

A DSP/BIOS PCM3002 Codec Device Driver for the TMS320C6416 TEB

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ABSTRACT

This document describes the usage and design of a device driver for the PCM3002 audio codec on the TI TMS320C6416 Test Evaluation Board. This device driver is written in conformance to the DSP/BIOS™ IOM device driver model and uses the generic TMS320C6X1X EDMA McBSP driver to transfer samples to and from the serial port. For details on this generic driver, see the application note *A DSP/BIOS EDMA McBSP Device Driver for TSM320C6x1x DSPs* (SPRA846).

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1 Usage

The device driver described here is part of an IOM mini-driver. That is, it is implemented as the lower layer of a 2-layer device driver model. The upper layer is called the class driver and can be either the DSP/BIOS GIO, SIO/DIO, or PIP/PIO modules. The class driver provides an independent and generic set of APIs and services for a wide variety of mini-drivers and allows the application to use a common interface for I/O requests. Figure 1 shows the overall DSP/BIOS device driver architecture. For more information about the IOM device driver model as well as the GIO, SIO/DIO, and PIP/PIO modules, see the *DSP/BIOS Device Driver Developer's Guide* (SPRU616).

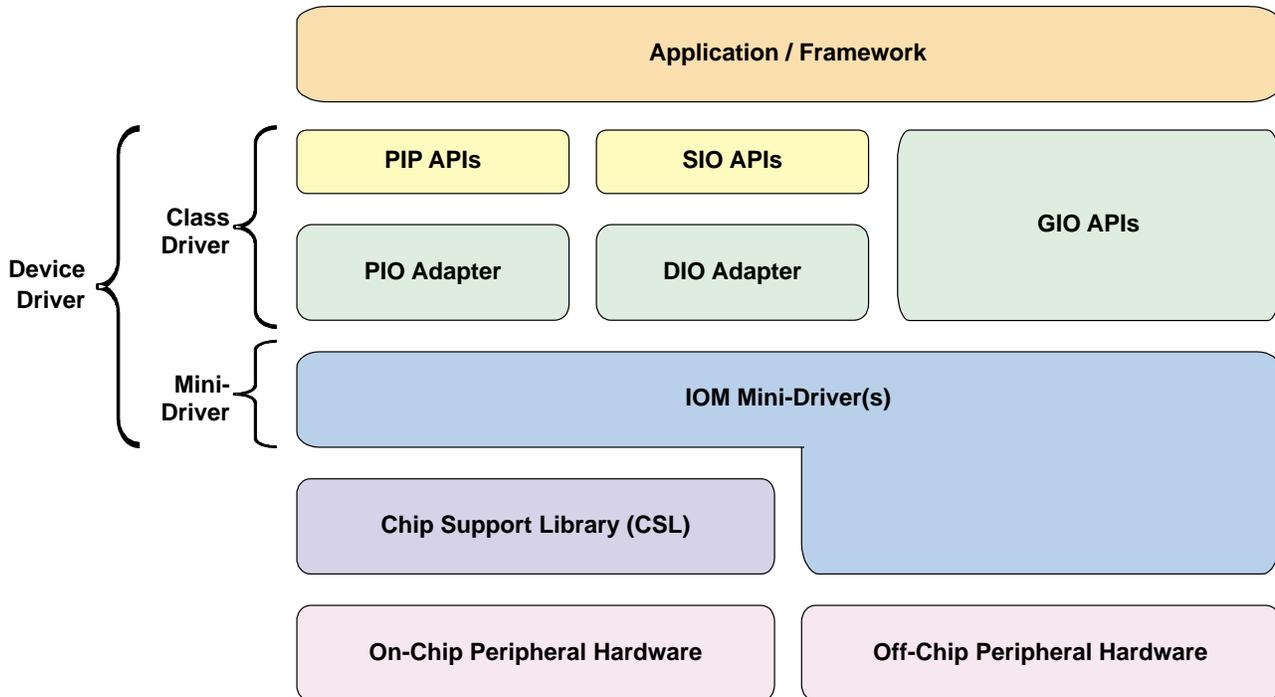


Figure 1. DSP/BIOS IOM Device Driver Model

Many mini-driver implementations split the code into a codec-specific portion and a generic portion that will work across many different codecs. Figure 2 shows the data flow between the components in a system in which the mini-driver is split into a generic part and a codec-specific part. This device driver uses the generic TMS320C6x1x EDMA McBSP to transfer samples to and from the serial port. This means that to use this driver, one must not only link with this driver library (*teb6416_edma_pcm3002.l64*), but also with the generic library (*c6x1x_edma_mcbasp.l64*). Other than this, the use of the generic driver is hidden from the user. Note that this device driver uses McBSP port 0 to communicate with the codec, which means it cannot be used for any other purposes.

