Keysight U2701A/U2702A USB Modular Oscilloscopes

IVI-COM Programmer's Reference for Visual Basic .Net

KEYSIGHT TECHNOLOGIES

Notices

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1 Introduction to IVI-COM

This chapter introduces the remote programming basics of the U2701A/U2702A USB modular oscilloscopes. The IVI-COM programming commands provide the means to control this instrument remotely via a PC.

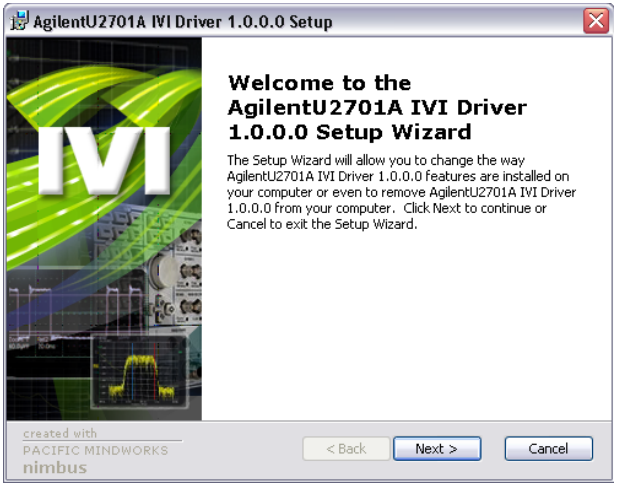
Getting Started

The IVI Foundation is an open consortium founded in year 1998 to promote specifications for programming test instruments.

For complete information on the IVI Foundation and for the most up-to-date versions of all IVI specifications and components, you can visit the IVI Foundation website at www.ivifoundation.org.

Installation Guide

1. To download the KeysightU2701A IVI Driver, go to the Keysight Technical Support website at: http://www.home.keysight.com/keysight/techSupport.jspx?pid=1369621&cc=US&lc=eng&t=80029.k.0&guid=181735
2. Click **Drivers & Software > IVI-COM and IVI-C for U2701A/U2702A** to download the KeysightU2701A IVI Driver package.
3. Save the file to any location on your hard disk.
4. Disconnect any instrument that is connected to your PC and close all other applications on your PC.
5. Double-click the saved installation file to begin installation.
6. The latest version of the IVI Shared Components should be downloaded from www.ivifoundation.org prior to installing the KeysightU2701A IVI Driver package. It is recommended that you periodically check for newer versions of the IVI Shared Components and update as available from the IVI Foundation.
7. If the latest version of the IVI Shared Components is detected, installation of the KeysightU2701A IVI Driver will proceed as normal.



8 The **KeysightU2701A IVI Driver 1.0.0.0 Setup Wizard** dialog will appear. Click **Next** to begin.

9 Read the License Agreement and select **I accept the terms in the License Agreement** to proceed. You may click **Print** to print a hardcopy of the Keysight License Terms for your reference. Click **Next** to proceed.

10 Fill in the Customer Information Form accordingly, and click **Next**.

11 Select the **Typical** or **Full** option in the Setup Type to install the KeysightU2701A IVI Driver package. Advanced users may select the **Custom** option to customize the program features to be installed and where they will be installed. Click **Next** to proceed.

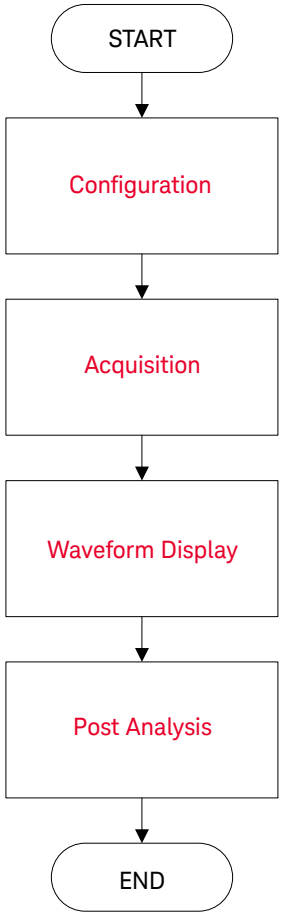
12 Click **Next** to install to the specified folder or click **Change** to install to a different folder.

13 Click **Install** to begin the installation of the KeysightU2701A IVI Driver package.

14 Click **Finish** when the installation has completed.

General Guidelines for Oscilloscope Programming

The block diagram below illustrates the general flow of steps required to program an oscilloscope. The necessary IVI-COM driver commands are arranged to reflect this block diagram.



You can use the commands in this section to configure the oscilloscope channels for waveform acquisition, set the type of event that triggers the oscilloscope, modify the registry status, and perform various utility operations.

You can use the commands in this section to configure the acquisition type, the size of the waveform record, the length of time that corresponds to overall waveform record, and the position of the first point in the waveform record relative to the trigger event.

The statements in this section is used to acquire waveform data from the oscilloscope. You can use the commands in this section to initiate, acquire, and abort measurements.

The statements in this section is used to analyze the waveform data acquired from the oscilloscope. You can also use the commands in this section to initiate, acquire, and abort measurements.

Side-by-Side SCPI and IVI-COM Comparison of the U2701A/U2702A Commands

Table 1-1 SCPI, IKeysightU2701A IVI, and IIviScope command comparison

SCPI command	IKeysightU2701A IVI command	IIviScope command
IEEE 488.2 Common commands		
*CLS	IKeysightU2701AStatus.Clear	-
*IDN	IIviDriver.Identity	IIviDriver.Identity
*OPC?	IKeysightU2701ASystem.WaitForOperation Complete()	-
*RST	IIviDriverUtility.Reset()	IIviDriverUtility.Reset()
Root level commands		
AUTO	IKeysightU2701AMeasurements.AutoSetup	IIviScopeMeasurements.AutoSetup
ACQuire commands		
AVERages	IKeysightU2701AAcquisition.NumberOf Averages	IIviScopeAcquisition.NumberOfAverages
MODE	IKeysightU2701AAcquisition.SampleMode	IIviScopeAcquisition.SampleMode
SRATe?	IKeysightU2701AAcquisition.SampleRate	IIviScopeAcquisition.SampleRate
TYPE	IKeysightU2701AAcquisition.Type	IIviScopeAcquisition.Type
CHANnel<n> commands		
BWLimit	IKeysightU2701AChannel.BandwidthLimit	-
COUPling	IKeysightU2701AChannel.Coupling	IIviScopeChannel.Coupling
DISPlay	IKeysightU2701AChannel.Enabled	IIviScopeChannel.Enabled
INVert	-	-
OFFSet	IKeysightU2701AChannel.Offset	IIviScopeChannel.Offset
PROBe	IKeysightU2701AChannel.ProbeAttenuation	IIviScopeChannel.ProbeAttenuation
SCALe	IKeysightU2701AChannel.Range	IIviScopeChannel.Range

Table 1-1 SCPI, IKeysightU2701A IVI, and IIviScope command comparison (continued)

SCPI command	IKeysightU2701A IVI command	IIviScope command
KEY commands		
AUTO_SCALE	IKeysightU2701AMeasurements.AutoSetup	IIviScopeMeasurements.AutoSetup
CH1	IKeysightU2701AChannel.Enabled	IIviScopeChannel.Enabled
CH1_POS_DEC	IKeysightU2701AChannel.Offset	IIviScopeChannel.Offset
CH1_POS_INC	IKeysightU2701AChannel.Offset	IIviScopeChannel.Offset
CH1_SCALE_DEC	IKeysightU2701AChannel.Range	IIviScopeChannel.Range
CH1_SCALE_INC	IKeysightU2701AChannel.Range	IIviScopeChannel.Range
CH2	IKeysightU2701AChannel.Enabled	IIviScopeChannel.Enabled
CH2_POS_DEC	IKeysightU2701AChannel.Offset	IIviScopeChannel.Offset
CH2_POS_INC	IKeysightU2701AChannel.Offset	IIviScopeChannel.Offset
CH2_SCALE_DEC	IKeysightU2701AChannel.Range	IIviScopeChannel.Range
CH2_SCALE_INC	IKeysightU2701AChannel.Range	IIviScopeChannel.Range
MAIN_DELAYED	IKeysightU2701AAcquisition.StartTime	IIviScopeAcquisition.StartTime
MATH	IKeysightU2701AMeasurementsMathFunction	-
MEASURE	IKeysightU2701AMeasurement	IIviScope.Measurement
MODE_COUPLING	IKeysightU2701AChannel.Coupling	IIviScopeChannel.Coupling
SINGLE	IKeysightU2701AMeasurements.Initiate	IIviScopeMeasurements.Initiate
TIME_POS_DEC	IKeysightU2701AAcquisition.StartTime	IIviScopeAcquisition.StartTime
TIME_POS_INC	IKeysightU2701AAcquisition.StartTime	IIviScopeAcquisition.StartTime
TIME_SCALE_DEC	IKeysightU2701AAcquisition.TimePerRecord	IIviScopeAcquisition.TimePerRecord
TIME_SCALE_INC	IKeysightU2701AAcquisition.TimePerRecord	IIviScopeAcquisition.TimePerRecord
TRIG_LVL_DEC	IKeysightU2701ATrigger.Level Property	IIviScopeTrigger.Level
TRIG_LVL_INC	IKeysightU2701ATrigger.Level Property	IIviScopeTrigger.Level

Table 1-1 SCPI, IKeysightU2701A IVI, and IIviScope command comparison (continued)

SCPI command	IKeysightU2701A IVI command	IIviScope command
MEASure commands		
FALLtime	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
FREQuency	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
NDUTycycle	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
NWIDth	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
OVERshoot	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
PDUTycycle	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
PERiod	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
PREShoot	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
PWIDth	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
RISetime	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
VAMPlitude	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
VAVerage	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
VBASe	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
VMAX	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
VMIN	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration

Table 1-1 SCPI, IKeysightU2701A IVI, and IIviScope command comparison (continued)

SCPI command	IKeysightU2701A IVI command	IIviScope command
MEASure commands		
VPP	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
VRMS	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
VTOP	KeysightU2701AMeasurementEnum Enumeration	IviScopeMeasurementEnum Enumeration
TIMebase commands		
DELayed	IKeysightU2701AAcquisition.StartTime	IIviScopeAcquisition.StartTime
HOLDoff	IKeysightU2701ATrigger.Holdoff	IIviScopeTrigger.Holdoff
POSition	IKeysightU2701AAcquisition.StartTime	IIviScopeAcquisition.StartTime
SCALe	IKeysightU2701AAcquisition.TimePerRecord	IIviScopeAcquisition.TimePerRecord
TRIGger commands		
[EDGE]:COUPling	IKeysightU2701ATrigger.Coupling Property	IIviScopeChannel.Coupling
[EDGE]:LEVel	IKeysightU2701ATrigger.Level Property	IIviScopeTrigger.Level
[EDGE]:SLOPe	IKeysightU2701ATriggerEdge.Slope Property	IIviScopeTriggerEdge.Slope
[EDGE]:SOURe	IKeysightU2701ATrigger.Source Property	IIviScopeTrigger.Source
[EDGE]:SWEep	IKeysightU2701ATrigger.Modifier Property	IIviScopeTrigger.Modifier
MODE	IKeysightU2701ATrigger.Type Property	IIviScopeTrigger.Type
PULSe:MODE	KeysightU2701ATriggerTypeEnum Enumeration	IIviScopeTriggerTypeEnum Enumeration
PULSEe:WIDTh	KeysightU2701ATriggerTypeEnum Enumeration	IIviScopeTriggerTypeEnum Enumeration
STATus	IKeysightU2701ATrigger.Status	-
WAVeform commands		
DATA?	IKeysightU2701AMeasurement.ReadWaveform	IIviScopeMeasurement.ReadWaveform
XINCrement?	IKeysightU2701AMeasurement.ReadWaveform	IIviScopeMeasurement.ReadWaveform
XORigin?	IKeysightU2701AMeasurement.ReadWaveform	IIviScopeMeasurement.ReadWaveform

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2 Configuration

This chapter describes the configuration commands used to program the U2701A/U2702A USB modular oscilloscopes over the remote interface. You can use the commands in this chapter to configure the oscilloscope channels for waveform acquisition, set the type of event that triggers the oscilloscope, modify the registry status, and perform various utility operations.

Count

Type

Property

Function

Get

Description

This command returns the number of channels available.

Hierarchy

```
IKeysightU2701A
    └ Channels
       └ Count
```

Parameters

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Count Statement
    Dim Count As Int32
    Count = Driver.Channels.Count
End Sub
```

Item

This is an interface reference pointer to the IKeysightU2701AChannel interface which is selected by the channel name.

BandwidthLimit

Type

Property

Function

Get and Set

Description

This command returns/sets the bandwidth limit status for the selected channel. If `True`, the bandwidth limit for the selected channel is enabled. If `False`, the bandwidth limit for the selected channel is disabled.

Hierarchy

```
IKeysightU2701A
    └ Channels
       └ Item(Name)
          └ BandwidthLimit
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' BandwidthLimit Statement
    ' To Get Bandwidth Limit from the Instrument
    Dim BandwidthLimit As Boolean
    BandwidthLimit = Driver.Channels.Item("Channel1").BandwidthLimit
    ' To Set Bandwidth Limit eg. True
    Driver.Channels.Item("Channel1").BandwidthLimit = True
End Sub
```

Configure

Type

Method

Function

Set

Description

This command configures the most commonly used properties of the oscilloscope channel sub-system. Use this command to enable or disable the channel and to set the range, offset, coupling, and probe attenuation values.

Hierarchy

```
IKeysightU2701A
    └ Channels
       └ Item(Name)
          └ Configure(Range, Offset, Coupling, ProbeAttenuation,
            Enabled)
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)
Range	Double	Specifies the vertical range. This value sets the Vertical Range property.
Offset	Double	Specifies the vertical offset. This value sets the Vertical Offset property.
Coupling	KeysightU2701A VerticalCoupling Enum	Specifies how to couple the input signal. This value sets the Vertical Coupling property.
ProbeAttenuation	Double	Specifies the probe attenuation. This value sets the ProbeAttenuation property.
Enabled	Boolean	Specifies if the channel is enabled for acquisition. This value sets the Channels.Enabled property.

