

# TA8405S

## Sequential Dual-Bridge Driver (Driver for Switching between Forward and Reverse Rotation) for DC Motor

The TA8405S can control a DC motor in four different modes (forward rotation, reverse rotation, stop, and brake), using its bridge driver best suited for switching between forward and reverse rotation.

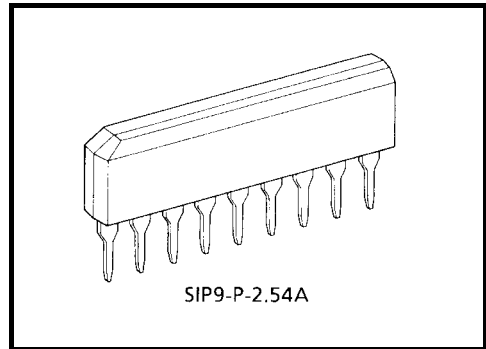
The IC can deliver an output current of 0.4 A (AVE.) and 1.0 A (PEAK). It has a circuit configuration best suited especially for VCR front loading and tape loading.

### Features

- Wide range of operating voltage:  $V_{CC}$  (opr.) = 4.5 to 22 V  
 $V_S$  (opr.) = 0 to 22 V

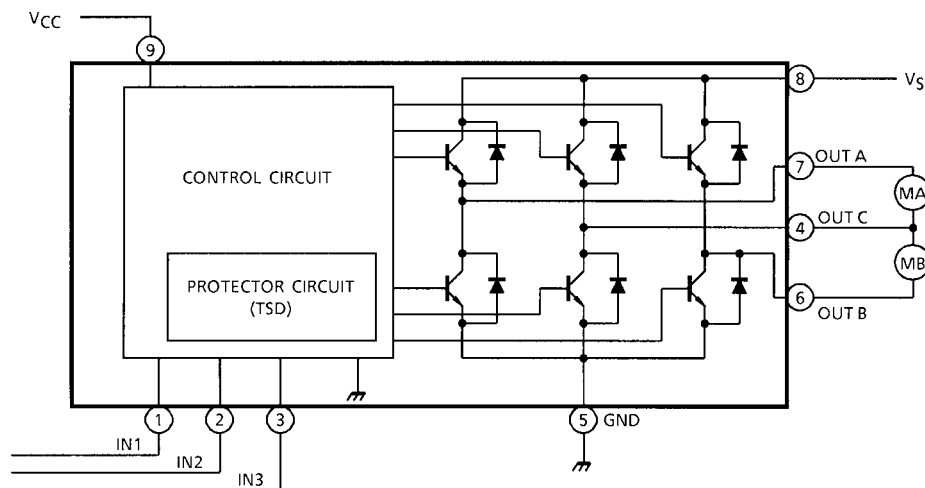
No malfunction occurs even if  $V_{CC}$  is higher than  $V_S$  or vice versa. However, observe  $V_{ref} \leq V_S$ .

- Output current up to 0.4 A (AVE.) and 1.0 A (PEAK)
- Built-in thermal shutdown circuit
- Panch-through current restriction circuit
- Built-in back electromotive force absorber diode
- Built-in hysteresis circuit



Weight: 0.92 g (typ.)

### Block Diagram

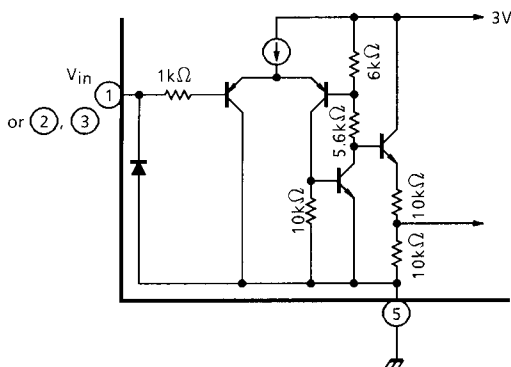


## Pin Function

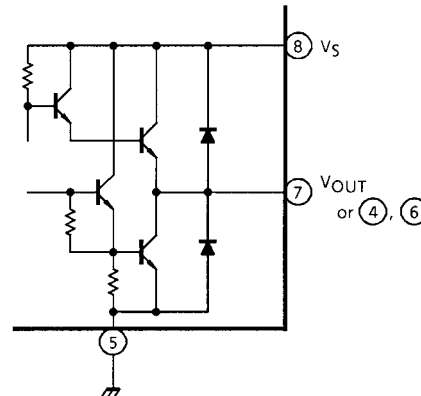
Pin No.	Symbol	Functional Description
1	IN <sub>1</sub>	Input terminal
2	IN <sub>2</sub>	Input terminal
3	IN <sub>3</sub>	Input terminal
4	OUT C	Output terminal
5	GND	GND terminal
6	OUT B	Output terminal
7	OUT A	Output terminal
8	V <sub>S</sub>	Supply voltage terminal for motor drive
9	V <sub>CC</sub>	Supply voltage terminal for logic

