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H8/300H Tiny Series Compact Emulator

Operating Back Trace ([Trace] Window)

Overview

The R0E436640CPE00 compact full-specification emulator for the H8/300H Tiny series incorporates a realtime tracing function which records the history of execution of the target program. The [Trace] window is used to display the results of realtime trace measurement. This document describes how to refer to the paths of execution of the source program in the source-mode display format in the [Trace] window.

Operation as described in this document can be confirmed on the H8/300H Tiny series compact emulator as a stand-alone unit. The same functions are usable with all compact emulators for the H8/300H Tiny series.

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1. Specifications

The realtime tracing function that is incorporated in H8/300H Tiny series compact emulators enables recording of up to 64 k cycles of the history of execution of the target program. When the results of realtime trace measurement are displayed in the source-mode display format within the [Trace] window, the mouse can be used to move a pointer to the source program in single steps along the program's path of execution. As well as single-step execution, operation of the [Come] button, which brings execution to the current cursor position, is available as a kind of step operation. Forward and backward (tracing back) are specifiable as directions for step operation.

2. Functional Description

This document describes how to use the H8/300H Tiny series compact emulator to refer to the path of execution of a source program in the [Trace] window. It guides you through a sample program provided on the CD-ROM for the H8/300H Tiny series compact emulator.

Versions of the individual tools are as follows.

Integrated Development Environment

High-performance Embedded Workshop Version 4.02.00

Compiler Package

H8SX, H8S, H8 compiler package Version 6.01, Release 02

Emulator Software

H8/300H Tiny compact emulator debugger Version 1.01, Release 00

3. Preparing the Software

3.1 Introduction

On your personal computer, install the software provided on the CD-ROM for the H8/300H Tiny series compact emulator. This will also deploy the sample program (tutorial workspace) to be used in this document.

The software on the CD-ROM can also be installed on a personal computer in which the High-performance Embedded Workshop has already been installed. In this case, some dialog boxes may be skipped in the installation process.

3.2 Installing the H8/300H Tiny Series Compact Emulator Software

Execute setup.exe from the CD-ROM for the H8/300H Tiny series compact emulator.

For details on installation, refer to the setup guide for the H8/300H Tiny series compact emulator and follow the instructions on the screen during installation. The installation procedure is omitted here.

3.3 Installing Other Necessary Software

- (1) The installation procedure is described in the manual supplied with the optional product; it is not described in this document.
- (2) This document describes the checking of operations when a part of the sample program is changed. The H8S, H8/300 series C/C++ compiler package is used for this purpose. Install the product version of the compiler package if you have already purchased it.



(3) If you have not purchased the product version of the compiler package, download the evaluation version from the Renesas website. The evaluation version of the H8S, H8/300 series C/C++ compiler package can be found from the top page by selecting [Support], [Download], [Download Search], and [Select Category], in that order, then selecting [Evaluation Version]. Links to the Renesas website are given in the last section of this document. Notes on restrictions and instructions for installing the evaluation version are available on the download page.

4. Operations

This section describes how to activate the High-performance Embedded Workshop (HEW) and how to use the step-operation function for the [Trace] window in the following steps.



Figure 4.1 Procedures for Sample Program Execution

4.1 Activating the High-Performance Embedded Workshop

First, connect the H8/300H Tiny series compact emulator to the host computer via the USB cable to check that debugging is available.



Then, activate the High-performance Embedded Workshop by opening the [Start] menu and selecting [All Programs], [Renesas], [High-performance Embedded Workshop], and [High-performance Embedded Workshop] in that order.



4.2 Opening a Workspace

(1) The [Welcome!] dialog box will appear on the High-performance Embedded Workshop window.

Parameter Provide the Provided Workshop				_ 8 🗙
File Edit View Project Build Debug Setup Tools	Test Window Help			
D # 8 8 8 8 4 1 9 1 9 1 9	▶ 🖬 🖓 🖉 🖬 🛣	a	•	
	Velcome! Options: Image: Construction of the system Image: Constred of the sy	OK Cancel Administration		
🕺 OL OT AL AT 🤱 🏦 🖉 😤 😭 🤶				
Build (Debug) Find in Files) Macro)	Fest X Version Control /			<u> </u>
Ready		E6000H perform	nance.doc - Microsoft Word	

Check that the H8/300H Tiny series compact emulator is turned on.

Select the [Browse to another project workspace] radio button in the [Welcome!] dialog box and click on the [OK] button.

Welcome!	? 🔀
Options:	ОК
C Create a new project workspace	Cancel
O Open a recent project workspace:	Administration
	1
Browse to another project workspace	



(2) The [Open Workspace] dialog box will appear.

Open Works	pace	? 🔀
Look <u>i</u> n: 🗀	Tutorial	- 🔁 🖆 🖬 -
Tutorial.hw		
File <u>n</u> ame:	Tutorial.hws	Select
Files of <u>type</u> :	HEW Workspaces (*.hws)	Cancel

If the software from the CD-ROM for this product has been installed, workspace "Tutorial.hws" will be within the directory structure as shown below (standard location). Specify the correct location by opening the folders in order. Select the workspace "Tutorial.hws" and click on the [Open] button.

C:\WorkSpace\Tutorial\CPE\H8Tiny\Tutorial\Tutorial.hws
C:\WorkSpace
└Tutorial
^L CPE
└H8Tiny
L'Tutorial
└_Tutorial.hws

Note: Depending on the software version, the above directory may not be specifiable. In this case, select the following directory.

<High-performance Embedded Workshop installation directory>

\Tools\Renesas\DebugComp\Platform\CPE\H8Tiny\Tutorial

Examples of directory names:

C:\hew3\Tools\Renesas\DebugComp\Platform\CPE\H8Tiny\Tutorial C:\hew2\Tools\Renesas\DebugComp\Platform\CPE\H8Tiny\Tutorial

(3) If the workspace is an old version, the following dialog box will appear. To update it to the new version, click on the [OK] button.

