

## AMBE-3000™-HDK Vocoder Board

### Quick Start Guide



HDK Kit Components	
Item	Description
Power Adapter	AC to 5 Volt DC
Handset	For Full Duplex communication
Handset Cord	Connects to RJ11 Connector and handset
DVSI CD	Software, Documentation and Reference Information

This guide outlines the set up and operation of the AMBE-3000™-HDK Vocoder board so that users can quickly experience the voice compression technology of the AMBE-3000™ Vocoder chip. The HDK component kit and a PC are all that is required to get started. This guide describes how to connect the HDK to a PC, encode a PCM file and decode (playback) the created PCM file.

### **Step 1**      **Review the HDK documentation**

The AMBE-3000™-HDK Development Board kit includes a CD that contains the HDK documentation, Reference information, software and voice test vectors. To keep this guide simple and to make operation easy, copy the entire contents of the HDK CD to the PC that will be used to connect to the HDK board. To copy the CD to the PC create a folder named C:\HDK on the PC and then copy the contents of the CD provided with the HDK into this folder. When the copying of all the contents is finished go to the C:\HDK directory and unzip tv.zip file to C:\HDK\tv. This compressed data file contains test vectors that may be used for vocoder testing. Before continuing on to Step 2 review all of the documentation in the C:\HDK\Docs directory.

### **Step 2**      **Verify DIP Switch Settings and Installed Jumpers**

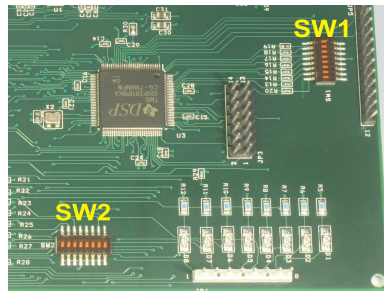
The HDK Board is designed with DIP switches and Jumpers that allow for easy board set up and configuration. To be sure that the HDK is set up correctly for the examples that follow, it is necessary to verify that SW1 and SW2 are set as shown in Tables 1 and 2. See Figure 1 to identify the locations of SW1 and SW2.

Dip Switch SW1 Settings							
SW1							
Pos 1	Pos 2	Pos 3	Pos 4	Pos 5	Pos 6	Pos 7	Pos 8
ON	ON	ON	ON	ON	ON	ON	ON

**Table 1 Dip Switch SW1 Settings**

Dip Switch SW2 Settings							
Pos 1	Pos 2	Pos 3	Pos 4	Pos 5	Pos 6	Pos 7	Pos 8
OFF	ON	ON	ON	ON	ON	OFF	ON

**Table 2 Dip Switch SW2 Settings**

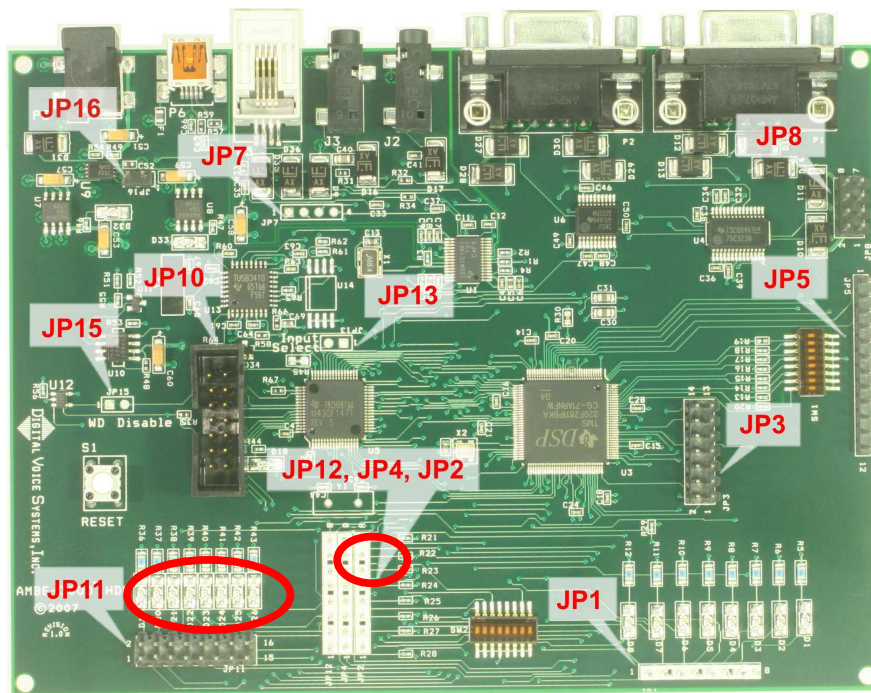


**Figure 1 Dip Switch SW1 and SW2 Locations**

Next verify that the jumpers are installed as shown in Table 3. Refer to Figure 3 for the Header locations.

