

Description

The Voice Extreme™ (VE) Module simplifies the design of speech recognition products by integrating all key components onto a single board. A low-noise audio channel and convenient connectors allow rapid prototyping, less debugging and shorter time to market.



Using the Voice Extreme™ Toolkit, programs can be downloaded into the VE Module. Modules can then be unplugged from the Development Board and wired directly into the final product. In-circuit reprogramming is also supported.

Through the 34-pin connector, the module offers 11 I/O lines, as well as connections for a power, microphone, speaker, and logic-level RS232 interface.

Features

Full Range of Sensory Speech™ 6 Capabilities

- ▶ Speaker-independent speech recognition
- ▶ Speaker-dependent speech recognition and word spotting
- ▶ High quality speech synthesis and sound effects
- ▶ Speaker verification
- ▶ Four-voice music synthesis
- ▶ Voice record & playback

Integrated Solution

- ▶ VE IC Speech processor & 2Mb Flash
- ▶ 14MHz (main) & 32kHz (time keeping) clocks
- ▶ 11 I/O lines and CMOS RS-232 interface
- ▶ Microphone preamplifier
- ▶ Speaker amplifier

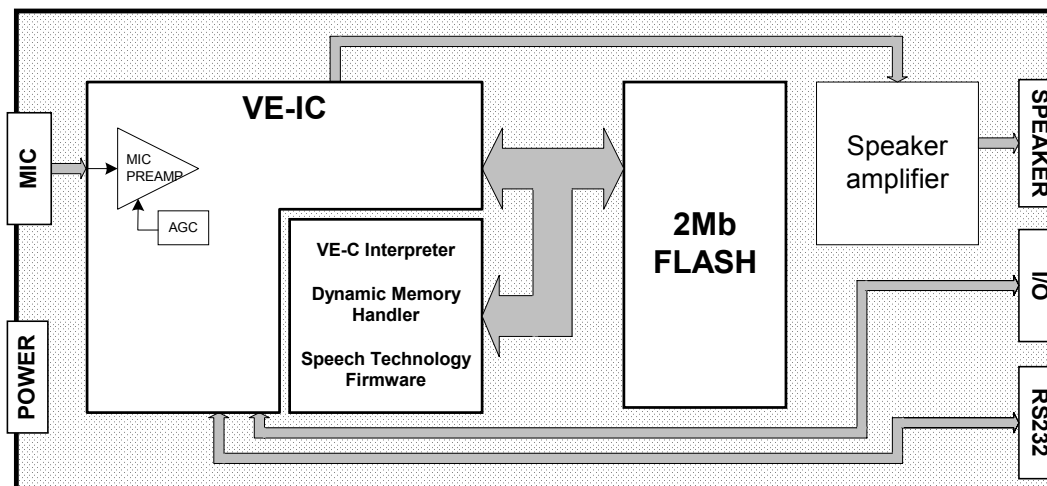
Low Power Requirements

- ▶ $V_{dd} = 2.85V - 3.3V$
- ▶ $I_{dd} = 26mA @ 3V$ (typ. for complete module)

