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M16C/64 群

定时器 A 操作（计数器模式）

1. 要点

在定时器模式中，可以选择如表 1 中所列的各种功能。在表 1 中用符号“○”表示本篇资料所选的项目，图 1 是定时器的工作时序图。本篇资料的参考例程是定时器 A1 选择定时器模式的例子。

2. 说明

本篇资料，适用于 M16C/64 群单片机。

本篇资料中的参考例程也适用于 M16C 族产品中与 M16C/64 群具有相同 SFR（特殊功能寄存器）定义的产品。

由于 M16C 系列产品中有些功能会有所改进，请参看用户手册。如果使用本篇资料中所列功能时，请仔细检查每一步操作。

3. 选定功能

表 1. 选定功能

设定项目	设定内容	
计数源	☐	内部时钟源（f1TIMAB/f2TIMAB/f8TIMAB/f32TIMAB/f64TIMAB/fOCO-S/fc32）
脉冲输出功能	☐	无脉冲输出
	☐	有脉冲输出
门控功能	☐	无门控功能
	☐	只有在 TAIIN 引脚为“低”电平期间进行计数
	☐	只有在 TAIIN 引脚为“高”电平期间进行计数
输出极性控制	☐	输出波形“高”电平有效
	☐	输出波形“低”电平有效（输出反转）

注: i = 0~4

4. 定时器 A 的操作

- 把计数开始标志位置为“1”，计数器开始对计数脉冲源的下降沿计数。
- 在发生下溢时，重加载寄存器的设定值被加载到计数器，计数器继续进行计数。同时，定时器 Ai 中断请求位置为“1”。
- 把计数开始标志位置为“0”，计数器停止计数，并且保持当前值。

