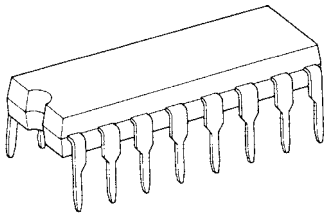
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8400P

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

The TA8400P 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 can adjust the motor voltage easily because it has a circuit configuration best suited especially for VCR front loading and tape loading, power supply pins separately for two sections (output and control), and the V_{ref} pin at the output for controlling the motor voltage. In addition, it can be connected directly to CMOS devices because its input current is low.



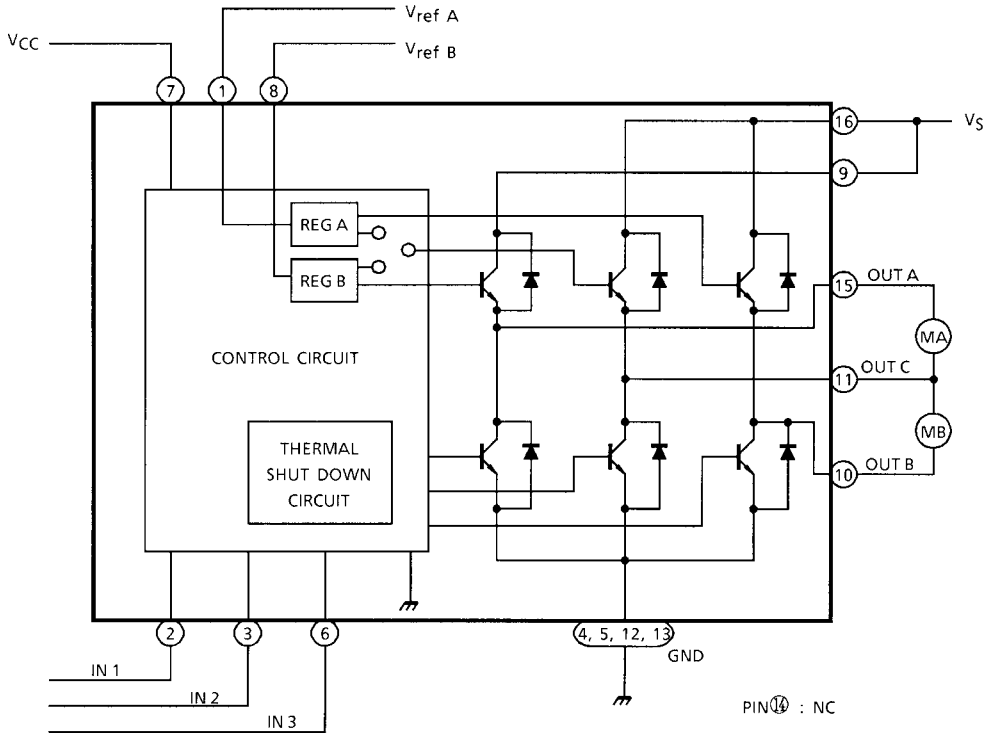
DIP16-P-300-2.54A

Weight: 1.11 g (typ.)

Features

- Wide range of operating voltage: V_{CC} (opr.) = 4.5 to 18 V
  V_S (opr.) = 0 to 22 V
  V_{ref} (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
- Punch−through current restriction circuit
- Built-in back electromotive force absorber diode
- Hysteresis for all inputs

Block Diagram



Pin Function

Pin No.	Symbol	Functional Description
1	$V_{ref\ A}$	Supply voltage terminal for control circuit
2	IN 1	Logic input terminal
3	IN 2	Logic input terminal
4	GND	GND terminal
5	GND	GND terminal
6	IN 3	Logic input terminal
7	V_{CC}	Supply voltage terminal for logic
8	$V_{ref\ B}$	Supply voltage terminal for control circuit
9	V_S	Supply voltage terminal for motor driver
10	OUT B	Output terminal
11	OUT C	Output terminal
12	GND	GND terminal
13	GND	GND terminal
14	NC	Non connection
15	OUT A	Output terminal
16	V_S	Supply voltage terminal for motor driver

