

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8440H, TA8440F

DC MOTOR FULL BRIDGE DRIVER

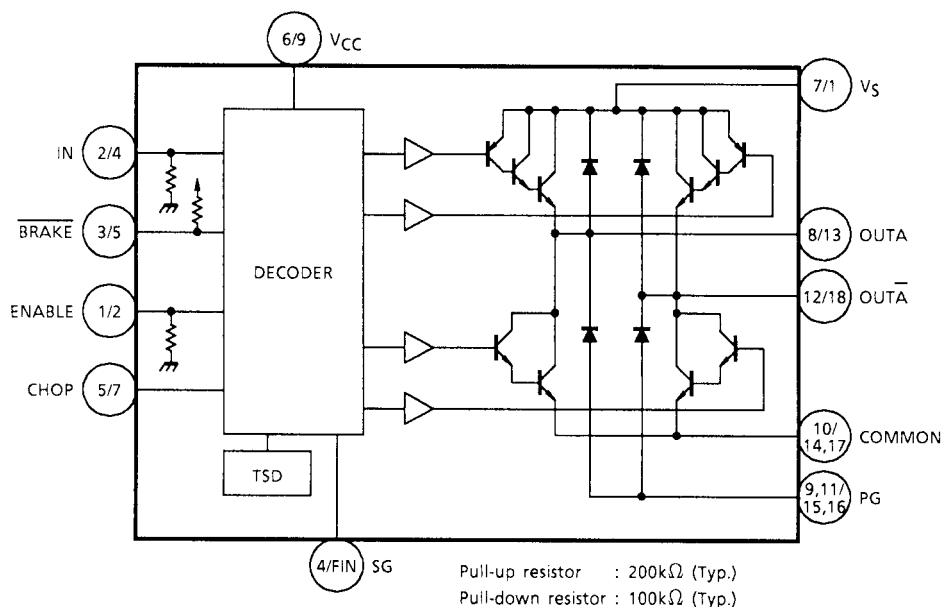
F TYPE: UNDER DEVELOPMENT

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.

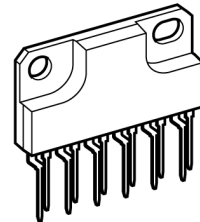
FEATURES

- 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 k Ω (Typ.)
- Built-in input pull-down resistor. IN, ENABLE = 100 k Ω (Typ.)

BLOCK DIAGRAM

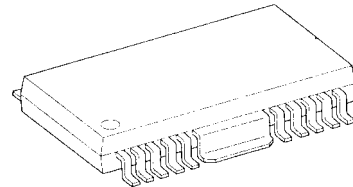


TA8440H



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.)

TA8440H/TA8440F

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

PIN FUNCTION

Pin No.		SYMBOL	FUNCTIONAL DESCRIPTION
H	F		
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 $\bar{A}$	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 $\bar{A}$	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

