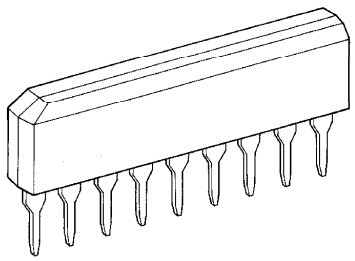
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8409S, TA8409F

BRIDGE DRIVER

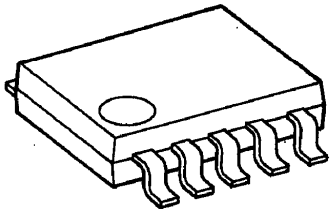
TA8409S and TA8409F are bridge driver with output voltage control.

TA8409S



SIP9-P-2.54A

TA8409F



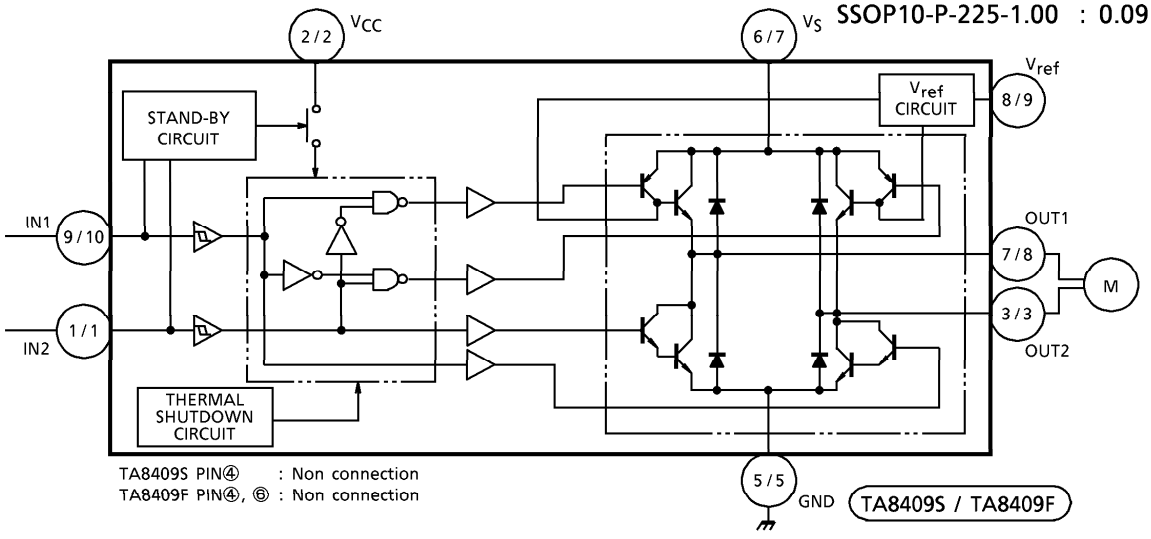
SSOP10-P-225-1.00

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 ($V_{ref} \leqq V_S$)
- Built-in thermal shutdown
- Standby mode available (STOP MODE)
- Hysteresis for all inputs

BLOCK DIAGRAM



TA8409S PIN④ : Non connection
TA8409F PIN④, ⑥ : Non connection

TA8409S / TA8409F

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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
IN1	IN2	OUT1	OUT2	MOTOR
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

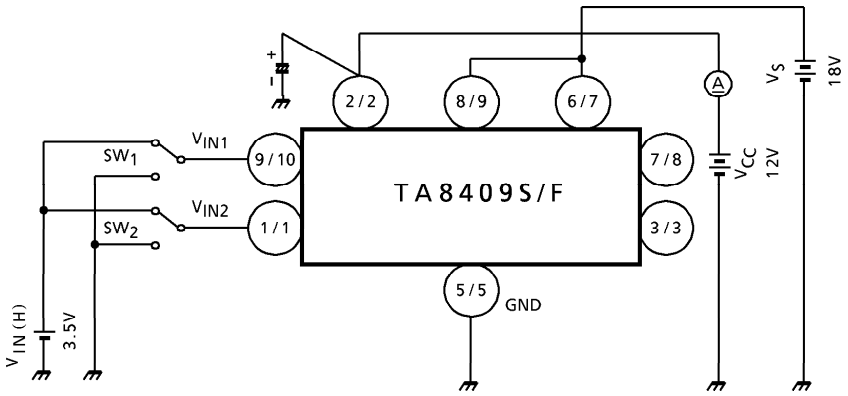
(Note) This rating is obtained by mounting on 50 × 50 × 1.6 mm PCB that occupied above 30% of copper area.

