

Testing HDMI 1.3 displays

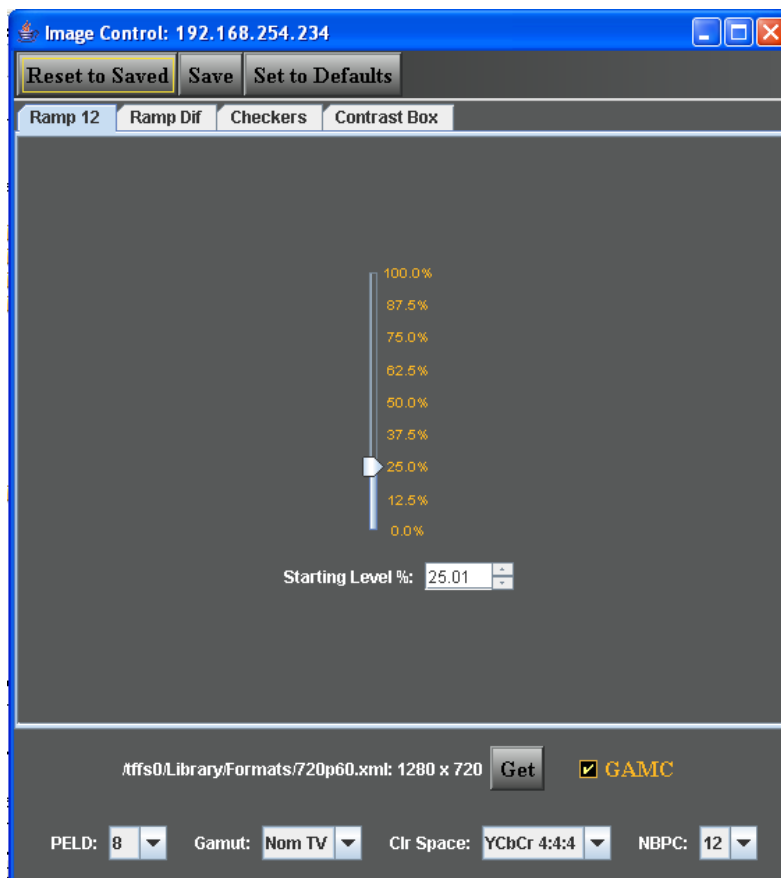
This section provides procedures for testing HDMI 1.3 deep color displays using the 881E or the 882E. There are specific images that have been created to test HDMI 1.3 deep color displays and there is an Image Control Tool accessible from the 881E/882E web page interface that enables you to control these images.

Image Control Tool

There are four images that can be controlled from the Image Control Tool but only three are used to test HDMI 1.3 deep color displays. These are listed and described below:

- Ramp12
- RampDif
- Checkers

The the Image Control Tool is accessible through the generator's home web page. It enables you to change various format and generator parameters, that applied to the test images, through a browser. The following is a view of the Image Control Tool:



The following table describes the functions on the upper most tabs of the Image Control Tool

Tab	Function
Reset to Saved	Resets the current parameter settings on the image to the saved settings.
Save	Saves the parameter settings currently indicated for the image shown
Set to Defaults	Resets the parameter settings to their defaults

