RICOH
imagine. change.

Electronic Device Product Catalog For Automotive 2021

RICOH Assists Electrification of Vehicles with Power Management IC

APPLICATION EXAMPLES

Some examples of RICOH power management ICs helping automobiles to run safely and comfortably

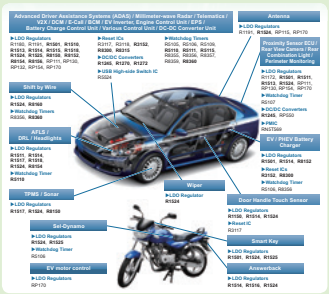
HIGH-VOLTAGE PRODUCTS

High-voltage lineups that can supply power directly from 48 V battery

ZOOM

Application Examples

RICOH power management IC adopted for various applications. For details, please refer to this catalog P.17 to P.18.



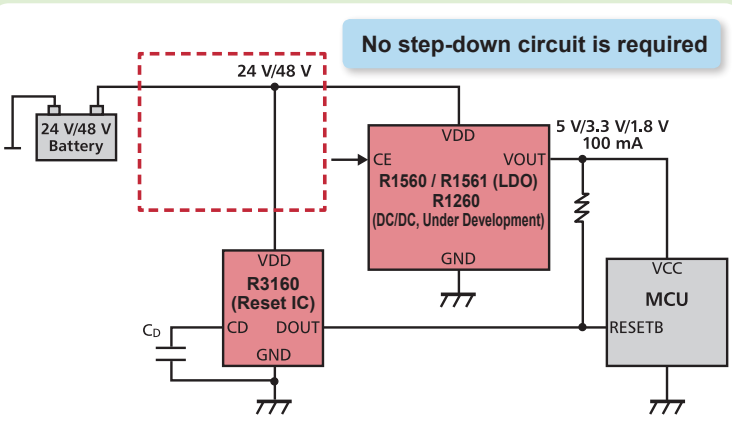
ZOOM

"Failures" in Functional Safety

ZOOM

Direct power supply from 48 V battery

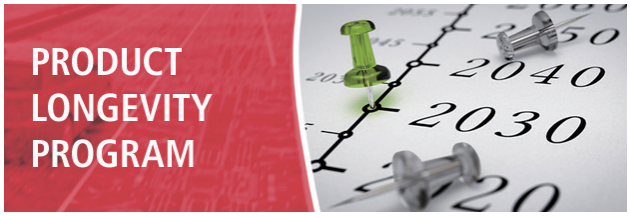
In order to support the design of your mild hybrid system, RICOH has a range of products with operation up to 60 V (maximum rating 80 V). Simple system configuration is realized by supplying power directly from 48 V battery.
R1560 / R1561 (LDO) and R3160 (Reset IC) combines the features of RICOH, low current consumption, fast transient response, and high precision. R1260 (DC/DC controller) is also under development and can be used in a variety of applications.



The reason RICOH power management IC has been chosen for more than 20 years

In order to support systems such as sensors, electrical control unit (ECU) and networks mounted on automobiles, many power management ICs for automotive applications are required.
Ricoh realizes high voltage, low consumption and high precision with its own process and circuit technology, enabling development of environment-friendly products that are market demand. RICOH will supply reliable and proven power management ICs for automotive application, in order to respond to further motorization such as automatic operation and digitization of vehicle condition.
→https://www.n-redc.co.jp/en/applications/automotive-introduction/

RICOH's approach to safety mechanisms, contributing safety and reliability of in-vehicle devices, please refer to this catalog P.3 to P.4



10 year supply program for realizing stable delivery

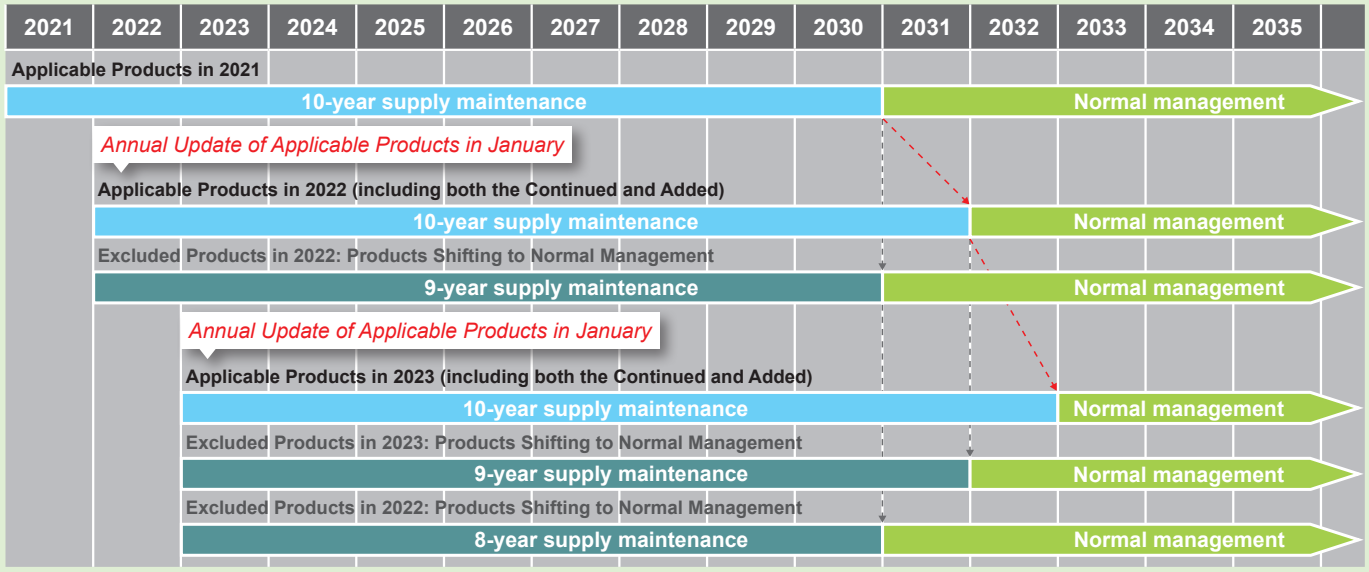
ZOOM

PRODUCT LONGEVITY PROGRAM

● Overview ●

1. Applicable Products :We announce the Product List for the Program on this page of our website.
2. Supply Period :We maintain supply of the Applicable Products for ten years from January, 2021.
3. Update :We update the Product List in January every year.
4. EOL :We provide you one year or more advanced notice when Applicable Products become EOL.

Figure of PLP



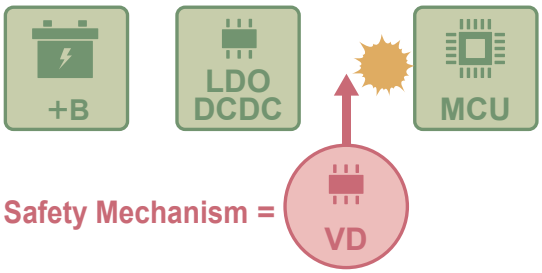
RICOH Assists Electrification of Vehicles with Power Management IC

···Functional Safety···

Implementation of Safety Mechanisms

Implementation of safety mechanisms with RICOH power management IC

Ricoh enhance safety and reliability of automobiles by offering products that can be useful for constructing safety mechanisms of customers' systems, such as window type voltage detectors (reset ICs) and system power management ICs with watchdog timer function.

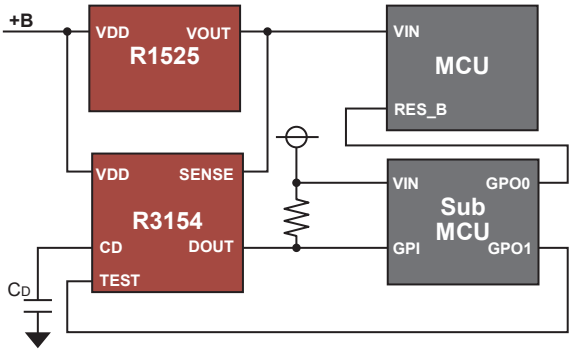


Voltage detector that monitors decrease / rise of output voltage of power supply IC with high accuracy.

●R3152 / R3154

The R3152 / R3154 series are window voltage detectors that can check more strictly whether or not the output voltage is at the desired value by monitoring both under- and overvoltage.

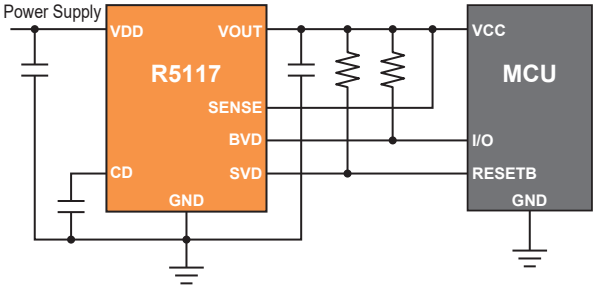
With R3154, OV / UV detection accuracy is -1.25% to 0.75%, hysteresis accuracy Max 0.75%, high precision detection is possible. It is a window voltage detector best suited for functional safety requirements to prevent the MCU from operating at abnormal voltage.
Furthermore, a simple system configuration can be realized by combining the voltage regulator R1525 with the maximum input voltage of 42 V. The R1525 achieves low current consumption of 2.2 μA and excellent transient response characteristics, excellent EMC noise immunity making it ideal for backup system constant voltage source.

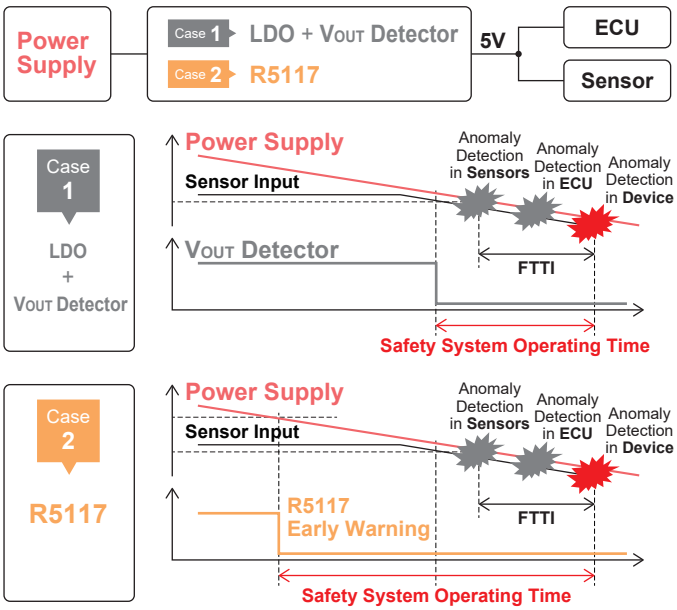


Power Management IC with Early Warning of Input Voltage Drop

●R5117

The R5117 is a power management IC containing an LDO regulator, a SENSE voltage detector, and a battery voltage detector in a single chip.
Separating the battery voltage monitoring function from the output voltage monitor of the LDO regulator enables the R5117 to detect decrease in the LDO output voltage in advance.
The early warning system, achieved by the early detection of the input voltage drop and quick transmission to the following devices, will provide a secure backup and prevent malfunction.