选择定时器模式的定时器工作时序图如下所示：

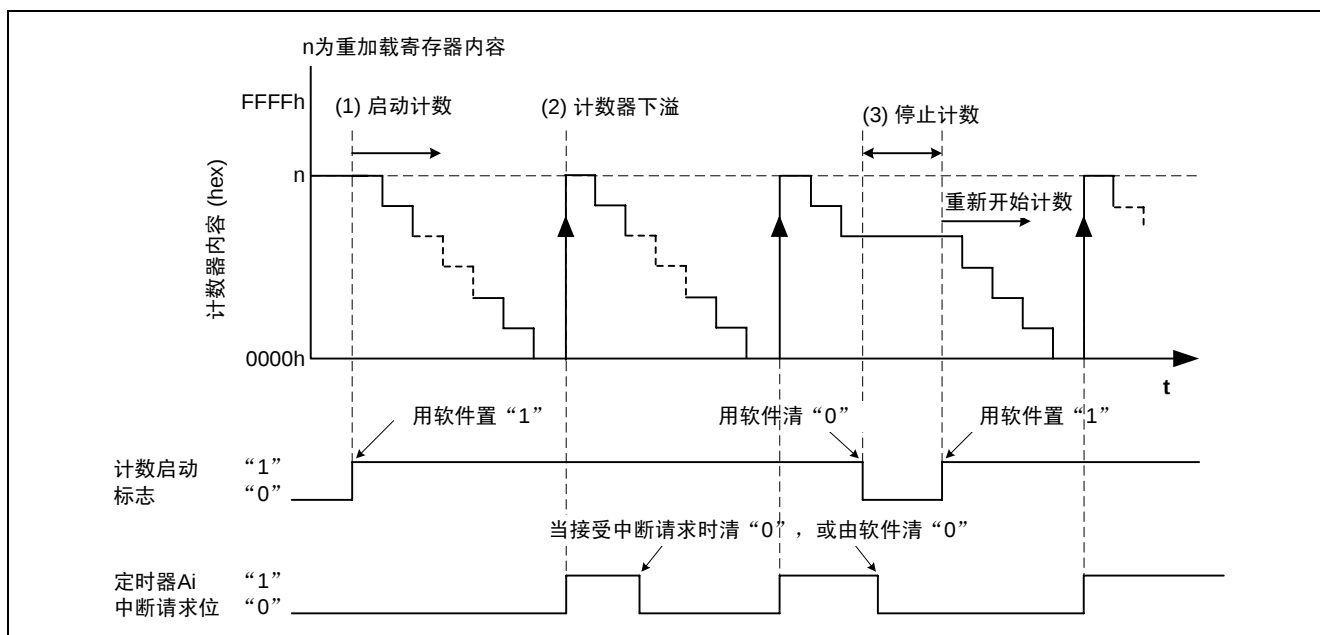


图 1. 选择定时器模式定时器的工作时序图

5. 寄存器设置

在定时器模式中，定时器 A 可以选择如表 2 中所列的各种计数源，定时器 A 计数源的结构框图如图 2 所示。

表 2. 定时器 A 计数源的选择

TACSi 寄存器（注 1）				TAiMR 寄存器		计数源	计数源周期
TCS3/ TCS7	TCS2/ TCS6	TCS1/ TCS5	TCS0/ TCS4	TCK1	TCK0		f(PLL):24MHz f(XCIN):32.768kHz
0	-	-	-	0	0	f1TIMAB/f2TIMAB （注 2）	41.7ns/83.3ns
0	-	-	-	0	1	f8TIMAB	333.3ns
0	-	-	-	1	0	f32TIMAB	1333.3ns
0	-	-	-	1	1	fc32	976.56ns
1	0	0	0	-	-	f1TIMAB/f2TIMAB （注 2）	41.7ns/83.3ns
1	0	0	1	-	-	f8TIMAB	333.3ns
1	0	1	0	-	-	f32TIMAB	1333.3ns
1	0	1	1	-	-	f64TIMAB	2666.7ns
1	1	0	1	-	-	foco-s	8μs
1	1	1	0	-	-	fc32	976.56μs

注 1: TACS0 寄存器的 TCS3~TCS0 位和定时器 A0 计数源的选择相对应, TACS0 寄存器的 TCS7~TCS4 位和定时器 A1 计数源的选择相对应, TACS1 寄存器的 TCS3~TCS0 位和定时器 A2 计数源的选择相对应, TACS1 寄存器的 TCS7~TCS4 位和定时器 A3 计数源的选择相对应, TACS2 寄存器的 TCS3~TCS0 位和定时器 A4 计数源的选择相对应。

注 2 如果 PCLKR 寄存器中的 PCLK0 位为“0”选择 f2TIMAB 作为计数源, PCLK0 位为“1”选择 f1TIMAB 作为计数源（复位设定值）。

