User's Manual

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R-Car V4H AUTOSAR R19-11 MCAL

Appendix

RTM8RC779GCMCL5DA0JCDRE
RTM8RC779GCMCL5QA0JCDRE
RTM8RC779GCSPL5DA0JCDRE
RTM8RC779GCSPL5QA0JCDRE
RTM8RC779GCCOM5DA0JCDRE
RTM8RC779GCCOM5QA0JCDRE
RTM8RC779GCCDD5DA0JCDRE
RTM8RC779GCCDD5QA0JCDRE

Target Device:
R-Car V4H

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1. Introduction

This document shall be used as reference by the users for module ROM/RAM usage, module stack size and module API execution time of AUTOSAR R19-11 for Gen4/V4H MCAL.

Modules:

- CAN
- DIO
- ETH
- FLS
- GPT
- MCU
- PORT
- SPI
- WDG
- CDDICCOM
- CDDTHS
- CDDEMM
- CDDIPMMU
- CDDIIC
- CDDRFSO
- CDDCRC

2. Memory Usage and Execution Time

2.1 Module ROM/RAM Usage

Module ROM/RAM usage shows the memory size allocated for each section used in each module.

2.2 Module Stack Size

Module stack size shows the max of stack size used in each module.
The unit of module stack size is Byte(s).

2.3 Module API Execution Time

Module API execution time shows the execution time of each module API.
The unit of module API execution time is microsecond.

3. Measurement Condition

Each module was measured with the following conditions:

- Typical configuration was used as the base configuraion for measurement.
  For details of configuration file, refer to the each module section.

- The CPU clock frequency used to measure the Execution Time is 1400 MHz
  for all the APIs.

The list of CDF files used for measurement are as below:

Module	CDF name	Remark
CAN	RCar_CAN_008.arxml	DET ON
	RCar_CAN_009.arxml	DET OFF
	RCar_CAN_001.arxml	DET ON
	RCar_CAN_014.arxml	DET ON
	RCar_CAN_RC_002.arxml	DET ON
GPT	RCar_Gpt_013.arxml	DET ON
	RCar_Gpt_014.arxml	DET OFF
DIO	RCar_Dio_007.arxml	DET ON
	RCar_Dio_008.arxml	DET OFF
ETH	RCar_Eth_011.arxml	DET ON
	RCar_Eth_012.arxml	DET OFF
CDDTHS	RCar_Cddths_030.arxml	DET OFF
	RCar_Cddths_031.arxml	DET ON
FLS	RCar_Fls_123.arxml	DET OFF
	RCar_Fls_124.arxml	DET ON
	RCar_Fls_138.arxml	DET OFF
	RCar_Fls_140.arxml	DET ON
MCU	RCar_Mcu_009.arxml	DET ON
	RCar_Mcu_010.arxml	DET OFF
	RCar_Mcu_017.arxml	DET OFF
PORT	RCar_Port_014.arxml	DET OFF
	RCar_Port_019.arxml	DET ON
SPI	RCar_Spi_003.arxml	DET OFF
	RCar_Spi_061.arxml	DET OFF
	RCar_Spi_060.arxml	DET ON
	RCar_Spi_067.arxml	DET ON
WDG	RCAR_Wdg_029.arxml	DET OFF
	RCAR_Wdg_030.arxml	DET ON
CDDCRC	RCar_CddCrc_001.arxml	DET ON
	RCar_CddCrc_003.arxml	DET OFF
CDDEMM	RCar_CddEmm_018.arxml	DET OFF
	RCar_CddEmm_019.arxml	DET ON
CDDICCOM	RCar_CddIccom_091.arxml	DET OFF
	RCar_CddIccom_092.arxml	DET ON
CDDIIC	RCar_CddIic_143.arxml	DET ON
	RCar_CddIic_144.arxml	DET OFF
	RCar_CddIic_148.arxml	DET ON
CDDIPMMU	RCar_CddIpmmu_041.arxml	DET ON
	RCar_CddIpmmu_040.arxml	DET OFF
CDDRFSO	RCar_Cddrfso_011.arxml	DET ON
	RCar_Cddrfso_012.arxml	DET OFF
	RCar_Cddrfso_025.arxml	DET OFF

Note: All *.arxml files are attached in the release package

4 CAN

4.1 CAN ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_CAN_008.arxml(DET_ON)' and 'RCar_CAN_009.arxml(DET_OFF)' configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CAN_PUBLIC_CODE_ROM	9344	7664
	CAN_PRIVATE_CODE_ROM	6536	6420
	CAN_APPL_CODE_ROM	80	80
	CAN_FAST_CODE_ROM	2812	2812
	CONST_ROM_8BIT	89	89
	CAN_CFG_DBTOC_UNSPECIFIED	476	476
	CAN_CFG_DATA_8BIT	2	2
	CAN_CFG_DATA_UNSPECIFIED	68	68
	Total	19407	17611
RAM	RAM_1BIT	6	6
	RAM_8BIT	2	2
	RAM_32BIT	12	12
	RAM_UNSPECIFIED	48	48
	NOINIT_RAM_1BIT	5	5
	NOINIT_RAM_8BIT	2	2
	NOINIT_RAM_32BIT	12	12
	NOINIT_RAM_UNSPECIFIED	48	48
	Total	135	135
Total	**-**	**19542**	**17746**

4.2 CAN Stack Size

This section provides the max of stack depth for the 'RCar_CAN_008.arxml(DET_ON)' and 'RCar_CAN_009.arxml(DET_OFF)' configuration.

