

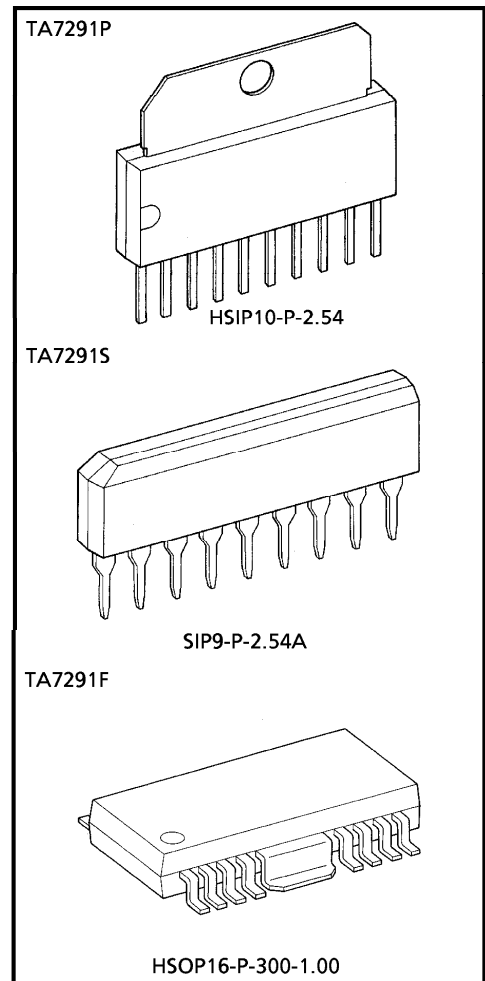
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

**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 :  $V_{CC}(\text{opr.}) = 4.5\sim 20\text{ V}$   
 $V_S(\text{opr.}) = 0\sim 20\text{ V}$   
 $V_{\text{ref}}(\text{opr.}) = 0\sim 20\text{ V}$
- Build in thermal shutdown, over current protector and punch = through current restriction circuit.
- Stand-by mode available (STOP MODE)
- Hysteresis for all inputs.

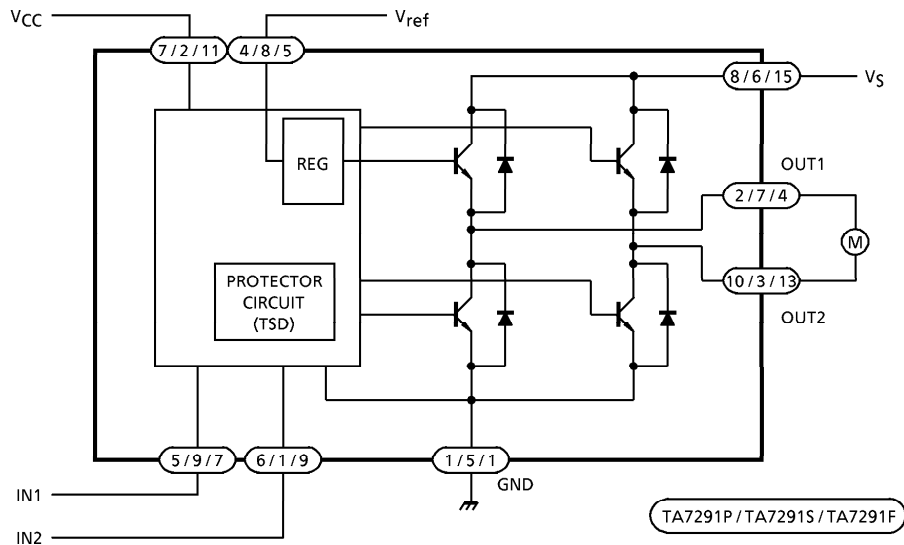


Weight  
 HSIP10-P-2.54 : 2.47 g (Typ.)  
 SIP9-P-2.54A : 0.92 g (Typ.)  
 HSOP16-P-300-1.00 : 0.50 g (Typ.)

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**BLOCK DIAGRAM**



**PIN FUNCTION**

PIN No.			SYMBOL	FUNCTIONAL 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	I <sub>O</sub> (PEAK)	A	
		S / F Type			2.0
	AVE.	P Type	I <sub>O</sub> (AVE.)		1.2
		S / F Type			1.0
Power Dissipation	P Type	P <sub>D</sub>	(*1) 12.5	W	
	S Type		(*2) 0.95		
	F Type		(*3) 1.4		
Operating Temperature		T <sub>opr</sub>	- 30~75	°C	
Storage Temperature		T <sub>stg</sub>	- 55~150	°C	

(\*1) T<sub>c</sub> = 25°C (TA7291P)

