The DICE Control Panel

Overview and Customization Guide

Doc Rev 0.2

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Revision history		
When	Who	What
2008-09-02	BK	Document Started. – 0.1
2008-10-11	BK	0.2 - Updated for revision 3.4.x

1. New in 3.4.x

In this revision, for Windows users there are changes to the driver WDM implementation which are noticeable in the Control Panel.

- WDM is now always enabled, so the option to enable/disable has been removed.
- Speaker Configuration (aka Speaker Setup in Windows) is no longer settable in the Control Panel, and is always managed by the User in the Windows Sounds and Audio Devices control panel. The corresponding controls have been removed from the Control Panel.
- There are always 8 channels in and 8 channels out for WDM. This is reflected in the WDM Channel Mapper window, which is accessed in the WDM 'tab' in the Global Setting area.
- The channel mapper has also been reworked and allows unmapping of channels (drag a map out of the list) and has a reset button which sets all of the first 8 wdm channels to the first 8 device channels (or as many channels as the device supports).

2. Overview

The DICE Control Panel is a cross-platform application which controls and monitors 1394 devices that are based on the DICE chip family.

This document describes how the application is used, and also how it may be customized and branded by the vendor without recompiling from sources. This is intended for developers and not for end-users, although vendors are free to copy parts of it for use in their own documents.

The sources are based on the Platform Abstraction Layer (PAL) provided by TCAT, and the JUCE API provided by Raw Material Software. See the TCAT Forums at http://www.tctechnologies.tc/forum/ for more information on these libraries.

The PAL is an abstraction of the DiceDriver implementation (provided by TCAT) and the AV/C interface as provided elsewhere.

Licensing

Vendors who are DICE Licensees may redistribute the Control Panel binaries that are complied by TCAT without additional licenses.

All source code for the app is available to DICE Licensees. Vendors who wish to make changes to the source code and compile their own versions should consult the TCAT forums and the JUCE software website before distributing the applications.

Customized Drivers and Control Panel

Vendors who are DICE Licensees may use and redistribute Host application binaries with their products. Vendors who do this will send TCAT some information that is required to customize the Drivers and Control Panel with their vendor identifiers, logo, and Control Panel defaults (outlined below). TCAT will provide regular customized builds of the driver, Host tools (Mac and PC), and Installer programs on our Subversion server.

3. Control Panel Functions

Not every function is described here, just the ones that have something notable.

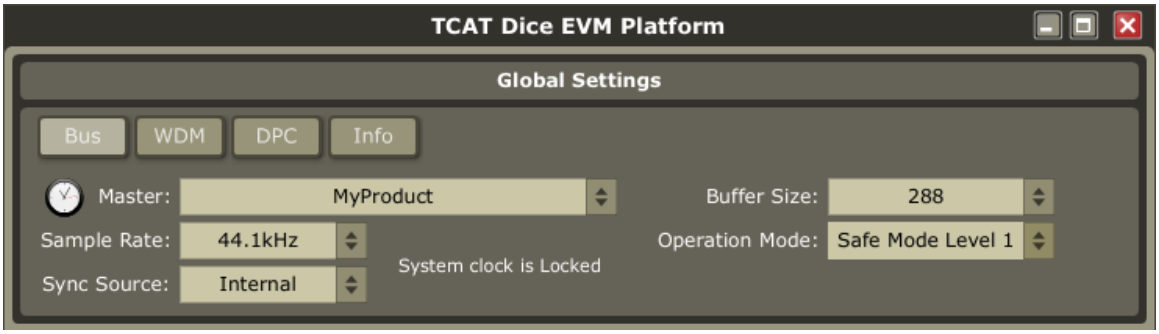
The Control Panel is divided into two main areas, Global Settings and Device Settings.

Global Settings

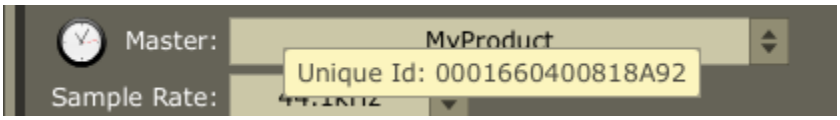
All system related settings are here, grouped into a number of “Tabs” which are activated by a row of buttons.

Bus tab

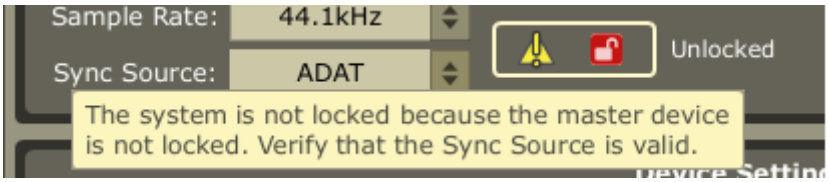
Contains controls for choosing the system Clock Master device, Sample Rate, Sync Source, Buffer size (Windows Only), and Operation Mode are on this tab.



When the mouse hovers over the Master combo box, a ToolTip will appear showing the 1394 unique ID of the device:



The Sample Rate and Sync Source always refer to the selected clock master. When the master device is not locked, a waning icon will appear under the Master combo box. The User can hover the mouse over the lock status icons or text to see a ToolTip describing what the status is in plain words.



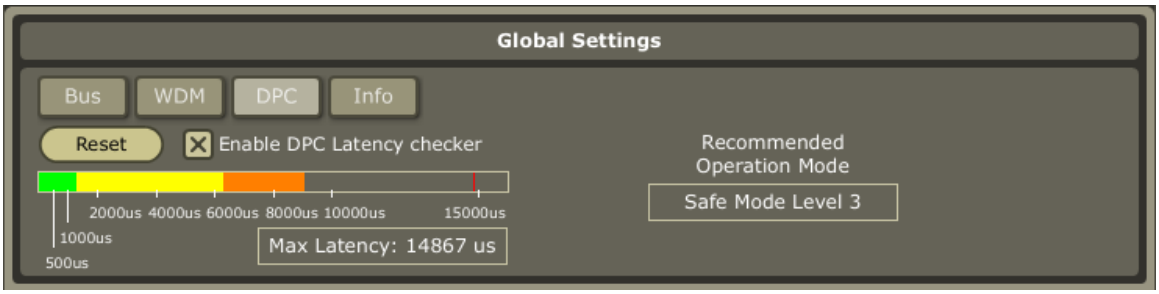
The Buffer Size combo contains a number of predefined sizes in its drop-down menu, or the user may type in a value. Depending on the setting, the driver may round the value and the current Operation Mode will enforce limits on the buffer size, so the resulting value may not always be the same as what is entered.

Some devices report only one Sample Rate and Sync source. In this case the Control Panel may be configured to make the corresponding control invisible to the user. The configuration for visibility of these controls is explained later.

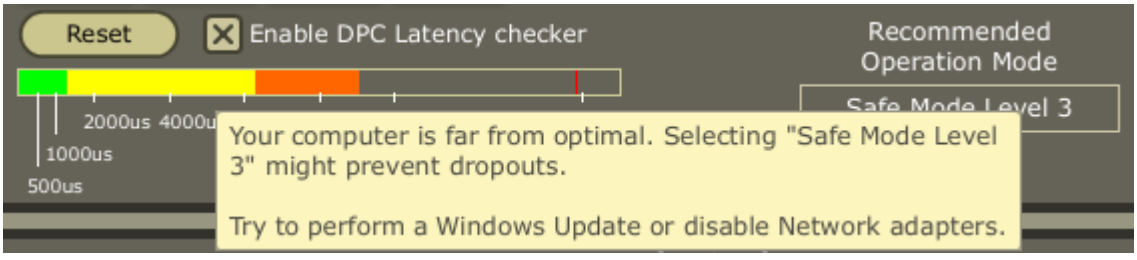
The Operation Mode enforces buffer levels which help the end-user prevent performance-related dropouts when using audio on their computer. The higher the Mode number, the less chance of audio artifacts, with the sacrifice of increased system latency. Dropouts are caused of course by the configuration of the computer, and also by what other applications are running at the time, and lastly by the worst-case DPC latency caused by other drivers. Network drivers, for example, are a notorious source of latency on an otherwise high-performance computer.

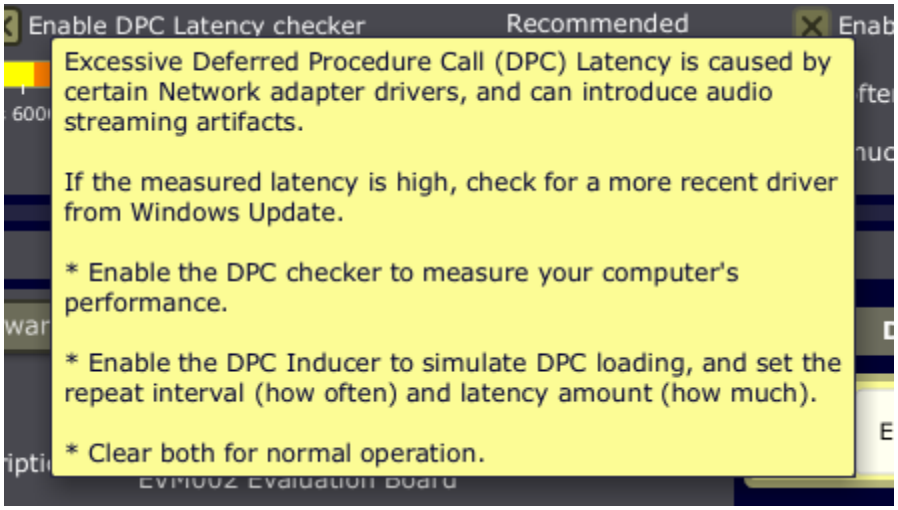
DPC tab

This is a Windows-only tab. The optional DPC tab can be used to measure the DPC latency of the user's computer and will suggest an optimal Operation Mode. If the DPC measuring is enabled, it will continue to measure even if a different tab is selected. This allows the user to make changes in the Control Panel and work as they usually would with other applications to get the most realistic peak latency measurement.

