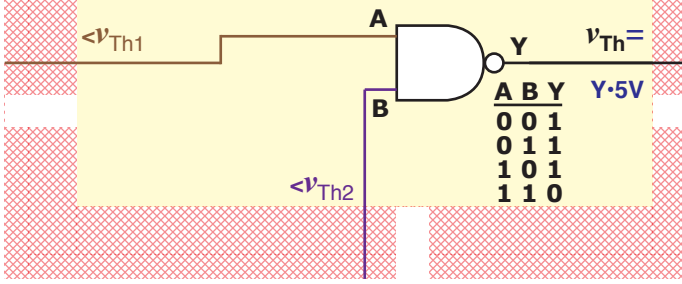
NAND Gate

5

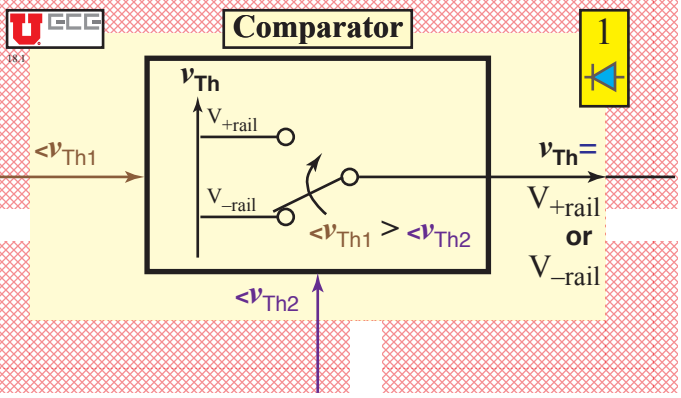


A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

$Y \cdot 5V$

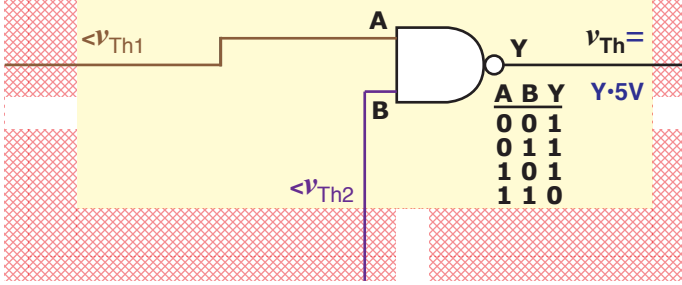
Comparator

1



NAND Gate

6

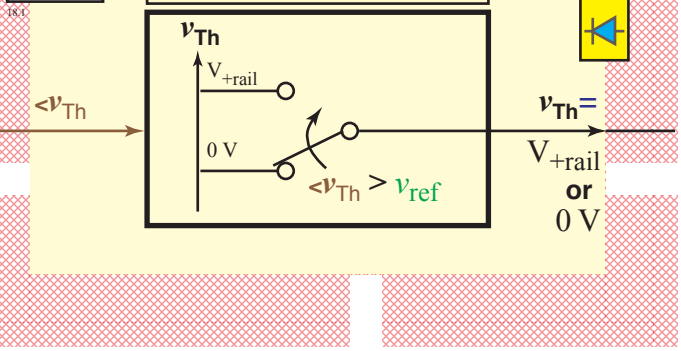


A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

$Y \cdot 5V$

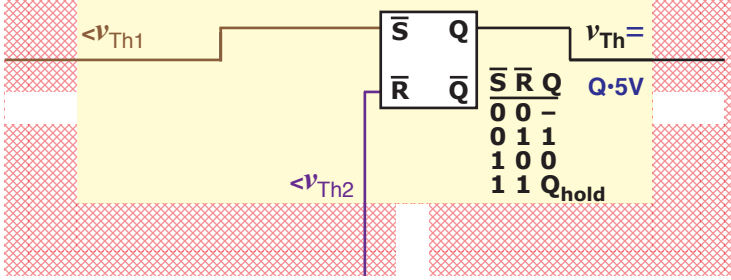
Comparator with V-Ref

2



RS Flip-Flop

7



$\overline{S}$	$\overline{R}$	Q
0	0	–
0	1	1
1	0	0
1	1	Q_{hold}

$Q \cdot 5V$

Op-Amp Level-Shifter

9

$$\Delta <v_{Th} := <v_{ThHi} - <v_{ThLow}$$

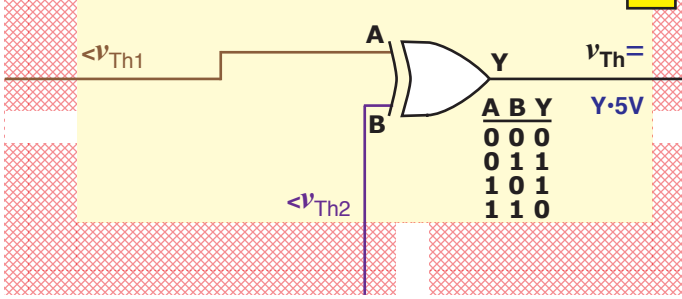
$$\Delta v_{Th} := v_{ThHi} - v_{ThLow}$$

$$\overline{<v_{Th}} := \frac{<v_{ThHi} + <v_{ThLow}}{2}$$

$$\overline{v_{Th}} := \frac{v_{ThHi} + v_{ThLow}}{2}$$

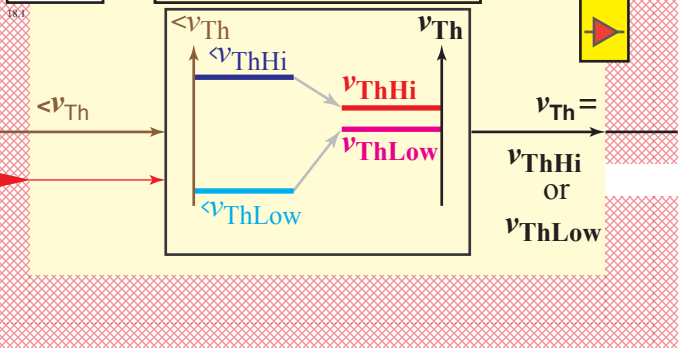
XOR Gate

8



A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

$Y \cdot 5V$

Op-Amp Level-Shifter

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