(\*2) No heat sink

(\*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

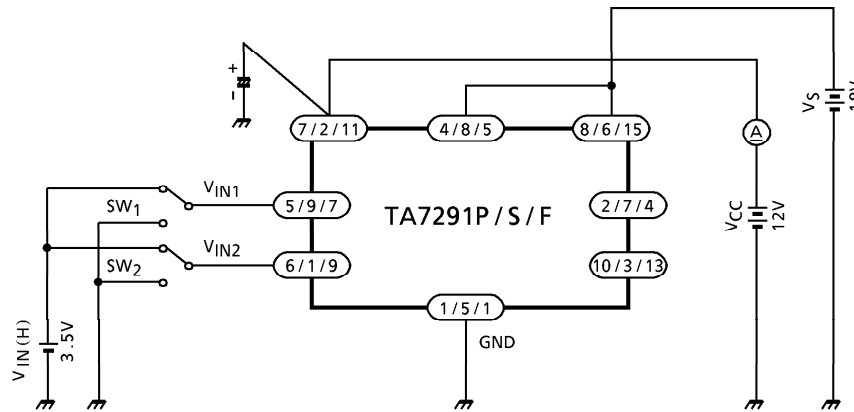
V<sub>ref</sub> ≤ V<sub>S</sub>

**ELECTRICAL CHARACTERISTICS** (Unless otherwise specified,  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 12\text{V}$ ,  $V_S = 18\text{V}$ )

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		$I_{CC1}$	1	Output OFF, CW/CCW mode	—	8.0	13.0	mA
		$I_{CC2}$		Output OFF, Stop mode	—	0	50	$\mu\text{A}$
		$I_{CC3}$		Output OFF, Brake mode	—	6.5	10.0	mA
Input Operating Voltage	1 (High)	$V_{IN1}$	2	$T_j = 25^\circ\text{C}$	3.5	—	5.5	V
	2 (Low)	$V_{IN2}$			GND	—	0.8	
Input Current		$I_{IN}$		$V_{IN} = 3.5\text{V}$ , Sink mode	—	3	10	$\mu\text{A}$
Input Hysteresis Voltage		$\Delta V_T$		—	—	0.7	—	V
Saturation Voltage	P/S/F Type	Upper Side	3	$V_{ref} = V_S$ , $V_{OUT} - V_S$ measure $I_O = 0.2\text{A}$ , CW/CCW mode	—	0.9	1.2	V
		Lower Side			$V_{ref} = V_S$ , $V_{OUT} - \text{GND}$ measure $I_O = 0.2\text{A}$ , CW/CCW mode	—	0.8	
	S/F Type	Upper Side		$V_{ref} = V_S$ , $V_{OUT} - V_S$ measure $I_O = 0.4\text{A}$ , CW/CCW mode	—	1.0	1.35	
		Lower Side		$V_{ref} = V_S$ , $V_{OUT} - \text{GND}$ measure $I_O = 0.4\text{A}$ , CW/CCW mode	—	0.9	1.35	
	P Type	Upper Side		$V_{ref} = V_S$ , $V_{OUT} - V_S$ measure $I_O = 1.0\text{A}$ , CW/CCW mode	—	1.3	1.8	
		Lower Side		$V_{ref} = V_S$ , $V_{OUT} - \text{GND}$ measure $I_O = 1.0\text{A}$ , CW/CCW mode	—	1.2	1.85	
Output Voltage (Upper Side)	S/F Type	$V_{SAT\ U-1}'$	3	$V_{ref} = 10\text{V}$ , $V_{OUT} - \text{GND}$ measure, $I_O = 0.2\text{A}$ , CW/CCW mode	—	11.2	—	V
		$V_{SAT\ U-2}'$		$V_{ref} = 10\text{V}$ , $V_{OUT} - \text{GND}$ measure, $I_O = 0.4\text{A}$ , CW/CCW mode	10.4	10.9	12.2	
	P Type	$V_{SAT\ U-3}'$		$V_{ref} = 10\text{V}$ , $V_{OUT} - \text{GND}$ measure, $I_O = 0.5\text{A}$ , CW/CCW mode	—	11.0	—	
		$V_{SAT\ U-4}'$		$V_{ref} = 10\text{V}$ , $V_{OUT} - \text{GND}$ measure, $I_O = 1.0\text{A}$ , CW/CCW mode	10.2	10.7	12.0	
Leakage Current		Upper Side	4	$V_L = 25\text{V}$	—	—	50	$\mu\text{A}$
		Lower Side		$V_L = 25\text{V}$	—	—	50	
Diode Forward Voltage	S/F Type	Upper Side	5	$I_F = 0.4\text{A}$	—	1.5	—	V
	P Type	Lower Side			$I_F = 1\text{A}$	—	2.5	
		S/F Type		Upper Side	$I_F = 0.4\text{A}$	—	0.9	
	P Type	Lower Side		$I_F = 1\text{A}$	—	1.2	—	
Reference Current		$I_{ref}$	2	$V_{ref} = 10\text{V}$ , Source mode	—	20	40	$\mu\text{A}$

