

**Research & Vehicle Technology**

**“Infotainment Systems Product Development”**

**Feature – Digital RVC**

**Infotainment Subsystem Part Specific Specification (SPSS)**

Version 1.4

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**Version Date: April 26, 2019**

**FORD CONFIDENTIALF**

**Revision History**

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|  |  |  |  |
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|  | RVC-REQ-292387/A-GearPos\_D\_Trg | | tmertiri: Added new signal name |
|  | RVC-REQ-292389/A-GearRvrse\_D\_Actl | | tmertiri: Added new signal name |
|  | RVC-REQ-292388/A-Veh\_V\_ActlEng | | tmertiri: Added new signal name |
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**Table of Contents**

[Revision History 1](#_Toc7180563)

[1 Architectural Design 5](#_Toc7180564)

[1.1 Overview 5](#_Toc7180565)

[1.2 DRVC-REQ-260282/A-Server 2 5](#_Toc7180566)

[1.3 DRVC-REQ-260268/A-DRVC Server 5](#_Toc7180567)

[1.4 DRVC-REQ-260267/A-DRVC Client 5](#_Toc7180568)

[1.5 DRVC-REQ-261261/A-Logical Signal Mapping 6](#_Toc7180569)

[1.6 DRVC-REQ-261254/A-Server 2 Tx 6](#_Toc7180570)

[1.6.1 DRVC-REQ-260270/A-DecklidAjar 6](#_Toc7180571)

[1.6.2 DRVC-REQ-260271/A-LiftgateAjar 7](#_Toc7180572)

[1.6.3 DRVC-REQ-260272/A-TrlrCnnct 7](#_Toc7180573)

[1.6.4 DRVC-REQ-260273/A-SteWhlAng 7](#_Toc7180574)

[1.6.5 DRVC-REQ-260274/A-StePinAng 7](#_Toc7180575)

[1.7 DRVC-REQ-261461/B-Client Rx 7](#_Toc7180576)

[1.7.1 DRVC-REQ-260270/A-DecklidAjar 7](#_Toc7180577)

[1.7.2 DRVC-REQ-260271/A-LiftgateAjar 7](#_Toc7180578)

[1.7.3 DRVC-REQ-260272/A-TrlrCnnct 8](#_Toc7180579)

[1.7.4 DRVC-REQ-260273/A-SteWhlAng 8](#_Toc7180580)

[1.7.5 DRVC-REQ-260274/A-StePinAng 8](#_Toc7180581)

[1.7.6 RVC-REQ-292387/A-GearPos\_D\_Trg 8](#_Toc7180582)

[1.7.7 MD-REQ-014023/A-GearLvrPos\_D\_Actl (TcSE ROIN-266648-1) 9](#_Toc7180583)

[1.7.8 MD-REQ-014024/A-GearRvrseActv\_D\_Actl (TcSE ROIN-266649-1) 9](#_Toc7180584)

[1.7.9 RVC-MD-REQ-292389/B-GearRvrse\_D\_Actl 9](#_Toc7180585)

[1.7.10 RVC-REQ-292388/A-Veh\_V\_ActlEng 10](#_Toc7180586)

[1.8 DRVC-REQ-261462/A-Client I2C Write 10](#_Toc7180587)

[1.8.1 DRVC-REQ-260269/A-DrvcViewRq 10](#_Toc7180588)

[1.8.2 DRVC-REQ-260276/A-DrvcSteAng 10](#_Toc7180589)

[1.8.3 DRVC-REQ-260278/A-DrvcOvrlsRq 10](#_Toc7180590)

[1.9 DRVC-REQ-261463/A-Clent I2C Read 10](#_Toc7180591)

[1.9.1 DRVC-REQ-260275/A-DrvcCurDispView 10](#_Toc7180592)

[2 General Requirements 11](#_Toc7180593)

[2.1 DRVC-REQ-261288/A-DrvcOvRq Data Generation 11](#_Toc7180594)

[2.2 DRVC-REQ-261289/A-DrvcVehSteAng Data Generation 11](#_Toc7180595)

[2.3 DRVC-REQ-261469/A-I2C Signals 11](#_Toc7180596)

[2.4 RVC-FUR-REQ-014087/B-RVC Malfunction (TcSE ROIN-146656-2) 11](#_Toc7180597)

