2-PHASE HALF-WAVE MOTOR PREDRIVER

■ FEATURES

1) Rotation detection(A6406RD) and rotational speed sensing(A6406FG) mechanisms are built in.
2) Compact 8-pin SOP package reduces the number of external components required.
3) Automatic restart when the motor lock is undone.
4) Hall inputs have a hysteresis.

■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Limits	Unit
Applied voltage	V_{CC}	30	V
Power dissipation	P_d	550 *1	mW
Operating temperature	T_{opr}	-40 ~ +95	°C
Storage temperature	T_{stg}	-55 ~ +125	°C
Output current	Io Max.	70	mA

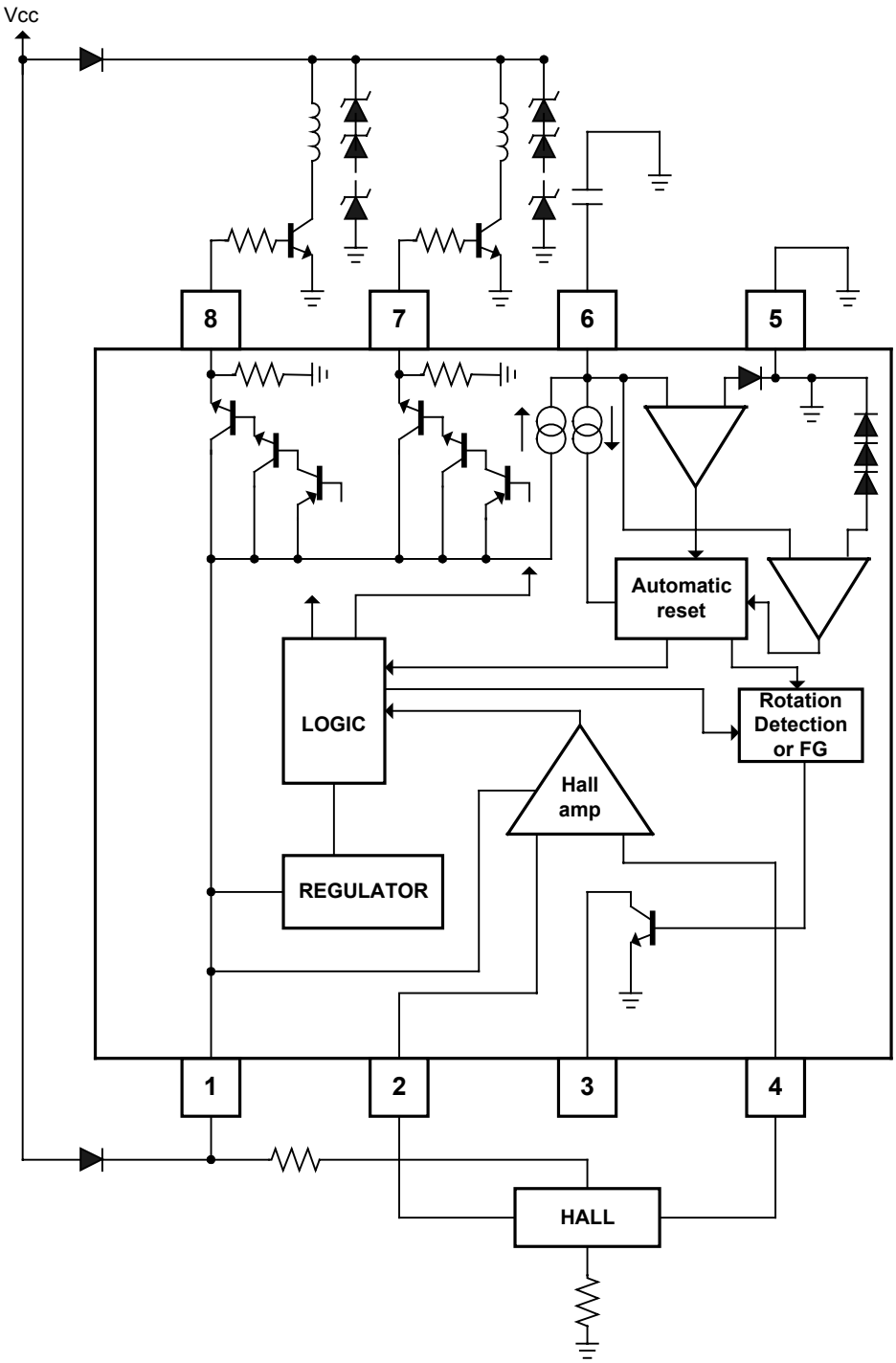
*1: Reduced by 5.5mW for each increase in Ta of 1°C over 25°C when mounted on a glass epoxy board (50X50X1.6mm).