**TEST CIRCUIT 1**

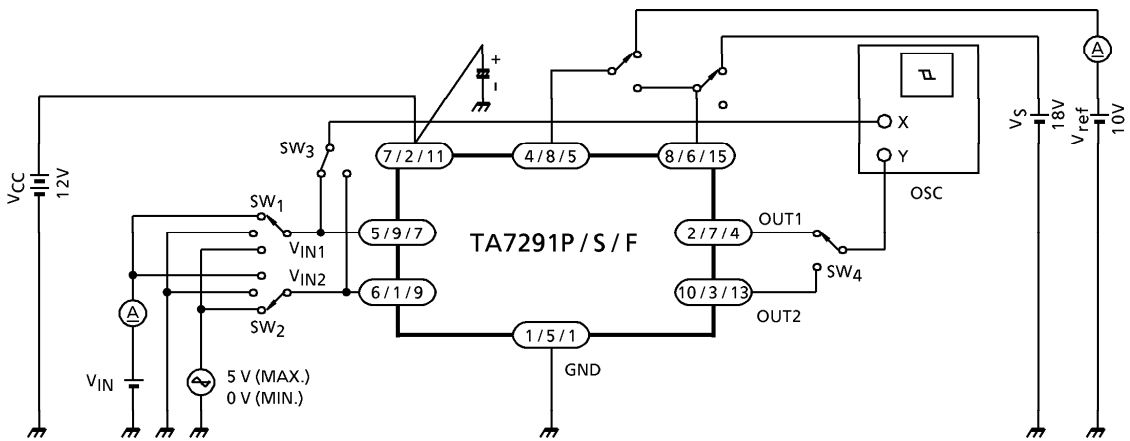
$I_{CC1}$ ,  $I_{CC2}$ ,  $I_{CC3}$



(Note) HEAT FIN of TA7291F is connected to GND.

**TEST CIRCUIT 2**

$V_{IN1}$ ,  $V_{IN2}$ ,  $I_{IN}$ ,  $\Delta V_T$ ,  $I_{ref}$

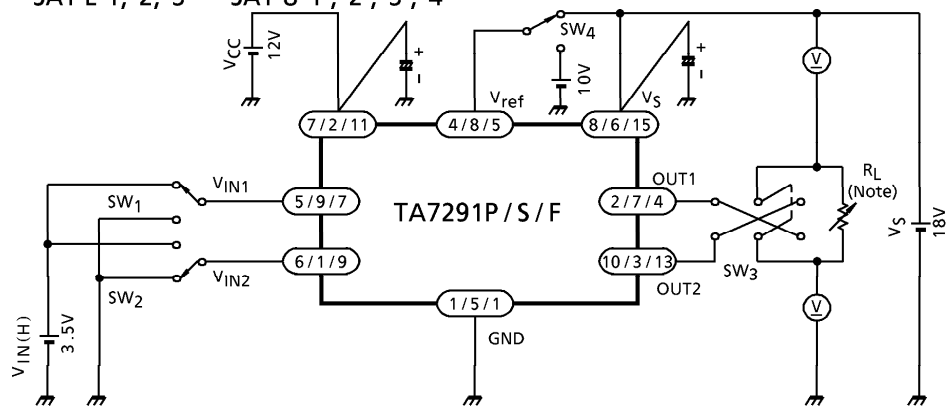


TA7291P / TA7291S / TA7291F

(Note) HEAT FIN of TA7291F is connected to GND.

**TEST CIRCUIT 3**

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

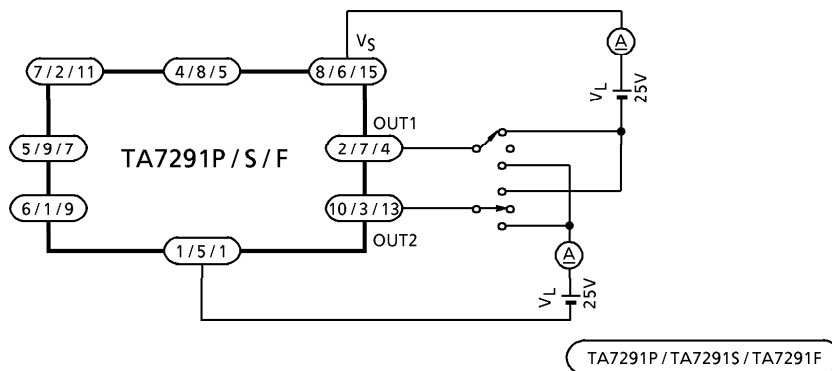


(Note)  $I_{OUT}$  calibration is required to adjust specified values of test conditions by  $R_L$ .  
( $I_{OUT} = 0.2 A / 0.4 A / 0.5 A / 1.0 A$ )

(Note) HEAT FIN of TA7291F is connected to GND.

