

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA7291P, TA7291S, TA7291F

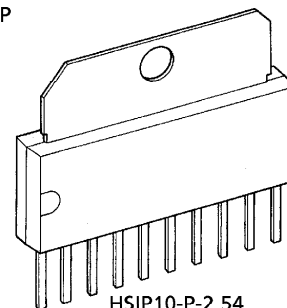
BRIDGE DRIVER

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

FEATURES

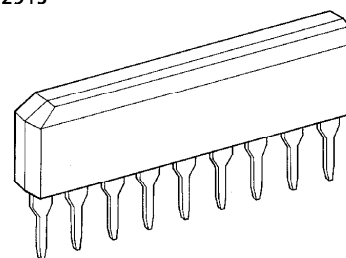
- 4 modes available (CW/CCW/STOP/BRAKE)
- Output current : P type 1.0 A (AVE.) 2.0 A (PEAK)
 S/F type 0.4 A (AVE.) 1.2 A (PEAK)
- Wide range of operating voltage : $V_{CC}(\text{opr.}) = 4.5 \sim 20 \text{ V}$
 $V_S(\text{opr.}) = 0 \sim 20 \text{ V}$
 $V_{\text{ref}}(\text{opr.}) = 0 \sim 20 \text{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

TA7291P



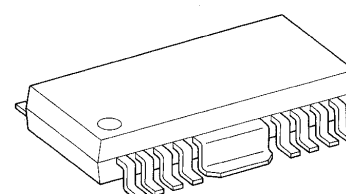
HSIP10-P-2.54

TA7291S



SIP9-P-2.54A

TA7291F



HSOP16-P-300-1.00

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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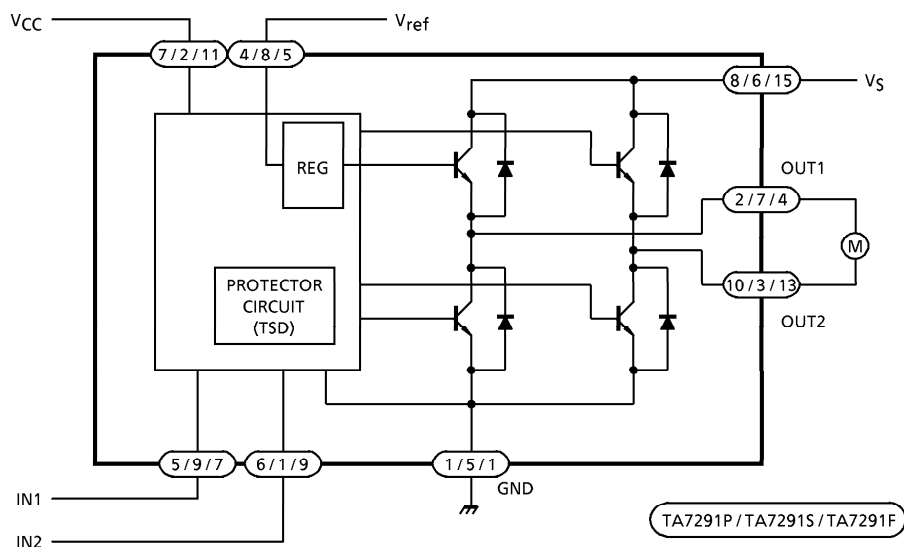
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BLOCK DIAGRAM



PIN FUNCTION

PIN No.			SYMBOL	FUNCTIONAL DESCRIPTION
P	S	F		
7	2	11	V _{CC}	Supply voltage terminal for Logic
8	6	15	V _S	Supply voltage terminal for Motor driver
4	8	5	V _{ref}	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 _{CC}	25	V
Motor Drive Voltage			V _S	25	V
Reference Voltage			V _{ref}	25	V
Output Current	PEAK	P Type	I _O (PEAK)	2.0	A
		S / F Type		1.2	
	AVE.	P Type	I _O (AVE.)	1.0	
		S / F Type		0.4	
Power Dissipation		P Type	P _D	(*1) 12.5	W
		S Type		(*2) 0.95	
		F Type		(*3) 1.4	
Operating Temperature			T _{opr}	− 30~75	°C
Storage Temperature			T _{stg}	− 55~150	°C

(*1) T_c = 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_{CC} (opr.) = 4.5~20 V

