致尊敬的顾客

关于产品目录等资料中的旧公司名称

NEC电子公司与株式会社瑞萨科技于2010年4月1日进行业务整合（合并），整合后的新公司暨“瑞萨电子公司”继承两家公司的所有业务。因此，本资料中虽还保留有旧公司名称等标识，但是并不妨碍本资料的有效性，敬请谅解。

瑞萨电子公司网址：http://www.renesas.com

2010年4月1日
瑞萨电子公司

【发行】瑞萨电子公司（http://www.renesas.com）

【业务咨询】http://www.renesas.com/inquiry

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.

   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

   "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

H8/300L Super Low Power 系列

单精度浮点转换为带符号的 32 位 2 进制数

要点

将设定在通用寄存器中的单精度浮点转换为带符号的 32 位 2 进制数。

动作确认器件

H8/38024

目录

1. 参数

内容		保存位置	数据长度（字节）
输入	单精度浮点	R0、R1	4
输出	带符号的 32 位 2 进制数	R2、R3	4

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）
100
数据存储器（字节）
0
堆栈（字节）
0
时钟周期数
108
重入
可
再定位
可
中途中断
可

4. 注意事项

规格的时钟周期数是执行完图 27-1 时的值。

浮点格式请参照“关于单精度浮点＜参考＞”。

5. 说明

5.1 功能

(1) 参数的详细内容如下：

(a) 输入参数的设定

R0：单精度浮点的高位 2 个字节

R1：单精度浮点的低位 2 个字节

(b) 输出参数的设定

R2：带符号的 32 位 2 进制数的高位 2 个字节

R3：带符号的 32 位 2 进制数的低位 2 个字节

(2) 软件 FKTR 的执行例子如图 27-1 所示。

一旦如①设定输入参数，就如②将转换结果设定到 R2、R3。

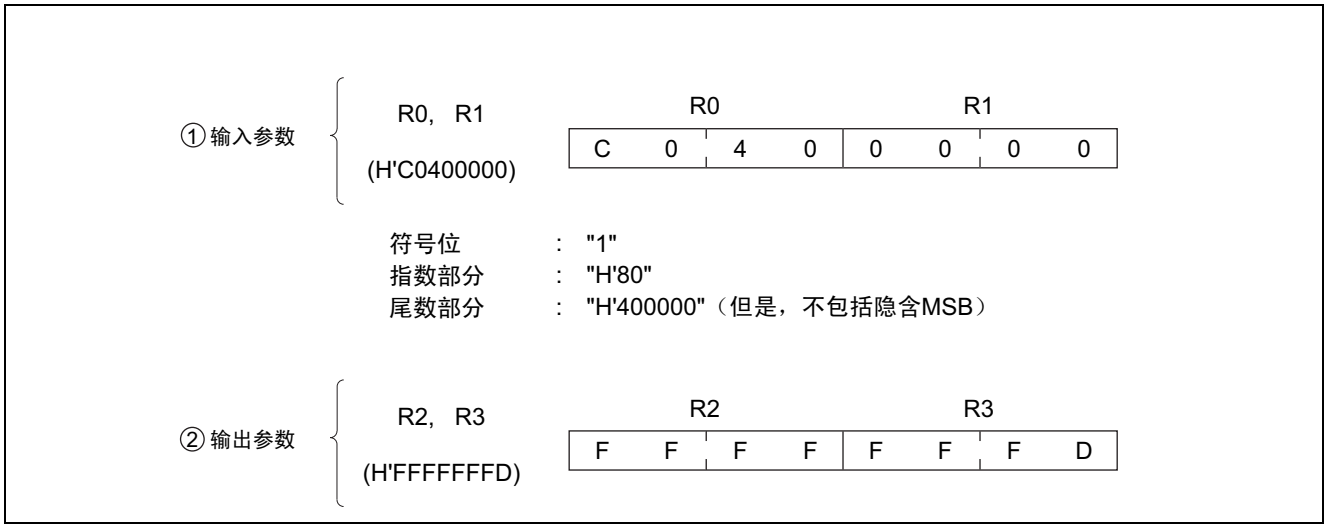


图 27-1 软件 FKTR 的执行例子

5.2 使用时的注意

(1) 单精度浮点是“0”或者小于｜1｜时，输出值为“0”。

(2) 单精度浮点大于等于｜2^{31}｜时，输出值为同符号的最大值（H’7FFFFFFF 或者 H’80000000）。

(3) 执行软件 FKTR 后，设定在 R0、R1 的输入参数被破坏。如果执行后还需要输入参数，就必须预先保存到存储器。

5.3 数据存储器的说明

