

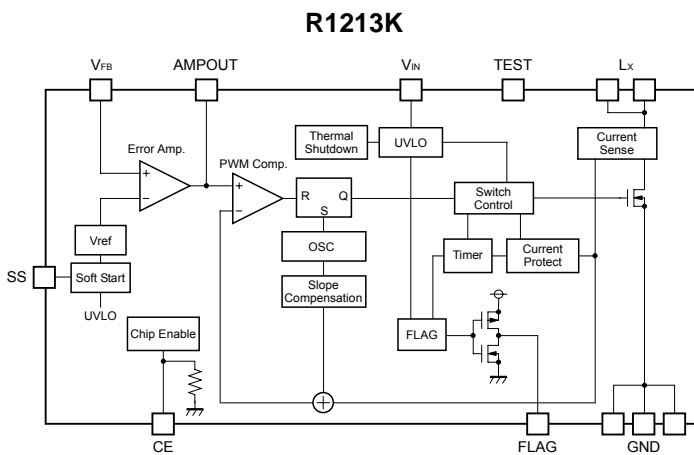
2.5A PWM Step-up DC/DC Converter

The R1213K Series are low supply current, CMOS-based PWM step-up DC/DC converters. R1213K includes a soft start circuit, an under-voltage lockout circuit (UVLO), a thermal shutdown circuit, and a latch protection circuit. By simply using an inductor, resistors, capacitors and a diode as external components, a high-efficiency step-up DC/DC converter can be easily configured. The soft start time as well as phase compensation can be set with external resistors and capacitors. Built-in a shutdown control circuit. It turns off the external Pch MOSFET at the protection time, so it cut off the power line from V_{DD} to V_{OUT}. To release the latch protection, change to the stand-by mode by the CE pin, or change the V_{DD} voltage lower than the UVLO detect voltage.

FEATURES

- Supply Current (I_{DD1}) Typ. 550μA (No switching)
- Supply Current (I_{DD2}) Typ. 3mA (Switching)
- Standby Current (I_{standby}) Typ. 0.1μA (CE="L")
- Input Voltage Range (V_{IN}) 2.3V to 5.5V (Absolute maximum rating : 6.5V)
- Output Voltage Range (V_{OUT}) 3.0V to 15.0V (Externally adjustable)
(Feedback voltage : 0.8V)
- Output Voltage Accuracy ± 8mV
- Temp. coeff. of Feedback Voltage ± 50ppm/°C
- Oscillator Frequency (f_{osc}) 1MHz
- Oscillator Maximum Duty Cycle (Maxduty) Min. 85%, Typ. 90%
- Coil-current Limit Circuit Current Limit Typ. 3A
- UVLO Detect Voltage (V_{UVLO}) Typ. 2.0V
- Soft Start Time (t_{start}) Can be set by SS pin
- Thermal Shutdown Circuit Stops at 150°C
- Latch Protection Circuit Delay time for protection Typ. 32ms
- Package DFN(PLP)2730-12

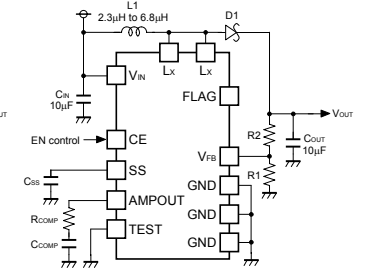
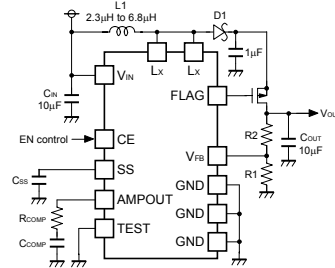
BLOCK DIAGRAM



TYPICAL APPLICATIONS

In case of using P-channel MOSEFT for shutdown function.

In case of not using shutdown function.



FLAG pin should be open.

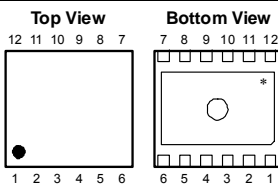
SELECTION GUIDE

Halogen Free	Package	Q'ty per Reel	Part No.
H/F	DFN(PLP)2730-12	5,000 pcs	R1213K001* ⁻ -TR

* : Select from (A) Low output voltage (V_{OUT}: 3.0V to 6.0) or (B) high output voltage (V_{OUT}: 6.0V to 15.0V).