Hig	gh-pe	rformance Embedded Workshop 🛛 🛛 🔀
4	1	The Workspace you are about to open was created with an earlier version of HEW. The data files for the workspace, projects and sessions will be updated. Once updated this workspace cannot be opened by an older version of HEW. Backup versions of your old files will be created in the workspace and project directories with the prefix 'old_version_xxx'. Do you wish to continue ?
		OK Cancel



(4) If the [Toolchain missing] dialog box appears, select the name of the target project and click on the [OK] button.



(5) If the [Changing Toolchain Version] dialog box appears, select the desired toolchain version and click on the [OK] button.

Change Toolchai	n Version		? 🛛
Toolchain name: Current version: <u>C</u> PU Family:	Hitachi H8S,H8/300 St. 6.0.0.0 <mark>H8S,H8/300</mark>	andard Toolchain	OK Cancel
<u>T</u> oolchain:	Hitachi H8S,H8/300 S	tandard Toolchain 💌	
Toolchain <u>v</u> ersion	6.1.2.0	Ŧ	\triangleright
Toolchain <u>b</u> uild pha	ses:		
Build phase		Version	Information
H8S,H8/300 Asse	mbler	6.01.01	
H8S,H8/300 C/C+		6.01.02	
	++ Library Generator	2.01.01	
OptLinker		9.01.01	



(6) If the [Change Toolchain Version Summary] dialog box appears, just click on the [OK] button.

Change Toolchain Version Summary				
Summary :				
Project name : Tutorial				
Hitachi H8S,H8/300 Standard Toolchain was upgraded 6.0.0.0 -> 6.1.2.0.				
[Standard Library]/[Mode]/[Mode :] option is changed.				
Generate Upgrade.txt as a summary file in the project directory				
ОК				

(7) After the workspace has been opened, the [Init (H8/300H Tiny Compact Emulator)] dialog box will appear. Click on [Browse...].

Init (H8/300H Tiny Compact Emulator)			
MCU Debugging Information Emulator			
MCU: H83664.mcu			
Serial No.: 2-R36640-5L10030 ▼ Self Check			
Debug Option			
Enable the Trace Point Function.			
☑ Only an effective cycle is recorded to the trace memory.			
OK Cancel Help Next Hide			



(8) The [Select MCU File] dialog box will appear. Here, select [H83664.mcu] and click on the [Open] button.

Select MCU	File 🔹 🤶 🔀
Look jn: 🔎	MCUFILES 💽 🗲 🗈 📸 🖽 -
H83687.m H83694N.r H83694.m H836014.r H83664.m H83664.m	ncu 🖬 H83687N.mcu cu 📾 H836087.mcu ncu 📾 H836064GF.mcu 💵 h836049.mcu
File <u>n</u> ame:	H83664.mcu
Files of <u>type</u> :	MCU Files (*.mcu)

Return to the [Init (H8/300H Tiny Compact Emulator)] dialog box and click on the [OK] button.

(9) The [MCU Setting] dialog box will appear. Check that the processor mode is [Single-Chip Mode] and click on the [OK] button.

MCU Setting	X
MCU	- MCU Status
MCU: H83664 Processor Mode: Single-Chip Mode	NMI [*] : H TEST NC
External Data Bus Width: 16-bit	
OK Cancel Help	Next Hide



(10) Once the workspace has been read, operations in the High-performance Embedded Workshop screen become possible.

🖗 Tutorial - High-performance Embedded Workshop	
Eile Edit <u>V</u> iew Project <u>B</u> uild <u>D</u> ebug Set <u>up</u> <u>T</u> ools Te <u>s</u> t <u>Wi</u> ndow <u>H</u> elp	
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」 ⊕ 17 15 12 8 2	I 🛛 😰 🛛 🖁
Iutorial Image: Concerning Image: Concerning	
2 91 92 AL AT 21 27 @ B . ?	
Connected	
Build Debug Find in Files Macro Test Version Control	
🔝 🔢 🔝 Default1 desktop	11.

When the H8/300H Tiny series compact emulator is successfully connected, [Connected] is displayed in the [Debug] tab in the [Output] window.

4.3 Customizing a Source File

(1) Open the source file by double-clicking on its name ("Tutorial.c") in the workspace pane.





(2) Add if-else statements to lines 51 to 58 in the [Source] window, as shown below.

	S.		
Line	S.,	Source	
47		sort(a);	
48		change (a) ;	
49			
50		sam.s0=a[0];	
51		if(a[1] & OxO1)	
52		sam.s1 = 0;	
53		else	
54		sam.s1 = a[1];	
55		if(a[2] & OxO1)	
56		sam.s2 = 0;	
57		else	
58		sam.s2 = a[2];	
59		sam.s3=a[3];	
60		sam.s4=a[4];	
61		sam.s5=a[5];	
62		sam.s6=a[6];	
63		sam.s7=a[7];	
64		sam.s8=a[8];	
65		sam.s9=a[9];	
66)	-
4			
🧈 Tut	orial.	c*	

4.4 Build Operations

(1) Before loading of the program for the customized source file, a build operation must be performed. Click on the [Build] item of the [Build] menu.



Select the [Build] tab in the [Output] window to check how far building has progressed.



(2) On completion of building, the numbers of errors and warnings that have been generated are displayed in the [Build] tab in the [Output] window. Once downloading is possible, the [Check Request] dialog box for downloading of the program automatically appears. Here, click on the [Yes] button.





4.5 Step Operations in the [Trace] Window

(1) Double-click on the [S/W Breakpoint] column for line 66 of the [Source] window to set a breakpoint.



(2) Click on [Reset Go] from the [Debug] menu to run the program.

