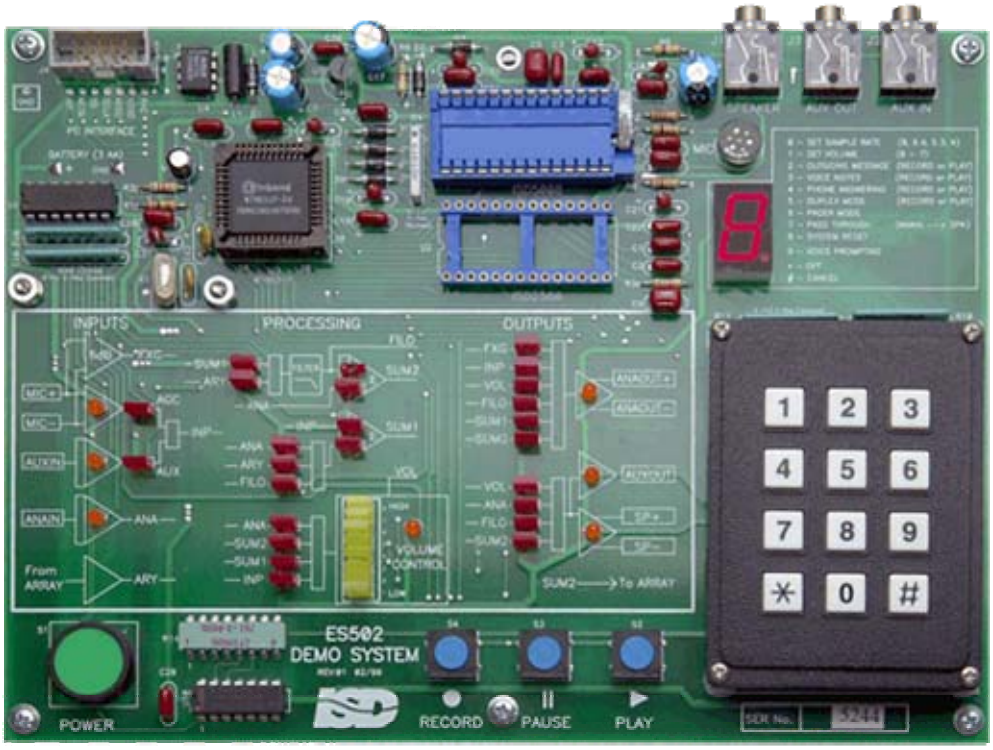
Winbond Electronics Corporation America
2727 North First Street, San Jose, Ca. USA Tel:(408)943-6666 Fax:(408)554-1786

ISD-ES502
Demonstration Board



DESCRIPTION:

The ES502 demonstration board illustrates the signal routing and flexibility of the ISD5008 as well as its recording and playback functions. The unit comprises an ISD5008, an ISD2560 to simulate background conversation, a Winbond W78E51 microcontroller, microphone and attendant circuitry, a seven-segment display for displaying mode and level information, and a keypad for selecting the modes. In addition, there are Power, Record, Pause and Play pushbuttons.

The most prominent feature of the system is an LED map of the available signal paths (indicated by red LEDs) which indicates the path in use for each of the demonstration modes. The map also shows which sections of the device are powered for each function with orange LEDs and the selected volume level with yellow LEDs in a bar graph.[1]

DEVICE SUPPORTED:

Product supported	Ordering Code
ISD5008 Series	ISD-ES502

CONTENTS OF KIT:

- One ISD-ES502 Demo Board
- Two AA batteries
- Instruction Sheet(User's guide with Schematics)

INITIAL SETUP:

1. When the ISD-ES502 board is initially received install the batteries, carefully observing polarity.
2. If some of the LEDs light at this time, push the green Power Button to start unit properly.
3. Otherwise, push the green Power Button on the lower left to power on the unit. The ES502 will announce that it is "Ready" and conclude with the "-" in the middle of the numeric LED display turned on. Note that the unit will automatically turn itself off after a period of inactivity to conserve battery capacity. If one wants to shut it off earlier then just press the "*" button on the keypad. The ES502 will sound a tone and turn off.
4. The ISD-ES502 is now ready for the user to choose the mode of operation.