Max of stack depth (Bytes)	800

4.3 CAN API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_CAN_001.arxml', 'RCar_CAN_009.arxml', RCar_CAN_014.arxml' and 'RCar_CAN_RC_002.arxml' configuration.

API Name	Execution time (us)	Remarks
Can_Init	52.2	-
Can_MainFunction_Write	0.8	-
Can_SetControllerMode_START	3.6	-
Can_SetControllerMode_STOP	3.4	-
Can_SetControllerMode_SLEEP	0.0	-
Can_DisableControllerInterrupts	0.0	-
Can_EnableControllerInterrupts	0.1	-
Can_Write	0.8	-
Can_GetVersionInfo	0.0	-
Can_MainFunction_Read	1.6	-
Can_MainFunction_BusOff	0.5	-
Can_MainFunction_Mode	0.1	-
Can_SetBaudrate	0.2	-
Can_GetControllerMode	0.0	-
Can_GetControllerErrorState	0.3	-
Can_GetControllerTxErrorCounter	0.2	-
Can_GetControllerRxErrorCounter	0.1	-
Can_SelfTestChannel	8.2	-
Can_RAMTest	25717.6	-
Can_SetIcomConfiguration	5.9	-
Can_DeInit	3.3	-
ISR_RX_RXFIFO_MODE	5.5	-
ISR_RX_TXRXFIFO_MODE	10.7	-
ISR_TX_BUFFER_MODE	7.2	-
ISR_TX_TXRXFIFO_MODE	7.5	-
ISR_TX_QUEUE_MODE	7.6	-
ISR_BUSOFF	6.7	-

5 GPT

5.1 GPT ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_Gpt_013.arxml' (DET ON) configuration and 'RCar_Gpt_014.arxml' (DET OFF) configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	GPT_PUBLIC_CODE_ROM	4664	3192
	GPT_PRIVATE_CODE_ROM	1960	1960
	GPT_FAST_CODE_ROM	360	360
	GPT_CFG_DATA_UNSPECIFIED	188	176
	GPT_CFG_DBTOC_UNSPECIFIED	16	16
	Total	7188	5704
RAM	RAM_1BIT	1	1
	GPT_CFG_RAM_UNSPECIFIED	12	12
	VAR_NO_INIT_PTR	12	12
	NOINIT_RAM_8BIT	1	1
	Total	26	26
Total	-	7214	5730

5.2 GPT Stack Size

This section provides the max of stack depth for the 'RCar_Gpt_013.arxml' configuration.

Max of stack depth (Bytes)	224

5.3 GPT API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_Gpt_014.arxml' configuration.

API Name	Execution time (us)	Remarks
Gpt_Init	25.4	-
Gpt_DeInit	12.5	-
Gpt_GetTimeElapsed	2.1	-
Gpt_GetTimeRemaining	0.8	-
Gpt_StartTimer	7.2	-
Gpt_StopTimer	1.8	-
Gpt_EnableNotification	0.2	-
Gpt_DisableNotification	0.04	-
Gpt_GetPredefTimerValue	1.0	-
Gpt_GetVersionInfo	0.1	-
Gpt_SetMode	1.0	-
Gpt_DisableWakeup	2.1	-
Gpt_EnableWakeup	0.3	-
Gpt_CheckWakeup	0.3	-
Gpt_HW_Tmu_CbkNotification	0.9	-

6 DIO

6.1 DIO ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_Dio_007.arxml' configuration with DET enabled and 'RCar_Dio_008.arxml' configuration with DET disabled.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	DIO_PUBLIC_CODE_ROM	1036	648
	DIO_PRIVATE_CODE_ROM	524	524
	DIO_CFG_DATA_UNSPECIFIED	100	100
	Total	1660	1272
RAM	-	0	0
Total	**-**	1660	1272

6.2 DIO Stack Size

This section provides the max of stack depth for the 'RCar_Dio_007.arxml' configuration.

