

Table S1 Truth table for 17 two-step ternary logics




























Logic Function	Initial State	Writing		Logic Output
		T ₁	T ₂	
F_0	0 	0	$q(0, 1, 2)$	0, 0, 0
F_1	0 	$q(0, 1, 2)$	V_1	0, 0, 1
F_2	0 	$q(0, 1, 2)$	V_{base}	0, 0, 2
F_5	0 	$q(0, 1, 2)$	0	0, 1, 2
F_9	0 	V_{th1}	$q(0, 1, 2)$	1, 0, 0
F_{18}	0 	V_{th2}	$q(0, 1, 2)$	2, 0, 0
F_4	1 	$q(0, 1, 2)$	V_2	0, 1, 1
F_{12}	1 	0	$q(0, 1, 2)$	1, 1, 0
F_{13}	1 	$q(0, 1, 2)$	V_1	1, 1, 1
F_{14}	1 	$q(0, 1, 2)$	0	1, 1, 2
F_{22}	1 	V_2	$q(0, 1, 2)$	2, 1, 1
F_{21}	2 	0	$q(0, 1, 2)$	2, 1, 0
F_8	2 	$q(0, 1, 2)$	V_{th2}	0, 2, 2
F_{17}	2 	$q(0, 1, 2)$	V_1	1, 2, 2
F_{24}	2 	V_{base}	$q(0, 1, 2)$	2, 2, 0
F_{25}	2 	V_1	$q(0, 1, 2)$	2, 2, 1
F_{26}	2 	$q(0, 1, 2)$	0	2, 2, 2

Table S2 Truth table for 10 three-step ternary logics

Logic Function	Initial State	Writing		Writing		Logic Output
		T ₁	T ₂	T ₁	T ₂	
F_3	0 	q	0	0	q	0, 1, 0
F_{10}	0 	V_{th1}	q	q	V_1	1, 0, 1
F_{11}	0 	V_{th1}	q	q	V_{base}	1, 0, 2
F_{19}	0 	q	V_1	V_{th2}	q	2, 0, 1
F_{20}	0 	V_{th2}	q	q	V_{base}	2, 0, 2
F_{23}	0 	V_{th2}	q	q	0	2, 1, 2
F_6	2 	q	V_{th2}	V_{base}	q	0, 2, 0
F_7	2 	V_1	q	q	V_{th2}	0, 2, 1
F_{15}	2 	q	V_1	V_{base}	q	1, 2, 0
F_{16}	2 	q	V_1	V_1	q	1, 2, 1