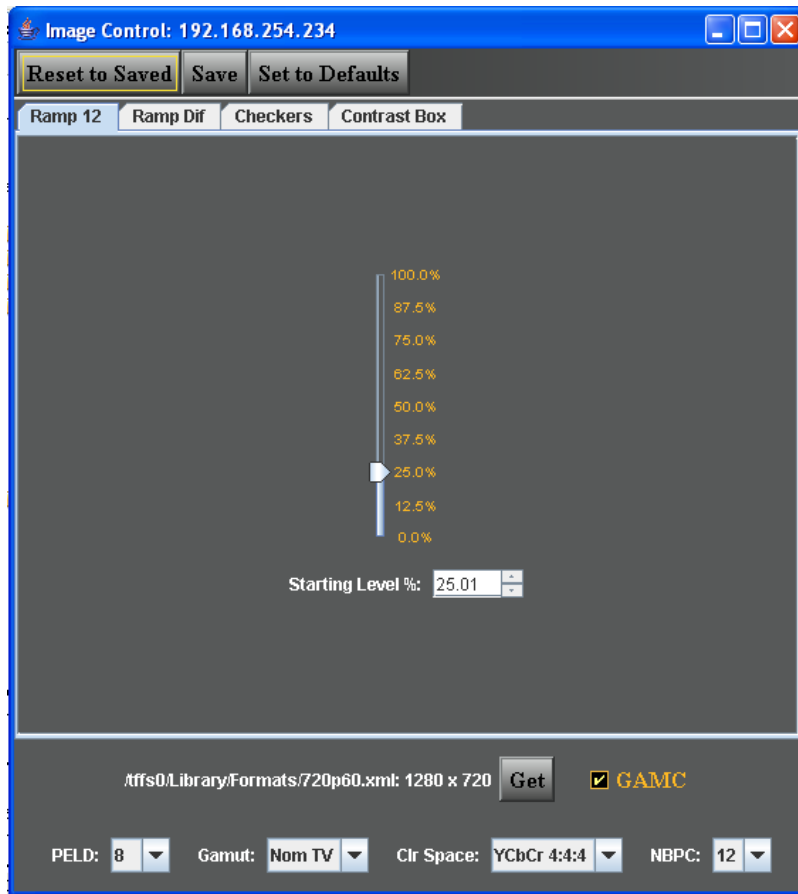
Ramp12 image

This image is used to view a specific range of grayscale levels (ranges up to 1024) throughout the entire range allowed by deep color support in the generator (i.e. 36 bit/pixel or 12-bit/component = 4096). If you set the ramp to display the maximum color depth supported by the display under test you will see a nearly uniform ramp depending on the horizontal resolution of the active format.

The following is a sample of the RampDif image is rendered on a display.



Refer to the image and table below to better understand the configuration and use of this image.



The following table describes the parameters of the Ramp12 image through Image Control Tool.

Function/Field	Function
Starting Level	This slide bar sets the beginning (left most) grayscale level in the ramp. This is expressed as a percentage of the total range defined by the setting of Number of Bits per Component (NBPC) from 0% to 100%. For example, if NBPC is 12 the total range is 4096 with a full gamut setting. Note that the 882E can only display up to 1024 colors or shades of gray simultaneously on one image (if PELD = 32).
PELD	This is the pixel depth within the generator. It defines the number of colors available to the generator for rendering simultaneously on an image. The valid values for the PELD pulldown select box are 8 and 32. A setting of 8 means there is a maximum of 256 on-screen luminance levels. A setting of 32 means there is a maximum of 1024 on screen luminance levels.

Function/Field	Function
Gamut (Range)	Sets the number gamut (range) of the output levels. This corresponds to the DVQM parameter. The values are Max (DVQM=0), MaxTV(DVQM=1) and NomTV (DVQM=2) this is the default for TV formats.
Clr (Color) Space	This pulldown select box specifies the color space. By setting this value to 12, the generator will put out 12 bit/component deep color video. This field corresponds to the DVSM command. Valid values are: RGB (DVSM=0), YCbCr4:2:2 (DVSM=2), YCbCr4:4:4 (DVSM=4).
NBPC	This pulldown select box specifies the color depth per component. By setting this value to 12, the generator will put out 12 bit/component deep color video. When you change this field the setting is applied to the generator. Valid values are 8, 10 and 12.
GET	The GET activation button updates all the fields on the image control in the event changes are made directly on the front panel or through the command line. Associated with the GET activation button is a string of information that tells you what format is currently active.

Note: The generator LCD will not show the updated values changed using the Image Control Tool in real time. You have to press the + key on the generator to update the LCD.

For example, given the following settings:

- Format = 1080i30 (HRES = 1920)
- NBPC = 12 for 12-bit/component color
- PELD = 32 (maximum generator color)
- Clr Space (DVSM) = RGB
- Gamut (DVQM) = NomTV (256 to 3760 [with RGB and NBPC =12])

