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Renesas Electronics Corporation

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Note : Mitsubishi Electric will continue the business operations of high frequency & optical devices and power devices.

Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

**Be sure to read this note.**

# SDI Emulator System for M32R Family MCUs M32100T2-SDI-E Release Note

MITSUBISHI ELECTRIC SEMICONDUCTOR APPLICATION ENGINEERING CORPORATION

September 1, 2001

## Outline

This Release Note explains the specifications, cautions and restrictions dependent on MCU models which are not covered by the M32100T2-SDI-E User's Manual. When referring to a required section in the User's Manual, read the Release Note together with the manual.

## Contents

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## 1. MCU Model List

This Release Note covers the MCU models listed in Table 1.

*Table 1 MCU model list*

M32102 Group	M32102S6FP
M32121 Group	M32121FCWG
M32170 Group	M32170FxVFP, M32170F6VWG
M32171 Group	M32171FxVFP
M32172 Group	M32172FxVFP, M32172FxVWG
M32173 Group	M32173FxVFP, M32173FxVWG
M32174 Group	M32174FxVFP

## 2. Specifications, Cautions and Restrictions Dependent on the MCU Model

The following explains the emulator specifications, cautions and restrictions dependent on the MCU model.

## 2.1 M32102S6FP

### (1) Differences between the emulator and MCUs

<b>IMPORTANT</b>	
•	The emulator initializes the MCU internal register to the following values. Initialization starts when the power switch is turned ON or MCU is reset.
	R0 = 00000000 R1 = 00000000 R2 = 00000000 R3 = 00000000 R4 = 00000000
	R5 = 00000000 R6 = 00000000 R7 = 00000000 R8 = 00000000 R9 = 00000000
	R10 = 00000000 R11 = 00000000 R12 = 00000000 R13 = 00000000 R14 = 00000000
	R15 = 00000100 SPI = 00000100 SPU = 00000100 BPC = 00000000 PC = 00000000
	ACCH = 00000000 ACCL = 00000000
	PSW = 00000000

### (2) MCU signals connected to the SDI MCU control interface connector (referred from Section 3.4 of the User's Manual)

Pin No.	Pin	Direction	Connected to	Remarks
1	TCLK	Emulator to target	TCK of MCU	Clock frequency: 4 MHz
2	Vss	-	GND (0 V)	
3	TDI	Emulator to target	TDI of MCU	
4	TDO	Target to emulator	TDO of MCU	
5	TMS	Emulator to target	TMS of MCU	
6	TRST	Emulator to target	TRST# of MCU	Totem pole output on the emulator
7	DBI	Emulator to target	DBI# of MCU	
8	N.C.	-	Not used	
9	Vcc	Target to emulator	VCCX of MCU	
10	RST	Emulator to target	System reset	Open corrector output on the emulator

### (3) MCU signals connected to the SDI trace interface connector (referred from Section 3.4 of the User's Manual)

Pin No.	Pin	Direction	Connected to	Remarks
1	TRCLK	Target to emulator	TRCLK of MCU	
2	Vss		GND (0 V)	
3	TRSYNC	Target to emulator	TRSYNC# of MCU	
4	TRDATA(0)	Target to emulator	TRDATA0 of MCU	
5	TRDATA(1)	Target to emulator	TRDATA1 of MCU	
6	Vss		GND (0 V)	
7	TRDATA(2)	Target to emulator	TRDATA2 of MCU	
8	TRDATA(3)	Target to emulator	TRDATA3 of MCU	
9	Vss		GND (0 V)	
10	TRDATA(4)	Target to emulator	TRDATA4 of MCU	
11	TRDATA(5)	Target to emulator	TRDATA5 of MCU	
12	Vss		GND (0 V)	
13	TRDATA(6)	Target to emulator	TRDATA6 of MCU	
14	TRDATA(7)	Target to emulator	TRDATA7 of MCU	
15	Vcc	Target to emulator	VCCX of MCU	
16	EVENT0	Target to emulator	EVENT0 of MCU	
17	EVENT1	Target to emulator	EVENT1 of MCU	
18	NC		Not used	
19	NC		Not used	
20	NC		Not used	

(4) Debug specifications dependent on MCU model (referred from Section 5.1 of the User's Manual)

