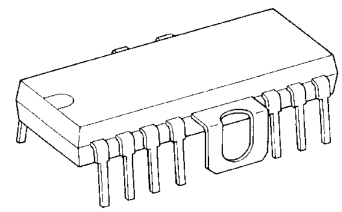
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA7279P,TA7279AP

Dual-Bridge Drivers (for Switching between Forward and Reverse Rotation) for DC Motors

The TA7279P and TA7279AP can control a DC motor in four modes (forward rotation, reverse rotation, stop, and brake), using their bridge driver best suited for switching between forward and reverse rotation.
These ICs can deliver an output current of 1.0 A (AVE.) and 3.0 A (PEAK). They can adjust the motor voltage easily because they have a circuit configuration best suited for VCR front loading, tape loading, and reel rotation as well as power supply pins separately for two sections (output and control). In addition, they can be connected directly to CMOS devices because their input current is low.



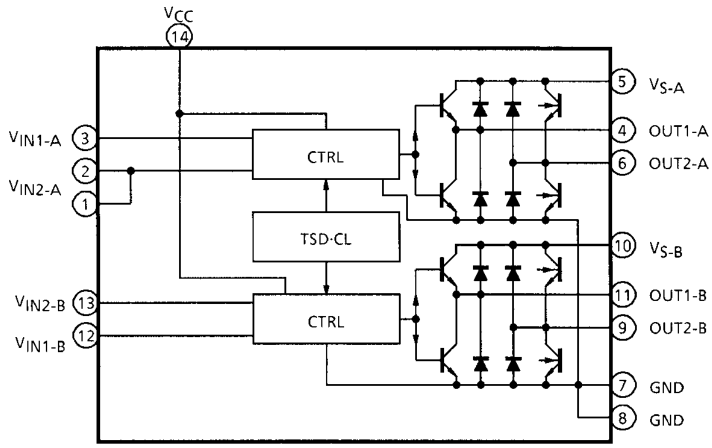
Weight: 3.00 g (typ.)

Features

- Wide range of operating voltage
  : V_{CC} (opr.) = 6 to 18 V (P, AP),
  V_S (opr.) = 0 to 16 V (P) / = 0 to 18 V (AP)
  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 1.0 A (AVE.), 3.0 A (PEAK)
- Built−in thermal shut down circuit
- Built-in back electromotive force absorber diode
- Built-in hysteresis circuit

The TA7279P/AP:
The TA7279P/AP is Sn plated product including Pb.
The following conditions apply to solderability:
*Solderability
1. Use of Sn-37Pb solder bath
   *solder bath temperature = 230°C
   *dipping time = 5 seconds
   *number of times = once
   *use of R-type flux
2. Use of Sn-3.0Ag-0.5Cu solder bath
   *solder bath temperature = 245°C
   *dipping time = 5 seconds
   *the number of times = once
   *use of R-type flux

Block Diagram

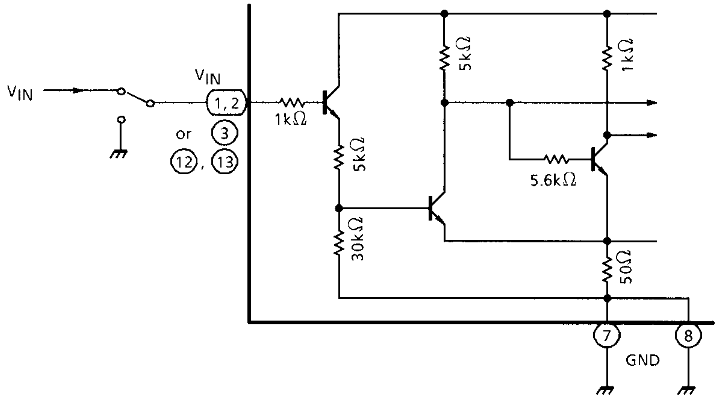


Pin Function

Pin No.	Symbol	Functional Description
1	V_{IN2-A}	A−ch input terminal
2	V_{IN2-A}	
3	$V_{I\ N1-A}$	A−ch input terminal
4	OUT1−A	A−ch output terminal
5	V_{S}−A	A−ch Motor drive power supply
6	OUT2−A	A−ch output terminal
7	GND	GND terminal
8	GND	
9	OUT2−B	B−ch output terminal
10	V_{S-B}	B−ch Moter drive power supply
11	OUT1−B	B−ch output terminal
12	V_{IN1-B}	B−ch input terminal
13	V_{IN2-B}	B−ch input terminal
14	V_{CC}	Logic power supply

