Introduction to ISD9160 Development Environment

For additional information or questions, please contact: Nuvoton Technology Corporation.

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1 Development Environment Overview

The ISD9160 is a Voice/Audio SoC product that embeds an ARM® Cortex™-M0 32-bit microcontroller core with a variety of peripheral devices. The microcontroller-based structure implies that application functions will have to be implemented in firmware together with built-in peripherals that makes the ISD9160 flexible in terms of various application developments, as compared to dedicated hardware/ASIC circuits.

The ISD9160 development environment consists of the following:

- ICE debugger + ISD9160:
  - The ISD9160 utilizes the ARM standard 2-pin SWD (Serial Wire Debug) interface for firmware code development/debugging. Depending on the needs customers could choose either ISD-Nu-Link dongle (the ICE debugger) + ISD9160 demo board, or the EVB that combines both.
- Keil uVision4:
  - Keil uVision4 is a C compiling environment for firmware development and debugging. Used together with the ICE debugger and Keil Nu-Link driver, Keil uVision4 has access to the ISD9160 registers and internal flash.
- Keil Nu-Link driver:
  - Keil Nu-Link driver is a PC-based driver for Keil uVision4 to recognize the ISD9160.
- Peripheral drivers and application libraries:
  - Peripheral drivers are firmware drivers for the application firmware to manipulate the ISD9160 peripheral devices such as ADC, PGA, and PDMA … etc. Application libraries are firmware libraries for facilitating specific applications such as Siren7, SpiFlash, SD (SDHC) card, and ADPCM … etc.
- ICP Tool:
  - ICP Tool is a PC-based software utility for programming the ISD9160 internal flash.
- VPE9160:
  - VPE9160 is a PC-based software utility for generating the pre-recorded voice/audio file that together with the application firmware will be programmed into the ISD9160 flash memory for voice/audio playback.

Users need to have Keil uVision4 installed for the ISD9160 application firmware development. Nuvoton provides the ISD9160 installation package that includes: Keil Nu-Link driver, peripheral drivers and application libraries, ICP Tool, and all documents. The VPE9160 is a separate installation.

2 Development Flow

The diagram below shows the typical ISD9160 development flow:

