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|  |  | | |  |
|  |  | | |  |
|  | Ambient Lighting  <<Feature>>  (F000063 - Model Rev. 196) | | |  |
|  |  | | |  |
| Document Type | **Feature Document (FD)** | | |  |
| Template Version | **6.1b** | | |  |
| SysML Report Template Version | **6.1b.5** | | |  |
| Document ID | **FD2 - Ambient Lighting - F000063 196** | | |  |
| Document Location | [**https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SfvJeEL9x3NrTDAAAAAAAAAAAAA&servername=Production\_Server**](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SfvJeEL9x3NrTDAAAAAAAAAAAAA&servername=Production_Server) | | |  |
| Document Owner | **Matheus Clavel** | | |  |
| Document Revision | **FD2** | | |  |
| Document Status | **Released** | | |  |
| Date Issued | **2022/08/16** | | |  |
| Date Revised | **2022/06/27** | | |  |
| Model Name and Version | **F000063 - Ambient Lighting - RCRUZ92 – [#196]** | | |  |
| Document Classification | GIS1 Item Number: | **27.60/35** | |  |
| GIS2 Classification: | **Confidential** | |
|  | | | | |
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# Contents

[Disclaimer 2](#_Toc111554430)

[Contents 3](#_Toc111554431)

[1 Introduction 5](#_Toc111554432)

[1.1 Document Purpose 5](#_Toc111554433)

[1.2 Document Scope 5](#_Toc111554434)

[1.3 Document Audience 5](#_Toc111554435)

[1.3.1 Stakeholder List 5](#_Toc111554436)

[1.4 Document Organization 5](#_Toc111554437)

[1.4.1 Document Context 5](#_Toc111554438)

[1.4.2 Document Structure 6](#_Toc111554439)

[1.5 Document Conventions 6](#_Toc111554440)

[1.5.1 Classification of Chapters 6](#_Toc111554441)

[1.5.2 Requirements Templates 6](#_Toc111554442)

[1.6 References 7](#_Toc111554443)

[1.6.1 Ford Documents 7](#_Toc111554444)

[1.6.2 External Documents and Publications 8](#_Toc111554445)

[1.7 Glossary 8](#_Toc111554446)

[1.7.1 Definitions 8](#_Toc111554447)

[1.7.2 Abbreviations 8](#_Toc111554448)

[1.7.3 Parameters / Values 8](#_Toc111554449)

[2 Feature Overview 9](#_Toc111554450)

[2.1 Purpose and Description of Feature 9](#_Toc111554451)

[2.2 Feature Variants 9](#_Toc111554452)

[2.2.1 Regions & Markets 10](#_Toc111554453)

[2.3 Input Requirements/Documents 10](#_Toc111554454)

[2.4 Lessons Learned 11](#_Toc111554455)

[2.5 Assumptions 11](#_Toc111554456)

[3 Feature Context 12](#_Toc111554457)

[3.1 Feature Context Diagram 12](#_Toc111554458)

[3.2 List of Influences 12](#_Toc111554459)

[4 Feature Modeling 14](#_Toc111554460)

[4.1 Operation Modes and States 14](#_Toc111554461)

[4.2 Use Cases 18](#_Toc111554462)

[4.2.1 Use Case Diagram 18](#_Toc111554463)

[4.2.2 Actors 19](#_Toc111554464)

[4.2.3 Use Case Descriptions 19](#_Toc111554465)

[4.3 Driving and Operation Scenarios **Error! Bookmark not defined.**](#_Toc111554466)

[4.4 Decision Tables **Error! Bookmark not defined.**](#_Toc111554467)

[5 Feature Requirements 23](#_Toc111554468)

[5.1 Functional Requirements 23](#_Toc111554469)

[5.2 Non-Functional Requirements 32](#_Toc111554470)

[5.2.1 Security 32](#_Toc111554471)

[5.2.2 Reliability 32](#_Toc111554472)

[5.2.3 Performance 32](#_Toc111554473)

[5.3 HMI Requirements 32](#_Toc111554474)

[5.4 Other Requirements 34](#_Toc111554475)

[5.4.1 Design Requirements 34](#_Toc111554476)

[5.4.2 Manufacturing Requirements 34](#_Toc111554477)

[5.4.3 Service Requirements 34](#_Toc111554478)

[5.4.4 After Sales Requirements 34](#_Toc111554479)

[5.4.5 Process Requirements 34](#_Toc111554480)

[6 Functional Safety 35](#_Toc111554481)

[6.1 System Behaviors for HARA 35](#_Toc111554482)

[6.2 Functional Safety Assumptions 35](#_Toc111554483)

[6.3 Safety Goals 35](#_Toc111554484)

[6.4 Functional Safety Requirements 35](#_Toc111554485)

[6.4.1 Derivation of Functional Safety Requirements on Assumptions **Error! Bookmark not defined.**](#_Toc111554486)

[6.4.2 ASIL Decomposition of Functional Safety Requirements **Error! Bookmark not defined.**](#_Toc111554487)

[7 CyberSecurity 36](#_Toc111554488)

[7.1 Security Goals 36](#_Toc111554489)

[7.2 Cybersecurity Requirements **Error! Bookmark not defined.**](#_Toc111554490)

[8 Architecture 37](#_Toc111554491)

[8.1 Functional Decomposition 37](#_Toc111554492)

[8.1.1 Functions 38](#_Toc111554493)

[8.2 Logical Architecture 38](#_Toc111554494)

[8.2.1 Logical Elements 39](#_Toc111554495)

[8.2.2 Logical Interfaces 42](#_Toc111554496)

[9 Traceability Matrix 65](#_Toc111554497)

[10 Open Concerns 67](#_Toc111554498)

[11 Revision History 68](#_Toc111554499)

[12 Appendix 69](#_Toc111554501)

[12.1 Definitions 69](#_Toc111554502)

[12.2 Abbreviations 69](#_Toc111554503)

**List of Figures**

[Figure 2: Feature Image Here 9](#_Toc111554504)

[Figure 4: Ambient Lighting Context 12](#_Toc111554505)

[Figure 5: Operational Modes and States 14](#_Toc111554506)

[Figure 6: Feature Use Cases & System Behaviors 19](#_Toc111554507)

[Figure 10: Functional Boundary Behavior 37](#_Toc111554508)

[Figure 11: Logical 39](#_Toc111554509)

**List of Tables**

[Table 1: Features described in this FD 5](#_Toc111554510)

[Table 3: Ford internal Documents 8](#_Toc111554511)

[Table 4: External documents and publications 8](#_Toc111554512)

[Table 6: Feature Variants 10](#_Toc111554513)

[Table 7: Regions & Markets 10](#_Toc111554514)

[Table 8: Input Requirements/Documents 11](#_Toc111554515)

[Table 9: List of Influences 13](#_Toc111554516)

[Table 10: Operation Modes and States on Operational Modes and States 15](#_Toc111554517)

[Table 11: Transitions between Operation Modes and States on Operational Modes and States 18](#_Toc111554518)

[Table 12: List of Actors 19](#_Toc111554519)

[Table 14: System Behaviors for HARA 35](#_Toc111554520)

[Table 15: Functional Safety Assumptions 35](#_Toc111554521)

[Table 16: Functional Safety Goals **Error! Bookmark not defined.**](#_Toc111554522)

[Table 17: Cybersecurity Goals 36](#_Toc111554523)

[Table 18: List of Functions 38](#_Toc111554524)

[Table 20: Logical Elements 42](#_Toc111554525)

[Table 21: Feature Interactions 64](#_Toc111554526)

[Table 23: Open Concerns *(Not supported by MagicDraw report generation)* 67](#_Toc111554527)

[Table 24: Revision History 68](#_Toc111554528)

[Table 25: Definitions used in this document 69](#_Toc111554529)

[Table 26: Abbreviations used in this document 69](#_Toc111554530)

# Introduction

## Document Purpose

A Feature Document (FD) document defines a Feature on [Concept Level](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_Y6ftAPI2VsW5zd82DgHb6g)). It 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. Refer [FFSG01.10 Feature Document Guideline](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG01.10_FeatureDocument_Guideline.pdf) for how to apply the Feature Doc template for Functional Safety.

## Document Scope

This Feature Document (FD) specifies the following features:

| **Feature ID** | **Feature Name** | **Owner** | **Reference** |
| --- | --- | --- | --- |
| F000063 - Model Rev. 196 | Ambient Lighting | Matheus Clavel | <https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SfvJeEL9x3NrTDAAAAAAAAAAAAA&servername=Production_Server> |

Table 1: Features described in this FD

## Document Audience

The FD is written by the feature owner of Ambient Lighting. 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.

### Stakeholder List

For the latest list of stakeholder of the feature and their influence refer to: [Click here to open the latest Stakeholders List.](https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=ymrJZvjAx3NrTD)

## Document Organization

### Document Context

Refer to the [Specification Structure page](http://wiki.ford.com/display/RequirementsEngineering/Specification+templates) in the [Ford RE Wiki](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Engineering+for+SW+Enabled+Features) to understand how the FD relates to other Ford Requirements Documents and Specifications.

### Document Structure

The structure of this document is explained below:

**Introduction** – Explains 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.

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

**Feature Context** – Describes all external entities, which have an influence on the feature.

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

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

**Functional Safety** – Lists System Behaviors, Safety Goals and Safety Requirements of the feature.

**CyberSecurity** – Lists Security Goals and Security Requirements of the feature.

**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.

**Traceability Matrix** – Traceability Matrix.

**Open Concerns** – List of Open Concerns

**Revision History** – 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.

**Appendix** – Appendix

## Document Conventions

### Classification of Chapters

A chapter is considered mandatory, unless the chapter or its parent chapter(s) are categorized by using the tag:

**#Classification:** Some Condition

If no requirement/other content is known for a mandatory chapter, leave a statement “Not Applicable”

Some chapters have a follow certain rules in context of specific Ford processes, e.g. Functional Safety. This is indicated at the beginning of the corresponding chapter by the tags:

**#Functional Safety:** Some process specific explanation

**#Cybersecurity:** Some process specific explanation

### Requirements Templates

Refer to “[How to use the Specification Templates](http://wiki.ford.com/display/RequirementsEngineering/How+to+use+the+Specification+Templates?src=contextnavpagetreemode)” on how to use the specification templates and the VBA macros to create/edit the requirements in the specifications.

#### **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](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes?src=contextnavpagetreemode).

## References

### Ford Documents

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

| **Reference** | **Title** | **Doc. ID** | **Document Location** | **Revision** |
| --- | --- | --- | --- | --- |
| Cybersecurity Assessment | Cybersecurity Relevancy Assessment Template V1.2 - Ambient Lighting 09-02-2021 | GIS1 Item Number: 27.60/35 | https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=0VuFivKLx3NrTD | v1.2 |
| FD | Feature Document | FD - Ambient Lighting - F000063 | <https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=SfvJeEL9x3NrTDAAAAAAAAAAAAA&servername=Production_Server> |  |
| FIS | Feature Implementation Specification | FIS – Ambient Lighting F000063 | <https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=zZsJ$ihEx3NrTDAAAAAAAAAAAAA&servername=Production_Server> |  |
| Ford GIS Standard | Ford GIS Standard |  |  |  |
| FS | Functional Specification | FGS - Ambient Lighting - F000063 | <https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=jhqJ$ihEx3NrTDAAAAAAAAAAAAA&servername=Production_Server> |  |
| Functional Specification Body Control Module | BCM Functional Specification | FS-RU5T-14B476-AGB001 | https://www.vsemweb.ford.com/tc/launchapp?-attach=true&-s=226TCSession&-o=CzkF7IK0x3NrTD | 16.01 |
| FUSA documentation guideline for FD | FFSG01.10 Feature Document (Item Definition) Guideline |  |  | 2022.1 |
| HMI Spec - APIM | VEHICLE SETTINGS APIM SPSS V1.23 | VSv2-FUN-REQ-025223 |  | 1.23 |

Table 2: Ford internal Documents

### External Documents and Publications

The list of external documents could include books, reports and online sources.

| **Reference** | **Document / Publication** | **Document Location** |
| --- | --- | --- |
| CIE\_1938 Standard | Light Color Standard Pattern - Cx, Cy | https://en.wikipedia.org/wiki/CIE\_1931\_color\_space |
| IEEE Std 1012-2004 IEEE Standard for Software Verification and Validation |  |  |
| ISO/IEC 19500-2:2003 | Information technology -- Open Distributed Processing -- Part 2 |  |
| Lumen definition | Lumen Definition | https://pt.wikipedia.org/wiki/L%C3%BAmen |
| UML Testing Profile (UTP), v1.2 |  |  |

Table 3: External documents and publications

## Glossary

See Appendix for Definitions and Abbreviations.

### Definitions

### Abbreviations

### Parameters / Values

No Parameters / Values specified.

# Feature Overview

## Purpose and Description of Feature

With the ambient lighting feature, a user can set the mood in the vehicle’s cabin by selecting one of several different accent colors.

When activated ambient lighting illuminates foot wells, cup holders, and door release handles, map pockets, etc., depending on the vehicle model. A user can also adjust brightness settings to further personalize the interior.

On multicolor variants equipped with door handle lights, when Ambient Lighting feature is available to the user experience it will also be capable of indicating a cabin door being ajar by activating the door’s lights in a pre-configured color (Red).

On vehicles equipped with a Contextual Ambient Lighting (CAL) system, the Ambient Lighting will also provide support the Selectable Drive Mode feature. Which means that when the CAL is in Auto mode, the user will see Ambient Lighting lamps being orchestrated by the Selectable Drive Mode feature (colors shift) through traditional drive modes.

Some features such as Welcome & Farewell, Rejuvenate and Selectable Drive Mode use Ambient Lighting lamps as a resource to perform their requirements.

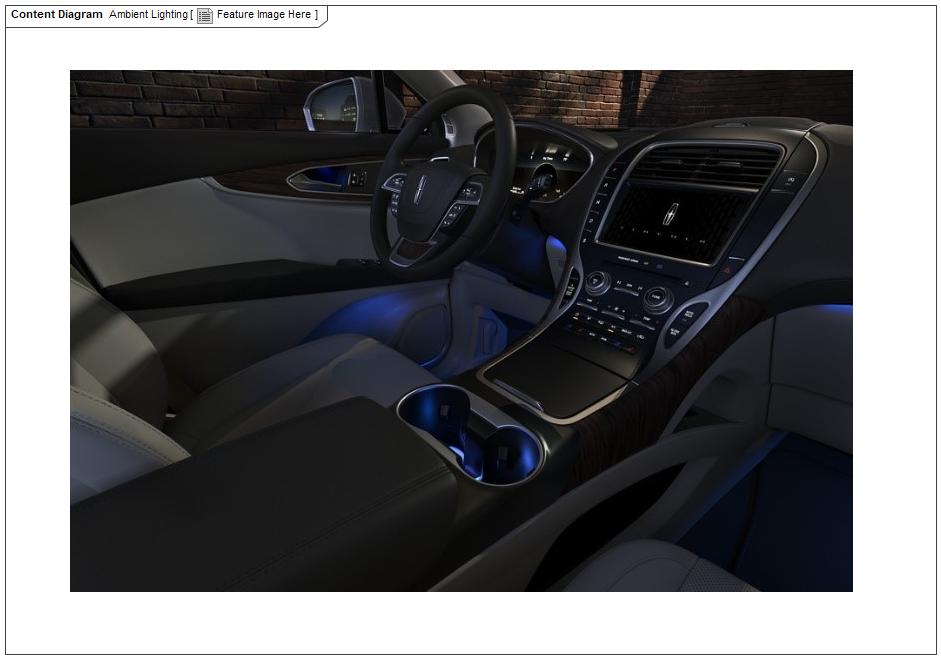


Figure 1: Feature Image Here

## Feature Variants

| **Variant Name** | **Variant Description** | **Remarks** |
| --- | --- | --- |
| **Contextual Ambient Lighting** | Variant for vehicles equipped with the SDM feature. |  |
| **Ford Multi Color** | Variant for Ford brand vehicles (except S650 Mustang and prior) with multi-color ambient lighting capability. |  |
| **Ford Single Color** | Variant for Ford brand vehicles (except S650 Mustang and prior) with single color ambient lighting capability. |  |
| **Lincoln** | Variant for Lincoln brand vehicles with multicolor ambient lighting capability. |  |

Table 4: Feature Variants

### Regions & Markets

| **Market /**  **Region**  Variant Name | **North America** | **South America** | **Europe** | **Middle East/Africa** | **Asia / Pacific** | **China** |
| --- | --- | --- | --- | --- | --- | --- |
| **Contextual Ambient Lighting** | Optional | Optional | Optional | Optional | Optional | Optional |
| **Ford Multi Color** | Optional | Optional | Optional | Optional | Optional | Optional |
| **Ford Single Color** | Optional | Optional | Optional | Optional | Optional | Optional |
| **Lincoln** | Optional | Optional | Optional | Optional | Optional | Optional |

Table 5: Regions & Markets

## Input Requirements/Documents

| **Reference**  (Reference as listed in ch. “References”) | **Section/Requirement** | **Description** | **Derived Requirement**  (optional – reference to requirement in ch. “Feature Requirements”) |
| --- | --- | --- | --- |
| **Attribute Requirements** | | | |
|  | Function Execution Cycle Time | The Ambient Lighting Control function shall have an execution cycle time of no more than 21ms from receipt of all necessary input signals. |  |
|  | Light Output Color Range | This function shall be able to emit light in the color coordinates based on CIE 1931 Color Space. |  |
|  | Execution of Logical Elements | The ambient lighting control function shall evaluate state charts and decision tables a maximum of one (1) time each execution cycle. |  |
|  | Light Output Intensity Range | This function shall be able to emit light with intensity measurable in lumens [lm] unit at . Its intensity ranges from 0 up to 2.5 lm. |  |
|  | Example AR |  |  |
| **Ford Engineering Standards** | | | |
|  | <Example: some SDS (requirement)> |  |  |
| **Legal Regulations** | | | |
| **Industry Standards** | | | |
|  | ISO 26262 | The system should be developed according to Ford's implementation of Functional Safety. |  |
|  | Ambient Lighting Strategy (UX / CIED) | Ambient Lighting shall comply with to RQT-002004-022593 the Ambient Lighting Strategy. |  |
| **Other Sources** | | | |

Table 6: Input Requirements/Documents

## Lessons Learned

No lessons learned specified.

