

PRODUCT SCOUT AUTOMOTIVE

AUTOMOTIVE MICROCONTROLLERS

EDITION DECEMBER 2020

Series	Nickname/ Group	Part number	Flash size	RAM [B]	Data flash	Core	FPU	I/O lines	CS/UART/LIN	CAN/CAN-FD	PC	External bus	Other interface	Timer channels [8/16/32-bit]	PWMs	Clock speed [MHz]	Internal oscillator	Subclock [32 kHz]	A/D converter/ D/A converter	Supply voltage (VDD) [V]	Pins	Packages	T _{max} [°C]	Other features		
F Series	RL78/ F12	RSF10968	8 K	0.5 K																						
		RSF1096A	16 K	1 K																						
		RSF1096B	24 K	1.5 K																						
		RSF1096C	32 K	2 K				16	2/3/1			1				4			-	4x 10-bit/-		20	PLSP0020JC-A			
		RSF1096D	48 K	3 K																						
		RSF1096E	64 K	4 K																						
		RSF109AA	16 K	1 K																						
		RSF109AB	24 K	1.5 K																						
		RSF109AC	32 K	2 K				26	4/4/1			4				7			-	8x 10-bit/-		30	PLSP0030JB-B			
		RSF109AD	48 K	3 K																						
		RSF109AE	64 K	4 K																						
		RSF109BA	16 K	1 K																						
		RSF109BB	24 K	1.5 K																						
		RSF109BC	32 K	2 K				28	4/4/1	0/-		4	-	-	-/9/-	7	32	1x 15 KHz 32 MHz	-	8x 10-bit/-	1.8...5.5	32	PWON0032KB-A	85, 125	DMA, LVI, POC	
		RSF109BD	48 K	3 K																						
		RSF109BE	64 K	4 K																						
		RSF109GA	16 K	1 K																						
		RSF109GB	24 K	1.5 K				44	6/5/1			6				7			✓	10x 10-bit/-		48	PLOP0048KF-A			
		RSF109GC	32 K	2 K																						
		RSF109GD	48 K	3 K																						
		RSF109GE	64 K	4 K																						
		RSF109LA	16 K	1 K																						
		RSF109LB	24 K	1.5 K				58	7/6/1			7				7			✓	12x 10-bit/-		64	PLOP0064KF-A			
		RSF109LC	32 K	2 K																						
		RSF109LD	48 K	3 K																						
		RSF109LE	64 K	4 K																						
		RL78/ F13-LIN	RSF10A6A	16 K	1 K																					
			RSF10A6C	32 K	2 K																					
			RSF10A6D	48 K	3 K				16	2/2/1			2			-/17/-	9			-	4x 10-bit/-		20	PLSP0020JC-B		
			RSF10A6E	64 K	4 K																					
	RSF10AAA		16 K	1 K																						
	RSF10AAC		32 K	2 K				26	2/2/1			2			-/17/-	9			-	10x 10-bit/-		30	PLSP0030JB-A			
	RSF10AAD		48 K	3 K																						
	RSF10AAE		64 K	4 K																						
	RSF10ABA		16 K	1 K																						
	RSF10ABC		32 K	2 K				28	2/2/1			2			-/17/-	8			-	8x 10-bit/-		32	PVON0032KD-A			
	RSF10ABD		48 K	3 K																						
	RSF10ABE		64 K	4 K																						
	RSF10AGA		16 K	1 K						0/-		-		-	-/17/-	9	32	2x 15 KHz 32 MHz	✓	12x 10-bit/-	2.7...5.5	48	PVON0048KG-A, PLOP0048KF-A	105, 125, 150	DTC, LVI, MCT, POC	
	RSF10AGC		32 K	2 K				44	2/2/1		2															
	RSF10AGD		48 K	3 K																						
	RSF10AGE		64 K	4 K																						
	RSF10AGF		96 K	6 K				4/3/1			5				-/21/-	11			✓	15x 10-bit/-						
	RSF10AGG		128 K	8 K																						
	RSF10ALC		32 K	2 K																						
	RSF10ALD		48 K	3 K				2/2/1			2				-/17/-	9			✓	12x 10-bit/-		64	PLOP0064KF-A			
	RSF10ALE		64 K	4 K																						
	RSF10ALF		96 K	6 K				4/3/1			5				-/21/-	11				19x 10-bit/-						
	RSF10ALG		128 K	8 K																						
	RSF10AME		64 K	4 K				74	4/3/1		5				-/21/-	11			✓	20x 10-bit/-		80	PLOP0080KE-A			
	RSF10AMF		96 K	6 K																						
	RSF10AMG		128 K	8 K																						
	RL78/ F13-CAN		RSF10BAC	32 K	2 K																					
			RSF10BAD	48 K	3 K				26	3/3/1			3													
			RSF10BAE	64 K	4 K																					
			RSF10BAF	96 K	6 K																					
		RSF10BAG	128 K	8 K																						
		RSF10BBC	32 K	2 K																						
		RSF10BBD	48 K	3 K				28	3/3/1			4														
		RSF10BBE	64 K	4 K																						
		RSF10BBF	96 K	6 K																						
		RSF10BBG	128 K	8 K																						
		RSF10BGC	32 K	2 K				44	4/3/1	1/-		5	-	-	-/21/-	11	32	2x 15 KHz 32 MHz	✓	15x 10-bit/-	2.7...5.5	48	PVON0048KG-A, PLOP0048KF-A	105, 125, 150	DTC, LVI, MCT, POC	
		RSF10BGD	48 K	3 K																						
		RSF10BGE	64 K	4 K																						
		RSF10BGF	96 K	6 K																						
		RSF10BGH	128 K	8 K																						
		RSF10BGL	32 K	2 K				58	4/3/1		5				-/21/-	11			✓	19x 10-bit/-		64	PLOP0064KF-A			
		RSF10BLD	48 K	3 K																						
		RSF10BLE	64 K	4 K																						
		RSF10BLF	96 K	6 K																						
		RSF10BLG	128 K	8 K				74	4/3/1		5				-/21/-	12			✓	20x 10-bit/-		80	PLOP0080KE-A			
		RSF10BME	64 K	4 K																						
		RSF10BMF	96 K	6 K																						
		RSF10BMG	128 K	8 K																						
		RL78/ F14	RSF10PAD	48 K	4 K				26	3/3/1			3													
			RSF10PAE	64 K	6 K																					
			RSF10PBD	48 K	4 K				28	3/3/1			4													

