

# Products Overview

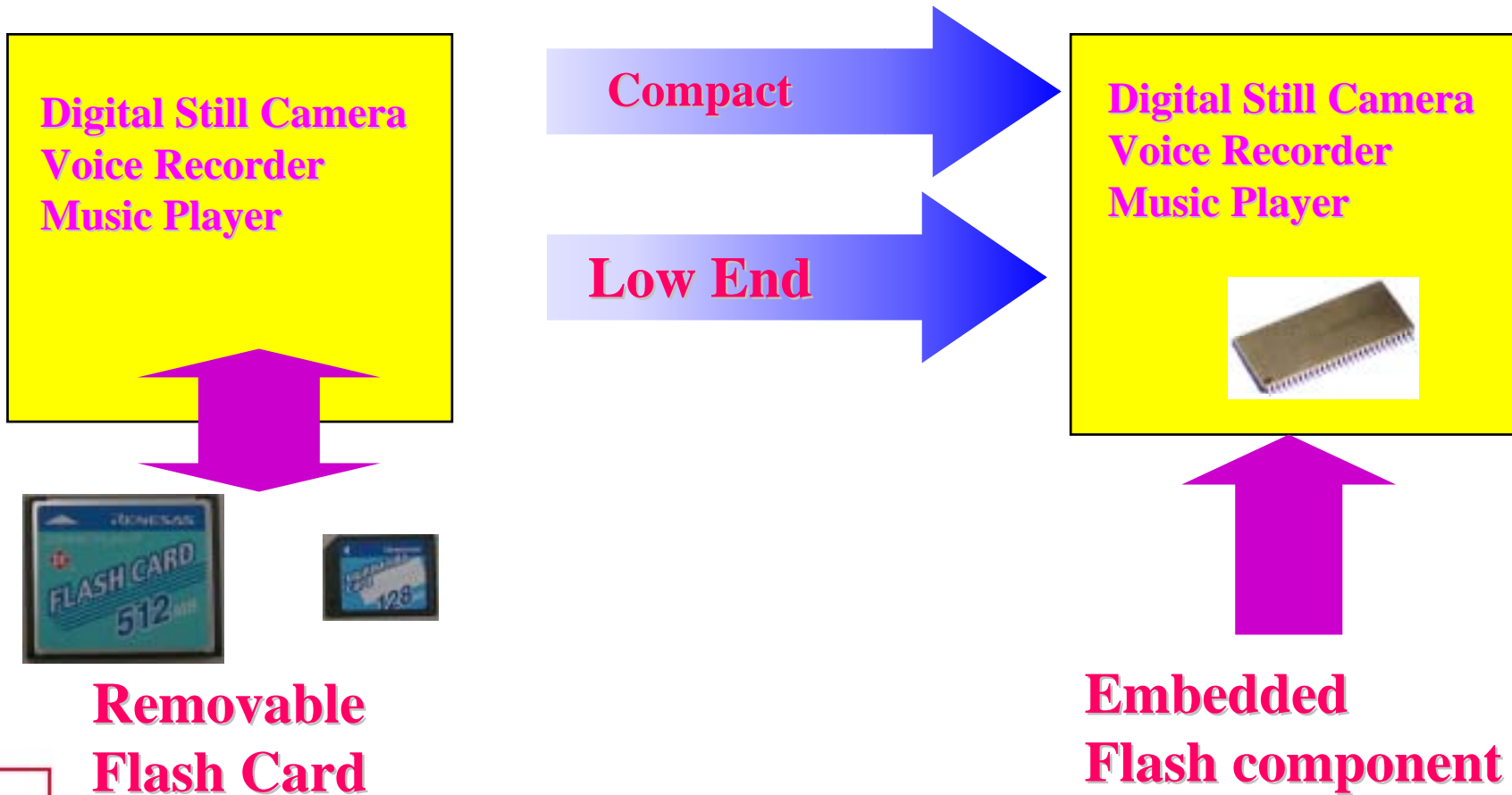
*AND FLASH COMPONENTS*

*FOR EMBEDDED APPLICATION*

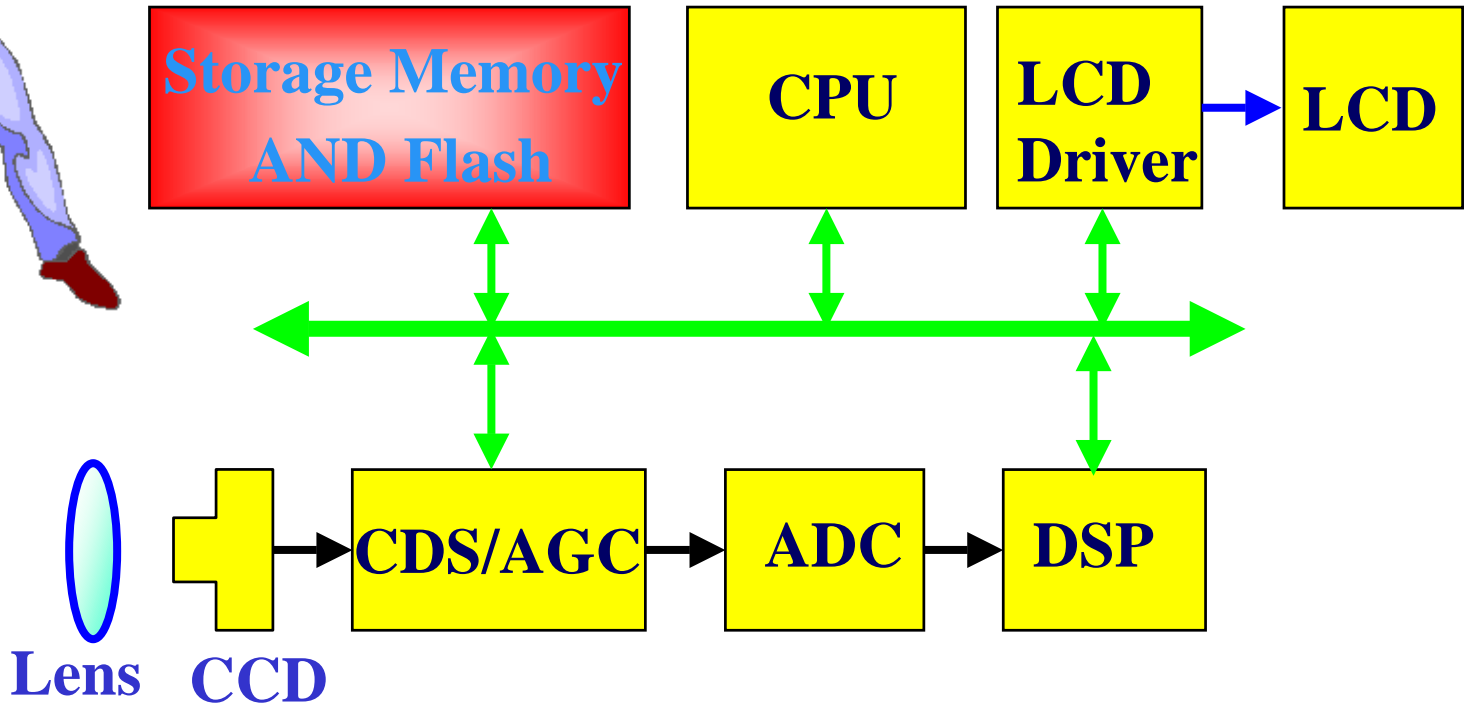
Memory Product Marketing Dept.  
