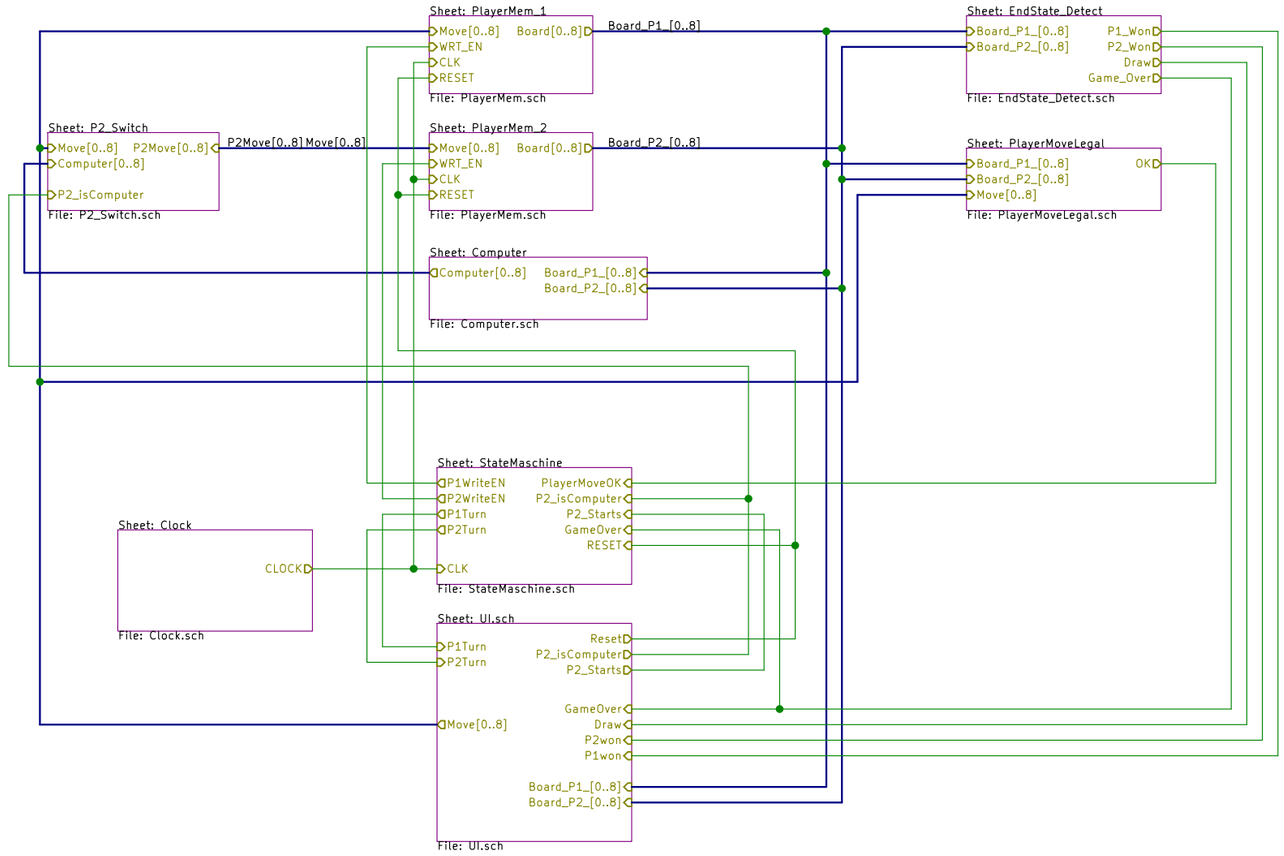
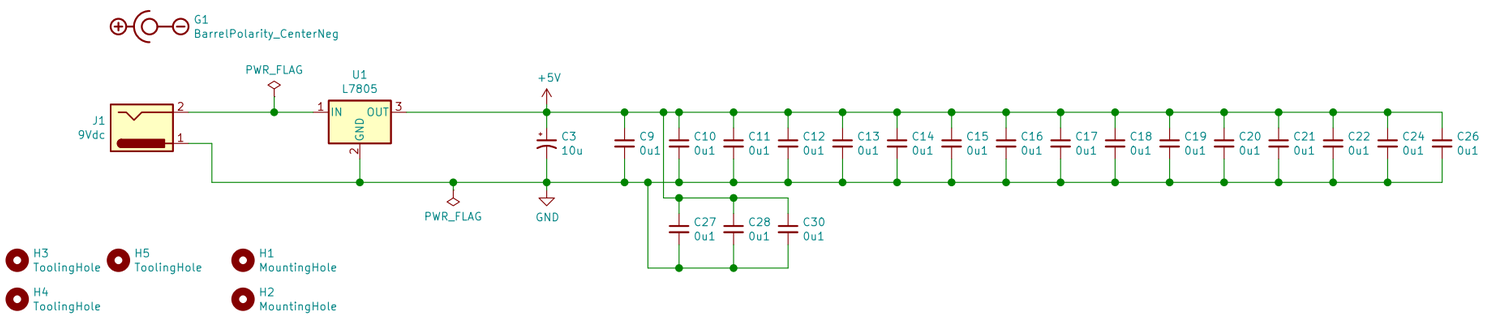
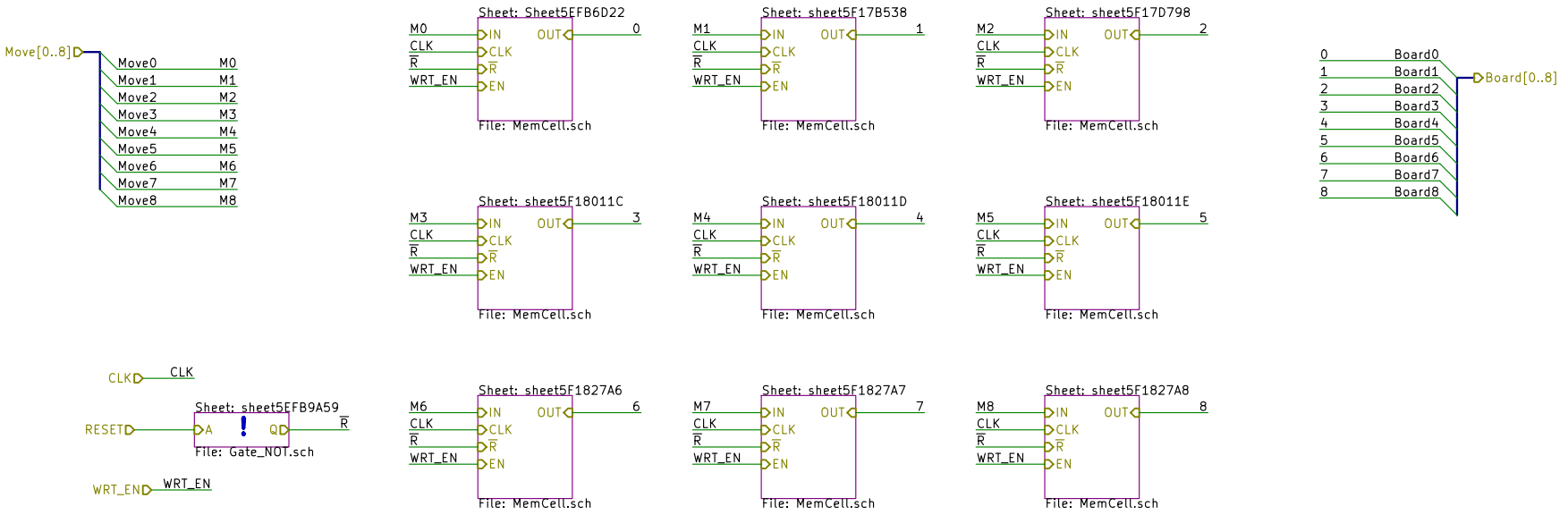
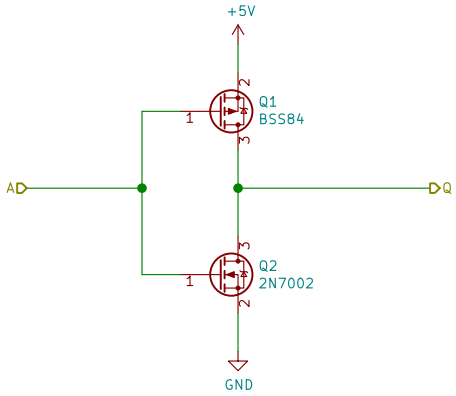
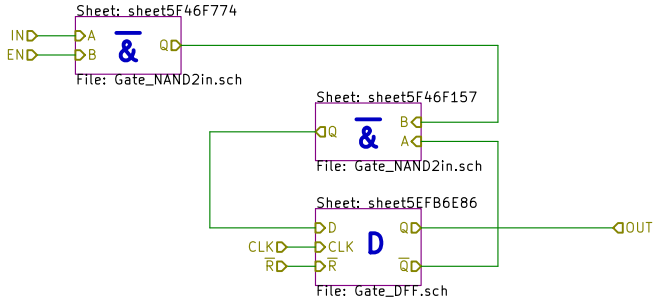
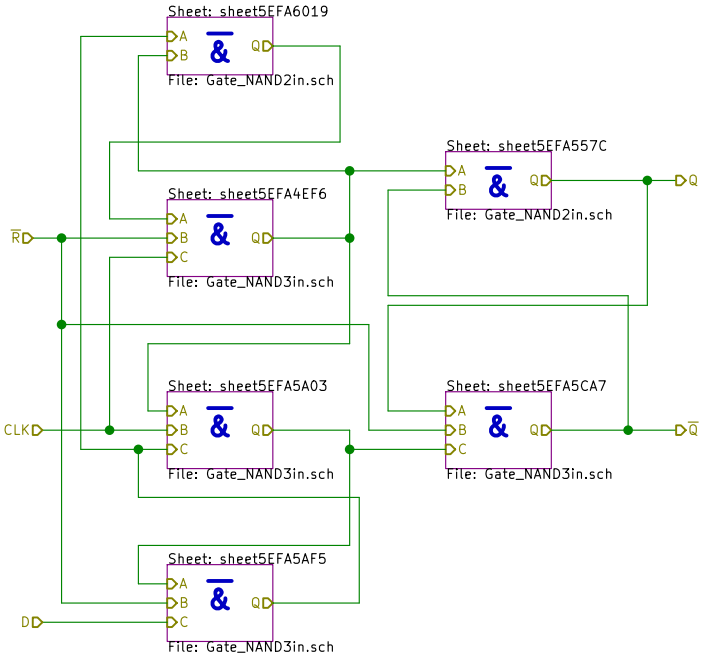

Sheet: PlayerMem_1
Move[0..8]
Board[0..8]
WRT_EN
CLK
RESET
File: PlayerMem.sch
Board_P1_[0..8]
Sheet: EndState_Detect
Board_P1_[0..8]
Board_P2_[0..8]
P1_Won
P2_Won
Draw
Game_Over
File: EndState_Detect.sch
Sheet: P2_Switch
Move[0..8]
P2Move[0..8]
Computer[0..8]
P2_isComputer
File: P2_Switch.sch
P2Move[0..8]
Move[0..8]
Sheet: PlayerMem_2
Move[0..8]
Board[0..8]
WRT_EN
CLK
RESET
File: PlayerMem.sch
Board_P2_[0..8]
Sheet: PlayerMoveLegal
Board_P1_[0..8]
Board_P2_[0..8]
Move[0..8]
OK
File: PlayerMoveLegal.sch
Sheet: Computer
Computer[0..8]
Board_P1_[0..8]
Board_P2_[0..8]
File: Computer.sch
Sheet: StateMaschine
P1WriteEN
P2WriteEN
P1Turn
P2Turn
CLK
PlayerMoveOK
P2_isComputer
P2_Starts
GameOver
RESET
File: StateMaschine.sch
Sheet: Clock
CLOCK
File: Clock.sch
Sheet: UI.sch
P1Turn
P2Turn
Move[0..8]
Reset
P2_isComputer
P2_Starts
GameOver
Draw
P2won
P1won
Board_P1_[0..8]
Board_P2_[0..8]
File: UI.sch

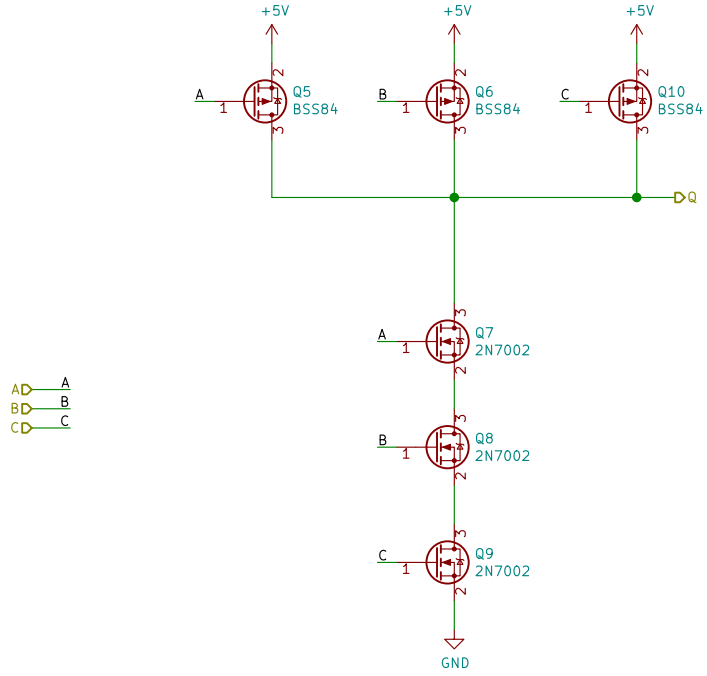

G1
BarrelPolarity_CenterNeg
PWR_FLAG
U1
L7805
IN
OUT
GND
J1
9Vdc
+5V
C3
10u
C9
0u1
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C24
C26
C27
C28
C30
PWR_FLAG
GND
H3
ToolingHole
H5
ToolingHole
H1
MountingHole
H4
ToolingHole
H2
MountingHole

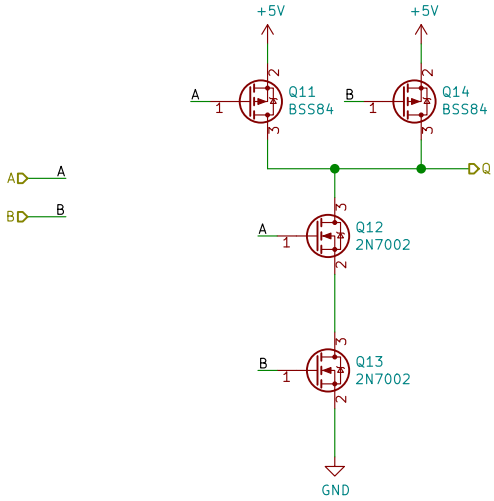

Move[0..8]
Move0 M0
Move1 M1
Move2 M2
Move3 M3
Move4 M4
Move5 M5
Move6 M6
Move7 M7
Move8 M8
Sheet: Sheet5FFB6D22
M0
CLK
R
WRT_EN
IN
OUT
CLK
R
EN
0
File: MemCell.sch
Sheet: sheet5F17B538
M1
1
File: MemCell.sch
Sheet: sheet5F17D798
M2
2
File: MemCell.sch
0 Board0
1 Board1
2 Board2
3 Board3
4 Board4
5 Board5
6 Board6
7 Board7
8 Board8
Board[0..8]
Sheet: sheet5F18011C
M3
3
File: MemCell.sch
Sheet: sheet5F18011D
M4
4
File: MemCell.sch
Sheet: sheet5F18011E
M5
5
File: MemCell.sch
CLK
CLK
Sheet: sheet5FFB9A59
RESET
A
Q
R
File: Gate_NOT.sch
WRT_EN
WRT_EN
Sheet: sheet5F1827A6
M6
6
File: MemCell.sch
Sheet: sheet5F1827A7
M7
7
File: MemCell.sch
Sheet: sheet5F1827A8
M8
8
File: MemCell.sch

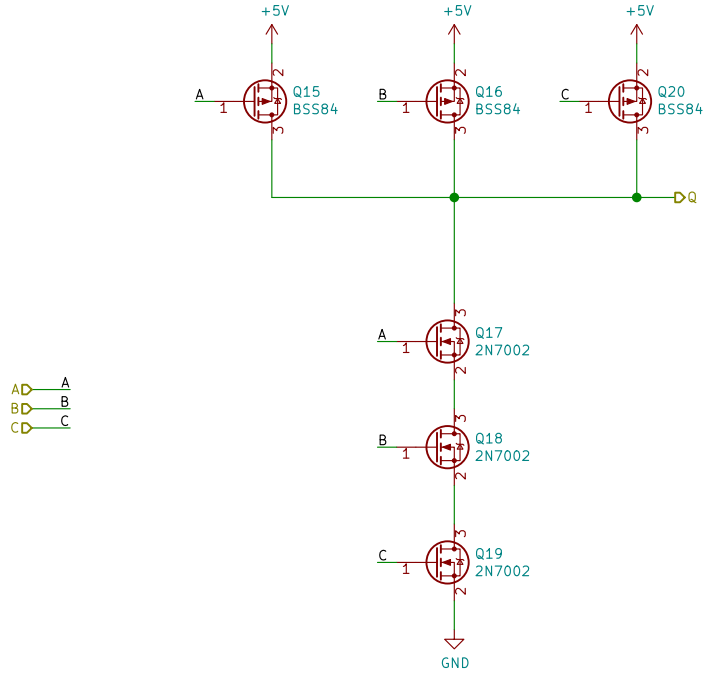

+5V
Q1
BSS84
A
Q
Q2
2N7002
GND

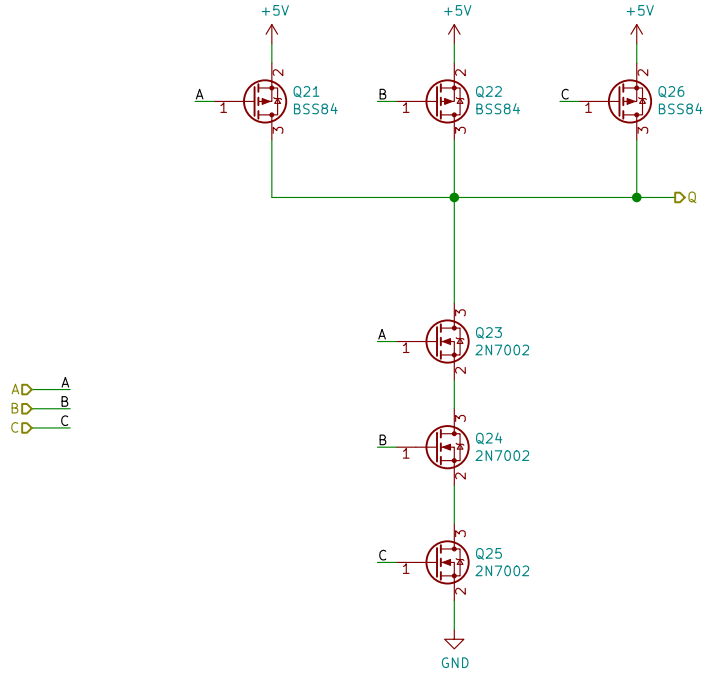

Sheet: sheet5F46F774
IN
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch

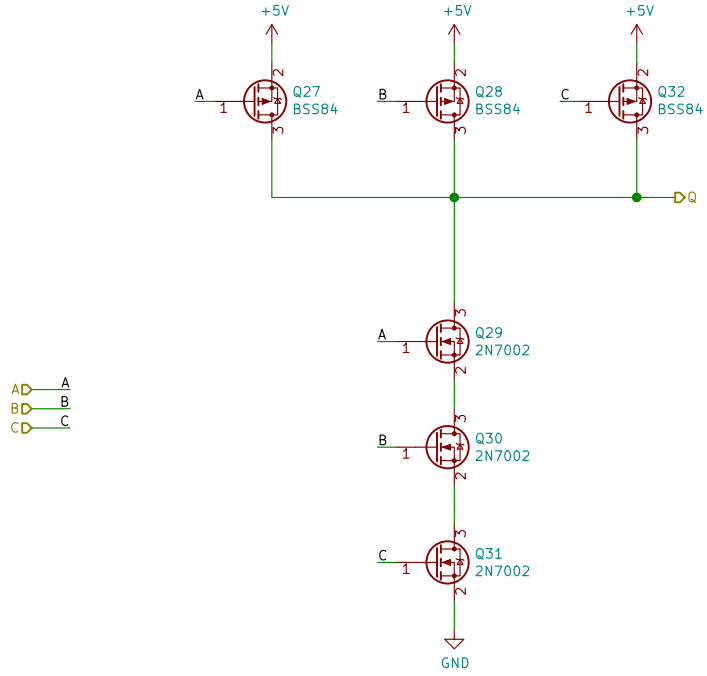

Sheet: sheet5EFA6019
A
B
Q
File: Gate_NAND2in.sch
Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
D
A
B
C
Q
File: Gate_NAND3in.sch

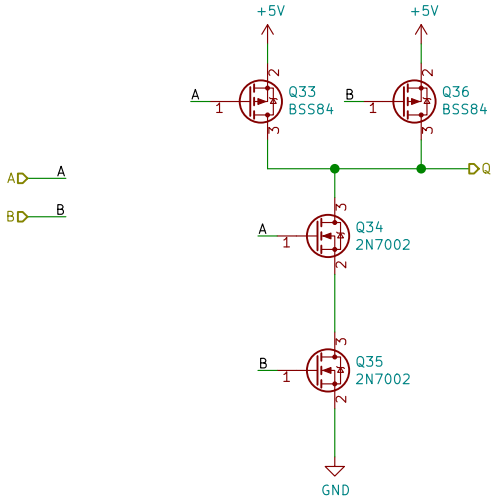

+5V
+5V
+5V
A
B
C
Q5
BSS84
Q6
BSS84
Q10
BSS84
Q
Q7
2N7002
Q8
2N7002
Q9
2N7002
GND
A
B
C

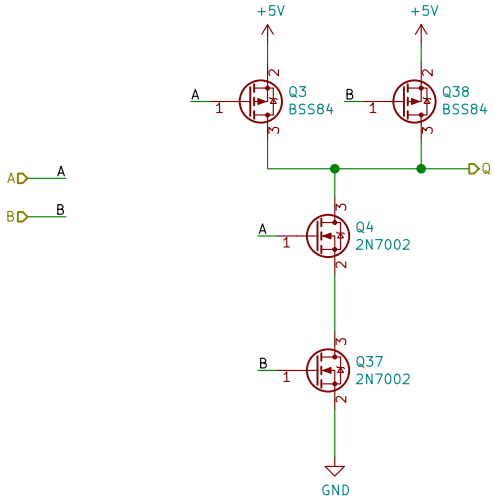

+5V
+5V
A
B
Q11
BSS84
Q14
BSS84
Q
A
B
Q12
2N7002
Q13
2N7002
GND

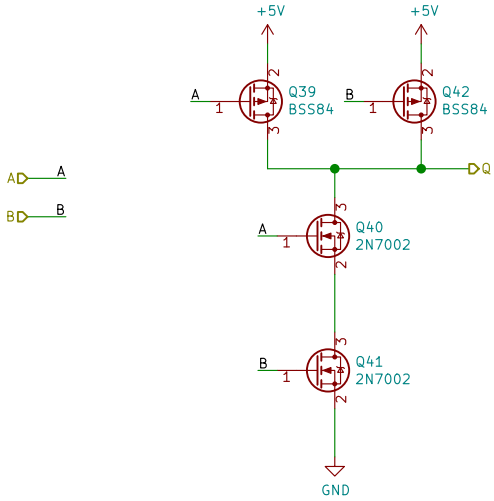

+5V
+5V
+5V
A
B
C
Q15
BSS84
Q16
BSS84
Q20
BSS84
Q
Q17
2N7002
Q18
2N7002
Q19
2N7002
GND
A
B
C

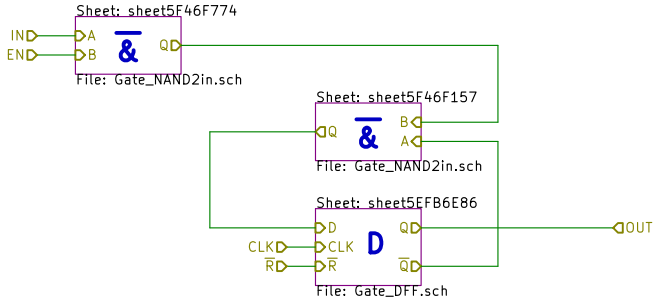

+5V
+5V
+5V
A
B
C
Q21
BSS84
Q22
BSS84
Q26
BSS84
Q
Q23
2N7002
Q24
2N7002
Q25
2N7002
GND
A
B
C
A
B
C

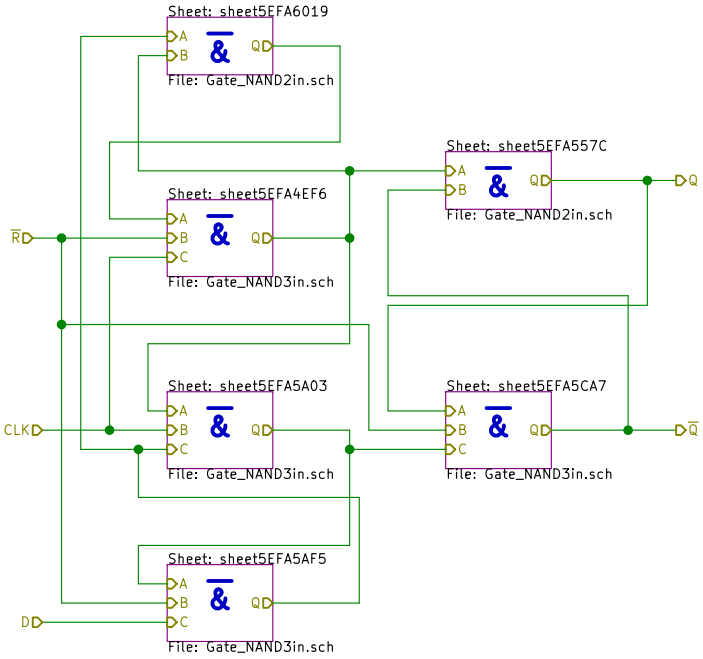

+5V
+5V
+5V
A
B
C
Q27
BSS84
Q28
BSS84
Q32
BSS84
Q
Q29
2N7002
Q30
2N7002
Q31
2N7002
GND
A
B
C

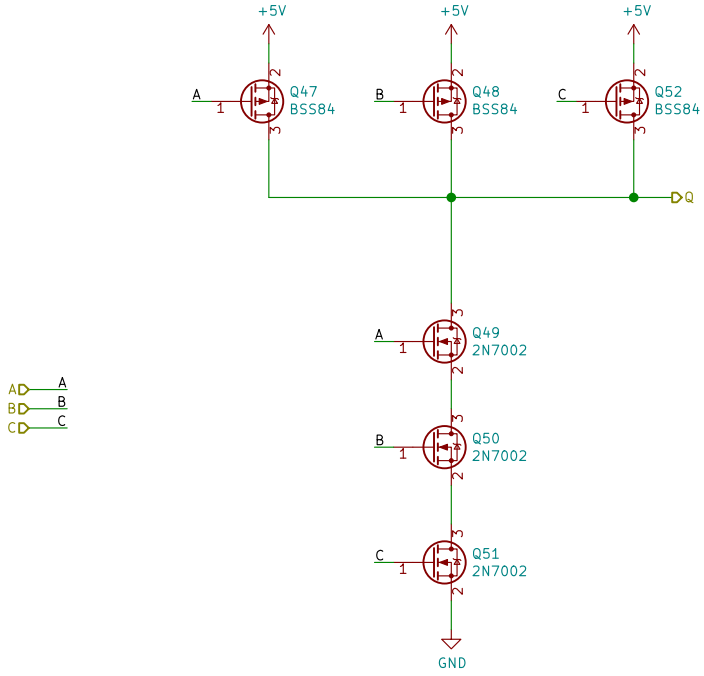

+5V
+5V
A
B
Q33
BSS84
Q36
BSS84
A
B
Q
A
B
Q34
2N7002
Q35
2N7002
GND

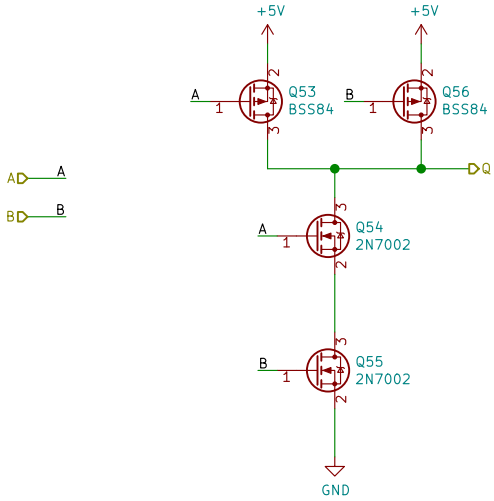

+5V
+5V
A
B
Q3
BSS84
Q38
BSS84
Q
A
B
Q4
2N7002
Q37
2N7002
GND

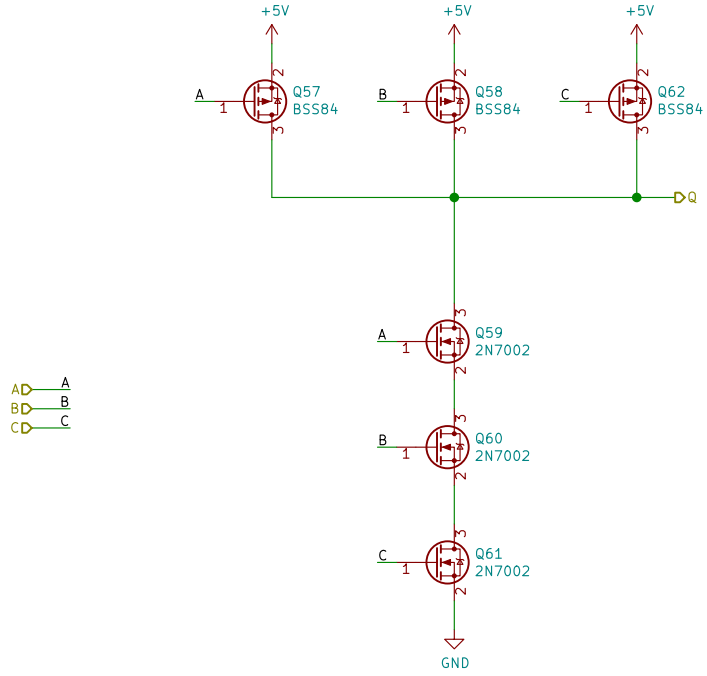

+5V
+5V
A
B
Q39
BSS84
Q42
BSS84
Q
A
B
Q40
2N7002
Q41
2N7002
GND

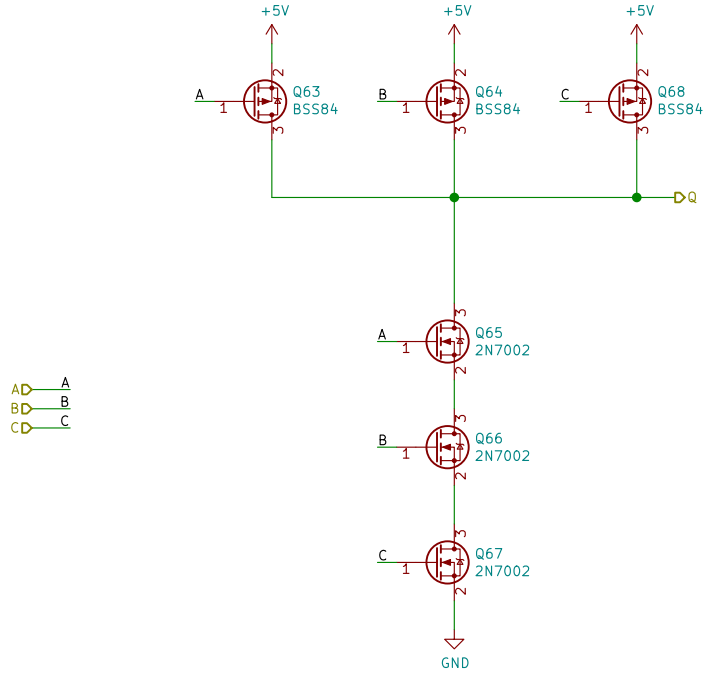

Sheet: sheet5F46F774
IN
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch

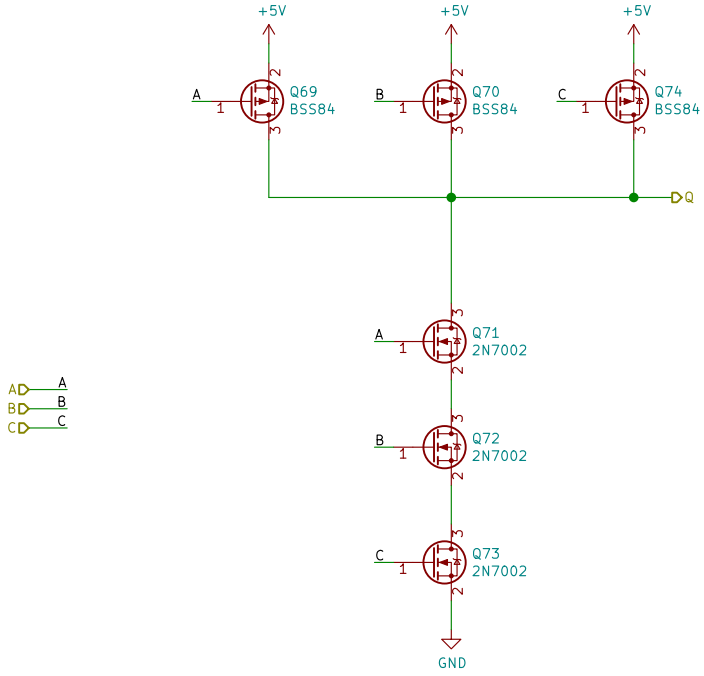

Sheet: sheet5EFA6019
A
B
Q
File: Gate_NAND2in.sch
Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
D
A
B
C
Q
File: Gate_NAND3in.sch

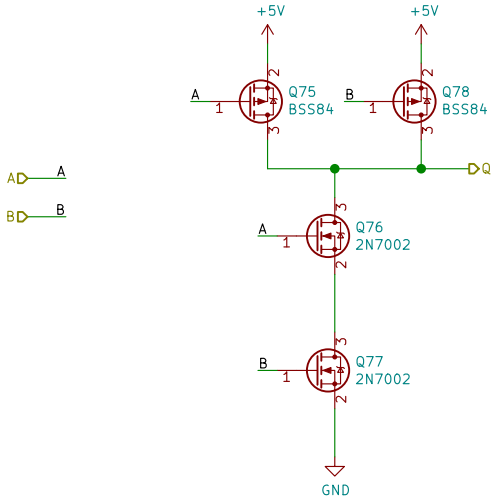

+5V
+5V
+5V
A
B
C
Q47
BSS84
Q48
BSS84
Q52
BSS84
Q
A
Q49
2N7002
B
Q50
2N7002
C
Q51
2N7002
GND
A
B
C

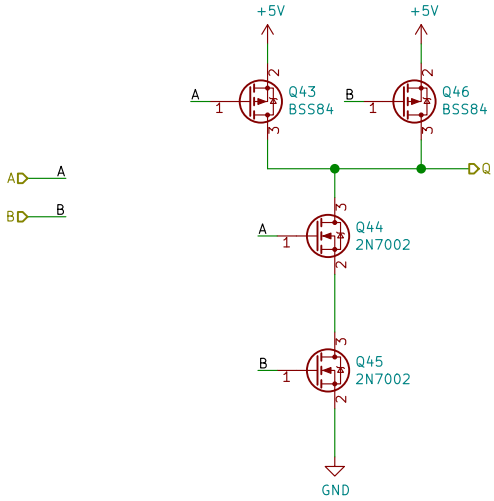

+5V
+5V
A
B
Q53
BSS84
Q56
BSS84
A
B
Q
Q54
2N7002
Q55
2N7002
GND

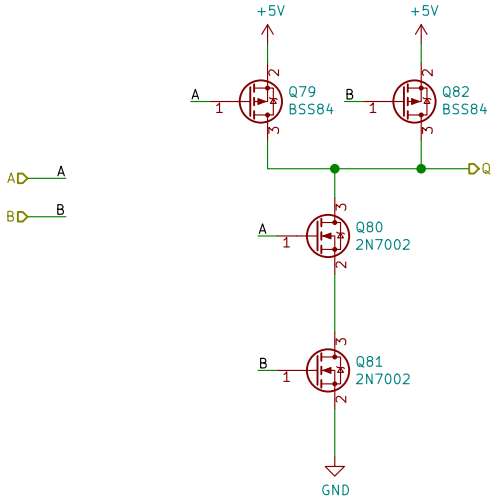

+5V
+5V
+5V
A
B
C
Q57
BSS84
Q58
BSS84
Q62
BSS84
Q
A
Q59
2N7002
B
Q60
2N7002
C
Q61
2N7002
GND
A
B
C

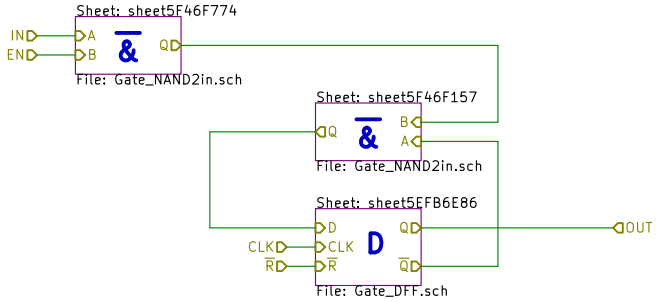

+5V
+5V
+5V
A
B
C
Q63
BSS84
Q64
BSS84
Q68
BSS84
Q
Q65
2N7002
Q66
2N7002
Q67
2N7002
GND
A
B
C

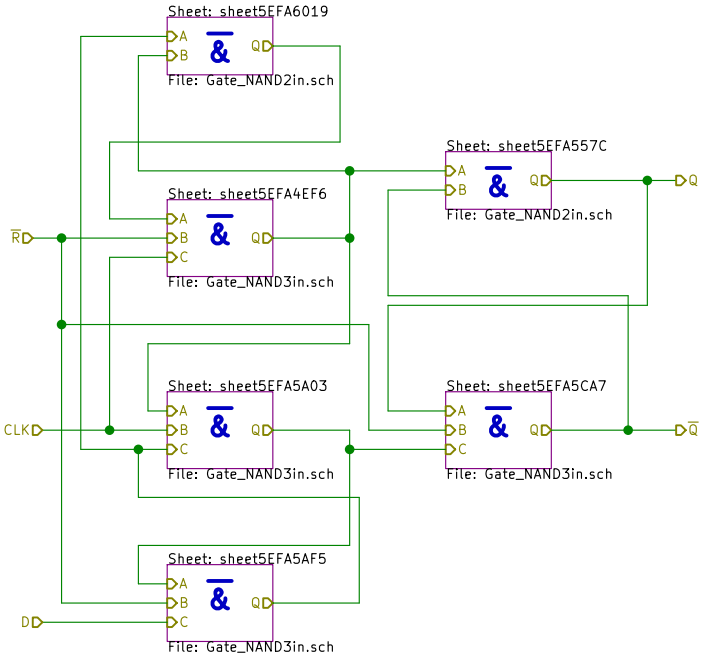

+5V
+5V
+5V
A
B
C
Q69
BSS84
Q70
BSS84
Q74
BSS84
Q
Q71
2N7002
Q72
2N7002
Q73
2N7002
GND
A
B
C

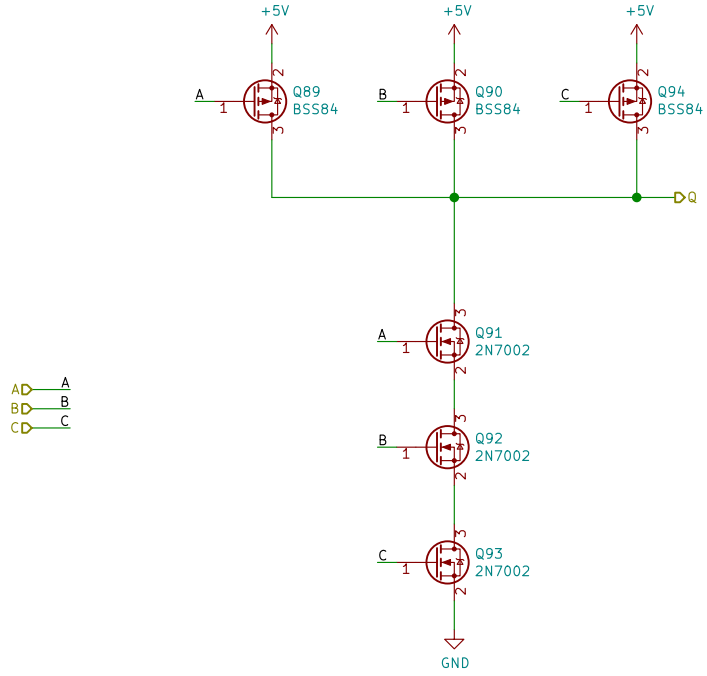

+5V
+5V
A
B
Q75
BSS84
Q78
BSS84
Q
A
B
Q76
2N7002
Q77
2N7002
GND

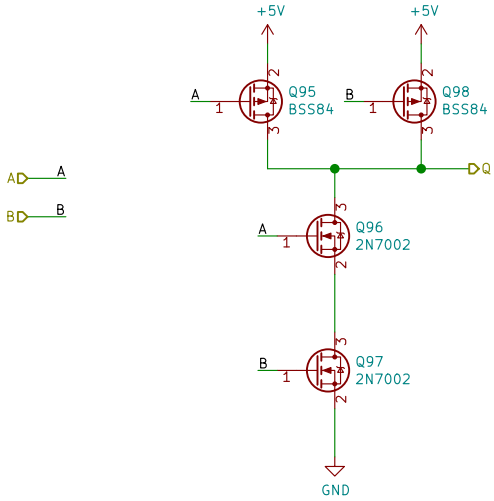

+5V
+5V
A
B
Q43
BSS84
Q46
BSS84
Q
A
B
A
Q44
2N7002
B
Q45
2N7002
GND

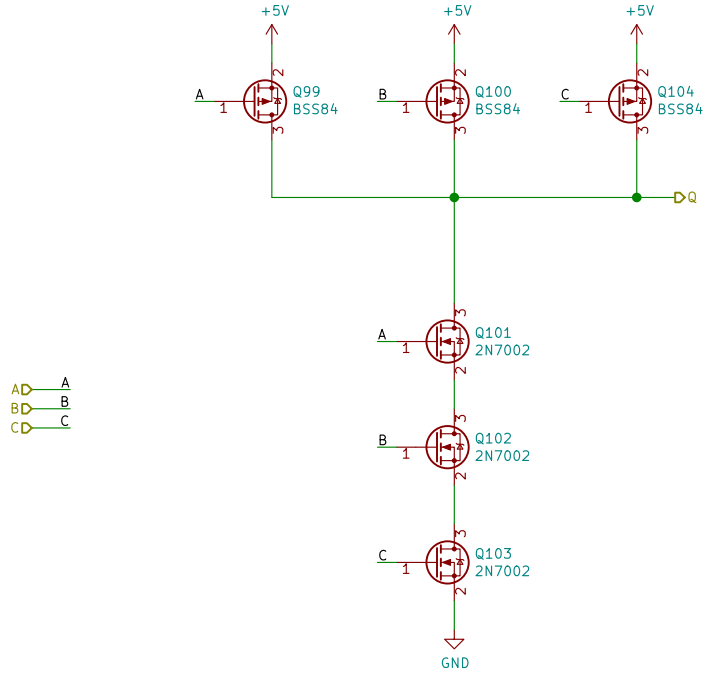

+5V
+5V
A
B
Q79
BSS84
Q82
BSS84
A
B
Q
Q80
2N7002
Q81
2N7002
GND

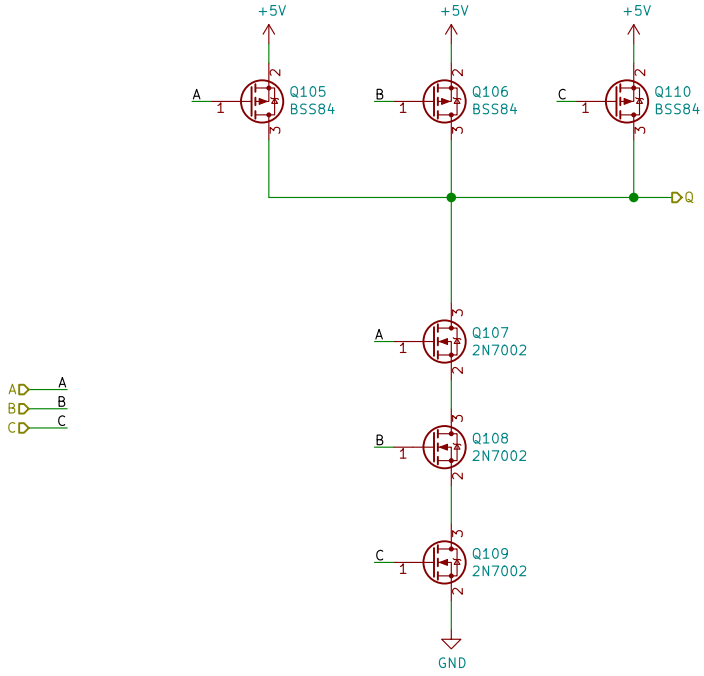

Sheet: sheet5F46F774
IN
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch

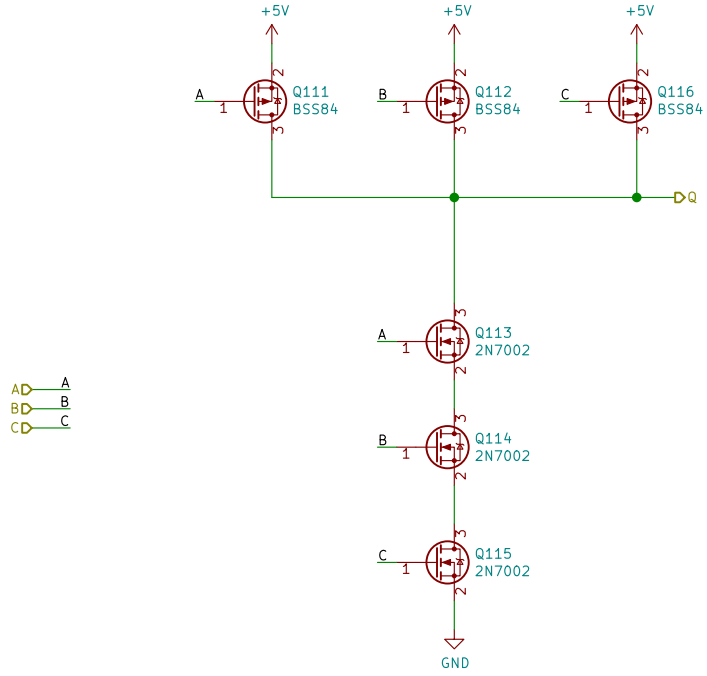

Sheet: sheet5EFA6019
A
B
Q
File: Gate_NAND2in.sch
Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
D
A
B
C
Q
File: Gate_NAND3in.sch