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



Tasking Vx-toolset (RH850)

- Integrated development environment for 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
- For more information visit www.tasking.com



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



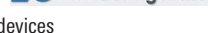
AUTOSAR

- Standard Peripheral Abstraction Layer (SPAL) drivers, communication drivers and test drivers
- For AUTOSAR ARA 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 up to 500 prototypes



AP4, Applit3, 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 <http://www.renesas.com/ap4>



Applit3 for RL78/D1A

- Peripheral driver code generator for RL78 devices
- Based on graphical user interface settings the peripheral driver initialization and API function code will be generated
- Available for free at <http://www.renesas.com/ap4>



Renesas Graphics Library (RGL) for RH850/D1x

- Driver stack for all graphic related macros
- Simple interface for graphics programming
- Production quality code a customer will use in product
- Easy to integrate into no-OS and RTOS environment
- Example programs for the best possible out of the box experience



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: RTE0100020KCE0000R



IECUBE In-Circuit Emulator (RL78)

- For RL78 devices
- Package includes
 - IAR Embedded Workbench (size limited)
 - USB cable, power supply
- Order codes:
 - Y-QB-RL78F12-ZZZ-EE (RL78/F12)
 - Y-QB-RL78F14-ZZZ-EE (RL78/F13 & RL78/F14)
 - Y-QB-RL78F15-ZZZ-EE (RL78/F15)
 - Y-QB-RL78D1A-ZZZ-EE (RL78/D1A)
 - Y-QB-RL78D1A2-ZZZ-EE (RL78/D1A, 512 KB version)



Please visit <https://www.renesas.com/eu/en/software-tool/iecube-r178-family> for socket references and software information.

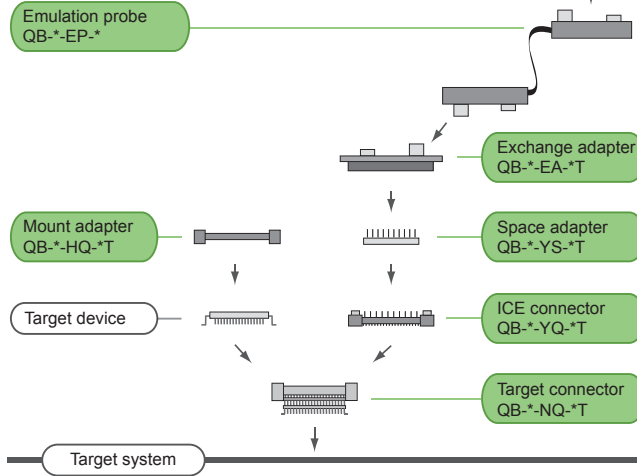
IE850 In-Circuit Emulator (RH850)

- For RH850/D1x devices
- Universal main unit, device dependent emulation probe
- Package includes
 - USB cable, power supply
- Order codes:
 - Y-QB-V850E2-EE (main unit)
- RTE7701460EPA0000R (Emulation Probe for RH850/D1M2H, RH850/D1M2, RH850/D1M1A, RH850/D1M1-V2, RH850/D1L2H, RH850/D1L2, RH850/D1L1 and RH850/D1S1)



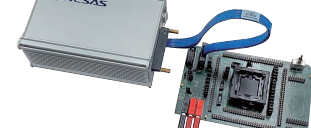
Please visit <https://www.renesas.com/eu/en/software-tool/ie850> for socket references and additional tool information.

Socket System (RL78)



IE850A Emulator featuring AURORA Trace (RH850/E2M and RH850/U2A16)

- For RH850/E2M and RH850/U2A16 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)
 - Y-RH850-E2X-40NM-EMU-ADAPTER-REV2 (Emulation Adapter for RH850/E2M)
 - RTE7702200EAB00000J (Emulation Adapter for RH850/U2A16)



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

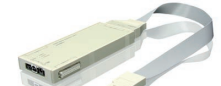
iSYSTEM

- 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 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) for Microsoft Windows™

- Supports RL78 and RH850 flash microcontrollers
- For development and prototyping
- Works with E2 On-Chip Debugging emulator and direct RS-232/UART connection
- Graphical user interface
- Ability to save programming settings in workspace files
- Support for automated programming using scripts
- Available for free at <http://www.renesas.com/rfp>



RL78/F12 Starter Kit

- Equipped with
 - 48-pin RL78/F12 device (RSF109GE)
 - 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
 - KickStart Edition of IAR EWRL78 (16 KB)
 - E1 On-Chip Debugging Emulator
 - Quick-start guide, user's manual and sample software
- Order code: Y-ASK-RL78F12



RL78/F13 Starter Kit

- Equipped with
 - 80-pin device (RSF10BMG)
 - 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
 - KickStart Edition of IAR EWRL78 (16 KB)
 - E1 On-Chip Debugging Emulator
 - Quick-start guide, user's manual and sample software
- Order code: Y-ASK-RL78F13



RL78/F14 Starter Kit

- Equipped with
 - 100-pin device (RSF10PPJ)
 - 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
 - KickStart Edition of IAR EWRL78 (16 KB)
 - E1 On-Chip Debugging Emulator
 - Quick-start guide, user's manual and sample software
- Order code: Y-ASK-RL78F14



RL78/F14 BLDC Starter Kit

- Equipped with
 - 80-pin device (RSF10PMJ)
 - LIN interface
 - One switch
 - 8 MHz main clock resonator
 - 14-pin debugging and programming interface
- Package includes
 - KickStart Edition of IAR EWRL78 (16 KB)
 - E1 On-Chip Debugging Emulator, BLDC motor
 - Quick-start guide, user's manual and sample software
- Order code: Y-BLDC-SK-RL78F14



RL78/F15 Starter Kit

- Equipped with
 - 144-pin RL78/F15 (RSF113TL) device
 - rotary 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
 - Target board: Y-QB-RS5F113TL-TB-V2
 - E1 On-Chip Debugging Emulator
 - IAR EWRL78 KickStart Edition
 - Quick-Start Guide
- Order code: Y-ASK-RL78F15



