INDEX

Emulator	Page
E2 emulator	On-chip Debuggers Performance Property - 1
E2 emulator Like	On-chip Debuggers Performance Property – 2
EI	Orr-chip Debuggers Performance Property - 3, 4
E20	On-chip Debuggers Performance Property - 5, 6
MINCUBE2	On-chip Debuggers Performance Property - 7
E10A-USB	On-chip Debuggers Performance Property - 8, 9
E8a	On-chip Debuggers Performance Property - 10

	Target MC	U		Break Function			Trace Function	Memory reference e&chang			
Family	Series/Core	Group	Connection system	Hardware Break	Software Break	Special Break	Internal trace	e while executin g	Performance measurement	Trigger	Hot plug in
	RA8	RA8D1/M1	JTAG or SWD	8 points for an execution address, 8 points for a data access			Obtained information of branches is stored in a dedicated buffer 8KB. (both branch-source and branch-destination info				
		RA6E2	SWD								
	RA6	Others than RA6xx	JTAG or				Obtained information of branches is stored in a dedicated buffer 2KB. (both branch-source and branch-destination info				
RA		RA4E2	SWD	6 points for an execution address, 4 points for a data access	2048 points for)		Not supported		
	RA4	RA4M1 RA4W1		4 points for a data access	ROM/RAM area		Obtained information of branches is stored in a	1	the time b/w Go and Stop is measurable.	Not supported	
			JTAG or SWD				dedicated buffer 1KB. (both branch-source and branch-destination info Obtained information of branches is stored in a dedicated buffer 2KB.	-			
		Others than RA4xx			-		(both branch-source and branch-destination info Obtains the information of up to 2K branches +5				
	RA2	RA2xx	SWD	4 points for an execution address, 2 points for a data access			(both branch-source and branch-destination info)				
RE	RE0	RE01					Obtains the information of up to 4K branches *5 (both branch-source and branch-destination info)				
	RH850/F1x RH850/E1x	RH850/F1H RH850/F1M RH850/F1L RH850/F1K RH850/F1KM RH850/F1KH RH850/E1M-S2	LPD4-pin or LPD1-pin				Between 2K and 4K of branch information				Support d
	RH850/C1x	RH850/C1H RH850/C1M	LPD4-pin				can be acquired when this is the only target or Between 1K and 2K of cycle information				
	RH850/D1x	RH850/D1L RH850/D1M	LPD4-pin or LPD1-pin				on data-access operation can be acquired when this is the only target Trace function isn't supported in some MCU's.				
RH850	RH850/P1x	RH850/P1M RH850/P1M-E	СРОТ-ри	12 points being shared by an execution address and data access	2000 points for ROM/RAM				supported		
	RH850/PIX	RH850/P1H-C RH850/P1M-C RH850/P1L-C	LPD4-pin		area						
	RH850/E2x	RH850/E2M RH850/E2H RH850/E2UH	LPD4-pin or JTAG				Between 4K and 8K of branch information can be acquired when this is the only target or Between 2K and 4K of cycle information on data-access operation can be acquired	-			
	RH850/U2x	RH850/U2A RH850/U2B					when this is the only target Trace function isn't supported in some MCU's.				
	RL78/G2x	RL78/G22 RL78/G23		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)	-			Not
	RL78/D1x	RL78/G24 RL78/D1A		1 point being shared by an execution address and data access	1		Not supported	-			support d
	RL78/F1x	RL78/F12 RL78/F13 RL78/F14 RL78/F15			2000 points			-			
	RL78/F2x	RL/8/FTE DI 79/E93		2 points being shared by an execution address and data access			Obtains the information of up to 128 branches (only branch-source info); the obtainable info is limited to 64 branches on some MCUs.				Support d
		RL78/F24 RL78/G10 RL78/G1M RL78/G1N		2 points for an execution address	Not supported		Not supported				
		RL78/G14 (ROM: 96KByte and more) RL78/G1F		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)				
RL78	RL78/G1x	RI.78/G1H RL78/G12 RL78/G13 RL78/G13 RL78/G14 (ROM: 64KByte and less) RL78/G15 RL78/G15 RL78/G16 RL78/G16 RL78/G16 RL78/G16 RL78/G16 RL78/G16 RL78/G13A	Single-wire Serial	5 point, being shared by an execution address and data access	2000 points	Forcible break by selecting "Stop" on emulator debugger	Not supported	Supporte d	Not supported, the time b/w Go and Stop is measurable.	IN:2ch OUT:2ch	Not support d
	RL78/I1x	RL78/I1B RL78/I1C RL78/I1D		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)	1			
	RL78/L1x	RL78/11E RL78/L12 RL78/L13		1 point being shared by an execution address and data access	1		Not supported				
	RL78/H1x	RL78/L1A RL78/L1C RL78/H1D		2 points being shared by an execution address and data access]		Obtains the information of up to 256 branches (only branch-source info)				
		B/FGIC		1 point being shared by an execution address and data access	1		Not supported	•			
		RX72v	JTAG	8 points for an execution address			Obtains the information of up to 256 branches or				
	RX700	RX71x	or Single-wire Serial	4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.			the information of up to 256 cycles on data-access operation (DMAC or DTC bus is selectable as a bus master)				
		RX64x RX65x	JTAG	8 points for an execution address + 4 points for a data access	1		Obtains the information of up to 256 branches or the information of up to 256 cycles				Support
		RX65x RX66x RX67x RX67x	or Single-wire Serial	(DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.			on data-access operation (DMAC or DTC bus is selectable as a bus master)		Supported		d *3
RX	RX600	Others than RX64v	JTAG	8 points for an execution address	256 points		Obtains the information of up to 256 branches		Supported +4		
100		RX65x RX66x RX67x	JTAG or double-wire Serial +2 (clock and data)	4 points for a data access * Sequential breaks are specifiable.	at the max		or the information of up to 256 cycles on data-access operation				
		RX26T	(clock and data)		-		Obtains the information of up to 64 branches				
	R Other ti	X200 X140 han RX26T		4 points for an execution address			or the information of up to 64 cycles on data-access operation *1				Not
	R	X100	Single-wire Serial	2 points for a data access * Sequential breaks are specifiable.			Obtains the information of up to 32 branches		Not supported; the time b/w Go and Stop is		support d
	Other t	han RX140					the information of up to 32 cycles on data-access operation		and Stop is measurable.		
R-Car	R-Car S4	-	<g4mhd LPD-4pin or JTAG <cortex-a,ro JTAG</cortex-a,ro </g4mhd 	(GAMH) 12 points for an execution address/a data access (Cortex-A) 6 pints for an execution address 6 pints for an execution address 6 pints for an execution address 2 pints for a data address	2048 points for ROM/RAM area		GGMMD Between 2X and 4K of branch information can be acquired when this is the only target Between 2X and 4K of cycle information on data-access operation can be acquired when this is the only target (Cortex-AE) Obtained information of branches is stored in a declarated buffer 20XIII. (both branch-source and branch-destination info		⟨G4MH⟩ Supported ⟨Cortex-A,R⟩ Not supported; the time b/w Go and Stop is measurable.	Not	Support d
	R-Car V4H	-	JTAG	(Cortex-A) 6 pints for an execution address (Cortex-R) 6 pints for an execution address 2 pints for a data address			Obtained information of branches is stored in a decleated buffer 32XB. (both branch-source and branch-destination info		Not supported, the time b/w Go and Stop is measurable.	supported	
RISC-V	R9A02G021	R9A02G021	oJTAG	4 points being shared by an execution address and data access	2000 points for ROM/RAM		Not supported		Not supported the time b/w Go and Stop is		Not support d

