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7544 群

异步串行 I/O（UART）

要点

这是串行 I/O 的异步（UART）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和使用条件：

- 单片机：7544 群

目录

1. 应用例子的说明

对于异步串行I/O（以下称UART），发送侧和接收侧统一波特率和传送数据格式，异步进行数据的发送和接收。

7544群根据UART控制寄存器的设定，能选择8种串行数据传送格式。

1.1 有关数据传送速度

位传送速率的计算式如下所示：

●在选择内部时钟时（在使用波特率发生器时）

$$\text{位传送速率 [bps]} = \frac{f(X_{IN})}{\text{分频比}^{*1} \times (\text{BRG设定值}^{*2} + 1) \times 16}$$

- 分频比[*1]：选择“1”或者“4”（通过串行I/O控制寄存器的位0设定）
- BRG设定值[*2]：设定0～255（00_{16}～FF_{16}）

●在选择外部时钟时

位传送速率 [bps] = SCLK管脚的输入时钟/16

波特率发生器的设定值和位传送速率的选择例如**表1**所示：

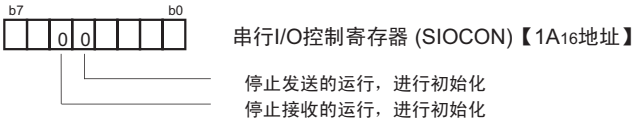
表1 波特率发生器（BRG）的设定值和位传送率的选择例

BRG计数源	BRG设定值	位传送率（bps）	
		在f(XIN) = 4.9152MHz时	在f(XIN) = 8MHz时
f(XIN)/4	255(FF_{16})	300	488.28125
f(XIN)/4	127($7F_{16}$)	600	976.5625
f(XIN)/4	63($3F_{16}$)	1200	1953.125
f(XIN)/4	31($1F_{16}$)	2400	3906.25
f(XIN)/4	15($0F_{16}$)	4800	7812.5
f(XIN)/4	7(07_{16})	9600	15625
f(XIN)/4	3(03_{16})	19200	31250
f(XIN)/4	1(01_{16})	38400	62500
f(XIN)	3(03_{16})	76800	125000
f(XIN)	1(01_{16})	153600	250000
f(XIN)	0(00_{16})	307200	500000

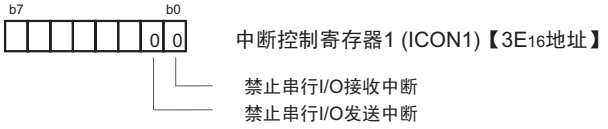
1.2 设定方法

串行I/O的UART设定方法如**图1**和**图2**所示。

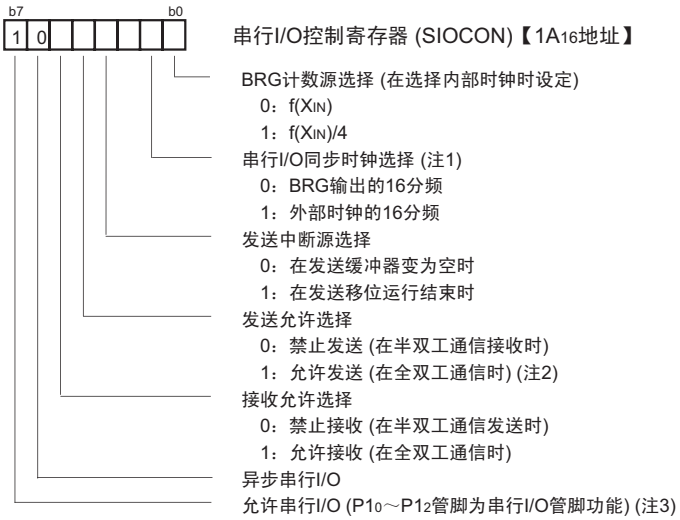
步骤1：停止串行I/O的运行，进行初始化



步骤2：禁止串行I/O发送和接收中断



步骤3：设定串行I/O控制寄存器



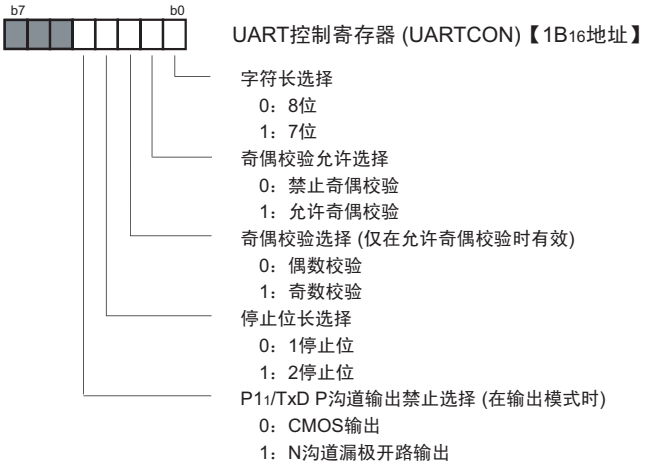
注1. 串行I/O同步时钟选择位的设定
“0”：P12管脚可作为通常的输入/输出管脚使用。
“1”：P12管脚变为外部时钟的输入管脚。