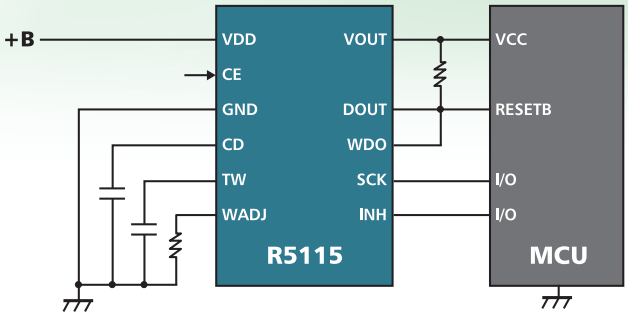




System power supply that automatically stops monitoring when the MCU is at sleep mode, or is suspended.

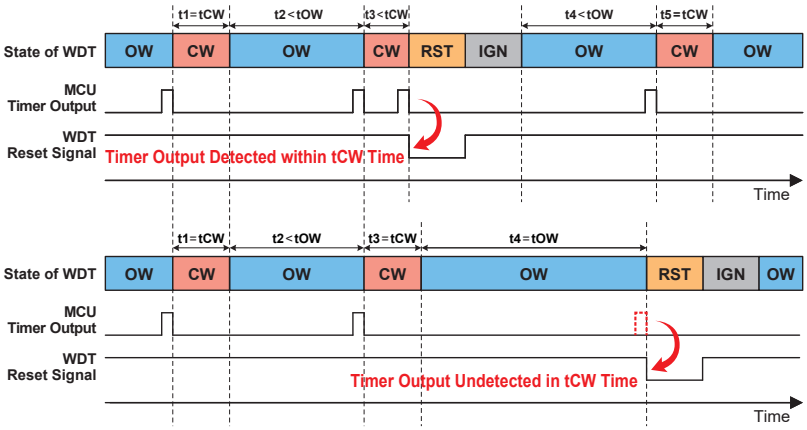
●R5115

The R5115 is a power management IC including an LDO regulator, a reset IC and a watchdog timer in a single chip. Designed with our independent technology, the R5115 features low supply current: typically 8.5 µA at operating mode, and typically 0.2 µA at standby mode. The watchdog timer turns off when the monitored MCU is set to a sleep mode. The window-type watchdog timer makes it possible to design a safer system by detecting errors caused not only by the over-time but by the short time.



WDT State: OW (Open Window), RST (Reset),
CW (Close Window), IGN (Ignore)

WDT is initialized at each transition of WDT states. If a timer clock is entered into WDT during tOW, WDT is initialized and goes into CW. If a timer clock is not entered into WDT during tOW, WDT goes into RST to output a reset signal. If a timer clock is entered into WDT during tCW, WDT goes into RST to outs a reset signal. If a timer clock is not entered into WDT during tCW, WDT goes into OW. After RST, WDT goes into IGN and a timer clock input during this time period would be ignored.



ZOOM

Functional Safety for CMOS Image Sensor PMIC

Under Development

RN5T5611 Series

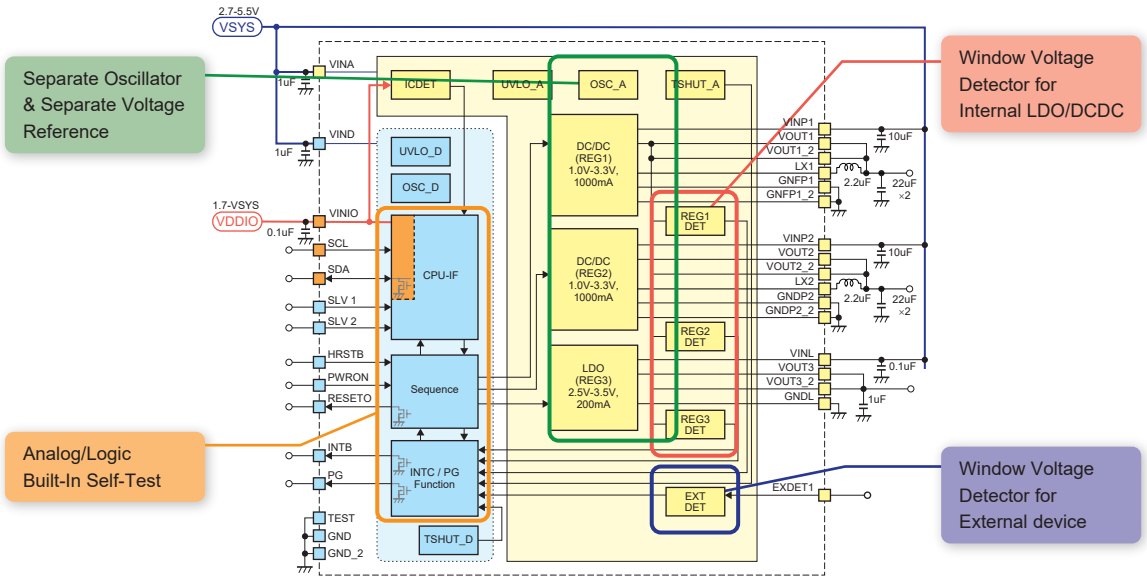
Provide ISO26262 ASIL-D with functional safety

Client's Concerns

In the development of systems that require ASIL, it takes a lot of time to investigate the failure mode coverage of all components according to the LEVEL and to measure the safety mechanism.

Ricoh's Solutions

We are preparing a product according to the development process conforming to ISO26262. This product is equipped with safety mechanisms that guarantee fault detection rate capable for ASIL. Therefore this makes no additional parts required and contributes to reducing man-hours and system area.



Ricoh Electronic Devices Co., Ltd. (REDC) offers a wide range of innovative technologies for automotive applications from on-vehicle electrical equipment to in-vehicle accessory. REDC provides environmentally friendly products by utilizing merits of low current consumption and high output precision of CMOS technology. Process Technology and Circuit Design Technology realize high performance analog ICs that feature low power consumption, high accuracy and high efficiency. Thanks to the technology and the products, REDC has achieved outstanding results in the portable equipment markets.
However, REDC conducts stricter process control and reliability tests than ever, for automotive products are required to be higher in quality. Furthermore, by manufacturing products in the cooperative factories that have passed stringent inspections for automotive products, REDC's products achieve the highest level of quality and reliability.

AEC-Q100

AEC-Q100 is stress test qualification for integrated circuits for automotive applications defined by the Automotive Electronics Council (AEC). REDC's automotive products are AEC-Q100 compliant. Some of our automotive products are on the way to acquiring the AEC-Q100 qualification. Grades of products are defined according to the operating Temperature range described in the right table.

Grade	Operating Temperature Range
Grade 0	-40°C to 150°C
Grade 1	-40°C to 125°C
Grade 2	-40°C to 105°C
Grade 3	-40°C to 85°C

AEC-Q100 Reliability Test Criteria

The reliability test compliant to AEC-Q100 requires a number of samples and test lots in addition to the extended temperature cycle test compared to the reliability test for consumer products. Please contact us for details.

	Automotive Products
Quality Standard	AEC-Q100
Number of Test Samples	77 or 45
Number of Test Lots	3 or 1
Grade 1 Temperature Cycling	−65°C to 150°C for 500 cycles

Quality Management System (QMS)

REDC has achieved the International Organization for Standardization's Quality Management System (ISO 9001) Certification in 1992.
Besides, REDC has acquired ISO/TS16949 certification in 2013, and IATF16949 in 2018. REDC is dedicated to supplying stable and high quality products that serve our customer's quality and safety needs. REDC's commitment to customer satisfaction is achieved by continuously improving our process, products and services.

∗ IATF 16949: 2016
IATF 16949: 2016, in conjunction with ISO 9001:2015, defines the quality management system requirements for the design and development, production and, when relevant, installation and service of automotive-related products. The aim of IATF 16949: 2016 is the development of a quality management system that provides for continual improvement, emphasizing defect prevention and the reduction of variation and waste in the supply chain.


COPY
DNV·GL
MANAGEMENT SYSTEM CERTIFICATE
RICOH ELECTRONIC DEVICES CO., LTD.
Yashiro Plant
30-1 Saho, Kato-City, Hyogo 673-1447, Japan
IATF 16949:2016
DESIGN AND MANUFACTURE OF SEMICONDUCTOR DEVICES


COPY
DNV·GL
Appendix to Certificate
RICOH ELECTRONIC DEVICES CO., LTD.
Yashiro Plant

<IATF 16949>

IATF 16949:2016 Core Tools

APQP&CP (Advanced Product Quality Planning and Control Plan)
Over the process from product planning to mass production, REDC involves related teams such as sales, design, manufacturing, production management, purchasing and quality assurance sections.

FMEA (Failure Mode and Effects Analysis)
REDC takes actions to eliminate or reduce failures by systematically identifying potential failures in a process or a system and studying the consequences of those failures.

PPAP (Production Part Approval Process)
REDC ensures the design and production process to meet our client's requirements by means of sharing FMEA and control plan before product delivery.

SPC (Statistical Process Control)
REDC constructs a framework for ensuring stable supply of products by using the SPC system to reduce the process variation and prevents defects, variation and wastes of products.

MSA (Measurement Systems Analysis)
REDC employs the analysis method that can confirm the availability of measuring-equipment for the process control and products pass/fail judgments.

Quality Rank and Quality Class for Automotive Products

REDC uses a different testing and quality control techniques for automotive products as compared with that of consumer products.

Quality Rank

REDC offers three different quality ranks for automotive products according to their applications.

Quality Rank	Applications
1	Safety-critical Parts (Operation Control System)
2	General Equipment (Body System)
3	Accessories

Quality Class

Three quality ranks are prepared for products for automotive according to applications. Choose the quality rank products that best suit the usage.

Quality Rank	Applications	Quality Class	Operating Temp. Range	Screening			Product Traceability
				Low	25°C	High	
1	Safety-critical Parts (Operation Control System)	**R8**	–40°C to 125°C 110°C	●	●	●	Sales, Manufacturing
		R	–40°C to 125°C	●	●	●	
2	General Equipment (Body System)	**K**	–40°C to 125°C	●	●	●	
		J	–40°C to 105°C				
		H	–40°C to 85°C				
3	Accessories	**A**	–40°C to 125°C 105°C 85°C		●	●	
—	Industrial Equipment	Y	–50°C to 125°C 105°C –40°C to 125°C 105°C		●	●	Sales
	General Electronic Products	—	–40°C to 125°C 105°C 85°C		●		

To improve quality level to match quality rank, inspections are strengthened at various process.
Quality class R / K / J / H products have different Ta, but a product belongs to only in one of them.
The operating temperature range depends on the product. Refer to the datasheet for details.
Quality class R products undergo reflow stress screening.

Traceability System

Since the products are used in a life-critical system, manufacturers of automotive electronic products are required to take prompt actions in case there is a failure or malfunction.
REDC has established the traceability system using lot number from manufacturing history to its delivered destination. By using this traceability system, it is possible to track all of the IC's history and those which belongs to the same lot as the failed IC.

Sales Traceability System is capable of controlling the warehousing and shipping of products, managing the first-in first-out method and tracking the destination of products by using lot numbers.
Manufacturing Traceability System is capable of managing the production history and tracking the source materials and manufacturing devices by using lot numbers.

Product Name Information

REDC's product name consists of the following information.

