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2010年4月1日
瑞萨电子公司

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3858 群

定时器 Z1 的操作（脉冲周期测量模式）

1. 要点

本篇资料介绍如何使用定时器 Z1 的脉冲周期测量模式，并举例说明如何应用该功能接收红外遥控信号的引导码。

2. 说明

该应用说明适用于以下条件：

采用的 MCU： 3858 群

振荡频率： 8MHz

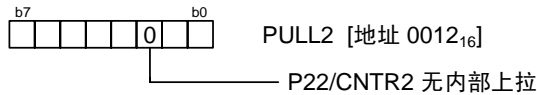
• 说明

- (1) 将遥控信号利用红外接收头去掉载波后输入到 CNTR₂ 管脚, 信号波形如上图所示;
- (2) 该引导码定义为两个脉冲周期, 第一个脉冲 22T (6.094ms±5%), 第二个脉冲 27T (7.479ms±5%);
- (3) 通过测定两个脉冲的周期长度判断是否为有效的遥控信号, 如果有效继续接收处理遥控信号。本例中 MCU 接收到有效的遥控信号后, 在 P1_7 输出一个 1 秒的低电平点亮一个 LED 作为指示。

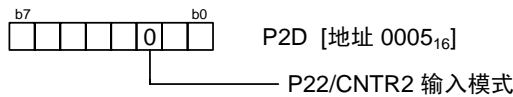
3.3 寄存器设置

3858 群定时器 Z1 脉冲周期测量模式的寄存器设置。

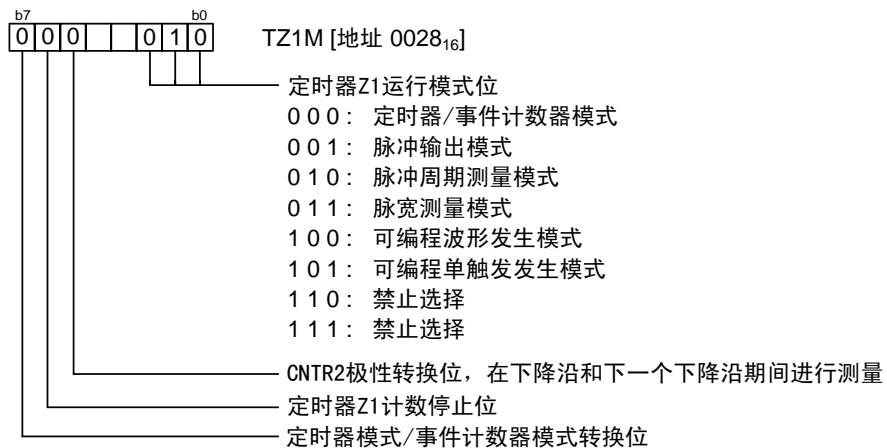
(1) 设置端口P2上拉控制寄存器



(2) 设置端口P2方向寄存器



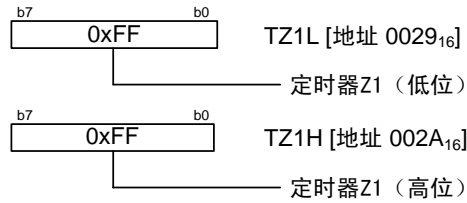
(3) 设置定时器Z1模式寄存器



(4) 设置定时器Y、Z1计数源设定选择寄存器



(5) 设置定时器Z1

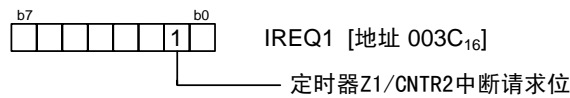


注意： 在写操作时，必须按照定时器Z1的低位（TZ1L），定时器Z1的高位（TZ1H）的顺序写两个寄存器；
 在读操作时，必须按照定时器Z1的高位（TZ1H），定时器Z1的低位（TZ1L）的顺序读两个寄存器。

