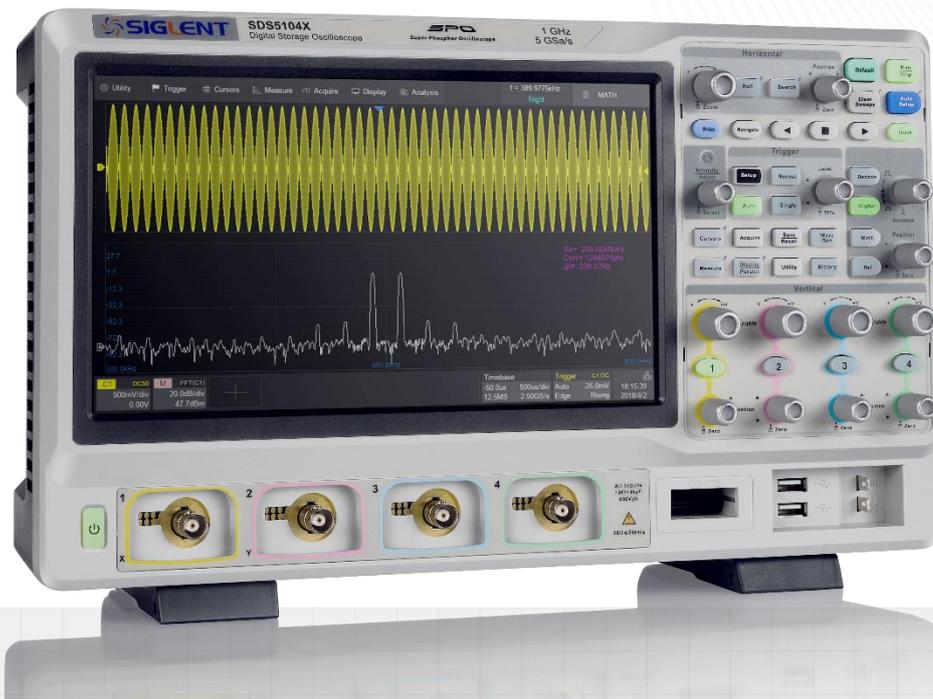


# Digital Oscilloscopes

## IVI-C Programming Guide

E01B  
July, 2021



## Revision History

This chapter declares the modifications of IVI driver in the most recent release of the programming guide version.

### Version E01A at Introduction

This version, as the first version, will be compared with later versions. When the next version is released, the differences between the two versions will be marked.

### Version E01B at Introduction

The following are the main revisions:

- ◆ New support models: SDS5000X , SDS6000A and SDS6000 Pro series.
- ◆ Added attribute of measurement subsystem:  
SDS\_ATTR\_MEASURE\_ADVANCED\_SOURCEA,  
SDS\_ATTR\_MEASURE\_ADVANCED\_SOURCEB,  
SDS\_ATTR\_MEASURE\_ADVANCED\_TYPE,  
SDS\_ATTR\_MEASURE\_ADVANCED\_VALUE

## Models Supported

The series of SIGLENT digital oscilloscopes supporting this IVI-C driver is shown below.

Series	Release Version Supporting IVI-C Driver
SDS5000X	0.9.3R2 and higher
SDS2000X Plus	1.3.5R3 and higher
SDS6000A	1.3.4.0 and higher
SDS6000 Pro	1.3.4.0 and higher

## Software Requirement

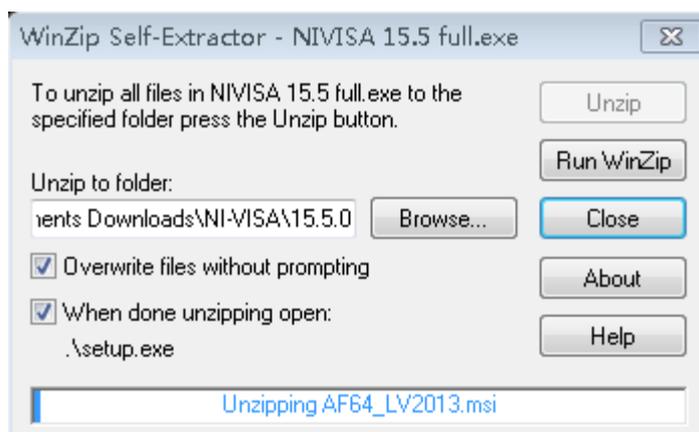
This chapter describes how to configure the IVI driver to control the instrument. If you want to use the IVI Driver, you must install NI-VISA, the IVI Compliance Package, and a C language development system that supports the IVI driver library.

### Install NI-MAX

Currently, NI-VISA is packaged in two versions: Full version and Run-Time Engine version. The full version includes the NI device drivers and a tool named NI-MAX which is a user interface to control and test remotely connected devices. You need to install the full version of NI-VISA.

You can get the NI-VISA 15.5 full version or higher version from <https://www.ni.com/en-us/support/downloads/drivers/download.ni-visa.html#306031>.

- a. Double click the NIVISA 15.5 full.exe, a dialog will be shown as below:

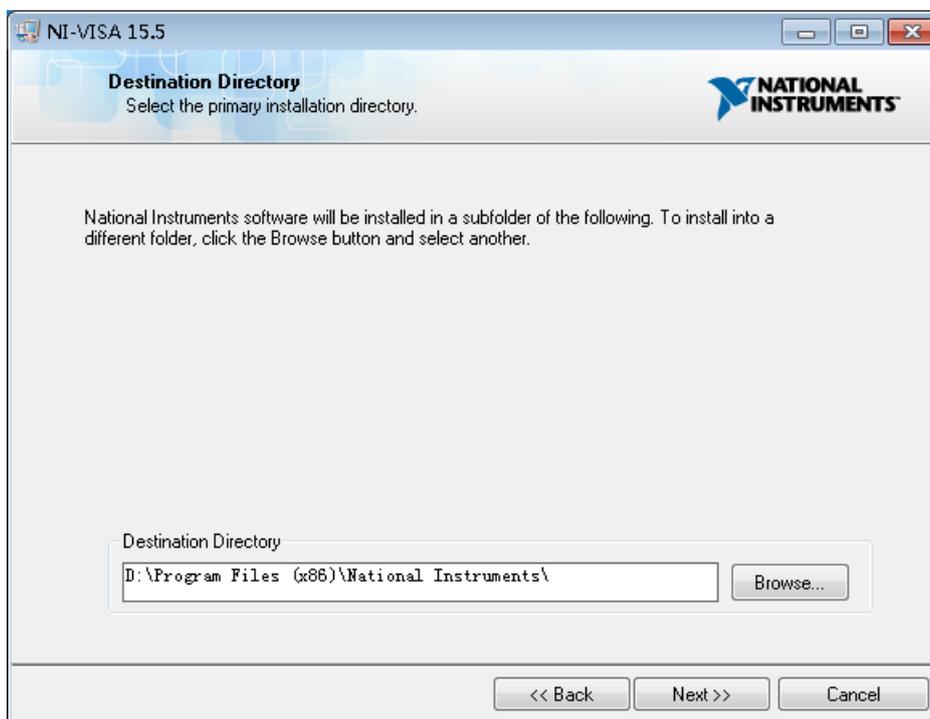


- b. Click Unzip, the installation process will automatically launch after unzipping files. If your computer needs to install .NET Framework 4, it may auto start.

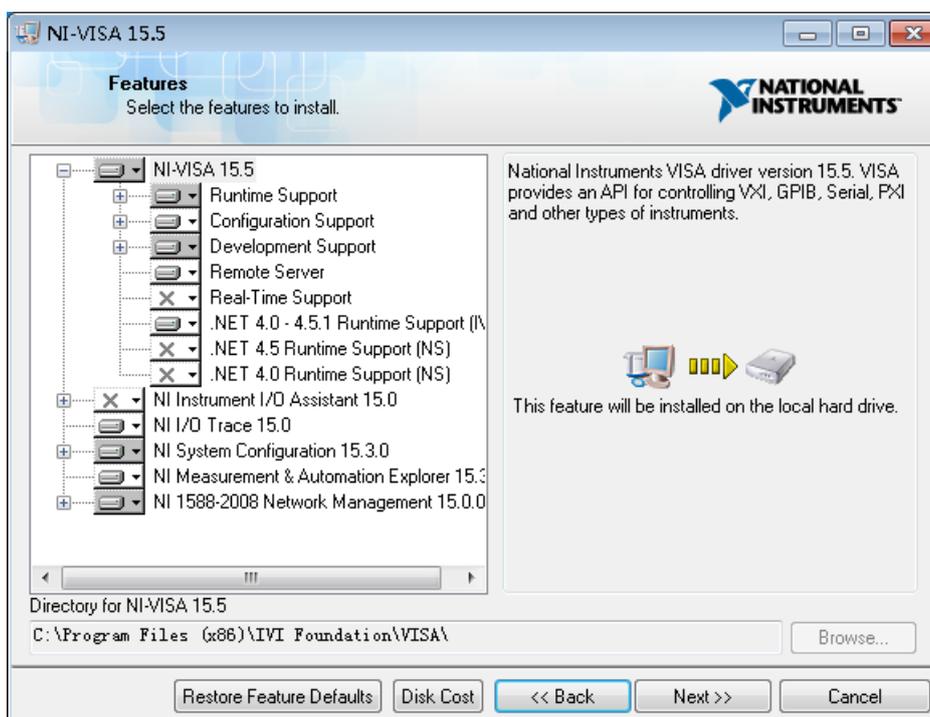


- c. The NI-VISA installing dialog is shown above. Click Next to start the installation

process.

