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℃)

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

*1 70mm×70mm×1.6mm glass epoxy board. Derating in done at 12.8mW/℃ for operating above Ta=25℃.
*2 Do not, however exceed Pd, ASO and Tjmax=150℃.

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

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*3	mA

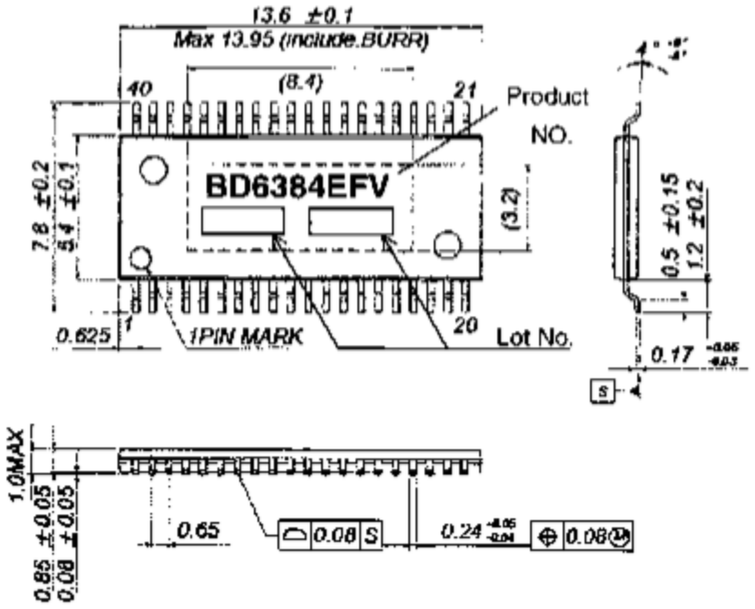
*3 Do not, however exceed Pd, ASO.

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.

○Electrical characteristics (Unless otherwise specified Ta=25℃, VCC=5V, VM=24V)

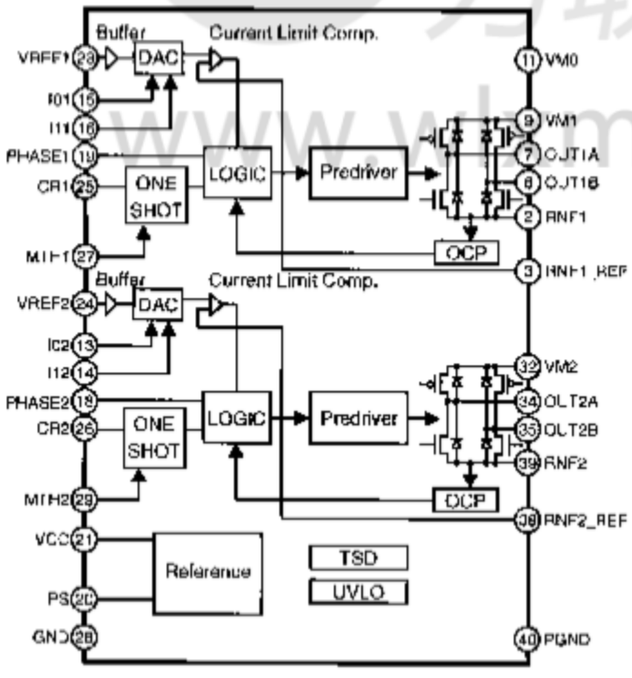
Item	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Whole circuit						
VCC circuit current at standby	ICCST	-	0	10	μA	PS=L
VCC circuit current	ICC	-	3	5	mA	PS=H, VREFX=2V
VM current at standby	IVMST	-	0	10	μA	PS=L
VM circuit current	IVM	-	1.5	3	mA	PS=H, VREFX=2V
Control input VCC=3.3V						
H level input voltage	VINH1	2.0	-	3.3	V	
L level input voltage	VINL1	0	-	0.8	V	
Control input VCC=5.0V						
H level input voltage	VINH2	2.5	-	5.0	V	
L level input voltage	VINL2	0	-	0.8	V	
Output						
Output ON resistance	RON	-	1.2	1.44	Ω	IOUT=1.0A, Sum of upper and lower
Output leak current	ILEAK	-	-	10	μA	
Current control part						
RNFX_REF input current	IRNF_REF	-2	-0.6	-	μA	RNFX_REF=0V
RNFX input current	IRNF	-40	-20	-	μA	
VREFX input current	IVREF	-1	-0.1	-	μA	VREFX=0V
VREFX input voltage range	VREF	0	-	2	V	
MTHX input current	IMTH	-1	-0.1	-	μA	MTHX=0V
MTHX input voltage range	MTH	0	-	2	V	
Comparator threshold (100%)	CTHLL	0.34	0.4	0.46	V	VREFX=2V,I0x=L,I1x=L
Comparator threshold (67%)	CTHHL	0.227	0.267	0.307	V	VREFX=2V,I0x=H,I1x=L
Comparator threshold (33%)	CTHLH	0.113	0.133	0.153	V	VREFX=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.

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东京	东京都中央区八重2-1-1，邮编：104-0082	
	电话：+81（3）5203-0321	传真：+81（3）5203-0300
横滨	神奈川县横滨市港北区新横滨2-4-8电话222-8575	
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