STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT SERIES 2ch Motor Driver

TYPE BD6884GUW

FEATURES
- Built in 1 Constant-Voltage Driver
- Built in 1 Linear Constant-Current Driver

●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limit	Unit
Power supply voltage	VCC	-0.5 to +6.5	V
Motor power supply voltage	VM	-0.5 to +6.5	V
Control input voltage	VIN	-0.5 to VCC+0.5	V
Input voltage for Constant-Voltage setting	VLIM	-0.5 to VM+0.5	V
Power dissipation	Pd	540※1	mW
Operating temperature range	Topr	-25 to +85	°C
Junction temperature	Tjmax	150	°C
Storage temperature range	Tstg	-55 to +150	°C
H-bridge output current	Iout	-800 to +800※2	mA/ch

※1 Reduced by 4.32mW/°C over 25°C, when mounted on a glass epoxy board (70mm × 70mm × 1.6mm)
※2 Must not exceed Pd, ASO, or Tjmax of 150°C.

●Operating Conditions (Ta= -25°C to +85°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	VCC	2.5	3.0	5.5	V
Motor power supply voltage	VM	2.5	5.0	5.5	V
Control input voltage	VIN	0	-	VCC	V
Input voltage for Constant-Voltage setting	VLIM	0	-	VM	V
H-bridge output current	Iout	-	-	±500※3	mA/ch

※3 Must not exceed Pd or ASO.

The product described in this specification is a strategic product (and/or service) subject to COCOM regulations.
It should not be exported without authorization from the appropriate government authorities.
This product isn't designed for protection against radioactive rays.

●Package Outline

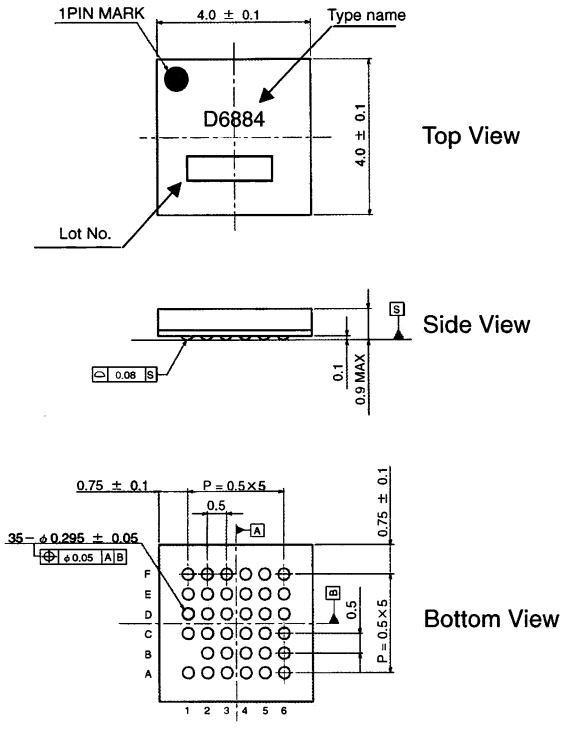

Fig.1 VBGA035W040 Package (Unit: mm)

●Pin Arrangement (Top View)

	1	2	3	4	5	6
A	N.C.	VREF	CLIMH	CLIML	CLIMS	N.C.
B		IN2A	N.C.	VLIM	IN1A	SEL
C	PS	IN2B	N.C.	N.C.	IN1B	GND
D	VCC	VM2	N.C.	N.C.	VM1	N.C.
E	RNF	SENSE	N.C.	N.C.	N.C.	PGND
F	N.C.	OUT2A	OUT2B	OUT1B	OUT1A	N.C.

Fig.2 BD6884GUW Pin Arrangement (Top View)

●Block Diagram

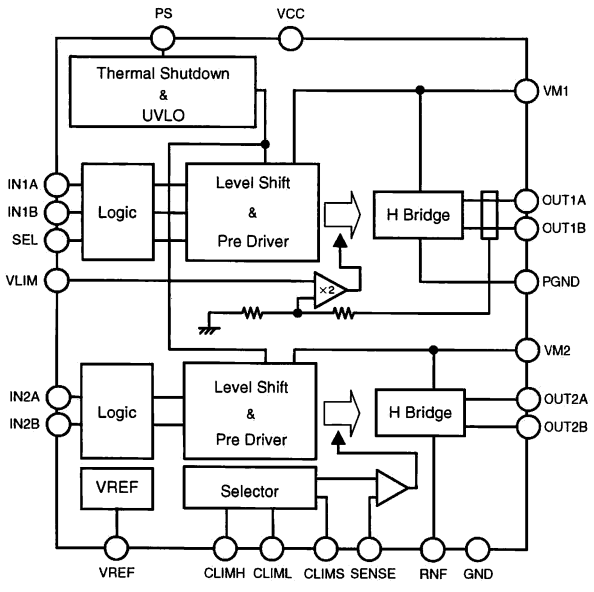

Fig.3 BD6884GUW Block Diagram

●Pin No. and Pin Name

No.	Pin name	No.	Pin name
1A	N.C.	1D	VCC
2A	VREF	2D	VM2
3A	CLIMH	3D	N.C.
4A	CLIML	4D	N.C.
5A	CLIMS	5D	VM1
6A	N.C.	6D	N.C.
1B		1E	RNF
2B	IN2A	2E	SENSE
3B	N.C.	3E	N.C.
4B	VLIM	4E	N.C.
5B	IN1A	5E	N.C.
6B	SEL	6E	PGND
1C	PS	1F	N.C.
2C	IN2B	2F	OUT2A
3C	N.C.	3F	OUT2B
4C	N.C.	4F	OUT1B
5C	IN1B	5F	OUT1A
6C	GND	6F	N.C.

