

STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT SERIES 6ch Stepping Motor Driver

TYPE **BD6873KN**

FEATURES • Built in 5 Full-ON Drivers
 • Built in 1 Linear Constant-Current Driver

●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limit	Unit
Power supply voltage	VCC	0 to +7.0	V
Motor power supply voltage	VM	0 to +7.0	V
Control input voltage	VIN	0 to VCC	V
Power dissipation	Pd	950 ^{*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 7.6mW/°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
Output current control input voltage range	VLIM	0	-	VCC	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

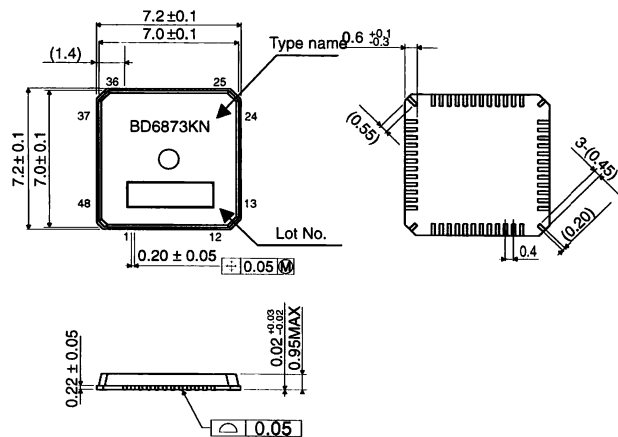


Fig.1 UQFN48 Package (Unit: mm)

●Pin Arrangement (Top View)

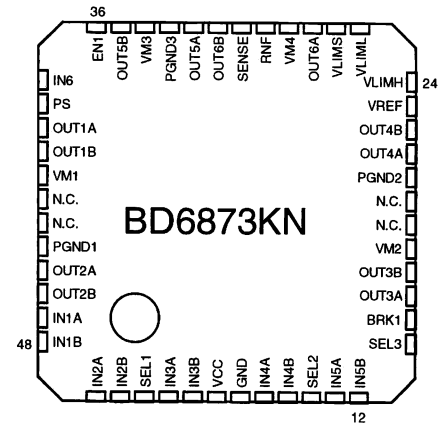


Fig.2 BD6873KN Pin Arrangement (Top View)

- Block Diagram

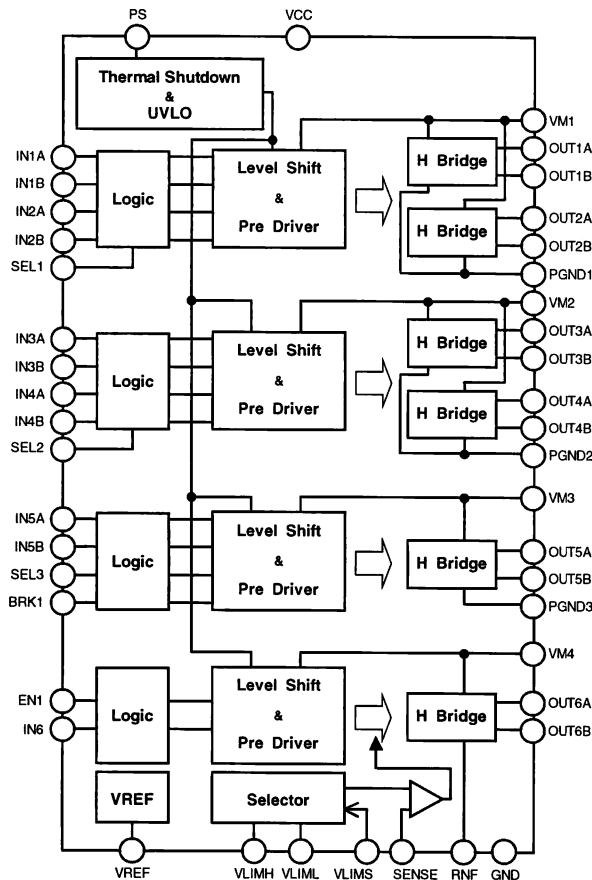


Fig.3 BD6873KN Block Diagram

●Pin No. and Pin Name

No.	Pin name	No.	Pin name
1	IN2A	25	VLIML
2	IN2B	26	VLIMS
3	SEL1	27	OUT6A
4	IN3A	28	VM4
5	IN3B	29	RNF
6	VCC	30	SENSE
7	GND	31	OUT6B
8	IN4A	32	OUT5A
9	IN4B	33	PGND3
10	SEL2	34	VM3
11	IN5A	35	OUT5B
12	IN5B	36	EN1
13	SEL3	37	IN6
14	BRK1	38	PS
15	OUT3A	39	OUT1A
16	OUT3B	40	OUT1B
17	VM2	41	VM1
18	N.C.	42	N.C.
19	N.C.	43	N.C.
20	PGND2	44	PGND1
21	OUT4A	45	OUT2A
22	OUT4B	46	OUT2B
23	VREF	47	IN1A
24	VLMH	48	IN1B

●BD6873KN 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	ICC	-	1.2	2.3	mA	PS=H with no signal
Power-saving						
High level input voltage	VPSH	2.0	-	-	V	
Low level input voltage	VPSL	-	-	0.7	V	
High level input current	IPSH	15	30	60	μA	PS=3V
Low level input current	IPSL	-1	0	-	μA	PS=0V
Control input						
High level input voltage	VINH	2.0	-	-	V	IN1A~IN5B, SEL1~3, BRK1, EN1, IN6, VLIMS
Low level input voltage	VINL	-	-	0.7	V	IN1A~IN5B, SEL1~3, BRK1, EN1, IN6, VLIMS
High level input current	IINH	15	30	60	μA	IN1A~IN5B, SEL1~3, BRK1, EN1, IN6, VLIMS; VIN=3V
Low level input current	IINL	-1	0	-	μA	IN1A~IN5B, SEL1~3, BRK1, EN1, IN6, VLIMS; VIN=0V
Pull-down resistance	RIN	50	100	200	kΩ	
UVLO						
UVLO voltage	VUVLO	1.6	-	2.4	V	
Full-ON Drive block (ch1 to ch5)						
Output ON-Resistance	RON	-	1.2	1.5	Ω	Io=±400mA on high and low sides in total
Linear Constant-Current Drive block (ch6)						
Output ON-Resistance	RON	-	1.0	1.25	Ω	Io=±400mA on high and low sides in total
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

●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 lose 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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