

**GRL**

GRANITE RIVER LABS



# GRL-HDMI-CONT

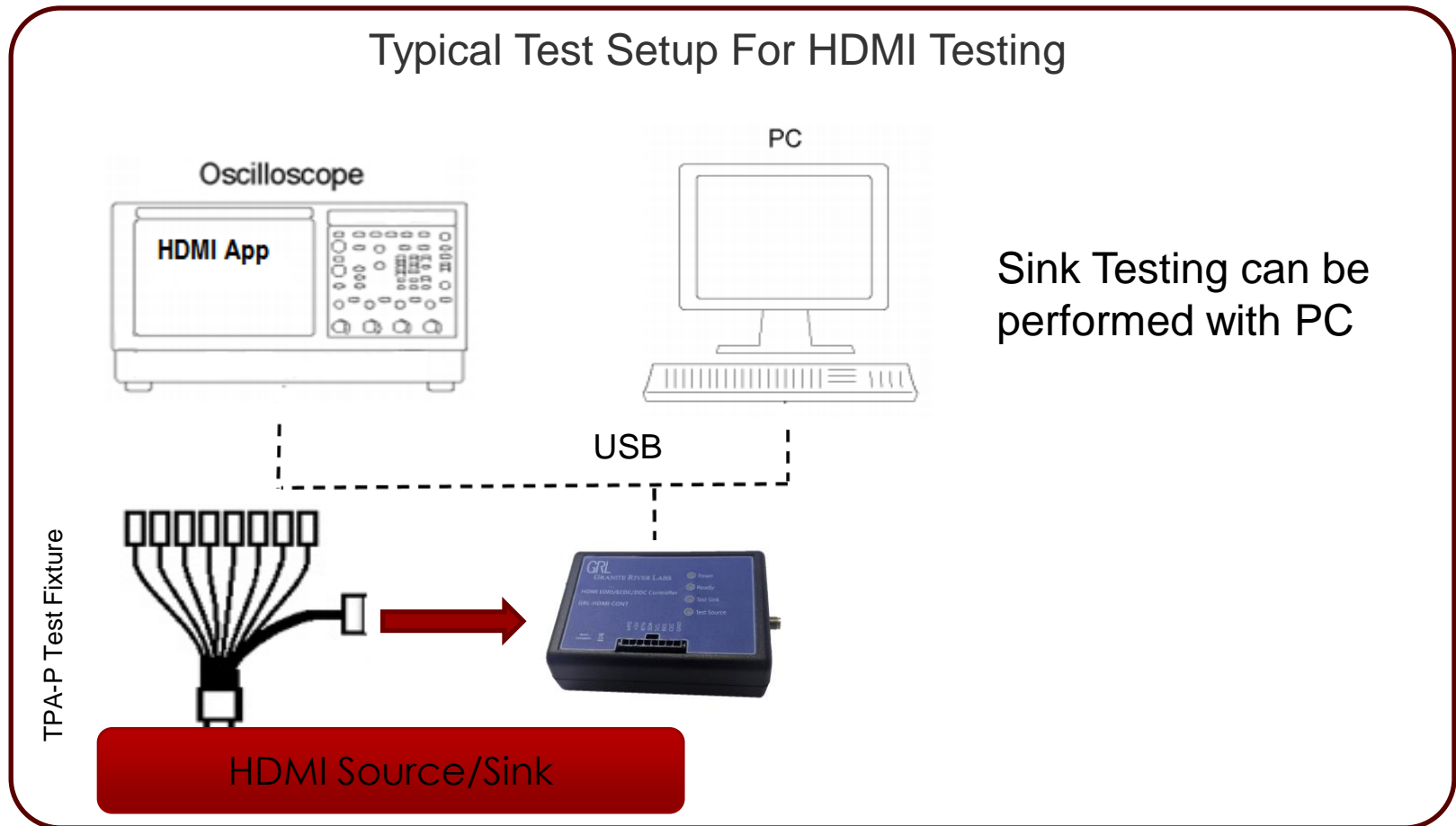
GRL HDMI EDID/SCDC/DDC Controller



# GRL-HDMI-CONT Key Features

- Fully automates HDMI 1.4b, 2.0, and 2.1 Source and Sink Physical Layer and Protocol Testing.
- Connects directly to HDMI plug and receptacle test fixtures.
- Standalone EDID/SCDCS editing software for debugging.
- Emulates Sink EDID and SCDCS registers in Source testing mode.
- Reads EDID and SCDCS data of Sink with standalone GUI.
- Simulates Hot Plug Detect programmatically.
- Connects to any Windows 7/8 PC or oscilloscope via USB