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_{CC}	25	V
Motor drive voltage		V_S	25	V
Reference voltage		V_{ref}	25	V
Output current	PEAK	$I_{O\ (PEAK)}$	1.0 (Note 1)	A
	AVE.	$I_{O\ (AVE.)}$	0.4	
Power dissipation		P_D	1.4 (Note 2)	W
Operating temperature		T_{opr}	−30 to 75	°C
Storage temperature		T_{stg}	−55 to 150	°C

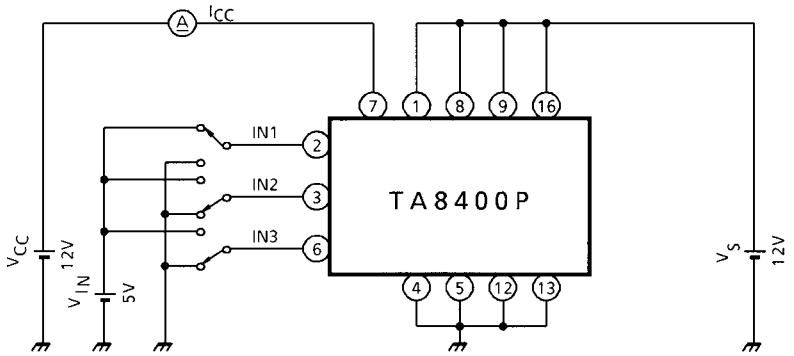
Note 1: Duty 1/10, 100 ms
Note 2: No heat sink

Electrical Characteristics
(unless otherwise specified, Ta = 25°C , V_{CC} = 12 V, V_S = 12 V)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Supply current		I_{CC1}	1	Output open, CW/CCW mode	—	25	38	mA
		I_{CC2}	1	Output open, Brake mode	—	25	38	
		I_{CC3}	1	Output open, Stop mode	—	10	20	
Input voltage	1 (High)	$V_{IN\,1}$	2	T_j = 25°C, pin (2), (3), (6)	3.5	—	5.5	V
	2 (Low)	$V_{IN\,2}$	2	T_j = 25°C, pin (2), (3), (6)	GND	—	1.2	
Input current		I_{IN}	2	V_{IN} = GND, source mode	6	12	60	μA
Input hysteresis voltage		ΔV_T	2	—	—	0.7	—	V
Saturation voltage	Upper	$V_{SAT\,U-1}$	3	V_{ref} = V_S, I_O = 0.4 A, V_{OUT}-V_S measure	—	1.0	1.5	V
	Lower	$V_{SAT\,L-1}$	3	V_{ref} = V_S, I_O = 0.4 A, V_{OUT}-GND measure	—	0.3	—	
	Upper	$V_{SAT\,U-2}$	3	V_{ref} = V_S, I_O = 1.0 A, V_{OUT}-V_S measure, ON LOAD: 20 ms	—	2.0	2.5	
	Lower	$V_{SAT\,L-2}$	3	V_{ref} = V_S, I_O = 1.0 A, V_{OUT}-GND measure, ON LOAD: 20 ms	—	0.8	1.3	
Output voltage		$V_{SAT\,U-1'}$	3	V_{ref} = 8 V, I_O = 0.4 A, V_{OUT}-GND measure	8.2	8.8	9.3	V
		$V_{SAT\,U-2'}$	3	V_{ref} = 8 V, I_O = 1.0 A, V_{OUT}-GND measure, ON LOAD: 20 ms	8.1	8.6	9.2	
Output transistor leakage current	Upper	$I_{L\,U}$	—	V_S = 25 V	—	—	200	μA
	Lower	$I_{L\,L}$	—	V_S = 25 V	—	—	200	
Diode forward voltage	Upper	$V_{F\,U}$	4	I_F = 1.0 A	—	3.6	—	V
	Lower	$V_{F\,L}$	4	I_F = 1.0 A	—	0.9	—	
Reference current		I_{ref}	2	V_{ref} = 8 V, source mode	—	0.45	0.7	mA
Thermal shut down operating temperature		T_{SD}	—	Junction temperature	110	130	150	°C