**TEST CIRCUIT 4**

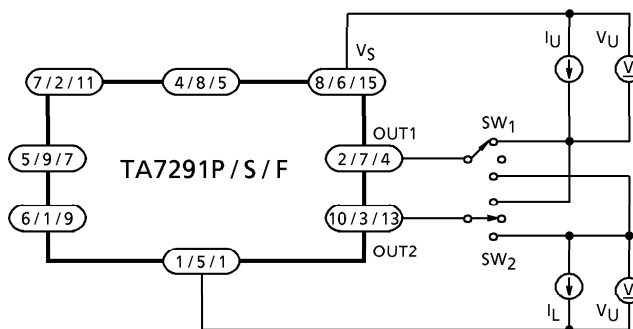
$I_{LU, L}$

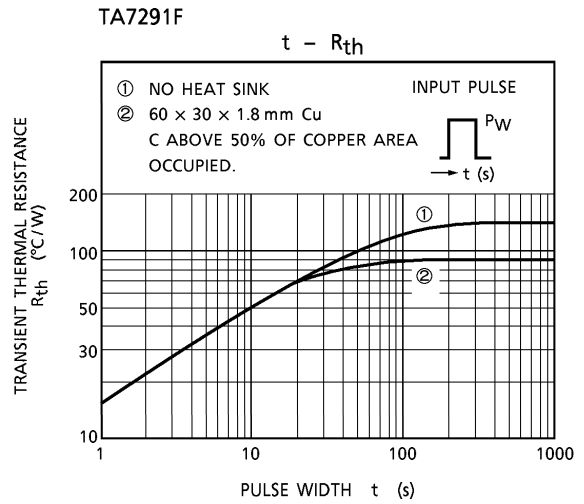
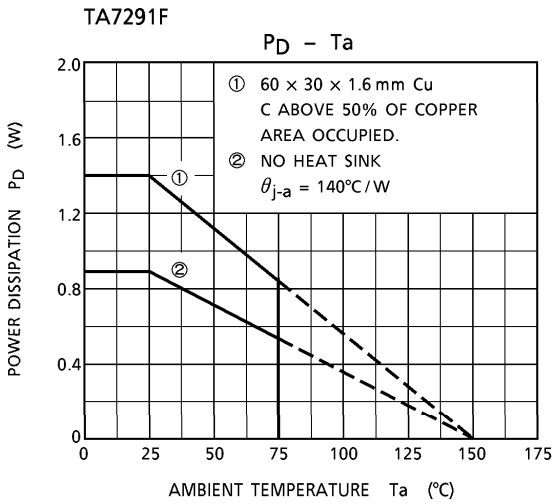
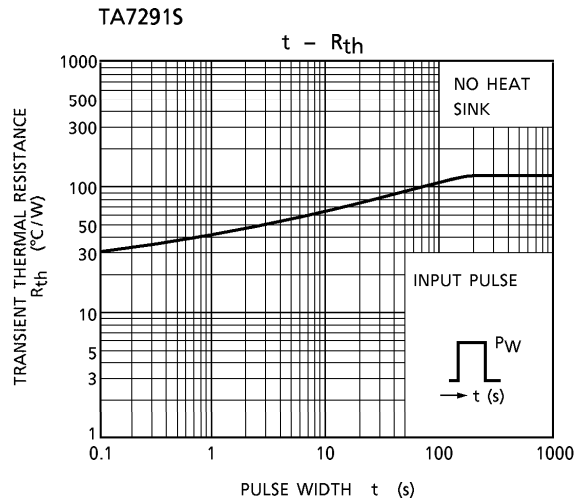
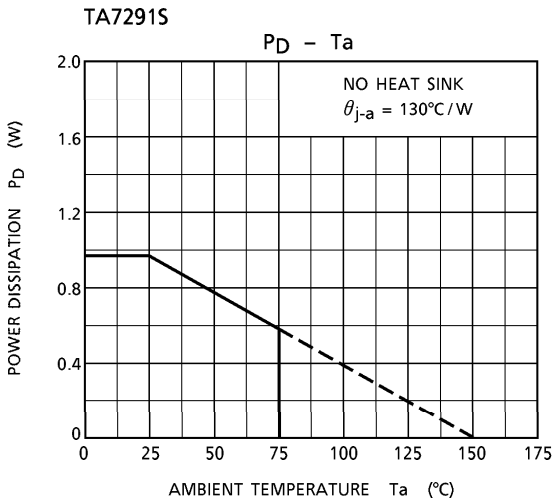
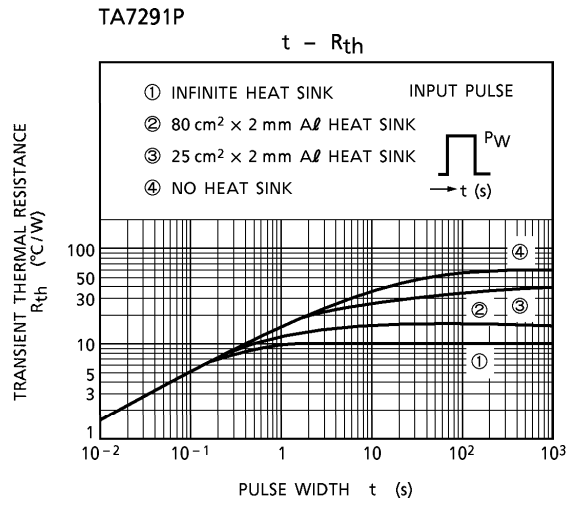
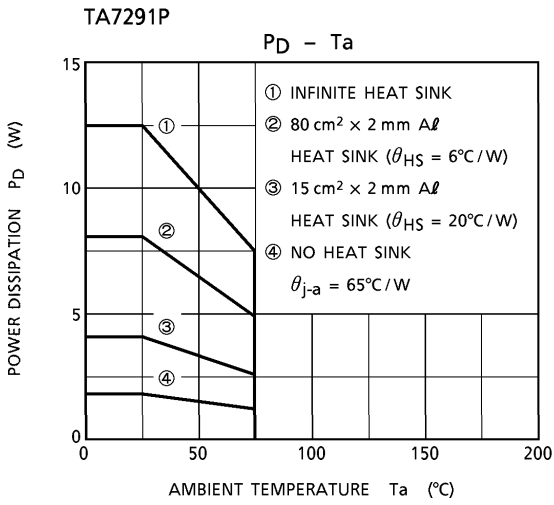