+5V
+5V
+5V
A
B
C
Q89
BSS84
Q90
BSS84
Q94
BSS84
Q
A
B
C
Q91
2N7002
Q92
2N7002
Q93
2N7002
GND


+5V
+5V
A
B
Q95
BSS84
Q98
BSS84
Q
A
B
Q96
2N7002
Q97
2N7002
GND


+5V
+5V
+5V
A
B
C
Q99
BSS84
Q100
BSS84
Q104
BSS84
Q
Q101
2N7002
Q102
2N7002
Q103
2N7002
GND
A
B
C


+5V
+5V
+5V
A
B
C
Q105
BSS84
Q106
BSS84
Q110
BSS84
Q
Q107
2N7002
Q108
2N7002
Q109
2N7002
GND
A
B
C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+5V
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C
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Q112
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Q116
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Q114
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Q115
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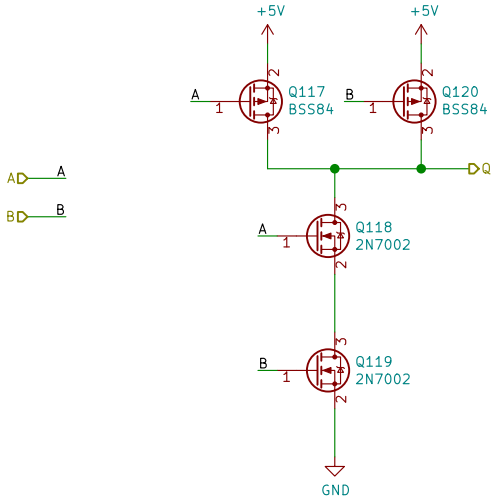
C
A
B
C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Q118
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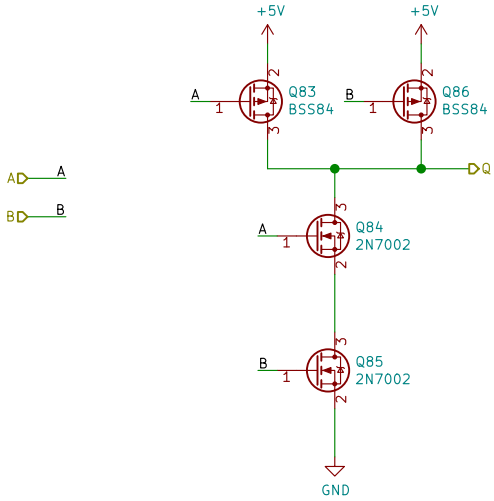
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Q
A
B
Q84
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Q85
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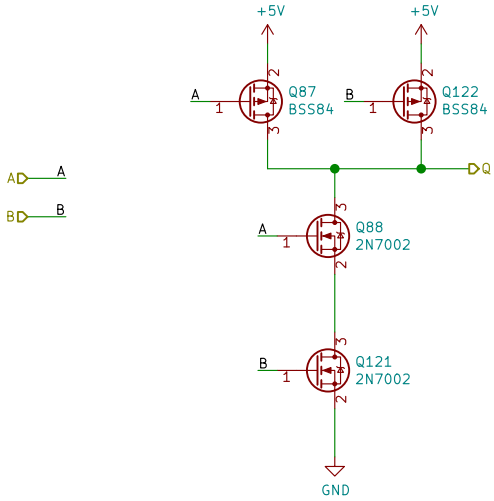
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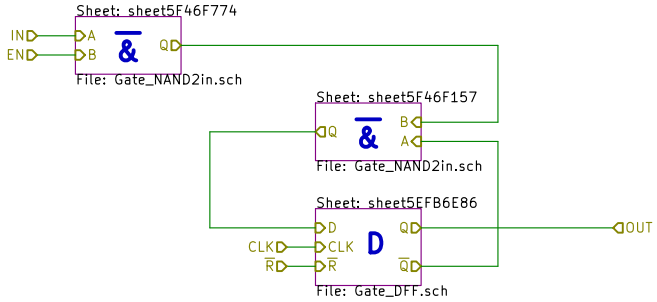
BSS84
Q
A
B
Q88
2N7002
Q121
2N7002
GND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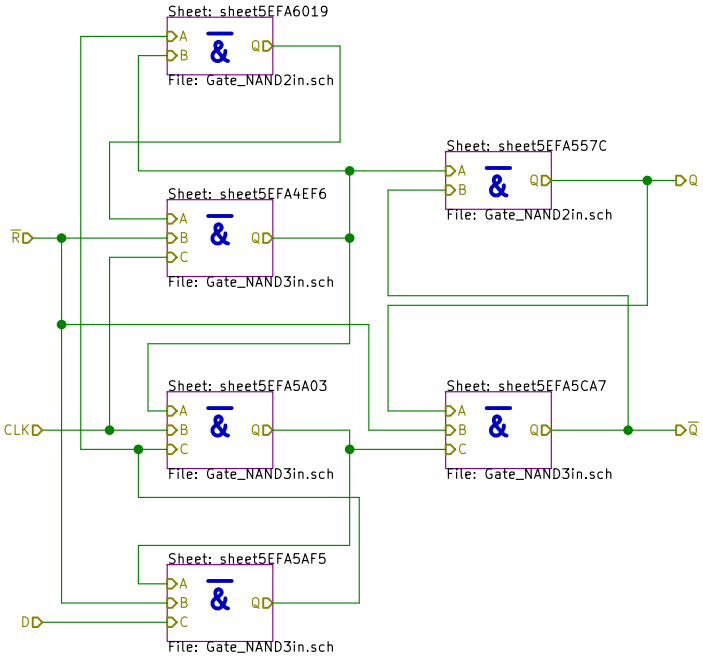
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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Q
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Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
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File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
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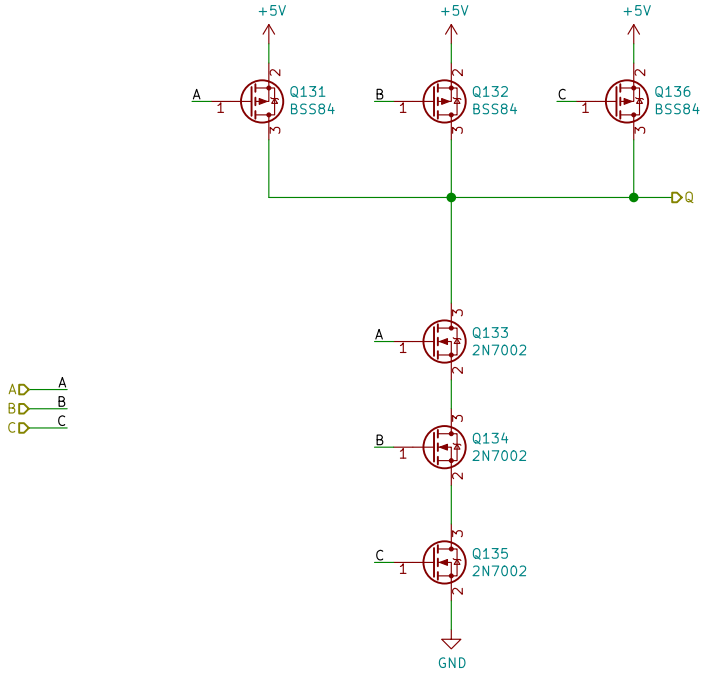
A
B
C
Q
File: Gate_NAND3in.sch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B
C
Q131
BSS84
Q132
BSS84
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Q135
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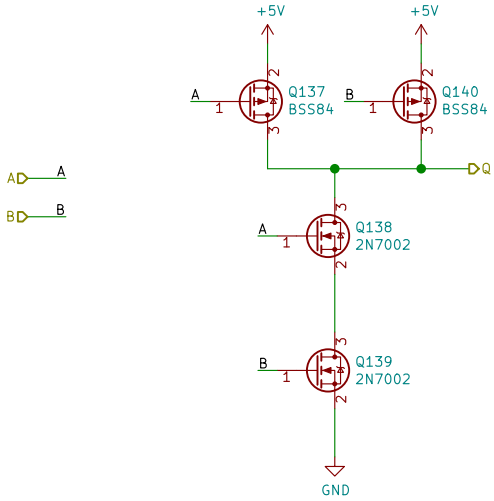
C
A
B
C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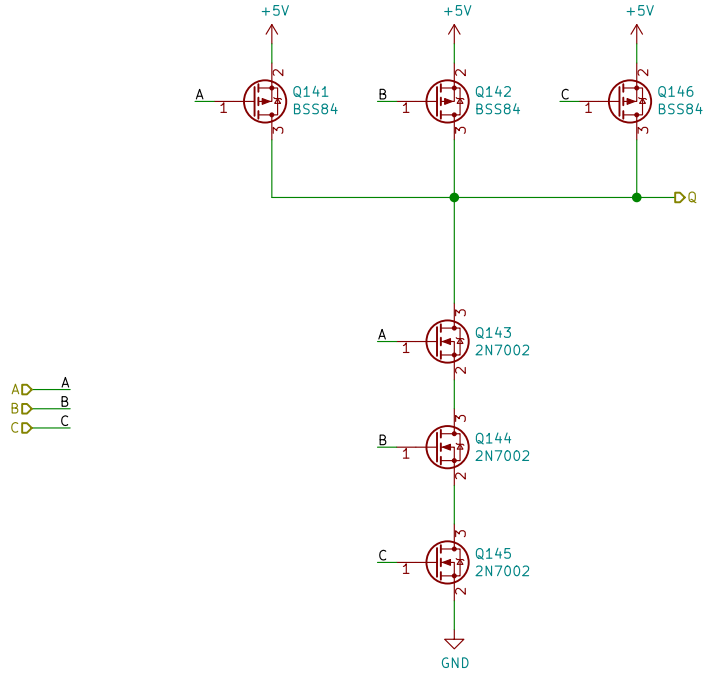
Q140
BSS84
Q
A
B
Q138
2N7002
Q139
2N7002
GND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+5V
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B
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Q141
BSS84
Q142
BSS84
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Q
Q143
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Q144
2N7002
Q145
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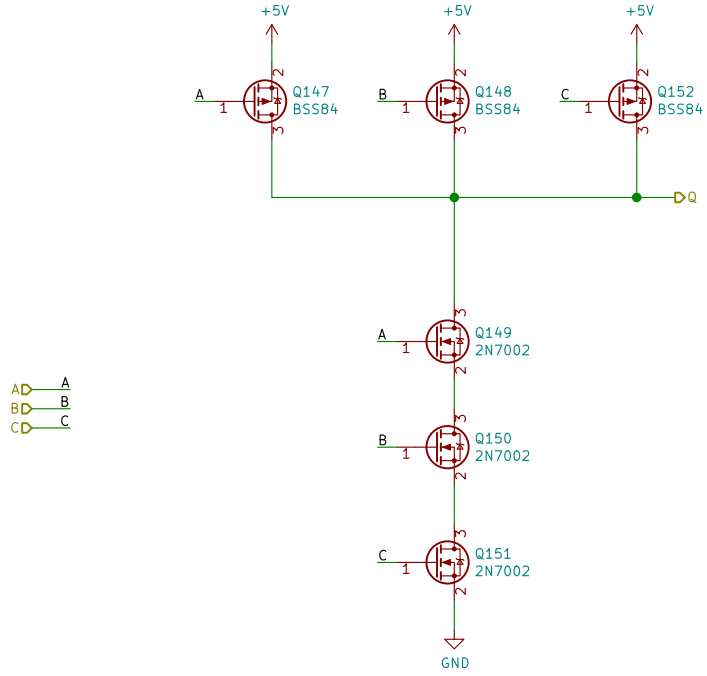
B
C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+5V
+5V
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B
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Q147
BSS84
Q148
BSS84
Q152
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Q149
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Q150
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Q151
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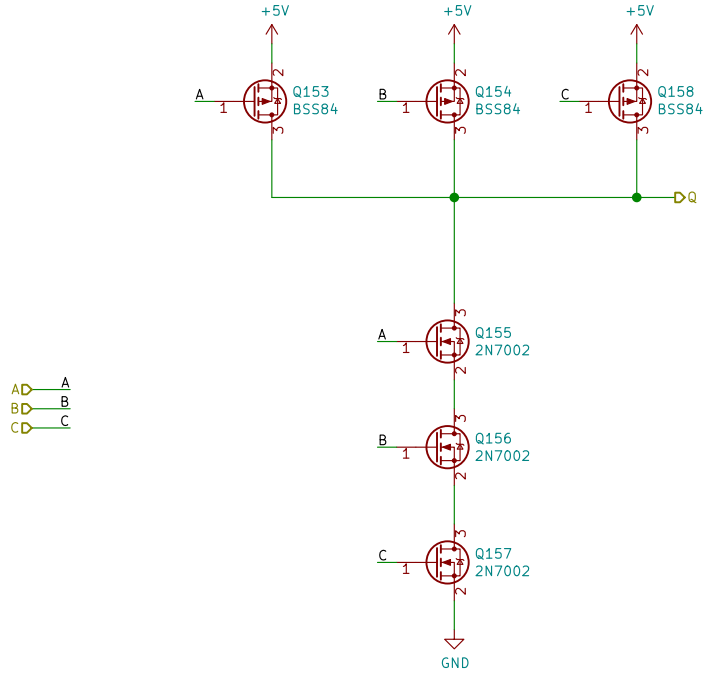
C
A
B
C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+5V
+5V
A
B
C
Q153
BSS84
Q154
BSS84
Q158
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Q
Q155
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Q156
2N7002
Q157
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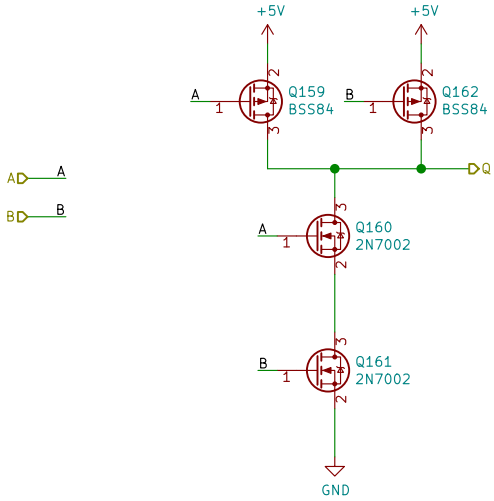
GND
A
B
C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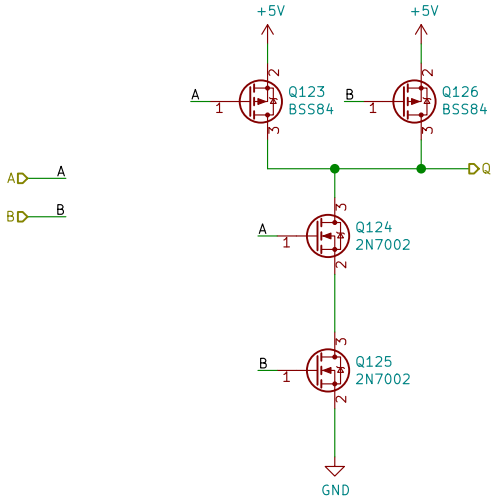
Q
A
B
Q160
2N7002
Q161
2N7002
GND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Q126
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Q
A
B
Q124
2N7002
Q125
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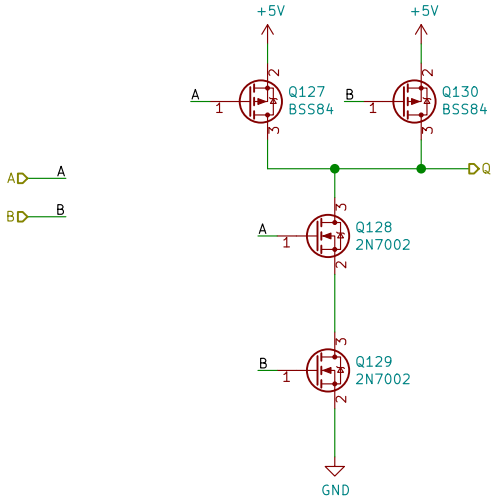
GND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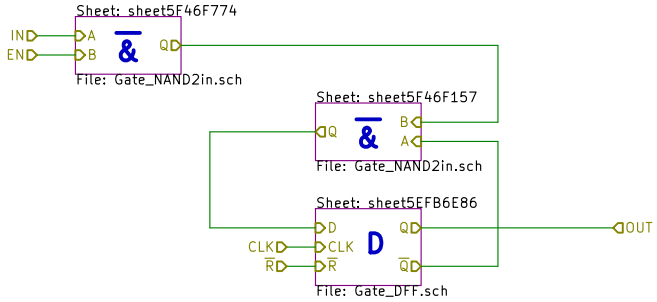
Q
A
B
Q128
2N7002
Q129
2N7002
GND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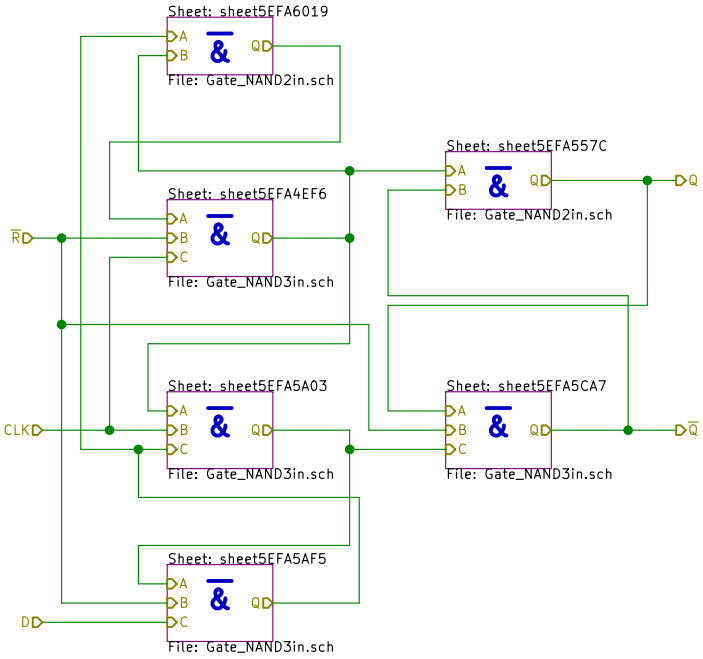
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
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C
Q
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File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
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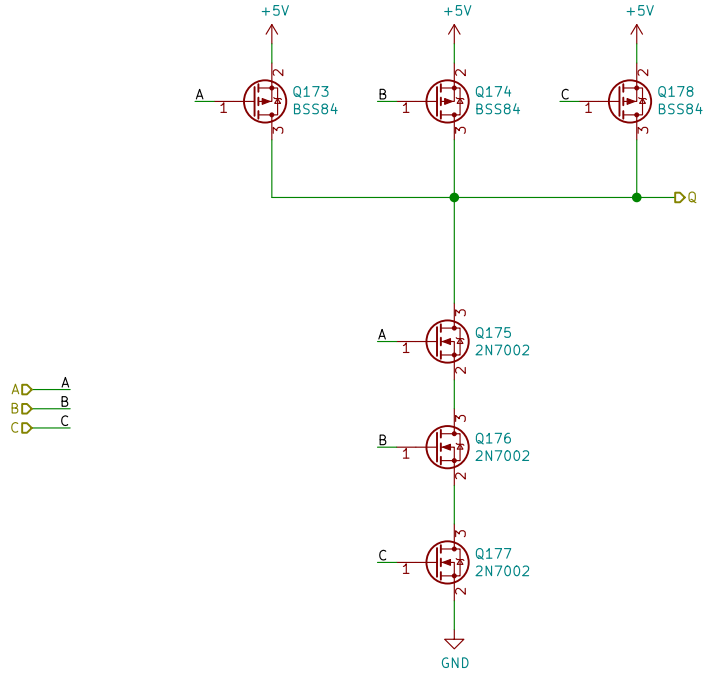
A
B
C
Q
File: Gate_NAND3in.sch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Q173
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Q177
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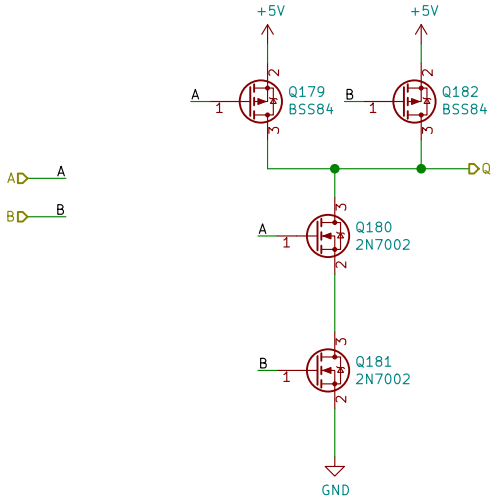
B
C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B
Q180
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Q181
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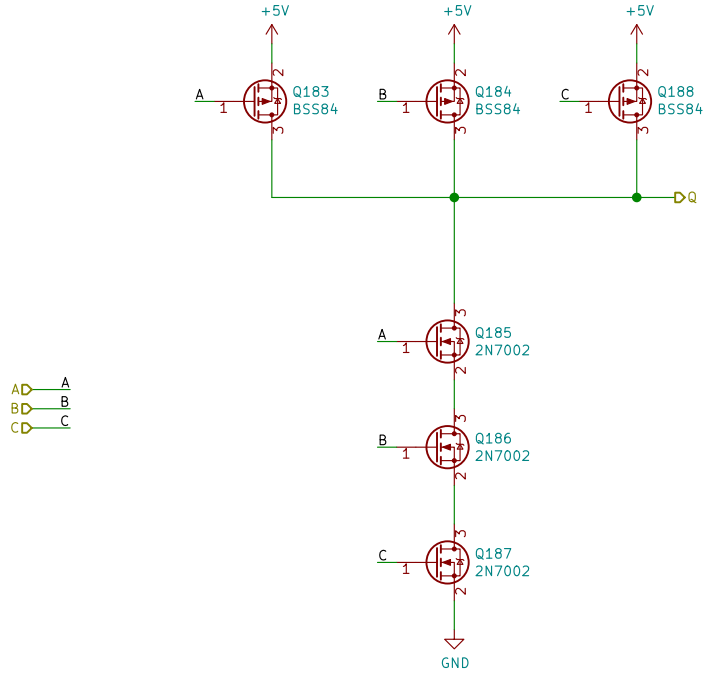
GND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+5V
+5V
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B
C
Q183
BSS84
Q184
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Q
Q185
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Q186
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Q187
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GND
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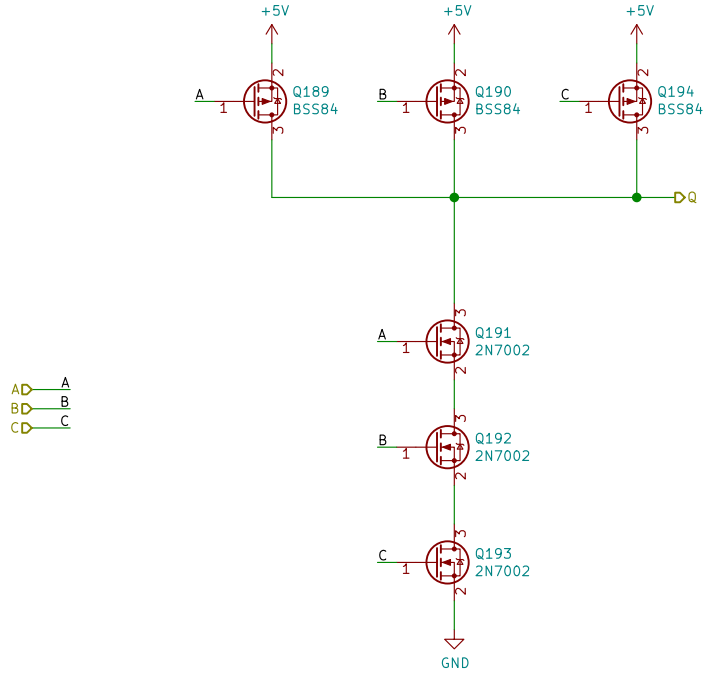
B
C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+5V
+5V
A
B
C
Q189
BSS84
Q190
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Q193
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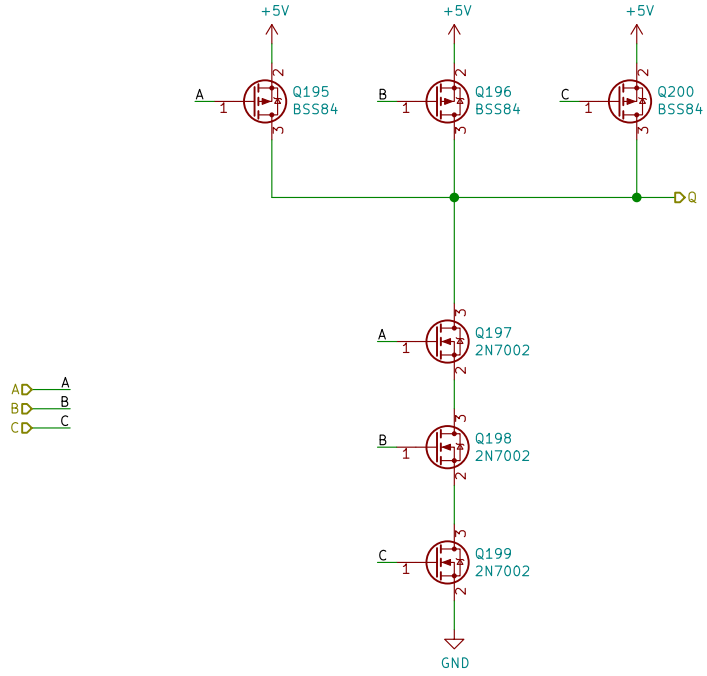
B
C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+5V
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BSS84
Q196
BSS84
Q200
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C
Q199
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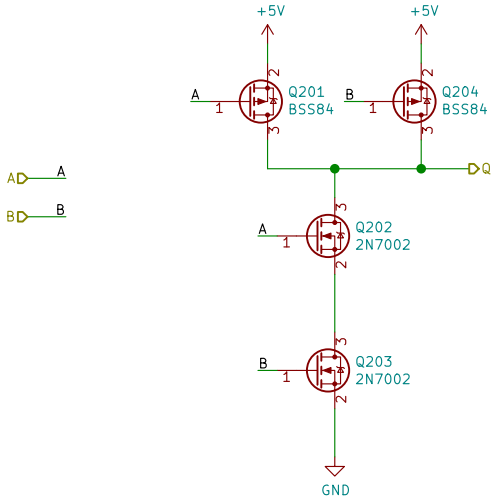
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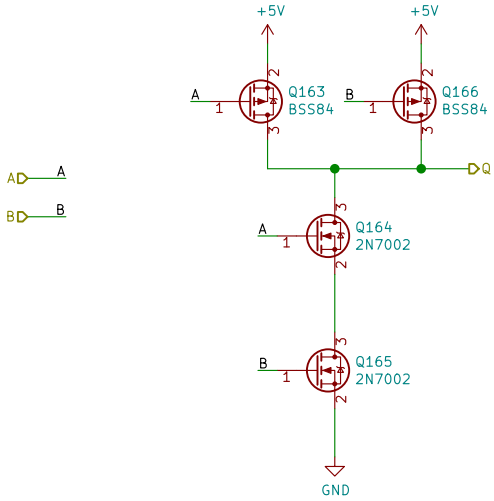
B
Q202
2N7002
Q203
2N7002
GND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A
B
Q
Q164
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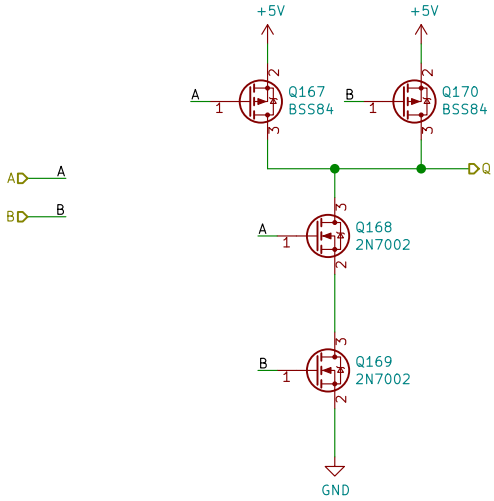
Q165
2N7002
GND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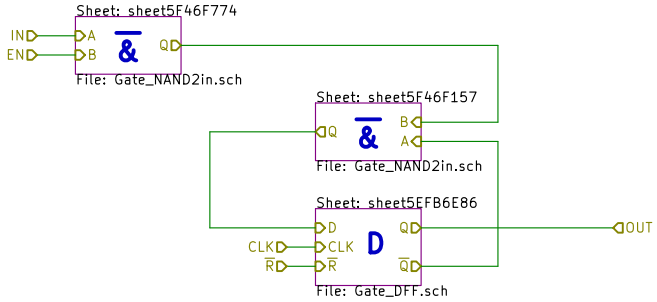
BSS84
Q170
BSS84
Q
A
B
Q168
2N7002
Q169
2N7002
GND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EN
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B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
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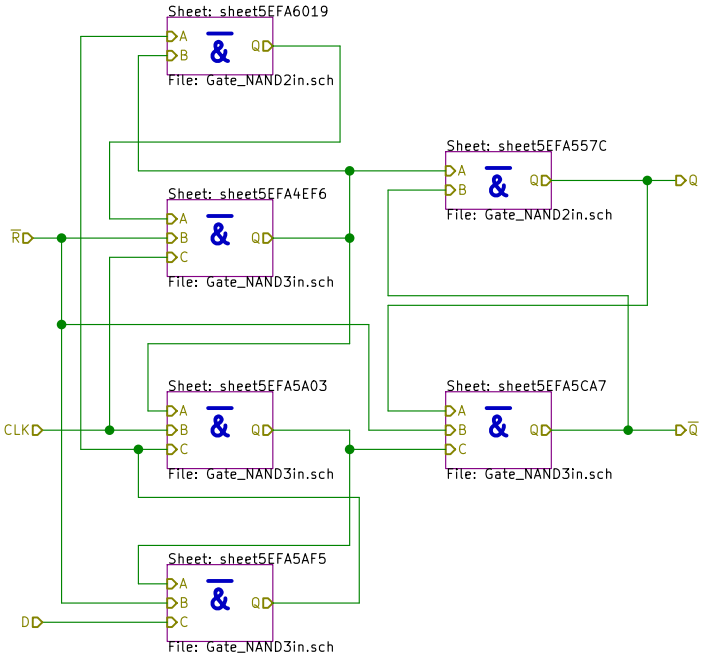
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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File: Gate_NAND2in.sch
Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
Q
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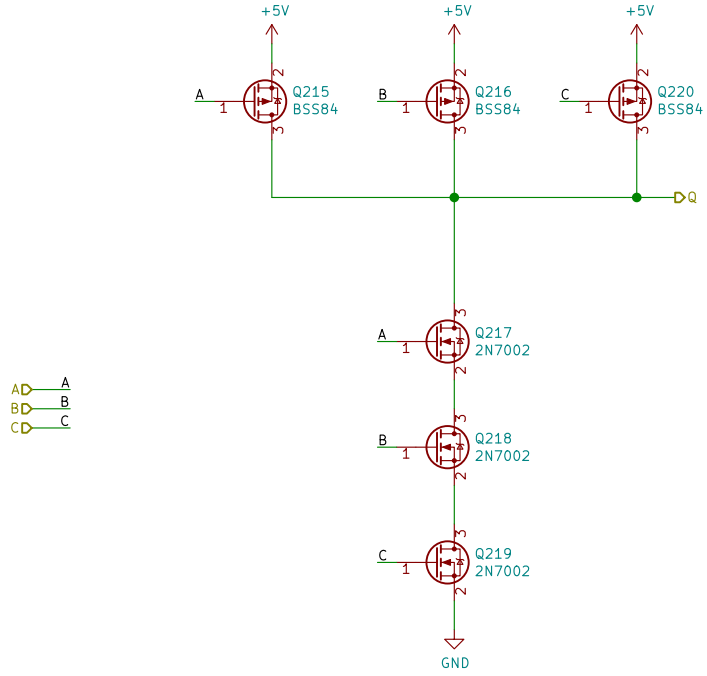
Sheet: sheet5EFA5AF5
D
A
B
C
Q
File: Gate_NAND3in.sch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B
C
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Q216
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Q217
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Q219
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GND
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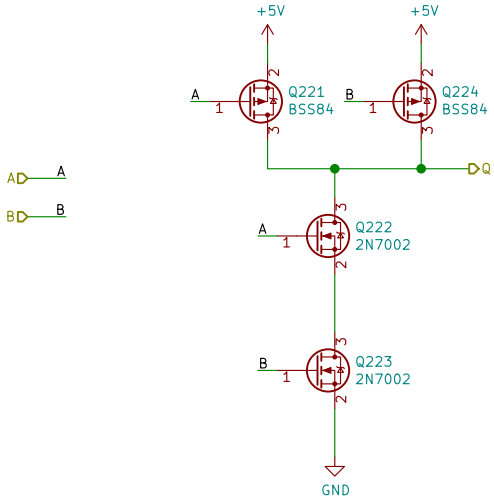
B
C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Q
Q222
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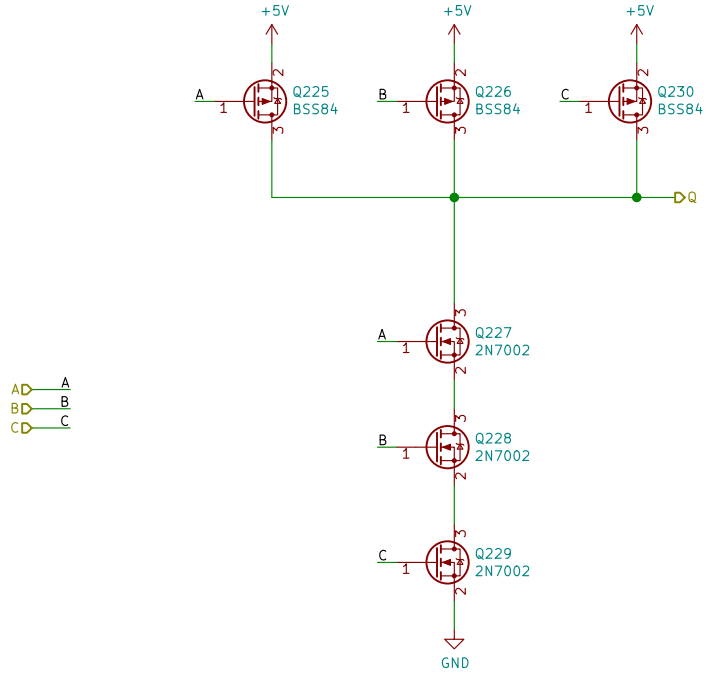
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+5V
+5V
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B
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Q225
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Q226
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C
Q227
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Q228
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Q229
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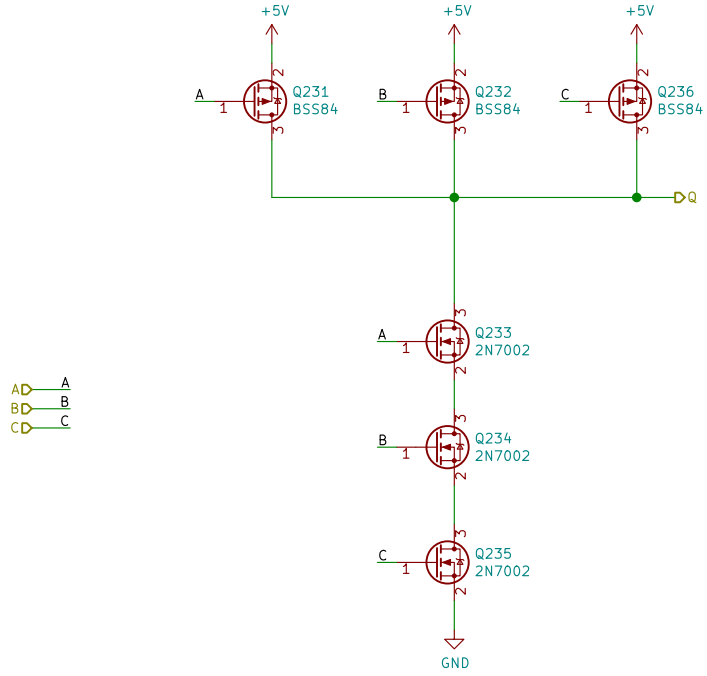
GND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+5V
+5V
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B
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Q231
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Q232
BSS84
Q236
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Q234
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GND
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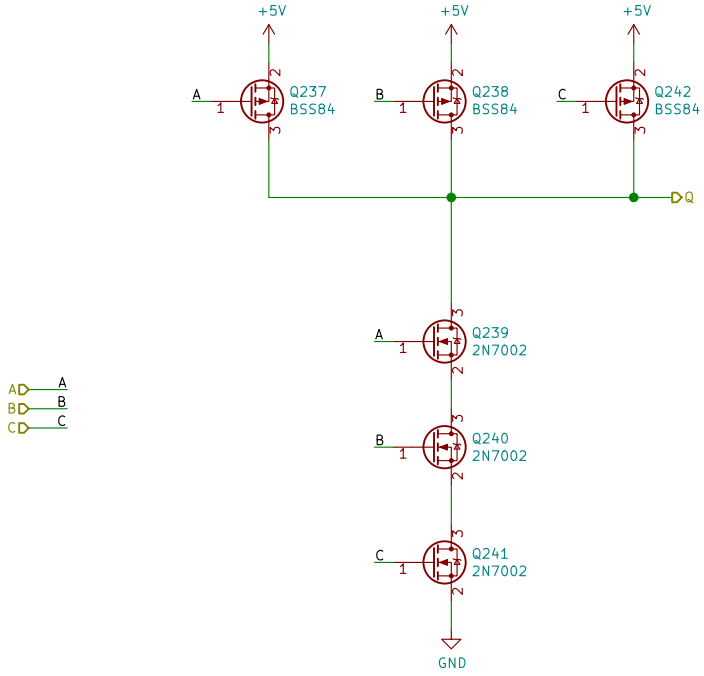
B
C
A
B
C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B
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Q242
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GND
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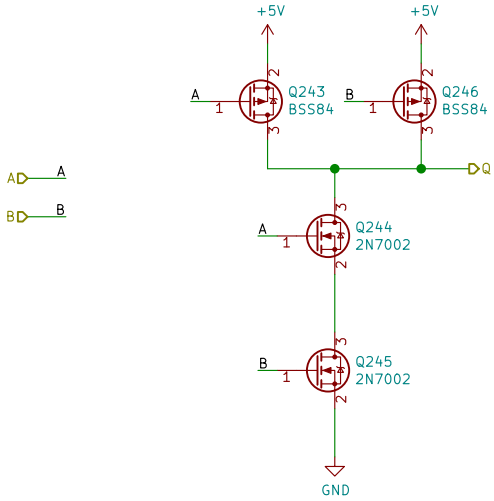
C
A
B
C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Q244
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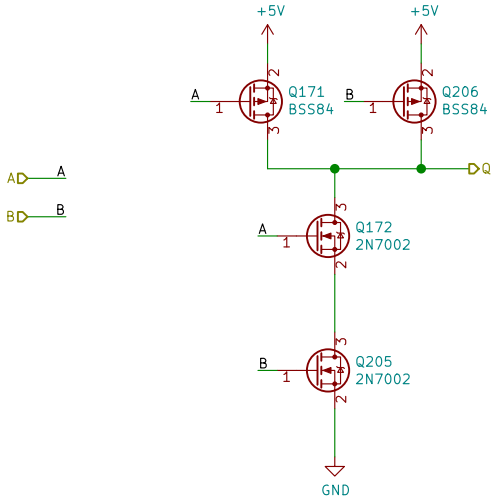
GND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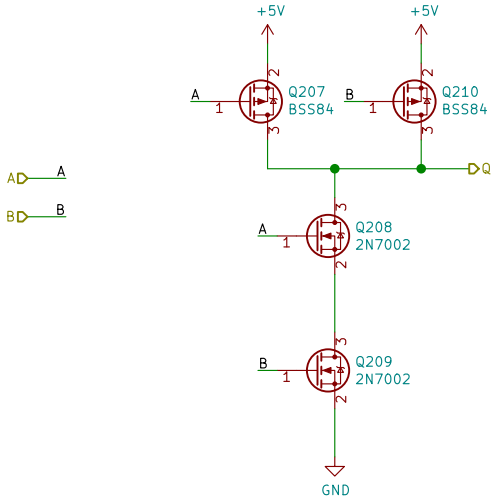
B
Q172
2N7002
Q205
2N7002
GND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+5V
A
B
Q207
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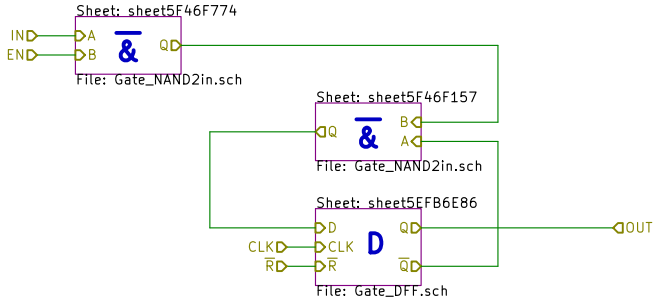
BSS84
Q
A
B
Q208
2N7002
Q209
2N7002
GND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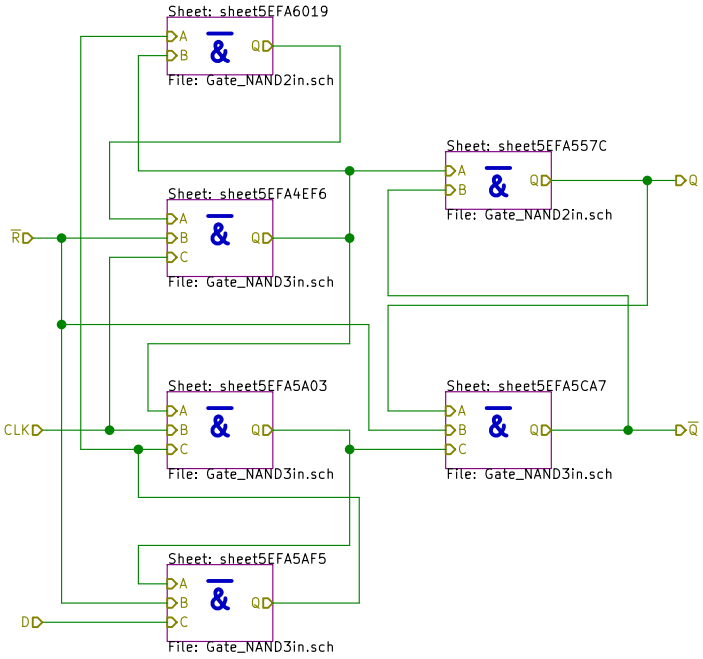
IN
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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A
B
Q
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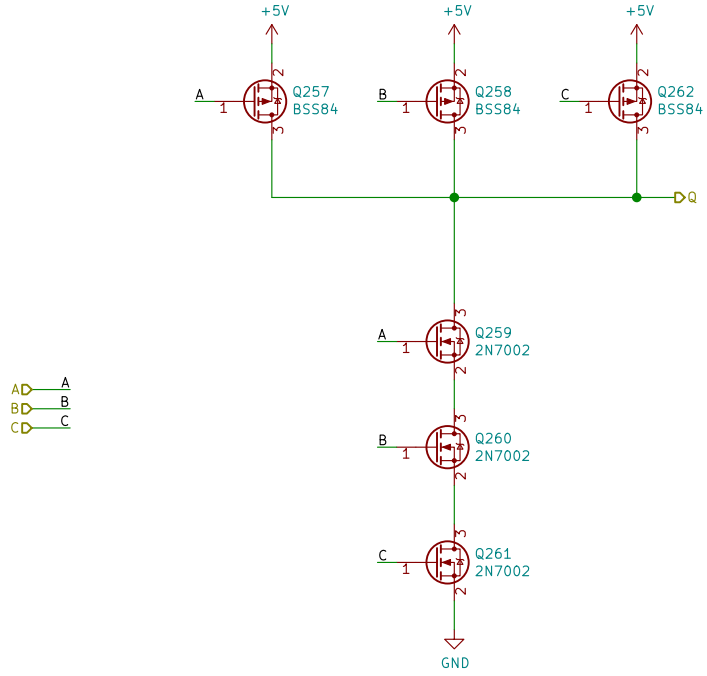
Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
D
A
B
C
Q
File: Gate_NAND3in.sch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A
B
C
Q257
BSS84
Q258
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Q262
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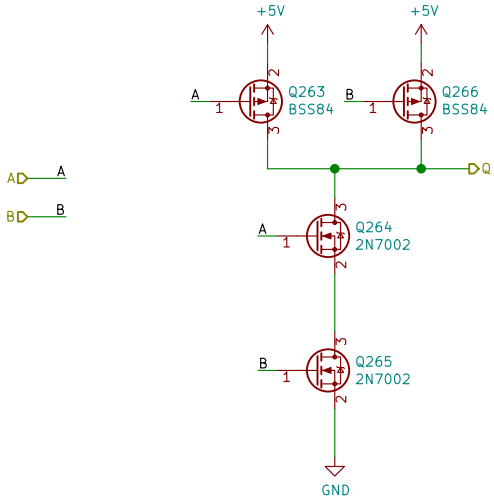
Q
Q259
2N7002
Q260
2N7002
Q261
2N7002
GND
A
B
C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+5V
A
B
Q263
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Q266
BSS84
A
B
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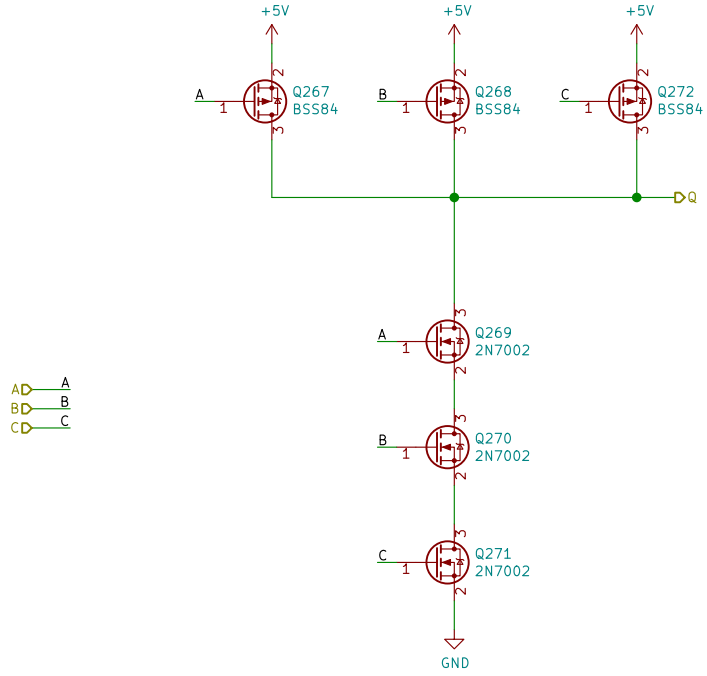
Q264
2N7002
Q265
2N7002
GND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+5V
A
B
C
Q267
BSS84
Q268
BSS84
Q272
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Q269
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Q270
2N7002
Q271
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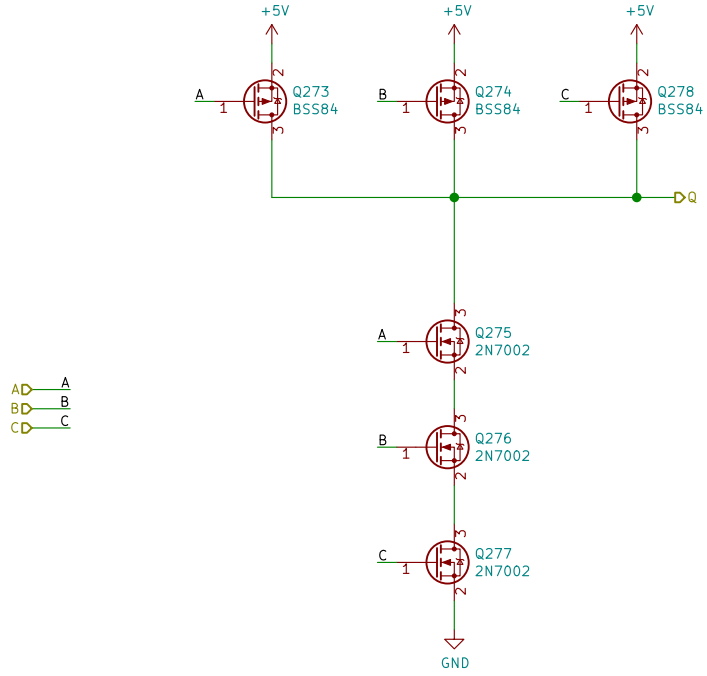
GND
A
B
C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+5V
+5V
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B
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Q273
BSS84
Q274
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A
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C
Q275
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Q276
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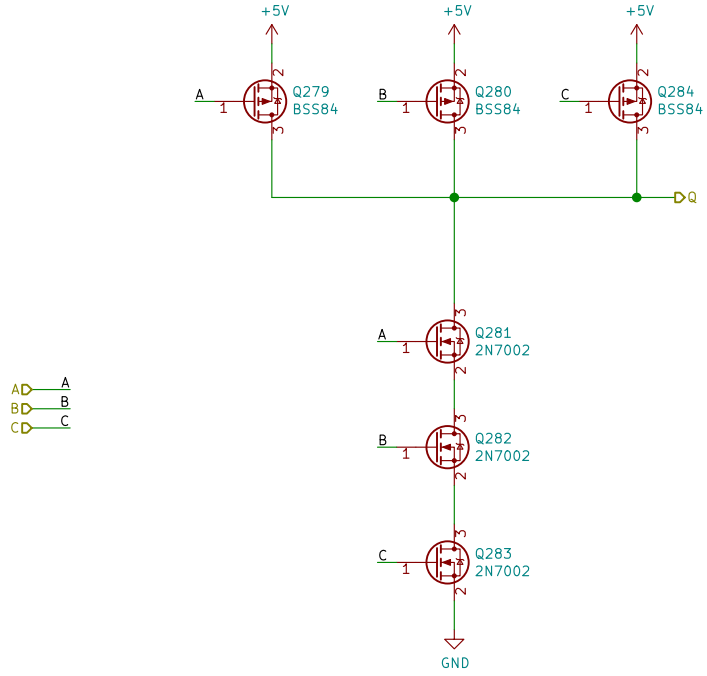
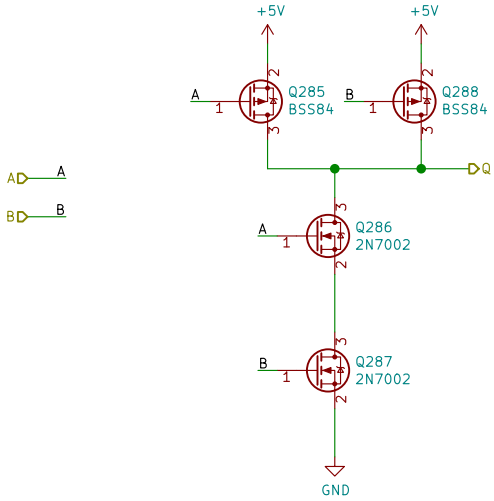
Q277
2N7002
GND


+5V
+5V
+5V
A
B
C
Q279
BSS84
Q280
BSS84
Q284
BSS84
Q
A
B
C
Q281
2N7002
Q282
2N7002
Q283
2N7002
GND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Q285
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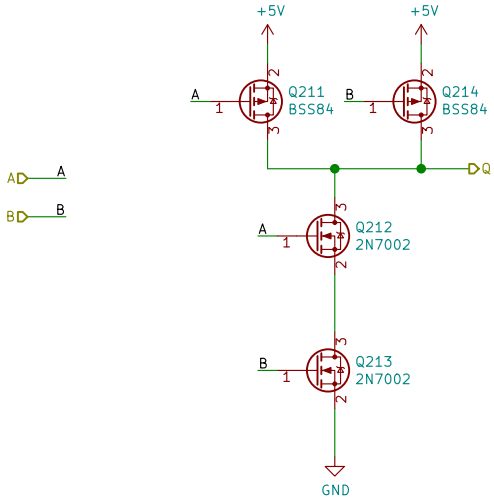
Q288
BSS84
Q
A
B
Q286
2N7002
Q287
2N7002
GND


+5V
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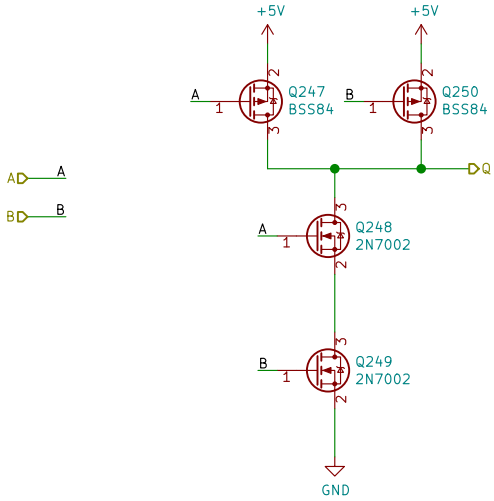
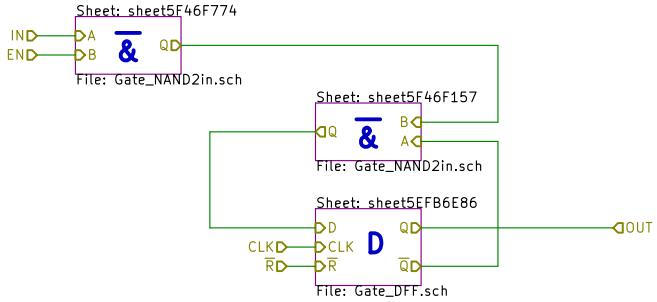
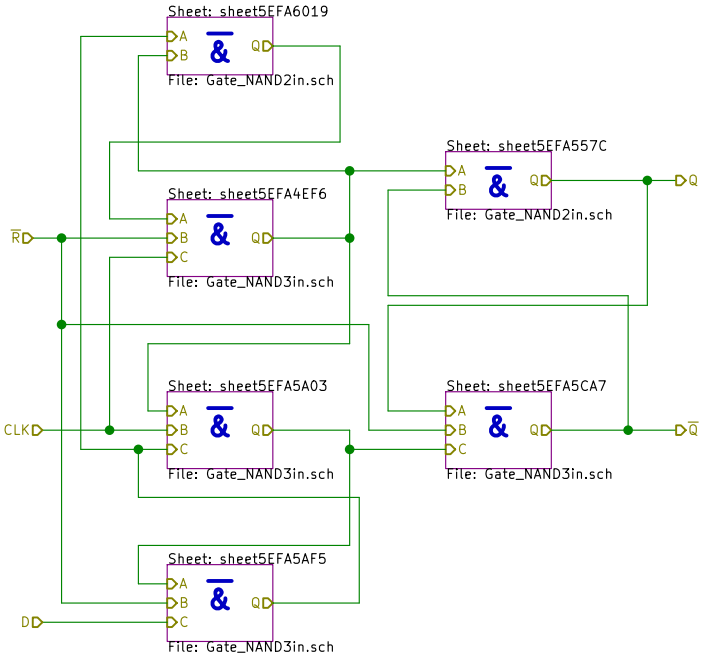
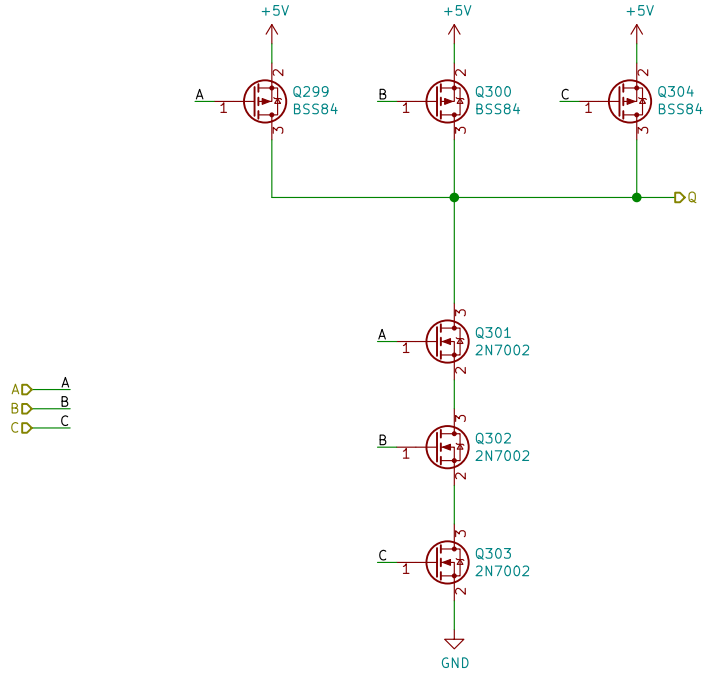
Q211
BSS84
Q214
BSS84
Q
A
B
Q212
2N7002
Q213
2N7002
GND


+5V
+5V
A
B
Q247
BSS84
Q250
BSS84
Q
A
B
Q248
2N7002
Q249
2N7002
GND


Sheet: sheet5F46F774
IN
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch


Sheet: sheet5EFA6019
A
B
Q
File: Gate_NAND2in.sch
Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
D
A
B
C
Q
File: Gate_NAND3in.sch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+5V
+5V
A
B
C
Q299
BSS84
Q300
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Q
Q301
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Q302
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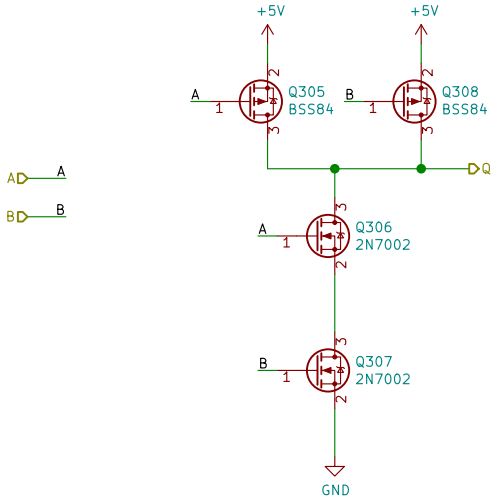
Q303
2N7002
GND
A
B
C


+5V
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Q308
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A
B
Q306
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Q307
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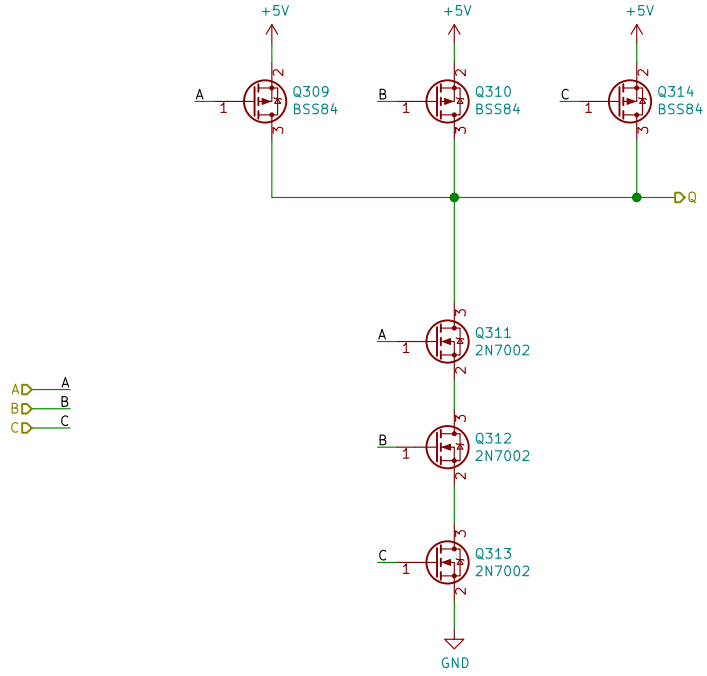
GND


+5V
+5V
+5V
A
B
C
Q309
BSS84
Q310
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Q
Q311
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Q313
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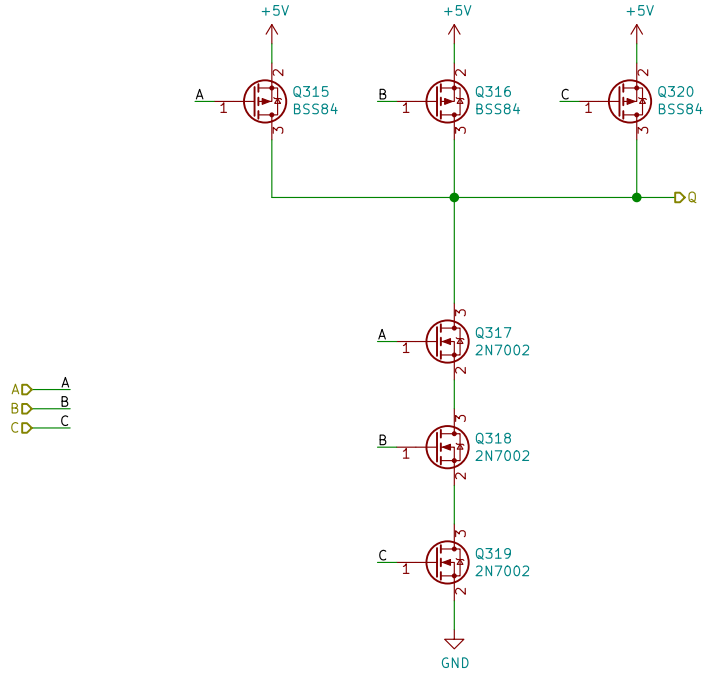
GND
A
B
C


+5V
+5V
+5V
A
B
C
Q315
BSS84
Q316
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Q
Q317
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Q319
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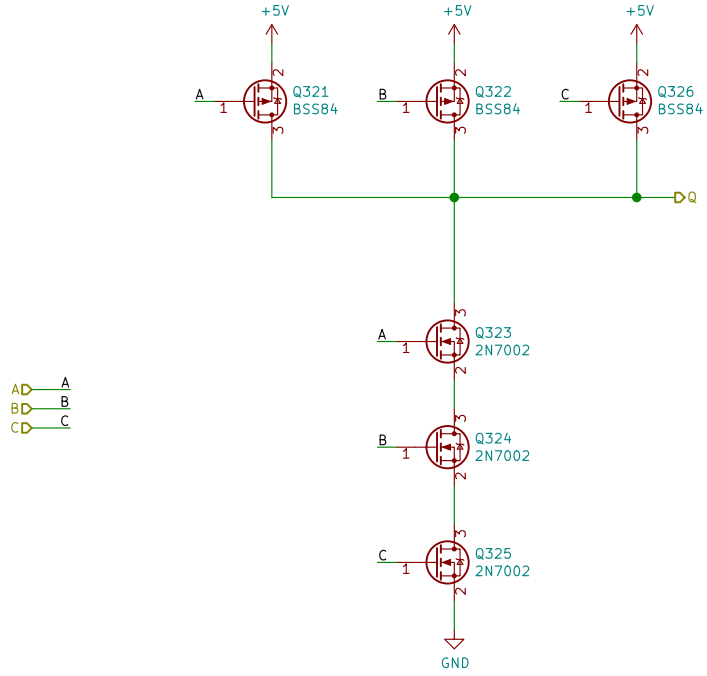
A
B
C


+5V
+5V
+5V
A
B
C
Q321
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Q322
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Q
A
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C
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Q324
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Q325
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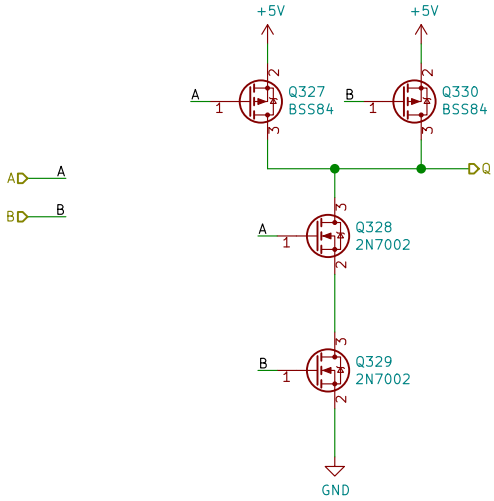
GND


+5V
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B
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Q
A
B
Q328
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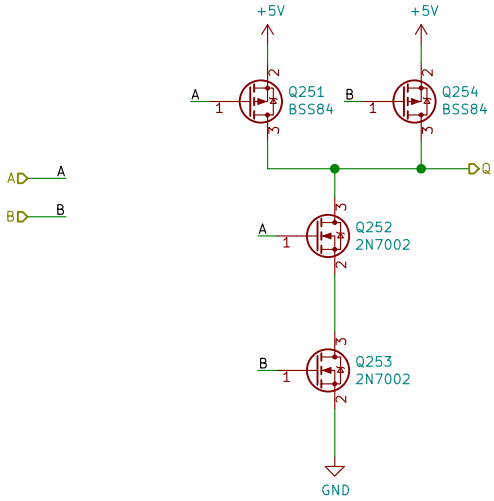
Q329
2N7002
GND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B
Q252
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Q253
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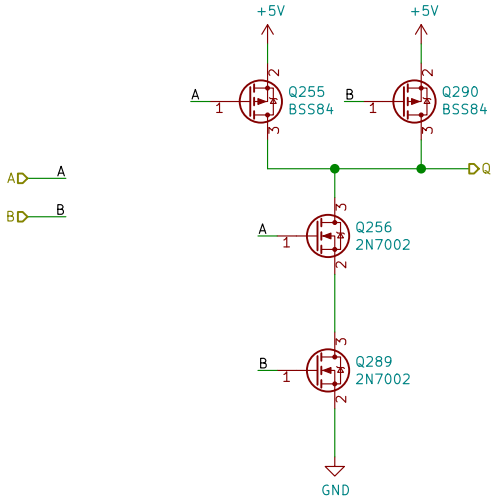
+5V
+5V
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BSS84
Q290
BSS84
Q
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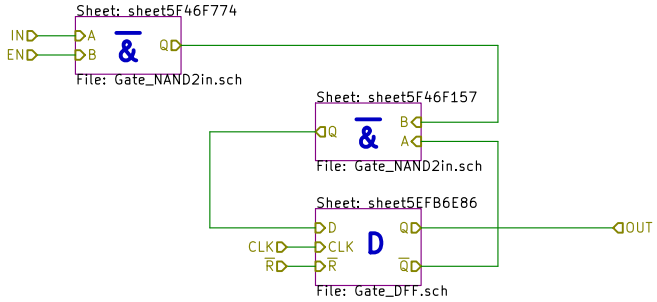
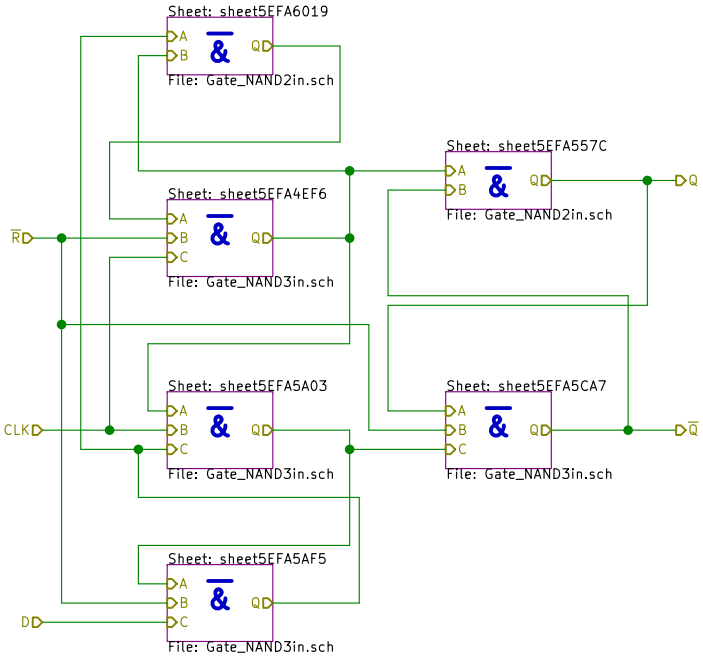
B
Q256
2N7002
Q289
2N7002
GND


Sheet: sheet5F46F774
IN
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch


Sheet: sheet5EFA6019
A
B
Q
File: Gate_NAND2in.sch
Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
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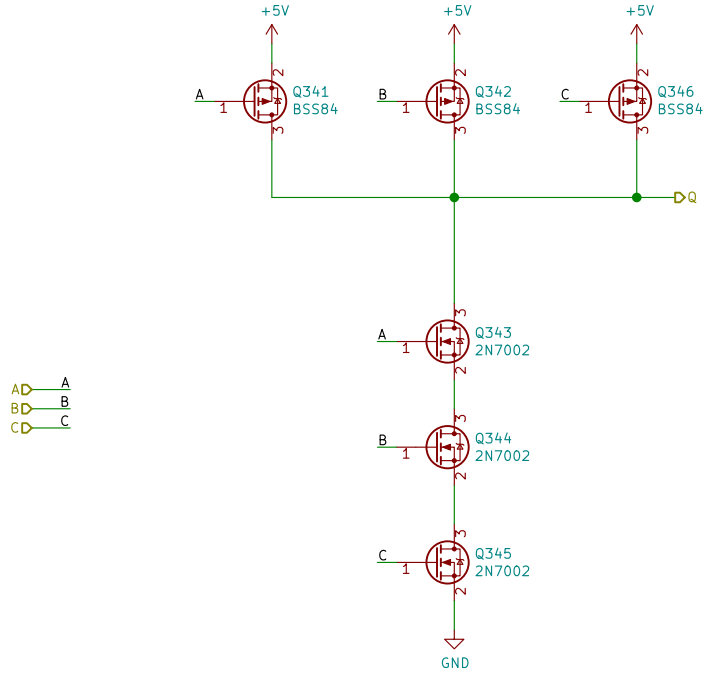
A
B
C
Q
File: Gate_NAND3in.sch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+5V
A
B
C
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Q342
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Q
Q343
2N7002
Q344
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Q345
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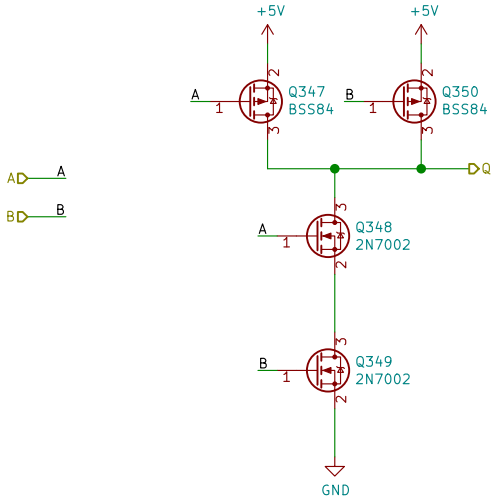
GND
A
B
C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Q350
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Q
A
B
Q348
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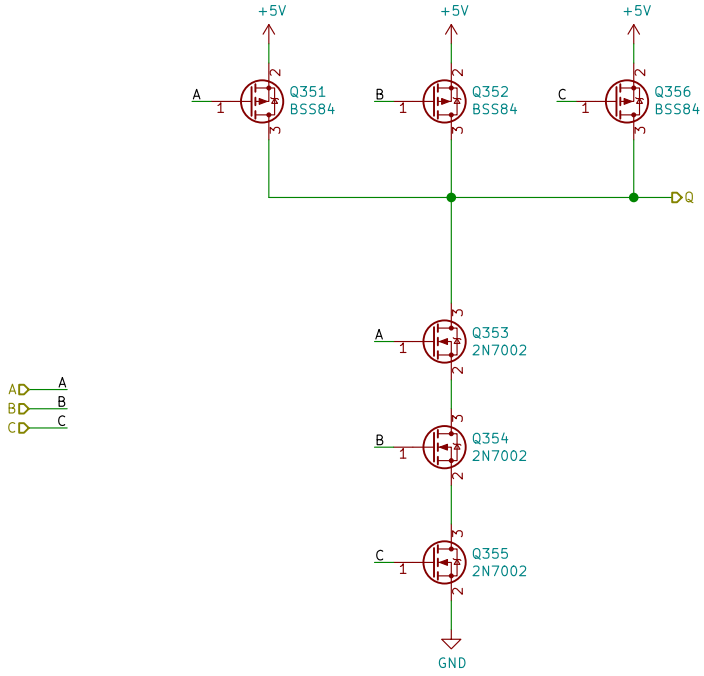
Q349
2N7002
GND