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Configure Statement
    Dim BandwidthLimit As Boolean
    Driver.Channels.Item("Channel1").Configure(40.0, 0.0,
      KeysightU2701AVerticalCouplingEnum.KeysightU2701AVerticalCoupling
      DC, 1.0, True)
End Sub
```

Coupling

Type

Property

Function

Get and Set

Description

This command returns/sets how the oscilloscope couples the input signal.

Hierarchy

```
IKeysightU2701A
    └ Channels
        └ Item(Name)
            └ Coupling
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Item	Type	Description
KeysightU2701A VerticalCoupling Enum	Enum	See "KeysightU2701AVerticalCouplingEnum" on page 109.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Coupling Statement
    ' To Get Coupling from the Instrument
    Dim Coupling As New KeysightU2701AVerticalCouplingEnum
    Coupling = Driver.Channels.Item("Channel1").Coupling
    ' To Set Coupling eg. DC
    Driver.Channels.Item("Channel1").Coupling =
      KeysightU2701AVerticalCouplingEnum.KeysightU2701AVerticalCoupling
      DC
End Sub
```

Enabled

Type

Property

Function

Get and Set

Description

If this command is set to True, the oscilloscope acquires a waveform for this channel when the IKeysightU2701AMeasurement.Initiate, IKeysightU2701AMeasurement.ReadWaveform, IKeysightU2701AMeasurement.ReadWaveformMeasurement, or IIviScopeMeasurement.ReadWaveformMinMax methods are called.

Hierarchy

```
IKeysightU2701A
    └ Channels
        └ Item(Name)
            └ Enabled
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Enabled Statement
    ' To Get Enabled from the Instrument
    Dim Enabled As Boolean

    Enabled = Driver.Channels.Item("Channel1").Enabled
    ' To Set Enabled eg. True
    Driver.Channels.Item("Channel1").Enabled = True

End Sub
```

Offset

Type

Property

Function

Get and Set

Description

This command returns/sets the location of the center of the range that was specified with the Range property. The units are expressed in volts, with respect to ground. For example, to acquire a sine wave spanning from 0.0 V to 10.0 V, set Offset to 5.0 V.

Hierarchy

```
IKeysightU2701A
    └ Channels
       └ Item(Name)
          └ Offset
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Offset Statement
    ' To Get Offset from the Instrument
    Dim Offset As Double
    Offset = Driver.Channels.Item("Channel1").Offset
    ' To Set Offset eg. 0.0
    Driver.Channels.Item("Channel1").Offset = 0.0
End Sub
```

ProbeAttenuation

Type

Property

Function

Get and Set

Description

This command returns/sets the scaling factor by which the probe attenuates the input signal. For example, with a 10:1 probe, the value is 10.0.

Hierarchy

```
IKeysightU2701A
    └ Channels
       └ Item(Name)
          └ ProbeAttenuation
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ProbeAttenuation Statement
    ' To Get ProbeAttenuation from the Instrument
    Dim ProbeAttenuation As Double
    ProbeAttenuation =
     Driver.Channels.Item("Channel1").ProbeAttenuation
    ' To Set ProbeAttenuation eg. 1.0
    Driver.Channels.Item("Channel1").ProbeAttenuation = 1.0
End Sub
```

Range

Type

Property

Function

Get and Set

Description

This command returns/sets the absolute value of the input range that the oscilloscope can acquire for the channel. The units are expressed in volts. For example, to acquire a sine wave spanning from –5.0 V to 5.0 V, set Range to 10.0 V.

Hierarchy

```
IKeysightU2701A
    └ Channels
        └ Item(Name)
            └ Range
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Remarks

The absolute value of the input range that the oscilloscope can acquire is equivalent to the Volt/Div value multiplied by eight at the scope setting.

Volt/Div (Attenuation = 1x)	Voltage range
2 mV	16 mV
5 mV	40 mV
10 mV	80 mV
20 mV	160 mV
50 mV	400 mV
100 mV	800 mV
200 mV	1.6 V
500 mV	4 V
1 V	8 V
2 V	16 V
5 V	40 V

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Range Statement
    ' To Get Range from the Instrument
    Dim Range As Double
    Range = Driver.Channels.Item("Channel1").Range
    ' To Set Range eg. 40
    Driver.Channels.Item("Channel1").Range = 40

End Sub
```

Name

Type

Property

Function

Get

Description

This command returns the channel name for a given index.

Hierarchy

```
IKeysightU2701A
    └ Channels
        └ Name(Index)
```

Parameters

Item	Type	Description
Index	Long/Int32	One based index into the collection of channels.

Return Format

String

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Name Statement
    Dim Name As String
    Name = Driver.Channels.Name(1)
End Sub
```

Close

Type

Method

Function

Set

Description

This command closes the I/O session to the instrument. Driver methods and properties that access the instrument are not accessible after Close is called.

Hierarchy

```
IKeysightU2701A
    └ Close()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Close Statement
    Driver.Close()
End Sub
```

Initialize

Type

Method

Function

Set

Description

This command opens the I/O session to the instrument. Driver methods and properties that access the instrument are only accessible after Initialize is called. Initialize optionally performs a Reset and queries the instrument to validate the instrument model.

Hierarchy

```
IKeysightU2701A
    └ Initialize(ResourceName, IdQuery, Reset, OptionString)
```

Parameters

Item	Type	Description
ResourceName	String/BSTR	An IVI logical name or an instrument specific string that identifies the address of the instrument, such as a VISA resource descriptor string.
IdQuery	Boolean	Specifies whether to verify the ID of the instrument.
Reset	Boolean	Specifies whether to reset the instrument.
OptionString	String/BSTR	The user can use the *OptionString* parameter to specify the initial values of certain IVI inherent attributes for the session. The format of an assignment in the *OptionString* parameter is "Name=Value", where *Name* is one of: RangeCheck, QueryInstrumentStatus, Cache, Simulate, RecordCoercions, InterchangeCheck, or DriverSetup. Value is either True or False except for DriverSetup. If the *OptionString* parameter contains an assignment for the Driver Setup attribute, the Initialize function assumes that everything following "DriverSetup=" is part of the assignment.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Initialize Statement
    Driver.Initialize("USB0::2391::10520::MY48151002::0::INSTR", True,
      True, "")
End Sub
```

Initialized

Type

Property

Function

Get

Description

This command returns `True` between a successful call to the Initialize method and a successful call to the Close method, and `False` at all other times.

Hierarchy

```
IKeysightU2701A
    └ Initialized
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Initialized Statement
    Dim Initialized As Boolean
    Initialized = Driver.Initialized
End Sub
```

Configure

Type

Method

Function

Set

Description

This command configures the trigger *Type* and *Holdoff*. *Holdoff* units are expressed in seconds.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Configure(Type, Holdoff)
```

Parameters

Item	Type	Description
Type	KeysightU2701A TriggerTypeEnum	Specifies the trigger type. This value sets the Trigger.Type property. See "KeysightU2701ATriggerTypeEnum" on page 106 for more information.
Holdoff	Double	Specifies the trigger hold-off. This value sets the Trigger.Holdoff property.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Configure Statement
    Driver.Trigger.Configure(KeysightU2701ATriggerTypeEnum.
      KeysightU2701ATriggerEdge, 5)
End Sub
```

Coupling

Type

Property

Function

Get and Set

Description

This command returns/sets how the oscilloscope couples the trigger source.

Hierarchy

```
IKeysightU2701A
    └ Trigger
        └ Coupling
```

Return Format

Item	Type	Description
KeysightU2701A TriggerCoupling Enum	Enum	See "KeysightU2701ATriggerCouplingEnum" on page 104 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Coupling Statement
    ' To Get Coupling from the Instrument
    Dim Coupling As KeysightU2701ATriggerCouplingEnum
    Coupling = Driver.Trigger.Coupling
    ' To Set Coupling eg. AC
    Driver.Trigger.Coupling =
      KeysightU2701ATriggerCouplingEnum.KeysightU2701ATriggerCouplingAC
End Sub
```

Edge

This interface configures slope of edge trigger.

Configure

Type

Method

Function

Set

Description

This command configures the conditions for edge trigger. An edge trigger occurs when the trigger source signal passes through the trigger level with the specified slope.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Edge
          └ Configure(Source, Level, Slope)
```

Parameters

Item	Type	Description
Source	String	Specifies the trigger source. This value sets the Trigger.Source property.
Level	Double	Specifies the trigger level. This value sets the Trigger.Level property.
Slope	KeysightU2701A TriggerSlopeEnum	Specifies the trigger slope. This value sets the Trigger.Slope property. See "KeysightU2701ATriggerSlopeEnum" on page 105 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Configure Statement
    Driver.Trigger.Edge.Configure("Channel1", 0,
      KeysightU2701ATriggerSlopeEnum.KeysightU2701ATriggerSlopePositive)
End Sub
```

Slope

Type

Property

Function

Get and Set

Description

This command returns/sets the slope, a rising or a falling edge, that triggers the oscilloscope.

Hierarchy

```
IKeysightU2701A
    └ Trigger
      └ Edge
        └ Slope
```

Parameters

Item	Type	Description
KeysightU2701A TriggerSlopeEnum	Enum	See "KeysightU2701ATriggerSlopeEnum" on page 105 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Slope Statement
    ' To Get Slope from the Instrument
    Dim Slope As KeysightU2701ATriggerSlopeEnum
    Slope = Driver.Trigger.Edge.Slope
    ' To Set Slope eg. AC
    Driver.Trigger.Edge.Slope =
      KeysightU2701ATriggerSlopeEnum.KeysightU2701ATriggerSlopePositive
End Sub
```

Glitch

This interface configures the condition, polarity, and width of the glitch trigger.

Condition

Type

Property

Function

Get and Set

Description

This command returns/sets the glitch condition that determines whether the oscilloscope triggers on a pulse with a width less than or greater than the glitch width value.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Glitch
          └ Condition
```

Parameters

Item	Type	Description
KeysightU2701A GlitchCondition Enum	Enum	See "KeysightU2701AGlitchConditionEnum" on page 99 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Condition Statement
    ' To Get Condition from the Instrument
    Dim Condition As KeysightU2701AGlitchConditionEnum
    Condition = Driver.Trigger.Glitch.Condition
    ' To Set Condition eg. Greater Than
    Driver.Trigger.Glitch.Condition =
      KeysightU2701AGlitchConditionEnum.KeysightU2701AGlitchConditionGr
      eaterThan
End Sub
```

Configure

Type

Method

Function

Set

Description

This command configures the glitch trigger *Source*, *Level*, *Width*, *Polarity*, and *Condition*. A glitch trigger occurs when the edge of a pulse that matches the *Width* and *Polarity* crosses the specified *Level* (expressed in volts).

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Glitch
          └ Configure(Source, Level, Width, Polarity, Condition)
```

Parameters

Item	Type	Description
Source	String	Specifies the trigger source. This value sets the Trigger.Source property.
Level	Double	Specifies the trigger level. This value sets the Trigger.Level property.
Width	Double	Specifies the glitch triggering glitch width in seconds. This value sets the Glitch.Width property.
Polarity	KeysightU2701A GlitchPolarity Enum	Specifies the glitch polarity. This value sets the Glitch.Polarity property.
Condition	KeysightU2701A GlitchCondition Enum	Specifies the glitch condition. This value sets the Glitch.Condition property.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Configure Statement
    Driver.Trigger.Glitch.Configure("Channel1", 0, 0.00000003,
      KeysightU2701AGlitchPolarityEnum.KeysightU2701AGlitchPolarityPosi
      tive,
      KeysightU2701AGlitchConditionEnum.KeysightU2701AGlitchConditionGr
      eaterThan)
End Sub
```

Polarity

Type

Property

Function

Get and Set

Description

This command returns/sets the polarity of the glitch that triggers the oscilloscope.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Glitch
          └ Polarity
```

Return Format

Item	Type	Description
KeysightU2701A GlitchPolarity Enum	Enum	Specifies the glitch polarity. This value sets the Glitch.Polarity property.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Polarity Statement
    ' To Get Polarity from the Instrument
    Dim Polarity As KeysightU2701AGlitchPolarityEnum
    Polarity = Driver.Trigger.Glitch.Polarity
    ' To Set Polarity eg. Positive
    Driver.Trigger.Glitch.Polarity =
      KeysightU2701AGlitchPolarityEnum.KeysightU2701AGlitchPolarityPosi
      tive
End Sub
```

Width

Type

Property

Function

Get and Set

Description

This command returns/sets the glitch width. The units are expressed in seconds.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Glitch
          └ Width
```

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Width Statement
    ' To Get Width from the Instrument
    Dim Width As Double
    Width = Driver.Trigger.Glitch.Width
    ' To Set Width eg. 0.00000003
    Driver.Trigger.Glitch.Width = 0.00000003
End Sub
```

Holdoff

Type

Property

Function

Get and Set

Description

This command returns/sets the length of time the oscilloscope waits after it fills the acquisition buffer until the oscilloscope enables the trigger interface to detect another trigger. The units are expressed in seconds.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Holdoff
```

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Holdoff Statement
    ' To Get Holdoff from the Instrument
    Dim Holdoff As Double
    Holdoff = Driver.Trigger.Holdoff
    ' To Set Holdoff eg. 0.00000006
    Driver.Trigger.Holdoff = 0.00000006
End Sub
```

Modifier

Type

Property

Function

Get and Set

Description

This command determines the oscilloscope behavior in the absence of a trigger.

Hierarchy

```
IKeysightU2701A
    └ Trigger
        └ Modifier
```

Return Format

Item	Type	Description
KeysightU2701A TriggerModifier Enum	Enum	See "KeysightU2701ATriggerModifierEnum" on page 104 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Modifier Statement
    ' To Get Modifier from the Instrument
    Dim Modifier As KeysightU2701ATriggerModifierEnum
    Modifier = Driver.Trigger.Modifier
    ' To Set Modifier eg. Auto
    Driver.Trigger.Modifier =
      KeysightU2701ATriggerModifierEnum.KeysightU2701ATriggerModifierAu
      to
End Sub
```

Level

Type

Property

Function

Get and Set

Description

This command returns/sets the voltage threshold for the trigger interface. The units are expressed in volts.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Level
```

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Level Statement
    ' To Get Level from the Instrument
    Dim Level As Double
    Level = Driver.Trigger.Level
    ' To Set Level eg. 0
    Driver.Trigger.Level = 0
End Sub
```

Source

Type

Property

Function

Get and Set

Description

This command returns/sets the signal that the oscilloscope monitors for a trigger. It can be a channel or one of many other values.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Source
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Source Statement
    ' To Get Source from the Instrument
    Dim Source As String
    Source = Driver.Trigger.Source
    ' To Set Source eg. Channel1
    Driver.Trigger.Source = "Channel1"
End Sub
```

Status

Type

Property

Function

Get

Description

If this command is set to **True**, the waveform starts directly after the trigger condition is met. If this command is set to **False**, the instrument has to send a force trigger to get a waveform.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Status
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Status Statement
    Dim Status As Boolean
    Status = Driver.Trigger.Status
End Sub
```

TV

This interface configures the signal format, number of lines, and events of the TV trigger.

