or off states of the low beam. The BCM shall tread activation requests always dominant over deactivation requetsts.				
V&V Acceptance Criteria	Simulate all combinations of Low Beam request input states. Low Beam on output state if one or more Low Beam request inout states received.				
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	Software test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req9 LB-F-S-Req09

‚LB Logic' shall only deactivate LBs in the case a valid deactivation request is detected.

Satisfied by:
- Logicals:
  - Evaluate HMI Request
  - Provide HMI Request

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req9

Purpose	In case low beam is deactivated based on an invalid deactivation request the SG01 can not be met. The BCM shall only perform actions based on valid requests.

V&V Acceptance Criteria	Simulate invalid light switch deactivation requests. LB is not deactivated.				
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req10 LB-F-S-Req10

‚Evaluate HMI Request' shall detect invalid Low Beam de-/activation requests.

Satisfied by:

- Logicals:
  - Evaluate HMI Request
  - Provide HMI Request

Requirement ID: LB-F-S-Req10

Purpose	The BCM shal detect invalid request from the Light Switch. Invalid deactivation/ activation requests shall be ignored.				
V&V Acceptance Criteria	Simulate invalid Light Switch requests for deactivation. Low Beam stays on.				
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req11 LB-F-S-Req11

‚Provide Headlamp Feedback' shall detect Low Beam actuator failures.

Satisfied by:

- Logicals:
  - Provide Headlamp Feedback

Related to:

- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req11

Purpose	The LDM shall detect low beam LED failures (LED Headlamps). The BCM shall detect low beam bulbs failures (Halogen Headlamps).				
V&V Acceptance Criteria	Simulate light source failures. Cluster message of Headlamp (low beam) outage received.				
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req12 LB-F-S-Req12

‚Provide Headlamp Feedback' shall provide Low Beam actuator failure status.

Satisfied by:
- Logicals:
  - Provide Headlamp Feedback

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req12

Purpose	The LDM shall report headlamp and LDM failures to the BCM (LED Headlamps). The BCM shall monitor Low Beam bulbs (Halogen Headlamps).				
V&V Acceptance Criteria	Cluster message of Headlamp (low beam) outage received.				
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	Vehicle test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req13 LB-F-S-Req13

‚Trigger HMI Headlamp Warning' shall trigger HMI warning in case of invalid Low Beam request.

Satisfied by:
- Logicals:
  - Evaluate HMI Request
  - Trigger HMI Warning

Related to:
- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req13

Purpose	The BCM shall send a cluster message request to the IPC invalid light switch request are received.				
V&V Acceptance Criteria	Silulate invalid light switch requests. Cluster Message displayed.				
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req14 LB-F-S-Req14

‚Trigger HMI Headlamp Warning' shall trigger HMI warning in case of Low Beam failure.

Satisfied by:

- Logicals:
  - Provide HMI Headlamp Warning

Related to:

- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req14

Purpose	The BCM shall send a cluster message request to the IPC in case of a headlamp failure.				
V&V Acceptance Criteria	Simulate LB failures (LED and Bulb). Cluster Message displayed.				
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req15 LB-F-S-Req15

‚Provide HMI Headlamp Warning' shall provide HMI warning in case HMI warning requested.

Satisfied by:

- Logicals:
  - LB Logic/LB Arbitrator
  - Trigger HMI Warning

Related to:

- Safe States:
  - Safe State 1: One Side Low Beam On
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req15

Purpose	The IPC shall display a cluster warning once requested by the BCM.				
V&V Acceptance Criteria	Simulate all defined failures which lead to a cluster warning message. Cluster Message displayed.				
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req24 LB-F-S-Req24

ECU Failure

Satisfied by:

- Logicals:
  - LB Logic/LB Arbitrator

Related to:

- Safe States:
  - Safe State 2: In case of one flickering LB and one steady LB, the flickering LB shall be turned off. In case of two flickering low beams the low beam shall be activated steady on. If that fails the flickering low beam shall be kept.
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam OFF
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req24

Purpose					
V&V Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.	• SG01 SG01 Ensure Low Beam is not deactivated unintendently			**V&V Method**	
Type	N/A	**Priority**	N/A	**Status**	
ASIL	B	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

