



STAND-ALONE/PARALLEL INTERFACE PRODUCTS

Good Audio Design Practices

ISD products are very high-quality single-chip voice recording and playback systems. To get the full-quality voice capability of these devices, it is important to follow a few minimum guidelines when constructing your system. These suggested guidelines can help ensure satisfactory performance of your new recording system.

BASIC GUIDELINES

The guidelines are summarized as follows:

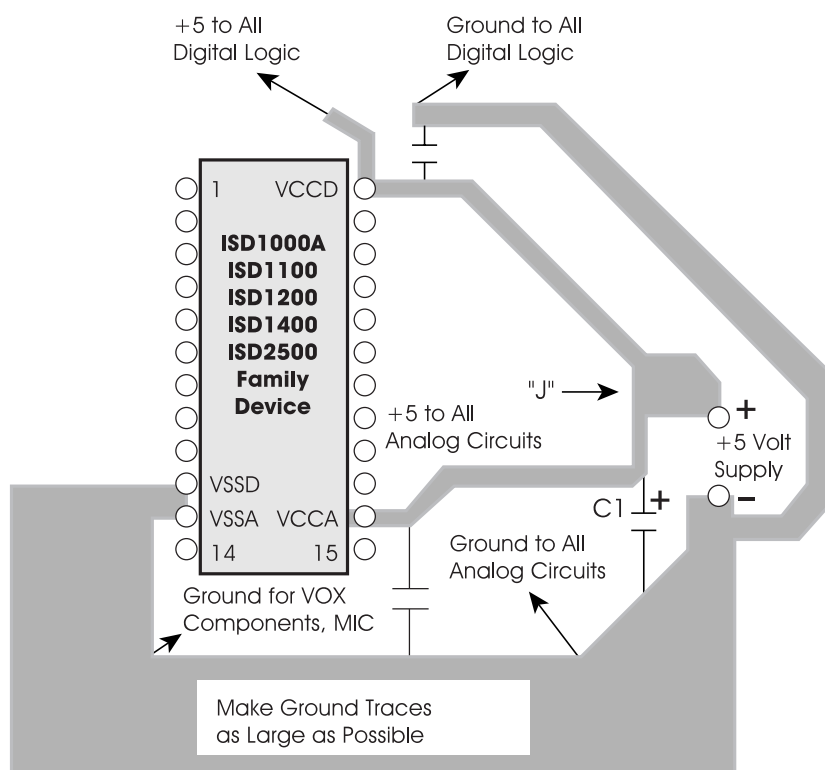
- Connect analog components (AGC resistors and capacitors, coupling capacitors, etc.) physically close to the ISD device. Use short component lead lengths.
- Use a quality microphone (see recommendations in "Microphone & Speaker Selection" under Application Information) and connect microphone ground to a low impedance analog ground return.
- Use either the differential electret circuit or the self biasing microphone, as demonstrated under the section on "Microphone and Speaker Selection."
- Provide high frequency decoupling capacitors at the analog and digital power pins, using low ESR (Effective Series Resistance) capacitors.
- Use a separate ground return to the power supply for the V_{CCD} (pin 28) decoupling capacitor.
- Use separate thick wire (#15 or better) or wide (>30 mils) power and ground routing lines.
- Use power supplies that do not introduce their own noise source (e.g., some switching supplies introduce noise into a recording.)

POWER SUPPLY AND GROUND DISTRIBUTION

There are two pin connections each for power and ground on the ISD devices. These separate connections are provided to minimize interference between the analog and digital portions of the circuits internal to the devices. It is highly recommended that this power separation be maintained in the manner shown on in the Figure 1 Power and Ground Connections diagram. Note in particular that V_{SSA} and V_{SSD} should be tied together right at pins 12 and 13.

CONNECTIONS TO THE ANALOG PATH

Components in the analog section of the ISD device should be physically located near the pins to which they are connected. Again referring to Figure 1, grounds and V_{CC} supplies for these components should be connected as indicated. In particular, capacitor C1 (low frequency voltage decoupling) should be as close to junction "J" as practicable. (Junction "J" separates V_{CCA} from V_{CCD} .) Components on the analog path should be tied as close as practicable to the device and be placed between C1 and the device. All digital control (addresses, control switches, etc.) should be tied to the appropriate V_{CC} or V_{SS} feed as shown at the top of the diagram.

Figure 1: ISD Device Power and Ground Connections

NOTE: Address and control logic and audio connections not shown. Drawing is for power connections only.

MICROPHONE AND SPEAKER

It is important to stress that the above guidelines are most effective if good quality microphones and speakers are used in the system. The user may want to experiment with a variety of microphones and speakers (and speaker enclosures) to get the optimum voice quality performance out of the system. The "Microphone and Speaker Selection" section contains several recommended microphones and speakers and "Using the Device" has a paragraph on audio amplification.

COMMENTS ON BATTERY OPERATION

The low operating power of the ISD series makes it ideal for use in portable battery operated environments. It should be noted, that as the battery approaches its end of life its output voltage will begin to drop. In addition, the effective series resistance of the battery at end of life increases substantially. As a result of these factors, the perceived voice quality of the ISD device will diminish. When this happens it is time to replace the battery. The device "tells" you when the battery is low.