

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

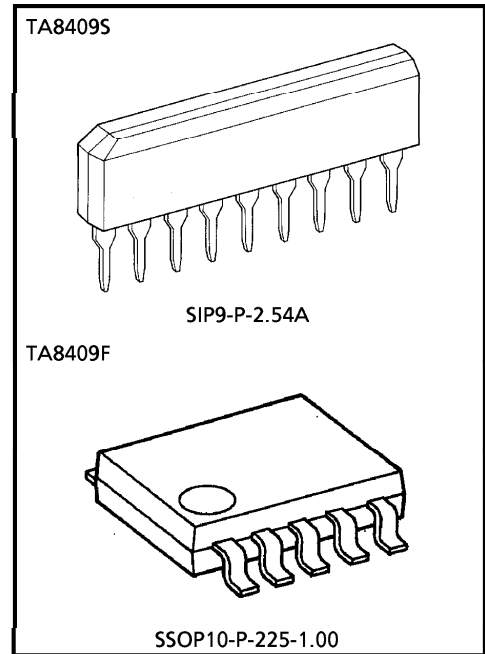
TA8409S, TA8409F

BRIDGE DRIVER

TA8409S and TA8409F are bridge driver with output voltage control.

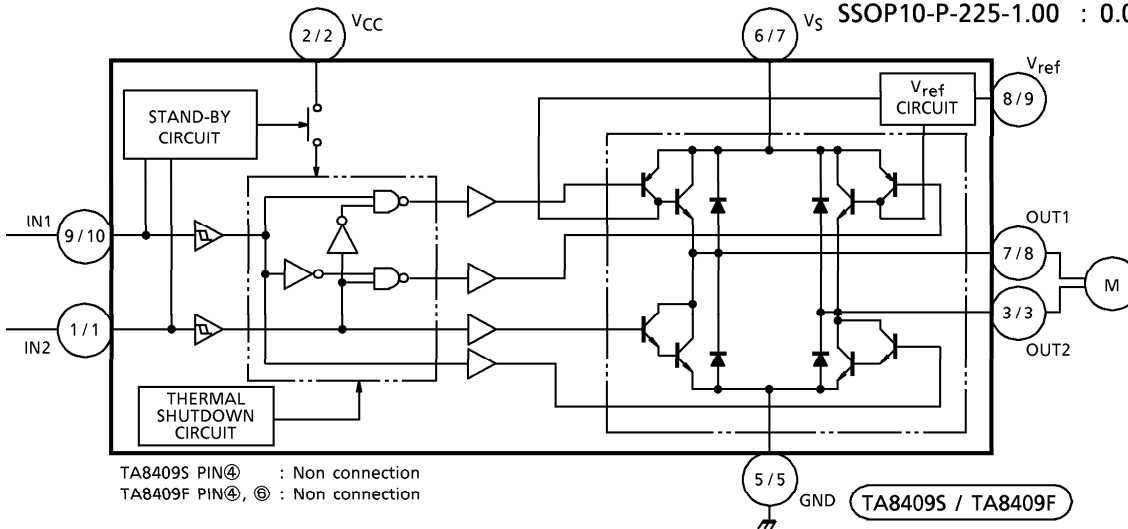
FEATURES

- Modes available (CW/CCW/STOP/BRAKE)
- Output current up to 0.4 A (AVE) and 1.0 A (PEAK)
- Wide range of operating voltage
 $V_{CC} \text{ (opr.)} = 4.5 \sim 20 \text{ V}$
 $V_S \text{ (opr.)} = 0 \sim 20 \text{ V}$
 $V_{ref} \text{ (opr.)} = 0 \sim 20 \text{ V} \text{ (} V_{ref} \leq V_S \text{)}$
- Built-in thermal shutdown
- Standby mode available (STOP MODE)
- Hysteresis for all inputs



BLOCK DIAGRAM

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



980910EBA2

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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)