Notes: *1. For RX220 group, the information of 32 branches or the information of 32 cycles on data-access operation is obtain *2. The debuggier function and the connection purpose upon by the MCU you use.

Available only when the emulator is connected via JTAG interface.
 1 sections can be gauged with RX100. 2 sections can be gauged with RX80

^{*}The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator.

This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our weeks ite in http://www.reness.com/d2

On-chip Debuggers Performance Property E2 emulator Lite

■E2 emulator Lite Debugging Function

	Target MCU			Break Function			Trace Function	Memory reference	Performanc	Hat alon
Family	Series/Core	Group	Connection system	Hardware Break	Software Break	Special Break	Internal trace	&change while executing program	e measureme nt	Hot plug- in
	RA8	RA8D1/M1		8 points for an execution address, 8 points for a data access			Obtained information of branches is stored in a dedicated buffer 8KB. (both branch-source and branch-destination info)			
RA	RA6 RA4	RA6xx RA4M1 RA4W1	SWD	6 points for an execution address, 2 points for a data access			Obtained information of branches is stored in a dedicated buffer 2KB. (both branch-source and branch-destination info) Obtained information of branches is stored in a dedicated buffer 1KB.		Not supported;	supported
		Others than RA4xx		2 points for a data access	2048 points for ROM/RAM area		(both branch-source and branch-destination info) Obtained information of branches is stored in a dedicated buffer 2KB. (both branch-source and branch-destination info)	-	the time b/w Go and Stop is measurable.	
	RA2	RA2xx	SWD	4 points for an execution address, 2 points for a data access			Obtains the information of up to 2K branches *6 (both branch-source and branch-destination info)			
RE	RE0	RE01					Obtains the information of up to 4K branches *6 (both branch-source and branch-destination info)			
	RL78/G2x	RL78/G22 RL78/G23 RL78/G24		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)			Not supported
	RL78/D1x	RL78/D1A RL78/F12		1 point being shared by an execution address and data access	2000 points		Not supported			
	RL78/F1x RL78/F2x	RL78/F13 RL78/F14 RL78/F15 RL78/F1E RL78/F23 RL78/F24		2 points being shared by an execution address and data access			Obtains the information of up to 128 branches (only branch-source info); the obtainable info is limited to 64 branches on some MCUs.			Supporte d *3
		RL78/G10 RL78/G1M RL78/G1N		2 points for an execution address	Not supported		Not supported			
		RL78/G14 (ROM: 96KByte and more) RL78/G1F RL78/G1H		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)			
RL78	RL78/G1x	RL78/G11 RL78/G12 RL78/G14 (ROM: 64KByte and less) RL78/G15 RL78/G16 RL78/G16 RL78/G10 RL78/G1E RL78/G1E RL78/G1E RL78/G1E RL78/G1G RL78/G13A	Single-wire Serial	I point being shared by an execution address and data access	2000 points	Forcible break by selecting "Stop"	Not supported	Supporte	Not supported; the time b/w Go and Stop is measurable.	Not supported
	RL78/I1x	RL78/I1A RL78/I1B RL78/I1C RL78/I1D RL78/I1E		2 points being shared by an execution address and data access		on emulator debugger	Obtains the information of up to 256 branches (only branch-source info)	d		
	RL78/L1x	RL78/L12 RL78/L13		1 point being shared by an execution address and data access			Not supported			
	RL78/H1x	RL78/L1A RL78/L1C RL78/H1D		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)			
	RL7	8/FGIC		1 point being shared by an execution address and data access			Not supported			
	RX700	RX72x RX71x	JTAG or Single-wire Serial	8 points for an execution address + 4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.			Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation (DMAC or DTC bus is selectable as a bus master)			
	RX600	RX64x RX65x RX66x RX67x RX26T	JTAG or Single-wire Serial	8 points for an execution address 4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.			Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation (DMAC or DTC bus is selectable as a bus master)		Supported *5	Supporte d *3 *4
RX		Others than RX64x RX65x RX66x RX67x RX26T	JTAG or double-wire Serial *2 (clock and data)	8 points for an execution address + 4 points for a data access * Sequential breaks are specifiable.	256 points at the max		Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation			
	F	X200 X140 han RX26T	Single-wire Serial	4 points for an execution address 4 2 points for a data access			Obtains the information of up to 64 branches or the information of up to 64 cycles on data-access operation *1 Obtains the information of up to 32 branches		Not supported;	- Not supported
	Other t	X100 han RX140		* Sequential breaks are specifiable.			or the information of up to 32 cycles on data-access operation		the time b/w Go and Stop is measurable.	
RISC-V MCU	R9A02G021	R9A02G021	cJTAG	4 points being shared by an execution address and data access	2000 points for ROM/RAM area		Not supported		Not supported; the time b/w Go and Stop is measurable.	Not supported

