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Electronic Device Product Catalog For Automotive 2018

REDC's achievement in 2017 !

Here is a representative new product. Please have a look.

R3152 series

42 V input Window Voltage Detector

RP510 series

4 A Forced PWM Step-down DCDC Converter with Synchronous Rectifier

R1275 series

2 A 30 V Input Forced PWM Step-down DCDC Converter with Synchronous Rectifier

REDC's challenge in 2018 !

We are going to exhibit REDC's automotive PMICs at the exhibitions.
We are looking forward to seeing you there.

AUTOMOTIVE WORLD 2018 Tokyo and Nagoya

January 17-19, 2018
Tokyo Big Sight

September 5-7, 2018
Nagoya International Exhibition Hall

ELECTRONICA CHINA 2018

March 14-16, 2018
Shanghai New International Expo Center

ELECTRONICA 2018 Munich, Germany

November 13-16, 2018
Messe München

RICOH ELECTRONIC DEVICES Official Website:
https://www.e-devices.ricoh.co.jp/en/

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. REDC is committed to providing a semiconductor device with the highest level of quality and reliability by restricting the device manufacturing only within REDC and the cooperative companies successfully passed our stringent inspections for automotive products.

The TS16949 Authorized Certification

REDC achieved the International Organization for Standardization's (ISO) Quality Management System (ISO 9001) Certification in 1992 and Quality Management System for Automotive Products (ISO/TS 16949) Certification in 2013. 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 and products and services.

∗ ISO/TS16949:2009
ISO/TS 16949:2009, in conjunction with ISO 9001:2008, 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 ISO/TS 16949:2009 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.

<ISO/TS16949>

ISO/TS 16949 Core Tools

APQP&CP (Advanced Product Quality Planning and Control Plan)
Over the process from product planning to mass production, REDC involves with the 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 the framework for ensuring the stable supply of products by using the SPC system to reduce the process variation and prevents the 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.

AEC-Q100

AEC-Q100 is a stress test qualification for integrated circuit 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. The part operating temperature grades are defined as 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 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

REDC offers five different quality classes for automotive products that are different in guaranteed operating temperature range. We support our client to select the best fit quality class for their automotive applications. Please note that you cannot use consumer products or automotive products in non-designated applications.

Quality Rank	Applications	Quality Class	Operating Temp. Range*1	Test Temp.*2 Low	Test Temp.*2 25°C	Test Temp.*2 High	Reliability Test Time	Product Traceability
Automotive Applications								
1	Safety-critical parts*3	R8	–40°C to 110°C, 125°C	●	●	●	2,000h	Sales, Manufacturing
2	General equipment*4	H	–40°C to 85°C	●	●	●	2,000h	
		J	–40°C to 105°C					
		K	–40°C to 125°C					
3	Accessories	A	85°C, –40°C to 105°C, 125°C		●	●	2,000h	
Consumer Applications								
—	General	—	85°C, –40°C to 105°C, 125°C		●		1,000h	Sales

*1 The operating temperature range differs by product. Refer to the datasheet for details.
*2 The screening was performed on all test items of the R8 class products. As for the H, J and K class products, the screening was performed on some of the test items.
*3 The R8 class products offer the highest quality obtained by the enhanced process inspection and quality control at manufacturing.
*4 The H, J and K class products can be selected at a time.

Traceability System

The manufacturers of automotive electronic products are required to take prompt actions, since their products are used in the life-critical systems, in case there is a failure or malfunction.
REDC has been established and maintained the traceability system to verify the production history and trace the destination of products by means of lot numbers. This traceability system is capable of tracking the product which belongs to the same lot as the failure product and verifying the quality of the product which uses same manufacturing device as the failure product.

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
R1172H282B-T1-HE	H	R11	72	H	282	B	-T1	-H	E
R1514H028B-T1-JE	J	R15	14	H	028	B	-T1	-J	E
R5104V008B-E2-KG	K	R51	04	V	008	B	-E2	-K	G
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".