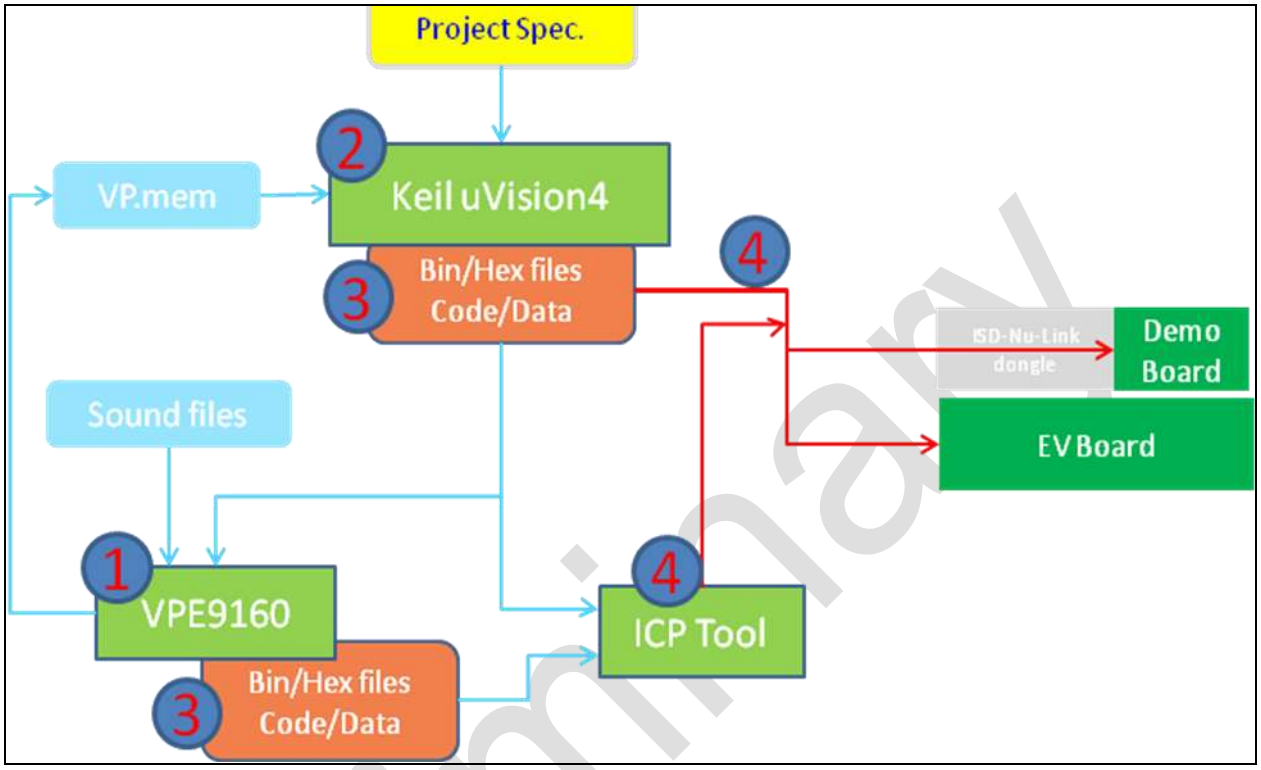

Figure 2 - 1 ISD9160 Development Flow

1. Depending on the application, users may or may not need the VPE9160 for generating the voice/audio file for playback.
2. Develop, debug, and test the application firmware by Keil uVision4. Nuvoton provides a demo RecPlay Keil firmware for a general record and playback application. The demo firmware also controls the LCD module on the EVB.
3. Combine the application firmware with the voice/audio file (VP.mem) in either Keil uVision4 compiling environment or in VPE9160.
4. Program the target file into the ISD9160 EVB or demo board by either Keil uVision4 compiling environment or ICP Tool.

3 Tools Overview

This section gives an overview of hardware and software tools. Each tool has a corresponding user's manual for details.

3.1 Hardware Tools

3.1.1 ISD-Nu-Link dongle

The ISD-Nu-Link dongle is the ICE debugger to connect to the ISD9160 demo board for communicating with the PC-based software tools such as Keil uVision4 and ICP Tool. The ISD-Nu-Link dongle can also be plugged onto a customer's prototype board for firmware development and re-programming, as long as the prototype board has a 5-pin interface same as the one of the dongle. Please note that the ISD-Nu-Link dongle is 5V only.

Users need to install the Nu-Link driver before using the ISD-Nu-Link dongle.

Figure 3 - 1 ISD-Nu-Link dongle

3.1.2 Demo board

The demo board is a small board (35mm x 50mm) with microphone, speaker pin-header, GPIO pin-header, and the external SPI-flash on board. It could be used for demo or firmware development together with the ISD-Nu-Link dongle.

Please refer to the ISD9160 Demo board User's Manual for details.

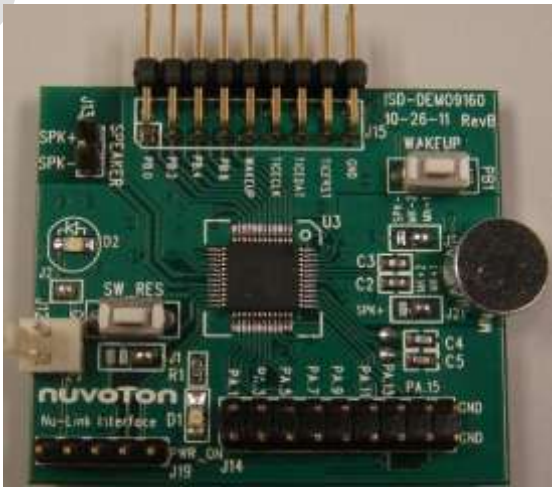

Figure 3 - 2 ISD-DEMO9160 rev-B

3.1.3 EVB

The EVB is a big board with on-board ICE debugger plus a variety of external components such as UART, SD card slot, LCD display, and NAU8822 (audio codec) for an flexible evaluation of various applications. The board uses jumpers for board configurations and has all pin-headers for measurement.

