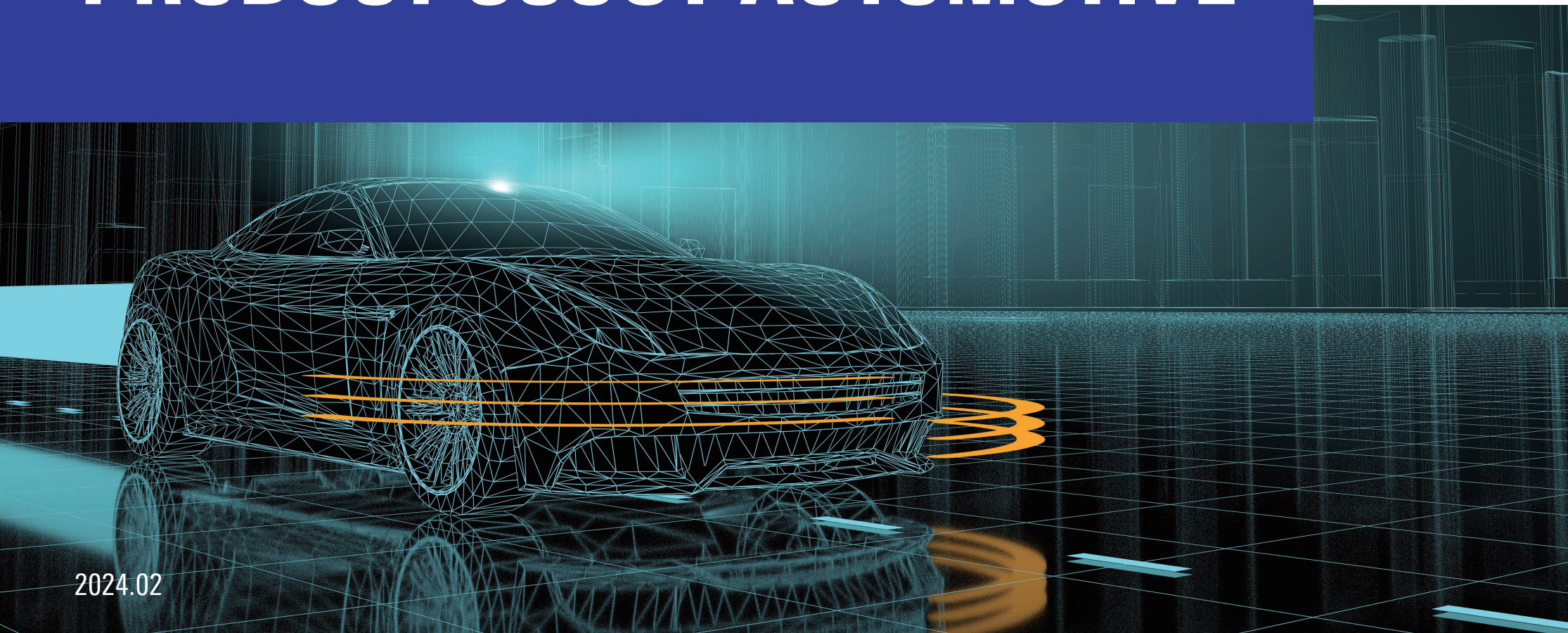
RENESAS

PRODUCT SCOUT AUTOMOTIVE



2024.02

AUTOMOTIVE MICROCONTROLLERS

Series	Nickname/ Group	Part number	Flash size [B]	RAM [B]	Data flash [B]	Core	FPU	I/O lines	CSI/UART/LIN	CAN/CAN-FD	I²C	External bus	Other interfaces	Timer channels [8-/16-/32-bit]	PWMs	Clock speed [MHz]	Internal oscillator(s)	Subclock [32 kHz]	A/D converter / D/A converter	Supply voltage (I/O) [V]	Pins	Packages	$T_{a,\,max}$ [°C]	Other features
F Series	RL78/ F12	R5F10968	8 K	0.5 K	4 K	RL78	-	16	2/3/1	0/-	1	-	-	-/9/-	4	32	1x 15 kHz 32 MHz	-	4x 10-bit/-	1.8...5.5	20	PLSP0020JC-A	85, 125	DMA, LVD, POR
		R5F1096A	16 K	1 K																				
		R5F1096B	24 K	1.5 K																				
		R5F1096C	32 K	2 K																				
		R5F1096D	48 K	3 K																				
		R5F1096E	64 K	4 K																				
		R5F109AA	16 K	1 K				26	4/4/1		4				7			-	8x 10-bit/-		30	PLSP0030JB-B		
		R5F109AB	24 K	1.5 K																				
		R5F109AC	32 K	2 K																				
		R5F109AD	48 K	3 K																				
		R5F109AE	64 K	4 K																				
		R5F109GA	16 K	1 K				44	6/5/1		6				7			✓	10x 10-bit/-		48	PLQP0048KF-A		
		R5F109GB	24 K	1.5 K																				
		R5F109GC	32 K	2 K																				
		R5F109GD	48 K	3 K																				
		R5F109GE	64 K	4 K																				
		R5F109LA	16 K	1 K				58	7/6/1		7				7			✓	12x 10-bit/-		64	PLQP0064KF-A		
		R5F109LB	24 K	1.5 K																				
		R5F109LC	32 K	2 K																				
		R5F109LD	48 K	3 K																				
		R5F109LE	64 K	4 K																				
	RL78/ F13-LIN	R5F10A6A	16 K	1 K	4 K	RL78	-	16	2/2/1	0/-	2	-	–	-/17/-	9	32	2x 15 kHz 32 MHz	-	4x 10-bit/-	2.7...5.5	20	PLSP0020JC-B	105, 125, 150	DTC, LVD, MCT, POR
		R5F10A6C	32 K	2 K																				
		R5F10A6D	48 K	3 K																				
		R5F10A6E	64 K	4 K																				
		R5F10AAA	16 K	1 K				26	2/2/1		2			-/17/-	9			-	10x 10-bit/-		30	PLSP0030JB-A		
		R5F10AAC	32 K	2 K																				
		R5F10AAD	48 K	3 K																				
		R5F10AAE	64 K	4 K																				
		R5F10ABA	16 K	1 K				28	2/2/1		2			-/17/-	8			-	8x 10-bit/-		32	PVQN0032KD-A		
		R5F10ABC	32 K	2 K																				
		R5F10ABD	48 K	3 K																				
		R5F10ABE	64 K	4 K																				
		R5F10AGA	16 K	1 K				44	2/2/1		2			-/17/-	9			✓	12x 10-bit/-		48	PVQN0048KG-A, PLQP0048KF-A		
		R5F10AGC	32 K	2 K																				
		R5F10AGD	48 K	3 K																				
		R5F10AGE	64 K	4 K																				
		R5F10AGF	96 K	6 K					4/3/1		5			-/21/-	11				15x 10-bit/-					
		R5F10AGG	128 K	8 K																				
		R5F10ALC	32 K	2 K				58	2/2/1		2			-/17/-	9			✓	12x 10-bit/-		64	PLQP0064KF-A		
		R5F10ALD	48 K	3 K																				
		R5F10ALE	64 K	4 K																				
		R5F10ALF	96 K	6 K					4/3/1		5			-/21/-	11				19x 10-bit/-					
		R5F10ALG	128 K	8 K																				
		R5F10AME	64 K	4 K				74	4/3/1		5			-/21/-	11			✓	20x 10-bit/-		80	PLQP0080KE-A		
		R5F10AMF	96 K	6 K																				
		R5F10AMG	128 K	8 K																				
	RL78/ F13-CAN	R5F10BAC	32 K	2 K	4 K	RL78	-	26	3/3/1	1/-	3	-	–	-/21/-	11	32	2x 15 kHz 32 MHz	-	12x 10-bit/-	2.7...5.5	30	PLSP0030JB-A	105, 125, 150	DTC, LVD, MCT, POR
		R5F10BAD	48 K	3 K																				
		R5F10BAE	64 K	4 K																				
		R5F10BAF	96 K	6 K																				
		R5F10BAG	128 K	8 K																				
		R5F10BBC	32 K	2 K				28	3/3/1		4			-/21/-	11			-	10x 10-bit/-		32	PVQN0032KD-A		
		R5F10BBD	48 K	3 K																				
		R5F10BBE	64 K	4 K																				
		R5F10BBF	96 K	6 K																				
		R5F10BBG	128 K	8 K																				
		R5F10BGC	32 K	2 K				44	4/3/1		5			-/21/-	11			✓	15x 10-bit/-		48	PVQN0048KG-A, PLQP0048KF-A		
		R5F10BGD	48 K	3 K																				
		R5F10BGE	64 K	4 K																				
		R5F10BGF	96 K	6 K																				
		R5F10BGG	128 K	8 K																				
		R5F10BLC	32 K	2 K				58	4/3/1		5			-/21/-	11			✓	19x 10-bit/-		64	PLQP0064KF-A		
		R5F10BLD	48 K	3 K																				
		R5F10BLE	64 K	4 K																				
		R5F10BLF	96 K	6 K																				
		R5F10BLG	128 K	8 K																				
		R5F10BME	64 K	4 K				74	4/3/1		5			-/21/-	12			✓	20x 10-bit/-		80	PLQP0080KE-A		
		R5F10BMF	96 K	6 K																				
		R5F10BMG	128 K	8 K																				
	RL78/ F14	R5F10PAD	48 K	4 K	4 K	RL78	-	26	3/3/1	1/-	3	-	–	-/21/-	11	32	2x 15 kHz 32 MHz	-	12x 10-bit/ 1x 8-bit	2.7...5.5	30	PLSP0030JB-A	105, 125, 150	CMP, DTC, ELC, LVD, MCT, POR
		R5F10PAE	64 K	6 K																				
		R5F10PBD	48 K	4 K	4 K			28	3/3/1		4			-/21/-	11			-	10x 10-bit/ 1x 8-bit		32	PVQN0032KD-A		
		R5F10PBE	64 K	6 K																				
		R5F10PGD	48 K	4 K	4 K			44	4/3/1		5			-/21/-	11			✓	15x 10-bit/ 1x 8-bit		48	PVQN0048KG-A, PLQP0048KF-A		
		R5F10PGE	64 K	6 K																				
		R5F10PGF	96 K	8 K																				
		R5F10PGG	128 K	10 K	8 K				4/4/2					-/25/-	15				18x 10-bit/ 1x 8-bit					
		R5F10PGH	192 K	16 K																				
		R5F10PGJ	256 K	20 K																				
		R5F10PLE	64 K	6 K	4 K			58	4/3/1		5			-/21/-	11			✓	19x 10-bit/ 1x 8-bit		64	PLQP0064KF-A		
		R5F10PLF	96 K	8 K																				
		R5F10PLG	128 K	10 K	8 K				4/4/2					-/25/-	15				20x 10-bit/ 1x 8-bit					
		R5F10PLH	192 K	16 K																				
		R5F10PLJ	256 K	20 K																				
		R5F10PME	64 K	6 K	4 K			74	5/3/2		5			-/21/-	12			✓	20x 10-bit/ 1x 8-bit		80	PLQP0080KE-A		
		R5F10PMF	96 K	8 K																				
		R5F10PMG	128 K	10 K	8 K				4/4/2					-/25/-	16				25x 10-bit/ 1x 8-bit					
		R5F10PMH	192 K	16 K																				
		R5F10PMJ	256 K	20 K																				
		R5F10PPE	64 K	6 K	4 K			92	4/4/2		5			-/25/-	16			✓	31x 10-bit/ 1x 8-bit		100	PLQP0100KE-A		
		R5F10PPF	96 K	8 K																				
		R5F10PPG	128 K	10 K	8 K																			
		R5F10PPH	192 K	16 K																				
		R5F10PPJ	256 K	20 K																				
	RL78/ F15	R5F113GK	384 K	26 K	16 K	RL78	-	44	4/4/2	2/-	5	-	IEBus	-/25/-	15	32	2x 15 kHz, 32 MHz	✓	18x 10-bit / 1x 8-bit	2.7...5.5	48	PVQN0048KG-A / PLQP0048KF-A	105, 125	CMP, DTC, ELC, LVD, MCT, POR
		R5F113GL	512 K	32 K																				
		R5F113LK	384 K	26 K				58											20x 10-bit / 1x 8-bit		64	PLQP0064KF-A		
		R5F113LL	512 K	32 K																				
		R5F113MK	384 K	26 K				74											25x 10-bit / 1x 8-bit		80	PLQP0080KE-A		
		R5F113ML	512 K	32 K																				
		R5F113PG	128 K	10 K	8 K			92	6/6/3										31x 10-bit / 1x 8-bit		100	PLQP0100KE-A		
		R5F113PH	192 K	16 K																				
		R5F113PJ	256 K	20 K																				
		R5F113PK	384 K	26 K	16 K																			
		R5F113PL	512 K	32 K																				
		R5F113TG	128 K	10 K	8 K			136						-/33/-	22				31x 10-bit / 1x 8-bit		144	PLQP0144KD-E		
		R5F113TH	192 K	16 K																				
		R5F113TJ	256 K	20 K																				
		R5F113TK	384 K	26 K	16 K																			
		R5F113TL	512 K	32 K																				
	RL78/ F23	R7F123FB	128 K	8 K	12 K	RL78	-	28	3/2/1	-/0	4	–	–	-/17/-	9	40	2x 15 kHz 40 MHz	–	11x 12-bit / -	2.7...5.5	32	PWQN0032KF-B	105, 125, 150	POR, LVD, DTC, AAU, AESEA
		R7F123FG						44	4/2/1		5							✓	20x 12-bit / -		48	PLQP0048KF-A PLQP0048KB-A		
		R7F123FL						58											25x 12-bit / -		64	PLQP0064KF-A PLQP0064KB-A		
		R7F123FM						74											26x 12-bit / -		80	PLQP0080KE-A PLQP0080KG-A		
	RL78/ F24	R7F124FB	256 K	16 K	24 K	RL78	-	28	3/2/1	-/1	4	–	–	-/21/-	11	40	2x 15 kHz 40 MHz	–	11x 12-bit / -	2.7...5.5	32	PWQN0032KF-B	105, 125, 150	POR, LVD, DTC, ELC, AAU, AESEA
		R7F124FG						44	4/2/1		5							✓	20x 12-bit / -		48	PLQP0048KF-A PLQP0048KB-A		
		R7F124FL						58											25x 12-bit / -		64	PLQP0064KF-A PLQP0064KB-A		
		R7F124FM						74											26x 12-bit / -		80	PLQP0080KE-A PLQP0080KG-A		
		R7F124FP						92											32x 12-bit / -		100	PLQP0100KE-A PLQP0100KB-A		
	RH850/ F1KM-S1	R7F701695	512 K	64 K	64 K	RH850	✓	33	2/1/3	1/1	2	–	2x SENT	- / 16 / 16	13	120	240 kHz, 8 MHz	–	8x 12-bit & 4x 10-bit / -	3.0...5.5	48	PLQP0048KB-A	105, 125	DMA, ICU-S, EMC, LPS, LVI, MCT, PAD, POC, RTC, SPF, WDT
		R7F701694	768 K	96 K																				
		R7F701693	1024 K	128 K																				
		R7F701692	512 K	64 K				49	2/2/4	3/3					24				10x 12-bit & 11x 10-bit / -		64	PLQP0064KB-A		
		R7F701691	768 K	96 K																				
		R7F701690	1024 K	128 K																				
		R7F701689	512 K	64 K				65	4/3/5	3/3				- / 32 / 16	24				11x 12-bit 14x 10-bit		80	PLQP0080KB-A		
		R7F701688	768 K	96 K																				
		R7F701687	1024 K	128 K																				
		R7F701686	512 K	64 K				81	5/4/7	6/6					48				16x 12-bit & 20x 10-bit / -		100	PLQP0100KB-A		
		R7F701685	768 K	96 K																				
		R7F701684	1024 K	128 K																				
	RH850/ F1K	R7F701580	1536 K	160 K	64 K	RH850	✓	81	5/4/7	6/6	1	–	–	- / 32 / 8	48	120	240 kHz, 8 MHz	–	16x 12-bit & 20x 10-bit/	3.0...5.5	100	PLQP0100KB-A	105, 125	DMA, ICU-S, EMC, LPS, LVI, MCT, PAD, POC, RTC, SPF, WDT
		R7F701581	2048 K	192 K																				
		R7F701623	1024 K	128 K				120	6/6/12						64			✓	24x 12-bit & 24x 10-bit/		144	PLQP0144KA-A		
		R7F701582	1536 K	160 K																				
		R7F701583	2048 K	192 K																				
		R7F701597	1024 K	128 K				150	6/6/16	7/6				- / 48 / 8	72				32x 12-bit & 28x 10-bit/-		176	PLQP0176KB-A		
		R7F701586	1536 K	160 K																				
		R7F701587	2048 K	192 K																				
	RH850/ F1KM-S2	R7F7017603	2M	256K	128K	RH850	✓	75	5/3/6	8/8	2	–	1x SENT	- / 32 / 16	44	240	240kHz, 8MHz	–	16x 12-bit & 16x 10-bit / -	3.0...5.5	100	PLQP0100KB-A	105°C	DMA, ICU-M, EMC, LPS, LVI, MCT, PAD, POC, RTC, SPF, WDT
		R7F7017623						114	6/6/12				2x SENT		64			✓	24x 12-bit & 22x 10-bit / -		144	PLQP0144KA-A		
		R7F7017643						144	8/8/18					- / 48 / 16	72				32x 12-bit & 26x 10-bit / -		176	PLQP0176KB-A		
	RH850/ F1KM-S4	R7F701644	3 M	384 K	128 K	RH850	✓	75	5/3/6	8/8	2	–	FlexRay, SENT	- / 32 / 16	44	240	240 kHz, 8 MHz	–	16x 12-bit & 16x 10-bit / -	3.0...5.5	100	PLQP0100KB-A	105	DMA, ICU-M, EMC, LPS, LVI, MCT, PAD, POC, RTC, SPF, WDT
		R7F701645	4 M	512 K																				
