

Key Differences Between the PCM290xB and PCM290xC

Audio Converter Products

ABSTRACT

This document presents the major differences between the PCM290xB and PCM290xC series audio data converters.

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1 Overview

The PCM290xC audio devices have been updated to pass the Microsoft® Windows® Logo Kit (WLK) v1.5. This certification makes these converters fully compatible with the Windows 7® operating system. Previous generation PCM290xB devices remain functionally compatible with Windows 7; however, manufacturers cannot pass WLK tests with these devices, and therefore are not allowed to put the Microsoft Windows 7 logo on products that use the PCM290xB series.

[Table 1](#) lists the descriptors that have been changed on the PCM290xC devices.

Table 1. Descriptor Differences Between the PCM290xB and PCM290xC Devices

Descriptor	PCM290xB	PCM290xC
Product ID	0x29B0/0x29B2/0x29B3/0x29B6	0x29C0/0x29C2/0x29C3/0x29C6
Vendor strings	Burr-Brown from TI	BurrBrown from Texas Instruments
Product strings	USB Audio CODEC	USB AUDIO CODEC
Input terminal	0x0201 (Microphone)	0x0603 (Line connector)

As [Table 1](#) indicates, the primary changes here are the vendor string, the product string, and the input terminal.

2 Volume Control Behavior Change

The volume control panel in Windows actually changes gain on the PCM290xB device itself, rather than allowing users to perform a simple digital mix with the operating system.

In the transition from WindowsXP through Vista and Windows 7, changes were made to the behavior and scale of the volume sliders. As a result, TI has now updated the volume control curves in the PCM290xC. The revised graph is shown in [Figure 1](#).

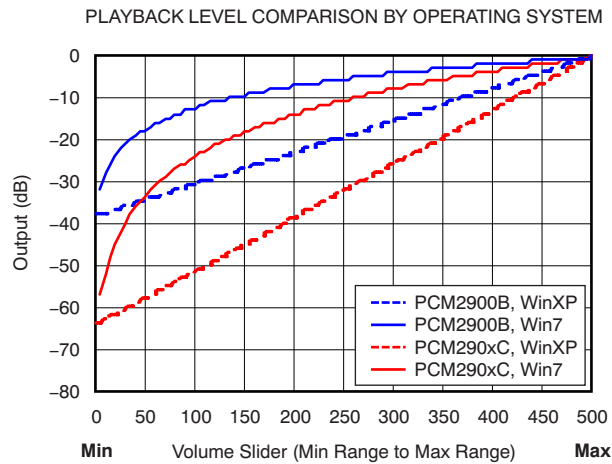


Figure 1. Playback Level Comparison of PCM290xB/290xC Devices by Operating System

In Windows 7, as a result of the smaller number of steps, a small change on the slider can have a drastic effect on the output volume. With the previous generation PCM290xB devices, a single volume step in Windows 7 can be as much as five steps in Windows XP. Therefore, the volume curve was changed to compensate for this operating system change.

3 Recording Level Control Behavior Change

On the PCM290xB series, the *Microphone* is identified as the input terminal descriptor. Thus, even though the PCM290xB does not provide a gain control function such as a programmable gain amplifier (PGA), Vista and Windows 7 both automatically give a positive gain on the volume control panel. As a result, the input signal will saturate at even slight recording volume increases. On the PCM290xC series, the *Line connector* is identified as the input terminal descriptor; therefore, Vista and Windows 7 do not present any positive gain on the volume control panel, and input signal saturation does not occur. The revised graph is shown in [Figure 2](#).