Package Information

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

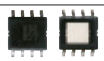
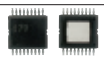
●DFN

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*2 (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*3	0.5	455	568	–	TR	3,000
8	L	DFN2020-8		 *1	2.0×2.0	2.0×2.0	0.8*3	0.5	2500	3100	–	TR	3,000
8	L	DFN2020-8B		 *1	2.0×2.0	2.0×2.0	0.8*3	0.5	2200	2800	–	TR	3,000
12	L	DFN3030-12		 *1	3.0×3.0	3.0×3.0	0.8*3	0.5	3400	4300	–	TR	3,000

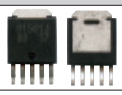
●SOT

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*2 (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*2 (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		 *1	5.2×4.4	5.2×6.2	1.45	1.27	2900	3600	E	E2	1,000
18	S	HSOP-18		 *1	5.2×4.4	5.2×6.2	1.45	0.5	3100	3900	E	E2	1,000

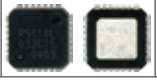
●TO

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

●HQFN

Pin	Symbol	Package	Actual Size	Perspective View	Dimensions (mm)				Power Dissipation*2 (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body Size	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C			
28	L	HQFN0808-28		 *1	8.0×8.0	8.8×8.8	0.95	0.8		5800	E	TR	2,000

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

: 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
Thermal : Thermal Shutdown Circuit Constant : Constant Slope Circuit Reverse : Reverse Current Protection Circuit Soft-Start : Soft Start Circuit
Inrush : Inrush Current Limit Circuit UVLO : Undervoltage Lockout circuit OVLO : Overvoltage Lockout Function OVP : Overvoltage Protection Circuit
Discharge : Auto-discharge Function Peak : Peak Voltage Ripple : Ripple Rejection, Frequency=1kHz Diode : Diode Rectification
Synchro : Synchronous Rectification PG : Power Good Function SSCG : Spectrum Diffusion Type Oscillator Sequencing : Start-up Sequencing Control
Phase : Phase Compensation Circuit

Products Lineup

●Voltage Regulator R8 Series

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
	R8						Ta=25°C	Ta=-40°C to 125°C*2	Typ.	Max.	Condition	Typ.	
R8151H R8151S	R8	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 *3: 60V Thermal
R8150S	R8	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 *3: 60V Thermal
R8160N R8160H R8160S	R8	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 *3: 60V Thermal
R8153S R8153J	R8	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 *3: 60V Thermal
R8156S	R8	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*4 Peak *3: 60V Thermal Discharge : Ver. D
R8154S R8154J	R8	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 *3: 60V Thermal Discharge : Ver. D/F
R8152S R8152J	R8	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	R8	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 *3: 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 Duration time=200ms *4 RR@f=100Hz

●Voltage Detector R8 Series

Product Name	Automotive Class	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
	R8							Typ.		
R8300NxxxA/G	R8	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, +2.5*1 (Ta=-40 to 125°C)	-35, +40 (Ta=-40 to 110°C) -40, +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	R8	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, +40 Detect Output Delay Time Accuracy -35, +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

· Watchdog Timer + Voltage Regulator + Voltage Detector (with Delay Function (External Capacitor Type)) R8 Series

Product Name	Automotive Class	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Voltage Regulator Part			Voltage Detector 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		
	R8										Min.	Typ.	Max.		Typ.	
R8360Sxx1	R8	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 *3: 60V Window WDT selectable*4 Thermal Inrush
R8360Sxx2		HSOP-18												√		

*1 CTW=0.01µF *2 The R8360S is guaranteed specification for full operating temperature range. *3 Duration time=200ms
*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 Timer + Voltage Detector (with Delay Function (External Capacitor Type)) R8 Series

Product Name	Automotive Class	Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Voltage Detector 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		
	R8							Min.	Typ.	Max.		Typ.	
R8355N	R8	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*2 +1.5 (Ta=-40 to 110°C)	±16*2	230	310	450	–	11	
R8356N	R8	SOT-23-6											CD pin and CTW pin are combined.
R8357G	R8	SSOP-8G									√		with MR pin (Manual Reset)
R8358G	R8	SSOP-8G		1.5 to 6.0 (7.0)									with SENSE pin
R8359G	R8	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.

Products Lineup

Lineup in Order of Input Voltage (Max.) and Output Current

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	
		6	R1114N			R1172x	
		6.5	RP130x				
		36		R1513S R8156S			
		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			R5116x +VD R5117x +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		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 DFN2020-8.

