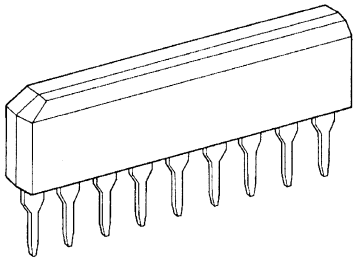
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8409S,TA8409F

BRIDGE DRIVER

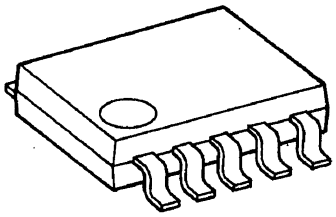
TA8409S and TA8409F are bridge driver with output voltage control.

TA8409S



SIP9-P-2.54A

TA8409F



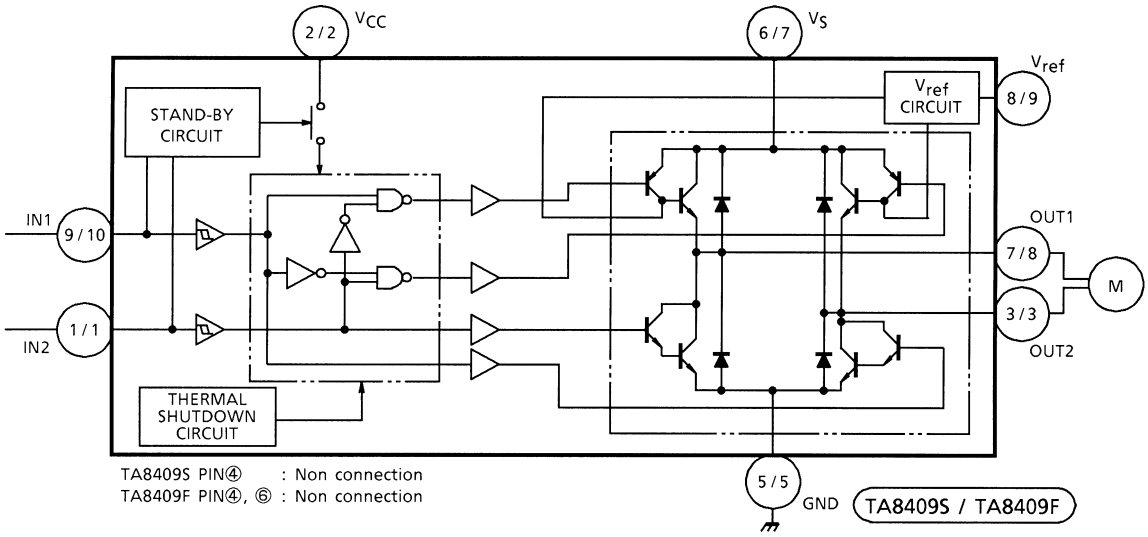
SSOP10-P-225-1.00

Weight
SIP9−P−2.54A : 0.92 g (Typ.)
SSOP10−P−225−1.00 : 0.09 g (Typ.)

FEATURES

- Modes available (CW / CCW / STOP / BRAKE)
- Output current up to 0.4 A (AVE) and 1.0 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 ($V_{ref} \leq V_S$)
- Built-in thermal shutdown
- Standby mode available (STOP MODE)
- Hysteresis for all inputs.

BLOCK DIAGRAM



980910EBA2

PIN FUNCTION

TA8409S

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	IN2	Input terminal
2	V_{CC}	Supply voltage terminal for logic
3	OUT2	Output terminal
4	NC	Non connection
5	GND	GND terminal
6	V_S	Supply voltage terminal for motor driver
7	OUT1	Output terminal
8	V_{ref}	Reference voltage terminal for control circuit
9	IN1	Input terminal

TA8409F

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	IN2	Input terminal
2	V_{CC}	Supply voltage terminal for logic
3	OUT2	Output terminal
4	NC	Non connection
5	GND	GND terminal
6	NC	Non connection
7	V_S	Supply voltage terminal for motor driver
8	OUT1	Output terminal
9	V_{ref}	Reference voltage terminal for control circuit.
10	IN1	Input terminal