Notes:

*1. For RX220 group, the information of 32 branches or the information of 32 cycles on data-access operation is obtained.

*2. The debugging function and the connection system vary by the MCU you use.

*3. Hot-plug Adapter for the E1 Emulator (optional) is required.

*4. Available only when the emulator is connected via JTAG interface.

*5. I sections can be gauged with RX100. 2 sections can be gauged with RX600.

*6. The internal RAM of the microcomputer is used as the trace buffer.

^{*} The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator. This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our website at https://www.reness.com/c2lite

■E1 Debugging Function

	Target MCU			Break Function			Trace Function	Memory reference &change	Performanc e	Hot plug
Family	Series/Core	Group	Connection system	Hardware Break	Software Break	Special Break	Internal trace	while executing program	measureme nt	in
	RH850/F1x	RH850/F1H RH850/F1M RH850/F1L RH850/F1K RH850/F1KM RH850/F1KH	LPD4-pin or LPD1-pin							
	RH850/E1x	RH850/E1M-S2	LPD4-pin							
RH850	RH850/C1x	RH850/C1H RH850/C1M	·	12 points	2000 points for		Between 2K and 4K of branch information can be acquired when this is the only target or Between 1K and 2K of cycle information			Support
KH850	RH850/D1x	RH850/D1L RH850/D1M	LPD4-pin or	being shared by an execution address and data access	ROM/RAM area		on data-access operation can be acquired when this is the only target Trace function isn't supported in some MCU's.		supported	*5
		RH850/P1M	LPD1-pin							
	RH850/P1x	RH850/P1M-E RH850/P1H-C	- LPD4-pin							
	RL78/D1x	RH850/P1M-C RH850/P1L-C RL78/D1A						-		_
	RL/6/DIX	RL78/F12		1 point being shared by an execution address and data access			Not supported			Not supporte
	RL78/F1x	RL78/F13			2000 points		Obtains the information of up to 128 branches	1		Support
		RL78/F14 RL78/F15 RL78/F1E RL78/G10		2 points being shared by an execution address and data access			(only branch-source info); the obtainable info is limited to 64 branches on some MCUs.	-		d *5
		RL78/G1M RL78/G1N RL78/G14		2 points for an execution address	Not supported		Not supported			
		(ROM: 96KByte and more) RL78/G1F RL78/G1H		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)			
RL78	RL78/G1x	RL78/G11 RL78/G12 RL78/G13 RL78/G14 (ROM: 64KByte and less) RL78/G1A RL78/G1D RL78/G1D RL78/G1G RL78/G1G RL78/G1G	Single-wire Serial	1 point being shared by an execution address and data access	2000 points	Forcible break by	Not supported		Not supported; the time b/w Go and Stop is measurable	Not supporte
	RL78/I1x	RL78/I1A RL78/I1B RL78/I1C RL78/I1D RL78/I1E		2 points being shared by an execution address and data access		selecting "Stop" on emulator debugger	Obtains the information of up to 256 branches (only branch-source info)	Supporte d		
	RL78/L1x	RL78/L12 RL78/L13		1 point being shared by an execution address and data access			Not supported			
	RL78/H1x	RL78/L1A RL78/L1C RL78/H1D		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)			
	RL7	8/FGIC		1 point being shared by an execution address and data access			Not supported	İ		
	RX700	RX72x RX71x	JTAG or Single-wire Serial	8 points for an execution address 4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.			Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation (DMAC or DTC bus is selectable as a bus master)			
	RX600	RX64x RX65x RX66x RX67x RX26T	JTAG or Single-wire Serial	8 points for an execution address + 4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.			Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation (DMAC or DTC bus is selectable as a bus master)		Supported *7	Support d *5 *6
RX	1,000	Others than RX64x RX65x RX66x RX67x RX26T	JTAG or double-wire Serial *4 (clock and data)	8 points for an execution address + 4 points for a data access * Sequential breaks are specifiable.	256 points at the max		Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation			
	R	X200 X140 han RX26T		4 points for an execution address			Obtains the information of up to 64 branches or the information of up to 64 cycles on data-access operation *3			
		X100 han RX140	Single-wire Serial	2 points for a data access * Sequential breaks are specifiable.			Obtains the information of up to 32 branches or the information of up to 32 cycles on data-access operation		Not supported; the time b/w Go and Stop is measurable	Not supporte
	V	850E1 850ES 850E2	JTAG, double-wire or 4-wire Serial (data × 2, clock and handshake)	2 points being shared by an execution address and data access * Sequential breaks are specifiable.	4 points for ROM area 2000 points for RAM area				Not supported;	
V850 *1 *2	V8 V8	50E2M 50E2S	Nexus or Single-wire Serial	[When using JTAG I/F] Before-execution: 4 points After-execution: 5 points Not supported Access: 6 points * Sequential breaks are specifiable.	8 points for ROM area 2000 points for RAM area		Not supported		the time b/w Go and Stop is measurable	

- Notes:

 **Notes:

 **I. V850E2/ME3 and V850E/ME2 cannot be used with the E1 emulator. Use the MINICUBE for them.

 **2. The number of break points varies by the integrated development environment you use.

 **3. For RV220 group, the information of 32 branches or the information of 32 cycles on data-access operation is obtained.

