Around View Monitor Function

<<Logical Function>>

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Important Note

You need to use the RE specification macros provided by the "RE_SpecificationMacroTemplate.dotm" (refer to "Utilities" on page "Specification Templates" in the RE Wiki) to allow seamless VSEM import of the specification content. ***Use only these RE specification macros to create requirements*** *in this specification. Refer to "How to use the Specification Templates" on how to enable and use the macros and the requirements templates in this specification.*

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1 FUNCTION SPECIFICATION

1.1 Function Overview

1.1.1 Function Description

Around View Monitor Function

The Around View Monitor (AVM) function of Enhancement DAT has made some upgrades compare with Surround View Cameras.

· It supports 3D view (front view, rear view, rear left view, rear right view and any angle view) screen and switch angles by gesture.
· It supports automatively active AVM screen when open turn light or steering wheel angle big than 120°or obstacle approach trigger.
· It supports self-calibration function, through road self-learning to complete calibration.

1.1.2 Function Variants

No Variants identified for Around View Monitor Function

1.1.3 Assumptions

No Assumptions specified.

1.2 Function Scope

The **– "Around View Monitor Function"** function is called by the following functions:

- – "I/O Block"

1.2.1 I/O Block

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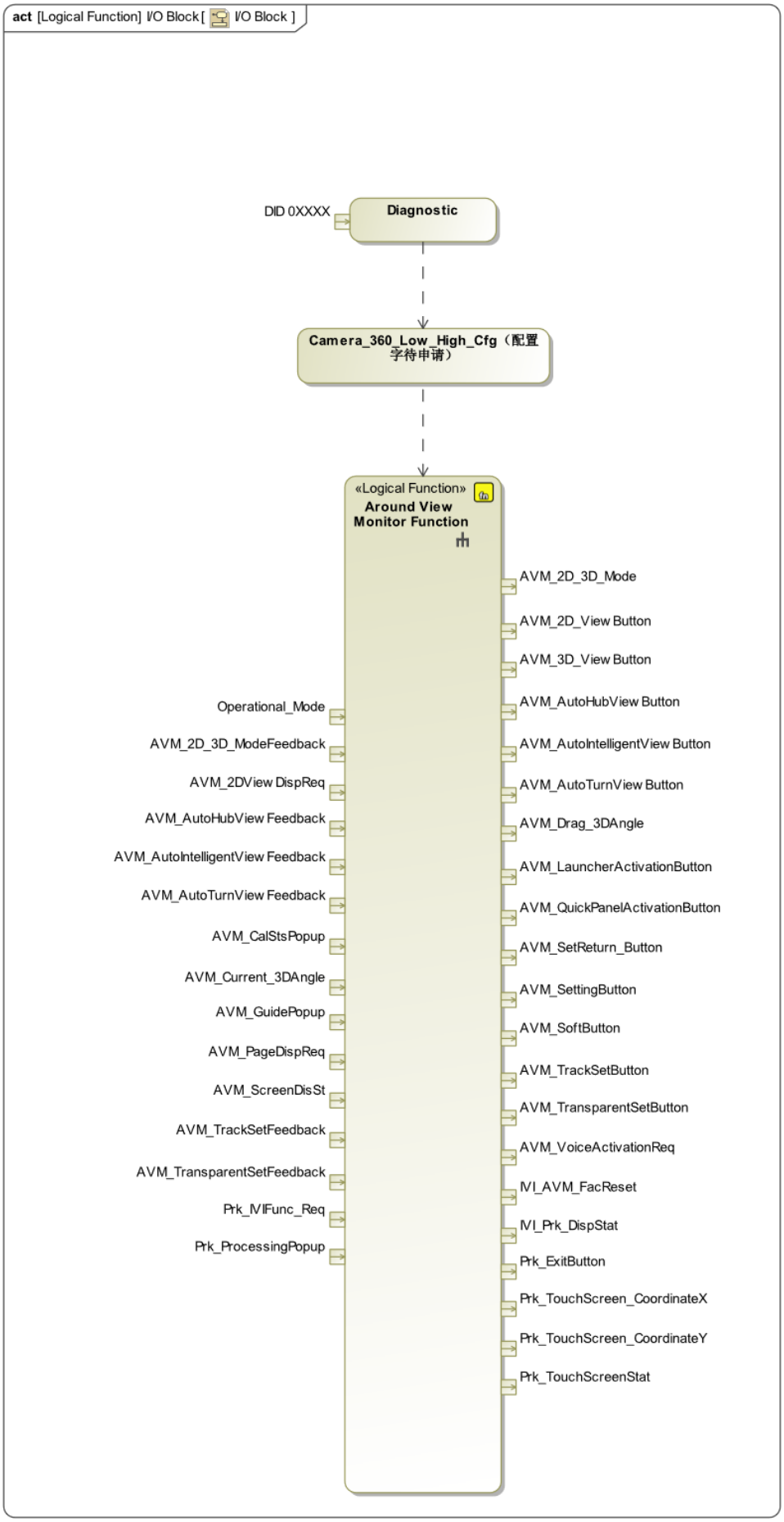

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Figure 1: Activity Diagram of "I/O Block" calling "Around View Monitor Function"

1.3 Function Interfaces

1.3.1 Logical Inputs

Signal Name	Description
AVM_PageDispReq	
AVM_2D_3D_ModeFeedback	
Prk_ProcessingPopup	
AVM_AutoIntelligentViewFeedback	
AVM_TransparentSetFeedback	
AVM_AutoHubViewFeedback	
AVM_GuidePopup	
AVM_ScreenDisSt	
Operational_Mode	
AVM_AutoTurnViewFeedback	
AVM_Current_3DAngle	
AVM_CalStsPopup	
AVM_TrackSetFeedback	
Prk_IVIFunc_Req	
AVM_2DViewDispReq	

1.3.2 Logical Outputs

Signal Name	Description
AVM_3D_ViewButton	
AVM_TrackSetButton	
Prk_TouchScreen_CoordinateX	
AVM_Drag_3DAngle	
AVM_SoftButton	
IVI_Prk_DispStat	

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AVM_LauncherActivationButton	
Prk_TouchScreenStat	
AVM_2D_3D_Mode	
AVM_2D_ViewButton	
AVM_SettingButton	
Prk_ExitButton	
AVM_QuickPanelActivationButton	
AVM_SetReturn_Button	
AVM_AutoIntelligentViewButton	
IVI_AVM_FacReset	
AVM_AutoHubViewButton	
AVM_AutoTurnViewButton	
Prk_TouchScreen_CoordinateY	
AVM_TransparentSetButton	
AVM_VoiceActivationReq	

1.3.3 Logical Parameters

(No parameters have been defined)

1.4 Function Modeling

1.4.1 State Charts

No state chart associated to specified function.

