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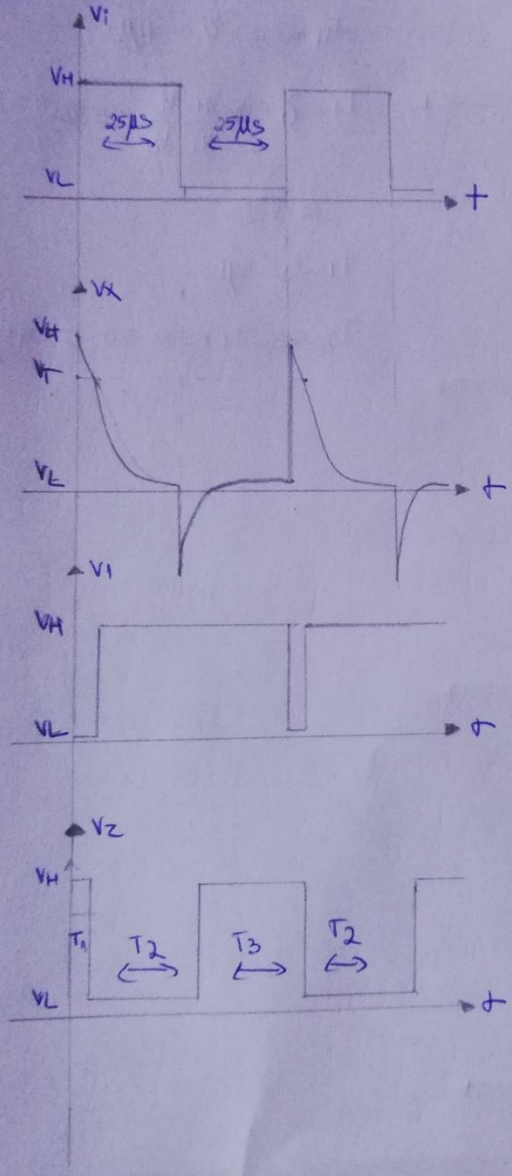
Lucrarea 11

Aplicații ale circuitelor integrate, realizate cu porți TTL

⊛ Schema 1



$t_1 = RC \ln \frac{V_L - V_H}{V_L - V_T} = 500 \cdot 10 \cdot 10^{-9} \ln \frac{0,2 - 3,5}{0,2 - 1,5}$