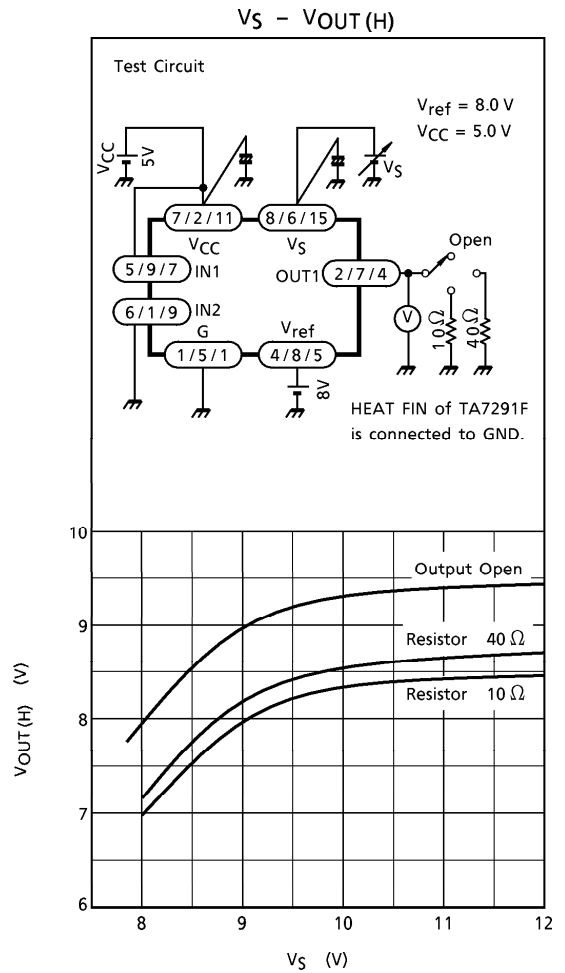
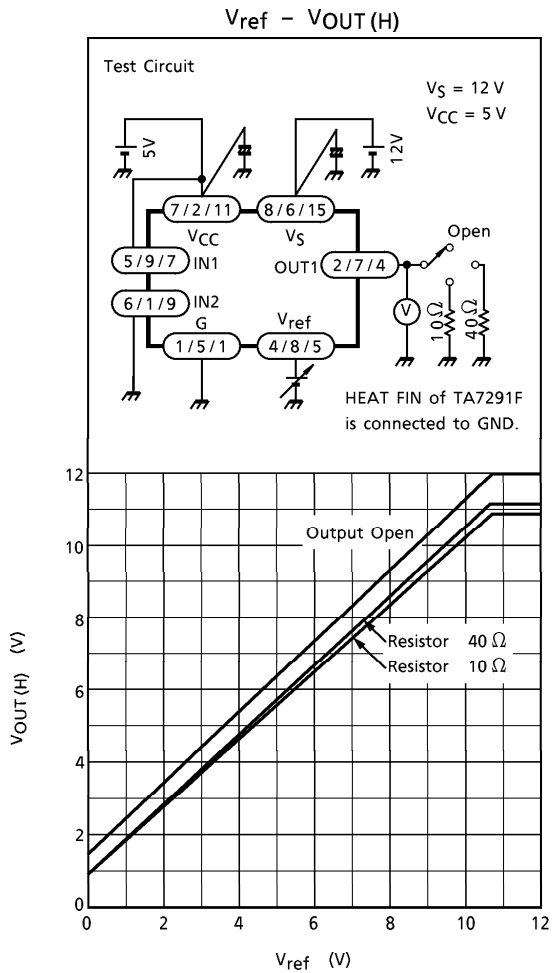
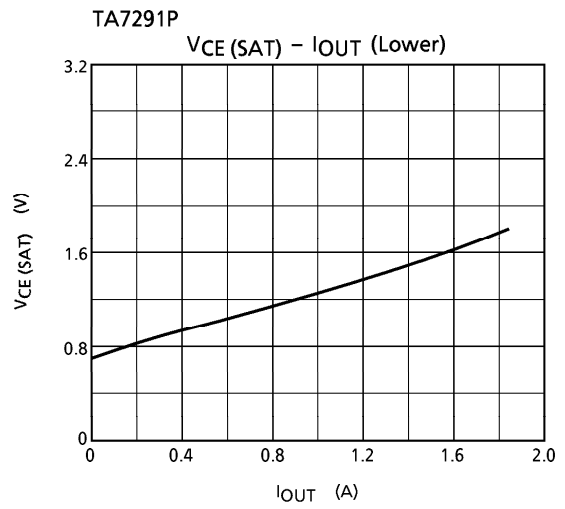
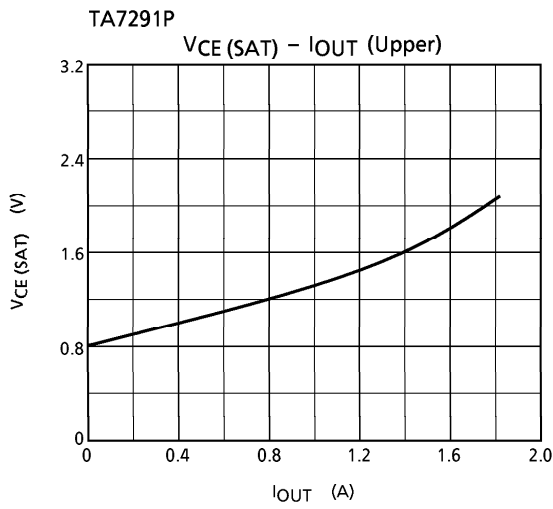
(Note) HEAT FIN of TA7291F is connected to GND.

