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1. General
The INTDSK1115 is an Analogue Daughter Board that is designed to be used in conjunction with DSP Based Products. It is primarily designed for use with a C6711™ DSK (DSP Starter Kit) as supplied by Texas Instruments.

2. Test Equipment
The following test equipment is required to carry out the tests defined in these test procedures:

- 1 × Texas Instruments TMS320C6711 DSK
- 1 × Power Supply
- 1 × PC with Code Composer Studio 2
- 1 × Audio Source and Speakers
- 2 × DSP Test Software
- 1 × Function Generator and Oscilloscope

This equipment is described in more detail below:

2.1. Texas Instruments TMS320C6711 DSK.
All the information required to set-up the DSK board is included in the DSK boards box. Refer to the C6211/C6711 DSK Hardware Installation Guide (SPRU436) to get the DSK running. See section 2.2 for power supply information.

2.2. Power Supply.
When using the INTDSK1115 on the DSK board, the power supply requirements change. Instead of using the +5V adaptor in J4, an external power supply is required (+5V, 0V, -12V, +12V), using J8.
Warning: Do not supply power to J4 and J8 at the same time.

2.3. PC with Code Composer Studio 2.
In order to use the INTDSK, a PC with Code Composer Studio (CCS) Version 2.0 or higher is required. Updates to CCS are available on the Internet.

2.4. Audio Source and Speakers.
In order to test the Codec, the PC must produce an audio signal. This could be in the form of a CD in the PCs CD-ROM drive or a sound file playing through the PCs sound card. The PC requires a pair of stereo speakers.

2.5. DSP Test Software.
There are two CCS projects available to test the INTDSK1115. The first one tests the CODEC, A/Ds and D/As. The second one is for advanced debugging of the A/Ds and D/As.

2.6. Function Generator and Oscilloscope.
A function generator is required to test the A/DS and D/As. This will need to produce a +5V peak-to-peak sine wave. An Oscilloscope is required to check the sine wave from the function generator.
3. **Test Procedure**
The following steps should be taken when testing an INTDSK1115 board:

**3.1. Serial Number.**
Check that the INTDSK1115 has a serial number sticker on it. If it hasn’t, check what the next serial number is in the log and print a sticker for the board.

**3.2. Visual Inspection.**
Check the INTDSK1115 for missing parts and solder shorts. Table 3.2 lists all parts that are not fitted by default. Check that the INTDSK1115 board has been modified correctly. Details of the modification can be found in the appendix.

<table>
<thead>
<tr>
<th>Table 3.2. Parts Not Fitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>R3, R12, R55, R52, R53</td>
</tr>
<tr>
<td>R18, R19, R45, R54</td>
</tr>
<tr>
<td>U11, U15</td>
</tr>
</tbody>
</table>

**3.3. Rules of Operation.**
- Ensure SW2 of the DSK is on and all the others are off.
- Power up the DSK before running CCS2.
- Use software reset not hardware reset when CCS2 is running.
- Close CCS2 before powering down DSK.

4. **Using the Software**
The two DSP programs are as follows:

- testapp.pjt - Test Application, Tests Codec, A/Ds and D/As.
- wavegen.pjt - Wave Generation, Generates a wave to D/As and reads A/Ds.

**4.1. Test Application.**
This application tests the Codec by reading audio data in and looping it back out. The software also reads the A/Ds and loops it back to the D/As.

**4.1.1. Testing the Codec:**
- Test the audio source by connecting it directly to the speakers.
- Connect the audio source to the audio input of the INTDSK1115 board (J6).
- Connect the speakers to the audio output of the INTDSK1115 board (J3).
- Ensure that SW1 on the DSK board is off.
- Run the Test Application software, and listen for the audio source on the speakers.
4.1.2. Testing the A/Ds and D/As:
- Set up the function generator to produce a +5V peak-to-peak Sine wave at 1KHz.
- Monitor the Sine wave on channel 1 of the oscilloscope.
- Connect the function generator to analogue input 1 of the INTDSK1115 board (J2).
- Monitor analogue output 1 of the INTDSK1115 board (J5) on channel 2 of the oscilloscope.
- Ensure that SW1 on the DSK board is on.
- Run the Test Application software. Compare the input waveform to the output waveform.

