

### //C program to generate square wave using DAC

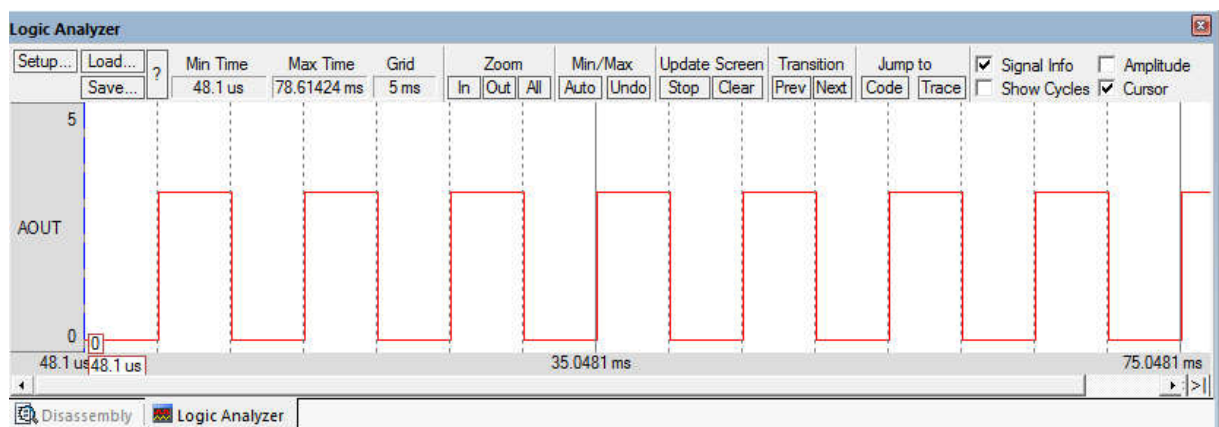
```
#include <stdio.h>
#include "lpc17xx.h"
void delay(uint32_t);

int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        LPC_DAC->DACR = (0<<6)|(1<<16); //value to be converted with bias
        delay(100000);
        LPC_DAC->DACR = (1023<<6)|(1<<16); //value to be converted with bias
        delay(100000);
    }
}

void delay(uint32_t i)
{
    uint32_t x;
    for(x=0;x<=i;x++);
}
```



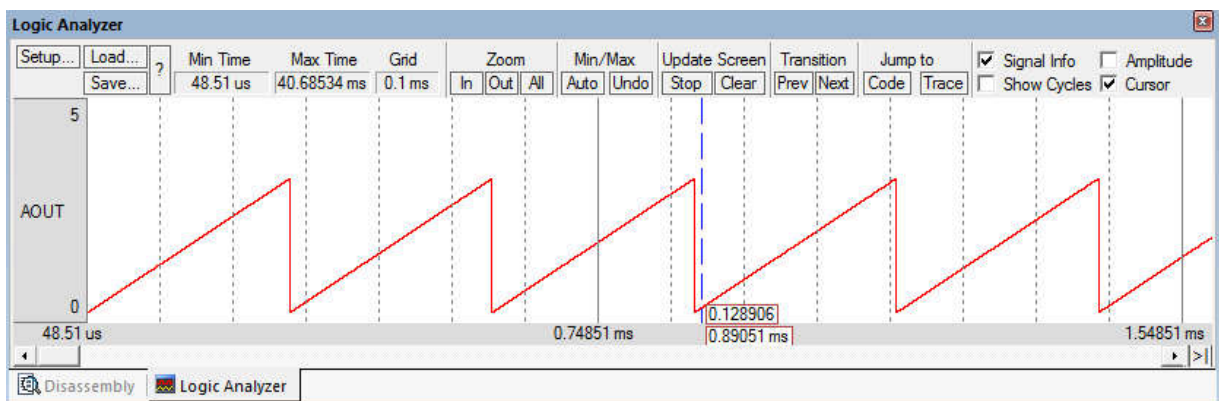
**//C program to generate +ve ramp using DAC**

```
#include <stdio.h>
#include "lpc17xx.h"
#define voltage 1024
uint32_t x;

int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        for(x=0;x<=voltage;x++)
        {
            LPC_DAC->DACR = (x<<6)|(1<<16);
        }
    }
}
```



