To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

Send any inquiries to http://www.renesas.com/inquiry.

User's Manual

SH7206 CPU Board M3A-HS60

User's Manual

Renesas32-Bit RISC Microcomputers
SuperH™ RISC Engine Family/SH7200 Series/
SH7206 Group

Renesas Electronics
www.renesas.com

Rev.1.00 2005.06

Requests for Safety Design

- Renesas is constantly making efforts to improve the quality and reliability of its products. However, not all semiconductor products are trouble-free, they may become faulty or operate erratically. To ensure that no accidents such as injury or a fire or no social damage may arise from Renesas semiconductor products should they become faulty or operate erratically, please pay careful attention to the safety design of your system by, for example, considering redundancy design and incorporating measures to check the spread of a fire and prevent device malfunction.

Precautions on Using This Manual

- This manual only provides reference information to help customers purchase the appropriate type of Renesas Technology product that suits the intended purpose of use, and the technical information contained herein does not implicitly or otherwise grant a license or rights to use the intellectual property or other rights of Renesas Technology.
- Renesas Technology will not assume any responsibility for damage or losses or infringement on the third parties' rights arising from the use of product data, diagrams, tables, programs, algorithms or example application circuits presented in this manual.
- The product data, diagrams, tables, programs, algorithms and all other information presented herein reflect the latest that was available at the time this manual was issued, and Renesas Technology reserves the right to change the products or specifications described herein without prior notice. When purchasing Renesas Technology semiconductor products, please contact Renesas Technology or Renesas Technology Sales or other distributors to obtain the latest information, and also keep abreast of the information published at the Renesas Technology home page (http://www.renesas.com) or through other media.
- The information contained herein was carefully prepared and is believed to be correct. However, Renesas Technology will not assume responsibility for losses that the customers by any possibility may suffer because of erroneous description in this manual.
- To use the technical contents in product data, diagrams or tables or the programs or algorithms presented herein for your system, please carefully evaluate their suitability as part of the entire system, not singly as a technical content, program or algorithm alone, to determine in advance whether they are actually suitable for your system. Renesas Technology will not assume responsibility for the suitability of said items in user systems.
- The products presented herein are not designed or manufactured for use in equipment or systems that are used under conditions where human life is concerned. If you plan to use the products presented herein for special applications such as transportation, mobile, medical, aerospace, nuclear control or submarine repeater equipment or systems, please consult Renesas Technology or Renesas Technology Sales or other distributors.
- This manual may not be copied or reproduced, in whole or part, without prior written consent of Renesas Technology.
- For more detailed information or for questions or doubts about this manual, please consult Renesas Technology or Renesas Technology Sales or other distributors.

Revision History	SH7206 CPU Board M3A-HS60User's Manual

Rev.	Date of Issue	Content of Revision	
		Page	Points
1.00	June 1.2005	-	First edition issued.

Table of Contents

Chapter1

Overview

1.1 Overview

The M3A-HS60 is the CPU board designed for users to evaluate the function and performance of original microcomputers of Renesas Technology the SH7206 series. With the board, you can develop and evaluate the application software for the SH7206 series. The SH7206's data bus, address bus, and pins of various internal peripheral circuit function are connected to the extension bus connector of the M3A-HS60. Thus, you can evaluate the timing relationships with peripheral devices by using measurement instruments. You can also develop extension boards depending on development purposes.
Furthermore, the E10A-USB, the on-chip emulator made by Renesas Technology, can be connected to the M3A-HS60.

1.2 Configuration

Figure1.2.1 shows an example system configuration using M3A-HS60.

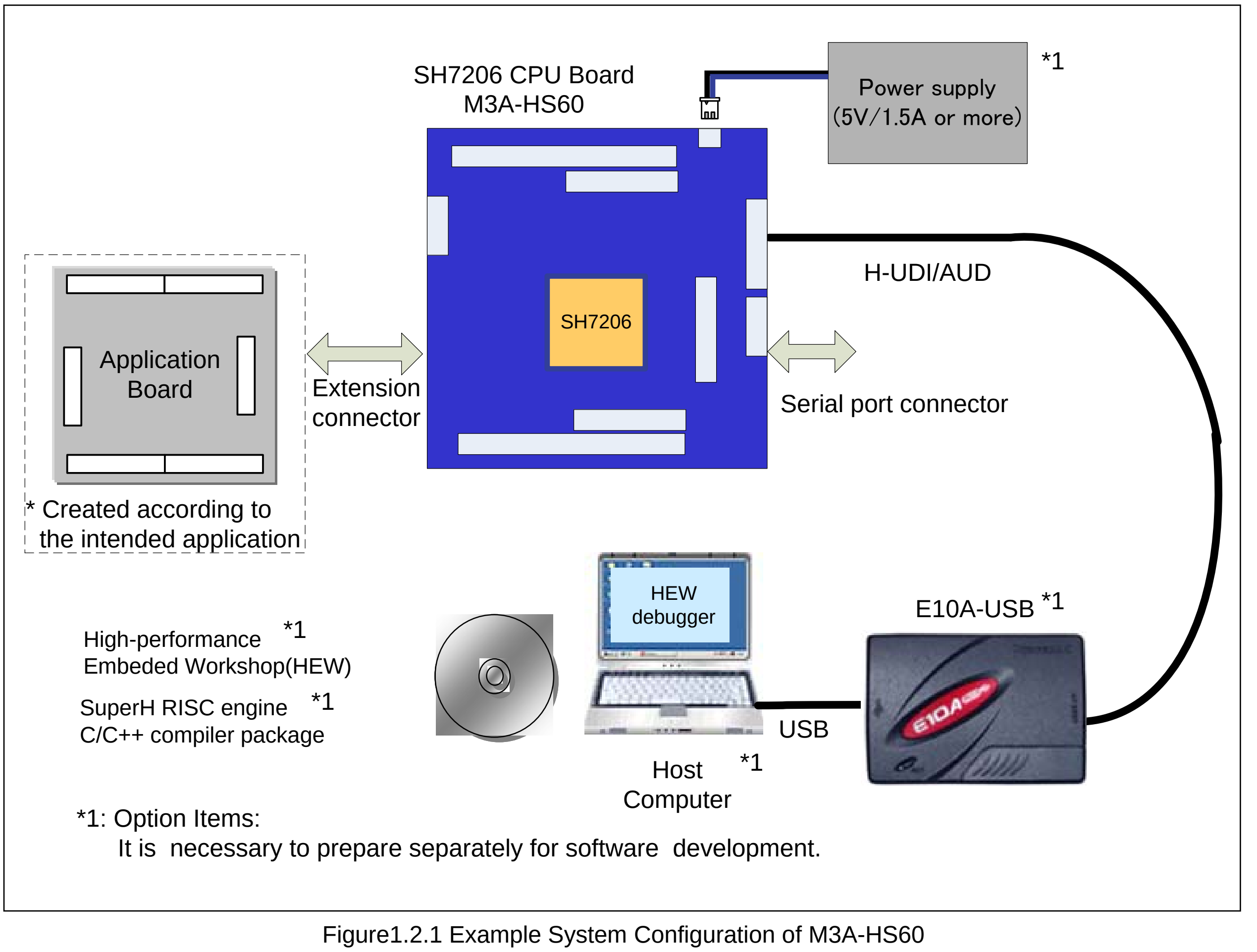


Figure1.2.1 Example System Configuration of M3A-HS60

1.3 External Specifications

Table1.3.1 lists external specifications of M3A-HS60

Table1.3.1 External Specifications of M3A-HS60

No.	Item	Content
1	CPU	SH7206（R5S72060） ● Input(XIN)clock: 16.67MHz ● Bus clock: 66.67MHz,max ● CPU clock: 200MHz,max
2	Memory	Following items of memory are included. ●SDRAM: 32 Mbytes, max. Following memory selectable by a DIP switch. • When 16-bit bus width is selected EDS1216AATA-75E x 1: 16 Mbytes • When 32-bit bus width is selected EDS1216AATA-75E x 2: 32 Mbytes ● Flash memory • M5M29KT331AVP x 1: 4Mbytes • Data bus width fixed to 16 bits
3	Connectors	● Extension connector (bus, I/O, VCC, GND: 100 pins) ● User I/O connector (SH7206's MTU2 and A/D function pins: 32 pins) ● Serial port connector (D-sub 9 pins) ● H-UDI connector (36 pins)
4	LED	● POWER LED (1 pc.) ● User LED（7 pcs.）
5	Switches	● Reset switch (1 pc.) ● MRES switch (1 pc.) ● NMI switch (1 pc.) ● User DIP switch (1 pc., 4 poles) ● System setup DIP switch (1 pc., 5 poles)
6	Package Dimensions	● Dimensions: 100 mm x 100 mm ● Mounting form: 4-layer, double-side mounted ● Board configuration: 1 board

1.4 External View

Figure1.4.1 shows the external view of M3A-HS60.

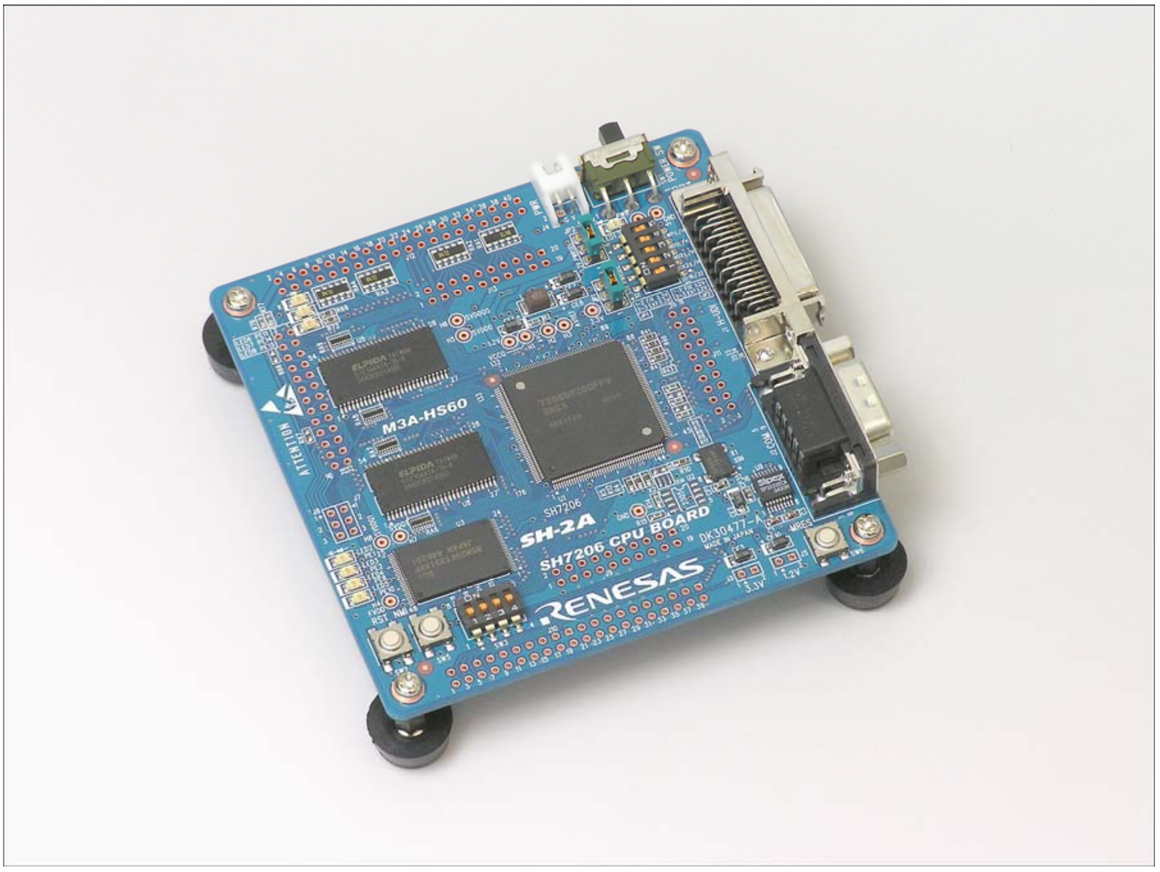


Figure1.4.1 External View of M3A-HS60

1.5 M3A-HS60 Block Diagram

Figure1.5.1 shows the system block diagram of M3A-HS60.

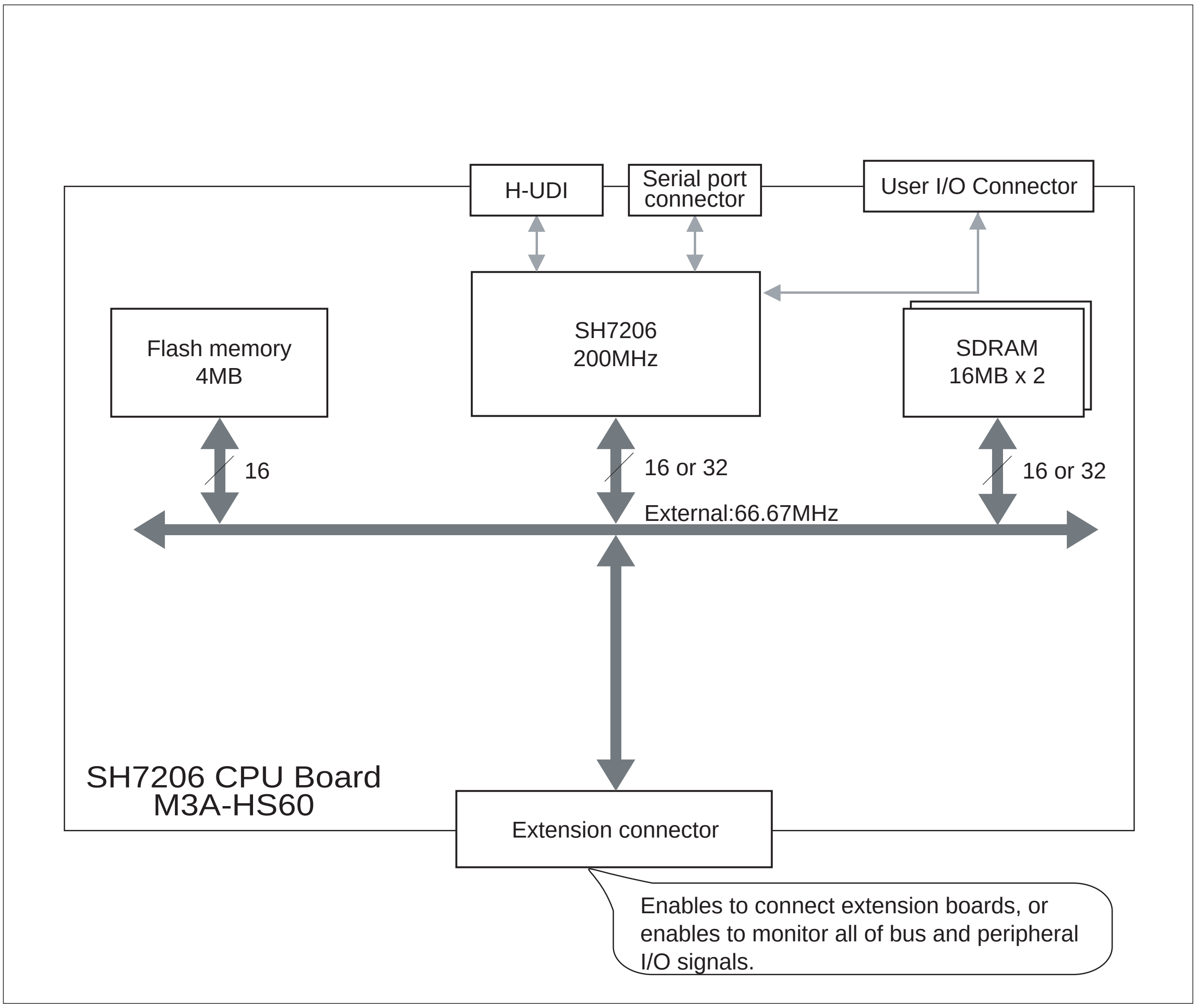


Figure1.5.1 System Block Diagram of M3A-HS60

1.6 M3A-HS60 Board Overview

Figure1.6.1 shows the M3A-HS60 board overview.

