

# Green Hills MULTI

## Abstract

This document describes tips and hints for using the Green Hills MULTI debugger as target system. MULTI will be started by TESSY automatically and kept open until the whole test run finishes. For currently supported compiler and debugger versions please check our website at <https://www.razorcat.com>.

**Important note for v850:** Please review the TEE attributes **CPU** and **CPU Name** before compiling and running the test. **CPU** denotes the CPU family (e.g. rh850), whereas **CPU Name** denotes the specific CPU name (e.g. rh850g3k). If **CPU Name** is empty, **CPU** is taken for both.

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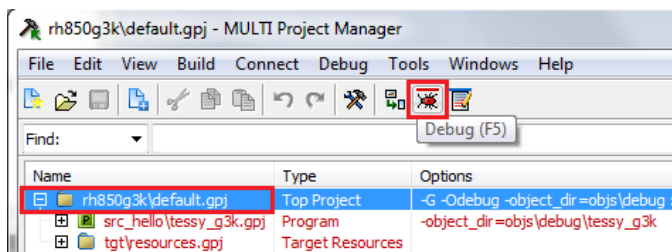
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# 1 Green Hills MULTI Debugger

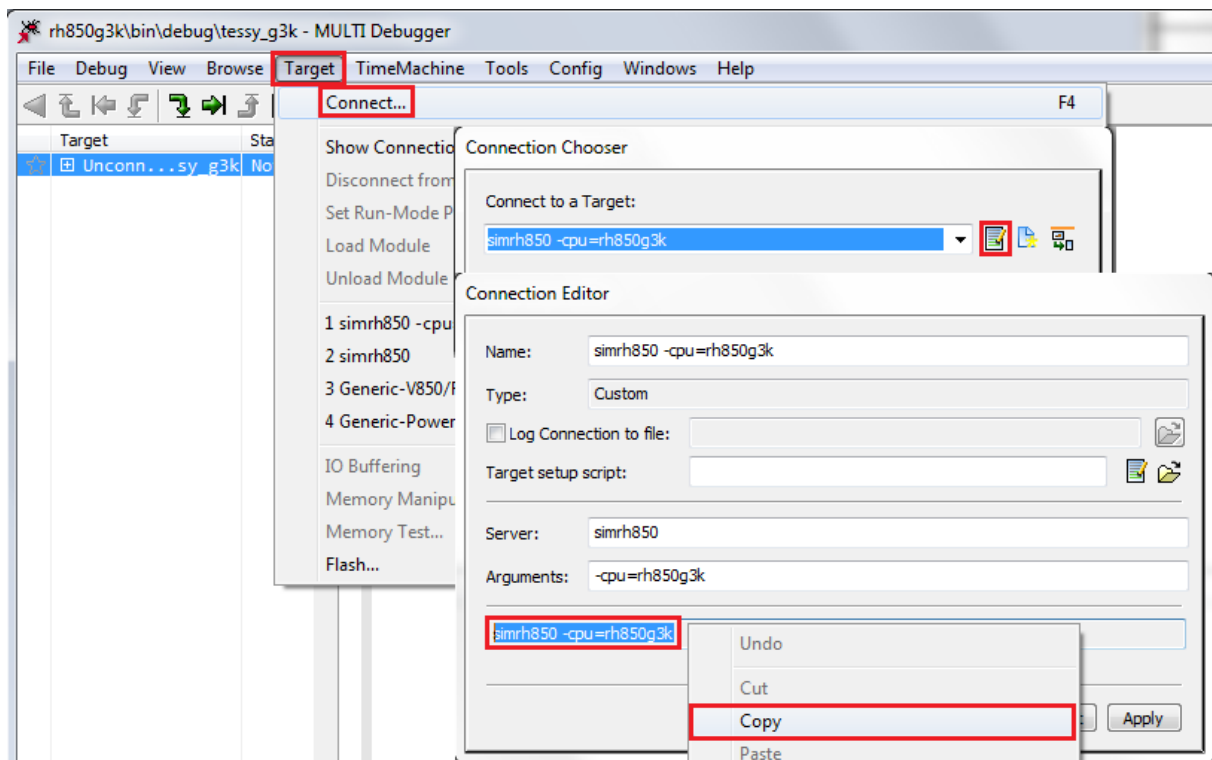
TESSY communicates with the Green Hills MULTI debugger interface using a socket connection. The port number of the communication endpoint may be changed within TEE attribute **Debug Port**. To start MULTI and connect the debugger to the proper device TESSY needs the correct settings within TEE attributes **Target Install Path**, **Target Connection**, and **GHS Project File** as described within the next chapter. TESSY launches the MULTI automatically and terminates it after the whole test run finishes.

