

Separate Sheet

Product Specifications of the RH850/D1x Series of MCUs

RH850 D1M Key Features:

		176-pin	272-pin	376-pin	484-pin	
		R7F701404	R7F701406	R7F701408	R7F701411	
		R7F701424	R7F701426	R7F701428	R7F701431	
		R7F701405	R7F701407	R7F701410	R7F701412	
		R7F701425	R7F701427	R7F701430	R7F701432	
CPU	CPU System	RH850G3M				
	CPU Frequency	160 MHz		240 MHz		
	Memory Protection Unit (MPU)	Supported				
	Floating Point Unit (FPU)	Supported				
	Memory caches	Instruction cache	8 KB / 4-way associative			
	Non-CPU system memories	16 KB / 4-way associative		32 KB / 4-way associative		
Memory	Code Flash	3.75 MB (R7F701404, R7F701424)	3.75 MB (R7F701406, R7F701426)	3.75 MB (R7F701408, R7F701428)	3.75 MB (R7F701411, R7F701431)	
		5 MB (R7F701405, R7F701425)	5 MB (R7F701407, R7F701427)	5 MB (R7F701410, R7F701430)	5 MB (R7F701412, R7F701432)	
	Data Flash	64 KB				
	Local RAM	512 KB				
	Retention RAM	16 KB				
	Video RAM with Video RAM wrapper	1.55 MB		2 x 1.55 MB		
External memory interfaces	SDRAM Interface	Bus width	-	32-bit	16-bit	32-bit
		Mode	-	SDR-SDRAM (SDRA)	DDR2-SDRAM Interface (SDRB)	
		Max. clock	-	80 MHz	240 MHz	
	Serial Flash Memory Interface	Bus width	8-bit			
		Mode	SDR, DDR			
		Max. clock	SDR : 120 MHz, DDR : 80 MHz			

DMA		16 channels			
Operating clock	Main Oscillator	8 to 16 MHz			
	Low Speed Internal Oscillator	Typ. 240 kHz			
	High Speed Internal Oscillator	Typ. 8 MHz			
	Sub Oscillator	Typ. 32.768 kHz			
	Spread-spectrum PLL0	480 MHz			
	PLL1	Fixed to 480 MHz			
	PLL2	-		Max. 480 MHz	
I/O port		126	126	159	199
A/D converter		16 channels, 12 bit resolution		20 channels, 12 bit resolution	
Timer	16-bit Timer Array Unit B (TAUB)	3 units (16 channels / unit)			
	32-bit Timer Array Unit J (TAUJ)	1 unit (4 channels / unit)			
	Timer for Operating System (OSTM)	2 units (32-bit resolution, 1 channel / unit)			
	32-bit Always-On-Area Timer (AWOT)	1 unit (1 channel / unit)			
	Real Time Clock (RTCA)	Supported			
	Window Watchdog Timer A (WDTA)	2 units			
	PWM Generators with Diagnostic	1 unit (12-bit resolution, 24 PWM generators, 12 with diagnostic capability)			
Communication interface	Clocked Serial Interface G (CSIG)	4 channels			
	Queued Clocked Serial Interface H (CSIH)	2 channels			
	CAN Interface (RS-CAN)	3 channels (total 192 message buffers)			
	CAN Interface (RSCANFD)	3 channels (total 192 message buffers) : Only available for R7F701428, R7F701430, R7F701431, R7F701432			
	LIN / UART Interface (RLIN3)	4 channels			
	I²C Interface (RIIC)	2 channels			
	Ethernet AVB MAC (ETNB)	1 channel (Media Access Controller for up to 100 Mbps, with Audio Video Bridging)			

Communication interface	Media Local Bus (MLBB)	-		1 channel (50 Mbps)	
External interrupts	Maskable	11			
	Non-maskable (NMI)	1			
Audio	Sound Generator (SG)	5 units			
	PCM-PWM Converter (PCMP)	1 unit			
	I²S Interface (SSIF)	2 units (1 channel / unit)			
Video and Graphics	Video output (VO)	Channels	1 channel (1024 x 1024 pixels, 30 MHz pixel clock, RGB888, 4 layers)	2 channels (1024 x 1024 pixels, 48 MHz pixel clock, RGB888, 4 layers)	
		Interface	LVTTTL	LVTTTL for both channels, single RSDS selectable for channel 0 or 1	
		Pre-distortion	Warping Engine (VOWE)	Warping Engine (VOWE) for video channel 0	
		RLE decoding	Supported	Supported for each video channel	
		Sprite layer	3 x 16 sprites for 3 output layers		
		Timing Controller(TCON)	7 programmable signals		
		Video input(VI)	Channels	1 channel	1 channel
	Resolution		1024 x 1024 pixels		
	Pixel clock		30 MHz	60 MHz	
	Color formats		RGB666, ITU656	RGB888, ITU656	
	Interface		LVTTTL	LVTTTL for both channels, single MIPI CSI-2 for channel 0	
		Graphics Processing Unit	2D Graphics Processing Unit (GPU2D), 80 MHz operation clock	2D Graphics Processing Unit (GPU2D), 240 MHz operation clock	
		JPEG Unit (JCUA)	Supported		
		Video output data control	Video Output Checker (VOCA)	Video Output Checker (VOCA)	