[2.5 RVC-TMR-REQ-166649/A-T\_cameraMalfunctionDelay 11](#_Toc7180598)

[2.6 RVC-FUR-REQ-014088/E-Deactivate RVC (TcSE ROIN-293328) 11](#_Toc7180599)

[2.7 CAMERA-REQ-014077/C-Feature Maximum Speed (TcSE ROIN-290556) 12](#_Toc7180600)

[2.8 RVC-FUR-REQ-014090/G-Display RVC Video (TcSE ROIN-194462-2) 12](#_Toc7180601)

[2.9 RVC-TMR-REQ-014091/A-T\_minImageDisp (TcSE ROIN-264661-1) 14](#_Toc7180602)

[2.10 RVC-TMR-REQ-014092/A-T\_maxImageDisp (TcSE ROIN-264662-1) 14](#_Toc7180603)

[2.11 CAMERA-FUR-REQ-014093/B-Camera Image Priority (TcSE ROIN-264652-1) 14](#_Toc7180604)

[3 Functional Requirements 15](#_Toc7180605)

[3.1 DRVC-REQ-261464/A-Use Cases 15](#_Toc7180606)

[3.1.1 RVC-UC-REQ-014095/A-Activate Rear View Camera (TcSE ROIN-289794) 15](#_Toc7180607)

[3.1.2 RVC-UC-REQ-014096/A-Rear View Camera Malfunction (TcSE ROIN-289795) 15](#_Toc7180608)

[3.1.3 RVC-UC-REQ-014097/A-Decklid/Liftgate is Ajar while Rear View Camera is ON (TcSE ROIN-289796) 15](#_Toc7180609)

[3.1.4 RVC-UC-REQ-014098/A-Deactivate Rear View Camera (TcSE ROIN-289797) 15](#_Toc7180610)

[3.1.5 RVC-UC-REQ-014099/B-Rear Camera Delay Mode is On (TcSE ROIN-289798) 16](#_Toc7180611)

[3.1.6 RVC-UC-REQ-014100/B-Active Park Assist is Active (TcSE ROIN-290554) 16](#_Toc7180612)

[3.1.7 RVC-UC-REQ-014107/A-Select Manual Zoom Level X (TcSE ROIN-289799) 16](#_Toc7180613)

[3.1.8 RVC-UC-REQ-014108/A-Deactivate Manual Zoom (TcSE ROIN-289802) 17](#_Toc7180614)

[3.1.9 RVC-UC-REQ-014112/A-Activate/Deactivate Rear Camera Delay (TcSE ROIN-289803) 17](#_Toc7180615)

[3.1.10 RVC-UC-REQ-014121/A-Activate/Deactivate Enhanced Park Aids (TcSE ROIN-289804) 17](#_Toc7180616)

[3.1.11 RVC-UC-REQ-196086/A-Rear Split View Exit 18](#_Toc7180617)

[3.1.12 RVC-UC-REQ-196085/A-Enable Split View 18](#_Toc7180618)

[3.2 DRVC-REQ-261465/A-White Box Views 19](#_Toc7180619)

[3.2.1 DRVC-REQ-261466/A-Activity Diagram 19](#_Toc7180620)

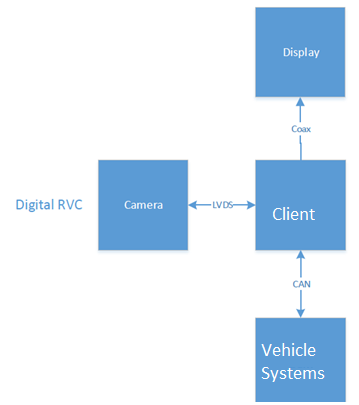
[3.2.2 DRVC-REQ-261467/A-Sequence Diagram 20](#_Toc7180621)

[4 Appendix 21](#_Toc7180622)

# Architectural Design

## Overview

Digital RVC (DRVC) is RVC system with LVDS communication between Camera and Client. Any needed CAN communication with any external module is done through an intermediator, Client in this case.



This figure shows the connection architecture in DRVC.

The main difference as mentioned above is communication between camera and client. The use cases of RVC are to remain the same with those of DRVC and other requirements as well, such as various speed limits to activate deactivate Rear View image streaming etc.

## DRVC-REQ-260282/A-Server 2

Server 2 are the various systems that send various CAN signals to the bus to be used by Client or DRVC Server.