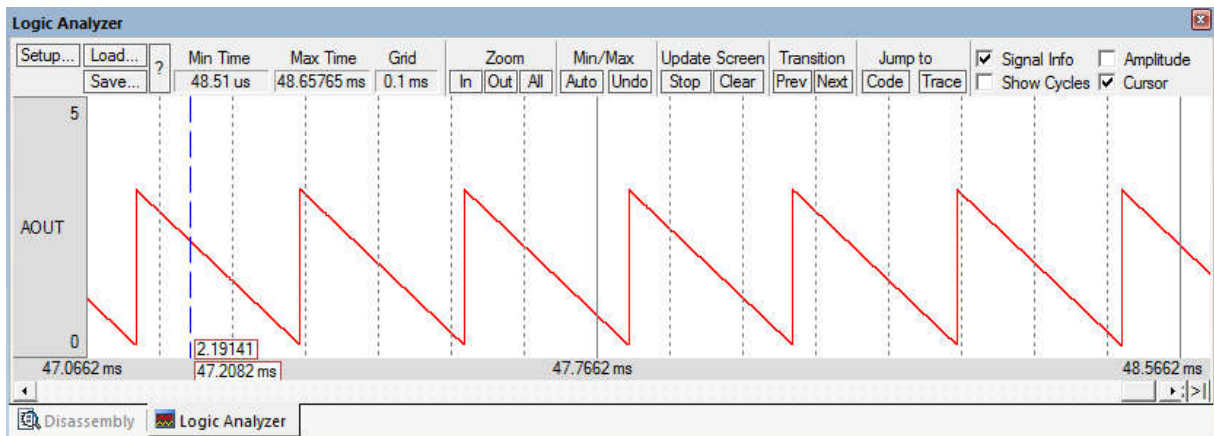
**//C program to generate -ve ramp using DAC**

```
#include <stdio.h>
#include "lpc17xx.h"
#define voltage 1024
uint32_t x;

int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        for(x=voltage;x>=0;x--)
        {
            LPC_DAC->DACR = (x<<6)|(1<<16);
        }
    }
}
```



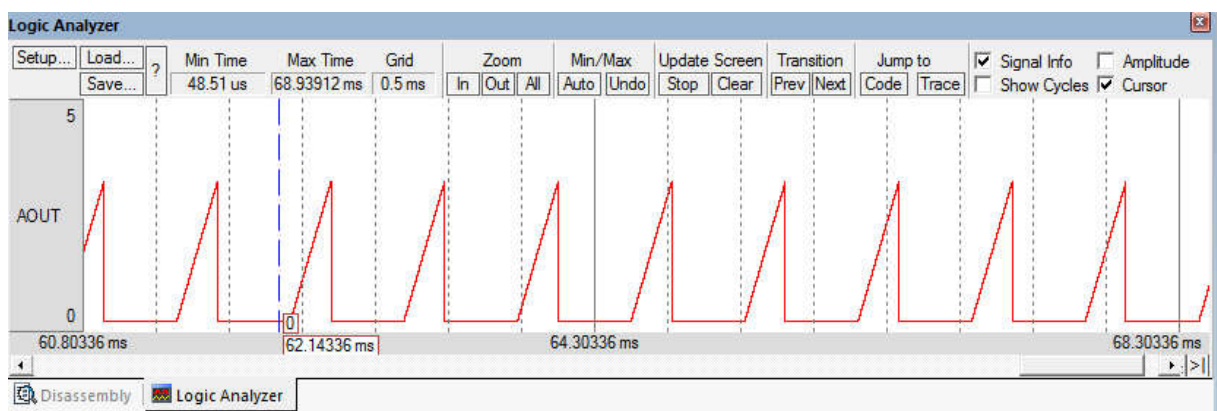
### //C program to generate sawtooth waveform using DAC

```
#include <stdio.h>
#include "lpc17xx.h"
#define voltage 1024
uint32_t x;
void delay(uint32_t);
int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        for(x=0;x<=voltage;x++)
        {
            LPC_DAC->DACR = (x<<6)|(1<<16);
        }
        delay(10000);
    }}

void delay(uint32_t i)
{
    uint32_t a;
    for(a=0;a<=i;a++);
}
```



