F28P55x编程实例Labs-CLA

- Code Composer Studio
- C2000Ware
- LaunchXL-F28P55x

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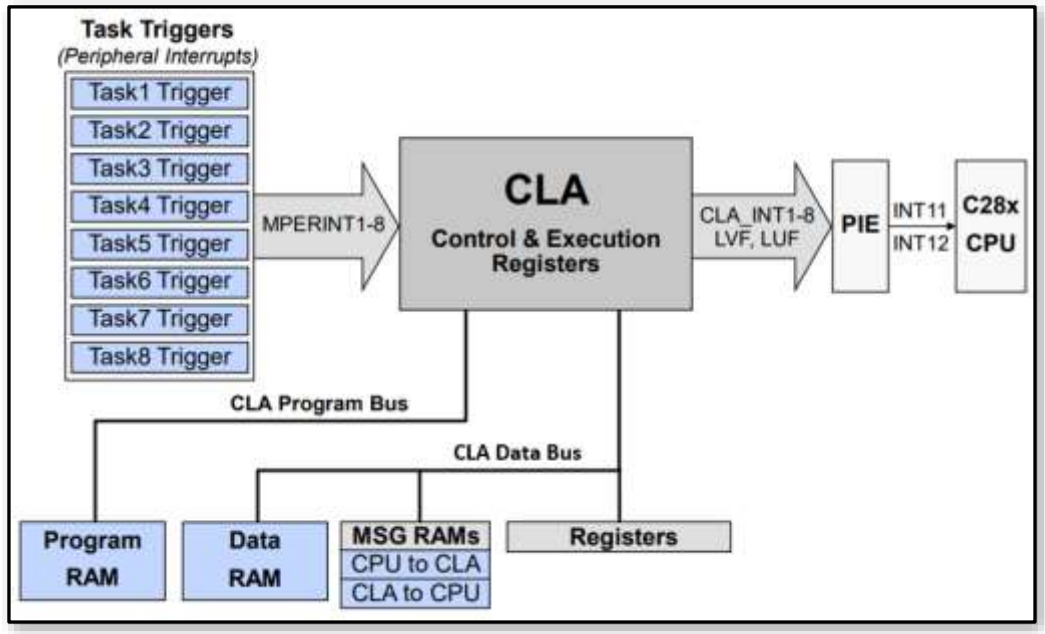
Control Law Accelerator， 控制率加速器

- 32位浮点数字处理单元，FPU
- 平行于CPU，时钟频率同CPU
- 执行算法和周期性的计算工作
- Type2型，直接读取ADC结果寄存器
- 直接操作EPWM、ECAP、EQEP、PGA等数据寄存器
- 独立响应外设中断



Type	Description	Devices Covered	Device-Specific Options
0	Original CLA Module Type	2803x	Only supports data RAM0 and 1 and does not allow CPU access when CLA data RAM is enabled.
		2805x, 2806x	Adds supports for data RAM2 and adds option to enable CPU access to data RAMs.
1	Increased Program address reachability to 16-bits; added instructions to support the new address reach; added two new offset addressing modes; CLA program memory is now user selectable and can reside anywhere in the lower 64k address space (excluding the M0 and M1 space). The job of giving control to the CLA and assigning triggers to a task is now done at the system level; a task can now fire an interrupt to main CPU mid execution.	2807x, 2837xD, 2837xS	–
2	Added Background-code mode, that can run task like communications and clean-up routines in Background; Background tasks runs continuously until disable or device/soft reset; Background task can be triggered by a peripheral or software; other foreground tasks can interrupt background task in the priority order defined; added provision for making sections of background code uninterruptible; added debug enhancements that has true software breakpoint support, where CLA re-fetches from the same address where halted during debug stop.	28003x, 28004x, 2838x, 28P55x, 28P65x	–

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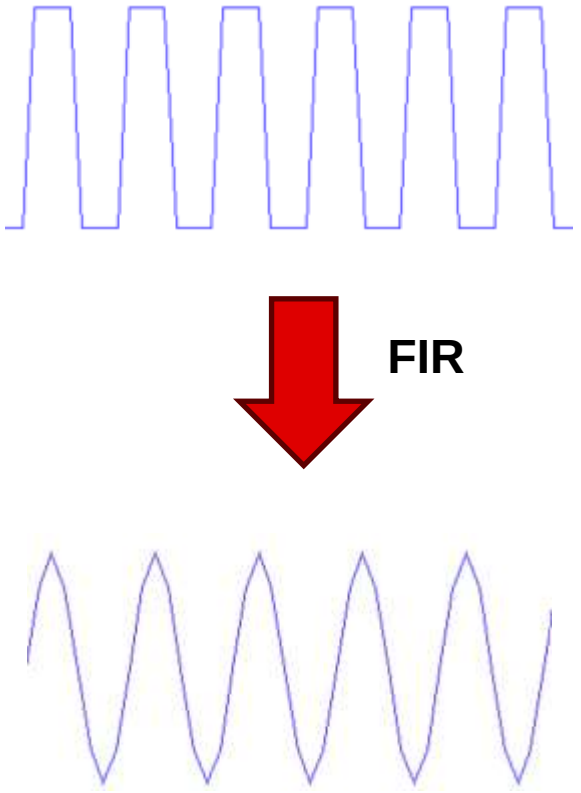
功能实现

用CLA实现一个FIR低通滤波器，方波输入，正弦波输出，EPWM1产生方波，ADC采样方波，EPWM2用于ADC的采样触发。

实现步骤

- 复制空白工程
- Sysconfig配置GPIO
- Sysconfig配置EPWM1
- Sysconfig配置EPWM2
- Sysconfig配置ADC
- Sysconfig配置CLA