HDK Headers with Jumpers			
Item	Header Pins	Name	Description
JP11	Jumpers on pins 1 thru 8	$\mu$ controller LED's	HDK board status indicators
JP4 to JP2	Jumper on Pins 1, 5, 6, and 7	HDK Configuration	Jumpers to set board options

**Table 3 HDK Installed Jumpers**



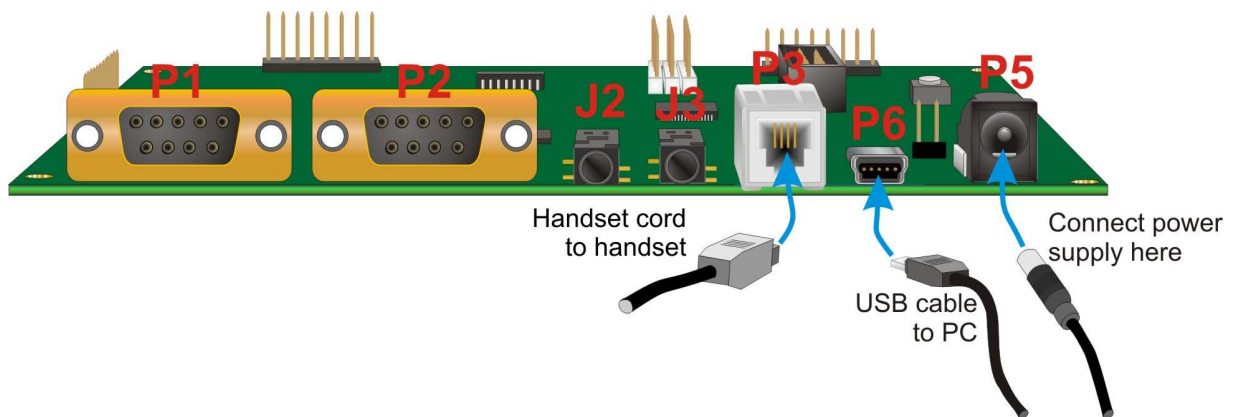
**Figure 2 HDK Jumper Locations**

### **Step 3      Connect the cables to the HDK**

To begin using the HDK board Plug in the power cable P5. Next, connect the handset cord to the handset and the opposite end to the RJ11 connector (P3) on the HDK board. Refer to Table 4 HDK Connections and Figure 3 HDK Connections.

AMBE-3000™ HDK Board Connectors	
P1	RS-232 Interface
P2	Console Out
P3	Handset
P5	Power
P6	USB
J2	Audio In
J3	Audio Out

**Table 4 HDK Connections**



**Figure 3 HDK Connections**

Now connect the AMBE-3000™ HDK to a PC's USB port, using the USB "Type A to Mini-B" cable included with the HDK. The USB connection on the AMBE-3000™ HDK is used to set system configuration, mode of operation and for file I/O via PC. To use the USB interface it is first necessary to install a USB driver.

**NOTE:** When using the USB Interface, connecting more than one HDK board to the same PC at the same time could result in a MS Windows fault. Therefore, it is recommended to connect only one HDK to a PC at a time.

### **Step 4      Install the USB drivers**

The AMBE-3000™ HDK Vocoder board is set-up, controlled and operated from a PC. In order for the PC to work with the HDK the USB cable must be connected as shown in Step 4 and USB driver must be installed.