Memory Division  
Memory Business Unit  
Renesas Technology Corp.

# AND Flash Application for embedded system

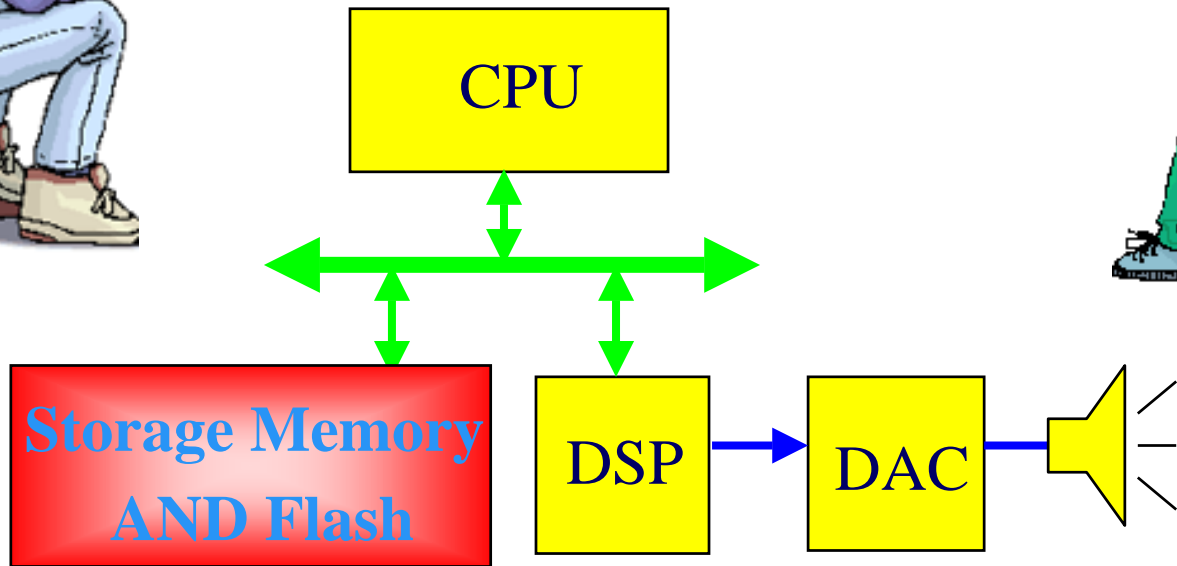
## AND Flash : Storage function in the system