6.4.2 Safety Goal: SG02 SG02 Ensure Low Beam is activated when requested

Name: SG02 Ensure Low Beam is activated when requested
Purpose:
Text: Activation means both low beams are activated simultaneously
ASIL: QM

6.4.2.1 Safety Goal Concept

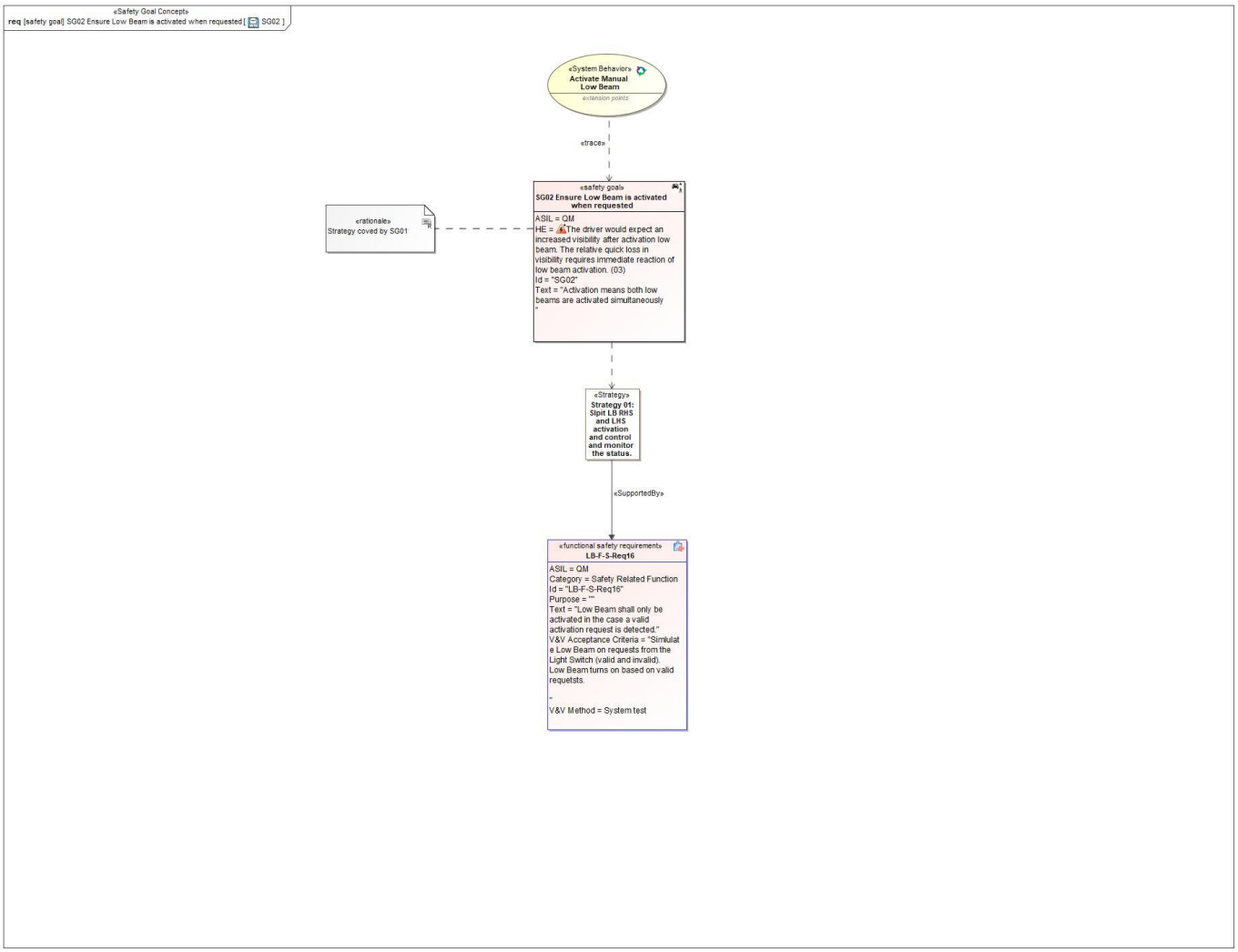


Figure 1: SG02 – SG02 Ensure Low Beam is activated when requested

Note: The authoritative source for the Safety Goals is document "FFSD 02 Hazard Analysis and Risk Assessment". The documentation of Safety Goals in this chapter (In the Argumentation for Safety Goal achievement) is for information purposes only.
The authoritative source for the Functional Safety Requirements is section 2.1.x.3: of this document. The documentation of Functional Safety Requirements in the following chapter (complete or summarised) is for information purposes only.

