

Renesas MPUs & MCUs

# V850 MCU Selection Guide



**High-Performance**

Applications	Device			Memory				Clock		I/O	Bus	Timer						Serial Interface										OCD	Peripheral Functions				Other									
	CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32.768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting LIN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with a bus master/transmission reception function	I <sup>2</sup> C	IEBUS	CAN	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	LCD (segments × commons)	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size (mm))	In-circuit emulator Emulation board
<b>All Flash</b>	V850ES	<b>V850ES/HE3</b>	μPD70F3747	128	Flash	√	8	32	8 M, 240 k	√	51	-/-	7	-	-	1	1	16 bits × 8 (6 phases, 16 bits × 1)	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-	√	-	-	10	-	POC, LVI, CLM, DMA	3.7 to 5.5	64-LQFP (10 × 10)	E1 QB-V850MINIL (MINICUBE) QB-V850ESFX3 (IECUBE)
		<b>V850ES/HF3</b>	μPD70F3750	256	Flash	√	16	32	8 M, 240 k	√	67	-/-	7	-	-	1	1	16 bits × 8 (6 phases, 16 bits × 1)	-	2	-	-	-	-	2	-	-	1	-	-	-	-	√	-	-	12	-	POC, LVI, CLM, DMA	3.7 to 5.5	80-LQFP (12 × 12)		
		<b>V850ES/HG3</b>	μPD70F3752	256	Flash	√	16	32	8 M, 240 k	√	84	-/-	8	-	-	1	1	16 bits × 11 (6 phases, 16 bits × 1)	-	3	-	-	-	-	2	-	-	1	-	-	-	-	√	-	-	16	-	POC, LVI, CLM, DMA	3.7 to 5.5	100-LQFP (14 × 14)		
		<b>V850ES/HJ3</b>	μPD70F3755	256	Flash	√	16	32	8 M, 240 k	√	128	16/16	9	-	-	1	1	16 bits × 14 (6 phases, 16 bits × 1)	-	3	-	-	-	-	-	3	-	-	1	-	-	-	-	√	-	-	24	-	POC, LVI, CLM, DMA	3.7 to 5.5	144-LQFP (20 × 20)	
μPD70F3757	512	32	4 <sup>bits</sup>	2 <sup>bits</sup>			1 <sup>bit</sup>												1																							

**Note** Six UART channels are provided in the μPD70F3757.

**Remark** POC: Power-on clear circuit  
LVI: Low-voltage detector  
CLM: Clock monitor

Applications		Device		Memory				Clock			I/O	Bus	Timer				Serial Interface										OC	Peripheral Functions			Other															
CPU core	Commercial name	Product name	ROM size [Kb]	ROM type	Single voltage flash	RAM size [Kb]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32, 768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting UN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with automatic transmission retransmission (422/RS485)	I <sup>2</sup> C	IEBus	CAN	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	LCD (segments x commons)	12-bit/A/D converter	10-bit/A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board					
<b>All Flash</b>	V850ES	V850ES/IE2	μPD70F3713	64	Flash	√	6	20	-	-	39	-/-	7	-	-	-	1	16 bits × 6 (6 phases, 16 bits × 1)	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	POC, LVI, CLM	3.5 to 5.5	64-LQFP (14 × 14)	E1 QB-V850ESIX2 (IECUBE)
			μPD70F3714	128																																										
	V850EI	V850EI/IF3	μPD70F3451	128	Flash	√	8	64	-	-	48	-/-	13	-	-	-	-	1	16 bits × 9 (6 phases, 16 bits × 2)	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	5+5	4	-	POC, LVI, CLM, DMA, operational amplifier × 4, comparator	3.5 to 5.5	80-LQFP (14 × 14)	E1 QB-V850EIX3 (IECUBE)
			μPD70F3452	256			12																																							
	V850EI	V850EI/IG3	μPD70F3453	128	Flash	√	8	64	-	-	64	-/-	13	-	-	-	-	1	16 bits × 11 (6 phases, 16 bits × 2)	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	√	-	5+5	8	-	POC, LVI, CLM, DMA, operational amplifier × 4, comparator	3.5 to 5.5	100-LQFP (14 × 14) 100-LQFP (14 × 20) Note 2 161-FBGA (10 × 10)	E1 QB-V850MINIL (MINICUBE) QB-V850EIX3 (IECUBE)	
			μPD70F3454	256			12					Note 1 16/16																																		
	V850EI	V850EI/IG4	μPD70F3913	256	Flash	√	24	100	-	-	67	-/-	13	-	-	-	-	1	16 bits × 13 (6 phases, 16 bits × 2)	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	√	-	4+3	12	-	POC, LVI, CLM, DMA, operational amplifier × 6, comparator	1.5/5.0	100-LQFP (14 × 14) 100-LQFP (14 × 20)	E1 QB-V850MINIL (MINICUBE)	
			μPD70F3914	384																																										
			μPD70F3915	480																																										
	V850EI	V850EI/IH4	μPD70F3916	256	Flash	√	24	100	-	-	80	-/-	13	-	-	-	-	1	16 bits × 13 (6 phases, 16 bits × 2)	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	√	-	4+4	12	-	POC, LVI, CLM, DMA, operational amplifier × 6, comparator	1.5/5.0	128-LQFP (14 × 20)			
			μPD70F3917	384																																										
			μPD70F3918	480																																										
	V850EI	V850EI/IG4-H	μPD70F3919	256	Flash	√	24	100	-	-	63	16/16	13	-	-	-	-	1	16 bits × 10 (6 phases, 16 bits × 1)	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	√	-	4+3	12	-	POC, LVI, CLM, DMA, operational amplifier × 6, comparator, USB 2.0 function	1.5/5.0/3.3	100-LQFP (14 × 14)			
			μPD70F3920	384																																										
μPD70F3921			480																																											
V850EI	V850EI/IH4-H	μPD70F3922	256	Flash	√	24	100	-	-	88	16/16	13	-	-	-	-	1	16 bits × 13 (6 phases, 16 bits × 2)	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-	√	-	4+4	12	-	POC, LVI, CLM, DMA, operational amplifier × 6, comparator, USB 2.0 function	1.5/5.0/3.3	128-LQFP (14 × 20)					
		μPD70F3923	384																																											
		μPD70F3924	480																																											

Notes 1. μPD70F3454, 14 × 14 mm and 10 × 10 mm packages only.  
2. μPD70F3454 only.

Remark POC: Power-on clear circuit  
LVI: Low-voltage detector  
CLM: Clock monitor