V_S (opr.) = 0~20 V

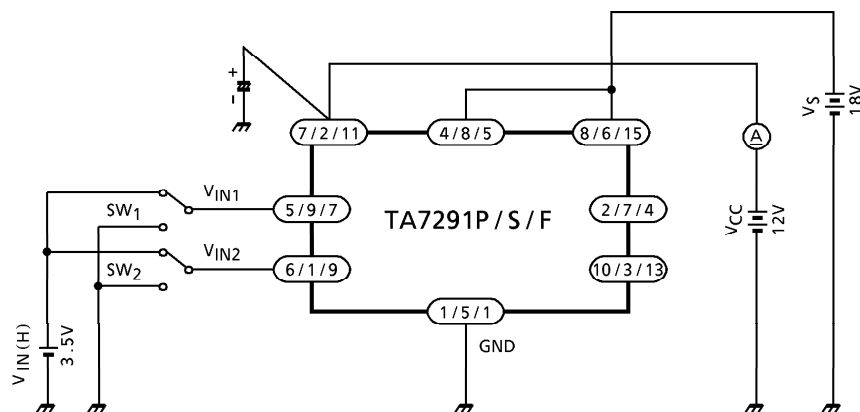
V_{ref} (opr.) = 0~20 V

V_{ref} ≤ V_S

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

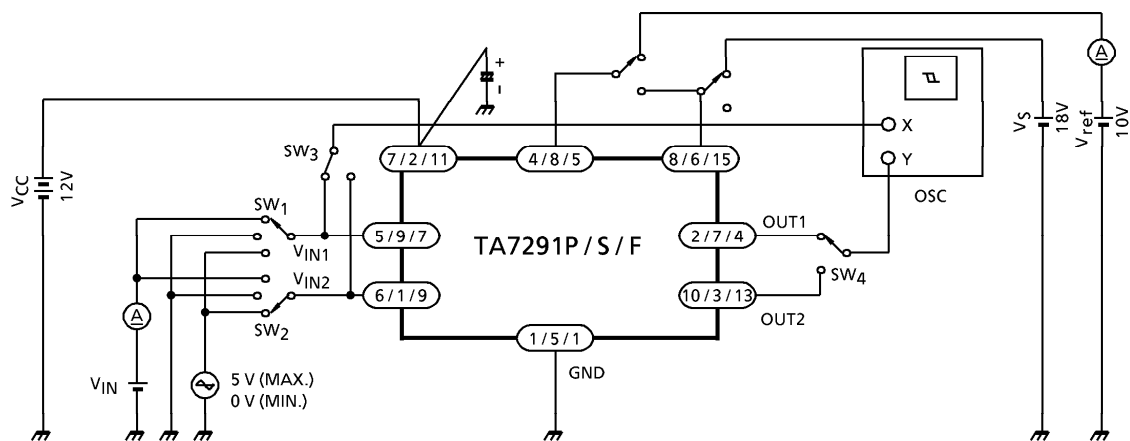
CHARACTERISTIC			SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current			I_{CC1}	1	Output OFF, CW/CCW mode	—	8.0	13.0	mA
			I_{CC2}		Output OFF, Stop mode	—	0	50	μA
			I_{CC3}		Output OFF, Brake mode	—	6.5	10.0	mA
Input Operating Voltage	1 (High)		V_{IN1}	2	$T_j = 25^\circ\text{C}$	3.5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

TEST CIRCUIT 1

 $l_{CC1}, l_{CC2}, l_{CC3}$ 

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

TEST CIRCUIT 2

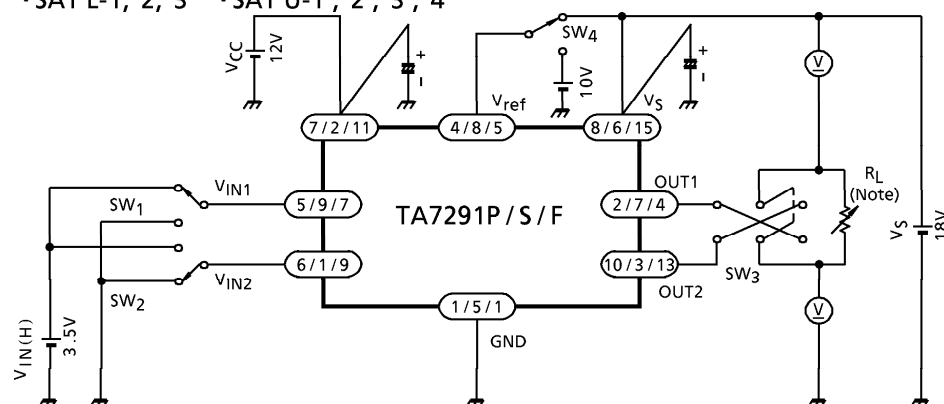
 $V_{IN1}, V_{IN2}, I_{IN}, \Delta V_T, I_{ref}$ 

