

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

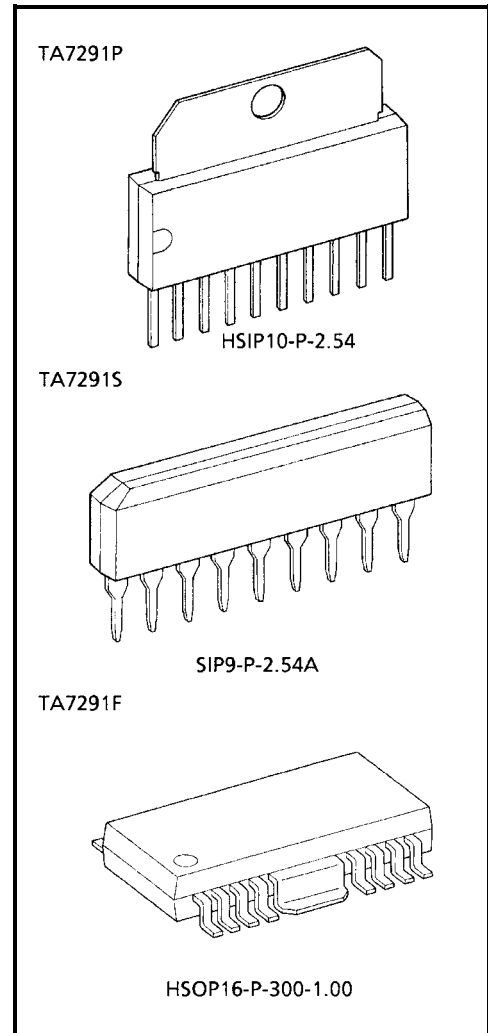
# TA7291P, TA7291S, TA7291F

## BRIDGE DRIVER

The TA7291P / S / F are Bridge Driver with output voltage control.

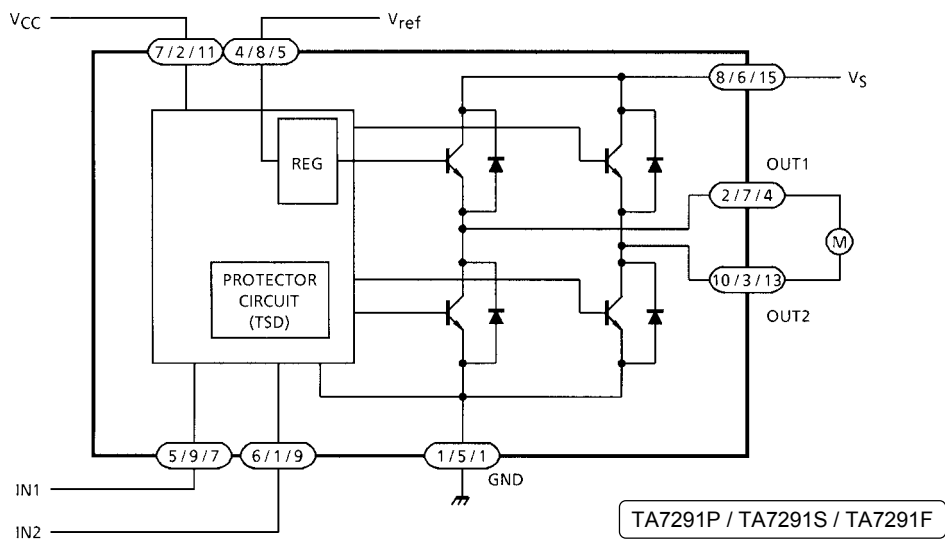
### FEATURES

- 4 modes available (CW / CCW / STOP / BRAKE)
- Output current: P type 1.0 A (AVE.) 2.0 A (PEAK)  
S / F type 0.4 A (AVE.) 1.2 A (PEAK)
- Wide range of operating voltage:  $V_{CC} (opr.) = 4.5 \sim 20 \text{ V}$   
 $V_S (opr.) = 0 \sim 20 \text{ V}$   
 $V_{ref} (opr.) = 0 \sim 20 \text{ V}$
- Build in thermal shutdown, over current protector and punch = through current restriction circuit.
- Stand-by mode available (STOP MODE)
- Hysteresis for all inputs.