2. 在数据发送时，如果选择外部时钟作为同步时钟，就必须在SCLK为“H”电平的状态下将发送允许位置“1”。

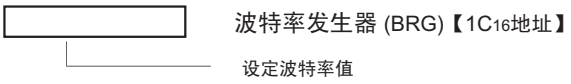
3. 在选择异步 (UART) 串行I/O时，P13管脚可作为通常的输入/输出管脚使用。

图 1　串行 I/O 的 UART 设定方法（1）

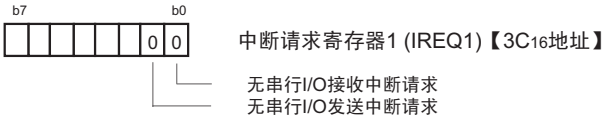
步骤4：设定UART控制寄存器



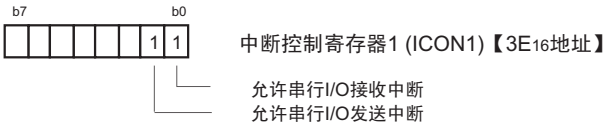
步骤5：在选择BRG输出的16分频作为同步时钟时，对波特率发生器进行设定



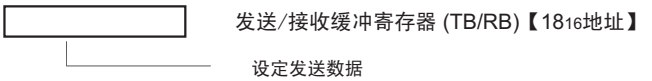
步骤6：为了不执行不必要的中断处理，必须将串行I/O发送和接收中断请求位置“0”(无请求)



步骤7：在执行中断时，必须将串行I/O发送和接收中断允许位置“1”(允许中断)



步骤8：在发送时，开始数据的发送 (注)



注. 在数据发送时，如果选择外部时钟作为同步时钟，就必须在SCLK为“H”电平的状态下进行。

图 2　串行 I/O 的 UART 设定方法（2）

1.3 使用 UART 的通信（发送和接收）

■要点

使用UART，发送和接收2字节的数据。通信控制使用端口P00。

■说明

使用串行I/O（选择UART），位传送速率为9600bps（对f(XIN)=4.9152MHz进行512分频）。
通信控制使用端口P00（端口P00的输出电平由软件控制）。
每隔10ms（由定时器产生）从发送侧将2字节数据传送给接收侧。