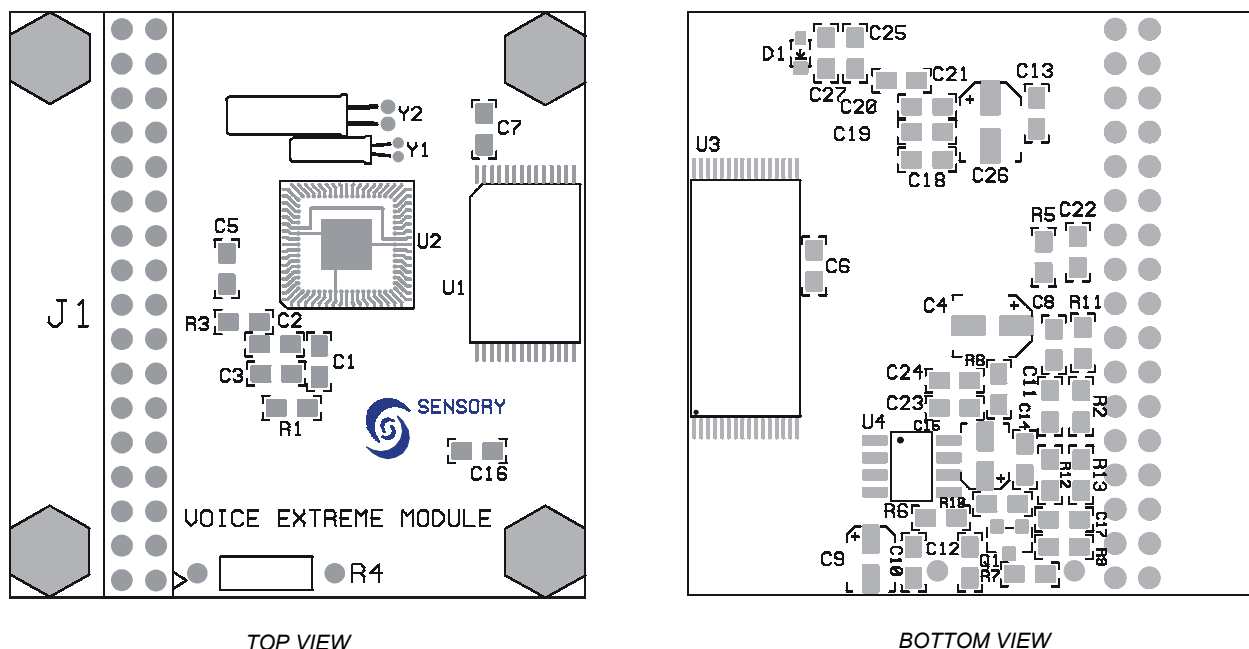
The Voice Extreme™ System

- ▶ Built-in VE-C Interpreter (a subset of ANSI-C), Dynamic Memory Handler, Speech Technology Firmware
- ▶ Works with Voice Extreme™ Toolkit
- ▶ Modules can be reprogrammed in-circuit

Voice Extreme™ Module Block Diagram



Module Layout



TOP VIEW

BOTTOM VIEW

U1 VE ROM

This 64KB OTP ROM contains the VE-C interpreter, dynamic memory handler and speech technology firmware. The VE IC includes these features masked into on-chip ROM.

Note that some modules may not include U1, since it is integrated into U2.

U2 VE IC

The Voice Extreme™ Integrated Circuit (VE IC) is the central speech processor. Please refer to the Voice Extreme™ IC Datasheet for detailed specifications.

Y1 Crystal

A 14.318 MHz crystal establishes the frequency of Timer 1 on the VE IC. Timer 1 is the system clock and is used for all speech recognition functions.

Y2 Crystal

A 32.768 KHz crystal establishes the frequency of Timer 2 on the VE IC. Timer 2 is useful for timekeeping applications since it is not interrupted, unlike Timer 1.

Note that Timer 2 is not available on the TQFP versions of the VE IC.

R4 Microphone Gain Resistor

An optional microphone resistor may be added to the VE module to change the microphone gain. From the factory, the microphone gain is pre-set to a level suitable for arms-length user interfaces with a 2.7K resistor at R7 and 3.3nF capacitor at C28. If a different microphone gain is desired, proceed in this way:

1. Unsolder and remove R7 and C28
2. Solder a new resistor at R4 (through holes)
3. Solder a new capacitor at C28 (surface mount part)

Select the values of R4 and C28 from the table below:

R4	C28	Microphone Note
1K	10nF	Close range or headset
1.5K	6.8nF	
2.2K	4.7nF	
2.7K	3.3nF	Arms length
3.9K	2.7nF	
4.7K	2.2nF	Distance

U3 2MB Flash Memory

This memory is required on the VE module and all VE applications. Because of the powerful dynamic memory handler of VE system software, this Flash is designed to store the application code, speaker independent weight sets, speech templates, record and playback data, program data, and music data.