Product Name	Quality Class	Category Code	Series Code	Package Code	Voltage Code	Version Code	Taping Code	Quality Class Code*1	Pin Code
R8150S028B-E2-FE	R8	R81	50	S	028	B	-E2	-F	E
R3154N201A-TR-R	R	R31	54	N	201	A	-TR	-R	-
R1172H282B-T1-HE	H	R11	72	H	282	B	-T1	-H	E
R1514H028B-T1-JE	J	R15	14	H	028	B	-T1	-J	E
R5110L102D-TR-KE	K	R51	10	L	102	D	-TR	-K	E
R1172S282B-E2-AE	A	R11	72	S	282	B	-E2	-A	E
RP506L001N-TR-A	A	RP5	06	L	001	N	-TR	-A	-

*1 Note that the Quality Class Code of the R8 product is "F".

: Products in Development : Products Newly Released : AEC-Q100 Compliant : AEC-Q100 to be Compliant
Automatic : Automatic Shift to ECO Mode Manual : Maunal Shift to ECO Mode
Peak : Peak Voltage, Duration time=200ms Thermal : Thermal Shutdown Circuit Ripple : Ripple Rejection, Frequency=1kHz Discharge : Auto-discharge Function
Reverse : Reverse Current Protection Circuit Constant : Constant Slope Circuit High Immunity : Enhanced Noise Immunity Inrush : Inrush Current Limit Circuit
Diode : Diode Rectification Synchro : Synchronous Rectification Soft-Start : Soft Start Circuit UVLO : Undervoltage Lockout circuit
OVLO : Overvoltage Lockout Function OVP : Overvoltage Protection Circuit Phase : Phase Compensation Circuit SSCG : Spectrum Diffusion Type Oscillator
PG : Power Good Function Sequencing : Start-up Sequencing Control

Products Lineup for Power Management IC

●LDO Regulators (Linear Regulators) R8 Series

Product Name	Package	Operating Temperature Range (°C)	Output Current (mA)	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)		Dropout Voltage*1 (V)			Supply Current (μA)	Remarks
						Ta=25°C	Ta=-40°C to 125°C*2	Typ.	Max.	Condition	Typ.	
R8151H R8151S	SOT-89-5 HSOP-6J	-40 to 110	50	4.0 to 36.0 (50.0)	2.0 to 12.0	±2.0	±4.0 (Ta=-40 to 110°C)	0.32	0.58	IOUT=40mA	9	Peak : 60V Thermal
R8150S	HSOP-6J	-40 to 125	150	4.0 to 36.0 (50.0)	2.0 to 12.0	±2.0	±4.0 (Ta=-40 to 110°C)	0.32	0.58	IOUT=40mA	9	Peak : 60V Thermal
R8160N R8160H R8160S	SOT-23-5 SOT-89-5 HSOP-6J	-40 to 125	200	3.5 to 36 (50)	3.3, 3.4, 5.0, 6.0, 8.0, 8.5, 9.0	±0.6	±1.6	0.6	1.2	IOUT=200mA	2.2	Peak : 60V Thermal
R8153S R8153J	HSOP-6J TO-252-5-P2	-40 to 125	300	3.5 to 36.0 (50.0)	3.0 to 9.0, Ext. Adjustable: 3.0 to 12.0	±1.0, Ext. Adjustable: ±30mV	±2.0, Ext. Adjustable: ±60mV	0.64	1.0	IOUT=300mA	100	Peak : 60V Thermal
R8156S	HSOP-8E	-40 to 125	300	3.5 to 36.0 (50.0)	1.2, 1.5, 1.8, 3.3, 3.4, 5.0, Ext. Adjustable: 1.2 to 18.0	±0.8	±1.0	0.32	0.60	IOUT=300mA	75	Ripple : 70dB*3 Peak : 60V Thermal Discharge : Ver. D
R8154S R8154J	HSOP-6J TO-252-5-P2	-40 to 125	500	3.5 to 36.0 (50.0)	2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 6.0, 8.0, 8.5, 9.0, Ext. Adjustable: 2.5 to 12.0	±0.8, Ext. Adjustable: ±20mV	±1.8, Ext. Adjustable: ±45mV	0.35	0.62	IOUT=500mA	18	Constant : Ext. Adjustable Ver. E/F Peak : 60V Thermal Discharge : Ver. D/F
R8152S R8152J	HSOP-6J TO-252-5-P2	-40 to 125	1A	3.0 to 24.0 (36.0)	3.0 to 18.0	±2.0	±4.0 (Ta=-40 to 110°C)	0.575	1.015	IOUT=1A	70	Thermal
R8155S R8155J	HSOP-6J TO-252-5-P2	-40 to 125	1A	3.5 to 36.0 (50.0)	2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 6.0, 8.0, 8.5, 9.0, Ext. Adjustable: 2.5 to 12.0	±0.8, Ext. Adjustable: ±20mV	±1.8, Ext. Adjustable: ±45mV	0.70	1.30	IOUT=1A	18	Constant : Ext. Adjustable Ver. E/F Peak : 60V Thermal Discharge : Ver. D/F

*1 VSET=5.0V *2 The specifications of R8 Series are guaranteed at -40°C to 110°C or -40°C to 125°C. *3 RR@f=100Hz

●Reset ICs (Voltage Detectors) R8 Series

Product Name	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Output Delay Time Accuracy (%)	Supply Current*2 (μA)	Hysteresis	Remarks
							Typ.		
R8300NxxxA/G	SOT-23-6	-40 to 125	1.4 to 36.0 (50.0)	3.0 to 12.0	±1.5 (Ta=25°C) ±2.0*1 (Ta=-40 to 110°C) -2.2 to 2.5*1 (Ta=-40 to 125°C)	-35 to 40 (Ta=-40 to 110°C) -40 to 80 (Ta=-40 to 125°C)	3.8	-VDET×0.045 (Min.) -VDET×0.055 (Max.)*1 (Ta=-40 to 110°C) -VDET×0.043 (Min.) -VDET×0.055 (Max.)*1 (Ta=-40 to 125°C) G: Without Hysteresis Type	with delay function (External capacitor type)
R8300NxxxE			2.4 to 6.0 (7.0) SENSE: Max. 36.0 (50.0)				3.5		with delay function (External capacitor type) with SENSE pin
R8315NxxxA/B	SOT-23-6	-40 to 125	1.4 to 36.0 (50.0)	5.0 to 10.0	±1.5 (Ta=25°C) ±2.0*1 (Ta=-40 to 110°C)	-35 to 40 Detect Output Delay Time Accuracy -35 to 40	3.8	Released Voltage Range: 5.3V to 11.0V Released Voltage Accuracy: ±1.5% (Ta=25°C) ±2.0%*1 (Ta=-40 to 110°C)	with delay function (External capacitor type) with CD pin (for Release output delay time setting) with CR pin (for Detect output delay time setting) E, F: with SENSE pin A, E: Reset Signal "L" B, F: Reset Signal "H"
R8315NxxxE/F			3.6 to 6.0 (7.0) SENSE: Max. 36.0 (50.0)				3.5		

*1 The specifications of R8300N and R8315N are guaranteed at -40°C to 110°C or -40°C to 125°C. *2 Detection released

●Watchdog Timers (WDT) R8 Series

・Watchdog Timer (WDT) with LDO Regulator (Linear Regulator) and Reset IC (Voltage Detector)

Product Name	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	LDO Regulator Part			Reset IC Part			Watchdog Timer Part				Supply Current (μA)	Remarks
				Output Voltage Range (V)	Output Voltage Accuracy (%)	Output Current (mA)	Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Output Delay Time Accuracy (%)	Timeout Period*1 (ms)			Inhibit Pin		
										Min.	Typ.	Max.		Typ.	
R8360Sxx1	HSOP-8E	-40 to 125	3.5 to 36.0 (50.0)	1.8 to 5.0	±1.5*2	500	1.6 to 5.5	±1.8*2	±20*2	14.4	18	21.6	–	25	Peak : 60V Window WDT selectable*3 Thermal Inrush
R8360Sxx2	HSOP-18												✓		

*1 CTW=0.01μF *2 The R8360S is guaranteed specification for full operating temperature range.
*3 Window watchdog timer. Window watchdog timer monitors microprocessor activity and asserts a reset signal if the watchdog pulse does not occur within the defined time window (open window) or if the watchdog pulse occurs within the other defined time window (close window).

・Watchdog Timers (WDT) with Reset ICs (Voltage Detectors)

Product Name	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Reset IC Part			Watchdog Timer Part				Supply Current (μA)	Remarks
				Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Output Delay Time Accuracy (%)	Timeout Period*1 (ms)			Inhibit Pin		
							Min.	Typ.	Max.		Typ.	
R8355N	SOT-23-6	-40 to 125	0.9 to 6.0 (7.0)	1.5 to 5.5	±1.0 (Ta=25°C) -2.8 to 1.5*2 (Ta=-40 to 110°C)	±16*2	230	310	450	–	11	CD pin and CTW pin are combined.
R8356N	SOT-23-6											
R8357G	SSOP-8G									✓		with MR pin (Manual Reset)
R8358G	SSOP-8G		1.5 to 6.0 (7.0)									with SENSE pin
R8359G	SSOP-8G		0.9 to 6.0 (7.0)								11.5	2 clock input type

*1 CTW=0.1μF *2 The specifications of R835x Series are guaranteed at -40°C to 110°C.

Maximum Input Voltage and Output Current Chart

Product Type		Max Input Voltage (V)	Output Current				
			Up to 150mA	Up to 300mA	Up to 500mA	Up to 1A	Up to 3A
High-performance		5.25			RP111x, RP115L*1	RP115x*1	
		5.5		RP160N: 200mA			
		6	R1114N			R1172x	
		6.5	RP130x				
		36		R1513S R8156S			
		42		R1526S			
		60	R1561x: 100mA				
Standard		5.25		RP154x			RP108J
		6				R1170H: 800mA	R1171S: 1.5A
		6.5				RP132x	
		8		R1130H			
		10	RP171N	RP170x			
		16				R1190x	
		24			R1500H	R1501x R8152x	
		36	R1516x	R1511x R8153x			
		42			R5116S / L +VD R5117S / L +VD		
Low Supply Current		6	R1180N				
		24	R1150H +VD				
		36	R1515x: 50mA R1514x	R1524x: 200mA	R1517x	R1518x	
			R8151x: 50mA R8150S	R8160x: 200mA	R8154x	R8155x	
		42		R1525x: 200mA R5112S +VD: 200mA			
		60	R1560x: 100mA				
ECO Functions	Automatic Mode Shifting	36		R1510S +VD			
	Manual Mode Shifting	6	R1163N				
		16		R1191x			
Voltage Tracker		42	R1540x: 70mA				

*1 Output Current (I_{OUT}) is switchable between 500mA and 1A using the LCON pin of DFN2020-8B.