6.4.2.2 Warning and Recovery Concept

Please refer to the diagram SG02 - W&RC – SG02 Ensure Low Beam is activated when requested.

6.4.2.3 Functional Safety Requirements without Dedicated Diagram

***#Hint:** The following Functional Safety Requirements are not depicted on dedicated requirements diagrams and are therefore all listed here.*

LB-F-S-Req16 LB-F-S-Req16

Low Beam shall only be activated in the case a valid activation request is detected.

Satisfied by:

- Logicals:
  - Activate Light Source
  - Evaluate HMI Request
  - Provide HMI Request

Related to:

- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam OFF

Requirement ID: LB-F-S-Req16

Purpose					
V&V Acceptance Criteria	Simlulate Low Beam on requests from the Light Switch (valid and invalid). Low Beam turns on based on valid requetsts.				
Notes					
Source				**Owner**	
Source Req.	• SG02 SG02 Ensure Low Beam is activated when requested			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	QM	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

6.4.3 Safety Goal: SG03 SG03 Prevent intermittent low beam activation

Name: SG03 Prevent intermittent low beam activation
Purpose:
Text: Avoid repeated on off cycles in a short time period.
ASIL: A

6.4.3.1 Safety Goal Concept

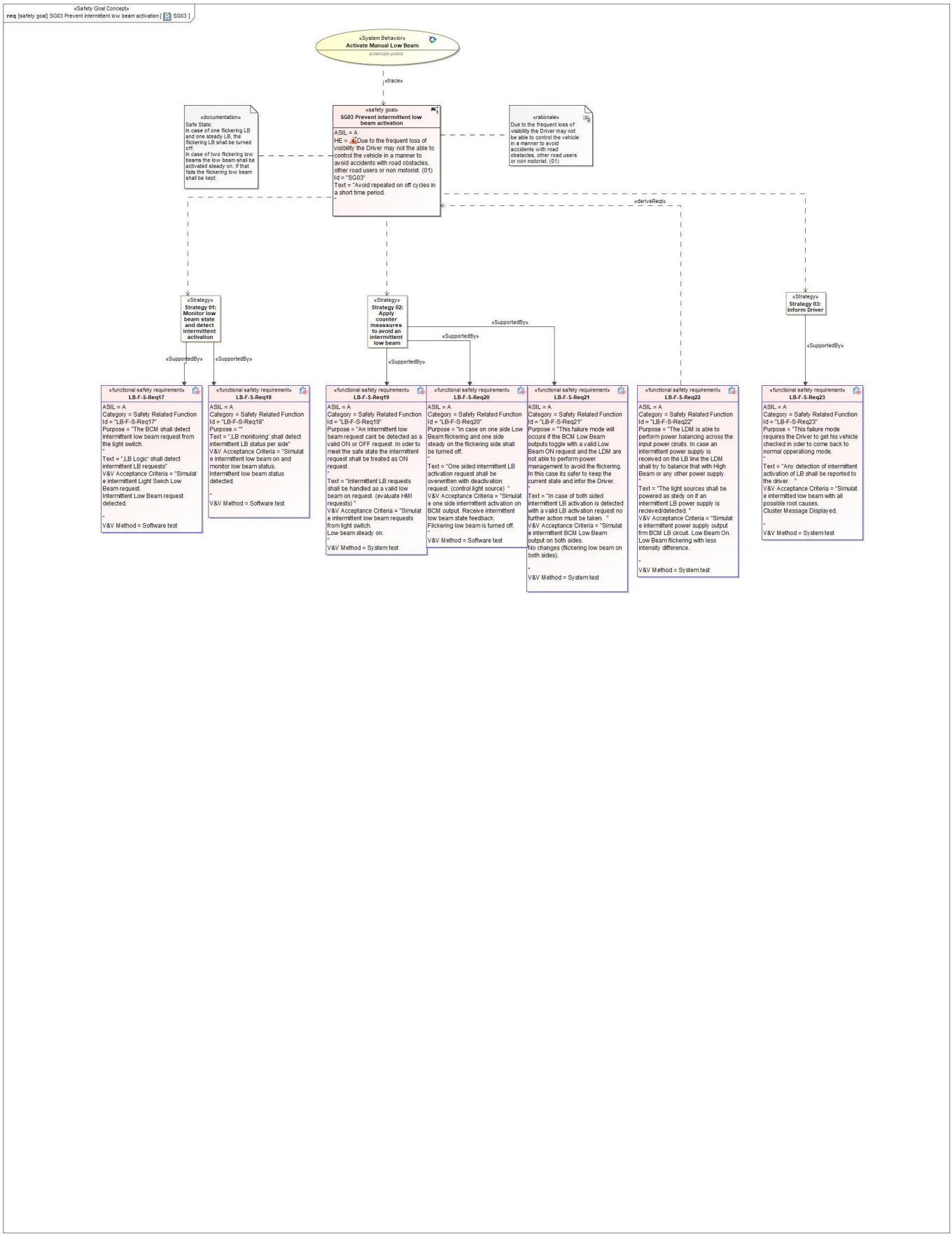


Figure 1: SG03 – SG03 Prevent intermittent low beam activation

Note: The authoritative source for the Safety Goals is document "FFSD 02 Hazard Analysis and Risk Assessment". The documentation of Safety Goals in this chapter (In the Argumentation for Safety Goal achievement) is for information purposes only.
The authoritative source for the Functional Safety Requirements is section 2.1.x.3: of this document. The documentation of Functional Safety Requirements in the following chapter (complete or summarised) is for information purposes only.