		R7F701646	3 M	384 K				114	6/6/12				FlexRay, 2x SENT		64			✓	24x 12-bit & 22x 10-bit / -		144	PLQP0144KA-A		
		R7F701647	4 M	512 K																				
		R7F701648	3 M	384 K				144	8/8/18			✓	FlexRay, Ethernet, 2x SENT	- / 48 / 16	72				32x 12-bit & 26x 10-bit / -		176	PLQP0176KB-A		
		R7F701649	4 M	512 K																				
		R7F701650	3 M	384 K				174	8/8/20						80				32x 12-bit & 38x 10-bit / -		233	PRBG0233GA-A	105, 125	
		R7F701651	4 M	512 K																				
		R7F701652	3M	384 K				214							96						272	PRBG0272GB-A		
		R7F701653	4M	512 K																				
	RH850/ F1KH-D8	R7F701708	6 M	896 K	256 K	2x RH850	✓	144	10/8/18	8/8	2	✓	FlexRay, Ethernet, 2x SENT	- / 48 / 16	72	240	240 kHz, 8 MHz	✓	32x 12-bit & 26x 10-bit / -	3.0...5.5	176	PLQP0176KB-A	105	DMA, ICU-M, EMC, LPS, LVI, MCT, PAD, POC, RTC, SPF, WDT
		R7F701709	8 M	1024 K																				
		R7F701710	6 M	896 K				174	10/8/20						80				32x 12-bit & 38x 10-bit / -		233	PRBG0233GA-A	105, 125	
		R7F701711	8 M	1024 K																				
		R7F701714	6 M	896 K				246	10/8/24	12/12			FlexRay, 2x Ethernet, 2x SENT		96						324	PRBG0324GB-A		
		R7F701715	8 M	1024 K																				
P Series	RH850/ P1L-C	R7F701391	512 K	64 K	32 K	RH850	✓	43	3/2/2	2/2	–	–	2x SENT	28x 24-bit	6	120	16 MHz	–	8x 12-bit / -	3.0...5.0	80	PLQP0080LC-A	Tj = 160 °C	voltage/clock/ temperature monitor, ECM, POC, DMA, DTS, MPU, WDT & SWDT, ICU-S
		R7F701390						57					2x SENT	28x 24-bit	12				12x 12-bit / -		100	PLQP0100LA-A		
		R7F701389	1 M	100 K	64 K			57					3x SENT	28x 24-bit	12				12x 12-bit / -		100	PLQP0100LA-A		
		R7F701388						81					4x SENT	28x 24-bit	12				20x 12-bit / -		144	PLQP0144LB-A		
	RH850/ P1M-E	R7F701381	1 M	192 K	32 K	RH850	✓	46	5/3/2	3/3	–	–	2x FlexRay, 2x PSI5, 5x SENT	-/48/19	30	160	16 MHz	–	19x 12-bit / -	3.0...5.5	100	PLQP0100KB-A	Tj = 150 °C (standard) Tj = 160 °C (optiona)	DMA, DTS, ECM, ENC, MCT, POC, THS, WDT, ICU-S, even part number = SVS odd part number = DVS
		R7F701382																						
		R7F701383						82					2x FlexRay, 2x PSI5, 6x SENT						24x 12-bit / -		144	PLQP0144LB-A		
		R7F701384																						
		R7F701385																				PLQP0144KA-A		
		R7F701386																						
		R7F701375	2 M		64 K			46					2x FlexRay, 2x PSI5, 5x SENT						19x 12-bit / -		100	PLQP0100KB-A		
		R7F701376																						
		R7F701377						82					2x FlexRay, 2x PSI5, 6x SENT						24x 12-bit / -		144	PLQP0144LB-A		
		R7F701378																						
		R7F701379																				PLQP0144KA-A		
		R7F701380																						
	RH850/ P1M-C	R7F701374	2 M	448 K	64 K	RH850	✓	81	4/2/2	3/3	–	–	2x FlexRay, Ethernet, 6x SENT	28x 24-bit	12	240	16 MHz	–	20x 12-bit / -	3.0...3.6	144	PLQP0144LB-A	Tj = 160 °C	voltage/clock/ temperature monitor, ECM, POC, DMA, DTS, MPU, WDT & SWDT, crypto core (ICU-M), Flash BGO
		R7F701373						98											24x 12-bit / -		292	PRBG0292GC-A	Tj = 150 °C	
		R7F701397						60					2x FlexRay, Ethernet, 4x SENT						16x 12-bit / -	3.0…3.6	156	PLBG0156JB-A		
	RH850/ P1H-C	R7F701372	4 M	1088 K	128 K	2+2 RH850	✓	131	4/4/4	3/3	–	✓	4x FlexRay, 2x Ethernet, 8x SENT	37x 24-bit	21	2x 240	16 MHz	–	32x 12-bit / -		292	PRBG0292GC-A		
		R7F701371	8 M		192 K					4/4									40x 12-bit / -	3.0...3.6				
		R7F701396	4 M		128 K			60	4/2/2	3/3		–	2x FlexRay, Ethernet, 4x SENT		12				16x 12-bit / -		156	PLBG0156JB-A		
C Series	RH850/ C1M-A1	R7F701278EAFP	2 M	192 K	64 K	1+1 RH850G3MH	✓	81	3/6/3	4	–	–	4x RSENT	-/32/4	TAUD: 2x 16-bit TAUJ: 1x 32-bit TSG3: 2x 18-bit	240	240 kHz	–	SAR: 30 inp., 12-bit	5	176	PLQP0176KB-A Plastic LFQFP-176 0.5-mm ball pitch 24 mm × 24 mm	Tj = 150 °C	R/D converter (RDC3A); motor control unit (EMU3); security (ICU-S);
	RH850/ C1M-A2	R7F701275EABG	4 M	320 K	64 K	2+1 RH850G3MH	✓	99	3/6/3	4	–	–	4x RSENT	-/64/8	TAUD: 4x 16-bit TAUJ: 2x 32-bit TSG3: 3x 18-bit	2x 320	240 kHz	–	SAR: 48 inp., 12-bit	5	252	PRBG0252GB-A Plastic FBGA-252 0.8-mm ball pitch 17 mm × 17 mm	Tj = 150 °C	R/D converter (RDC3A); motor control unit (EMU3); security (ICU-S);
E Series	RH850/ E2M	R7F702002AEABG	8 M	768 K	224 K	2+2 RH850G4MH	✓	158	6x CSIH, 4x SCI, 6x RLIN, 1x HS-SPI	5	–	–	1x FlexRay, 1x Ethernet 17x SENT, 1x PSI5-S 2x RHSB, 1x RHSIF	ATU-V: -/-/115 36x 24-bit (or GTM: -/64/- 196x 24-bit)	ATU-V: 33x 32-bit 36x 24-bit (or GTM: 64x 16-bit 64x 24-bit)	2x 400	100 MHz	–	SAR: 52 inp.,12-bit DS: 26 inp.,16-bit Cyclic: 8 inp.,16-bit	3.0...5.5	292	PRBG0292GD-A Plastic FBGA-292 0.8-mm ball pitch 17 mm × 17 mm	Tj = 150 °C	digital filter engine (DFE); security (ICU-M); Encoder Timer (ENCA)
		R7F702002AEABA	8 M	768 K	224 K	2+2 RH850G4MH	✓	211	6x CSIH, 4x SCI, 6x RLIN, 1x HS-SPI	5	–	–	1x FlexRay, 1x Ethernet 17x SENT, 1x PSI5-S 2x RHSB, 1x RHSIF	ATU-V: -/-/115 36x 24-bit (or GTM: -/64/- 196x 24-bit)	ATU-V: 33x 32-bit 36x 24-bit (or GTM: 64x 16-bit 64x 24-bit)	2x 400	100 MHz	–	SAR: 80 inp.,12-bit DS: 26 inp.,16-bit Cyclic: 8 inp.,16-bit	3.0...5.5	373	PRBG0373GB-A Plastic FBGA-373 0.8-mm ball pitch 21 mm × 21 mm	Tj = 150 °C	digital filter engine (DFE); security (ICU-M); Encoder Timer (ENCA)
	RH850/ E2H	R7F702011EABA	12 M	1152 K	288 K	4+2 RH850G4MH	✓	211	8x CSIH, 4x SCI, 6x RLIN, 1x HS-SPI	6	–	✓	1x FlexRay, 1x Ethernet 20x SENT, 1x PSI5-S 3x RHSB, 1x RHSIF	ATU-V: -/-/155 40x 24-bit (or GTM: -/80/- 228x 24bit)	ATU-V: 33x 32-bit 40x 24-bit (or GTM: 80x 16-bit 72x 24-bit)	4x 400	100 MHz	–	SAR: 96 inp.,12-bit DS: 38 inp.,16-bit Cyclic: 8 inp.,16-bit	3.0...5.5	373	PRBG0373GB-A Plastic FBGA-373 0.8-mm ball pitch 21 mm × 21 mm	Tj = 150 °C	digital filter engine (DFE); security (ICU-M); Encoder Timer (ENCA)
		R7F702011EABG	12 M	1152 K	288 K	4+2 RH850G4MH	✓	225	8x CSIH, 4x SCI, 6x RLIN, 1x HS-SPI	6	–	✓	1x FlexRay, 1x Ethernet 20x SENT, 1x PSI5-S 3x RHSB, 1x RHSIF	ATU-V: -/-/155 40x 24-bit (or GTM: -/80/- 228x 24bit)	ATU-V: 33x 32-bit 40x 24-bit (or GTM: 80x 16-bit 72x 24-bit)	4x 400	100 MHz	–	SAR: 96 inp.,12-bit DS: 38 inp.,16-bit Cyclic: 8 inp.,16-bit	3.0...5.5	468	PRBG0468GD-A Plastic FBGA-468 0.8-mm ball pitch 25 mm × 25 mm	Tj = 150 °C	digital filter engine (DFE); security (ICU-M); Encoder Timer (ENCA)
	RH850/ E2UH	R7F702012AEABA	16 M	2048 K	320 K	6+4 RH850G4MH	✓	211	8x CSIH, 4x SCI, 8x RLIN, 1x HS-SPI	10	–	✓	2x FlexRay, 1x Ethernet 20x SENT, 1x PSI5 1x PSI5-S, 4x RHSB 1x RHSIF	ATU-V: -/-/155 40x 24-bit (or GTM: -/96/- 252x 24bit)	ATU-V: 33x 32-bit 40x 24-bit (or GTM: 96x 16-bit 80x 24-bit)	6x 400	100 MHz	–	SAR: 96 inp.,12-bit DS: 38 inp.,16-bit Cyclic: 8 inp.,16-bit	3.0...5.5	373	PRBG0373GB-A Plastic FBGA-373 0.8-mm ball pitch 21 mm × 21 mm	Tj = 150 °C	digital filter engine (DFE); security (ICU-M); Encoder Timer (ENCA)
		R7F702012AEABG	16 M	2048 K	320 K	6+4 RH850G4MH	✓	258	8x CSIH, 4x SCI, 8x RLIN, 1x HS-SPI	10	–	✓	2x FlexRay, 1x Ethernet 20x SENT, 1x PSI5 1x PSI5-S, 4x RHSB 1x RHSIF	ATU-V: -/-/155 40x 24-bit (or GTM: -/96/- 252x 24bit)	ATU-V: 33x 32-bit 40x 24-bit (or GTM: 96x 16-bit 80x 24-bit)	6x 400	100 MHz	–	SAR: 96 inp.,12-bit DS: 38 inp.,16-bit Cyclic: 8 inp.,16-bit	3.0...5.5	468	PRBG0468GD-A Plastic FBGA-468 0.8-mm ball pitch 25 mm × 25 mm	Tj = 150 °C	digital filter engine (DFE); security (ICU-M); Encoder Timer (ENCA)
U2A Series	RH850/ U2A6	R7F702302FAFM-C	6 M	0.8 M	256	2+2 RH850	2x	97	4/10/10	7/7	1	–	2x FlexRay, 1x Ethernet, 6x SENT, 3x PSI5, 1x PSI5S	-/48/16 64x 24bit	64	2x 400	200 MHz, 240 kHz, 16 MHz	–	10/10/0 high res 3/10/6 low res no D/A	3.0...5.5	144	PLQP0144LC-B	Tj = 160 °C	DMA, DVS, ECM, LVI, MCT, PAD, RTC, SMC, SPF, SVS, WDT Further highlights: - OTA (Flash Over The Air) - ICU MH (Evita Full) - ASIL D - Inter-Virtual Machine Communication and Hypervisor support
		R7F702302FABD-C						77	6/8/8	8/8	2		2x FlexRay, 8x SENT, 4x PSI5, 1x PSI5S						8/8/0 high res 6/7/0 low res no D/A		156	PLBG0156JC-A		
		R7F702302FAFK-C						129	6/12/12	11/11			2x FlexRay, 1x Ethernet, 8x SENT, 4x PSI5, 1x PSI5S						14/14/5 high res 10/14/7 low res no D/A		176	PLQP0176KH-B		
		R7F702302FABB-C						165	6/12/12	12/12			2x FlexRay, 1x Ethernet, 8x SENT, 4x PSI5, 2x PSI5S						20/20/5 high res 10/14/10 low res no D/A		292	PRBG0292GC-A		
	RH850/ U2A8	R7F702301BFABG-C	8 M	1.8 M	320 K	2+2 RH850	2x	165	6/12/12	16/16	2	–	4x FlexRay, 2x Ethernet, 8x SENT, 4x PSI5, 2x PSI5S, 1x RHSIF 4x CXPI	-/48/16 64x 24bit	64	2x 400	200 MHz, 240 kHz, 16 MHz	–	20/20/5 high res 10/14/10 low res no D/A	3.0...5.5	292	PRBG0292GC-A	Tj = 160 °C	DMA, DVS, ECM, LVI, MCT, PAD, RTC, SMC, SPF, SVS, WDT Further highlights: - OTA (Flash Over The Air) - ICU MH (Evita Full) - ASIL D - Inter-Virtual Machine Communication and Hypervisor support
		R7F702301BEBBA-C						221	9/24/24										20/20/20 high res 10/14/10 low res no D/A		373	PRBG0373GB-A	Tj = 150 °C	
	RH850/ U2A16	R7F702300BFABA-C	16 M	3.6 M	576 K	4+4 RH850	4x	165	6/12/12	16/16	2	–	4x FlexRay, 2x Ethernet, 8x SENT, 4x PSI5, 2x PSI5S, 1x RHSIF 4x CXPI	-/48/16 64x 24bit	64	4x 400	200 MHz, 240 kHz, 16 MHz	–	20/20/5 high res 10/14/10 low res no D/A	3.0...5.5	292	PRBG0292GC-A	Tj = 160 °C	DMA, DVS, ECM, LVI, MCT, PAD, RTC, SMC, SPF, SVS, WDT Further highlights: - OTA (Flash Over The Air) - ICU MH (Evita Full) - ASIL D - Inter-Virtual Machine Communication and Hypervisor support
		R7F702300BEBBB-C						221	9/24/24										20/20/20 high res 10/14/10 low res no D/A		373	PRBG0373GB-A	Tj = 150 °C	
		R7F702300BEBBC-C						301	10/24/24												516	PRBG0516GD-A		
U2B Series	RH850/ U2B6	R7F70255*BFABB	6 M	576 K	128 K	3+2 RH850	3x	198	7x MSPI, 7x RLIN	8/8	–	–	1x 100Mb Ethernet TSN, 2x FlexRay, 10x RSENT, 2x RHSB	-/112/60 ATU-VI: 20x24bit	ATU-VI: 16x 32bit 20x 24bit GTM: 32x 16bit 32x 24bit 16x HRPWM	3x 400	200MHz, 240kHz, 16MHz	–	3x SAR-ADC, 64 inputs 4x DS-ADC, 18 inputs 4x Fast Comparator 4x DAC	3.0...5.5	292	PRBG0292GD-A Plastic FBGA-292 0.8-mm ball pitch 17 mm × 17 mm	Tj = 160 °C	- OTA (Flash Over The Air) - ICU MHB (Evita Full) - ASIL D - Inter-Virtual Machine Communication and Hypervisor support - R/D converter (RDC3AL) - Enhanced Motor Control Unit (EMU) - Digital Filter Engine (DFE)