**TEST CIRCUIT 5**

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





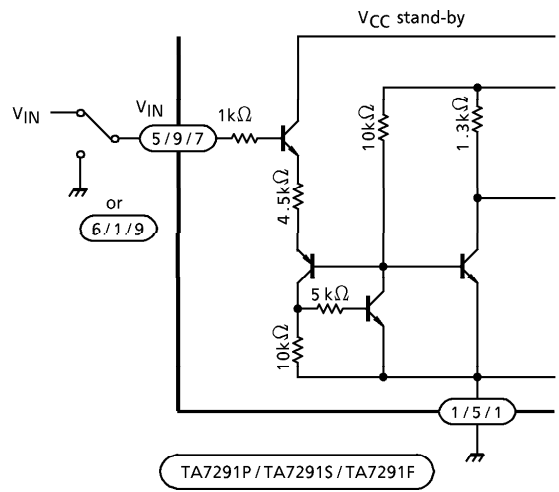




**NOTES**

**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 μA (typ.) of source mode input current is required.



**Output circuit**

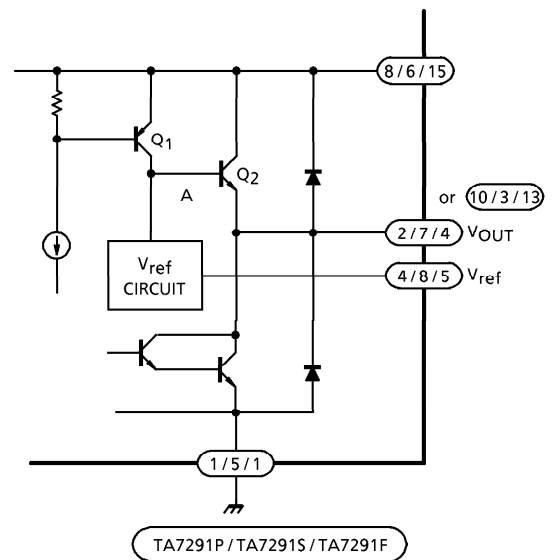
Output voltage is controlled by  $V_{ref}$  voltage.

