RICOH

RP401x Series

PWM/VFM Step-up DC/DC Converter

The RP401x Series are CMOS-based PWM/VFM step-up DC/DC converters which can start-up from Typ. 0.6V. RP401K can be switched from two control types by inputting signal to the MODE pin - fixed PWM control or PWM/VFM auto switching control in which mode automatically switches to high-efficiency VFM mode in low output current. (RP401N Series can be selected from fixed PWM control or PWM/VFM auto switching control.) RP401x includes a soft start circuit. By simply using an inductor, a capacitor, a diode, and (resistors) as external components, a high-efficiency step-up DC/DC converter can be easily configured. The output voltage can be selected from the internally fixed or the externally adjustment. In addition to SOT-23-5 package, a 1.8mm × 2.0mm square DFN(PLP)1820-6 package is also available.

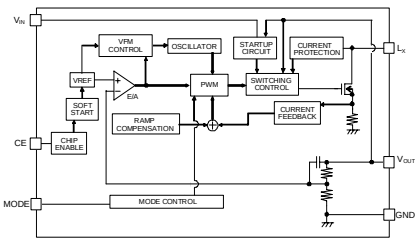
FEATURES

- Supply Current (I_{DD1}) ····· Typ. 400µA (RP401x301, V_{IN}=0.5×V_{SET}, V_{OUT}=0.95×V_{SET})
- Supply Current (I_{DD1}) ····· Typ. 380µA (Adjustable Ver., V_{IN}=2V, V_{OUT}=2.5V, V_{FB}=0V)
- Supply Current (I_{DD2}) ····· Typ. 130µA (C Version, V_{IN}=V_{OUT}=5.5V, In non-switching)
- Supply Current (I_{DD2}) ····· Typ. 230µA (D Version, Same as above)
- Standby Current ($I_{standby}$) ····· Max. 3µA (In standby, V_{IN}=V_{OUT}=5.5V)
- Input Voltage Range (V_{IN}) ····· 0.6V to 5.5V
- Hold-on Voltage (V_{HOLD}) ····· Min. 0.6V
- Output Voltage Range (V_{OUT}) ··· 1.8V to 5.5V (internally fixed) (xx1)
  Externally adjustable (Feedback voltage : 0.6V) (001C/D)
- Output Voltage Accuracy ····· ± 2%
- Oscillator Frequency (f_{osc}) ····· 1.2MHz
- Oscillator Maximum Duty Cycle (Maxduty) ··· Typ. 88%
- Lx Limit Current (I_{LXPEAK}) ····· Typ.1A*
- Soft Start Time (t_{start}) ····· Typ. 0.7ms
- Packages ····· DFN(PLP)1820-6, SOT-23-5

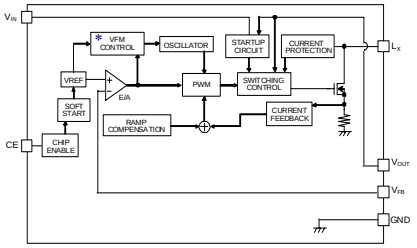
*)This is an approximate value, because ON duty depends on conditions

BLOCK DIAGRAMS

RP401Kxx1A/B
(Internally fixed output voltage type)

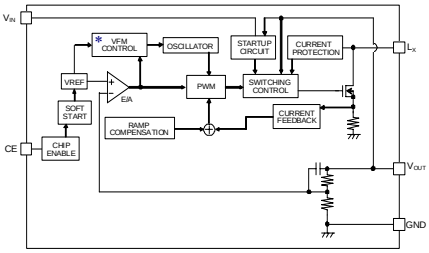


RP401N001C/D
(Ext. adjustable output voltage type)



*) only RP401N001C (PWM/VFM auto switching control)

RP401Nxx1C/D
(Internally fixed output voltage type)



*) only RP401Nxx1C (PWM/VFM auto switching control)

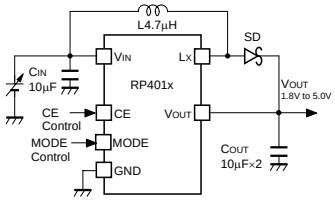
SELECTION GUIDES

Halogen Free	Package	Q'ty per Reel	Part No.
H/F	DFN(PLP)1820-6	5,000 pcs	RP401K xx1 * -TR
H/F	DFN(PLP)1820-6	5,000 pcs	RP401K 001 $ -TR
H/F	SOT-23-5	3,000 pcs	RP401N xx1 $ -TR-FE