- 编写应用代码



片上资源	PIN脚	用途
myBoardLED0_GPIO	LED5	指示系统的运行
EPWM1	--	产生PWM
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ADCINA0		用于AD采样
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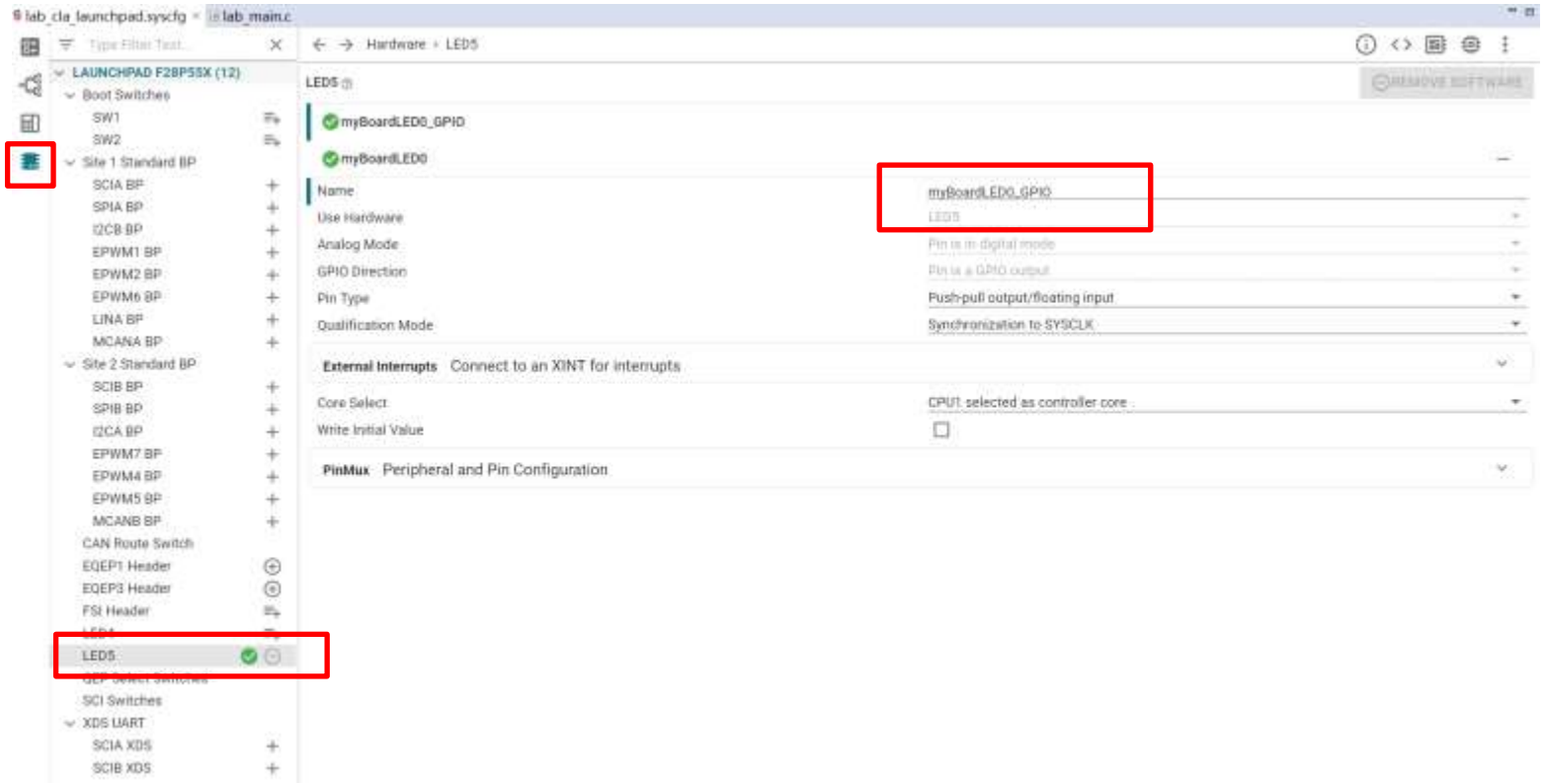

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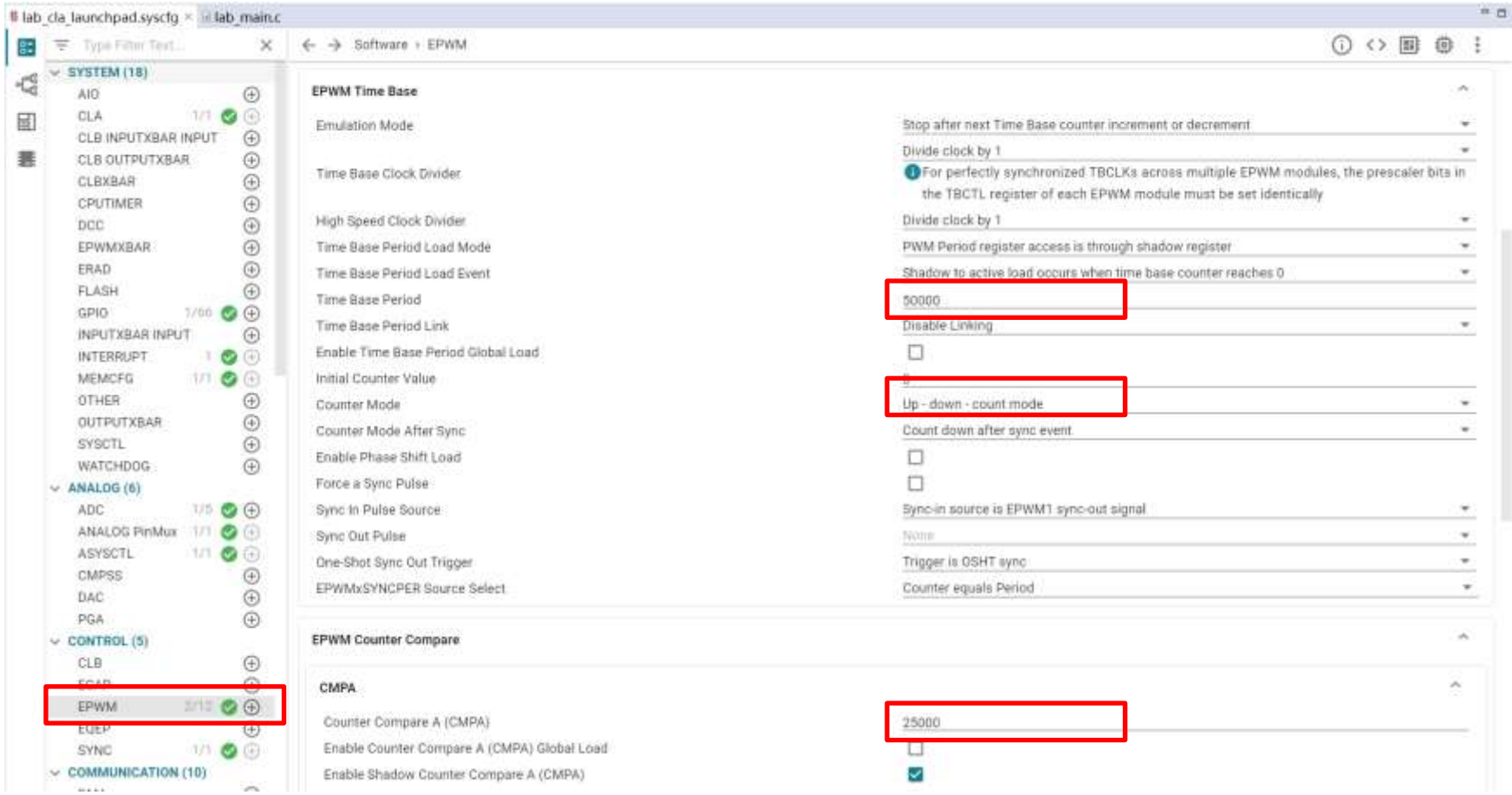
$$\text{Time Base Period} = \frac{f_{tbclk}}{2f_{pwm}} = \frac{100*10^6}{2*1000} = 50000.$$