Configure

Type

Method

Function

Set

Description

This command configures the TV trigger source, signal format, event, and polarity.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ TV
          └ Configure(Source, SignalFormat, Event)
```

Parameters

Item	Type	Description
Source	String	Specifies the trigger source. This value sets the Trigger.Source property.
SignalFormat	KeysightU2701ATV SignalFormat Enum	Specifies the TV trigger signal format. This value sets the TV.SignalFormat property. See "KeysightU2701ATVSignalFormatEnum" on page 107 for more information.
Event	KeysightU2701ATV TriggerEventEnum	Specifies the TV trigger event. This value sets the TV.Event property. See "KeysightU2701ATVTriggerEventEnum" on page 108 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Configure Statement
    Driver.Trigger.TV.Configure("Channel1",
      KeysightU2701ATVSignalFormatEnum.KeysightU2701ATVSignalFormatNTSC,
      KeysightU2701ATVTriggerEventEnum.KeysightU2701ATVTriggerEventAnyF
      ield)
End Sub
```

Event

Type

Property

Function

Get and Set

Description

This command returns/sets the event on which the oscilloscope triggers.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ TV
          └ Event
```

Return Format

Item	Type	Description
KeysightU2701ATV TriggerEventEnum	Enum	See "KeysightU2701ATVTriggerEventEnum" on page 108 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Event Statement
    ' To Get Event from the Instrument
    Dim TVEvent As KeysightU2701ATVTriggerEventEnum
    TVEvent = Driver.Trigger.TV.Event
    ' To Set Event eg. Channel1
    Driver.Trigger.TV.Event =
      KeysightU2701ATVTriggerEventEnum.KeysightU2701ATVTriggerEventAnyF
      ield
End Sub
```

LineNumber

Type

Property

Function

Get and Set

Description

This command returns/sets the line on which the oscilloscope triggers. The line number is absolute and not relative to the field of the TV signal.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ TV
          └ LineNumber
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' LineNumber Statement
    ' To Get LineNumber from the Instrument
    Dim LineNumber As Int32
    LineNumber = Driver.Trigger.TV.LineNumber
    ' To Set LineNumber eg. 1
    Driver.Trigger.TV.LineNumber = 1
End Sub
```

SignalFormat

Type

Property

Function

Get and Set

Description

This command returns/sets the format of the TV signal on which the oscilloscope triggers.

Hierarchy

```
IKeysightU2701A
    └ Trigger
      └ TV
        └ SignalFormat
```

Return Format

Item	Type	Description
KeysightU2701ATV SignalFormat Enum	Enum	See "KeysightU2701ATVSignalFormatEnum" on page 107 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SignalFormat Statement
    ' To Get SignalFormat from the Instrument
    Dim SignalFormat As KeysightU2701ATVSignalFormatEnum
    SignalFormat = Driver.Trigger.TV.SignalFormat
    ' To Set SignalFormat eg. NTSC
    Driver.Trigger.TV.SignalFormat =
      KeysightU2701ATVSignalFormatEnum.KeysightU2701ATVSignalFormatNTSC
End Sub
```

Type

Type

Property

Function

Get and Set

Description

This command returns/sets the kind of event that triggers the oscilloscope.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ TV
          └ Type
```

Return Format

Item	Type	Description
KeysightU2701A TriggerTypeEnum	Enum	See "KeysightU2701ATriggerTypeEnum" on page 106 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Type Statement
    ' To Get Type from the Instrument
    Dim Type As KeysightU2701ATriggerTypeEnum
    Type = Driver.Trigger.Type
    ' To Set Type eg. Edge
    Driver.Trigger.Type =
      KeysightU2701ATriggerTypeEnum.KeysightU2701ATriggerEdge
End Sub
```

Width

This interface configures condition, polarity, and threshold level of width trigger.

Condition

Type

Property

Function

Get and Set

Description

This command returns/sets whether a pulse within or outside the high and low thresholds triggers the oscilloscope.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Width
          └ Condition
```

Return Format

Item	Type	Description
KeysightU2701A WidthCondition Enum	Enum	See "KeysightU2701AWidthConditionEnum" on page 110 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Condition Statement
    ' To Get Condition from the Instrument
    Dim Condition As KeysightU2701AWidthConditionEnum
    Condition = Driver.Trigger.Width.condition
    ' To Set Condition eg. Outside
    Driver.Trigger.Width.condition =
      KeysightU2701AWidthConditionEnum.KeysightU2701AWidthConditionOuts
      ide
End Sub
```

Configure

Type

Method

Function

Set

Description

This command configures the width trigger *Source*, *Level*, *ThresholdLow*, *ThresholdHigh*, *Polarity*, and *Condition*. A width trigger occurs when a pulse, which passes through *Level*, with a width between or outside, the width threshold is detected.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Width
          └ Configure(Source, Level, ThresholdLow, ThresholdHigh,
            Polarity, Condition)
```

Parameters

Item	Type	Description
Source	String	Specifies the trigger source. This value sets the Trigger.Source property.
Level	Double	Specifies the trigger level. This value sets the Trigger.Level property.
ThresholdLow	Double	Sets the width triggering low threshold in seconds. This value sets the Width.ThresholdLow property.
ThresholdHigh	Double	Sets the width triggering high threshold in seconds. This value sets the Width.ThresholdHigh property.
Polarity	KeysightU2701A WidthPolarity Enum	Specifies the width polarity. This value sets the Width.Polarity property. See "KeysightU2701AWidthPolarityEnum" on page 110 for more information.
Condition	KeysightU2701A WidthCondition Enum	Specifies the width condition. This value sets the Width.Condition property. See "KeysightU2701AWidthConditionEnum" on page 110 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Configure Statement
    Driver.Trigger.Width.Configure("Channel1", 0, 0, 0.000000016,
      KeysightU2701AWidthPolarityEnum.KeysightU2701AWidthPolarityPositi
      ve,
      KeysightU2701AWidthConditionEnum.KeysightU2701AWidthConditionOuts
      ide)
End Sub
```

Polarity

Type

Property

Function

Get and Set

Description

This command returns/sets the polarity of the pulse that triggers the oscilloscope.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Width
          └ Polarity
```

Return Format

Item	Type	Description
KeysightU2701A WidthPolarity Enum	Enum	See "KeysightU2701AWidthPolarityEnum" on page 110 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Polarity Statement
    ' To Get Polarity from the Instrument
    Dim Polarity As KeysightU2701AWidthPolarityEnum
    Polarity = Driver.Trigger.Width.polarity
    ' To Set Polarity eg. Positive
    Driver.Trigger.Width.polarity =
      KeysightU2701AWidthPolarityEnum.KeysightU2701AWidthPolarityPositive
End Sub
```

ThresholdHigh

Type

Property

Function

Get and Set

Description

This command returns/sets the high width threshold time, expressed in seconds.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Width
          └ ThresholdHigh
```

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ThresholdHigh Statement
    ' To Get ThresholdHigh from the Instrument
    Dim ThresholdHigh As Double
    ThresholdHigh = Driver.Trigger.Width.ThresholdHigh
    ' To Set ThresholdHigh eg. 0.000000016
    Driver.Trigger.Width.ThresholdHigh = 0.000000016
End Sub
```

ThresholdLow

Type

Property

Function

Get and Set

Description

This command returns/sets the low width threshold time, expressed in seconds.

Hierarchy

```
IKeysightU2701A
    └ Trigger
       └ Width
          └ ThresholdLow
```

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ThresholdLow Statement
    ' To Get ThresholdLow from the Instrument
    Dim ThresholdLow As Double
    ThresholdLow = Driver.Trigger.Width.ThresholdLow
    ' To Set ThresholdLow eg. 0
    Driver.Trigger.Width.ThresholdLow = 0
End Sub
```

Clear

Type

Method

Function

Set

Description

This command clears all event registers and error queues. The enable registers are unaffected.

Hierarchy

```
IKeysightU2701A
    └ Status
       └ Clear()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Clear Statement
    Driver.Status.Clear()
End Sub
```

ConfigureServiceRequest

Type

Method

Function

Set

Description

This command clears all the enable registers. It then sets the appropriate transition filters and enable registers so when the specified event(s) occur(s) the instrument requests service. All other events are disabled from generating a service request. To detect a service request the client application must poll the status byte using the SerialPoll method or Register property and test the request service bit.

Hierarchy

```
IKeysightU2701A
    └ Status
        └ ConfigureServiceRequest(Reason)
```

Parameters

Item	Type	Description
Reason	KeysightU2701A SRQReasonEnum	The defined values are expressed in the powers of two: 1, 2, 4, and so on. You can OR several reasons together so multiple events can generate a service request. See "KeysightU2701ASRQReasonEnum" on page 100 for more information.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ConfigureServiceRequest Statement
    Driver.Status.ConfigureServiceRequest(KeysightU2701ASRQReasonEnum.
      KeysightU2701ASRQReasonEsrCommandError)
End Sub
```

Preset

Type

Method

Function

Set

Description

This command sets the SCPI defined enable registers and transition filters.

Hierarchy

```
IKeysightU2701A
    └ Status
       └ Preset()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Preset Statement
    Driver.Status.Preset()
End Sub
```

Register

Type

Property

Function

Get and Set

Description

This command returns/sets the instrument status registers.

Hierarchy

```
IKeysightU2701A
    └ Status
        └ Register(Register, SubRegister, val)
```

Parameters

Item	Type	Description
Register	KeysightU2701A StatusRegister Enum	The status register to access. See "KeysightU2701AStatusRegisterEnum" on page 102 for available registers.
SubRegister	KeysightU2701A StatusSubRegister Enum	The status sub register to access. See "KeysightU2701AStatusSubRegisterEnum" on page 103 for available sub registers.
val	Long/Int32	Instrument Status Register value

Return Format

Item	Type	Description
val	Long/Int32	Instrument Status Register value

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Register Statement
    ' To Get Register from Instrument
    Dim val As Int32
    val =
      Driver.Status.Register(KeysightU2701AStatusRegisterEnum.KeysightU
      2701AStatusRegisterArmEvent,
      KeysightU2701AStatusSubRegisterEnum.KeysightU2701AStatusSubRegist
      erCondition)
    ' To Set Register eg. 0
    Driver.Status.Register(KeysightU2701AStatusRegisterEnum.KeysightU2
      701AStatusRegisterArmEvent,
      KeysightU2701AStatusSubRegisterEnum.KeysightU2701AStatusSubRegist
      erCondition) = 0
End Sub
```

SerialPoll

Type

Property

Function

Get

Description

This command returns the serial poll of the instrument status byte.

Hierarchy

```
IKeysightU2701A
    └ Status
       └ SerialPoll
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SerialPoll Statement
    Dim SerialPoll As Int32
    SerialPoll = Driver.Status.SerialPoll
End Sub
```

TimeoutMilliseconds

Type

Property

Function

Set

Description

This command sets the value, in milliseconds, of the default timeout used by I/O operations. This property provides access to the driver Visa Session Timeout. Only in rare, unusual circumstances should you set this property. Driver methods and properties with operations which take a significant time to perform are responsible for adjusting the I/O timeout to an appropriate value. Some methods provide a *MaxTimeMilliseconds* parameter which gives you direct control over the timeout value for that method. Sometimes, however, increasing the timeout value can work around an obscure driver defect.

Hierarchy

```
IKeysightU2701A
    └ System
        └ TimeoutMilliseconds
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' TimeoutMilliseconds Statement
    ' To Get TimeoutMilliseconds from the Instrument
    Dim TimeoutMilliseconds As Int32
    TimeoutMilliseconds = Driver.System.TimeoutMilliseconds
    ' To Set TimeoutMilliseconds eg. 5000
    Driver.System.TimeoutMilliseconds = 5000
End Sub
```

WaitForOperationComplete

Type

Method

Function

Set

Description

This command sets the instrument not to return until previously started operations are completed or the *MaxTimeMilliseconds* time have expired.

Hierarchy

```
IKeysightU2701A
    └ System
        └ WaitForOperationComplete (MaxTimeMilliseconds)
```

Return Format

String/BTSR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' WaitForOperationComplete Statement
    Driver.System.WaitForOperationComplete(50000)
End Sub
```

Disable

Type

Method

Function

Set

Description

This command quickly places the instrument in a state where it has no, or minimal, effect on the external system to which it is connected. This state is not necessarily a known state.

