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瑞萨电子公司

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7542 群

输入捕捉的应用

要点

本资料说明 7542 群的输入捕捉功能的设定方法，并且记载了应用例子。

动作确认器件

本资料说明的应用例子适合下列单片机：

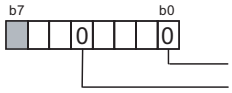
- 单片机：7542 群

目录

1. 设定方法

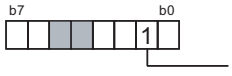
输入捕捉0的设定方法如**图1～图3**所示。在使用输入捕捉1时，也用同样的步骤设定。

步骤1：禁止定时器A中断和捕捉0中断



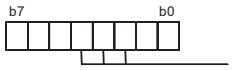
中断控制寄存器2 (ICON2)【3F16地址】
禁止捕捉0中断
禁止定时器A中断

步骤2：停止定时器A的计数



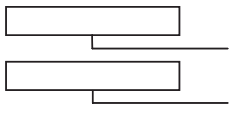
定时器A、B模式寄存器 (TABM)【1D16地址】
停止定时器A计数

步骤3：设定定时器A计数源



定时器计数源设定寄存器 (TCSS)【2A16地址】
定时器A计数源选择位
b4b3b2
0 0 0：f(XIN)/16
0 0 1：f(XIN)/2
0 1 0：f(XIN)/32
0 1 1：f(XIN)/64
1 0 0：f(XIN)/128
1 0 1：f(XIN)/256
1 1 0：内部振荡器输出
1 1 1：禁止选择

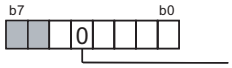
步骤4：给定时器A设定计数值



定时器A寄存器 (低位) (TAL)【2416地址】
计数值
定时器A寄存器 (高位) (TAH)【2516地址】
计数值

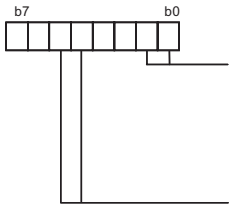
注．必须以定时器A(低位)、定时器A(高位)的顺序写。

步骤5：选择用于捕捉的定时器源



捕捉/比较定时器源选择寄存器 (TMSR)【1F16地址】
对于捕捉0定时器源，选择定时器A

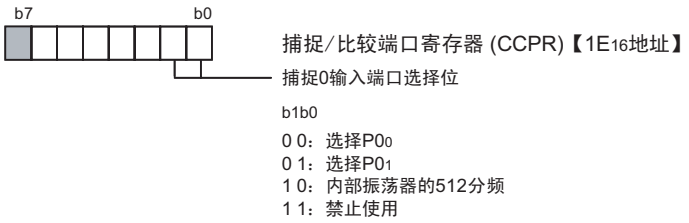
步骤6：设定捕捉模式寄存器



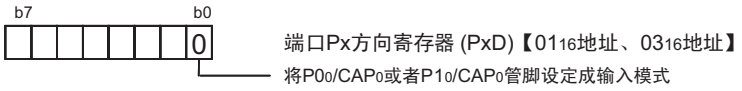
捕捉模式寄存器 (CAPM)【2016地址】
捕捉0中断边沿选择位
b1b0
0 0：上升沿和下降沿
0 1：上升沿
1 0：下降沿
1 1：禁止选择
捕捉0噪声滤波器选择位
b5b4
0 0：无滤波器
0 1：f(XIN)
1 0：f(XIN)/8
1 1：f(XIN)/32

图 1　输入捕捉的设定方法（1）

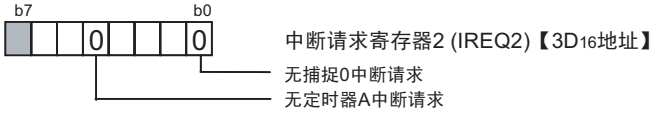
步骤7：设定捕捉0输入端口选择位



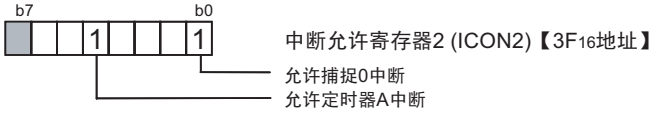
步骤8：将捕捉0输入端口设定成输入模式



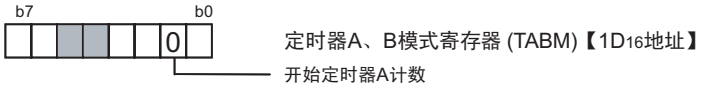
步骤9：为了不执行不必要的中断处理，必须将捕捉0中断请求位和定时器A中断请求位置“0”(无请求)



