Environment Settings (TEE)

Abstract

This application note describes all attributes available within the environment editor TEE and their possible settings.

Table of Contents

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1 TEE Attributes

The following three lists provide information about all the attributes available within the Test Environment Editor (TEE). There are commonly used attributes that are valid for all compiler and targets and those which are compiler respectively target related.

All attribute settings being changed within TEE will be propagated to the properties of all modules with the respective environment selected. You should make any changes to attributes within project related configuration files. This facilitates moving of projects with their corresponding attribute settings from one computer to another.

Some attributes are only relevant for specific environment configurations or for specific compiler or targets, e.g. Compiler Install Path.

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1.1 Common Attributes

Attribute	Type	Description
Alternate Breakpoint		When interactive debugging TESSY sets the test object as breakpoint (for C code) respectively TESSY_TestobjectCall (for C++ code). The attribute may be used to change the default breakpoint to a different value, e.g. **main**.
ASAP File		Contains a reference to an ASAP file. This file will be parsed by TESSY, if the **Enable ASAP** attribute is set. Refer to the application note “Using ASAP Information” for details.
ASAP Module	optional	Name of the ASAP module that shall be analyzed for the ASAP information. This module needs to be available within the ASAP file. Only relevant, if the **Enable ASAP** attribute is set to ***true***.
ASAP Project	optional	Name of the ASAP project that shall be analyzed for the ASAP information. This module needs to be available within the ASAP file. Only relevant, if the **Enable ASAP** attribute is set to ***true***.
Batchtest Wait Time	optional	Time in seconds to wait after each execution of a test object during batch test execution, the default is `0`. This time setting may need to be increased, if there are errors during start-up of the debugger (in case TESSY starts the debugger, e.g. when using winIDEA).
Binary Path		This attribute is only relevant for the OBT. It reflects the setting available within the module properties in case of OBT and contains the path to the binary application to be downloaded.
Call Count Size		Defines the size in bits of the variable(s) used for the call count of stub functions, default is 8 bit (resulting in a maximum call count of 255). This setting needs to be increased, if any stub function will be called more than 255 times. Possible values are **8**, 16 and 32. When changing this setting, please, keep in mind that each stub function has its own variable of this size, and that the memory required for all the call counts may grow too big for microcontrollers with limited memory resources.

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Attribute	Type	Description
Check Driver Layers		Please refer to application note *Using Test Driver Communication Tests*.
Comm Checksum		If set to ***true***, for all packages sent between the client and the master a checksum is calculated. If the checksum is wrong the current test run is stopped immediately.
Comm Buffer Integrity		The Boolean type attribute enables buffer integrity runtime tests, i.e. all communication buffers are checked if they are read only or if they are corrupted. If so an error message is issued and the test object's test run exits with the corresponding error code.
Comm File Compression		If the Boolean type attribute is set to ***true***, the amount of data sent between TESSY and the target debugger interface diminishes. The feature is supported for file communication only (CCES, CCS, C-Spy, MPLAB X, TASKING VX, TRACE32 (with 0x71), etc.). Because it consumes more CPU time on the target device, it depends on your target device, whether it is useful or not. ***It is required to enable "Makefile Variable" within the TEE attribute settings.***
Comm Transfer Limit		The numerical value is multiplied by one megabyte. The attribute's value specifies the approximate limit of bytes to be sent during a test object's test run in each direction. The default value is 1, which means one megabyte. 0 means no limit is set.
Component Test	internal	This setting is relevant for the module properties. It defines the kind of test as shown within the module properties dialog. Only one of the attributes **Unit Test** and **Component Test** must be set to true at any time.
Conversion DLL	internal	Contains the name of a conversion DLL, the default is "none". This attribute will be set when enabling ASAP from the module properties dialog.
Collect All Enums		If set to ***true***, all ***enum*** declarations are available for use in TESSY expressions even if they are unused within the test objects. See also **Enum Exclude List**.
Collect const Variables		If set to ***true***, all initialized global ***const*** variables, like `const int MASK = (1<<3 | 8);`, can be used in TESSY expressions even if they are unused within the test objects.

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Attribute	Type	Description
CTE File		Contains the name of the CTE file for a test object. This attribute will be set on test object level after CTE test cases have been synchronized with TESSY.
Declare Constructors List		The attribute contains a comma-separated list of class names for which a default constructor should ***not*** be automatically defined but declared only. Normally a default constructor is generated by TESSY, if a class is required by the test driver but has no default constructor. If the class has member variables that have to be initialized during construction (e.g. references or constant members), TESSY will generate code to initialize these variables. However, if a member variable is of type virtual class or a class without a default constructor, an error occurs during compilation or linking. For such cases, these class names should be added to this attribute, so that the classes will not be defined automatically but be declared only. Thus, you have to define the given classes in TESSY's Test Data Editor (TDE) on your own. The attribute accepts regular expressions as well.
Default Call Trace Evaluation		The attribute should contain either "Ignore Call Trace", which is the default, or "No Call Expected". The attribute only affects newly created test steps. If set to "No Call Expected", the test will fail if the test object calls a function.
Defines Exclude List		Contains a list of strings (with wildcards) that will be used for filtering the #defines parsed from the source code (the list of #defines is available as possible test data values within TDE). This setting may be changed in order to remove built-in or other undesired #defines from the list. Regular expressions are accepted. This attribute does not affect the #defines being generated for the user code. See **Generate Defines Exclude List**.
Define Value Collapse Exclude List		Special characters and spaces may cause trouble within define values. Therefore, TESSY generates short paths for those define values which contain absolute or relative paths of directories found in the TESSY process' current working directory. The expert mode attribute **Define Value Collapse Exclude List** contains a CSV list of those values, for which no short path will be generated.