软件 FKTR 不使用数据存储器。

5.4 使用例

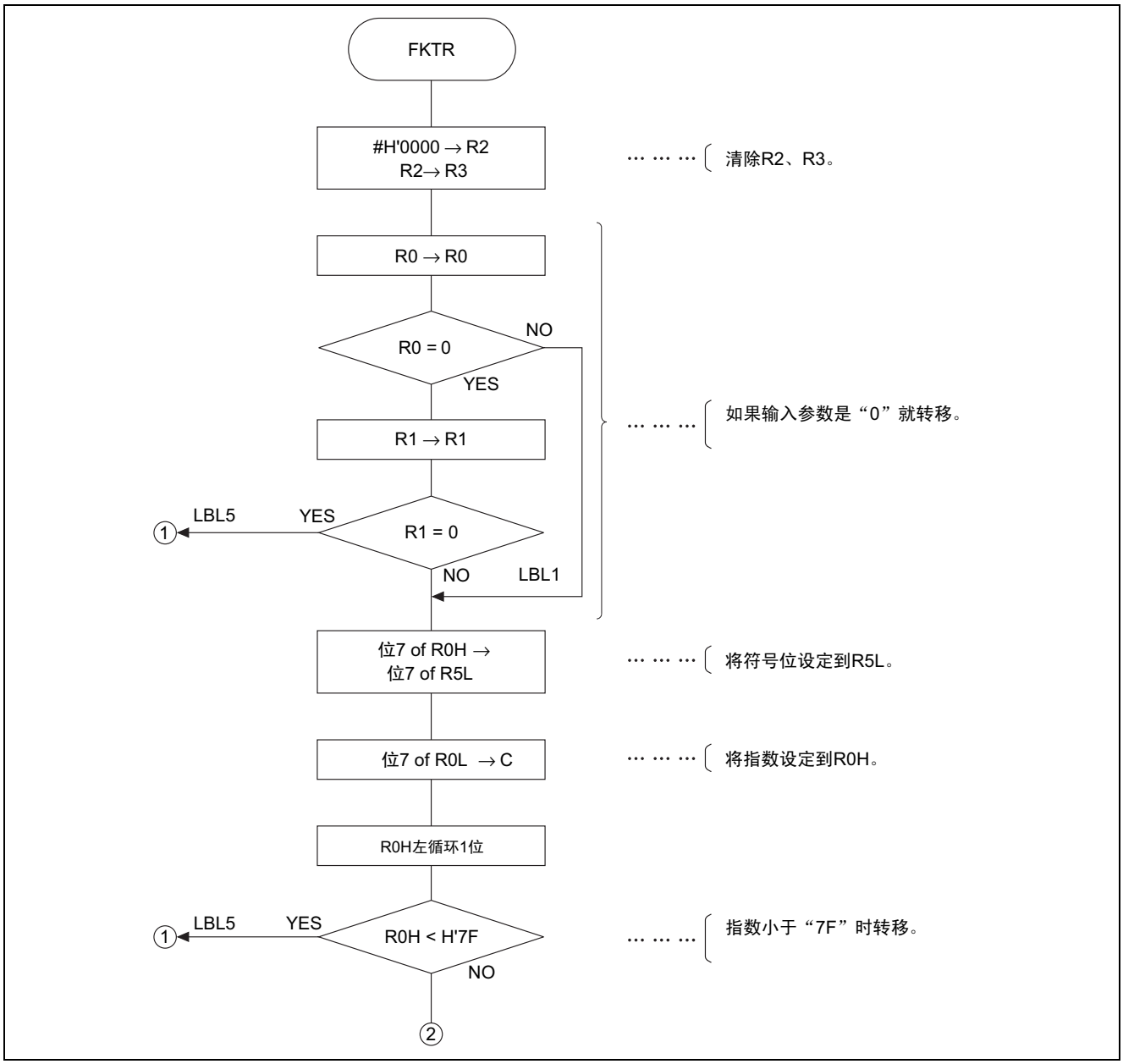
将单精度浮点设定到通用寄存器，子程序调用软件 FKTR

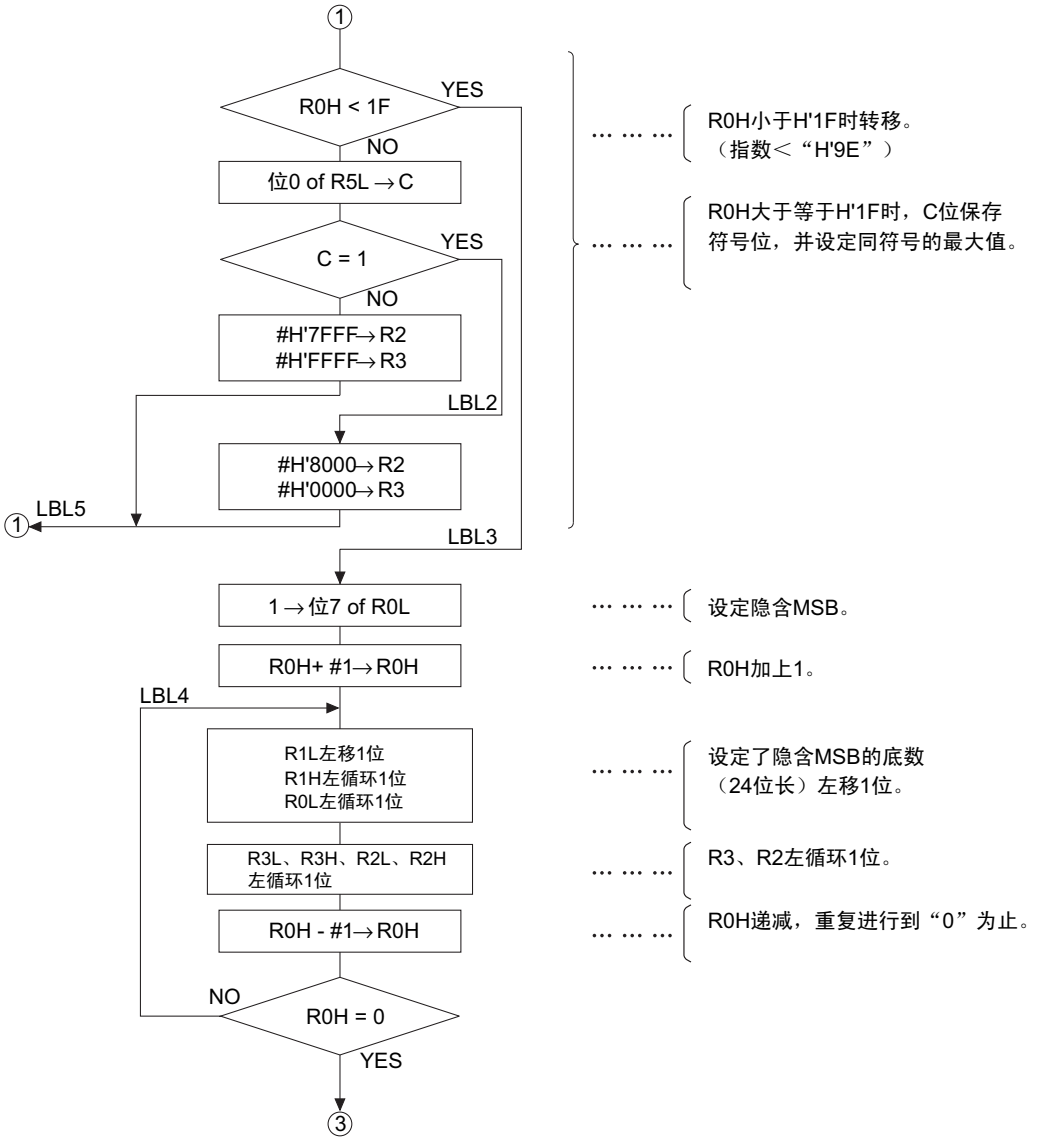
```
WORK1    . DATA. W   2,  0          …… 确保用户程序设定单精度浮点的
                                       数据存储区。

WORK2    . DATA. W   2,  0          …… 确保用户程序设定带符号32位
                                       2进制数的数据存储区。
                ⋮
         MOV. B      @WORK1, R0     …… 将由户程序设定的单精度浮点
         MOV. W      @WORK1+2, R1       设定到输入参数。

         JSR         @FKTR          …… 子程序调用软件FKTR。

         MOV. W      R2, @WORK2     …… 将带符号32位2进制数设定到
         MOV. W      R3, @WORK2+2       输出参数。
```

