SAM E CPU Support Package Guide

Version: 1.3

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SAM E Support Package

This guide describes the following features of the SAM E CPU support package:

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Creating SAM E Projects

Creating an SAM E C/C++ executable project

To create a new minimal C/C++ executable project:

Select the **File** > **New** > **New Project** menu item.

Select the **A C/C++ executable for Microchip SAM E** project template.

Set the required project name and location directory.

Click **Next**.

If required, change any of the default project settings.

Click **Finish** to create the project.

Creating an SAM E library project

To create a new library project:

Select the **File** > **New** > **New Project** menu item.

Select the **A library for Microchip SAM E** project template.

Set the required project name and location directory.

Click **Next**.

If required, change any of the default project settings.

Click **Finish** to create the project.

Creating an SAM E externally built executable project

To create a new project that will allow you to debug an existing externally built executable file:

Select the **File** > **New** > **New Project** menu item.

Select the **An externally built executable for Microchip SAM E** project template.

Set the required project name and location directory.

Click **Next**.

Set the **Load File** project property to point to the executable file you want to download and debug.

If required, change any of the other default project settings.

Click **Finish** to create the project.

Creating an SAM E CrossWorks Tasking Library executable project

To create a new C/C++ executable project configured to use the CrossWorks Tasking Library:

Select the **File** > **New** > **New Project** menu item.

Select the **A CrossWorks Tasking Library executable for Microchip SAM E** project template.

Set the required project name and location directory.

Click **Next**.

If required, change any of the other default project settings.

Click **Finish** to create the project.

Creating an SAM E assembly code only executable project

Please note, this template does not add any C/C++ startup code or libraries and is therefore not suitable for creating projects that include C/C++ code.

To create a new assembly code only executable project without:

Select the **File > New > New Project** menu item.

Select the **An assembly code only executable for Microchip SAM E** project template.

Set the required project name and location directory.

Click **Next**.

If required, change any of the other default project settings.

Click **Finish** to create the project.

Opening SAM E Sample Solutions

SAM E Samples Solution

This solution contains general sample projects that run on SAM E devices. To open the SAM E Samples Solution:

> Select the **Tools** > **Show Installed Packages** menu item.
> Select the **Microchip SAM E CPU Support Package** link.
> Select the **Samples Solutions** > **SAM E Samples Solution** link.

SAM E CMSIS-DSP Samples Solution

This solution contains sample projects that use the CMSIS-DSP library running on SAM E devices. To open the SAM E CMSIS-DSP Samples Solution:

> Select the **Tools** > **Show Installed Packages** menu item.
> Select the **Microchip SAM E CPU Support Package** link.
> Select the **Sample Solutions** > **SAM E CMSIS-DSP Samples Solution** link.

SAM E Project Properties

Projects creating using the project templates in this support package have the following device specific project properties:

Heap Size

The heap size is set to be 256 bytes when a project is created. The heap size can be modified using the **Heap Size** project property.

Section Placement

You can select the memory configuration you require using the **Section Placement** project property.

For SAM E projects, the set of placements are:

> **Flash** - The application runs in internal Flash memory *(default)*.
> **Flash Vectors In RAM** - The application runs in internal Flash memory and exception vectors are copied to RAM memory.
> **Flash Copy To RAM** - The application starts in internal flash and copies itself to run internal RAM memory.
> **RAM** - The application runs internal RAM memory.

Stack Sizes

The main stack size is set to be 256 bytes when a project is created.

The process stack size is set to be 0 bytes when a project is created.

The main and process stack sizes can be modified using the **Main Stack Size** and **Process Stack Size** project properties.

To change the location of the stacks, edit the section placement file and place the *.stack* and *.stack_process* sections as required.

Startup From Reset

By default, the application will only startup from power-on/reset in *Release* configuration. This acts as a safety net in case you accidently download a program in FLASH during development that crashes and prevents the debugger from taking control of the target over the debug interface thus rendering the device unusable.

For SAM E projects, the **Startup From Reset** project property can be set to one of the following:

> **No** - The application will not startup from reset.
> **Release Only** - The application will only startup from reset when built in *Release* configuration *(default)*.
> **Yes** - The application will always startup from reset.