Video and Graphics	Video output data control	2 CRC checker (DISCOM)		2 CRC checker (DISCOM) for each video channel		
Other functions	LCD Bus Interface (LCBI)	18 bit output, max. 10 MHz	-			
	Clock Monitors (CLMA)	For Main oscillator, Low speed internal oscillator, High speed internal oscillator, PLL0, PLL1, Video Input pixel clocks				
	Data CRC (DCRA)	Supported				
	Power-On-Clear (POC)	Supported				
	Intelligent Stepper Motor Driver (ISM), incl. zero point detection for each channel	1 unit, 6 channels	1 unit, 4 channels	1 unit, 6 channels		
	Error Correction Coding (ECC)	For Code Flash, Data Flash, Local RAM, Retention RAM, Video RAM, RS-CAN RAM, Caches tag / data RAMs				
	Intelligent Cryptographic Unit (ICU-S2)	Supported				
	On-Chip Debug (OCD)	Supported				
	Boundary Scan	Supported				
Voltage supply	Internal logic	Always-On-Area	3.3 V, 5 V via on-chip voltage regulator			
		Isolated-Area	3.3 V, 5 V via on-chip voltage regulator	1.25 V		
	I/O buffers	GPIO	3.3 V, 5 V			
		SDR-SDRAM	-	3.3 V	-	
		DDR2-SDRAM	-	1.8 V		
	A/D Converter supplies	Nominal 3.3 V, 5 V				
Package		HLQFP24 x 24 (0.5 mm)	BGA 21 x 21 (1.0 mm)	BGA 23 x 23 (1.0 mm)	BGA 27 x 27 (1.0 mm)	

RH850/D1L Key Features:

		144-pin R7F701401 R7F701421	144-pin R7F701402 R7F701422	176-pin R7F701403 R7F701423
CPU	CPU System		RH850G3M	
	CPU Frequency		120 MHz	
	Memory Protection Unit (MPU)		Supported	
	Floating Point Unit (FPU)		Supported	
	Memory caches	Instruction cache	8 KB / 4-way associative	
Non-CPU system memories		-	16 KB / 4-way associative	
Memory	Code Flash		2 MB	4 MB
	Data Flash		64 KB	
	Local RAM		256 KB	512 KB
	Retention RAM		16 KB	
	Video RAM with Video RAM wrapper		-	144 KB
External memory interfaces	Serial Flash	Bus width	4-bit	8-bit
		Mode	SDR	SDR, DDR
	Memory Interface	Max. clock	40 MHz	SDR : 120 MHz, DDR : 80 MHz
DMA		16 channels		
Operating clock	Main Oscillator		8 to 16 MHz	
	Low Speed Internal Oscillator		Typ. 240 kHz	
	High Speed Internal Oscillator		Typ. 8 MHz	
	Sub Oscillator		Typ. 32.768 kHz	
	Spread-spectrum PLL0		Max. 480 MHz	
	PLL1		Fixed to 480 MHz	
I/O port		103	126	
A/D converter		16 channels, 12-bit resolution		
Timer	16-bit Timer Array Unit B (TAUB)		3 units (16 channels / unit)	
	32-bit Timer Array Unit J (TAUJ)		1 unit (4 channels / unit)	

Timer	Timer for Operating System (OSTM)		2 units (32-bit resolution, 1 channel / unit)		
	32-bit Always-On-Area Timer (AWOT)		1 unit (1 channel / unit)		
	Real Time Clock (RTCA)		Supported		
	Window Watchdog Timer A (WDTA)		2 units		
	PWM Generators with Diagnostic		1 unit (12-bit resolution, 24 PWM generators, 12 with diagnostic capability)		
Communication interface	Clocked Serial Interface G (CSIG)		4 channels		
	Queued Clocked Serial Interface H (CSIH)		2 channels		
	CAN Interface (RS-CAN)		3 channels (total 192 message buffers) : Only for R7F701401, R7F701402, R7F701403		
	CAN Interface (RSCANFD)		3 channels (total 192 message buffers) : Only for R7F701421, R7F701422, R7F701423		
	LIN/UART Interface (RLIN3)		4 channels		
	I²C Interface (RIIC)		2 channels		
External Interrupt	Maskable		11		
	Non-maskable (NMI)		1		
Audio	Sound Generator (SG)		5 units		
	PCM-PWM Converter (PCMP)		1 unit		
	I²S Interface (SSIF)		2 units (1 channel / unit)		
Video and Graphics	Video output	Channels	-	1 channel (480 x 320 pixels, 10 MHz pixel clock, RGB666, 4 layers)	
		Interface	-	LVTTTL	
		RLE decoding	-	Supported	
		Sprite layer	-	3 x 16 sprites for 3 output layers	
		Timing Controller (TCON)	-	3 programmable signals	7 programmable signals
Other functions	LCD Bus Interface (LCBI)		18-bit output, max. 10 MHz		
	Clock Monitors (CLMA)		For Main oscillator, Low speed internal oscillator, High speed internal oscillator, PLL0, PLL1		

Other functions	Data CRC (DCRA)		Supported		
	Power-On-Clear (POC)		Supported		
	Intelligent Stepper Motor Driver (ISM), incl. zero point detection for each channel		1 unit, 6 channels		
	Error Collection Coding (ECC)		For Code Flash, Data Flash, Local RAM, Retention RAM, Video RAM, RS-CAN RAM, Caches tag/data RAMs		
	Intelligent Cryptographic Unit (ICU-S2)		Supported		
	On-Chip Debug (OCD)		Supported		
	Boundary Scan		Supported		
Voltage supply	Internal logic	Always-On-Area	3.3 V, 5 V via on-chip voltage regulator		
		Isolated-Area	3.3 V, 5 V via on-chip voltage regulator		
	I/O buffers	GPIO	3.3 V, 5 V		
	A/D Converter supplies		Nominal 3.3 V, 5 V		
Package			LQFP 20 x 20 (0.5 mm)	LQFP 20 x 20 (0.5 mm)	LQFP 24 x 24 (0.5 mm)

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