# Typical Test Setup





# Key Functionalities

- Works as a Source / Sink Emulator
- Source Emulator
  - Read EDID from Sink DUT
  - Read SCDCS Register from Sink DUT
  - Write SCDCS Register to Sink DUT
  - Read EDID from the Sink DUT and Save it in file
- Sink Emulation
  - Emulate Sink EDID
  - Emulate SCDCS registers
  - Software controllable Hot plug
  - Read EDID from File and keep it in EDID registers
  - Write binary EDID file into the EDID registers

# EDID Editor GUI Features



Source/Sink testing  
Mode select

Read/Write EDID

Programmable  
Hot Plug ON/OFF

The screenshot shows the GRL EDID Editor interface with the following components:

- Mode Select:** Radio buttons for Sink Testing and Source Testing.
- EDID Read/Write:** Buttons for Write EDID and Read EDID.
- Hot Plug Options:** Radio buttons for Hot Plug On and Hot Plug Off.
- EDID Structure:** A tree view on the left showing the hierarchy of EDID blocks and descriptors.
- Selected Field Data:** A central panel for editing specific fields like Tag, Length, and Native Bits for Short Video Descriptors.
- Byte Information Grid:** A table showing the binary data of the EDID block.

Address	00	01	02	03	04	05	06	07
0X58	00	1E	00	00	00	FC	00	50
0X60	61	6E	61	73	6F	6E	69	63
0X68	2D	54	56	0A	00	00	00	FD
0X70	00	17	3D	0F	88	3C	00	0A
0X78	20	20	20	20	20	20	01	9F
0X80	02	03	43	F0	4F	10	05	20
0X88	22	04	03	02	07	06	61	5D
0X90	5F	66	62	64	23	09	07	01
0X98	77	03	0C	00	10	00	B8	3C
0XA0	2F	C8	6A	01	03	04	81	41
0XA8	00	16	06	08	00	56	58	00
0XB0	67	D8	5D	C4	01	78	80	03
0XB8	E2	00	48	E3	05	FF	01	E3
0XC0	0F	00	12	01	1D	80	18	71
0XC8	1C	16	20	58	2C	25	00	BA
0XD0	88	21	00	00	9E	56	5E	00
0XD8	A0	A0	A0	29	50	30	20	35
0XE0	00	BA	88	21	00	00	1A	66
0XE8	21	56	AA	51	00	1E	30	46
0XF0	8F	33	00	BA	88	21	00	00
0XF8	1E	00	00	00	00	00	00	B2

EDID Tree View

EDID Detailed View  
Company Confidential

EDID Binary View

# SCDCS GUI Features

Source/Sink testing  
Mode select

Read/Write SCDC

Programmable  
Hot Plug ON/OFF

The screenshot shows the GRL EDID Editor interface. At the top, the status bar indicates 'EDID / SCDCS'. The main window is divided into several sections:

- HDMI EDID / DDC / SCDCS Controller Status:** Shows 'Connected'.
- Mode Select:** Includes radio buttons for 'Sink Testing' and 'Source Testing'.
- SCDCS Read/Write:** Contains 'Write SCDCS' and 'Read SCDCS' buttons.
- Hot Plug Options:** Includes radio buttons for 'Hot Plug On' and 'Hot Plug Off'.
- SCDCS Fields Details:** A list of configuration options such as 'RSED\_Update', 'FLT\_Update', 'FLR\_Start', 'Source\_Test\_Update', 'RR\_Test', 'CED\_Update', 'Status\_Update', 'TMDS Configuration', 'Scrambler Status', 'Configuration', and 'Source Test Configuration Request'.
- Byte Information Grid:** A table showing binary values for addresses from 0x0 to 0xF0.

Red arrows point to the following features:

- Mode Select (Source/Sink testing Mode select)
- SCDCS Read/Write (Read/Write SCDC)
- Hot Plug Options (Programmable Hot Plug ON/OFF)
- Byte Information Grid (SCDCS Binary Values)