Max of stack depth (Bytes)	128

6.3 DIO API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_Dio_008.arxml' configuration.

API Name	Execution time (us)	Remarks
Dio_WriteChannel	3.0	-
Dio_ReadChannel	3.7	-
Dio_WritePort	2.5	-
Dio_ReadPort	3.9	-
Dio_WriteChannelGroup	2.6	-
Dio_ReadChannelGroup	3.9	-
Dio_MaskedWritePort	2.6	-
Dio_FlipChannel	5.2	-
Dio_GetVersionInfo	0.0	-
Dio_ReadChannelOutputValue	0.7	-
Dio_ReadChannelGroupOutputValue	0.7	-

7 ETH

7.1 ETH ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_Eth_011.arxml' configuration for DET ON, 'RCar_Eth_012.arxml' for DET OFF.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	ETH_PUBLIC_CODE_ROM	7084	3756
	ETH_PRIVATE_CODE_ROM	15048	14936
	ETH_FAST_CODE_ROM	324	324
	CONST_ROM_32BIT	32	32
	ETH_CFG_DBTOC_UNSPECIFIED	8	8
	ETH_CFG_DATA_UNSPECIFIED	660	660
	Total	23156	19716
RAM	RAM_UNSPECIFIED	40	40
	NOINIT_RAM_32BIT	12	12
	NOINIT_RAM_UNSPECIFIED	6048	6048
	RAM_16BIT	72	72
	RAM_32BIT	24	24
	ETH_PORT_RAM_0	101072	101072
	ETH_PORT_RAM_1	101072	101072
	ETH_PORT_RAM_2	101072	101072
	ETH_PORT_DESCRIPTOR_0	1328	1328
	ETH_PORT_DESCRIPTOR_1	1328	1328
	ETH_PORT_DESCRIPTOR_2	1328	1328
	Total	313396	313396
Total	**-**	**336552**	**333112**

7.2 ETH Stack Size

This section provides the max of stack depth for the 'RCar_Eth_012.arxml' configuration.

Max of stack depth (Bytes)	576

7.3 ETH API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_Eth_012.arxml' configuration.

API Name	Execution time (us)	Remarks
Eth_Init	15.7	-
Eth_SetControllerMode(MODE_ACTIVE)	58.4	-
Eth_SetControllerMode(MODE_DOWN)	4.7	-
Eth_GetControllerMode	0.0	-
Eth_GetPhysAddr	0.0	-
Eth_SetPhysAddr	0.2	-
Eth_UpdatePhysAddrFilter	0.3	-
Eth_WriteMii	41.3	-
Eth_ReadMii	40.5	-
Eth_GetCounterValues	0.9	-
Eth_GetRxStats	2.6	-
Eth_GetTxStats	0.0	-
Eth_GetTxErrorCounterValues	0.0	-
Eth_ProvideTxBuffer	1.1	-
Eth_Transmit	2.3	-
Eth_Receive	3.7	-
Eth_TxConfirmation	2.1	-
Eth_GetVersionInfo	0.3	-
Eth_MainFunction	2.6	-
Eth_GetCurrentTime	1.0	-
Eth_EnableEgressTimeStamp	0.4	-
Eth_GetEgressTimeStamp	1.0	-
Eth_GetIngressTimeStamp	0.7	-
Eth_SetIncrementTimeForGptp	0.0	-
Eth_SetOffsetTimeForGptp	0.0	-
Eth_UpdateStreamFilter	0.4	-
ETH_AVBnDATAISR (Transmit)	2.4	-
ETH_AVBnDATAISR (Receive)	4.3	-

8 CDDTHS

8.1 CDDTHS ROM/RAM Usage

This section provides memory usage details measured using the RCar_Cddths_030.arxml and RCar_Cddths_031.arxml configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CODE_SLOW	3548	2416
	CONFIG_DATA_UNSPECIFIED	32	32
	Total	3580	2448
RAM	VAR_INIT_8	1	0
	VAR_INIT_UNSPECIFIED	4	4
	VAR_NO_INIT_PTR	4	4
	Total	9	8
Total	**-**	**3589**	**2456**

8.2 CDDTHS Stack Size

This section provides max of stack depth measured using the RCar_Cddths_030.arxml and RCar_Cddths_031.arxml configuration.

Max of stack depth (Bytes)	320

8.3 CDDTHS API Execution Time

This section provides excution time detail measured using the RCar_Cddths_030.arxml configuration.

API Name	Execution time (us)	Remarks
CddThs_Init	2244.5	-
CddThs_SetThermalInterruptionMode	2.0	-
CddThs_ConfigureThermalInterruption	9.6	-
CddThs_GetCurrentTemperature	4.4	-
CddThs_GetCurrentVoltage	1.0	-
CddThs_SetOperationState	2107.9	-
CddThs_GetOperationState	0.1	-
CddThs_GetVersionInfo	0.1	-
CddThs_DeInit	2114.0	-
CddThs_ClearTemperatureErrorStatus	0.02	-

9 FLS

9.1 FLS ROM/RAM Usage

This section provides memory usage details measured using the: RCar_Fls_123.arxml' configuration for Serial Flash (DET_OFF), RCar_Fls_124.arxml' configuration for Serial Flash (DET_ON), RCar_Fls_138.arxml' configuration for Hyper Flash (DET_OFF), RCar_Fls_140.arxml' configuration for Hyper Flash (DET_ON).

