

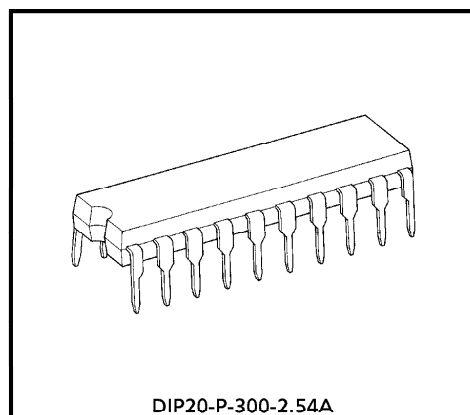
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8413P

3 PHASE BI-DIRECTIONAL HALL MOTOR CONTROL IC

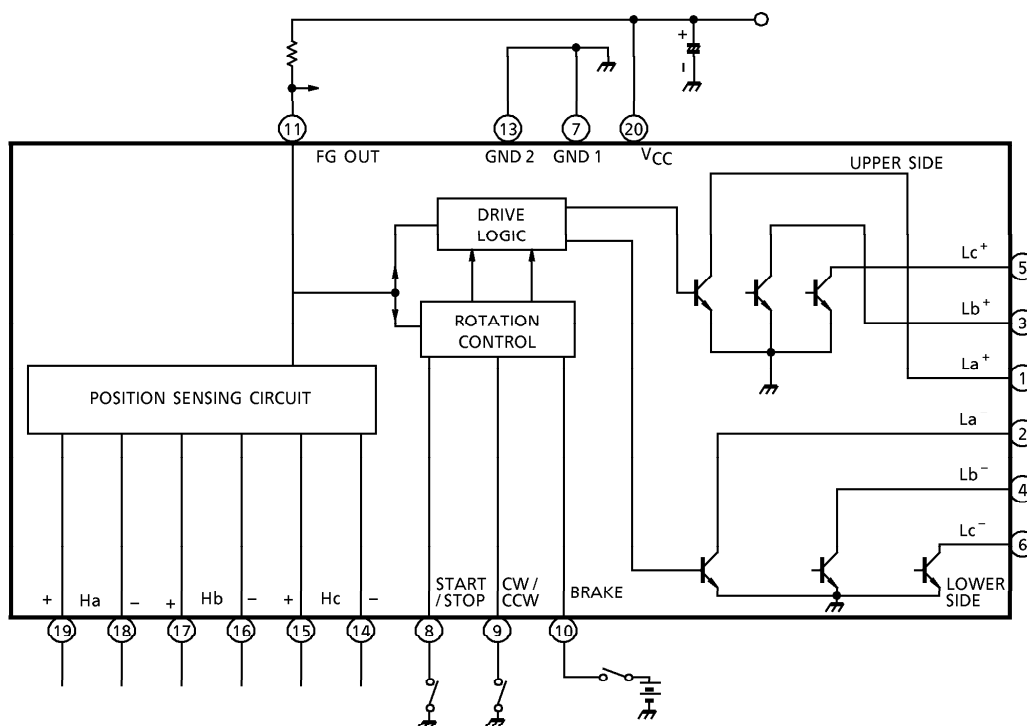
FEATURES

- FG is not required.
(System for obtaining rotation signal through position sensing)
- Start/stop, CW/CCW and brake function is provided.
- Gain of position sensing circuit is high, and hysteresis is provided.
- Rotation signal output is provided.
(Frequency signal of three times the position sensing output (hall element output) can be obtained.)
- External transistor type.



Weight : 2.25g (Typ.)