+5V
+5V
+5V
A
B
C
Q351
BSS84
Q352
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A
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C
Q353
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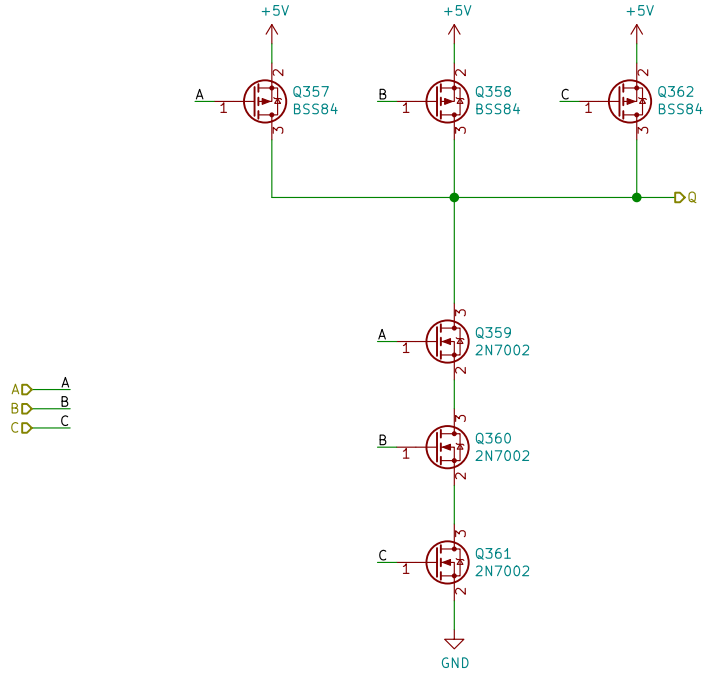
Q354
2N7002
Q355
2N7002
GND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+5V
+5V
A
B
C
Q357
BSS84
Q358
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Q
Q359
2N7002
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Q361
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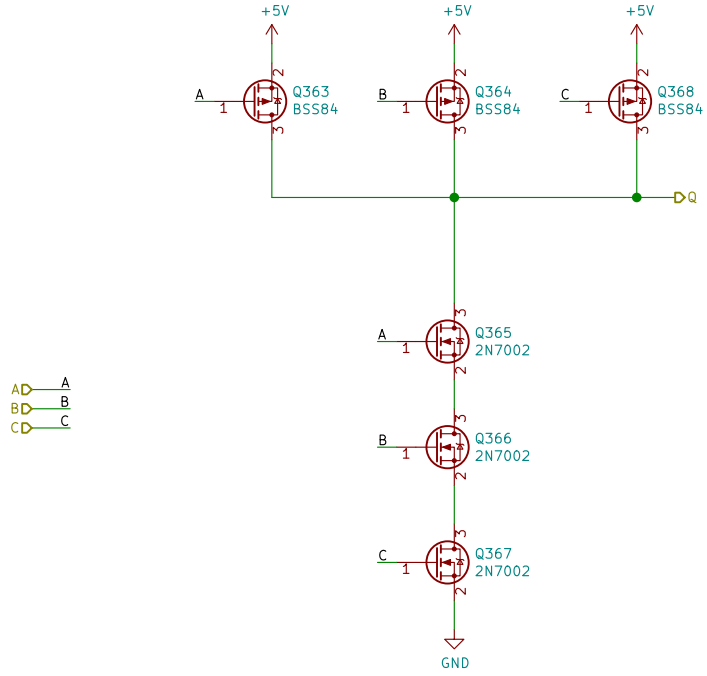
GND
A
B
C


+5V
+5V
+5V
A
B
C
Q363
BSS84
Q364
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B
C
Q365
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Q366
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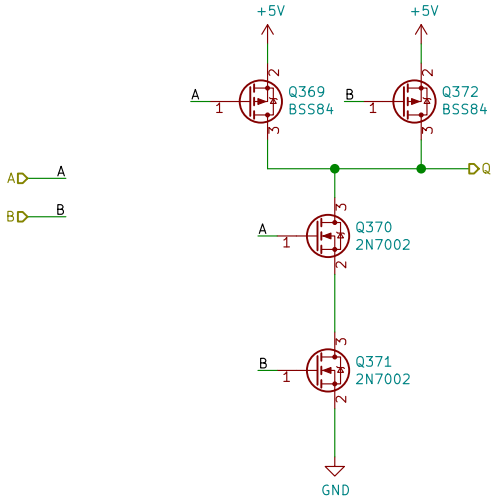
Q367
2N7002
GND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+5V
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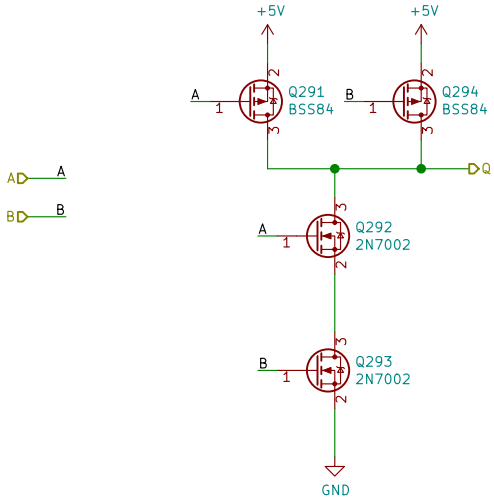
Q372
BSS84
Q
A
B
A
Q370
2N7002
B
Q371
2N7002
GND


+5V
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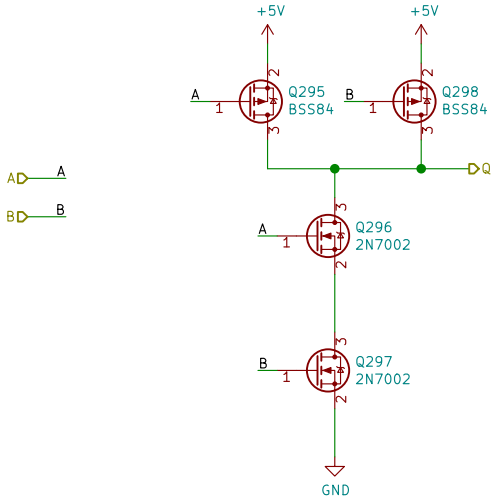
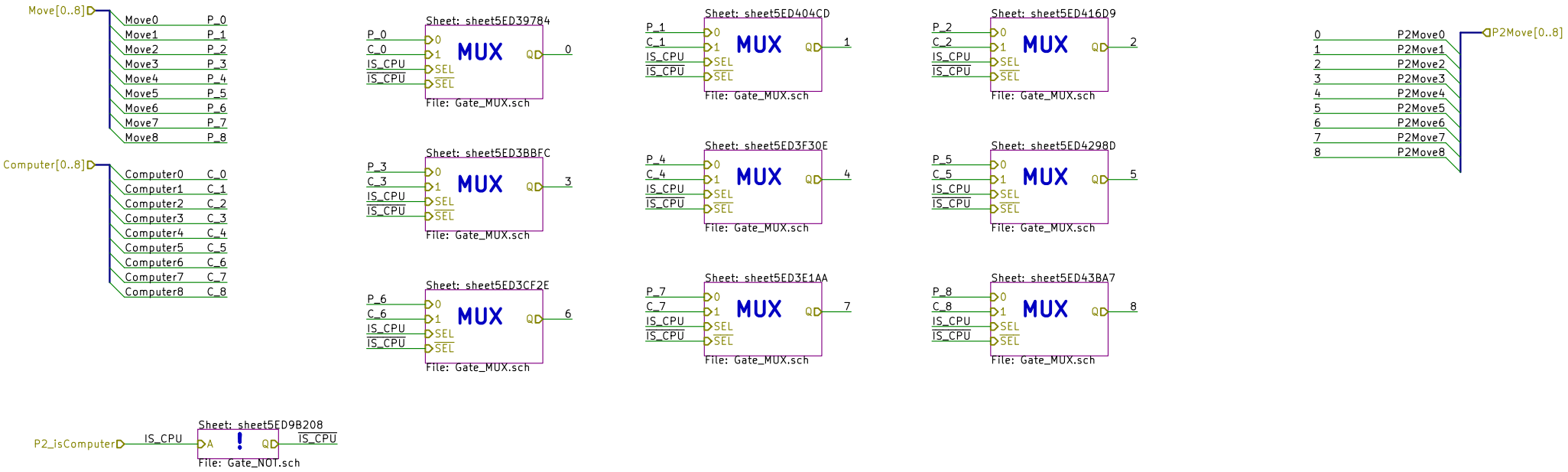
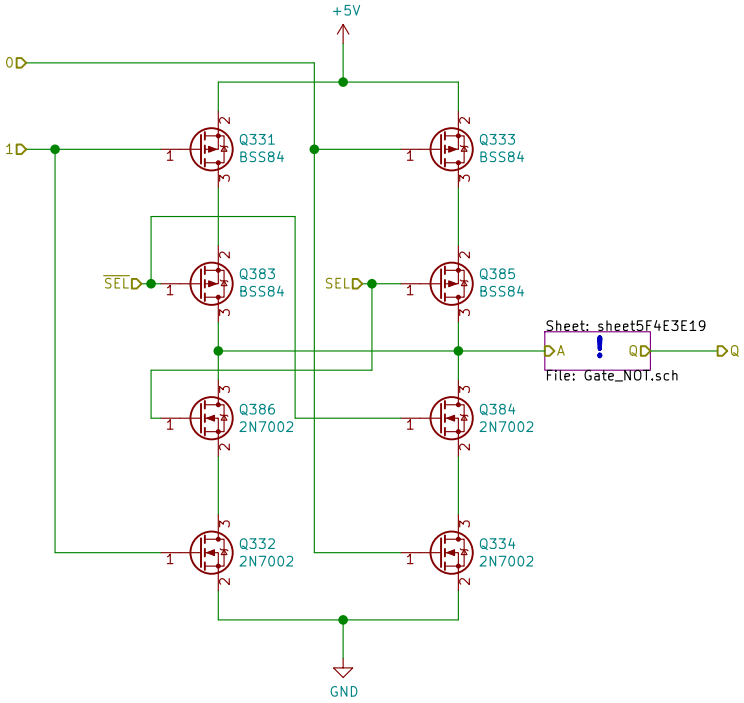
Q294
BSS84
Q
A
B
Q292
2N7002
Q293
2N7002
GND


+5V
+5V
A
B
Q295
BSS84
Q298
BSS84
A
B
Q
Q296
2N7002
Q297
2N7002
GND


Move[0..8]
Move0 P_0
Move1 P_1
Move2 P_2
Move3 P_3
Move4 P_4
Move5 P_5
Move6 P_6
Move7 P_7
Move8 P_8
Computer[0..8]
Computer0 C_0
Computer1 C_1
Computer2 C_2
Computer3 C_3
Computer4 C_4
Computer5 C_5
Computer6 C_6
Computer7 C_7
Computer8 C_8
Sheet: sheet5ED39784
P_0
C_0
IS_CPU
IS_CPU
MUX
0
1
SEL
SEL
Q
0
File: Gate_MUX.sch
Sheet: sheet5ED404CD
P_1
C_1
IS_CPU
IS_CPU
MUX
1
File: Gate_MUX.sch
Sheet: sheet5ED416D9
P_2
C_2
IS_CPU
IS_CPU
MUX
2
File: Gate_MUX.sch
Sheet: sheet5ED3BBFC
P_3
C_3
IS_CPU
IS_CPU
MUX
3
File: Gate_MUX.sch
Sheet: sheet5ED3F30E
P_4
C_4
IS_CPU
IS_CPU
MUX
4
File: Gate_MUX.sch
Sheet: sheet5ED4298D
P_5
C_5
IS_CPU
IS_CPU
MUX
5
File: Gate_MUX.sch
Sheet: sheet5ED3CF2E
P_6
C_6
IS_CPU
IS_CPU
MUX
6
File: Gate_MUX.sch
Sheet: sheet5ED3E1AA
P_7
C_7
IS_CPU
IS_CPU
MUX
7
File: Gate_MUX.sch
Sheet: sheet5ED43BA7
P_8
C_8
IS_CPU
IS_CPU
MUX
8
File: Gate_MUX.sch
0 P2Move0
1 P2Move1
2 P2Move2
3 P2Move3
4 P2Move4
5 P2Move5
6 P2Move6
7 P2Move7
8 P2Move8
P2Move[0..8]
P2_isComputer
IS_CPU
Sheet: sheet5ED9B208
A
!
Q
IS_CPU
File: Gate_NOT.sch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Q331
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Q333
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SEL
Q383
BSS84
SEL
Q385
BSS84
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Q386
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Q384
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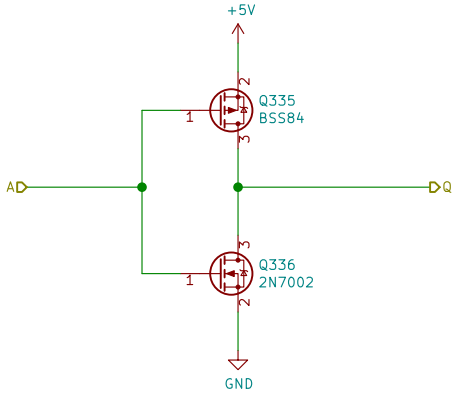
Q332
2N7002
Q334
2N7002
GND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Q336
2N7002
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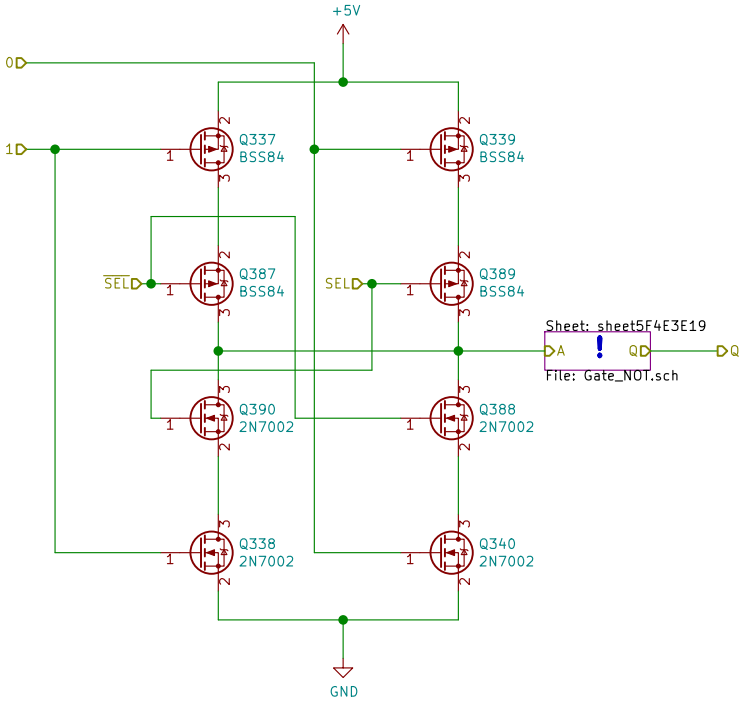
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BSS84
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Q388
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Q338
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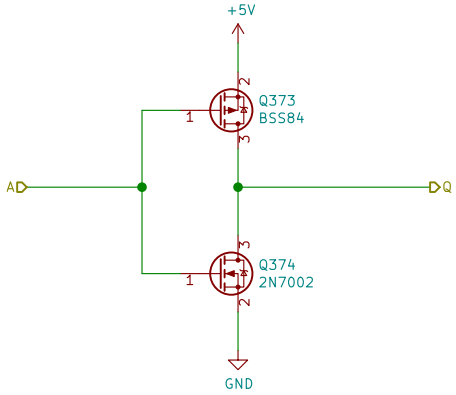
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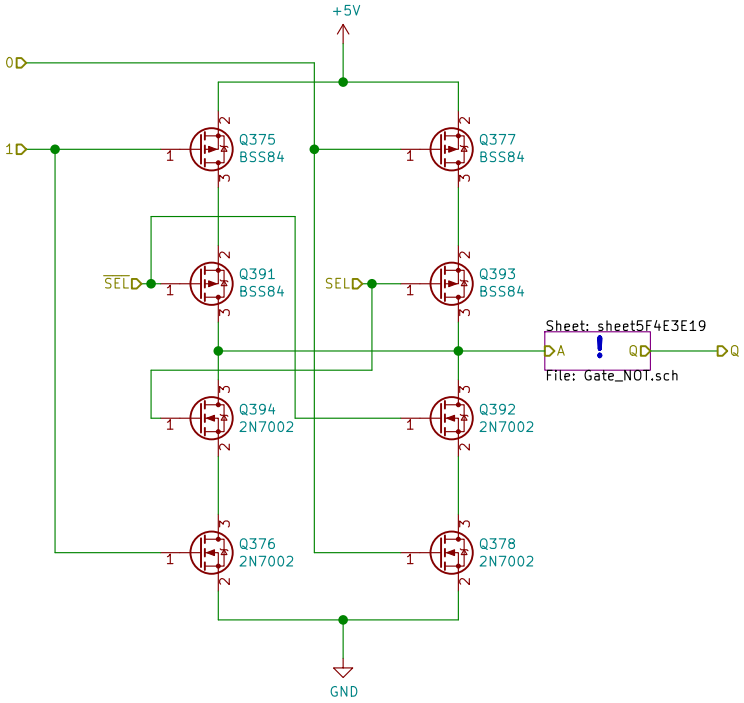
GND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SEL
Q391
BSS84
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Q393
BSS84
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Q394
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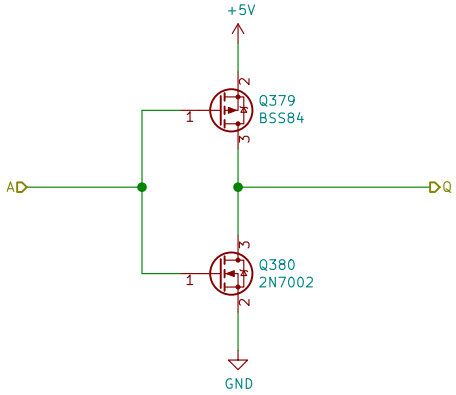
Q392
2N7002
Q376
2N7002
Q378
2N7002
GND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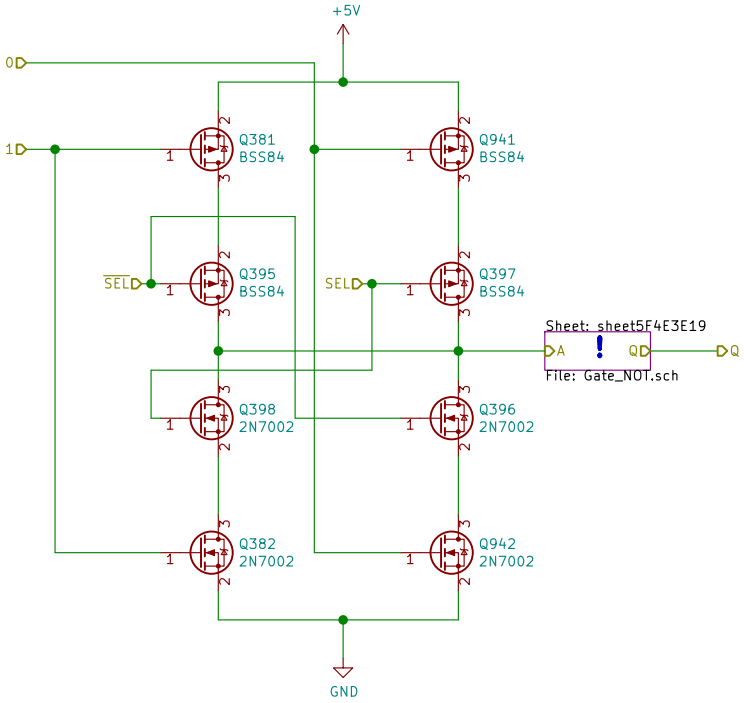
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BSS84
SEL
Q395
BSS84
SEL
Q397
BSS84
Sheet: sheet5F4E3E19
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Q
Q
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Q398
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Q396
2N7002
Q382
2N7002
Q942
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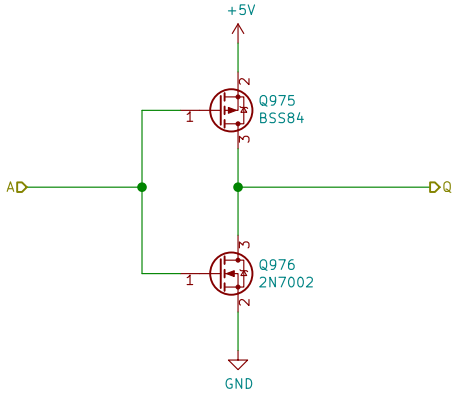
GND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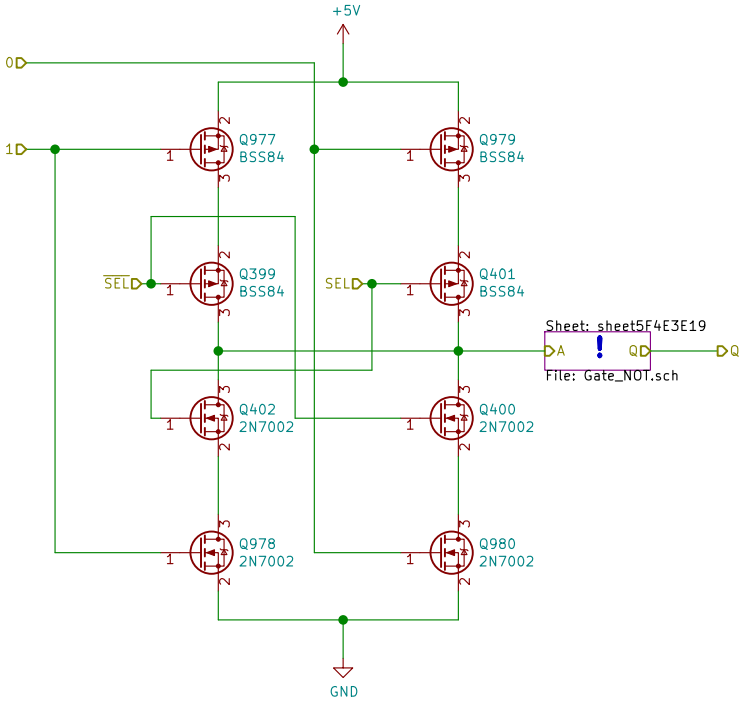
2N7002
GND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Q977
BSS84
Q979
BSS84
SEL
Q399
BSS84
SEL
Q401
BSS84
Sheet: sheet5F4E3E19
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Q
Q
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Q402
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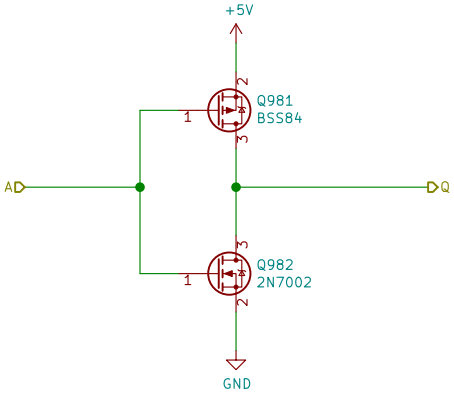
Q400
2N7002
Q978
2N7002
Q980
2N7002
GND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BSS84
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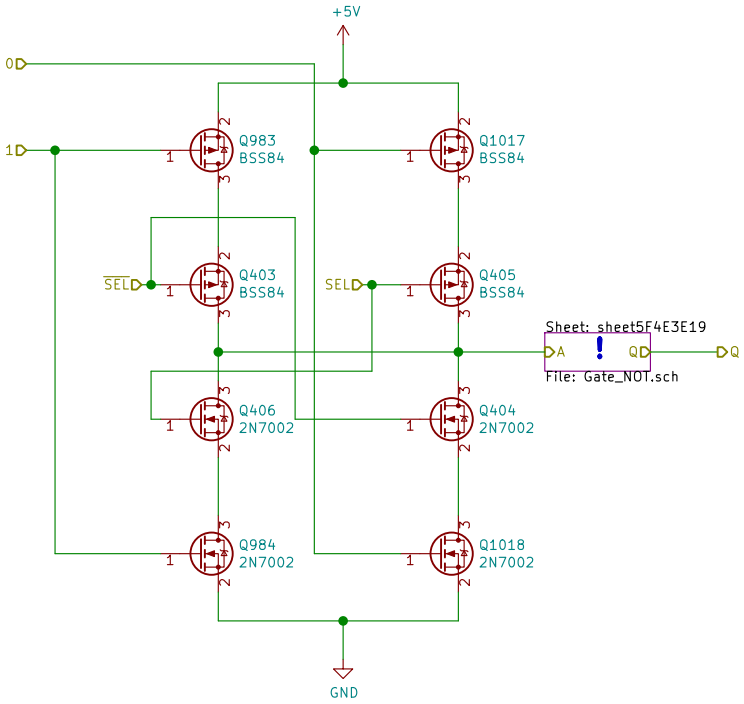
Q
Q982
2N7002
GND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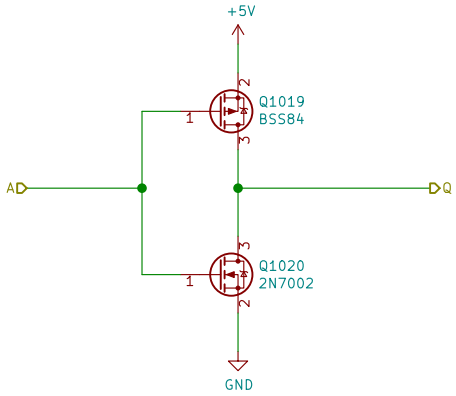
Q983
BSS84
Q1017
BSS84
SEL
Q403
BSS84
SEL
Q405
BSS84
Sheet: sheet5F4E3E19
A
Q
Q
File: Gate_NOT.sch
Q406
2N7002
Q404
2N7002
Q984
2N7002
Q1018
2N7002
GND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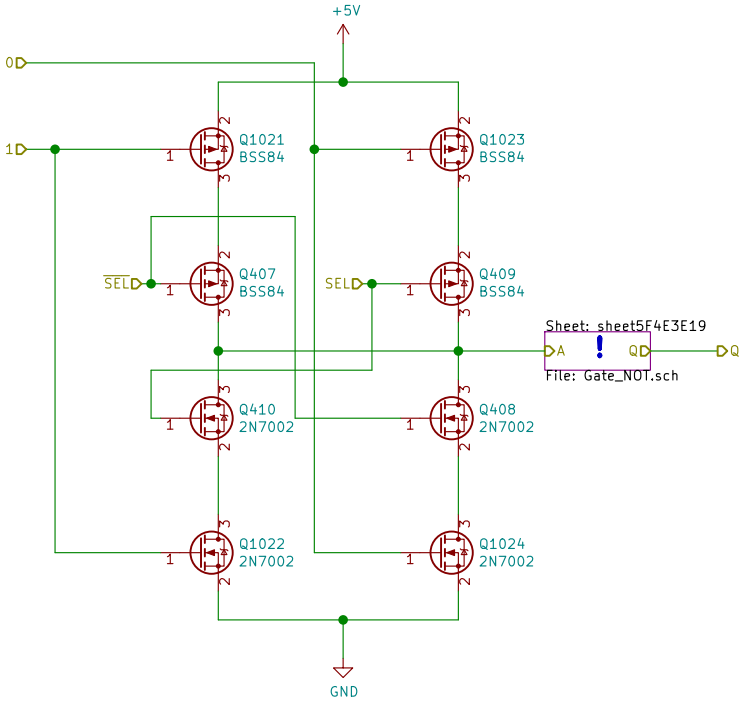
Q1019
BSS84
A
Q
Q1020
2N7002
GND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Q1023
BSS84
SEL
Q407
BSS84
SEL
Q409
BSS84
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Q
Q
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Q410
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Q408
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Q1022
2N7002
Q1024
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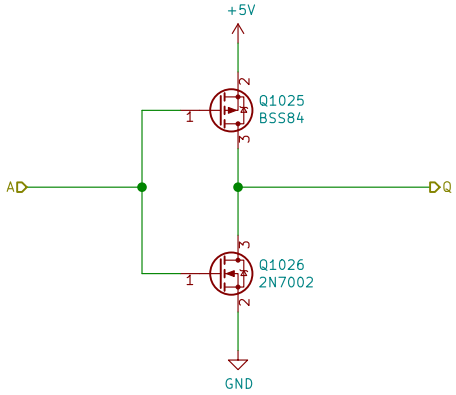
GND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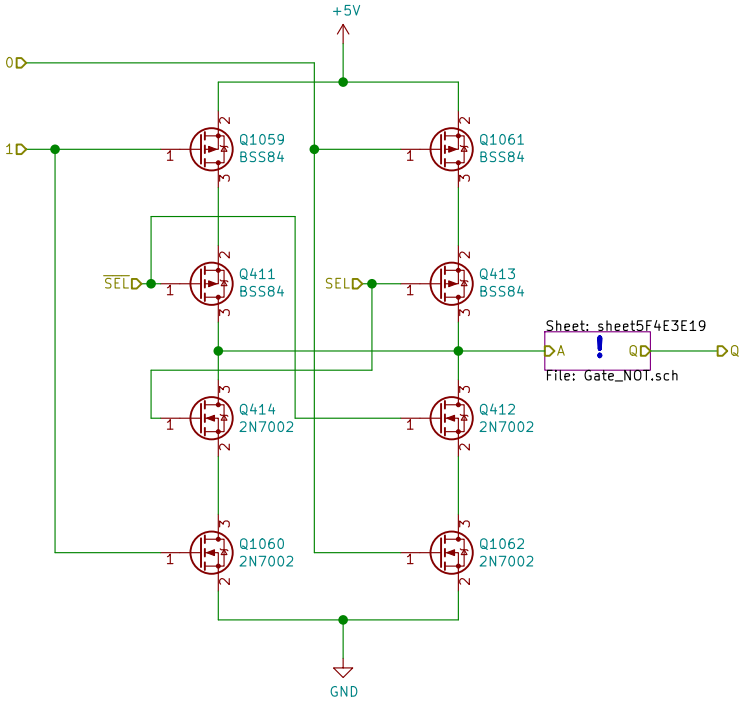
BSS84
A
Q
Q1026
2N7002
GND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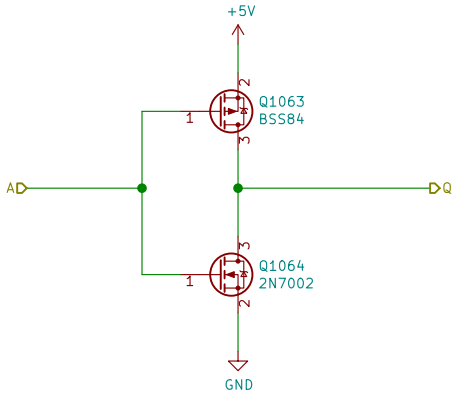
BSS84
Q1061
BSS84
SEL
Q411
BSS84
SEL
Q413
BSS84
Sheet: sheet5F4E3E19
A
Q
Q
File: Gate_NOT.sch
Q414
2N7002
Q412
2N7002
Q1060
2N7002
Q1062
2N7002
GND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Q1063
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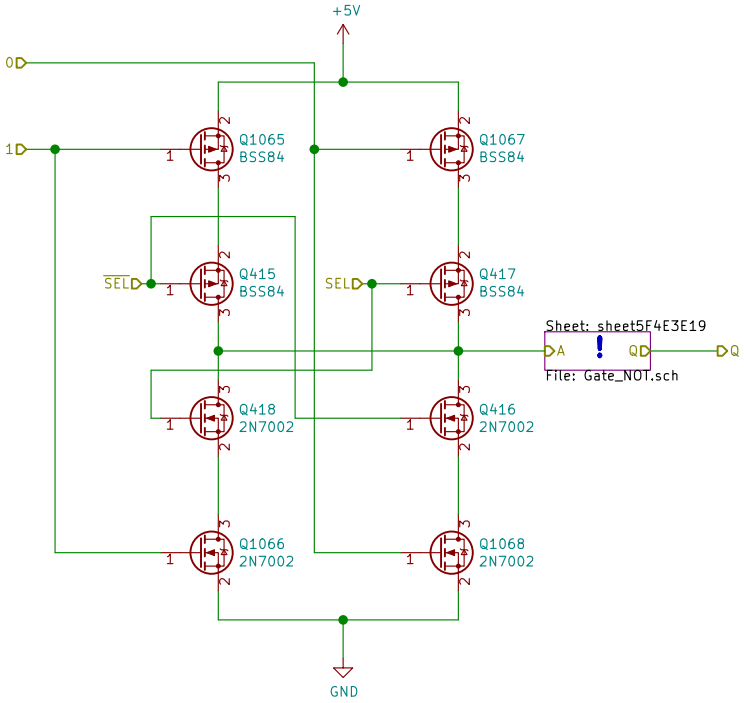
A
Q
Q1064
2N7002
GND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0
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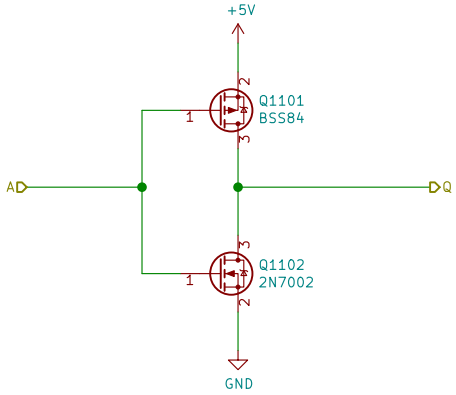
Q1065
BSS84
Q1067
BSS84
SEL
Q415
BSS84
SEL
Q417
BSS84
Sheet: sheet5F4E3E19
A
Q
Q
File: Gate_NOT.sch
Q418
2N7002
Q416
2N7002
Q1066
2N7002
Q1068
2N7002
GND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Q1101
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A
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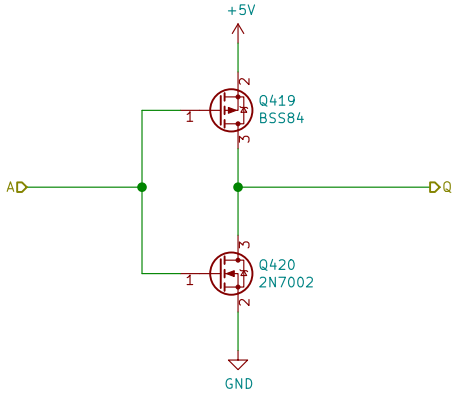
Q1102
2N7002
GND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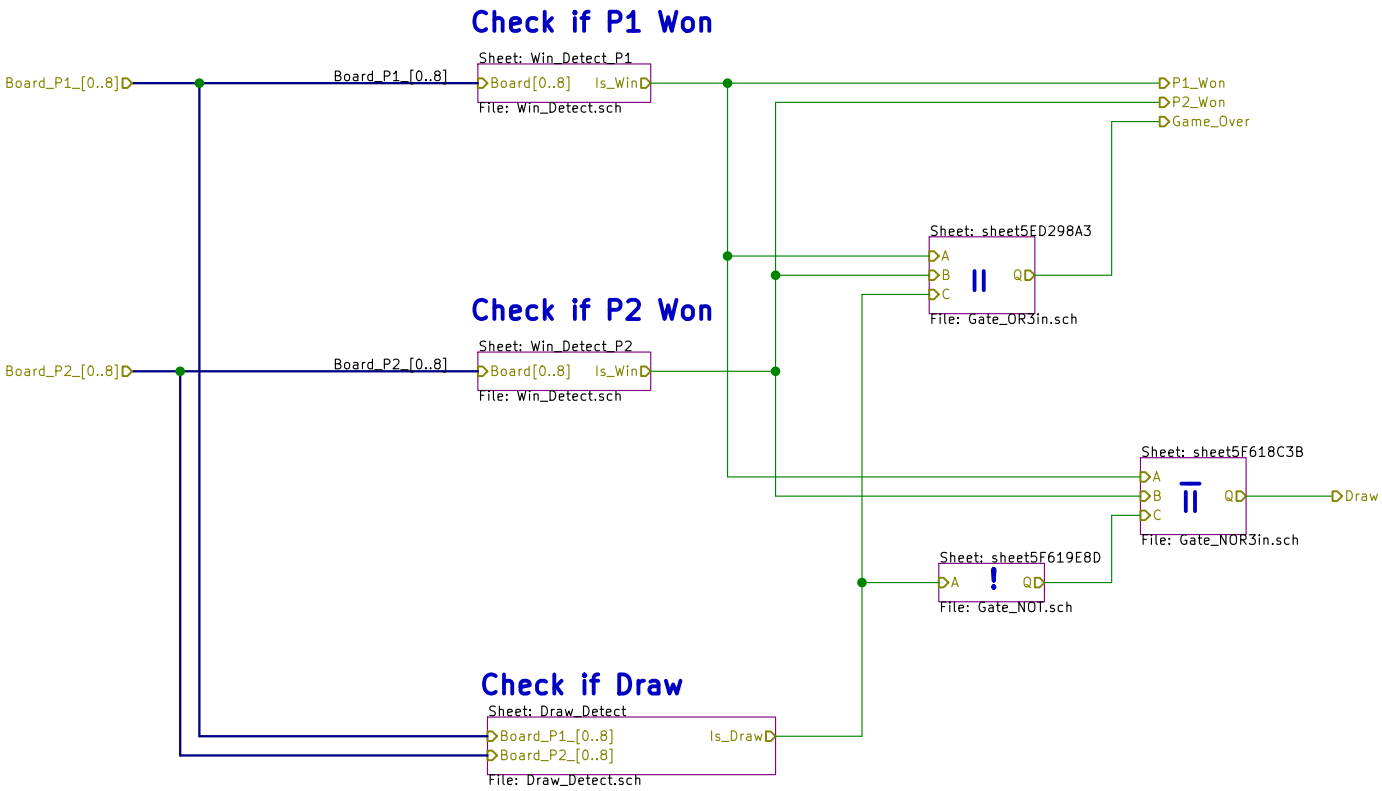
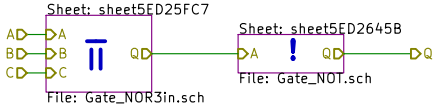
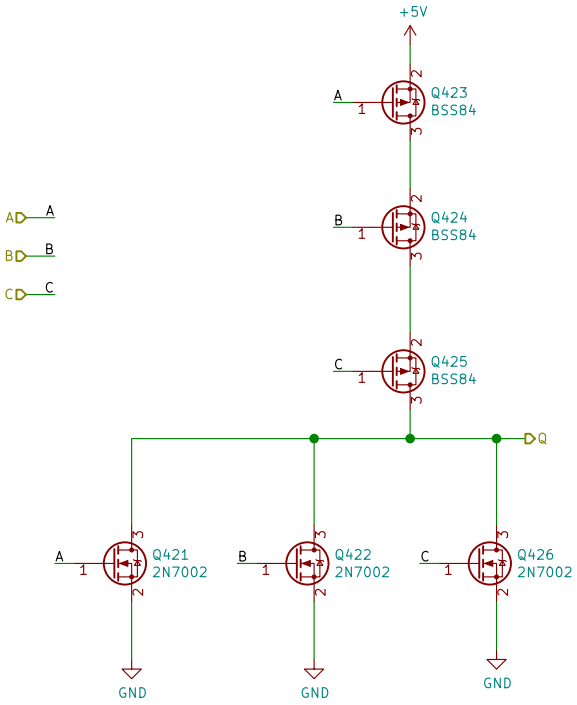
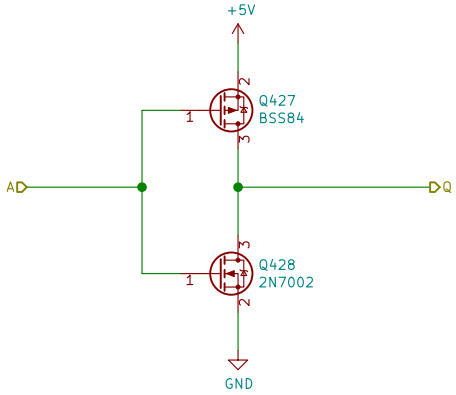
Q
Q420
2N7002
GND

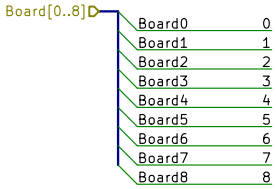

Check if P1 Won
Sheet: Win_Detect_P1
Board_P1_[0..8]
Board_P1_[0..8]
Board[0..8]
Is_Win
File: Win_Detect.sch
P1_Won
P2_Won
Game_Over
Sheet: sheet5ED298A3
A
B
C
Q
File: Gate_OR3in.sch
Check if P2 Won
Sheet: Win_Detect_P2
Board_P2_[0..8]
Board_P2_[0..8]
Board[0..8]
Is_Win
File: Win_Detect.sch
Sheet: sheet5F618C3B
A
B
C
Q
Draw
File: Gate_NOR3in.sch
Sheet: sheet5F619E8D
A
Q
File: Gate_NOT.sch
Check if Draw
Sheet: Draw_Detect
Board_P1_[0..8]
Board_P2_[0..8]
Is_Draw
File: Draw_Detect.sch

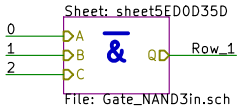

Sheet: sheet5ED25FC7
A
B
C
A
B
C
Q
File: Gate_NOR3in.sch
Sheet: sheet5ED2645B
A
Q
Q
File: Gate_NOT.sch

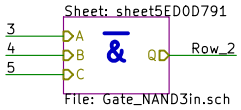

+5V
A
B
C
Q
Q423
BSS84
Q424
BSS84
Q425
BSS84
Q421
2N7002
Q422
2N7002
Q426
2N7002
GND
GND
GND

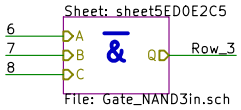

+5V
Q427
BSS84
A
Q
Q428
2N7002
GND

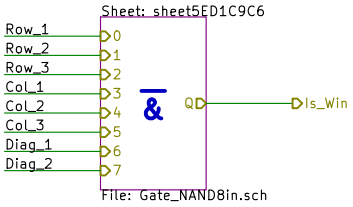
Checks if a Player has won by AND-ing all Rows, Cols, and Diags individually

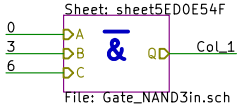


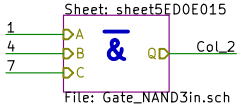


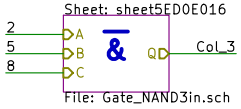


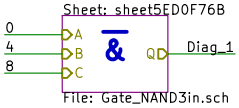


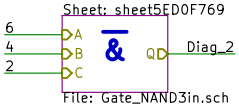


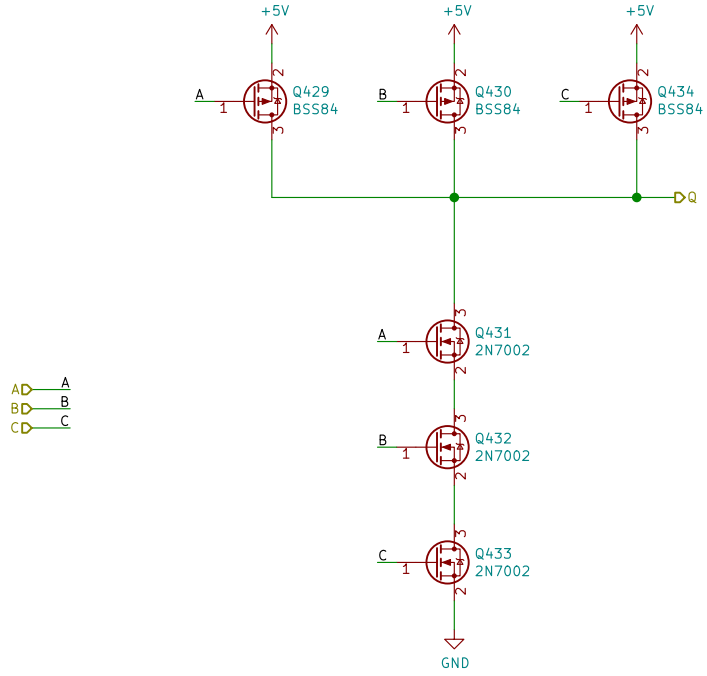











+5V
+5V
+5V
A
B
C
Q429
BSS84
Q430
BSS84
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Q
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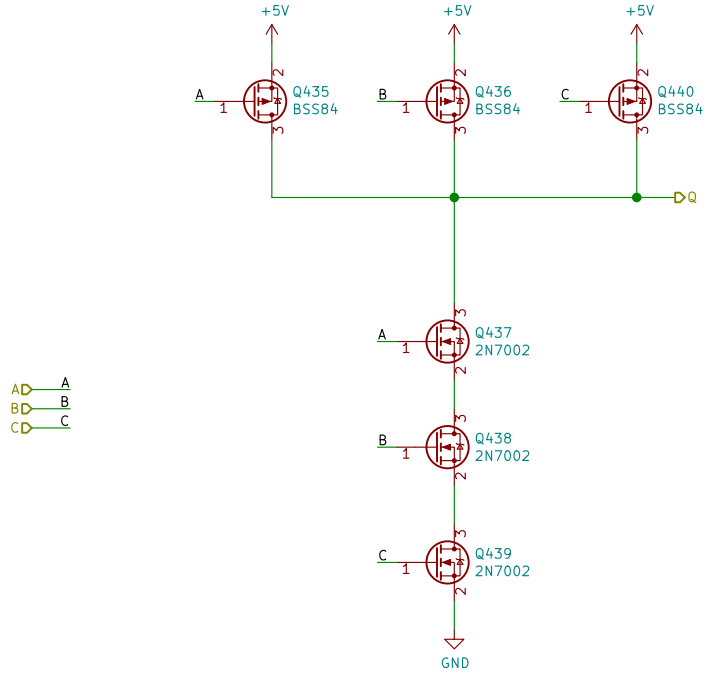
Q432
2N7002
Q433
2N7002
GND
A
B
C


+5V
+5V
+5V
A
B
C
Q435
BSS84
Q436
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B
C
Q437
2N7002
Q438
2N7002
Q439
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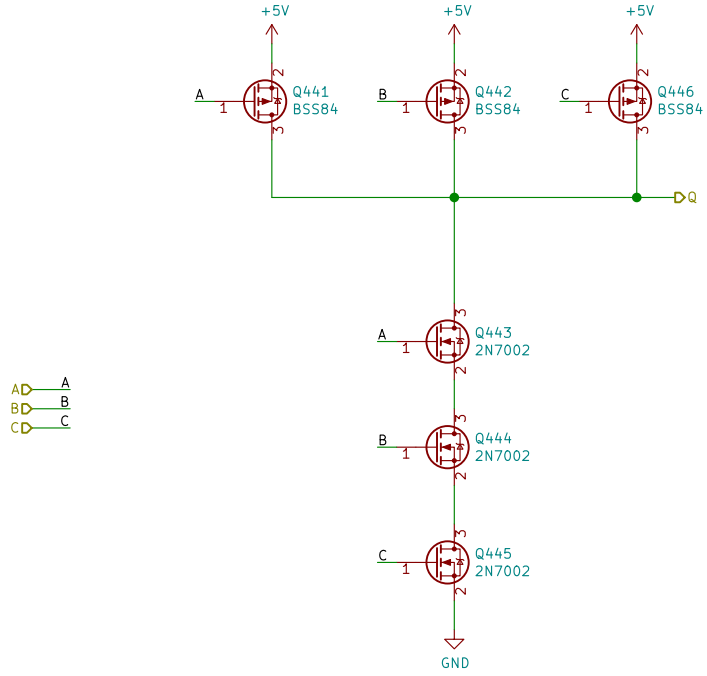
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+5V
+5V
A
B
C
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Q442
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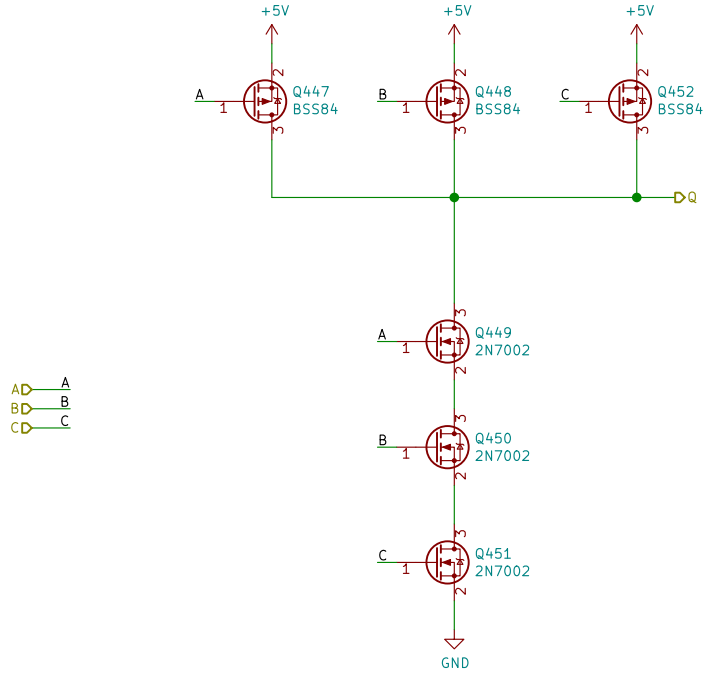
A
B
C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+5V
+5V
A
B
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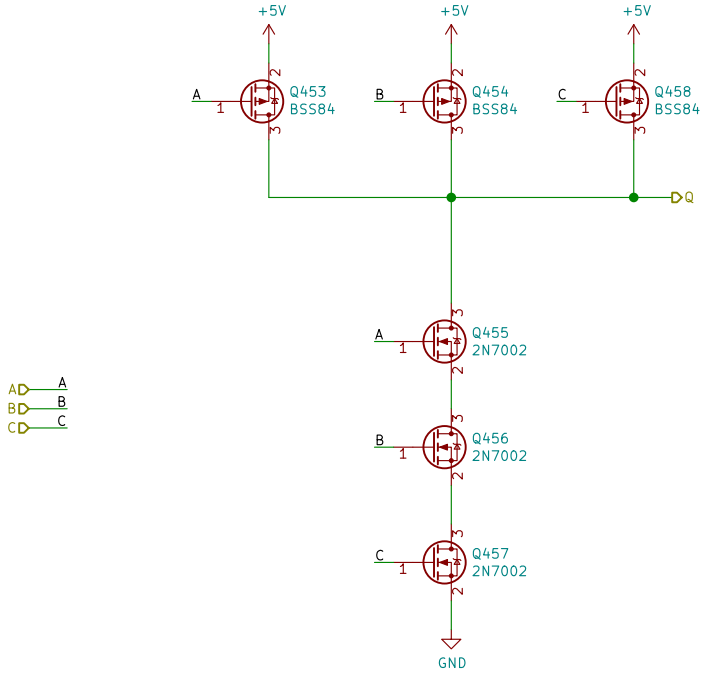
B
C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+5V
+5V
A
B
C
Q453
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Q454
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B
C
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Q456
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Q457
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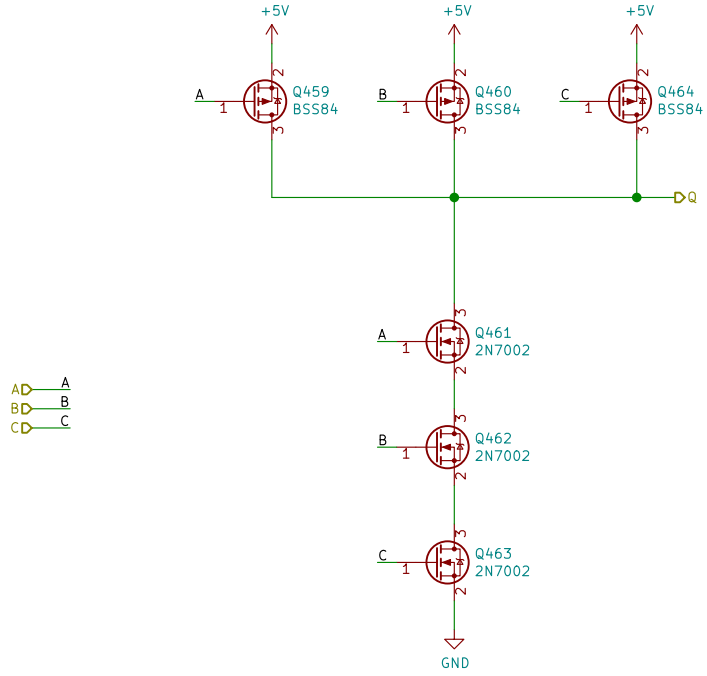
GND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+5V
+5V
A
B
C
Q459
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Q460
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BSS84
Q
Q461
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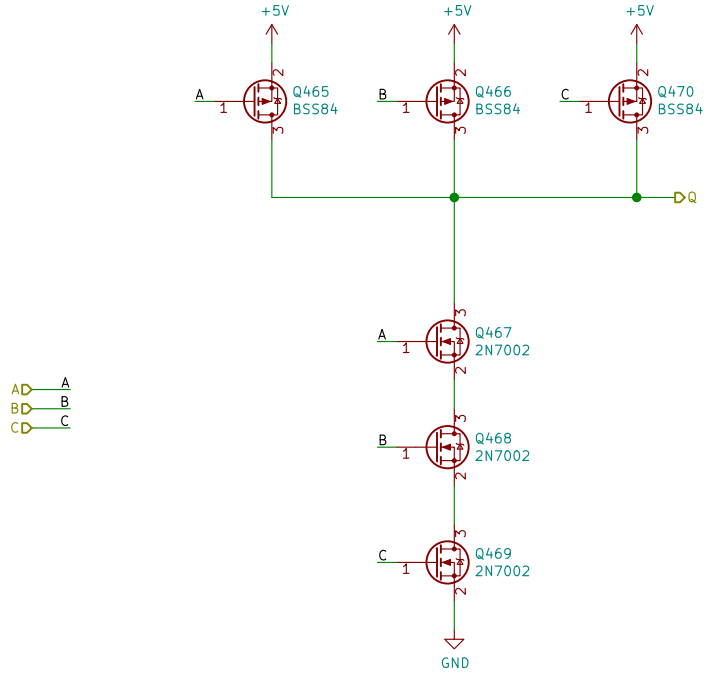
Q462
2N7002
Q463
2N7002
GND
A
B
C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+5V
+5V
A
B
C
Q465
BSS84
Q466
BSS84
Q470
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Q467
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Q468
2N7002
Q469
2N7002
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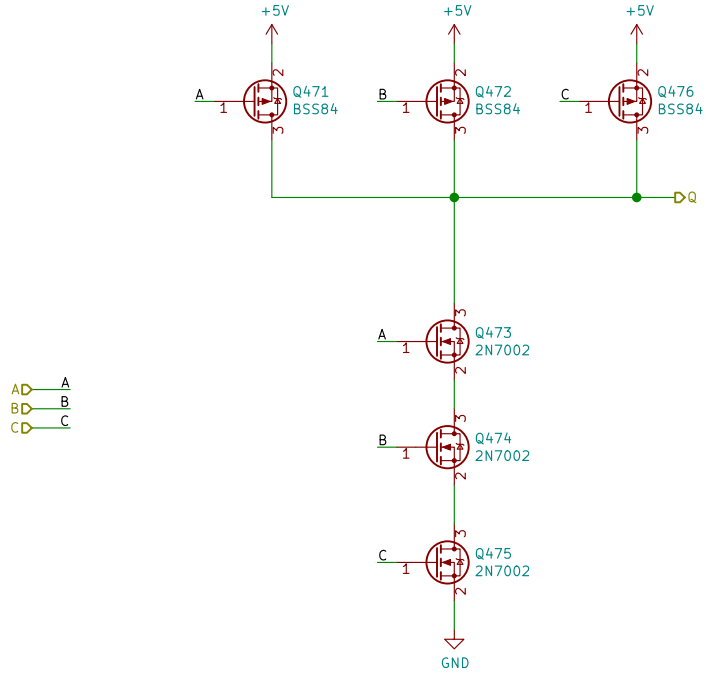
B
C
A
B
C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+5V
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B
C
Q471
BSS84
Q472
BSS84
Q476
BSS84
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Q474
2N7002
C
Q475
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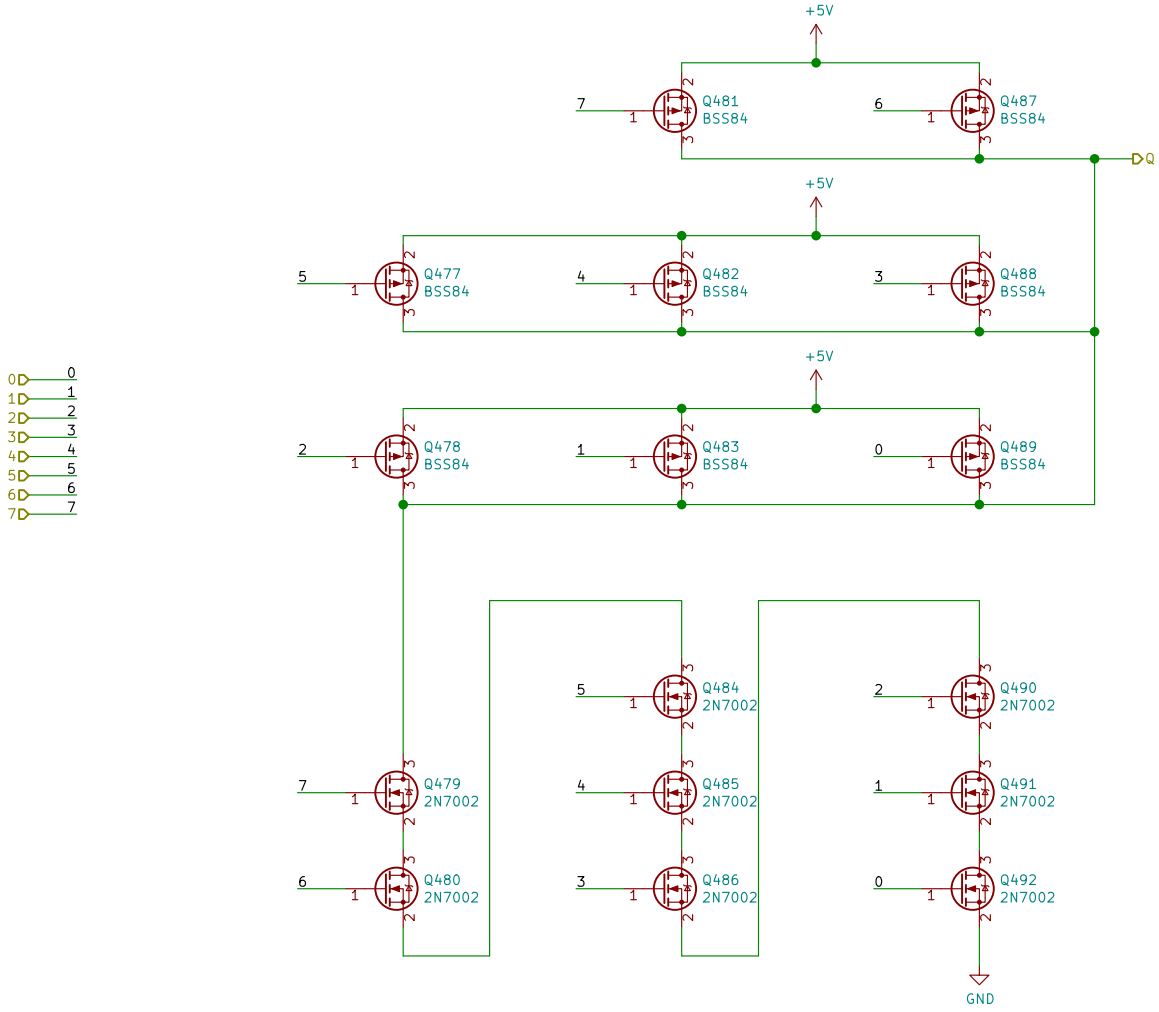
A
B
C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Q487
BSS84
Q
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5
Q477
BSS84
4
Q482
BSS84
3
Q488
BSS84
+5V
2
Q478
BSS84
1
Q483
BSS84
0
Q489
BSS84
0
1
2
3
4
5
6
7
5
Q484
2N7002
2
Q490
2N7002
7
Q479
2N7002
4
Q485
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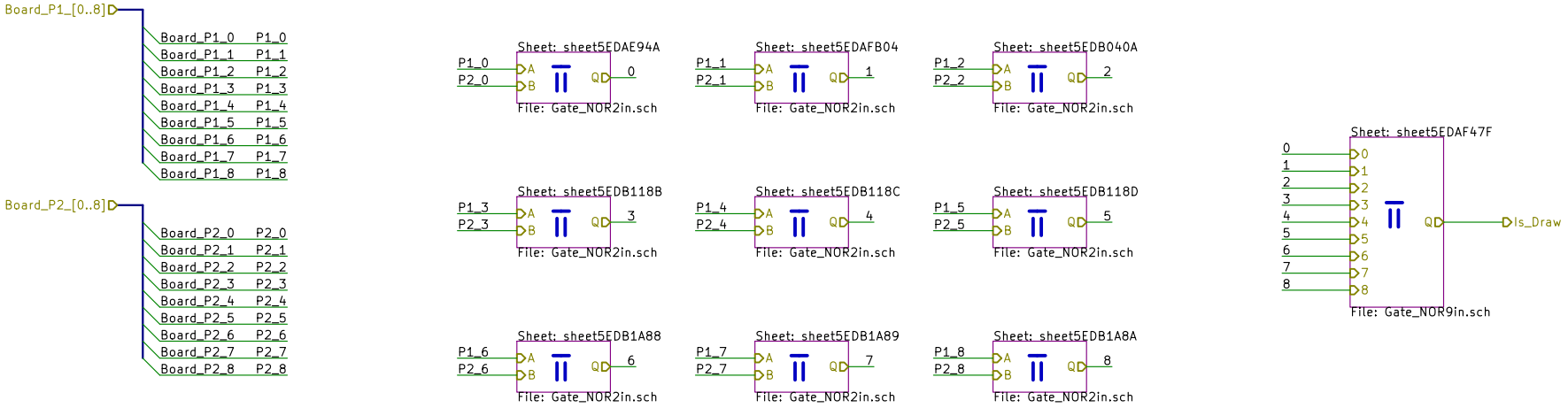
GND