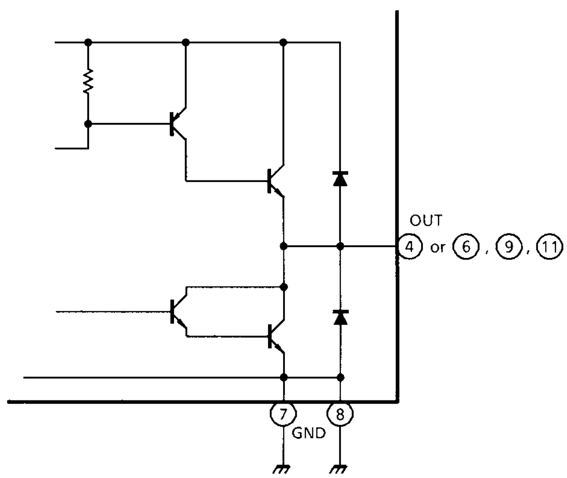
Application Note

(1) Input circuit



The input circuit is an active high type, as shown in the diagram. When voltage higher than the specified V_{IN} (H) is applied, the output is logic "H". When voltage lower than the specified V_{IN} (L) is applied or if the input is grounded, the output is logic "L". Since the input current IN flows to the input when logic "H", be careful with the output impedance at the previous step.

(2) Output circuit



Function

IN1	IN2	OUT1	OUT2	Mode
1	1	L	L	Brake
0	1	L	H	CW/CCW
1	0	H	L	CCW/CW
0	0	High impedance		Stop

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Supply voltage	AP	V_{CC} (max)	25	V
	P		20	
Motor drive voltage	AP	V_S (max)	25	V
	P		18	
Output current	PEAK	I_O (PEAK)	3.0	A
	AVE.	I_O (AVE.)	1.0	
Power dissipation		P_D (Note)	2.3	W
Operating temperature		T_{opr}	−30 to 75	°C
Storage temperature		T_{stg}	−55 to 150	°C

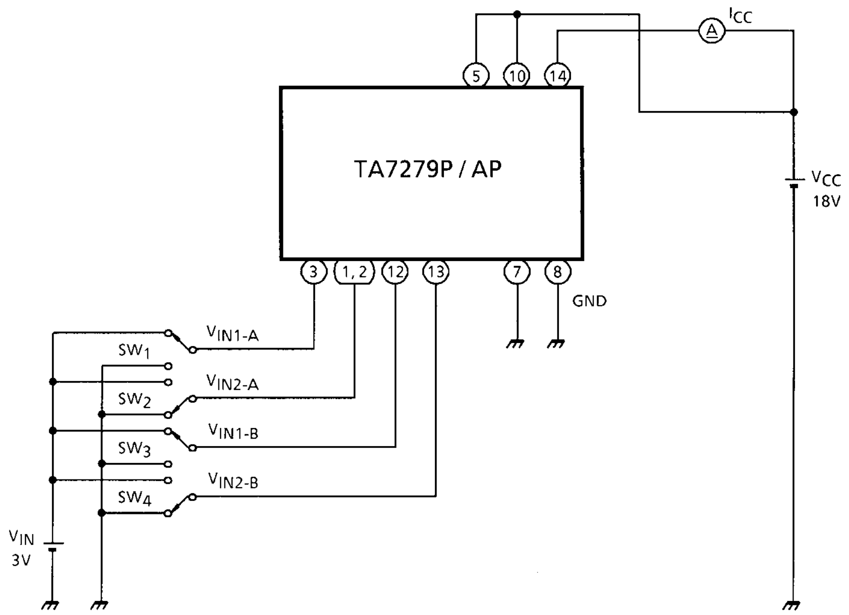
Note: No heat sink.

