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ELECTRONIC DEVICE PRODUCT CATALOG FOR AUTOMOTIVE 2016



Ricoh Electronic Devices Company (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. CMOS technology enables us to reduce consumption current down to 1/10^{*1} of the conventional products using bipolar technology. 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.

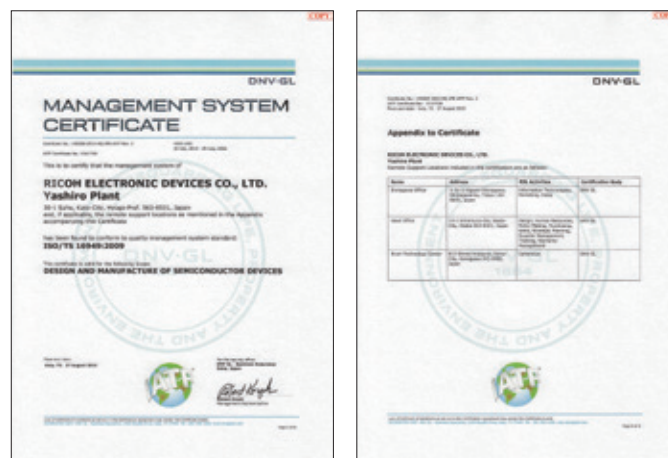
^{*1} From our data in fiscal year 2013. It may vary according to the characteristics of each individual product.

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
Grade 4	0°C to 70°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	Consumer Products
Quality Standard	AEC-Q100	EIAJ ED-4701
Number of Test Samples	77 or 45	32 or 22
Number of Test Lots	3 or 1	1
Grade 1 Temperature Cycling	-65°C to 150°C for 500 cycles	-65°C to 150°C for 100 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 for Automotive Products

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

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

Quality Class for Automotive Products

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	Automotive Purpose	Quality Class	Operating Temp. Range* ¹	Guaranteed Spec. Temp. Range* ²	Screening* ³			Reliability Test Time	Product Traceability
					Low	25°C	High		
Automotive Applications									
1	Safety-critical parts* ⁴	R8	−40°C to 110°C 125°C	−40°C to 110°C 125°C	●	●	●	2,000h	Sales, Manufacturing
2	General equipment* ⁵	H	−40°C to 85°C	−40°C to 85°C	●	●	●	2,000h	
		J	−40°C to 105°C	−40°C to 105°C					
		K	−40°C to 125°C	−40°C to 125°C					
3	Accessories	A	85°C −40°C to 105°C 125°C	25°C		●	●	2,000h	
Consumer Applications									
—	General	—	85°C −40°C to 105°C 125°C	25°C		●		1,000h	Sales

^{*1} The operating temperature range differs by product. Refer to the datasheet for details.

^{*2} The guaranteed specification temperature ranges of the H, J and K class products are currently shifting from 25°C to the full operating temperature ranges. As for the A class products, some of them are already guaranteed in the full operating temperature range. The guaranteed specification temperatures do not apply to some test items of the products.

^{*3} 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.

^{*4} The R8 class products offer the highest quality obtained by the enhanced process inspection and quality control at manufacturing.

^{*5} 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 Model Number Information

REDC's product model number consists of the following information. Refer to the *Product Model Number Information* on the website for details.

Product Model Number	Product Class	Category Code	Series Code	Package Code	Voltage Code	Version Code	Taping Code	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 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 : Manual Shift to ECO Mode
■ Thermal : Thermal Shutdown Circuit
 ■ Constant : Constant Slope Circuit
 ■ Discharge : Auto-discharge Function
■ Reverse : Reverse Current Protection Circuit
 ■ Inrush : Inrush Current Limit Circuit
 ■ Peak : Peak Voltage
 ■ Ripple : Ripple Rejection, Frequency = 1kHz

