

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

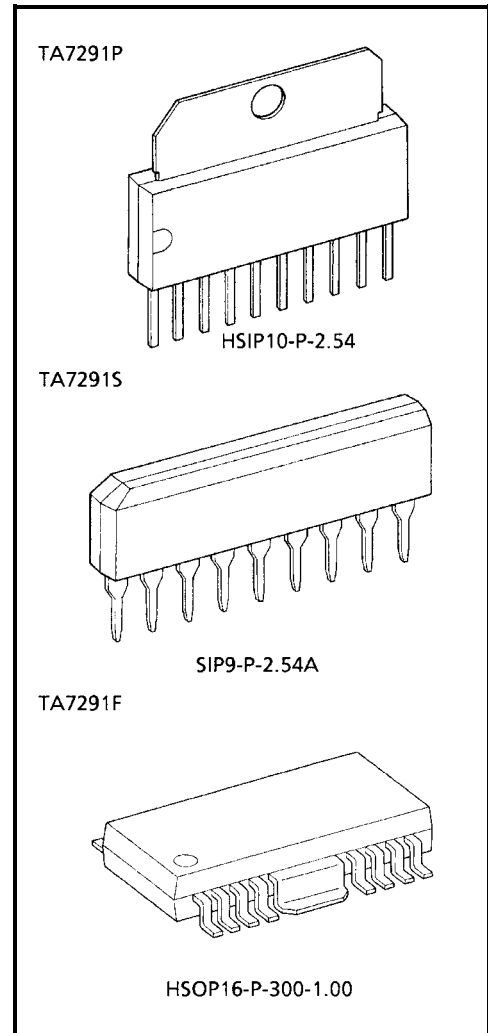
TA7291P, TA7291S, TA7291F

BRIDGE DRIVER

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

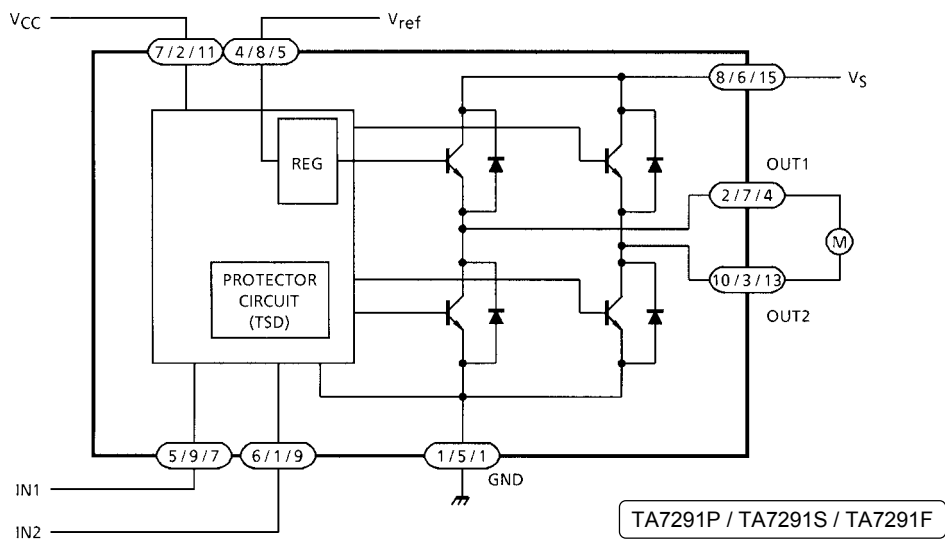
FEATURES

- 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.) = 4.5~20 V
 V_S (opr.) = 0~20 V
 V_{ref} (opr.) = 0~20 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 _{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)	A	
		S / F Type			2.0
	AVE.	P Type	I _O (AVE.)		1.2
		S / F Type			1.0
Power Dissipation	P Type	P _D	0.4	W	
	S Type		12.5 (Note 1)		
	F Type		0.95 (Note 2)		
Operating Temperature		T _{opr}	-30~75	°C	
Storage Temperature		T _{stg}	-55~150	°C	

