

致尊敬的顾客

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2010年4月1日  
瑞萨电子公司

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## M16C/65 群

### DMAC 的操作（重复传送模式）

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#### 1. 要点

在重复传送模式中，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。

#### 2. 说明

本篇资料，适用于 M16C/65 群单片机。

本篇应用说明也适用于 M16C 族中与上面所述的群具有相同 SFR（特殊功能寄存器）定义的产品。关于产品功能的改进，请参看手册中的相关信息。在使用本篇应用说明的程序前，需进行详细的评价。

### 3. 选定功能

表 1. 选定功能

| 设定项目     | 设定内容                     |                    |
|----------|--------------------------|--------------------|
| 传送地址空间   | <input type="checkbox"/> | 从 1MB 空间的任意地址到固定地址 |
|          | <input type="radio"/>    | 从固定地址到 1MB 的任意空间   |
|          | <input type="checkbox"/> | 从固定地址到固定地址         |
| 传送单位     | <input type="checkbox"/> | 8 位                |
|          | <input type="radio"/>    | 16 位               |
| 重复传送模式   | <input type="checkbox"/> | 单次传送               |
|          | <input type="radio"/>    | 重复传送               |
| 传送源地址方向  | <input type="radio"/>    | 固定                 |
|          | <input type="checkbox"/> | 正向                 |
| 传送目标地址方向 | <input type="checkbox"/> | 固定                 |
|          | <input type="radio"/>    | 正向                 |

### 4. 操作

(1) 如果选择软件触发，将软件 DMA 请求位置“1”，就产生一次 DMA 请求。

(2) 在允许 DMAC 后开始传送数据，将 DMA<sub>i</sub> 源指针所指向的地址的内容传送到 DMA<sub>i</sub> 正向地址指针所指向的地址。另外，在允许 DMAC 后开始传送数据，DMA<sub>i</sub> 传送计数器内的值将被重新加载到 DMA 传送计数器内，同时 DMA<sub>i</sub> 目标指针被重新加载到 DMA<sub>i</sub> 正向地址指针内。

每产生一次 DMA 传送请求，就传送两个字节的的数据。DMA<sub>i</sub> 传送计数器进行减计数，DMA<sub>i</sub> 正向地址指针进行加计数。

(3) 即便 DMA<sub>i</sub> 传送计数器发生下溢，DMA<sub>i</sub> 传送允许位仍然为“1”。同时，DMA 中断请求位置“1”。

(4) DMA 传送计数器下溢后，如果发生下一次 DMA 请求，就从(1)重新开始 DMA 传送。

工作时序图如下所示：

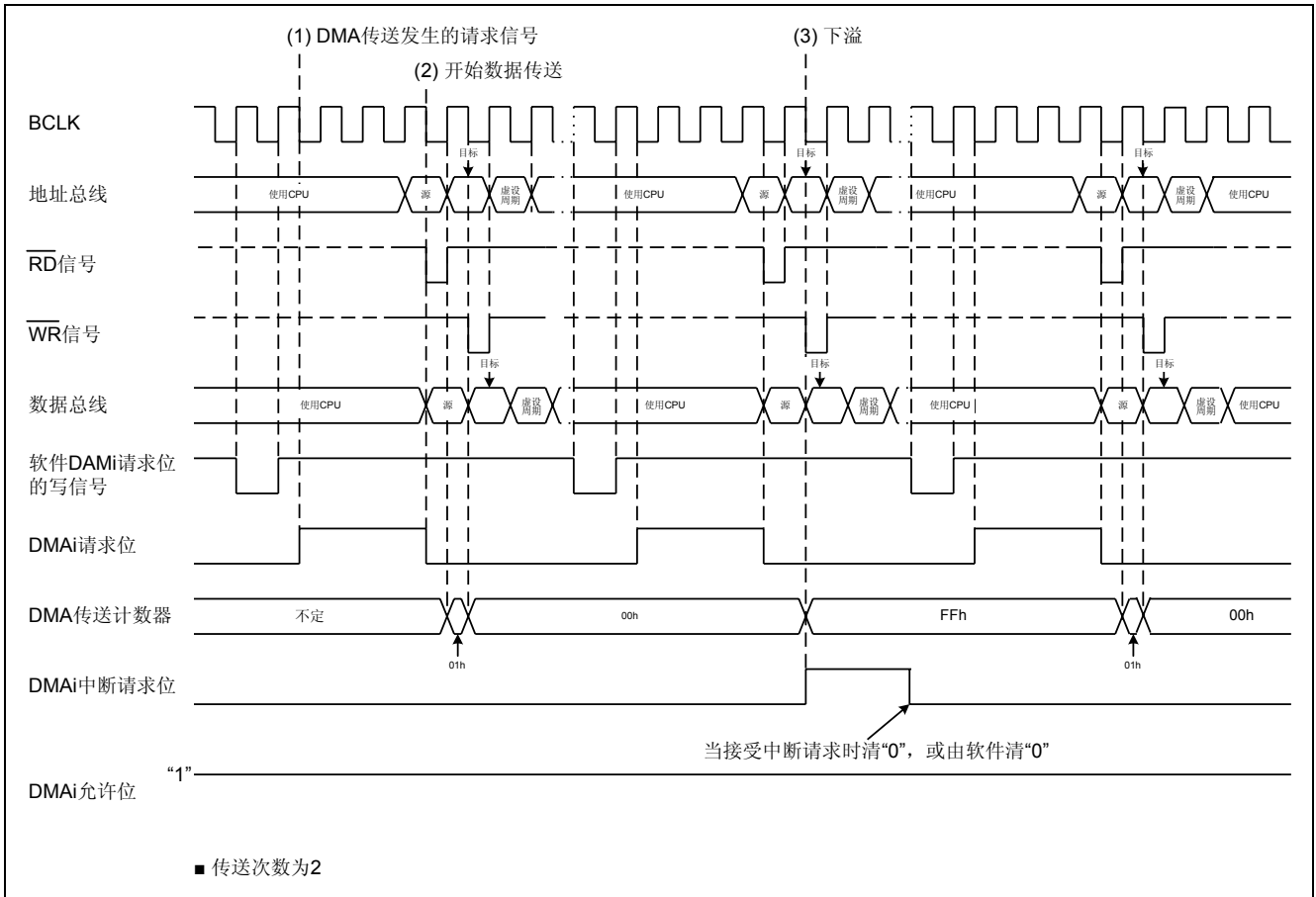
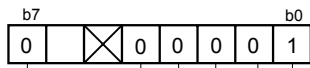


