

# **FT61F02X**

## **VREG Application note**

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## FT61F02x VREG 应用

## 1. 稳压器输出

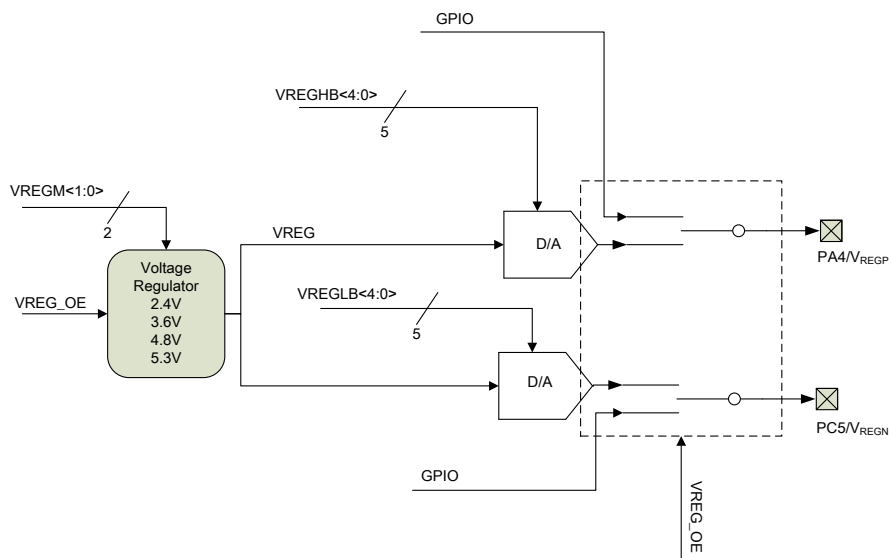


图 1-1 稳压器输出原理框图

FT61F02X 内置两路稳压器输出，每路可分别输出多达 32 档电压。当 VREG\_OE = 1 时（寄存器位 MSCKCON.6），PA4 和 PC5 便自动禁止数字输出功能，转为模拟电压输出。

输出电压由以下公式决定：

$$\text{公式 1.1} \quad V_{OUT} = V_{REG} * (VREGHB + 1) / 32$$

$$\text{公式 1.2} \quad V_{OUT} = V_{REG} * (VREGLB + 1) / 32$$

其中公式 1.1 为管脚 V<sub>REGP</sub>（PA4）的电压输出，公式 1.2 为管脚 V<sub>REGN</sub>（PC5）的电压输出，V<sub>REG</sub> 电压可以是 2.4V、3.6V、4.8V、5.3V 中的一种，由寄存器位 VREGM[1:0] 选择。

## 1.1. 稳压器输出相关寄存器汇总

名称	状态	寄存器	地址	复位值
VREG_OE	<u>稳压器输出使能位</u> 1 = 使能 (PA4 和 PC5 输出稳压器电压) 0 = 关闭 (PA4 和 PC5 为普通 IO)	MSCKCON[6]	0x1B	RW-0
VREGM	<u>稳压器电压选择位</u> 00 = 2.4V    10 = 4.8V 01 = 3.6V    11 = 5.3V	VCON1[6:5]		RW-00
VREGHB	<u>高电压范围 (PA4) 输出电压</u> 当 VREG_OE = 1 时: (MSCKCON 寄存器) $V_{OUT} = V_{REG} * (VREGHB + 1) / 32$	VCON1[4:0]	0x108	RW-0000
VREGLB	<u>低电压范围 (PC5) 输出电压</u> 当 VREG_OE = 1 时: (MSCKCON 寄存器) $V_{OUT} = V_{REG} * (VREGLB + 1) / 32$	VCON2[4:0]	0x109	RW-0000

