|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **FREQUENCIES** | **DUTY CYCLE** | **p** | **u\_p** | **fosc** | **PRESCALER** | **TIMER MAX COUNT** | **TIMER MAX COUNT** | **TO\_BINARY** |
| 300 | 0.1 | 0.003333333 | 0.000333333 | 0.000001 | 4 | 83 | 53 | 1010011 |
| 300 | 0.25 | 0.003333333 | 0.000833333 | 0.000001 | 4 | 208 | D0 | 11010000 |
| 300 | 0.5 | 0.003333333 | 0.001666667 | 0.000001 | 4 | 416 | 1A0 | 110100000 |
| 300 | 0.75 | 0.003333333 | 0.0025 | 0.000001 | 4 | 625 | 271 | #NUM! |
| 300 | 0.95 | 0.003333333 | 0.003166667 | 0.000001 | 4 | 791 | 317 | #NUM! |
| 500 | 0.1 | 0.002 | 0.0002 | 0.000001 | 4 | 50 | 32 | 110010 |
| 500 | 0.25 | 0.002 | 0.0005 | 0.000001 | 4 | 125 | 7D | 1111101 |
| 500 | 0.5 | 0.002 | 0.001 | 0.000001 | 4 | 250 | FA | 11111010 |
| 500 | 0.75 | 0.002 | 0.0015 | 0.000001 | 4 | 375 | 177 | 101110111 |
| 500 | 0.95 | 0.002 | 0.0019 | 0.000001 | 4 | 475 | 1DB | 111011011 |
| 1000 | 0.1 | 0.001 | 0.0001 | 0.000001 | 4 | 25 | 19 | 11001 |
| 1000 | 0.25 | 0.001 | 0.00025 | 0.000001 | 4 | 62 | 3E | 111110 |
| 1000 | 0.5 | 0.001 | 0.0005 | 0.000001 | 4 | 125 | 7D | 1111101 |
| 1000 | 0.75 | 0.001 | 0.00075 | 0.000001 | 4 | 187 | BB | 10111011 |
| 1000 | 0.95 | 0.001 | 0.00095 | 0.000001 | 4 | 237 | ED | 11101101 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TIMER MAX COUNT** | **TIMER MAX COUNT** | **TO\_BINARY** | **PR2** | **CCP1CON** | **CCP1<4:5>** |
| 83 | 53 | 1010011 | 53 | 01010011 | 11 |
| 208 | D0 | 11010000 | D0 | 11010000 | 00 |
| 416 | 1A0 | 110100000 | 1A0 | 0001101000 | 00 |
| 625 | 271 | 10 0111 0001 | 271 | 0010011100 | 01 |
| 791 | 317 | 11 0111 0001 | 317 | 0011000101 | 11 |
| 50 | 32 | 110010 | 32 | 00100000 | 00 |
| 125 | 7D | 1111101 | 7D | 01111101 | 01 |
| 250 | FA | 11111010 | FA | 11111010 | 10 |
| 375 | 177 | 101110111 | 17 | 00010111 | 11 |
| 475 | 1DB | 111011011 | 1DB | 11011101 | 01 |
| 25 | 19 | 11001 | 19 | 00011001 | 01 |
| 62 | 3E | 111110 | 3E | 00111110 | 10 |
| 125 | 7D | 1111101 | 7D | 01111101 | 01 |
| 187 | BB | 10111011 | BB | 10111011 | 11 |
| 237 | ED | 11101101 | ED | 11101101 | 01 |

| **PR2** | **CCP1CON (Binary)** | **CCP1<4:5> (Binary)** | **CCP1CON (Hex)** | **CCP1<4:5> (Hex)** |
| --- | --- | --- | --- | --- |
| **53** | **01010011** | **11** | 53 | 3 |
| **D0** | **11010000** | **00** | D0 | 0 |
| **1A0** | **0001101000** | **00** | A0 | 0 |
| **271** | **0010011100** | **01** | 9C | 1 |
| **317** | **0011000101** | **11** | 65 | 3 |
| **32** | **00100000** | **00** | 20 | 0 |
| **7D** | **01111101** | **01** | 7D | 1 |
| FA | 11111010 | 10 | FA | A |
| 17 | 00010111 | 11 | 17 | 3 |
| 1DB | 11011101 | 01 | DD | 1 |
| 19 | 00011001 | 01 | 19 | 1 |
| 3E | 00111110 | 10 | 3E | 2 |
| 7D | 01111101 | 01 | 7D | 1 |
| BB | 10111011 | 11 | BB | 3 |
| ED | 11101101 | 01 | ED | 1 |

LE4 Calculations

LE4-6 Calculations:

**LE4-7 Calculations**

*First, we will compute the value of PR2 for 10 Hz, 100 Hz, and 1000 Hz.*

**(10 Hz Frequency)**

10

**(100 Hz Frequency)**

10

**(1000 Hz Frequency)**

10

Now we will calculate the value of CPR1L:CCP1CON <5:4> for the given duty cycles…

**10% Duty Cycle**

10% Duty Cycle @ 10 Hz

* 1. \* 0.1s = 0.01s

10

10 or (1001 1100 0100)2

**CCPR1L = (**1001110001**)2or 0x271**

**CCP1CON<5:4> = (00)2 or 0x0**

**10% Duty Cycle @ 100 Hz**

0.1\* 0.01s = 0.001s

10 or (1111 1010)2

**CCPR1L = (111110)2or 0x3E**

**CCP1CON<5:4> = (10)2 or 0x2**

**10% Duty Cycle @ 100 Hz**

0.1\* 0.001s = 0.0001s

10

10 or (0001 1001)2

**CCPR1L = (000110)2or 0x06**

**CCP1CON<5:4> = (01)2 or 0x1**

**25% Duty Cycle**

25% Duty Cycle @ 10 Hz

0.25\* 0.1s = 0.025s

10

10 or (0001 1000 0110 1010)2

**CCPR1L = (**00011000011010**)2or 0x61A**

**CCP1CON<5:4> = (10)2 or 0x2**

25% Duty Cycle @ 100 Hz

0.25\* 0.01s = 0.0025s

10

10 or (0001 1001 0101)2

**CCPR1L = (**0001100101**)2or 0x65**

**CCP1CON<5:4> = (01)2 or 0x1**

25% Duty Cycle @ 1000 Hz

0.25\* 0.001s = 0.00025s

10

10 or (0011 1110)2

**CCPR1L = (**001111**)2or 0x0F**

**CCP1CON<5:4> = (10)2 or 0x2**

**50% Duty Cycle**

50% Duty Cycle @ 10 Hz

0.50\* 0.1s = 0.05s

10

10 or (0011 0000 1101 0100)2

**CCPR1L = (0011 0000 1101 01)2or 0xC35**

**CCP1CON<5:4> = (00)2 or 0x0**

50% Duty Cycle @ 100 Hz

0.50\* 0.01s = 0.005s

10

10 or (0100 1110 0010)2

**CCPR1L = (**0100111000**)2or 0x138**

**CCP1CON<5:4> = (10)2 or 0x2**

50% Duty Cycle @ 1000 Hz

0.50\* 0.001s = 0.0005s

10

10 or (01111101)2

**CCPR1L = (**011111**)2or 0x1F**

**CCP1CON<5:4> = (01)2 or 0x01**

**75% Duty Cycle**

75% Duty Cycle @ 10 Hz

0.75\* 0.1s = 0.075s

10

10 or (0100 1001 0011 1110)2

**CCPR1L = (**0100 1001 0011 11**)2or 0x124F**

**CCP1CON<5:4> = (11)2 or 0x3**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **DUTY CYCLE** | **FREQUENCY(Hz)** | **Period(s)** | **CCPR1L:CCP1CON<5:4>(DECIMAL)** | **CCPR1L (BINARY)** | **CCP1CON<5:4> (BINARY)** |
| 0.1 | 10 | 0.01 | 250010 | 10 0111 00012 | 002 |
| 0.1 | 100 | 0.001 | 25010 | 1111 102 | 102 |
| 0.1 | 1000 | 0.0001 | 2510 | 000110012 | 012 |
| 0.25 | 10 | 0.025 | 625010 | 0001 1000 0110 102 | 102 |
| 0.25 | 100 | 0.0025 | 62510 | 0010011100012 | 012 |
| 0.25 | 1000 | 0.00025 | 6210 | 0011 112 | 102 |
| 0.5 | 10 | 0.05 | 1250010 | 00110000110101002 | 002 |
| 0.5 | 100 | 0.005 | 125010 | 0100 1110 002 | 102 |
| 0.5 | 1000 | 0.0005 | 12510 | 011111012 | 012 |
| 0.75 | 10 | 0.075 | 1875010 | 01001001001111102 | 102 |
| 0.75 | 100 | 0.0075 | 187510 | 0111 0101 002 | 112 |
| 0.75 | 1000 | 0.00075 | 18710 | 101110112 | 112 |
| 0.95 | 10 | 0.095 | 2375010 | 01011100110001102 | 102 |
| 0.95 | 100 | 0.0095 | 237510 | 1001 0100 012 | 112 |
| 0.95 | 1000 | 0.00095 | 23710 | 111011012 | 012 |