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瑞萨电子公司

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## 38D2 群

### 定时器 3，定时器 X（PWM 信号输出：遥控器载波输出控制）

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#### 1. 要点

本篇资料介绍一个通过 38D2 群的定时器 3 和定时器 X 从 P35/Txout1 端口输出 PWM 信号（遥控器载波信号）的例子。

#### 2. 说明

该应用说明适用于以下条件：

采用的 MCU：38D2 群（例如：M38D24G6HP）

振荡频率： 4MHz

存储容量： ROM 24KB，RAM 640 字节

3. 内容

3.1 PWM 信号输出控制的应用实例

- 概要
  1. 应用定时器 X 生成 PWM 信号 (遥控器载波信号)。
  2. 应用定时器 3 对 P35/Txout1 端口输出的 PWM 信号进行控制。
  3. 在每次定时器 3 下溢时, 切换从 P35/Txout1 输出的载波信号的开关状态。
  4. 通过改变定时器 3 的设定值来改变从 P35/Txout1 输出的载波信号开关的间隔长度。
- 详述
  1. PWM 信号: 38KHz, 1/3 占空比
  2. P35/Txout1 载波输出信号: 标准间隔长度  $T=320\mu s$ ,  $8T$  开状态  $\rightarrow 4T$  关状态  $\rightarrow T$  开状态
- 下图 1 为定时器 3 对 PWM 信号输出的控制, 图 2 为定时器的关系及分频比。

