

Real Time Drivers (RTD) for S32K3xx – Product Brief

Contents

1. Software Product Overview.....	1
2. Software Content	2
3. Supported Targets	8
4. Quality, Standards Compliance and Testing Approach	9
5. Document Information.....	11

Software Product Overview

S32-based platform products offer Real Time Drivers (RTD) software supporting both AUTOSAR and non-AUTOSAR (similar to traditional SDKs) applications. Both are ISO 26262 functional safety compliant up to ASIL D. A wide range of standard low-level drivers (LLD) and complex device drivers (CDD) create a rich ecosystem integrated into a unified development environment with highly optimized code. Each driver provides two sets of APIs: one compliant with AUTOSAR and the other directly accessing the hardware. For a non-AUTOSAR application, any interface can be used, according to the scope of the application.

RTD software is developed using SPICE/CMMI Level 3, MISRA 2012, and ISO 26262 compliant processes –all automotive-grade quality and production ready. RTD software includes S32CT (non-AUTOSAR) configurators and supports Elektrobit Tresos (AUTOSAR) and multiple premium IDE toolchains.

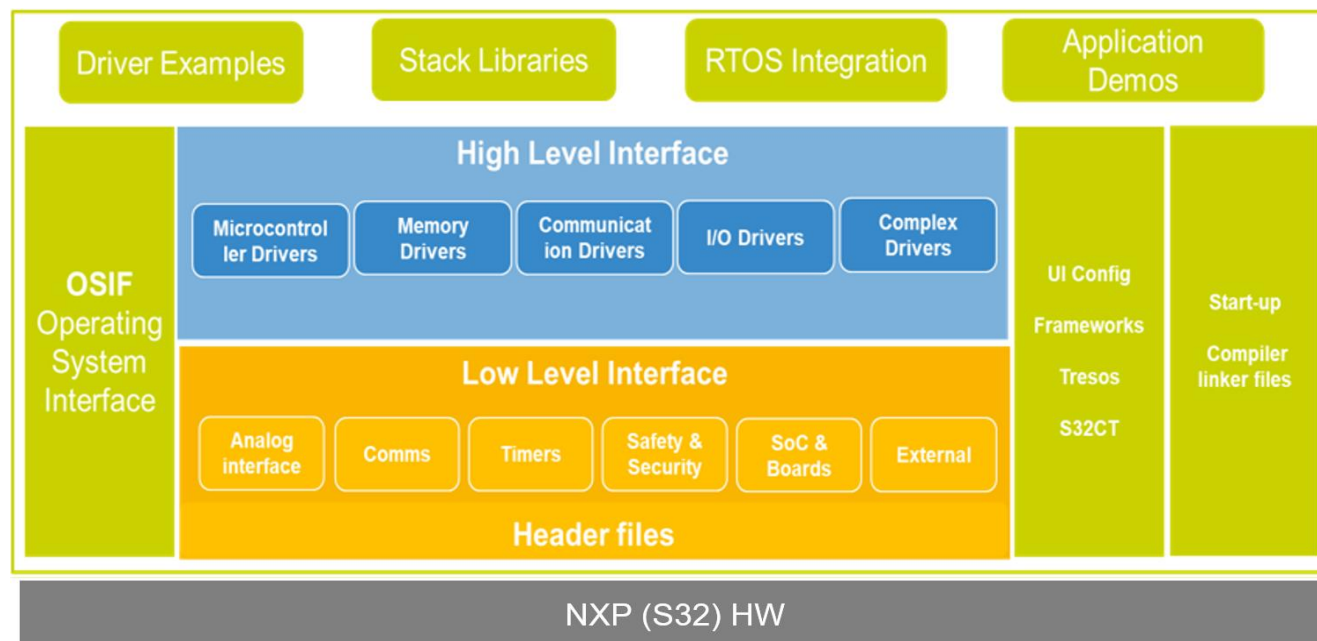


Figure 1. Real Time Drivers (RTD) Software Environment

Software Content

The list of high-level drivers (AUTOSAR compliant + extensions) include:

- *Adc*
- *Base*
- *Can*
- *Cdd_Crc*
- *Cdd_I2c*
- *Cdd_I3c*
- *Cdd_Platform*
- *Cdd_Qd*
- *Cdd_Rm*
- *Cdd_Sai*
- *Cdd_Uart*
- *Crypto*
- *Dem (stub)*
- *Det (stub)*
- *Dio*
- *Ecuc (stub)*
- *Ecum (stub)*
- *Eep*
- *Eth*
- *Fee*
- *Fls*
- *Gpt*
- *Icu*
- *Lin*
- *Mcl*
- *Mcu*
- *Ocu*
- *Os (stub)*
- *Port*
- *Pwm*
- *Resource*
- *Rte (stub)*
- *Sent*
- *Spi*
- *Wdg*

