Agilent W1130B T&M Toolkit 2.1 with Test Automation

W1130B-TA Additional Agilent Test Automation Debug and Runtime License

Data Sheet

- **Control your instruments and take measurements directly from code you write with Visual Studio**
- **Quickly sequence your prototype tests without the complexity of a manufacturing test executive**
- **Automatically generate statistical graphs and export data to Excel**

Develop tests in the language you choose

Slash test development time and get meaningful answers faster to accelerate your time to market

Cut your instrument programming time nearly in half, speed up your product development process and improve your productivity with the Agilent T&M Toolkit 2.1 with Test-Automation capability. Agilent's new T&M Toolkit 2.1 includes the first test automation tool that allows you to quickly sequence tests and generate reports for testing prototypes. The test automation capability provides the quickest and easiest way for you to gather measurement data, control instruments, create test sequences, and display results.

In addition to this new test automation tool, the T&M Toolkit extends the Microsoft® Visual Studio® development environment with a suite of integrated, easy-to-use software tools and components—project wizards, APIs, class libraries, widgets, graphs, drivers and more—to make Visual Studio a great environment for building measurements and tests into your custom applications (see Figure 1). Using T&M Toolkit 2.1 in the Visual Studio environment allows you to work in the textual programming language you choose—so you can program at peak productivity— and integrate your new code with existing code from other languages. In addition, the VEE Wrapper Wizard allows you to integrate existing Agilent VEE code.

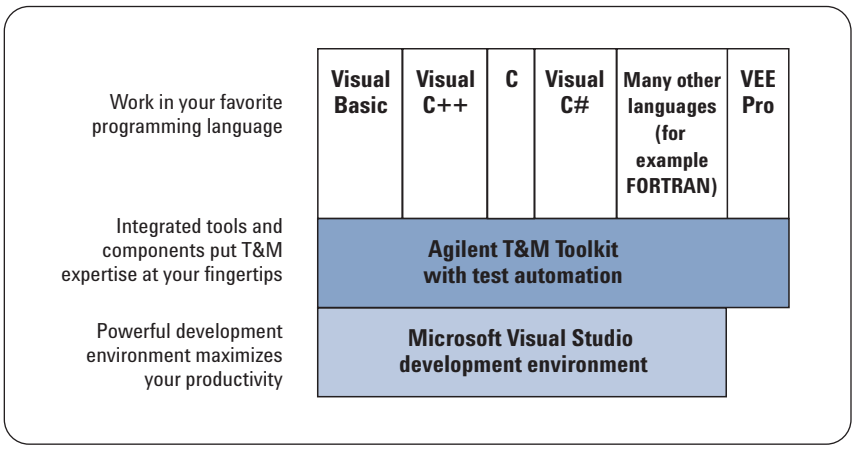

Figure 1. *Agilent's T&M Toolkit 2.1 makes Microsoft Visual Studio a great environment for building measurements and tests into your custom applications.*

Agilent Technologies

Easily sequence prototype tests without a test executive

Prior to the introduction of T&M Toolkit with test automation, sequencing and automating a few tests required you to choose between two paths:

1. Purchase an expensive, full-featured off-the-shelf test executive, such as NI TestStand, which is targeted for use in manufacturing. However, in order to communicate with instruments, you also have to buy a programming language to communicate directly with the instruments or DUT. You have to work through the complexity of applying the manufacturing test executive to your prototype test. Then you have to attach your measurement code to the test executive.

2. Program your own test executive functionality from scratch, which is a time-consuming and arduous process. In addition, when you are done, you have to support the scripts and sequences you created. More importantly, you often spend too much energy on software programming issues, instead of solving engineering problem.

With version 2.1 you can now freely distribute your Test Automator runtime application! Just like other Toolkit solutions, you can now load and run a Test Automator sequence and resulting output without licensing! With additional enhancements, you can create your test plan faster than ever. In addition, others can also modify, develop and debug your Test Automator sequences within the boundaries you specify on a PC that doesn't have a Toolkit development license by using a Test Automator Runtime and Debug license.

The test automation functionality in T&M Toolkit allows you to easily and inexpensively get just the capability you need. For instance, you may just want to connect to an instrument, capture a signal, do an FFT and plot the spectrum—all from code you write in Visual Studio using your favorite textual language. It's easy to do with T&M Toolkit's Instrument Explorer, engineering math and graph tools integrated into Visual Studio.

Or you may want to sequentially perform a set of a dozen commands that coordinate sending a stimulus, measuring a response, and comparing that to your estimated limits. T&M Toolkit's Test Automation user interface helps you quickly define a sequence of measurements and tests, run those tests on your device, and immediately get results. You can control instruments directly using native instrument commands without the need of a programming language. You also can automate previously written DLLs, COM objects, assemblies or new code written in your favorite language such as C, Managed C++, C#, VB, or VEE Pro. You can then set up tests, establish limits, develop your test logic and display results quickly—even put the data in Excel—all in minutes. To further customize, integrate into your enterprise or deploy your solution, you can use T&M Toolkit with your choice of any of the Microsoft Visual Studio languages such as Visual Basic, Visual C++, or Visual C#.

T&M Toolkit with test automation enables unprecedented ease in sequencing measurements and analyzing results in the world's most popular development environment—Microsoft Visual Studio. You can mix and match instruments, interfaces, languages, and components.