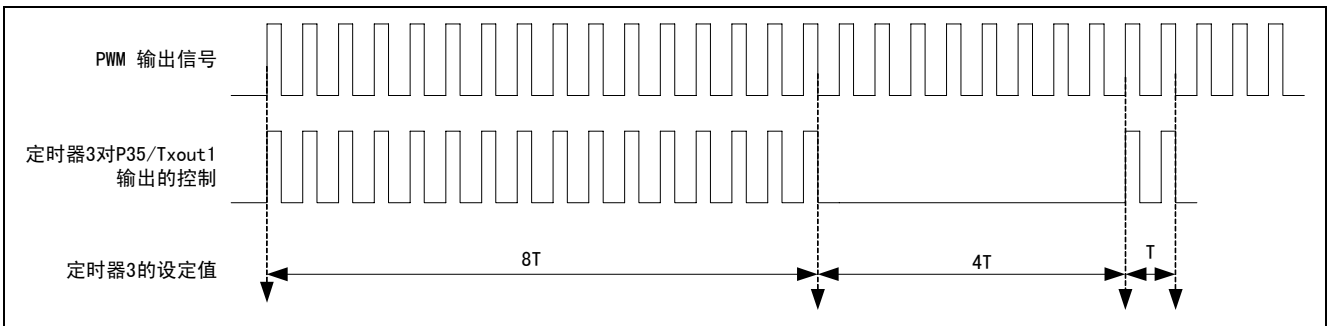


图 1. 定时器 3 对 PWM 信号输出的控制

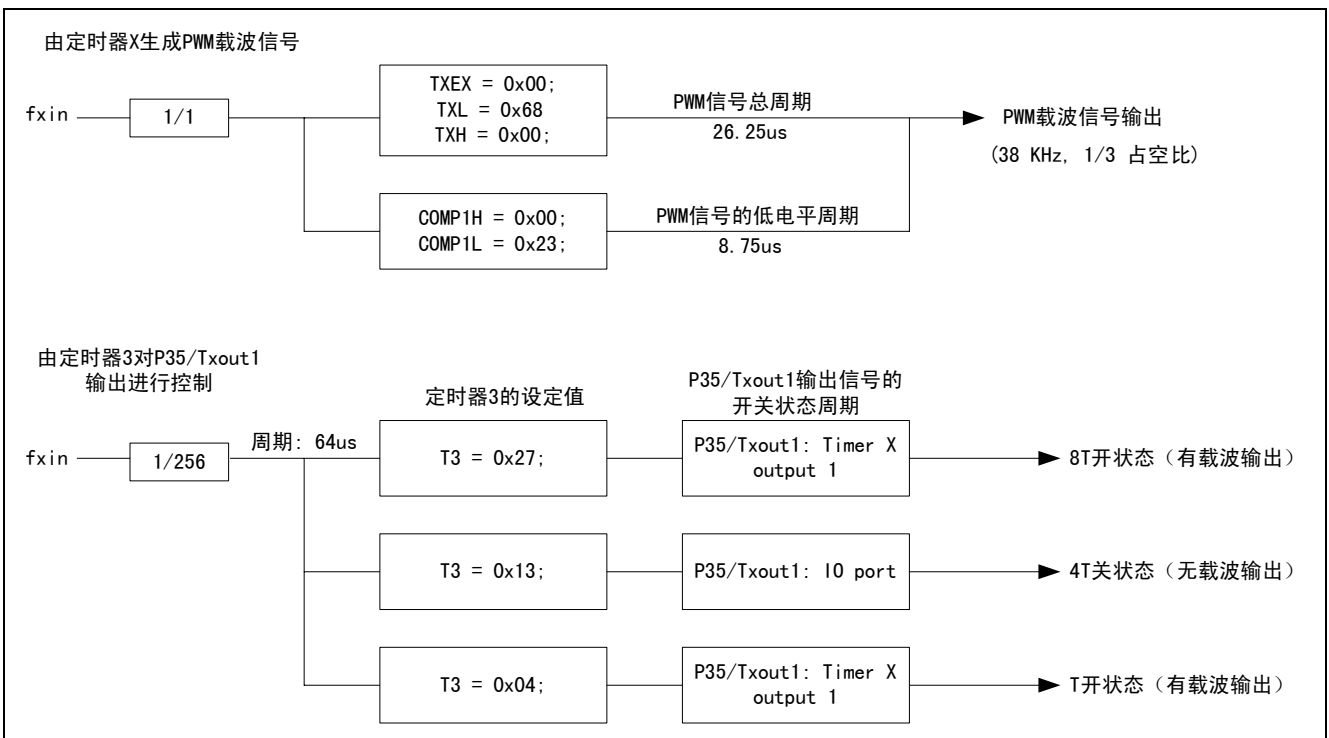


图 2. 定时器的关系及分频比

3.2 相关寄存器设定

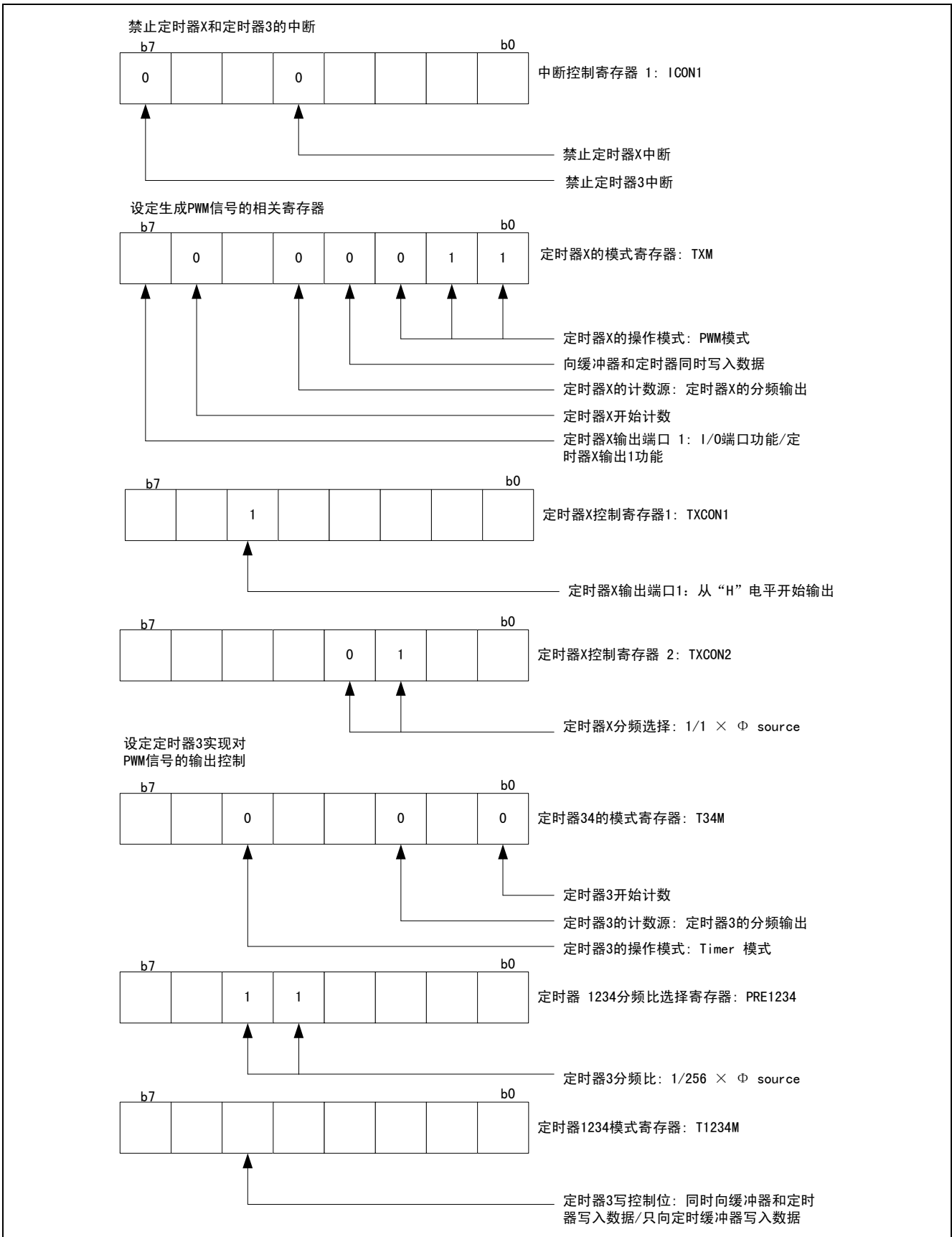


图 3. 相关寄存器的设定

3.3 程序流程图

以下为定时器 3 和定时器 X 应用于 PWM 信号输出 (遥控器载波输出控制) 的主程序的流程图。

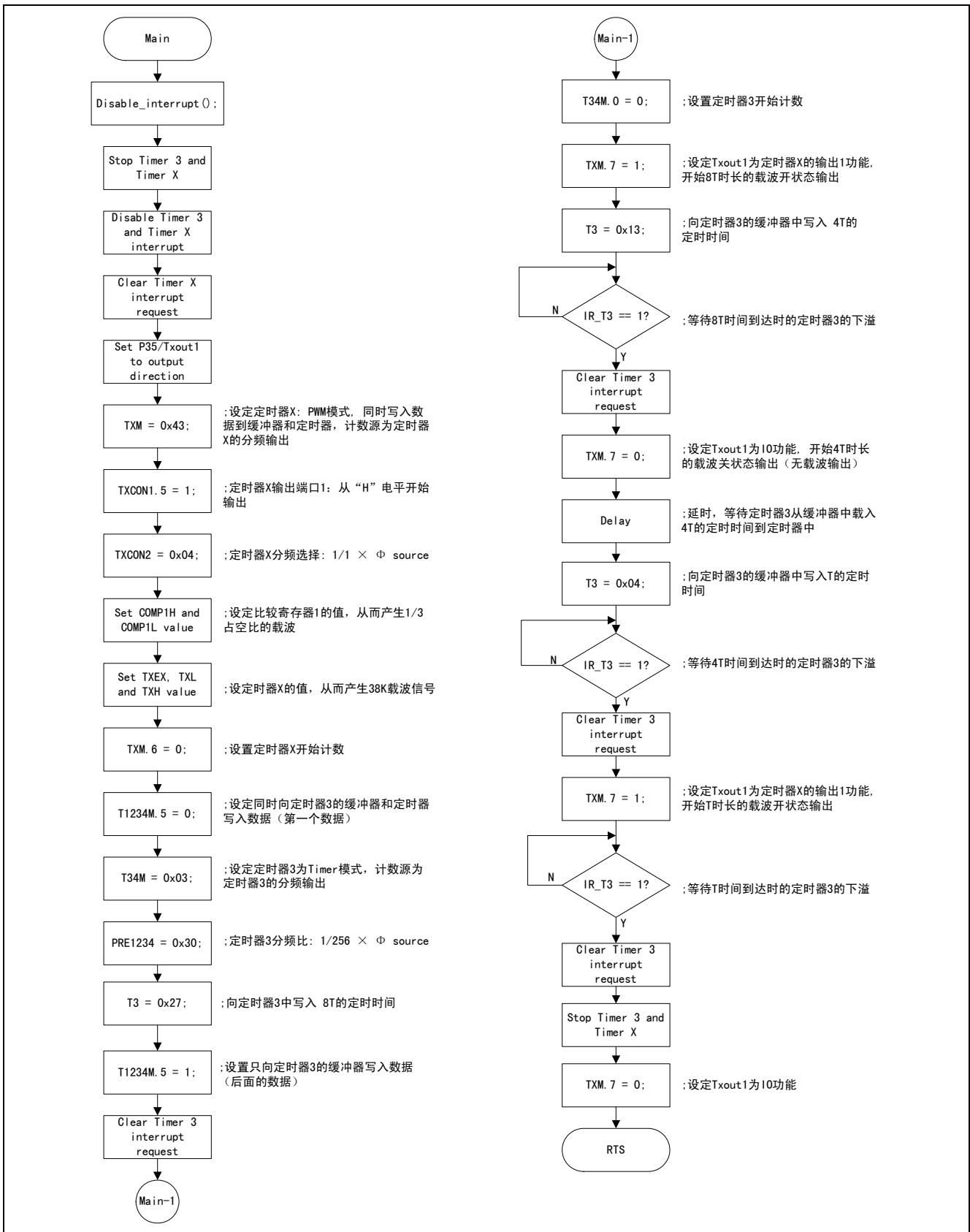


图 4. 程序流程图

#### 4. 参考例程

下述内容为定时器 3 和定时器 X 应用于 PWM 信号输出（遥控器载波输出控制）的参考例程。

```

/*****
*   File Name      : rcc05b0031_0100_source.c
*   CPU           : M38D24 Group
*   Function      : Timer 3, Timer X (PWM signal output control)
*   Version       : 1.00 (2007-02-08)
*   Copyright (C) 2007, Renesas Technology Corp. All right reserved.
*****/

/*****
*   Include File
*****/
#include <intr740.h>
#include "sfr_38d2.h"

/*****
Name      : Main
*****/
void main(void)
{
    unsigned char temp_i;
    disable_interrupt(); /*disable all interrupt*/

    T34M.0 = 1;          /*Timer 3 stop to operation*/
    TXM.6 = 1;          /*Timer X stop to operation*/

    IE_TX = 0;         /*disable Timer X interrupt*/
    IE_T3 = 0;         /*disable Timer 3 interrupt*/