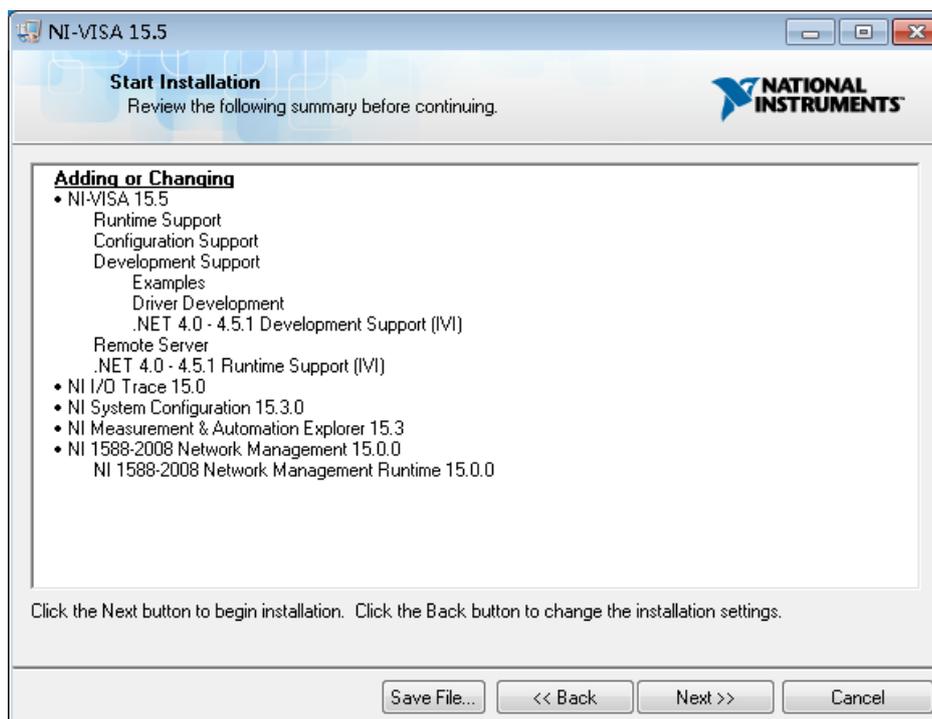


- d. Set the install path. The default path is “C:\Program Files\National Instruments\”. You can change it. Click Next.

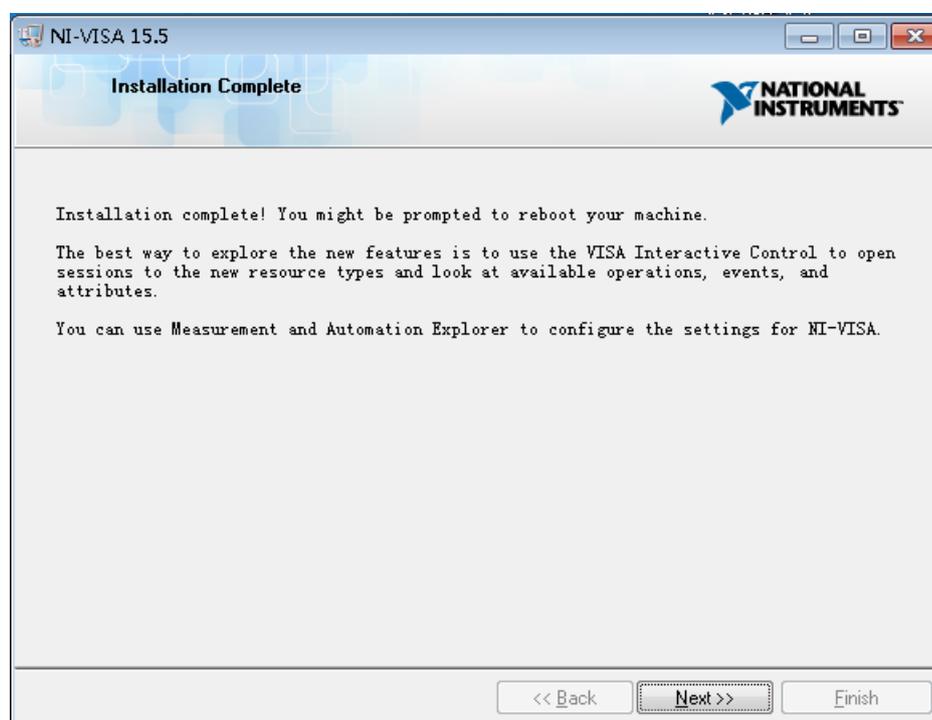


- e. Click Next twice, in the License Agreement dialog, select “I accept the above 2

License Agreement(s).” ,and click Next.



f. Click Next to begin the installation.



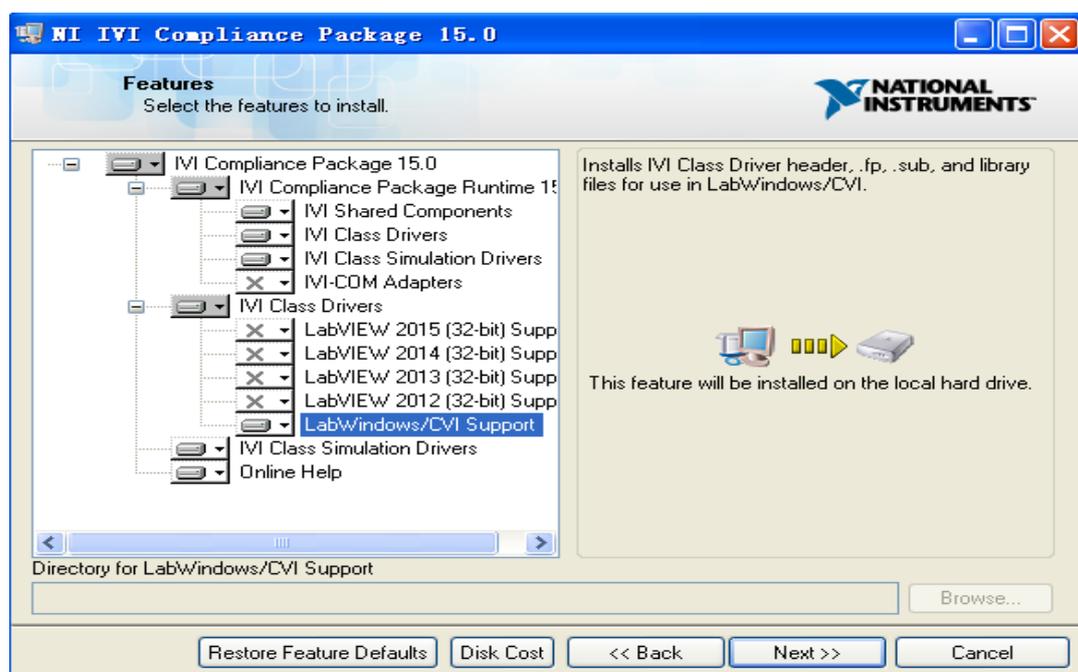
g. Wait until the installation is completed, and then reboot your PC.

## Install the IVI Compliance Package

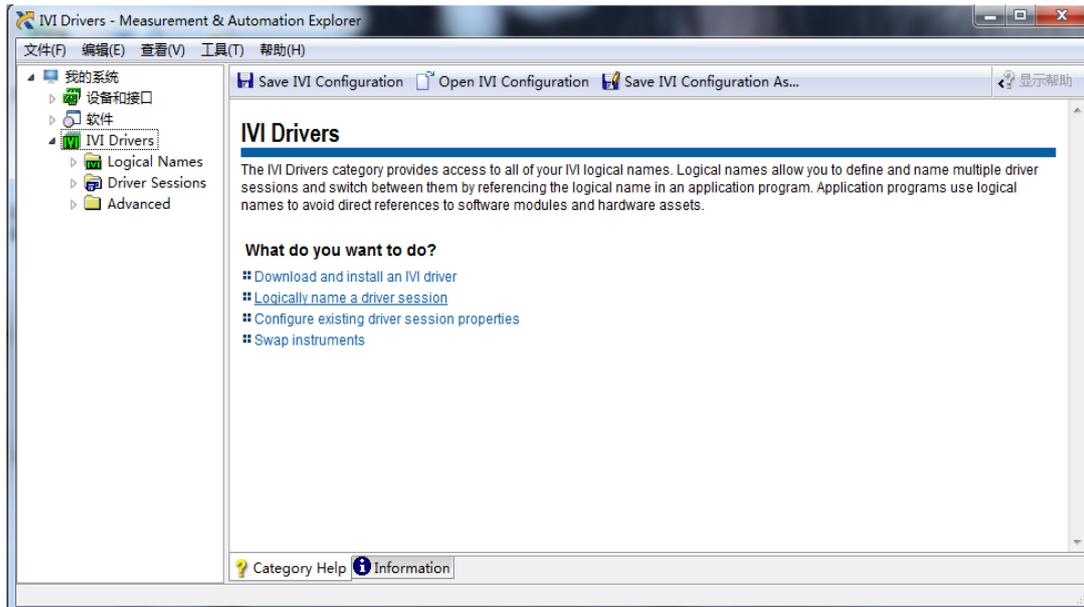
The IVI Compliance Package contains the IVI class drivers and supported libraries for developing and leveraging IVI-based applications.

You can get the IVI Compliance Package from <https://www.ni.com/zh-cn/support/downloads/drivers/download.ivi-compliance-package.html#329444>

- a. If the IVI Compliance Package is not installed, there is no IVI Drivers option in "My System".
- b. Install the IVI Compliance Package (ICP).



- c. Restart your computer after the installation. After the reboot, the IVI Drivers option appears.



## SDS IVI-C Driver Package List

The SDS IVI-C driver package provides three kinds of files: sds.dll file, sds.h file and sds.lib file.

File	Description
sds.dll/sds_64.dll	A dynamic link library file, including variables, functions, and data interfaces for various attributes.
sds.lib/sds_64.lib	An import library file, including the symbolic name and optional identification number of each exported function in the sds.dll file.
sds.h	A header file, including declarations of variables, functions, and data interfaces.

You include the sds.h when programming the Siglent oscilloscope with the IVI driver, and load the sds.dll dynamic file or sds.lib import library file into your own project.

You will find an example that show you how to use these files at the end of this document.

## Introduction to IVI

IVI (Interchangeable Virtual Instruments) is a new generation of instrument driver technology specifications introduced by the IVI Foundation. IVI can realize the interchangeability with the instrument, the instrument simulation, and the instrument state tracking and buffer function. All references to IVI drivers in this document refer to IVI-C drivers that are created using NI tools and that rely on the IVI Engine.

## IVI Data Type

There are six data types for the attributes of the IVI Engine: ViInt32, ViReal64, ViString, ViBoolean, ViSession and ViAddr.

Table 1 Data Type

Data Type	Description
ViInt32	32-bit signed integer
ViReal64	64-bit floating-point number
ViString	String type
ViBoolean	Boolean value
ViSession	A VISA session handle
ViAddr	Logical address type

## Access IVI Attribute

User-callable functions are typically implemented by manipulating attributes. You can call `sds_SetAttribute` or `sds_GetAttribute` functions.

## SetAttribute Function Group

- `sds_SetAttributeViInt32` (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)

Example: When you want to set the channel coupling, you can call the SetAttribute function to change the channel coupling.

```
sds_SetAttributeViInt32(session,"CHAN1",SDS_ATTR_VERTICAL_COUPLING,  
0);
```

where,

**session**: The instrument handle.

**“CHAN1”**: A constant string that represents the analog channel 1 and shows that this **SDS\_ATTR\_VERTICAL\_COUPLING** attribute is corresponding to that specific channel.

