|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **BENCHMARK CIRCUIT USED** | **NUMBER OF NETS IN THE CIRCUIT** | **OPTIMUM**  **THRESHOLD** | **NO OF LT NETS BEFORE INSERTION** | **NO OF LT NETS AFTER INSERTION** | **NO OF INSERTION POINTS** | **GATE OVERHEAD %** |
| S5378 | 2958 | 0.04 | 196 | 0 | 78 | 7.9 |
| S13207 | 8589 | 0.02 | 1183 | 0 | 524 | 11.4 |
| S15850 | 10306 | 0.06 | 1276 | 0 | 329 | 9.5 |
| S38417 | 23815 | 0.025 | 783 | 0 | 671 | 8.45 |

TROJAN ACTIVATION AND DETECTION ANALYSIS BEFORE APPLYING THE PROPOSED METHODOLOGY

**BEFORE APPLYING PROPOSED METHODOLOGY:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **(s38417)**  **Pth = 0.025** | **TOTAL CIRCUIT ACTIVITY** | **NO OF TRANSITION ON LT SET** | **NO OF TRANSITION ON TROJAN INPUTS** | **NO OF TRANSITION INSIDE TROJAN** | **NO OF TRANSITION AT TROJAN OUTPUT** | **TROJAN ACTIVITY** | **POC** | **TCA** |
| Trojan 1 | 9284492 | 24212 | 16 | NA | 4 | 4 | 0 | 4.3E-07 |
| Trojan 2 | 9284552 | 24272 | 89 | 48 | 2 | 50 | 0 | 5.3E-06 |
| Trojan 3 | 9284585 | 24304 | 123 | 92 | 0 | 92 | 0 | 9.9E-06 |
| Trojan 4 | 9284744 | 24464 | 357 | 247 | 0 | 247 | 0 | 2.6E-05 |

**AFTER APPLYING PROPOSED METHODOLOGY:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **(s38417)**  **Pth = 0.025** | **TOTAL CIRCUIT ACTIVITY** | **NO OF TRANSITION ON LT SET** | **NO OF TRANSITION ON TROJAN INPUTS** | **NO OF TRANSITION INSIDE TROJAN** | **NO OF TRANSITION AT TROJAN OUTPUT** | **TROJAN ACTIVITY** | **POC** | **TCA** |
| Trojan 1 | 1334509 | 266332 | 10454 | NA | 3603 | 3603 | 102 | 2.7E-03 |
| Trojan 2 | 1335796 | 267619 | 15403 | 9044 | 306 | 9350 | 36 | 7E-03 |
| Trojan 3 | 1336624 | 268447 | 23361 | 18077 | 101 | 18178 | 9 | 13.6E-03 |
| Trojan 4 | 1338685 | 270508 | 36390 | 29159 | 0 | 29183 | 0 | 21.8E-03 |

RESULTS OF THE PROPOSED METHODOLOGY (POC & TCA) USING OPTIMUM THRESHOLD p

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PROPOSED METHOD** | **PAYLOAD OUTPUT CHANGE (POC)** | | | | **TROJAN TO CIRCUIT ACTIVITY (TCA)** | | | |
| **S5378** | **S13207** | **S15850** | **S38417** | **S5378** | **S13207** | **S15850** | **S38417** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trojan 1 | 119 | 108 | 111 | 102 | 0.5E-03 | 1.63E-03 | 1.64E-03 | 2.7E-03 |
| Trojan 2 | 41 | 57 | 23 | 36 | 2.5E-03 | 3.42E-03 | 2.66E-03 | 7E-03 |
| Trojan 3 | 8 | 13 | 10 | 9 | 7.83E-03 | 4.63E-03 | 4.74E-03 | 13.6E-03 |
| Trojan 4 | 0 | 0 | 0 | 0 | 12.9E-03 | 9.44E-03 | 5.32E-03 | 21.8E-03 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **METHOD**  **IN [ \* ]** | **PAYLOAD OUTPUT CHANGE (POC)** | | | | **TROJAN TO CIRCUIT ACTIVITY (TCA)** | | | |
| **S5378** | **S13207** | **S15850** | **S38417** | **S5378** | **S13207** | **S15850** | **S38417** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Trojan 1 | 127 | 110 | 115 | 101 | 2.2E-03 | 0.6E-03 | 0.5E-03 | 3.0E-03 |
| Trojan 2 | 58 | 48 | 27 | 35 | 8.7E-03 | 1.9E-03 | 1.5E-03 | 11.0E-03 |
| Trojan 3 | 12 | 10 | 11 | 16 | 13.3E-03 | 3.1E-03 | 2.8E-03 | 19.5E-03 |
| Trojan 4 | 0 | 0 | 0 | 0 | 23.2E-03 | 5.0E-03 | 4.9E-03 | 34.9E-03 |

TIME COMPLEXITY AND CIRCUIT OVERHEADS AFTER APPLYING THE PROPOSED METHODOLOGY USING OPTIMUM PTH

**PROPOSED METHOD:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BENCHMARK** | **S5378** | **S13207** | **S15850** | **S38417** |
| **OPTIMUM PTH** | **0.04** | **0.02** | **0.06** | **0.025** |
| NO OF LT NETS | 196 | 1183 | 1276 | 783 |
| NO OF INSERTION POINTS | 78 | 524 | 329 | 671 |
| LINS (%) | 251 | 225 | 387 | 116 |
| GATE OVERHEAD (%) | 7.9 | 11.4 | 9.5 | 8.45 |
| RUN TIME (SEC) | 47 | 219 | 585 | 966 |

**METHOD IN \*:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **BENCHMARK** | **S5378** | **S13207** | **S15850** | **S38417** |
| **OPTIMUM PTH** | **0.04** | **0.02** | **0.06** | **0.025** |
| NO OF LT NETS | 196 | 1183 | 1276 | 783 |
| NO OF INSERTION POINTS | 119 | 657 | 557 | 959 |
| LINS (%) | 164 | 180 | 230 | 82 |
| GATE OVERHEAD (%) | 4.28 | 8.2 | 5.7 | 4.32 |
| RUN TIME (SEC) | 31 | 263 | 404 | 1998 |