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		
		6	R1114N			R1172x	
		6.5	RP130x				
		36		R1513S R8156S			
Standard		5.25		RP154x	RP115L ^{*1}	RP115x ^{*1}	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			
Low Supply Current		6	R1180N				
		24	R1150H +VD				
		36	R1515x: 50mA R1514x R8151x: 50mA R8150S	R1524x: 200mA R8160x: 200mA R5112S +VD: 200mA	R1517x R8154x	R1518x R8155x	
ECO Functions	Automatic Mode Shifting	36		R1510S +VD			
	Manual Mode Shifting	6	R1163N				
		16		R1191x			

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

●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
							Ta=25°C	Ta=-40°C to 125°C ^{*2}	Typ.	Max.	Condition	Typ.	
R8151H	R8	SOT-89-5	-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	I _{OUT} =40mA	9	Peak ^{*3} : 60V Thermal
R8151S		HSOP-6J											
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	I _{OUT} =40mA	9	Peak ^{*3} : 60V Thermal
R8160N	R8	SOT-23-5	-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	1.7	I _{OUT} =200mA	2.2	Peak ^{*3} : 60V Thermal
R8160H		SOT-89-5											
R8160S		HSOP-6J											
R8153S	R8	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	±2.0 Ext. Adjustable: ±60mV	0.64	1.0	I _{OUT} =300mA	100	Peak ^{*3} : 60V Thermal
R8153J		TO-252-5-P2											
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	I _{OUT} =300mA	75	Ripple ^{*4} : 70dB Peak ^{*3} : 60V Thermal Discharge [*] : Ver. D
R8154S	R8	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	±1.8 Ext. Adjustable: ±45mV	0.35	0.62	I _{OUT} =500mA	18	Constant [*] : Ext. Adjustable Ver. E/F Peak ^{*3} : 60V Thermal Discharge [*] : Ver. D/F
R8154J		TO-252-5-P2											
R8152S	R8	HSOP-6J	-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	I _{OUT} =1A	70	Thermal
R8152J		TO-252-5-P2											
R8155S	R8	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	±1.8 Ext. Adjustable: ±45mV	0.70	1.30	I _{OUT} =1A	18	Constant [*] : Ext. Adjustable Ver. E/F Peak ^{*3} : 60V Thermal Discharge [*] : Ver. D/F
R8155J		TO-252-5-P2											

*1 V_{SET}=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 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
									Typ.	Max	Condition		
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
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, 2.8, 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 36 (50)	3.3, 3.4, 5.0 Detector Threshold Range 2.5 to 4.8	±0.6 VD: ±1.0	0.6	1.7	I _{OUT} =200mA V _{SET} =5.0V	3.8	Peak ⁴ : 60V Thermal
R1524N R1524H R1524S	K	A	SOT-23-5 SOT-89-5 HSOP-6J	-40 to 125	200	3.5 to 36 (50)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0, 6.0, 8.0, 8.5, 9.0	±0.6	0.6	1.7	I _{OUT} =200mA V _{SET} =5.0V	2.2	Peak ⁴ : 60V Thermal
RP154N ^{2ch} RP154L ^{2ch}		A	SOT-23-6 DFN2020-8	-40 to 105	300	1.4 to 5.25 (6.0)	0.8 to 3.7	±1	0.25	0.30	I _{OUT} =300mA	50	Ripple : 75dB Discharge : Ver. B
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	I _{OUT} =100mA	50	Absolute Max. Ratings I _{OUT} =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, 3.0, 3.3, 5.0, 6.0	±1.0	0.770	1.185	I _{OUT} =300mA V _{SET} =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	I _{OUT} =300mA V _{SET} =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	I _{OUT} =300mA V _{SET} =5.0V	110 ² (12.5)	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) 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	I _{OUT} =300mA V _{SET} =5.0V	100	Peak ⁴ : 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	I _{OUT} =300mA V _{SET} =5.0V	75	Ripple : 70dB ⁵ Peak ⁴ : 60V Thermal Discharge : Ver. D
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, 1.2, 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	I _{OUT} =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	I _{OUT} =200mA V _{SET} =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 12.0	±0.8, Ext. Adjustable: ±20mV	0.35	0.62	I _{OUT} =500mA V _{SET} =5.0V	18	Constant : Ext. Adjustable Ver. E/F Peak ⁴ : 60V Thermal Discharge : Ver. D/F
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	I _{OUT} =300mA	80	Thermal
RP115x		A	SOT-89-5 DFN2020-8B	-40 to 105	1A (500)	1.4 to 5.25 (6.0)	0.7 to 4.3	±1.0	0.130	0.180	I _{OUT} =1A	110	Ripple : 75dB, 80dB (V _{SET} ≤1.8V) Thermal Reverse Constant Inrush Load regulation: Typ. 1mV Temperature Characteristics: Typ. ±30ppm/°C
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	I _{OUT} =300mA	60	Ripple : 70dB Thermal Inrush Discharge : Ver. D
RP132HxxxB/D RP132SxxxB/D RP132Jxxx1B/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, 1.2, 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	I _{OUT} =1A	65	Ripple : 70dB Thermal Inrush Discharge : Ver. D