**0**: Set the coupling mode to AC.

- `sds_SetAttributeViReal64` (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)

Example: When you want to set the probe attenuation, you can call SetAttribute or GetAttribute function to change or obtain the probe attenuation value.

```
sds_SetAttributeViReal64(session,"CHAN1",SDS_ATTR_PROBE_ATTENUATION,  
10);
```

where,

**session**: Instrument Handle.

**“CHAN1”**: A constant string that represents the analog channel 1 and shows that this

**SDS\_ATTR\_PROBE\_ATTENUATION** attribute is corresponding to this specific channel.

**10:** Set the probe attenuation to x10.

- `sds_SetAttributeViString` (ViSession vi, ViConstString channelName, ViAttr attributeld, ViConstString value)

Example: When you want to set the channel label text, you can call `SetAttribute` or `GetAttribute` function to change or obtain the channel label text.

```
sds_SetAttributeViString(session,"CHAN1",SDS_ATTR_CHANNEL_LABEL_TEXT,"Channel1");
```

where,

**session:** The instrument handle.

**“CHAN1”:** A constant string that represents the analog channel 1 and shows that this **SDS\_ATTR\_CHANNEL\_LABEL\_TEXT** attribute is corresponding to this specific channel.

**“Channel1”:** Set the label text of Channel 1 to “Channel1”.

- `sds_SetAttributeViBoolean` (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean value)

Example: When you want to set a channel on or off, you can call `SetAttribute` or `GetAttribute` function to change or obtain the state of the channel.

```
sds_SetAttributeViBoolean(session,"CHAN1",SDS_ATTR_CHANNEL_ENABLED,VI_FALSE);
```

where,

**session:** The instrument handle.

“**CHAN1**”: A constant string that represents the analog channel 1 and shows that this **SDS\_ATTR\_CHANNEL\_ENABLED** attribute is corresponding to this channel.

**VI\_FALSE:** This means turning channel 1 off.

## GetAttribute Function Group

- `sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeId, ViReal64 *value)`

Example: When you want to set the probe attenuation, you can call SetAttribute or GetAttribute function to change or obtain the probe attenuation value.

```
sds_GetAttributeViReal64(session,"CHAN1",SDS_ATTR_PROBE_ATTENUATION,  
&value64);
```

where,

**session:** The instrument handle.

“**CHAN1**”: A constant string that represents the analog channel 1 and shows that this **SDS\_ATTR\_PROBE\_ATTENUATION** attribute is corresponding to this channel.

**value64:** A ViReal64 type variable which is used to store the returned value of the probe attenuation query.

- `sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeId, ViInt32 *value)`

Example: When you want to set the channel coupling, you can call SetAttribute or GetAttribute function to change or obtain the channel coupling.

```
sds_GetAttributeViInt32(session,"CHAN1",SDS_ATTR_VERTICAL_COUPLING,  
&value32);
```

where,

**session:** The instrument handle.

**“CHAN1”:** A constant string that represents the analog channel 1 and shows that this **SDS\_ATTR\_VERTICAL\_COUPLING** attribute is corresponding to this specific channel.

**value32:** A ViInt32 type variable which is used to store the returned value of the coupling query.

- `sds_GetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean *value)`

Example: When you want to set a channel on or off, you can call SetAttribute or GetAttribute function to change or obtain the state of channel.

```
sds_GetAttributeViBoolean(session,"CHAN1",SDS_ATTR_CHANNEL_ENABLED,  
&boolean);
```

where,

**session:** The instrument handle.

**“CHAN1”:** A constant string that represents the analog channel 1 and shows that this **SDS\_ATTR\_CHANNEL\_ENABLED** attribute is corresponding to this specific channel.

**boolean:** A ViBoolean type variable which is used to store the returned value.

- `sds_GetAttributeViString` (ViSession vi, ViConstString channelName, ViAttr attributeId, ViInt32 bufSize, ViChar value[])

Example: When you want to set the channel label text, you can call `SetAttribute` or `GetAttribute` function to change or obtain the channel label text.

```
sds_GetAttributeViString(session,"CHAN1",SDS_ATTR_CHANNEL_LABEL_TEXT, buffersize,str);
```

where,

**session:** The instrument handle.

**"CHAN1":** A constant string that represents the analog channel 1 and shows that this **SDS\_ATTR\_CHANNEL\_LABEL\_TEXT** attribute is corresponding to this specific channel.

**buffersize:** A ViInt32 type variable.

**str:** A ViString type variable which is used to store the returned value.

## Attribute

This chapter describes the attributes of the SIGLENT IVI driver. The following table lists the supported IVI base class attributes and SIGLENT custom attributes.

System	Attribute
Channel Subsystem	SDS_ATTR_MAX_INPUT_FREQUENCY
	SDS_ATTR_INPUT_IMPEDANCE
	SDS_ATTR_VERTICAL_COUPLING
	SDS_ATTR_PROBE_ATTENUATION
	SDS_ATTR_VERTICAL_OFFSET
	SDS_ATTR_VERTICAL_RANGE
	SDS_ATTR_CHANNEL_ENABLED
	SDS_ATTR_CHANNEL_LABEL_TEXT
	SDS_ATTR_CHANNEL_COUNT
Acquisition Subsystem	SDS_ATTR_ACQUISITION_TYPE
	SDS_ATTR_HORZ_RECORD_LENGTH
	SDS_ATTR_HORZ_SAMPLE_RATE
	SDS_ATTR_HORZ_TIME_PER_RECORD
	SDS_ATTR_ACQUISITION_START_TIME
	SDS_ATTR_INTERPOLATION
	SDS_ATTR_HORZ_MIN_NUM_PTS
Trigger Subsystem	SDS_ATTR_TRIGGER_TYPE
	SDS_ATTR_TRIGGER_HOLDOFF
	SDS_ATTR_TRIGGER_SOURCE
	SDS_ATTR_TRIGGER_LEVEL
	SDS_ATTR_TRIGGER_MODIFIER
	SDS_ATTR_TRIGGER_COUPLING
	SDS_ATTR_TRIGGER_SLOPE
	SDS_ATTR_TV_TRIGGER_LINE_NUMBER
	SDS_ATTR_TV_TRIGGER_SIGNAL_FORMAT
	SDS_ATTR_RUNT_HIGH_THRESHOLD
	SDS_ATTR_RUNT_LOW_THRESHOLD
	SDS_ATTR_RUNT_POLARITY
	SDS_ATTR_GLITCH_CONDITION
SDS_ATTR_GLITCH_POLARITY	
Measurement Subsystem	SDS_ATTR_MEASURE_ENABLED
	SDS_ATTR_MEASURE_MODE
	SDS_ATTR_MEASURE_GATE
	SDS_ATTR_MEASURE_GATE_GA
	SDS_ATTR_MEASURE_GATE_GB
	SDS_ATTR_MEASURE_SIMPLE_SOURCE
	SDS_ATTR_MEASURE_ADVANCED_SOURCEA

	SDS_ATTR_MEASURE_ADVANCED_SOURCEB
	SDS_ATTR_MEASURE_ADVANCED_TYPE
	SDS_ATTR_MEASURE_ADVANCED_VALUE
	SDS_ATTR_MEASURE_ADVANCED_STYLE
	SDS_ATTR_MEASURE_ADVANCED_LINENUMBER
	SDS_ATTR_MEASURE_ADVANCED_STATISTICS
	SDS_ATTR_MEASURE_ADVANCED_STATISTICS_HISTOGRAM
	SDS_ATTR_MEASURE_ADVANCED_STATISTICA_MAXCOUNT
	SDS_ATTR_MEASURE_ADVANCED_STATISTICS_RESET

## Channel Subsystem

The channel group properties are used to set or read channel-related parameters. The channel group has the following attributes:

- ◆ **SDS\_ATTR\_MAX\_INPUT\_FREQUENCY**
- ◆ **SDS\_ATTR\_INPUT\_IMPEDANCE**
- ◆ **SDS\_ATTR\_VERTICAL\_COUPLING**
- ◆ **SDS\_ATTR\_PROBE\_ATTENUATION**
- ◆ **SDS\_ATTR\_VERTICAL\_OFFSET**
- ◆ **SDS\_ATTR\_VERTICAL\_RANGE**
- ◆ **SDS\_ATTR\_CHANNEL\_ENABLED**
- ◆ **SDS\_ATTR\_CHANNEL\_LABEL\_TEXT**
- ◆ **SDS\_ATTR\_CHANNEL\_COUNT**

## SDS\_ATTR\_MAX\_INPUT\_FREQUENCY

<b>Description</b>	This attribute specifies the channel bandwidth limit.
<b>Data type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is one of the following analog inputs: CHAN1, CHAN2, CHAN3 or CHAN4.  <b>attributeld</b> is SDS_ATTR_MAX_INPUT_FREQUENCY macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>(0,2e+7) means the bandwidth is limited to 20M.                  (2e+7,2e+8) means bandwidth is limited to 200M.                  (2e+8,1e+38) means bandwidth is Full.</p>
<b>Related Attribute</b>	SDS_ATTR_INPUT_IMPEDANCE
<b>High Level Functions</b>	sds_ConfigureChanCharacteristics

## SDS\_ATTR\_INPUT\_IMPEDANCE

<b>Description</b>	This attribute specifies the channel impedance.
<b>Data type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is one of the following analog inputs: CHAN1, CHAN2, CHAN3 or CHAN4.  <b>attributeld</b> is SDS_ATTR_INPUT_IMPEDANCE macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>50 means the impedance is 50 Ω .</p> <p>1 e+6 means the impedance is 1M Ω .</p>
<b>Related Attribute</b>	SDS_ATTR_MAX_INPUT_FREQUENCY
<b>High Level Functions</b>	sds_ConfigureChanCharacteristics

## SDS\_ATTR\_VERTICAL\_COUPLING

<b>Description</b>	This attribute specifies channel coupling.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**

**vi** is the instrument handle.  
**channelName** is one of the following analog inputs: CHAN1, CHAN2, CHAN3 or CHAN4.  
**attributeld** is SDS\_ATTR\_VERTICAL\_COUPLING macro.  
**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
AC	SDS_VAL_AC	0
DC	SDS_VAL_DC	1
GND	SDS_VAL_GND	2

<b>Related Attribute</b>	<p>SDS_ATTR_VERTICAL_OFFSET</p> <p>SDS_ATTR_VERTICAL_RANGE</p> <p>SDS_ATTR_CHANNEL_ENABLED</p> <p>SDS_ATTR_PROBE_ATTENUATION</p>
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<b>High Level Functions</b>	sds_ConfigureChannel
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## SDS\_ATTR\_PROBE\_ATTENUATION