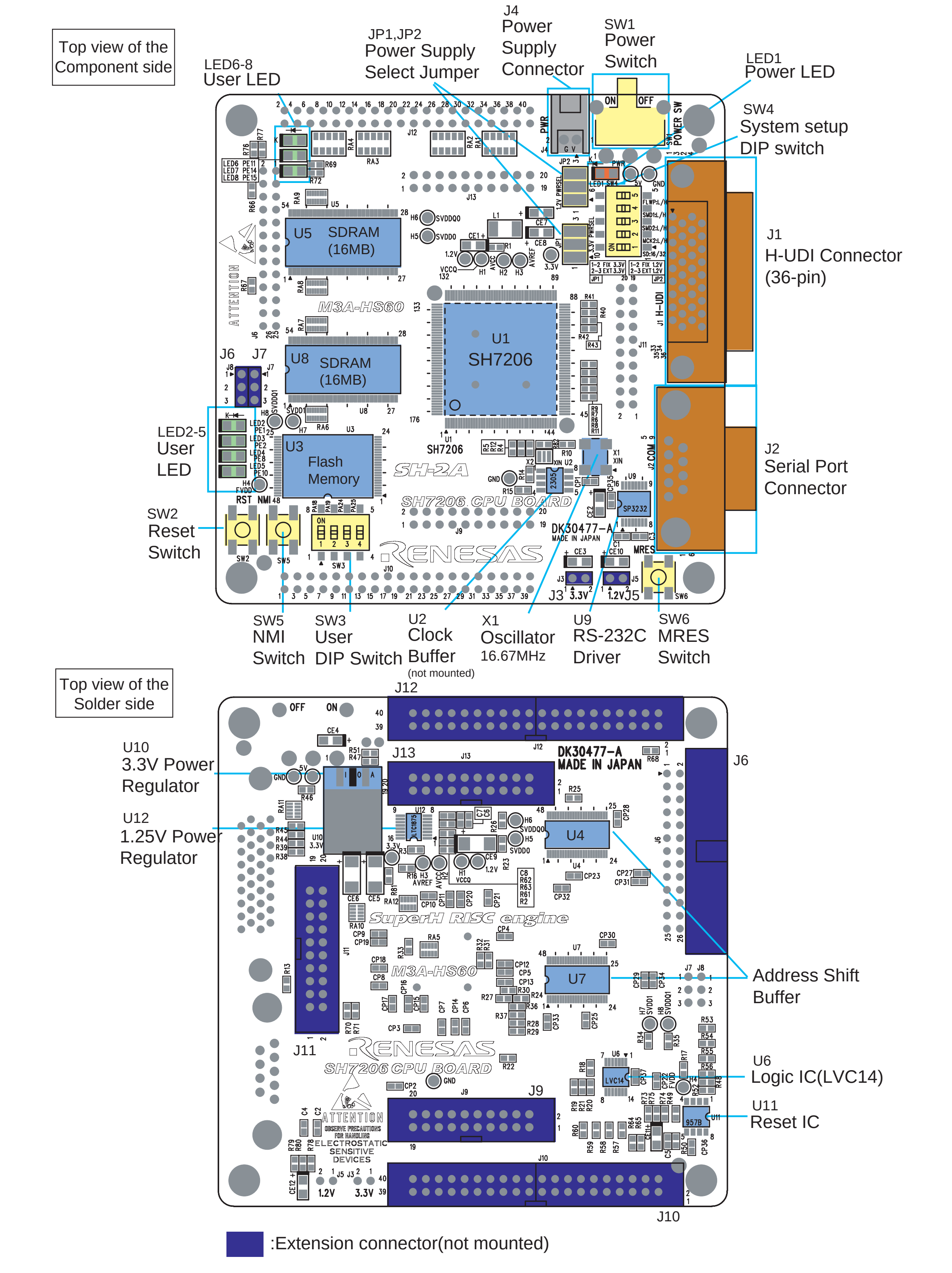


Figure1.6.1 M3A-HS60 Board Overview

Table1.6.1 lists main components mounted in M3A-HS60.

Table1.6.1 Main Components Mounted in M3A-HS60

Symbol	Component name	Note	Recommended parts' number for not mounted components (Makers)
U1	CPU	SH7206 (by Renesas)	
U2	Clock Buffer	Not mounted	CY2305SC-1 (by Cypress)
U3	Flash Memory	M5M29KT331AVP (by Renesas)	
U4,U7	Address Shift Buffer		
U5,U8	SDRAM	EDS1216AATA-75	
U6	Logic IC		
U9	RS-232C Driver		
U10	3.3V Power Regulator		
U11	Reset IC	M51957BFP (by Renesas)	
U12	1.25V Power Regulator		
X1	16.67MHz Oscillator	16.67MHz	
X2	Ceramic Resonators	Not mounted, 16.67MHz	CSTCE-G16M67 (by Murata)
J1	H-UDI Connector		
J2	Serial port Connector		
J3,J5	External Power Supply Connector	Not mounted	A2-2PA-2.54DSA (by Hirose)
J4	Power Supply Connector		
J6	Extension connector	Not mounted, 26pin MIL Standard Connector	XG4C-2634 Right angle
J7, J8	Extension connector	Not mounted, 3pin MIL Standard Connector	A2-3PA-2.54DSA
J9, J11, J13	Extension connector	Not mounted, 20pin MIL Standard Connector	XG4C-2031
J10, J12	Extension connector	Not mounted, 40pin MIL Standard Connector	XG4C-4031
LED1	Power LED	Red	
LED2-8	User LED	Green	
SW1	Power Switch		
SW2	Reset Switch		
SW5	NMI Switch		
SW6	MRES Switch		
SW3	User DIP Switch		
SW4	System setup DIP Switch		

1.7 M3A-HS60 Memory Mapping

Figure1.7.1 shows the memory mapping example of SH7206 in the M3A-HS60.

Logical address	Logical space of theSH7206	Memory Mapping of theM3A-HS60	
H'0000 0000 H'003F FFFF	CS0 space:64MB	Flash Memory(4MB) 16-bit bus	
		User area	
H'0400 0000	CS1 space:64MB	User area	
H'0800 0000	CS2 space:64MB	User area	
H'0C00 0000 H'0CFF FFFF	CS3 space:64MB	SDRAM(32MB) 32-bit bus	SDRAM(16MB) 16-bit bus
H'0DFF FFFF			User area
		User area	
H'1000 0000	CS4 space:64MB	User area	
H'1400 0000	CS5 space:64MB	User area	
H'1800 0000	CS6 space:64MB	Reserved area (Disabled)	
H'1C00 0000	CS7 space:64MB	Reserved area (Disabled)	
H'2000 0000	CS0-CS7 spaces (non-cacheable area)	CS0-CS7 spaces (non-cacheable area)	
H'4000 0000	CS8 space:1GB	User area	
H'8000 0000	Reserved area (Disabled)	Reserved area (Disabled)	
H'FFF8 0000	Internal RAM(128KB)	Internal RAM(128KB)	
H'FFFA 0000	Internal RAM, Reserved	Internal RAM, Reserved	
H'FFFC 0000 H'FFFF FFFF	Internal peripheral module	Internal peripheral module	

Note: There is the cacheable area from H'0000 0000~H'1FFF FFFF.

Figure1.7.1 Memory Mapping Example of SH7206

1.8 Absolute Maximum Ratings

Table1.8.1 lists the absolute maximum ratings of M3A-HS60.

Table1.8.1 Absolute Maximum Ratings of M3A-HS60

Symbol	Parameter	Rated Value	Remarks
VCC	5V System Power Supply Voltage	-0.3V to 6.0V	Relative to VSS
3VCC	3.3V System Power Supply Voltage	-0.3V to 4.6V	Relative to VSS
1.2VCC	1.25V System Power Supply Voltage	-0.3V to 1.7V	Relative to VSS
Topr	Operating Ambient Temperature	-5°C to 55°C	No dewdrops allowed. Use in corrosive gas environment prohibited.
Tstr	Storage Ambient Temperature	-10°C to 60°C	No dewdrops allowed. Use in corrosive gas environment prohibited.

Note: The ambient temperature refers to the air temperature in the closest place from the board.

1.9 Recommended Operating Conditions

Table1.9.1 lists the recommended operating conditions of the M3A-HS60.

Table1.9.1 Recommended Operating Conditions of M3A-HS60

Symbol	Parameter	Rated Value	Remarks
VCC	5V System Power Supply Voltage	4.75V to 5.25V	Relative to VSS
3VCC	3.3V System Power Supply Voltage	3.0V to 3.6V	Relative to VSS (Normally supplied from regulator)
1.2VCC	1.25V System Power Supply Voltage	1.15V to 1.35V	Relative to VSS (Normally supplied from regulator)
–	Maximum Power Consumption in the Board	Within 1A	
Topr	Operating Ambient Temperature	5°C to 50°C	No dewdrops allowed. Use in corrosive gas environment prohibited.

This is a blank page

Chapter2

Functional Overview

2.1 Functional Overview

Table2.1.1 lists the functional modules of M3A-HS60.

Table2.1.1 Functional Modules of M3A-HS60

Sections	Function	Content
2.2	CPU	SH7206 ●Input(XIN)clock : 16.67MHz ●Bus clock : 66.67MHz,max ●CPU clock : 200MHz,max
2.3	Memory	Following items of memory are included ● SDRAM: 32 Mbytes, max By switching a DIP switch, the following memories can be selected. • When 16-bit bus width is selected EDS1216AATA-75E x 1: 16 Mbytes • When 32-bit bus width is selected EDS1216AATA-75E x 2: 32 Mbytes ● Flash memory • M5M29KT331AVP x 1: 4 Mbytes • Data bus width fixed to 16 bits
2.4	Serial port interface	Connects SCIF0 of the SH7206 to the Serial port connector.
2.5	I/O ports	Connects to the I/O ports of the SH7206
2.6	Power Supply Circuit	Controls the system power supply of the M3A-HS60
2.7	Clock Module	Controls the clock
2.8	Reset Module	Controls device reset mounted on the M3A-HS60
2.9	Interrupt switches	Connects to NMI and MRES pins
2.10	E10A-USB Interface	SH7206 H-UDI/AUD interface
–	Operational specifications	Connectors, switches and LEDs ● SH7206 extension connector ● Switches and LEDs ● H-UDI connector Detailed in Chapter 3.

2.2 CPU

2.2.1 SH7206

The M3A-HS60 contains SH7206, the 32-bit RISC microcomputer, which operates with a maximum 200MHz of CPU clock frequency. The SH7206 includes 128-Kbyte RAM, 8-Kbyte instruction cache and 8-Kbyte data cache, and it can deal with a wide range of applications from data processing to equipment control.

The M3A-HS60 can be operated with a maximum 200MHz of CPU clock frequency (external bus 66.67MHz, max.) using a 16.67MHz input clock.

Figure2.2.1 shows the block diagram of SH7206 in the M3A-HS60.

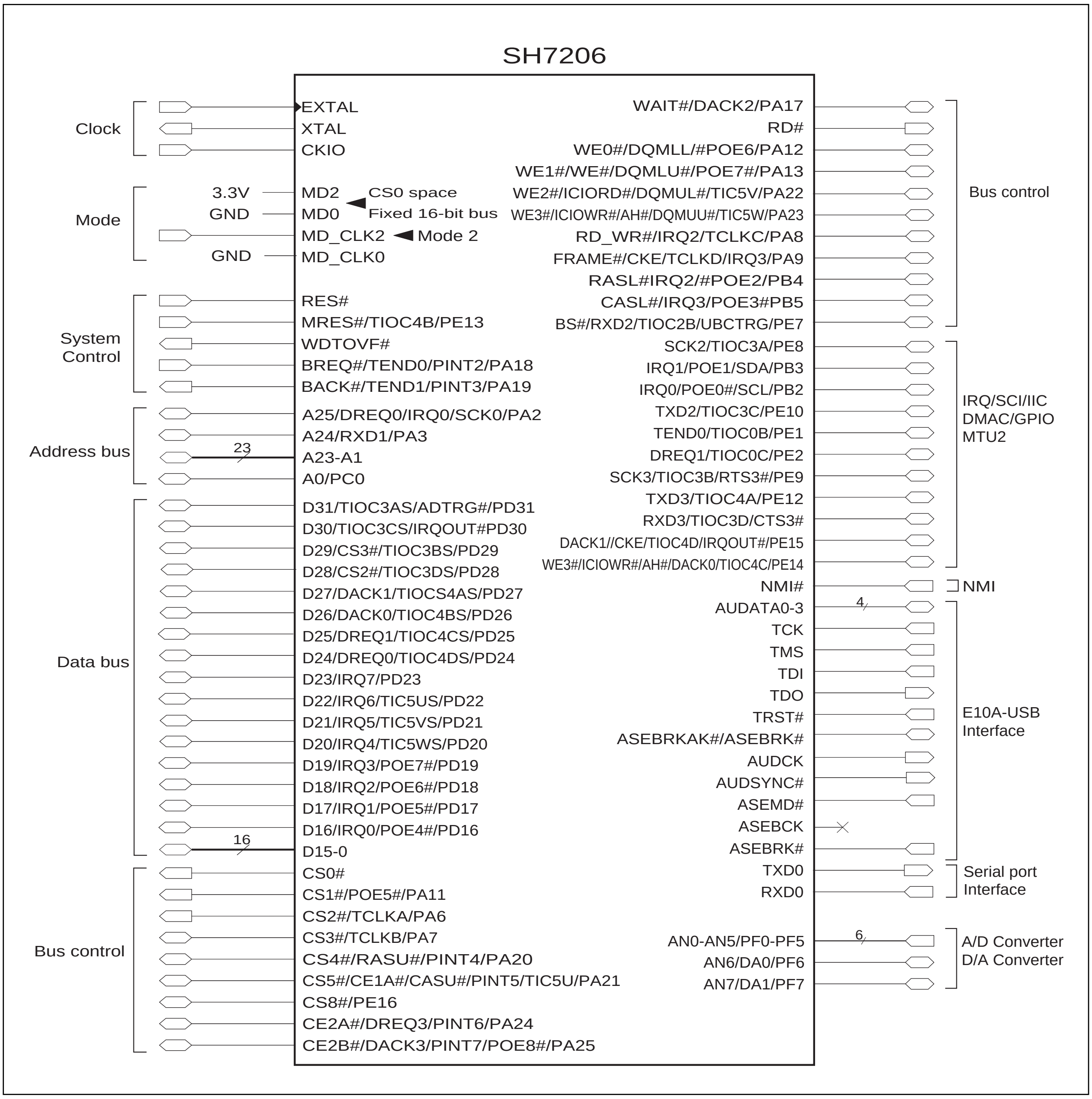


Figure2.2.1 Block Diagram of SH7206

2.3 Memory

The M3A-HS60 includes the internal RAM of the SH7206 (128 Kbytes), external Flash memory, and external SDRAM. These memory chips are detailed below.

2.3.1 SH7206's Internal RAM

The SH7206 contains an internal 128-Kbyte RAM.

2.3.2 Flash Memory M5M29KT331AVP (included as standard equipment)

The M3A-HS60 includes the Flash memory shown in Table2.3.1 as standard equipment. The memory can be used as the storage in which to save the user program. The Flash memory to boot is fixed to 16-bit mode of external bus and operates with a single 3.3 V power supply voltage. The write-protect of Flash memory can be enabled or disabled by using a DIP switch.
Figure2.3.1 shows a block diagram of Flash memory.
Table2.3.2 lists bus state controller settings (write/read) for operation with the SH7206 bus clock at 66.67MHz.

Table2.3.1 Outline of the Flash Memory

Part Number	Bus Size	Capacity	Access Time
M5M29KT331AVP	16-bit mode	4 Mbytes(16 bits × 2 Mword × 1pc.)	70ns

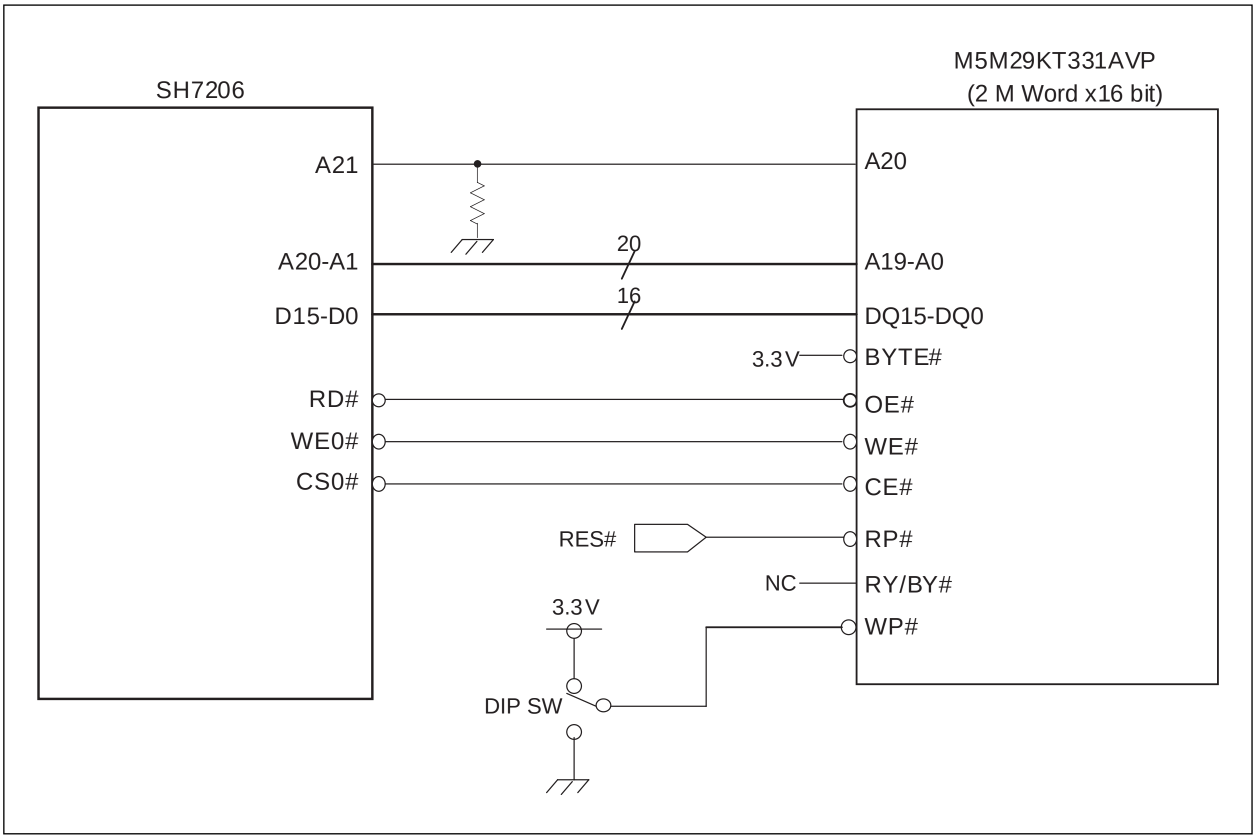


Figure2.3.1 Block Diagram of Flash Memory

Table2.3.2 Examples for Bus State Controller Settings (Flash Memory Write/Read)