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		
R1190S		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	I _{OUT} =1A V _{SET} =5.0V	150	Inrush : Ext. Adjustable Thermal Discharge : Ver. D
R1190J													
R1501S	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	I _{OUT} =1A V _{SET} =5.0V	70	Thermal
R1501J													
R1518S	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 12.0	±0.8, Ext. Adjustable: ±20mV	0.70	1.30	I _{OUT} =1A V _{SET} =5.0V	18	Constant : Ext. Adjustable Ver. E/F Peak : 60V Thermal Discharge : Ver. D/F
R1518J													
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	I _{OUT} =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	I _{OUT} =3A	350	Thermal Reverse Constant Discharge : Ver. D/F

^{*1} This value varies depending on the output voltage, V_{SET}=2.8V or close to 2.8V. (If described, value at the voltage.)

^{*2} at Fast Mode, () at Low Power Mode ^{*3} Supply Current (I_{SS}) per channel. ^{*4} Duration time=200ms ^{*5} RR@f=100Hz ^{*6} 1mA⇒250mA (1/2 I_{OUT} (Max.))

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 ⇒ V _{IN}	V _{SENSE}	V _{IN}	V _{SENSE}	V _{OUT}	V _{SENSE}	V _{IN}	V _{OUT}	V _{SENSE}
6	✓	Ext.Capacitor	R3116N/L	R3117N	R5105N R5106N R5107G R5109G R8355N R8356N R8357G R8359G	R5108G R8358G					
		Ini. Counter	R3134N								
24	✓	Ext.Capacitor							R1150HxxxA R1150HxxxC	R1150HxxxD	R1150HxxxB
36	✓	Ext.Capacitor	R3119NxxxA R3120NxxxA R3150NxxxA/B R3151NxxxA/B R8300NxxxA/G R8315NxxxA/B	R3119NxxxE R3120NxxxE R3150NxxxE/F R3151NxxxE/F R8300NxxxE R8315NxxxE/F			R5104V R5110Sxx1A/B R5111Sxx2C/D R8360Sxx1A/B	R5110Sxx2C/D R5111Sxx2C/D R8360Sxx2C/D	R1510SxxxA R1510SxxxC	R1510SxxxD R5112S	R1510SxxxB R5112S

●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
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)	-35, +40	3.8	-V _{DET} ×0.045(Min.) -V _{DET} ×0.055(Max.) 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)	-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 C _D pin (for Release output delay time setting) With C _R 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 and 110°C. ^{*2} Detection released

●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 R3116N		A	DFN1212-4 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		A	SOT-23-5	-40 to 85	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					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	-50, +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

