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瑞萨电子公司

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H8/300L Super Low Power 系列

32 位 2 进制数的加法

要点

进行 32 位 2 进制数的加法运算，并将加法结果（32 位 2 进制数）设定到通用寄存器。

动作确认器件

H8/38024

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1. 参数

	内容	保存位置	数据长度（字节）
输入	被加数	R0、R1	4
	加数	R2、R3	4
输出	加法结果	R0、R1	4
	有无进位	C 标志（CCR）	—

2. 内部寄存器变化和标志变化

R0		R1
○	○	○
R2		R3
•	•	•
R4		R5
•		•
R6		R7
•		•

I	U	H	U
•	•	×	•
N	Z	V	C
×	×	×	○

•：不变，×：不定，○：结果

3. 程序设计

	程序存储器（字节）
	8
	数据存储器（字节）
	0
	堆栈（字节）
	0
	时钟周期数
	14
	重入
	可
	再定位
	可
	中途中断
	可

4. 说明

4.1 功能

- (1) 参数的详细内容如下：
- R0、R1：设定 32 位 2 进制被加数。
执行软件 ADD1 后，设定加法结果。
 - R2、R3：输入参数，设定 32 位 2 进制加数。
 - C 标志（CCR）：输出参数，表示软件 ADD1 执行后有无进位。
C 标志= 1：表示加法结果产生进位（参照图 13-1）。
C 标志= 0：表示加法结果没有产生进位。