(6) 设置中断源选择寄存器



(7) 设置中断请求寄存器1



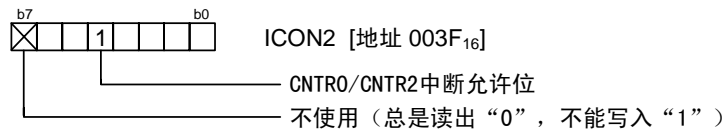
(8) 设置中断控制寄存器1



(9) 设置中断请求寄存器2

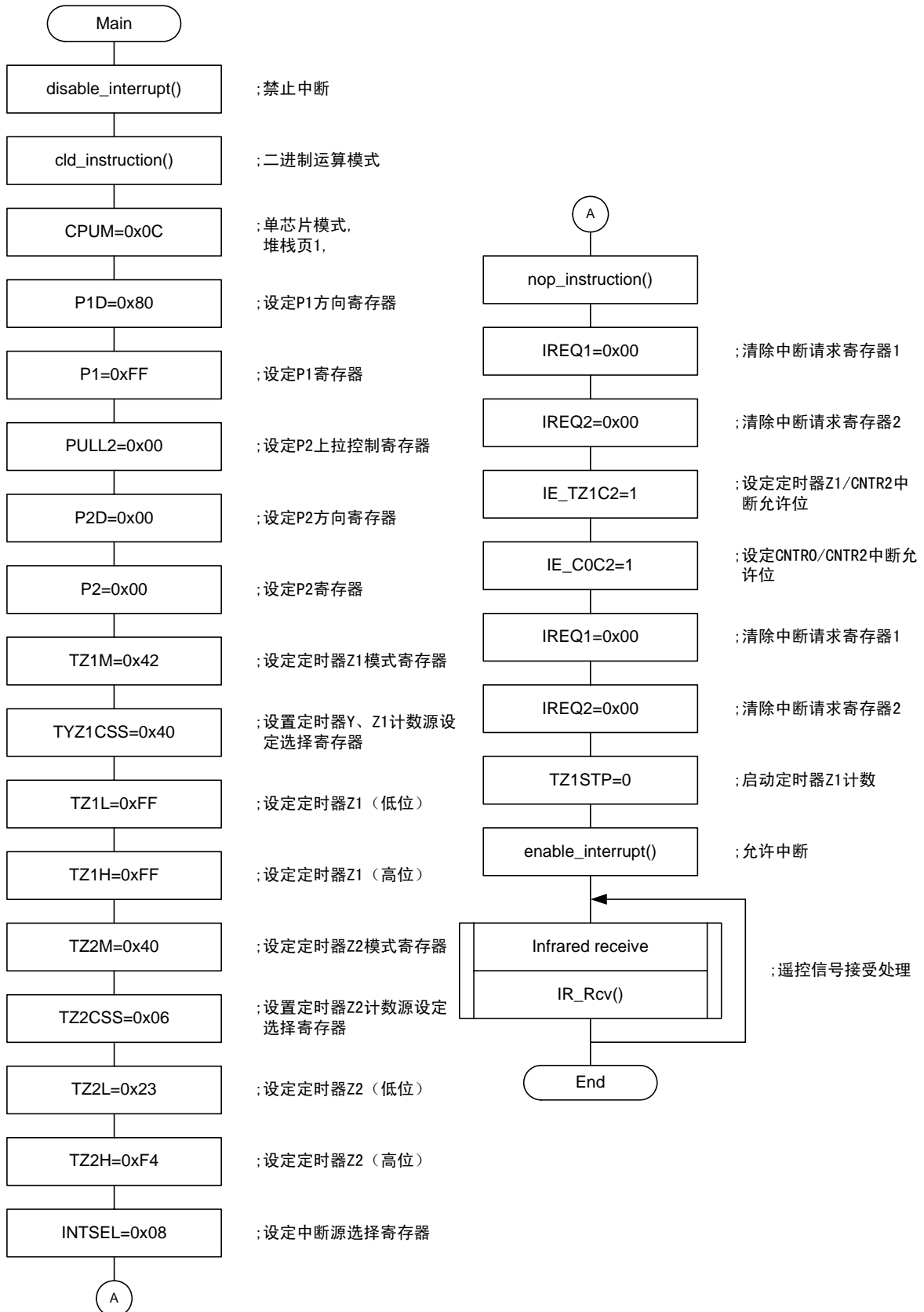


(10) 设置中断控制寄存器2

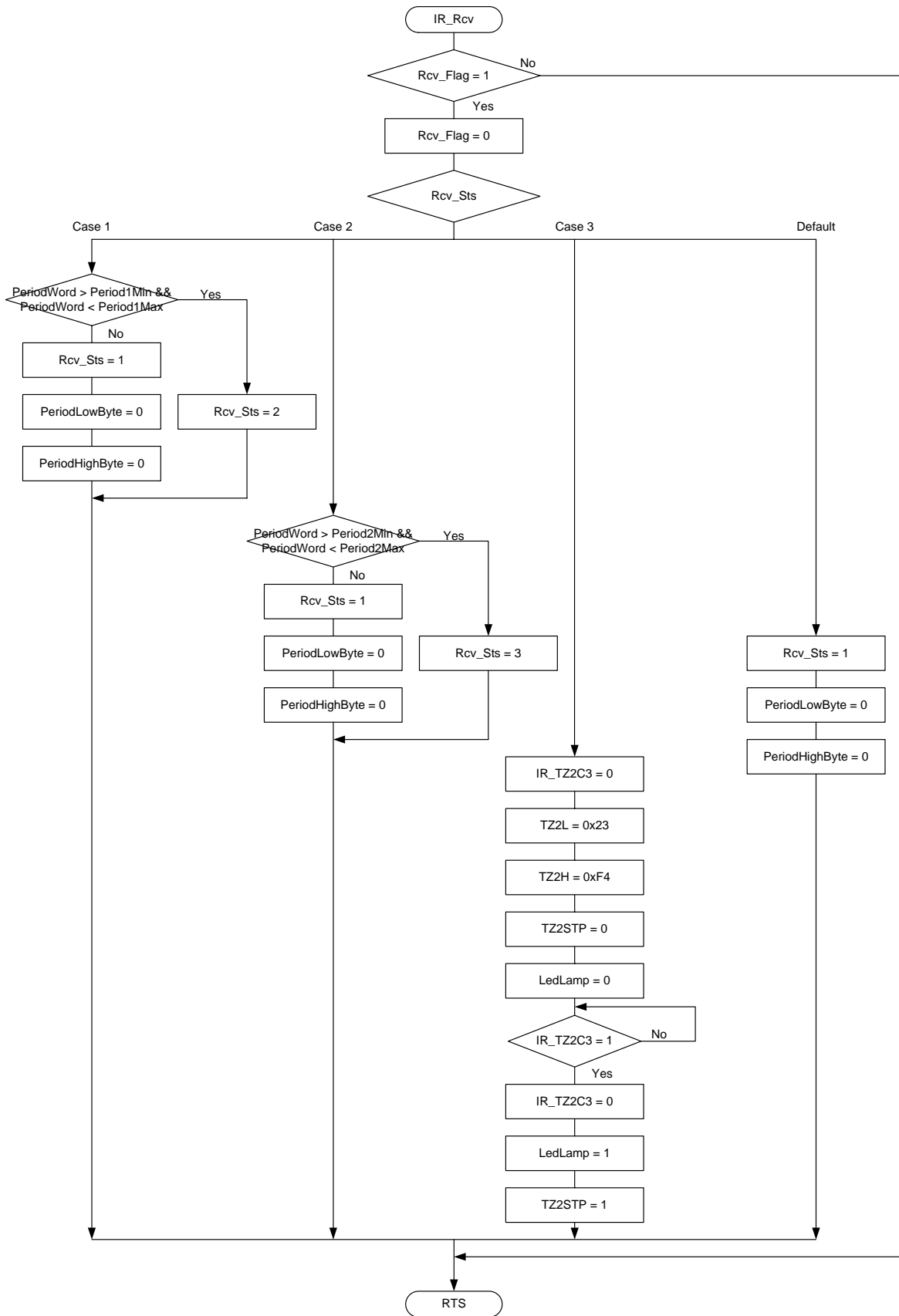


4. 程序流程图

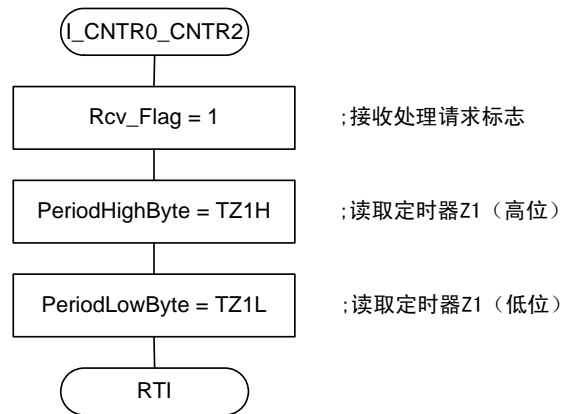
4.1 主程序



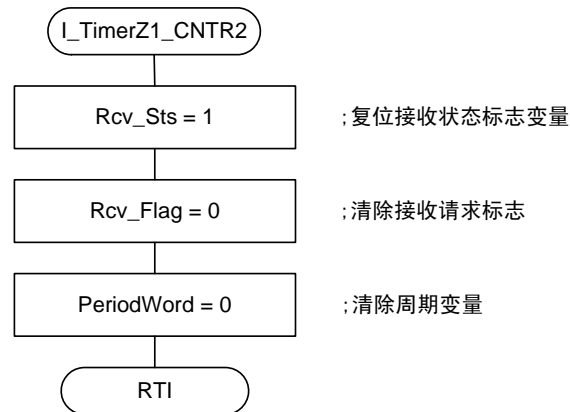
4.2 红外遥控信号处理子程序 (IR_Rcv)



4.3 CNTR₂ 中断服务子程序 (I_CNTR0_CNTR2)



4.4 定时器 Z1 中断服务子程序 (I_TimerZ1_CNTR2)



5. 参考例程

```

/*****
 *
 *   File name   : rcc05b0038_0100_source.c
 *   Contents    : Timer Z1 (Pulse Period Measurement Mode)
 *