🖗 Tutorial - High-performance	e Embedde	d Workst	hop - ["	Tutoria	l.c]	
A File Edit View Project Build	Debug Set	up Tools	Test	Window	Help	
D 😅 🛛 🗗 🗗 X 🖻	De <u>b</u> ug S	essions			💽 🛍 🖗	- 24
16 10 8 2 🛒 🛛	Debug S	ettings			ው ብን ብ	c PC
	ੇ≣ † Reset C	υ				
E 🔂 Tutorial	≣↓ <u>G</u> o			F5		
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dbsct.c intprg.c	≣≣ Free Go				:am.s0=a[0 .f(a[1] &	
······ ≝) resetprg.c ······ ≝) sbrk.c	∃i Go To ⊆				sam.s1 21se	= 0
≝ sort.c ≝ Tutorial.c	I _{PC} Set <u>P</u> C T <u>R</u> un	o Cursor			sam.s1 .f(a[2] &	
📃 📥 Download modules		-		o	sam.s2	= 0



(3) Execution is stopped at line 66 of the source program ("Tutorial.c"). A yellow arrow in the [Source] window indicates the position of the program counter (PC), and the corresponding section of the source code is highlighted in yellow.



(4) Click on [Trace] in the sub-menu for the [Trace] item of the [View] menu.

🖗 Tutorial -	High-performance Er	nbedded W	orkshop -	[Tutorial.c]
🧼 File 🛛 Edit	View Project Build De	bug Setup	Tools Test	Window Help
🛛 🗅 😅 🖬	Differences			🗖 🗛 🖓 🔽
001	мар Мар		it el ei	I + + + + + + + + + + + + + + + + + + +
	Command Line	Ctrl+L		
⊡ - 🚱 - 🖃 - 🖃 E - 👰 T	🇞 TCL Tool <u>k</u> it Cti	rl+Shift+K	<u>.</u>	
	Workspace	Alt+K	Source	S., Source
	Dutput	Alt+O	000970 000978	if(a[1] & OxO1) sam.s1 = 0;
	👼 Disassembly	Ctrl+D	00097C	else sam.s1 = a[1];
	CPU	•	000988 000990	if(a[2] & OxO1) sam.s2 = 0;
- -	<u>S</u> ymbol	•	000994	else
	<u>G</u> raphic	•	000910	sam.s2 = a[2]; sam.s3=a[3];
	Break	•	0009AC 0009B8	sam.s4=a[4]; sam.s5=a[5];
	<u>T</u> race	Þ	Trace P	oints =a[6];
	Code	۲	Time Me	
		66	🗐 <u>T</u> race	
		67	Hate	
•	•			



(5) The [Trace] window is displayed.

🖗 Tutorial - High-performance	Embedded Wo	orkshop - [Trace]]							
🛷 <u>File E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild	Debug Setup j	<u>T</u> ools Te <u>s</u> t <u>W</u> indov	∧ <u>H</u> elp							- 🗆 ×
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0 🖲 16 10 8 2 💻	• 1 4 💒]	et et et et (4)	ን ዋ ዓ 💿	I _{pg} <mark>y</mark> pc	₽₽	R1	1 10	🛱 🖉 🗍	a a	D.
E 🔄 Tutorial	🔳 🗸 🗎 🗸	1 0 0 0		z I II	•					
in torial	Range: -006425.	000000 Area: Befo	ore Break File:	Cycle: -	000018	Addres	s: 00EE62 Tim	ie:		
in internet	Cycle	Label	Address	Data	R/W	RWT	AREA	STATUS	MODE	~
intprg.c	-000018	Haber	OOFF62	ODAA	RD	0	RAM	DATA	ACT	
resetprg.c	-000017		0009E4	6FFO	RD	õ	ROM	PROG	ACT	
sbrk.c	-000016		0009E6	0020	RD	õ	ROM	PROG	ACT	
sort.c	-000015		0009E8	0100	RD	ŏ	ROM	PROG	ACT	
Tutorial.c	-000014		00FF38	0000	WR	ō	RAM	DATA	ACT	
🖻 🔄 Download modu	-000013		00FF3A	ODAA	WR	Ō	RAM	DATA	ACT	
Tutorial.abs	-000012		0009EA	6 F 60	RD	0	ROM	PROG	ACT	
🖃 🔄 Dependencies	-000011		0009EC	0024	RD	0	ROM	PROG	ACT	
sort.h	-000010		0009EE	0100	RD	0	ROM	PROG	ACT	
≣ stacksct.h	-000009		00FF64	0000	RD	0	RAM	DATA	ACT	
i typedefine.k	-000008		00FF66	0000	RD	0	RAM	DATA	ACT	
	-000007		0009F0	6FFO	RD	0	ROM	PROG	ACT	
	-000006		0009 F 2	0024	RD	0	ROM	PROG	ACT	
	-000005		0009F4	5770	RD	0	ROM	PROG	ACT	
	-000004		OOFF3C	0000	WR	0	RAM	DATA	ACT	
	-000003		OOFF3E	0000	WR	0	RAM	DATA	ACT	
	-000002		0009F6	0050	RD	0	ROM	PROG	ACT	
	-000001		00F01A	09 F 6	WR	0	I/O-16	DATA	ACT	
	000000		00F018	0404	WR	0	I/0-16	DATA	ACT	
• •	ļ									<u> </u>
	🧼 Tutorial.c	Trace								
	·	~/								
N OL OT AL AT LE LET 0	🖻 🖬 💡									
Connected										
Cause of break: S/W br	eak									
Build Debug / Find in	Files À Macro À	Test X Version Co	ontrol /							
Ready			Default1	desktop	Rea	id-write	66/74	2	INS	NI //

When the docking view has been selected, click the right-hand mouse button with the cursor on the [Trace] window to cancel the [Docking View] item of the popup menu.

The display in the [Trace] window is in one of three modes: bus cycle (BUS), disassembly (DIS), and source (SRC), and these can be mixed. Back-tracing, which is described in this document, is only available for a source (SRC) display.

(6) Click on the [SRC] button in the toolbar for the [Trace] window to enable the source (SRC) mode.