ROM/RAM for HyperFlash	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CODE_FAST	0	0
	CODE_SLOW	16172	13980
	CONFIG_DATA_UNSPECIFIED	636	636
	Total	16808	14616
RAM	VAR_INIT_UNSPECIFIED	8	8
	VAR_NO_INIT_UNSPECIFIED	76	76
	VAR_NO_INIT_PTR	4	4
	Total	88	88
Total	-	**16896**	**14704**

ROM/RAM for SerialFlash	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CODE_FAST	0	0
	CODE_SLOW	18236	15604
	CONFIG_DATA_UNSPECIFIED	928	928
	Total	19164	16532
RAM	VAR_INIT_UNSPECIFIED	8	8
	VAR_NO_INIT_UNSPECIFIED	84	84
	VAR_NO_INIT_PTR	4	4
	Total	96	96
Total	-	**19260**	**16628**

9.2 FLS Stack Size

This section provides memory usage details measured using the: RCar_Fls_123.arxml' configuration for Serial Flash (DET_OFF), RCar_Fls_124.arxml' configuration for Serial Flash (DET_ON), RCar_Fls_138.arxml' configuration for Hyper Flash (DET_OFF), RCar_Fls_140.arxml' configuration for Hyper Flash (DET_ON).

Max of stack depth for HyperFlash (Bytes)	1248

Max of stack depth for Serial Flash (Bytes)	1536

9.3 FLS API Execution Time

This section provides memory usage details measured using the: RCar_Fls_123.arxml' configuration for Serial Flash (DET_OFF), RCar_Fls_138.arxml' configuration for Hyper Flash (DET_OFF).

API Name	Execution time (us)		Remarks
	SerialFlash	HyperFlash	
Fls_BlankCheck	2.0	1.6	-
Fls_Cancel	2.0	1.6	-
Fls_Compare	2.0	1.6	-
Fls_DDRCalibrate	87.5	0.0	This function is not supported in Hyper Flash
Fls_DDRVerifyPattern	26.0	0.0	This function is not supported in Hyper Flash
Fls_DDRWritePattern	27.7	0.0	This function is not supported in Hyper Flash
Fls_Erase	2.1	1.6	-
Fls_GetJobResult	0.0	0.0	-
Fls_GetStatus	0.1	0.1	-
Fls_GetVersionInfo	0.3	0.3	-
Fls_Init	26.5	94.1	-
Fls_MainFunction_BlankCheck	92.7	50.4	-
Fls_MainFunction_Compare	96.4	53.6	-
Fls_MainFunction_Erase	1075714.4	1218915.3	-
Fls_MainFunction_Read	62.0	35.6	-
Fls_MainFunction_Write	2757.2	2214.3	-
Fls_Read	2.0	1.6	-
Fls_Resume	2.0	1.6	-
Fls_SendSpecificConfig_Read	24.1	31.4	-
Fls_SendSpecificConfig_Write	23.2	31.1	-
Fls_SetMode	0.3	0.3	-
Fls_Suspend	2.0	1.5	-
Fls_Write	2.0	1.7	-

10 MCU

10.1 MCU ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_Mcu_009.arxml' and 'RCar_Mcu_010.arxml' configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	MCU_PUBLIC_CODE_ROM	1016	352
	MCU_PRIVATE_CODE_ROM	2832	2832
	CONFIG_DATA_8	4	4
	CONFIG_DATA_32	608	608
	CONST_UNSPECIFIED	128	128
	CONFIG_DBTOC_DATA_UNSPECIFIED	32	32
	CONFIG_DATA_UNSPECIFIED	52	52
	Total	4672	4008
RAM	VAR_INIT_1	4	4
	VAR_NO_INIT_32	12	12
	VAR_NO_INIT_PTR	20	20
	Total	36	36
Total	**-**	**4708**	**4044**

10.2 MCU Stack Size

This section provides the max of stack depth for the 'RCar_Mcu_009.arxml' configuration.

Max of stack depth (Bytes)	192

10.3 MCU API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_Mcu_017.arxml' configuration.

API Name	Execution time (us)	Remarks
Mcu_Init	0.3	-
Mcu_InitClock	236.5	-
Mcu_InitRamSection	1.0	-
Mcu_GetPllStatus	1.2	-
Mcu_DistributePllClock	81.7	-
Mcu_GetRamState	0.0	-
Mcu_GetResetReason	2.0	-
Mcu_GetResetRawValue	0.2	-
Mcu_GetVersionInfo	0.02	-
Mcu_SetMode	0.03	-
Mcu_PerformReset	0.03	-

11 PORT

11.1 PORT ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_Port_019.arxml' configuration with DET enabled and the 'RCar_Port_014.arxml' configuration with DET disabled