<b>Description</b>	This attribute specifies channel probe attenuation.
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is one of the following analog inputs: CHAN1, CHAN2, CHAN3 or CHAN4.  <b>attributeld</b> is SDS_ATTR_PROBE_ATTENUATION macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	The range of value is [1E-6, 1E6].
<b>Related Attribute</b>	<p>SDS_ATTR_VERTICAL_OFFSET</p> <p>SDS_ATTR_VERTICAL_RANGE</p> <p>SDS_ATTR_CHANNEL_ENABLED</p> <p>SDS_ATTR_VERTICAL_COUPLING</p>
<b>High Level Functions</b>	sds_ConfigureChannel

## SDS\_ATTR\_VERTICAL\_OFFSET

<b>Description</b>	This attribute specifies channel vertical offset.
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is one of the following analog inputs: CHAN1, CHAN2, CHAN3 or CHAN4.  <b>attributeld</b> is SDS_ATTR_VERTICAL_OFFSET macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<ul style="list-style-type: none"> <li>● <b>Range of value for SDS6000A/SDS6000 Pro:</b>                      When the channel scale is between <math>[5e-4*probe, 5e-3*probe]</math>, the range of value is <math>[-1.6*probe, 1.6*probe]</math>.</li> <li>When the channel scale is between <math>(5e-3*probe, 1e-2*probe]</math>, the range of value is <math>[-4*probe, 4*probe]</math>.</li> <li>When the channel scale is between <math>(1e-2*probe, 2e-2*probe]</math>, the range of value is <math>[-8*probe, 8*probe]</math>.</li> <li>When the channel scale is between <math>[2e-2*probe, 1e-1*probe]</math>, the range of value is <math>[-16*probe, 16*probe]</math>.</li> <li>When the channel scale is between <math>(1e-1*probe, 2e-1*probe]</math>, the range of value is <math>[-80*probe, 80*probe]</math>.</li> <li>When the channel scale is between <math>(2e-1*probe, 1*probe]</math>, the range of value is <math>[-160*probe, 160*probe]</math>.</li> <li>When the channel scale is between <math>(1*probe, 1e+1*probe]</math>, the range of value is <math>[-400*probe, 400*probe]</math>.</li> </ul>

- **Range of value for SDS5000X/SDS2000X Plus:**

When the channel scale is between  $[5e-4 \cdot \text{probe}, 1e-1 \cdot \text{probe}]$ , the range of value is  $[-2 \cdot \text{probe}, 2 \cdot \text{probe}]$ .

When the channel scale is between  $(1e-1 \cdot \text{probe}, 1 \cdot \text{probe}]$ , the range of value is  $[-20 \cdot \text{probe}, 20 \cdot \text{probe}]$ .

When the channel scale is between  $(1 \cdot \text{probe}, 10 \cdot \text{probe}]$ , the range of value is  $[-200 \cdot \text{probe}, 200 \cdot \text{probe}]$ .

**Note:**

Probe is the value of channel attenuation.

**Related Attribute**

SDS\_ATTR\_VERTICAL\_OFFSET  
SDS\_ATTR\_VERTICAL\_RANGE  
SDS\_ATTR\_CHANNEL\_ENABLED  
SDS\_ATTR\_VERTICAL\_COUPLING  
SDS\_ATTR\_PROBE\_ATTENUATION

**High Level Functions**

sds\_ConfigureChannel

## SDS\_ATTR\_VERTICAL\_RANGE

<b>Description</b>	This attribute specifies channel vertical range.
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is one of the following analog inputs: CHAN1, CHAN2, CHAN3 or CHAN4.  <b>attributeld</b> is SDS_ATTR_VERTICAL_RANGE macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>When the channel impedance is set to 50Ω, the value range is [5e-4*probe,1e+0*probe].</p> <p>When the channel impedance is set to 1MΩ, the value range is [5e-4*probe,1e+1*probe].</p> <p><b>Note:</b>          Probe is the value of channel attenuation.</p>
<b>Related Attribute</b>	<p>SDS_ATTR_CHANNEL_ENABLED          SDS_ATTR_VERTICAL_OFFSET          SDS_ATTR_VERTICAL_COUPLING          SDS_ATTR_PROBE_ATTENUATION          SDS_ATTR_PROBE_ATTENUATION</p>
<b>High Level Functions</b>	sds_ConfigureChannel

## SDS\_ATTR\_CHANNEL\_ENABLED

<b>Description</b>	This attribute specifies the status of channel.
<b>Data Type</b>	ViBoolean
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean value)</p> <p>sds_GetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>ChannelName</b> is one of the following analog inputs: CHAN1, CHAN2, CHAN3 or CHAN4.  <b>attributeld</b> is SDS_ATTR_CHANNEL_ENABLED macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>VI_TRUE means to turn on the channel.</p> <p>VI_FALSE means to turn off the channel.</p>
<b>Related Attribute</b>	<p>SDS_ATTR_VERTICAL_OFFSET</p> <p>SDS_ATTR_VERTICAL_RANGE</p> <p>SDS_ATTR_CHANNEL_ENABLED</p> <p>SDS_ATTR_VERTICAL_COUPLING</p> <p>SDS_ATTR_PROBE_ATTENUATION</p> <p>SDS_ATTR_PROBE_ATTENUATION</p>
<b>High Level Functions</b>	sds_ConfigureChannel

## SDS\_ATTR\_CHANNEL\_LABEL\_TEXT

<b>Description</b>	This attribute specifies the label text of the source
<b>Data Type</b>	ViString
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViConstString value)</p> <p>sds_GetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 bufSize, ViChar value[])</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is one of the following analog inputs: CHAN1, CHAN2, CHAN3 or CHAN4.  <b>attributeld</b> is SDS_ATTR_CHANNEL_LABEL_TEXT macro.  <b>bufSize</b> is the number of bytes you specified for the Attribute Value parameter in the ViChar array.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	The limit of the label text is 20 bytes.
<b>Related Attribute</b>	None
<b>High Level Functions</b>	None

## SDS\_ATTR\_CHANNEL\_COUNT

<b>Description</b>	This attribute gets the channel counts.
<b>Data Type</b>	ViInt32
<b>Access</b>	RO
<b>Common Control Functions</b>	sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)
	<p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_CHANNEL_COUNT macro.  <b>value</b> is used to store the value of function returned by <b>attributeld</b>.</p>
<b>Value Range</b>	None
<b>Related Attribute</b>	None
<b>High Level Functions</b>	None

## Acquisition Subsystem

The acquisition group properties are used to set or read acquisition related parameters.

The acquisition group has the following attributes:

- ◆ **SDS\_ATTR\_ACQUISITION\_TYPE**
- ◆ **SDS\_ATTR\_HORZ\_RECORD\_LENGTH**
- ◆ **SDS\_ATTR\_HORZ\_SAMPLE\_RATE**
- ◆ **SDS\_ATTR\_HORZ\_TIME\_PER\_RECORD**
- ◆ **SDS\_ATTR\_ACQUISITION\_START\_TIME**
- ◆ **SDS\_ATTR\_INTERPOLATION**
- ◆ **SDS\_ATTR\_HORZ\_MIN\_NUM\_PTS**

## SDS\_ATTR\_ACQUISITION\_TYPE

<b>Description</b>	This attribute specifies the acquisition mode.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_ACQUISITION\_TYPE macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Normal	SDS_VAL_NORMAL	0
Peak	SDS_VAL_PEAK_DETECT	1
ERES	SDS_VAL_HI_ERES	2
Average	SDS_VAL_AVERAGE	4

**Notes:**

SDS2000X Plus only supports Normal and Peak.

<b>Related Attribute</b>	None
<b>High Level Functions</b>	sds_ConfigureAcquisitionType

## SDS\_ATTR\_HORZ\_RECORD\_LENGTH

<b>Description</b>	This attribute gets the length of the waveform record.
<b>Data Type</b>	ViInt32
<b>Access</b>	RO
<b>Common Control Functions</b>	sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)
	<p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_HORZ_RECORD_LENGTH macro.  <b>value</b> is used to store the value of function returned by <b>attributeld</b>.</p>
<b>Value Range</b>	None
<b>Related Attribute</b>	SDS_ATTR_HORZ_MIN_NUM_PTS SDS_ATTR_HORZ_TIME_PER_RECORD
<b>High Level Functions</b>	None

## SDS\_ATTR\_HORZ\_SAMPLE\_RATE

<b>Description</b>	This attribute gets the sampling rate.
<b>Data Type</b>	ViReal64
<b>Access</b>	RO
<b>Common Control Functions</b>	sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)
	<p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_HORZ_SAMPLE_RATE macro.  <b>value</b> is used to store the value of function returned by <b>attributeld</b>.</p>
<b>Value Range</b>	None
<b>Related Attribute</b>	SDS_ATTR_HORZ_TIME_PER_RECORD
<b>High Level Functions</b>	None

## SDS\_ATTR\_HORZ\_TIME\_PER\_RECORD

<b>Description</b>	This attribute specifies the horizontal scale of the main window.
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_HORZ_TIME_PER_RECORD macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>In the IVI-4.1 specification, values are default coerced up. And the following range make effect on the time base of the main window. So that,</p> <p>(2e-10,5e-10) means 500ps/div  (5e-10,1e-9) means 1ns/div  (1e-9,2e-9) means 2ns/div  (2e-9,5e-9) means 5ns/div  (5e-9,1e-8) means 10ns/div  (1e-8,2e-8) means 20ns/div  (2e-8,5e-8) means 50ns/div  (5e-8,1e-7) means 100ns/div  (1e-7,2e-7) means 200ns/div  (2e-7,5e-7) means 500ns/div  (5e-7,1e-6) means 1us/div  (1e-6,2e-6) means 2us/div  (2e-6,5e-6) means 5us/div  (5e-6,1e-5) means 10us/div  (1e-5,2e-5) means 20us/div  (2e-5,5e-5) means 50us/div  (5e-5,1e-4) means 100us/div  (1e-4,2e-4) means 200us/div  (2e-4,5e-4) means 500us/div</p>