## DRVC-REQ-260268/A-DRVC Server

Digital Rear View Camera Server is the camera module that sends video stream to the client. It can be used throughout this SPSS as Server or Server 1.

## DRVC-REQ-260267/A-DRVC Client

Responsibility: The DRVC Client is the interface of the Digital Rear View Camera function. It acts with other system parts that control the Digital Rear View Camera or need data from it. In addition to that, the client serves as the gateway between the camera and the rest of the system parts, converting the CAN signals from other systems to LVDS, the type that DRVC can make use.

## DRVC-REQ-261261/A-Logical Signal Mapping

The CAN signals mentioned throughout this document shall refer to the CAN signal’s logical name. The logical names shall be mapped to their actual CAN signal names. This is done to protect specs from being modified in case a signal name changes without any new functionality.

|  |  |
| --- | --- |
| **Logical Name** | **CAN Signal Name** |
| **DecklidAjar** | **DrStatTgate\_B\_Actl** |
| **LiftgateAjar** | **DrSTatInnrTgate\_B\_Actl** |
| **TrlrCnnct** | **TrlrLampCnnct\_B\_Actl** |
| **SteWhlAng** | **SteWhlComp\_An\_Est** |
| **StePinAng** | **StePinComp\_An\_Est** |
|  |  |

Table: Logical name/CAN signal mapping

I2C signals also have their own logical name. Unlike CAN protocol in I2C the connection between modules is known as Master-Slave, where only Master can initialize data request. As such the signals below are all initialized by the Client, which has a master relationship in the I2C bus.

|  |  |
| --- | --- |
| **Logical Name** | **I2C Signal Name** |
| **DrvcOvrlsRq** | **OvrlsRq** |
| **DrvcSteAng** | **SteAngle** |
| **DrvcViewRq** | **ViewRq** |
| **DrvcCurDispView** | **CurDispView** |
|  |  |

The table below is a list of I2C signals used for mainly diagnostics purposes. Refer DRVC Diagnostics SPSS and to I2C over LVDS Communication Protocol for Camera SPSS for further details.

|  |
| --- |
| **I2C Signal Name** |
| **Core Assembly FPN** |
| **Delivery Assembly FPN** |
| **Software FPN** |
| **Serial Number** |
| **Main Calibration Data FPN** |
| **Camera Status** |
| **Configuration Data** |

## DRVC-REQ-261254/A-Server 2 Tx

### DRVC-REQ-260270/A-DecklidAjar

DecklidAjar message is sent by the Server 2 to the Client.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Closed | 0 | Declid is closed |
| Ajar | 1 | Decklid is ajar |

### DRVC-REQ-260271/A-LiftgateAjar

LiftgateAjar message is sent by Server 2 to the Client.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Closed | 0 | Liftgate is closed |
| Ajar | 1 | Liftgate is ajar |

### DRVC-REQ-260272/A-TrlrCnnct

TrlrCnnct is a CAN message sent by Server 2 to the Client to inform if any trailer has been connected to the vehicle or not.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Off | 0 | Trailer Not Connected |
| Active | 1 | Trailer Connected |

### DRVC-REQ-260273/A-SteWhlAng

SteWhlAng is sent by Server2 to Client to indicate steering wheel angle position.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Angle | [0 – 32767] | 0.1\*value – 1600 to yield angle |

### DRVC-REQ-260274/A-StePinAng

StePinAng is sent by Server 2. It is used for dynamic guidelines.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Angle | [0 – 32767] | 0.1\*value – 1600 to yield angle |

## DRVC-REQ-261461/B-Client Rx

### DRVC-REQ-260270/A-DecklidAjar

DecklidAjar message is sent by the Server 2 to the Client.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Closed | 0 | Declid is closed |
| Ajar | 1 | Decklid is ajar |

### DRVC-REQ-260271/A-LiftgateAjar

LiftgateAjar message is sent by Server 2 to the Client.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Closed | 0 | Liftgate is closed |
| Ajar | 1 | Liftgate is ajar |

### DRVC-REQ-260272/A-TrlrCnnct

TrlrCnnct is a CAN message sent by Server 2 to the Client to inform if any trailer has been connected to the vehicle or not.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Off | 0 | Trailer Not Connected |
| Active | 1 | Trailer Connected |