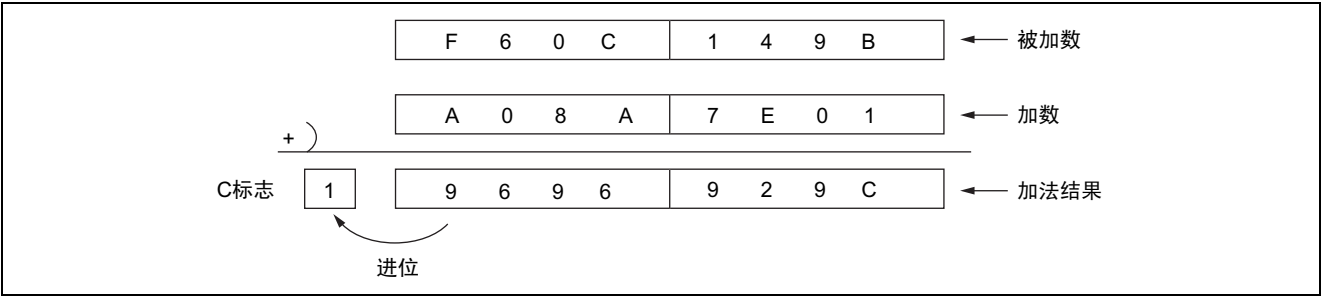


图 13-1 产生进位的加法例子

- (2) 软件 ADD1 的执行例子如图 13-2 所示。
- 一旦如①设定输入参数，就如②将加法结果设定到 R0、R1。

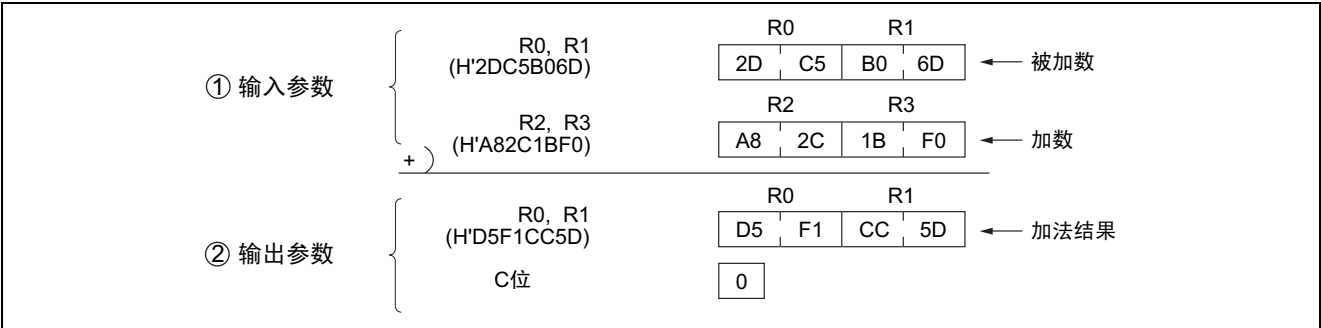


图 13-2 软件 ADD1 的执行例子

4.2 使用时的注意

(1) 如图 13-3，如果不使用高位，就必须将它置“0”。如果不置“0”，因为进行含有被设定在高位的不定数据的加法运算，所以就得不到正确的加法结果。

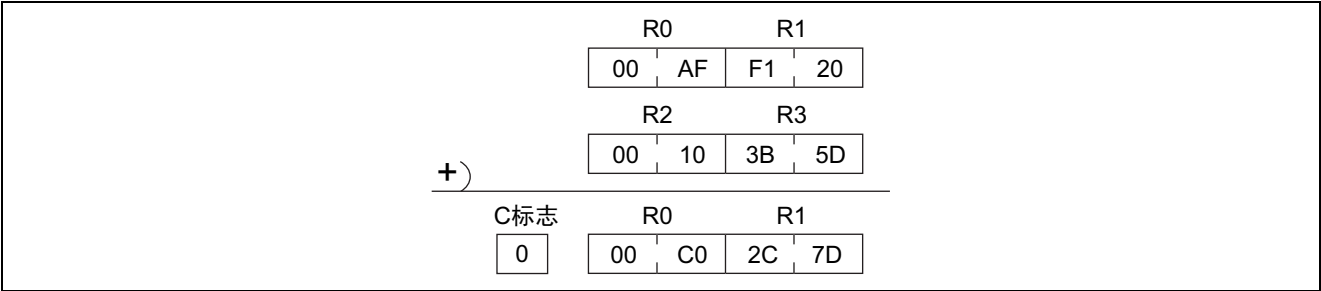


图 13-3 不使用高位的加法例子

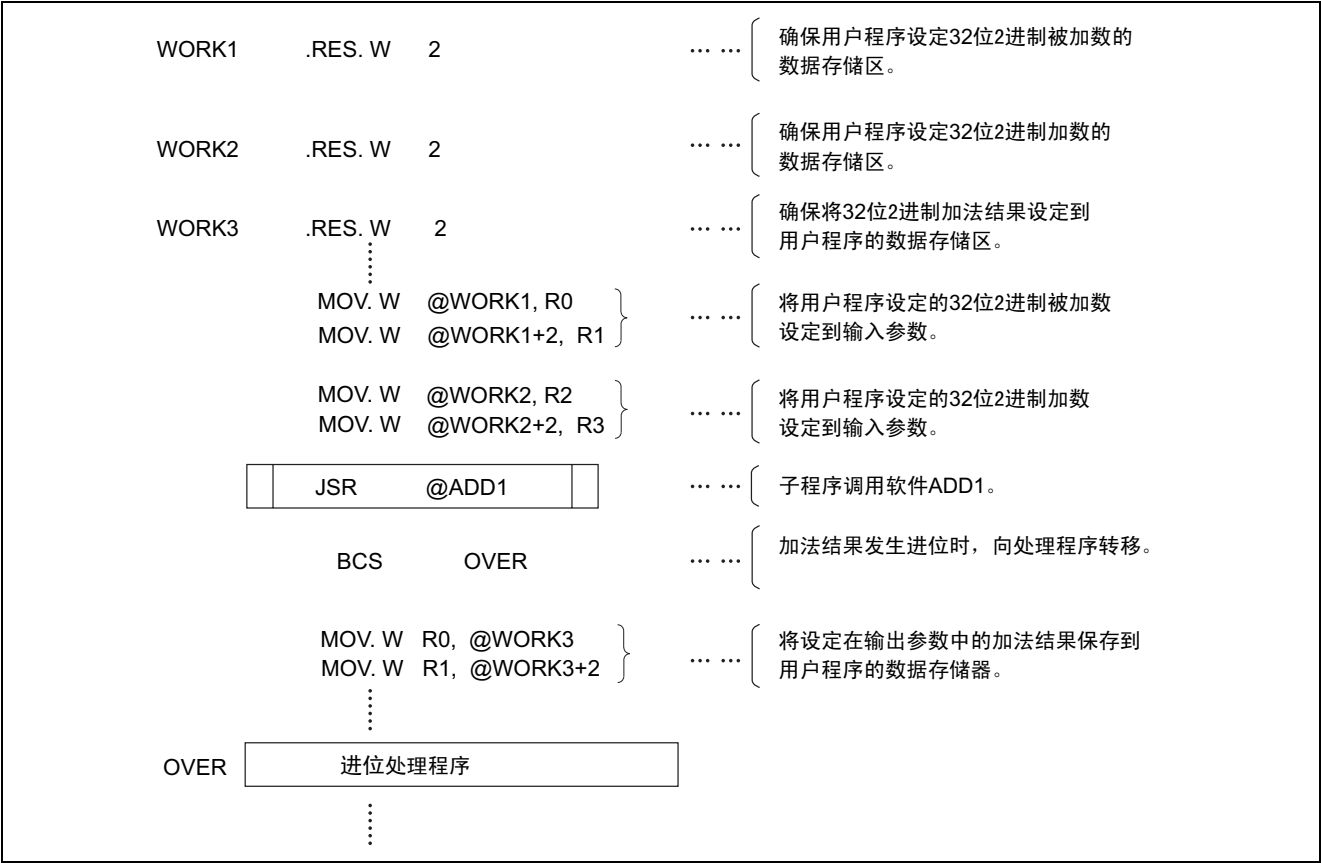
(2) 因为执行软件 ADD1 后加法结果被设定到 R0、R1，所以将破坏被加数。如果执行后还需要被加数，就必须预先保存到存储器。