## 1.1 Determining the Target Connection

Select the MULTI project and press **F5** or click the **Debug** button from the tool menu.



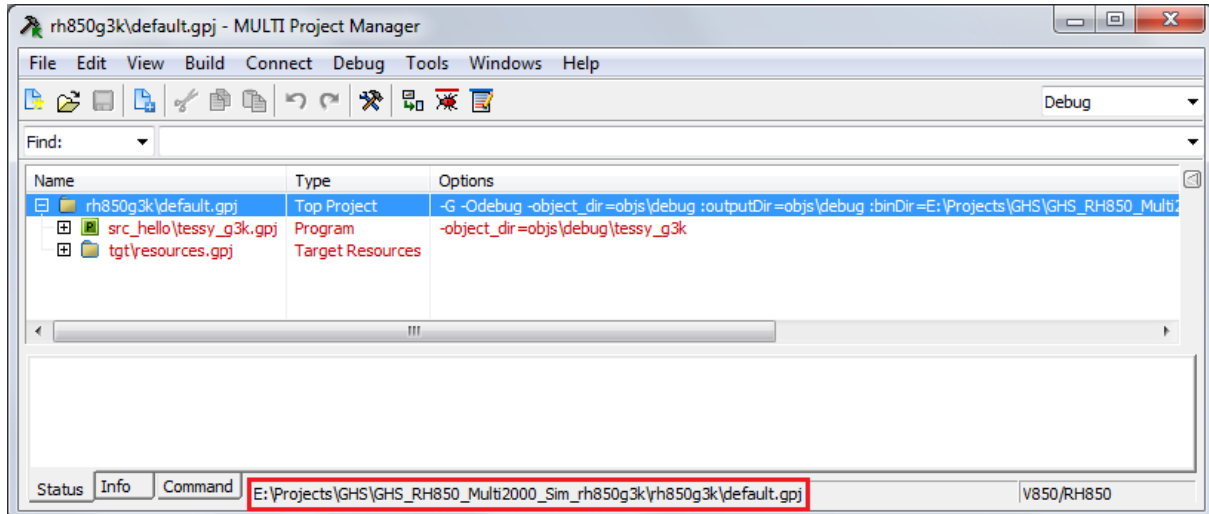
From within the MULTI debugger select the target and press **F4** or select **Connect...** from the **Target** menu. Click the edit button within the **Connection Chooser** dialog and finally select and copy the connection arguments from the **Connection Editor** as shown below.



## 1.2 Determining the GHS Project File

**Please note:** It is important to let TEE attribute **GHS Project File** point into your existing and executable MULTI project.

Opening your MULTI Project Manager you will find the path to your project file at the bottom of the MULTI IDE.



## 1.3 Deactivating the Watchdog

Using a MULTI emulator the *watchdog* has to be deactivated to avoid a watchdog reset during the test execution. This may either be done through a script command within the .rc file, i.e. for V850E:

```
target sfr wdtm2=0x0F
```