## Assumptions

No Assumptions specified.

# Feature Context

## Feature Context Diagram

F000063

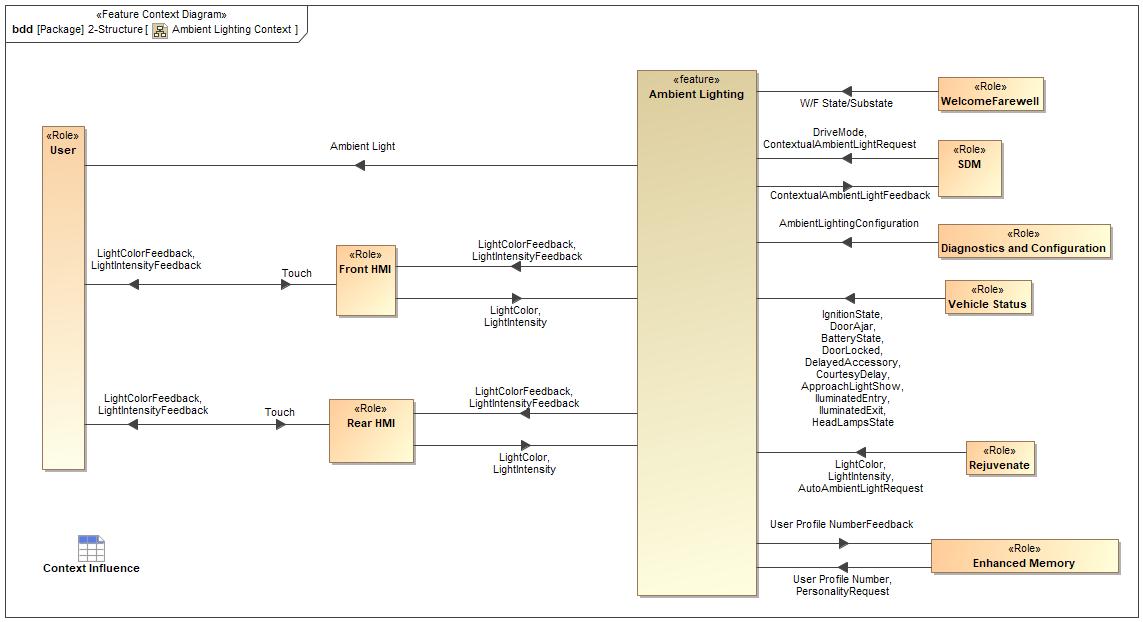


Figure 2: Ambient Lighting Context

## List of Influences

| **ID** | **External Entity** | **Influence Description** |
| --- | --- | --- |
| Ambient Light | Ambient Lighting To User | Ambient lighting illumination output to vehicle interior. |
| AmbientLightingConfiguration | Diagnostics and Configuration To Ambient Lighting | Configuration data provided through off vehicle diagnostics software. |
| ApproachLightShow | Vehicle Status To Ambient Lighting | Light show feature status. |
| AutoAmbientLightRequest | Rejuvenate To Ambient Lighting | The Rejuvenate feature request the HMI to put Ambient Lighting in automatic mode. |
| BatteryState | Vehicle Status To Ambient Lighting | Battery state of charge. |
| ContextualAmbientLightFeedback | Ambient Lighting To SDM | Current Contextual Ambient Lighting status to inform whether it is in Auto or Manual Mode. |
| ContextualAmbientLightRequest | SDM To Ambient Lighting | User request to Ambient Lighting to let Automatic Drive Mode feature drive Ambient Lighting color. |
| CourtesyDelay | Vehicle Status To Ambient Lighting | Request from Courtesy Delay feature to hold lights On for a preset amount of time. |
| DelayedAccessory | Vehicle Status To Ambient Lighting | Delayed Accessory status. |
| DoorAjar | Vehicle Status To Ambient Lighting | Doors ajar status. |
| DoorLocked | Vehicle Status To Ambient Lighting | Doors locked status. |
| DriveMode | SDM To Ambient Lighting | Current drive mode selection. |
| HeadLampsState | Vehicle Status To Ambient Lighting | Head lamp status. |
| IgnitionState | Vehicle Status To Ambient Lighting | Ignition status. |
| IluminatedEntry | Vehicle Status To Ambient Lighting | Status of feature Illuminated Entry. |
| IluminatedExit | Vehicle Status To Ambient Lighting | Status of feature Illuminated Exit. |
| LightColor | Front HMI To Ambient Lighting | Command to choose Ambient Lighting color. |
| Rear HMI To Ambient Lighting | Command to choose Ambient Lighting color. |
| Rejuvenate To Ambient Lighting | Command to choose Ambient Lighting color. |
| LightColorFeedback | Ambient Lighting To Front HMI | Current Ambient Lighting color. |
| Ambient Lighting To Rear HMI | Current Ambient Lighting color. |
| Front HMI To User | Current Ambient Lighting color. |
| Rear HMI To User | Current Ambient Lighting color. |
| LightIntensity | Front HMI To Ambient Lighting | Command to choose Ambient Lighting intensity. |
| Rear HMI To Ambient Lighting | Command to choose Ambient Lighting intensity. |
| Rejuvenate To Ambient Lighting | Command to choose Ambient Lighting intensity. |
| LightIntensityFeedback | Ambient Lighting To Front HMI | Current Ambient Lighting intensity. |
| Ambient Lighting To Rear HMI | Current Ambient Lighting intensity. |
| Front HMI To User | Current Ambient Lighting intensity. |
| Rear HMI To User | Current Ambient Lighting intensity. |
| PersonalityRequest | Enhanced Memory To Ambient Lighting | User request for personalization:  Copy of current Ambient Lighting settings to a selected profile.  User can recall personalized profile later on. |
| Touch | User To Front HMI | User touches HMI screen. |
| User To Rear HMI | User touches HMI screen. |
| User Profile Number | Enhanced Memory To Ambient Lighting | User profile number to store current Ambient Lighting color and intensity. |
| User Profile NumberFeedback | Ambient Lighting To Enhanced Memory | Current profile number number in use. |
| W/F State/Substate | WelcomeFarewell To Ambient Lighting | Current Welcome Farewell status. |

Table 7: List of Influences

# Feature Modeling

## Operation Modes and States

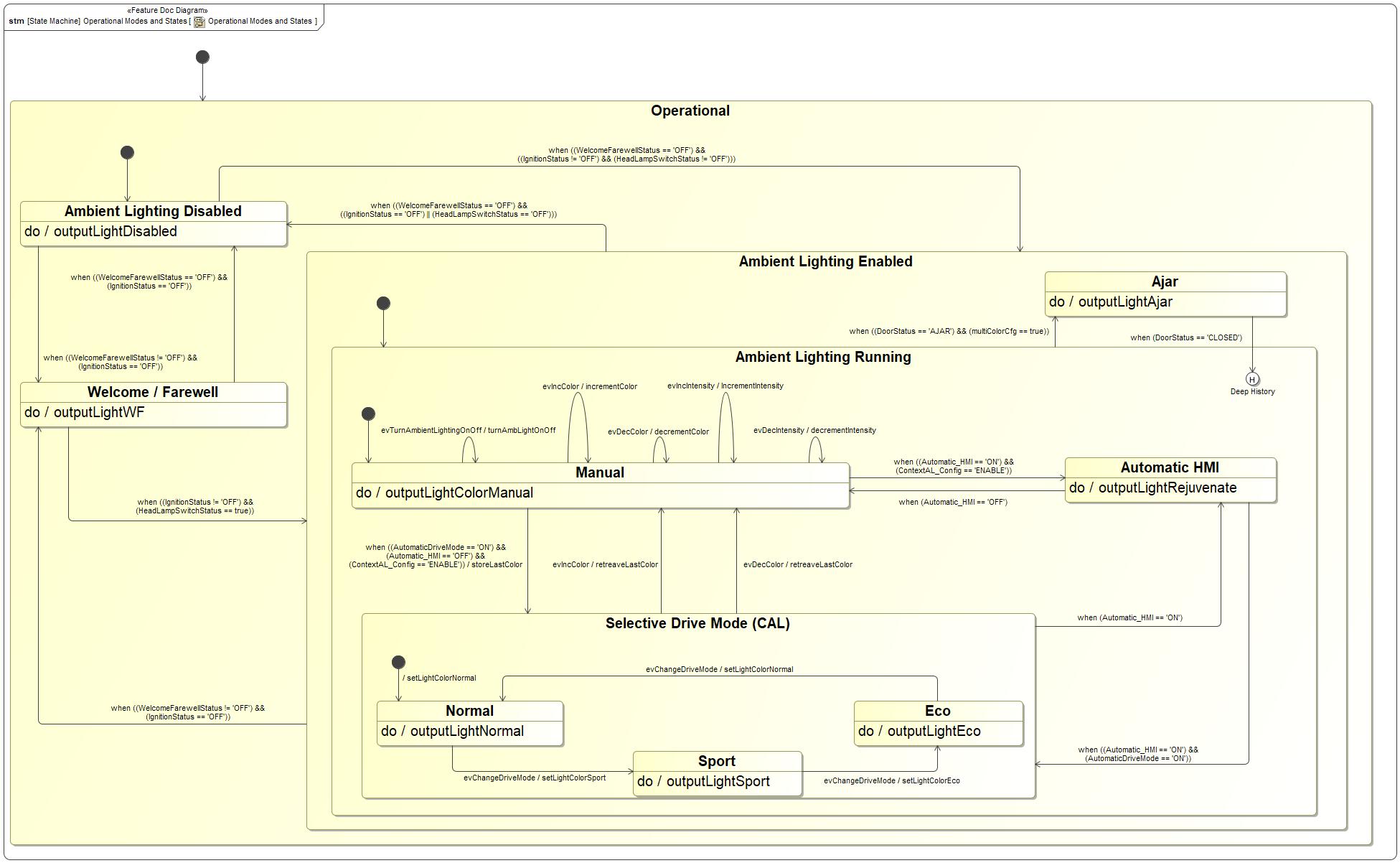


Figure 3: Operational Modes and States

| **State** | **Description** | **Requirements Reference** (optional) |
| --- | --- | --- |
| Ajar | Doors are illuminated in a configurable color when they are ajar.  Do behavior: outputLightAjar | * ID=R\_F\_AMBL\_000037 : Door Ajar Behavior |
| Ambient Lighting Disabled | Ambient Lighting not enabled.  User can' t change neither lighting color / intensity nor use any other ambient lighting function.  Do behavior: outputLightDisabled | * ID=R\_F\_AMBL\_000045 : Enable / Disable Ambient Lighting feature |
| Ambient Lighting Enabled | Ambient Lighting is enabled.  User can change either lighting color / intensity and also use any other ambient lighting function. | * ID=R\_F\_AMBL\_000045 : Enable / Disable Ambient Lighting feature |
| Ambient Lighting Running | When in this mode ambient lighting can be driven by manual user input or by SEL feature according to user 's choice through HMI or even by Rejuvenate feature also from user input from HMI. |  |
| Automatic HMI | Ambient Lighting is driven by Rejuvenate feature.  Do behavior: outputLightRejuvenate |  |
| Eco | Ambient Lighting is driven by feature SEL drive mode Eco.  Do behavior: outputLightEco | * ID=R\_F\_AMBL\_000022 : Contextual Ambient Light behavior when in AUTO Mode * ID=R\_F\_AMBL\_000023 : Drive Mode Selection on the HMI in AUTO Mode * ID=R\_F\_AMBL\_000021 : Contextual Ambient Light behavior when the slider transitions from Manual to AUTO Mode on the HMI |
| Manual | Ambient Lighting is driven by user manual input through HMI.  Do behavior: outputLightColorManual | * ID=R\_F\_AMBL\_00003 : Manually Selectable Intensity * ID=R\_F\_AMBL\_000026 : Drive Mode Selection on the HMI in Manual Mode |
| Normal | Ambient Lighting is driven by feature SEL drive mode Normal.  Do behavior: outputLightNormal | * ID=R\_F\_AMBL\_000022 : Contextual Ambient Light behavior when in AUTO Mode * ID=R\_F\_AMBL\_000023 : Drive Mode Selection on the HMI in AUTO Mode * ID=R\_F\_AMBL\_000021 : Contextual Ambient Light behavior when the slider transitions from Manual to AUTO Mode on the HMI |
| Operational | Represents the phase after EoL programming / configuration.  Feature is already configured and ready. | * ID=R\_F\_AMBL\_00001 : Host Vehicle State (Power Mode) for Feature Operation |
| Selective Drive Mode (CAL) | Ambient Lighting is driven by one of the SEL drive modes:  Normal, Eco and Sport. | * ID=R\_F\_AMBL\_000022 : Contextual Ambient Light behavior when in AUTO Mode |
| Sport | Ambient Lighting is driven by feature SEL drive mode Normal.  Do behavior: outputLightSport | * ID=R\_F\_AMBL\_000022 : Contextual Ambient Light behavior when in AUTO Mode * ID=R\_F\_AMBL\_000023 : Drive Mode Selection on the HMI in AUTO Mode * ID=R\_F\_AMBL\_000021 : Contextual Ambient Light behavior when the slider transitions from Manual to AUTO Mode on the HMI |
| Welcome / Farewell | Ambient lighting will have its behavior driven by Welcome / Farewell strategy.  Do behavior: outputLightWF | * ID=R\_F\_AMBL\_00002 : Conformance to Welcome Farewell Feature Specification |

Table 8: Operation Modes and States on Operational Modes and States

| **Transition ID** | **Source** | **Destination** | **Description** | **Requirements Reference**  (optional) |
| --- | --- | --- | --- | --- |
| T1 | Automatic HMI | Selective Drive Mode (CAL) | ChangeEvent when ((Automatic\_HMI == 'ON') && (AutomaticDriveMode == 'ON')) |  |
| T2 | Manual | Manual | Trigger signal: evTurnAmbientLightingOnOff  Effect: turnAmbLightOnOff  SignalEvent evTurnAmbientLightingOnOff |  |
| T3 | Initial | Ambient Lighting Disabled | Name: Default Transition  Documentation: No Condition.  No Action. |  |
| T4 | Manual | Manual | Trigger signal: evIncIntensity  Effect: IncrementIntensity  SignalEvent evIncIntensity |  |
| T5 | Initial | Operational | Name: Default Transition.  Documentation: No Condition.  No Action. | Requirements: Host Vehicle State (Power Mode) for Feature Operation |
| T6 | Ambient Lighting Disabled | Welcome / Farewell | Documentation: Event captured as a requirement of Welcome / Farewell feature.  ChangeEvent when ((WelcomeFarewellStatus != 'OFF') && (IgnitionStatus == 'OFF')) | Requirements: Host Vehicle State (Power Mode) for Feature Operation, Conformance to Welcome Farewell Feature Specification |
| T7 | Manual | Manual | Trigger signal: evDecColor  Effect: decrementColor  SignalEvent evDecColor | Requirements: Host Vehicle State (Power Mode) for Feature Operation, Conformance to Welcome Farewell Feature Specification, Ramp ON (To Welcome/Farewell Mode) |
| T8 | Sport | Eco | Trigger signal: evChangeDriveMode  Effect: setLightColorEco  SignalEvent evChangeDriveMode |  |
| T9 | Ambient Lighting Disabled | Ambient Lighting Enabled | ChangeEvent when ((WelcomeFarewellStatus == 'OFF') && ((IgnitionStatus != 'OFF') && (HeadLampSwitchStatus != 'OFF'))) |  |
| T10 | Ambient Lighting Enabled | Welcome / Farewell | ChangeEvent when ((WelcomeFarewellStatus != 'OFF') && (IgnitionStatus == 'OFF')) |  |
| T11 | Selective Drive Mode (CAL) | Manual | Trigger signal: evIncColor  Effect: retreaveLastColor  SignalEvent evIncColor | Requirements: Conformance to Welcome Farewell Feature Specification |
| T12 | Initial | Manual | Name: Default  Documentation: No Condition.  No Action. |  |
| T13 | Eco | Normal | Trigger signal: evChangeDriveMode  Effect: setLightColorNormal  SignalEvent evChangeDriveMode |  |
| T14 | Ambient Lighting Enabled | Ambient Lighting Disabled | ChangeEvent when ((WelcomeFarewellStatus == 'OFF') && ((IgnitionStatus == 'OFF') || (HeadLampSwitchStatus == 'OFF'))) |  |
| T15 | Ambient Lighting Running | Ajar | ChangeEvent when ((DoorStatus == 'AJAR') && (multiColorCfg == true)) |  |
| T16 | Selective Drive Mode (CAL) | Automatic HMI | ChangeEvent when (Automatic\_HMI == 'ON') | Requirements: Door Ajar Behavior |
| T17 | Welcome / Farewell | Ambient Lighting Enabled | ChangeEvent when ((IgnitionStatus != 'OFF') && (HeadLampSwitchStatus == true)) |  |
| T18 | Normal | Sport | Documentation: Represents an event of user changing driver mode.  Trigger signal: evChangeDriveMode  Effect: setLightColorSport  SignalEvent evChangeDriveMode | Requirements: Conformance to Welcome Farewell Feature Specification |
| T19 | Ajar | Deep History | ChangeEvent when (DoorStatus == 'CLOSED') |  |
| T20 | Selective Drive Mode (CAL) | Manual | Trigger signal: evDecColor  Effect: retreaveLastColor  SignalEvent evDecColor |  |
| T21 | Manual | Manual | Trigger signal: evDecIntensity  Effect: decrementIntensity  SignalEvent evDecIntensity |  |
| T22 | Initial | Ambient Lighting Running | Name: Default Transition.  Documentation: No Condition.  No Action. |  |
| T23 | Manual | Manual | Trigger signal: evIncColor  Effect: incrementColor  SignalEvent evIncColor |  |
| T24 | Manual | Automatic HMI | ChangeEvent when ((Automatic\_HMI == 'ON') && (ContextAL\_Config == 'ENABLE')) |  |
| T25 | Manual | Selective Drive Mode (CAL) | Effect: storeLastColor  ChangeEvent when ((AutomaticDriveMode == 'ON') && (Automatic\_HMI == 'OFF') && (ContextAL\_Config == 'ENABLE')) |  |
| T26 |  |  | Effect: setLightColorNormal | Requirements: a, Soft button to toggle AAL (Auto Ambient Light) between AUTO or MANUAL. |
| T27 | Welcome / Farewell | Ambient Lighting Disabled | Name: s  ChangeEvent when ((WelcomeFarewellStatus == 'OFF') && (IgnitionStatus == 'OFF')) | Requirements: a, Soft button to toggle AAL (Auto Ambient Light) between AUTO or MANUAL., Contextual Ambient Light behavior when the slider transitions from Manual to AUTO Mode on the HMI |
| T28 | Automatic HMI | Manual | ChangeEvent when (Automatic\_HMI == 'OFF') |  |

