硬體描述語言設計與模擬

題目: BCD to binary 轉換器

班級:電子二B

姓名:曾皓暐

學號:B10213147

指導老師:許明華教授

助教: 林信堃 王柚傑

**一、題目簡要說明:**

設計一個BCD to binary 轉換器

**二、設計理念解說**

將輸入8bits拆成a[3:0]、b[7:4]，如果a或b有其一大於9，表示輸入8bits非BCD碼，輸出設為unknow；若輸入8bits為BCD碼，輸出=10\*b+a。

**三、Verilog 程式碼**

module BCD\_to\_binary(in,out);

input [7:0]in;

output reg[6:0]out;

reg [3:0]a,b;

always @(in) begin

a=in[3:0];

b=in[7:4];

if (a>9||b>9) out = 7'bx;

else out = 10\*b + a;

end

endmodule

**四、測試訊號程式碼**

`timescale 1ns/1ns

module tb;

reg [7:0]in;

wire [6:0]out;

BCD\_to\_binary UUT(

.in(in),.out(out));

initial begin

in=0;

while(in<512)begin

in=in+1;

#10; end

end

initial #5120 $finish ;

initial $monitor ($realtime,"in=%b(%h) out=%b(%d)",in,in,out,out);

endmodule

**五、模擬結果輸出文字**

run -all

# 0in=00000001(01) out=0000001( 1)

# 10in=00000010(02) out=0000010( 2)

# 20in=00000011(03) out=0000011( 3)

# 30in=00000100(04) out=0000100( 4)

# 40in=00000101(05) out=0000101( 5)

# 50in=00000110(06) out=0000110( 6)

# 60in=00000111(07) out=0000111( 7)

# 70in=00001000(08) out=0001000( 8)

# 80in=00001001(09) out=0001001( 9)

# 90in=00001010(0a) out=xxxxxxx( x)

# 100in=00001011(0b) out=xxxxxxx( x)

# 110in=00001100(0c) out=xxxxxxx( x)

# 120in=00001101(0d) out=xxxxxxx( x)

# 130in=00001110(0e) out=xxxxxxx( x)

# 140in=00001111(0f) out=xxxxxxx( x)

# 150in=00010000(10) out=0001010( 10)

# 160in=00010001(11) out=0001011( 11)

# 170in=00010010(12) out=0001100( 12)

# 180in=00010011(13) out=0001101( 13)

# 190in=00010100(14) out=0001110( 14)

# 200in=00010101(15) out=0001111( 15)

# 210in=00010110(16) out=0010000( 16)

# 220in=00010111(17) out=0010001( 17)

# 230in=00011000(18) out=0010010( 18)

# 240in=00011001(19) out=0010011( 19)

# 250in=00011010(1a) out=xxxxxxx( x)

# 260in=00011011(1b) out=xxxxxxx( x)

# 270in=00011100(1c) out=xxxxxxx( x)

# 280in=00011101(1d) out=xxxxxxx( x)

# 290in=00011110(1e) out=xxxxxxx( x)

# 300in=00011111(1f) out=xxxxxxx( x)

# 310in=00100000(20) out=0010100( 20)

# 320in=00100001(21) out=0010101( 21)

# 330in=00100010(22) out=0010110( 22)

# 340in=00100011(23) out=0010111( 23)

# 350in=00100100(24) out=0011000( 24)

# 360in=00100101(25) out=0011001( 25)

# 370in=00100110(26) out=0011010( 26)

# 380in=00100111(27) out=0011011( 27)

# 390in=00101000(28) out=0011100( 28)

# 400in=00101001(29) out=0011101( 29)

# 410in=00101010(2a) out=xxxxxxx( x)

# 420in=00101011(2b) out=xxxxxxx( x)

# 430in=00101100(2c) out=xxxxxxx( x)

# 440in=00101101(2d) out=xxxxxxx( x)

# 450in=00101110(2e) out=xxxxxxx( x)

# 460in=00101111(2f) out=xxxxxxx( x)

# 470in=00110000(30) out=0011110( 30)

# 