Relationship between  $V_{OUT}$  and  $V_{ref}$  is

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

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

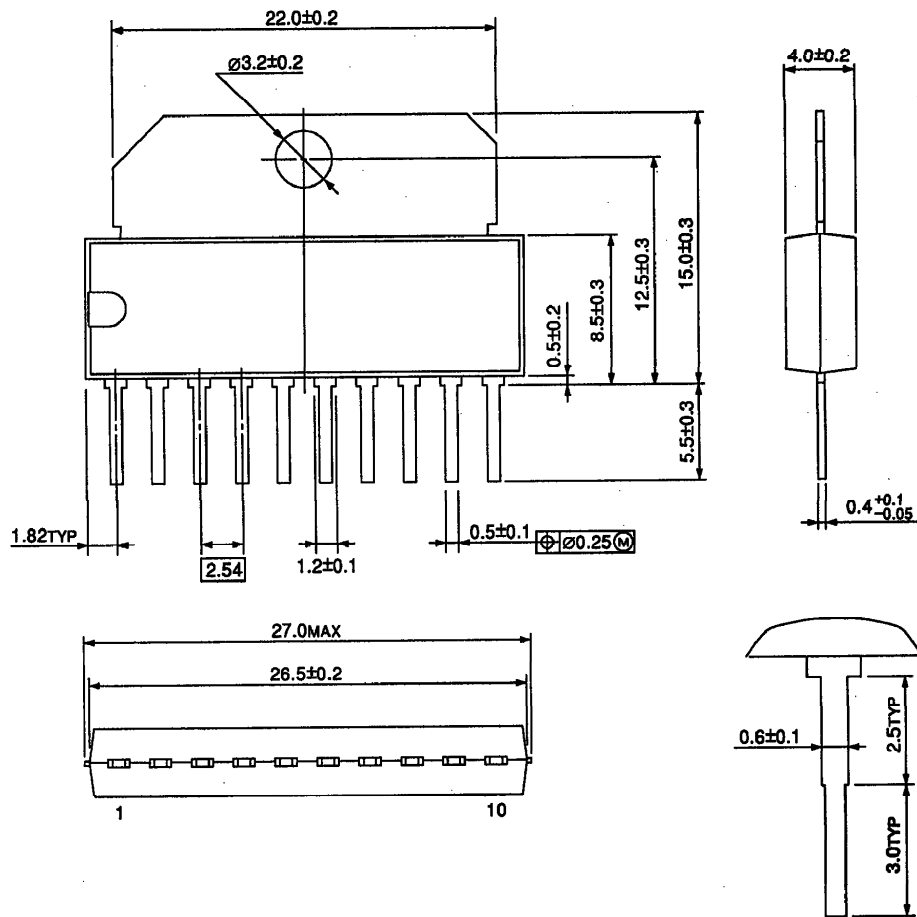
$$V_{ref} \leq V_S$$





**OUTLINE DRAWING**  
HSIP10-P-2.54