Table 9: Transitions between Operation Modes and States on Operational Modes and States

## Use Cases

### Use Case Diagram

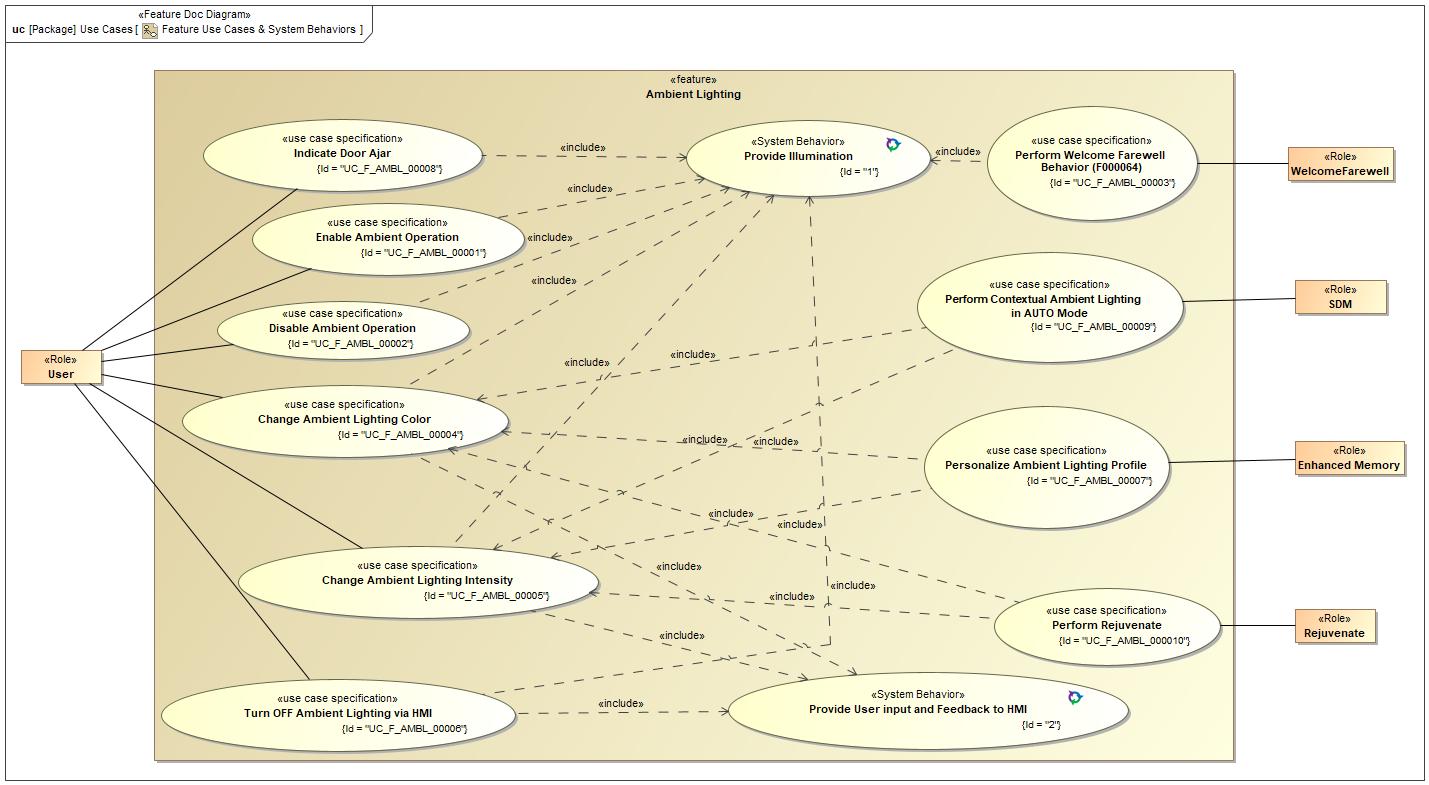


Figure 4: Feature Use Cases & System Behaviors

### Actors

| **Actor** | **Description** |
| --- | --- |
| Enhanced Memory | Represents Enhanced Memory feature. |
| Rejuvenate | Represents Rejuvenate feature. |
| SDM | Represents Selectable Drive Mode feature. |
| User | Person requesting ambient lighting changes. |
| WelcomeFarewell | Represents Welcome / Farewell feature. |

Table 10: List of Actors

### Use Case Descriptions

UC\_F\_AMBL\_00001 Enable Ambient Operation

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary |  |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | Vehicle Ignition is in RUN/START. |
| **Main Flow Description** |  | To describe the scenario of enabling “Ambient” operation mode of the feature. |
| **Main Flow** | M1 | The User turns the headlamp switch to ON. |
| **Alternative Flow Steps** | A1 | The user turns the headlamp switch to AUTO. |
| A2 | Nighttime visibility conditions have been detected. |
| **Postconditions** | PostC1 | The Ambient lighting turns ON in Ambient Mode. |

UC\_F\_AMBL\_00002 Disable Ambient Operation

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary |  |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | Vehicle Ignition is in RUN/START. |
| **Main Flow Description** |  | To describe the scenario of disabling “Ambient” operation mode of the feature. |
| **Main Flow** | M1 | The User turns the headlamp switch to OFF. |
| **Alternative Flow Steps** | A1 | A1 User turns headlamp switch to AUTO. |
| A2 | A2 Daytime visibility conditions is detected. |
| A3 | B1 User turns ignition off. |
| **Postconditions** | PostC1 | The Ambient lighting turns OFF. |

UC\_F\_AMBL\_00003 Perform Welcome Farewell Behavior (F000064)

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary | WelcomeFarewell |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | Vehicle Ignition is OFF. |
| **Main Flow Description** |  | To describe a scenario of the feature responding to a Welcome Farewell Trigger. For a full list of triggers and behaviors refer to the Welcome Farewell / Lincoln Embrace Strategy RQT-002004-704098. |
| **Main Flow** | M1 | The User interacts with the Welcome Farewell feature. |
| M2 | Welcome Farewell instructs ambient lighting to turn on/off in a specific color and intensity. |
| **Postconditions** | PostC1 | Based on instructions received the Ambient Lights are ON in a specific color and intensity or OFF. |

UC\_F\_AMBL\_00004 Change Ambient Lighting Color

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary |  |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | Color X is active. |
| PreC2 | Intensity X is active. |
| PreC3 | Vehicle ignition is in RUN/START. |
| **Main Flow Description** |  | To describe the scenario of a user changing the ambient lighting color setting. |
| **Main Flow** | M1 | The user selects color Y through the feature HMI. |
| **Postconditions** | PostC1 | The ambient lighting is ON in color Y and intensity X  The HMI screen displays updated settings. |

UC\_F\_AMBL\_00005 Change Ambient Lighting Intensity

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary |  |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | Vehicle ignition is in RUN/START. |
| **Main Flow Description** |  | To describe the scenario of a user changing the ambient lighting intensity setting. |
| **Main Flow** | M1 | The user selects a new intensity through the feature HMI. |
| **Postconditions** | PostC1 | The ambient lighting is ON in a new color and intensity  The HMI screen displays updated settings. |

UC\_F\_AMBL\_00006 Turn OFF Ambient Lighting via HMI

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary |  |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | Ambient Lighting is ON in the vehicle. |
| PreC2 | Vehicle ignition is in RUN/START. |
| **Main Flow Description** |  | To describe the scenario of a user turning OFF ambient lighting via the HMI. |
| **Main Flow** | M1 | The user selects Ambient Lighting OFF via the HMI. |
| **Postconditions** | PostC1 | The Ambient Lighting is turned OFF in the vehicle  The HMI shows Ambient Lighting turned OFF . |

UC\_F\_AMBL\_00007 Personalize Ambient Lighting Profile

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary | Enhanced Memory |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | Profile X exists with associated ambient lighting settings but is not active. |
| PreC2 | Vehicle equipped with Enhanced Memory. |
| **Main Flow Description** |  | Describes the scenario of changing ambient lighting settings through interaction with the Enhanced Memory Feature.  Reference the Enhanced Memory feature specification (F000172) for more details on methods by which a driver profile can be changed. |
| **Main Flow** | M1 | The user changes to driver profile X via Enhanced Memory. |
| M2 | Enhanced Memory provides new profile to ambient lighting. |
| **Postconditions** | PostC1 | The ambient lights transition to the color and intensity associated with profile X  The HMI screen displays updated settings. |

UC\_F\_AMBL\_00008 Indicate Door Ajar

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary |  |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | All doors are closed. |
| PreC2 | Ambient Lighting is enabled. |
| PreC3 | Lincoln/Ford Multicolor variant ONLY. |
| PreC4 | Vehicle ignition is in RUN/START. |
| **Main Flow Description** |  | To describe the scenario of a user opening a door or leaving it ajar in ambient operation mode. |
| **Main Flow** | M1 | A user opens any vehicle door. |
| **Postconditions** | PostC1 | The door ambient lighting LEDs for any open door are ON in the Ajar color (Red) at 100% intensity. |

UC\_F\_AMBL\_00009 Perform Contextual Ambient Lighting in AUTO Mode

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary | SDM |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | AAL is set to ON. |
| PreC2 | Ambient Lighting is enabled. |
| PreC3 | CAL variant ONLY. |
| PreC4 | Vehicle ignition is in RUN/START. |
| **Main Flow Description** |  | To describe the scenario of a user changing the drive mode in Auto Mode for Contextual Ambient Lighting. |
| **Main Flow** | M1 | The active drive mode changes from Drive Mode X to Drive Mode Y. |
| M2 | The Ambient Lighting changes color from that associated with Drive Mode X to that associated with Drive Mode Y. |
| **Alternative Flow Steps** | A1 | The Ambient Lighting is ON in Drive Mode Y associated color and the intensity is unchanged. |

UC\_F\_AMBL\_000010 Perform Rejuvenate

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary | Rejuvenate |
| **Subject** |  | Ambient Lighting |
| **Description** |  |  |
| **Preconditions** | PreC1 | All doors are closed. |
| PreC2 | Ambient Lighting is enabled. |
| PreC3 | Headlamps are NOT OFF. |
| PreC4 | Lincoln variant ONLY. |
| PreC5 | Vehicle ignition is in RUN/START. |
| **Main Flow Description** |  | Describe the scenario of the Rejuvenate feature taking control of the ambient lighting. |
| **Main Flow** | M1 | The User activates Rejuvenate Mode. |
| M2 | All manual input methods for Ambient Lighting are made inaccessible. |
| M3 | Rejuvenate requests ambient lighting activation in specific color and intensity. |
| M4 | Repeat M2 for each phase of Rejuvenate Mode. |
| M5 | Rejuvenate Mode ends and restores Ambient Lighting to the original state prior to experience. |
| **Postconditions** | PostC1 | Ambient Lighting is in original state. |

# Feature Requirements

## Functional Requirements

R\_F\_AMBL\_00001 Host Vehicle State (Power Mode) for Feature Operation

While the Ignition is NOT OFF and HeadLamp Switch is ON or AUTO ON, the feature Ambient Lighting shall available.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00001 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_00002 Conformance to Welcome Farewell Feature Specification

While the Ignition is OFF the ambient lights shall available to perform the Welcome & Farewell feature behaviors.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00002 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** | * 1661018052.jpg DR\_FNC\_45 Generate Internal Welcome Farewell Status Signal via Decision Table 4.2-1 * 1661018052.jpg DR\_FNC\_46 WelcomeFarewell\_Status Value at Reset * -1936834062.jpg R\_FNC\_00001 Receive Welcome Farewell State & Substate Signals | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_00003 Manually Selectable Intensity

While the feature operation state, the feature Ambient Lighting shall allow a user to manually select the ambient lighting intensity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00003 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_00004 Light Output Color

While the feature operation state, and when more than one Ambient Lighting color is available, the feature Ambient Lighting shall allow a user to manually select the ambient lighting color.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00004 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** |  |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_00005 Ambient Lighting User Feedback

While the feature is in Operational state, the feature Ambient Lighting shall provide feedback of active settings.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00005 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_00006 Data Analytics

Ambient Lighting shall record:

o How frequently users change the color of Ambient Lighting (Multi Color Variants)

o How often users manually change the intensity of Ambient Lighting

o How often NJOD color is overridden by customer (Contextual Ambient Lighting)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00006 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_00007 Lighting Transition Interruption

While a ramp ON or ramp OFF illumination behavior is running, if a new request is received, then the feature Ambient Lighting shall execute the new request instantly.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00007 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_00008 Ramp ON (Ambient Mode)

While the feature operation state, and when transitioning to ON, the feature Ambient Lighting shall ramp ON to the desired intensity at a configurable rate.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00008 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_00009 Ramp OFF (Ambient Mode)

While the feature operation state, and when transitioning to OFF, the feature Ambient Lighting shall ramp OFF at a configurable rate.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_00009 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000010 Ramp ON (To Welcome/Farewell Mode)

While the Welcome & Farewell state, and when transitioning to ON, the ambient lights shall ramp ON at a configured rate of 3 seconds.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000010 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000011 Ramp OFF (From Welcome/Farewell Mode)

While the Welcome & Farewell state, and when transitioning to OFF, the ambient lights shall ramp OFF at a configured rate of 4 seconds.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000011 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000012 Enhanced Memory – Store Profile Settings

While the feature operation state, and when the feature Enhanced Memory operations are supported, the feature Ambient Lighting shall support Enhanced Memory by storing settings for each Personalization Profile as they are updated.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000012 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000013 Enhanced Memory - Operations - Copy

While the feature operation state, and when the feature Enhanced Memory operations are supported, the feature Ambient Lighting shall provide resources to copy Ambient Lighting settings from the active personalization profile onto the selected personalization profile.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000013 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000015 Contextual Ambient Lighting at reset

At reset Contextual Ambient Lighting shall be in Auto Mode.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000015 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000017 Contextual Ambient Lighting Behavior on transition from OFF/ACCESSORY to RUN/START in Manual Mode

When manual mode is active, the transition from OFF/ACCESSORY to RUN/START shall cause the ambient lighting to transition from last manually chosen color and 100 percent intensity to last manually chosen color and last saved intensity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000017 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** | * 1661018052.jpg DR\_FNC\_4 Determination of Ambient Status | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000018 Contextual Ambient Lighting Behavior on transition from RUN/START to OFF/ACCESSORY in Manual Mode

When occur the transition from feature operation enabled to feature operation disabled (Ignition OFF), if MANUAL mode is active, then the feature ambient lighting shall illuminate in 100 percent intensity in the last manually choosen color for 25 seconds.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000018 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** | * 1661018052.jpg DR\_FNC\_4 Determination of Ambient Status | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000019 Manual color change through HMI while in AUTO Mode