Applications	Device			Memory				Clock			I/O		Bus				Timer							Serial Interface										OCD	Peripheral Functions				Other												
	CPU core	Commercial name	Product name	ROM size [Kb]	ROM type	Single voltage flash	RAM size [Kb]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32.768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting LIN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with automatic transmission/reception function	I <sup>2</sup> C	IEBus	CAN	IEBus	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	LOD (segments x commons)	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board								
All Flash	V850ES	V850ES/JC3-L (40-pin)	μPD70F3797	16	Flash	√	8	20	220 k	√	27	-/-	8	-	-	1	1	16 bits × 5	-	1	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	√	-	-	5	1	LVI, CLM, DMA, CRC	2.2 to 3.6	40-WQFN (6 × 6)	E1 QB-V850MINIL (MINICUBE) QB-V850ESJX3L (IECUBE)							
			μPD70F3798	32																																															
			μPD70F3799	64																																															
			μPD70F3800	128																																															
			μPD70F3838	256				16																																											
			μPD70F3801	16				8					34										1		2		2																								
			μPD70F3802	32																																															
			μPD70F3803	64																																															
		μPD70F3804	128																																																
		μPD70F3839	256				16																																												
		V850ES/JE3-L	μPD70F3805	16	Flash	√	8	20	220 k	√	50	-/-	8	-	-	-	1	1	16 bits × 9	-	-	-	1	-	2	-	3	1	-	-	-	-	-	-	-	-	√	-	-	10	1	LVI, CLM, DMA, CRC	2.2 to 3.6		64-LQFP (10 × 10) 64-FBGA (5 × 5)						
			μPD70F3806	32																																															
			μPD70F3807	64																																															
			μPD70F3808	128																																															
			μPD70F3840	256				16																																											
		V850ES/JF3-L	μPD70F3735	128	Flash	√	8	20	220 k	√	66	16/18	6	-	-	-	1	1	16 bits × 7	-	2	-	-	-	1	-	2	1	-	-	-	-	-	-	-	√	-	-	8	1	LVI, CLM, DMA, CRC	2.2 to 3.6	80-LQFP (12 × 12) 80-LQFP (14 × 14)								
	μPD70F3736		256				16																																												
	V850ES/JG3-L	μPD70F3737	128	Flash	√	8	20	220 k	√	84	16/22	8	-	-	-	1	1	16 bits × 9	-	-	-	1	-	2	-	3	1	-	-	-	-	-	-	-	√	-	-	12	2	LVI, CLM, DMA, CRC	2.2 to 3.6	100-LQFP (14 × 14) 100-LQFP (14 × 20) 121-FBGA (8 × 8)									
		μPD70F3738	256				16																																												
		μPD70F3792	384				32					83																																							
		μPD70F3793	512				40																																												
		μPD70F3841	768				80																																												
		μPD70F3842	1024																																																
		μPD70F3794	256				40																																												
		μPD70F3795	384									80																																							
		μPD70F3796	512																																																
		μPD70F3843	768				80																																												
		μPD70F3844	1024																																																
	V850ES/JG3	μPD70F3739	384	Flash	√	32	32	220 k	√	84	16/22	8	-	-	-	1	1	16 bits × 9	-	-	-	1	-	2	-	3	1	-	-	-	-	-	-	-	√	-	-	12	2	LVI, CLM, DMA, CRC	2.85 to 3.6	100-LQFP (14 × 14)									
		μPD70F3740	512				40																																												
		μPD70F3741	768				60																																												
		μPD70F3742	1024																																																
V850ES/JJ3	μPD70F3743	384	Flash	√	32	32	220 k	√	128	16/24	11	-	-	-	1	1	16 bits × 12	-	1	-	1	-	2	-	4	1	-	-	-	-	-	-	√	-	-	16	2	LVI, CLM, DMA, CRC	2.85 to 3.6	144-LQFP (20 × 20)											
	μPD70F3744	512				40																																													
	μPD70F3745	768				60																																													
	μPD70F3746	1024																																																	

Remark LVI: Low-voltage detector, CLM: Clock monitor



Applications	Device			Memory				Clock			I/O		Bus			Timer							Serial Interface										OC		Peripheral Functions				Other							
	CPU core	Commercial name	Product name	ROM size [Kb]	ROM type	Single voltage flash	RAM size [Kb]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32, 768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting UN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with automatic transmission retransmission function	I <sup>2</sup> C	IEBus	CAN	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	OC (segments × commons)	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board				
<b>All Flash</b>	V850ES	V850ES/JE3-E	μPD70F3826 *	64	Flash	√	32 <sup>note1</sup>	50	220 k	√	26	-/-	11	-	Real-time counter	-	1	16 bits × 6	-	-	-	1	-	1	1	-	-	-	-	-	-	-	-	√	-	-	10	-	LVI, CLM, DMA, CRC, USB 2.0 function, Ethernet controller	2.85 to 3.6	64-LQFP (10 × 10) 64-WQFN (9 × 9)	E1 QB-V850MINIL (MINICUBE) QB-V850ESJX3E (IECUBE)				
			μPD70F3827 *	128			48 <sup>note1</sup>																																							
			μPD70F3828 *	256			64 <sup>note1</sup>																																							
			μPD70F3829 *																																											
		V850ES/JF3-E	μPD70F3830 *	64	Flash	√	32 <sup>note1</sup>	50	220 k	√	42	-/-	11	-	-	Real-time counter	-	1	16 bits × 7 (6 phases, 16 bits × 1)	-	-	-	1	-	1	2	-	-	-	-	-	-	-	-	√	-	-	10	-	LVI, CLM, DMA, CRC, USB 2.0 function, Ethernet controller	2.85 to 3.6		80-LQFP (12 × 12)			
			μPD70F3831 *	128			48 <sup>note1</sup>																																							
			μPD70F3832 *	256			64 <sup>note1</sup>																																							
			μPD70F3833 *																																											
		V850ES/JG3-E	μPD70F3834 *	64	Flash	√	32 <sup>note1</sup>	50	220 k	√	62	-/-	11	-	-	Real-time counter	-	1	16 bits × 8 (6 phases, 16 bits × 1)	-	-	-	1	-	1	2	2	-	-	-	-	-	-	-	√	-	-	10	-	LVI, CLM, DMA, CRC, USB 2.0 function, Ethernet controller	2.85 to 3.6		100-LQFP (14 × 14) 121-FBGA (8 × 8) <sup>note3</sup>			
			μPD70F3835 *	128			48 <sup>note1</sup>																																							
			μPD70F3836 *	256			64 <sup>note1</sup>																																							
			μPD70F3837 *																																											
		V850ES/JH3-E	μPD70F3778	256	Flash	√	76 <sup>note1</sup>	50	220 k	√	84	16/22	13	-	-	Real-time counter	-	1	16 bits × 12 (6 phases, 16 bits × 1)	-	-	2	2	-	1	3	1	-	-	-	-	-	-	-	√	-	-	10	-	LVI, CLM, DMA, CRC, USB 2.0 function, Ethernet controller	2.85 to 3.6		128-LQFP (14 × 20)			
			μPD70F3779	384																																										
			μPD70F3780	512																																										
			μPD70F3781	384			124 <sup>note2</sup>																																							
			μPD70F3782	512																																										
		V850ES/JJ3-E	μPD70F3783																																											
			μPD70F3784	512	Flash	√	76 <sup>note1</sup>	50	220 k	√	100	16/24	13	-	-	Real-time counter	-	1	16 bits × 13 (6 phases, 16 bits × 1)	-	-	2	4	-	1	3	1	-	-	1	-	-	-	-	√	-	-	12	-	LVI, CLM, DMA, CRC, USB 2.0 function, Ethernet controller	2.85 to 3.6		144-LQFP (20 × 20)			
			μPD70F3785				124 <sup>note2</sup>																																							
		μPD70F3786																																												

- Notes 1. Contains a 16 KB area for data use only.  
2. Contains a 64 KB area for data use only.  
3. μPD70F3837 only.

