|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | |  |
|  |  | | |  |
|  | Power Release/Cinch Doors | | |  |
|  | (F000864) | | |  |
|  |  | | |  |
|  |  | | |  |
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| Document Status | **Draft** | | |  |
| Date Issued | **2021/08/05** | | |  |
| Date Revised | **2021/08/31** | | |  |
| Document Classification | GIS1 Item Number: | **27.60/35** | |  |
| GIS2 Classification: | **Confidential** | |
|  | | | | |
|  | | | | |
| Document Approval | | | | |
| Person | Role | | Email Confirmation | Date |
|  |  | |  |  |
|  |  | |  |  |

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**How to Use this Template**

Follow the [RE process definition](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_S-Rj8EHW_KKHa9Bz6IpdSw)) in Stages for [Creating a Feature Definition](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_VsOScGqJVwi5zd82DgHb6g)) to derive the information relevant for this document.

To get more information about the RE information model and the Concept, Logical and Technology abstraction level refer to the [Ford RE Wiki](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Engineering+for+SW+Enabled+Features). For details on the Ford Functional Safety (ISO26262) process refer to the [Ford Functional Safety Sharepoint](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Pages/default.aspx).

**Important:**

Use only these RE specification macros to create/insert requirements in this specification. Use of RE specification macros is a prerequisite for seamless VSEM import of the specification content.

Download RE\_SpecificationMacroTemplate.dotm from chapter “Utilities” on [page “Specification Templates” in the RE Wiki](http://wiki.ford.com/display/RequirementsEngineering/Specification+templates) and follow instructions at “[How to use the Specification Templates](http://wiki.ford.com/display/RequirementsEngineering/How+to+use+the+Specification+Templates?src=contextnavpagetreemode)” on how to enable and use the macros and the requirements templates in this specification.

Once the specification is complete it should be imported to VSEM (refer to ["How to import specifications into VSEM as separate requirements"](http://wiki.ford.com/pages/viewpage.action?pageId=104991616&src=contextnavpagetreemode)).

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# 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** |
| F000864 | Power Release/Cinch Doors  (Program(s): 2024MY U611 MCA) | F000864 | <Add VSEM Link> |
|  |  |  |  |

Table 1: Features described in this FD

## Document Audience

The FD is written by the feature owner of <Feature / Feature Group Name>. All Stakeholders, i.e., all people who have a valid interest in the feature should read and, if possible, review the FD. It needs to be guaranteed, that all stakeholders have access to the currently valid version of the FD.

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

**#Macro:** [Add Ins -> Edit Document Properties macro](https://wiki.ford.com/pages/viewpage.action?pageId=174654255) (select “Proprietary” for “Document Classification”)

### Stakeholder List

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

**#Hint:** Refer to [Ford RE Wiki – Stakeholder List](http://wiki.ford.com/display/RequirementsEngineering/Stakeholder+Analysis) on how to create a stakeholder list. The stakeholder list should be stored in VSEM in the pseudo folder “General Data Artifacts” of the corresponding feature.

**#Link:** [Stages - RE Identify Sources of Feature Requirements](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_M73_YEgVeAOY2aIJCaFfcg))

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **CDSID** | **Contact Info** | **Role** | **Stakeholder Group** |
| Brown, Kristopher | KBROWN359 | kbrow359@ford.com | Power Hinge Feature Owner | Non Primary |
| Cinar, Ahmet (.) | ACINAR1 | acinar1@ford.com | Locking/Unlocking Tech Specialist | Non Primary |
| Rahman, Mohammed | MRAHMA35 | mrahma35@ford.com | RCM Module Owner | Primary |
| Osterhoff, Stephen (S.) | SOSTERHO | sosterho@ford.com | FuSa Engineer | Primary |
| Fayad, Omar | OFAYAD | [ofayad@ford.com](mailto:ofayad@ford.com) | Cybersecurity Engineer | Primary |
| Vazquez, Frida (F.) | FVAZQU26 | fvazqu26@ford.com | MBSE Engineer | Non Primary |
| Radjewski, Christopher (C.M.) | CRADJEW1 | cradjew1@ford.com | eLatch Core Engineer | Primary |
| Prodin, Timothy (T.R.) | TPRODIN | tprodin@ford.com | eLatch Software | Non Primary |
| Dasari, Kovidha | KDASARI2 | kdasari2@ford.com | Feature Application Owner | Primary |
| Hu, Peter | LHU22 | [Lhu22@ford.com](mailto:Lhu22@ford.com) | Feature Application Owner | Primary |
| Xiao, Jevon | JXIAO8 | [Jxiao8@ford.com](mailto:Jxiao8@ford.com) | Features Supervisor | Primary |
| Hamilton, Hugh | HHAMILTO | [hhamilto@ford.com](mailto:hhamilto@ford.com) | PCM Engineer (vehicle speed) | Primary |
| Tumavitch, Jeff | JTUMAVIT | [jtumavit@ford.com](mailto:jtumavit@ford.com) | PCM Supervisor (transmission status) | Primary |
| Mehdi, Sam (H.A.) | HMEHDI | hmehdi@ford.com | BCM Engineer (locking) | Primary |
| Liu, Shayne | SLIU103 | [Sliu103@ford.com](mailto:Sliu103@ford.com) | BCM Engineer (perimeter alarm) | Primary |
| Reed, Eric | EREED2 | [ereed@ford.com](mailto:ereed@ford.com) | BCM Engineer (ignition status) | Primary |
| Watkins, Scott | SWATKINS | [swatkins@ford.com](mailto:swatkins@ford.com) | In Vehicle Infotainment Tech Expert | Primary |
| Korte, Chad | CKORTE1 | [Ckorte1@ford.com](mailto:Ckorte1@ford.com) | Chassis Controls Technical Leader | Primary |
| Ganna, Spurthi Varma | SGANNA | sganna@ford.com | Power Child Feature Owner | Non Primary |
| McInally, Steven (M.) | SMCINALL | smcinall@ford.com | Features Supervisor | Primary |
| Weiler, Jonathan (J.P.) | JWEILER7 | jweiler7@ford.com | Power Release/Cinch Doors Core Feature Owner | Primary |

## 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** |
| --- | --- | --- | --- | --- |
| [FFSG01.10] | FFSG01.10 Feature Document Guideline | FFSG01.10 | <https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG01.10_FeatureDocument_Guideline.pdf> |  |
| e.g. [ARL\_xyz] | e.g. “Attribute requirements List of the feature” |  |  |  |
|  |  |  |  |  |

Table 2: Ford internal Documents

### External Documents and Publications

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

**#Hint:** You may refer to [IEEE Citation Reference](http://www.ieee.org/documents/ieeecitationref.pdf) on how to format a reference.

| **Reference** | **Document / Publication** | **Document Location** |
| --- | --- | --- |
| IEEE Std 1012-2004 IEEE Standard for Software Verification and Validation |  |  |
| ISO/IEC 19500-2:2003 | Information technology -- Open Distributed Processing -- Part 2 |  |
| UML Testing Profile (UTP), v1.2 |  |  |

Table 3: External documents and publications

## Glossary

**#Hint**: Terms, concepts and abbreviations used in the document shall be defined and illustrated here. Note that changes to terms and/or concepts described in this section tend to cause major updates to this document.

The tables below have feature specific definitions and abbreviations. For additional, non-feature specific terms please refer to the [RE Glossary](https://wiki.ford.com/display/RequirementsEngineering/RE+Glossary)

### Definitions

| **Definition** | **Description** |
| --- | --- |
| eLatch | Side door latch with integrated electronic module |
| Cinch | Used to close the door when the door is placed in the secondary latch position |
| Release | Action that encapsulates the unlatch function as well as the movement of the doors due to seal force release |
| Lock | Securing the vehicle to disable the outside release |
| Unlock | Allow release from both the inside and outside release switch |
| Latch | Door closed to the secondary or primary latch position |
| Unlatch | Releasing the door from the secondary or primary latch position |
|  |  |
| Alarm Armed | Time when vehicle is locked for an extended period of time to enable the perimeter alarm |
| Child Locked | Disable the rear inside unlatch switch |
| Door Ajar Signal | Indicator illuminated when the door is in secondary or full open position |
| Crash Event Signal | Signal sent following a crash that will deploy airbags or fuel cutoff |
| Primary Latch Position | Door is fully latched (ajar signal is off) |
| Secondary Latch Position | Door is partially latched (ajar signal is on) |
| Door Slam | Action by the user to push the door to the primary latch position |
| Soft Close | Action of closing the door to the secondary latch position to enable the cinch function |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Table 4: Definitions used in this document

### Abbreviations

| **Abbr.** | **Stands for** | **Description** |
| --- | --- | --- |
| E-Latch | Electronic Latch (side door) | Side door latch with an integrated electronic control module |
| ENS | Event Notification Signal | Hard wired crash event signal from the restraint control module |
|  |  |  |
|  |  |  |
|  |  |  |

Table 5: Abbreviations

### Parameters / Values

| **Name** | **Description** | **Range / Resolution** |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

Table 6: Parameters / Values used in this document

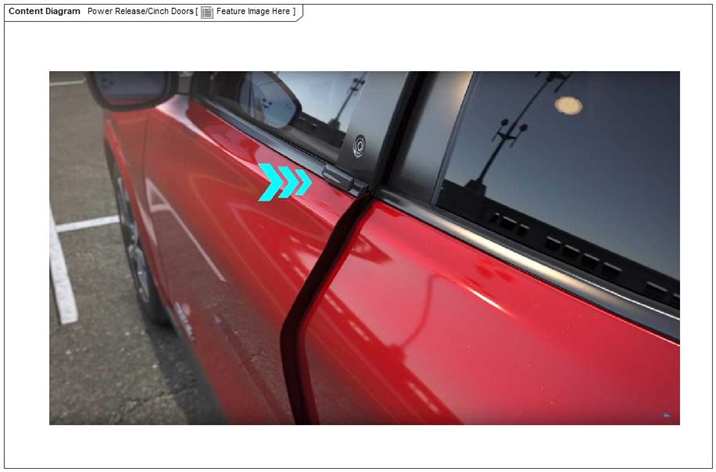
# Feature Overview

## Purpose and Description of Feature

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

**#Link:** [Stages – RE Write a Feature Description](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_SwnFgNkr2BSXFOeCKnyqmw))

The Power Release Doors (PRD) feature can release closed hinge doors to a slightly open position when the user requests to unlatch the door. The PRD system allows the user to then open the door by applying force to any location on the door thus simplifying the ingress and egress experience. The feature can also include cinching and presenting functionalities. The cinching functionality enables the soft closure of hinge doors by pulling the door to a fully closed position. The presenting functionality pushes the door to a more open position than the base Power Release Doors feature when unlatching of the door is requesting. This helps the user grab the edge of the door when opening and reduces the need for exterior door handles. The PRD system is also an enabling feature for other features such as the Power Hinge Door and is key to creating the Grand Entry moment.