There are three utility functions and six demonstration modes:

Utility Functions

Before trying the various modes it is necessary to understand the three action control buttons located at the bottom left of the board and the three general-purpose buttons on the keyboard.

Record Button - The Record Button is a push-push type of control. When it is first pushed, the Record operation will begin and continue until the end of the message space or the Record Button is pressed again. Thus the Record Button is used to both Start and Stop the Record operation.

Pause Button - The Pause Button will pause a Record or Play operation until the Record or Play button is pressed again. Then the paused operation will resume.

[1] A block diagram of the ISD5008 chip showing all of it's possible paths is located at the end of this document

Play Button - The Play Button is pressed to begin playing the recorded message, which will play until it ends or the Pause button is pressed. To resume playing press the Play Button again.

Button 9 - Voice Prompting Control - The system uses voice prompts recorded in the ISD5008 to assist the user in operating the unit. If you're familiar with the operation, or just prefer the "sounds of silence," you can turn off the prompting feature by pressing the "9" key on the keypad. The normal mode is initialized with the Voice Prompts turned on.

Button 0 - Set Sample Rate - The ISD5008 supports four data sampling rates. The ES502 retains in memory the sampling rates used to record the outgoing message, duplex messages, and telephone answering messages. When these messages are played back, the original sampling rate is restored. This allows one, for example, to use a high sampling rate for the best quality Outgoing Message (OGM) combined with a low sampling rate for the incoming message (ICM) to extend available recording time. To demonstrate the sound modification capability, the Voice Notes function does not retain the original rate, but uses the most recently set value. A message can therefore be recorded at one rate and played back at another. Utility Filter Mode routes an external signal through the internal low-pass filter. The cutoff frequency of the filter is determined by the most recently selected sample rate. When button 0 is pressed, the = sign appears. The second key push should be 8,6,5, or 4, after which the phrase "8 KHz," "6.4 KHz," "5.3 KHz," or "4 KHz," will be spoken if voice prompts are enabled. All recording operations from this point until the next change will be made at the selected rate.

The table below shows the filter setting for each sample rate. It should be noted that a full record and playback cycle routes the audio through the filter twice. The resulting filter function therefore will be 6 dB down at the indicated frequency.

Sample Rate	8.0 KHz	6.4 KHz	5.3 KHz	4 KHz
Filter cut off (- 6dB)	3.4 KHz	2.7 KHz	2.3 KHz	1.7 KHz

Button 1 - Set Volume[2] - The current volume level (0 through 7) appears on the 7-segment LED display with the decimal point illuminated to indicate volume (rather than mode). The desired volume level is entered with the keypad (note keys 8 and 9 default to 7) and the phrase "Volume is set" is spoken at the new volume. The volume level is also indicated with the yellow bar graph on the map.

Functions-

Button 2 - Outgoing Message (OGM) - This button sets the demo up to record or play the Outgoing Message used in the Telephone Answering Device demo. When in this mode, if the Play Button is pressed, the previously recorded outgoing message will be played at its originally selected sample rate (this sample rate defaults to 8 KHz in this location in the first version of the software). If the Record Button is pressed, the user can record a message (maximum length 50 seconds at 8 KHz sampling rate) using the microphone. In both cases, the map LEDs on the board will show the path used in a real application to make a local recording using the microphone. During playback, the path shown is the one used in an application to playback the recorded message over the telephone line. However, in order that the user is able to hear the message, it is also routed through the volume control and speaker amplifier.

The new OGM will be used in the Telephone Answering Device prompt. If the message exceeds the maximum available space, the recording will be truncated.

[2] The volume selection is effective for most operations- this demonstrates its function, but is also a convenience for using the board.

Button 3 - Voice Notes - The function for Voice Notes is the same as for the Outgoing Message except that the sampling rate used is the last one entered rather than the original rate used to record the message. The LED map in the demo board illustrates the paths used to record or playback a local message.

Because of the ability to control sample rates independent of record and play functionality in this mode, it is possible to record at one sample rate and playback at another.

Button 4 - Telephone Answering Device (TAD) - The function is similar to that for the OGM except that when the Record Button is pressed, the sequence "beep," <OGM>, "beep" is heard before the recording starts. The map shows the configuration for both the prompt and the recording.