 **4. The debugging function and the connection system vary by the MCU you use.

 **5. Hot-plug Adapter for the E1 Emulator (optional) is required.

 **6. Available only when the emulator is connected via JTAG interface.

 **7. I sections can be gauged with RX100. 2 sections can be gauged with RX600.

* The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator. This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our website at: https://www.rensas.com/e1

■E1 Debugging Function - Continued-

	Target MCU			Break Function			Trace Function	Memory reference &change	Performanc e	Hot plug-
Family	Series/Core	Group	Connection system	Hardware Break	Software Break	Special Break	Internal trace	while executing program	measureme nt	in
	78K0R		Single-wire Serial or double-wire Serial (clock and data)	1 point being shared by an execution address and data access	2000 points		Not supported			
	78K0		double-wire Serial (clock and data)	1 point for a before-execution break (only when software breaks are not used) + 1 point for Access break	2000 points		Not supported			
R8C	R8C/L38C R8C/L35I R8C/L36A G R8C/L46A G R8C/LA6A G R8C/L36 G R8C/L36 G R8C/L32C R8C/32C R8C/34C R8C/3	C, R8C/L36C, and R8C/L3AC roups M, R8C/L36M, R8C/L36M, R8C/L36M roups and R8C/LASA roups and R8C/LASA roups and R8C/LASA roups and R8C/LASA roups BCC/SC, R8C/38C, R8C/38C, R8C/38C, R8C/38C, R8C/38C, R8C/38C, R8C/38M, R8C/38M, GM Groups C/SSAC, R8C/SSAC, AND RSC/SSAC, AND GOOUPS AND RSC/SSAC, AND RSC/SSA	Single-wire Serial	8 points for an address break + 2 points for a data condition break * Sequential breaks are specifiable.	256 points at the max	Forcible break by selecting "Stop" on emulator debugger	Obtains the information of 4 branches (sum of the branch-source and branch-destination PC) or the information of up to 8 cycles of specified data access	Supporte d	Not supported; the time b/w Go and Stop is measurable.	Not supported

- Notes:

 *1. V850E2/ME3 and V850E/ME2 cannot be used with the E1 emulator. Use the MINICUBE for them.

 *2. The number of break points varies by the integrated development environment you use.

 *3. For RX220 group, the information of 32 branches or the information of 32 cycles on data-access operation is obtained.

 *4. The debugging function and the connection system vary by the MCU you use.

 *5. Hot-plug Adapter for the E1 Emulator (optional) is required.

 *6. Available only when the emulator is connected via JTAG interface.

* The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator. This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our website at: https://www.renesas.com/e1