While auto mode is active, when a manual ambient lighting color change request occurs via the HMI, Contextual Ambient Lighting shall transition from auto to manual and go to the selected color at the same intensity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000019 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000020 Contextual Ambient Lighting behavior while in Manual Mode

When in MANUAL Mode the Contextual Ambient Lighting shall use the last manually selected color and intensity for illumination.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000020 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000021 Contextual Ambient Light behavior when the slider transitions from Manual to AUTO Mode on the HMI

When a transitions from MANUAL to AUTO Mode occurs, Contextual Ambient Lighting shall use the color that corresponds to the active drive mode from the SDM for illumination.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000021 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000022 Contextual Ambient Light behavior when in AUTO Mode

When Contextual Ambient Lighting is in AUTO Mode, the Ambient Lighting color used shall correspond with the active drive mode.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000022 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000023 Drive Mode Selection on the HMI in AUTO Mode

While Contextual Ambient Lighting is in AUTO mode, when a new drive mode is selected, the feature Ambient Lighting shall be in the color associated with the new drive mode when illuminated.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000023 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000024 Contextual Ambient Lighting behavior on transition from RUN/START to OFF/ACCESSORY in AUTO Mode

When a transition from RUN/START to OFF/ACCESSORY occurs while Auto mode is active, Contextual Ambient Lighting shall cause the ambient lights to illuminate in the last manually chosen color and 100 percent intensity for 25 seconds.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000024 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** | * 1661018052.jpg DR\_FNC\_4 Determination of Ambient Status | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000025 Contextual Ambient Lighting behavior on transition from OFF/ACCESSORY to RUN/START in AUTO Mode

When occur the transition from feature operation disabled (ignition OFF) to feature operation enabled, if AUTO mode is active, then the feature shall use the color associated with the active drive mode reveived from SDM.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000025 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** | * 1661018052.jpg DR\_FNC\_4 Determination of Ambient Status | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000026 Drive Mode Selection on the HMI in Manual Mode

When occur the transition from feature operation enabled to feature operation disabled (Ignition OFF), if AUTO mode is active, then the feature ambient lighting shall illuminate in 100 percent intensity in the last manually choosen color for 25 seconds.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000026 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000027 Intensity change on HMI in AUTO Mode

When occur the transition from feature operation disabled (ignition OFF) to feature operation enabled, if AUTO mode is active, then the feature shall use the color associated with the active drive mode reveived from SDM.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000027 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000028 Profile change from Profile X to Profile Y (No change to AAL or Drive Mode, AAL Mode is in AUTO)

When the profile is changed from profile X to profile Y with no change to AAL and drive mode, while AAL is in Auto Mode, there will be no color change, and the intensity will change to profile Y intensity setting.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000028 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000029 Profile change from Profile X to Profile Y (No change to AAL or Drive Mode, AAL Mode is in Manual)

When the profile is changed from profile X to profile Y with no change to AAL and drive mode, while AAL is in Auto Mode, there will be a color and intensity change if stored values for profile Y are different from profile X.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000029 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000030 Profile change from Profile X to Profile Y (Change to AAL Mode, No change to Drive Mode, AAL Mode changes from Manual to AUTO)

When the profile is changed from profile X to profile Y with a change to AAL Mode, no change to Drive Mode, when AAL Mode changes from manual to auto mode, there will be a color change if defined SDM color values for profile Y are different than profile X drive mode. Ambient Lighting intensity will be set to profile Y’s saved intensity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000030 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000031 Profile change from Profile X to Profile Y (Change to AAL Mode, No change to Drive Mode, AAL Mode changes from AUTO to Manual)

When the profile is changed from profile X to profile Y with a change to AAL Mode, no change to Drive Mode, when AAL Mode changes from auto to manual mode, there will be a color and intensity change if stored values for profile Y are different than profile X.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000031 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000032 Profile change from Profile X to Profile Y (No change to AAL Mode, Change to Drive Mode, AAL Mode is in Manual)

When the profile is changed from profile X to profile Y with no change to AAL Mode, a change to Drive Mode, when AAL Mode is in manual mode, there will be a color and intensity change if stored values for profile Y are different than profile X.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000032 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000033 Profile change from Profile X to Profile Y (No change to AAL Mode, Change to Drive Mode, AAL Mode is in AUTO)

When the profile is changed from profile X to profile Y with a change to AAL Mode, no change to Drive Mode, when AAL Mode changes from manual to auto mode, there will be a color change if defined SDM color values for profile Y are different than profile X drive mode. Ambient Lighting intensity will be set to profile Y’s saved intensity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000033 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000034 Profile change from Profile X to Profile Y (Change to AAL Mode, Change to Drive Mode, AAL Mode changes from Manual to AUTO)

When the profile is changed from profile X to profile Y with a change to AAL Mode, change to Drive Mode, when AAL Mode changes from manual to auto mode, there will be a color change if defined SDM color values for profile Y are different than profile X stored color. Ambient Lighting intensity will be set to profile Y’s saved intensity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000034 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000035 Profile change from Profile x to Profile Y (Change to AAL Mode, Change to Drive Mode, AAL changes from AUTO to Manual)

When the profile is changed from profile X to profile Y with a change to AAL Mode, a change to Drive Mode, when AAL Mode changes from auto to manual mode, there will be a color change if stored values for profile Y are different than SDM color values for profile X drive mode. Ambient Lighting intensity will be set to profile Y’s saved intensity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000035 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000036 AAL Mode Slider Behavior

While the feature operation state, the feature Ambient Lighting shall provide HMI control elements for the following commands regarding AAL (Auto Ambient Lighting): ON and OFF.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000036 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000037 Door Ajar Behavior

When any door is ajar, while the Ignition is ON, the ajar door 's light shall turn on in the red color (or the ajar color config. in data dictionary) and 100 percent intensity.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000037 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000038 Rejuvenate Ambient Lighting Settings Retention

While the feature operation state, the feature Ambient Lighting shall provide HMI control elements for the following commands regarding AAL (Auto Ambient Lighting): ON and OFF.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000038 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000045 Enable / Disable Ambient Lighting feature

When Welcome / Farewell status is OFF and ((ignition status is not OFF) or (headlamp status is not OFF))

ambient lighting Shall enable its functions to the user (changing lighting colors, intensity, using SEL, etc.)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000045 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Functional Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

## Non-Functional Requirements

### Security

No Security Requirements specified.

### Reliability

No Reliability Requirements specified.

### Performance

R\_F\_AMBL\_000044 Flickering avoidance

The ambient lighting feature shall not flicker.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000044 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | Non-Functional Requirement - Performance | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

## HMI Requirements

R\_F\_AMBL\_000016 Soft button to toggle AAL (Auto Ambient Light) between AUTO or MANUAL.

On the HMI, there shall be a soft button to toggle between Auto and Manual modes that is always accessible in RUN/START under normal operation.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000016 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | HMI Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000039 Variant HMI display

Each Feature Variant Shall have a distinct HMI display.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000039 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | HMI Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000040 Lighting intensity indication

The HMI shall have a means of indicating intensity for each ambient lighting color.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000040 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | HMI Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000041 HMI Lockout when in Rejuvenate Mode.

When Rejuvenate Mode is active, the HMI for Ambient Lighting shall be inaccessible or unresponsive to user requests.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000041 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | HMI Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000042 Rear HMI lockout /disabling from front HMI

The front HMI shall provide the option to lockout/disable the rear HMI for this feature.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000042 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | HMI Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

R\_F\_AMBL\_000043 CAL Manual vs Automatic setup option

The front HMI shall provide the option to select Contextual Ambient Lighting between MANUAL and AUTOMATIC.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: R\_F\_AMBL\_000043 | | | | | | | |
| **Rationale** |  | | | | | | |
| **Acceptance Criteria** |  | | | | | | |
| **Notes** | HMI Requirement | | | | | | |
| **Source** |  | | | | | **Owner** |  |
| **Source Req.** |  | | | | | **V&V Method** |  |
| **Type** |  | | | **Priority** |  | **Status** | In-Progress |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.0 | End of Requirement | | | | |

## Other Requirements

### Design Requirements

*Not supported by MagicDraw report generation.*

### Manufacturing Requirements

No Manufacturing Requirements specified.

### Service Requirements

No Service Requirements specified.

#### **Cloud Connectivity Data Analytics Requirements**

### After Sales Requirements

No After Sales Requirements specified.

### Process Requirements

No Process Requirements specified.

# Functional Safety

## System Behaviors for HARA

| **ID** | **Name** | **Description** |
| --- | --- | --- |
| **1** | Provide Illumination | System function that contains all feature functions that are related to provide the actual light. |
| **2** | Provide User input and Feedback to HMI | Receive/Translate/Transmit User Input to change ambient lighting settings and the feedback sent to the primary and secondary (second-row display) HMI.  This System Behavior won't be considered in HARA  (as mentioned in FFSG01.10 Feature Document at item 2.3.6.1 - Item Definition Guideline). |

Table 11: System Behaviors for HARA

## Functional Safety Assumptions

|  |  |  |
| --- | --- | --- |
| ID | Assumption | |
| **ALA1** | **Name** | Unintended On when initial state is on |
| **Description** | Assumed initial state is On and User/System requested intentionally to be on and does not turns off. |
| **Purpose** | Severity rationale |
| **Category** | Behavioral |
| **Related Requirement IDs** |  |

Table 12: Functional Safety Assumptions

## Safety Goals

Feature is QM. Not applicable.

## Functional Safety Requirements

Feature is QM. Not applicable.

# CyberSecurity

## Security Goals

|  |  |  |
| --- | --- | --- |
| ID | Goal | |
| 1 | **Goal Name** | Cyber Security Not Relevant / Not Applicable |
| **Description** |  |
| **CAL** |  |
| **Related CSR IDs** |  |

Table 13: Cybersecurity Goals

# Architecture

## Functional Decomposition

This functional boundary diagram pictures logical function allocation in terms of logical function units.

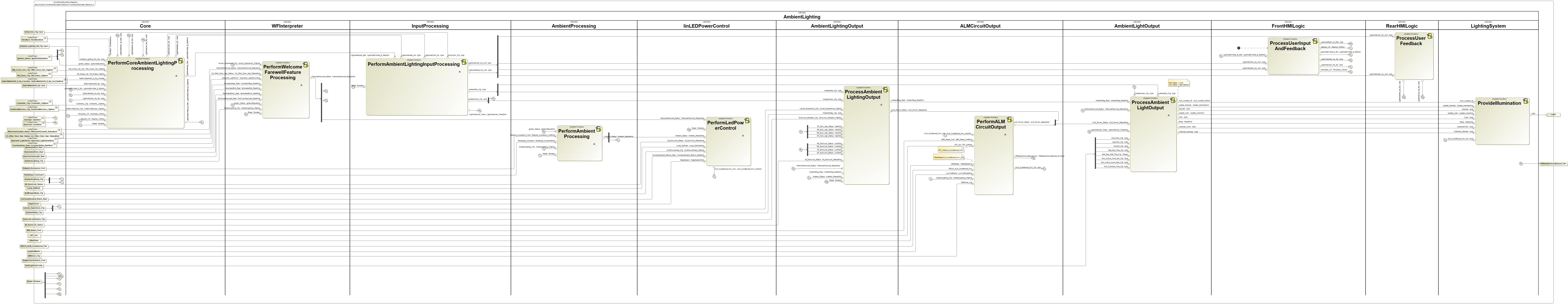


Figure 5: Functional Boundary Behavior

### Functions

| **Function Name** | Description | Comments |
| --- | --- | --- |
| *(activity)* ProvideIllumination |  |  |
| *(activity)* ProcessUserInputAndFeedback | *(activity)* Updates HMI 1 with user with current user settings. |  |
| *(activity)* ProcessUserFeedback | *(activity)* Updates HMI 2 with user with current user settings. |  |
| *(activity)* ProcessAmbientLightingOutput | *(activity)* Determines which light / group of light is to be turned ON / OFF.  Determines which behavior (Welcome, Farewell, Ajar, etc) is to be performed by a single / group of lights. |  |
| *(activity)* PerformLedPowerControl | *(activity)* Command Ambient Light Module power supply ON / OFF according to Table 2.2.17-25 LIN-LED Power Control. |  |
| *(activity)* PerformALMCircuitOutput | *(activity)* Manages ambient lighting by providing LED light module with pwm duty cycle necessary to light dimming, turn ON/OFF command, diagnostic reading, etc. |  |
| *(activity)* PerformAmbientLightingInputProcessing | *(activity)* Process ambient lighting color and intensity requested by user and updates HMI. |  |
| *(activity)* PerformWelcomeFarewellFeatureProcessing | *(activity)* Determines which Welcome Farewell behavior is to be used when Ambient Lighting Feature is not operating in Ambient mode. |  |
| *(activity)* PerformCoreAmbientLightingProcessing | *(activity)* Manages Ambient Lighting features:  - HMI Comm Variant Decoding  - Memory and Personalization  - Contextual Ambient Lighting (Selectable Drive Modes). |  |
| *(activity)* PerformAmbientProcessing | *(activity)* Command ambient lighting ON / OFF according to decision table 2.2.17-3 Ambient Lighting Decision Table. |  |
| *(activity)* ProcessAmbientLightOutput | *(activity)* Process ambient lighting requests and send them out to ALM through LIN. |  |

Table 14: List of Functions

## Logical Architecture

Ambient Lighting logical blocks and data shared among them.

