STRUCTURE Silicon Monolithic Integrated Circuit
PRODUCT SERIES Stepping Motor Driver for Digital Still Camera

TYPE **BD6758MWV**

FUNCTION
- Built in 4 H Bridge driver
- Built in 1 H Bridge driver (constant current type)
- Switching drive
- Low on resistance (POWER CMOS)

○Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Limit	Unit
Supply voltage VCC	VCC	0 ～ +7.0	V
Supply voltage VM	VM	0 ～ +7.0	V
Control input voltage	VIN	0～ VCC	V
Power dissipation	Pd	880 (*1)	mW
Operating Temperature range	Topr	-20 ～ +85	℃
Junction temperature	Tj	～ +150	℃
Storage temperature range	Tstg	-55 ～ +150	℃
Maximum output current	Iout	800 (*2)	mA

(*1) 74.2mm×74.2mm×1.6mm glass epoxy board.
(*1) Debating in done at 7.0mW/℃ for operating above Ta=25℃.
(*2) Do not, however exceed Pd, ASO and Tj=150℃.

○Operating Conditions

Item	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage VCC	VCC	2.5	3.0	5.5	V
Power supply voltage VM	VM	2.5	5.0	5.5	V
Control input voltage	VIN	0	–	VCC	V
H Bridge output current	Iout	–	–	±500 (*3)	mA
Logic input frequency	FIN	0	–	100	kHz

(*3) 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℃, VCC=3.0V, VM=5.0V)

Item	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Whole circuits						
Circuit current at standby	ICCST	-	0	10	μA	PS=L
Circuit current	ICC	-	1.4	2.5	mA	PS=H, No signal input
Power save						
H level input voltage	VPSH	2.0	-	-	V	
L level input voltage	VPSL	-	-	0.7	V	
H level input current	IPSH	15	30	60	μA	PS=3V
L level input current	IPSL	-	0	-	μA	PS=0V
Control input						
H level input voltage	VINH	2.0	-	-	V	IN1A~IN5,SEL1,SEL2,EN1, BRK1,BRK2
L level input voltage	VINL	-	-	0.7	V	〃
H level input current	IINH	15	30	60	μA	〃, VIN=3V
L level input current	IINL	-	0	-	μA	〃, VIN=0V
Pull-down resistance	RIN	-	100	-	kΩ	
UVLO						
UVLO voltage	VUVLO	1.6	-	2.4	V	

Stepping Motor Driver

Item	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Output ON Resistance	RON	-	1.2	1.5	Ω	Io=±400mA Sum of on-resistance of upside and bottom side

Constant Current Driver

Item	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Output ON Resistance	RON	-	1.0	1.25	Ω	Io=±400mA Sum of on-resistance of upside and bottom side
VREF output voltage	VREF	1.16	1.20	1.24	V	Iout=0~1mA
Output Limit voltage	VOL	194	200	206	mV	RNF=0.5Ω, VLIM = 0.2V
Output Min Limit voltage	VLMIN	-	-	30	mV	RNF=0.5Ω

○Package Outline

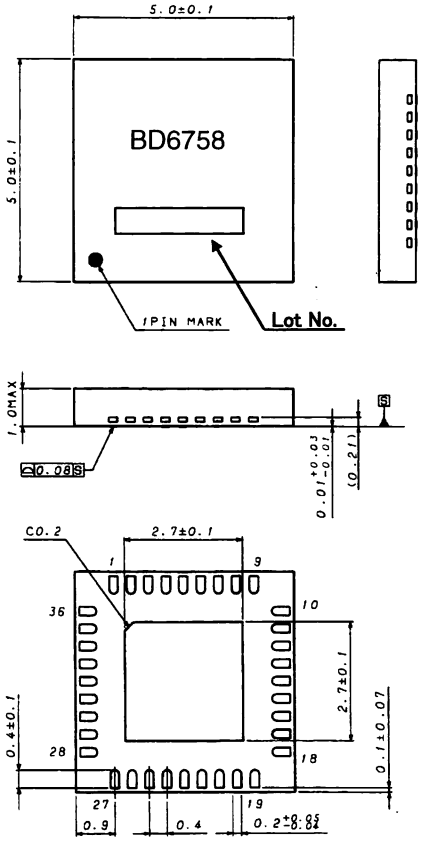

Fig.1 UQFN036V5050 (Unit : mm)

○Terminal Function Table

No.	Terminal name	Function
1	IN1B	Control input terminal ch1 B
2	IN2A	Control input terminal ch2 A
3	IN2B	Control input terminal ch2 B
4	VCC	Power supply terminal
5	GND	Digital GND terminal
6	IN3A	Control input terminal ch3 A
7	IN3B	Control input terminal ch3 B
8	IN4A	Control input terminal ch4 A
9	IN4B	Control input terminal ch4 B
10	BRK1	Brake input terminal ch3
11	BRK2	Brake input terminal ch4
12	OUT3A	H Bridge output terminal ch3 A
13	OUT3B	H Bridge output terminal ch3 B
14	VM2	Power supply terminal for Motor ch3,4
15	PGND2	H Bridge GND terminal ch 3,4
16	OUT4A	H Bridge output terminal ch4 A
17	OUT4B	H Bridge output terminal ch4 B
18	SEL2	Selecter terminal ch3,4
19	VLIM	Current limit control terminal
20	VREF	Regulator output terminal
21	OUT5A	H Bridge output terminal ch5 A
22	SENSE	Current detection terminal
23	RNF	Resistor connection terminal for the current detection
24	VM3	Power supply terminal for Motor ch5
25	OUT5B	H Bridge output terminal ch5 B
26	IN5	Control input terminal ch5 INPUT
27	EN1	Control input terminal ch5 ENABLE
28	SEL1	Selecter terminal ch1,2
29	OUT1A	H Bridge output terminal ch1 A
30	OUT1B	H Bridge output terminal ch1 B
31	VM1	Power supply terminal for Motor ch1,2
32	PGND1	H Bridge GND terminal ch1,2
33	OUT2A	H Bridge output terminal ch2 A
34	OUT2B	H Bridge output terminal ch2 B
35	PS	Power save terminal
36	IN1A	Control input terminal ch1 A

