19 Testing HDCP on HDMI and DisplayPort

Topics in this chapter:

- Overview
- Testing DVI displays with HDCP
- Testing HDMI displays with HDCP
- Running an HDMI HDCP self-test
- Understanding the HDCP test
- Running the HDCP compliance test for HDMI devices
- Running the HDCP compliance test for DisplayPort devices
Overview

You can use the generator with the High-bandwidth Digital Content Protection (HDCP) to test HDCP 1.0 and 1.1 compliant devices. The procedures in this chapter instruct you on how to complete the HDCP tests for a DVI, HDMI or DisplayPort sink devices.

The 882E and 882C are compliant HDMI-HDCP sources. For more information about HDCP, see http://www.digital-cp.com/.
Testing DVI displays with HDCP

This section describes how to test DVI and HDMI receivers with HDCP.

To set up the generator for testing a DVI display:

1. Connect an HDMI-to-DVI converter cable between the HDMI OUT connector on the generator and the device’s DVI receiver.

2. Activate the HDMI-D interface on the output port as follows:
   a. Press the Interface key. A listing of signal interfaces appears on the generator’s display as shown below.

<table>
<thead>
<tr>
<th>VGA</th>
<th>CVBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDMI-D</td>
<td>S-VIDEO</td>
</tr>
<tr>
<td>HDMI-H</td>
<td>SDI</td>
</tr>
</tbody>
</table>

   b. Choose the HDMI-D item by pressing the adjacent soft key. The interface is activated, and the port outputs the currently selected image and format.

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   XVSI 3 // Activates the HDMI-D interface
   ALLU   // Applies the interface setting to the generator

3. Choose a standard format (for example, DMT0660) by pressing the adjacent soft key.

   Alternatively, you can load the format with the following command:

   FMTL DMT0660
   FMTU
4. Choose the **HDCPprod** test image, or, if you are using HDMI OUT port 2, choose the **HDCP2** test image.

If you are testing a device with a production key, select the **HdcpProd** image (or, if you are using HDMI OUT port 2, choose the **HDCP2** test image). These test images assume that both the HDCP transmitter and receiver have a production key.

5. To test another device, connect the cable to the new device.

The HDCP test starts automatically.

Alternatively, you can enter the following command to initiate and run the test with any image displayed. A zero is returned if the HDCP test is successful.

```
HDCP? (OUT1:HDCP?, OUT2:HDCP?)
```

You can also specify a number of frames to run the test for. For example to run the test for 2000 frames you would enter:

```
HDCP? (OUT1:HDCP?, OUT2:HDCP?) 2000
```
Testing HDMI displays with HDCP

To test HDCP with an HDMI device:

1. Connect an HDMI cable between the HDMI OUT connector on the generator and the HDMI display.

2. Activate the HDMI-H interface on the output port as follows:
   a. Press the Interface key. A listing of signal interfaces appears on the generator's display as shown below.

<table>
<thead>
<tr>
<th>VGA</th>
<th>CVBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDMI-D</td>
<td>S-VIDEO</td>
</tr>
<tr>
<td>HDMI-H</td>
<td>SDI</td>
</tr>
</tbody>
</table>

   b. Choose the HDMI-H item by pressing the adjacent soft key. The interface is activated and the port outputs the currently selected image and format.

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   XVSI 4   // Activates the HDMI-H interface
   ALLU     // Applies the interface setting to the generator

3. Choose a standard format (for example, DMT0660) by pressing the adjacent soft key.

   Alternatively, you can load the format with the following command:

   FMTL DMT0660
   FMTU
4. Choose the **HDCPprod** test image, or, if you are using HDMI OUT port 2, choose the **HDCP2** test image.

If you are testing a device with a production key, select the **HdcpProd** image, or, if you are using HDMI OUT port 2, choose the **HDCP2** test image. These test images assume that both the HDCP transmitter and receiver have a production key.

5. To test another device, connect the cable to the new device.

The HDCP test starts automatically.

Alternatively, you can enter the following command to initiate and run the test with any image displayed. A zero is returned if the HDCP test is successful.

```
HDCP? (OUT1:HDCP?, OUT2:HDCP?)
```

You can also specify a number of frames to run the test for. For example to run the test for 2000 frames you would enter:

```
HDCP? (OUT1:HDCP?, OUT2:HDCP?) 2000
```
The image will indicate if the test passed or failed. If the test fails, see “Understanding the HDCP test” on page 685.

6. To test another device, connect the cable to the new device. The HDCP test starts automatically.
Testing DisplayPort sinks with HDCP

This section describes how to test DisplayPort sinks with HDCP.

To set up the generator for testing a DisplayPort sink:

1. Connect a DisplayPort cable between the DisplayPort OUT connector on the generator and the device's DisplayPort input.

2. Activate the DisplayPort interface on the output port as follows:
   a. Press the Interface key. A listing of signal interfaces appears on the generator's display as shown below.

   ![](DispPort.png)

   b. Choose the DisplayPort item by pressing the adjacent soft key. The interface is activated, and the port outputs the currently selected image and format.

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   XVSI 10 // Activates the DisplayPort interface
   ALLU // Applies the interface setting to the generator

3. Choose a standard format (for example, DMT0660) by pressing the adjacent soft key.

   Alternatively, you can load the format with the following command:

   FMTL DMT0660
   FMTU
4. Choose the **HDCPprod** test image. If you are testing a device with a production key, select the **HdcpProd** image. These test images assume that both the HDCP transmitter and receiver have a production key.

The image will indicate if the test passed or failed. If the test fails, see “Understanding the HDCP test” on page 685.

5. To test another device, connect the cable to the new device.

The HDCP test starts automatically.

Alternatively, you can enter the following command to initiate and run the test with any image displayed. A zero is returned if the HDCP test is successful.

```
HDCP? (OUT1:HDPC?, OUT2:HDPC?)
```

You can also specify a number of frames to run the test for. For example to run the test for 2000 frames you would enter:

```
HDCP? (OUT1:HDPC?, OUT2:HDPC?) 2000
```
Running HDCP test in step mode

The generator normally runs the steps in the HDCP test automatically. However, to troubleshoot a failed test, you can run the test in “step” mode. This enables you to read the values at the step where the test failed.

To run the HDCP test in step mode:

1. Connect a cable between the HDMI or DisplayPort OUT connector on the generator and the device’s input.

2. Activate the HDMI-H, HDMI-D or DisplayPort interface on the output port as follows:
   a. Press the Interface key. A listing of signal interfaces appears on the generator’s display as shown below.

```
+----------------+-------+
|    * VGA       | CVBS  |
|  HDMI-D        | S-VIDEO |
|  HDMI-H        | SDI   |
+----------------+-------+
```

   b. Choose either the HDMI-H, HDMI-D or DisplayPort item by pressing the adjacent soft key. The interface is activated, and the port outputs the currently selected image and format.

   Alternatively, to activate the interface through the command line interface, enter the following commands:

```
XVSI 4       // Activates the HDMI-H interface
            (3 for HDMI-D or 10 for DisplayPort)
ALLU        // Applies the interface setting to the generator
```

3. Press the Content key and choose the HdcpProd image by pressing the adjacent soft key. Or, if you are using HDMI OUT port 2, choose the HDCP2 test image.
4. Enable and view image versions for the test image as follows:
   
a. Press the **Options** key. The following menu appears on the generator’s display:

   ![Menu](image)

   b. Choose the **More** item by pressing the adjacent soft key until a + and Rendition appears next to the item.

   ![More](image)

   c. Press the + key to advance through the image versions.

   Alternatively, to enable and view image versions using the command line interface, enter the following commands:

   ```
   ISUB 1 // Enables sub images
   IVER 1 // Specifies the first image version
   IMGU // Activates the image version
   ```

5. When you are finished, disable image versions by pressing the **Options** key and choosing **More** until a - appears next to it.

   Alternatively, to disable image versions using the command line interface, enter the following command:

   ```
   ISUB 0 // Disables sub images
   ```
Running an HDMI HDCP self-test

An HDCP self-test checks that HDCP authentication is working properly between the transmitter and receiver on the analyzer. This test can also be used to confirm that a cable is not interfering with HDCP authentication, and that the DDC clock and DDC data pins (used by the I2C bus) are working correctly.

**To run an HDCP self-test:**

1. Connect the HDMI cable between the HDMI IN and HDMI OUT connectors on the generator.

2. Activate the HDMI-H interface on the output port as follows:
   a. Press the **Interface** key. A listing of signal interfaces appears on the generator's display as shown below.

   ![Interface List](image)

   b. Choose **HDMI-H** item by pressing the adjacent soft key. The interface is activated, and the port outputs the currently selected image and format.