🖗 Tutorial - High-performance	Embedded Workshop - [Trac	e]							
🗇 File Edit View Project Build	Debug Setup Tools Test Wind	ow Help							- 8 ×
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Tutorial	■ ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	fore Break File:	Cycle: -0	· ·	Address: 00	FF62 Time			
dbsct.c	Cycle Label	Address	Data	R/W	RWT AF	EA	STATUS	MODE	^
intprg.c	-000018	00 FF 62	ODAA	RD	0 R#	M	DATA	ACT	
illi resetprg.c	-000017	0009E4	6 FF O	RD	0 RC	M	PROG	ACT	
≝ sbrk.c	-000016	0009E6	0020	RD	0 RC	M	PROG	ACT	
≝ sort.c	-000015	0009E8	0100	RD	0 RC	M	PROG	ACT	



(7) Click on the [BUS] button in the toolbar for the [Trace] window to take the display out of bus-cycle (BUS) mode.

🖗 Tutorial - High-performanc	e Embedded W	orkshop - [Trace	9]							
🧀 File Edit View Project Build	Debug Setup	Tools Test Windo	w Help							_ 8 ×
D 🚅 🗉 🗗 🖨 X 🖻	€ 😽 🆗		▼ #9↓	8 8		**	i 👗 🛛 Debu	9	•	DefaultSessio
0 🕅 16 10 8 2 🛒	🖷 †+ 🎎 🗍	7 <u>15</u> 15 15 1 5	ን 🗗 🕀 🚥	I _{PC} PC	⊒⊒	R1	1 /0	F 🖉	a a	D. 🐻
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intprg.c	-000018		00FF62	ODAA	RD	0	RAM	DATA	ACT	
resetprg.c	-000017		0009E4	6FFO	RD	0	ROM	PROG	ACT	
- 날 dbsct.c - 날 intprg.c - 날 resetprg.c - 날 sbrk.c - 날 sort.c	-000016		0009E6	0020	RD	0	ROM	PROG	ACT	
≝ sort.c		Tutorial.c,	65:		sam	.s9=a	[9];			
Tutorial.c	-000015		0009E8	0100	RD	0	ROM	PROG	ACT	

If the disassembly (DIS) mode has also been enabled, click on the [DIS] button in the toolbar to take the display out of this mode.

(8) When only the source (SRC) mode is enabled, an image of lines of source code is displayed in the [Trace] window as shown below.

Tutorial - High-performance I	Embedde	d Workshop	- [Trac	e]	
🧈 Eile Edit <u>V</u> iew Project Build D	<u>)</u> ebug Sel	up <u>T</u> ools Tes	<u>st W</u> ind	ow <u>H</u> elp	_ 8 ×
D 🛩 E 💋 🖉 🕹 k 🖬 E	•	G		🔻 🗠 🖓 🎲 🎬 📇 🗖 Debug 🔍	DefaultSessio
			14 Jano 13		
0 10 10 2 9	†+ 🏦		i ≣↓ {	Q, Q, X,	D 🕅
🖃 🖓 Tutorial	• V	B / Ø (0.0		
🗄 🔂 Tutorial				fore Break File: Tutorial.c Cycle: -000015 Address: 0009E8 Time:	
⊡ - 🔄 C source file 🔰 📕	-				
intprg.c	Line 00049	Address	Now	Source	^
± resetprg.c	00049	000968	-	sam.s0=a[0];	
≝ sbrk.c	00051	000970	_	if(a[1] & 0x01)	
sort.c	00052	000978	-	sam.s1 = 0;	
Tutorial.c	00053			else	
🖃 🔄 Download modu	00054	00097c	-	sam.s1 = a[1];	
	00055	000988	-	if(a[2] & 0x01)	
sbrk.h	00056	000990	-	sam.s2 = 0;	
🖹 sort.h	00057			else	
📰 stacksct.h	00058	000994	-	sam.s2 = a[2];	
typedefine.ł	00059 00060	0009A0 0009AC	-	sam.s3=a[3];	
	00060	0009AC	_	sam.s4=a[4]; sam.s5=a[5];	
	00062	0009c4	_	sam.s5=a[5];	
	00063	000900	-	sam.s7=a[7];	
	00064	0009DC	-	sam.s8=a[8];	
	00065	0009E8	>>	sam.s9=a[9];	
	00066	0009F4	-	}	
	1				<u> </u>
	<u>`</u>				
	🧈 Tutor	ial.c 📃 T	race	J	
	Ba 🔒	?			
Connected					
Cause of break: S/W bre	ak				
Stabe of preak. S/W pre	- un				
Build Debug / Find in F	iles ∖ Ma	cro λ Test λ	Version (Control /	
Ready			1 2	🛛 🔝 Default1 desktop Read-write 66/74 2 INS	NI //

In the [Now] column of the [Trace] window, ">>" is displayed to indicate the cycle currently being referred to. For other lines of source code that have corresponding addresses, "-" is displayed in this column.



(9) Select [Symbol] from the [View] menu and click on [C Watch].

🖗 Tutorial -	High-performanc	e Embedded \	∜orkshop	- [Trac	e]
🧼 File Edit	View Project Build	Debug Setup	Tools Tes	t Wind	ow Help
] 🗅 🚅 🖬	Differences				■ # # %]
00	Мөр Мар		T EL E	i Il T	P) () () () () () ()
	⊵_ Command Line	Ctrl+L			
⊡🦓 Tutori ⊡ ि	🍇 TCL Toolkit	Ctrl+Shift+K			
Ē	workspace	Alt+K	000000	Area: Be	efore Break File: Tutorial.c Cycle
	🔁 O <u>u</u> tput	Alt+O	lress	Now	Source
	👰 Disassembly	Ctrl+D	0968	-	sam.s0=a[0]
	⊆PU		10970 10978	-	if(a[1]& sam
	<u>S</u> ymbol		ASMW	/atch	else
	<u>G</u> raphic		<mark>k€</mark> ⊆Wat	:h	if(a[2] ۵ sam
	<u>B</u> reak				else
	Trace		0994 09A0	-	sam sam.s3=a[3]
	C <u>o</u> de		09AC	-	sam.s4=a[4] sam.s5=a[5]

(10) Once the [C Watch] window has appeared, select the [Local] tab and double-click on the local variable name "sam" so that its display is in the expanded state.

