

To our customers,

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

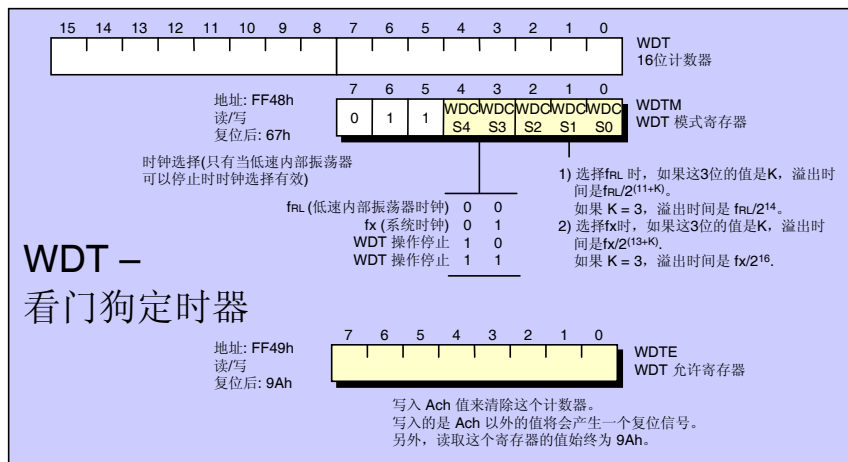
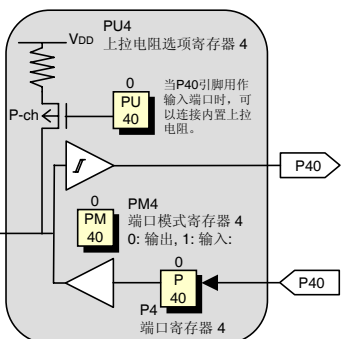
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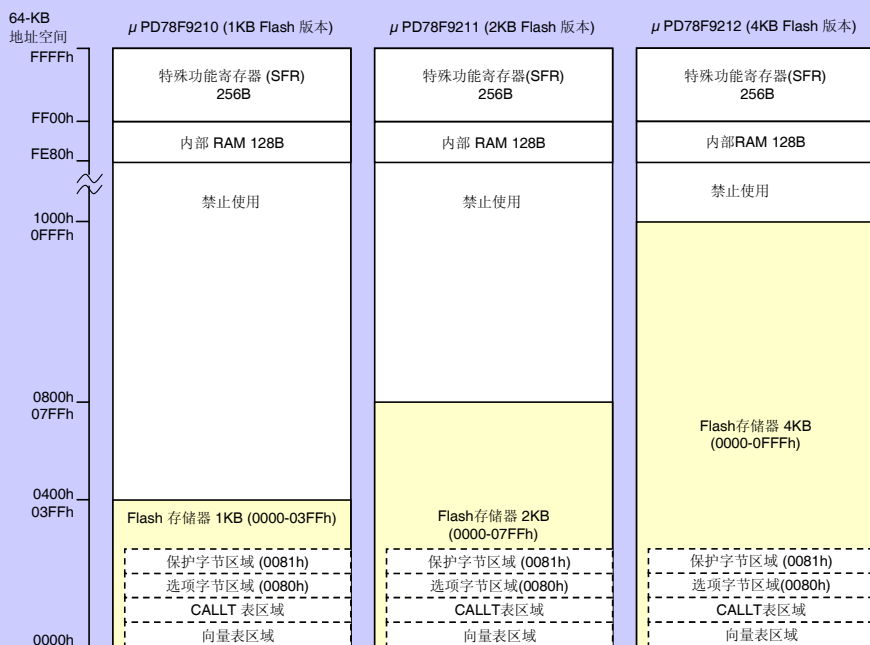
WDT的计数时钟