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Attribute	Type	Description
Deleted Constructors List		The attribute contains a comma-separated list of class names for which a default constructor has been explicitly deleted in source code. Normally a default constructor is generated by TESSY, if a class is required by the test driver but has no default constructor. Since explicitly deleted constructors cannot be defined, the deleted feature will be removed from all classes found in this attribute. Thus, you have to define the default constructor for each given class within TESSY's Test Data Editor (TDE) on your own. The attribute accepts regular expressions as well.
Display Name	internal	This is the name of any environment as displayed within TESSY. Please note: Changing this value may cause the environment name of existing modules becoming invalid. You would need to select another available environment in this case.
Double Precision		Indicates the precision applied for double variables. The default is `-1` which means that values are rounded up to 6 decimal places. You may specify the precision in number of decimal places (e.g. 7 or 8). Values greater than 16 do not make sense, because 16 is the highest precision available for double type values. If this attribute is missing the attribute **Float Precision** also applies for double variables.

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Attribute	Type	Description
Duplicated Defines Header		Some situations require a redefinition of a macro. If the macro in question is given within a header file, you will either have to change your code or put the absolute paths to the header files into this TEE attribute. In order to alter the attribute's value, you will have to enable the TEE's **Expert Mode**. Furthermore, you will have to add '`..`', e.g. **`-I..`**, as your first compiler include path within the Makefile template, because TESSY saves a copy of each given header file in '`..`'. The copied header files are equal to the original ones, except that all defines given in TESSY are removed from the files. However, there are some limitations: • The included header files have to be included without subdirectories, i.e. if the included file is for example included as `<sys/io.h>`, it will not work, whereas `<io.h>` will work. • You must not select two or more header files sharing the same base name, because the copied files would be overwritten by the files with the same base name. • If header files are included via quotation marks, i.e. `#include "config.h"`, all parent header files, if there are any, also have to be added to the attribute's value. • Only single-line macros are supported. • If you have to take some of these headers into account within TEE attribute **Header File Exclude List** or **Header File Include List**, you will have to add those header files in question without their path information to one of the before mentioned attributes.
Enable ASAP		Enables the ASAP functionality when set to true. Refer to the application note "Using ASAP Information" for details. This setting will be displayed as selectable feature within the module properties dialog.

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Attribute	Type	Description
Enable const As IN		If set to ***true***, all ***const*** variables receive the passing directions as recognized by TESSY's parser. This does not mean that the ***const*** type is converted to a non-***const*** type! If set to ***false***, the passing direction for these variables is set to `IRRELEVANT`.
Enable C0 Coverage Enable C1 Coverage Enable CPC Coverage Enable DC Coverage Enable EPC Coverage Enable FC Coverage Enable MC/DC Coverage Enable MCC Coverage		These Boolean attributes are set to ***true*** by default. Generally, all test objects are tested with the same predefined coverage settings during a test run. That is, you choose the coverage setting before the test run and it will be applied to all test objects being executed during the test run. However, if you wish to exclude some coverage settings from one or several test objects, you may utilize these attributes at the corresponding test object level from within TESSY's **Properties** view by setting the unwanted coverage settings to false.
Enable Coverage Data Compression		If set to ***true***, the coverage metadata will be compressed during test execution. Especially for tests with a large number of loop cycles, this option will significantly reduce the size of the data files and thus shorten the test execution time.
Enable Create Default Constructors		For C++: If set to ***true***, the TESSY parser creates a default constructor if it is missing.
Enable Create Function Stubs		If set to ***true***, external functions that are called are by default marked to create stub code unless they are listed in attribute **Function Stub Exclude List**.
Enable Create Method Stubs		For C++: If set to ***true***, undefined called methods are marked to create stub code unless they are listed in attribute **Method Stub Exclude List**.
Enable Define Variables		If set to ***true***, external variables that are used are marked to be defined unless they are listed in attribute **Variable Exclude List**.
Enable Exceptions		For C++: If set to ***true***, TESSY enables exceptions for the test object and generates a try-catch block around it. Also, the TIE displays an artificial global variable called **throws exception** which can be set to OUT in order to test an exception thrown be the test object. By default, the attribute is set to true.