480in=00110001(31) out=0011111( 31)

# 490in=00110010(32) out=0100000( 32)

# 500in=00110011(33) out=0100001( 33)

# 510in=00110100(34) out=0100010( 34)

# 520in=00110101(35) out=0100011( 35)

# 530in=00110110(36) out=0100100( 36)

# 540in=00110111(37) out=0100101( 37)

# 550in=00111000(38) out=0100110( 38)

# 560in=00111001(39) out=0100111( 39)

# 570in=00111010(3a) out=xxxxxxx( x)

# 580in=00111011(3b) out=xxxxxxx( x)

# 590in=00111100(3c) out=xxxxxxx( x)

# 600in=00111101(3d) out=xxxxxxx( x)

# 610in=00111110(3e) out=xxxxxxx( x)

# 620in=00111111(3f) out=xxxxxxx( x)

# 630in=01000000(40) out=0101000( 40)

# 640in=01000001(41) out=0101001( 41)

# 650in=01000010(42) out=0101010( 42)

# 660in=01000011(43) out=0101011( 43)

# 670in=01000100(44) out=0101100( 44)

# 680in=01000101(45) out=0101101( 45)

# 690in=01000110(46) out=0101110( 46)

# 700in=01000111(47) out=0101111( 47)

# 710in=01001000(48) out=0110000( 48)

# 720in=01001001(49) out=0110001( 49)

# 730in=01001010(4a) out=xxxxxxx( x)

# 740in=01001011(4b) out=xxxxxxx( x)

# 750in=01001100(4c) out=xxxxxxx( x)

# 760in=01001101(4d) out=xxxxxxx( x)

# 770in=01001110(4e) out=xxxxxxx( x)

# 780in=01001111(4f) out=xxxxxxx( x)

# 790in=01010000(50) out=0110010( 50)

# 800in=01010001(51) out=0110011( 51)

# 810in=01010010(52) out=0110100( 52)

# 820in=01010011(53) out=0110101( 53)

# 830in=01010100(54) out=0110110( 54)

# 840in=01010101(55) out=0110111( 55)

# 850in=01010110(56) out=0111000( 56)

# 860in=01010111(57) out=0111001( 57)

# 870in=01011000(58) out=0111010( 58)

# 880in=01011001(59) out=0111011( 59)

# 890in=01011010(5a) out=xxxxxxx( x)

# 900in=01011011(5b) out=xxxxxxx( x)

# 910in=01011100(5c) out=xxxxxxx( x)

# 920in=01011101(5d) out=xxxxxxx( x)

# 930in=01011110(5e) out=xxxxxxx( x)

# 940in=01011111(5f) out=xxxxxxx( x)

# 950in=01100000(60) out=0111100( 60)

# 960in=01100001(61) out=0111101( 61)

# 970in=01100010(62) out=0111110( 62)

# 980in=01100011(63) out=0111111( 63)

# 990in=01100100(64) out=1000000( 64)

# 1000in=01100101(65) out=1000001( 65)

# 1010in=01100110(66) out=1000010( 66)

# 1020in=01100111(67) out=1000011( 67)

# 1030in=01101000(68) out=1000100( 68)

# 1040in=01101001(69) out=1000101( 69)

# 1050in=01101010(6a) out=xxxxxxx( x)

# 1060in=01101011(6b) out=xxxxxxx( x)

# 1070in=01101100(6c) out=xxxxxxx( x)

# 1080in=01101101(6d) out=xxxxxxx( x)

# 1090in=01101110(6e) out=xxxxxxx( x)

# 1100in=01101111(6f) out=xxxxxxx( x)

# 1110in=01110000(70) out=1000110( 70)

# 1120in=01110001(71) out=1000111( 71)

# 1130in=01110010(72) out=1001000( 72)

# 1140in=01110011(73) out=1001001( 73)

# 