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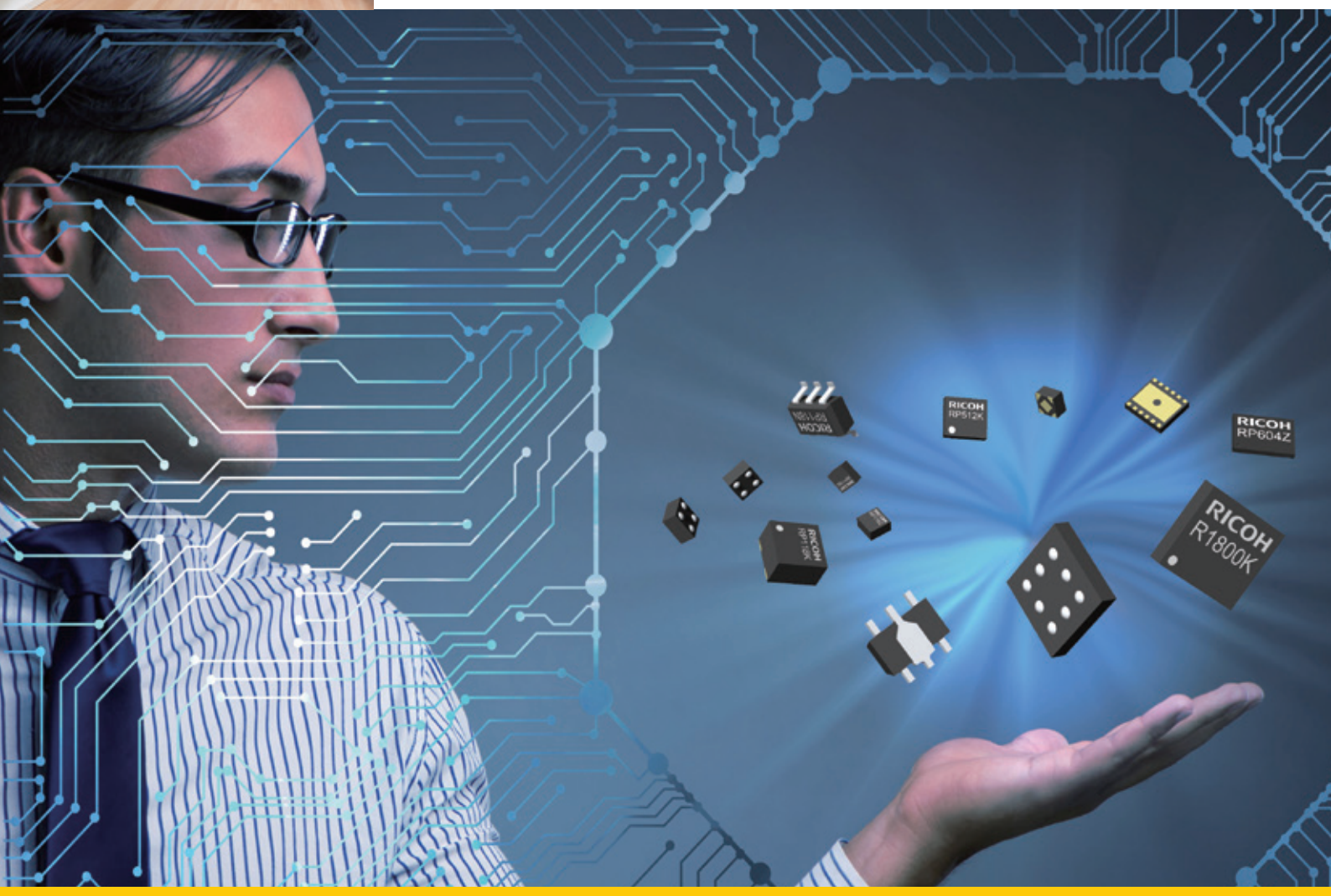
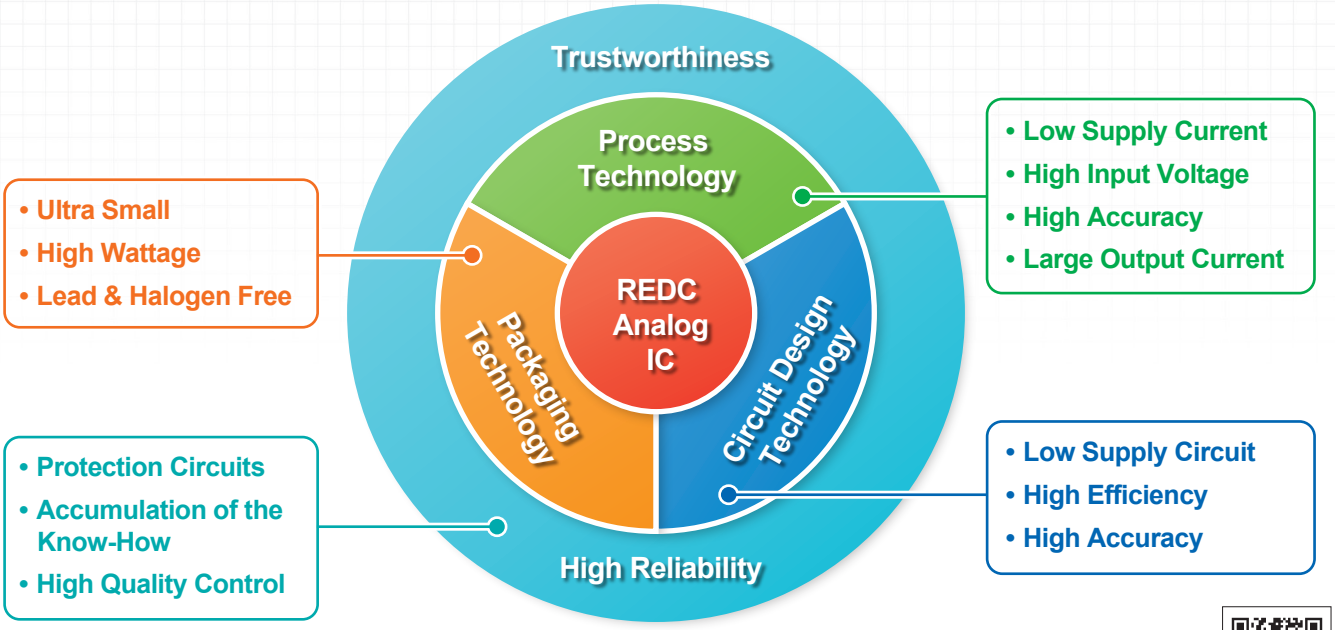
Electronic Device Product Selection Guide 2018



Electronic Devices Selection Guide

Introduction

Ricoh Electronic Devices Co., LTD. (REDC) offers safe and trusted high-performance CMOS analog devices developed by using our unique manufacturing process and circuitry technologies as well as the latest mounting technology. We promise that our devices can contribute to creating power-saving, small-sizing, high-precision and high-reliability products.



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

Definition of Marks

These are the definition of marks used in this selection guide.

- : Products Newly Released
- : Products in Development
- H/F : Halogen-free
- Rxxxx : Succeeding Products
- Automatic : Automatic Shift to ECO Mode
- Manual : Manual Shift to ECO Mode
- Manu/Auto : Manual/Automatic Shift to ECO Mode
- Seamless : Seamless 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
- OVLO : Overvoltage Lockout Circuit
- UVLO : Undervoltage Lockout Circuit
- OVP : Overvoltage Protection Circuit
- Shutdown : Shutdown Function
- Discharge : Auto-discharge Function
- Anti-Ringing : Anti-ringing Switch
- Phase : Phase Compensation

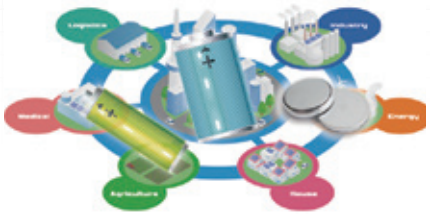
- ● : Available in Automotive Products
- ■ : Available in Industrial Products
- ♡ : Products available in PRODUCT LONGEVITY PROGRAM
- ◆ : Only available in Automotive Products
- ◆ : Conditions are based on JEDEC STD.
- Sequencing : Start-up Sequencing Control
- Maxduty : Maximum Duty Cycle
- LED Adjust : High-speed LED Adjustment
- Single-Wire : Single Wire Interface
- Diode : Diode Rectification
- Synchro : Synchronous Rectification
- TempCo : Output Voltage Temperature Coefficient
- Ripple : Ripple Rejection, Frequency = 1 kHz
- Load Reg : Load Regulation
- Peak : Peak Voltage, Application Time = 200 ms or less
- SSCG : Spectrum Diffusion Type Oscillator
- PG : Power Good Function
- Tantalum : Tantalum Capacitor
- High Immunity : Enhanced Noise Immunity
- +VD : with Voltage Detector (Reset IC) Function
- +BM : with Battery Monitor Assist Function
- Dual : Dual Channel
- Triple : Triple Channel

Index

Special Contents for IoT/Energy Harvesting Application

As IoT market expands, the strong market demands such as long-time battery driving, low noise, and miniaturization are increasing for IoT terminals. Our newly released products enable to meet the demands for IoT terminals with sensors, microcomputers, and communication ICs.

REDC's Power Management IC will Assists the Long Life of the Customer's IoT Device



Power Management IC Contributing to Battery Life

RP511 Series
RP512 Series
RP604 Series
RP118 Series

Extend a Battery Life by Ultra-Low Current of Nano-Order

Power Management IC to Reduce the Influence of Noise

RP122 Series
RP117 Series

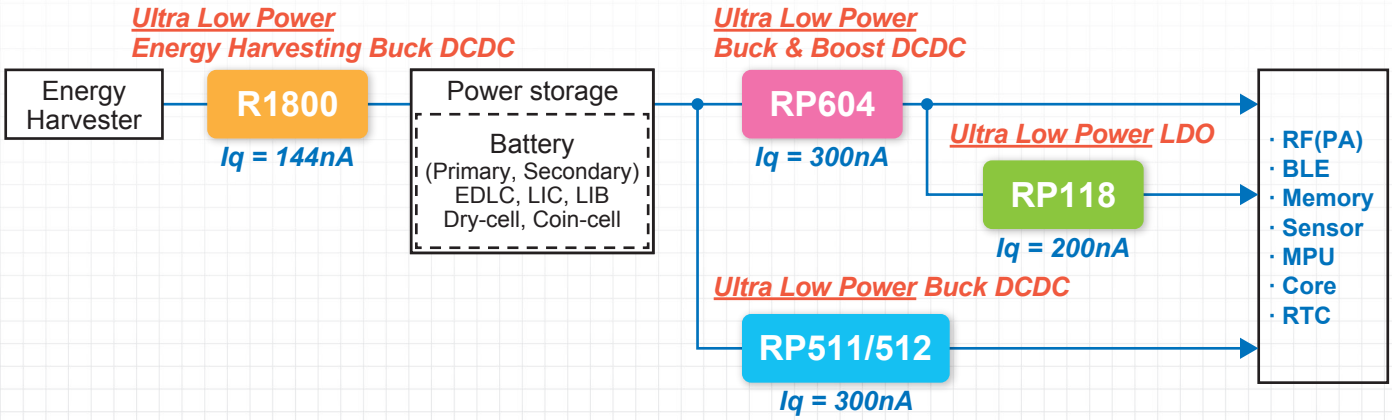
Achieves Low Noise, High PSRR, Low Power, Large Output Current and Fast Response

Power Management IC Supporting Energy Harvesting Technology

R1800 Series

A low operating quiescent current allows a harvester to be used under a low-illumination environment, and it is suitable for an equipment with low power supplied from a harvester.

REDC IoT Device Power Supply Configuration Example



Products for IoT/Energy Harvesting

: Products in Development

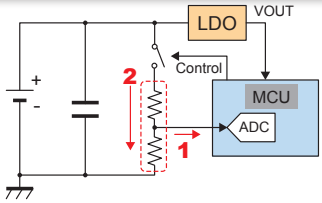
REDC offers small-size and high-accuracy products designed for IoT and energy harvesting.
See the individual product page for more details.

Ultra-Low Power Consumption	Step-down DCDC	RP511/RP512 (P.23) ·····VIN=2.0V~, **Iq=0.3μA**, IOUT=~100mA/~300mA
		RP514/RP515 +BM (P.23) ·····VIN=1.8V~, **Iq=0.3μA (+0.1μA:BM)**, IOUT=~100mA/~300mA
		RP516/RP517 (P.23) ·····VIN=1.8V~, **Iq=0.3μA**, IOUT=~100mA/~300mA, **VOUT=0.5V~**
	Step-Up/Down DCDC	RP604 (P.23) ·····VIN=1.8V~, **Iq=0.3μA**, IOUT=~300mA
	LDO	RP118 (P.11) ·····VIN=1.7V~, **Iq=0.2μA**, IOUT=~100mA
		RP124 +BM (P.11) ·····VIN=1.7V~, **Iq=0.2μA (+0.1μA:BM)**, IOUT=~100mA
Low Noise	LDO	RP122 (P.13) ·····VIN=1.7V~, Iq=9.5μA, IOUT=~400mA, **8μVrms**, **90dB@1kHz**
		RP123 (P.12) ·····VIN=1.7V~, Iq=9.5μA, IOUT=~250mA, **8μVrms**, **90dB@1kHz**
	Negative Voltage LDO	RP117 (P.11) ·····VIN=-10.0V~-2.5V, IOUT=~100mA, **16μVms**, **80dB@1kHz**, VOUT=-5.5V~-1.0V
Energy Harvesting	Step-Down DCDC for Storage	R1800 (P.23) ·····VIN=2.0V~, **Iq=144nA**, IOUT=1mA, **PST=720nW**
	Step-Up DCDC for Storage	R1810 (P.23) ·····VIN=0.5V~, **Iq=2.4μA**, IOUT=1mA, **PST=6.5μW**

Power Management IC Capable of Easily Monitoring Battery Voltage

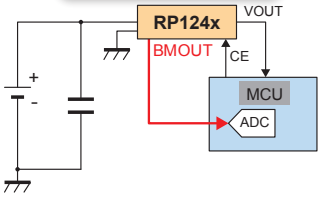
Example of RP124x, an ultra-low power voltage regulator with a battery monitor pin: BMOUT

Conventional Technology



The ADC with built-in MCU is the low-input impedance (as shown in 1), therefore it is necessary to design the voltage dividing resistor of the battery voltage monitor input (as shown in 2) with low impedance. The battery voltage is resistance-divided due to the battery voltage may exceed the input range of the ADC with built-in MCU or the breakdown voltage of MCU.
The large supply current or the leak current occurs at the path of this configuration, and it may affect the low supply current of the entire system. The mounting area is also increased due to external circuits and control signal lines.

RP124x

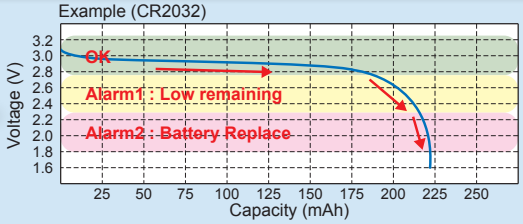


The problem in the conventional technology can be solved by dividing the battery voltage inside the RP124x and buffering output from BMOUT pin. Having the external circuit inside the RP124x enables space-saving mounting. The voltage dividing can be selected by 1/3 or 1/4 of the battery voltage.

Achieves ultra-low supply current and space saving!

Example of 3-step battery remaining capacity display of coin cell batteries

Measuring the buffer output of the battery voltage (1/3 or 1/4) by ADC with built-in MCU allows the 3-step battery remaining capacity display as shown in the diagram.



Special Contents for Industrial Application

3 APPROACHES TO INDUSTRIAL EQUIPMENT FIELD

- LONG-TERM SUPPLY
- FLEXIBLE PURCHASE
- HIGH QUALITY AND RELIABILITY

1 Long term supply

REDC products can be supplied for 10 years. EOL products can also be purchased.

Product Longevity Program

REDC has Product Longevity Program (PLP) that makes our products being supplied for 10 years. By using products under PLP, customers can make a long-term production plan.

For details, please visit WEB.

Partnership with EOL products distributor

Even if REDC products are discontinued, it is possible to purchase our products from Rochester dealing with EOL products.

For details, please visit WEB.

2 Flexible quantity purchase

REDC products can be purchased in unit of one piece.

Since 1 reel quantity is way more than the average production quantity of industrial equipment, handing the leftover parts often becomes trouble from time and cost point of view.
REDC is offering choices that customers can purchase the necessary quantity when needed.

Online sample purchase

Customers can also purchase REDC products from REDC's official online distributors, Chip1stop and Mouser where you can select purchase quantity from 1 piece.

For details, please visit WEB.

Check out our new service of Small Quantity Purchase (SQP) ! This service is designed for the customers who want to buy a small quantity of our official products.

SQP service allows our customers to order less than the minimum order quantities. This service includes cutting and delivering of a tape, which is cut from a full reel of the target products according to the desired amount of customers.

- Minimum order quantity is 100 pieces and adding must be ordered by 20 pieces.
- Delivery form is a cut tape or a reel with leader and trailer tape.
- In case of operation failure, we will perform the operation check on the device. If the device is determined as a defective, we will perform the failure analysis on the device to identify the cause of failure.

Note 1. The qualities of cut tapes or reels with leader and trailer tape are not eligible for failure analysis.
Note 2. Contact REDC official distributors or REDC representatives for the target products.

The number of target products increased.
PLP (Product Longevity Program) guarantees the products supply for at least 10 years.

PLP

1. Applicable Products *1	The heart mark, ♡ shows applicable products.
2. Supply Period	We maintain supply of the Applicable Products for ten years from January, 2018.
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.

*1 Applicable Products posted on the WEB site. https://www.e-devices.ricoh.co.jp/en/products/plp/list/

Have you or your engineers often faced following difficulties for designing PCB of industrial equipment ?

- **Investigating of substitute parts and redesign of board circuit caused by electronic parts EOL (End Of Life)**
- **Handling troublesome board design and development with variety of small quantity equipment**
- **Finding available channels for purchasing parts in small quantity**
- **Assuring safety and reliability in long-term operation**
- **Maintaining stable operation under severe temperature environment**

There are many problems peculiar to industrial equipment with long product life cycle.
Ricoh Electronic Devices Co., Ltd. carries out 3 methods to address the problems in such industrial equipment fields.

Notes: For details of the Special feature "RICOH's 3 approaches to industrial equipment field", please visit HP.
https://www.e-devices.ricoh.co.jp/en/technology/industrial/

3 High quality and reliability

REDC products can help stable operation in harsh environments.

High temperature / low temperature tolerance products

REDC is offering products with operation temperature at -50°C or 125°C.

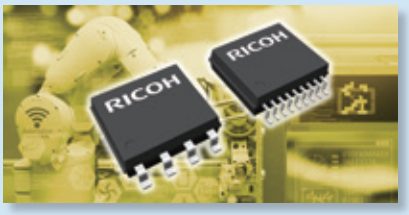
For details, please visit WEB.

High quality achievements

REDC decides quality policy based on our mission, offering "reliable, satisfying and exciting" products.
We have achieved a market return rate of 0.01 ppm or less, while billions of power management IC products are shipped annually.

For details, please visit WEB.

Power Management ICs for Industrial Applications



REDC offers high-reliability semiconductor devices for industrial applications that have passed both the screening at high temperature and the reliability test with extended hours. REDC's industrial power management ICs are characterized to −50°C, operate in an extended temperature range of −50°C to 105°C or 125°C. REDC serves various customer needs including harsh environment applications where the ICs are exposed to direct sunlight, extremely cold weather conditions or long-time operations in factories. REDC's industrial line of products can support applications in heat-generating motors and simple medical equipment such as AEDs.

Comparison of Products for Industrial Applications and Products for Consumer Applications

Industrial products of REDC are suitable for applications with wide temperature range and high reliability.

Product Grade	Industrial Grade	Consumer Grade
Operating Temp. Range	-50°C to 125°C	-40°C to 85°C
Test Temp.	25°C, High	25°C
Reliability Test Time	2000 hrs.	1000 hrs.
Applications	Industrial equipments such as FAs and smart meters Equipments used under high-temperature conditions such as surveillance camera and vending machine Equipments accompanied by self-heating such as motor and lighting	Portable equipment Digital consumer electronics
Product Name	RP132S331D-E2-YE, RP132K001B-TR-Y and other products.	RP132S331D-E2-FE, RP132K001B-TR and other products.

The operating temperature range differs by product. Refer to the each product page for details.

Products for Industrial

This is a high-reliability semiconductor device for industrial applications (-Y) that has passed both the screening at high temperature and the reliability test with extended hours. This line of products operate in a wide temperature range from low temperature (-40°C or -50°C) to high temperature (105°C or 125°C) to support harsh environment applications.

: Products Newly Released : Products in Development ♡ : Products available in PRODUCT LONGEVITY PROGRAM

LDO Regulators (Linear Regulators)

Product Name	Operating Temperature Range (°C)	Output Current (mA)	Input Voltage Range (Absolute Max. Ratings) (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1(V) Typ.	Max.	Condition	Supply Current (µA) Typ.	Other Features	Package
R1560x-Y ♡	**-50** 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**	1.5	3.0	IOUT=100mA VSET=5.0V	**3**	Peak : 90V Thermal COUT=0.1µF	HSOP-6J TO-252-5-P2
R1561x-Y ♡	**-50** 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**	1.3	2.5	IOUT=100mA VSET=5.0V	20	Peak : 90V Thermal	HSOP-6J TO-252-5-P2
RP130x-Y ♡	-40 to 105	150	1.7 to 6.5 (7.0)	1.2, 1.5, 1.8, 2.5, 2.8, 2.9, 3.0, 3.3, 3.4, 3.6, 5.0	±1	0.32	0.51	IOUT=150mA	38	TempCo : ±20ppm/°C Ripple : 80dB Discharge : Ver.D	DFN(PLP)1010-4 SOT-23-5
RP171N-Y ♡	-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	0.400	0.600	IOUT=150mA	23	Thermal Discharge : Ver.D Constant Ripple : 70dB	SOT-23-5
R1180x-Y ♡	**-50** to 105	150	1.7 to 6.0 (6.5)	1.2, 1.5, 1.8, 2.3, 2.5, 2.8, 3.0, 3.3, 3.4	±2	0.25	0.40	IOUT=150mA	**1**	COUT=0.1µF	SON1612-6 SOT-23-5
R1514x-Y ♡	-40 to 105	150	4.0 to **36.0** (50.0)	2.5, 2.8, 3.0, 3.4, 5.0, 6.0, 8.0, 8.5, 9.0, 12.0	±2	0.20	0.35	IOUT=20mA VSET=5.0V	**9**	Peak : 60V Thermal	SOT-89-5 HSOP-6J
R5112S-Y +VD ♡	-40 to **125**	200	3.5 to **42.0** (50.0)	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0 Ver.B: 1.6 to 4.8, Ver.D: 2.9 to 4.8, Detector Threshold Range	**±0.6** VD: ±0.6	0.6	1.2	IOUT=200mA VSET=5.0V	**3.8**	Peak : 60V Thermal COUT=0.1µF	HSOP-8E
R1524x-Y R1524SxxxH-Y ♡	**-50** to **125**	200	3.5 to **36.0** (50.0)	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 : 60V Thermal COUT=0.1µF	DFN(PLP)1820-6 SOT-23-5 SOT-89-5 HSOP-6J HSOP-8E
R1525x-Y	**-50** to **125**	200	3.5 to **42.0** (50.0)	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 : 60V Thermal High Immunity COUT=0.1µF	SOT-23-5 SOT-89-5 HSOP-6J HSOP-8E
RP170x-Y ♡	**-50** to 105	300	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	0.770	1.185	IOUT=300mA	23	Ripple : 70dB Thermal Constant Discharge : Ver.D	SOT-23-5 SOT-89-5
R1511x-Y ♡	-40 to 105	300	3.5 to **36.0** (50.0)	3.0, 3.3, 3.4, 5.0, 6.0, 8.0, 8.5, 9.0 3.0 to 12.0, Ext.Adjustable	±1 ±30mV	0.64	1.0	IOUT=300mA VSET=5.0V	100	Peak : 60V Thermal	HSOP-6J TO-252-5-P2
R1513S-Y ♡	-40 to **125**	300	3.5 to **36.0** (50.0)	1.2, 1.5, 1.8, 3.3, 3.4, 5.0 1.2 to 18.0, Ext.Adjustable	**±0.8**	0.32	0.60	IOUT=300mA VSET=5.0V	75	Thermal Peak : 60V Ripple : 70dB Discharge : Ver.D	HSOP-6J
RP154x-Y Dual ♡	-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	DFN1216-8 DFN2020-8 SOT-23-6
RP111x-Y ♡	-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 **0.7** to 3.6, Ext.Adjustable	**±0.8**	0.23	0.34	IOUT=500mA	80	Load Reg : Typ. 1mV Thermal Inrush Ripple : 75dB TempCo : Typ.±30ppm/°C response accuracy*4: Typ.-75mV/+45mV Discharge : Ver.D	DFN1212-6 SOT-23-5 SOT-89-5
R5116x-Y +VD	-40 to **125**	500	3.5 to **42.0** (50.0)	3.3 to 5.0 UD: 2.5 to 5.0, OV: 3.3 to 5.5, Detector Threshold Range	**±0.5** VD: **±0.5**	0.9	1.5	IOUT=500mA VSET=5.0V	25	Built-in Window VD Released Hysteresis: 0.5% (Max.) Peak : 60V Thermal	HSOP-8E HQFN0808-28
R5117x-Y +VD	-40 to **125**	500	3.5 to **42.0** (50.0)	3.3 to 5.0 SVD: 2.5 to 5.0, BVD: 3.5 to 12.0. Detector Threshold Range	**±0.5** SVD: **±0.5** BVD: **±0.8**	0.9	1.5	IOUT=500mA VSET=5.0V	35	Built-in Dual VD SVD Released Hysteresis: 0.5% (Max.) BVD Released Hysteresis: 5.0% (Max.) Peak : 60V Thermal	HSOP-8E HQFN0808-28
RP115x-Y ♡	-40 to 105	1A (500)	1.4 to 5.25 (6.0)	1.0, 1.2, 1.5, 1.75, 1.8, 2.5, 2.8, 3.0, 3.3, 3.4	±1	RP115L: 0.13 RP115H: 0.17	RP115L: 0.265 RP115H: 0.255	IOUT=1A	110	Ripple : 80dB (VSET≤1.8V) Thermal Reverse Constant Inrush Load Reg : Typ.1mV TempChar : Typ.±30ppm/°C Discharge : Ver.D	DFN1216-8 SOT-89-5
RP132x-Y ♡	-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 **0.8** to 5.5, Ext.Adjustable	±1 ±15mV	0.52	0.72	IOUT=1A VSET=3.0V	65	Load Reg : Typ.5mV Ripple : 70dB Thermal Inrush Discharge : Ver.D	DFN(PLP)1820-6 SOT-89-5 HSOP-6J TO-252-5-P2
RP108J-Y ♡	-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 **0.8** to 4.2, Ext.Adjustable	±1	0.51	0.67	IOUT=3A VSET=3.0V	350	Load Reg : Typ.3mV Thermal Reverse Constant Discharge : Ver.D/F	TO-252-5-P2

*1 Set Output Voltage (VSET) = 2.8 V or close to 2.8 V unless otherwise noted. *2 Fast Response Mode *3 Low Power Mode *4 1 mA ⇔ 250 mA

Voltage Tracker

Product Name	Operating Temperature Range (°C)	Output Current (mA)	Input Voltage Range (Absolute Max. Ratings) (V)	Voltage Tracking Range (V)	Voltage Tracking Accuracy (mV)	Dropout Voltage*1 (V)			Supply Current (µA)	Other Features	Package
						Typ.	Max.	Conditon	Typ.		
R1540x-Y	-40 to **125**	70	3.5 to **42.0** (50.0)	2.45 to	±15 (Ta=-40 to 125)	1.3		IOUT=70mA	60	Foldback Proteciton Circuit Peak : 60V Thermal High Immunity	SOT-23-5 HSOP-8E

Reset ICs (Voltage Detectors)

Product Name	Operating Temperature Range (°C)	Operating Voltage Range (V)	Absolute Max. Ratings (V)	Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Reset Signal	SENSE Pin	Adjustable Release Output Delay Time	Output Delay Time Accuracy (%)	Supply Current*1 (µA)	Hysteresis	Package
R3116x-Y ♡	**-50** to 105	0.5 to 6.0	7.0	0.7 to 5.0	±0.8	L	N	Ext.Capacitor	±15	0.35	Y	DFN(PLP)1010-4 SOT-23-5
R3117x-Y ♡	-40 to 105	1.0 to 6.0	7.0	0.7 to 5.0	±1.0	L	Y	—	—	0.29	Y	DFN(PLP)1010-4 SOT-23-5
R3119xxxxA-Y ♡	**-50** to 105	1.2 to **36.0**	50.0	2.3 to 12.0	±1.5	L	N	Ext.Capacitor	-50, +80	3.3	Y	DFN(PLP)1820-6
R3119xxxxE-Y ♡		2.1 to 6.0*2	7.0				Y	—	—			SOT-23-5
R3150NxxxA-Y ♡	-40 to 105	1.4 to **36.0**	50.0	Detector Threshold Range: 5.0 to 10.0, Release Threshold Range: 5.3 to 11.0	Detector Threshold Accuracy: ±1.5, Release Threshold Accuracy: ±1.5	L	N	Ext.Capacitor, Release Output Delay Time and Detector Output Delay Time are Adjustable	Output Delay Time Accuracy: -35, +40, Detector Output Delay Time Accuracy: -35, +40	3.8	Y	SOT-23-6
R3150NxxxB-Y ♡						H						
R3150NxxxE-Y ♡		3.6 to 6.0*2	7.0			L	Y			3.5		
R3150NxxxF-Y ♡						H						
R3152NxxxA-Y ♡	**-50** 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	L	Y	Ext.Capacitor	-37.5, +100	1.5	Y	SOT-23-6
R3152NxxxB-Y ♡											N	
R3160NxxxA-Y ♡	**-50** to **125**	2.7 to **60.0**	80.0	10.0 to 48.0	±1.0	L	N	Ext.Capacitor	±50	1.8	Y	SOT-23-6
R3160NxxxB-Y ♡						H						

*1 Detector Threshold (-VDET) = 1.5 V, Detection released *2 Input Voltage Range of SENSE Pin: 0 V to 36.0 V

Watchdog Timers (WDT)

● Watchdog Timer (WDT) with Reset IC (VD) and LDO Regulator (Linear Regulator)

Product Name	Operating Temperature Range (°C)	Operating Voltage Range (V)	Absolute Max. Ratings (V)	Voltage Detector Section					Watchdog Timer Section				LDO Regulator Section			Supply Current (µA)	Package
				Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Release Delay Time*1 (ms)			WDT Timeout Period*2 (ms)			Inhibit Pin	Output Voltage Range (V)	Output Voltage Accuracy (%)	Output Current (mA)		
						Min.	Typ.	Max.	Min.	Typ.	Max.					Typ.	
R5111Sxx1A-Y R5111Sxx1B-Y*3 ♡	-40 to 105	3.5 to **36.0**	50.0	1.6 to 5.5	±1.8*4	194	242	290	14.4	18	21.6	N	1.8 to 5.0	±1.5*4	300	25	HSOP-8E
R5111Sxx2C-Y R5111Sxx2D-Y*3 ♡												Y					HSOP-18
R5111Lxx2C-Y R5111Lxx2D-Y *3												Y					HQFN0808-28
R5114Sxx1x-Y ♡	-40 to **125**	3.5 to **42.0**	50.0	2.5 to 4.8	±1.6*4	184	220	253	14.8	18	21.9	Y	3.3 to 5.0	±1.6*4	250	8.5	HSOP-8E
R5114Sxx2x-Y ♡																	HSOP-18
R5114Lxx2x-Y																	HQFN0808-28
R5115Sxx1x-Y *3 ♡	-40 to **125**	3.5 to **42.0**	50.0	2.5 to 4.8	±1.6*4	184	220	253	14.8	18	21.9	Y	3.3 to 5.0	±1.6*4	250	8.5	HSOP-8E
R5115Sxx2x-Y *3 ♡																	HSOP-18
R5115Lxx2x-Y *3																	HQFN0808-28

*1 R5111/R5114/R5115: CD = 0.22 µF *2 R5111/R5114/R5115: CTW = 0.01 µF *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).
*4 Detector threshold accuracy in operating temperature range.