Emulation memory		<ul style="list-style-type: none"> <li>No built-in emulation memory provided in the emulator</li> <li>Function to download the data to an external flash ROM supported</li> </ul>
Software break		RAM area: Implemented by instruction replacement ROM area: Implemented by preexecution PC breakpoints of MCU (four points)
Hardware break	Forcible break	Implemented by internal resource of MCU
	Data access break	Implemented by internal resource of MCU (two data access break points)
Trace clock frequency		TRCLK frequency = CPU operation frequency/2

(5) Other cautions and restrictions dependent on MCU model

## IMPORTANT

### Note on Using the MVTC Instruction -1:

- When the user program is stopped by the MVTC instruction at the address of the instruction which operates BPC, a BPC value may be changed even if the MVTC instruction has not been executed. Occurrence of this phenomenon depends on the MCU status and the instruction sequence. After this phenomenon occurs, the program is normally re-executed starting with the PC value of the MVTC instruction. The following shows sample data when the phenomenon occurs.

Example:

Address	Instruction	
H'100	LD24	R0,#H'100
H'104	MVTC	R0,BPC
H'106	NOP	

When a break occurs at PC = H'104 in the above program fragment, BPC = H'100 may be enabled even before the MVTC instruction is executed.

### Note on Using the MVTC Instruction -2:

- In cases when instructions used to operate on the BPC with the MVTC instruction are followed by an RTE instruction, do not set a preexecution PC breakpoint for the RTE instruction. This is because the BPC value becomes illegal and the program cannot be run normally after a break.

The following shows sample data when the phenomenon occurs.

Example:

Address	Instruction	
H'100	LD24	R0,#H'100
H'104	MVTC	R0,BPC
H'106	NOP	
H'110	RTE	

If in the above program fragment a preexecution PC breakpoint is set at PC = H'110 to cause a break, the BPC value becomes illegal.

### Note on WDT:

- If a user program is stopped during operation of WDT built in the MCU, the WDT count halts meanwhile. This prevents SBI interruption by WDT while the user program is stopped. However, WDT is normally initialized then.

## 2.2 M32121CFWG

### (1) Differences between the emulator and MCUs

## IMPORTANT

- The emulator initializes the MCU internal register to the following values. Initialization starts when the power switch is turned ON or MCU is reset.
 

R0 = 00000000 R1 = 00000000 R2 = 00000000 R3 = 00000000 R4 = 00000000  
 R5 = 00000000 R6 = 00000000 R7 = 00000000 R8 = 00000000 R9 = 00000000  
 R10 = 00000000 R11 = 00000000 R12 = 00000000 R13 = 00000000 R14 = 00000000  
 R15 = 00000100 SPI = 00000100 SPU = 00000100 BPC = 00000000 PC = 00000000  
 ACCH = 00000000 ACCL = 00000000  
 PSW = 00000000
- To execute a target program which transfers to the sleep mode or to the stop mode, you must observe the following restrictions because of the MCU specifications:
  - (1) Add the instructions given below after the store instruction which transfers the target program to the sleep/stop mode.
  - (2) Do not set a break point between the STB instruction and the last NOP instruction added.

```

Target program
.
.
.
Store instruction <--Instruction to transfer to the sleep/stop mode
LOOP:  BRA  LOOP  }
        NOP      }
        NOP      }
        .        }
        .        }
        NOP      }

```

Insert 16 NOP instructions after the address branch command.
- When a break is forced while the target MCU is set in the sleep/stop mode, the target MCU may return to the normal mode. Also when memory is referenced or set while the target MCU is set in the sleep/stop mode, the target MCU may return to the normal mode from the sleep/stop mode.
- Do not change the target MCU to the sleep/stop mode using the memory rewrite function of the emulator debugger.