J1 Voice Extreme™ Module Connector

A standard 34-pin header with 0.1" centers to carry signals between the Development Board and the Voice Extreme™ module. This header has pins on 0.1" centers, and interfaces the VE module with the Development Board. It is referenced as J3 on the Development Board and J1 on the VE Module.

Pin	Description	Pin	Description	Pin	Description
1	GND	13	DOWNLOAD	25	P1-0
2	GND	14	RESET	26	P1-1
3	GND	15	VDD	27	P1-2
4	MIC-IN	16	PDN	28	P1-3
5	N.C.	17	P0-0 Serial port input from Host (RCV)	29	P1-4
6	DAC-OUT	18	P0-1 Serial port output to Host (XMT)	30	P1-5
7	GND	19	P0-2	31	P1-6
8	GND	20	P0-3	32	P1-7 Serial port enable, output (0=off, 1=on)
9	AUDIO-RET	21	P0-4	33	GND
10	AUDIO-OUT	22	P0-5 DO NOT USE (Flash address bit A16)	34	PND
11	PWM0	23	P0-6 DO NOT USE (Flash address bit A17)		
12	PWM1	24	P0-7		

Note, when designing your own hardware, note that the above table references the VE Module (NOT the development board).

Note also that if an application is stand alone, the two serial I/O pins, P0.0 and P0.1, and the serial port enable, P1.7, may be used for other purposes; however, programs will download via asynchronous serial I/O.

Since I/O pins P0.5 and P0.6 are connected to the address bus of the Flash memory, they should not be used under any circumstances.

4X5 Matrix Keypad Support

The VE Module supports a 4x5 keypad that can be controlled using functions built into the VE-C language.

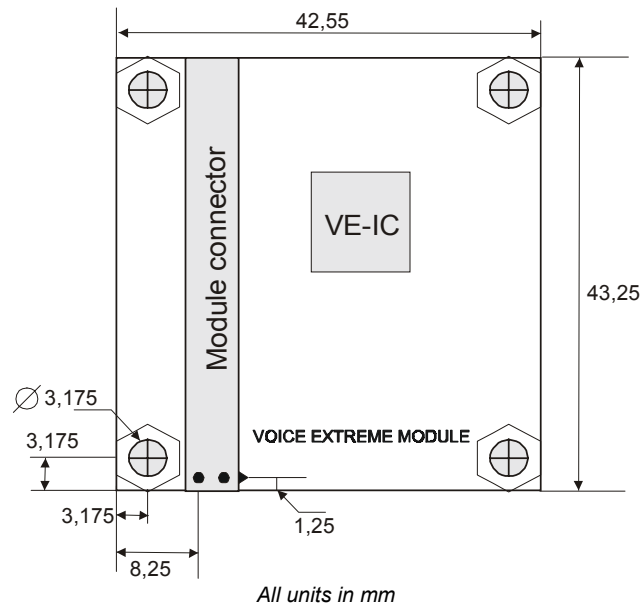
When the keypad is scanned, the columns are driven (active low), the rows are sensed (pulled high) and all previous configuration and output values for these pins are saved and restored. The keypad I/O pinouts are as follows:

Pin	P0.5	P1.5	P0.6	P1.6	P0.2
P0.3	1	2	3	A	E
P1.3	4	5	6	B	F
P0.4	7	8	9	C	G
P1.4	*	0	#	D	H

General Purpose I/O

The VE Module has 11 general-purpose I/O pins. Each line can be programmed as an input with a weak pull-up resistor (~150k ohm), input with a strong pull-up resistor (~10k ohm), input without pull-ups, or as an output.

Module Dimensions



There are two ways to install the VE Module into target applications:

1. Mount the module in your product using a 34-pin female 0.1" standard header. When the module header connector is used to connect the module to another board, the mounting holes are normally not required.
2. Alternatively, It can be mounted upside-down and secured with 4 machine screws and nuts. Connections can be made to the rest of the application using ribbon cable.