●Voltage 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	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 *4: 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	±0.8	1.50		I_{OUT}=100mA V_{SET}=5.0V	3	Peak *4: 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	±0.8	1.30		I_{OUT}=100mA V_{SET}=5.0V	20	Peak *4: 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, 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 *4: 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 *4: 60V Thermal
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 VD: ±0.6	0.6	1.2	I_{OUT}=200mA V_{SET}=5.0V	3.8	Peak *4: 60V Thermal

Product Name	Automotive Class H/J/K	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
R1524N	K	A	SOT-23-5	-40 to 125	200	3.5 to 36 (50)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 5.5, 6.0, 6.4, 8.0, 8.5, 9.0	±0.6	0.6	1.2	IOUT=200mA VSET=5.0V	2.2	Peak*4: 60V Thermal
R1524H			SOT-89-5										
R1524S			HSOP-6J										
R1524SxxxH	K	A	HSOP-8E										
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*3	Ripple : 75dB Discharge : Ver. B
RP154N 2ch			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	K	A	SOT-23-5	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, 6.0	±1.0	0.770	1.185	IOUT=300mA VSET=2.5V	23	Ripple : 70dB Thermal Constant Discharge : Ver. D
RP170H			SOT-89-5										
R1191N		A	SOT-23-5	-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
R1191H			SOT-89-5										
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	K	A	HSOP-6J	-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*4: 60V Thermal
R1511J			TO-252-5-P2										
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*4: 60V Thermal Discharge : Ver. D
RP111N	J	A	SOT-23-5	-40 to 105	500	1.4 to 5.25 (6.0)	0.7, 1.2, 1.5, 1.8, 2.5, 2.8, 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
RP111H			SOT-89-5										
RP111S			HSOP-6J										
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	K	A	HSOP-6J	-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	0.35	0.62	IOUT=500mA VSET=5.0V	18	Constant : Ext. Adjustable Ver. E/F Peak*4: 60V Thermal Discharge : Ver. D/F
R1517J			TO-252-5-P2										
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 UD: 2.5 to 5.0 OV: 3.3 to 5.5	±1.25 VD: ±1.25 (Ta=-40 to 125)	0.9	1.5	IOUT=500mA VSET=5.0V	25	Built-in Window VD Released Hysteresis: 0.5% (Max.) Peak*4: 60V Thermal
R5116L +VD			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 SVD: ±1.25 BVD: ±2.0 (Ta=-40 to 125)	0.9	1.5	IOUT=500mA VSET=5.0V	35	Built-in Dual VD Released Hysteresis of SVD Released Hysteresis: 0.5% (Max.) BVD Released Hysteresis: 5.0% (Max.) Peak*4: 60V Thermal
R5117L +VD			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, 1.5, 1.75, 1.8, 2.5, 2.8, 3.0, 3.3, 3.4	±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	H		SOT-23-5	-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
R1172Hxx2		A	SOT-89-5										
R1172Sxx2			HSOP-6J										
RP132HxxxB/D	J	A	SOT-89-5	-40 to 105	1A	1.4 to 6.5 (7.0)	0.8, 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
RP132SxxxB/D			HSOP-6J										
RP132Jxx1B/D			TO-252-5-P2										
R1190S		A	HSOP-6J	-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
R1190J			TO-252-5-P2										
R1501S		A	HSOP-6J	-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
R1501J	J		TO-252-5-P2										
R1518S	K	A	HSOP-6J	-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	0.70	1.30	IOUT=1A VSET=5.0V	18	Constant : Ext. Adjustable Ver. E/F Peak*4: 60V Thermal Discharge : Ver. D/F
R1518J			TO-252-5-P2										
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 Supply Current (ISS) per channel. *4 Duration time=200ms *5 RR@f=100Hz *6 1mA⇔250mA (1/2 IOUT (Max.))