○Block Diagram

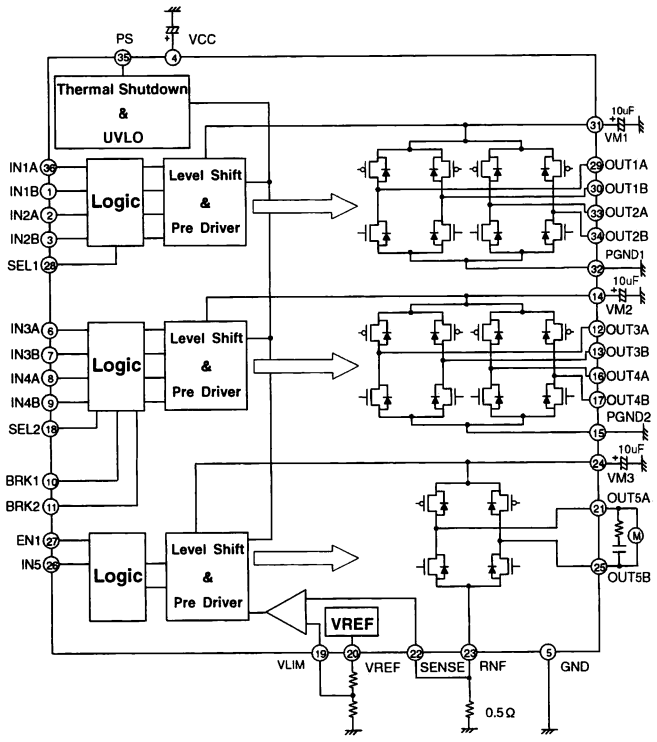

Fig.2 BD6758MWV Block Diagram

○Input-output Logic Table

H Bridge ch1, ch2

	INPUT			OUTPUT	
	SEL	IN_A	IN_B	OUT_A	OUT_B
LOGIC	L	L	L	H	L
	L	L	H	L	H
	L	H	X	Z	Z
	H	L	L	Z	Z
	H	L	H	L	H
	H	H	L	H	L
	H	H	H	L	L

H Bridge ch3, ch4

	INPUT				OUTPUT	
	SEL	BRK	IN_A	IN_B	OUT_A	OUT_B
LOGIC	L	L	L	L	H	L
	L	L	L	H	L	H
	L	X	H	X	Z	Z
	L	H	L	X	L	L
	H	X	L	L	Z	Z
	H	X	L	H	L	H
	H	X	H	L	H	L
	H	X	H	H	L	L

Constant current driver ch5

	INPUT		OUTPUT	
	EN	IN	OUT_A	OUT_B
LOGIC	H	X	Z	Z
	L	L	H	L
	L	H	L	H

H : High, L : Low, X : Don't care, Z : Hi impedance

○Cautions

1.) Absolute maximum ratings

Absolute maximum ratings are those values which, if exceeded, may cause the life of a device to become significantly shortened. Moreover, the exact failure mode cannot be defined, such as a short or an open. Physical countermeasures, such as a fuse, need to be considered when using a device beyond its maximum ratings.

2.) Power supply pins and lines

None of the VM line for the H-bridges is internally connected to the VCC power supply line, which is only for the control logic or analog circuit. Therefore, the VM and VCC lines can be driven at different voltages. Although these lines can be connected to a common power supply, do not open the power supply pin but connect it to the power supply externally.

Regenerated current may flow as a result of the motor's back electromotive force. Insert capacitors between the power supply and ground pins to serve as a route for regenerated current. Determine the capacitance in full consideration of all the characteristics of the electrolytic capacitor, because the electrolytic capacitor may loose some capacitance at low temperatures. 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 ground pins.

For this IC with 2 power supplies and a part consists of the CMOS block, it is possible that rush current may flow instantaneously due to the internal powering sequence and delays, and to the unstable internal logic, respectively. Therefore, give special consideration to power coupling capacitance, width of power and ground wirings, and routing of wiring.

3.) Ground pins and lines

Ensure a minimum GND pin potential in all operating conditions. Make sure that no pins are at a voltage below the GND at any time, regardless of whether it is a transient signal or not.

When using both small signal GND and large current PGND (RNF) 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.

The power supply and ground lines must be as short and thick as possible to reduce line impedance.

4.) Input terminals

Voltage should never be applied to the every input terminals unless VCC is already applied to the IC. Similarly when VCC is applied to the IC, the voltage on the input terminals should not be allowed to rise VCC or beyond the limits of Electrical characteristics.

5.) Thermal design

The thermal design should allow enough margin for actual power dissipation.

6.) Mounting failures

Mounting failures, such as misdirection or miss-mounts, may destroy the device.

7.) Electromagnetic fields

A strong electromagnetic field may cause malfunctions.

8.)Thermal shut down(T.S.D.) circuit

T.S.D. circuit shut down all circuit at about 175℃(typ.) with junction temperature. It has the temperature hysteresis of about 25℃(typ).

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www.rohm.com

Contact us : webmaster@rohm.co.jp

ROHM CO., LTD. 21, Saiin Mizosaki-cho, Ukyo-ku, Kyoto 615-8585, Japan
TEL : +81-75-311-2121
FAX : +81-75-315-0172