Weight	
HSIP10-P-2.54	: 2.47 g (Typ.)
SIP9-P-2.54A	: 0.92 g (Typ.)
HSOP16-P-300-1.00	: 0.50 g (Typ.)

## BLOCK DIAGRAM



## PIN FUNCTION

PIN No.			SYMBOL	FUNCTION DESCRIPTION
P	S	F		
7	2	11	V <sub>CC</sub>	Supply voltage terminal for Logic
8	6	15	V <sub>S</sub>	Supply voltage terminal for Motor driver
4	8	5	V <sub>ref</sub>	Supply voltage terminal for control
1	5	1	GND	GND terminal
5	9	7	IN1	Input terminal
6	1	9	IN2	Input terminal
2	7	4	OUT1	Output terminal
10	3	13	OUT2	Output terminal

P Type: Pin (3), (9): NC

S Type: PIN (4): NC

F Type: PIN (2), (3), (6), (8), (10), (12), (14), and (16): NC

For F Type, We recommend FIN to be connected to the GND.

## FUNCTION

INPUT		OUTPUT		MODE
IN1	IN2	OUT1	OUT2	
0	0	∞	∞	STOP
1	0	H	L	CW / CCW
0	1	L	H	CCW / CW
1	1	L	L	BRAKE

∞: High impedance

Note: Inputs are all high active type

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V <sub>CC</sub>	25	V
Motor Drive Voltage		V <sub>S</sub>	25	V
Reference Voltage		V <sub>ref</sub>	25	V
Output Current	PEAK	P Type	2.0	A
		S / F Type	1.2	
	AVE.	P Type	1.0	
		S / F Type	0.4	
Power Dissipation	P Type	P <sub>D</sub>	12.5 (Note 1)	W
	S Type		0.95 (Note 2)	
	F Type		1.4 (Note 3)	
Operating Temperature		T <sub>opr</sub>	-30~75	°C
Storage Temperature		T <sub>stg</sub>	-55~150	°C

Note 1: T<sub>c</sub> = 25°C (TA7291P)

Note 2: No heat sink

Note 3: PCB (60 × 30 × 1.6 mm, occupied copper area in excess of 50%) Mounting Condition.

Wide range of operating voltage: V<sub>CC</sub> (opr.) = 4.5~20 V

V<sub>S</sub> (opr.) = 0~20 V

V<sub>ref</sub> (opr.) = 0~20 V

V<sub>ref</sub> ≤ V<sub>S</sub>

## ELECTRICAL CHARACTERISTICS

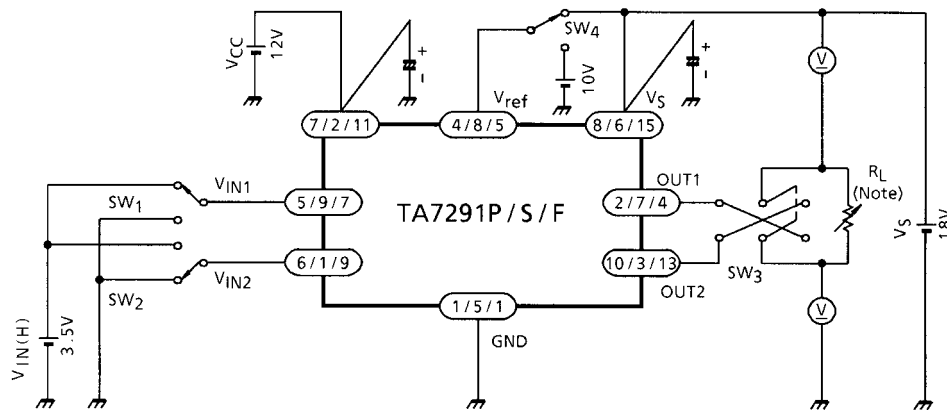
(Unless otherwise specified, Ta = 25°C, VCC = 12 V, VS = 18 V)