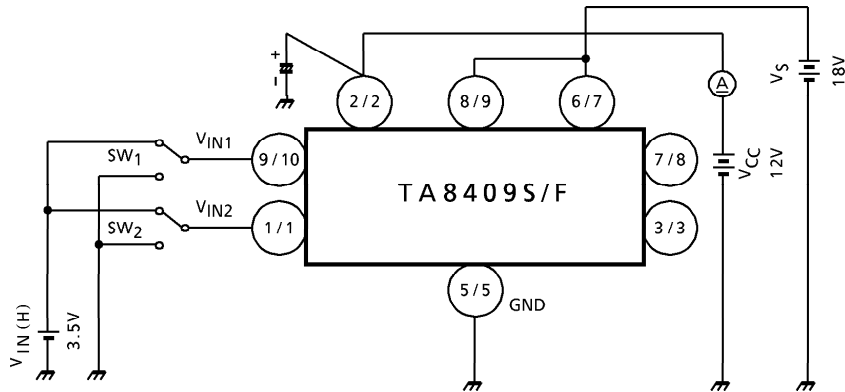
| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|-----------------------|------------------|-----------------------|--------------|
| Supply Voltage | V _{CC} | 25 | V |
| Motor Drive Voltage | V _S | 25 | V |
| Reference Voltage | V _{ref} | 25 | V |
| Output Current | PEAK | I _O (PEAK) | 1.0 |
| | AVE | I _O (AVE.) | 0.4 |
| Power Dissipation | TA8409F | P _D | 0.735 (Note) |
| | 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.

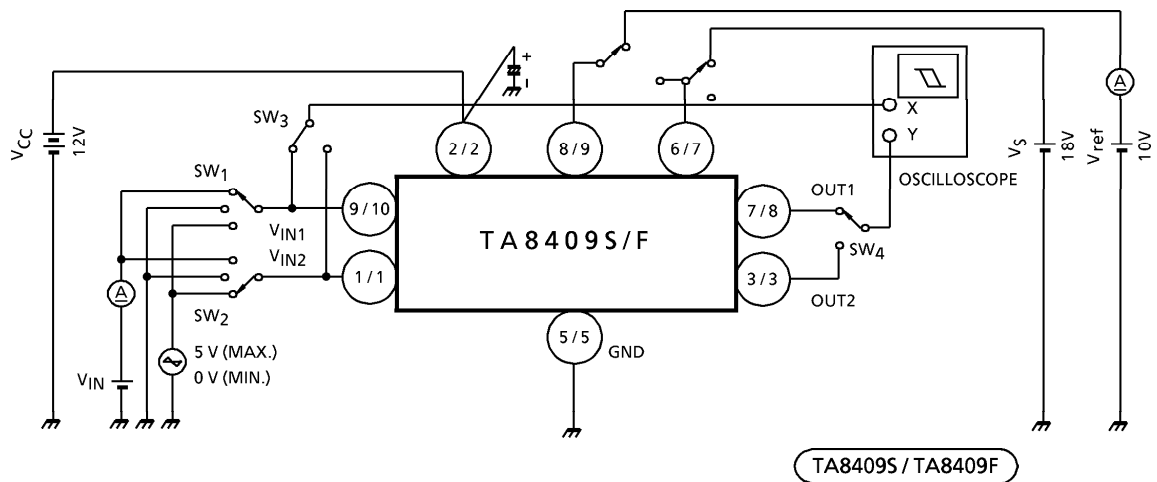
ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{CC} = 12 V, V_S = 18 V)

| 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}



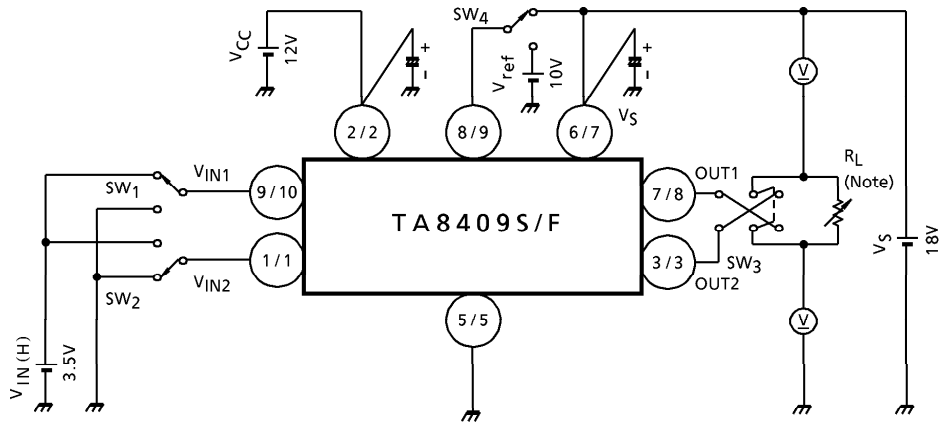
TEST CIRCUIT 2
 V_{IN1} , V_{IN2} , I_{IN} , ΔV_T , I_{ref}