6.4.3.2 Warning and Recovery Concept

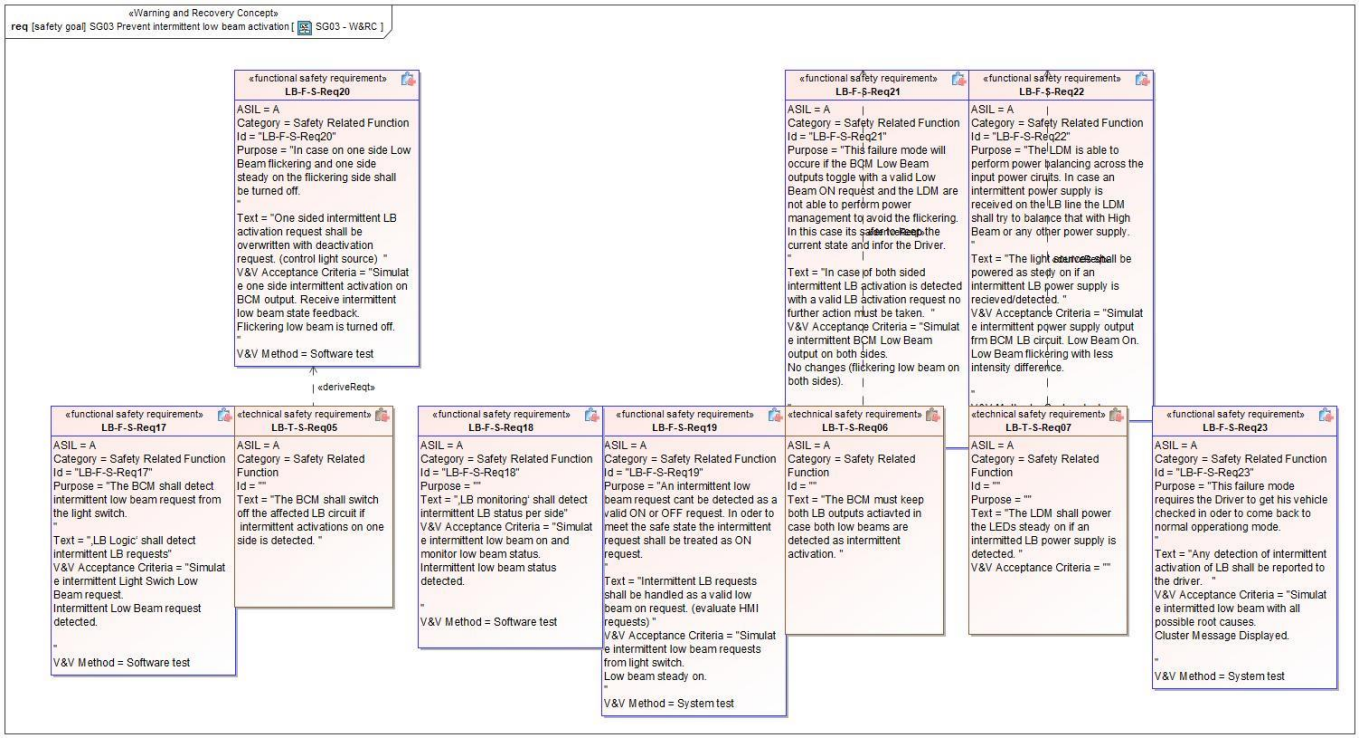


Figure 7: SG03 - W&RC – SG03 Prevent intermittent low beam activation

6.4.3.3 Functional Safety Requirements without Dedicated Diagram

***#Hint:** The following Functional Safety Requirements are not depicted on dedicated requirements diagrams and are therefore all listed here.*

LB-F-S-Req17 LB-F-S-Req17

‚LB Logic' shall detect intermittent LB requests

Satisfied by:

- Logicals:
  - Evaluate HMI Request
  - Provide HMI Request

Related to:

- Safe States:
  - Safe State 2: In case of one flickering LB and one steady LB, the flickering LB shall be turned off. In case of two flickering low beams the low beam shall be activated steady on. If that fails the flickering low beam shall be kept.
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam OFF
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req17	
Purpose	The BCM shall detect intermittent low beam request from the light switch.

V&V Acceptance Criteria	Simulate intermittent Light Swich Low Beam request. Intermittent Low Beam request detected.				
Notes					
Source				**Owner**	
Source Req.	• SG03 SG03 Prevent intermittent low beam activation			**V&V Method**	Software test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	A	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req18 LB-F-S-Req18

‚LB monitoring' shall detect intermittent LB status per side

Satisfied by:
- Logicals:
  - Monitor Low Beam Activation Status

Related to:
- Safe States:
  - Safe State 2: In case of one flickering LB and one steady LB, the flickering LB shall be turned off. In case of two flickering low beams the low beam shall be activated steady on. If that fails the flickering low beam shall be kept.
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam OFF
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req18

Purpose					
V&V Acceptance Criteria	Simulate intermittent low beam on and monitor low beam status. Intermittent low beam status detected.				
Notes					
Source				**Owner**	
Source Req.	• SG03 SG03 Prevent intermittent low beam activation			**V&V Method**	Software test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	A	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req19 LB-F-S-Req19