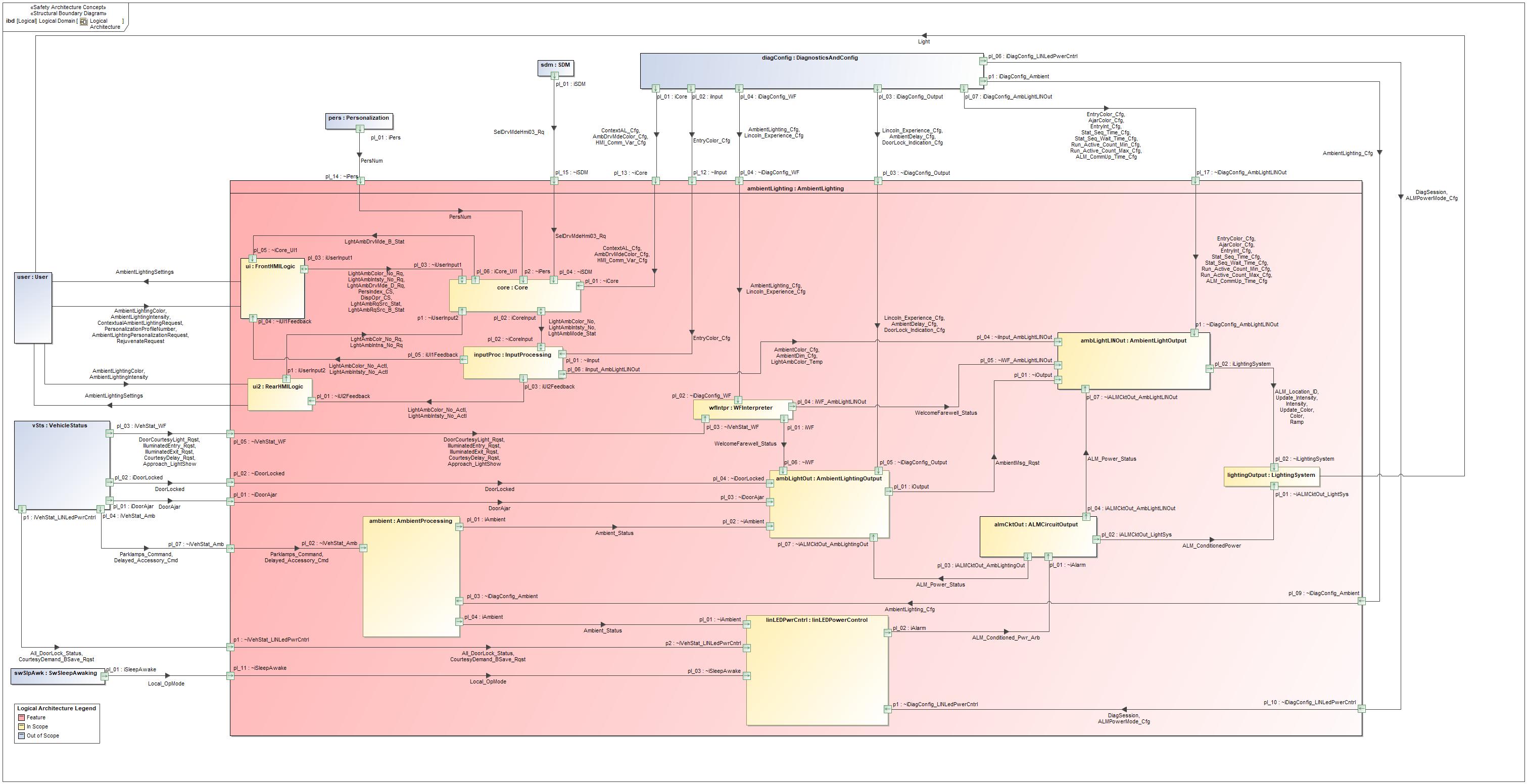


Figure 6: Logical

Architecture

### Logical Elements

| **Element Name** | **Description** | **Allocated Functions** | **Comments** |
| --- | --- | --- | --- |
|  |  |  |  |
| ALMCircuitOutput | Logic that process command to drive ambient lighting ON / Off when ambient lighting is configured as single color. | * PerformALMCircuitOutput * DetermineALMConditionedPwrCmd * DetermineALMPowerStatus * DetermineALMCktOutput |  |
| AmbientLighting | Logical block responsible to do all of the ambient lighting processing /management. | * PerformCoreAmbientLightingProcessing * PerformWelcomeFarewellFeatureProcessing * PerformAmbientLightingInputProcessing * PerformAmbientProcessing * PerformLedPowerControl * ProcessAmbientLightingOutput * ProcessAmbientLightOutput * ProcessUserInputAndFeedback * ProcessUserFeedback * PerformALMCircuitOutput * DeterminePassengerRearDoorLockLightBehavior * DeterminePassengerFrontDoorLockLightBehavior * DetermineDriverRearDoorLockLightBehavior * DetermineDriverFrontDoorLockLightBehavior * PerformSelectiveDriveModeRequestDecision * PerformSelectiveDriveModeRangeSelectionDecision * PerformHMICommVariantDecoding * PerformDriveModeBasedLightAmbientColorDecision * PerformContextualAmbientLightingColorIntensityValueDecision * PerformContextualAmbientLightingHMIStatusUpdate * PerformContextualAmbientLighting * PerformAmbientLightingMemoryAndPersonalization * PerformAmbientColorMappingDecision * PerformAmbientIntensityMappingDecision * DeterminePersonalizedAmbientLightingStatus * DeterminePersonalizedAmbientLightingIntensity * DeterminePersonalizedAmbientLightingColor * DeterminePassengerRearDoorLightBehavior * DeterminePassengerRearDoorLockIndication * DeterminePassengerFrontDoorLockIndication * DeterminePassengerFrontDoorLightBehavior * DetermineNonDoorLIN Master\_L1\_P00LedState * DetermineLedParams * DetermineLedLocationID * DetermineDriverRearDoorLockIndication * DetermineDriverFrontDoorLockIndication * DetermineDriverFrontDoorLightBehavior * DetermineDriverRearDoorLightBehavior * DetermineALMPowerStatus * DetermineALMConditionedPwrCmd * CheckLINWakeUp * CalculateAmbientLightingActiveProfileIndex * GenerateMessage0x37AmbientLightingData * ProvideIllumination |  |
| AmbientLightingOutput | Logic that provides ambient lighting with behavior according to each light location inside the vehicle. | * ProcessAmbientLightingOutput * DetermineDriverRearDoorLightBehavior * DetermineDriverFrontDoorLightBehavior * DeterminePassengerRearDoorLightBehavior * DeterminePassengerFrontDoorLightBehavior * DetermineNonDoorLIN Master\_L1\_P00LedState * DetermineDriverFrontDoorLockIndication * DeterminePassengerFrontDoorLockIndication * DetermineDriverRearDoorLockIndication * DeterminePassengerRearDoorLockIndication * DetermineDriverFrontDoorLockLightBehavior * DeterminePassengerFrontDoorLockLightBehavior * DetermineDriverRearDoorLockLightBehavior * DeterminePassengerRearDoorLockLightBehavior |  |
| AmbientLightOutput | Logic responsible to pack ambient lighting information (color, intensity, update, etc) and send it over the network. | * ProcessAmbientLightOutput * GenerateMessage0x37AmbientLightingData * CheckLINWakeUp * DetermineLedLocationID * DetermineLedParams |  |
| AmbientProcessing | Logic responsible to decide when ambient lighting feature should be enabled / disabled. | * PerformAmbientProcessing |  |
| Core | Logical module responsible to compute / manage variant configurations, user profile personalization and user driver mode selection. | * PerformCoreAmbientLightingProcessing * PerformHMICommVariantDecoding * PerformAmbientLightingMemoryAndPersonalization * PerformContextualAmbientLighting * PerformContextualAmbientLightingHMIStatusUpdate * PerformSelectiveDriveModeRequestDecision * PerformSelectiveDriveModeRangeSelectionDecision * PerformContextualAmbientLightingColorIntensityValueDecision * CalculateAmbientLightingActiveProfileIndex * DeterminePersonalizedAmbientLightingStatus * DeterminePersonalizedAmbientLightingColor * DeterminePersonalizedAmbientLightingIntensity |  |
| DiagnosticsAndConfig | Logic responsible to provide ambient lighting configuration data to ambient lighting. |  |  |
| FrontHMILogic | Logic responsible to provide lighting color, intensity, drive mode and rejuvenate option from HMI to ambient lighting  as well as update HMI with current user choice. | * ProcessUserInputAndFeedback |  |
| InputProcessing | Logic responsible to process user input command and update HMI with user choices. | * PerformAmbientLightingInputProcessing * PerformAmbientColorMappingDecision * PerformDriveModeBasedLightAmbientColorDecision * PerformAmbientIntensityMappingDecision |  |
| LightingSystem | Logic that receives ambient lighting commands (update, ramp, etc) and data (color, intensity, location, etc) and drives ambient lighting output. | * ProvideIllumination |  |
| linLEDPowerControl | Logic that arbitrates / manages light module in the network with respect to network sleep mode,  electric power delayed accessory and welcome / farewell trigger. | * PerformLedPowerControl |  |
| Personalization | Personalization feature responsible to send user personalization profile number to ambient lighting. |  |  |
| RearHMILogic | Logic responsible to provide lighting color, intensity, drive mode and rejuvenate option from HMI to ambient lighting  as well as update HMI with current user choice. | * ProcessUserFeedback |  |
| SDM | Logic responsible to provide current drive mode selected by user to ambient lighting. |  |  |
| SwSleepAwaking |  |  |  |
| User | Logical representation of user. | * Ideal Subfunction 2 * Ideal Subfunction 5 |  |
| VehicleStatus | Logic responsible to send vehicle state data to ambient lighting. |  |  |
| WFInterpreter | Logic responsible to provide ambient lighting with Welcome / Farewell behavior like by interpreting Welcome / Farewell command. | * PerformWelcomeFarewellFeatureProcessing |  |

