The TAS5421 I2C bus is designed to operate when the device is not in STANDBY mode as defined in the TAS5421 datasheet. 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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1 TAS5421-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 datasheet specifies the following Operating Modes while the device is in STANDBY:

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

When the TAS5421 is 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, i.e. STANDBY pin is set to logic high. This is when the device is either in Mute or Play mode. TI warranties TAS5421 operations when the device is out of STANDBY as described in the data sheet (SLOS814D).

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

2 TAS5421-Q1 Options

2.1 Option 1

A bi-directional switch or FET switch (e.g. SN74LVC1G66-Q1) is used to isolate SDA pin when TAS5421 is in STANDBY. A MCU can control the switch/FET using a GPIO pin to allow TAS5421 SDA pin 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 pin from the I2C bus.
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. The DSP can talk to other I2C devices on the other port while the TAS5421 is in STANDBY.

2.3 Option 3

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

Please see TAS5421-Q1 data sheet section 7.3.5 Load Diagnostics for startup timing.

NOTE: The above three options clarify the usage of the STANDBY pin during I2C communications, i.e. 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.
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