(5e-4,1e-3) means 1ms/div  
(1e-3,2e-3) means 2ms/div  
(2e-3,5e-3) means 5ms/div  
(5e-3,1e-2) means 10ms/div  
(1e-2,2e-2) means 20ms/div  
(2e-2,5e-2) means 50ms/div  
(5e-2,1e-1) means 100ms/div  
(1e-1,2e-1) means 200ms/div  
(2e-1,5e-1) means 500ms/div  
(5e-1,1e+0) means 1s/div  
(1e+0,2e+0) means 2s/div  
(2e+0,5e+0) means 5s/div  
(5e+0,1e+1) means 10s/div  
(1e+1,2e+1) means 20s/div  
(2e+1,5e+1) means 50s/div  
(5e+1,1e+2) means 100s/div  
(1e+2,2e+2) means 200s/div  
(2e+2,5e+2) means 500s/div  
(5e+2,1e+3) means 1ks/div

**Related Attribute**

SDS\_ATTR\_ACQUISITION\_START\_TIME

**High Level Functions**

sds\_ConfigureAcquisitionRecord

## SDS\_ATTR\_ACQUISITION\_START\_TIME

<b>Description</b>	This attribute specifies the horizontal delay (trigger delay).
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_GetAttributeViReal64(ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value);</p> <p>sds_SetAttributeViReal64(ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value);</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is                      SDS_ATTR_ACQUISITION_START_TIME macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	The value range is [-10*timebase, (10000-5)*timebase].
<b>Related Attribute</b>	SDS_ATTR_HORZ_TIME_PER_RECORD
<b>High Level Functions</b>	sds_ConfigureAcquisitionRecord

## SDS\_ATTR\_INTERPOLATION

<b>Description</b>	This attribute specifies the way of interpolation.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)  sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_INTERPOLATION macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Sinc	SDS_VAL_SINE_X	2
x	SDS_VAL_LINEAR	3

<b>Related Attribute</b>	None SDS_ATTR_HORZ_TIME_PER_RECORD
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<b>High Level Functions</b>	sds_ConfigureInterpolation
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**SDS\_ATTR\_HORZ\_MIN\_NUM\_PTS**

**Description** This attribute specifies the maximum memory depth.

**Data Type** ViInt32

**Access** R/W

**Common Control Functions** sds\_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)

sds\_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 \*value)

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_HORZ\_MIN\_NUM\_PTS macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Model	Type	Discrete Value	Value
SDS6000A/Pro	1.25k	SDS_VAL_1_25K	1.25e+3
SDS6000A/Pro	2.5k	SDS_VAL_2_5K	2.5e+3
SDS6000A/Pro	5k	SDS_VAL_5K	5e+3
SDS6000A/Pro	12.5k	SDS_VAL_12_5K	12.5e+3
SDS6000A/Pro	25k	SDS_VAL_25K	25e+3
SDS6000A/Pro	50k	SDS_VAL_50K	50e+3
SDS6000A/Pro	125k	SDS_VAL_125K	125e+3
SDS6000A/Pro	250k	SDS_VAL_250K	250e+3
SDS6000A/Pro	500k	SDS_VAL_500K	500e+3
SDS6000A/Pro	1.25M	SDS_VAL_1_25M	1.25e+6
SDS6000A/Pro	2.5M	SDS_VAL_2_5M	2.5e+6
SDS6000A/Pro	5M	SDS_VAL_5M	5e+6
SDS6000A/Pro	12.5M	SDS_VAL_12_5M	12.5e+6
SDS6000A/Pro	25M	SDS_VAL_25M	25e+6
SDS6000A/Pro	50M	SDS_VAL_50M	50e+6
SDS6000A/Pro	62.5M	SDS_VAL_62_5M	62.5e+6
SDS6000A/Pro	125M	SDS_VAL_125M	125e+6
SDS6000A/Pro	250M	SDS_VAL_250M	250e+6
SDS6000A/Pro	500M	SDS_VAL_500M	500e+6
SDS5000X	5k	SDS_VAL_5K	5e+3
SDS5000X	10k	SDS_VAL_10K	10e+3

SDS5000X	25k	SDS_VAL_25K	25e+3
SDS5000X	50k	SDS_VAL_50K	50e+3
SDS5000X	125k	SDS_VAL_125K	125e+3
SDS5000X	250k	SDS_VAL_250K	250e+3
SDS5000X	625k	SDS_VAL_625K	625e+3
SDS5000X	1.25M	SDS_VAL_1_25M	1.25e+6
SDS5000X	2.5M	SDS_VAL_2_5M	2.5e+6
SDS5000X	6.25M	SDS_VAL_6_25M	6.25e+6
SDS5000X	12.5M	SDS_VAL_12_5M	12.5e+6
SDS5000X	25M	SDS_VAL_25M	25e+6
SDS5000X	62.5M	SDS_VAL_62_5M	62.5e+6
SDS5000X	125M	SDS_VAL_125M	125e+6
SDS5000X	250M	SDS_VAL_250M	250e+6
SDS2000X Plus	10k	SDS_VAL_10K	10e+3
SDS2000X Plus	20k	SDS_VAL_20K	20e+3
SDS2000X Plus	100k	SDS_VAL_100K	100e+3
SDS2000X Plus	200k	SDS_VAL_200K	200e+3
SDS2000X Plus	1M	SDS_VAL_1M	1e+6
SDS2000X Plus	2M	SDS_VAL_2M	2e+6
SDS2000X Plus	10M	SDS_VAL_10M	10e+6
SDS2000X Plus	20M	SDS_VAL_20M	20e+6
SDS2000X Plus	50M	SDS_VAL_50M	50e+6
SDS2000X Plus	100M	SDS_VAL_100M	100e+6
SDS2000X Plus	200M	SDS_VAL_200M	200e+6

**Related Attribute**

SDS\_ATTR\_HORZ\_TIME\_PER\_RECORD

**High Level Functions**

sds\_ConfigureInterpolation

## Trigger Subsystem

The triggering group properties are used to set or read trigger related parameters. The triggering group has the following attributes:

- ◆ **SDS\_ATTR\_TRIGGER\_TYPE**
- ◆ **SDS\_ATTR\_TRIGGER\_HOLDOFF**
- ◆ **SDS\_ATTR\_TRIGGER\_SOURCE**
- ◆ **SDS\_ATTR\_TRIGGER\_LEVEL**
- ◆ **SDS\_ATTR\_TRIGGER\_MODIFIER**
- ◆ **SDS\_ATTR\_TRIGGER\_COUPLING**
- ◆ **SDS\_ATTR\_TRIGGER\_SLOPE**
- ◆ **SDS\_ATTR\_TV\_TRIGGER\_LINE\_NUMBER**
- ◆ **SDS\_ATTR\_TV\_TRIGGER\_SIGNAL\_FORMAT**
- ◆ **SDS\_ATTR\_RUNT\_HIGH\_THRESHOLD**
- ◆ **SDS\_ATTR\_RUNT\_LOW\_THRESHOLD**
- ◆ **SDS\_ATTR\_RUNT\_POLARITY**
- ◆ **SDS\_ATTR\_GLITCH\_CONDITION**
- ◆ **SDS\_ATTR\_GLITCH\_POLARITY**

## SDS\_ATTR\_TRIGGER\_TYPE

<b>Description</b>	This attribute specifies the trigger type.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_TRIGGER\_TYPE macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Edge	SDS_VAL_EDGE_TRIGGER	1
Runt	SDS_VAL_RUNT_TRIGGER	3
Pluse	SDS_VAL_GLITCH_TRIGGER	4
Video	SDS_VAL_TV_TRIGGER	5
Slope	SDS_VAL_SLOPE_TRIGGER	8
Pattern	SDS_VAL_PATTERN_TRIGGER	9
Qualified	SDS_VAL_QUALIFIED_TRIGGER	10
Window	SDS_VAL_WINDOW_TRIGGER	11
Interval	SDS_VAL_INTERVAL_TRIGGER	12
Dropout	SDS_VAL_DROPOUT_TRIGGER	13

**Related Attribute**

SDS\_ATTR\_TRIGGER\_HOLDOFF  
 SDS\_ATTR\_TRIGGER\_LEVEL  
 SDS\_ATTR\_TRIGGER\_SOURCE

**High Level Functions**

sds\_ConfigureTrigger  
 sds\_ConfigureWidthTriggerSource  
 sds\_ConfigureGlitchTriggerSource  
 sds\_ConfigureEdgeTriggerSource

## SDS\_ATTR\_TRIGGER\_HOLDOFF

<b>Description</b>	This attribute specifies the trigger holdoff time.
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_TRIGGER_HOLDOFF macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>[8.00e-09, 3.00e+01]</p> <p><b>Note:</b>  Only when the SDS_ATTR_TRIGGER_TYPE is Edge, Slope, Pulse, Window, Interval, Dropout, Runt, Pattern SDS_ATTR_TRIGGER_HOLDOFF can be set.</p>
<b>Related Attribute</b>	SDS_ATTR_TRIGGER_TYPE
<b>High Level Functions</b>	sds_ConfigureTrigger

## SDS\_ATTR\_TRIGGER\_SOURCE

<b>Description</b>	This attribute specifies the trigger source.
<b>Data Type</b>	ViString
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViConstString value)</p> <p>sds_GetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 bufSize, ViChar value[])</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_TRIGGER_SOURCE macro.  <b>bufSize</b> is the number of bytes you specified for the Attribute Value parameter in the ViChar array.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>The source can be set to:{Cn Dm EX EX5 LINE}  n can be set from 1 to 4.  m can be set from 0 to 15.</p> <p><b>Example:</b>  If you want to set the source to C1, enter "C1".  If you want to set the source to D0, enter "D0".</p> <p><b>Note:</b>  when the SDS_ATTR_TRIGGER_TYPE is Edge trigger, the SDS_ATTR_TRIGGER_SOURCE can be set as {Cn Dm EX EX5 LINE}.</p> <p>when the SDS_ATTR_TRIGGER_TYPE is Window, Runt, Slope, or TV trigger, the SDS_ATTR_TRIGGER_SOURCE can be set as {Cn}.</p> <p>when the SDS_ATTR_TRIGGER_TYPE is Dropout, Interval, Pulse trigger, the SDS_ATTR_TRIGGER_SOURCE can be set as {Cn Dm}.</p>

**Related Attribute**

SDS\_ATTR\_TRIGGER\_LEVEL  
SDS\_ATTR\_TRIGGER\_TYPE

**High Level Functions**

sds\_ConfigureEdgeTriggerSource  
sds\_ConfigureRuntTriggerSource  
sds\_ConfigureGlitchTriggerSource  
sds\_ConfigureWidthTriggerSource  
sds\_ConfigureTVTriggerSource