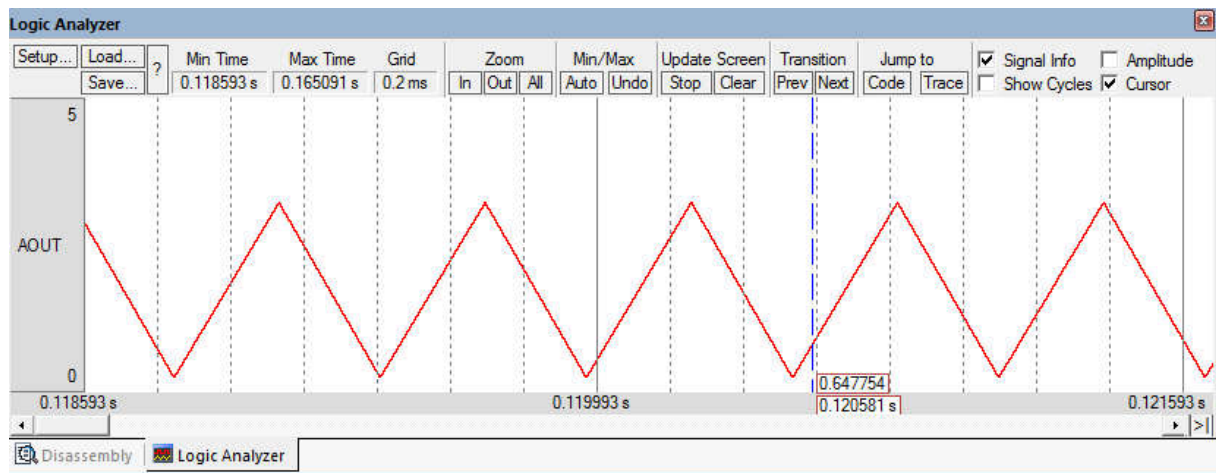
### //C program to generate Triangular waveform using DAC

```
#include <stdio.h>
#include "lpc17xx.h"
#define voltage 1023
uint32_t x,y;

int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        for(x=0;x<voltage;x++)
        {
            LPC_DAC->DACR = (x<<6)|(1<<16);
        }
        for(y=voltage;y>0;y--)
        {
            LPC_DAC->DACR = (y<<6)|(1<<16);
        }
    }
}
```