Hierarchy

```
IKeysightU2701A
    └ Utility
       └ Disable()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Disable Statement
    Driver.Utility.Disable()
End Sub
```

ErrorQuery

Type

Method

Function

Get

Description

This commad queries the instrument and returns the instrument specific error information. This function can be used when QueryInstrumentStatus is `True` to retrieve error details when the driver detects an instrument error.

Hierarchy

```
IKeysightU2701A
    └ Utility
        └ ErrorQuery(ErrorCode, ErrorMessage)
```

Return Format

Item	Type	Description
ErrorCode	Long/Int32	Instrument error code.
ErrorMessage	String/BSTR	Instrument error message.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ErrorQuery Statement
    Dim ErrorCode As Int32 = 0
    Dim ErrorMessage As String = ""
    Driver.Utility.ErrorQuery(ErrorCode, ErrorMessage)
End Sub
```

LockObject

Type

Method

Function

Set

Description

Obtains a multithread lock on the driver after waiting until all other execution threads have released their locks on the instrument session.

Hierarchy

```
IKeysightU2701A
    └ Utility
       └ LockObject()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' LockObject Statement
    Driver.Utility.LockObject()
End Sub
```

Reset

Type

Method

Function

Set

Description

This command places the instrument in a known state and configures instrument options on which the IVI specific driver depends (for example, enabling/disabling headers). For an IEEE-488.2 instrument, Reset sends the command string `*RST` to the instrument.

Hierarchy

```
IKeysightU2701A
    └ Utility
       └ Reset()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Reset Statement
    Driver.Utility.Reset()
End Sub
```

ResetWithDefaults

Type

Method

Function

Set

Description

This command does the equivalent of Reset and then, disables class extension capability groups, sets attributes to initial values defined by class specs, and configures the driver to option string settings used when Initialize was last executed.

Hierarchy

```
IKeysightU2701A
    └ Utility
       └ ResetWithDefaults()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ResetWithDefaults Statement
    Driver.Utility.ResetWithDefaults()
End Sub
```

SelfTest

Type

Method

Function

Get

Description

This command performs an instrument self-test, waits for the instrument to complete the test, and queries the instrument for the results. If the instrument passes the test, *TestResult* is "`0`" and *TestMessage* is "`Self test passed`".

Hierarchy

```
IKeysightU2701A
    └ Utility
       └ SelfTest(TestResult, TestMessage)
```

Return Format

Item	Type	Description
TestResult	Long/Int32	Numeric result from the self-test operation. 0 = no error (test passed).
TestMessage	String/BSTR	Self-test status message.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SelfTest Statement
    Dim TestResult As Int32 = 0
    Dim TestMessage As String = ""
    Driver.Utility.SelfTest(TestResult, TestMessage)
End Sub
```

UnlockObject

Type

Method

Function

Set

Description

This command releases a previously obtained multithread lock.

Hierarchy

```
IKeysightU2701A
    └ Utility
       └ UnlockObject()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' UnlockObject Statement
    Driver.Utility.UnlockObject()
End Sub
```

Enumeration Members

This section describes the members of each enumeration used in this specific IVI-COM driver.

KeysightU2701AGlitchConditionEnum

Description

IVI scope class-compliant values for glitch trigger condition.

Members

Member name	Value	Description
KeysightU2701A GlitchCondition LessThan	1	The oscilloscope triggers when the pulse width is less than the value you specify with the Glitch.Width property.
KeysightU2701A GlitchCondition GreaterThan	2	The oscilloscope triggers when the pulse width is greater than the value you specify with the Glitch.Width property.

KeysightU2701AGlitchPolarityEnum

Description

IVI scope class-compliant values for glitch trigger polarity.

Members

Member name	Value	Description
KeysightU2701A GlitchPolarity Positive	1	The oscilloscope triggers on a positive glitch.
KeysightU2701A GlitchPolarity Negative	2	The oscilloscope triggers on a negative glitch.

KeysightU2701ASRQReasonEnum

Description

Enumeration for the *Reason* parameter of the ConfigureServiceRequest method.

Members

Member name	Value	Description
KeysightU2701A SRQReasonStb MAV	1	Message Available. Bit 4 in the status byte.
KeysightU2701A SRQReasonStb Msg	2	Error/Event Queue Message Available. Bit 2 in the status byte. The Error/Event queue may be read by the ErrorQuery method.
KeysightU2701A SRQReasonEsr OPC	4	Operation Complete. Bit 0 of the standard event status register.

Member name	Value	Description
KeysightU2701A SRQReasonEsr QueryError	8	Query Error. Bit 2 of the standard event status register.
KeysightU2701A SRQReasonEsr DeviceError	16	Device Dependent Error. Bit 3 of the standard event status register.
KeysightU2701A SRQReasonEsr ExecutionError	32	Execution Error. Bit 4 of the standard event status register.
KeysightU2701A SRQReasonEsr CommandError	64	Command Error. Bit 5 of the standard event status register.
KeysightU2701A SRQReasonEsr UserRequest	128	User Request. Bit 6 of the standard event status register.
KeysightU2701A SRQReasonEsr PowerOn	256	Power On. Bit 7 of the standard event status register.
KeysightU2701A SRQReasonStbTrg	512	Trigger Event has occurred. Bit 0 in the status byte register.
KeysightU2701A SRQReasonStb User	1024	User Event has occurred. Bit 1 in the status byte register.

KeysightU2701AStatusRegisterEnum

Description

Enumeration for the *Register* parameter of the Register property.

Members

Member name	Value	Description
KeysightU2701A StatusRegister StatusByte	0	Status Byte register. Conditions defined by IEEE 488.2.
KeysightU2701A StatusRegister StandardEvent	1	Standard Event Status register. Conditions defined by IEEE 488.2.
KeysightU2701A StatusRegister Operation	2	Operation. Conditions which are part of the instrument's normal operation.
KeysightU2701A StatusRegister OverloadEvent	3	The Overload Status Register captures overload events and probe faults that occur on the input channels. This register does not support the Conditions subregister.
KeysightU2701A StatusRegister TriggerEvent	4	The Trigger Event Register captures the trigger event. This register does not support the Conditions or Enable subregisters.
KeysightU2701A StatusRegister ArmEvent	5	The Armed Event Register captures the arm event. An arm event occurs when the oscilloscope has fulfilled all its pre-trigger requirements and is waiting for a trigger event. This register does not support the Conditions or Enable subregisters.

KeysightU2701AStatusSubRegisterEnum

Description

Enumeration for the *SubRegister* parameter of the Register property in the Status interface.

Members

Member name	Value	Description
KeysightU2701A StatusSubRegisterCondition	0	Conditions Register. Read only and not available with the Standard Event Status register. Condition bits represent the current instrument state. Reading a condition register does not change the value of the bits.
KeysightU2701A StatusSubRegisterEvent	3	Event Register. Read only and not available with the Status Byte register. Event bits capture changes in condition bits. Reading an event register clears it.
KeysightU2701A StatusSubRegisterEnable	4	Enable Register. Can be read or written and is available for all registers. Enable bits select whether an event bit causes a register summary bit, a kind of condition bit, to become True. Thus, an event can propagated to the status byte and finally to request service. Though the bits in the status byte are not technically event bits, the status byte enable register selects which bits in the status byte cause a service request.

KeysightU2701ATriggerCouplingEnum

Description

IVI Scope class-compliant values for trigger Coupling.

Members

Member name	Value	Description
KeysightU2701A TriggerCouplingAC	1	The oscilloscope AC couples the trigger signal.
KeysightU2701A TriggerCouplingDC	2	The oscilloscope DC couples the trigger signal.
KeysightU2701A TriggerCouplingLF Reject	3	The oscilloscope filters out the low frequencies from the trigger signal.
KeysightU2701A TriggerCouplingHFReject	4	The oscilloscope filters out the high frequencies from the trigger signal.

KeysightU2701ATriggerModifierEnum

Description

IVI Scope class-compliant values for trigger Modifier.

Members

Member name	Value	Description
KeysightU2701A TriggerModifier None	1	The oscilloscope waits until the trigger the end-user specifies occurs.
KeysightU2701A TriggerModifier Auto	2	The oscilloscope automatically triggers if the configured trigger does not occur within the oscilloscope's timeout period.

KeysightU2701ATriggerSlopeEnum

Description

IVI Scope class-compliant values for edge trigger Slope.

Members

Member name	Value	Description
KeysightU2701A TriggerSlope Negative	0	Triggers will occur on the falling edge.
KeysightU2701A TriggerSlope Positive	1	Triggers will occur on the rising edge.
KeysightU2701A TriggerSlopeEither	2	Triggers will occur on either the rising or falling edge.
KeysightU2701A TriggerSlope Alternate	3	Triggers will occur alternately on the rising and falling edges.

KeysightU2701ATriggerTypeEnum

Description

IVI Scope class-compliant values for trigger Type.

Members

Member name	Value	Description
KeysightU2701A TriggerEdge	1	Configures the oscilloscope for edge triggering. An edge trigger occurs when the trigger signal specified with the Trigger.Source property passes the voltage threshold specified with the Trigger.Level property and has the slope specified with the Trigger.Slope property.
KeysightU2701A TriggerGlitch	2	Configures the oscilloscope for glitch triggering. Use the IviScopeGlitchTrigger extension properties and methods to configure the trigger.
KeysightU2701A TriggerTV	3	Configures the oscilloscope for triggering on TV signals. Use the IviScopeTVTrigger extension properties and methods to configure the trigger.
KeysightU2701A TriggerWidth	4	Configures the oscilloscope for width triggering. Use the IviScopeWidthTrigger extension properties and methods to configure the trigger.

KeysightU2701ATVSignalFormatEnum

Description

IVI Scope class-compliant values for TV trigger SignalFormat.

Members

Member name	Value	Description
KeysightU2701ATV SignalFormat NTSC	1	Configures the oscilloscope to trigger on the NTSC signal format.
KeysightU2701ATV SignalFormatPAL	2	Configures the oscilloscope to trigger on the PAL signal format.
KeysightU2701ATV SignalFormat SECAM	3	Configures the oscilloscope to trigger on the SECAM signal format.

KeysightU2701ATVTriggerEventEnum

Description

IVI Scope class-compliant values for TV trigger Event.

Members

Member name	Value	Description
KeysightU2701ATV TriggerEventField1	1	Sets the oscilloscope to trigger on field 1 of the video signal.
KeysightU2701ATV TriggerEventField2	2	Sets the oscilloscope to trigger on field 2 of the video signal.
KeysightU2701ATV TriggerEventAny Field	3	Sets the oscilloscope to trigger on any field.
KeysightU2701ATV TriggerEventAny Line	4	Sets the oscilloscope to trigger on any line.
KeysightU2701ATV TriggerEventField1 LineNumber	5	Sets the oscilloscope to trigger on a specific line number in Field 1 you specify with the TV.LineNumber property.
KeysightU2701ATVTrigg erEventField2 LineNumber	6	Sets the oscilloscope to trigger on a specific line number in Field 2 you specify with the TV.LineNumber property.

KeysightU2701AVerticalCouplingEnum

Description

IVI Scope class-compliant values for channel Coupling.

Members

Member name	Value	Description
KeysightU2701A VerticalCoupling AC	0	The oscilloscope AC couples the input signal.
KeysightU2701A VerticalCoupling DC	1	The oscilloscope DC couples the input signal.
KeysightU2701A VerticalCoupling LFReject	2	The oscilloscope rejects low frequency.
KeysightU2701A VerticalCoupling HFReject	3	The oscilloscope rejects high frequency.

KeysightU2701AWidthConditionEnum

Description

IKeysightU2701A instrument-specific values for the polarity of the pulse that triggers the oscilloscope.

Members

Member name	Value	Description
KeysightU2701A WidthPolarity Positive	1	Configures the oscilloscope to trigger on positive pulses that have a width that meets the condition the user specifies with the Width.Condition property.
KeysightU2701A WidthPolarity Negative	2	Configures the oscilloscope to trigger on negative pulses that have a width that meets the condition the user specifies with the Width.Condition property.

KeysightU2701AWidthPolarityEnum

Description

IKeysightU2701A instrument-specific values for the polarity of the pulse that triggers the oscilloscope.

Members

Member name	Value	Description
KeysightU2701A WidthPolarity Positive	1	Configures the oscilloscope to trigger on positive pulses that have a width that meets the condition the user specifies with the Width.Condition property.
KeysightU2701A WidthPolarity Negative	2	Configures the oscilloscope to trigger on negative pulses that have a width that meets the condition the user specifies with the Width.Condition property.

3 Acquisition

This chapter describes the acquisition commands used to program the U2701A/U2702A USB modular oscilloscopes over the remote interface. You can use the commands in this chapter to configure the acquisition type, the size of the waveform record, the length of time that corresponds to overall waveform record, and the position of the first point in the waveform record relative to the trigger event.