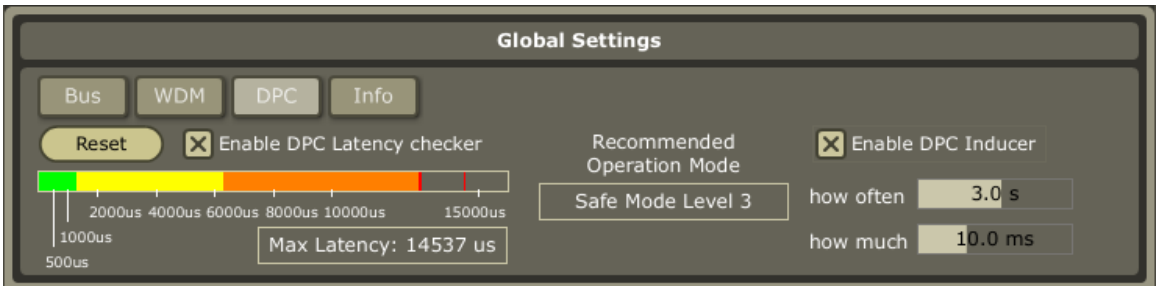


When the mouse is hovered above the various controls, a ToolTip window will show relevant info.



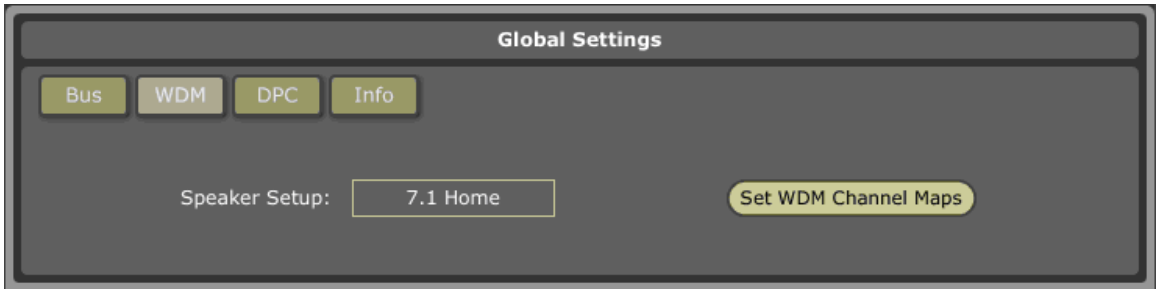


When the DPC inducer is not enabled and visible
This tab also contains an optional DPC inducer, so the effects of increased latency can be observed. This is rarely made visible to the end-user. Visibility of optional elements is described later in this doc. The inducer is automatically disabled when the user switches to another tab.

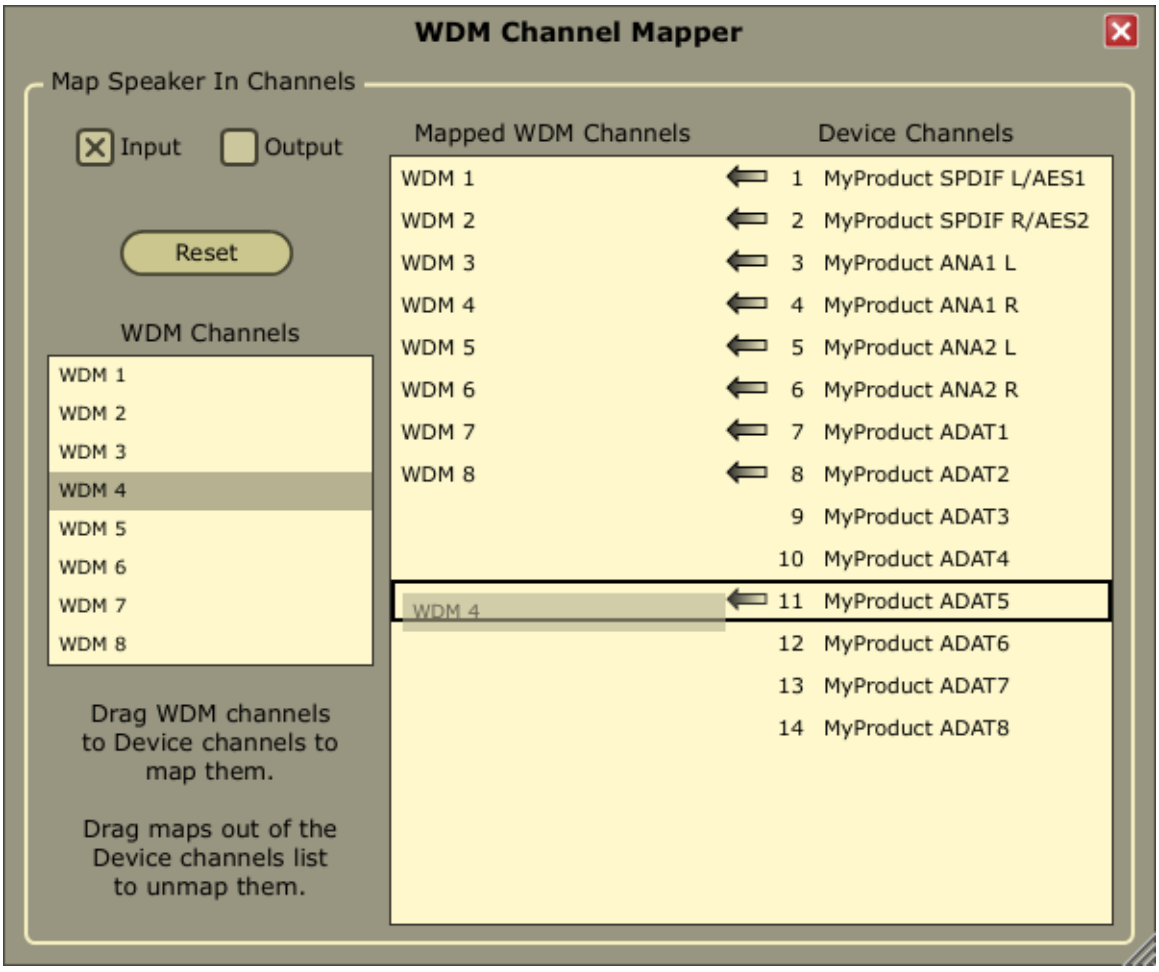


WDM tab

This is a Windows-only tab. Here the current Speaker Setup is shown, and the User can open the WDM Cannel Mapper window from here.



WDM channel mappings are set in a drag-and-drop interface.



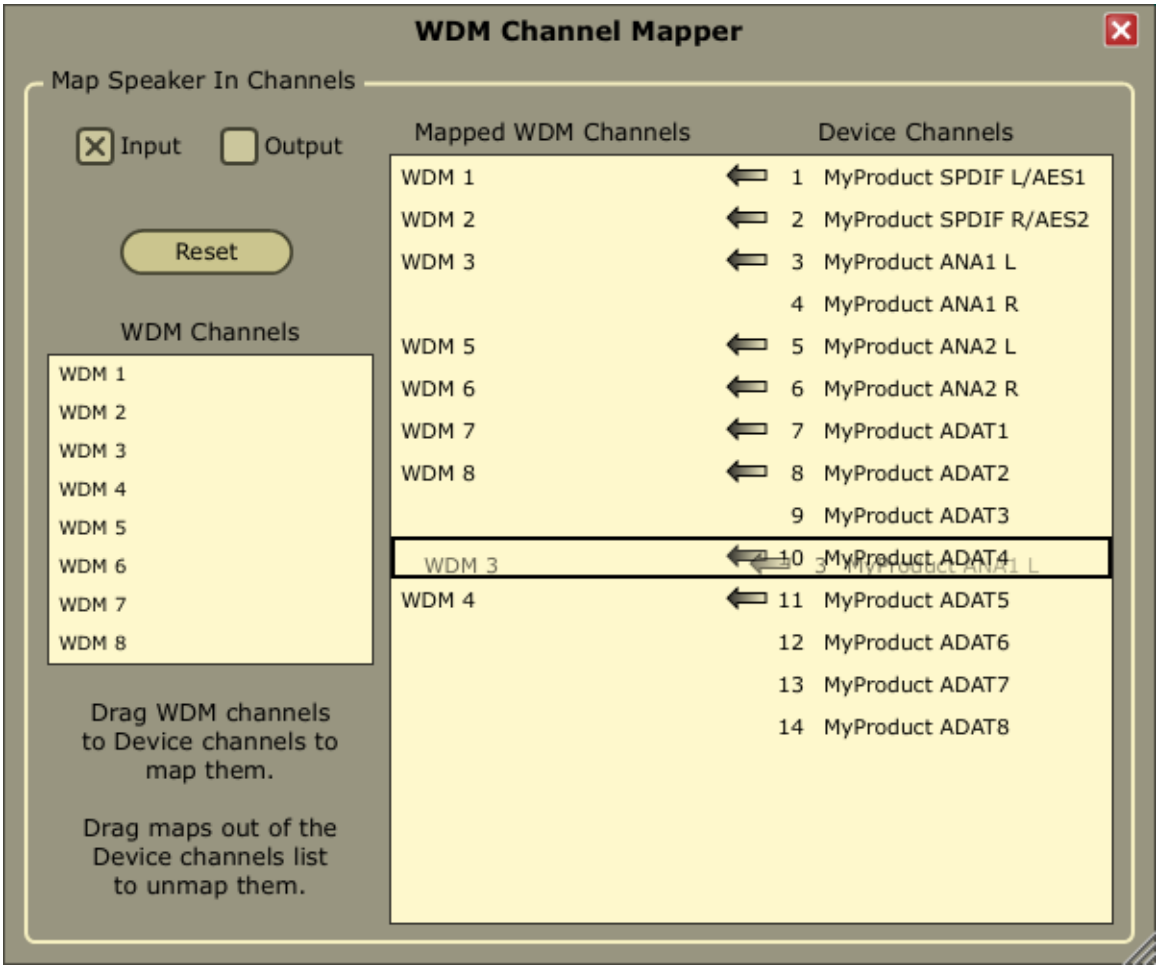
Here a WDM input channel is being mapped to a device channel by dragging a channel from the WDM Channels list into the Device Channels list. If a WDM Channel is dragged onto an existing map in the Device Channel list, the WDM channel corresponding to the existing map is unmapped, and the map for that Device Channel is then overwritten.