### //C program to generate Triangular waveform with delay using DAC

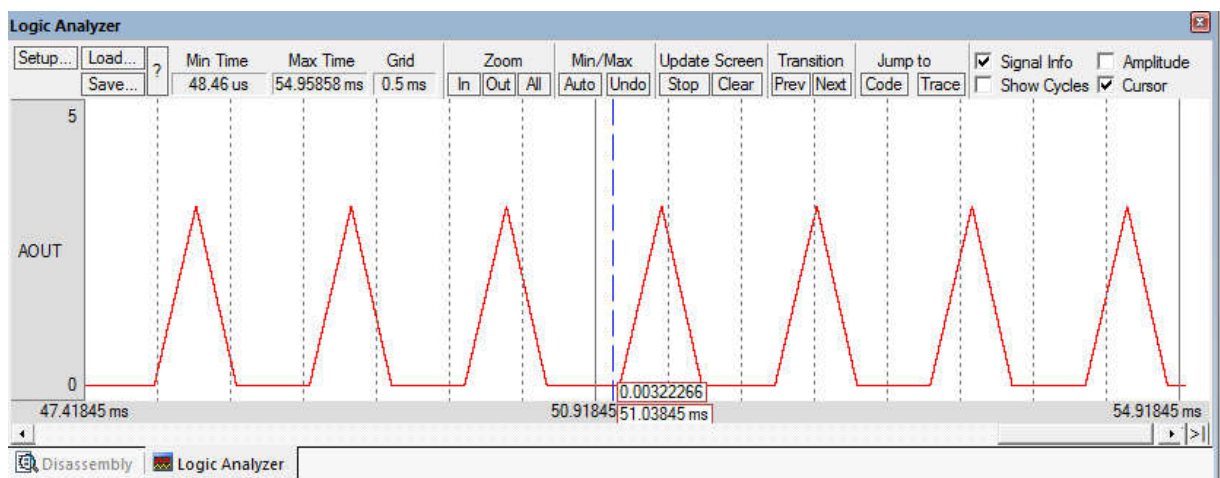
```
#include <stdio.h>
#include "lpc17xx.h"
#define voltage 1023
uint32_t x,y;
void delay(uint32_t);

int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        for(x=0;x<voltage;x++)
        {
            LPC_DAC->DACR = (x<<6)|(1<<16);
        }
        for(y=voltage;y>0;y--)
        {
            LPC_DAC->DACR = (y<<6)|(1<<16);
        }
        delay(10000);
    }

    void delay(uint32_t i)
    {
        uint32_t a;
        for(a=0;a<=i;a++);
    }
}
```



**//C program to generate combined triangular and square wave using DAC**

```
#include <stdio.h>
#include "lpc17xx.h"
#define voltage 1023
uint32_t x,y;
void delay(uint32_t);

int main (void)
{

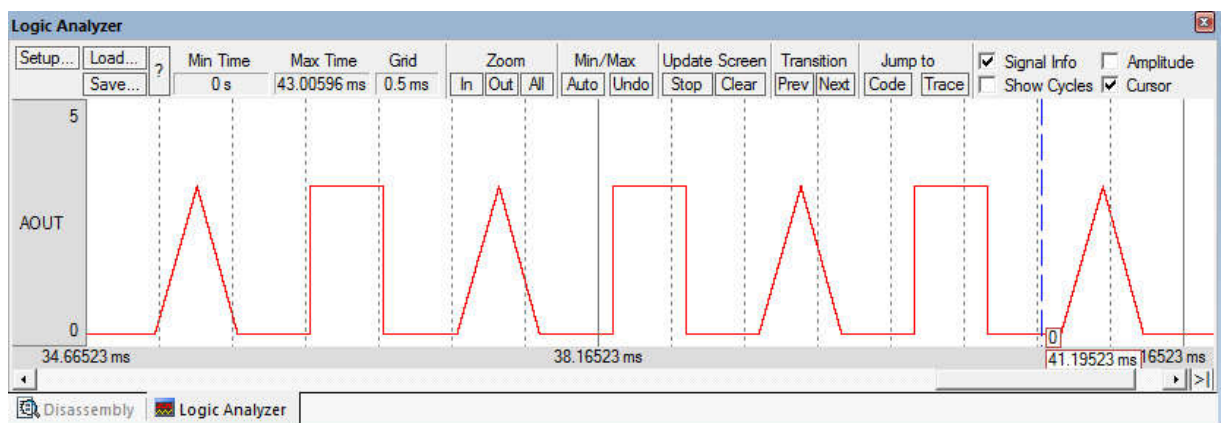
    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {

        for(x=0;x<voltage;x++)
        {
            LPC_DAC->DACR = (x<<6)|(1<<16);
        }
        for(y=voltage;y>0;y--)
        {
            LPC_DAC->DACR = (y<<6)|(1<<16);
        }

        LPC_DAC->DACR = (0<<6)|(1<<16);
        delay(10000);
        LPC_DAC->DACR = (voltage<<6)|(1<<16);
        delay(10000);
        LPC_DAC->DACR = (0<<6)|(1<<16);
        delay(10000);
    }

    void delay(uint32_t i)
    {
        uint32_t a;
        for(a=0;a<=i;a++);
    }
}
```