## SDS\_ATTR\_TRIGGER\_LEVEL

<b>Description</b>	This attribute specifies the trigger level.
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_TRIGGER_LEVEL macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>Range of values for SDS6000A/SDS6000 Pro: [-4.5*vertical_scale-vertical_offset,4.5*vertical_scale-vertical_offset].</p> <p>Range of values for SDS5000X/SDS2000X Plus: [-4.1*vertical_scale-vertical_offset,4.1*vertical_scale-vertical_offset].</p> <p><b>Note:</b>  Only when the SDS_ATTR_TRIGGER_TYPE is Edge, Pulse, Interval, Dropout TV trigger type, the SDS_ATTR_TRIGGER_LEVEL can be set.</p>
<b>Related Attribute</b>	SDS_ATTR_TRIGGER_SOURCE SDS_ATTR_TRIGGER_TYPE SDS_ATTR_TRIGGER_LEVEL
<b>High Level Functions</b>	sds_ConfigureTrigger sds_ConfigureWidthTriggerSource sds_ConfigureGlitchTriggerSource sds_ConfigureEdgeTriggerSource

## SDS\_ATTR\_TRIGGER\_MODIFIER

<b>Description</b>	This attribute specifies the trigger mode.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_TRIGGER\_MODIFIER macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Normal	SDS_VAL_NO_TRIGGER_MOD	1
Auto	SDS_VAL_AUTO	2
Single	SDS_VAL_SINGLE	4

**Related Attribute** None

**High Level Functions** sds\_ConfigureTriggerModifier

## SDS\_ATTR\_TRIGGER\_COUPLING

<b>Description</b>	This attribute specifies the coupling mode of the edge trigger.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_TRIGGER\_COUPLING macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
AC	SDS_VAL_AC_TRIGGER	0
DC	SDS_VAL_DC_TRIGGER	1
HF Reject	SDS_VAL_HF_REJECT	3
LF Reject	SDS_VAL_LF_REJECT	4

**Related Attribute** None

**High Level Functions** sds\_ConfigureTriggerCoupling

## SDS\_ATTR\_TRIGGER\_SLOPE

**Description** This attribute specifies the slope of the edge trigger.

**Data Type** ViInt32

**Access** R/W

**Common Control Functions** sds\_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)

sds\_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 \*value)

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_TRIGGER\_SLOPE macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Falling	SDS_VAL_NEGATIVE	0
Rising	SDS_VAL_POSITIVE	1
Alternating	SDS_VAL_ALTERNATE	2

**Related Attribute** SDS\_ATTR\_TRIGGER\_SOURCE  
SDS\_ATTR\_TRIGGER\_LEVEL

**High Level Functions** sds\_ConfigureEdgeTriggerSource

## SDS\_ATTR\_TV\_TRIGGER\_LINE\_NUMBER

**Descriptor** This attribute specifies the line number of the video trigger.

**Data type** ViInt32

**Access** R/W

**Common control function** sds\_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)

**Function** sds\_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 \*value)

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_TV\_TRIGGER\_LINE\_NUMBER macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range** [1,1125]

**Related Attribute**

SDS\_ATTR\_TV\_TRIGGER\_SIGNAL\_FORMAT

**High Level Function**

sds\_ConfigureTVTriggerLineNumber

sds\_ConfigureTVTriggerLineNumber

**Function**

**s**

## SDS\_ATTR\_TV\_TRIGGER\_SIGNAL\_FORMAT

<b>Description</b>	This attribute specifies the video standard of the video trigger.
<b>Data type</b>	ViInt32
<b>Access</b>	R/W
<b>Common control functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is

SDS\_ATTR\_TV\_TRIGGER\_SIGNAL\_FORMAT macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
NTSC	SDS_VAL_NTSC	1
PAL	SDS_VAL_PAL	2
720p/50	SDS_VAL_720P50	4
720p/60	SDS_VAL_720P60	5
1080p/50	SDS_VAL_1080P50	6
1080p/60	SDS_VAL_1080P60	7
1080i/50	SDS_VAL_1080I50	8
1080i/60	SDS_VAL_1080I60	9
Custom	SDS_VAL_CUSTOM	10

**Related Attribute** SDS\_ATTR\_TV\_TRIGGER\_LINE\_NUMBER

**High Level Functions** sds\_ConfigureTVTriggerSource

## SDS\_ATTR\_RUNT\_HIGH\_THRESHOLD

<b>Description</b>	This attribute specifies the upper trigger level of the runt trigger.
<b>Data type</b>	ViReal64
<b>Access</b>	R/W
<b>Common control functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_RUNT_HIGH_THRESHOLD macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>[-4.5*vertical_scale-vertical_offset,4.5*vertical_scale-vertical_offset]</p> <p><b>Note:</b>  The value cannot be less than the value of the SDS_ATTR_RUNT_LOW_THRESHOLD attribute.</p>
<b>Related Attribute</b>	<p>SDS_ATTR_RUNT_LOW_THRESHOLD  SDS_ATTR_GLITCH_POLARITY</p>
<b>High Level Functions</b>	sds_ConfigureRuntTriggerSource

## SDS\_ATTR\_RUNT\_LOW\_THRESHOLD

<b>Description</b>	This attribute specifies the lower trigger level of the runt trigger.
<b>Data type</b>	ViReal64
<b>Access</b>	R/W
<b>Common control functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_RUNT_LOW_THRESHOLD macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>[-4.5*vertical_scale-vertical_offset,4.5*vertical_scale-vertical_offset]</p> <p><b>Note:</b>  The value cannot exceed the value of the SDS_ATTR_RUNT_HIGH_THRESHOLD attribute.</p>
<b>Related Attribute</b>	<p>SDS_ATTR_RUNT_HIGH_THRESHOLD  SDS_ATTR_GLITCH_POLARITY</p>
<b>High Level Functions</b>	sds_ConfigureRuntTriggerSource

## SDS\_ATTR\_RUNT\_POLARITY

**Description** This attribute specifies the polarity of the runt trigger.

**Data type** ViInt32

**Access** R/W

**Common control functions** sds\_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)

sds\_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 \*value)

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_RUNT\_POLARITY macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Positive	SDS_VAL_RUNT_POSITIVE	1
Negative	SDS_VAL_RUNT_NEGATIVE	2

**Related Attribute** SDS\_ATTR\_RUNT\_HIGH\_THRESHOLD  
SDS\_ATTR\_RUNT\_LOW\_THRESHOLD  
SDS\_ATTR\_RUNT\_POLARITY

**High Level Functions** sds\_ConfigureRuntTriggerSource

## SDS\_ATTR\_GLITCH\_CONDITION

<b>Description</b>	This attribute specifies the limit range type of the pulse trigger.
<b>Data type</b>	ViInt32
<b>Access</b>	R/W
<b>Common control functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_GLITCH\_CONDITION macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Less than	SDS_VAL_GLITCH_LESS_THAN	1
Greater than	SDS_VAL_GLITCH_GREATER_THAN	2
Inner	SDS_VAL_GLITCH_INNER_THAN	3
Outer	SDS_VAL_GLITCH_OUTER_THAN	4

**Related to Channel** SDS\_ATTR\_GLITCH\_POLARITY

**High Level Functions** sds\_ConfigureGlitchTriggerSource

## SDS\_ATTR\_GLITCH\_POLARITY

<b>Description</b>	This attribute specifies the polarity of the pulse trigger.
<b>Data type</b>	ViInt32
<b>Access</b>	R/W
<b>Common control functions</b>	sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)  sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_GLITCH\_POLARITY macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Positive	SDS_VAL_GLITCH_POSITIVE	1
Negative	SDS_VAL_GLITCH_NEGATIVE	2

**Related to Channel** SDS\_ATTR\_GLITCH\_CONDITION

**High Level Functions** sds\_ConfigureGlitchTriggerSource

## Measurement Subsystem

The waveform measurement group properties are used to set or read Measurement related parameters. The waveform measurement group has the following attributes:

- ◆ **SDS\_ATTR\_MEASURE\_ENABLED**
- ◆ **SDS\_ATTR\_MEASURE\_MODE**
- ◆ **SDS\_ATTR\_MEASURE\_GATE**
- ◆ **SDS\_ATTR\_MEASURE\_GATE\_GA**
- ◆ **SDS\_ATTR\_MEASURE\_GATE\_GB**
- ◆ **SDS\_ATTR\_MEASURE\_SIMPLE\_SOURCE**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_SOURCEA**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_SOURCEB**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_TYPE**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_VALUE**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_STYLE**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_LINENUMBER**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_STATISTICS**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_STATISTICS\_HISTOGRAM**
- ◆ **SDS\_ATTR\_MEASURE\_ADVANCED\_STATISTICS\_RESET**

## SDS\_ATTR\_MEASURE\_ENABLED

<b>Description</b>	This attribute turns on or off measurements.
<b>Data Type</b>	ViBoolean
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean value)</p> <p>sds_GetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_MEASURE_ENABLED macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value range</b>	<p>VI_TRUE means measurement is on</p> <p>VI_FALSE means measurement is off</p>
<b>Related Attribute</b>	None
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_MODE

<b>Description</b>	This attribute specifies the mode of measurement.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**

**vi** is the instrument handle.

**channelName** is NULL.

**attributeld** is SDS\_ATTR\_MEASURE\_MODE macro.

**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
Simple	SDS_VAL_MEAS_MODE_SIMPLE	0
Advanced	SDS_VAL_MEAS_MODE_ADVANCED	1

**Related Attribute** SDS\_ATTR\_MEASURE\_ENABLED

**High Level Functions** None

## SDS\_ATTR\_MEASURE\_GATE

<b>Description</b>	This attribute turns on or off the measurement gate.
<b>Data Type</b>	ViBoolean
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean value)</p> <p>sds_GetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_MEASURE_GATE macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>VI_TRUE means enable the measurement gate</p> <p>VI_FALSE means to disable the measurement gate</p>
<b>Related Attribute</b>	<p>SDS_ATTR_MEASURE_GATE_GA</p> <p>SDS_ATTR_MEASURE_GATE_GB</p>
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_GATE\_GA

<b>Description</b>	This attribute specifies the position of gate A.
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_MEASURE_GATE_GA macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>[-5*timebase, 5*timebase].</p> <p><b>Notes:</b>  The value cannot exceed SDS_ATTR_MEASURE_GATE_GB.</p>
<b>Related Attribute</b>	<p>SDS_ATTR_MEASURE_GATE  SDS_ATTR_MEASURE_GATE_GB</p>
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_GATE\_GB