EDITION FEBRUARY 2024

AUTOMOTIVE INFORMATION SYSTEMS – MICROCONTROLLER

Series	Nickname/ Group	Part number	Flash size [B]	RAM [B]	Data flash [B]	Core	FPU	I/O lines	CSI/UART/LIN	CAN/CAN-FD	I²C	External bus	Other interfaces	Timer channels [8-/16-/32-bit]	PWMs	Clock speed [MHz]	Internal oscillator(s)	Subclock [32 kHz]	A/D converter / D/A converter	Supply voltage (I/O) [V]	Pins	Packages	$T_{a, max}$ [°C]	Other features
D Series	RL78/ D1A	R5F10CGB	24 K	2 K	8 K	RL78	-	38	2/1/1	-	1	–	–	-/24/-	15	32	15kHz 32MHz	✓	5x 10-bit/-	2.7...5.5	48	PLQP0048KF-A	85, 105	DMA, LCD, POC, RTC, SMC, SND
		R5F10CGC	32 K																					
		R5F10CGD	48 K	3 K																				
		R5F10CLD	48 K	3 K				54	2/2/2	-					18				5x 10-bit/-		64	PLQP0064KF-A		
		R5F10CMD	48 K	3 K				68	2/2/2	-					21				8x 10-bit/-		80	PLQP0080KE-A		
		R5F10CME	64 K	4 K																				
		R5F10DGC	32 K	2 K				38	2/1/1	1/-					15				5x 10-bit/-		48	PLQP0048KF-A		
		R5F10DGD	48 K	3 K																				
		R5F10DGE	64 K	4 K																				
		R5F10DLD	48 K	3 K				54	2/2/2	1/-					18				5x 10-bit/-		64	PLQP0064KF-A		
		R5F10DLE	64 K	4 K																				
		R5F10DMD	48 K	3 K				68	2/2/2	1/-					21				8x 10-bit/-		80	PLQP0080KE-A		
		R5F10DME	64 K	4 K																				
		R5F10DMF	96 K	6 K				68	2/2/2	1/-									8x 10-bit/-		80	PLQP0080KE-A		
		R5F10DMG	128 K	8 K																				
		R5F10DMJ	256 K	16 K																				
		R5F10DPE	64 K	4 K				84	3/2/2	1/-									9x 10-bit/-		100	PLQP0100KE-A		
		R5F10DPF	96 K	6 K																				
		R5F10DPG	128 K	8 K																				
		R5F10DPJ	256 K	16 K						2/-														
		R5F10TPJ	256 K	16 K				84	3/2/2	1/-									9x 10-bit/-		100	PLQP0100KE-A		
		R5F10DPK	384K	20K						2/-									9x 10bit/-		100	PLQP0100KE-A		
		R5F10DPL	512K	24K																				
		R5F10DSJ	256K	16K				112					LCD Bus I/F						11x 10bit/-		128	PLQP0128KD-A		
		R5F10DSK	384K	20K																				
		R5F10DSL	512K	24K																				
	RH850/ D1S1	R7F701417	1 M	128 K	32 K	RH850	✓	92	6/4/4	3/-	2	✓	4x SMC, LCD Bus	-/48/7 + RTC	17	120	240 kHz, 8 MHz	✓	12x 12-bit/-	3.3 to 5	144	PLQFP0144KF-A	105	DMA, LVI, POC
		R7F701437								-/3														
	RH850/ D1L1	R7F701401	2 M	256 K + 16 K	64 K			103		3/-			6x SMC, LCD Bus		24				16x 12-bit/-			PLQP0144KA-A		
		R7F701421								-/3														
	RH850/ D1L2	R7F701402	4 M	512 K + 16 K + 144 K						3/-			6x SMC, LCD Bus, Display-Out											DMA, LVI, POC, Sprite, RAM Wrapper
		R7F701422								-/3														
	RH850/ D1L2H	R7F701403	4 M	512 K + 16 K + 144 K				126		3/-											176	PLQP0176KB-A		
		R7F701423								-/3														
	RH850/ D1M1-V2	R7F701442	4 M	512 K + 16 K + 1.55 M						3/-			6x SMC, LCD Bus, Display out (LVTTL), Octa/Hyper Bus, Video in (LVTTL), 2x I²S, Ethernet AVB			160								DMA, LVI, POC, Sprite, RAM Wrapper, 2D-GPU, JPEG, Warping
		R7F701462	4 M							-/3														
	RH850/ D1M1A	R7F701441	4 M	512 K + 16 K + 2.4 M						3/-			6x SMC, SDRAM 32-bit, Octa/Hyper Bus, Display out (LVTTL + LVDS), Video in (LVTTL), 2x I²S, Ethernet AVB			240					272	PRBG0272FA-A		
		R7F701461	4 M							-/3														
	RH850/ D1M2	R7F701408	3.75 M	512 K + 16 K + 3.1 M				159		3/-			4x SMC, DDR2-480 16-bit, 2x Display out (RSDS), Video in (LVTTL), 2x I²S, Ethernet AVB			240			20x 12-bit/-	3.3 to 5 1.25 1.8	376	PRBG0376FB-A		
		R7F701428								-/3														
		R7F701410	5 M							3/-														
		R7F701430								-/3														
	RH850/ D1M2H	R7F701411	3.75 M					199		3/-			6x SMC, DDR2-480 32-bit, 2x Display out (1RSDS), 2x Video in (LVTTL + MIPI), 2x I²S, Ethernet AVB, MLB (MOST)								484	PRBG0484FF-A		
		R7F701431								-/3														
		R7F701412	5 M							3/-														
		R7F701432								-/3														