Reset

When the Reset button is pressed, each of the WDM channels will be mapped to the first 8 device channels (or the first of the device channels if less than 8). If the channel mapper is in Input mode, only the input channels are affected by the Reset button, similarly with output mode.

Remap

An existing map can be moved within the device channels list. Below, an existing map of a WDM output channel is being moved to another device channel.

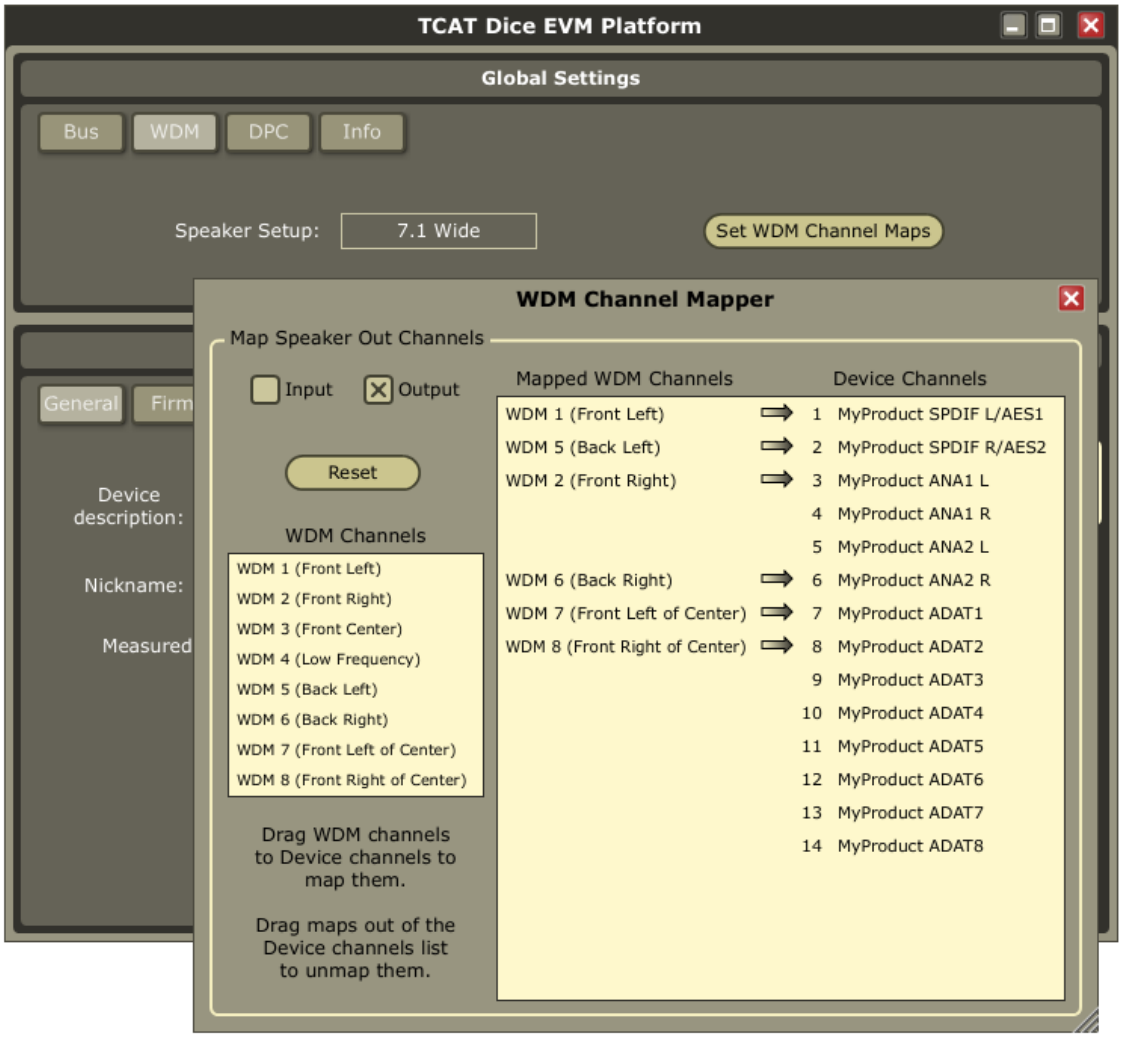


Unmap

In some cases, the User may want to remove a Device Channel map, and unmap the WDM channel. A mapped channel can be unmapped by dragging it out of the Device Channels list.

Speaker Setup and WDM Channel names

For some output Speaker Setups (configured in the Windows Sounds and Audio Devices control panel), there are no channel names for certain WDM channels so the WDM channels are always named “WDM <n>” and their WDM speaker name is added if they are in the current Speaker Setup. See below for how this looks with 7.1 Wide speaker setup for example. The example also shows that WDM channels 3 and 4 have been unmapped.



Info tab

This tab shows the PAL version that is compiled into the application as well as the version of the driver that was found, if any. Also, there are placeholders here for three Vendor Strings and an image. Shown below are the default string and image. **Vendor control of these elements is described below.**

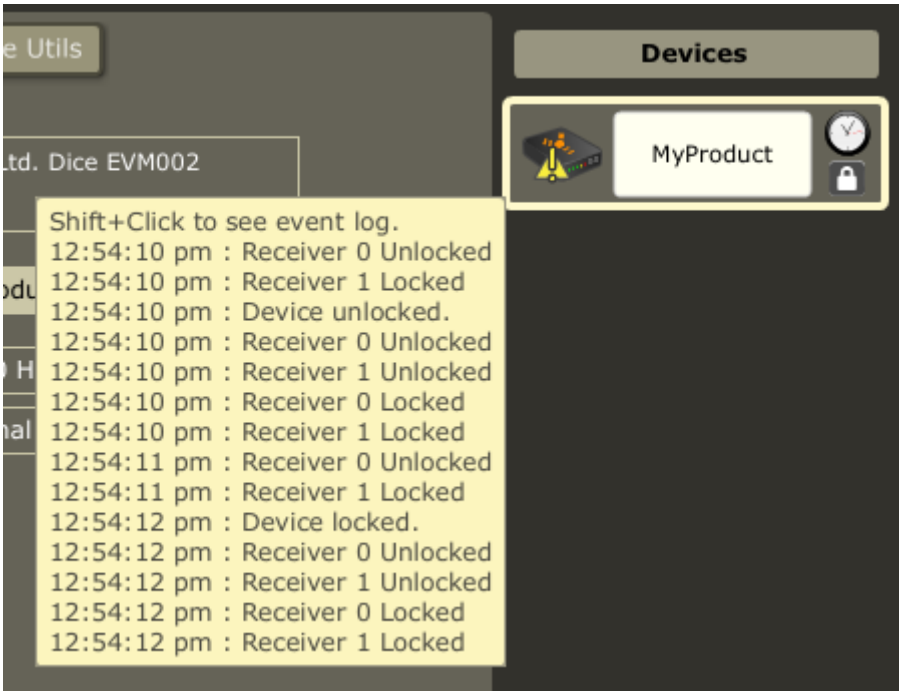
Device Settings

This area is divided into two areas, a device list on the right and a tabbed area on the left for groups of functions. The functions are grouped into a general settings tab, a user-level firmware loader, a developer-level firmware utilities tab, and other tabs that appear depending on the capabilities of the device.

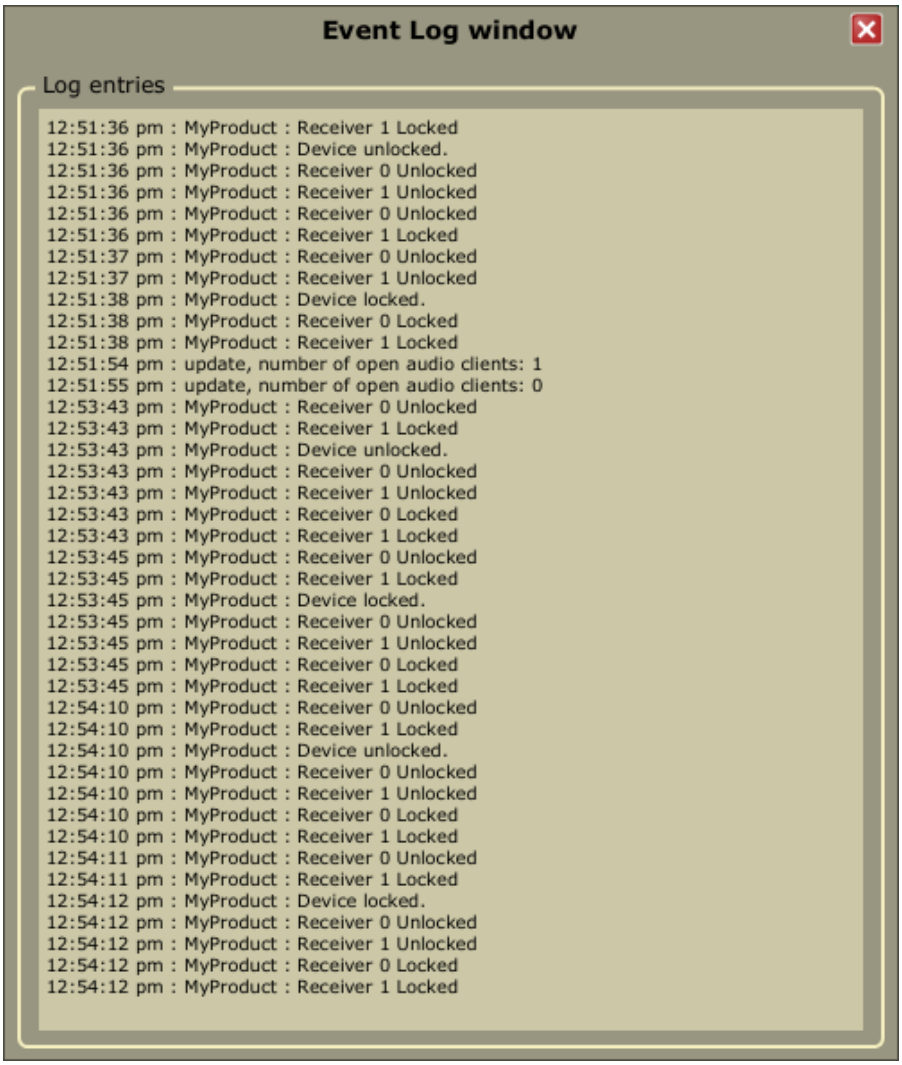
Device List

The device list contains an item for each device found on the bus, if any. The related controls for the selected device are shown to the left in the device tabs area. The selected device is always brighter than the others. The current nickname of the device is shown along with its lock status and whether or not it is clock master.

