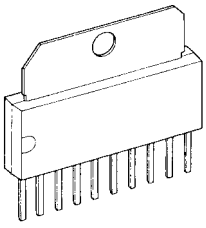
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA7288P

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

The TA7288P is a bridge driver that is ideal for normal / reverse switching.
This circuit offers four modes: normal rotation, reverse rotation, stop, and brake.
The output current is 1.0 A (AVE.) and 2.0 A (PEAK). TA7288P has an ideal circuit configuration for VCR front tape loading and offers two types of power supply pins. One is for output, the other for control. The V_{ref} pin on the output side used to control the motor voltage facilitates motor voltage adjustment. The IC requires little input current, enabling direct connection with CMOS.

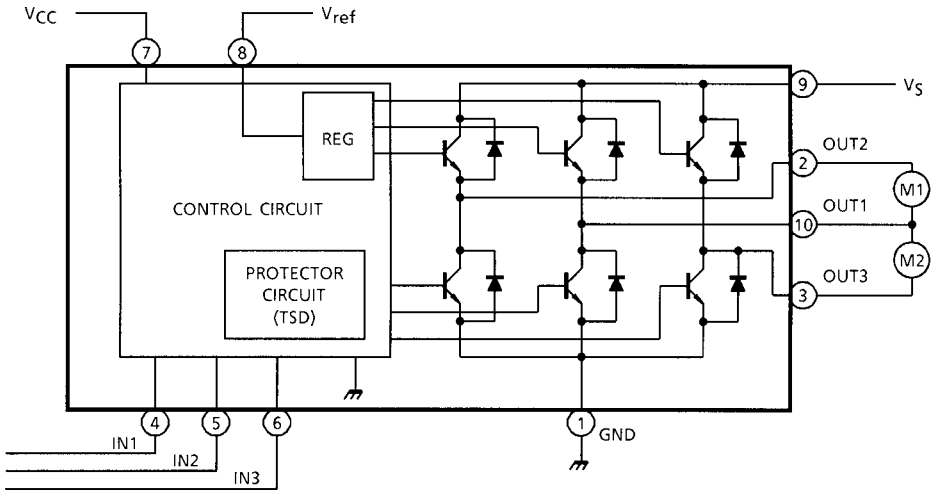


Weight: 2.47 g (typ.)

Features

- Wide range of operating voltage: V_{CC} (opr.) = 4.5 to 18 V
  V_S (opr.) = 0 to 18 V
  V_{ref} (opr.) = 0 to 18 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 1.0 A (AVE.) and 2.0 A (PEAK)
- Built-in thermal shutdown circuit and overcurrent protection circuit for output pins
- Built-in punch−through current restriction circuit
- Built-in back electromotive force absorber diode
- Built-in hysteresis circuit

