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April 1st, 2010
Renesas Electronics Corporation

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38D2 Group

Key Scan

1. Abstract

The following article introduces and shows an example of how to use the Key Scan on the 38D2 Group device.

2. Introduction

The application explained in this document applies to the following MCU and parameter(s):

Applicable MCU: 38D2 Group

Oscillation frequency: 8 MHz

This sample program may include operations of unused bit functions for the convenience of the SFR bit layout. Set the values according to the operational conditions of the user system.

3. Contents

3.1 Key Scan

Outline:

- Key matrix of 4×4 is input.

Specifications:

- Scan output: P04 to P07
- Key input: P00 to P03
- “L” scan at every 2.5 ms
- Fixed key input: Corresponding three times
- When pressing two keys simultaneously, key input is disabled.

Figure 3.1 shows the Connection Diagram, Tables 3.1 and 3.2 show the Used RAM Definitions and Flag Definitions, Figure 3.2 shows the Relevant Register Settings, and Figure 3.3 and 3.4 show the Control Procedure.

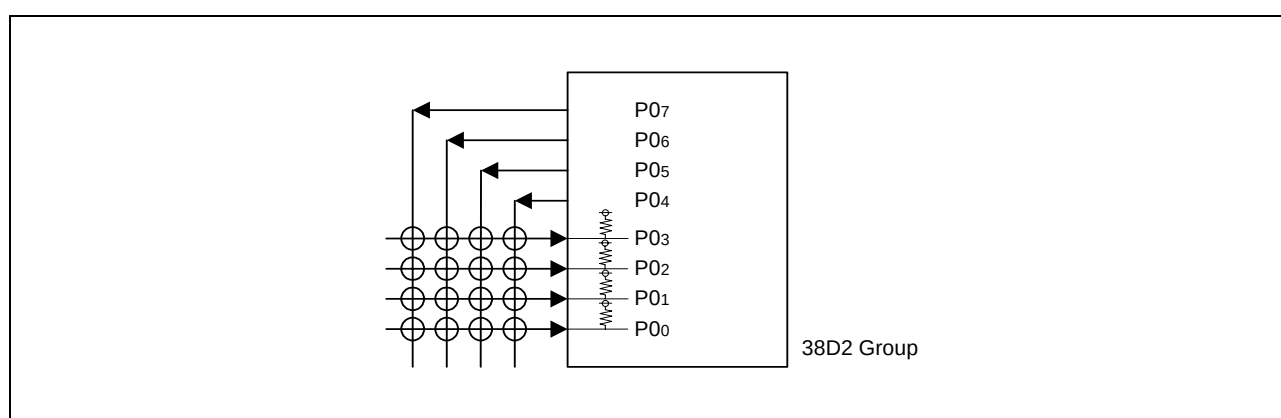


Figure 3.1 Connection Diagram

Table 3.1 Used RAM Definitions

Address (H)	Label Data Type	Initial Value	Size (Byte)	Description	Min (H)	Max (H)	Flag
0050	WORK	00H	1	Multipurpose buffer	00	FF	–
0051	WORK2	00H	1	Multipurpose buffer 2	00	16	–
0052	C_KEY	00H	1	Number of pressed keys	00	16	–
0053	KEY_SCAN_NOW	00H	4	Key input buffer	00	0F0F0F0F	–
0057	KEY_NO_BUF0	00H	1	Previous key input number	00	FF	–
0058	KEY_NO_BUF1	00H	1	Key input number before previous key input number	00	FF	–
0059	KEY_NO	00H	1	Fixed key input number	00	FF	–
005A	F_KEY	00H	1	Key flag	00	02	√

Table 3.2 Flag Definitions

Address(H)	005A	Label Data Type	F_KEY	File Name	FUNC_KEY2.A74
Bit Symbol	Bit Position	Initial Value	Contents	Bit Pattern	Meaning of Bit Pattern
F_KEY_OFF	b7 ☐ ☐ ☐ ☐ ☐ ☐ ☒ ☐ b0	0	Key input OFF flag	00000000B 00000010B	Key OFF Key ON

