1. As calculated in exercise 3, the charging time constant of a RC system: T0=RC, where T0 means the time when the capacity gets charged for 63%. In this case, the time constant is T0=1KΩ\*0.1uF=0.0001s. However, the carrier frequency is 20kHz, which means the period of PWM square wave is 0.00005s. The duty cycle is 20%, so the time foe the voltage goes up is only 0.00001s, which is 0.1T0. In this period of time the voltage goes up to . In other words, the increment and decrement of voltage is quite small. So it looks like a DC voltage output..
3. //According to the Mux table, EPWM8A can be used by GPIO14 and GPIO159. In this question I want to use GPIO14. So I need to set GPIO14 as PWM function, while set GPIO159 as GPIO use.
4. //disabled pull-up resistor for GPIO14 and GPIO15.
5. //Initial the two EPWM8A and EPWM8B.
6. // use GPIO 14 as EPWM8A
7. GPIO\_SetupPinMux(14, GPIO\_MUX\_CPU1, 1);
8. GPIO\_SetupPinOptions(14, GPIO\_OUTPUT, GPIO\_PUSHPULL);
9. GpioDataRegs.GPACLEAR.bit.GPIO14 = 1;
10. // do not use GPIO 159 as EPWM8A, use it as GPIO
11. GPIO\_SetupPinMux(159, GPIO\_MUX\_CPU1, 0);
12. GPIO\_SetupPinOptions(159, GPIO\_OUTPUT, GPIO\_PUSHPULL);
13. GpioDataRegs.GPECLEAR.bit.GPIO159 = 1;
14. // use pin 15 as EPWM8B
15. GPIO\_SetupPinMux(15, GPIO\_MUX\_CPU1, 1);
16. GPIO\_SetupPinOptions(15, GPIO\_OUTPUT, GPIO\_PUSHPULL);
17. GpioDataRegs.GPACLEAR.bit.GPIO15 = 1;
18. //disable pull up resistor
19. EALLOW; // This is needed to write to EALLOW protected registers
20. GpioCtrlRegs.GPAPUD.bit.GPIO14 = 1;
21. GpioCtrlRegs.GPAPUD.bit.GPIO15 = 1;
22. EDIS;
23. //initialize the PWM register 8A
24. //the TBPRD register can be calculated as 50MHz/50Hz = 1000000. and for 8% duty cycle, CMPA = 8% \* TBPRD = 80000
25. EPwm8Regs.TBCTL.bit.CTRMODE = 0;
26. EPwm8Regs.TBCTL.bit.FREE\_SOFT = 2;
27. EPwm8Regs.TBCTL.bit.PHSEN = 0;
28. EPwm8Regs.TBCTL.bit.CLKDIV = 0;
29. EPwm8Regs.TBCTR = 0;
30. EPwm8Regs.TBPRD = 1000000;
31. EPwm8Regs.TBPHS.bit.TBPHS = 0;
32. EPwm8Regs.CMPA.bit.CMPA = 80000;
33. EPwm8Regs.AQCTLA.bit.CAU = 1;
34. EPwm8Regs.AQCTLA.bit.ZRO = 2;
35. EPwm8Regs.CMPB.bit.CMPB = 80000;
36. EPwm8Regs.AQCTLA.bit.CBU = 1;
37. EPwm8Regs.AQCTLA.bit.ZRO = 2;