If something happened which caused an event that the user might want to know about, the device icon will show an alert badge, which will fade over time. If the mouse hovers over the icon while the badge is showing, a ToolTip will show the reasons for the alert.

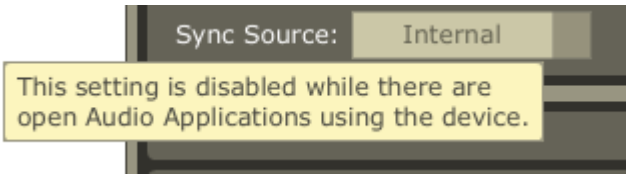


If the alert has faded, the user can still see a history of the 40 most recent events by shift+clicking on the selected device item, or anywhere in the lower-right Devices area if no devices are attached to the computer, to bring up the Event Log Window.



Parameter Locking

In certain situations, the user should not be able to change some of the settings in the Control Panel, such as when an Audio Client has an open driver. The driver and control panel respond to this by disabling the appropriate controls. When this happens, a ToolTip is shown for each disabled control explaining why it's disabled, and also the client-count events are logged to the Event Log window (shift+click on the device icon to see it.)



4. Control Panel Customization

Customizations fall into four categories: branding, visibility of features, default behaviors, and color scheme. These are all controlled using an external XML file called cpl.defs. Also, the vendor may provide an image file (square aspect ratio) which is placed in the Info tab. TCAT provides a sample.defs file which documents all current settable parameters. The sample.defs file is edited and renamed to cpl.defs and placed in a certain directory as described below.

Customization features will be added in future versions, so **please use sample.defs in the control panel source code directory as the most current customization doc.**

The file (once customized by the vendor and sent to TCAT) is built into the Installers, which place it in the appropriate folder depending on which platform it's installed on. For Windows this is the executable folder for the application. For Mac OS X it is placed in the Application package in the Contents/Resources directory. **Note that if a setting is already as you like it by default, then you don't need to have it in the file also.**

The vendor can manually place the file in these directories in order to develop and test the customizations, then send the finished version, along with their logo.png file if any, to TCAT for including in their usual custom builds.

It is not recommended that this file be documented for the end user.

5. Branding

The Info Tab has placeholders for the vendor to place strings and an image. The strings are centered in the tab. The image is placed to the right and scaled to 80x80 pixels. Some vendors consider the color scheme as part of the brand. Custom color schemes are described below.

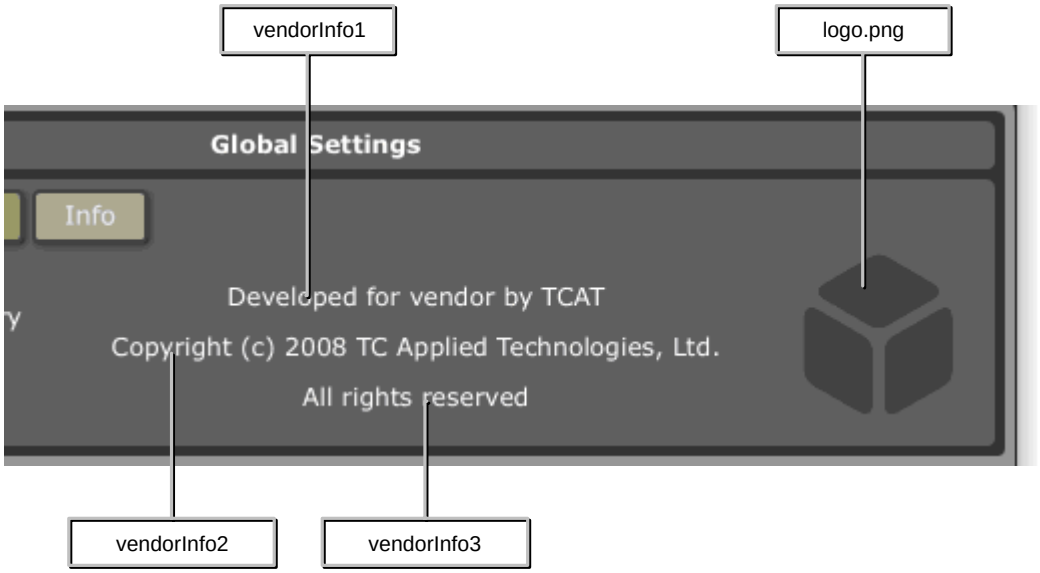
Vendor Strings

The default XML entries for this are:

```
<VALUE name="vendorInfo1" val="Developed for vendor by TCAT"/>
<VALUE name="vendorInfo2" val="Copyright (c) 2008 TC Applied Technologies, Ltd."/>
<VALUE name="vendorInfo3" val="All rights reserved"/>
```

Image

And the file that is used for the image should be in the same directory as cpl.defs, must be in PNG format and must be named “logo.png”



6. Controlling Visibility of Features

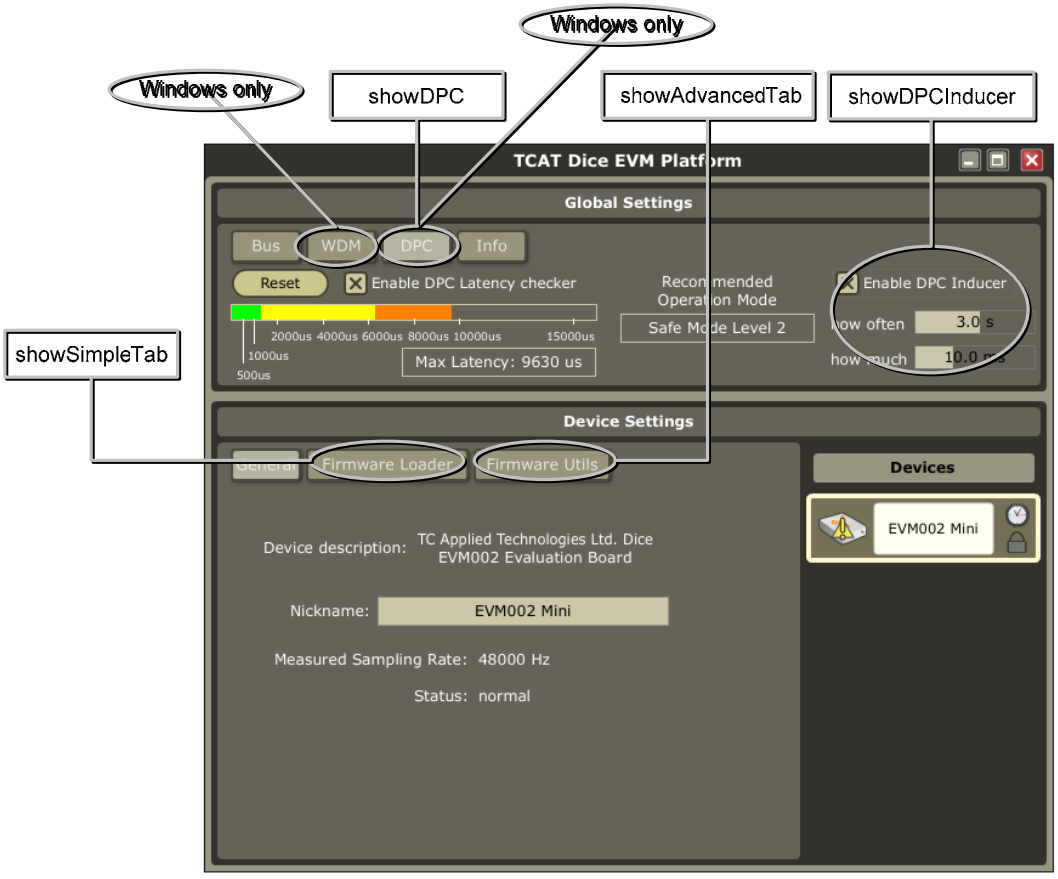
Optional tabs

Note that of course the WDM and DPC tabs are not present on the OS X platform.

The simple firmware loader, suitable for end-users
<VALUE name="showSimpleTab" val="1"/>

The advanced firmware utils tab, suitable for developers
<VALUE name="showAdvancedTab" val="0/>

The DPC tab, suitable for end-users
<VALUE name="showDPC" val="1"/>

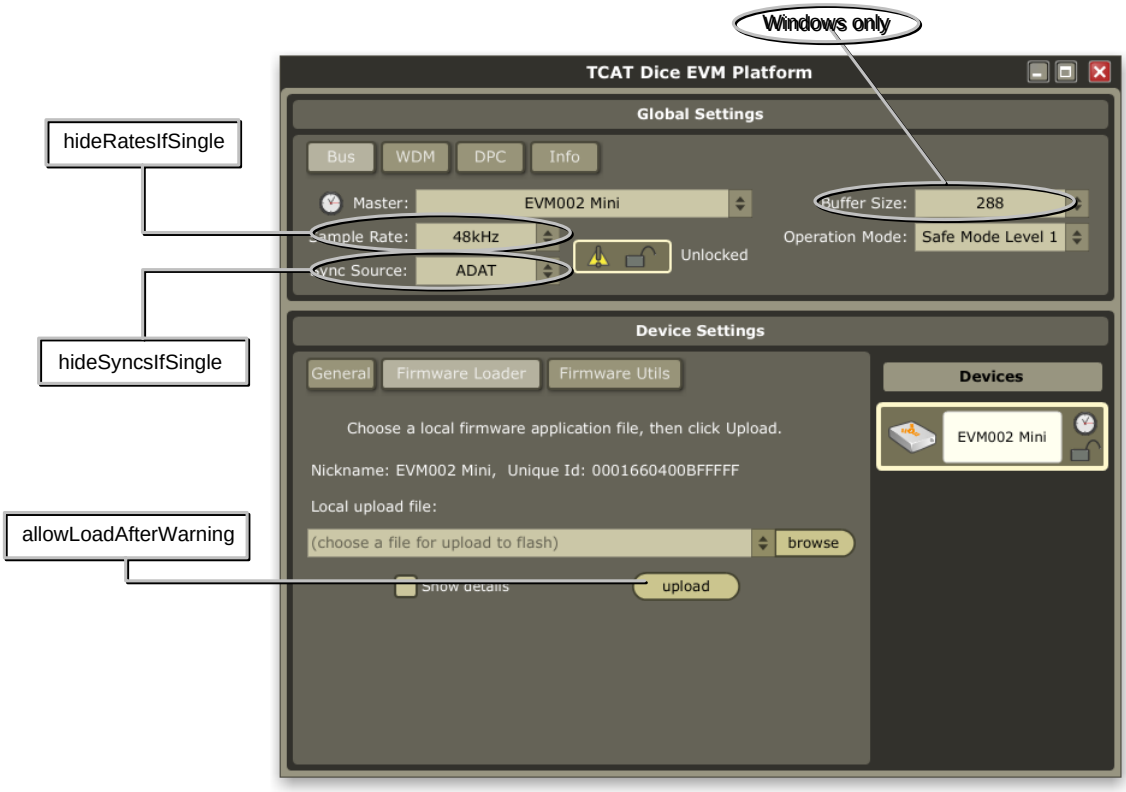


Controls which can be hidden:

These two controls are usually hidden for devices which only advertize a single sample rate and/or sync source at a time. Note that the buffer size control is always hidden on OS X.

The Sample Rate combo box:
<VALUE name="hideRatesIfSingle" val="1"/>
The Sync Sources combo box:
<VALUE name="hideSyncsIfSingle" val="1"/>

The DPC Inducer is usually only used by developers and should be hidden.
<VALUE name="showDPCInducer" val="0"/>



7. Default Behaviors

Firmware Loader

The firmware loader will make many checks to validate a firmware file and other parameters before the new firmware binary is committed to flash memory on the device. Some warnings are displayed to the user on the way, and the default is to disallow any loading of firmware if a warning has happened. This can be overridden (in case there is a situation where it's actually okay to continue) using the following entry:

```
<VALUE name="allowLoadAfterWarning" val="1"/>
```

See the screen shot above. This settting only "applies to the Firmware Loader" tab, and not the "Firmware Utils" since it's intended for Developers, who know what they are doing!

Color Refresh

When customizing the color scheme, you can make the control panel refresh its colors by hitting the F5 key if the following entry exists:

```
<VALUE name="F5RefreshesColours" val="1"/>
```

8. Automatic Color Schemes

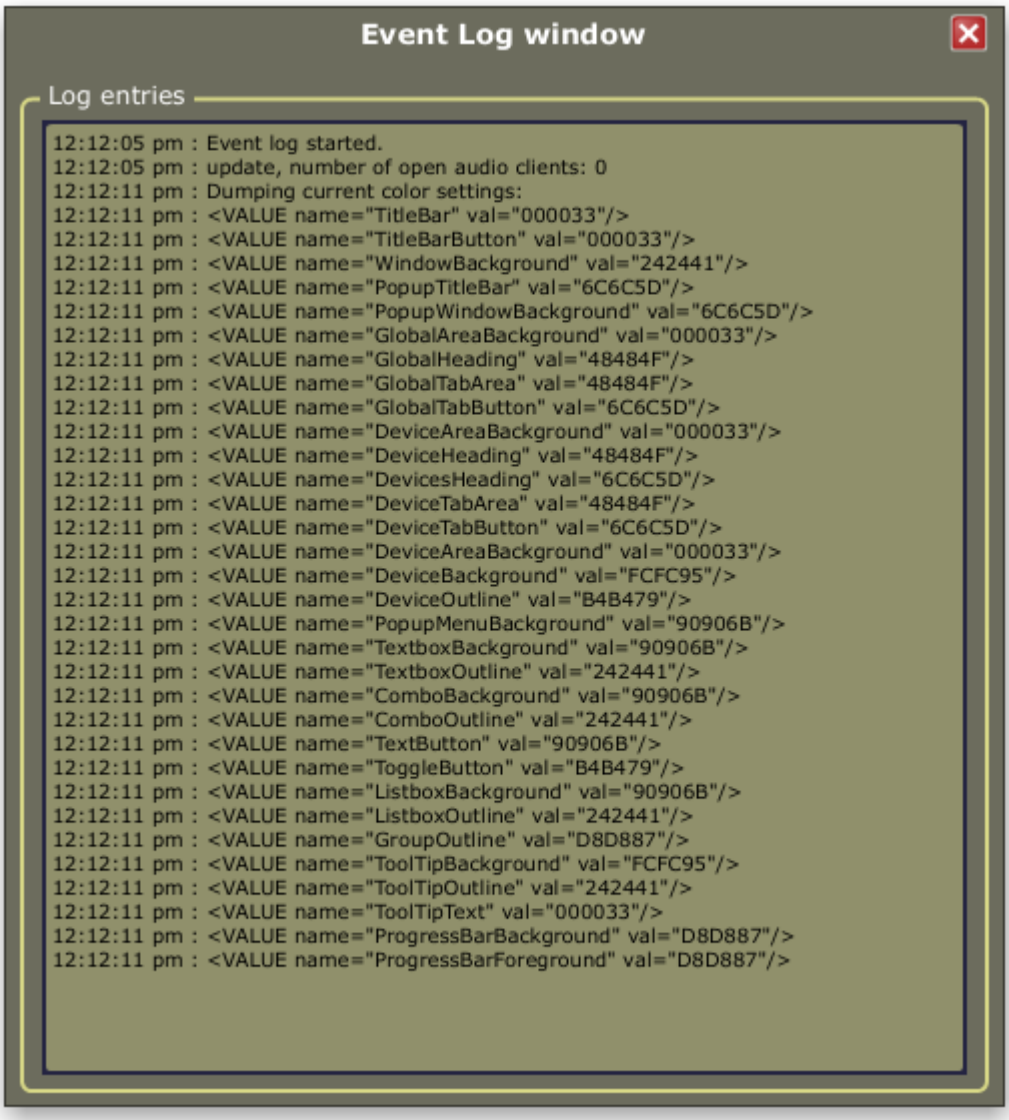
Live refresh

The Control Panel colors can be changed in a few ways. The vendor can make changes in cpl.defs which control the colors in the application. As mentioned a second ago above, to make it easier to develop color schemes, the vendor can add the following entry which will refresh the colors in the UI without restarting it, by rereading the setting in cpl.defs when the main window is selected and the F5 key is pressed:

```
<VALUE name="F5RefreshesColours" val="1"/>
```

This will also dump all of the current setting to the Event Log Window, which can be useful if you want to start with a generated scheme, then copy the settings out of the Event Log and create an adjusted version of it.

The Event Log Window appears when you shift+click on the active device icon.


Event Log window
Log entries
12:12:05 pm : Event log started.
12:12:05 pm : update, number of open audio clients: 0
12:12:11 pm : Dumping current color settings:
12:12:11 pm : <VALUE name="TitleBar" val="000033"/>
12:12:11 pm : <VALUE name="TitleBarButton" val="000033"/>
12:12:11 pm : <VALUE name="WindowBackground" val="242441"/>
12:12:11 pm : <VALUE name="PopupTitleBar" val="6C6C5D"/>
12:12:11 pm : <VALUE name="PopupWindowBackground" val="6C6C5D"/>
12:12:11 pm : <VALUE name="GlobalAreaBackground" val="000033"/>
12:12:11 pm : <VALUE name="GlobalHeading" val="48484F"/>
12:12:11 pm : <VALUE name="GlobalTabArea" val="48484F"/>
12:12:11 pm : <VALUE name="GlobalTabButton" val="6C6C5D"/>
12:12:11 pm : <VALUE name="DeviceAreaBackground" val="000033"/>
12:12:11 pm : <VALUE name="DeviceHeading" val="48484F"/>
12:12:11 pm : <VALUE name="DevicesHeading" val="6C6C5D"/>
12:12:11 pm : <VALUE name="DeviceTabArea" val="48484F"/>
12:12:11 pm : <VALUE name="DeviceTabButton" val="6C6C5D"/>
12:12:11 pm : <VALUE name="DeviceAreaBackground" val="000033"/>
12:12:11 pm : <VALUE name="DeviceBackground" val="FCFC95"/>
12:12:11 pm : <VALUE name="DeviceOutline" val="B4B479"/>
12:12:11 pm : <VALUE name="PopupMenuBackground" val="90906B"/>
12:12:11 pm : <VALUE name="TextboxBackground" val="90906B"/>
12:12:11 pm : <VALUE name="TextboxOutline" val="242441"/>
12:12:11 pm : <VALUE name="ComboBackground" val="90906B"/>
12:12:11 pm : <VALUE name="ComboOutline" val="242441"/>
12:12:11 pm : <VALUE name="TextButton" val="90906B"/>
12:12:11 pm : <VALUE name="ToggleButton" val="B4B479"/>
12:12:11 pm : <VALUE name="ListboxBackground" val="90906B"/>
12:12:11 pm : <VALUE name="ListboxOutline" val="242441"/>
12:12:11 pm : <VALUE name="GroupOutline" val="D8D887"/>
12:12:11 pm : <VALUE name="ToolTipBackground" val="FCFC95"/>
12:12:11 pm : <VALUE name="ToolTipOutline" val="242441"/>
12:12:11 pm : <VALUE name="ToolTipText" val="000033"/>
12:12:11 pm : <VALUE name="ProgressBarBackground" val="D8D887"/>
12:12:11 pm : <VALUE name="ProgressBarForeground" val="D8D887"/>