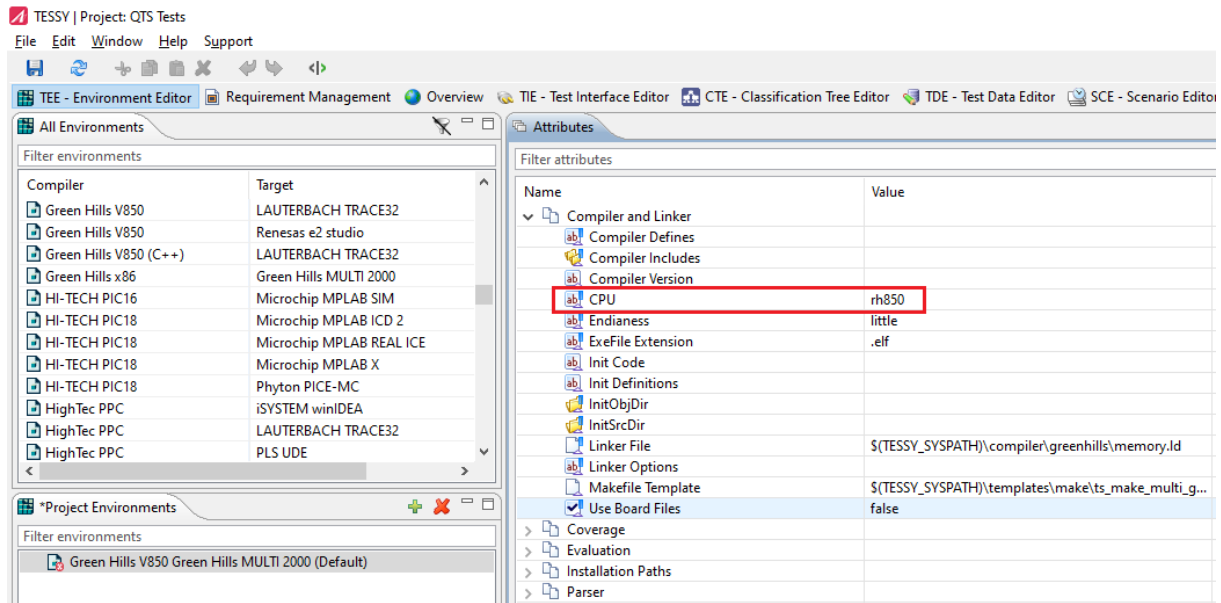
Or you may also set the register directly within the test object prolog of TESSY. Both methods require the correct **DEVICE\_FILE** environment variable setting. Refer to the MULTI manual for details on how to specify this file.

**Important note:** If the **DEVICE\_FILE** does not correspond to the target hardware in use it may result in failures while setting the watchdog register.

## 2 TESSY Environment Settings

### 2.1 CPU

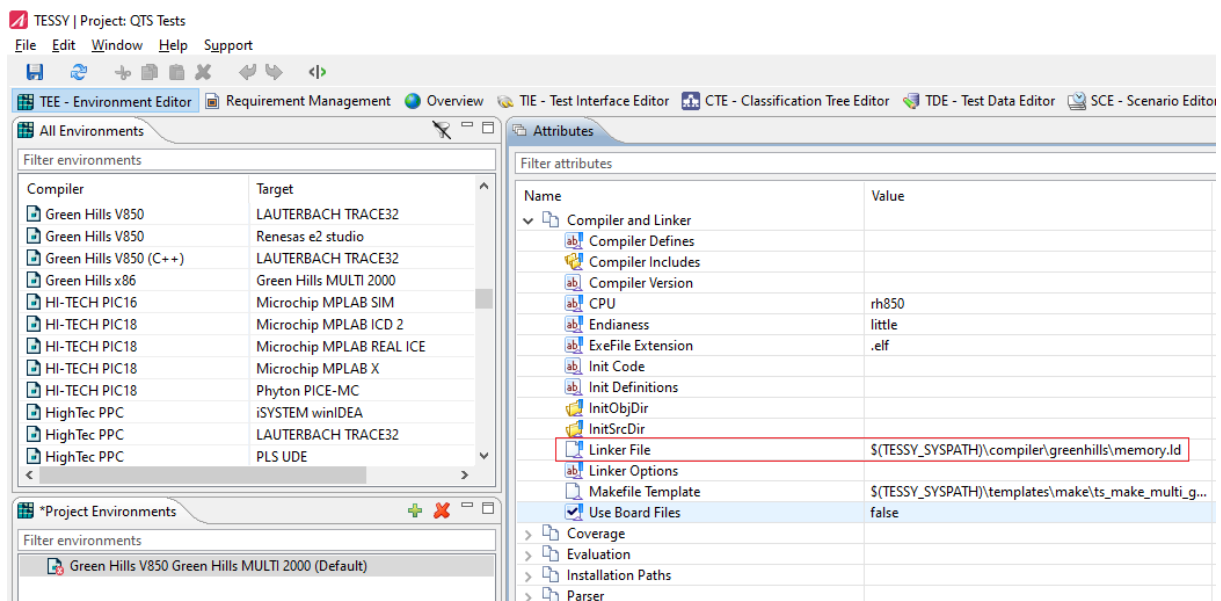
Specify the desired CPU subtype with the TEE attribute **CPU**. This setting is directly passed to the Makefile while building the test driver. Refer to the Makefile template for further information about the usage of this module attribute.