● Watchdog Timer (WDT) with Reset IC (VD)

Product Name	Operating Temperature Range (°C)	Operating Voltage Range (V)	Absolute Max. Ratings (V)	Voltage Detector Section			Watchdog Timer Section		Supply Current (µA)	Other Features	Package
				Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Release Delay Time Accuracy (%)	WDT Timeout Period Accuracy (%)	Inhibit Pin	Typ.		
R5106N-Y ♡	**-50** to **125**	0.9 to 6.0	7.0	1.5 to 5.5	±1.0	±18	±33	Y	11	CD Pin and CTW Pin are combined.	SOT-23-6
R5107G-Y ♡										MR Pin is included.	
R5108G-Y ♡		1.5 to 6.0								SENSE Pin is included.	SSOP-8G
R5109G-Y ♡		0.9 to 6.0							11.5	2 Clock Input Type	

Products for Industrial

DCDC Converters (Switching Regulators)

● High Voltage Step-down DCDC Converters

Product Name (Version)	Operating Temperature Range (°C)	Control	Input Voltage Range (Absolute Max. Ratings) (V)	Output Voltage Range (V)	V_{FB} Voltage Accuracy (%)	Switching Frequency (kHz)	Output Current*1 (A)	Protection Circuit Type	Other Features	Package
R1275S-Y (003A/C) ♡	-40 to 105	Forced PWM	3.6 to 30.0 (36.0)	3.3 to 5.0, Ext.Adjustable	0.64V±1	2000: Ext.Adjustable, Ext.Synchronizable with PLL Circuit (1800 to 2200)	2	Hiccup (Reset)	Synchro SSCG : Ver. 003C PG UVLO Soft-Start : Ext.Adjustable Thermal OVLO Phase : Ext.	HSOP-18
R1276S-Y (00xA/B/C/D)	-40 to 105	Forced PWM, PWM/VFM Auto Switching	3.6 to 30.0 (36.0)	001x: 0.7 to 6.0, 002x: 6.0 to 12.0, Ext. Adjustable	0.64V±1	250 to 1000: Ext. Adjustable, Ext. Synchronizable with PLL Circuit	3	Latch or Hiccup (Reset)	Synchro Soft-Start : Ext. Adjustable SSCG : Ver. xxxC/D PG UVLO OVLO Thermal Phase : Ext.	HSOP-18
R1271x-Y (xx1A/B/C/D)	-40 to 105	Forced PWM	3.6 to 30.0 (42.0)	3.3, 5.0	±1	2000	1	Latch or Hiccup (Reset)	Synchro Soft-Start : Ext. Adjustable SSCG : Ver.xx1C/D PG UVLO OVLO Thermal	DFN3030-12 HSOP-18
R1270S-Y (001A/B)	-40 to **125**	PWM, PWM/VFM Auto-Switching	3.6 to 34.0 (36.0)	0.8 to 31.6, Ext.Adjustable	0.8V±1	300 to 2400: Ext.Adjustable, Ext.Synchronizable with PLL Circuit	3	001A: Fold-back, Latch 001B: Fold-back	Diode UVLO OVLO Soft-Start : Ext.Adjustable Thermal FLG pin Phase : Ext.	HSOP-18
R1272S-Y (xxxA) ♡	-40 to 105	Forced PWM, PWM/VFM Auto-Switching	4.0 to 34.0 (36.0)	0.7 to 5.3, Ext.Adjustable	0.64V±1	250 to 1000: Ext.Adjustable, Ext.Synchronizable with PLL Circuit	External	Latch or Hiccup (Reset)	DCDC Controller Synchro SSCG : Ver. 03x PG UVLO Soft-Start : Ext.Adjustable Thermal OVP Phase : Ext.	HSOP-18
R1273L-Y (xxxA)	-40 to 105	Forced PWM, PWM/VFM Auto-Switching	4.0 to 34.0 (36.0)	0.7 to 5.3, Ext.Adjustable	0.64V±1	250 to 1000: Ext.Adjustable, Ext.Synchronizable with PLL Circuit	14	Latch or Hiccup (Reset)	Synchro SSCG : Ver. 03x PG UVLO Soft-Start : Ext.Adjustable Thermal OVP Phase : Ext.	QFN0505-32B
R1260S-Y (xx1A/B/C/D)	-40 to 105	Forced PWM, PWM/VFM Auto-Switching	5.0 to **60.0** (80.0)	1.0 to 16.0, Ext.Adjustable	0.8V±1	150 to 600: Ext.Adjustable, Ext.Synchronizable with PLL Circuit	External	Latch or Hiccup (Reset)	DCDC Controller Synchro Soft-Start : Ext. Adjustable SSCG : Ver.xxxB/D PG UVLO OVP Thermal Phase : Ext.	HSOP-18

*1 Output Current (I_{OUT}) can be affected by environmental conditions or external components. This is an approximate value.

● Low Voltage Step-down DCDC Converters

Product Name (Version)	Operating Temperature Range (°C)	Control	MODE Pin	Input Voltage Range (Absolute Max. Ratings) (V)	Output Voltage Range (V)	V_{FB} Voltage Accuracy*1 (mV)	Switching Frequency (kHz)	Output Current*2 (A)	Protection Circuit Type	Other Features	Package
RP506L-Y (xx1G/H/K/L, 001M/N) ♡	-40 to 105	Forced PWM, PWM/ VFM Auto Switching	Y	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: G/H/K/L	±1.5%	1200: K/L/M 2300: G/H/N	2	Latch	Synchro Soft-Start : Ext.Adjustable UVLO Thermal Discharge PG	DFN3030-12
					0.8 to 4.0: 001N, Ext.Adjustable	0.6V±9					
					0.6 to 4.0: 001M, Ext.Adjustable	0.6V±9					
RP510L-Y (xx1/4G, xx1/4H, 001/4J, 001/4N) ♡	**-50** to 105	Forced PWM	N	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: xxxG/H	±1.0	2300	4	xx1/001: Latch xx4/004: Fold-back	Synchro Soft-Start : Ext.Adjustable UVLO Thermal Discharge PG	DFN3030-12
					0.8 to 3.3: 00xJ/N, Ext.Adjustable	0.6V±6					
RP550L-Y Dual (001B) ♡	-40 to 105	Forced PWM, PWM/ VFM Auto Switching	Y	2.3~5.5 or 2.3~4.5 (6.5)	0.6 to 3.3: Ext.Adjustable	0.6V±9	2300	1 per Channel	Latch	Synchro UVLO Soft-Start Thermal	DFN3030-12

*1 For the externally adjustable output voltage type, this is a feedback voltage accuracy. *2 Output Current (I_{OUT}) can be affected by environmental conditions or external components. This is an approximate value.

● Step-up DCDC Converter with Charge Pumps for TFT/LCD

Product Name	Control	Operating Temperature Range (°C)	Input Voltage Range (Absolute Max. Ratings) (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (mV)	Switching Frequency (kHz)	Output Tr.	Lx Current Limit*2 (A)	Protection Circuit Type	Other Features	Package
R1294L-Y ♡	CH1: PWM, Step-up	-40 to 105	2.0 to 5.5 : 101A 2.5 to 5.5 : 102A 3.3 to 5.5 : 103A (6.5)	CH1: Ext.Adjustable, up to 20.0	1.0V-40, +25	210 to 1400, Ext.Adjustable, 800-10%, +14%*3	Internal	CH1: 2	Latch	The charge pump operates at 1/4th operating frequency. Soft-Start : Ext.Adjustable Sequencing UVLO Phase : Ext. Maxduty : Ext.Adjustable	QFN0404-24B
	CH2: Charge pump, Positive			CH2/3: Ext.Adjustable	1.5V-50, +35						
	CH3: Charge pump, Negative				0V±35						

*1 For the externally adjustable output voltage type, this is a feedback voltage accuracy. *2 Lx Current Limit is not Output Current. *3 This specification is guaranteed by design engineering at -40°C to 105°C.

Constant-Current LED Driver Controller

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

LDO Regulators (Linear Regulators)

Grey-out Products : The successors of these products are indicated in Other Features
● : Available in Automotive Products ■ : Available in Industrial Products ♡ : Products available in PRODUCT LONGEVITY PROGRAM
: Products Newly Released : Products in Development

Maximum Input Voltage and Output Current Chart

Product Type		Max. Input Voltage (V)	Output Current: Up to 150mA Single	Up to 150mA Dual	Up to 200mA	Up to 300mA Single	Up to 300mA Dual	Up to 400mA	Up to 500mA	Up to 800mA	Up to 1A	Up to 3A
High-performance		-10~-2.5	RP117x: Up to 100mA									
		5.25	RP112x			RP102x RP123x: Up to 250mA (Seamless)	RP150K	RP122x (Seamless)	RP111x RP115L*1		RP115x*1	
		6									R1172x R1173x	
		6.5	RP130x									
		36				R1513S						
		60	R1561x: Up to 100mA									
Standard		3.6						RP106x RP116Z				
		5.25	RP109x	RP152x	RP100x RP155Z	RP101x RP114x	RP154x	RP105x				RP108J
		6								R1170x		R1171S: Up to 1.5A R1171J: Up to 2A
		6.5									RP131x RP132x	
		8	R1111N R1121N			R1130H						
		10	RP171x			RP170x						
		16									R1190x	
		24							R1500H		R1501x	
		36	R1516x			R1511x						
		42							R5116x +VD R5117x +VD			
Low Supply Current		5.25	RP110x									
		5.5	RP118x: Up to 100mA (Automatic) RP124x +BM: Up to 100mA (Automatic)									
		6	R1180x									
		8	Rx5RW: Up to 80mA									
		10	Rx5RL: Up to 55mA									
		11	RP173x*2									
		24	R1150H +VD R1154x									
		36	R1515x: Up to 50mA R1514x		R1524x				R1517x		R1518x	
		42			R5112S +VD R1525x							
		60	R1560x: Up to 100mA									
ECO Functions	Automatic Mode Shifting	5.25			RP202x							
		6		R5326K								
		24	R1155x									
		36				R1510S +VD						
	Manual/Automatic Mode Shifting	5.25	RP201x			RP200x						
	Seamless	6	R1116x									
	Manual Mode Shifting	6	R1163x		R1160N							
		16				R1191x						
Ext. PNP Tr. Type		10									RN5RF	
Voltage Tracker		42	R1540x: Up to 70mA									

*1 Output Current (I_{OUT}) is switchable between 500 mA and 1 A using the LCON pin of DFN1216-8. *2 RP173x: V_{SET} + 6.5 V ≤ 11.0 V

LDO Regulators (Linear Regulators)

25 mA to 120 mA LDO Regulators (Linear Regulators)

Product Name	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1(V)			Supply Current (µA)	RR@1kHz (dB)	Capacitor Capacitance (µF)	Other Features	Package
					Typ.	Max.	Condition	Typ.	Typ.			
Rx5RL ♡	25 to 55	Max.10.0	2.0 to 6.0	±2.5	0.04	0.06	IOUT=1mA	**1**	—	0.1 to 2.2		SOT-23-5 SOT-89
Rx5RW	35 to 80	Max.8.0	1.5 to 6.0	±2	0.04	0.06	IOUT=1mA	**1.5**	—	0.1 to 2		SON1612-6 SC-82AB
R1100D	35 to 100	Max.6.0	0.9 to 4.0	±2	0.025	0.050	IOUT=1mA	**1.5**	—	**0.1 or more**		SON1408-3
RN5RT	25 to 65	Max.8.0	2.0 to 6.0	±2	0.3	0.5	IOUT=40mA	**4**	—	0.1 to 2.2		SOT-23-5
R1515x ● ♡	50	4.0 to **36.0**	2.0 to 12.0	±2	0.20	0.35	IOUT=20mA VSET=5.0V	**9**	—	0.1 to 10	Operating Temp.: -40 to 105°C Thermal	SOT-89-5 HSOP-6J
RH5RE	40 to 80	Max.10.0	2.0 to 6.0	±2.5	0.5	0.7	IOUT=30mA	**1.1**	—	0.1 to 2.2		SOT-89
RP117x ♡	100	-2.5 to -10.0	-1.0 to -5.5	±2.0	0.23	0.3	IOUT=100mA VSET=-3V	75	**80**	2.2 or more	Negative LDO Output noise: 16µVrms Thermal Discharge : Ver.D	DFN(PLP)1212-6 SC-88A
RP118Z RP118K ♡ RP118N	100	1.7 to 5.5	1.2 to 3.6	**±0.8**	0.10	0.16	IOUT=100mA	**0.2**	—	1 or more	Automatic Discharge : Ver.D	WLCSP-4-P8 DFN(PLP)1010-4 SOT-23-5
RP124x +BM	100	1.7 to 5.5	1.2 to 3.6	**±0.8**	0.10	0.16	IOUT=100mA	**0.2** BM:**0.1**		1 or more	Automatic Discharge : Ver.D	DFN1212-6 SOT-23-5
R1560x ● ■ ♡	100	5.5 to **60.0**	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0	**±0.8**	1.5	3.0	IOUT=100mA VSET=5.0V	**3**	—	**0.1 or more**	Operating Temp: -40 to 105°C Thermal	HSOP-6J TO-252-5-P2
R1561x ● ■ ♡	100	5.5 to **60.0**	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0	**±0.8**	1.3	2.5	IOUT=100mA VSET=5.0V	20	—	10 or more	Operating Temp: -40 to 105°C Thermal	HSOP-6J TO-252-5-P2
Rx5RZ	100	Max.8.0	2.0 to 6.0	±2	0.2	0.3	IOUT=60mA	20	55	10 or more	Tantalum	SOT-23-5 SOT-89
R1141Q	120	2.2 to 6.0	1.5 to 4.0	±1.5	0.18	0.28	IOUT=120mA	90	70	1 to 2.2 or more	⇒RP109x Discharge : Ver.D	SC-82AB

*1 Set Output Voltage (VSET) = 2.8 V or close to 2.8 V unless otherwise noted.

150 mA LDO Regulators (Linear Regulators)

Product Name	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1(V)			Supply Current (µA)	RR@1kHz (dB)	Capacitor Capacitance (µF)	Other Features	Package
					Typ.	Max.	Condition	Typ.	Typ.			
RP103x	150	1.7 to 5.25	1.2 to 3.3	±1	0.21	0.27	IOUT=150mA	36	**75**	0.47 or more	TempCo :Typ.±30ppm/°C ⇒RP109x Discharge : Ver.D	DFN(PLP)1010-4 SC-82AB SOT-23-5
RP104x ♡	150	1.7 to 5.25	1.2 to 3.3	**±0.8**	0.24	0.32	IOUT=150mA	**1**	—	**0.1 or more**	TempCo : Typ.±40ppm/°C ⇒RP110x Discharge : Ver.D	DFN(PLP)1010-4 SOT-23-5
RP109x ♡	150	1.4 to 5.25	**0.8** to 3.6	±1	0.25	0.35	IOUT=150mA	50	**75**	**0.1 or more**	Load Reg : Typ.5mV TempCo : Typ.±30ppm/°C Discharge : Ver.D	DFN(PLP)0808-4 DFN1010-4 SC-88A SOT-23-5
RP110x ♡	150	1.4 to 5.25	**0.8** to 3.6	±1	0.28	0.40	IOUT=150mA	**1**	—	**0.1 or more**	Constant Discharge : Ver.D	DFN(PLP)0808-4 DFN1010-4 SC-88A SOT-23-5
RP112x ♡	150	2.0 to 5.25	1.2 to 4.8	±1	0.20	0.28	IOUT=150mA	75	**80** **65***4	1 or more	Output noise : 10µVrms TempCo : Typ.±30ppm/°C Discharge : Ver.D	DFN(PLP)1010-4 SC-88A SOT-23-5
RP130x ● ■ ♡	150	1.7 to 6.5	1.2 to 5.3	±1	0.32	0.51	IOUT=150mA	38	**80**	0.47 or more	TempCo : Typ.±20ppm/°C Discharge : Ver.D	DFN(PLP)1010-4 SC-82AB SOT-23-5
RP171x ● ■ ♡	150	2.6 to 10.0	1.2 to 6.0	±1	0.400	0.580	IOUT=150mA	23	70	1 or more	Thermal Discharge : Ver.D Constant	SC-88A SOT-23-5
RP173x ♡	150	2.5 to 11.0*5	1.2 to 5.5	±1	0.90	1.47	IOUT=150mA	**2**	—	**0.1 or more**	Reverse Discharge : Ver.D	DFN(PLP)1010-4 SC-88A SOT-23-5
RP201x	150	1.4 to 5.25	**0.8** to 4.0	±1*2	0.12*2	0.18*2	IOUT=150mA	55*2 **1.5***3	70*2	1 or more	Manu/Auto Discharge : Ver.D	WLCSP-4-P5 DFN(PLP)1212-6
R1111N	150	2.0 to 8.0	1.5 to 5.0	±2	0.20	0.30	IOUT=100mA	35	70	1 or more	Tantalum Replaceable with LP2980/2985	SOT-23-5
R1114x ● ♡	150	2.0 to 6.0	1.5 to 4.0	±2	0.22	0.35	IOUT=150mA	75	70	0.47 to 1 or more	⇒RP109x, RP130x Discharge : Ver.D	SON1612-6 SC-82AB SOT-23-5
R1116x	150	1.8 to 6.0	1.5 to 4.0	±1.5	0.29	0.46	IOUT=150mA	10	70	1 or more	Seamless Discharge : Ver.D	SON1612-6 SOT-23-5
R1121N	150	2.0 to 8.0	1.5 to 5.0	±2	0.20	0.30	IOUT=100mA	35	70	1 or more	Tantalum Replaceable with TK111/112/113	SOT-23-5

Product Name	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1(V) Typ.	Max.	Condition	Supply Current (µA) Typ.	RR@1kHz (dB) Typ.	Capacitor Capacitance (µF)	Other Features	Package
R1122N	150	2.0 to 6.0	1.5 to 5.0	±2	0.19	0.26	IOUT=100mA	100	**80**	2.2 to 4.7 or more	Replaceable with TK111/112/113 ⇒RP112x, RP130x	SOT-23-5
R1150H +VD	150	**Max.24.0**	2.1 to 14.0 Ver.A: 2.3 to 15.0, Ver.B,C,D: 2.0 to 15.0, Detector Threshold Range	±2 VD: ±2.5	0.30	0.40	IOUT=20mA	**7**	—	**0.1 or more**	Thermal	SOT-89-5
R1154x	150	**Max.24.0**	2.5 to 12.0 2.5 to 24.0, Ext.Adjustable	±2 ±50mV	0.20	0.40	IOUT=20mA	**5**	—	0.1 to 2.2	Operating Temp.: -40 to 105°C Thermal	DFN1616-6 SOT-23-5 SOT-89-5
R1155x	150	3.5 to **24.0**	2.5 to 12.0 2.5 to 23.0, Ext.Adjustable	±2 ±50mV	0.55*2	1.70*2	IOUT=150mA VSET=5.0V	65*2 **7.5***3	60*2	4.7 or more	Operating Temp.: -40 to 105°C Automatic Thermal Reverse	SOT-23-5 SOT-89-5
R1163x	150	2.0 to 6.0	1.5 to 5.0	±1.5*2	0.25*2	0.35*2	IOUT=150mA	70*2 **6***3	70*2	0.47 or more	Manual Reverse Discharge : Ver.D	DFN(PLP)1616-6 SON-6 SOT-23-5
R1180x	150	1.7 to 6.0	1.2 to 3.6	±2	0.25	0.40	IOUT=150mA	**1**	—	**0.1 or more**		SON1612-6 SC-82AB SOT-23-5
R1514x	150	4.0 to **36.0**	2.0 to 12.0	±2	0.20	0.35	IOUT=20mA VSET=5.0V	**9**	—	0.1 to 10	Operating Temp.: -40 to 105°C Thermal	SOT-89-5 HSOP-6J
R1516x	150	4.0 to **36.0**	1.8 to 6.2	±1	—	0.60	IOUT=20mA VSET=5.0V	29	—	0.1 to 20	Operating Temp.: -40 to 105°C Thermal	SOT-89-5 HSOP-6J

*1 Set Output Voltage (VSET) = 2.8 V or close to 2.8 V unless otherwise noted. *2 Fast Response Mode *3 Low Power Mode *4 RR@f = 100 kHz *5 VSET + 6.5 V ≤ 11.0 V

200 mA to 800 mA LDO Regulators (Linear Regulators)

Product Name	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1(V) Typ.	Max.	Condition	Supply Current (µA) Typ.	RR@1kHz (dB) Typ.	Capacitor Capacitance (µF)	Other Features	Package
RP100x	200	1.7 to 5.25	1.2 to 3.3	**±0.6**	0.13	0.23	IOUT=150mA	18	**75**	1 or more	TempCo : **Typ.±30ppm/°C** Discharge : Ver.D	DFN(PLP)1612-4 SOT-23-5
RP107x	200	1.4 to 5.25	1.0 to 4.2	±1	0.27	0.36	IOUT=200mA	**9.5**	60	Output Capacitor-less (CIN=0.1 or more)	Constant Discharge : Ver.D	WLCSP-4-P5 DFN(PLP)1212-6 SC-88A
RP202x	200	1.4 to 5.25	**0.8 to** 4.0	±1*2	0.20*2	0.29*2	IOUT=200mA	50*2 **2.5***3	70*2	0.47 or more	Automatic Constant Discharge : Ver.D	DFN(PLP)1010-4 SC-88A SOT-23-5
R1160N	200	1.4 to 6.0	**0.8** to 3.3	±2*2	0.14*2	0.2*2 0.25*3	IOUT=200mA	40*2 **4.5***3	70*2	2.2 or more	Tantalum Manual	SOT-23-5
RP155Z	200	1.9 to 5.25	1.6 to 3.6	±1	0.085	0.117	IOUT=200mA VSET=2.85V	80	**75**	1 or more	TempCo : **Typ.±30ppm/°C** Thermal Inrush Discharge : Ver.B Dual Output voltage switchable.	WLCSP-5-P1
R5112S +VD	200	3.5 to **42.0**	1.8, 2.5, 2.8, 3.0, 3.3, 3.4, 5.0 Ver.B: 1.6 to 4.8, Ver.D: 2.9 to 4.8, Detector Threshold Range	**±0.6** VD: ±0.6	0.6	1.2	IOUT=200mA VSET=5.0V	**3.8**	—	**0.1 or more**	Operating Temp.: -40 to 105°C Thermal	HSOP-8E
R1524x R1524SxxxH	200	3.5 to **36.0**	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**	—	**0.1 or more**	Operating Temp.: -40 to 105°C Thermal	DFN(PLP)1820-6 SOT-23-5 SOT-89-5 HSOP-6J HSOP-8E
R1525x	200	3.5 to **42.0**	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**	—	**0.1 or more**	Operating Temp.: -40 to 105°C Thermal High Immunity	SOT-23-5 SOT-89-5 HSOP-6J HSOP-8E
RP123x	250	1.7 to 5.25	1.2 to 4.8	±1	0.12	0.20	IOUT=250mA	**9.5**	**90**	1 or more	Output noise: 8µVrms Seamless Thermal Inrush Discharge : Ver.D	WLCSP-4-P8 DFN(PLP)1010-4
RP101x	300	1.7 to 5.25	1.2 to 3.3	**±0.6**	0.13	0.23	IOUT=150mA	18	**75**	1 or more	TempCo : **Typ.±30ppm/°C** Discharge : Ver.D	DFN(PLP)1612-4 DFN(PLP)1612-4B SOT-23-5
RP102x	300	1.7 to 5.25	1.2 to 3.3	**±0.8**	0.120	0.190	IOUT=300mA	50	**80**	1 or more	TempCo : **Typ.±20ppm/°C** Discharge : Ver.D	WLCSP-4-P2 DFN(PLP)1820-6 SOT-23-5
RP114x	300	1.4 to 5.25	**0.8** to 3.6	±1	0.25	0.30	IOUT=300mA	50	**75**	1 or more	Discharge : Ver.D	DFN(PLP)1010-4 SC-88A SOT-23-5

LDO Regulators (Linear Regulators)