1150in=01110100(74) out=1001010( 74)

# 1160in=01110101(75) out=1001011( 75)

# 1170in=01110110(76) out=1001100( 76)

# 1180in=01110111(77) out=1001101( 77)

# 1190in=01111000(78) out=1001110( 78)

# 1200in=01111001(79) out=1001111( 79)

# 1210in=01111010(7a) out=xxxxxxx( x)

# 1220in=01111011(7b) out=xxxxxxx( x)

# 1230in=01111100(7c) out=xxxxxxx( x)

# 1240in=01111101(7d) out=xxxxxxx( x)

# 1250in=01111110(7e) out=xxxxxxx( x)

# 1260in=01111111(7f) out=xxxxxxx( x)

# 1270in=10000000(80) out=1010000( 80)

# 1280in=10000001(81) out=1010001( 81)

# 1290in=10000010(82) out=1010010( 82)

# 1300in=10000011(83) out=1010011( 83)

# 1310in=10000100(84) out=1010100( 84)

# 1320in=10000101(85) out=1010101( 85)

# 1330in=10000110(86) out=1010110( 86)

# 1340in=10000111(87) out=1010111( 87)

# 1350in=10001000(88) out=1011000( 88)

# 1360in=10001001(89) out=1011001( 89)

# 1370in=10001010(8a) out=xxxxxxx( x)

# 1380in=10001011(8b) out=xxxxxxx( x)

# 1390in=10001100(8c) out=xxxxxxx( x)

# 1400in=10001101(8d) out=xxxxxxx( x)

# 1410in=10001110(8e) out=xxxxxxx( x)

# 1420in=10001111(8f) out=xxxxxxx( x)

# 1430in=10010000(90) out=1011010( 90)

# 1440in=10010001(91) out=1011011( 91)

# 1450in=10010010(92) out=1011100( 92)

# 1460in=10010011(93) out=1011101( 93)

# 1470in=10010100(94) out=1011110( 94)

# 1480in=10010101(95) out=1011111( 95)

# 1490in=10010110(96) out=1100000( 96)

# 1500in=10010111(97) out=1100001( 97)

# 1510in=10011000(98) out=1100010( 98)

# 1520in=10011001(99) out=1100011( 99)

# 1530in=10011010(9a) out=xxxxxxx( x)

# 1540in=10011011(9b) out=xxxxxxx( x)

# 1550in=10011100(9c) out=xxxxxxx( x)

# 1560in=10011101(9d) out=xxxxxxx( x)

# 1570in=10011110(9e) out=xxxxxxx( x)

# 1580in=10011111(9f) out=xxxxxxx( x)

# 1590in=10100000(a0) out=xxxxxxx( x)

# 1600in=10100001(a1) out=xxxxxxx( x)

# 1610in=10100010(a2) out=xxxxxxx( x)

# 1620in=10100011(a3) out=xxxxxxx( x)

# 1630in=10100100(a4) out=xxxxxxx( x)

# 1640in=10100101(a5) out=xxxxxxx( x)

# 1650in=10100110(a6) out=xxxxxxx( x)

# 1660in=10100111(a7) out=xxxxxxx( x)

# 1670in=10101000(a8) out=xxxxxxx( x)

# 1680in=10101001(a9) out=xxxxxxx( x)

# 1690in=10101010(aa) out=xxxxxxx( x)

# 1700in=10101011(ab) out=xxxxxxx( x)

# 1710in=10101100(ac) out=xxxxxxx( x)

# 1720in=10101101(ad) out=xxxxxxx( x)

# 1730in=10101110(ae) out=xxxxxxx( x)

# 1740in=10101111(af) out=xxxxxxx( x)

# 1750in=10110000(b0) out=xxxxxxx( x)

# 1760in=10110001(b1) out=xxxxxxx( x)

# 1770in=10110010(b2) out=xxxxxxx( x)

# 1780in=10110011(b3) out=xxxxxxx( x)

# 1790in=10110100(b4) out=xxxxxxx( x)

# 1800in=10110101(b5) out=xxxxxxx( x)

# 