TA7291P / TA7291S / TA7291F

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

TEST CIRCUIT 3

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

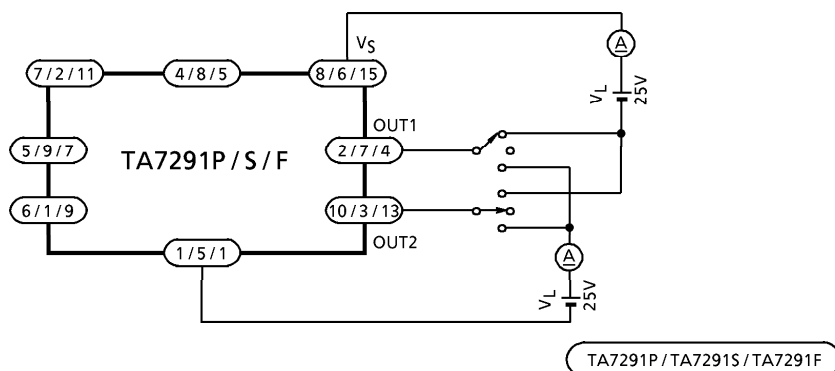


(Note) I_{OUT} calibration is required to adjust specified values of test conditions by R_L .
($I_{OUT} = 0.2 A / 0.4 A / 0.5 A / 1.0 A$)

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

TEST CIRCUIT 4

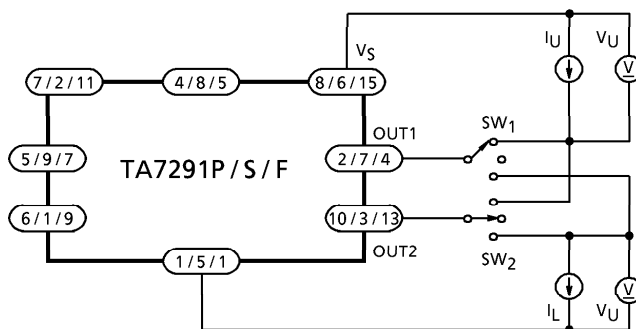
$I_{LU, L}$



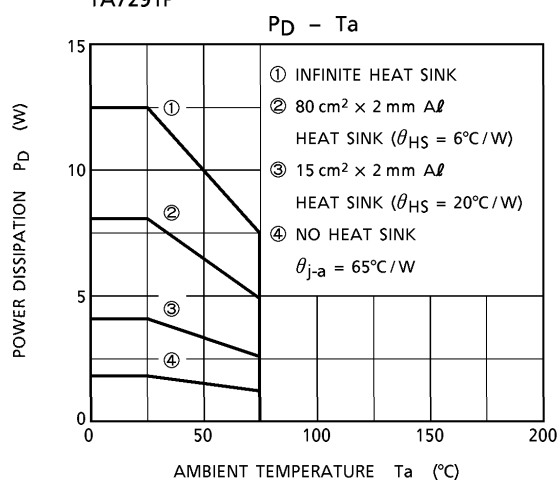
(Note) HEAT FIN of TA7291F is connected to GND.