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Supply current		I_{CC1}	1	V_{CC} = 18 V, Output Off, Stop mode	14	28	41	mA
		I_{CC2}	1	V_{CC} = 18 V, Output Off, CW/CCW mode	10	29	38	
		I_{CC3}	1	V_{CC} = 18 V, Output Off, Brake mode	8	20	35	
Input operating voltage	1 (High)	$V_{IN\ (H)}$	—	T_j = 25°C	3.0	—	V_{CC}	V
	2 (Low)	$V_{IN\ (L)}$	—	T_j = 25°C	—	—	0.8	
Input current		I_{IN}	2	Sink, V_{IN} = 3 V	—	3	10	μA
Output saturation voltage	Upper	V_{SATU-1}	3	I_O = 0.1 A, V_{CC} = V_S = 18 V	—	—	1.1	V
	Lower	V_{SATL-1}	3	I_O = 0.1 A, V_{CC} = V_S = 18 V	—	—	1.0	
	Upper	V_{SATU-2}	3	I_O = 1.0 A, V_{CC} = V_S = 18 V	—	1.2	1.5	
	Lower	V_{SATL-2}	3	I_O = 1.0 A, V_{CC} = V_S = 18 V	—	1.05	1.4	
Leakage current	Upper	I_{LU}	—	V_S = 25 V	—	—	50	μA
	Lower	I_{LL}	—	V_S = 25 V	—	—	50	
Diode forward drop	Upper	V_{FU}	4	I_F = 1 A	—	2.5	—	V
	Lower	V_{FL}	4	I_F = 1 A	—	1.3	—	