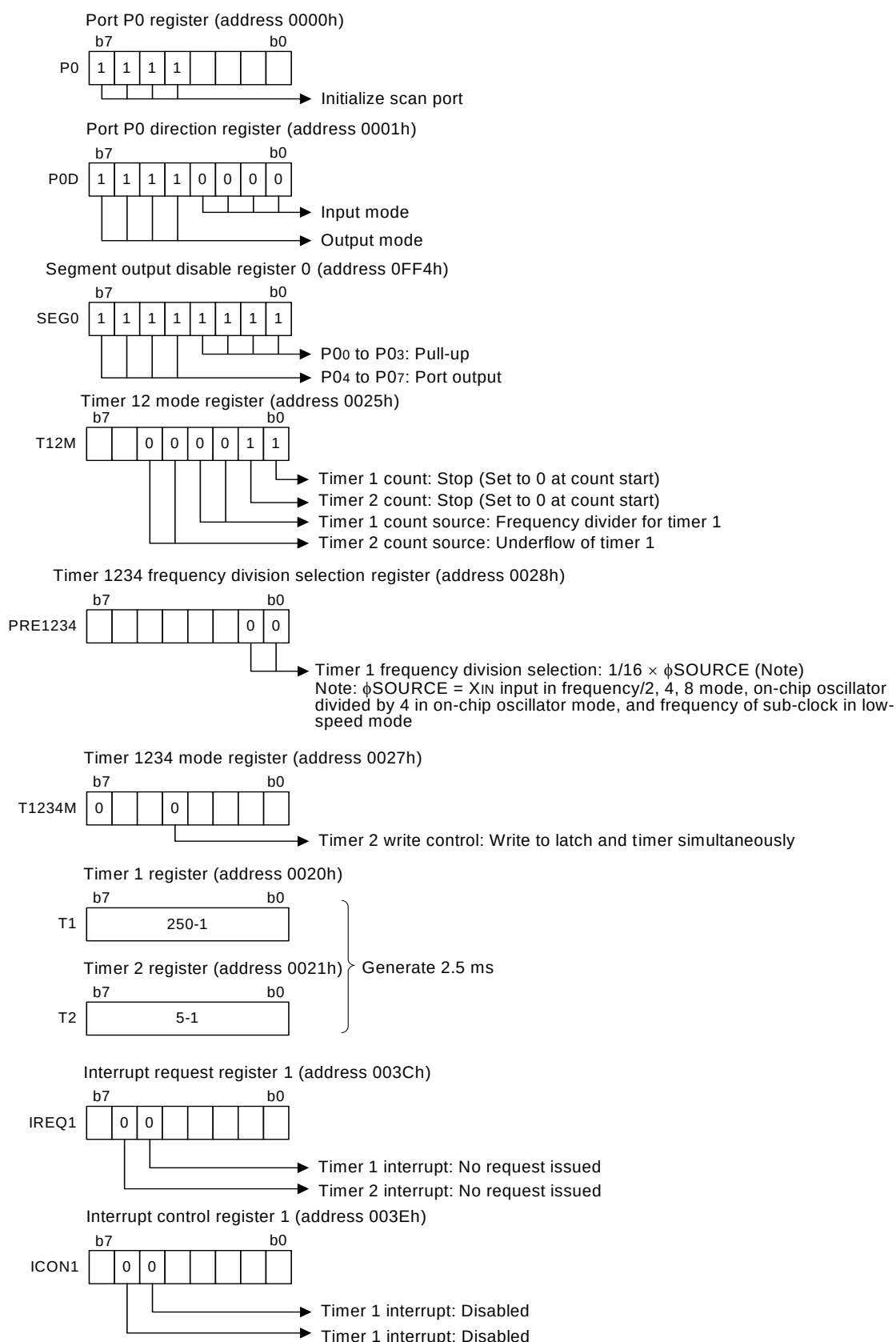
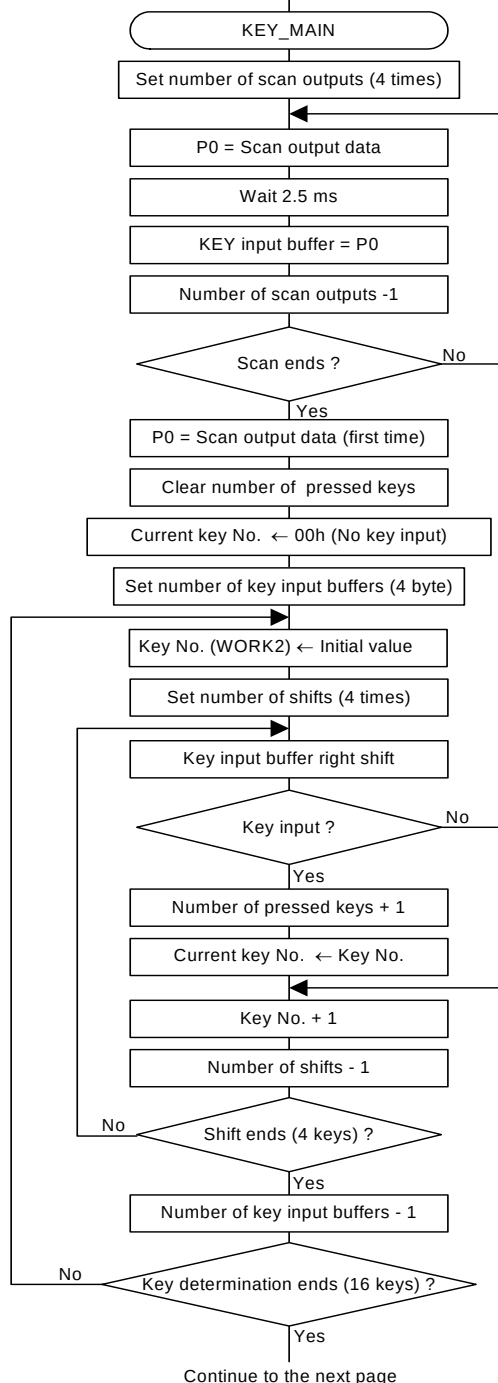