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

V_S (opr.) = 0~20 V

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

V_{ref} ≤ V_S

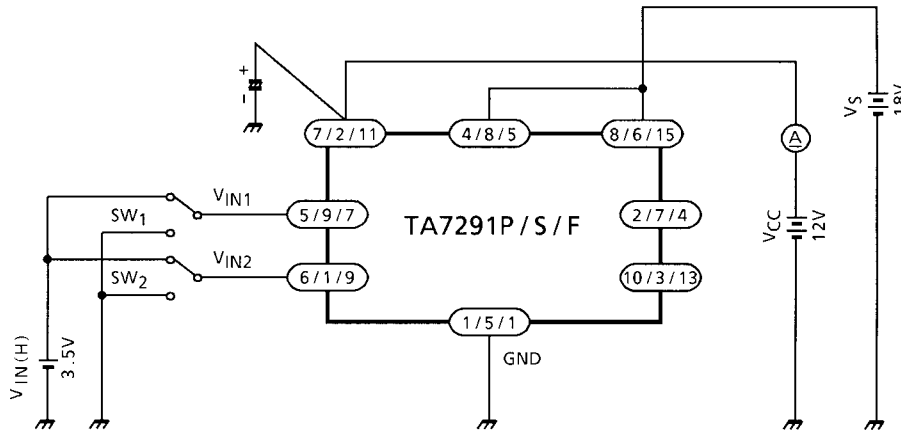
ELECTRICAL CHARACTERISTICS

(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	$V_{SAT\ U-1}'$	$V_{ref} = 10\text{ V}$ $V_{OUT} - \text{GND}$ 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_{LU}	4	$V_L = 25\text{ V}$	—	—	50	μA		
		Lower Side	I_{LL}		$V_L = 25\text{ V}$	—	—	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

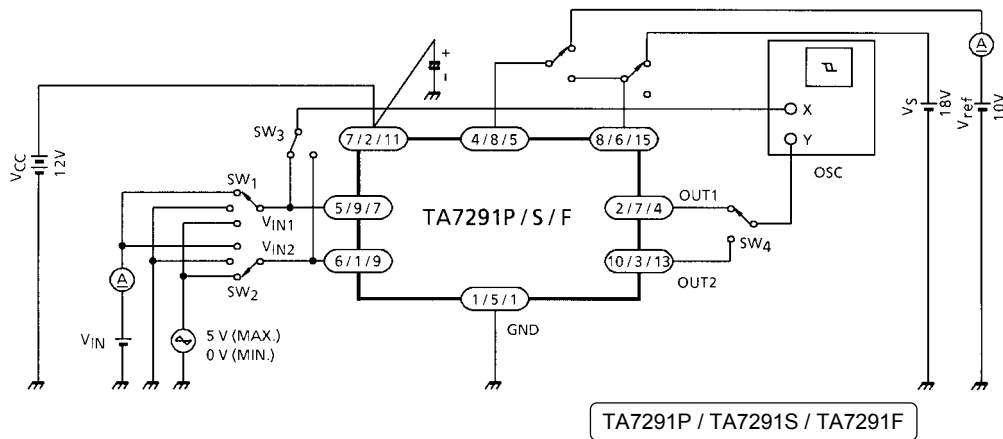
I_{CC1}, I_{CC2}, I_{CC3}



Note: HEAT FIN of TA7291F is connected to GND.

TEST CIRCUIT 2

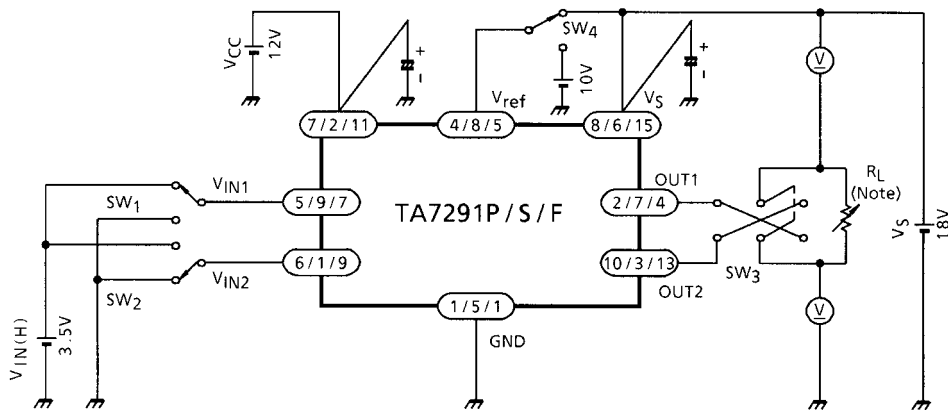
V_{IN1}, V_{IN2}, I_{IN}, ΔV_T, I_{ref}



Note: HEAT FIN of TA7291F is connected to GND.