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)
 - KickStart Edition of IAR EWRH850 (128 KB)
 - E1 On-Chip Debugging Emulator
 - iSYSTEM WinIDEA/E1 evaluation license
 - sample code software
- Order code: 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)
 - KickStart Edition of IAR EWRH850 (128 KB)
 - E1 On-Chip Debugging Emulator
 - iSYSTEM WinIDEA/E1 evaluation license
 - sample code software
- Order code: 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)
 - KickStart Edition of IAR EWRH850 (128 KB)
 - E1 On-Chip Debugging Emulator
 - iSYSTEM WinIDEA/E1 evaluation license
 - sample code software
- Order code: 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)
 - KickStart Edition of IAR EWRH850 (128 KB)
 - E1 On-Chip Debugging Emulator
 - iSYSTEM WinIDEA/E1 evaluation license
 - sample code software
- Order code: 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)
 - KickStart Edition of IAR EWRH850 (128 KB)
 - E1 On-Chip Debugging Emulator, BLDC motor
 - Quick-start guide, user's manual and sample software
- Order code: Y-BLDC-SK-RH850F1KM-S1



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. 110 mm x 55 mm
- Order codes:
 - Y-QB-RS5F109GE-TB (RL78/F12)
 - Y-QB-RS5F10BMG-TB (RL78/F13)
 - Y-QB-RS5F10PPJ-TB (RL78/F14)
 - Y-QB-RS5F113TL-TB-V2 (RL78/F15)



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-P1X-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-V2 (RH850/P1x-C, 156-pin)
 - Y-RH850-P1XC-204PIN-PB-T1-V2 (RH850/P1x-C, 204-pin)
 - Y-RH850-P1XC-404PIN-PB-T1-V2 (RH850/P1x-C Emulation Device supporting AURORA Trace)



RH850 Evaluation Platform - E2M Adapter Boards

- For RH850/E2M evaluation
- To be used in combination with the RH850 Evaluation Platform or stand-alone operation
- Equipped with
 - Burn-in socket to adapt RH850/E2M 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/E2x, 292-pin)
 - Y-RH850-E2X-373PIN-PB-T1-V3 (RH850/E2x, 373-pin)
 - Y-RH850-E2X-468PIN-PB-T1-V1 (RH850/E2x, 468-pin)



RH850 Evaluation Platform - U2A16 Adapter Boards

- For RH850/U2A16 evaluation
- To be used in combination with the RH850 Evaluation Platform or stand-alone operation
- Equipped with
 - Burn-in socket to adapt RH850/U2A16 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-292PIN-PB-T1-V1 (RH850/U2A16, 292-pin)
 - Y-RH850-U2A-373PIN-PB-T1-V1 (RH850/U2A16, 373-pin)
 - Y-RH850-U2A-516PIN-PB-T1-V1 (RH850/U2A16, 516-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 PS/5
 - 4 Signal LEDs (active high), 3 push buttons, 2 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-Reach 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 (excluding TFT display)
 - Y-RH850-X1X-MB-T2-V2 (including TFT display)



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	I ² C	Pins	Packages	Tj, max [°C]	Other features
R-Car Gen3	R-Car H3	R8A77951	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 H3N	R8A77951BN	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 Prcessor, Timers, WDT, PWMs
	R-Car M3	R8A77961	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 M3N	R8A77965	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 Prcessor, Timers, WDT, PWMs
	R-Car E3	R8A77990	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 Prcessor, Timers, WDT, PWMs
	R-Car D3	R8A77995	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, Timers, WDT, PWMs

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
	R-Car V3U	R8A779A0D	CR52 Lockstep 16Hz/2k DMIPS	8 x CA76 1,8GHz/93k DMIPS	GE7800 600MHz	8CVe / 533MHz	60 TOPS	4x ISP, 6x IMR, 2x DOF, 2x STV, 4x ACF, 2x SMD, 2x DSP	H264 Enc, H264 Codec	No	128bit LPDDR4-4266	2x QSPI 1x eMMC	4x MIPI_CSI2	2x MIPI_CSI2 2x DU	4x PCIe 4.0	8x CAN 2.0B/FD, Flexray	6x GBIT AVB	Up to ASIL D	FCBGA 0.8mm 1992 pins	4x UART, 6x SPI, 7x I2C, Security JTAG

Other features:	CVe DOF	Computer Vision Engine Dense Optical Flow	DU IMR	Display Unit Image Rectifier	ISP SMD	Image Signal Processor Simple Instruction Multiple Data	STV WDT	Stereo Vision Window Watchdog Timer
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Green Hills Multi (R-Car)



- 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

AUTOSAR



- Standard Peripheral Abstraction Layer (SPAL) Drivers, Communication Drivers and Complex Drivers for R-CAR
- For AUTOSAR AR4.X based MCAL for R-CAR
- Very high software quality standards supplemented by many years experience
- Worldwide support infrastructure with interface for 1st and 2nd level support in Europe
- Cooperation with various BSW/QS vendors and integrators
- Flexible Mass-Production Licenses
- Free-of-charge Development Licenses for up to 500 prototypes

R-Car e²studio



- e² studio is a complete, state of the art development environment supporting Renesas R-Car V series, based on an open source Eclipse CDT.
- Supported Core/Devices: Cortex A53 dual on Renesas R-Car V3M and R-Car V3H, A76 on R-Car V3U
- Package includes
 - Modern Arm Cores, Cortex A/R in R-Car SoC are supported with HSSTP high speed trace
 - ADAS plug-in's are available. "Debug Trace Agent", "Bus Traffic Monitor", "Image Viewer", "Pin Configurator", etc.
 - C99 toolchain optimized to 64 threads CVengine with ISO26262 TCL3 capable
 - Support SIL development with IMP-SimTools
- Hardware Support
 - Renesas Starter Kit board and embedded Yocto Linux.
 - Lauterbach JTAG incl. scripting and semi-hosting
- e²studio basic features : Based on Eclipse "Oxygen" with CDT support.
- See e² studio global web site :<<https://www.renesas.com/eu/en/software-tool/e-studio>>

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



R-Car Starter Kit Premier (R-Car H3)