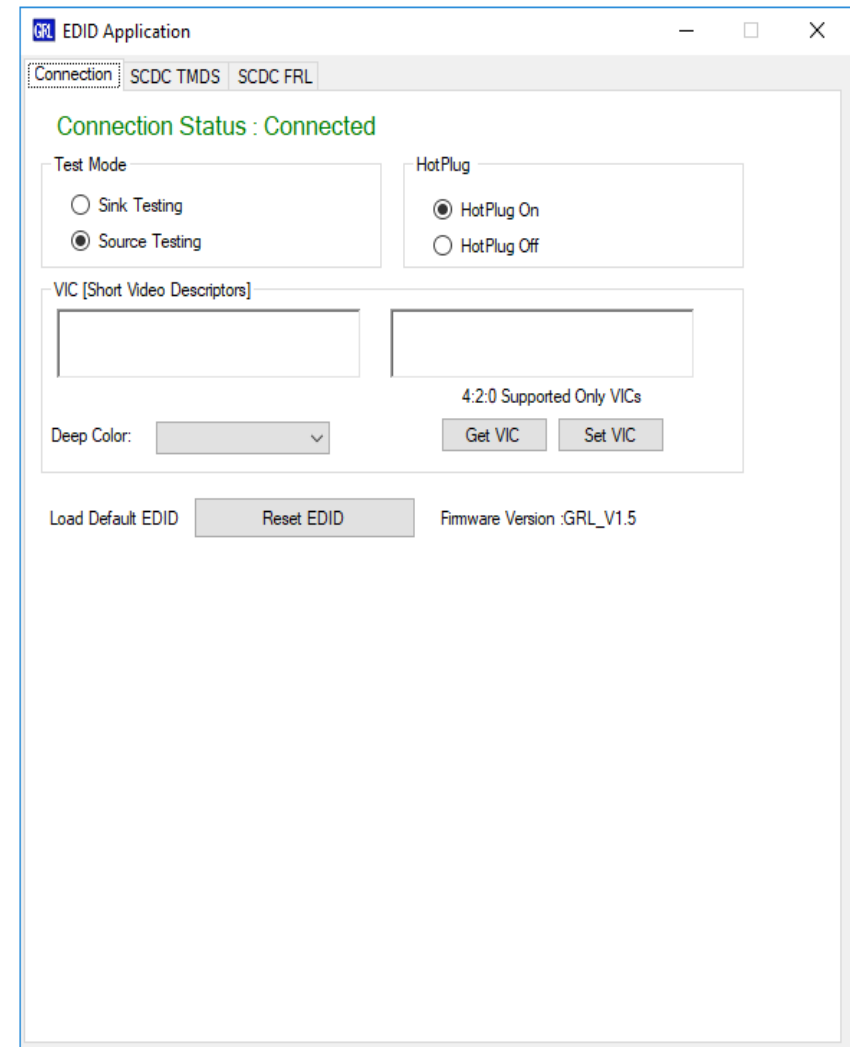
SCDCS Register Details

SCDCS Binary Values

# HDMI Test Utility (HDMI-CONT Utility.exe)



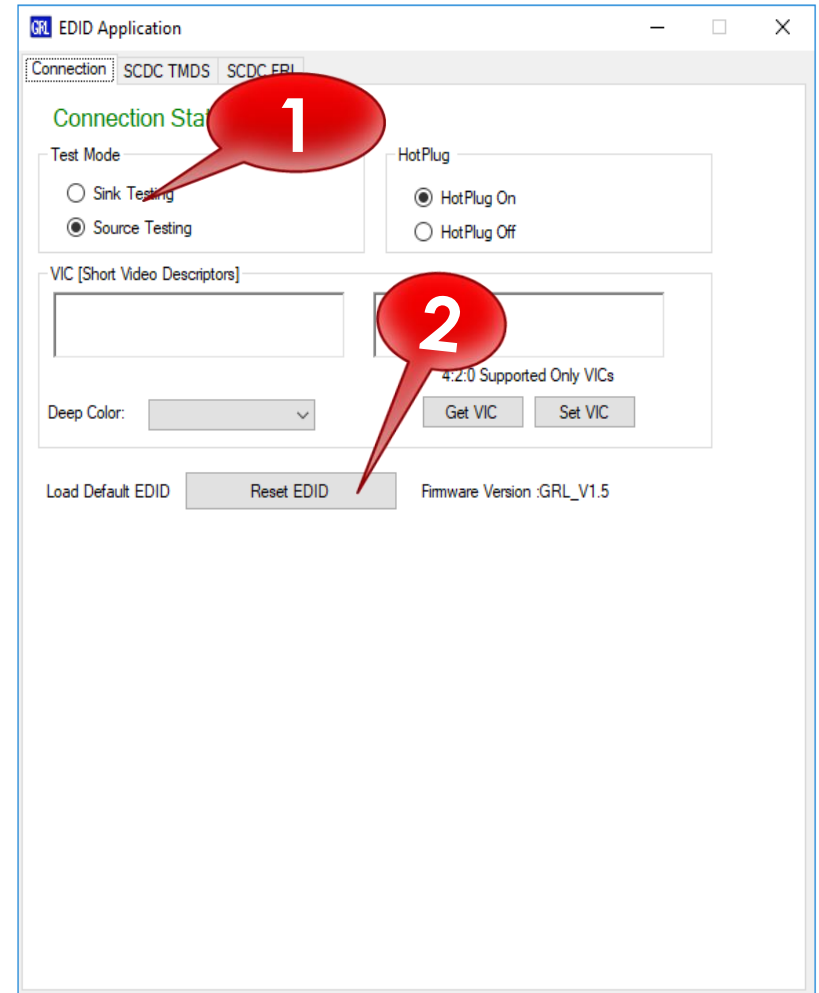
- Open the application
  - If the EDID Emulator is connected you can find the status of the same