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1.4.2 Activity Diagrams

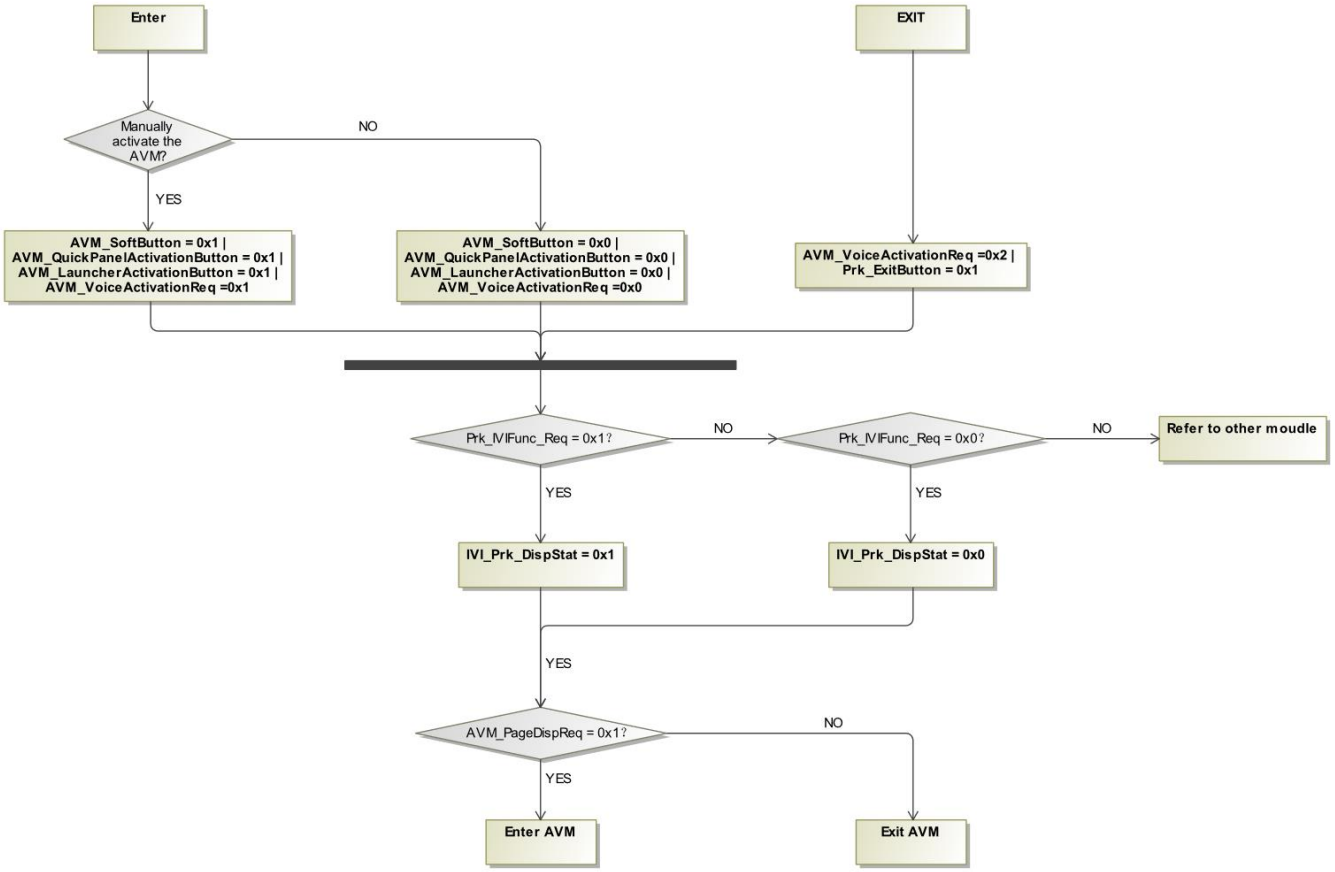

Figure 2: Activity Diagram of (a)Function Entrance/Exit Flow Chart

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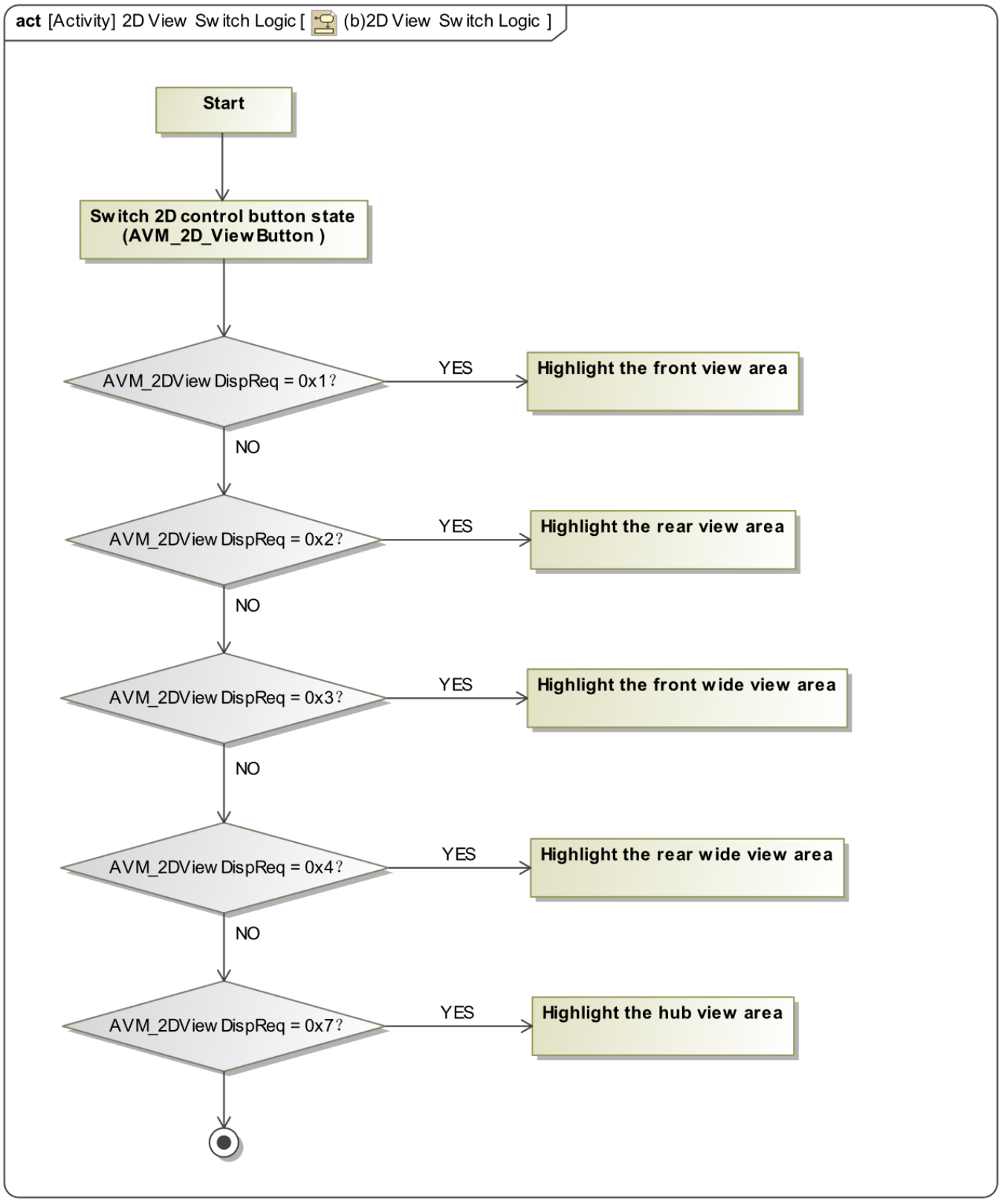

Figure 3: Activity Diagram of (b)2D View Switch Logic

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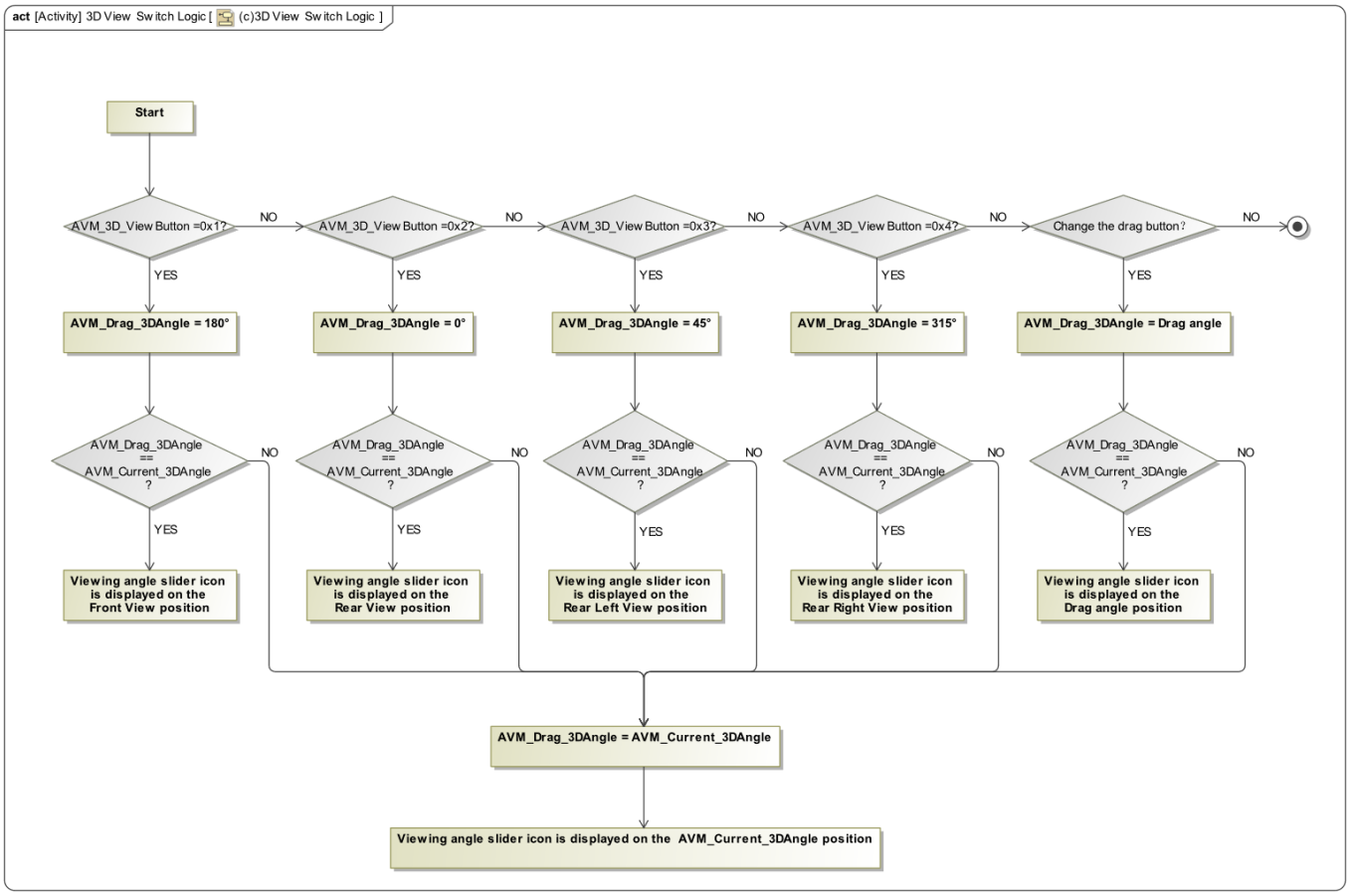