### (2) MCU signals connected to the SDI MCU control interface connector (referred from Section 3.4 of the User's Manual)

Pin No.	Pin	Direction	Connected to	Remarks
1	TCLK	Emulator to target	TCK of MCU	Clock frequency: 8 MHz
2	Vss	-	GND (0 V)	
3	TDI	Emulator to target	TDI of MCU	
4	TDO	Target to emulator	TDO of MCU	
5	TMS	Emulator to target	TMS of MCU	
6	TRST	Emulator to target	TRST# of MCU	Totem pole output on the emulator
7	DBI	Emulator to target	DBI# of MCU	
8	FVCC	Emulator to target	FVCC of MCU	Voltage is set to 2.5 V. Turned ON/OFF according to the setting of the ON/OFF switch supplied by FVCC.
9	Vcc	Target to emulator	VCCJ of MCU	
10	RST	Emulator to target	System reset	Open corrector output on the emulator

(3) MCU signals connected to the SDI trace interface connector  
(referred from Section 3.4 of the User's Manual)

Pin No.	Pin	Direction	Connected to	Remarks
1	TRCLK	Target to emulator	TRCLK of MCU	
2	Vss		GND (0 V)	
3	TRSYNC	Target to emulator	TRSYNC of MCU	
4	TRDATA(0)	Target to emulator	TRDATA0 of MCU	
5	TRDATA(1)	Target to emulator	TRDATA1 of MCU	
6	Vss		GND (0 V)	
7	TRDATA(2)	Target to emulator	TRDATA2 of MCU	
8	TRDATA(3)	Target to emulator	TRDATA3 of MCU	
9	Vss		GND (0 V)	
10	TRDATA(4)	Target to emulator	TRDATA4 of MCU	
11	TRDATA(5)	Target to emulator	TRDATA5 of MCU	
12	Vss		GND (0 V)	
13	TRDATA(6)	Target to emulator	TRDATA6 of MCU	
14	TRDATA(7)	Target to emulator	TRDATA7 of MCU	
15	Vcc	Target to emulator	VCCJ of MCU	
16	EVENT0	Target to emulator	EVENT0 of MCU	
17	EVENT1	Target to emulator	EVENT1 of MCU	
18	NC		Not used	
19	NC		Not used	
20	NC		Not used	

(4) Debug specifications dependent on MCU model  
(referred from Section 5.1 of the User's Manual)

Emulation memory		Flash ROM built in MCU used as the emulation memory
Software break		RAM area: Implemented by instruction replacement ROM area: Implemented by preexecution PC breakpoints of MCU (four points)
Hardware break	Forcible break	Implemented by internal resource of MCU
	Data access break	Implemented by internal resource of MCU (two data access break points)
Trace clock frequency		TRCLK frequency = CPU operation frequency/2



(5) Other cautions and restrictions dependent on MCU model

**IMPORTANT****Note on Using the MVTC Instruction -1:**

- When the user program is stopped by the MVTC instruction at the address of the instruction which operates BPC, a BPC value may be changed even if the MVTC instruction has not been executed. Occurrence of this phenomenon depends on the MCU status and the instruction sequence. After this phenomenon occurs, the program is normally re-executed starting with the PC value of the MVTC instruction. The following shows sample data when the phenomenon occurs.

Example:

Address		Instruction
H'100	LD24	R0,#H'100
H'104	MVTC	R0,BPC
H'106	NOP	
	.	
	.	

When a break occurs at PC = H'104 in the above program fragment, BPC = H'100 may be enabled even before the MVTC instruction is executed.

**Note on Using the MVTC Instruction -2:**

- In cases when instructions used to operate on the BPC with the MVTC instruction are followed by an RTE instruction, do not set a preexecution PC breakpoint for the RTE instruction. This is because the BPC value becomes illegal and the program cannot be run normally after a break.

The following shows sample data when the phenomenon occurs.

Example:

Address		Instruction
H'100	LD24	R0,#H'100
H'104	MVTC	R0,BPC
H'106	NOP	
	.	
	.	
H'110	RTE	

If in the above program fragment a preexecution PC breakpoint is set at PC = H'110 to cause a break, the BPC value becomes illegal.

**Note on WDT:**

- If a user program is stopped during operation of WDT built in the MCU, the WDT count halts meanwhile. This prevents SBI interruption by WDT while the user program is stopped. However, WDT is normally initialized then.

