ROHM

STRUCTURE	Silicon Monolithic Integrated Circuit
PRODUCT NAME	1ch DC／DC Converter IC built in synchronous rectifier
TYPE	**BD9130NV**
FEATURES	• Output Voltage：Adjustable(1.0～2.5V), Output Current：2.0A • High Efficiency and Fast Transient Response

○ABSOLUTE MAXIMUM RATING（Ta=25℃）

Parameter	Symbol	Limit	Unit
Power Supply Voltage	V_{CC}	-0.3～+7 [*1]	V
	PV_{CC}	-0.3～+7 [*1]	V
EN Voltage	V_{EN}	-0.3～+7	V
SW・ITH Voltage	V_{SW}, V_{ITH}	-0.3～+7	V
SW Output Current	I_{SW}	2.6 [*1]	A
Power Dissipation 1	Pd1	0.9 [*2]	W
Power Dissipation 2	Pd2	3.9 [*3]	W
Operating Temperature Range	Topr	-25～+105	℃
Storage Temperature Range	Tstg	-55～+150	℃
Maximum Junction Temperature	Tjmax	+150	℃

[*1] Pd, ASO, and Tjmax=150℃ should not be exceeded.
[*2] Reduced by 7.2mW for increase in Ta of 1℃ above 25℃.
       (when mounted on a board 70.0mm × 70.0mm × 1.6mm Glass-epoxy PCB)
[*3] Reduced by 31.2mW for increase in Ta of 1℃ above 25℃.
       (when mounted on a board according to JESD51-7)

○OPERATING CONDITIONS（Ta=-25～+105℃）

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	V_{CC}	2.7	3.3	5.5	V
	PV_{CC}	2.7	3.3	5.5	V
EN Voltage	V_{EN}	0	-	Vcc	V
Output Voltage range	V_{OUT}	1.0	-	2.5 [*4]	V
SW Average Output Current	I_{SW}	-	-	2.0 [*5]	A

[*4] In case set output voltage 1.6V or more, VccMin. = Vout + 1.3V.
[*5] Pd and ASO should not be exceeded.
   ★This product is not designed for protection against radioactive rays.

◯ELECTRICAL CHARACTERISTICS

(Unless otherwise specified , Ta=25℃ Vcc=PVcc=3.3V, EN=Vcc, R_1=10kΩ, R_2=5kΩ)

Parameter	Symbol	Limit			Unit	Condition
		Min.	Typ.	Max.		
Standby Current	ISTB	-	0	10	μA	EN=GND
Bias Current	ICC	-	250	450	μA	
EN Low Voltage	VENL	-	GND	0.8	V	Stand-by Mode
EN High Voltage	VENH	2.0	Vcc	-	V	Active Mode
EN Input Current	IEN	-	1	10	μA	VEN=3.3V
Oscillation Frequency	FOSC	0.8	1	1.2	MHz	
Pch FET ON Resistance*[1]	RONP	-	200	400	mΩ	PVcc=3.3V
Nch FET ON Resistance*[1]	RONN	-	160	350	mΩ	PVcc=3.3V
ADJ Reference Voltage	VADJ	0.788	0.800	0.812	V	
ITH SINK Current	ITHSI	10	20	-	μA	VADJ=1.0V
ITH Source Current	ITHSO	10	20	-	μA	VADJ=0.6V
UVLO Threshold Voltage	VUVLO1	2.400	2.500	2.600	V	Vcc=3.3V→0V
UVLO Hysteriesis Voltage	VUVLO2	2.425	2.550	2.700	V	Vcc=0V→3.3V
Soft Start Time	TSS	0.5	1	2	ms	
Timer Latch Time	TLATCH	1	2	3	ms	
Output Short circuit Threshold Voltage	VSCP	-	VOUT×0.5	VOUT×0.7	V	VOUT=1.2V→0V

◯PHYSICAL DIMENSION

5.0±0.15

BD9130

Lot No.