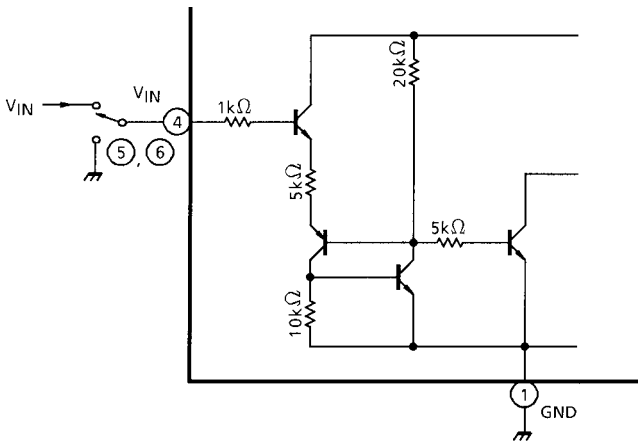
Block Diagram



Pin Function

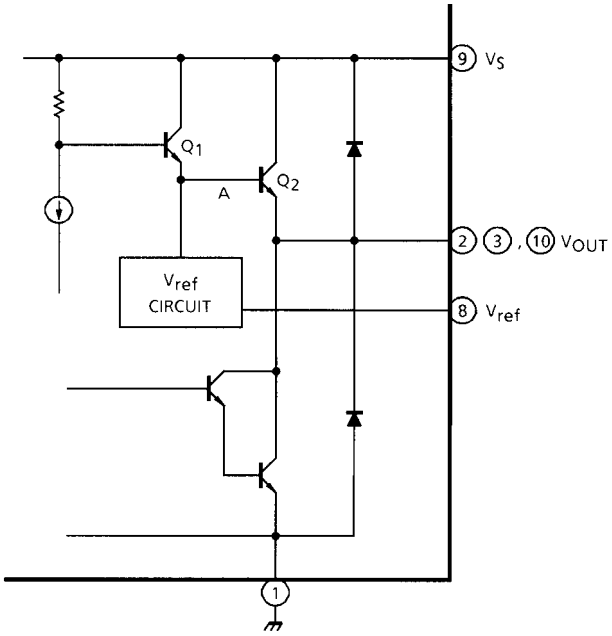
Pin No.	Symbol	Functional Description
1	GND	GND terminal
2	OUT2	Output terminal
3	OUT3	Output terminal
4	IN1	Input terminal
5	IN2	Input terminal
6	IN3	Input terminal
7	V_{CC}	Supply voltage terminal for Logic
8	V_{ref}	Supply voltage terminal for control
9	V_S	Supply voltage terminal for Motor drive
10	OUT1	Output terminal

Input Circuit



The input circuit uses active-high logic as shown below.
The specified voltage V_{IN} (H) and higher represent a logical high level. V_{IN} (L) and lower including a connection to a ground represent a logical low level.
When the input is on a logical high level, the input current I_{IN} flows into the input. So, be careful about the output impedance of the preceding stage.

Output Circuit



Output "H" Voltage

- Operation by V_{ref} voltage

  Voltage, which is applied to Vref, of which high output, $2V_{BE}$ is applied to base A of the Q_2 (power transistor) and low voltage, Q_2V_{BE} is output as V_{OUT} (H) by the V_{ref} circuit.

  $$V_{OUT} = V_{ref}+2V_{BE}-Q_2V_{BE}$$
  $$\fallingdotseq V_{ref}+0.7\ (V)$$

- V_{ref}

  V_{ref} terminal required to connect to V_S terminal for stable operation in case of no requirement of V_{OUT} control.

Function

Input			Output			Mode	
IN1	IN2	IN3	OUT1	OUT2	OUT3	M1	M2
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 high active type.

Maximum Ratings (Ta = 25°C)

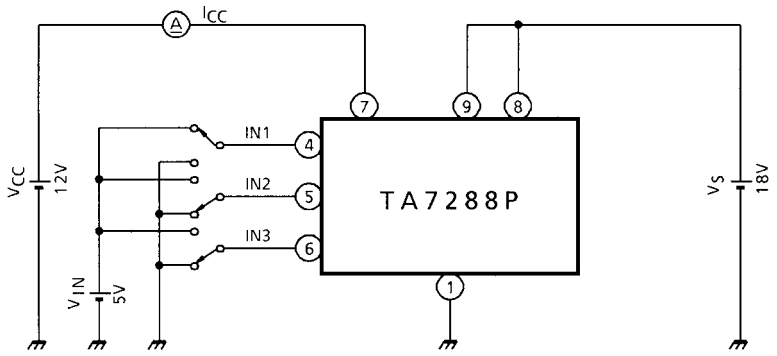
Characteristics		Symbol	Rating	Unit
Supply voltage		V_{CC}	25	V
Motor drive voltage		V_S	25	V
Reference voltage		V_{ref}	25	V
Output current	PEAK	$I_{O\ (PEAK)}$	2.0 (Note 1)	A
	AVE.	$I_{O\ (AVE.)}$	1.0	A
Power dissipation		P_D	12.5 (Note 2)	W
Operating temperature		T_{opr}	−30 to 75	°C
Storage temperature		T_{stg}	−5 to 150	°C