TEST CIRCUIT 5

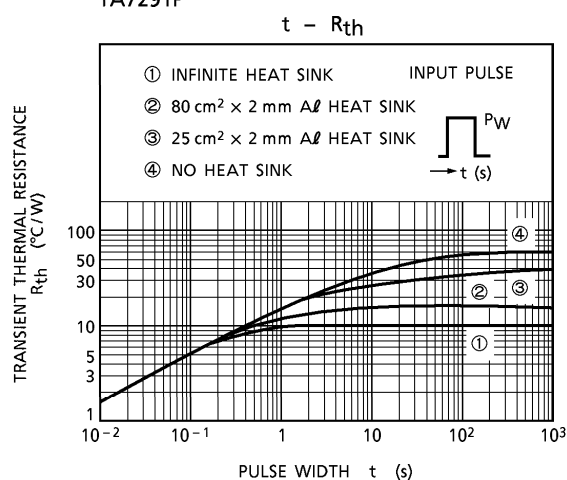
$V_{FU-1, 2}$ $V_{FL-1, 2}$



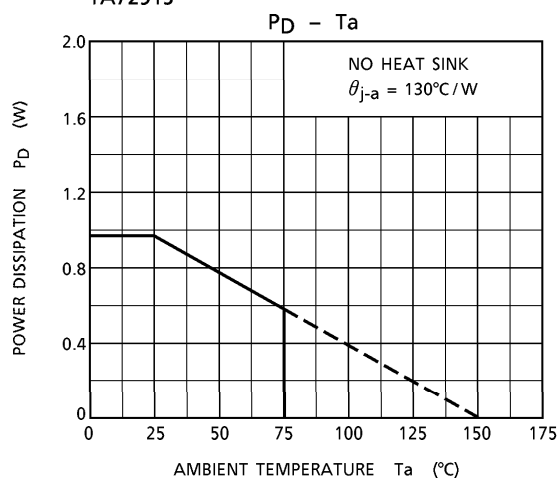
TA7291P



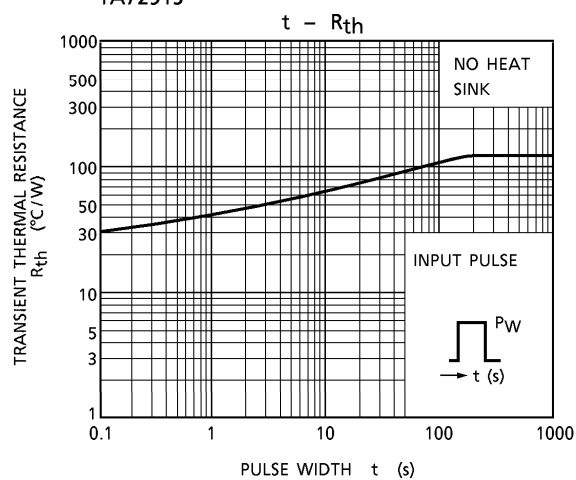
TA7291P



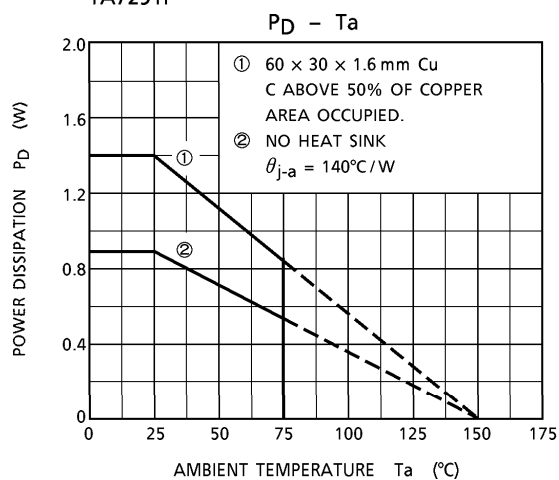