Range: -00	6425, 000000	Area: Be	fore Break File: Tutorial.c Cycle: -000015 Address	;: 00	Watch Local File Local Global	
Line	Address	Now	Source	^	Name	Value
00049					+(signed long [10]) a	OxFF40 (22117)
00050	000968	-	sam.s0=a[0];		(register signed int) i	10
00051	000970	-	if(a[1] & 0x01)		(register signed long) j	8410
00052	000978	-	sam.s1 = 0;		-(struct Sample) sam	OxFF18
00053			else		(signed long) sU	22117
00054	00097c	-	sam.s1 = a[1];		(signed long) s1	21468
00055	000988	-	if(a[2] & ΟxΟ1)		(signed long) s2	0
00056	000990	-	sam.s2 = 0;		(signed long) s3	16927
00057			else		(signed long) s4	16045
00058	000994	-	sam.s2 = a[2];		(signed long) s5	12122
00059	0009A0	-	sam.s3=a[3];		(signed long) s6	9988
00060	0009AC	-	sam.s4=a[4];		(signed long) s7	8410
00061	0009B8	-	sam.s5=a[5];			3498
00062	0009c4	-	sam.s6=a[6];	=	(signed long) s8	
00063	000900	-	sam.s7=a[7];		(signed long) s9	0
00064	0009DC	-	sam.s8=a[8];			
00065	0009E8	>>	sam.s9=a[9];			
00066	0009F4	-	}	~		
<			>	<u> </u>		



4 4

(11) Click on the [Step] button in the toolbar of the [Trace] window.

Range: -00	6425, 000000	Area: Be	fore Break Step utorial.c Cycle: -000015 Address: 00	Watch Local File Local Global	
Line	Address	Now	Source	Name	Value
00049				+(signed long [10]) a	OxFF40 (22117)
00050	000968	-	sam.s0=a[0];	(register signed int) i	10
00051	000970	-	if(a[1] & OxO1)	(register signed long) j	8410
00052	000978	-	sam.s1 = 0;	-(struct Sample) sam	OxFF18
00053			else	(signed long) s0	22117
00054	00097c	-	sam.s1 = a[1];	(signed long) s1	21468
00055	000988	-	if(a[2] & OxO1)	(signed long) s2	0
00056	000990	-	sam.s2 = 0;	(signed long) s3	16927
00057			else	(signed long) s4	16045
00058	000994	-	sam.s2 = a[2];	(signed long) s5	12122
00059	0009A0	-	sam.s3=a[3];	(signed long) s6	9988
00060	0009AC	-	sam.s4=a[4];	(signed long) s7	8410
00061	0009B8	-	sam.s5=a[5];	(signed long) s8	3498
00062	0009C4	-	sam.s6=a[6];	(signed long) s9	0
00063	0009D0 0009DC	-	sam.s7=a[7];	(Signed Iong/ 35	0
00064	0009DC	-	sam.s8=a[8];		
00065	0009E8 0009F4	>>	sam.s9=a[9];		
00066	000914		j 🗸		
<					

If the [Backward] button (upward triangle) is not active, click on the button to activate it.

(12) The symbol ">>", indicating the cycle currently being referred to is moved from line 65 to line 64.

lange: -00	6425, 000000	Area: Be	fore Break File: Tutorial.c Cycle: -000025 Address: 00	Watch Local File Local Global	
Line	Address	Now	Source	Name	Value
00049				+(signed long [10]) a	OxFF40 (22117)
00050	000968	-	sam.s0=a[0];	(register signed int) i	10
00051	000970	-	if(a[1] & OxO1)	(register signed long) j	8410
00052	000978	-	sam.s1 = 0;	-(struct Sample) sam	OxFF18
00053			else	(signed long) sO	22117
00054	00097c	-	sam.s1 = a[1];	(signed long) s1	21468
00055	000988	-	if(a[2] & 0x01)	(signed long) s2	0
00056	000990	-	sam.s2 = 0;	(signed long) s3	16927
00057			else	(signed long) s4	16045
00058	000994	-	sam.s2 = a[2];	(signed long) s5	12122
00059	0009A0	-	sam.s3=a[3];	(signed long) s6	9988
00060	0009AC	-	sam.s4=a[4];	(signed long) s7	8410
00061	0009B8	-	sam.s5=a[5];	(signed long) s?	3498
00062	0009c4	-	sam.s6=a[6];	(signed long) so	0
00063	000900	-	sam.s7=a[7];	(signed fond) sa	U
00064	0009DC	>>	sam.s8=a[8];		
00065	0009E8	-	sam.s9=a[9];		
00066	0009F4	-	}		
<			>		

This indicates that line 64 was executed before line 65.

The value for [Cycle], which shows the location of the current cycle in the results of trace measurement, is changed from (-000015) to (-000025). This means that the condition of an address corresponding to source-line information for a search in the negative direction from cycle location (-000015) has been satisfied at cycle location (-000025).

The range of cycles covered by the results of trace measurement is displayed against [Range]. The last cycle for which information was acquired is expressed as (000000), with cycles further in the past having increasing negative values. In the example covered by this document, results of trace measurement have been acquired over 6426 cycles (from (-006425) to (000000)).

In the H8/300H Tiny series compact emulator, results of trace measurement can be acquired for up to 64 kcycles.



(13) Similarly, clicking on the [Step] button five times moves the cycle location one line at a time until the reference cycle symbol indicates line 59 as shown below.

lange: -00	6425, 000000	Area: Be	efore Break File: Tutorial.c Cycle: -000075 Address: 00	Watch Local File Local Global	
Line	Address	Now	Source 🔥	Name	Value
00049				+(signed long [10]) a	OxFF40 (22117)
00050	000968	-	sam.s0=a[0];	(register signed int) i	10
00051	000970	-	if(a[1] & 0x01)	(register signed long) j	8410
00052	000978	-	sam.s1 = 0;	-(struct Sample) sam	OxFF18
00053			else	(signed long) sO	22117
00054	00097c	-	sam.s1 = a[1];	(signed long) s1	21468
00055	000988	-	if(a[2] & 0x01)	(signed long) s2	0
00056	000990	-	sam.s2 = 0;	(signed long) 32 (signed long) 33	16927
00057			else		16045
00058	000994	-	sam.s2 = a[2];	(signed long) s4	
00059	0009A0	>>	sam.s3=a[3];	(signed long) s5	12122
00060	0009AC	-	sam.s4=a[4];	(signed long) s6	9988
00061	0009B8	-	sam.s5=a[5];	(signed long) s7	8410
00062	0009c4	-	sam.s6=a[6]; 🔤	(signed long) s8	3498
00063	0009D0	-	sam.s7=a[7];	(signed long) s9	0
00064	0009DC	-	sam.s8=a[8];		
00065	0009E8	-	sam.s9=a[9];		
00066	0009F4	-	}		
			×		

(14) Clicking on the [Step] button again moves the reference cycle symbol from line 59 to line 56.