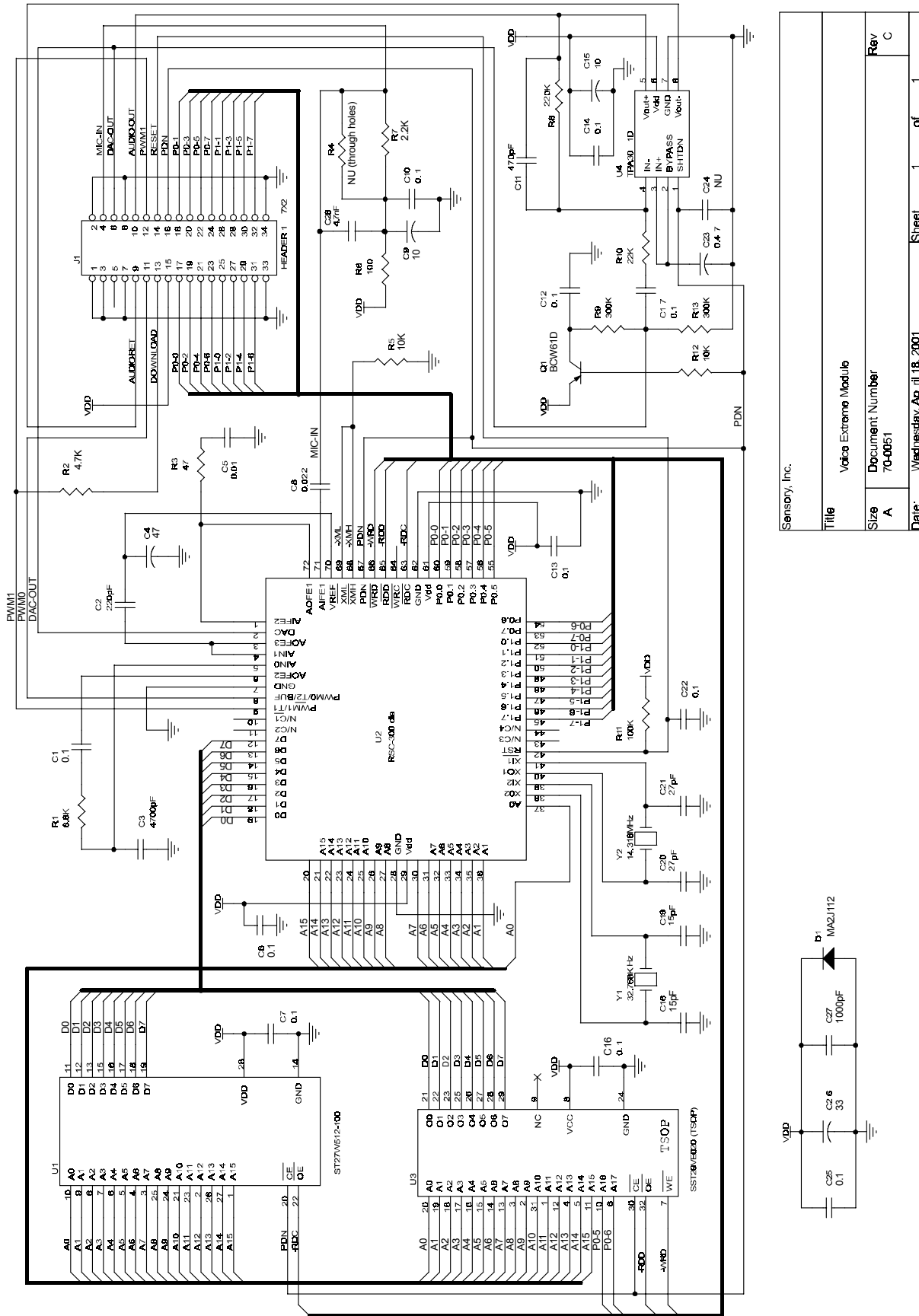
Voice Extreme™ Toolkit

The Voice Extreme™ Toolkit enables quick development of applications using *Sensory Speech™* technologies.

