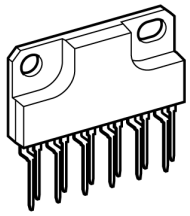
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8440H,TA8440F

DC MOTOR FULL BRIDGE DRIVER
F TYPE: UNDER DEVELOPMENT

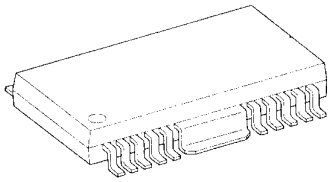
The TA8440H is a full−bridge driver for selecting the forward and reverse running of a motor with brushes and is able to control 4 modes of forward, reverse, stop and braking.
The motor driving unit and the control unit have a separate power supply line, independently and the TA8440H is also usable as a stepping motor driver.

TA8440H



HZIP12-P-1.78B

TA8440F (Under development)



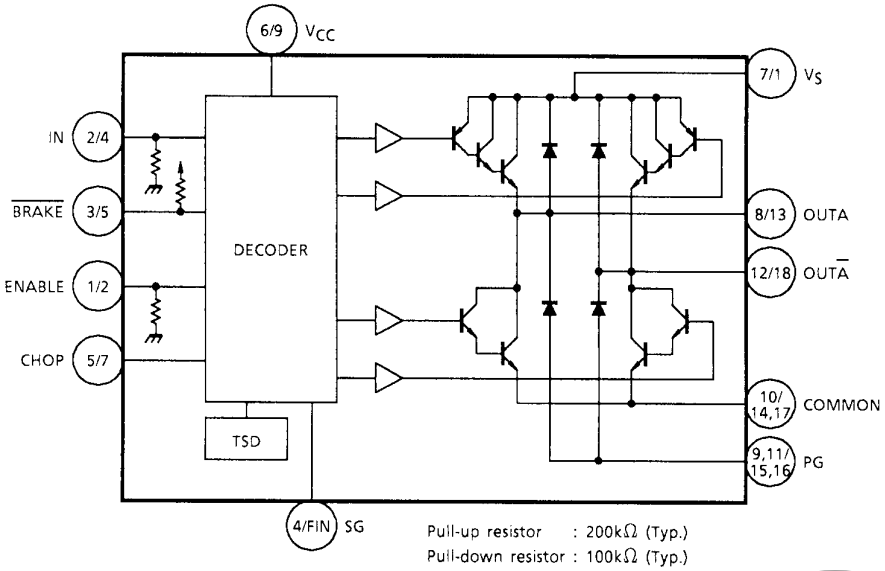
HSOP20-P-450-1.00

Weight
HZIP12-P-1.78B: 4.04 g (Typ.)
HSOP20-P-450-1.00: 0.79 g (Typ.)

FEATURES

- Output current is as large as 1.5A (AVE) and 3.0A (PEAK).
- 4 modes of forward, reverse, stop, and braking are available and a counter−electromotive force absorbing diode has been built−in.
- Thermal shutdown circuit incorporated.
- Input is compatible with CMOS.
- Built−in input pull−up resistor. BRAKE = 200 kΩ (Typ.)
- Built−in input pull−down resistor. IN, ENABLE = 100 kΩ (Typ.)

BLOCK DIAGRAM



TA8440F: 3, 6, 8, 10, 11, 12, 19, 20 pin is No Connection.

PIN FUNCTION

Pin No. H	Pin No. F	SYMBOL	FUNCTIONAL DESCRIPTION
1	2	ENABLE	ENABLE terminal
2	4	IN	Forward rotation / reverse rotation switch terminal
3	5	$\overline{\text{BRAKE}}$	BRAKE terminal
4	FIN	SG	Signal GND
5	7	CHOP	PWM signal input terminal
6	9	V_{CC}	Power voltage supply terminal for control
7	1	V_S	Power voltage supply terminal for motor driver
8	13	OUTA	Output terminal
9	15	PG	Power GND
10	14, 17	COMMON	COMMON terminal
11	16	PG	Power GND
12	18	OUT $\overline{\text{A}}$	Output terminal

TA8440F: 3, 6, 8, 10, 11, 12, 19, 20 pin is No Connection.

