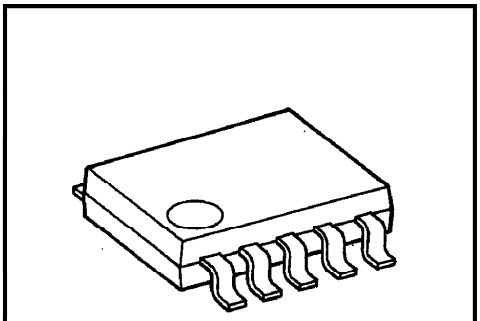
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8462F

FAN MOTOR DRIVER IC

The TA8462F is a 2 phase half-wave hall motor driver IC. This IC is best suited for the fan motor driving. The output current of this IC is 1.5A (peak) and all functions needed for fan motor driving have been incorporated into a 1 chip, enabling it to largely reduce peripheral parts and a space, thus realizing down-sizing. Further, the TA8462F is provided with the FG output pin (outputs pulses proportional to the motor speed) and the RD output pin (outputs the motor ON / OFF statues).



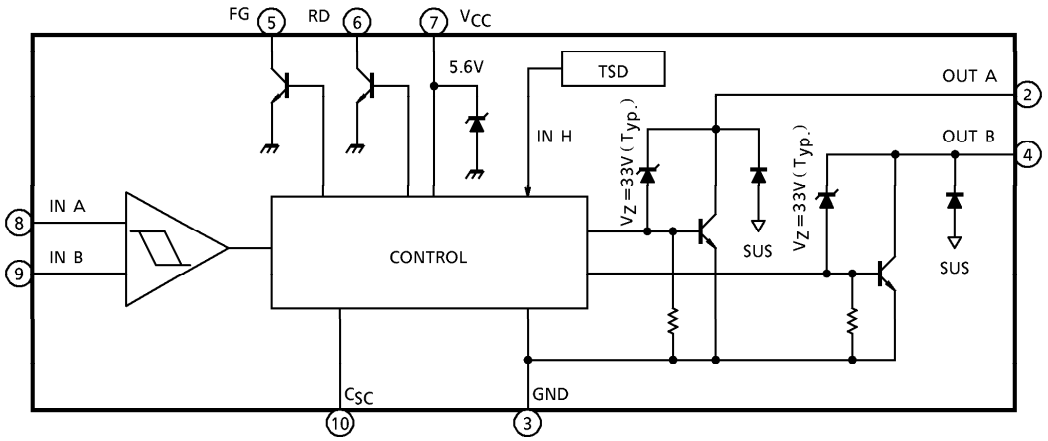
SSOP10-P-225-1.00

Weight : 0.09g (Typ.)

FEATURES

- Built-in Automatic Self Rotation Recovery Circuit After Release of Motor Locking.
- Thermal Shutdown Circuit Incorporated.
- Operating Voltage : 4~15V
- Recommended Operating Voltage : V_{CC} = 5V, 12V
- No V_{CC}-GND Reverse Connection Preventive Diode Required.

BLOCK DIAGRAM



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PIN FUNCTION

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	NC	Non connection
2	OUT A	Output terminal
3	GND	GND terminal
4	OUT B	Output terminal
5	FG	Rotation speed output terminal
6	RD	Rotation detect output terminal
7	V_{CC}	Power voltage supply terminal
8	IN A	Hall input terminal
9	IN B	Hall input terminal
10	C_{SC}	Lock protector time constant determined terminal

○ FG and RD outputs

Both the FG and RD outputs are the open collector outputs.
The FG output is pulse proportional to the number of revolutions (the cycle is the same as OUT B) and the RD output is at the GND level (actually, at $V_{sat\,(RD)}$ level) when the motor is being driven and the RD output at the potential level that is to be applied to the RD terminal as shown in Figure 2 is output when the motor is kept restrained.