Figure 4: Activity Diagram of (c)3D View Switch Logic

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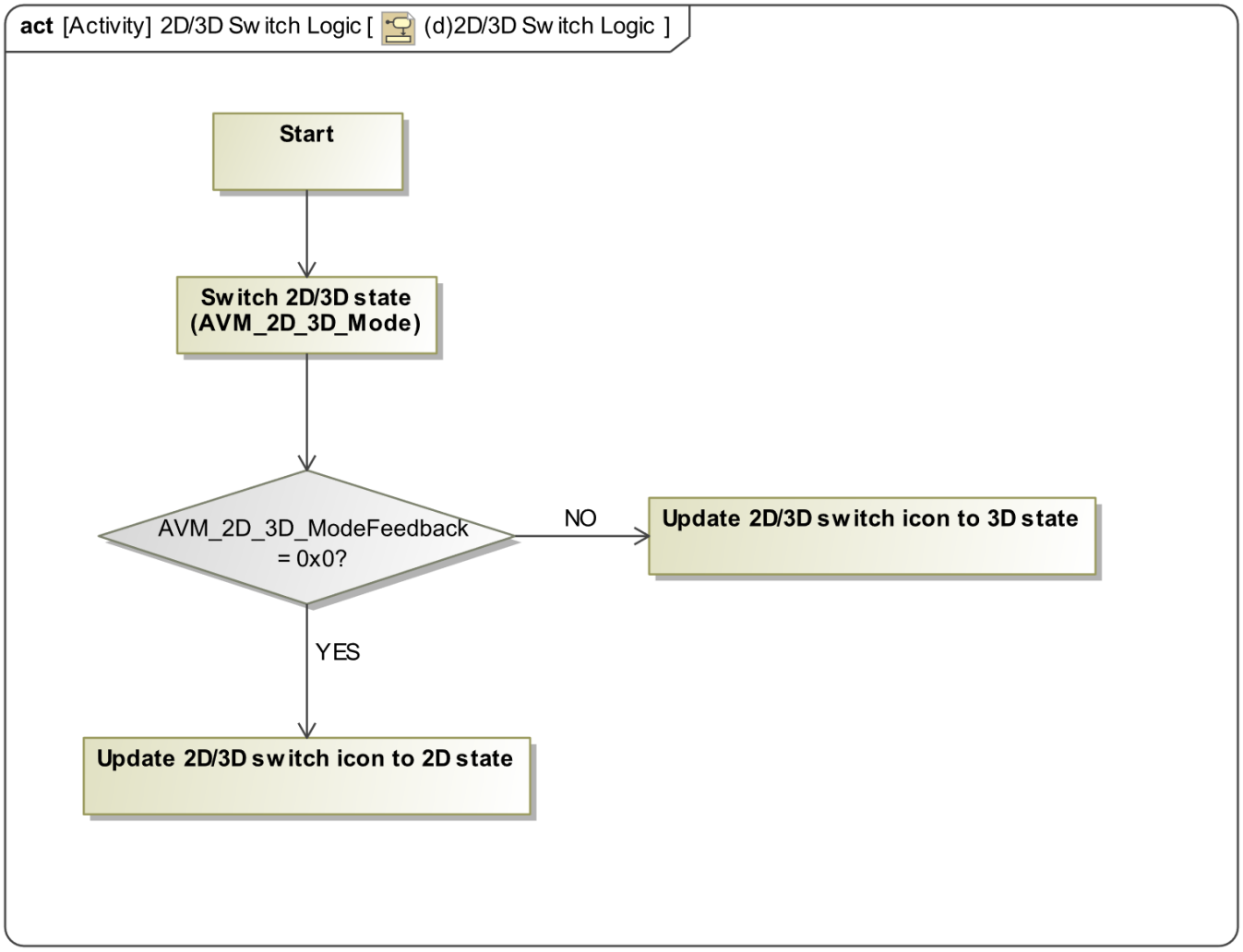

Figure 5: Activity Diagram of (d)2D/3D Switch Logic

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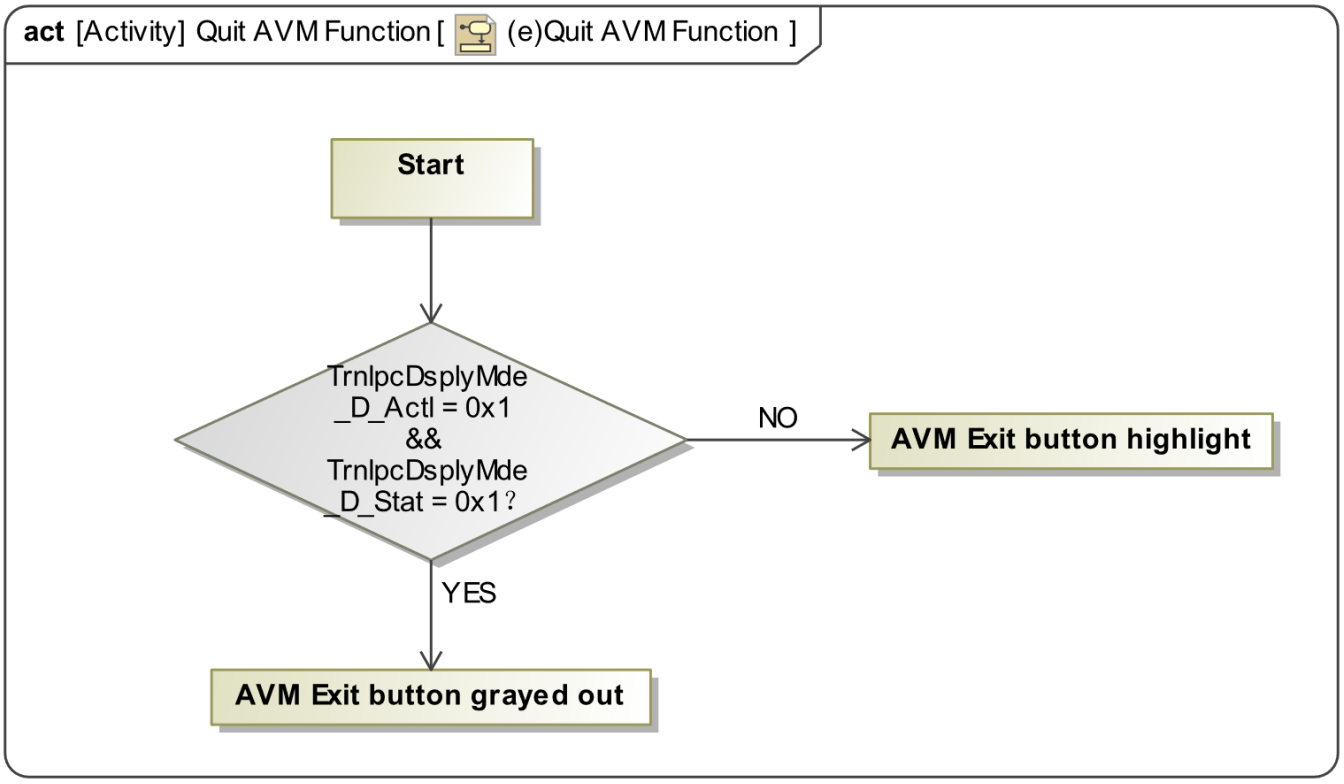

