2-phase motor driver for VCR cylinder motors

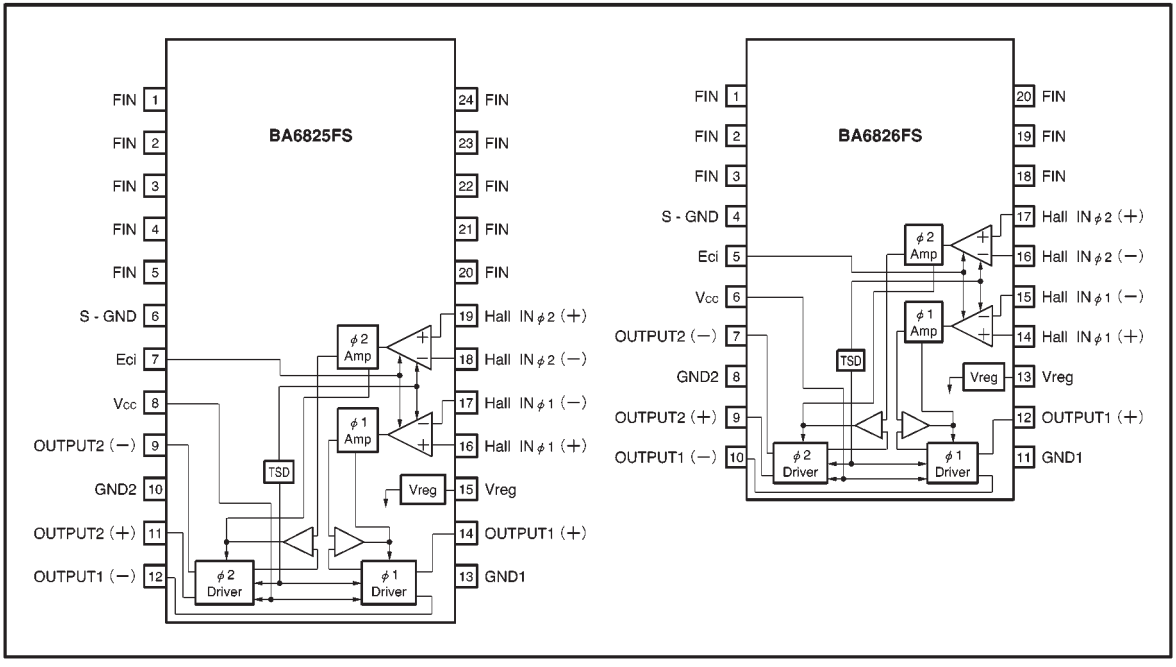
BA6825FS / BA6826FS

The BA6825FS and BA6826FS are direct-drive motor drivers suitable for 2-phase, full-wave linear motors. They consist of a Hall amplifier control circuit and driver circuits.

●Applications
VCR cylinder motors

●Features
1) Linear drive system provides low switching noise.
2) Constant supply voltage pin for hall devices.
3) High ratio of output current against control current. (4000 Typ.)
4) Available in compact surface-mount packages.

●Block diagram



●Absolute maximum ratings (Ta = 25°C)

Parameter		Symbol	Limits	Unit
Applid voltage		V_{CC}	24	V
Power dissipation	BA6825FS	Pd	1200*1	mW
	BA6826FS		1000*2	
Operating temperature		Topr	−25～+75	℃
Storage temperature		Tstg	−55～+150	℃
Output current		$I_{OMax.}$	1200*3	mA
Input current		$I_{ECIMax.}$	5	mA

*1, *2 When mounted on a glass epoxy board (90 X 50 X 1.6 mm).
Reduced by 9.6 mW for each increase in Ta of 1℃ over 25℃.
Reduced by 8.0 mW for each increase in Ta of 1℃ over 25℃.
*3 Should not exceed Pd or ASO values (for the current of one phase).

●Recommended operating conditions

Parameter	Symbol	Limits	Unit
Operating power supply voltage	V_{CC}	8.0～20.0	V

●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 12V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply current	I_{CC}	—	3.3	5.0	mA	
Constant output voltage	V_{reg}	4.6	5.0	5.4	V	
〈MDA〉						
Hall element minimum input level	V_{INH}	50	—	—	mV_{P-P}	
Hall input bias current	I_{BH}	—	0.25	2.0	μA	I_{ECI}=100 μA
Output saturation high level voltage	V_{OH}	10.50	10.84	—	V	I_{OUT}=800mA
Output saturation low level voltage	V_{OL}	—	1.27	2.1	V	I_{OUT}=800mA
〈ECI (current control)〉						
Ratio of pin-7 current to output current	I_{OUT}/I_{CONT}	3000	4000	5000	—	Measured at ΔV_{IN} = 100 mV and I_{ECI} = 30 μA, 50 μA

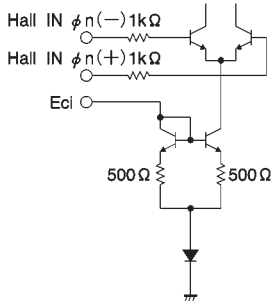
◎Not designed for radiation resistance.