FUNCTION

INPUT				OUTPUT		MODE
IN	$\overline{\text{BRAKE}}$	ENABLE	CHOP	OUTA	OUT $\overline{\text{A}}$	MOTOR
H	H	H	L	H	L	CW / CCW
L	H	H	L	L	H	CCW / CW
(*)	(*)	L	(*)	∞	∞	Stop
(*)	L	H	(*)	L	L	Brake
H	H	H	H	∞	L	Chop
L	H	H	H	L	∞	Chop

* : Don't care ∞: High impedance

MAXIMUM RATING (Ta = 25°C)

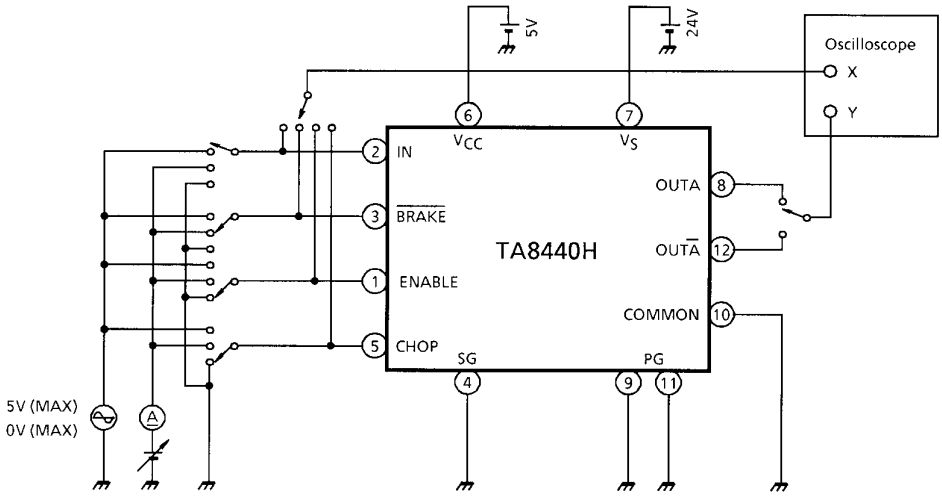
CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	7	V
		V_S	50	
Input Voltage		V_{IN}	−0.3~V_{CC}	V
Output Current	AVE	$I_{O\ (AVE.)}$	1.5	A
	PEAK	$I_{O\ (PEAK)}$	3.0 (Note 1)	A
Power Dissipation		P_D	2.52 (Note 2)	W
			25.0 (Note 3)	
Operating Temperature		T_{opr}	−30~75	°C
Storage Temperature		T_{stg}	−55~150	°C

