

STRUCTURE                    Silicon monolithic integrated circuits

PRODUCT SERIES            Bipolar stepping motor driver

TYPE                            **BD6384EFV**

FUNCTION                    • PWM constant current controllable two H bridge driver  
                                      • Mixed Decay control

○Absolute maximum ratings (Ta=25°C)

Item	Symbol	Limit	Unit
Supply voltage	VCC	7	V
	VM0,1,2	36	V
Power dissipation	Pd	1.6* <sup>1</sup>	W
Input voltage for control pin	VIN	0~VCC	V
RNF voltage	VRNF	0.5	V
Maximum output current	IOUT	1.5* <sup>2</sup>	A
Operating temperature range	Topr	-25~+85	°C
Storage temperature range	Tstg	-55~+150	°C
Junction temperature	Tjmax	150	°C

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

\*<sup>2</sup> Do not, however exceed Pd, ASO and Tjmax=150°C.

○Recommended operating conditions (Ta=-25~+85°C)

Item	Symbol	Min	Typ	Max	Unit
Supply voltage	VCC	3.0	5.0	5.5	V
	VM0,1,2	16	24	28	V
Output current	IOUT	-	1000	1200* <sup>3</sup>	mA

\*<sup>3</sup> Do not, however exceed Pd, ASO.

This product described in this specification isn't judged whether it applies to COCOM regulations.  
 Please confirm in case of export.  
 This product isn't designed for protection against radioactive rays.

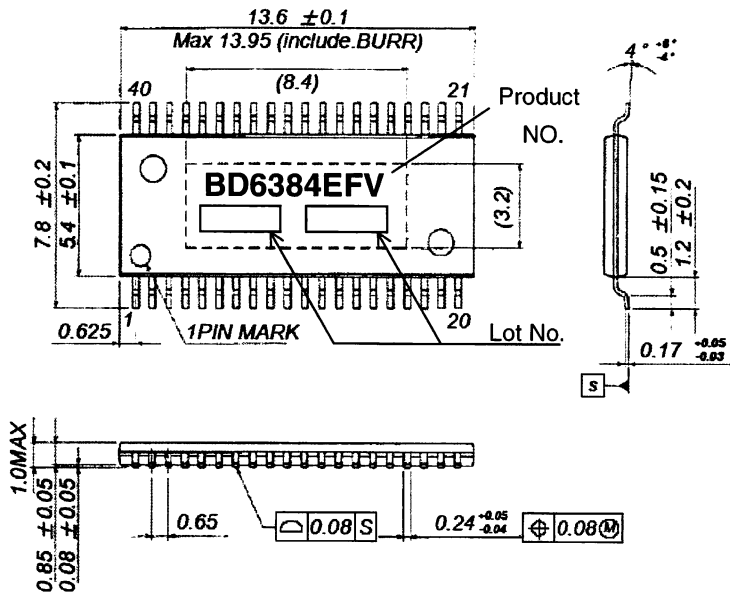
Status of this document

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, VCC=5V, VM=24V)