\* Under development

Remark LVI: Low-voltage detector  
CLM: Clock monitor

Applications	Device			Memory				Clock			I/O ports	Bus	Timer						Serial Interface						OCD	Peripheral Functions			Other			
	CPU core	Commercial name	Product name	ROM size [Kb]	ROM type	Single voltage flash	RAM size [Kb]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32.768 kHz)			External bus (data/address)	32-bit timer	16-bit timer	16-bit encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	IEBus		CAN	On-chip debugging	12-bit A/D converter	10-bit A/D converter	Other functions	Power supply voltage [V]	Package (size [mm])
<b>All Flash</b>	V850EZM	<b>V850E2/MN4</b>	$\mu$ PD70F3510	1024	Flash	√	64	200	-	-	188	32/26	4 ch × 1 unit	16 ch × 4 units	2	1	1	6	4	6	4	6	-	-	√	12 <sup>bits</sup>	12 <sup>bits</sup>	DMA, USB 2.0 host/function, H-bus shared memory: 64 KB; H-bus memory side cache: 16 KB; DMA dedicated to secondary memory controller, inverter timer support, boundary scan	1.1 to 1.3 (internal) 3.0 to 3.6 (external) 3.0 to 3.6 or 4.5 to 5.5 (analog system)	304-FBGA (19 × 19)	QB-V850MINIL (MINICUBE)	
			$\mu$ PD70F3512																													
			$\mu$ PD70F3514					64 × 2									2	2														
			$\mu$ PD70F3515	2048																												
		<b>V850E2/ML4</b>	$\mu$ PD70F4021 *	768				64				120		4 ch × 1 unit	16 ch × 2 units		1	1	2	2	2	2	2	-	1	√	12 <sup>bits</sup>	12 <sup>bits</sup>	DMA, USB 2.0 host/function, H-bus shared memory: 64 KB; Ethernet controller, inverter timer support, boundary scan	1.1 to 1.3 (internal) 3.0 to 3.6 (external) 3.0 to 3.6 or 4.5 to 5.5 (analog system)	216-LQFP (24 × 24)	QB-V850MINIL (MINICUBE)
			$\mu$ PD70F4022 *	1024				64																								

**Notes** 1. Only when 5 V analog power supply is used.  
2. Only when 3.3 V analog power supply is used.

\* Under development





Applications			Device			Memory			Clock			I/O		Bus		Timer						Serial Interface										OC		Peripheral Functions				Other								
CPU core	Commercial name	Product name	ROM size [Kb]	ROM type	Single voltage flash	RAM size [Kb]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32.768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting LIN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with automatic transmission/reception feature	I <sup>2</sup> C	IEBus	CAN	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	OC	LCD [segments x commons]	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board				
			Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash	Mask	Flash		
Inverter Control	V850E1	V850E/IA3	μPD703183	128	Mask	-	6	64	-	-	50	-/-	8	-	-	-	1	16 bits × 5 (6 phases, 16 bits × 1)	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	12	DMA, ROMC, operational amplifier × 5, comparator	2.3 to 2.7 4.0 to 5.5	80-QFP (14 × 14)	E1 QB-V850EIA4 (IECUBE)			
			μPD70F3184	256	Flash	√	12																																							
	V850E/IA4	μPD703185	128	Mask	-	6	64	-	-	64	-/-	9	-	-	-	-	1	16 bits × 5 (6 phases, 16 bits × 2)	1	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	DMA, ROMC, operational amplifier × 6, comparator	2.3 to 2.7 4.0 to 5.5	100-LQFP (14 × 14) 100-QFP (14 × 20)	E1 QB-V850MINIL (MINICUBE) QB-V850EIA4 (IECUBE)	
		μPD703186	256	Flash	√	12																																								
		μPD70F3186	256	Flash	√	12																																								
	V850ES	V850ES/IK1	μPD703327	64	Mask	-	4	32	-	-	39	-/-	7	-	-	-	1	16 bits × 6 (6 phases, 16 bits × 1)	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	POC, LVI, ROMC	3.5 to 5.5	64-LQFP (14 × 14)
μPD703329			128	Mask	-	6																																								
μPD70F3329			128	Flash	√	6																																								

Remark POC: Power-on clear circuit  
LVI: Low-voltage detector  
ROMC: ROM correction

Applications	Device			Memory			Clock			I/O	Bus	Timer					Serial Interface					OC <sup>2</sup>	Peripheral Functions			Other					
	CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32.768 kHz)	I/O ports	External bus (data/address)	32-bit timer	16-bit timer	16-bit encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	IEBus	CAN	On-chip debugging	12-bit A/D converter	10-bit A/D converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board
Car Electronics Car Multimedia (All Flash)	V850E2M	V850E2/SG4-H	μPD70F4013 *	1024 <sup>KB</sup>	Flash	√	96	160	8 M, 240 k	√	58	16/20	4 ch × 1 unit	16 ch × 1 unit	-	1	2	4	-	2	2	4	1	1	√	-	8	DMA, real-time clock, multiplexed SRAM interface (8/16 bits), IISA interface: 4 ch; PCM interface: 1 ch; MLB: 1 ch; POC (available in M1 products, not available in M2 products), CLM, data CRC, LVI, HBUS-RAM: 32 KB; Data flash: 32 KB; backup RAM: 32 KB; instruction cache: 8 KB/2-way associative (4 KB/way)	1.1 to 1.3 (supplied internally) 3.0 to 3.6 (supplied from I/O)	100-LQFP (14 × 14)	E1 QB-V850MINIL (MINICUBE) QB-V850E2 (IECUBE2)
			μPD70F4014 *	1536 <sup>KB</sup>			128																								
	V850E2/SJ4-H	V850E2/SJ4-H	μPD70F4015 *	1024 <sup>KB</sup>	Flash	√	96	160	8 M, 240 k	√	100	16/24	4 ch × 1 unit	16 ch × 1 unit	-	1	2	5	-	2	3	4	1	2	√	-	16	DMA, real-time clock, SDRAM interface, multiplexed/separate SRAM interface (8/16 bits), IISA interface: 4 ch; PCM interface: 2 ch; MLB: 1 ch; POC (available in M1 products, not available in M2 products), CLM, data CRC, LVI, KR, HBUS-RAM: 32 KB; Data flash: 32 KB; backup RAM: 32 KB; instruction cache: 8 KB/2-way associative (4 KB/way)	1.1 to 1.3 (supplied internally) 3.0 to 3.6 (supplied from I/O)	144-LQFP (20 × 20)	
			μPD70F4016 *	1536 <sup>KB</sup>			128																								
	V850E2/SK4-H	V850E2/SK4-H	μPD70F4017	1536 <sup>KB</sup>	Flash	√	128	160	8 M, 240 k	√	127	32/24	4 ch × 1 unit	16 ch × 2 units	2	1	2	5	-	2	3	4	1	2	√	-	16	DMA, real-time clock, SDRAM interface, multiplexed/separate SRAM interface (8/16/32 bits), IISA interface: 6 ch; PCM interface: 2 ch; MLB: 1 ch; POC (available in M1 products, not available in M2 products), CLM, data CRC, LVI, KR, HBUS-RAM: 32 KB; Data flash: 32 KB; backup RAM: 32 KB; instruction cache: 8 KB/2-way associative (4 KB/way) Ethernet controller	1.1 to 1.3 (supplied internally) 3.0 to 3.6 (supplied from I/O)	176-LQFP (24 × 24)	
			μPD70F4018	2048 <sup>KB</sup>			192																								