1810in=10110110(b6) out=xxxxxxx( x)

# 1820in=10110111(b7) out=xxxxxxx( x)

# 1830in=10111000(b8) out=xxxxxxx( x)

# 1840in=10111001(b9) out=xxxxxxx( x)

# 1850in=10111010(ba) out=xxxxxxx( x)

# 1860in=10111011(bb) out=xxxxxxx( x)

# 1870in=10111100(bc) out=xxxxxxx( x)

# 1880in=10111101(bd) out=xxxxxxx( x)

# 1890in=10111110(be) out=xxxxxxx( x)

# 1900in=10111111(bf) out=xxxxxxx( x)

# 1910in=11000000(c0) out=xxxxxxx( x)

# 1920in=11000001(c1) out=xxxxxxx( x)

# 1930in=11000010(c2) out=xxxxxxx( x)

# 1940in=11000011(c3) out=xxxxxxx( x)

# 1950in=11000100(c4) out=xxxxxxx( x)

# 1960in=11000101(c5) out=xxxxxxx( x)

# 1970in=11000110(c6) out=xxxxxxx( x)

# 1980in=11000111(c7) out=xxxxxxx( x)

# 1990in=11001000(c8) out=xxxxxxx( x)

# 2000in=11001001(c9) out=xxxxxxx( x)

# 2010in=11001010(ca) out=xxxxxxx( x)

# 2020in=11001011(cb) out=xxxxxxx( x)

# 2030in=11001100(cc) out=xxxxxxx( x)

# 2040in=11001101(cd) out=xxxxxxx( x)

# 2050in=11001110(ce) out=xxxxxxx( x)

# 2060in=11001111(cf) out=xxxxxxx( x)

# 2070in=11010000(d0) out=xxxxxxx( x)

# 2080in=11010001(d1) out=xxxxxxx( x)

# 2090in=11010010(d2) out=xxxxxxx( x)

# 2100in=11010011(d3) out=xxxxxxx( x)

# 2110in=11010100(d4) out=xxxxxxx( x)

# 2120in=11010101(d5) out=xxxxxxx( x)

# 2130in=11010110(d6) out=xxxxxxx( x)

# 2140in=11010111(d7) out=xxxxxxx( x)

# 2150in=11011000(d8) out=xxxxxxx( x)

# 2160in=11011001(d9) out=xxxxxxx( x)

# 2170in=11011010(da) out=xxxxxxx( x)

# 2180in=11011011(db) out=xxxxxxx( x)

# 2190in=11011100(dc) out=xxxxxxx( x)

# 2200in=11011101(dd) out=xxxxxxx( x)

# 2210in=11011110(de) out=xxxxxxx( x)

# 2220in=11011111(df) out=xxxxxxx( x)

# 2230in=11100000(e0) out=xxxxxxx( x)

# 2240in=11100001(e1) out=xxxxxxx( x)

# 2250in=11100010(e2) out=xxxxxxx( x)

# 2260in=11100011(e3) out=xxxxxxx( x)

# 2270in=11100100(e4) out=xxxxxxx( x)

# 2280in=11100101(e5) out=xxxxxxx( x)

# 2290in=11100110(e6) out=xxxxxxx( x)

# 2300in=11100111(e7) out=xxxxxxx( x)

# 2310in=11101000(e8) out=xxxxxxx( x)

# 2320in=11101001(e9) out=xxxxxxx( x)

# 2330in=11101010(ea) out=xxxxxxx( x)

# 2340in=11101011(eb) out=xxxxxxx( x)

# 2350in=11101100(ec) out=xxxxxxx( x)

# 2360in=11101101(ed) out=xxxxxxx( x)

# 2370in=11101110(ee) out=xxxxxxx( x)

# 2380in=11101111(ef) out=xxxxxxx( x)

# 2390in=11110000(f0) out=xxxxxxx( x)

# 2400in=11110001(f1) out=xxxxxxx( x)

# 2410in=11110010(f2) out=xxxxxxx( x)

# 2420in=11110011(f3) out=xxxxxxx( x)

# 2430in=11110100(f4) out=xxxxxxx( x)

# 2440in=11110101(f5) out=xxxxxxx( x)

# 2450in=11110110(f6) out=xxxxxxx( x)

# 2460in=11110111(f7) out=xxxxxxx( x)

# 2470in=11111000(f8) out=xxxxxxx( x)

