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Features

- Drop-in modules for the XC4000E, EX, XL, XV and Spartan families
- Two data bus inputs: 2 to 32 bits wide
- Supports both 2's complement signed and unsigned data
- Registered output
- Clock Enable for output register
- Asynchronous Clear for output register
- Uses Fast Carry logic for high speed
- High performance and density guaranteed through Relational Placed Macro (RPM) mapping and placement technology
- Available in Xilinx CORE Generator

Functional Description

The Registered Subtractor module accepts two input buses, **A** and **B**, and a borrow input (**CI**), subtracts **B** and **CI** from **A**, and registers the result, **S**. The input data buses can be in either 2's complement signed or unsigned numbers. The borrow input is active low, but is otherwise interpreted as a 1-bit binary value.

The output bus width is automatically set to the input bus width plus 1 to accommodate any borrow that may be produced when subtracting the MSB's of the input operands.

Pinout

Port names for the schematic symbol are shown in Figure 1 and described in Table 1.

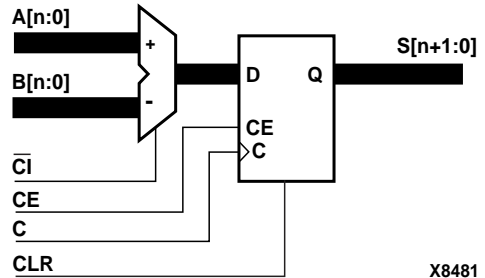


Figure 1: Core Schematic Symbol

Table 1: Core Signal Pinout

| Signal | Signal Direction | Description |
|-----------------|------------------|---|
| A[n:0] | Input | A data input. |
| B[n:0] | Input | B data input – value is subtracted from A data. |
| \overline{CI} | Input | CARRY IN – active low. Treated as a 1-bit binary value and subtracted from A. |
| CE | Input | CLOCK ENABLE – active high signal used to enable the transfer of data from the subtractor to the output register. |
| C | Input | CLOCK – With the exception of asynchronous control inputs (where applicable), control and data inputs are captured, and new output data formed on rising clock transitions. |
| S[n+1:0] | Output | DATA OUTPUT – the registered output of the subtractor. |
| CLR | Input | ASYNCHRONOUS CLEAR - Resets the output register. Overrides Clock and Clock Enable. Level sensitive. |

X8481

CORE Generator Parameters

The CORE Generator parameterization window for this macro is shown in Figure 2. The parameters are as follows:

- **Component Name:** Enter a name for the output files generated for this module.
- **Input Width:** Select an input bit width from the pull-down menu. The valid range is 2-32. The same data width is applied to both the A and B inputs. The output size is automatically set to the input width plus one.
- **Signed:** Select Signed or Unsigned.

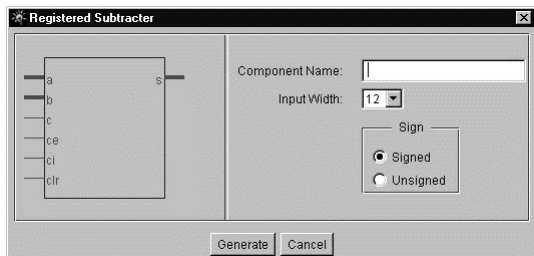


Figure 2: Parameterization Window

Core Resource Utilization

Table 2 shows the number of CLBs required for each available bit width.

Ordering Information

This macro comes free with the Xilinx CORE Generator. For additional information contact your local Xilinx sales representative, or e-mail requests to coregen@xilinx.com.

Table 2: Bit Width versus CLB Count

| Bit Width | CLB Count |
|-----------|-----------|
| 2 | 2 |
| 3 | 2 |
| 4 | 3 |
| 5 | 3 |
| 6 | 4 |
| 7 | 4 |
| 8 | 5 |
| 9 | 5 |
| 10 | 6 |
| 11 | 6 |
| 12 | 7 |
| 13 | 7 |
| 14 | 8 |
| 15 | 8 |
| 16 | 9 |
| 17 | 9 |
| 18 | 10 |
| 19 | 10 |
| 20 | 11 |
| 21 | 11 |
| 22 | 12 |
| 23 | 12 |
| 24 | 13 |
| 25 | 13 |
| 26 | 14 |
| 27 | 14 |
| 28 | 15 |
| 29 | 15 |
| 30 | 16 |
| 31 | 16 |
| 32 | 17 |

Parameter File Information

| Parameter Name | Type | Notes |
|----------------|---------|------------|
| Component_Name | String | |
| Input_Width | Integer | 2 - 32 |
| Signed | Boolean | True/False |