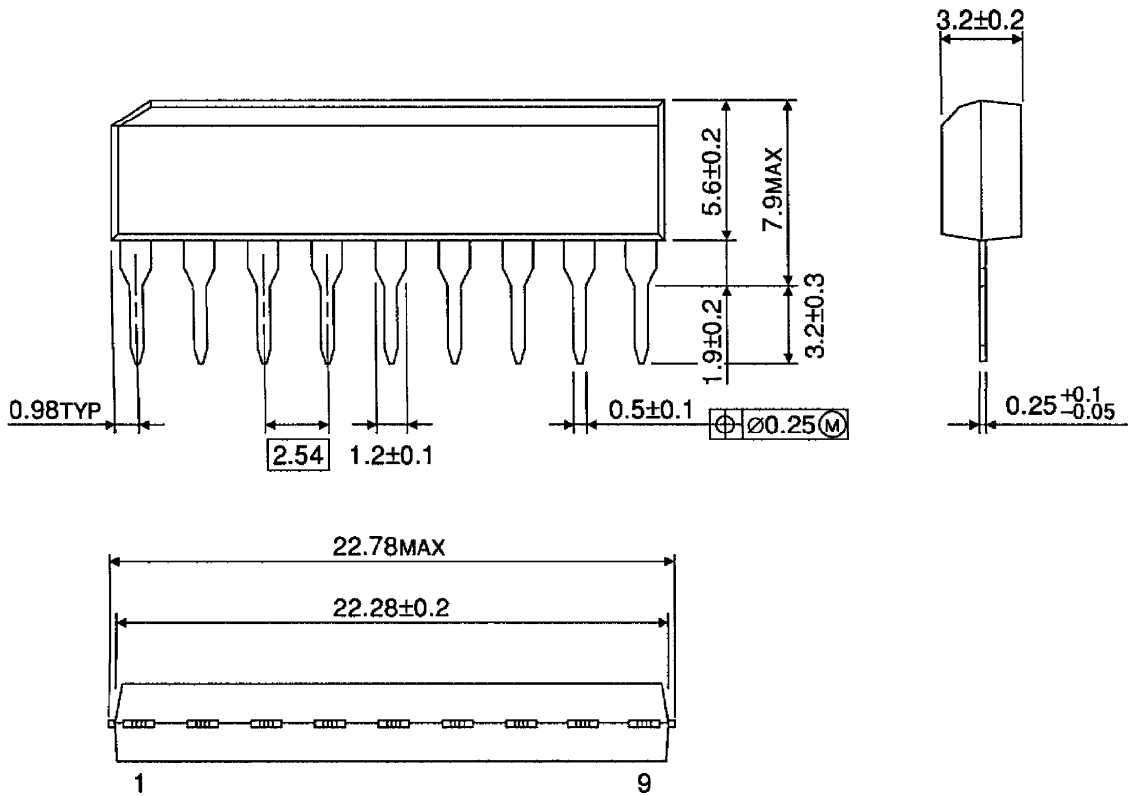
Unit : mm



Weight : 2.47 g (Typ.)

OUTLINE DRAWING  
SIP9-P-2.54A

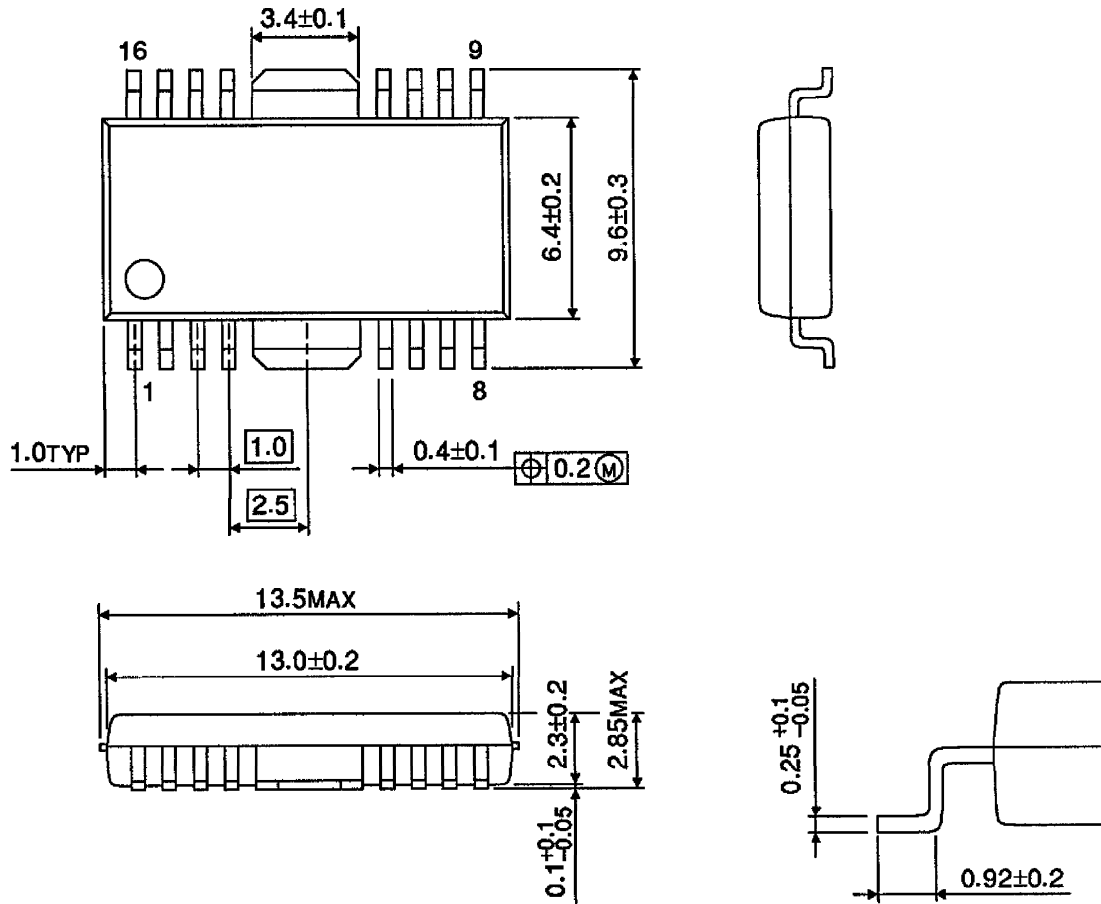
Unit : mm



Weight : 0.92 g (Typ.)

**OUTLINE DRAWING**  
HSOP16-P-300-1.00

Unit : mm



Weight : 0.50 g (Typ.)