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									
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	3.8	Released Voltage Range: 5.3V to 11.0V	With delay function (External capacitor type)
R3150NxxxE/F					Detect Output Delay Time Accuracy -35, +40			3.5	Released Voltage Accuracy: ±1.5%	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	3.8	Released Voltage Range: 5.3V to 11.0V	With delay function (External capacitor type)
R3151NxxxE/F					Detect Output Delay Time Accuracy -35, +40			3.5	Released Voltage Accuracy: ±1.5%	E, F: With SENSE pin A, E: Reset Signal "L" B, F: Reset Signal "H"	

*1 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	
											Min.	Typ.	Max.		
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
R8360Sxx2		HSOP-18												✓	

*1 C_{TW}=0.01μF *2 The R8360S is guaranteed specification for full operating temperature range.

*3 Duration time=200ms

*4 Window Watchdog Timer monitors the presence of output pulses from a CPU in a preset period of time (OPEN Window), in case these pulses fail the watchdog timer will initiate a CPU reset after a time out period.

• 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		Typ.
	Min.	Typ.										Max.					
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	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															
R5111Sxx1	K	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															

*1 R5104V: C_{TW}=0.1μF, R5110S/R5111S: C_{TW}=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 monitors the presence of output pulses from a CPU in a preset period of time (OPEN Window), in case these pulses fail the watchdog timer will initiate a CPU reset after a time out period.

• 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	
								Min.	Typ.	Max.		
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		SOT-23-6									✓	
R8357G		SSOP-8G									✓	
R8358G		SSOP-8G									✓	
R8359G		SSOP-8G									11.5	

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

• 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 (%)	Timeout Period ^{*1} (ms)			Inhibit pin	
								Min.	Typ.	Max.		
R5105N	J	SOT-23-6	-40 to 105	0.9 to 6.0 (7.0)	1.5 to 5.5	±1.0	±16 ^{*2}	230	310	450	—	11
R5106N		SOT-23-6									✓	
R5107G		SSOP-8G									✓	
R5108G		SSOP-8G									✓	
R5109G		SSOP-8G									11.5	

*1 C_{TW}=0.1μF *2 This specification is guaranteed by design engineering at -40°C to 105°C.

● : Products in Development
 ● : Products Newly Released
 ● : AEC-Q100 compliant
 ● : AEC-Q100 to be compliant
Soft-Start : Soft Start circuit **Thermal** : Thermal Shutdown circuit **Discharge** : Auto-discharge Function **Sequencing** : Start-up Sequencing Control
Reverse : Reverse Current Protection Circuit **UVLO** : Under Voltage Lockout circuit **OVLO** : Over Voltage Lockout function **OVP** : Overvoltage Protection Circuit
PG : Power Good Function **SSCG** : Spectrum Diffusion Type Oscillator **Diode** : Diode Rectification **Synchro** : Synchronous Rectification

● 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) Typ.	Current Limit Threshold (A)	Short Current Limit (A)	Flag Delay Time(ms) Typ.	UVLO Detect Voltage (V)	Internal FET	EN	Protection	Remarks
	H/J/K	A													
R5523N	H		SOT-23-5	-40 to 85	2.2 to 5.5 (6.5)	130	20	1 (Typ.) 1.8 (Max.)	0.75 (Typ.) 1.5 (Max.)	10	1.8	Pch.	H/L	Constant current type	Soft-Start Thermal
R5524N001 R5524N002 R5524N004		A	SOT-23-5	-40 to 85	2.7 to 5.5 (6.0)	100	110	0.8 (Typ.) 0.98 (Max.) 1.55 (Typ.) 1.85 (Max.)	0.65 (Typ.) 0.8 (Max.)	20	2.4	Nch.	H	Latch-off type Constant current type	Soft-Start Thermal Discharge Reverse