Other features:

CMP	Comparator(s)	ECM	Error Control Module	ICU-S	Intelligent Cryptographic Unit – Slave	POC	Power-On Clear	THS	Thermal sensor
DMA	Direct memory access	ELC	Event Link Controller	ICU-M	Intelligent Cryptographic Unit – Master	RTC	Real-Time Clock	WDT	Window Watchdog Timer
DRI	Direct RAM Input	EMC	Controller for external analogue MUX	IMR	Image renderer	SMC	Stepper motor controller	XIP	Execute in Place from serial flash
DRO	Direct RAM Output	ENC	Encoder timer for rotary switch	LCD	LCD controller/driver	SND	Sound generator		
DTC	Data Transfer Controller	GFX	2D/3D graphics engine	LVI	Low-voltage indicator	SPF	System Protection Function		
DTS	Data Transfer System	GPS	GPS baseband controller	MCT	Motor control timer	SRC	Sample Rate Converter		
DVS	Dual voltage supply	GPU	Graphics processing unit	PAD	PWM with analogue diagnostic function	SVS	Single voltage supply		

PACKAGE DIMENSIONS

Pincount	Code	Type	Body Size [mm²]	Pin Pitch [mm]
20	PLSP0020JC-A	SOP	6.1 x 6.65	0.65
	PLSP0020JC-B		6.1 x 6.5	
30	PLSP0030JB-A	SOP	6.1 x 9.7	0.65
	PLSP0030JB-B		6.1 x 9.85	
32	PVQN0032KD-A	QFN	5 x 5	0.5
	PWQN0032KB-A			
48	PLQP0048KF-A	QFP	7 x 7	0.5
	PLQP0048KF-B			
	PLQP0048KG-A			
	PVQN0048KG-A	QFN		
64	PLQP0064KB-A	QFP	10 x 10	0.5
	PLQP0064KF-A			
80	PLQP0080KE-A	QFP	12 x 12	0.5
	PLQP0080KE-B			
100	PLQP0100KB-A	QFP	14 x 14	0.5
	PLQP0100KE-A			
	PLQP0100LA-A		12 x 12	0.4
128	PLQP0128KD-A	LFQFP	14 x 20	0.5

Pincount	Code	Type	Body Size [mm²]	Pin Pitch [mm]
144	PLQP0144KA-A	QFP	20 x 20	0.5
	PLQP0144KD-E			
	PLQP0144LA-A		16 x 16	0.4
	PLQP0144LB-A			
	PLQFP0144KF-A	LFQFP	20 x 20	0.5
156	PLBG0156JB-A	BGA	10 x 10	0.65
176	PLQP0176KB-A	QFP	24 x 24	0.5
233	PLBG0233GC-A	BGA	15 x 15	0.8
	PRBG0233GA-A			
272	PRBG0272FA-A	BGA	21 x 21	1
	PRBG0272GB-A		17 x 17	0.8
292	PRBG0292GC-A	BGA	17 x 17	0.8
324	PRBG0324GA-A	BGA	19 x 19	0.8
373	PLBG0373GB-A	BGA	21 x 21	0.9
376	PRBG0376FB-A	BGA	23 x 23	1
404	PRBG0404GA-A	BGA	19 x 19	0.8
468	PRBG0468GD-A	BGA	25 x 25	0.8
484	PRBG0484FF-A	BGA	27 x 27	1
516	PRBG0516GC-A	BGA	25 x 25	0.8

TOOLS

SOFTWARE TOOLS

IAR Embedded Workbench (RL78 & RH850)

- Integrated development environment for C/C++
- Package includes project manager, editor, compiler, assembler, linker, simulator and C-Spy debugger
- Supports ELF/DWARF debugging format
- Different license options: locked to PC, dongled (USB), floating
- Order code depends on target platform and license type
- For more information visit www.iar.com

Green Hills Multi (RH850)

- Integrated development environment for C/C++
- Package includes project manager, editor, compiler, assembler, linker, simulator and debugger
- Supports ELF/DWARF debugging format
- Different license options: locked to PC, dongled (USB), floating
- Order code depends on target platform and license type
- For more information visit www.ghs.com

AP4, Applilet3, SmartConfigurator (RL78 & RH850)

- Peripheral driver code generator for RL78 & RH850 devices
- Based on graphical user interface settings the peripheral driver initialization and API function code will be generated
- Available for free at www.renesas.com/ap4
- SmartConfigurator: www.renesas.com/software-tool/smart-configurator

Wind River Diab Compiler (RH850)

- Integrated development environment for C
- Package includes project manager, editor, compiler, assembler, linker and simulator
- Supports ELF/DWARF debugging format
- Different license options: locked to PC, dongled (USB), floating
- For more information visit www.windriver.com

Renesas CS+ (RL78 & RH850)

- Integrated development environment for C Package includeds project manager, editor, compiler, assembler, linker simulator and debugger
- Supports ELF/DARF debugging format
- Different License Options: node locked, floating
- Different License Types: permanet
- For more information visit www.renesas.com/cs+

Renesas e² studio (RL78 & RH850)

- Integrated development environment based on Eclipse platform
- Support IAR compiler, GHS RH850 compiler and Renesas CC-RL compiler
- Supports ELF/DARF debugging format
- For more information visit www.renesas.com/e2studio

SOFTWARE

Renesas Graphic Library (RGL)

- For RH850/D1x
- Driver stack for all graphic related macros
- Simple interface for graphics programming
- Production quality code
- Easy to integrate into no-OS and RTOS environment
- Example programs for the best possible out of the box experience
- Contact you Renesas Sale representant for more information

Autosar MCAL

- Standard Peripheral Abstraction Layer (SPAL) drivers, communication drivers and test drivers
- AUTOSAR AR4.X based MCAL for RH850
- Worldwide support infrastructure with interface for 1st and 2nd level support in Europe
- Cooperation with various BSW/OS vendors and integrators
- Flexible mass-production licenses
- Free-of-charge development licenses for limited prototypes

Renesas is working closely with multiple partners in order to extend the software offer and support customer requirements.
A complete list of SW solutions, and its contact can be found under:
www.renesas.com/us/en/software-tool/renesas-graphics-library-rgl#overview
www.renesas.com/us/en/software-tool/renesas-mcal

OCD-EMULATOR

E2 On-Chip Debugging Emulator (RL78 & RH850)

- On-Chip Debugging Emulator for all RL78 and RH850 devices
- Supports fast in-circuit flash programming (Download speed 2 times faster than E1)
- Supports various Target Interfaces
  - » LPD (Low Pin Debug) for RH850
  - » Single-pin for RL78
- Supports power supply to target
  - » 3.3V ... 5V (max. 200mA)
- Supports hot plug-in function (including connector)
- Package includes USB interface cable and 14-pin target cable
- Order code: RTE0T00020KCE00000R

E2 Lite On-Chip Debugging Emulator

- On-Chip Debugging Emulator for all RL78 devices
- Supports single-pin target interface for RL78
- Support 3.3V (max. 200mA) power supply to target
- Package includes USB interface cable and 14-pin target cable
- Order code: RTE0T0002LKCE00000R

IN-CIRCUIT EMULATION

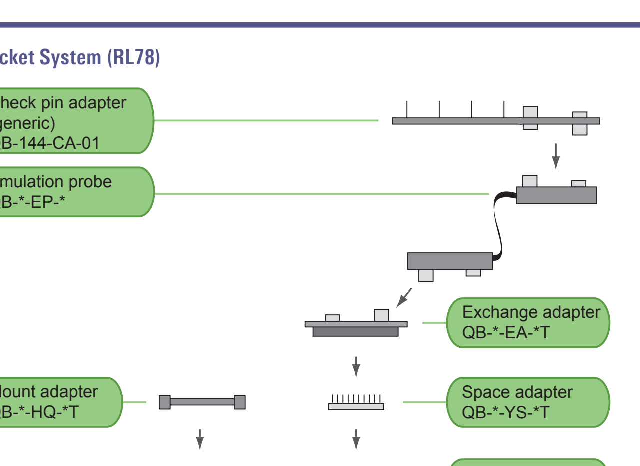
IECUBE In-Circuit Emulator (RL78)

- For RL78 devices
- Package includes
  - » USB cable
- Order codes: QB-RL78F12-ZZZ (RL78/F12)
  QB-RL78F14-ZZZ (RL78/F13 & RL78/F14)
  QB-RL78F15-ZZZ (RL78/F15)
  QB-RL78D1A-ZZZ (RL78/D1A)
  QB-RL78D1A2-ZZZ (RL78/D1A, 512 KB version)

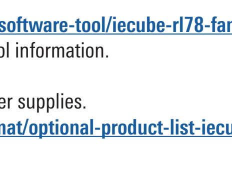
Please visit www.renesas.com/eu/en/software-tool/iecube-rl78-family for socket references and additional tool information.

Please refer the following URL for power supplies.
www.renesas.com/us/en/document/mat/optional-product-list-iecube-rl78-family

Socket System (RL78)



IE850 In-Circuit Emulator (RH850)



- For RH850/D1x devices
- Universal main unit, device dependent emulation probe
- Package includes
  - » USB cable
- Order codes:
  QB-V850E2 (main unit)
  RTE7701460EPA00000R
  (Emulation Probe for RH850/D1M2H, RH850/D1M2, RH850/D1M1A, RH850/D1M1-V2, RH850/D1L2H, RH850/D1L2, RH850/D1L1 and RH850/D1S1

Please visit
www.renesas.com/eu/en/software-tool/ie850
for socket references and additional tool information.

Please refer the following URL for power supplies.
www.renesas.com/us/en/software-tool/ie850#ac

IE850A Emulator featuring AURORA Trace (RH850/E2x, RH850/U2Ax, RH850/U2Bx)

- For RH850/E2x, RH850/U2Ax, RH850/U2Bx devices
- The IE850A emulator features 9 GB of memory for storing histories of program execution, enabling the saving and checking of histories of program execution over longer periods. and is equipped with a rich variety of debugging functions, such as events, tracing, and time measurement.
- Order codes: RTE0T0850AKCT00000J (IE850A Emulator main unit)

Please visit www.renesas.com/eu/en/products/software-tools/tools/emulator/ie850a.html for additional tool information.