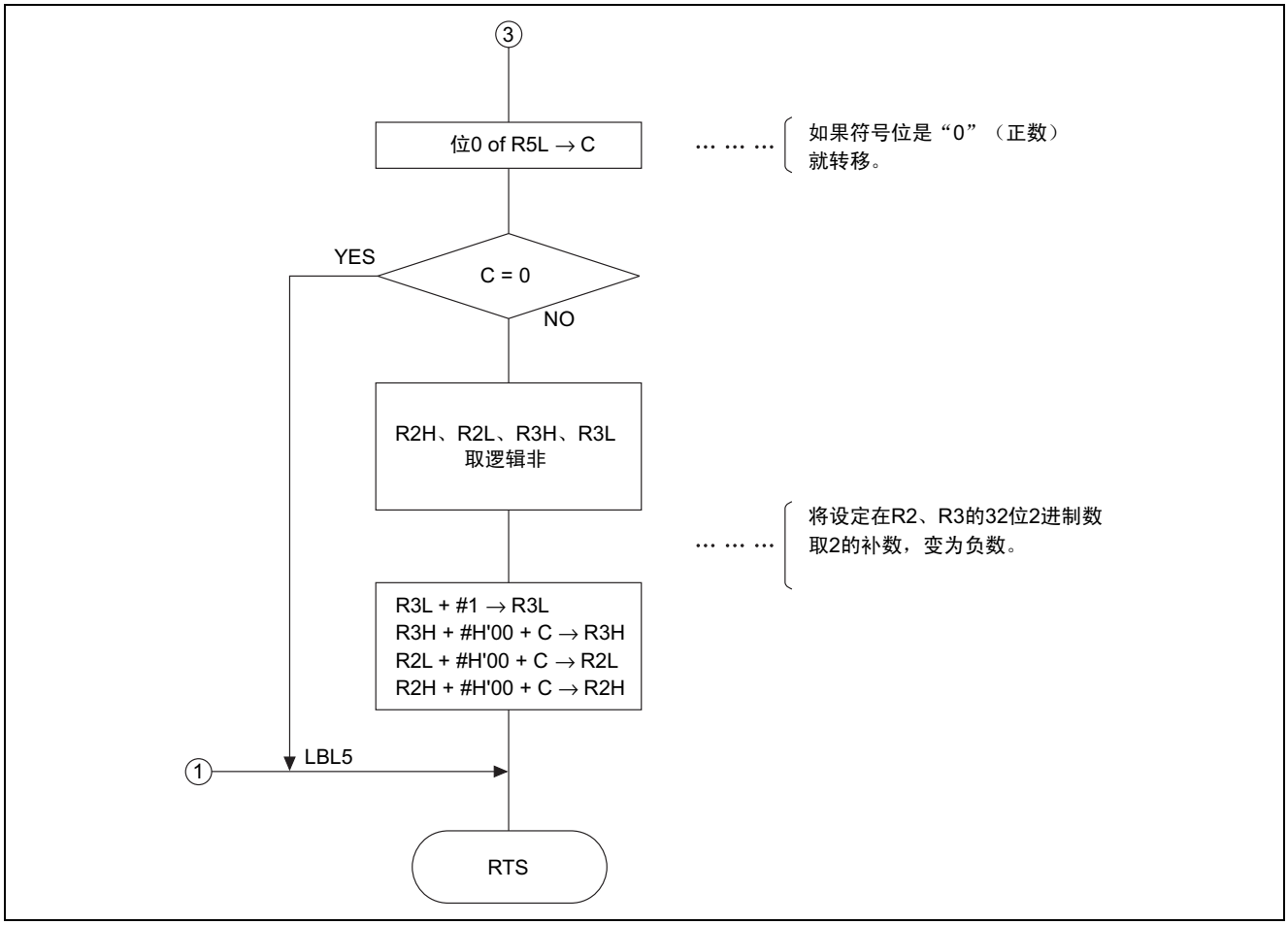
5.5 工作原理

(1) 在软件 FKTR 中，通过以下步骤将单精度浮点转换为带符号的 32 位 2 进制数：
(2) 首先，判断输入参数：
  (a) 如果输入参数是“0”，输出值就为“0”。
  (b) 如果指数小于“H’7F”，输出值就为“0”。
  (c) 如果指数大于等于“H’9E”，输出值就为同符号的最大值。
(3) 其次，当输入参数不是“0”、绝对值大于等于“1”（指数为 H’7F）并且小于 2^{31}（指数为 H’9E）时：
  (a) 设定隐含 MSB。
  (b) 将设定隐含 MSB 的尾数（24 位长）左移 1 位。
  (c) R3、R2 左循环 1 位。
  (d) 重复处理(b)、(c) “R0H + 1”次。
  (e) 如果符号位是负，就取 2 的补码，设定为负数。

6. 流程图


FKTR
#H'0000 → R2
R2→ R3
清除R2、R3。
R0 → R0
R0 = 0
NO
YES
R1 → R1
如果输入参数是“0”就转移。
LBL5
YES
R1 = 0
NO
LBL1
位7 of R0H →
位7 of R5L
将符号位设定到R5L。
位7 of R0L → C
将指数设定到R0H。
R0H左循环1位
LBL5
YES
