



**LVDS Video Signals Plug-in Application
Programmer Manual**





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Getting started

Introduction

This manual explains the use of commands to remotely control the LVDS Video plug-in application.

You can install the LVDS Video plug-in either in the SourceXpress software application or in an AWG5200 Series Arbitrary Waveform Generator.

Using a single VISA or raw socket session, it is possible to communicate the plug-in with both SourceXpress programmatic interface and AWG5200 Series instruments.

For information on the Remote Control, GPIB Parameters, LAN Parameters, Connecting to the Instrument using GPIB, and Setting up GPIB Communication, refer to the *AWG5200 Series Arbitrary Waveform Generators Programmer Manual*.

Syntax and commands

Command syntax

For information on the Syntax Overview, Command and Query Structure, Clearing the Instrument, Command Entry, Parameter Types, SCPI Commands and Queries, refer to the *AWG5200 Series Arbitrary Waveform Generators Programmer Manual*.

Parameter types

Every parameter in the command and query descriptions is of a specified type. The parameters are enclosed in brackets, such as <value>. The parameter type is listed after the parameter and is enclosed in parentheses, for example, (boolean). Some parameter types are defined specifically for the RSA Series command set and some are defined by ANSI/IEEE 488.2-1987 as defined in the table below.

Parameter type	Description	Example
arbitrary block ¹	A specified length of arbitrary data	#512234xxxxx . . . where 5 indicates that the following 5 digits (12234) specify the length of the data in bytes; xxxxx ... indicates the data
boolean	Boolean numbers or values	ON or 1; OFF or 0
binary	Binary numbers	#B0110
octal	Octal numbers	#Q57, #Q3
hexadecimal ¹	Hexadecimal numbers (0-9, A, B, C, D, E, F)	#HAA, #H1
NR1 ¹ numeric	Integers	0, 1, 15, -1
NR2 ^{1 2} numeric	Decimal numbers	1.2, 3.141516, -6.5
NR3 ¹ numeric	Floating point numbers	3.1415E-9, -16.1E5
NRf ¹ numeric	Flexible decimal number that may be type NR1, NR2 or NR3	See NR1, NR2, and NR3 examples
string ³	Alphanumeric characters (must be within quotation marks)	"Testing 1, 2, 3"

¹ Defined in ANSI/IEEE 488.2 as "Definite Length Arbitrary Block Response Data."

² Some commands and queries will accept an octal or hexadecimal value even though the parameter type is defined as NR1.

³ Defined in ANSI/IEEE 488.2 as "String Response Data."

Command groups

Control commands

Table 1: Control commands and their descriptions

Command	Description
LVS:FILE on page 13	Sets or queries the bit map image path.
LVS:FRATe on page 13	Sets or queries the frame rate value.
LVS:HRESolution on page 14	Sets or queries the horizontal resolution value.
LVS:PCLock on page 16	Queries the pixel clock value.
LVS:RESet on page 16	Resets the LVDS video plugin by setting all the controls to its default values/state.
LVS:VRESolution on page 17	Sets or queries the vertical resolution value.

Compile commands

Table 2: Compile commands and their descriptions

Command	Description
LVS:COMPile on page 7	Compiles and generates a waveforms, based on the LVDS video plugin setup.
LVS:COMPile:CANCel on page 7	Cancels the compilation.
LVS:COMPile:CASSign on page 7	Sets or queries the type of compilation.
LVS:COMPile:CHANnel on page 8	Sets or queries the channel number.
LVS:COMPile:ENABLE on page 8	Sets or queries the data lanes.
LVS:COMPile:NAME on page 8	Sets or queries the name of the waveform.
LVS:COMPile:OSAMpling on page 9	Sets the oversampling rate which is used to determine the sampling rate of the compiled signal.
LVS:COMPile:OUTPut on page 9	Sets or queries the output value.
LVS:COMPile:OVERwrite on page 9	Sets or queries the overwrite existing waveforms/sequences state (enabled or disabled) while compiling.
LVS:COMPile:PLAY on page 10	Sets or queries the Play after assign setting.
LVS:COMPile:SRATe on page 10	Sets or queries the sampling rate in compile settings.
LVS:COMPile:SRATe:AUTO on page 11	Sets or queries the sampling rate auto calculation status.