3RD PARTY EMULATORS

iSYSTEM

- Universal emulator and debugger system:
  - » On-chip debugging for RL78 and RH850
  - » In-Circuit Emulation of RL78
  - » On-Chip and Off-Chip Trace (Parallel and AURORA) for RH850
  - » Support for common compiler platforms
  - » Software API for 3rd party tools and test automation
- For more information visit www.isystem.com

Lauterbach

- Universal debugger system TRACE32®
  - » On-chip debugging for RL78 and RH850
  - » On-Chip and Off-Chip Trace (Parallel and AURORA) for RH850
  - » Support for common compiler platforms
  - » Software API for 3rd party tools and test automation
- For more information visit www.lauterbach.com

PLS

- Universal Debug Engine for debugging, trace and testing:
  - » UAD2pro, UADnext, UAD3+ support for RH850
  - » Support for common compiler platforms
  - » Software API for 3rd party tools and test automation
- For more information visit www.pls-mc.com

FLASH PROGRAMMERS

Flash Programmer PG-FP6

- Supports RL78 and RH850 flash microcontrollers
- For development, prototyping and mass production
- Windows™ and terminal interface
- Host-controlled and stand-alone operation
- 256 MB internal memory for up to 8 program codes incl. setup data
- USB2.0 and RS-232 interface
- Order code: RTE0T00001FWREA000R

Renesas Flash Programming Software (RFP)

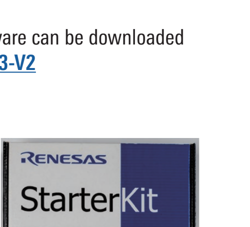
- Supports RL78 and RH850 flash microcontrollers
- For development and prototyping
- Works with E2 OCD Emulator (RH850 and RL78), E2 Lite OCD Emulator (only RL78), and direct PC COM-port connection
- Graphical user interface
- Ability to save programming settings in workspace files
- Support for automated programming using scripts
- Support of multiple host OS: Windows™, Linux, macOS™
- Available for free at www.renesas.com/rfp

STARTER KITS

RL78/F12 Starter Kit

- Equipped with
  - » 48-pin RL78/F12 device (R5F109GE)
  - » LIN interface
  - » One switch, two LEDs
  - » Breadboard area (2.54 mm pin pitch)
  - » 20 MHz main clock resonator
  - » 14-pin debugging and programming interface
- Package includes
  - » E2 Lite On-Chip Debugging Emulator
  - » RL78/F12 target board
  - » Evaluation versions of the tools and sample software can be downloaded from website www.renesas.com/Y-ASK-RL78F12-V2
- Order code: Y-ASK-RL78F12-V2

RL78/F13 Starter Kit



- Equipped with
  - » 80-pin device (R5F10BMG)
  - » CAN & LIN interface
  - » One switch, two LEDs
  - » Breadboard area (2.54 mm pin pitch)
  - » 4 MHz main clock resonator
  - » 14-pin debugging and programming interface
- Package includes
  - » E2 Lite On-Chip Debugging Emulator
  - » RL78/F13 target board
  - » Evaluation versions of the tools and sample software can be downloaded from website www.renesas.com/Y-ASK-RL78F13-V2
- Order code: Y-ASK-RL78F13-V2

RL78/F14 Starter Kit

- Equipped with
  - » 100-pin device (R5F10PPJ)
  - » CAN & LIN interface
  - » One switch, two LEDs
  - » Breadboard area (2.54 mm pin pitch)
  - » 4 MHz main clock resonator
  - » 14-pin debugging and programming interface
- Package includes
  - » E2 Lite On-Chip Debugging Emulator
  - » RL78/F14 target board
  - » Evaluation versions of the tools and sample software can be downloaded from website www.renesas.com/Y-ASK-RL78F14-V2
- Order code: Y-ASK-RL78F14-V2

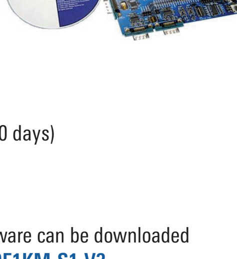
RL78/F15 Starter Kit

- Equipped with
  - » 144-pin RL78/F15 (R5F113TL) device
  - » 14-pin debug and flash programming interface
  - » CAN + LIN interface
  - » 4 MHz main clock resonator
  - » One switch, two LEDs
  - » Universal breadboard area (2.54 mm pitch)
- Package includes
  - » E2 Lite On-Chip Debugging Emulator
  - » RL78/F15 target board
  - » Evaluation versions of the tools and sample software can be downloaded from website www.renesas.com/Y-ASK-RL78F15-V2
- Order code: Y-ASK-RL78F15-V2

RL78/F24 Starter Kit

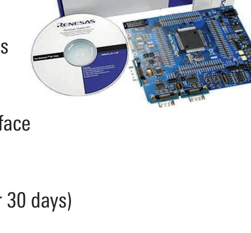
- Equipped with
  - » 100-pin device (R7F124FPJ)
  - » CAN & LIN interface
  - » One switch, two LEDs
  - » Breadboard area (2.54 mm pin pitch)
  - » 4 MHz main clock resonator
  - » 14-pin debugging and programming interface
- Package includes
  - » E2 Lite On-Chip Debugging Emulator
  - » RL78/F24 target board
  - » Evaluation versions of the tools and sample software can be downloaded from website: www.renesas.com/Y-ASK-RL78F24
- Order code: Y-ASK-RL78F24

RH850/F1KM-S1 Starter Kit



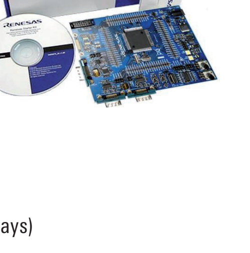
- Equipped with
  - » 100-pin RH850/F1KM-S1 device (R7F701684)
  - » 2 CAN-FD, LIN, UART/RS232 interface
  - » rotary switch with LEDs and push button
  - » potentiometer for analogue measurements
  - » pin headers for direct access to all microcontroller I/O pins
  - » 14-pin debugging and programming interface
- Package includes
  - » GHS MULTI evaluation license (90 days)
  - » IAR EWRH850 Kickstart license (128KB or 30 days)
  - » Renesas CS+ evaluation license (60 days)
  - » E1 On-Chip debugging Emulator
- Order code: Y-ASK-RH850F1KM-S1-V3
- Evaluation versions of the tools and sample software can be downloaded from website: www.renesas.com/Y-ASK-RH850F1KM-S1-V3

RH850/F1K Starter Kit



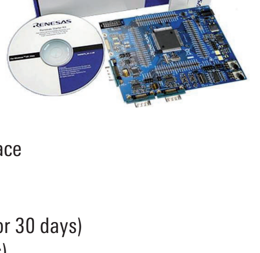
- Equipped with
  - » 176-pin RH850/F1K PREMIUM device (R7F701587)
  - » 2 CAN-FD, LIN, UART/RS232 interface
  - » rotary switch with LEDs and push button
  - » potentiometer for analogue measurements
  - » pin headers for direct access to all microcontroller I/O pins
  - » 14-pin debugging and programming interface
- Package includes
  - » GHS MULTI evaluation license (90 days)
  - » IAR EWRH850 Kickstart license (128KB or 30 days)
  - » Renesas CS+ evaluation license (60 days)
  - » E1 On-Chip debugging Emulator
- Order code: Y-ASK-RH850F1K-V3
- Evaluation versions of the tools and sample software can be downloaded from website: www.renesas.com/Y-ASK-RH850F1K-V3

RH850/F1KM-S4 Starter Kit



- Equipped with
  - » 176-pin RH850/F1KM-S4 device (R7F701649)
  - » Ethernet, FlexRay, 2 CAN-FD, LIN, UART/RS232 interface
  - » rotary switch with LEDs and push button
  - » potentiometer for analogue measurements
  - » pin headers for direct access to all microcontroller I/O pins
  - » 14-pin debugging and programming interface
- Package includes
  - » GHS MULTI evaluation license (90 days)
  - » IAR EWRH850 Kickstart license (128KB or 30 days)
  - » Renesas CS+ evaluation license (60 days)
  - » E1 On-Chip debugging Emulator
- Order code: Y-ASK-RH850F1KM-S4-V3
- Evaluation versions of the tools and sample software can be downloaded from website: www.renesas.com/Y-ASK-RH850F1KM-S4-V3

RH850/F1KH-D8 Starter Kit



- Equipped with
  - » 176-pin RH850/F1KH-D8 device (R7F701609)
  - » Ethernet, FlexRay, 2 CAN-FD, LIN, UART/RS232 interface
  - » rotary switch with LEDs and push button
  - » potentiometer for analogue measurements
  - » pin headers for direct access to all microcontroller I/O pins
  - » 14-pin debugging and programming interface
- Package includes
  - » GHS MULTI evaluation license (90 days)
  - » IAR EWRH850 Kickstart license (128KB or 30 days)
  - » Renesas CS+ evaluation license (60 days)
  - » E1 On-Chip debugging Emulator
- Order code: Y-ASK-RH850F1KH-D8-V3
- Evaluation versions of the tools and sample software can be downloaded from website: www.renesas.com/Y-ASK-RH850F1KH-D8-V3

RH850/F1KM-S1 BLDC Starter Kit

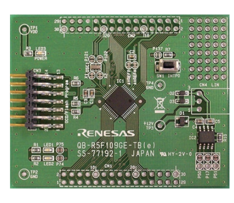
- Equipped with
  - » 100-pin RH850/F1KM-S1 device (R7F701684)
  - » 2 CAN-FD, LIN, UART/RS232 interface
  - » rotary switch with LEDs and push button
  - » potentiometer for analogue measurements
  - » pin headers for direct access to all microcontroller I/O pins
  - » 14-pin debugging and programming interface
- Package includes
  - » GHS MULTI evaluation license (90 days)
  - » IAR EWRH850 Kickstart license (128KB or 30 days)
  - » Renesas CS+ evaluation license (60 days)
  - » E1 On-Chip debugging Emulator
  - » IPS Sensor
- Order code: Y-BLDC-SK-RH850F1KM-S1-V2
- Evaluation versions of the tools and sample software can be downloaded from website: www.renesas.com/Y-BLDC-SK-RH850F1KM-S1-V2

RH850/C1M-A2 Starter Kit

- Equipped with
  - » RH850/C1M-A2 device
  - » 2 CAN-FD, 1 LIN/SENT, 1 USB/UART interface
  - » rotary switch with LEDs and push button
- Motor Control Features
  - » Access to R/D (resolver-to-digital converter)
  - » Output for motor control signals
  - » Inputs for resolver signals for motor control
- Package includes
  - » GHS MULTI evaluation license (90 days)
  - » IAR EWRH850 Kickstart license (128KB or 30 days)
  - » Renesas CS+ evaluation license (60 days)
  - » E1 On-Chip debugging Emulator
  - » sample code software
- Order Code: Y-ASK-RH850C1M-A2
- Evaluation versions of the tools and sample software can be downloaded from website: www.renesas.com/Y-ASK-RH850C1M-A2

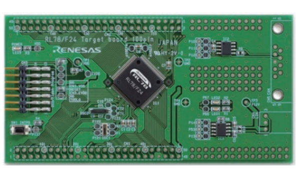
EVALUATION BOARDS

RL78/F1x Target Boards



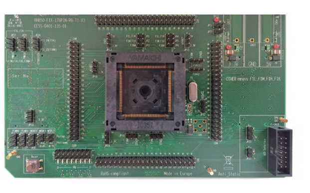
- For RL78/F1x evaluation
- Equipped with
  - » RL78/F12, RL78/F13,RL78/F14 or RL78/F15
  - » 14-pin debugging and programming interface
  - » CAN & LIN interface
  - » 4 or 20 MHz main clock resonator
  - » switch, 2 LEDs
  - » breadboard area (2.54 mm pitch)
- Board dimensions: approx. 109 mm x 56 mm
- Order codes: QB-R5F109GE-TB (RL78/F12)
  QB-R5F10BMG-TB (RL78/F13)
  QB-R5F10PPJ-TB (RL78/F14)
  Y-QB-R5F113TL-TB-V2 (RL78/F15)

RL78/F2x Target Boards



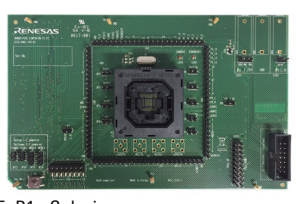
- For RL78/F2x evaluation
- Equipped with
  - » RL78/F24
  - » 14-pin debugging and programming interface
  - » CAN & LIN interface
  - » 4 or 20 MHz main clock resonator
  - » switch, 2 LEDs
  - » breadboard area (2.54 mm pitch)
- Board dimensions: approx. 109 mm x 56 mm
- Order codes: RTK7F124FPC01000BJ (RL78/F24)