User Area	Applicable Device	Bus State Controller Settings
CS0	M5M29KT331AVP	CS0 Space Bus Control Register : CS0BCR Initial value : H'36DB 0600(when MD2= H and MD0=L） Recommended set value : H'1000 0400 • Specify idle state in write to read and write to write intervals IWW[2:0] = B'001: 1 idle cycles inserted • Specify data bus BSZ[1:0] = B'10 : 16-bit bus width CS0 Space Wait Control Register (CS0WCR) Initial value: H'0000 0500 Recommended set value : H'0000 0AC1 • Address, CS0# assert -> RD#, WEn# assert delay cycle SW[1:0] = B'01 : 1.5 cycles • Specify access wait cycles WR[3:0] = B'0110 : 5 cycles • RD#, WEn# negate -> Address, CS0 negate delay cycle HW[1:0] = B'01 : 1.5 cycles

<Write and Read Timing>

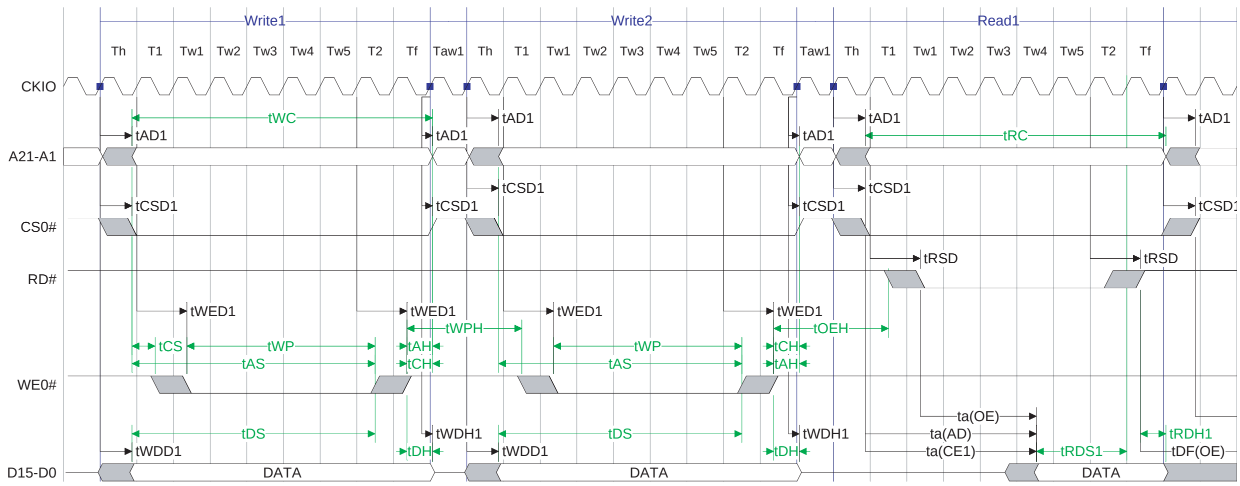


Figure2.3.2 Flash Memory Read and Write Access Timing

2.3.3 External SDRAM

The M3A-HS60 includes two pcs. of 16-Mbyte SDRAM (for an external SDRAM) as standard equipment.

The SH7206's internal bus state controller can be used to control the SDRAM.

Note that the SDRAM can be switched between 32-bit bus access and 16-bit bus access. (For 16-bit bus access, only one pc. of 16-Mbyte SDRAM can be used.)

Table2.3.3 lists SDRAM specifications used in M3A-HS60. Figure2.3.3 shows a block diagram of SDRAM.

Table2.3.3 SDRAM Specifications Used in M3A-HS60

Specification	Content
Part number	EDS1216AATA-75E
Configuration	16 Mbytes (16-bit bus width) x 2pcs.
Capacity	32 Mbytes
Access time	5.4ns
CAS latency	2 (At 66MHz bus clock)
Refresh interval	4,096 refresh cycles every 64ms
Row address	A11- A0
Column address	A8 - A0
Number of banks	4-bank operation controlled by BA0 and BA1

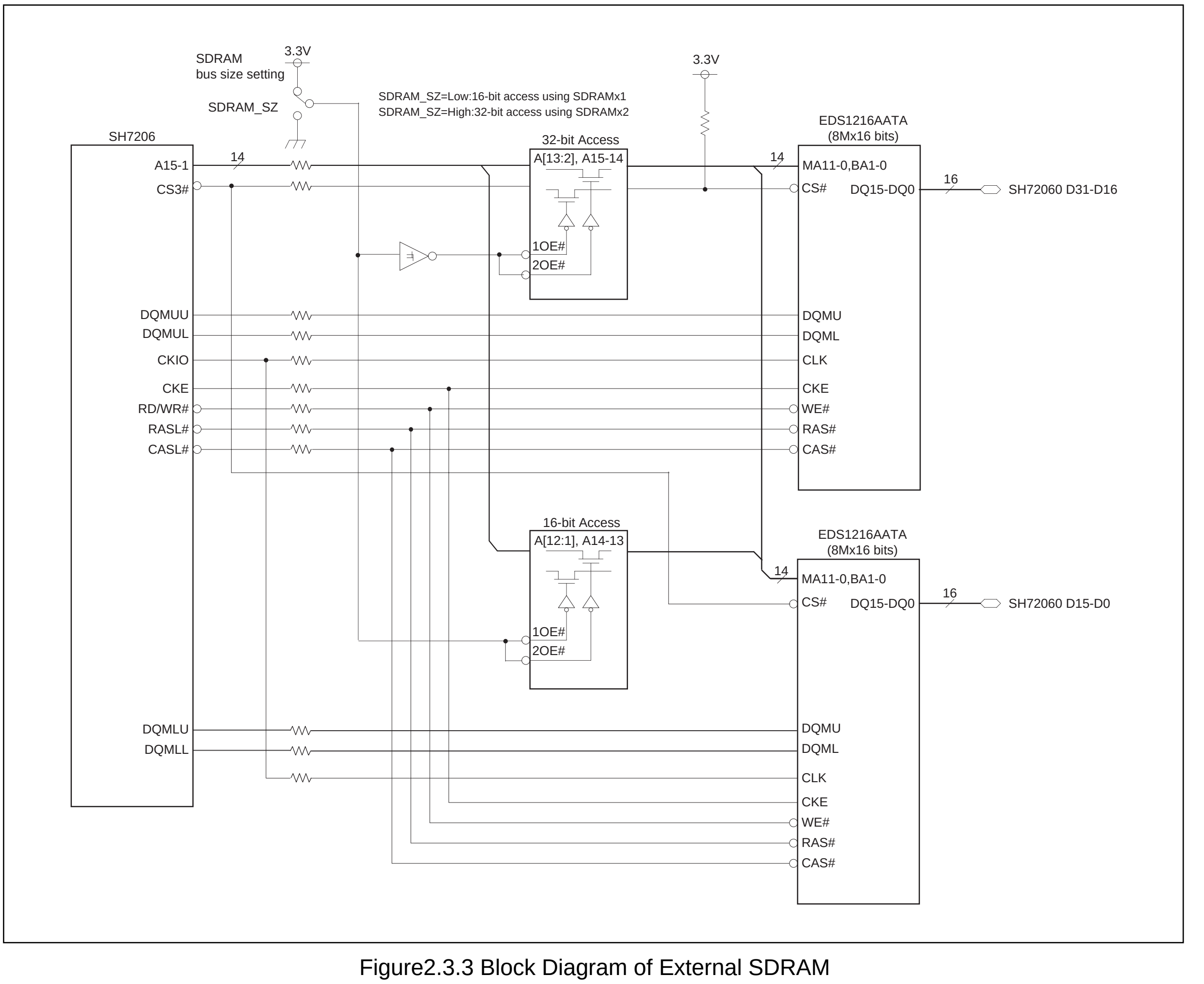


Figure2.3.3 Block Diagram of External SDRAM

Table2.3.4 lists bus state controller settings for operation with the SH7206 Bus clock at 66.67MHz.

Table2.3.4 Examples for Bus State Controller Settings (SDRAM Read/ Write)

User Area	Application Device	Bus State Controller Settings
CS3	EDS1216AATA-75E	**CS3 Space Bus Control Register (CS3BCR)** Initial value: H'36DB 0600 Recommended set value: H'0000 4400 (for 16-bit bus) or H'0000 4600 (for 32-bit bus) • Specify memory TYPE[2:0] B'100; SDRAM • Specify data bus BSZ[1:0] = B'10; 16-bit bus width BSZ[1:0] = B'11; 32-bit bus width **CS3 Space Wait Control Register (CS3WCR)** Initial value: H'0000 0500, Recommended set value: H'0000 2892 • Precharge completion wait cycles WTRP[1:0] = B'01; 1 cycles • Wait cycles between ACTV command -> READ(A)/WRITE(A)command WTRCD[1:0] = B'10; 2 cycles • Area 3 CAS latency A3CL[1:0] = B'01; 2 cycles • Precharge start wait cycles TRWL[1:0] = B'10; 2 cycles • Idle cycles between REF command/self-refresh deactivation -> ACTV/REF/MRS command WTRC[1:0] = B'10; 5 cycles **SDRAM Control Register (SDCR)** Initial value: H'0000 0000, Recommended set value: H'0000 0809 • Refresh control RFSH = B'1; Refresh enabled • Refresh control RMODE = B'0; Auto refresh • Bank active mode BACTV = 0; Auto precharge mode • Area 3 row address bits A3ROW[1:0] = B'01; 12 bits • Area 3 column address bits A3COL[1:0] = B'01; 9 bits **Refresh Timer Control/Status Register (RTCSR)** Initial value: H'0000 0000, Recommended set value: H'A55A 0010 • Clock select CKS[2:0] = B'010; B-ϕ/16 • Refresh times RRC[2:0] = B'000; 1 time **Refresh Time Constant Register (RTCOR)** Initial value: H'0000 0000, Recommended set value: H'A55A 0041 * The following shows refresh request intervals in cases when clock select is set to B- ϕ/16. 1 cycle: 240ns (66MHz/16 = 4.125MHz) Refresh request intervals for the SDRAM: every 15.625µs 15.625µs/240ns = 64 (0x41) cycles per refresh **AC Characteristics Switching Register (ACSWR)** Initial value: H'0000 0000, Recommended set value: H'0000 0009 • AC Characteristics Switch ACOSW[3:0] = B'1001; Switches characteristics and extends the delay time

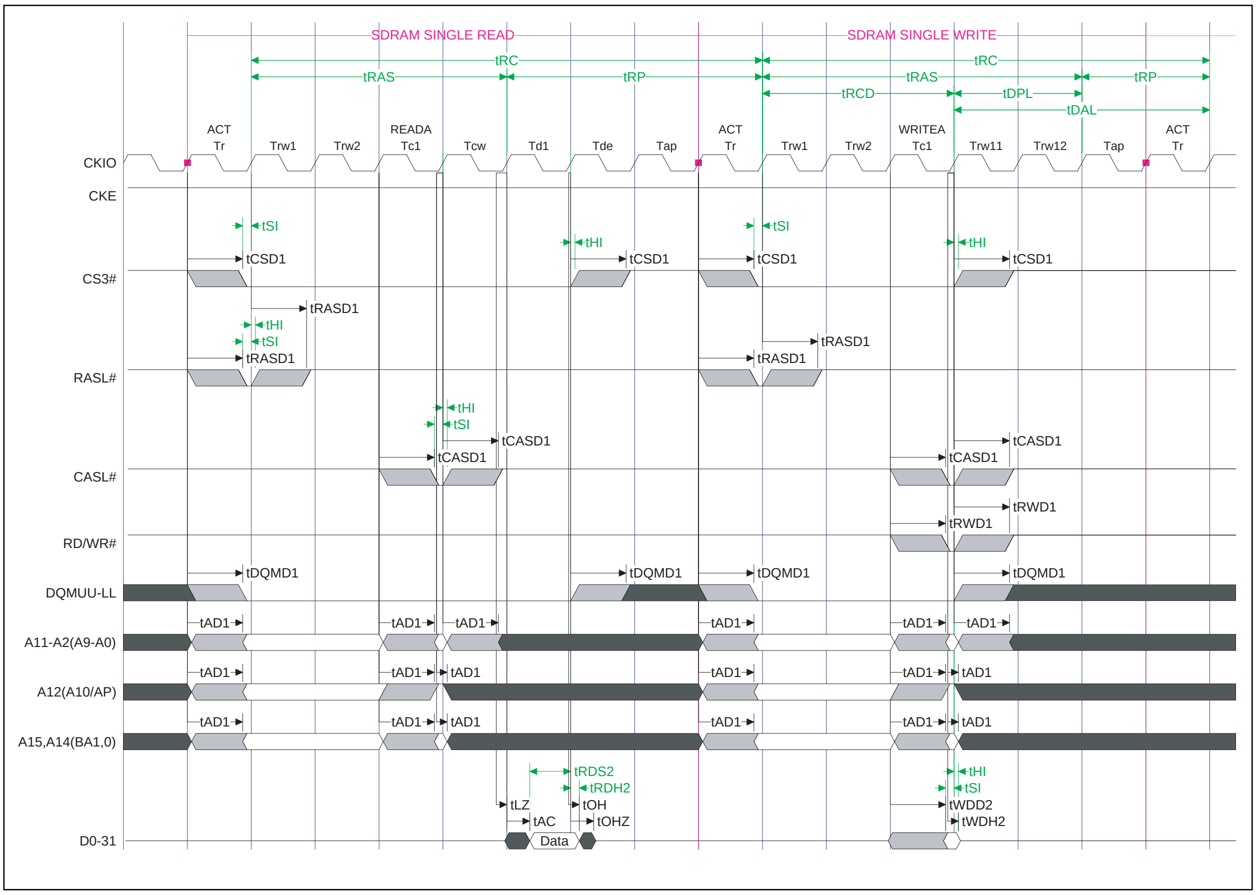


Figure2.3.4 Typical SDRAM Single Read/Write Timing

2.4 Serial Port Interface

The SH7206 included in the M3A-HS60 contains a UART module. As for the M3A-HS60, SCIF channel 0 is connected to serial port connector.

Figure2.4.1 shows a block diagram of serial port interface in the M3A-HS60.

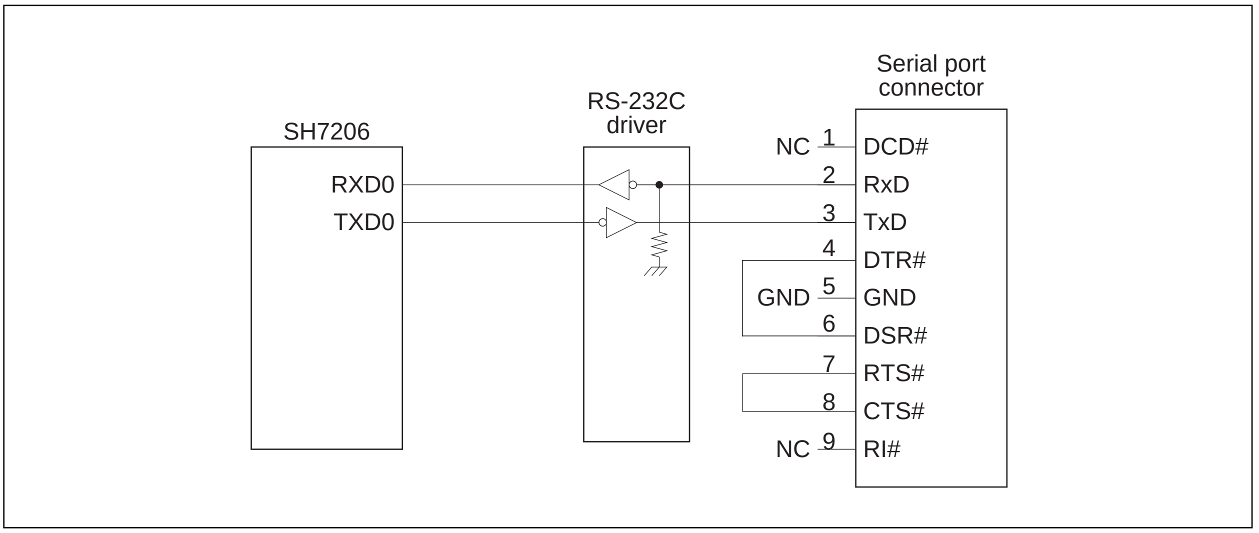


Figure2.4.1 Block Diagram of Serial Port Interface

2.5 I/O Ports

As for the M3A-HS60, the SH7206's I/O ports are connected to the extension bus connector of the M3A-HS60 board. Some I/O ports are connected to DIP switches and LEDs of the M3A-HS60 board. Users are free to use these ports. Figure2.5.1 shows a block diagram of SH7206 I/O ports.

Table2.5.1 shows the functions of SH7206 I/O ports.