Measure and control directly from code written in Visual Studio

T&M Toolkit 2.1 integrates Agilent's extensive measurement expertise into Visual Studio. The software automatically generates instrument setup code for you, and Windows functionality like drag and drop makes many tasks faster and easier. T&M Toolkit eliminates the difficulties traditionally associated with connecting to and controlling instruments.

Now you can migrate to Visual Studio 2005 when you're ready. You can install both Toolkit 2.0 with Visual Studio 2003 and Toolkit 2.1 (both included in the purchase of W1130B) with Visual Studio 2005 on the same PC, and create projects in both!

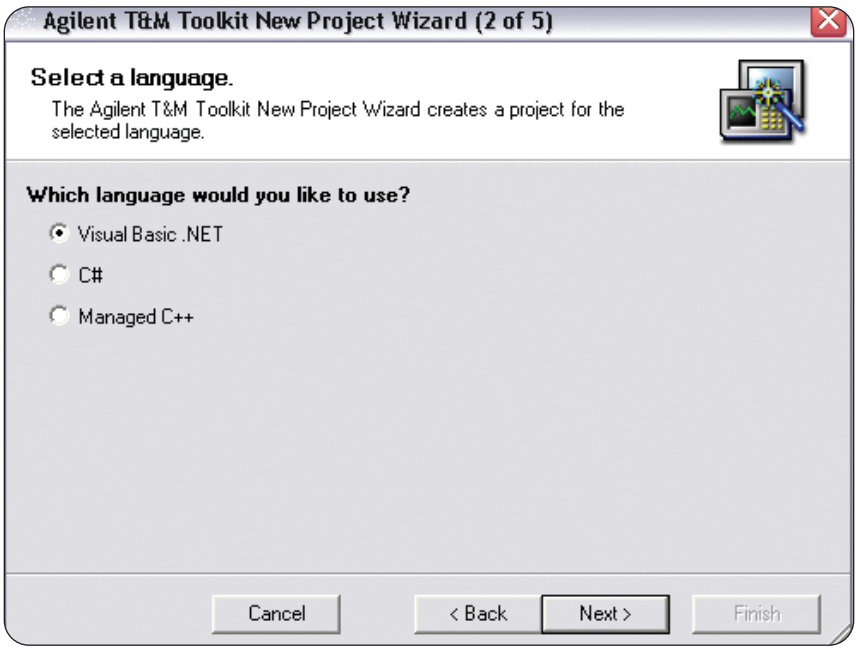

Figure 2. *T&M Toolkit's Project Wizard helps you get started quickly.*

T&M Toolkit helps you:

Get started quickly

T&M Toolkit's Project Wizard helps you get started quickly, allowing you to select your programming language, choose either an executable (.exe) or library (.dll) project, and easily import and reference all necessary T&M libraries—so you don't have to start from scratch.

Control instruments and collect data

- Use the Instrument Explorer to quickly configure your test system and manage instruments and drivers. You can easily find instruments on your PC or network, make measurements and control any instrument from any vendor—as well as many vendor's PC plug-in cards.
- Drag and drop the instrument icon into your work window to generate code to connect with the instrument.
- Use DirectIO to directly communicate and control an instrument using standard text commands in the language of your choice, or in the test automation tools without the need of any language at all.
- T&M Toolkit gives you the ability to use hundreds of drivers representing the most popular instruments from 70 different vendors

Analyze your data using engineering math and graphs

Get simple access to math and analysis routines through APIs that provide basic math routines such as digital signal processing functions (FFT, Bartlett, Hanning, Hamming windowing), Bessel functions, statistical function (RMS, standard deviation, binomial), regression functions (Lin, Log, Exp and curve fitting routines), as well as a complex number of waveform and spectrum classes and an engineering formatter.

T&M Toolkit 2.1 now automatically handles results data in the form of numeric array, waveform, and spectrum data types. This allows easy presentation of data as graphs or tables from typical instrument sources. In addition, for high speed data collection or large data volumes, Test Automator's Results Manager now allows referencing a result data file URL for display and analysis.

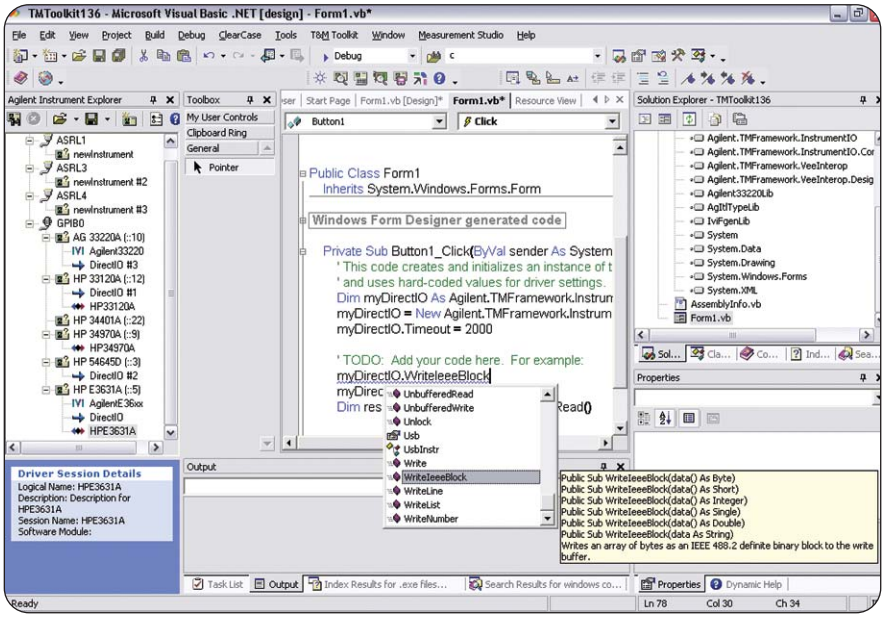

Figure 3. *Microsoft's Intellisense is integrated with Agilent's instrument connections to assist you in selecting the appropriate instrument command. And a fully integrated, online help system lowers your programming learning curve.*