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Attribute	Type	Description
Enable Handle BOM		When using instrumented code for testing, TESSY generates some code before the test object and appends the originals source code. So, if the original source file begins with a byte-order-mark, the byte-order-mark would occur in the middle of the generated source file, which is not allowed. A compiler would exit with an error message. If the Boolean type attribute **Enable Handle BOM** is set to ***true***, the byte-order-mark will be removed.
Enable Inline Functions		If set to ***true***, inline functions will be treated as normal functions and they will appear in the list of test objects. This setting should be set to false, if inline functions are defined within include files and a module contains more than one source file.
Enable setjmp/longjmp		If set to ***true***, the support for setjmp/longjmp statements within the source code will be enabled. Refer to application note “Using setjmp longjmp” for details. Please note that not all target compilers support this feature.
Enable Singleton Test		If set to ***true***, no constructor will be presented within the TDE and the object represented by the ***this*** pointer has to be created manually within TESSY’s **Prolog** view. For example: `TS_CREATE_THIS(TestClassSingleton::getInstance())`
Enable Static Functions		If set to ***true***, static functions will appear in the list of functions of a module and they may be used as test objects.
Enable Static Locals		If set to ***true***, static local variables will appear within the test object interface and input/expected values may be specified.
Enum Exclude List		The attribute holds a comma-separated list of regular expressions which comprise the enums which will be excluded from “all enums” as collected by enabling attribute **Collect All Enums**. This attribute is ignored if attribute **Enum Include List** is not empty.
Enum Include List		The attribute holds a comma-separated list of regular expressions to explicitly select the enums that are collected by enabling attribute **Collect All Enums**. Attribute **Enum Exclude List** is ignored if this attribute is not empty.

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Attribute	Type	Description
Execute Testcases Separately		On test object level, this setting reflects the last selection of the **Test Cases Separately** option within the **Execute Test** dialog. If set to true, the download and execution process of the test driver will be started separately for each test case. This provides an initial state of memory (and variables) for each test case and may be useful, if the test cases shall be executed independently of each other. The disadvantage of this approach is the increased execution time due to start/stop of the debugger and download of the test driver. It is recommended to set this option for dedicated test objects only.
Execution Mode	internal	The attribute's value determines TESSY's internal test execution path. Do not change
Execution Time Threshold	internal	Do not change
Execution Timeout		Forces the current test object's test run to be aborted after the specified time in seconds. No further test cases or test steps will be executed for this test object during the test run. The test will continue with the next test object. This might be useful for batch tests.
Execution Timeout Call		Command line to be executed after a test object's test run timed out. See **Execution Timeout**.
Float Eval Epsilon		The floating value determines the tolerable deviation of the actual value from the expected value (`1.0` means 100%).
Float Precision		Indicates the precision applied for float variables. The default is -1 which means that values are rounded up to 6 decimal places. You may specify the precision in number of decimal places (e.g. 7 or 8). Values greater than eight do not make sense, because eight is the highest precision available for float type values. If the attribute **Double Precision** is missing this attribute also applies for double variables.
Function Stub Exclude List		The comma-separated list of functions is excluded from automatic stub creation. See attribute **Enable Create Function Stubs**. Regular expressions are accepted.

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Attribute	Type	Description
Generate Constructors		The Boolean attribute determines whether C++ constructors can be set within TDE automatically or within TESSY's **Prolog** view manually. Normally TESSY provides all available C++ constructors within the TDE. If you encounter problems concerning C++ templates it might be helpful to call the constructor from within a TESSY prolog by calling the special function `TS_CREATE_THIS`, e.g. `TS_CREATE_THIS(1,'a',2);` `TS_CREATE_THIS` creates an instance of the class by calling the corresponding constructor.
Generate Defines Exclude List		TESSY generates all collected defines found in the test object's source code into the slave's main header file. This may however produce type respectively name space conflicts, if the test object's source code contains real types with the same names. To solve this problem, you may add the conflicting defines to attribute **Generate Defines Exclude List**. Regular expressions are accepted. This attribute does not affect the list of defines available within the TDE. See **Defines Exclude List**.

Generate Parameter Proxies		Having a C++ object passed to your test object, a situation may occur when you need to create the object on your own. If the Boolean type attribute is set to true, TESSY provides a template called **`TESSY_BIND_PARAMETER_name_of_parameter`** within TESSY's **Prolog** which helps to bind that object to the parameter used by TESSY, e.g.
		`MyClass &myVariable = MyFactory::createObject;`
		`TESSY_BIND_PARAMETER_name_of_paramter(myVariable);`
		The passing direction of the related parameter must be set to **`EXTERNAL`** within TESSY's Test Interface Editor (TIE).

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Attribute	Type	Description
Header File Exclude List		This expert mode attribute can be used to exclude inline functions from specified header files as test objects. By default, all inline functions are considered as test objects if attribute **Enable Inline Functions** is set to ***true***. **Header File Exclude List** holds a comma-separated list of header files respectively directories containing header files which contain inline functions to be excluded from the test objects list. The entries in this list can be specified in three forms: an absolute path to a header file (e.g. `C:\directory\subdirectory\file.h`,`$(SOURCEROOT)\subdirectory\file.h`), a directory that contains all header files to be considered without subdirectories (e.g. `C:\directory\subdirectory`,`$(SOURCEROOT)\subdirectory`), and a directory root that considers all header files including all subdirectories (e.g. `C:\directory\subdirectory\**`,`$(SOURCEROOT)\subdirectory\**`). **Header File Exclude List** is ignored if attribute **Header File Include List** is not empty.
Header File Include List		This expert mode attribute can be used to confine the list of included inline functions by listing those header files that contain the preferred inline functions. See **Header File Exclude List** to find out how to specify entries for this list. **Header File Exclude List** is ignored if **Header File Include List** is not empty.
Hide Functions	internal	This attribute will be set from the module properties on source file level. Do not change this attribute manually within TEE.
Insert External Stub At Declaration		If an external stub function is enclosed in pragma directives, the stub function itself should also be declared that way. If the Boolean attribute **Insert External Stub At Declaration** is set to ***true***, TESSY's stub functions will be declared right at the same location where the external declaration was found within the test object. The disadvantage may be that some variable types within the stub are unknown, if their type declaration is found below the external stub declaration in question.
Instrumentation Exclude List		The attribute holds a comma-separated list of regular expressions which comprise the functions and methods that will be excluded from the instrumentation process.