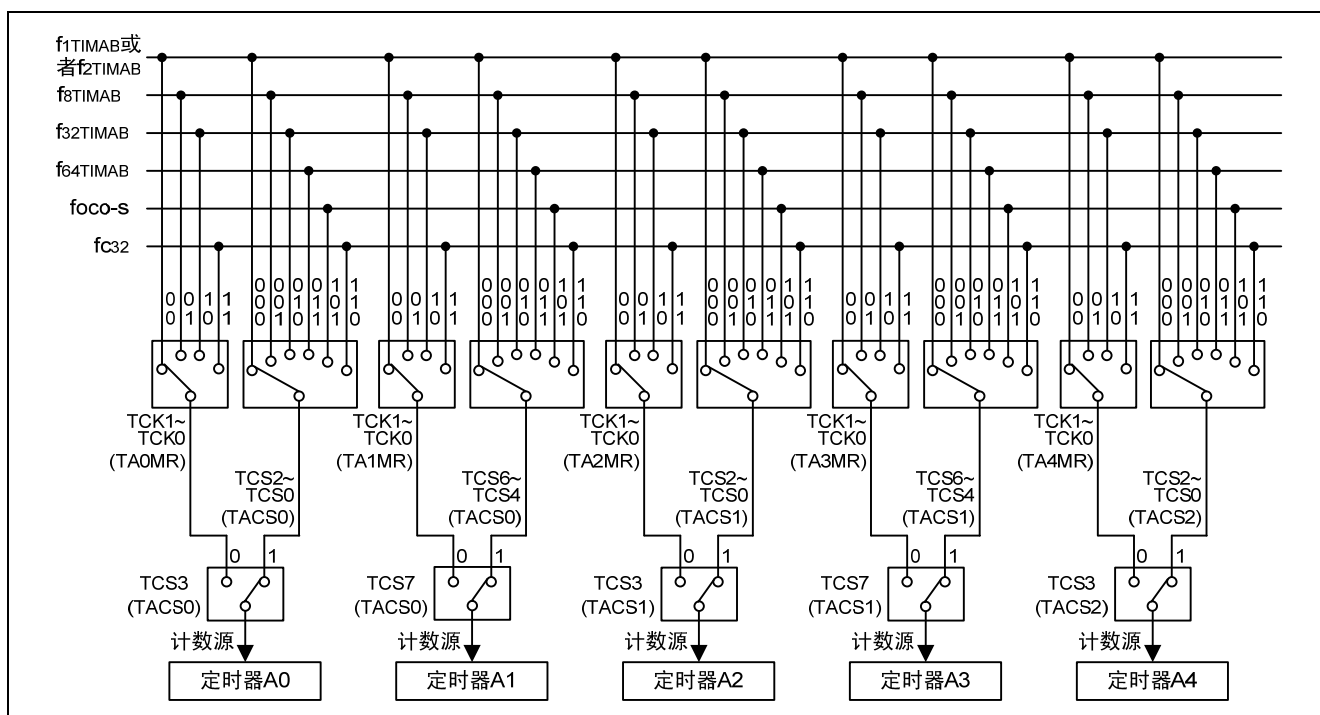
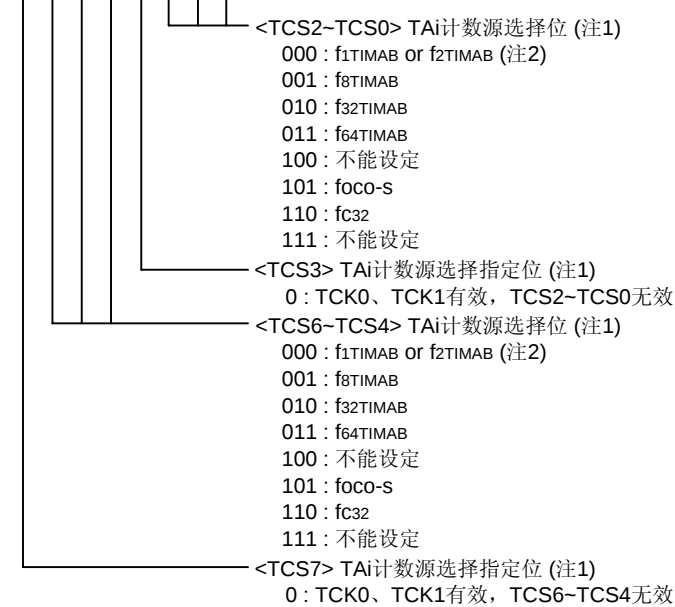