■ OPERATING POWER SUPPLY VOLTAGE (Ta = +25 °C)

Characteristic	Symbol	Conditions	Min	Typ	Max	Units
Applied voltage	V_{CC}	Operate within the allowable power dissipation for -30 °C<Ta<75 °C	4	-	28	V
Input voltage *1	V_{BH}	-	1.0	-	Vcc–0.5	V

*1: Input voltage range includes the amplitude of signal.

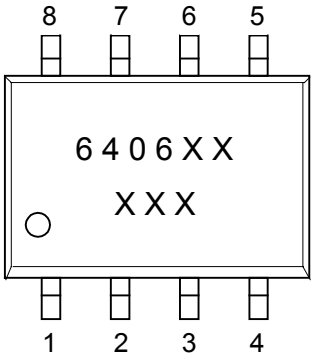
■ BLOCK DIAGRAM AND APPLICATION EXAMPLE



■ ELECTRICAL CHARACTERISTICS (unless otherwise noted, Ta = +25 °C and Vcc=12V)

Characteristic	Symbol	Conditions	Min	Typ	Max	Units
Supply current	I_{CC}	When output is OFF.	-	2.5	4	mA
		When output is ON.		3.2	5	mA
Hall amplifier input hysteresis (+)	V_{hys}+	Pin2 voltage with respect to Pin4 voltage , V_B=6V	3	-	15	mV
Hall amplifier input hysteresis (-)	V_{hys} -	Pin2 voltage with respect to Pin4 voltage , V_B=6V	-3	-	-15	mV
Pin6 charge current	I_{6C}	V6pin = 1.5V	1.6	2.5	3.75	uA
Pin6 discharge current	I_{8d}	V6pin = 1.5V	0.25	0.50	1.0	uA
Pin6 charge-discharge ratio	r_{cd}	I_{6C} / I_{6d}	3	4.5	8	-
Pin6 clamp voltage	V_{6CL}	-	2.2	2.6	3.0	V
Pin6 comparator voltage	V_{6CP}	-	0.4	0.6	0.8	V
Pin7 Output high level voltage	V_{7H}	I_O = 10mA	10	10.5	-	V
Pin8 Output high level voltage	V_{8H}	I_O = 10mA	10	10.5	-	V
Pin3 RD Output low level voltage	V_{3L}	I_{3L} = 5.0mA	-	-	0.5	V
Pin3 RD current capacity	I_3	V_{3L} = 2.0V	8.0	-	-	mA
Pin3 FG current capacity	I_3	V_{3L} = 2.0V	8.0	-	-	mA
Pin3 FG Output Voltage	$V_{FG(L)}$	I_{3L}=5mA	—	0.2	0.4	V

■ PIN DESCRIPTION



REMARK :

6406XX : Part Number

6406RD : RD Single Output

6406FG : FG Single Output

XXX : DATE CODE (ex : 52Z)

52 : WEEK (ex=>52:52 WEEK . 35:35 WEEK)

Z : YEAR (ex=>Z:DC2001 , Y:DC2002 , X:DC2003)

Name	P/I/O	Pin #	Description
Vcc	P	1	Positive Power Supply
H1	I	2	Input Pin
RD / FG	O	3	Rotation Detection / Frequency Generation
H2	I	4	Input Pin
Vss	P	5	Ground
C1	I	6	Capacitor
DO	O	7	Output Pin
DOB	O	8	Output Pin

■ ROTATION DETECTION

The automatic restart circuit detects a motor lock condition and automatically turns off the output current. When the lock condition is cleared, the IC automatically restarts and allow the motor to run.

In the A6406RD/FG, automatic restart is performed in the following manner. A motor lock condition is detected when the Hall signal stops switching. The output is ON when pin 6 is being charged, and OFF when pin 6 is being discharged. Pin 3 is ON during normal operation, and OFF when the motor is locked. Pin 3 is an open collector output.