Product Name	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1(V) Typ.	Max.	Condition	Supply Current (μA) Typ.	RR@1kHz (dB) Typ.	Capacitor Capacitance (μF)	Other Features	Package
RP170x	300	2.6 to 10.0	1.2 to 6.0	±1	0.77	1.08	IOUT=300mA	23	70	1 or more	Thermal Constant Discharge : Ver.D	SOT-23-5 SOT-89-5
RP200x	300	1.4 to 5.25	**0.8** to 4.0	±1*2	0.23*2	0.35*2	IOUT=300mA	55*2 **1.5***3	70*2	1 or more	Manu/Auto Discharge : Ver.D	WLCSP-4-P5 DFN(PLP)1212-6 SOT-23-5
R1130H	300	2.5 to 8.0	1.5 to 5.0 1.5 to 5.0, Ext.Adjustable	±2 ±36mV	0.25	0.34	IOUT=100mA	50	60	**0.1 or more**		SOT-89-5
R1131N	300	1.4 to 6.0	**0.8** to 3.3	±2	0.23	0.35	IOUT=300mA	60	65	1 or more (VSET≥1.0V)	⇒RP101N Discharge : Ver.D	SOT-23-5
R1131Dxx1	300	1.4 to 6.0	**0.8** to 3.3	±2	0.23	0.35	IOUT=300mA	60	65	1 or more (VSET≥1.0V)	Discharge : Ver.D	SON-6
R1161N	300	1.4 to 6.0	**0.8** to 3.3	±2*2	0.23*2	0.35*2	IOUT=300mA	60*2 **4.5***3	65*2	1 or more (VSET≥1.0V)	Manual Discharge : Ver.D ⇒RP200N	SOT-23-5
R1191x	300	3.5 to 16.0 (VSET≥3.0)	2.0 to 15.0	±1.5*2	0.55*2	0.75*2	IOUT=300mA VSET=5.0V	50*2 **6***3	70*2	4.7 or more	Manual Thermal Reverse Discharge : Ver.D	DFN1616-6 SOT-23-5 SOT-89-5
R1510S +VD	300	3.5 to **36.0**	2.5 to 12.0 Ver.A,B,C: 2.3 to 12.0, Ver.D: 2.3 to 10.6, Detector Threshold Range	±1.6 VD: ±1.7	1.0*2	2.0*2	IOUT=300mA VSET=5.0V	110*2 12.5*3	—	6.8 or more	Operating Temp.: -40 to 105°C Automatic Thermal	HSOP-8E
R1511x	300	3.5 to **36.0**	3.0 to 9.0 3.0 to 12.0, Ext.Adjustable	±1 ±30mV	0.64	1.0	IOUT=300mA VSET=5.0V	100	65	6.8 or more	Operating Temp.: -40 to 105°C Thermal	HSOP-6J TO-252-5-P2
R1513S	300	3.5 to **36.0**	1.2, 1.5, 1.8, 3.3, 3.4, 5.0 1.2 to 18.0, Ext.Adjustable	**±0.8**	0.32	0.60	IOUT=300mA VSET=5.0V	75	70*4	4.7 or more	Operating Temp.: -40 to **125°C** Thermal Discharge : Ver.D	HSOP-6J
RP105x	400	2.4 to 5.25 (VIN=from 0.9)	**0.6** to 1.5	±15mV	RP105L: 0.105 RP105K/N: 0.180	RP105L: 0.170 RP105K/N: 0.260	IOUT=400mA VSET=1.5V VBIAS=3.6V	28	**80***5	2.2 or more	Dual power supply Discharge : Ver.D/F	DFN1212-5 DFN(PLP)1212-6 SOT-23-5
RP106x	400	1.0 to 3.6	**0.7** to 1.8	**±0.8**	0.22	0.31	IOUT=400mA VSET=1.5V	48	60*6	1 or more	Constant Discharge : Ver.D	WLCSP-4-P5 DFN(PLP)1212-6 SC-88A
RP116Z	400	1.0 to 3.6	**0.7** to 1.8	**±0.8**	0.22	0.31	IOUT=400mA VSET=1.5V	48	60*6	1 or more	Constant Discharge : Ver.D Thinner than RP106Z (t=0.36mm)	WLCSP-4-P7
RP122Z RP122K	400	1.7 to 5.25	1.2 to 4.8	±1	0.17	0.265	IOUT=400mA	**9.5**	**90**	1 or more	Output noise: 8μVrms Seamless Thermal Inrush Discharge : Ver.D	WLCSP-4-P8 DFN(PLP)1010-4
RP111x	500	1.4 to 5.25	**0.7** to 3.6 **0.7** to 3.6, Ext.Adjustable	**±0.8**	0.23	0.34	IOUT=500mA	80	**75**	1 or more	Load Reg : Typ.1mV Thermal Inrush TempCo **: Typ.±30ppm/°C** Discharge : Ver.D Load transient response accuracy*7: Typ.-75mV/+45mV	DFN1212-6 SOT-23-5 SOT-89-5
RP115L	500*8	1.4 to 5.25	**0.7** to 4.3	±1	0.065	0.090	IOUT=500mA	110	**80** (VSET≤ 1.8V)	1 or more	Load Reg : Typ.1mV TempCo **: Typ.±30ppm/°C** Thermal Reverse Constant Inrush Discharge : Ver.D	DFN1216-8
R1500H	500	4.0 to **24.0**	3.0 to 12.0	±2	0.115	0.180	IOUT=200mA VSET=5.0V	70	60	10 or more	Operating Temp.: -40 to 105°C Thermal	SOT-89-5
R1517x	500	3.5 to **36.0**	2.5, 3.3, 3.4, 5.0, 8.5 2.5 to 12.0, Ext.Adjustable	**±0.8** ±20mV	0.35	0.62	IOUT=500mA VSET=5.0V	18	—	**0.1 or more**	Operating Temp.: -40 to 105°C Constant : Ext.Adjustable Thermal Discharge : Ver.D/F	HSOP-6J TO-252-5-P2
R5116x +VD	500	3.5 to **42.0**	3.3 to 5.0 UD: 2.5 to 5.0 OV: 3.3 to 5.5, Detector Threshold Range	**±0.5** VD:**±0.5**	0.9	1.5	IOUT=500mA VSET=5.0V	25		10 or more	Operating Temp.: -40 to 105°C Built-in Window VD Released Hysteresis: 0.5% (Max.) Thermal	HSOP-8E HQFN0808-28
R5117x +VD	500	3.5 to **42.0**	3.3 to 5.0 SVD: 2.5 to 5.0 BVD: 3.5 to 12.0, Detector Threshold Range	**±0.5** SVD: **±0.5** BVD: **±0.8**	0.9	1.5	IOUT=500mA VSET=5.0V	35		10 or more	Operating Temp.: -40 to 105°C Built-in Dual VD SVD Released Hysteresis: 0.5% (Max.) BVD Released Hysteresis: 5.0% (Max.) Thermal	HSOP-8E HQFN0808-28
R1170x	800	Max.6.0	1.5 to 5.0	±2	0.12	0.18	IOUT=300mA	80	50	10 or more	Thermal	HSON-6 SOT-89-5 HSOP-6J

*1 Set Output Voltage (VSET) = 2.8 V or close to 2.8 V unless otherwise noted. *2 Fast Response Mode *3 Low Power Mode *4 RR@f = 100 Hz *5 VIN = Ripple *6 RR@f = 10 kHz *7 1 mA ⇔ 250 mA
*8 Output Current (IOUT) is switchable between 500 mA or 1 A using the LCON pin of DFN1216-8.

1 A to 3 A LDO Regulators (Linear Regulators)

Product Name	Output Current (A)	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1(V) Typ.	Max.	Condition	Supply Current (μA) Typ.	RR@1kHz (dB) Typ.	Capacitor Capacitance (μF)	Other Features	Package
RP115x	1*2	1.4 to 5.25	**0.7** to 4.3	±1	RP115L: 0.13 RP115H: 0.17	RP115L: 0.18 RP115H: 0.24	IOUT=1A	110	**80** (VSET≤ 1.8V)	1 or more	Load Reg : Typ.1mV TempCo **: Typ.±30ppm/°C** Thermal Reverse Constant Inrush Discharge : Ver.D	DFN1216-8 SOT-89-5
RP131x	1	1.6 to 6.5	**0.8** to 5.5	±1	0.500	0.750	IOUT=1A	65	70	2.2 to 4.7 or more	Thermal Inrush Discharge : Ver.D	DFN1616-6B DFN(PLP)1820-6 SOT-89-5 HSOP-6J TO-252-5-P2
RP132x	1	1.4 to 6.5	**0.8** to 5.5 **0.8** to 5.5, Ext.Adjustable	±1 ±15mV	0.52	0.72	IOUT=1A	65	70	2.2 to 4.7 or more	Load Reg : Typ.5mV Thermal Inrush : Ext.Adjustable Discharge : Ver.D/F	DFN(PLP)1820-6 SOT-89-5 HSOP-6J TO-252-5-P2
R1172x	1	1.4 to 6.0	**0.8** to 5.0	±2	0.05	0.10	IOUT=300mA	60	70	4.7 or more (VSET≥1.0V)	Thermal Inrush Discharge : Ver.D	SOT-23-5 SOT-89-5 HSON-6 HSOP-6J
R1173x	1	1.4 to 6.0	**0.8** to 5.0 1.0 to VIN, Ext.Adjustable	±2 ±30mV	0.05	0.10	IOUT=300mA	60	70	4.7 or more (VSET≥1.0V)	Load Reg : Typ.-3mV Thermal Inrush Discharge : Ver.D	SOT-89-5 HSON-6 HSOP-6J
R1190x	1	3.5 to 16.0	2.0 to 12.0	±1.5	1.1	1.85	IOUT=1A VSET=5.0V	150	60	4.7 or more	Thermal Discharge : Ver.D Inrush : Ext.Adjustable	SOT-89-5 HSOP-6J TO-252-5-P2
R1501x	1	3.0 to **24.0**	3.0 to 18.0	±2	0.575	0.900	IOUT=1A VSET=5.0V	70	60	10 or more	Operating Temp.: -40 to 105°C Thermal	HSOP-6J TO-252-5-P2
R1518x	1	3.5 to **36.0**	2.5, 3.3, 3.4, 5.0, 6.0, 8.5 2.5 to 12.0, Ext.Adjustable	**±0.8** ±20mV	0.70	1.30	IOUT=1A VSET=5.0V	18	—	**0.1 or more**	Operating Temp.: -40 to 105°C Constant : Ext.Adjustable Thermal Discharge : Ver.D/F	HSOP-6J TO-252-5-P2
R1171S	1.5	2.1 to 6.0	1.5 to 5.0	±2	0.09	0.18	IOUT=300mA	130	50	4.7 to 10 or more	Thermal	HSOP-6J
R1171J	2		1.8 to 5.0									TO-252-5-P1
RP108J	3	1.6 to 5.25	**0.8** to 4.2 **0.8** to 4.2, Ext.Adjustable	±1	0.51	0.60	IOUT=3A	350	65	10 or more	Load Reg : Typ.3mV Thermal Reverse Constant Discharge : Ver.D/F	TO-252-5-P2
RN5RF	Ext.Tr.	1.8 to 10.0	1.2 to 6.0	±2	0.1*3	0.2	IOUT=100mA	30	60	10 or more	Tantalum	SOT-23-5

*1 Set Output Voltage (VSET) = 2.8 V or close to 2.8 V unless otherwise noted. *2 Output Current (IOUT) is switchable between 500 mA or 1 A using the LCON pin of DFN1216-8.
*3 Dropout Voltage (VDIF) is dependent on the external transistor.

Multi-Channel LDO Regulators (Linear Regulators)

Product Name	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Dropout Voltage*1(V) Typ.	Max.	Condition	Supply Current*2 (μA) Typ.	RR@1kHz (dB) Typ.	Capacitor Capacitance (μF)	Other Features	Package
RP152x Dual	150	1.4 to 5.25	**0.8** to 3.6	±1	0.20	0.35	IOUT=150mA	40	70	0.22 or more	Start-up sequence controllable: xxxC Discharge : Ver.B/C	DFN1212-6 SOT-23-6
R5326K Dual	150	1.4 to 6.0	**0.8** to 4.2	±1*3	0.19*3	0.27*3	IOUT=150mA	50*3 **5.5***4	70*3	1 to 3.3	Automatic Discharge : Ver.B	DFN(PLP)1820-6
RP150K Dual	300	2.5 to 5.25	1.5 to 3.3	±1	0.21	0.34	IOUT=300mA	24	**80**	1 or more	TempCo **: Typ.±30ppm/°C** Discharge : Ver.B	DFN(PLP)2020-8
RP154x Dual	300	1.4 to 5.25	**0.8** to 3.7	±1	0.25	0.30	IOUT=300mA	50	**75**	1 or more	Dual Input Type available: only DFN Discharge : Ver.B	DFN1216-8 SOT-23-6
R5324K Triple	100	2.0 to 6.0	1.5 to 4.0	±2	0.15	0.25	IOUT=100mA	90	70	1 or more	Discharge : Ver.B	DFN(PLP)2527-10
	150				0.22	0.33	IOUT=150mA					
	200				0.23	0.35	IOUT=200mA					

*1 Set Output Voltage (VSET) = 2.8 V or close to 2.8 V unless otherwise noted. *2 Supply Current (ISS) per channel. *3 Fast Response Mode *4 Low Power Mode
*5 Enhanced Load Transient Response Type (xxxD/E)

Voltage Tracker

Product Name	Output Current (mA)	Input Voltage Range (V)	Voltage Tracking Range (V)	Voltage Tracking Accuracy (mV)	Dropout Voltage*1 (V) Typ.	Max.	Conditon	Supply Current (μA) Typ.	RR @1kHz (dB) Typ.	Capacitor Capacitance (μF)	Other Features	Package
R1540x	70	3.5 to **42.0**	2.45 to	±15 (Ta=-40 to 105°C)	1.3		IOUT=70mA	60		4.7 or more	Operating Temp.:-40 to 105°C Foldback Proteciton Circuit Thermal High Immunity	SOT-23-5 HSOP-8E

Reset ICs (Voltage Detectors)/Watchdog Timers (WDT)/Reset Timer ICs

● : Available in Automotive Products ■ : Available in Industrial Products ◆ : Only available in Automotive Products
♡ : Products available in PRODUCT LONGEVITY PROGRAM : Products in Development : Products Newly Released

Microcontroller Supervisor Features

Max. Operating Voltage (V)	Release Output Delay Time	Supervisor Configuration:	VD		VD with WDT		VD with LDO and WDT		VD with LDO		
		VD Monitors:	VIN	VSENSE	VIN	VSENSE	VOUT	VSENSE	VIN	VOUT	VSENSE
5.5	Y	Int. Counter	RP300x								
6.0	N	—	R3114x	R3117x	—						
	Y	Ext. Capacitor	R3112x R3116x	R3118x	R5106N R5107G R5109G	R5108G					
		Int. Counter	R3130N R3132x R3133D R3134N								
10.0	N	—	R3111x		—						
	Y	Ext. Capacitor	RN5VD				R5101G				
24.0	N	—			—				R1150HxxxA		R1150HxxxB
	Y	Ext. Capacitor							R1150HxxxC	R1150HxxxD	
36.0	N	—		R3119xxxxE	—				R1510SxxxA		R1510SxxxB
	Y	Ext. Capacitor	R3119xxxxA R3150NxxxA/B	R3150NxxxE/F			R5110Sxx1A/B R5111Sxx1A/B	R5110Sxx2C/D R5110Lxx2C/D R5111Sxx2C/D R5111Lxx2C/D	R1510SxxxC	R1510SxxxD	
42.0	Y	Ext. Capacitor		R3152NxxxA/B			R5114x R5114L R5115x R5115L			R5112SxxxD	R5112SxxxB R5116x R5117x
60.0	Y	Ext. Capacitor	R3160N								

Reset ICs (Voltage Detectors)

Product Name	Operating Voltage Range (V)	Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Reset Signal	SENSE Pin	MR Pin*1	Adjustable Release Output Delay Time	Output Delay Time Accuracy (%)	Supply Current*2 (µA)	Hysteresis	Package
RP300x	0.72 to 5.50	1.1, 2.32, 2.63, 2.7, 2.8, 2.93, 3.08, 3.4, 4.38, 4.6	±0.8	L	N	Y	Int. Counter	50ms±5 200ms±5	0.95	N	DFN(PLP)1010-4B SOT-23-5
R3114x ♡	0.5 to 6.0	0.7 to 5.0	±0.8	L	N	N	—	—	0.35	Y	DFN(PLP)1010-4 SC-82AB SOT-23-5
R3112x ♡	0.7 to 6.0	0.9 to 5.0	±2.0	L	N	N	Ext. Capacitor	Not specified	0.5	Y	SON1612-6 SC-82AB SOT-23-5
R3116x ●■♡	0.5 to 6.0	0.7 to 5.0	±0.8	L	N	N	Ext. Capacitor	±15	0.35	Y	DFN(PLP)1010-4 SC-82AB SOT-23-5
R3130N	1.0 to 6.0	1.6 to 4.8	±1.5	L	N	N	Int. Counter	50ms±10 240ms±10	1.4	N	SOT-23-3
R3132x	0.75 to 6.0	1.0 to 5.0	±2.0	L	N	Y	Int. Counter	240ms±15	0.8	N	SON1612-6 SC-82AB
R3133D	0.8 to 6.0	1.0 to 5.0	±2.0	H	N	Y	Int. Counter	240ms±15	0.8	N	SON1612-6
R3134N ●♡	0.75 to 6.0	1.0 to 5.0	±1.8	L	N	Y	Int. Counter	240ms±15	0.8	N	SOT-23-5
R3117x*5 ●■♡	1.0 to 6.0	0.7 to 5.0	±1.0	L	Y	N	—	—	0.29	Y	DFN(PLP)1010-4 SC-88A SOT-23-5
R3118x ●♡	1.0 to 6.0	0.6 to 5.0	±1.5	L	Y	N	Ext. Capacitor	±30	0.4	Y	DFN(PLP)1212-6 SC-88A SOT-23-5
R3111x ♡	0.7 to 10.0	0.9 to 6.0	±2.0	L/H*3	N	N	—	—	1.0	Y	SON1612-6 SC-82AB SC-88A SOT-23-3 SOT-23-5 SOT-89
RN5VD ♡	0.7 to 10.0	0.9 to 6.0	±2.5	L	N	N	Ext. Capacitor	Not specified	1.0	Y	SOT-23-5
R3119xxxxA*5 ●■♡	1.2 to **36.0**	2.3 to 12.0	±1.5	L	N	N	Ext. Capacitor	-50, +80	3.3	Y	DFN(PLP)1820-6 SOT-23-5
R3119xxxxE*5 ●■♡	2.1 to 6.0*4				Y		—	—			
R3150NxxxA*5 ●■♡	1.4 to **36.0**	Detector Threshold Range: 5.0 to 10.0, Release Threshold Range: 5.3 to 11.0	Detector Threshold Accuracy: ±1.5, Release Threshold Accuracy: ±1.5	L	N	N	Ext. Capacitor, Detector Output Delay Time and Release Output Delay Time are also adjustable using external capacitors.	Output Delay Time Accuracy: -35, +40, Detector Output Delay Time Accuracy: -35, +40	3.8	Y	SOT-23-6
R3150NxxxB*5 ●■♡				H							
R3150NxxxE*5 ●■♡	3.6 to 6.0*4			L	Y				3.5		
R3150NxxxF*5 ●■♡				H							
R3152NxxxA*5 ●■♡	3.0 to **42.0**	UD: 1.6 to 4.8 OD: 2.0 to 5.9 Under Development UD: 1.0 to OD: 1.1 to	±0.5	L	Y	N	Ext. Capacitor	37.5, +100	1.5	Y	SOT-23-6
R3152NxxxB*5 ●■♡										N	
R3160N*5 ●■♡	2.7 to **60.0**	10.0 to 48.0	±1.0	H/L	N	N	Ext. Capacitor	±50	1.8	Y	SOT-23-6

*1 Manual Reset Pin *2 Detector Threshold (-VDET) = 1.5 V, Detection released *3 SON1612-6, SC-82AB and SC-88A generates a high reset signal. *4 Input Voltage of SENSE Pin: 0V to 36.0V
*5 Operating Temperature Rang = -40°C to 105°C

Watchdog Timers (WDT)

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

Product Name	Operating Voltage Range (V)	Voltage Detector Section					Watchdog Timer Section				LDO Regulator Section			Supply Current (µA)	Package
		Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Output Delay Time*1 (ms)			WDT Timeout Period*2 (ms)			Inhibit Pin	Output Voltage Range (V)	Output Voltage Accuracy (%)	Output Current (mA)		
				Min.	Typ.	Max.	Min.	Typ.	Max.					Typ.	
R5101G	1.5 to 10.0	1.7 to 4.5	±2.5	7	14	35	50	120	250	Y	1.8 to 5.0	±2.5	50	5	SSOP-8G
R5104V	Max.36.0	2.8 to 4.0	±2.0	Not specified			200	300	510	Y xxxA	3.3 to 5.0	±2.0	Depending on external Tr.	60	SSOP-10
R5110Sxx1A*6 R5110Sxx1B*3, *6	3.5 to **36.0**	1.6 to 5.5	±1.8*4	194	242	290	14.4	18	21.6	N	1.8 to 5.0	±1.5*4	500	25	HSOP-8E
R5110Sxx2C*5, *6 R5110Sxx2D*3, *6										Y					HSOP-18
R5110Lxx2C*6 R5110Lxx2D*3, *6															HQFN0808-28
R5111Sxx1A*5, *6 R5111Sxx1B*3, *5, *6	3.5 to **36.0**	1.6 to 5.5	±1.8*4	194	242	290	14.4	18	21.6	N	1.8 to 5.0	±1.5*4	300	25	HSOP-8E
R5111Sxx2C*5, *6 R5111Sxx2D*3, *5, *6										Y					HSOP-18
R5111Lxx2C*5, *6 R5111Lxx2D*3, *5, *6															HQFN0808-28
R5114Sxx1x*6	3.5 to **42.0**	2.5 to 4.8	±1.6*4	184	220	253	14.8	18	21.9	Y	3.3 to 5.0	±1.6*4	250	8.5	HSOP-8E
R5114Sxx2x*6															HSOP-18
R5114Lxx2x*6															HQFN0808-28
R5115Sxx1x*3, *6	3.5 to **42.0**	2.5 to 4.8	±1.6*4	184	220	253	14.8	18	21.9	Y	3.3 to 5.0	±1.6*4	250	8.5	HSOP-8E
R5115Sxx2x*3, *6															HSOP-18
R5115Lxx2x*3, *6															HQFN0808-28

*1 R5101: C_D = 0.001 µF, R5110/ R5111/R5114/R5115: C_D = 0.22 µF *2 R5101: C_W = 0.01 µF, R5104: C_{TW} = 0.1 µF, R5110/R5111/R5114/R5115: C_{TW} = 0.01 µF
*3 Window Watchdog Timer. Window watchdog timer monitors microprocessor activity and asserts a reset signal if the watchdog pulse does not occur witin the defined time window (open window) or if the watchdog pulse occurs within the defined time widown (close window). *4 Detector Threshold Accuracy in all temperature range.
*5 The R5111 are Industrial products. *6 Operating Temperature Rang = -40°C to 105°C

● Watchdog Timer (WDT) with Reset IC (Voltage Detector)

Product Name	Operating Voltage Range (V)	Voltage Detector Section			Watchdog Timer Section		Supply Current (µA)	Remarks	Package
		Detector Threshold Range (V)	Detector Threshold Accuracy (%)	Output Delay Time Accuracy (%)	WDT Timeout Period Accuracy (%)	Inhibit Pin	Typ.		
R5105N	0.9 to 6.0	1.5 to 5.5	±1.0	±16	±33	N	11		SOT-23-6
R5106N*1						Y		CD Pin and CTW Pin are combined.	
R5107G*1								MR Pin is included.	SSOP-8G
R5108G*1	1.5 to 6.0							SENSE Pin is included.	
R5109G*1	0.9 to 6.0						11.5	2 Clock Input Type	

*1 Operating Temperature Rang = -40°C to 105°C

Reset Timer ICs

A reset timer is designed for a mobile equipment, such as a smartphone and a tablet, with a fixed internal battery which cannot be removed to initiate a reset sequence.

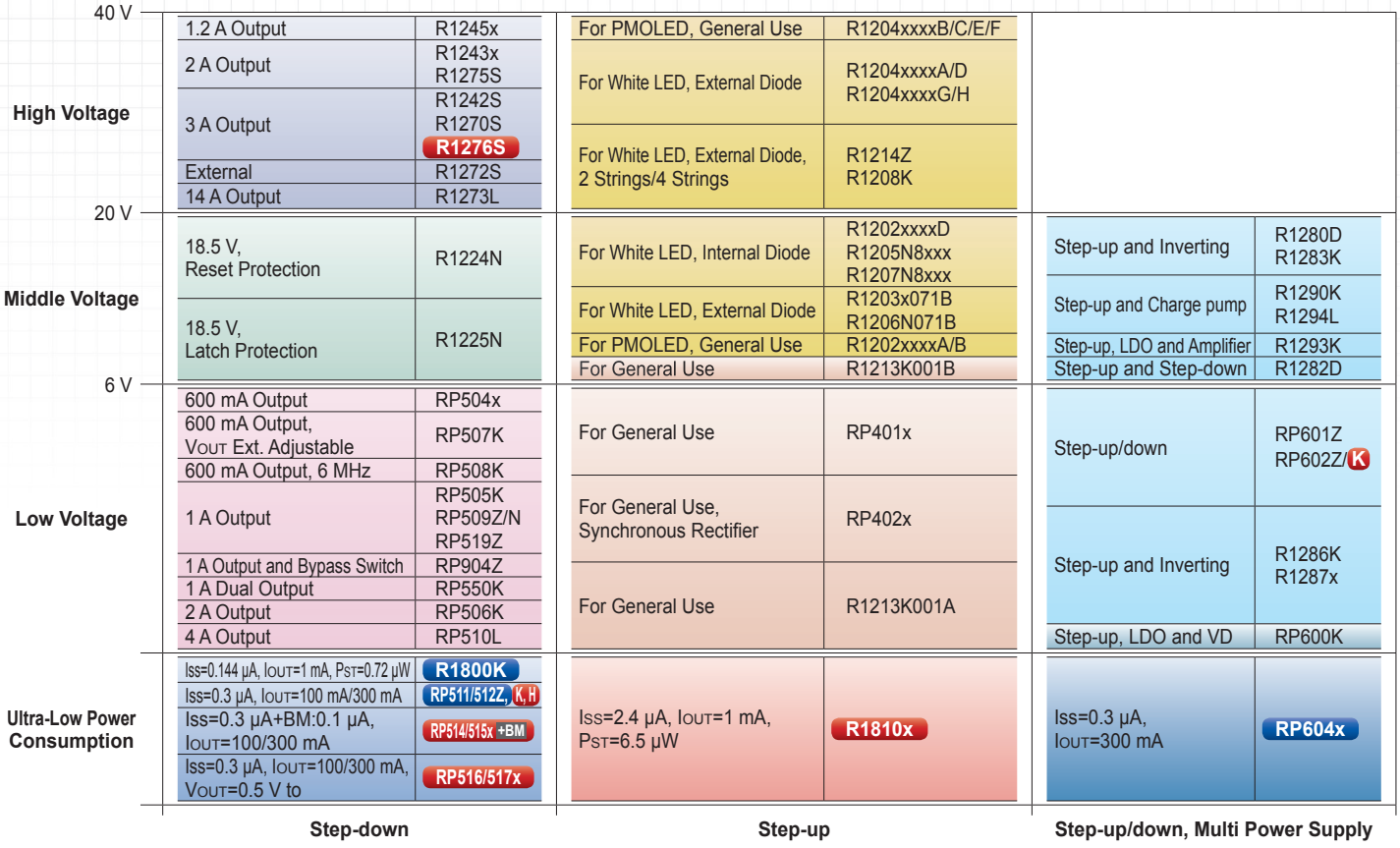
Product Name	Operating Voltage Range (V)	Reset Input	Reset Output	Supply Current (µA)	Output Delay Time (s)	Output Release Time (s)	Package	Remarks
R3200x001x	1.65 to 5.5	$\overline{SR0}$, $\overline{SR1}$	xxxA: $\overline{RST}$ xxxB: $\overline{RST}$, RST2	0.28	7.5, 11.25	—	DFN(PLP)2020-8B	
R3200x002x					7.5	0.234	DFN1216-8	
R3200L052B					10	0.313	DFN1216-8	
R3200L053B					10	0.078	DFN1216-8	
R3200L064A					3	0.1875	DFN1216-8	

DCDC Converters (Switching Regulators)

Grey-out Products : The successors of these products are indicated in Product Name.
● : Available in Automotive Products ■ : Available in Industrial Products ♡ : Products available in PRODUCT LONGEVITY PROGRAM
: Products Newly Released : Products in Development

Input Voltage Level and DCDC Converters (Switching Regulators) Type Chart

Major products are classified by input voltage and function. This chart does not include all products.