图 2. 定时器 A 的计数源

为了能够实现定义在“4. 定时器 A 的操作”的功能，下列寄存器必须按步骤顺序进行设置。对于每个寄存器的具体结构，请参考 M16C/64 群的硬件手册。

(1) 选择定时器计数源

定时器A计数源选择寄存器0 TACS0【地址 01D0h】
定时器A计数源选择寄存器1 TACS1【地址 01D1h】

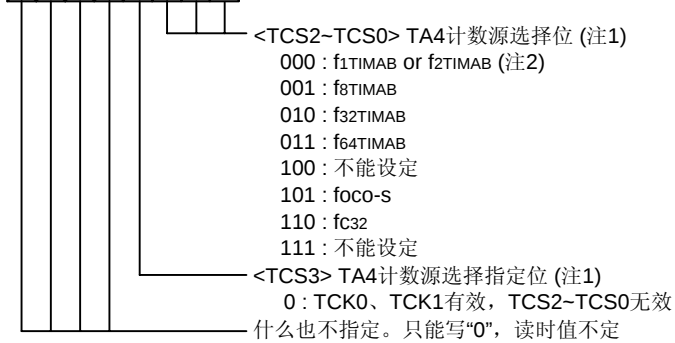


TACS0寄存器: i = 0、j = 1, TACS1寄存器: i = 2、j = 3

注1: 关于各种设定情况下的计数源周期，请参考表2。

注2: 如果PCLKR寄存器中的PCLK0位为0选择f2TIMAB作为计数源，PCLK0位为1选择f1TIMAB作为计数源（复位设定值）。

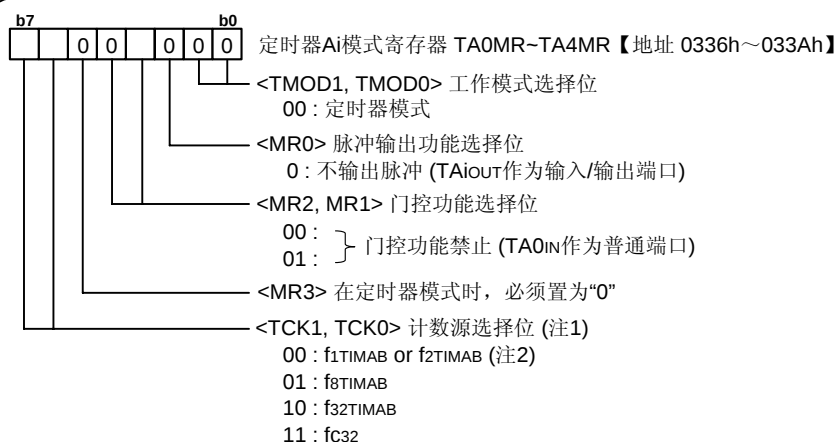
定时器A计数源选择寄存器2 TACS2【地址 01D2h】



注1: 关于各种设定情况下的计数源周期，请参考表2。

注2: 如果PCLKR寄存器中的PCLK0位为0选择f2TIMAB作为计数源，PCLK0位为1选择f1TIMAB作为计数源（复位设定值）。

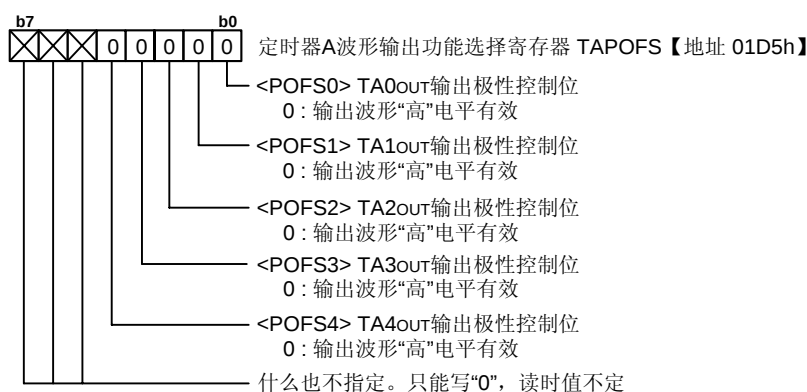
(2) 选择定时器模式和功能



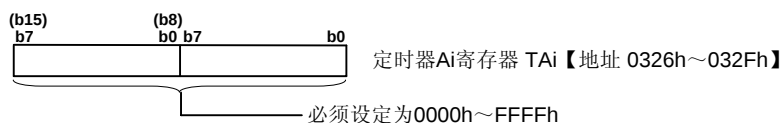
注1: TACS0~TACS2寄存器的TCS3位和TCS7位设置为0 (TCK0位、TCK1位有效)。关于各种设定情况下的计数源周期, 请参考表2。

注2: 如果PCLKR寄存器中的PCLK0位为0选择f2TIMAB作为计数源, PCLK0位为1选择f1TIMAB作为计数源 (复位设定值)。

(3) 选择定时器波形输出功能

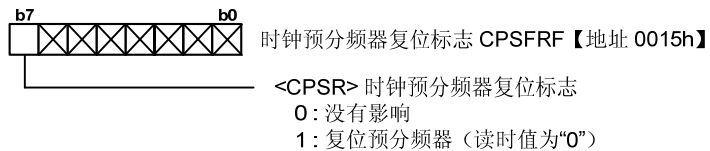


(4) 设置定时器Ai寄存器 (i=0~4)

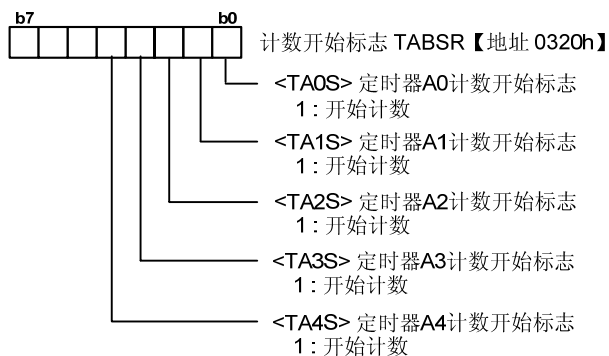


(5) 设置时钟预分频器复位标志位

这一功能只在选择 fc_{32} 作为计数源时有效，复位预分频器的目的是为了产生 X_{cin} 时钟的32分频即 fc_{32} 。



(6) 设置定时器计数开始标志位



开始计数

6. 参考文献

数据手册

M16C/64 群硬件手册

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