●Pin descriptions

Pin name	Function
S - GND	Signal ground
E_{CI}	Output current control
V_{CC}	Power supply
OUTPUT2 (−)	Output
GND2	OUTPUT2 GND
OUTPUT2 (+)	Output
OUTPUT1 (−)	Output
GND1	OUTPUT1 GND
OUTPUT1 (+)	Output
Vreg	Constant voltage output
Hall IN ϕ_1 (+)	Hall signal input
Hall IN ϕ_1 (−)	Hall signal input
Hall IN ϕ_2 (−)	Hall signal input
Hall IN ϕ_2 (+)	Hall signal input
FIN	Radiation FIN

●Input / output circuits

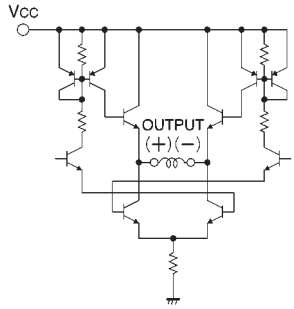
(1) Hall and E_{CI} inputs



(Resistances, in Ω, are typical values)

Fig.1

(2) Coil output



(Resistances, in Ω, are typical values)

Fig.2

●Circuit operation

(1) The signal from the Hall device is amplified by the Hall amplifier and then supplied to the driver circuit. The driver gain, which is constant, is regulated by changing the Hall amplifier gain with the input current on the output current control pin (E_{CI} pin). The motor rotational speed is sensed by the FG, and the output of which is F / I-converted and supplied to the E_{CI} pin as a feedback signal, so that a constant rotational speed is maintained as follows :

1) The motor speed decreases.
2) The speed control IC outputs a feedback signal to the ECI pin.
3) The Hall amplifier gain increases.
4) The output current increases.
5) The motor speed increases.

(2) When the voltage on Hall INϕ_1 (+) is higher than the voltage on Hall INϕ_1 (−), an output current flows from OUT1 (−) to OUT1 (+) according to the voltage differential. When the voltage on Hall INϕ_1 (−) is higher, on the other hand, an output current flows from OUT1 (+) to OUT1 (−).

Similarly, when the voltage on Hall INϕ_2 (+) is higher than the voltage on Hall INϕ_2 (−), an output current flows from OUT2 (−) to OUT2 (+) according to the voltage differential. When the voltage on Hall INϕ_2 (−) is higher, on the other hand, an output current flows from OUT2 (+) to OUT2 (−).

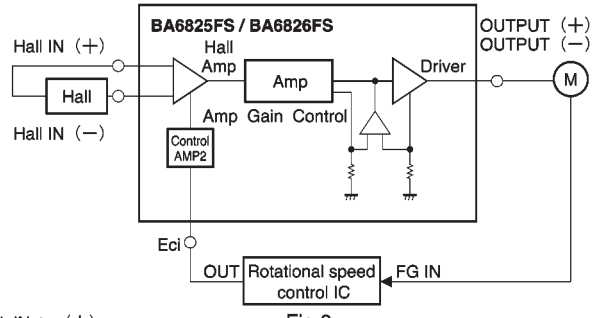


Fig.3

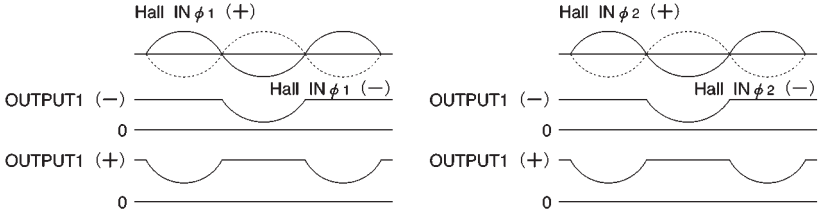


Fig.4

(3) Output waveforms are shown in Fig. 5. Because of the amplifier offset, the output is left OPEN when the output signal switches from positive to negative. The output waveform is determined by the external circuit because the IC impedance increases during this transition period. Since inductive loads are usually provided, a capacitor should be connected to suppress the backlash voltage.