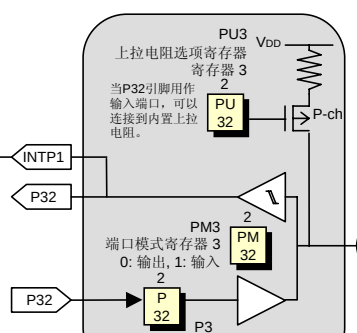
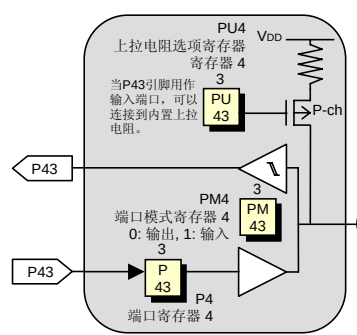
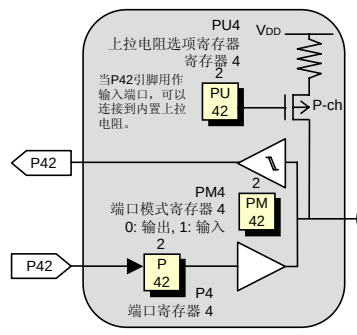
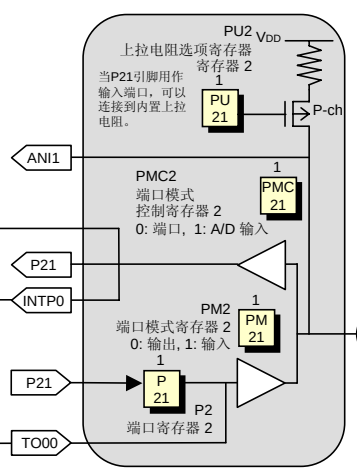
当低速内部振荡器无法通过选项字节停止时，**frl** 自动选择位计数时钟

另外，如果当低速内部振荡器可以通过选项字节停止时，计数时钟可以通过**WDTM**寄存器选择。

78K0S/KY1+

μ PD78F9210 μ PD78F9211 μ PD78F9212





脉宽宽度测量功能

这个功能是在检测到输入到TI000或者TI010引脚的脉冲沿的处罚，捕捉TM00计数器的值。可以通过上升沿和下降沿的时间值来计算脉冲宽度。

外部事件计数功能

这个功能计数输入到TI000引脚的脉冲。当计数值和比较寄存器0(CR000)的值相等时，这个功能产生一个中断请求。使用PRM00寄存器来设置输入脉冲的有效沿。

PPG(可编程脉冲发生器)功能

这个功能通过设置CR000为周期值和CR010为占空比来输出脉冲。

单脉冲功能

当输入一个触发，这个功能输出一个无效电平，直到这个电平到达比较寄存器1(CR010)的值。之后这个功能输出一个有效电平。最后这个功能再输出一个无效电平。

TM00 - 16位定时器/事件计数器 00

地址: FF60h 读/写 复位后: 00h

7 6 5 4 3 2 1 0

0 0 0 0 0 0 0 0

操作模式和清除模式的选择

7	6	5	4	3	2	1	0	操作模式和清除模式的选择	TO00 倒置时序选择	产生中断请求
0	0	0	0	0	0	0	0	操作停止(清除 TM00 为 00h)	不改变	不产生
0	0	0	1	0	0	0	0	操作停止(清除 TM00 为 00h)	不改变	不产生
0	0	1	0	0	0	0	0	自由运行模式	<A>	在<A>产生
0	0	1	1	0	0	0	0	自由运行模式		在<A>产生
1	0	0	0	0	0	0	0	在TI000引脚的有效沿时清除和开始	—	在<A>产生
1	0	1	0	0	0	0	0	在TI000引脚的有效沿时清除和开始	—	在<A>产生
1	1	0	0	0	0	0	0	在TM00和CR000相等时清除和开始	<A>	在<A>产生
1	1	1	0	0	0	0	0	在TM00和CR000相等时清除和开始		在<A>产生

<A> TM00 和 CR000 相等或者 TM00 和 CR010 相等
 TM00 和 CR000 相等, TM00 和 CR010 相等或者 TI000 引脚有效沿

地址: FF62h 读/写 复位后: 00h

7 6 5 4 3 2 1 0

0 0 0 0 0 0 0 0

CR010 操作模式选择

0: 比较, 1: 捕捉

CR000 捕捉触发选择

0: 在TI010的有效沿捕捉

1: 通过倒相器在TI000的有效沿捕捉

地址: FF63h 读/写 复位后: 00h

7 6 5 4 3 2 1 0

0 0 0 0 0 0 0 0

由软件控制单脉冲输出触发

0: 无单脉冲输出触发

1: 无单脉冲输出触发

单脉冲输出操作控制

0: 连续脉冲输出模式

1: 单脉冲输出模式

使用CR010和TM00相等来控制定时器输出 F/F

0: 禁止倒置操作

1: 允许倒置操作

定时器输出 F/F 状态设置

[0:0] 不改变

[0:1] 定时器输出 F/F 复位 (0)