Range: -00	6425, 000000	Area: Be	efore Break File: Tutorial.c Cycle: -000082 Address: 00	Watch Local File Local Global		
Line	Address	Now	Source		Name	Value
00049					+(signed long [10]) a	OxFF40 (22117)
00050	000968	-	sam.s0=a[0];		(register signed int) i	10
00051	000970	-	if(a[1] & 0x01)		(register signed long) j	8410
00052	000978	-	sam.s1 = 0;		-(struct Sample) sam	OxFF18
00053			else		(signed long) sO	22117
00054	00097c	-	sam.s1 = a[1];		(signed long) s1	21468
00055	000988	-	if(a[2] & OxO1)		(signed long) s2	0
00056	000990	>>	sam.s2 = 0;		(signed long) s3	16927
00057			else		(signed long) s4	16045
00058	000994	-			(signed long) s5	12122
00059	0009A0	-	sam.s3=a[3];		(signed long) s6	9988
00060	0009AC	-	sam.s4=a[4];		(signed long) so	8410
00061	000988	-	sam.s5=a[5];			3498
00062	0009c4	-	sam.s6=a[6];		(signed long) s8	
00063	000900	-	sam.s7=a[7];		(signed long) s9	0
00064	0009DC	-	sam.s8=a[8];			
00065	0009E8	-	sam.s9=a[9];			
00066	0009F4	-	}			
<						

At this point the condition for the if statement on line 55 had been true, so line 56 was executed instead of the statement on line 58, which follows the else statement. Zero has thus been assigned to the local variable "sam.s2".



(15) If we continue to follow the trace back by clicking on the [Step] button, we reach the point where line 54 was executed because the condition for the if statement on line 51 had been false.

lange: -00	6425, 000000	Area: Be	efore Break File: Tutorial.c Cycle: -000097 Address: 00	Watch Local File Local Global	
Line	Address	Now	Source	Name	Value
00049				+(signed long [10]) a	OxFF40 (22117)
00050	000968	-	sam.s0=a[0];	(register signed int) i	10
00051	000970	-	if(a[1] & 0x01)	(register signed long) j	8410
00052	000978	-	sam.s1 = 0;	-(struct Sample) sam	OxFF18
00053			else	(signed long) s0	22117
00054	00097c	\rightarrow	sam.s1 = a[1];	(signed long) s1	21468
00055	000988	-	📍 if(a[2] ω 0x01)	(signed long) s2	0
00056	000990	-	sam.s2 = 0;	(signed long) 52	16927
00057			else	(signed long) s3	16045
00058	000994	-	sam.s2 = a[2];		
00059	0009A0	-	sam.s3=a[3];	(signed long) s5	12122
00060	0009AC	-	sam.s4=a[4];	(signed long) s6	9988
00061	0009B8	-	sam.s5=a[5];	(signed long) s7	8410
00062	0009c4	-	sam.s6=a[6]; 🔤	(signed long) s8	3498
00063	0009D0	-	sam.s7=a[7];	(signed long) s9	0
00064	0009DC	-	sam.s8=a[8];		
00065	0009E8	-	sam.s9=a[9];		
00066	0009F4	-	}		
(1	<u> </u>		

(16) To change the direction of stepping, click on the [Upward] button (backward triangle) in the toolbar of the [Trace] window.

				1		× 🖂
■ ∀	D / Q	03 Q			🗁 🗙 🖾 🚺 16 - 2 Def 🛃 🖣	
Range: -00	6425, 000000	Area: Be	foreForward ile: Tutorial.c Cycle: -000111 Address: 00		Watch Local File Local Global	
Line	Address	Now	Source		Name	Value
00049					+(signed long [10]) a	OxFF40 (22117)
00050	000968	\rightarrow	sam.s0=a[0];		(register signed int) i	10
00051	000970	-	if(a[1] & 0x01)		(reqister signed long) j	8410
00052	000978	-	sam.s1 = 0;		-(struct Sample) sam	OxFF18
00053			else		(signed long) sO	22117
00054	00097c	-	sam.s1 = a[1];		(signed long) s1	21468
00055	000988	-	if(a[2] & 0x01)		(signed long) s2	0
00056	000990	-	sam.s2 = 0;		(signed long) s3	16927
00057			else		(signed long) s4	16045
00058	000994	-	sam.s2 = a[2];		(signed long) s1	12122
00059	0009A0	-	sam.s3=a[3];		(signed long) s6	9988
00060	0009AC	-	sam.s4=a[4];			8410
00061	0009B8	-	sam.s5=a[5];		(signed long) s7	
00062	0009c4	-	sam.s6=a[6];		(signed long) s8	3498
00063	0009D0	-	sam.s7=a[7];		(signed long) s9	0
00064	0009DC	-	sam.s8=a[8];			
00065	0009E8	-	sam.s9=a[9];			
00066	0009F4	-	}			
<						
🧼 Tutor	ial.c 📃 1	frace				
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(17) Now, continuing to click on the [Step] button searches through the results of trace measurement for the current line in the positive direction.