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_{IN1}	2	T_j = 25°C IN1, 2	3.5	—	5.5	V
	1 (Low)	V_{IN2}	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

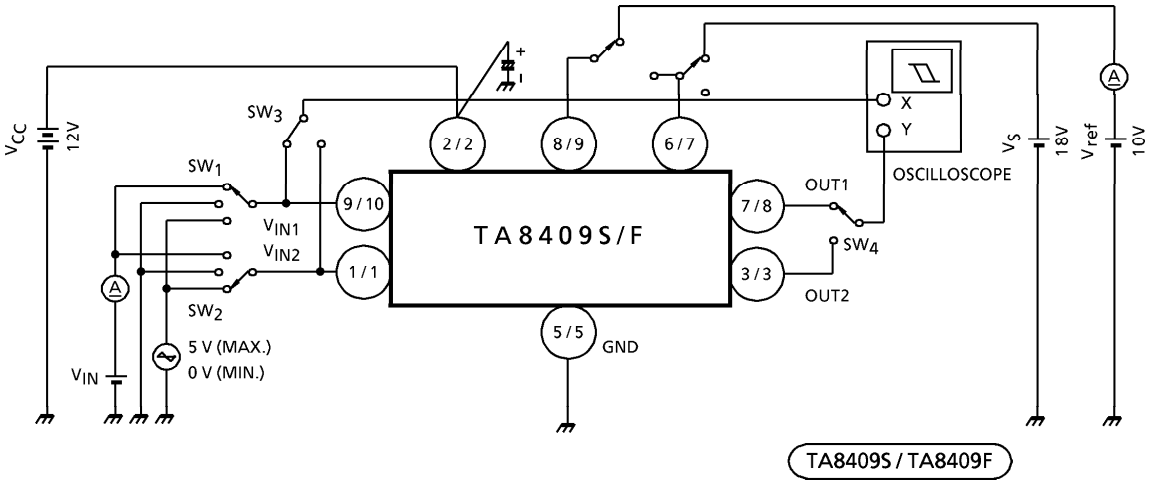
TEST CIRCUIT 1

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



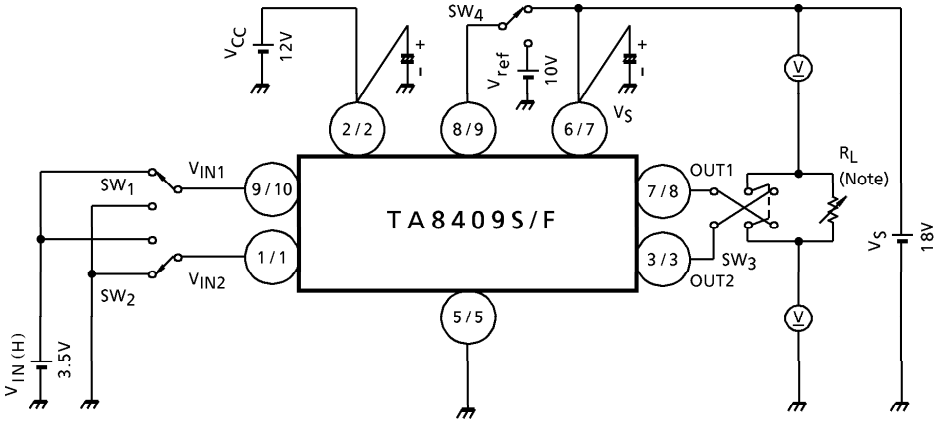
TEST CIRCUIT 2

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



TEST CIRCUIT 3

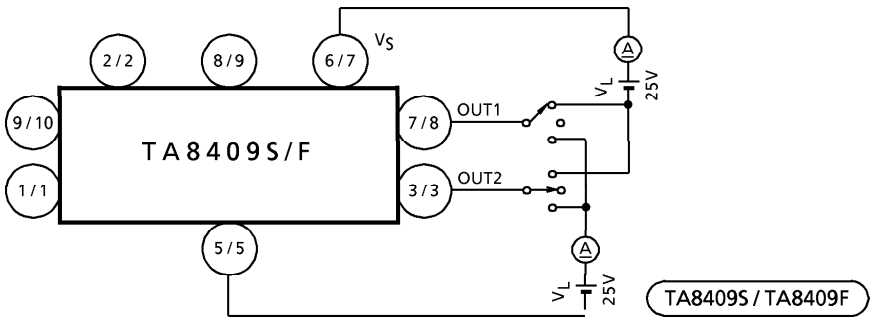
$V_{SAT\ U\text{-}1,\ 2}$, $V_{SAT\ L\text{-}1,\ 2}$, $V_{SAT\ U\text{-}1',\ 2'}$