FUNCTION

INPUT		OUTPUT		MODE
IN 1	IN 2	OUT1	OUT2	MB
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	$I_{O\ (PEAK)}$	1.0	A
	AVE	$I_{O\ (AVE.)}$	0.4	
Power Dissipation	TA8409F	P_D	0.735 (Note)	W
	TA8409S		0.95	
Operating Temperature		T_{opr}	−30~75	°C
Storage Temperature		T_{stg}	−55~150	°C

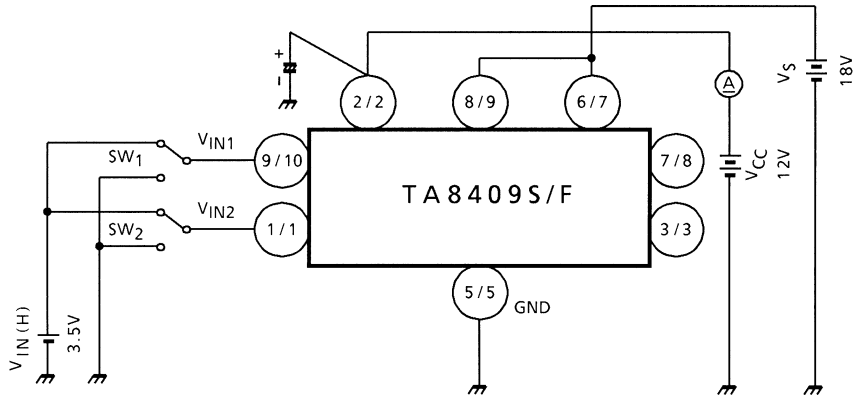
Note: This rating is obtained by mounting on 50 × 50 × 1.6 mm PCB that occupied above 30% of copper area.

ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{CC} = 12 V, V_S = 18 V)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Supply Current		I_{CC1}	1	Output OFF, CW / CCW mode	—	10.0	15.0	mA
		I_{CC2}	1	Output OFF, STOP mode	—	0	50	μA
		I_{CC3}	1	Output OFF, BREAK mode	—	6.5	10.0	mA
Input Operating Voltage	1 (High)	$V_{IN\ 1}$	2	T_j = 25°C IN1, 2	3.5	—	5.5	V
	2 (Low)	$V_{IN\ 2}$	2	T_j = 25°C IN1, 2	GND	—	0.8	
Input Current		I_{IN}	2	Sink mode, V_{IN} = 3.5 V	—	3	10	μA
Input Hysteresis Voltage		ΔV_T	2	—	—	0.7	—	V
Saturation Voltage	Upper Side	$V_{SAT\ U-1}$	3	V_{ref} = V_S, V_{OUT}−V_S measure I_O = 0.2 A, CW / CCW mode	—	0.9	1.2	V
	Lower Side	$V_{SAT\ L-1}$	3	V_{ref} = V_S, V_{OUT}−GND measure I_O = 0.2 A, CW / CCW mode	—	0.8	1.2	
	Upper Side	$V_{SAT\ U-2}$	3	V_{ref} = V_S, V_{OUT}−V_S measure I_O = 0.4 A, CW / CCW mode	—	1.0	1.35	
	Lower Side	$V_{SAT\ L-2}$	3	V_{ref} = V_S, V_{OUT}−GND measure I_O = 0.4 A, CW / CCW mode	—	0.9	1.35	
Output Voltage		$V_{SAT\ U-1'}$	3	V_{ref} = 10 V, V_{OUT}−GND measure I_O = 0.2 A	10.4	11.2	12.2	V
		$V_{SAT\ U-2'}$	3	V_{ref} = 10 V, V_{OUT}−GND measure I_O = 0.4 A	—	10.9	—	
Output Transistor Leakage Current	Upper Side	I_{LU}	4	V_L = 25 V	—	—	50	μA
	Lower Side	I_{LL}	4	V_L = 25 V	—	—	50	
Diode Forward Voltage	Upper Side	$V_{F\ U-1}$	5	I_F = 0.4 A	—	1.5	—	V
	Lower Side	$V_{F\ L-1}$	5	I_F = 0.4 A	—	0.9	—	
Reference Current		I_{ref}	2	V_{ref} = 10 V, source mode	—	20	40	μA