### DRVC-REQ-260273/A-SteWhlAng

SteWhlAng is sent by Server2 to Client to indicate steering wheel angle position.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Angle | [0 – 32767] | 0.1\*value – 1600 to yield angle |

### DRVC-REQ-260274/A-StePinAng

StePinAng is sent by Server 2. It is used for dynamic guidelines.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Angle | [0 – 32767] | 0.1\*value – 1600 to yield angle |

### RVC-REQ-292387/A-GearPos\_D\_Trg

GearPos\_D\_Trg

This signal is used to indicate Gear direction. Used with other gear signals to determine whether or not RVC is to be turned On or Off.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Literals | Value | Description |
| Type | - | - | - |
|  | Neutral | 0x0 |  |
|  | First | 0x1 |  |
|  | Second | 0x2 |  |
|  | Third | 0x3 |  |
|  | Fourth | 0x4 |  |
|  | Fifth | 0x5 |  |
|  | Sixth | 0x6 |  |
|  | Seventh | 0x7 |  |
|  | Eighth | 0x8 |  |
|  | Ninth | 0x9 |  |
|  | Tenth | 0xA |  |
|  | Undefined\_3 | 0xB |  |
|  | Undefined\_4 | 0xC |  |
|  | Undefined\_5 | 0xD |  |
|  | Reverse | 0xE |  |
|  | Unknown | 0xF |  |

### MD-REQ-014023/A-GearLvrPos\_D\_Actl (TcSE ROIN-266648-1)

Message Type: Status

Vehicle status signal for the Gear Lever Position on an automatic transmission vehicle.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Type | - | - | - |
|  | Park | 0x0 |  |
|  | Reverse | 0x1 |  |
|  | Neutral | 0x2 |  |
|  | Drive | 0x3 |  |
|  | Sport\_DriveSport | 0x4 |  |
|  | Low | 0x5 |  |
|  | First | 0x6 |  |
|  | Second | 0x7 |  |
|  | Third | 0x8 |  |
|  | Fourth | 0x9 |  |
|  | Fifth | 0xA |  |
|  | Sixth | 0xB |  |
|  | Undefined\_Treat\_as\_Fault | 0xC |  |
|  | Undefined\_Treat\_as\_Fault1 | 0xD |  |
|  | Unknown\_Position | 0xE |  |
|  | Fault | 0xF |  |

### MD-REQ-014024/A-GearRvrseActv\_D\_Actl (TcSE ROIN-266649-1)

Message Type: Status

Vehicle status signal for notifying that Reverse Gear is engaged on a manual transmission vehicle.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Literals** | **Value** | **Description** |
| Type | - | - | - |
|  | Inactive | 0x0 |  |
|  | Active | 0x1 |  |
|  | Unknown | 0x2 |  |
|  | Fault | 0x3 |  |

### RVC-MD-REQ-292389/B-GearRvrse\_D\_Actl

GearRvrse\_D\_Actl

The purpose of this signal is to notify that Reverse Gear is engaged on a manual transmission vehicle.

$0: Inactive\_not\_confirmed

$1: Inactive\_confirmed

$2: Active\_not\_confirmed

$3: Active\_confirmed

$4: NotUsed\_1

$5: NotUsed\_2

$6: NotUsed\_3

$7: Fault

Reverse status is indicated by both $2 (Active\_not\_confirmed) and $3 (Active\_confirmed)

### RVC-REQ-292388/A-Veh\_V\_ActlEng

Veh\_V\_ActlEng

This signal is used to indicate vehicle speed. Refer to database for proper signal values.

## DRVC-REQ-261462/A-Client I2C Write

### DRVC-REQ-260269/A-DrvcViewRq

DrvcViewRq: This signal is sent by the client to tell the server to change the camera view.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Off | 0x00 | Turn off |
| Normal | 0x01 | Put in Normal view |
| Zoom | 0x02 | Put in Zoom View |
| Split | 0x03 | Put in Split View |

### DRVC-REQ-260276/A-DrvcSteAng

DrvcVehSteAng signal is sent by the client to the server to indicate the steering wheel angle. This data is used by the server to calculate the dynamic overlays.

|  |  |  |
| --- | --- | --- |
| **Encoded Value** | **Logical Value** | **Usage/Meaning** |
| [0x00 – 0x7FFF] | Angle | 0.1\*value – 1600 to yield angle |