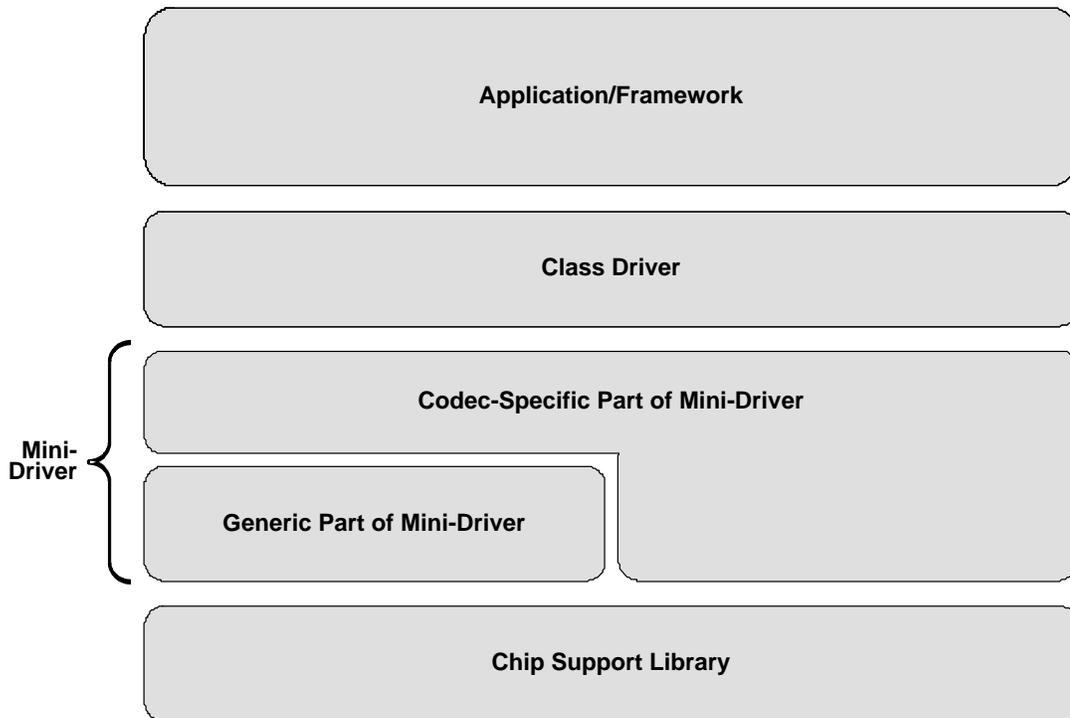


Figure 2. Codec Device Driver Partitioning

1.1 Configuration

To use this driver, a device entry has to be added and configured in the configuration tool. This device driver will set up the generic TMS320C6x1x EDMA McBSP driver to meet its needs.

- **Init function:** Type `_TEB6416_EDMA_PCM3002_init`.
- **Function table ptr:** Type `_TEB6416_EDMA_PCM3002_Fxns`.
- **Function table type:** Select `IOM_Fxns`.
- **Device id:** This property is ignored by this device driver since there is only one PCM3002 codec on the TMS320C6X11 DSK.
- **Device params ptr:** A pointer to your instance of the device parameter structure. Set this property to `0x0` to use the default parameters. The parameter structure and its defaults are described below.
- **Device global data ptr:** This property must be set to `0x0`.

