Error Detector Truth Table

S4	S3	S2	S1	Error
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	1	1

Error Detector Karnaugh Map

S_4S_3

S_2S_1	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	1	1	1	1
10	0	1	1	1
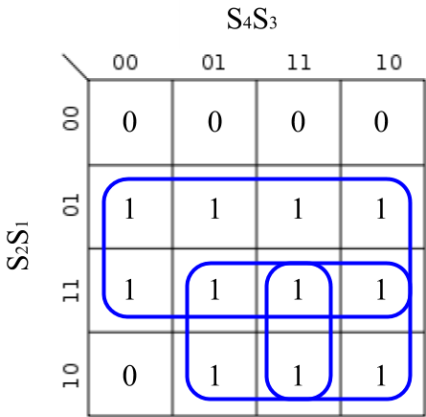
Minimal Sum of Products Form

$$\text{Error} = S_1 + S_3 * S_2 + S_4 * S_2$$