ASMD\_MUTIPLIER Logic Requirements Document

Module Name/Internal ID: ASMD\_MULT

Engineer(s):

# Revision

| Rev | Comments | Date | Approval: Team/Date |
| --- | --- | --- | --- |
| 1.0 | Initial Creation | 8/7/2023 |  |

# Required Documents

|  |  |  |
| --- | --- | --- |
| ID | Name | Revision |
|  |  |  |

# Supplemental Documents

|  |  |  |
| --- | --- | --- |
| ID | Name | Revision |
| ASM | Algorithmic\_state\_machine (Wikipedia) | https://en.wikipedia.org/wiki/Algorithmic\_state\_machine |

# Acronyms

|  |  |
| --- | --- |
| Abbreviation | Definition |
| ASMD | Algorithmic state machine with DataPath |

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# Module Scope

This module accepts two words as inputs and outputs their product.

# Functional Requirements

## Interfaces

ASMD\_MULT\_F001: Module shall implement the interfaces described in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| Port | Direction | Width | Description |
| clk | input | 1’b1 | Input Clock Signal |
| reset | input | 1’b1 | Input Synchronous Reset Signal |
| start | Input | 1’b1 | Input module start signal |
| word0 | input | [word-length]’b1 | Input word 0 |
| word1 | input | [word-length]’b1 | Input word 1 |
| ready | Output | 1’b1 | Module ready output signal |
| product | Output | [word-length\*2]’b1 | Module multiplication product output |

## Parameters

ASMD\_MULT\_F002: module shall implement the parameters described in the following table:

|  |  |  |
| --- | --- | --- |
| Name | Default Value | Description |
| word\_length | 4 | Input word size in bits |

## Logic requirements

* + - 1. ASMD\_MULT\_F003: Module shall, upon assertion of reset:
         1. assert ready.
         2. Assign product to zeros.
      2. ASMD\_MULT\_F004: Module shall, upon assertion of start:
         1. De-assert ready.
         2. Calculate the product of word0 \* word1.
         3. Assert ready only when the multiplication computation is complete.
         4. Output the multiplication computation on the product output port.