RH850 Evaluation Platform – F1Kx Adapter Boards



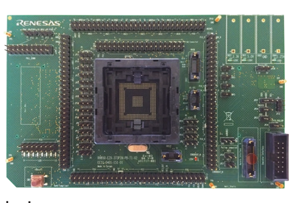
- For RH850/F1K and F1Kx evaluation
- To be used in combination with the RH850 Evaluation Platform main boards or stand-alone operation
- Equipped with
  - » Burn-in socket to adapt RH850/F1Kx devices
  - » pin headers for direct access to all microcontroller I/O pins
  - » 8 Signal LEDs
  - » Reset circuit, Oscillator circuit
  - » 14-pin debug and flash programming connector
- Board dimensions: 160 mm x 100 mm
- Package includes CD with user's manual and schematic
- Order codes:
  Y-RH850-F1X-048PIN-PB-T1-V1 (RH850/F1KM-S1, 48 pin)
  Y-RH850-F1X-064PIN-PB-T1-V1 (RH850/F1KM-S1, 64-pin)
  Y-RH850-F1X-080PIN-PB-T1-V1 (RH850/F1KM-S1, 80-pin)
  Y-RH850-F1X-100PIN-PB-T1-V3 (RH850/F1K, F1KM-S1/-S4, 100-pin)
  Y-RH850-F1X-144PIN-PB-T1-V3 (RH850/F1K, F1KM-S4, 144-pin)
  Y-RH850-F1X-176PIN-PB-T1-V4 (RH850/F1K, F1KM-S4, F1KH-D8 176-pin)
  Y-RH850-F1X-233PIN-PB-T2-V1 (RH850/F1KM-S4, F1KH-D8, 233-pin)
  Y-RH850-F1X-324PIN-PB-T1-V1 (RH850/F1KH-D8, 324-pin)

RH850 Evaluation Platform - P1M-E, P1x-C Adapter Boards



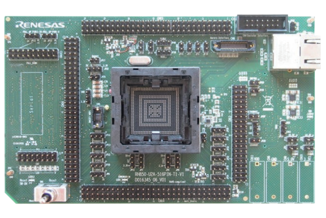
- For RH850/P1M-E and P1x-C evaluation
- To be used in combination with the RH850 Evaluation Platform main boards or stand-alone operation
- Equipped with
  - » Burn-in socket to adapt RH850/P1M-E, P1x-C devices
  - » pin headers for direct access to all microcontroller I/O pins
  - » 8 Signal LEDs
  - » Reset circuit, Oscillator circuit
  - » 14-pin debug and flash programming connector
- Board dimensions: 160 mm x 100 mm
- Package includes CD with user's manual and schematic
- Order codes:
  Y-RH850-P1X-100PIN-PB-T1-V2 (RH850/P1M-E, 100-pin, 0.5 mm p. p.)
  Y-RH850-P1X-144PIN-PB-T1-V2 (RH850/P1M-E, 144-pin, 0.4 mm p. p.)
  Y-RH850-P1XC-080PIN-PB-T1-V1 (RH850/P1x-C, 80-pin, 0.4 mm p. p.)
  Y-RH850-P1XC-100PIN-PB-T1-V1 (RH850/P1x-C, 100-pin, 0.4 mm p. p.)
  Y-RH850-P1XC-144PIN-PB-T1-V1 (RH850/P1x-C, 144-pin, 0.4 mm p. p.)
  Y-RH850-P1XC-156PIN-PB-T1-V1 (RH850/P1x-C, 156-pin)
  Y-RH850-P1XC-292PIN-PB-T1-V2 (RH850/P1x-C, 292-pin)
  Y-RH850-P1XC-404PIN-PB-T1-V2 (RH850/P1x-C Emulation Device supporting AURORA Trace)

RH850 Evaluation Platform - E2x Adapter Boards



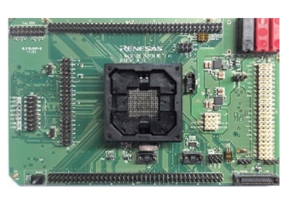
- For RH850/E2x evaluation
- To be used in combination with the RH850 Evaluation Platform or stand-alone operation
- Equipped with
  - » Burn-in socket to adapt RH850/E2x devices
  - » pin headers for direct access to all microcontroller I/O pins
  - » 8 Signal LEDs
  - » Reset circuit, Oscillator circuit
  - » 14-pin debug and flash programming connector
- Board dimensions: 160 mm x 100 mm
- Package includes CD with user's manual and schematic
- Order codes:
  Y-RH850-E2X-292PIN-PB-T1-V2 (RH850/E2M, 292-pin)
  Y-RH850-E2X-373PIN-PB-T1-V3 (RH850/E2M, E2H, E2UH, 373-pin)
  Y-RH850-E2X-468PIN-PB-T1-V1 (RH850/E2H, E2UH, 468-pin)

RH850 Evaluation Platform - U2A Adapter Boards



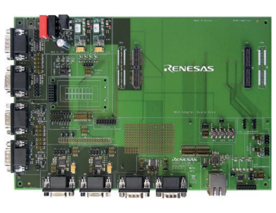
- For RH850/U2A evaluation
- To be used in combination with the RH850 Evaluation Platform or stand-alone operation
- Equipped with
  - » Burn-in socket to adapt RH850/U2A devices
  - » pin headers for direct access to all microcontroller I/O pins
  - » 8 Signal LEDs
  - » Reset circuit, Oscillator circuit
  - » Gigabit Ethernet interface
  - » 14-pin debug and flash programming connector
- Board dimensions: 160 mm x 100 mm
- Package includes CD with user's manual and schematic
- Order codes:
  Y-RH850-U2A-144PIN-PB-T1-V1 (RH850/U2A6, 144-pin)
  Y-RH850-U2A-156PIN-PB-T1-V1 (RH850/U2A6, 156-pin)
  Y-RH850-U2A-176PIN-PB-T1-V1 (RH850/U2A6, 176-pin)
  Y-RH850-U2A-292PIN-PB-T1-V2 (RH850/U2A6, RH850/U2A8, RH850/U2A16, 292-pin)
  Y-RH850-U2A-373PIN-PB-T1-V1 (RH850/U2A8, RH850/U2A16, 373-pin)
  Y-RH850-U2A-516PIN-PB-T1-V1 (RH850/U2A16, RH850/U2A-EVA, 516-pin)

RH850 Evaluation Platform - U2B Adapter Boards



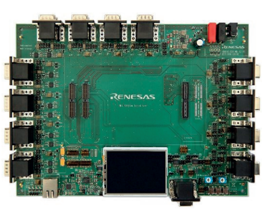
- For RH850/U2B evaluation
- To be used in combination with the RH850 Evaluation Platform or stand-alone operation
- Equipped with
  - » Burn-in socket to adapt RH850/U2B devices
  - » pin headers for direct access to all microcontroller I/O pins
  - » 8 Signal LEDs
  - » Reset circuit, Oscillator circuit
  - » RHSIF, RHSB, and MSPI onboard interface connectors
  - » 46-pin Aurora Debug Connector (46-pin to 14-pin adapter included)
- Board dimensions: 160 mm x 100 mm
- Package includes CD with user's manual and schematic
- Order codes: Y-RH850-U2B-292PIN-PB-T1-V1 (RH850/U2B6, 292-pin)

RH850/x1x Evaluation Platform Main Board - Type 1



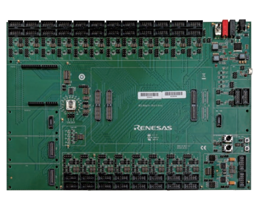
- For RH850 evaluation
- To be used in combination with MCU-specific Adapter Boards
- Equipped with
  - » various interfaces/connectors:
    – 2 CAN, 2 LIN,
    – FlexRay (2 channels)
    – Ethernet
    – 2 UART/RS232, 2 SENT, 2 PSI5
  - » 4 Signal LEDs (active high), 3 push buttons, 3 analogue inputs
  - » LCD Module, breadboard area
- Board dimensions: 260 mm x 174 mm
- Package includes CD with user's manual and schematic
- Order code: Y-RH850-X1X-MB-T1-V1

RH850/x1x Evaluation Platform Main Board - Type 2



- For RH850 evaluation
- To be used in combination with MCU-specific Adapter Boards
- Equipped with
  - » various interfaces/connectors:
    – 8 CAN-FD, 16 LIN,
    – FlexRay (2 channels)
    – Ethernet (selectable for either for BroadR-Rreach or RJ45)
    – 2 UART/RS232
  - » 4 Signal LEDs (active high), 3 push buttons, 2 analogue inputs
  - » 2.8" TFT touch display, breadboard area
- Board dimensions: 272 mm x 206 mm
- Package includes CD with user's manual and schematic
- Order codes:
  Y-RH850-X1X-MB-T2-V1
  Y-RH850-TFT-EXT-BRD (optional TFT Display)

RH850/x2x Evaluation Platform Main Board



- For RH850 evaluation
- To be used in combination with MCU-specific Adapter Boards
- Equipped with
  - » various interfaces/connectors:
    – 16 CAN-FD, 24 LIN,
    – FlexRay (2 channels)
    – Ethernet (2 channels)
    – SENT (2 channels)
    – 2 UART/RS232
  - » 20 Signal LEDs (active high), 2 push buttons, 2 analogue inputs
  - » Interface connector for 2.8" TFT touch display
- Board dimensions: 324 mm x 222 mm
- Package includes CD with user's manual and schematic
- Order codes:
  Y-RH850-X2X-MB-T1-V1
  Y-RH850-TFT-EXT-BRD (optional TFT Display)

Download this Product Scout at
https://www.renesas.com/document/bro/product-scout-automotive?language=en&r=169766

SYSTEM ON CHIP

Series	Nickname/ Group	Part number	Core	FPU	Clock Speed [MHz]	GPU	GPU Clock Speed [MHz]	DDR-Interface	Flash Interface	Video Output	Video Input	External bus	High Speed Interface	CAN/CAN FD	Ethernet 100 MBit/1 GBIT	USB	MLB	SPI	UART	I²C	Pins	Packages	Tj, max [°C]	Other features
R-Car Gen3e	R-Car H3e	R8A779M0	4x Cortex A57 4x Cortex A53 Cortex R7	✓	1700 1200 800	PowerVR - GX6650 D/AVE-HD	600	4x 32-bit LPDDR4-3200	Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO	Digital Out LVDS 2x HDMI	2x Digital 3x MIPI-CSI2	✓	2x PCIe SATA	2/2	-/1	3.0 4x 2.0	3-pin MOST50	4	11	7	1384	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car H3e-2G	R8A779M1	4x Cortex A57 4x Cortex A53 Cortex R7	✓	2000 1200 800	PowerVR - GX6650 D/AVE-HD	600	4x 32-bit LPDDR4-3200	Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO	Digital Out LVDS 2x HDMI	2x Digital 3x MIPI-CSI2	✓	2x PCIe SATA	2/2	-/1	3.0 4x 2.0	3-pin MOST50	4	11	7	1384	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car H3Ne	R8A779M8	4x Cortex A57 4x Cortex A53 Cortex R7	✓	1500 1200 800	PowerVR - GX6650 D/AVE-HD	600 266	2x 32-bit LPDDR4-3200	Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO	Digital Out LVDS HDMI	2x Digital 2x MIPI-CSI2	✓	2x PCIe SATA	2/2	-/1	3.0 2x 2.0	3-pin MOST50	4	11	7	1022	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car H3e-2G	R8A779M1	4x Cortex A57 4x Cortex A53 Cortex R7	✓	2000 1200 800	PowerVR - GX6650 D/AVE-HD	600	4x 32-bit LPDDR4-3200	Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO	Digital Out LVDS 2x HDMI	2x Digital 3x MIPI-CSI2	✓	2x PCIe SATA	2/2	-/1	3.0 4x 2.0	3-pin MOST50	4	11	7	1384	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car M3e	R8A779M2	2x Cortex A57 4x Cortex A53 Cortex R7	✓	1800 1300 800	PowerVR - GX6250 D/AVE-HD	700 266	2x 32-bit LPDDR4-3200	Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO	Digital Out LVDS HDMI	2x Digital 2x MIPI-CSI2	✓	2x PCIe	2/2	-/1	3.0 2x 2.0	3-pin MOST50	4	11	7	1022	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car M3e-2G	R8A779M3	4x Cortex A57 4x Cortex A53 Cortex R7	✓	2000 1300 800	PowerVR - GX6250 D/AVE-HD	700 266	2x 32-bit LPDDR4-3200	Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO	Digital Out LVDS HDMI	2x Digital 2x MIPI-CSI2	✓	2x PCIe	2/2	-/1	3.0 2x 2.0	3-pin MOST50	4	11	7	1022	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car M3Ne	R8A779M4	2x Cortex A57 Cortex R7	✓	1800 800	PowerVR - GE7800 D/AVE-HD	700 400	1x 32-bit LPDDR4-3200	Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO	Digital Out LVDS HDMI	2x Digital 2x MIPI-CSI2	✓	2x PCIe SATA	2/2	-/1	3.0 2x 2.0	3-pin MOST50	4	11	7	1022	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car M3Ne-2G	R8A779M5	2x Cortex A57 Cortex R7	✓	2000 800	PowerVR - GE7800 D/AVE-HD	700 400	1x 32-bit LPDDR4-3200	Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO	Digital Out LVDS HDMI	2x Digital 2x MIPI-CSI2	✓	2x PCIe SATA	2/2	-/1	3.0 2x 2.0	3-pin MOST50	4	11	7	1022	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car E3e	R8A779M6	2x Cortex A53 Cortex R7	✓	1200 800	PowerVR - GE8300 D/AVE-HD	600 400	2x 16-bit DDR3(L)-1866	Parallel Serial Flash Raw NAND 1x eMMC 3x SDIO	Dig. Out / LVDS LVDS	2x Digital MIPI-CSI2	✓	PCIe	2/2	-/1	3.0 2x 2.0	3-pin MOST50	4	11	8	552	BGA	125	Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs
	R-Car D3e	R8A779M7	1x Cortex A53	✓	1000	PowerVR - GE8300 D/AVE-HD	600 400	1x 16-bit DDR3(L)-1866	Raw NAND Serial Flash 1x eMMC	Dig. Out / LVDS LVDS	1x Digital	–	–	2/2	-/1	2.0	3-pin MOST50	4	8	4	401	BGA	125	Security, Safety, Image Processor, Timers, WDT, PWMs