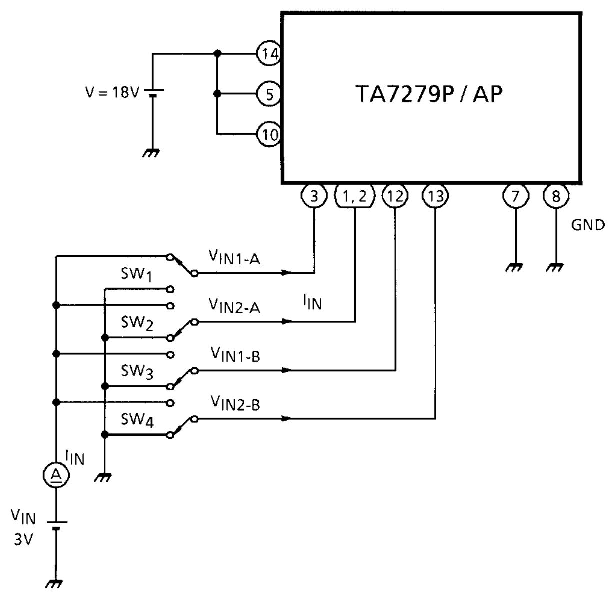
Test Circuit 1

$I_{CC1, 2, 3}$



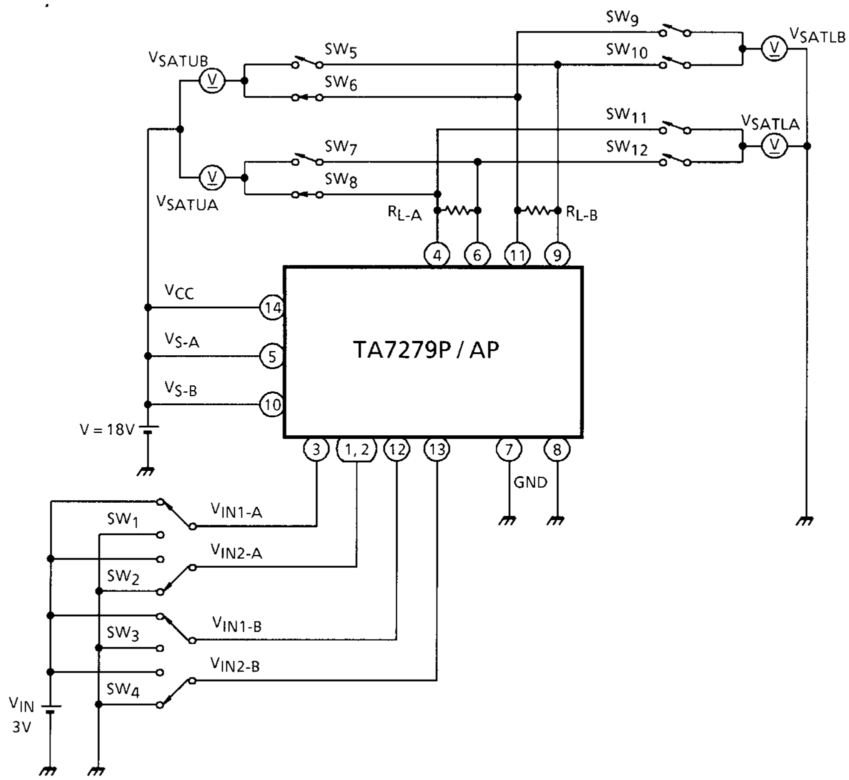
Test Circuit 2

I_{IN} (H), (L)