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Attribute	Type	Description
Instrumenter Consider Hide Functions		By default, TESSY considers all functions of all source files including their headers. If the Boolean type attribute is set to true, the functions of the source files, which are marked with 'Hide Functions', are ignored by the instrumenter.
Instrumenter Header Exclude List		By default, TESSY generates all non-primitive data types below the last #include pre-processor directive. This position may be too late for your test object code if for instance a header is included below the test object. Therefore, the String type attribute **Instrumenter Header Exclude List** takes a comma-separated list of file names (i.e. without its directory part) which will be ignored when searching the last #include. An * may be used as a place holder, e.g. `io*mem*.h`.
Main Memory Qualifier		This string type attribute may be used to set far or near qualifiers for function `main()`.
Main Type	internal	The attribute's value determines the type of function '`main()`'. Do not change
Make Use One Shell		If set to ***true*** the Boolean attribute may reduce the time of analysing a module. In rare cases a "`No rule to make target`"-error occurs so that the attribute has to be set to ***false***.
Method Stub Exclude List		The comma-separated list of methods is excluded from automatic stub creation. See attribute **Enable Create Method Stubs**. Regular expressions are accepted.
Minimum C0 Coverage		Minimum C0 coverage required to obtain a passed result.
Minimum C1 Coverage		Minimum C1 coverage required to obtain a passed result.
Minimum CPC Coverage		Minimum CPC coverage required to obtain a passed result.
Minimum DC Coverage		Minimum DC coverage required to obtain a passed result.
Minimum EPC Coverage		Minimum EPC coverage required to obtain a passed result.
Minimum FC Coverage		Minimum FC coverage required to obtain a passed result.
Minimum MC/DC Coverage		Minimum MC/DC coverage required to obtain a passed result.

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Attribute	Type	Description
Minimum MCC Coverage		Minimum MCC coverage required to obtain a passed result.
MISRA Do While Expressions		According to MISRA rule 19.4 “C macros shall only expand to a braced initializer, a constant, a string literal, a parenthesised expression, a type qualifier, a storage class specifier, or a do-while-zero construct.” Therefore TESSY ignores `do…while(0)` loops for Branch, MC/DC, and MCC software testing. If you need further symbols that evaluate within the while condition to `false` you may provide them as a comma-separated list. By default, the attribute is set to `0U,false`.
Parser Options		The comma-separated list of options is passed to the interface analyzer (idb32++) if attribute CLANG is set to true. Please start a TESSY shell (Help->Start Shell) and enter “idb32++ -help” to retrieve all available options.
Pre Execution Command		The given command line will be executed right *before* the batch test.
Post Execution Command		The given command line will be executed right *after* the batch test.
Relative Path Variables	optional	Use the given list of environment variables (comma-separated) to collapse source file name paths even if a given source file resides “besides” this directory resulting in a relative path containing “..” entries (e.g. “$(MY_ROOT)\..\..\source\test.c”).
Simplified Header Folder List		The attribute requires a comma separated list of directories that contain AUTOSAR related header files. Use this attribute to avoid Out-of-Memory errors while analyzing the module of AUTOSAR TESSY projects.
Static Defines In Source		By default, TESSY generates defines in the user code, which point to the corresponding addresses of the static variables found in the test object code. Thus, the static variables can be accessed from within the user code by the same name. In case of name conflicts at compile time this attribute can be set to false.
Stop On First Failure		If the attribute is set to ***`true`***, TESSY stops the test execution right after the first test result failure. This feature is not supported, if the TESSY debugger connection is based on file communication.

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Attribute	Type	Description
Sync State Polling Delay		For older TRACE32 versions: The attribute might help to reduce the polling cycle speed by adding an extra wait time in milliseconds for each cycle.
Synthetic Declarations In Source		By default, TESSY generates synthetic variables as *extern* declarations into the stub function code. This Boolean type attribute has to be set to ***`false`*** if a type of the declared variables is unknown. Than the corresponding variables have to be declared manually.
Test Object Exclude List		Comma-separated list of functions to be excluded as test objects. The attribute is ignored if attribute **Test Object Include List** is not empty. Regular expressions are accepted.
Test Object Include List		Comma-separated list of functions to be used as test objects. If this list is not empty the **Test Object Exclude List** attribute is ignored. Regular expressions are accepted.
Time Unit		Contains the time unit as string. Only relevant, if the **Timer Enabled** attribute is set to true.
Timer Enabled		If set to ***`true`***, the timing measurement will be enabled. Refer to the application note “Timing Measurement” for details. Timing measurement is only available for certain compiler/target combinations.
Type Exclude List		By default, all tag types of cast expressions within the test object’s code are collected so that these types can be used as types for synthetic variables. This attribute can be used to explicitly exclude specific tag types from all collected tag types. This attribute is ignored if attribute **Type Include List** is not empty.
Type Include List		The attribute holds a comma-separated list of regular expressions to explicitly select specific tag types, like **`enum`**, **`struct`**, **`union`**, **`class`**, being used with the test object’s cast expressions so that these collected tag types can be used as types for synthetic variables. The attribute **Type Exclude List** is ignored if this attribute is not empty.
Timer File		References a C source file containing the implementation of the timer functions. Only relevant, if the **Timer Enabled** attribute is set to true.