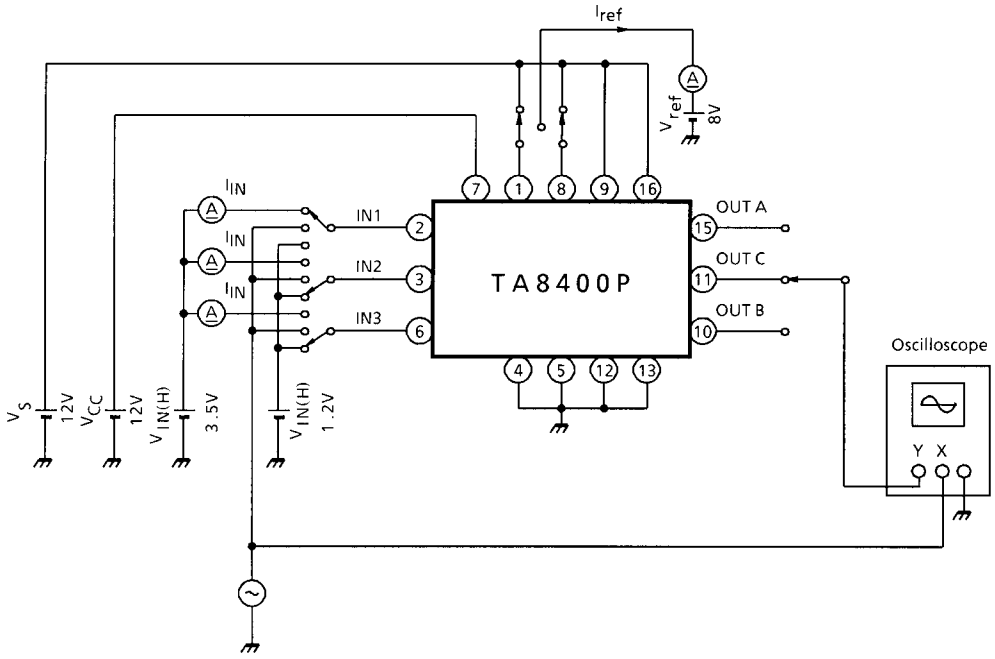
Test Circuit 1

$I_{CC1, 2, 3}$



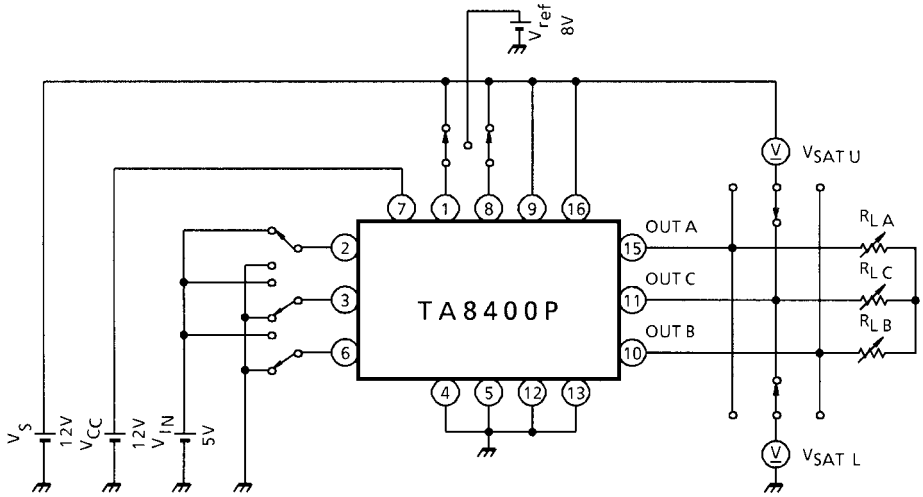
Test Circuit 2

$V_{IN1, 2}$, I_{IN}, ΔV_T, I_{ref}



Test Circuit 3

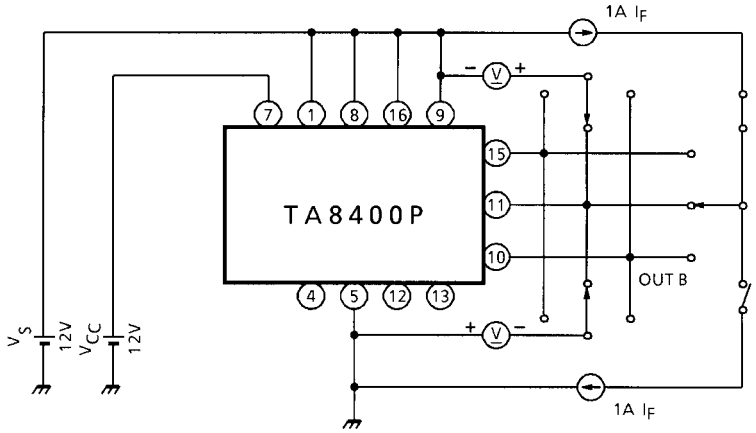
$V_{SAT\ U-1,\ L-1,\ U-2,\ L-2,\ U-1',\ U-2'}$