Intermittent LB requests shall be handled as a valid low beam on request. (evaluate HMI requests)

Satisfied by:
- Logicals:
  - Evaluate HMI Request
  - Provide HMI Request

Related to:
- Safe States:
  - Safe State 2: In case of one flickering LB and one steady LB, the flickering LB shall be turned off. In case of two flickering low beams the low beam shall be activated steady on. If that fails the flickering low beam shall be kept.
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam OFF
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req19

Purpose	An intermittent low beam request cant be detected as a valid ON or OFF request. In oder to meet the safe state the intermittent request shall be treated as ON request.				
V&V Acceptance Criteria	Simulate intermittent low beam requests from light switch. Low beam steady on.				
Notes					
Source				**Owner**	
Source Req.	• SG03 SG03 Prevent intermittent low beam activation			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	A	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req20 LB-F-S-Req20

One sided intermittent LB activation request shall be overwritten with deactivation request. (control light source)

Satisfied by:

- Logicals:
  - Control Light Source
  - Monitor Low Beam Activation Status

Related to:

- Safe States:
  - Safe State 2: In case of one flickering LB and one steady LB, the flickering LB shall be turned off. In case of two flickering low beams the low beam shall be activated steady on. If that fails the flickering low beam shall be kept.
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam OFF
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req20

Purpose	In case on one side Low Beam flickering and one side steady on the flickering side shall be turned off.				
V&V Acceptance Criteria	Simulate one side intermittent activation on BCM output. Receive intermittent low beam state feedback. Flickering low beam is turned off.				
Notes					
Source				**Owner**	
Source Req.	• SG03 SG03 Prevent intermittent low beam activation			**V&V Method**	Software test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	A	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req21 LB-F-S-Req21

In case of both sided intermittent LB activation is detected with a valid LB activation request no further action must be taken.