## 2.3 32170, 32171, 32172, 32173 and 32174 Groups

### (1) Differences between the emulator and MCUs

<b>IMPORTANT</b>	
<ul style="list-style-type: none"> <li>The emulator initializes the MCU internal register to the following values. Initialization starts when the power switch is turned ON or MCU is reset.</li> </ul>	
R0 = 00000000 R1 = 00000000 R2 = 00000000 R3 = 00000000 R4 = 00000000 R5 = 00000000 R6 = 00000000 R7 = 00000000 R8 = 00000000 R9 = 00000000 R10 = 00000000 R11 = 00000000 R12 = 00000000 R13 = 00000000 R14 = 00000000 R15 = 00000100 SPI = 00000100 SPU = 00000100 BPC = 00000000 PC = 00000000 ACCH = 00000000 ACCL = 00000000 PSW = 00000000	

### (2) MCU signals connected to the SDI MCU control interface connector (referred from Section 3.4 of the User's Manual)

Pin No.	Pin	Direction	Connected to	Remarks
1	TCLK	Emulator to target	JTCK of MCU	Clock frequency: 4 MHz
2	Vss	-	GND (0 V)	
3	TDI	Emulator to target	JTDI of MCU	
4	TDO	Target to emulator	JTDO of MCU	
5	TMS	Emulator to target	JTMS of MCU	
6	TRST	Emulator to target	JTRST of MCU	Totem pole output on the emulator
7	DBI	Emulator to target	JDBI of MCU	
8	N.C.	-	Not used	
9	Vcc	Target to emulator	VCCE of MCU	
10	RST	Emulator to target	System reset	Open corrector output on the emulator

(3) MCU signals connected to the SDI trace interface connector  
(referred from Section 3.4 of the User's Manual)

This connector is not necessary because M32170FxVFP and M32171FxVFP do not have a signal to be connect to the SDI trace interface connector. If you need debug functions such as real-time trace, prepare a target board for debugging using M32170F6VWG or use the converter for in-circuit connection (option).

Pin No.	Pin	Direction	Connected to	Remarks
1	TRCLK	Target to emulator	TRCLK of MCU	
2	Vss		GND (0 V)	
3	TRSYNC	Target to emulator	TRSYNC of MCU	
4	TRDATA(0)	Target to emulator	TRDATA0 of MCU	
5	TRDATA(1)	Target to emulator	TRDATA1 of MCU	
6	Vss		GND (0 V)	
7	TRDATA(2)	Target to emulator	TRDATA2 of MCU	
8	TRDATA(3)	Target to emulator	TRDATA3 of MCU	
9	Vss		GND (0 V)	
10	TRDATA(4)	Target to emulator	TRDATA4 of MCU	
11	TRDATA(5)	Target to emulator	TRDATA5 of MCU	
12	Vss		GND (0 V)	
13	TRDATA(6)	Target to emulator	TRDATA6 of MCU	
14	TRDATA(7)	Target to emulator	TRDATA7 of MCU	
15	Vcc	Target to emulator	VCCE of MCU	
16	EVENT0	Target to emulator	JEVENT0 of MCU	
17	EVENT1	Target to emulator	JEVENT1 of MCU	
18	NC		Not used	
19	NC		Not used	
20	NC		Not used	

(4) Debug specifications dependent on MCU model  
(referred from Section 5.1 of the User's Manual)

Emulation memory		Flash ROM built in MCU used as the emulation memory
Software break		RAM area: Implemented by instruction replacement ROM area: Implemented by preexecution PC breakpoints of MCU (four points)
Hardware break	Forcible break	Implemented by internal resource of MCU
	Data access break	Implemented by internal resource of MCU (two data access breakpoints)
Trace clock frequency		TRCLK frequency = CPU operation frequency/2

(5) Other cautions and restrictions dependent on MCU model

## IMPORTANT

### Note on CLOCK LED:

- When using M3217xFxVWG or connecting M3217xFxVFP to the converter for in-circuit connection (option), CLOCK LED may light regardless of oscillation on the MCU target board. Thus, you cannot use CLOCK LED to judge presence/absence of oscillation of vibrators on the target board.

### Note on Access Prohibited Areas:

- The emulator uses the system space from H'C000 0000 to H'FFFF FFFF stipulated in the MCU user's manual as an emulator-only area. If the system space is accessed by the target program, operation of the emulator cannot be guaranteed. Therefore, do not access the area H'C000 0000 through H'FFFF FFFF from the target program.