

PCM6xx0-Q1 Use-Case Scenarios in Automotive Audio Applications

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ABSTRACT

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1 Introduction

The automotive industry is experiencing a major transformation focused on comfortable driving experience without compromising fuel-efficiency and manufacturing cost. Car OEMs are constantly refreshing their audio system architecture to accommodate user-rich experience and better safety by incorporating several new audio technologies. These audio technologies such as active noise cancellation (ANC), in-cabin communication (ICC), and hands-free voice beam-forming use several microphones, amplifiers, and loudspeakers along with advanced digital signal processing techniques to enable background noise reduction, clear voice communication between passengers and hands-free calling. ANC is often incorporated in multiple end-equipments such as head-unit (or digital cockpit processing unit) or external amplifiers or can have its own standalone module. To make the system implementation simple and cost-effective, the audio inputs from ANC microphones can be combined with hands-free microphones or other auxiliary line inputs. This paper highlights the several use-case of PCM6xx0-Q1 for microphone and line input applications.

2 Overview of PCM6260-Q1 Family

To accommodate the short- and long-term vision of OEMs and Tier1s in most cost-optimized and space-constrained manner, Texas Instrument's developed a highly-integrated, package- and software-compatible multi-channel audio ADC family called PCM6xx0-Q1. These devices support microphone (analog and digital) and line inputs and integrate a programmable high-voltage microphone bias and input fault diagnostics. These devices provide a very flexible digital filtering scheme with linear-phase and low-latency filters, multiple biquads per channel, and high-pass filters. PCM6xx0-Q1 family support a very flexible data output and control interface, allowing several devices to use the same output data and control interface bus. In addition, these devices have GPIOs, fine phase and gain calibration schemes, and a digital mixer and summer, to optimize the system performance to a whole new level. The different offerings of this audio ADC family are shown in Table 1.

Table 1. Product Offerings of PCM6xx0-Q1 family

DEVICE	# OF INPUTS	BOOST CONVERTER	MICROPHONE BIAS	MICROPHONE DIAGNOSTICS
PCM6020-Q1	2 Analog	Yes	Yes	Yes
PCM6240-Q1	4 Analog	Yes	Yes	Yes
PCM6340-Q1	4 Analog	No	Yes	Yes
PCM6260-Q1	6 Analog	Yes	Yes	Yes
PCM6360-Q1	6 Analog	No	Yes	Yes
PCM480-Q1	4 Analog, 4 Digital	Yes	Yes	Yes

3 PCM6xx0-Q1 Use-Case Scenarios

PCM6xx0-Q1 can be used in wide-variety of audio application scenarios in head-unit, external amplifiers, ANC module, or audio hubs. Since PCM6xx0-Q1 support analog and digital microphone inputs and line inputs in both single-ended and differential mode, they cater to almost every conceivable audio signal input scenarios in automotive.