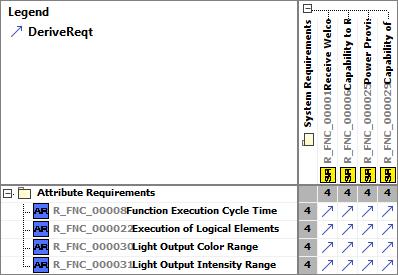
Table 15: Logical Elements

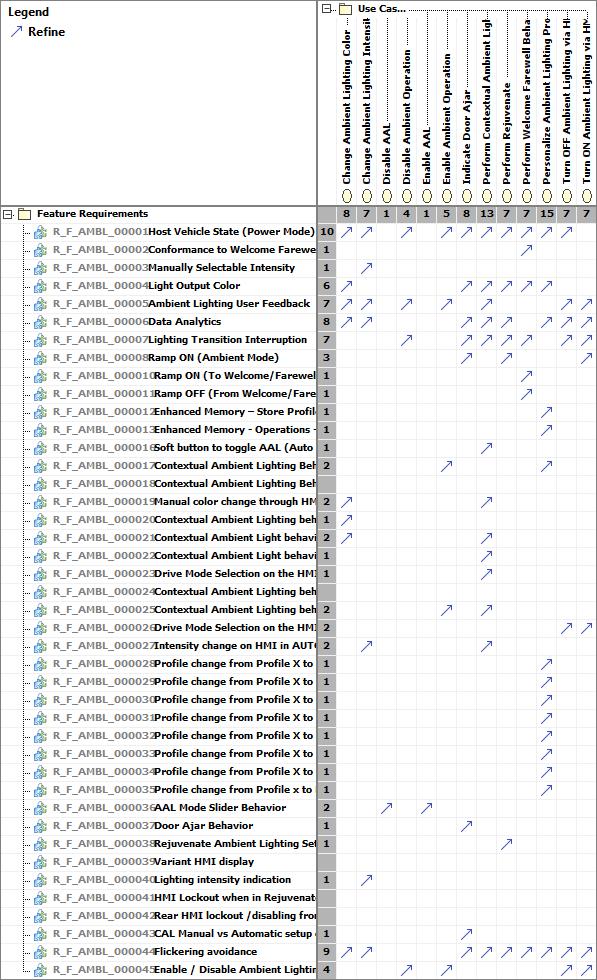
### Logical Interfaces

| **Interface** | **Direction** | **Description** | **Value Range** |
| --- | --- | --- | --- |
| AjarColor\_Cfg | pI\_07 (DiagnosticsAndConfig) To pI\_17 (AmbientLighting) | Name: AjarColor\_Cfg  Description: Ajar color level when vehicle door is ajar for ambient lighting.  Min Value: 0  Max Value: 15 | AjarColor\_Cfg  as byte: |
| pI\_17 (AmbientLighting) To p1 (AmbientLightOutput) | Name: AjarColor\_Cfg  Description: Ajar color level when vehicle door is ajar for ambient lighting.  Min Value: 0  Max Value: 15 | AjarColor\_Cfg  as byte: |
| All\_DoorLock\_Status | p1 (AmbientLighting) To p2 (linLEDPowerControl) |  | All\_DoorLock\_Status  as LockKind:   * 0x0-LOCK * 0x1-NULL * 0x2-UNLOCK   as LockKind:   * LOCK * NULL * UNLOCK |
| p1 (VehicleStatus) To p1 (AmbientLighting) |  | All\_DoorLock\_Status  as LockKind:   * 0x0-LOCK * 0x1-NULL * 0x2-UNLOCK   as LockKind:   * LOCK * NULL * UNLOCK |
| ALMPowerMode\_Cfg | pI\_06 (DiagnosticsAndConfig) To pI\_10 (AmbientLighting) | Name: ALMPowerMode\_Cfg  Description: The method 2 signal will decide one of two approaches, One approach is to keep ALM conditioned  power dependent on headlamp status, other approach is to keep ALM conditioned power independent  of headlamp status, while making it independent of headlamp status it is controlled on the basis of BCM | ALMPowerMode\_Cfg  as ALMPowerMode\_CfgKind:   * 0x0-BCM\_IO\_ACTIVE * 0x1-HEADLAMP\_CONTROLLED   as ALMPowerMode\_CfgKind:   * BCM\_IO\_ACTIVE * HEADLAMP\_CONTROLLED |
| pI\_10 (AmbientLighting) To p1 (linLEDPowerControl) | Name: ALMPowerMode\_Cfg  Description: The method 2 signal will decide one of two approaches, One approach is to keep ALM conditioned  power dependent on headlamp status, other approach is to keep ALM conditioned power independent  of headlamp status, while making it independent of headlamp status it is controlled on the basis of BCM | ALMPowerMode\_Cfg  as ALMPowerMode\_CfgKind:   * 0x0-BCM\_IO\_ACTIVE * 0x1-HEADLAMP\_CONTROLLED   as ALMPowerMode\_CfgKind:   * BCM\_IO\_ACTIVE * HEADLAMP\_CONTROLLED |
| ALM\_CommUp\_Time\_Cfg | pI\_07 (DiagnosticsAndConfig) To pI\_17 (AmbientLighting) | Name: ALM\_CommUp\_Time\_Cfg  Description: Configuration parameter specifying the time requried for ambient light node to wake up. | ALM\_CommUp\_Time\_Cfg  as byte: |
| pI\_17 (AmbientLighting) To p1 (AmbientLightOutput) | Name: ALM\_CommUp\_Time\_Cfg  Description: Configuration parameter specifying the time requried for ambient light node to wake up. | ALM\_CommUp\_Time\_Cfg  as byte: |
| ALM\_ConditionedPower | pI\_02 (ALMCircuitOutput) To pI\_01 (LightingSystem) |  | ALM\_ConditionedPower  as byte: |
| ALM\_Conditioned\_Pwr\_Arb | pI\_02 (linLEDPowerControl) To pI\_01 (ALMCircuitOutput) | Name: ALM\_Conditioned\_Pwr\_Arb  Description: Ambient Light Moudule conditioned power supply. | ALM\_Conditioned\_Pwr\_Arb  as ALM\_Conditioned\_Pwr\_ArbKind:   * 0x0-INACTIVE * 0x1-ACTIVE   as ALM\_Conditioned\_Pwr\_ArbKind:   * INACTIVE * ACTIVE |
| ALM\_Location\_ID | pI\_02 (AmbientLightOutput) To pI\_02 (LightingSystem) | Name: ALM\_Location\_ID  Description: Indicates the ALM module NODE ADDRESS placed at various locations.Generally, lighting elements  will be located in the cupholders, center console, footwells, doors, scuffplates. | ALM\_Location\_ID  as ALM\_Location\_IDKind:   * ALL * CUPHOLDERS\_ALL * DF\_DOOR * DF\_DOOR\_HANDLE * DF\_DOOR\_LIGHTBAR * DR\_DOOR * DR\_DOOR\_HANDLE * DR\_DOOR\_LIGHTBAR * FOOTWELLS * IDLE * PF\_DOOR * PF\_DOOR\_HANDLE * PF\_DOOR\_LIGHTBAR * PR\_DOOR * PR\_DOOR\_HANDLE * PR\_DOOR\_LIGHTBAR * STORAGEBIN\_LIGHTBAR |
| ALM\_Power\_Status | pI\_03 (ALMCircuitOutput) To pI\_07 (AmbientLightingOutput) | Name: ALM\_Power\_Status  Description: This dataflow is used to convert the numeric output of ALM\_Conditioned\_Pwr\_Ckt to discrete to send  it over LIN | ALM\_Power\_Status  as ALM\_Power\_StatusKind:   * INACTIVE * ACTIVE   as ALM\_Power\_StatusKind:   * 0x0-INACTIVE * 0x1-ACTIVE |
| pI\_04 (ALMCircuitOutput) To pI\_07 (AmbientLightOutput) | Name: ALM\_Power\_Status  Description: This dataflow is used to convert the numeric output of ALM\_Conditioned\_Pwr\_Ckt to discrete to send  it over LIN | ALM\_Power\_Status  as ALM\_Power\_StatusKind:   * INACTIVE * ACTIVE   as ALM\_Power\_StatusKind:   * 0x0-INACTIVE * 0x1-ACTIVE |
| AmbDrvMdeColor\_Cfg | pI\_01 (DiagnosticsAndConfig) To pI\_01 (Core) | Description: This configuration parameter will define the color table lookup for the drive mode colors.  The color defined in each entry is a HMI color index value in the range 1 to 7.  The color index 0 will present a fault that will result in the contextual ambient to operate in Manual  behavior. | AmbDrvMdeColor\_Cfg  as AmbientLighting\_CfgKind:   * AMB\_ONLY * DISABLED * WF\_AND\_AMB * WF\_ONLY * SINGLE\_COL   as AmbientLighting\_CfgKind:   * 0x0-AMB\_ONLY * 0x1-DISABLED * 0x2-WF\_AND\_A MB * 0x3-WF\_ONLY * 0x4-SINGLE\_COLOR |
| pI\_01 (DiagnosticsAndConfig) To pI\_13 (AmbientLighting) | Description: This configuration parameter will define the color table lookup for the drive mode colors.  The color defined in each entry is a HMI color index value in the range 1 to 7.  The color index 0 will present a fault that will result in the contextual ambient to operate in Manual  behavior. | AmbDrvMdeColor\_Cfg  as AmbientLighting\_CfgKind:   * AMB\_ONLY * DISABLED * WF\_AND\_AMB * WF\_ONLY * SINGLE\_COL   as AmbientLighting\_CfgKind:   * 0x0-AMB\_ONLY * 0x1-DISABLED * 0x2-WF\_AND\_A MB * 0x3-WF\_ONLY * 0x4-SINGLE\_COLOR |
| pI\_13 (AmbientLighting) To pI\_01 (Core) | Description: This configuration parameter will define the color table lookup for the drive mode colors.  The color defined in each entry is a HMI color index value in the range 1 to 7.  The color index 0 will present a fault that will result in the contextual ambient to operate in Manual  behavior. | AmbDrvMdeColor\_Cfg  as AmbientLighting\_CfgKind:   * AMB\_ONLY * DISABLED * WF\_AND\_AMB * WF\_ONLY * SINGLE\_COL   as AmbientLighting\_CfgKind:   * 0x0-AMB\_ONLY * 0x1-DISABLED * 0x2-WF\_AND\_A MB * 0x3-WF\_ONLY * 0x4-SINGLE\_COLOR |
| AmbientColor\_Cfg | pI\_06 (InputProcessing) To pI\_04 (AmbientLightOutput) | Name: AmbientColor\_Cfg  Description: Currently selected ambient color  DomainElement : 0:15  DomainDescription : Color level for ambient lighting | AmbientColor\_Cfg  as byte: |
| AmbientDelay\_Cfg | pI\_03 (AmbientLighting) To pI\_05 (AmbientLightingOutput) | Name: AmbientDelay\_Cfg  Description: Configuration Parameter which indicates the minimum time delay before entering to the ambient state  from welcome state, to avoid the ambient light turning OFF due to momentary low voltage during crank  when battery voltage is very low. | AmbientDelay\_Cfg  as DoorLock\_Indication\_CfgKind:   * COMMON * INDIVIDUAL * NULL   as DoorLock\_Indication\_CfgKind:   * 0x0-COMMON * 0x1-INDIVIDUAL * 0x2-NULL |
| pI\_03 (DiagnosticsAndConfig) To pI\_03 (AmbientLighting) | Name: AmbientDelay\_Cfg  Description: Configuration Parameter which indicates the minimum time delay before entering to the ambient state  from welcome state, to avoid the ambient light turning OFF due to momentary low voltage during crank  when battery voltage is very low. | AmbientDelay\_Cfg  as DoorLock\_Indication\_CfgKind:   * COMMON * INDIVIDUAL * NULL   as DoorLock\_Indication\_CfgKind:   * 0x0-COMMON * 0x1-INDIVIDUAL * 0x2-NULL |
| AmbientDim\_Cfg | pI\_06 (InputProcessing) To pI\_04 (AmbientLightOutput) | Name: AmbientDim\_Cfg  Description: Currently selected ambient dimming level  DomainElement : 0:15  DomainDescription : Ambient ligiting dimming level | AmbientDim\_Cfg  as byte: |
| AmbientLightingColor | User To FrontHMILogic |  |  |
| User To RearHMILogic |  |  |
| AmbientLightingIntensity | User To FrontHMILogic |  |  |
| User To RearHMILogic |  |  |
| AmbientLightingPersonalizationRequest | User To FrontHMILogic | The description of the signal in the Documentation field. |  |
| AmbientLightingSettings | FrontHMILogic To User |  |  |
| RearHMILogic To User |  |  |
| AmbientLighting\_Cfg | p1 (DiagnosticsAndConfig) To pI\_09 (AmbientLighting) | Name: AmbientLighting\_Cfg  Description: Configuration used to enable/disable the ambient and welcome & farewell behavior | AmbientLighting\_Cfg  as AmbientLighting\_CfgKind:   * AMB\_ONLY * DISABLED * WF\_AND\_AMB * WF\_ONLY * SINGLE\_COL   as AmbientLighting\_CfgKind:   * 0x0-AMB\_ONLY * 0x1-DISABLED * 0x2-WF\_AND\_A MB * 0x3-WF\_ONLY * 0x4-SINGLE\_COLOR |
| pI\_04 (AmbientLighting) To pI\_02 (WFInterpreter) | Name: AmbientLighting\_Cfg  Description: Configuration used to enable/disable the ambient and welcome & farewell behavior | AmbientLighting\_Cfg  as AmbientLighting\_CfgKind:   * AMB\_ONLY * DISABLED * WF\_AND\_AMB * WF\_ONLY * SINGLE\_COL   as AmbientLighting\_CfgKind:   * 0x0-AMB\_ONLY * 0x1-DISABLED * 0x2-WF\_AND\_A MB * 0x3-WF\_ONLY * 0x4-SINGLE\_COLOR |
| pI\_04 (DiagnosticsAndConfig) To pI\_04 (AmbientLighting) | Name: AmbientLighting\_Cfg  Description: Configuration used to enable/disable the ambient and welcome & farewell behavior | AmbientLighting\_Cfg  as AmbientLighting\_CfgKind:   * AMB\_ONLY * DISABLED * WF\_AND\_AMB * WF\_ONLY * SINGLE\_COL   as AmbientLighting\_CfgKind:   * 0x0-AMB\_ONLY * 0x1-DISABLED * 0x2-WF\_AND\_A MB * 0x3-WF\_ONLY * 0x4-SINGLE\_COLOR |
| pI\_09 (AmbientLighting) To pI\_03 (AmbientProcessing) | Name: AmbientLighting\_Cfg  Description: Configuration used to enable/disable the ambient and welcome & farewell behavior | AmbientLighting\_Cfg  as AmbientLighting\_CfgKind:   * AMB\_ONLY * DISABLED * WF\_AND\_AMB * WF\_ONLY * SINGLE\_COL   as AmbientLighting\_CfgKind:   * 0x0-AMB\_ONLY * 0x1-DISABLED * 0x2-WF\_AND\_A MB * 0x3-WF\_ONLY * 0x4-SINGLE\_COLOR |
| AmbientMsg\_Rqst | pI\_01 (AmbientLightingOutput) To pI\_01 (AmbientLightOutput) | Name: AmbientMsg\_Rqst  Description: This array contains the ambient message request for LIN module.  The index 'n' has following domain values:  ALL  FOOTWELLS  DF\_DOOR  PF\_DOOR  DR\_DOOR  PR\_DOOR  DF\_DOOR\_HANDLE  PF\_DOOR\_HANDLE  DR\_DOOR\_HANDLE  PR\_DOOR\_HANDLE | LED  as LightLocationKind:   * AJAR * AMBIENT * DF\_DOOR * NULL * OFF * RAMP\_OFF * WELCOME * WELCOME\_LE |
| Ambient\_Status | pI\_01 (AmbientProcessing) To pI\_02 (AmbientLightingOutput) | Name: Ambient\_Status  Description: Dataflow indicating the output of the ambient processing | Ambient\_Status  as Ambient\_StatusKind:   * 0x0-OFF * 0x1-AMBIENT   as Ambient\_StatusKind:   * OFF * AMBIENT |
| pI\_04 (AmbientProcessing) To pI\_01 (linLEDPowerControl) | Name: Ambient\_Status  Description: Dataflow indicating the output of the ambient processing | Ambient\_Status  as Ambient\_StatusKind:   * 0x0-OFF * 0x1-AMBIENT   as Ambient\_StatusKind:   * OFF * AMBIENT |
| Approach\_LightShow | pI\_03 (VehicleStatus) To pI\_05 (AmbientLighting) | Name: Approach\_LightShow  Description: Indicates when to start approach light show.  Note: It will take care of the maximum time limit of 25 seconds. | Approach\_LightShow  as Approach\_LightShowKind:   * SHOW\_OFF * SHOW\_ON   as Approach\_LightShowKind:   * 0x0-SHOW\_OFF * 0x1-SHOW\_ON |
| pI\_05 (AmbientLighting) To pI\_03 (WFInterpreter) | Name: Approach\_LightShow  Description: Indicates when to start approach light show.  Note: It will take care of the maximum time limit of 25 seconds. | Approach\_LightShow  as Approach\_LightShowKind:   * SHOW\_OFF * SHOW\_ON   as Approach\_LightShowKind:   * 0x0-SHOW\_OFF * 0x1-SHOW\_ON |
| Color | pI\_02 (AmbientLightOutput) To pI\_02 (LightingSystem) | Name: Color  Description: Indicates Color need to set for ambient lighting.  OFF domain value for Color is 0. | Update\_Color  as byte: |
| ContextAL\_Cfg | pI\_01 (DiagnosticsAndConfig) To pI\_01 (Core) | Name: ContextAL\_Cfg  Description: This configuration parameter will define if the Contextual Ambient Lighting is enabled or disabled. | ContextAL\_Cfg  as ContextAL\_CfgKind:   * 0x0-DISABLE * 0x1-ENABLE   as ContextAL\_CfgKind:   * DISABLE * ENABLE |
| pI\_01 (DiagnosticsAndConfig) To pI\_13 (AmbientLighting) | Name: ContextAL\_Cfg  Description: This configuration parameter will define if the Contextual Ambient Lighting is enabled or disabled. | ContextAL\_Cfg  as ContextAL\_CfgKind:   * 0x0-DISABLE * 0x1-ENABLE   as ContextAL\_CfgKind:   * DISABLE * ENABLE |
| pI\_13 (AmbientLighting) To pI\_01 (Core) | Name: ContextAL\_Cfg  Description: This configuration parameter will define if the Contextual Ambient Lighting is enabled or disabled. | ContextAL\_Cfg  as ContextAL\_CfgKind:   * 0x0-DISABLE * 0x1-ENABLE   as ContextAL\_CfgKind:   * DISABLE * ENABLE |
| ContextualAmbientLightingRequest | User To FrontHMILogic |  |  |
| CourtesyDelay\_Rqst | pI\_03 (VehicleStatus) To pI\_05 (AmbientLighting) | Name: CourtesyDelay\_Rqst  Description: Request to illuminate the interior courtesy lights. | CourtesyDelay\_Rqst  as CourtesyDelay\_RqstKind:   * OFF * ON   as CourtesyDelay\_RqstKind:   * 0x0-OFF * 0x1-ON |
| pI\_05 (AmbientLighting) To pI\_03 (WFInterpreter) | Name: CourtesyDelay\_Rqst  Description: Request to illuminate the interior courtesy lights. | CourtesyDelay\_Rqst  as CourtesyDelay\_RqstKind:   * OFF * ON   as CourtesyDelay\_RqstKind:   * 0x0-OFF * 0x1-ON |
| CourtesyDemand\_BSave\_Rqst | p1 (AmbientLighting) To p2 (linLEDPowerControl) | Name: CourtesyDemand\_BSave\_Rqst  Description: Request from Battery Saver to turn off the courtesy lights and the demand lights. | CourtesyDemand\_BSave\_Rqst  as CourtesyDemand\_BSave\_RqstKind:   * NO\_EFFECT * OFF   as CourtesyDemand\_BSave\_RqstKind:   * 0x0-NO\_EFFECT * 0x1-OFF |
| p1 (VehicleStatus) To p1 (AmbientLighting) | Name: CourtesyDemand\_BSave\_Rqst  Description: Request from Battery Saver to turn off the courtesy lights and the demand lights. | CourtesyDemand\_BSave\_Rqst  as CourtesyDemand\_BSave\_RqstKind:   * NO\_EFFECT * OFF   as CourtesyDemand\_BSave\_RqstKind:   * 0x0-NO\_EFFECT * 0x1-OFF |
| Delayed\_Accessory\_Cmd | pI\_04 (VehicleStatus) To pI\_07 (AmbientLighting) | Name: Delayed\_Accessory\_Cmd  Description: Input to load shedding - delayed accesory status | Delayed\_Accessory\_Cmd  as Delayed\_Accessory\_CmdKind:   * OFF * ON   as Delayed\_Accessory\_CmdKind:   * 0x0-OFF * 0x1-ON |
| pI\_07 (AmbientLighting) To pI\_02 (AmbientProcessing) | Name: Delayed\_Accessory\_Cmd  Description: Input to load shedding - delayed accesory status | Delayed\_Accessory\_Cmd  as Delayed\_Accessory\_CmdKind:   * OFF * ON   as Delayed\_Accessory\_CmdKind:   * 0x0-OFF * 0x1-ON |
| DiagSession | pI\_06 (DiagnosticsAndConfig) To pI\_10 (AmbientLighting) | Name: DiagSession  Description: Indicates the active session of Diagnostics | DiagSession  as DiagSessionKind:   * 0x0-DEFAULT * 0x1-EXTEND * 0x2-PROGRAM * 0x3-NKNOWN   as DiagSessionKind:   * DEFAULT * EXTEND * PROGRAM * UNKNOWN |
| pI\_10 (AmbientLighting) To p1 (linLEDPowerControl) | Name: DiagSession  Description: Indicates the active session of Diagnostics | DiagSession  as DiagSessionKind:   * 0x0-DEFAULT * 0x1-EXTEND * 0x2-PROGRAM * 0x3-NKNOWN   as DiagSessionKind:   * DEFAULT * EXTEND * PROGRAM * UNKNOWN |
| DispOpr\_CS | pI\_03 (FrontHMILogic) To pI\_03 (Core) | Name: DispOpr\_CS  Description: Operation request command for personalization features from Center Stack. | DispOpr\_CS  as DispOpr\_CSKind:   * 0x0-COPY * 0x1-NULL * 0x2-RESTORE * 0x3-SET * 0x4-UPLOAD   as DispOpr\_CSKind:   * COPY * NULL * RESTORE * SET * UPLOAD |
| DoorAjar | pI\_01 (AmbientLighting) To pI\_03 (AmbientLightingOutput) |  | state  as AjarKind:   * 0x0-CLOSED * 0x1-AJAR   as AjarKind:   * CLOSED * AJAR |
| pI\_01 (VehicleStatus) To pI\_01 (AmbientLighting) |  | state  as AjarKind:   * 0x0-CLOSED * 0x1-AJAR   as AjarKind:   * CLOSED * AJAR |
| DoorCourtesyLight\_Rqst | pI\_03 (VehicleStatus) To pI\_05 (AmbientLighting) | Name: DoorCourtesyLight\_Rqst  Description: Request to illuminate the interior courtesy lights. | DoorCourtesyLight\_Rqst  as DoorCourtesyLight\_RqstKind:   * OFF * ON   as DoorCourtesyLight\_RqstKind:   * 0x0-OFF * 0x1-ON |
| pI\_05 (AmbientLighting) To pI\_03 (WFInterpreter) | Name: DoorCourtesyLight\_Rqst  Description: Request to illuminate the interior courtesy lights. | DoorCourtesyLight\_Rqst  as DoorCourtesyLight\_RqstKind:   * OFF * ON   as DoorCourtesyLight\_RqstKind:   * 0x0-OFF * 0x1-ON |
| DoorLocked | pI\_02 (AmbientLighting) To pI\_04 (AmbientLightingOutput) |  | state  as LockKind:   * 0x0-LOCK * 0x1-NULL * 0x2-UNLOCK   as LockKind:   * LOCK * NULL * UNLOCK |
| pI\_02 (VehicleStatus) To pI\_02 (AmbientLighting) |  | state  as LockKind:   * 0x0-LOCK * 0x1-NULL * 0x2-UNLOCK   as LockKind:   * LOCK * NULL * UNLOCK |
| DoorLock\_Indication\_Cfg | pI\_03 (AmbientLighting) To pI\_05 (AmbientLightingOutput) | Name: DoorLock\_Indication\_Cfg  Description: Leave at initial value of NULL. This is for Ambient Lighting to indicate lock status via illumination of  the interior door pull handle. This feature is no longer supported. It is replaced by the trim panel lock  indicator LED feature (Section 2.2.18). | DoorLock\_Indication\_Cfg |
| pI\_03 (DiagnosticsAndConfig) To pI\_03 (AmbientLighting) | Name: DoorLock\_Indication\_Cfg  Description: Leave at initial value of NULL. This is for Ambient Lighting to indicate lock status via illumination of  the interior door pull handle. This feature is no longer supported. It is replaced by the trim panel lock  indicator LED feature (Section 2.2.18). | DoorLock\_Indication\_Cfg |
| EM\_Exists\_Cfg | pI\_01 (DiagnosticsAndConfig) To pI\_01 (Core) | Name: EM\_Exists\_Cfg  Description: The method 2 configuration parameter to decide whether Enhanced Memory configuration exists for  Ambient Lighting,  If this is NOT\_PRESENT then no personalization of ambient lighting will be provided. | EM\_Exists\_Cfg  as EM\_Exists\_CfgKind:   * NOT\_PRESENT * PRESENT   as EM\_Exists\_CfgKind:   * 0x0-NOT\_PRESENT * 0x1-PRESENT |
| EntryColor\_Cfg | pI\_02 (DiagnosticsAndConfig) To pI\_01 (InputProcessing) | Name: EntryColor\_Cfg  Description: Entry color level for ambient lighting | EntryColor\_Cfg  as byte: |
| pI\_02 (DiagnosticsAndConfig) To pI\_12 (AmbientLighting) | Name: EntryColor\_Cfg  Description: Entry color level for ambient lighting | EntryColor\_Cfg  as byte: |