### DRVC-REQ-260278/A-DrvcOvrlsRq

DrvcOvRq signal is used by the client to tell the server what type of overlays to use. The data in this signal is generated according to instructions in requirement number 261288.

|  |  |  |
| --- | --- | --- |
| **Encoded Value** | **Logical Value** | **Usage/Meaning** |
| 0x00 | Inactive | Overlays inactive |
| 0x01 | Static | Static Overlays Active |
| 0x02 | Dynamic | Static and dynamic Overlays are Active |
| 0x03 | Not Used | Unused Value |

## DRVC-REQ-261463/A-Clent I2C Read

### DRVC-REQ-260275/A-DrvcCurDispView

DrvcDispView : This signal is used to synchronize the displayed view.

|  |  |  |
| --- | --- | --- |
| **Logical Value** | **Encoded Value** | **Usage/Meaning** |
| Off | 0x00 | Image Off |
| Normal | 0x01 | Normal View |
| Zoom | 0x02 | Zoom View |
| Split | 0x03 | Split View |

# General Requirements

## DRVC-REQ-261288/A-DrvcOvRq Data Generation

DrvcOvRq makes use of several CAN signals data in order to be produced.

DecklidAjar and LiftgateAjar data are OR-ed together. Both need to be Closed (0) for the Ajar value in the table below to be Closed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Reverse\_Gear** | **TrlrCnnct** | **Ajar** | **Overlay Request** | **Encode value** |
| True | Off | Closed | Dynamic | 0x02 |
| False | Off | Closed | Static | 0x01 |
| All other values | | | Inactive | 0x00 |
|  | | | Not Used | 0x03 |

This table describes the various encoded values of DrvcOvRq gets in relation to other signals.

## DRVC-REQ-261289/A-DrvcVehSteAng Data Generation

StePinAng and SteWhlAng are the two CAN signals that provide steering angle data to the Client. These two signals do not coexist in the same vehicle. It can be either one of them being transmitted in the bus, but not both.

The client should remove CAN protocol details from the signal and send the raw data of the incoming signal to Camera through I2C protocol.

## DRVC-REQ-261469/A-I2C Signals

The mentioning of I2C signals here is done for convenience and ease of understand this SPSS. If there is any discrepancy between this SPSS and I2C over LVDS Communication Protocol for Camera the user should notify the team for the discrepancy.

## RVC-FUR-REQ-014087/B-RVC Malfunction (TcSE ROIN-146656-2)

When the RVC Client (RearViewCameraClient) does not detect video present in the signal from the camera it shall set a DTC and the RVC Client shall display camera overlays for T\_cameraMalfunctionDelay before displaying an error message allowing the user to acknowledge the video error and revert to the previous screen. At any time the video signal is detected RVC client should check for Gear position and show the camera.

## RVC-TMR-REQ-166649/A-T\_cameraMalfunctionDelay

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| T\_cameraMalfunctionDelay | Time DAFVC or RVC Client should wait before displaying an error message to the user according to RVC-REQ-014087-RVC Malfunction or DAFVC-REQ-166649 DAFVC Malfunction. | sec | 0-30 | 1 | 10 |

## RVC-FUR-REQ-014088/E-Deactivate RVC (TcSE ROIN-293328)

The RVC Client (RearViewCameraClient) shall stop displaying RVC video when one of the following conditions is met:

1. Vehicle is shifted out of reverse (Camera Delay = OFF)

2. Vehicle is shifted out of reverse (GearLvrPos\_D\_Actl does not equal Reverse in automatic Transmission vehicle or GearRvrse\_D\_Actl or GearRvrseActv\_D\_Actl does not equal active in Manual Transmission vehicle) and vehicle speed > limit per CAMERA-REQ-014077-Feature Maximum Speed (Camera Delay = ON)

3. CGEA 1.2:

Power Mode does not equal IgnitionOn\_2 or Running\_2 or Crank\_3

CGEA 1.3:

Ignition\_Status does not equal Run

4. Vehicle is shifted into Park

1. Automatic Transmission vehicle GearLvrPos\_D\_Actl == 0x0
2. Manual Transmission Vehicle with Mechanical Park Brake

GearRvrse\_D\_Actl == Inactive or GearRvrseActv\_D\_Actl == Inactive AND PrkBrkActv\_B\_Actl == Active