**Note** This is the size of the code flash.

\* Under development

**Remark** POC: Power-on clear circuit  
LVI: Low-voltage detector  
CLM: Clock monitor

Applications		Device	Memory			Clock			I/O	Bus	Timer				Serial Interface							OC	Peripheral Functions			Other															
CPU core	Commercial name	Product name	ROM size [Kb]	ROM type	Single voltage flash	RAM size [Kb]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subdock (32,768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting LIN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with automatic transmission reception function	I <sup>2</sup> C	IEBus	CAN	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	LCD [segments x commons]	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board
			ROM size [Kb]	Flash	√	RAM size [Kb]	48	220 k	√	128	16/24	13	-	Real-time counter	1	1	16 bits x 12	2	1	-	1	2	-	3	1	-	1	2	1	-	-	√	-	-	16	2	LVI, CLM, DMA, ROMC, CRC	2.85 to 3.6	144-LQFP (20 x 20)	E1 QB-V850MINIL (MINICUBE) QB-V850ESX3H (IECUBE)	
Car Electronics Car Multimedia (On-Chip IEBus) (All Flash)	V850E1	V850E/SJ3-H	μPD70F3931B	512	Flash	√	60	48	220 k	√	128	16/24	13	-	Real-time counter	1	1	16 bits x 12	2	1	-	1	2	-	3	1	-	1	2	1	-	-	√	-	-	16	2	LVI, CLM, DMA, ROMC, CRC	2.85 to 3.6	144-LQFP (20 x 20)	E1 QB-V850MINIL (MINICUBE) QB-V850ESX3H (IECUBE)
			μPD70F3934B	768		76																																			
			μPD70F3937B	1024		92																																			
			μPD70F3474A	1280		92																																			
			μPD70F3477A	1536		92																																			
	V850E/SK3-H	μPD70F3925A	1024	Flash	√	76	48	220 k	√	156	16/24	13	-	Real-time counter	1	1	16 bits x 12	2	1	-	2	2	1	3	1	1	2	1	-	-	√	-	-	16	2	LVI, CLM, DMA, ROMC, CRC	2.85 to 3.6	176-LQFP (24 x 24)	E1 QB-V850MINIL (MINICUBE) QB-V850ESX3H (IECUBE)		
			μPD70F3486A			1280																																		92	
			μPD70F3480A			1536																																		92	

**Remark** LVI: Low-voltage detector  
CLM: Clock monitor  
ROMC: ROM correction



Applications		Device		Memory				Clock			I/O		Bus			Timer							Serial Interface										OCD	Peripheral Functions				Other									
		CPU core	Commercial name	Product name	ROM size [Kb]	ROM type	Single voltage flash	RAM size [Kb]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subdock (32.768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting LIN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with "subpacket transmission" reception function	I <sup>2</sup> C	IEBus	CAN	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	LCD [segments x commons]	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board				
Car Electronics	V850ES	V850ES/SG3	μPD70F3335	256	Flash	√	24	32	220 k	√	84	16/22	8	-	-	1	1	16 bits × 9	-	-	-	1	-	2	-	3	1	-	-	-	-	1	-	√	-	-	-	12	2	LVI, CLM, DMA, ROMC, CRC	2.85 to 3.6	100-LQFP (14 × 14)	E1 QB-V850MINIL (MINICUBE) QB-V850ESSX2 (IECUBE)				
			μPD70F3336	384			32																																								
			μPD70F3350	512			40																																								
			μPD70F3351	640			48																																								
			μPD70F3352	768			60																																								
			μPD70F3353	1024																																											
		V850ES/SJ3	μPD70F3354	384	Flash	√	32	32	220 k	√	128	16/24	11	-	-	-	1	1	16 bits × 12	-	1	-	1	-	2	-	4	1	-	-	-	-	1	-	√	-	-	-	16	2	LVI, CLM, DMA, ROMC, CRC	2.85 to 3.6	144-LQFP (20 × 20)				
			μPD70F3355	512			40																																								
			μPD70F3356	640			48																																								
			μPD70F3357	768			60																																								
			μPD70F3358	1024																																											
			μPD70F3364	384			32																																								
			μPD70F3365	512			40																																								
			μPD70F3366	640			48																																								
			μPD70F3367	768			60																																								
	μPD70F3368	1024																																													
	V850E1	V850E/SJ3-H	μPD70F3932B	512	Flash	√	60	48	220 k	√	128	16/24	13	-	Real-time counter	1	1	16 bits × 12	2	1	-	1	-	2	-	3	1	-	1	1	-	1	-	√	-	-	-	16	2	LVI, CLM, DMA, ROMC, CRC	2.85 to 3.6	144-LQFP (20 × 20)	E1 QB-V850MINIL (MINICUBE) QB-V850ESX3H (IECUBE)				
			μPD70F3933B	768			76																																								
			μPD70F3935B	1024																																											
			μPD70F3936B	1280																																											
			μPD70F3938B	1536																																											
			μPD70F3939B	1840																																											
			μPD70F3475A	2144																																											
			μPD70F3476A	2448																																											
			μPD70F3478A	2752																																											
		μPD70F3479A	3056																																												
		V850E/SK3-H	μPD70F3926A	1024	Flash	√	76	48	220 k	√	156	16/24	13	-	Real-time counter	1	1	16 bits × 12	2	1	-	2	-	2	1	3	1	1	2	1	1	-	√	-	-	-	16	2	LVI, CLM, DMA, ROMC, CRC	2.85 to 3.6	176-LQFP (24 × 24)						
			μPD70F3927A	1280			92																																								
			μPD70F3487A	1536																																											
			μPD70F3488A	1840																																											
μPD70F3481A			2144																																												
μPD70F3482A	2448																																														

**Remark** LVI: Low-voltage detector  
CLM: Clock monitor  
ROMC: ROM correction

Applications		Device		Memory			Clock		I/O	Bus	Timer				Serial Interface					OCD	Peripheral Functions		Other													
CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subdock (32.768 kHz)	I/O ports	External bus (data/address)	32-bit timer	16-bit timer	16-bit encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	IEBus	CAN	On-chip debugging	12-bit A/D converter	10-bit A/D converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board						
Car Electronics Body Control (All Flash)	V850E2M	V850E2/FG4	μPD70F3548 *	512	Flash	√	48	80	8 M, 240 k	-	66	-	4 ch × 2 units	16 ch × 2 units	1	1	1	5	-	2	1	1	-	2	√	20	-	Data flash: 32 KB Backup RAM: 4 KB/8 KB Instruction cache: 8 KB/2-way associative (4 KB/way) DMA, motor control, POC, voltage comparator, CLM, RNG, data CRC, boundary scan	3.0 to 5.5	100-LQFP (14 × 14)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)					
			μPD70F3549 *	768			64																													
			μPD70F3550 *	1024			80																													
			μPD70F4000 <sup>Note *</sup>	512			48																													
			μPD70F4001 <sup>Note *</sup>	768			64																													
			μPD70F4002 <sup>Note *</sup>	1024			80																													
	V850E2/FJ4	V850E2/FJ4	μPD70F3551 *	512	Flash	√	48	80	8 M, 240 k	√	103	-	4 ch × 2 units	16 ch × 6 units	1	1	2	6	-	2	2	1	-	3	√	24	-	Data flash: 32 KB/64 KB Backup RAM: 4 KB/8 KB/16 KB Instruction cache: 8 KB/2-way associative (4 KB/way) FPU (μPD70F3554, 70F4006 only) DMA, motor control, POC, PMC, DLY, voltage comparator, CLM, RNG, data CRC, boundary scan	3.0 to 5.5	144-HLQFP (20 × 20)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)					
				μPD70F3552 *	768			64																												
				μPD70F3553 *	1024			80																												
				μPD70F3554 *	1536			112																												
				μPD70F4003 <sup>Note *</sup>	512			48																												
				μPD70F4004 <sup>Note *</sup>	768			64																												
	V850E2/FK4	V850E2/FK4	μPD70F3555 *	768	Flash	√	64	80	8 M, 240 k	√	128	16/22	4 ch × 2 units	16 ch × 7 units	1	1	2	8	-	2	3	1	-	4	√	40	-	Data flash: 32 KB/64 KB Backup RAM: 8 KB/16 KB Instruction cache: 8 KB/2-way associative (4 KB/way) FPU (μPD70F3557, 70F3558, 70F4009, 70F4010 only) MEMC, DMA, motor control, PMC, DLY, POC, voltage comparator, CLM, RNG, data CRC, boundary scan	3.0 to 5.5	176-HLQFP (24 × 24)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)					
				μPD70F3556 *	1024			80																												
				μPD70F3557 *	1536			112																												
				μPD70F3558 *	2048			144																												
				μPD70F4007 <sup>Note *</sup>	768			64																												
				μPD70F4008 <sup>Note *</sup>	1024			80																												
	V850E2/FL4	V850E2/FL4	μPD70F3559 *	1536	Flash	√	112	80	8 M, 240 k	√	158	16/22	4 ch × 2 units	16 ch × 8 units	1	1	2	12	-	2	3	1	-	4	√	48	-	Data flash: 64 KB Backup RAM: 16 KB Instruction cache: 8 KB/2-way associative (4 KB/way) FPU, MEMC, DMA, motor control, PMC, DLY, POC, voltage comparator, CLM, RNG, data CRC, boundary scan	3.0 to 5.5	208-QFP (28 × 28), 256-BGA (21 × 21)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)					
				μPD70F3560 *	2048			144																												
μPD70F4011 <sup>Note *</sup>				1536			112																													
μPD70F4012 <sup>Note *</sup>				2048			144																													