1.2 Device Parameters

```

/* Number of PCM3002 registers */
#define TEB6416_EDMA_PCM3002_NUMREGS 4

/* Device setup parameters */
typedef struct TEB6416_EDMA_PCM3002_DevParams {
    Int versionId;
    Bool cacheCalls;
    Int irqId;
    Int reg[TEB6416_EDMA_PCM3002_NUMREGS];
    Uns intrMask;
    Int edmaPriority;
} TEB6416_EDMA_PCM3002_DevParams;

```

- **versionId:** Version number of the driver.
- **cacheCalls:** If this parameter is set to TRUE, the device driver will treat buffers issued to any IOM channel associated with the device as if they are in cacheable memory and the L2 data cache is enabled. The default value of this parameter is TRUE.
- **irqId:** This parameter selects which IRQ number to use for the EDMA interrupt. The system default is 8. The default parameter of this value is 8.
- **Reg[TEB6416_EDMA_PCM3002_NUMREGS]:** The codec register setup. For information on the codec itself and its registers refer to the PCM3002 Data Sheet listed in the References section.
 - **reg[0]:** Default value is 0xff.
 - **reg[1]:** Default value is 0xff.
 - **reg[2]:** Default value is 0x2.
 - **reg[3]:** Default value is 0x0.
- **intrMask:** Interrupt mask, set in the ISR.
- **edmaPriority:** Priority queue, to use, for all EDMA transfers.

1.3 Channel Parameters

This driver does not have any channel parameters. Any value passed as a channel parameter will be ignored (NULL suggested).

1.4 Control Commands

This device driver has no run-time control commands.

2 Architecture

This portion of the mini-driver driver inherits the features of the generic TMS320C6x1x EDMA McBSP driver. The only thing the codec-specific part does is set up the codec and leaves the transfers of samples to the generic device driver. The fact that this device driver uses the generic device driver is hidden from the user in all aspects except that the generic device driver library has to be linked into the application.

Note that this device driver sets the McBSP to “free running during emulation halt” in order to take advantage of the maintained external frame sync. It also passes 4 as a channel parameter (tdmChans) to the generic device driver since this codec uses four McBSP (TDM) channels (but it still is a stereo codec; see the *PCM3002 Data Sheet*).

3 Constraints

Inherits the constraints of the generic TMS320C6x1x EDMA McBSP driver.

4 References

All these documents are available from the TI Developer's Village:

1. *A DSP/BIOS EDMA McBSP Device Driver for TMS320C6x1x DSPs* (SPRA846)
2. *PCM3002 Data Sheet* (pcm3002.pdf)
3. *DSP/BIOS Device Driver Developer's Guide* (SPRU616).
4. *TMS320C6000 Chip Support Library API Reference Guide* (SPRU401)
5. *TMS320C6000 Peripherals Reference Guide* (SPRU190)
6. *TMS320C6000 DSP/BIOS Application Programming Interface (API) Reference Guide* (SPRU403)

Appendix A Device Driver Data Sheet

A.1 Device Driver Library Name

teb6416_edma_pcm3002.l64

When building an application the generic c6x1x_edma_mcbbsp.l64 library is required.

A.2 DSP/BIOS Modules Used

Same as for the generic TMS320C6x1x EDMA McBSP device driver.

A.3 DSP/BIOS Objects Used

Same as for the generic TMS320C6x1x EDMA McBSP device driver.

A.4 CSL Modules Used

Same as for the generic TMS320C6x1x EDMA McBSP device driver.

A.5 CPU Interrupts Used

Same as for the generic TMS320C6x1x EDMA McBSP device driver.

A.6 Peripherals Used

Same as for the generic TMS320C6x1x EDMA McBSP device driver.

A.7 Interrupt Disable Time

Maximum time that hardware interrupts can be disabled by the driver: refer to the generic TMS320C6x1x EDMA McBSP device driver. This measurement is taken using the compiler option `-O3`.

A.8 Memory Usage

Includes the memory usage of the generic TMS320C6x1x EDMA McBSP device driver.

Table A–1. Device Driver Memory Usage

	Uninitialized Memory	Initialized Memory
CODE	—	828 (8-bit bytes)
DATA	120 (8-bit bytes)	184 (8-bit bytes)

NOTE: This data was gathered using the `sectti` command utility.
 Uninitialized data: `.bss`
 Initialized data: `.cinit + .const`
 Initialized code: `.text + .text:init`

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