Note 1: t = 100 ms
Note 2: No heat sink
Note 3: Tc = 75°C

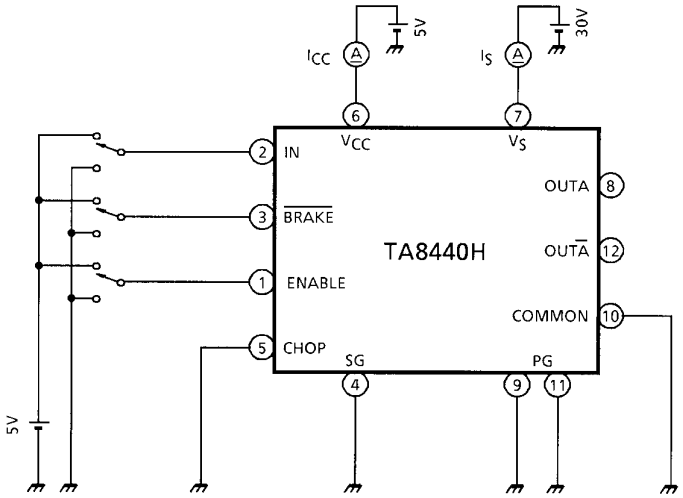
ELECTRICAL CHARACTERISTICS (V_{CC} = 5 V, V_S = 24 V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP.	MAX	UNIT
Input Voltage	High	$V_{IN\ (H)}$	1	IN, CHOP, ENABLE, $\overline{BRAKE}$		3.5	—	V_{CC}	v
	Low	$V_{IN\ (L)}$				GND	—	1.5	
Input Current	High	$I_{IN-1\ (H)}$	1	CHOP	V_{IN} = 5 V	—	5	52	µA
		$I_{IN-2\ (H)}$		IN, ENABLE		—	40	60	
		$I_{IN-3\ (H)}$		$\overline{BRAKE}$		—	0	5.5	
Input Current	Low	$I_{IN-1\ (L)}$		CHOP	V_{IN} = 0 V Source type	—	0	5.5	
		$I_{IN-2\ (L)}$		IN, ENABLE		—	0	5.5	
		$I_{IN-3\ (L)}$		$\overline{BRAKE}$		—	25	52	
Current Consumption (I)		I_{CC1}	2	Stop		—	6	10.5	mA
		I_{CC2}		Forward / reverse		—	10	14.5	
		I_{CC3}		Brake		—	14	18.5	
Current Consumption (II)		I_{S1}	2	Stop		—	2	4.2	mA
		I_{S2}		Forward / reverse		—	3.5	5.0	
		I_{S3}		Brake		—	2.5	3.7	
Output saturation voltage	Upper Side	V_{sat-U1}	3	I_{OUT} = 1.5A		1.5	2.0	2.7	V
	Under Side	V_{sat-L1}				0.7	1.25	1.9	
	Upper Side	V_{sat-U2}		I_{OUT} = 3.0A		2.7	3.0	3.9	
	Under Side	V_{sat-L2}				1.7	2.0	2.9	
Diode Forward Orientation Voltage	Upper Side	V_{F-U1}	—	I_{OUT} = 1.5A		—	3.5	—	V
	Under Side	V_{F-L1}				—	1.3	—	
Output Leakage Current	Upper Side	I_{OH}	4	V_S = 30V		—	—	200	µA
	Under Side	I_{OL}				—	—	100	
Shut Down Temperature		T_{SD}	—	—		—	170	—	°C
Transfer Time		t_{pLH}	—	IN−OUT		—	2.7	—	µs
		t_{pHL}				—	1.2	—	
		t_{pLH}		CHOP−OUT		—	0.7	—	
		t_{pHL}				—	2.5	—	
		t_{pLH}		ENABLE−OUT		—	2.9	—	
		t_{pHL}				—	1.1	—	
		t_{pLH}		$\overline{BRAKE}$ −OUT		—	45	—	
		t_{pHL}				—	45	—	

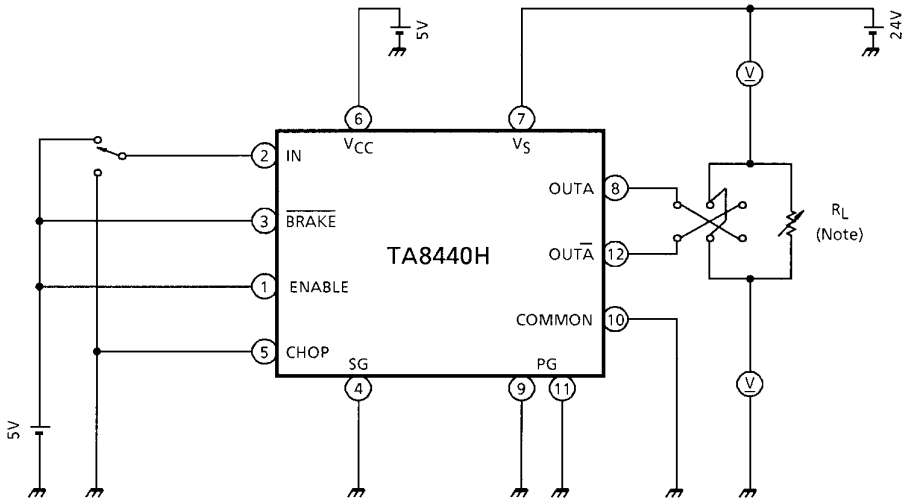
TEST CIRCUIT 1. $V_{IN\ (H)}$, $V_{IN\ (L)}$, $I_{IN\ (H)}$, $I_{IN\ (L)}$