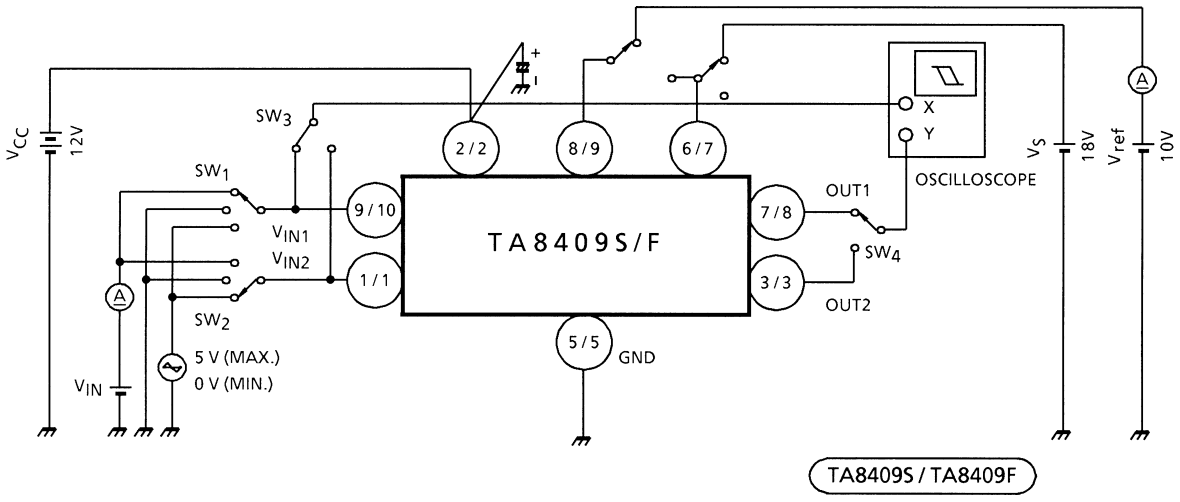
TEST CIRCUIT 1

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



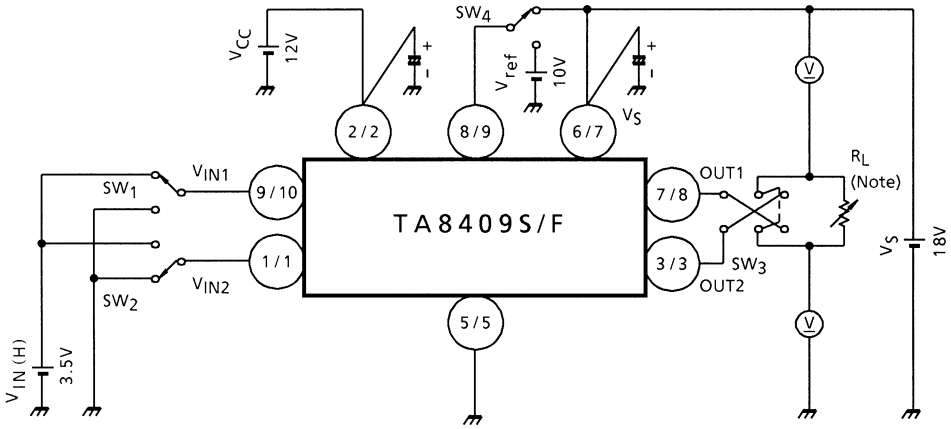
TEST CIRCUIT 2

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



TEST CIRCUIT 3

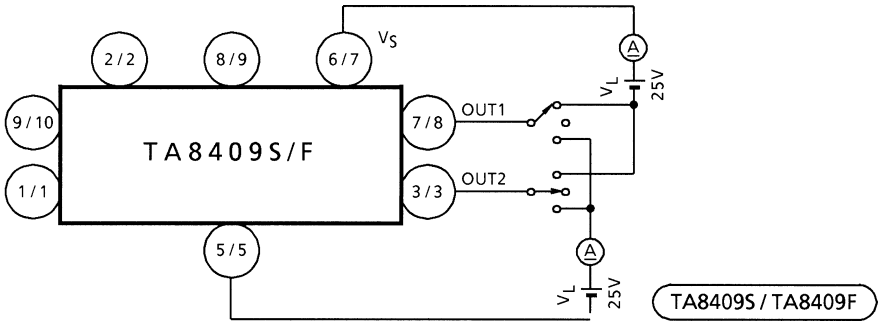
$V_{SAT\ U-1,\ 2}$, $V_{SAT\ L-1,\ 2}$, $V_{SAT\ U-1',\ 2'}$



Note: Calibrate I_{OUT} to 0.2 / 0.4 A by R_L.