$$\text{Counter Compare Value} = (1 - \frac{duty}{100}) * tbprd = (1 - \frac{50}{100}) * 50000 = 25000.$$



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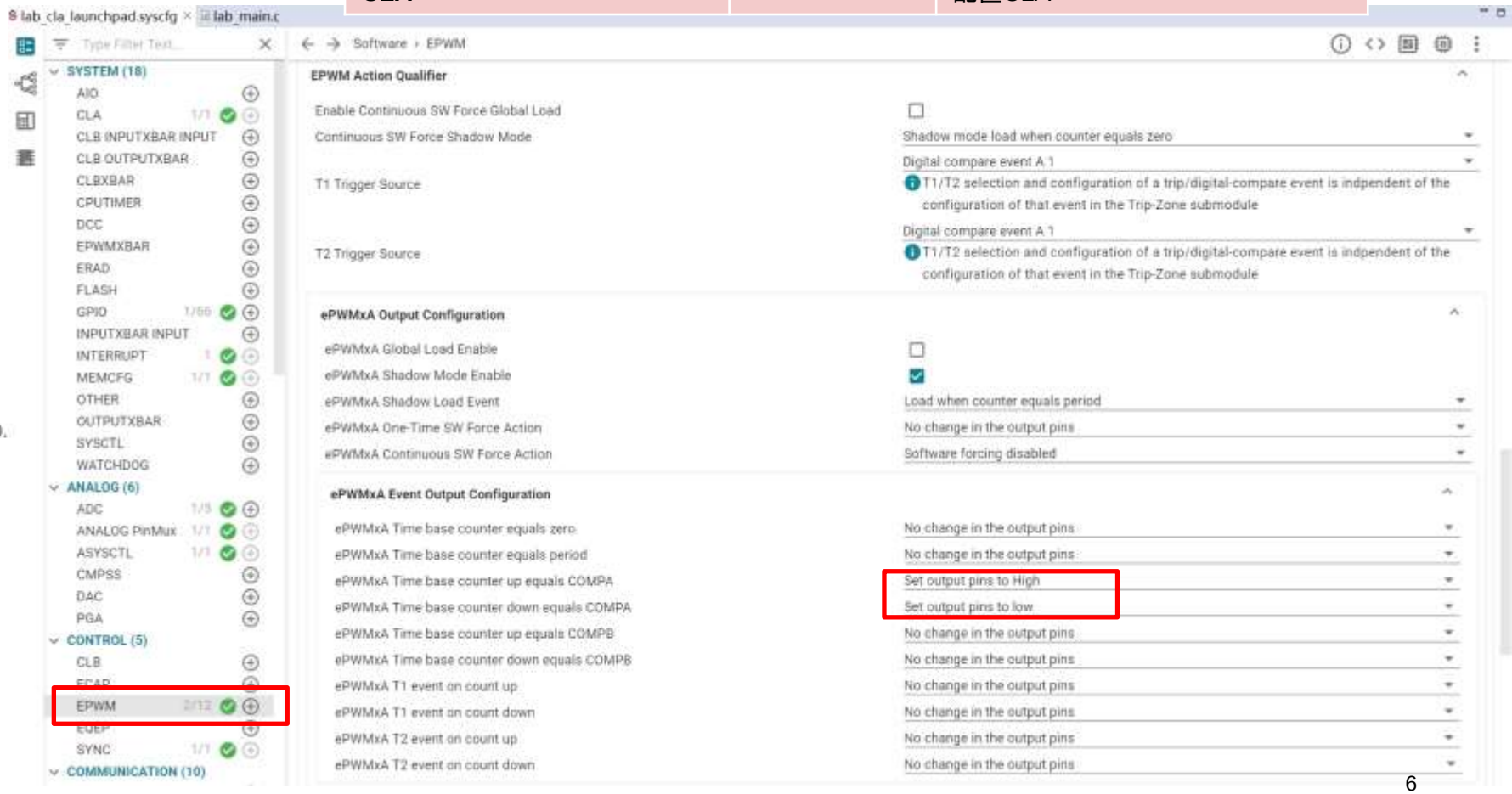