Please refer to ISD-ES9160_USB User's Manual for details.

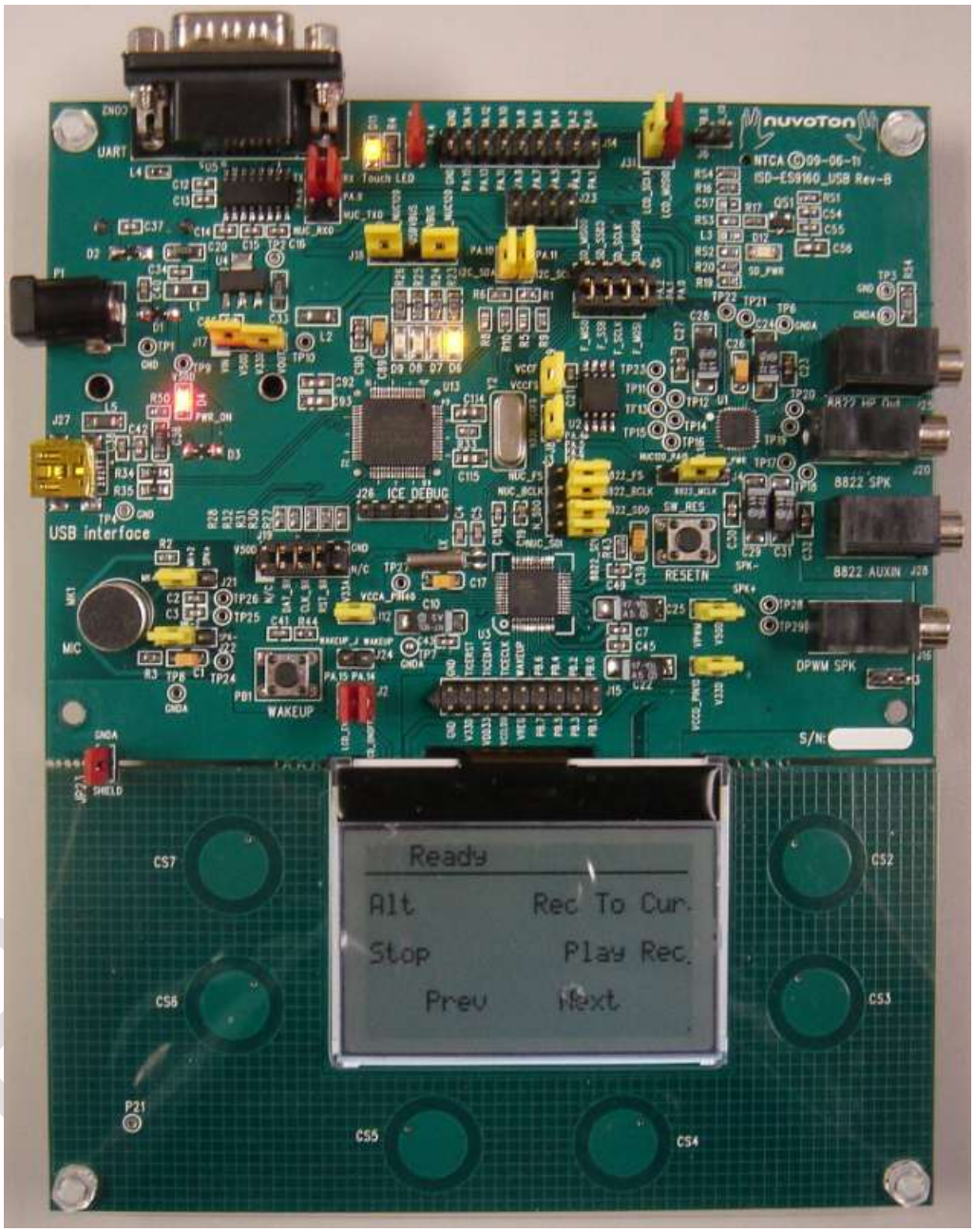

Figure 3 - 3 ISD-ES9160_USB rev-B

3.2 Software Tools

3.2.1 ICP Tool

The ICP (in-circuit programming) Tool is a PC-based software utility that provides users with access to the ISD9160 configurations, internal flash, and the external SPI-flash.