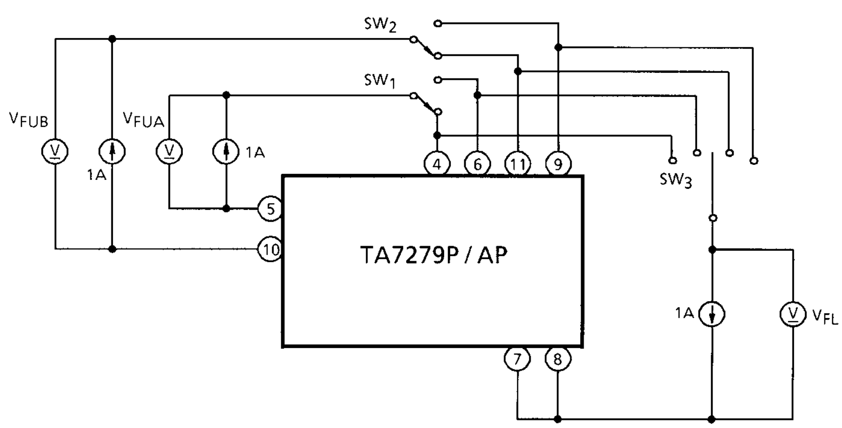
Test Circuit 3

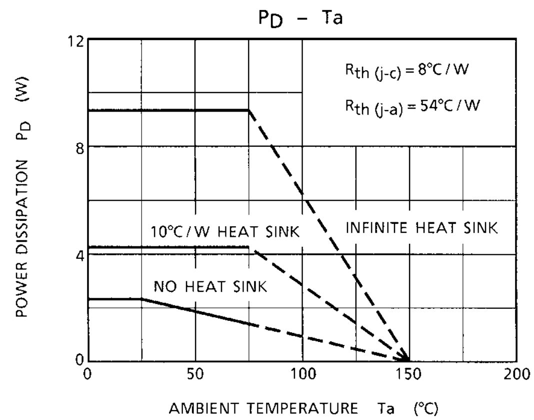
$V_{SATU-1, 2}$ / $V_{SATL-1, 2}$



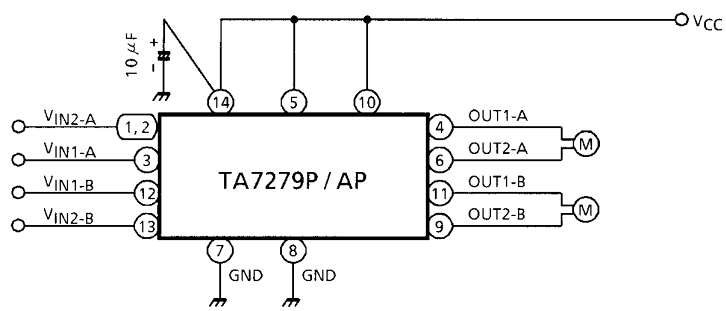
Test Circuit 4

$V_{FU, L}$

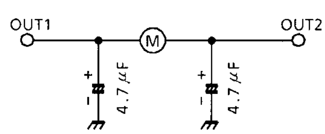




Application Circuit



Problems may result if a capacitor is inserted in parallel to the motor.
If measures against noise are necessary, connect capacitors as shown in the diagram below.
A larger bypass capacitor between V_{CC} and GND is effective against noise and other problems.
(A capacitance higher than 100 µF is recommended.)

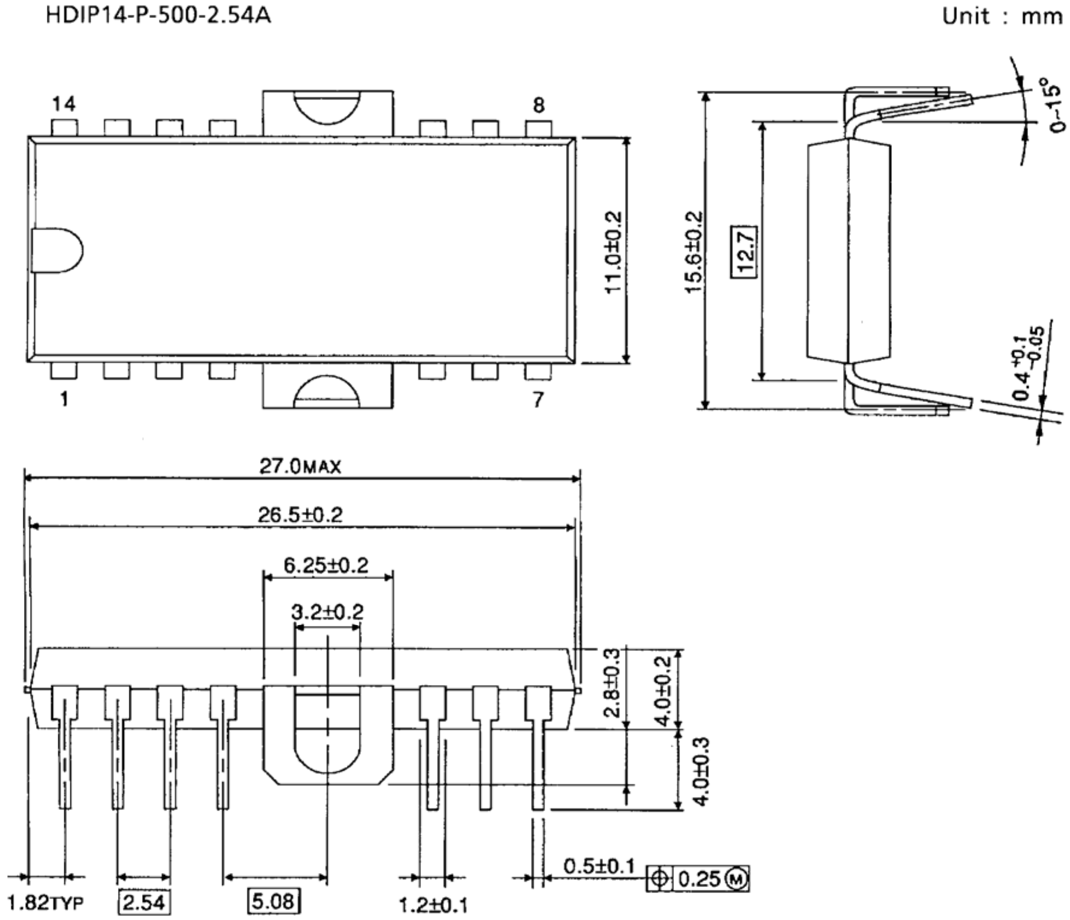


Note 1: Be sure to connect the V_S pins (pins 5 and 10) directly to each other.