# Digital Still Camera System



# Digital Music Player System



# Concerning Start of Design

**1. AND Flash is 98% MGM memory.**

→ **Maximum 2% unusable sector**

**Need address management**

**2. Sector failure may occur during an operation.**

→ **Need ECC and 1.8% spare sector**

**3. Accidental bit error may occur during a write operation.**

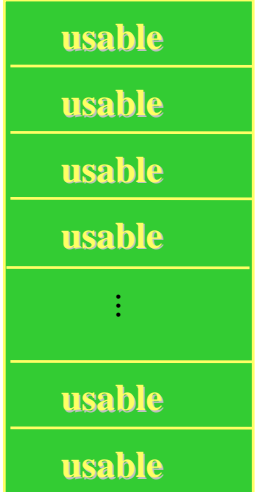
→ **Need verify to check the bit error.**

**4. Wear leveling is recommended.**

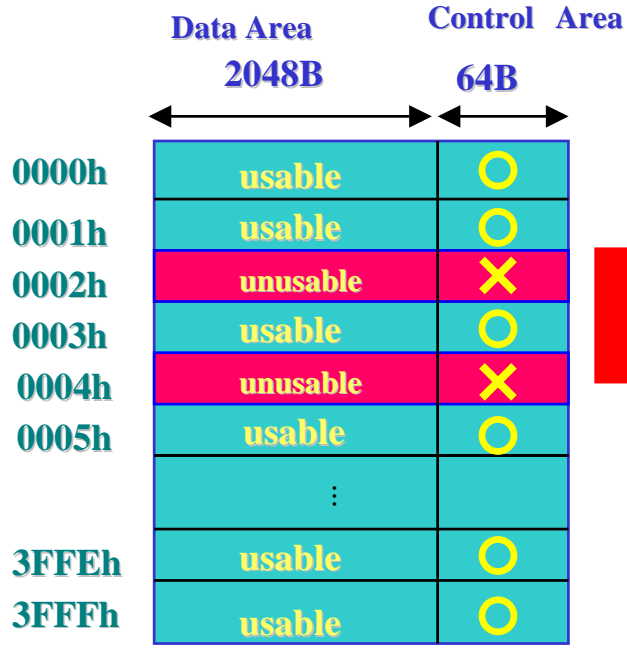
Please see the document [[Flash Application Design Guidelines](#)] as for the detail.

# 98% MGM memory

Host needs to control through sector management software.



