BrightSign®

Using the Expansion Module EM100 with BrightSign HD810, HD1010, and HD1010w

With BrightSign's USB Expansion Module, you can expand the interactive and audio potential of any display. The bi-directional GPIOs allow for the connection of up to 18 buttons or LEDs in a combination of your choosing (9 buttons and 9 LEDs, for example). This feature instantly makes any display more engaging. The digital and analog outputs support up to 3 simultaneous streams, enabling an immersive acoustic experience with flexible options. For example, you can link buttons (via the GPIOs) to the audio outputs, allowing users to listen to different audio sources on up to 3 speakers or headphones by pressing specified buttons. In addition, the optical SPDIF output provides even greater support for the A/V receivers.

Currently, the Expansion Module may be controlled using a script or a BrightAuthor project with a custom autorun script. Below is an explanation of the audio specifications, audio maps & outputs, several sample scripts, and an example of how to use the 18 GPIOs as inputs.

Audio Specifiations & Restrictions for BrightSign
HDMI and onboard analog run at the same sample rate.
   a. If playing video with 48kHz AC-3 out HDMI, then MP3 files using analog output must be 48kHz.
   b. AC3 Passthrough Only - No AC-3 decode.
   c. Simultaneous Audio Streams to Analog & Digital Outputs
      - The 3 streams streams can be composed of any combination of up to 1 video stream, and 3 audio streams. For example, you may have 1 video stream and 2 audio streams, or no video streams and 3 audio streams.
      - Different formats can be sent to each expander output. For example, video MP2 at 48kHz to output 1, and MP3s to outputs 2 and 3.

Note: *We recommend always using the included power adapter.*

Audio Maps & Outputs
These represent the different settings you can use in a script to control the Expansion Module

Audio mode	0	1	2	3	4
Monaco analog	y	n	n	n	y
Monaco HDMI	n	n	y	y	y
Expander analog	y	n	n	n	n
Expander SPDIF	n	n	y	y	n
USB speakers	n	y	n	n	n
	^		^	^	^ Only HDMI and onboard analog for this mode
	^		^	^	
	^		^	Output selected by MapDigitalOutput	
	^		^		
	^		Output selected by MapDigitalOutput		
	^				
	Output selected by MapStereoOutput				

Audio Outputs:
- 0 - Analog. Output to onboard analog output or one of the 3 expander analog outputs.
- 2 - Digital Stereo. For playing decoded audio to either HDMI or expander SPDIF e.g. decoded MP3 files.
- 3 - Digital Multichannel. For playing undecoded audio to either HDMI or expander SPDIF e.g. AC-3.
- 4 - Simultaneous onboard Analog output with mirroring on HDMI

Example Script Command - Sets video player to Analog Output:
```
Videoplayer.SetAudioOutput(0)
```

Analog Stereo Mapping:
This selects which analog stereo output is used from the 4 available:
- 0 - Onboard analog jack
- 1 - Expander left jack
- 2 - Expander centre jack
- 3 - Expander right jack

Example Script Command - Sets video player to Analog Expander Output 1:
```
Videoplayer.SetAudioOutput(0)
Videoplayer.MapStereoOutput(1)
```

Digital Audio Mapping:
This selects which digital output is used from the 2 available:
- 0 – HDMI
- 1 - Expander SPDIF

Example Script Command - Sets video player to Digital, Expander SPDIF:
```
Videoplayer.SetAudioOutput(3)
Videoplayer.MapDigitalOutput(1)
```

Sample Expander Scripts

Note: *Please rename the script to "autorun.brs" before copying to your flash card.*

1. This script plays one of 12 videos using GPIO input from the Expander:
https://www.brightsignnetwork.com/download/Expander%20board%20scripts/Expander%20board%20Script%201.pdf

2. This script plays 2 audio files to 2 of the expander audio outputs:
https://www.brightsignnetwork.com/download/Expander%20board%20scripts/Expander%20board%20script%202.pdf

3. This script plays 1 video with audio, and 2 separate audio files, all to the 3 analog outputs on the expander:
https://www.brightsignnetwork.com/download/Expander%20board%20scripts/Expander%20board%20script%203.pdf

4. This is a simple script that shows how you can use both the expander GPIO and onboard GPIO:

https://www.brightsignnetwork.com/download/Expander%20board%20scripts/Expander%20board%20script%204.pdf

5. This test script plays 3 audio files to the 3 analog outputs and accepts input from a USB keyboard:
https://www.brightsignnetwork.com/download/Expander%20board%20scripts/Expander%20board%20script%205.pdf

6. This script plays a video and 2 audio files at the same time, selection via serial command:
https://www.brightsignnetwork.com/download/Expander%20board%20scripts/Expander%20board%20script%206.pdf

7. This script plays a video and two audio files at the same time, selection via GPIO:
https://www.brightsignnetwork.com/download/Expander%20board%20scripts/Expander%20board%20script%207.pdf

An example of how to use the 18-pin GPIO Control as Inputs

It is possible to control the Expander Module by modifying the BrightAuthor .brs and .xml files. To do this, you need to set up the expander GPIOs. There will be a line in your autorun.brs file which contains:

```
BSP.gpioPort = CreateObject("roGpioControlPort")
```

For a new case, change it to this:

```
BSP.gpioPort = CreateObject("roControlPort", "Expander-GPIO")
```

Further down in that same file:

```
Sign.gpio0Config = BrightAuthor.meta.gpio0.GetText()
if Sign.gpio0Config = "input" then
gpioPort.EnableInput(0)
else
gpioPort.EnableOutput(0)
 endif
```


You need to create this bit of code for every GPIO you use, just replace "0" with the input/output number. Switching to .xml file under <meta>, you should see some lines like this:

```
<gpio0>output</gpio0>
<gpio1>output</gpio1>...
```

"output" should be replaced with "input". Again, you need a line like this for every GPIO you want to use. Next, go through the .xml code and either change the dummy inputs/outputs that have been created in BrightAuthor, or write new lines with the higher number of GPIOs that you need.

See BrightSign Expander Hardware Guide for details on the 25-pin input:
https://www.brightsignnetwork.com/download/ExpanderHardwareGuide.pdf

Note: *Currently, the DIP Switches aren't used.*