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Requirements: FIFO

* FIFO\_00: The FIFO module shall have a parameterizable memory depth of either 2, 4, 8, 16, 32, or 64
* FIFO\_01: ‘o\_full’, ‘o\_overflow’, and ‘o\_underflow’ shall be set to 0 when ‘i\_reset’ is 1.
* FIFO\_02: ‘o\_empty’ shall be set to 1 when ‘i\_reset’ is 1.
* FIFO\_03: ‘o\_underflow’ shall be 1 only when ‘i\_sys\_clk’ transitions from 0 to 1 when both ‘i\_r\_en’ and ‘o\_empty’ are 1
* FIFO\_04: ‘o\_overflow’ shall be 1 only when ‘i\_sys\_clk’ transitions from 0 to 1 when both ‘i\_w\_en’ and ‘o\_full’ are 1
* FIFO\_05: ‘o\_empty’ shall be 1 only when the internal read and write pointers are equal.
* FIFO\_06: ‘o\_full’ shall be 1 only when the internal read and write pointers’ most significant bit are not equal to each other and while the least significant bits are equal to each other.
* FIFO\_07: The internal read and write pointers shall have vector of size [1:0] when the depth parameter is 2.
* FIFO\_08: The internal read and write pointers shall have a vector of size [2:0] when the depth parameter is 4.
* FIFO\_09: The internal read and write pointers shall have a vector of size [3:0] when the depth parameter is 8.
* FIFO\_10: The internal read and write pointers shall have a vector of size [4:0] when the depth parameter is 16.
* FIFO\_11: The internal read and write pointers shall have a vector of size [5:0] when the depth parameter is 32.
* FIFO\_12: The internal read and write pointers shall have a vector of size [6:0] when the depth parameter is 64.
* FIFO\_13: The internal write pointer shall be incremented by a value of 1 when ‘i\_sys\_clk’ is set from 0 to 1 while ‘i\_w\_en’ is 1, unless ‘o\_full’ is 1.
* FIFO\_14: The internal read pointer shall be incremented by a value of 1 when ‘i\_sys\_clk’ is set from 0 to 1 while ‘i\_r\_en’ is 1, unless ‘o\_empty’ is 1.
* FIFO\_15: ‘o\_fifo\_r\_data’ shall output the value at the register the read pointer is currently pointing to.
* FIFO\_16: The register the write pointer is pointing to shall store the value of i\_fifo\_w\_data when i\_sys\_clk goes from 0 to 1 while i\_w\_en is 1, unless o\_full is 1.