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	PORT_PUBLIC_CODE_ROM	1304	888
	PORT_PRIVATE_CODE_ROM	6016	5960
	CONFIG_DATA_UNSPECIFIED	2316	2316
	PORT_CFG_DBTOC_UNSPECIFIED	40	40
	Total	9676	9204
RAM	VAR_INIT_1	1	1
	VAR_NO_INIT_32	8	8
	VAR_NO_INIT_PTR	4	4
	Total	13	13
Total	-	9689	9217

11.2 PORT Stack Size

This section provides the max of stack depth for the 'RCar_Port_019.arxml' configuration with DET enabled and the 'RCar_Port_014.arxml' configuration with DET disabled

Max of stack depth (Bytes)	96

11.3 PORT API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_Port_014.arxml' configuration.

API Name	Execution time (us)	Remarks
Port_Init	196.8	-
Port_SetPinDirection	5.4	-
Port_GetVersionInfo	0.03	-
Port_SetPinDefaultDirection	5.3	-
Port_SetToDioMode	2.6	-
Port_SetToAlternateMode	1.0	-
Port_RefreshPortDirection	16.9	-
Port_SetPinMode	5.8	-
Port_FUSEMonitoring	1.5	-
Port_UnintendedModuleStopCheck	1.4	-

12 SPI

12.1 SPI ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_Spi_003.arxml' (DET OFF) and 'RCar_Spi_060.arxml' (DET ON) configurations.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	SPI_PUBLIC_CODE_ROM	4128	2700
	SPI_PRIVATE_CODE_ROM	9588	9588
	CODE_FAST	312	312
	CONST_UNSPECIFIED	48	48
	CONFIG_DBTOC_DATA_UNSPECIFIED	36	36
	CONFIG_DATA_UNSPECIFIED	349	349
	Total	14461	13033
RAM	VAR_INIT_1	1	1
	VAR_NO_INIT_32	272	272
	VAR_NO_INIT_UNSPECIFIED	232	232
	VAR_NO_INIT_PTR	24	24
	Total	529	529
Total	-	14990	13562

12.2 SPI Stack Size

This section provides the max of stack depth for the 'RCar_Spi_003.arxml' (DMA OFF / DET OFF), 'RCar_Spi_060.arxml' (DMA OFF / DET ON), 'RCar_Spi_061.arxml' (DMA ON / DET OFF), 'RCar_Spi_067.arxml' (DMA ON / DET ON) configurations.

Max of stack depth (Bytes)	528

12.3 SPI API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_Spi_003.arxml' for API and 'RCar_Spi_061.arxml' for SPI_DMA0_00_ISR configurations.

API Name	Execution time (us)	Remarks
Spi_Init	27.5	-
Spi_DeInit	15.1	-
Spi_WriteIB	0.9	-
Spi_AsyncTransmit	125.8	-
Spi_ReadIB	0.7	-
Spi_SetupEB	0.1	-
Spi_GetStatus	0.2	-
Spi_GetJobResult	0.02	-
Spi_GetSequenceResult	0.0	-
Spi_GetVersionInfo	0.1	-
Spi_SyncTransmit	22241.4	-
Spi_GetHWUnitStatus	0.1	-
Spi_Cancel	0.7	-
Spi_SetAsyncMode(SPI_INTERRUPT_MODE)	0.1	-
Spi_SetAsyncMode(SPI_POLLING_MODE)	5.5	-
Spi_MainFunction_Handling	2.0	-
Spi_ForceCancel	22044	-
SPI_MSIOFn_ISR	68.1	-
SPI_DMAj_nn_ISR	77.4	-

13 WDG

13.1 WDG ROM/RAM Usage

This section provides memory usage details measured using the 'RCAR_Wdg_029.arxml' and 'RCAR_Wdg_030.arxml' configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	WDG_PUBLIC_CODE_ROM	480	164
	WDG_PRIVATE_CODE_ROM	1508	1892
	CODE_FAST	136	136
	CONFIG_DBTOC_DATA_UNSPECIFIED	32	32
	CONST_UNSPECIFIED	12	12
	Total	2168	2236
RAM	VAR_INIT_UNSPECIFIED	4	0
	VAR_NO_INIT_UNSPECIFIED	4	4
	VAR_NO_INIT_PTR	8	8
	VAR_NO_INIT_32	12	12
	Total	28	24
Total	**-**	2196	2260

13.2 WDG Stack Size

This section provides the max of stack depth for the 'RCAR_Wdg_029.arxml' and 'RCAR_Wdg_030.arxml' configuration.