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   ```
   XVSI 3 // Selects the HDMI-H interface
   ALLU // Applies the interface setting to the generator
   ```

3. Enter the following command to initiate and run the test with any image displayed. A zero is returned if the HDCP test is successful.

   ```
   HDCP? (OUT1:HDPC?, OUT2:HDPC?)
   ```

   You can also specify a number of frames to run the test for. For example to run the test for 2000 frames you would enter:

   ```
   HDCP? (OUT1:HDPC?, OUT2:HDPC?) 2000
   ```

   ```
   HDCP? (OUT1:HDPC?, OUT2:HDPC?) 2000
   ```
Understanding the HDCP test

Understanding what the generator does during an HDCP test can help you determine why an HDCP test failed.

HDMI HDCP test sequence:

The HDMI HDCP test sequence performed by the generator is listed below.

1. Reset the transmitter HDCP engine.
2. Initialize the transmitter.
3. Check Bcaps over the DDC bus to determine if the sink is a receiver or a repeater and generate a new An value (8 byte random session number) in the transmitter.
4. Transmitter writes An to the receiver using the DDC bus.
5. Transmitter writes Aksv to the receiver using the DDC bus.
6. Read Bksv from the receiver over the DDC bus and validate that it has exactly 20 zeroes and 20 ones in it. You can query this value with the following command:

   `i2cr? hdl 74 0 5`

   The display may return a value such as the following which is:

   `07BE05CEA9`

   The value in binary is `000001110110110000001011100111010101001` which contains 20 zeros and 20 ones.

7. Write the Bksv value to the transmitter to trigger calculation of R0.
8. Wait for the R0 calculation in the transmitter to complete.
9. Wait for at least 100 milliseconds and then read the R0' value out of the receiver over the DDC bus and compare the value with the R0 calculation in the transmitter. If this step fails, then go to step 1.
10. Enable encryption and read Ri' from the receiver over the DDC bus every 128 frames and compare it to the Ri value calculated in the transmitter. As long as the Ri value matches the Ri' value from the receiver continue to check these every 128 frames.

DisplayPort HDCP test sequence:

The DisplayPort HDCP test sequence performed by the generator is listed below.

1. Reset the transmitter HDCP engine.
2. Initialize the transmitter.
3. Check Bcaps over the Aux Channel DPCD address 0x68028 to determine if the sink is a receiver or a repeater and generate a new An value (8 byte random session number) in the transmitter.

4. Transmitter writes An to the receiver over the Aux Channel to DPCD address 0x6800C.

5. Transmitter writes Aksv to the receiver over the Aux Channel to DPCD address 0x68007.

6. Read Bksv from the receiver over the Aux Channel bus from DPCD address 0x68000 and validate that it has exactly 20 zeroes and 20 ones in it. You can query this value with the following command:

   `dptx:dpcd? 680000 5`

   The display may return a value such as the following which is:

   `07BE05CEA9`

   The value in binary is `000001111011110000010111001110101001` which contains 20 zeros and 20 ones.

7. Write the Bksv value to the transmitter to trigger calculation of R0.

8. Wait for the R0 calculation in the transmitter to complete.

9. Wait for at least 100 milliseconds and then read the R0' value out of the receiver over the Aux Channel from DPCD address 0x68005 and compare the value with the R0 calculation in the transmitter. If this step fails, then go to step 1.

10. Enable encryption and read Bstatus over the Aux Channel at DPCD address 0x68029 to determine if a Link Verification Failure has occurred.
Running the HDCP compliance test for HDMI devices

Overview

The 882CA and 882E-Analyzer (882EA) support the running of an HDCP compliance test on HDCP-enabled HDMI sources, sinks and repeaters. The HDCP compliance test was developed while working closely with Digital Content Protection. The 882E HDCP Compliance test tool has been approved by DCP.

Note: The HDCP compliance test is an optional feature available only with the 882 analyzer. You must purchase the license for this feature.

The HDCP compliance test system enables developers of HDMI products to perform a fast and comprehensive HDCP compliance test. Because the 882 can emulate HDMI HDCP sources, sinks and repeaters, it can perform a complete HDCP compliance test on any HDCP capable HDMI source, sink or repeater.

The HDCP compliance test can be run entirely through the 882 front panel or through the command line. In some cases for the 882CA, some of the tests need to be completed through the command line. The HDCP commands enable you to run a specific subset of the tests in the series of tests.

Compliance Controller

In release 2.18 the Compliance Controller was introduced. The Compliance Controller is GUI application accessible from the 882E web home page that enables you to configure the Product Capabilities Parameters (PCP) for the test as well as initiate the HDCP compliance test.

The HDCP compliance test procedures in this section describe how to run the HDCP compliance test through the front panel or using the Compliance Controller. The Compliance Controller is a web application that is accessible from the 882 home page.
To launch the Compliance Controller:

1. Open a Web browser (such as Internet Explorer) and type the generator’s IP address in the address entry field. For example, enter the following: http://206.135.215.189/.

The generator home page appears in the browser.

2. Click **Compliance Controller**.
3. Select the **HDCP** tab.

The Compliance Controller appears as shown below:
Encryption Status Tester

Some of the HDCP compliance tests for an HDMI source, sink and repeater device require the use of the standalone hardware device called the Encryption Status Tester (EST) (below). The EST device is currently only used for the 882E model. For the 882E, the EST device is connected into the test setup for all tests beginning with the 2.17.x release of the 882E model. The EST cannot be used for the 882CA model for now.

The following table lists the HDCP compliance tests that the EST is specifically used for.

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<th>Index</th>
<th>Test</th>
<th>EST Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1A_01 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Measures the position of the encryption enable pulse.</td>
</tr>
<tr>
<td>10</td>
<td>1B_01 (Transmitter Downstream w/Repeater)</td>
<td>Measures the position of the encryption enable pulse.</td>
</tr>
<tr>
<td>19</td>
<td>2C_04 (Receiver Upstream w/Transmitter) (w/DVI Transmitter)</td>
<td>Positions the encryption enable pulse in the vsync or vertical blanking at three different locations (beginning, center and end).</td>
</tr>
</tbody>
</table>
## List of Tests

The following table describes the HDCP compliance tests that can be performed.

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<th>Index</th>
<th>Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>3A_01 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Measures the position of the encryption enable pulse.</td>
</tr>
<tr>
<td>25</td>
<td>3B_01 (Repeater Downstream w/Repeater)</td>
<td>Measures the position of the encryption enable pulse.</td>
</tr>
</tbody>
</table>

### Index Test Description

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<tr>
<th>Index</th>
<th>Test</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1A_01 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Regular Procedure: With HDMI Capable Receiver</td>
</tr>
<tr>
<td>2</td>
<td>1A_02 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Regular Procedure: HPD After Writing Aksv</td>
</tr>
<tr>
<td>3</td>
<td>1A_03 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Regular Procedure: HPD After Starting Third Part of Authentication</td>
</tr>
<tr>
<td>4</td>
<td>1A_04 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Irregular Procedure: (First Part of Authentication) HDPC Port Access</td>
</tr>
<tr>
<td>5</td>
<td>1A_05 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Irregular Procedure: (First Part of Authentication) Verify Bksv</td>
</tr>
<tr>
<td>6</td>
<td>1A_06 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Irregular Procedure: (First Part of Authentication) Verify R0'</td>
</tr>
<tr>
<td>7</td>
<td>1A_07 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Irregular Procedure: (Third Part of Authentication) Verify R1'</td>
</tr>
<tr>
<td>8</td>
<td>1A_08 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
<td>Irregular Procedure: SRM. Requires SRM DVD disc.</td>
</tr>
<tr>
<td>9</td>
<td>1A_09 (Transmitter Downstream w/Receiver) w/DVI Receiver</td>
<td>Regular Procedure: With DVI Receiver</td>
</tr>
<tr>
<td>10</td>
<td>1B_01 (Transmitter Downstream w/Repeater)</td>
<td>Regular Procedure: With Repeater</td>
</tr>
<tr>
<td>11</td>
<td>1B_02 (Transmitter Downstream w/Repeater)</td>
<td>Regular Procedure: HPD After Reading R0'</td>
</tr>
<tr>
<td>12</td>
<td>1B_03 (Transmitter Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Timeout of KSV List READY</td>
</tr>
<tr>
<td>Index</td>
<td>Test</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>13</td>
<td>1B_04 (Transmitter Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify V'</td>
</tr>
<tr>
<td>14</td>
<td>1B_05 (Transmitter Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_DEVS EXCEEDED</td>
</tr>
<tr>
<td>15</td>
<td>1B_06 (Transmitter Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_CASCADE EXCEEDED</td>
</tr>
<tr>
<td>16</td>
<td>2C_01 (Receiver Upstream w/Transmitter) (w/HDMI Capable Transmitter)</td>
<td>Regular Procedure: With HDMI Capable Transmitter</td>
</tr>
<tr>
<td>17</td>
<td>2C_02 (Receiver Upstream w/Transmitter) (w/HDMI Capable Transmitter)</td>
<td>Irregular Procedure: (First Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>18</td>
<td>2C_03 (Receiver Upstream w/Transmitter) (w/HDMI Capable Transmitter)</td>
<td>Irregular Procedure: (Third Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>19</td>
<td>2C_04 (Receiver Upstream w/Transmitter) (w/DVI Transmitter)</td>
<td>Regular Procedure: With DVI Transmitter</td>
</tr>
<tr>
<td>20</td>
<td>3A_01 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Regular Procedure: With HDMI Capable Receiver</td>
</tr>
<tr>
<td>21</td>
<td>3A_02 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) HDCP Port Access</td>
</tr>
<tr>
<td>22</td>
<td>3A_03 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) Verify Bksv</td>
</tr>
<tr>
<td>23</td>
<td>3A_04 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) Verify R0'</td>
</tr>
<tr>
<td>24</td>
<td>3A_05 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and DVI Receiver)</td>
<td>Regular Procedure: With DVI Receiver</td>
</tr>
<tr>
<td>25</td>
<td>3B_01 (Repeater Downstream w/Repeater)</td>
<td>Regular Procedure: With Repeater</td>
</tr>
<tr>
<td>26</td>
<td>3B_02 (Repeater Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Timeout of KSV List READY</td>
</tr>
<tr>
<td>27</td>
<td>3B_03 (Repeater Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify V'</td>
</tr>
<tr>
<td>Index</td>
<td>Test</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>28</td>
<td>3B_04 (Repeater Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_DEVS_EXCEEDED</td>
</tr>
<tr>
<td>29</td>
<td>3B_05 (Repeater Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAXCASCADE_EXCEEDED</td>
</tr>
<tr>
<td>30</td>
<td>3C_I_01 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Regular Procedure: Transmitter – DUT – Receiver</td>
</tr>
<tr>
<td>31</td>
<td>3C_I_02 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Regular Procedure: HPD Pulse Output Caused By User Operation</td>
</tr>
<tr>
<td>32</td>
<td>3C_I_03 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>33</td>
<td>3C_I_04 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (Second Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>34</td>
<td>3C_I_05 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (Third Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>35</td>
<td>3C_I_06 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify Bksv</td>
</tr>
<tr>
<td>36</td>
<td>3C_I_07 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify R0'</td>
</tr>
<tr>
<td>37</td>
<td>3C_II_01 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Regular Procedure: Transmitter – DUT – Repeater-Receiver</td>
</tr>
<tr>
<td>38</td>
<td>3C_II_02 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Regular Procedure: HPD After Writing Aksv</td>
</tr>
<tr>
<td>39</td>
<td>3C_II_03 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Regular Procedure: HPD After Reading R0'</td>
</tr>
</tbody>
</table>
There are several configurations depending on what type of HDCP device you are testing. Procedures for each are provided below.

### Running HDCP compliance test on HDMI transmitters

To run the 1A and 1B series HDCP compliance tests on an HDMI source (transmitter):

**Note:** For the 882E, the 1A-08 test requires that you use the SRM disc for the 1A-08 test if the source device has an optical drive. Refer to “To run the 1A-08 HDCP compliance test using the SRM disc:” on page 704.

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<th>Test Description</th>
<th>Description</th>
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<td>3C_II_04 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Regular Procedure: HPD After Starting Third Part of Authentication</td>
</tr>
<tr>
<td>41</td>
<td>3C_II_05 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify V'</td>
</tr>
<tr>
<td>42</td>
<td>3C_II_06 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) DEVICE_COUNT</td>
</tr>
<tr>
<td>43</td>
<td>3C_II_07 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) DEPTH</td>
</tr>
<tr>
<td>44</td>
<td>3C_II_08 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_DEVS_EXCEEDED</td>
</tr>
<tr>
<td>45</td>
<td>3C_II_09 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX.Cascade_EXCEEDED</td>
</tr>
</tbody>
</table>
1. For the 882E analyzer, connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the source device under test output to the EST HDMI port labeled, “HDMI IN.”
   c. Connect an HDMI cable from the 882 HDMI Rx 1 port to the EST HDMI port labeled “HDMI OUT.”
   d. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”
   e. Connect an HDMI cable from the 882 HDMI Tx 1 port to the HDMI input of the display device (used to monitor the video).

The following diagram depicts the test setup for the 882EA:

![Diagram of 882EA setup]

2. For the 882CA, connect an HDMI cable from the source device under test output to the 882 HDMI Rx 1 port.

The following diagram depicts the test setup for the 882CA:

![Diagram of 882CA setup]
3. Activate the HDMI-H interface on the output port as follows:
   a. Press the **Interface** key. A listing of signal interfaces appears on the generator’s display as shown below.

   ![Interface Selection](image)

   b. Choose the **HDMI-H** item by pressing the adjacent soft key. The interface is activated and the display is shown below.

   ![Interface Selection](image)

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   ```
   XVSI 4       // Activates the HDMI-H interface
   ALLU         // Applies the interface setting to the generator
   ```

4. Press the **Interface** key repeatedly until the following menu appears:

   ![Interface Selection](image)

5. Choose the HDMI IN 1 by pressing the adjacent soft key.

6. For the 882E when using the EST, verify that the source is sending in video using the timing measurement function of the analyzer. Refer to “To view timing information of an external HDMI/DVI source signal on a display:” on page 246 for information on running the timing test.

   Verify that the source is outputting one of the following formats:
   - 640x480p at 59.94/60Hz
   - 720x480p at 59.94/60Hz
   - 720x576p at 50Hz

   Verify that the source is outputting the RGB mode:

   If the 882 cannot detect the incoming video, enter the following command to turn on the EST:

   ```
   QD:PROD:EST       // Turns on the EST.
   ```

7. *(For Front Panel Operation)* Press the **Tools** key and choose the **Reports** item by pressing the adjacent soft key.
**Note:** You can set the Product Capabilities Parameters through the Compliance Controller, see instructions in Step 9 below.

The following is displayed on the generator's LCD.

![EDID Packets](image)

![Misc HDCP](image)

8. Select **HDCP** to access the HDCP compliance test menu.

The following is displayed on the generator's LCD.

![CompRpt EditPCP](image)

9. Select **EditPCP** to define the capabilities of the HDCP device under test.

The following is displayed on the generator's LCD.

![Source DUT Type](image)

<table>
<thead>
<tr>
<th>Source</th>
<th>DUT Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Source_Max_KSV</td>
</tr>
<tr>
<td>1</td>
<td>Source_Auth_Cnt</td>
</tr>
<tr>
<td>+</td>
<td>Source_Out_OnlyRep</td>
</tr>
</tbody>
</table>

↓
The following table describes the test parameters and their settings (gray = N/A).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUT type</td>
<td>Specifies the type of device under test. This can be one of Sink, Source, Repeater, Repeater3AB, or Repeater3C. For this test, select Source.</td>
</tr>
<tr>
<td>Source Max KSV</td>
<td>Specifies the maximum number of KSVs the source can read. The valid values are 1 through 127.</td>
</tr>
<tr>
<td>Source Authentication Control</td>
<td>Specifies the number of times a source DUT attempts authentication before transitioning into the authentication state. The valid values are 1 or greater.</td>
</tr>
<tr>
<td>Source Out Only Repeater</td>
<td>Indicates whether the DUT outputs contents to a repeater to which no downstream device is connected. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Features Supported</td>
<td>Indicates whether the DUT supports Advanced_Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Audio Supported</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater 1.1 Features Supported</td>
<td>Indicates whether supports Advanced_Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater Audio Support</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater HPD Pulse</td>
<td>Indicates whether the DUT has the capability to output HPD pulse by user operation. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater Max KSV</td>
<td>Specifies the maximum number of KSVs the repeater can read. The valid values are 2 through 127.</td>
</tr>
<tr>
<td>Repeater Out Only Rep</td>
<td>Indicates whether the DUT outputs content to the downstream repeater that has no downstream device connected. The values are + for yes and - for no.</td>
</tr>
</tbody>
</table>

Alternatively you can define the PCP parameters through the Compliance Controller. Launch the Compliance Controller using the procedures in “To launch the Compliance Controller:” on page 688. Specify the values using the check box and entry fields using the information in the following steps and then click on the Use PCP activation button.
10. Select **Source** device by pressing the adjacent soft key to specify that the device under test is a source.