步骤10：在使用中断时，必须将捕捉0中断允许位和定时器A中断允许位置“1”(允许中断)



步骤11：开始定时器A的计数



在捕捉输入触发被输入时，捕捉输入电路将选择的定时器计数值保持到捕捉锁存器。捕捉锁存器x0保持外部输入触发上升时的定时器计数值，捕捉锁存器x1保持外部输入触发下降时的定时器计数值。

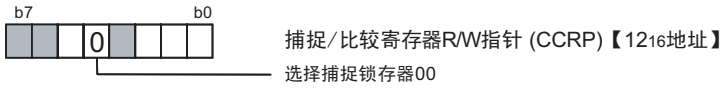
通过使用捕捉y(y=00、01、10、11)软件触发位，也可由捕捉y软件触发保持定时器的计数值。通过给捕捉y软件触发位写“1”，可将定时器计数值保持到对应的捕捉锁存器。

对于捕捉锁存器的状态，可通过读取捕捉x状态位来确认保持最新捕捉数据的锁存器(x0或者x1)。

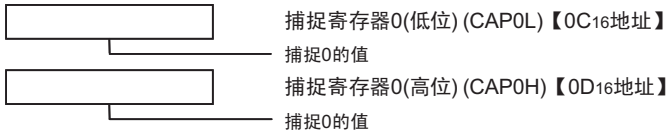
图 2　输入捕捉的设定方法（2）

如果CAP0管脚捕捉到上升沿或者下降沿，就产生捕捉0中断。在捕捉中断发生后，必须按如下步骤读取捕捉0的值。

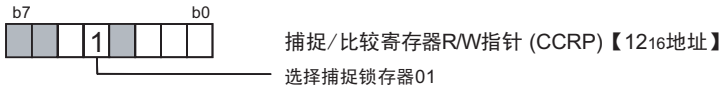
<在捕捉0中断沿选择上升沿时>
步骤a：将捕捉寄存器0的R/W指针置“0”(选择捕捉锁存器00)



步骤b：从捕捉锁存器00读取捕捉0的值



<在捕捉0中断沿选择下降沿时>
步骤c：将捕捉寄存器0的R/W指针置“1”(选择捕捉锁存器01)