TA7291S



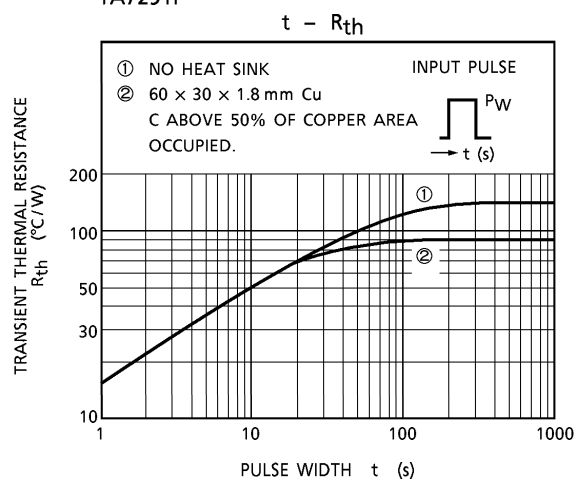
TA7291S

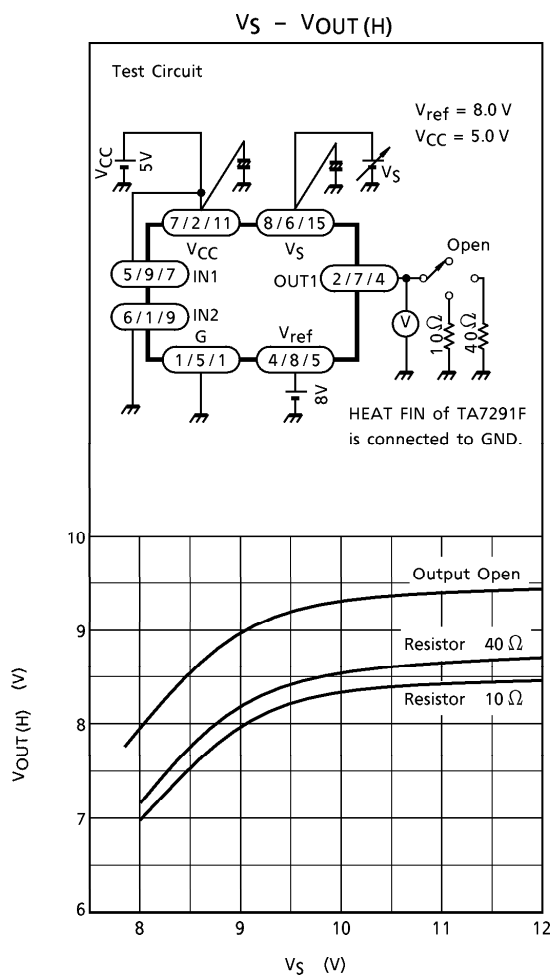
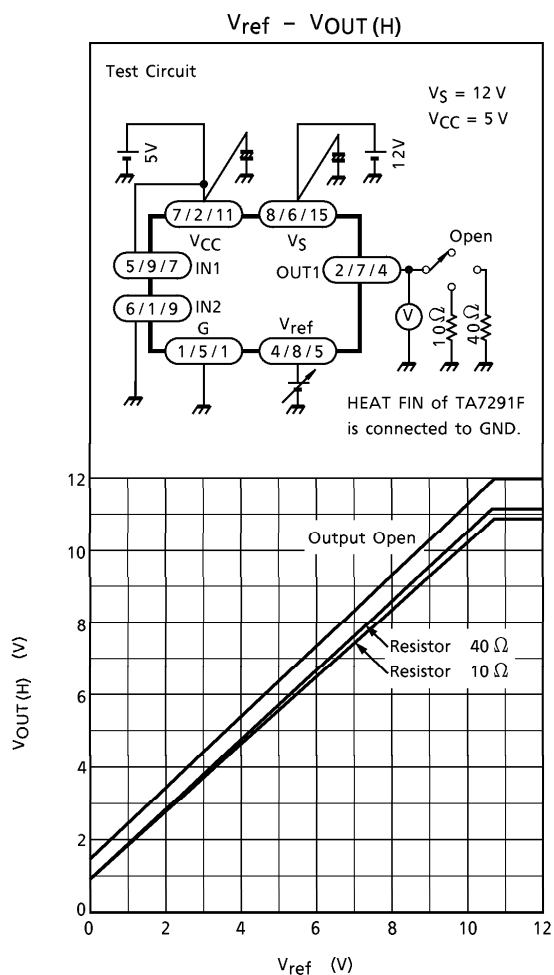
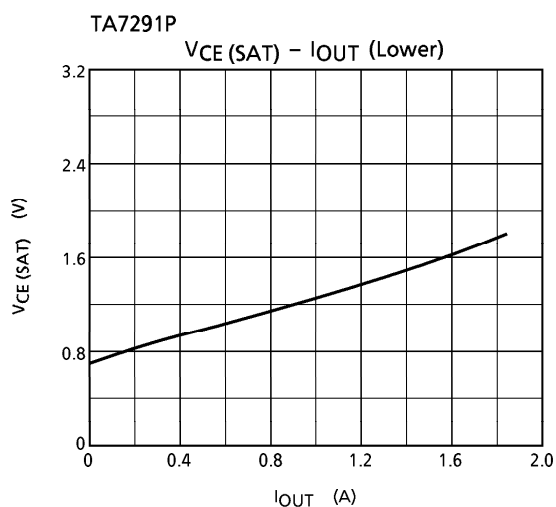
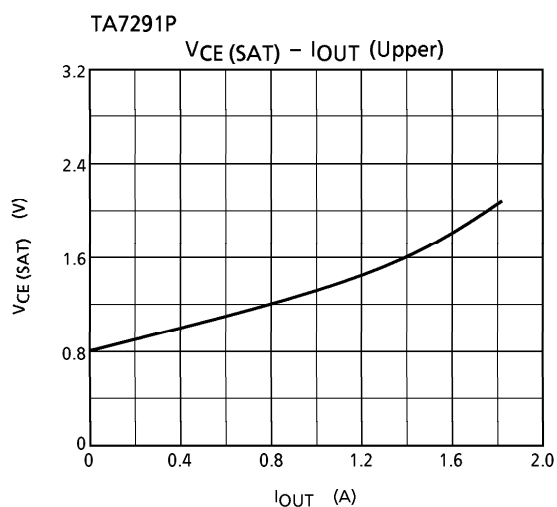