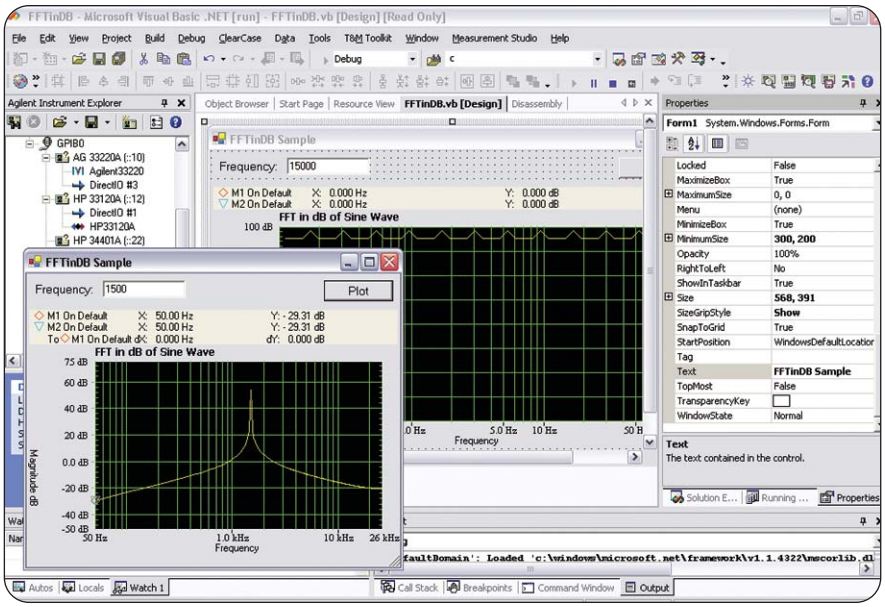

Figure 4. *Graph displays allow you to visualize, scale and track data from measurement and data stores. Display results with XY, Y, waveform, complex, magnitude, spectrum, or phase spectrum graphs or a strip chart.*

Debug instrument control applications

- The IO Monitor helps you debug and track interaction between instrument drivers and your software by capturing and displaying instrument communication details from several I/O layers. Or you can save the file for later analysis.
- Interactive IO—Gives you the ability to easily send and receive responses from instruments.

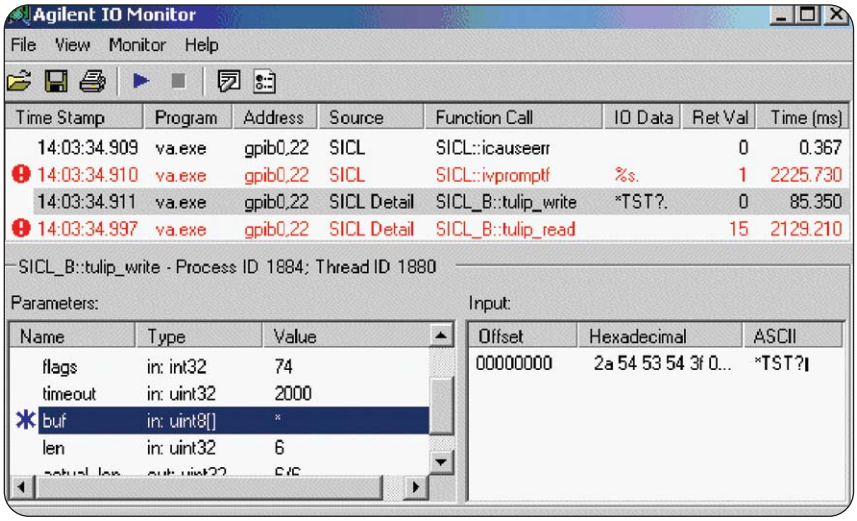

Figure 5. The IO Monitor traces I/O layers for Agilent's VISA, VISA COM, SICL, and SICL Detail. You can use it to find bottlenecks in your IO or create a log file to send to an Agilent support engineer for additional assistance..

Easily test your prototype using T&M Toolkit's test automation

Get quick answers from automatically generated tabular test data and statistical graphs

T&M Toolkit with Test Automation capability helps you get more directly to the insight you need from your tests. It also gives you instant data analysis using automatically generated control charts and histograms.

- A normalized progress chart lets you view overall normalized measurements within high and low limits.
- A limit chart lets you view measurements values as they are collected with any available limits.
- Histograms show you the distribution of measured values with simple statistics like mean, standard deviation, and coefficient of producibility (CpK).
- Highly configurable tabular test result reports showing time stamp, data type, actual measured value, tested limits, pass/fail, and status can be printed, sorted or saved to a file (Excel, csv, txt).