Figure 3.2 Relevant Register Settings

P0	(address 0000h)	← 1111XXXXb
P0D	(address 0010h)	← 11110000b
SEG0	(address 0FF4h)	← 11111111b
ICON1	(address 003Eh)	← X00XXXXXb
T12M	(address 0025h)	← XX000011b
PRE1234	(address 0028h)	← XXXXXX00b
T1234M	(address 0027h)	← 0XX0XXXXb
T1	(address 0020h)	← 250-1
T2	(address 0021h)	← 5-1
IREQ1	(address 003Ch)	← X00XXXXXb
T12M	(address 0025h)	← 0
T12M	(address 0025h)	← 0

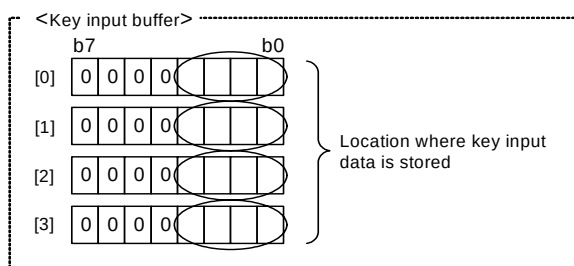
- X: Not used in this application.
Set to 0 or 1 according to use.

- P0₀ to P0₃: Input mode
- P0₄ to P0₇: Output mode
- P0₀ to P0₃: Pull-up
- Timer 1, 2 interrupt disabled
- Timer 1, 2 count stop
- Generate 2.5 ms
- No timer 1, 2 interrupt request issued
- Timer 2 count start
- Timer 1 count start



- Scan output
P0 = 01110000b (first time)
P0 = 10110000b (second time)
P0 = 11010000b (third time)
P0 = 11100000b (fourth time)

- Mask data in output mode (P0₄ to P0₇), invert bits and store them in key input buffer (4 bytes) sequentially.



- Shift data of key input buffer to one bit right and determine number of pressed keys and their key numbers.
- Shift key input buffer to the right and determine in what number of bit data is set.