High Voltage Step-down DCDC Converters (Switching Regulators)

Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range (V)	VFB Voltage Accuracy (mV)	Switching Frequency (kHz)	Output Current*1 (A)	Protection Circuit Type	Other Features	Package
R1240x	00xA 00xB	PWM	4.5 to 30.0	0.8 to 15.0, Ext.Adjustable	0.8V±12	1250	1.2	Latch Fold-back	Diode UVLO Soft-Start Thermal	SOT-23-6W*2 DFN(PLP)2527-10
R1244N	001B	PWM	4.5 to 30.0	0.8 to 15.0, Ext.Adjustable	0.8V±12	1250	1.2	Fold-back	Diode UVLO Soft-Start Thermal	SOT-23-6W*2
R1245x ● ♡	00xA/C/E/G 00xB/D/F/H	PWM	4.5 to 30.0	0.8 to 27.6, Ext.Adjustable	0.8V±8	330: xxxA/B, 500: xxxC/D, 1000: xxxE/F, 2400: xxxG/H	1.2	Latch Fold-back	Operating Temp.:-40 to 105°C Diode UVLO Soft-Start Thermal	DFN(PLP)2020-8 SOT-23-6W HSOP-8E
R1243x ♡	001A/C 001B/D 001E	PWM	4.5 to 30.0	0.8 to 18.0, Ext.Adjustable	0.5V±7	330: xxxC/D, 1000: xxxA/B/E	2	Latch Fold-back Latch	Diode UVLO Soft-Start : Ext. Adjustable Thermal FLG Pin	DFN(PLP)2527-10 HSOP-8E HSOP-8E
R1242S	001A/C/E/G 001B/D/F/H	PWM	5.0 to 30.0	0.8 to 15.0, Ext.Adjustable	0.8V±12	330: xxxC/D, 500: xxxE/F, 1000: xxxG/H, 330 to 1000: xxxA/B, Ext.Adjustable	3	Latch Fold-back	Synchro : with external low side transistor UVLO Soft-Start Thermal	HSOP-8E
R1275S ● ■ ♡	003x	Forced PWM	3.6 to 30.0	3.3 to 5.0, Ext.Adjustable	0.64V±1%	2000: Ext.Adjustable, Ext.Synchronizable with PLL Circuit (1800 to 2200)	2	Hiccup	Operating temp.:-40 to 105°C Synchro SSCG : Ver.003C PG UVLO Soft-Start : Ext.Adjustable Thermal OVLO Phase : Ext.	HSOP-18
R1276S ● ■	00xA/B/C/D	Forced PWM, PWM/VFM Auto Switching	3.6 to 30.0	001x: 0.7 to 6.0, 002x: 6.0 to 12.0, Ext. Adjustable	0.64V±1%	250 to 1000: Ext. Adjustable, Ext. Synchronizable with PLL Circuit	3	Latch or Hiccup	Operating temp.: -40 to 105°C Synchro SSCG : Ver. xxxC/D PG UVLO Soft-Start : Ext.Adjustable OVLO Thermal Phase : Ext.	HSOP-18
R1271x ● ■	xx1A/B/C/D	Forced PWM	3.6 to 30.0	3.3, 5.0	±1%	2000	1	Latch or Hiccup	Operating temp.: -40 to 105°C Synchro Soft-Start : Ext, Adjustable UVLO OVLO Thermal SSCG : xx1C/D PG	DFN3030-12 HSOP-18

Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range (V)	V_{FB} Voltage Accuracy (mV)	Switching Frequency (kHz)	Output Current*1 (A)	Protection Circuit Type	Other Features	Package
R1270S ● ■ ♡	001A 001B	PWM, PWM/VFM Auto-Switching	3.6 to 34.0	0.8 to 31.6, Ext.Adjustable	0.8V±8	300 to 2400: Ext.Adjustable, Ext.Synchronizable with PLL Circuit	3	Fold-back Latch Fold-back	Operating Temp.: -40 to 105°C Diode UVLO Soft-Start : Ext.Adjustable Thermal FLG Pin OVLO Phase : Ext.	HSOP-18
R1272S ● ■ ♡	xxxA	Forced PWM, PWM/VFM Auto-Switching	4.0 to 34.0	0.7 to 5.3, Ext.Adjustable	0.64V±1%	250 to 1000: Ext.Adjustable, Ext.Synchronizable with PLL Circuit	External	Latch or Hiccup	DCDC Controller Operating Temp.: -40 to 105°C Synchro SSCG : Ver.03x PG UVLO Soft-Start : Ext.Adjustable Thermal OVP Phase : Ext.	HSOP-18
R1273L ● ■	xxxA	Forced PWM, PWM/VFM Auto-Switching	4.0 to 34.0	0.7 to 5.3, Ext.Adjustable	0.64V±1%	250 to 1000: Ext.Adjustable, Ext.Synchronizable with PLL Circuit	14	Latch or Hiccup	Operating Temp.: -40 to 105°C Synchro SSCG : Ver.03x PG UVLO Soft-Start : Ext.Adjustable Phase : Ext. Thermal OVP	QFN0505-32B
R1260S ● ■	xxxA/B/C/D	Forced PWM, PWM/VFM Auto Switching	5.0 to **60.0**	1.0 to 16.0, Ext. Adjustable	0.8V±1%	150 to 600: Ext. Adjustable, Ext. Synchronizable with PLL Circuit	External	Latch or Hiccup	DCDC Contoller Operating Temp.: -40 to 105°C Synchro Soft-Start : Ext. Adjustable UVLO OVP Thermal SSCG : xxxB/D PG Phase : Ext.	HSOP-18

*1 Output Current (I_{OUT}) can be affected by environmental conditions or external components. This is an approximate value. *2 The pin-layout of R1240N and that of R1244N is upside down.

Middle Voltage Step-down DCDC Controllers (Switching Regulators)

These products are middle voltage step-down DCDC controllers with an external output transistor.

Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (%)	Switching Frequency (kHz)	Output Tr.	Output Current	Protection Circuit Type	Other Features	Package
R1223N	xx2A/B	PWM/VFM Auto Switching	2.3 to 13.2	1.5 to 5.0	±2	300: xxxA/C/E/G, 500: xxxB/D/F/H	External	Depending on external MOSFET	Latch	Diode	SOT-23-5
	xx2C/D	PWM								Soft-Start	
	xx2E/F	PWM/VFM Auto Switching							Reset		
	xx2G/H	PWM									
R1224N	xx2E/F/L	PWM/VFM Auto Switching	2.3 to 18.5	1.2 to 6.0	±2	180: xxxL/M, 300: xxxE/G, 500: xxxF/H	External	Depending on external MOSFET	Reset	Diode Soft-Start UVLO	SOT-23-5
	xx2G/H/M	PWM		1.0 to V_{IN}, Ext.Adjustable							
	102G/H/M										
R1225N	xx2C/D/K	PWM	2.3 to 18.5	1.2 to 6.0	±2	180: xxxJ/K, 300: xxxA/C, 500: xxxB/D	External	Depending on external MOSFET	Latch	Diode Soft-Start UVLO	SOT-23-6W
	xx2A/B/J	PWM/VFM Auto Switching									

*1 For the externally adjustable output voltage type, this is a feedback voltage accuracy.

Low Voltage Step-down DCDC Converters (Switching Regulators)

Product Name	Version	Control	MODE Pin	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (%)	Switching Frequency (MHz)	Output Current*2 (mA)	Protection Circuit Type	Other Features	Package
RP500x	xx1A	PWM/VFM Auto Switching	N	2.55 to 5.5	1.1 to 3.3	±1.5	1.2	600	Latch	Synchro UVLO Soft-Start Discharge : xx3A/xx4A	DFN1616-6 DFN(PLP)1820-6 SOT-23-6W
	xx2A	PWM									
	xx3A	PWM/VFM Auto Switching									
	xx4A	PWM									
RP503x	xx1A	PWM/VFM Auto Switching	N	2.5 to 5.5	0.8 to 2.5	±1.5	2	600	Latch	Synchro UVLO Soft-Start Discharge : xx2A	DFN1616-6 SOT-23-5
	xx2A										
RP507K ♡	001B	PWM/VFM Auto Switching	N	2.3 to 5.5	0.7 to 5.5, Ext.Adjustable	0.6V±9mV	2	600	—	Synchro UVLO Soft-Start Thermal Discharge	DFN(PLP)1616-6D
RP504x	xx1A	Forced PWM, PWM/VFM Auto Switching	Y	2.3 to 5.5 (V_{OUT}≥1.0)	0.8 to 3.3	±1.5	2.25	600	Latch	Synchro UVLO Soft-Start Discharge : xx1D	DFN(PLP)1216-6F DFN1616-6B
	xx1B	PWM/VFM Auto Switching	N								SOT-23-5
	xx1C	Forced PWM									
	xx1D	Forced PWM, PWM/VFM Auto Switching	Y								DFN(PLP)1216-6F DFN1616-6B
RP508K ♡	xx1A	Forced PWM, PWM/VFM Auto Switching	Y	2.3 to 5.5	0.8 to 3.3	±1.5	6	600	—	Synchro UVLO Soft-Start Thermal Discharge : xx1B	DFN(PLP)1212-6F
	xx1B										
RP502x	xx1B	PWM/VFM Auto Switching	N	2.5 to 5.5	0.8 to 3.3	±1.5	3.3	600	Latch	Synchro UVLO Soft-Start Discharge : xx3B/xx4B	WLCSP-6-P2 DFN1616-6
	xx2B	PWM									
	xx3B	PWM/VFM Auto Switching									
	xx4B	PWM									

DCDC Converters (Switching Regulators)

Product Name	Version	Control	MODE Pin	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (%)	Switching Frequency (MHz)	Output Current*2 (mA)	Protection Circuit Type	Other Features	Package
R1232D	xx1A/B 001C/D	PWM	N	2.6 to 5.5	0.9 to 3.3 0.8 to VIN, Ext.Adjustable	±2 0.8V±16mV	1: xxxA/C, 2.25: xxxB/D	1000	Latch	Synchro UVLO Soft-Start	SON-8
RP501K	xx1A xx1B	PWM, PWM/VFM Auto Switching	Y	2.5 to 5.5	1.0 to 3.3	±1.5	2.25	1000	Latch	Synchro UVLO Soft-Start Discharge : xx1B	DFN(PLP)2527-10
RP505K ♡	xx1A xx1B 001C	Forced PWM, PWM/VFM Auto Switching	Y	2.3 to 5.5 (VOUT≥0.8) 2.3 to 5.5	0.6 to 3.3 0.8 to 3.3, Ext.Adjustable	±1.5 0.6V±9mV	2.25	1000	Latch	Synchro UVLO Soft-Start Thermal Discharge : xx1B	DFN(PLP)2020-8
RP509x ♡	xxxA/B 00xC/D	Forced PWM, PWM/VFM Auto Switching	Y	2.3 to 5.5	0.6 to 3.3 0.6 to 5.5, Ext.Adjustable	±1.5 (VOUT≥1.2V) 0.6V±9mV	6	1000 or 500	—	Synchro UVLO Soft-Start Thermal Discharge : xxxB/00xD	WLCSP-6-P6 SOT-23-6
RP519Z	xxxA/B 00xC/D	Forced PWM, PWM/VFM Auto Switching	Y	2.3 to 5.5	0.6 to 3.3 0.6 to 5.5, Ext.Adjustable	±1.5 (VOUT≥1.2V) 0.6V±9mV	6	1000 or 500	—	Synchro UVLO Soft-Start Thermal Discharge : xxxB/00xD	WLCSP-6-P8 (t=0.36mm)
RP904Z	xxxA	PWM/VFM Manual Switching	Y	2.5 to 5.5	1.2 to 3.3 (VSET1) 1.0 to1.5 (VSET2)	±2 ±30mV	2	1000	Latch	Synchro UVLO Soft-Start Built-in Bypass switch, Output Voltage selectable from VSET1 or VSET2	WLCSP-11-P2
RP506K ● ■ ♡	xx1A/D xx1B/E 001C 001F	Forced PWM, PWM/VFM Auto Switching	Y	2.5 to 5.5 or 2.5 to 4.5	0.8 to 3.3: xx1A/B 0.6 to 3.3: xx1D/E 0.8 to 4.0, Ext.Adjustable 0.6 to 4.0, Ext.Adjustable	±1.5 0.6V±9mV	1.2: xxx1D/E/F, 2.25: xxxA/B/C	2000	Latch	Synchro UVLO Soft-Start : Ext.Adjustable Thermal Discharge : xx1B/E PG	DFN(PLP)2527-10
RP510L ● ■ ♡	xx1/4G xx1/4H 001/4J 001/4N	Forced PWM	N	2.5 to 5.5	0.8, 1.0, 1.1, 1.2, 1.3, 1.5, 1.8, 3.0, 3.3 0.8 to 3.3, Ext.Adjustable	±1.0 0.6V±6mV	2.3	4000	xx1/001: Latch xx4/004: Fold-back	Synchro UVLO Soft-Start : Ext.Adjustable Discharge : xxxH/N Thermal PG	DFN3030-12

● **Dual Channel**

RP550K Dual ● ■ ♡	001A	Forced PWM, PWM/VFM Auto Switching	Y	2.3 to 5.5 (VOUT≥0.8)	0.6 to 3.3, Ext. Adjustable	0.6V±9mV	2.25	1000 per Channel	Latch	Synchro UVLO Soft-Start Thermal	DFN(PLP)2730-12

*1 For the externally adjustable output voltage type, this is a feedback voltage accuracy. *2 Output Current (IOUT) can be affected by environmental conditions or external components. This is an approximate value. *3 Switching frequency is depending on the conditions of Input, Output Voltage, and Output Current.

Step-up DCDC Converters (Switching Regulators) for White LEDs/PMOLEDs/General Use

These products are PWM step-up DCDC converters, which are optimized to drive white LEDs for background illumination or passive matrix OLED display with constant current. These products include an under-voltage lockout circuit (UVLO), and a soft-start circuit. These are also able to be used in a general step-up power supply.

● **For White LEDs**

Diode	Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range*1 (V)	VFB Voltage Accuracy (mV)	Switching Frequency (kHz)	Lx Current Limit*2 (mA)	OVP Voltage (Typ.) (V)	Other Features	Package
Internal	R1202x ♡	3xxD 7xxD	PWM	1.8 to 5.5	Up to 22.2, Ext.Adjustable	0.2V±10	1200	350 700	14 23	UVLO Soft-Start Thermal Shutdown LED Adjust	DFN1616-6B TSOT-23-6
	R1205L	8x1B 8x1C	PWM	1.8 to 5.5	Up to 24.2, Ext.Adjustable	0.2V±10 0.4V±10	1200	350 700	25	UVLO Soft-Start Thermal LED Adjust	DFN1616-6B
	R1205N ⇒R1207N	8x3B	PWM	1.8 to 5.5	Up to 24.2, Ext.Adjustable	0.2V±10	1200	350 700	25	UVLO Soft-Start Thermal LED Adjust	TSOT-23-6*3
	R1207N	8x3B 8x3C	PWM	1.8 to 5.5	Up to 24.2, Ext.Adjustable	0.2V±10 0.4V±10	1200	350 700	25	UVLO Soft-Start Thermal LED Adjust	TSOT-23-6*3
	R1218N	021A 031A 041A	PWM	1.8 to 5.5	Up to 17, Ext.Adjustable	0.2V±10	1200	700	9.5 14 18.5	UVLO Soft-Start	SOT-23-6

Diode	Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range*1 (V)	VFB Voltage Accuracy (mV)	Switching Frequency (kHz)	Lx Current Limit*2 (mA)	OVP Voltage (Typ.) (V)	Other Features	Package
External	R1203L	071B	PWM	1.8 to 5.5	Up to 28.7, Ext.Adjustable	0.2V±10	1200	700	29.5	UVLO Soft-Start LED Adjust	DFN1616-6B
	R1203N ⇒R1206N	071B	PWM	1.8 to 5.5	Up to 28.7, Ext.Adjustable	0.2V±10	1200	700	29.5	UVLO Soft-Start LED Adjust	SOT-23-6*3
	R1206N	071B	PWM	1.8 to 5.5	Up to 28.7, Ext.Adjustable	0.2V±10	1200	700	29.5	UVLO Soft-Start LED Adjust	SOT-23-6*3
	R1204x ● ♡	11xA/D	PWM	2.3 to 5.5	Up to 40.2, Ext.Adjustable	0.2V±10	1000: xxxA, 750: xxxD	900	23	UVLO Soft-Start Thermal LED Adjust	DFN(PLP)1820-6 TSOT-23-6
		21xA/D							33		
		31xA/D							42		
		11xG/H				0.4V±10	1000: xxxG, 750: xxxH		23		
		21xG/H							33		
		31xG/H							42		
	R1218N	052A	PWM	1.8 to 5.5	Up to 30, Ext.Adjustable	0.2V±10	1200	700	23	UVLO Soft-Start	SOT-23-6
		062A							27.5		
		072A							31.5		

*1 Output voltage is different by version. *2 Lx current limit is different from output current. *3 The pin-layout of R1205N and that of R1207N are different by 180 degrees. Also, the pin-layout of R1203N and that of R1206N are different by 180 degrees.

● For 2 or 4 Strings of White LEDs

Diode	Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range*1 (V)	Max LED Current (mA)	LED Current Accuracy (%)	Switching Frequency (kHz)	Lx Current Limit*2 (A)	OVP Voltage (Typ.) (V)	Other Features	Package
External	R1214Z ♡	211A/C	PWM/VFM Auto Switching	2.7 to 5.5	Up to 29, Ext. Adjustable	40x2	±2: xx1A/B, ±1.5: xx1C/D	750: 221A/C, 450: 211A/B/C/D	1.9	35	UVLO Soft-Start Thermal LED Adjust 2 strings	WLCSP-9-P1
		221A/C										
		211B	PWM									
		211D										
	R1208K ♡	112A/B	PWM	2.7 to 22.0	Up to 42, Ext. Adjustable	80x4	±3	750: xxxA, 450: xxxB	2	23	UVLO Soft-Start Thermal LED Adjust 4 strings	DFN(PLP)2730-12
		212A/B								33		
		312A/B								43.5		

*1 Output voltage is different by version. *2 Lx current limit is different from output current.

● For PMOLEDs and General Use

Diode	Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range*1 (V)	VFB Voltage Accuracy (mV)	Switching Frequency (kHz)	Lx Current Limit*2 (mA)	OVP Voltage (Typ.) (V)	Other Features	Package
Internal	R1200x	001x	PWM	2.3 to 5.5	Up to 20, Ext.Adjustable	1.0V±15	1200	700	17	UVLO Soft-Start Shutdown Discharge : xxxA	DFN1616-6 DFN(PLP)1820-6 SOT-23-6
		002x							19		
		003x							21		
	R1202x ♡	3xxA/B	PWM	2.3 to 5.5	Up to 22.2, Ext.Adjustable	1.0V±15	1200	350 700	14	UVLO Soft-Start Thermal Shutdown Discharge : xxxA	DFN1616-6B TSOT-23-6
		4xxA/B							17		
		5xxA/B							19		
		6xxA/B							21		
		7xxA/B							23		
	R1205L	8x1A	PWM	2.3 to 5.5	Up to 24.2, Ext.Adjustable	1.0V±15	1200	350 700	25	UVLO Soft-Start Thermal	DFN1616-6B
	R1205N ⇒R1207N	8x3A	PWM	2.3 to 5.5	Up to 24.2, Ext.Adjustable	1.0V±15	1200	350 700	25	UVLO Soft-Start Thermal	TSOT-23-6*3
	R1207N	8x3A	PWM	2.3 to 5.5	Up to 24.2, Ext.Adjustable	1.0V±15	1200	350 700	25	UVLO Soft-Start Thermal	TSOT-23-6*3
External	R1204x ● ♡	11xB/C/E/F	PWM: xxxB/E PWM/VFM Auto Switching: xxxC/F	2.3 to 5.5	Up to 40.2, Ext.Adjustable	1.0V±15	1000: xxxB/C, 750: xxxE/F	900	23	UVLO Soft-Start Thermal	DFN(PLP)1820-6 TSOT-23-6
		21xB/C/E/F							33		
		31xB/C/E/F							42		

*1 Output voltage is different by version. *2 Lx current limit is different from output current. *3 The pin-layout of R1205N and that of R1207N are different by 180 degrees.

Step-up DCDC Converters (Switching Regulators) for General Use

Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (%)	Frequency (kHz)	Output Tr.	Lx Current Limit*2 (A)	Protection Circuit Type	Other Features	Package
RN5RK	xx1x	VFM	0.75 to 8.0	2.0 to 5.5	±2.5	Max.100	Internal	—	—	Diode	SOT-23-5
	xx2A		0.7 to 8.0				External				
R1210N	xx1A/C/D	PWM	0.9 to 8.0	2.2 to 6.0: xxxC/D 2.2 to 3.5: xx1A	±2.5	100: xxxA/C 180: xxxD	Internal	—	—	Diode xx1A: with frequency change-over circuit Soft-Start *3	SOT-23-5
	xx2C/D		0.8 to 8.0				External				

DCDC Converters (Switching Regulators)

Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy*1 (%)	Frequency (kHz)	Output Tr.	Lx Current Limit*2 (A)	Protection Circuit Type	Other Features	Package
R1213K ♡	001A	PWM	2.3 to 5.5	3.0 to 6.0, Ext.Adjustable	0.8V±8mV	1000	Internal	3	Latch	Diode Phase : Ext. Shutdown : FLAG pin Soft-Start : Ext. Adjustable UVLO Thermal	DFN(PLP)2730-12
	001B			6.0 to 15.0, Ext.Adjustable							
RP400x	xx1A	PWM/VFM Auto Switching	0.8 to 5.5	1.8 to 5.0 or 1.8 to 5.0, Ext.Adjustable : only DFN	±2	700	Internal	0.6*4	—	Diode Soft-Start Anti-Ringing	DFN(PLP)1820-6 SOT-23-5
	xx1B		0.7 to 5.5								
	xx1C		1.2 to 5.5								
RP401x	xx1A	PWM, PWM/VFM Auto Switching	0.6 to 5.5	1.8 to 5.5	±2	1200	Internal	1*4	Latch	Diode Soft-Start	DFN(PLP)1820-6
	xx1B								—		
	xx1C	PWM/VFM Auto Switching		1.8 to 5.5 or 1.8 to 5.5, Ext.Adjustable : only DFN					—		DFN(PLP)1820-6 SOT-23-5
	xx1D	PWM							—		
RP402x ♡	xx1A/C	PWM, PWM/VFM Auto Switching	0.6 to 4.8 or 0.6 to 4.6: 001	1.8 to 5.5 or 1.8 to 5.5, Ext.Adjustable	±1.5	1200	Internal	1.5*4	Latch	Synchro Soft-Start OVP OVLO Anti-Ringing : xx1/001 Regulation available at VIN>VOUT Reverse current protection at VIN=0V or open Input and output cut off completely at standby: xxxA/B/E/F Input and output bypass at standby: xxxC/D/G/H	DFN(PLP)2020-8
	xx2A	Forced PWM				1000					
	xx1B/D	PWM, PWM/VFM Auto Switching				1200			—		
	xx2B	Forced PWM				1000					
	xx1E/G	PWM/VFM Auto Switching	0.6 to 4.8	1.8 to 5.5		1200			Latch		SOT-23-5
	xx1F/H								—		

*1 For the externally adjustable output voltage type, this is a feedback voltage accuracy. *2 Lx current limit is different from output current. *3 Soft-start includes a function that detects a sudden fluctuation of voltage to prevent overshoot and undershoot. *4 Lx Limit Current fluctuates depending on Duty.

DCDC Converters (Switching Regulators) for LCDs/OLEDs/CCDs

These products are suitable for the power management of LCDs, OLEDs and CCDs. Many variations are available such as step-up DCDC controller (Switching Regulators), step-up and step-down dual output converter and step-up and positive/negative charge pump triple output converter. These products include an under-voltage lockout circuit (UVLO), and a latch type protection circuit. The products with a built-in sequence control circuit option are able to control a start-up sequence and a shutdown sequence.

● Step-up DCDC Controllers

Product Name	Control	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Accuracy*1 (mV)	Switching Frequency (kHz)	Output Tr.	Lx Current Limit*2 (A)	Protection Circuit Type	Other Features	Package
R1211x ● ♡	PWM	2.5 to 6.0	Ext.Adjustable	1.0V±15	700: xxxA/B 300: xxxxC/D	External	N	Latch	Soft-Start UVLO Diode Phase : Ext., xxxA/C Phase : Int., xxxB/D, with stand-by	SON-6 SOT-23-6W
R1212D	PWM	2.2 to 5.5	Ext.Adjustable	1.0V±15	300: xxxC 700: xxxA 1400: xxxB	External	N	Latch	Soft-Start : Ext.Adjustable UVLO Diode Phase : Ext. Maxduty : Ext.Adjustable	SON-8
R1215D	PWM	1.8 to 5.5	Ext.Adjustable	1.0V±15	700: xxxA/E 1400: xxxB/F	External	N	Latch	Soft-Start : Ext.Adjustable UVLO Diode Phase : Ext. Maxduty : Ext.Adjustable	SON-8

● Step-up and Inverting DCDC Converters

Product Name	Control	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Accuracy*1 (mV)	Switching Frequency (kHz)	Output Tr.	Lx Current Limit*2 (A)	Protection Circuit Type	Timer Latch Delay Time (ms)	Other Features	Package
R1280D	CH1: PWM, Step-up CH2: PWM, Inverting	2.5 to 5.5	Ext.Adjustable	1.0V±15	200: xxxC, 700: xxxA/B	External	—	Latch	100	Soft-Start : Ext.Adjustable UVLO Diode Phase : Ext., xxxA/C Phase : Int., xxxB, with stand-by	SON-10
R1283K ♡	CH1: PWM, Step-up CH2: PWM, Inverting	2.5 to 5.5	Up to 20.0, Ext.Adjustable Up to VDD-20.0, Ext.Adjustable	1.0V±15 0V±25	300: xxxA, 700: xxxB, 1400: xxxC	Internal	1.5 1.5	Latch	50	Soft-Start UVLO Discharge : Inverting output only Sequencing Diode	DFN(PLP)2730-12

Product Name		Control	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Accuracy*1 (mV)	Switching Frequency (kHz)	Output Tr.	Lx Current Limit*2 (A)	Protection Circuit Type	Timer Latch Delay Time (ms)	Other Features	Package
R1286K		CH1: PWM, Step-up	2.3 to 5.5	4.6 to 5.8: xxxA/C to G	±0.9%	1750	Internal	1.0: 0xxx, 1.1: 1xxx	Latch	16: 0xxx/001B, 40: 1xxx	Synchro Soft-Start UVLO Sequencing Discharge Thermal Single-Wire : xxxA/C to G, Inverting output can be dynamically changed by S-wire control.	DFN(PLP)2730-12
				4.6 to 5.8, Ext.Adjustable, 001B	1.0V±15							
		CH2: PWM, Inverting		-2.0 to -6.0: xxxA/C to G	±70			1.5: 0xxx, 1.8: 1xxx				
				-2.0 to -6.0, Ext.Adjustable, 001B	0V±25							
R1287x ♡	CH1: Step-up	PWM/VFM Auto Switching: xxxB/F, PWM: xxxC/D/G/H	2.5 to 5.5	4.5 to 5.8: xxx	±0.9%	900: xxxB/F, 300: xxxC/G, 1000: xxxD/H	Internal	1.1	Latch	30	Synchro Soft-Start UVLO Sequencing Discharge Thermal	WLCSP-12-P1 DFN3030-12
				4.5 to 5.8: Ext.Adjustable, 001	1.0V±15							
	CH2: Inverting			-4.5 to -5.8: xxx	±1.0%	1100: xxxB/F, 300: xxxC/G, 1000: xxxD/H		1.5				
				-4.5 to -6.0: Ext.Adjustable, 001	0V±30							

● Step-up and Step-down Type DCDC Controller

Product Name	Control	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Accuracy*1 (mV)	Switching Frequency (kHz)	Output Tr.	Protection Circuit Type	Other Features	Package
R1282D	CH1: PWM, Step-up	2.5 to 5.5	Ext.Adjustable	1.0V±15	700	External	Latch	UVLO Diode Soft-Start : Ext.Adjustable Phase : Ext.	SON-10
	CH2: PWM, Step-down								

● Step-up and Charge Pump Type DCDC Converters

Product Name	Control	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Accuracy*1 (mV)	Switching Frequency (kHz)	Output Tr.	Lx Current Limit*2 (A)	Protection Circuit Type	Other Features	Package
R1293K	PWM, Step-up	2.2 to 5.5	Up to 16.0, Ext.Adjustable	1.0V±15	300 to 1000, Ext.Adjustable	Internal	2	Latch	DCDC output with noise reduction function, VCOM amplifier 1 channel, GAMMA amplifier 6 channel Thermal Diode UVLO Soft-Start : Ext.Adjustable Phase : Ext. Maxduty : Ext.Adjustable	QFN(PLP)0404-32
	LDO		1.8 to 2.5	±1%		Internal	IOUT= 350mA			
	Amplifier	5.0 to 16.0	—	—		—	—			
R1290K ● ♡	CH1: PWM, Step-up	2.0 to 5.5 : 101A 2.5 to 5.5 : 102A 3.3 to 5.5 : 103A	CH1: Up to 20.0, Ext.Adjustable	1.0V±15	180 to 1400, Ext.Adjustable	Internal	CH1: 2	Latch	The charge pump operates at 1/4th operating frequency. Soft-Start : Ext.Adjustable Sequencing UVLO Diode Phase : Ext. Maxduty : Ext.Adjustable	QFN0404-24
	CH2: Charge pump, Positive		CH2/3: Ext.Adjustable	1.5V±25						
	CH3: Charge pump, Negative			0V±30						
R1294L ● ■ ♡	CH1: PWM, Step-up	2.0 to 5.5 : 101A 2.5 to 5.5 : 102A 3.3 to 5.5 : 103A	CH1: Up to 20.0, Ext.Adjustable	1.0V±15	210 to 1400, Ext.Adjustable, 800±8%	Internal	CH1: 2	Latch	The charge pump operates at 1/4th operating frequency. Soft-Start : Ext.Adjustable Sequencing UVLO Diode Phase : Ext. Maxduty : Ext.Adjustable	QFN0404-24B
	CH2: Charge pump, Positive		CH2/3: Ext.Adjustable	1.5V±25						
	CH3: Charge pump, Negative			0V±30						

*1 For the externally adjustable output voltage type, this is a feedback voltage accuracy. *2 Lx current limit is different from output current.

Step-up DCDC Converter (Switching Regulators) with Reset IC (Voltage Detector) and LDO Regulator (Linear Regulator)

Product Name	DCDC Converter Part							Other Features	Package
	Control	Input Voltage Range (V)	Output Voltage Range*1 (V)	CE	Switching Frequency (MHz)	Output Tr.	Lx Current Limit*2 (A)		
RP600K0xxA	PWM, PWM/VFM Auto Switching	0.8 to 5.5	2.3 to 5.5, Accuracy: ±2%	CE	1.2	Internal	1.4	Diode Soft-Start Thermal : Except xxC Sequencing	DFN(PLP)2527-10
RP600K0xxB				CE1					
RP600K2xxC				CE					
RP600K1xxD			2.3 to 5.5, Ext.Adjustable, Accuracy: ±12mV	CE					

Product Name	LDO Regulator Part						Voltage Detector Part			
	Output Current (mA)	Input Voltage Range (V)	Output Voltage Range (V)	CE	ECO Function	Input	Operating Voltage Range (V)	Detector Threshold Range (V)	Output Delay Time	Hysteresis Range (%)
RP600K0xxA	500	2.0 to 5.5	1.5 to 5.0, Accuracy: ±1%	CE	Fast Response Mode	DCDC output	0.8 to 5.5	1.0 to 4.5, Accuracy: ±2%, Monitor VSENSE	Y	5
RP600K0xxB	300			CE2	DCDC Enabled: Fast Response Mode DCDC Disabled: Automatic/Manual Shift Mode	VIN			Y	5
RP600K2xxC	150			—		DCDC output			N	30 to 80, 10% steps
RP600K1xxD	500			CE	Fast Response Mode				Y	5

*1 For the externally adjustable output voltage type, this is a feedback voltage accuracy. *2 Lx current limit is different from output current.