Figure 6: Activity Diagram of (e)Quit AVM Function

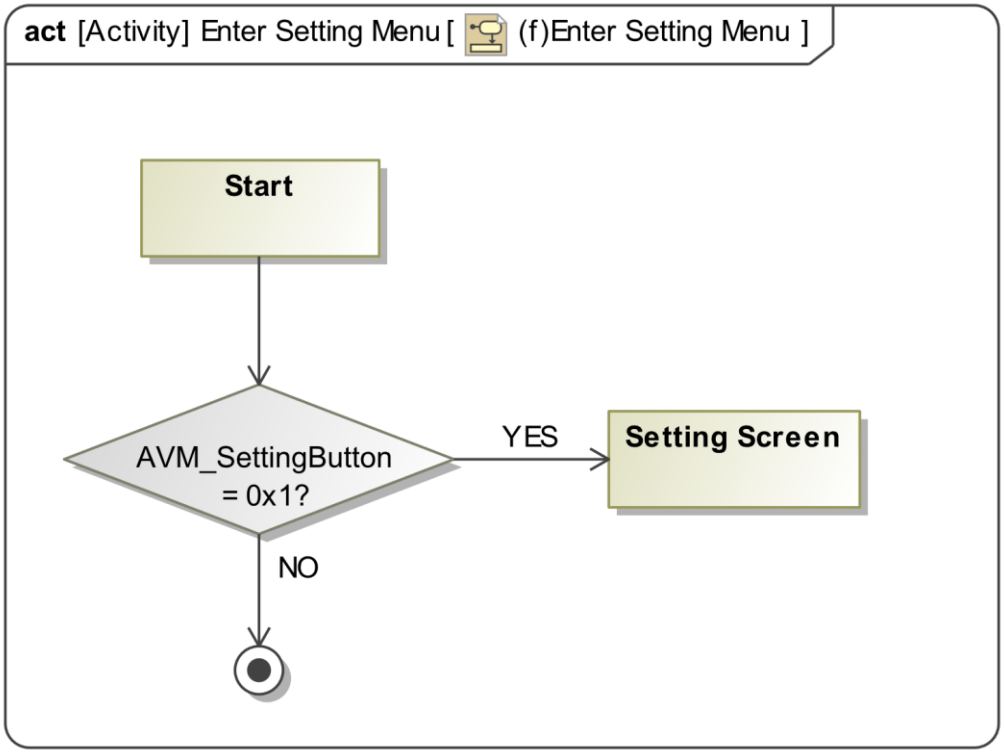

Figure 7: Activity Diagram of (f)Enter Setting Menu

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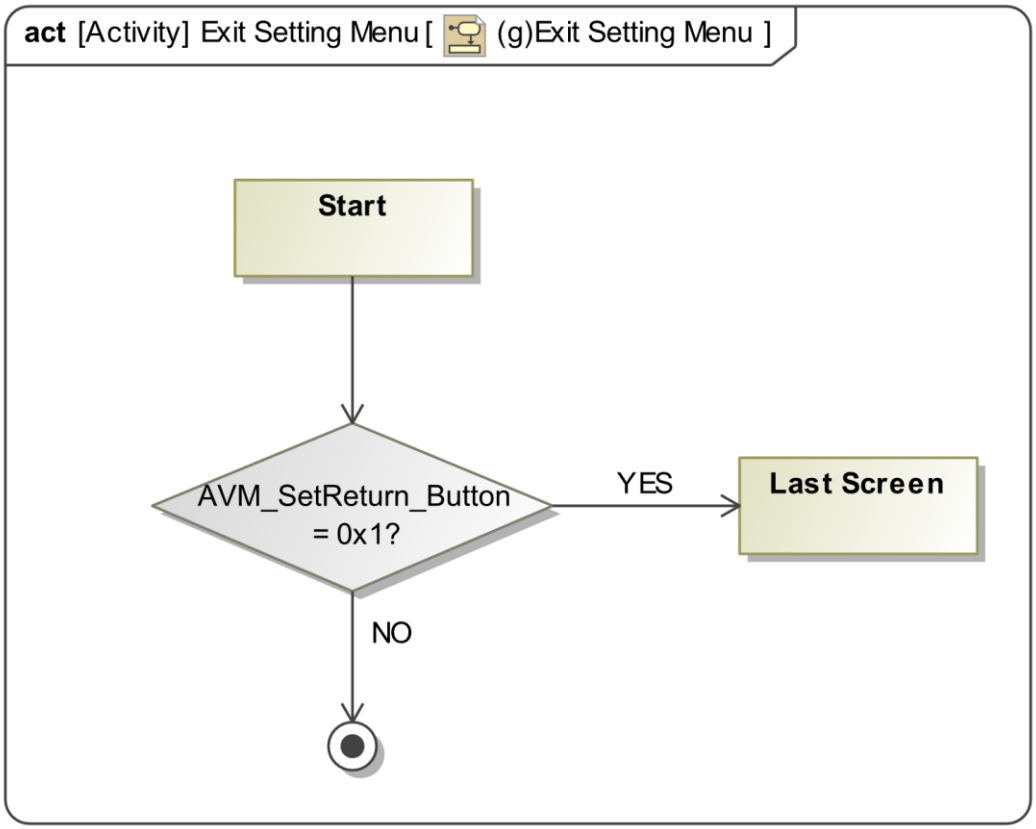

Figure 8: Activity Diagram of (g)Exit Setting Menu

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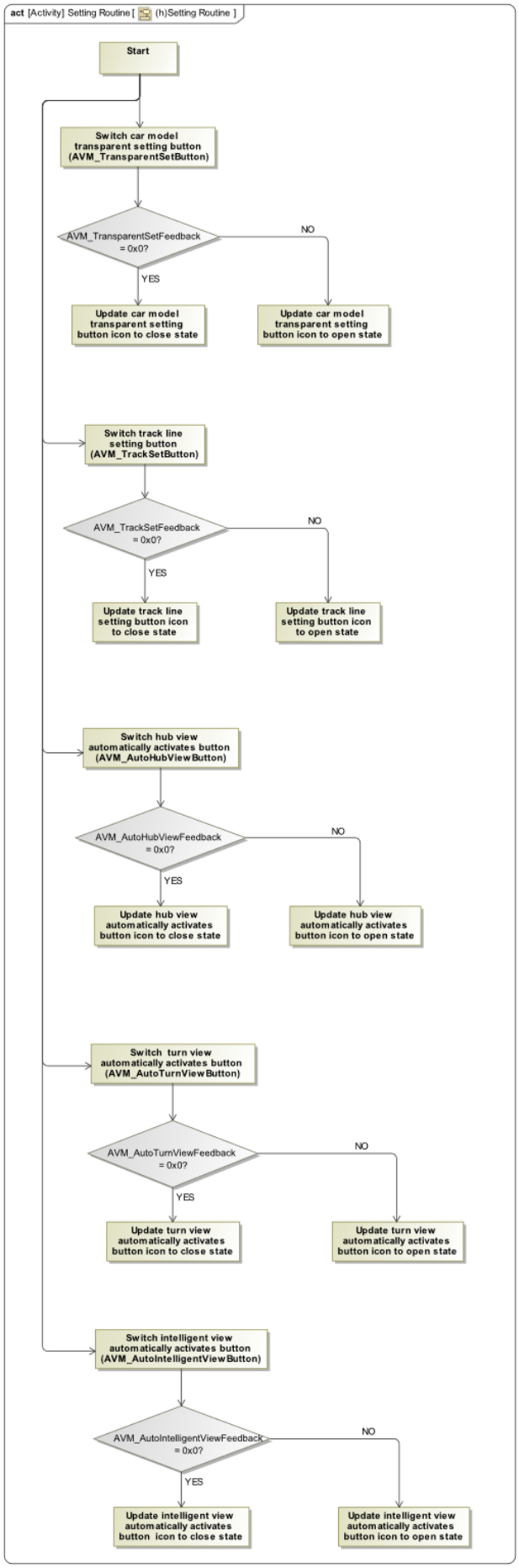

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Figure 9: Activity Diagram of (h)Setting Routine