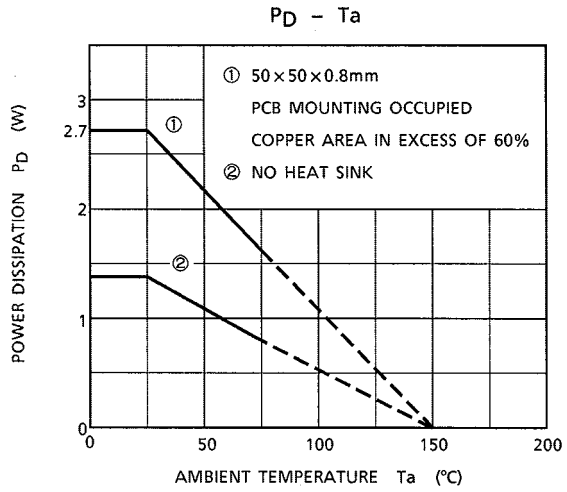


Note: Calibrate I_{OUT} to 0.4 / 1.0A by R_{LA}, R_{LB} and R_{LC}.

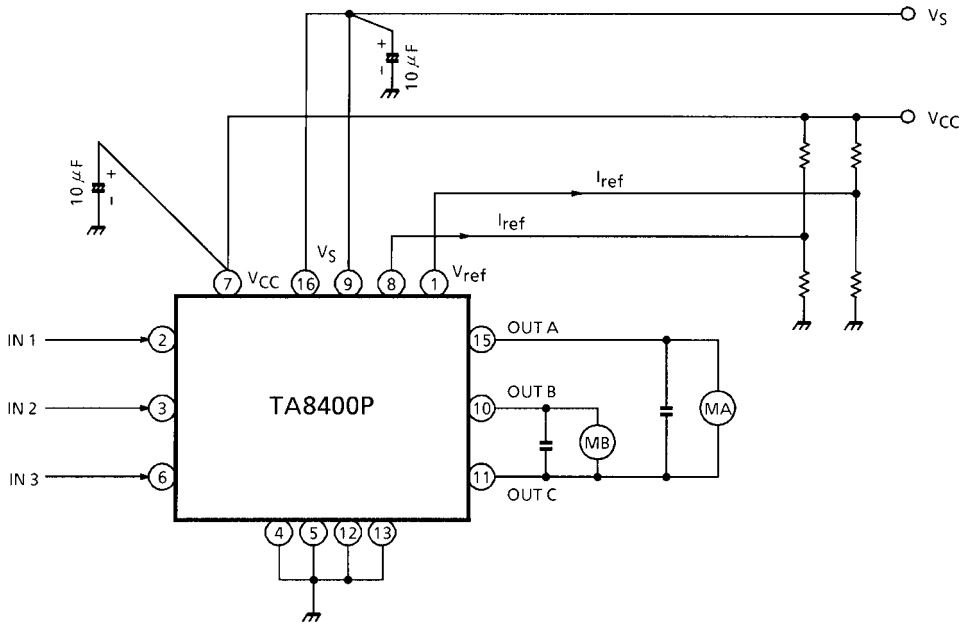
Test Circuit 4

$V_{F\ U,\ L}$





Application Circuit



Note: Pin (16) is required to connect to pin (9).