TEST CIRCUIT 3

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

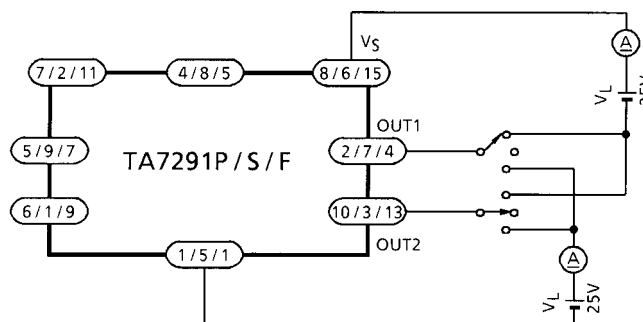


Note: I_{OUT} calibration is required to adjust specified values of test conditions by R_L .
 ($I_{OUT} = 0.2 A / 0.4 A / 0.5 A / 1.0 A$)

Note: HEAT FIN of TA7291F is connected to GND.

TEST CIRCUIT 4

$I_L U, L$

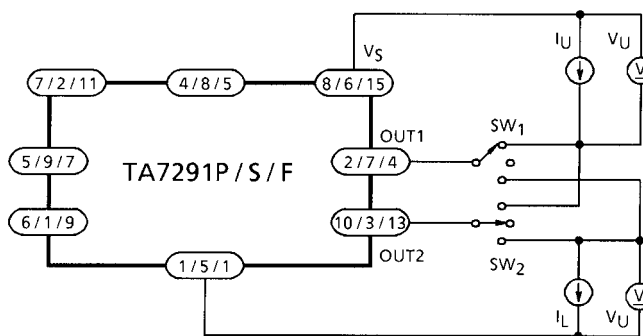


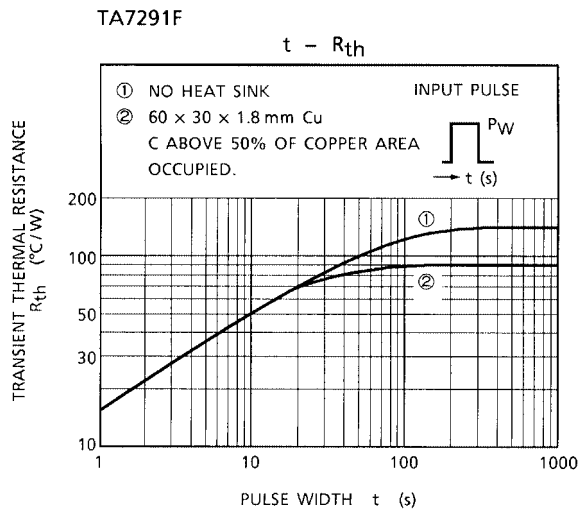
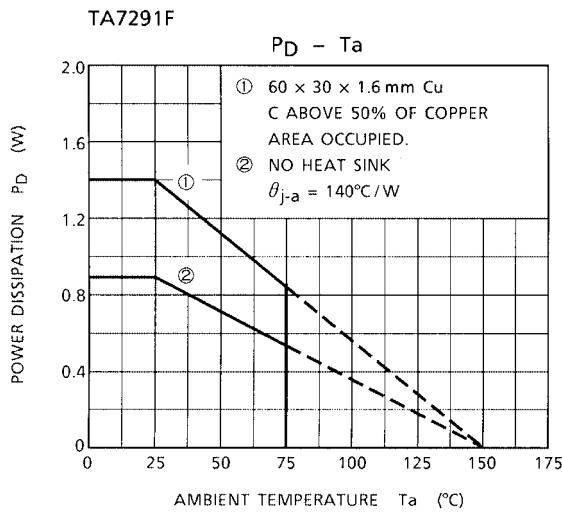
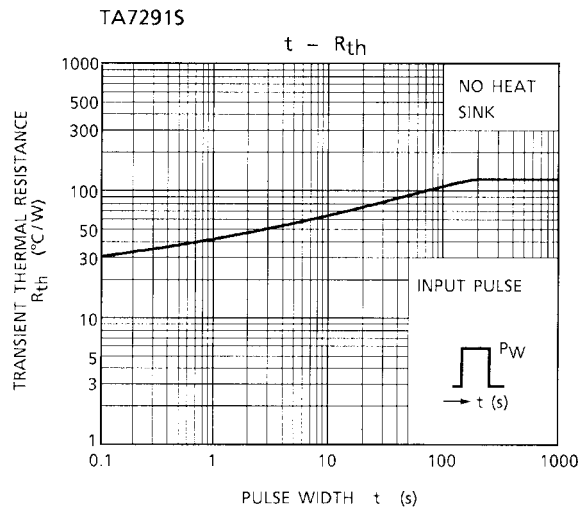
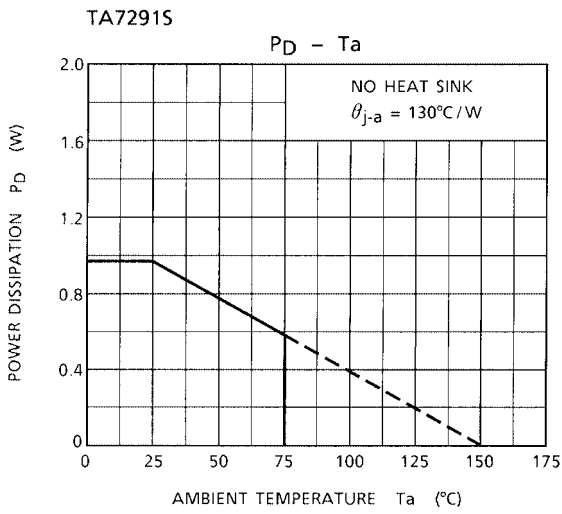
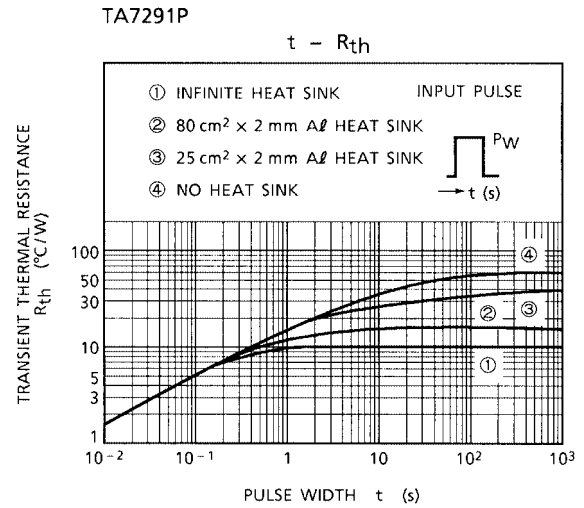
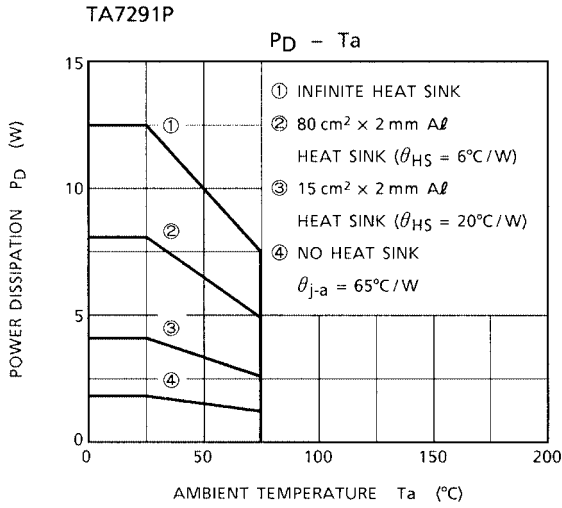
TA7291P / TA7291S / TA7291F