■E20 Debugging Function

RH850 RH	RH850/F1x RH850/E1x RH850/C1x RH850/D1x RH850/D1x RH850/P1x RL78/D1x	Group RH850/F1H RH850/F1K RH850/F1K RH850/F1K RH850/F1K RH850/F1KH RH850/F1KH RH850/C1M RH850/C1M RH850/C1M RH850/D1H RH850/D1H RH850/P1M-C RH850/P1M-C RH850/P1M-C RH850/P1M-C RH850/P1L-C RH86/F1 RH86/F1 RH86/F1 RH86/F1	Connection system LPD4-pin or LPD1-pin LPD4-pin or LPD4-pin or LPD1-pin	Hardware Break 12 points 12 points being shared by an execution address and data access 1 point being shared by an execution address and data access	Software Break 2000 points for ROM/RAM area	Special Break	Between 2K and 4K of branch info can be acquired when this is the only target on the condition of the condit	External Trace Not supported	- &change while executing program	e measureme nt	Real-time RAM monitor	C0 coverage	Hot plug in Supporte		
RH850 RH	RH850/E1x RH850/C1x RH850/D1x RH850/P1x RH850/P1x	RH850/FIL RH850/FIL RH850/FILK RH850/FIKM RH850/EIM-N FIRSO/OIM RH850/OIM RH850/OIM RH850/DIM RH850/PIM-C RH850/PI	or LPD1-pin LPD4-pin or LPD1-pin	being shared by an execution address and data access 1 point being shared by	2000 points for ROM/RAM area		branch info can be acquired when this is the only target or Between 1K and 2K of cycle info on data-raccess operation can be acquired when this is the only target Trace function isn't	Not supported		Supported					
RH850 RI	RH850/C1x RH850/D1x RH850/P1x RL78/D1x	RH850/C1H RH850/C1M RH850/D1L RH850/D1L RH850/D1M RH850/P1M-E RH850/P1H-C RH850/P1H-C RH850/P1L-C RL78/D1A RL78/D1A RL78/D1A RL78/F12 RL78/F13 RL78/F14 RL78/F15 RL78/F16 RL78/F16 RL78/F16	LPD4-pin or LPD1-pin	being shared by an execution address and data access 1 point being shared by	2000 points for ROM/RAM area		or Between 1K and 2K of cycle info on data-access operation can be acquired when this is the only target Trace function isn't	Not supported		Supported			Supporte d		
RI RI	RH850/D1x RH850/P1x RL78/D1x	RH850/D1L RH850/D1M RH850/P1M-E RH850/P1M-E RH850/P1H-C RH850/P1L-C RL78/D1A RL78/F12 RL78/F13 RL78/F15 RL78/F15 RL78/F16 RL78/F16 RL78/F16 RL78/F16	or LPD1-pin	an execution address and data access I point being shared by	ROM/RAM area		cycle info on data-access operation can be acquired when this is the only target Trace function isn't	Not supported		Supported					
Ri	RH850/P1x	RH850/D1M RH850/P1M RH850/P1M-E RH850/P1M-E RH850/P1H-C RH850/P1L-C RL78/D1A RL78/F12 RL78/F13 RL78/F15 RL78/F15 RL78/F16 RL78/F16 RL78/F16	or LPD1-pin	being shared by			Trace function isn't						i .		
R	RL78/D1x	RH850/P1M-E RH850/P1H-C RH850/P1H-C RH850/P1L-C RL78/D1A RL78/F12 RL78/F13 RL78/F14 RL78/F15 RL78/F15 RL78/F16	LPD4-pin	being shared by											
		RL78/D1A RL78/F12 RL78/F13 RL78/F14 RL78/F15 RL78/F1E RL78/G10		being shared by			supported in some MCU's.								
F	RL78/F1x	RL78/F13 RL78/F14 RL78/F15 RL78/F1E		an execution address and data access			Not supported						Not supported		
				2 points being shared by an execution address and data access	2000 points		Obtains the information of up to 128 branches (only branch-source info); the obtainable info is limited to 64 branches on some MCUs.						Supporte d		
	-			2 points for an execution address	Not supported		Not supported								
		RL78/G1N RL78/G14 (ROM: 96KByte and more) RL78/G1F RL78/G1H		2 points being shared by an execution address and data access		Ob (or	Obtains the information of up to 256 branches (only branch-source info)				Not supported	Not supported			
RL78	RL78/G1x	RL78/G11 RL78/G13 RL78/G13 RL78/G14 (ROM: 64KByte and less) RL78/G10 RL78/G10 RL78/G10 RL78/G16 RL78/G13A RL78/G19	Single-wire Serial	1 point being shared by an execution address and data access	2000 points		Not supported	Not supported		Not supported; the time b/w Go and Stop is measurable			Not supported		
F	RL78/I1x	RL78/I1A RL78/I1B RL78/I1C RL78/I1D RL78/I1E		2 points being shared by an execution address and data access			Obtains the information of up to 256 branches (only branch-source info)								
	RL78/L1x	RL78/L12 RL78/L13		1 point being shared by an execution address and data access			Not supported								
	RL78/H1x	RL78/L1A RL78/L1C RL78/H1D		2 points being shared by an execution address and data access		Forcible break by selecting	Obtains the information of up to 256 branches (only branch-source info)		Supporte						
	RL78	B/FGIC		1 point being shared by		"Stop" on emulator debugger	Not supported		ed	d					
RX			JTAG only or Single-wire Serial	an execution address and data access 8 points for an execution address + 4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.		debugger	Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation (DMAC or DTC bus is	-			Not supported	Not supported			
	RX700	RX71x	JTAG + External Trace	8 points for an execution address 4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.			selectable as a bus master) Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation (DMAC or DTC bus is selectable as a bus master)	Obtains the information of approx. 2M branches or the information of approx. 2M cycles on data access operation (DMAC or DTC bus is selectable as a bus master).			Supported (Data- and Last-access attributes [Read/Write/ Non- accessed])	Supporte d			
		RX64x RX65x RX66x RX67x RX26T	JTAG only or Single-wire Serial	8 points for an execution address 4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.			Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation (DMAC or DTC bus is selectable as a bus master)	-			Not supported	Not supported	Supporte d *5		
	RX600	RX64x RX65x RX66x RX67x	JTAG + External Trace	8 points for an execution address 4 points for a data access (DMAC or DTC bus is selectable as a bus master) * Sequential breaks are specifiable.	256 points at the max		Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation (DMAC or DTC bus is selectable as a bus master)	Obtains the information of approx. 2M branches or the information of approx. 2M cycles on data access operation (DMAC or DTC bus is selectable as a bus master)		Supported *6	Supported (Data- and Last-access attributes [Read/Write/ Non- accessed])	Supporte d			
		Others than RX64x RX65x	JTAG only or double-wire Serial *4 (clock and data)	8 points for an execution address 4 points for a data access * Sequential breaks are specifiable.			Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation	-			Not supported Supported	Not			
		RX66x RX67x RX26T	JTAG or double-wire Serial *4 (clock and data)	8 points for an execution address 4 points for a data access * Sequential breaks are specifiable.			Obtains the information of up to 256 branches or the information of up to 256 cycles on data-access operation	Obtains the information of approx. 2M branches or the information of approx. 2M cycles on data access operation			(Data- and Last-access attributes [Read/Write/ Non- accessed])	supported			
	Other th	X200 X140 nan RX26T X100 nan RX140	Single-wire Serial	4 points for an execution address + 2 points for a data access * Sequential breaks are specifiable.			Obtains the information of up to 64 branches or the information of up to 64 cycles on data-access Obtains the information of up to 32 branches or the information of up to 32 cycles on data-access operation	Not supported		Not supported; the time b/w Go and Stop is measurable	Not supported	Not supported	Not supported		

Notes:

*1. V850E2/ME3 and V850E/ME2 cannot be used with the E1 emulator. Use the MINICUBE for them.

*2. The number of break points varies by the integrated development environment you use.

*3. For RX220 group, the information of 32 branches or the information of 32 cycles on data-access operation is obtained.

*4. The debugging function and connection system vary by the MCU you use.

*5. Available only when the emulator is connected via JTAG interface.

*6. 1 sections can be gauged with RX100. 2 sections can be gauged with RX800.

