Normal mode

Normal mode timer counter is the simplest mode of operation, this time waveform generation mode control bit WGM3 [3: 0] = 0 Count maximum value TOP for MAX (0xFFFF). In this mode, a counting mode for each clock count plus an increment, when the counter reaches TOP After the spill back BOTTOM Re-start accumulating. The count value TCNT3 The same count clock becomes zero set timer counter's overflow flag TOV3 . In this mode TOV3 The first sign is like 17 Count bit, but will only be set is not cleared. Overflow interrupt service routine will automatically clear TOV3 Logos, software can use it to improve the resolution of the timer counter. Normal mode is not to be considered a special case, a new count value can be written at any time.

Set up OC3x Pin data direction register as an output a comparison signal to obtain an output OC3x Waveform. when COM3x = 1 When, flips compare match OC3x Signal, in this case the frequency waveform may be calculated using the following formula:

$$f_{OC3xnormal} = f_{sys} / (2 * N * 65536)$$

among them, N It represents the prescale factor (1 , 8 , 64 , 256 or 1024).

Output Compare unit can be used to generate interrupts, but does not recommend the use of interrupts in the normal mode, it will take up too much CPU time.

CTC mode

Set up WGM3 [3: 0] = 4 or 12 When the timer counter 1 enter CTC mode. when WGM3 [3] = 0 The count maximum TOP for OCR3A , when WGM3 [3] = 1 The count maximum TOP for ICR3 . Below WGM3 [3: 0] = 4 As an example to describe CTC Mode In this mode, a counting mode for each clock count plus an increment, when the value of the counter TCNT3 equal TOP When the counter is cleared. This mode allows the user to easily control the frequency of the compare match output also simplifies the operation of the external event count.

When the counter reaches TOP = OCR3A Output Compare match flag OCF3A Is set, when the counter reaches TOP = ICR3 Output Compare match flag ICF3 Is set, an interrupt will be generated when the corresponding interrupt enable bit is set. Can be updated in the interrupt service routine OCR3A register. In this mode OCR3A Do not use double buffering, the counter prescaler to work under no or very low prescaler will be updated as close to the maximum value of the minimum time to be careful. If you write OCR3A The value is less than the time TCNT3 When the value of the counter will miss the compare match. Before a match occurs the next comparison, the first counter had counted to MAX And then from BOTTOM To start counting OCR3A . And normal mode, as the count value back 0x0 The count clock in the set TOV3 Mark.

Set up OC3x Pin data direction register as an output a comparison signal to obtain an output OC3x Waveform. Frequency waveform may be calculated using the following formula:

$$f_{OC3xctc} = f_{sys} / (2 * N * (1 + OCR3A))$$

among them, N It represents the prescale factor (1 , 8 , 64 , 256 or 1024). As can be seen from the formula, when set OCR3A for 0x0 And when no prescaler, allowing for maximum frequency $f_{sys} / 2$ The output waveform.

when WGM3 [3: 0] = 12 When the WGM3 [3: 0] = 4 Similarly, just and OCR3A Related replaced ICR3 It can be.

fast PWM mode

Set up WGM3 [3: 0] = 5 , 6 , 7 , 14 or 15 When the timer counter 1 Enter the fast PWM Mode, the maximum count TOP Respectively 0xFF , 0x1FF , 0x3FF , ICR3 or OCR3A , It can be used to generate high frequency PWM Waveform. fast PWM