## Feature Variants

**#Hint:** List all known variants of the feature applying to current and upcoming programs. Reference each variant by a descriptive name. If no variant exists, state “No Feature Variants”. The “Variant Description” table column should give a short informative text, which describes the variant of the feature.

Requirements in chapter “Feature Requirements”, which do not apply for all variants, should clearly state, which variants they are applicable for.

|  |  |  |
| --- | --- | --- |
| Variant Name | Variant Description | Remarks |
| **Power Release Doors** | Power Release Doors releases a latched hinge door when prompted by the user. |  |
| **Power Release Doors with Cinch** | Power Release Doors with Cinch provides the same functionality as PRD with additional functionality during hinge door closure. When the door reaches a partially closed position, PRD with Cinch will then close the door to the fully closed position using an additional motor and cable system. |  |
| **Power Release Doors with Cinch and Presenter** | Power Release Doors with Cinch and Presenter provides the same functionality with the additional functionality of the cinch and presenter defined above. |  |
| **Power Release Doors with Presenter** | Power Release Doors with Presenter provides the same functionality as PRD with additional functionality during door opening. Door in the closed position will open approximately 50mm after unlatching. |  |

Table 7: Feature Variants

### Regions & Markets

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Market /**  **Region**  Variant Name | **North America** | **South America** | **Europe** | **Middle East / Africa** | **Asia / Pacific** | **China** |
| **Power Release Doors** | *Optional* | Optional | Optional | Optional | Optional | Optional |
| **Power Release Doors with Cinch** | *Optional* | Optional | Optional | Optional | Optional | Optional |
| **Power Release Doors with Cinch and Presenter** | *Optional* | Optional | Optional | Optional | Optional | Optional |
| **Power Release Doors with Presenter** | *Optional* | Optional | Optional | Optional | Optional | Optional |

Table 8: Regions & Markets

## Input Requirements/Documents

**#Hint:** List relevant documents or requirements, which should be considered when considered when specifying the requirements in chapter “Feature Requirements” of this document. When finalizing the spec, the feature owner should check, if all inputs have been properly considered by derived/outgoing requirements.

**#Link:** Refer to “Forward Traceability” at [Stages – RE Traceabilty Record](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/artifact/_ZbIhsK4EkzaN49uPh7SLuQ))

|  |  |  |  |
| --- | --- | --- | --- |
| **Reference**  (Reference as listed in ch. “References) | **Section/Requirement** | **Description** | **Derived Requirement**  (optional – reference to requirement in ch. “Feature Requirements”) |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Requirements** | | | |
|  | Example AR |  |  |
| **Ford Engineering Standards** | | | |
|  | <Example: some SDS (requirement)> |  |  |
| **Legal Regulations** | | | |
|  | Compliance with FMVSS101 | The Feature shall comply with FMVSS101. |  |
|  | Compliance with FMVSS206 | Door Locks and Door Retention Components |  |
| **Industry Standards** | | | |
|  | ISO 26262 | The system should be developed according to Ford's implementation of Functional Safety. |  |
|  | IEEE Std 1012-2004 | Standard for Software Verification and Validation |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Requirements** | | | |
|  | <Example:  id + title of attribute requirement> | <Example: “attribute requirement(s) of feature xyz”> | <If you reference a requirement in this column, that requirement should have a trace link in its [“Source”/”Source Req.” attribute](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) field referring back to the input requirement (or to a requirement inside the input document) given in this table row> |
| **Other Sources** | | | |
|  | <Example: some stakeholder document> |  |  |
|  |  |  |  |

Table 9: Input Requirements/Documents

## Lessons Learned

**#Hint:** Additional information and lessons learned from previous development or related features. A typical source for Lessons Learned is the FMA Quality History.

**#Functional Safety:** Insert (or reference) additional safety information and lessons learned from previous development of related items /features or legacy features, e.g., potential consequences of behavior shortfalls including known failure modes and hazards, already known safety requirements.