[1:0] 定时器输出 F/F 设置 (1)

[1:1] 禁止设置

地址: FF61h 读/写 复位后: 00h

7 6 5 4 3 2 1 0

ES ES ES ES ES ES ES ES

110 100 010 000 0 0 0 0

PRM00 预分频模式寄存器 00

TI010 引脚有效沿选择

[0:0] 下降沿

[0:1] 上升沿

[1:0] 禁止设置

[1:1] 下降沿和上升沿

TI000 引脚有效沿选择

[0:0] 下降沿

[0:1] 上升沿

[1:0] 禁止设置

[1:1] 下降沿和上升沿

计数时钟选择

[0:0] fxp (10 MHz)

[0:1] fxp/4 (2.5 MHz)

[1:0] fxp/256 (39.06 kHz)

[1:1] TI000 引脚有效沿

中断控制

地址: FFECh 读/写 复位后: 00h

7 6 5 4 3 2 1 0

0 0 ES ES ES ES ES ES

11 10 01 00 0 0 0 0

INTM0 外部中断模式寄存器 0

INTP1 有效沿选择

[0:0] 下降沿

[0:1] 上升沿

[1:0] 禁止设置

[1:1] 下降沿和上升沿

INTP0 有效沿选择

[0:0] 下降沿

[0:1] 上升沿

[1:0] 禁止设置

[1:1] 下降沿和上升沿

地址: FFE0h 读/写 复位后: 00h

7 6 5 4 3 2 1 0

ADIF TMIF TMIF TMIF PIF1 PIF0 LVIF

010 000 H1 0 0 0 0

IF0 中断请求标志寄存器 0

0: 没有中断请求产生

1: 产生一个中断请求, 并且生成这个中断

地址: FFE4h 读/写 复位后: FFh

7 6 5 4 3 2 1 0

AD TMM TMM TMM TMM PMK PMK

MK K010 K000 KH1 1 0 MK

MK0 中断屏蔽标志寄存器 0

0: 允许中断服务 1: 禁止中断服务

中断优先级顺序

7 6 5 4 3 2 1

中断请求信号

INTAD INTM010 INTM000 INTM010 INTP1 INTP0 INTLV1

边缘检测

INTM0

虚线区域只用于外部中断 (INTP0, INTP1)

IF0

IE

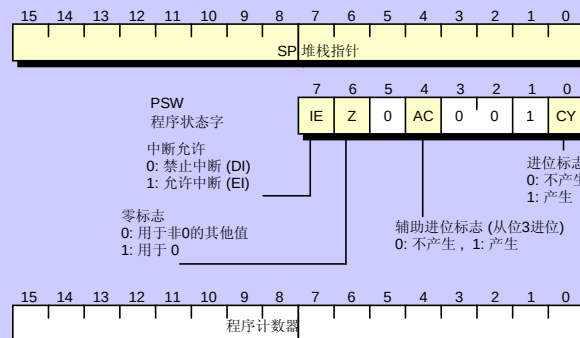
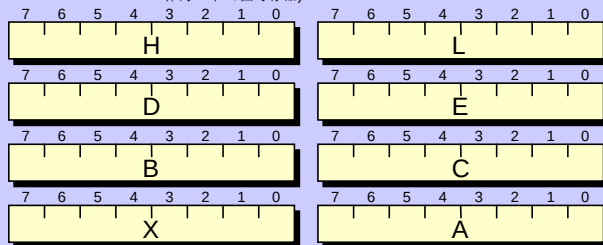
PSW 程序状态字

到 CPU 的中断

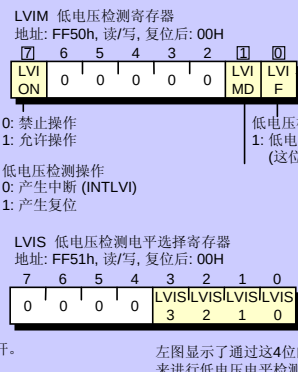
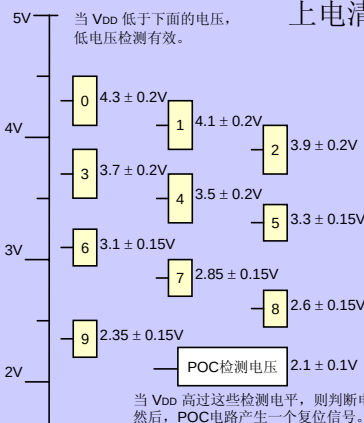
待机释放信号