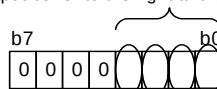


Figure 3.3 Control Procedure (1)

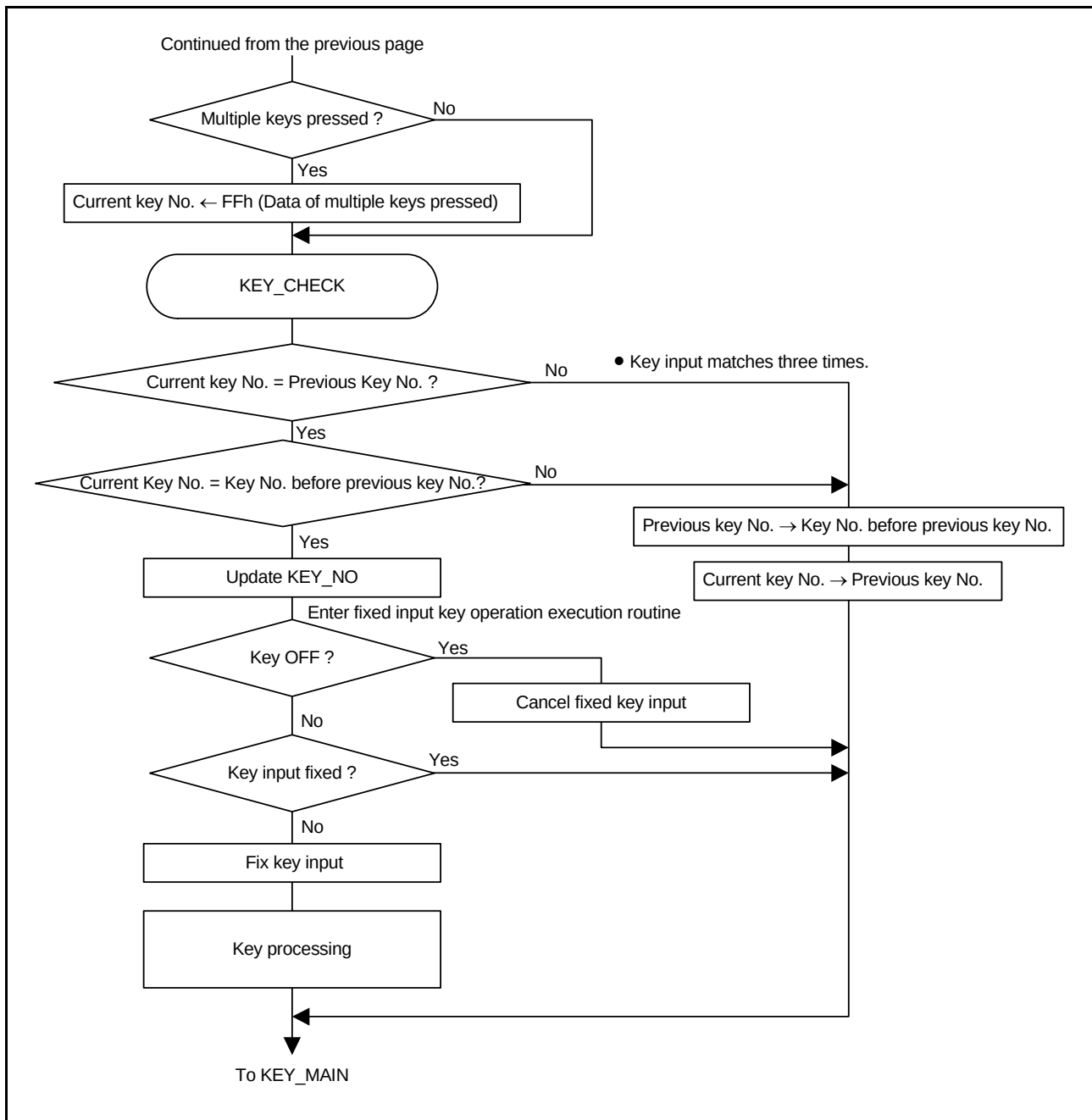


Figure 3.4 Control Procedure (2)

4. Sample Programming Code

Download a sample program from the Renesas Technology website.

To download, click "Application Notes" in the left side menu on the page of the 38D2 Group.

5. Reference Document

Datasheet

38D2 Group Datasheet

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REVISION HISTORY	38D2 Group Key Scan
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Rev.	Date	Description	
		Page	Summary
1.00	Feb 9 2007	–	First Edition issued

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