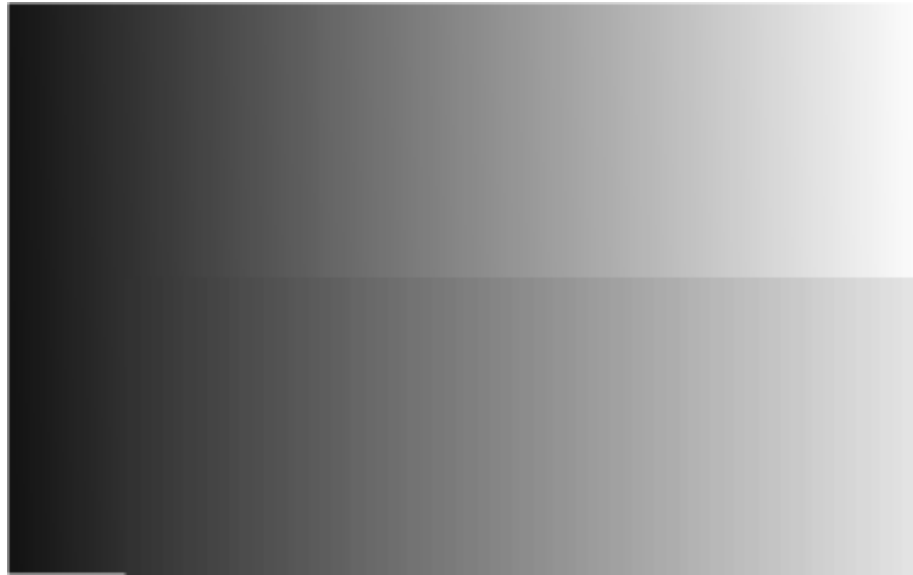
the maximum range available is $(3760 - 256 = 3504)$ grayscale levels. Since PELD is set to 32 (24 pixel depth in the generator) the maximum number or grayscale levels that can be rendered by the generator on a display is 1024. So if you set the **Starting Level** at 25%, the Ramp12 image will begin at the left with a grayscale level of 1132 ($3504 * 0.25 = 876 + 256$) and end at the right with a grayscale level of 2156 ($1132 + 1024 = 2156$). Because the horizontal image resolution of the format is 1920, you would see a ramp with bands of ~ 2.0 pixels each ($1920 / 1024 = 1.89$).

RampDif image

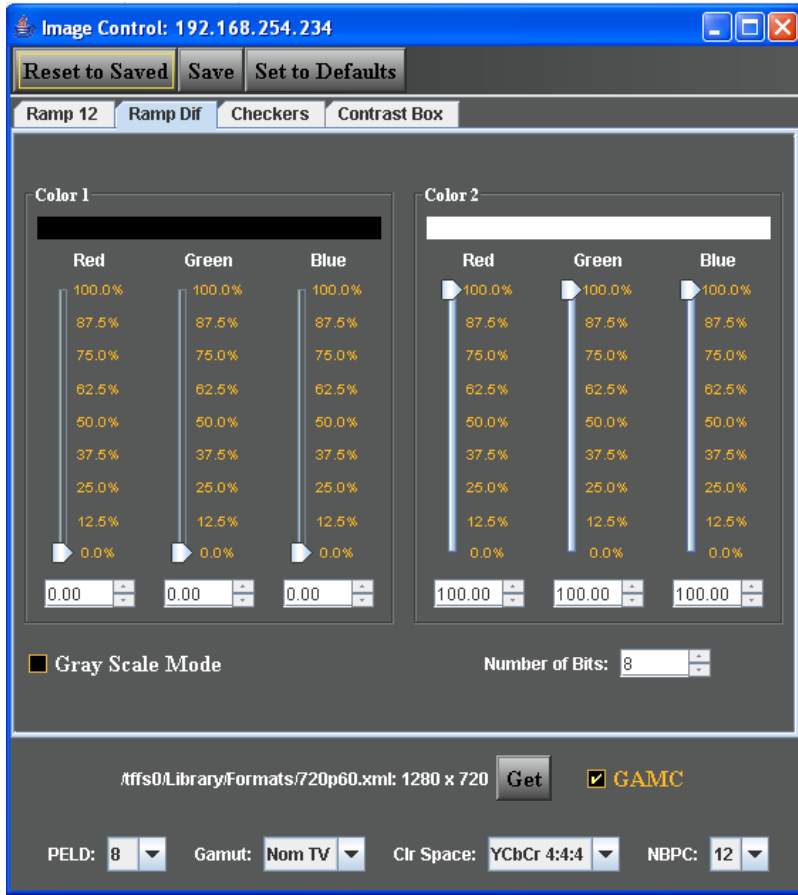
This image has two ramps. One on the top and one on the bottom. It enables you to show a contrast of color depths. For example you can specify that the top ramp use 12-bit/component deep color and the bottom ramp 10-bit color. You can then view the image and see whether banding occurs and how pronounced, in the either of the ramps. If the display under test supports 12-bit/component color, the top ramp will show a near

uniform ramp on the top (depending on the horizontal resolution of the active format). The bottom ramp will show more pronounced banding because the range of the ramp is greater than the color depth.