**#Link:** [FFSG01.10 Feature Document Guideline](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG01.10_FeatureDocument_Guideline.pdf)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Section A: Quality Issues** | | | **Section B: Failure Mode Analysis** | | **Section C: Countermeasures** |
|  |  |  |  |  |  |
| **Program Source** | **Data Source** | **Issue Description** (or CCC) | **Failure Mode** | **Root Cause** (In engineering terms) | **Program Countermeasures** |
|  |  | **3. Recent Launch / AIMS Issues** |  |  |  |
| D544 | AIMS 3480318 | Each door trim lock/unlock switch will lock or unlock all 4 doors | Trim switch is a global (all 4 door) lock/unlock | This is design intent. BCM will only send the global lock/unlock message on a trim switch request | Design Intent - no action |
| D544 | AIMS 3480319 | Rear door must be unlocked prior to unlatching | Rear door (parked & locked) requires 2x inside release or unlock then unlatch | This is design intent. It is an FMVSS requirement to have 2 separate activation to exit a rear locked door. | Design Intent - no action |
| D544 | AIMS 3469698 | Incorrect pin-out for cinch motor | Cinch motor does not operate | Pin-out incorrectly labled on the drawing and DT | Correct motor pinout on the drawing and DT |
| D544 | AIMS 3481329 | Latch can not be assembled to the door | Fastener can not be torqued to the frameplate | Threads in the frameplate were not formed properly. Thread tapping is done during a secondary operation | Implement in-die tapping to be done as part of the prog die stamping. |
| D544 | AIMS 3473826 | Door Harness connector can not be removed easily. Connector cap is held in the latch connector. | High efforts to remove the connector | Flash at the parting line inside the latch molded in connector header. | Tool correction to eliminate the flash. Modify parting line in the tool. |
| D544 | AIMS 3485700 | Overmold on the ratchet is cracked and is pealing off of the ratchet | Appearance | The door is misaligned during assembly and is causing the ratchet to touch the striker and shear the overmold off of the ratchet | Correctly align the door prior to closig to the striker. |
| D544 | AIMS 3505449 | Red rust on the latch frameplate | Appearance | Insufficient corrosion protection on the DV level parts | Original specified plating was not sufficient. Change coating of the frameplate to ZnNi +ecoat |
| D544 | AIMS 3506383 | Red rust on the latch housing/cover fasteners | Appearance | This is design intent. Fasteners are in a non-visible area to the outside of the door. The corrosion on the fastener did not comprimise integrity | Design Intent - no action |
| D544 | AIMS 3562023 3538845 | Door Fault Message - Outside Release Handle | Cluster message door fault | The latch software was falsly indicating an issue with the outside handle switch due to the way it was monitoring the diagnostics signal of a stuck switch | Software robustness, increase the sampling rate |
| D544 | AIMS 3555273 | Latch fishmouth seal foam is sticking out of the fishmouth opening | Appearance | When assembled the latch is sliding across the inside of the door fishmouth area causing it to catch and stick out | Improve the latch assembly method |
| D544 | AIMS 3476945 | Outside release switch is difficult to engage | Door is difficult to open, high effort to press switch | The activator lever was not proud of the handle enough, the lever was not ridgid. | Increase the rigidity of the handle switch lever. Reduce the activation length of the handle lever. Add thickness of the lever to make it more proud of the handle. |
| D544 | AIMS 3486699 | Door latch does not have an external mechanical unlatch handle on all doors | Door will not open | Power loss on any of the passenger doors would require removal of the trim panel to access the service release on the latch | Design Intent - no action |
| D544 | AIMS 3494024 | Mechanical handle does not release the latch | When the latch is operated on the bench the latch does not release | Latch requires some level of force on the ratchet (seal load) to rotate the ratchet when released | Design Intent - no action |
| D544 | AIMS 3525409 | Latch setting a General Electric Fault DTC | Latch will not pass pre-rolls EOL test at the assembly plant | The latch is subject to an offline EOL test during VP/EPT build phase. Fault occurrs when the outside release handle is held in the full release travel position for and extended period of time. | Production latch assembly EOL test will not hold the lever in the full travel position |
| D544 | AIMS 3552589 | Outside release switch is INOP | Door does not open | Issue on the vehicle wireharness that is attached to the outside handle | Ensure proper solder and connection to the handle switch |
| D544 | AIMS 3552088 | Latch frame plate is scratched | Appearance | Door fitters are using abrasive tools to align the doors. The latch was scratched and removed the black coating | Wrap door fitters tools with soft material to not scratch components |
| D544 | AIMS 3484421 3482399 | Latch has poor opening sound quality | Poor Sound Quality | The reset sound in the latch is too loud | Modify the Aux Ratchet Bumper to dampen the sound |
| D544 | AIMS 3541227 | Latch would not pass EOL test | Latch will not pass pre-rolls EOL test at the assembly plant | Bent pin on the connector in the latch | Latches are being reflashed line-side at FRAP. Production intent software should be deliverd with the latch from the supplier assembly plant |
| D544 | AIMS 3556035 | Door Sheetmetal is deformed during the latch assembly | Latch is not properly installed to the door | Excess sealer between the latch reinforcement and the door is causing the latch to be misaligned during assembly | Sealer robot program to be adjusted for improved placement on LH front door and all 4 doors to be validated prior to Pre-MP1 door buildup. |
| D544 | AIMS 3546119 | CCC markings on the latch are not required | Test latches are not able to be received through China customs | CCC markings on the latch do not have a CCC number and paperwork | CCC marking was removed from the latch it is not required. |
| D544 | AIMS 3495883 | Unlock Switch is INOP | Could not unlock the door via interior trim switch | Solder on the latch connector was creating a short. | Improve the wave solder process on the ECU connector to eliminate short circuit |
| D544 | AIMS 3480526 | Concern that the latch can be operated in the event of a power loss | Provide an intuitave way to exit the vehicle in the event of a power loss | Each latch has backup energy stored in the event of a Vbatt loss. This will enable the function of the lock/unlock switches and release switches | Design Intent - no action |
| D544 | AIMS 3498106 | PELI symbol illuminates unlocked but the door will not unlatch | Door will not open | PELI indicated the vehicle lock status. NLI indicated the door lock status. PELI will show unlocked if any door is unlocked. | Design Intent - no action |
| D544 | AIMS 3505529 | KOL from the latch is too high | Excessive battery drain | Software was incorrectly keeping the latch awake | Software robustness to allow the latch to go to sleep |
| D544 | AIMS 3532682 | Cinch motor operates with poor sound quality | Poor Sound Quality | The latch and cinch motor are operating to design intent. Data shows that the latch is among best in class for cinch closing sound. | Design Intent - no action |
| D544 | AIMS | Incorrect pin-out for outside release handle | Door will not open | Pin-out did not match the DT that was originally submitted. | Pinout was changed back to original design intent |
| D544 | Test | Water intrusion into the latch | Door will not open | Inside unlock switch is not sealed and is causing the super caps to drain. Latch was not sealed causing water to enter ECU area. | Remove diods from Latch ECU for lock/unlock wakeup. Correct sealing within Latch ECU. |
| D544 | Test | Inside release switch is difficult to activate | Door does not open | There are 2 contacts beneath the inside release switch which must be activated together to unlatch the door. If the switch is pressed around the perimeter then both contacts will not be made. | Improve the internal guides of the switch to improve function |
| D544 | Test | Cinch function is INOP | Door will not cinch to the primary position | Cinch over ride was causing the post on the cinch lever to break | Modify the software to return the cinch lever to the home position prior to release |
| D544 | Test | Cinch function is INOP | Door will not cinch to the primary position | Cinch link lever material is not robust and deforms due to cinch loads | Modify the cinch lever material to be the same hardness as the pawl material. |
| D544 | Test | Cinch function is INOP | Door will not cinch to the primary position | Cinch cable seal compresses during operation causing the cable to bind | Modify the cable design so that the cable condiut is resting against the plastic wall instead of a bumper |
| D544 | AIMS 3562119 | Cinch function is INOP | Door will not cinch to the primary position | Seal is deformed and allowed water to leak in the motor causing corrosion | Add an additional seal around the motor. Need to propose design change to sealing surface |
| D544 | VOCF | Door will not close | Door will not close to the secondary or primary position | The key cylinder was not properly fastened and became trapped between the glass and door panel and pulled the cable to release position | This was a reworked part during the build. Need to fasten the key cylinder to the proper torque and function the part following assembly. |
| D544 | Test | Latch did not pass DL181 requirement | Door did not pass pushout test following LINCAP test | Outer sheetmetal intrusion into the latch causing the latch to fracture and pull the Key Lever | Add an external bracket to block the release of the key lever during crash |
| D544 | AIMS 3479928 | Air leakage | Excessive air leakage through the latch | Seal does not cover the entire perimeter of the fishmouth and the reset lever | Increase the coverage of the seal to include the perimeter of the fishmouth and the reset lever. |
| D544 | AIMS 3534565 | Front cinch motor connector is difficult to assemble | Door will not cinch to the primary position | Connector is difficult to reach during assembly of the harness to the motor | Add a pigtail harness to the cinch motor to present the connector closer to the access hole |
| D544 | AIMS 3479256 | Difficult to assemble the key lock cylinder | Difficult to assemble | Dimension and tolerance between the lock cylinder o-ring and the cable connector. The connector was pushing the o-ring out of position. | Change O-Ring dimension and revise cable connector dimension and shape |
| D544 | AIMS 3540019 | Foam around the reset lever is visible through the door sheet metal | Appearance | Foam ID dimension was too close to the ID of the hole in the door sheet metal | Increase the ID of the hole of the foam seal |
| D544 | AIMS 3524769 | Grommet on the inside release cable is difficult to assemble | Assembly | The grommet was difficult to assembly because there was not a feature to pull the grommet into position and the material would not hold against the door inner panel. | Add handle feature to grab and pull the gromet into position. Modify material and sealing feature. |
| D544 | AIMS 3523187 | Inside releasse cable difficult to assemble because of alignment feature | Assembly | There was an alignment feature on the cable abutment that was difficult to find the slot on the inside release handle. | Remove the alignment feature from the cable. It is not necessary to have the cable aligned. |
| D544 | AIMS 3523719 | Non-cinch latches failing self test | Would not pass EOL test | Had cinch latch software code | Correctly match the software config with the latch variant. |
| D544 | AIMS 3525770 | U2000 & U3000 DTCs at EOL | Would not pass EOL test | U2101 DTC aging strategy was not automatically cleared by the software when chilld lock configuration was done. | U2101 DTC aging strategy change: shall be automatically cleared by the software as soon as the correctly matching child lock configuration for the Elatch and the BCM is detected. |
| D544 | VP Build | Not entering in the cinch state in the software | Door will not cinch | Detecting the ajar signal, entering a state that was not considered valid state to start the cinch activation | Added additional pre-condition states to capture all possible states acceptable to start the cinch operation. |
| D544 | KLT | Door not cinching closed | Door will not cinch | Aux Ratchet spring was broken and was holding the Main Pawl out of position and the software would not recognize as a valid state to start cinching. | Revise design of Aux Ratchet spring to make it more robust. |
| D544 | AIMS 3538236 | Air leakage | Excessive air leakage through the door | Fastener head diameter was not large enough to cover the through hole in the door sheetmetal. | Add an additional foam seal between the fastener and the door sheetmetal. |
| D544 | EPT Build | Doors inadvertently go into the locked state | Door will not open | Software changed the state of the latch from unlocked to locked in the event of a power loss | Software change: the latch to retain its last known state in the event of a power loss. |
| D544 | Test | Cinch motor operates with poor sound quality | Poor Sound Quality | The o-ring around the motor was too loose and created a stick/slip condition that was causing noise during operation. | Revise o-ring design to ensure and interference fit on the ID |
| D544 | Test | Increased vehicle system line resistance | Vehicle line resistance incorrect | Each latch had included terminating resistors into the latch ECU design. | Remove latch terminating resistors. |
| D544 | AIMS 3556537 | Water Leak through the door inner panel from wet to dry side | Excessive water leakage through the grommet | Grommet interface to the inside release cable was not an interference fit. This allowed water to go between the cable and grommet wall. | Revise the sealing surface to the cable. Add interference ribs along the length of the cable/grommet interface. |
| D544 | AIMS 3562119 | Water Leak through the cinch motor between the stator can and gear box | Door will not open - cinch motor will not return home | Assembly of the seal between the stator can and gearbox is not robust. Seal can twist and become deformed and allow water ingress into the motor | Revise end cap(commutator housing) to allow sufficient surface to position the seal correctly. Modify the assembly process to confirm seal position prior to next assembly step. |
| D544 | Plant Assembly | Cinch motor studs are spinning during the assembly of the cinch motor to the door | Can't achieve the proper torque | The nut should have a chamfer to avoid interference to the stud shank (below the threads) | Add a counterbore to the nut to provide sufficient clearance |
| D544 | AIMS 3628112 | Vehicle has a dead battery. Full charge battery will discharge overnight. Cluster message is displayed "switches inhibited security mode". This means that the unlock switch was pressed while the vehicle was locked and armed. | Vehicle will not start. Latches are operating in Super Cap mode | Issue on the main vehicle wire harness on the unlock line from the latch to the BCM. The wire insulation was damaged causing a short between the lock line and another wire in the harness. | Wire harness will test the wire continutiy to ensure the insulation is OK. |
| U611 | AIMS 3680073 | Delay in lock switch illumination (about 2 seconds) | Delay of 2 seconds to get lock status feedback | There is a long communication chain for determining the vehicle lock status. Biggest contributer is the GWM where the CAN message from the DCU is periodic so it could take up to 1 second for the message to be sent to the BCM. | Investigation to illuminate the switch immediately from the latch and then just confirm the status.  Or Change the message in the GWM to Event Periodic to speed up the communication |
| U611 | AIMS 3670589 | Unable to flash the latch when the ignition is ON | Latch will not enter the programming session when the vehicle ignition is ON | Precondition set in the latch is only Ignition OFF or Ignition ACCESSORY. | Modify the software to add a precondition  Ignition ON-Engine OFF |
| U611 | HIL | Inside Unlatch Switch Illumintion | Dimming ramp direction is not always correct. | Misinterperting the specification and the Litval for Day/Night and Night/Day transition | Software change to follow the illumination requirement |
| U611 | HIL | Inside Unlatch Switch Illumintion | Switch does not remain illuminated when the door is ajar | The latch software is turning off the switch when the door is ajar | Software change to illuminate the switch in Delay Accessory and Battery Saver mode |
| U611 | Crash | Latch did not pass DL181 requirement | Did not remain in the primary or secondary position | Pawl Spring was disconnected from the installed position | Extend the tab on the backplate to cover over the pivot of the Pawl Spring |
| U611 | AIMS 3718687 | Set a missing CAN message fault during Extended Play session | DTC set | ELatch is awake and looking for CAN messages from the BCM but the BCM is asleep during the Extended Play session. | Add the latch as a receiver of the Extended Play CAN message. When this is received the ELatch will ignore the missing message. |
| U611 | HIL | Unlatch due to post crash unlock signal sent with an unlatch signal | Door Ajar | This was missed in the FS because it is aligned with this function. However, this is not how we want the latch to function. | Correct the software to not relelease until after the post crash unlock + unlatch signal. |
| U611 | AIMS 3708936 | Key cylinder high insertion effort | Operator issues assembling the Outside Cable to Key Cylinder | Flash in the Key Cylinder connector area. Key Cylinder opening had a tolerance applied but did not indicate which side of the feature to measure from. Supplier applied draft angle and measured on the largest opening. Supplier was also measuring wit a vernier rather than a pin gauge | Supplier is now using a pin gauge to measure the feature. Feature has been modified so that side with start of draft angle meets tolerance requirement. |
| U611 | KLT | Cracking door inner latch mounting conicles | Weakened retention between the sheetmetal and latch | Without a reinforcement plate the conicals formed into the sheetmetal can show signs of cracking post KLT | Thicker and higher durometer fishmouth foam can help prevent cracking of the conicals. |
| U611 | AIMS 3699057 | Cinch motor mounting stud that has the bolt assembly(Ford Side) is spinning during assembly | Can't achieve the proper torque | Tolerance stackup was not done on the assembly. The bolts on each side are making contact within the stud not allow the fastener to reach full torque. | Use a shorter bolt (M5 x 13) on the Cinch Motor side. |
| U611 | AIMS 3722677 | Cinch Cable is disconnected from the Cinch Motor | Door will not cinch | Lower cable retention force and handling during assembly. | Add tie straps to hold down the cable abutment at the motor. Investigate to create a separate bracket that can be attached to the motor. |
| U611 | AIMS 3699767 | When assembling the cable it could be assembled on the wrong side of the glass run | Could not lower the glass | Cable clip location is in the wrong location | Move the cable clip 10mm closer to the glass run. |
| U611 | AIMS | VO did not like a 2 step "push in then pull out" cable grommet. It was difficult to seat properly in the door. | Air leak issue | Grommet was difficult to seat properly during assembly | Use a pull through cable grommet. |
| U611 | AIMS | Latch setting a DTC Ajar Circuit Current Overload. This sets a fault flag on CAN which will set a fault in the GSM | DTC set | The GSM pull up resistor is different from D544 (1.1kOhm for U611/2.2kOhm for D544) this puts more current in the ajar line and the elatch FET protection sets a fault. | Increase the GSM pull up resistor value. Modify the latch software to accept a higher current prior to setting the DTC. |