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

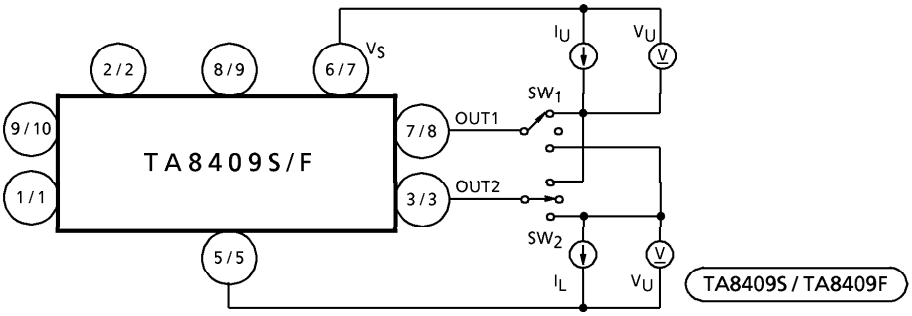
TEST CIRCUIT 4

$I_{L\ U,\ L}$



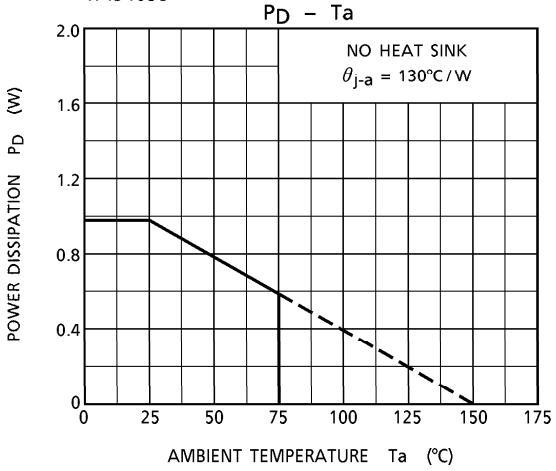
TEST CIRCUIT 5

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



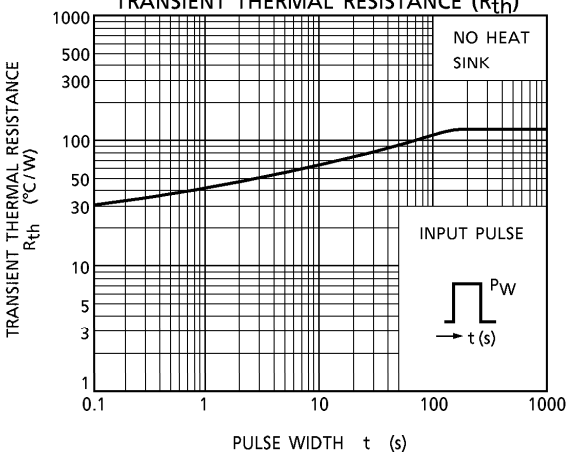
TA8409S

P_D – Ta



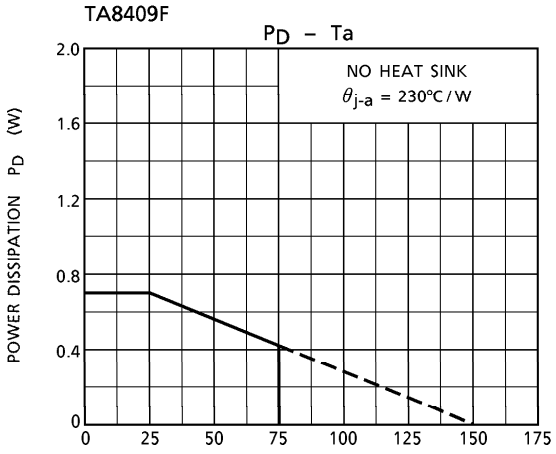
TA8409F

PULSE WIDTH (t) – TRANSIENT THERMAL RESISTANCE (R_{th})



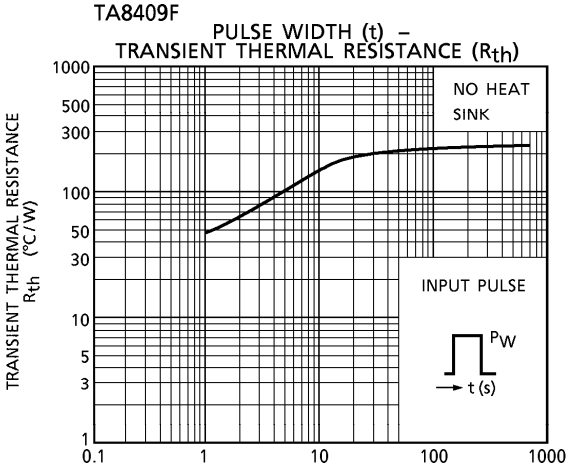
TA8409F

P_D – Ta



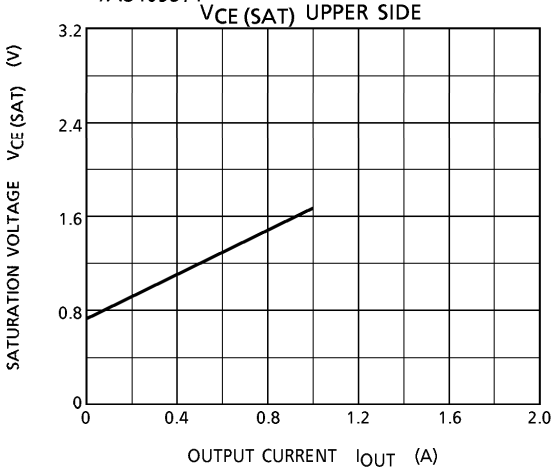
TA8409F

PULSE WIDTH (t) – TRANSIENT THERMAL RESISTANCE (R_{th})



