Application Report

TAS5421-Q1 and TAS5411-Q1 I2C Applications Note

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ABSTRACT

The TAS5421-Q1 and TAS5411-Q1 I2C bus is designed to operate when the device is not in STANDBY mode as defined in the TAS5421-Q1 and TAS5411-Q1 data sheets. In some applications special handling of the SDA pin may be required. For these applications there are three options which can be employed to minimize the effect.

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Trademarks

1 TAS5421-Q1 and TAS5411-Q1 I2C Bus Operation

1.1 Standby Mode

In STANDBY mode, the device is designed to draw the lowest current possible for use in battery operated applications. Therefore, in STANDBY mode the device goes into complete shutdown. The TAS5421-Q1 and TAS5411-Q1 data sheets specify the following operating modes while the device is in STANDBY:

- **OUTPUT:** Hi-Z, floating
- **OSCILLATOR:** Stopped
- **I2C:** Stopped

When the TAS5421-Q1 and TAS5411-Q1 are in STANDBY mode, the SDA pin may be pulled low due to parasitic effects if the micro-controller (MCU) communicates with other I2C devices on the bus.

1.2 Mute and Play Mode

The I2C bus is active when STANDBY pin is de-asserted (for example, STANDBY pin is set to logic high). This is when the device is either in Mute or Play mode. TI warranties TAS5421-Q1 and TAS5411-Q1 operation when the device is out of STANDBY as described in the data sheet (SLOS921B and SLOS814D).

The SDA pin usage is described in the following sections. The described options below follow the data sheet recommendation (for example, all I2C communications is performed during STANDBY high). The descriptions are meant to clarify the usage stated in the data sheets. The solutions described below do not alter TI's warranty, other terms of sale, or the applicable specification.

2 TAS5421-Q1 and TAS5411-Q1 Options

2.1 Option 1

A bi-directional switch or FET switch (for example, SN74LVC1G66-Q1) is used to isolate SDA pin when TAS5421-Q1 and TAS5411-Q1 are in STANDBY. A MCU can control the switch/FET using a GPIO pin to allow TAS5421-Q1 and TAS5411-Q1 SDA pins on the bus when the device is in mute or play mode. When the device is in STANDBY mode, the MCU switches off the switch/FET and isolates the TAS5421-Q1 and TAS5411-Q1 pins from the I2C bus.

Please see TAS5421-Q1 and TAS5411-Q1 data sheets section 7.3.5 Load Diagnostics for startup timing.

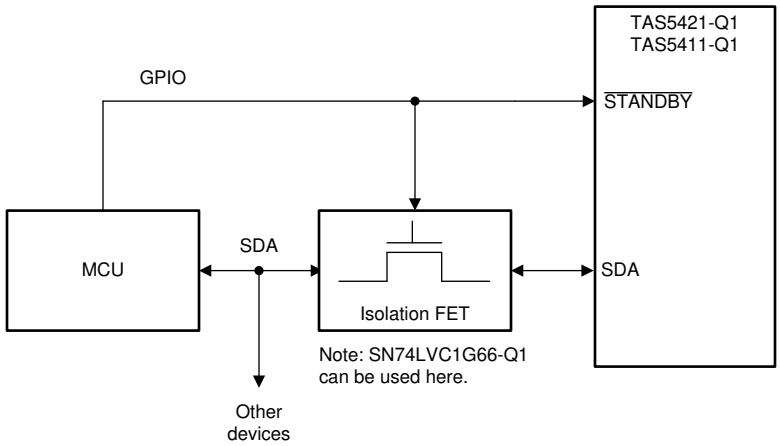

Figure 2-1. Option 1

2.2 Option 2

In some applications, when a digital signal processor (DSP) is used, it may have several I2C ports. One I2C port can be assigned to TAS5421-Q1 and TAS5411-Q1. The DSP can talk to other I2C devices on the other port while the TAS5421-Q1 and TAS5411-Q1 is in STANDBY.

2.3 Option 3

For some applications, a micro-controller (MCU) is used to one or more of the facilitate devices functions through I2C bus and GPIO pins (General Purpose Input or Output). Embedded software in the MCU can program one of the GPIO pins controlling the STANDBY pin on TAS5421-Q1 and TAS5411-Q1. When I2C commands are being sent to one or more of the devices, the GPIO pin can pull STANDBY pin high prior to sending I2C transactions.

Please see TAS5421-Q1 and TAS5411-Q1 data sheets section 7.3.5 Load Diagnostics for startup timing.

Note

The above three options clarify the usage of the STANDBY pin during I2C communications (for example, STANDBY pin is pulled high). The described usage of the STANDBY pin in the data sheet (SLOS814D) may not be obvious to the reader and it is clarified here in this application note.

3 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision A (June 2018) to Revision B (May 2021)	Page
• Updated the numbering format for tables, figures, and cross-references throughout the document	2
• Added the *TAS5411-Q1* part number to the document	2

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