ConfigureRecord

Type

Method

Function

Set

Description

This command configures the most commonly used properties of the oscilloscope channel sub-system. Use this command to enable or disable the channel and to set the range, offset, coupling, and probe attenuation values.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ ConfigureRecord(TimePerRecord, AcquisitionStartTime)
```

Parameters

Item	Type	Description
TimePerRecord	Double	Specifies the time per record. This value sets the Horizontal TimePerRecord property.
AcquisitionStart Time	Double	Specifies the position of the first point in the waveform record relative to the trigger event. This value sets the Acquisition.StartTime property.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ConfigureRecord Statement
    Driver.Acquisition.ConfigureRecord(0.001, 0.0)
End Sub
```

Interpolation

Type

Property

Function

Get and Set

Description

This command returns/sets the interpolation method the oscilloscope uses when it cannot sample a voltage for every point in the waveform record.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ Interpolation
```

Return Format

Item	Type	Description
KeysightU2701A InterpolationEnum	Enum	See "KeysightU2701AInterpolationEnum" on page 128.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Interpolation Statement
    ' To Get Interpolation from Instrument
    Dim Interpolation As New KeysightU2701AInterpolationEnum
    Interpolation = Driver.Acquisition.Interpolation
    ' To Set Interpolation eg. SineX
    Driver.Acquisition.Interpolation =
      KeysightU2701AInterpolationEnum.KeysightU2701AInterpolationSineX
End Sub
```

NumberOfAverages

Type

Property

Function

Get and Set

Description

This command returns/sets the number of waveforms the oscilloscope acquires and averages before returning to idle state.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ NumberOfAverages
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' NumberOfAverage Statement
    ' To Get Number of Average from Instrument
    Dim NumberOfAverage As Int32
    NumberOfAverage = Driver.Acquisition.NumberOfAverages
    ' To Set Number of Average eg. 30
    Driver.Acquisition.NumberOfAverages = 30
End Sub
```

RecordLength

Type

Property

Function

Get

Description

This command returns the actual number of points the oscilloscope acquires for each channel. It is equal to or greater than the minimum number of points specified with the IviScopeAcquisition.NumberOfPointsMin command.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ RecordLength
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' RecordLength Statement
    Dim RecordLength As Long
    RecordLength = Driver.Acquisition.RecordLength
End Sub
```

SampleMode

Type

Property

Function

Get

Description

This command returns the sample mode that the oscilloscope is currently using.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ SampleMode
```

Return Format

Item	Type	Description
KeysightU2701A SampleMode Enum	Enum	See "KeysightU2701ASampleModeEnum" on page 128.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SampleMode Statement
    Dim SampleMode As KeysightU2701ASampleModeEnum
    SampleMode = Driver.Acquisition.SampleMode
End Sub
```

SampleRate

Type

Property

Function

Get

Description

This command returns the effective digitizing rate using the current configuration. The units are expressed in samples per second.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ SampleRate
```

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SampleRate Statement
    Dim SampleRate As Double
    SampleRate = Driver.Acquisition.SampleRate
End Sub
```

StartTime

Type

Property

Function

Get and Set

Description

This command returns/sets the length of time from the trigger event to the first point in the waveform record. The units are expressed in seconds. If positive, the first point in the waveform occurs after the trigger. If negative, the first point in the waveform occurs before the trigger.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ StartTime
```

Return Format

Double

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' StartTime Statement
    ' To Get Start Time from the Instrument
    Dim StartTime As Double
    StartTime = Driver.Acquisition.StartTime
    ' To Set Start Time eg. 0.0 s
    Driver.Acquisition.StartTime = 0.0
End Sub
```

TimePerRecord

Type

Property

Function

Get and Set

Description

This command returns/sets the time in seconds that corresponds to the record length.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ TimePerRecord
```

Return Format

Double

Remarks

The time per record length is equivalent to the Time/Div multiplied by 10 at the scope setting. The Maximum data point per second you can achieve is 1250, except when in interleave mode (only available with the Keysight Measurement Manager), you can achieve 2000 data points.

Time/Div	TimePer Record	Maximum Data Point
1 ns	10 ns	5
2 ns	20 ns	10
5 ns	50 ns	25
10 ns	100 ns	50
20 ns	200 ns	100
50 ns	500 ns	250
100 ns	1 µs	500
200 ns	2 µs	100
500 ns	5 µs	1250
1 µs	10 µs	1250
2 µs	20 µs	1250
5 µs	50 µs	1250
10 µs	100 µs	1250
20 µs	200 µs	1250
50 µs	500 µs	1250
100 µs	1 ms	1250
200 µs	2 ms	1250
500 µs	5 ms	1250
1 ms	10 ms	1250
2 ms	20 ms	1250
5 ms	50 ms	1250
10 ms	100 ms	1250

Time/Div	TimePer Record	Maximum Data Point
20 ms	200 ms	1250
50 ms	500 ms	1250
100 ms	1 s	1250
200 ms	2 s	1250
500 ms	5 s	1250
1 s	10 s	1250
2 s	20 s	1250
5 s	50 s	1250
10 s	100 s	1250
20 s	200 s	1250
50 s	500 s	1250

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' TimePerRecord Statement
    ' To Get Time Per Record from the Instrument
    Dim TimePerRecord As Double
    TimePerRecord = Driver.Acquisition.TimePerRecord
    ' To Set Time Per Record eg. 0.001
    Driver.Acquisition.TimePerRecord = 0.001
End Sub
```

Type

Type

Property

Function

Get and Set

Description

This commands returns/sets how the oscilloscope acquires data and fills the waveform record. When set to `Envelope` or `Peak Detect`, the oscilloscope acquires minimum and maximum waveforms.

Hierarchy

```
IKeysightU2701A
    └ Acquisition
        └ Type
```

Return Format

Item	Type	Description
KeysightU2701A AcquisitionType Enum	Enum	See "KeysightU2701AAcquisitionTypeEnum" on page 127.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Type Statement
    ' To Get Type from the Instrument
    Dim Type As KeysightU2701AAcquisitionTypeEnum
    Type = Driver.Acquisition.Type
    ' To Set Type eg. Normal
    Driver.Acquisition.Type =
      KeysightU2701AAcquisitionTypeEnum.KeysightU2701AAcquisitionTypeNo
      rmal
End Sub
```

Enumeration Members

This section describes the members of each enumeration used in this specific IVI-COM driver.

KeysightU2701AAcquisitionStatusEnum

Description

IVI scope class-compliant values for the *Status* parameter of the acquisition status method.

Members

Member name	Value	Description
KeysightU2701A AcqInProgress	0	The oscilloscope is still acquiring data.
KeysightU2701A AcqComplete	1	The oscilloscope has completed the acquisition.
KeysightU2701A AcqStatus Unknown	–1	The oscilloscope cannot determine the status of the acquisition.

KeysightU2701AAcquisitionTypeEnum

Description

IVI scope class-compliant values for acquisition type.

Members

Member name	Value	Description
KeysightU2701A AcquisitionType Normal	0	Configures the oscilloscope to acquire one sample for each point in the waveform record. The oscilloscope uses real-time or equivalent time sampling.
KeysightU2701A AcquisitionType PeakDetect	1	Sets the oscilloscope to the peak-detect acquisition mode. The oscilloscope oversamples the input signal and keeps the minimum and maximum values that correspond to each position in the waveform record. The oscilloscope uses only real-time sampling.
KeysightU2701A AcquisitionType Average	2	Configures the oscilloscope to acquire multiple waveforms and calculates the average value for each point in the waveform record. The end-user specifies the number of waveforms to acquire with the NumberOfAverages property. The oscilloscope uses real-time or equivalent time sampling.

KeysightU2701AInterpolationEnum

Description

IVI scope class-compliant values for acquisition interpolation.

Members

Member name	Value	Description
KeysightU2701A InterpolationNone	1	The oscilloscope does not interpolate points in the waveform. Instead, the driver sets every element in the waveform record for which the oscilloscope cannot receive a value to an IEEE-defined NaN (Not-a-Number) value. Use the IsWaveformElementInvalid method to determine if the waveform record element is invalid.
KeysightU2701A InterpolationSineX	2	The oscilloscope uses a sin(x)/x calculation to interpolate a value when it cannot resolve a voltage in the waveform record.

KeysightU2701ASampleModeEnum

Description

IVI Scope class-compliant values for acquisition SampleMode.

Members

Member name	Value	Description
KeysightU2701A SampleModeReal Time	0	Indicates that the oscilloscope is using real-time sampling.

4 Waveform Display

This chapter describes the waveform display commands used to program the U2701A/U2702A USB modular oscilloscopes over the remote interface. The statements in this section is used to acquire waveform data from the oscilloscope. You can use the commands in this section to initiate, acquire, and abort measurements.

Abort

Type

Method

Function

Set

Description

This command aborts an acquisition and returns the oscilloscope to the Idle state.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Abort()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Abort Statement
    Driver.Measurements.Abort()
End Sub
```

AutoSetup

Type

Method

Function

Set

Description

This command automatically configures all the oscilloscopes settings based on the input signals.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ AutoSetup()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' AutoSetup Statement
    Driver.Measurements.AutoSetup()

End Sub
```

Count

Type

Property

Function

Get

Description

This command returns the number of measurements.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Count
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Count Statement
    Dim Count As Int32
    Count = Driver.Measurements.Count
End Sub
```

Initiate

Type

Method

Function

Set

Description

This command initiates a waveform acquisition. The oscilloscope leaves the Idle state and waits for a trigger. The oscilloscope acquires a waveform for each enabled channel.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Initiate()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Initiate Statement
    Driver.Measurements.Initiate()

End Sub
```

IsWaveformElementInvalid

Type

Method

Function

Get

Description

This command returns `False` if an element in a waveform array returned by the driver contains a valid voltage. This command returns `True` if an element in a waveform array returned by the driver contains a value indicating that the oscilloscope could not sample a voltage.

Hierarchy

```
IKeysightU2701A
    └ Measurements
        └ IsWaveformElementInvalid(Element)
```

Parameters

Item	Type	Description
Element	Double	Pass one of the values from the waveform array returned by the read and fetch waveform methods.

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' IsWaveformElementInvalid Statement
    Dim Element As Double = 0
    Dim IsWaveformElementInvalid As Boolean
    IsWaveformElementInvalid =
     Driver.Measurements.IsWaveformElementInvalid(Element)
End Sub
```

Item

This is an interface reference pointer to the IKeysightU2701AMeasurement interface which is selected by the measurement name.

FetchWaveform

Type

Method

Function

Get

Description

This command returns a previously acquired waveform for this channel. The acquisition must be made prior to calling this method. Call this method separately for each channel.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Item(Name)
          └ FetchWaveform(WaveformArray, InitialX, XIncrement)
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Item	Type	Description
WaveformArray	Double	The array contains the acquired waveform. Units for the individual array elements are expressed in volts.
InitialX	Double	The time in relation to the trigger event of the first point in the waveform in seconds. Negative values mean that the first point in the waveform array was acquired before the trigger event.
XIncrement	Double	The effective time between points in the acquired waveform in seconds.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Initialization required
    Driver.Measurements.Initiate()
    ' Get Record Length
    Dim RecordLength As Int32
    RecordLength = Driver.Acquisition.RecordLength
    ' FetchWaveform Statement
    Dim WaveformArray() As Double
    Dim InitialX As Double
    Dim XIncrement As Double
    ReDim WaveformArray(RecordLength - 1)
    Driver.Measurements.Item("Channel1").FetchWaveform(WaveformArray,
      InitialX, XIncrement)
End Sub
```

ReadWaveform

Type

Method

Function

Get

Description

This command initiates an acquisition on all enabled channels, waits (up to *MaxTime*) for the acquisition to complete, and returns the waveform for this channel. Call FetchWaveform to obtain the waveforms for other channels.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Item(Name)
          └ ReadWaveform(MaxTimeMilliseconds, WaveformArray, InitialX,
            XIncrement)
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Item	Type	Description
MaxTime Milliseconds	Long/Int32	Specifies the maximum time the end-user allows for this method to complete in milliseconds.
WaveformArray	Double	The array contains the acquired waveform. Units for the individual array elements are expressed in volts.
InitialX	Double	The time in relation to the trigger event of the first point in the waveform in seconds. Negative values mean that the first point in the waveform array was acquired before the trigger event.
XIncrement	Double	The effective time between points in the acquired waveform in seconds.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Get Record Length
    Dim RecordLength As Int32
    RecordLength = Driver.Acquisition.RecordLength
    ' ReadWaveform Statement
    Dim WaveformArray() As Double
    Dim InitialX As Double
    Dim XIncrement As Double
    ReDim WaveformArray(RecordLength - 1)
    Driver.Measurements.Item("Channel1").ReadWaveform(50000,
      WaveformArray, InitialX, XIncrement)
End Sub
```

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5 Post Analysis

This chapter describes the post analysis commands used to program the U2701A/U2702A USB modular oscilloscopes over the remote interface. The statements in this section is used to analyze the waveform data acquired from the oscilloscope. You can also use the commands in this section to initiate, acquire, and abort measurements.

Abort

Type

Method

Function

Set

Description

This command aborts an acquisition and returns the oscilloscope to the Idle state.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Abort()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Abort Statement
    Driver.Measurements.Abort()
End Sub
```

AutoSetup

Type

Method

Function

Set

Description

This command automatically configures all the oscilloscopes settings based on the input signals.

Hierarchy

```
IKeysightU2701A
    └ Measurements
        └ AutoSetup()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' AutoSetup Statement
    Driver.Measurements.AutoSetup()
End Sub
```

Count

Type

Property

Function

Get

Description

This command returns the number of measurements.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Count
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Count Statement
    Dim Count As Int32
    Count = Driver.Measurements.Count
End Sub
```

Initiate

Type

Method

Function

Set

Description

This command initiates a waveform acquisition. The oscilloscope leaves the Idle state and waits for a trigger. The oscilloscope acquires a waveform for each enabled channel.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Initiate()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Initiate Statement
    Driver.Measurements.Initiate()

End Sub
```

IsWaveformElementInvalid

Type

Method

Function

Get

Description

This command returns `False` if an element in a waveform array returned by the driver contains a valid voltage. This command returns `True` if an element in a waveform array returned by the driver contains a value indicating that the oscilloscope could not sample a voltage.

Hierarchy

```
IKeysightU2701A
    └ Measurements
        └ IsWaveformElementInvalid(Element)
```

Parameters

Item	Type	Description
Element	Double	Pass one of the values from the waveform array returned by the read and fetch waveform methods.

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' IsWaveformElementInvalid Statement
    Dim Element As Double = 0
    Dim IsWaveformElementInvalid As Boolean
    IsWaveformElementInvalid =
     Driver.Measurements.IsWaveformElementInvalid(Element)
End Sub
```

Item

This is an interface reference pointer to the IKeysightU2701AMeasurement interface which is selected by the measurement name.