●Voltage Tracker

Product Name	Automotive Class H/J/K	Automotive Class A	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*1 (V) Typ.	Dropout Voltage*1 (V) Max	Dropout Voltage*1 (V) Condition	Supply Current (μA) Typ.	Remarks
R1540N	K	A	SOT-23-5	-40 to 125	70	3.5 to 42.0 (50.0)	2.2 to	±15 (Ta=-40 to 125)	1.3		IOUT=70mA	60	Thermal Foldback Protection Circuit
R1540S			HSOP-8E										

Microcontroller Supervisor Features

Max. Operating Voltage (V)	Release Output Delay Time	Configuration	VD		VD and WDT		VD, VR and WDT		VD and VR		
			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 R3150NxxxA/B R3151NxxxA/B R8300NxxxA/G R8315NxxxA/B	R3150NxxxE/F R3151NxxxE/F R8300NxxxE R8315NxxxE/F			R5104V R5110Sxx1A/B R5111Sxx1A/B R8360Sxx1A/B	R5110Sxx2C/D R5110Lxx2C/D R5111Sxx2C/D R5111Lxx2C/D R8360Sxx2C/D	R1510SxxxC	R1510SxxxD	
42	√	Ext.Capacitor		R3152N			R5114S R5114L R5115S R5115L			R5112S	R5112S R5116S/L R5117S/L
60	√	Ext.Capacitor	R3160N								

●Voltage Detectors

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Output Delay Time Accuracy (%)	Supply Current*1 (µA)	Hysteresis	Remarks
	H/J/K	A							Typ.		
R3116L		A	DFN1212-4	-40 to 105	0.5 to 6.0 (7.0)	0.7 to 5.0	±0.8	±15	0.35	-VDET×0.04(Min.) -VDET×0.07(Max.)	with delay function (External capacitor type)
R3116N		A	SOT-23-5	-40 to 105	0.5 to 6.0 (7.0)	0.7 to 5.0	±0.8	±15	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	–	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	±30	0.4	-VDET×0.04(Min.) -VDET×0.07(Max.)	with delay function (External capacitor type) with SENSE pin
R3119NxxxA	J		SOT-23-5	-40 to 105	1.2 to 36.0 (50.0)	2.3 to 12.0	±1.5	-50, +80	3.3	-VDET×0.035(Min.) -VDET×0.065(Max.)	with delay function (External capacitor type)
R3119NxxxE	J		SOT-23-5	-40 to 105	2.1 to 6.0 (7.0) SENSE: 0 to 36.0 (50.0)	2.3 to 12.0	±1.5	–	3.3	-VDET×0.035(Min.) -VDET×0.065(Max.)	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	-50, +80	3.3	-VDET×0.035(Min.) -VDET×0.065(Max.)	with delay function (External capacitor type)
R3120NxxxE		A	SOT-23-5	-40 to 105	2.1 to 6.0 (7.0) SENSE: 0 to 36.0 (50.0)	2.3 to 12.0	±1.5	–	3.3	-VDET×0.035(Min.) -VDET×0.065(Max.)	Normal 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	240ms ±15	0.8	No Hysteresis	with delay function (Internal counter type)
R3150NxxxA/B	J		SOT-23-6	-40 to 105	1.4 to 36 (50.0)	5.0 to 10.0	±1.5	-35, +40 Detect Output Delay Time Accuracy -35, +40	3.8	Released Voltage Range: 5.3V to 11.0V Released Voltage Accuracy: ±1.5%	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	J		SOT-23-6	-40 to 105	3.6 to 6.0 (7.0) SENSE: Max. 36.0 (50.0)	5.0 to 10.0	±1.5	-35, +40 Detect Output Delay Time Accuracy -35, +40	3.5	Released Voltage Range: 5.3V to 11.0V Released Voltage Accuracy: ±1.5%	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"
R3151NxxxA/B		A	SOT-23-6	-40 to 105	1.4 to 36 (50.0)	5.0 to 10.0	±1.5	-35, +40 Detect Output Delay Time Accuracy -35, +40	3.8	Released Voltage Range: 5.3V to 11.0V Released Voltage Accuracy: ±1.5%	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		A	SOT-23-6	-40 to 105	3.6 to 6.0 (7.0) SENSE: Max. 36.0 (50.0)	5.0 to 10.0	±1.5	-35, +40 Detect Output Delay Time Accuracy -35, +40	3.5	Released Voltage Range: 5.3V to 11.0V Released Voltage Accuracy: ±1.5%	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"
R3152NxxxA	K	A	SOT-23-6	-40 to 125	3.0 to 42.0 (50.0)	UD: 1.6 to 4.8 OD: 2.0 to 5.9 Under Development UD: 1.0 to OD: 1.1 to	±0.5	-37.5, +100	1.5	VOVDET, VUVDET × 0.005 (Min.) VOVDET, VUVDET × 0.015 (Max.)	with delay function (External capacitor type) with SENSE pin
R3152NxxxB	K	A	SOT-23-6	-40 to 125	3.0 to 42.0 (50.0)	UD: 1.6 to 4.8 OD: 2.0 to 5.9 Under Development UD: 1.0 to OD: 1.1 to	±0.5	-37.5, +100	1.5	No hysteresis	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 or ±1.75*2,*3	±50	1.8	-VDET × 0.034 (Min.) -VDET × 0.052 (Max.)	with delay function (External capacitor type)