1PIN MARK

6.0±0.15

1.0MAX

4.2±0.1

3.6±0.1

0.8±0.1

0.59

0.4
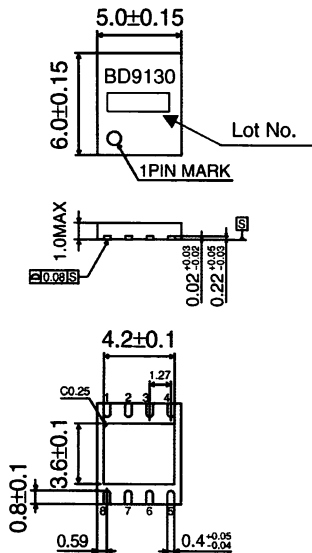
SON008V5060   (unit:mm)

◯ SETTING THE OUTPUT VOLTAGE
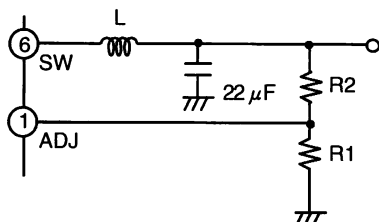
The Output Voltage is set by the external resistor divider and is calculated as :

$$Vout=(R2/R1+1)×VADJ \cdots ①$$ VADJ : ADJ pin reference Voltage (0.8V typ)

It's possible to adjust the output voltage by R1 and R2. (The Vout must be set from 1.0V to 2.5V.)

Resistance R1≒10kΩ is recommended. Please confirm the ripple voltage, if you can use the resistance more than 100kΩ.

◯BLOCK DIAGRAM・APPLICATION CIRCUIT
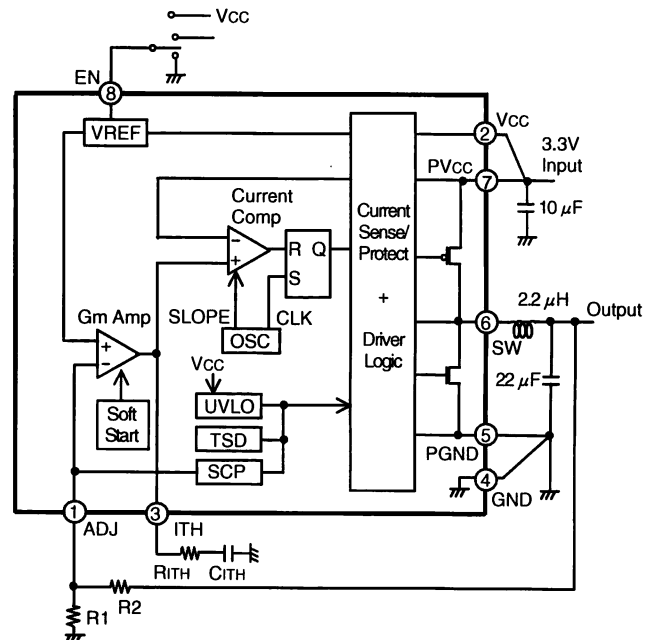
◯PIN No., PIN NAME

PIN No.	PIN Name
1	ADJ
2	Vcc
3	ITH
4	GND
5	PGND
6	SW
7	PVcc
8	EN

○NOTES FOR USE

(1) Absolute Maximum Ratings

We are careful enough for quality control about this IC. So, there is no problem under normal operation, excluding that it exceeds the absolute maximum ratings. However, this IC might be destroyed when the absolute maximum ratings, such as impressed voltages or the operating temperature range, is exceeded, and whether the destruction is short circuit mode or open circuit mode cannot be specified. Pleases take into consideration the physical countermeasures for safety, such as fusing, if a particular mode that exceeds the absolute maximum rating is assumed.

(2) GND Potential

Make setting of the potential of the GND terminal so that it will be maintained at the minimum in any operating state. Furthermore, check to be sure no terminals are at a potential lower than the GND voltage except for SW, PGND, GND terminals including an actual electric transient.

(3) Thermal design

Do not exceed the power dissipation (Pd) of the package specification rating under actual operation, and please design enough temperature margins.

(4) Short circuit mode between terminals and wrong mounting

In order to mount the IC on a set PCB, pay thorough attention to the direction and offset of the ICs. Erroneous mounting can destroy the IC. Furthermore, if a short circuit occurs due to foreign matters entering between terminals or between the terminal and the power supply or the GND terminal, the IC can destroy

(5) Operation in Strong electromagnetic field

Be noted that using the IC in the strong electromagnetic radiation can cause operation failures.

(6) ASO(Area of Safety Operation.)

Do not exceed the maximum ASO and the absolute maximum ratings of the output driver.