The AMBE-3000™ HDK Board requires the Texas Instruments TUSB3410/5052 device driver. TI's USB driver is easy to install and is available for download from TI's website <http://focus.ti.com/docs/toolsw/folders/print/tusbwinvcp.html>

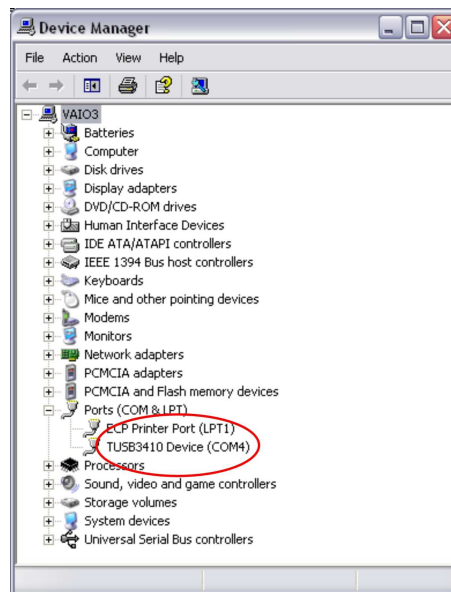
It is a Microsoft WHQL Certified VCP driver for MS Windows XP and MS Windows VISTA.

USB driver installation:

Go to the link above and download the USB Driver (swrc094.zip (13MB)) this file contains TUSBWINVCP\_WDF-Single\_Driver\_v1-2.exe. Note in order to download the file you must be a "my.ti" registered user. To register to my.ti visit the following web page. [https://myportal.ti.com/portal/dt?lt=myti&provider=TIPassLoginSingleContainer&goto=http%3A//focus.ti.com/general/docs/interimdownload.jsp%3Fdest\\_url%3Dhttp%253A//focus.ti.com/general/docs/lit/getliterature.tsp%253FbaseLiteratureNumber%253Dswrc094%2526fileType%253Dzip](https://myportal.ti.com/portal/dt?lt=myti&provider=TIPassLoginSingleContainer&goto=http%3A//focus.ti.com/general/docs/interimdownload.jsp%3Fdest_url%3Dhttp%253A//focus.ti.com/general/docs/lit/getliterature.tsp%253FbaseLiteratureNumber%253Dswrc094%2526fileType%253Dzip) for registration and login information.

Create a folder on the PC named C:\TUSB3410. Then, unzip the swrc094.zip file to this folder and run the setup.exe program to install the driver. Additional details regarding the USB driver installation can be found at TI's web site.

Verify the driver is installed and check what COM port has been assigned to the driver. To find this information use Windows "Device Manager". To open Windows "Device Manager" or Click Start, click Run (Start Search in Vista), and then type "devmgmt.msc" (without the quotation marks).



**Figure 4 Windows Device Manager**

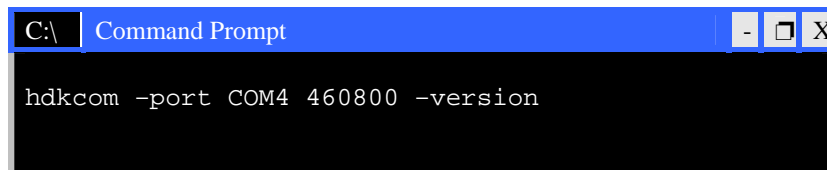
NOTE: Write down the Com Port that is being used for the TUSB3410, this value will be required to run the HDK control program. In Figure 4 Windows Device Manager the COM port is shown as COM4.

## **Step 5**      **Verify HDK Board operation**

The AMBE-3000™-HDK Development Board software includes a PC executable program (hdkcom.exe) that provides board set up and operation. The hdkcom.exe file is located in the C:/HDK/bin directory that was created when the CD was copied onto the PC. This program can encode a PCM speech file and save it as a compressed voice file on the PC, decode a previously encoded file and play an encoded/decoded PCM file out the analog outputs. These operations are performed in Steps 6 through 10.

The operation of the board can be easily verified by running the hdkcom file that can be found on the installation CD. This executable file with the -version argument requests the HDK to respond with the version number of the AMBE-3000™ Vocoder Chip. To control the HDK board using the hdkcom program first open a Command Prompt window and change to the C:/HDK/bin directory. (This is the directory where the hdkcom.exe program file is located.)

