

STRUCTURE Silicon monolithic integrated circuits

PRODUCT SERIES Bipolar stepping motor driver

TYPE **BD6387EFV**

FUNCTION • PWM constant current controllable two H bridge driver
 • Built-in translator circuit for CLK-IN control
 • Full, Half, Quarter step
 • Mixed Decay control
 • Parallel IN control

○Absolute maximum ratings(Ta=25°C)

Item	Symbol	Limit	Unit
Supply voltage	V _{CC0,1,2}	-0.2~+36.0	V
Power dissipation	Pd	1.6 ^{*1}	W
		4.7 ^{*2}	W
Input voltage for control pin	V _{IN}	-0.2~+5.5	V
RNF maximum voltage	V _{RNF}	0.5	V
Maximum output current	I _{OUT}	2.0 ^{*3}	A/phase
Operating temperature range	T _{opr}	-25~+75	°C
Storage temperature range	T _{stg}	-55~+150	°C
Junction temperature	T _{jmax}	150	°C

*1 70mm×70mm×1.6mm glass epoxy board. Derating in done at 12.8mW/°C for operating above Ta=25°C.

*2 4-layer recommended board. Derating in done at 37.6mW/°C for operating above Ta=25°C.

*3 Do not, however exceed Pd, ASO and Tjmax=150°C.

○Recommended operating conditions (Ta=-25~+75°C)

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	V _{CC0,1,2}	10	24	28	V
Output current	I _{OUT}	-	1.5	1.7 ^{*4}	A/phase

*4 Do not, however exceed Pd, ASO.

This product isn't designed for protection against radioactive rays.

Status of this document

The Japanese version of this document is the formal specification.

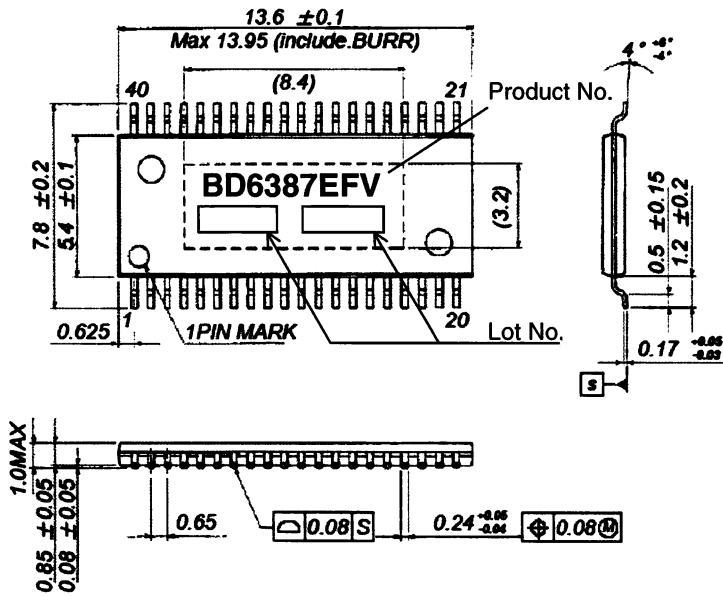
A customer may use this translation version only for a reference to help reading the formal version.

If there are any differences in translation version of this document, formal version takes priority.

○Electrical characteristics (Unless otherwise specified Ta=25°C, VCC0,1,2=24V)

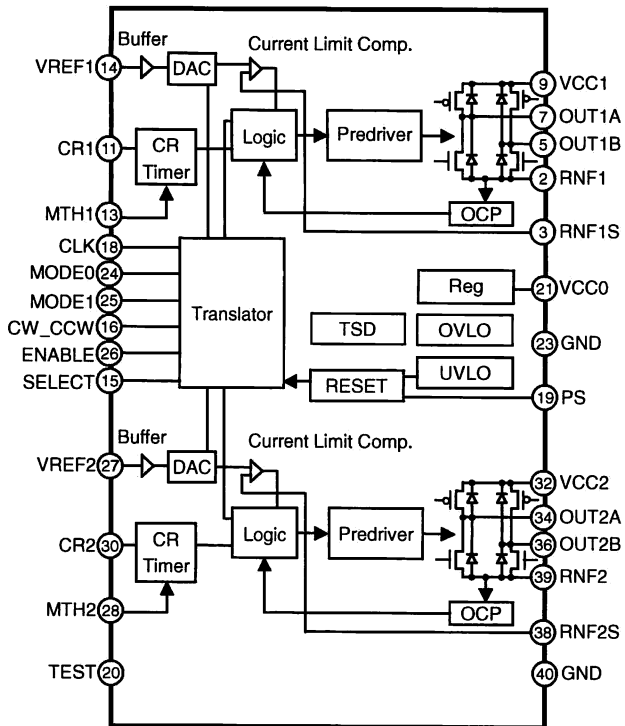
Item	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Whole						
Circuit current at standby	I _{CCST}	-	1.0	3.0	mA	PS=L
Circuit current	I _{CC}	-	4.5	10	mA	PS=H, VREFX=2V
Control input (SELECT, CW_CCW, CLK, PS, MODE0, MODE1, ENABLE)						
H level input voltage	V _{INH}	2.0	-	-	V	
L level input voltage	V _{INL}	-	-	0.8	V	
H level input current	I _{INH}	35	50	85	μA	V _{IN} =5V
L level input current	I _{INL}	-10	0	-	μA	V _{IN} =0V
Output (OUT1A, OUT1B, OUT2A, OUT2B)						
Output ON resistance	R _{ON}	-	0.8	1.04	Ω	I _{OUT} =1.5A, Sum of upper and lower
Output leak current	I _{LEAK}	-	-	10	μA	
Current control						
RNFXS input current	I _{RNFS}	-2.0	-0.2	-	μA	RNFXS =0V
RNFX input current	I _{RNF}	-40	-20	-	μA	RNFX=0V
VREFX input current	I _{VREF}	-2.0	-0.1	-	μA	VREFX=0V
VREFX input voltage range	V _{REF}	0	-	2.0	V	
MTHX input current	I _{MTH}	-2.0	-0.1	-	μA	MTHX=0V
MTHX input voltage range	V _{MTH}	0	-	3.5	V	
Comparator threshold	V _{CTH}	0.36	0.4	0.44	V	VREFX=2V
Minimum on time	t _{ONMIN}	0.3	0.7	1.2	μs	R=39kΩ, C=1000pF