1. Manual Transmission Vehicle with Electronic Park Brake

GearRvrse\_D\_Actl == Inactive or GearRvrseActv\_D\_Actl == Inactive AND PrkBrkStatus == Active

## CAMERA-REQ-014077/C-Feature Maximum Speed (TcSE ROIN-290556)

The feature maximum speed when displaying a camera image in forward gear shall be as described for each operational scenario below:

1. **Any camera feature activation attempted by User**
   1. *Rear Camera*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Not Available*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Available and does NOT meet conditions for Off Road Mode per Determine Off Road Mode requirement*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Available and meets conditions for Off Road Mode per Determine Off Road Mode requirement*

*Feature maximum speed = 20 kph*

1. **Rear Camera Active**

*Feature maximum speed = 10 kph*

1. **Front Camera Active**
   1. Off Road Front Camera configured: *Not Available*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Available and does NOT meet conditions for Off Road Mode per Determine Off Road Mode requirement*

*Feature maximum speed = 10 kph*

* 1. Off Road Front Camera configured: *Available and meets conditions for Off Road Mode per Determine Off Road Mode requirement*

*Feature maximum speed = 24 kph*

## RVC-FUR-REQ-014090/G-Display RVC Video (TcSE ROIN-194462-2)

There are two ways for Reverse Detection. What way to use is decided on configuration values.

Reverse Detection NEW:

Reverse\_Gear is determined as mentioned in below table. Once GearLvrPos\_D\_Actl is reverse, System need to loop through signal GearPos\_D\_Trg to determine reverse gear until either GearLvrPos\_D\_Actl is not reverse OR Camera turn ON.

|  |  |  |
| --- | --- | --- |
| GearLvrPos\_D\_Actl = 0x1 (Reverse) (automatic transmission) | GearPos\_D\_Trg | Gear position and Camera Status |
| Reverse | 0xE (Reverse) | Gear is Reverse, Turn Camera On |

Upon detecting the conditions for RVC to be ON, the RVC Client (RearViewCameraClient) shall start a timer (T\_minImageDisp) and shall not display the RVC image until the expiration of this timer.  Upon expiration of the timer, the RVC Client shall start another timer (T\_maxImageDisp). The RVC Client must display the RVC image prior to the expiration of T\_maxImageDisp.

Once the conditions for displaying RVC are no longer applicable the RVC client shall:

1.            Cancel the timer

2.            Not display the RVC image

Reverse Detection LEGACY:

Reverse Detection is determined as mentioned in below table.

|  |  |
| --- | --- |
| GearLvrPos\_D\_Actl = 0x1 (Reverse) (automatic transmission) or  GearRvrseActv\_D\_Actl = 0x1 (Active )(manual transmission vehicle and Legacy Message Set) or GearRvrse\_D\_Actl = 0x3 or 0x2 ( Active Confirmed or Active\_not\_confirmed) (manual transmission vehicle and New Message Set) | Gear position and Camera Status |
| Reverse | Gear is Reverse, Turn Camera On |

Upon detecting the conditions for RVC to be ON, the RVC Client (RearViewCameraClient) shall start a timer (T\_minImageDisp) and shall not display the RVC image until the expiration of this timer.  Upon expiration of the timer, the RVC Client shall start another timer (T\_maxImageDisp). The RVC Client must display the RVC image prior to the expiration of T\_maxImageDisp.

Once the conditions for displaying RVC are no longer applicable the RVC client shall:

1.            Cancel the timer

2.            Not display the RVC image

## RVC-TMR-REQ-014091/A-T\_minImageDisp (TcSE ROIN-264661-1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| T\_minImageDisp | Minimum time RVC Client should wait before displaying the RVC video image to the user according to RVC-GREQ-194462-2-Display RVC Video. | msec | 225-275 | 5 | 250 |

## RVC-TMR-REQ-014092/A-T\_maxImageDisp (TcSE ROIN-264662-1)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Description** | **Units** | **Range** | **Resolution** | **Default** |
| T\_maxImageDisp | Maximum time RVC Client should wait before displaying the RVC video image to the user according to RVC-GREQ-194462-2-Display RVC Video. | msec | 450-550 | 5 | 500 |

## CAMERA-FUR-REQ-014093/B-Camera Image Priority (TcSE ROIN-264652-1)

Once the camera image has been displayed to user, the image shall be maintained as long as the conditions required to be in the particular camera view are present and shall have highest priority:

• No pop-up screens shall interrupt the video image.