^{*} The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator.

This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our website at https://www.reneass.com/e20

■E20 Debugging Function - Continued-

	Target MCU		Break Functio	n		Trace F	unction	Memory reference &change	Performanc	Real-time	C0	Hot plug-
Family	Series/Core Group	Connection system	Hardware Break	Software Break	Special Break	Internal trace	External Trace	while executing program	e measureme nt	RAM monitor	coverage	
	V850E1 V850ES V850E2	JTAG, double-wire or 4-wire Serial (data × 2, clock and handshake)	2 points being shared by an execution address and data access * Sequential breaks are specifiable.	4 points for ROM area 2000 points for RAM area								Not supported
V850 *1 *2	V850E2M V850E2S	Nexus or Single-wire Serial	[When using JTAG I/F] [When using Serial I/F] Before-execution: 4 points After-execution: 8 points Access: 6 points Access: 4 points * Sequential breaks are specifiable.	8 points for ROM area 2000 points for RAM area		Not supported						Supporte d
	78K0R	Single-wire Serial or double-wire Serial (clock and data)	1 point being shared by an execution address and data access	2000 points								
	78K0	double-wire Serial (clock and data)	1 point for a before-execution break (only when software breaks are not used) + 1 point for an access break	2000 points								
R8C	R8C/L35C, R8C/L36C, R8C/L38C and R8C/L3AC Groups R8C/L35M, R8C/L36M, R8C/L35M, R8C/L36M, R8C/L35M, R8C/L36M, Groups R8C/L36A and R8C/L3AM Groups R8C/L3AA and R8C/L3AM Groups R8C/L3AA and R8C/LA5A Groups R8C/LAFS Group R8C/3XT-A R8C/32C, R8C/33C, R8C/34C, R8C/35C, R8C/33C, R8C/34C, R8C/35C, R8C/36C, R8C/38C, R8C/33T, R8C/34M, R8C/35M, R8C/35M, R8C/36M, R8C/34M, R8C/35M, R8C/34M, R8C/35M, R8C/34M, R8C/35M, R8C/34M, R8C/35M, R8C/34M, R8C/35M, R8C/34M, R8C/35M, R8C/34M, R8C/3MM, RRC/3MM,	Single-wire Serial	8 points for an address break + 2 points for a data condition break * Sequential breaks are specifiable.	256 points at the max	Forcible break by selecting "Stop" on emulator debugger	Obtains the information of 4 branches (sum of the branch-source and branch-destination PC) or the information of up to 8 cycles of specified data access	Not supported	Supporte	Not supported; the time b/w Go and Stop is measurable.	Not supported	Not supported	Not supported

Notes:

*1. V850E2/ME3 and V850E/ME2 cannot be used with the E1 emulator. Use the MINICUBE for them.

*2. The number of break points varies by the integrated development environment you use.

*3. For RX220 group, the information of 32 branches or the information of 32 cycles on data-access operation is obtained.

*4. The debugging function and connection system vary by the MCU you use.

*5. Available only when the emulator is connected via JTAG interface.

^{*} The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator.

This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our website at: https://www.renesas.com/e20

■MINICUBE2 Debugging Function

	Target MCU		Break Fun	ction			DMM	Time Measurement		
Family	Series/ Core	Group	Hardware Break	Software Break	Forcible break	RAM Monitor	(Rewriting memories during RUN)	(from the start of execution to break)		
V850	V85	50E1 50ES 50E2	2 points *1 (Shared by an execution and access)	ROM area: 4 points RAM area: 2000 points	Supported *2	Supported	Supported	Measurement resolution: 100 μ s		
Voc		0E2M 0E2S	Before-execution break : 4 points Access break : 4 points * Sequential breaks are specifiable.	ROM area: 8 points RAM area: 2000 points					Саррогса	Max. measurement time: Approx. 100 hours
	78K0R		1 point (Shared by an execution and access)	2000 points	Supported	Pseudo-Real RAM Monitor (RRM) : Supported	Supported	Measurement resolution: 100 μ s Max. measurement time: Approx. 100 hours		
	78K0		Before-execution break : 1 point (Not supported when software breaks are used) Access break : 1 point	2000 points	Supported	Pseudo-Real RAM Monitor (RRM): Supported	Supported	Measurement resolution: 100 μ s Max. measurement time: Approx. 100 hours		
	78K0S		Not supported	Not supported 2000 points Supported (Not supported while interrupts are inhibited)		Not supported	Not supported	Measurement resolution: 100 μ s Max. measurement time: Approx. 100 hours		

Notes:

*1. The following MCUs have not been supported yet: V850ES/KE2, V850ES/KF2, V850ES/KG2, μPD70F3733, and V850ES/E2.

*2. A forcible break is not possible in the following states.

- Interrupts are inhibited (DI).

- Interrupts from the serial interface used for communications between MINICUBE2 and the target device are masked.

- The device is on standby and triggering of release from standby by makeable interrupts is disabled.

- The main clock is stopped while the UART is being used as the communications interface between MINICUBE2 and the target device.

^{*} The information provided only applies to MCUs where we have been able to confirm the specifications of the

millator.