● DC/DC Converters

• High Voltage Step-down DC/DC Converters Lineup

Product Name	Ver.	Automotive Class		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
		H/J/K	A										
R1245S	003A/G 003C/E 003B/H 003D/F	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	±1.0	A/B: 330 C/D: 500 E/F: 1000 G/H: 2400	1.2	Latch type Fold back type	Diode Soft-Start UVLO Thermal
R1245L	003A/C/E/G 003B/D/F/H		A	DFN2020-8								Latch type Fold back type	
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	±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
R1272S	xxxxA	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	±1.0	Ext. Adjustable: 250 to 1000, Ext. Synchronizable with PLL Circuit	External	Latch type or Hiccup type (Reset type)	Synchro Soft-Start : Ext. Adjustable UVLO OVP Thermal SSCG PG
R1273L	xxxxA		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	±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 PG
R1275S	xxxx	K	A	HSOP-18	-40 to 125	Forced PWM, PWM/VFM Auto Switching	3.6 to 34.0 (36.0)	Ext. Adjustable: 0.7 to 12.0	±1.0	Ext. Adjustable: 2000, Ext. Synchronizable with PLL Circuit	2	Latch type or Hiccup type (Reset type)	Synchro Soft-Start : Ext. Adjustable UVLO OVP OVLO Thermal SSCG PG

• Low Voltage Step-down DC/DC Converters Lineup

Product Name	Ver.	Automotive Class		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
		H/J/K	A											
RP506L	xx1G/K xx1H/L 001N 001M		A	DFN3030-12	-40 to 105	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 Ext. Adjustable: 0.8 to 4.0	±1.5% 0.6V±9 0.6V±9	K, L, M: 1200 G, H, N: 2300	2	Latch type	- ✓ -	Synchro Soft-Start : Ext. Adjustable UVLO Thermal PG
RP510L	xx1G/4G xx1H/4H 001J/4J 001N/4N		A	DFN3030-12	-40 to 105	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 Ext. Adjustable: 0.8 to 3.3	±1.0% 0.6V±6	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
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 Converter Lineup For White LED/ PMOLED

Product Name	Ver.	Automotive Class		Package	Operating Temperature Range (°C)	Input Voltage Range (Absolute Max.) (V)	Output Voltage Range (V)	VFB Voltage Accuracy (mV)	Frequency (kHz)	Lx Current Limit ³ (A)	OVP Voltage (Typ.) (V)	Remarks
		H/J/K	A									
R1204N	114x 214x 314x		A	SOT-23-6	-40 to 105	2.5 to 5.5 (6.5)	Ext. Adjustable: Up to 22.0 Ext. Adjustable: Up to 31.5 Ext. Adjustable: Up to 40.2	0.4V±10 or 1.0V±15	300	0.9	23 33 42	High-speed Dimming Diode : External Soft-Start UVLO Thermal

• PWM Step-up DC/DC Controller Lineup For LCD/ OLED/ CCD

Product Name	Ver.	Automotive Class		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
		H/J/K	A									
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	Int. phase compensation. With stand-by. Soft-Start UVLO

• Step-up and Charge pump DC/DC Converters Lineup For LCD/ OLED/ CCD

Product Name	Automotive Class		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
	H/J/K	A									
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% ⁴	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 Lx current limit is different from output current. ⁴ This specification is guaranteed by design engineering at -40°C to 105°C.

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	Top/Bottom View	Dimensions (mm)				Power Dissipation ² (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body size	Mount area	Thickness	Pitch	T _{jmax} =125°C	T _{jmax} =150°C			
4	L	DFN1212-4			1.2×1.2	1.2×1.2	0.8	0.5	455	568	–	TR	3,000
8	L	DFN2020-8			2.0×2.0	2.0×2.0	0.8	0.5	880	1100	–	TR	3,000
8	L	DFN2020-8B			2.0×2.0	2.0×2.0	0.8	0.5	880	1100	–	TR	3,000
12	L	DFN3030-12			3.0×3.0	3.0×3.0	0.8	0.5	1950	2440	–	TR	3,000