FetchWaveform

Type

Method

Function

Get

Description

This command returns a previously acquired waveform for this channel. The acquisition must be made prior to calling this method. Call this method separately for each channel.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Item(Name)
          └ FetchWaveform(WaveformArray, InitialX, XIncrement)
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Item	Type	Description
WaveformArray	Double	The array contains the acquired waveform. Units for the individual array elements are expressed in volts.
InitialX	Double	The time in relation to the trigger event of the first point in the waveform in seconds. Negative values mean that the first point in the waveform array was acquired before the trigger event.
XIncrement	Double	The effective time between points in the acquired waveform in seconds.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Initialization required
    Driver.Measurements.Initiate()
    ' Get Record Length
    Dim RecordLength As Int32
    RecordLength = Driver.Acquisition.RecordLength
    ' FetchWaveform Statement
    Dim WaveformArray() As Double
    Dim InitialX As Double
    Dim XIncrement As Double
    ReDim WaveformArray(RecordLength - 1)
    Driver.Measurements.Item("Channel1").FetchWaveform(WaveformArray,
      InitialX, XIncrement)
End Sub
```

FetchWaveformMeasurement

Type

Method

Function

Get

Description

This command returns a previously acquired waveform measurement for this channel. The acquisition must be made prior to calling this method. Call this method separately for each measurement.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Item(Name)
          └ FetchWaveformMeasurement (MeasFunction, Measurement)
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Item	Type	Description
MeasFunction	KeysightU2701A Measurement Enum	Characteristic of the acquired waveform to be measured. See "KeysightU2701AMeasurementEnum" on page 162 for more information.
Measurement	Double	The measured value. The units depend on the measurement that the user specifies with the *MeasFunction* parameter.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Initialization required
    Driver.Measurements.Initiate()
    ' FetchWaveformMeasurement Statement
    Dim Measurement As Double
    Driver.Measurements.Item("Channel1").FetchWaveformMeasurement
      (KeysightU2701AMeasurementEnum.KeysightU2701AMeasurementFrequency,
      Measurement)
End Sub
```

ReadFullWaveform

Type

Method

Function

Get

Description

This command pulls the data directly from the device without data manipulation (interleaving or value conversion). It will automatically detect the 16M/32M data size for each channel.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Item(Name)
          └ ReadFullWaveform(ref Data, ref Length)
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Item	Type	Description
Data	Array	The data that contains a raw waveform data in bytes.
Length	Long/Int32	The length of the data size.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ReadFullWaveform Statement
    Dim Data() As Byte
    Dim Length As Int32
    Driver.Measurements.Item("Channel1").ReadFullWaveform(Data,
      Length)
End Sub
```

ReadWaveform

Type

Method

Function

Get

Description

This command initiates an acquisition on all enabled channels, waits (up to *MaxTime*) for the acquisition to complete, and returns the waveform for this channel. Call FetchWaveform to obtain the waveforms for other channels.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Item(Name)
          └ ReadWaveform(MaxTimeMilliseconds, WaveformArray, InitialX,
            XIncrement)
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Item	Type	Description
MaxTime Milliseconds	Long/Int32	Specifies the maximum time the end-user allows for this method to complete in milliseconds.
WaveformArray	Double	The array contains the acquired waveform. Units for the individual array elements are expressed in volts.
InitialX	Double	The time in relation to the trigger event of the first point in the waveform in seconds. Negative values mean that the first point in the waveform array was acquired before the trigger event.
XIncrement	Double	The effective time between points in the acquired waveform in seconds.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Get Record Length
    Dim RecordLength As Int32
    RecordLength = Driver.Acquisition.RecordLength
    ' ReadWaveform Statement
    Dim WaveformArray() As Double
    Dim InitialX As Double
    Dim XIncrement As Double
    ReDim WaveformArray(RecordLength - 1)
    Driver.Measurements.Item("Channel1").ReadWaveform(50000,
      WaveformArray, InitialX, XIncrement)
End Sub
```

ReadWaveformMeasurement

Type

Method

Function

Get

Description

This command returns a previously acquired waveform for this channel. The acquisition must be made prior to calling this method. Call this method separately for each channel.

Hierarchy

```
IKeysightU2701A
    └ Measurements
       └ Item(Name)
          └ ReadWaveformMeasurement (MeasFunction, MaxTimeMilliseconds,
            Measurement)
```

Parameters

Item	Type	Description
Name	String	The name of a measurement. This command is used to select the channel the function is to be run on. (For example: Channel 1, Channel 2, and so on.)

Return Format

Item	Type	Description
MeasFunction	KeysightU2701A Measurement Enum	Characteristic of the acquired waveform to be measured. See "KeysightU2701AMeasurementEnum" on page 162 for more information.
MaxTime Milliseconds	Long/Int32	Specifies the maximum time the end-user allows for this method to complete in milliseconds.
Measurement	Double	The measured value. The units depend on the measurement that the user specifies with the *MeasFunction* parameter.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Initialization required
    Driver.Measurements.Initiate()
    ' ReadWaveformMeasurement Statement
    Dim Measurement As Double
    Driver.Measurements.Item("Channel1").ReadWaveformMeasurement
      (KeysightU2701AMeasurementEnum.KeysightU2701AMeasurementFrequency,
      50000, Measurement)
End Sub
```

MathFunction

Type

Method

Function

Set

Description

This command configures a mathematical operation for Channel 1 and 2. The operation and reverse will be set to "**ADD**" and "**False**" by default.

Hierarchy

```
IKeysightU2701A
    └ Measurements
        └ MathFunction(Operation, Reverse)
```

Parameters

Item	Type	Description
Operation	KeysightU2701A Measurement Enum	Channel 1 and Channel 2 math operation.
Reverse	Boolean	The operation order of Channel 1 and Channel 2. If True, Channel 2 <operation> Channel 1. If False ,Channel 1 <operation> Channel 2

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' MathFunction Statement
    Driver.Measurements.MathFunction(KeysightU2701AMathOperationEnum.
      KeysightU2701AMathOperationAdd, True)
End Sub
```

Name

Type

Property

Function

Get

Description

This command returns the measurement name for a given index.

Hierarchy

```
IKeysightU2701A
    └ Measurements
        └ Name(Index)
```

Parameters

Item	Type	Description
Index	Long/Int32	One based index into the collection of measurements.

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Name Statement
    Dim Name As String
    Name = Driver.Measurements.Name(1)
End Sub
```

Status

Type

Method

Function

Get

Description

This command returns whether an acquisition is in progress, complete, or if the status is unknown.

Hierarchy

```
IKeysightU2701A
    └ Measurements
        └ Status()
```

Return Format

Item	Type	Description
KeysightU2701A AcquisitionStatusEnum	Enum	See "KeysightU2701AAcquisitionStatusEnum" on page 126.

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Status Statement
    Driver.Measurements.Status()
End Sub
```

Enumeration Members

This section describes the members of each enumeration used in this specific IVI-COM driver.

KeysightU2701AMathOperationEnum

Description

IKeysightU2701A instrument-specific values for channels mathematical operations.

Members

Member name	Value	Description
KeysightU2701A MathOperation Add	0	Add operation between two channels.
KeysightU2701A MathOperation Subtract	1	Subtract operation between two channels.
KeysightU2701A MathOperation Multiply	2	Multiply operation between two channels.
KeysightU2701A MathOperation Divide	3	Divide operation between two channels.

KeysightU2701AMeasurementEnum

Description

IVI scope class-compliant values for the *MeasFunction* parameter read and fetch methods.

Members

Member name	Value	Description
KeysightU2701A MeasurementRise Time	0	The length of time for a rising edge of the signal to rise from the low reference level to the high reference level. The units are expressed in seconds.
KeysightU2701A MeasurementFall Time	1	The length of time for a falling edge of the signal to fall from the high reference level to the low reference level. The units are expressed in seconds.
KeysightU2701A Measurement Frequency	2	The frequency of one complete cycle in the waveform. The units are expressed in hertz.
KeysightU2701A Measurement Period	3	The length of time of one complete cycle in the waveform. The units are expressed in seconds.
KeysightU2701A Measurement VoltageRMS	4	The true Root Mean Square voltage of the entire waveform. The units are expressed in volts.
KeysightU2701A Measurement VoltageRMSAC	5	The true Root Mean Square voltage(AC) of the entire waveform. The units are expressed in volts.
KeysightU2701A Measurement VoltagePeakTo Peak	6	The absolute difference between the Voltage Max and the Voltage Min. The units are expressed in volts.
KeysightU2701A Measurement VoltageMax	7	The maximum amplitude found in the entire waveform. The units are expressed in volts.

Member name	Value	Description
KeysightU2701A Measurement VoltageMin	8	The minimum amplitude found in the entire waveform. The units are expressed in volts.
KeysightU2701A Measurement VoltageHigh	9	The voltage that corresponds to 100% when using the reference levels. The oscilloscope calculates this value using either the min/max or histogram methods. The min/max method uses the maximum value found. The histogram method uses a common value found above the middle of the waveform. The units are expressed in volts.
KeysightU2701A Measurement VoltageLow	10	The voltage that corresponds to 0% when using the reference levels. The oscilloscope calculates this value using either the min/max or histogram methods. The min/max method uses the minimum value found. The histogram method uses a common value found below the middle of the waveform. The units are expressed in volts.
KeysightU2701A Measurement VoltageAverage	11	The arithmetic average in volts measured over the entire waveform. The units are expressed in volts.
KeysightU2701A Measurement WidthNeg	12	The length of time between the mid reference level points of a negative pulse in the waveform. The units are expressed in seconds.
KeysightU2701A Measurement WidthPos	13	The length of time between the mid reference level points of a positive pulse in the waveform. The units are expressed in seconds.
KeysightU2701A MeasurementDutyCycle Neg	14	The ratio of the WidthNeg to the Period of an integer number of cycles in the waveform expressed as a percentage.
KeysightU2701A MeasurementDutyCycle Pos	15	The ratio of the WidthPos width to the Period of an integer number of cycles in the waveform expressed as a percentage.
KeysightU2701A Measurement Amplitude	16	The VoltageHigh less the VoltageLow expressed in volts over the entire waveform.
KeysightU2701A Measurement VoltageCycleRMS	17	The true root mean square voltage over an integer number of cycles in the waveform. The units are expressed in volts.
KeysightU2701A MeasurementOverShoot	18	The relative waveform distortion that follows an edge transition.

Member name	Value	Description
KeysightU2701A Measurement Preshoot	19	The relative waveform distortion that precedes an edge transition.
KeysightU2701A Measurement Phase	20	Phase.
KeysightU2701A Measurement Delay	21	Delay.
KeysightU2701A Measurement CrestFactor	22	Crest factor.
KeysightU2701A Measurement StandardDeviation	23	Standard deviation.
KeysightU2701A Measurement TimeAtMax	24	Time at maximum voltage.
KeysightU2701A Measurement TimeAtMin	25	Time at minimum voltage.

KeysightU2701ATimeOutEnum

Description

IVI Scope class-compliant values for *maxTime* parameter of the measurement Read and Fetch methods.

Members

Member name	Value	Description
KeysightU2701A TimeOut Immediate	0	This method returns immediately. If no measurement value exists, an error is returned.
KeysightU2701A TimeOutInfinite	–1	The method waits indefinitely for the measurement to complete.

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6 Others

This chapter describes the other commands used to program the U2701A/ U2702A USB modular oscilloscopes over the remote interface. You can use the commands in this chapter to get and set some of the oscilloscope properties. You can also calibrate the instrument and perform various driver operations.

Calibrate

Type

Method

Function

Set

Description

This command calibrates the instrument. This method might take several minutes to complete.

Hierarchy

```
IKeysightU2701A
    └ Calibration
       └ Calibrate()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Calibrate Statement
    Driver.Calibration.Calibrate()
End Sub
```

Date

Type

Property

Function

Get

Description

This command returns the date the instrument was last calibrated.

Hierarchy

```
IKeysightU2701A
    └ Calibration
       └ Date
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Date Statement
    Dim LastCalDate As String
    LastCalDate = Driver.Calibration.Date
End Sub
```

Label

Type

Property

Function

Get

Description

This command returns the label set during the last calibration.

Hierarchy

```
IKeysightU2701A
    └ Calibration
       └ Label
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Label Statement
    Dim Label As String
    Label = Driver.Calibration.Label
End Sub
```

Time

Type

Property

Function

Get

Description

This command returns the time the instrument was last calibrated.