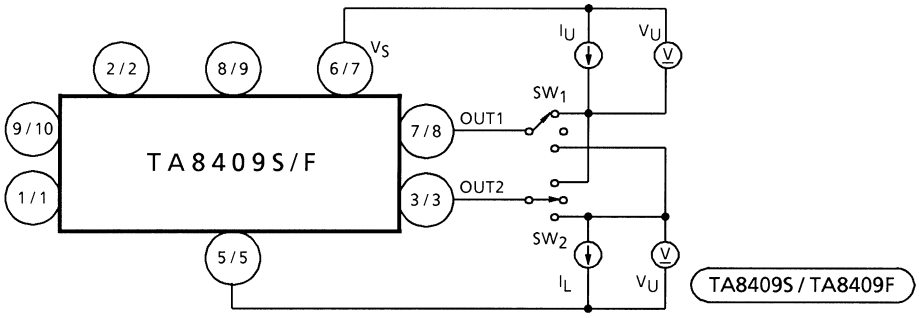
TEST CIRCUIT 4

$I_{L\ U,\ L}$

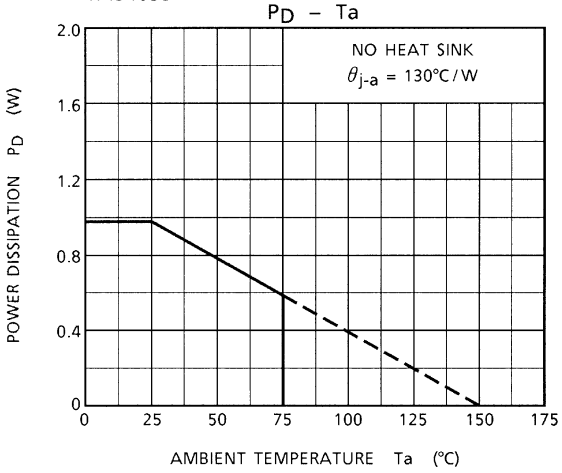


TEST CIRCUIT 5

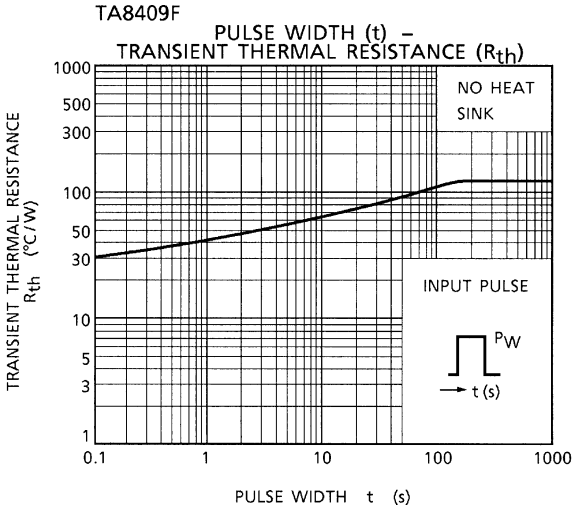
$V_{F\ U-1,\ 2}$, $V_{F\ L-1,\ 2}$



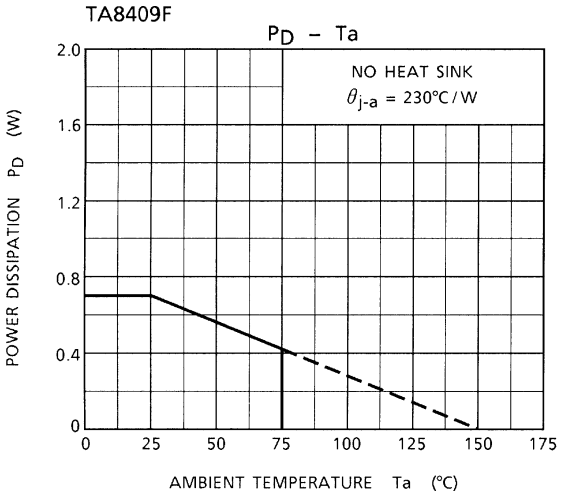
TA8409S



