

**NAME**

**snd\_emu10kx** - Creative SoundBlaster Live! and Audigy sound cards device driver

**SYNOPSIS**

To compile this driver into the kernel, place the following lines in your kernel configuration file:

```
device sound
device snd_emu10kx
```

Alternatively, to load the driver as a module at boot time, place the following line in loader.conf(5):

```
snd_emu10kx_load="YES"
```

**DESCRIPTION**

The **snd\_emu10kx** bridge driver allows the generic audio driver `sound(4)` to attach to Creative sound cards based on the EMU10K1, CA0100, CA0101, CA0102 and CA0108 DSPs.

The **snd\_emu10kx** sound cards have a PCM part, which is accessible through one to five `pcm(4)` devices (see *MULTICHANNEL PLAYBACK* for details), and MPU401-compatible MIDI I/O controller, which is accessible through the `midi` device. Wave table synthesizer support is not available.

**HARDWARE**

The **snd\_emu10kx** driver supports the following sound cards:

- ⊕ Creative Sound Blaster Live! (EMU10K1 Chipset). Both PCM and MIDI interfaces are available.
- ⊕ Creative Sound Blaster Audigy (CA0100 and CA0101 Chipset). PCM and two MIDI interfaces available.
- ⊕ Creative Sound Blaster Audigy 2 and Creative Sound Blaster Audigy 4 (CA0102 Chipset). PCM support is limited to 48kHz/16 bit stereo (192kHz/24 bit part of this chipset is not supported).
- ⊕ Creative Sound Blaster Audigy 2 Value (CA0108 Chipset). PCM support is limited to 48kHz/16 bit stereo (192kHz/24 bit part of this chipset is not supported). There is no MIDI support for this card.

The **snd\_emu10kx** driver does *not* support the following sound cards (although they have names similar to some supported ones):

- ⊕ Creative Sound Blaster Live! 24-Bit, identified by FreeBSD as "emu10k1x Soundblaster Live! 5.1".
- ⊕ Creative Sound Blaster Audigy LS / ES, identified by FreeBSD as "CA0106-DAT Audigy LS".
- ⊕ All other Creative sound cards with -DAT chipsets.
- ⊕ All Creative X-Fi series sound cards.

**MULTICHANNEL PLAYBACK**

By default the `snd_emu10kx` driver is loaded with multichannel playback capabilities enabled. If you do not set the `hint.emu10kx.0.multichannel_disabled` option in your `loader.conf(5)` configuration file you will get up to five DSP devices, one for each sound card output. You can use additional software (like *audio/pulseaudio* from *The Ports Collection*) to do sound stream demultiplexing. Only "FRONT" output can play and record sound from external sources (like line or S/PDIF inputs).

**MULTICHANNEL RECORDING**

By default multichannel recording capabilities are not enabled when you load the `snd_emu10kx` driver. If you enable the `hint.emu10kx.0.multichannel_recording` option in `loader.conf(5)` you will get one more DSP device that is rate-locked to 48kHz/16bit/mono. This is actually 48kHz/16bit/32 channels on SB Live! cards and 48kHz/16bit/64channels on Audigy cards, but the current implementation of the sound subsystem does not support such an amount of PCM channels. This device can not be opened for read, thus confusing many applications.

Within a multichannel stream, the first half (0-15 or 0-31) is a copy of all DSP outputs, the second half (15-30 or 32-63) is a copy of some DSP inputs. On Live! cards the last substream (31) is used as a sync stream and is always set to 0xc0de. Audigy cards do not need such sync data, because a stream always starts with substream 0.

**SB Live! substream map (in byte offsets, each substream is 2 bytes LE)**

Offset	Substream
+0x00..+0x1E	PCM streams 0..15
+0x20, +0x22	Empty
+0x24..+0x2A	PCM inputs: front left, front right, rear left, rear right, center, sub
+0x2C..+0x3C	DSP inputs 0..8:
+0x3E	sync substream (0xc0de)

**Audigy substream map (in byte offsets, each substream is 2 bytes LE)**

Offset	Substream
+0x00..+0x3E	PCM streams 0..31

+0x40..+0x5E PCM inputs: front LR, rear LR, center, sub, ...