Max of stack depth (Bytes)	224

13.3 WDG API Execution Time

This section provides Execution Time details of the API measured using the 'RCAR_Wdg_029.arxml'

API Name	Execution time (us)	Remarks
Wdg_Init	131.5	-
Wdg_SetMode	0.1	-
Wdg_SetTriggerCondition	144.5	-
Wdg_GetVersionInfo	0.1	-
Wdg_Cbk_GptNotification	1.1	-

14 CDDCRC

14.1 CDDCRC ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_CddCrc_001.arxml' configuration with DET enabled and 'RCar_CddCrc_003.arxml' configuration with DET disabled.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CDDCRC_PRIVATE_CODE_ROM	2192	2192
	CDDCRC_PUBLIC_CODE_ROM	3248	1556
	CODE_FAST	1024	1024
	CONFIG_DBTOC_DATA_UNSPECIFIED	20	20
	CONFIG_DATA_UNSPECIFIED	1484	1484
	CONST_UNSPECIFIED	24	24
	Total	7992	6300
RAM	VAR_INIT_8	1	1
	VAR_CLEARED_UNSPECIFIED	384	384
	VAR_NO_INIT_PTR	16	16
	VAR_CLEARED_DESC_UNSPECIFIED	768	768
	Total	1169	1169
Total	**-**	**9161**	**7469**

14.2 CDDCRC Stack Size

This section provides the max of stack depth for the 'RCar_CddCrc_001.arxml' configuration.

Max of stack depth (Bytes)	256

14.3 CDDCRC API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_CddCrc_003.arxml' configuration.

API Name	Execution time (us)	Remarks
CddCrc_GetVersionInfo	0.04	-
CddCrc_Init	6.2	-
CddCrc_Process	4.2	-
CddCrc_SetMode	0.3	-
CddCrc_SetupEB	0.6	-
CddCrc_Write	0.7	-
CddCrc_ReadStatus	0.1	-
CddCrc_Compare	2.4	-
CddCrc_ReadCompareResult	0.3	-
CddCrc_Command	0.8	-
CddCrc_UnintendedModuleStopCheck	2.0	-
CddCrc_Stop	0.8	-
CDDCRC_DMAxx_ISR	0.9	-

15 CDDEMM

15.1 CDDEMM ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_CddEmm_018.arxml' (DET OFF) and 'RCar_CddEmm_019.arxml' (DET ON) configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CODE_SLOW	4320	3232
	CODE_FAST	6276	6276
	CONFIG_DATA_32	8472	8472
	Total	19068	17980
RAM	VAR_INIT_1	4	4
	VAR_INIT_32	0	0
	VAR_CLEARED_32	1160	1160
	VAR_NO_INIT_PTR	16	16
	Total	1180	1180
Total	**-**	**20248**	**19160**

15.2 CDDEMM Stack Size

This section provides the max of stack depth for the 'RCar_CddEmm_019.arxml' configuration.

Max of stack depth (Bytes)	224

15.3 CDDEMM API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_CddEmm_018.arxml' configuration.

API Name	Execution time (us)	Remarks
CddEmm_GetVersionInfo	0.2	-
CddEmm_Init	29.3	-
CddEmm_SupportPseudoError	0.5	-
CddEmm_SetTarget	0.4	-
CddEmm_SetPseudoErrorSignal	0.3	-
CddEmm_ReadErrorStatus	2.2	-
CddEmm_ClearPseudoErrorSignal	0.1	-
CddEmm_ClearErrorStatus	0.8	-
CddEmm_GetCurrentErrorCountUpValue	5.5	-
CddEmm_SetHoldMaskCounter	0.3	-
CddEmm_SupportControlExternalErrorRequest	0.3	-
CDDEMM_DOMAIN0_ISR	1.1	-
CDDEMM_DOMAIN1_ISR	0.8	-
CDDEMM_DOMAIN2_ISR	0.8	-
CDDEMM_DOMAIN3_ISR	0.8	-
CDDEMM_DOMAIN4_ISR	0.8	-
CDDEMM_DOMAIN5_ISR	0.8	-
CDDEMM_DOMAIN6_ISR	0.8	-
CDDEMM_DOMAIN7_ISR	0.8	-
CDDEMM_DOMAIN8_ISR	0.8	-
CDDEMM_DOMAIN9_ISR	0.8	-
CDDEMM_DOMAIN10_ISR	0.8	-
CDDEMM_DOMAIN11_ISR	0.8	-
CDDEMM_DOMAIN12_ISR	0.8	-
CDDEMM_DOMAIN13_ISR	0.8	-
CDDEMM_DOMAIN16_ISR	0.8	-
CDDEMM_DOMAIN17_ISR	0.8	-
CDDEMM_DOMAIN18_ISR	0.8	-
CDDEMM_DOMAIN19_ISR	0.8	-
CDDEMM_DOMAIN20_ISR	0.8	-
CDDEMM_DOMAIN21_ISR	1.0	-
CDDEMM_DOMAIN22_ISR	0.8	
CDDEMM_DOMAIN23_ISR	0.8	-
CDDEMM_DOMAIN24_ISR	0.8	-
CDDEMM_DOMAIN25_ISR	0.8	-
CDDEMM_DOMAIN26_ISR	0.8	-
CDDEMM_DOMAIN27_ISR	0.8	-
CDDEMM_DOMAIN28_ISR	0.8	-
CDDEMM_DOMAIN29_ISR	0.8	-
CDDEMM_DOMAIN30_ISR	0.8	-
CDDEMM_DOMAIN31_ISR	0.9	-
CDDEMM_DOMAIN32_ISR	0.8	-
CDDEMM_DOMAIN33_ISR	0.8	-
CDDEMM_DOMAIN34_ISR	0.8	-
CDDEMM_DOMAIN35_ISR	0.8	-
CDDEMM_DOMAIN36_ISR	0.8	-
CDDEMM_DOMAIN38_ISR	0.9	-
CDDEMM_DOMAIN39_ISR	0.8	-
CDDEMM_DOMAIN40_ISR	0.8	-
CDDEMM_DOMAIN41_ISR	0.8	-
CDDEMM_DOMAIN42_ISR	0.8	-