 *   Copyright(C) 2007. Renesas Technology Corp., All rights reserved.
 *
 *   Version     : 1.00 (2007-07-02)
 *
 *****/
/*****
/*****
 *
 *   Include
 *
 *****/
#include <stdio.h>
#include <intr740.h>
#include "sfr_3858.h"

/*****
 *
 *   Definition
 *
 *****/
void IR_Rcv(void);
#define LedLamp          P1_7                /* Led lamp */
#define Period1Max      1599                /* 6.094ms*(1+5%) */
#define Period1Min      1447                /* 6.094ms*(1-5%) */
#define Period2Max      1963                /* 7.479ms*(1+5%) */
#define Period2Min      1776                /* 7.479ms*(1-5%) */

typedef union {                               /* Define a type */
    unsigned int Word;
    struct {
        unsigned char LowByte;
        unsigned char HighByte;
    }Byte_Def;
}TwoByteUnion_Def;
zpage TwoByteUnion_Def PeriodValue;         /* Declare an union */
#define PeriodWord      PeriodValue.Word
#define PeriodLowByte   PeriodValue.Byte_Def.LowByte
#define PeriodHighByte  PeriodValue.Byte_Def.HighByte

zpage unsigned char Rcv_Sts;                 /* Declare a variable */
zpage unsigned char Rcv_Flag = 0;           /* Declare a variable */

/*****
 *
 *   Main
 *
 *****/