CHARACTERISTIC			SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT		
Supply Current			ICC1	1	Output OFF, CW / CCW mode	—	8.0	13.0	mA		
			ICC2		Output OFF, Stop mode	—	0	50	μA		
			ICC3		Output OFF, Brake mode	—	6.5	10.0	mA		
Input Operating Voltage		1 (High)	VIN1	2	Tj = 25°C	3.5	—	5.5	V		
		2 (Low)	VIN2			GND	—	0.8			
Input Current			IIN		VIN = 3.5 V, Sink mode	—	3	10	μA		
Input Hysteresis Voltage			ΔVT		—	—	0.7	—	V		
Saturation Voltage	P / S / F Type	Upper Side	VSAT U-1	3	Vref = VS, VOUT - VS measure IO = 0.2 A, CW / CCW mode	—	0.9	1.2	V		
		Lower Side	VSAT L-1		Vref = VS, VOUT - GND measure IO = 0.2 A, CW / CCW mode	—	0.8	1.2			
	S / F Type	Upper Side	VSAT U-2		Vref = VS, VOUT - VS measure IO = 0.4 A, CW / CCW mode	—	1.0	1.35			
		Lower Side	VSAT L-2		Vref = VS, VOUT - GND measure IO = 0.4 A, CW / CCW mode	—	0.9	1.35			
	P Type	Upper Side	VSAT U-3		Vref = VS, VOUT - VS measure IO = 1.0 A, CW / CCW mode	—	1.3	1.8			
		Lower Side	VSAT L-3		Vref = VS, VOUT - GND measure IO = 1.0 A, CW / CCW mode	—	1.2	1.85			
Output Voltage (Upper Side)			S / F Type	VSAT U-1'	Vref = 10 V VOUT - GND measure, IO = 0.2 A, CW / CCW mode	—	11.2	—	V		
				VSAT U-2'	Vref = 10 V VOUT - GND measure, IO = 0.4 A, CW / CCW mode	10.4	10.9	12.2			
			P Type	VSAT U-3'	Vref = 10 V VOUT - GND measure, IO = 0.5 A, CW / CCW mode	—	11.0	—			
				VSAT U-4'	Vref = 10 V VOUT - GND measure, IO = 1.0 A, CW / CCW mode	10.2	10.7	12.0			
Leakage Current		Upper Side	ILU	4	VL = 25 V	—	—	50	μA		
		Lower Side	ILL		VL = 25 V	—	—	50			
Diode Forward Voltage			S / F Type	Upper Side	VF U-1	5	IF = 0.4 A	—	1.5	V	
			P Type	Lower Side	VF U-2		IF = 1 A	—	2.5		—
			S / F Type	Upper Side	VF L-1		IF = 0.4 A	—	0.9		—
			P Type	Lower Side	VF L-2		IF = 1 A	—	1.2		—
Reference Current			Iref	2	Vref = 10 V, Source mode	—	20	40	μA		



## TEST CIRCUIT 3

$V_{SAT U-1, 2, 3}$   $V_{SAT L-1, 2, 3}$   $V_{SAT U-1', 2', 3', 4'}$

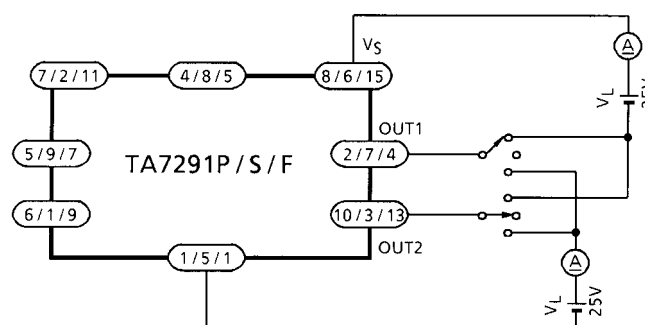


Note:  $I_{OUT}$  calibration is required to adjust specified values of test conditions by  $R_L$ .  
( $I_{OUT} = 0.2 A / 0.4 A / 0.5 A / 1.0 A$ )

Note: HEAT FIN of TA7291F is connected to GND.