		0.0			<u></u>
Range: -00 Line 00049 00050 00051 00052 00053 00054 00055 00056 00057 00058	Address 000968 000970 000978 00097c 000988 000990		<pre>sfore Break Step]utorial.c Cycle: -000111 Address: 00 Source sam.s0=a[0]; if(a[1] & 0x01) sam.s1 = 0; else sam.s1 = a[1]; if(a[2] & 0x01) sam.s2 = 0; else sam.s2 = a[2];</pre>	Watch Local File Local Global Name +(signed long [10]) a (register signed int) i (register signed long) j -(struct Sample) sam (signed long) s0 (signed long) s1 (signed long) s3 (signed long) s4 (signed long) s5	
00059 00060 00061 00062 00063 00064 00065 00066 < 20066	0009A0 0009AC 0009B8 0009C4 0009D0 0009DC 0009E8 0009F4	- - - - - - - - - - - - - - - - - - -	<pre>sam.s3=a[3]; sam.s4=a[4]; sam.s5=a[5]; sam.s6=a[6]; sam.s7=a[7]; sam.s8=a[8]; sam.s9=a[9]; }</pre>	(signed long) s5 (signed long) s6 (signed long) s7 (signed long) s8 (signed long) s9	12122 9988 8410 3498 0

Click on the [Upward] and [Backward] buttons to change the direction of searching at any time. Using the results of trace measurement to check the path of execution of the source program enables efficiency in program debugging and test verification.

(18) To set a new cycle location for reference, select the line in [Source] and click on the [Come] button.

				1		
■ ∀	🗈 / 🔍	Q. Q.			🗁 🗙 🖾 🖋 16 2 Def 🛃 🖣	-
Range: -00	6425, 000000	Area: Be	fore Break File: T _{Come} c Cycle: -000111 Address: 00		Watch Local File Local Global	
Line	Address	Now	Source		Name	Value
00049					+(signed long [10]) a	OxFF40 (22117)
00050	000968	>>	sam.s0=a[0];		(register signed int) i	10
00051	000970	-	if(a[1] & OxO1)		(register signed long) j	8410
00052	000978	-	sam.s1 = 0;		-(struct Sample) sam	OxFF18
00053			else		(signed long) s0	22117
00054	00097c	-	sam.s1 = a[1];		(signed long) s1	21468
00055	000988	-	if(a[2] & OxO1)		(signed long) s2	0
00056	000990	-	sam.s2 = 0;		(signed long) s3	16927
00057			else		(signed long) s3	16045
00058	000994	-	sam.s2 = a[2];			
00059	0009A0	-	sam.s3=a[3];		(signed long) s5	12122
00060	0009AC	-	sam.s4=a[4];		(signed long) s6	9988
00061	0009B8	-	sam.s5=a[5];		(signed long) s7	8410
00062	0009c4	-	sam.s6=a[6];		(signed long) s8	3498
00063	0009⊅0	-	sam.s7=a[7];		(signed long) s9	0
00064	0009DC	-	sam.s8=a[8];			
00065	0009E8	-	sam.s9=a[9];			
00066	0009F4	-	}			
			×			
<		1111				
🧼 Tutor	ial.c 🗍 T	race				
]		J	



(19) In this case, the reference cycle symbol is set on line 65.

ange: -00	6425, 000000	Area: Be	fore Break File: Tutorial.c Cycle: -000015 Address: 00	Watch Local File Local Global	
Line	Address	Now	Source	Name	Value
00049				+(signed long [10]) a	OxFF40 (22117)
00050	000968	-	sam.s0=a[0];	(register signed int) i	10
00051	000970	-	if(a[1] & 0x01)	(register signed long) j	8410
00052	000978	-	sam.s1 = 0;	-(struct Sample) sam	OxFF18
00053			else	(signed long) s0	22117
00054	00097c	-	sam.s1 = a[1];	(signed long) s1	21468
00055	000988	-	if(a[2] & OxO1)	(signed long) s2	0
00056	000990	-	sam.s2 = 0;	(signed long) s3	- 16927
00057			else	(signed long) s4	16045
00058	000994	-	sam.s2 = a[2];	(signed long) s5	12122
00059	0009A0	-	sam.s3=a[3];	(signed long) s6	9988
00060	0009AC	-	sam.s4=a[4];	(signed long) so	8410
00061	0009в8	-	sam.s5=a[5];		3498
00062	0009c4	-	sam.s6=a[6];	(signed long) s8	
00063	000900	-	sam.s7=a[7];	(signed long) s9	0
00064	0009DC		sam.s8=a[8];		
00065	0009 E 8	$\langle \rangle$	sam.s9=a[9];		
00066	0009F4				
			>		

(20) In backward stepping, if exit from a function call immediately precedes the line containing the reference cycle symbol, the function call is indicated by a red arrow.

Range: -00	6425, 000000	Area: Be	efore Break File: Tutorial.c Cycle: -000111 Address:	00					
Line	Address	Now	Source	^					
00047	00095c	-							
00048	000962	-	change (a) ;						
00049			▲						
00050	000968	>>	sam.s0=a[0];						
00051	000970	-	if(a[1] & OxO1)						
00052	000978	-	sam.s1 = 0;						
00053			else						
00054	00097c	-	sam.s1 = a[1];						
00055	000988	-	if(a[2] & 0x01)						
00056	000990	-	sam.s2 = 0;						
00057			else						
00058	000994	-	sam.s2 = a[2];						
00059	0009A0	-	sam.s3=a[3];						
00060	0009AC	-	sam.s4=a[4];						
00061	0009B8	-	sam.s5=a[5];						
00062	0009c4	-	sam.s6=a[6];	-					
00063	000900	-	sam.s7=a[7];						
00064	0009DC	-	sam.s8=a[8];	~					
<			>	-					
				_					
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(21) In this case, the call of function "change" on line 58 is indicated.