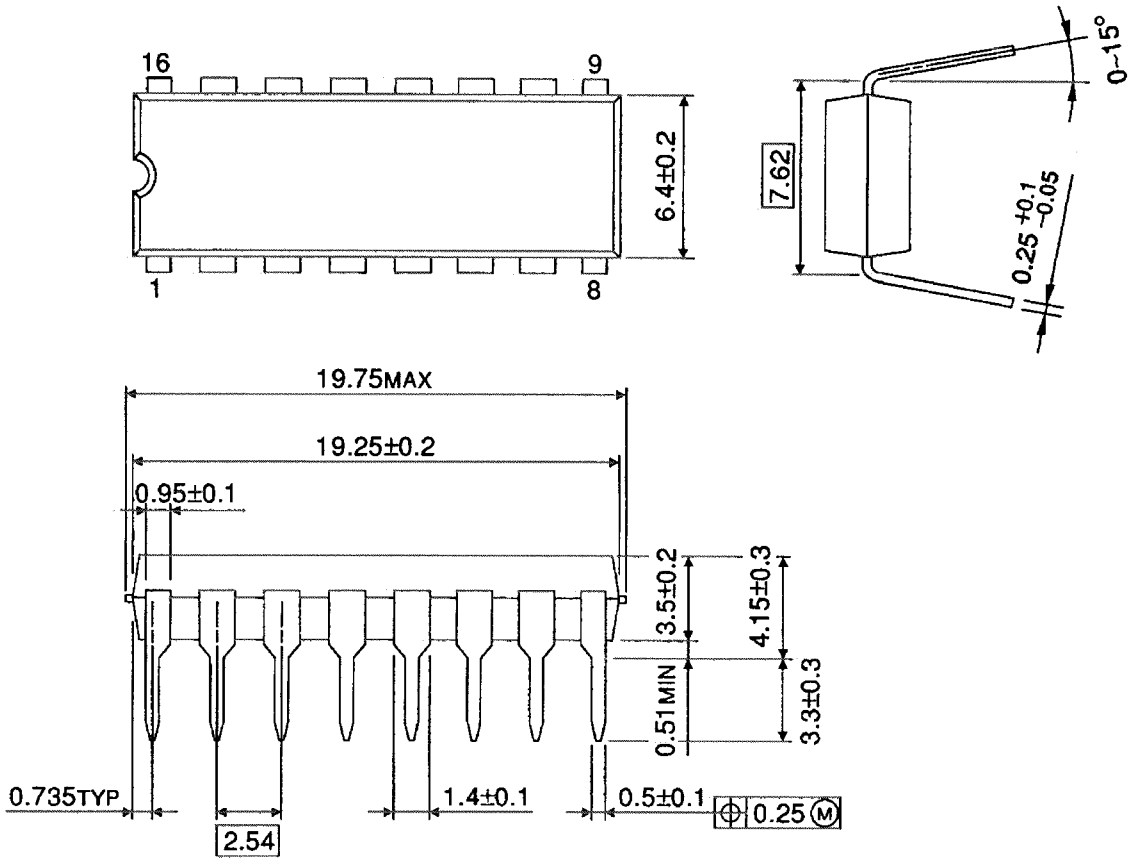
Note 1: Be sure to connect the V_S pins (pins 16, 9) directly to each other.

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 the 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: 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 and IN2) on a low level.

Package Dimensions

DIP16-P-300-2.54A Unit : mm



Weight: 1.11 g (typ.)

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