表 1-1 稳压器输出相关寄存器

## 2. 应用范例

```
//*****
/* 文件名: TEST_61F02x_VREG.c
* 功能:    FT61F02x-dac 功能演示
* IC:      FT61F023 SOP16
* 晶振:    16M/2T
* 说明:    利用稳压输出器在 PA4 上输出频率为 16K 幅值为 3.6V 的三角波
*          在 PC5 上输出 3.6/2=1.8V 电压
*
*          FT61F023  SOP16
*          -----
* VDD-----|1(VDD) (VSS)16|-----GND
* NC-----|2(PA7) (PA0)15|-----NC
* NC-----|3(PA6) (PA1)14|-----NC
* NC-----|4(PA5) (PA2)13|-----NC
* NC-----|5(PC3) (PA3)12|-----NC
* NC-----|6(PC2) (PC0)11|-----NC
* VREGP---|7(PA4) (PC1)10|-----NC
* VREGN---|8(PC5) (PC4)09|-----NC
*
*          -----
*/
#include "SYSCFG.h"
//*****宏定义*****
#define uchar unsigned char

volatile bit    SAFlag;
volatile uchar  VREGC;
/*-----
* 函数名: POWER_INITIAL
* 功能:   上电系统初始化
* 输入:   无
* 输出:   无
*-----*/
void POWER_INITIAL (void)
{
    OSCCON = 0B01110001;    //IRCF=111=16MHz/2T=8MHz,0.125µs
    INTCON = 0;             //暂禁止所有中断

    PORTA = 0B00000000;
    TRISA = 0B00000000;    //PA 输入输出 0-输出 1-输入,PA4 输出
    PORTC = 0B00000000;
    TRISC = 0B00000000;    //PC 输入输出 0-输出 1-输入,PC5 输出
    WPUA = 0B00000000;    //PA 端口上拉控制 1-开上拉 0-关上拉
    WPUC = 0B00000000;    //PC 端口上拉控制 1-开上拉 0-关上拉
}
```

```

OPTION = 0B00001000;      //Bit3=1,WDT MODE,PS=000=WDT RATE 1:1
MSCKCON = 0B00000000;
//Bit6->0,禁止 PA4, PC5 稳压输出
//Bit5->0,TIMER2 时钟为 Fosc
//Bit4->0,禁止 LVR

```

```

CMCON0 = 0B00000111;      //关闭比较器, CxIN 为数字 IO 口

```

```

}

```

```

/*-----

```

```

* 函数名: DelayUs
* 功能:   短延时函数 --16M-2T--大概快 1%左右.
* 输入:   Time 延时时间长度 延时时长 Time μs
* 输出:   无

```

```

-----*/

```

```

void DelayUs(unsigned char Time)

```

```

{
    unsigned char a;
    for(a=0;a<Time;a++)
    {
        NOP();
    }
}

```

```

/*-----

```

```

* 函数名: DelayMs
* 功能:   短延时函数 快 1%
* 输入:   Time 延时时间长度 延时时长 Time ms
* 输出:   无

```

```

-----*/

```

```

void DelayMs(unsigned char Time)

```

```

{
    unsigned char a,b;
    for(a=0;a<Time;a++)
    {
        for(b=0;b<5;b++)
        {
            DelayUs(197);
        }
    }
}

```

```

/*-----

```

```

* 函数名: VREG_INITIAL
* 功能:   稳压器输出初始化
* 设置稳压器输出电压  $1 = VREG * (VREGHB + 1) / 32$ 

```

```

*          =3.6*(31+1)/32 =3.6V
*  稳压器输出电压 2=VREG*(VREGLB+1)/32
*          =3.6*(15+1)/32 = 1.8V
*          -----*/
void VREG_INITIAL(void)
{
    VREG_OE = 0;
    VCON1 = 0B00111111;          //VREG = 3.6V
    //Bit[6:5] VREGM[1:0]-D 稳压器电压(VREG)选择位 00-2.4V 01-3.6V 10-4.8V 11-5.3V
    //Bit[4:0] VREGHB[4:0] PA4 输出电压设置

    VCON2 = 0B00001111;
    //Bit[4:0] VREGLB[4:0] PC5 输出电压设置
    //VOUT = VREG*(VREGLB+1)/32

    VREG_OE = 1;                //稳压器输出使能
}
/*-----*/
* 函数名: main
* 功能:   主函数
* 输入:   无
* 输出:   无
*          -----*/
void main()
{
    POWER_INITIAL();            //系统初始化
    VREG_INITIAL();             //输出稳压器初始化
    SAFlag = 1;
    while(1)
    {
        if(SAFlag == 1)        //产生三角波
        {
            VREGC++;            //输出电压增加
            VCON1 &= 0B11100000;
            VCON1 |= VREGC;
            if(VREGC >= 31)
            {
                SAFlag = 0;
            }
        }
        else
        {
            VREGC--;            //输出电压减小
            VCON1 &= 0B11100000;

```

```
        VCON1 |= VREGC;
        if(VREGC == 0)
        {
            SAFlag = 1;
        }
    }
    DelayMs(1);          //1ms
}
}
```

## 联系信息

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