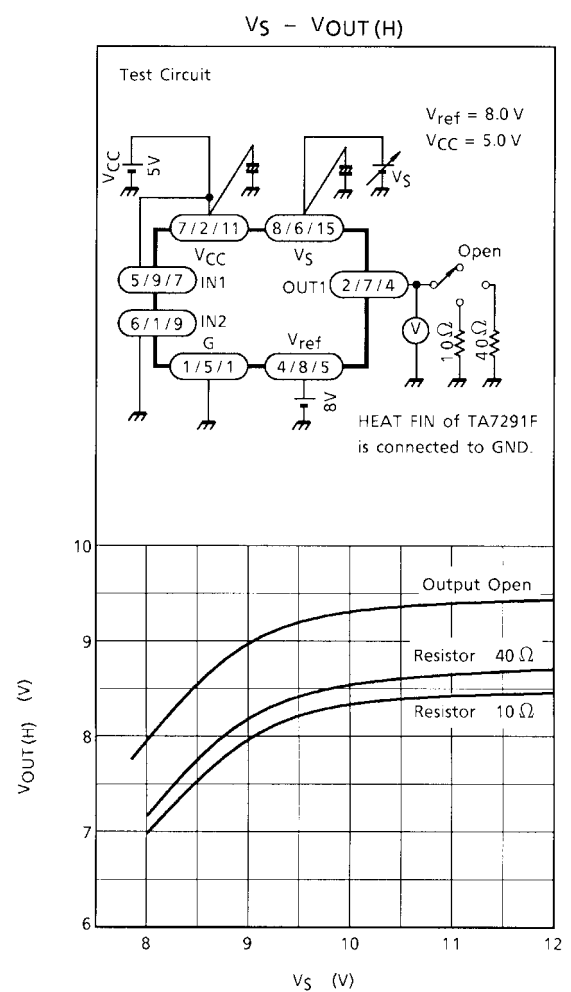
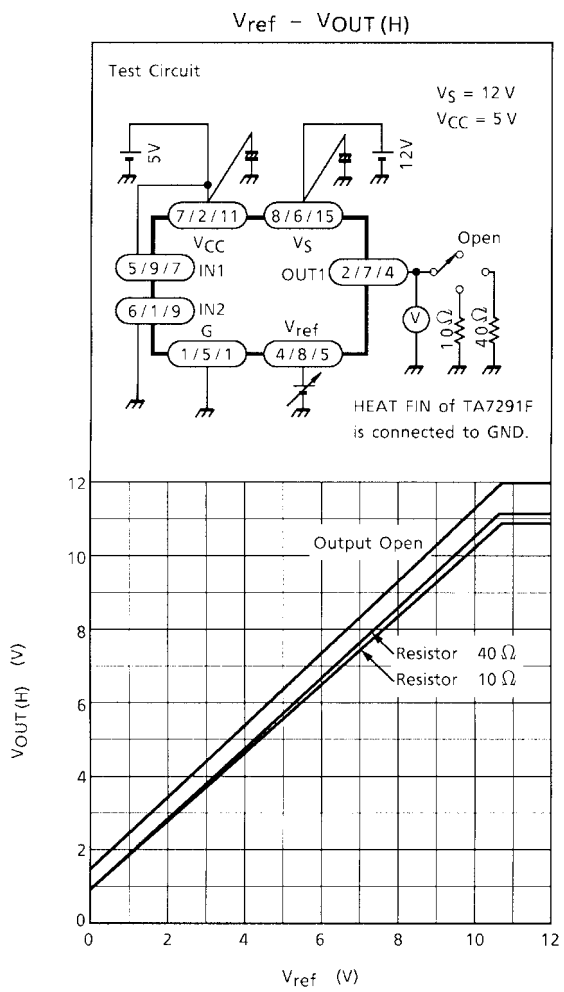
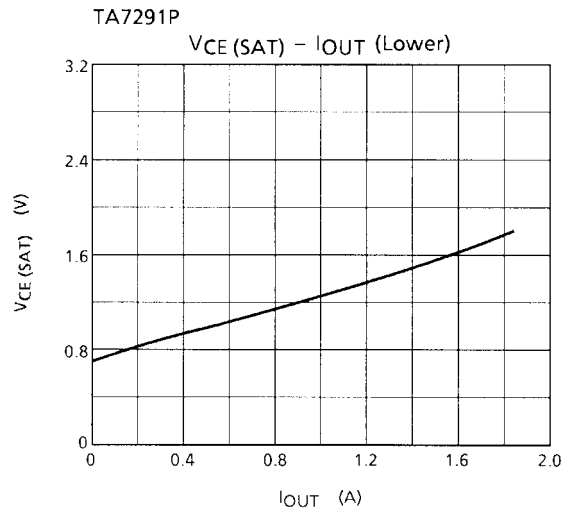
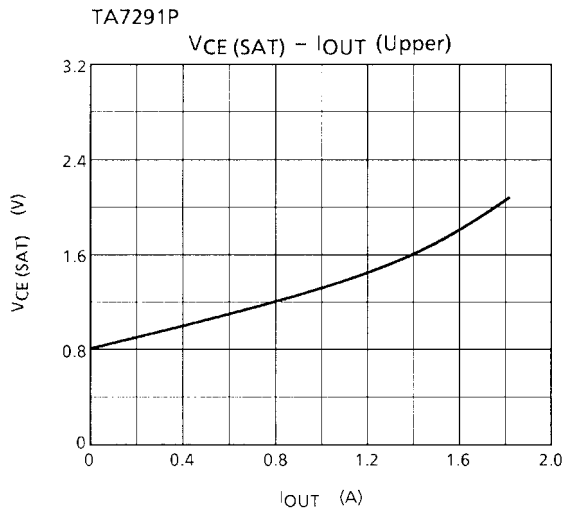
Note: HEAT FIN of TA7291F is connected to GND.