This includes MCUs and enulator software that are under development. For more information on support for these items as it becomes available, check our website at:
https://www.renesas.com/cs* > "Functions Supported by CS+"(PDF)

■E10A-USB(HS0005KCU01H/HS0005KCU02H) Debugging Function

	Target MCU		Break Function		Performance		Trace	Function
Family	Series/ Core	Group	Hardware Break	Software Break	Measurement Function	Invalid External extension Mode of Embedded ROM	Internal Trace	AUD Trace
	SH (Except for Mu	-4A lti-core MCUs)	Address/Data/R/W/Execution-rount condition break: 2 points Address/R/W condition break: 4 points + + Data/R/W condition break: 2 points + System bus condition break: 2 points * Sequential breaks are specifiable.		Supported	No Mode	8 branches ⊚	Up to 64K events *1 (Up to 32K of branch information can be acquired when branch trace is the only target)
	SH-4	SH7760 SH7751R	Address/Data/R/W : 2 points + Address/R/W condition break : 4 points * Sequential breaks are specifiable.		Supported	No Mode	8 branches	Up to 64K events *1 (Up to 32K of branch information can be acquired when branch trace is the only target)
		SH7750R				No Mode		-
	SH-3	SH7721 SH7720 SH7712 SH7710 SH7705	Address/Data/R/W/Execution-count condition break : 1 point + Address/R/W condition break : 1 point		Supported	No Mode	8 branches	Up to 64K branches *1 (Only branch-destination information) ⊚
		SH7727 SH7709S SH7706	* Sequential breaks are specifiable.			No Mode		Up to 26214 branches *1
		SH7206 SH72AY SH72AW SH72A0 SH72A2				No Mode	1000	
	SH-2A (Except for Multi-core	SH7211 SH7216 (SH7216, SH7214) SH7231 SH7237 SH7239 SH7243 SH7243 SH7285 SH7286	Address break : 8 points + Address/Data/R/W/Execution-count condition break : 1 point		Supported	Supported	1000 cycles Select the target info from: Address/Data/Status/ Time stamp bus.	Up to 64K events *1 (Up to 32K of branch information can be acquired when
SuperH	(Except for Multi-core MCUs)	SH7670 SH726A SH726B SH726B SH7268 SH7267 SH7266 SH7264 SH7262 SH7203 SH7263	+ Address/Data/R/W condition break: 1 point * Sequential breaks are specifiable.			No Mode	256 cycles Select the target info from: Address/Data/Status/ Time stamp bus.	can be acquired when branch trace is the only target)
		SH7201 SH7261				No Mode		
		SH7256R SH7254R		255 points		Supported	=	
		SH7253				No Mode		-
		SH7619 SH7618	Address/Data/R/W/Execution-count condition break: 1 point + + + Address/R/W condition break: 1 point * Sequential breaks are specifiable.		-	No Mode	4 branches	-
		SH7145F SH7144F SH7047F	Address break : 4 points * Sequential breaks are specifiable.			-	-	Up to 64K events *2 (Up to 32K of branch information can be acquired when branch trace is the only target)
	SH-2	RSF71494A RSF71464A RSF70865A RSF70855A RSF70854A RSF70845A RSF70845A RSF70835A	Address break : 2 points + Address/Data/R/W/Execution-count condition break : 1 point + Address/Data/R/W condition break : 1 point		Supported	Supported	4 branches	-
		SH7137 SH7136	* Sequential breaks are specifiable.		_	Supported		
		SH7125 SH7124 R5E71494R R5E71491R R5E71464R R5E70865R R5E70855R R5E70845R R5E70835R	Address break : 8 points + Address/Data/R/W/Execution-count condition break : 1 point Address/Data/R/W condition break : 1 point * Sequential breaks are specifiable.		Supported	No Mode Supported	1000 cycles Select the target info from: Address/Data/Status/ Time stamp bus.	Up to 64K events *1 (Up to 32K of branch information can be acquired when branch trace is the only target)
H8SX	H8SX/1700 H8SX H8SX	H8SX/1720S H8SX/1720 /1600	Address break : 3 points + Address/Data/Satisfaction-count condition break : 1 point * Sequential breaks are specifiable.		Supported _	- *3	8 branches	-
	1.00%	H8S/2472 H8S/2463		1		_	4 branch sources	
H8S	H8S/2400	H8S/2462 H8S/2456R H8S/2456 H8S/2454 H8S/2426R H8S/2426 H8S/2424 H8S/2427R	Address break : 6 points + Address/Data condition break : 2 points		-	Supported	4 branch sources 4 branch sources or Bus trace : 1024 cycles	-
	H8S/2300	H8S/2425 H8S/2378 H8S/2378R H8S/2368 H8S/2319 *4 H8S/2319 *5 H8S/2329 *6	Address/Data condition break : 2 points			- Supported	4 branch sources or Bus trace : 512 cycles 4 branch sources	
	H8S/2200	H8S/2218 H8S/2215 *7	Address/Data condition break : 2 points	1	_	-	4 branch sources	_
Notes:	e with HS0005KCU01H.	H8S/2212		<u> </u>	Acquirable trace	information:	e, and Software trace (Trace(x): va	

Notes:

11. Not usable with HS0005KCU01H.

22. Not usable with HS0005KCU01H. While using RAM monitor function with HS0005KCU02H, no trace information can be acquired.

33. Supported only by H88X/1851.

44. Only H85/2319EF is supported.

45. Only H85/2319EF is supported.

46. Only H85/2319EF is supported.

47. Only H85/221ER and H85/2215T are supported.

Branch, Memory access within the specified range, and Software trace (Trace(x): variable x).

^{*} The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator. This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our website at: https://www.renesas.com/e10a_usb

■E10A-USB(HS0005KCU01H/HS0005KCU02H) Debugging Function - Continued-

		Target MCU		Break Function		Performance		Trace	Function
Fai	mily	Series/ Core	Group	Hardware Break	Software Break	Measurement Function	Invalid External extension Mode of Embedded ROM	Internal Trace	AUD Trace
н	88	H8S/2100	H8S/2168 H8S/2153 H8S/2164 H8S/2117 H8S/2117R H8S/2125 H8S/2116 H8S/2113 H8S/2112 H8S/2112	Address break : 6 points + Address/Data condition break : 2 points	255 points	Not supported	No Mode	4 branch sources	Not supported
			H8S/2189R H8S/2114R	Address break : 6 points + Address/Data condition break : 2 points				4 branch sources or Bus trace : 512 cycles	

- Notes:
 *I. Not usable with HS0005KCU01H.
 *Z. Not usable with HS0005KCU01H. While using RAM monitor function with HS0005KCU02H, no trace information can be acquired.