TA7291F



TA7291F

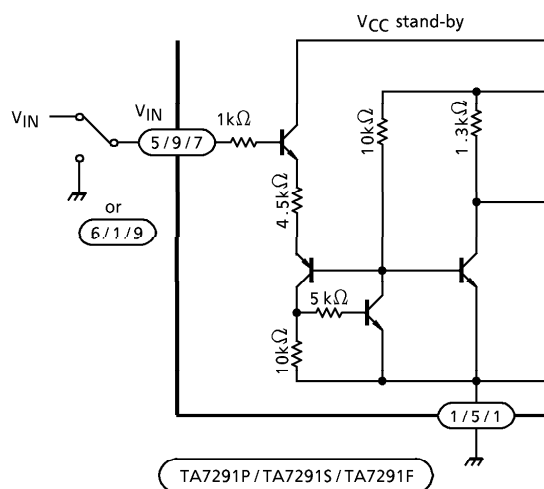




NOTES

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 μ A (typ.) of source mode input current is required.



Output circuit

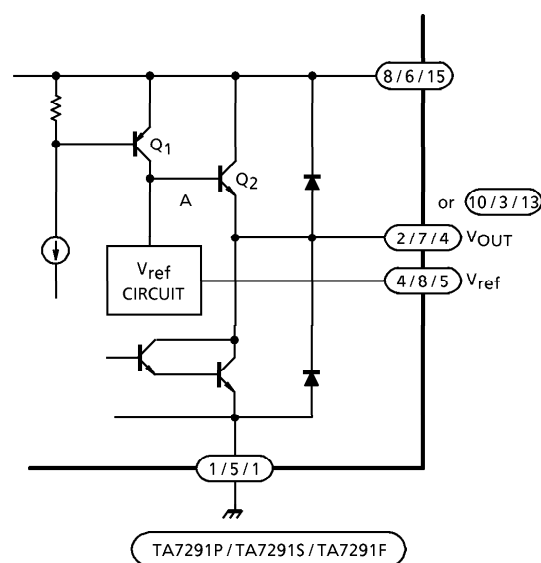
Output voltage is controlled by V_{ref} voltage.

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

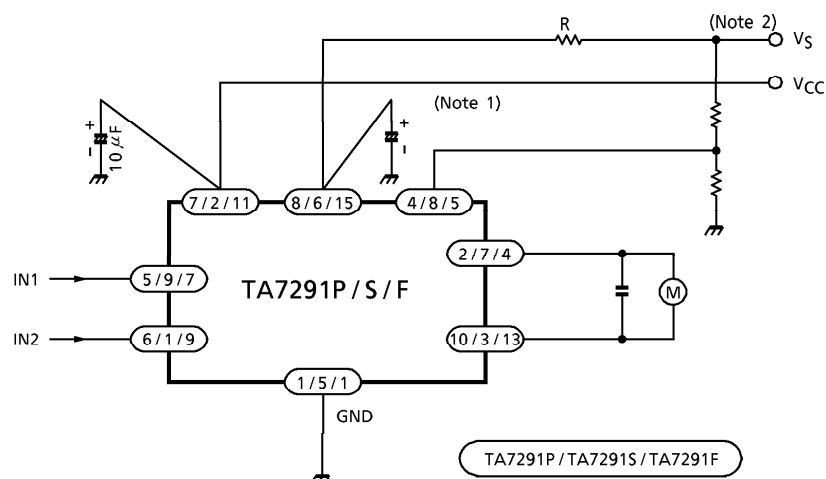
$$V_{OUT} = V_{BE} (\cong 0.7) + V_{ref}$$

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

$$V_{ref} \leq V_S$$



APPLICATION CIRCUIT



(Note 1) Experiment to find the optimum capacitor value.