| pI\_07 (DiagnosticsAndConfig) To pI\_17 (AmbientLighting) | Name: EntryColor\_Cfg  Description: Entry color level for ambient lighting | EntryColor\_Cfg  as byte: |
| pI\_12 (AmbientLighting) To pI\_01 (InputProcessing) | Name: EntryColor\_Cfg  Description: Entry color level for ambient lighting | EntryColor\_Cfg  as byte: |
| pI\_17 (AmbientLighting) To p1 (AmbientLightOutput) | Name: EntryColor\_Cfg  Description: Entry color level for ambient lighting | EntryColor\_Cfg  as byte: |
| EntryInt\_Cfg | pI\_07 (DiagnosticsAndConfig) To pI\_17 (AmbientLighting) | Name: EntryInt\_Cfg  Description: Entry level intensity for ambient lighting | EntryInt\_Cfg  as byte: |
| pI\_17 (AmbientLighting) To p1 (AmbientLightOutput) | Name: EntryInt\_Cfg  Description: Entry level intensity for ambient lighting | EntryInt\_Cfg  as byte: |
| HMI\_Comm\_Var\_Cfg | pI\_01 (DiagnosticsAndConfig) To pI\_01 (Core) | This configuration parameter will select the Communication variant used in HMI to BCM Ambient Lighting Interface. Variant1 is the original carryover protocol.  Variant2 was added to support enhanced memory and supported for contextual ambient lighting. This configuration can also be used to support standard ambient lighting.  The module providing the customer interface (currently SYNC) and the BCM must use the same variant settings for proper operation of any of Ambient Lighting features. | HMI\_Comm\_Var\_Cfg  as HMI\_Comm\_Var\_CfgKind:   * 0x1-VARIANT1 * 0x2-VARIANT2   as HMI\_Comm\_Var\_CfgKind:   * VARIANT1 * VARIANT2 |
| pI\_01 (DiagnosticsAndConfig) To pI\_13 (AmbientLighting) | This configuration parameter will select the Communication variant used in HMI to BCM Ambient Lighting Interface. Variant1 is the original carryover protocol.  Variant2 was added to support enhanced memory and supported for contextual ambient lighting. This configuration can also be used to support standard ambient lighting.  The module providing the customer interface (currently SYNC) and the BCM must use the same variant settings for proper operation of any of Ambient Lighting features. | HMI\_Comm\_Var\_Cfg  as HMI\_Comm\_Var\_CfgKind:   * 0x1-VARIANT1 * 0x2-VARIANT2   as HMI\_Comm\_Var\_CfgKind:   * VARIANT1 * VARIANT2 |
| pI\_13 (AmbientLighting) To pI\_01 (Core) | This configuration parameter will select the Communication variant used in HMI to BCM Ambient Lighting Interface. Variant1 is the original carryover protocol.  Variant2 was added to support enhanced memory and supported for contextual ambient lighting. This configuration can also be used to support standard ambient lighting.  The module providing the customer interface (currently SYNC) and the BCM must use the same variant settings for proper operation of any of Ambient Lighting features. | HMI\_Comm\_Var\_Cfg  as HMI\_Comm\_Var\_CfgKind:   * 0x1-VARIANT1 * 0x2-VARIANT2   as HMI\_Comm\_Var\_CfgKind:   * VARIANT1 * VARIANT2 |
| IlluminatedEntry\_Rqst | pI\_03 (VehicleStatus) To pI\_05 (AmbientLighting) | Name: IlluminatedEntry\_Rqst  Description: Request to illuminate the interior courtesy lights. | IlluminatedEntry\_Rqst  as IlluminatedEntry\_RqstKind:   * OFF * ON   as IlluminatedEntry\_RqstKind:   * 0x0-OFF * 0x1-ON |
| pI\_05 (AmbientLighting) To pI\_03 (WFInterpreter) | Name: IlluminatedEntry\_Rqst  Description: Request to illuminate the interior courtesy lights. | IlluminatedEntry\_Rqst  as IlluminatedEntry\_RqstKind:   * OFF * ON   as IlluminatedEntry\_RqstKind:   * 0x0-OFF * 0x1-ON |
| IlluminatedExit\_Rqst | pI\_03 (VehicleStatus) To pI\_05 (AmbientLighting) | Name: IlluminatedExit\_Rqst  Description: Request to illuminate the interior courtesy lights. | IlluminatedExit\_Rqst  as IlluminatedExit\_RqstKind:   * OFF * ON   as IlluminatedExit\_RqstKind:   * 0x0-OFF * 0x1-ON |
| pI\_05 (AmbientLighting) To pI\_03 (WFInterpreter) | Name: IlluminatedExit\_Rqst  Description: Request to illuminate the interior courtesy lights. | IlluminatedExit\_Rqst  as IlluminatedExit\_RqstKind:   * OFF * ON   as IlluminatedExit\_RqstKind:   * 0x0-OFF * 0x1-ON |
| Intensity | pI\_02 (AmbientLightOutput) To pI\_02 (LightingSystem) | Name: Intensity  Description: Indicates the intesity required to set for ambient lighting. | Intensity  as byte: |
| LghtAmbColr\_No\_Rq | p1 (RearHMILogic) To p1 (Core) | Ambient Lighting Color Selection Request. | Encoding  as byte: |
| LghtAmbDrvMde\_B\_Stat | pI\_02 (Core) To pI\_02 (InputProcessing) | Name: LghtAmbDrvMde\_B\_Stat  Description: CAN signal for Contextual Ambient Lighting MANUAL and AUTOMATIC BCM f eedback. | LghtAmbDrvMde\_B\_Stat  as LghtAmbDrvMde\_B\_StatKind:   * MANUAL * AUTOMATIC   as LghtAmbDrvMde\_B\_StatKind:   * 0x0-MANUAL * 0x1-AUTOMATIC |
| pI\_06 (Core) To pI\_05 (FrontHMILogic) | Name: LghtAmbDrvMde\_B\_Stat  Description: CAN signal for Contextual Ambient Lighting MANUAL and AUTOMATIC BCM f eedback. | LghtAmbDrvMde\_B\_Stat  as LghtAmbDrvMde\_B\_StatKind:   * MANUAL * AUTOMATIC   as LghtAmbDrvMde\_B\_StatKind:   * 0x0-MANUAL * 0x1-AUTOMATIC |
| LghtAmbDrvMde\_D\_Rq | pI\_03 (FrontHMILogic) To pI\_03 (Core) | Name: LghtAmbDrvMde\_D\_Rq  Description: CAN signal for setting Contextual Ambient Lighting MANUAL and AUTOMATIC HMI request. | LghtAmbDrvMde\_D\_Rq  as LghtAmbDrvMde\_D\_RqKind:   * NULL * MANUAL * AUTOMATIC   as LghtAmbDrvMde\_D\_RqKind:   * 0x0-NULL * 0x1-MANUAL * 0x2-AUTOMATIC |
| LghtAmbIntns\_No\_Rq | p1 (RearHMILogic) To p1 (Core) | User request to set ambient intensity level. | Encoding  as byte: |
| LghtAmbMode\_Stat | pI\_02 (Core) To pI\_02 (InputProcessing) | Name: LghtAmbDrvMde\_B\_Stat  Description: CAN signal for Contextual Ambient Lighting MANUAL and AUTOMATIC BCM f eedback. | LghtAmbMode\_Stat  as LghtAmbMode\_StatKind:   * MANUAL * AUTOMATIC |
| LghtAmbRqSrc\_B\_Stat | pI\_03 (FrontHMILogic) To pI\_03 (Core) |  |  |
| LghtAmbRqSrc\_Stat | pI\_03 (FrontHMILogic) To pI\_03 (Core) |  |  |
| Light | LightingSystem To User |  |  |
| LightAmbColor\_No | pI\_02 (Core) To pI\_02 (InputProcessing) | Name: LightAmbColor\_No  Description: This number will be derived from CAN inputs from ambient color number depending on whether  Enhanced memory exists. | LightAmbColor\_No  as byte: |
| LightAmbColor\_No\_Actl | pI\_03 (InputProcessing) To pI\_01 (RearHMILogic) | Name: LightAmbColor\_No\_Actl  Description: CAN signal for ambient color level status  DomainElement : 0:15  DomainDescription : ambient color level | Encoding  as byte: |
| pI\_05 (InputProcessing) To pI\_04 (FrontHMILogic) | Name: LightAmbColor\_No\_Actl  Description: CAN signal for ambient color level status  DomainElement : 0:15  DomainDescription : ambient color level | Encoding  as byte: |
| LightAmbColor\_No\_Rq | pI\_03 (FrontHMILogic) To pI\_03 (Core) | Name: LightAmbColor\_No\_Rq  Description: CAN signal for setting ambient color level  DomainElement : 0:15  DomainDescription : ambient color level | LightAmbColor\_No\_Rq  as byte: |
| LightAmbColor\_Temp | pI\_06 (InputProcessing) To pI\_04 (AmbientLightOutput) | Name: LightAmbColor\_Temp  Description: Ambient color for Lincoln and Ford.  0-ICE\_BLUE; 1- ORANGE; 2-SOFT\_BLUE; 3-RED; 4-GREEN; 5-BLUE; 6-PURPLE; 7-LICOLN\_WHITE; 8-AMBER; 9-TEAL; 10-BURNT\_ORANGE; 11-LINCOLN\_BLUE; 12-LINCOLN\_GREEN; 13-LILAC | LightAmbColor\_Temp  as byte: |
| LightAmbIntsty\_No | pI\_02 (Core) To pI\_02 (InputProcessing) | Name: LightAmbIntsty\_No  Description: This number will be derived from CAN inputs from ambient intensity number depending on whether  Enhanced memory exists | LightAmbIntsty\_No  as byte: |
| LightAmbIntsty\_No\_Actl | pI\_03 (InputProcessing) To pI\_01 (RearHMILogic) | Name: LightAmbIntsty\_No\_Actl  Description: CAN signal for ambient color level status  DomainElement : 0:100  DomainDescription : ambient dimming level | Encoding  as byte: |
| pI\_05 (InputProcessing) To pI\_04 (FrontHMILogic) | Name: LightAmbIntsty\_No\_Actl  Description: CAN signal for ambient color level status  DomainElement : 0:100  DomainDescription : ambient dimming level | Encoding  as byte: |
| LightAmbIntsty\_No\_Rq | pI\_03 (FrontHMILogic) To pI\_03 (Core) | Name: LightAmbIntsty\_No\_Rq  Description: CAN signal for setting ambient dim level  DomainElement : 0:255  DomainDescription : ambient dimming level | LightAmbIntsty\_No\_Rq  as byte: |
| Lincoln\_Experience\_Cfg | pI\_03 (AmbientLighting) To pI\_05 (AmbientLightingOutput) | Name: Lincoln\_Experience\_Cfg  Description: The configuration parameter is to differentiate the Welcome/Farewell Lighting (Interior and Exterior)  behaviour between Lincoln Experience vehicles and Non Lincoln vehicles.  When Lincoln\_Experience\_Cfg is set to LINCOLN\_EXPERIENCE1 then method 2 configuration parameters LR\_Stop\_Pos\_Lamp\_Ckt\_Usage\_Cfg and RR\_Stop\_Pos\_Lamp\_Ckt\_Usage\_Cfg shall be always set to STOP\_TURN, similarly method 3 configuration parameter  Freq\_Cfg[Freq\_Sel\_Cfg][Park\_Lamps\_Body\_Ckt] shall be always set to DC. | Lincoln\_Experience\_Cfg  as Lincoln\_Experience\_CfgKind:   * 0x0-LINCOLN\_EXPERIENCE1 * 0x1-NULL   as Lincoln\_Experience\_CfgKind:   * LINCOLN\_EXPERIENCE1 * NULL |
| pI\_03 (DiagnosticsAndConfig) To pI\_03 (AmbientLighting) | Name: Lincoln\_Experience\_Cfg  Description: The configuration parameter is to differentiate the Welcome/Farewell Lighting (Interior and Exterior)  behaviour between Lincoln Experience vehicles and Non Lincoln vehicles.  When Lincoln\_Experience\_Cfg is set to LINCOLN\_EXPERIENCE1 then method 2 configuration parameters LR\_Stop\_Pos\_Lamp\_Ckt\_Usage\_Cfg and RR\_Stop\_Pos\_Lamp\_Ckt\_Usage\_Cfg shall be always set to STOP\_TURN, similarly method 3 configuration parameter  Freq\_Cfg[Freq\_Sel\_Cfg][Park\_Lamps\_Body\_Ckt] shall be always set to DC. | Lincoln\_Experience\_Cfg  as Lincoln\_Experience\_CfgKind:   * 0x0-LINCOLN\_EXPERIENCE1 * 0x1-NULL   as Lincoln\_Experience\_CfgKind:   * LINCOLN\_EXPERIENCE1 * NULL |
| pI\_04 (AmbientLighting) To pI\_02 (WFInterpreter) | Name: Lincoln\_Experience\_Cfg  Description: The configuration parameter is to differentiate the Welcome/Farewell Lighting (Interior and Exterior)  behaviour between Lincoln Experience vehicles and Non Lincoln vehicles.  When Lincoln\_Experience\_Cfg is set to LINCOLN\_EXPERIENCE1 then method 2 configuration parameters LR\_Stop\_Pos\_Lamp\_Ckt\_Usage\_Cfg and RR\_Stop\_Pos\_Lamp\_Ckt\_Usage\_Cfg shall be always set to STOP\_TURN, similarly method 3 configuration parameter  Freq\_Cfg[Freq\_Sel\_Cfg][Park\_Lamps\_Body\_Ckt] shall be always set to DC. | Lincoln\_Experience\_Cfg  as Lincoln\_Experience\_CfgKind:   * 0x0-LINCOLN\_EXPERIENCE1 * 0x1-NULL   as Lincoln\_Experience\_CfgKind:   * LINCOLN\_EXPERIENCE1 * NULL |
| pI\_04 (DiagnosticsAndConfig) To pI\_04 (AmbientLighting) | Name: Lincoln\_Experience\_Cfg  Description: The configuration parameter is to differentiate the Welcome/Farewell Lighting (Interior and Exterior)  behaviour between Lincoln Experience vehicles and Non Lincoln vehicles.  When Lincoln\_Experience\_Cfg is set to LINCOLN\_EXPERIENCE1 then method 2 configuration parameters LR\_Stop\_Pos\_Lamp\_Ckt\_Usage\_Cfg and RR\_Stop\_Pos\_Lamp\_Ckt\_Usage\_Cfg shall be always set to STOP\_TURN, similarly method 3 configuration parameter  Freq\_Cfg[Freq\_Sel\_Cfg][Park\_Lamps\_Body\_Ckt] shall be always set to DC. | Lincoln\_Experience\_Cfg  as Lincoln\_Experience\_CfgKind:   * 0x0-LINCOLN\_EXPERIENCE1 * 0x1-NULL   as Lincoln\_Experience\_CfgKind:   * LINCOLN\_EXPERIENCE1 * NULL |
| Local\_OpMode | pI\_01 (SwSleepAwaking) To pI\_03 (linLEDPowerControl) | Name: Local\_OpMode  Description: initial value changed Awake -> Sleep(Conti.m)  This Dataflow indicates the current state of the ECU. | Local\_OpMode  as Local\_OpModeKind:   * 0x0-AWAKE * 0x1-CAN\_SLEEP * 0x2-PERIPS\_ACTIVE * 0x3-SLEEP   as Local\_OpModeKind:   * 0x0-AWAKE * 0x1-CAN\_SLEEP * 0x2-LOW\_MHZ * 0x3-PERIPS\_ACTIVE * 0x4-SLEEP |
| pI\_01 (SwSleepAwaking) To pI\_11 (AmbientLighting) | Name: Local\_OpMode  Description: initial value changed Awake -> Sleep(Conti.m)  This Dataflow indicates the current state of the ECU. | Local\_OpMode  as Local\_OpModeKind:   * 0x0-AWAKE * 0x1-CAN\_SLEEP * 0x2-PERIPS\_ACTIVE * 0x3-SLEEP   as Local\_OpModeKind:   * 0x0-AWAKE * 0x1-CAN\_SLEEP * 0x2-LOW\_MHZ * 0x3-PERIPS\_ACTIVE * 0x4-SLEEP |
| pI\_11 (AmbientLighting) To pI\_03 (linLEDPowerControl) | Name: Local\_OpMode  Description: initial value changed Awake -> Sleep(Conti.m)  This Dataflow indicates the current state of the ECU. | Local\_OpMode  as Local\_OpModeKind:   * 0x0-AWAKE * 0x1-CAN\_SLEEP * 0x2-PERIPS\_ACTIVE * 0x3-SLEEP   as Local\_OpModeKind:   * 0x0-AWAKE * 0x1-CAN\_SLEEP * 0x2-LOW\_MHZ * 0x3-PERIPS\_ACTIVE * 0x4-SLEEP |
| Parklamps\_Command | pI\_04 (VehicleStatus) To pI\_07 (AmbientLighting) | Name: Parklamps\_Command  Description: Command to control the position/parklamps. | Parklamps\_Command  as Parklamps\_CommandKind:   * 0x0-OFF * 0x1-ON   as Parklamps\_CommandKind:   * OFF * ON |
| pI\_07 (AmbientLighting) To pI\_02 (AmbientProcessing) | Name: Parklamps\_Command  Description: Command to control the position/parklamps. | Parklamps\_Command  as Parklamps\_CommandKind:   * 0x0-OFF * 0x1-ON   as Parklamps\_CommandKind:   * OFF * ON |
| PersIndex\_CS | pI\_03 (FrontHMILogic) To pI\_03 (Core) | Name: PersIndex\_CS  Description: Personality index to use with operation from Center Stack. | PersIndex\_CS  as PersIndex\_CSKind:   * PERS\_1 * PERS\_2 * PERS\_3 * PERS\_4 * VEHICLE   as PersIndex\_CSKind:   * 0x0-PERS\_1 * 0x1-PERS\_2 * 0x2-PERS\_3 * 0x3-PERS\_4 * 0x4-VEHICLE |
| PersNum | pI\_01 (Personalization) To pI\_14 (AmbientLighting) | Name: PersNum  Description: Indicates which personality is currently selected. | PersNum  as PersNumKind:   * 0x0-PERS\_1 * 0x1-PERS\_2 * 0x2-PERS\_3 * 0x3-PERS\_4 * 0x4-VEHICLE   as PersNumKind:   * PERS\_1 * PERS\_2 * PERS\_3 * PERS\_4 * VEHICLE |
| pI\_14 (AmbientLighting) To p2 (Core) | Name: PersNum  Description: Indicates which personality is currently selected. | PersNum  as PersNumKind:   * 0x0-PERS\_1 * 0x1-PERS\_2 * 0x2-PERS\_3 * 0x3-PERS\_4 * 0x4-VEHICLE   as PersNumKind:   * PERS\_1 * PERS\_2 * PERS\_3 * PERS\_4 * VEHICLE |
| PersonalizationProfileNumber | User To FrontHMILogic |  |  |
| Ramp | pI\_02 (AmbientLightOutput) To pI\_02 (LightingSystem) | Name: Ramp  Description: Indicates ramping is required/not required for ambient lighting. | Ramp  as RampKind:   * 0x0-NO * 0x1-YES   as RampKind:   * NO * YES |
| RejuvenateRequest | User To FrontHMILogic |  |  |
| Run\_Active\_Count\_Max\_Cfg | pI\_07 (DiagnosticsAndConfig) To pI\_17 (AmbientLighting) | Name: Run\_Active\_Count\_Max\_Cfg  Description: The dataflow decides the max range of a count which is used in Static Sequential by Light Engines. | Run\_Active\_Count\_Max\_Cfg  as byte: |
| pI\_17 (AmbientLighting) To p1 (AmbientLightOutput) | Name: Run\_Active\_Count\_Max\_Cfg  Description: The dataflow decides the max range of a count which is used in Static Sequential by Light Engines. | Run\_Active\_Count\_Max\_Cfg  as byte: |
| Run\_Active\_Count\_Min\_Cfg | pI\_07 (DiagnosticsAndConfig) To pI\_17 (AmbientLighting) | Description: The dataflow decides the starting range of a count which is used for Static Sequential in Lighting Engines | Run\_Active\_Count\_Min\_Cfg  as byte: |
| pI\_17 (AmbientLighting) To p1 (AmbientLightOutput) | Description: The dataflow decides the starting range of a count which is used for Static Sequential in Lighting Engines | Run\_Active\_Count\_Min\_Cfg  as byte: |
| SelDrvMdeHmi03\_Rq | pI\_01 (SDM) To pI\_15 (AmbientLighting) | Name: SelDrvMdeHmi03\_Rq  Description: CAN signal for the selected drive mode. | currDriveMode  as byte: |
| pI\_15 (AmbientLighting) To pI\_04 (Core) | Name: SelDrvMdeHmi03\_Rq  Description: CAN signal for the selected drive mode. | currDriveMode  as byte: |
| Stat\_Seq\_Time\_Cfg | pI\_07 (DiagnosticsAndConfig) To pI\_17 (AmbientLighting) | Name: Stat\_Seq\_Time\_Cfg  Description: This method 2 data decides the increment frequency of counter,The counter is transmitted over LIN | Stat\_Seq\_Time\_Cfg  as byte: |
| pI\_17 (AmbientLighting) To p1 (AmbientLightOutput) | Name: Stat\_Seq\_Time\_Cfg  Description: This method 2 data decides the increment frequency of counter,The counter is transmitted over LIN | Stat\_Seq\_Time\_Cfg  as byte: |
| Stat\_Seq\_Wait\_Time\_Cfg | pI\_07 (DiagnosticsAndConfig) To pI\_17 (AmbientLighting) | Name: Stat\_Seq\_Wait\_Time\_Cfg  Description: The dataflow is used to decide the rate at which the value of signal Run\_Active\_Count is written in  protected RAM once the value of is stabilized to either min or max | Stat\_Seq\_Wait\_Time\_Cfg  as byte: |
| pI\_17 (AmbientLighting) To p1 (AmbientLightOutput) | Name: Stat\_Seq\_Wait\_Time\_Cfg  Description: The dataflow is used to decide the rate at which the value of signal Run\_Active\_Count is written in  protected RAM once the value of is stabilized to either min or max | Stat\_Seq\_Wait\_Time\_Cfg  as byte: |
| Update\_Color | pI\_02 (AmbientLightOutput) To pI\_02 (LightingSystem) | Name: Update\_Color  Description: Indicates whether the color set for ambient lighting needs update or not. | Update\_Color  as Update\_ColorKind:   * NO * YES   as Update\_ColorKind:   * 0x0-NO * 0x0-YES |
| Update\_Intensity | pI\_02 (AmbientLightOutput) To pI\_02 (LightingSystem) | Name: Update\_Intensity  Description: Indicates the intesity for ambient lighting needs to be updated or not. | Update\_Intensity  as Update\_IntensityKind:   * 0x0-NO * 0x1YES   as Update\_IntensityKind:   * NO * YES |
| WelcomeFarewell\_Status | pI\_01 (WFInterpreter) To pI\_06 (AmbientLightingOutput) | Name: WelcomeFarewell\_Status  Description: Indicates welcome or farewell status for ambient lighting. | WelcomeFarewell\_Status  as WelcomeFarewell\_StatusKind:   * OFF * WELCOME1 * WELCOME1\_EXIT * WELCOME2 * WELCOME3 * WELCOME\_LE   as WelcomeFarewell\_StatusKind:   * 0x0-OFF * 0x1-WELCOME1 * 0x2-WELCOME1\_EXIT * 0x3-WELCOME2 * 0x4-WELCOME3   as WelcomeFarewell\_StatusKind:   * OFF * WELCOME1 * WELCOME1\_EXIT * WELCOME2 * WELCOME3 |
| pI\_04 (WFInterpreter) To pI\_05 (AmbientLightOutput) | Name: WelcomeFarewell\_Status  Description: Indicates welcome or farewell status for ambient lighting. | WelcomeFarewell\_Status  as WelcomeFarewell\_StatusKind:   * OFF * WELCOME1 * WELCOME1\_EXIT * WELCOME2 * WELCOME3 * WELCOME\_LE   as WelcomeFarewell\_StatusKind:   * 0x0-OFF * 0x1-WELCOME1 * 0x2-WELCOME1\_EXIT * 0x3-WELCOME2 * 0x4-WELCOME3   as WelcomeFarewell\_StatusKind:   * OFF * WELCOME1 * WELCOME1\_EXIT * WELCOME2 * WELCOME3 |