16 CDDICCOM

16.1 CDDICCOM ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_CddIccom_091.arxml' (DET OFF) and 'RCar_CddIccom_092.arxml' (DET ON) configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CODE	2212	948
	CODE_FAST	528	528
	CODE_SLOW	3976	3600
	CONFIG_DATA_32	268	268
	Total	**6984**	**5344**
RAM	VAR_INIT_32	4	4
	VAR_CLEARED_32	240	240
	VAR_NO_INIT_PTR	8	8
	Total	**252**	**252**
Total	**-**	**7236**	**5596**

16.2 CDDICCOM Stack Size

This section provides the max of stack depth for the 'RCar_CddIccom_091.arxml' configuration.

Max of stack depth (Bytes)	480

16.3 CDDICCOM API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_CddIccom_091.arxml' configuration.
The result is collected with precondition Cortex-R52 L1 Cache OFF.

API Name	Execution time (us)	Remarks
CddIccom_Init	0.4	-
CddIccom_GetVersionInfo	1.6	-
CddIccom_Ch0SendRun	21.6	-
CddIccom_Ch0ReceiveRun	51.9	-
CddIccom_MainFunction_Send	7.2	-
MFIS_xIICR0_ISR_RCV_INIT	2.2	-
MFIS_xIICR0_ISR_RCV_ACK	2.3	-
MFIS_xIICR0_ISR_RCV_DATA	3.6	-

Note: ICCOM driver supports multiple channels, however, the implementation of them are same. Therefore, the test result is collected on Channel 0 for communication between CR52 core 0 and AP-System core (CA76) core 0 domain.

17 CDDIIC

17.1 CDDIIC ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_Cddlic_143.arxml(DET ON)' configuration and 'RCar_Cddlic_144.arxml(DET OFF)' configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CODE_ROM	1384	1384
	CODE_FAST	2476	2476
	CODE_SLOW	5072	4416
	CONFIG_DATA_32	620	620
	Total	9552	8896
RAM	VAR_INIT_1	1	1
	VAR_CLEARED_32	240	240
	VAR_NO_INIT_PTR	8	8
	Total	249	249
Total	-	**9801**	**9145**

17.2 CDDIIC Stack Size

This section provides the max of stack depth for the 'RCar_Cddlic_143.arxml' configuration.

Max of stack depth (Bytes)	448

17.3 CDDIIC API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_Cddlic_144.arxml' configuration for all API except CDDIIC_DMAn_ISR use 'RCar_Cddlic_148.arxml'.

API Name	Execution time (us)	Remarks
Cddlic_Init	47.7	-
Cddlic_GetVersionInfo	0.4	-
Cddlic_ChnSlaveInit (n = 0...5)	5.1	-
Cddlic_ChnWrite (n = 0...5)	8.0	-
Cddlic_ChnRead (n = 0...5)	7.0	-
Cddlic_ChnWriteRead (n = 0...5)	7.4	-
IIC_HW_CHn_ISR (n = 0...5)	2.0	-
CDDIIC_DMAn_ISR (n = 0...31)	3.2	-

18 CDDIPMMU

18.1 CDDIPMMU ROM/RAM Usage

This section provides memory usage details measured using the 'RCar_CddIpmmu_041.arxml (DET ON)' and 'RCar_CddIpmmu_040.arxml (DET OFF)' configurations.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CODE_SLOW	7996	5412
	CODE_FAST	1052	1052
	CONFIG_DATA_32	24	24
	CONFIG_DATA_UNSPECIFIED	248	248
	Total	9320	6736
RAM	VAR_NO_INIT_PTR	4	4
	VAR_INIT_1	1	1
	Total	5	5
Total	**-**	**9325**	**6741**

18.2 CDDIPMMU Stack Size

This section provides memory usage details measured using the 'RCar_CddIpmmu_041.arxml (DET ON)' and 'RCar_CddIpmmu_040.arxml (DET OFF)' configurations.