TA8409S / TA8409F

TEST CIRCUIT 3

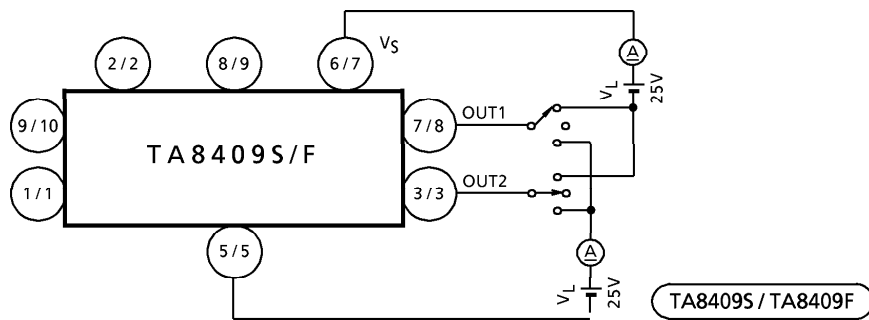
V_{SAT} U-1, 2, V_{SAT} L-1, 2, V_{SAT} U-1', 2'



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

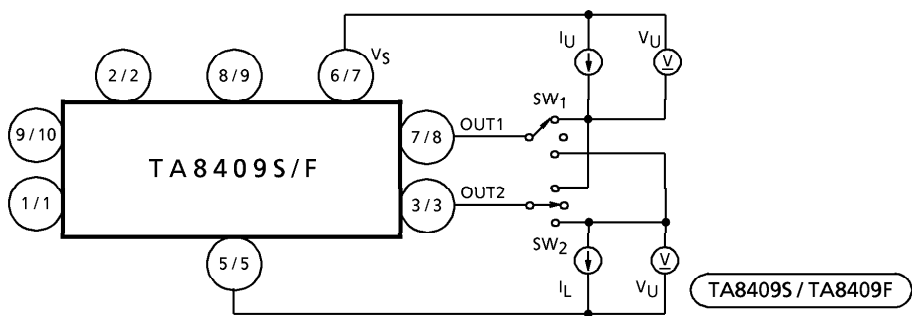
TEST CIRCUIT 4