   Alternatively, you can specify the device under test as a source using the following commands:

   CPTX:DUTT 1  // specifies the device under test as a source.

   You can query the current value of the parameter with:

   CPTX:DUTT?  // returns the device under test type.

11. (Optional) Specify the remaining parameters in the **EditPCP** menu using the table above.

   Alternatively, you can specify the parameters through the command line as follows:

   CPTX:SKSV 10  // specifies maximum number of downstream devices listed in the KSV list of the device under test. Valid values are 1-127.
CPTX:SRAC 5 // specifies number of times a source DUT attempts authentication before transitioning into the authenticated state. Valid values, 1 or greater.

CPTX:SOOR 1 // Indicates whether DUT (source) outputs contents to repeater with no downstream devices. 1 = yes; 0 = no.

CPTX:SDCZ 0 // indicates whether the 882 should use a downstream device count of 0 or the device count as specified by the SKSV command (Source Max KSV).

Note 1: This parameter is only used for the 1B-01 test and this test should be run for both settings: 0 or 1 (use setting of SKSV).

Note 2: For the 882CA you will have to run the 1B-01 test using the command line. The 882E starting in release 2.17.x will run these two iterations of the test automatically in batch mode.

12. Press the **Options** key to save the capabilities definition.

   The generator LCD will display the message “Saved”.

13. Press the **Tools** key get back to the Reports menu.

   The generator LCD will display the reports menu as shown below.

   ![Report Menu]

14. Select **HDCP** to access the HDCP compliance test menu.

   The following is displayed on the generator’s LCD.

   ![HDCP Menu]

15. Select **!CompRpt** to initiate the HDCP compliance test.

   The message “HDCP Compliance Test” is shown and then all the tests are shown in sequence.

   Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.

   Alternatively, you can run the tests using the following command:

   CPTX:CPTR 46 // specifies that all applicable tests will be run.
CPTX:CPTU  // Initiates the execution of the test

Another alternative is that you can initiate the tests through the Compliance Controller. Specify the tests you want to run using the check boxes and then click on the Run Tests activation button.

16. For the 882CA (only), run the 1B-01 test through the command line for both settings of the SDCZ parameter which indicates whether the 882 should use a downstream device count of 0 or the device count specified by the SKSV parameter (Source Max KSV).

   a. Set the SDCZ parameter to indicate that the 882 should use a downstream device count of 0:

      CPTX:SDCZ 0  // indicates that the 882 should use a downstream device count of 0.

   b. Run the 1B-01 test using the following command:

      CPTX:CPTR 10  // Selects specific test (e.g. 1B_01) see table below
CPTX:CPTU  // Initiates the execution of the test.

c. Set the SDCZ parameter to indicate that the 882 should use the device as specified by the SKSV parameter (Source Max KSV):

CPTX:SDCZ 1  // indicates that the 882 should use the device count as specified by the SKSV command (Source Max KSV).

d. Run the 1B-01 test using the following command:

CPTX:CPTR 10  // Selects specific test (e.g. 1B_01).
CPTX:CPTU  // Initiates the execution of the test.

17. Monitor the 882E (with release 2.17.x) LCD for a set of prompts during the 1A-01, 1A-09, and 1B-01 tests.

**Note:** You will not be prompted as shown below when using 882E releases prior to 2.17.x nor will you be prompted when running the test with the 882CA.

e. When prompted with the screen shown below, examine the video on the display under test and press the appropriate button adjacent to the indication (Yes! or No!) to continue.

**Note:** The prompt asks you if the video appearing on the connected display looks good. “Looks good” means that there is a picture and an absence of excessive snow.

<table>
<thead>
<tr>
<th>Does the video look good?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

18. (Optional) To run a specific test with the generator as sink (1A tests), you can use the command line as shown below:

CPTX:CPTR 1  // Selects specific test (e.g. 1A_01) see table below
CPTX:CPTU  // Initiates the execution of the test.

You can query the complete list of tests to choose from:

CPTX:GCTN?  // Queries the list of tests supported

You can query the currently selected test to run with:

CPTX:CPTR?  // Queries the selected test to run (see table)

19. (Optional) To run a specific test with the generator as repeater (1B tests), you can use the command line as shown below:

CPTX:CPTR 10  // Selects specific test (e.g. 1B_01) see table below
CPTX:CPTU  // Initiates the execution of the test.

You can query the complete list of tests to choose from:

CPTX:GCTN?  // Queries the list of tests supported

You can query the currently selected test to run with:

CPTX:CPTR?  // Queries the selected test to run (see table)
The following table describes the tests that can be performed.

<table>
<thead>
<tr>
<th>CPTX:CPTR</th>
<th>Test Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A_01</td>
<td>1 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
</tr>
<tr>
<td>1A_02</td>
<td>2 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
</tr>
<tr>
<td>1A_03</td>
<td>3 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
</tr>
<tr>
<td>1A_04</td>
<td>4 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
</tr>
<tr>
<td>1A_05</td>
<td>5 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
</tr>
<tr>
<td>1A_06</td>
<td>6 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
</tr>
<tr>
<td>1A_07</td>
<td>7 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
</tr>
<tr>
<td>1A_08</td>
<td>8 (Transmitter Downstream w/Receiver) w/HDMI Capable Receiver</td>
</tr>
<tr>
<td>1A_09</td>
<td>9 (Transmitter Downstream w/Receiver) w/DVI Receiver</td>
</tr>
<tr>
<td>1B_01</td>
<td>10 (Transmitter Downstream w/Repeater)</td>
</tr>
<tr>
<td>1B_02</td>
<td>11 (Transmitter Downstream w/Repeater)</td>
</tr>
<tr>
<td>1B_03</td>
<td>12 (Transmitter Downstream w/Repeater)</td>
</tr>
<tr>
<td>1B_04</td>
<td>13 (Transmitter Downstream w/Repeater)</td>
</tr>
<tr>
<td>1B_05</td>
<td>14 (Transmitter Downstream w/Repeater)</td>
</tr>
<tr>
<td>1B_06</td>
<td>15 (Transmitter Downstream w/Repeater)</td>
</tr>
</tbody>
</table>
To run the 1A-08 HDCP compliance test using the SRM disc:

1. Set up the test as described in “To run the 1A and 1B series HDCP compliance tests on an HDMI source (transmitter):” on page 694 using the instructions for the 882E analyzer.

   **Note:** The SRM test is only supported on the 882E analyzer. You can insert the SRM disc into the source device and run the HDCP tests in batch mode rather than through the command line.

2. Insert the SRM disc into the optical drive.

   **Note:** The SRM test does not apply for source devices that cannot play a DVD.

3. To run 1A-08 test, use the command line as shown below:

   - `CPTX:DUTT 1` // Selects the device type as a source.
   - `CPTX:CPTR 8` // Selects specific test (e.g. 1A_08).
   - `CPTX:CPTU` // Initiates the execution of the test.

   Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.

### Running HDCP compliance tests on HDMI receivers

The receiver tests are the 2C-0x series. The test procedures differ somewhat for the 882E analyzer and the 882CA.

For the 882E the 2C-01 and 2C-04 tests are run multiple times for various settings. The 2C-01 test is required to be run in two configurations: 1) combined reads and 2) short reads. The 2C-04 test is required to be run in six (6) configurations. There are two read configurations: 1) short read and 2) combined read and there are three encryption pulse configurations: 1) in the beginning of the vertical blanking; 2) in the middle of the vertical blanking and 3) at the end of the vertical blanking.

With 882E releases prior to 2.17.x, these multiple iterations for the 2C-01 and 2C-04 test have to run through the command line. For the 2.17.x release, these multiple iterations are handled in the batch mode but you can choose to run them through the command line as well.

For the 882CA (with release 2.13.3) only the 2C-01 test is run multiple times for the two configurations: 1) combined reads and 2) short reads. These tests must be run through the command line.

Refer to “To run the 2C-01 HDCP compliance test on an HDMI sink (receiver):” on page 712 for procedures on running this test. Refer to “To run the 2C-04 HDCP compliance test on an HDMI sink (receiver):” on page 713 for procedures on running this test.
To run the 2C series HDCP compliance test on an HDMI sink (receiver):

1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter that is supplied with the EST.
   b. Connect an HDMI cable from the sink device under test input to the EST HDMI port labeled, “HDMI OUT.”
   c. Connect an HDMI cable from the 882 HDMI Tx 1 port to the EST HDMI port labeled “HDMI IN.”
   d. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”

   The following diagram depicts the test setup for the 882EA:

2. For the 882CA, connect an HDMI cable from the sink device under test input to the 882 HDMI Tx 1 port.

   The following diagram depicts the test setup for the 882CA:
3. Activate the HDMI-H interface on the output port as follows:

   a. Press the **Interface** key. A listing of signal interfaces appears on the generator's display as shown below.

   ```
   + VGA   CVBS
   HDMI-D  S-VIDEO
   HDMI-H  SDI
   ```

   b. Choose the **HDMI-H** item by pressing the adjacent soft key. The interface is activated and the display is shown below.

   ```
   VGA   CVBS
   HDMI-D  S-VIDEO
   *HDMI-H  SDI
   ```

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   ```
   XVSI 4 // Activates the HDMI-H interface
   ALLU // Applies the interface setting to the generator
   ```

4. Press the **Tools** key and choose the **Reports** item by pressing the adjacent soft key. The following is displayed on the generator's LCD.

   ```
   [EDID Packets]
   [Misc HDCP]
   ```

   *Note: You can set the Product Capabilities Parameters through the Compliance Controller, see instructions in Step 6 below.*

5. Select **HDCP** to access the HDCP compliance test menu. The following is displayed on the generator's LCD.

   ```
   !CompRpt EditPCP
   ```

6. Select **EditPCP** to define the capabilities of the HDCP device under. The following is displayed on the generator's LCD.

   ```
   Source :DUT Type
   0 :Source_Max_KSV
   1 :Source_Auth_Cnt
   +Source_Out_OnlyRep
   ```
The following table describes the test parameters and their settings (gray = N/A).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUT type</td>
<td>The type of device under test. This can be one of Sink, Source, Repeater, Repeater3AB, or Repeater3C. For this test, select Sink.</td>
</tr>
<tr>
<td>Source Max KSV</td>
<td>Specifies the maximum number of KSVs the source can read. The valid values are 1 through 127.</td>
</tr>
<tr>
<td>Source Authentication Control</td>
<td>Specifies the number of times a source DUT attempts authentication before transitioning into the authentication state. The valid values are 1 or greater.</td>
</tr>
<tr>
<td>Source Out Only Repeater</td>
<td>Indicates whether the DUT outputs contents to a repeater to which no downstream device is connected. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Features Supported</td>
<td>Indicates whether the DUT supports Advanced Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Audio Supported</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater 1.1 Features Supported</td>
<td>Indicates whether supports Advanced Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater Audio Support</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater HPD Pulse</td>
<td>Indicates whether the DUT has the capability to output HPD pulse by user operation. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater Max KSV</td>
<td>Specifies the maximum number of KSVs the repeater can read. The valid values are 2 through 127.</td>
</tr>
<tr>
<td>Repeater Out OnlyRep</td>
<td>Indicates whether the DUT outputs content to the downstream repeater that has no downstream device connected. The values are + for yes and - for no.</td>
</tr>
</tbody>
</table>

Alternatively you can define the PCP parameters through the Compliance Controller. Launch the Compliance Controller using the procedures in “To launch the Compliance Controller” on page 688. Specify the values using the check box and entry fields using the information in the following steps and then click on the **Use PCP** activation button.
7. Select **Sink** device by pressing the adjacent soft key to specify that the device under test is a sink.

The following is displayed on the generator’s LCD.

```
<table>
<thead>
<tr>
<th>Sink</th>
<th>DUT Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Source_Max_KSV</td>
</tr>
<tr>
<td>1</td>
<td>Source_Authentication</td>
</tr>
<tr>
<td>+</td>
<td>Source_Out_OnlyRep</td>
</tr>
</tbody>
</table>
```

Alternatively, you can specify the device under test as a sink using the following commands:

```
CPTX:DUTT 0 // specifies the device under test as a sink.
```

You can query the current value of the parameter with:

```
CPTX:DUTT? // returns the device under test type.
```
8. (Optional) Specify the remaining parameters in the EditPCP menu using the table above.

Alternatively, you can specify the parameters through the command line as follows:

CPTX:SRFT 0 // indicates whether DUT (sink) supports 1.1 features such as Advanced Cipher and Enhanced Link Verification. 1 = yes; 0 = no.

9. Press the Options key to save the capabilities definition.

The generator LCD will display the message “Saved”.

10. Press the Tools key get back to the Reports menu.

The generator LCD will display the reports menu as shown below.