**Important note:** Please select the appropriate CPU type within this attribute otherwise MULTI will fail executing your tests. Abnormal message boxes and execution errors may occur within MULTI when using false CPU settings!

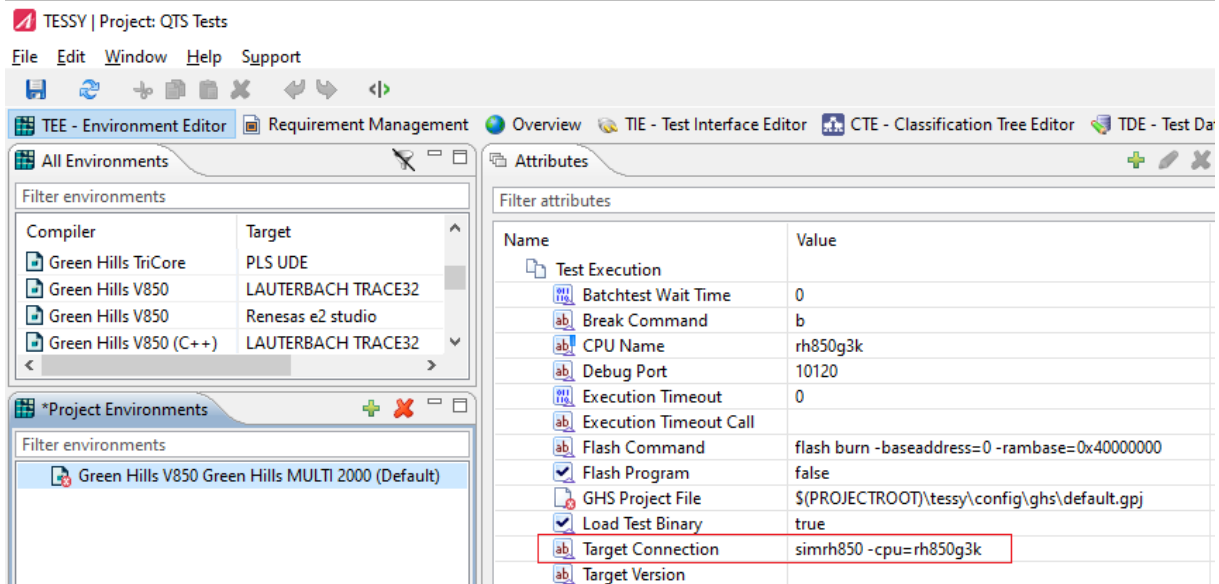
## 2.2 Linker File

Please add the appropriate linker file into the TEE attribute Linker File. TESSY needs generally no special linker file. But you should test your linker file with your MULTI environment before you use it for TESSY's test program.



## 2.3 Target Connection

Fill in the target connection (see 1.1).



TESSY | Project: QTS Tests

File Edit Window Help Support

TEE - Environment Editor Requirement Management Overview TIE - Test Interface Editor CTE - Classification Tree Editor TDE - Test Data

All Environments

Filter environments

Compiler	Target
Green Hills TriCore	PLS UDE
Green Hills V850	LAUTERBACH TRACE32
Green Hills V850	Renesas e2 studio
Green Hills V850 (C++)	LAUTERBACH TRACE32

\*Project Environments

Filter environments

- Green Hills V850 Green Hills MULTI 2000 (Default)