*1 Detection released
*2 ±1.75%: Detector Threshold 20V or lower, ±1.5%: Detector Threshold 20.5V or higher
*3 The K class is guaranteed specification for full operating temperature range. The A class is guaranteed by design engineering at full operating temperature range.

●Watchdog Timers

· Watchdog Timer + Voltage Regulator + Voltage Detector (with Delay Function (External Capacitor Type))

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Voltage Regulator Part			Voltage Detector 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		
	H/J/K	A										Min.	Typ.	Max.		Typ.	
R5104V	K		SSOP-10	-40 to 125	Max. 36.0 (50.0)	3.3 to 5.0	±2.0	Depends on Ext. Tr.	2.8 to 4.0	±2.0	–	200	300	510	√ xxxA	60	Peak*2: 60V
R5110Sxx1	K	A	HSOP-8E	-40 to 125	3.5 to 36.0 (50.0)	1.8 to 5.0	±1.5*3	500	1.6 to 5.5	±1.8*3	±20*3	14.4	18	21.6	–	25	Peak*2: 60V Window WDT selectable*4 Thermal Inrush
R5110Sxx2			HSOP-18												√		
R5110Lxx2	K	A	HQFN0808-28												√		
R5111Sxx1	K	A	HSOP-8E	-40 to 125	3.5 to 36.0 (50.0)	1.8 to 5.0	±1.5*3	300	1.6 to 5.5	±1.8*3	±20*3	14.4	18	21.6	–	25	Peak*2: 60V Window WDT selectable*4 Thermal Inrush
R5111Sxx2			HSOP-18												√		
R5111Lxxx2	K	A	HQFN0808-28												√		
R5114Sxx1	K	A	HSOP-8E	-40 to 125	3.5 to 42.0 (50.0)	3.3 to 5.0	±1.6*3	250	2.5 to 4.8	±1.6*3	-17, +15*3	14.8	18	21.9	√	8.5	Peak*2: 60 V 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*3	250	2.5 to 4.8	±1.6*3	-17, +15*3	14.8	18	21.9	√	8.5	Peak*2: 60 V Window WDT only*4 Thermal
R5115Sxx2			HSOP-18												√		
R5115Lxx2	K	A	HQFN0808-28												√		

*1 R5104V: CTW=0.1µF, R5110x/R5111x/R5114x/R5115x: CTW=0.01µF *2 Duration time=200ms
*3 The K class is guaranteed specification for full operating temperature range. The A class is guaranteed by design engineering at full operating temperature range.
*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 Timer + Voltage Detector (with Delay Function (External Capacitor Type))

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	Voltage Detector Part			Watchdog Timer Part				Supply Current (µA)	Remarks
						Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Output Delay Time Accuracy*2 (%)	Timeout Period*1(ms)			Inhibit Pin		
	H/J/K	A							Min.	Typ.	Max.		Typ.	
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									√		CD pin and CTW 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 CTW=0.1µF *2 This specification is guaranteed by design engineering at full operating temperature range.