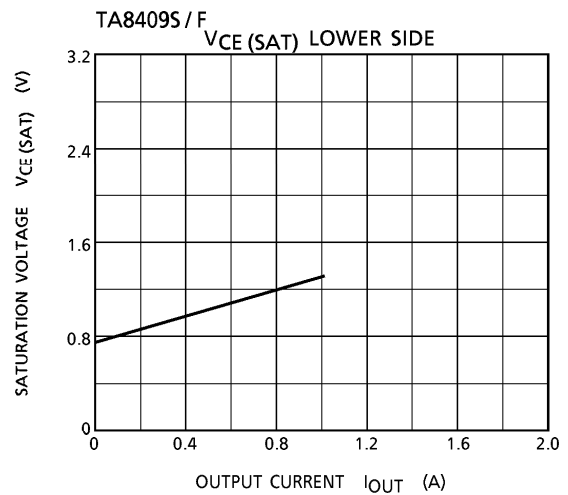
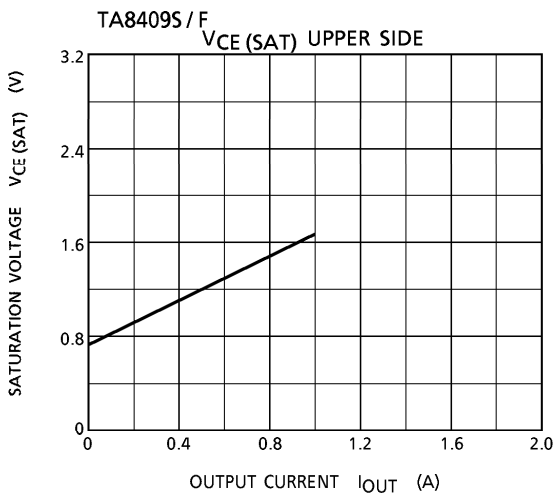
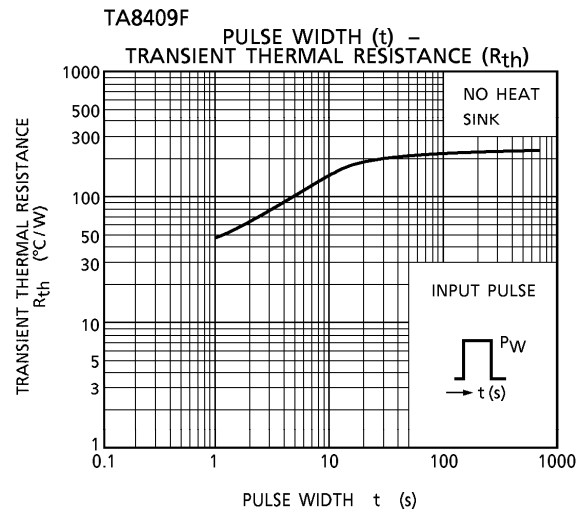
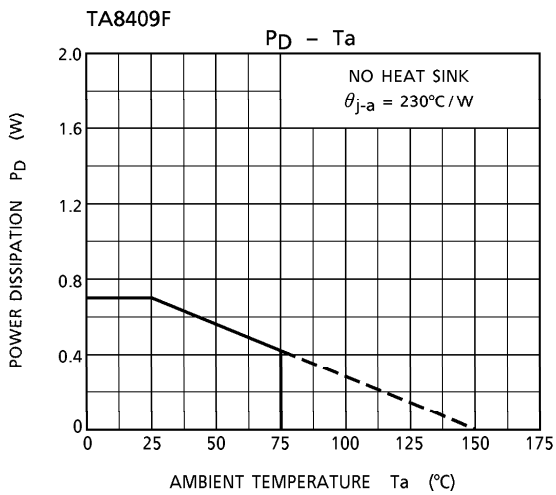
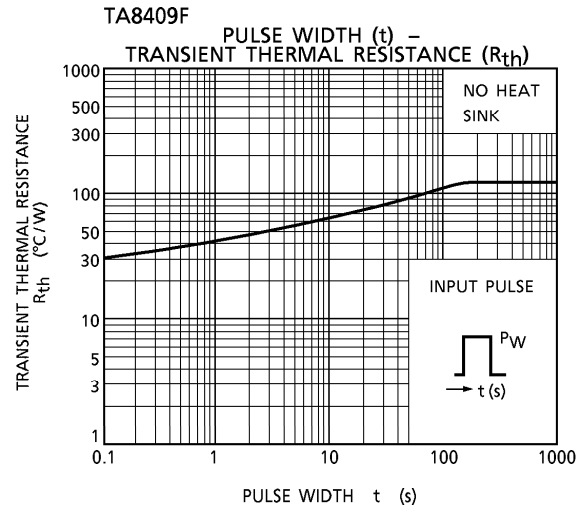
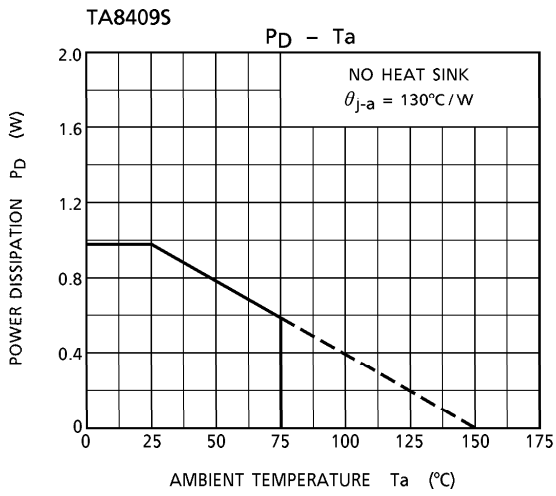
I_L U, L