## TEST CIRCUIT 4

$I_L U, L$

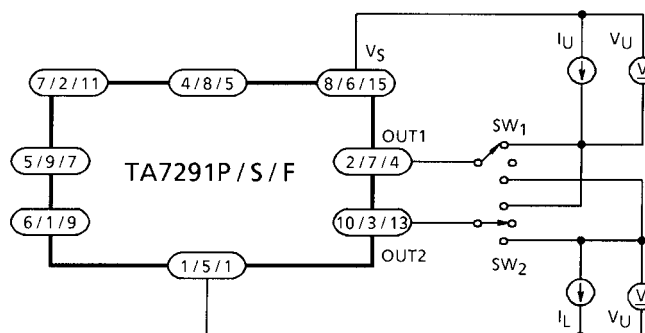


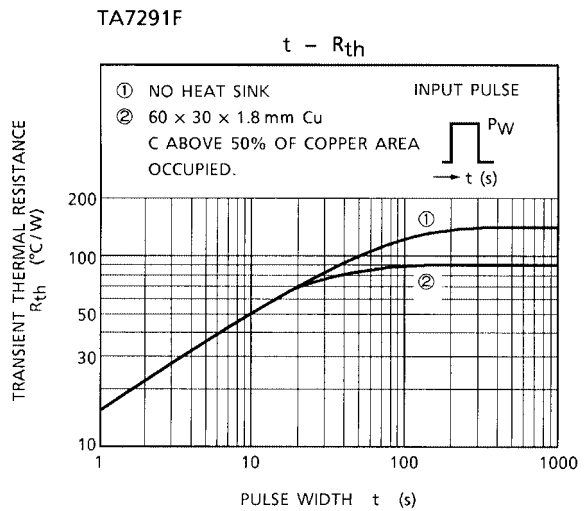
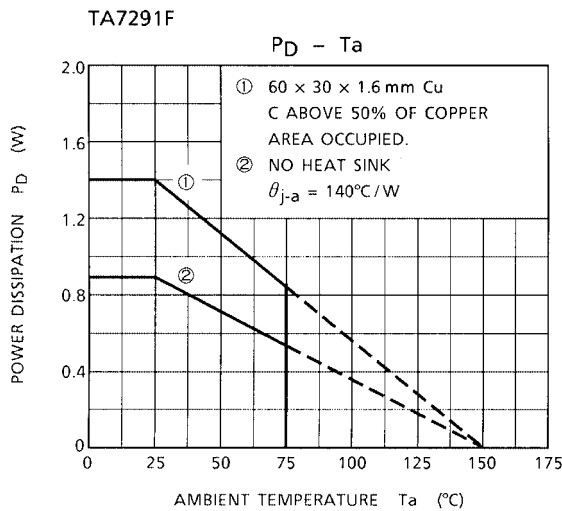