Step-down DCDC Converter (Switching Regulators) with Reset ICs (Voltage Detectors) and LDO Regulators (Linear Regulators)

Product Name	Control	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Accuracy (%)	Switching Frequency (MHz)	Output Tr.	Output Current *1 (mA)	Protection Circuit Type	Other Features	Package
R5220K	PWM	2.8 to 5.5	1.0 to 3.3	±2	1.2	Internal	400: DCDC, 50: LDO	Latch	Synchro, Soft-Start, UVLO, Built-in DCDC and LDO Alternative Circuit	DFN(PLP)2514-6
RP901K	PWM, PWM/VFM Auto Switching	4.5 to 5.5	1.2 to 1.8: DCDC	±2	1.2	Internal	800: xxxA/B/C, 900: xxxD	Reset	Synchro, Soft-Start, UVLO, Thermal, Sequencing, Built-in VD and LDO, for DVD drive	DFN(PLP)2527-10
			2.5 to 3.3: LDO	±1			600			
			2.0 to 3.0: VD, xxxA 3.0 to 5.0: VD, xxxB/C/D	±2			—			

*1 Output Current (I_{OUT}) can be affected by environmental conditions or external components. This is an approximate value.

Step-up/down DCDC Converters (Switching Regulators)

Product Name	Control	Input Voltage Range (V)	Output Voltage Range (V)	Voltage Accuracy (%)	Switching Frequency (MHz)	Output Tr.	Output Current *1 (A)	Protection Circuit Type	Other Features	Package
RP601Z ♡	Forced PWM, PWM/VFM Auto Switching	2.3 to 5.5	2.75 to 4.2	±2	2.4	Internal	1	—	Synchro, UVLO, Soft-Start, Discharge, Thermal, PG, Single-Wire : Dynamic Control of Output Voltage Using S-Wire, Forced Bypass Mode, DVS: 50mV	WLCSP-16-P1
RP602Z ♡ **RP602K** ♡	Forced PWM, PWM/VFM Auto Switching	2.3 to 5.5	2.7 to 4.2	±1.5	2.6	Internal	1.5	Latch or Reset	Synchro, OVP, UVLO, Soft-Start, Discharge, Thermal	WLCSP-20-P1 DFN(PLP)2730-12

*1 Output Current (I_{OUT}) can be affected by environmental conditions or external components. This is an approximate value. *2 The actual input/output voltage range can be changed due to using conditions.

Ultra-Low Power Consumption Step-up, Step-down, Step-up/down DCDC Converters (Switching Regulators)

Product Name	Version	Control	Input Voltage Range (V)	Output Voltage Range (V)	Output Voltage Accuracy (%)	Switching Frequency	Output Current*1 (mA)	Supply Current (µA)	Other Features	Package
RP511Z ♡ **RP511K** **RP511H**	**xx1A/B**	VFM	2.0 to 5.5	1.0 to 4.0	±1.5	1*2	100	**0.3**	Step-down, Synchro, UVLO, Soft-Start, Discharge : xx1B	WLCSP-8-P1 DFN(PLP)2527-10 SOT-89-5
RP512Z ♡ **RP512K** **RP512H**	**xx1C/D**	VFM	2.0 to 5.5	1.0 to 4.0	±1.5	1*2	300	**0.3**	Step-down, Synchro, UVLO, Soft-Start, Discharge : xx1D	WLCSP-8-P1 DFN(PLP)2527-10 SOT-89-5
RP514x +BM	**xxxA/B**	VFM	1.8 to 5.5	1.0 to 4.0	±1.5	1*2	100	**0.3** BM:**0.1**	Step-down, Synchro, UVLO, Soft-Start, Discharge : xxxB	WLCSP-9-Px DFN(PLP)2527-10
RP515x +BM	**xxxC/D**	VFM	1.8 to 5.5	1.0 to 4.0	±1.5	1*2	300	**0.3** BM:**0.1**	Step-down, Synchro, UVLO, Soft-Start, Discharge : xxxD	WLCSP-9-Px DFN(PLP)2527-10
RP516x	**xxxA/B**	VFM	1.8 to 5.5	**0.5** to 1.2	±18mV	1*2	100	**0.3**	Step-down, Synchro, UVLO, Soft-Start, Discharge : xxxB	WLCSP-8-P1 DFN(PLP)2527-10 SOT-89-5
RP517x	**xxxC/D**	VFM	1.8 to 5.5	**0.5** to 1.2	±18mV	1*2	300	**0.3**	Step-down, Synchro, UVLO, Soft-Start, Discharge : xxxD	WLCSP-8-P1 DFN(PLP)2527-10 SOT-89-5
R1800K ♡	**xx1A**	VFM	2.0 to 5.5	2.0 to 4.5	±3	*2	1	**0.144**	Step-down, Reverse, Maximum Power Point Control: 2.0V to 5.3V, Minimum Starting Power: **0.72µW**	DFN(PLP)2730-12
R1810x	**xx1A**	VFM	0.5 to 2.1	2.0 to 4.5	±5	*2	1	**2.4**	Step-up, Reverse, PG, Maximum Power Point Control: 0.2V to 2.5V, Minimum Starting Power: **6.5µW**	WLCSP-15 DFN(PLP)2735-14B
RP604x ♡	**xx1A/B**	VFM	1.8 to 5.5	1.6 to 5.2	±1.5	*2	300	**0.3**	Step-up/down, Synchro, Thermal, UVLO, OVP, Soft-Start, Discharge : xxxB	WLCSP-20-P2 DFN(PLP)2730-12

*1 Output Current (I_{OUT}) can be affected by environmental conditions or external components. This is an approximate value. *2 Switching frequency is depending on the conditions of Input, Output Voltage, and Output Current.

● : Available in Automotive Products ♡ : Products available in PRODUCT LONGEVITY PROGRAM : Products Newly Released

Introduction

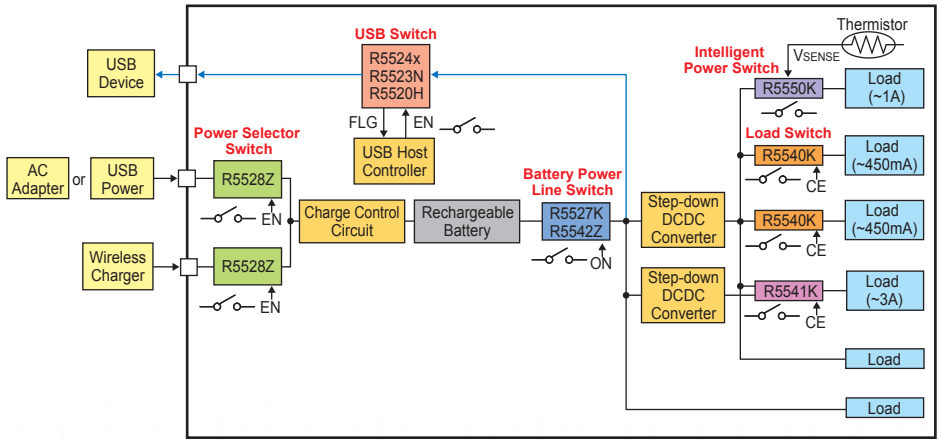
Aiming at saving energy, not only the battery-powered application, but all electronic equipment is required to consumption power limit according to each local standard. To save energy, instead of using LDO, switch IC for each circuit block is used after DCDC converter. Simple MOSFET can play the role as a switch, but load switch IC can include protection circuits, discharge function at off state, and a slew rate control circuit. As a result, saving space and intensive function realization are possible. REDC provides wide variety lineup of switch ICs with low on-resistance MOSFET and protection circuits in one chip.

Switch Features

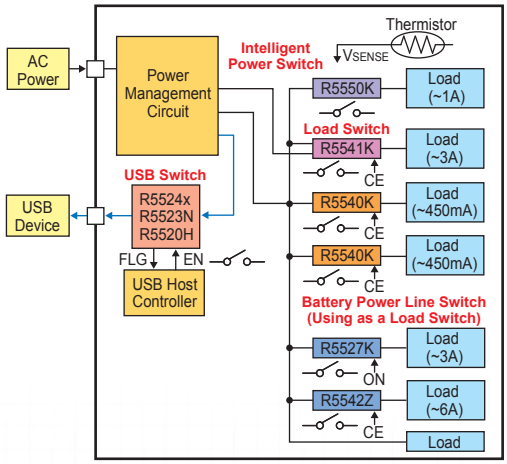
Product Category	Product Description	Typical Applications	Product Name
USB Switch	USB Power Line Protection USB Power Line ON/OFF Control	USB Powered Application: PCs, PC Peripherals, Digital TVs, STBs, Printers, Smartphones	R5520H R5523N R5524x
Rectifier Switch	Output Rectifier Regardless of Input Polarity	Toy and Healthcare Product Powered by Dry Cell	R5590D/N
Load Switch	Power Line ON/OFF Control and Distribution; Secondary Power Supply Switch	Power-saving Required Equipment during Standby/Sleep Mode: Portable Communication Equipment, DSCs, DSVCs, PCs, MFPs	R5527K R5540K R5541K
Battery Line Switch	Battery Line Protection; Primary Power Supply Switch or Load Switch	Secondary Battery Powered Equipment: Smartphones, Tablet PCs, PNDs, Notebook PCs It can be used as a load switch for any electronic equipment.	R5527K R5542Z
Intelligent Power Switch	Power Line's Systematic Protection; Secondary Power Supply Switch	Power-saving with High Protection Required Equipment during Standby/Sleep Mode: Portable Communication Equipment, DSCs, DSVCs, PCs, MFPs	R5550K
External Power Switch	Several Power Line Switchover Control	Power Selection Required Equipment: AC Adapters, USB Chargers, Wireless Charger	R5528Z
OVP Switch	Overvoltage Protection for Input Pin	Charger Protection for Secondary Battery-Powered Equipment	R5560Z R5528Z
PC Card & Express Card Power Switch	ON/OFF Control of PC Card Power Line ON/OFF Control of Express Card Power Line	PC Card Bus Slot, PC Card Reader Writer Express Card Slot	R5533V R5538D

Typical Application

For Portable Equipment



For Non-Portable Equipment



USB Switches

There are two main roles of USB. Recently, USB switch IC is used as a load switch with protections.

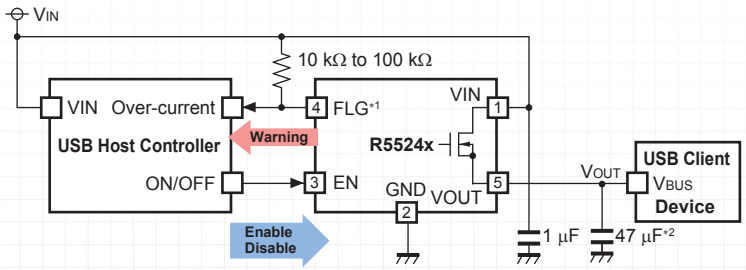
1. USB Power Line's ON/OFF Control

By the enable signal from another device such as a USB Host Controller, the USB switch turn on the USB power line with suppressing inrush current with soft-start function. On the contrary, by the disable signal, the USB switch cut off the power line with or without auto-discharge function (Option).

2. USB Power Line Protection

There is protection capability against the abnormal heating in the USB switch, and if preset over-current is detected, output current is limited or power is cut off and latched for protection.

R5524x Typical Application



*1 FLG pin has N-channel open drain output, therefore pull-up resistance is necessary when it is used. The output of FLG pin becomes "L" when the thermal shutdown or over-current limit-function works.

*2 According to the USB standard, 120 uF or more capacitor attachment is recommended, however, as an IC, changing capacitor is acceptable considering other usage.

USB Switch Lineup

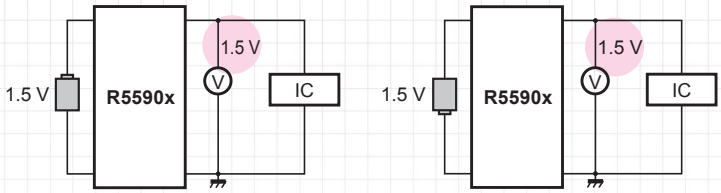
Product Name	ON Resistance (mΩ)	Supply Current (µA)	Operating Voltage Range (V)	UVLO Detect Voltage (V)	Current Limit Threshold (mA)		Short Current Limit (mA)		Internal FET	EN	Protection Type	Other Features	Package
		Typ.		Typ.	Min.	Typ.	Min.	Typ.					
R5520H	100	20	4.0 to 5.5	2.2	—	1200	500	750	Pch	H/L	Constant Current	Thermal Soft-Start FLG	SOT-89-5
R5523N ●♡	130	20	2.2 to 5.5	1.8	—	1000	500	750	Pch	H/L	Constant Current	Thermal Soft-Start FLG	SOT-23-5
R5524x001A/B ●♡	100	110	2.7 to 5.5	2.4	650	800	550	650	Nch	H	Latch-Off/ Constant Current	Thermal Soft-Start FLG	DFN(PLP)1820-6
R5524x002A/B ●♡												Reverse : OFF	SOT-23-5
R5524N004A ●♡					1250	1550					Constant Current	Discharge : xxxA	SOT-23-5

Switch ICs

Rectifier Switch

Protection against reverse insertion of a dry cell, generally, mechanically or using diode method is common. These method limits operation if reverse insertion happens. REDC offers direction free insertion of a dry cell with the R5590. The R5590 reduces the energy loss of Vf by a diode and rectifies and realizes dry cell direction free insertion.

R5590x Typical Application



The R5590x allows batteries to be placed in any direction without regard to positive or negative polarity.

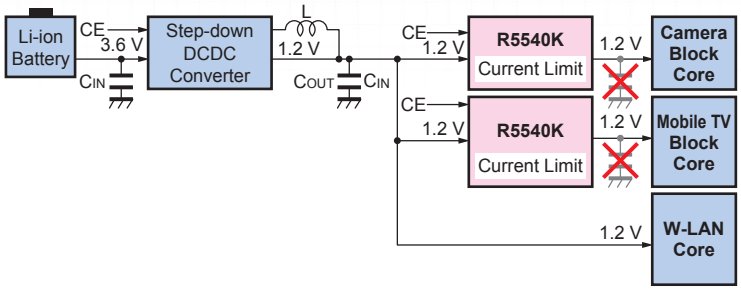
Rectifier Switch Lineup

Product Name	ON Resistance (Ω) Typ.	Supply Current (μA) Typ.	Operating Voltage Range (V)	Package
R5590D R5590N	0.4: SON1612-6, VIN=1.5 V 0.5: SOT-23-5, VIN=1.5 V	0.05: VIN=1.5 V	0.9 to 5.25	SON1612-6 SOT-23-5

Load Switch

Same voltage is necessary for different function blocks. In that case, to make a power tree, a higher than required voltage is generated by DCDC converter and distributed the appropriate voltage to each function block via LDO. In another case, the same voltage is generated by DCDC converter directly, and distributed the voltage via load switch. In using LDO method, a certain dropout voltage between input and output is necessary, therefore, power loss should be bigger than using load switch method. Not only that, to secure the phase compensation of an LDO, external capacitors are often necessary, therefore more space is required. On the other hand, load switches do not have the regulation function, however, internal output transistor's on-resistance is very small, therefore dropout voltage can be minimized and suppression of the power loss is possible. External capacitors are unnecessary.

R5540K Typical Application



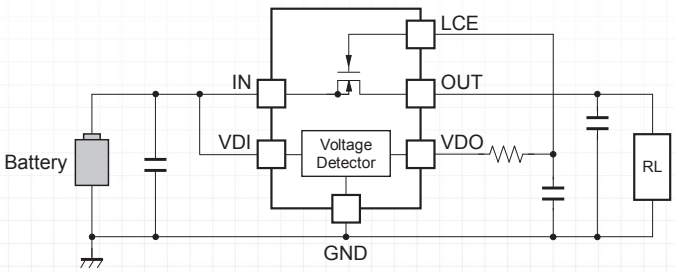
Load Switch Lineup

Product Name	ON Resistance (mΩ)	Supply Current (μA) Typ.	Operating Voltage Range (V)	Output Current (mA)	Current Limit Threshold (mA) Typ.	Current Limit Threshold (mA) Max.	Internal FET	CE	Other Features	Package
R5540K002 ♡	120	9	0.75 to 3.6	200	350	500	Nch	H/L	Discharge : xxxC/D Soft-Start Reverse : OFF	DFN(PLP)1010-4F
R5540K004 ♡			0.8 to 3.6	450	700	1000				
R5541K ♡	18	25	VIN: 0.6 to 4.8 VBIAS: 2.5 to 5.5	3000	—	—	Nch	H	Thermal UVLO Reverse : OFF Discharge : xxxD Soft-Start : Ext.Adjustable	DFN(PLP)1216-6G

Battery Line Switch

Battery line switch IC can suppress inrush current at start-up by its soft-start circuit. Due to the reverse current protection function during off state or for always, unlike a simple MOSFET, space saving is possible to realize intensive functions. They are used as load switches. To use a battery line switch as a load switch, discharge function can be selected as an option. Further, the R5542 Series have another voltage detector inside.

R5542Z Typical Application



The R5542Z detects a voltage drop of battery and cuts the switch off.

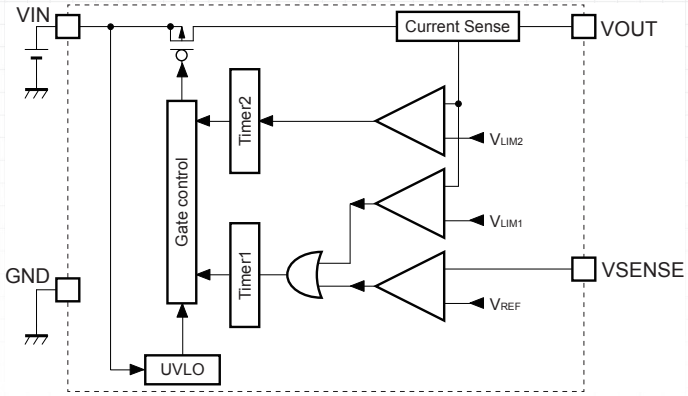
Battery Line Switch Lineup

Product Name	ON Resistance (mΩ)	Supply Current (μA) Typ.	Operating Voltage Range (V)	Output Current (A)	Internal FET	ON/CE	Other Features	Package
R5527K ♡	45	40	1.8 to 5.5	3	Nch	H/L	Reverse : ON/OFF Soft-Start Discharge : xxxC/D	DFN(PLP)1612-4D
R5542Z	9	Switch: 10 VD: 1	Switch: 2.3 to 5.5 VD: 1.2 to 5.5	6	Nch	H	Soft-Start UVLO Reverse : OFF Built-in Voltage Detector (CMOS Output) Detector Threshold: 2.0 V to 5.0 V Detector Threshold Accuracy: ±2.0%	WLCSP-12-P3

Intelligent Power Switch

Intelligent power switch protects a battery line. For example, each IC of the R5550K series has two steps abnormal current detectors and an abnormal voltage detector. In the R5550KxxxA, the first step abnormal current detector for lower current, detecting counter delay is set long, but second step abnormal current detector for higher current, the counter delay is set short.
Therefore, recognition of the momentum permissible current is possible. Not only that, if the preset detector delay time has passed, the switch turns off. But after a certain time, automatically resumed and checking the current again and the same operation repeats until the abnormal cause is removed.

R5550K Block Diagram



Intelligent Power Switch Lineup

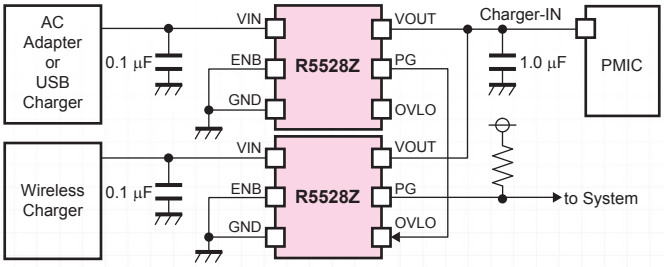
Product Name	ON Resistance (mΩ)	Supply Current (µA)	Operating Voltage Range (V)	UVLO Detect Voltage (V)	Output Current (A)	Current Limit Threshold (mA)			Output Current Limit (mA)			Internal FET
		Typ.		Typ.		Min.	Typ.	Max.	Min.	Typ.	Max.	
R5550K001A	180	2.6	2.3 to 5.25	1.9	1	300	460	624	1130	1470	1790	Pch

Product Name	Detector Threshold (V)	Current Limit/Under Voltage Detection (ms)			Output Current Limit (ms)			Protection	Package
	Typ.	Delay Time	OFF Time	ON Time	Delay Time	OFF Time	ON Time		
R5550K001A	0.5	10	80	2.5	1.33	80	1.33	Auto Release	DFN(PLP)1010-4F

External Power Switch/ OVP Switch

Handheld equipment such as smartphones and tablet PCs, charging via AC adapter or USB cable, wireless charging is also possible. Therefore selector switch is necessary. Further, if abnormal voltage adapter is connected, over voltage must be detected to prevent from destruction of the system. The switch is called an OVP switch. The R5528 has both of the functions, switch-over and OVP. The R5560 does not have the function of switch-over, however, OVLO voltage can be set by user with divider resisteors.
The circuit shown below is an example of input voltage switch-over circuit.
In this example, when the AC Adapter or USB Charger input is in the appropriate range, PG pin becomes "L", then Wireless Charger side switch turns off by the OVLO pin, as a result, input power source can be switched over. In this example, the AC Adapter or USB Charger side becomes primary input.

R5528Z Typical Application



External Power Switch/ OVP Switch Lineup

Product Name	ON Resistance (mΩ)	Supply Current (µA)	Operating Voltage Range (V)	OVLO Detect Voltage (V)	UVLO Detect Voltage (V)	Output Current (A)	Internal FET	EN	Other Features	Package
		Typ.		Typ.	Typ.		FET			
R5528Z001A ♡	54	50	2.3 to 36.0	6.8 ±3%	1.9	3	Nch	L	Thermal Soft-Start Reverse : OFF PG Debounce Time Delay Circuit	WLCSP-9-P1
R5560Zxx1A ♡	38	19	2.5 to 28.0	6.8 ±3%	—	4.5	Nch	—	Thermal Soft-Start Adjustable OVLO Threshold Surge Clamp Circuit: 80 V Debounce Time Delay Circuit PG	WLCSP-12-P2

PC Card & Express Card Power Switch Products Lineup

Product Name	Function	Feature	Package
R5533V	Single Slot Power Switch for PC Card	Corresponding to Standard-type PCMCIA Power Controller, Nch MOSFET	SSOP-16
R5538D	Power Switch for Express Card	For Total Power Management for Express Card	QFN0404-20

Li-ion Battery Protection ICs

REDC's Li-ion/polymer battery protection ICs and Li-ion/polymer battery second protection ICs have been released to the market since 1995, when the Li-ion rechargeable batteries became available. REDC has over 20 years of experience developing these products. These protection ICs protect batteries provide features like over-charge/discharge voltage, excess charge/discharge current and short circuit. REDC has a wide product portfolio of 1-cell protection ICs for smartphones and tablets, 2-cell protection ICs for DSLR and portable DVD players, multi-cell protection ICs for electrical power tools and E-bike and second protection ICs for notebook PCs and electrical power tools.

: Products Newly Released ♡ : Products available in PRODUCT LONGEVITY PROGRAM

1-Cell Li-ion Battery Protection ICs

REDC's 1-cell Li-ion/polymer battery protection ICs are high accuracy devices. RSENS type products have a highly accurate detection of ±3 mV in low voltage while having an extremely low voltage range of the excess discharge current detection. Due to using external sensing resistance solution, RSENS type can detect more precise excess charge/discharge current than conventional solution of using FET's on resistance. FET's on resistance is unstable depending on the condition such as gate voltage, temperature, and FET part number. Besides, the R5471 Series (FET sensing type) or the R5441 Series (RSENS type) have high accuracy over-charge voltage detector with ±10 mV accuracy in the temperature range from 0°C to 50°C.

FET Sensing Type

Product Name		R540xx	R5471L	R5478N	R5487L R5497L	R5492N	R5442x	R5499Z
Supply Current (µA)	Typ.	3.5 or 4.0	4.0	3.0	3.0	4.0	3.0	4.0
Standby Current (µA)	Max.	0.1 or 2.0	0.1	0.1 or 2.0	0.1 or 0.5	0.5	0.1	0.1
Overcharge (OVP)								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		4.0 to 4.5, ±25	4.1 to 4.5*1, ±10	4.2 to 4.5, 3.65 or 3.9, ±25	4.2 to 4.6, ±20	4.0 to 4.5, ±20	4.1 to 4.6, ±20	4.3 to 4.6*1, ±12
Output Delay Time (s)	Typ.	0.250 or 0.275 or 1.0 or 1.1	1	1	1	1	1	1
Protection Circuit Type		Latch or Auto Release	Latch	Latch or Auto Release	Latch or Auto Release	Auto Release	Auto Release	Latch
Overdischarge (UVP)								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		2.0 to 3.0, ±2.5%	2.0 to 3.0, ±2.5%	1.9 to 3.0, ±2.5%	2.0 to 3.0, ±35	2.0 to 3.0, ±2.5%	2.1 to 3.0, ±1.5%	2.0 to 3.0, ±2.5%
Output Delay Time (ms)	Typ.	20	20	20	20	20	20	32
Protection Circuit Type		Latch or Auto Release	Latch	Latch or Auto Release	Latch or Auto Release	Auto Release	Auto Release	Latch
Excess Discharge Current								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		0.05 to 0.20, ±15	0.05 to 0.13, ±10	0.05 to 0.20, ±15	0.025 to 0.15, ±10, ±10% or ±5	0.05 to 0.20, ±15	0.020 to 0.160, ±5 or ±10	0.030 to 0.080, ±5
Output Delay Time (ms)	Typ.	6, 12 or 18	36	6 or 12	12, 128	12	12	128
Excess Charge Current								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		-0.2 to -0.05, ±30	-0.17 to -0.05, ±20	—	-0.150 to -0.020, ±10% or ±5	-0.20 to -0.05, ±15	-0.120 to -0.020, ±5 or ±10	-0.100 to -0.050, ±15
Output Delay Time (ms)	Typ.	8 or 16	16	—	8	8	8	8
Short Protection								
Detector Threshold (V)	Typ.	0.8 or 1.3	0.35	0.75	0.15 to 0.40	0.8	0.120 to 0.500	0.150 or 0.230
Output Delay Time (µs)	Typ.	200, 300 or 400	600	200 or 300	250	300	300	250
0V charge		Selectable	Selectable	Selectable	Selectable	Acceptable	Selectable	Acceptable
Other Features			High Precision: ±10mV					
Package		DFN(PLP)1616-6 DFN1814-6 SOT-23-5 SOT-23-6	DFN1814-6	SOT-23-6	R5487L: DFN1814-6B DFN1414-6B R5497L: DFN1414-6B	SOT-23-6	DFN1814-6B SOT-23-6	WLCSP-6-P4

*1 Topt=0°C to 50°C, Considering of variation in parameters. We compensate for these characteristics related to temperature by laser-trimming, however, this specifications is guaranteed by design.