Button 5 - Duplex Mode - A recording is made from the microphone input mixed with a simulated background sound (stored in the ISD2560). During the recording, the background sound is also audible, as it would be in the real application. Play simply plays back this recording.

Button 6 – Utility Filter Mode[3] - Utility Filter Mode demonstrates the capability of the ISD5008 to supply a filter function for other analog sources. For example, the device could be used as the smoothing filter for an external D to A converter. To demonstrate this, a sample message (stored in the ISD2560) is played from the analog input to the speaker through the filter. Utility Filter mode routes an external signal through the internal low-pass filter. The cutoff frequency of the filter is determined by the most recently selected sample rate. This mode allows one to hear the effect of the filter cutoff frequency changing with sample rate.

Button 7 - Feed-Through Mode - This mode illustrates the ability of the ISD5008 to pass through both input and output circuits of a cellular phone when the configuration is set to pass data both ways and remains in this state until another function or Cancel is selected. The user will have to supply the external signals via the jacks at the top of the board.

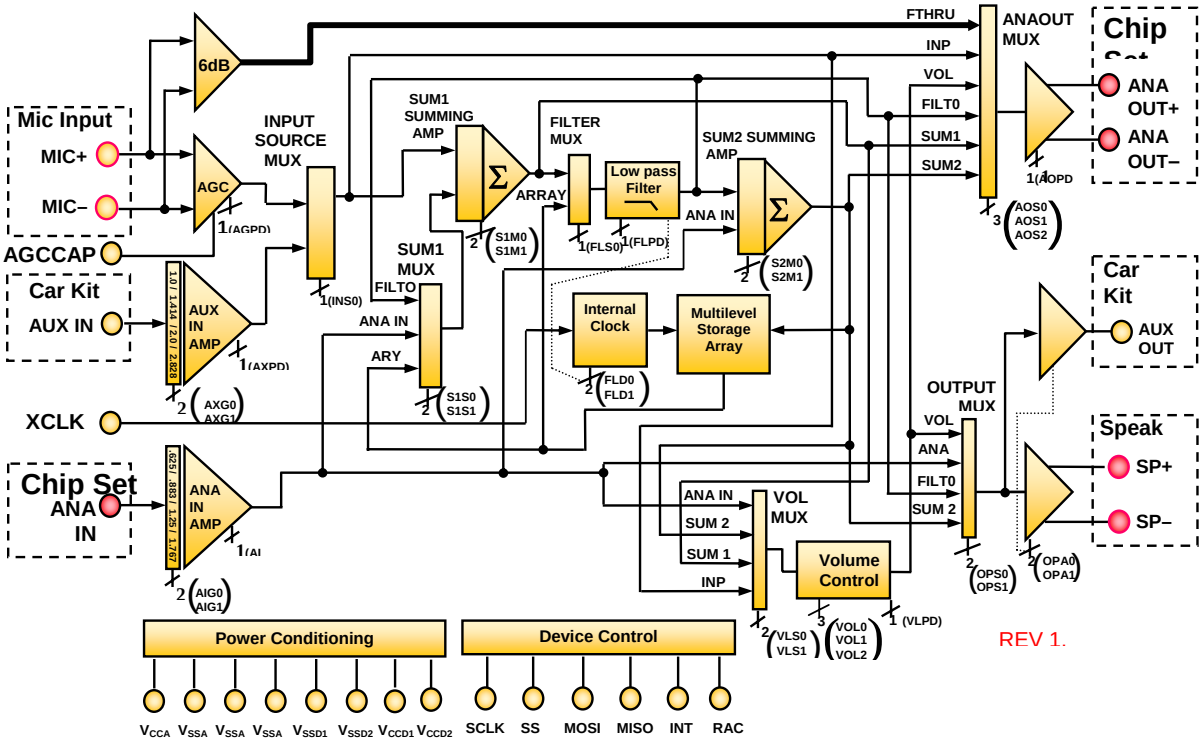
Button 8 - Restart ES502 - Restarts the ES502 from the introductory phrases, initializing all variables.

Button * - ES502 Off - Turns off the demo board displays and puts the processor, ISD2560, and ISD5008 in sleep mode.

Button # - Cancel - Cancels a pending operation; can be used in place of the second key push in modes 2-5 to exit the mode.