• Media functions (source change, volume control, etc.) shall be available, but shall not interrupt the image view to the user.

# Functional Requirements

## DRVC-REQ-261464/A-Use Cases

### RVC-UC-REQ-014095/A-Activate Rear View Camera (TcSE ROIN-289794)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start. |
| **Scenario Description** | The driver activates the Rear View Camera (RVC) by placing the vehicle in Reverse Gear. |
| **Post-conditions** | The vehicle display shows the RVC image. |
| **List of Exception Use Cases** | E1 – [Rear View Camera Malfunction](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.78849059&LID=19.0.79292089)  E2 – [Decklid/Liftgate is Ajar while Rear View Camera is ON](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.78849134&LID=19.0.79292091) |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-014096/A-Rear View Camera Malfunction (TcSE ROIN-289795)

**Linked Elements**

RVC-UC-REQ-014095/A-Activate Rear View Camera (TcSE ROIN-289794)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Same as Normal Usage Use Case. |
| **Scenario Description** | The HMI interface indicates that the Rear View Camera (RVC) image cannot be shown because of a malfunction. |
| **Post-conditions** | The vehicle display is NOT showing RVC image. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-014097/A-Decklid/Liftgate is Ajar while Rear View Camera is ON (TcSE ROIN-289796)

**Linked Elements**

RVC-UC-REQ-128278/A-Activate Rear View Camera

RVC-UC-REQ-014095/A-Activate Rear View Camera (TcSE ROIN-289794)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Same as Normal Usage Use Case. |
| **Scenario Description** | The HMI interface indicates that the Decklid/Liftgate is Ajar. |
| **Post-conditions** | The vehicle display shows the Rear View Camera image.  The video feed from the Rear View Camera contains an image without guideline overlays. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-014098/A-Deactivate Rear View Camera (TcSE ROIN-289797)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start. |
| **Scenario Description** | The driver deactivates the Rear View Camera (RVC) by shifting the vehicle out of Reverse Gear. |
| **Post-conditions** | The vehicle display is NOT showing RVC image. |
| **List of Exception Use Cases** | E1 – [Rear Camera Delay Mode is On](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.78849284&LID=19.0.79292101)  E2 – [Active Park Assist is Active](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.79223622&LID=19.0.79292103)  E3 – [Trailer Backup Assist is Active](http://ivs02.pd3.ford.com:8080/tcr/controller/ObjLauncher?wolf_objectid=19.0.79213757&LID=19.0.79292104) (N/A for stand-alone RVC) |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-014099/B-Rear Camera Delay Mode is On (TcSE ROIN-289798)

**Linked Elements**

RVC-UC-REQ-128280/A-Deactivate Rear View Camera

RVC-UC-REQ-014098/A-Deactivate Rear View Camera (TcSE ROIN-289797)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Same as Normal Usage Use Case. |
| **Scenario Description** | The driver shifts out of Reverse Gear and into any gear other than Park. The RVC image remains displayed to the driver until the vehicle reaches limit per CAMERA-REQ-014077-Feature Maximum Speed. |
| **Post-conditions** | The vehicle display stops showing Rear View Camera image when vehicle speed reaches limit per CAMERA-REQ-014077-Feature Maximum Speed. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-014100/B-Active Park Assist is Active (TcSE ROIN-290554)

**Linked Elements**

RVC-UC-REQ-014098/A-Deactivate Rear View Camera (TcSE ROIN-289797)