NOR Flash  
DRAM, SRAM



AND Flash



### Host System

**Manage the table from physical to logical address**

**physical add.**

0000h
0001h
0002h
0003h
0004h
0005h

**logical add.**

0000h
0001h
0002h
0003h

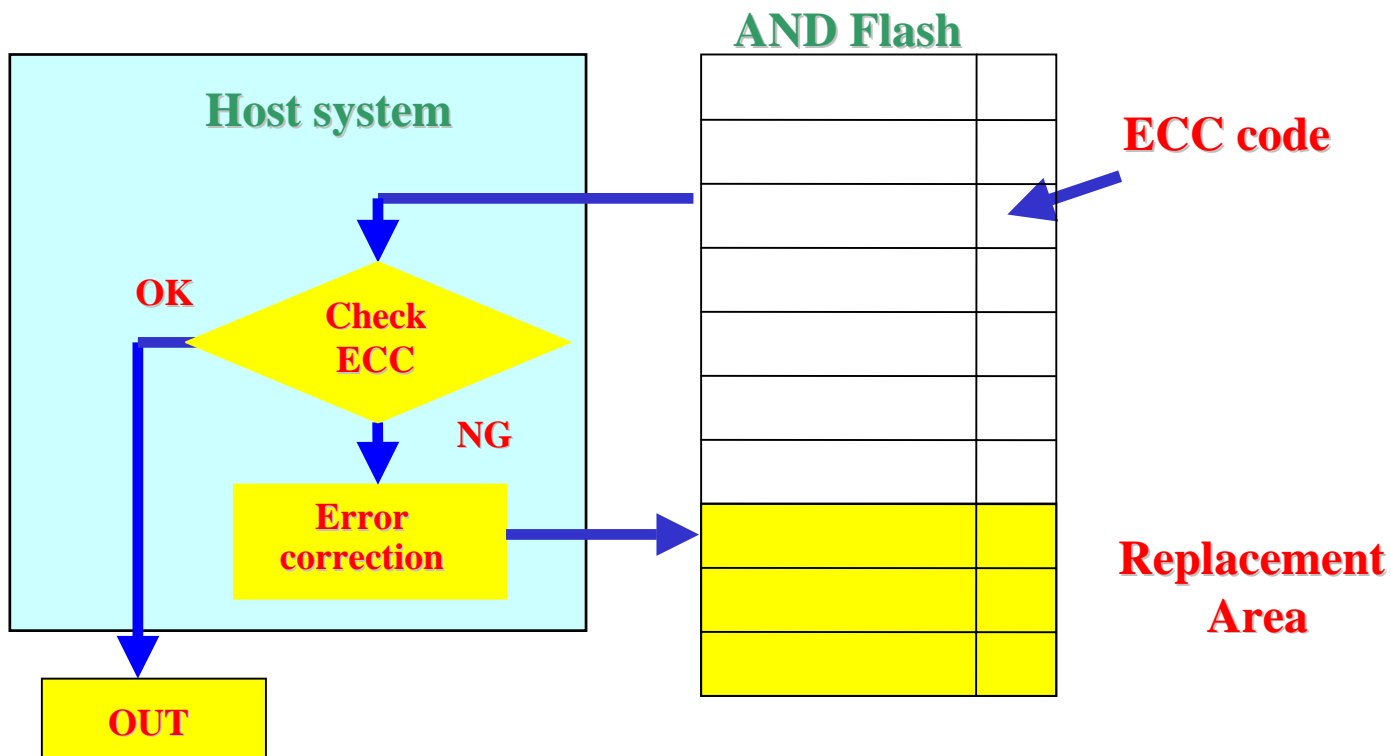
# ECC Control



**Hitachi recommends using 1 bit ECC Control.**



**Spare sectors are allocated for replacement purposes.**



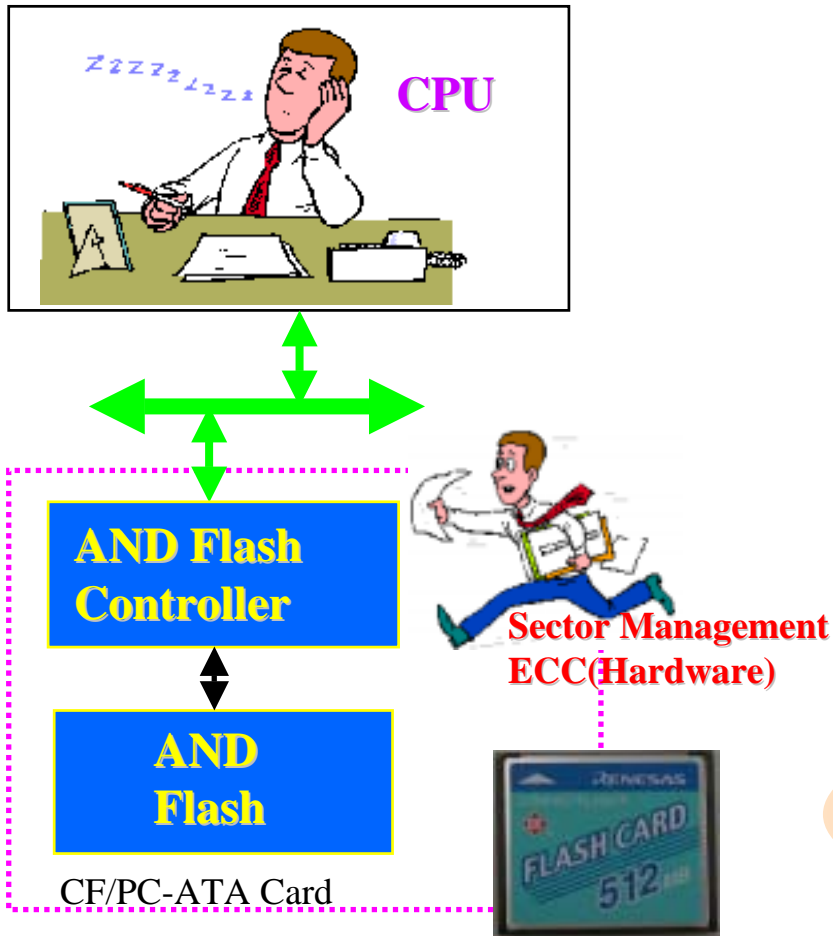




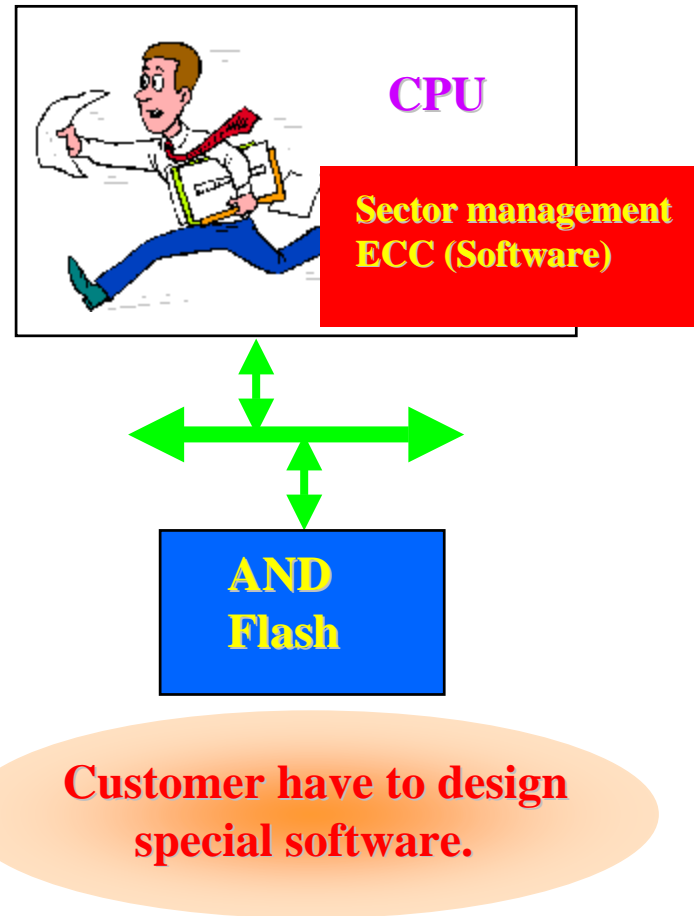
# AND Flash Control System

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## (Case 1) Through AND Flash Controller



## (Case 2) Direct control with Micon

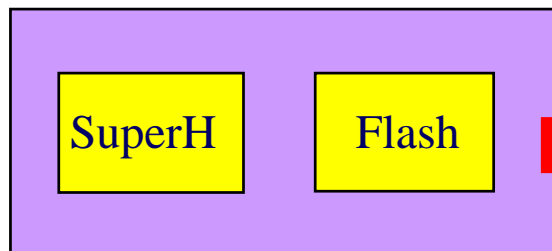