Easily control and automate measurements for design validation

T&M Toolkit with Test Automation capability lets you sequence:

- SCPI commands
- Code written in Visual Basic, Visual C++, Visual C#, or Visual J#
- VXI*plug&play*, IVI-COM, and IVI-C drivers
- .NET-wrapped VEE code (user functions)
- Components such as COM modules or assemblies

Easily create tests using built-in branch logic, limit checking and debugging

- Control flow: If-then, for-loop, group, try-catch, subroutine, and external sequence calls
- Tests: min/max limits for real numbers, integers, and arrays; equality/inequality limits for strings and Boolean expressions and arrays
- Debug: breakpoints, stepping, and variable-current value view/edit

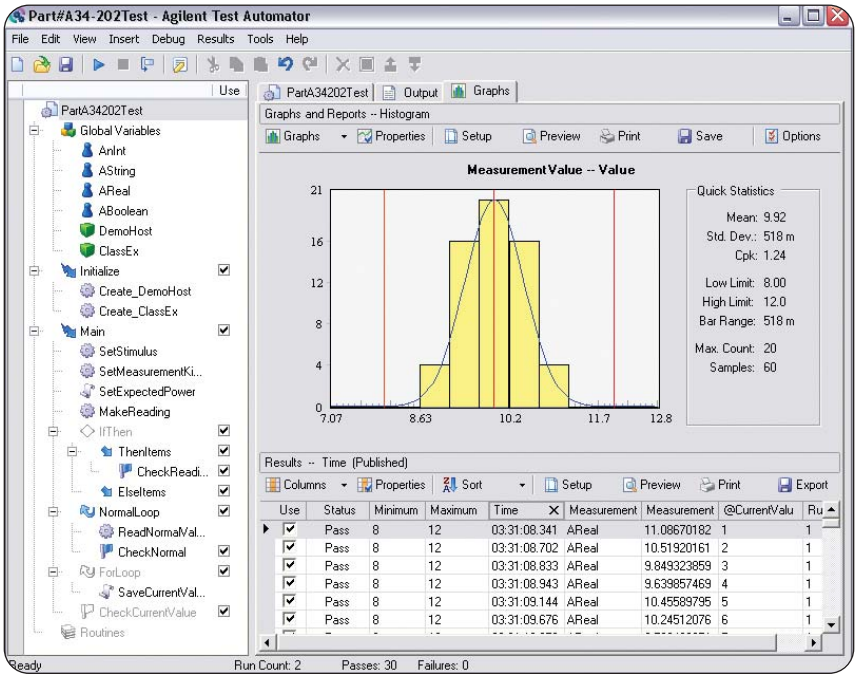

Figure 6. T&M Toolkit's test automation capability automatically captures test results and generates statistics for easy export to Excel.

Build a library of reusable test sequences

You can import already-written sequence definitions into your working sequence, pass parameters to test routines, and create groups of sequence items to help organize your tests. You can easily build a library of reusable test sequences and measurements that capture the expertise of your team. Reuse your library to reduce future development efforts and increase your productivity. The test automation capability also lets you interface to external libraries and mix and match between standard and custom tests.

Customize your application by integrating your code and components into Visual Studio

Customize your code for your specific application

- Manage your results:
  - Configure standard results handling textually to add or exclude results graphs, reporters, or loggers and configure their behavior
  - Build custom programs that easily capture results and display them as reports in Word or graphs in Excel that automatically email via Outlook
  - Send specified data to your enterprise database for future warranty information
- Leverage components for custom test and measurement applications (see Table 1)
  - Develop your company's user interface with specific security levels for integrators, engineers, technicians and operators
  - Customize any of the sequences for different product families, geographical locations, multiple vendor part sourcing, or test system deployment (requires test automation debug and runtime license)
  - Create your custom application using T&M Toolkit's math, engineering and measurement classes with free runtime executable

Integrate your existing code from a variety of languages

With the multiple compilers and translators in Visual Studio, you can combine code from a variety of sources with your T&M Toolkit project. You can select the source code of your T&M Toolkit project—either Visual Basic (.vb), Managed C++ (.cpp), or C# (.cs). You can then integrate Visual Basic 6, VB, C, Visual C++, Visual C# code, as well as COM objects, ActiveX components and controls and assemblies into your application. You also can integrate code from 12 other .NET-compatible languages, or use the VEE Wrapper Wizard to call your Agilent VEE Pro User Functions from a Visual Studio project or the T&M Toolkit test automation tool.

Your customized application-specific solution

T&M Toolkit capabilities (for more details, see Detailed Capabilities at the end)	**Connect to instruments**	**Graphs and reports**	**Leverage VEE code in Visual Studio**	**Manu-facturing test**	**Prototype test or validation**
Data visualization		●			●
Test sequencing		●		●	●
Results management		●		●	●
Data analysis		●		●	●
VEE interoperability			●	●	●
Driver interoperability	●			●	●
I/O interoperability	●			●	●
T&M data types	●	●	●	●	●
T&M Framework	●	●	●	●	●
Microsoft .NET	●	●	●	●	●

Table 1. *Components from Agilent T&M Toolkit and Microsoft enable your solution.*