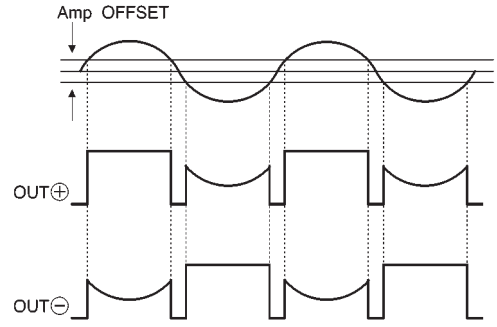


Fig.5

●Operation notes

(1) E_{CI} input

The ECI input circuit has $2V_F$ and a 500Ω resistor connected in series. Current is limited only by the 500Ω resistor.

(2) Hall input

Signals of 50mV (peak to peak) or greater should be applied to the Hall device input. The DC input range is between 2V and (Vreg – 1.5V). There will be no problem if the input is centered around Vreg / 2.

Because the Hall input impedance is 1MΩ or grater, any type of Hall device can be connected. No current flows when the transistor is off because the Hall input pins (+ and –) are differential.

Because the ICs are linear drivers, any DC offset in the Hall device will be amplified and appear in the output. Use Hall devices having a minimum offset. Hall devices can be connected in either series or parallel.

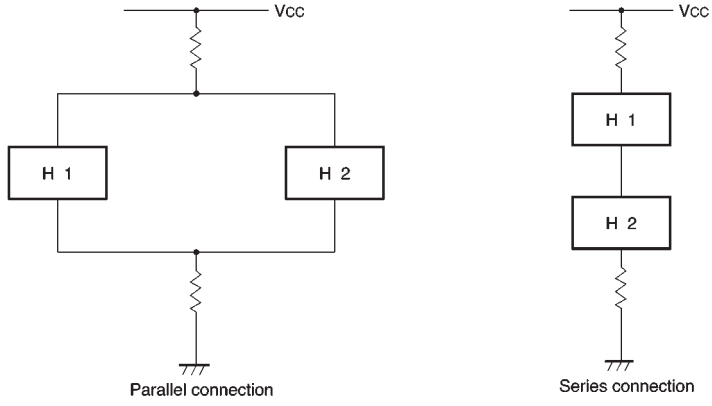


Fig. 6

(3) Thermal shutdown circuit

The circuit puts the driver outputs (9, 11, 12, and 14 pin) to the open state at the temperature of 175°C (typical). There is a temperature difference of about 20°C between the temperatures at which the circuit is activated and deactivated.