Target Processor

Once a project has been created you can target different devices by modifying the **Target Processor** project property. See the SAM E Devices section for details on the files, preprocessor definitions and macro definitions used when a device is selected.

Use On-Chip RC Oscillator

The **Build Options > Use On-Chip RC Oscillator** project property can be set to one of the following:

> **No** - The startup code will configure the device to use an external oscillator *(default)*.
> **Yes** - The startup code will configure the device to use the on-chip RC oscillator.

TCM Configuration

The **Build Options > TCM Configuration** project property can be set to one of the following:

> **ITCM and DTCM Disabled** - The startup code will configure the device to have no ITCM and DTCM *(default)*.
> **32 Kbytes ITCM and DTCM** - The startup code will configure the device to have a 32 Kbyte ITCM and DTCM.
> **64 Kbytes ITCM and DTCM** - The startup code will configure the device to have a 64 Kbyte ITCM and DTCM.
> **128 Kbytes ITCM and DTCM** - The startup code will configure the device to have a 128 Kbyte ITCM and DTCM.

SAM E Project Templates

The project template system simplifies the creation of new projects with the IDE, it also system makes it easy to create new projects with a text editor or script. All that needs to be specified is the project name, the support packages that the project is dependent on, the target processor and the source files you want to add to the project. For example, create a file called *example.hzp* with the following contents:

```
<!DOCTYPE CrossStudio_Project_File>
<solution Name="Example Solution">
  <project Name="Example Project" template_name="SAM_E_EXE">
    <configuration Name="Common" package_dependencies="SAM_E" Target="ATSAME70J21" />
    <folder Name="Source Files">
      <file file_name="file1.c" />
      <file file_name="file2.c" />
    </folder>
  </project>
</solution>
```

You can also add any other property settings that the project requires such as preprocessor definitions or include paths using the property save name, for example:

```
<!DOCTYPE CrossStudio_Project_File>
<solution Name="Example Solution">
  <project Name="Example Project" template_name="SAM_E_EXE">
    <configuration Name="Common" package_dependencies="SAM_E" Target="ATSAME70J21"
 c_preprocessor_definitions="MYDEF1=1;MYDEF2=TWO" c_user_include_directories="$(ProjectDir)/
include1;$(ProjectDir)/include2" />
    <folder Name="Source Files">
      <file file_name="file1.c" />
      <file file_name="file2.c" />
    </folder>
  </project>
</solution>
```

Available SAM E project templates

Template Name	Template Description
SAM E_ASM_EXE	SAM E Assembly Code Only Executable
SAM E_CTL_EXE	SAM E CTL Executable
SAM E_EXE	SAM E C/C++ Executable
SAM E_EXT_EXE	SAM E Externally Built Executable
SAM E_LIB	SAM E Library

SAM E Devices

This package supports the following SAM E devices:

ATSAME70J19
ATSAME70J19B
ATSAME70J20
ATSAME70J20B
ATSAME70J21
ATSAME70J21B
ATSAME70N19
ATSAME70N19B
ATSAME70N20
ATSAME70N20B
ATSAME70N21
ATSAME70N21B
ATSAME70Q19
ATSAME70Q19B
ATSAME70Q20
ATSAME70Q20B
ATSAME70Q21
ATSAME70Q21B

ATSAME70J19

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70J19_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70J19_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70J19_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70J19__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x0047FFFF
RAM	0x20400000 - 0x2043FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70J19_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70J19_Vectors.s
DeviceFamily=SAM E

ATSAME70J19B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70J19B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70J19B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70J19B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70J19B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x0047FFFF
RAM	0x20400000 - 0x2043FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70J19B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70J19B_Vectors.s
DeviceFamily=SAM E

ATSAME70J20

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70J20_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70J20_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70J20_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70J20__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x004FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70J20_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70J20_Vectors.s
DeviceFamily=SAM E

ATSAME70J20B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70J20B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70J20B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70J20B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70J20B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x004FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70J20B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70J20B_Vectors.s
DeviceFamily=SAM E

ATSAME70J21

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70J21_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70J21_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70J21_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70J21__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x005FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70J21_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70J21_Vectors.s
DeviceFamily=SAM E

ATSAME70J21B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70J21B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70J21B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70J21B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70J21B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x005FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70J21B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70J21B_Vectors.s
DeviceFamily=SAM E