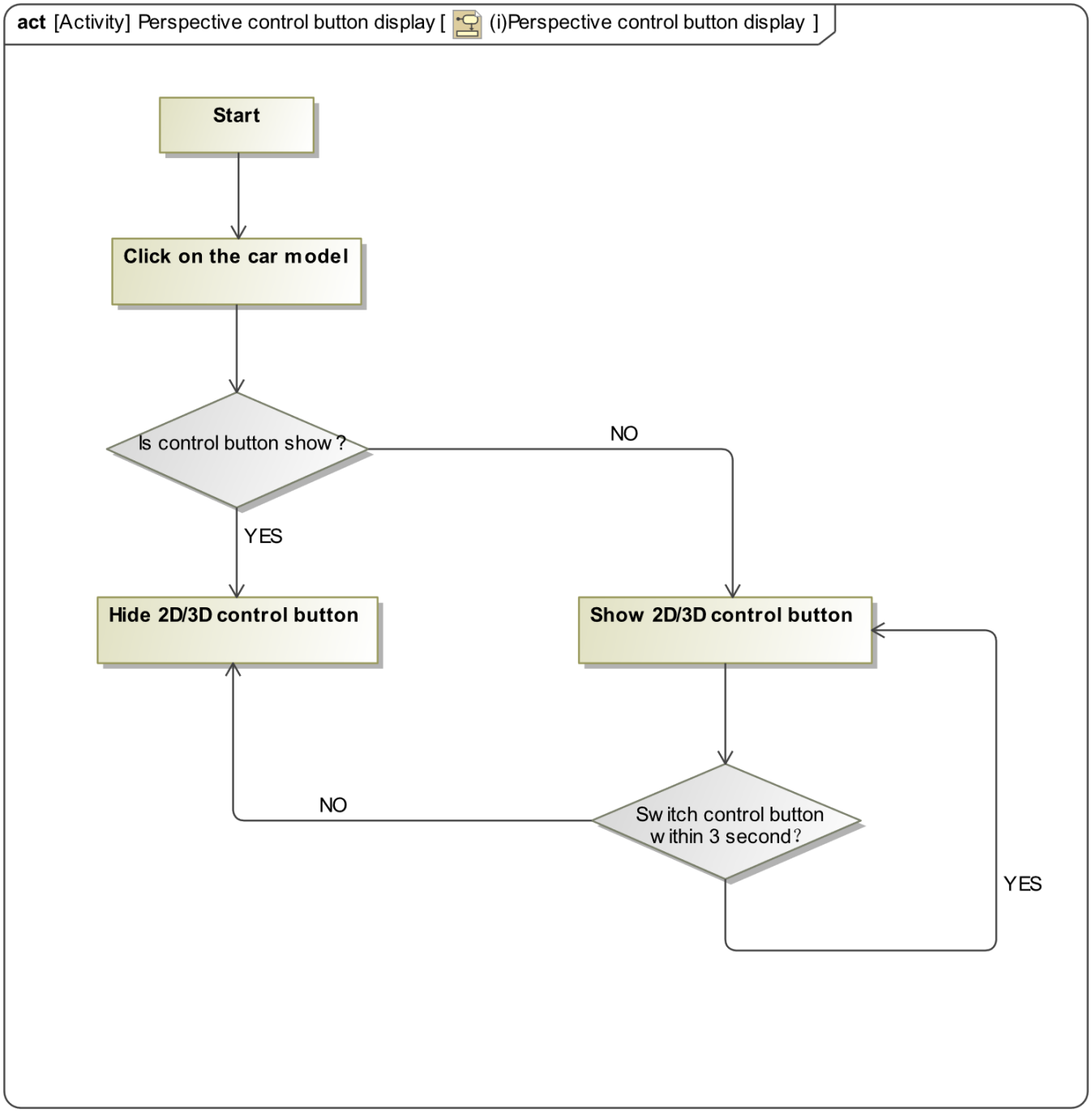

Figure 10: Activity Diagram of (i)Perspective control button display

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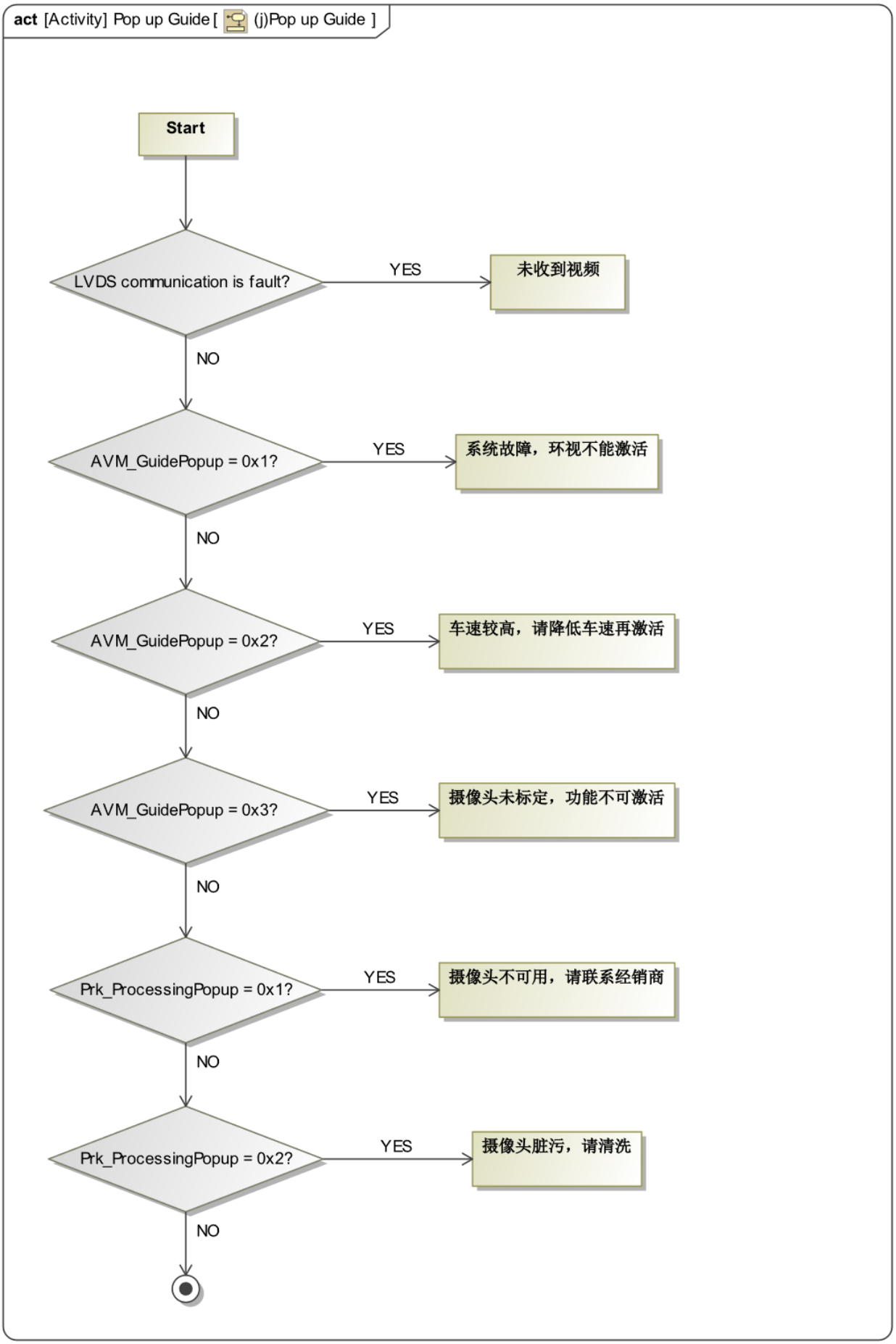

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Figure 11: Activity Diagram of (j)Pop up Guide