●LDO Regulators (Linear Regulators)

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	Output Current (mA)	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1 (V)			Supply Current (μA)	Remarks
	H/J/K/R	A							Typ.	Max	Condition	Typ.	
R1515H R1515S	J	A	SOT-89-5 HSOP-6J	-40 to 105	50	4.0 to 36.0 (50.0)	2.0 to 12.0	±2.0	0.20	0.35	I_{OUT}=20mA V_{SET}=5.0V	9	Peak : 60V Thermal
R1560S R1560J	K	A	HSOP-6J TO-252-5-P2	-40 to 125	100	5.5 to 60.0 (80.0)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 7.0, 8.0, 9.0, 10.0, 12.0, 14.0	±0.8	1.50		I_{OUT}=100mA V_{SET}=5.0V	3	Peak : 90V Thermal
R1561S R1561J	K	A	HSOP-6J TO-252-5-P2	-40 to 125	100	5.5 to 60.0 (80.0)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 7.0, 8.0, 9.0, 10.0, 12.0, 14.0	±0.8	1.30		I_{OUT}=100mA V_{SET}=5.0V	20	Peak : 90V Thermal
R1114N		A	SOT-23-5	-40 to 85	150	2.0 to 6.0 (6.5)	1.5 to 4.0	±2.0	0.22	0.35	I_{OUT}=150mA	75	Ripple : 70dB Discharge : Ver. D
R1163N		A	SOT-23-5	-40 to 85	150	2.0 to 6.0 (6.5)	1.5 to 5.0	±1.5*2	0.25*2	0.35*2	I_{OUT}=150mA	70*2 (6)	Ripple : 70dB*2 Reverse Manual Discharge : Ver. D
R1180N	H	A	SOT-23-5	-40 to 85	150	1.7 to 6.0 (6.5)	1.2 to 3.6	±2.0	0.25	0.40	I_{OUT}=150mA	1	Low Supply Current
RP130L RP130N		A	DFN1212-4 SOT-23-5	-40 to 105	150	1.7 to 6.5 (7.0)	1.2, 1.5, 1.8, 2.5, 2.7, 2.8, 2.9, 3.0, 3.3, 3.4, 4.5, 5.0	±1.0	0.32	0.51	I_{OUT}=150mA	38	Ripple : 80dB Discharge : Ver. D
RP171N	J	A	SOT-23-5	-40 to 105	150	2.6 to 10.0 (12.0)	1.2, 1.5, 1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 6.0	±1.0	0.40	0.60	I_{OUT}=150mA	23	Ripple : 70dB Thermal Constant Discharge : Ver. D
R1150H +VD	H	A	SOT-89-5	-40 to 85	150	Max. 24.0 (26.0)	2.1 to 14.0, Detector Threshold Range Ver. A: 2.3 to 15.0 Ver. B,C,D: 2.0 to 15.0	±2.0, VD: ±2.5	0.3	0.4	I_{OUT}=20mA	7	Built-in Voltage Detector A: V_{IN} detect (Normal type) B: SENSE detect (Normal type) C: V_{IN} detect (with delay function) D: V_{OUT} detect (with delay function) Thermal
R1514H R1514S	J	A	SOT-89-5 HSOP-6J	-40 to 105	150	4.0 to 36.0 (50.0)	2.0 to 12.0	±2.0	0.20	0.35	I_{OUT}=20mA V_{SET}=5.0V	9	Peak : 60V Thermal
R1516H R1516S	J	A	SOT-89-5 HSOP-6J	-40 to 105	150	4.0 to 36.0 (50.0)	1.8 to 6.2	±1.0	–	0.60	I_{OUT}=20mA V_{SET}=5.0V	29	Peak : 60V Thermal

Product Name	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Output Current (mA)	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1 (V) Typ.	Dropout Voltage*1 (V) Max	Dropout Voltage*1 (V) Condition	Supply Current (μA) Typ.	Remarks
RP160N	R	A	SOT-23-5	-40 to 125	200	2.7 to 5.5 (6.5)	2.5, 2.8, 3.0, 3.3, 3.4, 4.8	±2.0	0.10		IOUT=200mA VSET=3.3V	350	Ripple : 60dB*5 Thermal Discharge : Ver.D Outout noise: 6μVrms
R5112S +VD	K	A	HSOP-8E	-40 to 125	200	3.5 to 42.0 (50)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, Detector Threshold Range B: 1.6 to 4.8 D: 2.9 to 4.8	±0.6, ±1.6*3, VD: ±0.6, VD: ±1.6*3	0.6	1.2	IOUT=200mA VSET=5.0V	3.8	Peak : 60V Thermal
R1524N R1524H R1524S R1524SxxxH	K	A	SOT-23-5 SOT-89-5 HSOP-6J HSOP-8E	-40 to 125	200	3.5 to 36.0 (50)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 5.5, 6.0, 6.4, 7.0, 7.5, 8.0, 8.5, 9.0, 10.0, 10.5, 11.0, 12.0	±0.6, ±1.6*3	0.6	1.2	IOUT=200mA VSET=5.0V	2.2	Peak : 60V Thermal
R1525N R1525H R1525S R1525SxxxH	K	A	SOT-23-5 SOT-89-5 HSOP-6J HSOP-8E	-40 to 125	200	3.5 to 42.0 (50)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 5.5, 6.0, 6.4, 7.5, 8.0, 8.5, 9.0, 10.0, 10.5, 11.0, 12.0	±0.6, ±1.6*3	0.6	1.2	IOUT=200mA VSET=5.0V	2.2	Peak : 60V Thermal High Immunity
RP154L5xx 2ch		A	DFN2020-8	-40 to 105	300	1.4 to 5.25 (6.0)	0.8 to 3.7	±1	0.25	0.32	IOUT=300mA	50*4	Ripple : 75dB Discharge : Ver. B
RP154N 2ch		A	SOT-23-6										
R1130H	H		SOT-89-5	-40 to 85	300	2.5 to 8.0 (9.0)	1.5 to 5.0, Ext. Adjustable: 1.8 to 5.0	±2.0, Ext. Adjustable: ±36mV	0.25	0.34	IOUT=100mA	50	Absolute Max. Ratings IOUT=450mA
RP170N RP170H	K	A	SOT-23-5 SOT-89-5	A : -40 to 105 K : -40 to 125	300	2.6 to 10.0 (12.0)	1.2, 1.25, 1.5, 1.8, 2.5, 2.8, 2.9, 3.0, 3.3, 5.0, 5.5, 6.0	±1.0	0.770	1.185	IOUT=300mA VSET=2.5V	23	Ripple : 70dB Thermal Constant Discharge : Ver. D
R1191N R1191H		A	SOT-23-5 SOT-89-5	-40 to 85	300	3.5 to 16.0 (18.0)	2.0 to 15.0	±1.5*2	0.55*2	0.75*2	IOUT=300mA VSET=5.0V	50*2 (6)	Ripple : 70dB*2 Thermal Reverse Manual Discharge : Ver. D
R1510S +VD	J	A	HSOP-8E	-40 to 105	300	3.5 to 36.0 (50.0)	2.5 to 12.0, Detector Threshold Range Ver. A, B, C: 2.3 to 12.0 Ver. D: 2.3 to 10.6	±1.6, VD: ±1.9	1.0*2	2.0*2	IOUT=300mA VSET=5.0V	110*2 (12.5)	Built-in Voltage Detector A: VIN detect (Normal type) B: SENSE detect (Normal type) C: VIN detect (with delay function) D: VOUT detect (with delay function) Automatic Thermal
R1511S R1511J	K	A	HSOP-6J TO-252-5-P2	-40 to 125	300	3.5 to 36.0 (50.0)	3.0 to 9.0, Ext. Adjustable: 3.0 to 12.0	±1.0, Ext. Adjustable: ±30mV	0.64	1.00	IOUT=300mA VSET=5.0V	100	Peak : 60V Thermal
R1513S	K	A	HSOP-6J	-40 to 125	300	3.5 to 36.0 (50.0)	1.2, 1.5, 1.8, 3.3, 3.4, 5.0, Ext. Adjustable: 1.2 to 18.0	±0.8	0.32	0.60	IOUT=300mA VSET=5.0V	75	Ripple : 70dB*5 Peak : 60V Thermal Discharge : Ver. D
R1526S	K	A	HSOP-8E	-40 to 125	300	3.5 to 42.0 (50)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 5.5, 6.0, 6.4, 7.5, 8.0, 8.5, 9.0	±0.6, ±1.6*3	0.40	0.74	IOUT=300mA VSET=5.0V	32	Peak : 60V Ripple : 50dB*5 Thermal High Immunity
RP111N RP111H RP111S	J	A	SOT-23-5 SOT-89-5 HSOP-6J	-40 to 105	500	1.4 to 5.25 (6.0)	0.7, 1.1, 1.2, 1.5, 1.8, 2.5, 2.8, 2.85, 2.9, 3.0, 3.3, 3.4, Ext. Adjustable: 0.7 to 3.6	±0.8, Ext. Adjustable: ±18mV	0.23	0.34	IOUT=500mA	80	Ripple : 75dB Thermal Inrush Discharge : Ver. D Load regulation: Typ. 1mV Load transient response accuracy*6: Typ. -75mV/+45mV
R1500H	J	A	SOT-89-5	-40 to 105	500	4.0 to 24.0 (36.0)	3.0 to 12.0	±2.0	0.115	0.180	IOUT=200mA VSET=5.0V	70	Thermal
R1517S R1517J	K	A	HSOP-6J TO-252-5-P2	-40 to 125	500	3.5 to 36.0 (50.0)	2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 6.0, 8.0, 8.5, 9.0, Ext. Adjustable: 2.5 to 20.0	±0.8, Ext. Adjustable: ±20mV	0.35	0.62	IOUT=500mA VSET=5.0V	18	Constant : Ext. Adjustable Ver. E/F Peak : 60V Thermal Discharge : Ver. D/F
R5116S +VD	K	A	HSOP-8E	-40 to 125	500	3.5 to 42.0 (50.0)	3.3 to 5.0, Detector Threshold Range UV: 2.5 to 5.0 OV: 3.3 to 5.5	-1.25 to 0.75*3, VD: -1.25 to 0.75*3	0.9	1.5	IOUT=500mA VSET=5.0V	25	Built-in Window VD Released Hysteresis: 0.7% (Max.) Peak : 60V Thermal
R5116L +VD	K	A	HQFN0808-28										
R5117S +VD	K	A	HSOP-8E	-40 to 125	500	3.5 to 42.0 (50.0)	3.3 to 5.0, Detector Threshold Range SVD: 2.5 to 5.0 BVD: 3.5 to 12.0	-1.25 to 0.75*3, SVD: -1.25 to 0.75*3, BVD: -2.0 to 1.0*3	0.9	1.5	IOUT=500mA VSET=5.0V	35	Built-in Dual VD SVD Released Hysteresis: 0.7% (Max.) BVD Released Hysteresis: 5.0% (Max.) Peak : 60V Thermal
R5117L +VD	K	A	HQFN0808-28										
R1170H	H	A	SOT-89-5	-40 to 85	800	2.1 to 6.0 (7.0)	1.5 to 5.0	±2.0	0.12	0.18	IOUT=300mA	80	Thermal
RP115Lxx2		A	DFN2020-8B	-40 to 105	1A (500)	1.4 to 5.25 (6.0)	0.9, 1.0, 1.2, 1.25, 1.5, 1.75, 1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 3.9	±1.0	0.150	0.295	IOUT=1A VSET=1.8V	110	Ripple : 75dB, 80dB (VSET≤1.8V) Thermal Reverse Constant Inrush Discharge : Ver. D Load regulation: Typ. 1mV Temperature Characteristics: Typ. ±30ppm/°C
RP115H		A	SOT-89-5						0.190	0.285			
R1172N R1172Hxx2 R1172Sxx2	H	A	SOT-23-5 SOT-89-5 HSOP-6J	-40 to 85	1A	1.4 to 6.0 (6.5)	0.8 to 5.0	±2.0	0.05	0.10	IOUT=300mA	60	Ripple : 70dB Thermal Inrush Discharge : Ver. D
RP132HxxxB/D RP132SxxxB/D RP132Jxx1B/D	J	A	SOT-89-5 HSOP-6J TO-252-5-P2	-40 to 105	1A	1.4 to 6.5 (7.0)	0.8, 1.05, 1.2, 1.5, 1.8, 2.5, 3.0, 3.3, 5.0, Ext. Adjustable: 0.8 to 5.5	±1.0, Ext. Adjustable: ±15mV	0.52	0.72	IOUT=1A	65	Ripple : 70dB Thermal Inrush Discharge : Ver. D
R1190S R1190J		A	HSOP-6J TO-252-5-P2	-40 to 85	1A	3.5 to 16.0 (18.0)	2.0 to 12.0	±1.5	1.1	1.85	IOUT=1A VSET=5.0V	150	Inrush : Ext. Adjustable Thermal Discharge : Ver. D
R1501S R1501J	J	A	HSOP-6J TO-252-5-P2	-40 to 105	1A	3.0 to 24.0 (36.0)	3.0 to 18.0	±2.0	0.575	0.900	IOUT=1A VSET=5.0V	70	Thermal