<b>Description</b>	This attribute specifies the position of gate B
<b>Data Type</b>	ViReal64
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 value)</p> <p>sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is SDS_ATTR_MEASURE_GATE_GB macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	[-5*timebase, 5*timebase].
	<p><b>Notes:</b>  The value cannot be less than the value of the SDS_ATTR_MEASURE_GATE_GA</p>
<b>Related Attribute</b>	SDS_ATTR_MEASURE_GATE SDS_ATTR_MEASURE_GATE_GA
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_SIMPLE\_SOURCE

<b>Description</b>	This attribute specifies the source of the simple measurement.
<b>Data Type</b>	ViString
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViConstString value)</p> <p>sds_GetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 bufSize, ViChar value[])</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is                      SDS_ATTR_MEASURE_SIMPLE_SOURCE macro.  <b>bufSize</b> is passed the number of bytes you specified for the Attribute Value parameter in the ViChar array.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>The source can be set to:                      {Cx Zx Fx Dn ZDn REFA REFB REFC REFD}.</p> <p>x can be set from 1 to 4                      n can be set from 0 to 15</p> <p><b>Example:</b>                      If you want to set the source to C1, enter "C1".                      If you want to set the source to D0, enter "D0".                      If you want to set the source to C1 in the Zoom window, enter "Z1".                      If you want to set the source to D0 in the Zoom window, enter "ZD0".</p>
<b>Related Attribute</b>	None
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_SOURCEA

<b>Description</b>	This attribute sets the source A of the specified advance measurement.
<b>Data Type</b>	ViString
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViConstString value)</p> <p>sds_GetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 bufSize, ViChar value[])</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is the position of advance measurement item.  <b>attributeld</b> is                      SDS_ATTR_MEASURE_ADVANCED_SOURCEA macro.  <b>bufSize</b> is passed the number of bytes you specified for the Attribute Value parameter in the ViChar array.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>The position can be set to: {Pn}.                      n can be set from 1 to 12                      The source can be set to:                      {Cx Zx Fx Dn ZDn REFA REFB REFC REFD}.                      x can be set from 1 to 4                      n can be set from 0 to 15</p> <p><b>Example:</b>                      If you want to set the source of the first measurement item to C1, channelName enter P1, value enter "C1".                      If you want to set the source of the second measurement item to D0, channelName enter P2, value enter "D0".</p>
<b>Related Attribute</b>	SDS_ATTR_MEASURE_ADVANCED_SOURCEB
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_SOURCEB

<b>Description</b>	This attribute sets the source B of the specified advance measurement. Only the delay measurement item needs to set source B, and only supports setting as analog channel.
<b>Data Type</b>	ViString
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViConstString value)</p> <p>sds_GetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 bufSize, ViChar value[])</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is the position of advance measurement item.  <b>attributeld</b> is SDS_ATTR_MEASURE_ADVANCED_SOURCEB macro.  <b>bufSize</b> is passed the number of bytes you specified for the Attribute Value parameter in the ViChar array.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>The position can be set to: {Pn}.  n can be set from 1 to 12  The source can be set to: {Cx}.  x can be set from 1 to 4</p> <p><b>Example:</b>  If you want to set the source of the first measurement item to C1, channelName enter P1, value enter "C1".</p>
<b>Related Attribute</b>	SDS_ATTR_MEASURE_ADVANCED_SOURCEA
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_TYPE

<b>Description</b>	This attribute sets the type of the specified advance measurement item.
<b>Data Type</b>	ViString
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViConstString value)</p> <p>sds_GetAttributeViString (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 bufSize, ViChar value[])</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is the position of advance measurement item.  <b>attributeld</b> is SDS_ATTR_MEASURE_ADVANCED_TYPE macro.  <b>bufSize</b> A is passed the number of bytes you specified for the Attribute Value parameter in the ViChar array.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	<p>The position can be set to: {Pn}.  n can be set from 1 to 12  The type can be set to:  {PKPK MAX MIN AMPL TOP BASE LEVELX CMEAN M  EAN STDEV VSTD RMS CRMS MEDIAN CMEDIAN OV  SN FPRE OVSP RPRE PER FREQ TMAX TMIN PWID   NWID DUTY NDUTY WID NBWID DELAY TIMEL RISE   FALL CCJ PAREA NAREA AREA ABSAREA PACA NA  CA ACA ABSACA CYCLES REDGES FEDGES EDGES   PPULSES NPULSES PHA SKEW FRR FRF FFR FFF L  RR LRF LFR LFF}</p>
<b>Related Attribute</b>	SDS_ATTR_MEASURE_ADVANCED_VALUE
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_VALUE

<b>Description</b>	This attribute returns the value of the specified advance measurement item. If the measured value is invalid, it returns -9999.99.
<b>Data Type</b>	ViReal64
<b>Access</b>	R/O
<b>Common Control Functions</b>	sds_GetAttributeViReal64 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViReal64 *value)
	<p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is the position of advanced measurement item.  <b>attributeld</b> is SDS_ATTR_MEASURE_ADVANCED_VALUE macro.  <b>value</b> is used to store the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	The position can be set to: {Pn}. n can be set from 1 to 12
<b>Related Attribute</b>	SDS_ATTR_MEASURE_ADVANCED_TYPE
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_STYLE

<b>Description</b>	This attribute specifies the display mode of the advanced measurement.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>High Level Functions</b>	None
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p>

**Note:**  
**vi** is the instrument handle.  
**channelName** is NULL.  
**attributeld** is  
 SDS\_ATTR\_MEASURE\_ADVANCED\_STYLE macro.  
**value** is used to store or set the value of function represented by **attributeld**.

**Value Range**

Type	Discrete Value	Value
M1	SDS_VAL_MEAS_ADV_STYLE_M1	0
M2	SDS_VAL_MEAS_ADV_STYLE_M2	1

<b>Related Attribute</b>	SDS_ATTR_MEASURE_MODE
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_LINENUMBER

<b>Description</b>	This attribute specifies the total number of advanced measurement items displayed.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is                      SDS_ATTR_MEASURE_ADVANCED_LINENUMBER                      macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	[1,12]
<b>Related Attribute</b>	SDS_ATTR_MEASURE_ADVANCED_STYLE
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_STATISTICS

<b>Description</b>	This attribute turns on or off the measurement statistics.
<b>Data Type</b>	ViBoolean
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean value)</p> <p>sds_GetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is                      SDS_ATTR_MEASURE_ADVANCED_STATISTICS                      macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	VI_TRUE means to enable measurement statistics VI_FALSE means to disable measurement statistics
<b>Related Attribute</b>	SDS_ATTR_MEASURE_MODE
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_STATISTICS\_HISTOGRAM

<b>Description</b>	This attribute turns on or off the measurement histogram.
<b>Data Type</b>	ViBoolean
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean value)</p> <p>sds_GetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is                      SDS_ATTR_MEASURE_ADVANCED_STATISTICS_HISTOGRAM macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	VI_TRUE means to enable measurement histogram VI_FALSE means to disable measurement histogram
<b>Related Attribute</b>	SDS_ATTR_MEASURE_ADVANCED_STATISTICS
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_STATISTICA\_MAXCOUNT

<b>Description</b>	This attribute specifies the maximum value of the statistics count.
<b>Data Type</b>	ViInt32
<b>Access</b>	R/W
<b>Common Control Functions</b>	<p>sds_SetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 value)</p> <p>sds_GetAttributeViInt32 (ViSession vi, ViConstString channelName, ViAttr attributeld, ViInt32 *value)</p> <p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is                      SDS_ATTR_MEASURE_ADVANCED_STATISTICA_MAXCOUNT macro.  <b>value</b> is used to store or set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	[0,1024]
<b>Related Attribute</b>	SDS_ATTR_MEASURE_ADVANCED_STATISTICS
<b>High Level Functions</b>	None

## SDS\_ATTR\_MEASURE\_ADVANCED\_STATISTICS\_RESET

<b>Description</b>	This attribute resets the measurement statistics.
<b>Data Type</b>	ViBoolean
<b>Access</b>	WO
<b>Common Control Functions</b>	sds_SetAttributeViBoolean (ViSession vi, ViConstString channelName, ViAttr attributeld, ViBoolean value)
	<p><b>Note:</b>  <b>vi</b> is the instrument handle.  <b>channelName</b> is NULL.  <b>attributeld</b> is            SDS_ATTR_MEASURE_ADVANCED_STATISTICS_RESET macro.  <b>value</b> is used to set the value of function represented by <b>attributeld</b>.</p>
<b>Value Range</b>	VI_TRUE means to restart measurement statistics
<b>Related Attribute</b>	SDS_ATTR_MEASURE_ADVANCED_STATISTICS
<b>High Level Functions</b>	None

## High Level Functions

Some high level functions are available to set multiple attributes.

- **sds\_InitWithOptions(ViRsrc resourceName, ViBoolean IDQuery, ViBoolean resetDevice, ViConstString optionString, ViSession \*newVi)**

This function creates a new IVI session.

Parameter	Description
resourceName	This parameter specifies the resource name of the instrument
IDQuery	To perform ID query or not
resetDevice	To reset the device or not
optionString	This parameter is the option string sets to the InitWithOptions function of the instrument driver. It includes settings for Simulate, RangeCheck, QueryInstrStatus and Cache
*newVi	Instrument handle
<p><b>Example:</b></p> <pre>sds_InitWithOptions("USB0::0xF4EC::0x1013::0123456789::INSTR", VI_TRUE, VI_FALSE, "Simulate=0,RangeCheck=1,QueryInstrStatus=0,Cache=0", &amp;session);</pre>	

**Notes:** Siglent's driver 1.0 does not support simulation, cache, range check and querying instrument status. Therefore, it is only useful when connecting to an actual instrument. You should initiate the instrument by calling sds\_InitWithOptions() before using it, and input the parameters we suggested except argument resourceName.

➤ **sds\_Abort (ViSession vi)**

This function aborts a previously initiated acquisition.

Parameter	Description
vi	Instrument handle
<b>Example:</b> sds_Abort(session);	

➤ **sds\_FetchWaveform(ViSession vi, ViConstString channel, ViInt32 waveformSize, ViReal64 waveform[], ViInt32 \*actualPoints, ViReal64 \*initialX, ViReal64 \*xIncrement)**

This function fetches a waveform from a specified channel from a previously initiated acquisition.

