

STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT SERIES 7ch Stepping Motor Driver

TYPE **BD6757KN**

- FEATURES
- Built in 6 Full-ON Drivers
 - Built in 1 Linear Constant-Current Driver

●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limit	Unit
Power supply voltage	VCC	-0.5 to +7.0	V
Motor power supply voltage	VM	-0.5 to +10.0	V
Charge pump voltage	VG	15.0	V
Control input voltage	VIN	-0.5 to VCC+0.5	V
Power dissipation	Pd	950* ¹	mW
Operating temperature range	Topr	-25 to +75	°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 +75°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	8.0	V
Control input voltage	VIN	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

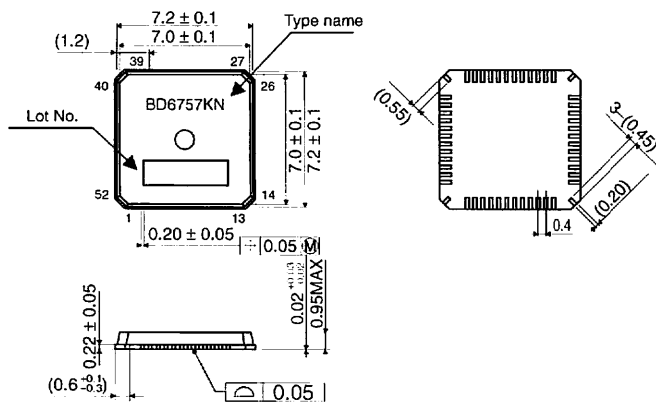


Fig.1 UQFN52 Package (Unit: mm)

●Pin Arrangement (Top View)

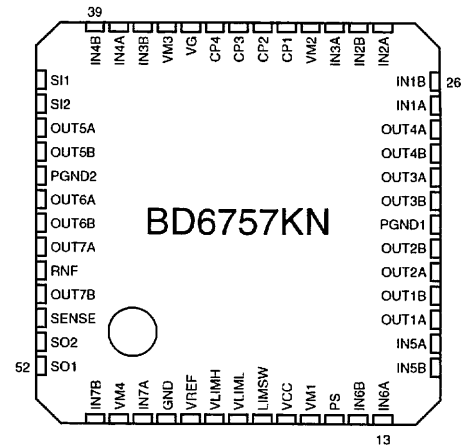


Fig.2 BD6757KN Pin Arrangement (Top View)

●Block Diagram

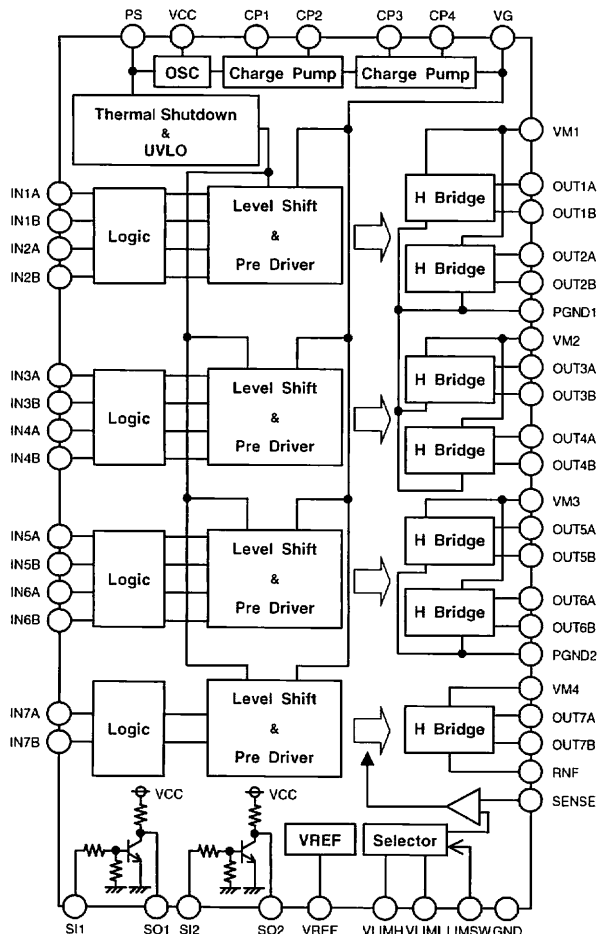


Fig.3 BD6757KN Block Diagram

●Pin No. and Pin Name

No.	Pin name	No.	Pin name
1	IN7B	27	IN2A
2	VM4	28	IN2B
3	IN7A	29	IN3A
4	GND	30	VM2
5	VREF	31	CP1
6	VLIMH	32	CP2
7	VLIML	33	CP3
8	LIMSW	34	CP4
9	VCC	35	VG
10	VM1	36	VM3
11	PS	37	IN3B
12	IN6B	38	IN4A
13	IN6A	39	IN4B
14	IN5B	40	S11
15	IN5A	41	S12
16	OUT1A	42	OUT5A
17	OUT1B	43	OUT5B
18	OUT2A	44	PGND2
19	OUT2B	45	OUT6A
20	PGND1	46	OUT6B
21	OUT3B	47	OUT7A
22	OUT3A	48	RNF
23	OUT4B	49	OUT7B
24	OUT4A	50	SENSE
25	IN1A	51	SO2
26	IN1B	52	SO1

● BD6757KN 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	-	1.0	3.0	mA	PS=H with no signal
Control input						
High level input voltage	VINH	2.0	-	-	V	IN1A~IN7B, LIMSW, PS
Low level input voltage	VINL	-	-	0.7	V	IN1A~IN7B, LIMSW, PS
High level input current	IINH	15	30	60	μA	IN1A~IN7B, LIMSW, PS; VIN=3V
Low level input current	IINL	-1	0	-	μA	IN1A~IN7B, LIMSW, PS; VIN=0V
Pull-down resistor	RIN	50	100	200	kΩ	
Charge pump						
Charge pump voltage	VCP	10	11	-	V	
UVLO						
UVLO voltage	VUVLO	1.6	-	2.4	V	
Full-ON Drive block (ch1 to ch6)						
Output ON-Resistance	RON	-	1.3	1.6	Ω	Io=±400mA on high and low sides in total
Pulse input response	tp	100	-	-	ns	With an input pulse with of 200ns
Linear Constant-Current Drive block (ch7)						
Output ON-Resistance	RON	-	0.9	1.1	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 current 1	VOL1	388	400	412	mA	RNF=0.5Ω with a load of 10Ω VLIMH(or L)=0.2V, LIMSW=0V(or 3V) ^{*4}
Output limit current 2	VOL2	285	300	315	mA	RNF=0.5Ω with a load of 10Ω VLIMH(or L)=0.15V, LIMSW=0V(or 3V) ^{*4}
Output limit current 3	VOL3	190	200	210	mA	RNF=0.5Ω with a load of 10Ω VLIMH(or L)=0.1V, LIMSW=0V(or 3V) ^{*4}
Digital transistor block for waveform shaping						
Input current	ISIH	-	-	0.1	mA	SIx=3V
Low level output voltage	VSOL	-	0.1	0.25	V	SIx=3V, ISO=0.5mA
Input dividing resistance	RSIL	70	100	130	kΩ	
Output pull-up resistance	RSOH	5	10	20	kΩ	
Input dividing resistance comparison	-	0.8	1.0	1.2	-	Division resistance comparison between SIx and GND ^{*4}

^{*4} Design target value (No total shipment inspection is made.)

●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	20

(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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