Max of stack depth (Bytes)	512

18.3 CDDIPMMU API Execution Time

This section provides Execution Time details of the API measured using the 'RCar_CddIpmmu_040.arxml (DET OFF)' configuration.

API Name	Execution time (us)	Remarks
CddIpmmu_Init	13.8	-
CddIpmmu_MmuSetMode	0.7	-
CddIpmmu_MmuSetMemAttr	0.5	-
CddIpmmu_MmuSetTransTableBase	0.9	-
CddIpmmu_MmuEnable	0.3	-
CddIpmmu_MmuDisable	0.3	-
CddIpmmu_MmuFlush	0.2	-
CddIpmmu_PmbSet	0.7	-
CddIpmmu_PmbEnable	0.3	-
CddIpmmu_PmbDisable	0.2	-
CddIpmmu_MicroTlbSet	0.6	-
CddIpmmu_MicroTlbFlush	0.3	-
CddIpmmu_MmuIsEnable	0.1	-
CddIpmmu_MmuGetMode	0.2	-
CddIpmmu_MmuGetMemAttr	0.2	-
CddIpmmu_MmuGetTransTableBase	0.4	-
CddIpmmu_PmbGet	0.5	-
CddIpmmu_PmbIsEnable	0.2	-
CddIpmmu_MicroTlbGet	0.4	-
CddIpmmu_GetVersionInfo	0.0	-
CDDIPMMU_ERROR_ISR	1.7	-

19 CDDRFSO

19.1 CDDRFSO ROM/RAM Usage

This section provides memory usage details measured using the RCar_Cddrfso_011.arxml and RCar_Cddrfso_012.arxml configuration.

ROM/RAM	Section Name	Memory size (Bytes)	
		DET ON	DET OFF
ROM	CONFIG_DATA_32	76	76
	CODE_SLOW	5988	3168
	CODE_FAST	624	624
	Total	6688	3868
RAM	VAR_INIT_1	1	1
	VAR_CLEARED_32	12	12
	VAR_NO_INIT_PTR	4	4
	Total	17	17
Total	**-**	**6705**	**3885**

19.2 CDDRFSO Stack Size

This section provides the max of stack depth for the RCar_Cddrfso_011.arxml and RCar_Cddrfso_012.arxml configuration.

Max of stack depth (Bytes)	384

19.3 CDDRFSO API Execution Time

This section provides Execution Time details of the API measured using the RCar_Cddrfso_012.arxml and RCar_Cddrfso_025.arxml configuration.

API Name	Execution time (us)	Remarks
CddRfso_Init	3.2	-
CddRfso_ChannelClockSet	0.7	-
CddRfso_IntervalTimeConfigure	1.7	-
CddRfso_IntervalCycleConfigure	0.5	-
CddRfso_TimeoutTimeConfigure	1.9	-
CddRfso_TimeoutCycleConfigure	0.9	-
CddRfso_StartIntervalTimer	0.3	-
CddRfso_StopIntervalTimer	0.1	-
CddRfso_StartTimeoutTimer	0.2	-
CddRfso_StopTimeoutTimer	0.1	-
CddRfso_ClearTimeoutInterrupt	0.2	-
CddRfso_GetCFEPinStatus	0.3	-
CddRfso_GetTOESPinStatus	0.2	-
CddRfso_ExternalPinControl	0.6	-
CddRfso_GetVersionInfo	0.1	-
CddRfso_GetTimeoutTimerValue	0.2	-
CddRfso_GetIntervalTimerValue	0.2	-
CddRfso_CtrlIntervalTimerInterrupt	0.3	-
CddRfso_IntervalTimerInterruptStatus	0.2	-
CDDRFSO_CHANNEL0_ISR	0.6	-
CDDRFSO_CHANNEL1_ISR	0.6	-
CDDRFSO_CHANNEL2_ISR	0.6	-
CDDRFSO_CHANNEL3_ISR	0.6	-
CDDRFSO_CHANNEL4_ISR	0.6	-
CDDRFSO_CHANNEL5_ISR	0.6	-
CDDRFSO_CHANNEL6_ISR	0.6	-
CDDRFSO_CHANNEL7_ISR	0.6	-
CDDRFSO_CHANNEL8_ISR	0.6	-
CDDRFSO_CHANNEL9_ISR	0.6	-
CDDRFSO_CHANNEL10_ISR	0.6	-

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Rev.	**Date**	**Description**	
		Page	**Summary**
1.00	Oct 10, 2022	—	First Edition issued
1.01	Oct 28, 2022	—	Update measurement result for all modules.
1.02	Dec 05, 2022	—	Update measurement result for all modules.
1.03	Jan 05, 2023	—	Update measurement result for all modules.
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1.07	May 05, 2023	—	Update measurement result for SPI module.
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1.10	Jul 25, 2023	—	Update measurement result for PORT module.
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