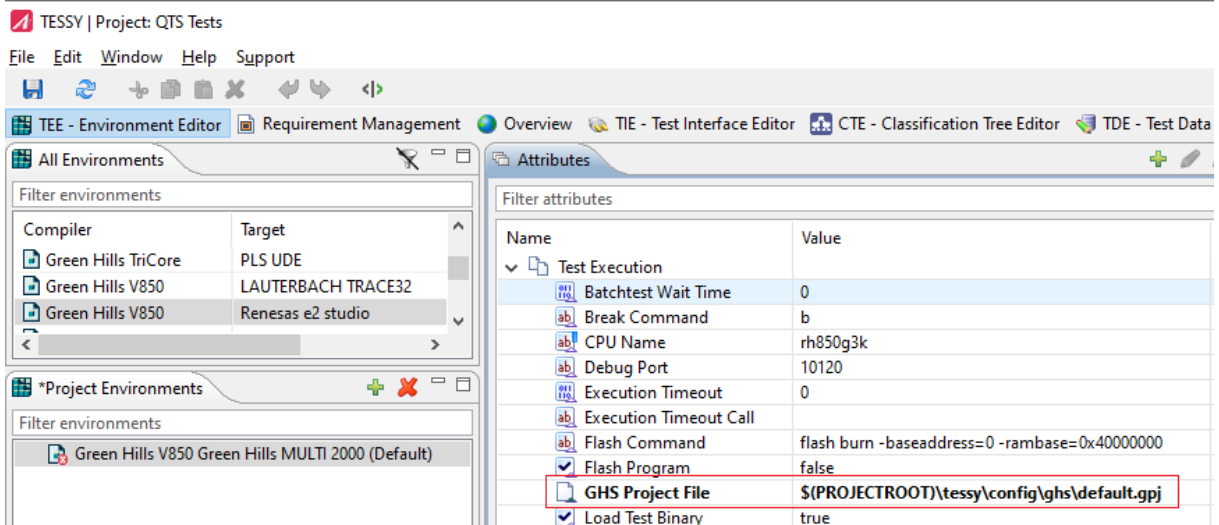
Attributes

Filter attributes

Name	Value
Test Execution	
Batchtest Wait Time	0
Break Command	b
CPU Name	rh850g3k
Debug Port	10120
Execution Timeout	0
Execution Timeout Call	
Flash Command	flash burn -baseaddress=0 -rambase=0x40000000
Flash Program	false
GHS Project File	\$(PROJECTROOT)\tessy\config\ghs\default.gpj
Load Test Binary	true
Target Connection	simrh850 -cpu=rh850g3k
Target Version	

## 2.4 GHS Project File

Fill in the absolute path to the GHS project file (see 1.2).



TESSY | Project: QTS Tests

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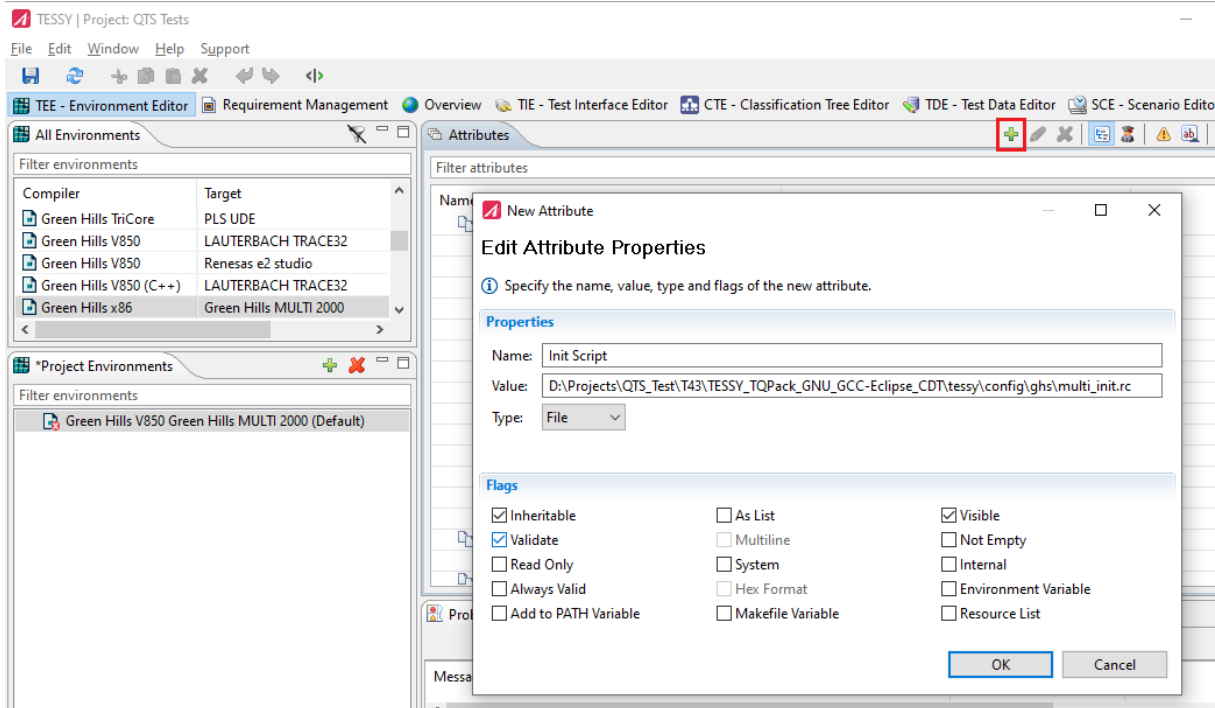
Attributes