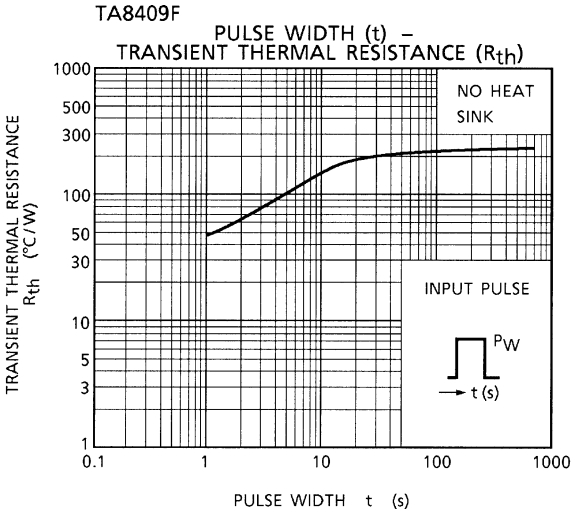
TA8409F



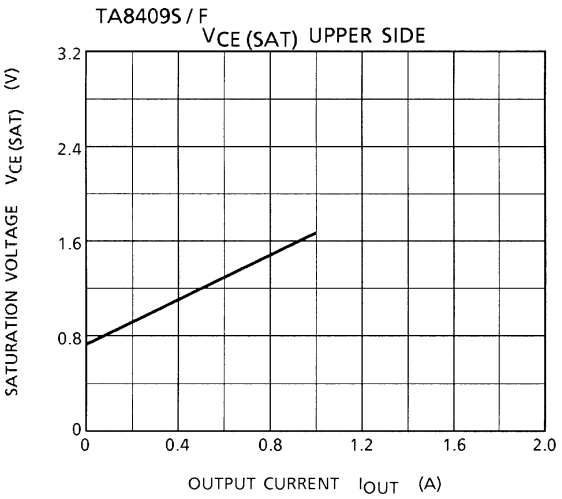
TA8409F



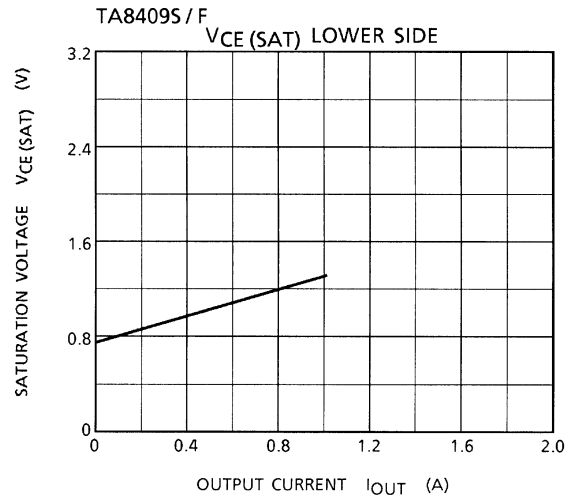
TA8409F



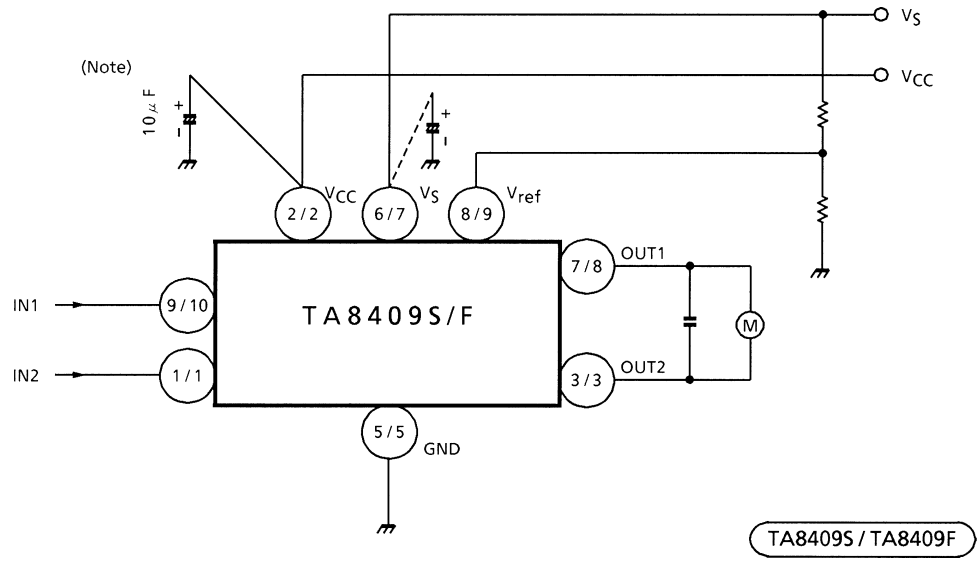
TA8409S / F



TA8409S / F



APPLICATION CIRCUIT