**Note: This window is applicable for HDMI 1.4, 2.0, and 2.1 Source and Sink Physical Layer and Protocol Testing.**

# Source Test Setup

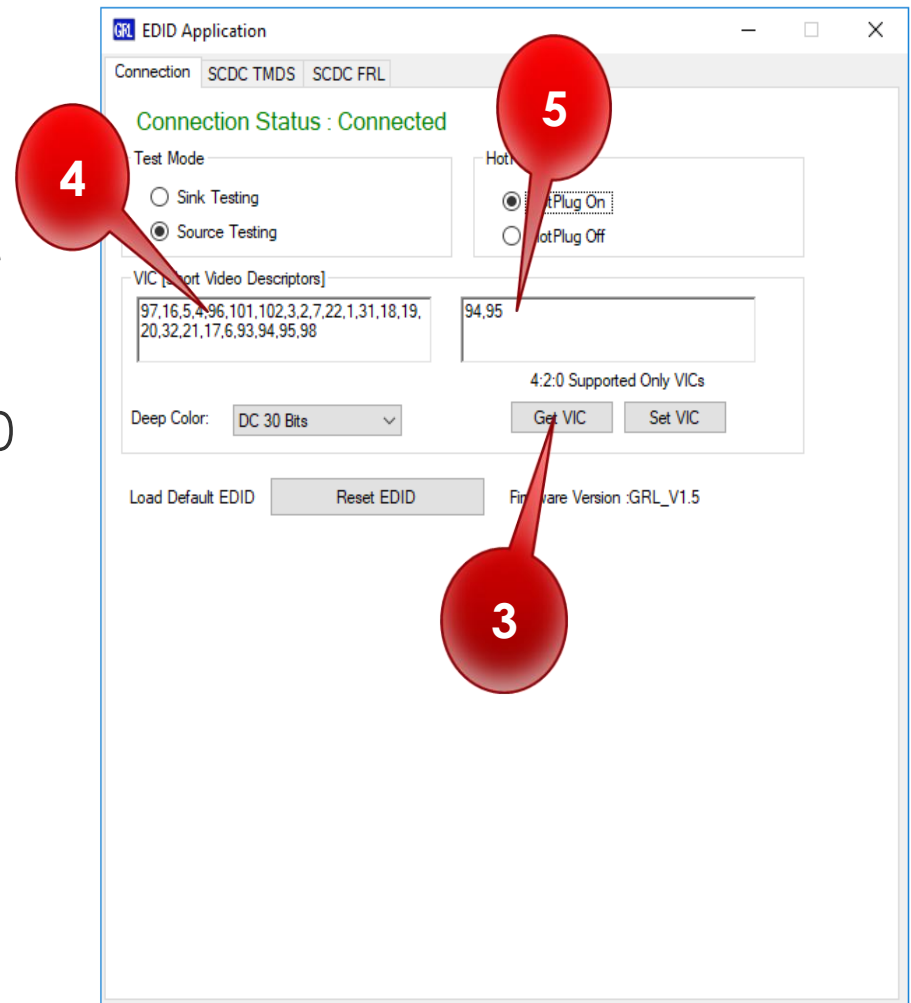
- Step 1: Click Source Testing
- Step 2: Click Reset EDID