RVC-UC-REQ-128280/A-Deactivate Rear View Camera

DAFVCv1-UC-REQ-128313/A-Deactivate Driver Assist Front View Camera

DAFVCv1-UC-REQ-014049/B-Deactivate Driver Assist Front View Camera (TcSE ROIN-290146)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | Same as Normal Usage Use Case. |
| **Scenario Description** | The driver shifts out of Reverse Gear and into any other gear while Active Park Assist (APA) is active. The camera image feed remains displayed to the driver as long as APA is active and vehicle speed does not exceed limit per CAMERA-REQ-014077-Feature Maximum Speed. |
| **Post-conditions** | The vehicle display stops showing Rear View Camera image when APA is no longer active or vehicle speed exceeds limit per CAMERA-REQ-014077-Feature Maximum Speed. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-014107/A-Select Manual Zoom Level X (TcSE ROIN-289799)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start.  The vehicle display is showing the Rear View Camera image. |
| **Scenario Description** | The driver activates Manual Zoom Mode Level X via the HMI interface. |
| **Post-conditions** | The vehicle display continues to show the Rear View Camera image.  The vehicle display indicates that a zoom level is selected.  The video feed from the Rear View Camera contains a zoomed-in image. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |
| **Notes** | *There are three defined zoom levels and "Level X" is used to generically designate that one of the three is selected as described in this use case.*  *Refer to HMI documentation (requirements and/or screen-flow) for which level(s) of zoom will be utilized.* |

### RVC-UC-REQ-014108/A-Deactivate Manual Zoom (TcSE ROIN-289802)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start.  The vehicle display is showing the Rear View Camera image with Zoom Level X selected. |
| **Scenario Description** | The user deactivates Manual Zoom Mode via HMI interface. |
| **Post-conditions** | The vehicle display continues to show the Rear View Camera image.  The vehicle display indicates that no zoom level is selected.  The video feed from the Rear View Camera contains a normal (no zoom applied) image. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |
| **Notes** | *There are three defined zoom levels and "Level X" is used to generically designate that one of the three is selected as described in this use case.*  *Refer to HMI documentation (requirements and/or screen-flow) for which level(s) of zoom will be utilized.* |

### RVC-UC-REQ-014112/A-Activate/Deactivate Rear Camera Delay (TcSE ROIN-289803)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start. |
| **Scenario Description** | The driver activates/deactivates the Rear View Camera (RVC) Delay Mode via the HMI interface. |
| **Post-conditions** | The RVC Delay Mode is activated/deactivated. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-014121/A-Activate/Deactivate Enhanced Park Aids (TcSE ROIN-289804)

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | The infotainment system is powered on.  The ignition status is Run/Start. |
| **Scenario Description** | The driver activates/deactivates the Enhanced Park Aids via the HMI interface. |
| **Post-conditions** | The Enhance Park Aids are activated/deactivated.  The HMI indicates the setting change determined by vehicle system interface signal. |
| **List of Exception Use Cases** | NA |
| **Interfaces** | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-196086/A-Rear Split View Exit

|  |  |
| --- | --- |
| **Actors** | Rear Split View Exit |
| **Pre-conditions** | Vehicle Occupant |
| **Scenario Description** | * Vehicle in Run/Start * Rear Camera is showing * Rear Split View is showing on camera (rear split view stat = on) * Display and Camera are configured for Rear Split View (display also configured for without front camera, TBA, CHMSL camera, or Aux camera) |
| **Post-conditions** | * Customer presses Rear Normal View button   OR   * Rear Camera is sending Rear Normal View (Rear split view stat = off) |
| **List of Exception Use Cases** | Sync highlights Rear Normal View, populates the zoom button, and sends rear split request signal as on. Camera switches to rear normal view (if not already at rear normal view). |
| **Interfaces** | E1 – Vehicle is not RUN/START  E2 – valid camera video signal not present  E3 – Loss of communication with RVC |
|  | G-HMI  Vehicle System Interface |

### RVC-UC-REQ-196085/A-Enable Split View

|  |  |
| --- | --- |
| **Actors** | Vehicle Occupant |
| **Pre-conditions** | * Vehicle in Run/Start * RVC is display * RVC is not showing Split View * Display and Camera are configured for Rear Split View (display also configured for without front camera, TBA, CHMSL camera, or Aux camera) |
| **Scenario Description** | Customer presses the view button to go to Rear Split View |
| **Post-conditions** | Sync highlights Rear Split View button, stops showing the zoom button, and sends Rear Split View request signal as Rear Split View On. Camera then shows Rear Split View |
| **List of Exception Use Cases** | E1 – Vehicle is not ON  E2 – valid camera video signal not present  E3 – Loss of communication with RVC |
| **Interfaces** | G-HMI  Vehicle System Interface |

## DRVC-REQ-261465/A-White Box Views

### DRVC-REQ-261466/A-Activity Diagram

#### DRVC-REQ-258517/A-Digital RVC Operation



### DRVC-REQ-261467/A-Sequence Diagram

#### DRVC-REQ-261300/A-DRVC SD



# Appendix

Feature- I2C over LVDS Communication Protocol for camera