处理器寄存器

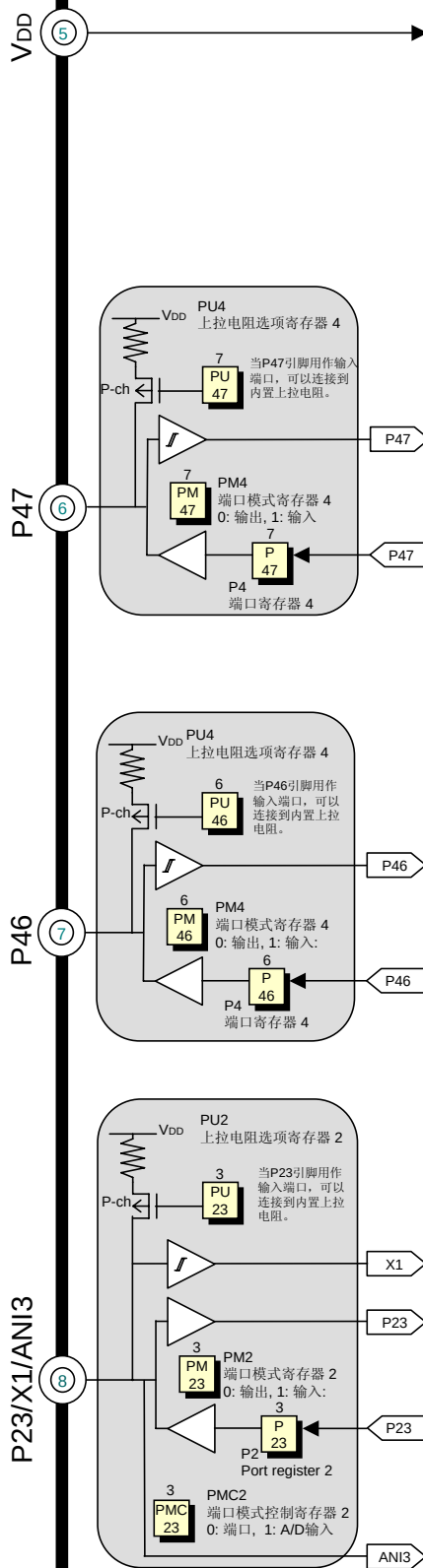
通用寄存器
(其中两个相连的寄存器可以连接起来
作为一个16位寄存器)



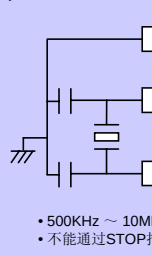
POC/LVI 上电清零/低电压检测



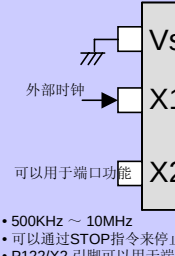
通过LVI实现复位功能
代替中断信号, 当低电压检测时可以同样产生复位信号。当需要产生复位信号, 设置LVIMD为1。