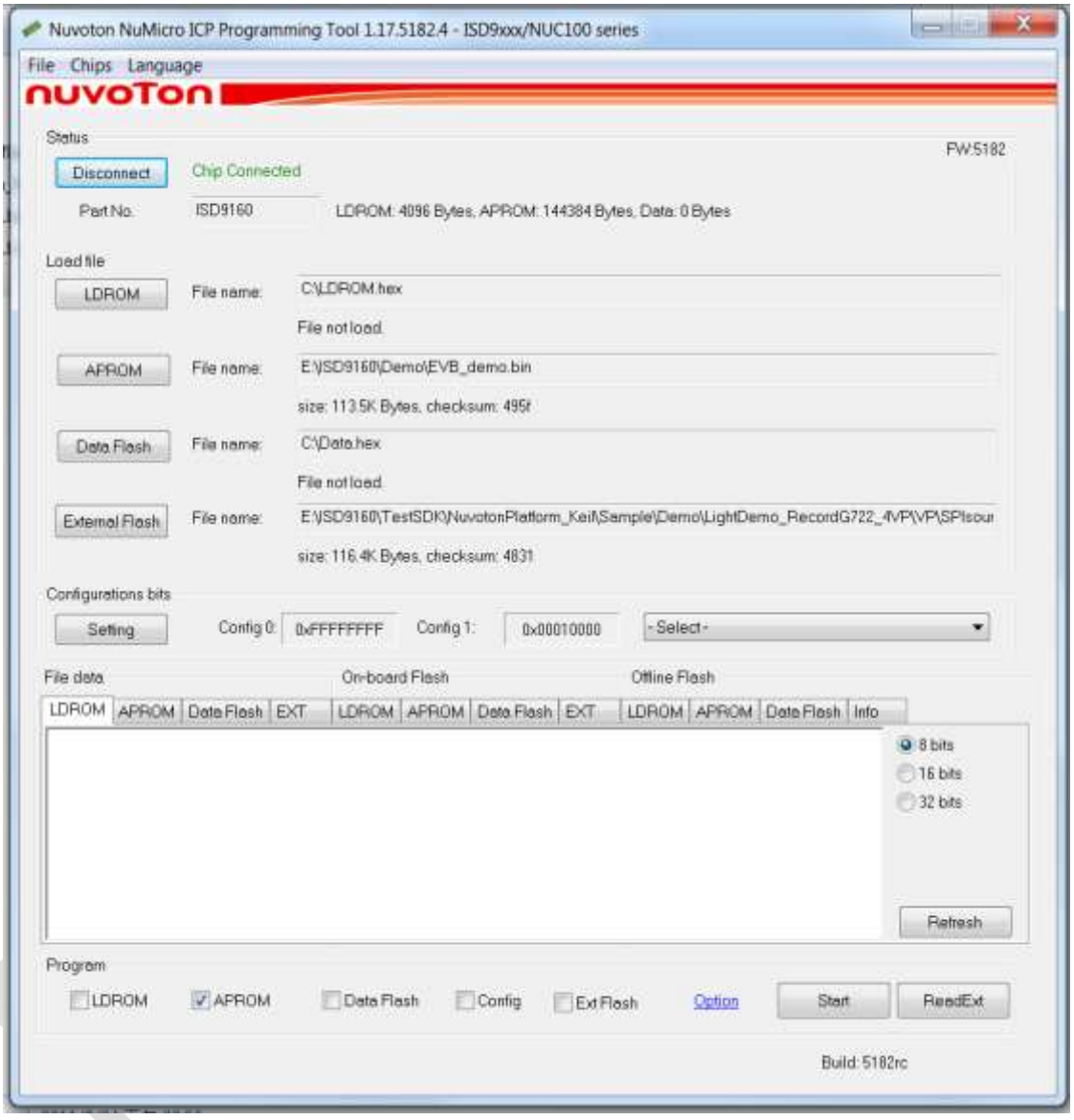

Figure 3 - 4 ICP Tool

3.2.2 Keil Vision4

The Keil uVision4 is a PC-based software development platform that combines a robust editor, project manager, and some other facilities. It integrates software development tools including the C compiler, macro assembler, linker/locator, and HEX file generator.

Users can download the Keil™ RealView® Microcontroller Development Kit