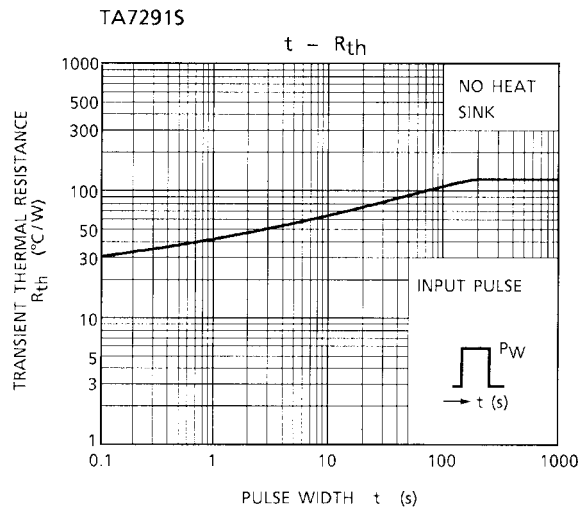
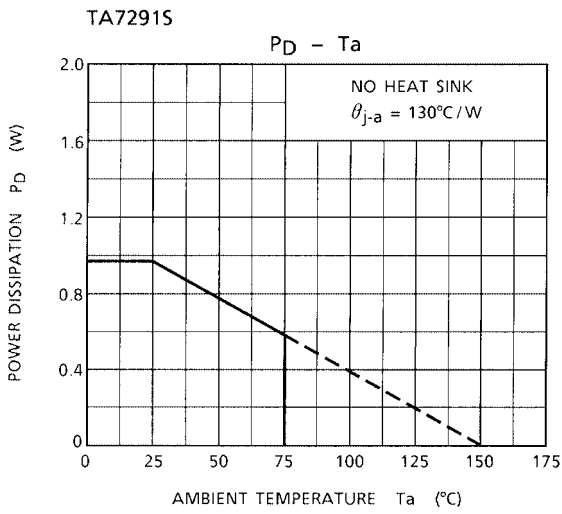
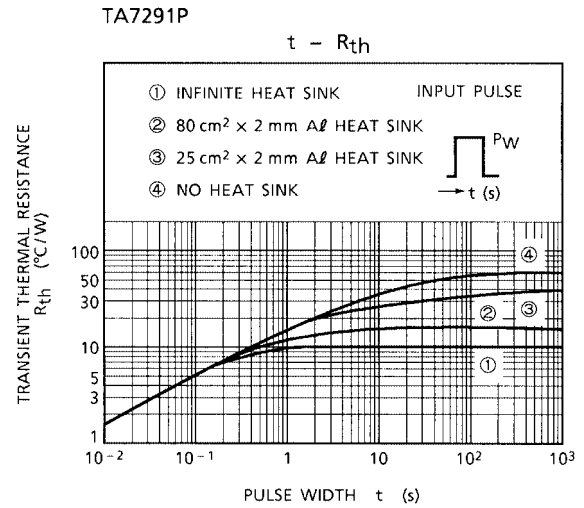
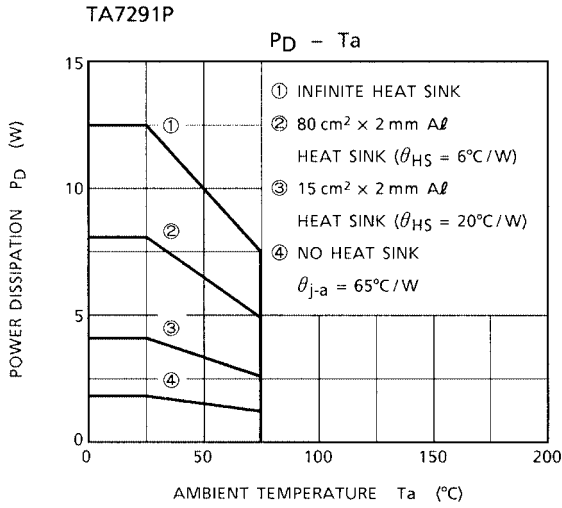
TA7291P / TA7291S / TA7291F

