

Datasheet for I2C Master Controller

Functional Description:

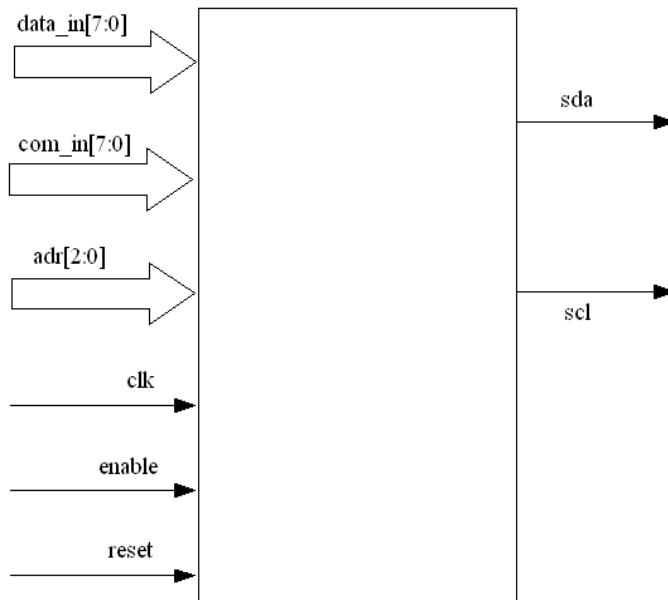
I2C is a two wire, bidirectional serial bus that provides effective data communication between two devices. I2c bus supports many devices, each device is recognized by a unique address—whether its a micro-controller, LCD Driver, memory or keyboard interface and can operate as transmitter or receiver based on the functioning of the device.

I2C Master Controller module is a full featured I2C control system that allows creating as well as generating I2C bus transactions to any I2C device. It generates all of the necessary clocking and data singal. It also appropriately read the received data and ACK status.

Features:

- Compatible with Philips I2C Standard
- Multi Master operation
- Programmable clock frequency
- Operates with wide range of input frequencies
- Stop and Start signal generation/detection
- Repeated Start signal generation
- Acknowledge bit generation/detection
- Compatible with any number of slaves
- Static Synchronous design
- Fully Synthesizable

Symbol:

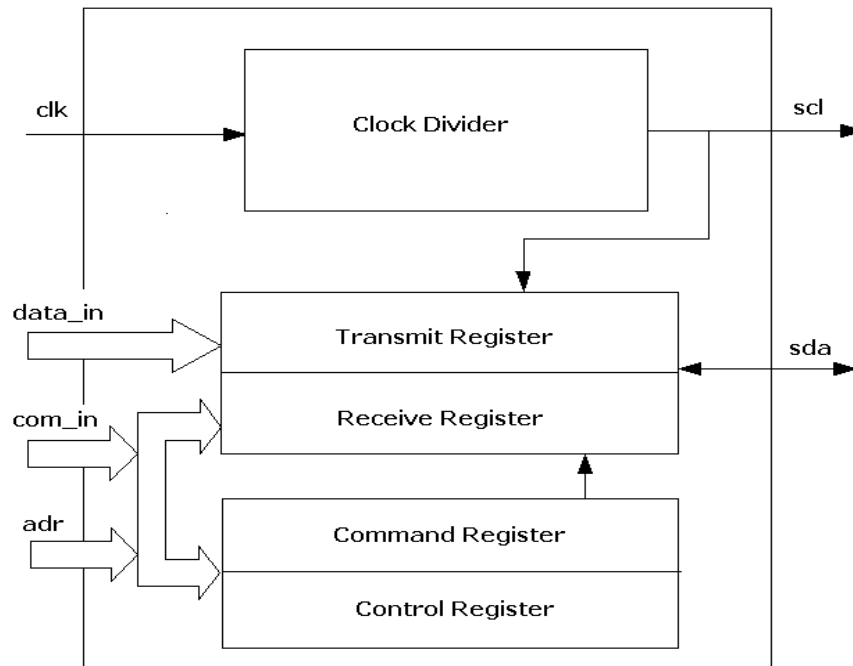


Pin Descriptions:

Pin	Type	Description
adr[2:0]	input	Address bits
com_in[7:0]	input	Command in to the core
data_in[7:0]	input	Data in to the core
clk	input	Master Clock

Pin	Type	Description
enable	input	Enable line
reset	input	Asynchronous reset input
scl	output	Serial clock line output
sda	inout	Serial data line input/output

Block Diagram:



Functionality of the sub-blocks is given below:

- **Clock Divider:** This block is used to control the serial clock frequency based on the input master clock. The I2C is normally operating in three frequencies-100KHz,400khz,3.5MHz.Based on the requirement, the clock divider is able to produce the particular output frequency.
- **Transmit and Receive Registers:** These registers are used to hold the transmitting and received data. After the completion of a cycle, transmit register will have new data values that is to be written on the

'sda' line, while the receive register's data is stored in memory.

- **Command Register:** This register gives different commands for I2C operation like Start, Stop, Read, Write, Acknowledge, Repeated start etc. This register is responsible for performing sequence of operation.
- **Control Register:** The Control register is responsible for controlling different sequence of I2C operation like core enable, interrupt enable etc.

Performance:

Device	Slice Count	Frequency
Spartan-3A (3s700anfg484-4)	95	111.00 MHz
Virtex-4 (4vsx25ff668-12)	97	262.50 MHz

Verification:

The I2C Master Controller module has been verified with following approaches:

- Exhaustive Functional/Timing simulation
- Prototyped on Xilinx Virtex-4 ML401 development board
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Deliverables:

- Verilog RTL source code
- Test benches
- Synthesis and Simulation scripts