Evaluation software from http://www.keil.com/. The evaluation version (license-free version) can compile up to 32kbyte code size.

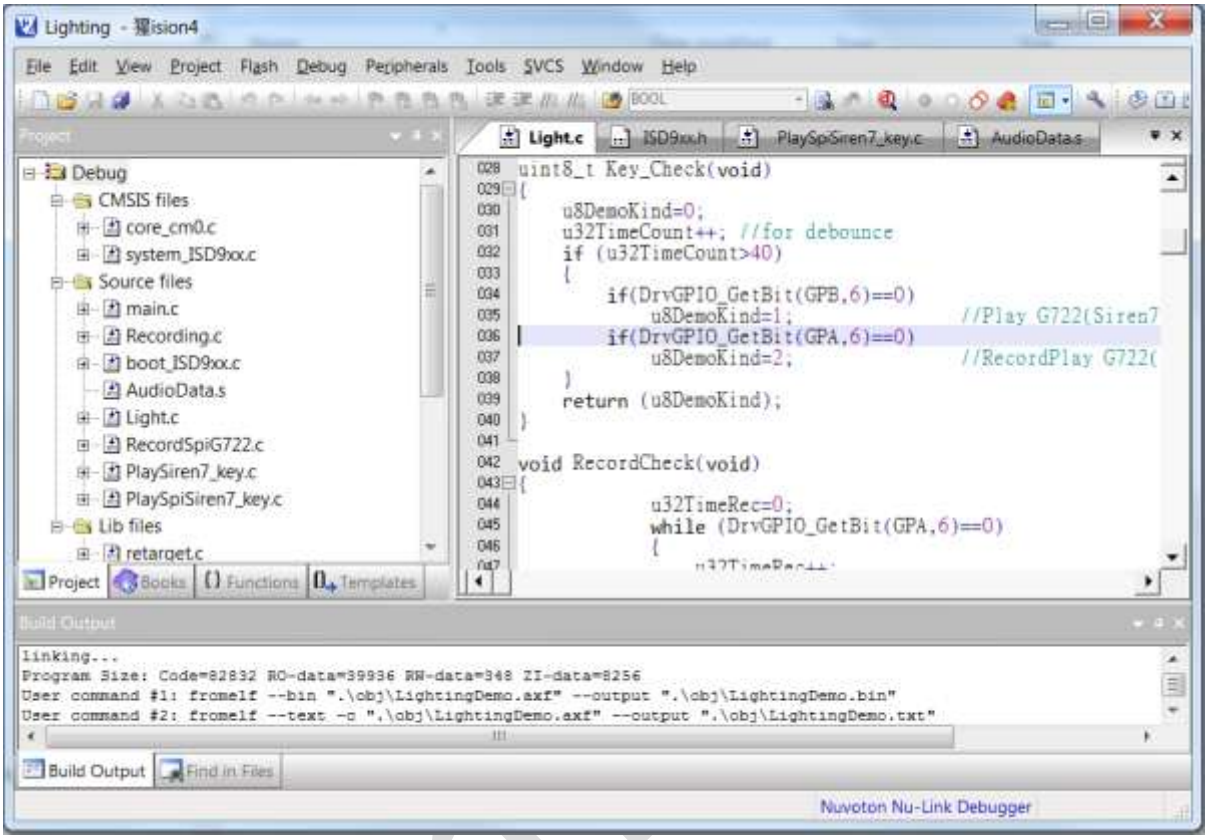

Figure 3 - 5 Keil uVision4

3.2.3 VPE9160

The VPE9160 is a PC-based software utility for converting voice/audio files (standard wave files) to voice prompt binary files that together with the Keil application firmware implement the voice/audio playback function.