○ Automatic self rotation recovery circuit

If the rotation of the fan motor is forced to stop by any physical power, the driving coil may be burnt as inducing voltage caused when the motor is running disappears and large current flows to the driving coil.
Therefore, it becomes necessary to provide the fan motor with a circuit to prevent the driving coil from being burned by detecting the forced stop of the motor rotation from the outside by some method and a circuit to automatically rotate the motor when it is released from the restraint.
The TA8462F is an IC that has cleared the above problems by the burning preventive automatic return circuit.
This operation is shown in Figure 1.
The capacitor C_{SC} connected to the C_{SC} terminal is charged by the charging current I_{SL} (6.3μA Typ.) and its potential rises as shown below :

$$V = \frac{1}{C_{SC}} \int I_{SL} dt$$

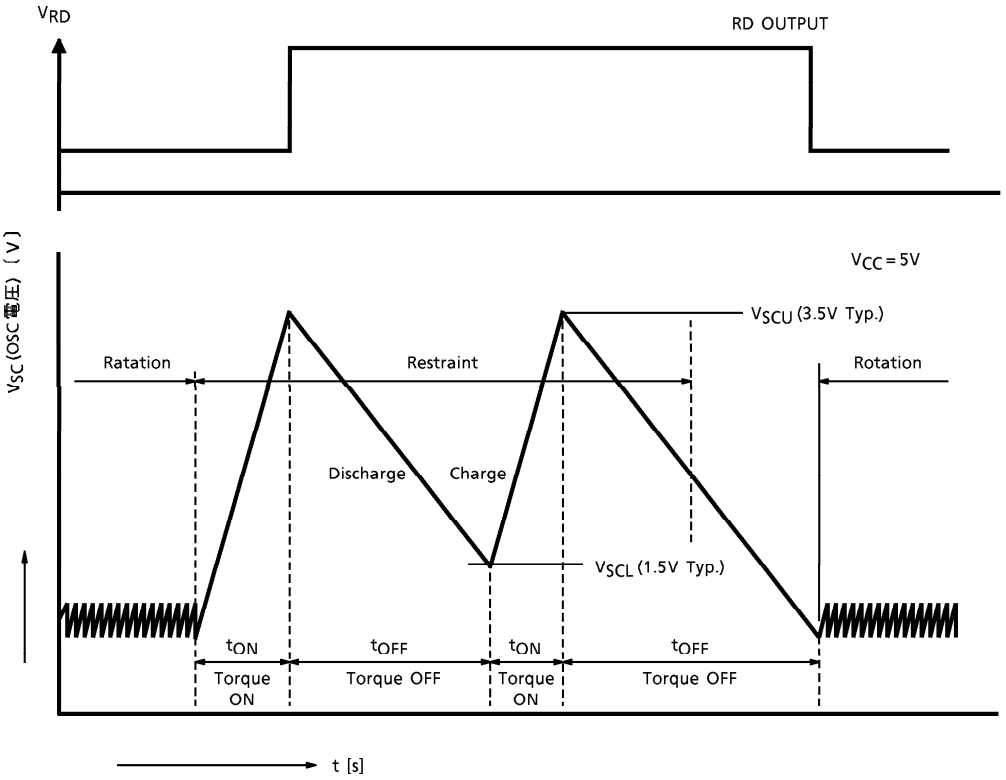


Fig. 1 Automatic Self Rotation Recovery Circuit Operation

When the motor is rotating, it is charged and discharged repeatedly by trigger pulse but if the motor rotation is physically restrained, C_{SC} discharge by trigger pulse is stopped and the potential further increases. During this period, current flows continuously to the motor. If V_{SC} (OSC potential) reaches V_{SCU} (3.5V Typ.), discharge starts slowly and at the same time, the output is turned OFF to cur off current flowing to the motor. When the V_{SC} potential reaches V_{SCL} (1.5V Typ.), the output is turned ON to allow current flow to the motor and torque is generated.
As long as the motor rotation is kept restrained, this operation is repeated and the output is turned ON / OFF at a ratio of nearly 1 : 5.
By this operation, the motor is heated and cooled and its temperature rise can be suppressed to a certain level. If the motor is released from the above restraint, the motor is started to run again by the generated torque and is continuously rotated by the generated trigger pulse.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Output Terminal Breakdown Voltage	V_{CER}	35	V
Output Current (PEAK)	$I_{O\ (PEAK)}$	1.5 (Note 1)	A
FG Output Current (PEAK)	$I_{FG\ (PEAK)}$	10 (Note 1)	mA
RD Output Current (PEAK)	$I_{RD\ (PEAK)}$	10 (Note 1)	mA
Hall Input Voltage	V_{HM}	300 (Note 2)	mV
Power Dissipation	P_D	735 (Note 3)	mW
Operating Temperature	T_{opr}	− 30 ~ 85	°C
Storage Temperature	T_{stg}	− 55 ~ 150	°C