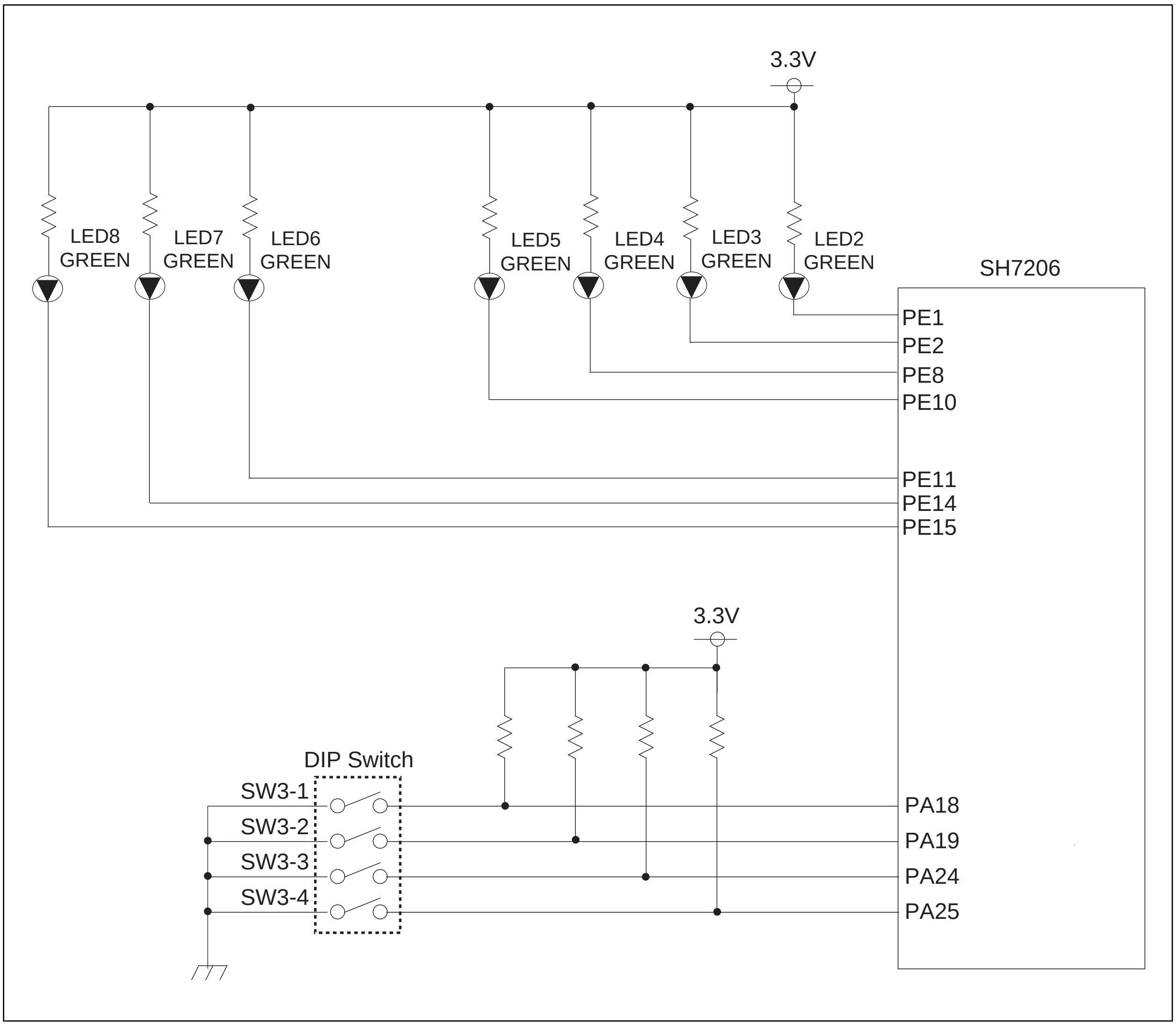


Figure2.5.1 Block Diagram of SH7206 I/O Ports

Table2.5.1 Functions of SH7206 I/O Ports

SH7206 Port Name	Connection in the M3A-HS60
PA0-PA1	Serial port connector.
PA2	Extension connector, SDRAM_SZ signal input.
PA3,PA6,PA11,PA17, PA20,PA21	Extension connector.
PA4-PA5	Flash memory and extension connector.
PA7-PA9,PA13,PA22,PA23	SDRAM and extension connector.
PA12	Flash memory, SDRAM and extension connector.
PA13	SDRAM and extension connector.
PA18	SW1-1 and extension connector.
PA19	SW1-2 and extension connector.
PA24	SW1-3 and extension connector.
PA25	SW1-4 and extension connector.
PB2,PB3	Extension connector.
PB4,PB5	SDRAM and extension connector.
PB9	Flash memory and extension connector.
PC0	Extension connector.
PC1	Flash memory, SDRAM and extension connector.
PD8-PD15	Flash memory, SDRAM and extension connector.
PD16-PD31	SDRAM (when 32-bit bus selected) and extension connector.
PE1	LED2 and extension connector.
PE2	LED3 and extension connector.
PE7,PE9,PE12,PE13,PE16	Extension connector.
PE8	LED4 and extension connector.
PE10	LED5 and extension connector.
PE11	LED6 and extension connector.
PE14	LED7 and extension connector.
PE15	LED8 and extension connector.
PF0-7	Extension connector.

2.6 Power Supply Circuit

The M3A-HS60 accepts a 5V power supply as its input, and generates 3.3V and 1.25V by using a regulator.

The regulator used here is an output voltage variable type, so that any desired voltage can be generated by changing the resistance value.

Figure2.6.1 shows a block diagram of power supply circuit in the M3A-HS60.

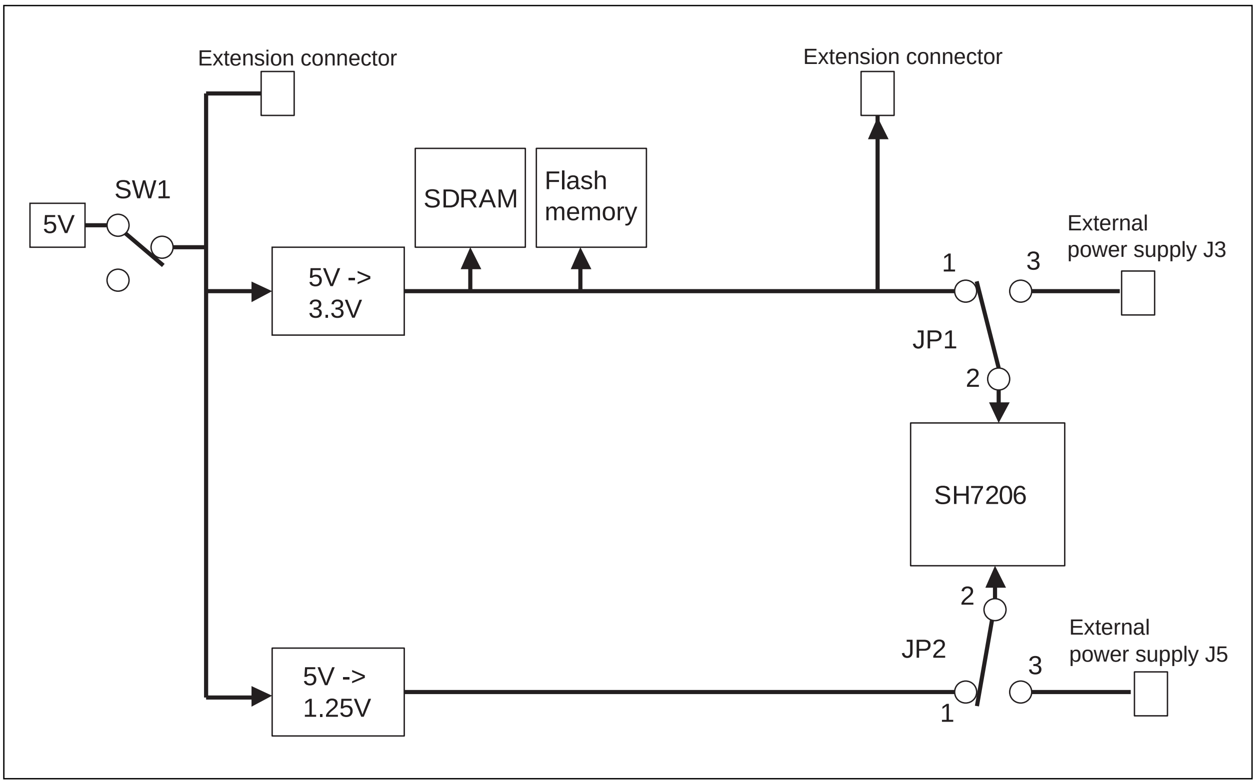


Figure2.6.1 Block Diagram of Power Supply Circuit

2.7 Clock Module

The clock module in the M3A-HS60 consists of the following two blocks:

• Output from a oscillator connected to EXTAL of the SH7206

• Ceramic resonator connected to EXTAL and XTAL

The M3A-HS60 has a 16.67MHz oscillator connected. Furthermore, the bus clock output from the SH7206 is connected to the SDRAM via a damping resistor. To connect an extension board to the extension connector, we recommend including a clock buffer that contains a PLL to ensure that the board will be supplied with a stable clock signal.

Figure2.7.1 shows a block diagram of clock module.

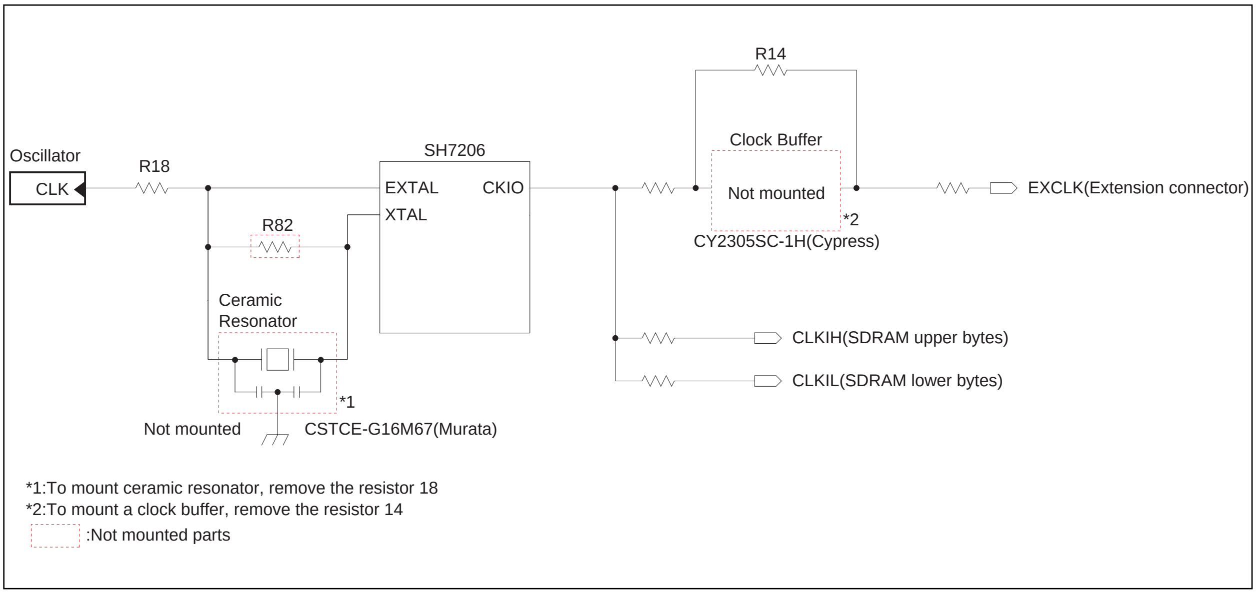


Figure2.7.1 Block Diagram of Clock Module

2.8 Reset Module

This module controls the reset signals connected to both the SH7206 and Flash memory mounted in the M3A-HS60. Figure2.8.1 shows a block diagram of the reset module in M3A-HS60.

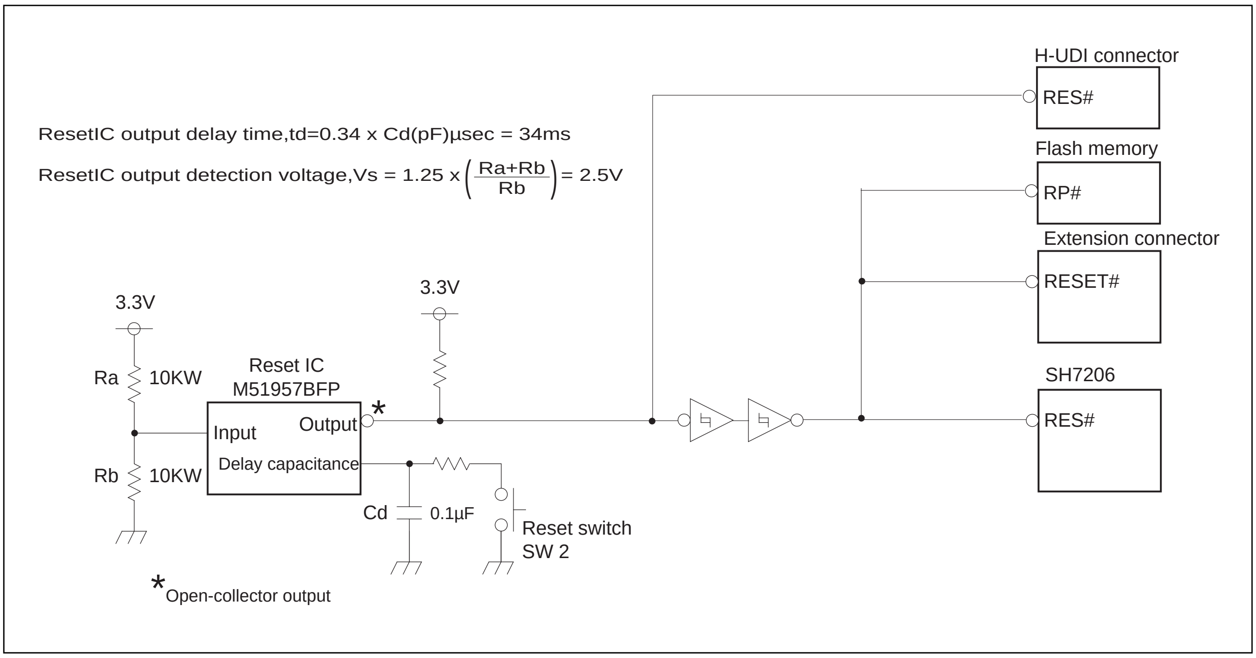


Figure2.8.1 Block Diagram of Reset Module

2.9 Interrupt Switches

As for the M3A-HS60, both the SH7206's NMI interrupt pin and MRES pin have a push switch connected. MRES switch can be used for controlling manual reset for SH7206. When manual reset is done, the internal condition of CPU will be formatted, but each register of on-chip peripheral module.
Figure2.9.1 shows a block diagram of interrupt switches.

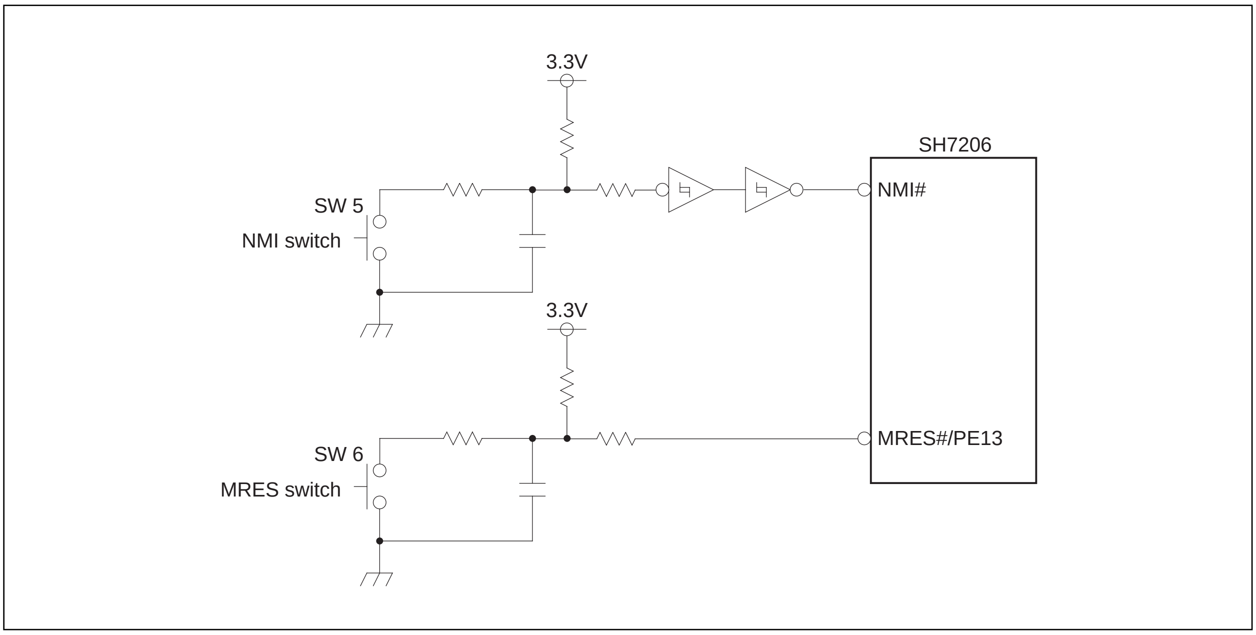


Figure2.9.1 Block Diagram of Interrupt Switches

2.10 E10A-USB Interface

As for the M3A-HS60, a 36-pin H-UDI connector to connect it with the E10A-USB is mounted.
Figure2.10.1 shows a block diagram of the E10A-USB interface.