PACKAGE

DFN(PLP)2730-12



1	AMPOUT	7	TEST**
2	V _{FB}	8	Lx***
3	CE	9	Lx***
4	GND***	10	V _{IN}
5	GND***	11	FLAG
6	GND***	12	SS

*) The tab is substrate level (GND).

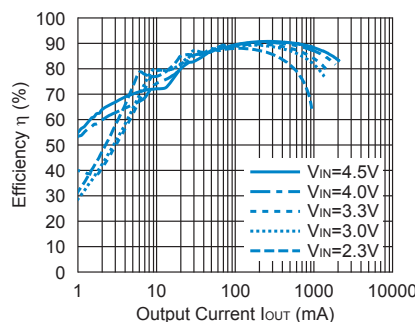
***) The TEST pin connected to the GND level or should be open.

****) No.4,5 pin and No.6 pin, No.8 pin and No.9 pin must be wired each other when it is mounted on board.

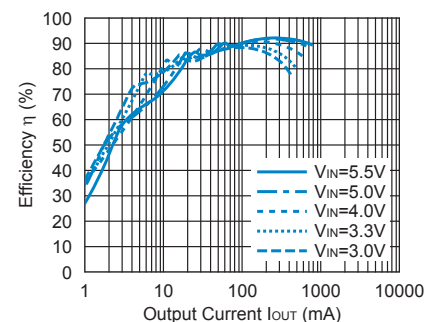
TYPICAL CHARACTERISTICS

Efficiency vs. Output Current

R1213K001A (V_{OUT}=5.0V)



R1213K001B (V_{OUT}=15.0V)



APPLICATION

- Flash LED, Data card, DSC, LCD source Bias Supplies

2.5A PWM Step-up DC/DC Converter

Phase compensation

The R1213K requires external phase compensation to prevent from large output ripple and unstable operation and low efficiency. To make phase compensation, connect a resistance R_{COMP} and a capacitor C_{COMP} in series between AMPOUT and GND. The resistance and capacitance values can be calculated with next formulas. The values are the basic values, however, to judge if they are appropriate or not, check the transient response and cut and try for adjustment.

(A Version)

$$R_{COMP} = 90 \times V_{IN} \times V_{OUT} \times C_{OUT} / (L \times I_{OUTmax})$$

$$C_{COMP} = 30 \times V_{OUT} \times L \times I_{OUTmax} / (V_{IN}^2 \times R_{COMP})$$

(B Version)

$$R_{COMP} = 45 \times V_{IN} \times V_{OUT} \times C_{OUT} / (L \times I_{OUTmax})$$

$$C_{COMP} = 30 \times V_{OUT} \times L \times I_{OUTmax} / (V_{IN}^2 \times R_{COMP})$$

V_{IN} (V)	V_{OUT} (V)	I_{OUTmax} (mA)	C_{IN} (μ F)	C_{OUT} (μ F)	L1(μ H)	D1	R_{COMP} (k Ω)	C_{COMP} (nF)
3.3	3.8	1200	10	20	2.2	3A	8.2	3.3
3.3	5.0	800			4.7		8.2	6.8
3.3	12.0	250			4.7		27.0	1.8
5.0	15.0	650			6.8		15.0	5.1

Setting of Output Voltage

Output voltage can be set with divider resistors for voltage setting, R1 and R2 as shown in the typical application. Refer to the next formula.

$$\text{Output Voltage} = V_{FB} \times (R1+R2)/R1 \quad (V_{FB}=0.8V)$$

*) Recommended value of resistors ($R1 + R2$) is equal or less than 200k Ω .

Setting of Soft start time

Soft-start time can be set by connecting a capacitor "C_{SS}" between SS pin and GND. Soft start time can be calculated by the next formula.

$$\text{Soft start time} = C_{SS} \times V_{FB} / I_{SS} \quad (V_{FB}=0.8V, I_{SS}=10\mu A)$$

$$= 8 \times C_{SS} \times 10^4 \text{ (s)}$$



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 products since April 1, 2012.

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<http://www.e-devices.ricoh.co.jp/en/>

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The currently available information as of September 2014 is provided in this New Product News.

EK-278-140930