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Attribute	Type	Description
Timer Prescale		Contains the prescale factor for the timer register of the C166 microcontroller (depends on the implementation within the **Timer File**). Only relevant, if the **Timer Enabled** attribute is set to true.
Timer Resolution		Contains the resolution of the timer register of the C166 microcontroller (depends on the implementation within the **Timer File**). Only relevant, if the **Timer Enabled** attribute is set to ***true***.
Type Table File		The referenced file contains compiler settings for the respective compiler. If you need to change any of those settings, it is recommended that you make a copy of the type table file, add your changes and save it somewhere into your project directory. This attribute should then refer to the changed file within your project.
Unit Test	internal	This setting is relevant for the module properties. It defines the kind of test as shown within the module properties dialog. Only one of the attributes **Unit Test** and **Component Test** must be set to true at any time.
Use Alias Names		This attribute must be set to ***true*** in order to display alias names provided by defines within the source code (e.g. "`#define door_light_right_b door_light_flags_c.b.b1`" for accessing individual bits of structs built from commonly named bit field types), the default is false.
Use Parameter Prefix		If set to true, test object function parameter names will be prefixed to avoid naming conflicts with the test object's name. The default value is false.
Use Module Stub Code		If the attribute is set to true, TESSY generates stub code already defined for the module for external functions that are not called by the current test object. However, this may lead to compiler/linker errors, if the predefined stub code contains artificial variables, which are not defined for the current test object. If the attribute is set to false or if no appropriate stub code is found for the module, TESSY generates default stub code, which may result in an uninitialized value compiler warning. The default value is true.

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Attribute	Type	Description
Variable Exclude List		The comma-separated list of variables is excluded from being automatically defined. See attribute **Enable Define Variables**. Regular expressions are accepted.

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1.2 Compiler related Attributes

Attribute	Type	Description
Code Segment Begin		The attribute's value is used for some linkers to specify the beginning of the code segment.
Code Start		The attribute's value is used for some linkers to specify the start of the code.
Code Model		The attribute's value is used for some linkers to specify the code model.
Compiler Call		The attribute contains the command line call to be executed when "Check Source" is triggered from the respective context menus. It is *not* related to the building of the test driver!
Compiler Commandline		The attribute's content is passed to the compiler command line used for compiling the test object source file.
Compiler Concurrency		A nonzero value limits the number of concurrently executed builds. In case of 0, which is the default value for most compilers supported by TESSY, the number is limited to twice the number of CPUs available on your PC.
Compiler Defines		The attribute contains test object specific defines and its corresponding values. The attribute's value affects the test objects source file(s) only.
Compiler Dialect		The attribute determines the compiler dialect to be used. For IAR C++: --c++, --ec++ or --ecc++ For ARM V5: --c90, --c99
Compiler Id	internal	Used to identify the compiler. Never ever change this value!
Compiler Includes		The attribute contains test object specific include paths. The attribute's value affects the test objects source file(s) only.
Compiler Install Path		The attribute contains the compiler's install path. It should be set in section "Compiler".

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Attribute	Type	Description
Compiler Version	internal	Do not change except for Wind River compilers.
CPU		The attribute's value is passed to the corresponding Makefile variable if available. It affects the compiler's command line arguments.
Data Segment Begin		The attribute's value is used for some linkers to specify the beginning of the data segment.
Enable User Includes		Determines if the include-files found by TESSY's parser in the test object's source file should also be included in the user code.
ExeFile Extension	internal	The attribute's value determines the file extension of the test driver. Do not change unless otherwise noted within the corresponding application note.
Heap Size		The attribute's value is used for some linkers to specify the target binary's heap size.
IDBMake Makefile		This attribute points to an alternate idb.mak file. The idb.mak file is used by TESSY to determine, if TESSY has to reanalyze the respective test module.
IDBMake Preprocessing		The Boolean value determines if **IDBMake Makefile** will be used instead of idb.mak.
Include Position		The string value may be set to **1** or **0** and determines the order of pragmas and header includes. If you encounter compilation errors concerning pragmas and headers while instrumentation is enabled this attribute may be set to **0** to put the include statements below the pragma statements.
Init Code		The attribute's content is placed at the very beginning of the test driver's main() function.
Init Definitions		The attribute's content is placed at the beginning of the test driver's main() function file.
Library		The attribute provides the name or path to the library being passed to the corresponding Makefile variable if available. It affects the linker's command line.
Library File		Same as **Library**.
Linker File		The attribute provides the name or path to the linker file being passed to the corresponding Makefile variable if available. It affects the linker's command line.