TEST CIRCUIT 5

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



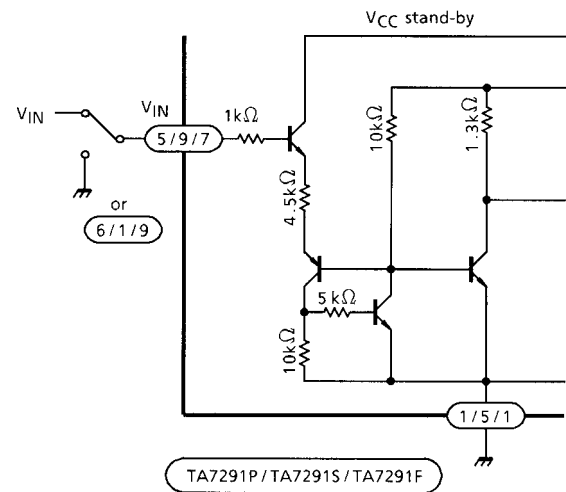




NOTES

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



Output circuit

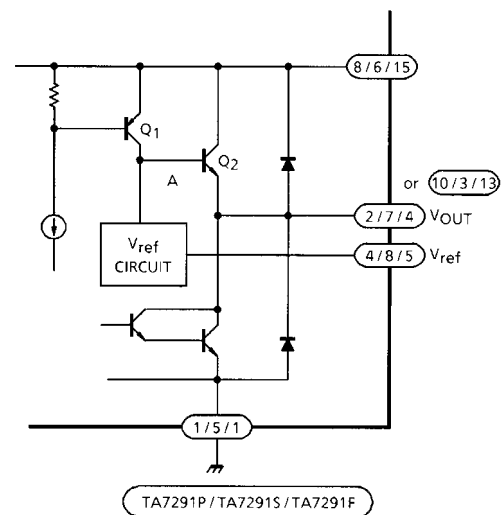
Output voltage is controlled by V_{ref} voltage.

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

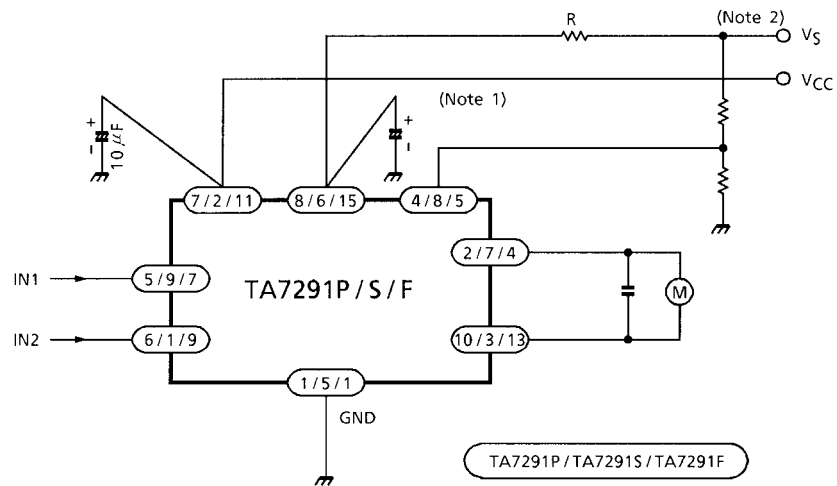
$$V_{OUT} = V_{BE} (\approx 0.7) + V_{ref}$$

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

$$V_{ref} \leq V_S$$



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.