Filter attributes

Name	Value
Test Execution	
Batchtest Wait Time	0
Break Command	b
CPU Name	rh850g3k
Debug Port	10120
Execution Timeout	0
Execution Timeout Call	
Flash Command	flash burn -baseaddress=0 -rambase=0x40000000
Flash Program	false
GHS Project File	\$(PROJECTROOT)\tessy\config\ghs\default.gpj
Load Test Binary	true

## 2.5 Init Script

The *optional* TEE attribute **Init Script** allows you to execute a MULTI script each time before downloading the target binary. Selecting **New Attribute** from the context menu or pressing the button opens the **New Attribute** dialog as shown below.



Select the file to be executed. Now TESSY will automatically execute the script commands from the given MULTI script before each test object test run. Refer to the MULTI documentation for details on the scripting language.

## 3 Troubleshooting

### 3.1 No Connection to MULTI

The following error messages within the TESSY message window indicate problems while connecting to MULTI. The corresponding socket port is probably not available.

```

Console Problems Variants Notes Suspicious Elements
Messages
+-----+
| Execute Test [Is value in range/is_value_in_range] |
+-----+

[DRV] Target Communication: Unable to connect to Debugger at localhost:10120 - No error
[DRV] Process 'E:/Projects/TESSY_4.2/GHS/teffy/work\00000401\00000402\00000403\00000404\ts_is_value_in_range_m.exe -receive' terminated with exit code 0x00000001
[EXP] Process 'driver32.exe "C:\teffy\temp\tbs\7248.tbs"' terminated with exit code 0x00000001
[ERROR] [EXE] Failed to execute test object 'is_value_in_range'
[LIB] 'C:\PROGRAM-1\Razorcat\TESSY_4.2\bin\exp32.exe "E:/Projects/TESSY_4.2/GHS/teffy/work\00000401\00000402\00000403\00000404\execute.tbs"' terminated with exit code 1
[EXP] Process 'driver32.exe "C:\teffy\temp\tbs\7248.tbs"' terminated with exit code 0x00000001
[DRV] Process 'E:/Projects/TESSY_4.2/GHS/teffy/work\00000401\00000402\00000403\00000404\ts_is_value_in_range_m.exe -receive' terminated with exit code 0x00000001
[INFO] [EXE] Execution job finished after 22972 milliseconds
[ERROR] [EXE] Test execution finished with errors
[EXE] Failed to execute test object 'is_value_in_range'
[LIB] 'C:\PROGRAM-1\Razorcat\TESSY_4.2\bin\exp32.exe "E:/Projects/TESSY_4.2/GHS/teffy/work\00000401\00000402\00000403\00000404\execute.tbs"' terminated with exit code 1
[EXP] Process 'driver32.exe "C:\teffy\temp\tbs\7248.tbs"' terminated with exit code 0x00000001
[DRV] Process 'E:/Projects/TESSY_4.2/GHS/teffy/work\00000401\00000402\00000403\00000404\ts_is_value_in_range_m.exe -receive' terminated with exit code 0x00000001

```

Please check your firewall and virus scanner rules.