| CX727 | BB/JIRA | Inside release on the rear door is INOP | Will not unlatch | Cable end is jammed into the attachment slot into the Rear Inside Release Lever | Increase the cable diecast diameter so that it can't fit through the lever attachement slot. |
| CX727 | Test | Rear Inside Release return force <5N | Low cable return effort | Spring design does not apply enough force to the Rear Inside Release Lever | Increase torsion spring torque |
| CX727 | BB/JIRA | The latch does not function when power is removed | Back-up energy in the latch is INOP | There was a component on the ECU missing that helps regulate the charge of the super capacitors. This caused the S-Cap to over charge and become INOP. | Ensure the correct BOM is applied to the ECU. Initiate Automated Optical Inspection(AOI) and Final Function Test(FFT) in the ECU assembly process. |
| CX727 | BB/JIRA | The latch is INOP | Following a diagnostic reset the latch is INOP | The software code to manage the diagnostic session was not implemented for the FDJ breadboard release. | Ensure time to complete and validate the software prior to delivery. |
| CX727 | BB/JIRA | The latch is INOP | Latch is INOP. Need to perform a hard reset to get the latch to function again. | the sleep management process checks periodically if there are condition met to go to sleep, so also the CAN bus activity. There is a run condition between the check of the bus activity and the setting of the CAN bus activity flag generating an unwanted software request to go to sleep. Because the CAN bus is actually active, the sleep request is immediately aborted. This generate however a re-initialization of the task scheduler. This generates unwanted multiple execution of higher priority tasks and might leat to missing execution of lower priority tasks. The release command manager is lower priority task. If not executed properly it would prevent any door unlatch (I/S or O/S). | Software correction to the task scheduler. |
| CX727 | Test | Water ingress into the latch during vehicle testing. Note, this was discovered during a review of the parts in the door assembly. No actual test issue was created. | Water ingress into the latch, potential for freeze. | Door Inner sheetmetal was design to not touch the integrated latch seal. This created a gap above the fishmouth of the latch on the rear doors. | Add a rain shield above the latch to seal to the door inner panel to prevent water migration into the latch. |
| CX727 | Test | NVH issue | Excess freeplay between the latch retention module and the latch housing | There were too many degrees of freedom between the latch retention module and the latch housing. This caused relative rotational movement of the retention module. | Add a rib support structure for the backplate. Reduce the through hole for the rivets. |
| CX727 | Test | Pawl Binding | During abusive distortion of the frameplate the pawl becomes stuck. | Insufficient clearance between the Pawl and Frameplate. The Frameplate mounting with respect to the support surface did not have coverage around the mounting conicals causing frameplate deflection when mounted. | Remove giding button on the Pawl. Add a support guide on the Frameplate for the Pawl. Add support material around the mounting conical. |
| CX727 | Manufacture | Rear Inside Release Lever to Inside Release Cable Assembly is difficult' | Increased assembly time and/or difficulty to assemble the inside release cable to the lever. | The design of the housing and lever do not hold the lever securly in position during assembly | Increase the rib heigth in the Latch Housing to add a holding feature to rest the Inside Release Lever during assembly |
| CX727 | Test | Loss of power post crash (low speed front) | Door would not unlatch electrically from the Inside or Outside Unlatch Switch | This was a North America vehicle. Original design intent was to not have the back-up energy on the passenger side front door. | Add supercapacitors to passenger front door (use EU version for NA) |
| CX727 | AIMS # 3759704 | Door closing sound | During door slam there is an extended rattle sound in primary latch position | Loose fit between the cable abutment and the latch housing | Create a design interference fit of the abutment and latch housing. |
| CX727 | DCV | Front & Rear cable length issues | Varrious issues with cable length and cable construction caused release issues during the build | Incorrect cable construction (flatwrap vs laywire) and incorrect cable tuning cause short and long release travel | Use laywire cable construction. Travel capability study. |
| CX727 | AIMS 3751468 | Cable grommet is the incorrect size (small diameter) | Carryover grommet was incorrectly used for the cable assembly | Used the U611 carryover grommet | Incorrect assumption to use U611 grommet. CX727 grommet had to be designed. |
| CX727 | AIMS 3754368 | Cable grommet difficult to install | Long assembly time to assemble the latch cable grommet. | Too much material thickness caused the grommet to be very stiff during assembly | Core out material to make it more flexible. |
| CX727 | DCV | Double Lock actuator (reverse polarity) | DL is engaged when Unlocked and disengaged when Locked | Polarity is incorrect on the DT, latch did not match the DL actuator | Update the DT of the DL actuator to match the DT for the latch and electrical system. |
| CX727 | Test | EMC test issue | Issues with audio FM & DAB reception | Failed Component and Vehicle EMC testing (RE310). The charge pump in the GDU is always powered on when the latch is active. | Increase ground plane on the PCB. Modify the latch software to only run diagnostics on the presenter during presenter actuation. Do not power the charge pump when the presenter is not active. |
| CX727 | DCV | Insufficient clearance between the striker loop and ratchet face (requirement is min 3mm) | Potential interference condition between latch/striker due to extreme misassembly | Design checks in place, DPA issue was signed off to incorrect section. | Verify all DPA issue signoff. Have Ford systems engineering & supplier verify this clearance. |
| CX727 | AIMS 3756536 | When DAS is actiated the presenter stays in the extended position when the door is pushed to the open then closed position. | Accelerometer is not detecting door movement | Accelerometer is losing configuration and becoming inactive. Will only reactivate on hard reset (remove/replace power) | Run a software routine to continuously check accelerometer |
| CX727 | Test | When power is lost to the rear door latch, there is no inside release wake-up to unlatch from the inside. | Inside release will not unlatch without power | No wake-up designed into the latch. | Add a reed switch into the rear inside release chain for the PCB circuit. This will wake-up the latch and allow a release from the Super Capacitors. |
| CX727 | HIL & DCV | 1. Turn the ignition OFF 2. Open the driver door from the INSIDE Release (driver door unlocks and opens) => All other doors remain closed and locked 3. Close the driver door 4. Attempt to lock the doors either using the FOB or Inside Trim Switch 5. Driver Door remains unlocked (DAS Illumination remains green (all others are red)) => \*\*This should lock the driver door 6. Unlock All doors => All DAS switch display green 7. Lock All Doors => All DAS display Red We did confirm via CAN traffic that the BCM was sending the Lock signal. | Doors will not lock | Softwre bug in order to accept a new lock command from BCM, software was only comparing the new lock command with the last command received by BCM and accepted. In the scenario above the last command was a lock command already, so the new lock command was rejected, regardless the lock unlock. | Revise software to accept locking commands |
| CX727 | Test | During freeze test < -20C, the DAS switch would not respond and send LIN signal to unlatch | Door will not unlatch from the exterior | Issue with the components selected on the circuit board and reading of the electric signals managed at low temperatures | Correct circuit and software on the DAS |
| CX727 | Test AIMS # 3781264 | Water was leaking though the Inside Release Cable Grommet during water leak testing. Was leaking through the interface between the grommet and cable condiut | Water ingress into the dry side of the door. | Twisting/clocking of the grommet during assembly causes a gap between the grommet and cable giving a leak patch for water ingress. | Extend the grommet sleeve (towards the latch side) to bring the pinch point down the cable and make it more flexible. |
| CX727 | TT | Loss of LIN communication between the DAS & ELatch. DTC B1087-00. | Door will not unlatch via 1 push (requires 2x push to unlatch) and the DAS illumination will not work. | Issue with the DAS software, will not wake up and will not recover the LIN communication loss. | Software modification to correct the issue. |
| CX727 | AIMS # 3782451 | The presenter is only functioning in emergency mode and not retracting based on door acceleration. | Accelerometer is not detecting door movement | Component Q32 making no or intermittent contact with the solder pad due to the solder pad being partially covered in mask. | Supplier to use camera based alignment method rather than manual system for all orders regardless of size. |
| CX727 | EPT Build | PEPS Communication during BCM self test | BCM was setting a fault during self test because the latch wasn't providing the correct information when prompted | Elatch was not sending a start message to the BCM for the PEPS response during selftest. | Software modification to correct the issue. |
| CX727 | Test AIMS # 3789152 | Vehicle Freeze Test. Door would not unlatch from the inside release (mechanical or electrical). | Water ingress into the DL actuator and froze. | Water ingress between the cable abutment and DL actuator cover. The cable & abutment appear to be twisted during assembly. This caused a gap for water ingress. At cold, the inside release cable would not move. The DL gear & nut were frozen. | ICA: Add a sealant to the cable abutment & cover interface. PCA: modify the housing design to have a different design interference to the abutment. Add another attachment screw to hold down the cover. |
| CX727 | AIMS# 3794716 | Label info string is scanned by CSAP to serialize the latch to the VIN. There was a failure at vehicle EOL due to the part number serial mismatch. | Magna was not aware that the plant was using the information on the label for traceability | 2D bar code wasn’t changed when the parts were re-worked. | When parts are reworked, there must be a change to the 2D barcode label. |
| CX727 | AIMS# 3806035 | Presenter is not functioning | Door is not able to be closed | Accelerometer stiction. Due to high G-Load on the latch accelerometer is causing it to stick. G-Load is coming from the Latch EOL test. | Modify EOL test software to detect accelerometer stiction. Modify E-Latch software to ignore the x-direction input when it is stuck. This input is not critical to determine acceleration due to door swing. |
| CX727 |  | Presenter is stuck in the extended position | Door is not able to be closed | When the latch detects a stall and the presenter is still in the extended position, there is not another input to the latch to restart the presenter in the retract direction. | Add new inputs to restart a stalled presenter. If the latch detects a stall and the presenter is not in the home position, the latch will accept new inputs to retract again: new acceleration, vehicle speed, lock command. Will limit the current for retracting the presenter. Will log a fault if there is a stall due to low vehicle battery power. |
| CX727 |  | Vehicle alarm is going off | Door is not locked, alarm is set and will go off when the door is opened. | When a new lock is commanded from any source, the BCM sends the rollcode along with the locking command but in two separate CAN messages. The locking command is set to NULL once it is consumed and the rollcode is set to 0. Due to the CAN traffic and bandwidth, the rollcode may not make it onto the CAN bus. In the meantime, the E-Latch is looking for a Rollcode that matches one of 4 rollcodes they stored in order to execute the lock/unlock command and it will not do that since the rollcode that it sees is 0.  1) When an unlock command is commanded from any source, the lock status is changed to UNLOCK\_ALL. But since the rollcode that was placed onto the bus was 0, the E-Latch will not unlock the vehicle. This is why the DAS button has to be pressed more than once in order for Unlock to occur.  2) When a LOCK\_ALL is commanded from any source, the Lock Status of is changed to LOCK\_ALL. Since the alarm feature and the locking feature are both local to the BCM, the alarm will assume that the vehicle is locked, and it will arm the alarm. In the meantime, the E-latches did not lock the vehicle because they did not see the rollcode that they were expecting and the doors remain unlocked.  As a result, a user can open a door since the E-latches did not lock the doors. The alarm sees that a door became AJAR and since it is armed, it will trigger the alarm. | ICA/PCA: Do not set the transmitted rollcode to 0 but rather send the rollcode that was transmitted by the E-latch even when the local lock/unlock command is set to NULL after it has been consumed. This is included in RC01.  Additional Future Robustness/PCA (coordinated change): Have the rollcode persist for a period of 50-100ms, and then set it to zero. This was we ensure the rollcode will make it onto the bus irrespective of the bus load and bandwidth (and whether the BCM is asleep or not). Also the E-Latch module has to NULL the transmitted rollcode in order to maintain vehicle security. |
| CX727 | AIMS# 3797070 (BM-2758) | Vehicle will not lock/unlock(may take multiple attempts) from PEPS. | Door will not lock/unlock via passive entry | 1)BCM is ignoring the passive entry request for locking/unlocking due to a high ignore time and lower polling rate.  2)BCM is not sending the Roll Code along with the lock/unlock CAN message  3)There is a fault in the BCM where the PEPS signal is getting stuck in the BCM software state machine | 1)ELatch will transmit a value of "E" during the startup message. This will set the ignore time to 80mSec. BCM will increase the polling rate to 1000mSec  2)BCM will not null the roll code  3)BCM software update to correct the issue |
| CX727 |  | Double Lock is not set when the DAS Passive Lock Switch is pressed (EU RHD vehicle only) | Vehicle will not Double Lock from PEPS Switch on DAS | BCM was not programed to DL from this request. | Update the BCM software to accept the DAS press as a Double Lock request for the EU RHD vehicles. |
| CX727 |  | Vehicle will not lock/unlock(may take multiple attempts) from PEPS. | Door will not lock/unlock via passive entry | There is an air gap between the capacitive sensor and the PMMA applique | Supplier to define the proper torque specification for fastener assembly of DAS to applique. This may be different from NA to China due to applique material change. |
|  |  | **4. Field Quality Data (Warranty; GQRS)** |  |  |  |
| D544 | Warranty | Cinch motor binds and won't return to the home position | Will not cinch. DTC set - cluster message "see dealer for servce" | Ice forms in the cinch cable at the motor end. This prevent the cinch lever return spring from being able to pull the cable back through the condiut. The cinch lever does not reach the home position. | Add a wiper boot to the end of the cable to prevent water from entering at the end of the cable (motor end). |
| D544 | Warranty | Cinch motor binds and won't return to the home position | Will not cinch. DTC set - cluster message "see dealer for servce" | Water entry from the gearbox/drum area. This causes corrosion within the motor and prevents the motor shaft from rotating | Revise the O-Ring seal around the drum |
| D544 | Warranty | Cinch mechanism binds and won't return to the home position | Will not cinch. DTC set - cluster message "see dealer for servce" | Cinch cable end fitting breaks(latch side). Handling damage. Side load/excessive load to the cable end fitting causes the break. | Increase the interrior radius on the end fitting @ where it snaps into the frameplate |
| D544 | Warranty | Door latch will not communicate | Latch will not operate electrically. DTC set | Latch connector(harness side connector) not assembled properly at the door line | Added check at the door line to ensure proper connection |
| D544 | Warranty | Door will not unlatch from the outside release | Latch will not operate electrically | Wire diameter of the pigtail is too large and doesn't allow for proper routing of the harness. | Change the wire gauge and overall OD of the wire insulation to allow for better routing |
| D544 | Warranty | Door will not unlatch from the outside release | Latch will not operate electrically | Switch potting was not sufficient and allowed water to enter the switch teminals and cause a short. | Change potting process to ensure dispensing of the potting material for the switch is in the proper location with the proper volumn of material. |
| D544 | Warranty | Door will not unlatch from the inside release switch | Door will not unlatch electrically | Housing on the inside release switch is broken. Pushing the release button will not force the rubber dome to make contact with the PCB. | Correct the molding process of the inside release switch housing. |
| D544 | Warranty | Door will not close / OWD | Door will not latch, OWD | Si outgassing from the ECU potting material is migrating to the release motor and when the motor actuates the Si gas reacts with the arc of the motor creating a SiO2 contamination on the motor and insulates the commutator from the brushes. This causes an INOP condition. Reference FSA 19S03. | Remove the potting material that contains silicone |
| U611 | Warranty | Inop Latch, door will not close | Door wil not close | Additional spring found in the latch | Assembly line vision to confirm correct components |
| D544 & U611 | Production | Cadmium found in the Aux Pawl 2nd shot molding. | Banned substance in the material pigment | Lower tier supplier for the pigment did not disclose the cadmium in the IMDS | Physical testing of the component materials to confirm IMDS |
| U611 | Warranty | Cinch motor homing fault detected (B147F:07) | Cinch would not function | Cinch cable boot was found to be misassembled on the cinch motor | Secondary check before latch assembly pack after EOL test. Investigated a design change to the motor to poke-yoke misassembly. |
| D544 | Warranty | power release motor loose worm | Door will not reset | ID of the through hole on the worm is oversized due to the process of creating the worm | Supplier will modify their process to prevent this issue. |
| U611 | Warranty | Door will not unlatch from the outside release | Door will not unlatch electrically | Outside release switch activation lever in the outside handle can freeze when water accumulates in the gap around the perimenter of the lever. | None |
| D544 | Warranty | Door wll not close / OWD | Door will not latch, OWD | During the assembly process of the warranty repair the cable is not routed correctly/assembled correctly in the door. This results in pretension of the cable and a limited engagement of the pawl to catch. | Update warranty repair documents to highlight the assembly process and verification checks following the repair |
| CX727 | Warranty | Door will not close | Takes 8 seconds for the latch to reset. Once reset the latch will close. | Latch backplate was not rivited to the latch. The rivets were there but not formed. This caused the latch housing to separate from the frameplate. The HES were not able to read the magnet sensors on the levers. This caused the door to always read "door ajar". | Add secondary check of rivit height before the cover is assembled. The will ensure the proper rivit joint to the backplate. |
| CX727 | Warranty | Door will not close due to presenter not retracting | Door will not latch, DTC Set B15F9-19 Presenter Circuit Over Current | The latch is seeing a excessive spike in current from the presenter that lasts longer than 10microSec. Was found that the presenter motor is generating a spike 1x per revolution. | TBD, under investigation |

