

Structure Silicon Monolithic Integrated Circuit  
 Product Series 1ch Sensorless Spindle Motor Driver for MD  
 Type BA6966FV  
 Features

- Soft-switching/sensorless driving method
- VM voltage variable control method
- Deals with double speed operation
- Startup/Brake/Standby function
- FG signal output function
- Thermal shutdown circuit
- Small package SSOP-B20

○Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limit	Unit
Power supply voltage	Vcc	7	V
Input voltage	VIN	0~VCC	V
Output current	I <sub>OMAX</sub>	*1000	mA
Power dissipation	Pd	**800	mW
Operating temperature range	Topr	-25~+75	°C
Storage temperature range	Tstg	-55~+150	°C
Junction temperature	Tjmax	+150	°C

\* Must not exceed Pd or ASO, Tjmax=150°C.

\*\* Reduced by 6.4mW/°C over Ta=25°C, when mounted on a glass epoxy board (70mm×70mm×1.6mm).

○Operating conditions (Ta=-25~+75°C)

Parameter	Symbol	Range	Unit
Operating power supply voltage range	Vcc	2.4~6.5	V
	VM	0~Vcc	V

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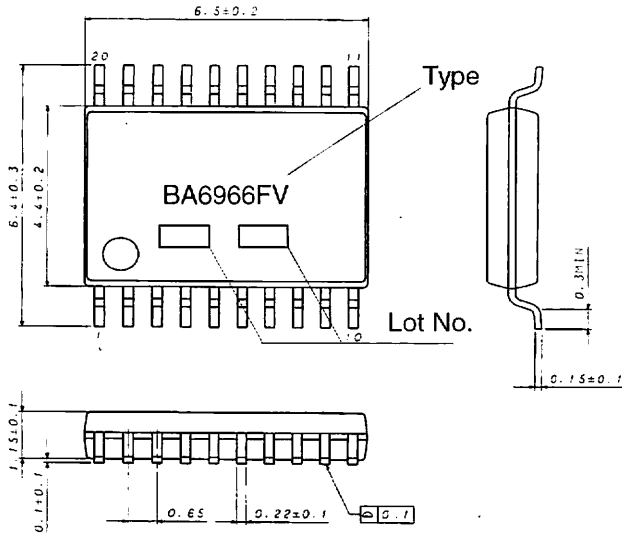
○Electrical characteristics

(Unless otherwise specified, Ta=25°C, VCC=2.7V, VM=0.3V)

Parameter	Symbol	Limit			Unit	Conditions
		Min.	Typ.	Max.		
Circuit current	ICCS	—	20	40	μA	STBY=L
	ICC	—	4	5.5	mA	STBY=H IM=20mA
Output saturation voltage H1	VOH1	—	0.85	1	V	VM=2.7V Io=400mA
Output saturation voltage H2	VOH2	—	0.2	0.35	V	VM=VCC-1V Io=400mA
Output saturation voltage L	VOL	—	0.25	0.35	V	Io=400mA
~Rotor position detection comparator~						
Input offset voltage	VCO	-10	—	+10	mV	
In-phase input voltage range	VCD	0	—	VCC-1.5	V	
~Standby pin~						
Input current	IST	—	70	120	μA	STBY=VCC
Input high level voltage	VSTH	VCC-0.5	—	VCC	V	
Input low level voltage	VSTL	—	—	0.3	V	
~Brake comparator~						
Input current	IBR	—	—	2.0	μA	BRK=VCC
Input offset voltage	VBO	-15	—	+15	mV	
In-phase input voltage range	VBD	0	—	VCC-1.5	V	
~CST pin~						
Charge current	ICTO	-1.3	-2.5	-3.7	μA	CST=1V
Discharge current	ICTI	2.6	5.0	7.4	mA	CST=1V
Clamp H voltage	VCTH	0.6	1.35	2.1	V	
Clamp L voltage	VCTL	0.13	0.3	0.57	V	
~CSL pin~						
Charge current	ICLO	-4	-8.5	-13	μA	
Discharge current	ICLI	2.6	5.0	7.4	μA	
Clamp H voltage	VCLH	VCC-0.25	VCC-0.05	—	V	
Clamp L voltage	VCLL	VCLH-0.75	VCLH-0.6	VCLH-0.45	V	
~RIB pin~						
Offset voltage	VRO	—	15.5	19	mV	
~FG pin~						
Output L voltage	VOLF	—	0.1	0.25	V	
Pull-up resistance	RBF	10	20	30	kΩ	