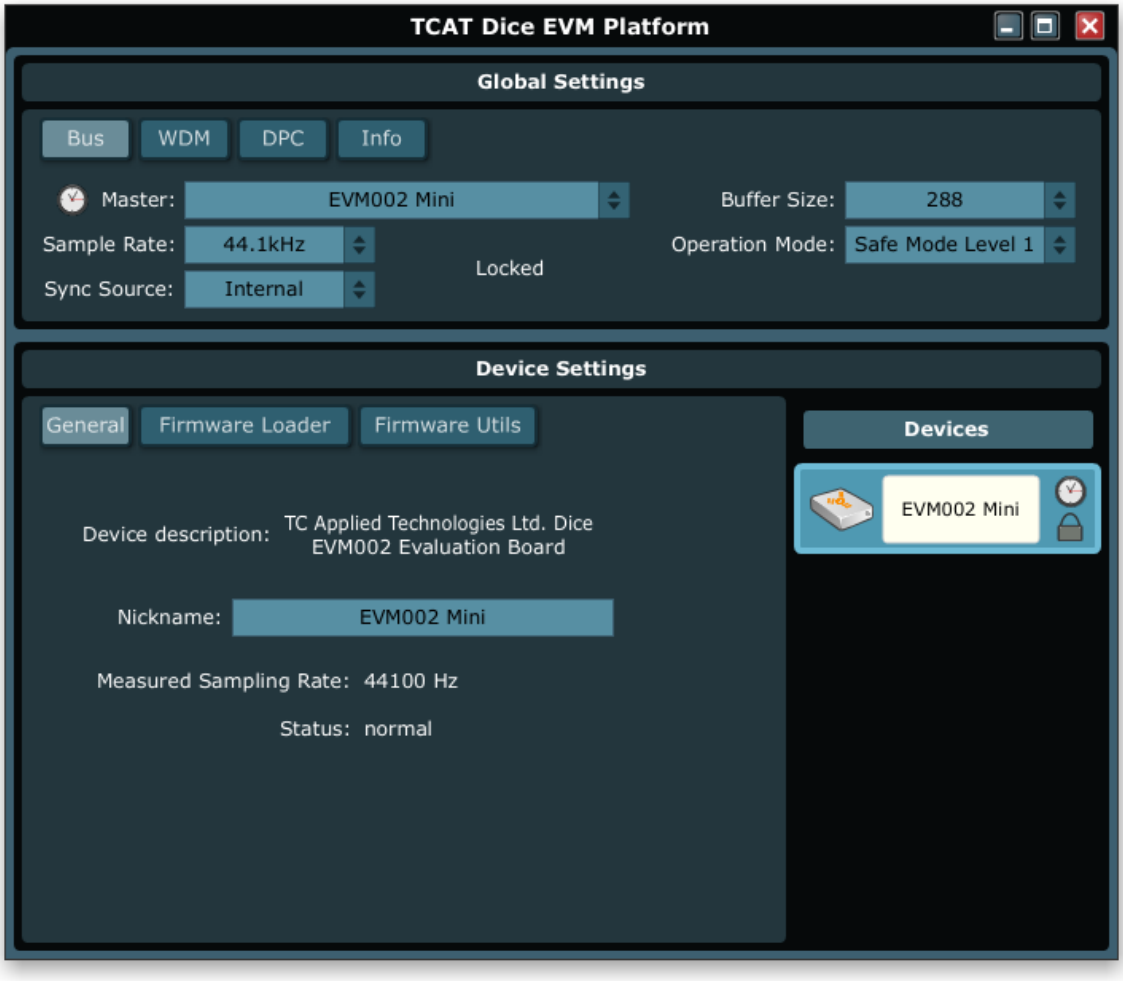
Shades of One Hue

For a UI based on shades of one color, use the following HSV settings:

This enables or disables color shade based color schemes
<VALUE name="UseGeneratedColourShades" val="1"/>

0-360 here will pick a standard hue
<VALUE name="BaseColourHue" val="200
Value of 0-255 controls brightness
<VALUE name="BaseColourValue" val="35"/>
Value of 0-255 controls saturation
<VALUE name="BaseColourSaturation" val="110>

The settings above look like this:



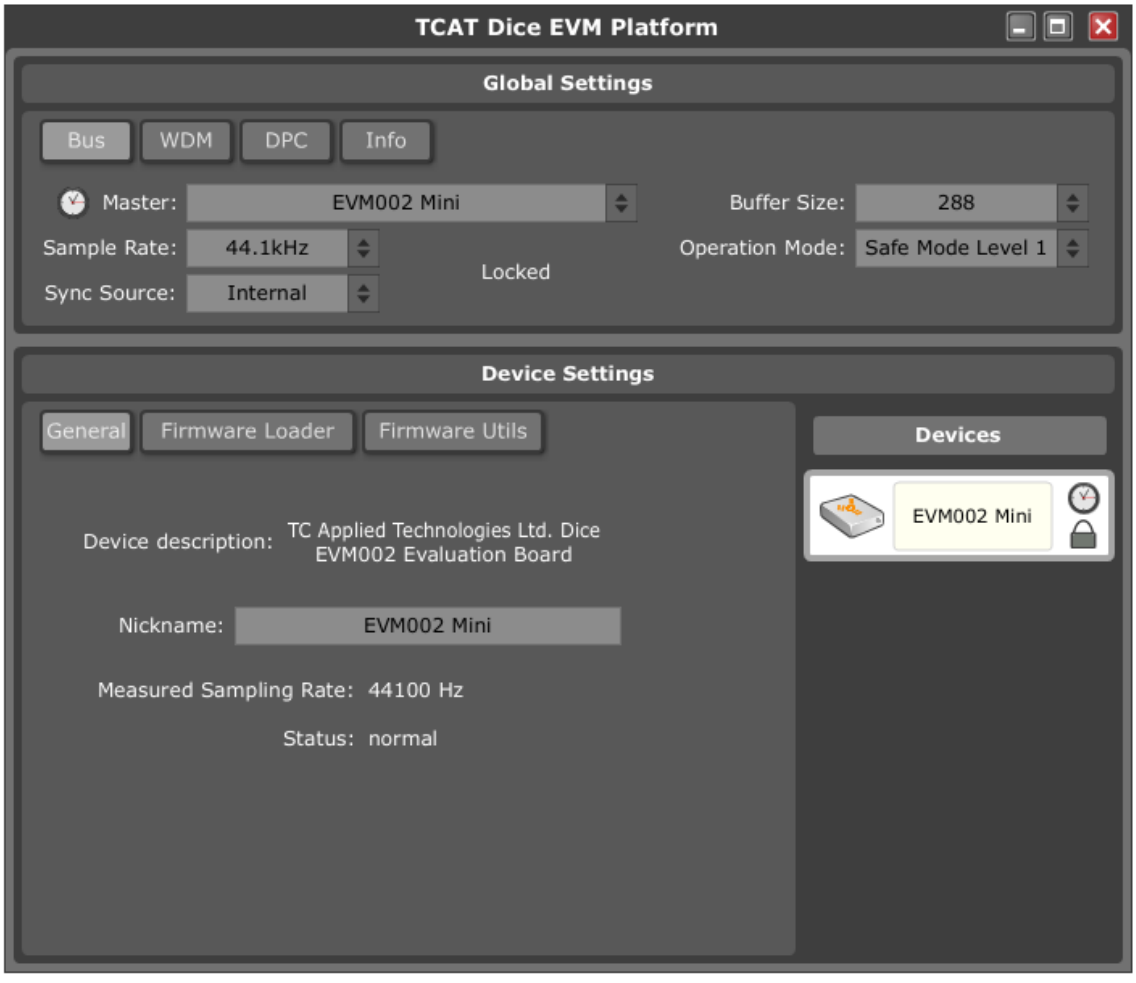
Shades of Grey

For a grayscale UI, use the following settings:

This enables or disables color shade based color schemes
<VALUE name="UseGeneratedColourShades" val="1" />

A value greater than 360 here will force greyscale
<VALUE name="BaseColourHue" val="361" />
Value of 0-255 control brightness
<VALUE name="BaseColourValue" val="75" />
Value of 0-255 controls an approximation of saturation
<VALUE name="BaseColourSaturation" val="30" />

These settings look like this:

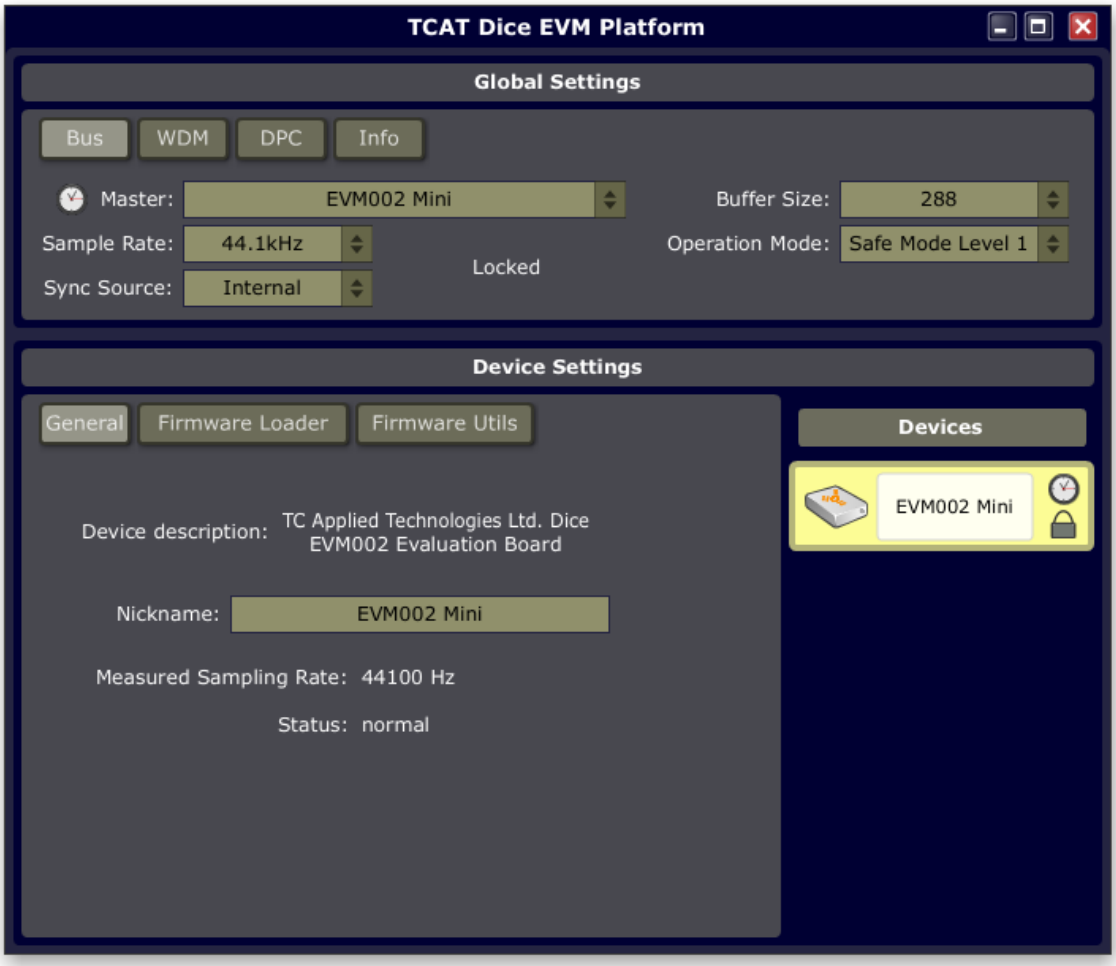


Blend Between Two RGB Values

To create a UI that is based on a blend of colors from one to another use these settings:

