RTA-OS
Freescale MPC55xx/ STM SPC56x with the Green Hills Compiler

RTA Product Family

RTA-RTE | RTA-TRACE

RTA-OS

RTA-OS
Target Ports
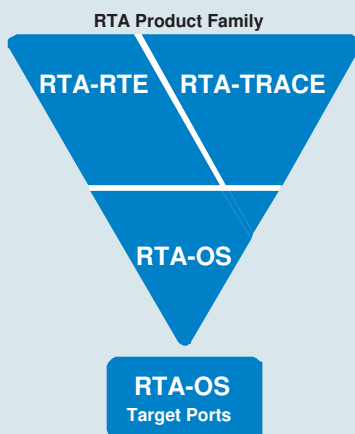
Features at a Glance

- AUTOSAR compliant OS
- Supports all Scalability Classes
- OSEK/VDX OS v2.2 compliant OS
- MISRA-C:2004 compliant
- RTOS RAM overhead: 69 bytes
- Category 2 interrupt latency: 94 CPU cycles

ETAS Group
Automotive LifeCycle
Solutions

RTA-OS

RTA-OS is the new generation operating system from ETAS that conforms to the AUTOSAR OS specification and builds on the benefits of the successful RTA-OSEK product. 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 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-OS 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-OS to allow hard real-time requirements to be met.

RTA Product Family

RTA-OS integrates seamlessly with other tools in the RTA product family, including:

- RTA-RTE - a mature, robust production quality AUTOSAR RTE Generator.

- RTA-TRACE - a software logic analyser that allows the runtime behaviour of RTA-OS applications to be observed.

Microcontroller Support

RTA-OS supports all variants of the Freescale MPC55xx/STMicroelectronics SPC56x family of microcontrollers. Release testing has taken place using the MPC5674F and SPC563M variants.

Compiler Toolchain

RTA-OS for the Freescale MPC55xx/STMicroelectronics SPC56x has been developed with the Green Hills MULTI v5.0.5 compiler.

Due to the adaptive code generation of RTA-OS, it is possible to use other versions of this compil-

er to build applications.

ORTI Debugger Support

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

Interrupt Model

RTA-OS supports 16 levels of nested interrupts.

Memory Model

RTA-OS 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-OS.

	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-OS		
Max. application modes		2^{32}-1		

Memory Usage

The memory overhead of RTA-OS is:

Memory Type	Overhead (bytes)
RAM	69
ROM/Flash	0

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	12	2
Counter	4	20
ScheduleTable	16	16
Expiry Point	0	4

Performance

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

Task Type	Execution Time	Ref
Pre-emption	114	A
Normal Termination	67	B
Task switch	87	C
ChainTask	159	D
WaitEvent	329	E
SetEvent	439	F
Schedule	99	G
ReleaseResource	103	H
Category 2 ISR Entry Latency	94	I
Category 2 ISR Exit Latency	126	J
Category 1 ISR Latency	40	L

The following figures illustrate how the RTA-OS kernal overheads are allocated during the operations given in the above table.
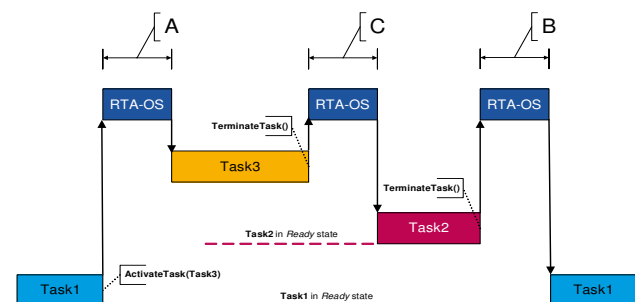

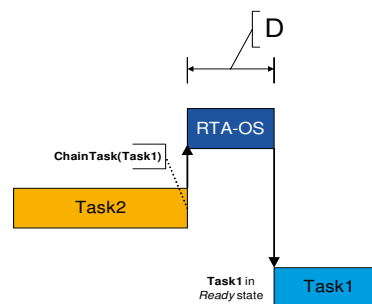**Figure 1 - Task1 is preempted by Task3, followed by a task switch and then normal termination of Task2**
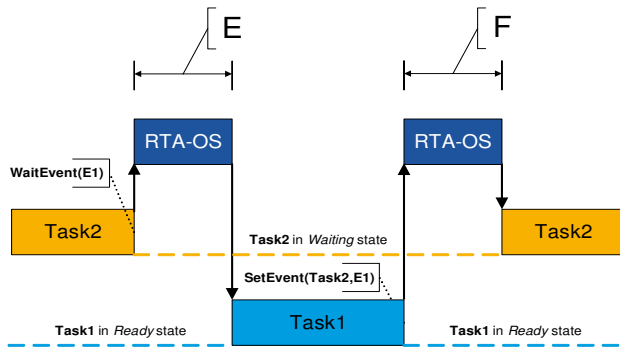