# 2480in=11111001(f9) out=xxxxxxx( x)

# 2490in=11111010(fa) out=xxxxxxx( x)

# 2500in=11111011(fb) out=xxxxxxx( x)

# 2510in=11111100(fc) out=xxxxxxx( x)

# 2520in=11111101(fd) out=xxxxxxx( x)

# 2530in=11111110(fe) out=xxxxxxx( x)

# 2540in=11111111(ff) out=xxxxxxx( x)

# 2550in=00000000(00) out=0000000( 0)

# 2560in=00000001(01) out=0000001( 1)

# 2570in=00000010(02) out=0000010( 2)

# 2580in=00000011(03) out=0000011( 3)

# 2590in=00000100(04) out=0000100( 4)

# 2600in=00000101(05) out=0000101( 5)

# 2610in=00000110(06) out=0000110( 6)

# 2620in=00000111(07) out=0000111( 7)

# 2630in=00001000(08) out=0001000( 8)

# 2640in=00001001(09) out=0001001( 9)

# 2650in=00001010(0a) out=xxxxxxx( x)

# 2660in=00001011(0b) out=xxxxxxx( x)

# 2670in=00001100(0c) out=xxxxxxx( x)

# 2680in=00001101(0d) out=xxxxxxx( x)

# 2690in=00001110(0e) out=xxxxxxx( x)

# 2700in=00001111(0f) out=xxxxxxx( x)

# 2710in=00010000(10) out=0001010( 10)

# 2720in=00010001(11) out=0001011( 11)

# 2730in=00010010(12) out=0001100( 12)

# 2740in=00010011(13) out=0001101( 13)

# 2750in=00010100(14) out=0001110( 14)

# 2760in=00010101(15) out=0001111( 15)

# 2770in=00010110(16) out=0010000( 16)

# 2780in=00010111(17) out=0010001( 17)

# 2790in=00011000(18) out=0010010( 18)

# 2800in=00011001(19) out=0010011( 19)

# 2810in=00011010(1a) out=xxxxxxx( x)

# 2820in=00011011(1b) out=xxxxxxx( x)

# 2830in=00011100(1c) out=xxxxxxx( x)

# 2840in=00011101(1d) out=xxxxxxx( x)

# 2850in=00011110(1e) out=xxxxxxx( x)

# 2860in=00011111(1f) out=xxxxxxx( x)

# 2870in=00100000(20) out=0010100( 20)

# 2880in=00100001(21) out=0010101( 21)

# 2890in=00100010(22) out=0010110( 22)

# 2900in=00100011(23) out=0010111( 23)

# 2910in=00100100(24) out=0011000( 24)

# 2920in=00100101(25) out=0011001( 25)

# 2930in=00100110(26) out=0011010( 26)

# 2940in=00100111(27) out=0011011( 27)

# 2950in=00101000(28) out=0011100( 28)

# 2960in=00101001(29) out=0011101( 29)

# 2970in=00101010(2a) out=xxxxxxx( x)

# 2980in=00101011(2b) out=xxxxxxx( x)

# 2990in=00101100(2c) out=xxxxxxx( x)

# 3000in=00101101(2d) out=xxxxxxx( x)

# 3010in=00101110(2e) out=xxxxxxx( x)

# 3020in=00101111(2f) out=xxxxxxx( x)

# 3030in=00110000(30) out=0011110( 30)

# 3040in=00110001(31) out=0011111( 31)

# 3050in=00110010(32) out=0100000( 32)

# 3060in=00110011(33) out=0100001( 33)

# 3070in=00110100(34) out=0100010( 34)

# 3080in=00110101(35) out=0100011( 35)

# 3090in=00110110(36) out=0100100( 36)

# 3100in=00110111(37) out=0100101( 37)

# 3110in=00111000(38) out=0100110( 38)

# 3120in=00111001(39) out=0100111( 39)

# 3130in=00111010(3a) out=xxxxxxx( x)