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	Output Current (mA)	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1 (V)			Supply Current (μA)	Remarks
	H/J/K/R	A							Typ.	Max	Condition	Typ.	
R1518S / R1518J	K	A	HSOP-6J / TO-252-5-P2	-40 to 125	1A	3.5 to 36.0 (50.0)	2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 6.0, 8.0, 8.5, 9.0, Ext. Adjustable: 2.5 to 20.0	±0.8, Ext. Adjustable: ±20mV	0.70	1.30	IOUT=1A VSET=5.0V	18	Constant : Ext. Adjustable Ver. E/F Peak : 60V Thermal Discharge : Ver. D/F
R1171Sxx2		A	HSOP-6J	-40 to 85	1.5A	2.1 to 6.0 (7.0)	1.5 to 5.0	±2.0	0.09	0.18	IOUT=300mA	130	Thermal
RP108J		A	TO-252-5-P2	-40 to 105	3A	1.6 to 5.25 (6.0)	0.8, 1.2, 1.5, 1.8, 2.5, 3.0, 3.3, Ext. Adjustable: 0.8 to 4.2	±1.0	0.51	0.67	IOUT=3A	350	Thermal Reverse Constant Discharge : Ver. D/F

*1 This value varies depending on the output voltage, VSET=2.8V or close to 2.8V. (If described, value at the voltage.)
*2 at Fast Mode, ( ) at Low Power Mode *3 The K class is guaranteed specification for operating temperature range. The A class is guaranteed by design engineering at operating temperature range. *4 Supply Current (ISS) per channel. *5 RR@f=100Hz *6 1mA ⇔ 250mA (1/2 IOUT (Max.))

●Voltage Tracker

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	Output Current (mA)	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	Output Voltage Tracking Accuracy (mV)	Dropout Voltage (V)			Supply Current (μA)	Remarks
	H/J/K/R	A							Typ.	Max	Condition	Typ.	
R1540N / R1540S	K	A	SOT-23-5 / HSOP-8E	-40 to 125	70	3.5 to 42.0 (50.0)	2.2 to 14.0	±15 (Ta=-40 to 125)	1.3	2.1	VADJ=5V IOUT=70mA	60	Ripple : 80dB (f=100Hz) Thermal High Immunity Foldback Protection Circuit

Immunity Tolerant Series: R1525 / R1526 / R1540

By design considering noise immunity, malfunction is prevented. Learn more about. Please refer to each data sheet for details.

R1540 series to solve your worries

Designed with techniques for electromagnetic noise immunity to prevent malfunction with fewer external components for electromagnetic interference (EMI)

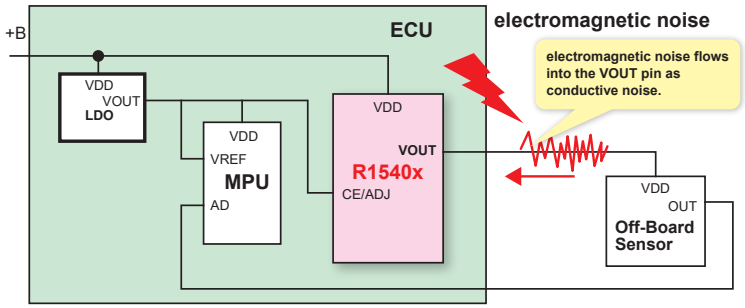
Client's Concerns

Concerns about noise from communication devices, etc. affecting operation of systems using sensors.
Countermeasure components for EMI lead to increase of cost and mounting area.

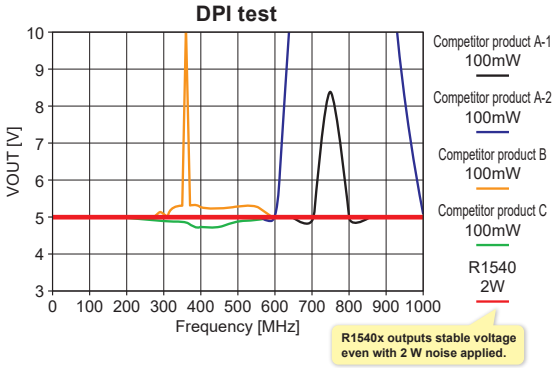
Ricoh's Solutions

High noise immunity enables the construction of systems with robust resistance to EMI.
Fewer countermeasure components for EMI such as external filters, means a smaller equipment footprint.
Excellent immunity reduces rework after input noise tests.

When voltage is supplied to off-board sensors as below figure, wiring such as harnesses is affected by electromagnetic noise which flows into the IC's VOUT pin.
⇒ **EMI-resistant components are required for the IC.**



Stable output voltage with high-frequency noise.
⇒ **IC contributes to system safety.**



Microcontroller Supervisor Features

Max. Operating Voltage (V)	Release Output Delay Time	Configuration	VD		VD and WDT		VD and LDO, WDT		VD and LDO		
			VD Monitors ⇒ VIN	VSENSE	VIN	VSENSE	VOUT	VSENSE	VIN	VOUT	VSENSE
6	–	–		R3117N							
	✓	Ext.Capacitor	R3116N/L	R3118N	R5105N R5106N R5107G R5109G R8355N R8356N R8357G R8359G	R5108G R8358G					
		Ini. Counter	R3134N								
24	–	–							R1150HxxxA		R1150HxxxB
	✓	Ext.Capacitor							R1150HxxxC	R1150HxxxD	
36	–	–		R3119NxxxE R3120NxxxE					R1510SxxxA		R1510SxxxB
	✓	Ext.Capacitor	R3119NxxxA R3120NxxxA R3121NxxxA/G R3150NxxxA/B R3151NxxxA/B R8300NxxxA/G R8315NxxxA/B	R3121NxxxE R3150NxxxE/F R3151NxxxE/F R8300NxxxE R8315NxxxE/F			R5104V R5110Sxx1A/B R5111Sxx1A/B R8360Sxx1A/B	R5110S/Lxx2C/D R5111S/Lxx2C/D R8360Sxx2C/D	R1510SxxxC	R1510SxxxD	
42	✓	Ext.Capacitor		R3152N **R3154N** **R3500S**			R5114S/L R5115S/L		R5117S/L	R5112S	R5112S R5116S/L R5117S/L
60	✓	Ext.Capacitor	R3160N								

●Reset ICs (Voltage Detectors)

Product Name	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Detector Threshold Range (V)	Detector Threshold Accuracy*1 (%)	Output Delay Time Accuracy*1 (%)	Supply Current*2 (μA) Typ.	Hysteresis*1	Remarks
R3116L R3116N		A	DFN1212-4 SOT-23-5	-40 to 105	0.5 to 6.0 (7.0)	0.7 to 5.0	±0.8*3	±15*3	0.35	-VDET×0.04(Min.) -VDET×0.07(Max.)	with delay function (External capacitor type)
R3117N		A	SOT-23-5	-40 to 105	1.0 to 6.0 (7.0)	0.7 to 5.0	±1.0*3	–	0.29	-VDET×0.04(Min.) -VDET×0.07(Max.)	Normal type with SENSE pin
R3118N	K	A	SOT-23-5	A: -40 to 85 K: -40 to 125	1.0 to 6.0 (7.0)	0.6 to 5.0	±1.5*3	±30*3	0.4	-VDET×0.04(Min.)*3 -VDET×0.07(Max.)*3	with delay function (External capacitor type) with SENSE pin
R3134N		A	SOT-23-5	-40 to 85	0.75 to 6.0 (6.5)	1.0 to 5.0	±1.8*3	240ms ±15*3	0.8	No Hysteresis	with delay function (Internal counter type)
R3119NxxxA	J		SOT-23-5	-40 to 105	1.2 to 36.0 (50.0)	2.3 to 12.0	±1.5*3	-50 to 80	3.3	-VDET×0.035(Min.) -VDET×0.065(Max.)	with delay function (External capacitor type)
R3119NxxxE					2.1 to 6.0 (7.0) SENSE: 0 to 36.0 (50.0)			–			Normal type with SENSE pin
R3120NxxxA		A	SOT-23-5	-40 to 105	1.2 to 36.0 (50.0)	2.3 to 12.0	±1.5*3	-50 to 80	3.3	-VDET×0.035(Min.) -VDET×0.065(Max.)	with delay function (External capacitor type)
R3120NxxxE					2.1 to 6.0 (7.0) SENSE: 0 to 36.0 (50.0)			–			Normal type with SENSE pin
R3121NxxxA/G	K	A	SOT-23-6	-40 to 125	1.4 to 36.0 (50.0)	3.0 to 12.0	±1.5*3, -2.2 to 2.5	-40 to 80	3.8	-VDET×0.043 (Min.) -VDET×0.055 (Max.) G: Without Hysteresis Type	with delay function (External capacitor type)
R3121NxxxE					2.4 to 6.0 (7.0) SENSE: Max. 36.0 (50.0)				3.5		with delay function (External capacitor type) with SENSE pin
R3150NxxxA/B	J		SOT-23-6	-40 to 105	1.4 to 36.0 (50.0)	5.0 to 10.0	±1.5*3	-35 to 40 Detect Output Delay Time Accuracy -35 to 40	3.8	Released Voltage Range: 5.3V to 11.0V Released Voltage Accuracy: ±1.5%*3	with delay function (External capacitor type) with CD pin (for Release output delay time setting) with CR pin (for Detect output delay time setting) E, F: with SENSE pin A, E: Reset Signal "L" B, F: Reset Signal "H"
R3150NxxxE/F					3.6 to 6.0 (7.0) SENSE: Max. 36.0 (50.0)				3.5		
R3151NxxxA/B		A	SOT-23-6	-40 to 105	1.4 to 36.0 (50.0)	5.0 to 10.0	±1.5*3	-35 to 40 Detect Output Delay Time Accuracy -35 to 40	3.8	Released Voltage Range: 5.3V to 11.0V Released Voltage Accuracy: ±1.5%*3	with delay function (External capacitor type) with CD pin (for Release output delay time setting) with CR pin (for Detect output delay time setting) E, F: with SENSE pin A, E: Reset Signal "L" B, F: Reset Signal "H"
R3151NxxxE/F					3.6 to 6.0 (7.0) SENSE: Max. 36.0 (50.0)				3.5		
R3152NxxxA	K	A	SOT-23-6	-40 to 125	3.0 to 42.0 (50.0)	OV: 1.1 to 5.9 UV: 1.0 to 4.8	±0.5*3, -1.25 to 0.75	-37.5 to 100	1.5	VOVDET, VUVDET × 0.005 (Min.) VOVDET, VUVDET × 0.015 (Max.)	with delay function (External capacitor type) with SENSE pin
R3152NxxxB										No hysteresis	