This image is used to view two specific range of grayscale or color levels (ranges up to 512) throughout the entire range allowed by deep color support in the generator (i.e. 36 bit or 4096). You need to set the pixel depth in the generator to 24 bit (PELD = 32) in order to access 512 grayscale or color levels on a single image rendered on a display. The following is a sample of the RampDif image is rendered on a display.



Refer to the image and table below to better understand the configuration and use of this image.



The following table describes the parameters of the Image Control Tool.

Function/Field	Function
Color 1	These slide bars set the beginning color component and grayscale level (left most value) of the top and bottom ramps. This is expressed as a percentage of the total range defined by the setting of Number of Bits per Component (NBPC) from 0% to 100%. For example, if NBPC is 12 the total range is 4096 with a full gamut setting. Note that the 882E can only display up to 512 colors simultaneously for each ramp on this RampDif image (if PELD = 32).
Color 2	These slide bars set the ending color component and grayscale level (right most value) of the top and bottom ramps. This is expressed as a percentage of the total range defined by the setting of Number of Bits per Component (NBPC) from 0% to 100%. For example, if NBPC is 12 the total range is 4096 with a full gamut setting. Note that the 882E can only display up to 512 colors simultaneously for this RampDif image (if PELD = 32).

Function/Field	Function
PELD	This is the pixel depth within the generator. It defines the number of colors available to the generator for rendering simultaneously on an image. The valid values for the PELD pulldown select box are 8 and 32. A setting of 8 means there is a maximum of 256 on-screen luminance levels per ramp. A setting of 32 means there is a maximum of 1024 on screen luminance levels but only 512 per ramp.
Gamut (Range)	Sets the number gamut of the output signal. This corresponds to the DVQM parameter. The values are Max (DVQM=0), MaxTV(DVQM=1) and NomTV (DVQM=2) this is the default for TV formats.
Clr (Color) Space	This pulldown select box specifies the color space. By setting this value to 12, the generator will put out 12 bit/component deep color video. When you change this field the setting is applied to the generator. This field corresponds to the DVSM command. Valid values are: RGB (DVSM=0), YCbCr4:2:2 (DVSM=2), YCbCr4:4:4 (DVSM=4).
NBPC	This pulldown select box specifies the color depth per component on the <i>top</i> ramp. By setting this value to 12, the generator will put out 12 bit/component deep color video on the top ramp. Valid values are 8, 10 and 12.
Number of bits	This pulldown select box specifies the color depth per component on the <i>bottom</i> ramp. By setting this value to 12, the generator will put out 12 bit/component deep color video on the bottom ramp. Valid values are 4-12.
Grayscale mode	When checked this will set all three slide bars for each color component on each Color 1 and Color 2 to the same value. When unchecked you are free to set each color component to any value.
GET	The GET activation button updates all the fields on the image control in the event changes are made directly on the front panel or through the command line. Associated with the GET activation button is a string of information that tells you what format is currently active.

Note: The generator LCD will not show the updated values changed using the Image Control Tool in real time. You have to press the + key on the generator to update the LCD.

For example given the following settings:

- Format = 720p60 (HRES = 1280)
- NBPC = 12 for 12-bit/component color
- Number of Bits = 8 for 8-bit/component color
- PELD = 32 (maximum generator color)
- Clr Space (DVSM) = RGB
- Grayscale mode = Checked (enabled)