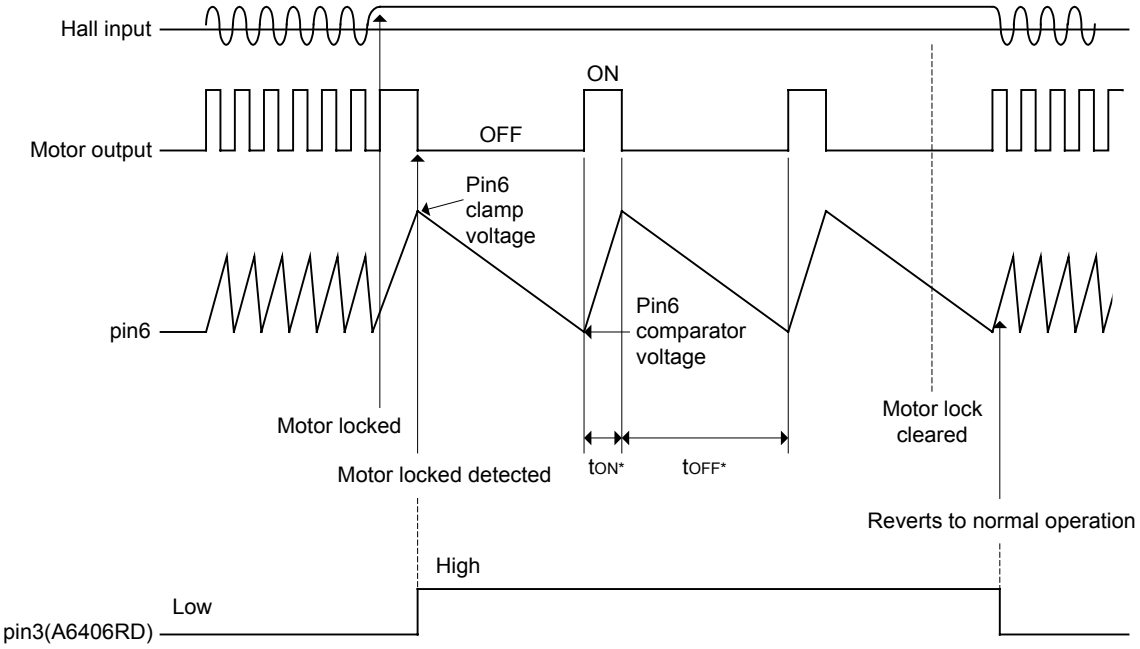


Fig.1

Output ON time (t_{ON}) and OFF time (t_{OFF}) determined by the pin 6 capacitor

Where

$$T_{ON} = \frac{C \times (V_{6CL} - V_{6CP})}{I_{6C}} \text{ (sec)}$$

$$T_{OFF} = \frac{C \times (V_{6CL} - V_{6CP})}{I_{6d}} \text{ (sec)}$$

C is the capacitance of the pin-6 external capacitor

V_{6CL} is the pin 6 clamp voltage

V_{6CP} is the pin 6 comparator voltage

I_{6C} is the pin 6 charge current

I_{6d} is the pin 6 discharge current

■ OPERATION NOTES

(1) The lock detection output pin (pin 3) may maintain HIGH level for a few hundred milliseconds when the power is turned on.

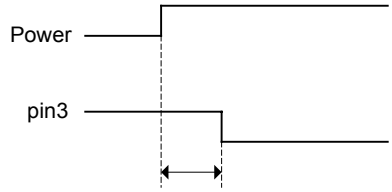


Fig.2

(2) Allowable power dissipation
The allowable power dissipation is plotted against ambient temperature in Fig. 3.

(3) Power dissipation
Power consumed in the IC can be calculated from the following equation:
$P_C = P_{C1} + P_{C2} + P_{C3}$

1. P_{C1} is power consumed by the circuit current.
   $P_{C1} = V_{CC} \times I_{CC}$
2. P_{C2} is the output current consumption.
   $P_{C2} = (V_{CC} - V_{OH}) \times I_O$

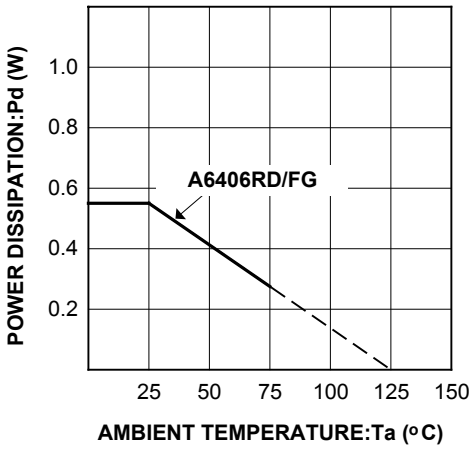


Fig.3

V_{OH} is the HIGH level voltage of pins 7 and 8. Power dissipation can be reduced by raising the hfe-rank of the external output transistor and thereby reducing the I_O value.

