contact@boolean-algebra.com

Boolean Algebra Simplifier

$\overline{A}\overline{B}C\overline{D}+\overline{A}BC\overline{D}+ABC\overline{D}+A\overline{B}C\overline{D}+A\overline{B}\overline{C}\overline{D}+A\overline{B}\overline{C}D+A\overline{B}CD$ Go

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Solution: $C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}$

WARNING: Solution is not complete. Unable to apply redundancy theorem.

Steps

Start

$\overline{A}BCD+\overline{A}BCD+ABCD+ABCD+ABCD+ABCD+ABCD$

Apply the Distributive Law: $AB+AC = AB+C$

$\overline{A}C\overline{D}(\overline{B}+B)+ABC\overline{D}+A\overline{B}C\overline{D}+A\overline{B}\,\overline{C}\,\overline{D}+A\overline{B}\,\overline{C}D+A\overline{B}CD$

Apply the Complement Law: $A+\overline{A} = 1$

$\overline{A}C\overline{D}1+ABC\overline{D}+A\overline{B}C\overline{D}+A\overline{B}\,\overline{C}\,\overline{D}+A\overline{B}\,\overline{C}D+A\overline{B}CD$

Apply the Identity Law: $A1 = A$

$\overline{A}C\overline{D}+ABC\overline{D}+A\overline{B}C\overline{D}+A\overline{B}\,\overline{C}\,\overline{D}+A\overline{B}\,\overline{C}D+A\overline{B}CD$

Apply the Distributive Law: $AB+AC = AB+C$

$C\overline{D}(AB+\overline{A})+A\overline{B}C\overline{D}+A\overline{B}\,\overline{C}\,\overline{D}+A\overline{B}\,\overline{C}D+A\overline{B}CD$

Apply the Absorption Law: $AB+\overline{A} = B+\overline{A}$

$C\overline{D}(B+\overline{A})+A\overline{B}C\overline{D}+A\overline{B}\,\overline{C}\,\overline{D}+A\overline{B}\,\overline{C}D+A\overline{B}CD$

Apply the Distributive Law: $AB+AC = AB+C$

$C\overline{D}(B+\overline{A})+A\overline{B}\,\overline{D}(C+\overline{C})+A\overline{B}\,\overline{C}D+A\overline{B}CD$

Apply the Complement Law: $A+\overline{A} = 1$

$C\overline{D}(B+\overline{A})+A\overline{B}\,\overline{D}1+A\overline{B}\,\overline{C}D+A\overline{B}CD$

Apply the Identity Law: $A1 = A$

$C\overline{D}(B+\overline{A})+A\overline{B}\,\overline{D}+A\overline{B}\,\overline{C}D+A\overline{B}CD$

Apply the Distributive Law: $AB+AC = AB+C$

$C\overline{D}(B+\overline{A})+A\overline{B}(\overline{C}D+\overline{D})+A\overline{B}CD$

Apply the Absorption Law: $AB+\overline{A} = B+\overline{A}$

$C\overline{D}(B+\overline{A})+A\overline{B}(\overline{C}+\overline{D})+A\overline{B}CD$

Apply: Distribution

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}(\overline{C}+\overline{D})+A\overline{B}CD$

Apply: Distribution

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}\,\overline{C}+A\overline{B}\,\overline{D}+A\overline{B}CD$

Apply the Distributive Law: $AB+AC = AB+C$

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}\,\overline{D}+A\overline{B}(CD+\overline{C})$

Apply the Absorption Law: $AB+\overline{A} = B+\overline{A}$

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}\,\overline{D}+A\overline{B}(D+\overline{C})$

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Apply: Distribution

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}\,\overline{D}+A\overline{B}D+A\overline{B}\,\overline{C}$

Apply the Distributive Law: $AB+AC = AB+C$

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}(\overline{D}+D)+A\overline{B}\,\overline{C}$

Apply the Complement Law: $A+\overline{A} = 1$

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}1+A\overline{B}\,\overline{C}$

Apply the Identity Law: $A1 = A$

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}+A\overline{B}\,\overline{C}$

Apply the Absorption Law: $A+AB = A$

$C\overline{D}B+C\overline{D}\,\overline{A}+A\overline{B}$

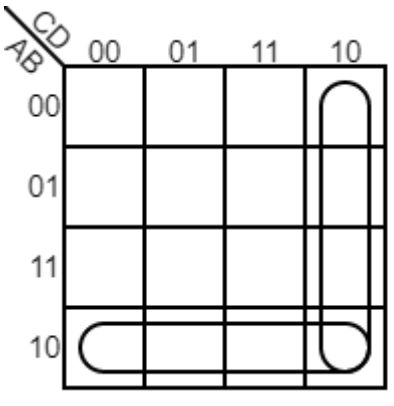
Apply steps to convert to POS form

Truth Table

A	B	C	D	Output
0	0	0	0	F
0	0	0	1	F
0	0	1	0	T
0	0	1	1	F
0	1	0	0	F
0	1	0	1	F
0	1	1	0	T
0	1	1	1	F
1	0	0	0	T
1	0	0	1	T
1	0	1	0	T
1	0	1	1	T
1	1	0	0	F
1	1	0	1	F
1	1	1	0	T
1	1	1	1	F

$\overline{A}B\overline{C}\overline{D}+\overline{A}BC\overline{D}+A\overline{B}\,\overline{C}\,\overline{D}+A\overline{B}\,\overline{C}D+A\overline{B}C\overline{D}+A\overline{B}CD+ABC\overline{D}$

K-Map



Logic Gate

View Minimalized

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