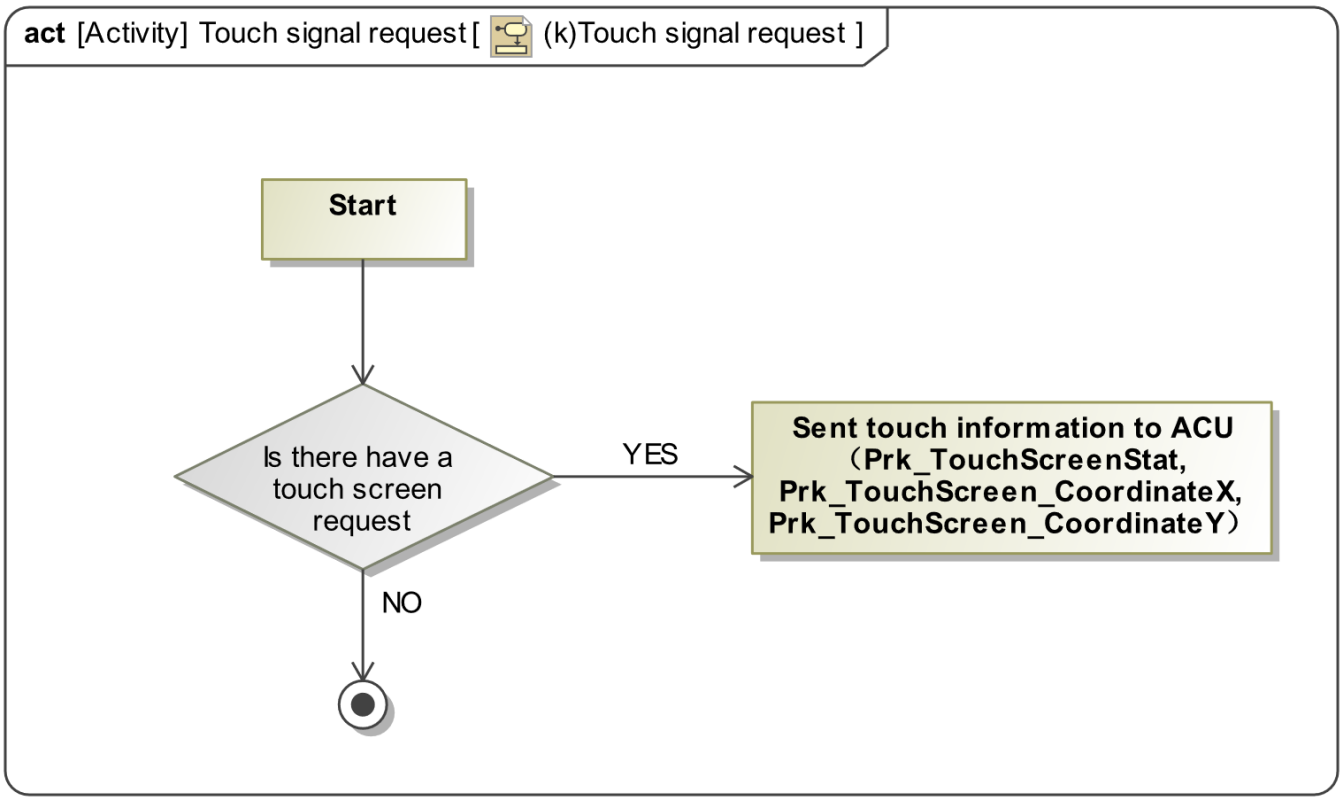

Figure 12: Activity Diagram of (k)Touch signal request

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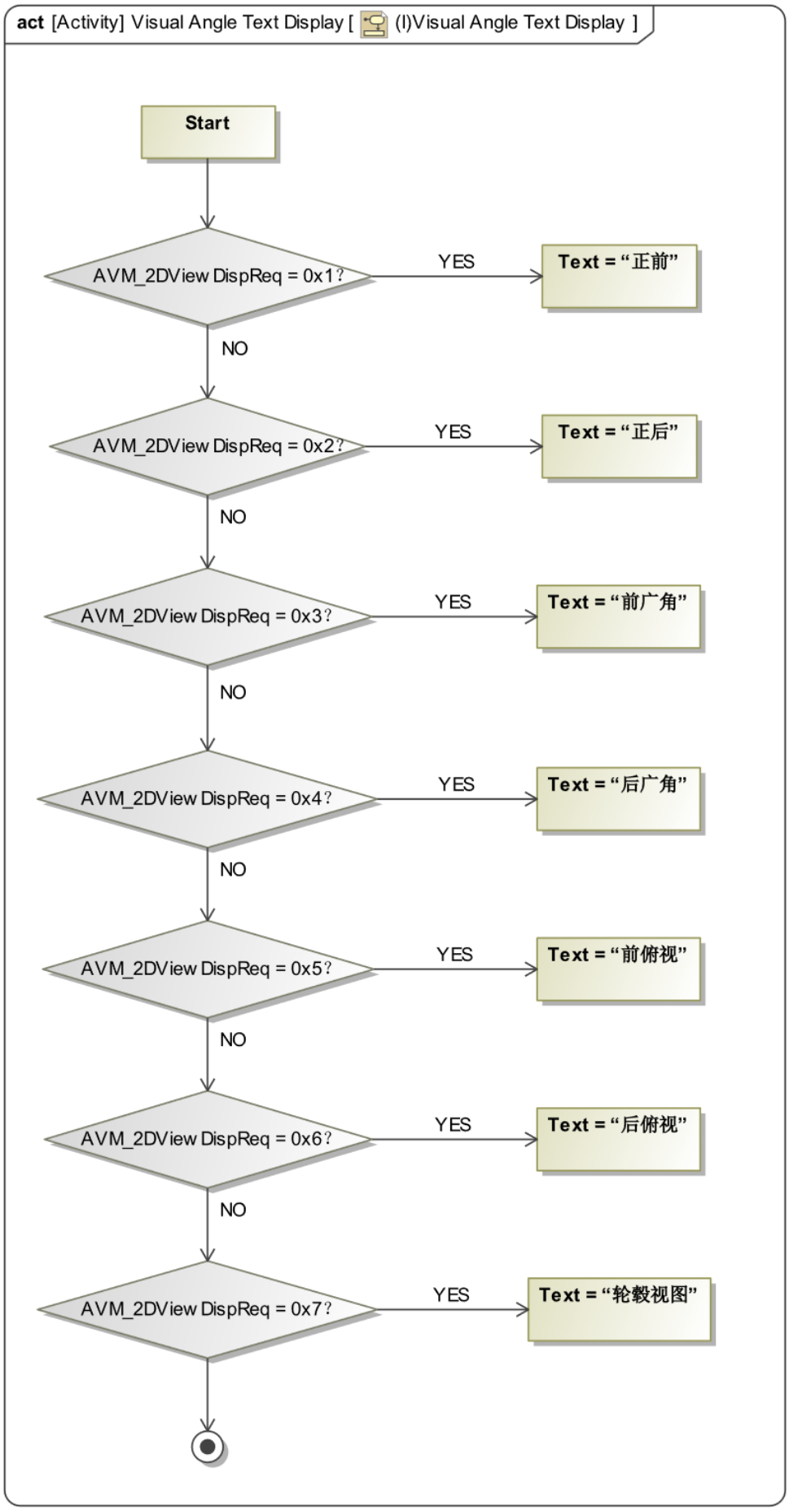

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Figure 13: Activity Diagram of (I)Visual Angle Text Display