图 1. 单次传送模式时的工作时序图

### 5. 寄存器设置

为了能够实现定义在“4. 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/65 群的硬件手册。

#### 设定DMAi请求源选择寄存器



- DMA0请求源选择寄存器 DM0SL 【地址 0398h】
- DMA1请求源选择寄存器 DM1SL 【地址 039Ah】
- DMA2请求源选择寄存器 DM2SL 【地址 0390h】
- DMA3请求源选择寄存器 DM3SL 【地址 0392h】

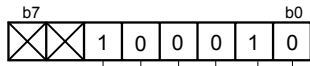
<DSEL4~DSEL0> DMA请求选择位

b4 b3 b2 b1 b0

0 0 0 0 1: 软件触发

<DSR> 软件DMA请求位  
清为“0”

#### 设定DMAi控制寄存器



- DMA0控制寄存器 DM0CON 【地址 018Ch】
- DMA1控制寄存器 DM1CON 【地址 019Ch】
- DMA2控制寄存器 DM2CON 【地址 01ACh】
- DMA3控制寄存器 DM3CON 【地址 01BCh】

<DMBIT> 传送单位选择位

0: 16位

<DMASL> 重复传送模式选择位

1: 重复传送

<DMAS> DMA请求位

0: DMA无请求

<DMAE> DMA允许位

0: 禁止

<DSD> 传送源地址方向选择位

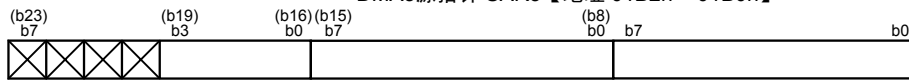
0: 固定 (bit4和bit5不能同时设置为“1”)

<DAD> 传送目标地址方向选择位

1: 正向 (bit4和bit5不能同时设置为“1”)

#### 设定DMAi源指针

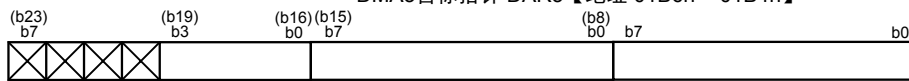
- DMA0源指针 SAR0 【地址 0182h ~ 0180h】
- DMA1源指针 SAR1 【地址 0192h ~ 0190h】
- DMA2源指针 SAR2 【地址 01A2h ~ 01A0h】
- DMA3源指针 SAR3 【地址 01B2h ~ 01B0h】



源指针  
保存传送源地址

#### 设定DMAi目标指针

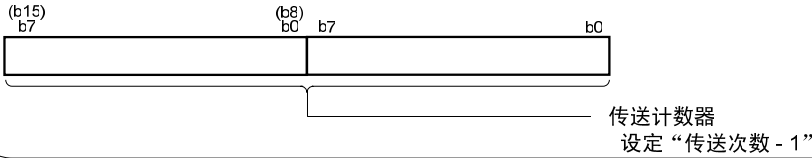
- DMA0目标指针 DAR0 【地址 0186h ~ 0184h】
- DMA1目标指针 DAR1 【地址 0196h ~ 0194h】
- DMA2目标指针 DAR2 【地址 01A6h ~ 01A4h】
- DMA3目标指针 DAR3 【地址 01B6h ~ 01B4h】



目标指针  
保存传送目标地址

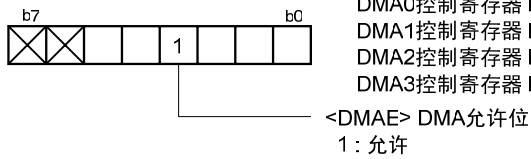
设定DMAi传送计数器

DMA0传送计数器 TCR0 【地址 0189h ~ 0188h】  
 DMA1传送计数器 TCR1 【地址 0199h ~ 0198h】  
 DMA2传送计数器 TCR2 【地址 01A9h ~ 01A8h】  
 DMA3传送计数器 TCR3 【地址 01B9h ~ 01B8h】



设定DMAi控制寄存器

DMA0控制寄存器 DM0CON 【地址 018Ch】  
 DMA1控制寄存器 DM1CON 【地址 019Ch】  
 DMA2控制寄存器 DM2CON 【地址 01ACh】  
 DMA3控制寄存器 DM3CON 【地址 01BCh】



注：请再次将DMA请求位同时清“0”

当软件DMA请求位 = “1”

开始DMA传送

## 6. 参考文献

数据手册

M16C/65 群硬件手册

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