步骤d：从捕捉锁存器01读取捕捉0的值

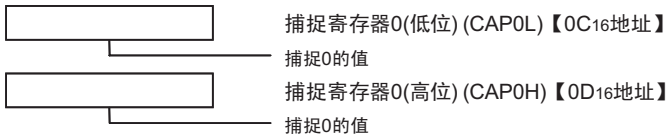


图 3　输入捕捉的设定方法（3）

2. 应用例子的说明

■要点

从输入捕捉0的输入管脚（P00/CAP0）输入由定时器X脉冲输出模式生成的波形，测定该脉冲的宽度。

■说明

从P14/CNTR0管脚输出将时钟f(XIN)=1.8432MHz分频成1.00Hz的方波。通过输入捕捉0测定该输出波形的“H”电平的宽度。

在捕捉0中断处理程序中读取捕捉锁存寄存器以及计算脉冲宽度（下降沿触发）。

2.1 外围电路例子

外围电路例子如**图4**所示。

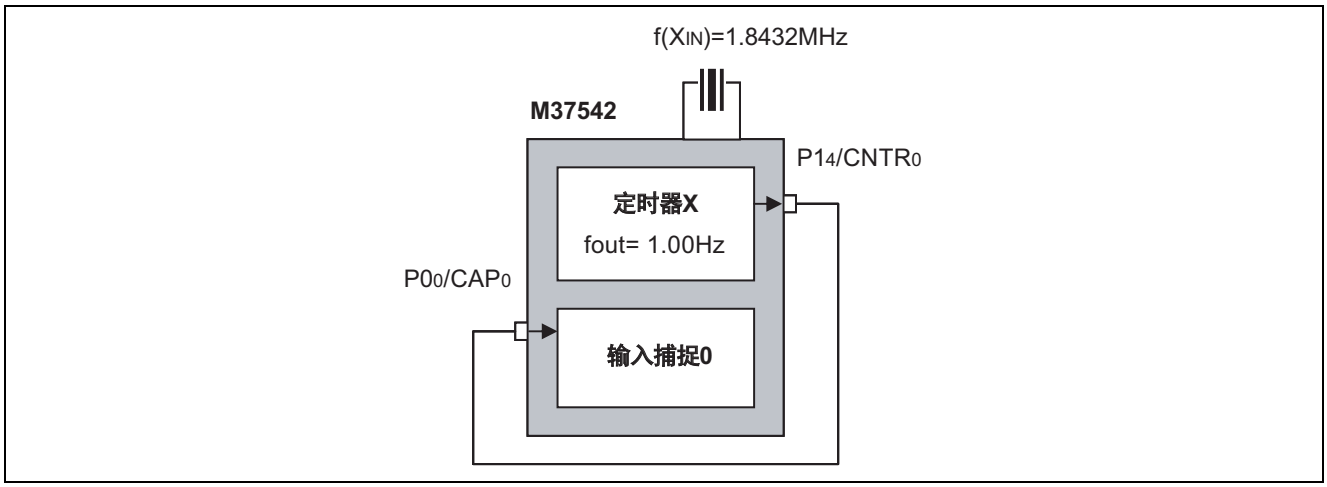


图 4 外围电路例子

2.2 控制步骤例子

控制步骤例子如**图5**和**图6**所示。

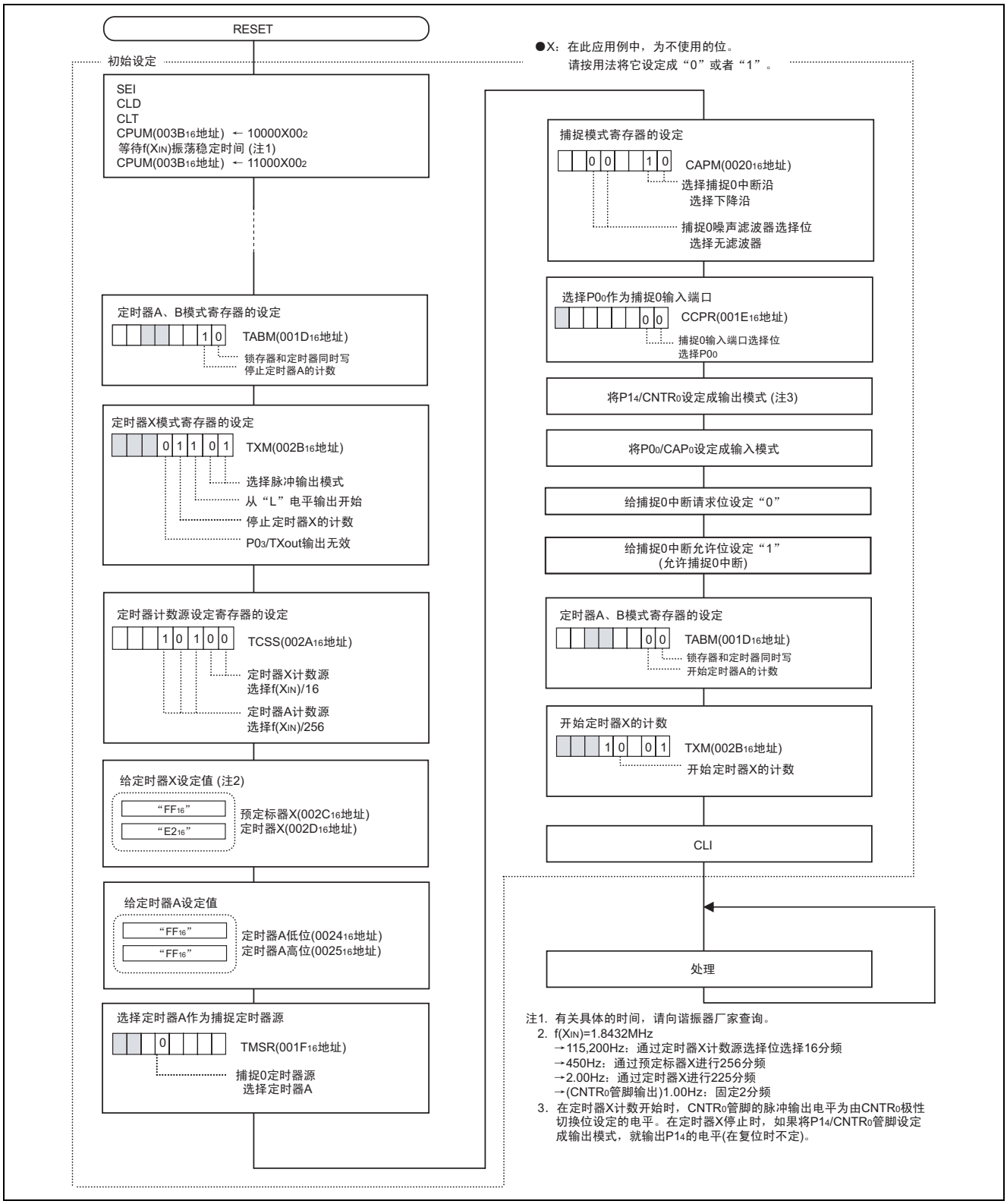

RESET
初始设定
SEI
CLD
CLT
CPUM(003B16地址) ← 10000X002
等待f(XIN)振荡稳定时间 (注1)
CPUM(003B16地址) ← 11000X002
定时器A、B模式寄存器的设定
TABM(001D16地址)
锁存器和定时器同时写
停止定时器A的计数
定时器X模式寄存器的设定
TXM(002B16地址)
选择脉冲输出模式
从“L”电平输出开始
停止定时器X的计数
P03/TXout输出无效
定时器计数源设定寄存器的设定
TCSS(002A16地址)
定时器X计数源
选择f(XIN)/16
定时器A计数源
选择f(XIN)/256