Then run the following command.



```
C:\ Command Prompt
hdkcom -port COM4 460800 -version
```

where:

COM4 is the COM port on the PC that the HDK communicates on as indicated by Windows Device Manger

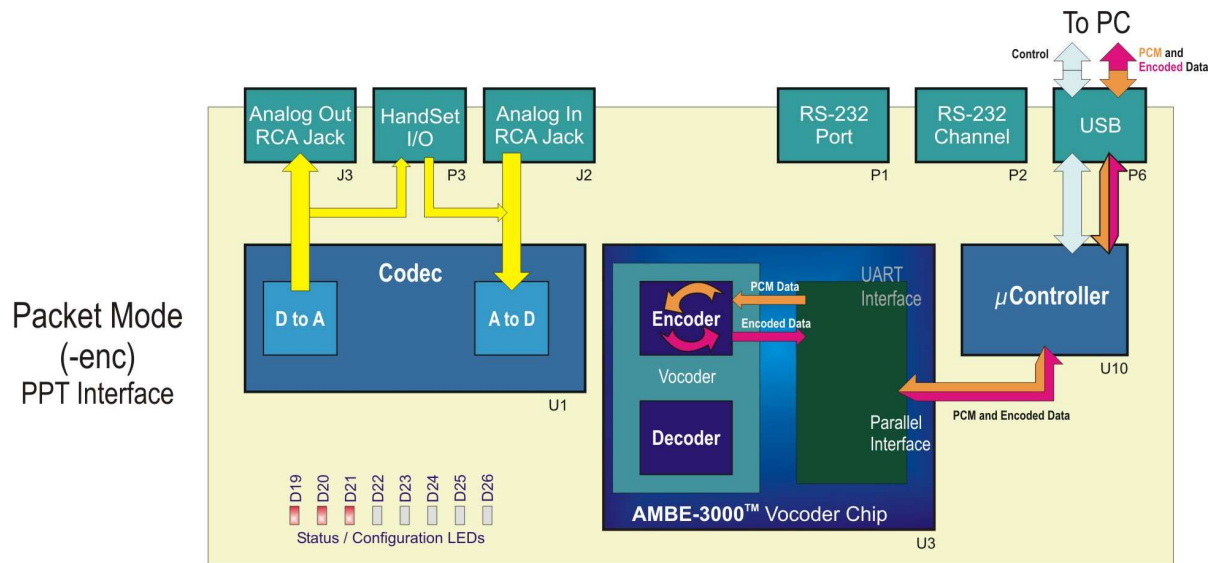
460800 is the baud rate of the PC connection

-version is to argument to use to display the version information of the HDK board

## **Step 6**      **Encode a file**

To encode a PCM file and create a compressed data file the program hdkcom.exe is used with the -enc parameter. The -enc is used to encode a file from the PC, the (.pcm suffix) file input to the HDK via USB interface must be 16-bit linear PCM data sampled at 8kHz. The file from the PC will be encoded by the AMBE-3000™ and then sent back to PC and saved as the (.bit) file as named in the command line.

The following example will set the HDK into Packet Mode and encode a File to a compressed data file.



**Figure 5 Packet Mode -enc PPT Interface Block Diagram**

```
C:\ Command Prompt
hdkcom.exe -port COM4 460800 -ppt -r 39 -enc C:\HDK\tv\dam.pcm dvsi-
r39.bit
```

where

COM4 is the COM port on the PC that the HDK communicates on as indicated by Windows Device Manager  
460800 is the baud rate of the PC connection

-ppt sets the HDK to use the PPT Interface of the AMBE-3000™ Vocoder chip

-r39 is the rate index of the bit rate the file is to be encoded at 3600bps

-enc encodes the PCM file and saves it to a file

dam.pcm is the name of the PCM file (located in the /tv directory) to be encoded

dvsi-r39.bit is the name of the file to be saved

## **Step 7 Compare the encoded file to its test vector**

To validate that the file was encoded correctly simply compare the created file dvsi-r39.bit with the test vector dam.bit file located in the C:\HDK\tv\r39\ directory that was copied from the included HDK CD.