Table 1. Hardware IPs to Software mapping

HW Module	S32K3	SW Module where the IP is enabled
IOMUX	n/a	n/a for RTD
MCM	Y	CDD_PLATFORM
MSCM	Y	CDD_PLATFORM
A53_GPR	n/a	n/a for RTD
CM7_GPR	n/a	n/a for RTD
VIRT_WRAPPER	Y	CDD_RM
SIUL2	Y	DIO/PORT/MCU
TSPC	Y	DIO
AXBS_Lite	Y	CDD_RM
AIPS_Lite	Y	n/a for RTD
DMAMUX	Y	MCL
eDMA	Y	MCL
DMA_CRC	n/a	CRC
INTM	Y	CDD_PLATFORM
SEMA42	Y	CDD_RM
XBIC	Y	CDD_RM
XRDC	Y	CDD_RM
FastDMA	n/a	n/a for RTD
SRC	n/a	CDD_PLATFORM
SRC_0	n/a	CDD_PLATFORM
SRC_1	n/a	CDD_PLATFORM
Main GPRs	n/a	n/a for RTD
Stby GPRs	n/a	n/a for RTD
c40asf	Y	FLS
PFLASH	Y	FLS, MCU, RM
PRAMC	Y	MCU
DFS	n/a	MCU
MC_CGM	Y	MCU
MC_CGM_0	n/a	MCU

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MC_CGM_1	n/a	MCU
MC_CGM_2	n/a	MCU
MC_CGM_5	n/a	MCU
FIRC	Y	MCU
SIRC	Y	MCU
FXOSC	Y	MCU
SXOSC	Y	MCU
PLLDIG	Y	MCU
ACCEL_PLL	n/a	MCU
CORE_PLL	n/a	MCU
DDR_PLL	n/a	MCU
SRAMC	n/a	MCU
DDR	n/a	n/a for RTD
DDR_GPR	n/a	n/a for RTD
PERIPH_PLL	n/a	MCU
MC_RGM	Y	MCU
RDC	n/a	MCU
POR_WDG	Y	n/a for RTD
FUSE_LC	n/a	n/a for RTD
DCF	Y	n/a for RTD
DCM	Y	PLATFORM
MU	Y	CRYPTO
OCOTP	n/a	CDD_OCOTP
PMC	Y	MCU
MC_ME	Y	MCU
MC_PCU	Y	n/a for RTD
WKPU	Y	ICU
NVIC	Y	PLATFORM
EIM	Y	n/a for RTD
ERM	Y	n/a for RTD
FCCU	Y	n/a for RTD
SELFTES T_GPR	Y	n/a for RTD

Real Time Drivers (RTD) for S32K3xx – Product Brief, Product Brief, Rev. 1.5, 11/2021

SELFTES T_GPR_0	n/a	n/a for RTD
SELFTES T_GPR_1	n/a	n/a for RTD
SELFTEST_GPR_T OP	n/a	n/a for RTD
STCU2	Y	n/a for RTD
SBSW	n/a	n/a for RTD
CMU_FC	Y	MCU
CMU_FM	Y	MCU
REG_PROT	Y	BASE
CRC	Y	CRC
SAR_ADC	Y	ADC
LPCMP	Y	ICU
LCU	Y	MCL
EMIOS	Y	GPT, PWM, ICU, OCU
BCTU	Y	ADC
TRGMUX	Y	MCU
SWT	Y	WDG
STM	Y	GPT
PIT	Y	GPT
PIT-RTI	Y	GPT
RTC	Y	GPT
LPSPi	Y	SPI
LPI2C	Y	CDD_I2C
FlexIO	Y	CDD_I2C, CDD_UART, SPI, SENT, PWM
FlexCAN	Y	CAN
SAI	Y	CDD_SAI
EMAC	Y	ETH
ENET	Y	ETH
LPUART	Y	CDD_UART
QuadSPI	Y	FLS
TAP	Y	n/a for RTD
DAP TAP	Y	n/a for RTD