Encoding commands

Table 3: Encoding commands and their descriptions

Command	Description
LVS:ENCoding:CBITs on page 12	Sets or queries the values of encoding color bits.
LVS:ENCoding:CMODE on page 12	Sets or queries the value of compatibility mode.
LVS:ENCoding:TYPE on page 13	Sets or queries the encoding type.

Voltage characteristics commands

Table 4: Pulse setup commands and their descriptions

Command	Description
LVS:VOLTage:HIGH on page 19	Sets or queries the value of high voltage.
LVS:VOLTage:LOW on page 19	Sets or queries the value of low voltage.

Horizontal (pixel) commands

Table 5: Horizontal (pixel) commands and their description

Command	Description
LVS:HORizontal:ACTive on page 14	Queries the horizontal active value.
LVS:HORizontal:ALOW on page 14	Sets or queries the status of horizontal active low checkbox.
LVS:HORizontal:BLANKing:BP ORch on page 15	Sets or queries the horizontal blanking back porch value.
LVS:HORizontal:BLANKing:FP ORch on page 15	Sets or queries the horizontal blanking front porch value.
LVS:HORizontal:PERiod on page 15	Queries the horizontal period value.
LVS:HORizontal:SYNC on page 16	Sets or queries the horizontal synchronization value.

Vertical (lines) commands

Table 6: Vertical (lines) command and their description

Command	Description
LVS:VERTical:ACTive on page 17	Queries the vertical active value.
LVS:VERTical:ALOW on page 17	Sets or queries the status of vertical active low checkbox.
LVS:VERTical:BLANKing:BPORch on page 18	Sets or queries the vertical blanking back porch value.
LVS:HORizontal:BLANKing:FPORch on page 15	Sets or queries the vertical blanking front porch value.
LVS:VERTical:PERiod on page 18	Queries the vertical period value.
LVS:VERTical:SYNC on page 19	Sets or queries the vertical synchronization value.

Export image data commands

Table 7: Export image data commands and their description

Commands	Description
LVS:EXPort:ENABle on page 11	Sets or queries the status of export check box.
LVS:EXPort:FILE on page 11	Sets or queries the path file name used to save the exported image data into a text file.

Commands in alphabetical order

This section contains all the available commands which are represented in alphabetical order.

Use the Command Groups section to simplify navigating to specific groups of commands.

LVS:COMPile This command compiles and generates a waveform, based on the LVDS video plugin setup.

This is an overlapping command.

Syntax. LVS:COMPile

Group. Compile

Arguments. NA

Returns. NA

Example. LVS:COMPile, compiles the waveform based on the LVDS video plugin settings.

LVS:COMPile:CANcEl This command cancels the compilation.

Syntax. LVS:COMPile:CANcEl

Group. Compile

Arguments. NA

Returns. NA

Example. LVS:COMPile:CANcEl, cancels the current compilation in progress.

LVS:COMPile:CASSign This command sets or queries the type of compilation.

Syntax. LVS:COMPile:CASSign {0 | 1}

LVS:COMPile:CASSign?

Group. Compile

Arguments. 0 or OFF compiles the waveform.

1 or ON compiles and assign the waveform to a channel.

Returns. A single <Boolean> value.

Example. LVS:COMPile:CASSign 1, compile and assign the function.

LVS:COMPile:CASSign? might return 0, which indicates the compilation of waveform.

LVS:COMPile:CHANnel This command sets or queries the channel number.

Syntax. LVS:COMPile:CHANnel <firstargument>,<secondargument>
LVS:COMPile:CHANnel? <firstargument>

Group. Compile

Arguments. <firstargument>::=<string>::={Clock | IClock | DL<n> | IDL<n>}
where <n>::=0,1,2,3,4
<secondargument>:: <NR1> 1 to 8

Returns. <secondargument>

Example. LVS:COMPile:CHANnel "Clock",4, sets the clock to channel4.

LVS:COMPile:CHANnel? "DL3", might return 2, which indicates the channel2 is set for data lane 3.

LVS:COMPile:ENABLE This command sets or queries the data lanes which are enabled/disabled for compilation.

Syntax. LVS:COMPile:ENABLE <firstargument>,<secondargument>
LVS:COMPile:ENABLE? <firstargument>

Group. Compile

Arguments. <firstargument>::=<string>::={Clock | IClock | DL<n> | IDL<n>}
where <n>::=0,1,2,3,4
<secondargument>::={0 | 1}

Returns. <secondargument>

Example. LVS:COMPile:ENABLE "Clock", 1, enables the clock check box.