●DC/DC Converters

· High Voltage Step-down DC/DC Converters Lineup

Product Name	Ver.	Automotive Class H/J/K	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		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		A									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 Synchro Soft-Start : Ext. Adjustable UVLO OVP Thermal SSCG : Ver. 03x 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)	Synchro Soft-Start : Ext. Adjustable UVLO OVP Thermal SSCG : Ver. 03x PG Phase : Ext.
R1275S	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)	Synchro Soft-Start : Ext. Adjustable UVLO OVLO Thermal SSCG : Ver. 003C PG Phase : Ext.
R1276S	00xA/B/C/D	K	A	HSOP-18	-40 to 125	Forced PWM, PWM/VFM Auto Switching	3.6 to 30.0 (36.0)	Ext. Adjustable: 001x: 0.7 to 6.0, 002x: 6.0 to 12.0	0.64V±1.0	Ext. Adjustable: 250 to 1000, Ext. Synchronizable with PLL Circuit"	3	Latch type or Hiccup type (Reset type)	Synchro Soft-Start : Ext. Adjustable UVLO OVLO Thermal SSCG : Ver. 00xC/D PG Phase : Ext.
R1271L	xx1A/B/C/D	K	A	DFN3030-12	-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 OVP Thermal Phase : Ext.

· Low Voltage Step-down DC/DC Converters Lineup

Product Name	Ver.	Automotive Class H/J/K	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							Ext. Adjustable: 0.8 to 4.0	0.6V±9				✓	
	001N													
	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							Ext. Adjustable: 0.8 to 3.3	0.6V±6				✓	
	001J/4J												–	
	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 Lineup for LCD/ OLED/ CCD

Product Name	Ver.	Automotive Class H/J/K	Automotive Class A	Package	Operating Temperature Range (°C)	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range	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 Lineup for LCD/ OLED/ CCD

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

*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 Lx current limit is different from output current. *4 The J class is guaranteed specification for full operating temperature range. The A class is guaranteed by design engineering at full operating temperature range.

●USB High-side Switches

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	Operating Voltage Range (Absolute Max.) (V)	ON Resistance (mΩ)	Supply Current (μA)	Current Limit Threshold (mA)	Short Current Limit (mA)	Flag Delay Time(ms)	UVLO Detect Voltage (V)	Internal FET	EN	Protection	Remarks
	H/J/K	A					Typ.			Typ.					
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

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		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)	Supply Current (μA)	Other Features
		H/J/K	A							Typ.		
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		

●Multiple-PMU Products

Flexible programmable setting to raise design convenience and relieve design complexity.

Product Name	Automotive Class		Package	Operating Temperature Range (°C)	Input Voltage Range (V)	Interface	Main Function								
	H/J/K	A					Step-down DC/DC	LDO	VD	Charger	Battery-Gauge (Fuel-Gauge)	WDT	ADC	RTC	GPIO
RN5T569		**A**	QFN0707-48	-40 to 105	2.7 to 5.5	I²C	4 DVS*	7	4	–	–	1	–	–	4

* DVS (Dynamic Voltage Scaling) allows the output voltages to be programmed through I²C.

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 / BCM / EV Inverter, Engine Control Unit / EPS / Battery Charge Control Unit / Various Control Unit / DC/DC Converter Unit

▶Voltage Regulator
R1180, R1191, **R1501**, **R1510**, **R1513**, **R1514**, **R1515**, **R1518**, **R1524**, **R8150**, **R8152**, **R8154**, **R8156**, RP130, RP132, RP170

▶Voltage Detector
R3117, R3118, **R5110**, **R8300**, **R8315**

▶DC/DC Converter
R1270

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

Antenna

▶Voltage Regulator
R1524, RP170

V2X / Proximity Sensor ECU / Rear View Camera / Rear Combination Light / Perimeter Monitoring