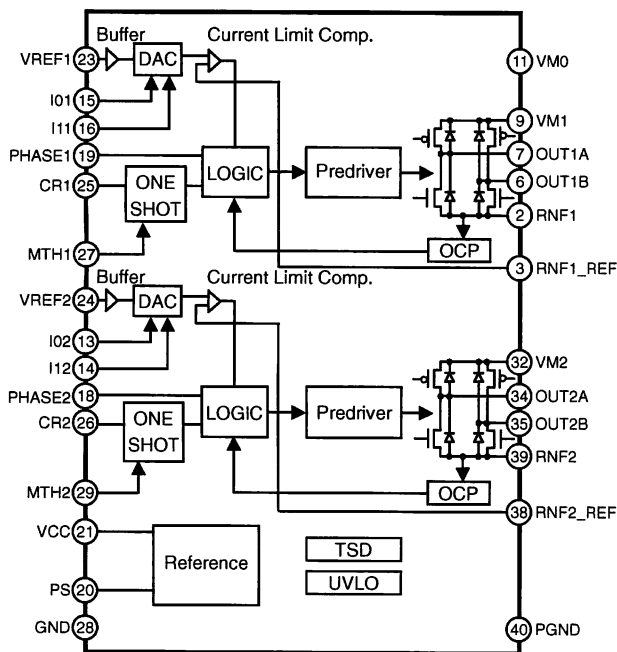
Item	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
<b>Whole circuit</b>						
VCC circuit current at standby	ICCST	-	0	10	μA	PS=L
VCC circuit current	ICC	-	3	5	mA	PS=H, VREFX=2V
VM current at standby	IVMST	-	0	10	μA	PS=L
VM circuit current	IVM	-	1.5	3	mA	PS=H, VREFX=2V
<b>Control input VCC=3.3V</b>						
H level input voltage	VINH1	2.0	-	3.3	V	
L level input voltage	VINL1	0	-	0.8	V	
<b>Control input VCC=5.0V</b>						
H level input voltage	VINH2	2.5	-	5.0	V	
L level input voltage	VINL2	0	-	0.8	V	
<b>Output</b>						
Output ON resistance	RON	-	1.2	1.44	Ω	IOUT=1.0A, Sum of upper and lower
Output leak current	ILEAK	-	-	10	μA	
<b>Current control part</b>						
RNF <sub>X</sub> _REF input current	IRNF_REF	-2	-0.6	-	μA	RNF <sub>X</sub> _REF=0V
RNF <sub>X</sub> input current	IRNF	-40	-20	-	μA	
VREF <sub>X</sub> input current	IVREF	-1	-0.1	-	μA	VREF <sub>X</sub> =0V
VREF <sub>X</sub> input voltage range	VREF	0	-	2	V	
MTH <sub>X</sub> input current	IMTH	-1	-0.1	-	μA	MTH <sub>X</sub> =0V
MTH <sub>X</sub> input voltage range	MTH	0	-	2	V	
Comparator threshold (100%)	CTHLL	0.34	0.4	0.46	V	VREF <sub>X</sub> =2V,I0x=L,I1x=L
Comparator threshold (67%)	CTHHL	0.227	0.267	0.307	V	VREF <sub>X</sub> =2V,I0x=H,I1x=L
Comparator threshold (33%)	CTHLH	0.113	0.133	0.153	V	VREF <sub>X</sub> =2V,I0x=L,I1x=H
Minimum on time	TMINON	0.3	0.7	1.2	μsec	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	N.C.	21	VCC
2	RNF1	22	N.C.
3	RNF1_REF	23	VREF1
4	N.C.	24	VREF2
5	N.C.	25	CR1
6	OUT1B	26	CR2
7	OUT1A	27	MTH1
8	N.C.	28	GND
9	VM1	29	MTH2
10	N.C.	30	N.C.
11	VM0	31	N.C.
12	N.C.	32	VM2
13	I02	33	N.C.
14	I12	34	OUT2A
15	I01	35	OUT2B
16	I11	36	N.C.
17	N.C.	37	N.C.
18	PHASE2	38	RNF2_REF
19	PHASE1	39	RNF2
20	PS	40	PGND

○Operation Notes

- (1) Absolute maximum ratings  
 Use of the IC in excess of absolute maximum ratings such as the applied voltage or operating temperature range may result in IC damage. Assumptions should not be made regarding the state of the IC (short mode or open mode) when such damage is suffered. A physical safety measure such as a fuse should be implemented when use of the IC in a special mode where the absolute maximum ratings may be exceeded is anticipated.
- (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 a 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  
 Ensure a minimum GND pin potential in all operating conditions.
- (4) Setting of heat  
 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 magnetic field  
 Use caution when using the IC in the presence of a strong magnetic 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  
 This IC incorporates a TSD (Thermal shutdown) circuit. If the chip becomes the following temperature, 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 guarantee peripheral equipment. Do not use the TSD function to protect peripheral equipment.

TSD on temperature [°C] (min.)	Hysteresis temperature [°C] (typ.)
150	25

- (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 application's reference point 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.

### 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
----------	-----------------------	------------------------