Enables or disables blended color schemes
<VALUE name="UseBlendedColours" val="1" />
The starting color to use
<VALUE name="BlendColour1" val="ffff99" />
The ending color to use
<VALUE name="BlendColour2" val="000033" />

The settings above look like this:



If you have more than one type of color scheme generator enabled, then this blended colors method will be used.

9. Specifying Individual Custom Colors

The F5 key will also refresh the colors with this method.

Just make sure that none of the other methods are enabled and the individual specified colors will be used as entered. Note that the application has default values that will be used in case any are omitted or misspelled!!

Since defaults are used when values are left out of the file, there must be entries in the file for the other methods, and they must be set to zero. For example:

```
<VALUE name="UseGeneratedColourShades" val="0"/>
<VALUE name="UseBlendedColours" val="0"/>
```

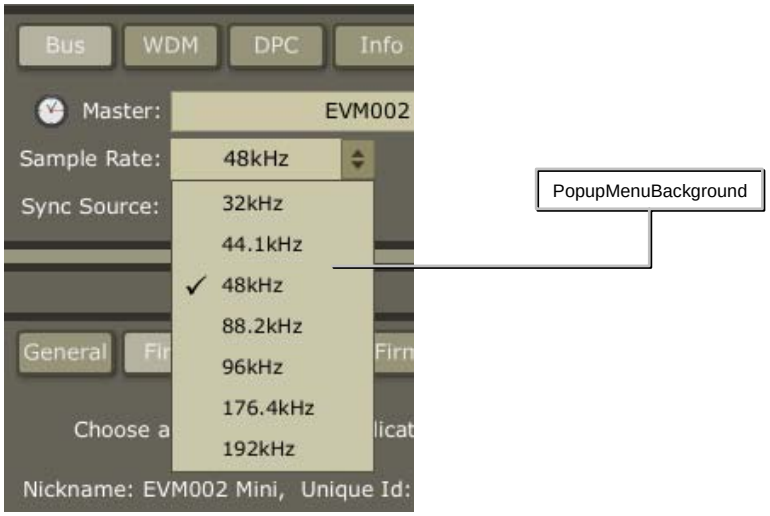
Color values are entered like so:

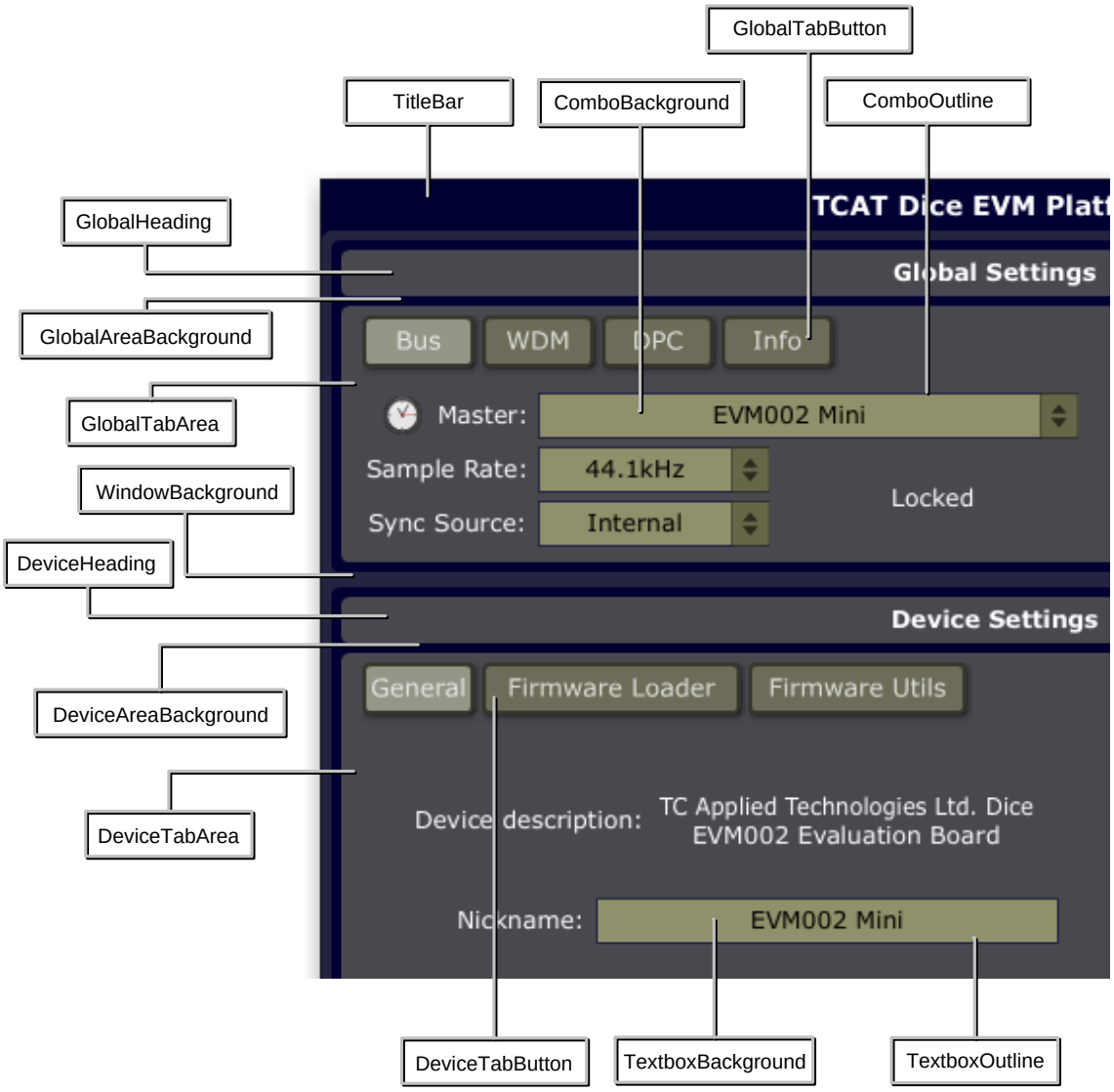
<VALUE name="TitleBar" val="0C0C0C"/>

Where the format for the value is RRGGBB which specify 8-bit (hexadecimal) red green and blue color values. The screen shots below show each of the possible customizable color elements and the part of the UI they specify.

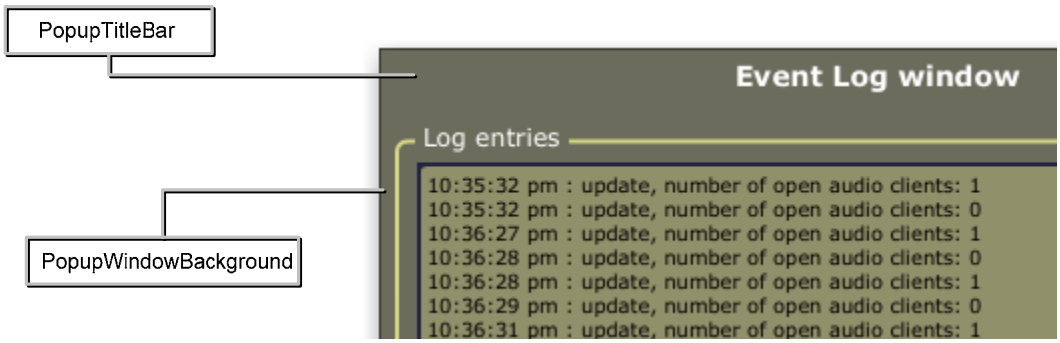
Some elements are not specified in cpl.defs. In those cases, a sensible color is derived from what is specified. For example, text colors in the control labels will automatically contrast with background colors.