LVS:COMPile:ENABLE? "DL3", might return 1, which indicates the data lane 3 is enabled.

LVS:COMPile:NAME This command sets or queries the name of the waveform.

Syntax. LVS:COMPile:NAME <waveform_name>
LVS:COMPile:NAME?

Group. Compile

Arguments. <Waveform_name>::= <string>

Returns. <string>

Example. LVS:COMPile:NAME "LVDSVideoWfm" , sets the waveform name as LVDSVideoWfm.

LVS:COMPile:NAME? returns the waveform name as LVDSVideoWfm.

- LVS:COMPile:OSAMpling** This command sets the oversampling rate which is used to determine the sampling rate of the compiled signal.
- The query returns the current value.
- Syntax.** LVS:COMPile:OSAMpling <oversampling>
- LVS:COMPile:OSAMpling?
- Group.** Compile
- Arguments.** <oversampling>::=<NR1> where the values of <NR1> varies from 1 to 1000.
- Returns.** <NR1>
- Example.** LVS:COMPile:OSAMpling 6, sets the over sampling rate to 6.
- LVS:COMPile:OSAMpling? might return 4, which indicates the over sampling rate is 4.
-
- LVS:COMPile:OUTPut** This command sets or queries the output value.
- Syntax.** LVS:COMPile:OUTPut <firstargument>,<secondargument>
- LVS:COMPile:OUTPut? <firstargument>
- Group.** Compile
- Arguments.** <firstargument>::=<string>::={Clock | IClock | DL<n> | IDL<n>}::=<n>::=0,1,2,3,4
- <secondargument>::=<string>::={Analog | Marker<n>}::=<n>={1,2,3,4}
- Returns.** <secondargument>
- Example.** LVS:COMPile:OUTPut "Clock", Marker 3, sets the output to Marker 3.
- LVS:COMPile:OUTPut? "DL3", might return Analog, which indicates the output value is analog.
-
- LVS:COMPile:OVERwrite** This command sets or queries the overwrite existing waveforms/sequences state (enabled or disabled) while compiling. When enabled, new waveforms/sequences overwrite existing waveforms/sequences of the same name. When disabled, new waveforms are generated with an additional numeric suffix added at the end of each name.
- Syntax.** LVS:COMPile:OVERwrite {0 | 1 | ON | OFF}
- LVS:COMPile:OVERwrite?
- Group.** Compile
- Arguments.** ON or 1 enables overwriting waveforms/sequences state.
- OFF or 0 disables overwriting waveforms/sequences state.
- Returns.** A single <Boolean> value.

Example. LVS:COMPile:OVERwrite 1, enables overwriting exist waveforms/sequences state.

LVS:COMPile:OVERwrite? might return 0, which indicates the overwriting waveforms/sequences state is disabled.

LVS:COMPile:PLAY This command sets or queries the Play after assign setting.

Syntax. LVS:COMPile:PLAY <play>

LVS:COMPile:PLAY?

Group. Compile

Arguments. <play>::=<Boolean>

0 or OFF disables the play after assign setting.

1 or ON enables the play after assign setting.

Returns. A single <Boolean> value.

Example. LVS:COMPile:PLAY 1, enables play after assign setting.

LVS:COMPile:PLAY? might returns 0, which indicates the play after assign setting is disabled.

LVS:COMPile:SRATe This command sets or queries the sampling rate in compile settings.

Syntax. LVS:COMPile:SRATe <sample_rate>

LVS:COMPile:SRATe?

Group. Compile

Arguments. <sample_rate>::=<NRf> where the value of <NRf> is dependent on the instrument and instrument options.

Returns. <NRf>

Example. LVS:COMPile:SRATe 1e9, sets the sampling rate to 1 GS/s.

LVS:COMPile:SRATe? might return 2.25e9, which indicates the sampling rate is 2.25 GS/s.