●Application examples

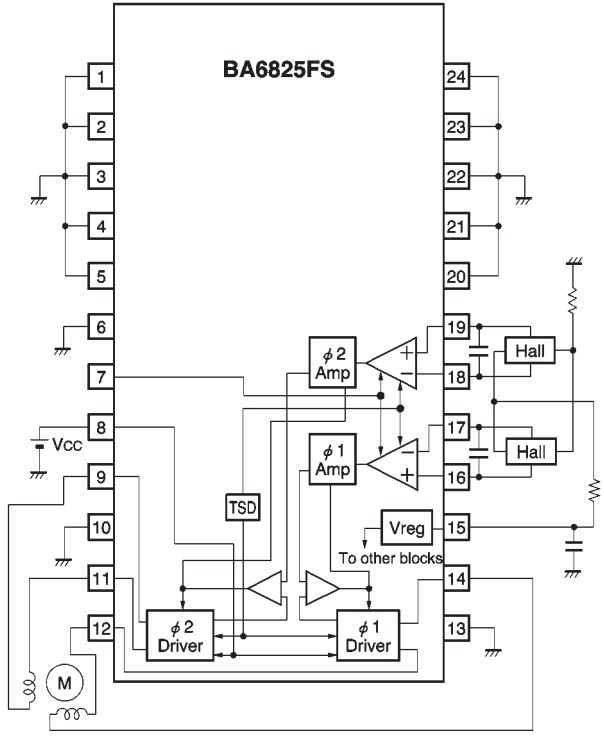


Fig.7

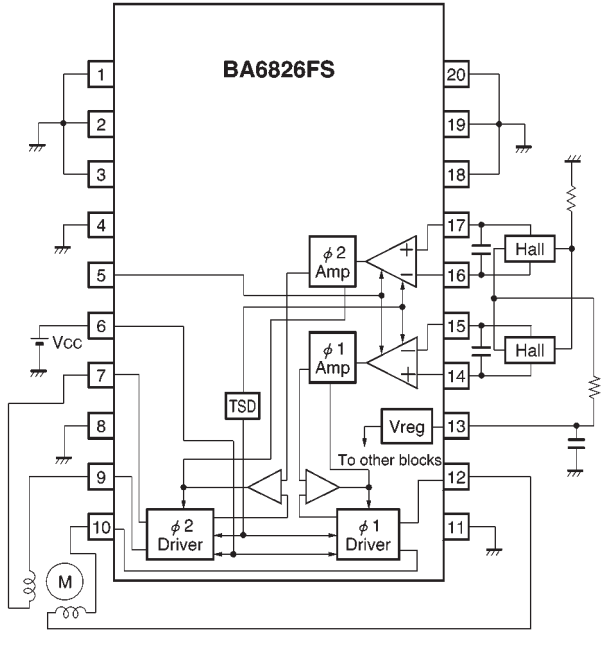


Fig.8

●Electrical characteristic curves

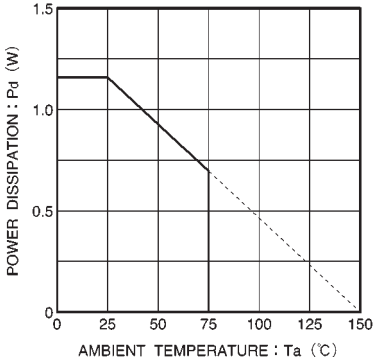


Fig.9 Thermal derating curve (BA6825FS)

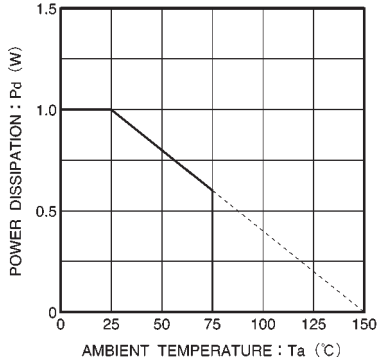


Fig.10 Thermal derating curve (BA6826FS)

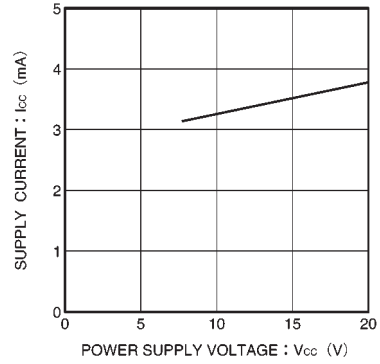


Fig.11 Supply current vs. power supply voltage

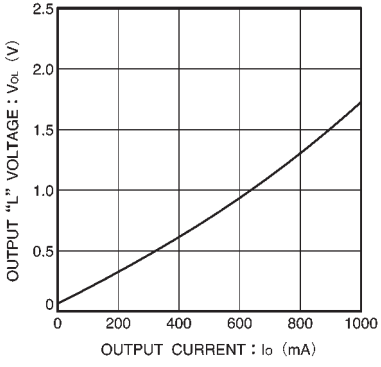


Fig.12 Output low level voltage vs. output current

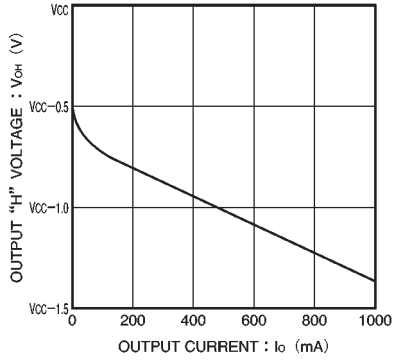
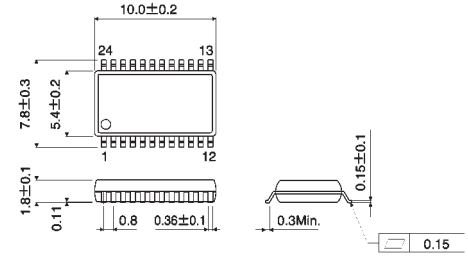


Fig.13 Output high level voltage vs. output current

●External dimensions (Units: mm)

BA6825FS



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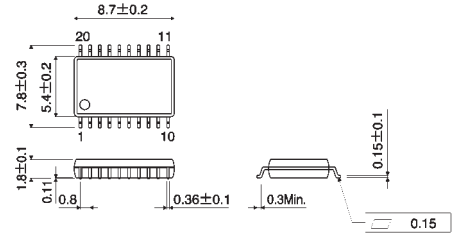

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