Product Name	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Detector Threshold Range (V)	Detector Threshold Accuracy*1 (%)	Output Delay Time Accuracy*1 (%)	Supply Current*2 (μA) Typ.	Hysteresis*1	Remarks
R3154N	R	A	SOT-23-6	-40 to 125	3.0 to 42.0 (50.0)	OV: 0.75 to 3.7 UV: 0.55 to 3.3	±0.5*3, *4, -1.25 to 0.75*4	-37.5 to 100	2.0	V_{OVDET}, V_{UVDET} × 0.0025 (Min.) V_{OVDET}, V_{UVDET} × 0.0075 (Max.)	with failure diagnosis function with delay function (External capacitor type) with SENSE pin
R3500S	K	A	HSOP-18	-40 to 125	3.0 to 42.0 (50.0)	OV: 1.0 to 5.9 UV: 0.9 to 5.0	±0.5*3, -1.25 to 0.75	-37.5 to 100	10	V_{OVDET}, V_{UVDET} × 0.0025 (Min.) V_{OVDET}, V_{UVDET} × 0.0075 (Max.)	with failure diagnosis function 4ch Window Voltage Detector with delay function (External capacitor type) with SENSE pin
R3160N	K	A	SOT-23-6	-40 to 125	2.7 to 60.0 (80.0)	10.0 to 48.0	±1.5*5 or ±1.75*5	±50	1.8	-V_{DET} × 0.034 (Min.) -V_{DET} × 0.052 (Max.)	with delay function (External capacitor type)

*1 The K class is guaranteed specification for operating temperature range. The A class is guaranteed by design engineering at operating temperature range. *2 Detection released *3 This value is guaranteed specification at Ta=25°C. *4 OV 0.9V, UV 0.66V or lower *5 ±1.75%: Detector Threshold 20V or lower, ±1.5%: Detector Threshold 20.5V or higher

●Watchdog Timers (WDT)

・Watchdog Timers (WDT) with LDO Regulators (Linear Regulators) and Reset ICs (Voltage Detectors)

Product Name	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	LDO Regulator Part: Output Voltage Range (V)	LDO Regulator Part: Output Voltage Accuracy*1 (%)	LDO Regulator Part: Output Current (mA)	Reset IC Part: Detector Threshold Range (V)	Reset IC Part: Detector Threshold Accuracy*1 (%)	Reset IC Part: Output Delay Time Accuracy*1 (%)	Watchdog Timer Part: Timeout Period*2(ms) Min.	Timeout Period*2(ms) Typ.	Timeout Period*2(ms) Max.	Inhibit Pin	Supply Current (μA) Typ.	Remarks
R5104V	K		SSOP-10	-40 to 125	Max. 36.0 (50.0)	3.3 to 5.0	±2.0*3	Depends on Ext. Tr.	2.8 to 4.0	±2.0*3	–	200	300	510	✓ xxxA	60	Peak : 60V
R5110Sxx1	K	A	HSOP-8E	-40 to 125	3.5 to 36.0 (50.0)	1.8 to 5.0	±1.5	500	1.6 to 5.5	±1.8	±20	14.4	18	21.6	–	25	Peak : 60V Window WDT selectable*4 Thermal Inrush
R5110Sxx2			HSOP-18												✓		
R5110Lxx2			HQFN0808-28												✓		
R5111Sxx1	K	A	HSOP-8E	-40 to 125	3.5 to 36.0 (50.0)	1.8 to 5.0	±1.5	300	1.6 to 5.5	±1.8	±20	14.4	18	21.6	–	25	Peak : 60V Window WDT selectable*4 Thermal Inrush
R5111Sxx2			HSOP-18												✓		
R5111Lxxx2			HQFN0808-28												✓		
R5114Sxx1	K	A	HSOP-8E	-40 to 125	3.5 to 42.0 (50.0)	3.3 to 5.0	±1.6	250	2.5 to 4.8	±1.6	-17, +15	14.8	18	21.9	✓	8.5	Peak : 60V Thermal
R5114Sxx2			HSOP-18												✓		
R5114Lxx2	K	A	HQFN0808-28												✓		
R5115Sxx1	K	A	HSOP-8E	-40 to 125	3.5 to 42.0 (50.0)	3.3 to 5.0	±1.6	250	2.5 to 4.8	±1.6	-17, +15	14.8	18	21.9	✓	8.5	Peak : 60V Window WDT only*4 Thermal
R5115Sxx2			HSOP-18												✓		
R5115Lxx2	K	A	HQFN0808-28												✓		

*1 The K class is guaranteed specification for operating temperature range. The A class is guaranteed by design engineering at operating temperature range. *2 R5104V: C_{TW}=0.1μF, R5110x/R5111x/R5114x/R5115x: C_{TW}=0.01μF *3 This value is guaranteed specification at Ta=25°C. *4 Window watchdog timer. Window watchdog timer monitors microprocessor activity and asserts a reset signal if the watchdog pulse does not occur within the defined time window (open window) or if the watchdog pulse occurs within the other defined time window (close window).

・Watchdog Timers (WDT) with Reset ICs (Voltage Detectors)

Product Name	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Reset IC Part: Detector Threshold Range (V)	Reset IC Part: Detector Threshold Accuracy (%)	Reset IC Part: Output Delay Time Accuracy*2 (%)	Watchdog Timer Part: Timeout Period*1(ms) Min.	Timeout Period*1(ms) Typ.	Timeout Period*1(ms) Max.	Inhibit Pin	Supply Current (μA) Typ.	Remarks
R5105N	J	A	SOT-23-6	J: -40 to 105 A: -40 to 125	0.9 to 6.0 (7.0)	1.5 to 5.5	±1.0	J: ±16 A: ±18	230	310	450	–	11	
R5106N	J	A	SOT-23-6											C_D pin and C_{TW} pin are combined.
R5107G	J	A	SSOP-8G											with MR pin (Manual Reset)
R5108G	J	A	SSOP-8G		1.5 to 6.0 (7.0)							✓		with SENSE pin
R5109G	J	A	SSOP-8G		0.9 to 6.0 (7.0)								11.5	2 clock input type

*1 C_{TW}=0.1μF *2 This specification is guaranteed by design engineering at operating temperature range.

●DC/DC Converters (Switching Regulators)

· High Voltage Step-down DC/DC Converters (Switching Regulators)

Product Name	Ver.	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Control	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (%)	Frequency (kHz)	Output Current*2 (A)	Protection Circuit	Remarks
R1245S	003A/G	J	A	HSOP-8E	-40 to 105	PWM	4.5 to 30.0 (32.0)	Ext. Adjustable: A/B/C/D: 0.8 to 27.3, E/F: 0.8 to 25.8, G/H: 0.8 to 21.3	0.8V±1.0	A/B : 330 C/D: 500 E/F : 1000 G/H: 2400	1.2	Latch type	Diode Soft-Start UVLO Thermal
	003C/E											Fold back type	
	003B/H	J										Latch type	
	003D/F											Fold back type	
R1245L	003A/C/E/G		A	DFN2020-8									
	003B/D/F/H												
R1270S	001A/B	K	A	HSOP-18	-40 to 125	PWM, PWM/VFM Auto Switching	3.6 to 34.0 (36.0)	Ext. Adjustable: 0.8 to 31.6	0.8V±1.0	Ext. Adjustable: 300 to 2400, Ext. Synchronizable with PLL Circuit	3	Fold back type (With Latch type)	Diode Soft-Start : Ext. Adjustable FLAG Output Function UVLO OVLO Thermal Phase : Ext.
R1272S	xxxA	K	A	HSOP-18	-40 to 125	Forced PWM, PWM/VFM Auto Switching	4.0 to 34.0 (36.0)	Ext. Adjustable: 0.7 to 5.3	0.64V±1.0	Ext. Adjustable: 250 to 1000, Ext. Synchronizable with PLL Circuit	External	Latch type or Hiccup type (Reset type)	DC/DC Controller Tracking function Synchro Soft-Start : Ext. Adjustable UVLO OVP Thermal SSCG : Ver. 03x, 13x PG Phase : Ext.
R1273L	xxxA		A	QFN0505-32B	-40 to 125	Forced PWM, PWM/VFM Auto Switching	4.0 to 34.0 (36.0)	Ext. Adjustable: 0.7 to 5.3	0.64V±1.0	Ext. Adjustable: 250 to 1000, Ext. Synchronizable with PLL Circuit	14	Latch type or Hiccup type (Reset type)	Tracking function Synchro Soft-Start : Ext. Adjustable UVLO OVP Thermal SSCG : Ver. 03x, 13x PG Phase : Ext.
R1277L	xxxA	K	A	QFN0505-32D*3	-40 to 125	Forced PWM, PWM/VFM Auto Switching	4.0 to 34.0 (36.0)	Ext. Adjustable: 0.7 to 5.3	0.64V±1.0	Ext. Adjustable: 250 to 1000, Ext. Synchronizable with PLL Circuit	8	Latch type or Hiccup type (Reset type)	Tracking function Synchro Soft-Start : Ext. Adjustable UVLO OVP Thermal SSCG : Ver. 03x/13x PG Phase : Ext.
R1275S	003A/C		A	HSOP-18	-40 to 125	Forced PWM	3.6 to 30.0 (36.0)	Ext. Adjustable: 3.3 to 5.0	0.64V±1.0	Ext. Adjustable: 2000, Ext. Synchronizable with PLL Circuit (1800 to 2200)	2	Hiccup type (Reset type)	Synchro Soft-Start : Ext. Adjustable UVLO OVLO Thermal SSCG : Ver. 003C PG Phase : Ext.
R1278S	003A/C	K	A	HSOP-18	-40 to 125	Forced PWM	3.6 to 30.0 (36.0)	Ext. Adjustable: 3.3 to 5.0	0.64V±1.0	Ext. Adjustable: 2000, Ext. Synchronizable with PLL Circuit (1800 to 2200)	2	Hiccup type (Reset type)	Tracking function Synchro Soft-Start : Ext. Adjustable UVLO OVLO Thermal SSCG : Ver. 003C PG Phase : Ext.
R1276S	00xA/C	K	A	HSOP-18	-40 to 125	Forced PWM, PWM/VFM Auto Switching	3.6 to 30.0 (36.0)	Ext. Adjustable: 0.7 to 6.5	0.64V±1.0	Ext. Adjustable: 250 to 1000, Ext. Synchronizable with PLL Circuit"	3	Hiccup type (Reset type)	Tracking function Synchro Soft-Start : Ext. Adjustable UVLO OVLO Thermal SSCG : Ver. 00xC PG Phase : Ext.
R1271L	xx1A/B/C/D	K	A	DFN3030-12B*3	-40 to 125	Forced PWM	3.6 to 30.0 (42.0)	3.3, 5.0	±1.0	2000	1	Latch type or Hiccup type (Reset type)	Synchro Soft-Start : Ext. Adjustable SSCG : Ver. xx1C/D PG UVLO OVLO Thermal
R1271S				HSOP-18									
R1260S	xxxA/B/C/D	K	A	HSOP-18	-40 to 125	Forced PWM, PWM/VFM Auto Switching	5.0 to 60.0 (80.0)	Ext. Adjustable: 1.0 to 16.0	0.8V±1.5 (Ta=-40 to 125)	Ext. Adjustable: 150 to 600, Ext. Synchronizable with PLL Circuit	External	Latch type or Hiccup type (Reset type)	DC/DC Controller Synchro Soft-Start : Ext. Adjustable SSCG : Ver. xxxB/D PG UVLO Thermal Phase : Ext.

