

Using the DAC Output

There are three motivating factors for using the DAC output of a Sensory IC or module: sound quality, higher possible volume if an external amplifier can be run at a higher V_{dd} than the Sensory IC's V_{dd}, and radiated emissions for CE or FCC compliance.

Sound Quality

In order to optimize sound output from a Sensory speech IC or module, Sensory recommends using the DAC output with an external amplifier. The overall product cost is increased slightly, but the DAC will provide higher quality sound output. To use the DAC output, a few components need to be added to correctly interface the circuitry between the DAC output and the amplifier input. This circuitry performs the following necessary functions:

- Provides DC blocking between the DAC output and the preamplifier input.
- Biases the DAC output to center when the DAC output is turned off during the execution of technology code that uses the A/D converter.

With this circuitry in place, the Sensory speech processor can provide correctly balanced, pop free, high quality synthesized output.

Radiated Emissions for CE or FCC Compliance

When properly applied, the RSC-4x Family should not exceed the requirements of EN55022, Class A & B, even when using the PWM.

To reduce radiated emissions from all Sensory speech products to the lowest possible levels, the PWM output should also be disabled any time it is not immediately in use. This can be done by the software running on the IC.

Low-voltage Power Amplifiers

There are many excellent choices for external amplifiers. The following example has been included because it offers tested performance, low cost, low power, wide supply voltage range, and good availability. Other amplifiers, such as the LM386, LM4876M, and TDA2822 offer a variety of tradeoffs of cost and performance that may be preferable in certain applications.

Using the TPA301D (Texas Instruments)

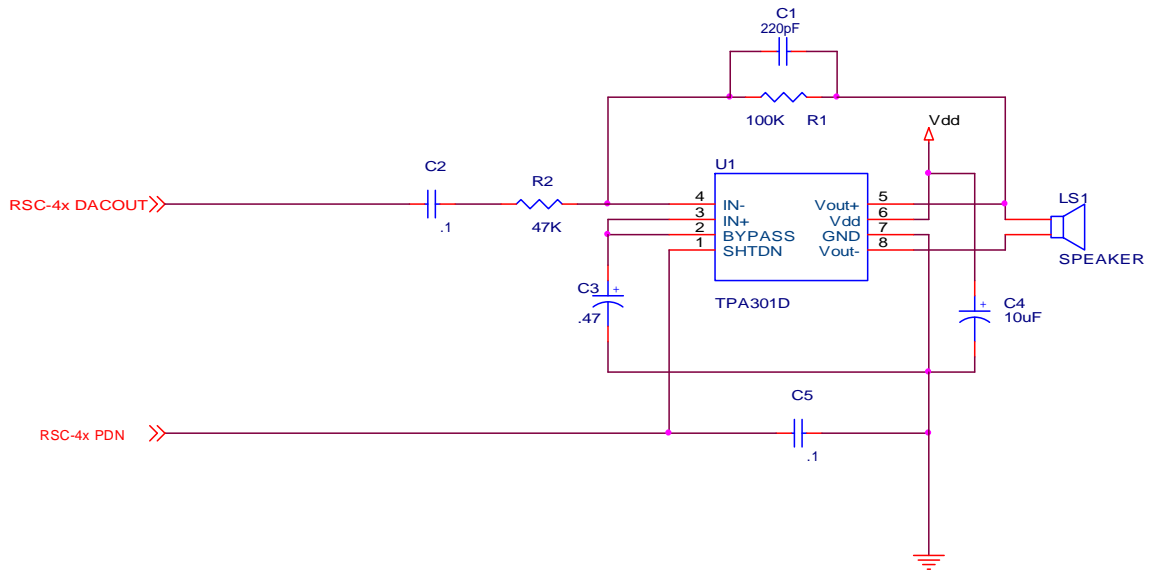
This amplifier is designed specifically for bridged mono operation, and the following application circuit (Figure 1) has been designed with external resistor-controlled gain. Note that it is designed to work with a ground reference input signal, with V_{out+} and V_{out-} outputs centered at the amplifier's V_{dd}/2.

Gain is set by R1/R2. C1 creates a low pass filter to reduce gain, and thus system noise above the frequency range of Sensory synthesis.

The amplifier is disabled if SHTDN (U1 pin1) is brought high, and thus may be directly connected to a Sensory IC PDN pin. Note that this circuit assumes V_{dd} is the same voltage as the RSC-4x's V_{dd}. If a different voltage supply is used for the amplifier, SHTDN may need a level translator to ensure that the RSC-4x PDN properly controls the SHTDN pin.

The C3 value is selected to minimize turn on transients when the amplifier is enabled, and the amplifier outputs rise from ground to the center voltage.

If SHTDN is not used, it should be tied to GND.



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 technologies. It is designed for cost-sensitive consumer-electronic applications such as home electronics, home automation, toys, and personal communication. The product line includes the award-winning RSC-4x general-purpose microcontrollers and tools, the *VR Stamp™* 40 pin DIP module and tools, the SC series of speech and music synthesis microcontrollers. Our suite of software development kits are designed to run on non-Sensory processors and DSP's, and support most popular operating systems.

RSC Microcontrollers and Tools

The RSC product family 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 recording/playback. The family is supported by a complete suite of evaluation and development toolkits.

Speech Recognition Modules and Tools

The VR Stamp™ is a complete speech recognition module based on the RSC-4x and is ideal for fast design and easy production. A low-noise audio channel and standardized 40-pin DIP footprint allow rapid prototyping, less debugging, and shorter time to market. The *VR Stamp Toolkit* includes everything needed to get started today, including VR Stamps, Module Programming Board, sample applications, and a complete set of development tools featuring the Phyton IDE and limited-life C compiler, QuickSynthesis™ 4 and Quick T2SI-Lite™ speech tools.

SC Microcontrollers and Tools

The SC-6x product family 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 processing and control functions. Members of the SC-6x line can store as much as 37 minutes of speech on-chip and include as many as 64 I/O pins for external interfacing. Integrating this broad range of features into a single chip enables developers to create products with high quality, long duration speech at very competitive price points.

FluentSoft™ Technology

FluentSoft™ Recognizer is the engine powering the FluentSoft™ SDK. It provides a noise-robust, large-vocabulary, speaker-independent solution with continuous digit recognition and word-spotting capabilities. This small-footprint software recognizes up to 5,000 words; runs on non-Sensory processors including Intel XScale, TI OMAP, and ARM9 platforms; and supports operating systems such as MS Windows, Linux, and Symbian.

3Dmsg™ Technology

3Dmsg's (www.3Dmsg.com) Animated Speech technology offers animated avatars with advanced speech recognition and synthesis capabilities for use in smartphones, language trainers, and kiosk applications. Facial expressions can be configured to show emotions and lip synchronization can be automatically driven from voice or text data.

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