Parameter	Description
vi	Instrument handle
channel	Name of the channel from which to fetch a waveform.
waveformSize	Specifies the number of elements in the waveform array.
waveform[]	A user-allocated buffer into which the acquired waveform is stored.
*actualPoints	Number of points actually placed in the waveform array.
*initialX	The time in relation to the Trigger Event of the first point in the waveform in seconds.
*xIncrement:	The effective time between points in the acquired waveform in seconds.
<b>Example:</b> sds_FetchWaveform(session,"CHAN1",256,waveform,&actualPoints,&initialX,&xIncrement);	

- **sds\_ReadWaveform** (ViSession vi, ViConstString channel, ViInt32 waveformSize, ViInt32 maxTime, ViReal64 waveform[], ViInt32 \*actualPoints, ViReal64 \*initialX, ViReal64 \*xIncrement)

This function initiates a new waveform acquisition and returns a waveform from a specific channel.

Parameter	Description
vi	Instrument handle
channel	Name of the channel from which to read a waveform
waveformSize	Specifies the number of elements in the waveform array.
maxTime	Specifies the maximum time the end-user allows for this function to complete in milliseconds.
waveform[]	A user-allocated buffer into which the acquired waveform is stored.
*actualPoints	Contains the number of points the driver actually places in the waveform array.
*initialX	Contains the time of the first point in the waveform.
*xIncrement:	Contains the effective time between points in the waveform. The units are seconds.
<p><b>Example:</b></p> <pre>sds_ReadWaveform(session,"CHAN1",200,256,waveform, &amp;actualPoints, &amp;initialX, &amp;xIncrement);</pre>	

- **sds\_ActualRecordLength** (ViSession vi, ViInt32 \*actualRecordLength)

This function returns the actual waveform record length the oscilloscope acquires.

Parameter	Description
vi	Instrument handle

*actualRecordLength	Record length
<b>Example:</b> <pre>sds_ActualRecordLength(session,&amp;value32);</pre>	

➤ **sds\_InitiateAcquisition (ViSession vi)**

This function initiates waveform acquisition.

Parameter	Description
vi	Instrument handle
<b>Example:</b> <pre>sds_InitiateAcquisition(session);</pre>	

➤ **sds\_SampleRate (ViSession vi, ViReal64 \*sampleRate)**

This function returns the effective sample rate of the oscilloscope.

Parameter	Description
vi	Instrument handle
*sampleRate	Effective sample rate
<b>Example:</b> <pre>sds_SampleRate(session,&amp;value64);</pre>	

➤ **sds\_IsInvalidWfmElement (ViSession vi, ViReal64 elementValue, ViBoolean \*isInvalid)**

This function takes one of the Waveform Array's element value that you obtain from the ReadWaveform or FetchWaveform function and determines if the value is a valid measurement value or a value indicating that the oscilloscope could not sample a voltage.

Parameter	Description
vi	Instrument handle
elementValue	Specify the value for which you want to determine the type
*isInvalid	The result of judgment
<b>Example:</b> <pre>sds_IsInvalidWfmElement(session,1,&amp;isinvalid);</pre>	

➤ **sds\_GetChannelName (ViSession vi, ViInt32 index, ViInt32 bufferSize, ViChar name[])**

This function returns the highest-level channel name that corresponds to the specific driver channel string that is in the channel table at an index you specify.

Parameter	Description
vi	Instrument handle
index	Specified index
bufferSize	The length of the channel name
name[]	Channel name storage location
<b>Example:</b> <pre>sds_GetChannelName(session,1,256,str);</pre>	

➤ **sds\_ConfigureAcquisitionType (ViSession vi, ViInt32 acquisitionType)**

This function sets the acquisition mode.

Parameter	Description
vi	Instrument handle
acquisitionType	Acquisition mode

**Example:**

```
sds_ConfigureAcquisitionType (session,0);
```

- **sds\_ConfigureAcquisitionRecord (ViSession vi, ViReal64 timePerRecord, ViInt32 minimumRecordLength, ViReal64 acqStartTime)**

This function configures the most common attributes of the horizontal subsystem

Parameter	Description
vi	Instrument handle
timePerRecord	Time base
minimumRecordLength	Memory depth
acqStartTime	Time delay

**Example :**

```
sds_ConfigureAcquisitionRecord (session,1e-3, 5, 2e-3);
```

- **sds\_ConfigureInterpolation (ViSession vi, ViInt32 interpolation)**

This function sets the interpolation method.

Parameter	Description
vi	Instrument handle
interpolation	The way of interpolation

**Example:**

```
sds_ConfigureInterpolation (session, 2);
```

- **sds\_ConfigureChannel (ViSession vi, ViConstString channel, ViReal64 range, ViReal64 offset, ViInt32 coupling, ViReal64 probeAttenuation, ViBoolean enabled)**

This function configures the vertical subsystem.

Parameter	Description
vi	Instrument handle
channel	Channel name
range	Vertical scale
offset	Vertical offset
coupling	Coupling mode
probeAttenuation	Probe attenuation
enabled	The state of the selected channel
<b>Example:</b> <code>sds_ConfigureChannel(session,"CHAN1",1e+1,2e+1,0,1e+1,VI_TRUE);</code>	

- **sds\_ConfigureChanCharacteristics (ViSession vi, ViConstString channel, ViReal64 inputImpedance, ViReal64 maxInputFrequency)**

This function configures the less common attributes of the vertical subsystem.

Parameter	Description
vi	Instrument handle
channel	Channel name
inputImpedance	Impedance
maxInputFrequency	Bandwidth limit
<b>Example:</b> <code>sds_ConfigureChanCharacteristics (session,"CHAN1", 5e+1, 2e+7);</code>	

- **sds\_ConfigureTrigger (ViSession vi, ViInt32 triggerType, ViReal64 holdoff)**

This function configures the common triggering attributes.

Description	Description
vi	Instrument handle

triggerType	Trigger type
holdoff	Holdoff time
<b>Example:</b> sds_ConfigureTrigger (session, 1, 8e-6);	

➤ **sds\_ConfigureTriggerCoupling (ViSession vi, VInt32 coupling)**

This function configures the trigger coupling.

Description	Description
vi	Instrument handle
coupling	Coupling mode
<b>Example:</b> sds_ConfigureTriggerCoupling (session, 0);	

➤ **sds\_ConfigureTriggerModifier (ViSession vi, VInt32 modifier)**

This function configures the trigger modifier.

Description	Description
vi	Instrument handle
modifier	Trigger mode
<b>Example:</b> sds_ConfigureTriggerModifier (session, 1);	

➤ **sds\_ConfigureEdgeTriggerSource (ViSession vi, VInt32 source, ViReal64 level, VInt32 slope)**

This function configures the edge triggering.

Description	Description
vi	Instrument handle

source	Trigger source
level	Trigger level
slope	Trigger slope
<b>Example:</b> sds_ConfigureEdgeTriggerSource (session, "C1", 1e+0, 1);	

➤ **sds\_ConfigureTVTriggerSource (ViSession vi, ViConstString source, ViInt32 TVSignalFormat, ViInt32 TVEvent, ViInt32 TVPolarity)**

This function configures the TV triggering.

Description	Description
vi	Instrument handle
source	Trigger source
TVSignalFormat	The video standard
TVEvent	Not supported. Can be set to any value
TVPolarity	Not supported. Can be set to any value
<b>Example:</b> sds_ConfigureTVTriggerSource (session, "C1", 1, 0, 0);	

➤ **sds\_ConfigureTVTriggerLineNumber (ViSession vi, ViInt32 lineNumber)**

This function configures the line number ofTV triggering.

Description	Description
vi	Instrument handle
lineNumber	The line number
<b>Example:</b> sds_ConfigureTVTriggerLineNumber (session, 200);	

- **sds\_ConfigureRuntTriggerSource (ViSession vi, ViConstString source, ViReal64 runtLowThreshold, ViReal64 runtHighThreshold, ViInt32 runtPolarity)**

This function configures the runt triggering.

Description	Description
vi	Instrument handle
source	Trigger source
runtLowThreshold	The lower trigger level
runtHighThreshold	The upper trigger level
runtPolarity	Trigger polarity
<b>Example:</b>	
sds_ConfigureRuntTriggerSource (session, "C1", -1e+0, 1e+0, 1);	

- **sds\_ConfigureGlitchTriggerSource (ViSession vi, ViConstString source, ViReal64 level, ViReal64 glitchWidth, ViInt32 glitchPolarity, ViInt32 glitchCondition)**

This function configures the glitch triggering.

Description	Description
vi	Instrument handle
source	Trigger source
level	Trigger level
glitchWidth	Not supported. Can be set to any value
glitchPolarity	Trigger polarity
glitchCondition	The limit range type
<b>Example:</b>	
sds_ConfigureGlitchTriggerSource(session, "C1", 1e+0, 15e-1, 1, 1);	

➤ **sds\_AutoSetup(ViSession vi)**

This function performs an autoseup on the instrument.

Description	Description
vi	Instrument handle
<p><b>Example:</b></p> <pre>sds_AutoSetup(session);</pre>	

## IVI-C Driver Programming Example

The example is running in an environment where NI VISA 5.4, LabWindow/CVI 2017, and IVI Compliance Package 15.0 are installed.

### Using dynamic link library

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <Windows.h>
#include "sds.h"

#define SDS_EXAMPLE_INSTR_RES_ADDR
"TCPIP0::10.12.255.134::inst0::INSTR"
#define SDS_EXAMPLE_INIT_OPTION
"Simulate=0,RangeCheck=0,QueryInstrStatus=0,Cache=1"
#define BUFFER_SIZE 512L

ViSession session;
ViStatus status;

void main()
{
    ViChar    str[BUFFER_SIZE];
    //Connect the instrument
    status = sds_InitWithOptions(SDS_EXAMPLE_INSTR_RES_ADDR, VI_TRUE,
VI_FALSE, SDS_EXAMPLE_INIT_OPTION, &session);
    //Configure settings for channel 1
    sds_ConfigureChannel(session,"CHAN1",1e+1,2e+1,0,1e+1,VI_TRUE);
    //Open measurement
    sds_SetAttributeViBoolean(session,VI_NULL,SDS_ATTR_MEASURE_ENABLED,VI
_TRUE);
    //Query simple measurement source
    sds_GetAttributeViString(session,VI_NULL,SDS_ATTR_MEASURE_SIMPLE_SOUR
CE,BUFFER_SIZE,str);
```

```
printf("SDS_ATTR_MEASURE_SIMPLE_SOURCE = %s\n",str);  
  
system("cmd /C pause");  
}
```

# SDS Series

## Digital Oscilloscope

### About SIGLENT

SIGLENT is an international high-tech company, concentrating on R&D, sales, production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, isolated handheld oscilloscopes, function/arbitrary waveform generators, RF/MW signal generators, spectrum analyzers, vector network analyzers, digital multimeters, DC power supplies, electronic loads and other general purpose test instrumentation. Since its first oscilloscope was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

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