```
  EDID  Packets
  Misc  HDCP
```

11. Select HDCP to access the HDCP compliance test menu.

The following is displayed on the generator's LCD.

```
!CompRpt  EditPCP
```

12. Select !CompRpt to initiate the HDCP compliance test.

The message “HDCP Compliance Test” is shown and then all the tests are shown in sequence.

Alternatively, you can run the tests using the following command:

CPTX:CPTR 46 // specifies that all applicable tests will be run.
CPTX:CPTU // Initiates the execution of the test

Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.

Another alternative is that you can initiate the tests through the Compliance Controller. Specify the tests you want to run using the check boxes and then click on the Run Tests activation button.

13. Monitor the 882E LCD (with release 2.17.x) for a set of prompts during the 2C-01 test.
**Note:** You will not be prompted as shown below when using 882E releases prior to 2.17.x.

a. When prompted shown below occurs, power cycle the device under test:

```
Please power cycle the DUT
Next!
```

b. Press the button adjacent to the Next! indication after the device under test is back on to continue.

c. When prompted with the screen shown below, examine the video on the display under test and press the appropriate button adjacent to the indication (Yes! or No!) to continue.

**Note:** The prompt asks you if the video appearing on the connected display looks good. “Looks good” means that there is a picture and an absence of excessive snow.

```
Does the video look good?
!Yes No!
```

14. (Optional) To run a specific test you can use the command line as shown below:

```
CPTX:CPTR 16 // Selects specific test (e.g. 2C_01) see table below
CPTX:CPTU // Initiates the execution of the test
```

You can query the complete list of tests to choose from:

```
CPTX:GCTN? // Queries the list of tests supported
```

You can query the currently selected test to run with:

```
CPTX:CPTR? // Queries the selected test to run (see table)
```

The following table describes the tests that can be performed.

<table>
<thead>
<tr>
<th>CPTX:CPTR Index</th>
<th>Test Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>2C_01 (Receiver Upstream w/Transmitter) (w/HDMI Capable Transmitter)</td>
<td>Regular Procedure: With HDMI Capable Transmitter</td>
</tr>
<tr>
<td>17</td>
<td>2C_02 (Receiver Upstream w/Transmitter) (w/HDMI Capable Transmitter)</td>
<td>Irregular Procedure: (First Part of Authentication) New Authentication</td>
</tr>
</tbody>
</table>
To run the 2C-01 HDCP compliance test on an HDMI sink (receiver):

For the 882E releases prior to 2.17.x and for the 882CA, the 2C-01 tests are required to be run with 2 different set ups through the command line for both read configurations: 1) short read and 2) long read.

1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the sink device under test input to the EST HDMI port labeled, “HDMI OUT.”
   c. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”
   d. Connect an HDMI cable from the 882 HDMI Tx 1 port to the EST HDMI port labeled, “HDMI IN.”

The following diagram depicts the test setup for the 882EA:
2. For the 882CA connect an HDMI cable from the sink device under test input to the 882 HDMI Tx 1 port.

The following diagram depicts the test setup for the 882CA:

3. Ensure that the 882 settings used for the 2C-0x series described in “To run the 2C series HDCP compliance test on an HDMI sink (receiver):” on page 705, are maintained during this test. This includes selection of the HDMI interface, selection of the key PCP parameters such as the device type, etc.

4. To run 2C-01 tests using the short read, enter the following commands:

   CPTX:CRIP 0 // Specifies short read.
   CPTX:CPTU // Initiates the execution of the test.

5. To run 2C-01 tests using the combined read, enter the following commands:

   CPTX:CRIP 1 // Specifies combined read.
   CPTX:CPTU // Initiates the execution of the test.

Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.

To run the 2C-04 HDCP compliance test on an HDMI sink (receiver):

For the 882E releases prior to 2.17.x, the 2C-04 tests are required to be run with 6 different set ups through the command line. There are two read configurations: 1) short read and 2) long read and there are three encryption pulse configurations: 1) in the beginning of the vertical blanking; 2) in the middle of the vertical blanking and 3) at the end of the vertical blanking.
1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the sink device under test input to the EST HDMI port labeled, “HDMI OUT.”
   c. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”
   d. Connect an HDMI cable from the 882 HDMI Tx 1 port to the EST HDMI port labeled, “HDMI IN.”

The following diagram depicts the test setup for the 882EA:

2. Ensure that the 882 settings used for the 2C-0x series described in “To run the 2C series HDCP compliance test on an HDMI sink (receiver):” on page 705, are maintained during this test. This includes selection of the HDMI interface, selection of the key PCP parameters such as the device type, etc.

3. To run 2C-04 tests using the short read with the encryption enable pulse positioned at the beginning of the vsync pulse, enter the following commands:

   CPTX:CRIP 0 // Specifies short read.
   CPTX:OESS 1 // Positions pulse at beginning of vsync.
   CPTX:CPTR 19 // Selects specific test (e.g. 2C_04).
   CPTX:CPTU // Initiates the execution of the test.

4. To run 2C-04 tests using the short read with the encryption enable pulse positioned at the center of the vsync pulse, enter the following commands:

   CPTX:CRIP 0 // Specifies short read.
   CPTX:OESS 3 // Positions pulse at center of vsync.
   CPTX:CPTR 19 // Selects specific test (e.g. 2C_04).
   CPTX:CPTU // Initiates the execution of the test.
5. To run 2C-04 tests using the short read with the encryption enable pulse positioned at the end of the vsync pulse, enter the following commands:

```
CPTX:CRIP 0 // Specifies short read.
CPTX:OESS 2 // Positions the pulse at end of vsync.
CPTX:CPTR 19 // Selects specific test (e.g. 2C_04).
CPTX:CPTU // Initiates the execution of the test.
```

6. To run 2C-04 tests using the combined read with the encryption enable pulse positioned at the beginning of the vsync pulse, enter the following commands:

```
CPTX:CRIP 1 // Specifies combined read.
CPTX:OESS 1 // Positions pulse at beginning of vsync.
CPTX:CPTR 19 // Selects specific test (e.g. 2C_04).
CPTX:CPTU // Initiates the execution of the test.
```

7. To run 2C-04 tests using the combined read with the encryption enable pulse positioned at the center of the vsync pulse, enter the following commands:

```
CPTX:CRIP 1 // Specifies combined read.
CPTX:OESS 3 // Positions pulse at center of vsync.
CPTX:CPTR 19 // Selects specific test (e.g. 2C_04).
CPTX:CPTU // Initiates the execution of the test.
```

8. To run 2C-04 tests using the combined read with the encryption enable pulse positioned at the end of the vsync pulse, enter the following commands:

```
CPTX:CRIP 1 // Specifies combined read.
CPTX:OESS 2 // Positions the pulse at end of vsync.
CPTX:CPTR 19 // Selects specific test (e.g. 2C_04).
CPTX:CPTU // Initiates the execution of the test.
```

Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.
Running HDCP compliance tests on HDMI repeaters

To run the 3A series HDCP compliance tests on an HDMI repeater:

1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the repeater device under test output to the EST HDMI port labeled, “HDMI IN.”
   c. Connect an HDMI cable from a compliant source device output to the input of the repeater device under test.
   d. Connect an HDMI cable from the 882 HDMI Rx 1 port to the EST HDMI port labeled “HDMI OUT.”
   e. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”
   f. Connect an HDMI cable from the 882 HDMI Tx 1 port to the HDMI input of the display device (used to monitor the video).

The following diagram depicts the test setup for the 882EA:
2. For the 882CA connect the cables as follows:
   a. Connect an HDMI cable from the repeater device under test output to the 882 HDMI Rx 1 port.
   b. Connect an HDMI cable from a compliant source device such as a DVD player (shown) to the input of the repeater device under test.

The following diagram depicts the test setup for the 882CA:

![Diagram of the test setup for the 882CA]

3. Activate the HDMI-H interface on the output port as follows:
   c. Press the **Interface** key. A listing of signal interfaces appears on the generator's display as shown below.

   * VGA       CVBS
   * HDMI-D    S-VIDEO
   * HDMI-H    SDI

   d. Choose the **HDMI-H** item by pressing the adjacent soft key. The interface is activated and the display is shown below.

   ![List of signal interfaces]

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   XVSI 4  // Activates the HDMI-H interface
   ALLU   // Applies the interface setting to the generator

4. Press the **Interface** key repeatedly until the following menu appears:

   ![Menu with options]

5. Choose the HDMI IN 1 by pressing the adjacent soft key.
6. Verify that the repeater is sending in video using the Timing measurement function of the analyzer. Refer to “Measuring timing of video signal” on page 279 for information on running the timing test.

Verify that the source is outputting one of the following formats:

- 640x480p at 59.94/60Hz
- 720x480p at 59.94/60Hz
- 720x576p at 50Hz

Verify that the source is outputing the RGB mode:

If the 882 cannot detect the incoming video, enter the following command to turn on the EST:

```
QD:PROD:EST // Turns on the EST
```

7. Press the **Tools** key and choose the **Reports** item by pressing the adjacent soft key.

The following is displayed on the generator’s LCD.

```
<table>
<thead>
<tr>
<th>EDID</th>
<th>Packets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc</td>
<td>HDCP</td>
</tr>
</tbody>
</table>
```

*Note: You can set the Product Capabilities Parameters through the Compliance Controller, see instructions in Step 9 below.*

8. Select **HDCP** to access the HDCP compliance test menu.

The following is displayed on the generator’s LCD.

```
!CompRpt EditPCP
```

9. Select **EditPCP** to define the capabilities of the HDCP device under.

The following is displayed on the generator’s LCD.

```
Source :DUT Type
0 :Source_Max_KSV
1 :Source_Authentication_CNT
+Source_Out_OnlyRep
```
The following table describes the test parameters and their settings (gray = N/A).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUT type</td>
<td>The type of device under test. This can be one of Sink, Source, Repeater, Repeater3AB, or Repeater3C. For this test, select Repeater3AB.</td>
</tr>
<tr>
<td>Source Max KSV</td>
<td>Specifies the maximum number of KSVs the source can read. The valid values are 1 through 127.</td>
</tr>
<tr>
<td>Source Authentication Control</td>
<td>Specifies the number of times a source DUT attempts authentication before transitioning into the authentication state. The valid values are 1 or greater.</td>
</tr>
<tr>
<td>Source Out Only Repeater</td>
<td>Indicates whether the DUT outputs contents to a repeater to which no downstream device is connected. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Features Supported</td>
<td>Indicates whether the DUT supports Advanced Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Audio Supported</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater 1.1 Features Supported</td>
<td>Indicates whether supports Advanced Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater Audio Support</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater HPD Pulse</td>
<td>Indicates whether the DUT has the capability to output HPD pulse by user operation. The values are + for yes, repeater DUT allows the user to initiate a HPD; and - for no, the repeater DUT does not support a user to manually force of a hot plug pulse.</td>
</tr>
<tr>
<td>Repeater Max KSV</td>
<td>Specifies the maximum number of KSVs the repeater can read. The valid values are 2 through 127.</td>
</tr>
<tr>
<td>Repeater Out OnlyRep</td>
<td>Indicates whether the DUT outputs content to the downstream repeater that has no downstream device connected. The values are + for yes, the repeater will forward encrypted video to a downstream repeater when there are no other downstream devices; and - for no, the repeater will not forward encrypted video to a downstream repeater when there are no other downstream devices.</td>
</tr>
</tbody>
</table>

Alternatively you can define the PCP parameters through the Compliance Controller. Launch the Compliance Controller using the procedures in "To launch the Compliance Controller:" on page 688. Specify the values using the check box and entry fields using the information in the following steps and then click on the **Use PCP** activation button.
10. Select Repeater3AB device by pressing the adjacent soft key to specify that the device under test is a repeater.

The following is displayed on the generator’s LCD.