## Function Specification

### (1) Input circuit



### (2) Output circuit



## Function

Input			Output			Mode	
IN 1	IN 2	IN 3	OUT C	OUT A	OUT B	MA	MB
0	0	1/0	∞	∞	∞	STOP	STOP
1	0	0	H	L	∞	CW/CCW	STOP
1	0	1	L	H	∞	CCW/CW	STOP
0	1	0	H	∞	L	STOP	CW/CCW
0	1	1	L	∞	H	STOP	CCW/CW
1	1	1/0	L	L	L	BRAKE	BRAKE

∞: High impedance

Note: Inputs are all low active type.

## Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Supply voltage		V <sub>CC</sub>	25	V
Motor drive voltage		V <sub>S</sub>	25	V
Output current	PEAK	I <sub>O</sub> (PEAK)	1.0 (Note 1)	A
	AVE.	I <sub>O</sub> (AVE.)	0.4	
Power dissipation		P <sub>D</sub>	0.75 (Note 2)	W
Operating temperature		T <sub>opr</sub>	-30 to 75	°C
Storage temperature		T <sub>stg</sub>	-55 to 150	°C

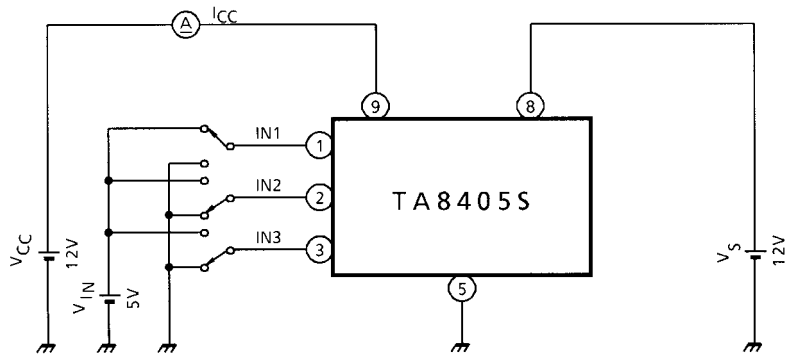
Note 1: Duty 1/10, 100 ms

Note 2: No heat sink

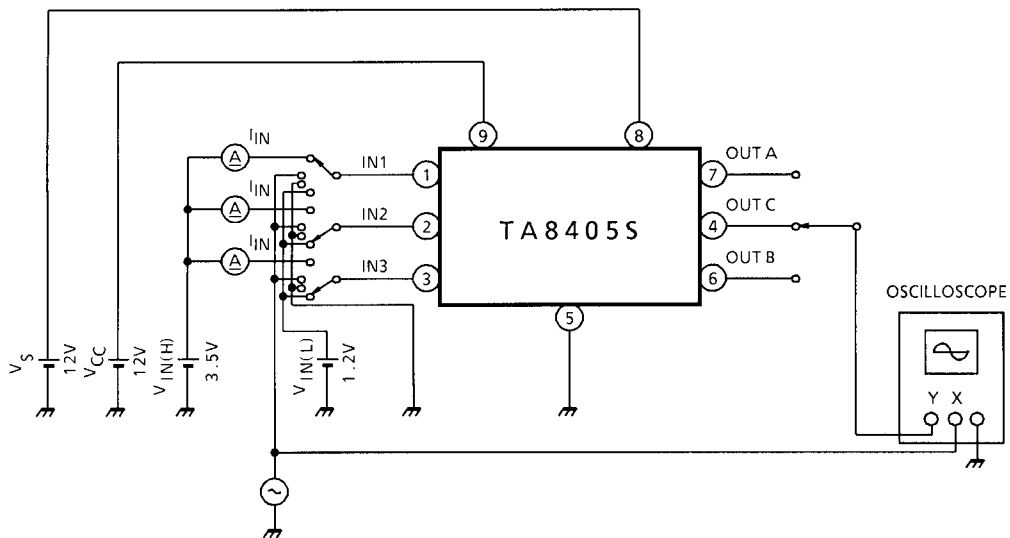
## Electrical Characteristics (unless otherwise specified, Ta = 25°C, V<sub>CC</sub> = 12 V, V<sub>S</sub> = 12 V)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Supply current		I <sub>CC1</sub>	1	Output open, CW/CCW mode	—	7	15	mA
		I <sub>CC2</sub>	1	Output open, BRAKE mode	—	15	38	
		I <sub>CC3</sub>	1	Output open, STOP mode	—	7	15	
Input operating voltage	1 (High)	V <sub>IN1</sub>	2	—	3.5	—	5.5	V
	2 (Low)	V <sub>IN2</sub>	2	—	GND	—	1.2	
Input current		I <sub>IN</sub>	2	V <sub>IN</sub> = GND, source mode	—	4	60	μA
Input hysteresis voltage		ΔV <sub>T</sub>	2	—	—	1.5	—	V
Output saturation voltage	Upper	V <sub>SAT U-1</sub>	3	I <sub>O</sub> = 0.4 A, V <sub>OUT</sub> -V <sub>S</sub> measure	—	1.0	1.4	V
	Lower	V <sub>SAT L-1</sub>	3	I <sub>O</sub> = 0.4 A V <sub>OUT</sub> -GND measure	—	0.8	1.2	
	Upper	V <sub>SAT U-2</sub>	3	V <sub>OUT</sub> -V <sub>S</sub> measure I <sub>O</sub> = 1.0 A, ON LOAD : 20 ms	—	1.3	2.3	
	Lower	V <sub>SAT L-2</sub>	3	V <sub>OUT</sub> -GND measure I <sub>O</sub> = 1.0 A, ON LOAD : 20 ms	—	1.0	1.5	
Output transistor leakage current	Upper	I <sub>LU</sub>	5	V <sub>S</sub> = 25 V	—	—	50	μA
	Lower	I <sub>LL</sub>	5	V <sub>S</sub> = 25 V	—	—	50	
Diode forward voltage	Upper	V <sub>FU</sub>	4	I <sub>F</sub> = 1.0 A	—	2.1	—	V
	Lower	V <sub>FL</sub>	4	I <sub>F</sub> = 1.0 A	—	1.6	—	
Thermal shut down operating temperature		T <sub>SD</sub>	—	T <sub>j</sub>	—	130	—	°C