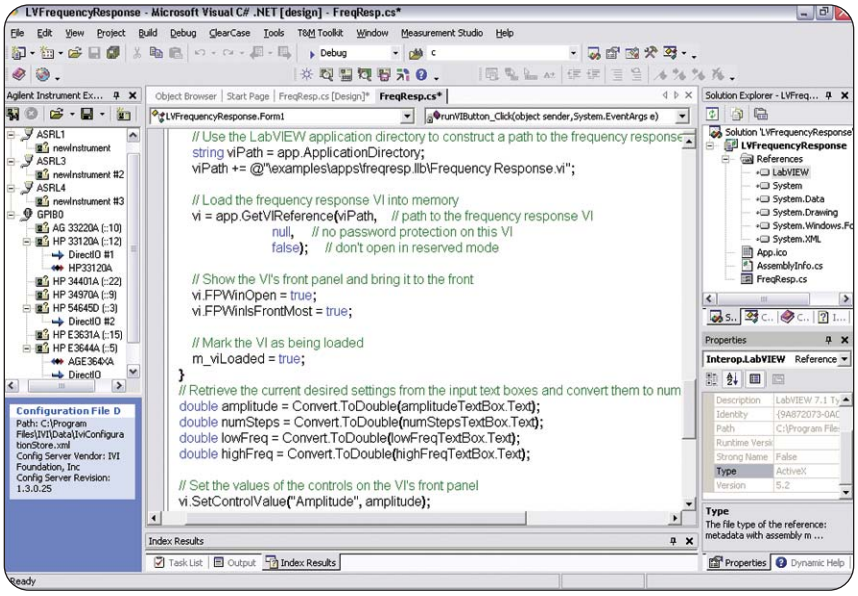

Figure 7. *T&M Toolkit with Visual Studio can access LabVIEW code and wrap LabVIEW code for use with the test automation tools.*

Create your application for distribution

You get free runtime distribution with your T&M Toolkit purchase, so you can freely distribute your executables, just like you do from your C or Visual Basic program. You can create a Windows or console application (.exe) for resale or use on other computers without paying additional fees. Or you can create a Windows control library or class library (.dll) for use with other programs without paying more. With T&M Toolkit 2.1, you can now deploy your test sequencing capabilities free of charge, so you may create your own "test executive." T&M Toolkit 2.1 ships with one additional Test Automation Development & Debug License in addition to the main development license, so someone else can edit your deployed test plan within the limits you have established. If you want additional licenses to create additional tests, modify test sequences you created, or debug a test plan, you can order W1130B-TA, Additional Agilent Test Automation Development & Debug Licenses.

Because Toolkit with test automation provides fast throughput at runtime, you can leverage the same code you write for prototype testing on a production line. That means you only have to write your test program once, instead of multiple times, which improves your team's productivity.

Detailed T&M Toolkit capabilities

Component or class	Description of properties, methods and events
Data visualization	
Axis, Caption, ComplexGraph, FillBar, GraphBase, Graticule, InformationDisplay, Line, MagnitudeSpectrumGraph, Marker, MarkerCollection, MarkerDisplay, PhaseSpectrumGraph, PlotArea, Shape, SpectrumTrace, StripChart, StripChartTrace, StripChartTraceCollection, TickLabels, Trace, TraceLegend, WaveformGraph, WaveformTrace, WaveformTraceCollection, XAxis, XYGraph, XYTrace, XYTraceCollection, YAxis, YGraph, YTrace, YTraceCollection.	Hundreds of properties available to ensure complete design and runtime control of graphs
Test sequencing	
SequenceHost, SequenceGUIHelper, SequenceDefinition, SequenceRuntime, SequenceContentKind	Hundreds of methods, properties and events to aid creation and modification of test automation applications
Sequence Definition, Editor, and Runtime Classes for sequence definition content kinds	Hundreds of methods, properties and events to define, edit, and run multiple sequence content kinds, including variables, DirectIO, method calls, routine calls, if-then, for-loop, local routine, external sequence, limit checks, and value assignment with expressions,
Sequence, FlowControl, IfThenFlowControl, SerialFlowControl, ForLoopFlowControl, TryRecoverFlowControl, ExternalSequenceFlowControl, SequenceItem	Hundreds of methods, properties and events that implement the core sequencing capabilities of T&M Toolkit test automation.
Multiple TMFramework.Sequencing	Supporting classes and interfaces to enable T&M Toolkit test automation supporting classes
Problem, ProblemExceptionWrapper, ProblemLocation	Dozens of properties and methods that provide information about detected design problems (including problems from exceptions), including their location for Test Automation sequence definitions
ProblemList, ProblemList.ProblemEnumerator	33 methods and 6 properties that provide a collection that stores Problem objects and the Problem Collection enumerator for Test Automation sequence definition design error presentation
SequenceExecutable TmExecutablechildStatechangeEventHandler	53 methods, 23 properties and an event handler provide base classes for lifecycle-managed T&M .NET components with integrated T&M Toolkit results capture
PropertyUndoAction, SerializedUndoAction, UndoAction, UndoActionManager, UndoCheckpoint, UndoManager, UndoStackChangeEvenArgs, UndoStateChangeEventArgs	Dozens of methods and properties for various classes that encapsulate the state information and provide algorithms required to undo various user operations in the test automation tool