$= 5 \cdot 10^{-6} \ln \frac{3,3}{1,3} \simeq 5 \cdot 10^{-6} = 5\mu s$

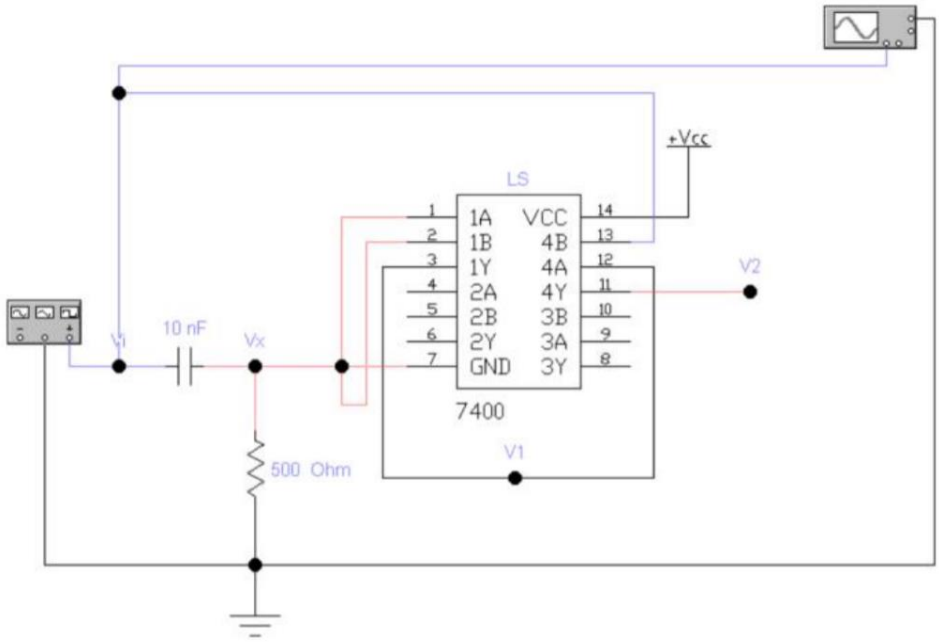
$T_1 = 5\mu s$

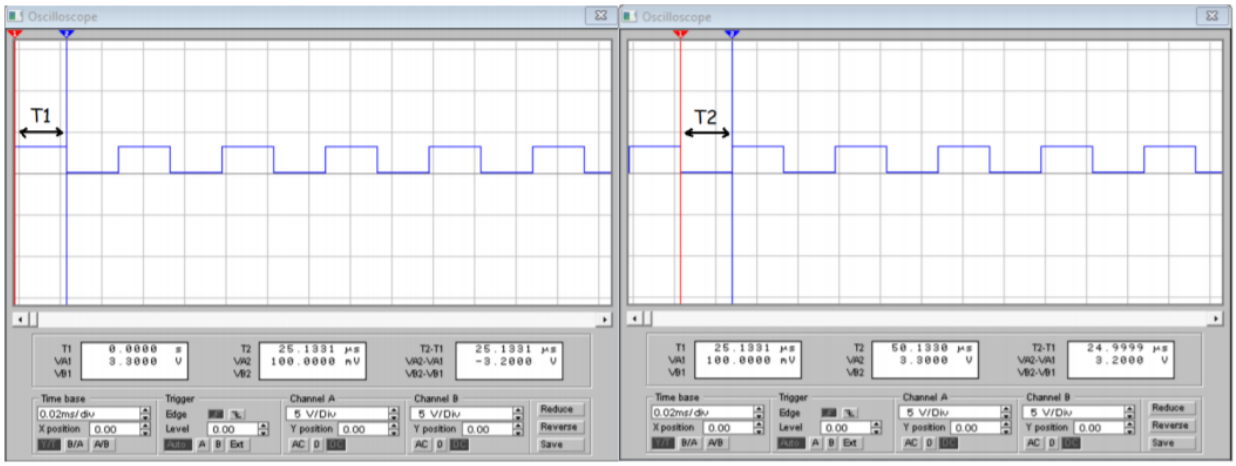
$T_2 = 25\mu s - 5\mu s = 20\mu s$

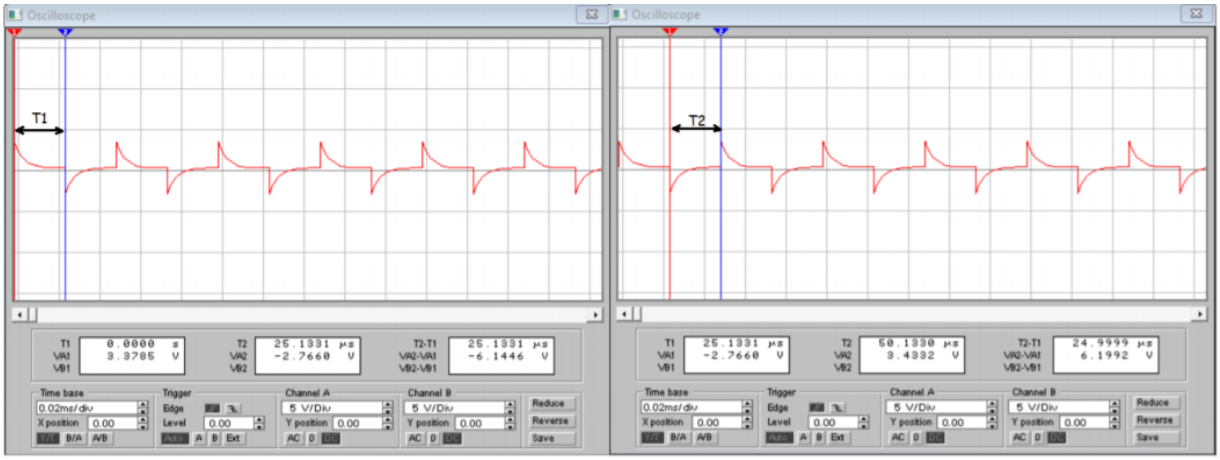
$T_3 = 25\mu s + 5\mu s = 30\mu s$