    IR_TX = 0;         /*clear Timer X interrupt request*/

    P3D.5 = 1;        /*P35/Txout1 output direction*/

    TXM = 0x43;       /*set TXM register value*/
    TXCON1.5 = 1;    /*Timer X output 1 started from "H"*/
    TXCON2 = 0x04;   /*set Timer X dividing frequency*/
    COMP1H = 0x00;   /*set compare register 1 value*/
    COMP1L = 0x23;
    TXEX = 0x00;     /*set Timer X value*/
    TXL = 0x68;
    TXH = 0x00;
    TXM.6 = 0;       /*set Timer X to start operation*/

    T1234M.5 = 0;    /*Timer 3:write both timer and timer latch*/
    T34M = 0x03;     /*set T34M related Timer 3*/
    PRE1234 = 0x30; /*set Timer 3 frequency division*/
    T3 = 0x27;      /*set 8T time value to Timer 3*/
    T1234M.5 = 1;   /*Timer 3 write control:write timer latch only*/

    IR_T3 = 0;      /*clear Timer 3 interrupt request*/
    T34M.0 = 0;     /*Timer 3 start to operate*/
    TXM.7 = 1;      /*set Timer X output 1 function*/

    T3 = 0x13;      /*set 4T time value to Timer 3 latch ahead of schedule*/
