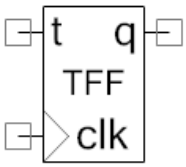
Toggle Flip Flop

1.0



Features

- T input toggles Q value
- Configurable width for array of Toggle Flip Flops

General Description

The Toggle Flip Flop captures a digital value that can be toggled.

When to Use a Toggle Flip Flop

Use the Toggle Flip Flop to implement sequential logic.

Input/Output Connections

This section describes the various input and output connections for the Toggle Flip Flop.

t – Input

This input determines whether to toggle the output. The output does not change until the next rising edge of the clock.

clock – Input

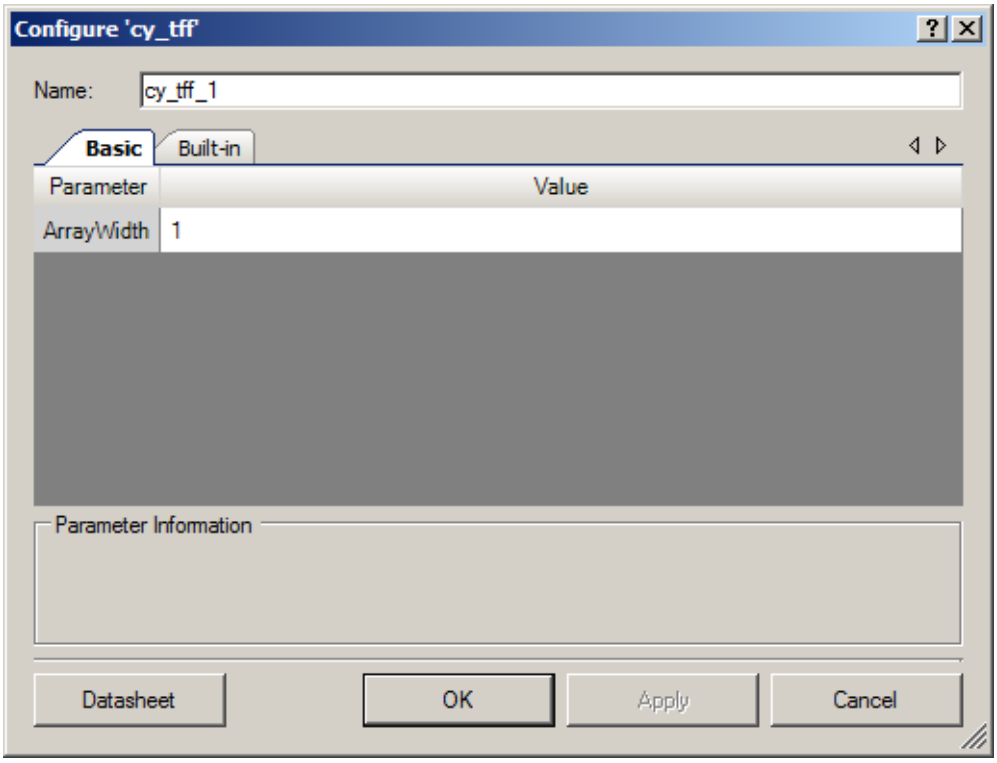
The clock signal determines when the output will change. The output changes when a rising edge of the clock is detected.

q – Output

The stored value.

Component Parameters

Drag a Toggle Flip Flop onto your design and double-click it to open the **Configure** dialog.



The Toggle Flip Flop provides the following parameters.

ArrayWidth

You can create an array of Toggle Flip Flops, which is useful if the input or output is a bus. This parameter defines the bus width of the t and q terminals. The value must be between 1 and 32. The default is **1**.

Functional Description

The Toggle Flip Flop is implemented in PLD macrocells using the built-in T Flip Flop mode.

Table 1. 1-ArrayWidth Toggle Flip Flop Truth Table

Q_{PREV}	T	Q
0	0	0
0	1	1
1	0	1
1	1	0

Resources

The Toggle Flip Flop uses one macrocell. If the ArrayWidth parameter is greater than 1, the Toggle Flip Flop uses a number of macrocells equal to ArrayWidth. All Toggle Flip Flop components in the same PLD must have the same clock signal for clocking.

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. Non PSoC 6 project deviations are described in the MISRA Compliance section of the *System Reference Guide* along with information on the MISRA compliance verification environment. For PSoC 6, refer to PSoC Creator Help > Building a PSoC Creator Project > Generated Files (PSoC 6) for information on MISRA compliance and deviations for files generated by PSoC Creator.

The Toggle Flip Flop component does not have any C source code APIs.

DC and AC Electrical Characteristics

The Toggle Flip Flop component supports the maximum device frequency.

Component Changes

This section lists the changes in the Component from the previous version.

Version	Description of Changes
1.0.b	Updated MISRA section. Added PSoC 6 support.
1.0.a	Minor datasheet update.
1.0	Initial release of the Toggle Flip Flop Component.

© Cypress Semiconductor Corporation, 2012-2017. This document is the property of Cypress Semiconductor Corporation and its subsidiaries, including Spansion LLC (“Cypress”). This document, including any software or firmware included or referenced in this document (“Software”), is owned by Cypress under the intellectual property laws and treaties of the United States and other countries worldwide. Cypress reserves all rights under such laws and treaties and does not, except as specifically stated in this paragraph, grant any license under its patents, copyrights, trademarks, or other intellectual property rights. If the Software is not accompanied by a license agreement and you do not otherwise have a written agreement with Cypress governing the use of the Software, then Cypress hereby grants you a personal, non-exclusive, nontransferable license (without the right to sublicense) (1) under its copyright rights in the Software (a) for Software provided in source code form, to modify and reproduce the Software solely for use with Cypress hardware products, only internally within your organization, and (b) to distribute the Software in binary code form externally to end users (either directly or indirectly through resellers and distributors), solely for use on Cypress hardware product units, and (2) under those claims of Cypress’s patents that are infringed by the Software (as provided by Cypress, unmodified) to make, use, distribute, and import the Software solely for use with Cypress hardware products. Any other use, reproduction, modification, translation, or compilation of the Software is prohibited.

TO THE EXTENT PERMITTED BY APPLICABLE LAW, CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS DOCUMENT OR ANY SOFTWARE OR ACCOMPANYING HARDWARE, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. To the extent permitted by applicable law, Cypress reserves the right to make changes to this document without further notice. Cypress does not assume any liability arising out of the application or use of any product or circuit described in this document. Any information provided in this document, including any sample design information or programming code, is provided only for reference purposes. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. Cypress products are not designed, intended, or authorized for use as critical components in systems designed or intended for the operation of weapons, weapons systems, nuclear installations, life-support devices or systems, other medical devices or systems (including resuscitation equipment and surgical implants), pollution control or hazardous substances management, or other uses where the failure of the device or system could cause personal injury, death, or property damage (“Unintended Uses”). A critical component is any component of a device or system whose failure to perform can be reasonably expected to cause the failure of the device or system, or to affect its safety or effectiveness. Cypress is not liable, in whole or in part, and you shall and hereby do release Cypress from any claim, damage, or other liability arising from or related to all Unintended Uses of Cypress products. You shall indemnify and hold Cypress harmless from and against all claims, costs, damages, and other liabilities, including claims for personal injury or death, arising from or related to any Unintended Uses of Cypress products.

Cypress, the Cypress logo, Spansion, the Spansion logo, and combinations thereof, WICED, PSoC, CapSense, EZ-USB, F-RAM, and Traveo are trademarks or registered trademarks of Cypress in the United States and other countries. For a more complete list of Cypress trademarks, visit cypress.com. Other names and brands may be claimed as property of their respective owners.