



## Application Note XXX

### Connecting to the ChipCorder Analog Input

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Providing the appropriate analog signal level to the Winbond ChipCorder line of devices can sometimes be a little challenging. In the professional programmers sold for the ChipCorder products, these levels have already been taken care of in the design.

It is during initial testing and design of their prototype that many people would like to be able to load a sound file in from their computer sound card, or from their CD player, tape deck, or numerous other sources. Getting the correct level for the best storage and reproduction takes attention to details.

The input voltage specification for the 5 VDC parts is 50 mV P-P, and for the 3 VDC parts, 32 mV P-P typically. The best way to insure this level setting is to use an oscilloscope and measure the level directly in mV P-P at the ChipCorder device pin. However, many people do not have the oscilloscope readily available so they must use what equipment IS available.

The first action is to determine the peak output level from the audio source. Contrary to the way most of us expect, the common "Line Out" from stereo equipment may be anywhere from 300 mV to 2.0 V RMS. There is little consistency, even among different models from the same vendor. Reading the specifications helps but actually measuring the level on a peak signal is the best approach. For the sake of this example, we will consider a source of 500 mV RMS peak output.

Next, this value needs to be converted to mV P-P in order to calculate the ratio for a voltage divider or step-down transformer. Both approaches are illustrated on the following page, along with the calculations. Line 1) gives the relationship between RMS and P-P voltage measurements. In this example the 500 mV RMS equates to 1414 mV P-P as calculated in lines 2) and 3).

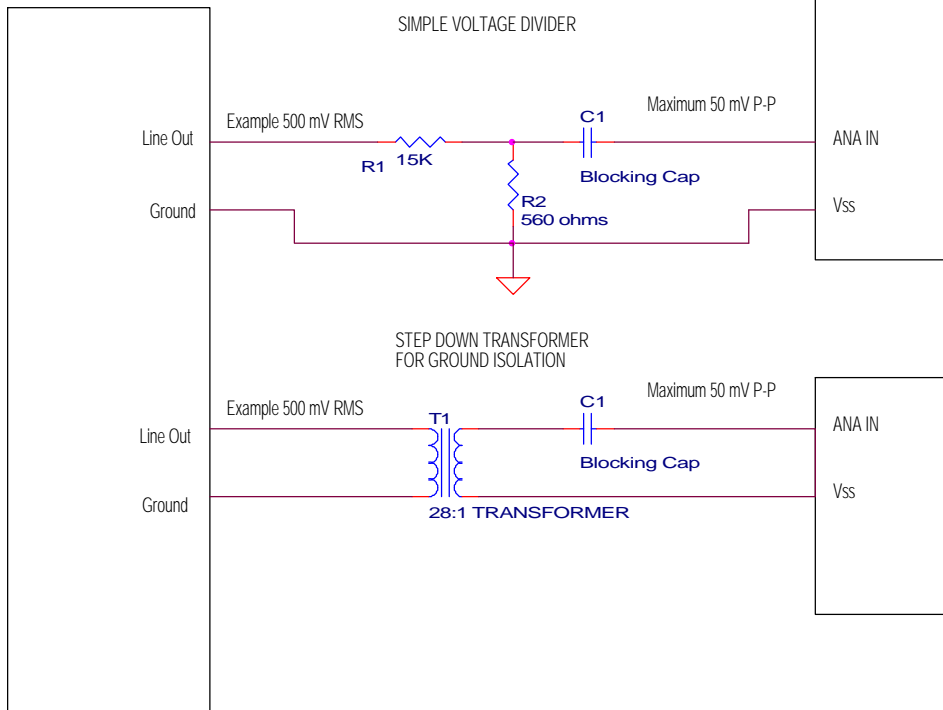
The resistive voltage divider is a simple "L" pad divider with two resistors and a DC blocking capacitor. The values have been determined to reduce the voltage from 500 mV RMS to 50 mV P-P. The reduction must be approximately 28 to 1 in this example, as illustrated in line 4). By using a chart of the common standard 10% resistor values the 15 Kohm and the 560 ohm resistors work out to very close to the required 28:1 ratio. See line 5) for details.

Remember to use the blocking capacitor to provide DC isolation from the ground references and the results should be satisfactory. The transformer approach is to eliminate "hum" from ground loop problems if such problems arise in the resistive voltage divider because of the common ground connection.

SOURCE  
TAPE DECK OR CD PLAYER

TARGET  
DEVICE

- 1) Peak-to-Peak =  $2.828 \times \text{RMS}$
- 2) Peak-to-Peak =  $2.828 \times 500$
- 3) = 1414 mV
- 4)  $1414 \text{ mV} / 50 \text{ mV} = 28.3$
- 5)  $15000 + 560 \text{ ohms} / 560 \text{ ohms} = 27.8$
- 6)  $R1 = 15000 \text{ ohms}, R2 = 560 \text{ ohms}$



Title		
CHIPCORDER RECORDING AUDIO PATH		
Size	Document Number	Rev
A	{Doc}	N/C
Date:	Friday, January 18, 2002	Sheet 1 of 1

ISD 25XX chip connection details:  
 ANA IN is pin 20  
 VSS is pin 13  
 Disconnect ANA OUT (pin 21) from ANA IN