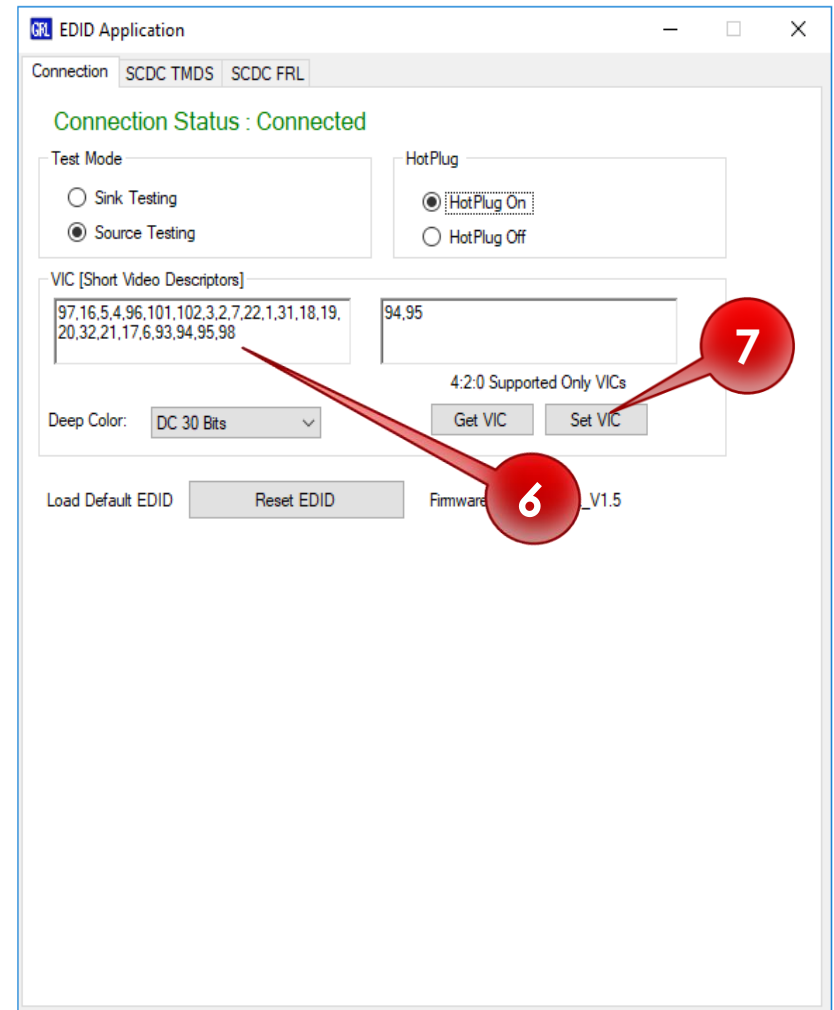
# Source Test Setup

- Step 3 : Click Get VIC
- Step 4: Edit the list of VIC.  
Remove all and enter only the required VICs
- Step 5: If the DUT supports 4:2:0  
Enter the specific VICs