R0H < H'7F
NO
指数小于“7F”时转移。
1
2


①
R0H < 1F
YES
NO
位0 of R5L → C
C = 1
YES
NO
#H'7FFF→ R2
#H'FFFF→ R3
LBL2
#H'8000→ R2
#H'0000→ R3
①
LBL5
LBL3
1 → 位7 of R0L
R0H+ #1→ R0H
LBL4
R1L左移1位
R1H左循环1位
R0L左循环1位
R3L、R3H、R2L、R2H
左循环1位
R0H - #1→ R0H
NO
R0H = 0
YES
③
R0H小于H'1F时转移。
（指数＜“H'9E”）
R0H大于等于H'1F时，C位保存
符号位，并设定同符号的最大值。
设定隐含MSB。
R0H加上1。
设定了隐含MSB的底数
（24位长）左移1位。
R3、R2左循环1位。
R0H递减，重复进行到“0”为止。


3
位0 of R5L → C
… … …
如果符号位是“0”（正数）
就转移。
YES
C = 0
NO
R2H、R2L、R3H、R3L
取逻辑非
… … …
将设定在R2、R3的32位2进制数
取2的补数，变为负数。
R3L + #1 → R3L
R3H + #H'00 + C → R3H
R2L + #H'00 + C → R2L
R2H + #H'00 + C → R2H
1
LBL5
RTS