The Voice Extreme™ Toolkit contains:

- ▶ Voice Extreme™ Development Board
- ▶ Voice Extreme™ Module
- ▶ Power supply
- ▶ Serial cable for PC RS-232 connection
- ▶ Quick Start Guide
- ▶ Software CD containing the Voice Extreme™ IDE, Quick Synthesis™, sample projects, sample data files and documentation

Module Schematic



Sensory, Inc.	
Title	Voice Extreme Module
Size	Document Number
A	70-0051
Date:	Wednesday, Apr 18, 2001
Sheet	1 of 1
Rev	C

The Interactive Speech™ Product Line

The Interactive Speech line of ICs and software was developed to “bring life to products” through advanced speech recognition and audio technology.

The Interactive Speech Product Line was designed for consumer telephony products and cost-sensitive consumer electronic applications such as home electronics, personal security, and personal communication.

The product line includes award-winning RSC series general-purpose microcontrollers and tools, SC series of speech microcontrollers, plus a line of easy-to-implement chips that can be pin-configured or controlled by an external host microcontroller. Sensory's software technologies run on a variety of microcontrollers and DSPs.

RSC Microcontrollers and Tools

The RSC product line contains low-cost 8-bit speech-optimized microcontrollers designed for use in consumer electronics. All members of the RSC family are fully integrated and include A/D, pre-amplifier, D/A, ROM, and RAM circuitry. The RSC family can perform a full range of speech/audio functions including speech recognition, speaker verification, speech and music synthesis, and voice record/playback. The family is supported by a complete suite of evaluation tools and development kits.



SC Microcontrollers and Tools

The **SC-6x** product line features the highest quality speech synthesis ICs at the lowest data rate in the industry. The line includes a 12.32 MIPS processor for high-quality low data-rate speech compression and MIDI music synthesis, with plenty of power left over for other processor and control functions. Members of the SC-6x line can store as much as 37 minutes of speech on chip and include as much as 64 I/O pins for external interfacing. Integrating this broad range of features onto a single chip enables developers to create products with high quality, long duration speech at very competitive price points.

Application Specific Standard Products (ASSPs)

- ◆ **Voice Direct™ 364** provides inexpensive speaker-dependent speech recognition and speech synthesis. This easy-to-use, pin-configurable chip requires no custom programming and can recognize up to 60 trained words in slave mode, and 15 words in stand-alone mode. Ideal for speaker-dependent command and control of household consumer products, Voice Direct 364 is part of a complete product line that includes the IC, module, and Voice Direct 364 Speech Recognition Kit.

- ◆ **Voice Extreme™** simplifies the creation of fully custom speech-enabled products by offering developers the capability of programming the chip in a high-level C-like language. Program code, speech data, and even record and playback information can be stored on a single off-chip Flash memory. Based on Sensory's RSC-364 speech processor, Voice Extreme includes a highly efficient on-chip code interpreter, and is supported by a comprehensive suite of low-cost development tools.



Software and Technology

- ◆ **Voice Activation™** micro footprint software provides advanced speech technology on a variety of microcontroller and DSP platforms. A flexible design with a broad range of technologies allows manufacturers to easily integrate speech functionality into consumer electronic products.

- ◆ **Fluent Speech™** small footprint software recognizes up to 50,000 words; offers Animated Speech with the ability to automate enunciation and articulation; performs text-to-speech synthesis in either male or female voices; provides noise and echo cancellation, performs Wordspotting for natural language usage; offers telephone barge-in; and provides continuous digit recognition.



Important notices

Reasonable efforts have been made to verify the accuracy of information contained herein, however no guarantee can be made of accuracy or applicability. Sensory reserves the right to change any specification or description contained herein.



1991 Russell Ave., Santa Clara, CA 95054
Tel: (408) 327-9000 Fax: (408) 727-4748

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