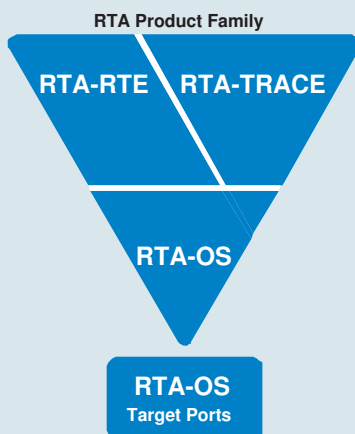


RTA-OS3.0

Freescale/STM MPC55xx/SPC56x with the Green Hills Compiler



Features at a Glance

- AUTOSAR R3.0 compliant OS
- Supports Scalability Class 1
- OSEK/VDX OS v2.2 compliant OS
- MISRA-C:2004 compliant
- RTOS RAM overhead: 28 bytes
- Category 2 interrupt latency: 111 CPU cycles



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RTA-OS3.0

RTA-OS3.0 is the new generation operating system from ETAS that conforms to the AUTOSAR R3.0 specification and builds on the benefits of the successful RTA-OSEK OS. It provides a tool suite that includes a PC-based graphical configuration tool and adaptive OS generation capabilities to deliver flexible, fast solutions for a wide range of automotive microcontrollers.

The graphical configuration tool allows all OS objects to be configured, and creates AUTOSAR R3.0 conformant XML files describing the OS configuration. In addition, it provides automatic verification against the AUTOSAR XML schema and allows users to create projects for easy management of multiple files.

RTA-OS3.0 improves on RTA-OSEK in several areas, including better runtime performance and smaller memory footprint, support for multiple processor environments, and automatic support for up to 1024 tasks. The powerful performance analysis tools developed for RTA-OSEK have been updated for RTA-OS3.0 to allow hard real-time requirements to be met.

RTA Product Family

RTA-OS3.0 integrates seamlessly with other tools in the RTA product family, including:

- RTA-RTE3.0 - a mature, robust production quality AUTOSAR R3.0 RTE Generator.
- RTA-TRACE - a software logic analyser that allows the runtime behaviour of RTA-OS3.0 applications to be observed.

Microcontroller Support

RTA-OS3.0 supports all variants of the Freescale/STMicroelectronics MPC55xx/SPC56x family of microcontrollers. Release testing has taken place using the MPC5516 and SPC563M variants.

Compiler Toolchain

RTA-OS3.0 for the Freescale/STMicroelectronics MPC55xx/SPC56x has been developed with the Green Hills MULTI v5.0.3 compiler.

Due to the adaptive code generation of RTA-OS3.0, it is possible to use other versions of this compiler to build applications.

ORTI Debugger Support

RTA-OS3.0 can generate OSEK Runtime Interface information for the Lauterbach TRACE32 debugger.

Interrupt Model

RTA-OS3.0 supports 16 levels of nested interrupts.

Memory Model

RTA-OS3.0 supports a flat 32 bit address space.

Functionality

The table below outlines the restrictions on the maximum number of operating system objects allowed by RTA-OS3.0.

	BCC1	BCC2	ECC1	ECC2
Max. no. of tasks		Up to 1024		
Max. tasks per priority		Up to 1024		
Max. queued activations	1	$2^{32}-1$	1	$2^{32}-1$
Max. events per task	n/a	n/a	32	32
Max. nested resources		$2^{32}-1$		
Max. alarms		$2^{32}-1$		
Max. standard resources		$2^{32}-1$		
Max. internal resources	Not limited by RTA-OS3.0			
Max. application modes		$2^{32}-1$		

Memory Usage

The memory overhead of RTA-OS3.0 is:

Memory Type	Overhead (bytes)
RAM	24
ROM/Flash	140

In addition to the OS overhead, each object used by an application has the following memory requirements:

Object	RAM Bytes	ROM Bytes
Task	0	16
Category 2 ISR	0	8
Resource	4	8
Alarm	2	12
Counter	4	20
ScheduleTable	16	16
Expiry Point	0	4

Performance

The following table gives the key RTA-OS3.0 kernel performance data measured in CPU cycles. All measurements were taken on a STMicroelectronics SPC563M with a 60MHz clock speed.

Task Type	Execution Time	Ref
Pre-emption	111	A
Normal Termination	66	B
Task switch	86	C
ChainTask	158	D
WaitEvent	329	E
SetEvent	438	F
Schedule	98	G
ReleaseResource	103	H
Category 2 ISR Entry Latency	111	I
Category 2 ISR Exit Latency	125	J
Category 1 ISR Latency	54	L

The following figures illustrate how the RTA-OS3.0 kernel overheads are allocated during the operations given in the above table.

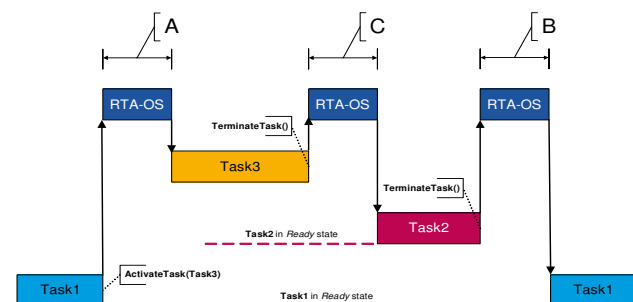


Figure 1 - Task1 is preempted by Task3, followed by a task switch and then normal termination of Task2