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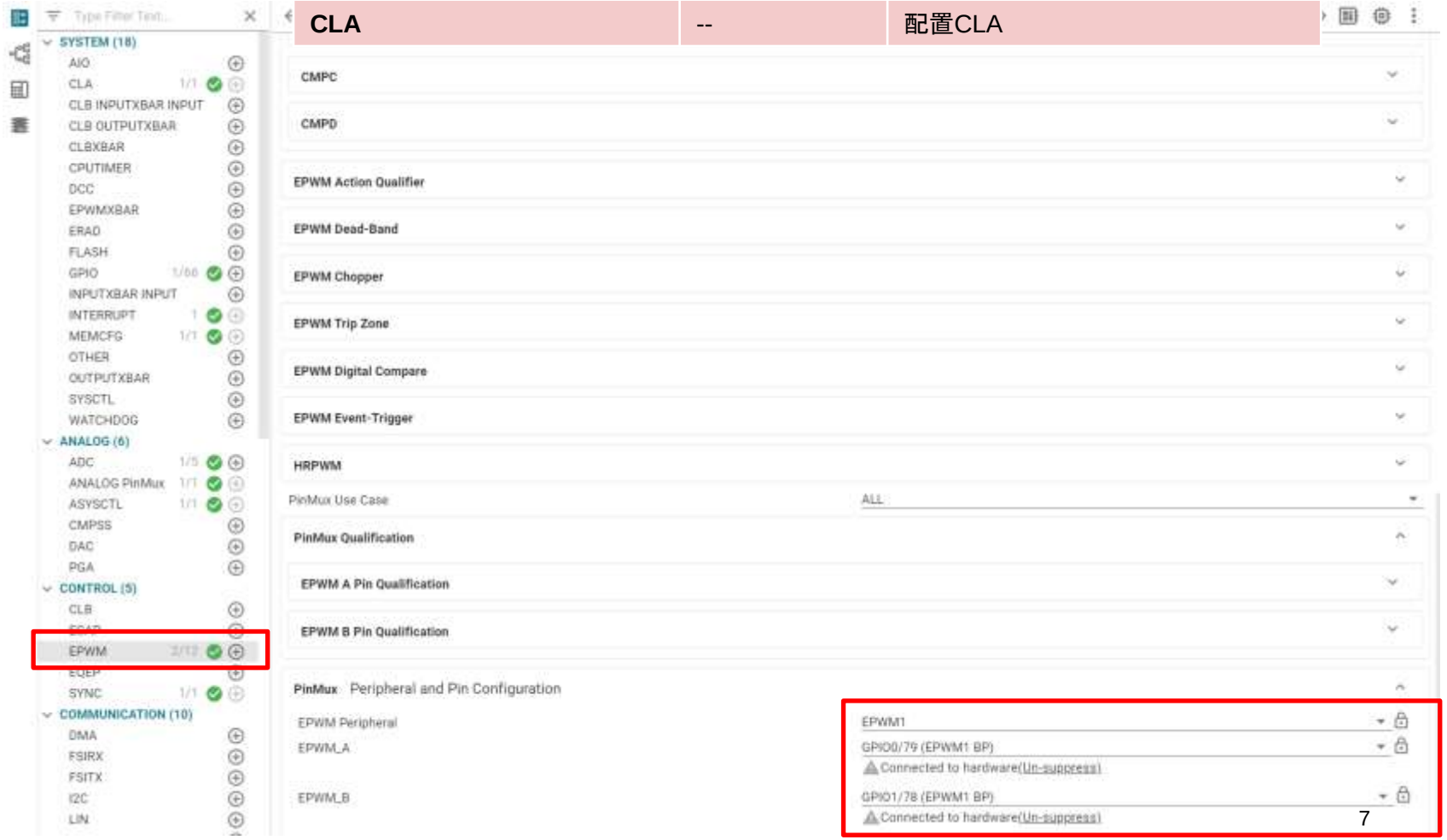

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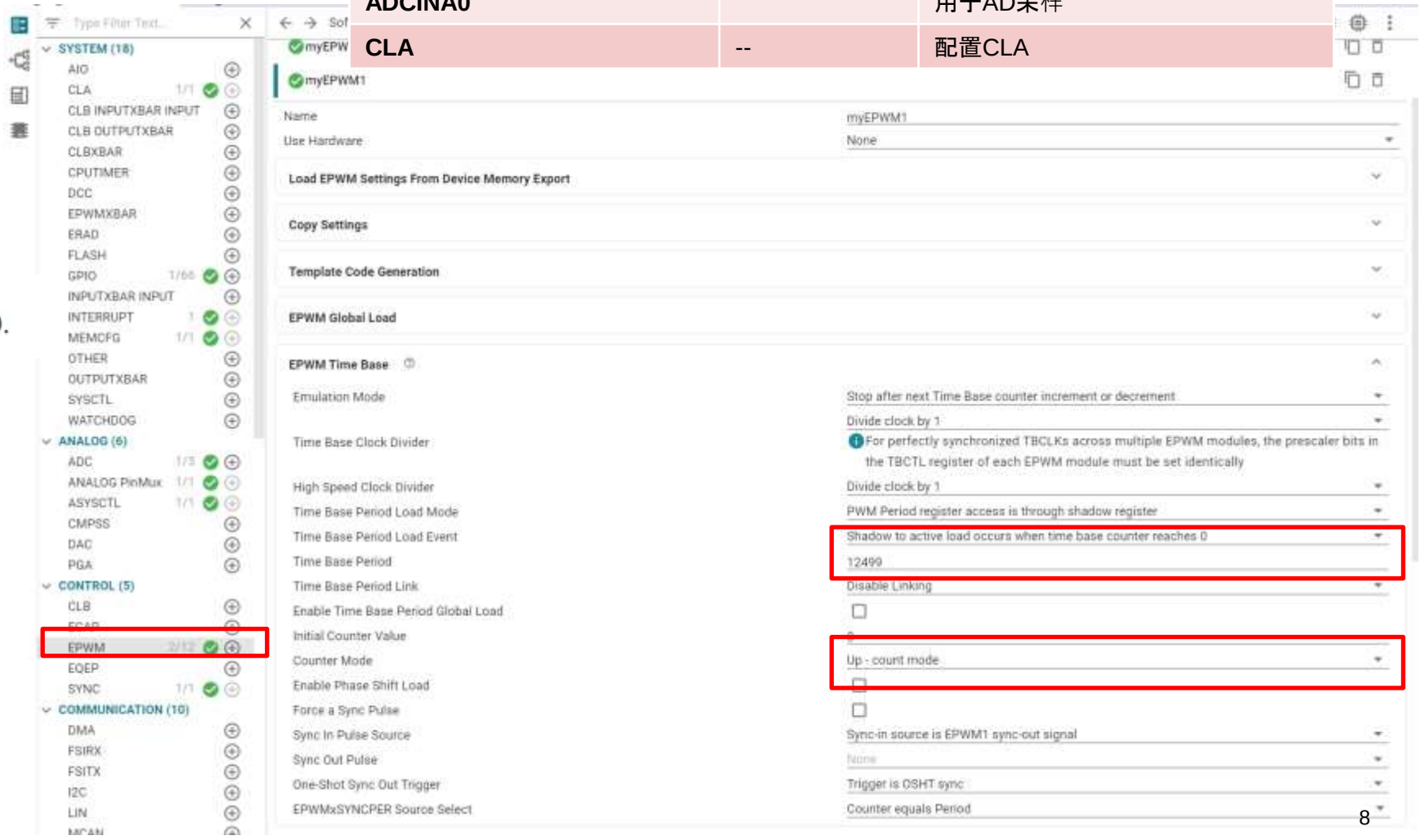
$$\text{Time Base Period} = \frac{f_{tbclk}}{f_{pwm}} - 1 = \frac{100*10^6}{8000} - 1 = 12499.$$