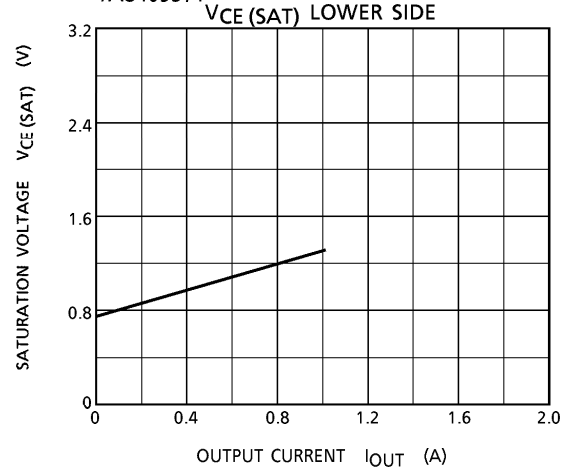
TA8409S / F

$V_{CE\ (SAT)}$ UPPER SIDE

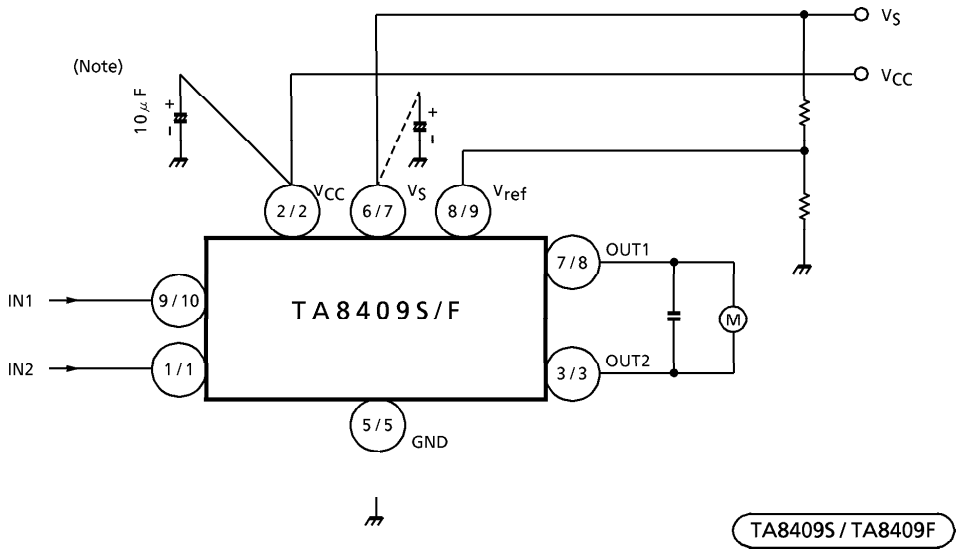


TA8409S / F

$V_{CE\ (SAT)}$ LOWER SIDE



APPLICATION CIRCUIT

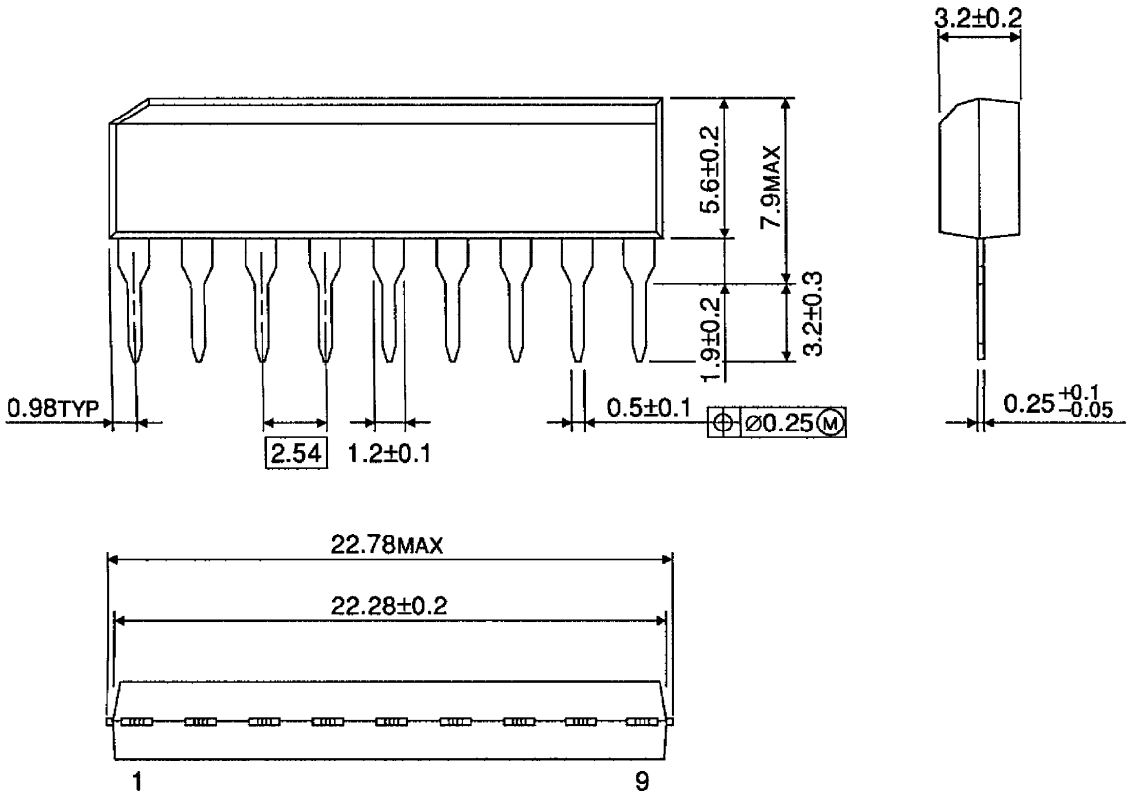


(Note 1) Connect if required.
(Note 2) Utmost care is necessary in the design of the output line, V_S and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.
(Note 3) Be careful when switching the input because rush current 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