Figure 2 - Task2 chains Task1
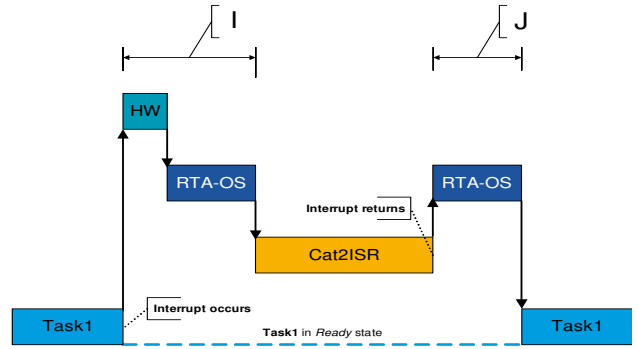
Figure 3 - Task2 waits for an event set by Task1

Figure 4 - Task1 allows cooperative scheduling by Task2

Figure 5 - Task1 releases a resource

Figure 6 - Category2 ISR entry and exit latency

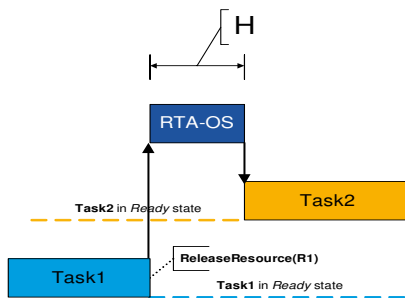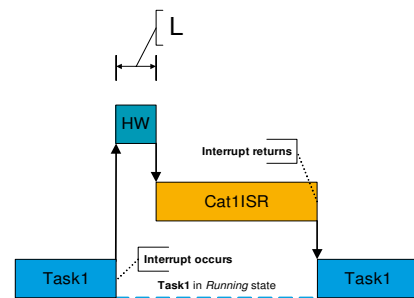**Figure 7 - Category2 ISR switches to Task2**

Figure 8 - Category1 ISR entry latency

Ordering Information

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

Order Name	Order Number
Machine-named license for RTA-OS for Windows PC	F 00K 106 703
User-named license for RTA-OS for Windows PC	F 00K 106 704
Floating license for RTA-OS for Windows PC	F 00K 106 705
Product CD for RTA-OS	F 00K 106 706

The RTA-OS port for the IFreescale MPC55xx/STMicroelectronics SPC56x with GHS compiler can be purchased in two versions, which support AUTOSAR OS Scalability Classes 1&2 or Scalability Classes 1-4 respectively.

Order Name	Order Number
Machine-named license for RTA-OS for Freescale/STMicroelectronics MPC55xx/SPC56x with GHS compiler Scalability Classes 1&2	F 00K 106 742
User-named license for RTA-OS for Freescale/STMicroelectronics MPC55xx/SPC56x with GHS compiler Scalability Classes 1&2	F 00K 106 743
Floating license for RTA-OS for Freescale/STMicroelectronics MPC55xx/SPC56x with GHS compiler Scalability Classes 1&2	F 00K 106 744
Machine-named license for RTA-OS for Freescale/STMicroelectronics MPC55xx/SPC56x with GHS compiler Scalability Classes 1-4	F 00K 106 750
User-named license for RTA-OS for Freescale/STMicroelectronics MPC55xx/SPC56x with GHS compiler Scalability Classes 1-4	F 00K 106 751
Floating license for RTA-OS for Freescale/STMicroelectronics MPC55xx/SPC56x with GHS compiler Scalability Classes 1-4	F 00K 106 752
Product CD for RTA-OS for Freescale/STMicroelectronics MPC55xx/SPC56x	F 00K 106 745

To obtain further information or an evaluation version of RTA-OS for Freescale MPC55xx/ST-Microelectronics SPC56x with GHS compiler please contact your local ETAS Sales Office using the details shown on the right.

Notes