- *3. Supported only by H8SX/1651. *4. Only H8S/2319EF is supported. *5. Only H8S/2339EF is supported.

- *6. Only H8S/2329EF is supported. *7. Only H8S/2215R and H8S/2215T are supported.
- * The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator. This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our website at: https://www.renesas.com/e10a_usb

■E10A-USB(HS0005KCU01H/HS0005KCU02H + Debug MCU Board) Debugging Function

	Target MCU		Break Function		Performance		Trace	Function
Family	Series/ Core	Group	Hardware Break	Software Break	Measurement Function	Invalid External extension Mode of Embedded ROM	Internal Trace	AUD Trace
SuperH	SH-4A	SH7456 SH7455 SH7451 SH7450	Address/Data/R/W/Execution~count condition break : 2 points + Address/R/W condition break : 4 points + Data/R/W condition break : 2 points + System bus condition break : 2 points * Sequential breaks are specifiable.		Supported	No Mode	8 branches [©]	Up to 64K events *1 (Up to 32K of branch information can be acquired when branch trace is the only target)
	SH-2	SH7125 SH7124	Address break: 8 points + Address/Data/R/W/Execution-count condition break: 1 point + Address/Data/R/W condition break: 1 point * Available to specify the sequential break	255 points	Supported	No Mode	1000 cycles Select the target one from Address/Data/Status/ Time stamp bus.	Up to 64K events *1 (Up to 32K of branch information can be acquired when branch trace is the only target.)
H8S	H8S/2400	H8S/2456R H8S/2456 H8S/2454 H8S/2426R H8S/2426 H8S/2424	Address break : 6 points + Address/Data condition break : 2 points		Not supported	Supported	4 branch sources or Bus trace : 1024 cycles	Not supported

■E10A-USB(HS0005KCU14H) Debugging Function

	Target MCU		Break Function		Performance	Invalid External extension Mode	Trace	Function
Family	Series/ Core	Group	Hardware Break	Software Break	Measurement Function	of Embedded ROM	Internal Trace	AUD Trace
	SH-4A (Multi-core MCU)	SH7786		255			60 sets of branch sources and destinations	Up to 128K events
SuperH	SH-2A (Multi-core MCU)	SH7205 SH7265	10 points (Using UBC module)			No Mode	1024 cycles (When acquiring trace info by core in MCU, 512 cycles respectively.)	(Up to 64K of branch information can be acquired when branch trace is the only target)

O Acquirable trace acquisition information: Branch, Memory access, and General register. (Conditions are settable by each CPU.)

Note:

*1. Not usable with HS0005KCU01H.

Acquirable trace information: Branch, Memory access within the specified range, and Software trace (Trace(x): variable x).

■E8a Debugging Function

Target MCU			Break Function			Trace Function
Family	Series/ Core	Group	Hardware Break	Software Break	Special Break	Internal Trace
R8C	R8C/Lx		Address break : 8 points + Data condition break : 2 points * Sequential breaks are specifiable.			4 branches (sum of branch source PC and destination PC) or Up to 8 cycles of specified data access
	R8C/Mx		Address break : 4 points + Data condition break : 1 point			3 branches (sum of branch source PC and destination PC) or 6 branches (branch source PC) or Up to 8 cycles of specified data access
	R8C/3x	Other than R8C/3xD	Address break : 8 points + Data condition break : 2 points * Sequential breaks are specifiable.			4 branches (sum of branch source PC and destination PC) or Up to 8 cycles of specified data access
		R8C/3xD	Address break : 4 points			
	R8C/2x Other than R8C/10-13		or Address break : 2 points + Data condition break : 1 point			The latest 4 branches (branch source PC)
	RoO/ IX	R8C/10-13	Address break : 2 points]		-
M16C	R32C/100		Address break : 8 points			
	M32C/80					_
	M16C/60	M16C/62P M16C/6Nx M16C/6S	Address break . 0 politis	255 points	Forcible break by selecting "Stop" on emulator debugger	
		M16C/63 M16C/64A M16C/64C M16C/65 M16C/65C M16C/6C	Address break : 8 points			32 branches of order execution history (sum of branch source PC and destination PC) or Up to 64 cycles of specified data access
		M16C/6S1 M16C/6B	Data condition break : 2 points * Sequential breaks are specifiable.			16 branches of order execution history (sum of branch source PC and destination PC) or Up to 32 cycles of specified data access
	M16C/50					32 branches of order execution history (sum of branch source PC and destination PC) or Up to 64 cycles of specified data access
	M16C/Tiny		Address break : 6 points			-
H8S	H8S/Tiny		Address break : 8 points + Address/Data condition break : 2 points			The latest 8 branch sources or The latest 4 branch sources + 4 branch destinations
	H8/300H Tiny		Address/Data condition break : 2 points Address/Data condition break : 1 point	1		
Н8	H8/300H Super Low Power		Address break : 1 point + Address break : 1 point + Address/Data condition break : 1 point			The latest 4 branch sources
	H8/300L Super Low Power		Address/Data condition break : 1 point			
740			Address break : 2 points	1		-

Address break: 2 points

* The information provided only applies to MCUs where we have been able to confirm the specifications of the emulator.

This includes MCUs and emulator software that are under development. For more information on support for these items as it becomes available, check our website at:

https://www.renesas.com/e8a