(1) 晶体/陶瓷振荡器



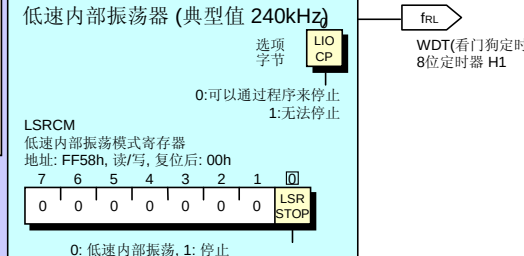
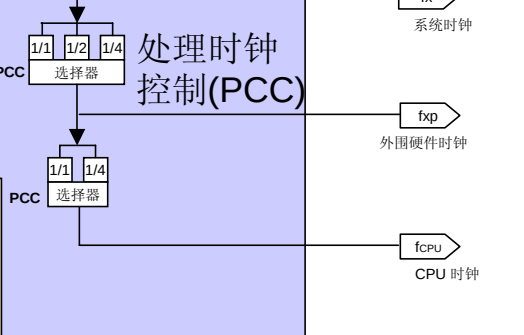
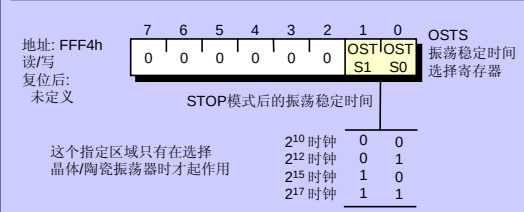
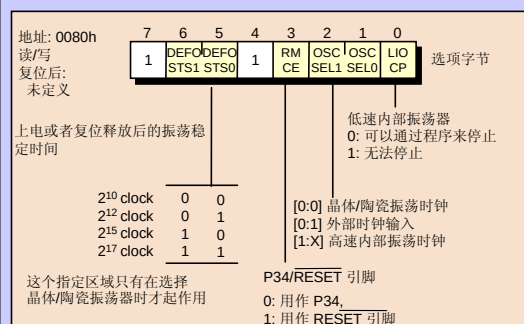
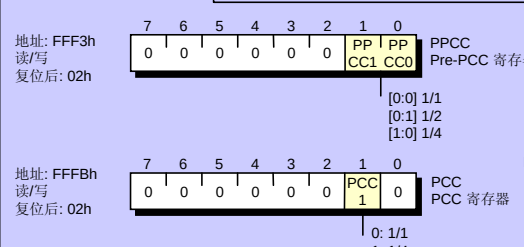
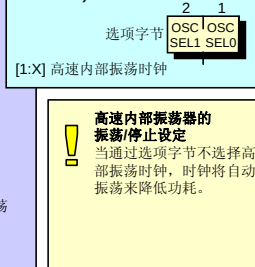
(2) 外部时钟输入



(3) 高速内部振荡



高速内部振荡器 (典型值 8MHz)



CALLT 表区域和向量表区域

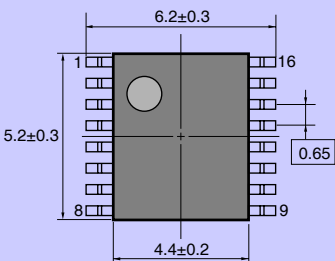
008xh	程序区域						保护字节	选项字节
007xh	CALLT31	CALLT30	CALLT29	CALLT28	CALLT27	CALLT26	CALLT25	CALLT24
006xh	CALLT23	CALLT22	CALLT21	CALLT20	CALLT19	CALLT18	CALLT17	CALLT16
005xh	CALLT15	CALLT14	CALLT13	CALLT12	CALLT11	CALLT10	CALLT9	CALLT8
004xh	CALLT7	CALLT6	CALLT5	CALLT4	CALLT3	CALLT2	CALLT1	CALLT0
003xh	程序区域							
002xh								
001xh							A/D 转换器 INTAD	16位定时器 INTTM010
000xh	16位定时器 INTTM000	8位定时器H INTTMH1	外部中断 1 INTP1	外部中断 0 INTP0	低电压检测 INTLVI	保留	保留	复位输入
	F	E	D	C	B	A	9	8
							7	6
							5	4
							3	2
							1	0

封装信息

• 16引脚塑封 SSOP

封装码：GR-JJG
厚度：1.44 mm
公称尺寸：5.72 mm (225)
引脚间距：0.65 mm

外观尺寸



复位控制

复位源

- 通过RESET引脚输入外部复位
- 通过WDT(看门狗定时器)程序循环检测来内部复位
- 通过比较供电电压和POC(上电清零电路)的检测电压来内部复位
- 通过比较供电电压和LVI(低电压检测器)的检测电压来内部复位

RESF 复位控制标志寄存器

地址: FF54h, 读, 复位后: 00H

7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0
			WDT				LVI
			RF				RF

1: WDT (看门狗定时器) 复位

1: LVI (低电压检测) 复位

读取这个寄存器将把这位清零

待机功能

√: 操作
—: 停止操作

	HALT 模式 (CPU 操作停止。 系统时钟振荡继续)	STOP 模式 (CPU 操作停止。系统时 钟振荡停止)
LVI(低电压检测器)	√	√
外部中断	√	√
系统时钟	√(CPU 时钟停止)	—
I/O 端口	√(保持HALT模式前 设置的状态)	√(保持STOP模式前 设置的状态)
16位定时器	√	—
8位定时器H1	√	注 1
WDT (看门狗)	注 2	注 2
A/D 转换器	√	—
CPU	—	—