Satisfied by:

- Logicals:
  - Control Light Source
  - Monitor Low Beam Activation Status

Related to:

- Safe States:
  - Safe State 2: In case of one flickering LB and one steady LB, the flickering LB shall be turned off. In case of two flickering low beams the low beam shall be activated steady on. If that fails the flickering low beam shall be kept.
- Operating Modes:

- Enabled; Driver inside the vehicle
- Manual Low Beam OFF
- Manual Low Beam ON

Requirement ID: LB-F-S-Req21

Purpose	This failure mode will occure if the BCM Low Beam outputs toggle with a valid Low Beam ON request and the LDM are not able to perform power management to avoid the flickering. In this case its safer to keep the current state and infor the Driver.				
V&V Acceptance Criteria	Simulate intermittent BCM Low Beam output on both sides. No changes (flickering low beam on both sides).				
Notes					
Source				**Owner**	
Source Req.	• SG03 SG03 Prevent intermittent low beam activation			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	A	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req22 LB-F-S-Req22

The light sources shall be powered as stedy on if an intermittent LB power supply is recieved/detected.

Satisfied by:

- Logicals:
  - Control Light Source

Related to:

- Safe States:
  - Safe State 2: In case of one flickering LB and one steady LB, the flickering LB shall be turned off. In case of two flickering low beams the low beam shall be activated steady on. If that fails the flickering low beam shall be kept.
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam OFF
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req22

Purpose	The LDM is able to perform power balancing across the input power ciruits. In case an intermittent power supply is received on the LB line the LDM shall try to balance that with High Beam or any other power supply.				
V&V Acceptance Criteria	Simulate intermittent power supply output frm BCM LB circuit. Low Beam On. Low Beam flickering with less intensity difference.				
Notes					
Source				**Owner**	
Source Req.	• SG03 SG03 Prevent intermittent low beam activation			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	A	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

LB-F-S-Req23 LB-F-S-Req23

Any detection of intermittent activation of LB shall be reported to the driver.

Satisfied by:

- Logicals:
  - Evaluate HMI Request
  - Trigger HMI Warning

Related to:

- Safe States:

  - Safe State 2: In case of one flickering LB and one steady LB, the flickering LB shall be turned off. In case of two flickering low beams the low beam shall be activated steady on. If that fails the flickering low beam shall be kept.
- Operating Modes:
  - Enabled; Driver inside the vehicle
  - Manual Low Beam OFF
  - Manual Low Beam ON

Requirement ID: LB-F-S-Req23

Purpose	This failure mode requires the Driver to get his vehicle checked in oder to come back to normal opperationg mode.				
V&V Acceptance Criteria	Simulate intermitted low beam with all possible root causes. Cluster Message Displayed.				
Notes					
Source				**Owner**	
Source Req.	• SG03 SG03 Prevent intermittent low beam activation			**V&V Method**	System test
Type	N/A	**Priority**	N/A	**Status**	
ASIL	A	**Category**	Safety Related Function	**Fault Handling Time**	N/A

Req. Template Version 6.0 End of Requirement

7 FUNCTIONAL ARCHITECTURE

*#**Classification:** Optional (mandatory for Functional Safety)*
*#**Hint**: This section depicts the coarse Functional Architecture. This architectural step is needed to find the right functional partitioning for the function level. The function shown here are those, which are specified on function level. Either SysML activity diagrams or Data Flow Diagrams could be used to depict such a Functional Architecture. For bigger features, which are decomposed in a hierarchical manner down to atomic functions (and which do not follow the Functional Safety process), a function tree could be given here.*
*#**Links:***
- *Functional Decomposition: RE Wiki – Functional Decomposition*
- *SysML - Activity Diagrams or RE Wiki - Data Flow Diagrams*
- *Data Flow Diagram: RE Wiki – Data Flow Diagram*