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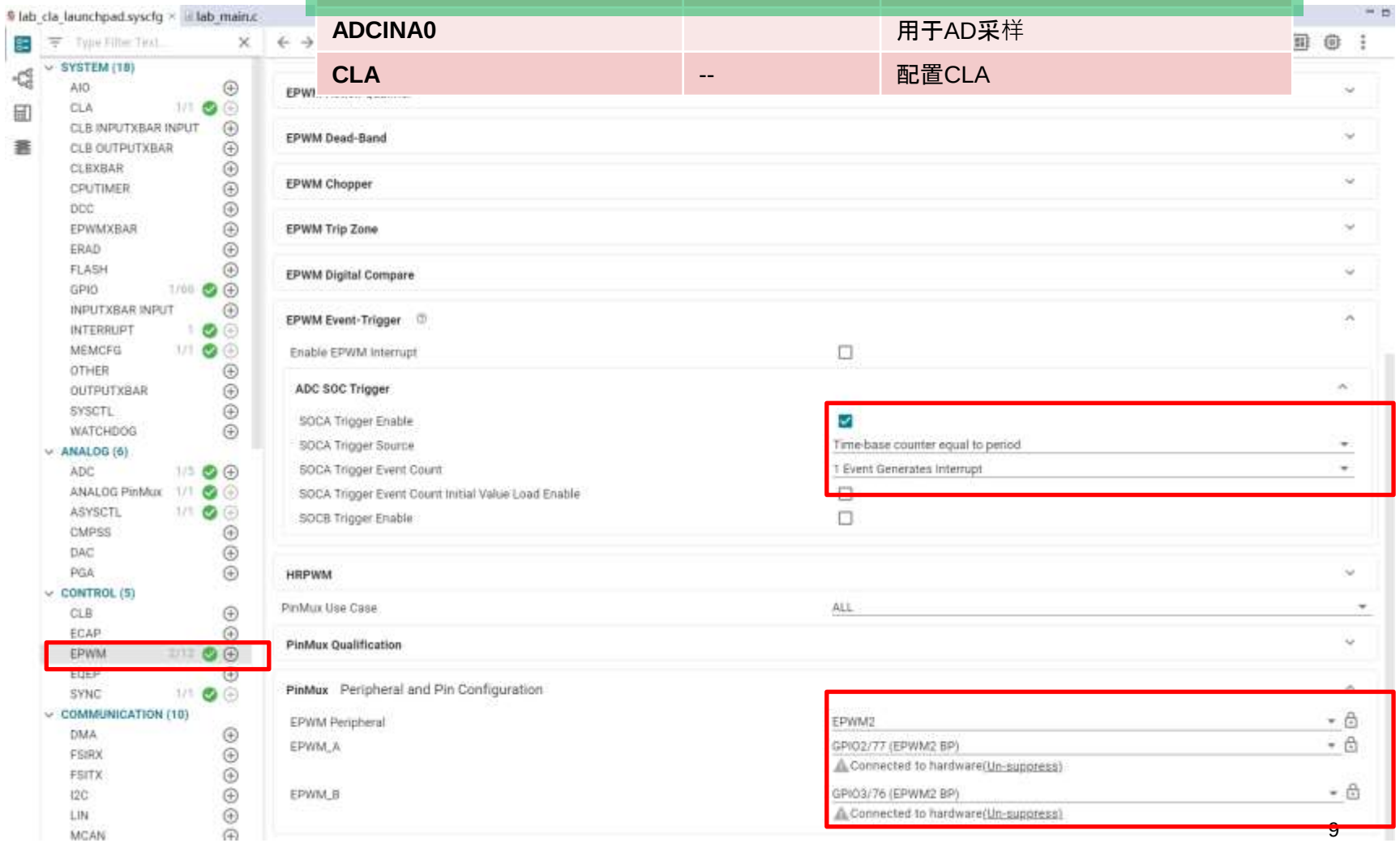