# 3140in=00111011(3b) out=xxxxxxx( x)

# 3150in=00111100(3c) out=xxxxxxx( x)

# 3160in=00111101(3d) out=xxxxxxx( x)

# 3170in=00111110(3e) out=xxxxxxx( x)

# 3180in=00111111(3f) out=xxxxxxx( x)

# 3190in=01000000(40) out=0101000( 40)

# 3200in=01000001(41) out=0101001( 41)

# 3210in=01000010(42) out=0101010( 42)

# 3220in=01000011(43) out=0101011( 43)

# 3230in=01000100(44) out=0101100( 44)

# 3240in=01000101(45) out=0101101( 45)

# 3250in=01000110(46) out=0101110( 46)

# 3260in=01000111(47) out=0101111( 47)

# 3270in=01001000(48) out=0110000( 48)

# 3280in=01001001(49) out=0110001( 49)

# 3290in=01001010(4a) out=xxxxxxx( x)

# 3300in=01001011(4b) out=xxxxxxx( x)

# 3310in=01001100(4c) out=xxxxxxx( x)

# 3320in=01001101(4d) out=xxxxxxx( x)

# 3330in=01001110(4e) out=xxxxxxx( x)

# 3340in=01001111(4f) out=xxxxxxx( x)

# 3350in=01010000(50) out=0110010( 50)

# 3360in=01010001(51) out=0110011( 51)

# 3370in=01010010(52) out=0110100( 52)

# 3380in=01010011(53) out=0110101( 53)

# 3390in=01010100(54) out=0110110( 54)

# 3400in=01010101(55) out=0110111( 55)

# 3410in=01010110(56) out=0111000( 56)

# 3420in=01010111(57) out=0111001( 57)

# 3430in=01011000(58) out=0111010( 58)

# 3440in=01011001(59) out=0111011( 59)

# 3450in=01011010(5a) out=xxxxxxx( x)

# 3460in=01011011(5b) out=xxxxxxx( x)

# 3470in=01011100(5c) out=xxxxxxx( x)

# 3480in=01011101(5d) out=xxxxxxx( x)

# 3490in=01011110(5e) out=xxxxxxx( x)

# 3500in=01011111(5f) out=xxxxxxx( x)

# 3510in=01100000(60) out=0111100( 60)

# 3520in=01100001(61) out=0111101( 61)

# 3530in=01100010(62) out=0111110( 62)

# 3540in=01100011(63) out=0111111( 63)

# 3550in=01100100(64) out=1000000( 64)

# 3560in=01100101(65) out=1000001( 65)

# 3570in=01100110(66) out=1000010( 66)

# 3580in=01100111(67) out=1000011( 67)

# 3590in=01101000(68) out=1000100( 68)

# 3600in=01101001(69) out=1000101( 69)

# 3610in=01101010(6a) out=xxxxxxx( x)

# 3620in=01101011(6b) out=xxxxxxx( x)

# 3630in=01101100(6c) out=xxxxxxx( x)

# 3640in=01101101(6d) out=xxxxxxx( x)

# 3650in=01101110(6e) out=xxxxxxx( x)

# 3660in=01101111(6f) out=xxxxxxx( x)

# 3670in=01110000(70) out=1000110( 70)

# 3680in=01110001(71) out=1000111( 71)

# 3690in=01110010(72) out=1001000( 72)

# 3700in=01110011(73) out=1001001( 73)

# 3710in=01110100(74) out=1001010( 74)

# 3720in=01110101(75) out=1001011( 75)

# 3730in=01110110(76) out=1001100( 76)

# 3740in=01110111(77) out=1001101( 77)

# 3750in=01111000(78) out=1001110( 78)

# 3760in=01111001(79) out=1001111( 79)

# 3770in=01111010(7a) out=xxxxxxx( x)

# 3780in=01111011(7b) out=xxxxxxx( x)

# 3790in=01111100(7c) out=xxxxxxx( x)

