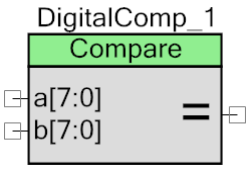
Digital Comparator

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

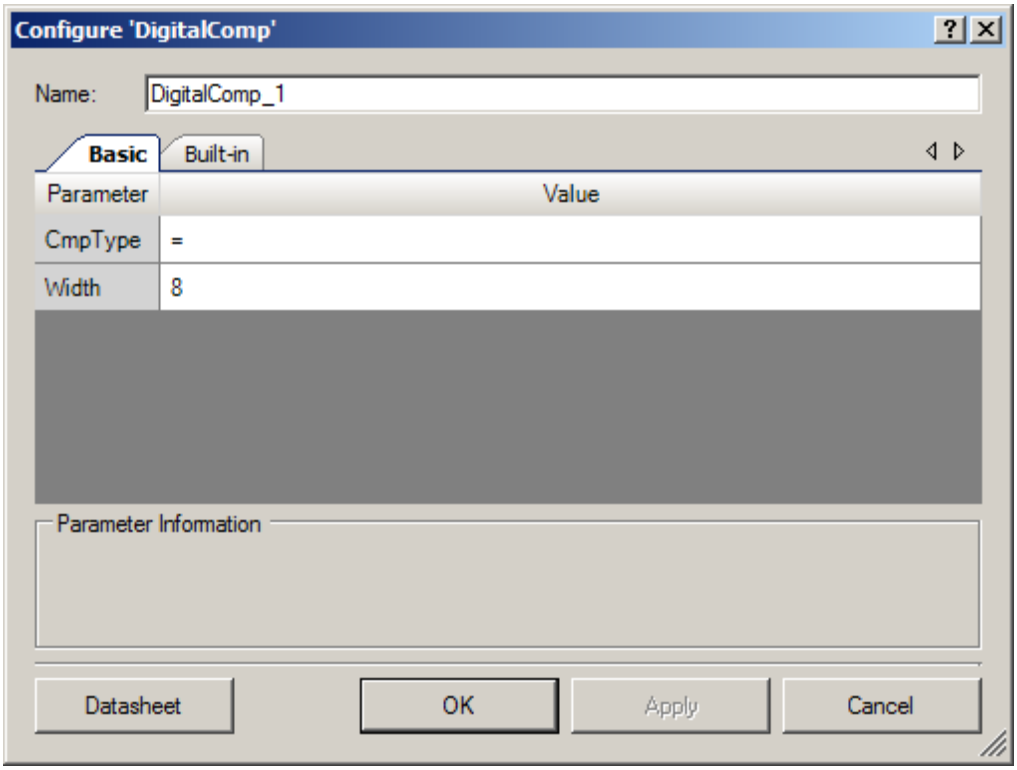
The b input is the second operand of the comparison.

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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