# AND Flash development reference kit

SUNSTAR微波通信 <http://www.rfce.net/> TEL:0755-83399882 FAX:0755-83376182 E-MAIL:szss20@163.com



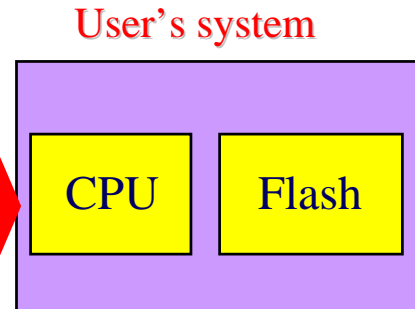
## AND Flash Development Reference Kit



Evaluate the control software



Translate the Flash memory control software to user's CPU



Please see the [AND Flash Reference Support Kit](#) as for the detail.

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# System Configuration

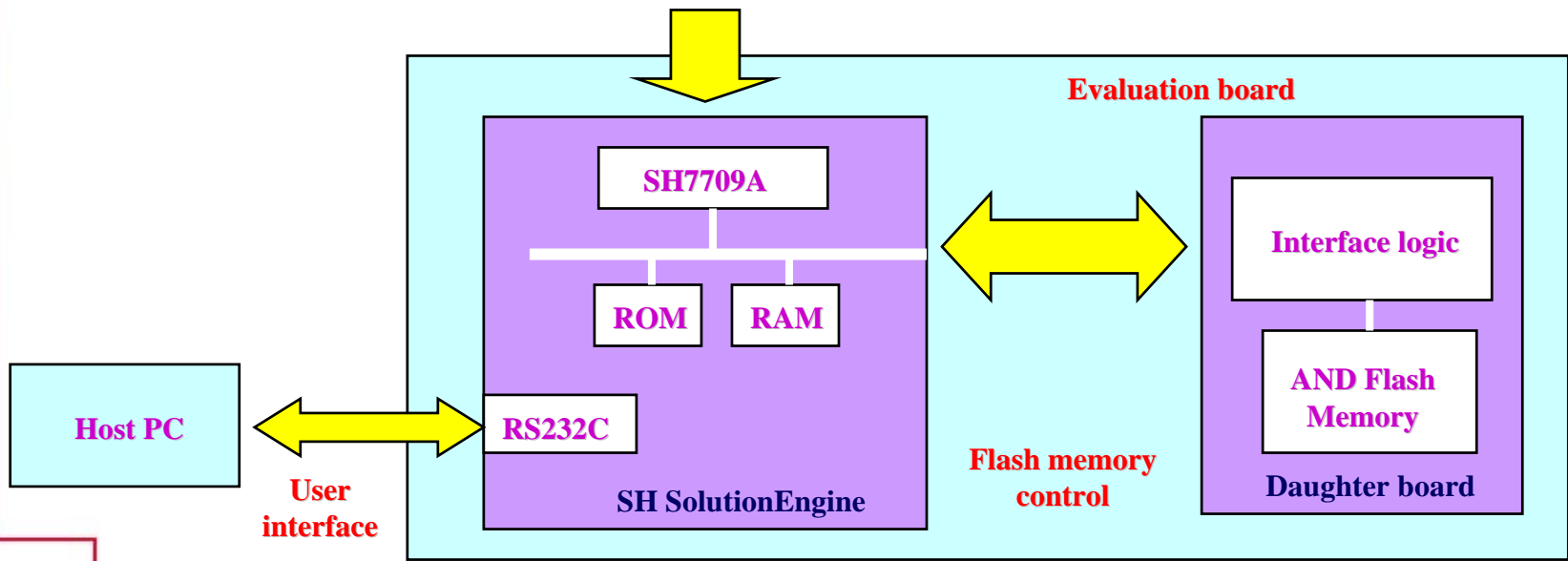
- Software with C-source code Control AND Flash.
- Evaluation board



**ECC**

Using Hamming code.