· Low Voltage Step-down DC/DC Converters (Switching Regulators)

Product Name	Ver.	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Control	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (mV)	Frequency (kHz)	Output Current*2 (A)	Protection Circuit	Auto-Discharge	Remarks
RP506L	xx1G/K	K	A	DFN3030-12	A: -40 to 105 K: -40 to 125	Forced PWM, PWM/VFM Auto Switching	2.5 to 5.5 or 2.5 to 4.5 (6.5)	0.8, 1.0, 1.1, 1.2, 1.3, 1.5, 1.8, 1.85, 3.0, 3.3	±1.5%	K, L, M: 1200 G, H, N: 2300	2	Latch type	–	Synchro Soft-Start : Ext. Adjustable UVLO Thermal PG
	xx1H/L												√	
	001N							Ext. Adjustable: 0.8 to 4.0	0.6V±9				–	
	001M							Ext. Adjustable: 0.6 to 4.0	0.6V±9					
RP510L	xx1G/4G	K	A	DFN3030-12	A: -40 to 105 K: -40 to 125	Forced PWM	2.5 to 5.5 (6.5)	0.8, 1.0, 1.1, 1.2, 1.3, 1.5, 1.8, 3.0, 3.3	±1.0%	2300	4	Ver. 1G/1H/1J/1N: Latch type, Ver. 4G/4H/4J/4N: Fold back type	–	Synchro Soft-Start : Ext. Adjustable UVLO Thermal PG
	xx1H/4H												√	
	001J/4J							Ext. Adjustable: 0.8 to 3.3	0.6V±6				–	
	001N/4N												√	
RP550L Dual	001B		A	DFN3030-12	-40 to 105	Forced PWM, PWM/VFM Auto Switching	2.3 to 5.5 2.3 to 4.5 (6.5)	Ext. Adjustable: 0.6 to 3.3	0.6V±9	2300	1×2ch	Latch type	–	Synchro Soft-Start UVLO Thermal

· PWM Step-up DC/DC Controller (Switching Regulator) for LCD/ OLED/ CCD

Product Name	Ver.	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range	Output Voltage Accuracy*1 (mV)	Frequency (kHz)	Output Tr.	Protection Circuit	Remarks
R1211N	002B/D		**A**	SOT-23-6W	-40 to 85	2.5 to 6.0 (6.5)	Ext. Adjustable	1.0V±15	B: 700 D: 300	External	Latch type	Phase : Int. with stand-by. Soft-Start UVLO

· Step-up and Charge Pump DC/DC Converters (Switching Regulators) for LCD/ OLED/ CCD

Product Name	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Control	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (mV)	Frequency (kHz)	Lx Current Limit*4 (A)	Remarks
R1290K		**A**	QFN0404-24	-40 to 105	CH1: PWM (Step-up) CH2: Charge pump (Positive) CH3: Charge pump (Negative)	2.0 to 5.5: 101A 2.5 to 5.5: 102A 3.3 to 5.5: 103A (6.5)	CH1: Up to 20.0, Ext. Adjustable CH2/3: Ext. Adjustable	CH1: 1.0V-40, +25 CH2: 1.5V-50, +35 CH3: 0V±35	Ext. Adjustable: 180 to 1400	CH1: 2	The charge pump operates at 1/4th operating frequency. Sequencing Soft-Start : Ext. Adjustable UVLO
R1294L	**J**	**A**	QFN0404-24B	-40 to 105	CH1: PWM (Step-up) CH2: Charge pump (Positive) CH3: Charge pump (Negative)	2.0 to 5.5: 101A 2.5 to 5.5: 102A 3.3 to 5.5: 103A (6.5)	CH1: Up to 20.0, Ext. Adjustable CH2/3: Ext. Adjustable	CH1: 1.0V-40, +25 CH2: 1.5V-50, +35 CH3: 0V±35	Ext. Adjustable: 210 to 1400, 800-10%, +14%*5	CH1: 2	The charge pump operates at 1/4th operating frequency. Sequencing Soft-Start : Ext. Adjustable UVLO

*1 When the output voltage is adjusted by external resistors, the value means the feedback voltage accuracy. *2 This is an approximate value, because output current depends on conditions and external parts.
*3 Wettable flank package *4 Lx current limit is different from output current.
*5 The J class is guaranteed specification for operating temperature range. The A class is guaranteed by design engineering at operating temperature range.

●USB High-side Switch ICs

Product Name	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	ON Resistance (mΩ)	Supply Current (µA) Typ.	Current Limit Threshold (mA)	Short Current Limit (mA)	Flag Delay Time(ms) Typ.	UVLO Detect Voltage (V)	Internal FET	EN	Protection	Remarks
R5523N	**H**		SOT-23-5	-40 to 85	2.2 to 5.5 (6.5)	130	20	1000 (Typ.) 1800 (Max.)	750 (Typ.) 1500 (Max.)	10	1.8	Pch.	H/L	Constant current type	Soft-Start Thermal
R5524N001 R5524N002		**A**	SOT-23-5	-40 to 85	2.7 to 5.5 (6.0)	100	110	800 (Typ.) 980 (Max.)	650 (Typ.) 800 (Max.)	20	2.4	Nch.	H	Latch-off type	Soft-Start Thermal
R5524N004								1550 (Typ.) 1850 (Max.)						Constant current type	Discharge Reverse

●Constant-Current LED Driver Controller IC

REDC provides a new constant-current LED driver controller that achieves human-friendly LED lightings.
The R1580 is a product for flicker-free camera systems, such as passenger monitoring and surround monitoring.

Product Name	Ver.	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Max. SOURCE Pin Voltage Accuracy (mV)	Signal Input Circuit	Dimming Control	Standby Current (µA) Typ.	Supply Current (µA) Typ.	Remarks
R1580N	001A		**A**	SOT-23-6	-40 to 105	3.6 to 34.0 (36)	400±8	Comparator Input, H=1.3 V, L=1.1 V	1% to 100%	140	320	Thermal UVLO OVP
	002A						800±16	Comparator Input, H=1.3 V, L=1.1 V	0.5% to 100%	140		
	003A						400±8	Inverter Input, H=1.2 V, L=0.4 V	1% to 100%	28		

●Power Management Multiple-channel ICs

REDC offers highly integrated power management system ICs.
Flexible programmable setting to raise design convenience and relieve design complexity.

Product Name	Automotive Class H/J/K/R	Automotive Class A	Package	Operating Temperature Range (°C)	Input Voltage Range (V)	Interface	Main Function Step-down DCDC	LDO	VD	WDT	GPIO	INTC	Remarks
RN5T569		**A**	QFN0707-48-P27*1	-40 to 105	2.7 to 5.5	I²C	4	7	4	1	4	✓	Built-in DVS OTP
RN5T5611	**K**		QFN0505-32-P7*1	-40 to 125	2.7 to 5.5	I²C	2	1	4 Window VD	–	–	✓	Analog built in self test Logic built in self test

*1 Wettable flank package

LD Driver LSI for Display

: AEC-Q100 Compliant

REDC provides LD drivers for display by using MFP / LP driver technology.
This LD driver LSI for display contributes to high image quality and space saving.

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	CH	Supply Voltage (V)	Maximum Output Rate Per 1 Channel (Mdots/sec)	Rising/Falling Time (ns)	Maximum Operating Current (mA)		Protection Function etc.
	H/J/K/R	A							LD1	LD2/3/4	
RN5C750	J		QFN0808-56*1	-40 to 105	4CH	1.8 & 3.3	200	1.0	800	400	LD Over Current Detection LD Pin Short Circuit Detection PDI Current Error Detection Thermal Shutdown

*1 Wettable flank package

ZOOM

RN5C750 Series

AEC-Q100 Compliant

Maintains a high gradation output by internal detection for the LD characteristics of Ith and Icolor.

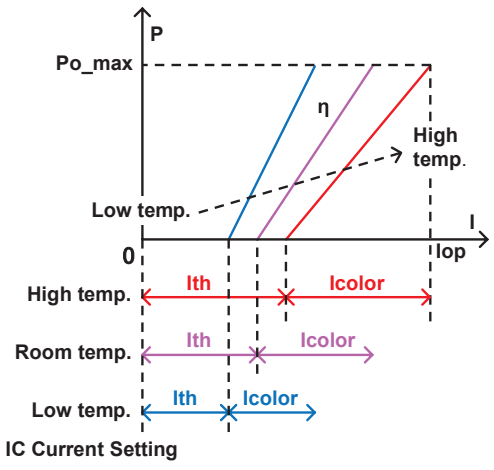
Client's Concerns

When the LD characteristics of Ith and Icolor vary with changes in ambient temperature, the gradation range in color is maintained?
Keep BOM (Bill of Materials) cost low?

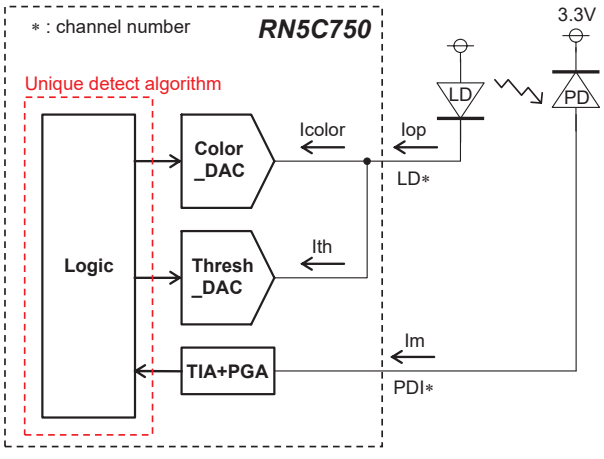
Ricoh's Solutions

With connecting a PD (Photo Diode), RN5C750 automatic detection for a threshold current (Ith) and a light emitting current (Icolor) enables to keep a high gradation output regardless of changes in ambient temperature.