- 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 & 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-H3-8GB-WS30 / RTP0RC77951SKBX010SA03
- Y-SICA20I2P (JTAG Debug Adapter)



R-Car Starter Kit Pro (R-Car M3)

- Equipped with
 - 1384-pin R-Car M3 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 & 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-M3W-8GB-WS30 / RTP8J77961ASKB0SK0SA05A
- 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 [WIFI, 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 QSPI 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
 - USB& 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)



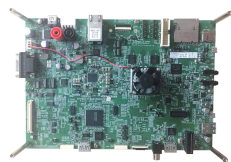
R-Car V3H Starter Kit

- Equipped with :
 - R-Car V3H
 - 2 Gbytes DDR3L-1600
 - 64 Mbytes Hyper Flash
 - 64 Mbytes QSPI 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
 - USB& HDMI Cable
- Software
 - Linux BSP (Linux.Org)
 - Configuration tools
 - Mimi Monitor
- Order codes: Y-ASK-RCAR-V3H-WS11 (with Rohm PMIC)
- Y-ASK-RCAR-V3H-WS20 (with Renesas PMIC)



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



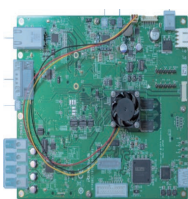
R-Car H3/M3/M3N Development Board 'SALVATOR-XS'

- 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 / RTP0RC7796SIPB0012SS5A
 - Y-R-CAR-H3-8GB-BOARD-SKT-WS30 / RTP0RC7795SIPB0012S-S03



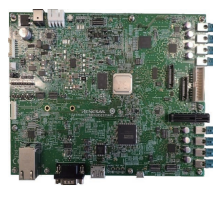
R-Car V3M Development Board "EAGLE"

- 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 / RTP8A77970ASKB0EG0SA001#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 / RTP8A77980ASKB0CW0SA001#WS



R-Car V3U Development Board "FALCON"

- Equipped with
- NOR flash memory:
 - Serial NOR flash memory device for QSPI0
 - HyperFlash memory device for QSPI0 and QSPI1
 - SDRAM:
 - Four LPDDR4X devices for DBSC4
 - Display interface:
 - Mini display port connector for DSI0
 - GMSL output connector (FAKRA) for DSI0 and DSI1
 - Video input interfaces : x3 GMSL input connectors (FAKRA) for CSI0 to CSI3
 - Storage interface: eMMC memory for MMC
 - Network interfaces:
 - OcuLink connector for PCIe0 and PCIe1 (4 lanes),OcuLink connector for PCIe2 and PCIe3 (4 lanes)
 - Gigabit Ethernet (GbE) connector for EtherAVB0
 - Six Ethernet AVB ports (MATenet) for EtherAVB0 to EtherAVB5
 - Two FlexRay connectors for FlexRay_A and FlexRay_B
 - Peripheral interfaces : Debug serial connector for SCIF0/HSCIF0
 - Debugger interfaces: 20-pins JTAG connector for JTAG1,JTAG connects for JTAG2
 - Peripheral connectors:
 - EX-SPI connector for QSPI0
 - Two break-out board connectors (EXIO connectors A and B)
 - Ethernet sub-board connector
 - CSI and DSI sub-board connector
 - Mode switch-board connector
 - Power supply: Two 12.0-V DC inputs (D12.0V1 and/or D12.0V2)
 - Operating temperature: +25 degrees C at ambient
 - Package includes CD with User's Manual, Schematic and boot software
 - Order Code: Y-RCAR-V3U-FALCON-BRD-DEV-WS10 / RTP8A779A0ASKB0FS0SA000#WS



Download this Product Scout at
<https://www.renesas.com/eu/en/document/bro/product-scout-automotive-0>

POWER SUPPLY PRODUCTS

EDITION DECEMBER 2020

Power Management ICs (PMIC)

Product Name	Function	Input Voltage [V]	Linear Output	Digital Output Pins	Can Sample	Switching Regulators	Switching Frequency [MHz]	LDOs	GPIOs [n]	Comm. Interface	Temp. Range	Package
RAA270000	PMIC for Automotive RH850 E1x, C1x MCUs	6.3 - 18.5	yes	MUXOUT, FSOUT, EXCNT, (INTOUT, RSTB)	yes	Buck/Buck	2.1/2.1	4LDOs, 2Trackers	0	SPI	-40 to +125	64pin HTQFP 12 x 12mm
RAA270005	PMIC for Automotive RH850 P1x MCUs	2.2 - 18.5	yes	MUXOUT, EXCNT1, EXCNT2, (INTOUT, RSTB)	yes	Boost/Buck	0.42/2.1	2LDOs, 2Tracker	0	SPI	-40 to +125	40pin HLQFP 9 x 9mm

Camera PMIC

Product Name	Function	Input Voltage	# of Outputs	LDO	DCDC	Switching Frequency	Temp. Range	Package
ISL78083	PMIC for satellite cameras with power good pins	4.5 - 42V	4	300 mA	3 x 750 mA	2.2 MHz	-40 to +125°C	24 Ld SCQFN

Multiphase Synchronous Controllers

Product Name	Function	Topology	Input Voltage	# of Outputs	# of Phases	Output Voltage	Bias Voltage	Digital Interface	Temp. Range	Package
ISL78224	48/12V bidirectional DCDC	buck and boost	65V / 45V	1	4	48V / 12V	5V	I2C/PMBus	-40 to +125°C	64 Ld TQFP
ISL78226	48/12V bidirectional DCDC	buck and boost	65V / 45V	1	6	48V / 12V	5V	I2C/PMBus	-40 to +125°C	65 Ld TQFP
ISL78225	multiphase DCDC controller	buck or boost	45V	1	4	ext. FET driver	5V	no	-40 to +125°C	44 Ld TQFP
ISL78220	multiphase DCDC controller	buck or boost	45V	1	6	ext. FET driver	5V	no	-40 to +125°C	44 Ld TQFP
ISL78227	multiphase Boost w. integrated drivers	boost	60V	1	2	55V	5V	no	-40 to +125°C	32 Ld WFOFN
ISL78229	multiphase Boost w. integrated drivers	boost	60V	1	2	55V	5V	I2C/PMBus	-40 to +125°C	40 Ld WFOFN