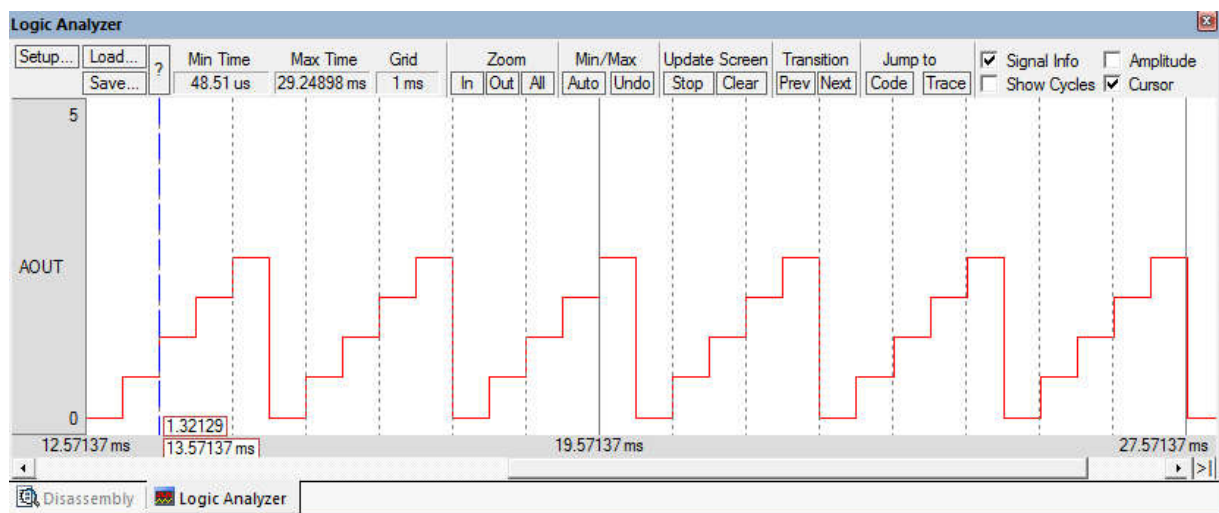
**//C program to generate +ve staircase waveform using DAC**

```
#include <stdio.h>
#include "lpc17xx.h"
#define voltage 1023
uint32_t x;
void delay(uint32_t);
int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        for(x=0;x<=voltage;x=x+205)
        {
            LPC_DAC->DACR = (x<<6)|(1<<16);
            delay(10000);
        }
    }

    void delay(uint32_t i)
    {
        uint32_t a;
        for(a=0;a<=i;a++);
    }
```





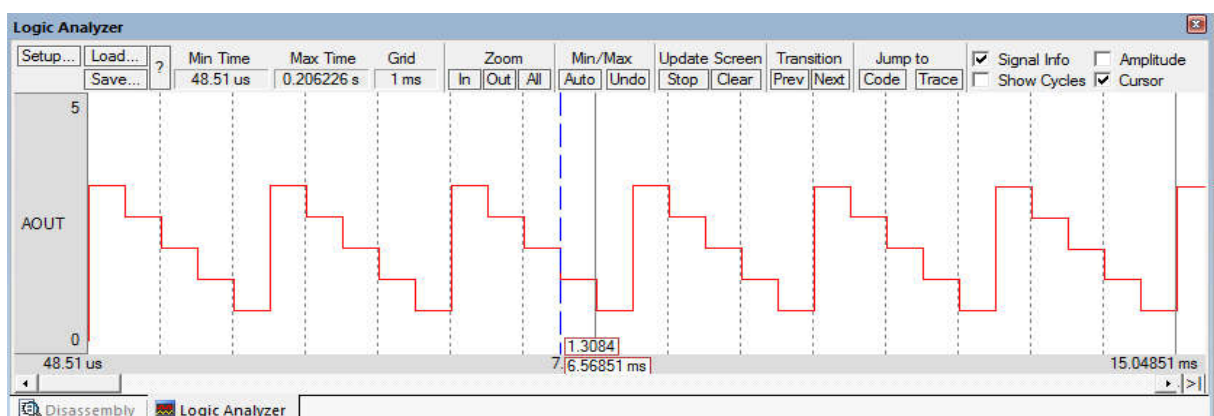
### //C program to generate -ve staircase waveform using DAC

```
#include <stdio.h>
#include "lpc17xx.h"
#define voltage 1023
uint32_t x;
void delay(uint32_t);
int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        for(x=voltage;x>=0;x=x-205)
        {
            LPC_DAC->DACR = (x<<6)|(1<<16);
            delay(10000);
        }
    }

    void delay(uint32_t i)
    {
        uint32_t a;
        for(a=0;a<=i;a++);
    }
```