```
Repeater3AB  :DUT Type
0  :Source_Max_KSV
1  :Source_Authn_Cnt
+Source_Out_OnlyRep

```

Alternatively, you can specify the device under test as a repeater for the 3A test using the following commands:

```
CPTX:DUTT 3 // specifies the device under test as a repeater for test 3AB.

```

You can query the current value of the parameter with:

```
CPTX:DUTT? // returns the device under test type.
```
11. (Optional) Specify the remaining parameters in the **EditPCP** menu using the table above.

Alternatively, you can specify the parameters through the command line as follows:

```
CPTX:RPFT 0 // indicates whether DUT (repeater) supports 1.1 features such as Advanced Cipher and Enhanced Link Verification. 1 = yes; 0 = no.
CPTX:RKS V 10 // specifies maximum number of downstream devices that can be supported in the repeater’s KSV list
CPTX:ROOR 0 // indicates whether DUT (repeater) outputs outputs content to the downstream repeater that does not have any downstream device connected. 1 = yes; 0 = no.
```

12. Press the **Options** key to save the capabilities definition.

The generator LCD will display the message “Saved”.

13. Press the **Tools** key get back to the Reports menu.

The generator LCD will display the message “Saved”.

14. Select **HDCP** to access the HDCP compliance test menu.

The following is displayed on the generator’s LCD.

```
!CompRpt     EditPCP
```

15. Select **!CompRpt** to initiate the HDCP compliance test.

The message “HDCP Compliance Test” is shown and then all the tests are shown in sequence.

Alternatively, you can run the tests using the following command:

```
CPTX:CPTR 46 // specifies that all applicable tests will be run.
```
Refer to “To view the HDCP compliance report” on page 752 for procedures on how to view the generated report.

Another alternative is that you can initiate the tests through the Compliance Controller. Specify the tests you want to run using the check boxes and then click on the Run Tests activation button.

16. Monitor the 882E LCD (with release 2.17.x) for a set of prompts during the 3A-01 and 3A-05 tests.
Note: You will not be prompted as shown below when using releases prior to 2.17.x.

a. When prompted shown below occurs, power cycle the device under test:

Please power cycle the DUT

Next!

b. Press the button adjacent to the Next! indication after the device under test is back on to continue.

c. When prompted with the screen shown below, examine the video on the display under test and press the appropriate button adjacent to the indication (Yes! or No!) to continue.

Note: The prompt asks you if the video appearing on the connected display looks good. “Looks good” means that there is a picture and an absence of excessive snow.

Does the video look good?

Yes No!

17. (Optional) To run a specific test you can use the command line as shown below:

CPTX:CPTR 20 // Selects specific test (e.g. 3A_01) see table below
CPTX:CPTU // Initiates the execution of the test

You can query the complete list of tests to choose from:

CPTX:GCTN? // Queries the list of tests supported

You can query the currently selected test to run with:

CPTX:CPTU? // Queries the selected test to run (see table)

The following table describes the tests that can be performed.

<table>
<thead>
<tr>
<th>CPTX:CPTR</th>
<th>Index</th>
<th>Test Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPTX:CPTR</td>
<td>20</td>
<td>3A_01 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and HDMI Capable Receiver) Regular Procedure: With HDMI Capable Receiver</td>
</tr>
<tr>
<td>CPTX:CPTR</td>
<td>21</td>
<td>3A_02 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and HDMI Capable Receiver) Irregular Procedure: (First Part of Authentication) HDCP Port Access</td>
</tr>
<tr>
<td>CPTX:CPTR</td>
<td>22</td>
<td>3A_03 (Repeater Downstream w/Receiver) (Between HDMI Capable Transmitter and HDMI Capable Receiver) Irregular Procedure: (First Part of Authentication) Verify Bksv</td>
</tr>
</tbody>
</table>
To run the 3B series HDCP compliance tests on an HDMI repeater:

For the 882E releases prior to 2.17.x, the 3B-01 test is run multiple times for the two read configurations: 1) short read and 2) combined read. For the 2.17.x release, these multiple iterations are handled in the batch mode but you can choose to run them through the command line as well.

Refer to “To run the 3B-01 HDCP compliance test on an HDMI repeater:” on page 733 for procedures on running this test.
1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the repeater device under test output to the EST HDMI port labeled, “HDMI IN.”
   c. Connect an HDMI cable from a compliant source device output to the input of the repeater device under test.
   d. Connect an HDMI cable from the 882 HDMI Rx 1 port to the EST HDMI port labeled “HDMI OUT.”
   e. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”
   f. Connect an HDMI cable from the 882 HDMI Tx 1 port to the HDMI input of the display device (used to monitor the video).

The following diagram depicts the test setup for the 882EA:
2. For the 882CA connect the cables as follows:
   a. Connect an HDMI cable from the repeater device under test output to the 882 HDMI Rx 1 port.
   b. Connect an HDMI cable from a compliant source device such as a DVD player (shown) to the input of the repeater device under test.

The following diagram depicts the test setup for the 882CA:

3. Activate the HDMI-H interface on the output port as follows:
   a. Press the Interface key. A listing of signal interfaces appears on the generator's display as shown below.

```
* VGA          CVBS
HDMI-D        S-VIDEO
HDMI-H        SDI
```

   b. Choose the HDMI-H item by pressing the adjacent soft key. The interface is activated and the display is shown below.

```
VGA          CVBS
HDMI-D       S-VIDEO
*HDMI-H      SDI
```

Alternatively, to activate the interface through the command line interface, enter the following commands:

```
XVSI 4      // Activates the HDMI-H interface
ALLU       // Applies the interface setting to the generator
```

4. Press the Interface key repeatedly until the following menu appears:

```
* HDMI IN 1
HDMI IN 2
```

5. Choose the HDMI IN 1 by pressing the adjacent soft key.
6. Verify that the repeater is sending in video using the Timing measurement function of the analyzer. Refer to “To view timing information of an external HDMI/DVI source signal on a display:” on page 246 for information on running the timing test.

Verify that the source is outputting one of the following formats:

- 640x480p at 59.94/60Hz
- 720x480p at 59.94/60Hz
- 720x576p at 50Hz

Verify that the source is outputting the RGB mode:

If the 882 cannot detect the incoming video, enter the following command to turn on the EST:

```
QD:PROD:EST // Turns on the EST
```

7. Press the Tools key and choose the Reports item by pressing the adjacent soft key.

The following is displayed on the generator's LCD.

```
<table>
<thead>
<tr>
<th>EDID</th>
<th>Packets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc</td>
<td>HDCP</td>
</tr>
</tbody>
</table>
```

**Note:** You can set the Product Capabilities Parameters through the Compliance Controller, see instructions in Step 9 below.

8. Select HDCP to access the HDCP compliance test menu.

The following is displayed on the generator's LCD.

```
!CompRpt EditPCP,
```

9. Select EditPCP to define the capabilities of the HDCP device under.

The following is displayed on the generator's LCD.

```
Source :DUT Type
0 :Source_Max_KSV
1 :Source_AuthCt
+Source_Out_OnlyRep ↓
```
The following table describes the test parameters and their settings (gray = N/A).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUT type</td>
<td>The type of device under test. This can be one of Sink, Source, Repeater, Repeater3AB, or Repeater3C. For this test, select Repeater3AB.</td>
</tr>
<tr>
<td>Source Max KSV</td>
<td>Specifies the maximum number of KSVs the source can read. The valid values are 1 through 127.</td>
</tr>
<tr>
<td>Source Authentication Control</td>
<td>Specifies the number of times a source DUT attempts authentication before transitioning into the authentication state. The valid values are 1 or greater.</td>
</tr>
<tr>
<td>Source Out Only Repeater</td>
<td>Indicates whether the DUT outputs contents to a repeater to which no downstream device is connected. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Features Supported</td>
<td>Indicates whether the DUT supports Advanced Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Audio Supported</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater 1.1 Features Supported</td>
<td>Indicates whether supports Advanced Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater Audio Support</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater HPD Pulse</td>
<td>Indicates whether the DUT has the capability to output HPD pulse by user operation. The values are + for yes, repeater DUT allows the user to initiate a HPD; and - for no, the repeater DUT does not support a user to manually force of a hot plug pulse.</td>
</tr>
<tr>
<td>Repeater Max KSV</td>
<td>Specifies the maximum number of KSVs the repeater can read. The valid values are 2 through 127.</td>
</tr>
<tr>
<td>Repeater Out Only Rep</td>
<td>Indicates whether the DUT outputs content to the downstream repeater that has no downstream device connected. The values are + for yes, the repeater will forward encrypted video to a downstream repeater when there are no other downstream devices; and - for no, the repeater will not forward encrypted video to a downstream repeater when there are no other downstream devices.</td>
</tr>
</tbody>
</table>

Alternatively you can define the PCP parameters through the Compliance Controller. Launch the Compliance Controller using the procedures in "To launch the Compliance Controller:" on page 688. Specify the values using the check box and entry fields using the information in the following steps and then click on the **Use PCP** activation button.
10. Select Repeater3AB device by pressing the adjacent soft key to specify that the device under test is a repeater.

The following is displayed on the generator’s LCD.

```
  Repeater3AB  :DUT Type
  0  :Source_Max_KSV
  1  :Source_Authentication
  +Source_Out_OnlyRep  
```

Alternatively, you can specify the device under test as a repeater for the 3B test using the following commands:

```
CPTX:DUT 3 // specifies the device under test as a repeater for test 3AB.
```

You can query the current value of the parameter with:

```
CPTX:DUT? // returns the device under test type.
```
11. (Optional) Specify the remaining parameters in the **EditPCP** menu using the table above.

Alternatively, you can specify the parameters through the command line as follows:

- CPTX:RPFT 0 // indicates whether DUT (repeater) supports 1.1 features such as Advanced Cipher and Enhanced Link Verification. 1 = yes; 0 = no.
- CPTX:RKSv 10 // specifies maximum number of downstream devices that can be supported in the repeater’s KSV list.
- CPTX:ROOR 0 // indicates whether DUT (repeater) outputs outputs content to the downstream repeater that does not have any downstream device connected. 1 = yes; 0 = no.
- CPTX:SRCZ 0 // indicates whether the 880 should use a downstream device count of 0 or the device count as specified by the SKSV command.

**Note** that this parameter is only used for the 3B-01 test and this test should be run for both settings: 0 or 1 (use setting of SKSV).

12. Press the **Options** key to save the capabilities definition.

The generator LCD will display the message “Saved”.

13. Press the **Tools** key get back to the Reports menu.

The generator LCD will display the reports menu as shown below.

```
<table>
<thead>
<tr>
<th>EDID</th>
<th>Packets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HDCP</td>
</tr>
</tbody>
</table>
```

14. Select **HDCP** to access the HDCP compliance test menu.

The following is displayed on the generator’s LCD.

```
|  !CompRpt |   EditPCP |
```

15. Select **!CompRpt** to initiate the HDCP compliance test.

The message “HDCP Compliance Test” is shown and then all the tests are shown in sequence.

Alternatively, you can run the tests using the following command:

- CPTX:CPTR 46 // specifies that all applicable tests will be run.
CPTX:CPTU  // Initiates the execution of the test

Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.

Another alternative is that you can initiate the tests through the Compliance Controller. Specify the tests you want to run using the check boxes and then click on the Run Tests activation button.

Monitor the 882E LCD (with release 2.17.x) for a set of prompts during the 3B-01 test.
Note: You will not be prompted as shown below when using releases prior to 2.17.x.

a. When prompted shown below occurs, power cycle the device under test:

```
Please power cycle the DUT
```

b. Press the button adjacent to the Next! indication after the device under test is back on to continue.

c. When prompted with the screen shown below, examine the video on the display under test and press the appropriate button adjacent to the indication (Yes! or No!) to continue.

Note: The prompt asks you if the video appearing on the connected display looks good. “Looks good” means that there is a picture and an absence of excessive snow.