Note Contains a FlexRay controller.

\* Under development

Remark POC: Power-on clear circuit; CLM: Clock monitor; FLX: FlexRay controller; MEMC: External memory interface; PMC: PWM diagnostic module; DLY: PWM delay unit; RNG: Random number generator

Applications		Device		Memory			Clock			I/O	Bus	Timer				Serial Interface					OC <sup>1</sup>	Peripheral Functions			Other										
	CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32.768 kHz)	I/O ports	External bus (data/address)	32-bit timer	16-bit timer	16-bit encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	IEBus	CAN	On-chip debugging	12-bit/A/D converter	10-bit/A/D converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board				
Car Electronics	V850E2S	V850E2/FE4-L	μPD70F3570 *	256	Flash	√	24	48	8 M, 240 k	-	45	-	4 ch × 1 unit	16 ch × 1 unit	-	1	2	2	-	2	-	1	-	1	√	-	12	Data flash: 32 KB Backup RAM: 4 KB DMA, POC, CLM, boundary scan	3.0 to 5.5	64-LQFP (10 × 10)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)				
			μPD70F3571 *	384		28																													
			μPD70F3572 *	512		32																													
		V850E2/FF4-L	μPD70F3573 *	256	Flash	√	24	48	8 M, 240 k	-	61	-	-	4 ch × 1 unit	16 ch × 1 unit	-	1	2	2	-	2	-	1	-	1	√	-	14	Data flash: 32 KB Backup RAM: 4 KB DMA, POC, CLM, boundary scan	3.0 to 5.5	80-LQFP (12 × 12)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)			
			μPD70F3574 *	384		28																													
			μPD70F3575 *	512		32																													
		V850E2/FG4-L	μPD70F3576 *	256	Flash	√	24	48	8 M, 240 k	-	76	-	-	4 ch × 1 unit	16 ch × 1 unit	-	1	2	3	-	3	-	1	-	2	√	-	20	Data flash: 32 KB Backup RAM: 4 KB/8 KB DMA, POC, CLM, boundary scan	3.0 to 5.5	100-LQFP (14 × 14)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)			
			μPD70F3577 *	384		28																													
			μPD70F3578 *	512		32																													
			μPD70F3579 *	768		48		64																											
			μPD70F3580 *	1024		64																													
		V850E2/FJ4-L	μPD70F3582 *	384	Flash	√	28	48	8 M, 240 k	-	116	-	-	4 ch × 1 unit	16 ch × 2 units	-	1	2	3	-	3	-	1	-	2	√	-	24	Data flash: 32 KB Backup RAM: 4 KB/8 KB DMA, POC, CLM, boundary scan	3.0 to 5.5	144-LQFP (20 × 20)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)			
			μPD70F3583 *	512		32																													
			μPD70F3584 *	768		48		64																											
			μPD70F3585 *	1024		64																													

Remark POC: Power-on clear circuit  
CLM: Clock monitor

\* Under development

Applications		Device		Memory			Clock		I/O	Bus	Timer				Serial Interface						OC <sup>1</sup>	Peripheral Functions		Other													
Applications	CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32.768 kHz)	I/O ports	External bus (data/address)	32-bit timer	16-bit timer	16-bit encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	IEBus	CAN	On-chip debugging	12-bit A/D converter	10-bit A/D converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board						
Car Electronics	V850E2M	V850E2/FK4-H	μPD70F3561 *	2048	Flash	√	144	160	8 M, 240 k	√	131	16/22	4 ch × 2 units	16 ch × 7 units	√	1	2	12	-	2	3	1	-	4	√	40	-	Data flash: 64 KB Backup RAM: 16 KB Instruction cache: 8 KB/2-way associative (4 KB/way) FPU, MEMC, DMA, DCAN, motor control, ETH, PMC, DLY, POC, voltage comparator, CLM, RNG, data CRC, boundary scan, FLX	3.0 to 5.5	176-HLQFP (24 × 24)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)						
				2048			144				160		8 M, 240 k	√	161	16/22	4 ch × 2 units	16 ch × 8 units	√	1	2	12	-	3	3	1	-	5	√	48	-	Data flash: 64 KB Backup RAM: 16 KB Instruction cache: 8 KB/2-way associative (4 KB/way) FPU, MEMC, DMA, DCAN, motor control, ETH, PMC, DLY, POC, voltage comparator, CLM, RNG, data CRC, boundary scan, FLX	3.0 to 5.5	208-QFP (28 × 28), 272-BGA (21 × 21)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)		
				256			Flash				√		32	80	8 M, 240 k	-	49	-	4 ch × 1 unit	16 ch × 2 units	1	1	2	3	-	2	-	1	-	1	√	12	-	Data flash: 32 KB Backup RAM: 4 KB Instruction cache: 8 KB/2-way associative (4 KB/way) FPU, DMA, motor control, POC, voltage comparator, CLM, RNG, data CRC, boundary scan	3.0 to 5.5	80-LQFP (12 × 12)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)
													40																								
48																																					
512	48																																				
Body Control (All Flash)	V850E2/FK4-G	μPD70F3592 *	1024	Flash	√	128	80	8 M, 240 k	√	136	-	4 ch × 2 units	16 ch × 2 units	-	1	2	5	-	2	1	1	-	6	√	24+12	-	Data flash: 32 KB Backup RAM: 8 KB Instruction cache: 8 KB/2-way associative (4 KB/way) DMA, POC, voltage comparator, CLM, RNG, data CRC, boundary scan, FLX	3.0 to 5.5	176-HLQFP (24 × 24)	E1 QB-V850E2 (IECUBE2) QB-MINI2 (MINICUBE2)							

Remark POC: Power-on clear circuit; CLM: Clock monitor; FLX: FLEXRay controller; MEMC: External memory interface; DCAN: Diagnostic CAN; PMC: PWM diagnostic module; ETH: Ethernet controller; DLY: PWM delay unit; RNG: Random number generator