**Test Circuit 1**  
I<sub>CC</sub>1, 2, 3

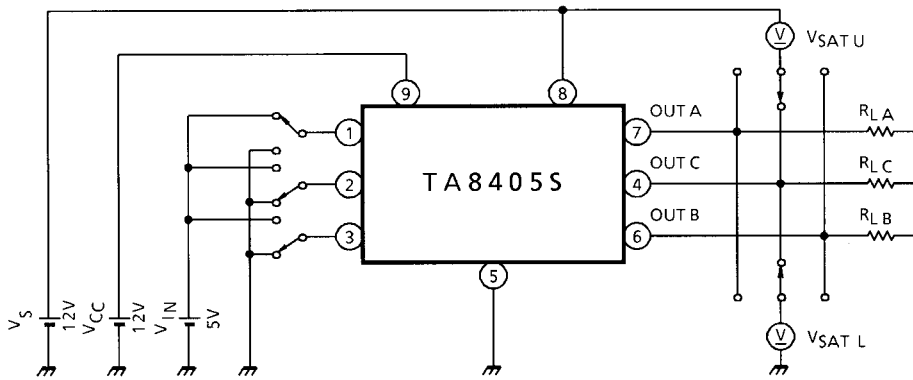


**Test Circuit 2**  
V<sub>IN1, 2</sub>, I<sub>IN</sub>, ΔV<sub>T</sub>



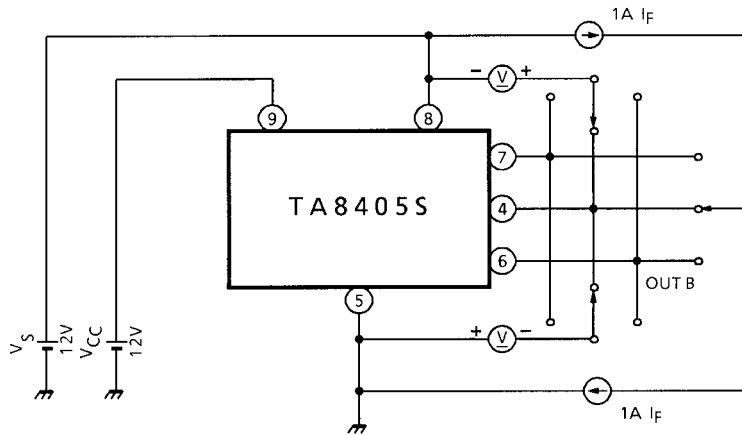
## Test Circuit 3

$V_{SAT U-1, L-1, U-2, L-2}$



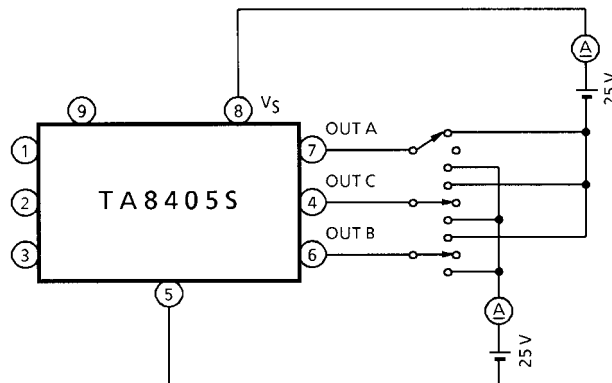