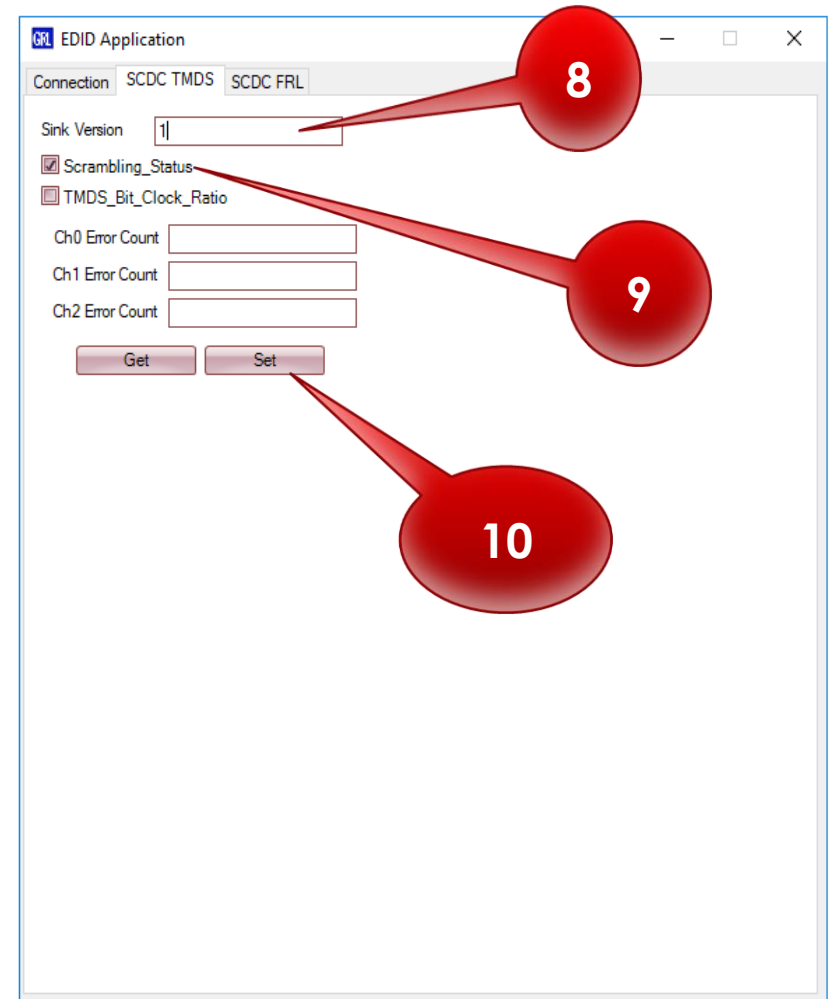
# Source Test Setup

- Step 6: If the source supports deep color select appropriate deep color
  - This applies to both 4:4:4 and 4:2:0 VICs
- Step 7: Click “Set VIC”
- EDID Configuration is complete



# Source Test Setup

- Step 8: Set the SCDC sink version as 1
- Step 9: Select Scrambling status if required
- Step 10: Set the SCDC Values

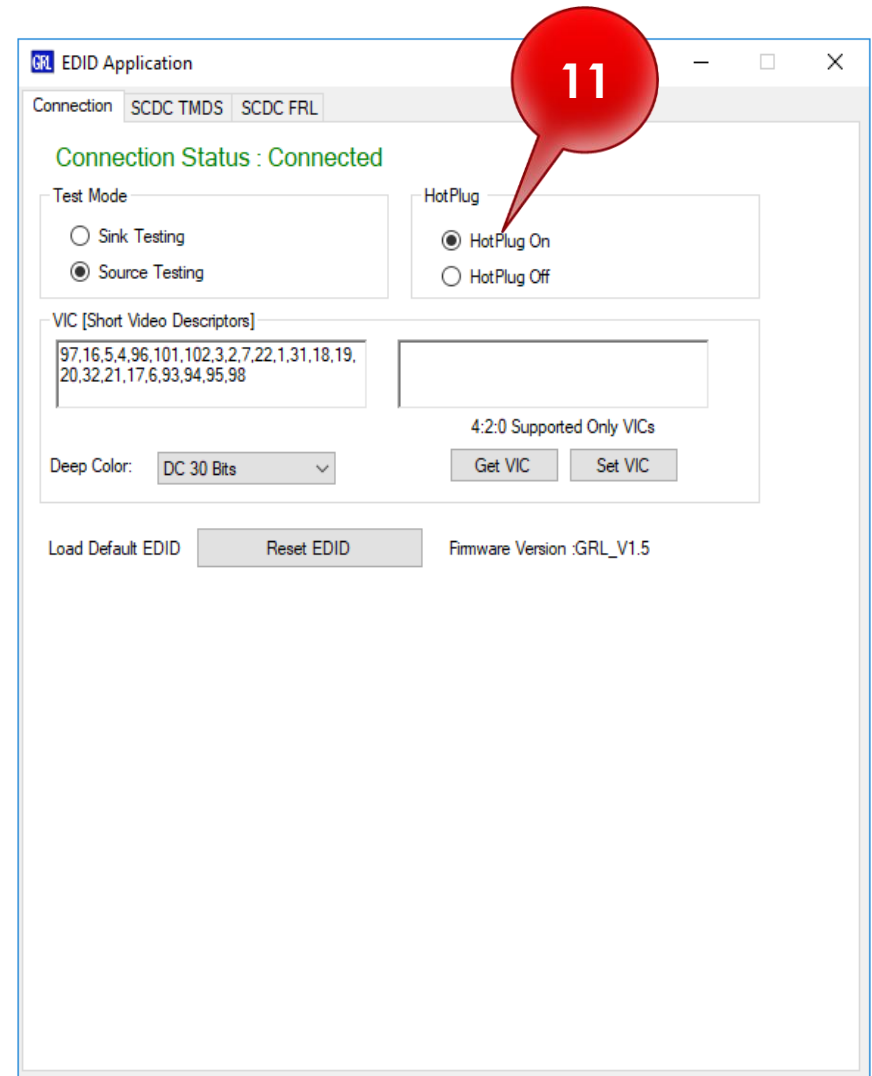


**Note: This window is applicable for HDMI 2.0, and 2.1 Source and Sink Physical Layer and Protocol Testing.**

# Source Test Setup

- Step 11: Set Hot Plug ON
- Source should be able to read the EDID data and send the appropriate signal