+0x60..+0x7E DSP inputs 0..16

## OSS MIXER CONTROLS

These are the controls available through the standard OSS programming interface. You can use `mixer(8)` to change them.

On EMU10K1-based cards the OSS mixer directly controls the AC97 codec. On newer cards the OSS mixer controls some parameters of the AC97 codec and some DSP-based mixer controls.

"vol" mixer control for the overall sound volume.

"pcm" mixer control for the PCM playback volume. It controls only front output volume in multichannel mode and all output volume in single channel mode.

"rec" mixer control acts very differently on EMU10K1 and other cards. On EMU10K1 cards it controls the AC97 codec recording level. On non-EMU10K1 cards it controls the amount of AC97 "stereo mix" entering the DSP. AC97 recording level and AC97 recording source are fixed on CA0100, CA0101, CA0102 and CA0108 cards. The AC97 recording levels are always set to maximum and recording source is always "stereo mix".

"dig1" is a CD S/PDIF (on-card) volume control

"dig2" is an AudigyDrive S/PDIF (Audigy series) or TOSLink (SB Live! series) volume control

"dig3" is an on-card S/PDIF volume control

"line2" is AudigyDrive "Line In 2" volume control

"line3" is AudigyDrive "AUX In 2" volume control

Other OSS mixer controls control the inputs of the AC97 codec.

## PRIVATE DEVICE CONTROLS

You can control some of EMU10Kx's operation and configuration parameters through `dev.emu10kx.<X>` sysctls. These `sysctl(8)` values are temporary and should not be relied upon.

## DRIVER CONFIGURATION

Loader tunables are used to set driver configuration. Tunables can be set at the `loader(8)` prompt before

booting the kernel or they can be stored in */boot/loader.conf*. These tunables cannot be changed from a machine `sysctl(8)` entry after boot, but you can change them using `kenv(1)` before loading the **snd\_emu10kx** driver.

*hint.emu10kx.<X>.disabled*

Disables loading a driver instance.

*hint.emu10kx.<X>.multichannel\_disabled*

Disables multichannel playback support, when one card is represented as several PCM devices.

*hint.emu10kx.<X>.multichannel\_recording*

Enables experimental multichannel recording support.

*hint.emu10kx.<X>.debug*

Set debug output level.

- 0 No additional debug options enabled
- 1 Enables all DSP outputs to be connected, even those that are known to be unused on a particular card.
- 2 Additional debug messages about in-driver events will be printed.
- 2 Additional debug messages will be printed when memory allocation fails.

## FILES

*/dev/emu10kx?* **snd\_emu10kx** management interface

## SEE ALSO

`sound(4)`

## HISTORY

The **snd\_emu10kx** device driver first appeared in FreeBSD 7.0.

## AUTHORS

The PCM part of the driver is based on the `snd_emu10k1(4)` SB Live! driver by Cameron Grant <[cg@FreeBSD.org](mailto:cg@FreeBSD.org)>. The MIDI interface is based on the `snd_emu10k1(4)` MIDI interface code by Mathew Kanner <[matk@FreeBSD.org](mailto:matk@FreeBSD.org)>. The **snd\_emu10kx** device driver and this manual page were written by Yuriy Tsibizov.

**BUGS**

The driver does not detect lost S/PDIF signals and produces noise when S/PDIF is not connected and S/PDIF volume is not zero.

The PCM driver cannot detect the presence of Live!Drive or AudigyDrive breakout boxes and tries to use them (and list their connectors in the mixer).

The MIDI driver cannot detect the presence of Live!Drive or AudigyDrive breakout boxes and tries to enable the IR receiver on them anyway.