Note 1: Duty 1/10, 100 ms
Note 2: Tc = 25°C

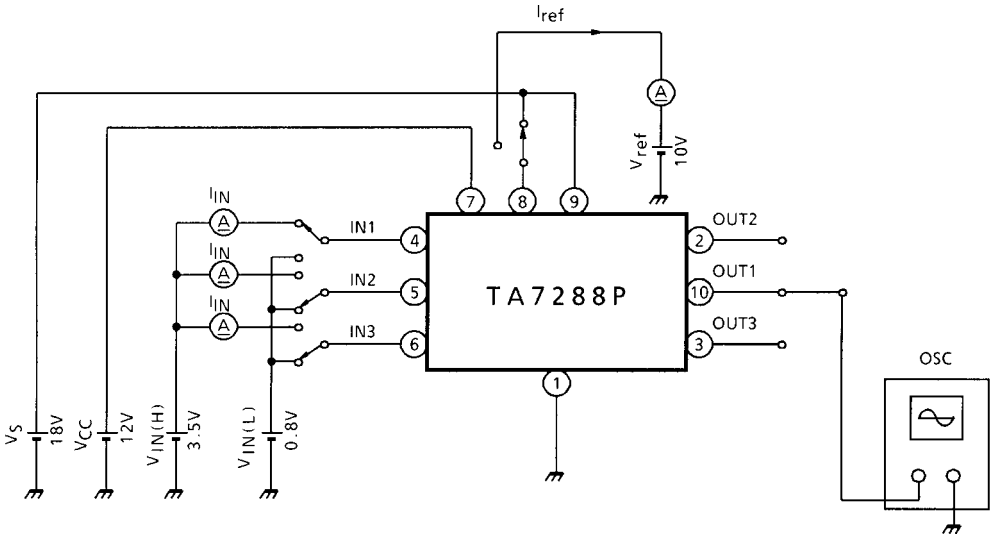
Electrical Characteristics
(unless otherwise noted, Ta = 25°C, V_{CC} = 12 V, V_S = 18 V)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Supply current		I_{CC1}	1	Output OFF CW/CCW mode	—	17	30	mA
		I_{CC2}	1	Output OFF Brake mode	—	13	25	
Input voltage	1 (High)	$V_{IN\ (H)}$	2	T_j = 25°C pin (4), (5), (6)	3.5	—	5.5	V
	2 (Low)	$V_{IN\ (L)}$	2	T_j = 25°C pin (4), (5), (6)	GND	—	0.8	
Input current		I_{IN}	2	V_{IN} = 3.5 V, sink mode	—	5	20	μA
Input hysteresis voltage		ΔV_T	2	—	—	0.7	—	V
Saturation voltage	Upper	V_{SATU-1}	3	$V_{ref} = V_S$, $V_S - V_{out}$, I_O = 0.2 A	—	0.9	1.2	V
	Lower	V_{SATL-1}	3	$V_{ref} = V_S$, V_{out}−GND, I_O = 0.2 A	—	1.0	1.3	V
	Upper	V_{SATU-2}	3	$V_{ref} = V_S$, $V_S - V_{out}$, I_O = 1.0 A	—	1.3	1.6	V
	Lower	V_{SATL-2}	3	$V_{ref} = V_S$, V_{out}−GND I_O = 1.0 A	—	1.8	2.5	V
Output voltage		$V_{SATU-1'}$	3	V_{ref} = 10 V, V_{out}−GND I_O = 0.5 A	10.7	11.0	11.8	V
		$V_{SATU-2'}$	3	V_{ref} = 10 V, V_{out}−GND I_O = 1.0 A	10.4	10.7	11.5	V
Leakage current	Upper	$I_{L\ U}$	—	V_S = 25 V	—	—	50	μA
	Lower	$I_{L\ L}$	—	V_S = 25 V	—	—	50	
Diode forward voltage	Upper	$V_{F\ U}$	4	I_F = 1 A	—	2.2	—	V
	Lower	$V_{F\ L}$	4	I_F = 1 A	—	1.4	—	
Reference current		I_{ref}	2	V_{ref} = 10 V, source mode	—	5	30	μA