\* Under development



Applications		Device		Memory			Clock			I/O		Bus		Timer				Serial Interface										OC		Peripheral Functions				Other																	
Applications	CPU core	Commercial name	Product name	ROM size [Kf]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subblock (32, 768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting LIN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with in-circuit transmission/reception function	I <sup>2</sup> C	IEBus	CAN	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	LCD [segments x commons]	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board									
																			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Car Electronics	Body Control (All Flash)	V850ES	V850ES/FE3	μPD70F3370A	128	Flash	√	8	32	8 M, 240 k	√	51	-/-	7	-	-	1	1	16 bits × 8 (6 phases, 16 bits × 1)	-	2	-	-	-	-	2	-	-	1	-	1	-	-	√	-	-	10	-	POC, LVI, CLM, DMA	3.3 to 5.5	64-LQFP (10 × 10)	E1 QB-V850MINIL (MINICUBE) QB-V850ESFX3 (IECUBE)									
				μPD70F3371	256		√	16																																											
		V850ES/FF3	μPD70F3372	128	Flash	√	8	32	8 M, 240 k	√	67	-/-	7	-	-	-	1	1	16 bits × 8 (6 phases, 16 bits × 1)	-	2	-	-	-	-	-	2	-	-	1	-	1	-	-	√	-	-	12	-	POC, LVI, CLM, DMA	3.3 to 5.5		80-LQFP (12 × 12)								
			μPD70F3373	256		√	16																																												
		V850ES/FG3	μPD70F3374	128	Flash	√	8	32	8 M, 240 k	√	84	-/-	8	-	-	-	1	1	16 bits × 11 (6 phases, 16 bits × 1)	-	3	-	-	-	-	-	2	-	-	1	-	2	-	-	√	-	-	16	-	POC, LVI, CLM, DMA	3.3 to 5.5		100-LQFP (14 × 14)								
			μPD70F3375	256		√	16																																												
			μPD70F3376A	384		√	24	48																																											
			μPD70F3377A	512		√	32																																												
		V850ES/FJ3	μPD70F3378	256	Flash	√	16	32	8 M, 240 k	√	128	-/-	9	-	-	-	1	1	16 bits × 14 (6 phases, 16 bits × 1)	-	3	-	-	-	-	3	-	-	1	-	3	-	-	√	-	-	24	-	POC, LVI, CLM, DMA	3.3 to 5.5	144-LQFP (20 × 20)										
			μPD70F3379	384		√	24	48																																											
			μPD70F3380	512		√	32																																												
			μPD70F3381	768		√	40																																												
			μPD70F3382	1024		√	48																																												
		V850ES/FK3	μPD70F3383	512	Flash	√	32	48	8 M, 240 k	√	152	-/-	12	-	-	-	1	1	16 bits × 17 (6 phases, 16 bits × 1)	-	8	-	-	-	-	4	-	-	1	-	5	-	-	√	-	-	24+16	-	POC, LVI, CLM, DMA	3.3 to 5.5	176-LQFP (24 × 24)										
			μPD70F3384	768		√	48																																												
			μPD70F3385	1024		√	60																																												
		V850ES/FE3-L	μPD70F3610	64	Flash	√	6	20	8 M, 240 k	√	51	-/-	6	-	-	-	1	1	16 bits × 5	-	2	-	-	-	-	2	-	-	1	-	1	-	-	√	-	-	10	-	POC, LVI, CLM	3.3 to 5.5	64-LQFP (10 × 10)										
			μPD70F3611	96		√	8																																												
			μPD70F3612	128		√	12																																												
			μPD70F3613	192		√	16																																												
			μPD70F3614	256		√	16																																												
		V850ES/FF3-L	μPD70F3615	64	Flash	√	6	20	8 M, 240 k	√	67	-/-	6	-	-	-	1	1	16 bits × 5	-	2	-	-	-	-	2	-	-	1	-	1	-	-	√	-	-	12	-	POC, LVI, CLM	3.3 to 5.5	80-LQFP (12 × 12)										
			μPD70F3616	96		√	8																																												
			μPD70F3617	128		√	12																																												
			μPD70F3618	192		√	16																																												
			μPD70F3619	256		√	16																																												
		V850ES/FG3-L	μPD70F3620	128	Flash	√	8	20	8 M, 240 k	√	84	-/-	6	-	-	-	1	1	16 bits × 5	-	3	-	-	-	-	2	-	-	1	-	1	-	-	√	-	-	16	-	POC, LVI, CLM	3.3 to 5.5	100-LQFP (14 × 14)										
			μPD70F3621	192		√	12																																												
μPD70F3622	256			√	16																																														

Remark POC: Power-on clear circuit  
LVI: Low-voltage detector  
CLM: Clock monitor

Applications		Device		Memory				Clock			I/O		Bus		Timer							Serial Interface										OC			Peripheral Functions			Other									
Applications	CPU core	Commercial name	Product name	ROM size [Kb]	ROM type	Single voltage flash	RAM size [Kb]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subclock (32.768 kHz)	I/O ports	External bus (data/address)	16-bit timer	8-bit timer	Other timers	Watch timer	Watchdog timer	PWM output	UART	UART supporting LIN	UART, CSI	UART supporting LIN, CSI	UART, I <sup>2</sup> C	UART supporting LIN, I <sup>2</sup> C	UART supporting LIN, CSI, I <sup>2</sup> C	CSI	CSI, I <sup>2</sup> C	CSI with automatic transmission reception (CSI-AT)	I <sup>2</sup> C	IEBus	CAN	CAN, IEBus	UART supporting LIN, I <sup>2</sup> C, CAN	On-chip debugging	LCD [segments × commons]	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board					
																																											Car Electronics			Dashboard Control (All Flash)	
V850E1	V850E/DG3	μPD70F3416	128	Flash	√	6	24	240 k	√	80	-/	12	-	-	-	1	1	16 bits × 3	-	2	-	-	-	-	2	-	-	1	-	1	-	-	-	√	40 × 4	-	8	-	Meter driver × 4, POC, CLM, ROMC, sound generator	3.5 to 5.5	100-LQFP (14 × 14)	QB-V850MINIL (MINICUBE) QB-703427 (IECUBE)					
			256			12																																									
	V850E/DJ3	μPD70F3421	μPD70F3422	256	Flash	√	12	32	240 k	√	114	-/	27	-	-	-	1	1	16 bits × 11	-	2	-	-	-	-	-	2	-	-	2	-	3	-	-	-	√	40 × 4	-	12	-	Meter driver × 6, POC, CLM, DMA, ROMC, voltage comparator, sound generator, LCD bus interface	3.5 to 5.5	144-LQFP (20 × 20)	QB-V850MINIL (MINICUBE) QB-703427 (IECUBE) QB-703426 (IECUBE)			
				384			20																																								
				512			20																																								
				μPD70F3424			24																																						64	31	3
				μPD70F3425			1024																																						32	2	
				μPD70F3426A			2048																																						84		
	V850E/DL3	μPD70F3427	1024	Flash	√	60	64	240 k	√	117	32/24	31	-	-	-	1	1	16 bits × 11	-	2	-	-	-	-	3	-	-	2	-	3	-	-	√	-	-	16	-	Meter driver × 6, POC, CLM, DMA, ROMC, voltage comparator, sound generator, LCD bus interface	3.5 to 5.5	208-LQFP (28 × 28)	QB-V850MINIL (MINICUBE) QB-703427 (IECUBE)						

**Remark** POC: Power-on clear circuit  
 CLM: Clock monitor  
 ROMC: ROM correction

Applications		Device		Memory			Clock			I/O	Bus	Timer			Serial Interface						OC	Peripheral Functions			Other											
		CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subdock (32.768 kHz)	I/O ports	External bus (data/address)	32-bit timer	16-bit timer	16-bit timer encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	I <sup>2</sup> S	CAN	FlexRay	On-chip debugging	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board		
Car Electronics Instrument Cluster Control	V850E2	V850E2/DJ4	μ PD70F3522	256	Flash	√	24	80	8 M/ 240 k	√	105	-/-	4 ch × 3 units	16 ch × 5 units	-	1	2	2	-	3	-	2	-	3	-	√	16	-	-	Data flash: 32 KB Backup RAM: 16 KB Real-time clock FPU, instruction cache, DMA LCD bus interface, POC, CLM, boundary scan LCD [segments x commons] 69 × 6	2.7 to 5.5	144-LQFP (20 x 20)	E1 QB-V850E2 (IECUBE)			
			μ PD70F3523	512		48	96																											120	1	1
			μ PD70F3524	1024		96	120																											1	1	
			μ PD70F3525	2048		192	120																											1	1	
			μ PD70F3526	3072		256	120																											1	1	

