

# 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.

### Contents

1	Overview .....	1
2	Volume Control Behavior Change .....	1
3	Recording Level Control Behavior Change .....	2
4	Design and End User Impact .....	4

## 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**

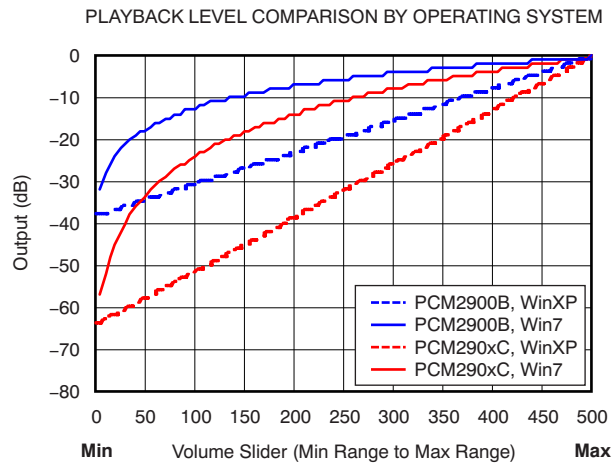
Descriptor	PCM290xB	PCM290xC
Product ID	0x29B0/0x29B2/0x29B3/0x29B6	0x29C0/0x29C2/0x29C3/0x29C6
Vendor strings	Burr-Brown from TI	BurrBrown from Texas Instruments
Product strings	USB Audio CODEC	USB AUDIO CODEC
Input terminal	0x0201 (Microphone)	0x0603 (Line connector)

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](#).

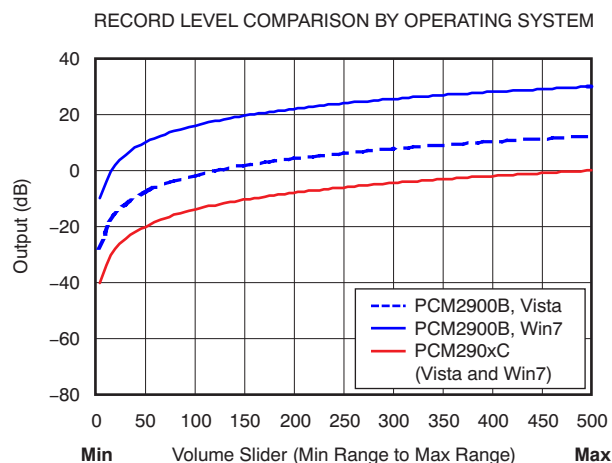


**Figure 1. Playback Level Comparison of PCM290xB/290xC Devices by Operating System**

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](#).

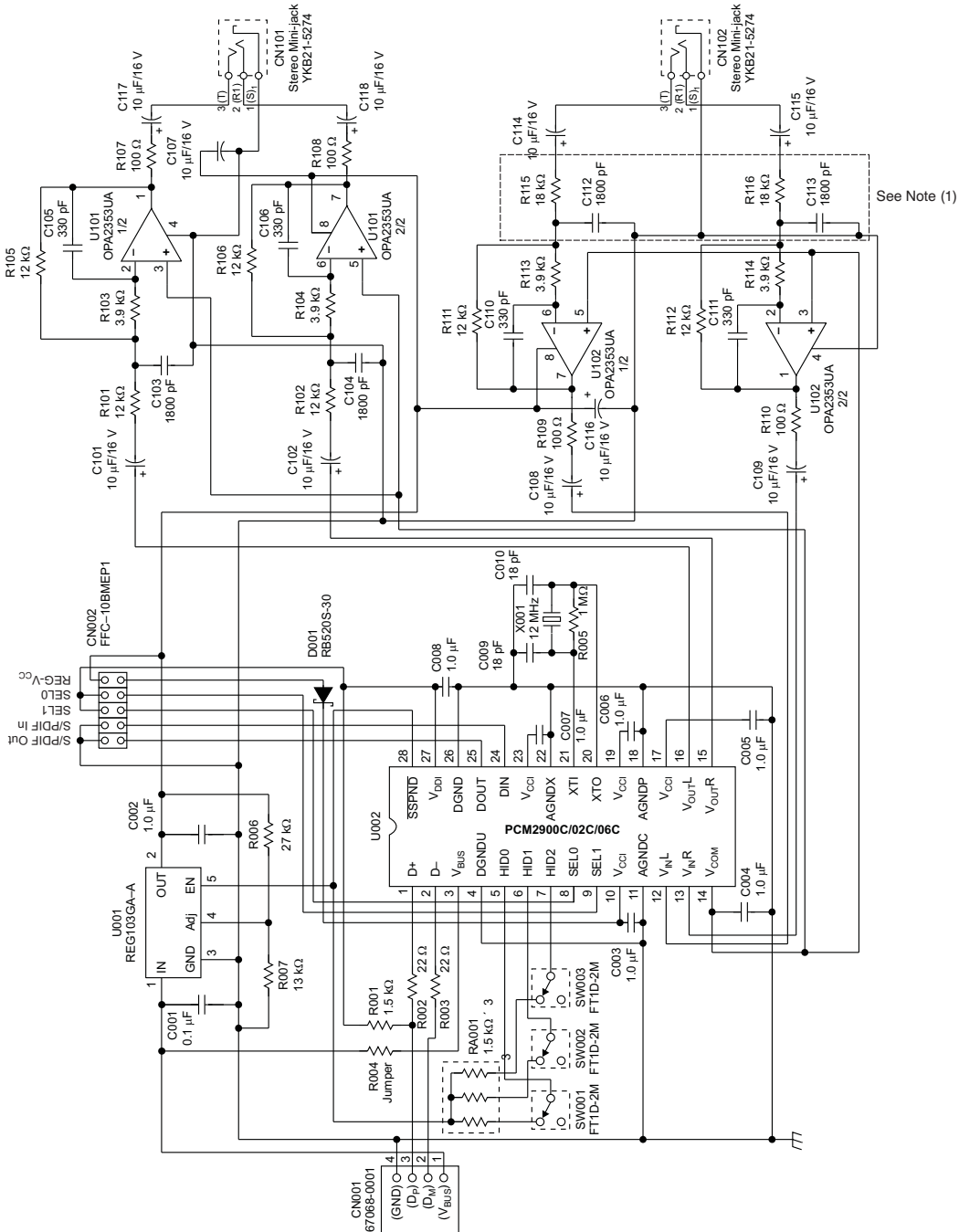


**Figure 2. Recording Level Comparison of PCM290xB/290xC Devices by Operating System**

### 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 $\Omega$  instead of 12 k $\Omega$ . This difference results in a 3.5-dB attenuation at the external input circuit.



(1) Recommended resistor values for R115 and R116: 18 k $\Omega$ .

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.

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

### Products

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Mobile Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>

### Applications

Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
Transportation and Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>

TI E2E Community Home Page

[e2e.ti.com](http://e2e.ti.com)

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2011, Texas Instruments Incorporated