Range: -00	6425, 000000	Area: Be	fore Break File: sort.c Cycle: -000139 Address: 00091A Time:
Line	Address	Now	Source
00041			}
00042			}
00043	0008B6	-	gap = gap/2;
00044			}
00045	0008C2	-	}
00046			
00047	0008C6	-	void change(long *a)
00048	0008CE	-	{
00049			long tmp[10];
00050			int i;
00051			
00052	0008D2	-	for(i=0; i<10; i++){
00053	0008D4	-	tmp[i] = a[i];
00054			}
00055	0008F2	-	for(i=0; i<10; i++){
00056	0008F4	-	a[i] = tmp[9 - i];
00057			}
00058	00091A 🔇	>>	
<			

(22) If the program has a loop, the steps are repeated the same number of times as the actual number of iterations of the loop.

Range: -00	6425, 000000	Area: Be	fore Break File: sort.c Cycle: -000210 Address: 0008F4 Time:
Line	Address	Now	Source
00041			}
00042			}
00043	0008B6	-	gap = gap/2;
00044			}
00045	0008c2	-	}
00046			
00047	0008c6	-	void change(long *a)
00048	0008CE	-	{
00049			long tmp[10];
00050			int i;
00051			
00052	0008D2	-	for(i=0; i<10; i++){
00053	0008D4	-	tmp[i] = a[i];
00054			}
00055	0008F2	-	for(i=0; i<10; i++){
00056	0008F4	>>	a[i] = tmp[9 - i];
00057			}
00058	00091A	-	}
<			

In the example above, line 56 is repeated ten times.



(23) Double-clicking on [Line] in the [Trace] window produces a dialog box that allows changing of the displayed file.

Range: -00	6425, 000000	Area: Be	Fore Break File: sort.c Cycle: -000139 Address: 00091A Time:	
Line	Address	Now	Source	^
00041			}	
00042			}	
00043	0008B6	-	gap = gap/2;	
00044			}	
00045	0008c2	-	}	
00046				
00047	0008c6	-	void change(long *a)	
00048	0008CE	-	{	
00049			long tmp[10];	
00050			int i;	
00051				
00052	0008D2	-	for(i=0; i<10; i++){	
00053	0008D4	-	tmp[i] = a[i];	
00054			}	
00055	0008F2	-	for(i=0; i<10; i++){	
00056	0008F4	-	a[i] = tmp[9 - i];	
00057			}	
00058	00091A	>>	}	
<				-

Double-clicking on any position within the column under [Line] has the same effect.

(24) When a file name is selected, a list of the functions it contains is displayed in the box at right. Select the name of the desired function and click on the [OK] button to display the specified function.





(25) When either end of the range corresponding to results of trace measurement is reached, further stepping in the same direction is not available.

Range: -006425, 000000 Area: Before Break seetprg.c Cycle: -006425 Address: 000400 Time:							
Line	Address	Now	Source	^			
00050			//#ifdefcplusplus				
00051			//}				
00052			//#endif				
00053							
00054			#pragma section ResetPRG				
00055							
00056	000400	>>	entry(vect=0) void PowerON_Reset(void)				
00057			-				
00058	000404	-	<pre>set_imask_ccr((_UBYTE)1);</pre>				
00059	000406	-	_INITSCT();				
00060							
00061			<pre>// _CALL_INIT();</pre>				
00062							
00063			<pre>// _INIT_IOLIB();</pre>				
00064							
00065			// errno=0;				
00066			<pre>// srand((_UINT)1);</pre>				
00067			// _s1ptr=NULL;	~			
<	1			>			

In the example above, where [Range] is from (-006425) to (000000), the following error message is displayed if stepping in the negative direction from (-006425) under [Cycle] is attempted.



When stepping in the positive direction from (000000) under [Cycle] is attempted, the same error message is displayed.



(26) Double-clicking on [Address] in the [Trace] window produces a dialog box that allows searching for an address.



Double-clicking on any position within the column under [Address] has the same effect.

(27) The [Address Search] dialog box is used to search for an address in the specified direction.

Address Search	×
Address:	•
Direction C Forward C	Backward
Find Next	Close

The [Address] field can also be specified by clicking on the label-selection button to the right of the field and then using the [Label Select] dialog box.

Select Label			
Label 🔸	Address	^	ОК
\$DIVL\$3	00000AB4		
\$DIVUL\$3	00000AFA		Cancel
\$MULL\$3	00000ADA		
\$sp_regsv\$3	000009FC		
\$spregld2\$3	00000A1C		
_INITSCT	00000A32		
mext	0000FD 80		
_change	000008C6		
_init	00000826		
_INT_ABRK	0000041E		
_INT_ADI	00000436		
_INT_IIC	00000434		
_INT_IRQ0	00000422		
_INT_IRQ1	00000424		
_INT_IRQ2	00000426		
_INT_IRQ3	00000428		
_INT_NMI	00000414		
_INT_SCI3	00000432		
_INT_SLEEP	00000420	_	
_INT_TimerA	0000042C		
_INT_TimerV	00000430		
_INT_TimerW	0000042E		
_INT_TRAP1	00000416		
_INT_TRAP2	00000418		
_INT_TRAP3	0000041A	~	



5. Related Documents

The H8/300H Tiny compact emulator and High-performance Embedded Workshop provide many other useful functions that have not been mentioned in this document. Please refer to the following related documents for important information such as detailed specifications, technical information, and restrictions.

Documents Related to the H8/300H Tiny Compact Emulator:

- H8/300H Tiny Compact Emulator Debugger User's Manual
- H8/300H Tiny Compact Emulator Debugger Release Notes

Document Related to High-Performance Embedded Workshop

• High-performance Embedded Workshop User's Manual

Documents Related to CPU

- H8/3664 Group Hardware Manual
- H8/300H Series Programming Manual

Documents Related to H8S, H8/300 Series C/C++ Compiler Package

- Notes on Usage of the C/C++ Compiler Package for H8SX, H8S, H8 Family V.6.01 Release 02 and Corrections in the User's Manual
- H8S, H8/300 Series C/C++ Compiler, Assembler, Optimizing Linkage Editor User's Manual

Visit the following Renesas websites for information on this product:

Global site:	http://www.renesas.com/cpe
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Renesas Technology Website:

http://www.renesas.com/

Customer Support: http://www.renesas.com/inquiry

Revision History

		Revisions		
Rev.	Publication date	Page	Description	
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