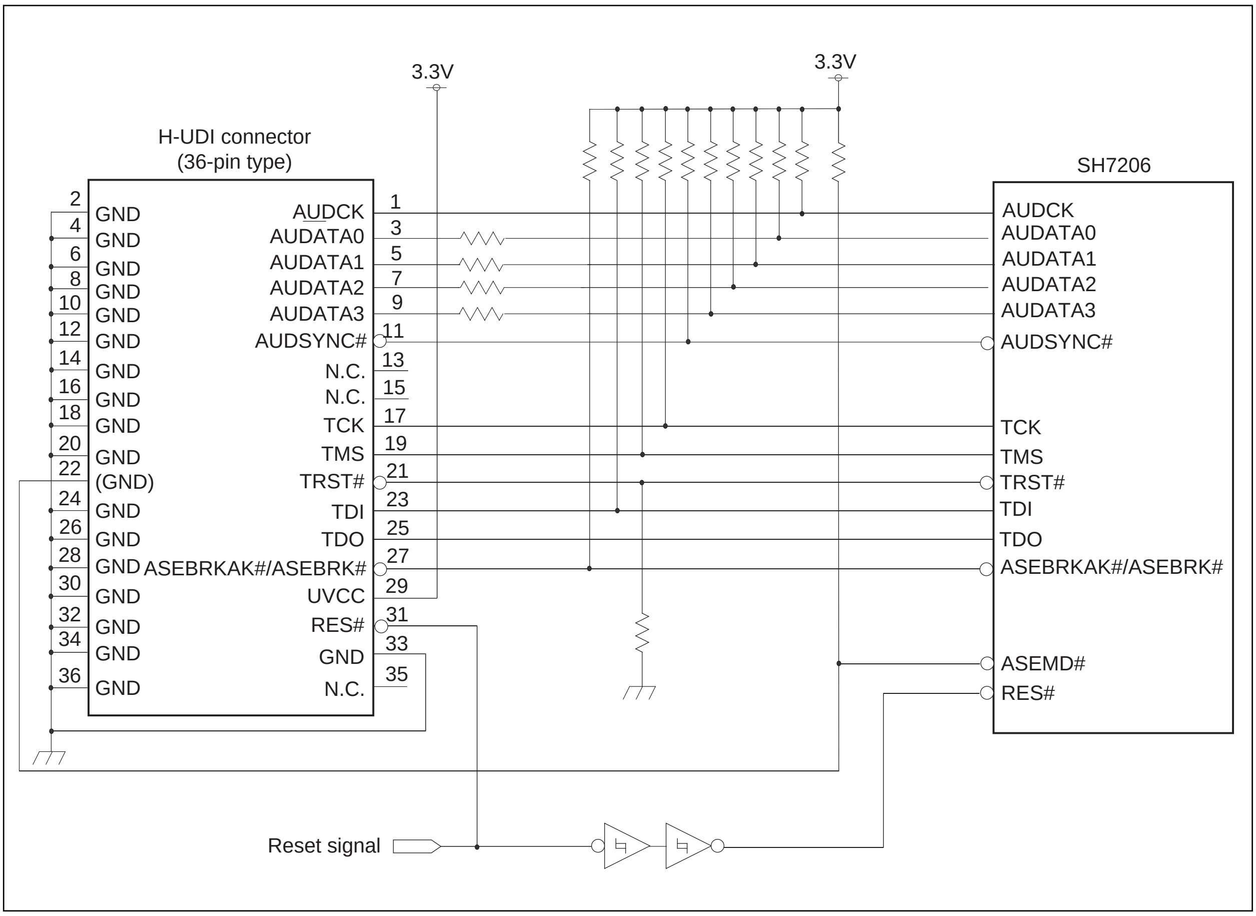


Figure2.10.1 Block Diagram of the E10A-USB Interface

This is a blank page

Chapter3

Operational Specifications

3.1 M3A-HS60 Connectors Outline

Figure3.1.1 shows the M3A-HS60 connectors assignments.

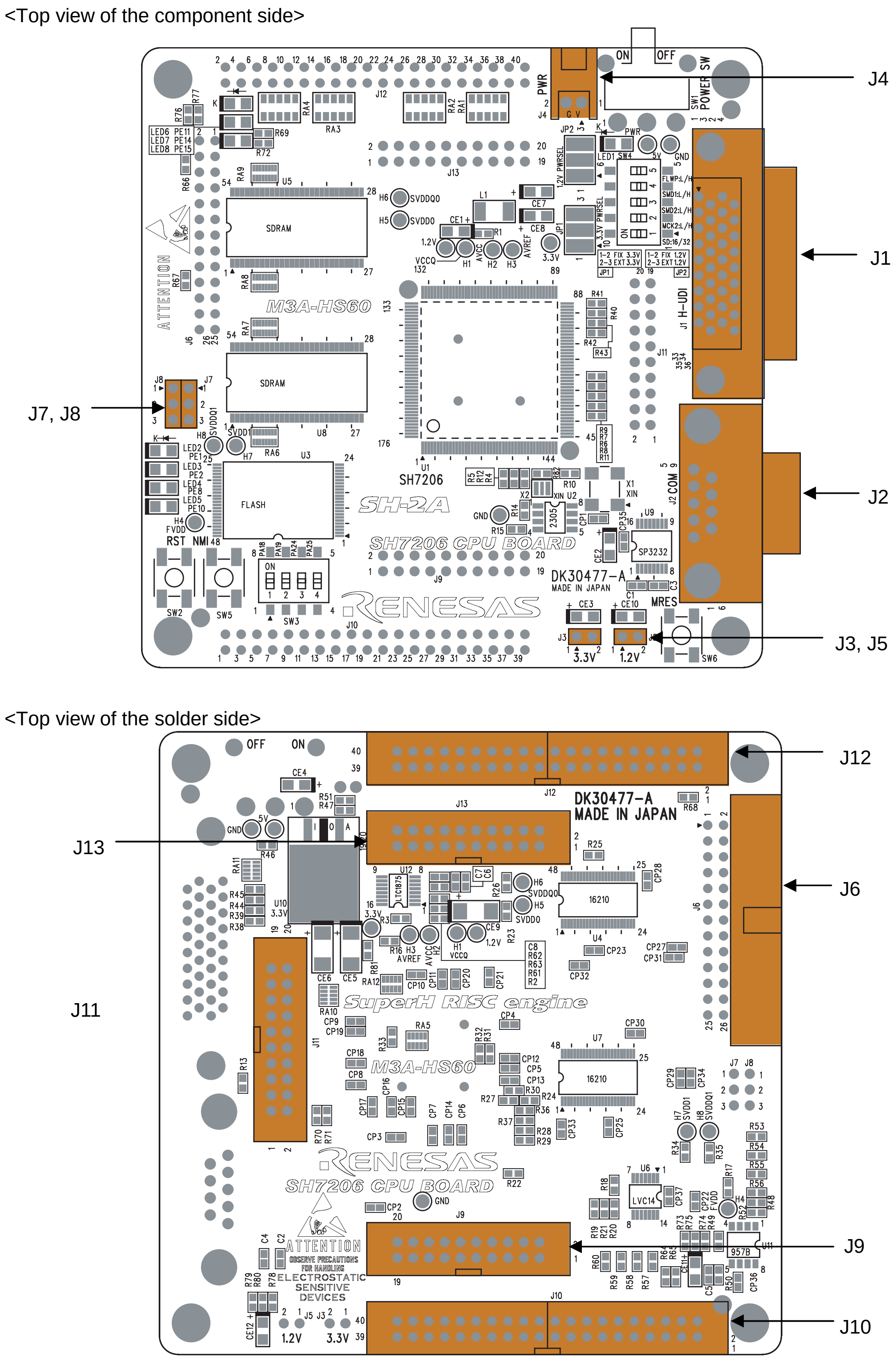


Figure3.1.1 M3A-HS60 Connector Assignment

3.1.1 H-UDI Connector (J1)

The M3A-HS60 includes an H-UDI (J1) connector for connection to the E10A-USB emulator.
Figure3.1.2 shows a pin arrangement of the H-UDI connector.

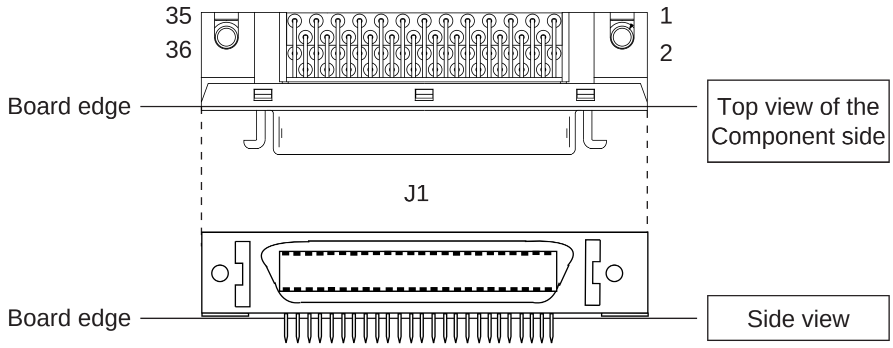


Figure3.1.2 Pin Arrangements of the H-UDI Connector

Table3.1.1 lists pin assignments of H-UDI connector.

Table3.1.1 Pin Assignments of H-UDI Connector (J1)

Pin	Signal Name	Pin	Signal Name
1	AUDCK(PE0)	19	TMS
2	GND	20	GND
3	AUDATA0(PE6)	21	TRST#
4	GND	22	GND
5	AUDATA1(PE5)	23	TDI
6	GND	24	GND
7	AUDATA2(PE4)	25	TDO
8	GND	26	GND
9	AUDATA3(PE3)	27	ASEBRKAK#/ASEBRK#
10	GND	28	GND
11	AUDSYNC#(PA16)	29	+3.3V
12	GND	30	GND
13	NC	31	RES#
14	GND	32	GND
15	NC	33	GND
16	GND	34	GND
17	TCK	35	NC
18	GND	36	GND

3.1.2 Serial Port Connector (J2)

The M3A-HS60 includes a serial port connector for serial communication (J2).

Figure3.1.3 shows a pin assignment of serial port connector.

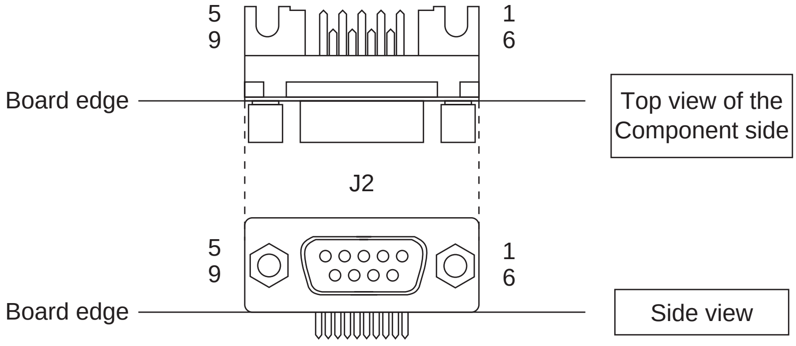


Figure3.1.3 Pin Arrangement of Serial Port Connector (J2)

Table3.1.2 lists pin assignments of serial port connector.

Table3.1.2 Pin Assignments of Serial Port Connector (J2)

Pin	Signal Name	Pin	Signal Name
1	NC	6	DSR#
2	RXD(PA0/RxD0)	7	RTS#
3	TXD(PA1/TxD0)	8	CTS#
4	DTR#	9	NC
5	GND		

Pins 4-8 are loopback-connected.

3.1.3 External Power Supply Connectors(J3 and J5)

The M3A-HS60 has the through-hole for two external power supply connectors (J3 for 3.3 V and J5 for 1.25 V) for the SH7206.
Figure3.1.4 shows a pin assignment of external power supply connectors.

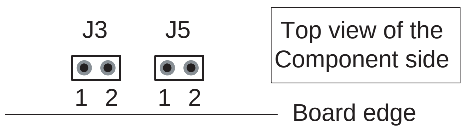


Figure3.1.4 Pin Arrangement of External Power Supply Connectors (J3 and J5)

Table3.1.3, and Table3.1.4 list pin assignments of external power supply connectors.

Table3.1.3 Pin Assignments of External Power Supply Connector (J3)

Pin	Signal Name	Pin	Signal Name
1	+3.3V	2	GND

Table3.1.4 Pin Assignments of External Power Supply Connector (J5)

Pin	Signal Name	Pin	Signal Name
1	+1.25V	2	GND

3.1.4 Power Supply Connector (J4)

The M3A-HS60 includes a power supply connector for the board itself.
Figure3.1.5 shows a pin assignment of power supply connector.

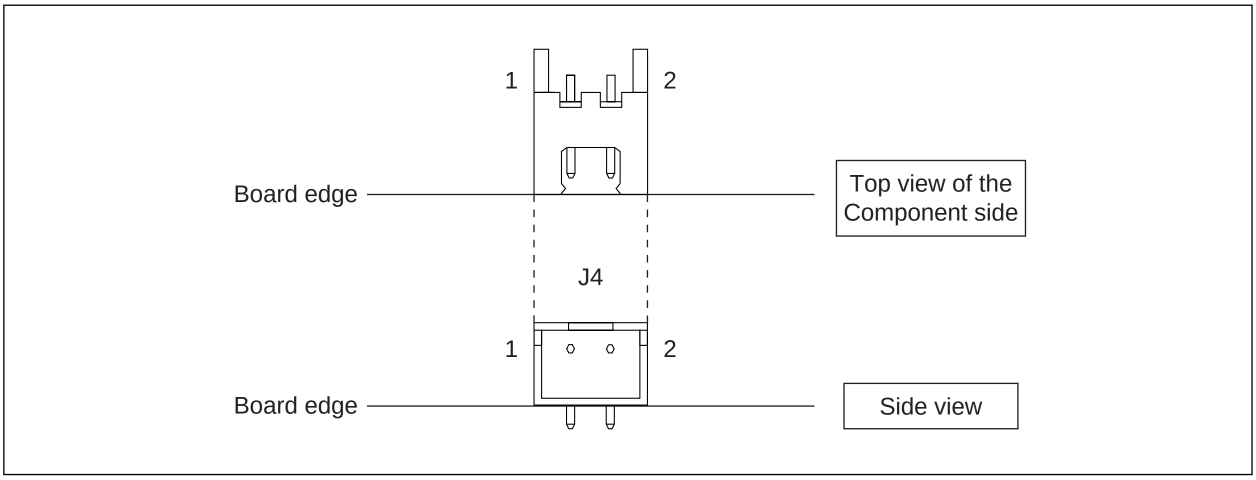


Figure3.1.5 Pin Arrangement of Power Supply Connector (J4)

Table3.1.5 lists pin assignments of power supply connector for the M3A-HS60.

Table3.1.5 Pin Assignments of Power Supply Connector (J4)

Pin	Signal Name	Pin	Signal Name
1	+5V	2	GND

3.1.5 User I/O Connectors (J6-J8)

The through-hole for the extension connector pin connecting the pins of the on-chip peripheral functions (such as MTU2 and AD), which is suitable for the motor control of SH7206, is mounted on M3A-HS60.
Figure3.1.6 shows a pin arrangement of extension connector.

Note: The J6 connects the pins multiplexed to data bus (D31-D16) of SH7206. Therefore, the data bus D31–D16 becomes unusable when the J6 is used. Please set the SDRAM bus width to 16-bit wide (D15-D0) when the J6 is being used.

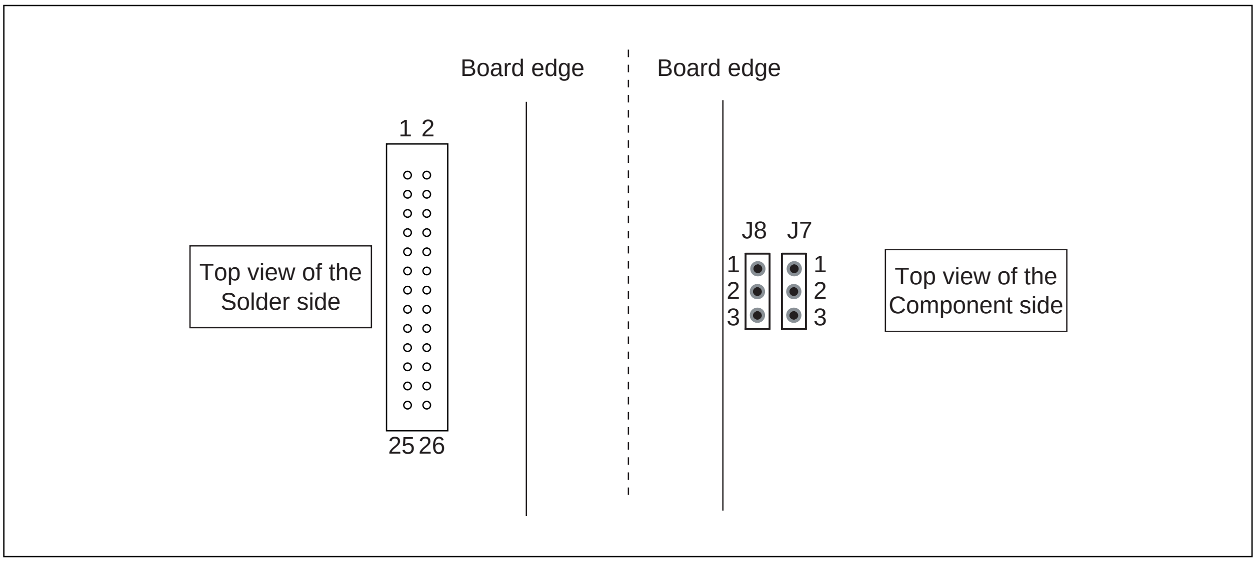


Figure3.1.6 Pin Assignment of Extension Connectors (J6-J8)

Table3.1.6 and Table3.1.7 list pin assignments of the extension connectors.