BLOCK DIAGRAM



961001EBA2

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PIN FUNCTION

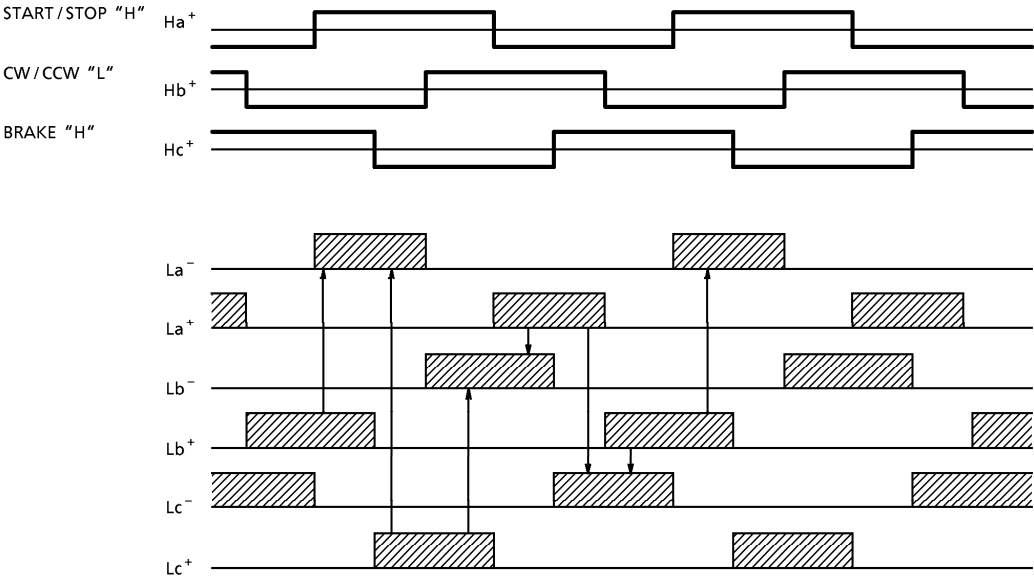
PIN No.	SYMBOL	FUNCTION DESCRIPTION
1	La ⁺	a-phase upper drive output terminal.
2	La ⁻	a-phase lower drive output terminal.
3	Lb ⁺	b-phase upper drive output terminal.
4	Lb ⁻	b-phase lower drive output terminal.
5	Lc ⁺	c-phase upper drive output terminal.
6	Lc ⁻	c-phase lower drive output terminal.
7	GND1	GND1 terminal.
8	START/STOP	Start/stop control terminal.
9	CW/CCW	Forward /Reverse rotation control terminal.
10	BRAKE	Breake terminal.
11	FG OUT	FG signal output terminal.
12	N. C.	Non connection.
13	GND2	GND2 terminal.
14	Hc ⁻	c-phase Hall Amp. negative input terminal.
15	Hc ⁺	c-phase Hall Amp. positive input terminal.
16	Hb ⁻	b-phase Hall Amp. negative input terminal.
17	Hb ⁺	b-phase Hall Amp. positive input terminal.
18	Ha ⁻	a-phase Hall Amp. negative input terminal.
19	Ha ⁺	a-phase Hall Amp. positive input terminal.
20	VCC	Power supply input terminal.

961001EBA2'

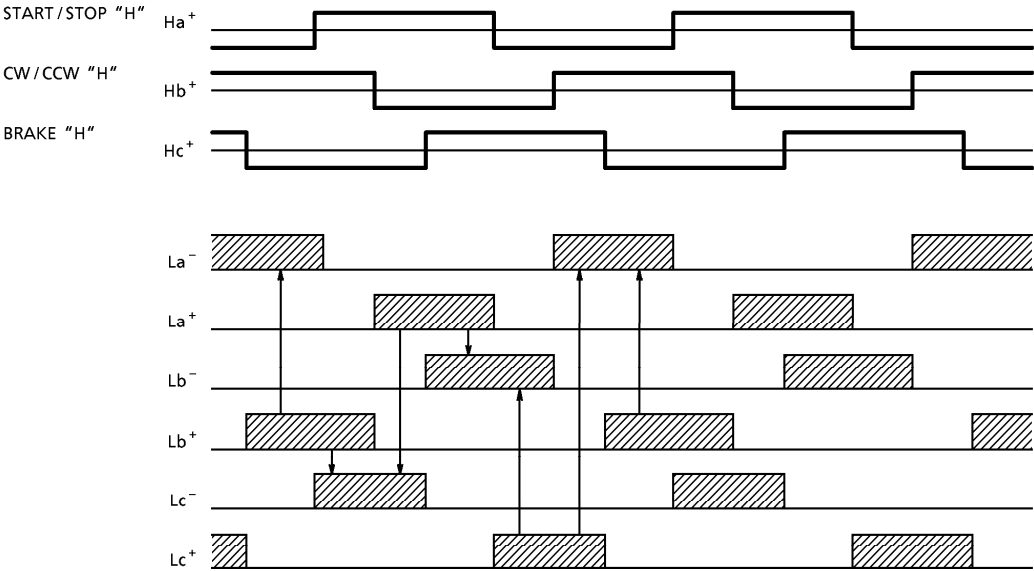
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TIMING CHART