ATSAME70N19

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70N19_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70N19_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70N19_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70N19__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x0047FFFF
RAM	0x20400000 - 0x2043FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70N19_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70N19_Vectors.s
DeviceFamily=SAM E

ATSAME70N19B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70N19B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70N19B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70N19B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70N19B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x0047FFFF
RAM	0x20400000 - 0x2043FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70N19B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70N19B_Vectors.s
DeviceFamily=SAM E

ATSAME70N20

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70N20_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70N20_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70N20_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70N20__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x004FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70N20_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70N20_Vectors.s
DeviceFamily=SAM E

ATSAME70N20B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70N20B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70N20B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70N20B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70N20B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x004FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70N20B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70N20B_Vectors.s
DeviceFamily=SAM E

ATSAME70N21

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70N21_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70N21_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70N21_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70N21__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x005FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70N21_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70N21_Vectors.s
DeviceFamily=SAM E

ATSAME70N21B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70N21B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70N21B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70N21B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70N21B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x005FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70N21B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70N21B_Vectors.s
DeviceFamily=SAM E

ATSAME70Q19

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70Q19_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70Q19_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70Q19_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70Q19__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x0047FFFF
RAM	0x20400000 - 0x2043FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70Q19_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70Q19_Vectors.s
DeviceFamily=SAM E

ATSAME70Q19B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70Q19B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70Q19B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70Q19B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70Q19B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x0047FFFF
RAM	0x20400000 - 0x2043FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70Q19B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70Q19B_Vectors.s
DeviceFamily=SAM E

ATSAME70Q20

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70Q20_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70Q20_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70Q20_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70Q20__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x004FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70Q20_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70Q20_Vectors.s
DeviceFamily=SAM E

ATSAME70Q20B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70Q20B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70Q20B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70Q20B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70Q20B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x004FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70Q20B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70Q20B_Vectors.s
DeviceFamily=SAM E

ATSAME70Q21

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70a/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ATSAME70Q21_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ATSAME70Q21_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ATSAME70Q21_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70Q21__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x005FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70a/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70a/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70Q21_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70Q21_Vectors.s
DeviceFamily=SAM E

ATSAME70Q21B

Device Details	
CMSIS Header File	$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
CMSIS Include Path	$(TargetsDir)/SAM_E/CMSIS/same70b/include
CMSIS System File	$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
Family	SAM E
Loader File	$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
Memory Map File	$(TargetsDir)/SAM_E/XML/ ATSAME70Q21B_MemoryMap.xml
Register Definition File	$(TargetsDir)/SAM_E/XML/ ATSAME70Q21B_Registers.xml
Vectors File	$(TargetsDir)/SAM_E/Source/ ATSAME70Q21B_Vectors.s

Preprocessor Definitions
ARM_MATH_CM7
__SAME70Q21B__
__SAM_E_FAMILY

Memory Segments	
FLASH	0x00400000 - 0x005FFFFF
RAM	0x20400000 - 0x2045FFFF

Project Macros
DeviceIncludePath=$(TargetsDir)/SAM_E/CMSIS/same70b/include
DeviceHeaderFile=$(TargetsDir)/SAM_E/CMSIS/same70b/include/sam.h
DeviceLoaderFile=$(TargetsDir)/SAM_E/Loader/SAME70_Loader.elf
DeviceRegisterDefinitionFile=$(TargetsDir)/SAM_E/XML/ATSAME70Q21B_Registers.xml
DeviceSystemFile=$(TargetsDir)/SAM_E/CMSIS/source/system_SAME70.c
DeviceVectorsFile=$(TargetsDir)/SAM_E/Source/ATSAME70Q21B_Vectors.s
DeviceFamily=SAM E

Troubleshooting

On-Chip RC Oscillator

If your program doesn't start up and you are using a board without an external oscillator, set the **Build Options > Use On-Chip RC Oscillator** project property to **Yes**.

TCM

Code and data can be placed in TCM memory either by setting the **Section Placement** project property to one of the TCM configurations or by placing code/data in the TCM program sections (.bss_tcm, .data_tcm, .rodata_tcm and .text_tcm).

For this to work, the device must also be configured to enable TCM memory by setting the **Build Options > TCM Configuration** project property. Failure to do this will result in ITCM/DTCM memory segment overflow errors from the linker.