```
Does the video look good?
!Yes                 No!
```

16. (Optional) To run a specific test you can use the command line as shown below:

```
CPTX:CPTR 25 // Selects specific test (e.g. 3B_01) see table below
CPTX:CPTU // Initiates the execution of the test
```

You can query the complete list of tests to choose from:

```
CPTX:GCTN? // Queries the list of tests supported
```

You can query the currently selected test to run with:

```
CPTX:CPTR? // Queries the selected test to run (see table)
```

The following table describes the tests that can be performed.

<table>
<thead>
<tr>
<th>CPTX:CPTR</th>
<th>Test Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 3B_01</td>
<td>(Repeater Downstream w/Repeater) Regular Procedure: With Repeater</td>
</tr>
<tr>
<td>26 3B_02</td>
<td>(Repeater Downstream w/Repeater) Irregular Procedure: (Second Part of Authentication) Timeout of KSV List READY</td>
</tr>
<tr>
<td>27 3B_03</td>
<td>(Repeater Downstream w/Repeater) Irregular Procedure: (Second Part of Authentication) Verify V’</td>
</tr>
<tr>
<td>28 3B_04</td>
<td>(Repeater Downstream w/Repeater) Irregular Procedure: (Second Part of Authentication) MAX_DEVS_EXCEEDED</td>
</tr>
<tr>
<td>29 3B_05</td>
<td>(Repeater Downstream w/Repeater) Irregular Procedure: (Second Part of Authentication) MAXCASCADE_EXCEEDED</td>
</tr>
</tbody>
</table>
To run the 3B-01 HDCP compliance test on an HDMI repeater:

For the 882E releases prior to 2.17.x and for the 882CA, the 3B-01 tests are required to be run with 2 different set ups through the command line for both read configurations: 1) short read and 2) long read.

1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the repeater device under test output to the EST HDMI port labeled, “HDMI IN.”
   c. Connect an HDMI cable from a compliant source device output to the input of the repeater device under test.
   d. Connect an HDMI cable from the 882 HDMI Rx 1 port to the EST HDMI port labeled “HDMI OUT.”
   e. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”
   f. Connect an HDMI cable from the 882 HDMI Tx 1 port to the HDMI input of the display device (used to monitor the video).

The following diagram depicts the test setup for the 882EA:

2. Ensure that the 882 settings used for the 3B-0x series described in “To run the 3B series HDCP compliance tests on an HDMI repeater:” on page 724, are maintained during this test. This includes selection of the HDMI interface, selection of the key PCP parameters such as the device type, etc.

3. To run 3B-01 tests using the short read with the encryption enable pulse positioned at the beginning of the vsync pulse, enter the following commands:
   
   CPTX:CRIP 0 // Specifies short read.
   CPTX:CPTU // Initiates the execution of the test.
4. To run 3B-01 tests using the combined read with the encryption enable pulse positioned at the beginning of the vsync pulse, enter the following commands:

```
CPTX:CRIP 1 // Specifies combined read.
CPTX:CPTU // Initiates the execution of the test.
```

Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.

To run the 3C-I series HDCP compliance tests on an HDMI repeater:

For the 882E releases prior to 2.17.x, the 3C-I-01 test is run for each of the two read configurations: 1) short read and 2) combined read. For the 2.17.x release, these multiple iterations are handled in the batch mode but you can choose to run them through the command line as well.

Refer to “To run the 3C-I-01 HDCP compliance test on an HDMI repeater:” on page 741 for procedures on running the 3C-I-01 test in both configurations.

1. For the 882E analyzer connect the cables as follows:

   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.

   b. Connect an HDMI cable from the repeater device under test input to the EST HDMI port labeled, “HDMI OUT.”

   c. Connect an HDMI cable from the 882 HDMI Rx 1 port to the HDMI output of the repeater device under test.

   d. Connect an HDMI cable from the 882 HDMI Tx 1 port to the EST HDMI port labeled “HDMI IN.”

   e. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”

The following diagram depicts the test setup for the 882EA:
2. For the 882CA connect the cables as follows:
   a. Connect an HDMI cable from the repeater device under test output to the 882 HDMI Rx 1 port.
   b. Connect an HDMI cable from the 882 HDMI Tx 1 port to the HDMI input of the repeater device under test.

The following diagram depicts the test setup for the 882CA:

![Diagram showing test setup]

3. Activate the HDMI-H interface on the output port as follows:
   c. Press the **Interface** key. A listing of signal interfaces appears on the generator's display as shown below.

   ```
   * VGA   CVBS
   HDMI-D  S-VIDEO
   HDMI-H  SDI
   ```

   d. Choose the **HDMI-H** item by pressing the adjacent soft key. The interface is activated and the display is shown below.

   ```
   VGA   CVBS
   HDMI-D S-VIDEO
   *HDMI-H SDI
   ```

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   ```
   XVSI 4 // Activates the HDMI-H interface
   ALLU // Applies the interface setting to the generator
   ```

4. Press the **Interface** key repeatedly until the following menu appears:

   ```
   * HDMI IN 1
   HDMI IN 2
   ```
5. Choose the HDMI IN 1 by pressing the adjacent soft key.

6. For the 882E when using the EST, verify that the source is sending in video using the timing measurement function of the analyzer. Refer to “To view timing information of an external HDMI/DVI source signal on a display:” on page 246 for information on running the timing test.

Verify that the source is outputting one of the following formats:

- 640x480p at 59.94/60Hz
- 720x480p at 59.94/60Hz
- 720x576p at 50Hz

Verify that the source is outputting the RGB mode:

If the 882 cannot detect the incoming video, enter the following command to turn on the EST:

```
QD:PROD:EST  // Turns on the EST.
```

7. Press the Tools key and choose the Reports item by pressing the adjacent soft key.

The following is displayed on the generator's LCD.

```
| EDID     | Packets |
| Misc     | HDCP    |
```

**Note:** You can set the Product Capabilities Parameters through the Compliance Controller, see instructions in Step 9 below.

8. Select HDCP to access the HDCP compliance test menu.

The following is displayed on the generator's LCD.

```
!CompRpt  EditPCP<
```

9. Select EditPCP to define the capabilities of the HDCP device under.

The following is displayed on the generator's LCD.

```
Source :DUT Type
0 :Source_Max_KSV
1 :Source_Authn_Cnt
+Source_Out_OnlyRep↓
```
The following table describes the test parameters and their settings (gray = N/A).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUT type</td>
<td>The type of device under test. This can be one of Sink, Source, Repeater, Repeater3AB, or Repeater3C. For this test, select Repeater3C.</td>
</tr>
<tr>
<td>Source Max KSV</td>
<td>Specifies the maximum number of KSVs the source can read. The valid values are 1 through 127.</td>
</tr>
<tr>
<td>Source Authentication Control</td>
<td>Specifies the number of times a source DUT attempts authentication before transitioning into the authentication state. The valid values are 1 or greater.</td>
</tr>
<tr>
<td>Source Out Only Repeater</td>
<td>Indicates whether the DUT outputs contents to a repeater to which no downstream device is connected. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Features Supported</td>
<td>Indicates whether the DUT supports Advanced_Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Audio Supported</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater 1.1 Features Supported</td>
<td>Indicates whether supports Advanced_Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater Audio Support</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater HPD Pulse</td>
<td>Indicates whether the DUT has the capability to output HPD pulse by user operation. The values are + for yes, repeater DUT allows the user to initiate a HPD; and - for no, the repeater DUT does not support a user to manually force of a hot plug pulse.</td>
</tr>
<tr>
<td>Repeater Max KSV</td>
<td>Specifies the maximum number of KSVs the repeater can read. The valid values are 2 through 127.</td>
</tr>
<tr>
<td>Repeater Out OnlyRep</td>
<td>Indicates whether the DUT outputs content to the downstream repeater that has no downstream device connected. The values are + for yes, the repeater will forward encrypted video to a downstream repeater when there are no other downstream devices; and - for no, the repeater will not forward encrypted video to a downstream repeater when there are no other downstream devices.</td>
</tr>
</tbody>
</table>

Alternatively you can define the PCP parameters through the Compliance Controller. Launch the Compliance Controller using the procedures in "To launch the Compliance Controller:" on page 688. Specify the values using the check box and entry fields using the information in the following steps and then click on the **Use PCP** activation button.
Select **Repeater3C** device by pressing the adjacent soft key to specify that the device under test is a repeater.

The following is displayed on the generator's LCD.

```
Repeater3C :DUT Type
0 :Source_Max_KSV
1 :Source_Authen_Cnt
+Source_Out_OnlyRep ↓
```

Alternatively, you can specify the device under test as a repeater for the 3C test using the following commands:

```
CPTX:DUTT 4 // specifies the device under test as a repeater for the 3C test.
```

You can query the current value of the parameter with:

```
CPTX:DUTT? // returns the device under test type.
```
1. (Optional) Specify the remaining parameters in the EditPCP menu using the table above.

Alternatively, you can specify the parameters through the command line as follows:

CPTX:RPFT 0 // indicates whether DUT (repeater) supports 1.1 features such as Advanced Cipher and Enhanced Link Verification. 1 = yes; 0 = no.

CPTX:RKS V 10 // specifies maximum number of downstream devices that can be supported in the repeater’s KSV list.

CPTX:ROR 0 // indicates whether DUT (repeater) outputs outputs content to the downstream repeater that does not have any downstream device connected. 1 = yes; 0 = no.

2. Press the Options key to save the capabilities definition.

The generator LCD will display the message “Saved”.

3. Press the Tools key get back to the Reports menu.

The generator LCD will display the reports menu as shown below.

```
| EDID | Packets | Misc | HDCP |
```

4. Select HDCP to access the HDCP compliance test menu.

The following is displayed on the generator's LCD.

```
!CompRpt  EditPCP
```

5. Select !CompRpt to initiate the HDCP compliance test.

The message “HDCP Compliance Test” is shown and then all the tests are shown in sequence.

Alternatively, you can run the tests using the following command:

CPTX:CPTR 46 // specifies that all applicable tests will be run.
CPTX:CPTU // Initiates the execution of the test

Refer to “To view the HDCP compliance report” on page 752 for procedures on how to view the generated report.

Another alternative is that you can initiate the tests through the Compliance Controller. Specify the tests you want to run using the check boxes and then click on the Run Tests activation button.

(Optional) To run a specific test you can use the command line as shown below:

CPTX:CNTR 30 // Selects specific test (e.g. 3C1_01) see table below
CPTX:CPTU // Initiates the execution of the test

You can query the complete list of tests to choose from:

CPTX:GCTN? // Queries the list of tests supported

You can query the currently selected test to run with:

CPTX:CPTR? // Queries the selected test to run (see table)
The following table describes the tests that can be performed.

<table>
<thead>
<tr>
<th>CPTX:CPTR Index</th>
<th>Test Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 3C_I_01 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Regular Procedure: Transmitter – DUT – Receiver</td>
<td></td>
</tr>
<tr>
<td>31 3C_I_02 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Regular Procedure: HPD Pulse Output Caused By User Operation</td>
<td></td>
</tr>
<tr>
<td>32 3C_I_03 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) New Authentication</td>
<td></td>
</tr>
<tr>
<td>33 3C_I_04 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (Second Part of Authentication) New Authentication</td>
<td></td>
</tr>
<tr>
<td>34 3C_I_05 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (Third Part of Authentication) New Authentication</td>
<td></td>
</tr>
<tr>
<td>35 3C_I_06 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify Bksv</td>
<td></td>
</tr>
<tr>
<td>36 3C_I_07 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and HDMI Capable Receiver)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify R0'</td>
<td></td>
</tr>
</tbody>
</table>

To run the 3C-I-01 HDCP compliance test on an HDMI repeater:

For the 882E releases prior to 2.17.x, the 3C-I-01 tests are required to be run with 2 different set ups through the command line for both read configurations: 1) short read and 2) long read.
1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the repeater device under test input to the EST HDMI port labeled, “HDMI OUT.”
   c. Connect an HDMI cable from the 882 HDMI Rx 1 port to the HDMI output of the repeater device under test.
   d. Connect an HDMI cable from the 882 HDMI Tx 1 port to the EST HDMI port labeled “HDMI IN.”
   e. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”

   The following diagram depicts the test setup for the 882EA:

2. Ensure that the 882 settings used for the 3C-I-0x series described in “To run the 3C-II series HDCP compliance tests on an HDMI repeater:” on page 743, are maintained during this test. This includes selection of the HDMI interface, selection of the key PCP parameters such as the device type, etc.

3. To run 3C-I-01 tests using the short read with the encryption enable pulse positioned at the beginning of the vsync pulse, enter the following commands:

   ```
   CPTX:CRIP 0    // Specifies short read.
   CPTX:CPTU      // Initiates the execution of the test.
   ```

4. To run 3C-I-01 tests using the combined read with the encryption enable pulse positioned at the beginning of the vsync pulse, enter the following commands:

   ```
   CPTX:CRIP 1    // Specifies combined read.
   CPTX:CPTU      // Initiates the execution of the test.
   ```

   Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.
To run the 3C-II series HDCP compliance tests on an HDMI repeater:

For the 882E releases prior to 2.17.x, the 3C-II-01 test is run for each of the two read configurations: 1) short read and 2) combined read. For the 2.17.x release, these multiple iterations are handled in the batch mode but you can choose to run them through the command line as well.

Refer to “To run the 3C-II-01 HDCP compliance test on an HDMI repeater:” on page 750 for procedures on running the 3C-II-01 test in both configurations.

1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the repeater device under test input to the EST HDMI port labeled, “HDMI OUT.”
   c. Connect an HDMI cable from the 882 HDMI Rx 1 port to the HDMI output of the repeater device under test.
   d. Connect an HDMI cable from the 882 HDMI Tx 1 port to the EST HDMI port labeled “HDMI IN.”
   e. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”

The following diagram depicts the test setup for the 882EA:
2. For the 882CA connect the cables as follows:
   a. Connect an HDMI cable from the repeater device under test output to the 882 HDMI Rx 1 port.
   b. Connect an HDMI cable from the 882 HDMI Tx 1 port to the HDMI input of the repeater device.