Board_P1_[0..8]
Board_P1_0 P1_0
Board_P1_1 P1_1
Board_P1_2 P1_2
Board_P1_3 P1_3
Board_P1_4 P1_4
Board_P1_5 P1_5
Board_P1_6 P1_6
Board_P1_7 P1_7
Board_P1_8 P1_8
Board_P2_[0..8]
Board_P2_0 P2_0
Board_P2_1 P2_1
Board_P2_2 P2_2
Board_P2_3 P2_3
Board_P2_4 P2_4
Board_P2_5 P2_5
Board_P2_6 P2_6
Board_P2_7 P2_7
Board_P2_8 P2_8
Sheet: sheet5EDAE94A
P1_0
P2_0
A
B
QD
0
File: Gate_NOR2in.sch
Sheet: sheet5EDAFB04
P1_1
P2_1
A
B
QD
1
File: Gate_NOR2in.sch
Sheet: sheet5EDB040A
P1_2
P2_2
A
B
QD
2
File: Gate_NOR2in.sch
Sheet: sheet5EDB118B
P1_3
P2_3
A
B
QD
3
File: Gate_NOR2in.sch
Sheet: sheet5EDB118C
P1_4
P2_4
A
B
QD
4
File: Gate_NOR2in.sch
Sheet: sheet5EDB118D
P1_5
P2_5
A
B
QD
5
File: Gate_NOR2in.sch
Sheet: sheet5EDB1A88
P1_6
P2_6
A
B
QD
6
File: Gate_NOR2in.sch
Sheet: sheet5EDB1A89
P1_7
P2_7
A
B
QD
7
File: Gate_NOR2in.sch
Sheet: sheet5EDB1A8A
P1_8
P2_8
A
B
QD
8
File: Gate_NOR2in.sch
Sheet: sheet5EDAF47F
0
1
2
3
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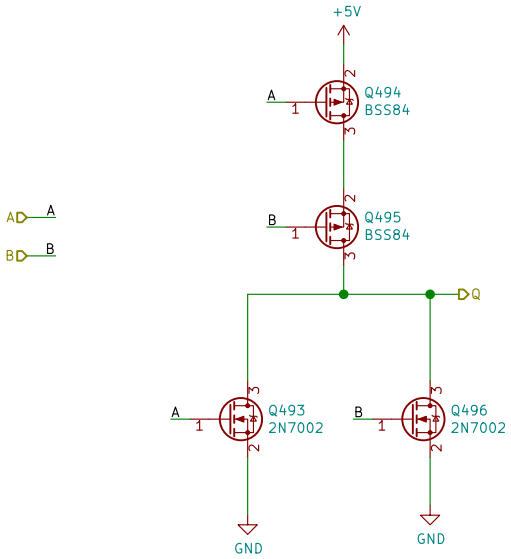
7
8
QD
Is_Draw
File: Gate_NOR9in.sch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Q495
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Q496
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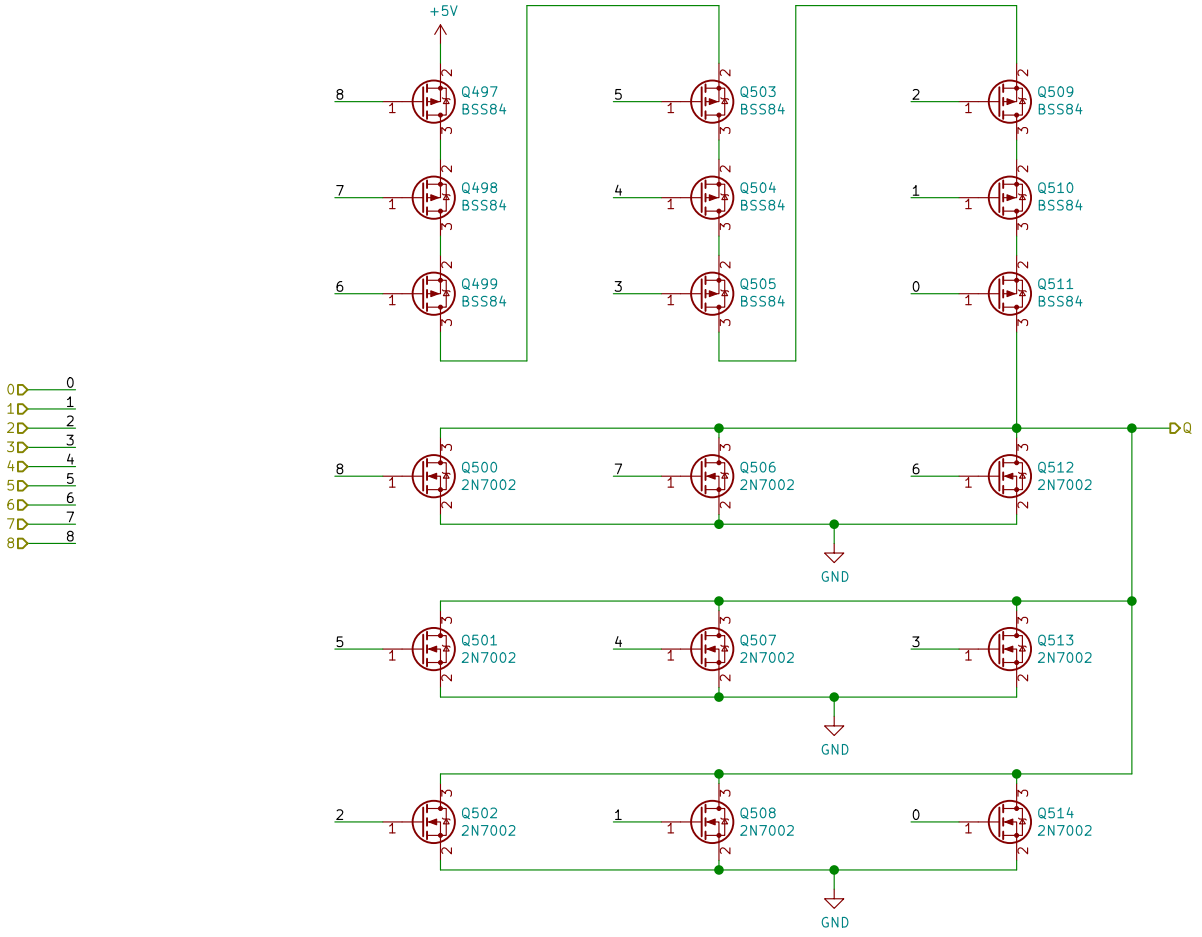
GND
GND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Q497
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Q498
BSS84
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BSS84
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BSS84
Q504
BSS84
Q505
BSS84
Q509
BSS84
Q510
BSS84
Q511
BSS84
Q500
2N7002
Q506
2N7002
Q512
2N7002
Q501
2N7002
Q507
2N7002
Q513
2N7002
Q502
2N7002
Q508
2N7002
Q514
2N7002
GND
GND
GND
Q
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1
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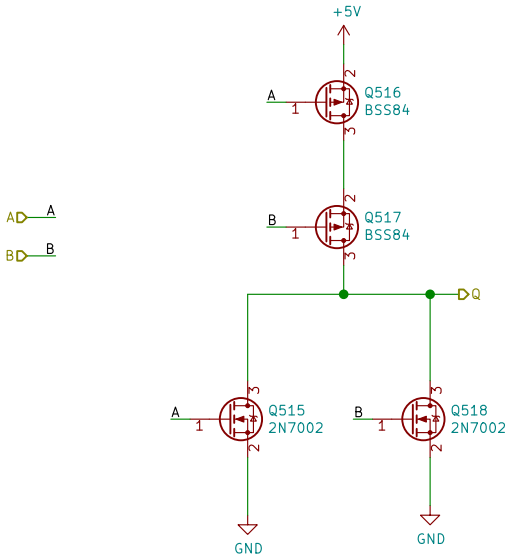
5
6
7
8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A
Q516
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B
Q517
BSS84
Q
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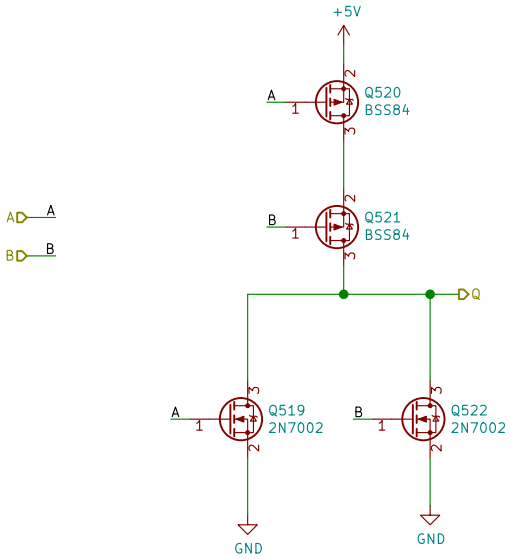
Q515
2N7007
B
Q518
2N7002
GND
GND
A
B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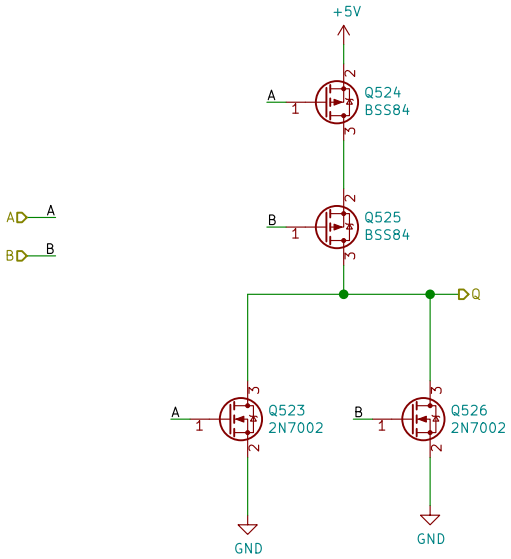
B
Q
Q520
BSS84
Q521
BSS84
Q519
2N7002
Q522
2N7002
GND
GND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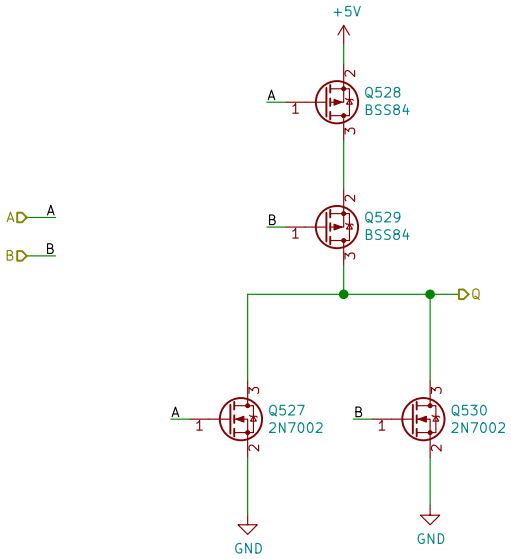
BSS84
Q523
2N7002
Q526
2N7002
GND
GND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BSS84
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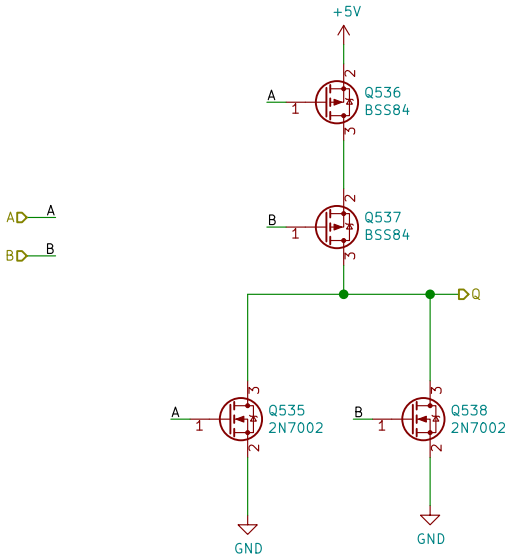
2N7002
Q530
2N7002
GND
GND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A
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BSS84
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Q
A
Q535
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B
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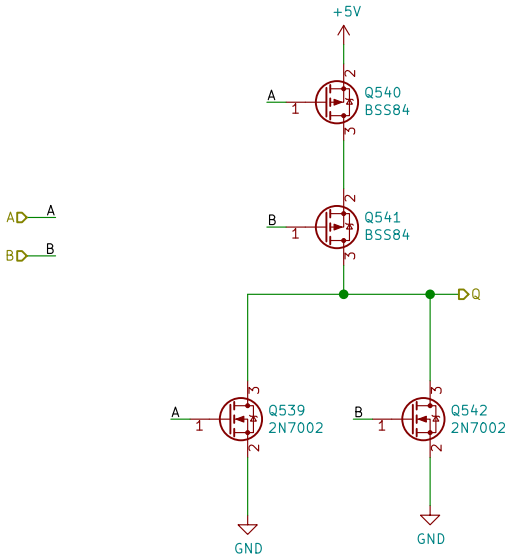
GND
GND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Q
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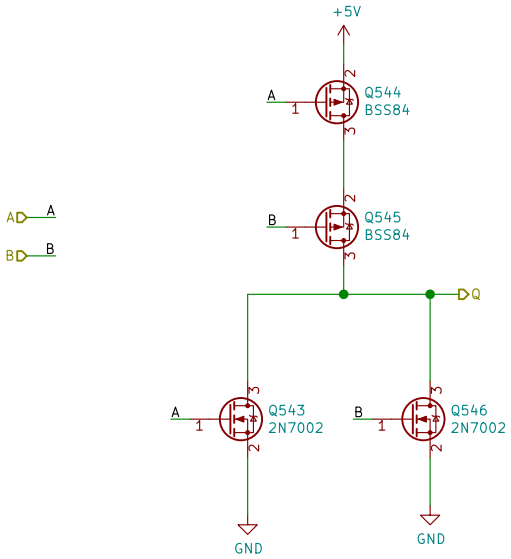
GND
GND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Q
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Q545
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2N7002
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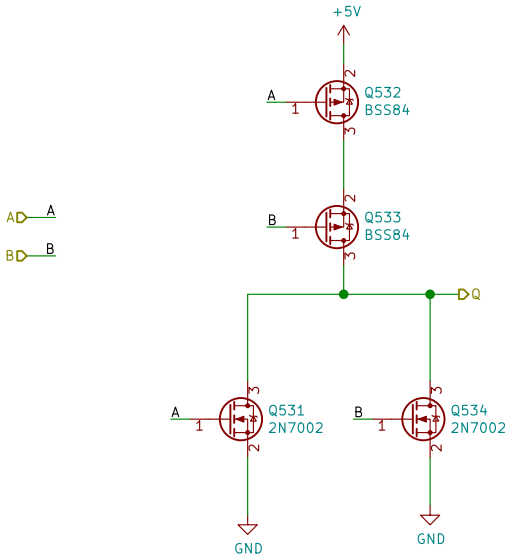
2N7002
GND
GND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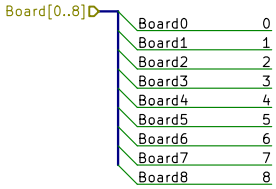
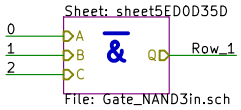
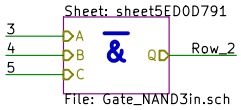
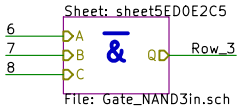
A
Q532
BSS84
B
Q533
BSS84
A
B
Q
A
Q531
2N7002
B
Q534
2N7002
GND
GND

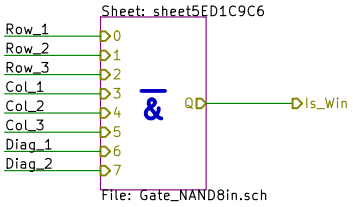
Checks if a Player has won by AND-ing all Rows, Cols, and Diags individually

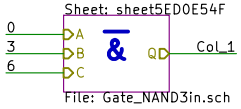


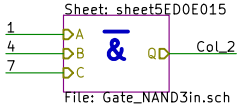


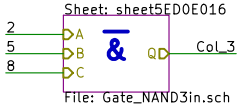


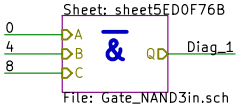


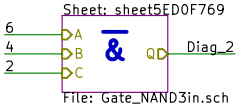


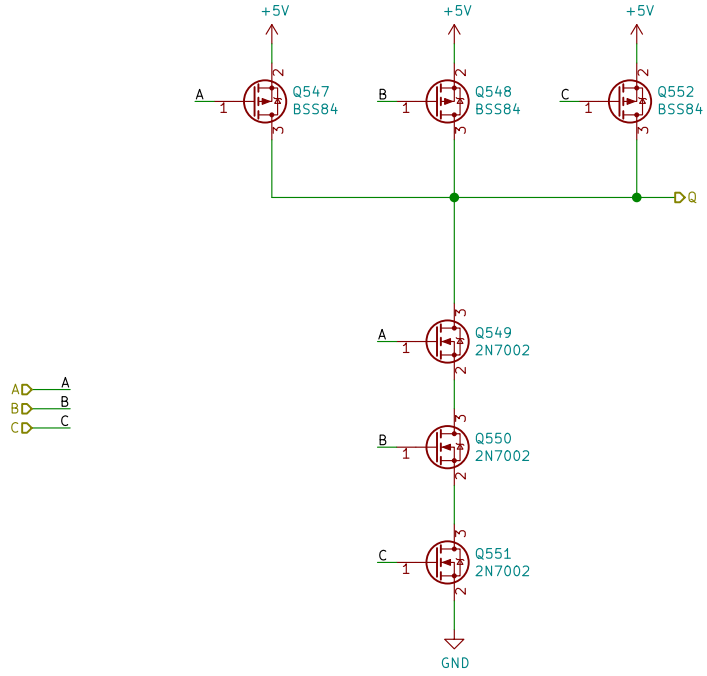








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+5V
+5V
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B
C
Q547
BSS84
Q548
BSS84
Q552
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2N7002
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2N7002
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C
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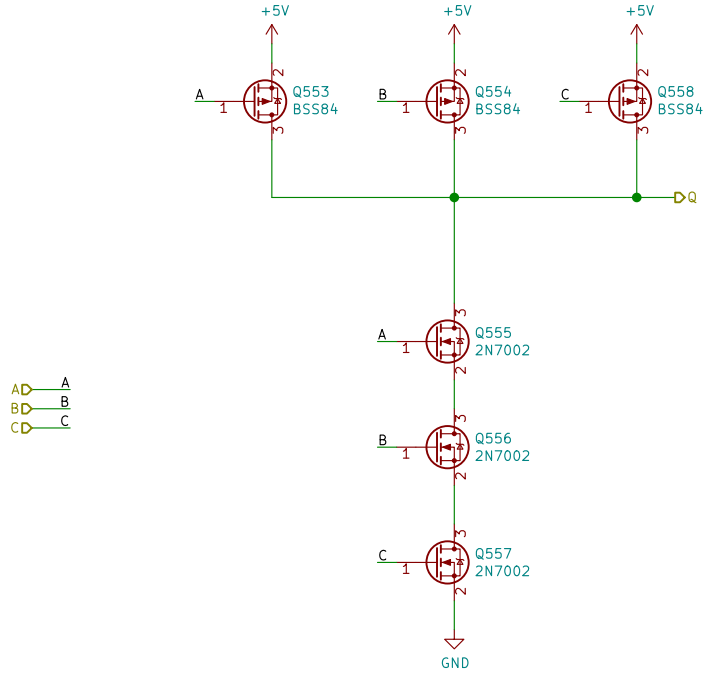
2
3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+5V
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B
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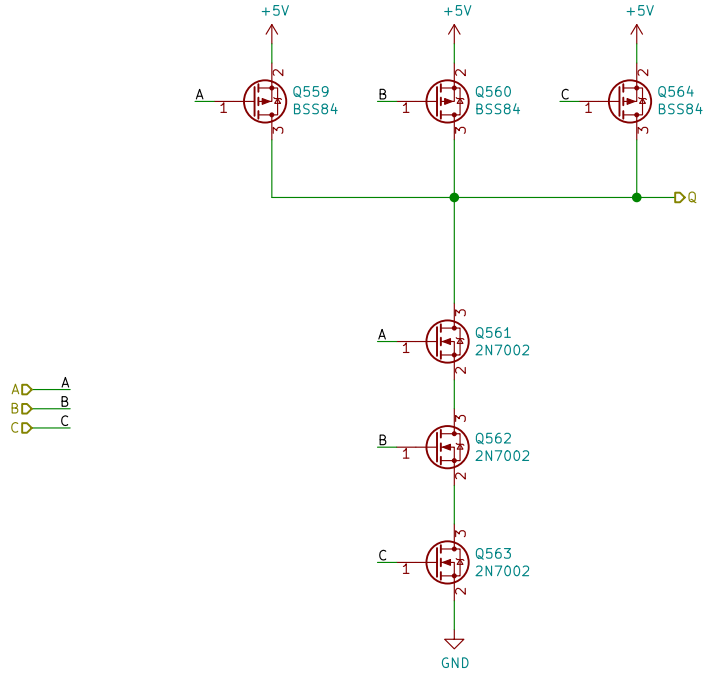
B
C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+5V
+5V
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B
C
Q559
BSS84
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Q561
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Q563
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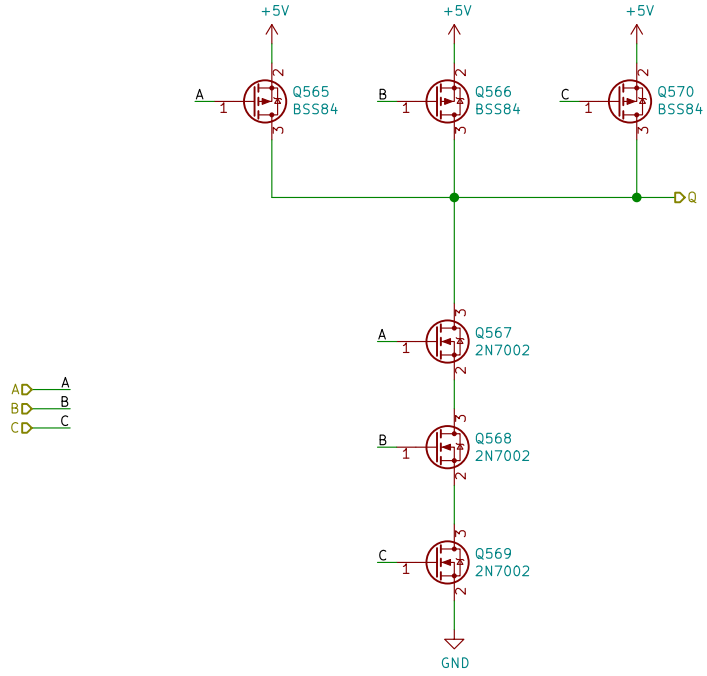
GND
A
B
C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+5V
+5V
A
B
C
Q565
BSS84
Q566
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B
C
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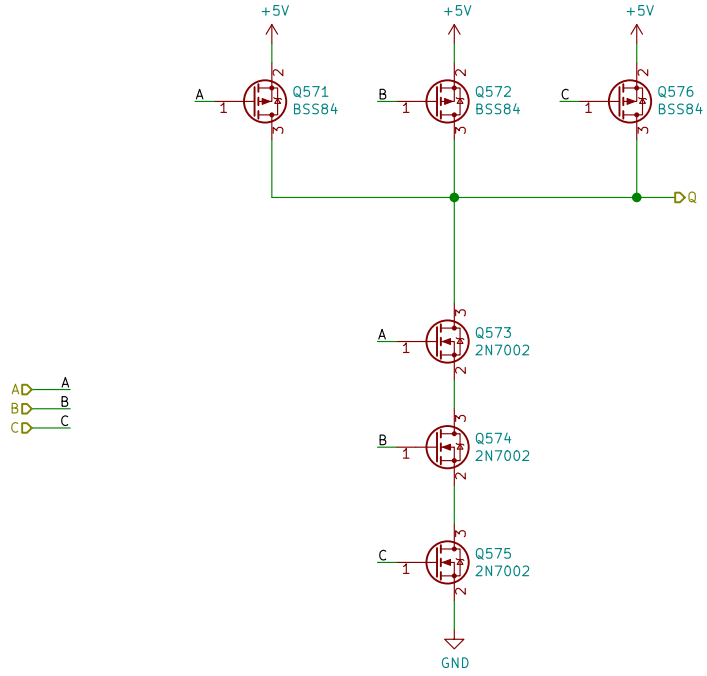
GND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+5V
+5V
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B
C
Q571
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Q572
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C
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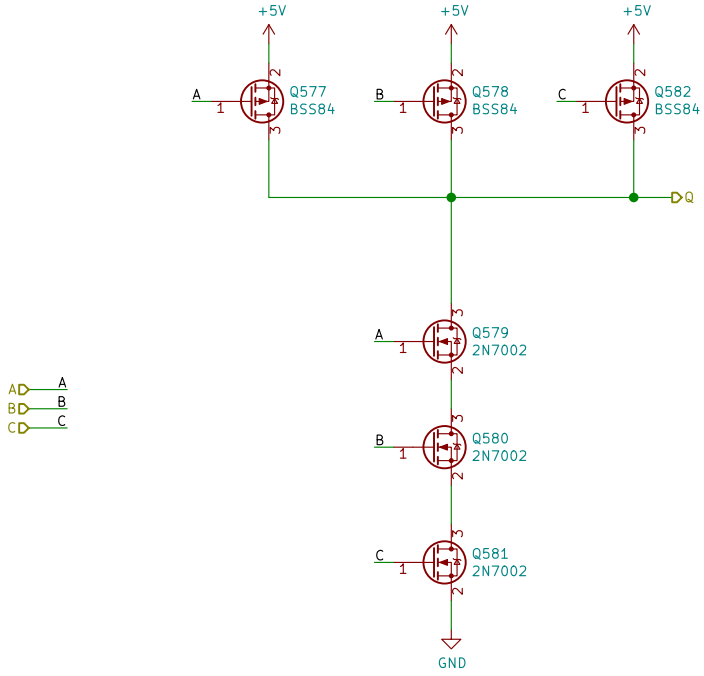
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+5V
+5V
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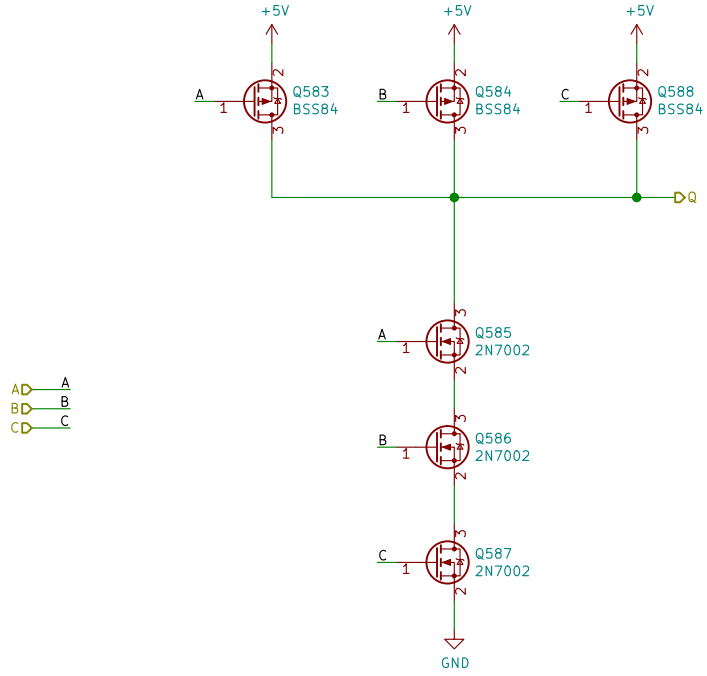
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+5V
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Q584
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C
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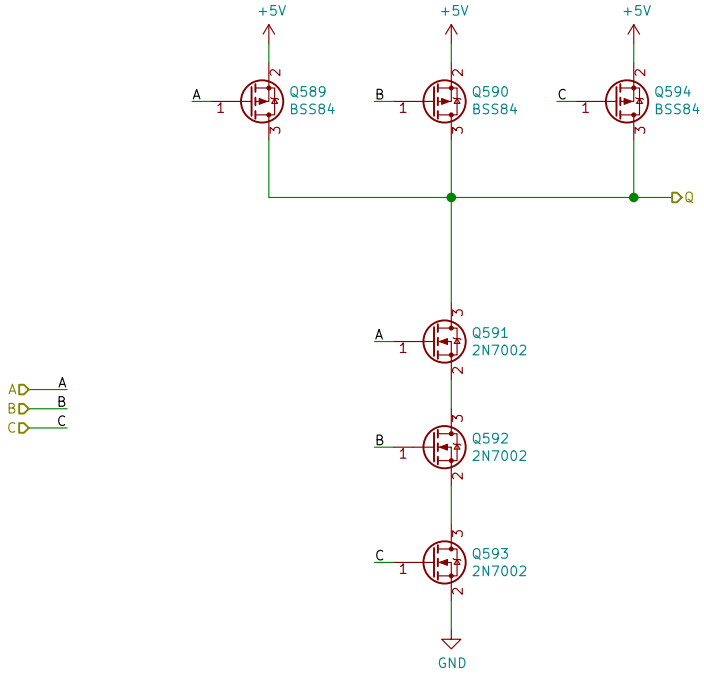
GND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+5V
+5V
A
B
C
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BSS84
Q590
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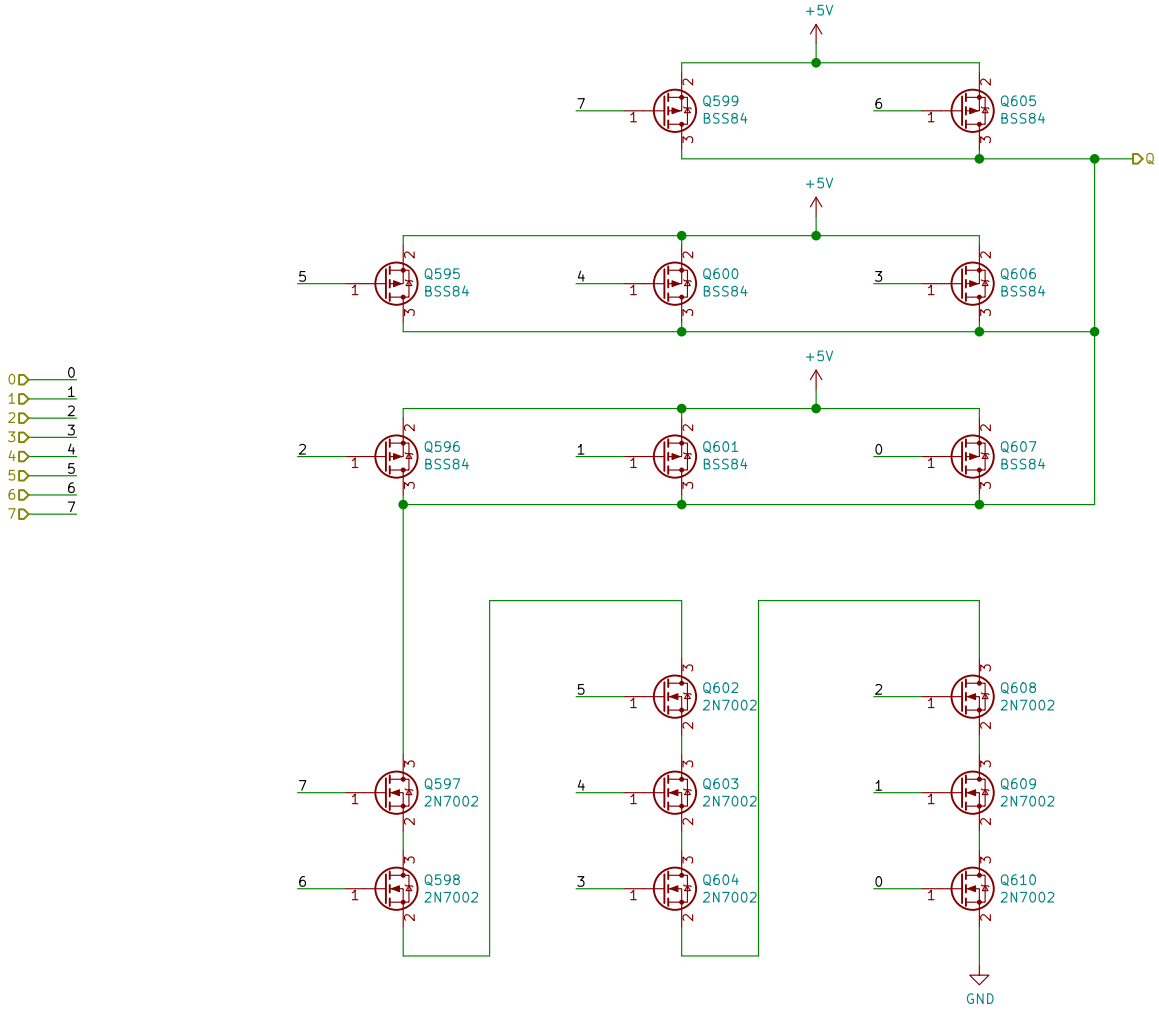
A
B
C


0
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BSS84
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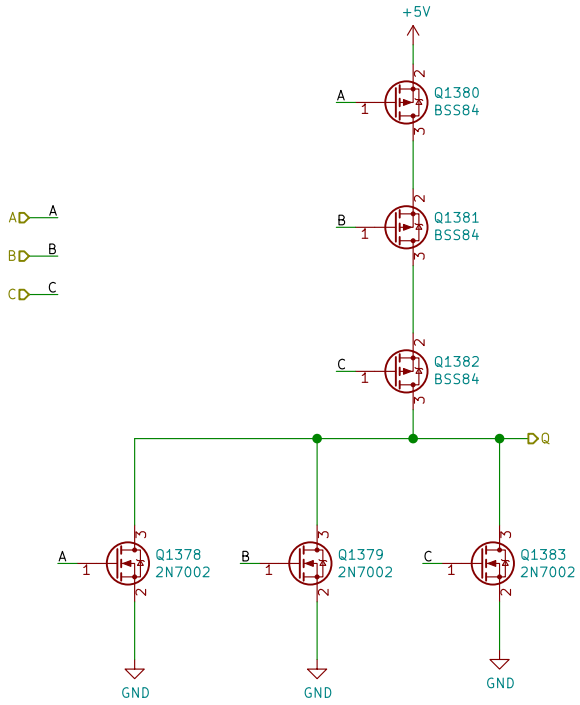
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Q1383
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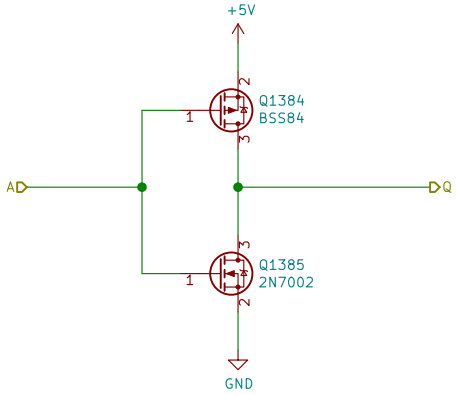
GND
GND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Q
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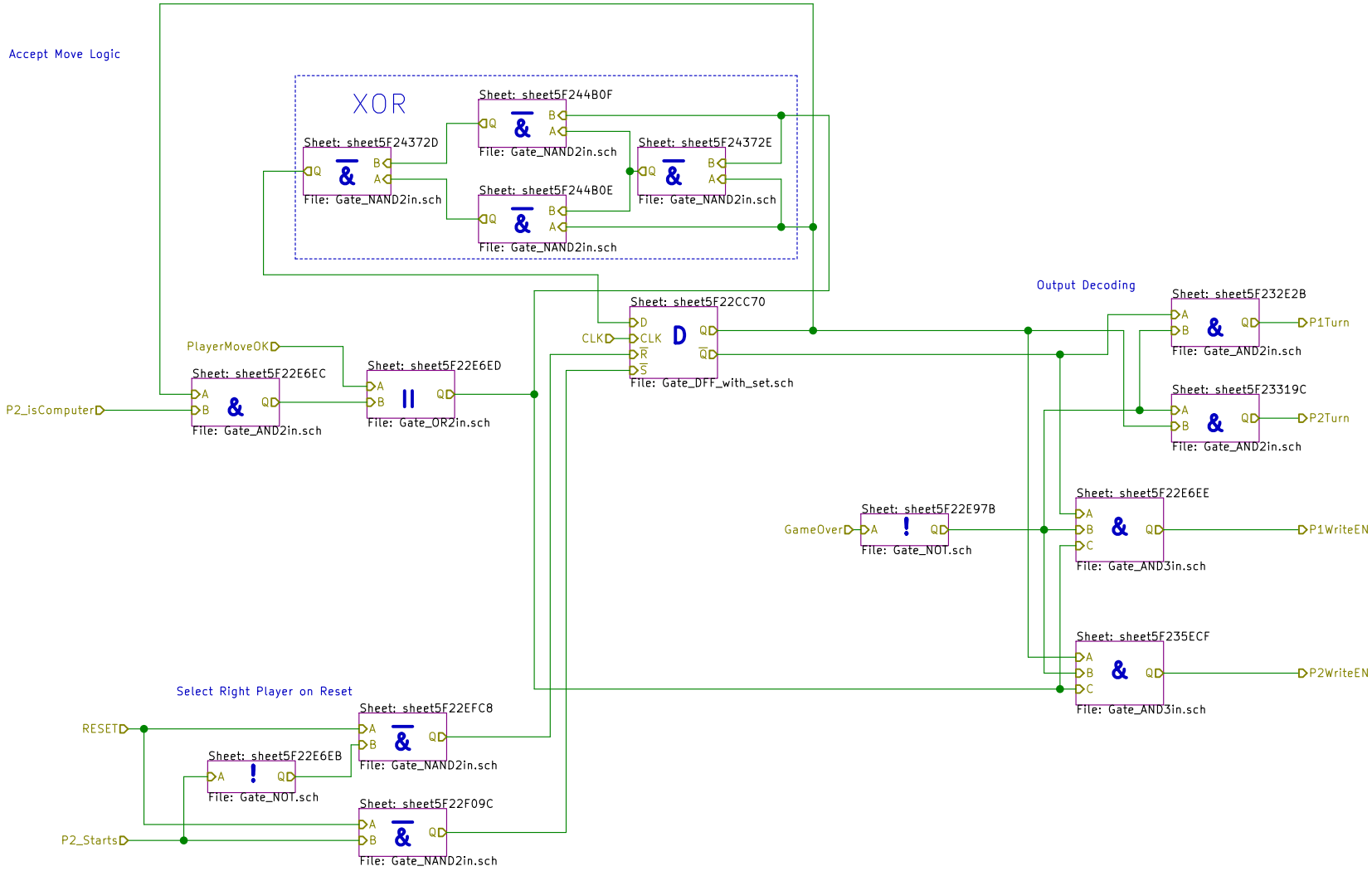
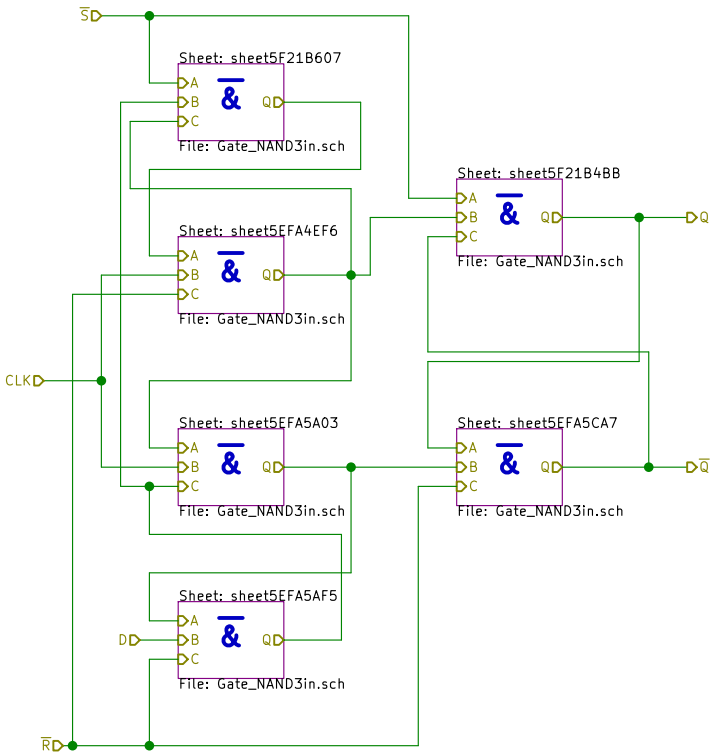
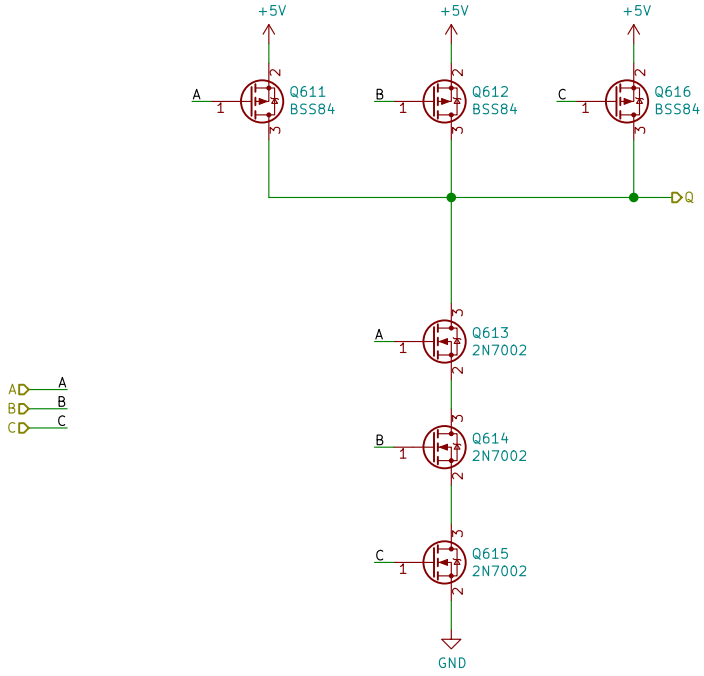
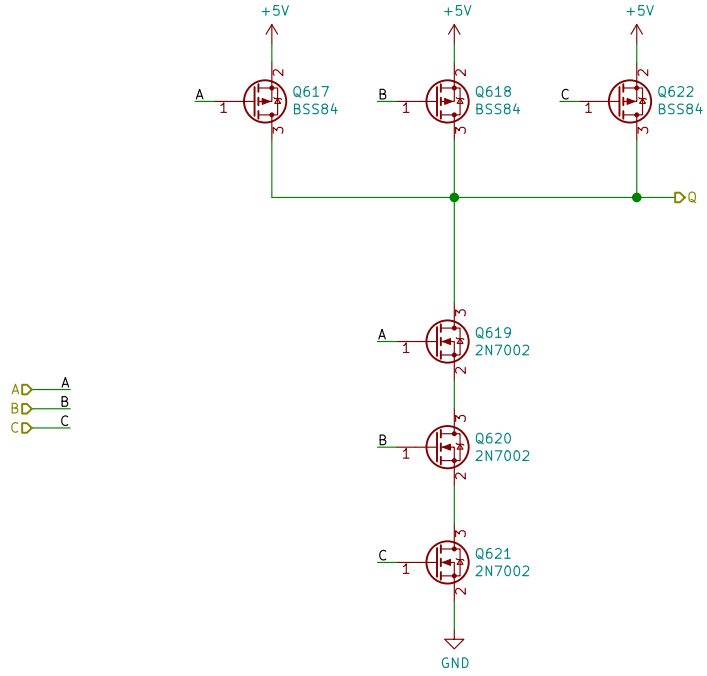
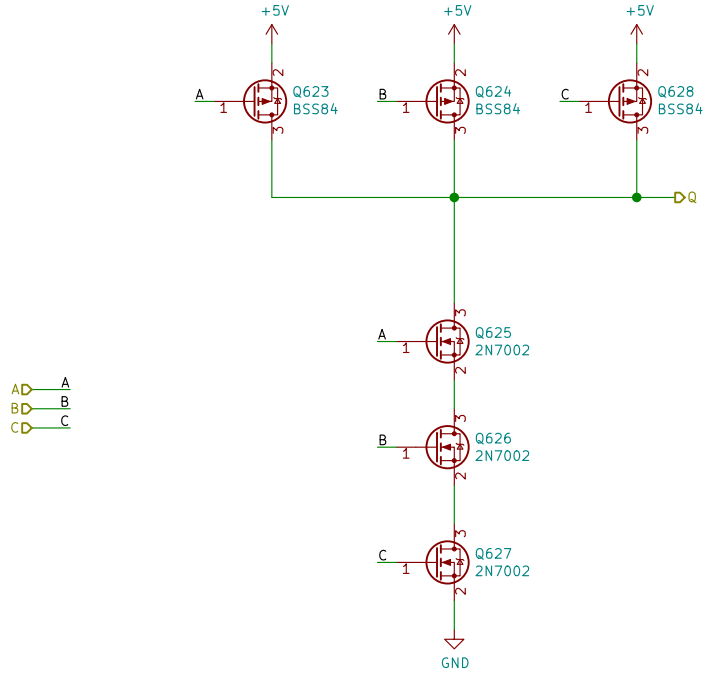
2N7002
GND

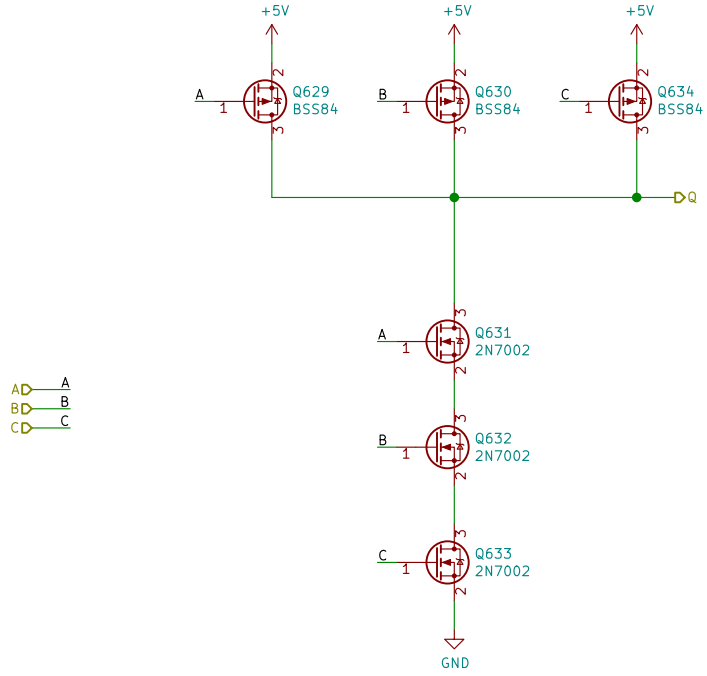

Accept Move Logic
XOR
Sheet: sheet5F24372D
File: Gate_NAND2in.sch
Sheet: sheet5F244B0F
File: Gate_NAND2in.sch
Sheet: sheet5F244B0E
File: Gate_NAND2in.sch
Sheet: sheet5F24372E
File: Gate_NAND2in.sch
PlayerMoveOK
P2_isComputer
Sheet: sheet5F22E6EC
File: Gate_AND2in.sch
Sheet: sheet5F22E6ED
File: Gate_OR2in.sch
CLK
Sheet: sheet5F22CC70
File: Gate_DFF_with_set.sch
Output Decoding
Sheet: sheet5F232E2B
File: Gate_AND2in.sch
P1Turn
Sheet: sheet5F23319C
File: Gate_AND2in.sch
P2Turn
GameOver
Sheet: sheet5F22E97B
File: Gate_NOT.sch
Sheet: sheet5F22E6EE
File: Gate_AND3in.sch
P1WriteEN
Sheet: sheet5F235ECF
File: Gate_AND3in.sch
P2WriteEN
Select Right Player on Reset
RESET
Sheet: sheet5F22EFC8
File: Gate_NAND2in.sch
Sheet: sheet5F22E6EB
File: Gate_NOT.sch
P2_Starts
Sheet: sheet5F22F09C
File: Gate_NAND2in.sch

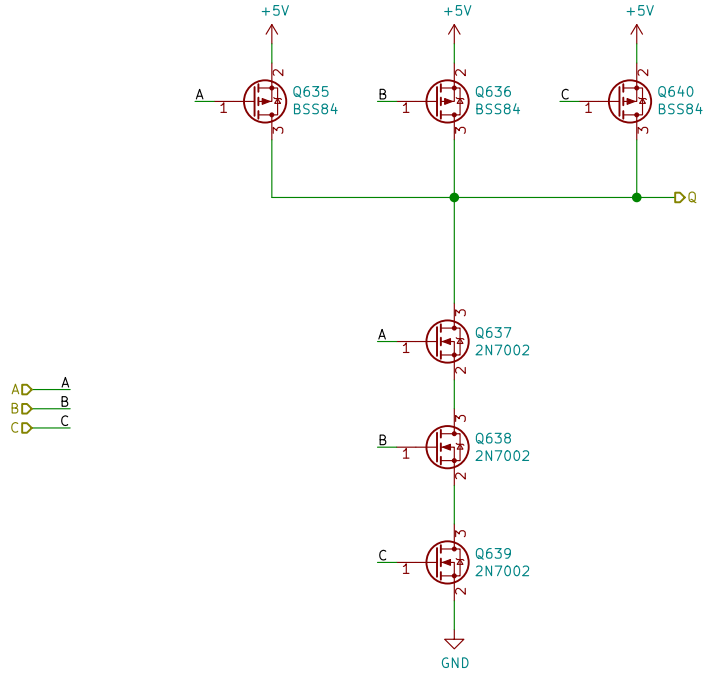

S
Sheet: sheet5F21B607
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5F21B4BB
A
B
C
Q
File: Gate_NAND3in.sch
Q
Sheet: sheet5EFA4EF6
A
B
C
Q
File: Gate_NAND3in.sch
CLK
Sheet: sheet5EFA5A03
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
File: Gate_NAND3in.sch
Q
Sheet: sheet5EFA5AF5
A
B
C
Q
File: Gate_NAND3in.sch
D
R

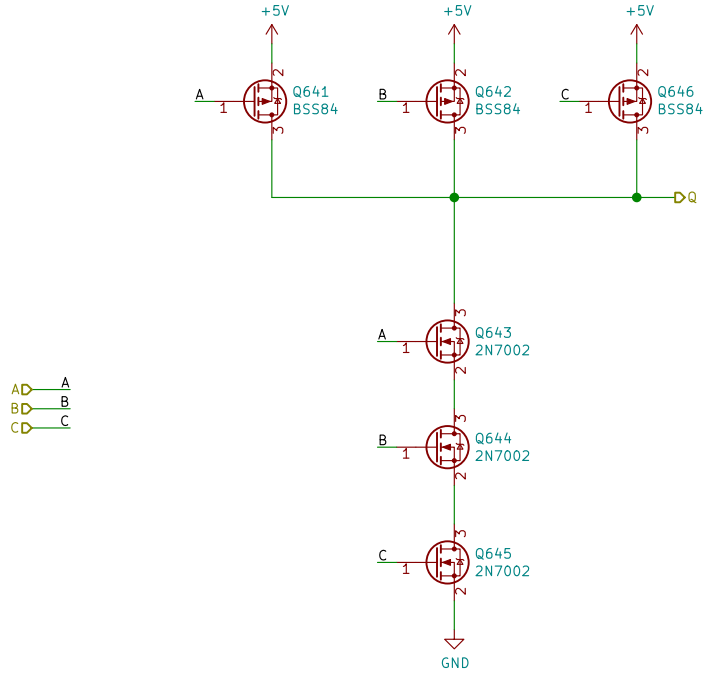

+5V
+5V
+5V
A
B
C
Q611
BSS84
Q612
BSS84
Q616
BSS84
Q
A
B
C
Q613
2N7002
Q614
2N7002
Q615
2N7002
GND

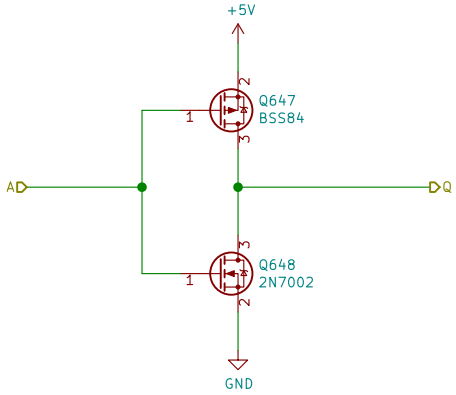

+5V
+5V
+5V
A
B
C
Q617
BSS84
Q618
BSS84
Q622
BSS84
Q
Q619
2N7002
Q620
2N7002
Q621
2N7002
GND
A
B
C

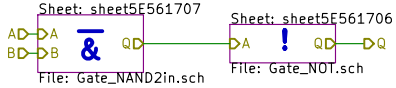

+5V
+5V
+5V
A
B
C
Q623
BSS84
Q624
BSS84
Q628
BSS84
Q
Q625
2N7002
Q626
2N7002
Q627
2N7002
GND
A
B
C

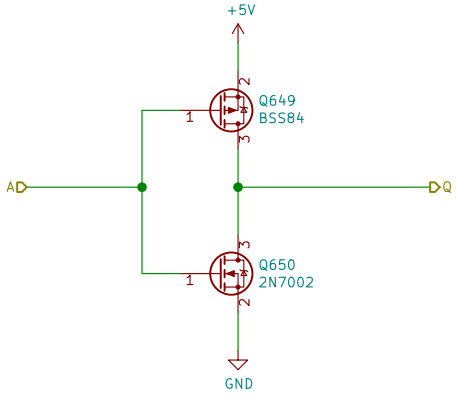

+5V
+5V
+5V
A
B
C
Q629
BSS84
Q630
BSS84
Q634
BSS84
Q
Q631
2N7002
Q632
2N7002
Q633
2N7002
GND
A
B
C

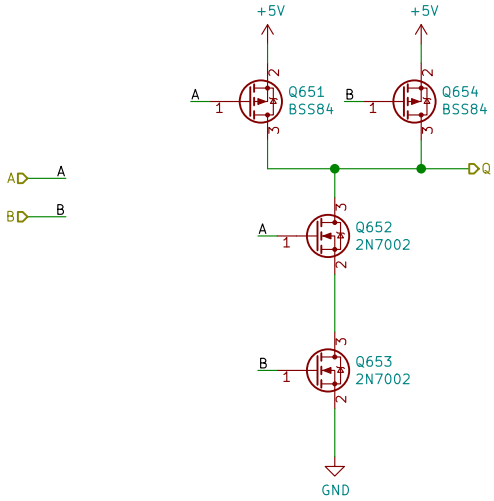

+5V
+5V
+5V
A
B
C
Q635
BSS84
Q636
BSS84
Q640
BSS84
Q
A
B
C
Q637
2N7002
Q638
2N7002
Q639
2N7002
GND

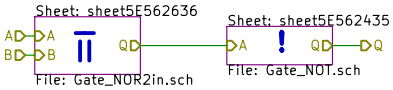

+5V
+5V
+5V
A
B
C
Q641
BSS84
Q642
BSS84
Q646
BSS84
Q
A
B
C
Q643
2N7002
Q644
2N7002
Q645
2N7002
GND

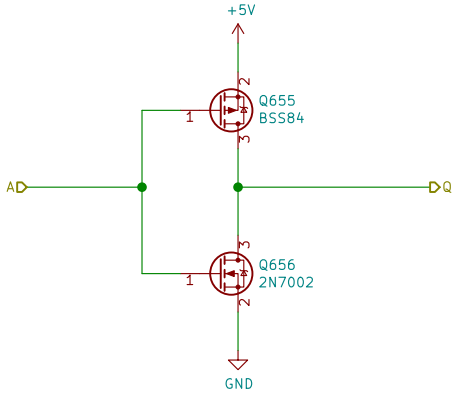

+5V
Q647
BSS84
A
Q
Q648
2N7002
GND

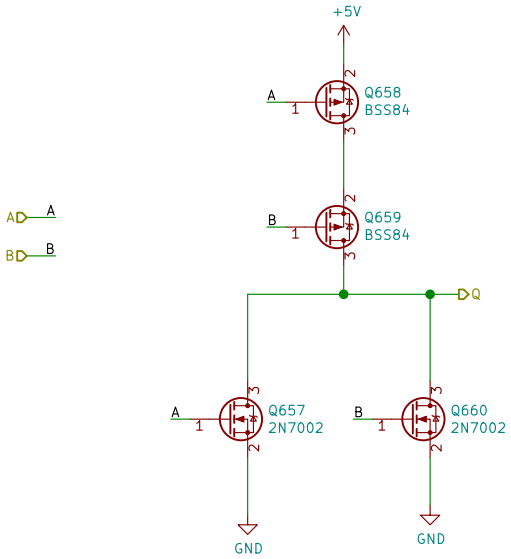

Sheet: sheet5E561707
A
B
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5E561706
A
!
Q
Q
File: Gate_NOT.sch