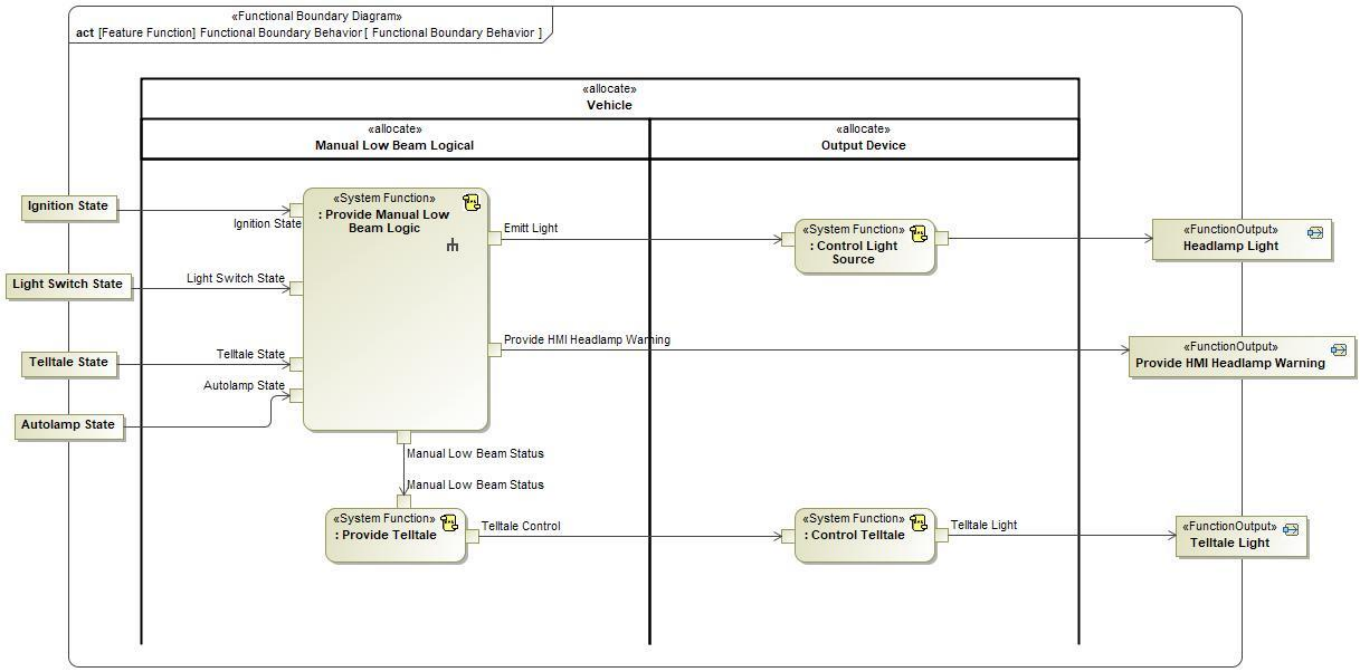


Figure 8: Functional Boundary Behavior

7.1 List of Functions

*#**Hint:** The functions shown in the Functional Architecture should be listed and described in the table below*

Function Name	Description	Comments
(activity) Provide Manual Low Beam Logic	*(activity)*	
(activity) Control Light Source	*(activity)*	
(activity) Provide Telltale	*(activity)*	
(activity) Control Telltale	*(activity)*	

Table 14: List of Functions

8 OPEN CONCERNS

*#**Hint:** The following list presents open concerns, which have to be discussed or clarified over the course of the on-going requirements engineering.*

ID	Concern Description	e-Tracker / Reference	Responsible	Status	Solution
1					

Table 15: Open Concerns *(Not supported by MagicDraw report generation)*

9 REVISION HISTORY

*#**Hint:** A new version number is assigned to a document with a given revision each time it is checked in to Team Center (TCSE). After release of a revision, the document cannot be edited and no new versions can be created on that revision. When updating the document after that, a new revision has to be created and new versions on that revision will be created upon checking in.*

No Revision History found.

10 APPENDIX

10.1 Definitions

Definition	Description
HMI	Human Machine Interface

Table 16: Definitions used in this document

10.2 Abbreviations

No acronyms specified.

Document ends here.