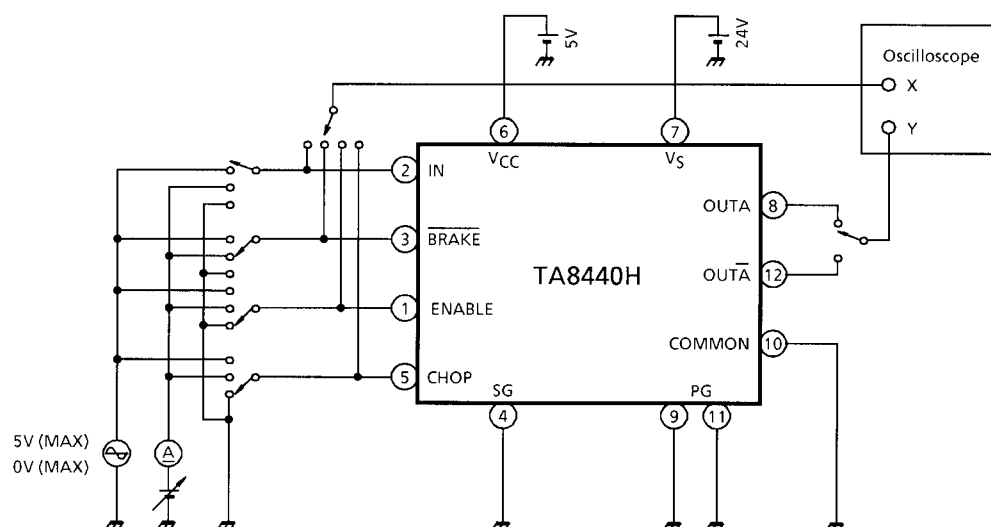
Note 2: No heat sink

Note 3: Tc = 75°C

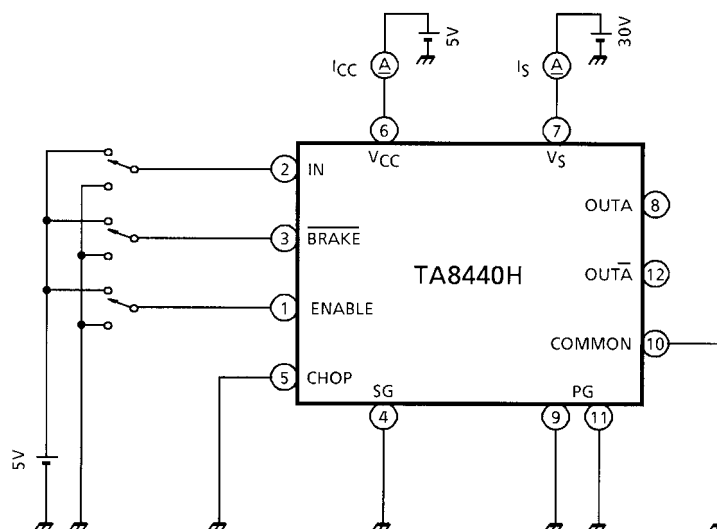
ELECTRICAL CHARACTERISTICS ($V_{CC} = 5\text{ V}$, $V_S = 24\text{ V}$, $T_a = 25^\circ\text{C}$)

CHARACTERISTIC		SYMBOL	TEST CIR- CUIT	TEST CONDITION		MIN	TYP.	MAX	UNIT
Input Voltage	High	V _{IN} (H)	1	IN, CHOP, ENABLE, $\overline{\text{BRAKE}}$		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
		IN, ENABLE		—		40	60		
		$\overline{\text{BRAKE}}$		—		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)		$\overline{\text{BRAKE}}$		—	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}		$\overline{\text{BRAKE}}$ -OUT		—	45	—	
		t _{pHL}				—	45	—	

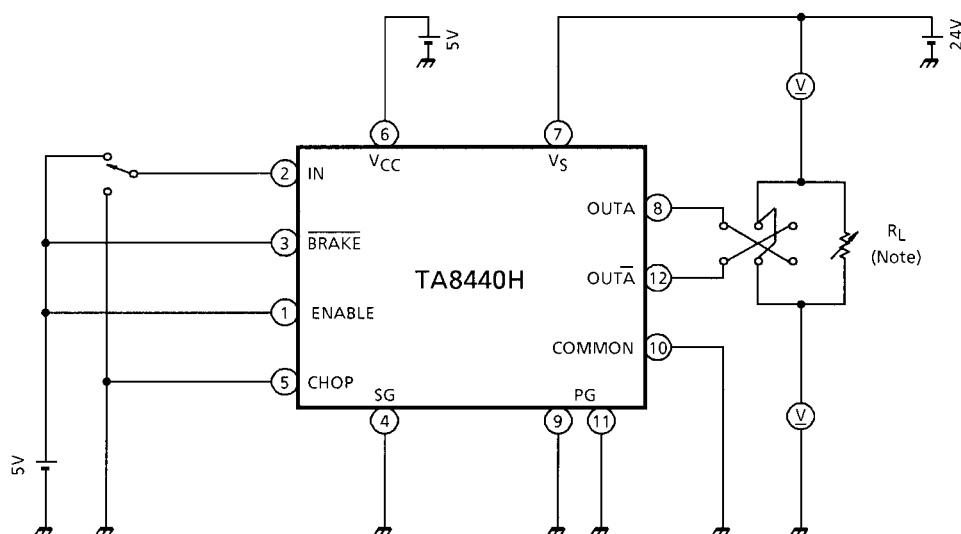
TEST CIRCUIT 1. $V_{IN} (H)$, $V_{IN} (L)$, $I_{IN} (H)$, $I_{IN} (L)$