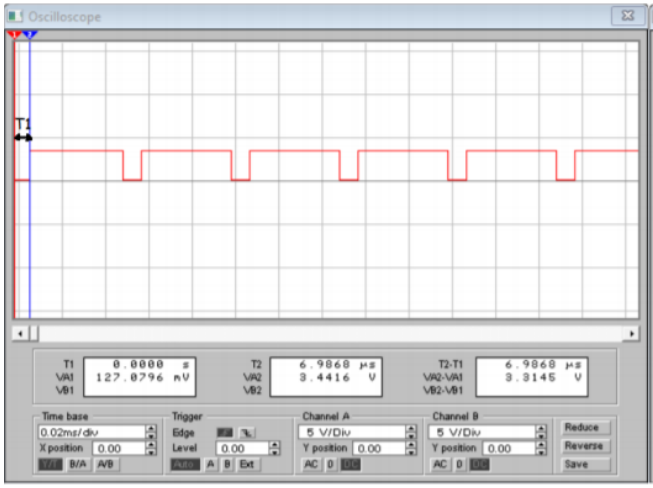
$\tau = R \cdot C = 5 \cdot 10^{-6} = 5\mu s$

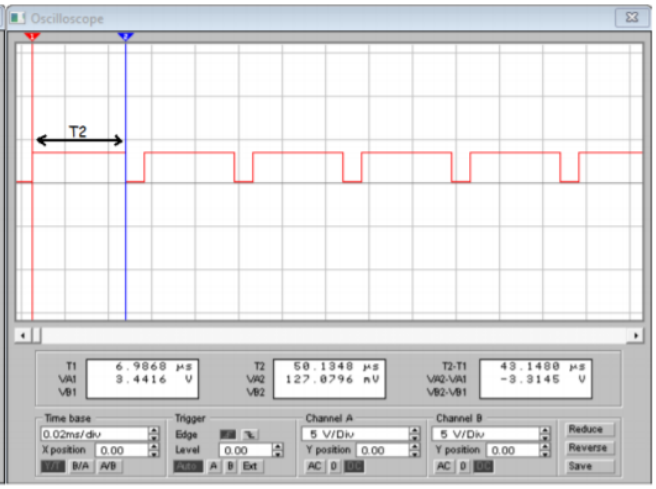
$t_2 = \tau \cdot 2,2 = 11\mu s$

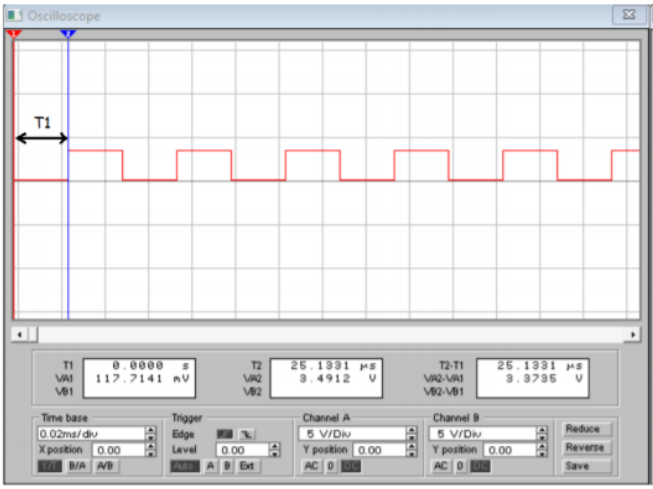

+Vcc
LS
1A
1B
1Y
2A
2B
2Y
GND
VCC
4B
4A
4Y
3B
3A
3Y
7400
V2
V1
Vi
10 nF
Vx
500 Ohm