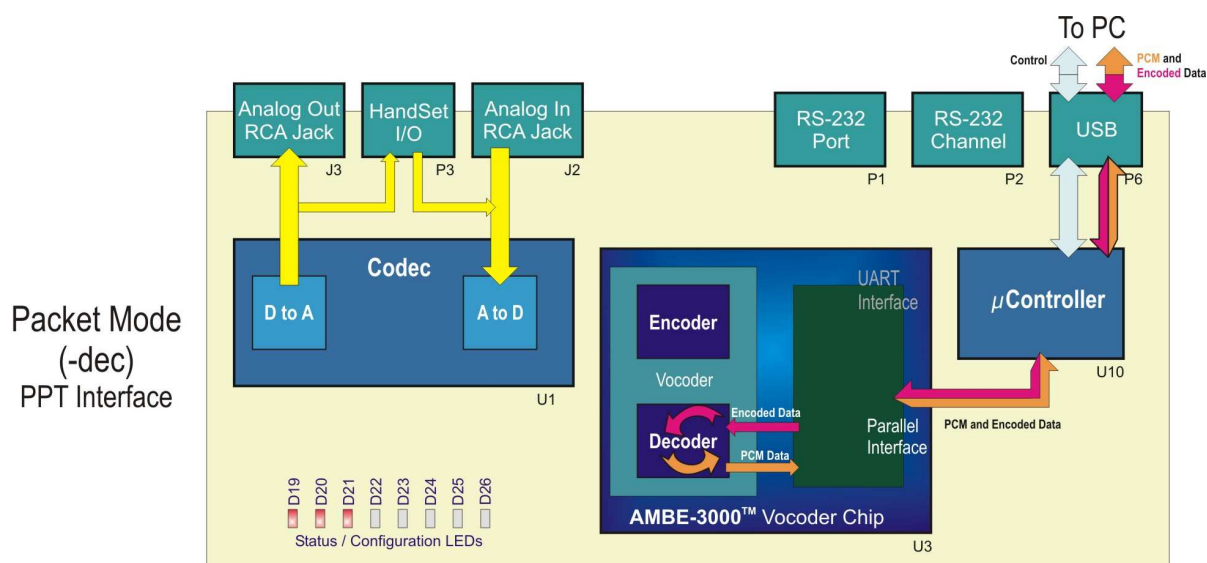
In the bin directory use the following DOS command.

```
C:\ Command Prompt
fc /b dvsi-r39.bit C:\HDK\tv\r39\dam.bit (The response should be)
no differences encountered
```



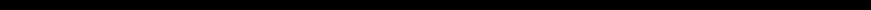
## Step 8      Decode a file

To decode a compressed data file to a PCM audio file the program hdkcom.exe is used with the -dec parameter. The -dec is used to decode a previously encoded (.bit) file from the PC, When the HDK receives the encoded (.bit) file over the USB interface it is processed by the AMBE-3000™ Vocoder Chip's decoder. The digital speech data is sent back to the PC via the USB interface and saved as the (.pcm suffix) file named in the command line.



### Figure 6 Packet Mode -dec PPT Interface Block Diagram

The following example will set the HDK into Packet Mode and decode a File to a PCM audio file.



The screenshot shows a Windows Command Prompt window with a blue title bar that reads "Command Prompt". The address bar shows "C:\". The command prompt displays the following command: `hdkcom.exe -port COM4 460800 -ppt -r 39 -dec dvsi-r39.bit dvsi-r39.pcm`.

where

COM4 is the COM port on the PC that the HDK will communicate on

460800 is the baud rate of the PC connection

-ppt sets the HDK to use the PPT Interface of the AMBE-3000™ Vocoder chip

-r 39 is the rate index of the bit rate the file is to be decoded at 3600bps.

- dec decodes the previously encoded file and saves it to a file

dvsi-r39.bit is the name of the encoded file to be decoded

dvsi-r39.pcm is the name of the file to be saved

## Step 9 Compare the decoded file to its test vector

To validate that the file was decoded correctly simply compare the created file dvsi-r39.pcm with the test vector dam.pcm file located in the C:/HDK/tv/r39 directory that was copied from the included HDK CD.