Component or class	Description of properties, methods and events
Results management and visualization	
ResultFieldFormat	Methods (DateTimeFormat, NumericFormat, UseValueFieldDecorations, Verbose) hold data about how to format data values in columns depending on the type
ResultsControl	224 methods, 97 properties and 73 events in base class for all controls hosted by the RESULTS tab in Test Automator and can be used standalone
ResultsControlExample	Example of results-aware graphing control
ResultsControlViewer	Hosts any results-aware control that presents user with processed information from the results data table
ResultsHistogram	Histogram that provides statistics on the selected column in the results data table
ResultsLimitChart	Limit chart plots value and its similar limits as three lines on a scaled strip chart
ResultsProgressReport	Normalized progress chart displays values plotted against any available limits, which can be unlike the measurements
ResultsTableViewer	Presents measurement values and other records that meet the selection criteria as they are published
ResultsTablePreference, ResultsTablePreferences, ResultsTablePreferences.Enumerator	Preferences or collections of preferences or iterations of a list of preferences containing how the results data table should handle fields for creating custom or default look and feel.
UpdateResultEventArgs	Holds event arguments for the UpdateResult event. An event occurs when a new result row is available to update the graph or report.
BackstoreListener	15 methods allow publishing, opening and closing normal and compressed XML files, naming, setting attributes, etc (4 properties)
Decorations, FloatDecorations, IntegerDecorations, StringDecorations	Dozens of methods and properties for basic, floating point number, integer and string decorations of values of results publication
DefaultResultsListener	13 methods and properties send formatted results records to the output window of Visual Studio
ResultField, ResultFieldList	15 methods and 12 properties allow testing different APIs along with a list a fields found
ResultNames	7 methods and 41 properties provide common names used to avoid detailed character-by-character comparison to improve search performance of listeners
Results, ResultsDataColumn, ResultsListener, ResultsListenerCollection, ResultsRecord, ResultRecordId, ResultsTableListener, ResultsTableRecordMatch, ResultsTableStartRecordMatch	Hundreds of methods and properties separate user code from results; create columns; produce graphs and reports; save to files or databases; retrieves results; stores record name, time stamp and all fields; check start and end of a record; cache results for use in a grid table; match and filter records. Events: Disposed, CaptureCleared, CaptureRecordKindChanged
TextWriterListener	14 methods and 10 properties write the selected record to a file specified
UnitsTable	10 methods collect abbreviated and full names used for formatting units, conversions
Data analysis and math	
Bessel Provides spherical or cylindrical coordinates with frequency modulation.	I0, J0, J1, Y0, Y1
DSP Digital signal processing class for time series data	Bartlett, Blackman, Convolve, CrossCorrelate, FFT, Hamming, Hanning, IFFT, Rectangular (Narrow band, wide band and fixed windowed time-domain measurements for FFTs)
DSP Exception Exceptions when a DSP object encounters an error	GetBaseException, GetObjectData, GetType, (HelpLink, Inner Exception, Message, Source, StackTrace, TargetSite, HResult)
Regression Use to get coefficients for linear, logarithmic, exponential, and power curve regressions	ExponentialRegression, LinearRegression, LogarithmicRegression, PowerRegression Equals, GetHashCode, GetType, ToString, Finalize, MemberwiseClone
Statistics Contains probability and statistical functions for use with calculations	Beta, Binomial, Combination, Factorial, Gamma, Max, Mean, Median, Min, Mode, Permutation, RMS, StandardDeviation, Variance
StatisticsException Exceptions when a Statistics object encounters an error	StatisticsException, GetBaseException, GetObjectData, GetType, (HelpLink, InnerException, Message, Source, StackTrace, TargetSite)