3. P_{C3} is power consumed by pin 3.
   $P_{C3} = V_{3L} \times I_3$
   where V_{3L} is the pin-3 LOW level voltage and I_3 is the pin-3 current. Make sure that your application does not exceed the allowable power dissipation of the IC.

■ ELECTRICAL CHARACTERISTIC CURVES

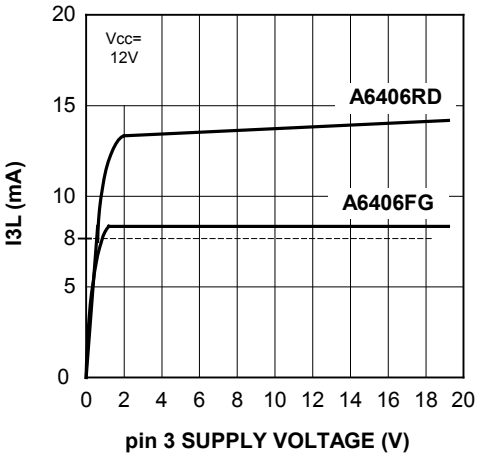


Fig.4 Current capacity vs. supply voltage for pin3

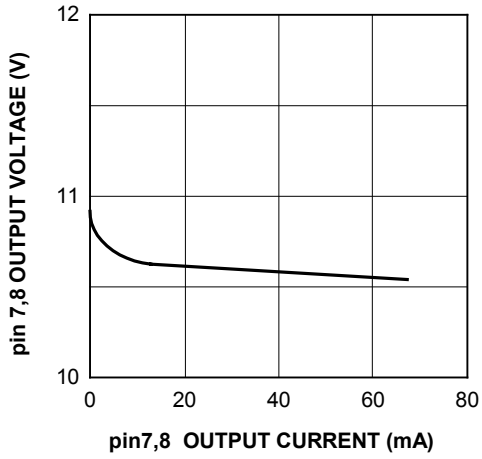
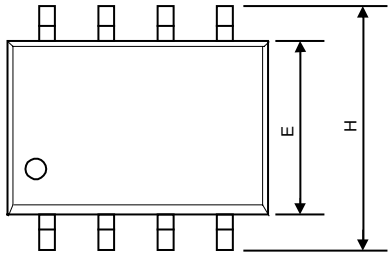
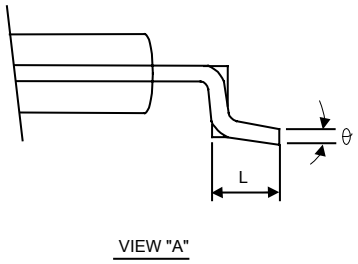
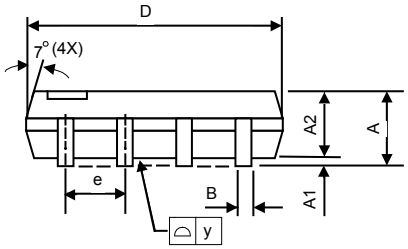


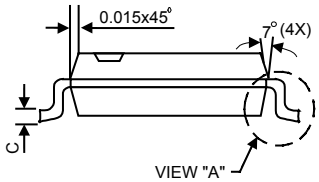
Fig.5 Output voltage vs. output current for pins 7 and 8

■ PACKAGE INFORMATION (SOP-8)









SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.40	1.60	1.75	0.055	0.063	0.069
A1	0.10	–	0.25	0.040	–	0.100
A2	1.30	1.45	1.50	0.051	0.057	0.059
B	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.010
D	4.80	4.85	5.05	0.189	0.191	0.199
E	3.80	3.91	4.00	0.150	0.154	0.157
e	–	1.27	–	–	0.050	–
H	5.79	5.99	6.20	0.228	0.236	0.244
L	0.38	0.71	1.27	0.015	0.028	0.050
y	–	–	0.10	–	–	0.004
θ	0^O	–	8^O	0^O	–	8^O