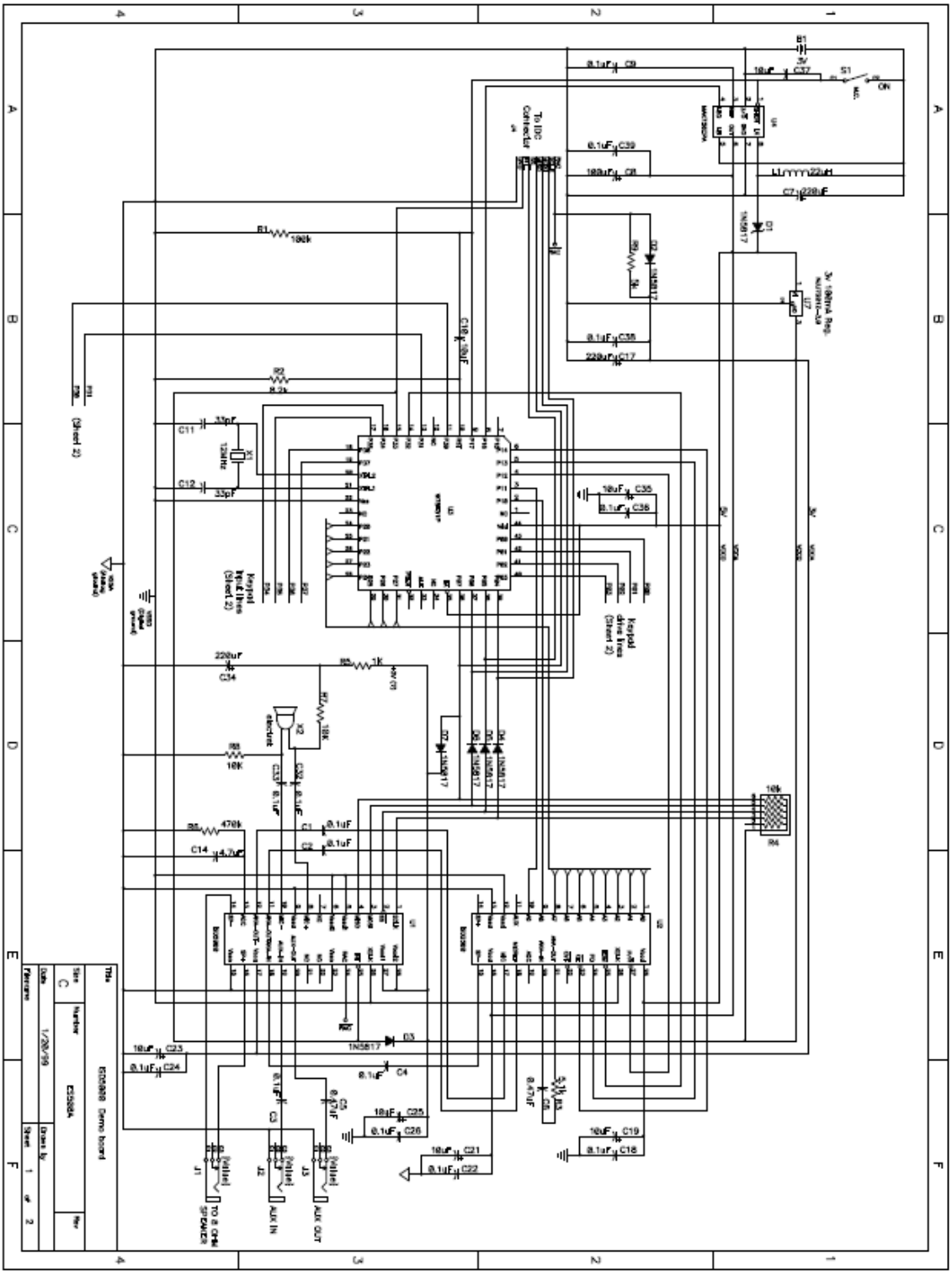
[3] The first version of the ISD-ES502 prompts this mode as “Pager Mode”. This will be changed in the next version of the product.