```

```

void main(void){
    disable_interrupt();          /* Interrupt disable */
    cld_instruction();           /* Binary mode */
    CPUM = 0x0c;                 /* Stack lpage */
    P1D = 0x80;                 /* Set Port P1 direction register */
    P1 = 0xff;                  /* Set Port P1 register */
    PULL2 = 0x00;               /* Set Port P22 pull-up control bit */
    P2D = 0x00;                 /* Set Port P2 direction register */
    P2 = 0x00;                  /* Set Port P2 register */
    TZ1M = 0x42;                /* Set Timer Z1 mode register */
    TYZ1CSS = 0x40;             /* Set Timer YZ1 Count register */
    TZ1L = 0xff;                /* Set Timer Z1(low) */
    TZ1H = 0xff;                /* Set Timer Z1(high) */
    TZ2M = 0x40;                /* Set Timer Z2 mode register */
    TZ2CSS = 0x06;              /* Set Timer Z2 Count register */
    TZ2L = 0x23;                /* Set Timer Z2(low) */
    TZ2H = 0xf4;                /* Set Timer Z2(high) */
    INTSEL = 0x08;              /* Set Interrupt source selection register */
    nop_instruction();
    IREQ1 = 0x00;                /* All Interrupt Request Bit are cleared */
    IREQ2 = 0x00;
    IE_TZ1C2 = 1;                /* TimerZ1 Interrupt enable */
    IE_C0C2 = 1;                /* CNTR2 Interrupt enable */
    IREQ1 = 0x00;                /* All Interrupt Request Bit are cleared */
    IREQ2 = 0x00;
    TZ1STP = 0;                 /* Timer Z1 count start */
    enable_interrupt();          /* Interrupt enable */
    while(1){
        IR_Rcv();
    }
}

/*****
 *
 *   Infrared Receive
 *
 *****/
void IR_Rcv(void){
    if (Rcv_Flag){
        Rcv_Flag = 0;
        switch(Rcv_Sts){
            case 1:
                if ((PeriodWord > Period1Min) &&(PeriodWord < Period1Max)){
                    Rcv_Sts = 2;          /* Trun to case2 */
                }
                else{
                    Rcv_Sts = 1;
                    PeriodLowByte = 0;
                    PeriodHighByte = 0;
                }
                break;
            case 2:
                if ((PeriodWord > Period2Min) &&(PeriodWord < Period2Max)){

```

```

        Rcv_Sts = 3;          /* Trun to case3 */
    }
    else{
        Rcv_Sts = 1;
        PeriodLowByte = 0;
        PeriodHighByte = 0;
    }
    break;
case 3:
    IR_TZ2C3 = 0;           /* Clear TimerZ2 Interrup Request bit */
    TZ2L = 0x23;           /* Set Timer Z2(low) */
    TZ2H = 0xf4;           /* Set Timer Z2(high) */
    TZ2STP = 0;            /* Timer Z2 count start */
    LedLamp = 0;           /* Output "0", light LED lamp */
    while (!IR_TZ2C3){}    /* 1 second */
    IR_TZ2C3 = 0;         /* Clear TimerZ2 Interrup Request bit */
    LedLamp = 1;          /* Output "1", close LED lamp */
    TZ2STP = 1;           /* Timer Z2 count stop */
    break;
default:
    Rcv_Sts = 1;
    PeriodLowByte = 0;
    PeriodHighByte = 0;
    break;
}
}
}

/*****
 *
 *   Interrupt CNTR2
 *
 *****/
void interrupt[6] I_CNTR0_CNTR2(void){
    Rcv_Flag = 1;          /* Receive request flag */
    PeriodLowByte = TZ1L;  /* Read period measure value */
    PeriodHighByte = TZ1H;
}

/*****
 *
 *   Interrupt TimerZ1
 *
 *****/
void interrupt[28] I_TimerZ1_CNTR2(void){
    Rcv_Sts = 1;          /* Reset receive status */
    Rcv_Flag = 0;        /* Clear receive request flag */
    PeriodWord = 0;      /* Clear variable value */
}

```

6. 参考文献

硬件手册

3858 群数据手册

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Rev.	发行日	修订内容	
		页	要点
1.00	2007.07.02	—	初版发行
1.01	2008.03.17	11	更新咨询邮箱地址, 修改硬件手册名称

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