给定时器X设定值 (注2)
“FF16”
“E216”
预定标器X(002C16地址)
定时器X(002D16地址)
给定时器A设定值
“FF16”
“FF16”
定时器A低位(002416地址)
定时器A高位(002516地址)
选择定时器A作为捕捉定时器源
TMSR(001F16地址)
捕捉0定时器源
选择定时器A
●X：在此应用例中，为不使用的位。
请按用法将它设定成“0”或者“1”。
捕捉模式寄存器的设定
CAPM(002016地址)
选择捕捉0中断沿
选择下降沿
捕捉0噪声滤波器选择位
选择无滤波器
选择P00作为捕捉0输入端口
CCPR(001E16地址)
捕捉0输入端口选择位
选择P00
将P14/CNTR0设定成输出模式 (注3)
将P00/CAP0设定成输入模式
给捕捉0中断请求位设定“0”
给捕捉0中断允许位设定“1”
(允许捕捉0中断)
定时器A、B模式寄存器的设定
TABM(001D16地址)
锁存器和定时器同时写
开始定时器A的计数
开始定时器X的计数
TXM(002B16地址)
开始定时器X的计数
CLI
处理
注1. 有关具体的时间，请向谐振器厂家查询。
2. f(XIN)=1.8432MHz
→115,200Hz：通过定时器X计数源选择位选择16分频
→450Hz：通过预定标器X进行256分频
→2.00Hz：通过定时器X进行225分频
→(CNTR0管脚输出)1.00Hz：固定2分频
3. 在定时器X计数开始时，CNTR0管脚的脉冲输出电平为由CNTR0极性切换位设定的电平。在定时器X停止时，如果将P14/CNTR0管脚设定成输出模式，就输出P14的电平(在复位时不定)。