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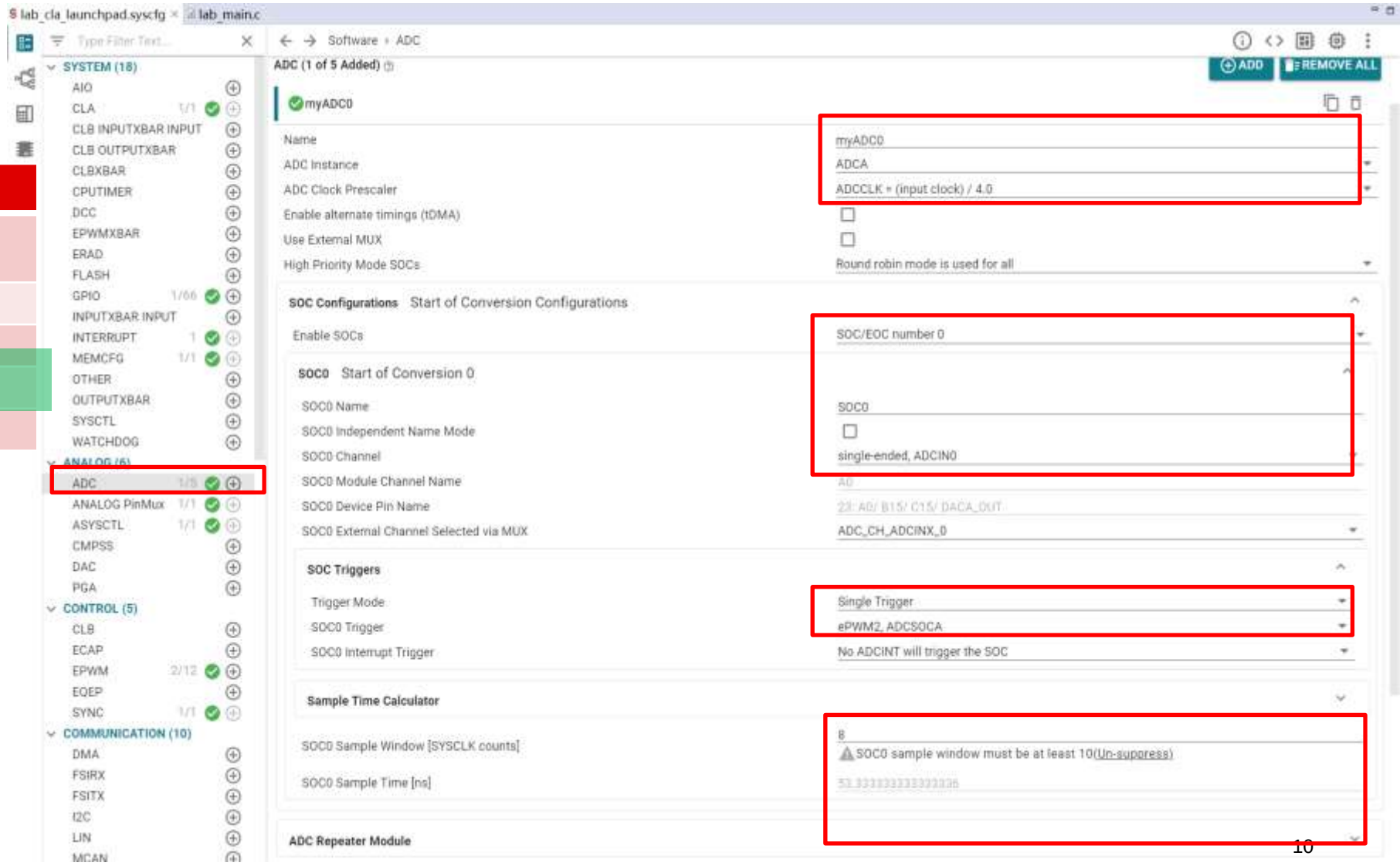

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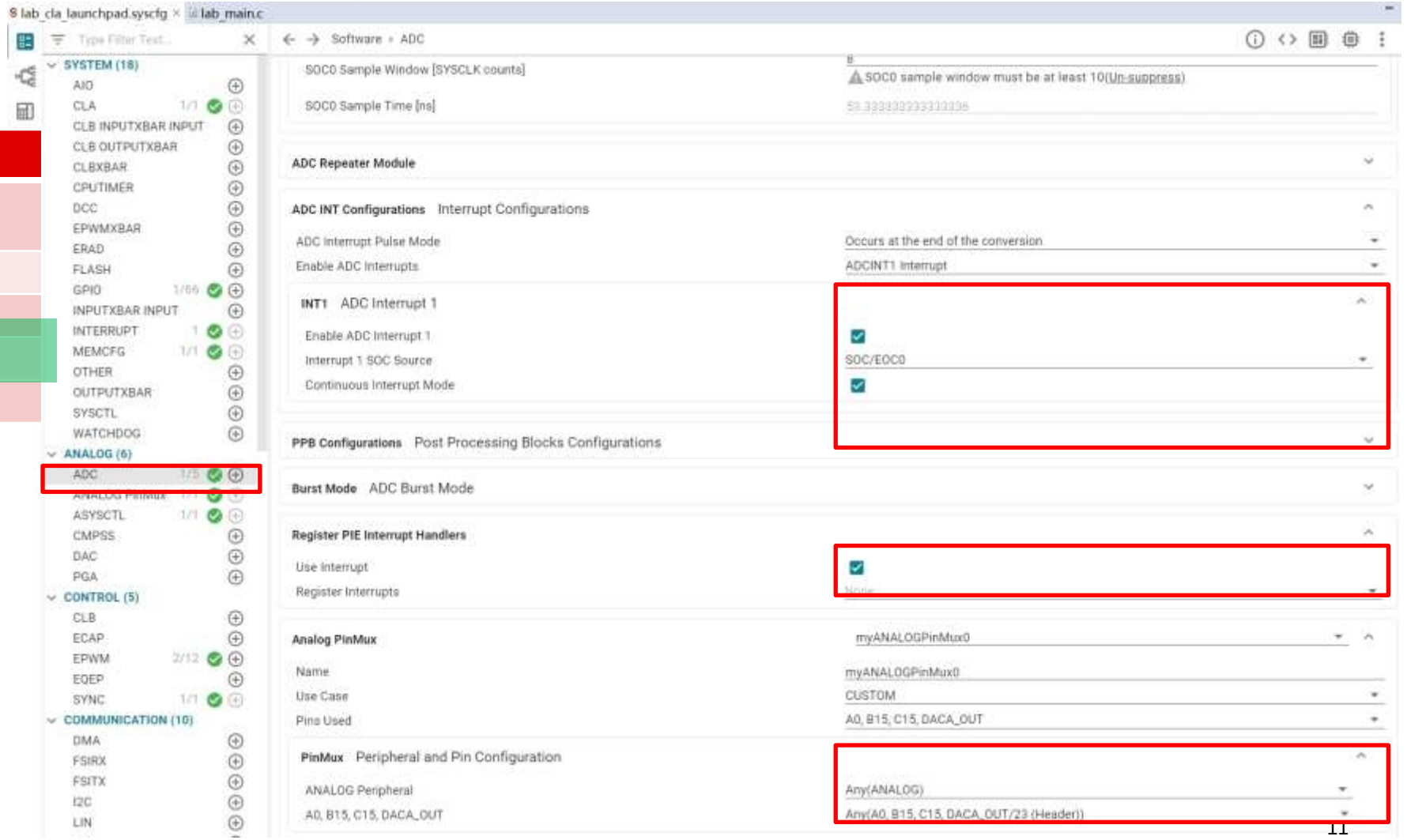

