

STRUCTURE Silicon monolithic integrated circuits

PRODUCT SERIES 3-phase spindle motor driver

TYPE **BD6671FM**

FUNCTION

- 180 degree direct PWM drive
- Low consumption by MOS-FET

○Absolute maximum ratings (Ta=25°C)

Item	Symbol	Limit	Unit
Supply voltage	VCC	7	V
	VM	15	V
VG pin voltage	VG	20	V
Power dissipation	Pd	2200 *1	mW
Input voltage	VIN	0~VCC	V
Output current	IOUT	2500 *2	mA
Operating temperature range	Topr	-40~+85	°C
Storage temperature range	Tstg	-55~+150	°C
Junction temperature	Tjmax	150	°C

*1 70mm×70mm×1.6mm glass epoxy board. Derating is done at 17.6mW/°C for operating above Ta=25°C.

*2 Do not, however exceed Pd, ASO and Tjmax=150°C.

The current is guaranteed up to 3.0A in case of the current is turn on/off in a duty-ratio of less than 1/10 with a maximum on-time of 5msec.

○Operating Condition(Ta=-40~+85°C)

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	VCC	4.5	5	5.5	V
	VM	4	12	13.2	V
VG pin voltage	VG	8.5	-	19	V
Output current	IOUT	-	-	2000*2	mA

This product isn't designed for protection against radioactive rays.

Status of this document

The Japanese version of this document is the formal specification.

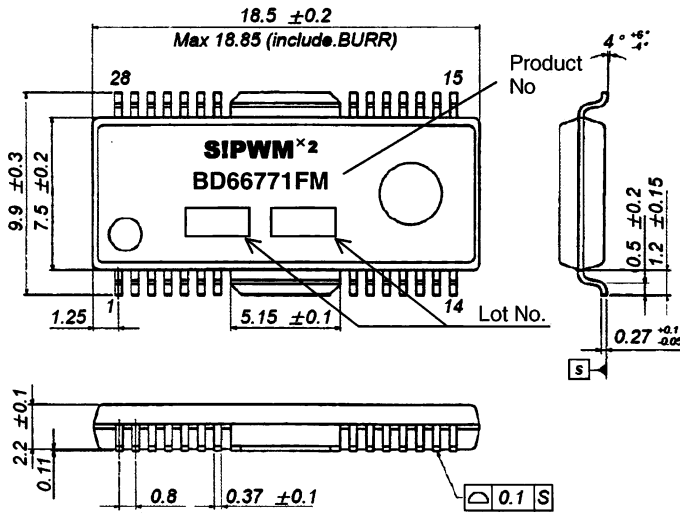
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○Electrical characteristics (Unless otherwise specified, Ta=25°C, VCC=5V, VM=12V)