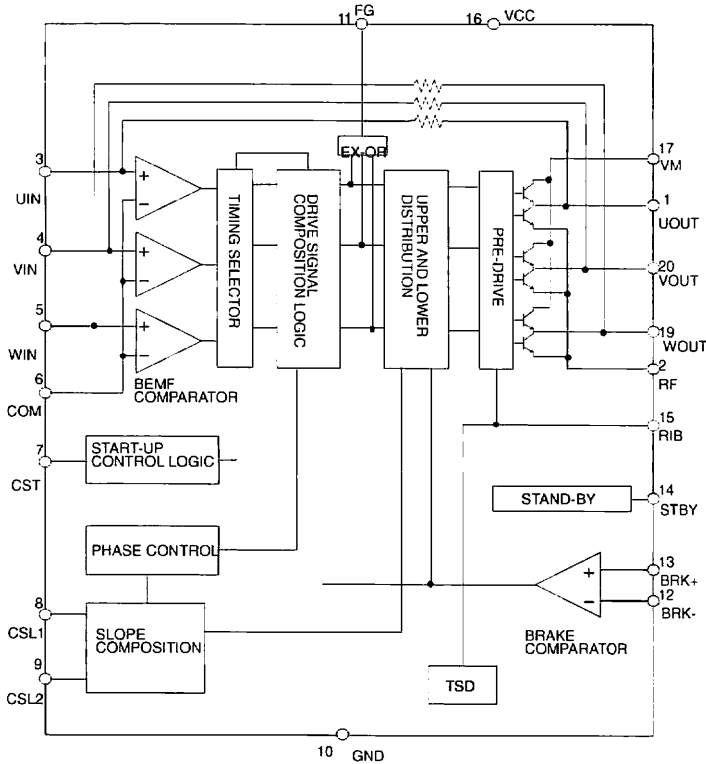
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○Package outlines



SSOP-B20 outlines (Unit : mm)

○Block diagram



○Pin No./Pin name

No	Pin name	Function
1	UOUT	Phase U coil output pin
2	RF	Output current detection pin (Power block GND)
3	UIN	Rotor position detection comparator input pin
4	VIN	
5	WIN	
6	COM	Motor coil neutral point input pin
7	CST	Startup oscillation capacitor connection pin
8	CSL1	Slope capacitor connection pin
9	CSL2	
10	GND	Signal block GND
11	FG	FG output pin
12	BRK-	Brake comparator input pin
13	BRK+	
14	STBY	Standby pin
15	RIB	Output Tr. base current setting resistor connection pin
16	VCC	Signal block power supply pin
17	VM	Motor output block power supply pin
18	N.C.	
19	WOUT	Phase W coil output pin
20	VOUT	Phase V coil output pin

○Notes on the use

- (1) Absolute maximum ratings  
If the input voltage or the operating temperature range exceeds absolute maximum ratings, IC may be damaged. No destruction mode (e.g., short-circuiting or open) can be specified in that case. If such special mode as will exceed absolute maximum ratings is assumed, take the physical safety measures, such as a fuse.
- (2) Power supply lines  
The regenerated current by BEMF of the motor will return. Therefore, take measures, such as the insertion of a capacitor between the power supply and GND as the pass of the 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.
- (3) Ground potential  
Ensure a minimum GND pin potential in all operating conditions.
- (4) Design for heat  
Use the design for heat that allows for a sufficient margin in light of the power dissipation (Pd) in actual using conditions.
- (5) Operation in strong magnetic field  
Use caution when using the IC in the strong magnetic field as doing so may cause the IC to malfunction.
- (6) ASO  
When using the IC, make settings so that the output transistors for the motor will not be used under conditions in excess of the absolute maximum ratings and ASO.
- (7) Thermal shutdown circuit  
This IC incorporates thermal shutdown circuit(TSD circuit).  
When the chip temperature becomes the one shown in below, TSD circuit operates and makes the coil output to motor open. It is designed to shut the IC off from 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.)
165	20

- (8) Ground wiring pattern  
When having both small signal and large current GND, it is recommended to isolate the two GND 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 voltage variations of the small signal GND. Be careful not to change the GND wiring pattern of any external parts, either.

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