7. 程序清单

```
*** H8/300 ASSEMBLER    VER 1.0B **  08/18/92 10:17:31
PROGRAM NAME =
1                           ;*********************************************************************
2                           ;*
3                           ;*    00 - NAME          :CHANGE FLOATING POINT TO 32 BIT BINARY
4                           ;*                        (FKTR)
5                           ;*
6                           ;*********************************************************************
7                           ;*
8                           ;*    ENTRY              :R0 (UPPER WORD OF FLOATING POINT)
9                           ;*                        R1 (LOWER WORD OF FLOATING POINT)
10                          ;*
11                          ;*    RETURNS            :R2       (UPPER WORD OF 32 BIT BINARY)
12                          ;*                        R3       (LOWER WORD OF 32 BIT BINARY)
13                          ;*
14                          ;*********************************************************************
15                          ;
16 FKTR_cod C 0000                  .SECTION           FKTR_code,CODE,ALIGN=2
17                                  .EXPORT            FKTR
18                          ;
19 FKTR_cod C      00000000 FKTR    .EQU     $                    ;Entry point
20 FKTR_cod C 0000 79020000         MOV.W    #H'0000,R2           ;Clear R2
21 FKTR_cod C 0004 0D23             MOV.W    R2,R3                ;Clear R3
22                          ;
23 FKTR_cod C 0006 0D00             MOV.W    R0,R0
24 FKTR_cod C 0008 4604             BNE      LBL1
25 FKTR_cod C 000A 0D11             MOV.W    R1,R1
26 FKTR_cod C 000C 4754             BEQ      LBL5                 ;Branch if R0=R1=0
27 FKTR_cod C 000E           LBL1
28 FKTR_cod C 000E 7770             BLD      #7,R0H
29 FKTR_cod C 0010 670D             BST      #0,R5L               ;Set sign bit to bit 0 of R5L
30 FKTR_cod C 0012 7778             BLD      #7,R0L
31 FKTR_cod C 0014 1200             ROTXL.B  R0H                  ;Set expornent
32 FKTR_cod C 0016 F57F             MOV.B    #H'7F,R5H
33 FKTR_cod C 0018 1850             SUB.B    R5H,R0H
34 FKTR_cod C 001A 4546             BCS      LBL5                 ;Branch if R0H<"H'7F"
35 FKTR_cod C 001C A01F             CMP.B    #H'1F,R0H
36 FKTR_cod C 001E 4518             BCS      LBL3                 ;Branch if R0H<"H'1F"
37 FKTR_cod C 0020 770D             BLD      #0,R5L
38 FKTR_cod C 0022 450A             BCS      LBL2                 ;Branch if sign bit = 1
39 FKTR_cod C 0024 79027FFF         MOV.W    #H'7FFF,R2
40 FKTR_cod C 0028 7903FFFF         MOV.W    #H'FFFF,R3           ;Set "H'7FFFFFFF"
41 FKTR_cod C 002C 4034             BRA      LBL5                 ;Branch always
42 FKTR_cod C 002E           LBL2
43 FKTR_cod C 002E 79028000         MOV.W    #H'8000,R2
44 FKTR_cod C 0032 79030000         MOV.W    #H'0000,R3           ;Set "H'80000000"
45 FKTR_cod C 0036 402A             BRA      LBL5
46                          ;
47 FKTR_cod C 0038           LBL3
48 FKTR_cod C 0038 7078             BSET     #7,R0L               ;Set implicit MSB