**Note:** In the VIC list, only set the required list.  
Remove all unwanted VICs



# FRL Mode

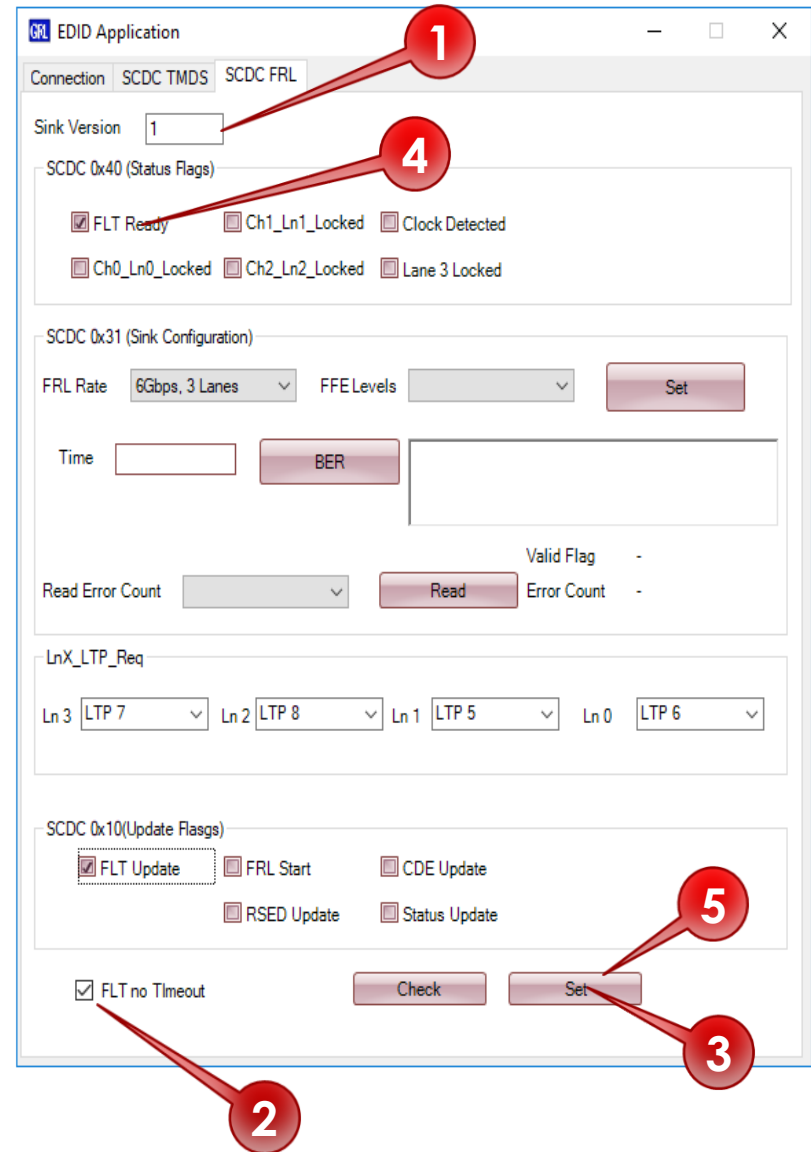
## LTS : 1

- Step 1 : Set sink Version as 1
- Step 2 : Set FLT\_No\_Timeout to true
- Step 3 : Set the SCDC values