Laser Driver

Product Name	Function	Supply Voltage	Rise/Fall Time	# of Channels	Pixel Frequency	Output Current	Digital Interfaces	Temp. Range	Package
ISL78365	quad channel laser driver for HUD w. speckle reduction	3.3V	1.5 ns	4	150 MHz	750 mA	10 Bit video interface and SPI	-40 to +125°C	40 Ld WFOFN

DISCRETE POWER PRODUCTS

PowerMOSFET

Series	Part Number	V _{DS} [V]	R _{DS(on)} max [mΩ]		I _{DDM} [A]	PT @ T _c = 25 °C [W]	R _{th(j-c)} [°C/W]	Q _g typ. [nC]	C _{iss} typ. [pF]	Package
			V _{GS} = 10.0 V	V _{GS} = 4.5 V *V _{GS} = 4.0 V						
N-Channel	ANL3	40	0.85	-	250	348	0.43	245	12900	TO-263-7p-SHL
			1.25	-	160	250	0.60	157	8800	TO-263-7p-SHL
			1.05	-	180	348	0.43	198	10500	TO-263-7p
			1.25	-	180	288	0.52	160	8900	TO-263-7p
			1.4	-	110	348	0.43	198	10500	TO-2632P
			1.75	-	110	250	0.60	126	7200	TO-2632P
			2.3	-	100	176	0.85	80	4700	TO-2632P
			2.8	-	90	147	1.02	68	3900	TO-2522P
			2.8	6.0	90	147	1.02	68	3900	TO-2522P
			2.8	6.0	90	147	1.02	68	3800	TO-2522P
			2.95	6.2	90	147	1.02	68	3900	TO-2632P
			2.95	-	90	147	1.02	68	3900	TO-2632P
			3.3	-	75	138	1.09	58	3400	HSO8-8
			3.85	-	60	105	1.43	42	2450	HSO8-8
			3.85	8.6	60	105	1.43	42	2450	TO-2522P
			3.90	8.6	60	105	1.43	42	2450	TO-2522P
			4.8	-	50	97	1.55	38	2100	HSO8-8
			5.7	-	75	75	2.00	30	1630	TO-2522P
			5.7	12.6	75	75	2.00	27	1630	TO-2522P
			8.0	-	30	59	2.54	27	1600	HSO8-8 Dual
			10.1	-	30	44	3.37	19	1000	HSO8-8 Dual
	ANL2	55	1.4	-	180	348	0.43	196	10700	TO-263-7p
			1.75	-	180	288	0.52	160	9300	TO-263-7p
			1.75	-	110	348	0.43	196	10700	TO-2632P
			2.1	-	160	250	0.60	126	7500	TO-263-7p
			2.2	-	110	250	0.60	126	7500	TO-2632P
			3.25	-	100	176	0.85	80	4900	TO-2632P
			3.85	-	90	147	1.02	68	4000	TO-2522P
			4.0	-	90	147	1.02	68	4000	TO-2632P
			4.5	-	75	138	1.09	55	3500	HSO8-8
			5.5	-	60	105	1.43	42	2500	TO-2522P
			6.7	-	35	97	1.55	38	2240	HSO8-8
			5.3	8.2	90	147	1.02	63	4000	TO-2522P
			5.3	8.2	90	147	1.02	63	4000	TO-2522P
			5.3	8.2	90	147	1.02	63	4000	TO-2632P
			7.9	12.0	60	105	1.43	37	2400	TO-2522P
			7.9	12.0	60	105	1.43	37	2400	TO-2522P
			9.6	-	45	75	2.00	30	1690	TO-2632P
			9.6	-	45	75	2.00	30	1690	TO-2522P
			11.6	19.6	45	75	2.00	25	1530	TO-2522P
			14.0	21.0	30	59	2.54	25	1500	HSO8-8 Dual
			20.0	30.0	30	44	3.37	16	1000	HSO8-8 Dual
			21.0	-	30	44	3.37	20	1000	HSO8-8 Dual
			35	55	16	27.3	5.49	12	400	HSO8-8
			39.0	60.0	16	25	5.95	11	500	HSO8-8 Dual
	ANM2	100	2.4	-	250	348	0.43	190	9500	TO-263-7p SHL
			8.4	-	-50	102	1.47	64	2300	HSO8-8
			6.2	-	-75	138	1.09	94	3200	HSO8-8
			4.0	60.0*	-15	30	5	23	1100	TO-2522K
			25.0	38.0*	-20	38	3.95	34	1650	TO-2522K
			17.0	23.5*	-36	56	2.68	55	2800	TO-2522K
			17.0	23.5*	-36	56	2.68	55	2800	TO-2632K
			9.6	15.0*	-50	84	1.79	100	3800	TO-2522K
			9.6	15.0*	-50	84	1.79	100	5000	TO-2522K
			9.6	15.0*	-50	90	1.67	100	5100	TO-2632K
			9.7	-	-75	138	1.09	91	3200	HSO8-8
			5.3	8.0*	-83	150	1	200	9820	TO-2632P
			3.5	5.1*	-100	200	0.75	320	15100	TO-2632P
			3.7	5.1*	-100	200	0.75	320	15100	TO-2632P
			70.0	95.0*	-15	30	5	23	1100	TO-2522K
			47.0	70.0*	-20	57	2.63	34	1605	HSO8-8
			48.0	64.0*	-20	38	3.95	34	1650	TO-2522K
			29.5	37.5*	-36	56	2.68	54	3100	TO-2632K
			30.0	40.0*	-36	56	2.68	52	3200	TO-2522K
			16.5	23.0*	-50	84	1.79	100	5000	TO-2522K
			17.0	23.0*	-50	90	1.67	95	5000	TO-2632K
			8.8	12.0*	-83	150	1	190	10100	TO-2632P
			6.0	7.8*	-100	200	0.75	300	15000	TO-2632P
			6.0	7.8*	-100	200	0.75	300	15000	TO-2632P
P-Channel	UMOS4	-30.0	8.4	-	-50	102	1.47	64	2300	HSO8-8
			6.2	-	-75	138	1.09	94	3200	HSO8-8
			4.0	60.0*	-15	30	5	23	1100	TO-2522K
			25.0	38.0*	-20	38	3.95	34	1650	TO-2522K
			17.0	23.5*	-36	56	2.68	55	2800	TO-2522K
			17.0	23.5*	-36	56	2.68	55	2800	TO-2632K
			9.6	15.0*	-50	84	1.79	100	3800	TO-2522K
			9.6	15.0*	-50	84	1.79	100	5000	TO-2522K
			9.6	15.0*	-50	90	1.67	100	5100	TO-2632K
			9.7	-	-75	138	1.09	91	3200	HSO8-8
			5.3	8.0*	-83	150	1	200	9820	TO-2632P
			3.5	5.1*	-100	200	0.75	320	15100	TO-2632P
			3.7	5.1*	-100	200	0.75	320	15100	TO-2632P
			70.0	95.0*	-15	30	5	23	1100	TO-2522K
			47.0	70.0*	-20	57	2.63	34	1605	HSO8-8
			48.0	64.0*	-20	38	3.95	34	1650	TO-2522K
			29.5	37.5*	-36	56	2.68	54	3100	TO-2632K
			30.0	40.0*	-36	56	2.68	52	3200	TO-2522K
			16.5	23.0*	-50	84	1.79	100	5000	TO-2522K
			17.0	23.0*	-50	90	1.67	95	5000	TO-2632K
			8.8	12.0*	-83	150	1	190	10100	TO-2632P
			6.0	7.8*	-100	200	0.75	300	15000	TO-2632P
			6.0	7.8*	-100	200	0.75	300	15000	TO-2632P
	UMOS4	-40.0	8.4	-	-50	102	1.47	64	2300	HSO8-8
			6.2	-	-75	138	1.09	94	3200	HSO8-8
			4.0	60.0*	-15	30	5	23	1100	TO-2522K
			25.0	38.0*	-20	38	3.95	34	1650	TO-2522K
			17.0	23.5*	-36	56	2.68	55	2800	TO-2522K
			17.0	23.5*	-36	56	2.68	55	2800	TO-2632K
			9.6	15.0*	-50	84	1.79	100	3800	TO-2522K
			9.6	15.0*	-50	84	1.79	100	5000	TO-2522K
			9.6	15.0*	-50	90	1.67	100	5100	TO-2632K

