R1500x Series

500mA 24V Input VR

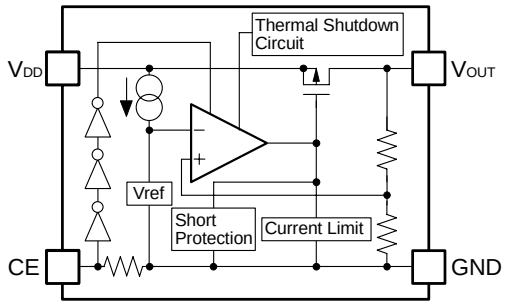
The R1500x Series are CMOS-based voltage regulators featuring 500mA output current and 24V input voltage. R1500x provides high input voltage operation and low on-resistance (at V_{OUT} = 10V, below 0.6Ω) because of using CMOS transistor. In addition to a fold-back protection circuit built into conventional regulators, R1500x contains a thermal shutdown circuit. Besides the low supply current by CMOS, the operating temperature is -40°C to 105°C and the maximum input voltage is 24V, the R1515x series are very suitable for power source of car accessories.

FEATURES

- Supply Current (I_{SS}) ····· Typ. 70μA (V_{IN}=SET V_{OUT}+1V)
- Standby Current ($I_{standby}$) ····· Typ. 0.1μA (V_{IN}=24V, CE="L")
- Dropout Voltage (V_{DIF}) ····· Typ. 0.115V (I_{OUT}=200mA, V_{OUT}=5V)
- Input Voltage Range (V_{IN}) ····· 4V to 24V (Absolute maximum rating: 36V)
- Ripple Rejection (RR) ····· Typ. 60dB (f=1kHz, V_{OUT} ≦ 6V)
  Typ. 50dB (f=1kHz, V_{OUT} > 6V)
- Output Voltage Range (V_{OUT}) ····· 3.0V to 12.0V (internally fixed)
- Output Voltage Accuracy ····· ± 2%
- Temp. coeff of Output Voltage ····· Typ. ±100ppm/°C
- Line Regulation ····· Typ. 0.05%/V
- Fold-back Protection Circuit ····· Current limit Typ. 65mA
- Thermal Shutdown Circuit ····· Stops at Typ. 160°C.
- Package ····· SOT-89-5,TO-252-5-P2
- Ceramic capacitors can be used. ····· 10μF or more

BLOCK DIAGRAM

R1500xxxxB



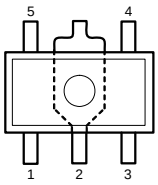
SELECTION GUIDES

Package	Quantity per Reel	Part No.
SOT-89-5	1,000 pcs	R1500HxxxB-T1-F
TO-252-5-P2	3,000 pcs	R1500JxxxB-T1-F

xxx : Specify the output voltage within the range 3.0V (030) to 12.0V (120) in 0.1V steps

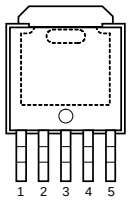
PACKAGES (Top View)

SOT-89-5



1	V_{DD}
2	GND*
3	GND*
4	CE
5	V_{OUT}

TO-252-5-P2

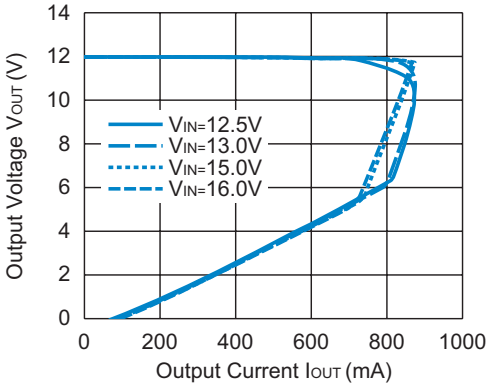


1	V_{DD}
2	GND*
3	GND*
4	CE
5	V_{OUT}

*) The GND pin must be wired together when it is mounted on board

TYPICAL CHARACTERISTIC

R1500x120B Output Voltage vs. Output Current



APPLICATIONS

- Power source for home appliances such as refrigerators, rice cookers, electric water warmers, etc
- Power source for car audio equipment, car navigation systems, ETC systems, etc
- Power source for laptop personal computers, digital TVs, cordless phones, and private LAN systems for home, etc
- Power source for office equipment machines such as copiers, printers, facsimiles, scanners, etc

