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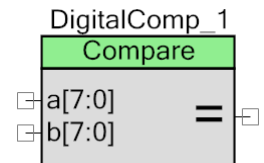
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Digital Comparator

1.0

Features

- 1 to 32 bit Configurable Digital Comparator.
- Six selectable comparison operators.



General Description

The Digital Comparator component provides a selectable-width, selectable-type comparator, implemented in PLD macrocells.

When to Use a Digital Comparator

Use the Digital Comparator when the digital values of two signals need to be compared.

Input/Output Connections

This section describes the various input and output connections for the Digital Comparator.

a – Input

The a input is the first operand of the comparison.

b – Input

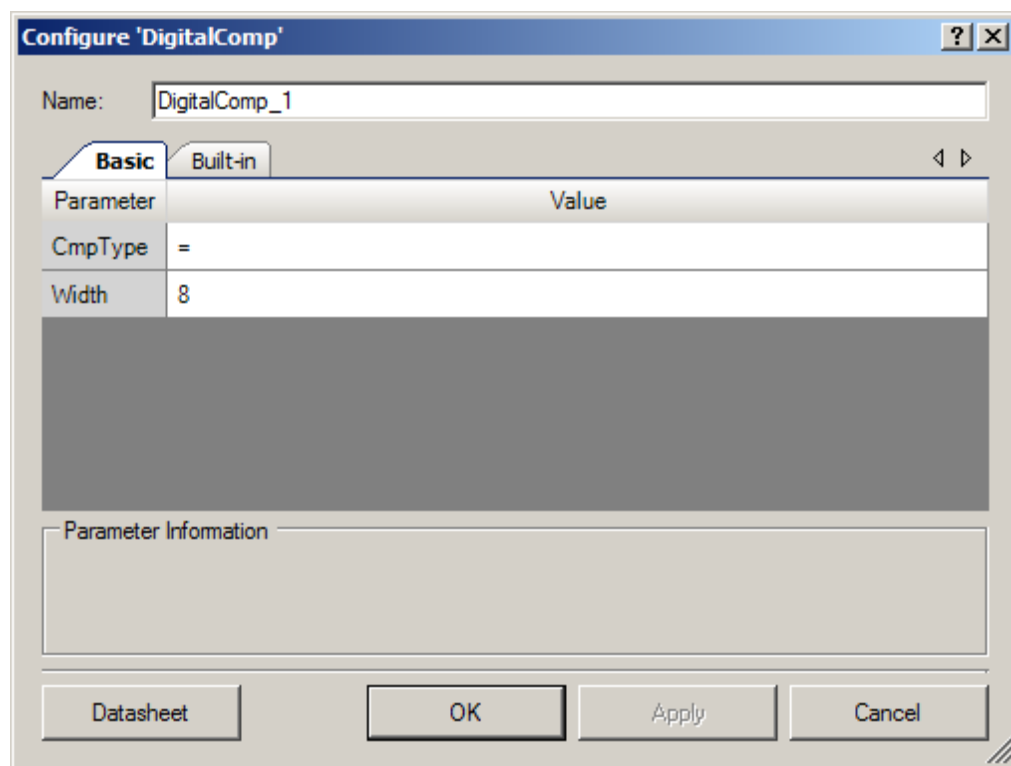
The b input is the second operand of the comparison.

cmp – Output

The result of the comparison.

Component Parameters

Drag a Digital Comparator onto your design and double-click it to open the **Configure** dialog.



The Digital Comparator provides the following parameters.

CmpType

This parameter determines the type of comparison to perform. The value must be one of [=, ≠, <, ≤, >, ≥]. The default is =.

Width

This parameter defines the width of the **a** and **b** terminals. The value must be between 1 and 32. The default is 8.

Functional Description

The Digital Comparator performs the selected comparison on the **a** and **b** input. If the comparison evaluates to true, the **cmp** output goes high, otherwise it goes low. [Figure 1](#) shows the truth table for a Digital Comparator of width=2, configured with different comparison types.

Figure 1: 2-bit Digital Comparator Truth Table

| Input | | | | CmpType | | | | | |
|-------|----|----|----|---------|---|---|---|---|---|
| a1 | a0 | b1 | b0 | = | ≠ | < | ≤ | > | ≥ |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |

Resources

The Digital Comparator is implemented with logic expressions and synthesized to macrocells in the UDB array. Macrocell usage is dependent on optimizations performed during synthesis. Table 1 provides an estimate of the resource usage for different sizes and different configurations of the Digital Comparator. Resource usage for “≠” should be comparable to the

estimates provided for the “=” cmpType, and resource usage for “≥”, “<”, and “≤” should be comparable to the estimates provided for the “<” cmpType.

Table 1. Resource Usage

| Configuration | Resource Type | | | | | |
|---------------------|----------------|------------|--------------|---------------|--------------|------------|
| | Datapath Cells | Macrocells | Status Cells | Control Cells | DMA Channels | Interrupts |
| 4-bit, cmpType:“=” | – | 1 | – | – | – | – |
| 4-bit, cmpType:“<” | – | 2 | – | – | – | – |
| 8-bit, cmpType:“=” | – | 3 | – | – | – | – |
| 8-bit, cmpType:“<” | – | 6 | – | – | – | – |
| 16-bit, cmpType:“=” | – | 7 | – | – | – | – |
| 16-bit, cmpType:“<” | – | 12 | – | – | – | – |
| 24-bit, cmpType:“=” | – | 10 | – | – | – | – |
| 24-bit, cmpType:“<” | – | 17 | – | – | – | – |
| 32-bit, cmpType:“=” | – | 13 | – | – | – | – |
| 32-bit, cmpType:“<” | – | 24 | – | – | – | – |

MISRA Compliance

This section describes the MISRA-C:2004 compliance and deviations for the component. There are two types of deviations defined: project deviations – deviations that are applicable for all PSoC Creator components and specific deviations – deviations that are applicable only for this component. This section provides information on component specific deviations. The project deviations are described in the MISRA Compliance section of the *System Reference Guide* along with information on the MISRA compliance verification environment.

The Digital Comparator component does not have any C source code APIs.

Component Changes

This section lists the major changes in the component from the previous version.

| Version | Description of Changes | Reason for Changes / Impact |
|---------|--|-----------------------------|
| 1.0.b | Minor datasheet edits. | |
| 1.0.a | Datasheet edit. | Corrected the truth table. |
| 1.0 | This is the first release of the Digital Comparator Component. | |

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