SOT

pin	Symbol	Package	Actual Size	Top/Bottom View	Dimensions (mm)				Power Dissipation ² (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body size	Mount area	Thickness	Pitch	T _{jmax} =125°C	T _{jmax} =150°C			
5	N	SOT-23-5 (SC-74A)			2.9×1.6	2.9×2.8	1.2	0.95	420	525	E	TR	3,000
6	N	SOT-23-6 (SC-74)			2.9×1.6	2.9×2.8	1.2	0.95	420	525	E	TR	3,000
6	N	SOT-23-6W			2.9×1.8	2.9×2.8	1.2	0.95	430	–	E	TR	3,000
5	H	SOT-89-5			4.5×2.5	4.5×4.35	1.5	1.5	2200	2700	E	T1	1,000

SOP

pin	Symbol	Package	Actual Size	Top/Bottom View	Dimensions (mm)				Power Dissipation ² (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body size	Mount area	Thickness	Pitch	T _{jmax} =125°C	T _{jmax} =150°C			
8	G	SSOP-8G			2.9×2.8	2.9×4.0	1.3	0.65	380	475	E	TR	3,000
10	V	SSOP-10			3.1×4.4	3.1×6.4	1.25	0.5	450	–	G	E2	2,000
6	S	HSOP-6J			5.02×3.9	5.02×6.0	1.65	1.905	2700	3400	E	E2	1,000
8	S	HSOP-8E			5.2×4.4	5.2×6.2	1.5	1.27	2900	3600	E	E2	1,000
18	S	HSOP-18			5.2×4.4	5.2×6.2	1.5	0.5	2500	3125	E	E2	1,000

TO

pin	Symbol	Package	Actual Size	Top/Bottom View	Dimensions (mm)				Power Dissipation ² (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body size	Mount area	Thickness	Pitch	T _{jmax} =125°C	T _{jmax} =150°C			
5	J	TO-252-5-P2			6.6×6.1	6.6×9.9	2.427	1.27	3800	4800	E	T1	3,000

QFN

pin	Symbol	Package	Actual Size	Top/Bottom View	Dimensions (mm)				Power Dissipation ² (mW)		Pin Plating Code	Taping Direction	Quantity/ Reel
					Body size	Mount area	Thickness	Pitch	T _{jmax} =125°C	T _{jmax} =150°C			
24	K	QFN0404-24			4.0×4.0	4.0×4.0	0.75	0.5	1500	1860	–	E2	1,000
24	L	QFN0404-24B			4.0×4.0	4.0×4.0	0.75	0.5	1500	1860	–	E2	1,000
32	L	QFN0505-32B			5.0×5.0	5.0×5.0	0.85	0.5	1600	2000	–	E2	1,000

^{*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.

Website of Ricoh Electronic Devices Company, Ltd.

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Usage example of automotive applications

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Body Electronics & Lighting

Sliding Door Control	▶ Watchdog Timer R5104V
Electric Window Control	▶ Voltage Regulator R1150H +VD
Side Mirror Control	▶ Voltage Regulator R1514H/S R1524S
Door handle Touch Sensor	▶ Voltage Regulator R1150H +VD
Advanced Driver Assistance Systems (ADAS)	▶ Voltage Regulator R1501J R8150S R1510S +VD R8152J R1513S R8154S R1515H/S R8156S
Millimeter-wave radar	▶ Voltage Detector
Telematics	R8300N R8315N
EV Inverter/Engine Control Unit	▶ Watchdog Timer
Battery Charge Control Unit	R5106N R8357G R5109G R8358G R5110S R8359G R8355N R8360S R8356N
Various Control Unit	
DC/DC Converter Unit	

TPMS	▶ Voltage Regulator R8150S
Shift by Wire	▶ Voltage Regulator R1524N/S R8160N ▶ Watchdog Timer R8356N R8360S
PHEV Battery Charger	▶ Voltage Regulator R1514H/S
DRL (Daytime Running Lights) Headlights	▶ Voltage Regulator R1511S R8154H/S R1514S