## Test Circuit 4

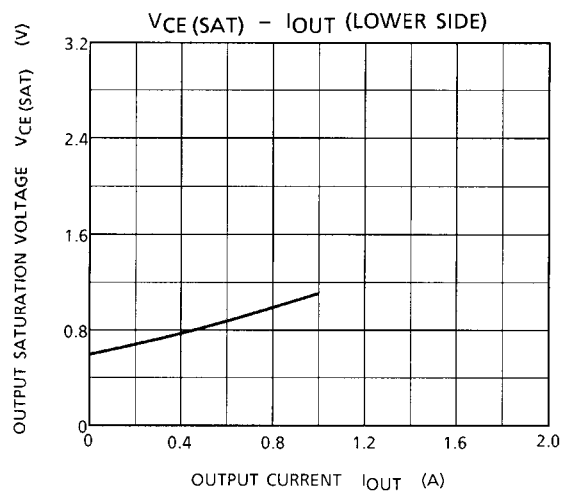
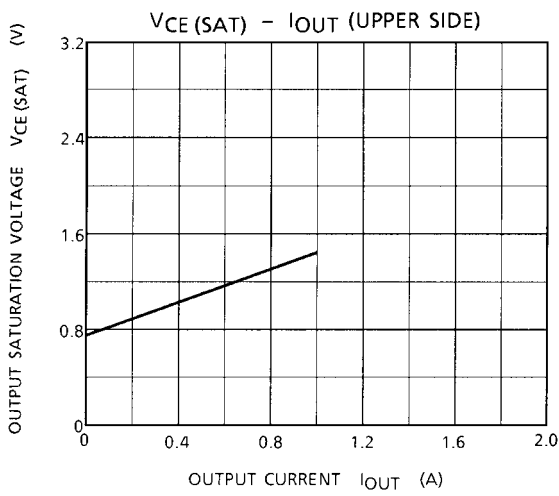
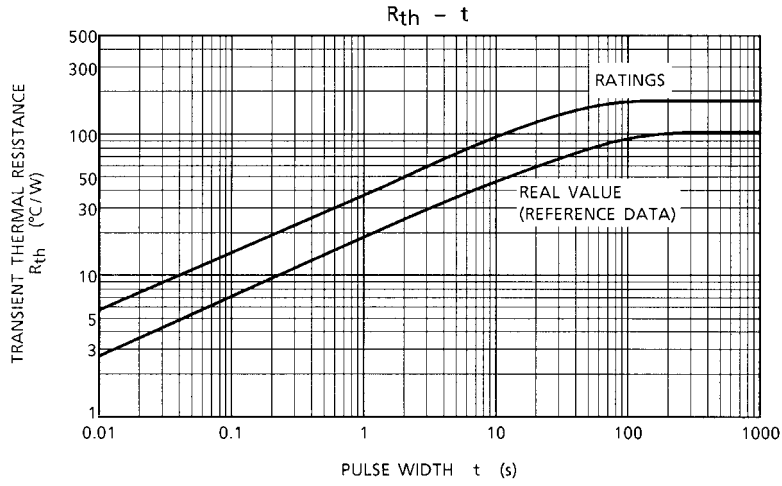
$V_{FU, L}$



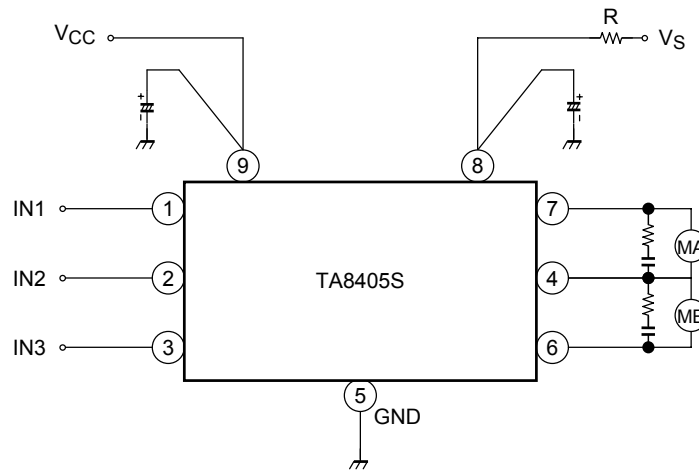
## Test Circuit 5

$I_{LU, L}$





## Application Circuit



Note 1: Select an optimum value for the capacitor by experiment.