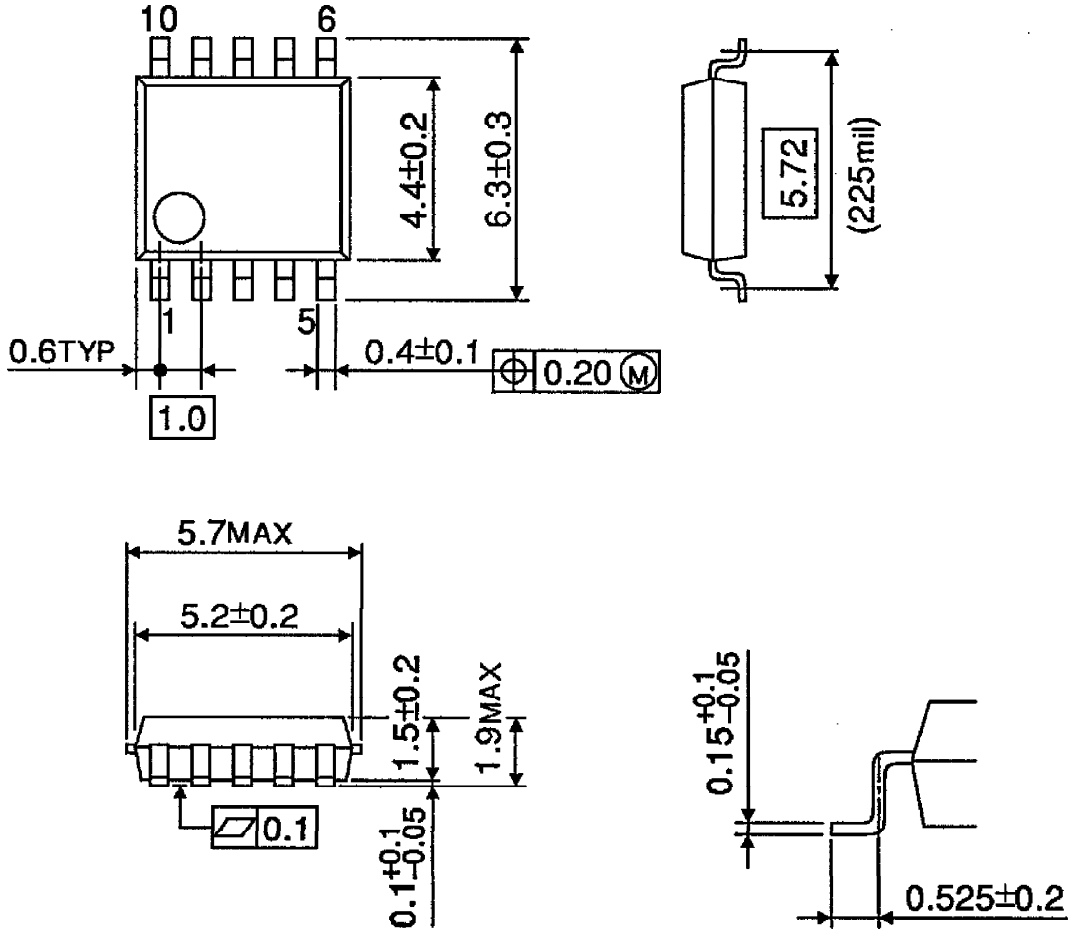
Unit : mm



Weight : 0.92 g (Typ.)

OUTLINE DRAWING

SSOP10-P-225-1.00 Unit : mm



Weight : 0.09 g (Typ.)