Table3.1.6 Pin Assignments of Extension Connector (J6)

Pin	Signal Name	Pin	Signal Name
1	+5V	2	GND
3	NC (AN3/PF3 when R66 is mounted)	4	D27/DACK1/TIOC4AS/PD27
5	D26/DACK0/TIOC4BS/PD26	6	D25/DREQ1/TIOC4CS/PD25
7	SCK3/TIOC3B/RTS3#/PE9	8	TXD3/TIOC4A/PE12
9	MRES#/TIOC4B/PE13	10	RXD3/TIOC3D/CTS3#/PE11
11	DACK1/CKE/TIOC4D/IRQOUT#/PE15	12	WE3#/ICIOWR#/AH#/DACK0/TIOC4C/PE14
13	D20/IRQ4/TIC5WS/PD20	14	D21/IRQ5/TIC5VS/PD21
15	D22/IRQ6/TIC5US/AUDCK/PD22	16	D19/IRQ3/POE7#/AUDATA3/PD19
17	AN2/PF2	18	AN3/PF3
19	AN4/PF4	20	NC（AN4/PF4 when R67 is mounted）
21	D28/CS2#/TIOC3DS/PD28	22	D29/CS3#/TIOC3BS/PD29
23	D30/TIOC3CS/IRQOUT#/PD30	24	D31/TIOC3AS/ADTRG#/PD31
25	AN0/PF0	26	AN1/PF1

Table3.1.7 Pin Assignments of Extension Connectors (J7 and J8)

J7		J8	
Pin	Signal Name	Pin	Signal Name
1	D16/IRQ0/POE4#/AUDATA0/PD16	1	AN5/PF5
2	D17/IRQ1/POE5#/AUDATA1/PD17	2	AN6/DA0/PF6
3	D18/IRQ2/POE6#/AUDATA2/PD18	3	AN7/DA1/PF7

3.1.6 Extension Connectors (J9-J13)

The M3A-HS60 has the trough-hole for extension bus connectors to which the I/O pins of the SH7206 are connected. MIL Standard connectors can be mounted to J9–J13, and it is available for the connection to extension boards, or monitoring the SH7206 bus signals. The bus signals of SH7206 are connected with J10 (J12) of the terminal connector via J9 (J13).

J9 and J13 are connected to the terminal connector J10 (J12) via J9 (J13). J9 and J13 are mounted for the monitoring signals by the measuring instrument. When the extension boards are made, J10 and J12 of the terminal connector are recommended to be used to prevent the waveform distortion because of the reflection of the signal.

Figure3.1.7 shows a pin assignment of extension bus connector.

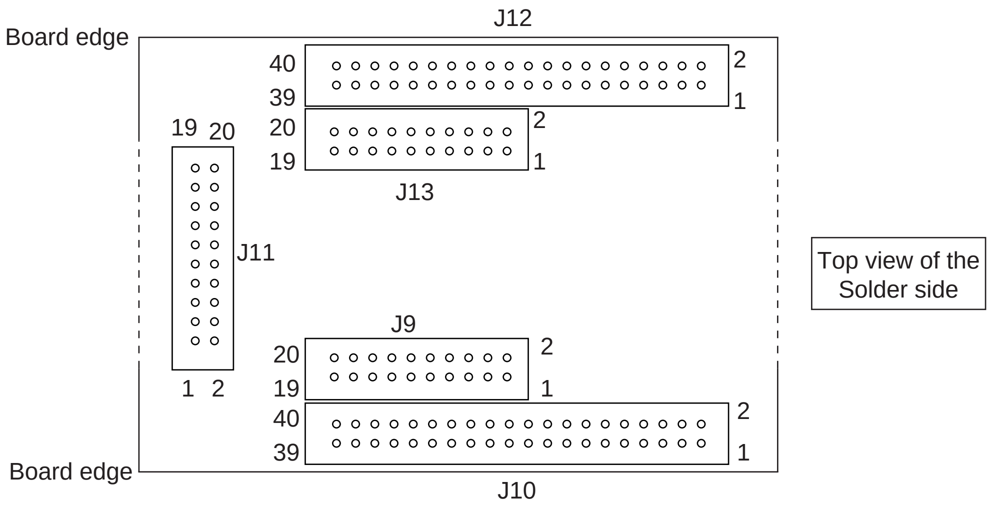


Figure3.1.7 Pin Assignment of Extension Connectors (J9-J13)

Table 3.1.8 to 3.1.12 list pin assignments of extension connector.

Table3.1.8 Pin Assignment of Extension connector(J9)

Pin	Signal name	Pin	Signal name
1	NC	2	NC
3	EXCLK	4	A9
5	A8	6	A7
7	A6	8	A5
9	A4	10	A3
11	A2	12	A1/PC1
13	A0/PC0	14	CS0#
15	CS1#/POE5/PA11	16	CS2#/TCLKA/PA6
17	RASU#/PINT4/CS4#/PA20	18	CASU#/PINT5/CS5#/CE1A#/TIC5U/PA21
19	RESET#	20	GND

Table3.1.9 Pin Assignment of Extension connector(J10)

Pin	Signal name	Pin	Signal name
1	+3.3V	2	+3.3V
3	WDTOVF#	4	A25/DREQ0/IRQ0/SCK0/PA2
5	A24/RXD1/PA3	6	A23/TXD1/PA4
7	A22/DREQ1/IRQ1/SCK1/PA5	8	A21/IRQ7/ADTRG#/POE8#/PB9
9	A20	10	A19
11	A18	12	A17
13	A16	14	A15
15	A14	16	A13
17	A12	18	A11
19	A10	20	GND
21	NC	22	NC
23	EXCLK	24	A9
25	A8	26	A7
27	A6	28	A5
29	A4	30	A3
31	A2	32	A1/PC1
33	A0/PC0	34	CS0#
35	CS1#/POE5/PA11	36	CS2#/TCLKA/PA6
37	RASU#/PINT4/CS4#/PA20	38	CASU#/PINT5/CS5#/CE1A#/TIC5U/PA21
39	RESET#	40	GND

Table3.1.10 Pin Assignments of Extension Connector(J13)

Pin	Signal Name	Pin	Signal Name
1	NC	2	NC
3	RD#	4	D15/TIOC4DS/PD15
5	D14/TIOC4CS/PD14	6	D13/TIOC4BS/PD13
7	D12/TIOC4AS/PD12	8	D11/TIOC3DS/PD11
9	D10/TIOC3CS/PD10	10	D9/TIOC3BS/PD9
11	D8/TIOC3AS/PD8	12	D7
13	D6	14	D5
15	D4	16	D3
17	D2	18	D1
19	D0	20	GND

Table3.1.11 Pin Assignments of Extension Connector (J12)

Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	WAIT#/DACK2/PA17	4	D31/TIOC3AS/ADTRG#/PD31
5	D30/TIOC3CS/IRQOUT#/PD30	6	D29/CS3#/TIOC3BS/PD29
7	D28/CS2#/TIOC3DS/PD28	8	D27/DACK1/TIOC4AS/PD27
9	D26/DACK0/TIOC4BS/PD26	10	D25/DREQ1/TIOC4CS/PD25
11	D24/DREQ0/TIOC4DS/PD24	12	D23/IRQ7/AUDSYNC#/PD23
13	D22/IRQ6/TIC5US/AUDCK/PD22	14	D21/IRQ5/TIC5VS/PD21
15	D20/IRQ4/TIC5WS/PD20	16	D19/IRQ3/POE7#/AUDATA3/PD19
17	D18/IRQ2/POE6#/AUDATA2/PD18	18	D17/IRQ1/POE5#/AUDATA1/PD17
19	D16/IRQ0/POE4#/AUDATA0/PD16	20	GND
21	TEND0/TIOC0B/PE1	22	DREQ1/TIOC0C/PE2
23	RD#	24	D15/TIOC4DS/PD15
25	D14/TIOC4CS/PD14	26	D13/TIOC4BS/PD13
27	D12/TIOC4AS/PD12	28	D11/TIOC3DS/PD11
29	D10/TIOC3CS/PD10	30	D9/TIOC3BS/PD9
31	D8/TIOC3AS/PD8	32	D7
33	D6	34	D5
35	D4	36	D3
37	D2	38	D1
39	D0	40	GND

Table3.1.12 Pin Assignment of Extension connector (J11)

Pin	Signal Name	Pin	Signal Name
1	IRQ1/POE1#/SDA/PB3	2	IRQ0/POE0#/SCL/PB2
3	CS3#/TCLKB/PA7	4	RD_WR#/IRQ2/TCLKC/PA8
5	WE0#/DQMLL#/POE6#/PA12	6	WE1#/WE#/DQMLU#/POE7#/PA13
7	WE2#/ICIORD#/DQMUL#/TIC5V/PA22	8	WE3#/ICIOWR#/AH#/DQMUU#/TIC5W/PA23
9	FRAME#/CKE/TCLKD/IRQ3/PA9	10	RASL#/IRQ2/POE2#/PB4
11	CASL#/IRQ3/POE3#/PB5	12	CS8#/PE16
13	SCK2/TIOC3A/PE8	14	TXD2/TIOC3C/PE10
15	BS#/RXD2/TIOC2B/UBCTRG#/PE7	16	CE2A#/DREQ3/PINT6/PA24
17	CE2B#/DACK3/PINT7/POE8#/PA25	18	BREQ#/TEND0/PINT2/PA18
19	BACK#/TEND1/PINT3/PA19	20	GND

3.2 Outline of Switches and LEDs

The M3A-HS60 includes switches and LEDs as its operational components.

Figure3.2.1 shows the M3A-HS60 Operational Component Assignment.

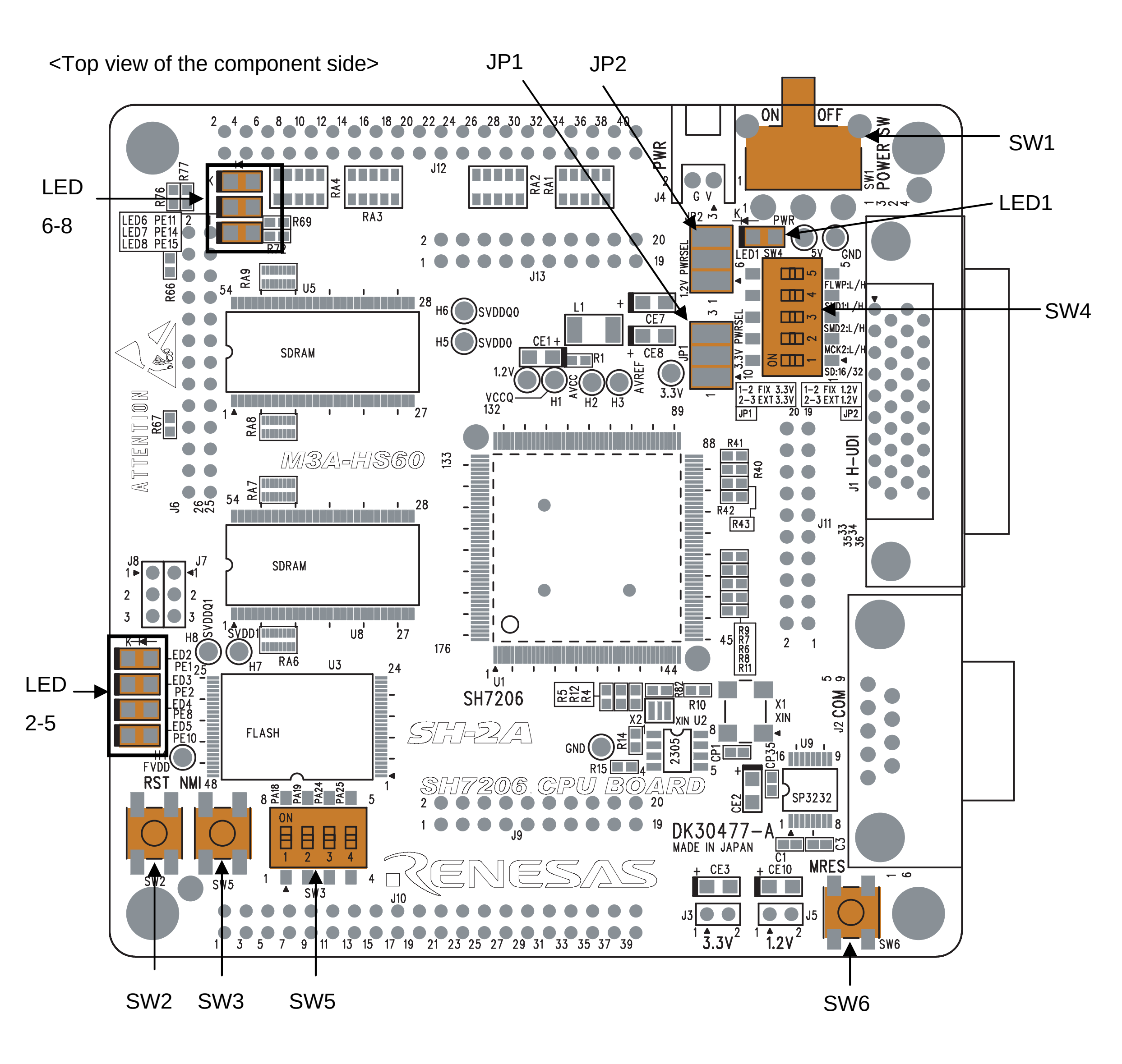


Figure3.2.1 M3A-HS60 Operational Component Assignment

3.2.1 Power Supply Select Jumpers (JP1 and JP2)

The SH7206 uses 3.3V and 1.25V power supply voltages. The JP1 and JP2 allow the sources for the SH7206 power supply voltages (3.3V and 1.25V) to be selected.

Figure3.2.2 shows the SH7206 Power Supply Voltage Select Jumpers Assignment (JP1 and JP2).

Table3.2.1 and Table3.2.2 list jumper settings for selecting SH7206 power supply voltage.

: Initial Setting

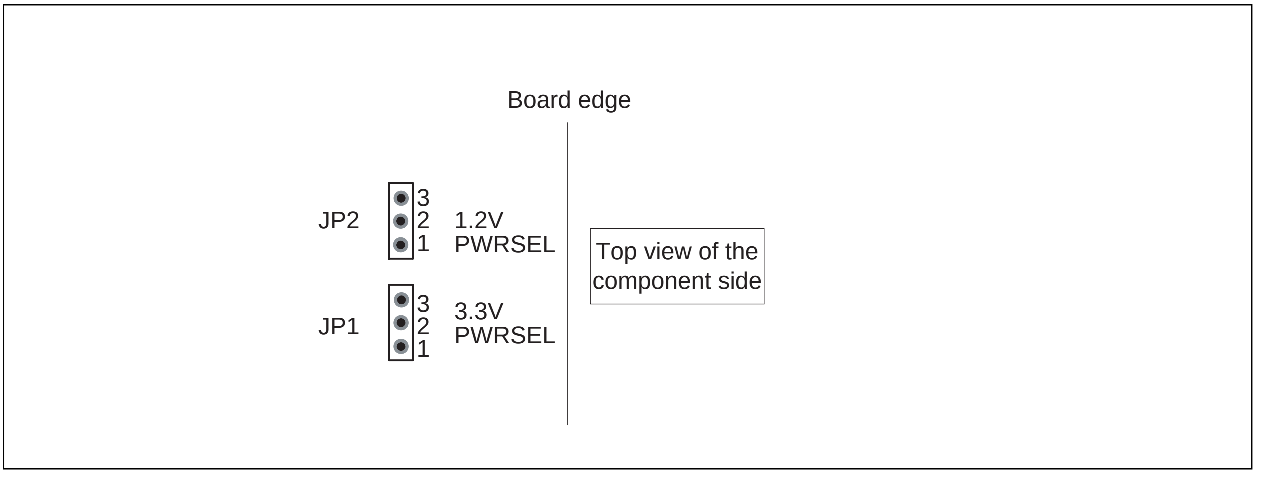


Figure3.2.2 SH7206 Power Supply Voltage Select Jumper Assignment (JP1 and JP2)

Table3.2.1 Jumper Settings for Selecting SH7206 Power Supply Voltage (JP1)

Jumper	Setting	Function
JP1 3.3V PWRSEL	1-2	3.3 V fixed power supply voltage (supplied from regulator)
	2-3	External power supply voltage (supplied from J3)

Table3.2.2 Jumper Settings for Selecting SH7206 Power Supply Voltage (JP2)

Jumper	Setting	Function
JP2. 1.2V PWRSEL	1-2	1.25 V fixed power supply voltage (supplied from regulator)
	2-3	External power supply voltage (supplied from J5)

Note: Do not change jumper settings while the M3A-HS60 is being operated. Be sure to turn off the power of the M3A-HS60 before changing jumper settings for all the time.

3.2.2 Switch and LED Functions

The M3A-HS60 includes six switches and eight LEDs.
Figure3.2.3 shows the M3A-HS60 Switch and LED Pin Assignment.
Table3.2.3 lists the switches mounted on M3A-HS60.