Note 1: Connect if required.

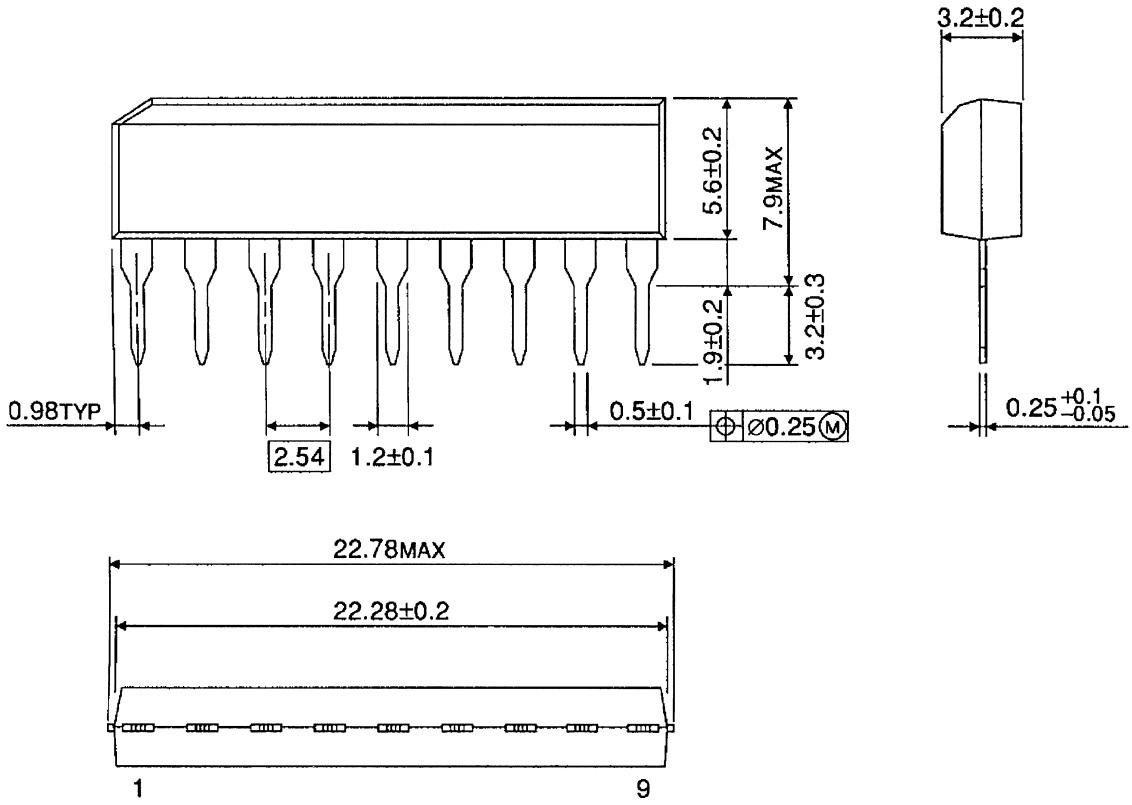
Note 2: Utmost care is necessary in the design of the output line, V_S and GND line since IC may be destroyed due to short−circuit between outputs, air contamination fault, or fault by improper grounding.