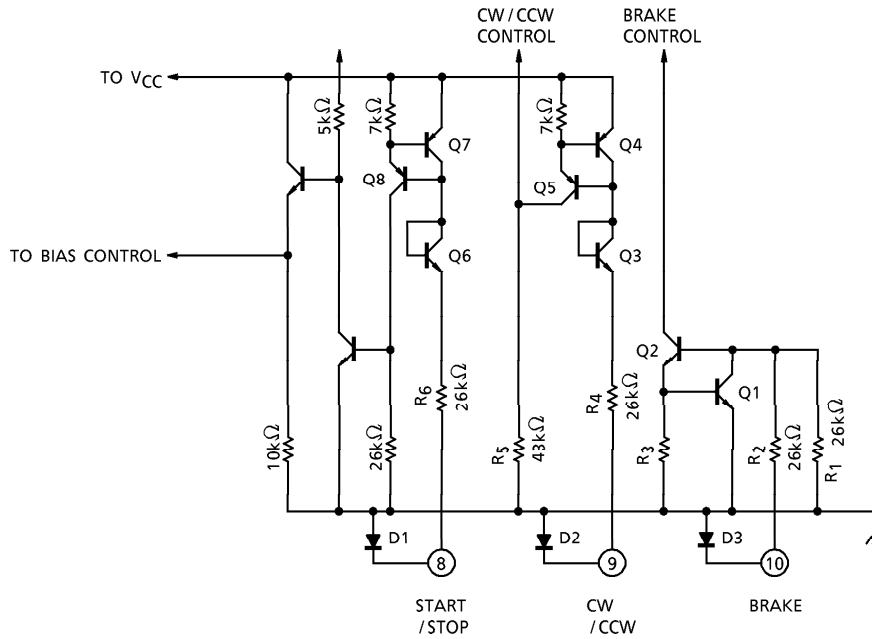
Forward rotation (Position sensing signal advances Ha→Hb→Hc.)



Reverse rotation (Position sensing signal advances Ha→Hc→Hb.)



(1) Control input circuit



START/STOP and CW/CCW inputs are Low Active and BRAKE input is High Active type.
D1~D3 are input protect diodes.

Input current of START/STOP and CW/CCW are calculated by following equations.

$$I_{IN\ C} = \frac{V_{CC} - V_{INC} - V_{BEQ3} - V_{BEQ4} - V_{BEQ5}}{R_4} \doteq \frac{V_{CC} - V_{INC} - 2.1}{26 \times 10^3} \quad (A)$$

(Pin⑨)

$$I_{IN\ R} = \frac{V_{CC} - V_{INR} - V_{BEQ6} - V_{BEQ7} - V_{BEQ8}}{R_6} \doteq \frac{V_{CC} - V_{INR} - 2.1}{26 \times 10^3} \quad (A)$$