1Byte error is correctable per 512Byte for 256Mbit AND Flash

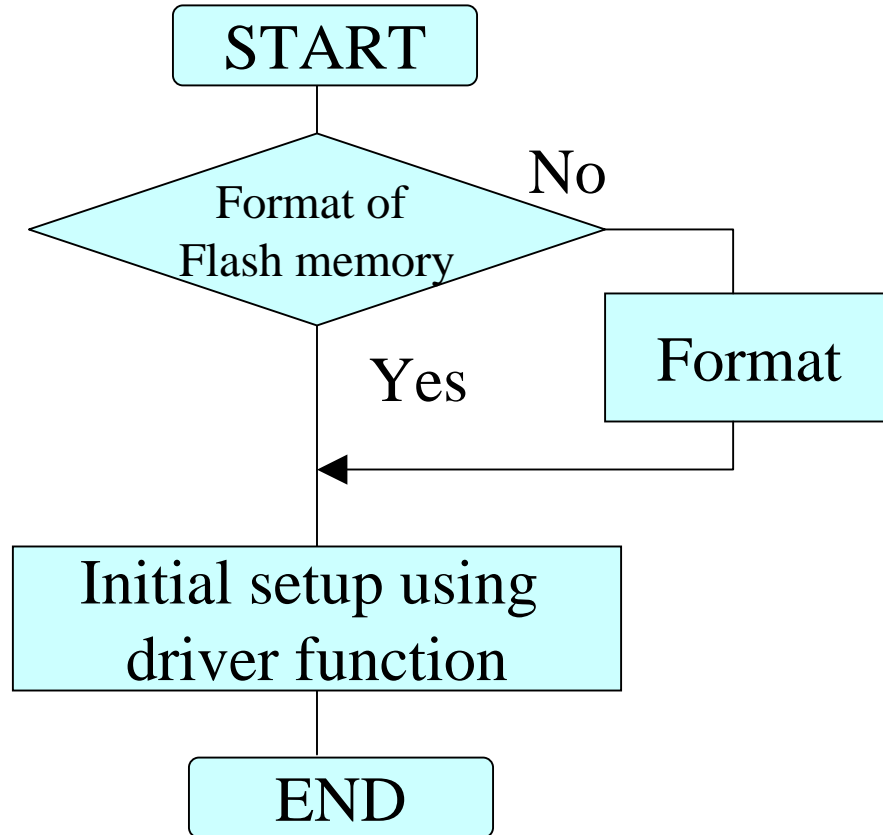


# Management Software

## Flash Memory Control Function

Function	Contents
Memory Format	Generate logical-physical conversion table
Driver (Initial setup)	Copy the conversion table to the RAM Preparation for memory access
Read	Access per 512 bytes ECC error detection. Error correction +Refresh
Write	Access per 512 bytes Error correction + Sector replacement
Erase	Erase per 2048 bytes Error management (Sector replacement)