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Attribute	Type	Description
Linker Options		The attribute provides further linker options being passed to the corresponding Makefile variable. It affects the linker's command line.
Make Call		The attribute contains the make command line call that is used to build the test driver. The path to the test driver's generated Makefile is appended. Do not change.
Make Command		The Makefile program to be used in **Make Call**. Do not change.
Make Options		The attribute is used for attribute **Make Call**. Some of TESSY's makefiles are prepared for parallel builds within the Makefile. For those combinations this option is not empty. Do not change.
Makefile Template		The attribute contains the path to the template Makefile to be used for the test driver's generated Makefile. If you need to adjust the template Makefile, please, copy the installed template Makefile into your project folder and let this attribute point to its path.
MCU		unused
Method Exclude List		For C++: List of functions to be excluded functions from test module. Regular expressions are accepted.
Model		Used for Fujitsu FFMC16. Same as **Code Model**.
Multicore Emulator		Used for CrossCore Embedded Studio SHARC. The Boolean value defines if a multicore (including one ARM core) connected via emulator is used. If true, the required preload is done.
ObjFile Extension	internal	Do not change.
Preprocessor Call		The preprocessor resolves define, pragma, and include directives found in the C source file which contains the test object to be tested.
Ram Begin		Start of the RAM section, written into the linker file for certain compilers (e.g. COSMIC).
Ram End		End of the RAM section, written into the linker file for certain compilers (e.g. COSMIC).
Rom Begin		Start of the ROM section, written into the linker file for certain compilers (e.g. COSMIC).

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Attribute	Type	Description
Rom End		End of the ROM section, written into the linker file for certain compilers (e.g. COSMIC).
Scanner Call		The scanner prepares the C source file which contains the test object to be tested for TESSY's parser.
Stack Begin		Start of the STACK section, written into the linker file for certain compilers (e.g. COSMIC).
Stack Size		End of the STACK section, written into the linker file for certain compilers (e.g. COSMIC).
Stack Start		Start address of the STACK section
Start Address		Start address to begin test execution, used for some ARM controllers
Startup Code		Some devices need specific code for initialization. Here one C or assembler file is expected.
TKS Template File		A specific TKS is generated based on the template file pointed to by this attribute. Attribute **Enable CLANG** has to be set to true to enable this feature.
Vector Table Begin		Start of the VECTOR TABLE section, written into the linker file for certain compilers (e.g. COSMIC).
Vector Table File		End of the VECTOR TABLE section, written into the linker file for certain compilers (e.g. COSMIC).
Wind River Home Path		The attribute's directory path points to the Wind River base path which is by default C:\WindRiver. The path is needed to find wrenv.exe which is used by TESSY to launch the Wind River tools (compiler, simulator).
Zero Page Begin		Start of the special ZERO PAGE section, written into the linker file for certain compilers (e.g. COSMIC).

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1.3 Target related Attributes

Attribute	Type	Description
Break Trigger		For all GDB-file-based adaptions the TEE attribute may be set to help TESSY's master to find the given alternative break point line the GDB client outputs. For most GDB clients this attribute is not needed.
Buffer Size		TESSY uses for its communication with the debugger one (for socket communication) or two (for file communication) buffers. The size of the buffers in bytes is determined by the **Buffer Size** attribute. A multiple of 8 and a minimum of 8 should be used. It depends on the type of debugger API used for the communication if other values might work as well. The maximum value also depends on it. If you encounter memory overlay at linking time you may try to reduce this buffer size. A larger buffer size may reduce the breakpoint hit count which may result in a shorter execution time.
Builtin Header		See Generate Builtin Data. If set to 1, the communication buffer is filled during its definition.
Flash Program		The Boolean value determines if target program should be flashed.
FlashFile Extension		For TRACE32: The attribute is used for the TRACE32 scripting language. Variable TESSY_FLASH_FILE will contain the name of the file to be flashed before the ELF binary is loaded. **FlashFile Extension** contains the name of the extension for the variable including the dot, e.g. `.s19`. If the TEE attribute is missing the local variable TESSY_FLASH_FILE will not be generated. There is no default value.
GDB Client Script		For GDB file-based adaptions: The contents of the file pointed to by this TEE attribute is send to the GDB client before the GDB client contacts the GDB server. See also **Init Script** and **Postload Script**.
GDB Client Debugger		For gdbserver: Points to the path of the GDB client.
GDB Delete File		For gdbserver: gdbserver command used to delete the target binary after the test run.

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Attribute	Type	Description
GDB File Transfer		For gdbserver: gdbserver command used to transfer the target binary.
GDB Host Name		For gdbserver: Target host name used by GDB client to connect to gdbserver.
GDB Server Debugger		For gdbserver: Shell command used to start gdbserver.
GDB System Root		For gdbserver: The system root path is needed by GDB client to load proper libraries.
GDB Test Run Folder		For gdbserver: Folder on remote operating system where the target binary will be put to.
GDB Write Blocks		Some GDB clients/server do not support filling arrays block by block. If the Boolean attribute is set to true, TESSY sends the data byte by byte.
GDI Parameter		The parameter is used for the Generic Debug Instrument interface communication.
Generate Builtin Data		For targets not supporting interactive debugging this attribute is available to generate a test program which contains the test data as built-in and which can be manually loaded into the debugger. The communication buffer is filled at runtime.
Go Until TestObject		For TRACE32: The Boolean type attribute is used to debug the script during an original binary test.
Hide IDE		If set to true (default), for some target debuggers the target IDE respectively the debugger window will be hidden during the test run unless a breakpoint is set or logging is enabled. For Keil µVision the IDE's window will vanish from the taskbar. The µVision window can be restored by typing ALT+TAB and selecting µVision.
Init Script		Points to the script file to be executed right after the connection to TRACE32 has been established.
Jump To Source		For Renesas CS+: In interactive debugging when set to true (default) open the test object's C source file.
Load Auto		For TRACE32: If the Boolean type attribute is set to true TESSY will use TRACE32's d.load.auto command to load the target binary. If the attribute is missing or set to false the TRACE32 load command is determined by the target binary's file name extension.