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System JTAGC	Y	n/a for RTD
JTAGC	n/a	n/a for RTD
CJTAG	n/a	n/a for RTD
IPG	Y	n/a for RTD
Debug	Y	n/a for RTD
Trace	Y	n/a for RTD
ECT	Y	n/a for RTD
MDM_AP	Y	n/a for RTD
SDA_AP	Y	n/a for RTD
JTAG_C	Y	n/a for RTD
JDC	Y	n/a for RTD
MEMU	n/a	n/a for RTD
TempSense	Y	ADC
uSDHC	n/a	EEP
FTM	n/a	GPT, PWM, ICU, OCU
I2C	n/a	CDD_I2C
GMAC	Y	ETH
PFE	n/a	ETH
FlexRay	n/a	FR
LINFlexD	n/a	LIN, CDD_UART
SPI	n/a	SPI
SERDES_GPR	n/a	n/a for RTD
SERDES_GPR_0	n/a	n/a for RTD
SERDES_GPR_1	n/a	n/a for RTD
LLCE	n/a	CAN, LIN, FR
USBOTG	n/a	n/a for RTD
TMU	n/a	CDD_THERMAL
JTAGM	n/a	n/a for RTD
FBXC	n/a	CDD_OCOTP
SPT	n/a	n/a for RTD
BBE32EP DSP	n/a	n/a for RTD
CTE	n/a	n/a for RTD

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MIPICSI2	n/a	n/a for RTD
LAX	n/a	n/a for RTD
CTU	n/a	ADC
I3C	Y	CDD_I3C
HSE-H	n/a	CRYPTO
HSE-B	Y	CRYPTO
Arm® Cortex®-A53	n/a	n/a for RTD
Arm Cortex-M7	Y	CDD_RM, MCL, CDD_PLATFORM
System NoC	n/a	n/a for RTD
Accelerator NoC	n/a	n/a for RTD
Ncore	n/a	n/a for RTD
SDP	n/a	n/a for RTD
OTFAD	n/a	n/a for RTD
PCIe	n/a	n/a for RTD
PCIe Gen3 PHY	n/a	n/a for RTD
USB	Y	n/a for RTD
OCPSRA MC	n/a	MCU
RCCU	Y	n/a for RTD
CMU	Y	MCU
ATP	Y	n/a for RTD
PLL (Aurora)	Y	n/a for RTD
PLL	n/a	n/a for RTD
IVT	n/a	n/a for RTD
DCD	n/a	n/a for RTD
UART	n/a	n/a for RTD
e200z7	n/a	n/a for RTD
e200z4	n/a	n/a for RTD
SPE	n/a	n/a for RTD
AXBS	Y	CDD_RM
SMPU	n/a	n/a for RTD
DTS	n/a	n/a for RTD
INTC	n/a	n/a for RTD

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PCM	n/a	n/a for RTD
MCB	n/a	n/a for RTD
eTimer	n/a	GPT, ICU, OCU, PWM
FlexPW M	n/a	PWM
Zipwire	n/a	CDD_ZIPWIRE
SIPI	n/a	CDD_ZIPWIRE
LFAST	n/a	CDD_ZIPWIRE
JTAG2IPS	n/a	n/a for RTD
NXMC	n/a	n/a for RTD
NPC	n/a	n/a for RTD
NAL	n/a	n/a for RTD
ATP_PHY	n/a	n/a for RTD

Supported Targets

The RTD described in this document is intended to be used with microcontroller devices of NXP Semiconductors, including:

- **S32K3xx**

Quality, Standards Compliance and Testing Approach

RTD product is developed according to NXP Software Development Processes that are Automotive-SPICE, ISO 26262, IATF 16949 and ISO 9001 compliant.

RTD software packages (starting with Beta releases) contain drivers as eclipse plugins for Elektrobit Tresos or S32 Design Studio (S32DS) IDE.

1. For each driver:
 - Source code + configuration templates
 - Driver User Manual
 - Driver Integration Manual
 - Driver Example Application
2. For the entire package:
 - RTD Release Note

RTD software packages (starting with Beta releases) are accompanied by software quality packages containing the following deliverables:

3. For each RTD driver:
 - Driver Test Specification
 - Driver Test Summary Report
 - Driver MISRA Summary Report
 - Driver Code Coverage Summary Report
 - Driver Traceability Matrix
 - Driver VSMD Report
 - Driver Profiling Report
 - Driver Code size, Stack size, RAM size Reports
 - Driver Static analysis Report (added only on customer request)
4. For the entire RTD package:
 - RTD Test Summary Report
 - RTD Quality Matrix
 - List of changes

SW Testing approach is documented in RTD Test Strategy document that contain the following information and can be shared with customers in request.

- Testing scope and objectives
- Test levels: unit tests, unit integration tests
- Test types: functional, non-functional, regression tests, robustness, performance tests, conformance testing
 - Test techniques: white-box, black-box tests
 - Test cases organization and prioritization
 - Test deliverables (test report, test specification, code coverage report, traceability matrix, static analysis report)

Document Information

Table 2. Revision History

Revision number	Date	Substantive changes
1.0	07/2020	Initial release
1.1	09/2020	IP Matrix update.
1.2	02/2021	General updates
1.3	08/2021	S32K3 specific details, list of IPs
1.4	09/2021	Updated template
1.5	11/2021	Added CDD_Sai, minor format updates

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