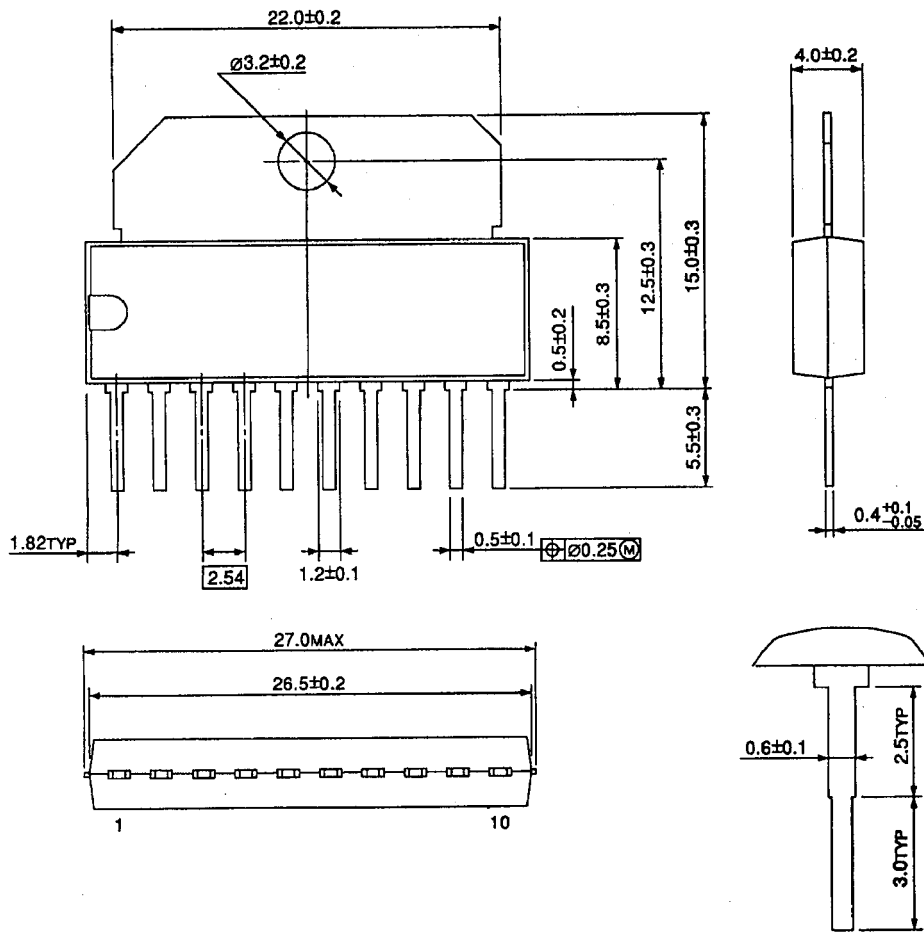
NOTES

- 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, VS, VCC and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