    while(!IR_T3){ /*wait to end of 8T time count*/
    }
}
    
```

```

IR_T3 = 0;           /*clear Timer 3 interrupt request*/
TXM.7 = 0;          /*set Timer X output 1 as IO port function*/
for(temp_i=0;temp_i<2;temp_i++)
{;}                /*wait load timer latch value(4T) to Timer 3 register*/
T3 = 0x04;          /*set T time value to Timer 3 latch ahead of schedule*/
while(!IR_T3){}   /*wait to end of 4T time count*/
IR_T3 = 0;          /*clear Timer 3 interrupt request*/
TXM.7 = 1;          /*set Timer X output 1 function*/
while(!IR_T3){}   /*wait to end of T time count*/
IR_T3 = 0;          /*clear Timer 3 interrupt request*/
T34M.0 = 1;        /*Timer 3 stop to operation*/
TXM.6 = 1;          /*Timer X stop to operation*/
TXM.7 = 0;          /*set Timer X output 1 as IO port function*/
}
    
```

## 5. 参考文献

硬件手册

38D2 群数据手册

(最新版本请从瑞萨科技网页上取得)

技术信息/技术更新

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Rev.	发行日	修订内容	
		页	要点
1.00	2007.02.08	—	初版发行
1.01	2008.03.17	7	更新咨询邮箱地址, 修改硬件手册名称

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