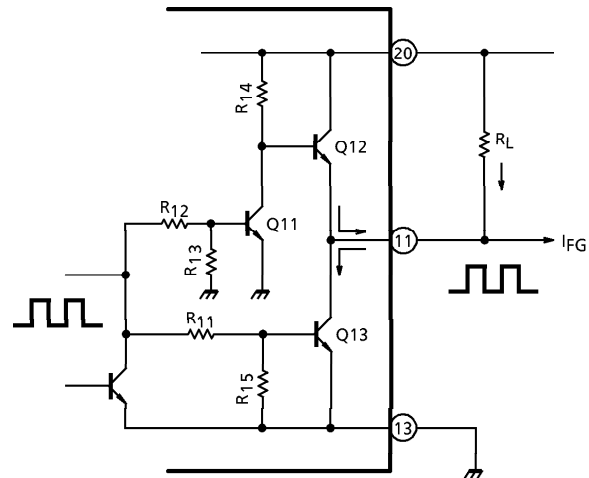
(Pin⑧)

And also input current of BRAKE (Pin⑩) is calculated by following equation.

$$I_{IN\ B} = \frac{V_{INB} - V_{BEQ2} - V_{BEQ3}}{R_2} \doteq \frac{V_{INB} - 1.4}{26 \times 10^3} \quad (A)$$

(Pin⑩)

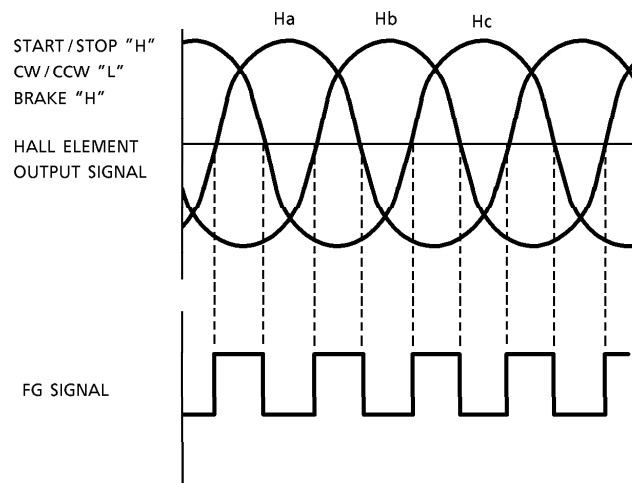
(2) FG output circuit



FG signal is generated by the using 3 phase hall signals.

FG output transistors of Q12 and Q13 work push-pull.

Specified output voltage generates if load resistor connect to FG output to V_{CC} .



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{CC}	18	V
Output Current	I _O	± 100	mA
Position Sensing Circuit Input Voltage (T _j = 25°C)	V _H	400	mV _{p-p}
Power Dissipation	P _D (Note)	1.2	W
Operating Temperature	T _{opr}	– 30~75	°C
Storage Temperature	T _{stg}	– 55~150	°C