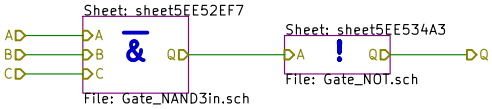

+5V
Q649
BSS84
A
Q
Q650
2N7002
GND

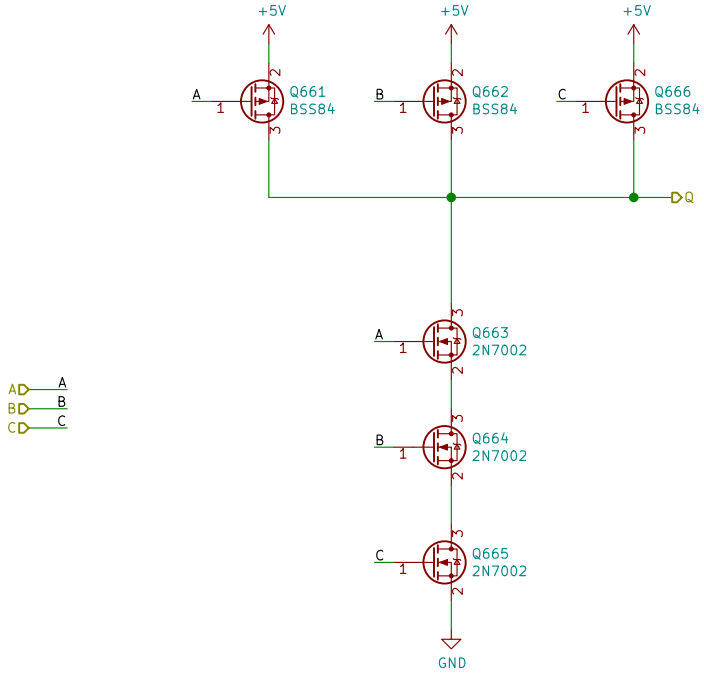

+5V
+5V
A
B
Q651
BSS84
Q654
BSS84
Q
A
B
Q652
2N7002
Q653
2N7002
GND

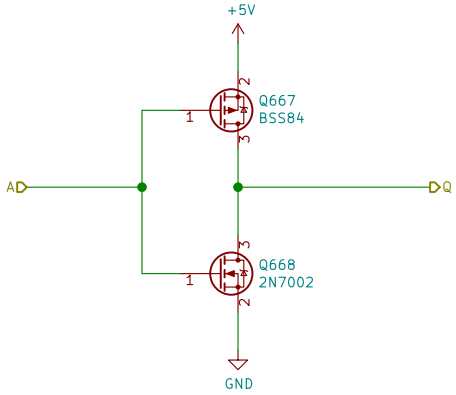

Sheet: sheet5E562636
A
B
A
B
Q
File: Gate_NOR2in.sch
Sheet: sheet5E562435
A
Q
Q
File: Gate_NOT.sch

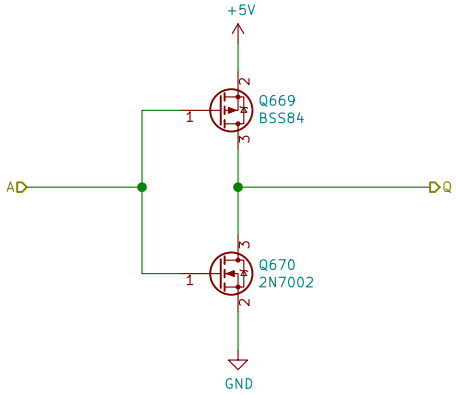

+5V
Q655
BSS84
A
Q
Q656
2N7002
GND

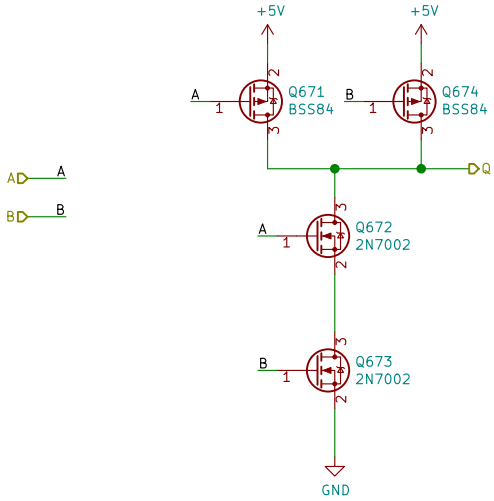

+5V
A
B
Q
Q658
BSS84
Q659
BSS84
Q657
2N7002
Q660
2N7002
GND
GND

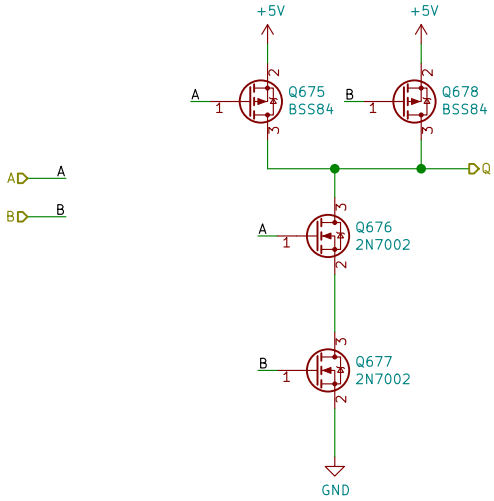

Sheet: sheet5EE52EF7
A
B
C
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EE534A3
A
Q
File: Gate_NOT.sch
Q

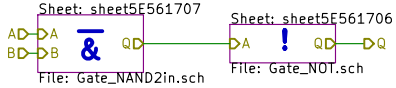

+5V
+5V
+5V
A
B
C
Q661
BSS84
Q662
BSS84
Q666
BSS84
Q
Q663
2N7002
Q664
2N7002
Q665
2N7002
GND
A
B
C

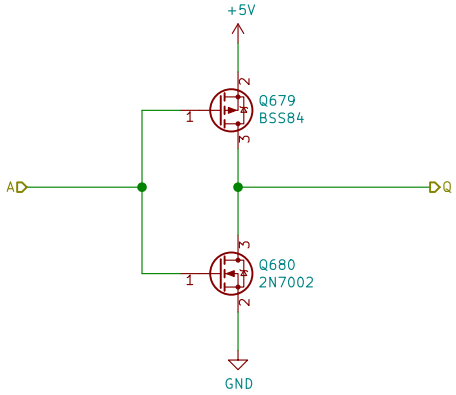

+5V
Q667
BSS84
A
Q
Q668
2N7002
GND

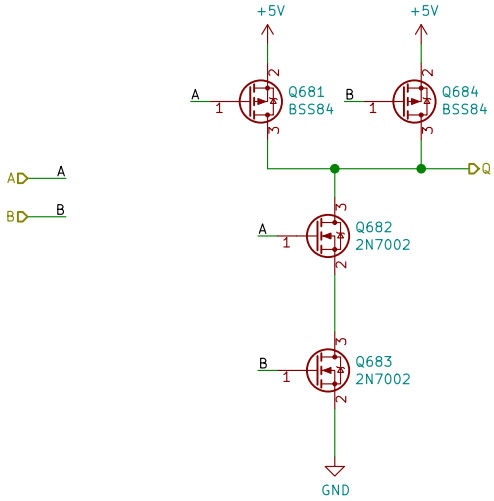

+5V
Q669
BSS84
A
Q
Q670
2N7002
GND

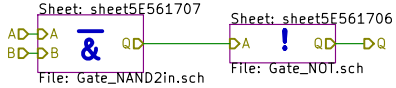

+5V
+5V
A
B
Q671
BSS84
Q674
BSS84
A
B
Q
Q672
2N7002
Q673
2N7002
GND

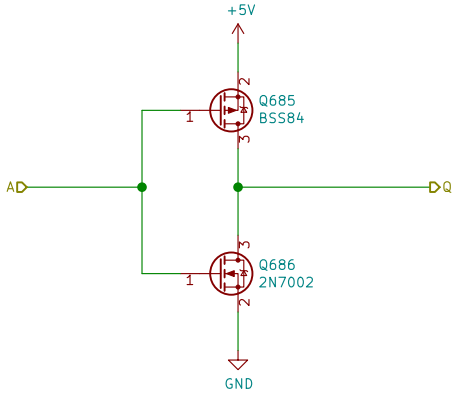

+5V
+5V
A
B
Q675
BSS84
Q678
BSS84
A
B
Q
Q676
2N7002
Q677
2N7002
GND

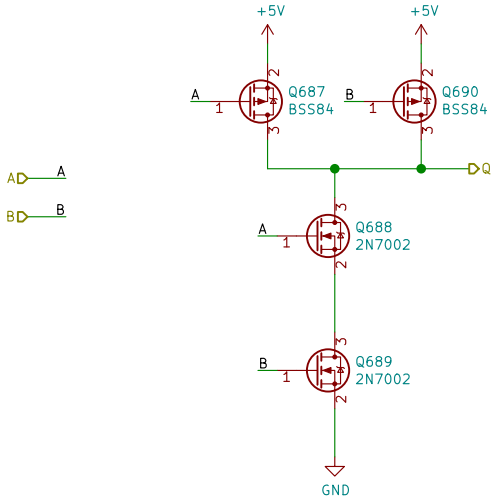

Sheet: sheet5E561707
A
B
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5E561706
A
!
Q
Q
File: Gate_NOT.sch

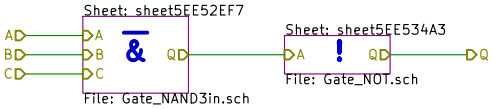

+5V
Q679
BSS84
A
Q
Q680
2N7002
GND

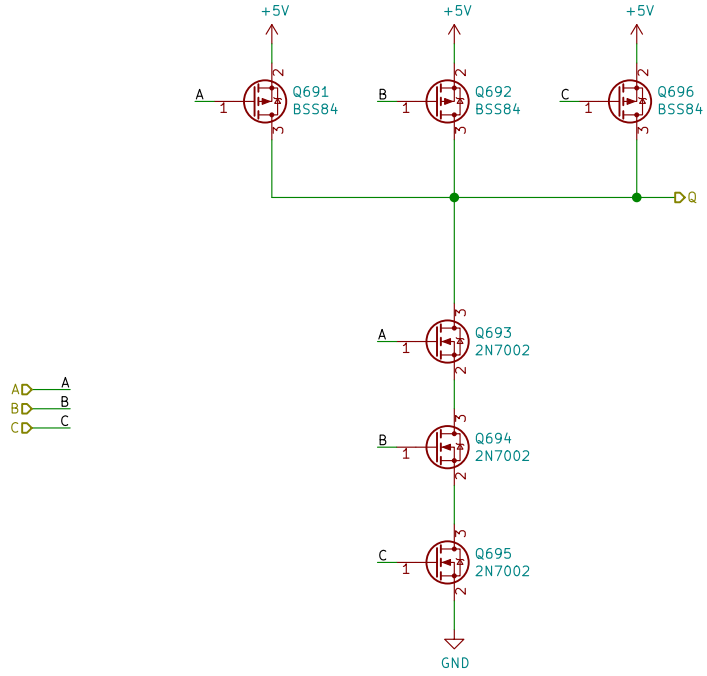

+5V
+5V
A
B
Q681
BSS84
Q684
BSS84
Q
A
B
Q682
2N7002
Q683
2N7002
GND

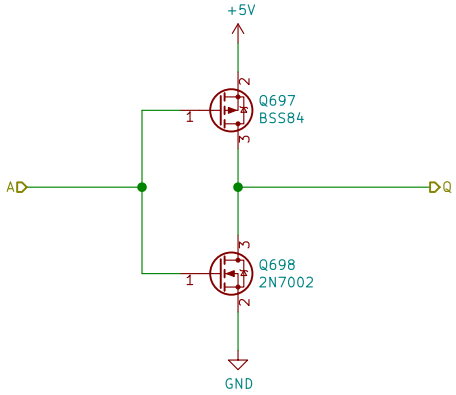

Sheet: sheet5E561707
A
B
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5E561706
A
!
Q
Q
File: Gate_NOT.sch


+5V
Q685
BSS84
A
Q
Q686
2N7002
GND


+5V
+5V
A
B
Q687
BSS84
Q690
BSS84
Q
A
B
Q688
2N7002
Q689
2N7002
GND


Sheet: sheet5EE52EF7
A
B
C
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EE534A3
A
Q
File: Gate_NOT.sch
Q


+5V
+5V
+5V
A
B
C
Q691
BSS84
Q692
BSS84
Q696
BSS84
Q
A
B
C
Q693
2N7002
Q694
2N7002
Q695
2N7002
GND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Q697
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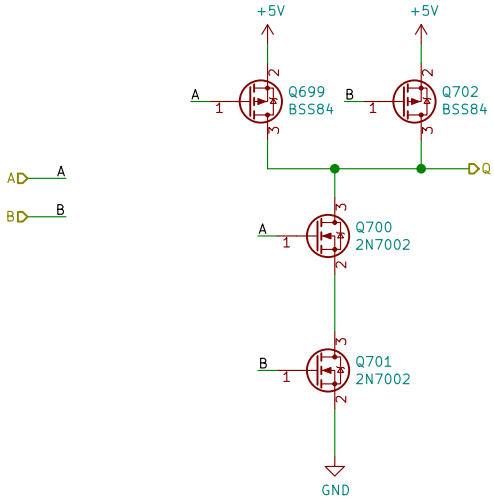
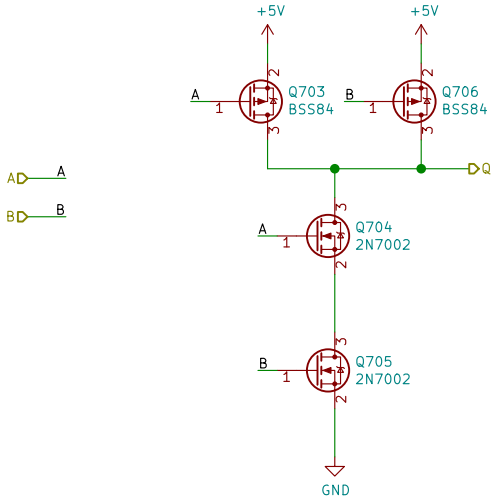
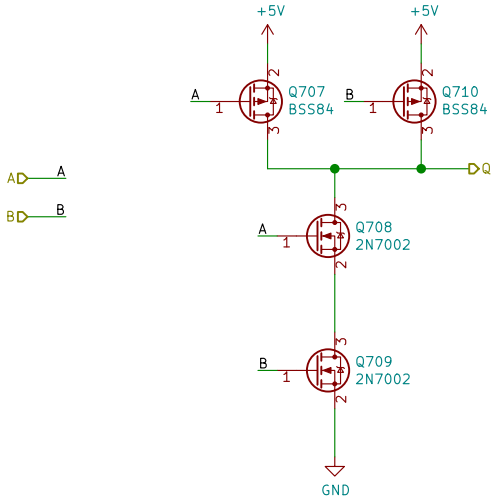
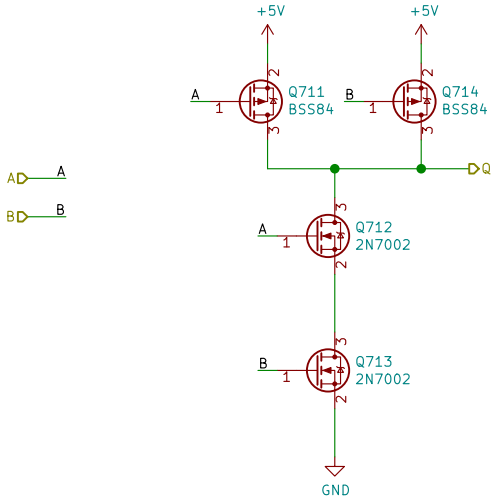
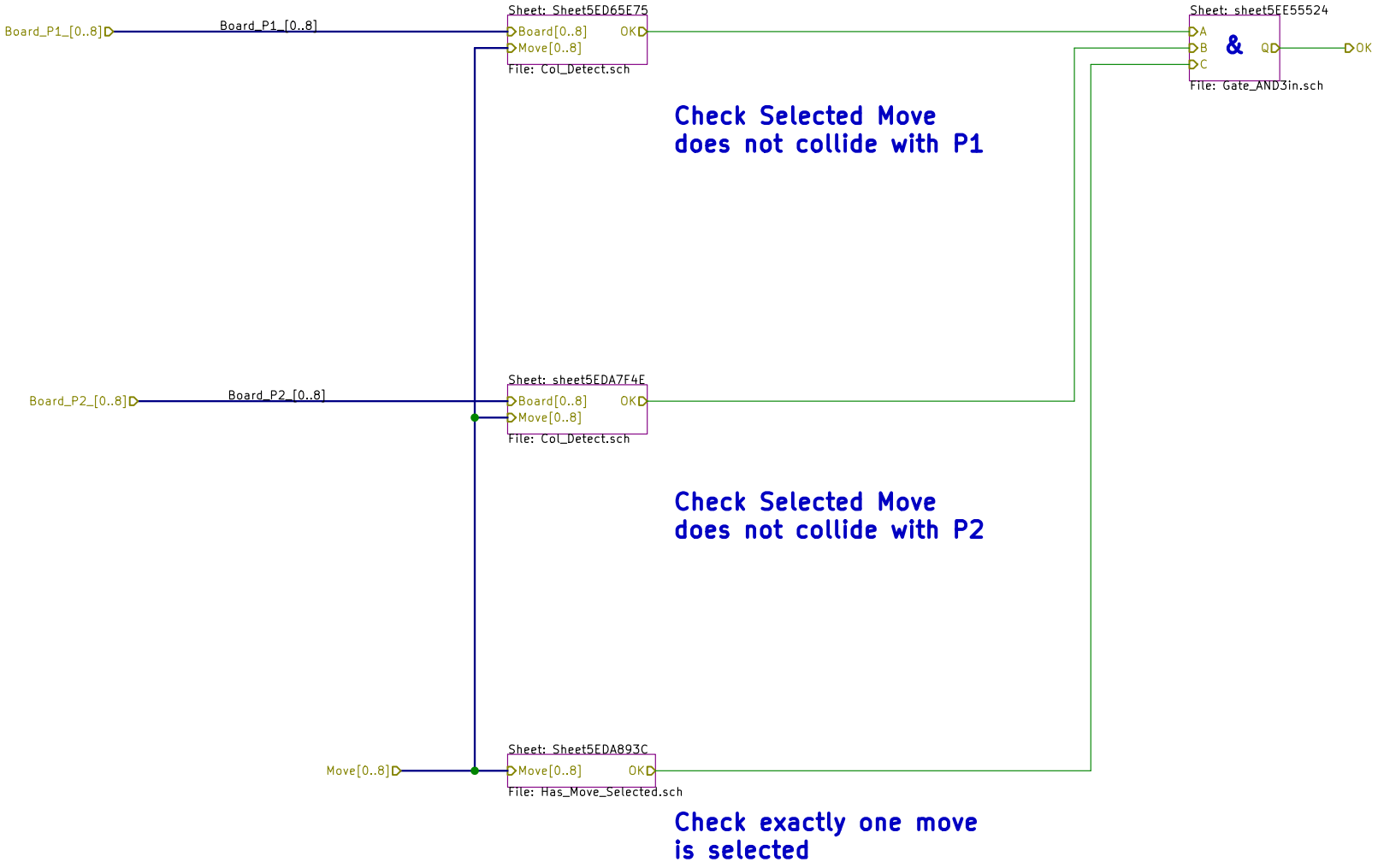
A
Q
Q698
2N7002
GND

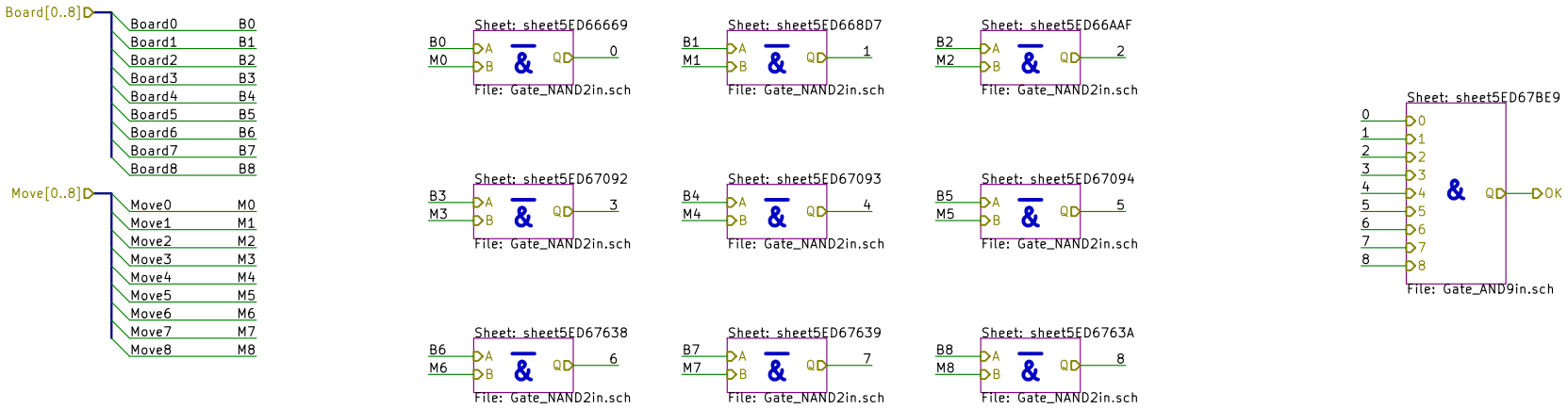

+5V
+5V
A
B
Q699
BSS84
Q702
BSS84
Q
A
B
Q700
2N7002
Q701
2N7002
GND

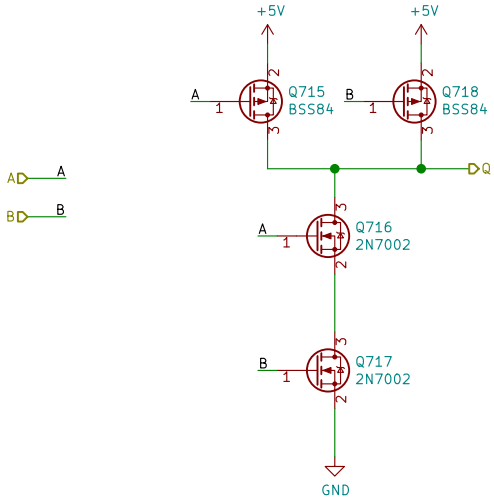

+5V
+5V
A
B
Q703
BSS84
Q706
BSS84
A
B
Q
Q704
2N7002
Q705
2N7002
GND

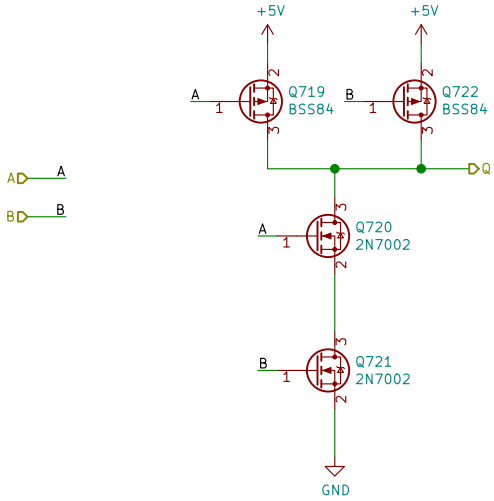

+5V
+5V
A
B
Q707
BSS84
Q710
BSS84
Q
A
B
Q708
2N7002
Q709
2N7002
GND

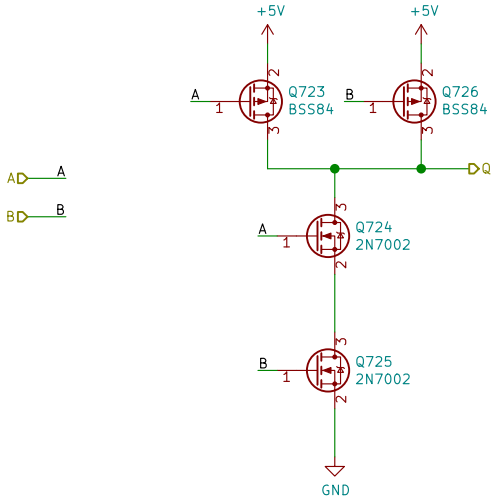

+5V
+5V
A
B
Q711
BSS84
Q714
BSS84
Q
A
B
Q712
2N7002
Q713
2N7002
GND

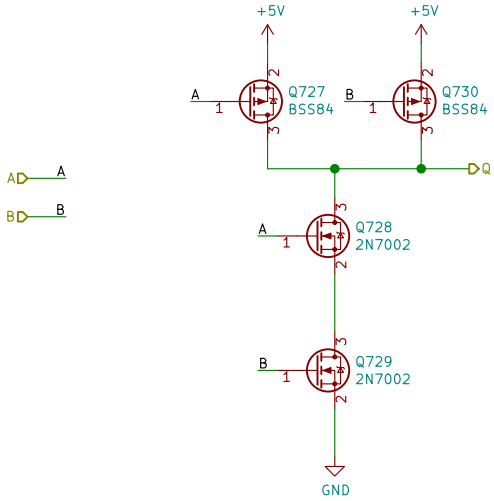

Board_P1_[0..8]
Board_P1_[0..8]
Sheet: Sheet5ED65E75
Board[0..8]
Move[0..8]
OK
File: Col_Detect.sch
Sheet: sheet5EE55524
A
B
C
&
Q
OK
File: Gate_AND3in.sch
Check Selected Move
does not collide with P1
Board_P2_[0..8]
Board_P2_[0..8]
Sheet: sheet5EDA7F4E
Board[0..8]
Move[0..8]
OK
File: Col_Detect.sch
Check Selected Move
does not collide with P2
Move[0..8]
Sheet: Sheet5EDA893C
Move[0..8]
OK
File: Has_Move_Selected.sch
Check exactly one move
is selected

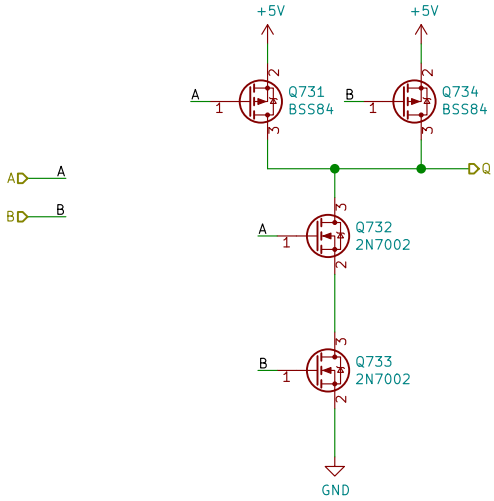

Board[0..8]
Board0 B0
Board1 B1
Board2 B2
Board3 B3
Board4 B4
Board5 B5
Board6 B6
Board7 B7
Board8 B8
Move[0..8]
Move0 M0
Move1 M1
Move2 M2
Move3 M3
Move4 M4
Move5 M5
Move6 M6
Move7 M7
Move8 M8
Sheet: sheet5ED66669
B0
M0
A
B
&
QD
0
File: Gate_NAND2in.sch
Sheet: sheet5ED668D7
B1
M1
1
Sheet: sheet5ED66AAF
B2
M2
2
Sheet: sheet5ED67092
B3
M3
3
Sheet: sheet5ED67093
B4
M4
4
Sheet: sheet5ED67094
B5
M5
5
Sheet: sheet5ED67638
B6
M6
6
Sheet: sheet5ED67639
B7
M7
7
Sheet: sheet5ED6763A
B8
M8
8
Sheet: sheet5ED67BE9
0
1
2
3
4
5
6
7
8
OK
File: Gate_AND9in.sch

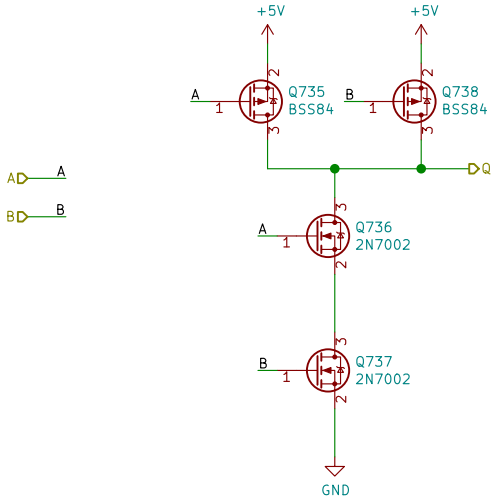

+5V
+5V
A
B
Q715
BSS84
Q718
BSS84
Q
A
B
Q716
2N7002
Q717
2N7002
GND

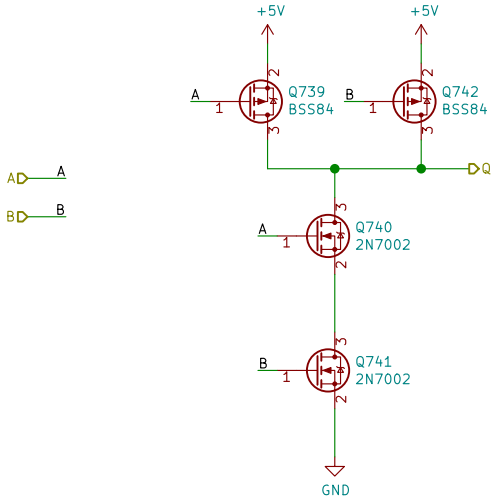

+5V
+5V
A
1
Q719
BSS84
B
1
Q722
BSS84
2
3
2
3
Q
A
B
A
1
Q720
2N7002
B
1
Q721
2N7002
3
2
3
2
GND

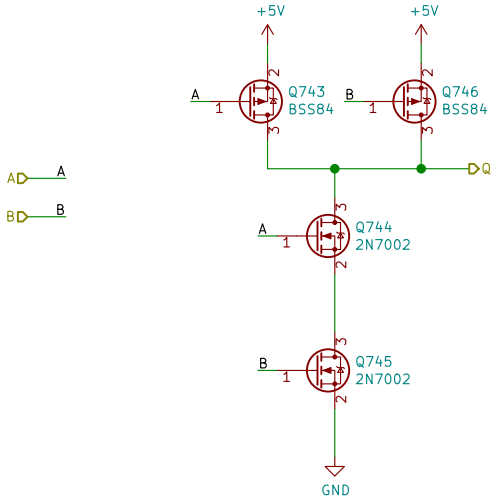

+5V
+5V
A
B
Q723
BSS84
Q726
BSS84
A
B
Q
Q724
2N7002
Q725
2N7002
GND

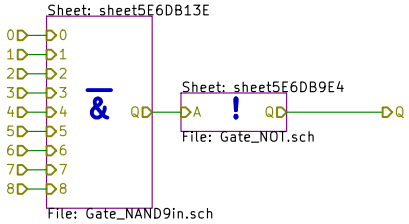

+5V
+5V
A
B
Q727
BSS84
Q730
BSS84
Q
A
B
Q728
2N7002
Q729
2N7002
GND

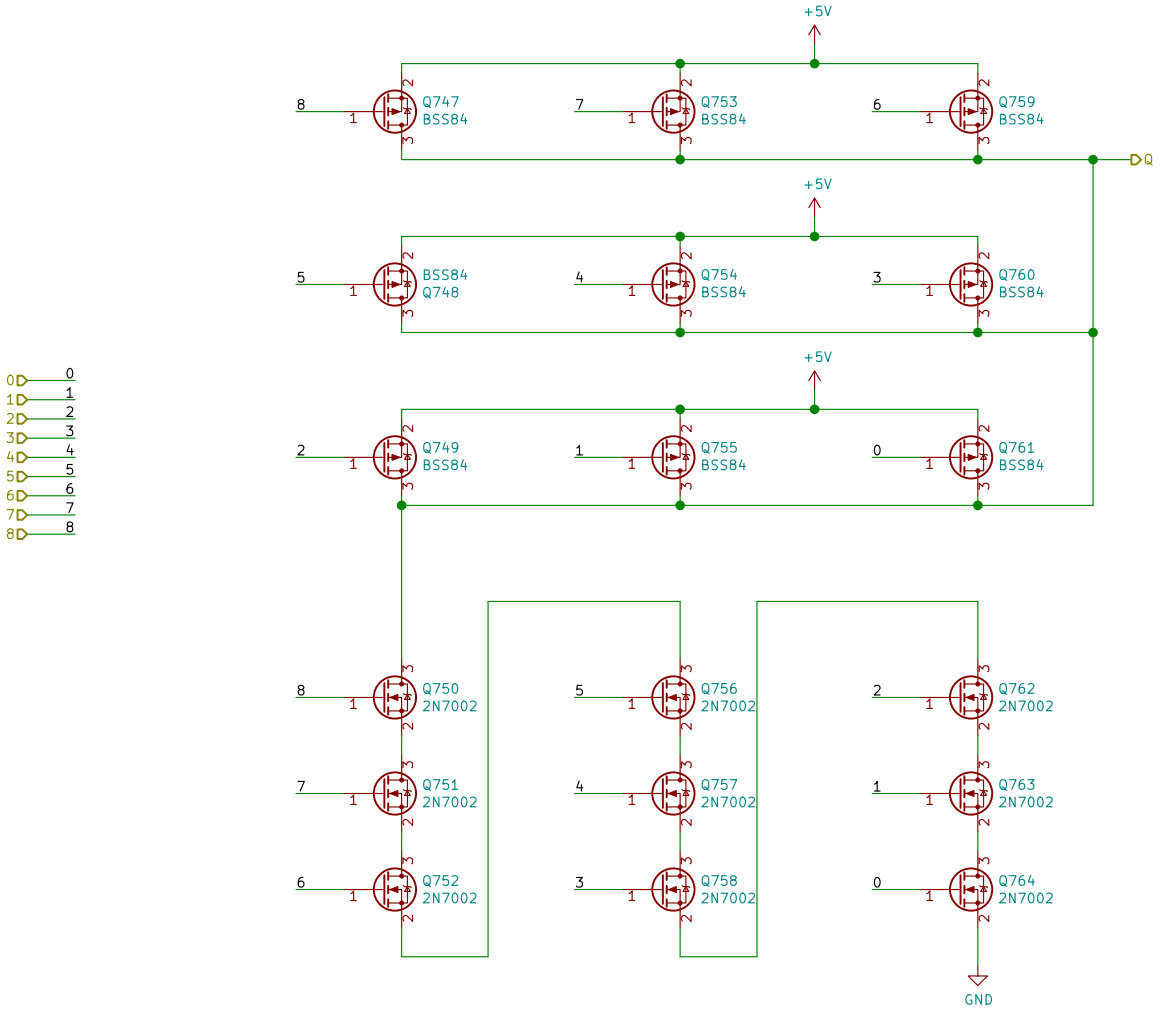

+5V
+5V
A
B
Q731
BSS84
Q734
BSS84
Q
A
B
Q732
2N7002
Q733
2N7002
GND

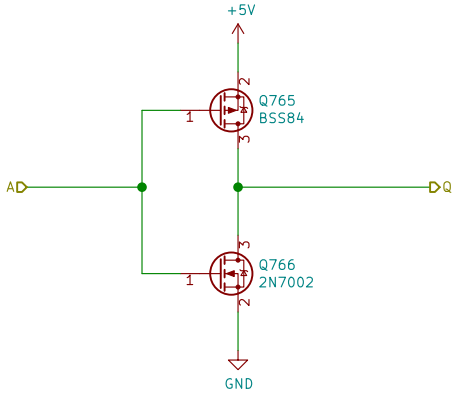

+5V
+5V
A
B
Q735
BSS84
Q738
BSS84
Q
A
B
Q736
2N7002
Q737
2N7002
GND

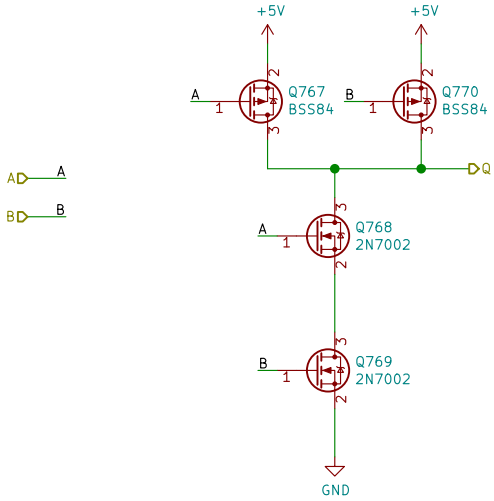

+5V
+5V
A
B
Q739
BSS84
Q742
BSS84
Q
A
B
Q740
2N7002
Q741
2N7002
GND

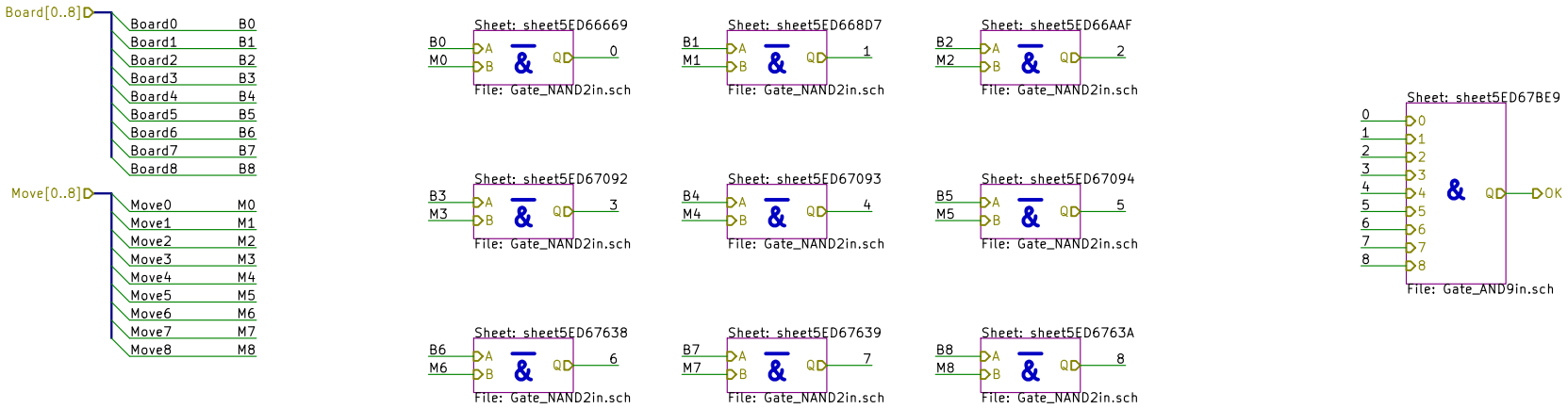

+5V
+5V
A
B
Q743
BSS84
Q746
BSS84
Q
A
B
Q744
2N7002
Q745
2N7002
GND

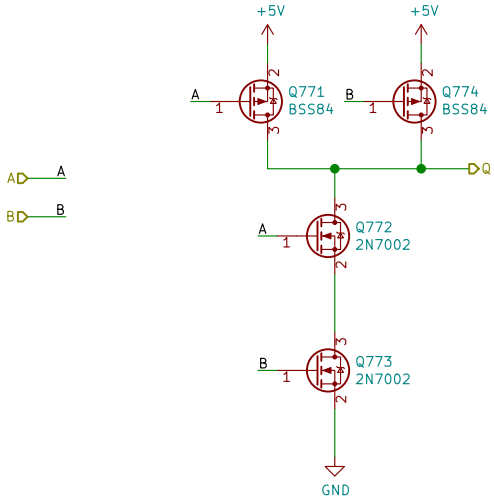

Sheet: sheet5E6DB13E
0
1
2
3
4
5
6
7
8
0
1
2
3
4
5
6
7
8
&
Q
File: Gate_NAND9in.sch
Sheet: sheet5E6DB9E4
A
!
Q
Q
File: Gate_NOT.sch

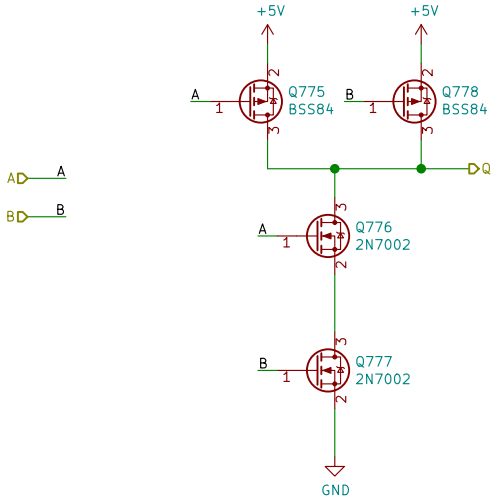

0
1
2
3
4
5
6
7
8
+5V
Q747
BSS84
Q753
BSS84
Q759
BSS84
Q
+5V
BSS84
Q748
Q754
BSS84
Q760
BSS84
+5V
Q749
BSS84
Q755
BSS84
Q761
BSS84
Q750
2N7002
Q751
2N7002
Q752
2N7002
Q756
2N7002
Q757
2N7002
Q758
2N7002
Q762
2N7002
Q763
2N7002
Q764
2N7002
GND

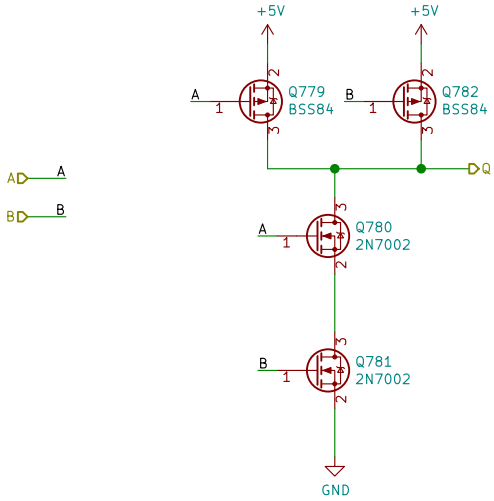

+5V
Q765
BSS84
A
Q
Q766
2N7002
GND

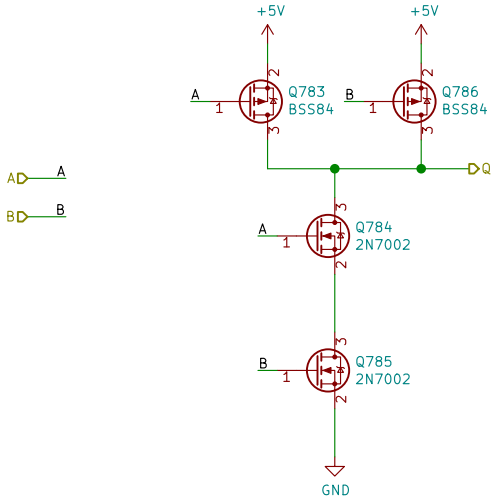

+5V
+5V
A
B
Q767
BSS84
Q770
BSS84
Q
A
B
Q768
2N7002
Q769
2N7002
GND

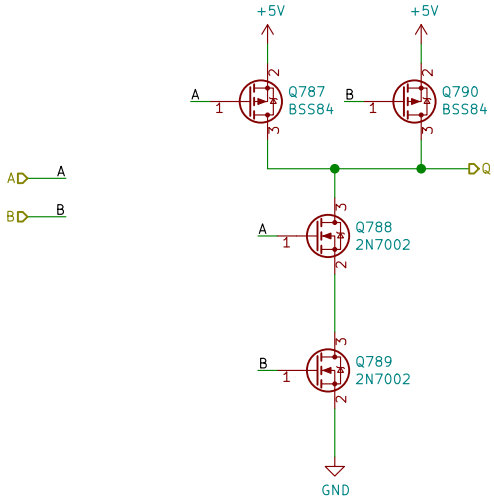

Board[0..8]
Board0 B0
Board1 B1
Board2 B2
Board3 B3
Board4 B4
Board5 B5
Board6 B6
Board7 B7
Board8 B8
Move[0..8]
Move0 M0
Move1 M1
Move2 M2
Move3 M3
Move4 M4
Move5 M5
Move6 M6
Move7 M7
Move8 M8
Sheet: sheet5ED66669
B0
M0
A
B
&
QD
0
File: Gate_NAND2in.sch
Sheet: sheet5ED668D7
B1
M1
1
Sheet: sheet5ED66AAF
B2
M2
2
Sheet: sheet5ED67092
B3
M3
3
Sheet: sheet5ED67093
B4
M4
4
Sheet: sheet5ED67094
B5
M5
5
Sheet: sheet5ED67638
B6
M6
6
Sheet: sheet5ED67639
B7
M7
7
Sheet: sheet5ED6763A
B8
M8
8
Sheet: sheet5ED67BE9
0
1
2
3
4
5
6
7
8
OK
File: Gate_AND9in.sch

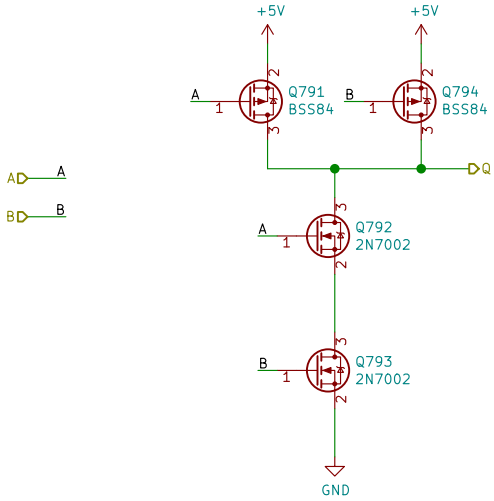

+5V
+5V
A
B
Q771
BSS84
Q774
BSS84
Q
A
B
Q772
2N7002
Q773
2N7002
GND

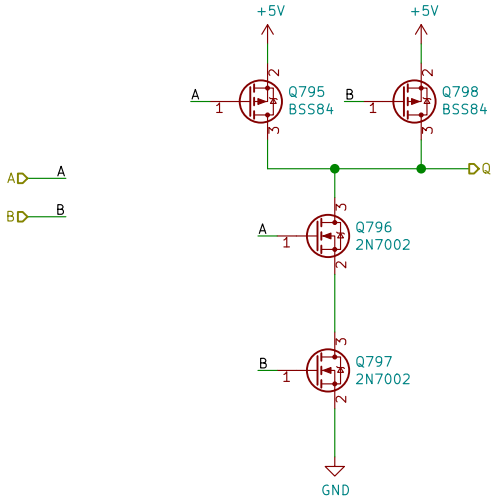

+5V
+5V
A
B
Q775
BSS84
Q778
BSS84
Q
A
B
Q776
2N7002
Q777
2N7002
GND

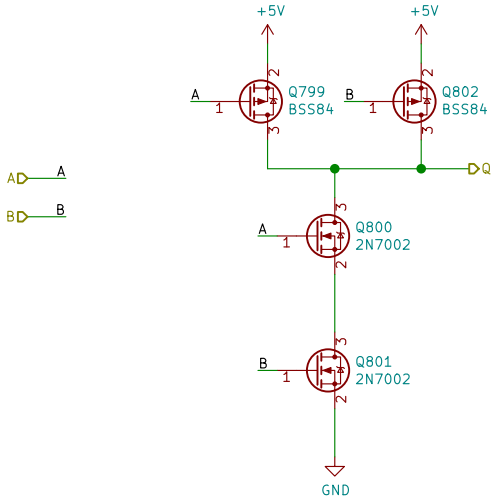

+5V
+5V
A
B
Q779
BSS84
Q782
BSS84
Q
A
B
Q780
2N7002
Q781
2N7002
GND

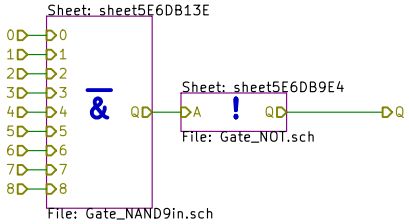

+5V
+5V
A
B
Q783
BSS84
Q786
BSS84
Q
A
B
Q784
2N7002
Q785
2N7002
GND

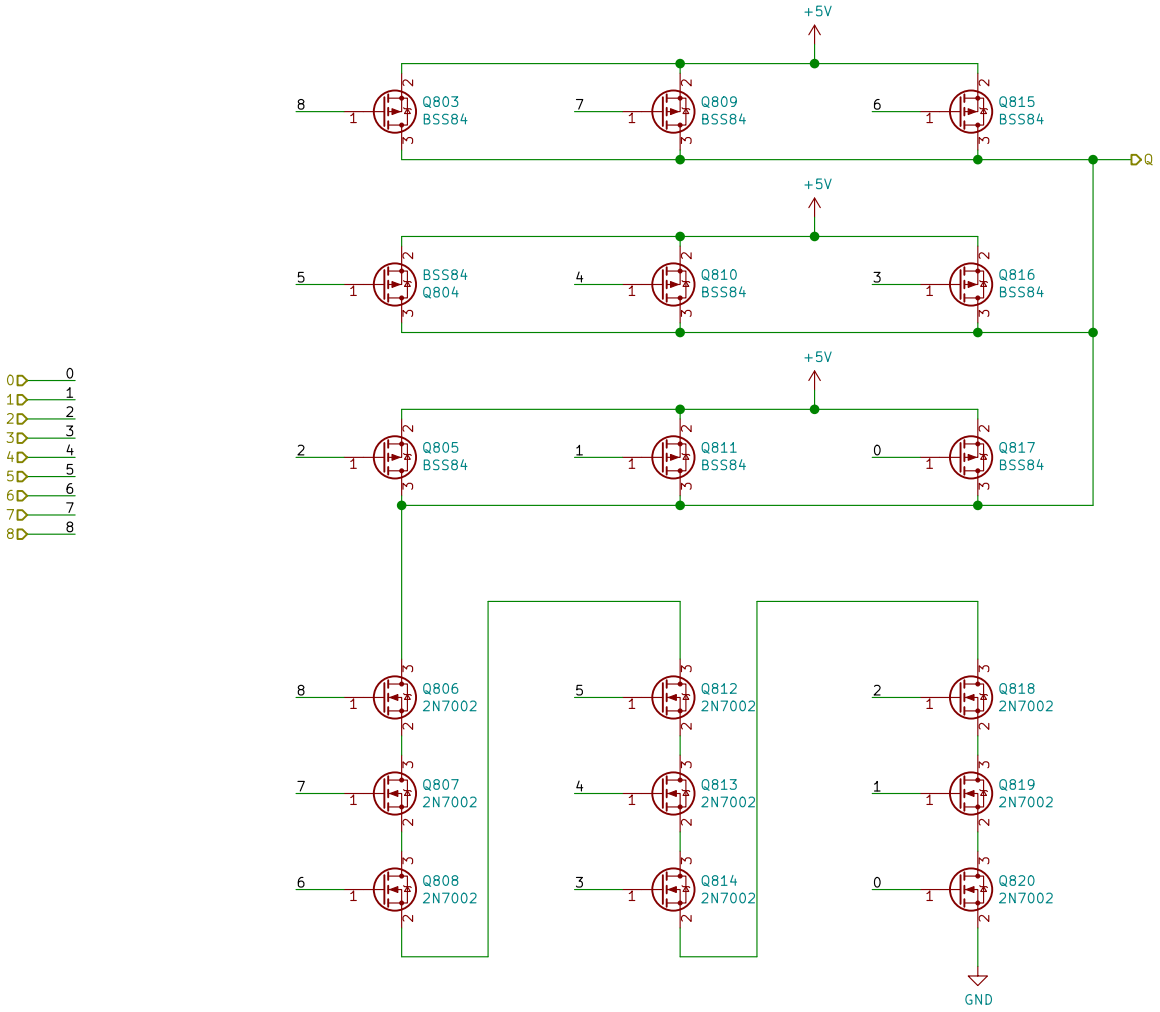

+5V
+5V
A
B
Q787
BSS84
Q790
BSS84
Q
A
B
Q788
2N7002
Q789
2N7002
GND

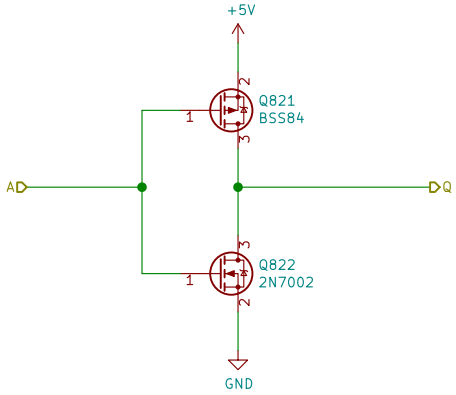

+5V
+5V
A
B
Q791
BSS84
Q794
BSS84
Q
A
B
Q792
2N7002
Q793
2N7002
GND

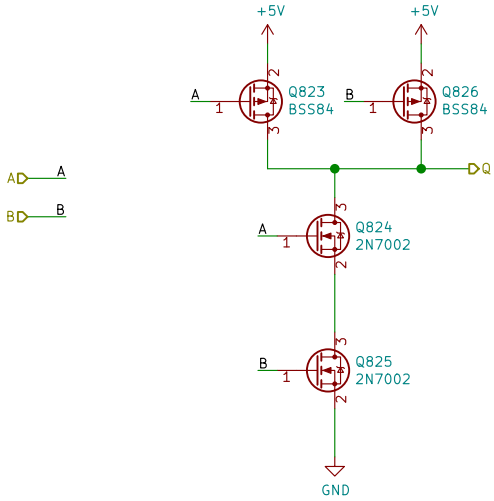

+5V
+5V
A
B
Q795
BSS84
Q798
BSS84
Q
A
B
Q796
2N7002
Q797
2N7002
GND

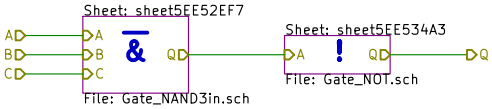

+5V
+5V
A
B
Q799
BSS84
Q802
BSS84
Q
A
B
Q800
2N7002
Q801
2N7002
GND

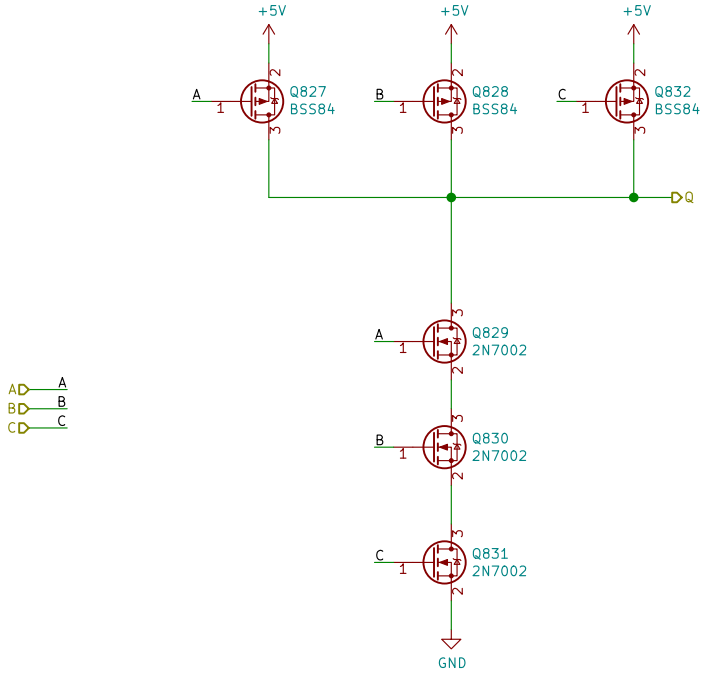

Sheet: sheet5E6DB13E
0
1
2
3
4
5
6
7
8
0
1
2
3
4
5
6
7
8
&
Q
File: Gate_NAND9in.sch
Sheet: sheet5E6DB9E4
A
!
Q
Q
File: Gate_NOT.sch

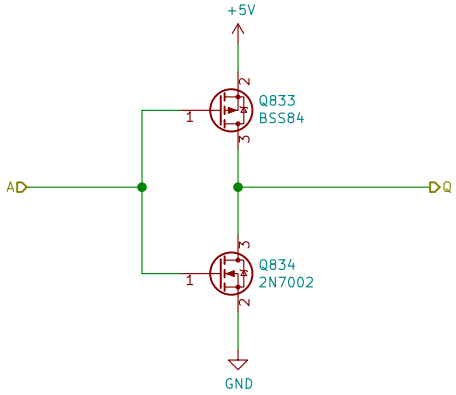

+5V
Q803
BSS84
Q809
BSS84
Q815
BSS84
Q
+5V
BSS84
Q804
Q810
BSS84
Q816
BSS84
+5V
Q805
BSS84
Q811
BSS84
Q817
BSS84
Q806
2N7002
Q807
2N7002
Q808
2N7002
Q812
2N7002
Q813
2N7002
Q814
2N7002
Q818
2N7002
Q819
2N7002
Q820
2N7002
GND
0
1
2
3
4
5
6
7
8