### //C program to generate staircase waveform using DAC

```
#include <stdio.h>
#include "lpc17xx.h"

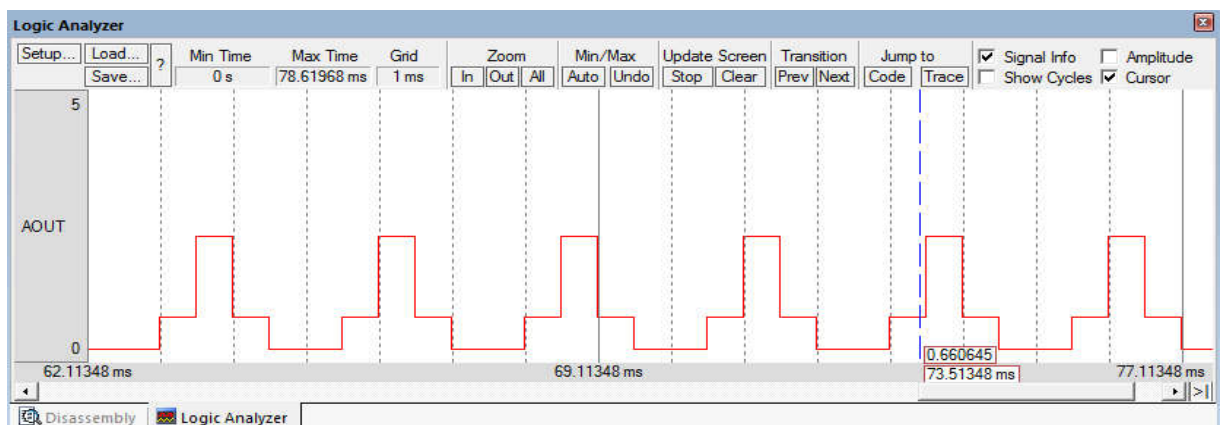
void delay(uint32_t);
int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {

        LPC_DAC->DACR = (0<<6)|(1<<16);
        delay(10000);
        LPC_DAC->DACR = (205<<6)|(1<<16);
        delay(10000);
        LPC_DAC->DACR = (715<<6)|(1<<16);
        delay(10000);
        LPC_DAC->DACR = (205<<6)|(1<<16);
        delay(10000);
        LPC_DAC->DACR = (0<<6)|(1<<16);
        delay(10000);
    }

    void delay(uint32_t i)
    {
        uint32_t a;
        for(a=0;a<=i;a++);
    }
```