Note 2: Utmost care is necessary in the design of the output, V_{CC}, V_M, and GND lines since the IC may be destroyed by short-circuiting between outputs, air contamination faults, or faults due to improper grounding, or by short-circuiting between contiguous pins.

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



Weight: 3.00 g (typ.)

Notes on Contents

1. Block Diagrams

Some of the functional blocks, circuits, or constants in the block diagram may be omitted or simplified for explanatory purposes.

2. Equivalent Circuits

The equivalent circuit diagrams may be simplified or some parts of them may be omitted for explanatory purposes.

3. Timing Charts

Timing charts may be simplified for explanatory purposes.

4. Application Circuits

The application circuits shown in this document are provided for reference purposes only. Thorough evaluation is required, especially at the mass production design stage.
Toshiba does not grant any license to any industrial property rights by providing these examples of application circuits.

5. Test Circuits

Components in the test circuits are used only to obtain and confirm the device characteristics. These components and circuits are not guaranteed to prevent malfunction or failure from occurring in the application equipment.

IC Usage Considerations

Notes on handling of ICs

[1] The absolute maximum ratings of a semiconductor device are a set of ratings that must not be exceeded, even for a moment. Do not exceed any of these ratings.
Exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.

[2] Use an appropriate power supply fuse to ensure that a large current does not continuously flow in case of over current and/or IC failure. The IC will fully break down when used under conditions that exceed its absolute maximum ratings, when the wiring is routed improperly or when an abnormal pulse noise occurs from the wiring or load, causing a large current to continuously flow and the breakdown can lead smoke or ignition. To minimize the effects of the flow of a large current in case of breakdown, appropriate settings, such as fuse capacity, fusing time and insertion circuit location, are required.

[3] If your design includes an inductive load such as a motor coil, incorporate a protection circuit into the design to prevent device malfunction or breakdown caused by the current resulting from the inrush current at power ON or the negative current resulting from the back electromotive force at power OFF. IC breakdown may cause injury, smoke or ignition.
Use a stable power supply with ICs with built-in protection functions. If the power supply is unstable, the protection function may not operate, causing IC breakdown. IC breakdown may cause injury, smoke or ignition.

[4] Do not insert devices in the wrong orientation or incorrectly.
Make sure that the positive and negative terminals of power supplies are connected properly.
Otherwise, the current or power consumption may exceed the absolute maximum rating, and exceeding the rating(s) may cause the device breakdown, damage or deterioration, and may result injury by explosion or combustion.
In addition, do not use any device that is applied the current with inserting in the wrong orientation or incorrectly even just one time.

Points to remember on handling of ICs

(1) Thermal Shutdown Circuit

Thermal shutdown circuits do not necessarily protect ICs under all circumstances. If the thermal shutdown circuits operate against the over temperature, clear the heat generation status immediately.

Depending on the method of use and usage conditions, such as exceeding absolute maximum ratings can cause the thermal shutdown circuit to not operate properly or IC breakdown before operation.

(2) Heat Radiation Design

In using an IC with large current flow such as power amp, regulator or driver, please design the device so that heat is appropriately radiated, not to exceed the specified junction temperature (T_J) at any time and condition. These ICs generate heat even during normal use. An inadequate IC heat radiation design can lead to decrease in IC life, deterioration of IC characteristics or IC breakdown. In addition, please design the device taking into considerate the effect of IC heat radiation with peripheral components.

(3) Back-EMF

When a motor rotates in the reverse direction, stops or slows down abruptly, a current flow back to the motor's power supply due to the effect of back-EMF. If the current sink capability of the power supply is small, the device's motor power supply and output pins might be exposed to conditions beyond maximum ratings. To avoid this problem, take the effect of back-EMF into consideration in system design.