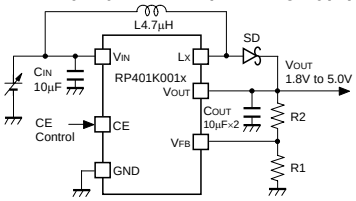
xx : Specify the output voltage within the range of 1.8V (18) to 5.5V (55) in 0.1V steps.
00 : Specify the output voltage external adjustable within the recommendation range of 1.8V to 5.5V.
* : Select from (A) With MODE pin, with Latch protection circuit, (B) With MODE pin, without Latch protection circuit.
$: Select from (C) PWM/VFM auto switching, (D) Fixed PWM.

TYPICAL APPLICATIONS

RP401Kxx1A/B
(Internally fixed output Voltage type)



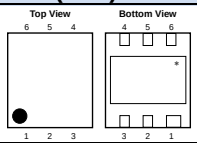
RP401K001C/D
(Externally adjustable output voltage type)



CIN : C1608JB0J106M, (10µF, TDK)
COUT : C1608JB0J106M x 2, (10µF x 2, TDK)

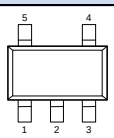
PACKAGES

DFN(PLP)1820-6



1	VIN
2	CE
3	GND
4	LX
5	MODE or VFB
6	VOUT

SOT-23-5



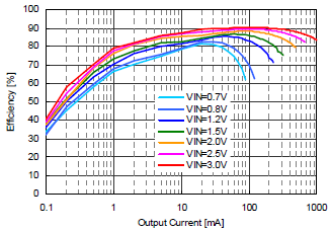
1	CE
2	GND
3	VIN
4	VOUT
5	LX

*) The tab is substrate level (GND).

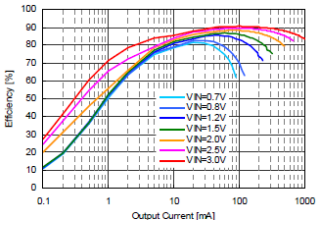
TYPICAL CHARACTERISTICS

RP401x331x / RP401K001x
Efficiency vs. Output Current

PWM/VFM auto switching



Fixed PWM



APPLICATIONS

- MP3 players and PDA
- Digital cameras
- LCD bias power supply
- Personal medical equipment
- Wireless Handset
- GPS

PWM/VFM Step-up DC/DC Converter

RP401x Series / RP400x Series
Step-up DC/DC Converter Comparison

	RP401x Series			RP400x Series
	A/B Version	C Version	D Version	
Control	Fixed PWM⇔ PWM/VFM auto switching (It can be switched by MODE pin)	PWM/VFM auto switching	Fixed PWM	PWM/VFM auto switching
Lx Current limit *	1A			600mA
Input Voltage Range	0.6V to 5.5V			0.7V to 5.5V (A/B Version) 1.2V to 5.5V (B Version)
Output Voltage Range	1.8V to 5.5V or Externally adjustable (only DFN)			1.8V to 5.0V or Externally adjustable (only DFN)
Output Voltage Accuracy	±2% (±12mV)			±2% (±12mV)
Oscillator Frequency (Typ.)	1.2MHz			700kHz
Oscillator Maximum Duty Cycle (Min.)	80%			80%
Soft-start Time (Typ.)	0.7ms			0.7ms
Latch Protection Circuit (Protection Delay Time)(Typ.)	3.3ms (only A Version)			–
Package	DFN(PLP)1820-6	DFN(PLP)1820-6 (Ext. adjustable type) SOT-23-5 (Fixed output Voltage type)		DFN(PLP)1820-6 SOT-23-5 (Fixed output Voltage type only)
Others				Built- in Anti-Ringing Switch

*) Will change according to the duty cycle.

Ricoh Co.,LTD. Electronic Devices Company

■ **Ricoh presented with the Japan Management Quality Award for 1999.**
Ricoh continually strives to promote customer satisfaction, and shares the achievements of its management quality improvement program with people and society.

■ **Ricoh awarded ISO 14001 certification.**
The Ricoh Group was awarded ISO 14001 certification, which is an international standard for environmental management systems, at both its domestic and overseas production facilities. Our current aim is to obtain ISO 14001 certification for all of our business offices.

RoHS Compliant
Ricoh completed the organization of the Lead-free production for all of our products. After Apr. 1, 2006, we will ship out the lead free products only. Thus, all products that will be shipped from now on comply with RoHS Directive.

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

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