In the HDK directory use the following DOS command.

```

C:\ Command Prompt
fc /b dvsi-r39.pcm C:\HDK\tv\r39\dam.pcm (The response should be)
no differences encountered

```

## Step 10 Play a PCM file out the HDK

Now the HDK can be run in Codec Play/Record Mode (-play) to play (decode) the encoded (.bit) file stored on the PC out the analog audio output

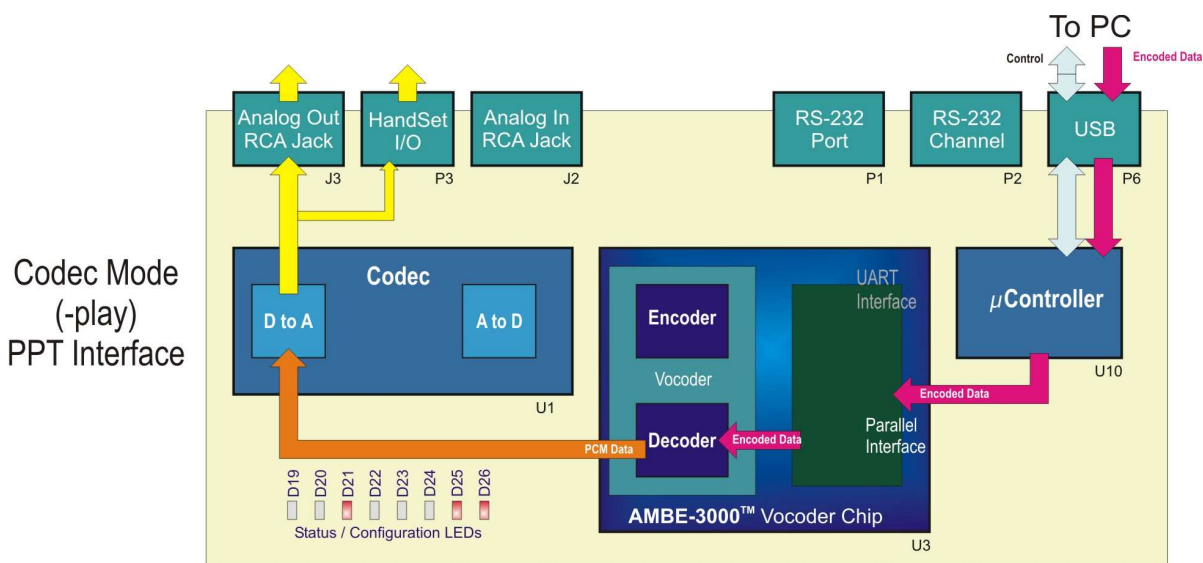


Figure 7 Play / Record-play Block Diagram

Codec Play Audio Output Command Example of playing an encoded (3600bps) file out the audio output

```

C:\ Command Prompt
hdkcom.exe -port COM4 460800 -ppt -r 39 -play dvsi-r39.bit

```

where



COM4 is the COM port on the PC that the HDK communicates on as indicated by Windows Device Manger

460800 is the baud rate of the PC connection

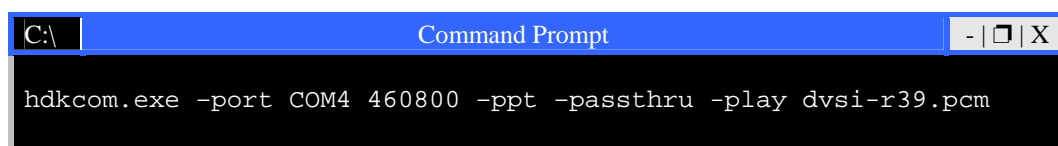
-ppt sets the HDK to use the PPT Interface of the AMBE-3000™ Vocoder chip

-r 39 is the rate index of the bit rate the file was originally encoded at

-play decodes the previously encoded file and plays it out the audio output

dvsi-r39.bit is the name of the file to be played out the audio output

Instead of playing the encoded (3600bps) file out the audio output an alternative method to test the HDK is to use the pass-through option to play the encoded / decoded PCM file as described below.



```
C:\ Command Prompt
hdkcom.exe -port COM4 460800 -ppt -passthru -play dvsi-r39.pcm
```

where

COM4 is the COM port on the PC that the HDK communicates on as indicated by Windows Device Manger

460800 is the baud rate of the PC connection

-ppt sets the HDK to use the PPT Interface of the AMBE-3000™ Vocoder chip

-passthru sets the HDK to pass the data through the AMBE-3000™ Vocoder Chip without performing any processing

-play plays the previously encoded/decoded file and plays it out the audio output

dvsi-r39.pcm is the name of the file to be played out the audio output

By substituting the original PCM file (C:/HDK/tv/dvsi.pcm) with the processed (encoded/decoded) file (dvsi-r39.pcm) the user can listen to either the original file or the processed file for a quality comparison.

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