(7) TSD(Thermal Shut-Down) circuit

The thermal shutdown circuit (TSD circuit) is built in this product. When IC chip temperature becomes higher, the thermal shutdown circuit operates and turns output off. The guarantee and protection of IC are not purpose. Therefore, please do not use this IC after TSD circuit operates, nor use it for assumption that operates the TSD circuit.

(8) GND wiring pattern

Use separate ground lines for control signals and high current power driver outputs. Because these high current outputs that flows to the wire impedance changes the GND voltage for control signal. Therefore, each ground terminal of IC must be connected at the one point on the set circuit board. As for GND of external parts, it is similar to the above-mentioned.

(9) Operation in supply voltage range

Functional Circuit operation is guaranteed within operation ambient temperature, as long as it is within operation supply voltage range. The electrical characteristics standard value cannot be guaranteed.
However, there is no drastic variation in these values, as long as it is within operation supply voltage range.

(10) We are confident in recommending the above application circuit example, but we ask that you carefully check the characteristics of this circuit before using it. If using this circuit after modifying other external circuit constants, be careful to ensure adequate margins for variation between external devices and this IC, including not only static characteristics but also transient characteristics. If switching noise is high, please insert the Low pass filter between Vcc pin and PVcc pin, insert the schottky barrier diodes between SW pin and PGND pin.

(11) Overcurrent protection circuit

The overcurrent protection circuit is built in the output. If the protection circuit operates more than for specific hours (when the load is short.), the output will be latched in OFF. The output returns when EN is turned on or UVLO is released again. These protection circuits are effective in the destruction prevention by broken accident. Please do not use in continuous circuit operation.

(12) Selection of inductor

It is recommended to use an inductor with a series resistance element (DCR) 0.1 Ω or less. Especially, in case output voltage is set 1.6V or more, note that use of a high DCR inductor will cause an inductor loss, resulting in decreased output voltage. Should this condition continue for a specified period (soft start time + timer latch time), output short circuit protection will be activated and output will be latched OFF. When using an inductor over 0.1 Ω, be careful to ensure adequate margins for variation between external devices and this IC, including transient as well as static characteristics. Furthermore, in any case, it is recommended to start up the output with EN after supply voltage is within operation range.

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U.S.A / San Diego	TEL : +1(858)625-3630	FAX : +1(858)625-3670
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Germany / Dusseldorf	TEL : +49(2154)9210	FAX : +49(2154)921400
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Shanghai	TEL : +86(21)6279-2727	FAX : +86(21)6247-2066
Dilian	TEL : +86(411)8230-8549	FAX : +86(411)8230-8537
Beijing	TEL : +86(10)8525-2483	FAX : +86(10)8525-2489
Taiwan / Taipei	TEL : +866(2)2500-6956	FAX : +866(2)2503-2869
Korea / Seoul	TEL : +82(2)8182-700	FAX : +82(2)8182-715
Singapore	TEL : +65-6332-2322	FAX : +65-6332-5662
Malaysia / Kuala Lumpur	TEL : +60(3)7958-8355	FAX : +60(3)7958-8377
Philippines / Manila	TEL : +63(2)807-6872	FAX : +63(2)809-1422
Thailand / Bangkok	TEL : +66(2)254-4890	FAX : +66(2)256-6334

Japan /
(Internal Sales)

Tokyo   2-1-1, Yaesu, Chuo-ku, Tokyo 104-0082
                 TEL : +81(3)5203-0321   FAX : +81(3)5203-0300

Yokohama   2-4-8, Shin Yokohama, Kohoku-ku, Yokohama, Kanagawa 222-8575
                 TEL : +81(45)476-2131   FAX : +81(45)476-2128

Nagoya   Dainagayo Building 9F 3-28-12, Meieki, Nakamura-ku, Nagoya,Aichi 450-0002
                 TEL : +81(52)581-8521   FAX : +81(52)561-2173

Kyoto   579-32 Higashi Shiokouji-cho, Karasuma Nishi-iru, Shiokoujidori, Shimogyo-ku,
                 Kyoto 600-8216
                 TEL : +81(75)311-2121   FAX : +81(75)314-6559

(Contact address for overseas customers in Japan)

Yokohama   TEL : +81(45)476-9270   FAX : +81(045)476-9271

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