## LTS : 2

- Step 4 : Set FLT\_Ready to true
- Step 5 : Set the SCDC values

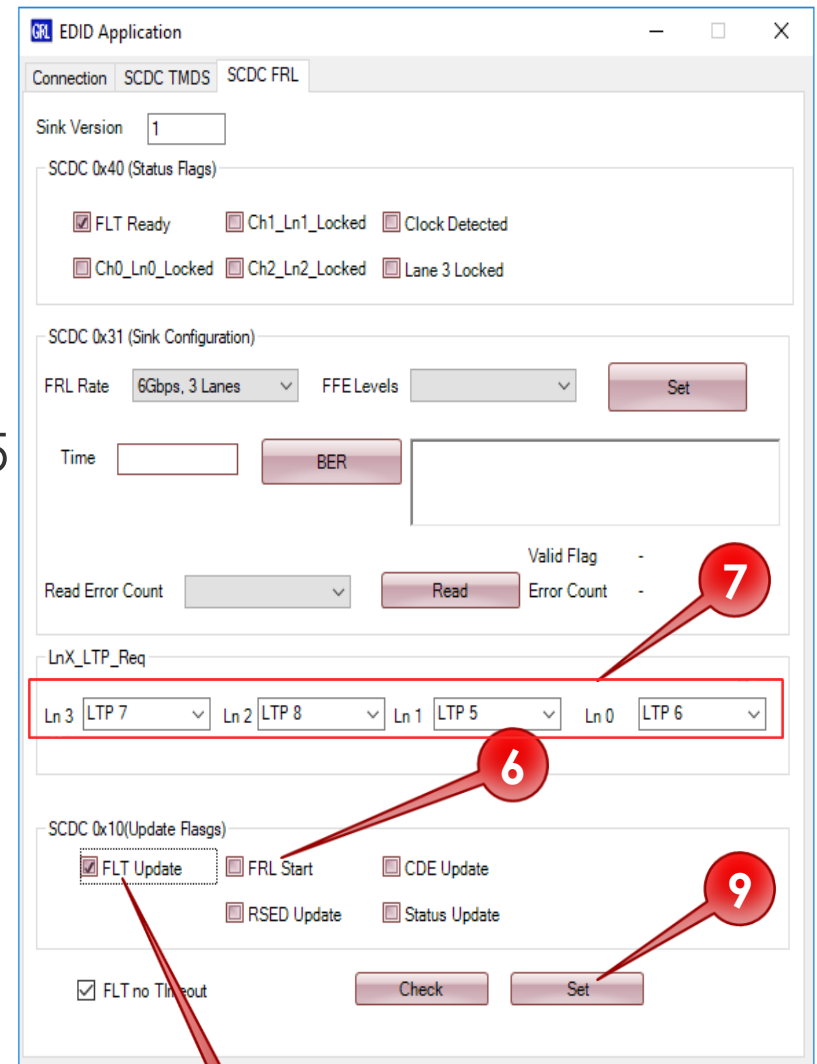
**Note:** This window is applicable for HDMI 2.1 Source and Sink Physical Layer and Protocol Testing.



# FRL Mode

## LTS : 3

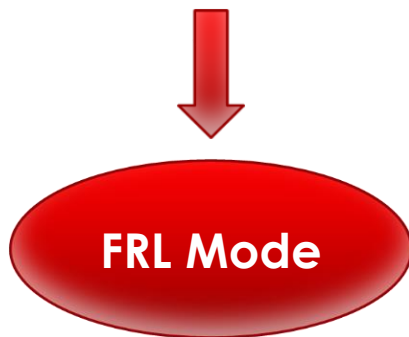
- Step 6 : SCDC clear FRL\_Start
- Step 7 : Set Ln\_Req\_3 to LTS7, Ln\_Req\_2 to LTS8, Ln\_Req\_1 to LTS5, Ln\_Req\_0 to LTS6
- Step 8 : Set FLT\_Update to true
- Step 9 : Set SCDC Values



# FRL Mode

## LTS:P

- Step 10 : Set Ln\_Req\_3 to LTS0, Ln\_Req\_2 to LTS0, Ln\_Req\_1 to LTS0, Ln\_Req\_0 to LTS0
- Step 11 : Set FLT\_Update to false
- Step 12 : Set FRL\_Start to true
- Step 13 : Set SCDC Values



The screenshot shows the 'EDID Application' window with the 'SCDC FRL' tab selected. The interface includes several sections:

- SCDC 0x40 (Status Flags):** Contains checkboxes for 'FLT Ready', 'Ch1\_Ln1\_Locked', 'Clock Detected', 'Ch0\_Ln0\_Locked', 'Ch2\_Ln2\_Locked', and 'Lane 3 Locked'.
- SCDC 0x31 (Sink Configuration):** Includes a dropdown for 'FRL Rate' (set to '6Gbps, 3 Lanes'), a dropdown for 'FFE Levels', a 'Set' button, a 'Time' field, a 'BER' button, a 'Read Error Count' dropdown, a 'Read' button, and 'Valid Flag' and 'Error Count' fields.
- LnX\_LTP\_Req:** A section highlighted with a red box and callout 10, containing four dropdown menus for lanes Ln 3, Ln 2, Ln 1, and Ln 0, all set to 'LTP 0'.
- SCDC 0x10 (Update Flags):** Contains checkboxes for 'FLT Update', 'FRL Start' (checked and highlighted with callout 12), 'RSED Update', and 'Status Update'. Callout 11 points to the 'FLT Update' checkbox.
- At the bottom, there is a 'Check' button and a 'Set' button (highlighted with callout 13), and a checkbox for 'FLT no Timout'.