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Attribute	Type	Description
Load Options		Contains the PRACTICE command options to be passed to the data.load command issued by TESSY to load the target binary file (e.g. `/NOCODE`).
Master Call		The attribute defines the master command line used by TESSY to start the master.
Master Script Template		Some target adaptions use a scripting language for communication. This attribute's value point to the script template file delivered with TESSY, which the master uses to generate the target specific script file.
Port		Specifies the port used for communication. The port number should be altered If the port number is in use.
Port Trigger		For GDB-file-based adaptions: Many GDB servers output the communication port number to which the GDB client may connect to. This TEE attribute should hold the unique text which is output right in front of the port number. If TEE attribute **GDB Server Port** is set to **0**, TESSY will determine the GDB server port number by reading it from GDB server's standard output searching for the **Port Trigger**. The first number following the **Port Trigger** is taken as the port number.
Postload Script		For TRACE32 and GDB: Points to the script file to be executed after loading the binary. See also **Init Script**.
Postload Wait Time		The attribute's value determines the time in seconds the master waits after the target binary was loaded. For TRACE32: after execution of the PostloadScript, before starting the binary.
Preload Wait Time		The attribute's value determines the time in seconds the master waits for the connection between the master and the target to be established and before the target binary was loaded. The attribute is only used by some adaptions, e.g. TRACE32
Project File		Points to the IAR Embedded Workbench project file TESSY will use.
Quit Target Handler		For MPLAB X > 2.15: Quits the target handler after each test run and thus it will be automatically restarted before the next test run.

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Attribute	Type	Description
Register File		For legacy versions of CodeWarrior (<10): Select the appropriate register file.
Setup File		Points to the IAR Embedded Workbench setup file TESSY will use.
Send Single Bytes		For µVision: If the Boolean type attribute is set to true, bytes are sent byte-by-byte to the target memory instead of block by block. If the debugger API does not support writing blocks to the target memory, this attribute has to be enabled. If writing blocks is supported, the lowest communication layer should be fine. I.e., **Check Driver Layers** set to 0x31 should succeed (see Check Driver Layers).
Slave Call		The attribute defines the slave command line used by TESSY to start the slave, if the communication requires it. It depends on the type of communication between master and slave if TESSY needs to start the debugger or slave separately.
Slave Debug Call		The attribute defines the slave command line used by TESSY to start the slave for interactive debugging, i.e. if “Define Breakpoint at Test Object” has been checked from TESSY’s Execute Test dialog. If the attribute is empty or missing, the attribute Slave Call is used for interactive debugging instead. It depends on the type of communication between master and slave if TESSY needs to start the debugger or slave separately.
Separately Wait Time		If test cases are executed separately, this is the amount of time TESSY waits between two consecutive test cases.
Start Script		For TRACE32: Points to the script file to be executed after reaching the main() function.
Stop Script		Points to the Script file to be executed before disconnecting from TRACE32.
Sync Wait Time		For IAR Embedded Workbench: Time to wait during each synchronization loop (in milliseconds). If you run into timeout problems or if TESSY prints messages like “Trying to restart C-SPY”, this option may help. The default is 100ms.
Sync Wait Timeout		For IAR Embedded Workbench: Time until timeout for synchronization (in milliseconds). The default is 10000 ms. You may increase the value for very large test objects.
Target Concurrency		A nonzero value limits the number of concurrently executed test runs. In case of 0, which

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Attribute	Type	Description
		is the default value for most targets supported by TESSY, the number is limited to twice the number of CPUs available on your PC. It depends on the type of your target environment and the type of debugger communication if test runs may be executed concurrently at all.
Target Configuration		Used for CrossCore Embedded Studio API to determine the target for the debug session configuration.
Target Id	internal	Do not change.
Target Install Path		The attribute's value points to the installation directory of the debugger IDE.
Target Interface		Used for Freescale's CodeWarrior API to determine the target interface to be used.
Target Platform		Used for CrossCore Embedded Studio API to determine the platform for the debug session configuration.
Target Version	internal	Do not change.
Timer Breakpoint Options		For TRACE32: In contrast to the other debuggers, TESSY sets two more breakpoints for the timer functions, if the timer feature was enabled (see Timer Enable). For instance, if the emulator supports only two breakpoints, the breakpoints for timer functions may be set as soft breakpoint by setting the value to `/SOFT`. The default is `/Onchip`.
UDE Config File		References a PLS UDE configuration file for the desired target board.
Wait Timeout		The attribute is used for various TESSY-debugger adaptions. The function and value of this attribute depends on the specific connection type. Please refer to the corresponding application note we provide for the TESSY-debugger adaption in question.
Workspace File	optional	References a workspace file for the respective target debugger. It is recommended to set this attribute when using the PLS UDE debugger in order to specify debug settings.

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2 Special Attribute Flags

The following table lists the available special purpose flags for attributes which are interpreted by the process executor “ti.exe” that invokes all child processes of the TESSY application. These flags are represented by characters that need to be added as the first characters of the attribute value. They will be interpreted by “ti.exe” and being removed when passing the attribute value to its respective receiver.