Hierarchy

```
IKeysightU2701A
    └ Calibration
       └ Time
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Time Statement
    Dim LastCalTime As String
    LastCalTime = Driver.Calibration.Time
End Sub
```

Cache

Type

Property

Function

Get and Set

Description

Drivers may choose to always cache some instrument settings, never cache others, or optionally cache others to avoid unnecessary I/O activities to the instrument. If this command is set to `True`, the driver caches optionally cache instrument settings.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ Cache
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Cache Statement
    ' To Get Cache from the Instrument
    Dim Cache As Boolean
    Cache = Driver.DriverOperation.Cache
    ' To Set Cache eg. True
    Driver.DriverOperation.Cache = True
End Sub
```

ClearInterchangeWarnings

Type

Method

Function

Set

Description

This command clears the list of interchangeability warnings that the IVI specific driver maintains.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ ClearInterchangeWarnings
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Clear InterchangeWarnings Statement
    Driver.DriverOperation.ClearInterchangeWarnings()
End Sub
```

DriverSetup

Type

Property

Function

Get

Description

This command returns the driver setup string. It is either specified in the configuration store or passed in the *OptionString* parameter of the function. Driver setup is empty if the driver is not initialized.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ DriverSetup
```

Return Format

String/BTSR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' DriverSetup Statement
    Dim DriverSetup As String
    Cache = Driver.DriverOperation.Cache
    ' To Set Cache eg. True
    DriverSetup = Driver.DriverOperation.DriverSetup
End Sub
```

GetNextCoercionRecord

Type

Method

Function

Get

Description

This command returns the oldest record from the coercion record list. Records are only added to the list if RecordCoercions is set to `True`.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ GetNextCoercionRecord()
```

Return Format

String/BTSR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' GetNextCoercionRecord Statement
    Dim DriverSetup As String
    GetNextCoercionRecord =
      Driver.DriverOperation.GetNextCoercionRecord()
End Sub
```

GetNextInterchangeWarning

Type

Method

Function

Get

Description

This command returns the oldest warning from the interchange warning list. Records are only added to the list if InterchangeCheck is set to `True`.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
       └ GetNextInterchangeWarning()
```

Return Format

String/BTSR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' GetNextInterchangeWarning Statement
    Dim GetNextInterchangeWarning As String
    GetNextInterchangeWarning =
     Driver.DriverOperation.GetNextInterchangeWarning()
End Sub
```

InterchangeCheck

Type

Property

Function

Get and Set

Description

If this command is set to `True`, the driver maintains a record of interchangeability warnings. If the driver does not support interchangeability checking, attempts to set InterchangeCheck to `True` returns an error.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ InterchangeCheck
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' InterchangeCheck Statement
    ' To Get InterchangeCheck from the Instrument
    Dim InterchangeCheck As Boolean
    InterchangeCheck = Driver.DriverOperation.InterchangeCheck
    ' To Set InterchangeCheck eg. True
    Driver.DriverOperation.InterchangeCheck = True
End Sub
```

InvalidateAllAttributes

Type

Method

Function

Set

Description

This command invalidates all of the driver cached values.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
       └ InvalidateAllAttributes()
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' InvalidateAllAttributes Statement
    Driver.DriverOperation.InvalidateAllAttributes()
End Sub
```

IoResourceDescriptor

Type

Property

Function

Get

Description

This command returns the instrument resource descriptor. The resource descriptor specifies the connection to a physical device. It is either specified in the configuration store or passed in the *ResourceName* parameter of the Initialize function. It is empty if the driver is not initialized.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ IoResourceDescriptor
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' IoResourceDescriptor Statement
    Dim IoResourceDescriptor As String
    IoResourceDescriptor = Driver.DriverOperation.IoResourceDescriptor
End Sub
```

LogicalName

Type

Property

Function

Get

Description

This command returns the instrument logical name. The logical name identifies a driver session in the configuration store. If logical name is not empty, the driver was initialized from the information in the driver session. If it is empty, the driver was initialized without using the configuration store.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ LogicalName
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' IoResourceDescriptor Statement
    Dim LogicalName As String
    LogicalName = Driver.DriverOperation.LogicalName
End Sub
```

QueryInstrumentStatus

Type

Property

Function

Get and Set

Description

If this command is set to **True**, the driver queries the instrument status at the end of each method or property that performs I/O to the instrument. If an error is reported, use ErrorQuery to retrieve error messages one at a time from the instrument.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
       └ QueryInstrumentStatus
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' QueryInstrumentStatus Statement
    ' To Get QueryInstrumentStatus from the Instrument
    Dim QueryInstrumentStatus As Boolean
    QueryInstrumentStatus =
      Driver.DriverOperation.QueryInstrumentStatus
    ' To Set QueryInstrumentStatus eg. True
    Driver.DriverOperation.QueryInstrumentStatus = True
End Sub
```

RangeCheck

Type

Property

Function

Get and Set

Description

Drivers may choose to always validate some property or parameter values, never validate others, and optionally validate others, to avoid sending invalid commands to the instrument. If this command is set to `True`, the driver performs optional validations.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ RangeCheck
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' RangeCheck Statement
    ' To Get RangeCheck from the Instrument
    Dim RangeCheck As Boolean
    RangeCheck = Driver.DriverOperation.RangeCheck
    ' To Set RangeCheck eg. True
    Driver.DriverOperation.RangeCheck = True
End Sub
```

RecordCoercions

Type

Property

Function

Get and Set

Description

If this command is set to **True**, the driver keeps a list of the value coercions it makes for *ViInt32* and *ViReal64* attributes. If the driver does not support coercion recording, attempts to set RecordCoercions to **True** will return an error.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ RecordCoercions
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' RecordCoercions Statement
    ' To Get RecordCoercions from the Instrument
    Dim RecordCoercions As Boolean
    RecordCoercions = Driver.DriverOperation.RecordCoercions
    ' To Set RecordCoercions eg. True
    Driver.DriverOperation.RecordCoercions = True
End Sub
```

ResetInterchangeCheck

Type

Method

Function

Set

Description

This command resets the interchangeability checking algorithms of the driver so that methods and properties that were executed prior to calling this function have no affect on whether future calls to the driver will generate interchangeability warnings or not.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ ResetInterchangeCheck()
```

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' ResetInterchangeCheck Statement
    Driver.DriverOperation.ResetInterchangeCheck()
End Sub
```

Simulate

Type

Property

Function

Get and Set

Description

If this command is set to **True**, the driver does not perform I/O to the instrument, and returns simulated values for output parameters instead.

Hierarchy

```
IKeysightU2701A
    └ DriverOperation
        └ Simulate
```

Return Format

Boolean

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Simulate Statement
    ' To Get Simulate from the Instrument
    Dim Simulate As Boolean
    Simulate = Driver.DriverOperation.Simulate
    ' To Set Simulate eg. True
    Driver.DriverOperation.Simulate = True
End Sub
```

Description

Type

Property

Function

Get

Description

This command returns a brief description of the implementing component. Description is limited to 256 bytes.

Hierarchy

```
IKeysightU2701A
    └ Identity
        └ Description
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Description Statement
    Dim Description As String
    Description = Driver.Identity.Description
End Sub
```

GroupCapabilities

Type

Property

Function

Get

Description

This command returns a comma-separated list of the class capability groups implemented by the driver. Capability group names are documented in the IVI class specifications. If the driver is not class compliant, the driver returns an empty string.

Hierarchy

```
IKeysightU2701A
    └ Identity
        └ GroupCapabilities
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' GroupCapabilities Statement
    Dim GroupCapabilities As String
    GroupCapabilities = Driver.Identity.GroupCapabilities
End Sub
```

Identifier

Type

Property

Function

Get

Description

This command returns the case-sensitive unique identifier of the implementing IVI-COM instrument driver.

Hierarchy

```
KeysightU2701A
    └ Identity
       └ Identifier
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Identifier Statement
    Dim Identifier As String
    Identifier = Driver.Identity.Identifier
End Sub
```

InstrumentFirmwareRevision

Type

Property

Function

Get

Description

This command returns the firmware revision reported by the physical instrument. If Simulate is enabled or the instrument is not capable of reporting the firmware revision, a string is returned that explains the condition.

Hierarchy

```
IKeysightU2701A
    └ Identity
        └ InstrumentFirmwareRevision
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' InstrumentFirmwareRevision Statement
    Dim InstrumentFirmwareRevision As String
    InstrumentFirmwareRevision =
      Driver.Identity.InstrumentFirmwareRevision
End Sub
```

InstrumentManufacturer

Type

Property

Function

Get

Description

This command returns the name of the manufacturer reported by the physical instrument. If Simulate is enabled or the instrument is not capable of reporting the name of the manufacturer, a string is returned that explains the condition. InstrumentManufacturer is limited to 256 bytes.

Hierarchy

```
IKeysightU2701A
    └ Identity
        └ InstrumentManufacturer
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' InstrumentManufacturer Statement
    Dim InstrumentManufacturer As String
    InstrumentManufacturer = Driver.Identity.InstrumentManufacturer
End Sub
```

InstrumentModel

Type

Property

Function

Get

Description

This command returns the model number or name reported by the physical instrument. If Simulate is enabled or the instrument is not capable of reporting the model number or name, a string is returned that explains the condition. InstrumentModel is limited to 256 bytes.

Hierarchy

```
IKeysightU2701A
    └ Identity
       └ InstrumentModel
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' InstrumentModel Statement
    Dim InstrumentModel As String
    InstrumentModel = Driver.Identity.InstrumentModel
End Sub
```

Revision

Type

Property

Function

Get

Description

This command returns the revision of the implementing component. Revision is limited to 256 bytes.

Hierarchy

```
IKeysightU2701A
    └ Identity
        └ Revision
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Revision Statement
    Dim Revision As String
    Revision = Driver.Identity.Revision
End Sub
```

SpecificationMajorVersion

Type

Property

Function

Get

Description

For IVI class-compliant drivers, this command returns the major version number of the instrument class specification. If the driver is not class compliant, the driver returns zero.

Hierarchy

```
IKeysightU2701A
    └ Identity
        └ SpecificationMajorVersion
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SpecificationMajorVersion Statement
    Dim SpecificationMajorVersion As Int32
    SpecificationMajorVersion =
      Driver.Identity.SpecificationMajorVersion
End Sub
```

SpecificationMinorVersion

Type

Property

Function

Get

Description

For IVI class-compliant drivers, this command returns the minor version number of the instrument class specification. If the driver is not class compliant, the driver returns zero.

Hierarchy

```
IKeysightU2701A
    └ Identity
       └ SpecificationMinorVersion
```

Return Format

Long/Int32

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SpecificationMinorVersion Statement
    Dim SpecificationMinorVersion As Int32
    SpecificationMinorVersion =
     Driver.Identity.SpecificationMinorVersion
End Sub
```

SupportedInstrumentModels

Type

Property

Function

Get

Description

This command returns a comma-separated list of instrument models that the IVI specific driver can control. The string does not include an abbreviation for the manufacturer if it is the same for all models.

Hierarchy

```
KeysightU2701A
    └ Identity
        └ SupportedInstrumentModels
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SupportedInstrumentModels Statement
    Dim SupportedInstrumentModels As String
    SupportedInstrumentModels =
      Driver.Identity.SupportedInstrumentModels
End Sub
```

Vendor

Type

Property

Function

Get

Description

This command returns the name of the vendor that supplies the implementing component. Vendor is limited to 256 bytes.

Hierarchy

```
IKeysightU2701A
    └ Identity
        └ Vendor
```

Return Format

String/BSTR

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' Vendor Statement
    Dim Vendor As String
    Vendor = Driver.Identity.Vendor
End Sub
```

SerialNumber

Type

Property

Function

Get

Description

This command returns the instrument serial number.

Hierarchy

```
IKeysightU2701A
    └ System
       └ SerialNumber
```

Return Format

String

Example

```
Sub Main()
    ' Create an instance of the driver
    Dim Driver As New KeysightU2701A
    ' SerialNumber Statement
    Dim SerialNumber As String
    SerialNumber = Driver.System.SerialNumber
End Sub
```

7 Application Example

This chapter contains an example program for the U2701A/U2702A USB modular oscilloscopes. The following program uses Microsoft Windows and Microsoft Visual Basic .Net (2003 and later). Refer to the instruction manual of Visual Basic .Net for further details about Visual Basic .Net.

Introduction

This section describes how the KeysightU2701A IVI driver is used for Visual Basic .Net (2003 and later). All explanations will be using Console Application as the project.

Referencing the Driver

In order to access KeysightU2701A IVI driver interface, a reference to the driver DLL must be created by following the steps listed below:

1. In the Solution Explorer, right-click your project name and select **Add Reference**.
2. Click the **COM** tab.
3. Select the **IVI KeysightU2701A 1.0 Type Library** and click **OK**.
4. The IVI KeysightU2701A 1.0 Type Library should now appear under the Reference tab by right-clicking your project name and selecting Properties.

All data types (interfaces and enums) are located under namespaces. Usually namespace qualified name must be used, but the “Imports” statement allows the type name to be used directly.

```
Imports System

Imports System.Runtime.InteropServices

Imports Ivi.Driver

Imports Ivi.Scope

Imports Keysight.KeysightU2701A.Interop
```

Creating an Instance

Create an instance of the Keysight U2701A IVI-COM driver.

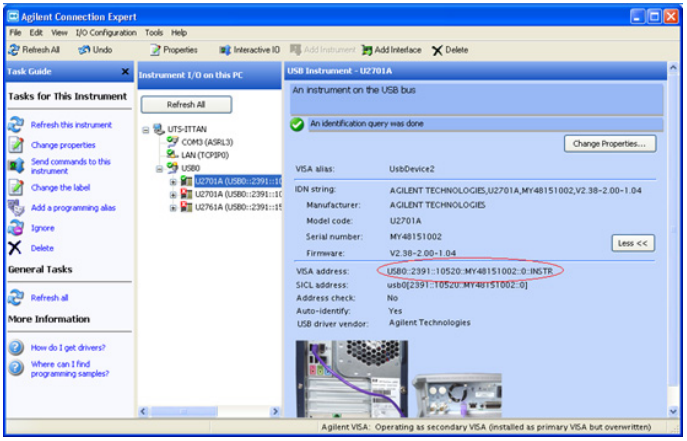
```
' Create an instance of the driver

Dim Driver As New KeysightU2701A
```

Initializing the Driver

Calling Initialize will establish a connection to Keysight U2701A. You can get your resource name of your instrument by using the Keysight Connection Expert. Please refer to the “Initialize” on page 42 for a more detailed explanation.