图 5　控制步骤例子（1）

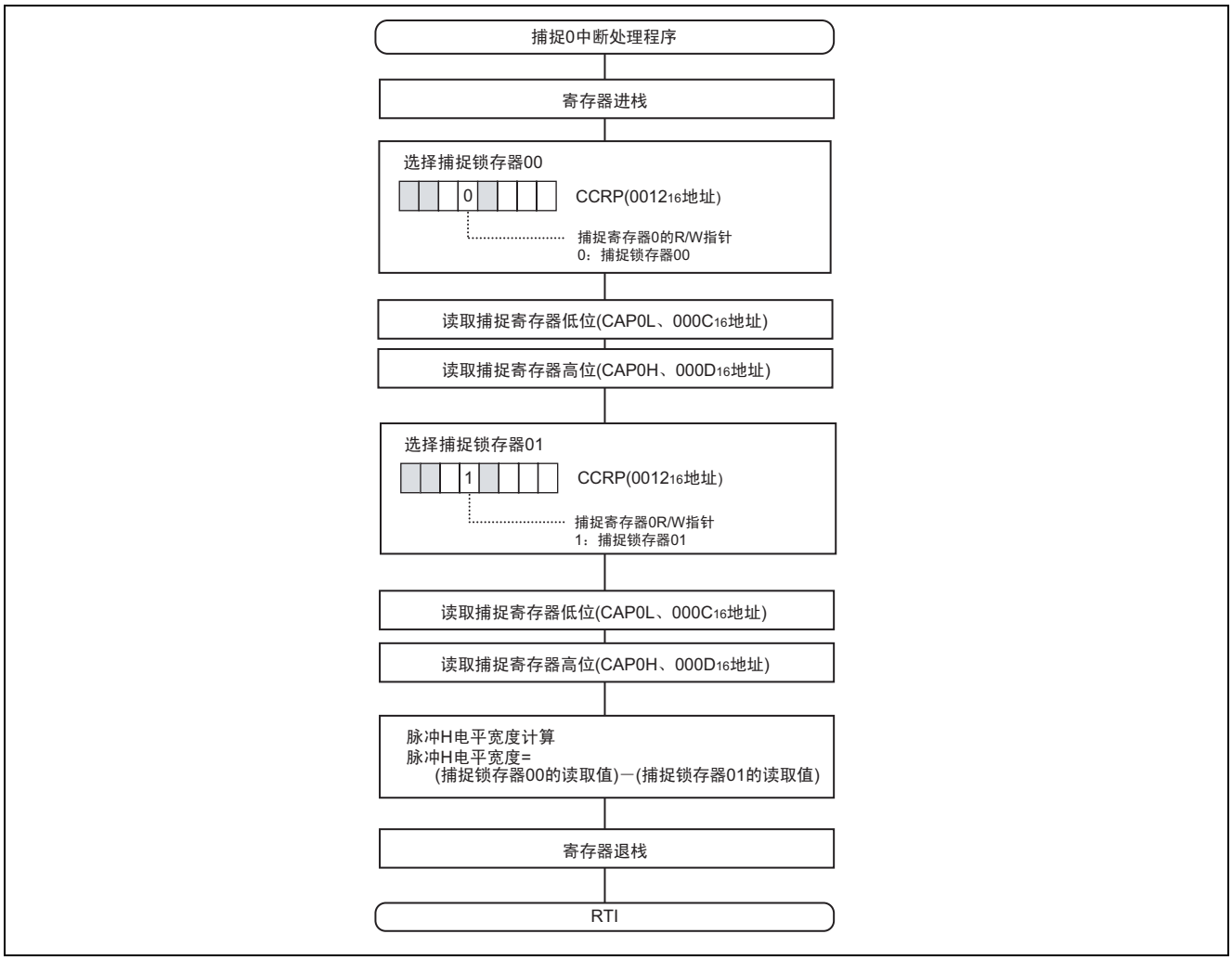

捕捉0中断处理程序
寄存器进栈
选择捕捉锁存器00
0
CCRP(0012₁₆地址)
捕捉寄存器0的R/W指针
0：捕捉锁存器00
读取捕捉寄存器低位(CAP0L、000C₁₆地址)
读取捕捉寄存器高位(CAP0H、000D₁₆地址)
选择捕捉锁存器01
1
CCRP(0012₁₆地址)
捕捉寄存器0R/W指针
1：捕捉锁存器01
读取捕捉寄存器低位(CAP0L、000C₁₆地址)
读取捕捉寄存器高位(CAP0H、000D₁₆地址)
脉冲H电平宽度计算
脉冲H电平宽度=
(捕捉锁存器00的读取值)－(捕捉锁存器01的读取值)
寄存器退栈
RTI

图 6　控制步骤例子（2）

3. 参考文献

数据表

7542群数据表（最新版本请从瑞萨科技网页取得）

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修订记录

Rev.	发行日	修订内容	
		页	修订处
1.00	2004.09.15	—	初版发行

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