Ambient Light Sensors (ALS)

Product Name	Function	Peak Spectral Sensitivity	Supply Voltage	Supply Current @ EV=100lx	Lux Range	Package Type	Temp. Range
ISL76671	analog output ambient light sensor	550 nm	1.8V to 3.3V	23 µA	0.01 to 100 lx	6 ld ODFN	-40 to 105 °C
ISL76683	digital output ambient light sensor with I ² C and interrupt	540 nm	2.25 to 3.3 V	290µA	0.01 to 64000 lx	7 ld ODFN	-40 to 105 °C

Battery Management ICs (BMIC)

Product Name	Function	# Series Cells	Comm. Interface	Implementation	Cell Balancing	Pack Voltage [V]	Absolute Cell Voltage Measurement Accuracy	Integrated Charge/Discharge FET Drive	Integrated Current Sense Detection	Integrated Temperature Sense	Is (max)	SHDN Icc	Integrated Regulator Output/Reference Output	Special Features	Package
ISL78714	Battery Management	up to 14 cells	SPI and Proprietary Asynchronous	Pack	External (Built-In FET Drivers) or Internal	up to 70V per device	±2.0mV Max (-20 to 85 °C)	no	no	yes	(typ) 5.6mA	(typ) 19 uA	3.3V / 2.5V	*Daisy Chain up to 30 devices (420 Cells) *Robust Hot Plug Performance *Provides Diagnostic Information *Fast Scan Rate of 20µs/cell	64Ld TQFP (10x10mm)
ISL78600	Battery Management	up to 12 cells	SPI and Proprietary Asynchronous	Pack	External (Built-In FET Drivers) or Internal	up to 63V per device	±10mV Max (-20 to 60 °C)	no	no	yes	(typ) 5.6mA	(typ) 15 uA	3.3V / 2.5V	*Daisy Chain up to 14 devices (168 Cells) *Robust Hot Plug Performance *Provides Diagnostic Information *Fast Scan Rate of 20µs/cell	64Ld TQFP (10x10mm)
ISL78610	Battery Management	up to 12 cells	SPI and Proprietary Asynchronous	Pack	External (Built-In FET Drivers) or Internal	up to 63V per device	±2.0mV Max (-20 to 60 °C)	no	no	yes	(typ) 5.6mA	(typ) 15 uA	3.3V / 2.5V	*Daisy Chain up to 14 devices (168 Cells) *Robust Hot Plug Performance *Provides Diagnostic Information *Fast Scan Rate of 20µs/cell	64Ld TQFP (10x10mm)

WIRELESS POWER PRODUCTS

Product Name	Function	Coils	Wireless Power Standard	Input Voltage [V]	Output Voltage [V]	Output Power max [W]	Package	Temperature Range
P9260	Wireless Power Transmitter	MPA13 - 1 coils	WPC Qi 1.2.4	4.25V to 21V	NA	15	48 pin VFQFPN 7 x 7mm	-40 to +105
P9261	Wireless Power Transmitter	MPA13 - 3 coils	WPC Qi 1.2.4	4.25V to 21V	NA	15	48 pin VFQFPN 7 x 7mm	-40 to +105