连接图、时序图、发送侧控制步骤的例子、接收侧控制步骤的例子分别如图3、图4、图5、图6所示。

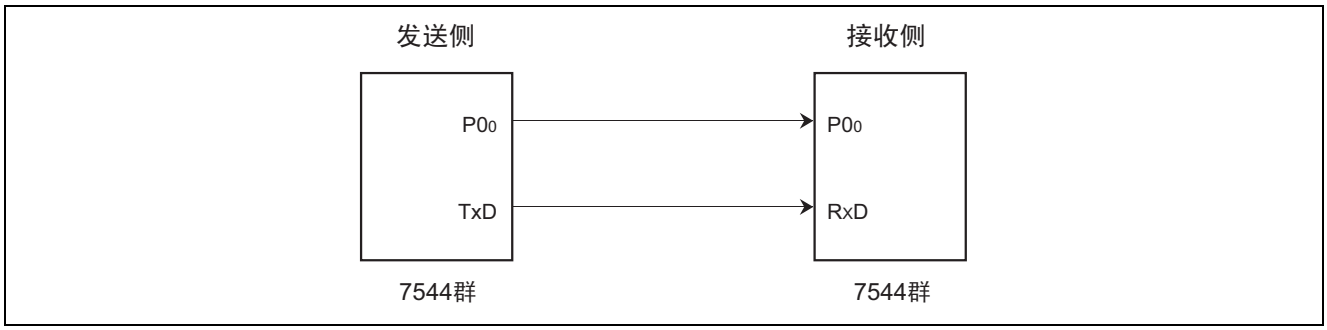


图 3　连接图

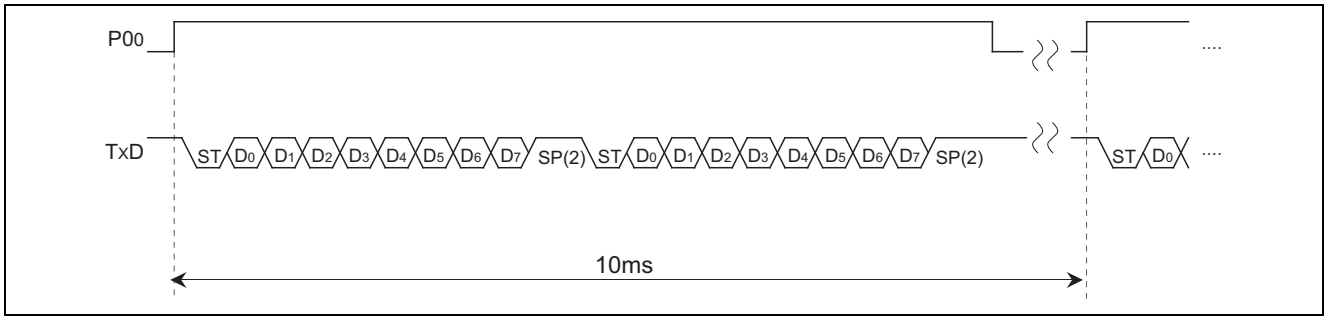


图 4　时序图

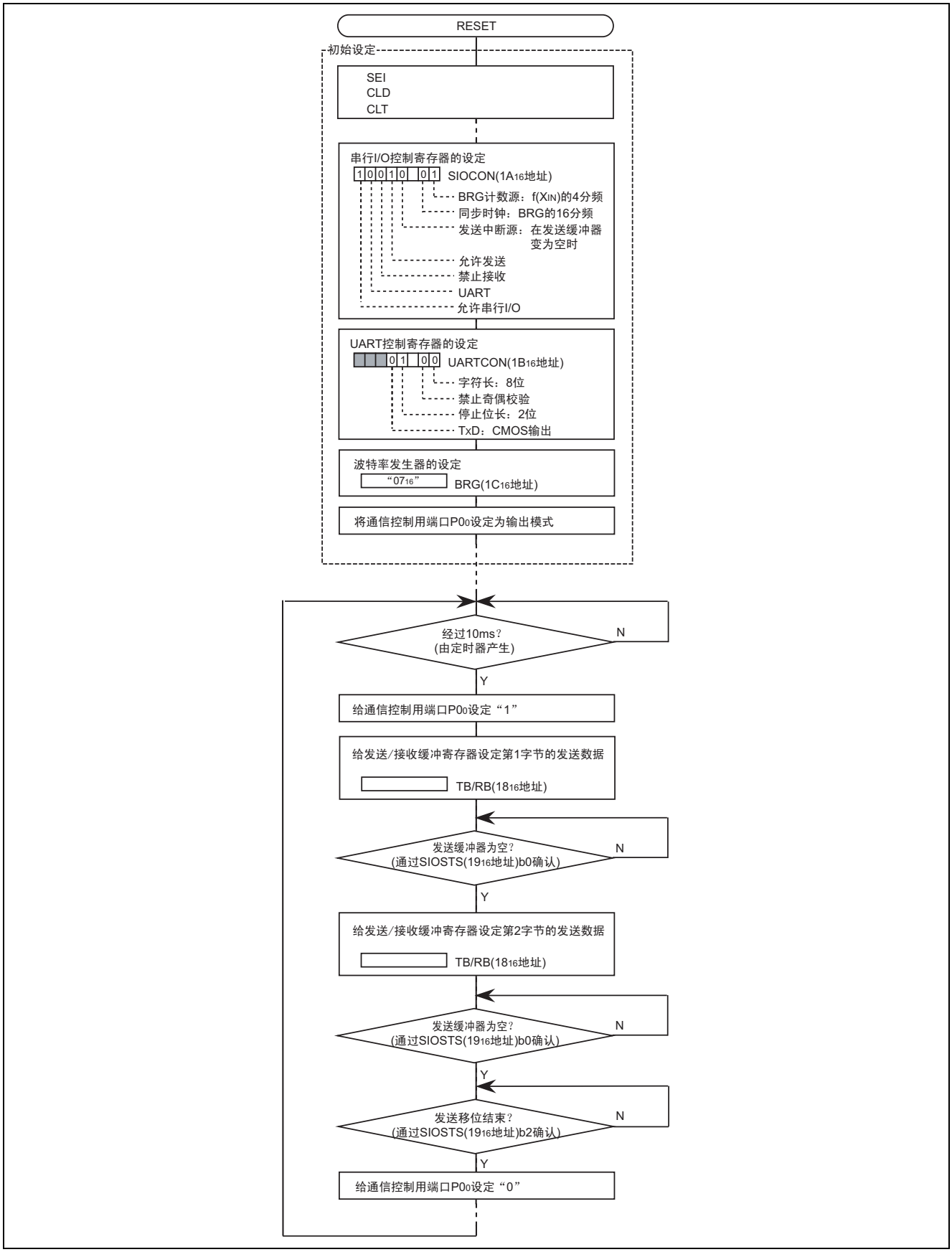