Test Circuit 1
$I_{CC1, 2}$

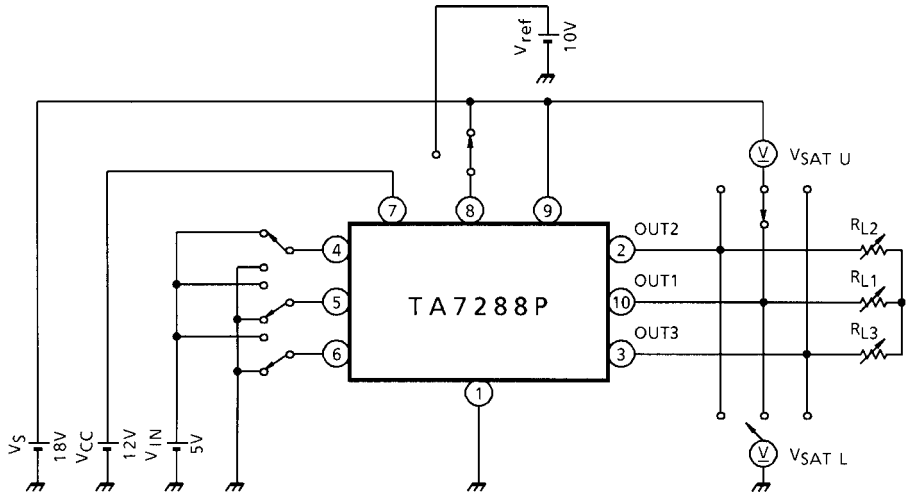


Test Circuit 2
$V_{IN\ (H)}$, $V_{IN\ (L)}$, I_{IN}, ΔV_T, I_{ref}



Test Circuit 3

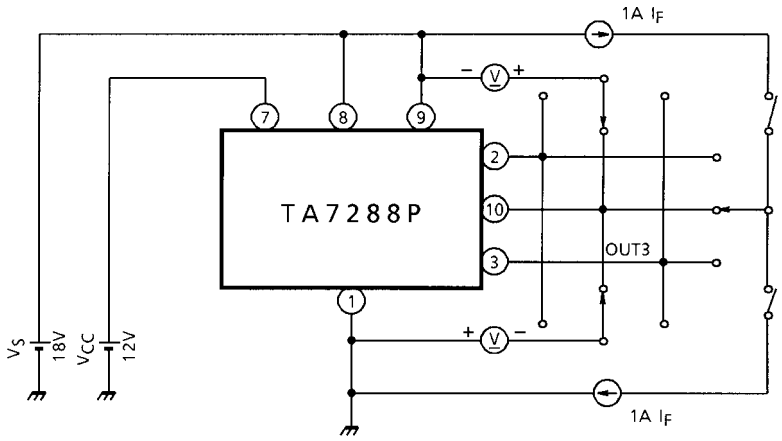
V_{SAT} U−1, L−1, U−2, L−2, U−1', U−2'

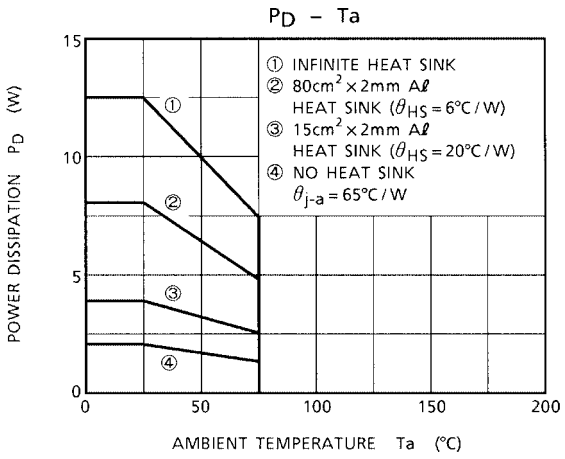


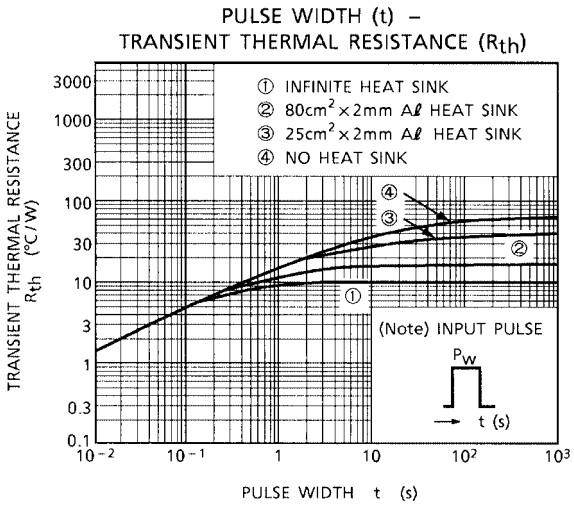
Please adjust R_{L1}, R_{L2}, R_{L3} to be output, I_{OUT} = 0.24 or 1.0 A.