CLOCKS & TIMING SOLUTIONS

Product Name	Function	Outputs [#]	Output Type	Output Freq [MHz]	Input Freq [MHz]	Inputs [#]	Input Type	Core Voltage [V]	Output Voltage [V]	Output Banks [#]	Phase Jitter Typ RMS (ps)*1	C-C Jitter Type P-P (ps)	C-C Jitter Max P-P (ps)	Package Type	Temp. Range [°C]
5P35021	Programmable VersaClock® Clock Generator	2 pairs + 1	LP-HCSL, LVCMOS, LVDS, LVPECL	1 - 500 + 32.768 kHz	8 - 40 (Crystal) 1 - 125 (Clock)	1	Crystal, LP-HCSL, LVCMOS, LVDS, LVPECL	3.3	1.8, 2.5, 3.3	3	1.5	20	—	3x3 mm 20 QFN	-40 to 105
5P35023	Programmable VersaClock® Clock Generator	2 pairs + 3	LP-HCSL, LVCMOS, LVDS, LVPECL	1 - 500 + 32.768 kHz	8 - 40 (Crystal) 1 - 125 (Clock)	1	Crystal, LP-HCSL, LVCMOS, LVDS, LVPECL	3.3	1.8, 2.5, 3.3	5	1.5	20	—	4x4 mm 24 QFN Wettable	-40 to 105
5P49V60	VersaClock® 6E Programmable Clock Generator for Automotive	4 pairs + 1	HCSL, LVCMOS, LVDS, LVPECL	1 - 350	8 - 40 (Crystal) 1 - 350 (Clock)	2	Crystal, HCSL, LVCMOS, LVDS, LVPECL	1.8, 2.5, 3.3	1.8, 2.5, 3.3	4	0.5	25	35	4x4 mm 24 QFN Wettable	-40 to 105
5PB1104	1.8 V to 3.3 V 1:1 LVCMOS High Performance Clock Buffer	4	LVC MOS	0 - 200	0-200	1	LVC MOS	1.8, 2.5, 3.3	1.8, 2.5, 3.3	1	35fs (additive)	—	—	8 DFN Wettable	-40 to 125
5PB1110	1.8 V to 3.3 V 1:10 LVCMOS High Performance Clock Buffer	10	LVC MOS	0 - 200	0-200	1	LVC MOS	1.8, 2.5, 3.3	1.8, 2.5, 3.3	1	35fs (additive)	—	—	20 QFN Wettable	-40 to 105
9FGV0841	8-output 1.8 V PCIe Gen1-4 Clock Generator with Zo=100 ohms	8	LP-HCSL	100	25	1	Crystal	1.8	1.05V - 1.8V	1	0.37 (PCIe Gen4)	14	50	6x6 mm 48 QFN Wettable	-40 to 105
XA	Oscillator	1	HCMOS, LVDS, LVPECL	0.75 - 1350	—	—	—	2.5, 3.3	2.5, 3.3	1	1	—	—	—	-40 to 105

Note: *1 Integration range 12 kHz - 20 MHz

VIDEO & DISPLAY CONTROLLER

Video Signal Processing (VSP)

Product Name	Function	CVBS Input	S-Video Input	YPbPr Input	Analog RGB Input	ADC Input Frequency (MHz)	Digital RGB/Y CbCr Input	LVDS Input	Comb Filter	Max Output Resolution	Color Enhancement	PIP	OSD Type	External OSD	OSD Colors	TCON Output	LVDS Output	TTL Output	Memory Support	MCU	Additional Output	Touch-screen Controller	Temperature Range	Package Type
TW8809	RGB to BT656 format converter	Yes (differential)	No	No	No	27	24-bit	No	2D	SVGA	Yes	No	Font	No	16 Colors / 16-bit Palette	No	No	No	No	External	BT.656	No	-40 to +105	56pin-WFOFN
TW8819	LCD Display Controllers	Yes (differential)	No	No	No	27	No	No	2D	WXGA	Yes	No	Font	No	16 Colors / 16-bit Palette	Digital	No	Yes	No	External	No	No	-40 to +105	48pin-WFOFN
TW8823	LCD Display Controllers	Yes	Yes	Yes	Yes	108	2 Ports	No	3D / 2D	WXGA	Yes	Yes	Graphic (16 bit)	Analog/Digital 18-bit & PIP overlay	65K Color/ 24-bit Palette	Digital & Analog	Yes	Yes	DDR	Integrated	No	Yes	-40 to +85	216pin-LQFP
TW8824	LCD Display Controllers	Yes (differential)	No	No	No	27	24-bit	No	2D	WXGA	Yes	No	Font	No	16 Colors / 16-bit Palette	Digital	Yes	Yes	No	External	BT.656	No	-40 to +105	100pin-TQFP
TW8832S	LCD Display Controllers	Yes	Yes	Yes	Yes	60	BT656 Only	No	2D	SVGA	No	No	Font / SPI bitmap	No	16 Colors / 16-bit Palette	Digital	No	Yes	No	External	BT.656	No	-40 to +85	80pin-LQFP
TW8834	LCD Display Controllers	Yes (differential)	No	No	No	27	24-bit	Yes	2D	WXGA	Yes	No	Font	No	16 Colors / 16-bit Palette	Digital	Yes	Yes	No	External	BT.656	No	-40 to +105	100pin-TQFP
TW8836	LCD Display Controllers	Yes (differential)	Yes	Yes	Yes	148	24-bit	Yes	2D	WXGA (1366x768)	Yes	No	Font / SPI bitmap	No	16 Colors / 16-bit Palette	Digital	Yes	Yes	No	Integrated	BT.656	Yes	-40 to +105	128pin-LQFP
TW8846	LCD Display Controllers	Yes (differential)	No	No	No	27	2 x 24-bit (up to 1080p)	Yes (2CH)	2D	1080p (1920x1080)	Yes	No	Font / SPI bitmap	No	16 Colors / 16-bit Palette	Digital	Yes (2CH)	Yes	No	External	MIPI-CSI2	No	-40 to +105	156pin-LQFP
TW8847	LCD Display Controllers	Yes (differential)	No	No	No	27	2 x 24-bit (up to 1080p)	Yes (2CH)	2D	1080p (1920x1080)	Yes	No	Font / SPI bitmap	No	16 Colors / 16-bit Palette	Digital	Yes (2CH)	Yes	No	External	BT.656	No	-40 to +105	156pin-LQFP
RAA278842	LCD Display Controllers	Yes (differential)	No	No	No	27	24-bit + 8 bit	Yes (2CH)	2D	1080p (1920x1080)	Yes (10 bit/color)	No	Font / SPI bitmap	No	16 Colors / 16-bit Palette	No	Yes (2CH)	No	No	External	MIPI-CSI2	No	-40 to +105	128pin-LQFP
RAA278843	LCD Display Controllers	Yes (differential)	No	No	No	27	24-bit + 8 bit	Yes (2CH)	2D	1080p (1920x1080)	Yes (10 bit/color)	No	Font / SPI bitmap	No	16 Colors / 16-bit Palette	No	Yes (2CH)	No	No	External	BT.656	No	-40 to +105	128pin-LQFP