# 3800in=01111101(7d) out=xxxxxxx( x)

# 3810in=01111110(7e) out=xxxxxxx( x)

# 3820in=01111111(7f) out=xxxxxxx( x)

# 3830in=10000000(80) out=1010000( 80)

# 3840in=10000001(81) out=1010001( 81)

# 3850in=10000010(82) out=1010010( 82)

# 3860in=10000011(83) out=1010011( 83)

# 3870in=10000100(84) out=1010100( 84)

# 3880in=10000101(85) out=1010101( 85)

# 3890in=10000110(86) out=1010110( 86)

# 3900in=10000111(87) out=1010111( 87)

# 3910in=10001000(88) out=1011000( 88)

# 3920in=10001001(89) out=1011001( 89)

# 3930in=10001010(8a) out=xxxxxxx( x)

# 3940in=10001011(8b) out=xxxxxxx( x)

# 3950in=10001100(8c) out=xxxxxxx( x)

# 3960in=10001101(8d) out=xxxxxxx( x)

# 3970in=10001110(8e) out=xxxxxxx( x)

# 3980in=10001111(8f) out=xxxxxxx( x)

# 3990in=10010000(90) out=1011010( 90)

# 4000in=10010001(91) out=1011011( 91)

# 4010in=10010010(92) out=1011100( 92)

# 4020in=10010011(93) out=1011101( 93)

# 4030in=10010100(94) out=1011110( 94)

# 4040in=10010101(95) out=1011111( 95)

# 4050in=10010110(96) out=1100000( 96)

# 4060in=10010111(97) out=1100001( 97)

# 4070in=10011000(98) out=1100010( 98)

# 4080in=10011001(99) out=1100011( 99)

# 4090in=10011010(9a) out=xxxxxxx( x)

# 4100in=10011011(9b) out=xxxxxxx( x)

# 4110in=10011100(9c) out=xxxxxxx( x)

# 4120in=10011101(9d) out=xxxxxxx( x)

# 4130in=10011110(9e) out=xxxxxxx( x)

# 4140in=10011111(9f) out=xxxxxxx( x)

# 4150in=10100000(a0) out=xxxxxxx( x)

# 4160in=10100001(a1) out=xxxxxxx( x)

# 4170in=10100010(a2) out=xxxxxxx( x)

# 4180in=10100011(a3) out=xxxxxxx( x)

# 4190in=10100100(a4) out=xxxxxxx( x)

# 4200in=10100101(a5) out=xxxxxxx( x)

# 4210in=10100110(a6) out=xxxxxxx( x)

# 4220in=10100111(a7) out=xxxxxxx( x)

# 4230in=10101000(a8) out=xxxxxxx( x)

# 4240in=10101001(a9) out=xxxxxxx( x)

# 4250in=10101010(aa) out=xxxxxxx( x)

# 4260in=10101011(ab) out=xxxxxxx( x)

# 4270in=10101100(ac) out=xxxxxxx( x)

# 4280in=10101101(ad) out=xxxxxxx( x)

# 4290in=10101110(ae) out=xxxxxxx( x)

# 4300in=10101111(af) out=xxxxxxx( x)

# 4310in=10110000(b0) out=xxxxxxx( x)

# 4320in=10110001(b1) out=xxxxxxx( x)

# 4330in=10110010(b2) out=xxxxxxx( x)

# 4340in=10110011(b3) out=xxxxxxx( x)

# 4350in=10110100(b4) out=xxxxxxx( x)

# 4360in=10110101(b5) out=xxxxxxx( x)

# 4370in=10110110(b6) out=xxxxxxx( x)

# 4380in=10110111(b7) out=xxxxxxx( x)

# 4390in=10111000(b8) out=xxxxxxx( x)

# 4400in=10111001(b9) out=xxxxxxx( x)

# 4410in=10111010(ba) out=xxxxxxx( x)

# 4420in=10111011(bb) out=xxxxxxx( x)

# 4430in=10111100(bc) out=xxxxxxx( x)

# 4440in=10111101(bd) out=xxxxxxx( x)

# 4450in=10111110(be) out=xxxxxxx( x)