Voltage Regulator with 500mA Output Current and 24V Input Voltage

●Voltage Regulator with 500mA Output and 24V Input Voltage

MAXIMUM INPUT VOLTAGE 24V

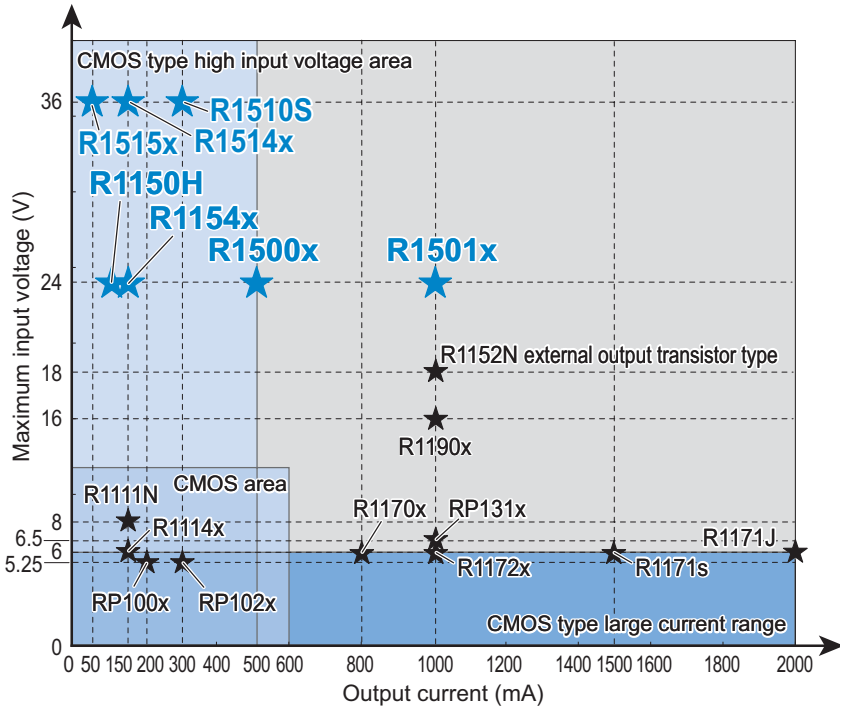
The CMOS type regulator has been introduced into the high input voltage area where only bipolar type could previously operate.

ADOPTION OF DMOS PROCESS

The DMOS (Double Diffused MOS) transistor adopted by R1500x is characterized by a double diffusion structure which comprises a low density n-type (channel) diffused layer and a high density p-type (sources) diffused layer from the edge of the gate electrode. The R1500x series possess outstanding properties of high operating voltage and low on-resistance, which have been achieved by the channel length scaled down to submicron dimensions and decreased thickness of the gate oxide film.

MAXIMUM OPERATING AMBIENT TEMPERATURE 105°C

Unlike Ricoh's conventional regulators, the operating ambient temperature range of the R1500x Series is rated from -40°C to 105°C that makes it suitable for use in automotive and industrial applications involving higher temperatures.



Thermal Shutdown Circuit

The Thermal Shutdown Circuit shown in the block diagram detects an increase in temperature, stops operation, and protects the regulator from being damaged by a short circuit in the output pin (V_{OUT}) and ground pin (GND).
The Thermal Shutdown Circuit stops operation of the regulator when the junction temperature of the regulator exceeds 160°C. Moreover, when the junction temperature decreases to a level below 135°C after the regulator has stopped, the regulator resumes to normal operation.
As a result, the operation of the Thermal Shutdown Circuit causes the regulator repeatedly to turn OFF and ON till the causes of overheating are removed. As a consequence, a pulse shaped output voltage occurs. Care should be taken to prevent this situation.
In the datasheet it is shown as a thermal shutdown detection temperature (T_{TSD}) and a thermal shutdown release temperature (T_{TSR}).

Products with a built-in Thermal Shutdown Circuit

R1150H	R1154x	R1170x	R1171x	R1172x	R1173x	R1190x	R1191x	R1500x	R1501x
R1514x	R1515x	RP131x	RP170x	RP171x					

http://www.ricoh.com/LSI/

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