Component or class	Description of properties, methods and events
VEE interoperability	
VeeCallServer Provides access to the properties of the Callable VEE Automation Server	CreateObjRef and CreateVeeDataContainer methods plus 8 other methods, (DebugEnabled, Height, InstallDir, IOConfigPath, Left, Path, Top, Version, Width)
VeeDataContainer Holds data types which exist in VEE. No counterparts in other languages	55 methods and properties such as DataShape, DataType, NumCoordDims, NumDims, NumElements
VeeException	8 methods and 8 properties handle when the Callable VEE Automation Server returns an error
VeeLibrary	13 methods and 6 properties provide the base class for VEE program wrappers. It provides access to the VeeCallServer object as well as data about the VEE program associated with the wrapper
VeeArgument, VeeUserFunction, VeeUserFunctionCollection	Handles input or output to VEE User Function, a Callable VEE User Function or stores User Function Object with dozens of methods and properties
VeeWrapperGenerator and VeeWrapperGeneratorException	Parses Agilent VEE programs and generates a .NET wrapper assembly: CancelParse, CompileAssembly, EmitSourceCode, ParseVeeProgram et al (ClassName, CodeDomProvider, GenerateXmlDocComments, NamespaceName, UserFunctions, VeeLibPath); as well as handles with 8 methods and 6 properties when an error is encountered. Event: ParseProgress
Instrument driver interoperability	
IviCConstants, IviCDriver, IviCException,	Includes dozens of properties and methods used in IVI-C drivers as specified in VPP-3.4 specification, IVI-C driver wrapper classes, exceptions
VxipnpConstants, VxipnpDriver, VxipnpException	Includes dozens of properties and methods used in VXI*plug&play* drivers as specified in vpptype.h file, VXI*plug&play* driver wrapper classes, and exceptions
IviCWrapperGenerator, VxipnpWrapperGenerator	Parses drivers and generates a Wrapper for easy use in Visual Studio. Allows setting CompilerParameters, GenerateXmlDocComments, and LibDirs. CancelWrapperGeneration, GenerateWrapper, GetType, Finalize. Event: WrapperProgress,
IviCDriverSessionFactory	7 methods create an instance of an IVI-C driver .NET wrapper
IviComDriverSessionFactory	7 methods create an instance of an IVI-COM driver .NET wrapper
VxipnpDriverSessionFactory	7 methods create an instance of an VXI*plug&play* driver .NET wrapper
IncompatibleSessionException, IviConfigStoreException, IviInvalidItemException, IviItemDoesNotExistException	9 methods and 8 properties for Exception when a logical name in IVI Configuration Store specifies a driver type that is incompatible; 8 methods and 7 properties for handling an exception with IVI Configuration Store; 8 methods and 7 properties for handling an un-installed IVI driver or multiple copies of the master configuration; 8 methods and 7 properties for handling when a referenced item is not found in the IVI Configuration
Direct I/O interoperability	
DirectIO Enables commonly used VISA features to be easily accessible from the Visual Studio programming environment	At least 45 different methods for reading, writing, making conversions, handling a buffer (15 properties that get or set timeout, termination, service requests, status, various bus objects) Event: ServiceRequest
DirectIO.GpibInstr Provides data and control of GPIB instrument session	9 methods for controlling the GPIB interface (6 Properties that get addresses and states of instruments)
DirectIO.SerialInstr Provides data and control of Serial instrument session	8 methods such as setting buffer size, reset, equality, etc. (17 properties such as get and set baud rate, status, control flow, parity, stop, on and off)
DirectIO.TcpipInstr Provides data and control of TCPIP instrument session	6 methods for equality, getting type, finalizing, returning a string. (DeviceName, HostName, IpAddress)
DirectIO.UsbInstr Provides data and control of USB instrument session	9 methods for controlling the USB interface. (HardwareInterfaceNumber, Is4882Compliant, ManufacturerID, ManufacturerName, ModelCode, ModelName, UsbInterfaceNumber, UsbSerialNumber)
ServiceRequestEventArgs Determines if Request is associated with DirectIO object	4 methods (StatusByte)
VisaContants, VisaException, VisaResourceName, VisaResourceNameComparer, VisaResourceName Format Exception, VisaUtil	Constants used by VISA [False, Null, Success, True], 6 standard methods; as well as handling VISA exceptions, 15 Exception methods, (1 Exception property); as well as properly compares and sorts VISA resource strings, 7 methods; as well as handling VISA Name exceptions, 8 Exception methods, (7 Exception properties); as well as useful utility methods to interact with VISA such as Failed, GetMajorVersion, GetMInorVersion, GetSubMinorVersion, IsWarning, Succeeded plus 6 methods
DirectIOSessionFactory	Creates a new instance of DirectIO using CreatesDirectIO method, plus uses 6 methods
IncompatibleSessionException	8 methods and 7 properties for handling an exception when a logical name in IVI Configuration Store specifies a driver type that is incompatible

Component or class	Description of properties, methods and events
T&M-specific data types (waveform, complex, spectrum)	
Waveform Data Type Class	Provides common data format for many instruments. Waveform compromises an array of double values, the Y data, along with an implicit X axis (start time and number of points). The waveform data type treats the combination of Y data and X axis (time-domain data) as a singular unit. Provides 17 methods, 10 arithmetic operations, 4 properties
IWaveformData Interface	Easily use waveform data returned from scopes. If class is not defined for specific instrument, user can write a class for instrument, (StartTime, TimeBetweenPoints, YData)
Agilent5460XWaveformData, Agilent5461XWaveformData, Agilent 5462XWaveformData, Agilent5464XWaveformData, Agilent548XXWaveformData	Unique classes for Agilent oscilloscopes that implement the IWaveformData interface to aid in getting waveform data from these oscilloscopes.
Complex Data Type Structure	Contains the basic arithmetic operations (+,-,/,*) for complex numbers; complex number evaluations such as positive/negative infinity, hash code, magnitude, phase, and not-a-number (NAN); equivalencies to an object or another complex number; and parsing operations
Complex, ImaginaryComparer, MagnitudeComparer, PhaseComparer	8 arithmetic operations; 20 methods, (ImaginaryComparer, Magnitude Comparer, Phase Comparer, Conjugate, Imaginary, Real); Uses 18 .NET Framework methods for conversions
Spectrum Data Type Class	Models spectral data from spectrum or network analyzers, vector Signal analyzers, et al. Data comprises an array of complex values, the Y data, along with X axis data (stop/start frequency and number of points). 11 mathematic operations, 19 methods, 5 properties
Agilent T&M framework and component model	
EngineeringFormatter Use to format the string representation of a number in engineering format.	Equals, GetHashCode, ToString, Finalize, MemberwiseClone. Six different format strings can be used to select different engineering format.engineering formats.
EngMath Provides constants and static methods for trigonometric, logarithmic, and other mathematical functions	Abs, Acos, Acosh, Acot, Acoth, Asin, Asinh, Atan, Atan2, Atanh, Ceiling, Conjugate, Cos, Cosh, Cot, Coth, Exp, Floor, IEEERemainder, Imaginary, Log, Log10, Magnitude, Max, Min, Phase, Pow, Real, Round, Sign, Sin, Sinh, Sqrt, Tan, Tanh, ToDegrees, ToRadians
FunctionWaveformGenerator Creates waveforms. Includes Sine, Cosine, Square, Triangle, PositiveRamp, NegativeRamp types of waves.	CreateObjRef, Dispose, Equals, GenerateXData, GenerateYData, GetLifetimeService, GetType, InitializeLifetimeService, Disposed, GetService, (Amplitude, Container, DCOffset, Frequency, FunctionType, NumberOfPoints, Phase, Site, StartTime, StopTime, TimeBetweenPoints, DesignMode, Events)
ProgressUpdateEventArgs Provides data for a WrapperProgress event.	Compare, (Message, PercentComplete)
Timing Utilizes computer's high-resolution performance counter to provide timing	CalculateElapsedSeconds, Delay, (CounterFrequency, CounterResolution, CounterValue, HiResCounterSupported)

Get help when you need it

An integrated help system provides easily accessible assistance, fully integrated with the Microsoft Visual Studio help system, including sample code you can cut and paste directly into your source code.

