



Exclusive-NOR Gate

The Exclusive-NOR Gate function is a digital logic gate that is the reverse or complementary form of the Exclusive-OR function

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Basically the “Exclusive-NOR” gate is a combination of the Exclusive-OR gate and the NOT gate but has a truth table similar to the standard NOR gate in that it has an output that is normally at logic level “1” and goes “LOW” to logic level “0” when **ANY** of its inputs are at logic level “1”.

However, an output “1” is only obtained if **BOTH** of its inputs are at the same logic level, either binary “1” or “0”. For example, “00” or “11”. This input combination would then give us the Boolean expression

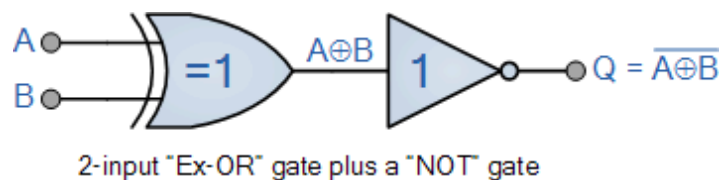
$$\text{of: } Q = (A \oplus B) = A.B + A.B$$

Then the output of a digital logic Exclusive-NOR gate **ONLY** goes “HIGH” when its two input terminals, A and B are at the “**SAME**” logic level which can be either at a logic level “1” or at a logic level “0”. In other words, an even number of logic “1’s” on its inputs gives a logic “1” at the output, otherwise is at logic level “0”.

Then this type of gate gives an output “1” when its inputs are “*logically equal*” or “*equivalent*” to each other, which is why an **Exclusive - NOR** gate is sometimes called an Equivalence Gate.

The logic symbol for an Exclusive-NOR gate is simply an Exclusive-OR gate with a circle or “inversion bubble”, (o) at its output to represent the NOT function. Then the **Logic Exclusive-NOR Gate** is the reverse or “*Complementary*” form of the Exclusive-OR gate, $(A \oplus B)$ we have seen previously.

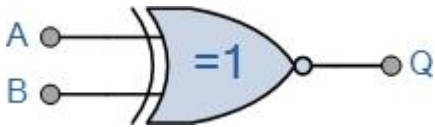
Ex-NOR Gate Equivalent



The **Exclusive-NOR Gate**, also written as: “Ex-NOR” or “XNOR”, function is achieved by combining standard gates together to form more complex gate functions and an example of a 2-input Exclusive-NOR gate is given below.

The Digital Logic “Ex-NOR” Gate

2-input Ex-NOR Gate

Symbol	Truth Table		
 <p>2-input Ex-NOR Gate</p>	B	A	Q
	0	0	1
	0	1	0
	1	0	0
	1	1	1
Boolean Expression $Q = A \oplus B$	Read if A AND B the SAME gives Q		