ALU运算器模块测试结果记录表

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| --- | --- | --- | --- | --- |
| **A= 0x7FFFFFFF B= 0x7FFFFFFF** | | | | |
| ALU\_OP | **运算方式** | Shift\_carry\_out，来自CPSR的CF、VF | F | **NZCV** |
| 0000 | F=A & B | 10\* | 2147483647 | 001N |
| 0001 | F=A ^ B | 00\* | 0 | 010N |
| 0010 | F=A - B | 01\* | 0 | 0100 |
| 0011 | F=B - A | 01\* | 0 | 0100 |
| 0100 | F=A + B | 01\* | 4294967294 | 1001 |
| 0101 | F=A + B +CF | 01\* | 4294967294 | 1001 |
| 0110 | F=A - B + CF - 1 | 01\* | 0 | 0100 |
| 0111 | F=B - A + CF - 1 | 01\* | 0 | 0100 |
| 1000 | F=A | 00\* | 2147483647 | NNNN |
| 1010 | F=A–B + 4 | 01\* | 4 | 0000 |
| 1100 | F=A | B | 10\* | 2147483647 | 001N |
| 1101 | F=B | 00\* | 2147483647 | NNNN |
| 1110 | F=A & (~B) | 10\* | 0 | 011N |
| 1111 | F=~B | 10\* | 2147483648 | 101N |

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| --- | --- | --- | --- | --- |
| **A= 0x00000001 B= 0xFFFFFFFF** | | | | |
| ALU\_OP | **运算方式** | Shift\_carry\_out，来自CPSR的CF、VF | F | **NZCV** |
| 0000 | F=A & B | 01\* | 1 | 000N |
| 0001 | F=A ^ B | 11\* | 4294967294 | 101N |
| 0010 | F=A - B | 00\* | 2 | 0010 |
| 0011 | F=B - A | 00\* | 4294967294 | 1000 |
| 0100 | F=A + B | 00\* | 0 | 0110 |
| 0101 | F=A + B +CF | 00\* | 0 | 0110 |
| 0110 | F=A - B + CF - 1 | 00\* | 1 | 0010 |
| 0111 | F=B - A + CF - 1 | 00\* | 4294967293 | 1000 |
| 1000 | F=A | 01\* | 1 | NNNN |
| 1010 | F=A–B + 4 | 00\* | 6 | 0010 |
| 1100 | F=A | B | 01\* | 4294967295 | 100N |
| 1101 | F=B | 01\* | 4294967295 | NNNN |
| 1110 | F=A & (~B) | 01\* | 0 | 010N |
| 1111 | F=~B | 01\* | 0 | 010N |

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| --- | --- | --- | --- | --- |
| **A= 0x55555555 B= 0xAAAAAAAA** | | | | |
| ALU\_OP | **运算方式** | Shift\_carry\_out，来自CPSR的CF、VF | F | **NZCV** |
| 0000 | F=A & B | 10\* | 0 | 011N |
| 0001 | F=A ^ B | 00\* | 4294967295 | 100N |
| 0010 | F=A - B | 01\* | 2863311531 | 1011 |
| 0011 | F=B - A | 01\* | 1431655765 | 0001 |
| 0100 | F=A + B | 01\* | 4294967295 | 1000 |
| 0101 | F=A + B +CF | 01\* | 0 | 0110 |
| 0110 | F=A - B + CF - 1 | 01\* | 2863311531 | 1011 |
| 0111 | F=B - A + CF - 1 | 01\* | 1431655765 | 0001 |
| 1000 | F=A | 00\* | 1431655765 | NNNN |
| 1010 | F=A–B + 4 | 01\* | 2863311535 | 1011 |
| 1100 | F=A | B | 10\* | 4294967295 | 101N |
| 1101 | F=B | 00\* | 2863311530 | NNNN |
| 1110 | F=A & (~B) | 10\* | 1431655765 | 001N |
| 1111 | F=~B | 10\* | 1431655765 | 001N |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A= 0x7FFFFFFF B= 0x00000001** | | | | |
| ALU\_OP | **运算方式** | Shift\_carry\_out，来自CPSR的CF、VF | F | **NZCV** |
| 0000 | F=A & B | 01\* | 1 | 000N |
| 0001 | F=A ^ B | 11\* | 2147483646 | 001N |
| 0010 | F=A - B | 00\* | 2147483646 | 001N |
| 0011 | F=B - A | 00\* | 2147483650 | 1010 |
| 0100 | F=A + B | 00\* | 2147483648 | 1001 |
| 0101 | F=A + B +CF | 00\* | 2147483648 | 1001 |
| 0110 | F=A - B + CF - 1 | 00\* | 2147483645 | 0000 |
| 0111 | F=B - A + CF - 1 | 00\* | 2147483649 | 1010 |
| 1000 | F=A | 01\* | 2147483647 | NNNN |
| 1010 | F=A–B + 4 | 00\* | 2147483650 | 1001 |
| 1100 | F=A | B | 01\* | 2147483647 | 000N |
| 1101 | F=B | 01\* | 1 | NNNN |
| 1110 | F=A & (~B) | 01\* | 2147483646 | 000N |
| 1111 | F=~B | 01\* | 4294967294 | 100N |