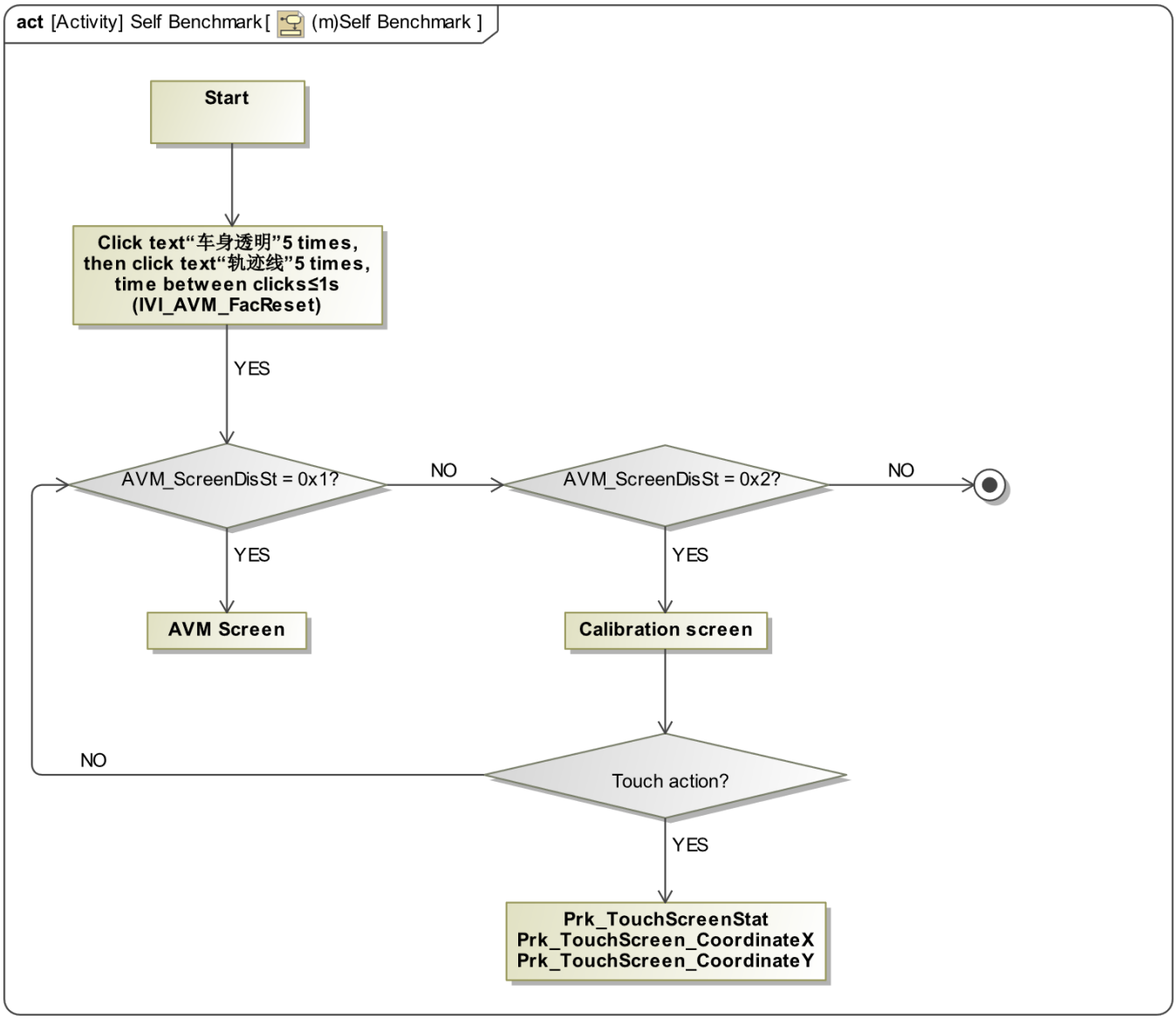

Figure 14: Activity Diagram of (m)Self Benchmark

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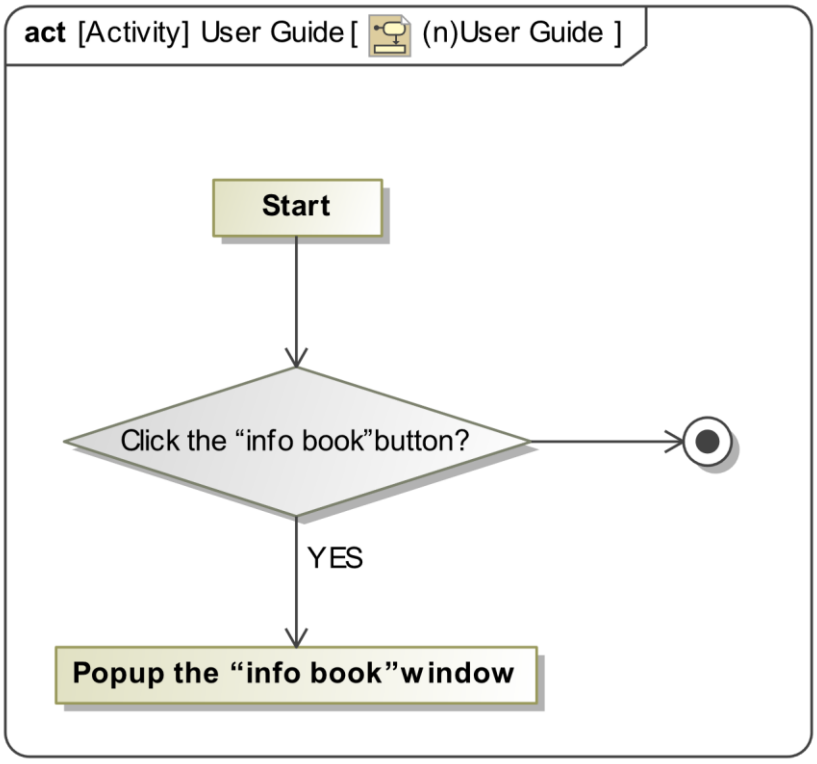

Figure 15: Activity Diagram of (n)User Guide

1.4.3 Sequence Diagrams

No sequence diagram associated to specified function.

1.4.4 Decision Tables

No Decision Tables found in the Magicdraw model.

1.5 Function requirements

1.5.1 Functional Requirements

1.5.1.1 Normal Operation

1 Input Signal Details

- INTERNAL:
  - Operational_Mode
  - Camera_360_Low_High_Cfg(配置子待申请)

- MUX message on the CAN Bus

Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.

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Prk_IVIFunc_Req	3		/	1	0		0(0x0)	7(0x7)
		No req				0x0		
		AVM ON req				0x1		
		APA ON req				0x2		
		Backtrack ON req				0x3		
		HAVP ON req				0x4		
		Reserved				0x5		
		Reserved				0x6		
		Reserved				0x7		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_PageDispReq	2		/	1	0		0(0x0)	3(0x3)
		No Req				0x0		
		AVM_Mainpage				0x1		
		Reserved				0x2		
		Reserved				0x3		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_2D_3D_ModeFeedback	1		/	1	0		0(0x0)	1(0x1)
		2D Mode				0x0		
		3D Mode				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_2DViewDispReq	4		/	1	0		0(0x0)	15(0xF)
		No View Req				0x0		
		Front View				0x1		
		Rear View				0x2		
		Front Wide View				0x3		
		Rear Wide View				0x4		
		Front Vertical View				0x5		
		Rear Vertical View				0x6		
		Hub View				0x7		
		Reserved				0x8		
		Reserved				0x9		
		Reserved				0xA		
		Reserved				0xB		
		Reserved				0xC		
		Reserved				0xD		
		Reserved				0xE		

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		Reserved				0xF		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_Current_3DAngle	9		Degree	1	0		0(0x0)	511(0x1FF)
		0-360degree						
		0x1FF: Invalid						
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_TransparentSetFeedback	1		/	1	0		0(0x0)	1(0x1)
		OFF				0x0		
		ON				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_TrackSetFeedback	1		/	1	0		0(0x0)	1(0x1)
		OFF				0x0		
		ON				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_AutoHubViewFeedback	1		/	1	0		0(0x0)	1(0x1)
		OFF				0x0		
		ON				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_AutoTurnViewFeedback	1		/	1	0		0(0x0)	1(0x1)
		OFF				0x0		
		ON				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_AutoIntelligentViewFeedback	1		/	1	0		0(0x0)	1(0x1)
		OFF				0x0		

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		ON				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
Prk_ProcessingPopup	3			1	0		0(0x0)	7(0x7)
		0x0: No Popup				0x0		
		0x1: Cameras failure please contact supplier				0x1		
		0x2: Cameras block please clean				0x2		
		0x3: R Gear AVM can't be closed				0x3		
		0x4: Reserved				0x4		
		0x5: Reserved				0x5		
		0x6: Reserved				0x6		
		0x7: Reserved				0x7		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_GuidePopup	3			1	0		0(0x0)	7(0x7)
		No Popup				0x0		
		Cameras failure 360 can't be activated				0x1		
		Please slow speed 30km/h to activate				0x2		
		cameras not calibrated 360 can't be activated				0x3		
		Reserved				0x4		
		Reserved				0x5		
		Reserved				0x6		
		Reserved				0x7		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_ScreenDisSt	2			1	0		0(0x0)	3(0x3)
		Reserved				0x0		
		Main Screen				0x1		
		EOL/Test				0x2		
		Reserved				0x3		

Satisfied by:

- Functions:
  - Around View Monitor Function

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Requirement ID: 1						
Rationale						
Acceptance Criteria						
Notes						
Source				**Owner**		
Source Req.				**V&V Method**		
Type		**Priority**		**Status**	In-Progress	
Req. Template Version 6.0					End of Requirement	

2 Output Signal Details

Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
IVI_Prk_DispStat	3			1	0		0(0x0)	7(0x7
		OFF				0x0		
		AVM actived				0x1		
		APA actived				0x2		
		Backtrack actived				0x3		
		HAVP active				0x4		
		Reserved				0x5		
		Reserved				0x6		
		Reserved				0x7		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_SoftButton	1			1	0		0(0x0)	1(0x1)
		No Pressed				0x0		
		Pressed				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_QuickPanelActivationButton	1			1	0		0(0x0)	1(0x1)
		No Pressed				0x0		
		Pressed				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_LauncherActivationButton	1			1	0		0(0x0)	1(0x1)
		No Pressed				0x0		
		Pressed				0x1		

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Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_VoiceActivationReq	2						0(0x0)	3(0x3)
		No request				0x0		
		ON				0x1		
		OFF				0x2		
		Reserved				0x3		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_SettingButton	1						0(0x0)	1(0x1)
		No Pressed				0x0		
		Pressed				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
Prk_ExitButton	1						0(0x0)	1(0x1)
		No Pressed				0x0		
		Pressed				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_2D_3D_Mode	1						0(0x0)	1(0x1)
		2D Mode				0x0		
		3D Mode				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_2D_ViewButton	3						0(0x0)	7(0x7)
		No View Req				0x0		
		Front View				0x1		
		Rear View				0x2		
		Front Wide View				0x3		
		Rear Wide View				0x4		
		Hub View				0x5		
		Reserved				0x6		
		Reserved				0x7		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_3D_ViewButton	3						0(0x0)	7(0x7)

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		No View Req				0x0		
		Front View				0x1		
		Rear View				0x2		
		Front Wide View				0x3		
		Rear Wide View				0x4		
		Hub View				0x5		
		Reserved				0x6		
		Reserved				0x7		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
Prk_TouchScreenStat	3						0(0x0)	7(0x7)
		No command				0x0		
		Press				0x1		
		Release				0x2		
		Slither				0x3		
		Reserved				0x4		
		Reserved				0x5		
		Reserved				0x6		
		Reserved				0x7		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
Prk_TouchScreen_CoordinateX	12						0(0x0)	4095(0xFFF)
		0~4095						
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
Prk_TouchScreen_CoordinateY	12						0(0x0)	4095(0xFFF)
		0~4095						
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_Drag_3DAngle	9		Degree				0(0x0)	511(0X1FF)
		0-360degree 0x1FF: Invalid						
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.