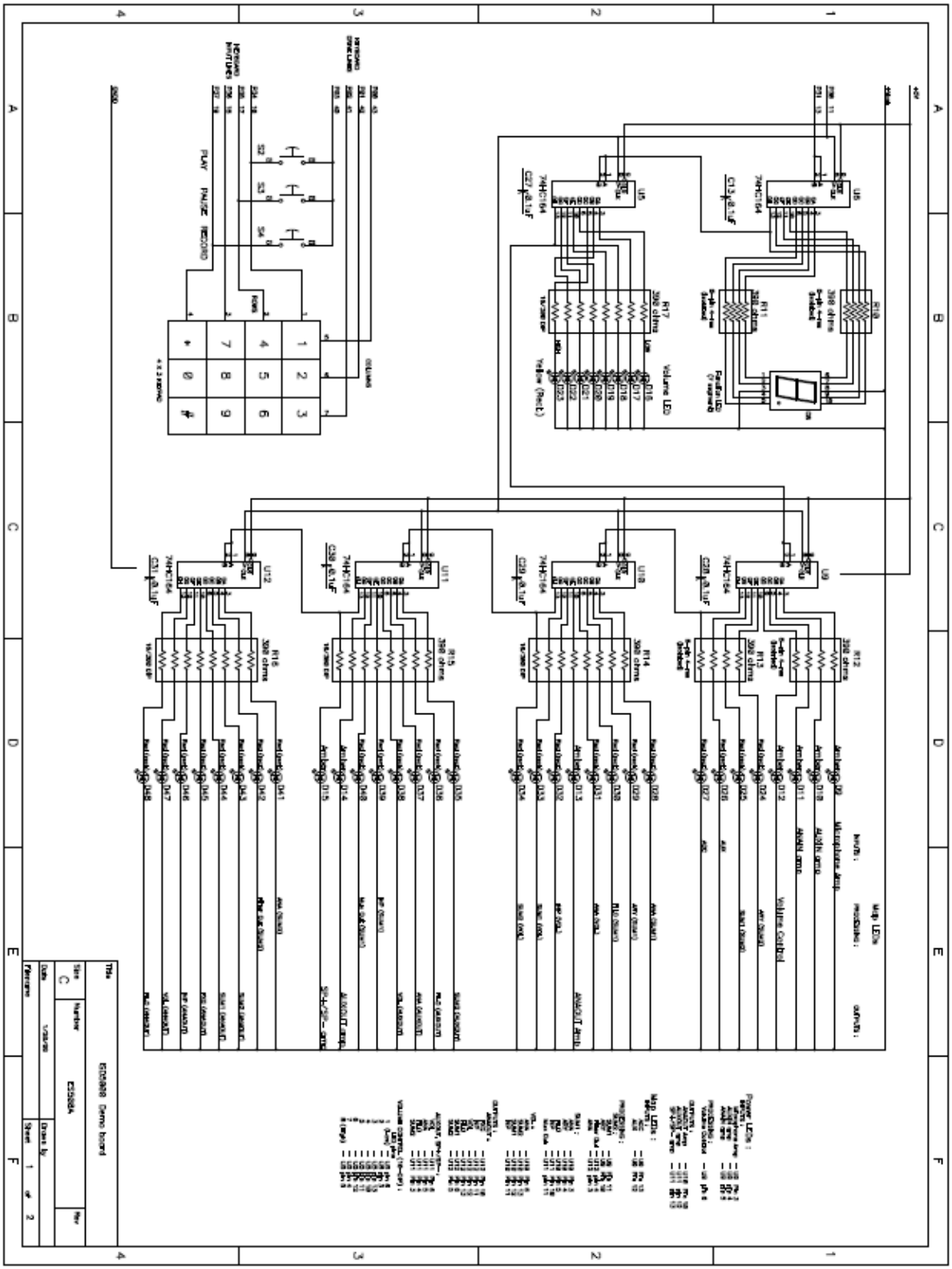
ES502 BLOCK DIAGRAM



REV 1.

SCHEMATICS:





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ООО «НИОКР СИТЕМС»
Москва, 125362, Россия, ул. Вишневая, д. 9, к. 1, Блок 104 а и 104 в

Телефон: 8 (495) 268-14-82
Email: n@nsistems.ru

ИНН: 7735154786
ОГРН: 1167746717709