## Assumptions

**#Hint:** A list of known assumptions concerning the effects of the feature’s behavior on other features or elements (i.e., dependencies) as well as assumptions on the behavior expected by the feature (e.g. known limitations). During the course of the feature development most of those assumptions are typically either converted into actual requirements or discarded at some point – such that this chapter remains mostly empty.  
**#Functional Safety:** For assumptions, which are relevant for the Functional Safety process refer to chapter 6.2 “Functional Safety Assumptions”

1. E-Latch is provided for each door
2. Each door must have an interior and exterior unlatch switch
3. Exterior unlatch switch shall have diagnostics capabilities to detect short and open circuit
4. Interior unlatch switch shall have diagnostics capabilities
5. Driver door shall have a mechanical interior and exterior release mechanisms

# Feature Context

## Feature Context Diagram

**#Hint:** High level diagram of feature interactions with the environment, people or other feature or other external entities.

**#Functional Safety:** The Context Diagram is not required, if the Feature Document is only used as an Item Definition (not as a requirements specification). In that case the Item Boundary is defined in chapter “Logical Architecture”.

**#Link:** [*Stages- RE Model the Context*](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_RwbBQG35kpCMg85u0m-tig))

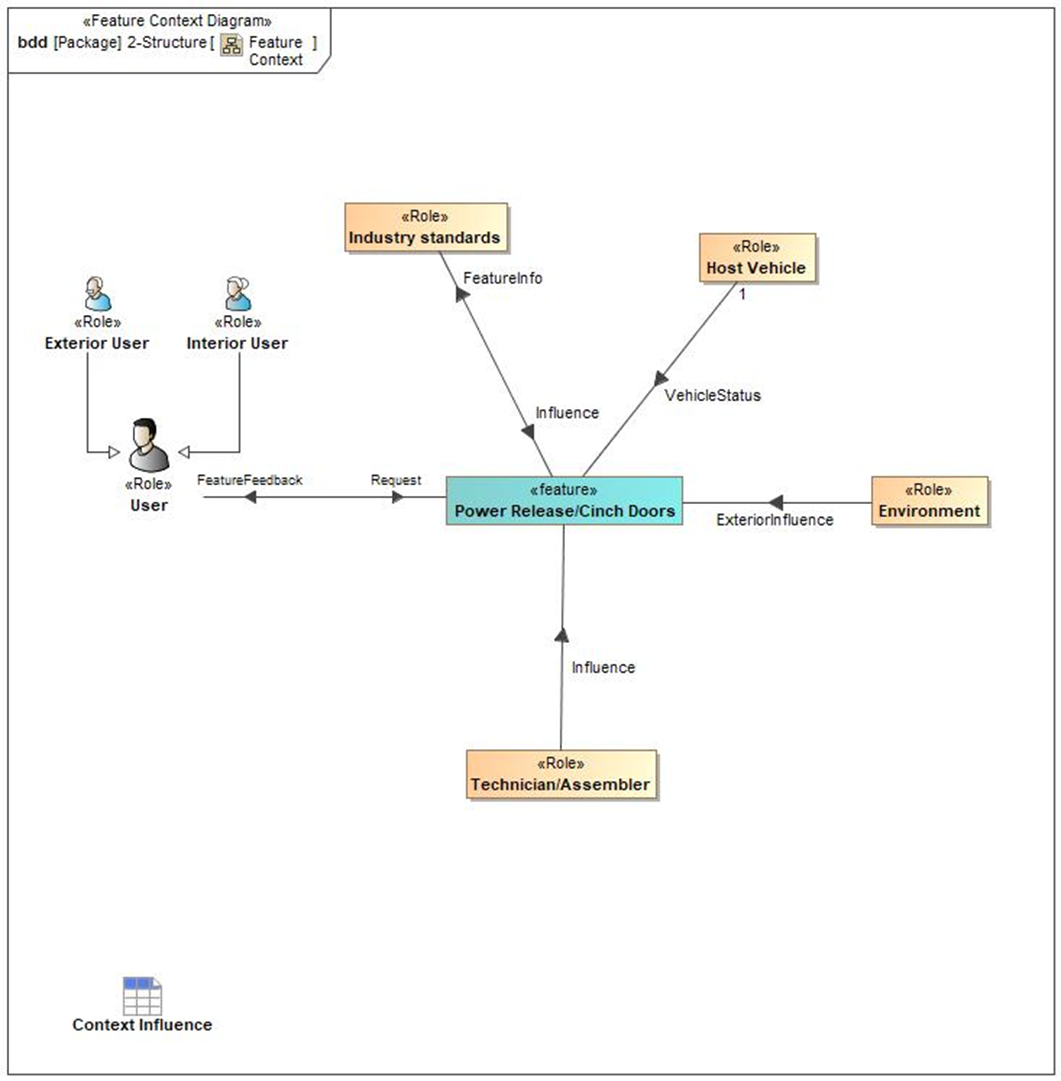
**

Figure 1: Sample Context Diagram

## List of Influences

|  |  |  |
| --- | --- | --- |
| **ID** | **External Entity** | **Influence Description** |
| I1 | User | *Provides input to the feature in the form of release or cinch requests while receiving feedback from the feature* |
| I2 | Industry Standards | Influences the design of the feature to ensure FMVSS standards are met |
| I3 | Host Vehicle | Provides the feature additional information needed to perform functions |
| I4 | Environment | Affects the feature functionality in cases of ice, high wind, and bumpy roads |
| I5 | Technician/Assembler | Influences the design of the Feature to ensure the feature components can be assembled, tested, and serviced |
|  |  |  |

Table 10: List of Influences

# Feature Modeling

**#Hint:** Use at least one of the modelling techniques listed in this chapter – and additionally a functional decomposition (refer to chapter 8.1 “Functional Decomposition”) – to gather and analyze the feature requirements.