图 5　发送侧的控制步骤例子

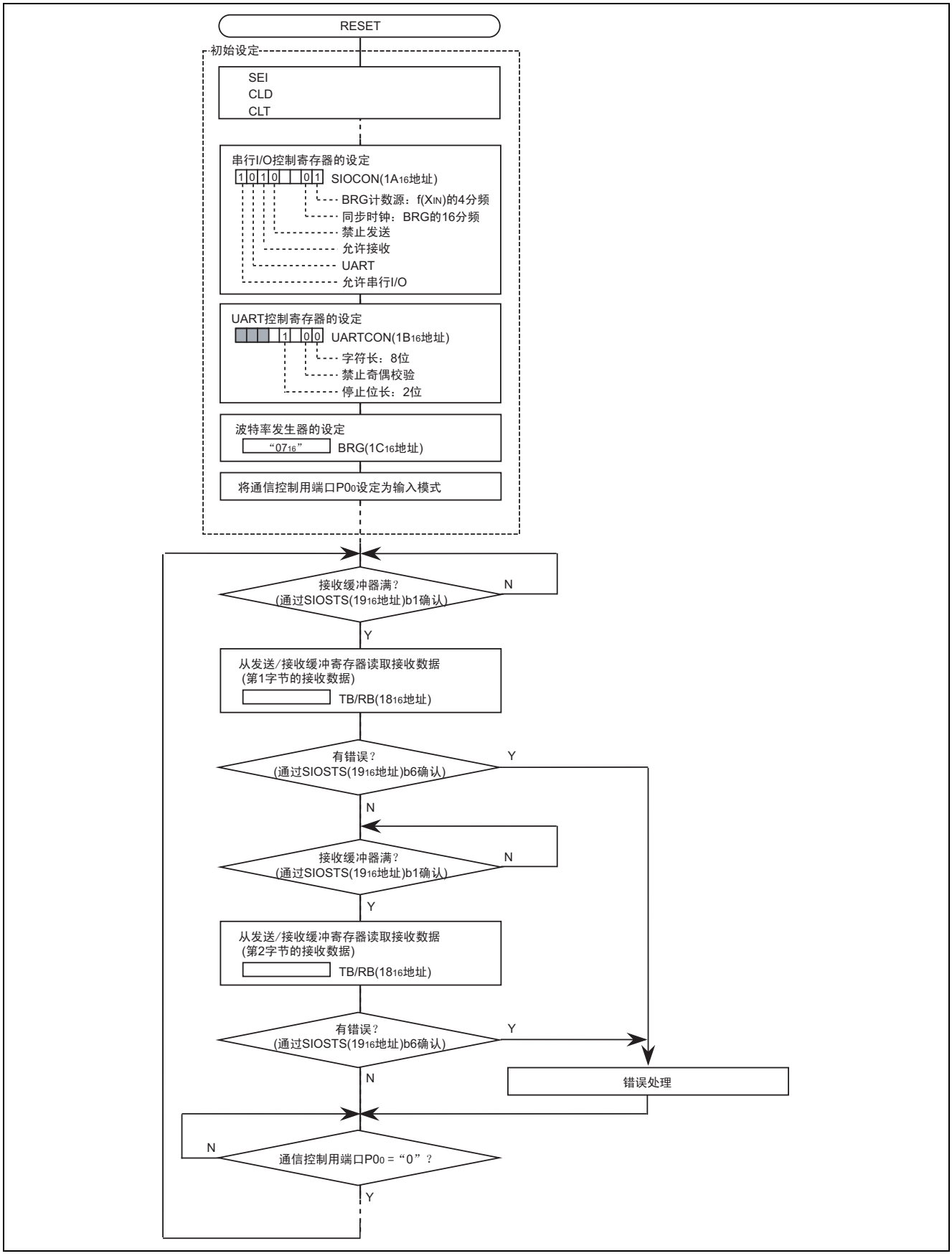


图 6　接收侧的控制步骤例子

2. 参考文献

数据表

7544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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