○ Package outline



HTSSOP-B40 (Unit:mm)

○ Block diagram



○ Pin No. / Pin name

Pin No.	Pin name	Pin No.	Pin name
1	NC	21	VCC0
2	RNF1	22	NC
3	RNF1S	23	GND
4	NC	24	MODE0
5	OUT1B	25	MODE1
6	NC	26	ENABLE
7	OUT1A	27	VREF2
8	NC	28	MTH2
9	VCC1	29	NC
10	NC	30	CR2
11	CR1	31	NC
12	NC	32	VCC2
13	MTH1	33	NC
14	VREF1	34	OUT2A
15	SELECT	35	NC
16	CW_CCW	36	OUT2B
17	NC	37	NC
18	CLK	38	RNF2S
19	PS	39	RNF2
20	TEST	40	GND

NC : Non Connection

○Operation Notes

- (1) Absolute maximum ratings
An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down the devices, thus making impossible to identify breaking mode, such as a short circuit or an open circuit. If any over rated values will expect to exceed the absolute maximum ratings, consider adding circuit protection devices, such as fuses.
- (2) Power supply lines
As return of current regenerated by back EMF of motor happens, take steps such as putting capacitor between power supply and GND as an electric pathway for the regenerated current. Be sure that there is no problem with each property such as emptied capacity at lower temperature regarding electrolytic capacitor to decide capacity value. If the connected power supply does not have sufficient current absorption capacity, regenerative current will cause the voltage on the power supply line to rise, which combined with the product and its peripheral circuitry may exceed the absolute maximum ratings. It is recommended to implement a physical safety measure such as the insertion of a voltage clamp diode between the power supply and GND pins.
- (3) GND potential
The potential of GND pin must be minimum potential in all operating conditions.
- (4) Thermal design
Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions. This IC exposes its frame of the backside of package. Note that this part is assumed to use after providing heat dissipation treatment to improve heat dissipation efficiency. Try to occupy as wide as possible with heat dissipation pattern not only on the board surface but also the backside.
- (5) Actions in strong electromagnetic field
Use caution when using the IC in the presence of a strong electromagnetic field as doing so may cause the IC to malfunction.
- (6) ASO
When using the IC, set the output transistor so that it does not exceed absolute maximum ratings or ASO.
- (7) Thermal shutdown circuit
The IC has a built-in thermal shutdown circuit (TSD circuit). If the chip temperature becomes $T_{jmax}=150^{\circ}\text{C}$, and higher, coil output to the motor will be open. The TSD circuit is designed only to shut the IC off to prevent runaway thermal operation. It is not designed to protect or indemnify peripheral equipment. Do not use the TSD function to protect peripheral equipment.
- (8) Ground Wiring Pattern
When using both small signal and large current GND patterns, it is recommended to isolate the two ground patterns, placing a single ground point at the ground potential of application so that the pattern wiring resistance and voltage variations caused by large currents do not cause variations in the small signal ground voltage. Be careful not to change the GND wiring pattern of any external components, either.
- (9) TEST pin
Be sure to connect TEST pin to GND.

Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available,
please contact your nearest sales office.

Please contact our sales offices for details ;

U.S.A / San Diego	TEL : +1(858)625-3630	FAX : +1(858)625-3670
Atlanta	TEL : +1(770)754-5972	FAX : +1(770)754-0691
Dallas	TEL : +1(972)312-8818	FAX : +1(972)312-0330
Germany / Dusseldorf	TEL : +49(2154)9210	FAX : +49(2154)921400
United Kingdom / London	TEL : +44(1)908-282-666	FAX : +44(1)908-282-528
France / Paris	TEL : +33(0)1 56 97 30 60	FAX : +33(0) 1 56 97 30 80
China / Hong Kong	TEL : +852(2)740-6262	FAX : +852(2)375-8971
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
----------	-----------------------	------------------------