TEST CIRCUIT 2. I_{CC1}, I_{CC2}, I_{CC3}, I_{S1}, I_{S2}, I_{S3}

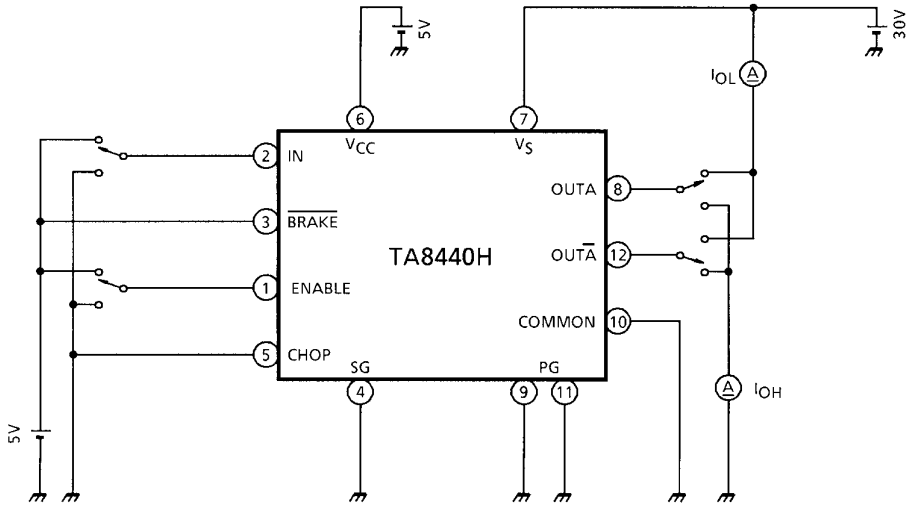


TEST CIRCUIT 3. V_{sat-L}, V_{sat-U}

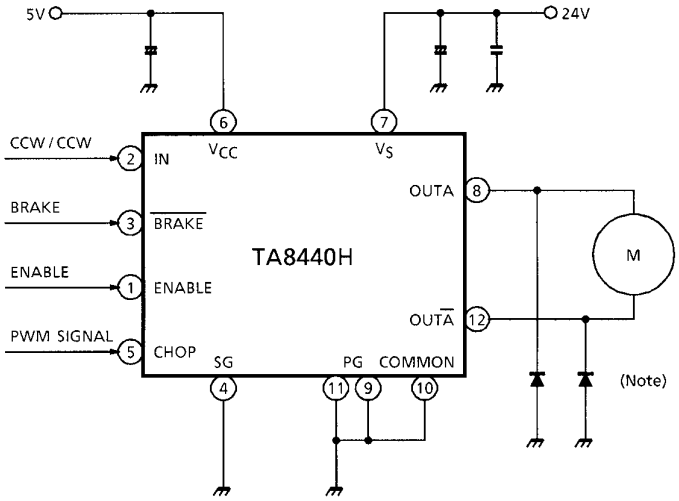


Note: Calibrate I_{OUT} to 1.5 / 3.0 A by R_L.