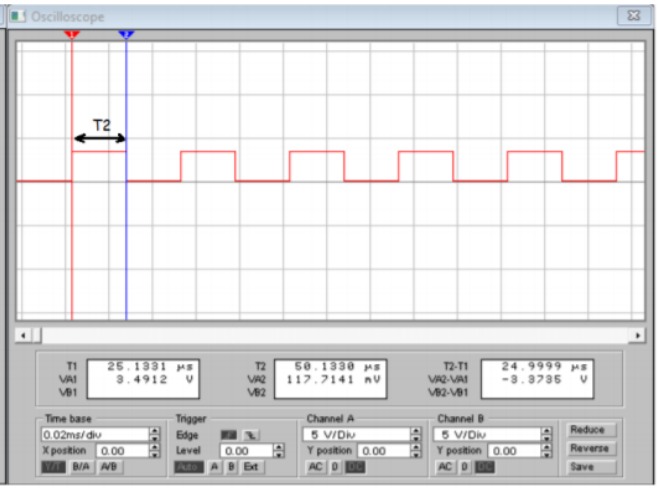

Oscilloscope
T1
T2

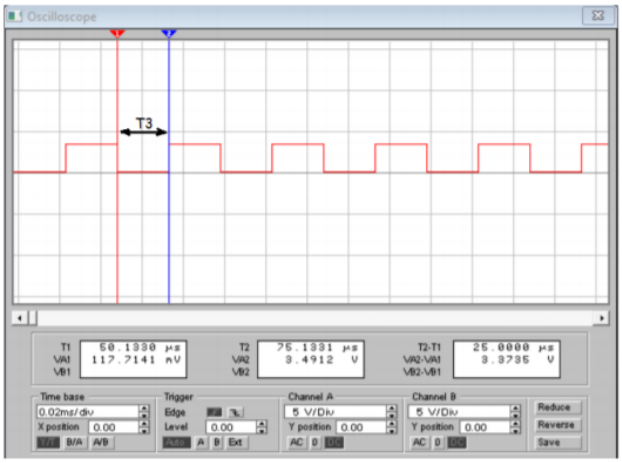

Oscilloscope
T1
T2


Oscilloscope
T1
T1 0.0000 s
VA1 127.0796 mV
VB1
T2 6.9868 µs
VA2 3.4416 V
VB2
T2-T1 6.9868 µs
VA2-VA1 3.3145 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T2
T1 6.9868 µs
VA1 3.4416 V
VB1
T2 50.1348 µs
VA2 127.0796 mV
VB2
T2-T1 43.1480 µs
VA2-VA1 -3.3145 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T1
T1 0.0000 s
VA1 117.7141 mV
VB1
T2 25.1331 µs
VA2 3.4912 V
VB2
T2-T1 25.1331 µs
VA2-VA1 3.3795 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T2
T1 25.1331 µs
VA1 3.4912 V
VB1
T2 50.1330 µs
VA2 117.7141 mV
VB2
T2-T1 24.9999 µs
VA2-VA1 -3.3795 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T3
T1 50.1330 µs
VA1 117.7141 mV
VB1
T2 75.1331 µs
VA2 3.4912 V
VB2
T2-T1 25.0000 µs
VA2-VA1 3.3795 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save

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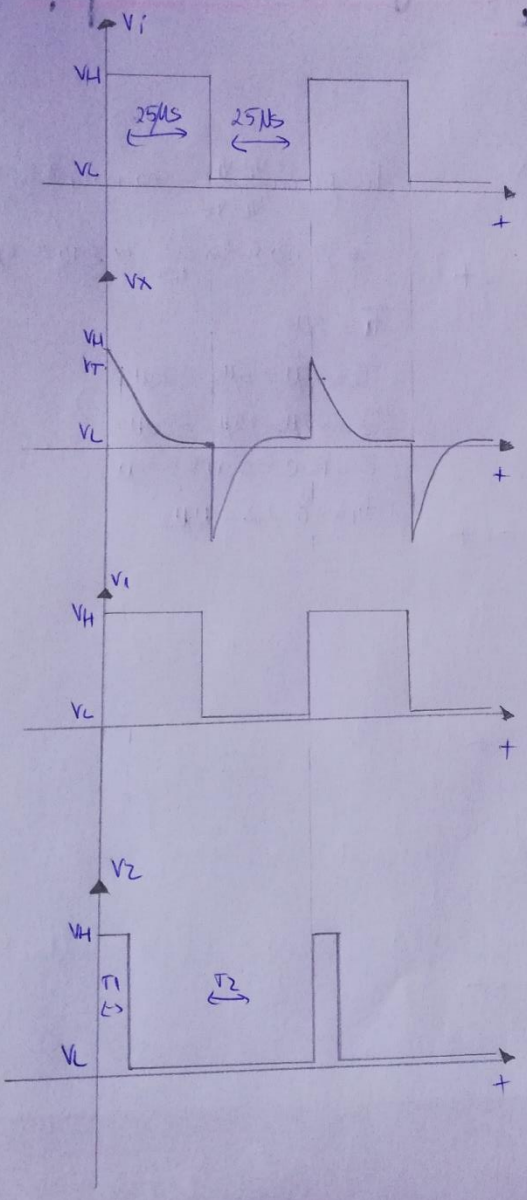
⊛Schema 2