(Note 1) t = 0.1s
(Note 2) Tj = − 25~150°C
(Note 3) This value is obtained by 50 × 50 × 1.6mm PCB mounting occupied in excess of 30% of copper area.

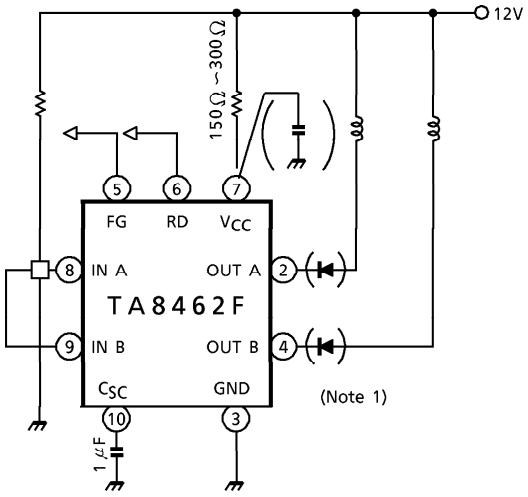
ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{CC} = 12V, RV_{CC} = 200Ω, C_{SC} = 1.0μF)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Supply Current		I_{CC}	—	V_{CC} = 5V, RV_{CC} = 0Ω, Output open	A : ON	—	8.7	13.0	mA
					B : ON	—	7.7	12.0	
				V_{CC} = 12V, RV_{CC} = 200Ω, Output open	A : ON	—	28	35	
					B : ON	—	28	35	
Output Saturation Voltage		V_{SAT}	—	I_O = 0.2A, T_j = 25°C		—	0.8	1.0	V
				I_O = 1.0A, T_j = 25°C		—	1.15	1.6	
Output Terminal Clamp Voltage		V_{CER}	—	—		31	—	35	V
Automatic Self Rotation Recovery Circuit	Charge Current	I_c	—	C_{SC} = GND		3.0	6.2	8.2	μA
	Discharge Current	I_d	—	C_{SC} = 4V		0.5	1.15	1.3	
	Output OFF Voltage	V_{SCU}	—	V_{CC} = 5V		—	3.5	—	V
	Output ON Voltage	V_{SCL}	—	V_{CC} = 5V		—	1.5	—	
	Duty	DR	—	$I_d / I_c = t_{OFF} / t_{ON}$		3	5	8	
	ON Time	t_{ON}	—	—		—	0.35	—	s
	OFF Time	t_{OFF}	—	—		—	1.75	—	

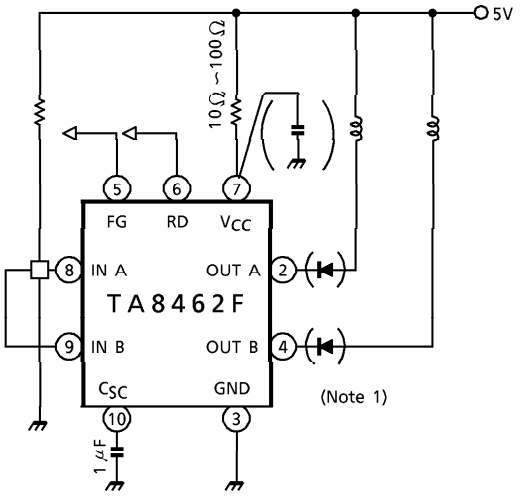
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Hall Amp.	Sensitivity	V_{HS}	—	Include offset / hysteresis	10	—	—	mV
	Hysteresis	V_{HH}	—	—	—	2.5	—	
	Operating DC Potential	CMR	—	—	0	~	3	V
Supply Zener Voltage		V_Z	—	—	5.4	6.0	6.3	V
FG Output Saturation Voltage		$V_{sat\ (FG)}$	—	I_{FG} = 5mA	—	0.2	0.4	V
RD Output Saturation Voltage		$V_{sat\ (RD)}$	—	I_{RD} = 5mA	—	0.2	0.4	V
Thermal Shutdown Operating Temperature		T_{SD}	—	T_j	150	—	—	°C