**#Link:** [*Stages- RE Analyze Feature Requirements*](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_E_h9QKJNeBGY2aIJCaFfcg))

## Operation Modes and States

**#Classification:** Optional (Mandatory for Functional Safety)

**#Hint:** Insert (or reference) a description of the feature’s operation modes and states by one or multiple state machine diagrams. The purpose of the state machine is to help analyze the requirements, i.e., if the behavior described in the requirements is consistent and complete. Therefore, the state machine should not provide details, which are not referenced in feature level requirements. It should typically show only those states and transitions, which describe the high level behavior facing or impacting the user.

**#Link:** [Stages - RE Model the States and Modes](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_iKH7oFMNkpOMg85u0m-tig))

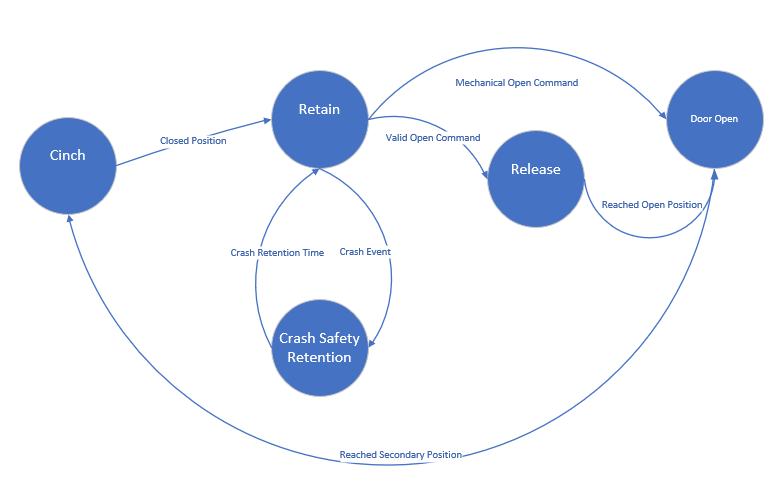


Figure 2: Feature Operation Modes and States

|  |  |  |
| --- | --- | --- |
| **State** | **Description** | **Requirements Reference** (optional) |
| S1 | Door Open Position |  |
| S2 | Cinch Motor Active |  |
| S3 | Primary Latched Position |  |
|  |  |  |
|  |  |  |
|  |  |  |

Table 11: Operation Modes and States

|  |  |  |
| --- | --- | --- |
| **Transition ID** | **Description** | **Requirements Reference**  (optional) |
| T1 | When an open command is received, the door opens from primary latched position to Door Open Position |  |
| T2 | When a mechanical release is activated by the user, the door opens from the primary latched position to Door Open Position |  |
| T3 | When the user pushes the door to secondary position, the cinch motor activates and pulls the door from secondary to primary latched position (fully closed) |  |
| T4 | When the user pushes the door above the threshold force value, the door bypasses the cinch motor and moves into primary latches position (fully closed) |  |
| T5 | When an open command is received on a rear door from the interior but the Child Lock is engaged, the door will not leave primary latched position |  |
| T6 | When an open command is received on a locked door, the door will not leave primary latched position | This isn’t necessarily true (can double press) |

Table 12: Transitions between Operational Modes and States

## Use Cases

**#Classification:** Optional (Mandatory for Functional Safety)

**#Hint:** Describe (or reference) the ways the user interacts with the system

**#Link:** [Stages - RE Model a Use Case](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_A8UUYPnykpCMg85u0m-tig))

### Use Case Diagram

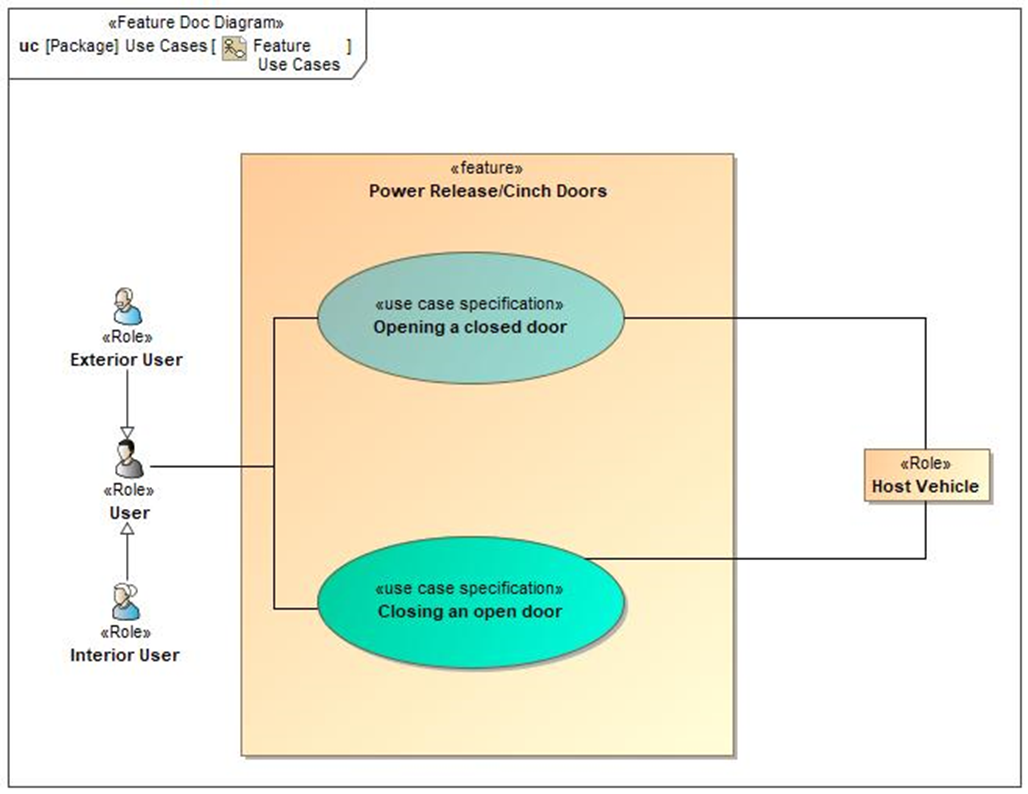


Figure 3: Use Case Diagram

### Actors

| Actor | Description |
| --- | --- |
| User |  |
| Exterior User | User on the exterior of the vehicle |
| Interior User | User on interior of the vehicle |
| Host Vehicle |  |

Table 13: List of Actors

### Use Case Descriptions

**#Classification:** Optional (Mandatory for Functional Safety)

**#Macro:** [Add Ins -> Add Requirement macro](http://wiki.ford.com/display/RequirementsEngineering/How+to+use+the+Specification+Templates#HowtousetheSpecificationTemplates-AddNewRequirement) (select “Use Case” as type)

Closing an open door

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary | Exterior User |
| Secondary | Interior User |
| **Subject** |  | Power Release/Cinch Doors |
| **Description** |  |  |
| **Preconditions** |  |  |

Opening a closed door

|  |  |  |
| --- | --- | --- |
| **Actors** | Primary | User |
| Secondary |  |
| **Subject** |  | Power Release/Cinch Doors |
| **Description** |  | This use case is used to unlatch the door from inside / outside when child lock is OFF and the door is unlocked |
| **Preconditions** | PreC1 | No on-going crash event |
| PreC2 | Vehicle Speed is less than 3 kph |
| PreC3 | Vehicle Door is unlocked |
| **Main Flow Description** |  | User presses the unlatch button  Door pre-presents, unlatches, presents |
| **Postconditions** | PostC1 | Door unlatched and unlock status information is displayed |
|  |  |  |

## Driving and Operation Scenarios

**#Classification:** Optional (Mandatory for Functional Safety)

**#Hint:** “Driving Scenario” is a story-board like technique, which focusses on the feature interacting with its environment.

**#Functional Safety**: Describe (or reference) driving and operating scenarios that impact the functionality of the item/feature, including potential operational and environmental constraints. The objective of this section is to describe the environment of the feature in order to understand its impact on the feature. Concept FMEA and P-diagram may be an input for this section.

**#Macro:** [Add Ins -> Add Requirement macro](http://wiki.ford.com/display/RequirementsEngineering/How+to+use+the+Specification+Templates#HowtousetheSpecificationTemplates-AddNewRequirement) (select “Scenario” as type)

**#Link:** [Stages - RE Model a Driving Situation](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_KC_OMN4hkpGMg85u0m-tig))

## Decision Tables

**#Classification:** Optional (Remove, if not used)

**#Hint:** Use decision table, if behavior is not state based (in that case prefer state chart from ch. 4.1) and based purely on current inputs.