The output waveform should be the same frequency as the input, but the amplitude should be around +10V peak-to-peak. Clipping of the waveform can be avoided by adjusting the trim pots. (RV1 For the input waveform And RV3 For the output waveform).

- Do the same test for the second analogue channel. (Analogue input 2 (J4) and Analogue output 2 (J7), trim pots RV2 And RV4).

4.2. Waveform Generation.
If the all above tests passed, the waveform generation software doesn’t need to be run. However, if a problem it is not obvious whether it is the A/Ds or the D/As that are at fault. The waveform generation project produces a triangle wave and outputs it to the D/As. It also stores values from the A/Ds is SDRAM. This allows the two devices to be tested separately so that the problem can be found.

4.2.1. Testing the A/Ds:
- Set up the function generator to produce a +5V peak-to-peak Triangle wave at 100Hz.
- Connect the function generator to analogue input 1 of the INTDSK1115 board (J2).
- Ensure that SW3 on the DSK board is off.
- Run the Test Application software for a few seconds to capture the input waveform.
- Halt the application and view SDRAM.

The contents of the SDRAM will hold samples of the triangle wave. They will be stored at the start of the memory in the locations 0x80000000 to 0x80002FFC. Each 32-Bit word will be in the format 0xGGGGHHHH, where G represents A/D 2 and H represents A/D 1.

**Note:** Only one A/D can be captured at a time, so repeat the test with the waveform on analogue input 2 (J4) to capture A/D 2.

- Look through the memory for a value that is out of place. (See Figure 4.2).

```
<table>
<thead>
<tr>
<th>Al2</th>
<th>AD1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x002</td>
<td>004</td>
</tr>
<tr>
<td>0x002</td>
<td>0046</td>
</tr>
<tr>
<td>0x002</td>
<td>0048</td>
</tr>
<tr>
<td>0x002</td>
<td>004A</td>
</tr>
<tr>
<td>0x002</td>
<td>0022</td>
</tr>
<tr>
<td>0x002</td>
<td>004E</td>
</tr>
<tr>
<td>0x002</td>
<td>0050</td>
</tr>
<tr>
<td>0x002</td>
<td>0052</td>
</tr>
<tr>
<td>0x002</td>
<td>0054</td>
</tr>
</tbody>
</table>

expected 004C
```

**Figure 4.2. Checking A/Ds for Errors.**
4.2.1. Testing the D/As:
- Monitor the analogue outputs of the INTDSK1115 board on the oscilloscope.
- Ensure that SW3 on the DSK board is off.
- Run the Waveform Generation application.

The application will generate a triangle waveform on both analogue outputs of the board. Use the oscilloscope to check the waveforms for errors.

Note: By switching SW3 on, the waveform generation application will feed the A/Ds to the D/As. The test sequence for this mode of operation is as in section 4.1.2.

5. Appendix.

Appendix A – DSK Link Settings:

**Appendix A**

<table>
<thead>
<tr>
<th>SW1</th>
<th>SW2</th>
<th>SW3</th>
<th>SW4</th>
<th>Function</th>
<th>LED Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>Normal DSK Operation</td>
<td>ALL LEDs OFF</td>
</tr>
</tbody>
</table>

**Running the Test Application**

<table>
<thead>
<tr>
<th>SW1</th>
<th>SW2</th>
<th>SW3</th>
<th>SW4</th>
<th>Function</th>
<th>LED Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>Codec test mode</td>
<td>User LED 2 OFF</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>A/D &amp; D/A feed through mode</td>
<td>User LED 2 ON</td>
</tr>
</tbody>
</table>

**Running the Wave Generation Application**

<table>
<thead>
<tr>
<th>SW1</th>
<th>SW2</th>
<th>SW3</th>
<th>SW4</th>
<th>Function</th>
<th>LED Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>A/D &amp; D/A debug mode</td>
<td>User LED 3 OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>A/D &amp; D/A feed through mode</td>
<td>User LED 3 ON</td>
</tr>
</tbody>
</table>