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AVM_SetReturn_Button	1						0(0X0)	1(0X1)
		No Pressed				0X0		
		Pressed				0X1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_TransparentSetButton	1						0(0x0)	1(0x1)
		OFF				0x0		
		ON				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_TrackSetButton	1						0(0x0)	1(0x1)
		ON				0x0		
		OFF				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_AutoHubViewButton	1						0(0x0)	1(0x1)
		ON				0x0		
		OFF				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_AutoTurnViewButton	1						0(0x0)	1(0x1)
		ON				0x0		
		OFF				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
AVM_AutoIntelligentViewButton	1						0(0x0)	1(0x1)
		ON				0x0		
		OFF				0x1		
Signal Name	Size(bits)	Detail	Units	Res.	Offset	State Encoded	Min.	Max.
IVI_AVM_FacReset	1						0(0x0)	1(0x1)

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		OFF				0x0		
		ON				0x1		

Satisfied by:

- Functions:
  - Around View Monitor Function

Requirement ID: 2					
Rationale					
Acceptance Criteria					
Notes					
Source				**Owner**	
Source Req.				**V&V Method**	
Type		**Priority**		**Status**	In-Progress
Req. Template Version 6.0					End of Requirement

3 Operational Mode

Mode	Differentiating Vehicle Conditions
Sleep Mode	Around View Monitor Function Text Message Disabled
Limited Mode	Around View Monitor Function Text Message Disabled
Normal Mode	Around View Monitor Function Text Message Enabled / Disabled
Crank Mode	Around View Monitor Function Text Message Enabled / Disabled

4 Subsystem Algorithm Flowchart/State Diagram

None.

5 Operation Description (supports algorithm flowchart /state diagram)

None.

6 Indicator Color Coordinates

None.

7 Indicator Characteristics

None.

8 Audio

None.

9 Switch Control Logic

Consumer access to AVM Configuration shall be as specified in the message center basic functionality display as specified in Message Center X Display_Y Button Interface Section, where X and Y are appropriate values in this document.

10 System Accuracy

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Within 100 msec of receiving a message that results in a change of state the cluster will update the display to the proper state.

11 Memory Storage

Parameter Name	Description	Value at Battery Connect	Value at Module Wake-up	Value at Transition to Normal/Crank Mode From Limited Mode
Operational_Mode	4 state indicator for cluster operational mode	Limited	Limited, Normal or Crank	Normal or Crank
Camera_360_Low_High_Cfg（配置字待申请）				
Prk_IVIFunc_Req	This signal indicates parking feature request for IVI to have function ON, include APA/AVM/Backtrack/HAVP.	0x0	0x0	0x0
AVM_PageDispReq	This signal indicates the different AVM pages request for APIM.	0x0	0x0	0x0
AVM_2D_3D_Mode Feedback	This signal indicates the feedback status of AVM 2D or 3D mode setting.	0x0	0x0	0x0
AVM_2DViewDispReq	This signal indicates current 2D view in IVI.	0x0	0x0	0x0
AVM_Current_3DAngle	This signal indicates the current angle of AVM under 3D mode, which is IPMB feedback to APIM.	0x0	0x0	0x0
AVM_TransparentSetFeedback	This signal indicates the feedback status of car model transparent setting.	0x0	0x0	0x0
AVM_TrackSetFeedback	This signal indicates the feedback status of track line setting.	0x0	0x0	0x0
AVM_AutoHubView Feedback	This signal indicates the feedback status of AVM hub view automatically activates setting.	0x0	0x0	0x0
AVM_AutoTurnView Feedback	This signal indicates the feedback status of AVM turn view automatically activates setting.	0x0	0x0	0x0
AVM_AutoIntelligentViewFeedback	This signal indicates the feedback status of AVM intelligent view automatically activates setting.	0x0	0x0	0x0
Prk_ProcessingPopup	This signal indicates the popup content after AVM camera fault, which is used for remind user on IVI screen.	0x0	0x0	0x0
AVM_GuidePopup	This signal indicates the prompt after AVM actived, which is dispalyed on IVI screen.	0x0	0x0	0x0

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AVM_ScreenDisSt	This signal indicates that AVM screen display status	0x0	0x0	0x0
IVI_Prk_DispStat	This signal indicates which parking feature is displayed on APIM, include APA/AVM/Backtrack/HAVP.	0x0	0x0	0x0
AVM_SoftButton	This signal indicates the soft button of AVM on APIM screen, if user click this button, APIM will sent pressed status to IPMB.	0x0	0x0	0x0
AVM_QuickPanelActivationButton	This signal indicates the soft button of AVM on APIM quick panel page, if user click this button, APIM will sent pressed status to IPMB.	0x0	0x0	0x0
AVM_LauncherActivationButton	This signal indicates the soft button of AVM on APIM launcher page, if user click this button, APIM will sent pressed status to IPMB.	0x0	0x0	0x0
AVM_VoiceActivationReq	This signal indicates the voice activation of AVM, if user request AVM ON by voice, APIM will sent this signal to IPMB.	0x0	0x0	0x0
AVM_SettingButton	This signal indicates the setting button of AVM on APIM screen, if user click this button, APIM will sent this	0x0	0x0	0x0
Prk_ExitButton	This signal indicates parking feature request for APIM to have function OFF, include APA/AVM/Backtrack/HAVP.	0x0	0x0	0x0
AVM_2D_3D_Mode	This signal indicates the AVM 2D or 3D mode that user selected on APIM screen.	0x0	0x0	0x0
AVM_2D_ViewButton	This signal indicates the button of different view of AVM under 2D mode, which is APIM sent to IPMB.	0x0	0x0	0x0
AVM_3D_ViewButton	This signal indicates the button of different view of AVM under 3D mode, which is APIM sent to IPMB.	0x0	0x0	0x0
Prk_TouchScreenStat	This signal indicates finger touch screen status, which is send by APIM to IPMB	0x0	0x0	0x0
Prk_TouchScreen_CoordinateX	This signal indicates the X coordinate of finger touch position on APIM screen	0x0	0x0	0x0
Prk_TouchScreen_CoordinateY	This signal indicates the Y coordinate of finger touch position on APIM screen	0x0	0x0	0x0

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AVM_Drag_3DAngle	This signal indicates the selected angle of AVM on APIM screen under 3D mode, which is APIM sent to IPMB.	0x0	0x0	0x0
AVM_SetReturn_Button	This signal indicates the exit button status of setting page.	0x0	0x0	0x0
AVM_TransparentSetButton	This signal indicates the status of car model transparent setting button.	0x0	0x0	0x0
AVM_TrackSetButton	This signal indicates the status of track line setting button.	0x0	0x0	0x0
AVM_AutoHubViewButton	This signal indicates the status of AVM hub view automatically activates button.	0x0	0x0	0x0
AVM_AutoTurnViewButton	This signal indicates the status of AVM turn view automatically activates button.	0x0	0x0	0x0
AVM_AutoIntelligentViewButton	This signal indicates the status of AVM intelligent view automatically activates button.	0x0	0x0	0x0
IVI_AVM_FacReset	This signal indicates that user want to factory reset when calibration failure.	0x0	0x0	0x0

12 Prove out

None.

13 Message Center Msg

None.

14 Self Test

None.

15 Engineering Test Mode

Reference section “Dealer / Engineering Test Mode (ETM)”.

16 Part II Performance

Supported Diagnostic Trouble Codes (DTCs)

DTC	Description
C15900(tbd)	Lost of Communication with IPAMB
CXXXX(tbd)	Invalid Data

DID 0xDExx

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Block Num	Block Description	Byte(s)	Bits	State: Description	"0"	"1"	Default	Comments / Information
PACKETED BLOCKS								

17 Reference Specification

None.

18 Voltage Level

Refer to the Cluster Features table located in the Operational Modes and Voltage Range Strategies Section in this SPSS.

19 Indicator Graphics/Display Format

None.

1.5.1.2 Error Handling

Missing Message Strategy

The signals will be declared missing as per the Diagnostics section of this SPSS.

DTCs states and history will be determined as per the Diagnostics section of this SPSS.

1.5.2 Non-Functional Requirements

No Non-Functional Requirements specified.

1.5.3 Functional Safety Requirements

Function Safety Classification(EMC)

None.

1.5.4 Other Requirements

No Other Requirements specified.

1.5.4.1 Design Requirements

No Design Requirements specified.

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2 OPEN CONCERNS

No Open Concerns (Ford Modeling Action Items) in the Magicdraw model.

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3 REVISION HISTORY

No Revision History found.

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4 APPENDIX

4.1 Data Dictionary

4.1.1 Logical Signals

No “Logical Interface Table” or “Logical Signals” tables found.

4.1.2 Logical Parameters

(No parameters have been defined)

4.1.3 Encoding Types

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