Series	Nickname/ Group	Part number	CPU system	Clock Speed [MHz]	SRAM [MB]	Memory I/F	High Speed Interface	CAN FD	Ethernet 100 Mbit/2.5 Gbit	FlexRay	LIN	UART	I²C	ASIL level	Package	Other features
R-Car Gen4	R-Car S4-8	R8A779F4	8x Cortex A55 1x Cortex R52 2x RH850 G4MH	1200 1000 400	8	LPDDR4x-3200 (ECC corrected) 32bit (=> 12.8 GB/s) 2x QSPI 1x Hyperflash Serial NOR Flash I/F (OCTAL FLASH) eMMC 5.01	2x PCIe V4.0 (2 lanes)	16	1 AVB/3x Gbit TSN + swit	1	16	4	7	D	FCBGA 780 0.8mm pitch	HSM, crypto core Communication IP H/W acceleration Enhanced power management features LV PMIC RAA271005 HV PMIC RAA271041 Timing IC RC21212 JTAG debug I/F
	R-Car S4N-8	R8A779F5	8x Cortex A55 1x Cortex R52 2x RH850 G4MH	1200 1000 400	8	LPDDR4x-3200 (ECC corrected) 32bit (=> 12.8 GB/s) 2x QSPI 1x Hyperflash Serial NOR Flash I/F (OCTAL FLASH) eMMC 5.01	2x PCIe V4.0 (2 lanes)	16	1 AVB/3x Gbit TSN + swit	–	16	4	5	D	FCBGA 780 0.65mm pitch	HSM, crypto core Communication IP H/W acceleration Enhanced power management features LV PMIC RAA271006 HV PMIC RAA271041 Timing IC RC21212 JTAG debug I/F
	R-Car S4-4	R8A779F6	4x Cortex A55 1x Cortex R52 2x RH850 G4MH	1200 1000 400	8	LPDDR4x-3200 (ECC corrected) 32bit (=> 12.8 GB/s) 2x QSPI 1x Hyperflash Serial NOR Flash I/F (OCTAL FLASH) eMMC 5.01	2x PCIe V4.0 (2 lanes)	16	1 AVB/3x Gbit TSN + swit	–	16	4	5	D	FCBGA 780 0.8mm pitch	HSM, crypto core Communication IP H/W acceleration Enhanced power management features LV PMIC RAA271005 HV PMIC RAA271041 Timing IC RC21212 JTAG debug I/F
	R-Car S4N-4	R8A779F7	4x Cortex A55 1x Cortex R52 2x RH850 G4MH	1200 1000 400	8	LPDDR4x-3200 (ECC corrected) 32bit (=> 12.8 GB/s) 2x QSPI 1x Hyperflash Serial NOR Flash I/F (OCTAL FLASH) eMMC 5.01	2x PCIe V4.0 (2 lanes)	16	1 AVB/3x Gbit TSN + swit	–	16	4	5	D	FCBGA 780 0.65mm pitch	HSM, crypto core Communication IP H/W acceleration Enhanced power management features LV PMIC RAA271006 HV PMIC RAA271041 Timing IC RC21212 JTAG debug I/F

Series	Nickname	Part number	Real Time Core Freq / KDMIPS	Application Core	GPU / Frequency	Computer Vision / Frequency	Deep Learning (TOPS)	Other Accel.	Video Codec	Audio Codec	DDR Interface	Flash Interface	Video Input	Video Output	High Speed Interface	Auto I/F	Ethernet 100MBit/1GBit	ASIL	Pins / Package	Other Features
R-Car V3x	R-Car V3M	R8A77970	CR7 Lockstep 800MHz /2kDMIPS	2x CA53 800MHz/ 3,6k DMIPS	No	2CVe / 400MHz	0,3 TOPs	1x ISP, 4x IMR	H264 Enc	No	32bit DDR3L-1600	2x QSPI	1x MIPI-CSI2 (4L) 2x Digital Vin TTL	1x DU 1x LVDS (OpenLDI) 1x Digital Vout TTL	No	2x CAN 2.0B/FD, FlexRay	1x Gbit AVB	Up to ASIL B	FCBGA 0.8mm 419 balls	4x UART 4x SPI 5x I²C Security JTAG
	R-Car V3H	R8A77980A	CR7 Lockstep 800MHz/2k DMIPS	4x CA53 1GHz/9,2k DMIPS	No	5CVe / 533MHz	3,7 TOPS	2x ISP, 5x IMR, 1x DOF, 1x STV, 5x ACF	H264 Enc	No	32bit LPDDR4-3200	2x QSPI 1x eMMC	2x MIPI-CSI2 (4L) 2x Digital Vin TTL	1x DU 1x LVDS (OpenLDI) 1x Digital Vout TTL	1x PCIe 2.0	3x CAN 2.0B/FD, FlexRay	1x Gbit AVB 1x Gbit Std port	Up to ASIL C	FCBGA 0.8mm 538 balls	4x UART 6x SPI 7x I²C Security JTAG
	Evaluation versions of the tools and sample software can be downloaded from website: www.renesas.com/Y-ASK-RH850F1KM-S4-V3																			

Series	Nickname	Part number	Real Time Core Freq / KDMIPS	Application Core	GPU / Frequency	Computer Vision / Frequency	Deep Learning (TOPS)	Other Accel.	Video Codec	Audio Codec	DDR Interface	Flash Interface	Video Input	Video Output	Hight Speed Interface	Auto I/F	Ethernet 100MBit/1GBit	ASIL	Pins / Package	Other Features
R-Car V4x	R-Car V4H	R8A779G0LA01BA	3x CR52 Lockstep 1,4GHz	4x CA76 1,8GHz	AXM-8256 600MHz	4x Computer Vision Engine	34 TOPS	2x ISP, 5x IMR, 1x SMD, 1x DOF, 4x DSP	H.264 Enc./ H.264 Codec	No	64-bit LPDDR5-6400 LPDDR4-4266	2x QSPI 1x eMMC	2x MIPI-CSI2	2x DU 2x MIPI CSI2/ DSI-output	2x PCIe 4.0	8x CAN 2,0/FD, Flexray	3xGBit AVB, 1xGbit TSN	Up to ASIL -D	FCBGA 1135 pins 0.65mm pitch 25x25mm	4x UART 6x SPI 7x I²C I2S Security JTAG
	R-Car V4M	R8A779H1LL31BA	3x CR52 Lockstep 1,4GHz	4x CA76 1 GHz	BXS-4-64 1GHz	4x Computer Vision Engine	17 TOPS	1x ISP, 5x IMR, 1x SMD, 1x DOF, 2x DSP	H.264 Enc.	No	32-bit LPDDR5-6400 LPDDR4x-4266	2x QSPI 1x eMMC	2x MIPI-CSI2	1 x DU 1 x MIPI CSI2/ DSI-output	1x PCIe 4.0	4x CAN 2,0/FD, Flexray	3xGBit AVB,	Up to ASIL -D	FCBGA 729 pins 0.65mm pitch 19x19mm	4x UART 6x SPI 4x I²C I2S Security JTAG

Other features: CVe Computer Vision Engine; DOF Dense Optical Flow; DU Display Unit; IMR Image Rectifier; ISP Image Signal Processor; SMD Simple Instruction Multiple Data; STV Stereo Vision; WDT Window Watchdog Timer

TOOLS

SOFTWARE TOOLS

R-Car e² Studio

- e² Studio is a complete, state of the art development environment supporting Renesas R-Car V series based on an Open Source Eclipse CDT
- Complete environment available to download, included in the R-Car SDK package.
- Supports R-Car V3x, R-Car V4H and the corresponding Evaluation boards and starter kits running embedded linux.
- Includes:
  - HSSTP high speed Trace for ARM cores
  - ADAS plug-ins: "Debug Trace Agent" for computer vision hardware accelerators, Bus Traffic Monitoring, image Viewer, Pin configurator.
  - Support the Computer Vision simulators
- For more information refer to: **www.renesas.com/software-tool/e-studio-r-car**

R-Car CNN toolchain

- Network conversion from Caffe or ONNX model to binary for efficient execution on R-Car Gen3 CNN architecture
- Easy to use through single line command & GUI support
- Support for various R-Car V3x architectures through single click option
- Manual & automatic execution optimisation features to maximize efficiency
- Support for programmable layers on Renesas CVe architecture for flexibility
- Seamless integration with ONNX Runtime on ARM CPUs for wide ONNX networks execution
- Built-in 16-bit & 8-bit quantization capabilities
- Support for SIL & HIL
- Windows & Linux support
- Integrated within R-Car SDK

SOFTWARE

R-Car SDK

R-Car Software Development Kit: Easy to start, easy to access, easy to use, easy to develop. It includes:
- Development tools, Simulation platform
- Target libraries
- Sample code and Documentation

Multiple variants of the R-Car SDK are available:
- R-Car SDK Linux reference package:
  - Available under ELA on renesas.com for R-Car V3x and S4, V4H
- R-Car SDK certified:
  - ASIL Target Libraries are compiled with certified compiler.
  - OS dependent package. Please contact Renesas for more information.

Autosar MCAL

AUTOSAR

- Standard Peripheral Abstraction Layer (SPAL) drivers, communication drivers and test drivers
- For AUTOSAR AR4.X based MCAL for Cortex R
- Worldwide support infrastructure with interface for 1st and 2nd level support in Europe
- Cooperation with various BSW/OS vendors and integrators
- Flexible mass-production licenses
- Free-of-charge development licenses for up to 500 prototypes

Security Software

Renesas provides a variety of software for implementing strong security functions, such as:
- secure boot functions that prevent modifications to programs;
- security level management functions that correspond to the product lifetime; and trusted execution environments.
- enables OTA updating, which allows application and OS upgrades without the driver having to return to the car dealer.
- Renesas plans to sequentially roll out a variety of security software packages to respond to system structures and needs, and to support the hypervisor.

CR7 SDK

R-Car CR7 Software Development Kit: reference solution for Easy To Start on CR7. It includes:
- FreeRTOS CR7 SW:
  - BSP
  - 2D Gfx libraries
  - Video decoders
- Virtio based inter-processor communication driver (Linux on CA5x).

Please contact Renesas for more information.