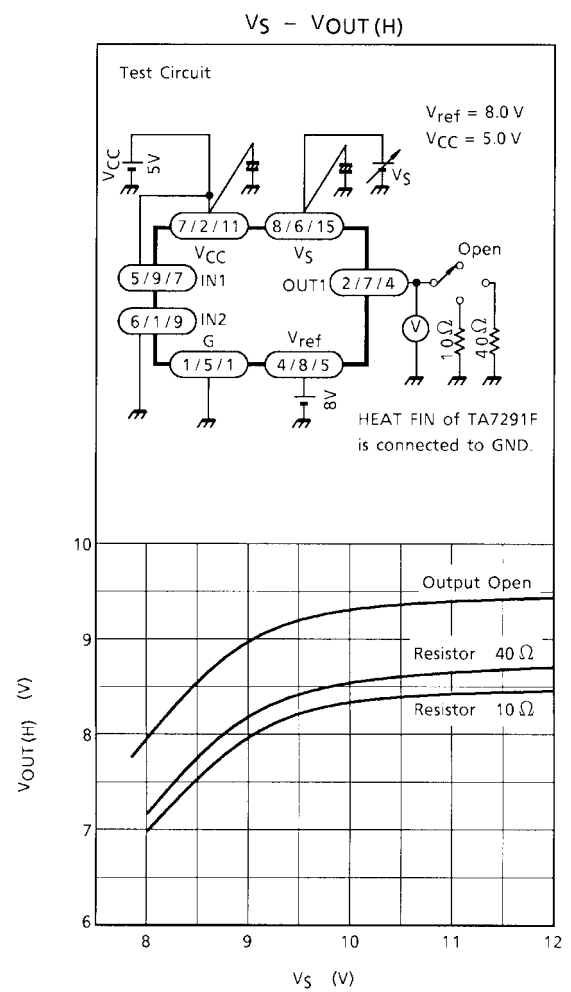
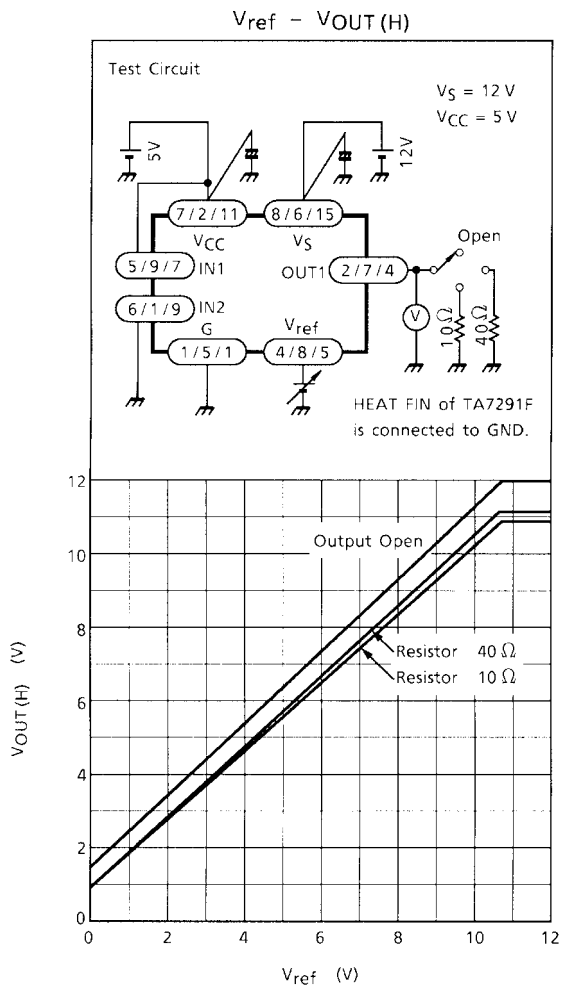
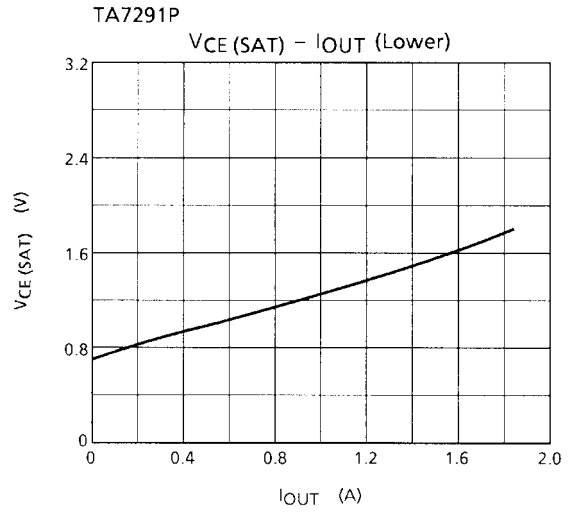
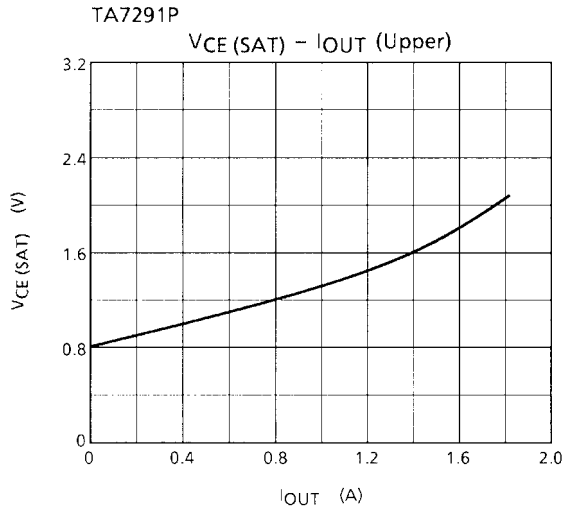
Note: HEAT FIN of TA7291F is connected to GND.