**#Link:** [RE Wiki – Decision Tables](http://wiki.ford.com/display/RequirementsEngineering/Decision+Table).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Customer Input** | **Vehicle Speed** | **eLatch Power** | **CAN Signal** | **Ignition Status** | **Crash Signal Status** | **eLatch Output** |
| Exterior activation method engaged | <20 kph | Power Up | CAN Up | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| CAN Down | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| Power Down | CAN Up | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| CAN Down | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| Exterior activation method engaged | >20 kph | Power Up | CAN Up | On | No Crash | Do Not Unlatch |
| Crash |  |
| Off | No Crash | Do Not Unlatch |
| Crash |  |
| CAN Down | On | No Crash | Do Not Unlatch |
| Crash |  |
| Off | No Crash | Do Not Unlatch |
| Crash |  |
| Power Down | CAN Up | On | No Crash | Do Not Unlatch |
| Crash |  |
| Off | No Crash | Do Not Unlatch |
| Crash |  |
| CAN Down | On | No Crash | Do Not Unlatch |
| Crash |  |
| Off | No Crash | Do Not Unlatch |
| Crash |  |
| Interior activation method engaged | <3 kph | Power Up | CAN Up | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| CAN Down | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| Power Down | CAN Up | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| CAN Down | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| Interior activation method engaged | >3 kph | Power Up | CAN Up | On | No Crash | Do Not Unlatch?? |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| CAN Down | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| Power Down | CAN Up | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |
| CAN Down | On | No Crash | Unlatch |
| Crash |  |
| Off | No Crash | Unlatch |
| Crash |  |

Table 14: Sample Decision Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cinch status** | **Latch Location** | **Pall Force** | **Latch Fault Status?** | **eLatch Output** |
|  | Value I1 | Value I2 |  | Value O1 |
|  |  |  |  |  |

# Feature Requirements

**#Hint**: Include functional requirements specifying quality, performance and availability of the functionality.   
The subsections contained in this chapter help not to forget aspects, which are typically relevant on Concept Level. It is not possible and not required to always strictly classify a requirement according to the subsections.

Alternatively, this chapter could be structured according to the functions derived in chapter “Functional ”, i.e., each function comes with its own heading and related requirements are listed beneath.

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

**#Macro:** [Add Ins -> Add Requirement macro](https://wiki.ford.com/pages/viewpage.action?pageId=174654231) (select “Requirement” as type)

**#Link:** [Stages - RE Specify Feature Requirements](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_Q_2kYJ6ceBKY2aIJCaFfcg)).

## Functional Requirements

**#Hint:** Functional requirements specify the functionality of the feature, i.e., what the feature shall do. Functional requirements should not only specify the normal flow/behavior, but also exceptional cases/error handling.

###R\_F\_PowerReleaseandCinchDoors\_00001### Door Electronically Release

When a proper activation method is engaged, the Power Release Door Feature shall unlatch the door

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_F\_PowerReleaseandCinchDoors\_00005### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Choose an item. | | | **Priority** | Choose an item. | **Status** | Choose an item. | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

###R\_F\_PowerReleaseandCinchDoors\_00002### Door Mechanical Release

When the mechanical release is engaged, the Power Release Door Feature shall unlatch the door

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_F\_PowerReleaseandCinchDoors\_00006### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Choose an item. | | | **Priority** | Choose an item. | **Status** | Choose an item. | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

###R\_F\_PowerReleaseandCinchDoors\_00003### Door Cinch to Fully Closed

When the door is closed to the secondary latched position, the Power Release Door Feature shall activate the cinch motor to fully close the door.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_F\_PowerReleaseandCinchDoors\_00007### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Choose an item. | | | **Priority** | Choose an item. | **Status** | Choose an item. | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

###R\_F\_PowerReleaseandCinchDoors\_00004### Door Bypass Cinch when Slammed

When the door is slammed, the Power Release Door Feature shall bypass the cinch motor and allow the door to close to the primary latch position

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_F\_PowerReleaseandCinchDoors\_00008### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Choose an item. | | | **Priority** | Choose an item. | **Status** | Choose an item. | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |
|  | |  |  | | | | | |

###R\_F\_PowerReleaseandCinchDoors\_00005### Door Ajar

While the door is not in the fully closed position (primary position), the Power Release and Cinch Doors feature shall provide an audio and visual Door Ajar Warning to the customer.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_F\_PowerReleaseandCinchDoors\_00013### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Choose an item. | | | **Priority** | Choose an item. | **Status** | Choose an item. | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

###R\_F\_PowerReleaseandCinchDoors\_00006### Door Fault

When door fault is detected, the Power Release Doors Feature shall provide an audio and visual Door Fault Warning to the customer

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_F\_MyFeature\_00004### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Choose an item. | | | **Priority** | Choose an item. | **Status** | Choose an item. | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

###R\_F\_PowerReleaseandCinchDoors\_00007### Crash Scenario

When a crash scenario occurs, the Power Release and Cinch Doors feature shall ignore unlatch requests for 6 seconds after the signal is received.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_F\_PowerReleaseandCinchDoors\_00009### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Choose an item. | | | **Priority** | Choose an item. | **Status** | Choose an item. | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

###R\_F\_PowerReleaseandCinchDoors\_00008### Power Loss Scenario

While in a power loss event, the Power Release and Cinch Doors feature shall allow electronic release of the latch for a certain number of cycles or amount of time, but it shall not allow activation of the cinch motor. The feature shall also allow mechanical release of the door from interior and exterior of the vehicle

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement ID: ###R\_F\_PowerReleaseandCinchDoors\_00010### | | | | | | | |
| **Rationale** |  | | | | | | | |
| **Acceptance Criteria** |  | | | | | | | |
| **Notes** |  | | | | | | | |
| **Source** |  | | | | | **Owner** |  | |
| **Source Req.** |  | | | | | **V&V Method** |  | |
| **Type** | Choose an item. | | | **Priority** | Choose an item. | **Status** | Choose an item. | |
| [Req. Template](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes) Version | | 6.1a | End of Requirement | | | | |

## Other Requirements

### Design Requirements

**#Classification:** Optional (Remove, if not used)

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

### Manufacturing Requirements

### Service Requirements

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

#### Cloud Connectivity Data Analytics Requirements

**#Hint:** All features must consider opportunity for prognostics using cloud connectivity and data analytics. Use the Feature Data Analytics Creation Tool to identify the list of data elements that could help with the following:

* Confirm customer usage of the feature
* Early identification of feature failure modes and causes
* Data elements that help with feature reductive design

**#Link:** Feature Data Analytics Creation Tool (work in progress, no link available yet).

### After Sales Requirements

**#Hint:** Requirements in this section could specify, e.g. input for the Owner’s Manual could be gathered.

### Process requirements

**#Hint:** Requirements in this section are relevant for the development process of the feature, e.g. ISO26262 compliance.

# Functional Safety

**#Classification**: Functional Safety only – leave a statement “Not Applicable” otherwise and remove subchapters.

**#Hint:** This section is dedicated to the Ford Functional Safety (ISO26262) process. For details of this process refer **#Link:** [RE Wiki – RE Alignment with Functional Safety (ISO26262)](http://wiki.ford.com/pages/viewpage.action?pageId=176397025), [Ford Functional Safety Sharepoint](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Pages/default.aspx)

**#Contact:** [*RE Wiki Roles & Responsibilites page – Role: Application Functional Safety Engineer*](http://wiki.ford.com/display/RequirementsEngineering/Default+Contacts+for+Stakeholder+Roles#ApplicationFunctionalSafetyEngineer)

## System Behaviors for HARA

**#Hint:** List selected system behaviors for the HARA and give a rationale why other system behaviors or functions are not considered. Depending on the granularity, not all system behaviors but the ones that have influence on the function associated output (mainly physical actuators) shall be analysed in the HARA. Grouping (of system behaviors according to their function associated outputs) support this step.

**#Link:**  [*FFSG01.10 Feature Document Guideline*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG01.10_FeatureDocument_Guideline.pdf)*,* [*FFSG02 Hazard Analysis and Risk Assessment Guideline*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG02_HazardAnalysisAndRiskAssessment_Guideline.pdf)

|  |  |  |
| --- | --- | --- |
| ID | Name | Description |
| **F\_ATC\_U0002** | Tilt the vehicle body | Tilt the vehicle body |

Table 15: System Behaviors for HARA

## Functional Safety Assumptions

**#Hint:** During the initial creation of the Feature Document this section generally remains empty, since assumptions are stated later, during performing the HARA. Once and if stated, assumption shall be inserted in this section. The purpose of this section is to provide the reader of the Feature Document, who is generally looking for a high level overview of the feature, also with significant information on the feature’s safety.

**#Link:**  [*FFSG01.10 Feature Document Guideline*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG01.10_FeatureDocument_Guideline.pdf)*,* [*FFSG02 Hazard Analysis and Risk Assessment Guideline*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG02_HazardAnalysisAndRiskAssessment_Guideline.pdf)

|  |  |  |
| --- | --- | --- |
| ID | Assumption | |
| **1** | **Name** |  |
| **Description** |  |
| **Purpose** |  |
| **Category** |  |
| **Related Requirements IDs** |  |
| **2** | **Name** |  |
| **Description** |  |
| **Purpose** |  |
| **Category** |  |
| **Related Requirements IDs** |  |

Table 16: Functional Safety Assumptions

## Safety Goals

**#Hint:** During the initial creation of the Feature Document this section generally remains empty, since safety goals are developed later, after performing the HARA. Once and if created, safety goals shall be inserted in this section. The purpose of this section is to provide the reader of the Feature Document, who is generally looking for a high level overview of the feature, also with significant information on the feature’s safety.

**#Link:** [*FFSG01.10 Feature Document Guideline*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG01.10_FeatureDocument_Guideline.pdf)*,* [*FFSG02 Hazard Analysis and Risk Assessment Guideline*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Released%20Templates%20Guidelines%20and%20Examples/Guidelines/FFSG02_HazardAnalysisAndRiskAssessment_Guideline.pdf)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Goal | | | |
| **1** | **Goal Name** |  | | |
| **Description** |  | | |
| **Safety Goal Concept** | <fill in Safety Goal Concept incl. the Warning & Recovery Concept and also the Safe Statel> | | |
| **ASIL** |  | **FTTI** | <fill in Fault Tolerant Time Interval (if applicable)> |
| **Related FSR IDs** |  | | |
| **2** | **Goal Name** |  | | |
| **Description** |  | | |
| **Safety Goal Concept** | <fill in Safety Goal Concept incl. the Warning & Recovery Concept and also the Safe State> | | |
| **ASIL** |  | **FTTI** | <fill in Fault Tolerant Time Interval (if applicable)> |
| **Related FSR IDs** |  | | |

Table 17: Functional Safety Goals

## Functional Safety Requirements

**#Hint:** The section lists the Functional Safety Requirements (FSRs) derived from

* a Safety Goal (list in subsections “<Goal 1 Name>” and following)   
  in this case each FSR should trace back to a safety goal in ch. “Safety Goals”
* and Assumptions (list in subsection “Derivation of Functional Safety Requirements on Assumptions”).   
  in this case each FSR should trace back to an assumption in ch. “Functional Safety Assumptions”.

In section “ASIL Decomposition” the initial FSRs from chapters “<Goal 1 Name>” to “Derivation of Functional Safety Requirements on Assumptions” may be decomposed, if required.