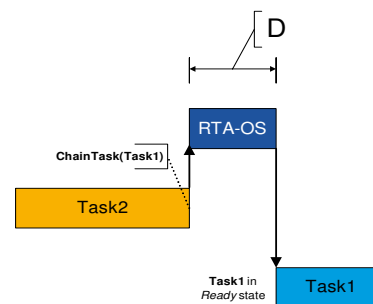


Figure 2 - Task2 chains Task1

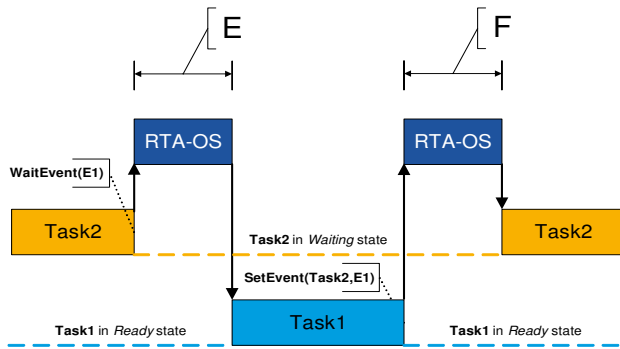


Figure 3 - Task2 waits for an event set by Task1

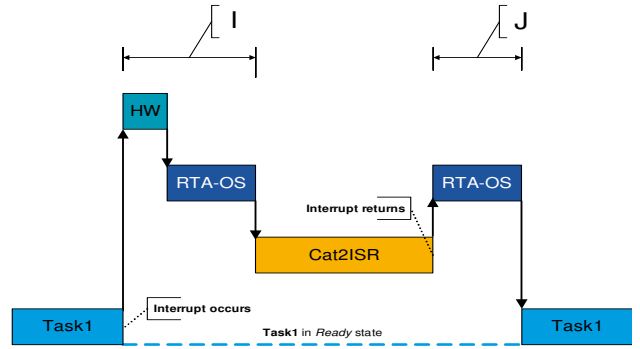


Figure 6 - Category2 ISR entry and exit latency

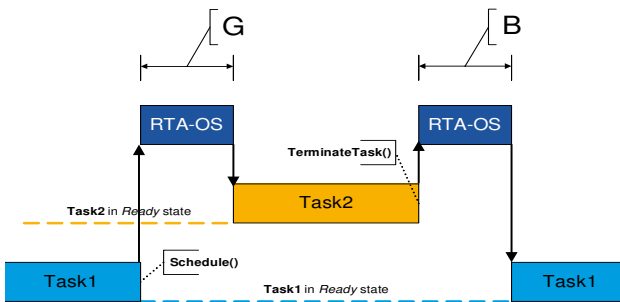


Figure 4 - Task1 allows cooperative scheduling by Task2

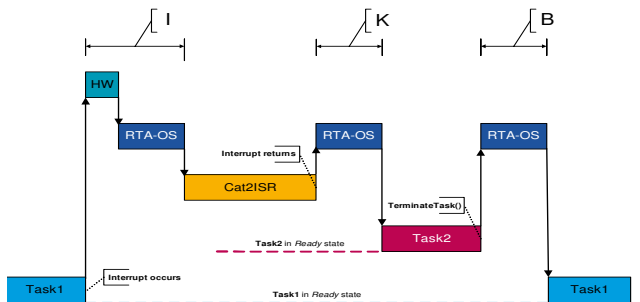


Figure 7 - Category2 ISR switches to Task2

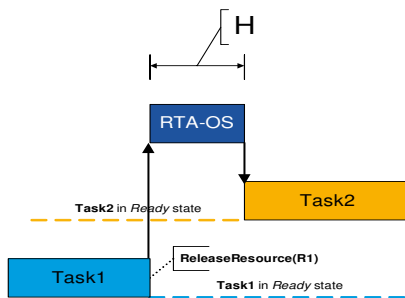


Figure 5 - Task1 releases a resource

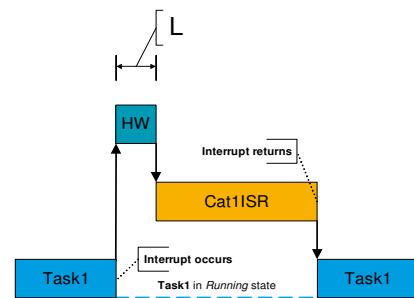


Figure 8 - Category1 ISR entry latency

Ordering Information

To use RTA-OS3.0 it is necessary to purchase a development license for the tools together with an add-on license for the Freescale/STMicroelectronics MPC55xx/SPC56x port. Machine-named, user-named and floating licenses are available.

Order Name	Order Number
Machine-named license for RTA-OS3.0 for Windows PC	F 00K 106 211
User-named license for RTA-OS3.0 for Windows PC	F 00K 106 212
Floating license for RTA-OS3.0 for Windows PC	F 00K 106 213
Product CD for RTA-OS3.0	F 00K 106 214

Order Name	Order Number
Machine-named license for RTA-OS3.0 for Freescale/STMicroelectronics MPC55xx/SPC56x	F 00K 106 525
User-named license for RTA-OS3.0 for Freescale/STMicroelectronics MPC55xx/SPC56x	F 00K 106 527
Floating license for RTA-OS3.0 for Freescale/STMicroelectronics MPC55xx/SPC56x	F 00K 106 528
Product CD for RTA-OS3.0 for Freescale/STMicroelectronics MPC55xx/SPC56x	F 00K 106 529

To obtain further information or an evaluation version of RTA-OS3.0 for Freescale/STMicroelectronics MPC55xx/SPC56x please contact your local ETAS Sales Office using the details shown on the right.

Notes

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