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CTM Compare match output說明

在比较匹配输出模式 (compare match output)下，比较器 A或P 分别将计数器与对应的 CCRA 或 CCRP 寄存器设置值进行比较，当比较结果相同时触发 CCRA 或 CCRP 中断，同时输出指定波形(输出不变/输出 Low/输出 High/输出翻转)。比较匹配输出模式适用于通用计时、Buzzer 输出等功能需求场合。

在比较匹配输出模式下，TM 功能引脚的功能说明如下表。

引脚名称(n为TM 编号)	功能
CTCKn	输入引脚，外部时钟输入，可作为 CTM 的时钟源
CTPn	输出引脚，根据设定输出指定信号
CTPnB	输出引脚，CTPn的反向输出

example 说明

此范例演示了CTM 的compare match output模式的使用

程序说明

1. config sys clock

CTM clock 来自系统时钟，因此系统时钟一定要配置正确

2. config CTM to compare match mode

- 范例设置：时钟源为 $F_{sys}/4$ ，count = 500

$$T = 1/(F_{sys}/4) * count$$

- 4M : $T = 1/(4/4) * count = 500 \mu s$
- 8M : $T = 1/(8/4) * count = 250 \mu s$

- 范例设置：输出引脚不反相，CTM 输出脚初始状态为Low，符合匹配条件翻转 IO

CTnP 在 CTM0_Enable();后为Low，根据T反转CTnP

若设置输出引脚反相，CTM 输出脚初始状态为Low，符合匹配条件翻转 IO，则CTnP 在 CTM0_Enable();后为High(包括初始状态下的所有状态反相后输出)，根据T反转CTnP

3. config output pin

4. enable CTM

5. enable Interrupt : Non-required

根据需求设定

现象说明

连接 e-link 和目标板，将程序下载到 MCU 并运行

通过示波器测量 CTnP 或者 CTnPb 即可看到对应的输出波形

CTnPb 为 CTnP 的反相输出，下图为 8 MHz 下 CT0PB 和 CT0P 的波形提供参考



FAQ

1. compare match output模式与timer模式有啥区别

两者的差异仅仅在于compare match output会输出信号到引脚，而Timer不会有任何信号输出到引脚，可将对应引脚作为普通 IO 使用