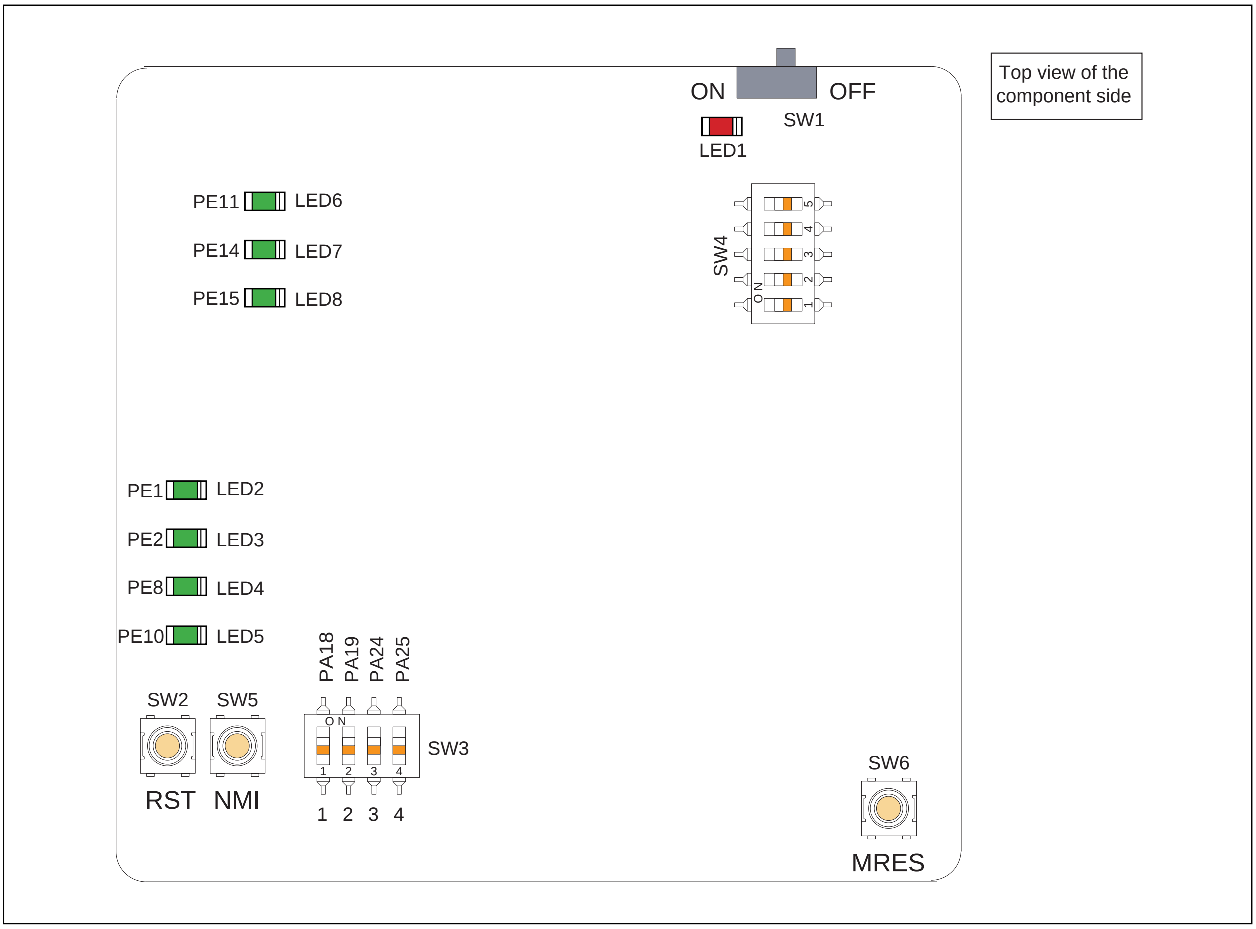


Figure3.2.3 M3A-HS60 Switch and LED Pin Assignment

Table3.2.3 Switches Mounted on M3A-HS60

No.	Function	Remarks
SW1	System power on/off switch	-
SW2	System reset input switch	Refer to section 2.8 for details
SW3	User DIP switch (4-pole) SW3-1 OFF:PA18=H,ON:PA18=L SW3-2 OFF:PA19=H,ON:PA19=L SW3-3 OFF:PA24=H,ON:PA24=L SW3-4 OFF:PA25=H,ON:PA25=L	PA18, PA19, PA24, and PA25 are pull-upped. Refer to section 2.5 for details
SW4	System setup DIP switch (5-pole)	Refer to Table 3.2.4 for function lists
SW5	NMI interrupt switch	Refer to section 2.9 for details
SW6	Manual reset switch[*1]	Refer to section 2.9 for details

[*1]Although an internal state of CPU is initialized in manual reset, each register of the on-chip peripheral module is not initialized

.

Table3.2.4 lists the functions of the switch SW4.

▒: Initial Setting

Table3.2.4 Functions of the Switch SW4

No.	Setting	Function	
SW4-1 [*] SDRAM_SZ	OFF	SDRAM_SZ=H (32-bit access)	Sets SDRAM bus width
	ON	SDRAM_SZ=L (16-bit access)	
SW4-2 MD_CLK2	OFF	MD_CLK2 pin state "H" (Disable setting)	Sets clock mode
	ON	MD_CLK2 pin state "L" (clock mode 2)	
SW4-3 Reserved	OFF	Disable setting	Reserved (Disable setting)
	ON	This setting should always be "ON"	
SW4-4 Reserved	OFF	Disable setting	
	ON	This setting should always be "ON"	
SW4-5 FLASH _WP#	OFF	Releases write protect for the flash memory(WP0# pin state "H")	
	ON	Write protects the flash memory(WP0# pin state "L")	

[*] When using the J6 connector, make sure the SDRAM bus width is set to 16-bit access (SW4-1 OFF).

Table3.2.5 lists the functions of the LEDs mounted in M3A-HS60.

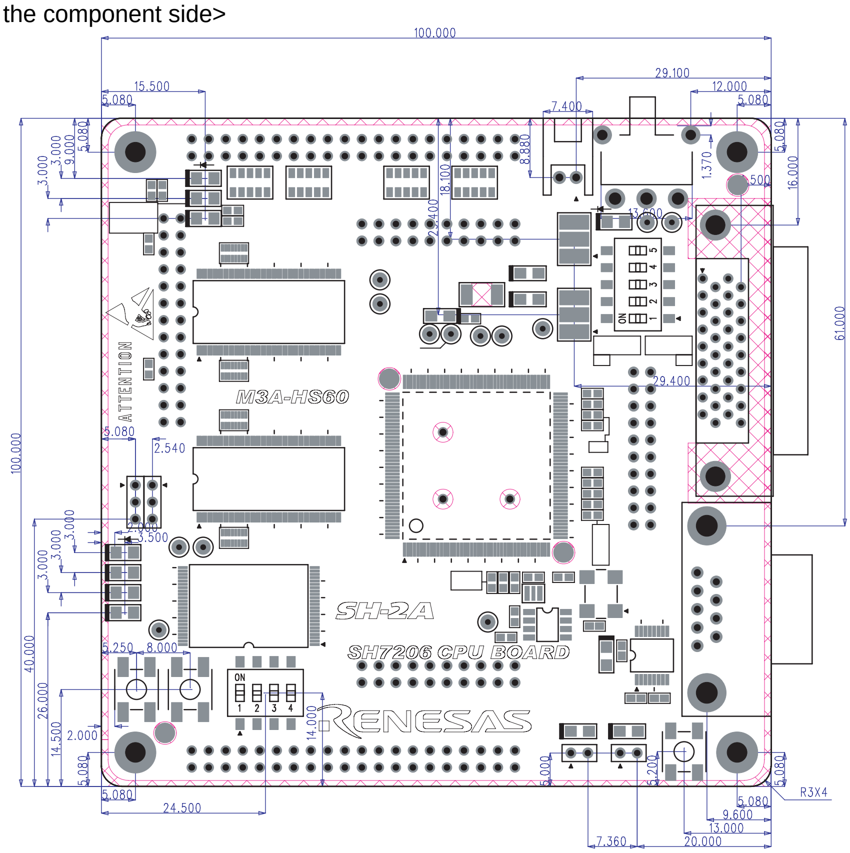
Table3.2.5 Functions of the LEDs Mounted in M3A-HS60

No.	Color	Functions/Remarks
LED1	Red	Power-on LED (LED1 lights when 3.3 V power is supplied)
LED2	Green	Open to the user (LED2 lights when PE1 outputs "L")
LED3	Green	Open to the user (LED3 lights when PE2 outputs "L")
LED4	Green	Open to the user (LED4 lights when PE8 outputs "L")
LED5	Green	Open to the user (LED5 lights when PE10 outputs "L")
LED6	Green	Open to the user (LED6 lights when PE11 outputs "L")
LED7	Green	Open to the user (LED7 lights when PE14 outputs "L")
LED8	Green	Open to the user (LED8 lights when PE15 outputs "L")

3.3 Outline Dimensions of M3A-HS60

Figure3.3.1 shows the outline dimensions of M3A-HS60. Connectors can be mounted on J6-J13 so that it is easy to connect extension boards.

<Top view of the component side> Unit :mm



<Perspective view of the component side>

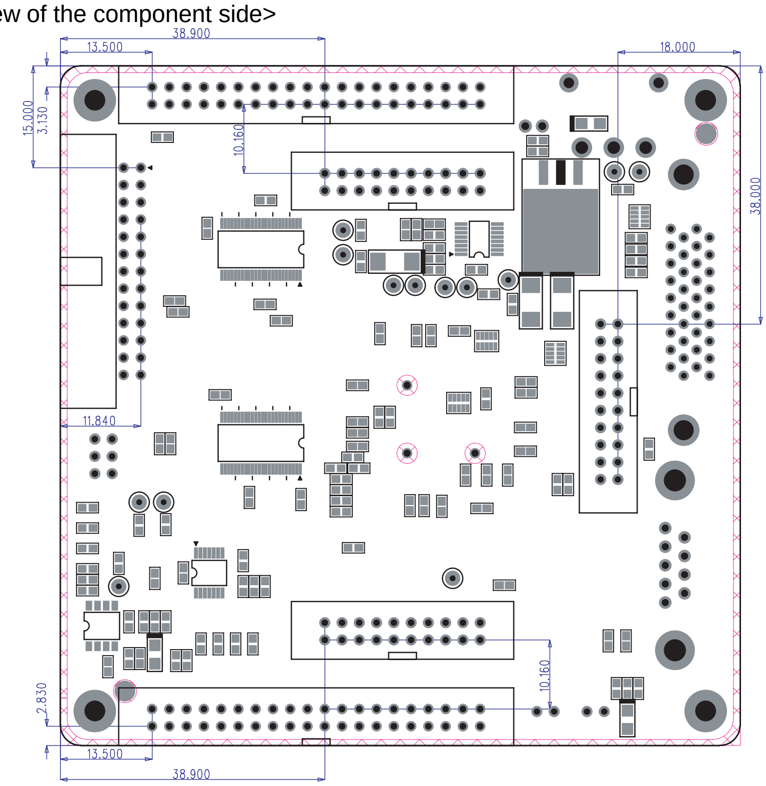


Figure3.3.1 Outline Dimensions of M3A-HS60

This is a blank page

Appendix

M3A-HS60 Schematics

This is a blank page

SH-2A SH7206 CPU BOARD M3A-HS60 SCHEMATICS

Note:
VCC = 5V
3VCC = 3.3V
1.2VCC = 1.25V

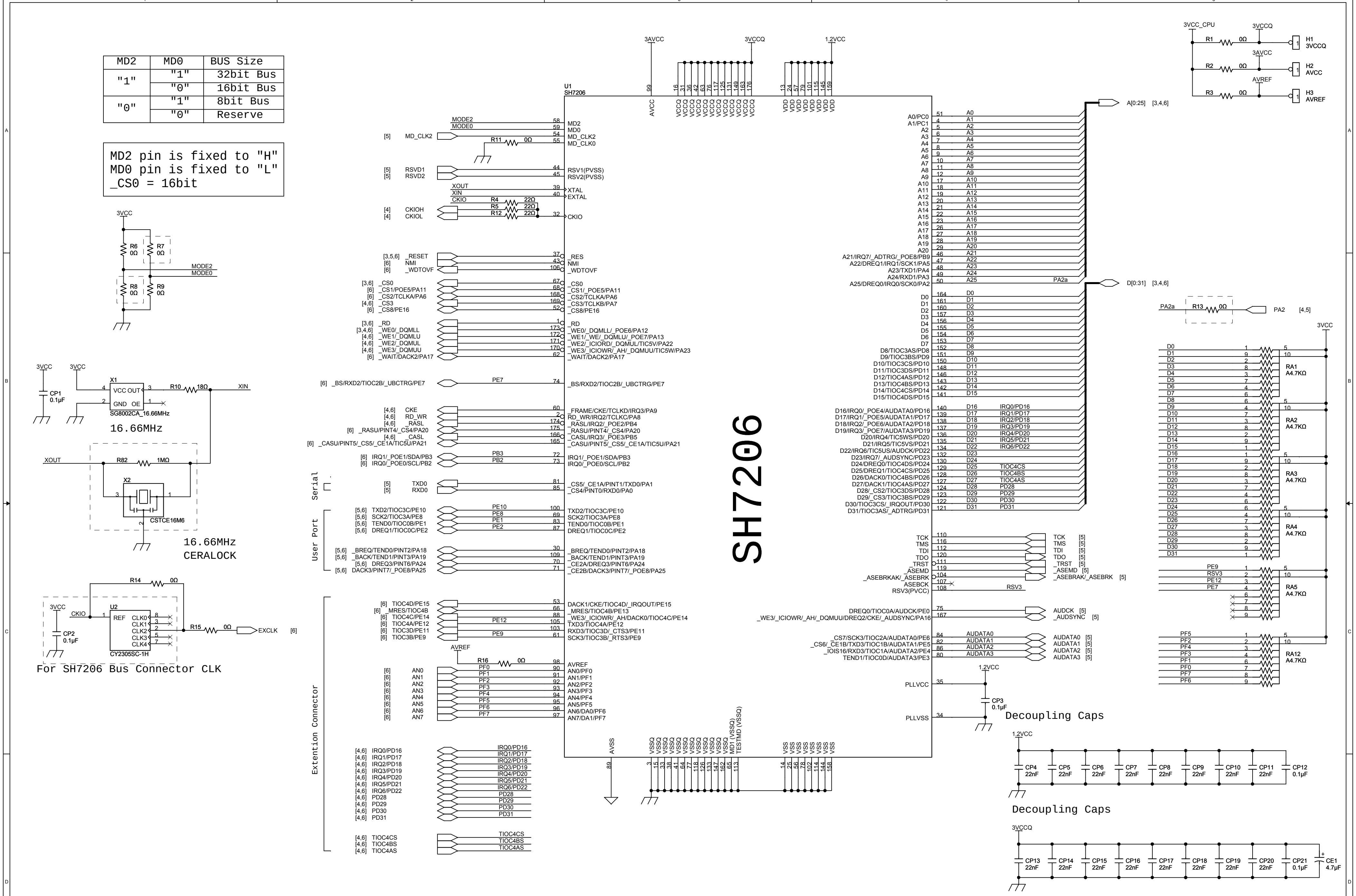
R = Fixed Resistors
RA = Resistor Array
C = Ceramic Caps
CE = Tantalum Electrolytic Caps
CP = Decoupling Caps

[Note] :not mounted

CHANGE						
Ver. 1.0			RENESAS SOLUTIONS CORPORATION			M3A-HS60
	SCALE		DRAWN	CHECKED	DESIGNED	APPROVED
	DATE	05-06-01				INDEX (1 / 7)
						DK30477-A

MD2	MD0	BUS Size
"1"	"1"	32bit Bus
	"0"	16bit Bus
"0"	"1"	8bit Bus
	"0"	Reserve

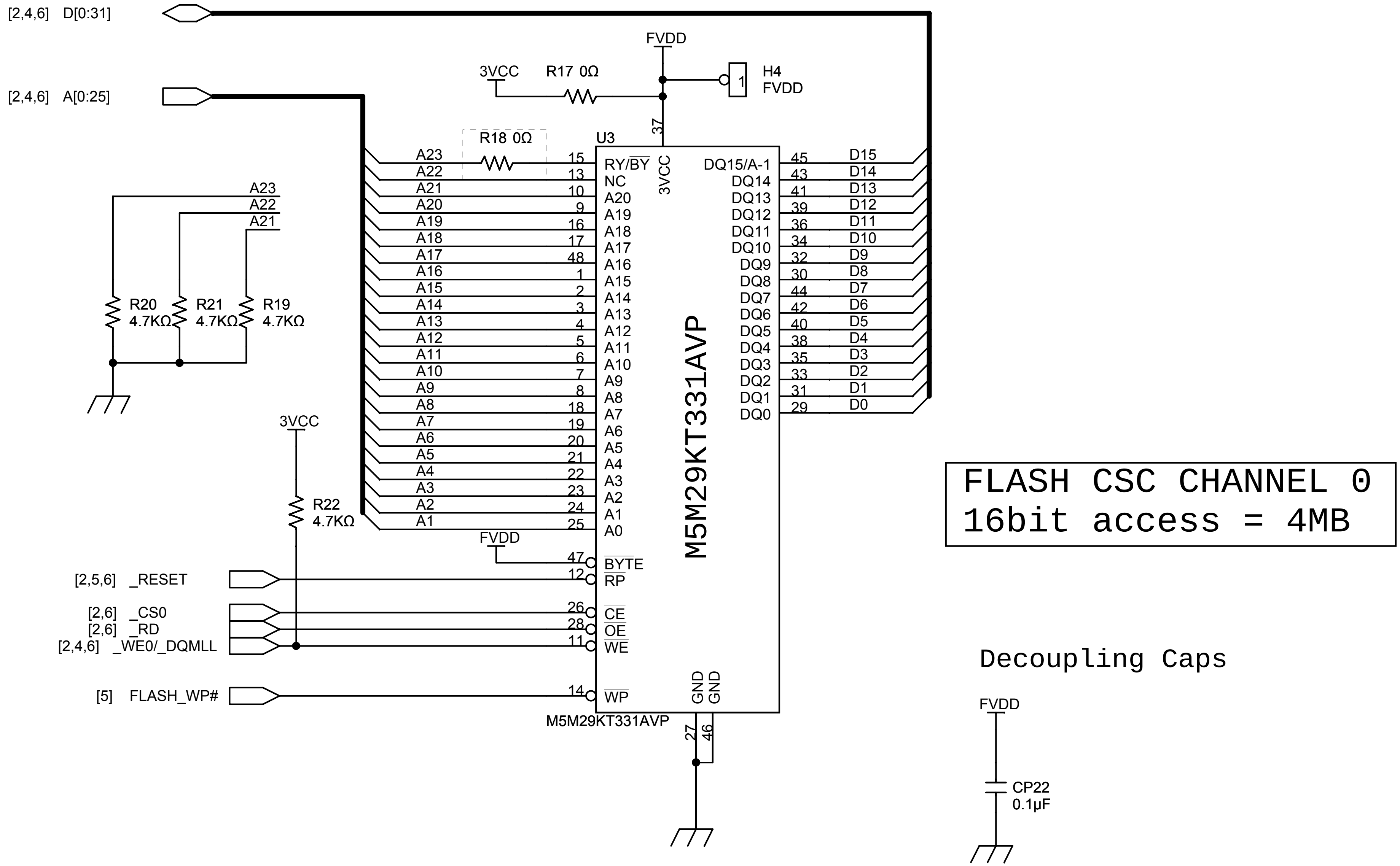
MD2 pin is fixed to "H"
MD0 pin is fixed to "L"
_CS0 = 16bit