Note 3: Be careful when switching the input because rush current may occur.
When switching, stop mode should be entered or current limitation resister R should be inserted.

Note 4: The IC functions cannot be guaranteed when turning power on of off.
Before using the IC for application, check that there are no problems.

OUTLINE DRAWING

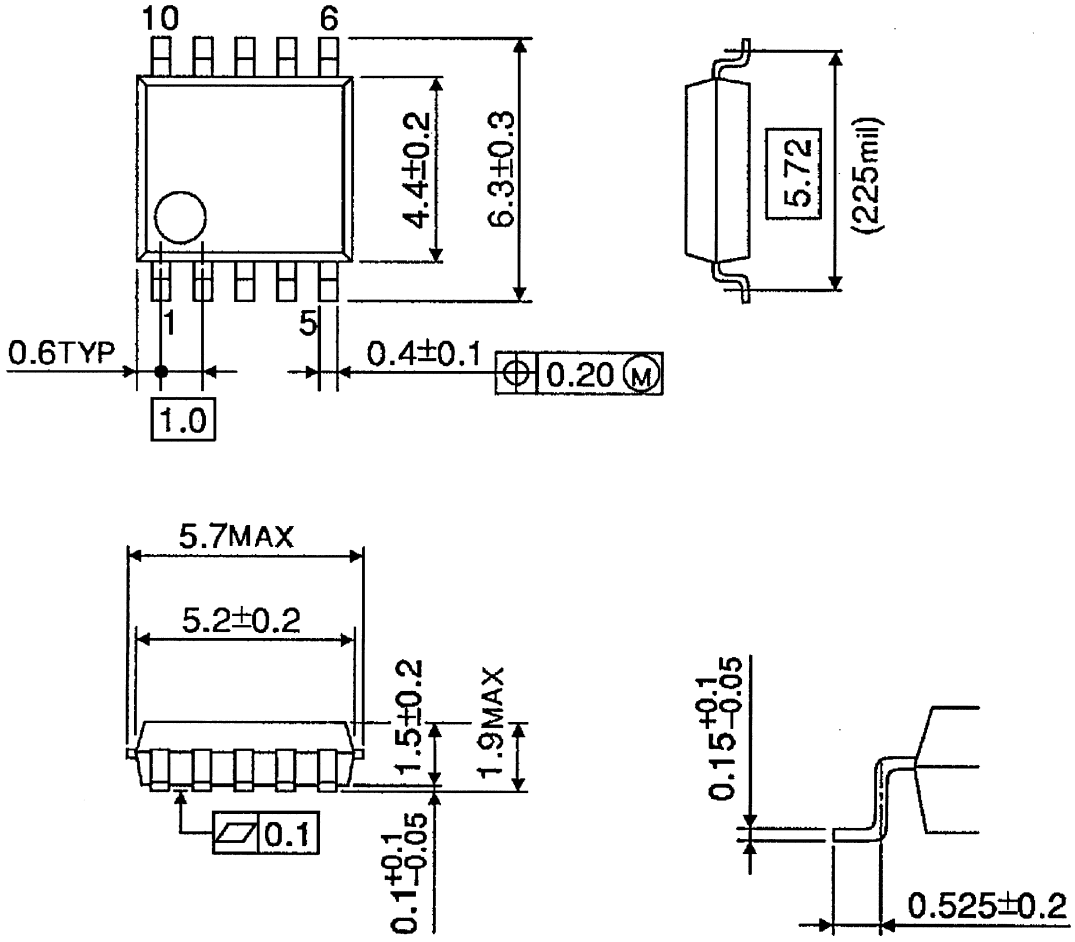
SIP9-P-2.54A Unit: mm



Weight: 0.92 g (Typ.)

OUTLINE DRAWING

SSOP10−P−225−1.00 Unit: mm



Weight: 0.09 g (Typ.)