- LVS:COMPile:SRATe:AUTO** This command sets or queries the sampling rate auto calculation status.
0
- Syntax.** LVS:COMPile:SRATe:AUTO <bool>
LVS:COMPile:SRATe:AUTO?
- Group.** Compile
- Arguments.** OFF or 0 disables the sampling rate auto calculation.
ON or 1 enables the auto calculation.
- Returns.** 0 | 1 | OFF | ON
- Example.** LVS:COMPile:SRATe:AUTO 1, enables the signal's sampling rate auto calculation.
- LVS:COMPile:SRATe:AUTO? might return 0, which indicates the signal's sampling rate auto calculation is disabled.
-
- LVS:EXPort:ENABLE** This command sets or queries the status of export check box.
- Syntax.** LVS:EXPort:ENABLE<bool>
LVS:EXPort:ENABLE?
- Group.** Export
- Arguments.** <bool>={1 | 0 | OFF | ON}
1 or ON enables the export checkbox.
0 or OFF disables the export checkbox.
- Returns.** 0 | 1 | OFF | ON
- Example.** LVS:EXPort:ENABLE 1, enables the export check box.
- LVS:EXPort:ENABLE? might return 0, which indicates the export checkbox is disabled.
-
- LVS:EXPort:FILE** This command sets or queries the path file name used to save the exported image data into a text file.
- Syntax.** LVS:EXPort:FILE <file_name>
LVS:EXPort:FILE?
- Group.** Export
- Arguments.** <file_name>::=<string>
- Returns.** <file_name>::=<string>
- Example.** LVS:EXPort:FILE "C:\Samples\Pattern.txt", sets path file name used to save the exported image data into a text file.
- LVS:EXPort:FILE? returns the file path as C:\Samples\Pattern.txt.

LVS:ENCoding:CBITs This command sets or queries the value of encoding color bits.

Syntax. LVS:ENCoding:CBITs <enum>

LVS:ENCoding:CBITs?

Group. Encoding

Arguments. <enum>::={SIX | EIGHt | TEN}

Where

SIX Represents 6 bit encoding

EIGHt Represents 8 bit encoding

TEN Represents 10 bit encoding

Returns. SIX | EIGHt | TEN

Example. LVS:ENCoding:CBITs SIX, sets the encoding color bit value to 6 bit.

LVS:ENCoding:CBITs? might return EIGHt, which indicates the encoding color bit value is 8 bit.

LVS:ENCoding:CMODE This command sets or queries the value of compatibility mode.

Syntax. LVS:ENCoding:CMODE <bool>

LVS:ENCoding:CMODE?

Group. Encoding

Arguments. <bool>={0 | 1 | ON | OFF}

1 or ON enables the compatibility mode.

0 or OFF disables the compatibility mode.

Returns. 0 | 1 | OFF | ON

Example. LVS:ENCoding:CMODE 1, enables the compatibility mode.

LVS:ENCoding:CMODE? might return 0, which indicates the compatibility mode is disabled.

- LVS:ENCoding:TYPE** This command sets or queries the encoding type.
- Syntax.** LVS:ENCoding:TYPE <type>
LVS:ENCoding:TYPE?
- Group.** Encoding
- Arguments.** <type>::={JEIDa | VESA}
- Returns.** JEIDa | VESA
- Example.** LVS:ENCoding:TYPE JEIDa, sets the encoding type to JEIDa.
- LVS:ENCoding:TYPE? might return VESA, which indicates the encoding type is VESA.
-
- LVS:FILE** This command sets or queries the bit map image path.
- Syntax.** LVS:FILE <file_name>
LVS:FILE?
- Group.** Control
- Arguments.** <file_name>::=<string>
- Returns.** Returns the bit map image path.
- Example.** LVS:FILE "C:\Samples\Pattern.txt", sets the bit map image path.
- LVS:FILE? might return the bit map image path as C:\Samples\Pattern.txt.
-
- LVS:FRATe** This command sets or queries the frame rate value.
- Syntax.** LVS:FRATe <framerate>
LVS:FRATe?
- Group.** Control
- Arguments.** <framerate>::=<NR1> where the value of <NR1> varies from 1 to 144.
- Returns.** <NR1>
- Example.** LVS:FRATe 30, sets the frame rate to 30 Hz.
- LVS:FRATe? might return 20, which indicates the frame rate value is 20 Hz.

LVS:HRESolution This command sets or queries the horizontal resolution value.

Syntax. LVS:HRESolution <hresolution>
LVS:HRESolution?