PACKAGE DIMENSIONS

HSIP10-P-2.54

Unit: mm

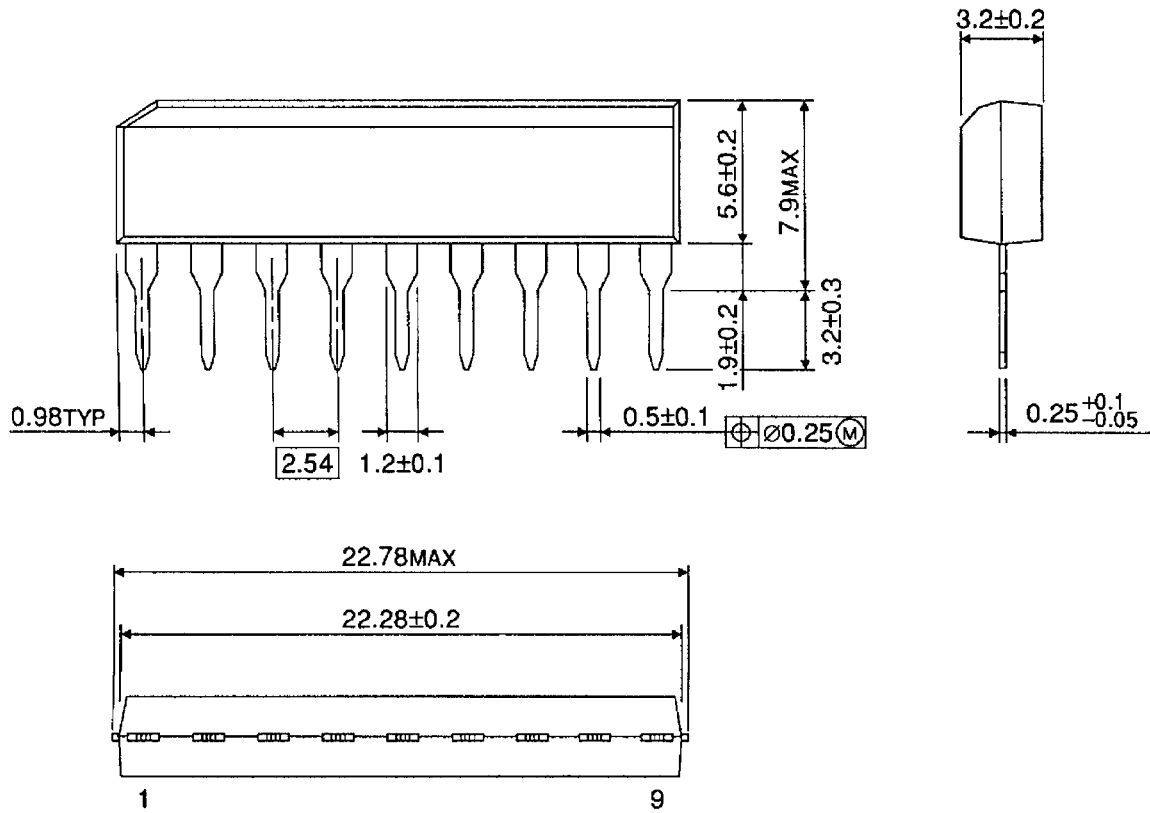


Weight: 2.47 g (Typ.)

PACKAGE DIMENSIONS

SIP9-P-2.54A

Unit: mm

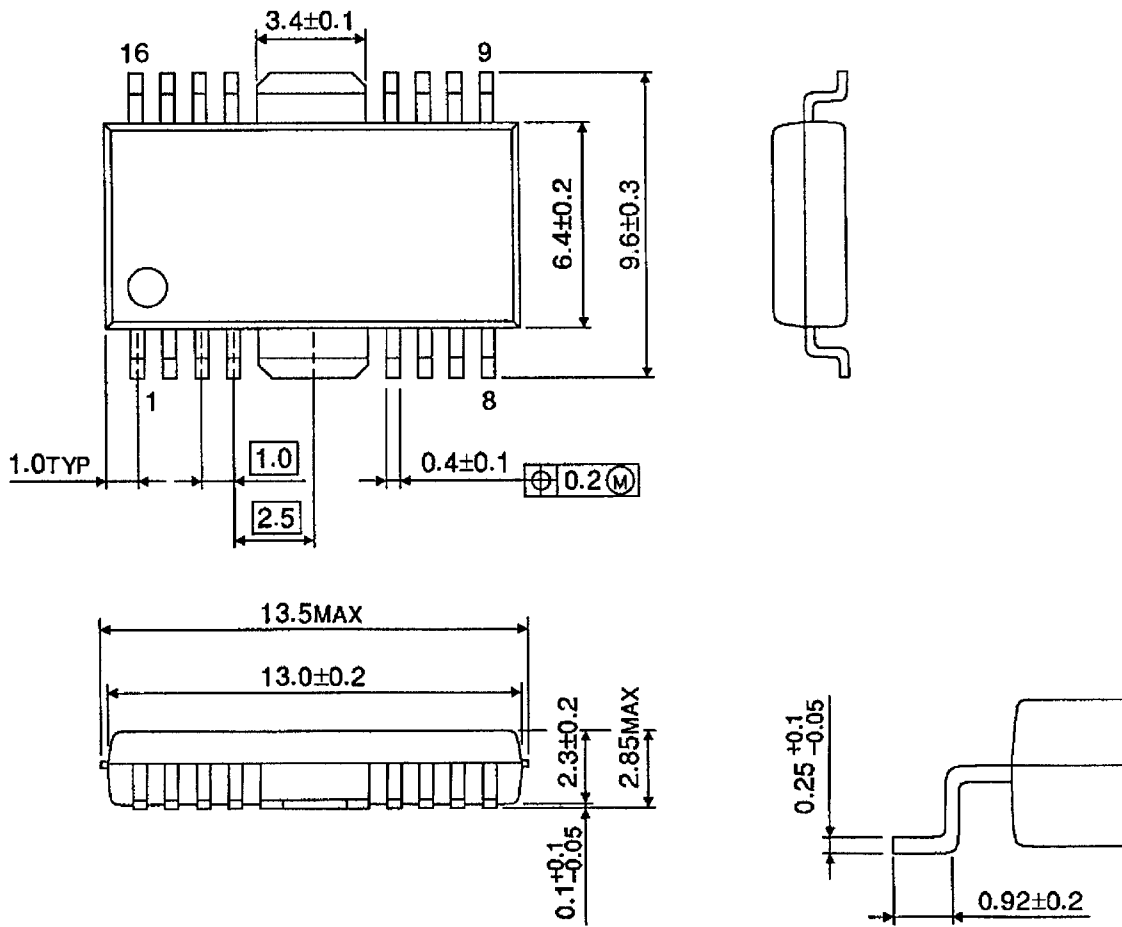


Weight: 0.92 g (Typ.)

PACKAGE DIMENSIONS

HSOP16-P-300-1.00

Unit: mm



Weight: 0.50 g (Typ.)

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000707EBA

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