Table 16: Feature Interactions

# Traceability Matrix





# Open Concerns

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

Table 17: Open Concerns *(Not supported by MagicDraw report generation)*

# Revision History

| Rev.  (revision) | Date | Description | Approved by | Responsible |
| --- | --- | --- | --- | --- |
| FD1 | 2022-06-27 | V 1.0 June 22, 2022 Auto generated from Magicdraw model - to be submitted for review. |  | rcruz92 |
| FD2 | 2022-08-16 | V 2.0 August 16h, 2022 Auto generated from Magicdraw model - ready to be archived in VSEM. |  | rcruz92 |

Table 18: Revision History

## Template Revisions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Version | Rev. | Date | Description | Responsible |
| 0 | 6 | 2015-05-26 | * Chapter “Feature Overview” and made a 2nd level heading. * Chapter “Feature Modeling” divided into 3 subchapter (“Scenarios”, “Use Cases”, “State Machines”) for different modeling methods | Jbaden1 |
| 0 | 7 | 2015-05-27 | * Table of Content updated * Template Revision History chapter added | Jbaden1 |
| 0 | 8 | 2015-07-02 | * Section “Unsettled Issues” added | Alevin7 |
| 0 | 9 | 2015-08-04 | * Section “Feature Variants” added * Section “Feature Boundary Diagram” renamed to “Feature Context Diagram” * Document Properties adapted to match needs of VBA macros | Jbaden1, Awegman1 |
| 1 | 0 | 2015-09-11 | * Section “Feature Variants” reworked * Feature Goals removed. Only “Safety Goals“ chapter remains. * Heading 2 formatting issues corrected. * Requirements / Use Cases Listing removed from traceability chapter. * Formatting of attribute table in Notation chapter corrected * Open Topics / Known Issues chapter moved to the end | Jbaden1 |
| 1 | 1 | 2015-11-16 | * Table-Styles removed (for smooth VSEM import) * Some clean-up of sections “Purpose” and “Audience” | Awegman1, jbaden1 |
| 1 | 2 | 2016-02-26 | * Minor corrections based on lessons learned from CC and PCL pilot (e.g. section market/regions) and discussion with Functional Safety Team (purpose of feature) * Footer corrected * Boundary diagram interface chapter renamed to influences. | Jbaden1 |
| 1 | 3 | 2016-02-26 | * Minor corrections after review with Whitney Keith from Functional Safety team | Jbaden1 |
| 1 | 4 | 2016-03-10 | * Some cleanup of meta-data in Word Properties | Jbaden1 |
| 1 | 5 | 2016-03-10 | * Footer formatting corrected (Issue 19) * Results from review with Functional Safety Team incorporated (Issue 20). | jbaden1 |
| 1 | 6 | 2016-04-18 | * Scenario Template added | Jbaden1 |
| 1 | 7 | 2016-04-18 | * Chapter “Operation Modes and States” moved before “Use Case” section. | Jbaden1 |
| 1 | 8 | 2016-04-18 | * Broken Wiki links repaired. | Jbaden1 |
| 2 | 0 | 2016-05-19 | * Adapted to Specification\_Macros.dotm V2.0 * Requirements Templates chapter (ch. 1.7.1) no longer has an attribute table, but refers directly to the Wiki.. | Jbaden1 |
| 2 | 1 | 2016-06-10 | * Table for Context Diagram modified (lists external entities and Influence Description only) | Jbaden1 |
| 2 | 2 | 2016-07-08 | * Template version added to footer * Several hints added to the various sections * Findings from Functional Safety Team incorporated. * RE\_SafetyRequirement style added | Jbaden1 |
| 2 | 3 | 2016-09-21 | * Update from Functional Safety Team incorporated (“Lessons Learned”, “System Behaviors for HARA”) | Jbaden1 |
| 2 | 4 | 2016-11-15 | * Update from Functional Safety Team incorporated (“Lessons Learned”, “System Behaviors for HARA”) * Explanatory notes made more formal | Jbaden1 |
| 3 |  |  | Skipped to synchronize with Specification\_Macros.dotm |  |
| 4 |  |
| 5 | 0 | 2017-01-13 | * Meta data updated for specification macros, version 3.1 * SW Unit chapter removed for the time being * Green boxes added for user hints | Jbaden1 |
| 5 | 1 | 2017-01-18 | * Minor editorial changes | Jbaden1 |
| 6 | 0 | 2017-02-03 | * CR48: Chapter 6 renamed from “Safety” to “Functional Safety”. New sub-chapter “Safety” introduced in Non-Functional Requirements section | Jbaden1 |
| 6 | 0 | 2017-04-28 | * CR7: “RequirementsTraceability” chapter removed | Jbaden1 |
| 6 | 0 | 2017-11-15 | * CR32/53: New Cover Sheet + Disclaimer replaces FAP-150 like ones. * CR75: Some rewording -> Terminology to Glossary, Notation -> Document Conventions * CR49: Rename “Assumptions & Constraints” to “Assumptions” * CR74: Safety Assumptions added to chapter 6. * CR58: Add function allocation column to Logical Architecture chapter | Jbaden1 |
| 6 | 0 | 2018-01-31 | * CR63: Updated links to Functional Safety Sharepoint | Jbaden1 |
| 6 | 0 | 2018-07-24 | * CR69: Add FSR to FeatureDoc * CR64: Add new section "Design Requirements" to Function Spec and Feature Spec | Jbaden1 |
| 6 | 0 | 2018-08-06 | * CR53: some corrections for metada and formatting | Jbaden1 |
| 6 | 0 | 2018-09-28 | * Broken links to RE Wiki repaired | Jbaden1 |
| 6 | 0 | 2018-10-31 | * Cover sheet and footer more GIS like. Functional Safety team feedback incorporated:   + New subsections “Functional Safety Requirements, (Decomposed) FSRs and Parameters / Values   + Removal of “Logical Architecture” | Jbaden1 |
| 6 | 0 | 2018-12-12 | * FSR template removed, now as a macro in the Specification\_Macros.dotm | Jbaden1 |
| 6 | 0a | 2019-05-23 | * Re-introduce “Logical Architecture” (for Functional Safety) | Jbaden1 |
| 6 | 0b | 2019-06-26 | * Chapter “Logical Elements” in “Logical Architecture” section added (FuSa CR 15136240) | Jbaden1 |
| 6 | 0c | 2019-03-22 | * Chapter “Decomposed FSRs” renamed to “ASIL Decomposition of Functional Safety Requirements” and moved beneath Chapter “Functional Safety Requirements”. Explanatory text improved. | Jbaden1 |
| 6 | 0c | 2019-04-05 | * Some wording in ASIL decomposition table modified. Description of fields in that table improved. | Jbaden1 |
| 6 | 0c | 2019-06-24 | * “Input Requirements” section modified (table approach as for the other RE templates). * “References” and “Glossary” chapter moved to the “Introduction” chapter. | Jbaden1 |
| 6 | 0c | 2019-07-02 | * "Important" box added on cover sheet which points to the macros | Jbaden1 |
| 6 | 0c | 2019-07-02 | * Subsection “Error Handling” removed form chapter “Feature Requirements”->”Functional Requirements” (teams are free to create their own substructure of that section). Note tells author not to forget about error handling. * Hint for chapter “Feature Variants” improved reworded upon request from Functional Safety Team. | Jbaden1 |
| 6 | 0c | 2019-05-11 | * Copyright notice shortened and moved to cover sheet and added to footer (to be compliant [with Ford copyright guidelines](http://www.fgti.ford.com/client/NewFGTI/CopyrightNotice.html)) * Term “Disclaimer” no longer used for what is actually only a copyright notice | Jbaden1 |
| 6 | 0c | 2019-22-11 | * Chapter “Input Requirements/Documentst: minor modifications (examples added), Word comment removed” | Jbaden1 |
| 6 | 0c | 2019-12-05 | * Upstream Documents section added to “Input Requirements/Documents” table * Custom style table formatting removed * Hint on system behaviors modified as requested from FuSa team | Jbaden1 |
| 6 | 0c | 2019-12-09 | * Term “Upstream Documents” replaced by “Attribute Requirements” in “Input Requirements/Documents” table * ASIL Decomposition table replaced by a version, which get not corrupted during VSEM import. | Jbaden1 |
| 6 | 0c | 2019-12-10 | * In ch. “Functional Safety Requirements” Word reference Id by Word reference text replaced.. | Jbaden1 |
| 6 | 1a | 2020-02-12 | * New chapter “Cybersecurity” added. | Jbaden1 |
| 6 | 1a | 2020-03-03 | * All User Hints formatted using style “RE\_UserHint” to enable automatic removal by a macro. | Jbaden1 |
| 6 | 1a | 2020-03-04 | * Chapter “Cloud Connectivity Data Analytics Requirements” added upon request by D. Crockett/J. Rawlings | Jbaden1 |
| 6 | 1a | 2020-03-09 | * Missing doc property “LatestSigMappingID” and “LatestAisInterfaceID” added * doc property “CopyrightDate” re-formatted to text and copyright date field in footer corrected * Version numbering re-initialized as 0.1 * Init value of version/revision date set to “yyyy/mm/dd” instead of “yyyy-mm-dd” to be in line with the “Edit Document Property” dialog * type of document property for latest IDs changed to number instead of text | Jbaden1 |
| 6 | 1b | 2020-03-17 | * Chapter “Functional Architecture” renamed to “Functional Decomposition” * New MBSE terminology introduced: “Feature Level”, “Function Level” and “Component Level” renamed to “Concept Level”, “Logical Level” and “Technology Level” | Jbaden1 |
| 6 | 1b | 2020-07-03 | * CR31: Chapter “Traceability Matrix” added. | Jbaden1 |
| 6 | 1b | 2020-23-09 | * CR28: Alignment to [*FFSG01.10 Feature Document Guideline*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG01.10_FeatureDocument_Guideline.pdf) for how to apply the Feature Doc template for Functional Safety. New section “Classification of Chapters” added. “Active Tilt Control” Example in section “Logical Architecture” updated based on input from HARA training. | Jbaden1 |
| 6 | 1b | 2020-25-11 | * Reference to process definition in Stages added to “How to Use” section on cover sheet. User hints removed from “Document Purpose” chapter. * RE-Wiki links mostly replaced by Stages links, links to Functional Safety Sharepoint updated | Jbaden1 |

# Appendix

## Definitions

| **Definition** | **Description** |
| --- | --- |
| Ajar | Any door position other than closed. |
| AUTO | Contextual Ambient Lighting Automatic Mode: Lighting color and intensity driven by SDM. |
| Auto Ambient Lighting | Auto Ambient Lighting is a trade name displayed on the HMI for Contextual Ambient Lighting. |
| Contextual Ambient Lighting | Operation mode in which Ambient Lighting can be driven either by user input (in this case it is called MANUAL mode) or by SDM (in this case it is called AUTOMATIC). |
| Diagnostics and Configuration | Feature / System that deals with vehicle's configuration and diagnostics parameters and services such as lighting ramping up and down times, default colors, diagnostics services, etc. |
| Drive Mode | Current drive mode selected by user through SDM. |
| Front HMI | HMI available to driver and passenger at vehicle interior 1st row. |
| MANUAL | Contextual Ambient Lighting Manual Mode: Lighting color and intensity driven by user selection. |
| Rear HMI | HMI available to passengers at vehicle 2nd / 3rd interior rows. |
| Selectable Drive Mode | Feature that allows user to select a drive mode. |
| Vehicle Status | Any data that exposes vehicle system state variables such as ignition state, battery state, door ajar status, etc. |

Table 19: Definitions used in this document

## Abbreviations

| **Abbr.** | **Stands for** |
| --- | --- |
| AAL | Auto Ambient Lighting |
| Acc | Accessory |
| BCM | Body Control Module |
| CAL | Contextual Ambient Lighting |
| ECU | Electronic Control Unit |
| HMI | Human Machine Interface |
| LIN | Local Interconnected Network |
| SDM | Selectable Drive Mode |
| WF | Welcome / Farewell |

Table 20: Abbreviations used in this document

Document ends here.