Group. Control

Arguments. <hresolution>::=<NR1> where the values of <NR1> 2 to 4096.

Returns. <NR1>

Example. LVS:HRESolution 1024, sets the horizontal resolution value to 1024 pixels.

LVS:HRESolution? might return 1024, which indicates the horizontal resolution value is 1024 pixels.

LVS:HORizontal:ACTive This command queries the horizontal active value.

Syntax. LVS:HORizontal:ACTive?

Group. Horizontal (pixel)

Arguments. None

Returns. Returns the horizontal active value.

Example. LVS:HORizontal:ACTive? might return 65, which indicates the horizontal active value is 65.

LVS:HORizontal:ALOW This command sets or queries the status of horizontal active low checkbox.

Syntax. LVS:HORizontal:ALOW <bool>
LVS:HORizontal:ALOW?

Group. Horizontal (pixel)

Arguments. <bool>={0 | 1 | ON | OFF}
1 or ON enables the horizontal active low checkbox.
0 or OFF disables the horizontal active low checkbox.

Returns. A single <Boolean> value.

Example. LVS:HORizontal:ALOW 1, enables the horizontal active low check box.

LVS:HORizontal:ALOW? might return 0, which indicates the horizontal active check box is disabled.

LVS:HORizontal:BLANking:BPORch

This command sets or queries the horizontal blanking back porch value.

Syntax. LVS:HORizontal:BLANking:BPORch <bporch>

LVS:HORizontal:BLANking:BPORch?

Group. Horizontal (pixel)

Arguments. <bporch>::=<NR1> where <NR1> varies from 1 to maximum value.

The maximum value is dependent on bitmap image horizontal resolution.

Returns. <NR1>

Example. LVS:HORizontal:BLANking:BPORch 1080, sets the horizontal blanking back porch value to 1080 pixels.

LVS:HORizontal:BLANking:BPORch? might return 1080, which indicates the horizontal blanking back porch value is 1080 pixels.

LVS:HORizontal:BLANking:FPORch

This command sets or queries the horizontal blanking front porch value .

Syntax. LVS:HORizontal:BLANking:FPORch <fporch>

LVS:HORizontal:BLANking:FPORch?

Group. Horizontal (pixel)

Arguments. <fporch>::=<NR1> where <NR1> varies from 1 to maximum value.

The maximum value is dependent on bitmap image horizontal resolution.

Returns. <NR1>

Example. LVS:HORizontal:BLANking:FPORch 1080, sets the horizontal blanking front porch value to 1080 pixels.

LVS:HORizontal:BLANking:FPORch? might return 1080, which indicates the horizontal blanking front porch value is 1080 pixels.

LVS:HORizontal:PERiod

This command queries the horizontal period value.

Syntax. LVS:HORizontal:PERiod?

Group. Horizontal (pixel)

Arguments. None

Returns. <NR1>

Example. LVS:HORizontal:PERiod? might return 65, which indicates the horizontal period value is 65.

LVS:HORizontal:SYNC This command sets or queries the horizontal synchronization value.

Syntax. LVS:HORizontal:SYNC <hsync>
LVS:HORizontal:SYNC?

Group. Horizontal (pixel)

Arguments. <hsync>::=<NR1> where <NR1> varies from 1 to maximum value. The maximum value is dependent on bitmap image horizontal resolution.

Returns. <NR1>

Example. LVS:HORizontal:SYNC 1080, sets the horizontal synchronization value to 1080 pixels.

LVS:HORizontal:SYNC? might return 1080, which indicates the horizontal synchronization value is 1080 pixels.

LVS:PCLock This command queries the pixel clock value.

Syntax. LVS:PCLock?

Group. Control

Arguments. None

Returns. <NR1>

Example. LVS:PCLock? might return 65, which indicates the pixel clock value is 65.

LVS:RESet This command resets the LVDS video plugin by setting all the controls to its default values/state.

Syntax. LVS:RESet

Group. Control

Arguments. NA

Returns. NA

Example. LVS:RESet, resets LVDS video plugin and all controls to its default value/state.

LVS:VRESolution This command sets or queries the vertical resolution value .

Syntax. LVS:VRESolution <vresolution>

LVS:VRESolution?

Group. Control

Arguments. <vresolution>::=<NR1> where <NR1> varies from 2 to 2160.