(Note) No heat sink

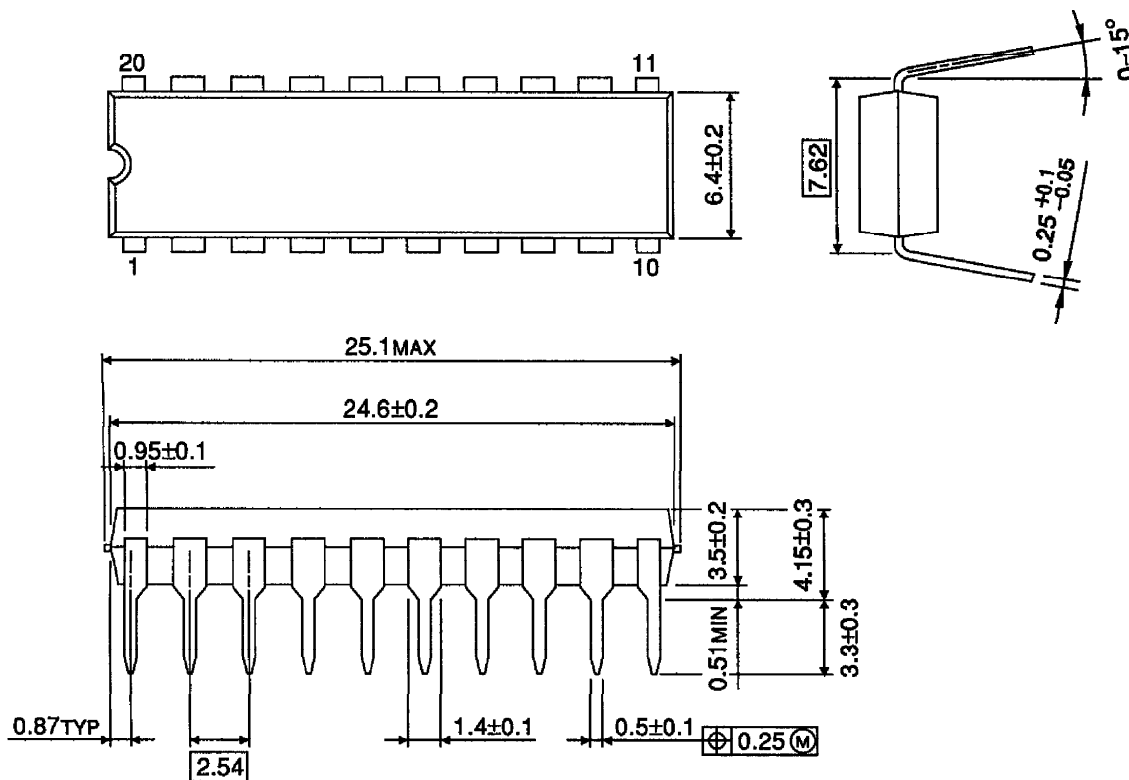
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC} = 5V, Ta = 25°C)

CHARACTERISTIC			SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operation Power Supply Voltage			V _{CC (opr)}	—		4.0	—	18	V
Power Supply Current			I _{CC1}	1	Stop state	—	4	—	mA
			I _{CC2}		Output open	—	4	—	
Saturation Voltage	Upper Side	V _{SAT (U-1)}	2	I _O = 10mA	—	1.5	—	V	
		V _{SAT (U-2)}		I _O = 100mA	—	2.0	—		
	Lower Side	V _{SAT (L-1)}		I _O = 10mA	—	0.4	—		
		V _{SAT (L-2)}		I _O = 100mA	—	0.5	1.0		
Leak Current	Upper Side	I _{L (U)}	2	V = 18V	—	—	100	μA	
	Lower Side	I _{L (L)}			—	—	100		
Position Sensing Input	Common Mode Voltage Range		CMR _H	—		2.0	—	V _{CC} – 0.5	V
	Input Sensitivity		V _H			20	—	—	mV _{p-p}
	Input Hysteresis		V _H – H _{ys}			2	7	15	mV
START Input (Low Act)	Operation Input Voltage	"H"	V _{IN R (H)}	2		V _{CC} – 0.9	—	V _{CC}	V
		"L"	V _{IN R (L)}	2		—	—	1.0	
	Input Current	"L"	I _{IN R}	2	V _{IN R} = 1.0V	—	70	200	μA
CW / CCW Input (Low Act)	Operation Input Voltage	"H"	V _{IN C (H)}	2		V _{CC} – 0.9	—	V _{CC}	V
		"L"	V _{IN C (L)}	2		—	—	1.0	
	Input Current	"L"	I _{IN C}	2	V _{IN C} = 1.0V	—	70	200	μA
BRAKE Input (High Act)	Operation Input Voltage	"H"	V _{IN B (H)}	2		4.0	—	V _{CC}	V
		"L"	V _{IN B (L)}	2		—	—	1.0	
	Input Current	"L"	I _{IN B}	3	V _{IN B} = 4V	—	100	250	μA
FG Output	Output Voltage	"H"	V _{FGH}	3	I _{FG} = 1mA	V _{CC} – 1.0	—	—	V
	Output Voltage	"L"	V _{FG L}	3		—	—	0.5	

OUTLINE DRAWING

DIP20-P-300-2.54A

Unit : mm



Weight : 2.25g (Typ.)