# Setup for flash Access Using Management Software

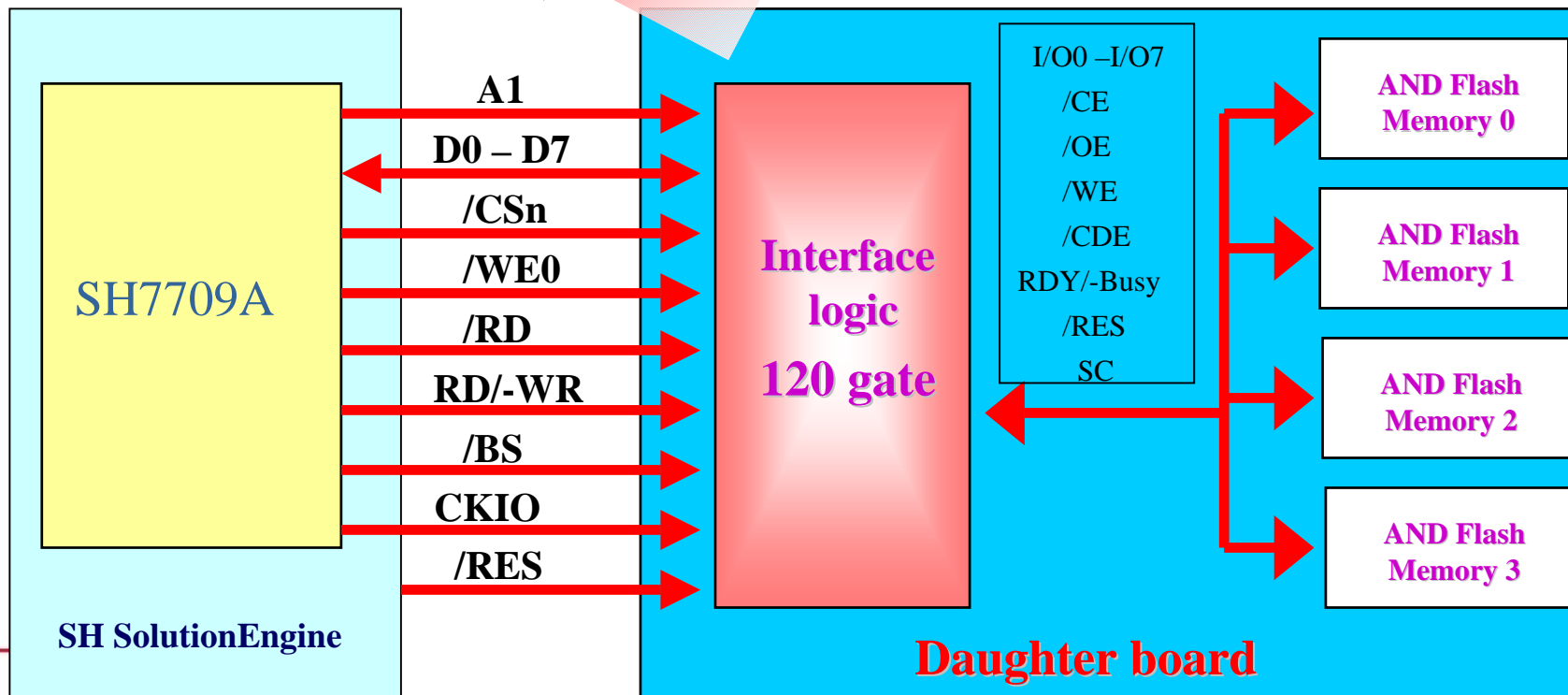


# AND Flash Daughter board

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RTL data

Hitachi provides the RTL data of Interface logic.



# Register Map

**Flash memory is accessed through flash control register from SH bus.**

**Register address: 0xB4000000 (SH bus area 5)**

Register Name	Offset address	Function	R/W
FROMD	+0h	Flash I/O	R/W
FROMC	+2h	Flash Control	W
FROMS		Flash Status	R

# FROMD

**Connected to the I/O0 – I/O7 of Flash Memory**

**READ : Input data from I/O7-I/O0**

**WRITE : Output to the flash I/O7-I/O0**

Bit No.	Bit name	R/W	Initial value	Function
7	FROMD7	R/W	-	I/O7
6	FROMD6	R/W	-	I/O6
5	FROMD5	R/W	-	I/O5
4	FROMD4	R/W	-	I/O4
3	FROMD3	R/W	-	I/O3
2	FROMD2	R/W	-	I/O2
1	FROMD1	R/W	-	I/O1
0	FROMD0	R/W	-	I/O0



# FROMS

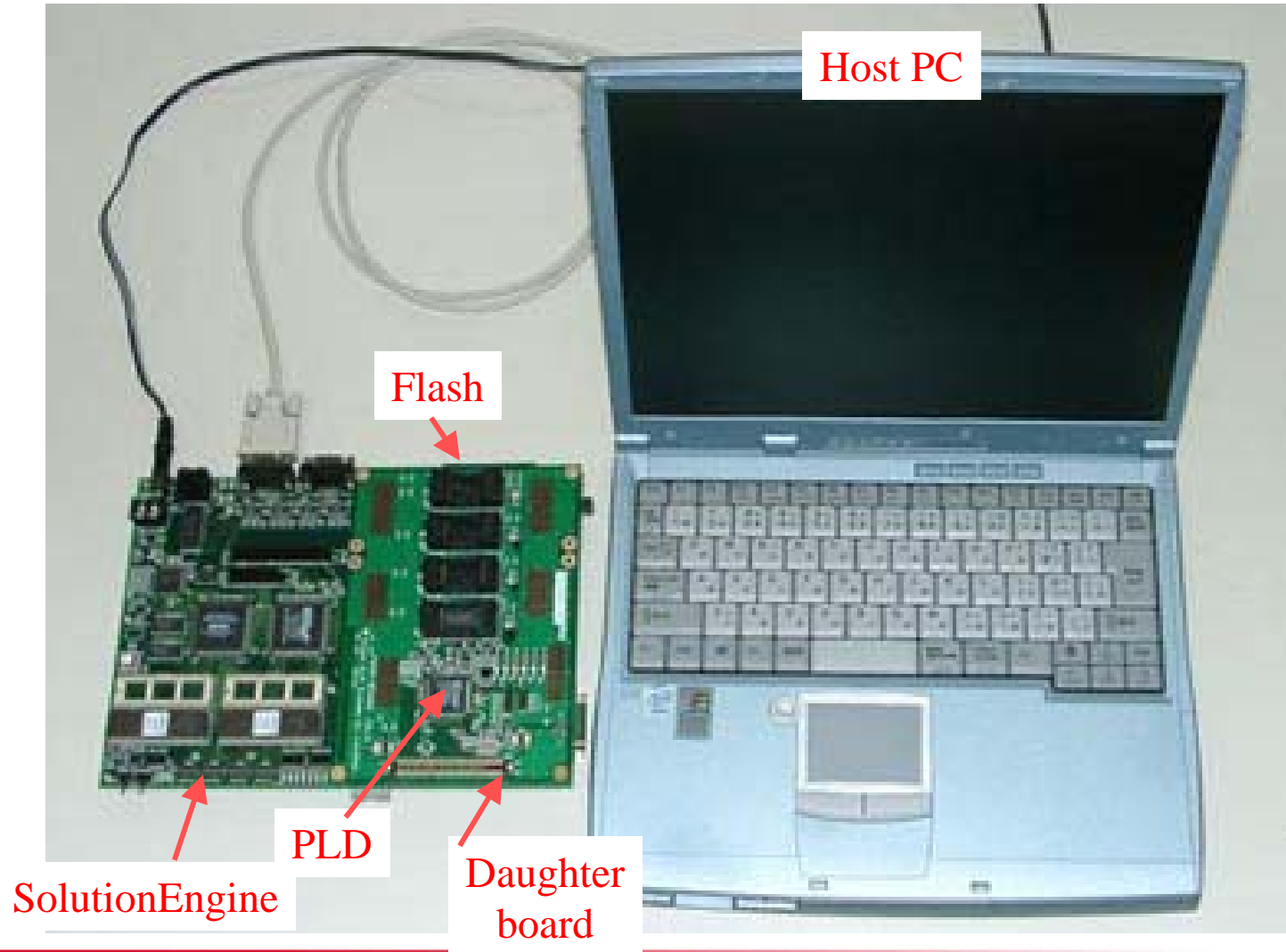
## Read the RDY/-Busy signal of Flash Memory