Returns. <NR1>

Example. LVS:VRESolution 1080, sets the vertical resolution value to 1080 pixels.

LVS:VRESolution? might return 1080, which indicates the vertical resolution value is 1080 pixels.

LVS:VERTical:ACTive This command queries the vertical active value.

Syntax. LVS:VERTical:ACTive?

Group. Vertical (Lines)

Arguments. None

Returns. <NR1>

Example. LVS:VERTical:ACTive? might return 65, which indicates the vertical active value is 65.

LVS:VERTical:ALOW This command sets or queries the status of vertical active low checkbox.

Syntax. LVS:VERTical:ALOW <bool>

LVS:VERTical:ALOW?

Group. Vertical (Lines)

Arguments. <bool>={0 | 1 | ON | OFF}

1 or ON enables the vertical active low checkbox

0 or OFF disables the vertical active low checkbox

Returns. A single <Boolean> value.

Example. LVS:VERTical:ALOW 1, enables the vertical active low checkbox.

LVS:VERTical:ALOW? might return 0, which indicates the vertical active low checkbox is disabled.

**LVS:VERTical:BLANking:
BPORch**

This command sets or queries the vertical blanking back porch value.

Syntax. LVS:VERTical:BLANking:BPORch <bporch>

LVS:VERTical:BLANking:BPORch?

Group. Vertical (Lines)

Arguments. <bporch>::=<NR1> where <NR1> varies from 1 to maximum value.
The maximum value is dependent on bitmap image vertical resolution.

Returns. <NR1>

Example. LVS:VERTical:BLANking:BPORch 1080, sets the vertical blanking back porch value to 1080 pixels.

LVS:VERTical:BLANking:BPORch? might return 1080, which indicates the vertical blanking back porch value is 1080 pixels.

**LVS:VERTical:BLANking:F
PORch**

This command sets or queries the vertical blanking front porch value.

Syntax. LVS:VERTical:BLANking:FPORch <fporch>

LVS:VERTical:BLANking:FPORch?

Group. Vertical (Lines)

Arguments. <fporch>::=<NR1> where <NR1> varies from 1 to maximum value.
The maximum value is dependent on bitmap image vertical resolution.

Returns. <NR1>

Example. LVS:VERTical:BLANking:FPORch 1080, sets the vertical blanking front porch value to 1080 pixels.

LVS:VERTical:BLANking:FPORch? might return 1080, which indicates the vertical blanking front porch value is 1080 pixels.

LVS:VERTical:PERiod

This command queries the vertical period value.

Syntax. LVS:VERTical:PERiod?

Group. Vertical (Lines)

Arguments. None

Returns. <NR1>

Example. LVS:VERTical:PERiod? might return 65, which indicates the vertical period value is 65.

- LVS:VERTical:SYNC** This command sets or queries the vertical synchronization value.
- Syntax.** LVS:VERTical:SYNC <vsync>
LVS:VERTical:SYNC?
- Group.** Vertical (Lines)
- Arguments.** <vsync>::=<NR1> where <NR1> varies from 1 to maximum value.
The maximum value is dependent on bitmap image vertical resolution.
- Returns.** <NR1>
- Example.** LVS:VERTical:SYNC 1080, sets the vertical synchronization value to 1080 pixels.
LVS:VERTical:SYNC? might return 1080, which indicates the vertical synchronization value is 1080 pixels.
-
- LVS:VOLTage:HIGH** This command sets or queries the value of high voltage.
- Syntax.** LVS:VOLTage:HIGH <NRf>
LVS:VOLTage:HIGH?
- Group.** Voltage Characteristics
- Arguments.** <NRf>
- Returns.** <NRf>
- Example.** LVS:VOLTage:HIGH -250e-3, sets the high voltage value to -250 mV.
LVS:VOLTage:HIGH? returns -250e-3, which indicates the high voltage value is -250 mV.
-
- LVS:VOLTage:LOW** This command sets or queries the value of low voltage.
- Syntax.** LVS:VOLTage:LOW <NRf>
LVS:VOLTage:LOW?
- Group.** Voltage Characteristics
- Arguments.** <NRf>
- Returns.** <NRf>
- Example.** LVS:VOLTage:LOW -200e-3, sets the low voltage value to -200 mV.
LVS:VOLTage:LOW? returns -200e-3, which indicates the low voltage value is -200 mV.

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