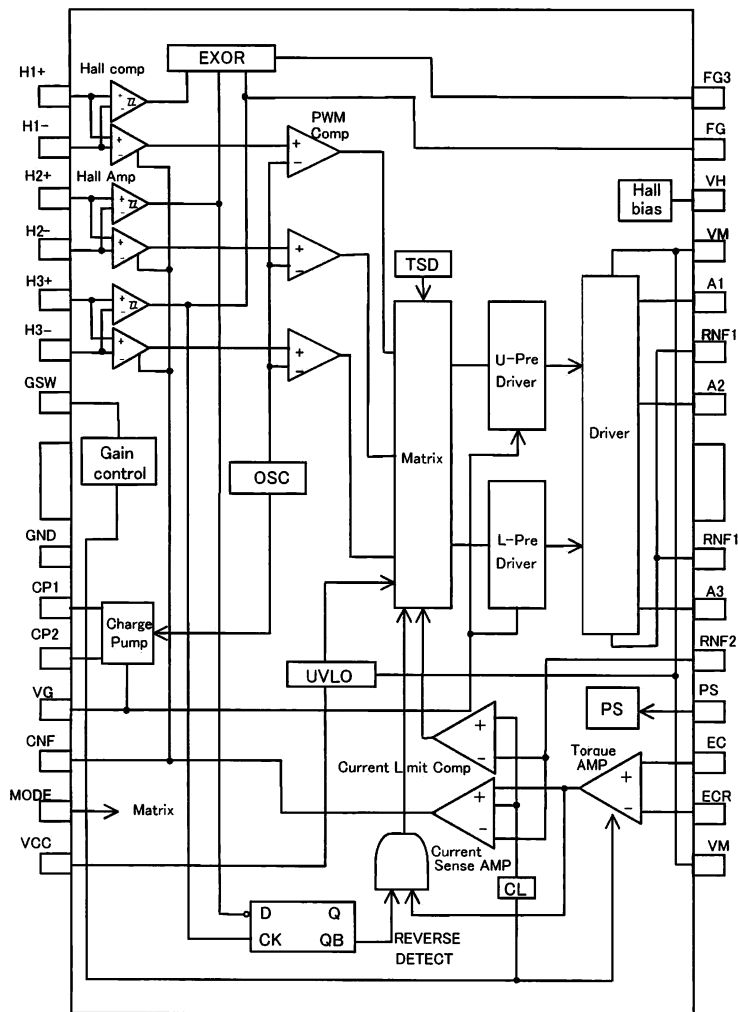
Item	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Overall						
Circuit current 1	I _{CC1}	—	100	200	μA	PS=L, GSW=OPEN
Circuit current 2	I _{CC2}	8	14	20	mA	PS=H, GSW=OPEN
Power save						
ON voltage range	V _{PSON}	—	—	1.0	V	Circuit OFF
OFF voltage range	V _{PSOFF}	2.5	—	—	V	Circuit ON
Hall bias						
Hall bias voltage	V _{HB}	0.7	1.0	1.3	V	I _{HB} =10mA
Hall amp						
In-phase input voltage range	V _{HAR}	1.4	—	3.6	V	
Minimum input level	V _{INH}	100	—	—	mVpp	Both sides input level
Hall hysteresis level (+)	V _{HYS+}	5	20	40	mV	
Hall hysteresis level (-)	V _{HYS-}	-40	-20	-5	mV	
Gain switch						
Low voltage range	V _{GSWL}	—	—	0.6	V	
High voltage range	V _{GSWH}	2.0	—	—	V	
Open voltage range	V _{GSWOP}	—	1.3	—	V	
Torque control						
Input voltage range	E _C , E _{CR}	0	—	5	V	Linear range:0.5~3.0V
Offset voltage (+)	E _{COFF+}	5	50	100	mV	GSW=M
Offset voltage (-)	E _{COFF-}	-100	-50	5	mV	GSW=M
Input current	E _{CIN}	-11	-2.5	0	μA	E _C =E _{CR} =1.65V
Input-output gain L	G _{ECL}	0.28	0.35	0.42	A/V	GSW=L, RNF=0.5Ω
Input-output gain M	G _{ECLM}	0.56	0.70	0.84	A/V	GSW=M, RNF=0.5Ω
Input-output gain H	G _{ECLH}	1.12	1.40	1.68	A/V	GSW=H, RNF=0.5Ω
Output						
Output ON resistor	R _{ON}	—	1.0	1.35	Ω	I _{OUT} =±600mA (Upper+Lower)
Torque limit current L	I _{TLL}	340	400	460	mA	GSW=L, RNF=0.5Ω
Torque limit current M	I _{TLM}	680	800	920	mA	GSW=M, RNF=0.5Ω
Torque limit current H	I _{TLH}	1020	1200	1380	mA	GSW=H, RNF=0.5Ω
FG/FG3 output						
High voltage	V _{FGH}	4.6	—	—	V	I _{FG} =-100μA
Low voltage	V _{FGH}	—	—	0.4	V	I _{FG} =+100μA
Charge pump voltage						
Charge pump output voltage	V _{PUMP}	12.5	17	19	V	VCC=5V, VM=12V CP1=CP2=0.1μF
CP1 output						
High side saturation voltage	V _{CP1H}	0.25	0.45	0.65	V	I _{CP1} =-4mA
Low side saturation voltage	V _{CP1L}	0.2	0.4	0.6	V	I _{CP1} =+4mA
CP2 output						
High side saturation voltage	V _{CP2H}	0.4	0.6	0.8	V	I _{CP2} =+4mA
Low side saturation voltage	V _{CP2L}	0.15	0.35	0.55	V	I _{CP2} =+4mA

○ Package outline



HSOP-M28 (Unit:mm)

○ Block diagram



○ Pin No / Pin name

Pin No	Pin Name	Pin No	Pin Name
1	H1+	15	VM
2	H1-	16	ECR
3	H2+	17	EC
4	H2-	18	PS
5	H3+	19	RNF2
6	H3-	20	A3
7	GSW	21	RNF1
8	GND	22	A2
9	CP1	23	RNF1
10	CP2	24	A1
11	VG	25	VM
12	CNF	26	VH
13	MODE	27	FG
14	VCC	28	FG3
		FIN	FIN

* FIN : GND

○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 (T_{opr}) 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 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.

(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 (P_d) 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.)
170	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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