$\tau = R \cdot C = 5 \cdot 10^{-6} = 5\mu s$

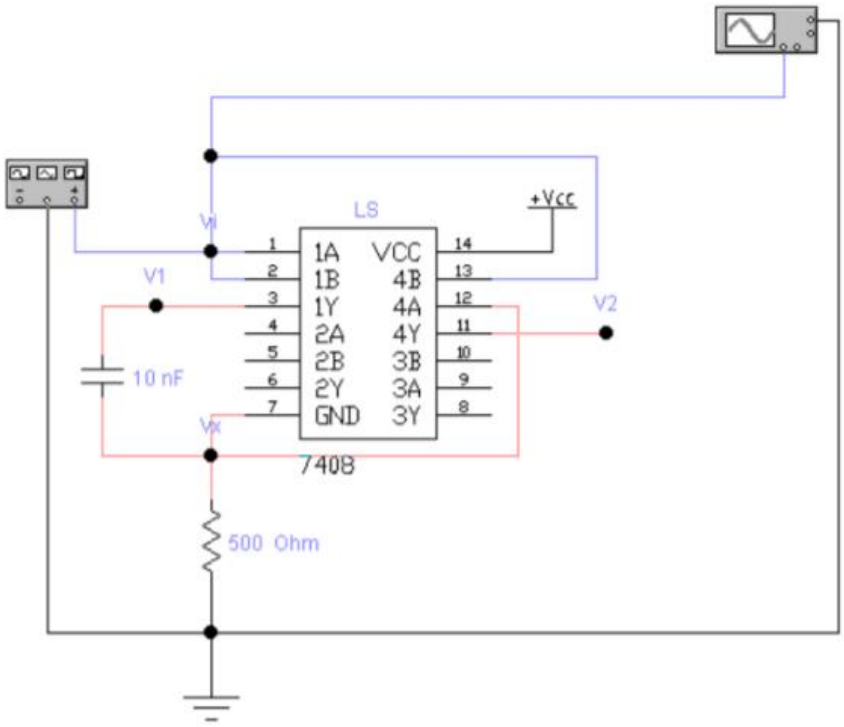
$t_{r2} = 2{,}2 \cdot \tau = 11\mu s$

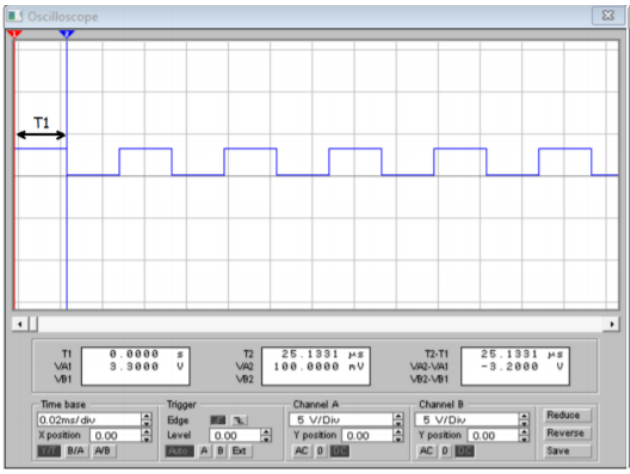
$t_1 = \tau \cdot \ln \frac{V_H - V_L}{V_T - V_L} = 5 \ln \frac{3{,}5 - 0{,}2}{1{,}5 - 0{,}2} =$