The following diagram depicts the test setup for the 882CA:

3. Activate the HDMI-H interface on the output port as follows:
   c. Press the Interface key. A listing of signal interfaces appears on the generator’s display as shown below.

   | VGA     | CVBS  |
   | HDMA-D  | S-VIDEO |
   | HDMI-H  | SDI    |

   d. Choose the HDMI-H item by pressing the adjacent soft key. The interface is activated and the display is shown below.

   | VGA     | CVBS  |
   | HDMA-D  | S-VIDEO |
   | *HDMI-H | SDI    |

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   XVSI 4 // Activates the HDMI-H interface
   ALLU   // Applies the interface setting to the generator

4. Press the Interface key repeatedly until the following menu appears:

   | * HDMI IN 1 |
   | HDMI IN 2  |
5. Choose the HDMI IN 1 by pressing the adjacent soft key.

6. For the 882E when using the EST, verify that the source is sending in video using the timing measurement function of the analyzer. Refer to “To view timing information of an external HDMI/DVI source signal on a display:” on page 246 for information on running the timing test.

   Verify that the source is outputting one of the following formats:
   • 640x480p at 59.94/60Hz
   • 720x480p at 59.94/60Hz
   • 720x576p at 50Hz

   Verify that the source is outputing the RGB mode:

   If the 882 cannot detect the incoming video, enter the following command to turn on the EST:
   
   QD:PROD:EST // Turns on the EST.

7. Press the Tools key and choose the Reports item by pressing the adjacent soft key.

   The following is displayed on the generator’s LCD.

   !CompRpt EditPCP

   Note: You can set the Product Capabilities Parameters through the Compliance Controller, see instructions in Step 9 below.

8. Select HDCP to access the HDCP compliance test menu.

   The following is displayed on the generator’s LCD.

9. Select EditPCP to define the capabilities of the HDCP device under.

   The following is displayed on the generator’s LCD.

   Source :DUT Type
   0 :Source_Max_KSV
   1 :Source_Authentication_CNT
   +Source_Out_OnlyRep ↓
The following table describes the test parameters and their settings (gray = N/A).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUT type</td>
<td>The type of device under test. This can be one of Sink, Source, Repeater, Repeater3AB, or Repeater3C. For this test, select Repeater3C.</td>
</tr>
<tr>
<td>Source Max KSV</td>
<td>Specifies the maximum number of KSVs the source can read. The valid values are 1 through 127.</td>
</tr>
<tr>
<td>Source Authentication Control</td>
<td>Specifies the number of times a source DUT attempts authentication before transitioning into the authentication state. The valid values are 1 or greater.</td>
</tr>
<tr>
<td>Source Out Only Rep</td>
<td>Indicates whether the DUT outputs contents to a repeater to which no downstream device is connected. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Features Supported</td>
<td>Indicates whether the DUT supports Advanced Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Sink 1.1 Audio Supported</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater 1.1 Features Supported</td>
<td>Indicates whether supports Advanced Cipher mode and Enhanced Link Verification. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater Audio Support</td>
<td>Indicates whether the DUT supports audio output. The values are + for yes and - for no.</td>
</tr>
<tr>
<td>Repeater HPD Pulse</td>
<td>Indicates whether the DUT has the capability to output HPD pulse by user operation. The values are + for yes, repeater DUT allows the user to initiate a HPD; and - for no, the repeater DUT does not support a user to manually force of a hot plug pulse.</td>
</tr>
<tr>
<td>Repeater Max KSV</td>
<td>Specifies the maximum number of KSVs the repeater can read. The valid values are 2 through 127.</td>
</tr>
<tr>
<td>Repeater Out Only Rep</td>
<td>Indicates whether the DUT outputs content to the downstream repeater that has no downstream device connected. The values are + for yes, the repeater will forward encrypted video to a downstream repeater when there are no other downstream devices; and - for no, the repeater will not forward encrypted video to a downstream repeater when there are no other downstream devices.</td>
</tr>
</tbody>
</table>

Alternatively you can define the PCP parameters through the Compliance Controller. Launch the Compliance Controller using the procedures in "To launch the Compliance Controller:" on page 688. Specify the values using the check box and entry fields using the information in the following steps and then click on the **Use PCP** activation button.
Select **Repeater3C** device by pressing the adjacent soft key to specify that the device under test is a repeater.

The following is displayed on the generator's LCD.

```
Repeater3C :DUT Type
0 :Source_Max_KSV
1 :Source_Authen_Cnt
+Source_Out_OnlyRep
```

Alternatively, you can specify the device under test as a repeater using the following commands:

```
CPTX:DUT 4 // specifies the device under test as a repeater.
```

You can query the current value of the parameter with:

```
CPTX:DUT? // returns the device under test type.
```
1. (Optional) Specify the remaining parameters in the **EditPCP** menu using the table above.

   Alternatively, you can specify the parameters through the command line as follows:

   - **CPTX:RPFT 0** // indicates whether DUT (repeater) supports 1.1 features such as Advanced Cipher and Enhanced Link Verification. 1 = yes; 0 = no.
   - **CPTX:RKS 10** // specifies maximum number of downstream devices that can be supported in the repeater’s KSV list
   - **CPTX:ROOR 0** // indicates whether DUT (repeater) outputs outputs content to the downstream repeater that does not have any downstream device connected. 1 = yes; 0 = no.

2. Press the **Options** key to save the capabilities definition.

   The generator LCD will display the message “Saved”.

3. Press the **Tools** key get back to the Reports menu.

   The generator LCD will display the reports menu as shown below.

   ![Reports Menu]

4. Select **HDCP** to access the HDCP compliance test menu.

   The following is displayed on the generator’s LCD.

   ![HDCP Menu]

5. Select **!CompRpt** to initiate the HDCP compliance test.

   The message “HDCP Compliance Test” is shown and then all the tests are shown in sequence.

   Alternatively, you can run the tests using the following command:

   **CPTX:CPTR 46** // specifies that all applicable tests will be run.
CPTX:CPTU // Initiates the execution of the test

Refer to "To view the HDCP compliance report:" on page 752 for procedures on how to view the generated report.

Another alternative is that you can initiate the tests through the Compliance Controller. Specify the tests you want to run using the check boxes and then click on the Run Tests activation button.

(Optional) To run a specific test you can use the command line as shown below:

CPTX:CPTR 37 // Selects specific test (e.g. 3C2_01) see table below
CPTX:CPTU // Initiates the execution of the test

You can query the complete list of tests to choose from:

CPTX:GCTN? // Queries the list of tests supported

You can query the currently selected test to run with:

CPTX:CPTR? // Queries the selected test to run (see table)
The following table describes the tests that can be performed.

<table>
<thead>
<tr>
<th>CPTX:CPTR</th>
<th>Test Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>3C_II_01 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
<tr>
<td>38</td>
<td>3C_II_02 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
<tr>
<td>39</td>
<td>3C_II_03 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
<tr>
<td>40</td>
<td>3C_II_04 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
<tr>
<td>41</td>
<td>3C_II_05 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
<tr>
<td>42</td>
<td>3C_II_06 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
<tr>
<td>43</td>
<td>3C_II_07 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
<tr>
<td>44</td>
<td>3C_II_08 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
<tr>
<td>45</td>
<td>3C_II_09 (Repeater Upstream w/Transmitter) (Between HDMI Capable Transmitter and Repeater)</td>
</tr>
</tbody>
</table>

To run the 3C-II-01 HDCP compliance test on an HDMI repeater:

For the 882E releases prior to 2.17.x, the 3C-II-01 tests are required to be run with 2 different set ups through the command line for both read configurations: 1) short read and 2) long read.
1. For the 882E analyzer connect the cables as follows:
   a. Apply power to the Encryption Status Tester (EST) using the power adapter supplied with the EST.
   b. Connect an HDMI cable from the repeater device under test input to the EST HDMI port labeled, “HDMI OUT.”
   c. Connect an HDMI cable from the 882 HDMI Rx 1 port to the HDMI output of the repeater device under test.
   d. Connect an HDMI cable from the 882 HDMI Tx 1 port to the EST HDMI port labeled “HDMI IN.”
   e. Connect an HDMI cable from the 882 HDMI Tx 2 port to the EST HDMI port labeled “HDMI.”

The following diagram depicts the test setup for the 882EA:

2. Ensure that the 882 settings used for the 3C-II-0x series described in “To run the 3C-II series HDCP compliance tests on an HDMI repeater:” on page 743, are maintained during this test. This includes selection of the HDMI interface, selection of the key PCP parameters such as the device type, etc.

3. To run 3C-II-01 tests using the short read with the encryption enable pulse positioned at the beginning of the vsync pulse, enter the following commands:
   CPTX:CRIP 0  // Specifies short read.
   CPTX:CPTU  // Initiates the execution of the test.

4. To run 3C-II-01 tests using the combined read with the encryption enable pulse positioned at the beginning of the vsync pulse, enter the following commands:
   CPTX:CRIP 1  // Specifies combined read.
   CPTX:CPTU  // Initiates the execution of the test.

Refer to “To view the HDCP compliance report:” on page 752 for procedures on how to view the generated report.
To view the HDCP compliance report:

1. Open a Web browser (such as Internet Explorer) and type the generator's IP address in the address entry field. For example, enter the following: http://206.135.215.189/
The generator home page appears in the browser.

Note: You can add the page to your list of favorite pages in your Web browser to avoid retyping the IP address each time you want to access the page.
2. Choose the **Generated Reports** item. The Generator the provides a list of reports currently available as shown below.

3. Select the HDCP compliance test report from the list. The report then appears in the browser window as shown below. You can then save the report as a web page file for distribution. The following is an example of a report for the HDCP compliance test for a display.
The following is an example of a report for the HDCP compliance test for a source (player).
**Generator Information**

- Model: 882CA
- Unit Revision: A
- Unit SN: 6050019
- Date: 05042006
- Firmware: 20.1833502
- Unit Under Test Type: Player

**PCP Selections**

- Source_Max_KSV = 0
- Source_Adlbe_Count = 0
- Source_Out_OnlyRep = NO
- Sink_1.1Features_Supported = NO
- Sink_Audio_Supported = NO
- Repeater_1.1Features_Supported = NO
- Repeater_Audio_Supported = NO
- Repeater_HPD_Pulse = NO
- Repeater_Max_KSV = 0
- Repeater_Out_OnlyRep = NO

**SOURCE TESTS**

1. Starting Test 1A-01

- Timestamp: 150.49644 secs., Rx read (both bytes).
- Timestamp: 2.12720 secs., Not plug detect timer expired.
- Timestamp: 3.41866 secs., Status read.
- Timestamp: 3.42071 secs., Bumps read.
- Timestamp: 3.42234 secs., Warning. Video Signal is not HDMI mode and is running on
The following is an example of a report for the HDCP compliance test for a repeater.
Running the HDCP compliance test for DisplayPort devices

The 882E supports the running of an HDCP compliance test on HDCP-enabled DisplayPort sinks. The HDCP compliance test was developed while working closely with Digital Content Protection.

**Note:** The HDCP compliance test is an optional feature. You must purchase the optional license for this feature.

The HDCP compliance test system enables developers of DisplayPort products to perform a fast and comprehensive HDCP compliance test. Because the 882E can emulate DisplayPort HDCP sources it can perform an HDCP compliance tests on any sink.

The HDCP compliance test can be run entirely through the 882E front panel or through the command line. The HDCP commands enable you to run a specific subset of the tests in the series of tests.

The following table describes the tests that can be performed (gray = not yet supported).