## TEST CIRCUIT 5

$V_{FU-1, 2}$   $V_{FL-1, 2}$





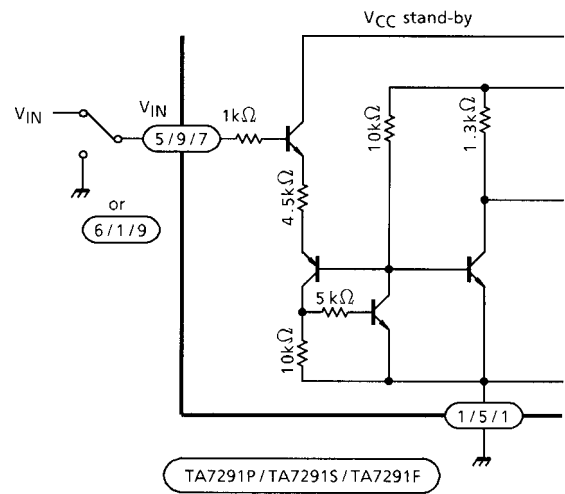




**NOTES**

**Input circuit**

Input Terminals of pin (5) and (6) (TA7291P) are all high active type and have a hysteresis of 0.7 V (typ.), 3  $\mu$ A (typ.) of source mode input current is required.



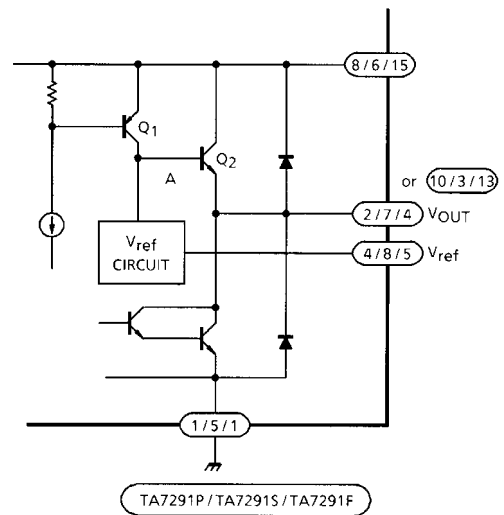
**Output circuit**

Output voltage is controlled by  $V_{ref}$  voltage.  
Relationship between  $V_{OUT}$  and  $V_{ref}$  is