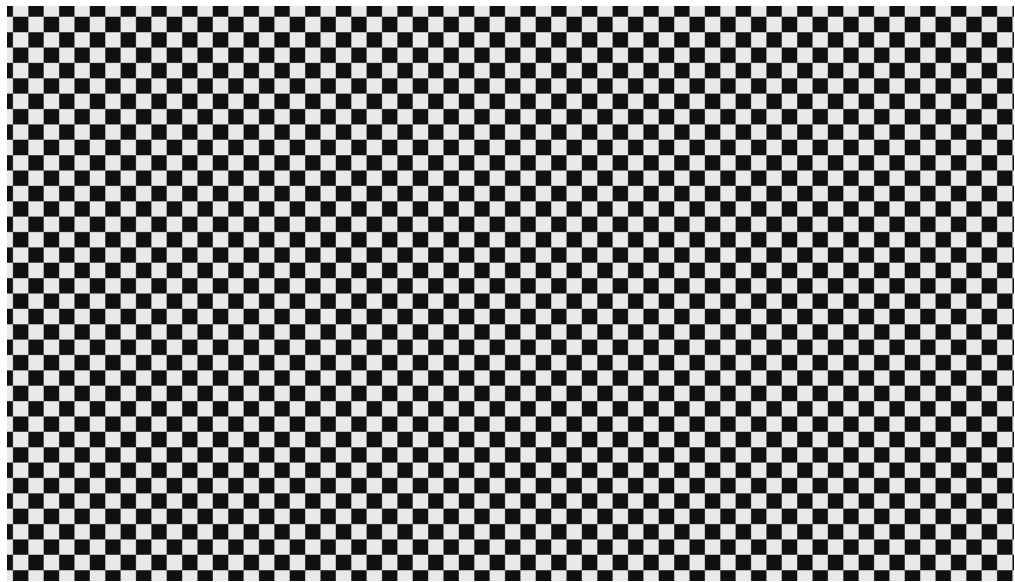
- Gamut (DVQM) = NomTV (256 to 3760 [with RGB and NPBC =12])

the maximum range available is $(3760 - 256 = 3504)$ grayscale levels. Since PELD is set to 32 (24 bit depth) the maximum number of grayscale levels that can be rendered by the generator on a display with the RampDif image is 1024 (512 per ramp). So if you set the **Color1** slide bar at 25% and the **Color2** slide bar at 75%, the level on the left of the ramps would be 1132 ($[3504 * 0.25] + 256 = 1132$) and the level on the right end would be 2884 ($[3504 * 0.75] + 256 = 2884$). Since the top ramp can render 512 distinct levels you would see bands of ~2.5 pixels each ($1280 / 512 = 2.5$). Since the bottom ramp can render 256 distinct levels you would see bands of 5.0 pixels each ($1280 / 256 = 5.0$).