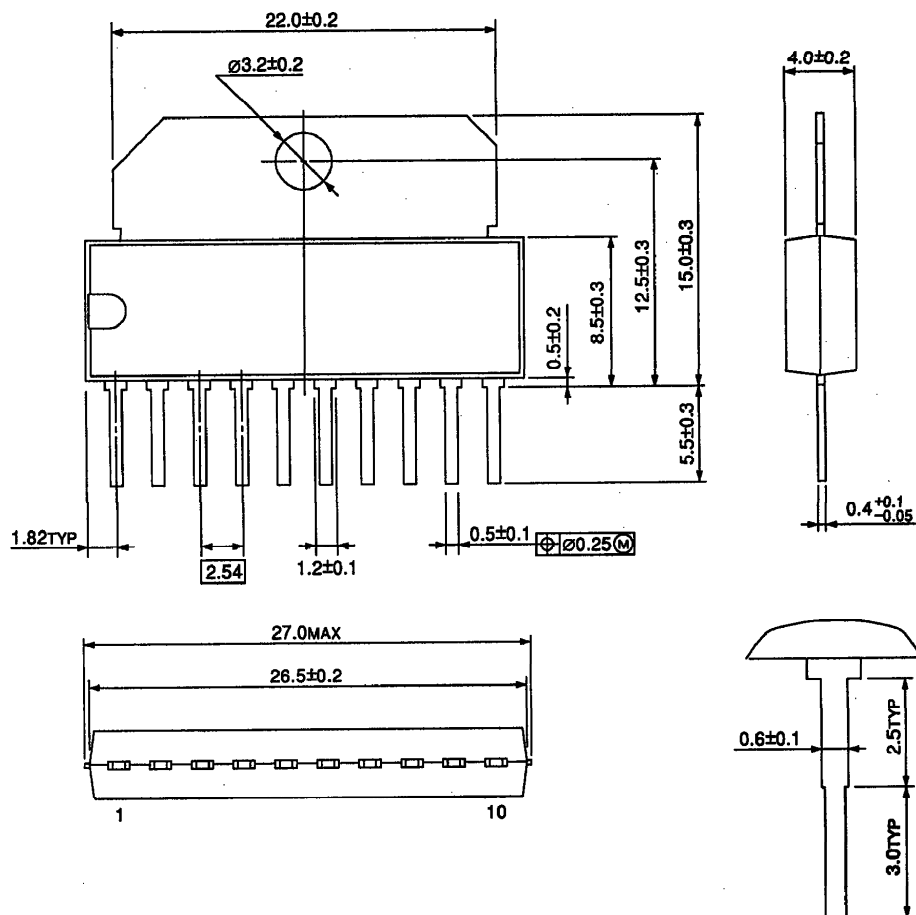
(Note 2) To protect against excess current, current limitation resistor R should be inserted where necessary.

NOTES

- Be careful when switching the input because rush current may occur.
When switching, stop mode should be entered or current limitation resistor R should be inserted.
- The IC functions cannot be guaranteed when turning power on or off.
Before using the IC for application, check that there are no problems.
- Utmost care is necessary in the design of the output line, V_S , V_{CC} and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