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| --- | --- | --- | --- | --- |
| **A= 0x7FFFFFFF B= 0x00000001** | | | | |
| ALU\_OP | **运算方式** | Shift\_carry\_out，来自CPSR的CF、VF | F | **NZCV** |
| 0000 | F=A & B | 10\* | 1 | 001N |
| 0001 | F=A ^ B | 00\* | 2147483646 | 000N |
| 0010 | F=A - B | 01\* | 2147483646 | 0000 |
| 0011 | F=B - A | 01\* | 2147483650 | 1010 |
| 0100 | F=A + B | 01\* | 2147483648 | 1001 |
| 0101 | F=A + B +CF | 01\* | 2147483649 | 1001 |
| 0110 | F=A - B + CF - 1 | 01\* | 2147483646 | 0000 |
| 0111 | F=B - A + CF - 1 | 01\* | 2147483650 | 1010 |
| 1000 | F=A | 00\* | 2147483647 | NNNN |
| 1010 | F=A–B + 4 | 01\* | 2147483650 | 1001 |
| 1100 | F=A | B | 10\* | 2147483647 | 001N |
| 1101 | F=B | 00\* | 1 | NNNN |
| 1110 | F=A & (~B) | 10\* | 2147483646 | 001N |
| 1111 | F=~B | 10\* | 4294967294 | 101N |

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| --- | --- | --- | --- | --- |
| **A= 0x12345678 B= 0x87654321** | | | | |
| ALU\_OP | **运算方式** | Shift\_carry\_out，来自CPSR的CF、VF | F | **NZCV** |
| 0000 | F=A & B | 01\* | 35930656 | 000N |
| 0001 | F=A ^ B | 11\* | 2505119065 | 101N |
| 0010 | F=A - B | 00\* | 2328826711 | 1011 |
| 0011 | F=B - A | 00\* | 1966140585 | 0001 |
| 0100 | F=A + B | 00\* | 2576980377 | 1000 |
| 0101 | F=A + B +CF | 00\* | 2576980377 | 1000 |
| 0110 | F=A - B + CF - 1 | 00\* | 2328826710 | 1011 |
| 0111 | F=B - A + CF - 1 | 00\* | 1966140584 | 0001 |
| 1000 | F=A | 01\* | 305419896 | NNNN |
| 1010 | F=A–B + 4 | 00\* | 2328826715 | 1011 |
| 1100 | F=A | B | 01\* | 2541049721 | 100N |
| 1101 | F=B | 01\* | 2271560481 | NNNN |
| 1110 | F=A & (~B) | 01\* | 269489240 | 000N |
| 1111 | F=~B | 01\* | 2023406814 | 000N |

桶形移位器和ALU运算器模块联调实验记录表

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SHIFT\_OP | 移位次数Shift\_Num | 被移位数据  Shift\_Data | ALU\_OP | **A** | 来自CPSR的CF、VF | F | **NZCV** |
| 4 | 9 | 104198786 | 2 | 2387748323 | 10 | 10001110010011110000101011101010 | 1000 |
| 6 | 61 | 3075893865 | 6 | 3370207629 | 11 | 00001110001011011111011001000000 | 0000 |
| 6 | 202 | 2712518425 | 7 | 1740811722 | 01 | 01011110101001011011110110100100 | 0001 |
| 6 | 225 | 1472260198 | 6 | 1436620584 | 01 | 00101001110000001010001011110100 | 0000 |
| 6 | 13 | 453094394 | 2 | 250338712 | 11 | 10101111000110110000010110001011 | 1010 |
| 5 | 2 | 757396330 | 2 | 1566476644 | 01 | 01010010000101010100110010001010 | 0000 |
| 2 | 20 | 3980337688 | 6 | 601579611 | 01 | 00100011110110110101000110000111 | 0000 |
| 2 | 20 | 3980337688 | 6 | 601579611 | 01 | 00100011110110110101000110000111 | 0000 |
| 7 | 159 | 469166869 | 3 | 2944929838 | 00 | 10001000011001011100010111111100 | 1011 |
| 5 | 241 | 3965596891 | 2 | 4180446016 | 10 | 11111001001011001000101101000001 | 1010 |
| 4 | 146 | 3199009183 | 12 | 8348083 | 01 | 11111111111111111111111111111111 | 1011 |
| 6 | 154 | 476471947 | 2 | 1993661682 | 10 | 01011101001111000011101000101011 | 0000 |
| 6 | 137 | 10283643834 | 10 | 2439090665 | 11 | 10110100010110010001110111100110 | 1010 |
| 7 | 9 | 1611511709 | 3 | 3763323544 | 01 | 11101110011000000100010001000011 | 1010 |
| 6 | 166 | 661575940 | 10 | 966158376 | 11 | 00101000111110001010110011001000 | 0000 |