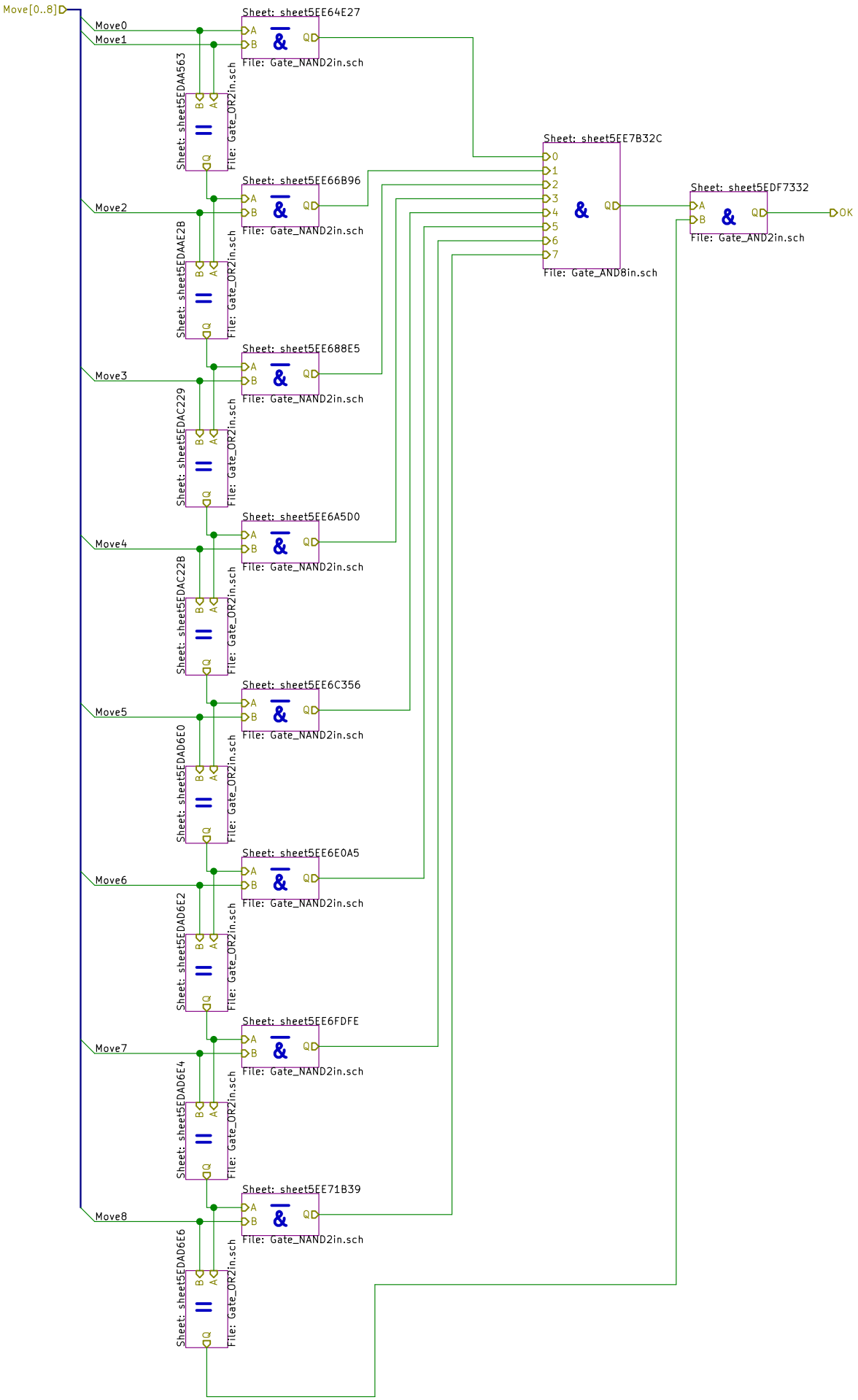

+5V
Q821
BSS84
A
Q
Q822
2N7002
GND

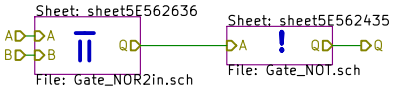

+5V
+5V
A
B
Q823
BSS84
Q826
BSS84
Q
A
B
Q824
2N7002
Q825
2N7002
GND

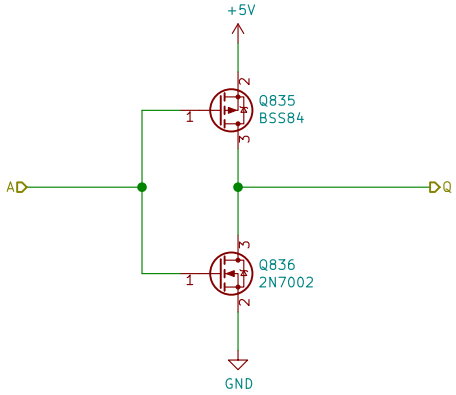

Sheet: sheet5EE52EF7
A
B
C
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EE534A3
A
Q
File: Gate_NOT.sch
Q

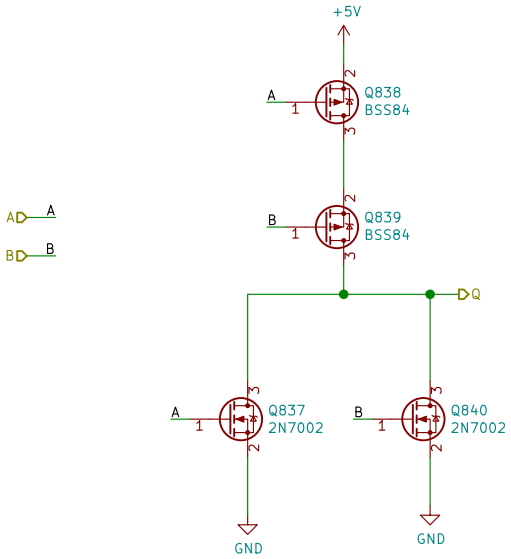

+5V
+5V
+5V
A
B
C
Q827
BSS84
Q828
BSS84
Q832
BSS84
Q
Q829
2N7002
Q830
2N7002
Q831
2N7002
GND
A
B
C

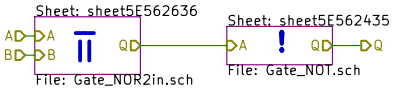

+5V
Q833
BSS84
A
Q
Q834
2N7002
GND


Move[0..8]
Move0
Move1
Move2
Move3
Move4
Move5
Move6
Move7
Move8
Sheet: sheet5EE64E27
File: Gate_NAND2in.sch
Sheet: sheet5EDAA563
File: Gate_OR2in.sch
Sheet: sheet5EE66B96
File: Gate_NAND2in.sch
Sheet: sheet5EDAAE2B
File: Gate_OR2in.sch
Sheet: sheet5EE688E5
File: Gate_NAND2in.sch
Sheet: sheet5EDAC229
File: Gate_OR2in.sch
Sheet: sheet5EE6A5D0
File: Gate_NAND2in.sch
Sheet: sheet5EDAC22B
File: Gate_OR2in.sch
Sheet: sheet5EE6C356
File: Gate_NAND2in.sch
Sheet: sheet5EDAD6E0
File: Gate_OR2in.sch
Sheet: sheet5EE6E0A5
File: Gate_NAND2in.sch
Sheet: sheet5EDAD6E2
File: Gate_OR2in.sch
Sheet: sheet5EE6FDFE
File: Gate_NAND2in.sch
Sheet: sheet5EDAD6E4
File: Gate_OR2in.sch
Sheet: sheet5EE71B39
File: Gate_NAND2in.sch
Sheet: sheet5EDAD6E6
File: Gate_OR2in.sch
Sheet: sheet5EE7B32C
File: Gate_AND8in.sch
Sheet: sheet5EDF7332
File: Gate_AND2in.sch
OK


Sheet: sheet5E562636
A
B
A
B
Q
File: Gate_NOR2in.sch
Sheet: sheet5E562435
A
Q
Q
File: Gate_NOT.sch