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

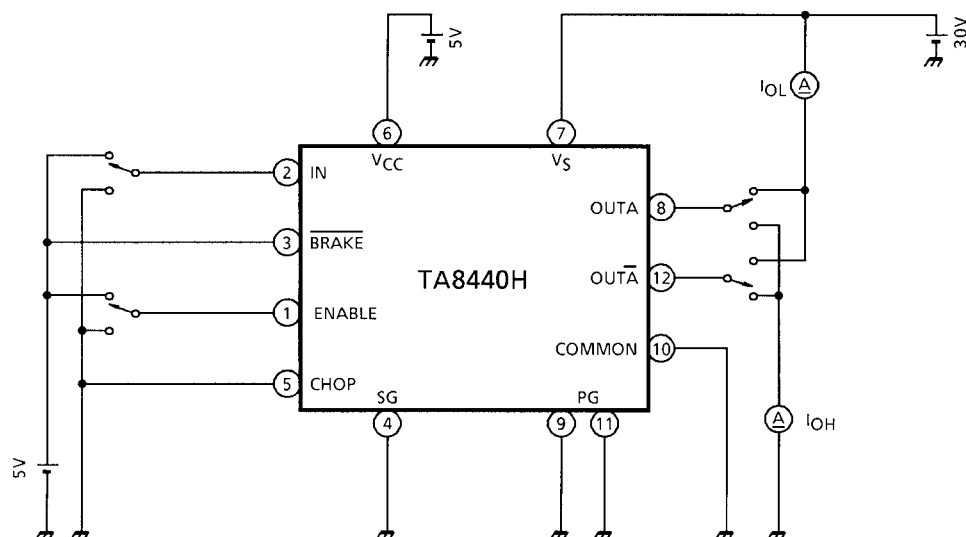


TEST CIRCUIT 3. V_{sat-L} , V_{sat-U}

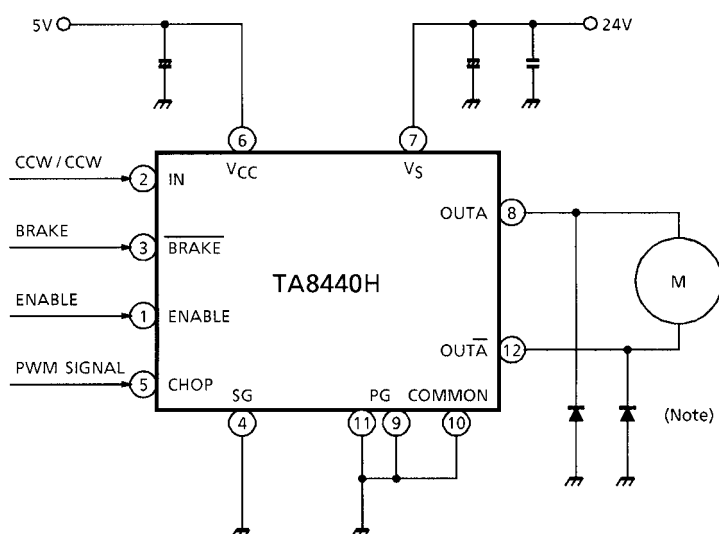


Note: Calibrate I_{OUT} to 1.5 / 3.0 A by R_L .

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



APPLICATION CIRCUIT



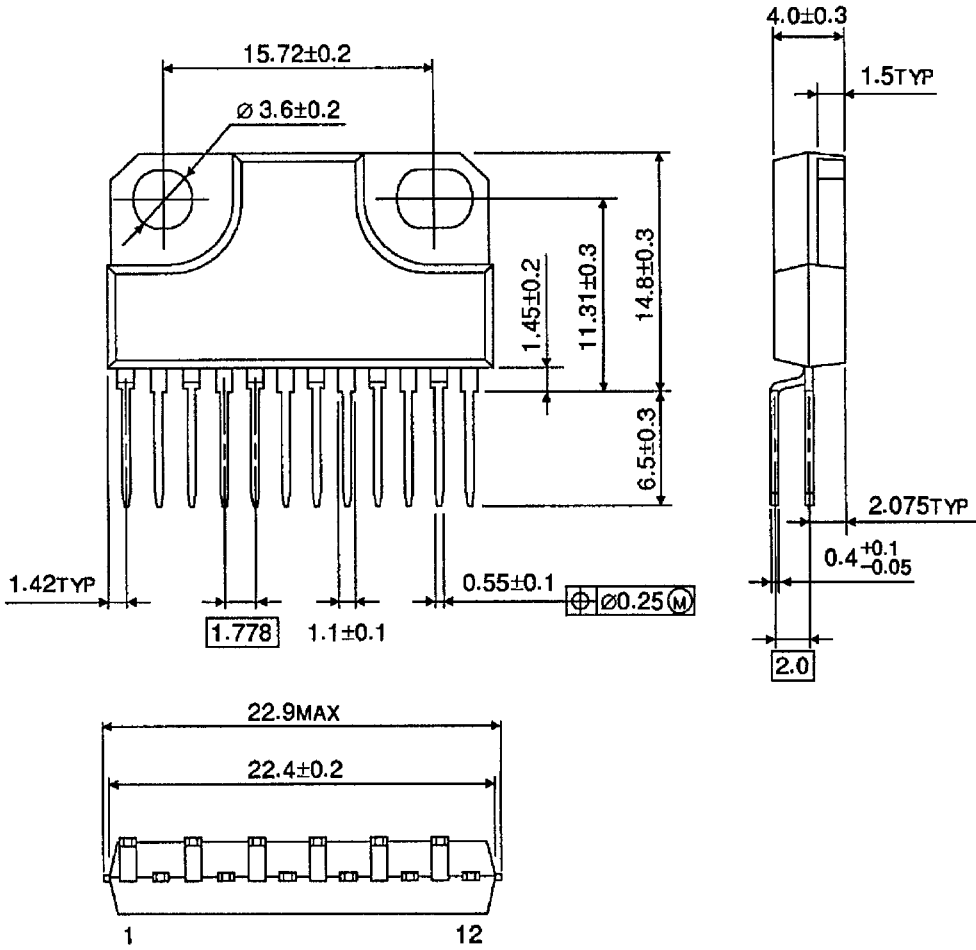
Note 1: Schottky diode (2GWJ42) to be connected additionally between each output (pin 16 / 19 / 20 / 23) and GND for preventing Punch-Through Current.