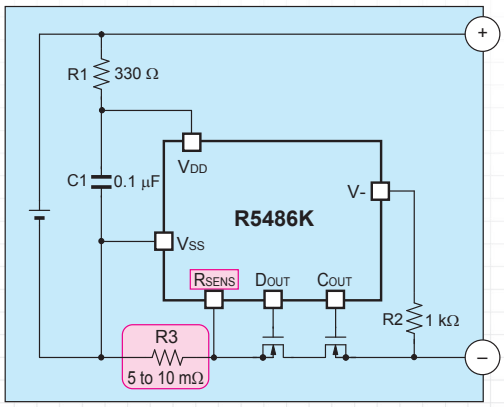
RSENS Type: Excess Current Sensing by External Resistor with RSENS Pin

Product Name		R5472x	R5480x	R5486K	R5494L	R5610L R5611L	R5441Z	R5443Z
Supply Current (µA)	Typ.	4.0	4.0	4.0	3.0	3.0	3.5	2.5
Standby Current (µA)	Max.	0.1	0.1	0.1	0.5	0.5	0.04	0.04
Overcharge (OVP)								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		4.1 to 4.5, ±20	4.1 to 4.5, ±20	4.1 to 4.5, ±20	4.1 to 4.5, ±20	4.2 to 4.7, ±20	4.2 to 4.6*1, ±10	4.2 to 4.6*1, ±10
Output Delay Time (s)	Typ.	1	1	1	1	1	1	1
Protection Circuit Type		Latch	Latch	Latch	Auto Release	Auto Release	Latch	Latch
Overdischarge (UVP)								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		2.1 to 3.0, ±35	2.1 to 3.0, ±35	2.1 to 3.0, ±35	2.1 to 3.0, ±35	2.1 to 3.0, ±55	2.0 to 3.4, ±2.0%	2.0 to 3.4, ±2.0%
Output Delay Time (ms)	Typ.	20	20 or 132	20	128	64	16 or 32 or 128	16, 32 or 128
Protection Circuit Type		Latch	Latch	Latch	Auto Release	Auto Release	Latch	Latch
Excess Discharge Current								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		0.050 to 0.080, ±10 0.081 to 0.100, ±15	0.030 to 0.048, ±15%	V_{D3-1}: 0.015 to 0.046, ±8% or ±3.1, V_{D3-2}: 0.030 to 0.080, ±8% or ±3.1	0.030 to 0.048, ±15%	0.015 to 0.043, ±3	0.015 to 0.150, ±3, ±10% or ±5	0.015 to 0.150, ±3, ±10% or ±5
Output Delay Time (ms)	Typ.	12	12	tV_{D3-1}: 3s, 4s or 5s tV_{D3-2}: 12	8	4096	8, 16, 32, 128, 256, 512, 1s or 3s	8, 16, 32, 128 or 512
Excess Charge Current								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		-0.100 to -0.081, ±15, -0.080 to -0.050, ±10	-0.030 to -0.020, ±15%	-0.060 to -0.015, ±15% or ±3	-0.035 to -0.020, ±15%	-0.043 to -0.017, ±3	-0.150 to -0.015, ±4, ±20% or ±8	-0.150 to -0.015, ±4, ±20%, ±8
Output Delay Time (ms)	Typ.	16	8 or 16	16	9	8.5	8	8
Short Protection								
Detector Threshold (V)	Typ.	0.5	0.18 or 0.5	0.15 to 0.3	V_{DET3}×3 or V_{DET3}×4	0.050 to 0.200	0.040 to 0.280	0.040 to 0.300
Output Delay Time (µs)	Typ.	250	250	250	200	280	280	280
0V charge		Prohibited	Prohibited	Prohibited	Selectable	Acceptable	Selectable	Selectable
Other Features				Excess discharging sensing by two-steps detection of V_{D3}.		V_{D3} is a two-steps detection. Low-resistance RSENS is available. Excess discharge current is detectable with high accuracy. R5611: with Reset Function	Temperature Protection Function: External NTC detects high temperature of charge/discharge.	
Package		DFN(PLP)1414-6 DFN1414-6	DFN(PLP)1414-6 DFN1814-6C	DFN(PLP)1414-6	DFN1814-6C	R5610L: DFN1816-6 R5611L: DFN1616-8	WLCSP-8-P2	WLCSP-6-P7

*1 Topt=0°C to 50°C, Considering of variation in parameters. We compensate for these characteristics related to temperature by laser-trimming, however, this specifications is guaranteed by design.

■ Typical Application

Battery Pack



RSENS: Over-current detector input pin
Due to using external resistance R3, RSENS type can detect more precise excess charge/discharge current than conventional solution of using FET's on-resistance. FET's on-resistance is unstable depending on the condition such as gate voltage, temperature, and FET part number.
Excess current threshold of R5610/R5611 are ±3 mV accuracy. (Detection voltage=10 mV)

Li-ion Battery Protection ICs

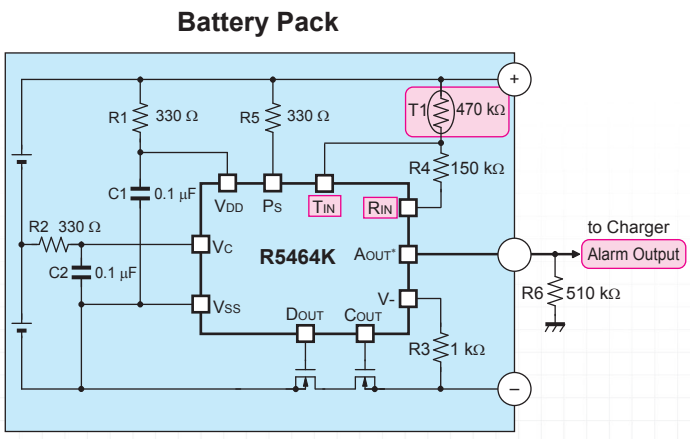
2-Cell Li-ion Battery Protection ICs

REDC's 2-cell Li-ion/polymer battery protection ICs have a high accuracy. Especially R5462 Series have a high accuracy over-charge detection of ±10 mV in a temperature range from 0°C to 50°C.

Product Name		R5460x	R5461K	R5462K	R5463K	R5464K	R5466K
Supply Current (µA)	Typ.	4.0	4.0 or 5.0	4.0	4.0	5.0 or 6.0	5.0
Standby Current (µA)	Max.	0.1 or 2.0	0.1	0.1 or 2.0	0.1	0.1	0.1
Overcharge (OVP)							
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		4.1 to 4.5 or 3.5 to 4.0, ±25	3.60 to 4.35*1, +10 -15	3.65 to 4.32*1, ±10	3.65 to 4.32, ±20	3.6 to 4.5*1, +10 -15	4.0 to 4.3, +20 -25
Output Delay Time (s)	Typ.	1	1	1	1	1	1
Protection Circuit Type		Auto Release	Auto Release	Auto Release	Auto Release	Auto Release	Auto Release
Overdischarge (UVP)							
Detector Threshold Range (V) Detector Threshold Accuracy (%)		2.0 to 3.0, ±2.5	2.0 to 3.0, ±2.5	2.0 to 3.2, ±1	2.0 to 3.2, ±1	2.0 to 3.0, ±2.5	2.0 to 3.0, ±2.5
Output Delay Time (ms)	Typ.	128	128	128	128	128	128
Protection Circuit Type		Latch or Auto Release	Latch	Latch or Auto Release	Latch	Latch	Latch
Excess Discharge Current							
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		0.05 to 0.20, ±15	0.05 to 0.24, ±15	0.05 to 0.20, ±10	0.05 to 0.20, ±10 or 0.20 to 0.40, ±10%	0.05 to 0.24, ±15	0.05 to 0.24, ±15
Output Delay Time (ms)	Typ.	12	12 or 24	12	12	12 or 16	16
Excess Charge Current							
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		-0.1, -0.2, -0.4 ±30, ±30, ±40	-0.22 to -0.1, ±30	-0.2 to -0.1, ±20	-0.2 to -0.1, ±20	-0.22 to -0.1, ±20	-0.22 to -0.1, ±20
Output Delay Time (ms)	Typ.	8	8	8	8	8	8
Short Protection							
Detector Threshold (V)	Typ.	1.1 or 0.5	1	1	1	1	1
Output Delay Time (µs)	Typ.	300	300	300	300	300	300
0V Charge		Acceptable	Selectable	Selectable	Prohibited	Selectable	Acceptable
Other Features			with Alarm Function	High Precision		with Alarm Function	with Alarm Function
Package		DFN(PLP)1820-6 SOT-23-6	DFN(PLP)2527-10	DFN(PLP)1820-6B	DFN(PLP)1820-6B	DFN(PLP)2527-10	DFN(PLP)2527-10

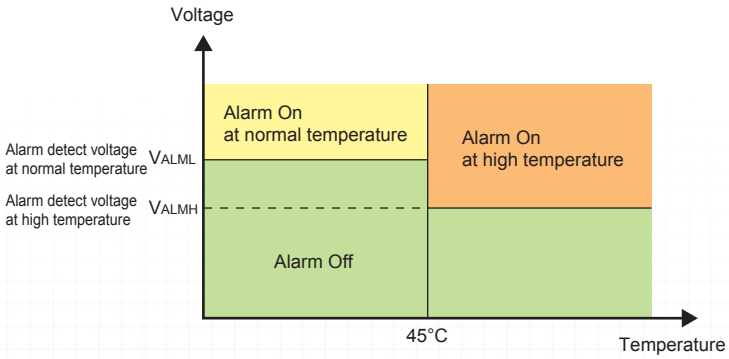
*1 Topt=0°C to 50°C, Considering of variation in parameters. We compensate for these characteristics related to temperature by laser-trimming, however, this specifications is guaranteed by design.

■ Typical Application



TIN: External thermistor connection pin.
RIN: External resistor connection pin.
PS: P-channel source pin for over-charge alarm output*
* Alarm output pin (AOUT) is a P-channel open drain output.
In the R5464K, the source of AOUT is Ps pin, not VDD pin. Therefore, the external pull-down resistor, R6 does not have an impact on the drop out between a plus terminal of a battery pack and a VDD pin.
Thus, R6 value range is wide enough to choose.
* Products built-in the Alarm output pin (AOUT): R5461, R5464, R5466

■ Alarm Function



When 1-cell voltage or 2-cell voltage exceeds the alarm threshold voltage (VALML), an alarm signal will be present at the AOUT pin. If the detection temperature of thermistor exceeds 45°C, the alarm detect voltage threshold changes to VALMH. (The detection temperature can be changed.)

Products with alarm output controlled by an external thermistor: R5461, R5464, R5466

Multi-Cell Li-ion Battery Protection ICs

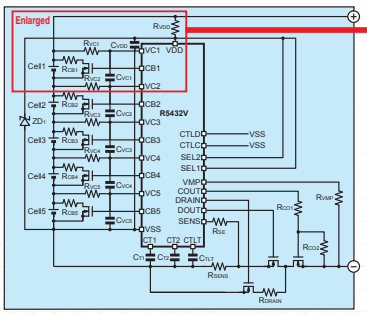
REDC's multi-cell Li-ion/polymer ICs battery protection have several advanced features such as Cell Balance Function, Cascade Connection and Breaking Wire Detection.

Product Name		R5432V ♡	R5433V ♡	R5436T	R5650T ♡
Supply Current (μA)	Typ.	12.0	6.0	12.0	12.0
Standby Current (μA)	Typ.	—	—	6.0	5.0
Overcharge (OVP)					
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		3.6 to 4.5, ±25	3.6 to 4.5, ±25	3.6 to 4.5, ±25	3.6 to 4.5, ±25
Output Delay Time (s)	Typ.	1	1	1	1
Protection Circuit Type		Auto Release	Auto Release	Auto Release	Auto Release
Overdischarge (UVP)					
Detector Threshold Range (V) Detector Threshold Accuracy (%)		2.0 to 3.0, ±2.5	2.0 to 3.0, ±2.5	2.0 to 3.2, ±2.5	2.0 to 3.2, ±50mV
Output Delay Time (s)	Typ.	Settable by C_{T1}	Settable by C_{T1}	Settable by C_{T1}	Settable by C_{T1}
Protection Circuit Type		Auto Release	Auto Release	Latch or Auto Release	Auto Release
Excess Discharge Current					
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		V_{D3-1} 0.1 to 0.3, ±20 V_{D3-2} BA: 0.45 or 0.60, ±100 BB/BC: 0.25 to 0.40, ±70 BD: 0.25 or 0.30, ±55 ($V_{D3-2} \geq V_{D3-1}$ + 0.1V)	—	V_{D3-1}: 0.05 to 0.25, ±20 V_{D3-2}: 3×V_{D3-1}, ±50	V_{D3-1}: 0.03 to 0.05, ±5, 0.05 to 0.1, ±10% V_{D3-2}: 2, 2.5 or 3×V_{D3-1}, 0.06 to 0.10, ±12.5, 0.10 to 0.30, ±12.5%
Output Delay Time (ms)	Typ.	tV_{D3-1}: Settable by C_{T2} tV_{D3-2}: tV_{D3-1}×1/100 or 1/6	—	tV_{D3-1}: Settable by C_{T2} tV_{D3-2}: tV_{D3-1}×1/100 or 1/6	tV_{D3-1}: Settable by C_{T2} tV_{D3-2}: Settable by C_{T3}
Excess Charge Current					
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		-0.05, -0.1, -0.2, -0.4 ±30, ±30, ±30, ±40	—	-0.05, -0.1, -0.2 ±30, ±30, ±30	-0.015 to -0.025, ±5, -0.030 to -0.050, ±20%, or disable
Output Delay Time (ms)	Typ.	8	—	8	Ax: 256 or Bx: 8
Short Protection					
Detector Threshold (V)	Typ.	BA: 1.0 BB/BC: 0.75 BD: V_{D3-2}×1.67	—	0.25 to 1.0	0.1 to 0.6
Output Delay Time (μs)	Typ.	300	—	330	500
0V charge		Selectable	Acceptable	Acceptable	Selectable
Other Features		For 3-cell to 5-cell Protection*1, Built-in Cell Balance Function, Built-in Breaking Wire Detection	For 3-cell to 5-cell Protection, Over-charge/-discharge is controlled by sending a signal to MCU from the COUT/DOUT pin, Signal Output Type, Built-in Breaking Wire Detection	For 3-cell to 5-cell Protection*1, Built-in Cell Balance Function, Built-in Breaking Wire Detection*2, Temperature Protection Function: External NTC, Charge/Discharge Over Temperature	For 3-cell to 5-cell Protection, Temperature Protection Function: External NTC, Charge Over/ Under Temperature, Discharge Over Temperature
Package		SSOP-24	SSOP-16	TSSOP-28	TSSOP-20

*1 Cascadable for 6-cell or more cells protection. *2 Only BA version.

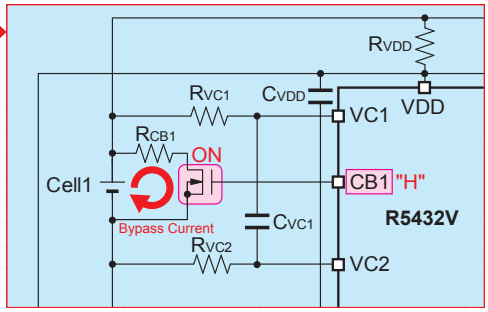
Typical Application

Battery Pack

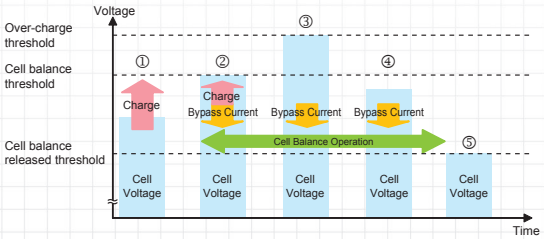


Enlarged Figure

Battery Pack



Cell Balance Operation



① When a cell voltage is lower than the cell balance threshold, a cell is charged.
② When a cell voltage becomes higher than the cell balance threshold, CB1 pin becomes "H" and N-channel transistor turns on, and then the cell balance operation starts. Then a bypass current flows to the direction of a arrow and a charge current becomes suppressed by the bypass current.
③ When a cell voltage reaches to the over-charge threshold, cell charging stops after the output delay time.
④ If charging to a cell stops, the cell balance operation continues until a cell voltage becomes lower than the cell balance released threshold. The bypass current continues to flow decreasing the cell voltage.
⑤ When a cell voltage reaches to the cell balance released voltage, CB1 pin becomes "L" and N-channel transistor turns off, and then cell balance operation stops.

Breaking Wire Detection

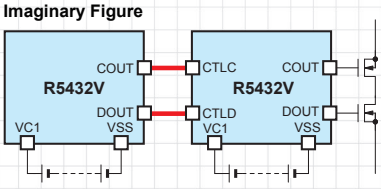
In case of using a battery pack in electric power tools exposed to heavy vibrations, there is a risk that the protection circuit fails due to a breaking wire condition between battery cells and protection circuit board.

The Breaking Wire Detection Circuit checks the connection between the cell and the IC at the specified cycle. When an abnormality is detected, it is judged a breaking wire. R5432 prohibits charge and R5436 prohibits charge and discharge.

Cascade Connection

Multi cell Li-ion/polymer battery protection ICs can protect over 6 cells by cascade connection.

Imaginary Figure

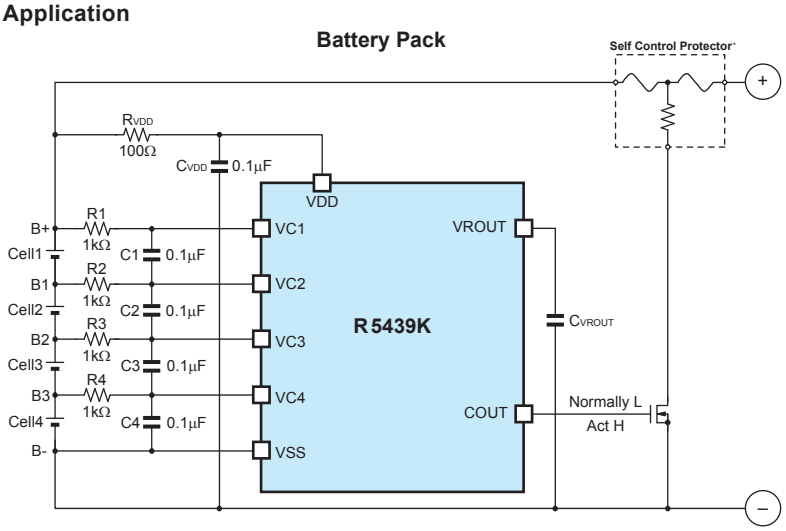


Li-ion Battery Second Protection ICs

REDC's Li-ion/polymer battery second protection ICs support over-charge voltage protection only. These are suitable from 1-cell to 5-cell battery packs.

Product Name		R5434D ♡	R5435x	R5437L ♡ R5438L ♡	R5439K ♡	R5458L	R5640G ♡	R5641L
Supply Current (µA)	Typ.	3.0	3.0	0.85	4.0: V_{CELLn}=4.15V (n=1, 2, 3, 4) 2.5: V_{CELLn}=3.1V (n=1, 2, 3, 4)	1.5	2.5	2.8
Standby Current (µA)	Max.	—	0.1	0.1	0.2	0.5	0.2	0.2
Overcharge (OVP)								
Detector Threshold Range (V) Detector Threshold Accuracy (mV)		3.6 to 4.6, ±25	4.10 to 4.55, ±20	4.10 to 4.60, ±20	4.20 to 4.60, ±20	4.00 to 4.70, ±20	3.6 to 4.6 ±16	4.1 to 4.6 ±16
Output Delay Time (s)	Typ.	1.5	2, 4 or 6	2, 4 or 6	1.5, 2, 4 or 6	2	2, 4, 6, 10 or 16	2, 4 or 6
C_{OUT} Output "H" Voltage (V)	Typ.	3.7	4.7	4.7	4.7	VDD	4.7	4.7
Shutdown Detector Threshold (V)	Typ.	—	3.5	3.5	Shutdown1 detector threshold: 3.8, Shutdown2 detector threshold: 2.3 to 2.8	—	2.5 or 3.7	2.5 or 3.7
Other Features		2-cell to 5-cell	2-cell to 3-cell	1-cell to 3-cell	2-cell to 4-cell Voltage Regulator Function: 2.9V to 3.7V	1-cell	2-Cell to 5-Cell, Cascadable for 6-cell or more cells protection.	2-Cell to 4-Cell
Package		SON-8	DFN(PLP)1616-6B TSOT-23-6	DFN1814-6, The pin-layout of R5437L and that of R5438L is different.	DFN(PLP)2020-8	DFN1814-6C	MSOP-8	DFN2020-8C

■ Typical Application



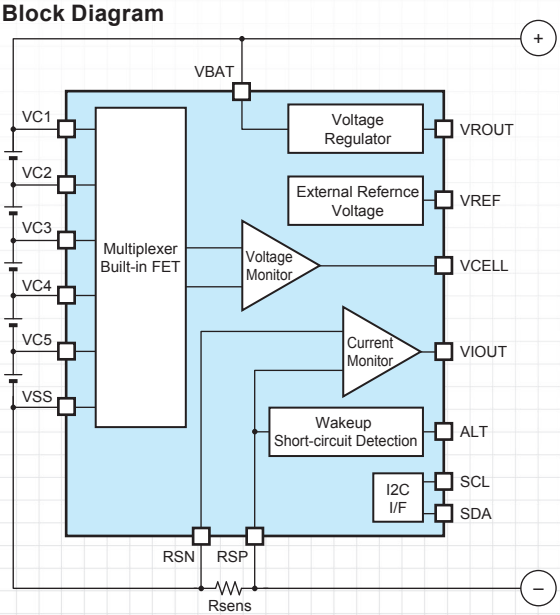
In terms of the order of connecting terminals, Connect sequences must be used as following: B-→B3→B2→B1→B+.
Otherwise, COUT may output "H" tentatively, and the fuse may be fused.
Please contact Dexerials Corporation regarding Self-control Protector.

Li-ion Battery Management Analog Front-End ICs

CMOS-based analog front-ends monitor up to five cell voltage levels of multi-cell Li-ion/polymer battery packs.

Analog Front-ends		R5601T ♡
Supply Current (µA)	Typ.	36
Low Supply Current Mode (µA)	Typ.	6.5
Standby Current (µA)	Max.	2.0
Voltage Monitoring Accuracy (mV)		Input-referred Voltage Error: ±9
Current Monitoring Gain Accuracy H		AA: 40±2.0% AC: 10±1.0%
Current Monitoring Gain Accuracy L		AA: 10±1.0% AC: 5±0.8%
External Reference Voltage (mV)		±3.5
Voltage Regulator Output Voltage (V)		3.3±1.0%
Voltage Regulator Output Current (mA)		30
Communication		I^2C
Other Features		For 3-cell to 5-cell Wakeup Function Short-circuit Current Detection
Package		TSSOP-16

■ Block Diagram



REDC offers power management ICs for LED lighting in 'Smart Society' that help our customers to add a new value to their products.

● : Available in Automotive Products ■ : Available in Industrial Products ♡ : Products available in PRODUCT LONGEVITY PROGRAM
: Products Newly Released

Constant Current LED Driver Controller

We provide a constant current LED driver controller that can achieve human-friendly LED lightings. This controller can be used for LED lightings for FA equipment or various facilities that are directly driven by DC current. It also can be used for illumination for brightening surroundings or illumination for amusement that requires a large current or a wide dimming range. Also, it can be used for illumination for image recognition system that requires flicker-free lighting at photographing. This controller also can be used as a constant current controller for various equipments that require constant current.

Product Name	Version	Input Voltage Range (V)	Absolute Max. Ratings (V)	Max. SOURCE Pin Voltage Accuracy (mV)	Signal Input Circuit	Dimming Control (%)	Standby Current (μA) Typ.	Supply Current (μA) Typ.	Other Features	Package
R1580N ● ■ ♡	001A	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	SOT-23-6
	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			

Variable Output Current/Voltage PFC/LED Driver Controller

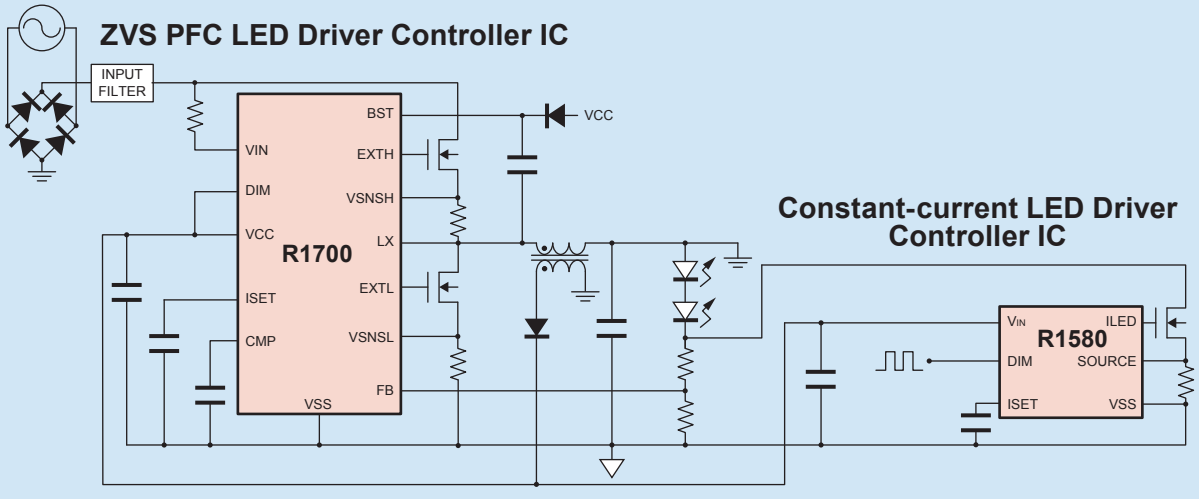
This device is a zero-voltage switching (ZVS) PFC/LED driver controller with a variable output current/voltage. It is ideal for improving power factors of LED lightings and consumer appliances.
R1700 is capable of Arbitrary Setting an Output Voltage based on Buck-boost (Inverting) Topology. Integration of this device and the R1580 allows the two-stage architecture and a flicker-free operation in LED lighting applications.

Product Name	Version	Input Voltage Range (V)	Dimming Control (%)	Optional functions: Latch-type Protection	Optional functions: FB Pin UVD	Optional functions: FB Pin OVP Voltage	Corresponding Topologies	Other Features	Package
R1700V	001A	8 to 650	5 to 100	Y	N	Typ. 1.2V (Rising)	·Buck-boost (Inverting) PFC ·Variable Output Current PFC, Linear Dimmable ·Variable Output Voltage PFC ·Boost PFC ·Buck PFC	Thermal UVLO : BST/VCC Pin OVLO : VCC Pin Overcurrent Protection	SSOP-16
	001B			N					
	001C			Y	Y	Typ. 3.65V (Rising)			
	001D			N					

The horizontal lines across the captured digital images or moving images are caused by flickering in LEDs. REDC's R1700V offers a flicker-free operation by integrating it with R1580N, which is equipped with a linear dimming control circuit using a PWM input signal [1].

[1] It controls the DC current proportional to the duty ratio of a PWM input signal.

TYPICAL APPLICATION CIRCUIT (R1700V + R1580N)



Package Information

For more details, please refer to the Package Information on the REDC web site.

: Products Newly Released : Products in Development H/F : Halogen Free ◆ : Conditions are based on JEDEC STD.