Note 2: A short-circuit between outputs, an output voltage fault, and a ground fault may break down the ICs and supply an overvoltage and overcurrent to components around them. Be very careful when designing the output,  $V_{CC}$ ,  $V_S$ , and ground lines.

Note in mind that mounting the IC in the reverse orientation may also cause a breakdown.

Note 3: Use a current limiting resistor (R) or fuse for overcurrent protection.

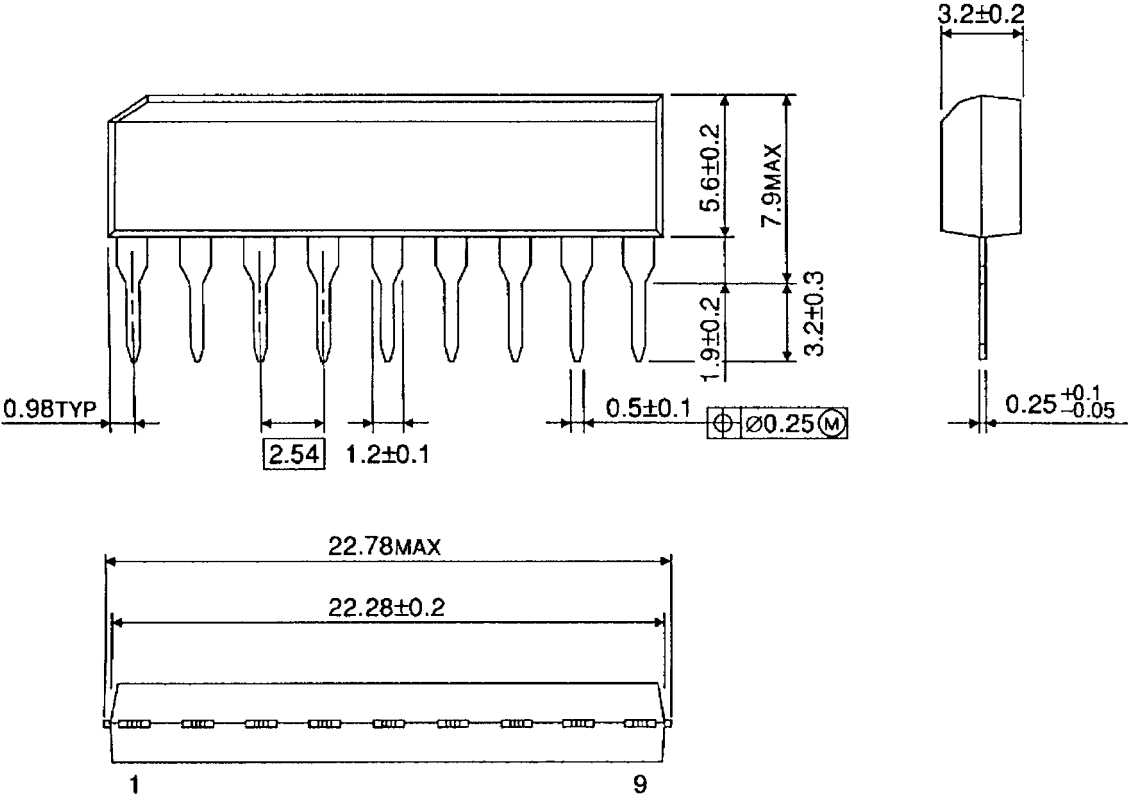
Note 4: When turning on the power for the ICs, apply  $V_S$  after  $V_{CC}$  (or  $V_{CC}$  and  $V_S$  simultaneously). When shutting off the power, drop  $V_S$  before  $V_{CC}$  (or  $V_S$  and  $V_{CC}$  simultaneously).

When turning on the power ( $V_{CC}$ ), keep both the inputs (IN1, IN2 and IN3) on a low level.

Package Dimensions

SIP9-P-2.54A

Unit : mm



Weight: 0.92 g (typ.)



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