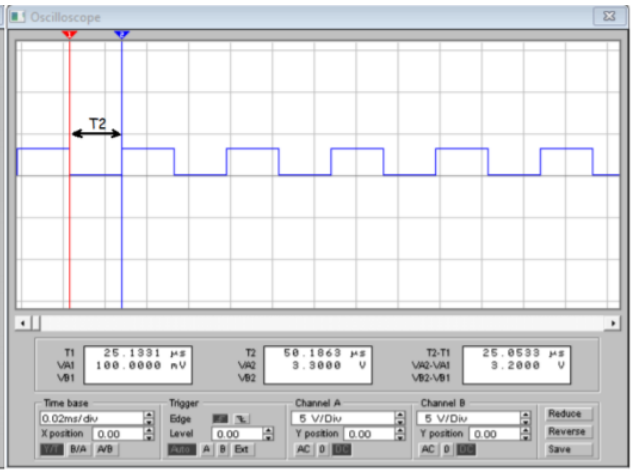
$\cong 5\mu s$

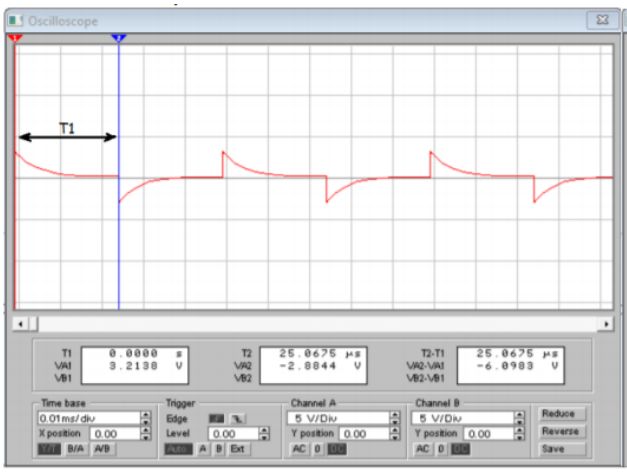
$T_1 = t_1 = 5\mu s$

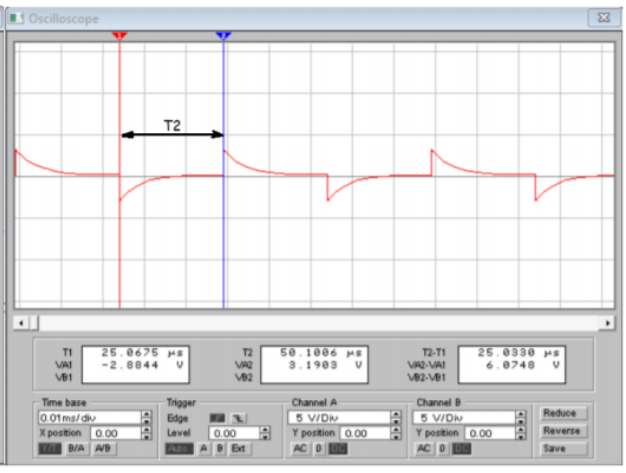
$T_2 = 25 - T_1 + 25 = 50 - 5 = 45\mu s$

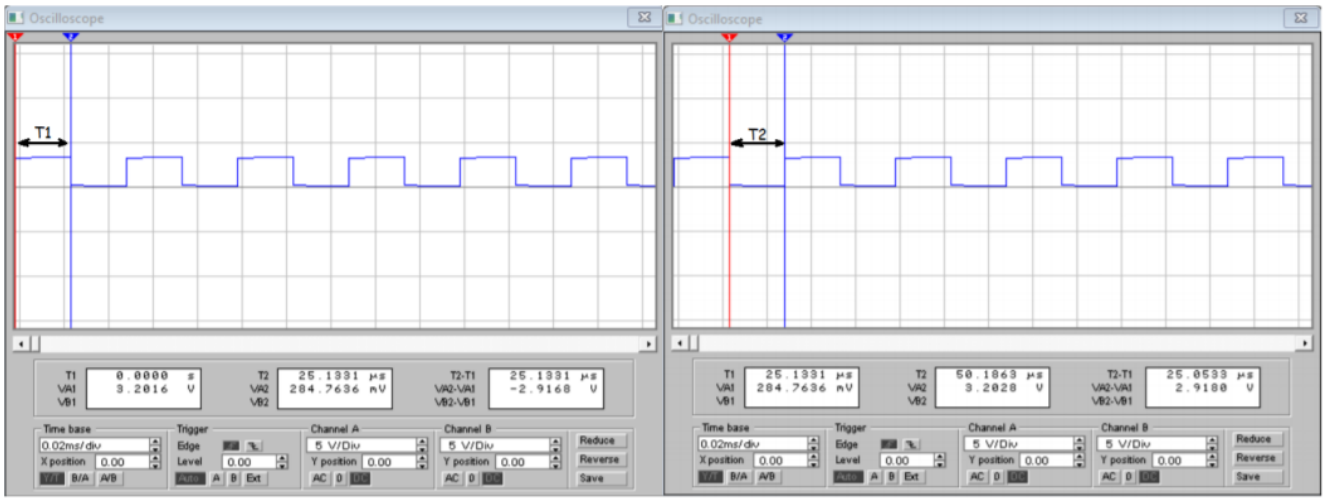

LS
+Vcc
Vi
V1
V2
Vx
1A
1B
1Y
2A
2B
2Y
GND
VCC
4B
4A
4Y
3B
3A
3Y
1
2
3
4
5
6
7
14
13
12
11
10
9
8
10 nF
500 Ohm
7408