R-Car S4 Whitebox SDK

The R-Car S4 Whitebox SDK is an integrated development platform that accelerates the development of connected services applications.
- All software is provided under a FoC license for easy testing
- This is replaceable with rich software solutions from the RCC partner ecosystem of over 255 companies
- R-Car S4 Whitebox SDK provides the OS/framework layer, allowing users to focus on developing value-added applications for the product
- Provides experience through sample applications for various use cases
- All software are customizable as it consists mainly of open source.
- Hypervisor support for MCUs
- RTOS based on AUTOSAR specifications

Renesas is working closely with multiple partners in order to extend the software offer and support customer requirements. From OS vendors to system integration.
For more information refer to the Renesas consortium WebPage: **R-Car Consortium Partners | Renesas**

3RD PARTY EMULATORS

iSYSTEM

- Universal emulator and debugger system:
  - On-chip debugging for RL78, RH850 and R-Car
  - In-Circuit Emulation of RL78
  - On-Chip and Off-Chip Trace (Parallel and AURORA) for RH850
  - Off-Chip HSSTP Trace for R-Car
  - Support for common compiler platforms
  - Software API for 3rd party tools and test automation
  - For more information visit www.isystem.com

Lauterbach

- Universal debugger system TRACE32:
  - On-chip debugging for RL78, RH850 and R-Car
  - On-Chip and Off-Chip Trace (Parallel and AURORA) for RH850
  - Off-Chip HSSTP Trace for R-Car
  - Support for common compiler platforms
  - Software API for 3rd party tools and test automation
- For more information visit www.lauterbach.com

STARTER KITS

R-Car Starter Kit Premier (R-Car H3e-2G)

- Equipped with
  - 1384-pin R-Car H3 device on SIP module
  - 8 GB LPDDR4-3200 SDRAM
  - 64 MB QSPI flash
  - 128 GB eMMC
  - Ethernet, Micro SD, USB, Micro HDMI display out
  - Add. interfaces 9 SOC signals via COM Express connector (440-pin)
  - JTAG interface
- Package includes
  - Starter Kit
  - Power supply
  - USB and HDMI cable
- Software
  - Linux BSP / MMP / Graphics Libraries available
- Order codes: Y-ASK-RCAR-H3E-8GB-WS30 / RTPIL779M1ASKB0SK0SA003
  Y-SICA20I2P (JTAG Debug Adapter)

Kingfisher Expansion Board (R-Car H3/M3)

- For R-Car H3/M3 evaluation
- Expansion board to be used in combination with the R-Car H3/M3 starter kit board
- Equipped with
  - Wireless & Automotive network connectivity (Wi-Fi, Bluetooth, 2x CAN-FD)
  - 2ch display output (1x HDMI, 1x LVDS)
  - SD Card, USB2.0/3.0, Mini PCIe
  - 7.1 Audio output, Video input, CSI camera I/F, FM/AM radio
  - JTAG debug connector
- Software
  - Linux BSP / MMP / Graphics Libraries available
- Board dimensions: 180 mm x 198 mm
- Order codes: Y-SBEV-RCAR-KF-M06 (Kingfisher Advanced Carrier Board)
  Y-SBEV-RCAR-KF-GMSL02
  (4 port GMSL camera input option-board)

R-Car V3M Starter Kit

- Equipped with :
  - R-Car V3M
  - 2 Gbytes DDR3L-1600
  - 64 Mbytes Hyper Flash
  - 64 Mbytes OSPI Flash
  - 16Gbytes eMMC
  - HDMI, RGB, LVDS, MipiCSI2, EthernetAVB, Can-FD, I²C, JTAG, Debug Interface
  - On board Connector with SOC signals
- Package include
  - Starter Kit
  - Power Supply
  - USBB HDMI Cable
- Software
  - Linux BSP (Linux.Org)
  - Configuration tools
  - Mimi Monitor
- Order codes: Y-ASK-RCAR-V3M-WS20 (with Rohm PMIC)
  Y-ASK-RCAR-V3M-WS20-REV2 (with Renesas PMIC)

R-Car V3H Starter Kit

- Equipped with :
  - R-Car V3H2
  - 2 Gbytes DDR3L-1600
  - 64 Mbytes Hyper Flash
  - 64 Mbytes OSPI Flash
  - 16Gbytes eMMC
  - HDMI, RGB, LVDS, MipiCSI2
  - EthernetAVB, B-Ethernet, Can-FD, I²C
  - JTAG, Debug Interface
  - On board Connector with SOC signals
- Package include
  - Starter Kit
  - Power Supply
  - USBB HDMI Cable
- Software
  - Linux BSP (Linux.Org)
  - Configuration tools
  - Mimi Monitor
- Order codes: Y-ASK-RCAR-V3H-WS21 (with Renesas PMIC)

R-Car S4 Starter Kit

- Simplifies the process of establishing open-source automotive Linux environments.
- The R-Car starter kits are designed to simplify the task of setting up automotive Linux environments for engineers who are new to the development of automotive software, and are competitively priced so that each developer can be provided with their own kit.
- Eight 1.2 GHz Cortex A55 cores, one 1.0 GHz Cortex® R52 dual core (lock-step) and two 400 MHz RH850 G4MH dual cores (lock-step) deliver up to 27 kDMIPS application performance plus greater than 5.3 kDMIPS real-time performance.
- Ethernet TSN x 2
- CAN FD x2, LIN x 1
- 128GiB UFS
- 64MiB Quad SPI flash memory
- Order codes: Y-ASK-RCAR-S4-1000BASE-T

EVALUATION BOARDS

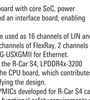
R-Car E3 Development Board "EBISU"

- For R-Car E3
- Equipped with:
  - R-Car E3
  - 64 MB NOR Flash Memory
  - 2GB DDR3L-DRAM-1866
  - 32GB eMMC
  - USB 3.0/2.0, LAN
  - 2ch display output (1x HDMI, 1-2x LVDS, 1x Analog RGB)
  - HDMI and CVBS video input
  - Audio Output and Microphone Input
  - JTAG debug/trace connector
- Board dimensions: 230mm x 160mm
- Package includes CD with user's manual, schematic and boot software
- Order code: Y-R-CAR-E3-BOARD-DEV-WS11 / RTP0RC77990SEB0020SA00

R-Car D3 Development Board "DRAAK"

- For R-Car D3
- Equipped with:
  - R-Car D3
  - 64 MB NOR Flash Memory
  - 512MB DDR3L-SDRAM-1856
  - 16GB eMMC
  - USB 2.0, LAN
  - 2ch display output (1x HDMI, 1-2x LVDS, 1x Analog RGB)
  - HDMI and CVBS video input
  - JTAG debug/trace connector
- Board dimensions: 210mm x 160mm
- Package includes CD with user's manual, schematic and boot software
- Order code: Y-R-CAR-D3-BOARD-DEV-WS11 / RTP0RC77995SEB0010S

R-Car H3/M3/M3N Development Board "SALVATOR-XS"



- For R-Car H3, M3 and M3N
- Equipped with:
  - R-Car H3/M3/M3N SiP
  - 64 MB NOR Flash Memory
  - 8GB LPDDR4-DRAM-3200 [H3 and M3]
    or 2GB LPDDR4-DRAM-3200 [M3N]
  - 32GB eMMC
  - USB 3.0/2.0, SD, LAN, SATA, PCIe
  - 3-4ch Display output (1-2x HDMI, 1x LVDS, 1x Analog RGB)
  - JTAG debug/trace connector
- Board dimensions: 210mm x 160mm
- Package includes CD with user's manual, schematic and boot software
- Order codes:
  Y-R-CAR-M3N-SIP-BOARD-SKT-ES20 / RTP0RC77965SIPB012S-S
  Y-R-CAR-M3W-8GB-BOARD-SKT-WS30 / RTP0RC7796SIPB0012SSSA
  Y-R-CAR-H3-8GB-BOARD-SKT-WS30 / RTP0RC7795SIPB0012S-S03
- Y-R-CAR-M3N2-2GB-BRD-DEV-WS11 / RTP8J779M5ASKB0SJ0SA103 (with soldered M3Ne-2G)
- Y-R-CAR-M3W2-8GB-BRD-DEV-WS30 / RTP8J779M3ASKB0SJ0SA103 (with soldered M3e-2G)
- Y-R-CAR-H3E-8GB-BRD-DEV-WS30 / RTP8J779M1ASKB0SJ0SA103 (with soldered H3e-2G)

R-Car V3M Development Board "EAGLE"

Equipped with:
- NOR flash memory
  - Two serial NOR flash memory devices for QSPI0
  - Serial NOR flash memory device for QSPI1
- SDRAM :
  - LPDDR3-SDRAM for DBSC4
- Display interfaces :
  - HDMI output connector for LVDS
- Video input interfaces :
  - 4 camera input connectors for CSI2 channel 0
- Network interfaces:
  - Gigabit Ethernet (GbE) connector for EthernetAVB
  - CAN connector for CANFD0
- Peripheral interfaces:
  - 'Debug Serial' connector for SCIF0
- Debugger interfaces:
  - 20-pin JTAG connector
  - HSSTP connector for LVDS
- Peripheral connectors:
  - Four EXIO connectors for DPAD, VIN0, MMC, and other modules
- Power supply: 12.0-V DC input
- Operating temperature : +25 degrees C at ambient temperature
- Order Code: Y-R-CAR-V3M-BOARD-DEV-ES20 /
  RTP8A7797DASKB0EG0SA001#WS

R-Car V3H Development Board "CONDOR-I"

Equipped with:
- NOR flash memory:
  - Two serial NOR flash memory devices for QSPI0,
  - Serial NOR flash memory for QSPI1
- SDRAM:
  - LPDDR4-SDRAM for DBSC4
- Display interface:
  - HDMI output connector for LVDS
- Video input interfaces :
  - camera input connectors for CSI2 channel 0
  - camera input connectors for CSI2 channel 2
- Storage interface:
  - eMMC memory for MMC
- Network interfaces:
  - PCIE x 4 connectors (2 lanes) for PCIE
  - Ethernet AVB PHY connector for EthernetAVB
  - Gigabit Ethernet (GbE) connector for GETHER
  - CAN connector for CANFD0_A
- Peripheral interfaces:
  - 'Debug Serial' connector for SCIF0 or HSCIF0_B
- Debugger interfaces:
  - 20-pin JTAG connector for JTAG1
  - 20-pin JTAG connector for JTAG2
  - HSSTP connector through LVDS
  - HSSTP connector through PCIE0
- Peripheral connectors:
  - Three EXIO connectors for DPAD, GETHER (RMII), Flex Ray, VIN0, and other modules
- Power supply: 12.0-V DC input
- Operating temperature: +25 degrees C at ambient
- Package includes CD with User's Manual, Schematic and boot software
- Order Code: Y-RCAR-V3H-CONDOR-I-BRD-WS20 / RTP0RC77980SEB0012SA01

R-Car S4 Reference Board "Spider"

Features
- Reduces the board size and BoM costs through MCU core integration into R-Car SoC, and use a single board to control both MCU domain and application SoC domain, which previously required separately.
- The reference board consists of a CPU board with core SoC, power management IC (PMIC) and memory, and an interface board, enabling support for a variety of networks.
- Supports 16 channels of CAN FD (can be used as 16 channels of LIN and 8 channels of SENT by multi-function), 2 channels of FlexRay, 2 channels of PCIe V4.0 x2 lanes, and 3 channels of 5G-USXGMII for Ethernet.
- The core system is realized by installing the R-Car S4, LPDDR4x-3200 memory and HyperFlash™ memory on the CPU board, which contributes to shortening the time to market by simplifying the design.
- The combination of pre-regulators and PMICs developed for R-Car S4 can provide various supply voltages to meet functional safety requirements up to ASIL D in accordance with ISO 26262.
- Order Code: RTP8A779F0ASKB0SP2S

R-Car V4H Development Board "White Hawk"

Equipped with:
- NOR flash memory:
  - Serial NOR flash memory (64 MB) device for QSPI0
  - HYPERFLASH™ memory device (64 MB) for QSPI0 and QSPI1
- SDRAM:
  - LDDR5 – 6400, 8 GB, 64-bit, 1 module
- Display interface:
  - 2x eDP (mini display port connector) for DSI0 and DSI1
  - 2x GMSL2 output (FAKRA) for DSI0 and DSI1
- Video input interfaces:
  - 2x GMSL2 input (Quad HFM FAKRA) for CSI0-1 via C-PHY
- Storage interfaces: eMMC memory (32GB)
- Network interfaces:
  - OcuLink connector for PCIE0 and PCIE1 (4 lanes)
  - Gigabit Ethernet (GbE) connector for Ether AVB0
  - 2x Ethernet AVB + 1x Ethernet TSN ports (MATEnet) for EtherAVBx and EtherTSN0
  - 2 FlexRay connectors for FlexRay A and FlexRay B
  - Peripheral interfaces: Debug serial connector for SCIF0/HSCIF0
- Debugger interfaces: 20-pins JTAG connector for JTAGx
- Peripheral connectors:
  - EX-SPI connector for QSPI0
  - 2 break-out board connected (EXIO connectors A and B)
  - Ethernet sub-board connector
  - CSI and DSI sub-board connector
  - Mode switch-board connector
- Power supply: 12.0-V DC inputs for mother board or 5V for CPU board only
- Operating temperature: +25 degrees C at ambient
- Package includes CD with User's Manual, Schematic and boot software
- Order Code: Y-RCAR-V4H-WHITEHAWK-BRD-WS10 /
  RTP8A779G0ASKB0FS0SA000

New all in one board:

RTP8A779G0ASKB0F10SA100

CPU board:

RTP8A779GZASKB0RC0SA001

[V4H] White Hawk CPU Board (3rd lot) | [B-Cart] EC site of Evaluation Board for R-Car Products (bcart.jp)

RCar V4M Development Board "Grey Hawk"

RTP8A779H0ASKB0F10SA001

Info available at:
www.renesas.com/us/en/document/mat/r-car-v4m-evaluation-boards

[V4M] Gray Hawk All in 1 Board BQ [1st Lot] |
[B-Cart] EC site of Evaluation Board for R-Car Products (bcart.jp)

RCar V4M CPU Board:

RTP8A779H0ASKB0RC0SA001

CPU Board (CPU) |
[B-Cart] EC site of Evaluation Board for R-Car Products (bcart.jp)

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