Bit No.	Bit name	R/W	Initial value	Function
7	-	-	-	-
6	-	-	-	-
5	-	-	-	-
4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-
0	RDYn	R	-	1 : RDY/Busy is High (Ready) 0 : RDY/Busy is Low (Busy)

# FROMC

## Control signal is set and output to Flash Memory

Bit No.	Bit name	R/W	Initial value	Function
7	FRESn	W	1	RESn signal is output to Flash(4 pieces)
6	FCE3n	W	1	CE signal is output to Flash 3
5	FCE2n	W	1	CE signal is output to Flash 2
4	FCE1n	W	1	CE signal is output to Flash 1
3	FCE0n	W	1	CE signal is output to Flash 0
2	FSC	W	0	SC signal is output to Flash(4 pieces)
1	FCDEn	W	1	CDEn signal is output to Flash(4 pieces)
0	FWEn	W	0	WEn signal is output to Flash(4 pieces)



# Sample Program

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```
*****  
* Flash ROM Test *  
*****
```

[Enter Command]

- 1 ..... Select FROM & START
- 2 ..... Format FROM
- 3 ..... FROM Logical Block Read
- 4 ..... FROM Logical Block Write
- 5 ..... FROM Cluster Erase
- 6 ..... Get Driver Information
- 7 ..... Show Write Data
- 8 ..... Show Read Data
- 9 ..... Set Write Data Pattern
- 10 ..... Edit Write Data Pattern
- 11 ..... FROM Physical Cluster Read
- 12 ..... FROM Physical Cluster Write
- 13 ..... Edit Physical Data
- 14 ..... Quit

Read

Get Information

Write

```
*****  
* Flash ROM Test *  
*****  
6  
*** FROM Information ***  
flID = 0000  
Data Cluster No = 3EAC  
Backup Cluster No = 012C  
Used Backup Cluster = 0000
```

```
*****  
* Flash ROM Test *  
*****  
4  
<<< FROM Block Write Test >>>  
Start Block No[0-Max]>0  
Write Block Cnt[1-50]>1  
*** End of Block Write ***
```

```
*****  
* Flash ROM Test *  
*****
```

```
3  
<<< FROM Block Read Test >>>  
Start Block No[0-Max]>0  
Read Block Cnt[1-50]>1  
*** End of Block Read ***
```

Show read data

```
*****  
* Flash ROM Test *  
*****  
8  
Read Blk Count -> 1  
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F  
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F  
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F  
30 31 32 33 34 35 36 37 38 39 3A 3B 3C 3D 3E 3F  
40 41 42 43 44 45 46 47 48 49 4A 4B 4C 4D 4E 4F  
50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D 5E 5F  
60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F  
70 71 72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F  
80 81 82 83 84 85 86 87 88 89 8A 8B 8C 8D 8E 8F  
90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D 9E 9F  
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD AE AF  
B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF  
C0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF  
D0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF  
E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF  
F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF  
Read 512 Block0000
```

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RENESAS

# Reference Kit Support

	Supply	Technical Support
Ref. Software (C-Source, Manual)	Hitachi Web. Site	Memory Product Marketing Dept. Memory Division Memory Business Unit Renesas Technology Corp.
AND Flash Daughter board	Hitachi ULSI Systems	
SolutionEngine (MS7709ASE01)	by way of Nissei Sangyo	Hitachi ULSI Systems by e-mail (sh-sengn@hitachi-ul.co.jp)

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