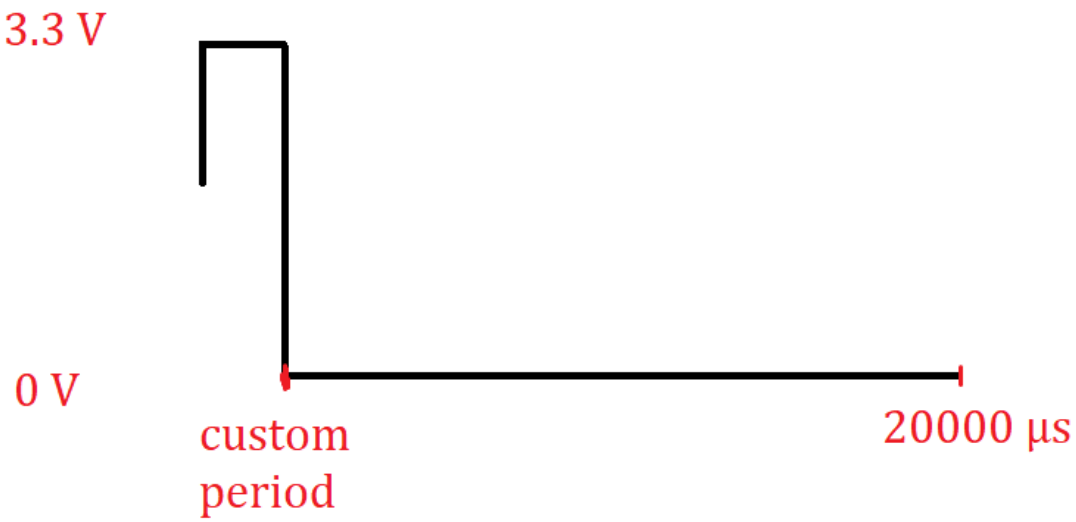
**For all the pwm timers (TIM2, TIM3, TIM4),**




Custom period is between 1100 and 1900 $\mu s$

$$PWM\ frequency = \frac{1}{20000\ \mu s} = 50\ Hz$$

$$Min\ duty\ cycle = \frac{1100}{20000} = 0.055$$

$$Min\ frequency = 0.055 * 50\ Hz = 2.75\ Hz$$

$$Max\ duty\ cycle = \frac{1900}{20000} = 0.095$$

$$Max\ frequency = 0.095 * 50\ Hz = 4.75\ Hz$$

$$\frac{84 * 10^6\ Hz}{(Period + 1) * (Prescaler + 1)} = \ Max\ freq. = 50\ Hz$$

$$Prescaler = 49$$

$$Period = 33599$$

∴

$When\ the\ custom\ period\ is\ 1100\ \mu s\ (duty\ cycle = 5.5\%)$

$PWM\ OC\ Pulse = 0.055 * (Period + 1) = 0.055 * 33600 = 1848$

$When\ the\ period\ is\ 1900\ \mu s\ (duty\ cycle = 9.5\%)$

$PWM\ OC\ Pulse = 0.095 * (Period + 1) = 0.095 * 33600 = 3192$

Pulse of the timer can be formulized for any custom period,

$$TIMX \rightarrow CCRY = duty\ cycle * \max pulse = \frac{period(\mu s)}{20000\ \mu s} * 33600$$

$$= 1.68 * period(\mu s)$$

```
__HAL_TIM_SET_COMPARE(&htim2, TIM_CHANNEL_1, pulse);
```