### 3.2 Endless loop while running the Test

If the test runs infinitely, please review the status of MULTI: Did the debugger stop due to a trap or breakpoint or other kind of execution failure? This may be caused by the following reasons:

- writing to hardware registers when using the simulator
- a watchdog reset occurred causing a restart of the program and execution of illegal code

In the above cases, close and restart MULTI and check your test data or the code of the test object.

In case of the watchdog being triggered, refer to the above watchdog section in this document.

### 3.3 Abnormal Termination of the Test Run

In case of error messages within the TESSY messages window, please review the status of MULTI: Did the debugger stop due to a trap or breakpoint or other kind of execution failure? This may be caused by the following reasons:

- A watchdog reset occurred causing a restart of the program, thus breaking the synchronization between TESSY and MULTI.
- A wrong placement of the RAM/ROM areas causing the connection buffers to be overwritten or placed in read only memory.

In case of the watchdog being triggered, refer to the above watchdog section in this document.

### 3.4 NEC AVALON

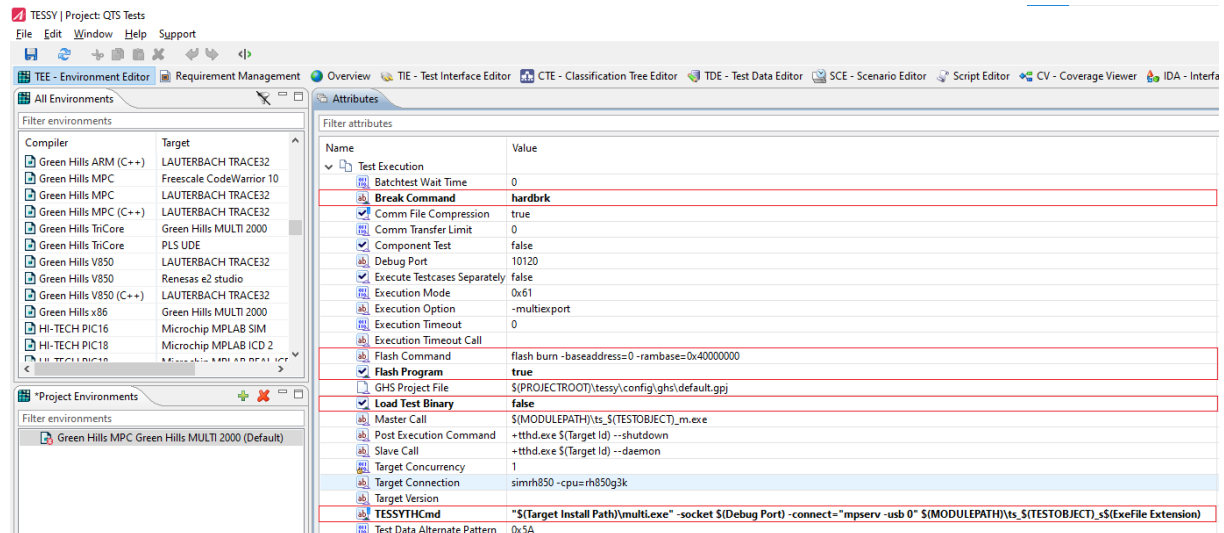
The MULTI startup for the NEC V850DB1 (AVALON) requires an InitScript to be executed with the following command line:

```
target cpu a=12
```

The module attribute **CPU** need to be set to **v850** for this microprocessor derivative.

### 3.5 GHS MPC

The TESSY configuration has to be adapted if you need to flash and run your GHS MPC built target binary. The following TEE attributes have to be adjusted.



The contents of attribute **Flash Command** can be retrieved from the *Multi Fast Flash Programmer* window. If the hardware device is not found, it might be helpful to alter the USB index number in attribute **TESSYTHCmd**.