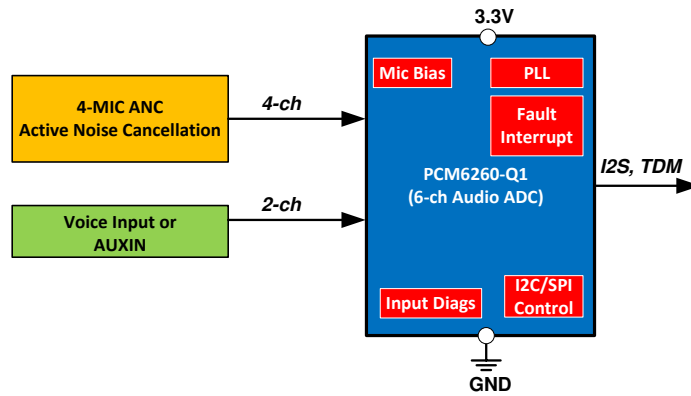


Figure 1. ANC with Voice or Auxiliary Audio Input in Head-unit

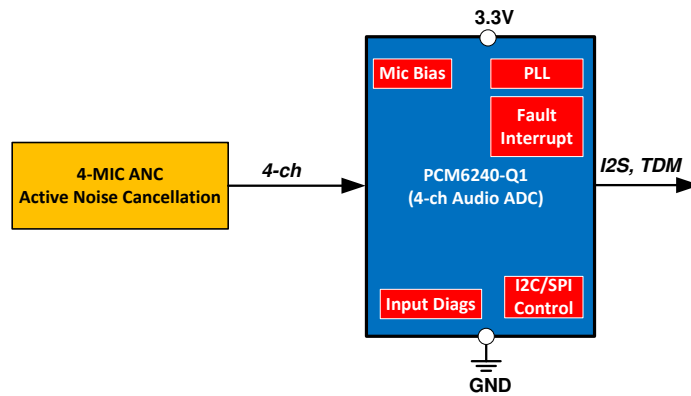


Figure 2. ANC in Head-unit

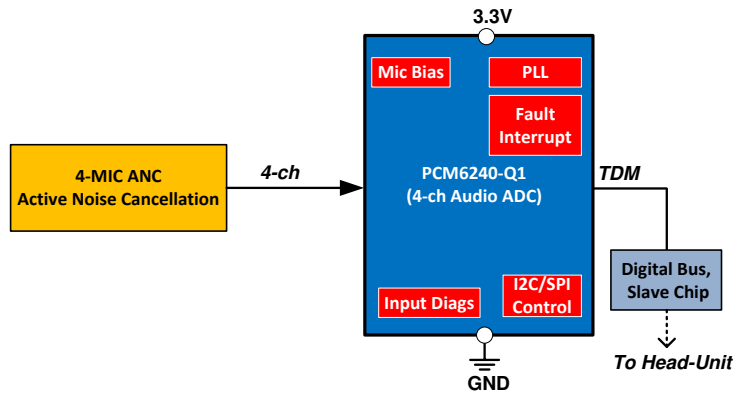


Figure 3. ANC in Standalone ANC module

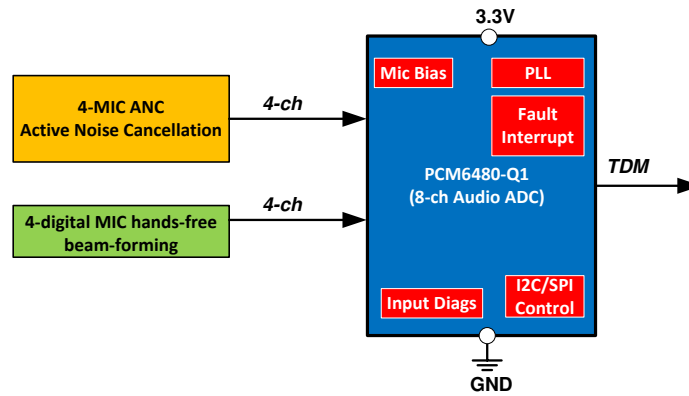


Figure 4. ANC and 4-digital MIC Hands-free Beamforming in Head-unit

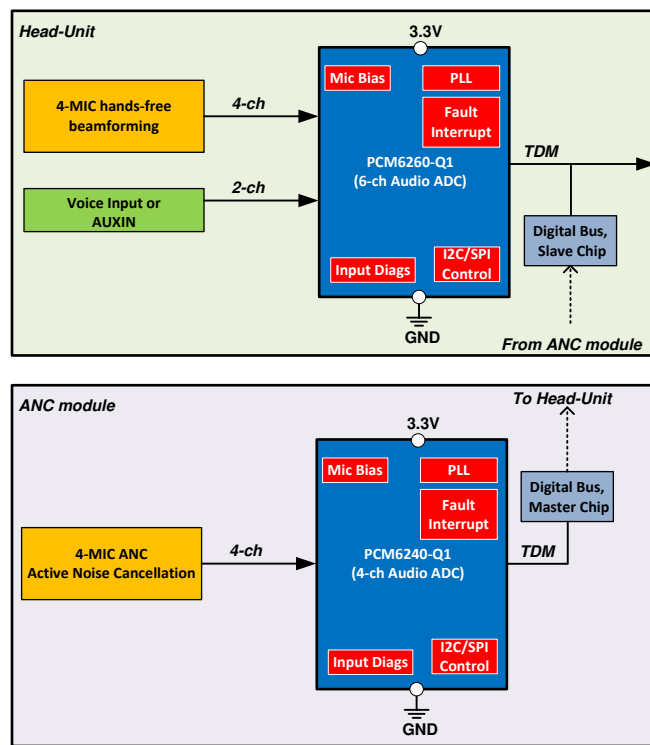


Figure 5. ANC in Standalone Module, Hands-free Beamforming and AUXIN or Voice input in Head-unit

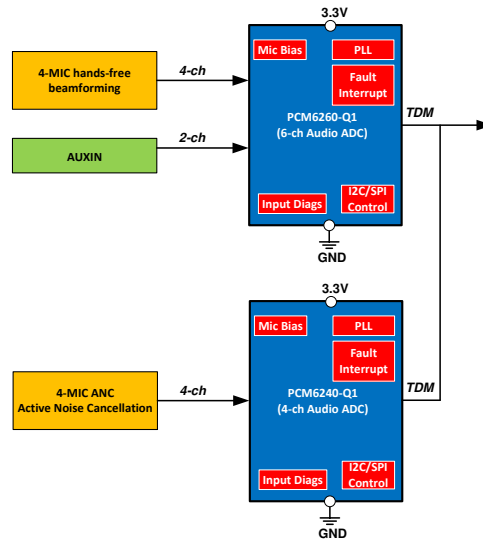


Figure 6. ANC, Hands-free Beamforming and Auxiliary Input in Head-unit

For more details about the product features, refer to the product folder [PCM6260-Q1](#).

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