WLCSP Package

Pin	Symbol	Package	Halogen Free	Actual Size	Bottom View	Dimensions (mm)					Power Dissipation (mW) Standard Condition / High Wattage Condition		Taping Direction	Quantity/ Reel (pcs)
						Body	Mount Area	Thickness Including the Solder Ball	Pitch	Solder Ball ϕ	Tjmax=125°C	Tjmax=150°C*1		
4	Z	WLCSP-4-P2	H/F			0.79×0.79	0.79×0.79	0.48	0.5	0.16	530	662	TR	5,000
4	Z	WLCSP-4-P5	H/F			0.69×0.69	0.69×0.69	0.48	0.4	0.16	278	348	TR	5,000
4	Z	WLCSP-4-P7	H/F			0.69×0.69	0.69×0.69	0.36	0.4	0.16	278		TR	5,000
4	Z	WLCSP-4-P8	H/F			0.64×0.64	0.64×0.64	0.36	0.35	0.2	**470 ◆**		TR	5,000
5	Z	WLCSP-5-P1	H/F			1.346×0.98	1.346×0.98	0.56	X=0.433 Y=0.5	0.25	**770 ◆**		E2	5,000
6	Z	WLCSP-6-P2	H/F			1.29×0.87	1.29×0.87	0.48	0.5	0.16	650		E2	5,000
6	Z	WLCSP-6-P4	H/F			1.10×0.83	1.10×0.83	0.48	X=0.4 Y=0.5	0.16			E2	5,000
6	Z	WLCSP-6-P6	H/F			1.28×0.88	1.28×0.88	0.64	0.4	0.26	**910 ◆**		E2	5,000
6	Z	WLCSP-6-P7	H/F			1.25×0.84	1.25×0.84	0.36	X=0.4 Y=0.5	0.16	**730 ◆**		E2	5,000
6	Z	WLCSP-6-P8	H/F			1.28×0.88	1.28×0.88	0.36	0.4	0.23	**880 ◆**		E2	5,000
8	Z	WLCSP-8-P1	H/F			1.45×1.48	1.45×1.48	0.36	0.4	0.245	**1140 ◆**		TR	5,000
8	Z	WLCSP-8-P2	H/F			1.51×0.92	1.51×0.92	0.36	X=0.4 Y=0.58	0.16	**800 ◆**		E2	5,000
9	Z	WLCSP-9-P1	H/F			1.27×1.27	1.27×1.27	0.64	0.4	0.26	**1190 ◆**		E2	5,000
9	Z	WLCSP-9-Px	H/F			1.45×1.48	1.45×1.48	0.36	0.4	0.245			TR	5,000
11	Z	WLCSP-11-P2	H/F			2.37×1.47	2.37×1.47	0.78	0.5	0.16	1000		E2	4,000
12	Z	WLCSP-12-P1	H/F			1.97×1.47	1.97×1.47	0.81	0.4	0.26	**760 ◆**		E2	4,000
12	Z	WLCSP-12-P2	H/F			1.288×1.828	1.288×1.828	0.64	0.4	0.27	**760 ◆**		TL	5,000
12	Z	WLCSP-12-P3	H/F			1.68×1.28	1.68×1.28	0.65	0.4	0.26	**1000 ◆**		E2	4,000
15	Z	WLCSP-15	H/F			2.88×1.68	2.88×1.68	0.36	0.5	0.25				
16	Z	WLCSP-16-P1	H/F			1.95×1.95	1.95×1.95	0.64	0.4	0.26	**1400 ◆**		E2	5,000
20	Z	WLCSP-20-P1	H/F			2.305×1.70	2.305×1.70	0.54	0.4	0.265	**1400 ◆**		E2	5,000
20	Z	WLCSP-20-P2	H/F			2.315×1.71	2.315×1.71	0.36	0.4	0.245	**1490 ◆**		E2	5,000

DFN(PLP) Package

Pin	Symbol	Package	Halogen Free	Actual Size	Bottom View	Dimensions (mm)				Power Dissipation (mW) Standard Condition / High Wattage Condition		Taping Direction	Quantity/ Reel (pcs)
						Body	Mount Area	Thickness (Max.)	Pitch	Tjmax=125°C	Tjmax=150°C*1		
4	K	DFN(PLP)0808-4	H/F			0.8×0.8	0.8×0.8	0.4	0.48	286	358	TR	10,000
4	K	DFN(PLP)1010-4	H/F			1.0×1.0	1.0×1.0	0.6	0.65	**800 ◆**	**1000 ◆**	TR	10,000
4	K	DFN(PLP)1010-4B	H/F			1.0×1.0	1.0×1.0	0.6	0.65	**800 ◆**	**1000 ◆**	TR	10,000
4	K	DFN(PLP)1010-4F	H/F			1.0×1.0	1.0×1.0	0.4	0.5	300		TR	10,000
4	K	DFN(PLP)1612-4	H/F			1.2×1.6	1.2×1.6	0.6	0.6	610	762	TR	5,000
4	K	DFN(PLP)1612-4B	H/F			1.2×1.6	1.2×1.6	0.4	0.6	580	725	TR	5,000
4	K	DFN(PLP)1612-4D	H/F			1.2×1.6	1.2×1.6	0.6	0.5	610		TR	5,000
4	K	DFN(PLP)2114-4B	H/F			1.4×2.1	1.4×2.1	0.6	0.65	714		TR	5,000
6	K	DFN(PLP)1212-6	H/F			1.2×1.2	1.2×1.2	0.4	0.4	400	500	TR	5,000
6	K	DFN(PLP)1212-6F	H/F			1.2×1.2	1.2×1.2	0.4	0.4	**666 ◆**		TR	5,000
6	K	DFN(PLP)1216-6F	H/F			1.6×1.2	1.6×1.2	0.4	0.5	385		E2	5,000
6	K	DFN(PLP)1216-6G	H/F			1.6×1.2	1.6×1.2	0.4	0.6	800 **714 ◆**	1000	E2	5,000
6	K	DFN(PLP)1414-6	H/F			1.4×1.4	1.4×1.4	0.4	0.5			TR	5,000
6	K	DFN(PLP)1616-6	H/F			1.6×1.6	1.6×1.6	0.6	0.5	640	800	TR	5,000
6	K	DFN(PLP)1616-6B	H/F			1.6×1.6	1.6×1.6	0.6	0.5	640		TR	5,000
6	K	DFN(PLP)1616-6D	H/F			1.6×1.6	1.6×1.6	0.6	0.5	640		TR	5,000

Pin	Symbol	Package	Halogen Free	Actual Size	Bottom View	Dimensions (mm)				Power Dissipation (mW) Standard Condition / High Wattage Condition		Taping Direction	Quantity/ Reel (pcs)
						Body	Mount Area	Thickness (Max.)	Pitch	Tjmax=125°C	Tjmax=150°C*1		
6	K	DFN(PLP)1820-6	H/F			1.8×2.0	1.8×2.0	0.6	0.5	**2200 ◆**	**2700 ◆**	TR	5,000
6	K	DFN(PLP)1820-6B	H/F			1.8×2.0	1.8×2.0	0.6	0.55	**2200 ◆**	**2700 ◆**	TR	5,000
6	K	DFN(PLP)2514-6	H/F			1.4×2.5	1.4×2.5	0.6	0.5	730		TR	5,000
8	K	DFN(PLP)2020-8	H/F			2.0×2.0	2.0×2.0	0.6	0.5	**2200 ◆**	**2700 ◆**	TR	5,000
8	K	DFN(PLP)2020-8B	H/F			2.0×2.0	2.0×2.0	0.6	0.5	**2200 ◆**	**2700 ◆**	TR	5,000
10	K	DFN(PLP)2527-10	H/F			2.7×2.5	2.7×2.5	0.6	0.5	910 **2800 ◆**	1138 **3500 ◆**	TR	5,000
12	K	DFN(PLP)2730-12	H/F			3.0×2.7	3.0×2.7	0.6	0.5	1000 3100	**3900 ◆**	TR	5,000
14	K	DFN(PLP)2735-14B	H/F			3.5×2.7	3.5×2.7	0.58	0.5			E2	5,000

DFN Package

Pin	Symbol	Package	Halogen Free	Actual Size	Bottom View	Dimensions (mm)				Power Dissipation (mW) Standard Condition / High Wattage Condition		Taping Direction	Quantity/ Reel (pcs)
						Body	Mount Area	Thickness (Max.)	Pitch	Tjmax=125°C	Tjmax=150°C*1		
4	L	DFN1010-4	H/F			1.0×1.0	1.0×1.0	0.4	0.65	**1000 ◆**	**1250 ◆**	TR	10,000
5	L	DFN1212-5	H/F			1.2×1.2	1.2×1.2	0.4	0.8	650		TR	5,000
6	L	DFN1212-6	H/F			1.2×1.2	1.2×1.2	0.4	0.4	**1500 ◆**	**1900 ◆**	TR	5,000
6	L	DFN1414-6	H/F			1.4×1.4	1.4×1.4	0.4	0.5	600		TR	5,000
6	L	DFN1414-6B	H/F			1.4×1.4	1.4×1.4	0.6	0.5			TR	5,000
6	L	DFN1616-6	H/F			1.6×1.6	1.6×1.6	0.4	0.5	**2400 ◆**	**3000 ◆**	TR	5,000
6	L	DFN1616-6B	H/F			1.6×1.6	1.6×1.6	0.4	0.5	**2400 ◆**	**3000 ◆**	TR	5,000
6	L	DFN1816-6	H/F			1.6×1.8	1.6×1.8	0.4	0.5			TR	5,000
6	L	DFN1814-6	H/F			1.4×1.8	1.4×1.8	0.4	0.5			TR	5,000
6	L	DFN1814-6B	H/F			1.4×1.8	1.4×1.8	0.4	0.5			TR	5,000
6	L	DFN1814-6C	H/F			1.4×1.8	1.4×1.8	0.4	0.5			TR	5,000
8	L	DFN1216-8	H/F			1.6×1.2	1.6×1.2	0.4	0.4	**1700 ◆**	**2200 ◆**	E2	5,000
8	L	DFN1616-8	H/F			1.6×1.6	1.6×1.6	0.6	0.4			TR	5,000
8	L	DFN2020-8C	H/F			2.0×2.0	2.0×2.0	0.6	0.5	**1100 ◆**		TR	3,000
12	L	DFN3030-12	H/F			3.0×3.0	3.0×3.0	0.8	0.5	**3400 ◆**	**4300 ◆**	TR	3,000

SC Package

Pin	Symbol	Package	Halogen Free	Actual Size	Top View	Dimensions (mm)				Power Dissipation (mW) Standard Condition / Ultra High Wattage Condition		Taping Direction	Quantity/ Reel (pcs)
						Body	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C*1		
4	Q	SC-82AB	H/F			2.0×1.25	2.0×2.1	0.9	1.3	380	470	TR	3,000
5	Q	SC-88A	H/F			2.0×1.25	2.0×2.1	0.9	0.65	380	475	TR	3,000

SOT Package

3	N	SOT-23-3 (SC-59A)	H/F			2.9×1.6	2.9×2.8	1.1	0.95	420		TR	3,000
5	N	SOT-23-5 (SC-74A)	H/F			2.9×1.6	2.9×2.8	1.1	0.95	**660 ◆**	**830 ◆**	TR	3,000
6	N	SOT-23-6 (SC-74)	H/F			2.9×1.6	2.9×2.8	1.1	0.95	**660 ◆**	**830 ◆**	TR	3,000
6	N	SOT-23-6W	H/F			2.9×1.8	2.9×2.8	1.1	0.95	430		TR	3,000
6	N	TSOT-23-6	H/F			2.9×1.6	2.9×2.8	0.85	0.95	460		TR	3,000
3	H	SOT-89 (SC-62)	H/F			4.5×2.5	4.5×4.0	1.5	1.5	900		T1	1,000
5	H	SOT-89-5	H/F			4.5×2.5	4.5×4.35	1.5	1.5	900 **2600 ◆**	1120 **3200 ◆**	T1	1,000

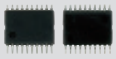
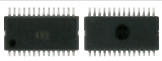
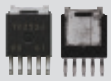
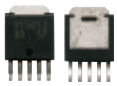
SON Package

3	D	SON1408-3	H/F			1.4×0.8	1.4×1.2	0.6*2	0.45	250		TR	9,000
6	D	SON1612-6	H/F			1.6×1.2	1.6×1.6	0.6*2	0.5	500		TR	4,000

Package Information

Pin	Symbol	Package	Halogen Free	Actual Size	Top View	Dimensions (mm)				Power Dissipation (mW) Standard Condition / Ultra High Wattage Condition		Taping Direction	Quantity/ Reel (pcs)
						Body	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C*1		
6	D	SON-6	H/F			1.6×2.6	1.6×3.0	0.85*2	0.5	500	625	TR	3,000
6	D	HSON-6	H/F			2.9×2.8	2.9×3.0	0.9*2	0.95	**3000 ◆**	**3700 ◆**	TR	3,000
8	D	SON-8	H/F			2.9×2.8	2.9×3.0	0.9*2	0.65	480		TR	3,000
10	D	SON-10	H/F			2.9×2.8	2.9×3.0	0.9*2	0.5	480		TR	3,000

SOP/TO Package

Pin	Symbol	Package	Halogen Free	Actual Size	Top View	Dimensions (mm)				Power Dissipation (mW) Standard Condition / Ultra High Wattage Condition		Taping Direction	Quantity/ Reel (pcs)
						Body	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C*1		
8	G	SSOP-8G	H/F			2.9×2.8	2.9×4.0	1.1	0.65	380	475	TR	3,000
8	G	MSOP-8	H/F			3.0×3.0	3.0×4.9	0.85	0.65	**960 ◆**	**1200 ◆**	E2	3,000
10	V	SSOP-10	H/F			3.1×4.4	3.1×6.4	1.15	0.5	450		E2	2,000
16	V	SSOP-16	H/F			5.1×4.4	5.1×6.4	1.15	0.65	685		E2	2,000
24	V	SSOP-24	H/F			7.9×5.6	7.9×7.6	1.15	0.65	770		E2	3,000
6	S	HSOP-6J	H/F			5.02×3.9	5.02×6.0	1.5	3.81	1700 **2700 ◆**	2100 **3400 ◆**	E2	1,000
8	S	HSOP-8E	H/F			5.2×4.4	5.2×6.2	1.45	1.27	**2900 ◆**	**3600 ◆**	E2	1,000
18	S	HSOP-18	H/F			5.2×4.4	5.2×6.2	1.45	0.5	**3100 ◆**	**3900 ◆**	E2	1,000
16	T	TSSOP-16	H/F			5.0×4.4	5.0×6.4	0.9	0.65	**850 ◆**		E2	2,500
20	T	TSSOP-20	H/F			6.5×4.4	6.5×6.4	0.9	0.65	**800 ◆**			
28	T	TSSOP-28	H/F			9.7×4.4	9.7×6.4	1.2*2	0.65	**1250 ◆**		E2	3,000
5	J	TO-252-5-P1	—			6.54×6.04	6.54×9.68	2.29	1.27	1900 **3800**	2350 **4800**	T1	3,000
5	J	TO-252-5-P2	H/F			6.6×6.1	6.6×9.9	2.3	1.27	**3800 ◆**	**4800 ◆**	T1	3,000

QFN/HQFN Package

Pin	Symbol	Package	Halogen Free	Actual Size	Bottom View	Dimensions (mm)				Power Dissipation (mW) Standard Condition / High Wattage Condition		Taping Direction	Quantity/ Reel (pcs)
						Body	Mount Area	Thickness	Pitch	Tjmax=125°C	Tjmax=150°C*1		
20	D	QFN0404-20	H/F			4.0×4.0	4.0×4.0	0.7	0.5			TR	2,000
24	K	QFN0404-24	H/F			4.0×4.0	4.0×4.0	0.75	0.5	670 **1500**	830 **1860**	E2	1,000
24	L	QFN0404-24B	H/F			4.0×4.0	4.0×4.0	0.75*2	0.5	**3400 ◆**	**4300 ◆**	E2	1,000
32	K	QFN(PLP)0404-32	H/F			4.0×4.0	4.0×4.0	0.6*2	0.4	670 **1500**	830 **1860**	E2	2,000
32	L	QFN0505-32B	H/F			5.0×5.0	5.0×5.0	0.85*2	0.5	**2300 ◆**	**2900 ◆**	E2	1,000
28	L	HQFN0808-28	H/F			8.0×8.0	8.8×8.8	0.95	0.8	**4600 ◆**	**5800 ◆**	TR	2,000

*1 Tjmax = 150°C does not apply to all products. *2 A maximum value.

Real Time Clock ICs (RTC)

♡ : Products available in PRODUCT LONGEVITY PROGRAM

4-wire Serial Interface (SPI Bus)

Product Name	Package	Time Keeping Current Typ. (µA)	Time Keeping Voltage (V)	Alarm Function	Perodic Interupt Function	32kHz Clock Output	Battery Checker (V)	Clock Adjust Function	OSC Halt Sensing	Back-up Battery Switch-over Circuit	VD with Delay Function	Other Features
R2043x ♡	QFN023023-16 TSSOP10G	0.45, at 3V	Typ. 0.66 to 5.50 Worst. 1.0 to 5.5	2 Sets, W/H/M, H/M	0.5s to 1Month	Nch Open Drain Output, Controllable by Command	1.6 or 1.3	Y	Y	N	N	
R2045S ♡	SOP14	0.48, at 3V	1.15 to 5.50	2 Sets, W/H/M, H/M	0.5s to 1Month	Nch Open Drain Output, Controllable by Command	2.1 or 1.3	Y	Y	N	N	Built-in Crystal Unit, Frequency Deviation: 0±5ppm
Rx5C348A	SSOP10 SSOP10G	0.35, at 3V	1.45 to 5.50	2 Sets, W/H/M, H/M	0.5s to 1Month	Nch Open Drain Output, Controllable by Command	2.1 or 1.6	Y	Y	N	N	
RV5C348B	SSOP10G	0.55, at 3V				Nch Open Drain Output, Keeping Output Enable						

3-wire Serial Interface

Product Name	Package	Time Keeping Current Typ. (µA)	Time Keeping Voltage (V)	Alarm Function	Perodic Interupt Function	32kHz Clock Output	Battery Checker (V)	Clock Adjust Function	OSC Halt Sensing	Back-up Battery Switch-over Circuit	VD with Delay Function	Switch-over/ Detector Threshold
R2033x ♡	QFN023023-16 TSSOP10G	0.45, at 3V	Typ. 0.66 to 5.50 Worst. 1.0 to 5.5	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS Output with Control Pin	1.6 or 1.3	Y	Y	N	N	
R2061x ♡	QFN023023-16 SSOP16	0.4, at 3V	Typ. 0.75 to 5.50 Worst. 1.0 to 5.5	2 Sets, W/H/M, H/M	0.5s to 1Month	—	2.10 or 1.35	Y	Y	Y	Y	1.7V, 2.8V 2.4V
R2062L	QFN023023-16	0.4, at 3V	Typ. 0.75 to 5.50 Worst. 1.0 to 5.5	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS Output with Level Shifter	2.10 or 1.35	Y	Y	Y*1	Y	2.7V, 2.9V
R2262x	QFN0202-18 TSSOP10G	0.3, at 3V	Typ. 0.6 to 5.5 Worst. 0.9 to 5.5	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS Output with Level Shifter	1.35	Y	Y	Y*2	Y	2.7V
Rx5C338A	SSOP10 SSOP10G	0.35, at 3V	1.45 to 5.50	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS Output with Control Pin	2.1 or 1.6	Y	Y	N	N	

2-wire Serial Interface (I^2C Bus)

Product Name	Package	Time Keeping Current Typ. (µA)	Time Keeping Voltage (V)	Alarm Function	Perodic Interupt Function	32kHz Clock Output	Battery Checker (V)	Clock Adjust Function	OSC Halt Sensing	Back-up Battery Switch-over Circuit	VD with Delay Function	Others Switch-over/ Detector Threshold
R2023x ♡	QFN023023-16 TSSOP10G	0.45, at 3V	Typ. 0.66 to 5.50 Worst. 1.0 to 5.5	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS output with control pin	1.6 or 1.3	Y	Y	N	N	
R2025x ♡	SOP14 SON22	0.48, at 3V	1.15 to 5.50	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS output with control pin	2.1 or 1.3	Y	Y	N	N	Built-in crystal unit. Frequency Deviation : 0±5ppm
R2051x ♡	QFN023023-16 SSOP16 TSSOP10G	0.4, at 3V	Typ. 0.75 to 5.50 Worst.1.0 to 5.5	2set W/H/M, H/M Register only, No INTR pin	0.5s to 1Month Register only, No INTR pin	CMOS output with level shifter	2.10 or 1.35	Y	Y	Y	Y — —	2.4V, 2.8V 2.4V, 2.8V, 4.0V 2.4V
R2221x ♡	QFN018018-12 TSSOP10G	0.3*3, at 3V	Typ. 0.6 to 5.5 Worst. 0.9 to 5.5	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS output with control pin	1.35	Y	Y	N	N	ECO mode is set by ECO Pin.
R2223x ♡	QFN018018-12 TSSOP10G	0.3*3, at 3V	Typ. 0.6 to 5.5 Worst. 0.9 to 5.5	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS output with control pin	1.35	Y	Y	N	N	ECO Mode is set by a Register.
RS5C372A ♡ RS5C372B	SSOP8	0.5, at 3V	1.3 to 6.0 1.45 to 6.00	2 Sets, W/H/M×2	0.5s to 1Month	Nch open drain output (Controllable by command) CMOS output (Controllable by command)	—	Y	Y	N	N	32768Hz/32000Hz Crystal is Selectable
RV5C386A	SSOP10G	0.35, at 3V	1.45 to 5.50	2 Sets, W/H/M, H/M	0.5s to 1Month	CMOS output with control pin	2.1 or 1.6	Y	Y	N	N	
RV5C387A	SSOP10G	0.35, at 3V	1.45 to 5.50	2 Sets, W/H/M, H/M	0.5s to 1Month	Nch open drain output (Controllable by command)	2.1 or 1.6	Y	Y	N	N	

*1 For secondary battery or capacitor *2 For secondary battery or capacitor, built-in VR for charger *3 Time keeping current can be reduced in ECO mode.

Glossary/Lineup/Functional Map

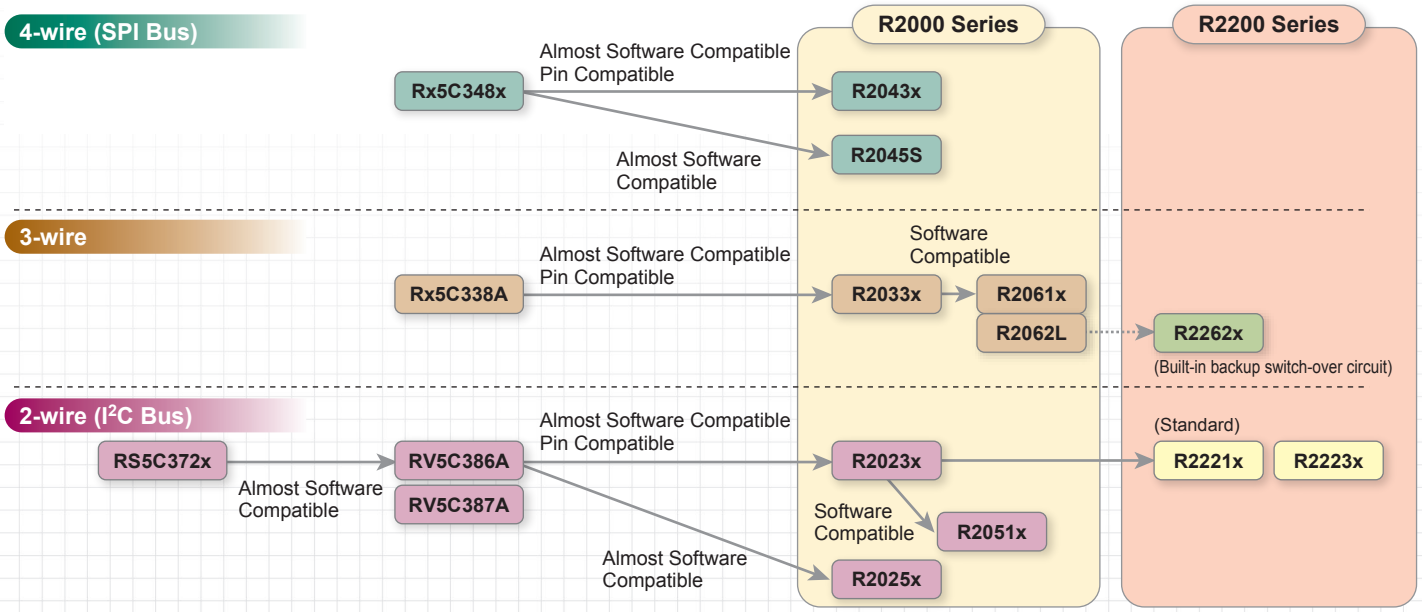
Glossary

Time Keeping Current	The consumption current which operates only clock and calendar without accessing CPU.
Time Keeping Voltage	The voltage which operates only clock and calendar without accessing CPU. The operating voltage to access CPU is specified in the other specification.
Alarm Function	The function which outputs the interrupt signal at the setting time.
Periodic Interrupt Function	The interrupt function which outputs at constant period such as every second, every minute, every hour and every month. It is useful when indicating clock and calendar by using the RTC clock data.
32 kHz Clock Output	It is possible to output same clocks of crystal frequency which is used in RTC. There are four types of selectable outputs such as Open drain controllable by pin, Open drain keeping output enable, CMOS controllable by pin, and CMOS with level shifter. It is suitable for CPU sub-clock.
Clock Adjustment Circuit	The circuit which adjusts time gain or loss by the software. It is useful to compensate the crystal frequency deviation.
OSC Halt Sensing Circuit	The circuit which records past oscillation halt to internal register. It can be used to judge the validity of internal data in such events as power-on.
Battery Checker	It records them as Flag when detecting voltage threshold of backup battery. It is useful as checker of the output voltage for backup battery.
32768 Hz/32000 Hz Crystal Selectable	RTC generally use 32768 Hz crystal oscillator. But RS5C372A/B can select 32000 Hz crystal oscillator as well as 32768 Hz crystal oscillator. 32KOUT pin outputs 32000 Hz clock pulses when 32000 Hz crystal oscillator is used.
Battery Backup Switch-over Function	R2051x, R2061x, R2062L, R2262x, incorporate the automatic switch-over circuit which can switch between a main power supply and a backup battery. Primary battery, secondary battery, electric double layered capacitor or aluminum electrolytic capacitor are selectable as backup battery in R2051x, R2061x. Secondary battery, electric double layered capacitor or aluminum electrolytic capacitor are selectable as backup battery in R2062L and R2262x. R2262x includes VR for charger.
Frequency Deviation (0±5 ppm)	R2025S/D and R2045S incorporates 32768 Hz crystal unit. The oscillation frequency is adjusted to high precision (0±5 ppm: at 25°C). The deviation corresponds to ±13 seconds per month. By using the clock adjustment circuit, time deviation also can be calibrated to 3 or 6 or 9±5 ppm.
ECO Mode	In the case that equivalent series resistance of crystal oscillator is low, (approximately equal or less than 45 kΩ) time keeping current can be reduced, if ECO mode is active. There are a register setting type such as R2223x and a pin setting type such as R2221x and in the setting ECO mode.

Lineup

	Standard	Built-in Backup Battery Switch-over Circuit	Built-in Crystal, Real Time Clock Module
4-Wire (SPI Bus)	**R2043x** Rx5C348x	–	**R2045S**
3-Wire	**R2033x** Rx5C338A	**R2262x** **R2061x** **R2062L**	–
2-Wire (I^2C Bus)	**R2221x** **R2223x** **R2023x** RS5C372x RV5C386A RV5C387A	**R2051x**	**R2025x**

Functional Map



Merits of Using a Real Time Clock

1. Low Power Consumption

Clock functions often have a backup power circuit, so they can continue to keep time while the primary source of power is off or unavailable. Although keeping time can be done without an RTC, using RTC has benefits of reducing the size and the cost of developing a backup circuit board since it only requires extremely low consumption current and very low input voltage.

2. Facilitates a Software Development

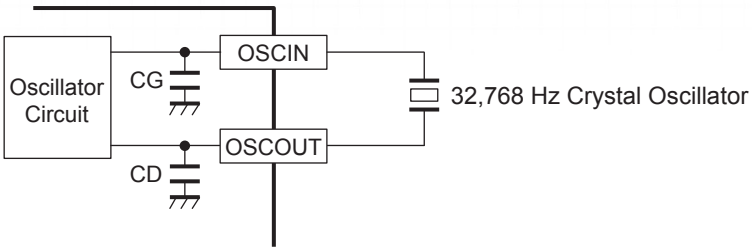
RTCs are specifically designed for keeping track of the current time and calendar. The clock function of RTCs tracks hours, minutes and seconds. The calendar function of RTCs tracks year, month, date, day-of-the-week and is accurate through 2099, with automatic leap year/long month/short month correction. By integrating RTCs, the need of developing a complicated software for tracking time and calendar can be omitted.

3. Facilitates a Oscillation Circuit Design

RTCs have peripheral components for the oscillator circuit built in, so an oscillator circuit can be easily configured by only adding a crystal resonator as an external component. Using RTCs can facilitate a layout design of oscillator circuit which is susceptible to noises.

Back-up Time Measurement **(R2051S01)**

Backup Device	Backup Time	
	Backup Starting Voltage: 5 V	Backup Starting Voltage: 3 V
Coin Cell Primary Battery (CR2032)	–	10 Years or more (Calculated Value)
Electric Double Layered Capacitor (1 F)	130 Days	116 Days
Electric Double Layered Capacitor (0.1 F)	21 Days	15 Days
Aluminum Electrolytic Capacitor (4700 µF)	20 Hrs	12 Hrs 30 Min
Aluminum Electrolytic Capacitor (470 µF)	2 Hrs	1 Hr 15 Min
Aluminum Electrolytic Capacitor (47 µF)	12 Min	7 Min 30 Sec



1. Key Features of REDC Real Time Clocks

1. Programmable Calibration Adjustment

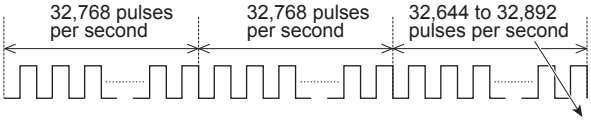
REDC RTCs have a programmable calibration adjustment from −189 ppm to +189 ppm or −63 ppm to +63 ppm.

The crystal oscillator used in REDC RTCs provides 32,644 to 32,892 pulses per 20 seconds or 60 seconds while a normal crystal oscillator provides exactly 32,768 pulses per second.

Tuning fork crystal provides highly stable natural oscillation frequency; however, environmental changes of temperature, humidity, pressure, vibration or a capacitance formed on a substrate can change the resonant frequency of a crystal oscillator.

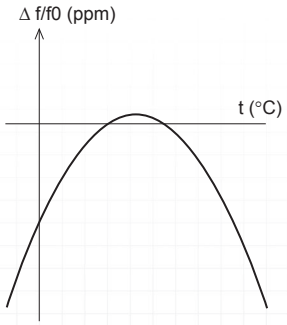
When performing a capacitor matching evaluation using a PCB for mass production, those influences need to be considered. REDC RTCs have a programmable time register to adjust a timekeeping glitch without the need of additional capacitors, which makes the capacitor matching evaluation easier.

A tuning fork crystal is usually cut such that its frequency over temperature is a parabolic curve centered around 25°C. REDC's programmable calibration circuit have an external temperature sensor to compensate this deviation.

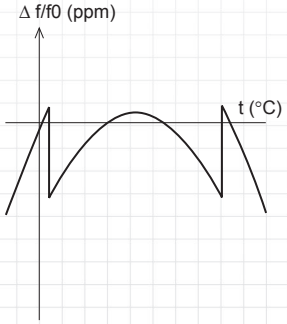


REDC RTCs perform this calibration adjustment every 20 or 60 seconds.
Notes: R2025x/R2045S performs a calibration adjustment evey 20 seconds.