<table>
<thead>
<tr>
<th>Index</th>
<th>Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1A_01 (Transmitter w/Receiver)</td>
<td>Regular Procedure: With Receiver</td>
</tr>
<tr>
<td>2</td>
<td>1A_02 (Transmitter w/Receiver)</td>
<td>Regular Procedure: HPD After Writing Aksv</td>
</tr>
<tr>
<td>3</td>
<td>1A_03 (Transmitter w/Receiver)</td>
<td>Regular Procedure: HPD During Link Integrity Check Stage</td>
</tr>
<tr>
<td>4</td>
<td>1A_04 (Transmitter w/Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) Failure to Read Bcaps HDCP_CAPABLE Bit</td>
</tr>
<tr>
<td>5</td>
<td>1A_05 (Transmitter w/Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) Verify Bksv</td>
</tr>
<tr>
<td>6</td>
<td>1A_06 (Transmitter w/Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) Verify R0'</td>
</tr>
<tr>
<td>7</td>
<td>1A_07 (Transmitter w/Receiver)</td>
<td>Irregular Procedure: (Link Integrity Check) Link Integrity Failure</td>
</tr>
<tr>
<td>8</td>
<td>1A_08 (Transmitter w/Receiver)</td>
<td>Irregular Procedure: SRM</td>
</tr>
<tr>
<td>9</td>
<td>1A_09 (Transmitter w/Receiver)</td>
<td>Regular Procedure: Encryption Disable Bootstrapping</td>
</tr>
<tr>
<td>10</td>
<td>1B_01 (Transmitter w/Repeater)</td>
<td>Regular Procedure: With Repeater</td>
</tr>
<tr>
<td>11</td>
<td>1B_02 (Transmitter w/Repeater)</td>
<td>Irregular Procedure: Spurious CP_IRQ Interrupt</td>
</tr>
<tr>
<td>12</td>
<td>1B_03 (Transmitter w/Repeater)</td>
<td>Regular Procedure: HPD After Reading R0'</td>
</tr>
<tr>
<td>13</td>
<td>1B_04 (Transmitter w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Timeout of KSV List READY</td>
</tr>
<tr>
<td>14</td>
<td>1B_05 (Transmitter w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify V'</td>
</tr>
<tr>
<td>Index</td>
<td>Test</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>15</td>
<td>1B_06 (Transmitter w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_DEVS EXCEEDED</td>
</tr>
<tr>
<td>16</td>
<td>1B_07 (Transmitter w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_CASCADE EXCEEDED</td>
</tr>
<tr>
<td>17</td>
<td>2A_01 (Receiver w/Transmitter)</td>
<td>Regular Procedure: With Transmitter</td>
</tr>
<tr>
<td>18</td>
<td>2A_02 (Receiver w/Transmitter)</td>
<td>Irregular Procedure: (First Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>19</td>
<td>2A_03 (Receiver w/Transmitter)</td>
<td>Irregular Procedure: (Link Integrity Check) New Authentication</td>
</tr>
<tr>
<td>20</td>
<td>2A_04 (Receiver w/Transmitter)</td>
<td>Regular Procedure: Encryption Disable Bootstrapping</td>
</tr>
<tr>
<td>21</td>
<td>3A_01 (Repeater Downstream w/Receiver)</td>
<td>Regular Procedure: With Receiver</td>
</tr>
<tr>
<td>22</td>
<td>3A_02 (Repeater Downstream w/Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) Failure to Read Bcaps HDCP_CAPABLE Bit</td>
</tr>
<tr>
<td>23</td>
<td>3A_03 (Repeater Downstream w/Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) Verify Bksv</td>
</tr>
<tr>
<td>24</td>
<td>3A_04 (Repeater Downstream w/Receiver)</td>
<td>Irregular Procedure: (First Part of Authentication) Verify R0'</td>
</tr>
<tr>
<td>25</td>
<td>3B_01 (Repeater Downstream w/Repeater)</td>
<td>Regular Procedure: With Repeater</td>
</tr>
<tr>
<td>26</td>
<td>3B_02 (Repeater Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Timeout of KSV List READY</td>
</tr>
<tr>
<td>27</td>
<td>3B_03 (Repeater Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify V'</td>
</tr>
<tr>
<td>28</td>
<td>3B_04 (Repeater Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_DEVS_EXCEEDED</td>
</tr>
<tr>
<td>29</td>
<td>3B_05 (Repeater Downstream w/Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_CASCADE_EXCEEDED</td>
</tr>
<tr>
<td>30</td>
<td>3C_01 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Receiver)</td>
<td>Regular Procedure: Transmitter – DUT – Receiver</td>
</tr>
<tr>
<td>31</td>
<td>3C_02 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Receiver)</td>
<td>Regular Procedure: HPD Propagation when an Active Receiver is Disconnected and Reconnected Downstream</td>
</tr>
<tr>
<td>32</td>
<td>3C_03 (Repeater Upstream w/Transmitter) (Reconnected Downstream)</td>
<td>Regular Procedure: HPD Propagation when an Active Receiver is Disconnected Downstream</td>
</tr>
<tr>
<td>33</td>
<td>3C_04 (Repeater Upstream w/Transmitter) (Downstream)</td>
<td>Regular Procedure: HPD Propagation when an Active Receiver is Connected</td>
</tr>
<tr>
<td>Index</td>
<td>Test</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>34</td>
<td>3C_05 (Repeater Upstream w/Transmitter) (Downstream)</td>
<td>Irregular Procedure: (First Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>35</td>
<td>3C_06 (Repeater Upstream w/Transmitter) (Downstream)</td>
<td>Irregular Procedure: (Second Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>36</td>
<td>3C_07 (Repeater Upstream w/Transmitter) (Downstream)</td>
<td>Irregular Procedure: (Link Integrity Check) New Authentication</td>
</tr>
<tr>
<td>37</td>
<td>3C_08 (Repeater Upstream w/Transmitter) (Downstream)</td>
<td>Irregular Procedure: (Second Part of Authentication) New Authentication</td>
</tr>
<tr>
<td>38</td>
<td>3C_09 (Repeater Upstream w/Transmitter) (Downstream)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify Bksv</td>
</tr>
<tr>
<td>39</td>
<td>3C_10 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Regular Procedure: Transmitter – DUT – Repeater</td>
</tr>
<tr>
<td>40</td>
<td>3C_11 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Regular Procedure: HPD After Writing Aksv</td>
</tr>
<tr>
<td>41</td>
<td>3C_12 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Regular Procedure: HPD After Reading R0'</td>
</tr>
<tr>
<td>42</td>
<td>3C_13 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Regular Procedure: HPD After Starting Third Part of Authentication</td>
</tr>
<tr>
<td>43</td>
<td>3C_14 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) Verify V'</td>
</tr>
<tr>
<td>44</td>
<td>3C_15 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) DEVICE_COUNT</td>
</tr>
<tr>
<td>45</td>
<td>3C_16 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) DEPTH</td>
</tr>
<tr>
<td>47</td>
<td>3C_17 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_DEVS_EXCEEDED</td>
</tr>
<tr>
<td>48</td>
<td>3C_18 (Repeater Upstream w/Transmitter) (Repeater (DUT) Connected to Transmitter (TE) and Repeater)</td>
<td>Irregular Procedure: (Second Part of Authentication) MAX_CASCADE_EXCEEDED</td>
</tr>
</tbody>
</table>
There are several configurations depending on what type of HDCP device you are testing. Procedures for each are provided below.

**To run the 2C series HDCP compliance tests on DisplayPort sinks (receivers):**

1. Connect a cable between the DisplayPort Out connector on the generator and the sink device’s DisplayPort receiver interface with the HDCP function.

   The following diagram depicts the test setup:

   ![Diagram](image)

2. Activate the DisplayPort interface by pressing the **Interface** key and choosing the DisplayPort interface as shown below.

   ![Interface Selection](image)

   Alternatively, to activate the interface through the command line interface, enter the following commands:

   ```
   XVSI 10 // Activates the DisplayPort interface
   ALLU // Applies the interface setting to the generator
   ```

3. Press the **Tools** key and choose the **Reports** item by pressing the adjacent soft key.

   The following is displayed on the generator’s LCD.

   ![Reports Display](image)

4. Select **HDCP** to access the HDCP compliance test menu.

   The following is displayed on the generator’s LCD.

   ![HDCP Menu](image)
5. Select **EditPCP** to define the capabilities of the HDCP device under.

   **Note:** For the sink device tests there are no parameter settings required. You will only need to set the device type to sink.

<table>
<thead>
<tr>
<th>Source :DUT Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>+Src_Fld_CPIRQ_R0'</td>
</tr>
<tr>
<td>+Src_Fld_CPIRQ_RDY</td>
</tr>
<tr>
<td>+Source_Out_OnlyRep</td>
</tr>
</tbody>
</table>

   The following table describes the test parameters and their settings.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Under Test type</td>
<td>The type of device under test. For this test, select Sink (Receiver).</td>
</tr>
</tbody>
</table>

6. Select **Sink** device by pressing the adjacent soft key to specify that the device under test is a sink.

   The following is displayed on the generator's LCD.

<table>
<thead>
<tr>
<th>Sink :DUT Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>+Src_Fld_CPIRQ_R0'</td>
</tr>
<tr>
<td>+Src_Fld_CPIRQ_RDY</td>
</tr>
<tr>
<td>+Source_Out_OnlyRep</td>
</tr>
</tbody>
</table>

   Alternatively, you can specify the device under test as a sink using the following commands:

   CPTX:DUTT 0 // specifies device under test as a sink (receiver)

7. Specify the remaining parameters in the **EditPCP** menu using the table above.

8. Press the **Enter/Options** key to save the capabilities definition.

   The generator LCD will display the message “Saved”.

9. Press the **Tools** key get back to the Reports menu.

   The generator LCD will display the reports menu as shown below.

10. Select **HDCP** to access the HDCP compliance test menu.

    The following is displayed on the generator's LCD.

    ![HDCP Menu](image)
11. Select CompRpt to initiate the HDCP compliance test.

The message “HDCP Compliance Test” is shown and then all the tests are shown in sequence.

Alternatively, you can run the tests using the following command:

CPTX:CPTR 48  // specifies that all applicable tests will be run.
DPRX:CPTU  // Initiates the execution of the test

Refer to “To view the DisplayPort HDCP compliance report:” on page 763 for procedures on how to view the generated report.

12. (Optional) To run a specific test you can use the command line as shown below:

CPTX:CPTR 17  // Selects specific test (e.g. 2A_01) see table below
CPTX:CPTU  // Initiates the execution of the test

You can query the complete list of tests to choose from:

CPTX:GCTN?  // Queries the list of tests supported

You can query the list of completed reports with:

CPTX:CPTR?  // Queries the list of tests run (see table)

The following table describes the applicable tests that can be performed.

<table>
<thead>
<tr>
<th>DPRX: HDCP Index</th>
<th>Test Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 2A_01 (Receiver w/Transmitter)</td>
<td>Regular Procedure: With Transmitter</td>
<td></td>
</tr>
<tr>
<td>18 2A_02 (Receiver w/Transmitter)</td>
<td>Irregular Procedure: (First Part of Authentication) New Authentication</td>
<td></td>
</tr>
<tr>
<td>19 2A_03 (Receiver w/Transmitter)</td>
<td>Irregular Procedure: (Link Integrity Check) New Authentication</td>
<td></td>
</tr>
<tr>
<td>20 2A_04 (Receiver w/Transmitter)</td>
<td>Regular Procedure: Encryption Disable Bootstrapping</td>
<td></td>
</tr>
</tbody>
</table>
To view the DisplayPort HDCP compliance report:

1. Open a Web browser (such as Internet Explorer) and type the generator’s IP address in the address entry field. For example, enter the following: http://206.135.215.189/

   The generator home page appears in the browser.

   ![Quantum Data Virtual Video Display]

   **Note:** You can add the page to your list of favorite pages in your Web browser to avoid retyping the IP address each time you want to access the page.
2. Choose the **Generated Reports** item. The Generator the provides a list of reports currently available as shown below.

---

**Generated Report List**

Click on a link to view the report contents

- DP_Link_Compliance_Sink
  - Timing_Date
  - Edid_Date
- HDCP_Compliance_Sink
  - GunStats
Select the HDCP compliance test report from the list. The report then appears in the browser window as shown below. You can then save the report as a web page file for distribution. The following is an example of a report for the HDCP compliance test for a display.

**HDCP Compliance Report**

**GENERATOR INFORMATION**
- Model: 9823
- Unit Revision: A
- Unit SN: 07120003
- Generator Build Date: 12/04/2007
- Firmware: 20.1085901

**UNIT UNDER TEST INFORMATION (TCP SELECTIONS)**
- Unit Under Test Type: Snk
- DUT DPCD Revision: 1
- DUT Maximum Lane Count: 4
- DUT Maximum Link Rate: 2.70 Gbps
- Enhanced Frame Capable: Y
- Current Lane Count: 4

**SINK TEST SUMMARY**
- **PASS Test 2A-01:** Regular Procedure: With Transmitter: Verify the Receiver’s implementation of the HDCP Transmitter is connected to it.
- **PASS Test 2A-02:** Irregular Procedure: (First Part of Authentication) New Authentication: Verify that a new A and Akey are written by the Transmitter immediately after write of the first A part of authentication.
- **PASS Test 2A-03:** Irregular Procedure: (Link Integrity Check) New Authentication: Verify that the Re a new A and Akey are written by the Transmitter during the link integrity check stage.
- **PASS Test 2A-04:** Regular Procedure: Encryption Disable Bootstrapping: Verify that the Receiver correctly disable bootstrapping.