Remark FPU: Floating-point unit  
POC: Power-on clear circuit  
LVI: Low-voltage detector

Applications		Device			Memory			Clock			I/O		Bus		Timer						Serial Interface				OCD			Peripheral Functions			Other							
		CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subdock (32.768 kHz)	I/O ports	External bus (data/address)	32-bit timer	16-bit timer	16-bit timer encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	I <sup>2</sup> S	CAN	FlexRay	On-chip debugging	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions			Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board		
Car Electronics	Instrument cluster Control	V850E2	V850E2/DK4-H	μ PD70F3529	2048	Flash	√	96	80	8 M, 240 k	√	127	-	4 ch × 1 unit	16 ch × 3 units	-	1	2	2	-	2	-	2	1	3	-	√	12	-	-	Data flash: 32 KB Backup RAM: 8 KB/16 KB Video RAM: 592 K/8 MB FPU, instruction cache, DMA LCD bus interface, 2D graphics functions, POC, CLM, boundary scan HFSI: 1 ch to 2 ch	2.7 to 5.5	176-HLQFP (24 x 24)	E1 QB-V850E2 (IECUBE)				
			V850E2/DN4-H	μ PD70F3532	3072		256	160	165		32/24	4 ch × 3 units	16 ch × 5 units				4	3																	1.1 to 1.3 (internal)	352-PBGA (23 x 23)		
			V850E2/DP4-H	μ PD70F3535	3072		256																														2.7 to 5.5 and 3.0 to 3.6 (external)	408-PBGA (27 x 27)
				μ PD70F3536																																		
			μ PD70F3537																																			

Remark FPU: Floating-point unit  
POC: Power-on clear circuit  
LVI: Low-voltage detector

Applications		Device		Memory			Clock			I/O	Bus	Timer				Serial Interface					OC	Peripheral Functions			Other								
		CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subdock (32.768 kHz)	I/O ports	External bus (data/address)	24-bit timer	16-bit timer	16-bit timer encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	FS	CAN	FlexRay	On-chip debugging	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])
Car Electronics	Body Control	V850E1	V850E/PG2	μ PD70F3413	240	Flash	√	12	64	-	-	49	-/-	1 + 5 units	2 units	6 units	-	-	3	-	2	-	-	1	-	-	22	-	-	Tuning RAM: 2 KB DMA, motor control, LVI, NBD	4.0 to 5.5 (external) 1.35 to 1.65 (internal)	100-QFP (14 x 14)	E1 QB-V850E2 (ECUBE) QB-MINI2 (MINICUBE2)
				μ PD70F3414	496		32	2																									

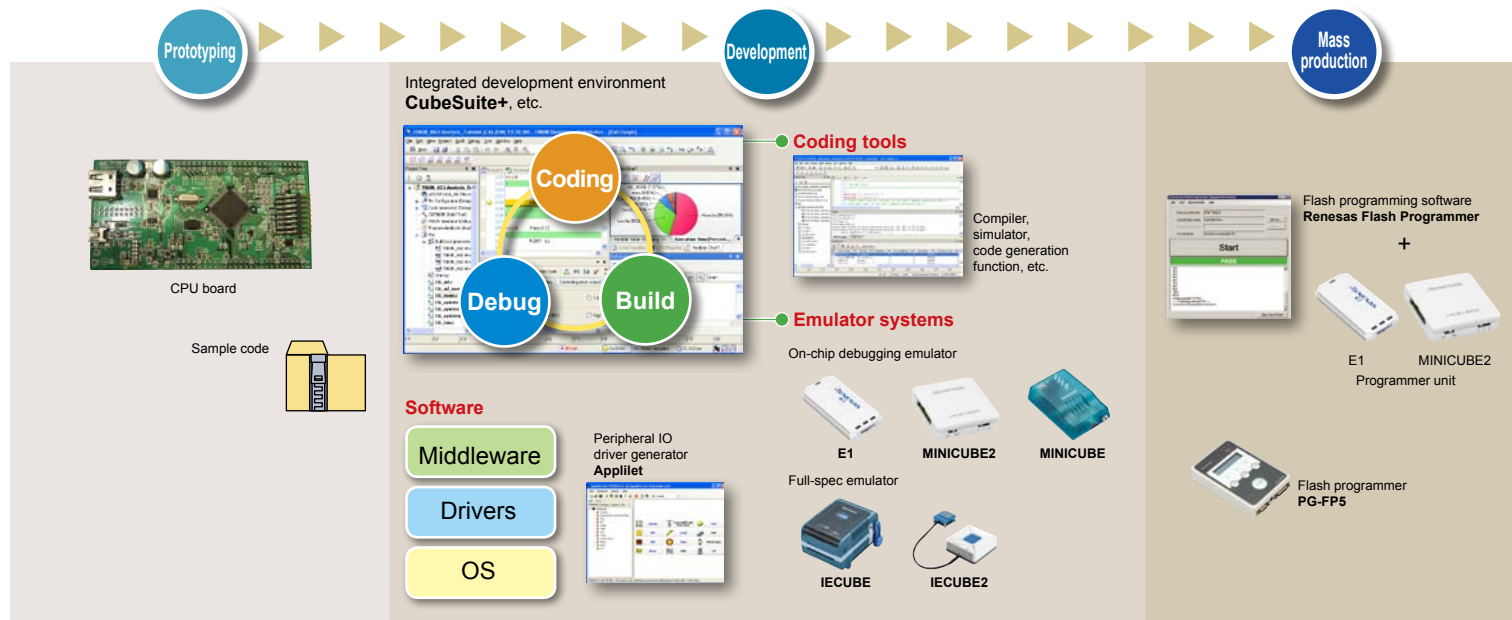
**Remark** NBD: Non-break debug  
LVI: Low-voltage detector

Applications		Device	Memory				Clock		I/O	Bus	Timer				Serial Interface						OCD	Peripheral Functions			Other								
Applications	CPU core	Commercial name	Product name	ROM size [KB]	ROM type	Single voltage flash	RAM size [KB]	Maximum operating frequency [MHz]	On-chip oscillator [Hz]	Subdock (32.768 kHz)	I/O ports	External bus (data/address)	32-bit timer	16-bit timer	16-bit timer encoder timer	OS timer	Watchdog timer	UART supporting LIN	UART supporting FIFO	CSI	CSI supporting FIFO	I <sup>2</sup> C	FS	CAN	FlexRay	On-chip debugging	12-bit A/D converter	10-bit A/D converter	8-bit D/A converter	Other functions	Power supply voltage [V]	Package (size [mm])	In-circuit emulator Emulation board
Car Electronics Body Control	V850E2	V850E2/PJ4	μ PD70F3506*	512	Flash	√	40	80	-	-	73	-/-	4 ch × 2 units	16 ch × 2 units	2 units	2	1	3	-	3	2	-	-	2	1	√	22	-	-	Data flash: 32 KB FPU, motor control, data CRC, POF, LVI, CLM, DMA	3.0 to 3.6 (external) 1.1 to 1.3 (internal)	144-HLQFP (20 x 20)	E1 QB-V850MINIL (MINICUBE)
			μ PD70F3507*				80	160	4.5 to 5.5 (external) 1.1 to 1.3 (internal)																								
			μ PD70F3508*	1024	80	160	3.0 to 3.6 (external) 1.1 to 1.3 (internal)																										
			μ PD70F3509*		80	160	4.5 to 5.5 (external) 1.1 to 1.3 (internal)																										
	V850E2/PG4-L	μ PD70F4154*	384	Flash	√	24	80	-	-	46	-/-	4 ch × 1 unit	16 ch × 1 unit	1 unit	2	1	2	-	2	-	-	-	2	-	√	18	-	-	Data flash: 16 KB motor control, data CRC, POF, LVI, CLM, DMA	3.0 to 5.5	100-LQFP (14 x 14)	E1 QB-V850MINIL (MINICUBE)	
																														μ PD70F4155*			3.0 to 5.5

**Remark** FPU: Floating-point unit  
POF: Power-on flag  
LVI: Low-voltage detector  
CLM: Clock monitor

\* Under development





\* A free evaluation version is also available for the coding tools and flash programming software (Renesas Flash Programmer).