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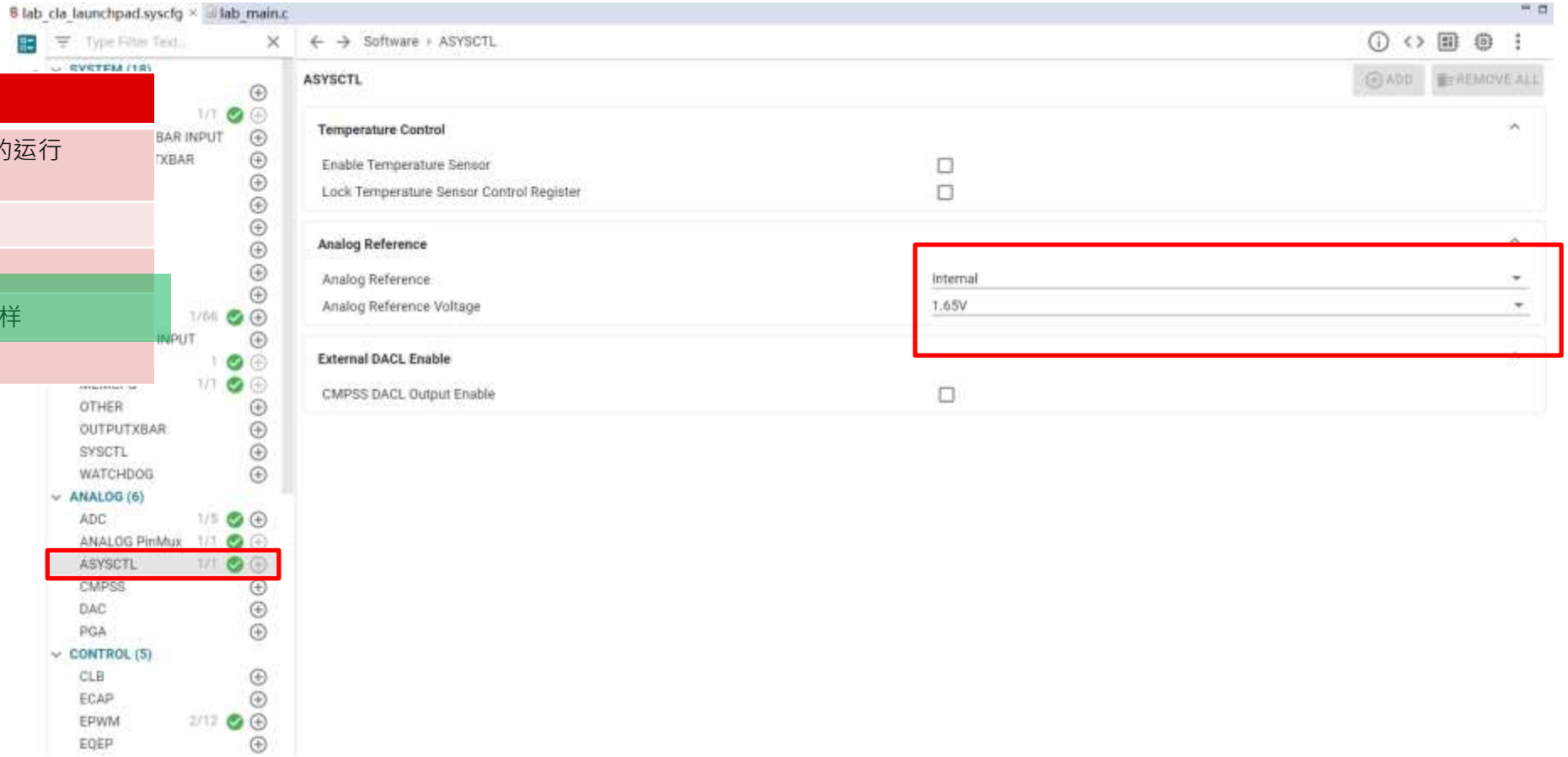