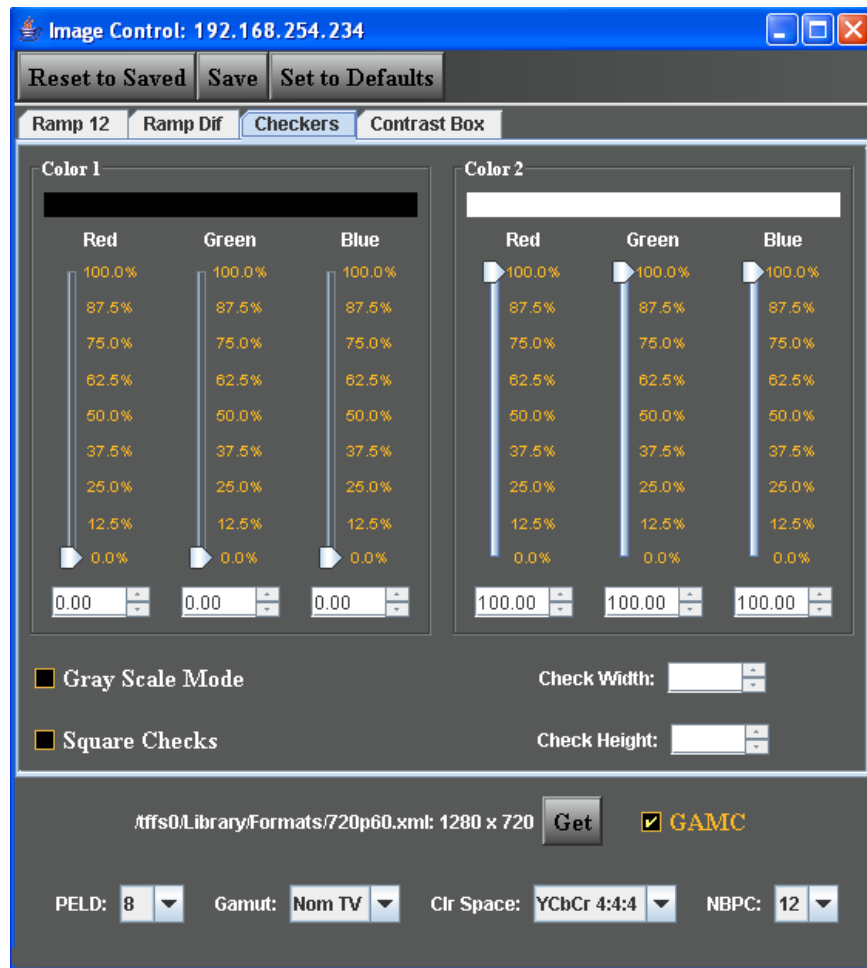
Checkers image

This image has two color checker type arranged in a checker board pattern. It enables you to show a contrast of color depth for each type of checker type. For example you can specify one tile to use 12 bit deep color and the other checker tile to use 10 bit color. You can then view the image and see whether distinguish between the two checker types. You need to set the pixel depth in the generator to 24 bit (PELD = 32) in order to access 512 grayscale or color levels for each tile for a single image rendered on a display.

The following is a sample of the Checkers image is rendered on a display.



Refer to the image and table below to understand the configuration and use of this image.



The following table describes the parameters of the Image Control Tool.

Function/Field	Function
Color 1	These slide bars set the color component and grayscale level for one set of tiles. This is expressed as a percentage of the total range defined by the setting of Number of Bits per Component (NBPC) from 0% to 100%. For example, if NBPC is 12 the total range is 4096. Note that the 882E can only display up to 512 colors simultaneously for each tile on this image.
Color 2	These slide bars set the color component and grayscale level for one the other set of tiles. This is expressed as a percentage of the total range defined by the setting of Number of Bits per Component (NBPC) from 0% to 100%. For example, if NBPC is 12 the total range is 4096. Note that the 882E can only display up to 512 colors simultaneously for each tile on this image.

Function/Field	Function
PELD	This is the pixel depth within the generator. It defines the number of colors available to the generator for rendering simultaneously on an image. The valid values for the PELD pulldown select box are 8 and 32. This parameter does not effect this image.
Gamut (Range)	Sets the number gamut of the output signal. This corresponds to the DVQM parameter. The values are Max (DVQM=0), MaxTV(DVQM=1) and NomTV (DVQM=2) this is the default for TV formats.
Clr (Color) Space	This pulldown select box specifies the color space. By setting this value to 12, the generator will put out 12 bit/component deep color video. This field corresponds to the DVSM command. Valid values are: RGB (DVSM=0), YCbCr4:4:2 (DVSM=2), YCbCr4:4:4 (DVSM=4).
NBPC	This pulldown select box specifies the color depth per component on the <i>top</i> ramp. By setting this value to 12, the generator will put out 12 bit/component deep color video on the top ramp. Valid values are 8, 10 and 12.
Grayscale mode	When checked this will set all three slide bars for each color component on each Color 1 and Color 2 to the same value. When unchecked you are free to set each color component to any value.
Square Checks	Fixes the aspect ratio of the tiles to be the same width and height.
Check Width	Determines the width of each tile (checker element)
Check Height	Determines the height of each tile (checker element)
GET	The GET activation button updates all the fields on the image control in the event changes are made directly on the front panel or through the command line. Associated with the GET activation button is a string of information that tells you what format is currently active.

Note: The generator LCD will not show the updated values changed using the Image Control Tool in real time. You have to press the + key on the generator to update the LCD.

For example given the following settings:

- NBPC = 12 for 12-bit/component color
- Clr Space (DVSM) = RGB
- Grayscale mode = Checked (enabled)
- Gamut (DVQM) = NomTV (256 to 3760 [with RGB and NBPC =12])

the maximum range available is $(3760 - 256 = 3504)$ grayscale levels. So if you set the **Color1** slide bar at 50% and the **Color2** slide bar at 51%, the level for **Color1** tiles would be 2008 ($[3504 * 0.50] + 256 = 2008$) and the level for **Color2** tiles would be 2043 ($[3504 * 0.51] + 256 = 2043$). If the display under test supports 12 bit deep color you would be able to distinguish between the two tiles because the difference in the value (or grayscale) level between the two tiles would be within the granularity of a 12-bit/component display.

Accessing the Image Control Tool

The procedures below describe how to access the Image Control Tool.

To access the Image Control Tool:

1. Set up the generator for HDMI output. See “[Setting up the generator for HDMI testing](#)” on page 272.
2. Press the **Source** key and select the desired format.

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

```
FMTL format_name  
FMTU
```

3. 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.



4. Select the Image Control Tool link.

The Image Control Tool appears in the browser.