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

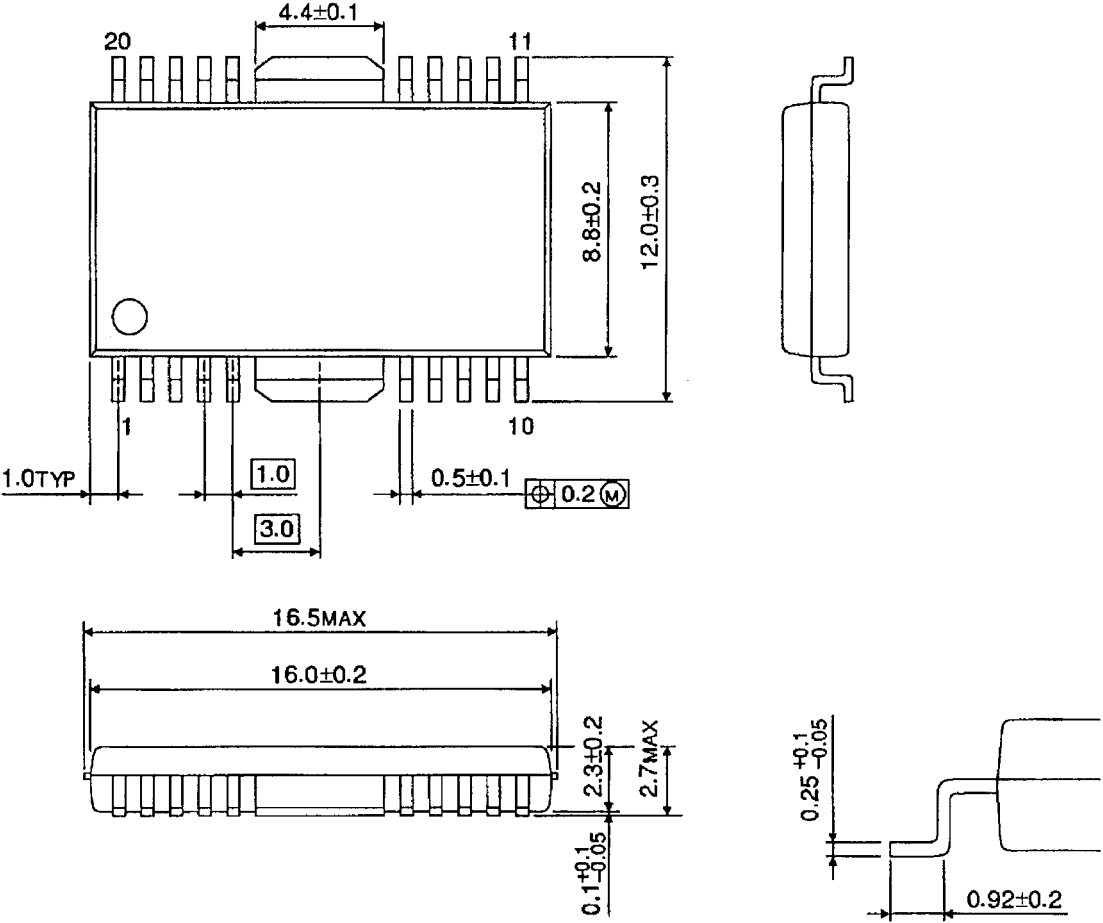


Weight: 4.04 g (Typ.)

PACKAGE DIMENSIONS

HSOP20-P-450-1.00

Unit : mm



Weight: 0.79 g (Typ.)

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000707EBA

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