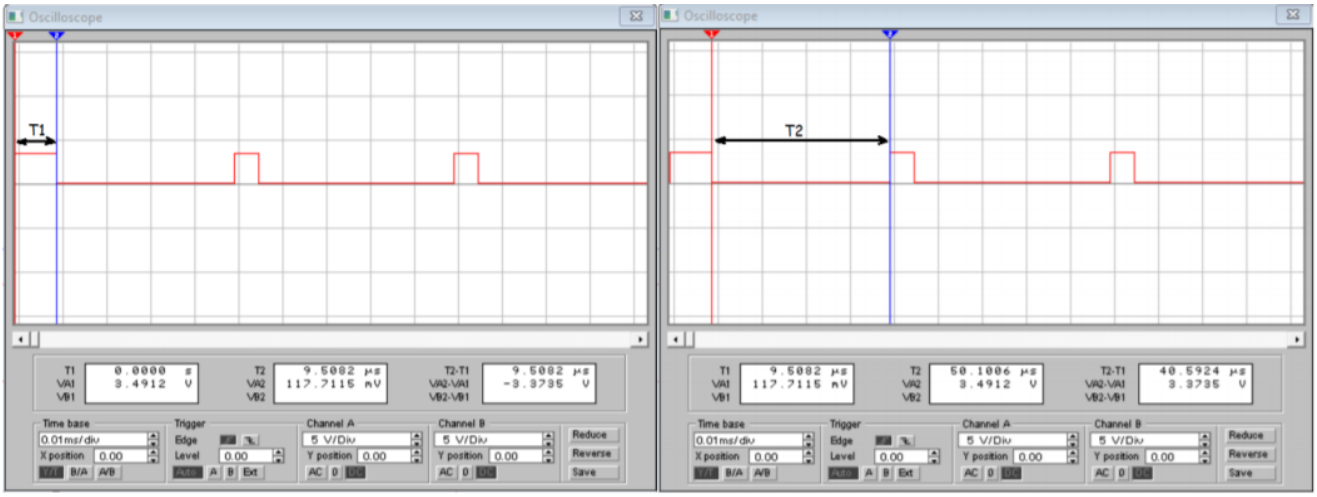

Oscilloscope
T1
T1 0.0000 s
VA1 3.3000 V
VB1
T2 25.1331 µs
VA2 100.0000 mV
VB2
T2-T1 25.1331 µs
VA2-VA1 -3.2000 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T2
T1 25.1331 µs
VA1 100.0000 mV
VB1
T2 50.1863 µs
VA2 3.3000 V
VB2
T2-T1 25.0533 µs
VA2-VA1 3.2000 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T1
T1 0.0000 s
VA1 3.2138 V
VB1
T2 25.0675 µs
VA2 -2.8844 V
VB2
T2-T1 25.0675 µs
VA2-VA1 -6.0983 V
VB2-VB1
Time base
0.01ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T2
T1 25.0675 µs
VA1 -2.8844 V
VB1
T2 50.1006 µs
VA2 3.1903 V
VB2
T2-T1 25.0330 µs
VA2-VA1 6.0748 V
VB2-VB1
Time base
0.01ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T1
T1 0.0000 s
VA1 3.2016 V
VB1
T2 25.1331 µs
VA2 284.7636 mV
VB2
T2-T1 25.1331 µs
VA2-VA1 -2.9168 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save
Oscilloscope
T2
T1 25.1331 µs
VA1 284.7636 mV
VB1
T2 50.1863 µs
VA2 3.2028 V
VB2
T2-T1 25.0533 µs
VA2-VA1 2.9188 V
VB2-VB1
Time base
0.02ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save


Oscilloscope
T1
T1 0.0000 s
VA1 3.4912 V
VB1
T2 9.5082 µs
VA2 117.7115 mV
VB2
T2-T1 9.5082 µs
VA2-VA1 -3.3735 V
VB2-VB1
Time base
0.01ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save
Oscilloscope
T2
T1 9.5082 µs
VA1 117.7115 mV
VB1
T2 50.1006 µs
VA2 3.4912 V
VB2
T2-T1 40.5924 µs
VA2-VA1 3.3735 V
VB2-VB1
Time base
0.01ms/div
X position 0.00
Trigger
Edge
Level 0.00
Channel A
5 V/Div
Y position 0.00
Channel B
5 V/Div
Y position 0.00
Reduce
Reverse
Save