**#Macro:** [Add Ins -> Add Requirement macro](http://wiki.ford.com/pages/viewpage.action?pageId=174654231) (select “**Func./Tech. Safety Requirement**” as type)

**#Link:**

* [*Functional Safety Sharepoint*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Pages/default.aspx) – Functional Safety Concept
* [*RE Wiki - Requirements Attributes*](http://wiki.ford.com/display/RequirementsEngineering/Requirements+Attributes)

### <Goal 1 Name>

### <Goal 2 Name>

### Derivation of Functional Safety Requirements on Assumptions

**#Hint:** Derive FSRs from the Assumptions (refer to section “Safety Assumptions”

### ASIL Decomposition of Functional Safety Requirements

***#Hint:*** *For ASIL D features additional measures like a requirements decomposition might be required. Fill out the following table for each ASIL D decomposition applied in the feature.*

*The decomposed FSRs should be listed beneath each table and referenced inside the table by ID and Title*

**#Macro:** [Add Ins -> Add Requirement macro](https://wiki.ford.com/pages/viewpage.action?pageId=174654231) (select “**Func./Tech. Safety Requirement**” as type)

***#Link:***[*Functional Safety Sharepoint*](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Pages/default.aspx) *- Functional Safety Concept*

| **Input FSR** | <Give the ID of a FSR from sections above which shall be decomposed> | |
| --- | --- | --- |
| **Decomposition Rationale** | <Give a reason why the decomposition was performed> | |
| **Method for Decomposition** | Choose a Method | |
| **FSR 1 after Decomposition** | **FSR ID** | <Give the ID of the decomposed FSR> |
| **FSR Title** | <Give the title of the decomposed FSR> |
| **ASIL** |  |
| **Rationale** | <Give a reason and thought behind that particular requirement. Should include how the requirement is able to independently fulfill the needs of the parent requirement> |
| **Satisfied by** | <Logical Function/Signal from Functional Architecture in chapter 8.1 “Functional Decomposition”. This element shall be independent of the element satisfied by the other half of the ASIL decomposition.> |
| **FSR 2 after Decomposition** | **FSR ID** | <Give the ID of the decomposed FSR> |
| **FSR Title** | <Give the title of the decomposed FSR> |
| **ASIL** |  |
| **Rationale** | <Give a reason and thought behind that particular requirement. Should include how the requirement is able to independently fulfill the needs of the parent requirement> |
| **Satisfied by** | <Logical Function/Signal from Functional Architecture in chapter 8.1 “Functional Decomposition”. This element shall be independent of the element satisfied by the other half of the ASIL decomposition.> |
| **FSR for Independence**  *Note: should consider commonly used input, output and processing*  *Note: additional row should be added if additional* *requirements for Independence are necessary* | **F-S-Req.-ID** |  |
| **F-S-Req. Title** |  |
| **ASIL** |  |
| **Rationale** |  |

# Cybersecurity

**#Classification**: Cybersecurity only – leave a statement “Not Applicable” otherwise and remove subchapters

.

NOT APPLICABLE - No goals or requirements cascaded from the TARA

# Architecture

## Functional Decomposition

**#Hint:** Techniques like Activity Diagrams, Data Flow or Function Tree Diagrams help the feature owner to analyze the behavior of the feature. The goal of functional decomposition is to gain a complete understanding of the desired functionality, independent of technological solutions. The Feature Owner may group the requirements in chapter “Feature Requirements” according to the functions derived from this decomposition. The Feature Owner may take the Functional Architecture for related features (if it exists) into consideration for this decomposition. This would ease cascading of feature requirements later on. Since feature requirements are input requirements for the Logical Functions, it helps, if the feature requirements are grouped by functions when cascaded to Logical Functions of the Functional Architecture.

**#Link:**

* [Stages - RE Model the Functional Analysis](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/activity/_4KsyQPmOkqGMg85u0m-tig))
* [SysML – Activity Diagrams](https://azureford.sharepoint.com/sites/SystemsEngineering/SEC/sysml-teamsite/SysML%20Wiki/Activity%20Diagram%20Basics.aspx)

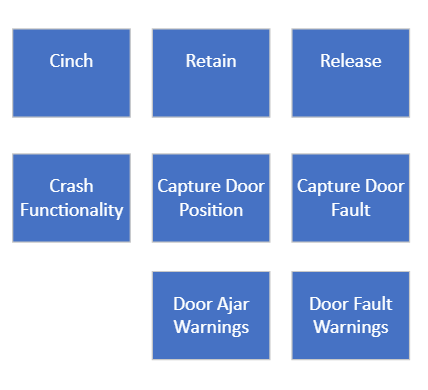


Figure 4: Activity Diagram/Data Flow Diagram of Feature

### Functions

**#Hint:** The functions derived by functional decomposition should be listed and described in the table below

| Function Name | Description | Comments |
| --- | --- | --- |
| Release | The release function releases the latch from primary position to open position |  |
| Cinch | The cinch function pulls the door from secondary to primary (fully closed) position |  |
| Retain | The retain function keeps the door in the fully closed position |  |
| Crash Functionality | The crash functionality function ignores any unlatch requests for six seconds after a valid Crash Signal is received |  |
| Capture Door Position | Detect when door is open, at secondary position (after being open), or at primary position |  |
| Capture Door Faults | The Capture Door Faults function documents any door faults related to the feature and transmits them to the associated functions |  |
| Door Ajar Warnings | The Display Ajar Warnings function visually alerts the customer the door is not in the fully closed (primary) position and audibly alerts the customer when the door is ajar and vehicle speed is greater than 5kph |  |
| Door Fault Warnings | The Door Fault Warnings function visually and audibly alerts the customer a door fault has occurred |  |

Table 19: List of Functions

## Logical Architecture

**#Classification:** Functional Safety only

**#Hint:** Describe (or reference):

* the logical boundary (if known)
* the elements/components/subsystems within the boundary of the item/feature.
* The interaction of features with other features or elements

The logical boundary of the item/feature can be described by using a boundary diagram, block diagram, etc. The elements of the feature can also be based on other technology.

**#Link:** [Ford Functional Safety Sharepoint](https://azureford.sharepoint.com/sites/GlobalFunctionalSafety/Pages/default.aspx)

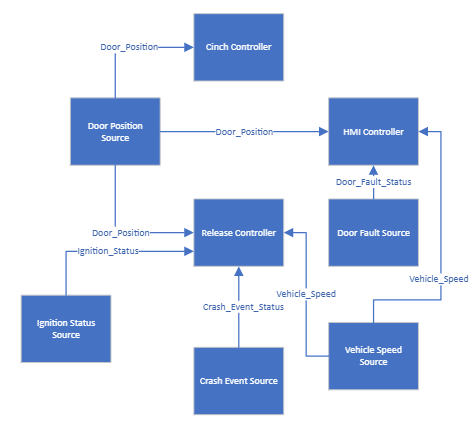


Figure 5: Logical Boundary Diagram

### Logical Elements

**#Hint:** Lists the elements of the Logical Architecture and the functions from the Functional Architecture, which are allocated to those elements.

|  |  |  |  |
| --- | --- | --- | --- |
| **Element Name** | **Description** | **Allocated Functions** | **Comments** |
| Cinch Controller | Controls the cinch function | Cinch |  |
| Release Controller | Controls the release, retain and crash functionality functions | Release, Crash Functionality, Retain |  |
| Door Position Source | Provides the door position so the cinch controller knows when the door is in secondary and the HMI knows when to display the door ajar signal and play the chime | Capture Door Position |  |
| Crash Event Source | Captures crash events and provides the Crash Event status to the Release Controller | Crash Functionality |  |
| Vehicle Speed Source | Captures vehicle speed and provides the vehicle speed to the Release Controller and HMI |  |  |
| Door Fault Source | Captures Door Faults and sends the Door Fault signal to the HMI | Capture Door Faults, Door Fault Warnings |  |
| HMI | Displays the appropriate signals and chimes to the customer | Door Fault Warnings, Door Ajar Warnings |  |

Table 20: Logical Elements

### Logical Interfaces

**#Hint:** Describe the interactions of the feature with other features or elements.

|  |  |  |  |
| --- | --- | --- | --- |
| **Interface Name** | **Direction** | **Description** | **Value Range** |
| Door\_Position | Door Position Source to HMI Controller | Provides whether or not the Door is ajar AND NOT in secondary position, ajar AND in secondary position, and in primary position so the HMI can display the appropriate warning and play the appropriate chime | Ajar\_AND\_NOT\_in\_Secondary  Ajar\_AND\_in\_Secondary  Primary |
| Door\_Position | Door Position Source to Release Controller | Provides whether or not the Door is ajar AND NOT in secondary position, ajar AND in secondary position, and in primary position. Release Controller only releases in the primary (fully Closed) Position | Ajar\_AND\_NOT\_in\_Secondary  Ajar\_AND\_in\_Secondary  Primary |
| Door\_Position | Door Position Source to Cinch Controller | Provides whether or not the Door is ajar AND NOT in secondary position, ajar AND in secondary position, and in primary position. Cinch Controller only cinches in the Ajar\_AND\_in\_Secondary Position | Ajar\_AND\_NOT\_in\_Secondary  Ajar\_AND\_in\_Secondary  Primary |
| Crash\_Event\_Status | Crash Event Source to Release Controller | Provides whether or not the vehicle is in a crash event. If it is, this alerts the Release Controller to engage Crash Functionality | True or False |
| Vehicle\_Speed | Vehicle Speed Source to HMI Controller, Vehicle Speed Source to Release Controller | Vehicle Speed Signal provides the vehicle speed to the HMI to determine whether or not the door ajar chime should be played. It is also provided to the Release Controller to determine whether or not the release command from the customer should be executed. | Min: 0 Max: 655.35 (unit: KPH) |
| Door\_Fault\_Status | Door Fault Source to HMI Controller | Door Fault Signal provides whether or not a door fault has occurred to the HMI so it can display the appropriate warning and play the appropriate chime. | True or False |
|  |  |  |  |

Table 21: Logical Interfaces

# Traceability Matrix

**#Hint:** The traceability matrix is ideally generated from a Requirement Management tool (e.g. VSEM RM) once the specification is imported to the tool and all trace links are drawn in the tool.

**#Link:** Refer to “Backward Traceability” at [Stages – RE Traceabilty Record](https://bd101001.pd2.ford.com/stages/#/workspace/209/_vv/(process/artifact/_ZbIhsK4EkzaN49uPh7SLuQ))

# Open Concerns

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

| ID | Concern Description | e-Tracker / Reference | Responsible | Status | Solution |
| --- | --- | --- | --- | --- | --- |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |
| 7 |  |  |  |  |  |
| 8 |  |  |  |  |  |
| 9 |  |  |  |  |  |

Table 22: Open Concerns

# Revision History

| Revision | Date | Description | Approved by | Responsible |
| --- | --- | --- | --- | --- |
| A |  | Initial version |  | Jbaden1 |
|  |  |  |  |  |

## Template Revisions

*#Important: Do not change this section*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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

Document ends here.