## ■ V850 Development Tool Lineup

MCU	Real-time OS	Software Tools	Emulators		Programming Tools
			On-chip debugging emulator	Full-spec emulator	Programmer <sup>5</sup>
<b>V850</b>	Ri850V4 <sup>1</sup> Ri850MP (V850E2M Dual Core)	Integrated Development Environment CubeSuite+ for V850 (includes integrated development environment <sup>2</sup> , compiler, simulator, and emulator debugger)	E1 <sup>4</sup> MINICUBE2 MINICUBE (JTAG emulator for V850)	IECUBE IECUBE2	PG-FP5 <sup>6</sup> E1 <sup>4,7</sup> MINICUBE2 <sup>7,8</sup>
		Software Package for V850 [SP850] (includes integrated development environment <sup>2</sup> , compiler, simulator, and emulator debugger)			

**Notes:**

- Some MCUs support the RX850V4 real-time OS instead.
- The integrated development environment is CubeSuite+.
- The integrated development environment is the project manager PM+.
- The E20 emulator may be used as well, but the supported debugging functions are equivalent to those of the E1.
- This is a programmer for flash MCUs from Renesas. For details about which programmers can be used with each MCU and the programmer specifications, see the Renesas website (<http://www.renesas.com/programmer>).
- Used together with a programming GUI (provided free of charge).
- Used together with the programming software Renesas Flash Programmer (a free evaluation version is available).
- Used together with the programming software QB-Programmer (provided free of charge).

\* CubeSuite+ is not generally promoted to the U.S. and European customers. Customers in the U.S. and Europe who are interested in CubeSuite+ are requested to contact our regional marketing departments for details.

\* For details about which emulators can be used with each MCU and emulator specifications, see the Renesas website ([http://www.renesas.com/emulation\\_debugging](http://www.renesas.com/emulation_debugging)). The emulator that can be used might differ depending on the MCU part number.



## CPU Board

This CPU board is used to evaluate the operation of a V850 MCU by using the on-chip debugging emulator E1 or MINICUBE2 (each sold separately). By using this board, you can evaluate a series of development processes from program development to actual operation.

All MCU pins are assigned to peripheral board connectors, letting you create evaluation circuits using a commercially available universal board.



QB-V850ESJG3L-TB



QB-V850ESJG3U-TB

Target Device		Product Name	Emulator (sold separately)
Core	Group		
V850E2	V850E2/MN4	QB-V850E2MN4DUAL-TB *	E1
	V850E2/ML4	QB-V850E2ML4-TB	E1
V850E	V850E/IF3	QB-V850EIG3-TB *	E1 or MINICUBE2
	V850E/IG3		
V850ES	V850E/1H4-H	QB-V850E1H4H-TB *	E1 or MINICUBE2
	V850E/1HE2	QB-V850ESHG2-TB *	E1 or MINICUBE2
	V850E/1HF2		
	V850E/1HG2		
	V850E/1HJ2		
	V850E/1HE3	QB-V850ESHG3-TB *	E1 or MINICUBE2
	V850E/1HF3		
	V850E/1HG3		
	V850E/1HJ3		
	V850E/1IE2	QB-V850ESIE2-TB *	E1 or MINICUBE2
	V850E/1JG2	QB-V850ESJG2-TB *	E1 or MINICUBE2
	V850E/1JJ2		
	V850E/1JF3-L	QB-V850ESJG3L-TB *	E1 or MINICUBE2
	V850E/1JG3-L		
	V850E/1JC3-L	QB-V850ESJG3LUSB-TB *	E1 or MINICUBE2
	V850E/1JE3-L		
	V850E/1JF3-L		
	V850E/1JG3-L		
	V850E/1JG3-U	QB-V850ESJG3U-TB *	E1 or MINICUBE2
	V850E/1JH3-U		
V850E/1JE3-E	QB-V850ESJJ3E-TB *	E1 or MINICUBE2	
V850E/1JF3-E			
V850E/1JG3-E			
V850E/1JH3-E			
V850E/1JJ3-E			
V850E/1JG3	QB-V850ESJJ3-TB *	E1 or MINICUBE2	
V850E/1JJ3			
V850E/1KE2	QB-V850ESKG2-TB *	E1 or MINICUBE2	
V850E/1KF2			
V850E/1KG2			
V850E/1KJ2			



QB-F14T16-01

\* A 14-/16-pin conversion adapter QB-F14T16-01 (sold separately) is required when connecting an E1 emulator to a CPU board that has a connector for the MINICUBE2 emulator.

## Extensive Renesas Development Ecosystem

A wide variety of products for the V850 family, such as compilers and programmers, are available from partner tool vendors. These products enable the V850 family to be used in an even broader range of applications.

### ■ IDE/Compilers/Code generators

- Accurate Technologies
- CATS CO.,LTD.
- CriticalBlue
- dSPACE GmbH
- Gaio Technology Co., Ltd.
- Green Hills Software
- IAR Systems
- MathWorks
- Red Hat, Inc.
- Ubiquitous Corporation
- Vector Informatik GmbH

### ■ Co-verification

- Accurate Technologies
- ETAS GmbH
- Gaio Technology Co., Ltd.
- IAR Systems
- Synopsys
- Vector Informatik GmbH
- Yokogawa Digital Computer Corporation

### ■ OS

- EB (Elektrobit)
- ETAS GmbH
- Green Hills Software
- SEGGER Microcontroller
- Vector Informatik GmbH

### ■ Middleware/Drivers/Software IP

- Aplix Corporation
- E-Globaledge Corporation
- eSOL Co., Ltd.
- Kyoto Software Research, Inc.
- Mentor Graphics Corporation
- Ubiquitous Corporation
- Vector Informatik GmbH

### ■ Emulators and related emulation tools

- Accurate Technologies
- Computex Co., Ltd.
- ETAS GmbH
- Green Hills Software
- iSYSTEM AG
- Kyoto Microcomputer Co., Ltd.
- Lauterbach
- Tokyo Eletech Corporation
- Yokogawa Digital Computer Corporation

### ■ Starter kits/Evaluation boards/Platforms

- Sophia Systems Co., Ltd.
- Vector Informatik GmbH
- Yokogawa Digital Computer Corporation

### ■ Programmers

- Flash Support Group, Inc.
- Hokuto Denshi Co.,Ltd.
- Tokyo Eletech Corporation
- Vector Informatik GmbH
- WaveTechnology Co., Ltd.
- Yokogawa Digital Computer Corporation



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# Renesas MPUs & MCUs V850 MCU Selection Guide

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