# 4460in=10111111(bf) out=xxxxxxx( x)

# 4470in=11000000(c0) out=xxxxxxx( x)

# 4480in=11000001(c1) out=xxxxxxx( x)

# 4490in=11000010(c2) out=xxxxxxx( x)

# 4500in=11000011(c3) out=xxxxxxx( x)

# 4510in=11000100(c4) out=xxxxxxx( x)

# 4520in=11000101(c5) out=xxxxxxx( x)

# 4530in=11000110(c6) out=xxxxxxx( x)

# 4540in=11000111(c7) out=xxxxxxx( x)

# 4550in=11001000(c8) out=xxxxxxx( x)

# 4560in=11001001(c9) out=xxxxxxx( x)

# 4570in=11001010(ca) out=xxxxxxx( x)

# 4580in=11001011(cb) out=xxxxxxx( x)

# 4590in=11001100(cc) out=xxxxxxx( x)

# 4600in=11001101(cd) out=xxxxxxx( x)

# 4610in=11001110(ce) out=xxxxxxx( x)

# 4620in=11001111(cf) out=xxxxxxx( x)

# 4630in=11010000(d0) out=xxxxxxx( x)

# 4640in=11010001(d1) out=xxxxxxx( x)

# 4650in=11010010(d2) out=xxxxxxx( x)

# 4660in=11010011(d3) out=xxxxxxx( x)

# 4670in=11010100(d4) out=xxxxxxx( x)

# 4680in=11010101(d5) out=xxxxxxx( x)

# 4690in=11010110(d6) out=xxxxxxx( x)

# 4700in=11010111(d7) out=xxxxxxx( x)

# 4710in=11011000(d8) out=xxxxxxx( x)

# 4720in=11011001(d9) out=xxxxxxx( x)

# 4730in=11011010(da) out=xxxxxxx( x)

# 4740in=11011011(db) out=xxxxxxx( x)

# 4750in=11011100(dc) out=xxxxxxx( x)

# 4760in=11011101(dd) out=xxxxxxx( x)

# 4770in=11011110(de) out=xxxxxxx( x)

# 4780in=11011111(df) out=xxxxxxx( x)

# 4790in=11100000(e0) out=xxxxxxx( x)

# 4800in=11100001(e1) out=xxxxxxx( x)

# 4810in=11100010(e2) out=xxxxxxx( x)

# 4820in=11100011(e3) out=xxxxxxx( x)

# 4830in=11100100(e4) out=xxxxxxx( x)

# 4840in=11100101(e5) out=xxxxxxx( x)

# 4850in=11100110(e6) out=xxxxxxx( x)

# 4860in=11100111(e7) out=xxxxxxx( x)

# 4870in=11101000(e8) out=xxxxxxx( x)

# 4880in=11101001(e9) out=xxxxxxx( x)

# 4890in=11101010(ea) out=xxxxxxx( x)

# 4900in=11101011(eb) out=xxxxxxx( x)

# 4910in=11101100(ec) out=xxxxxxx( x)

# 4920in=11101101(ed) out=xxxxxxx( x)

# 4930in=11101110(ee) out=xxxxxxx( x)

# 4940in=11101111(ef) out=xxxxxxx( x)

# 4950in=11110000(f0) out=xxxxxxx( x)

# 4960in=11110001(f1) out=xxxxxxx( x)

# 4970in=11110010(f2) out=xxxxxxx( x)

# 4980in=11110011(f3) out=xxxxxxx( x)

# 4990in=11110100(f4) out=xxxxxxx( x)

# 5000in=11110101(f5) out=xxxxxxx( x)

# 5010in=11110110(f6) out=xxxxxxx( x)

# 5020in=11110111(f7) out=xxxxxxx( x)

# 5030in=11111000(f8) out=xxxxxxx( x)

# 5040in=11111001(f9) out=xxxxxxx( x)

# 5050in=11111010(fa) out=xxxxxxx( x)

# 5060in=11111011(fb) out=xxxxxxx( x)

# 5070in=11111100(fc) out=xxxxxxx( x)

# 5080in=11111101(fd) out=xxxxxxx( x)

# 5090in=11111110(fe) out=xxxxxxx( x)

# 5100in=11111111(ff) out=xxxxxxx( x)

# 5110in=00000000(00) out=0000000( 0)

**六、模擬結果輸出波形**

如附圖