OUTLINE DRAWING
HSIP10-P-2.54

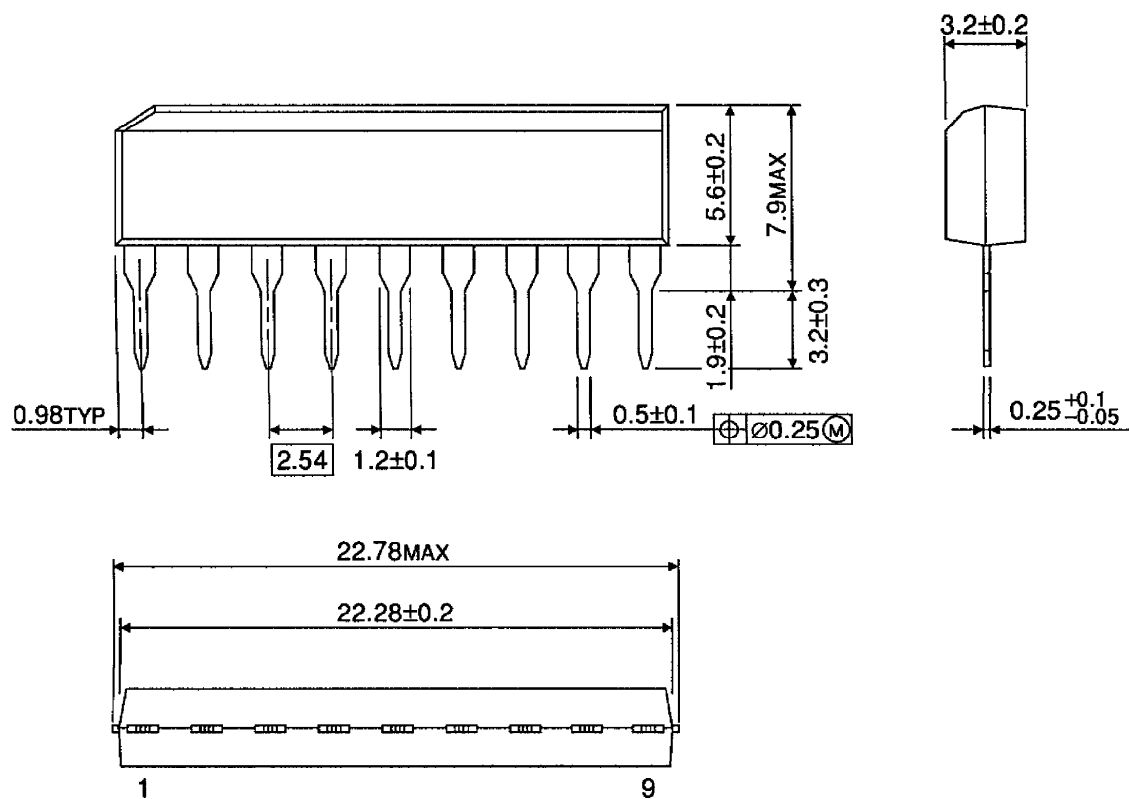
Unit : mm



Weight : 2.47 g (Typ.)

OUTLINE DRAWING
SIP9-P-2.54A

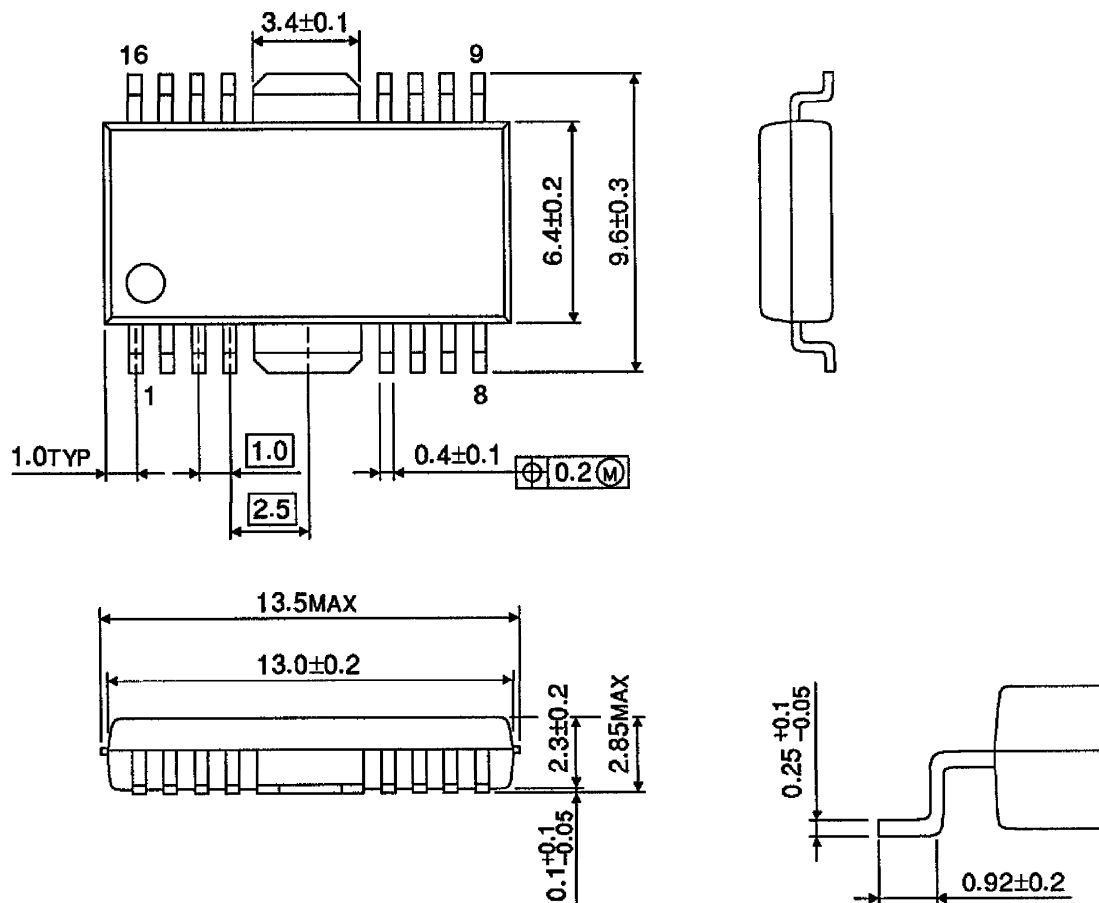
Unit : mm



Weight : 0.92 g (Typ.)

OUTLINE DRAWING
HSOP16-P-300-1.00

Unit : mm



Weight : 0.50 g (Typ.)