Uncompensated Crystal Drift



REDC RTCs Compensated Crystal Drift



2. Key Features of REDC Real Time Clocks

1. Clock Data Validation

4-Wire (SPI Bus): R2043x
3-Wire: R2033x/R2061x/R2062L/R2262x
2-Wire (I^2C Bus): R2023x/R2051x/R2221x/R2223x

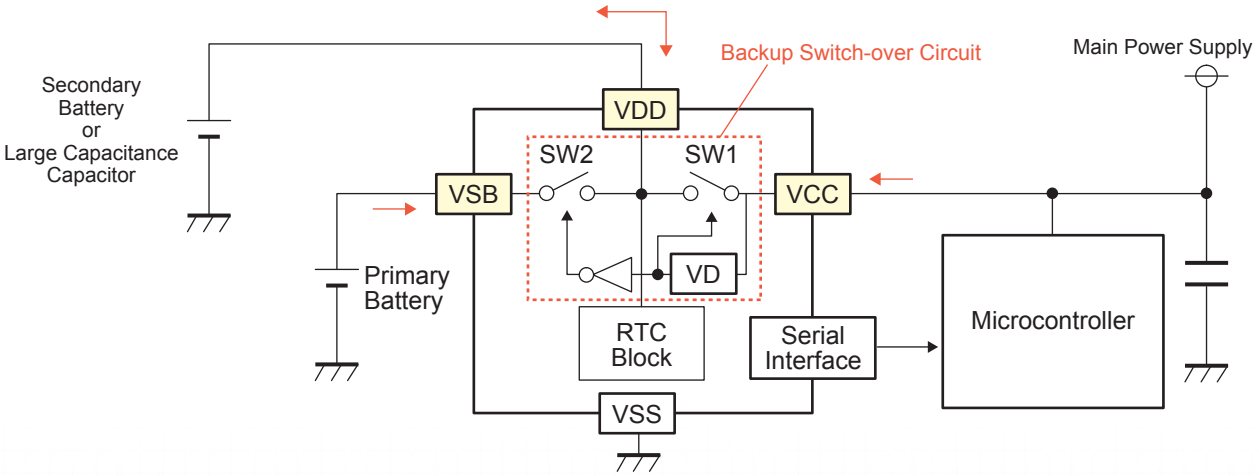
These RTCs provide a power-on reset function, an oscillation halt sensing function and a supply voltage monitoring function. These functions can be applied to judge a clock data validity.

- **Power-on Reset Function**
  Power-on reset circuit is configured to reset a control register and store the status as a flag after initial power on from 0 V without backup battery.
- **Oscillation Halt Sensing Function**
  Oscillation halt sensing circuit is equipped with internal registers configured to record any past oscillation halt as a flag.
- **Supply Voltage Monitoring Function**
  Supply voltage monitoring circuit is configured to record a drop in supply voltage below supply voltage monitoring thresholds.

2. Battery Backup Switch-over Circuit

3-Wire: R2061x/R2062L/R2262x
2-Wire (I^2C Bus): R2051x

These RTCs have a backup battery switch-over circuit which detects power failures and automatically switches to the battery supply when a power failure occurs. They are also equipped with two or three power supply pins so there is no need of adding a diode.



Notes: R2062L does not have the SW2 switch or the VSB pin. R2262x has the SW2 switch and the BAT pin instead of the VSB pin. The SW2 switch is constantly turned on unless it is turned off by a register setting.

3. High-precision Real Time Clock Module

4-Wire (SPI Bus): R2045S
2-Wire (I^2C Bus): R2025x

These RTCs have a built-in crystal oscillator that is adjusted to 0±5 ppm at 25°C at the time of factory shipping. This means ±13 seconds per month at 25°C.

Package Informaiton

H/F : Halogen-free

Pin	Symbol	Package	Halogen Free	Actual Size	Top View/ Bottom View	Dimensions (mm)				Taping Direction	Quantity/Reel	Product Name
						Body Size	Mount Area	Thickness	Pitch			
8	S	SSOP8	H/F			3.5×4.4	3.5×6.4	1.15	0.65	E2	2,000	RS5C372A RS5C372B
10	S	SSOP10	H/F			3.5×4.4	3.5×6.4	1.15	0.5	E2	2,000	RS5C338A RS5C348A
10	V	SSOP10G	H/F			2.9×2.8	2.9×4.0	1.1	0.5	E2	2,000	RV5C338A RV5C348A RV5C348B RV5C386A RV5C387A
10	T	TSSOP10G	H/F			2.9×2.8	2.9×4.0	0.75	0.5	E2	2,000	R2023T R2033T R2043T R2051T R2221T R2223T R2262T
12	L	QFN018018-12	H/F			1.8×1.8	1.8×1.8	0.43*1	0.4	E2	3,000	R2221L R2223L
16	L	QFN023023-16	H/F			2.3×2.3	2.3×2.3	0.43*1	0.4	E2	3,000	R2023L R2033L R2043L R2051L R2061L R2062L
18	L	QFN0202-18	H/F			2.0×2.0	2.0×2.0	0.43*1	0.4	E2	3,000	R2262L
14	S	SOP14 (RTC Module)	H/F			10.1×5.0	10.1×7.4	3.1	1.27	E2	1,000	R2025S R2045S
16	S	SSOP16	H/F			5.0×4.4	5.0×6.4	1.15	0.65	E2	2,000	R2051S R2061S
22	D	SON22 (RTC Module)	H/F			6.1×4.7	6.1×5.0	1.3	0.5	E2	1,000	R2025D

*1 A maximum value.

Lead (Pb) Free/Halogen Free Information

Ricoh is committed to reducing the environmental loading materials in electrical devices with a view to contributing to the protection of human health and the environment. Ricoh has been providing RoHS compliant products since April 1, 2006 and Halogen-free & Antimony-free products since April 1, 2012.

Definition of Halogen-free According to "IEC 61249-2-21" Standard
- 900 ppm of chlorine or
- 900 ppm of bromine or
- a combined total of 1,500 ppm of chlorine and bromine

Definition of Antimony-free
- 1,000 ppm of antimony trioxide

The performance and reliability of the Ricoh's halogen-free products are comparable to conventional products. Please contact our sales representatives for details.

: Products in Development H/F : Halogen Free ♡ : Products available in PRODUCT LONGEVITY PROGRAM

LD Driver LSI

This LD driver LSI achieves highly accurate printing. It is offered in a cathode type or an anode type. It provides a small package solution.

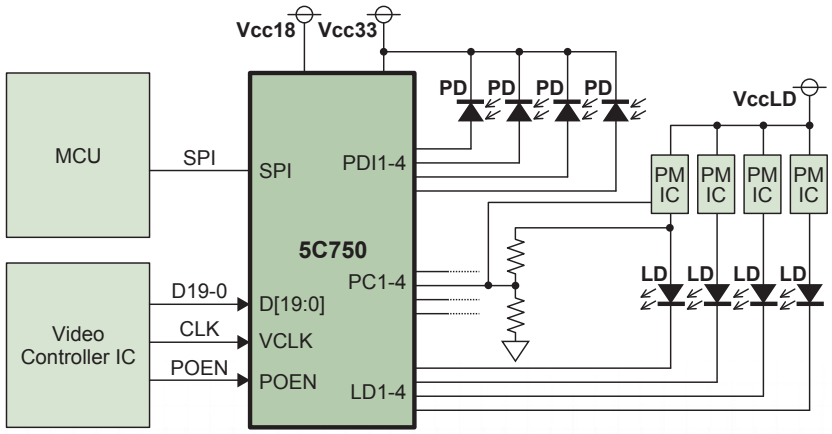
Product Name	LD	CH	Supply Voltage (V)	Max. Operating Frequency (MHz)	LED Current Min. Pulse Width (ns)	Drive Current Setting (mA)			Package	Halogen Free	Other
						Threshold Current	LED Current	Operating Current			
RN5C713	Cathode	2CH	5.0	400	1.25	50	50	70	QFN0606-48 (6.0×6.0, t=0.9)	H/F	Need no VR, Digital method
RN5C711 ♡	Cathode	2CH	3.3 or 5.0	200	2.5	—	—	70	QFN0505-36 (5.0×5.0, t=0.9)	H/F	Include APC (Automatic Power Control), LVDS (Low Voltage Differential Signal) format data
RN5C716 ♡	Anode	1CH	3.3 or 5.0	200	2.5	—	—	80	QFN0303-20 (3.0×3.0, t=0.75)	H/F	

LD Driver LSI for Display

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	CH	Supply Voltage (V)	Maximum Output Rate Per 1 Channel (Mdots/sec)	Rising/Falling Time (ns)	Maximum Operating Current (mA)		Protection Circuit	Package (Unit:mm)	Halogen Free
					LD1	LD2/3/4			
RN5C750	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	QFN0808-56 (8.0×8.0, t=0.75)	H/F

RN5C750 TYPICAL APPLICATIONS



Key Specifications

- RGGB 4 Channel Current Output (Sink)
- High Gradation Output by 10-Bit Color DAC
- 20-Bit Parallel Input Video I/F, 200 MHz
- 10-Bit Parallel Input Video I/F, 225 MHz
- 10-V LD Pin Corresponding to High Forward Voltage (VF) LD
- APC Function
- Pulse-Off Function
- Dimming Function
- QFN0808-56 package with Wettable Flank
- Operating Temperature Range : -40°C to 105°C
- To be Compliant with AEC-Q100

Applications

- HUD
- Pico Projector

USB Type-C Power Delivery Controller

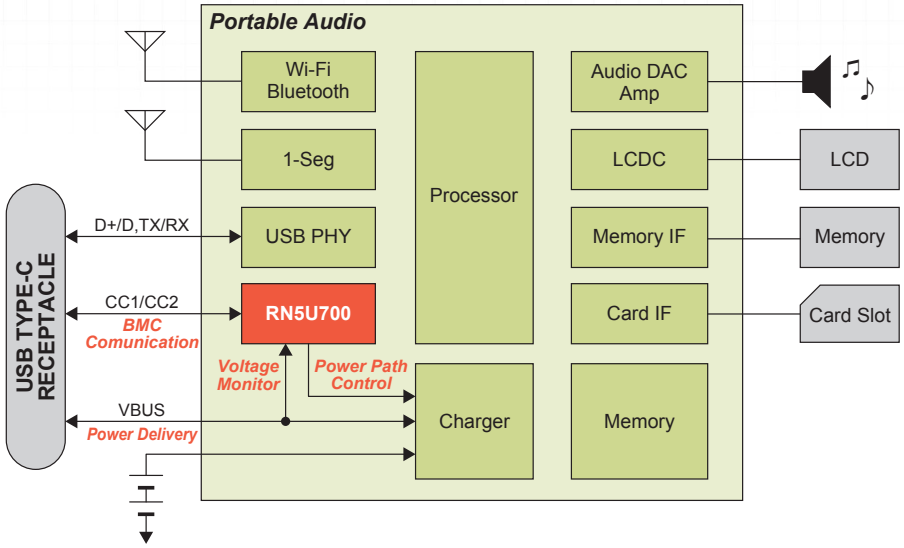
: Products Newly Released H/F : Halogen-free

USB Type-C Power Delivery Controller

REDC has been developing the USB Power Delivery (hereinafter called USB-PD) controller IC supporting the USB Type-C connector standard. The USB-PD is a standard regarding the power supply with USB cable made by USB Implementers Forum. Applying the USB-PD standard increases the power supply with USB cable from 7.5 W to the maximum of 100 W. Our USB-PD controller IC has various built-in analog functions. It enables onstructing USB-PD system with small number of external components.

Product Name	Standby Current (μA)	Power Role	Data Role	VBUS Controls	Protection Circuit	VBUS Input Voltage (V)	CC1/2 Pin Input Voltage (V)	Operating Temperature Range (℃)	Package (Unit:mm)	Halogen Free	Other
RN5U700	2.8 (Deep-Sleep)	DRP Source Sink	DRD DFP UFP	Nch.FET Pch.FET Switch IC	VBUS OVP/OCP CC Pin OVP OTP	4.5 to 24	Up to 24	-20 to 85	QFN0404-24-P12 (4.0×4.0, t=0.75)	H/F	Supports Dead Battery operation, I²C Interface: Up to 1MHz (FM+)

RN5U700
Typical Application of Control IC Supporting USB Type-C and USB PD



Applications

Digital Camera, Powerbanks, Game Machine, Audio Player, Scaner, USB HDD, POS, etc.

H/F : Halogen Free ♡ : Products available in PRODUCT LONGEVITY PROGRAM

Multiple-PMU Products

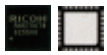
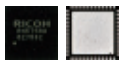
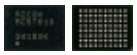
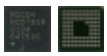
REDC's Multiple-PMU is a high integrated power management system IC.
Sequence control and flexible setting of output voltage are ideal when precise control functions are required as multiple core application processors.
For applications that use single Li-ion battery, products (RN5T618 and RC5T619) with a Charger Function and Battery-Gauge Function are best.

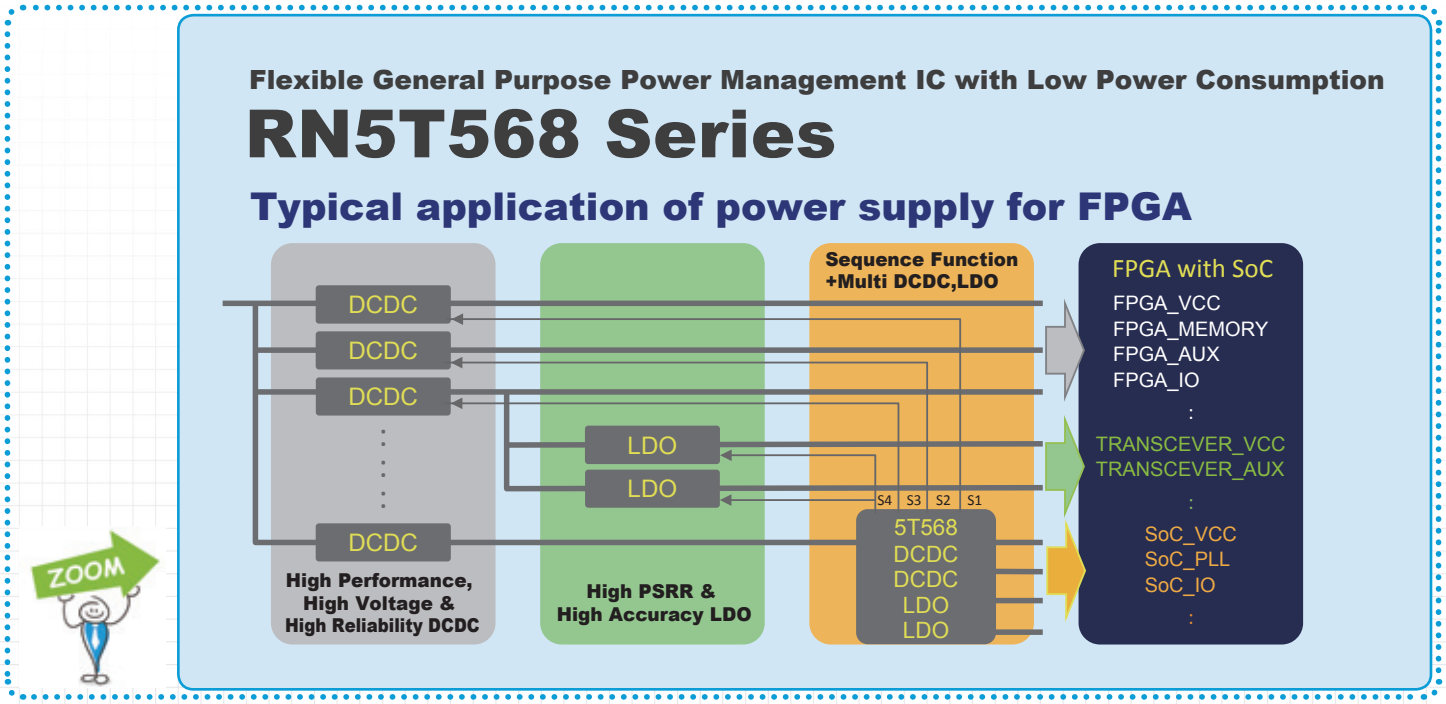
Multiple-PMU Products Lineup

Product Name	Package	Input Voltage Range (V)	Interface	Main Function								
				Step-down DCDC	LDO	VD	Charger	Battery-Gauge (Fuel-Gauge)	WDT	ADC	RTC	GPIO
RN5T566 ♡	QFN0606-36	2.7 to 5.5	PIN	2	5	2	—	—	—	—	—	—
RN5T567 ♡	QFN0606-48-P14	2.7 to 5.5	I²C	4 DVS*1	7	4	—	—	1	—	—	4
RN5T568 ♡	QFN0707-48	2.7 to 5.5	I²C	4 DVS*1	7	4	—	—	1	—	—	4
RN5T614	QFN0606-48-P14	3.1 to 5.5	I²C	3 DVS*1	8	2	Wall USB	—	—	—	—	—
RN5T618 ♡	QFN0606-48-P22	2.7 to 5.5	I²C	3 DVS*1	7	4	Wall USB	1	1	1	—	4
RC5T619	CSP0606-85	2.7 to 5.5	I²C	5 DVS*1	12	4	Wall USB	1	1	1	1	5
RC5T619x	CSP0608-80											

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

Multiple-PMU Package Information

Pin	Symbol	Package	Actual Size	Bottom view	Halogen Free	Dimensions (Unit: mm)			Taping Direction	Quantity /Reel	Product Name
						Body Size	Thickness	Pitch			
36	N	QFN0606-36			H/F	6.0×6.0	0.9	0.5	E4	5,000	RN5T566
48	N	QFN0606-48-P14			H/F	6.0×6.0	0.9	0.4	E4	2,000	RN5T567 RN5T614
		QFN0606-48-P22								5,000	RN5T618
		QFN0707-48			H/F	7.0×7.0	0.9	0.5	E4	2,000	RN5T568
80	C	CSP0608-80			H/F	8.0×6.0	1.2	0.65	E4	2,000	RC5T619x
85	C	CSP0606-85			H/F	6.0×6.0	1.07	0.5	E4	2,000	RC5T619



Product Index

Non-Promotion/ Limited/ Discontinued Products

■ Non-Promotion Products: These products will be discontinued in the future. New adoption is not recommended.
■ Limited Products: These products are already discontinued. Providing only for the customer under present adoption with stock.
■ Discontinued Products: These products are already discontinued.

The lists below do not include some of our old products. The alternative products are not fully compatible with the non-promotion/ limited/ discontinued products. The function of alternative products are similar to these products, but the electrical characteristics and the pin-layout may differ.

Category	Product Name	Sub Category	Package	Status	Termination Date	Alternative Product			
						Same Spec with Different Package	Package	Succeeding Product	Package
LDO Regulators	RN5RG	External transisitor type	SOT-23-5	Discontinued	Already				
	R1110N	Low supply current type	SOT-23-5	Discontinued	Already				
	R1112N	High-performance type	SOT-23-5	Discontinued	Already				
	R1113Z	High-performance type	WLCSP-4-P1	Limited	Already	R1122N	SOT-23-5	RP112N	SOT-23-5
	R1115Z	Standard type	WLCSP-4-P4	Discontinued	Already				
	R1118K	With ECO function	DFN(PLP)1612-4B	Limited	Already	—	—	RP201Z RP201K	WLCSP-4-P5 DFN(PLP)1212-6
	R1118N		SOT-23-5	Discontinued	Already				
	R1120N	Standard type	SOT-23-5	Discontinued	Already				
	R1124N	Standard type	SOT-23-5	Discontinued	Already				
	R1126N	With ECO function	SOT-23-5	Discontinued	Already				
	R1130D	Standard type	HSON-6	Discontinued	Already				
	R1131Dxx2	Standard type	HSON-6	Discontinued	Already				
	R1140Q	Standard type	SC-82AB	Discontinued	Already				
	R1151N	External transisitor type+VD	SOT-23-6	Discontinued	Already				
	R1152N	External transisitor type	SOT-23-5	Discontinued	Already				
	R1160D	With ECO function	SON-6	Discontinued	Already				
	R1161Dxx1	With ECO function	SON-6	Discontinued	Already				
	R1161Dxx2		HSON-6						
	R1162D	With ECO function	SON1612-6	Discontinued	Already				
	R1162N		SOT-23-5						
	R1182K	With ECO function	DFN(PLP)1616-6	Discontinued	Already				
	R1182N		SOT-23-5						
	R1183Z	Low supply current type	WLCSP-4-P2	Discontinued	Already				
	R1500J	Standard type	TO-252-5-P2	Discontinued	Already				
	RP103Qxx2	Standard type	SC-88A	Discontinued	Already				
	RP104Q	Low supply current type	SC-82AB	Discontinued	Already				
	RP105Q	Ultra low voltage	SC-88A	Discontinued	Already				
	RP106N	Standard type	SOT-23-5	Non-promotion		RP106Z RP106K RP106Qxx2	WLCSP-4-P5 DFN(PLP)1212-6 SC-88A	—	—
	RP107N	Standard type	SOT-23-5	Limited	Already	RP107Z RP107K RP107Q	WLCSP-4-P5 DFN(PLP)1212-6 SC-88A	—	—
	RP113Q	Standard type	SC-88A	Discontinued	Already				
	RP119N	Standard type	SOT-23-5	Discontinued	Already				
	RP170Q	Standard type	SC-88A	Discontinued	Already				
	RP200Q	With ECO function	SC-88A	Discontinued	Already				
	RP201Q	With ECO function	SC-88A	Discontinued	Already				
	RP201N		SOT-23-5						
LDO Regulators: Multiple Output	R5320D	3ch.	SON-8	Discontinued	Already				
	R5320G		SSOP-8G						
	R5321D	2ch.	SON-8	Discontinued	Already				
	R5322N	2ch.	SOT-23-6W	Discontinued	Already				
	R5323Z	2ch.	WLCSP-6-P1	Discontinued	Already				
	R5323K		DFN(PLP)1820-6						
	R5323N		SOT-23-6						
	R5324D	3ch.	SON-8	Discontinued	Already				
	R5325K	2ch., With ECO function	DFN(PLP)1820-6	Discontinued	Already				
	R5325N		SOT-23-6						
	R5326Z	2ch., With ECO function	WLCSP-6-P1	Discontinued	Already				
	R5326N		SOT-23-6						
	R5428K	2ch.+VD	DFN(PLP)2020-8	Non-promotion		—	—	—	—
	RP151K	2ch.+VD	DFN(PLP)2020-8	Discontinued	Already				
	RP153L	2ch.+VD	DFN1216-8	Non-promotion		—	—	RP154L	DFN1216-8
Reset ICs (VD)	R3111E	Normal type	TO-92	Discontinued	Already				
	R3112Qxx2	With delay function (External capacitor type)	SC-88A	Limited	Already	R3112D R3112Qxx1 R3112N	SON1612-6 SC-82AB SOT-23-5	R3116K R3116Q R3116N	DFN(PLP)1010-4 SC-82AB SOT-23-5
	R3113D	Normal type	SON1408-3	Discontinued	Already				
	R3115Z	With delay function (External capacitor type)	WLCSP-4-P2	Discontinued	Already				
	R3131N	With delay function (Internal counter type)	SOT-23-3	Discontinued	Already				
	R3133Q	With delay function (Internal counter type)	SC-82AB	Discontinued	Already				
	R3134K	With delay function (Internal counter type)	DFN(PLP)1212-6	Discontinued	Already				
	R3134Q		SC-88A						

Category	Product Name	Sub Category	Package	Status	Termination Date	Alternative Product			
						Same Spec with Different Package	Package	Succeeding Product	Package
Watchdog Timers, Switch ICs	R5102V	WDT with Dual output VR	SSOP-10	Discontinued	Already				
	R5521V	For pay on-demand	SSOP-16	Discontinued	Already				
	R5522V	For pay on-demand	SSOP-20	Discontinued	Already				
	R5531V	For PCMCIA 1slot	SSOP-16	Discontinued	Already				
	R5532V	For PCMCIA 2slot	SSOP-28	Discontinued	Already				
	R5534V	For PCMCIA 2slot	SSOP-20	Discontinued	Already				
	R5535V	For Express Card	SSOP-20	Discontinued	Already				
DCDC Converters	RN5RYxx1/202	Step-up	SOT-23-5	Discontinued	Already				
	R1200Z	For PMOLED and general step-up use	WLCSP-6-P1	Discontinued	Already				
	R1201L	For white LED backlight	DFN1616-6	Discontinued	Already	—	—	R1202LxxxD R1202NxxxD	DFN1616-6B TSOT-23-6
	R1201N		SOT-23-6	Non-promotion					
	R1218K	For white LED backlight	DFN(PLP)1820-6	Non-promotion		R1218N	SOT-23-6	R1202LxxxD R1202NxxxD R1204KxxxA/D R1204NxxxA/D	DFN1616-6B TSOT-23-6 DFN(PLP)1820-6 TSOT-23-6
	R1221N	Step-down with VD (Middle voltage)	SOT-23-6W	Discontinued	Already				
	R1230D	Step-down (Low voltage)	SON-8	Discontinued	Already				
	R1234D	Step-down (Low voltage)	SON-8	Discontinued	Already				
	R1250V	Charge pump inverting	TSOP-8	Discontinued	Already				
	R1283Z	Step-up/Inverting	WLCSP-11-P2	Discontinued	Already				
	R1285L	Step-up/Inverting	DFN2730-12	Discontinued	Already				
	RP500Z	Step-down (Low voltage)	WLCSP-6-P2	Limited	Already	RP500L RP500K RP500N	DFN1616-6 DFN(PLP)1820-6 SOT-23-6W	RP504K RP504L RP504N	DFN(PLP)1216-6F DFN1616-6B SOT-23-5
	RP503Z	Step-down (Low voltage)	WLCSP-6-P2	Discontinued	Already				
Li-ion/ Polymer Battery Protection	R5400D	For 1cell battery	SON1612-6	Discontinued	Already				
	R5401K	For 1cell battery	DFN(PLP)1820-6	Non-promotion				R5405K	DFN(PLP)1616-6
	R5401N		SOT-23-5	Discontinued	Already				
	R5403K	For 1cell battery	DFN(PLP)1820-6	Non-promotion		R5403N	SOT-23-5	R5405K R5405N R5492N R5442L R5442N	DFN(PLP)1616-6 SOT-23-6 SOT-23-6 DFN1814-6B SOT-23-6
	R5404K	For 1cell battery	DFN(PLP)1616-6	Discontinued	Already				
	R5406K	For 1cell battery	DFN(PLP)1616-6B	Discontinued	Already				
	R5407K	For 1cell battery	DFN(PLP)1820-6B	Discontinued	Already	—	—	R5405K R5405N R5492N R5442L R5442N	DFN(PLP)1616-6 SOT-23-6 SOT-23-6 DFN1814-6B SOT-23-6
	R5407N		SOT-23-5	Limited					
	R5408K	For 1cell battery	DFN(PLP)1616-6	Discontinued	Already	R5408N	SOT-23-6	R5405K	DFN(PLP)1616-6
	R5408L		DFN1414-6	Non-promotion					
	R5408D		SON1612-6						
	R5409K	For 1cell battery	DFN(PLP)2114-4	Discontinued	Already				
	R5421N	For 1cell battery	SOT-23-6	Discontinued	Already				
	R5425N	For 1cell battery	SOT-23-6	Discontinued	Already				
	R5426D	For 1cell battery	SON-6	Non-promotion		—	—	R5405N	SOT-23-6
	R5426N		SOT-23-6	Limited	Already				
	R5429K	For 1cell battery	DFN(PLP)1820-6	Limited	Already			—	—
	R5429D		SON-6	Discontinued					
	R5429N		SOT-23-6						
	R5431V	For Multi-cell battery	SSOP-16	Non-promotion		—	—	—	—
	R5450N	For 1cell battery	SOT-23-5	Non-promotion		—	—	—	—
	R5451K	For 1cell battery	DFN(PLP)1616-6B	Discontinued	Already				
	R5454K	For 1cell battery	DFN(PLP)1820-6B	Discontinued	Already				
	R5455K	For 1cell battery	DFN(PLP)2114-4	Discontinued	Already				
	R5456K	For 1cell battery	DFN(PLP)1616-6	Discontinued	Already				
	R5470K	For 1cell battery	DFN(PLP)2114-4B	Discontinued	Already				
	R5471K		DFN(PLP)1616-6B		Already				
	R5475N	For 1cell battery	SOT-23-5	Discontinued	Already				
	R5476K	For 1cell battery	DFN(PLP)1616-6B	Discontinued	Already				
Multi Power Supply	R5210D	For optical disk drive	HSON-6	Discontinued	Already				
	R5210N		SOT-23-6W						
	R5212D	For optical disk drive	HSON-6	Discontinued	Already				
	R5220D	For general use	SON-6	Limited	Already	R5220K	DFN(PLP)2514-6	—	—
	R5310L	For mobile phone	LQFP0505-32	Discontinued	Already				
	R5312L	For mobile phone	LQFP0505-32	Discontinued	Already				
	R5314D	For mobile phone	QFN0404-20	Discontinued	Already				
	R5315B	Wireless Modules for M2M	CSP0605-49	Limited	Already	—	—	—	—
	R5510H	For optical disk drive	SOT-89-5	Limited	Already	—	—	RP901K	DFN(PLP)2527-10
	R5511D	For optical disk drive	SON-6	Discontinued	Already				
	R5511N		SOT-23-5						
	R5511H		SOT-89-5						
	RP902K	For optical disk drive	QFN0404-20	Discontinued	Already				
Real Time Clocks	R2045D	4-wire Serial Interface	SON22	Non-promotion		R2045S	SOP14	—	—
	RS5C313	3-wire Serial Interface	SSOP8	Non-promotion		—	—	R2033L R2033T R2061L R2061S R2062L	QFN023023-16 TSSOP10G QFN023023-16 SSOP16 QFN023023-16
	RS5C316A/B	3-wire Serial Interface	SSOP8	Non-promotion		—	—		

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Halogen Free

Ricoh is committed to reducing the environmental loading materials in electrical devices with a view to contributing to the protection of human health and the environment.
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