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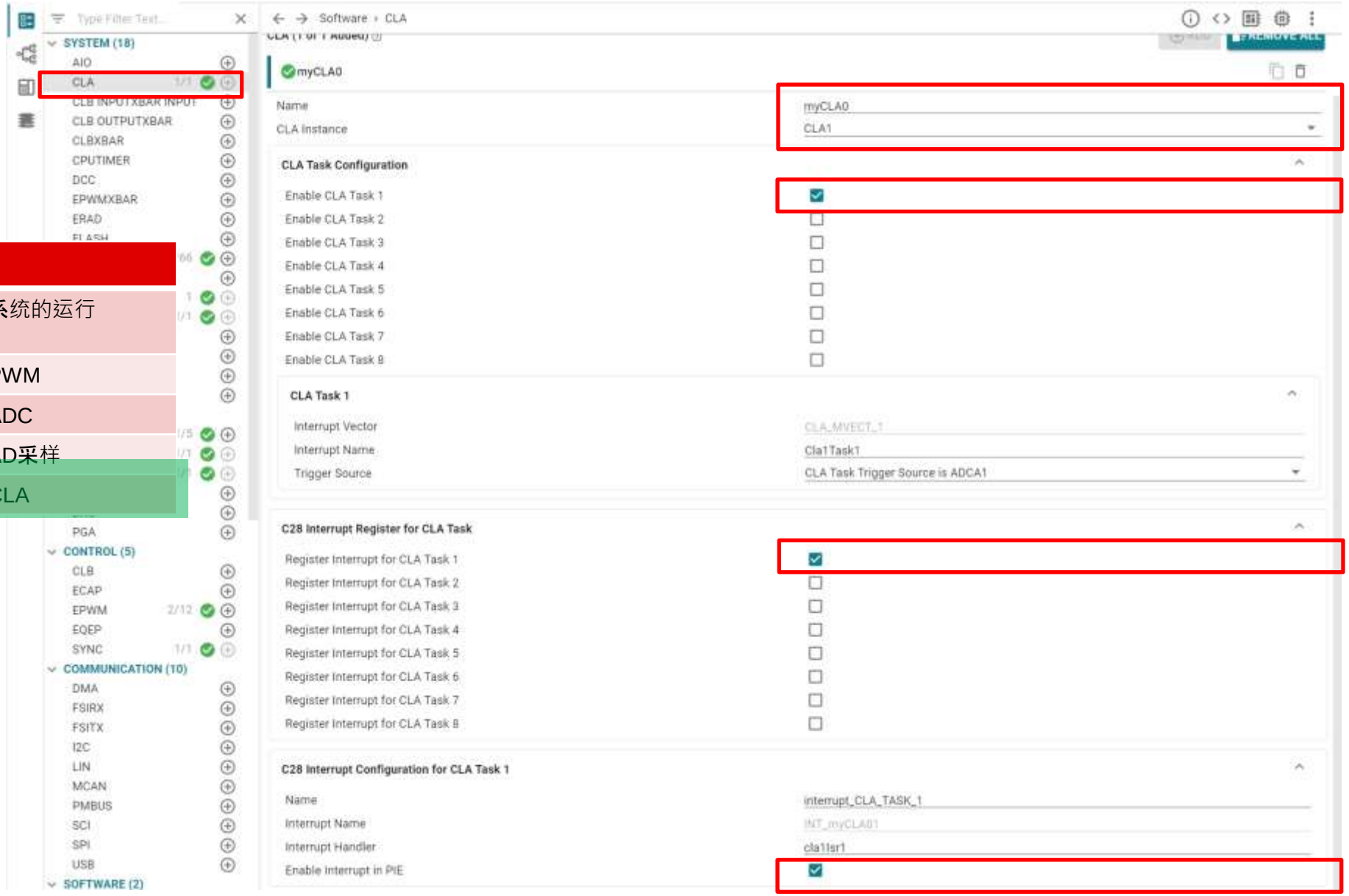

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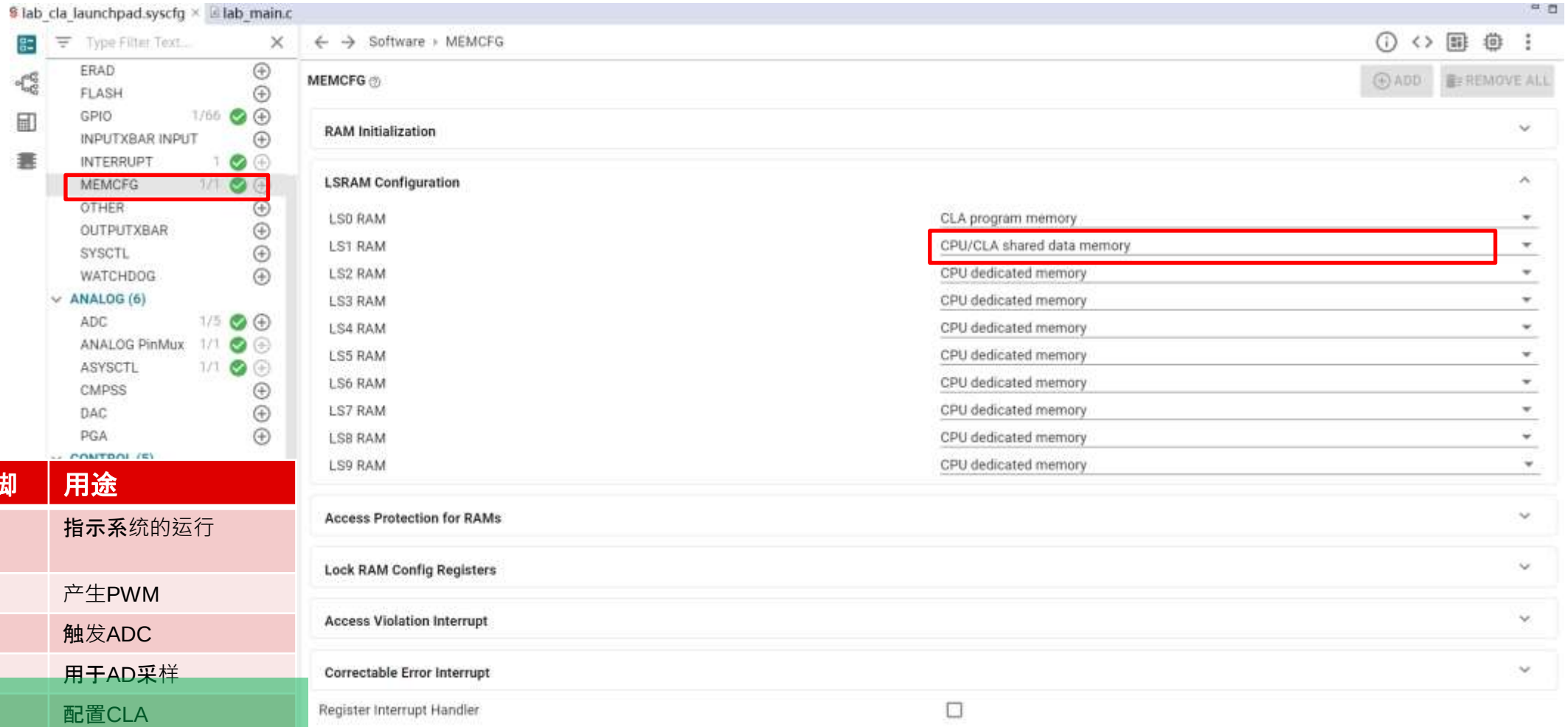

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