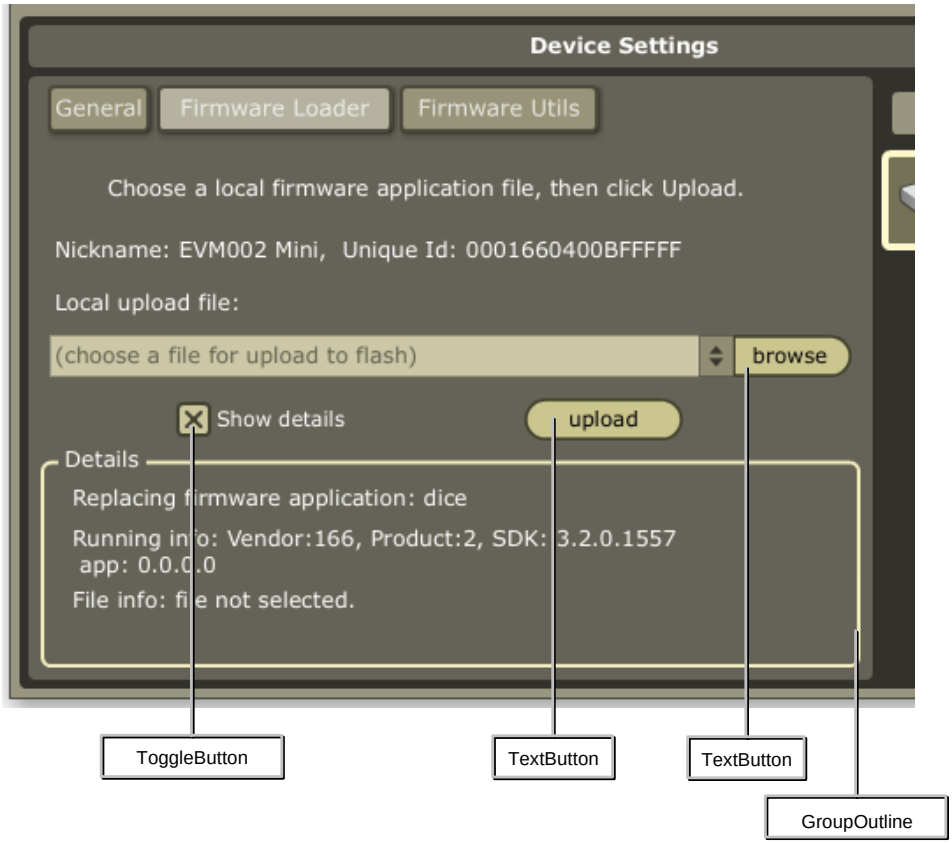
Below are a few screen shots with labels that correspond to the color parameter in cpl.defs.

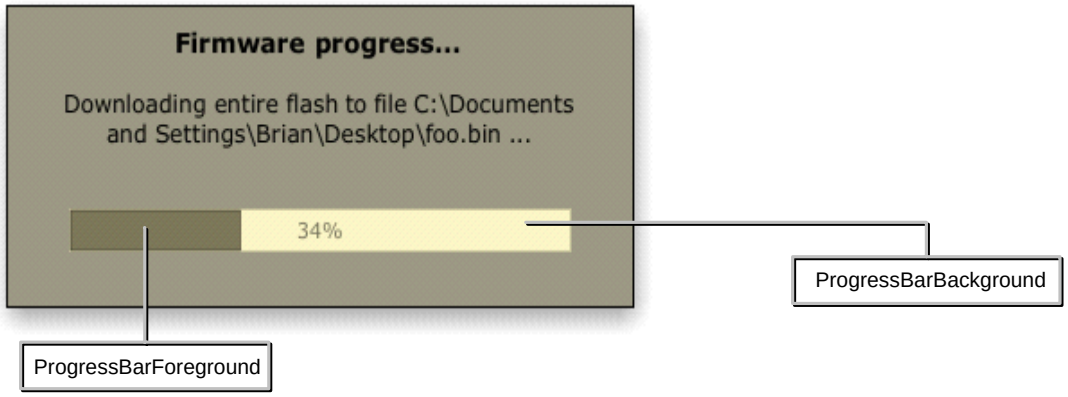



GlobalTabButton
TitleBar
ComboBackground
ComboOutline
GlobalHeading
GlobalAreaBackground
GlobalTabArea
WindowBackground
DeviceHeading
DeviceAreaBackground
DeviceTabArea
TCAT Dice EVM Platf
Global Settings
Bus
WDM
DPC
Info
Master:
EVM002 Mini
Sample Rate:
44.1kHz
Locked
Sync Source:
Internal
Device Settings
General
Firmware Loader
Firmware Utils
Device description:
TC Applied Technologies Ltd. Dice
EVM002 Evaluation Board
Nickname:
EVM002 Mini
DeviceTabButton
TextboxBackground
TextboxOutline

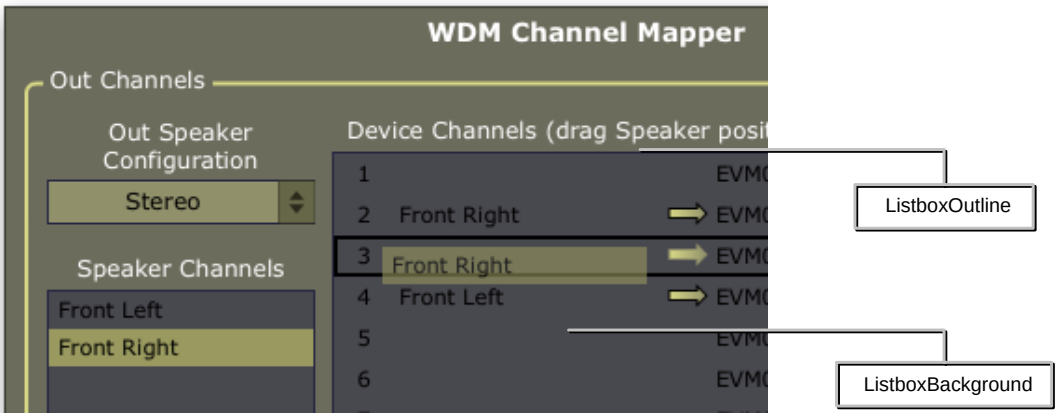

ToolTipText
Shift+Click to see event log.
11:47:52 pm : Device unlocked.
11:47:52 pm : Receiver 0 Unlocked
11:47:52 pm : Receiver 0 Locked
11:47:54 pm : Receiver 0 Unlocked
11:47:54 pm : Device locked.
11:47:55 pm : Receiver 0 Locked
ToolTipBackground
ToolTipOutline


PopupTitleBar
PopupWindowBackground
Event Log window
Log entries
10:35:32 pm : update, number of open audio clients: 1
10:35:32 pm : update, number of open audio clients: 0
10:36:27 pm : update, number of open audio clients: 1
10:36:28 pm : update, number of open audio clients: 0
10:36:28 pm : update, number of open audio clients: 1
10:36:29 pm : update, number of open audio clients: 0
10:36:31 pm : update, number of open audio clients: 1


Device Settings
General
Firmware Loader
Firmware Utils
Choose a local firmware application file, then click Upload.
Nickname: EVM002 Mini, Unique Id: 0001660400BFFFFF
Local upload file:
(choose a file for upload to flash)
browse
Show details
upload
Details
Replacing firmware application: dice
Running info: Vendor:166, Product:2, SDK: 3.2.0.1557
app: 0.0.0.0
File info: file not selected.
ToggleButton
TextButton
TextButton
GroupOutline


Firmware progress...
Downloading entire flash to file C:\Documents and Settings\Brian\Desktop\foo.bin ...
34%
ProgressBarBackground
ProgressBarForeground


Device Settings
Utils
Devices
DICEII EVM
EVM002 Mini
DevicesHeading
DeviceOutline
DeviceBackground


WDM Channel Mapper
Out Channels
Out Speaker Configuration
Stereo
Speaker Channels
Front Left
Front Right
Device Channels (drag Speaker posi
1
2 Front Right
3 Front Right
4 Front Left
5
6
ListboxOutline
ListboxBackground

Fully Specifed Colors: Example

The values below describe a grayscale scheme. They are ordered from darkest to brightest, rather than by their spatial grouping.

```
<?xml version="1.0" encoding="UTF-8"?>


<PROPERTIES>
 <VALUE name="vendorInfo1" val="Developed for vendor by TCAT"/>
 <VALUE name="vendorInfo2" val="Copyright (c) 2008 TC Applied Technologies, Ltd."/>
 <VALUE name="vendorInfo3" val="All rights reserved"/>
 <VALUE name="showSimpleTab" val="1"/>
 <VALUE name="showAdvancedTab" val="0/>
 <VALUE name="showDPC" val="1"/>
 <VALUE name="showDPCInducer" val="0/>
 <VALUE name="hideRatesIfSingle" val="1"/>
 <VALUE name="hideSyncsIfSingle" val="1"/>
 <VALUE name="allowLoadAfterWarning" val="1"/>
 <VALUE name="F5RefreshesColours" val="1"/>
 <VALUE name="UseGeneratedColourShades" val="0"/>
 <VALUE name="BaseColourHue" val="200"/>
 <VALUE name="BaseColourValue" val="35"/>
 <VALUE name="BaseColourSaturation" val="110"/>
 <VALUE name="UseBlendedColours" val="0"/>
 <VALUE name="BlendColour1" val="ffff99"/>
 <VALUE name="BlendColour2" val="000033"/>
 <VALUE name="ToolTipText" val="191919"/>
 <VALUE name="WindowBackground" val="7F3F3F"/>
 <VALUE name="ToolTipOutline" val="3F3F3F"/>
 <VALUE name="ComboOutline" val="3F3F3F"/>
 <VALUE name="TextboxOutline" val="3F3F3F"/>
 <VALUE name="TitleBar" val="0C0C0C"/>
 <VALUE name="GlobalAreaBackground" val="0C0C0C"/>
 <VALUE name="DeviceAreaBackground" val="0C0C0C"/>
 <VALUE name="GlobalHeading" val="262626"/>
 <VALUE name="DeviceHeading" val="262626"/>
 <VALUE name="GlobalTabArea" val="262626"/>
 <VALUE name="DeviceTabArea" val="262626"/>
 <VALUE name="DevicesHeading" val="404040"/>
 <VALUE name="GlobalTabButton" val="404040"/>
 <VALUE name="DeviceTabButton" val="404040"/>
 <VALUE name="PopupTitleBar" val="404040"/>
 <VALUE name="PopupWindowBackground" val="404040"/>
 <VALUE name="PopupMenuBackground" val="5A5A5A"/>
 <VALUE name="TextButton" val="5A5A5A"/>
 <VALUE name="TextboxBackground" val="5A5A5A"/>
 <VALUE name="ComboBackground" val="5A5A5A"/>
 <VALUE name="ListboxOutline" val="5A5A5A"/>
 <VALUE name="DeviceOutline" val="747474"/>
 <VALUE name="ToggleButton" val="747474"/>
 <VALUE name="GroupOutline" val="8E8E8E"/>
 <VALUE name="ProgressBarBackground" val="8E8E8E"/>
 <VALUE name="ProgressBarForeground" val="8E8E8E"/>
 <VALUE name="ListboxBackground" val="8E8E8E"/>
 <VALUE name="ToolTipBackground" val="CECECE"/>
 <VALUE name="DeviceBackground" val="CECECE"/>

</PROPERTIES>
```