●BD6884GUW Electrical Characteristics (Unless otherwise specified, Ta=25°C, VCC=3.0V, VM=5.0V)

Parameter	Symbol	Limit			Unit	Conditions
		Min.	Typ.	Max.		
Overall						
Circuit current during standby operation	ICCST	-	0	10	μA	PS=L
Circuit current 1	ICC	-	1.0	1.5	mA	PS=H with no signal
Circuit current 2	IM	-	0.4	0.7	mA	PS=H, and VLIM=5V with no signal
Control input						
High-level input voltage	VINH	2.0	-	-	V	INxA, INxB, SEL, CLIMS, PS
Low-level input voltage	VINL	-	-	0.7	V	INxA, INxB, SEL, CLIMS, PS
High-level input current	IINH	15	30	60	μA	INxA, INxB, SEL, CLIMS, PS; VIN=3V
Low-level input current	IINL	-1	0	-	μA	INxA, INxB, SEL, CLIMS, PS; VIN=0V
Pull-down resistor	RIN	50	100	200	kΩ	INxA, INxB, SEL, CLIMS, PS
Input for Constant-Voltage setting						
Input current	IVLIM	-1.5	-0.5	-	μA	VLIM=0V
UVLO						
UVLO voltage	VUVLO	1.6	-	2.4	V	
Constant-Voltage Drive block (ch1)						
Output ON-Resistance	RON	-	1.5	2.0	Ω	Io=±400mA on high and low sides in total
Output high-level voltage	VOH	1.9×VLIM	2.0×VLIM	2.1×VLIM	V	VLIM=1V with 10Ω load
Turn-on time	ton	-	1.5	5.0	μs	VLIM=VM with 10Ω load※4
Turn-off time	toff	-	0.1	2.0	μs	VLIM=VM with 10Ω load※4
Rise time	tr	-	2.0	8.0	μs	VLIM=VM with 10Ω load※4
Fall time	tf	-	0.05	1.0	μs	VLIM=VM with 10Ω load※4
Linear Constant-Current Drive block (ch2)						
Output ON-Resistance	RON	-	1.0	1.25	Ω	Io=±400mA on high and low sides in total
VREF output voltage	VREF	0.88	0.90	0.92	V	Iout=0~1mA
Output limit voltage 1	VOL1	291	300	309	mV	RNF=1.5Ω with 10Ω load, CLIM=0.3V
Output limit voltage 2	VOL2	437	450	463	mV	RNF=1.5Ω with 10Ω load, CLIM=0.45V
Output limit voltage 3	VOL3	194	200	206	mV	RNF=0.5Ω with 10Ω load, CLIM=0.2V
Min. value for output current setting	IOLMIN	60	-	-	mA	RNF=2.5Ω
Turn-on time	ton	-	1.0	5.0	μs	RNF=0.5Ω with 10Ω load, CLIM=0.2V※4
Turn-off time	toff	-	0.1	2.0	μs	RNF=0.5Ω with 10Ω load, CLIM=0.2V※4
Rise time	tr	-	0.5	8.0	μs	RNF=0.5Ω with 10Ω load, CLIM=0.2V※4
Fall time	tf	-	0.07	1.0	μs	RNF=0.5Ω with 10Ω load, CLIM=0.2V※4

※4 Design target value (No total shipped devices are fully tested.)

●I/O Truth Table

BD6884GUW Constant-Voltage Driver ch1 I/O Truth Table

Input mode	INPUT				OUTPUT	
	PS	SEL	IN1A	IN1B	OUT1A	OUT1B
EN/IN	H	L	L	X	Z	Z
			H	L	H	L
			H	H	L	H
IN/IN		H	L	L	Z	Z
			H	L	H	L
			L	H	L	H
			H	H	L	L
-	L	X	X	X	Z	Z

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

The OUTPUTs are provided with feed back resistor. This is so that GND voltage will be output, when the OUTPUT is "Z".

BD6884GUW Linear Constant-Current Driver ch2 I/O Truth Table

Input mode	INPUT			OUTPUT	
	PS	IN2A	IN2B	OUT2A	OUT2B
EN/IN	H	L	X	Z	Z
		H	L	H	L
		H	H	L	H
-	L	X	X	Z	Z

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

●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 (Topr) 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. The implementation of a physical safety measure such as a fuse should be considered when use of the IC in a special mode where the absolute maximum ratings may be exceeded is anticipated.

(2) Power supply lines

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 GND pins.

(3) Ground 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.

(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 for the motor so that it does not exceed absolute maximum ratings or ASO.

(7) Thermal shutdown circuit

This IC incorporates a TSD (thermal shutdown) circuit (TSD circuit). If the temperature of the chip reaches the following temperature, the motor coil output will be opened. The thermal shutdown circuit (TSD circuit) is designed only to shut the IC off to prevent runaway thermal operation. It is not designed to protect the IC or guarantee its operation. Do not continue to use the IC after operating this circuit or use the IC in an environment where the operation of this circuit is assumed.

TSD ON temperature [°C] (Typ.)	Hysteresis temperature [°C] (Typ.)
175	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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