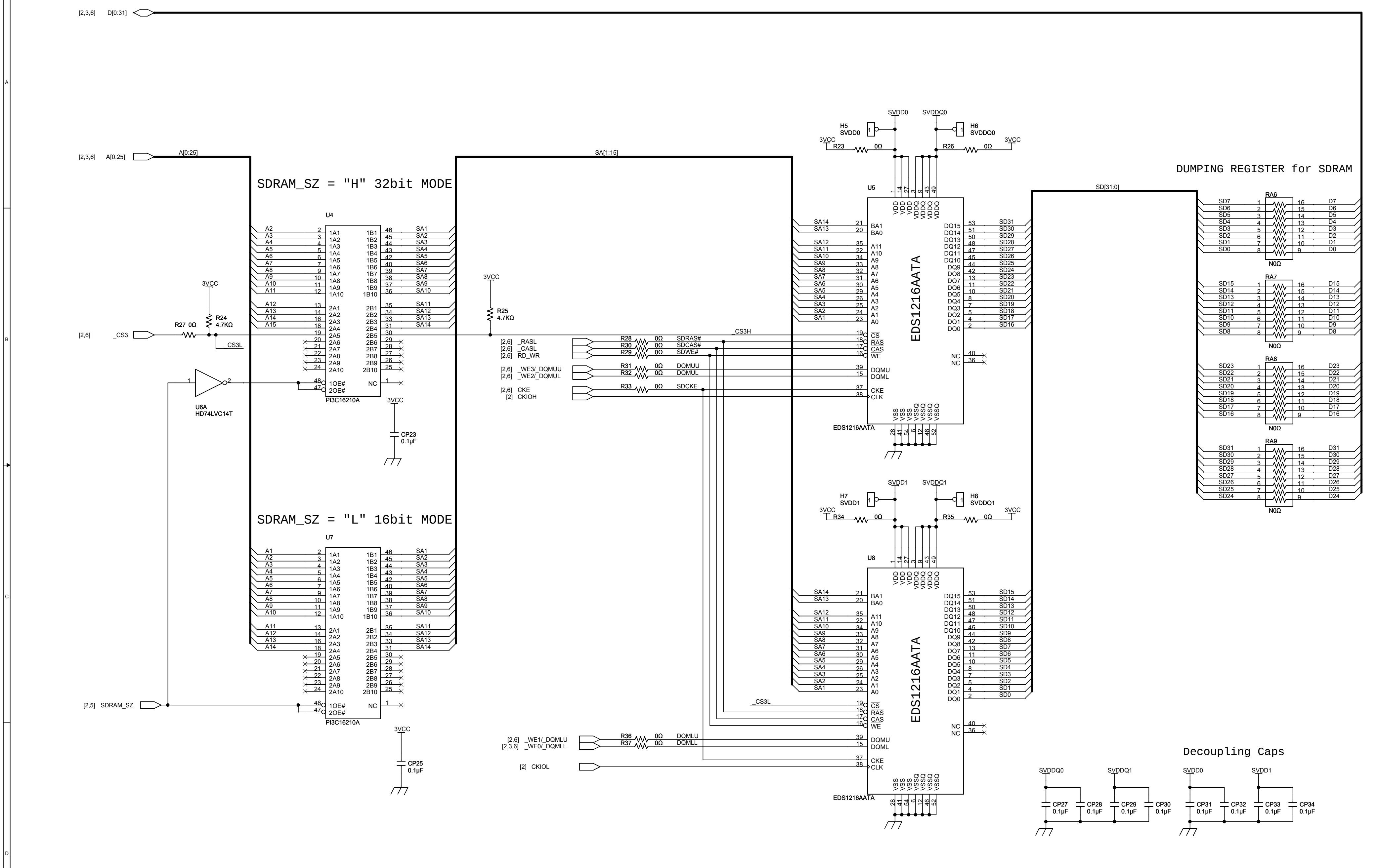
CHANGE	Ver. 1.0	SCALE	RENESAS SOLUTIONS CORPORATION			M3A-HS60
		DATE 05-06-01	DRAWN	CHECKED	DESIGNED	APPROVED

CPU SH7206 (2 / 7)

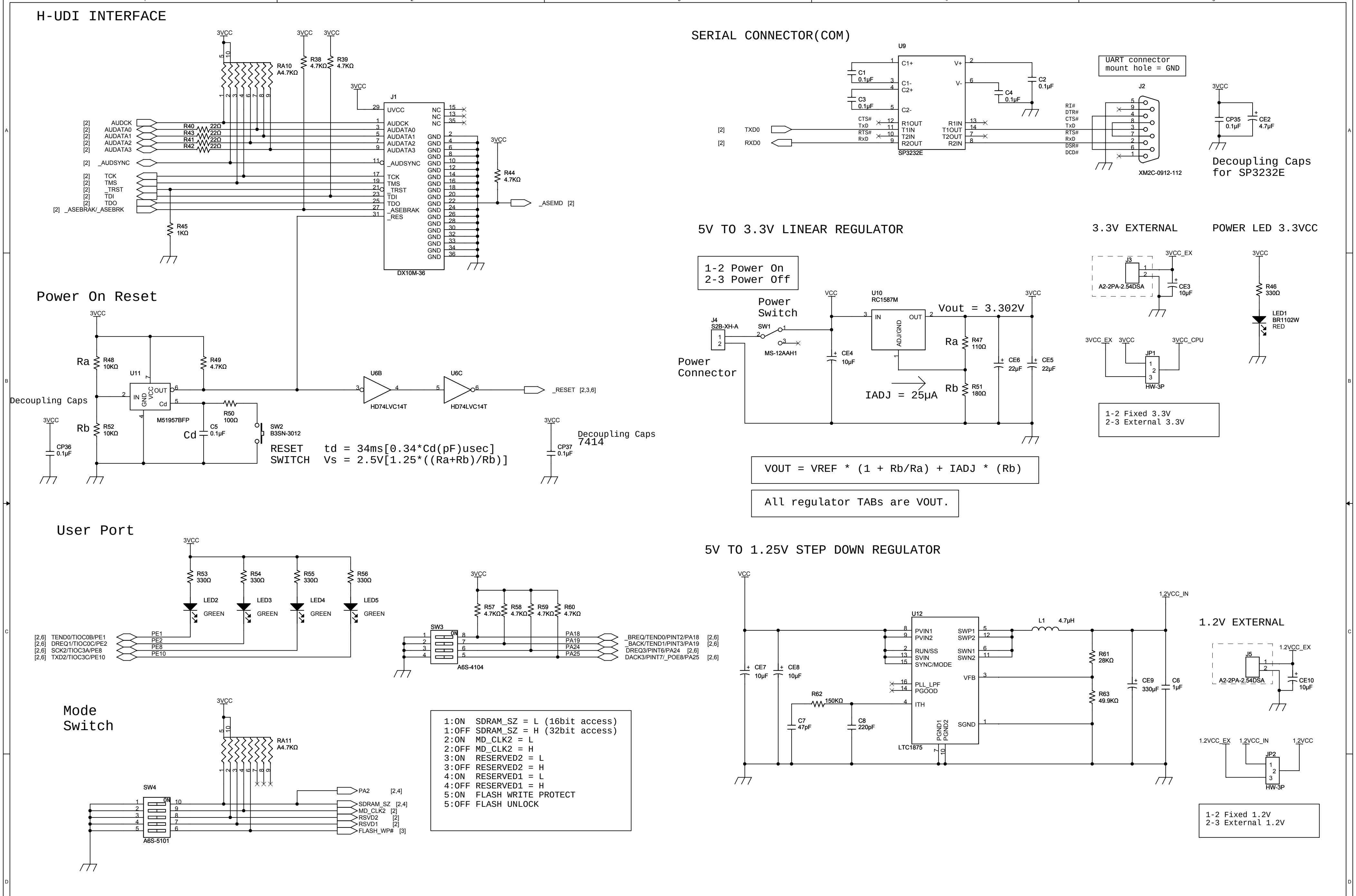
DK30477-A



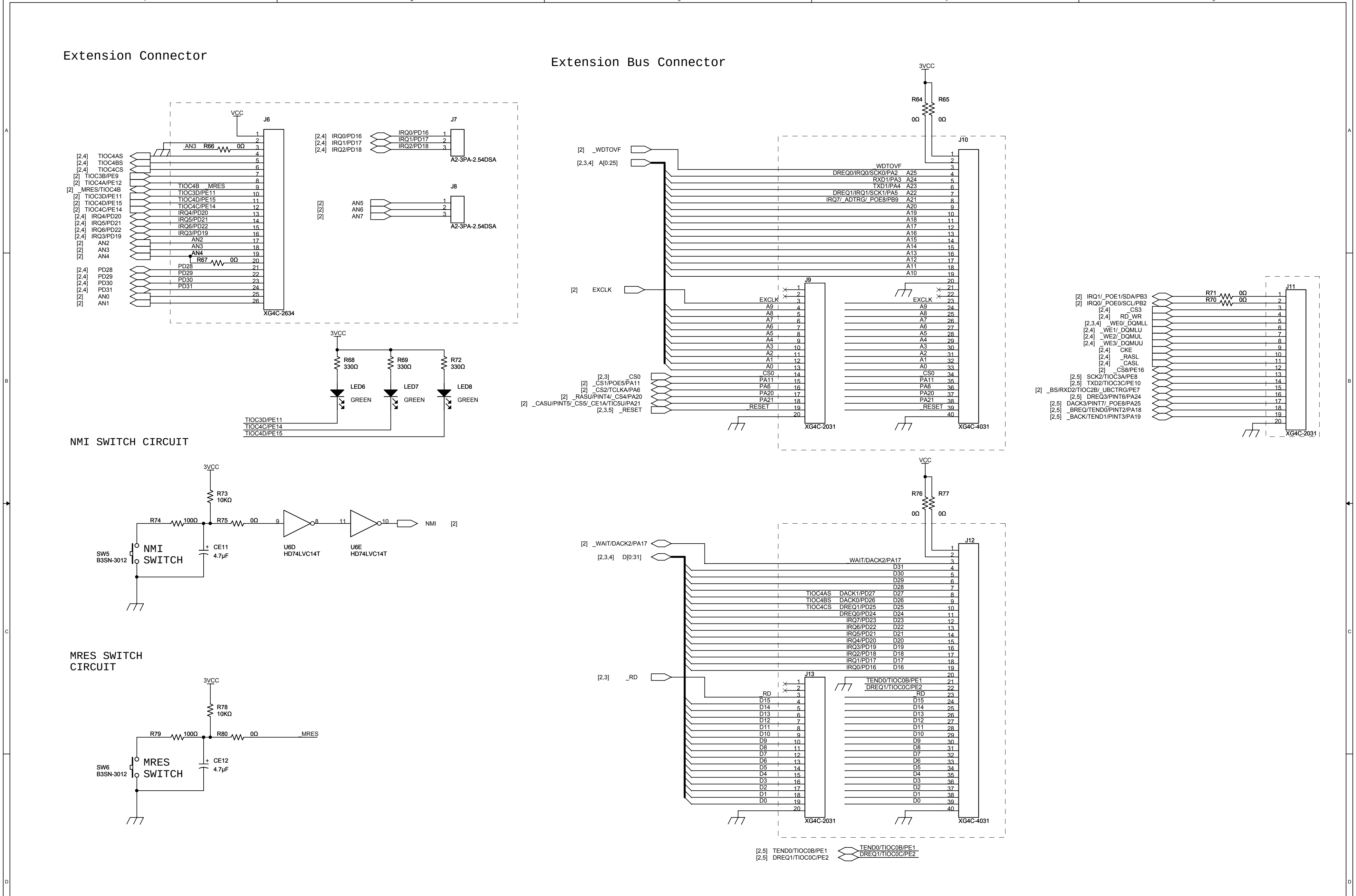
CHANGE			RENESAS SOLUTIONS CORPORATION			M3A-HS60
	SCALE		DRAWN	CHECKED	DESIGNED	APPROVED
Ver. 1.0	DATE	05-06-01				FLASH MEMORY (3 / 7) DK30477-A



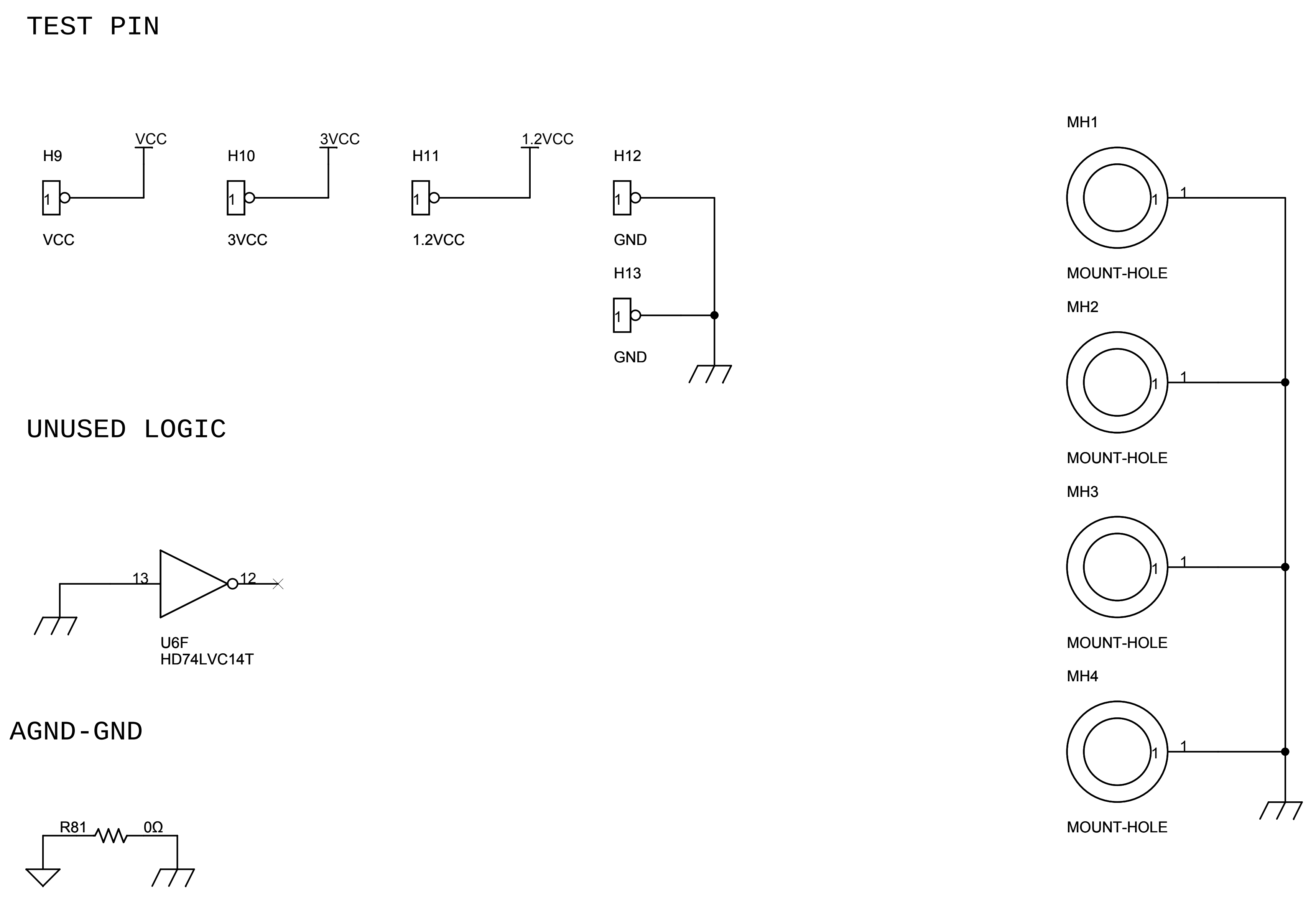
CHANGE			
Ver. 1.0	SCALE	RENESAS SOLUTIONS CORPORATION	M3A-HS60
	DATE 05-06-01	DRAWN / CHECKED / DESIGNED / APPROVED	SDRAM (4 / 7)
			DK30477-A



CHANGE	Ver. 1.0	SCALE	RENESAS SOLUTIONS CORPORATION		M3A-HS60
		DATE 05-06-01	DRAWN	CHECKED	H-UDI/RESET/UART/POWER (5 / 7)
			DESIGNED	APPROVED	DK30477-A



CHANGE	Ver. 1.0	SCALE	RENESAS SOLUTIONS CORPORATION		M3A-HS60
		DATE 05-06-01	DRAWN	CHECKED	BUS CONNECTORS/PUSH SW (6 / 7)
			DESIGNED	APPROVED	DK30477-A



CHANGE			
Ver. 1.0	SCALE		
	DATE	05-06-01	

RENESAS SOLUTIONS CORPORATION

DRAWN	CHECKED	DESIGNED	APPROVED

M3A-HS60

OTHERS (7 / 7)

DK30477-A

This is a blank page

SH7206 CPU Board
M3A-HS60
User's Manual

Publication Data June 1,2005 Rev. 1.00

Published by Renesas Technology Corp.
Renesas Solutions Corp.

SH7206 CPU Board
M3A-HS60
User's Manual

Renesas Electronics Corporation
1753, Shimonumabe, Nakahara-ku, Kawasaki-shi, Kanagawa 211-8668 Japan

REJ11J0002-0100Z