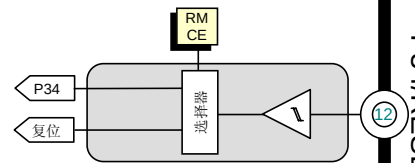
注 1. 当选择低速内部振荡时钟时操作。

注 2. 当通过选项字节禁止低速内部振荡中断时操作。

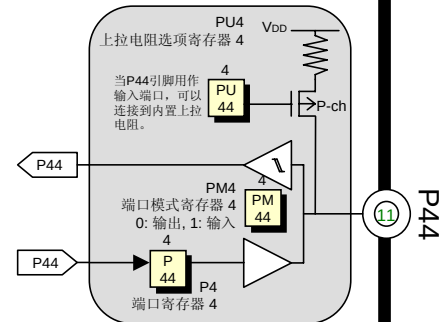
当时通过选项字节允许低速内部振荡中断操作。

在任一个模式中, 所有前面寄存器, 标志, 数据和存储器区域的内容都保留。同样保留I/O端口的输出锁存的状态和输出缓冲。要释放HALT 或者STOP 模式, 产生一个复位或者可评比中断请求。

选项字节

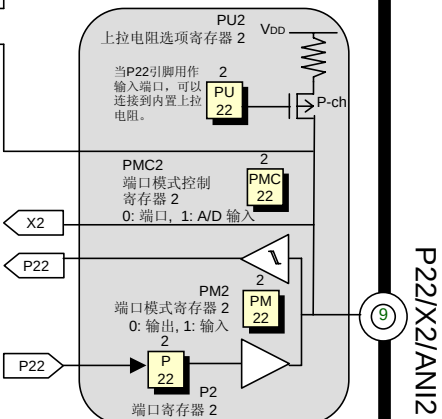
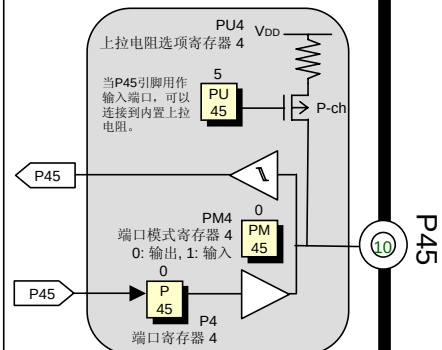


* 当这个引脚用作输入端口时, P34必须连接一个外部上拉电阻。这样就不会执行RESET引脚的复位输入。



No.1 引脚 (P20/ANIO/TIO00/TOH1引脚)

No.16引脚 (P21/ANI1/TIO10/TO00/INTP0引脚)



10位 A/D 转换器 (4 通道)

ADCRH

8位 A/D 转换结果寄存器

读, 复位后: 未定义

7	6	5	4	3	2	1	0
MSB							LSB

ADCR

10位 A/D 转换结果寄存器

读, 复位后: 未定义

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
						MSB									LSB

地址: FF81h
读/写
复位后: 00h

7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0
						ADS	ADS
						1	0

ADS 模拟输入通道专用寄存器

[0:0] ANIO

[0:1] ANI1

[1:0] ANI2

[1:1] ANI3

地址: FF80h
读/写
复位后: 00h

7	6	5	4	3	2	1	0
AD	0	FR	FR	FR	0	0	AD
CS		2	1	0			CE

0: 停止转换操作

1: 允许

转换时间选择

0 0 0 36/txp

0 0 1 48/txp

0 1 0 72/txp

0 1 1 112/txp

1 0 0 72/txp

1 0 1 96/txp

1 1 0 144/txp

1 1 1 224/txp

0: 停止参考电压产生器

1: 允许

采样时间包括在转换时间内

10位/8位模式
A/D 转换结果
这个 A/D 转换器产生一个二进制结果并且保存下面两个寄存器的结果。
ADCRH: 8位 A/D 结果
ADCR: 10位 A/D 结果

INTAD 信号

A/D 转换结束