+5V
Q835
BSS84
A
Q
Q836
2N7002
GND


+5V
A
B
Q
Q838
BSS84
Q839
BSS84
Q837
2N7002
Q840
2N7002
GND
GND


Sheet: sheet5E562636
A
B
A
B
Q
File: Gate_NOR2in.sch
Sheet: sheet5E562435
A
Q
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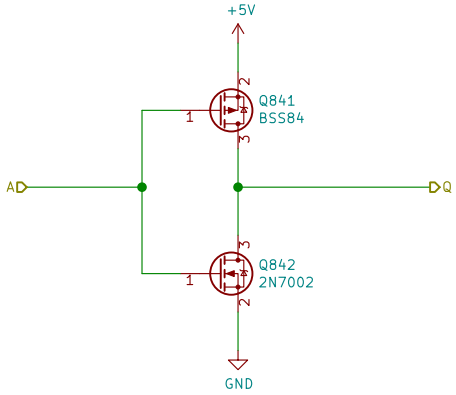
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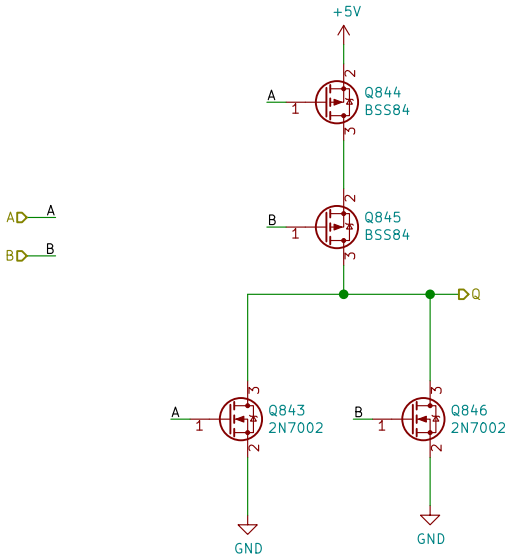
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Q846
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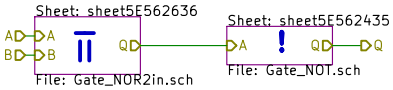
B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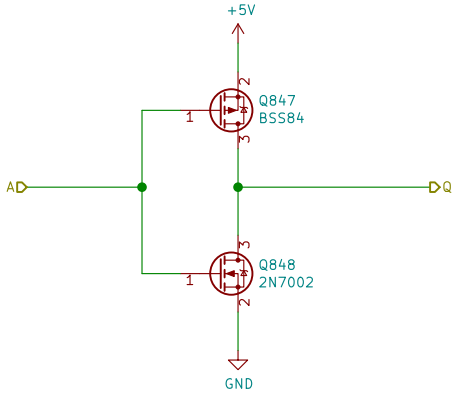
Q
Q
File: Gate_NOT.sch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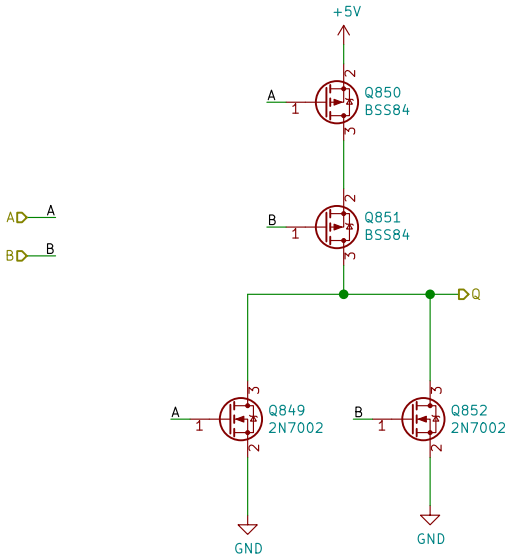
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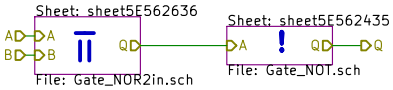
GND
GND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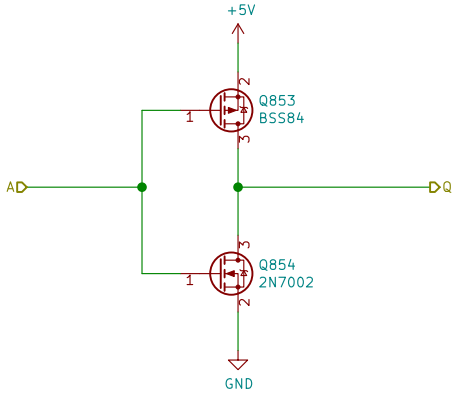
Q
File: Gate_NOT.sch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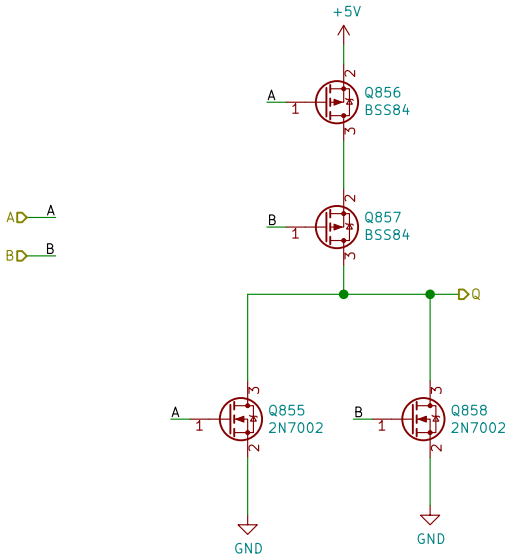
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A
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Q856
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Q857
BSS84
Q855
2N7002
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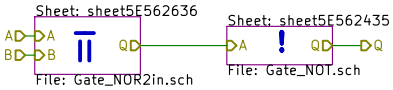
GND
GND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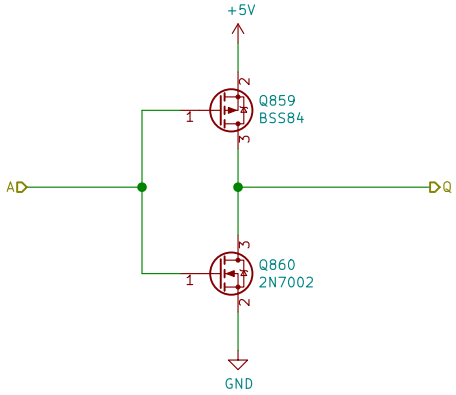
A
Q
Q
File: Gate_NOT.sch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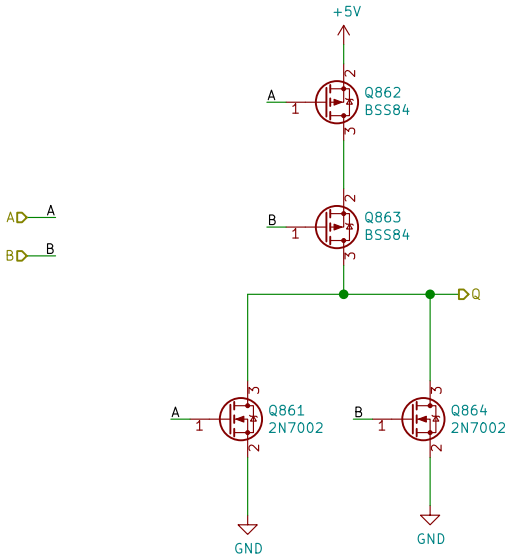
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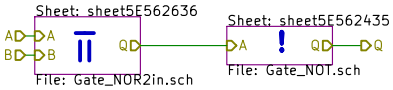
GND
GND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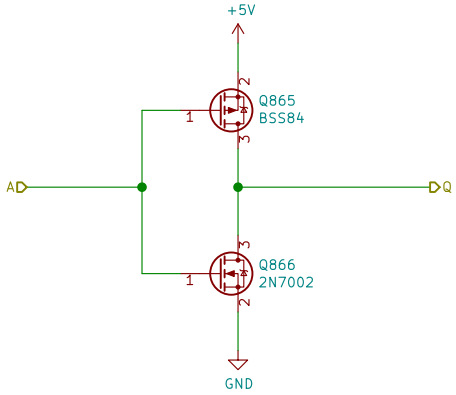
B
A
B
Q
File: Gate_NOR2in.sch
Sheet: sheet5E562435
A
Q
Q
File: Gate_NOT.sch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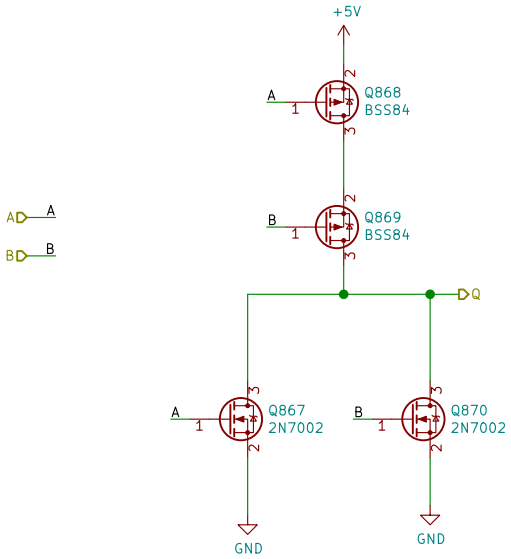
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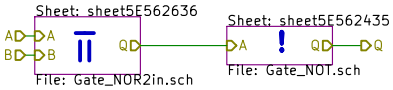
GND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File: Gate_NOR2in.sch
Sheet: sheet5E562435
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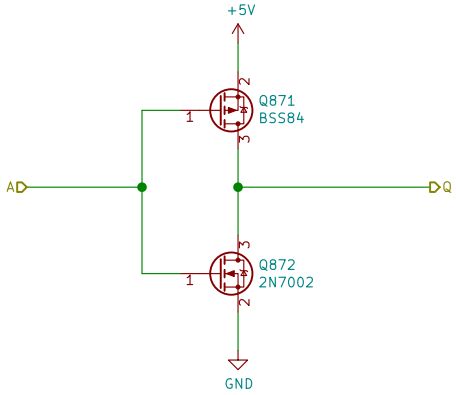
Q
Q
File: Gate_NOT.sch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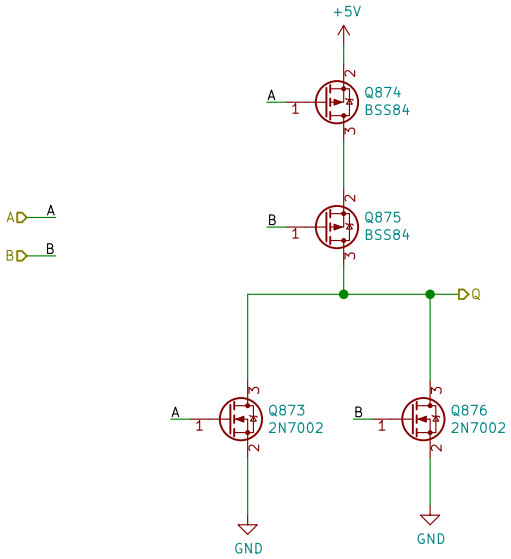
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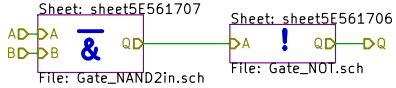
GND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Q
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!
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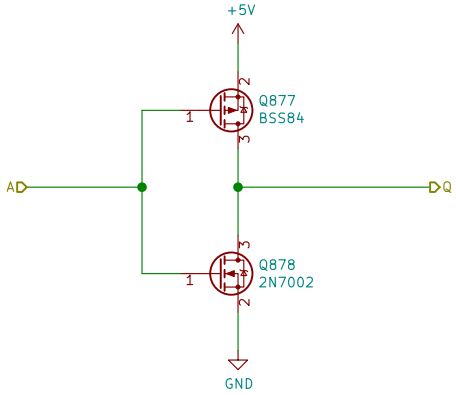
Q
File: Gate_NOT.sch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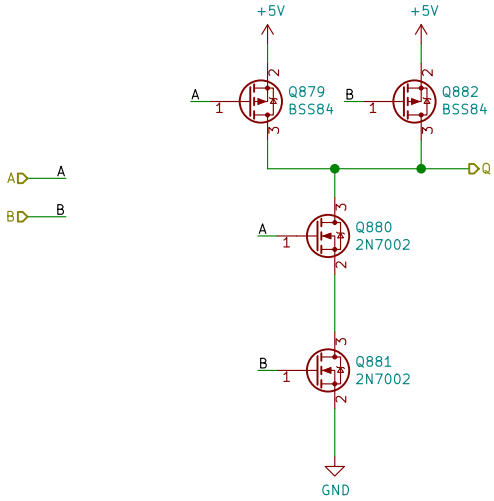
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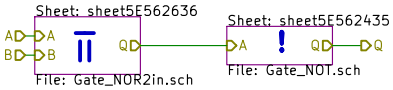
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B
Q
File: Gate_NOR2in.sch
Sheet: sheet5E562435
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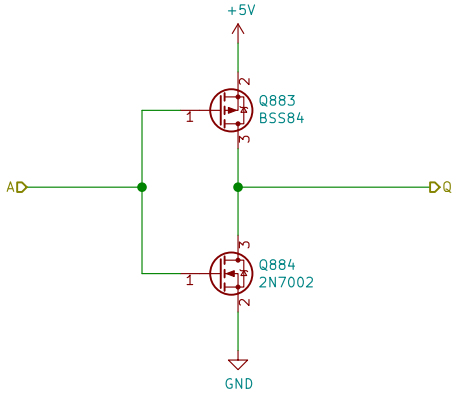
Q
Q
File: Gate_NOT.sch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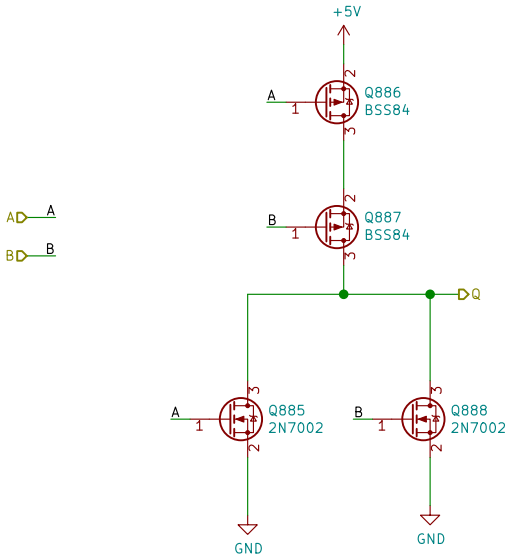
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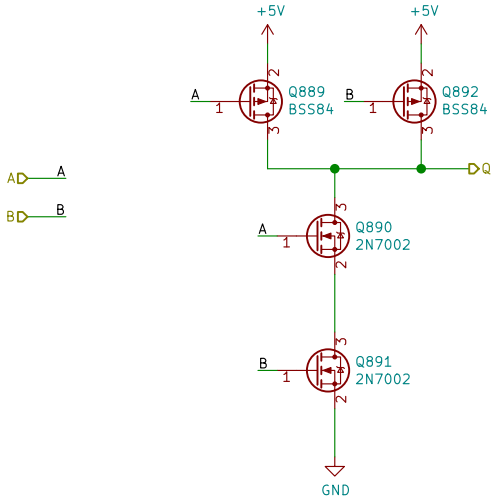
GND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+5V
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Q
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Q890
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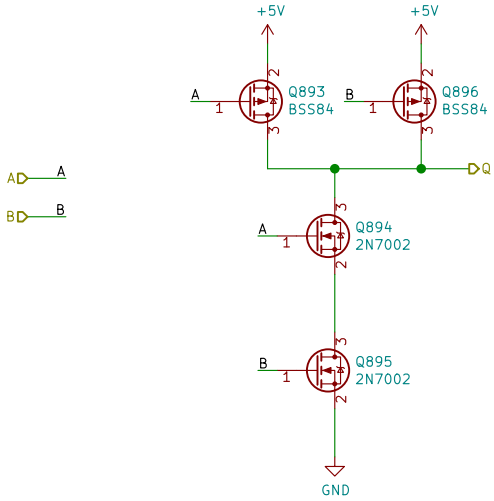
GND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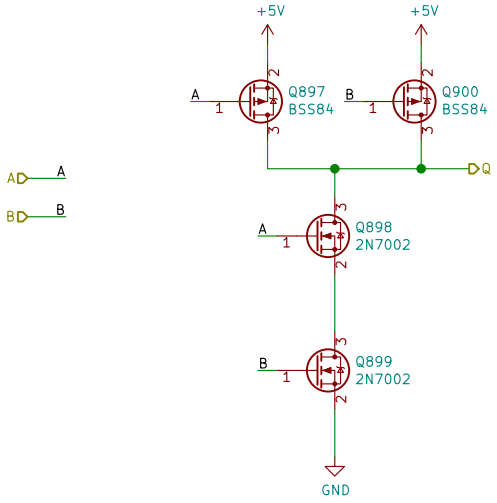
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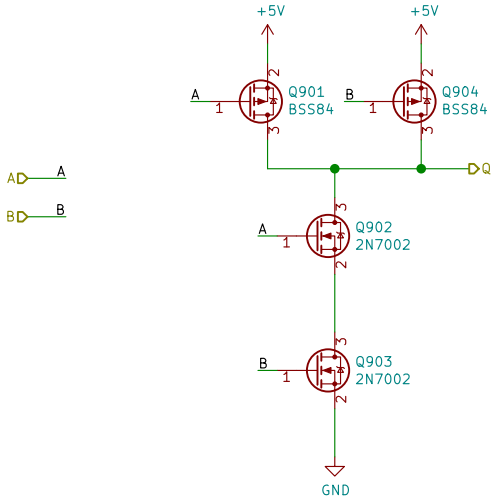
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Q902
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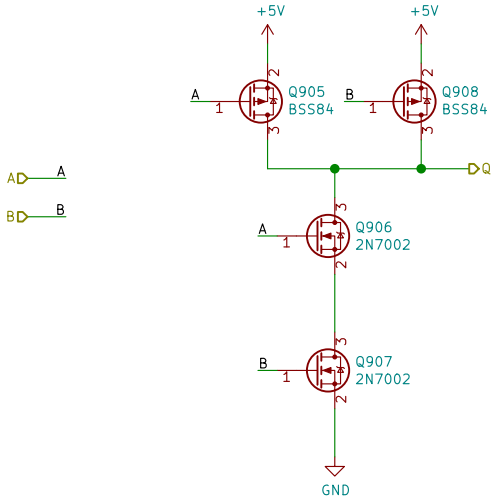
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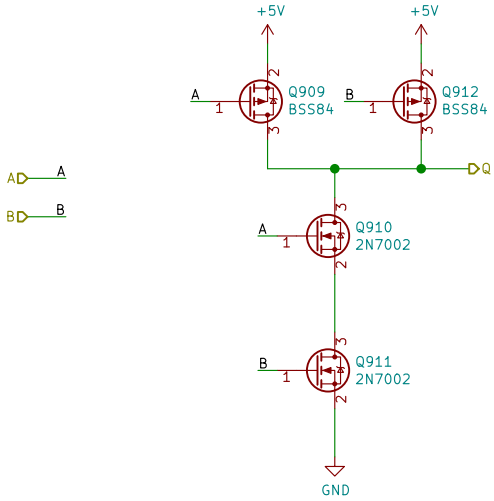
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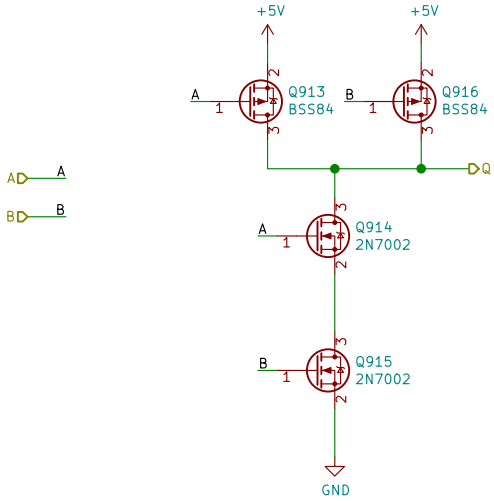
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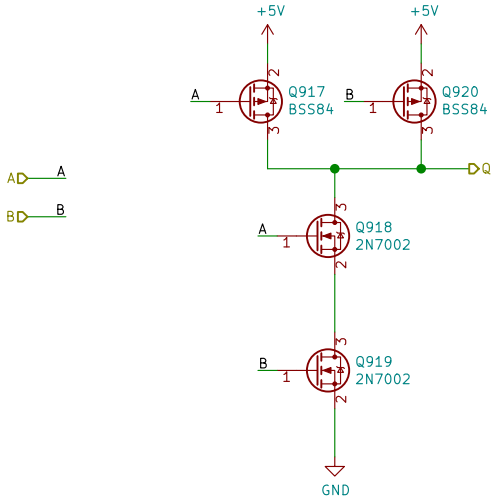
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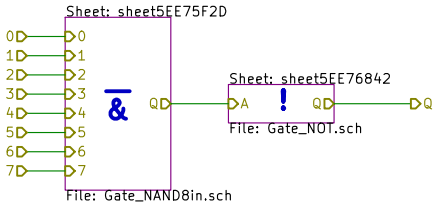
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&
Q
File: Gate_NAND8in.sch
Sheet: sheet5EE76842
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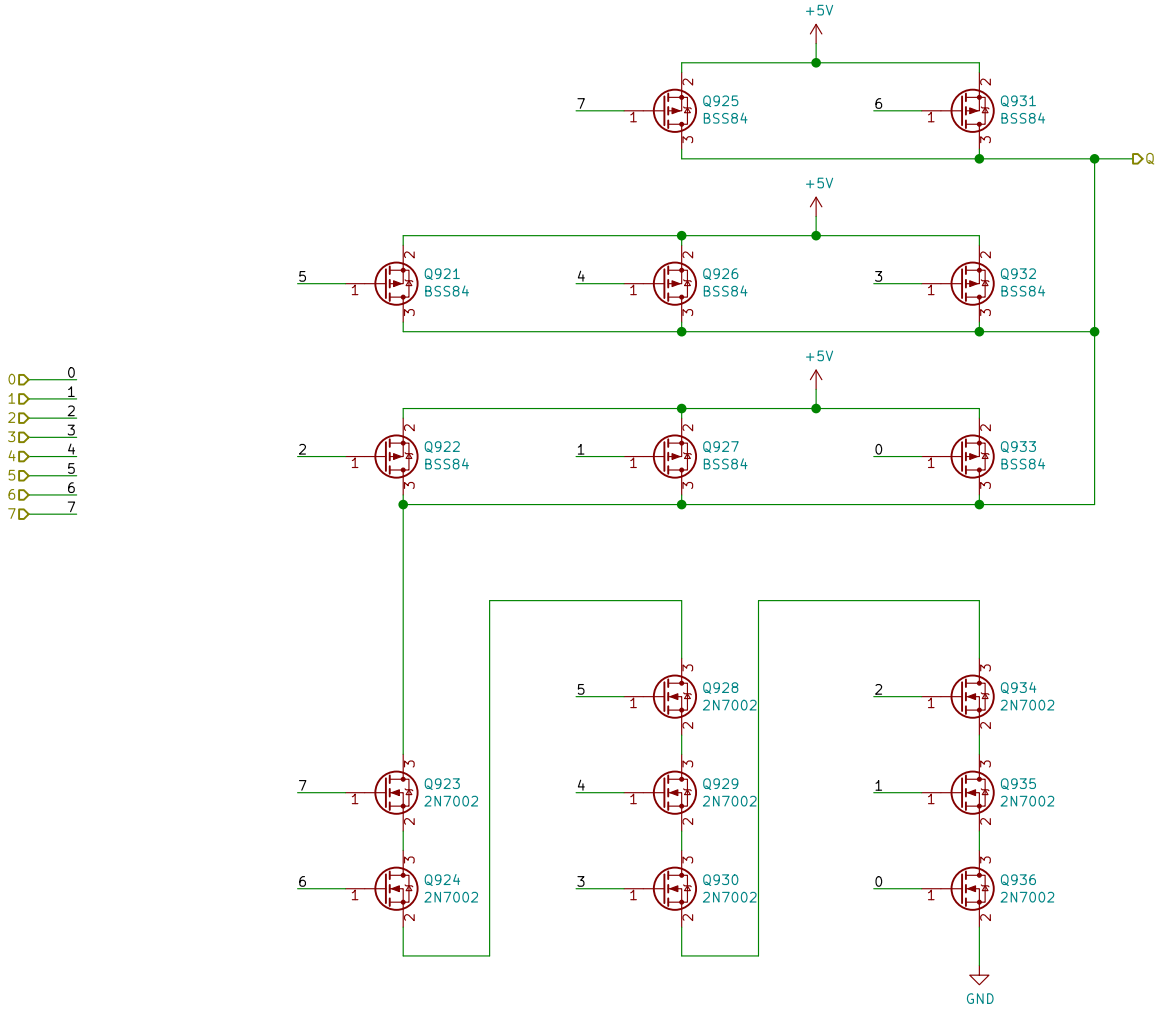
Q
File: Gate_NOT.sch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Q921
BSS84
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Q926
BSS84
3
Q932
BSS84
+5V
2
Q922
BSS84
1
Q927
BSS84
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Q933
BSS84
0
1
2
3
4
5
6
7
5
Q928
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2
Q934
2N7002
7
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2N7002
4
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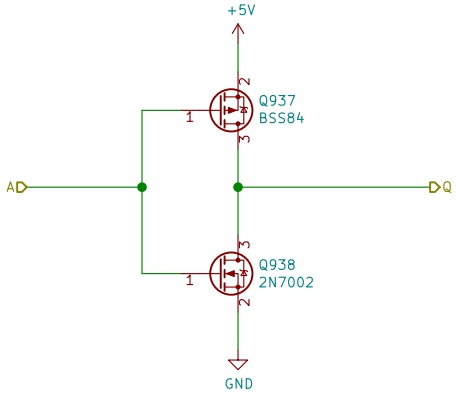
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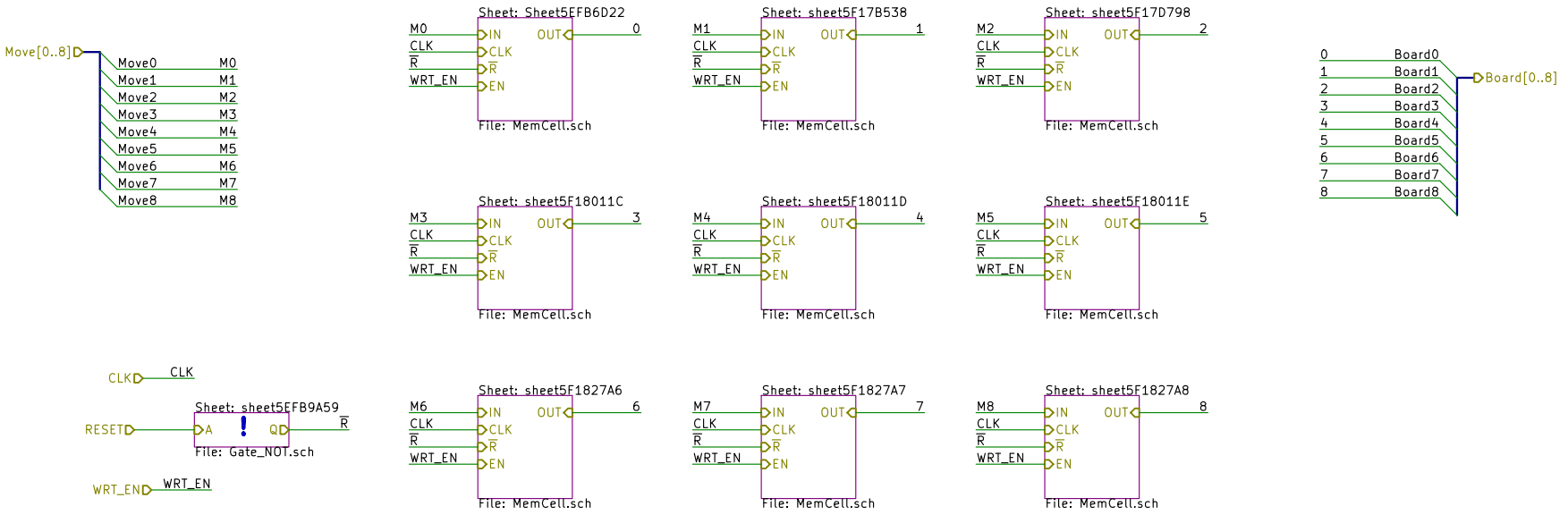
Move[0..8]
Move0 M0
Move1 M1
Move2 M2
Move3 M3
Move4 M4
Move5 M5
Move6 M6
Move7 M7
Move8 M8
Sheet: Sheet5FFB6D22
M0
CLK
R
WRT_EN
IN
OUT
CLK
R
EN
0
File: MemCell.sch
Sheet: sheet5F17B538
M1
1
File: MemCell.sch
Sheet: sheet5F17D798
M2
2
File: MemCell.sch
0 Board0
1 Board1
2 Board2
3 Board3
4 Board4
5 Board5
6 Board6
7 Board7
8 Board8
Board[0..8]
Sheet: sheet5F18011C
M3
3
File: MemCell.sch
Sheet: sheet5F18011D
M4
4
File: MemCell.sch
Sheet: sheet5F18011E
M5
5
File: MemCell.sch
CLK
CLK
Sheet: sheet5FFB9A59
RESET
A
Q
R
File: Gate_NOT.sch
WRT_EN
WRT_EN
Sheet: sheet5F1827A6
M6
6
File: MemCell.sch
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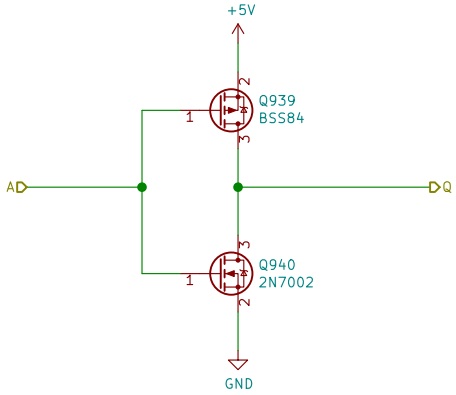
M7
7
File: MemCell.sch
Sheet: sheet5F1827A8
M8
8
File: MemCell.sch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A
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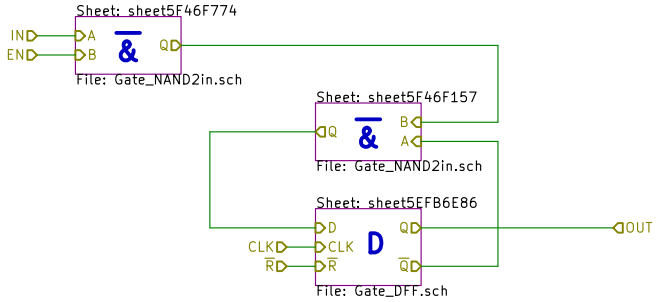
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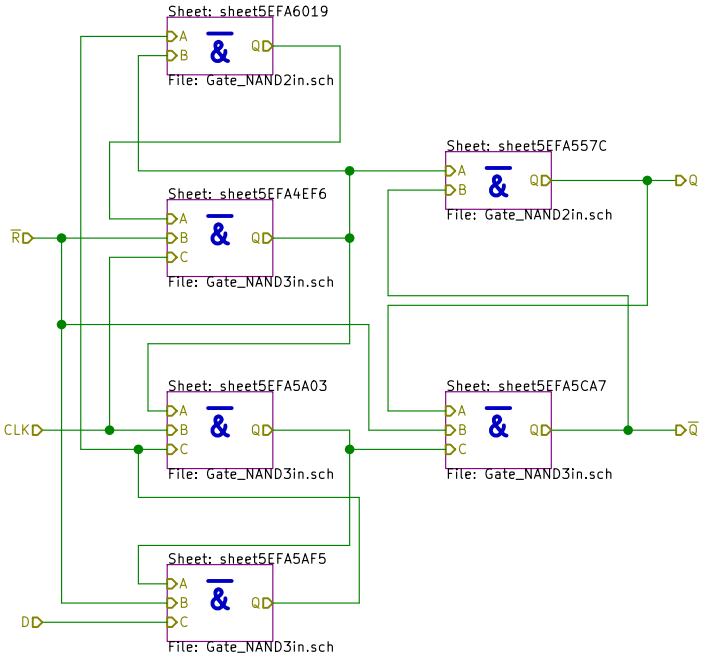
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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B
Q
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Q
File: Gate_NAND2in.sch
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Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
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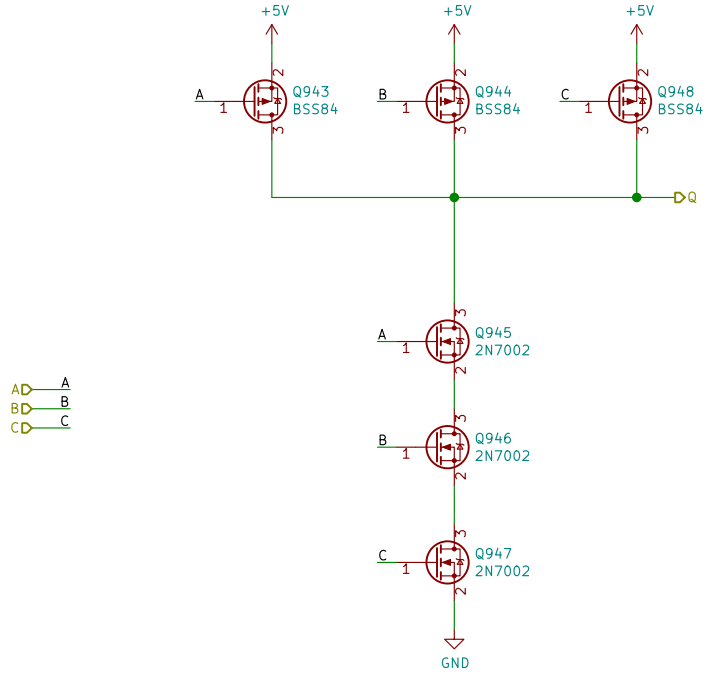
File: Gate_NAND3in.sch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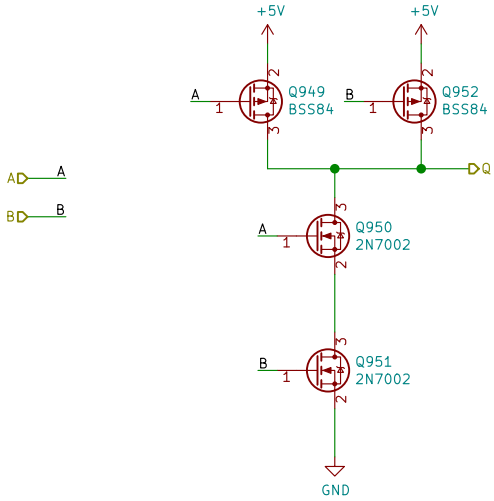
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B
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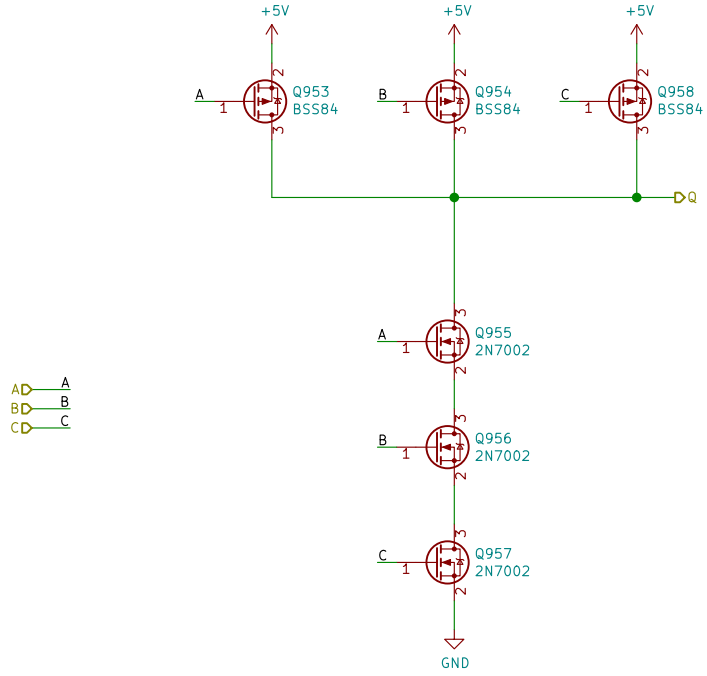
2N7002
2
GND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Q957
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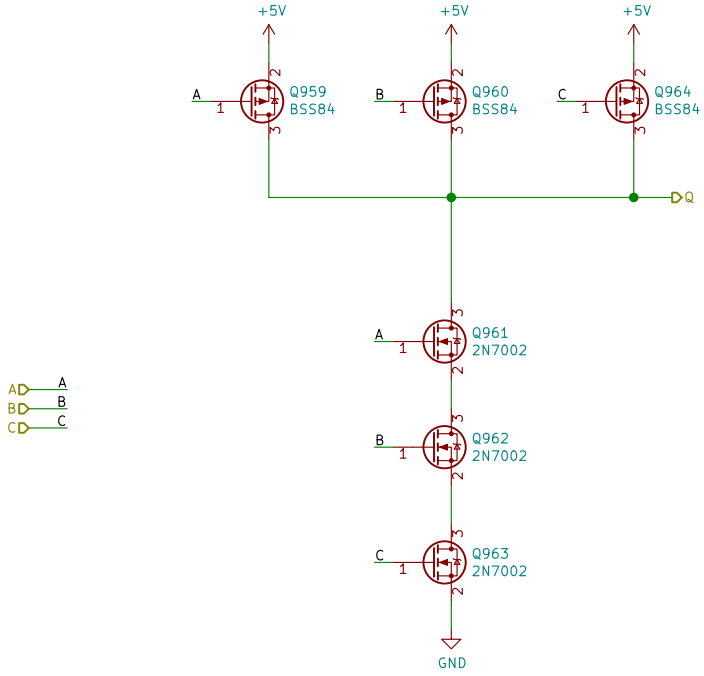
B
C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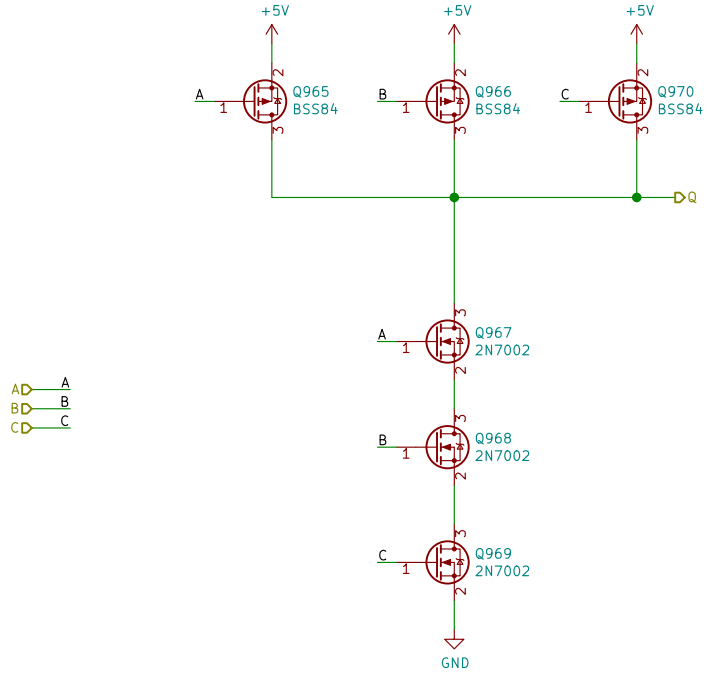
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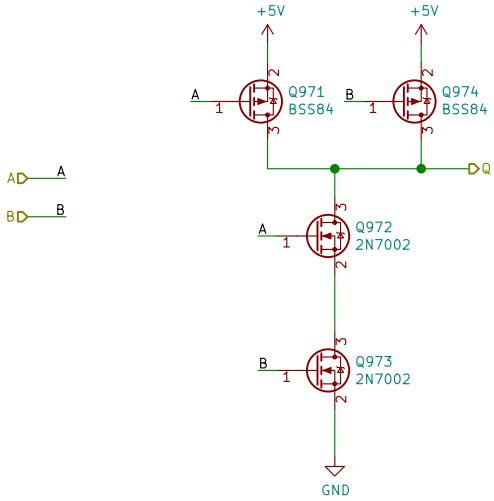
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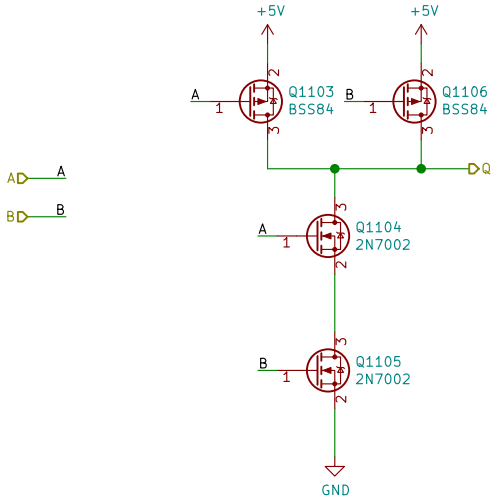
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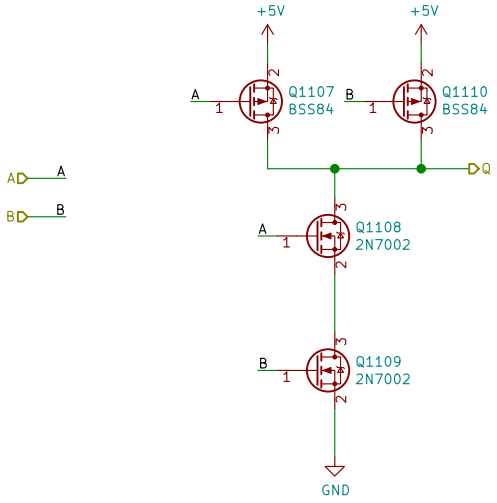
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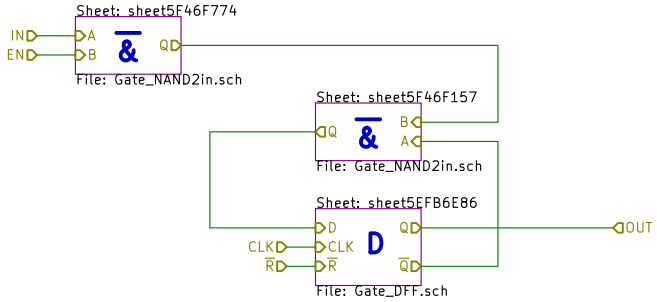
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B
&
Q
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Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
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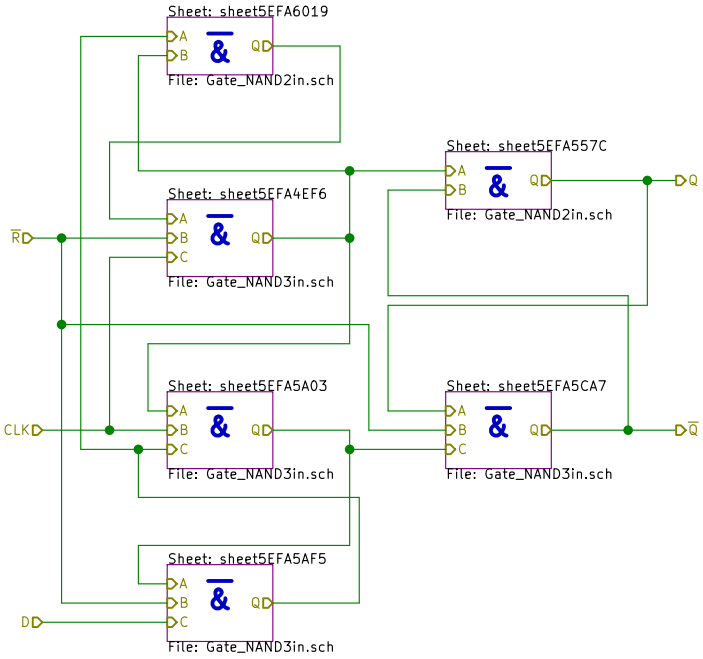
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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Q
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Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
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C
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B
C
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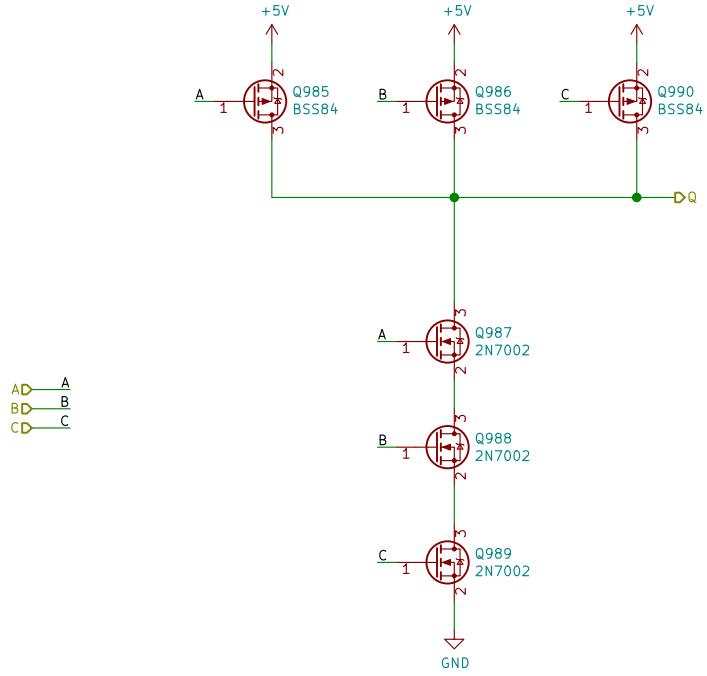
File: Gate_NAND3in.sch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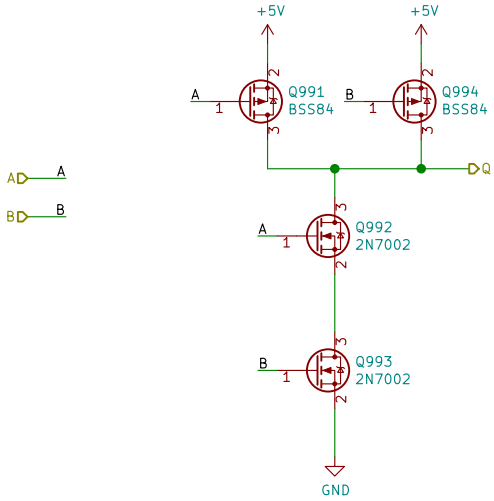
C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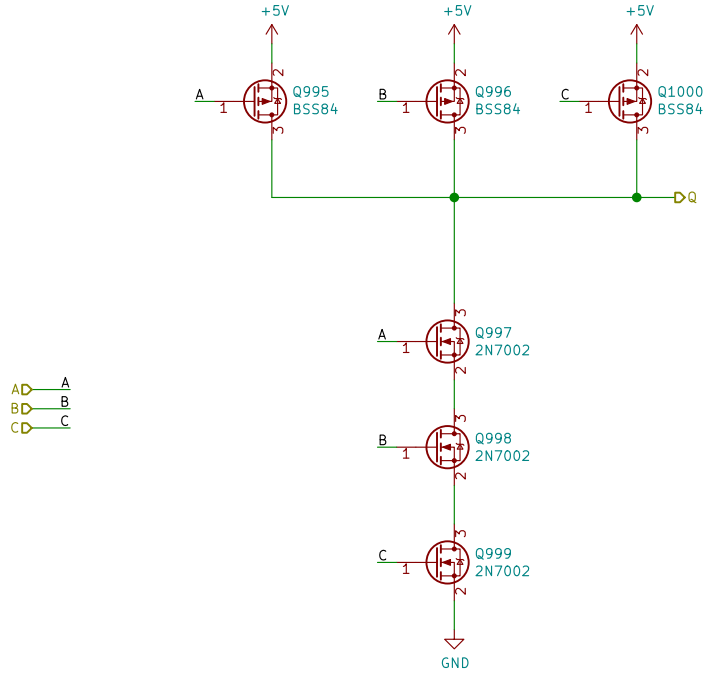
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Q999
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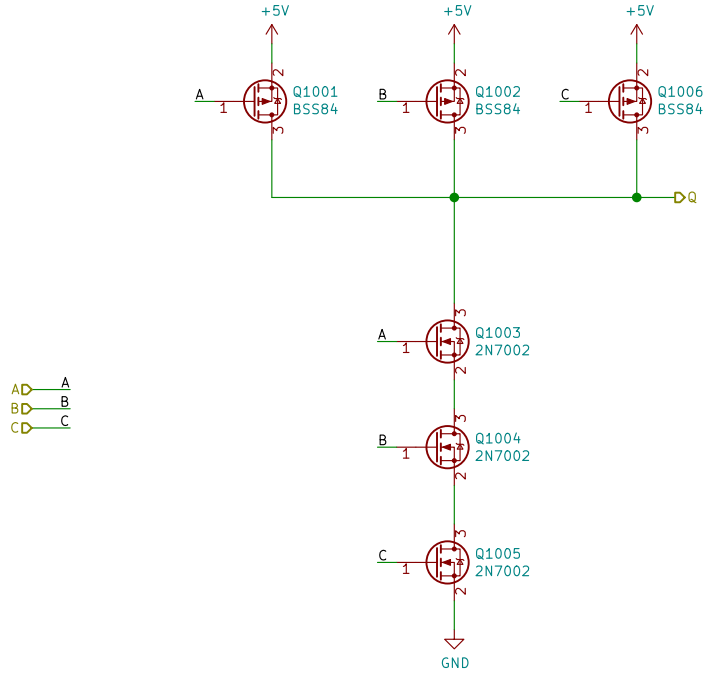
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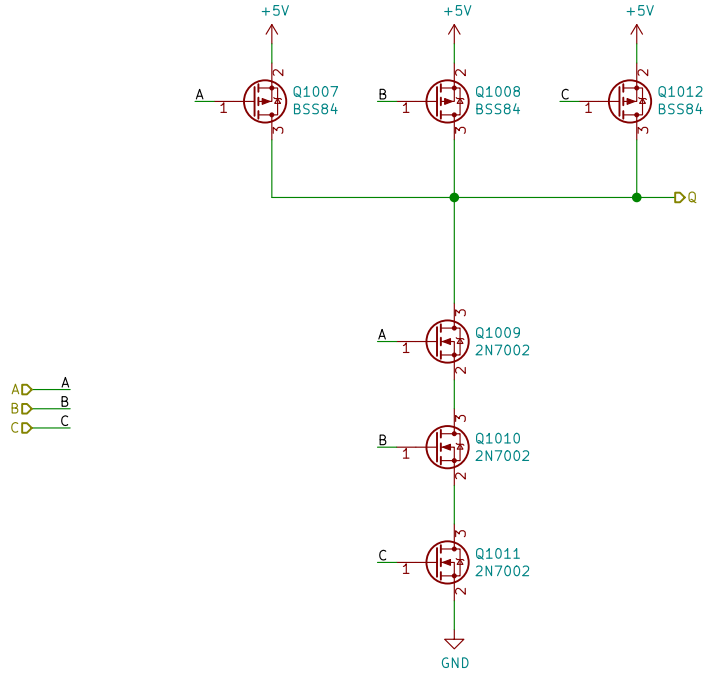
B
C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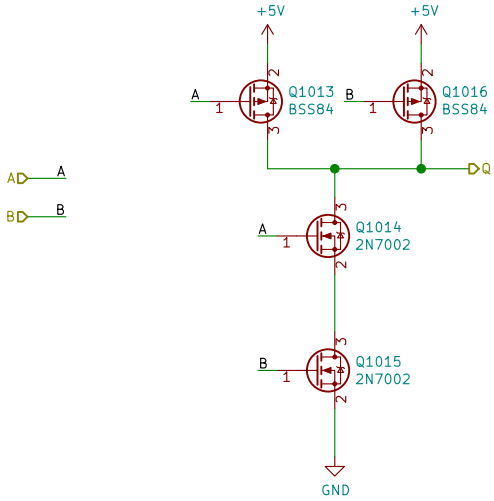
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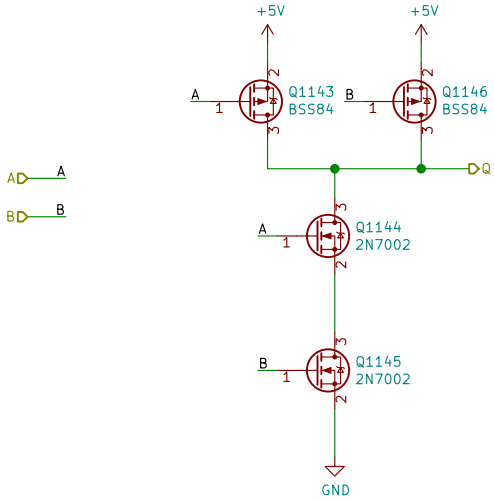
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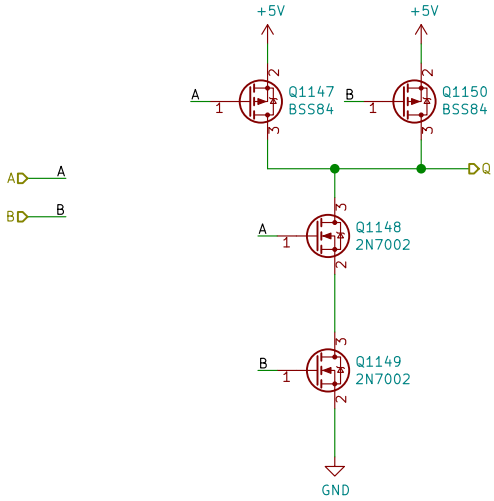
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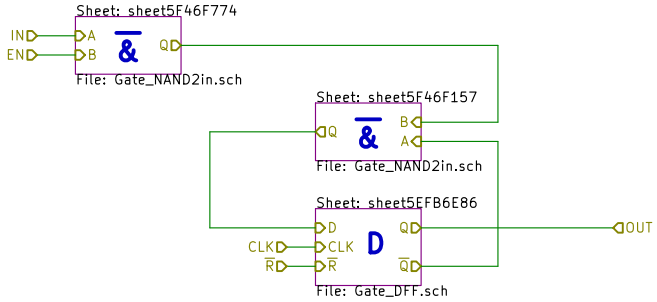
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&
B
A
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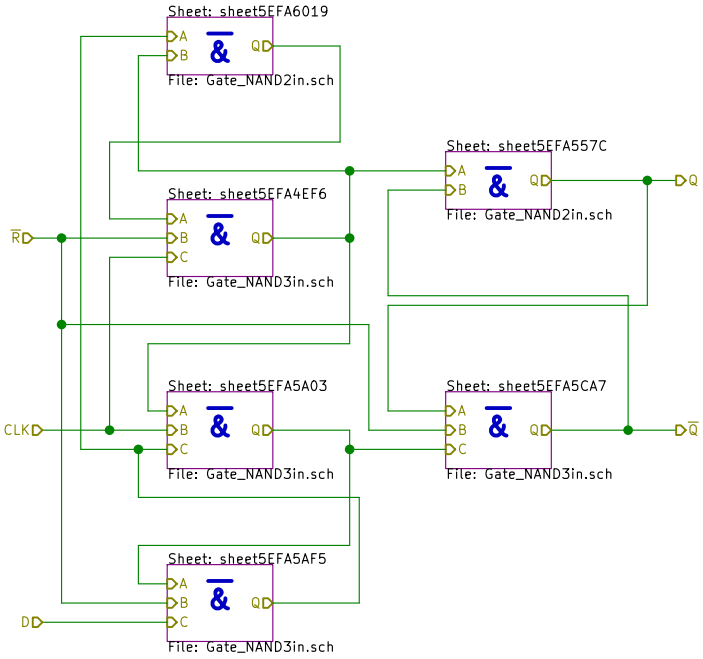
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
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C
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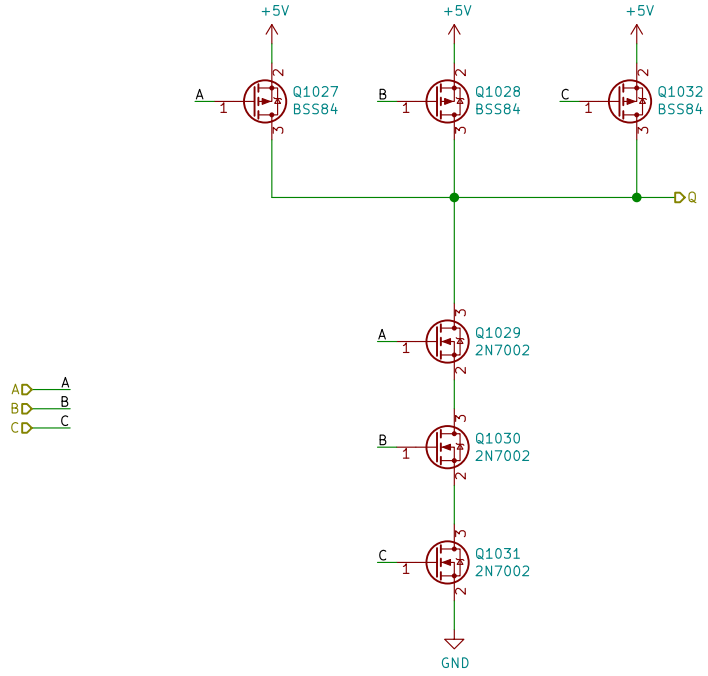
File: Gate_NAND3in.sch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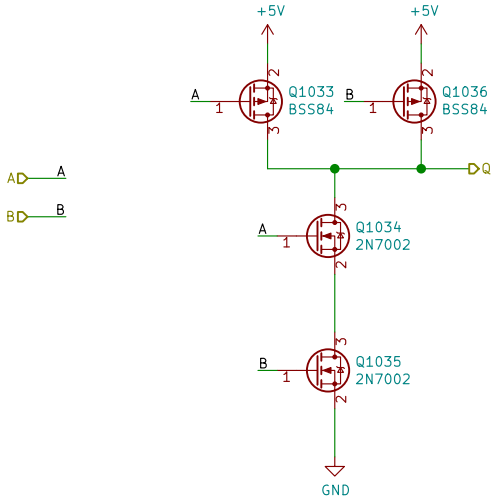
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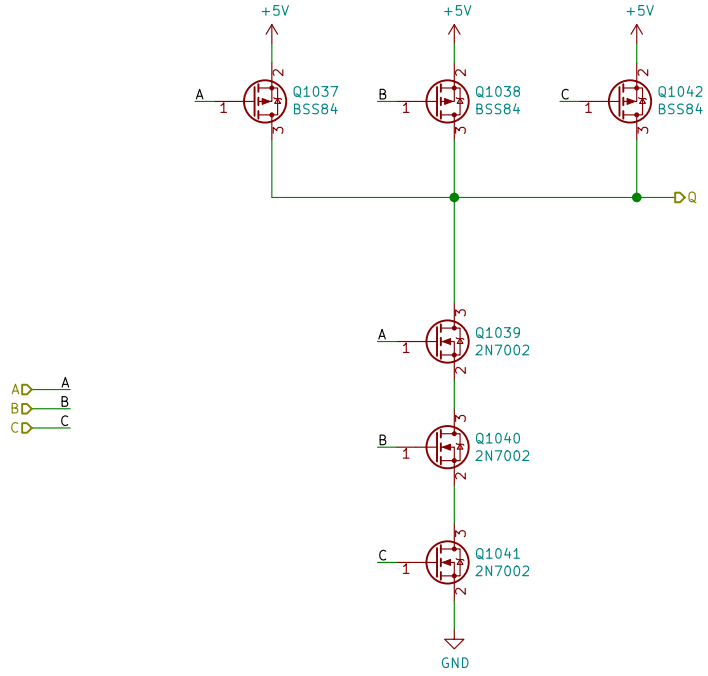
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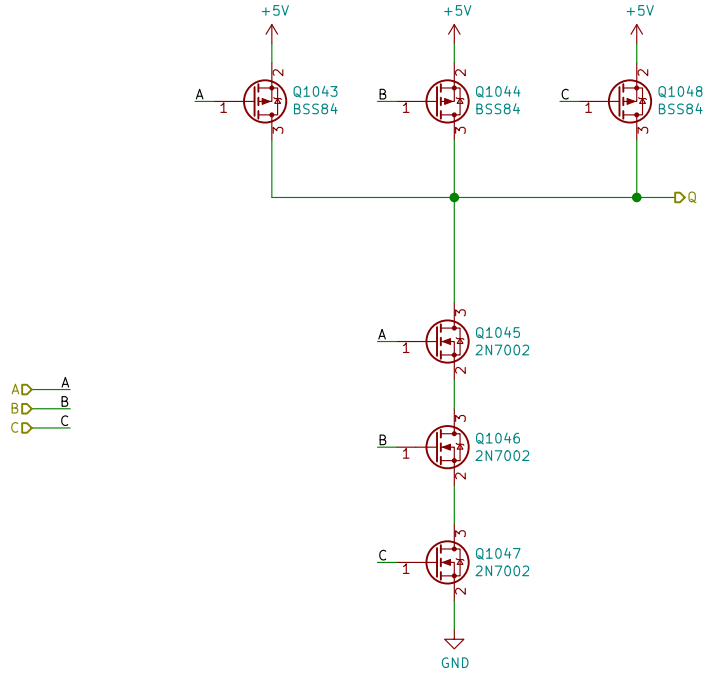
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+5V
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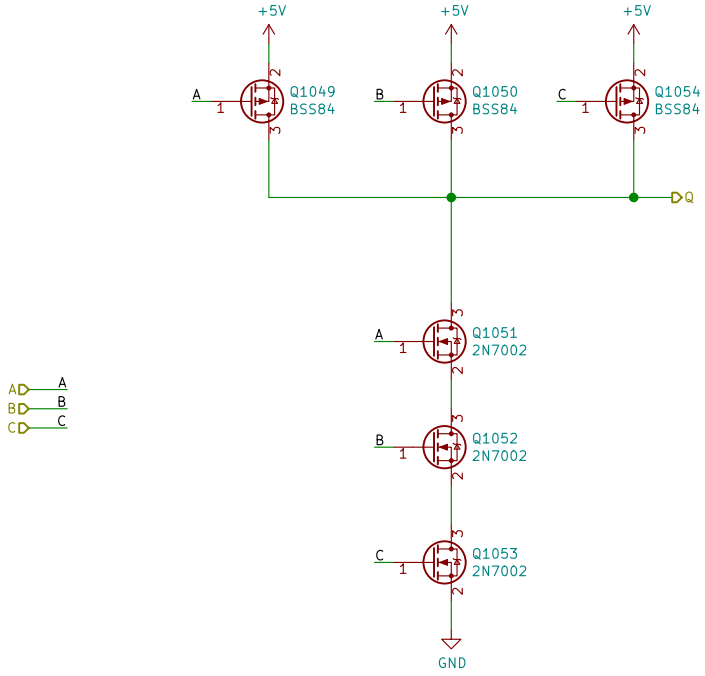
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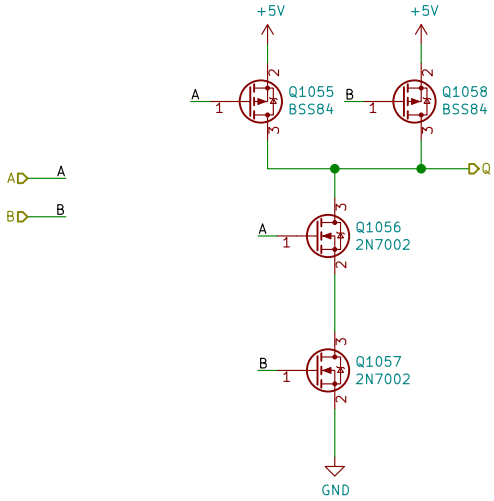
C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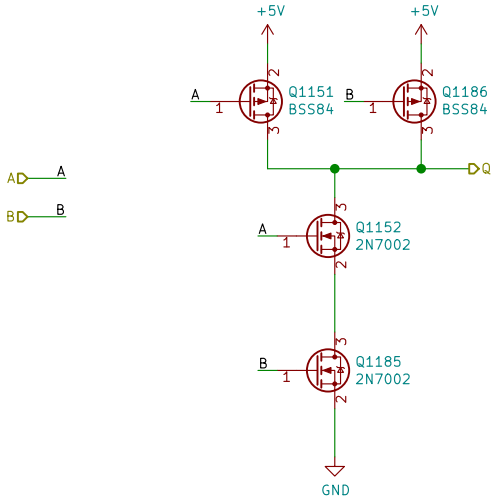
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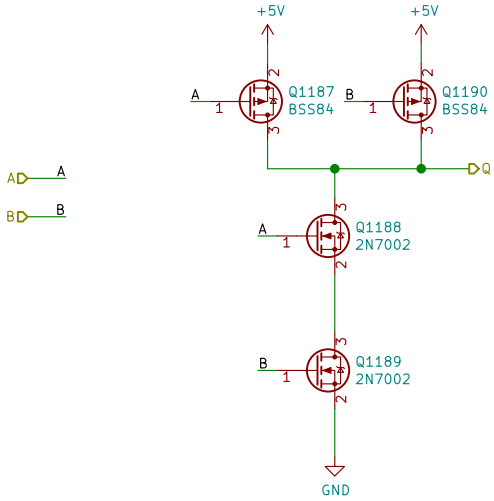
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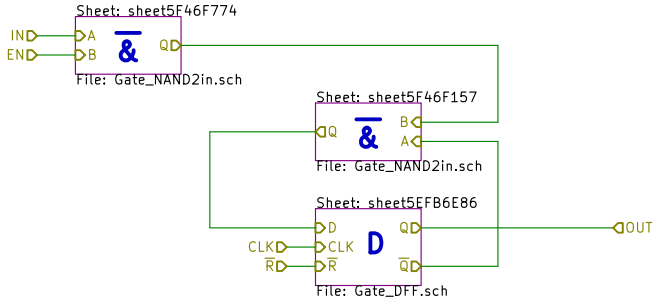
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EN
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B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
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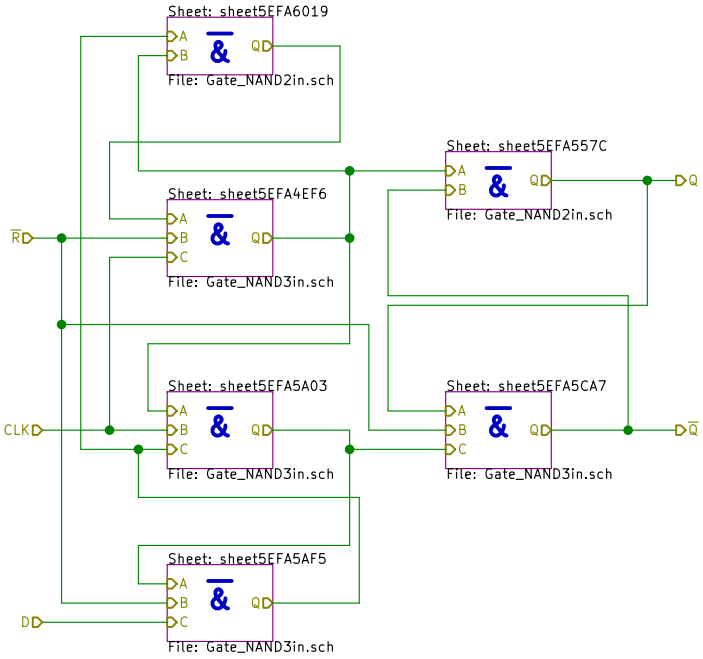
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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Q
File: Gate_NAND2in.sch
Sheet: sheet5EFA557C
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B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
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C
Q
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File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
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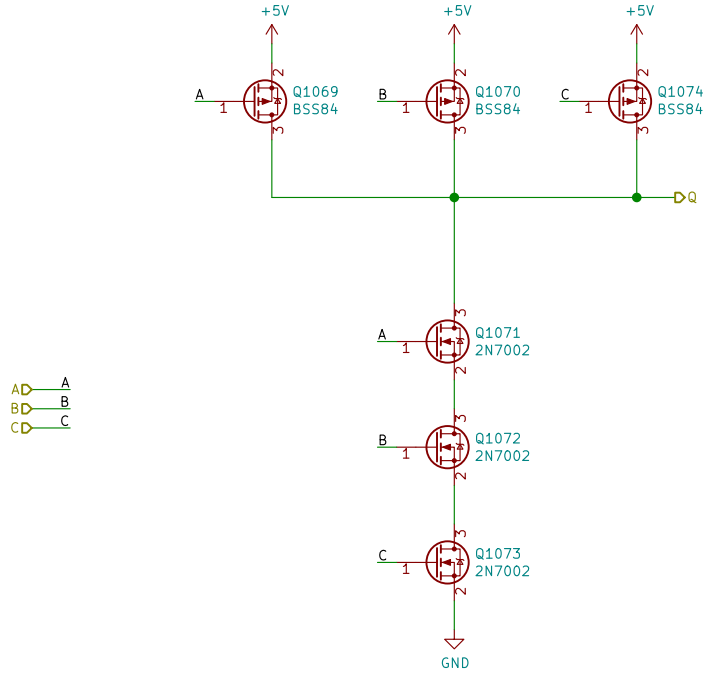
A
B
C
Q
File: Gate_NAND3in.sch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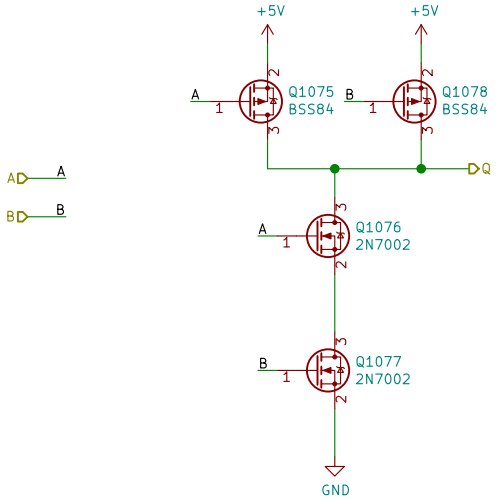
B
C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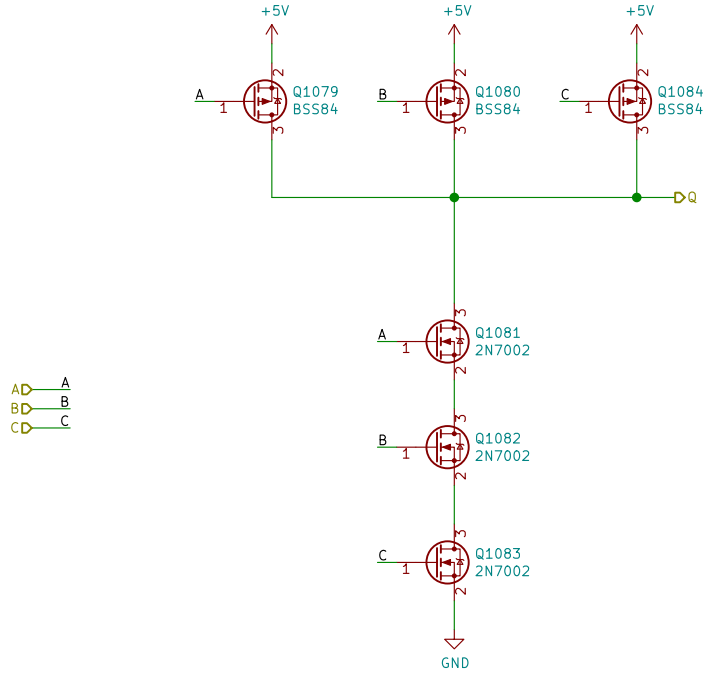
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+5V
+5V
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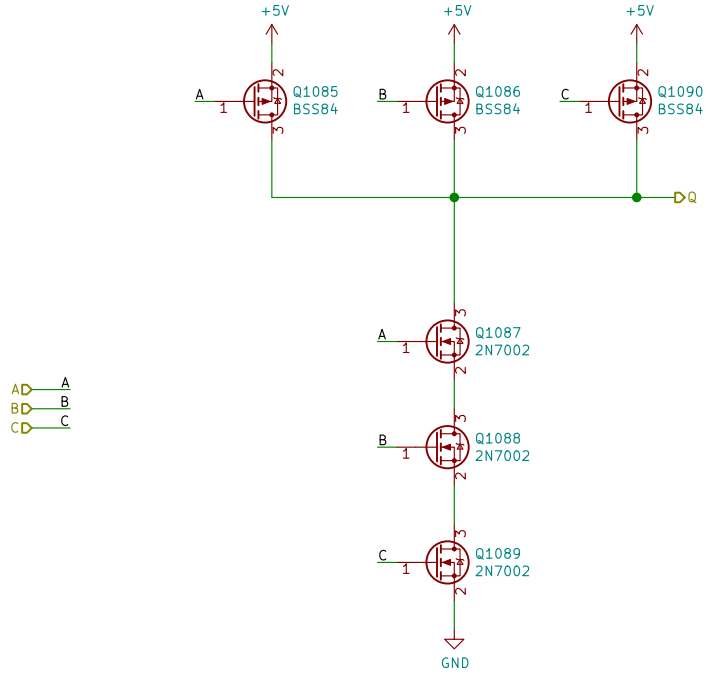
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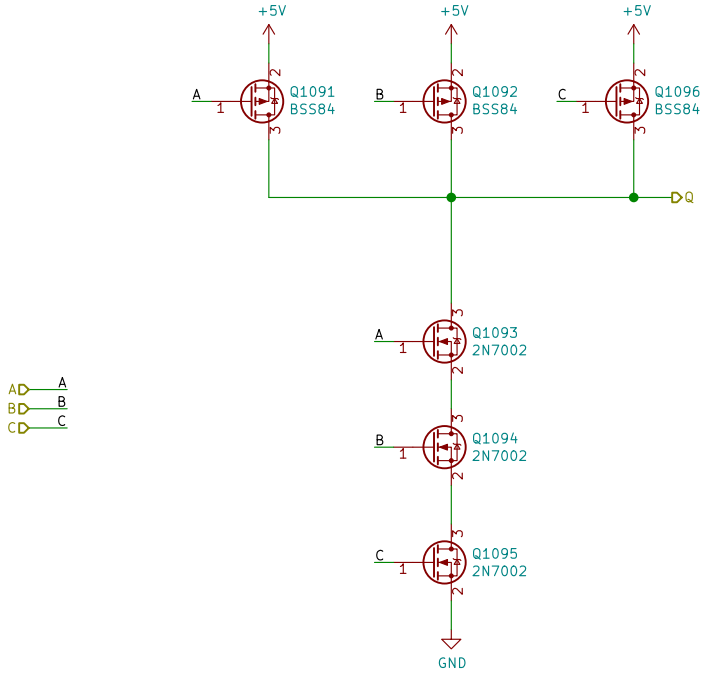
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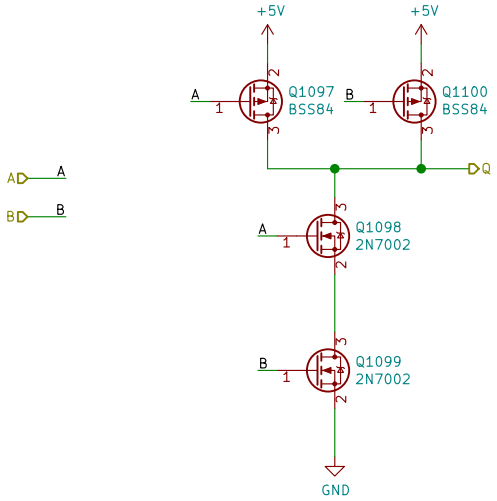
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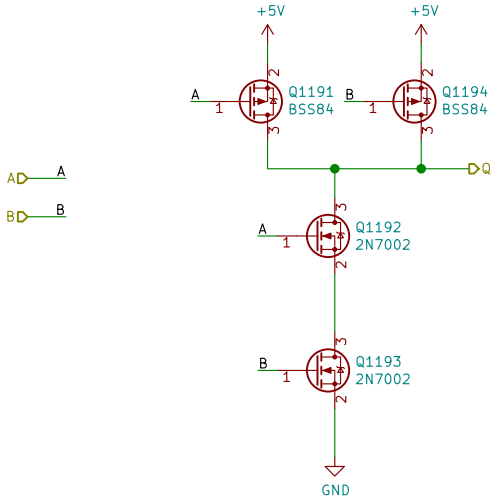
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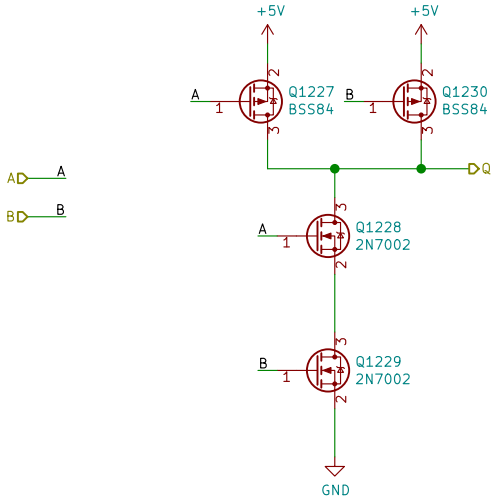
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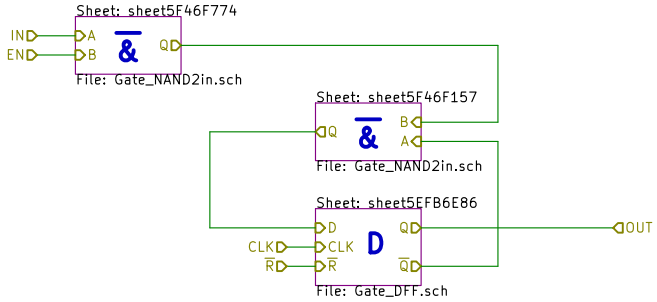
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&
Q
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Sheet: sheet5F46F157
Q
&
B
A
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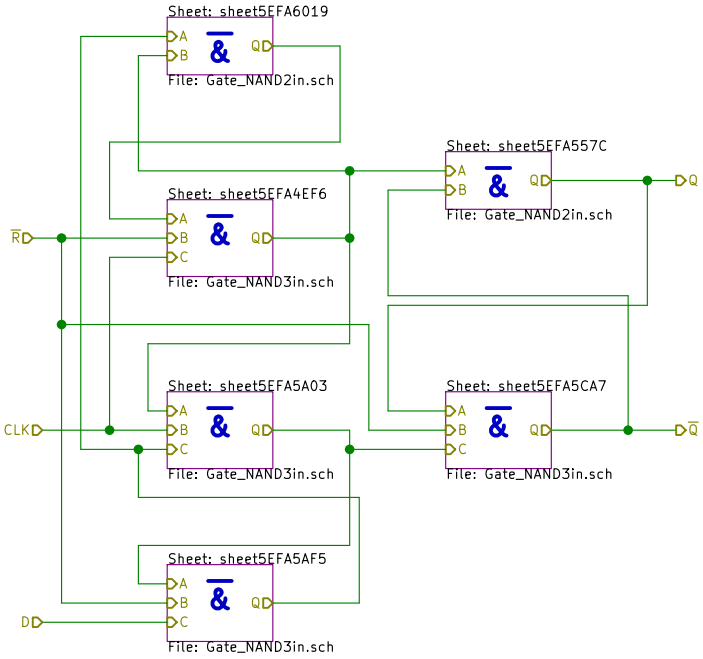
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
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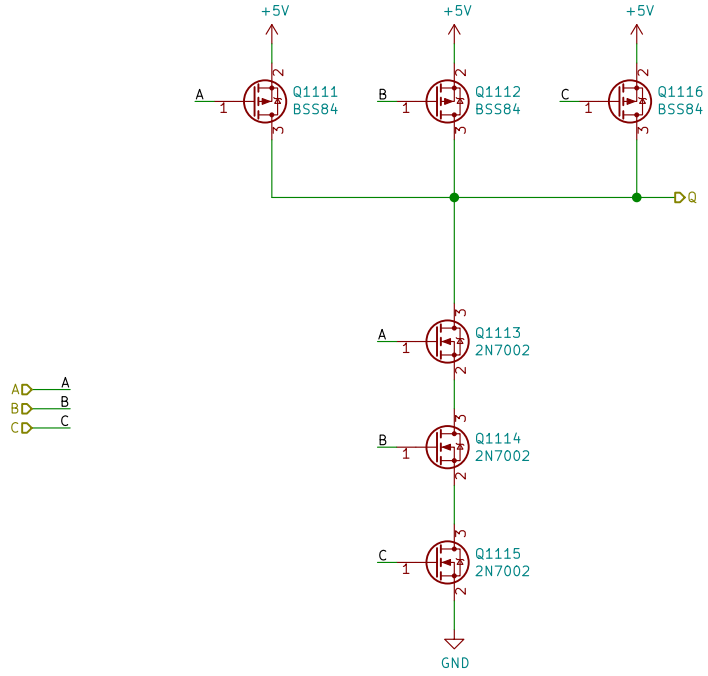
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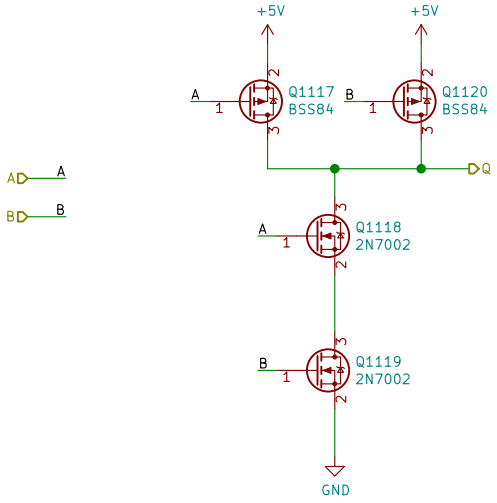
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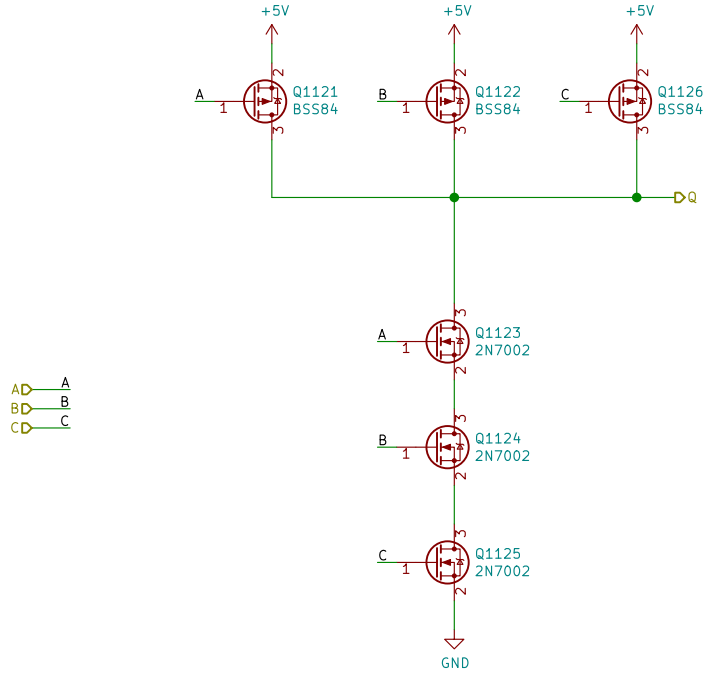
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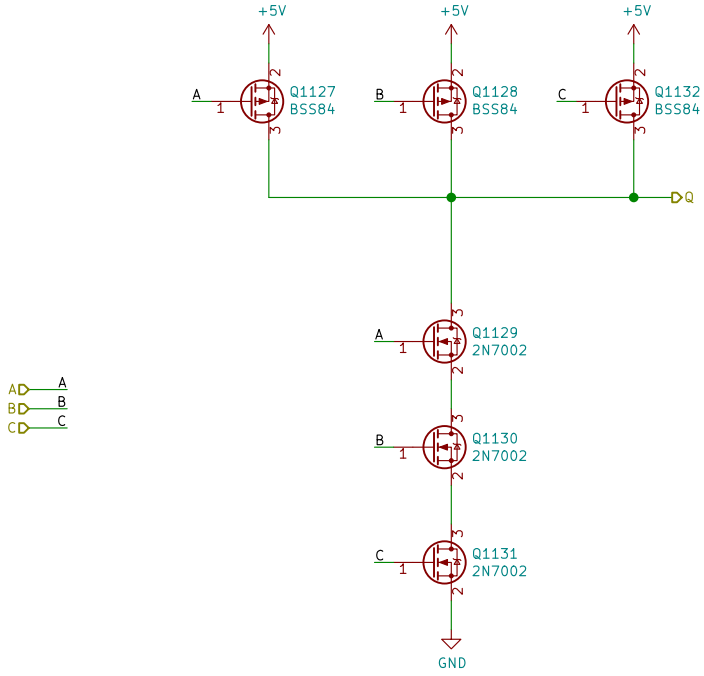
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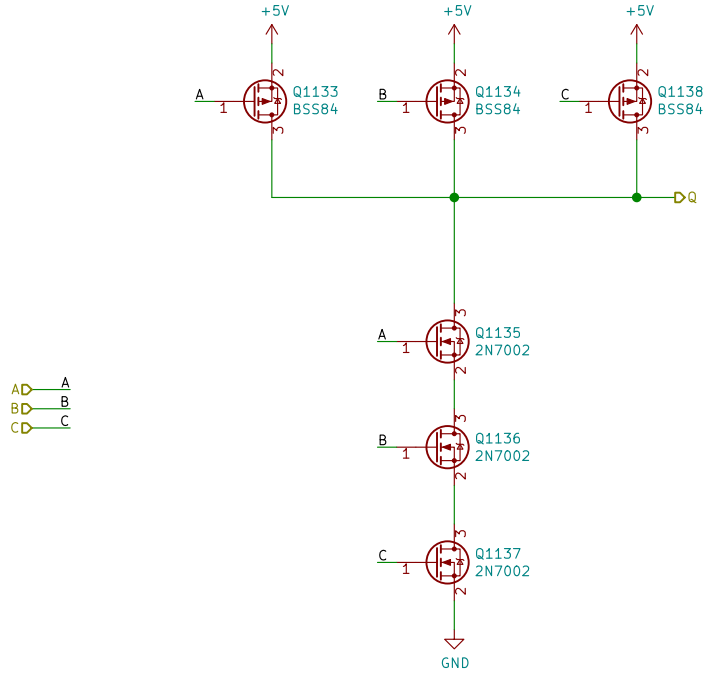
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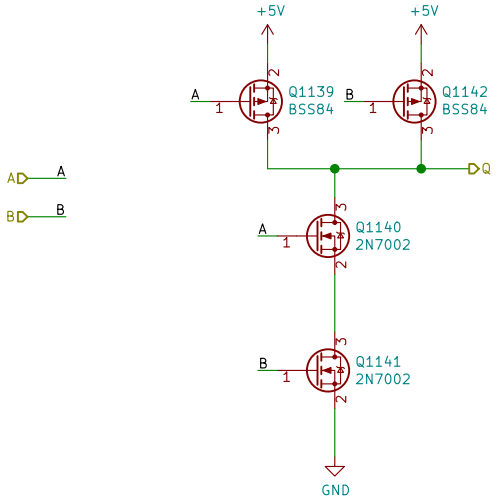
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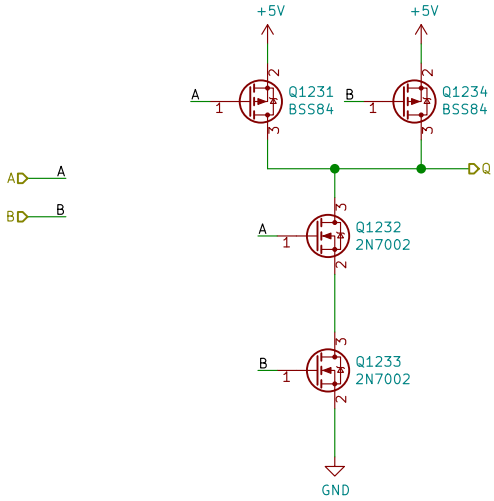
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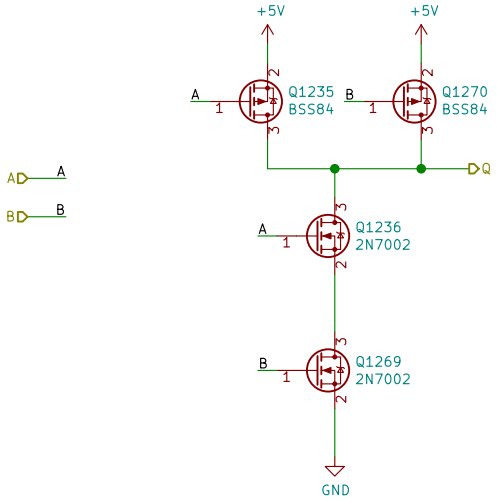
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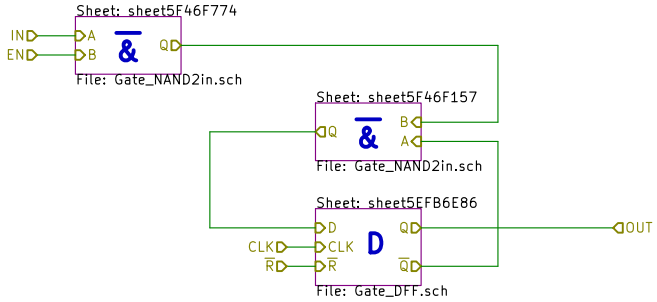
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Q
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Sheet: sheet5F46F157
Q
&
B
A
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Sheet: sheet5EFB6E86
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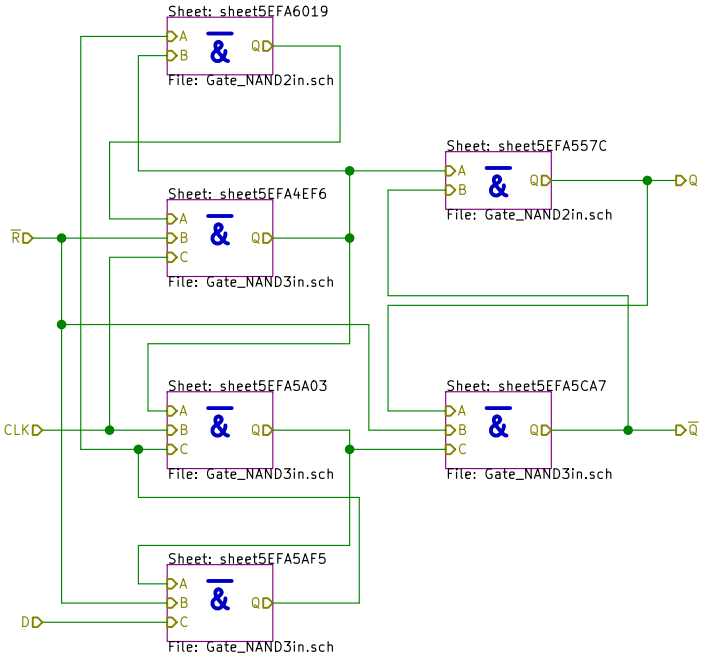
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
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A
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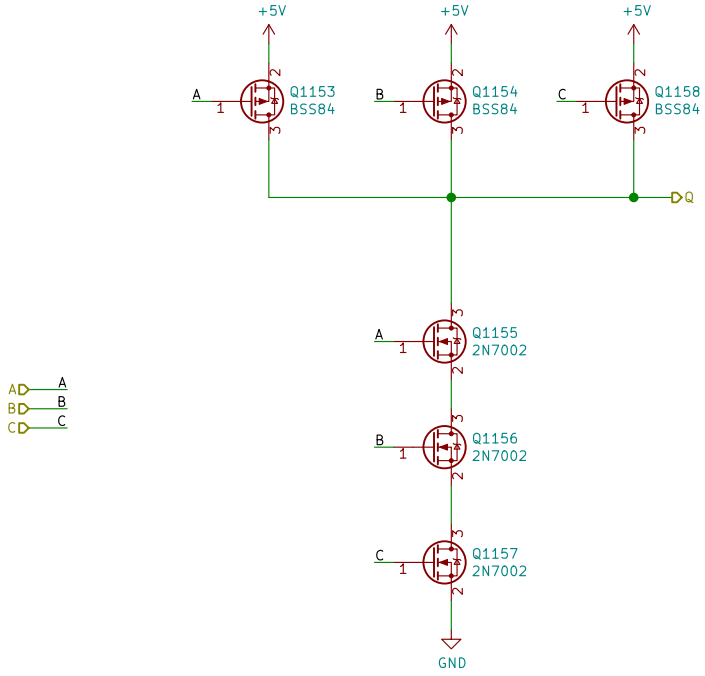
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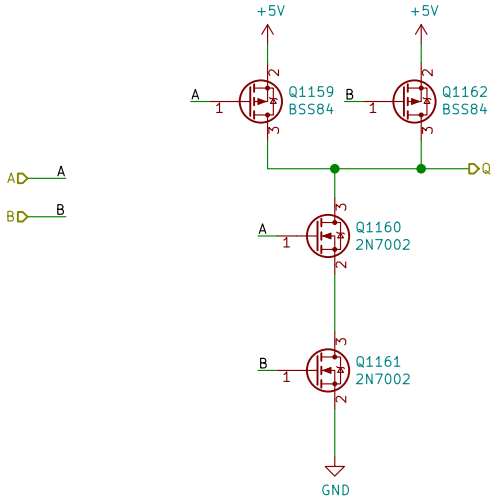
C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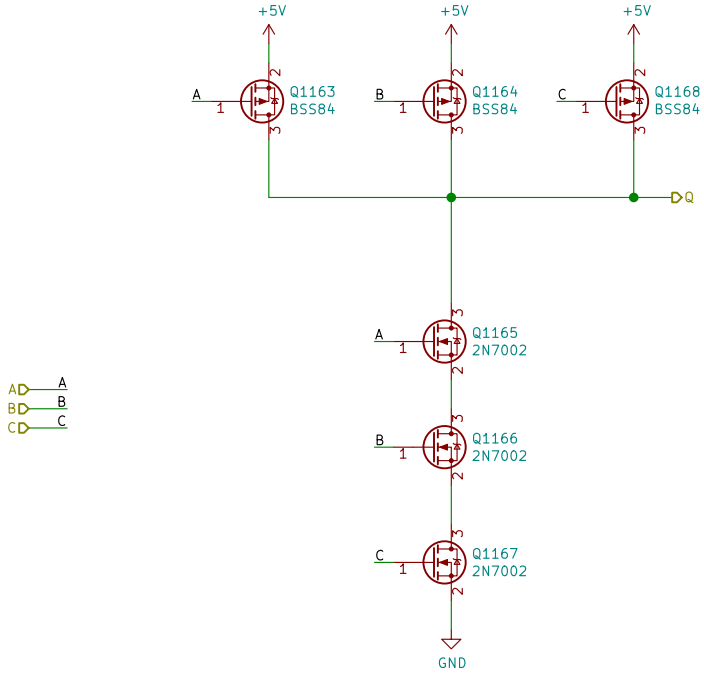
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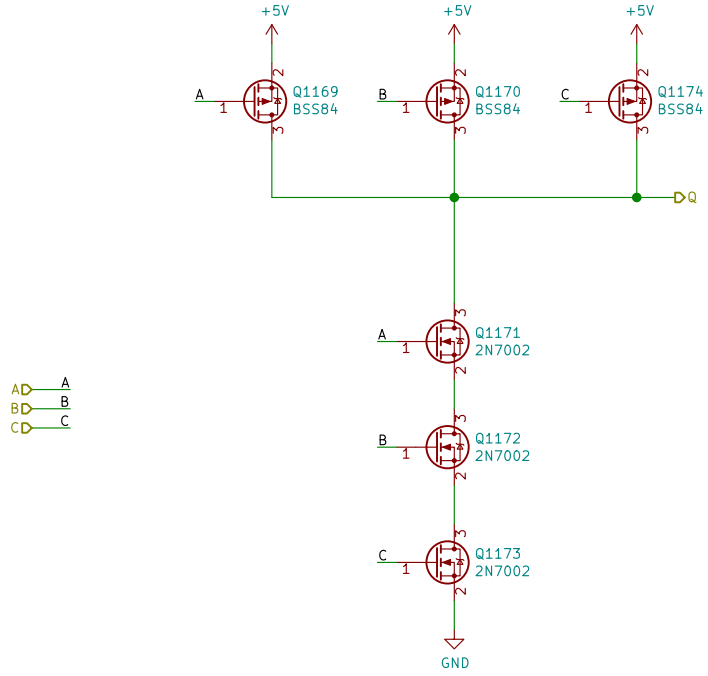
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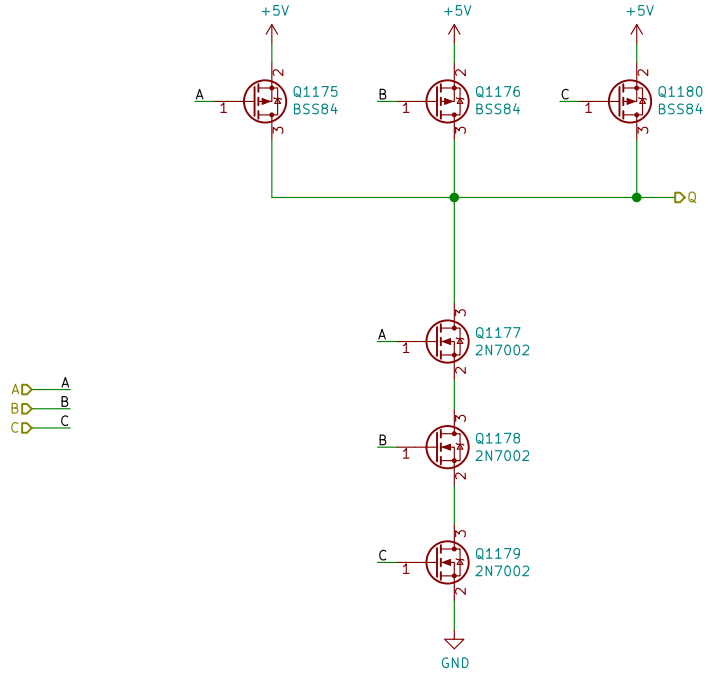
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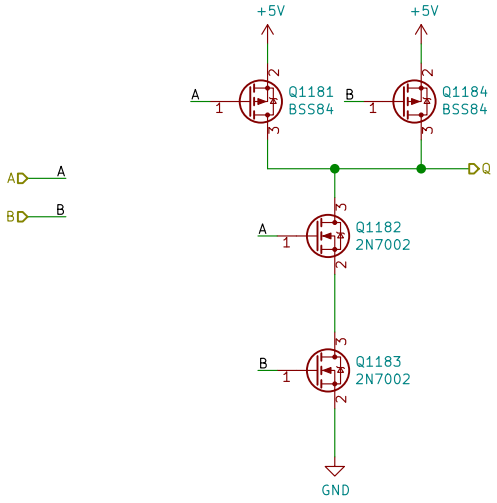
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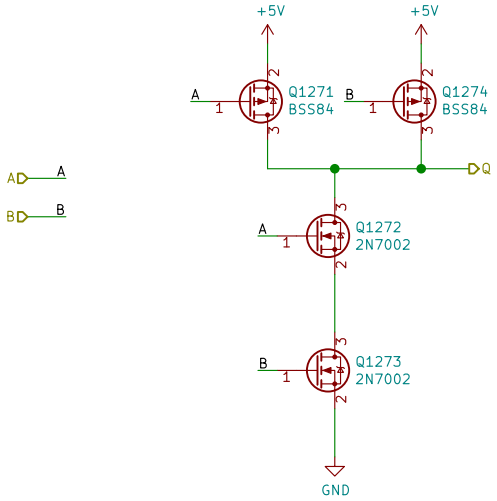
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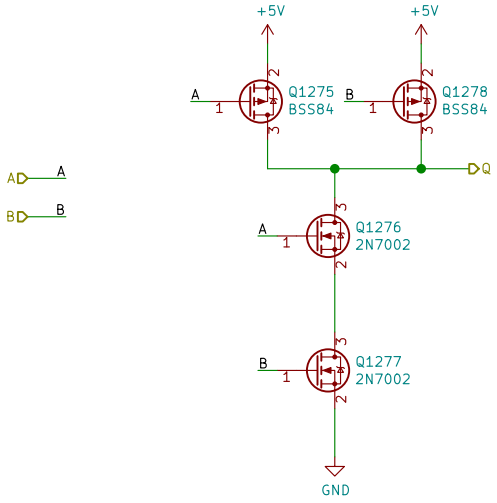
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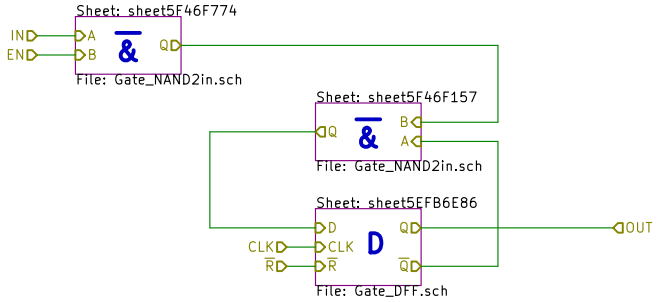
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Q
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Sheet: sheet5F46F157
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&
B
A
File: Gate_NAND2in.sch
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CLK
R
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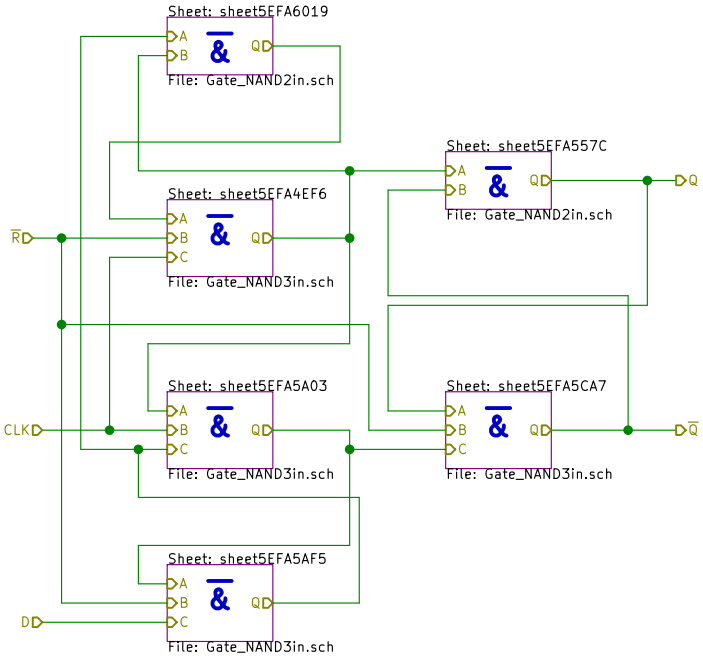
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
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A
B
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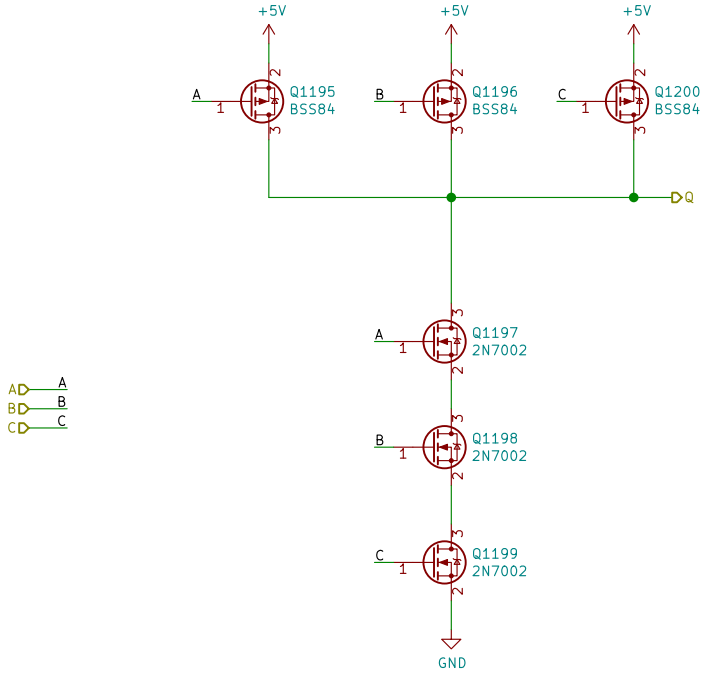
File: Gate_NAND3in.sch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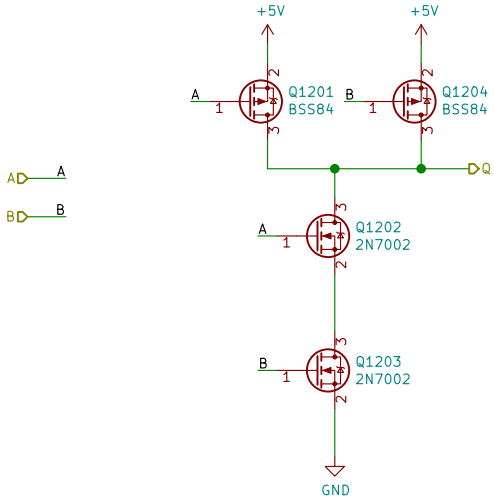
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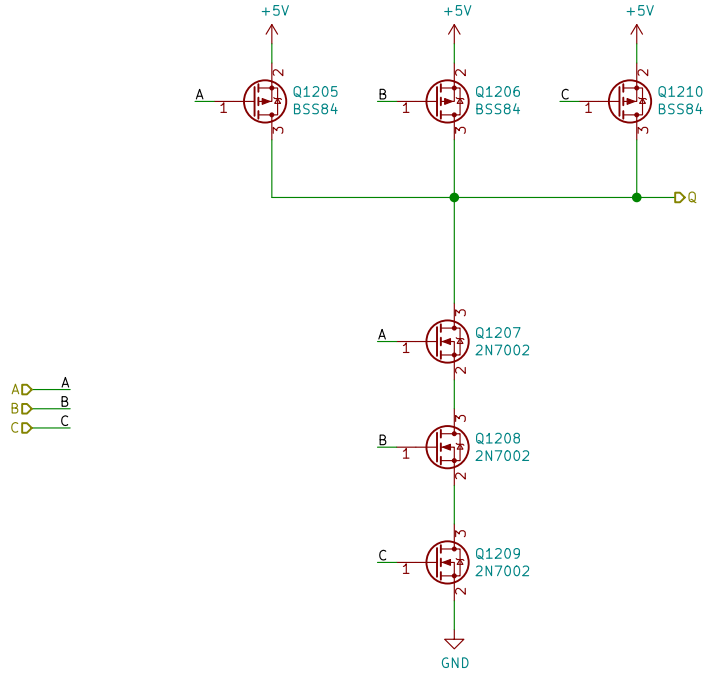
GND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+5V
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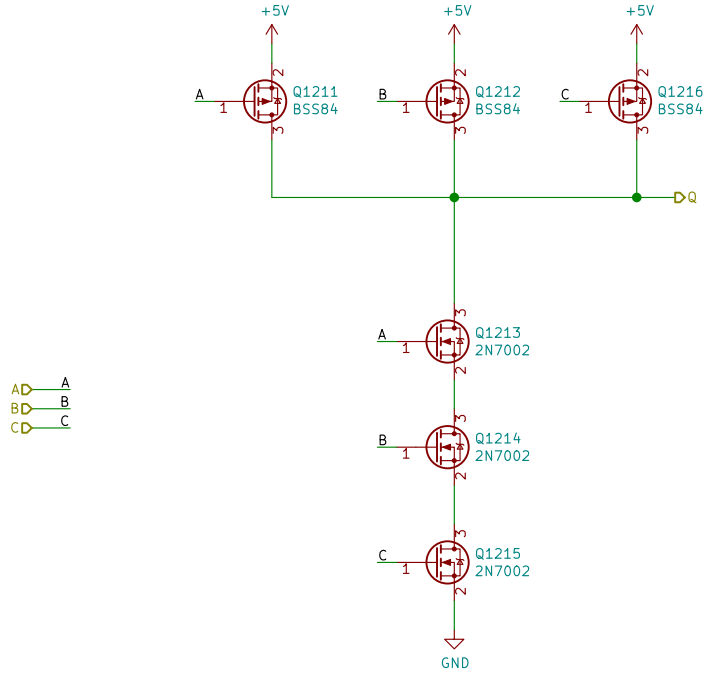
B
C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+5V
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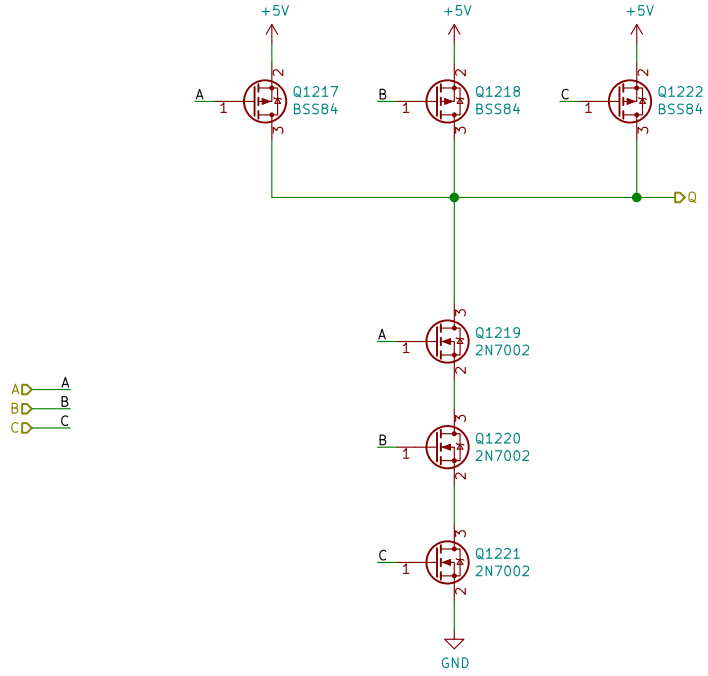
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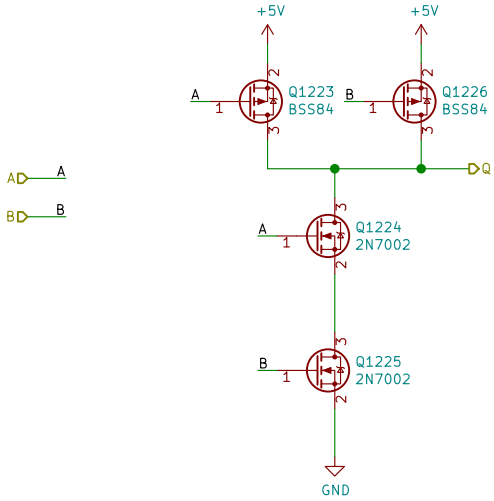
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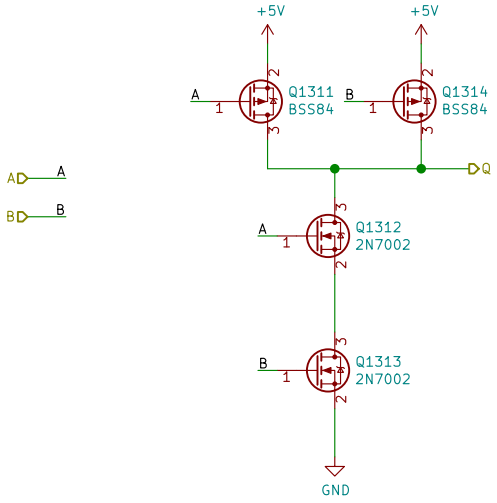
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Q1314
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Q
A
B
Q1312
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Q1313
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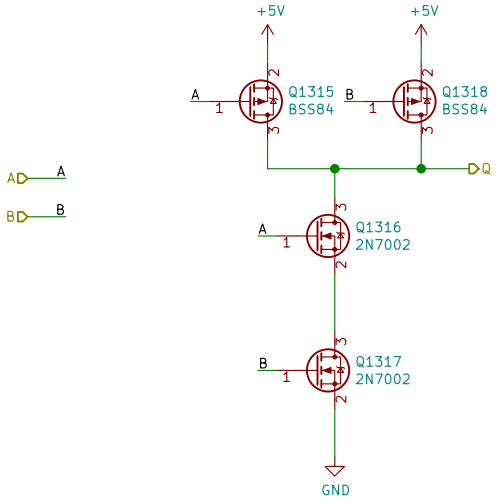
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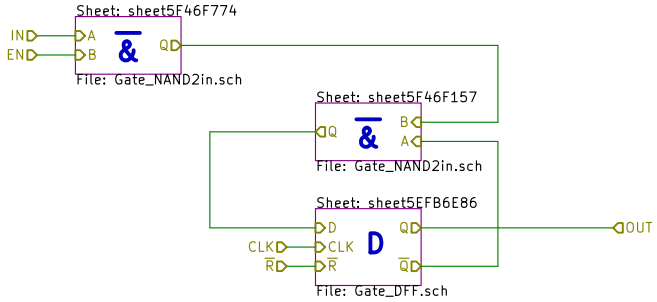
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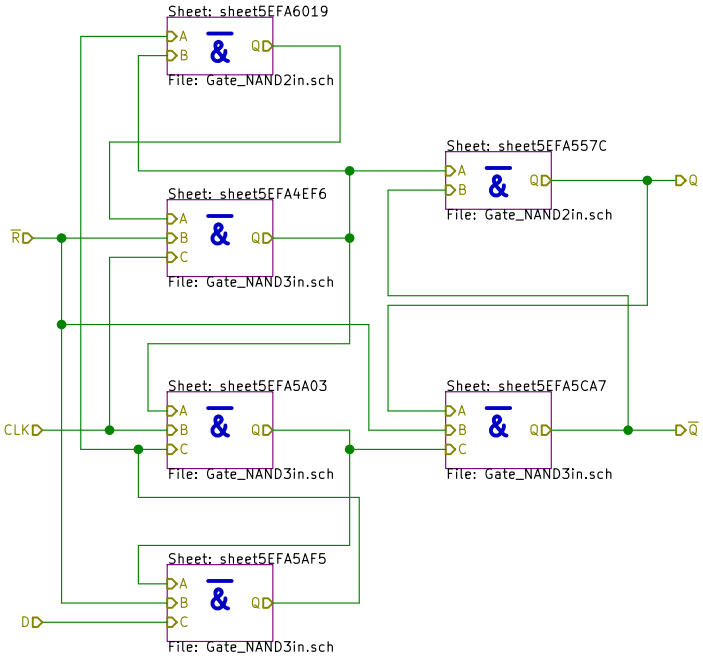
IN
EN
A
B
&
Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
D
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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Q
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Sheet: sheet5EFA557C
A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
Q
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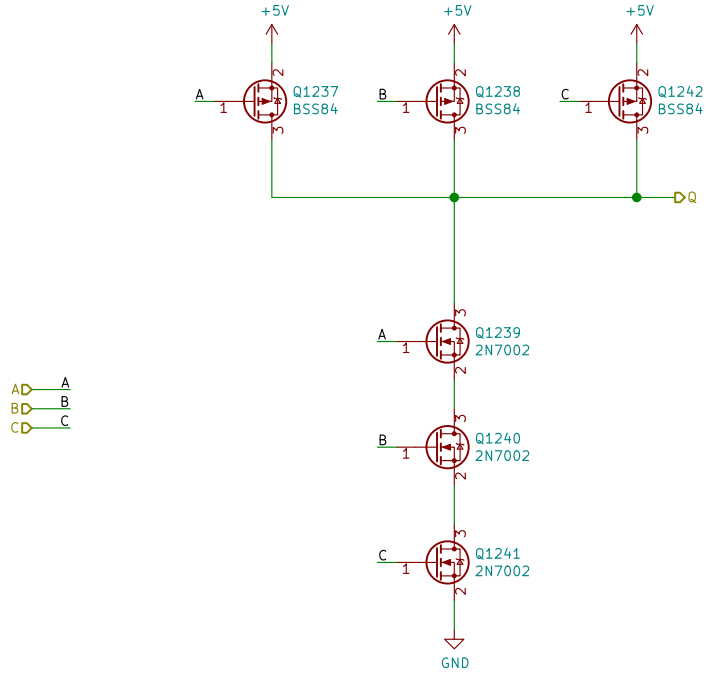
Sheet: sheet5EFA5AF5
D
A
B
C
Q
File: Gate_NAND3in.sch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B
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Q1240
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Q1241
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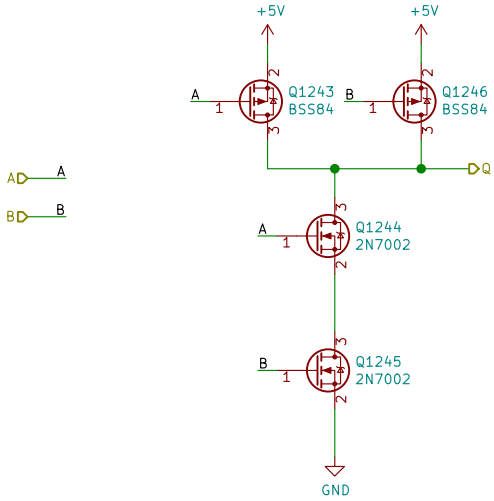
GND
A
B
C
A
B
C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B
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Q
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B
Q1244
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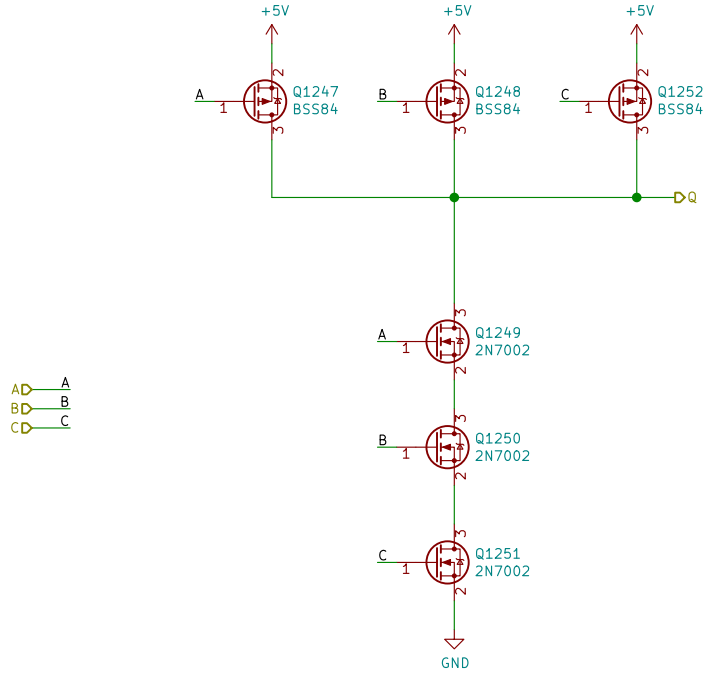
Q1245
2N7002
GND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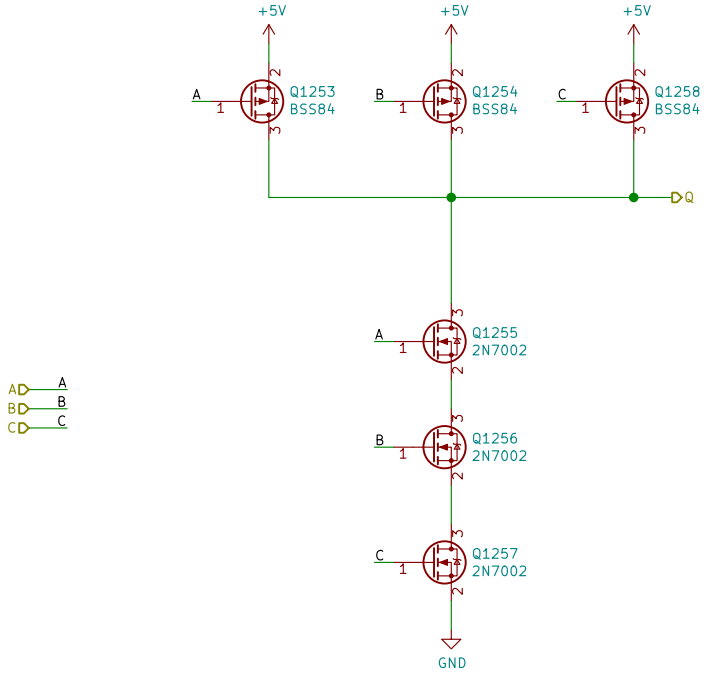
Q1250
2N7002
Q1251
2N7002
GND
A
B
C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Q1254
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Q
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Q1256
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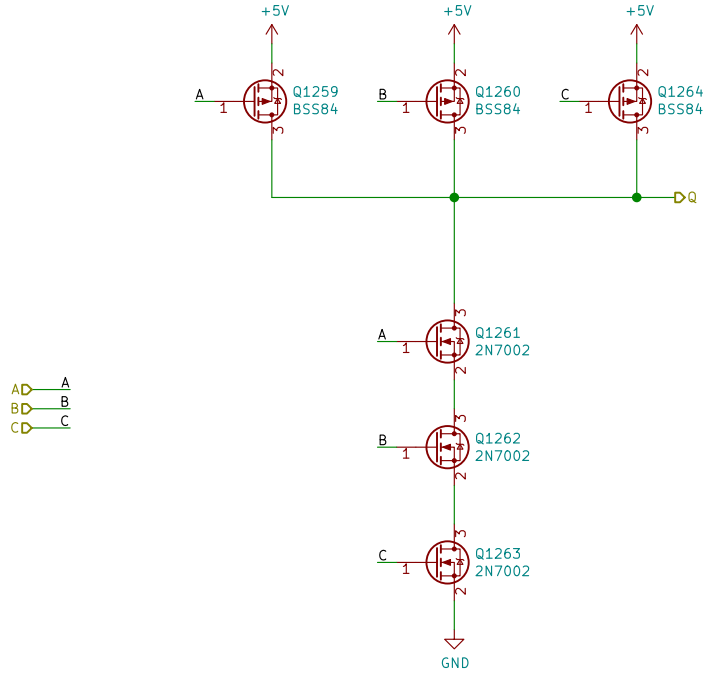
Q1257
2N7002
GND
A
B
C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+5V
+5V
A
B
C
Q1259
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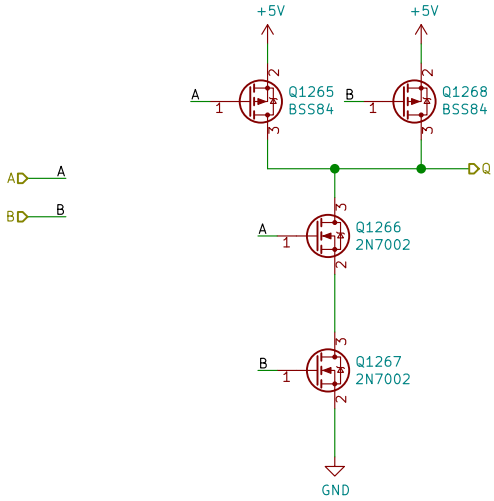
Q1260
BSS84
Q1264
BSS84
Q
A
Q1261
2N7002
B
Q1262
2N7002
C
Q1263
2N7002
GND
A
B
C