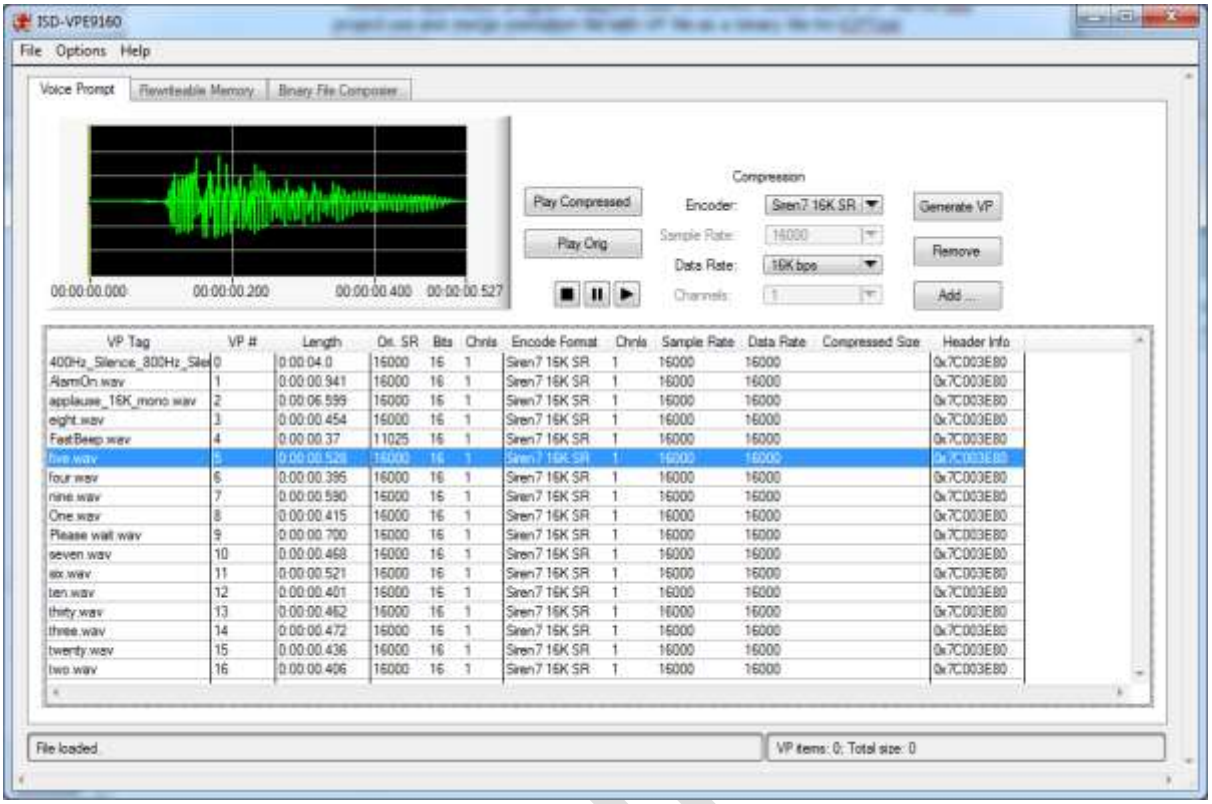

Figure 3 - 6 ISD-VPE9160

4 Revision History

VERSION	DATE	DESCRIPTION
V0.2	Nov. 16, 2011	First Release.

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