I2C-SMBUS
I2C & SMBus Controller

AMD

The I2C-SMBUS core implements a serial interface controller for the Inter-Integrated Circuit (I2C) bus and the System Management Bus (SMBus). The core is also suitable for implementing controllers for the Power Management Bus (PMBUS).

The core can be programmed to operate either as a bus master or a slave, and it is easy to program and integrate. An arbitration mechanism allows operation in a multiple master bus and the SMBus provisioned clock synchronization mechanism allows fast-master/slow-slave communication. Furthermore, the core detects timeout and errors to prevent bus deadlocks and can filter out glitches on the serial line. The control, status, and data registers of the I2C-SMBUS core are accessible via an AMBA APB or a generic memory mapped interface.

The I2C-SMBUS is a microcode-free design developed for reuse in ASIC and FPGA implementations. The design uses rising-edge-triggered flip-flops only with the reset type (i.e., asynchronous and/or synchronous) being configurable at synthesis time. Furthermore, the core does not use tri-states; therefore, scan insertion is straightforward.

Applications

The I2C-SMBUS can manage the communication of a host processor with peripherals such as sensors, smart battery subsystems, analog front ends, analog-to-digital and digital to analog converters, and display controllers.

Block Diagram
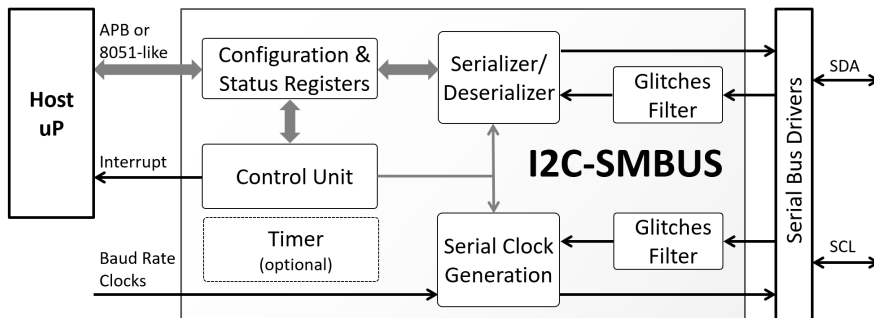
Implementation Results

I2C-SMBUS core reference designs have been evaluated in a variety of technologies. The following are sample implementation results on AMD FPGA for the core configured with an APB interface and the optional timer instantiated.

Family	Device	LUTs	BRAM	Clock Freq.
Artix-7	xc7a12t-1	593	0	100 MHz
Artix UltraScale+	xcau20p-2	563	0	100 MHz
Kintex UltraScale	xcku025-2	566	0	100 MHz
Kintex UltraScale+	xcku3p-3	566	0	100 MHz
Spartan-7	xc7s75-1IL	592	0	100 MHz
Versal Prime	xcvm1102-1LP	492	0	100 MHz

Support

The core as delivered is warranted against defects for ninety days from purchase. Thirty days of phone and email technical support are included, starting with the first interaction. Additional maintenance and support options are available.

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