49 FKTR_cod C 003A 8001             ADD.B    #1,R0H               ;R0H + #1 -> R0H
50 FKTR_cod C 003C           LBL4
51 FKTR_cod C 003C 1009             SHLL.B   R1L                  ;Shift mantissa 1 bit left
52 FKTR_cod C 003E 1201             ROTXL.B  R1H
53 FKTR_cod C 0040 1208             ROTXL.B  R0L
```

```
54                          ;
55 FKTR_cod C 0042 120B             ROTXL.B  R3L                ;Rotate 32 bit binary 1 bit left
56 FKTR_cod C 0044 1203             ROTXL.B  R3H
57 FKTR_cod C 0046 120A             ROTXL.B  R2L
58 FKTR_cod C 0048 1202             ROTXL.B  R2H
59 FKTR_cod C 004A 1A00             DEC.B    R0H                ;Decrement R0H
60 FKTR_cod C 004C 46EE             BNE      LBL4               ;Branch if Z=0
61                          ;
62 FKTR_cod C 004E 770D             BLD      #0,R5L             ;Bit load sign bit to C flag
63 FKTR_cod C 0050 4410             BCC      LBL5               ;Branch if C=0
64 FKTR_cod C 0052 1702             NOT      R2H                ;2's complement 32 bit binary
65 FKTR_cod C 0054 170A             NOT      R2L
66 FKTR_cod C 0056 1703             NOT      R3H
67 FKTR_cod C 0058 170B             NOT      R3L
68 FKTR_cod C 005A 8B01             ADD.B    #H'01,R3L
69 FKTR_cod C 005C 9300             ADDX.B   #H'00,R3H
70 FKTR_cod C 005E 9A00             ADDX.B   #H'00,R2L
71 FKTR_cod C 0060 9200             ADDX.B   #H'00,R2H
72 FKTR_cod C 0062          LBL5
73 FKTR_cod C 0062 5470             RTS
74                          ;
75                                  .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

Cautions

Keep safety first in your circuit designs!

1. Renesas Technology Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corp. or a third party.
2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein.
   The information described here may contain technical inaccuracies or typographical errors.
   Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
   Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (http://www.renesas.com).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
   Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.

注意

本文只是参考译文，前页所载英文版“Cautions”具有正式效力。

请遵循安全第一进行电路设计

1. 虽然瑞萨科技尽力提高半导体产品的质量和可靠性，但是半导体产品也可能发生故障。半导体的故障可能导致人身伤害、火灾事故以及财产损害。在电路设计时，请充分考虑安全性，采用合适的如冗余设计、利用非易燃材料以及故障或者事故防止等的安全设计方法。

关于利用本资料时的注意事项

1. 本资料是为了让用户根据用途选择合适的瑞萨科技产品的参考资料，不转让属于瑞萨科技或者第三者所有的知识产权和其它权利的许可。
2. 对于因使用本资料所记载的产品数据、图、表、程序、算法以及其它应用电路的例子而引起的损害或者对第三者的权力的侵犯，瑞萨科技不承担责任。
3. 本资料所记载的产品数据、图、表、程序、算法以及其它所有信息均为本资料发行时的信息，由于改进产品或者其它原因，本资料记载的信息可能变动，恕不另行通知。在购买本资料所记载的产品时，请预先向瑞萨科技或者经授权的瑞萨科技产品经销商确认最新信息。
   本资料所记载的信息可能存在技术不准确或者印刷错误。因这些错误而引起的损害、责任问题或者其它损失，瑞萨科技不承担责任。
   同时也请通过各种方式注意瑞萨科技公布的信息，包括瑞萨科技半导体网站。
   （http：//www.renesas.com）
4. 在使用本资料所记载部分或者全部数据、图、表、程序以及算法等信息时，在最终做出有关信息和产品是否适用的判断前，务必对作为整个系统的所有信息进行评价。由于本资料所记载的信息而引起的损害、责任问题或者其它损失，瑞萨科技不承担责任。
5. 瑞萨科技的半导体产品不是为在可能和人命相关的环境下使用的设备或者系统而设计和制造的产品。在研讨将本资料所记载的产品用于运输、交通车辆、医疗、航空宇宙用、原子能控制、海底中继器的设备或者系统等特殊用途时，请与瑞萨科技或者经授权的瑞萨产品经销商联系。
6. 未经瑞萨科技的书面许可，不得翻印或者复制全部或者部分资料的内容。
7. 如果本资料所记载的某产品或者技术内容受日本出口管理限制，必须在得到日本政府的有关部门许可后才能出口，并且不准进口到批准目的地国家以外的国家。
   禁止违反日本和（或者）目的地国家的出口管理法和法规的任何转卖、挪用或者再出口。
8. 如果需要了解本资料所记载的信息或者产品的详细，请与瑞萨科技联系。