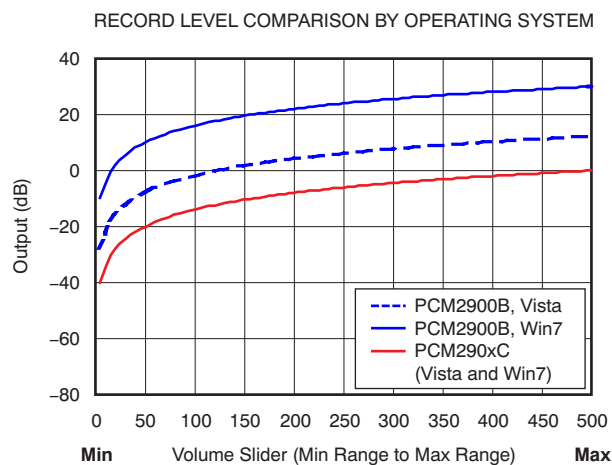
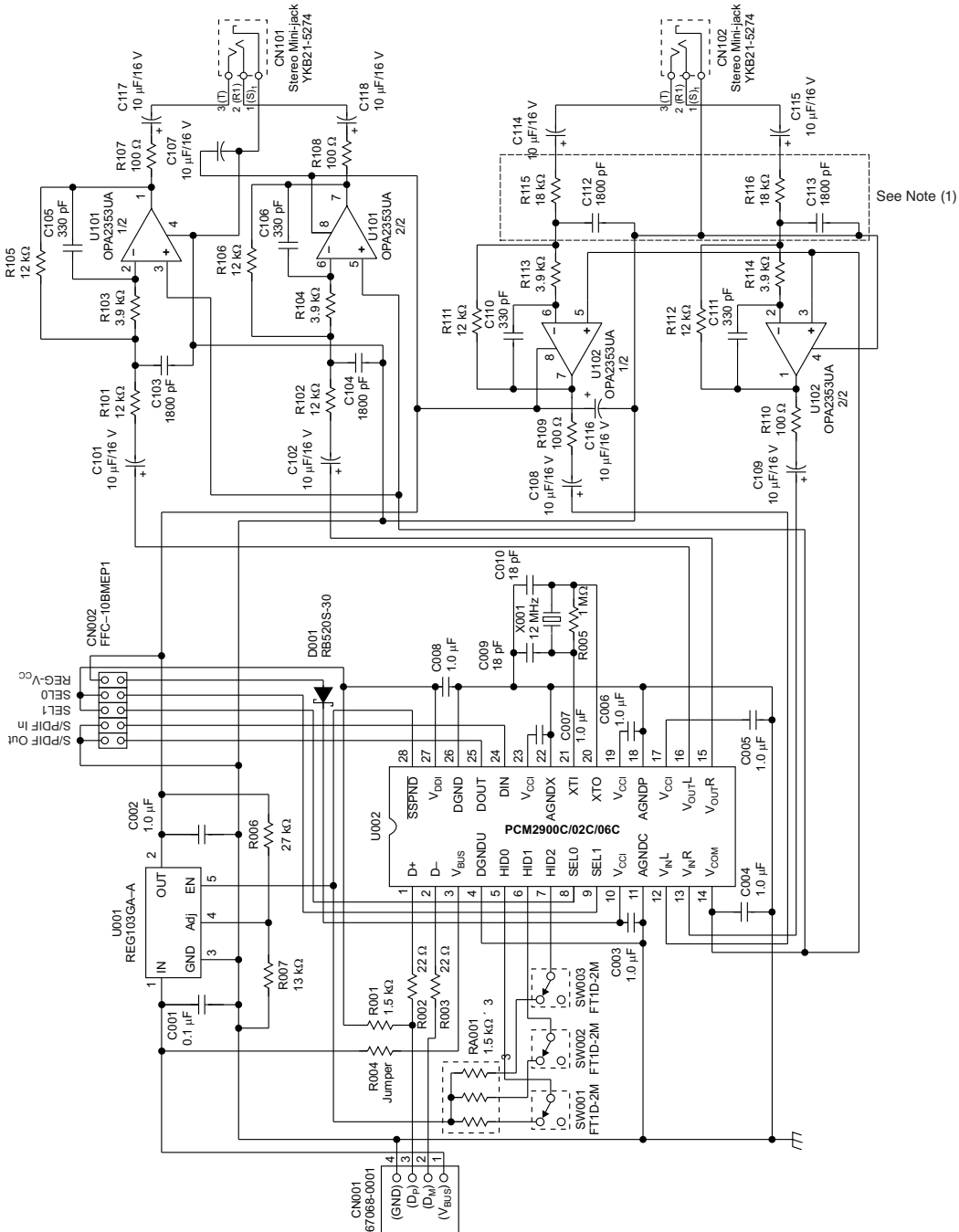


Figure 2. Recording Level Comparison of PCM290xB/290xC Devices by Operating System

3.1 Input Full-Scale

There is also an important notice that is required to pass WLK1.5 certification with the PCM290xC.

The PCM290xC series supports $0.6 \bullet V_{CC1}$ (approximately $0.7 V_{RMS}$) input full-scale. However, WLK1.5 requires greater than $1 \cdot V_{RMS}$ input full-scale level. Therefore, the input full-scale must be set to more than $1.0 V_{RMS}$ by adjusting the external input buffer circuit shown in Figure 3. The recommended input resistors (R115 and R116) are 18 k Ω instead of 12 k Ω . This difference results in a 3.5-dB attenuation at the external input circuit.



(1) Recommended resistor values for R115 and R116: 18 k Ω .

Figure 3. PCM290xC-EVM Board Schematic

4 Design and End User Impact

The original volume curve was never published in the PCM290xB product data sheet, because most users do not tend to dial in an exact amount of attenuation/gain. Users are more likely to slide the bar up and down until they find a comfortable listening level.

Windows 7 users, on the other hand, now find the volume controls in the new operating system significantly more sensitive and easier to use with the new volume control curves in the PCM290xC family of devices.

Designers using multiple PCM290xB devices in the same product should make efforts to ensure they are not mixing PCM290xC and non-C (that is, PCM290x) devices together; volume behavior varies between these two generations of devices.

From the perspective of the *PC Speaker* and *PC Accessory* features, there should be little impact for end users. They will continue to use the volume control sliders until they find a comfortable listening point. However, systems that require specific input and output voltages may need to be reconfigured if the input and output are attenuated from the typical 0-dB attenuation point in systems by default.

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