Character Sequence	Description
+	Pass defined environment variables to the new created process. Applicable for **Make Call** and **Slave Call** attributes.
&	Use cmd.exe instead of CreateProcess to start the command line. Applicable for **Slave Call** attributes.
<path>:@:	Execute the given command within the directory denoted by <path>. Applicable for **Make Call** and **Slave Call** attributes.

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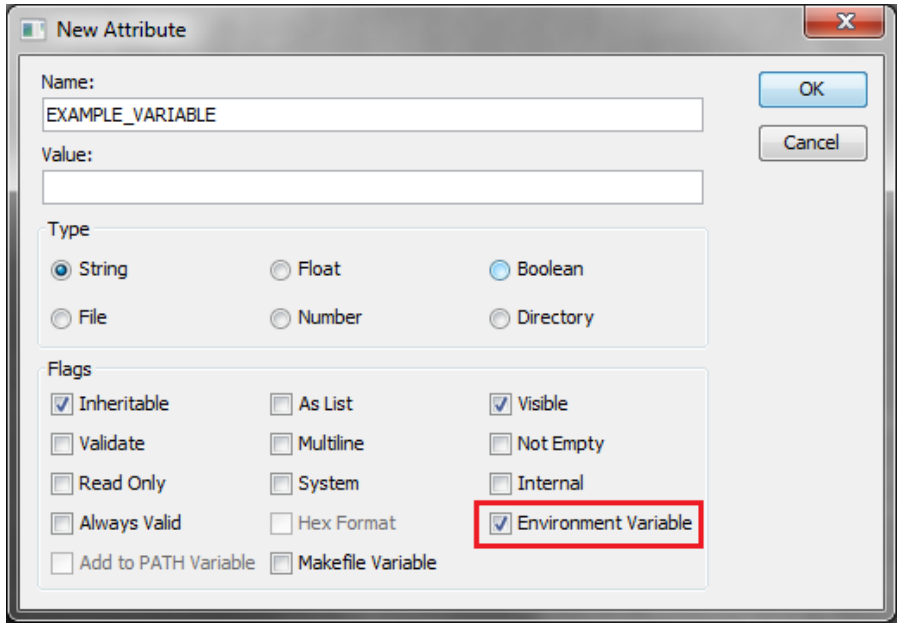
3 Environment Variables

TEE attributes can be used to create environment variables which will be available during the build process of the test program or during the test execution as long as the corresponding attributes start with a '+' (see 2). However, there are several restrictions which have to be considered:

- The name of the attribute must not contain a space character.
- The name of the attribute has to match the name of the environment variable you want to create.
- It is possible to use other attributes inside the value of the attribute, e.g. $(Compiler Install Path), which will be expanding on the fly. However, these attributes have to be of type File, Directory, or String. Other attributes will not be expanded even if the included attribute is of type String but contains further attributes of unsupported types for expansion.



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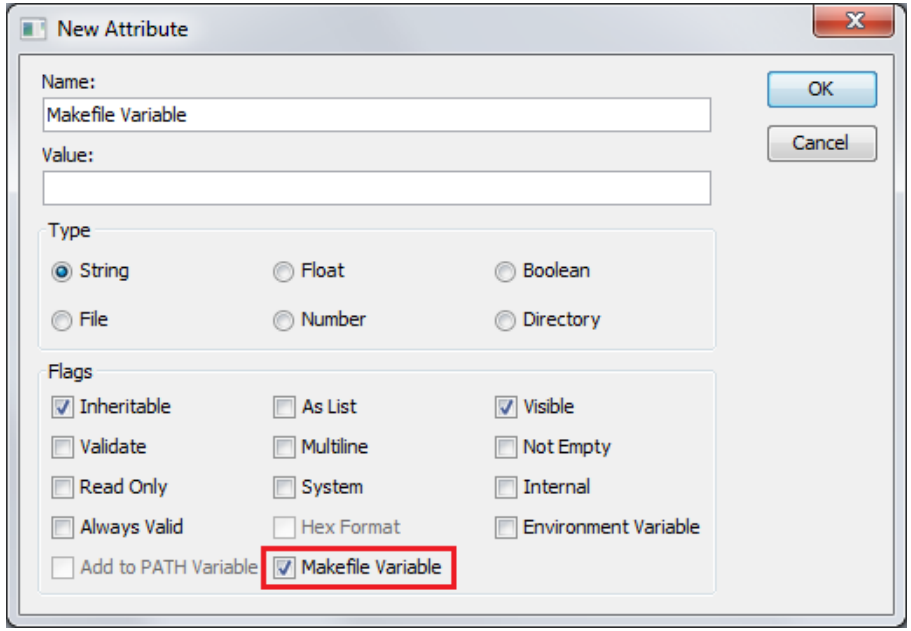
4 Makefile Variables

TEE attributes can be used to create Makefile variables which will be generated into the Makefile which is used to build the test program (see 1.2). The name of the TEE attribute is automatically converted into upper case letters while spaces are converted to underscores. The value of the attribute may contain all types of TEE attributes which will be expanded when the Makefile is generated.



The generated Makefile variable from this example will be called MAKEFILE_VARIABLE inside the Makefile. Thus, you can use it as variable MAKEFILE_VARIABLE in your Makefile template.

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