4.3 数据存储器的说明

软件 ADD1 不使用数据存储器。

4.4 使用例

设定被加数和加数，子程序调用软件 ADD1。



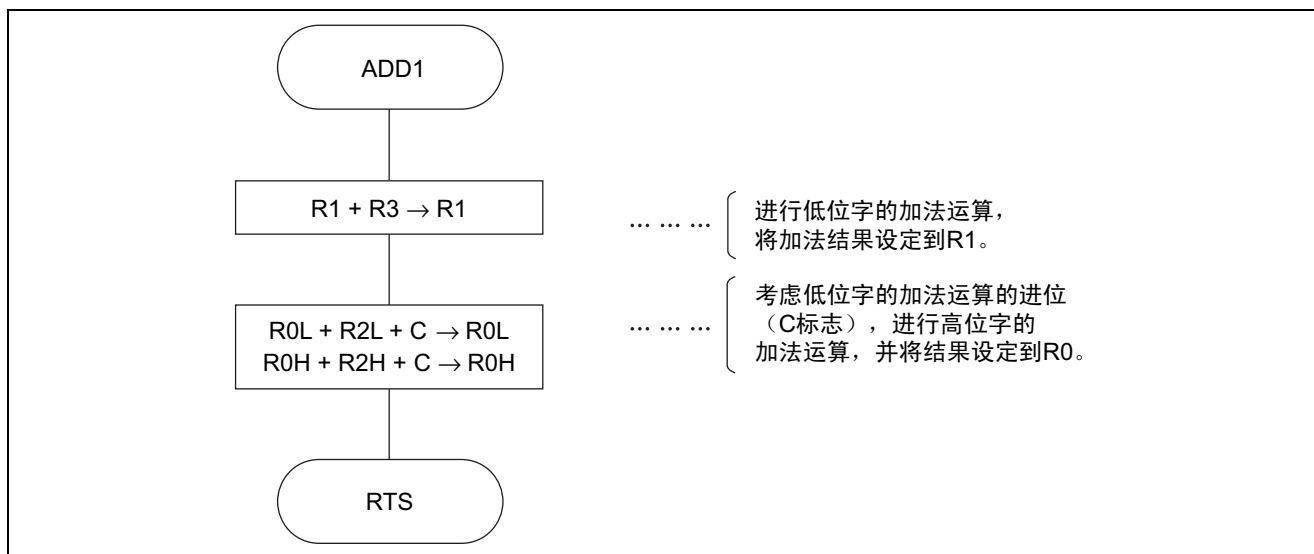
4.5 工作原理

- (1) 在进行 3 个字节以上的加法时，能通过重复 1 个字节以上的加法来实现。
 - (2) 使用不考虑 C 标志的 1 个字的加法指令（ADD.W 指令），进行如（式 1）所示的低位字的加法运算。
执行（式 1）后，如果有进位就置 C 标志。

$$R1 + R3 \rightarrow R1 \quad \dots \quad \dots \quad \text{（式1）}$$
 - (3) 使用 2 次考虑 C 标志的 1 个字节的加法指令（ADDX.B 指令），进行如（式 2）所示的高位字的加法运算。

$$\left. \begin{array}{l} R0L + R2L + C \rightarrow R0L \\ R0H + R2H + C \rightarrow R0H \end{array} \right\} \dots \quad \dots \quad \text{（式2）}$$
- 在此，C 标志是在(2)中由低位字和高位字的低位字节的加法结果所产生的进位。

5. 流程图



6. 程序清单

```

*** H8/300 ASSEMBLER      VER 1.0B **      08/18/92 09:53:09
PROGRAM NAME =

1                          ;*****
2                          ;*
3                          ;* 00-NAME      :32 BIT      ADDITION (ADD1)
4                          ;*
5                          ;*****
6                          ;*
7                          ;* ENTRY       :R0,R1      (SUMMAND)
8                          ;*              R2,R3      (ADDEND)
9                          ;*
10                         ;* RETURNS     :R0,R1      (SUM)
11                         ;*              C flag OF CCR (C=0;TRUE , C=1;OVERFLOW)
12                         ;*
13                         ;*****
14                         ;
15 ADD1_cod C 0000          .SECTION      ADD1_code,CODE,ALIGN=2
16                         .EXPORT      ADD1
17                         ;
18 ADD1_cod C      00000000 ADD1 .EQU      $          ;Entry point
19 ADD1_cod C 0000 0931      ADD.W       R3,R1      ;Adjust lower word
20 ADD1_cod C 0002 0EA8      ADDX.B      R2L,R0L    ;Adjust upper word
21 ADD1_cod C 0004 0E20      ADDX.B      R2H,R0H    ;
22 ADD1_cod C 0006 5470      RTS
23                         ;
24                         .END

*****TOTAL ERRORS      0
*****TOTAL WARNINGS    0

```


修订记录

Rev.	发行日	修订内容	
		页	修订要点
1.00	2005.07.29	—	初版发行

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