### //C program to generate sine wave using DAC

```
#include <stdio.h>
#include "lpc17xx.h"
uint32_t x;

uint32_t sinetable[]={512,528,544,560,576,592,608,624,639,655,
                      670,685,700,715,730,744,759,773,786,800,813,826,838,850,862,
                      874,885,896,906,916,926,935,944,953,961,968,975,982,988,994,
                      999,1004,1008,1012,1015,1018,1020,1022,1022,1023,1023,1023,
                      1022,1022,1020,1018,1015,1012,1008,1004,999,994,988,982,975,
                      968,961,953,945,936,927,917,907,896,886,874,863,851,839,826,
                      813,800,787,773,759,745,731,716,701,686,671,656,640,624,609,
                      593,577,561,545,529,513,497,481,465,449,433,417,401,386,370,
                      355,339,324,310,295,280,266,252,238,225,212,199,186,174,162,
                      151,139,129,118,108,98,89,80,72,64,56,49,43,36,31,25,21,16,
                      13,9,6,4,2,1,0,0,0,1,2,4,6,9,12,16,20,25,30,35,42,48,55,63,
                      71,79,88,97,107,117,127,138,149,160,172,185,197,210,223,236,
                      250,264,278,293,307,322,337,352,368,383,399,415,430,446,462,
                      478,494};

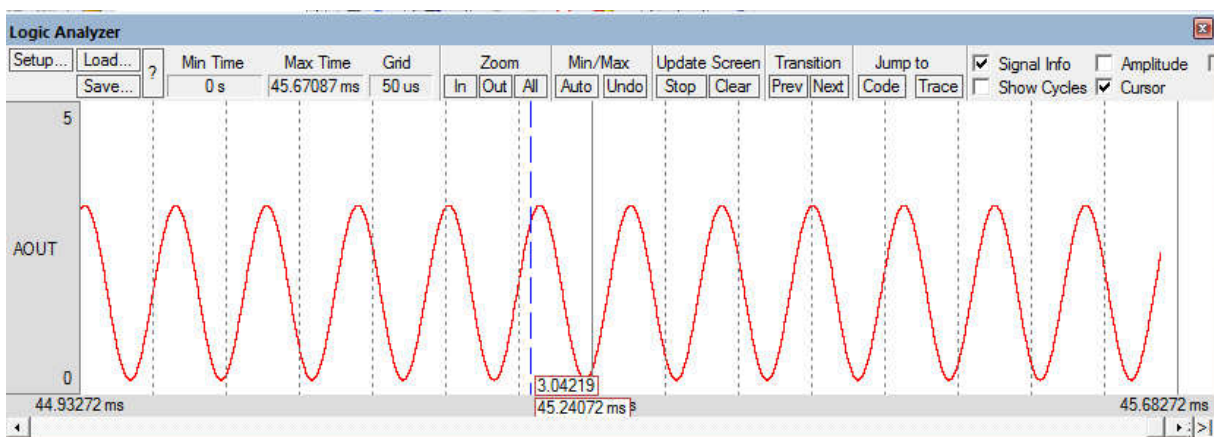
int main (void)
{

    LPC_PINCON->PINSEL1 |= (2<<20);    // set p0.26 to DAC output

    while(1)
    {
        for(x=0;x<200;x++)
        {
            LPC_DAC->DACR = (sinetable[x]<<6)|(1<<16);
        }
    }
}
```

### Logic:

$V_{out} = 512 + 512(\sin\theta)$ , where  $\theta = 0^\circ$  to  $360^\circ$  at  $1.8^\circ$  interval, 200 values



## //C program to generate pulse of different duty cycle using PWM

```
#include<stdio.h>
#include <lpc17xx.h>

void PWM_init(void)
{
    LPC_PINCON->PINSEL3 |= (2<<4)|(2<<8)|(2<<10);// pwm1.1 p1.18,pwm1.2 p1.20,pwm1.3 p1.21
    LPC_PWM1->TCR=(1<<0);// enable counter and PWM
    LPC_PWM1->PR=0;//to fix the period of pwm
    LPC_PWM1->MCR=(1<<1);//reset the timer on match
    LPC_PWM1->MR0=24999;//ton+toff = 1ms
    LPC_PWM1->PCR=(1<<9)|(1<<10)|(1<<11);//PWM1,PWM2andPWM3 enable
}

int main (void)
{
    PWM_init();
    while(1)
    {
        LPC_PWM1->MR1=6250;//ton,duty cycle = 24999/6250=25%
        LPC_PWM1->MR2=12500;//ton=12500,duty cycle = 24999/12500=50%
        LPC_PWM1->MR3=18750;//ton=18750,duty cycle = 24999/18750=75%
        LPC_PWM1->LER=0xe;//Enable the bits in LER register to load and latch the new
        //match values in MR1,MR2 and MR3 registers
    }
}
```