Video Decoder

Product Name	Function	# of Inputs	# of Channels/Device	Resolution	Comb Filter	Bus/Output Interface	Analog Output	Temperature Range	Package Type
TW9990	Video Decoder	4	1	D1	2D	BT.656, BT601	No	-40 to +105	32pin-WFOFN
TW9992	Video Decoder	8	1	D1	2D	MIPI-CSI2 v1.1	No	-40 to +105	32pin-WFOFN
ISL79987	Video Decoder	8	4	D1	2D	MIPI-CSI2 v1.1	No	-40 to +105	48pin-QFN
ISL79988	Video Decoder	8	4	D1	2D	BT.656	No	-40 to +105	48pin-QFN

Laser Driver

Product Name	Function	Supply Voltage	Rise/Fall Time	# of Channels	Pixel Frequency	Output Current	Digital Interfaces	Temp. Range	Package
ISL78365	quad channel laser driver for HUD w. speckle reduction	3.3V	1.5 ns	4	150 MHz	750 mA	10 Bit video interface and SPI	-40 to +125°C	40 Ld WFOFN

OPTOCOUPLER

High-Speed Communication (Digital)

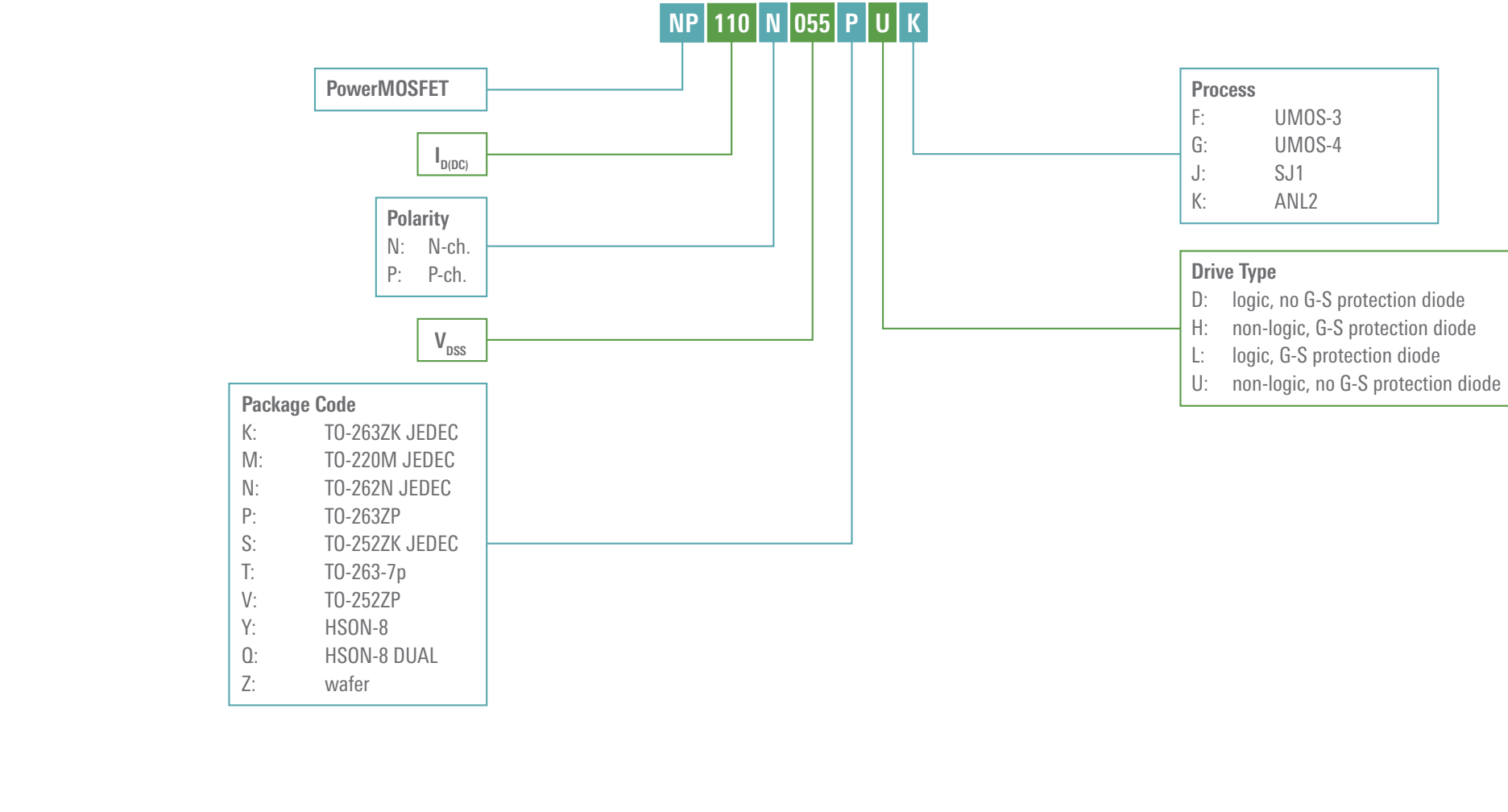
Product Name	Function	Package	Creepage Distance [mm]	Isolation Voltage [kVrms]	Supply Voltage [V]	Temp. Range [°C]	Threshold Input Current IFHL Max [mA]	Propagation Delay Time tPHZ/LH max [ns]	Pulse Width Distortion PWD max [ns]	Common Mode Rejection CMR min [kV/us]	Output Type	Logic
RV1S9184Q	1Mbps High speed optocoupler	SO-5	4.2	3.75	4.5 to 20	-40 to 135	3.5	700	500	15	Open Collector	Active Low

Transistor Output

Product Name	Function	Package	Creepage Distance [mm]	Isolation Voltage [kVrms]	Collector to Emitter Voltage VCEO [V]	Temp. Range [°C]	Current Transfer Ratio CTR [%]	Turn-on Time Ton Max [µs]	Turn-off Time Toff Max [µs]
RV1S2752Q	Single transistor output optocoupler	SO-4	4.2	3.75	40	-40 to 135	200 to 850	100	300

GENERAL INFORMATION

Part numbering system for NP-Series PowerMOSFETs





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