This is an example to show you how to get your module resource name by using Keysight Connection Expert.




```
' Initialize the Driver

Driver.Initialize("USB0::2391::10520::MY48151002::0::INSTR", True,
True, "")
```

Calling Close is required to release the driver object.

```
' Close the Driver Object

Driver.Close()
```

Complete Example

This section illustrates a complete example covering the steps needed to fetch the instrument identity, reset the instrument, automatically scale the instrument, conducting a simple measurement, and finally acquiring and saving the waveform data. All the steps taken are commented in this example program.

```
Imports System
Imports System.Runtime.InteropServices
Imports System.IO
Imports Ivi.Driver
Imports Ivi.Scope
Imports Keysight.KeysightU2701A.Interop

Module Module1

    Sub Main()

       Try

          ' Create the instance of the driver
          Dim Driver As New KeysightU2701A

          ' Initialize the Driver
          Driver.Initialize("USB0::2391::10520::MY48151002::0::INSTR", False, False, "")

          ' Get Instrument Identity property
          Dim InstrumentModel As String
          InstrumentModel = Driver.Identity.InstrumentModel
          Console.WriteLine("Instrument Model: {0}", InstrumentModel)

          Dim InstrumentManufacturer As String
          InstrumentManufacturer = Driver.Identity.InstrumentManufacturer
          Console.WriteLine("Instrument Manufacturer: {0}", InstrumentManufacturer)

          Dim Revision As String
          Revision = Driver.Identity.Revision
```

```
Console.WriteLine("Revision: {0}", Revision)

' Set TimeoutMilliseconds = 30000 (30 seconds)
Driver.System.TimeoutMilliseconds = 30000
' Reset U2701A
Driver.Utility.Reset()
Console.WriteLine("Reset Instrument Done")

' Auto Scale U2701A
Driver.Measurements.AutoSetup()
Console.WriteLine("Auto Scale Done")

' Measure Frequency signal input from Channel 1
Dim CH1Name As String = Driver.Channels.Name(1)
Dim FrequencyMeasured As Double

Driver.Measurements.Item(CH1Name).ReadWaveformMeasurement(KeysightU2701AMeas
  urementEnum.KeysightU2701AMeasurementFrequency, 5000, FrequencyMeasured)
Console.WriteLine("Frequency Measured: {0} Hz", FrequencyMeasured)

' Waveform Acquisition
Dim RecordLength As Int32 = Driver.Acquisition.RecordLength
Dim WaveformArray() As Double
Dim XIncrement As Double
Dim InitialX As Double
Dim XValue As Double = 0
Dim waveformText As String = ""
ReDim WaveformArray(RecordLength - 1)

Driver.Measurements.Item(CH1Name).ReadWaveform(5000, WaveformArray, InitialX,
  XIncrement)
Console.WriteLine("Initial X Value: {0}", InitialX)
Console.WriteLine("X Increment Value: {0}", XIncrement)
Console.WriteLine("WaveformArray: ")
Dim i As Int32 = 0
While i < RecordLength
   XValue = InitialX + i*XIncrement
```

```
            Console.Write("{0}, {1}" + vbCrLf, XValue, WaveformArray(i))
            waveformText += XValue.ToString("F6") + vbTab +
              WaveformArray(i).ToString("F4") + vbCrLf
            i = i + 1
        End While
        ' Create a writer and open the file
        Dim tw As TextWriter
        tw = New StreamWriter("C:\waveform.txt")

        ' Write the text stream to file
        tw.Write(waveformText)

        ' Close the stream
        tw.Close()

        ' Read instrument error queue until its empty
        Dim ErrorCode = -1
        Dim ErrorMessage = ""

        Console.WriteLine()
        While ErrorCode <> 0
            Driver.Utility.ErrorQuery(ErrorCode, ErrorMessage)
            Console.WriteLine("ErrorQuery: {0}, {1}", ErrorCode, ErrorMessage)
        End While

        ' Close the Driver Object
        Driver.Close()
        Catch ex As Exception
        Console.WriteLine(ex.Message)

    End Try

    Console.WriteLine("Done - Press Enter to Exit")
    Console.ReadLine()

End Sub

End Module
```

Command Quick Reference

Root keyword	Second-level	Third-level	Fourth-level	Page
IKeysightU2701A	Acquisition	ConfigureRecord		See page 112
		Interpolation		See page 114
		NumberOfAverages		See page 116
		RecordLength		See page 117
		SampleMode		See page 118
		SampleRate		See page 119
		StartTime		See page 120
		TimePerRecord		See page 121
		Type		See page 124
	Calibration	Calibrate		See page 169
		Date		See page 170
		Label		See page 171
		Time		See page 172
	Channels	Count		See page 25
		Item	BandwidthLimit	See page 26
			Configure	See page 28
			Coupling	See page 30
			Enabled	See page 32
			Offset	See page 34
			ProbeAttenuation	See page 36
			Range	See page 38
		Name		See page 40
	Close			See page 41

Root keyword	Second-level	Third-level	Fourth-level	Page
IKeysightU2701A	DriverOperation	Cache		See page 173
		ClearInterchange Warnings		See page 174
		DriverSetup		See page 175
		GetNextCoercion Record		See page 176
		GetNextInterchange Warning		See page 177
		InterchangeCheck		See page 178
		InvalidateAllAttributes		See page 179
		IoResourceDescriptor		See page 180
		LogicalName		See page 181
		QueryInstrumentStatus		See page 182
		RangeCheck		See page 183
		RecordCoercions		See page 184
		ResetInterchange Check		See page 185
		Simulate		See page 186
	Identity	Description		See page 187
		GroupCapabilities		See page 188
		Identifier		See page 189
		InstrumentFirmware Revision		See page 190
		Instrument Manufacturer		See page 191
		InstrumentModel		See page 192
		Revision		See page 193
		SpecificationMajor Version		See page 194

Root keyword	Second-level	Third-level	Fourth-level	Page
IKeysightU2701A	Identity	SpecificationMinor Version		See page 195
		SupportedInstrumentModels		See page 196
		Vendor		See page 197
	Initialize			See page 42
	Initialized			See page 44
	Measurements	Abort		See page 130/142
		AutoSetup		See page 131/143
		Count		See page 132/144
		Initiate		See page 133/145
		IsWaveformElement Invalid		See page 134/146
		Item	FetchWaveform	See page 136/148
			FetchWaveform Measurement	See page 150
			ReadWaveform	See page 138/154
			ReadWaveform Measurement	See page 156
		MathFunction		See page 158
		Name		See page 159
		Status		See page 160
	Status	Clear		See page 81
		ConfigureService Request		See page 82
		Preset		See page 84
		Register		See page 85
		SerialPoll		See page 87

Root keyword	Second-level	Third-level	Fourth-level	Page
IKeysightU2701A	System	SerialNumber		See page 198
		TimeoutMilliseconds		See page 88
		WaitForOperation Complete		See page 90
	Trigger	Configure		See page 45
		Coupling		See page 46
		Edge	Configure	See page 48
			Slope	See page 50
		Glitch	Condition	See page 52
			Configure	See page 54
			Polarity	See page 56
			Width	See page 58
		Holdoff		See page 59
		Modifier		See page 60
		Level		See page 62
		Source		See page 63
		Status		See page 64
		TV	Configure	See page 65
			Event	See page 67
			LineNumber	See page 69
			SignalFormat	See page 70
			Type	See page 72
		Width	Condition	See page 73
			Configure	See page 75
			Polarity	See page 77
			ThresholdHigh	See page 79

Root keyword	Second-level	Third-level	Fourth-level	Page
IKeysightU2701A	Trigger	Width	ThresholdLow	See page 80
	Utility	Disable		See page 91
		ErrorQuery		See page 92
		LockObject		See page 93
		Reset		See page 94
		ResetWithDefaults		See page 95
		SelfTest		See page 96
		UnlockObject		See page 98

Enumeration Quick Reference

Enumeration members	Page
KeysightU2701AAcquisitionStatusEnum	See page 126
KeysightU2701AAcquisitionTypeEnum	See page 127
KeysightU2701AGlitchConditionEnum	See page 99
KeysightU2701AGlitchPolarityEnum	See page 100
KeysightU2701AInterpolationEnum	See page 128
KeysightU2701AMathOperationEnum	See page 161
KeysightU2701AMeasurementEnum	See page 162
KeysightU2701ASampleModeEnum	See page 128
KeysightU2701ASRQReasonEnum	See page 100
KeysightU2701AStatusRegisterEnum	See page 102
KeysightU2701AStatusSubRegisterEnum	See page 103
KeysightU2701ATimeOutEnum	See page 165
KeysightU2701ATriggerCouplingEnum	See page 104
KeysightU2701ATriggerModifierEnum	See page 104
KeysightU2701ATriggerSlopeEnum	See page 105
KeysightU2701ATriggerTypeEnum	See page 106
KeysightU2701ATVSignalFormatEnum	See page 107
KeysightU2701ATVTriggerEventEnum	See page 108
KeysightU2701AVerticalCouplingEnum	See page 109
KeysightU2701AWidthConditionEnum	See page 110
KeysightU2701AWidthPolarityEnum	See page 110

Property	Possible values		
IKeysightU2701AAcquisition.NumberOfAverages	**Values (Int32)**		
	1 - 999		
IKeysightU2701AAcquisition.StartTime **IKeysightU2701AAcquisition.TimePerRecord**	**Time/Div**	**TimePerRecord**	**StartTime**
	1 ns	10 ns	–5 ns - 5 ns
	2 ns	20 ns	–10 ns - 10 ns
	5 ns	50 ns	–25 ns - 25 ns
	10 ns	100 ns	–50 ns - 50 ns
	20 ns	200 ns	–100 ns - 100 ns
	50 ns	500 ns	–250 ns - 250 ns
	100 ns	1 µs	–500 ns - 500 ns
	200 ns	2 µs	–1 µs - 1 µs
	500 ns	5 µs	–2.5 µs - 2.5 µs
	1 µs	10 µs	–5 µs - 5 µs
	2 µs	20 µs	–10 µs - 10 µs
	5 µs	50 µs	–25 µs - 25 µs
	10 µs	100 µs	–50 µs - 50 µs
	20 µs	200 µs	–100 µs - 100 µs
	50 µs	500 µs	–250 µs - 250 µs
	100 µs	1 ms	–500 µs - 500 µs
	200 µs	2 ms	–1 ms - 1 ms
	500 µs	5 ms	–2.5 ms - 2.5 ms
	1 ms	10 ms	–5 ms - 5 ms
	2 ms	20 ms	–10 ms - 10 ms
	5 ms	50 ms	–25 ms - 25 ms

Property	Possible values		
	Time/Div	**TimePerRecord**	**StartTime**
IKeysightU2701AAcquisition.StartTime **IKeysightU2701AAcquisition.TimePerRecord**	10 ms	100 ms	–50 ms - 50 ms
	20 ms	200 ms	–100 ms - 100 ms
	50 ms	500 ms	–250 ms - 250 ms
	100 ms	1 s	–500 ms - 500 ms
	200 ms	2 s	–1 s - 1 s
	500 ms	5 s	–2.5 s - 2.5 s
	1 s	10 s	–5 s - 5 s
	2 s	20 s	–10 s - 10 s
	5 s	50 s	–25 s - 25 s
	10 s	100 s	–50 s - 50 s
	20 s	200 s	–100 s - 100 s
	50 s	500 s	–250 s - 250 s
IKeysightU2701AChannels.Item		**Name (String)**	
		Channel1	
		Channel2	
		MathChannel	
IKeysightU2701AChannel.ProbeAttenuation		**Value (double)**	
		1	
		10	
		100	
IKeysightU2701AChannel.Offset **IKeysightU2701AChannel.Range**	**Volt/Div**	**Voltage Range (Attenuation = 1x)**	**Offset**
	2 mV	16 mV	–8 mV - 8 mV
	5 mV	40 mV	–20 mV - 20 mV
	10 mV	80 mV	–40 mvV - 40 mV
	20 mV	160 mV	–80 mV - 80 mV
	50 mV	400 mV	–200 mV - 200 mV

Property	Possible values		
	Volt/Div	**Voltage Range (Attenuation = 1x)**	**Offset**
IKeysightU2701AChannel.Offset **IKeysightU2701AChannel.Range**	100 mV	800 mV	–400 mV - 400 mV
	200 mV	1.6 V	–800 mV - 800 mV
	500 mV	4 V	–2 V - 2 V
	1 V	8 V	–4 V - 4 V
	2 V	16 V	–8 V - 8 V
	5 V	40 V	–20 V - 20 V
IKeysightU2701ATriggerGlitch.Width	**Condition LessThan (Value)**	**Condition GreaterThan (Value)**	
	> 7 ns	> 15 ns	
IKeysightU2701ATrigger.Holdoff	**Value (Double)**		
	> 59 ns		
IKeysightU2701ATrigger.Source	**Value (String)**		
	Channel1		
	Chan1		
	CHANNEL1		
	Channel2		
	Chan2		
	CHANNEL2		
	Ext		
	EXT		
IKeysightU2701ATriggerTv.LineNumber	**Value (Int)**		
	1 - 263		
IKeysightU2701ATriggerWidth.ThresholdHigh	**Value (Double)**		
	> 15 ns		
IKeysightU2701ATriggerWidth.ThresholdLow	**Value (Double)**		
	> 7 ns		

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