TEST CIRCUIT 4. I_{OH}, I_{OL}



APPLICATION CIRCUIT

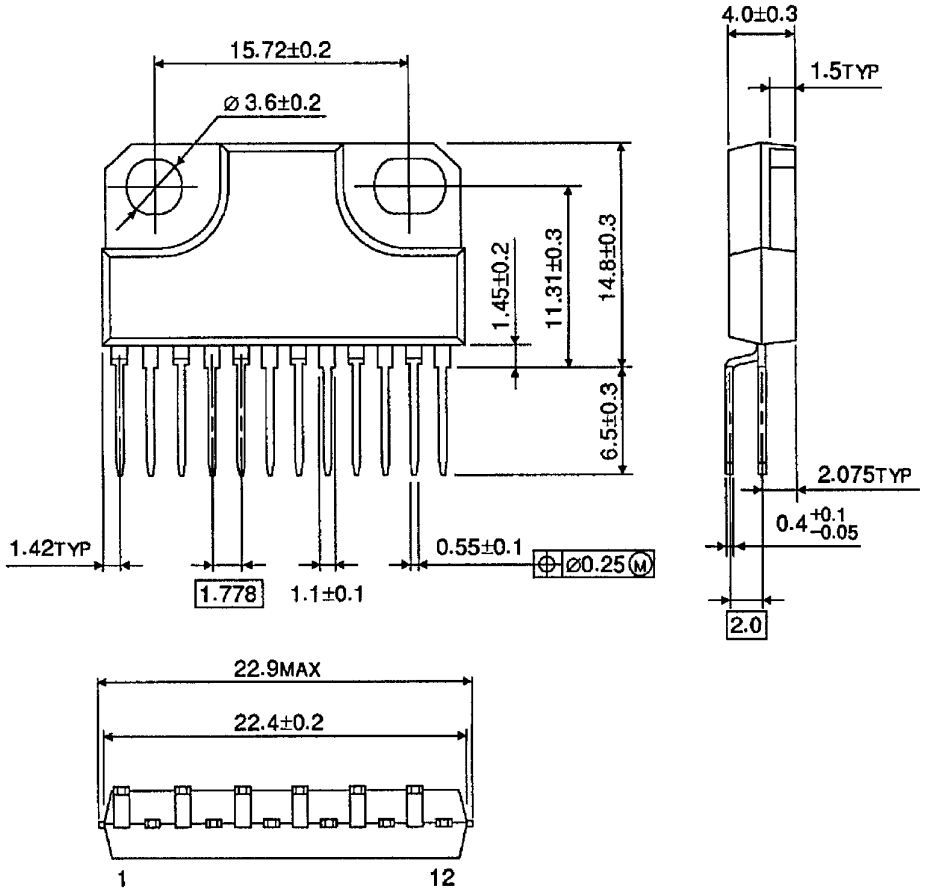


Note 1: Schottky diode (2GWJ42) to be connected additionally between each output (pin 16 / 19 / 20 / 23) and GND for preventing Punch−Through Current.

Note 2: Utmost care is necessary in the design of the output line, V_S and GND line since IC may be destroyed due to short−circuit between outputs, air contamination fault, or fault by improper grounding.

PACKAGE DIMENSIONS

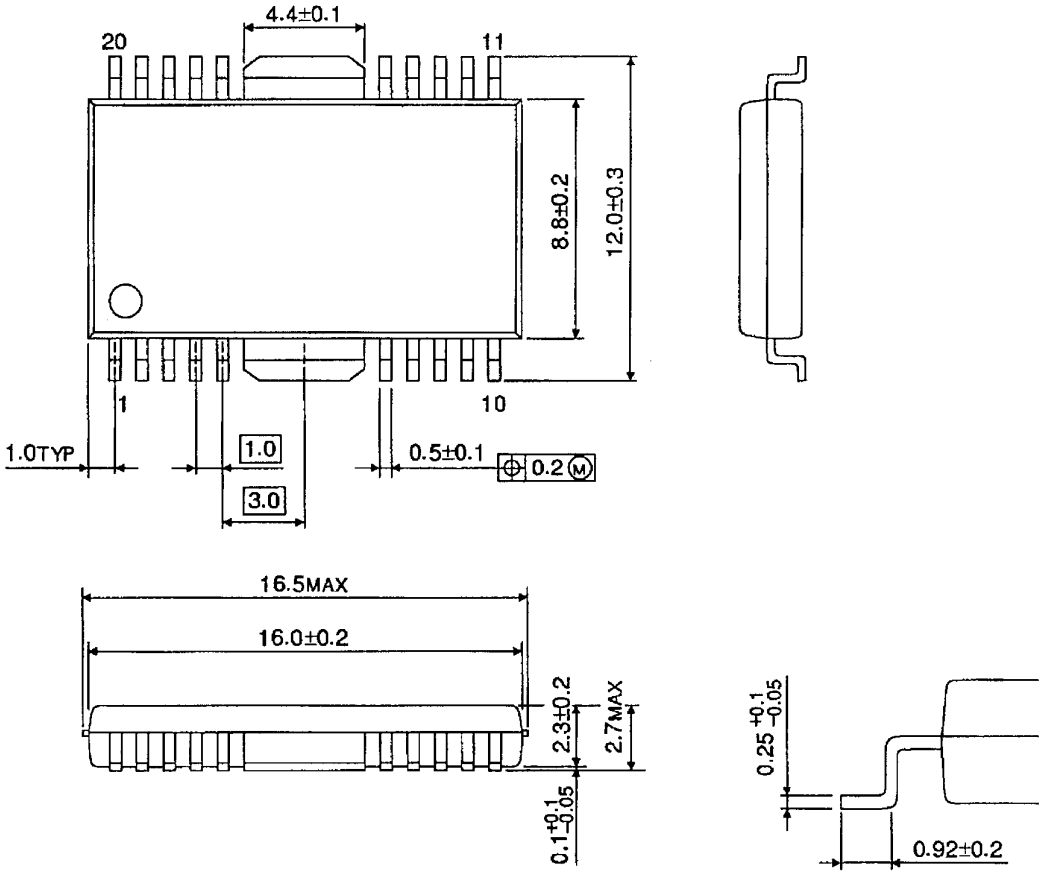
HZIP12−P−1.78B Unit: mm



Weight: 4.04 g (Typ.)

PACKAGE DIMENSIONS

HSOP20-P-450-1.00 Unit : mm



Weight: 0.79 g (Typ.)

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