APPLICATION CIRCUIT

- 12Vμse



- 5Vμse

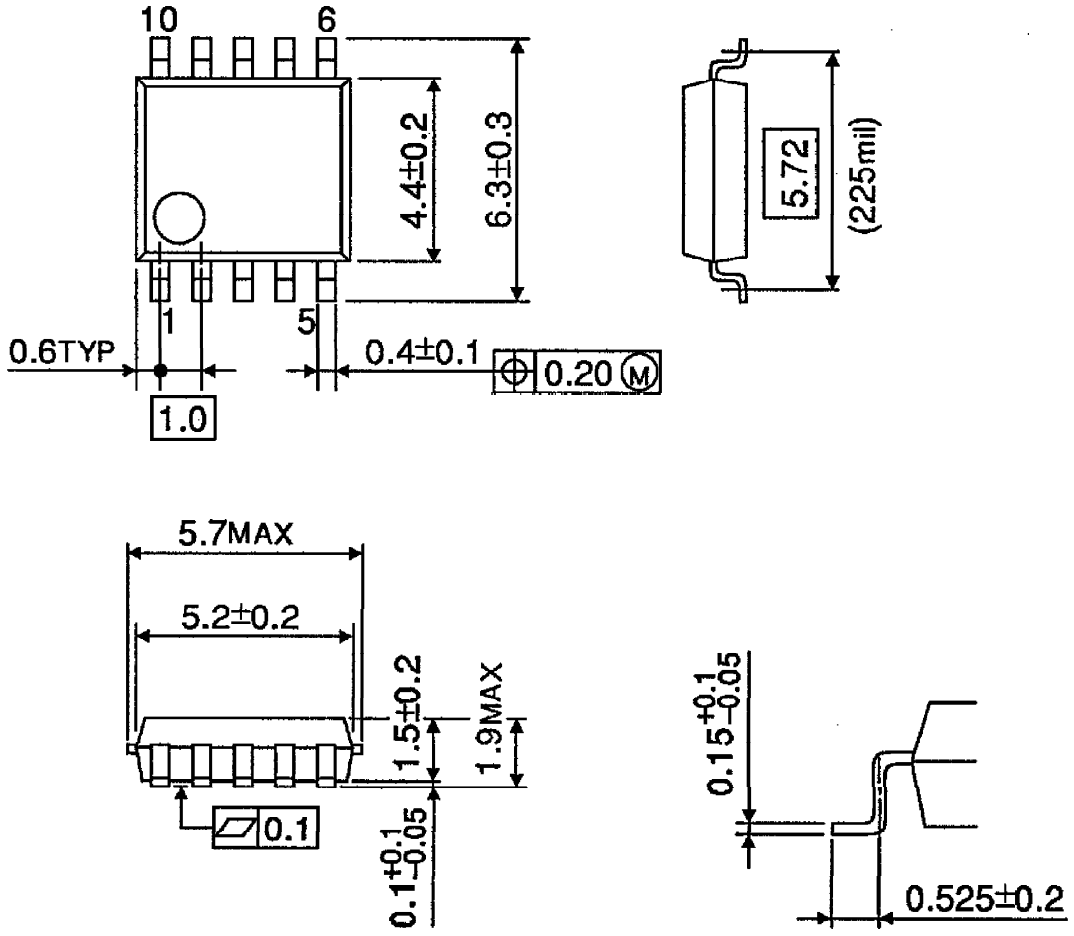


(Note 1) If the mutual induction of a motor is large, it is recommended to insert a diode in the circuit.

(Note 2) Utmost care is necessary in the design of the output line, V_{CC} and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

OUTLINE DRAWING

SSOP10-P-225-1.00 Unit : mm



Weight : 0.09g (Typ.)