+5V
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B
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Q
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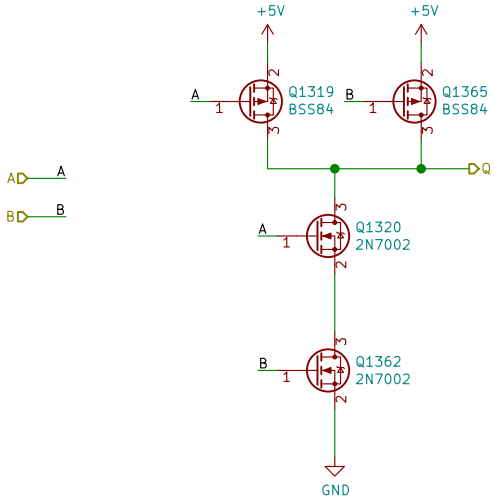
B
Q1266
2N7002
Q1267
2N7002
GND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B
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Q1365
BSS84
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Q
A
B
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B
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Q1362
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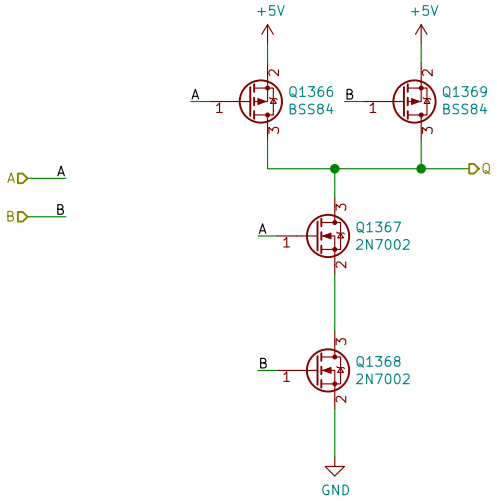
GND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Q
A
B
Q1367
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Q1368
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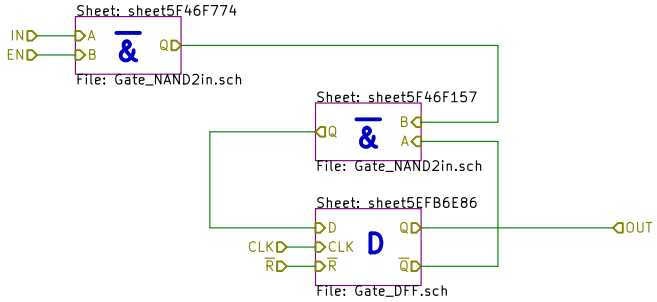
GND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Q
File: Gate_NAND2in.sch
Sheet: sheet5F46F157
Q
&
B
A
File: Gate_NAND2in.sch
Sheet: sheet5EFB6E86
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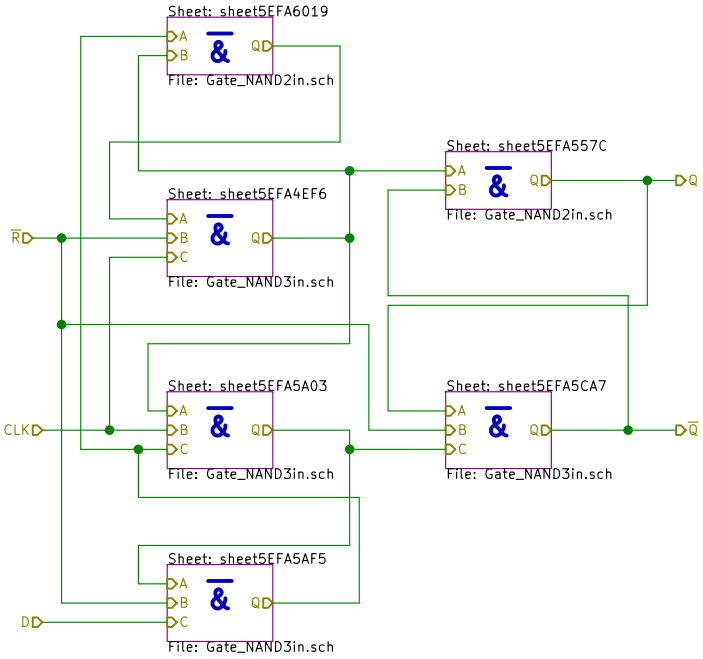
CLK
R
D
CLK
R
D
Q
Q
OUT
File: Gate_DFF.sch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A
B
Q
File: Gate_NAND2in.sch
Q
Sheet: sheet5EFA4EF6
R
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5A03
CLK
A
B
C
Q
File: Gate_NAND3in.sch
Sheet: sheet5EFA5CA7
A
B
C
Q
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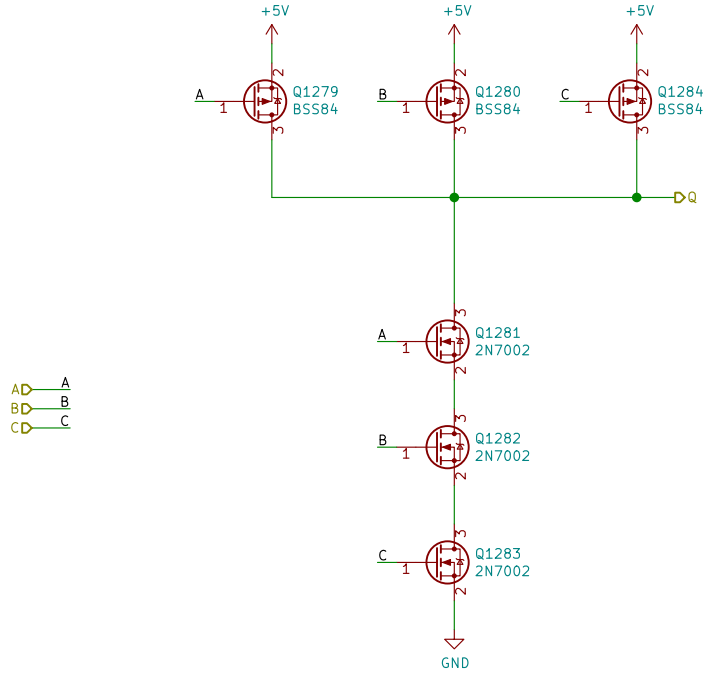
File: Gate_NAND3in.sch
Sheet: sheet5EFA5AF5
D
A
B
C
Q
File: Gate_NAND3in.sch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Q1279
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Q1280
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Q1282
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Q1283
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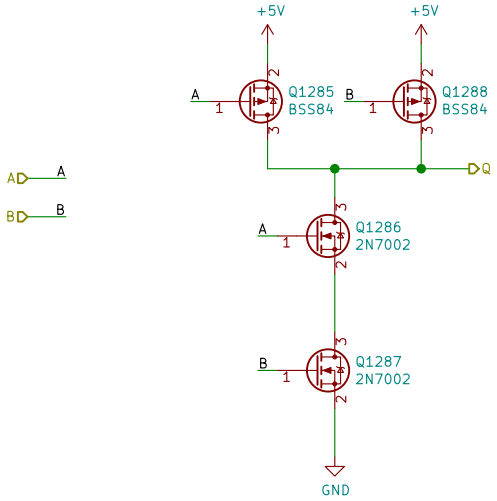
GND
A
B
C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+5V
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Q1285
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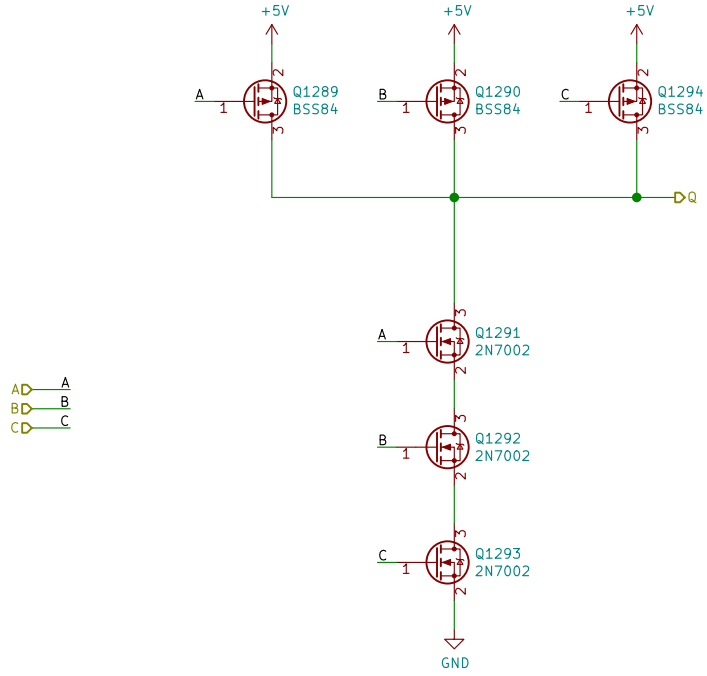
Q
A
B
Q1286
2N7002
Q1287
2N7002
GND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+5V
+5V
A
B
C
Q1289
BSS84
Q1290
BSS84
Q1294
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Q
Q1291
2N7002
Q1292
2N7002
Q1293
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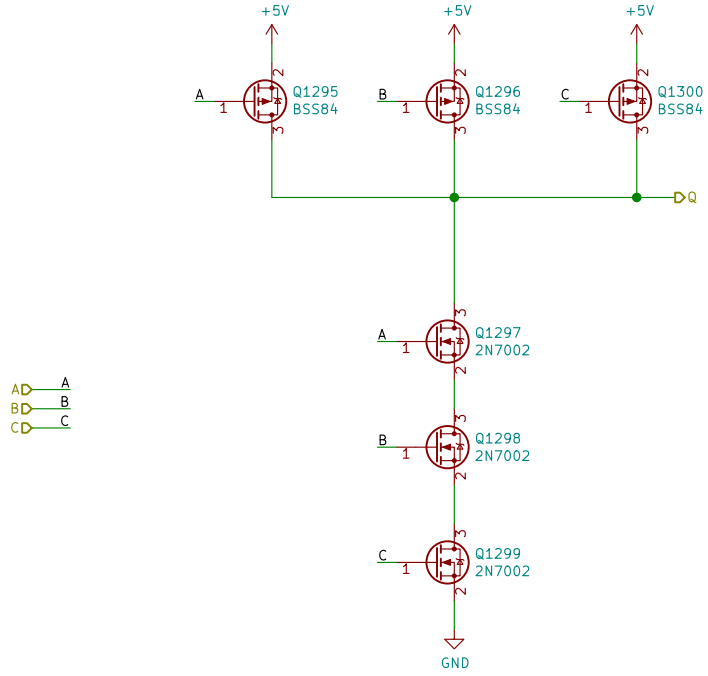
GND
A
B
C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+5V
+5V
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B
C
Q1295
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Q1296
BSS84
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Q
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Q1298
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Q1299
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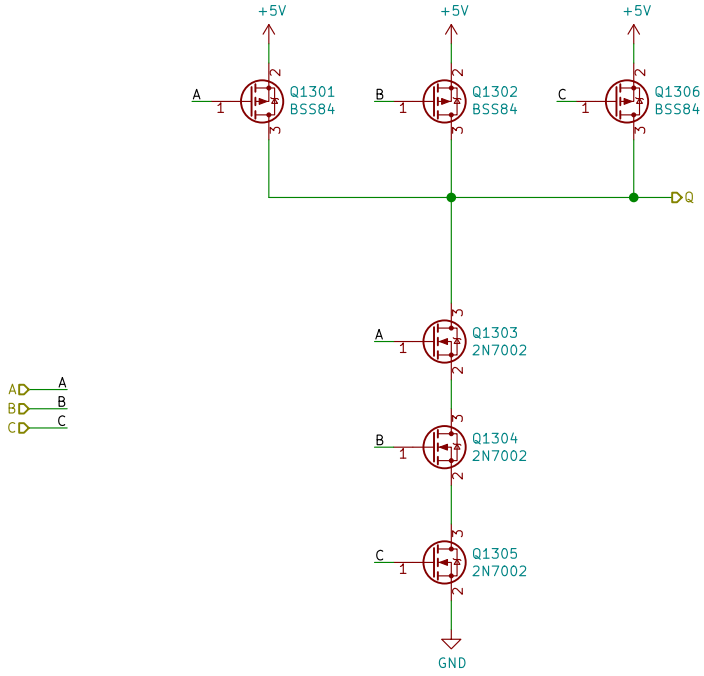
GND
A
B
C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+5V
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B
C
Q1301
BSS84
Q1302
BSS84
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C
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Q1304
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Q1305
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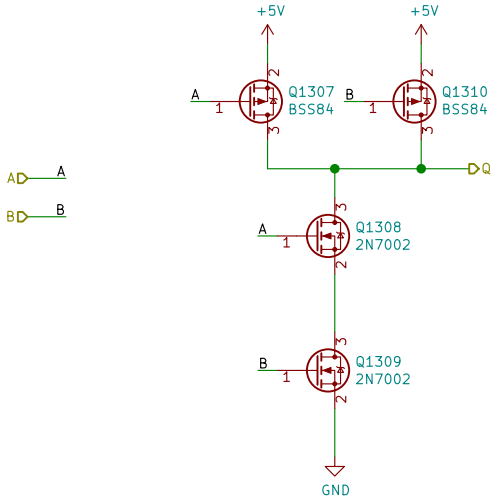
GND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+5V
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B
Q1308
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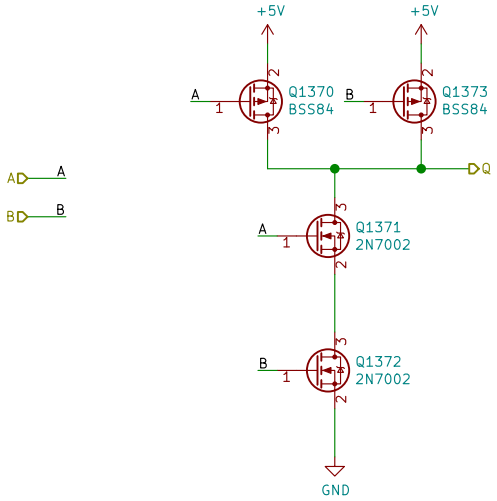
GND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+5V
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B
Q1371
2N7002
Q1372
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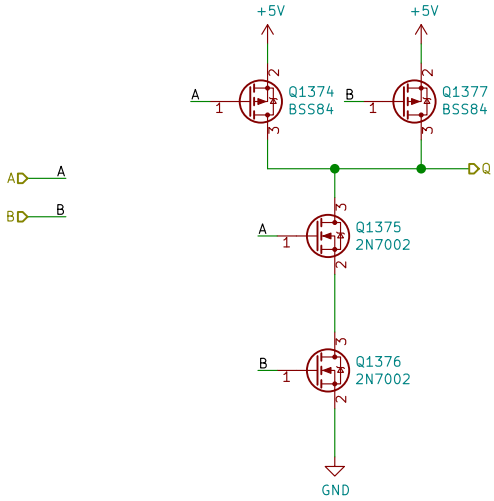
GND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+5V
A
B
Q1374
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Q1377
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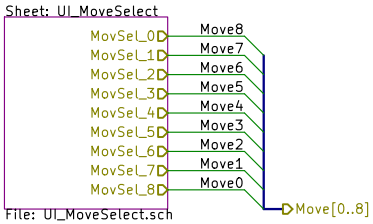
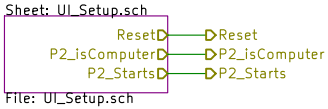
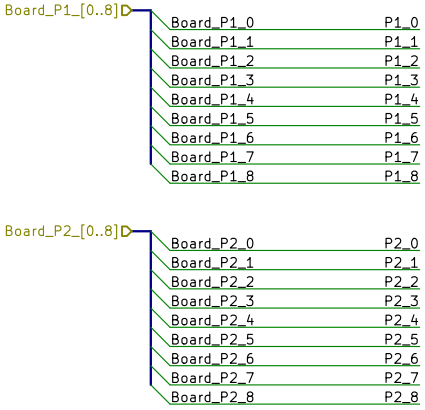
A
B
Q1375
2N7002
Q1376
2N7002
GND

Player Move Selection

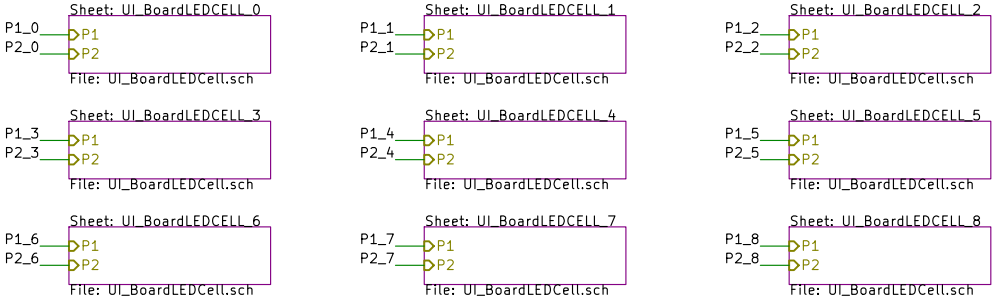


Setup

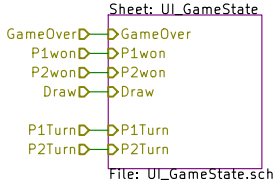




Board Display



GameState Display



P1
1
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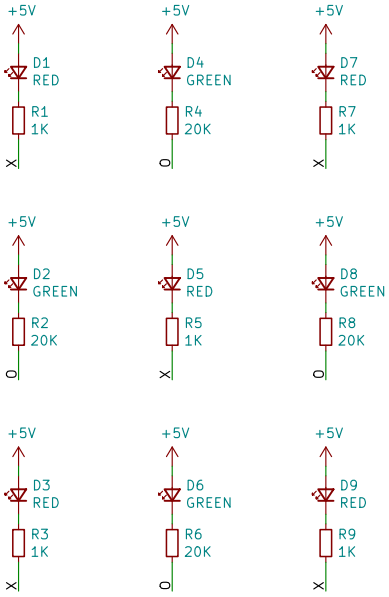
2N7002
3
2
0
GND
P2
1
Q1322
2N7002
3
2
X
GND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D1
RED
R1
1K
X
+5V
D4
GREEN
R4
20K
0
+5V
D7
RED
R7
1K
X
+5V
D2
GREEN
R2
20K
0
+5V
D5
RED
R5
1K
X
+5V
D8
GREEN
R8
20K
0
+5V
D3
RED
R3
1K
X
+5V
D6
GREEN
R6
20K
0
+5V
D9
RED
R9
1K
X

P1
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GND
P2
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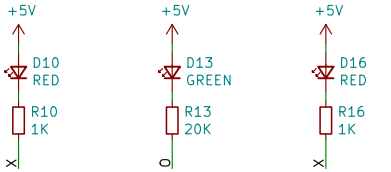
Q1324
2N7002
3
2
X
GND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D10
RED
R10
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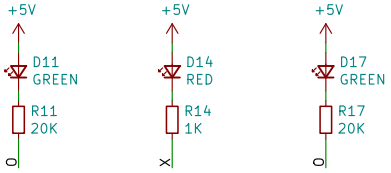
X
+5V
D13
GREEN
R13
20K
0
+5V
D16
RED
R16
1K
X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D11
GREEN
R11
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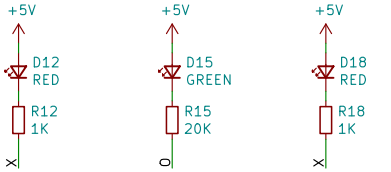
D14
RED
R14
1K
X
+5V
D17
GREEN
R17
20K
0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D12
RED
R12
1K
X
+5V
D15
GREEN
R15
20K
0
+5V
D18
RED
R18
1K
X

P1
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Q1325
2N7002
3
2
0
GND
P2
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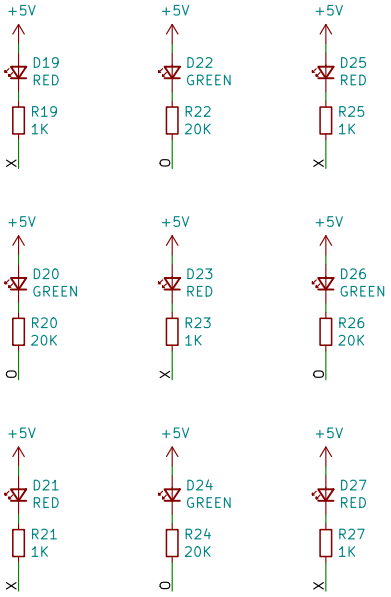
Q1326
2N7002
3
2
X
GND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D19
RED
R19
1K
X
+5V
D22
GREEN
R22
20K
0
+5V
D25
RED
R25
1K
X
+5V
D20
GREEN
R20
20K
0
+5V
D23
RED
R23
1K
X
+5V
D26
GREEN
R26
20K
0
+5V
D21
RED
R21
1K
X
+5V
D24
GREEN
R24
20K
0
+5V
D27
RED
R27
1K
X

P1
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GND
P2
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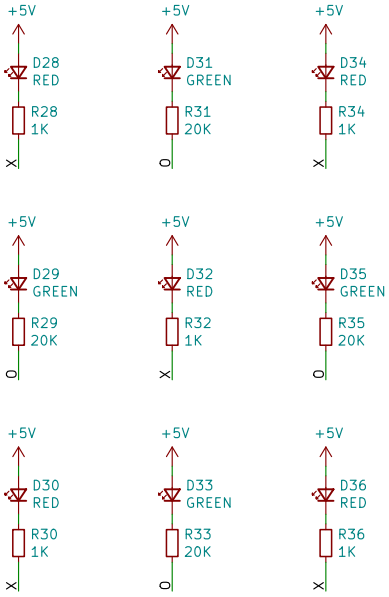
Q1328
2N7002
3
2
X
GND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RED
R28
1K
X
+5V
D31
GREEN
R31
20K
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+5V
D34
RED
R34
1K
X
+5V
D29
GREEN
R29
20K
0
+5V
D32
RED
R32
1K
X
+5V
D35
GREEN
R35
20K
0
+5V
D30
RED
R30
1K
X
+5V
D33
GREEN
R33
20K
0
+5V
D36
RED
R36
1K
X

P1
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Q1329
2N7002
3
2
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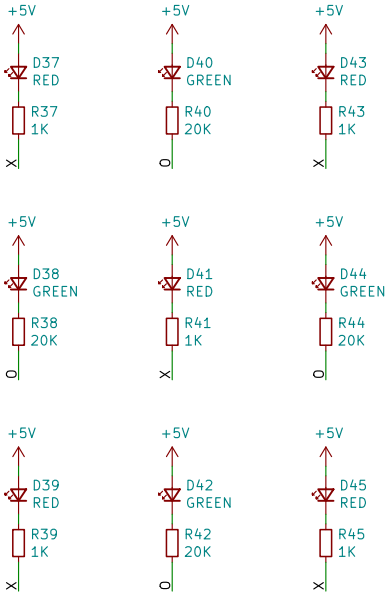
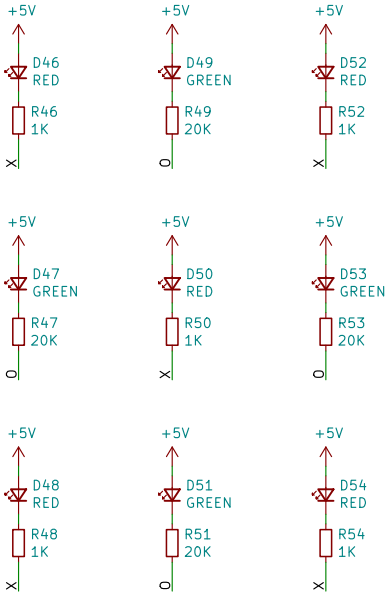
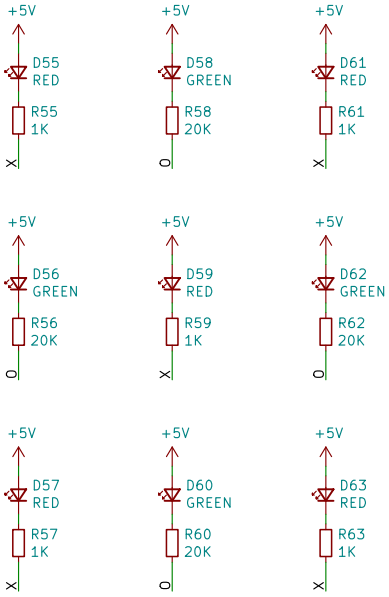
GND
P2
1
Q1330
2N7002
3
2
X
GND


+5V
D37
RED
R37
1K
X
+5V
D40
GREEN
R40
20K
0
+5V
D43
RED
R43
1K
X
+5V
D38
GREEN
R38
20K
0
+5V
D41
RED
R41
1K
X
+5V
D44
GREEN
R44
20K
0
+5V
D39
RED
R39
1K
X
+5V
D42
GREEN
R42
20K
0
+5V
D45
RED
R45
1K
X

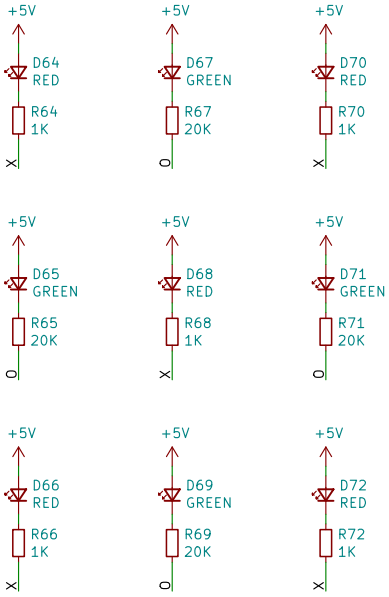
P1
1
Q1331
2N7002
3
2
0
GND
P2
1
Q1332
2N7002
3
2
X
GND


+5V
D46
RED
R46
1K
X
+5V
D49
GREEN
R49
20K
0
+5V
D52
RED
R52
1K
X
+5V
D47
GREEN
R47
20K
0
+5V
D50
RED
R50
1K
X
+5V
D53
GREEN
R53
20K
0
+5V
D48
RED
R48
1K
X
+5V
D51
GREEN
R51
20K
0
+5V
D54
RED
R54
1K
X

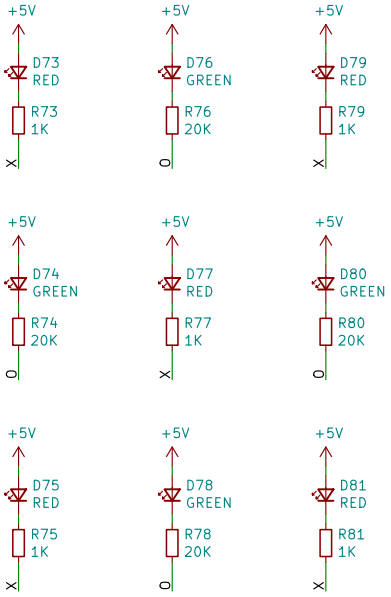
P1
1
Q1333
2N7002
0
3
2
GND
P2
1
Q1334
2N7002
X
3
2
GND

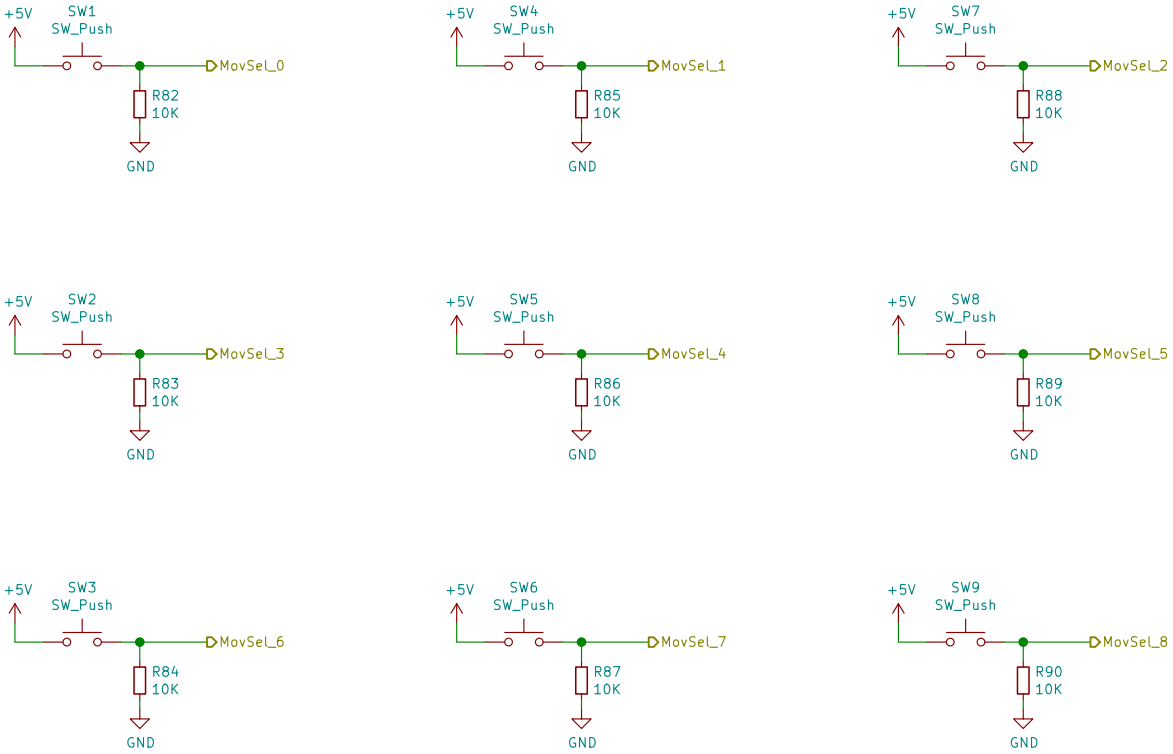

+5V
D55
RED
R55
1K
X
+5V
D58
GREEN
R58
20K
0
+5V
D61
RED
R61
1K
X
+5V
D56
GREEN
R56
20K
0
+5V
D59
RED
R59
1K
X
+5V
D62
GREEN
R62
20K
0
+5V
D57
RED
R57
1K
X
+5V
D60
GREEN
R60
20K
0
+5V
D63
RED
R63
1K
X

P1
1
Q1335
2N7002
0
3
2
GND
P2
1
Q1336
2N7002
X
3
2
GND

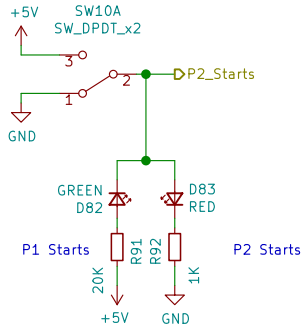

+5V
D64
RED
R64
1K
X
+5V
D67
GREEN
R67
20K
0
+5V
D70
RED
R70
1K
X
+5V
D65
GREEN
R65
20K
0
+5V
D68
RED
R68
1K
X
+5V
D71
GREEN
R71
20K
0
+5V
D66
RED
R66
1K
X
+5V
D69
GREEN
R69
20K
0
+5V
D72
RED
R72
1K
X

P1
1
Q1337
2N7002
0
3
2
GND
P2
1
Q1338
2N7002
X
3
2
GND

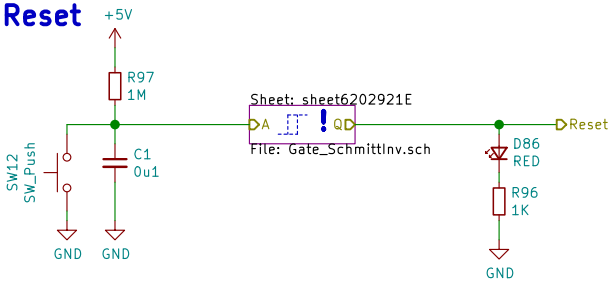

+5V
D73
RED
R73
1K
X
+5V
D76
GREEN
R76
20K
0
+5V
D79
RED
R79
1K
X
+5V
D74
GREEN
R74
20K
0
+5V
D77
RED
R77
1K
X
+5V
D80
GREEN
R80
20K
0
+5V
D75
RED
R75
1K
X
+5V
D78
GREEN
R78
20K
0
+5V
D81
RED
R81
1K
X


+5V
SW1
SW_Push
MovSel_0
R82
10K
GND
+5V
SW4
SW_Push
MovSel_1
R85
10K
GND
+5V
SW7
SW_Push
MovSel_2
R88
10K
GND
+5V
SW2
SW_Push
MovSel_3
R83
10K
GND
+5V
SW5
SW_Push
MovSel_4
R86
10K
GND
+5V
SW8
SW_Push
MovSel_5
R89
10K
GND
+5V
SW3
SW_Push
MovSel_6
R84
10K
GND
+5V
SW6
SW_Push
MovSel_7
R87
10K
GND
+5V
SW9
SW_Push
MovSel_8
R90
10K
GND

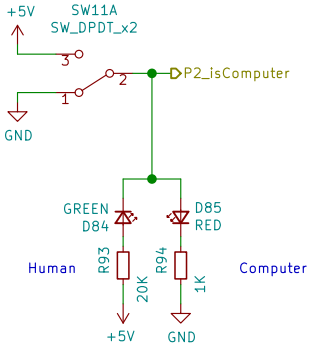
P2 or P1 starts

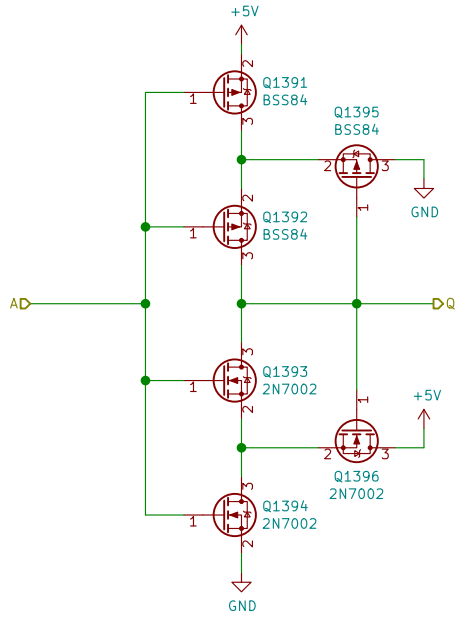


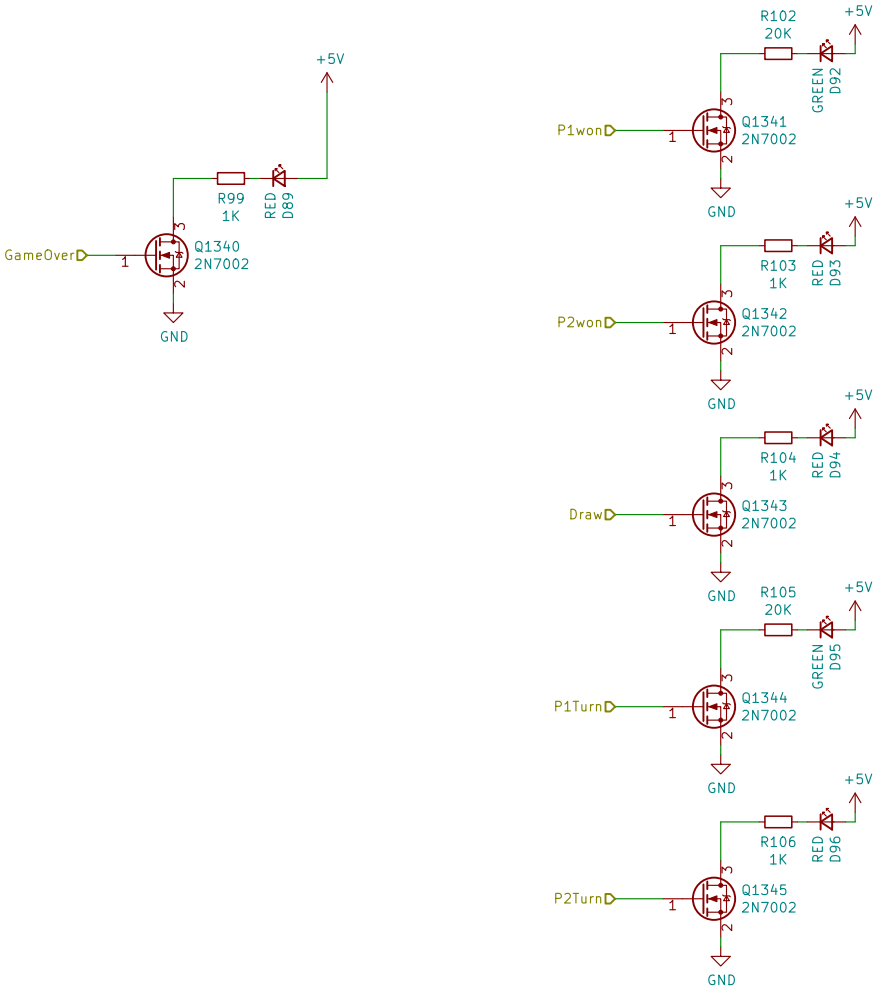
Reset

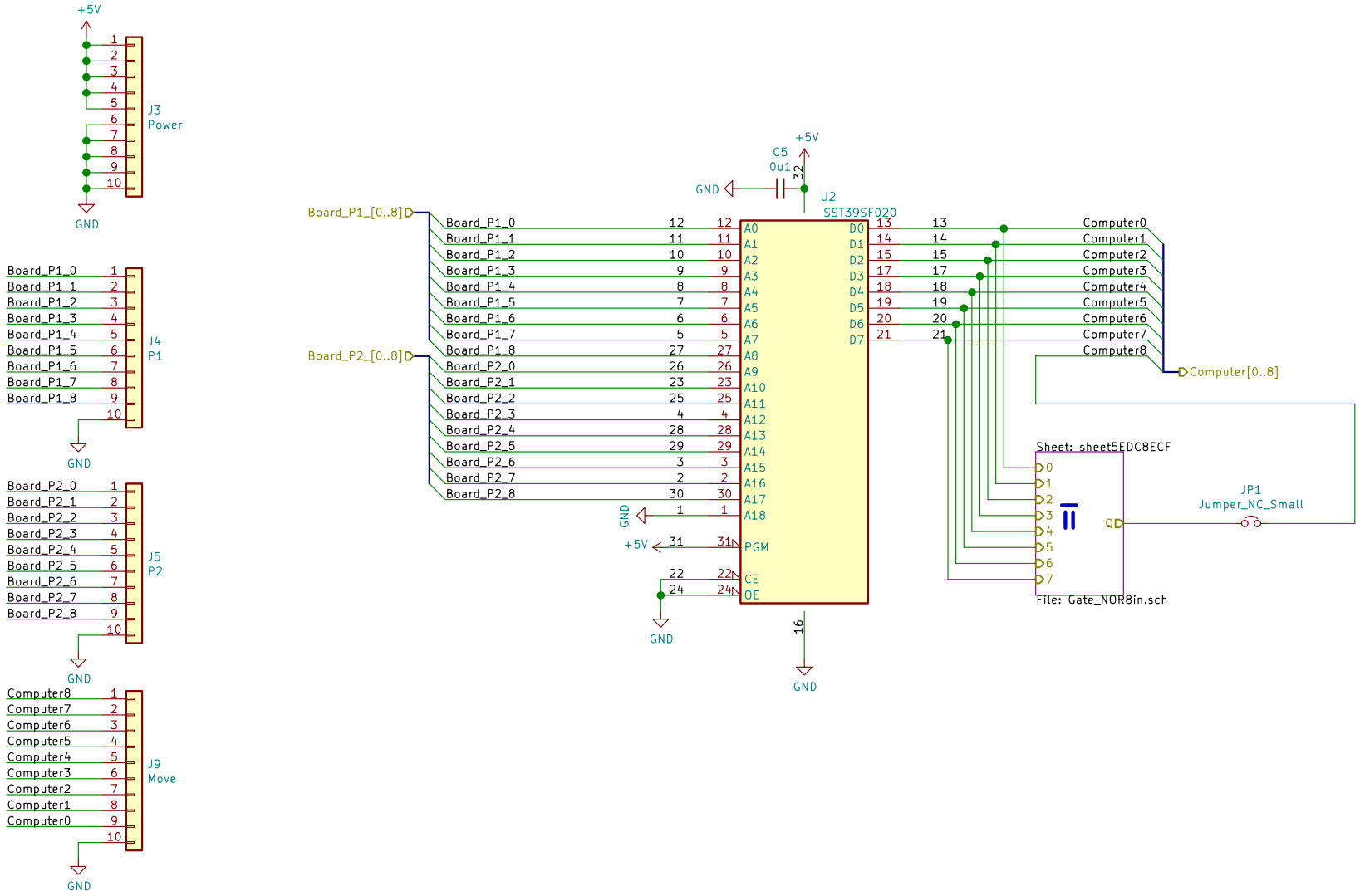


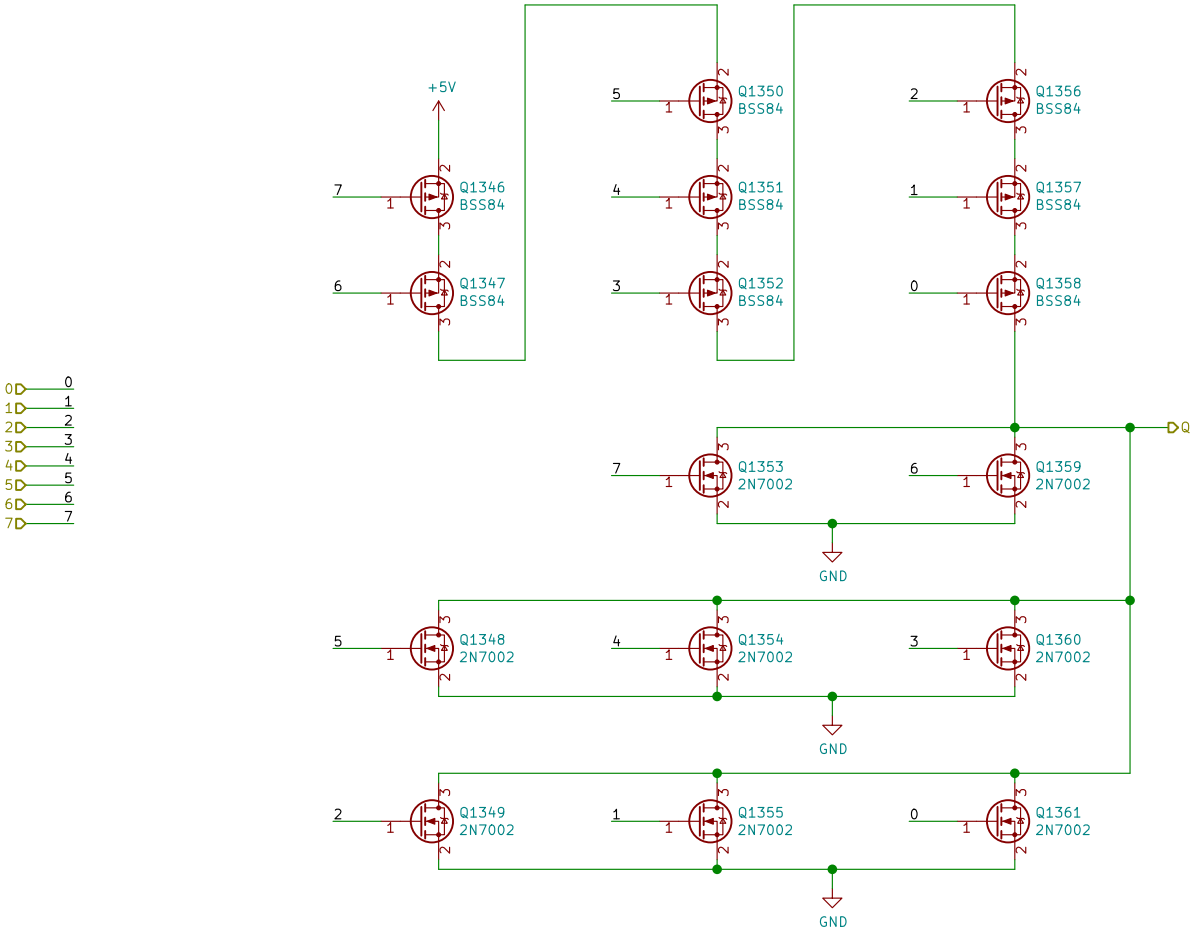
P2: Computer vs. Human Select

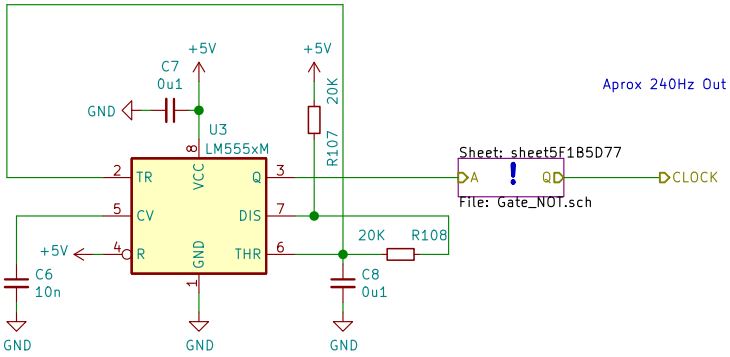


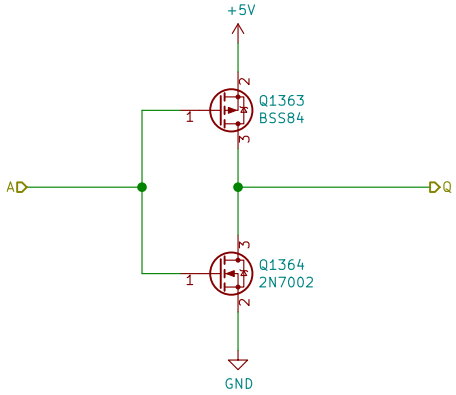

+5V
Q1391
BSS84
Q1395
BSS84
GND
Q1392
BSS84
A
Q
Q1393
2N7002
+5V
Q1396
2N7002
Q1394
2N7002
GND


+5V
R99
1K
RED
D89
GameOver
1
Q1340
2N7002
3
2
GND
R102
20K
+5V
GREEN
D92
P1won
1
Q1341
2N7002
3
2
GND
R103
1K
+5V
RED
D93
P2won
1
Q1342
2N7002
3
2
GND
R104
1K
+5V
RED
D94
Draw
1
Q1343
2N7002
3
2
GND
R105
20K
+5V
GREEN
D95
P1Turn
1
Q1344
2N7002
3
2
GND
R106
1K
+5V
RED
D96
P2Turn
1
Q1345
2N7002
3
2
GND


+5V
J3
Power
GND
Board_P1_0
Board_P1_1
Board_P1_2
Board_P1_3
Board_P1_4
Board_P1_5
Board_P1_6
Board_P1_7
Board_P1_8
J4
P1
Board_P2_0
Board_P2_1
Board_P2_2
Board_P2_3
Board_P2_4
Board_P2_5
Board_P2_6
Board_P2_7
Board_P2_8
J5
P2
Computer8
Computer7
Computer6
Computer5
Computer4
Computer3
Computer2
Computer1
Computer0
J9
Move
C5
0u1
32
U2
SST39SF020
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
A15
A16
A17
A18
PGM
CE
OE
D0
D1
D2
D3
D4
D5
D6
D7
16
Computer[0..8]
Sheet: sheet5EDC8ECF
File: Gate_NOR8in.sch
JP1
Jumper_NC_Small
Q


0
1
2
3
4
5
6
7
+5V
Q1346
BSS84
Q1347
BSS84
Q1350
BSS84
Q1351
BSS84
Q1352
BSS84
Q1356
BSS84
Q1357
BSS84
Q1358
BSS84
Q1353
2N7002
Q1359
2N7002
GND
Q1348
2N7002
Q1354
2N7002
Q1360
2N7002
GND
Q1349
2N7002
Q1355
2N7002
Q1361
2N7002
GND
Q


+5V
C7
0u1
GND
U3
LM555xM
8
VCC
2
TR
5
CV
4
R
1
GND
3
Q
7
DIS
6
THR
+5V
20K
R107
20K
R108
C6
10n
C8
0u1
GND
GND
GND
Aprox 240Hz Out
Sheet: sheet5F1B5D77
A
Q
CLOCK
File: Gate_NOT.sch


+5V
Q1363
BSS84
A
Q
Q1364
2N7002
GND