Adoption of Ricoh uniquely algorithm



TEMPERATURE CHARACTERISTIC



TYPICAL APPLICATION

REDC's automotive products are halogen-free products only.
Please refer to our website for additional details.
: Products in Development : Products Newly Released

Package Information for Power Management

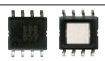
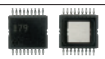
●DFN

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*3 (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body Size	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C			
4	L	DFN1212-4			1.2×1.2	1.2×1.2	0.8*4	0.5	550	690	–	TR	3,000
8	L	DFN2020-8		 *2	2.0×2.0	2.0×2.0	0.8*4	0.5	2500	3100	–	TR	3,000
8	L	DFN2020-8B		 *2	2.0×2.0	2.0×2.0	0.8*4	0.5	2200	2800	–	TR	3,000
12	L	DFN3030-12		 *2	3.0×3.0	3.0×3.0	0.8*4	0.5	3400	4300	–	TR	3,000
12	L	DFN3030-12B *1		 *2	3.0×3.0	3.0×3.0	0.8*4	0.5	3400	4300	–	TR	3,000

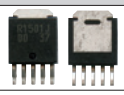
●SOT

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*3 (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body Size	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C			
5	N	SOT-23-5 (SC-74A)			2.9×1.6	2.9×2.8	1.1	0.95	660	830	E	TR	3,000
6	N	SOT-23-6 (SC-74)			2.9×1.6	2.9×2.8	1.1	0.95	660	830	E	TR	3,000
6	N	SOT-23-6W			2.9×1.8	2.9×2.8	1.1	0.95	430	–	E	TR	3,000
5	H	SOT-89-5			4.5×2.5	4.5×4.35	1.5	1.5	2600	3200	E	T1	1,000

●SOP

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*3 (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body Size	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C			
8	G	SSOP-8G			2.9×2.8	2.9×4.0	1.1	0.65	380	475	E	TR	3,000
10	V	SSOP-10			3.1×4.4	3.1×6.4	1.15	0.5	450	–	G	E2	2,000
6	S	HSOP-6J			5.02×3.9	5.02×6.0	1.5	1.905	2700	3400	E	E2	1,000
8	S	HSOP-8E		 *2	5.2×4.4	5.2×6.2	1.45	1.27	2900	3600	E	E2	1,000
18	S	HSOP-18		 *2	5.2×4.4	5.2×6.2	1.45	0.5	3100	3900	E	E2	1,000

●TO

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*3 (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body Size	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C			
5	J	TO-252-5-P2		 *2	6.6×6.1	6.6×9.9	2.3	1.27	3800	4800	E	T1	3,000

●QFN

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*3 (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body Size	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C			
24	K	QFN0404-24		 *2	4.0×4.0	4.0×4.0	0.75	0.5	1500	1860	–	E2	1,000
24	L	QFN0404-24B		 *2	4.0×4.0	4.0×4.0	0.75*4	0.5	3400	4300	–	E2	1,000
32	L	QFN0505-32B		 *2	5.0×5.0	5.0×5.0	0.85*4	0.5	2300	2900	–	E2	1,000
32	L	QFN0505-32D *1		 *2	5.0×5.0	5.0×5.0	0.85*4	0.5			–	E2	1,000
32	L	QFN0505-32-P7 *1		 *2	5.0×5.0	5.0×5.0	0.75*4	0.5	3330	4160	–		
48	L	QFN0707-48-P27*1		*2	7.0×7.0	7.0×7.0	0.9*4	0.5	4300	5400	–	E4	2,000
56	L	QFN0808-56*1		*2	8.0×8.0	8.0×8.0	0.8*4	0.5	4540	5680	–	Tray	1,040

●HQFN

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*3 (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body Size	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C			
28	L	HQFN0808-28		*2	8.0×8.0	8.8×8.8	0.95	0.8	4600	5800	E	TR	2,000

*1 Wettable flank package *2 Tab in the reverse side of the IC is GND or VDD level. The tab is better to be connected to the GND or VDD, but leaving it open is also acceptable.
*3 Please refer to our website for additional details. *4 A maximum value.

Application Examples of REDC's Automotive Products

REDC has an extensive portfolio of automotive products that features low power consumption, high-precision, high-reliability and small packaging. From solutions in body electronics and lighting, infotainment and passive safety to solutions in electric motorcycles and scooters, REDC offers a wide range of innovative technologies that enables our customers to succeed in today's marketplace.

Advanced Driver Assistance Systems (ADAS) / Millimeter-wave Radar / Telematics / V2X / DCM / E-Call / BCM / EV Inverter, Engine Control Unit / EPS / Battery Charge Control Unit / Various Control Unit / DC-DC Converter Unit

▶LDO Regulators
R1180, R1191, **R1501**, **R1510**, **R1513**, **R1514**, **R1515**, **R1518**, **R1524**, **R1525**, **R8150**, **R8152**, **R8154**, **R8156**, RP111, RP130, RP132, RP154, RP170

▶Reset ICs
R3117, R3118, **R3152**, **R8300**, **R8315**

▶DC/DC Converters
R1245, **R1270**, **R1272**

▶USB High-side Switch IC
R5524

▶Watchdog Timers
R5105, R5106, R5109, **R5110**, **R5111**, **R5115**, R8355, R8356, R8357, R8359, **R8360**

Antenna

▶LDO Regulators
R1191, **R1524**, RP115, RP170

Proximity Sensor ECU / Rear View Camera / Rear Combination Light / Perimeter Monitoring

▶LDO Regulators
R1172, **R1501**, **R1511**, **R1513**, **R1524**, RP111, RP130, RP154, RP170

▶Watchdog Timer
R5107

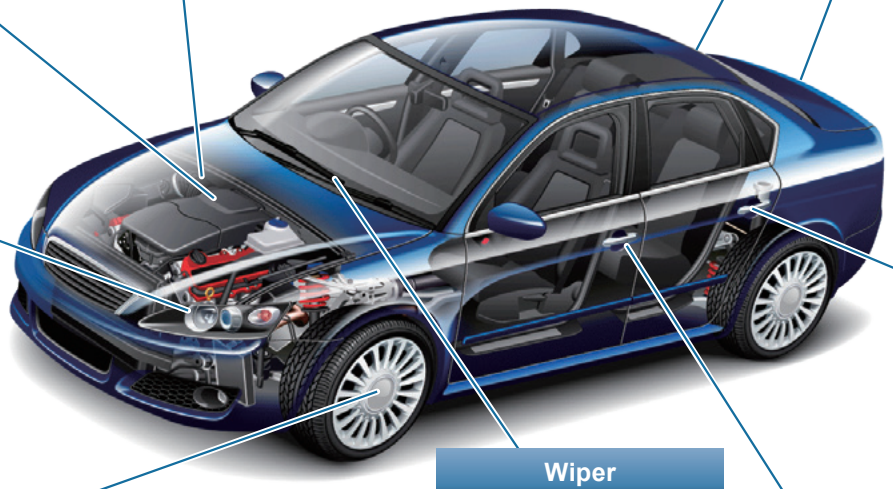
▶DC/DC Converters
R1245, RP550

▶PMIC
RN5T569

Shift by Wire

▶LDO Regulators
R1524, **R8160**

▶Watchdog Timers
R8356, **R8360**



AFLS / DRL / Headlights

▶LDO Regulators
R1511, **R1514**, **R1517**, **R1518**, **R1524**, **R8154**

▶Watchdog Timer
R5110

EV / PHEV Battery Charger

▶LDO Regulators
R1501, **R1514**, **R8152**

▶Reset ICs
R3152, **R8300**

▶Watchdog Timer
R5106, R8356

TPMS / Sonar

▶LDO Regulators
R1517, **R1524**, **R8150**

Wiper

▶LDO Regulator
R1524

Door Handle Touch Sensor

▶LDO Regulators
R1150, **R1514**, **R1524**

▶Reset IC
R3117

Sel-Dynamo

▶LDO Regulators
R1524, **R1525**

▶Watchdog Timer
R5106

Smart Key

▶LDO Regulators
R1501, **R1524**, **R1525**

EV motor control

▶LDO Regulators
RP170

Answerback

▶LDO Regulators
R1514, **R1516**, **R1524**

Electric Steering Lock

▶Watchdog Timer
R5108

Steering Switch

▶LDO Regulator
R1524

▶Watchdog Timer
R5106

Automotive Instrument Panel Display

▶LDO Regulators
R1172, R1180, **R1560**, **R8151**, **R8152**

▶Reset ICs
R3150, **R3151**

Head-up Display

▶LDO Regulators
R1501, **R1524**, **R5112**, RP111, RP132, RP170

▶Reset IC
R3119

▶Watchdog Timers
R5110, **R5114**, R8356

▶DC/DC Converters
R1270, RP506

Cluster / Meter

▶LDO Regulators
R1524, **R8152**

▶Reset IC
R3119

▶Watchdog Timer
R5110

▶DC/DC Converter
RP506

Handle Heater / Handle Light

▶LDO Regulators
R1516, **R1524**

Product names: Products that are being used or will be used by our customers.
Product names in bold: High-voltage products.

Navigation System / Audio System / Audio Visual Display System / Bluetooth / Tuner / AMP

▶LDO Regulators
R1114, R1130, **R1150**, R1163, R1170, R1171, R1172, R1180, R1190, R1191, **R1500**, **R1501**, **R1510**, **R1513**, **R1514**, **R1515**, **R1516**, **R1517**, **R1518**, **R1524**, RP108, RP115, RP130, RP132, RP170, RP171

▶Reset ICs
R3116, R3117, R3118, **R3119**, **R3120**, R3134, **R3150**, **R3151**

▶PMIC
RN5T569

▶Watchdog Timers
R5104, R5105, R5106, R5107, R5108, R5109, **R5111**

▶USB High-side Switch ICs
R5523, R5524

▶DC/DC Converters
R1211, **R1245**, **R1270**, **R1272**, **R1273**, **R1275**, **R1276**, R1290, R1294, RP506, RP510, RP550

Wireless Charger

▶LDO Regulators
R1517, **R1524**, **R5112**, RP170

▶Reset ICs
R3119, **R3120**

▶DC/DC Converter
R1245

USB-Charger

▶DC/DC Controller
R1272

USB-BOX

▶LDO Regulators
R1516, RP108

Flap Touch Panel Sensor

▶LDO Regulator
R1514

Air Conditioners

▶LDO Regulators
R5112, **R8150**, **R8152**

▶Watchdog Timer
R5111

ETC

▶LDO Regulators
RP115, RP132, RP170

▶Reset ICs
R3116, R3117

▶Watchdog Timer
R5105

Communication Module for EV

▶LDO Regulators
R1172, R1180, **R1501**, RP108

▶DC/DC Converters
R1270, RP506

Smart Entry / Immobilizer System

▶LDO Regulators
R1150, **R1501**, **R1510**, **R1514**, **R1524**

▶Watchdog Timer
R5105

Next Generation Security

▶LDO Regulator
R1514

Side Mirror Control

▶LDO Regulator
R1514

Sliding Door Control

▶Watchdog Timer
R5104

Electric Window Control

▶LDO Regulator
R1150

Sun Roof / Sun Roof ECU

▶LDO Regulator
R1511

▶Watchdog Timers
R5110, **R5115**

Seat ECU

▶LDO Regulators
R1514, **R1524**

Seat Heater

▶LDO Regulator
R1516

Seat Belt ECU

▶LDO Regulator
R1516

▶Watchdog Timer
R5110

Idle Stop and Go

▶LDO Regulator
R1524

▶Watchdog Timer
R5110

Interior Lighting

▶LDO Regulator
R1524

Occupant Detection System

▶Watchdog Timer
R5110

Drive Recorder

▶LDO Regulator
RP111

▶PMIC
RN5T569

Smart Room Mirror

▶LDO Regulators
R1500, RP170

▶Reset ICs
R3117, **R3119**

Camera ECU

▶LDO Regulators
R1501, **R1524**

▶Reset IC
R3150

▶DC/DC Converters
RP506, RP510

Interior Illumination

▶DC/DC Converter
R1275

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