IVI (In-Vehicle Infotainment)

Flap Touch Panel Sensor	▶ Voltage Regulator R1514H/S
Head-up Display	▶ Voltage Regulator R1501J R1524S ▶ Voltage Detector R3119N
Electric Steering Lock	▶ Watchdog Timer R5108G
Occupant Detection System	▶ Watchdog Timer R5110S

Navigation system	▶ Voltage Regulator
Audio system	R1114N R1180N R1130H R1190S/J R1150H +VD R1191N/H R1163N R1500H R1170H R1501S/J R1171S R1510S +VD R1172H/S R1513S
Audio visual display system	▶ USB high-side Switch
Bluetooth tuner	R5523N R5524N
Communication module for EV	▶ Voltage Regulator
Data Communication Module	R1172H R1180N ▶ DC/DC Converter R1270S RP506L

Passive Safety & Security

Air conditioners

►Voltage Regulator

R8150S R8152S

Next Generation Security System

►Voltage Regulator

R1514H

Smart Entry

►Voltage Regulator

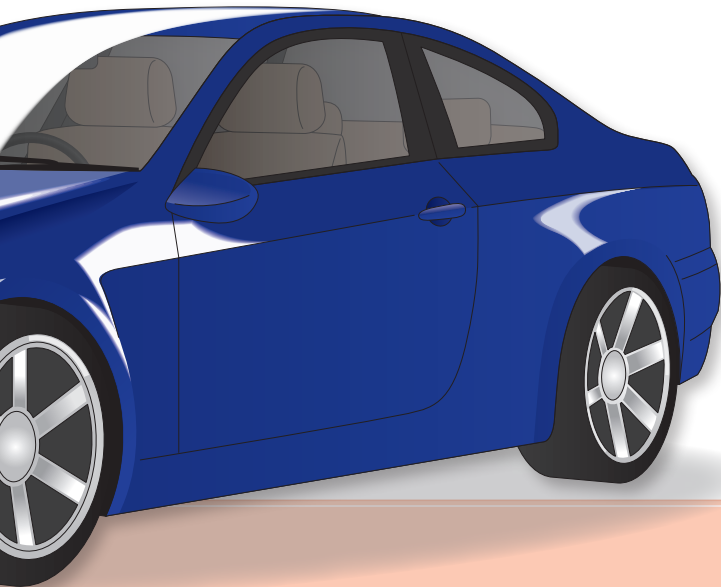
R1150H +VD R1514H/S

R1501J R1524N/H

R1510S +VD

►Watchdog Timer

R5105N



Sel-Dynamo

►Watchdog Timer

R5106N

Smart Key

►Voltage Regulator

R1501S/J

Answerback

►Voltage Regulator

R1514H/S R1516H/S

R1524H/S

E-bike

►Voltage Detector

R1514H/S	RP171N	R3116N	R3118N	R3134N
R1515H/S		R3117N	R3119N	R3150N

►Watchdog Timer

R1516H/S		R5104V	R5106N	R5108G
R1524N/H/S		R5105N	R5107G	R5109G

►DC/DC Converter

RP108J		R1211N	R1270S	RP506L
RP132H/S/J		R1245S	R1272S	RP510L
RP170H		R1290K	R1273L	RP550L
		R1294L	R1275S	

R1501S	RP108J
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Rear View Camera Proximity Sensor ECU

►Voltage Regulator

R1172N	RP111N/H
R1501S/J	RP170N

Smart Rearview Mirror

►DC/DC Converter

R1245L

Front View Camera

►Watchdog Timer

R5107G

Automotive Instrument Panel Display

►Voltage Regulator

R1172H	R8151H/S
R1180N	R8152J

►Voltage Detector

R3150N	R3151N
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Antenna

►Voltage Regulator

R1524N/H	RP170N
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