Worldwide service and support

With Agilent T&M Toolkit with Test Automation, you have access to Agilent's worldwide resources for start-up assistance, training classes, and update services. As part of the purchase of any Agilent T&M Toolkit product you are entitled to receive technical support free of charge. There is no need to register. Additional consulting services are available from Agilent. There are currently over 30 companies available in North America, Europe, Middle East and Asia to help you develop your Agilent T&M Toolkit solution. Visit **www.agilent.com/find/assist** to locate your local Agilent contact.

To see a demo or download an evaluation version of T&M Toolkit 2.1 go to **www.agilent.com/find/connectivity.**

You can download drivers for Agilent/HP instruments from: **http://www.agilent.com/find/drivers.**

Software requirements

Requirements for T&M Toolkit 2.1:

- Windows® 2000 Pro (SP4 or later) and Windows XP Pro & Home (SP2 or later)
- Internet Explorer 5.5 or later
- Visual Studio 2005, any edition except for Express Editions (add-ins are not supported)
- Agilent IO Libraries Suite 14.1 or newer (included with purchase)

Requirements for T&M Toolkit 2.0:

- Windows 2000 Pro (SP4 or later) and Windows XP Pro (SP1 or later) for Toolkit development
- Windows 98 SE and Me, Windows XP Pro and Home (SP1 or later), and Windows 2000 Pro (SP4 or later) for Test Automator and Toolkit Runtime
- Visual Studio 2003, any edition
- Agilent IO Libraries Suite 14.0 or newer (included with T&M Toolkit purchase)

Please note: You must install Visual Studio and Agilent IO Libraries Suite before you can use T&M Toolkit. The Additional Agilent Test Automation Development & Debug License install does not require Visual Studio to install, however.

PC hardware requirements

The hardware requirements listed below include the combined resource needs for Microsoft Visual Studio and the Agilent T&M Toolkit.

- PC with Pentium® II-class processor, 600 MHz
- 196 MB RAM
- Visual Studio requires 2.0 GB of free disk space with 500 MB minimum on the system drive, Agilent T&M Toolkit requires 100 MB on the installation drive
- CD-ROM or DVD-ROM Drive
- Display with a minimum of 800x600 (for Version 2.0) or 1024x768 (for Version 2.1) resolution, 16k colors (only small fonts supported)
- PC keyboard and 2-button mouse (third button, if present, is not used)
- Web access is strongly recommended
- One of the following physical connectivity options is required for the PC-to-instrument connection:
  - Agilent 82357A USB/GPIB interface
  - Agilent E5810A or E2050A/B LAN/GPIB gateway
  - Agilent 82350A/B GPIB interfaces
  - USB connection to instruments supporting the TMC protocol
  - Standard RS-232
  - LAN connection to instruments supporting the VXI-11 protocol
  - National Instruments I/O hardware using NI 488 version 1.5 (or higher)
  - National Instruments I/O hardware using NI VISA version 3.0 (or higher)

Warranty information

Agilent software comes with an exclusive money-back guarantee. If you are not completely satisfied with the Agilent T&M Toolkit, you can return it within 90 days for a full refund, no questions asked.

Ordering information

Product description

- **Agilent W1130B**
  T&M Toolkit 2.1 with Test Automation
  Includes T&M Toolkit 2.1 with Test Automation for Visual Studio 2005, T&M Toolkit 2.0 with Test Automation for Visual Studio 2003, Agilent Test Automator Development and Debug license (to be used on a different PC) and technical support.
- **Agilent W1130B-UN**
  University version of T&M Toolkit 2.1 with Test Automation
  Includes 50 licenses of T&M Toolkit for accredited universities only.
- **Agilent W1130B-TA**
  Additional Agilent Test Automation Development and Debug License
  Includes an additional Product Key to deploy the Agilent Test Automator on a PC.

For additional information on these and other software products, please visit **http://www.agilent.com/find/connectivity.**

Related Agilent literature

- **Agilent VEE Pro 7.5** (W1140A-VEE)
  Data sheet, pub. no. 5988-6302EN
- **IO Libraries Suite 14.2** (E2094P)
  Data sheet, pub. no. 5989-1439EN
- **Agilent USB/4-Port RS232 (E5805A)and Networked 5-Port USB Hub** (E5813A)
  Data sheet, 5989-1889EN
- **Agilent USB/GPIB Interface** (82357A)
  Data sheet, pub. no. 5988-5028EN
- **Agilent USB/GPIB Gateway** (E5810A)
  Data sheet, pub. no. 5988-5810EN
- **Agilent PCI GPIB Interface** (82350B)
  Data sheet, pub. no. 5966-2720EN

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