$$V_{OUT} = V_{BE} (\approx 0.7) + V_{ref}$$

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

$$V_{ref} \leq V_S$$

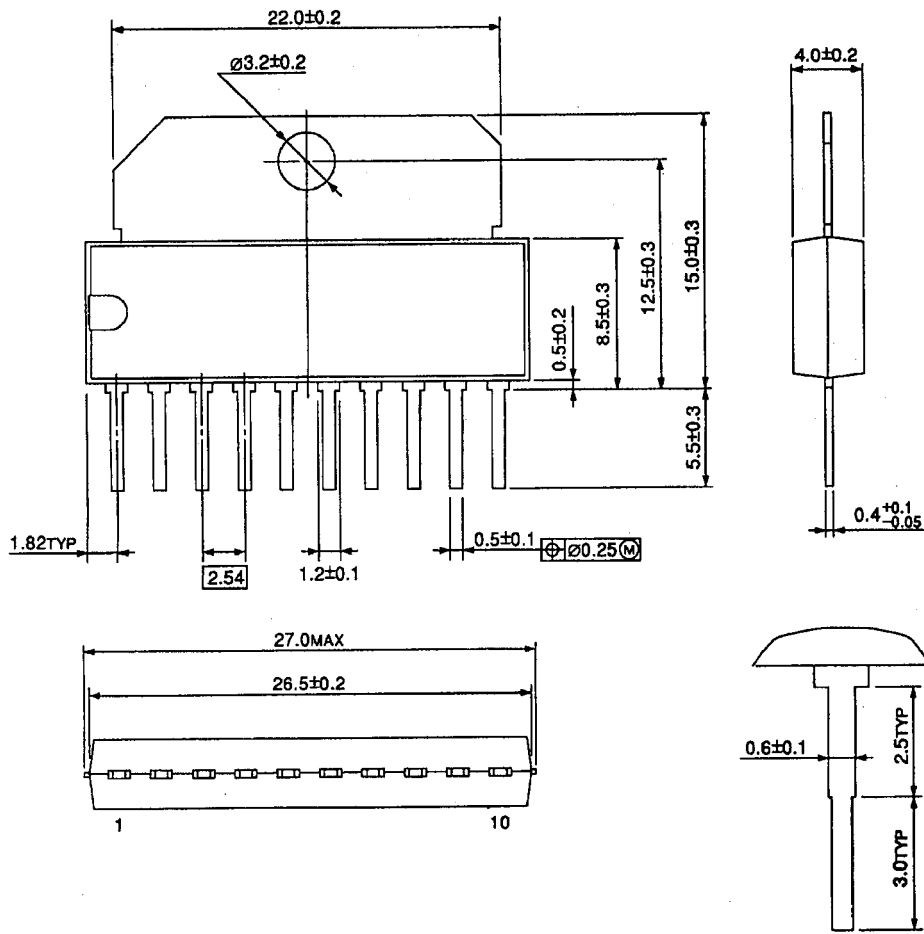




## PACKAGE DIMENSIONS

HSIP10-P-2.54

Unit: mm



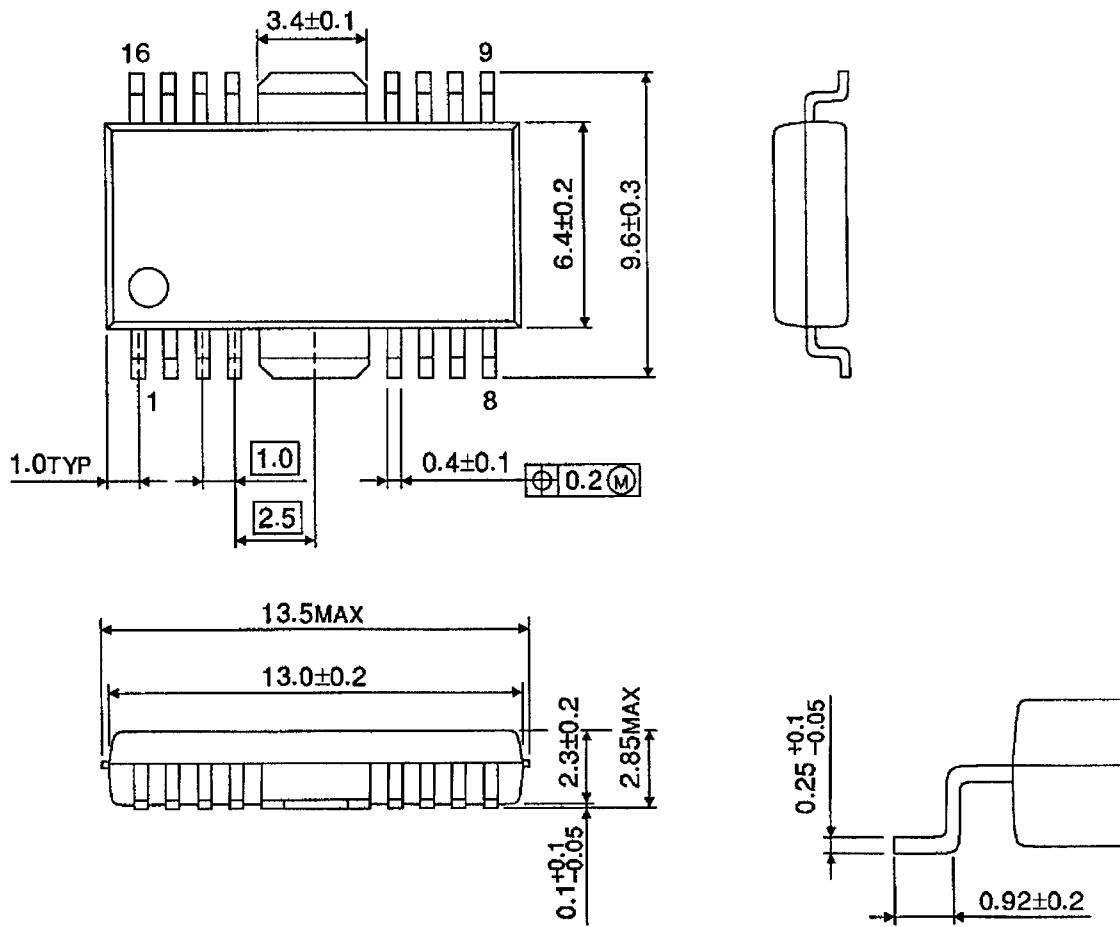
Weight: 2.47 g (Typ.)



**PACKAGE DIMENSIONS**

HSOP16-P-300-1.00

Unit: mm



Weight: 0.50 g (Typ.)

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000707EBA

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