Test Circuit 4

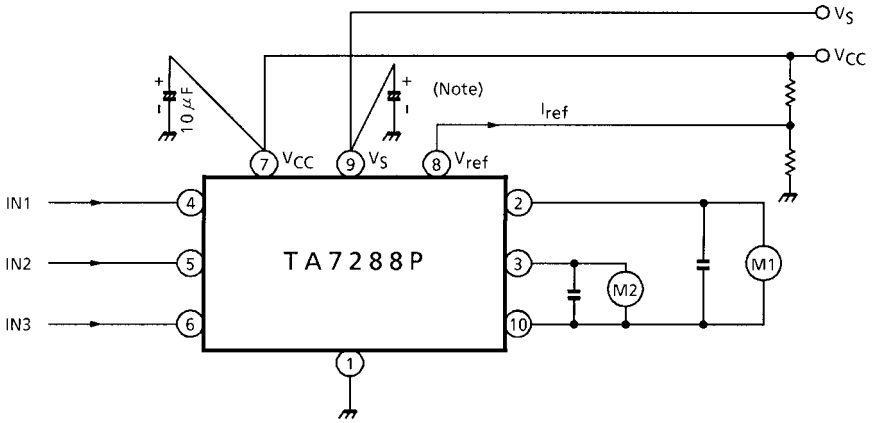
V_{F} U, L







Application Circuit



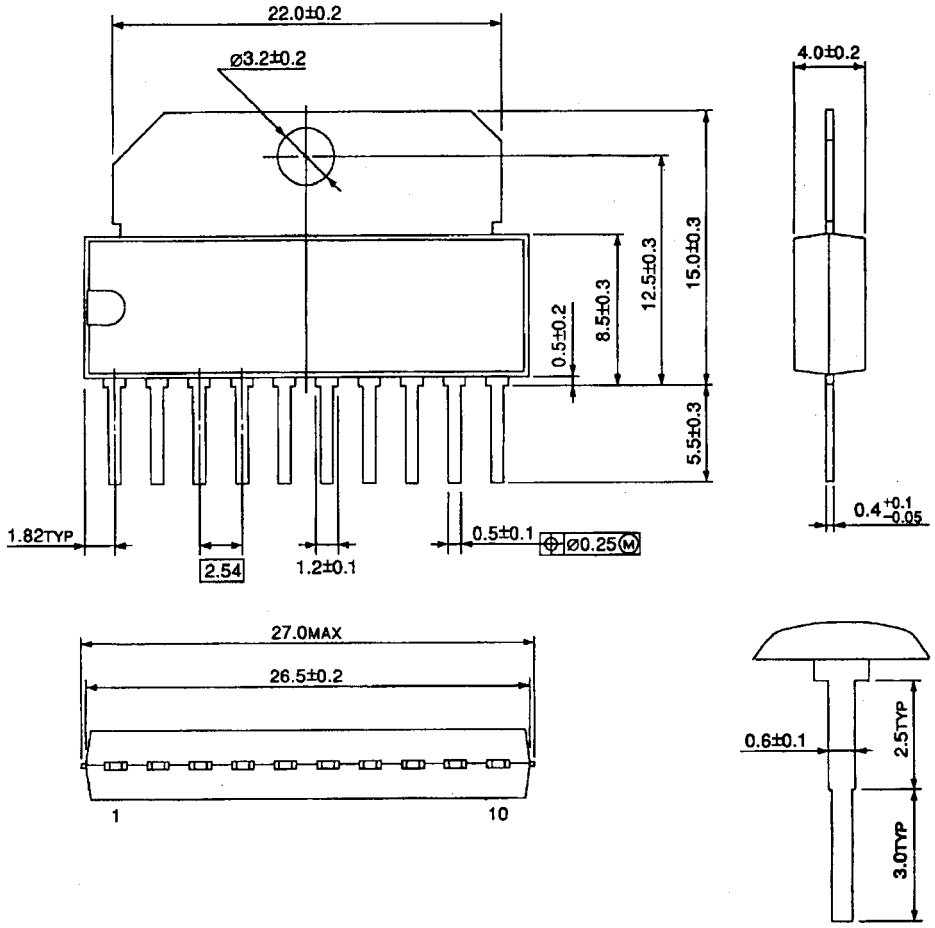
Note 1: Select an optimum value for the capacitor by experiment.

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 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 VS after V_{CC} (or V_{CC} and V_S simultaneously). When shutting off the power, drop VS 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

HSIP10-P-2.54 Unit : mm



Weight: 2.47 g (typ.)

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