▶Voltage Regulator
R1172, **R1501**, **R1513**, **R1524**, RP111, RP130, RP170,

▶Watchdog Time
R5107

▶DC/DC Converter
R1245, RP550,

▶PMU
RN5T569

Shift by Wire

▶Voltage Regulator
R1524, **R8160**

▶Watchdog Time
R8356, **R8360**

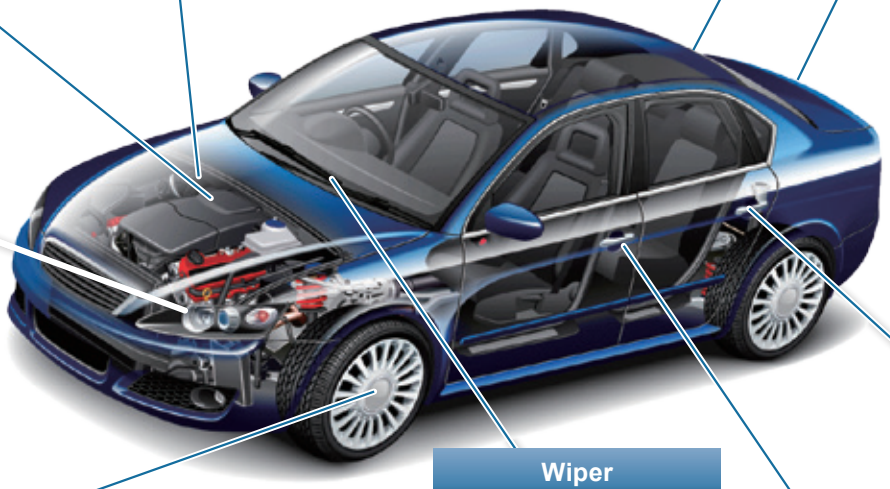
AFLS / DRL / Headlights

▶Voltage Regulator
R1511, **R1514**, **R1524**, **R1518**, **R8154**

▶Watchdog Time
R5110

TPMS / Sonar

▶Voltage Regulator
R1517, **R1524**, **R8150**



Wiper

▶Voltage Regulator
R1524

EV / PHEV Battery Charger

▶Voltage Regulator
R1514, **R8152**

▶Watchdog Time
R8356

Door Handle Touch Sensor

▶Voltage Regulator
R1150

Sel-Dynamo

▶Voltage Regulator
R1524

▶Watchdog Time
R5106

Smart Key

▶Voltage Regulator
R1501, **R1524**

Answerback

▶Voltage Regulator
R1514, **R1516**, **R1524**

Electric Steering Lock

▶Watchdog Time
R5108

Steering Switch

▶Voltage Regulator
R1524

▶Watchdog Time
R5106

Automotive Instrument Panel Display

▶Voltage Regulator
R1172, R1180, **R8151**, **R8152**

▶Voltage Detector
R3150, **R3151**

Head-up Display

▶Voltage Regulator
R1501, **R1524**

▶Voltage Detector
R3119

▶Watchdog Time
R8356

▶DC/DC Converter
R1270, RP506

Cluster / Meter

▶Voltage Regulator
R8152

▶Voltage Detector
R3119

▶Watchdog Time
R5110

▶DC/DC Converter
RP506

Handle Heater / Handle Light

▶Voltage Regulator
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

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

▶Voltage Detector
R3116, R3117, R3118, **R3119**, **R3120**, R3134, **R3150**, **R3151**

▶PMU
RN5T569

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

▶USB High-side Switch
R5523, R5524

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

Wireless Charger

▶Voltage Regulator
R1517, **R1524**, **R5112**, RP170

▶Voltage Detector
R3119

▶DC/DC Converter
R1245

USB-BOX

▶Voltage Regulator
R1516, RP108

Flap Touch Panel Sensor

▶Voltage Regulator
R1514

Air Conditioners

▶Voltage Regulator
R8150, **R8152**

ETC

▶Voltage Regulator
RP115, RP170

▶Voltage Detector
R3117

Communication Module for EV / Data Communication Module

▶Voltage Regulator
R1172, R1180, **R1501**, RP108

▶DC/DC Converter
R1270, RP506

Smart Entry / Immobilizer System

▶Voltage Regulator
R1150, **R1501**, **R1510**, **R1514**, **R1524**

▶Watchdog Time
R5105

Next Generation Security

▶Voltage Regulator
R1514

Side Mirror Control

▶Voltage Regulator
R1514

Sliding Door Control

▶Watchdog Time
R5104

Electric Window Control

▶Voltage Regulator
R1150

Sun Roof / Sun Roof ECU

▶Watchdog Time
R5110, **R5115**

Seatback ECU

▶Voltage Regulator
R1514

Seat Heater

▶Voltage Regulator
R1516

Seat Belt ECU

▶Voltage Regulator
R1516

▶Watchdog Time
R5110

Idle Stop and Go

▶Voltage Regulator
R1524

▶Watchdog Time
R5110

Interior Lighting

▶Voltage Regulator
R1524

Occupant Detection System

▶Watchdog Time
R5110

Drive Recorder

▶Voltage Regulator
RP111

▶PMU
RN5T569

Smart Room Mirror

▶Voltage Detector
R3117, **R3119**

Camera ECU

▶Voltage Detector
R3150

▶DC/DC Converter
RP510

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