General Description

The DB-I2C-S-APB-BRIDGE is an I2C Slave Controller IP Core focused on low VLSI footprint ASIC / ASSP designs not requiring internal configuration & control registers (and thus no local host CPU required). The DB-I2C-S-APB-BRIDGE processes the I2C protocol & physical layers, and receives & transmits bytes with respect to the I2C payload via a bridge APB Master Interface to user registers or memory.

The DB-I2C-S-APB-BRIDGE runs off the APB Master external clock input within the ASIC / ASSP, providing a synchronous design while offering I2C spike filtering of SDA and SCL.

The DB-I2C-S-APB-BRIDGE is a member of Digital Blocks DB-I2C Controller IP Core family, which includes I2C Master/Slave, I2C Master-only, and I2C Slave-only configurations.

Figure 1 depicts the DB-I2C-S-APB-BRIDGE Core system view. The IP is configured by internal pre-synthesis parameters and post-synthesis top-level input signals, receives input clock and reset, and performs I2C Slave-Receiver transfers (for writing data to the APB via its APB Master Interface) and Slave-Transmitter transfers (for reading data from the APB via the APB Master Interface).

**Digital Blocks offers an I2C Master and Master/Slave IP

Figure 1: DB-I2C-S-APB-BRIDGE Controller - System View
Features

- I2C Slave Controller - Implements Slave-only protocol for smaller VLSI footprint, for applications requiring Slave–Receiver and Slave–Transmitter capability
- APB Master Interface – bridging the I²C Bus to the APB Bus
- Autonomous I2C Slave Controller:
  - No local CPU host required
  - No configuring of control/status registers
- Slave I²C Controller Modes:
  - Slave – Transmitter
  - Slave – Receiver
- Supports five I2C bus speeds:
  - Standard Mode (100 Kb/s)
  - Fast Mode (400 Kb/s)
  - Fast Mode plus (1 Mbit/s)
  - Ultra fast mode (5 Mbit/s)
  - Hs-mode (3.4 Mbit/s)
- 7- or 10-bit I2C Slave ID addressing, SCL Low Wait States
- Digital filter for the received SDA and SCL lines
- Compliance with I2C specifications:
  - NXP Rev 7.0 October 1, 2021
- Fully-synchronous, synthesizable Verilog RTL core, with rising-edge clocking, no gated clocks, and no internal tri-states, for easy integration into FPGA or ASIC design flows.

Pin Description

The DB-I2C-S-APB-BRIDGE I2C Slave Controller interface signals are listed in Table 1.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I2C Bus Interface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDAI</td>
<td>Input</td>
<td>Serial Data</td>
</tr>
<tr>
<td>SDAO</td>
<td>Output</td>
<td>Serial Data</td>
</tr>
<tr>
<td>SCLI</td>
<td>Input</td>
<td>Serial Clock Line</td>
</tr>
<tr>
<td>APB Master Interface</td>
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<tr>
<td></td>
<td></td>
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</tbody>
</table>

See AMBA 3 APB Protocol v2.0 Specification

Table 1: DB-I2C-S-APB-BRIDGE – I/O Pin Description
Verification Method

The DB-I2C-S-APB-BRIDGE Controller IP Core contains a test suite that generates & sends I2C transactions, monitors the I2C bus protocol, and checks expected results.

Customer Evaluation

Digital Blocks offers a variety of methods for prospective customers to evaluate the DB-I2C-S-APB-BRIDGE. Please contact Digital Blocks for additional information.

Deliverables

The DB-I2C-S-APB-BRIDGE is available in synthesizable RTL Verilog or a technology-specific netlist for FPGAs, along with Synopsys Design Constraints, a simulation test bench with expected results, datasheet, and user manual.

Ordering Information

Please contact Digital Blocks for additional technical, pricing, evaluation, and support information.

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