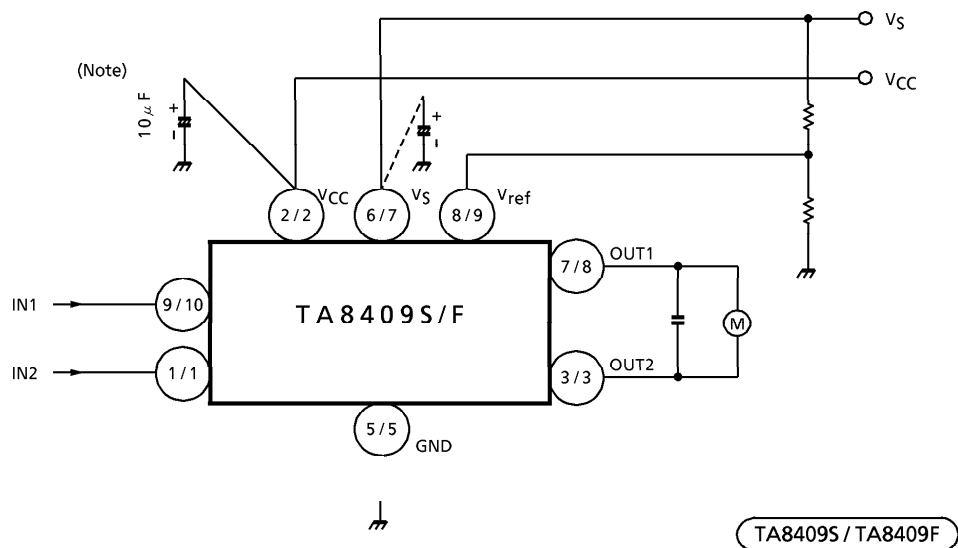
TEST CIRCUIT 5

V_F U-1, 2, V_F L-1, 2





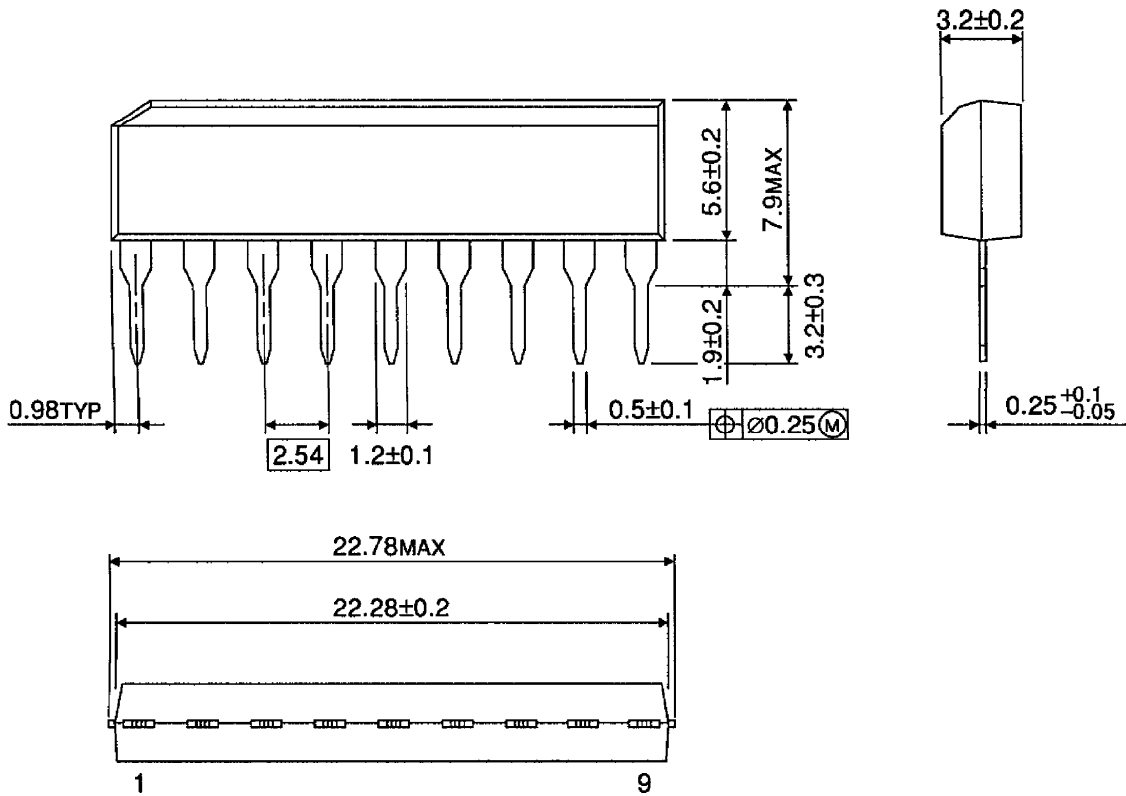
APPLICATION CIRCUIT



- (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 resistor R should be inserted.
- (Note 4) The IC functions cannot be guaranteed when turning power on or off. Before using the IC for application, check that there are no problems.

OUTLINE DRAWING
SIP9-P-2.54A

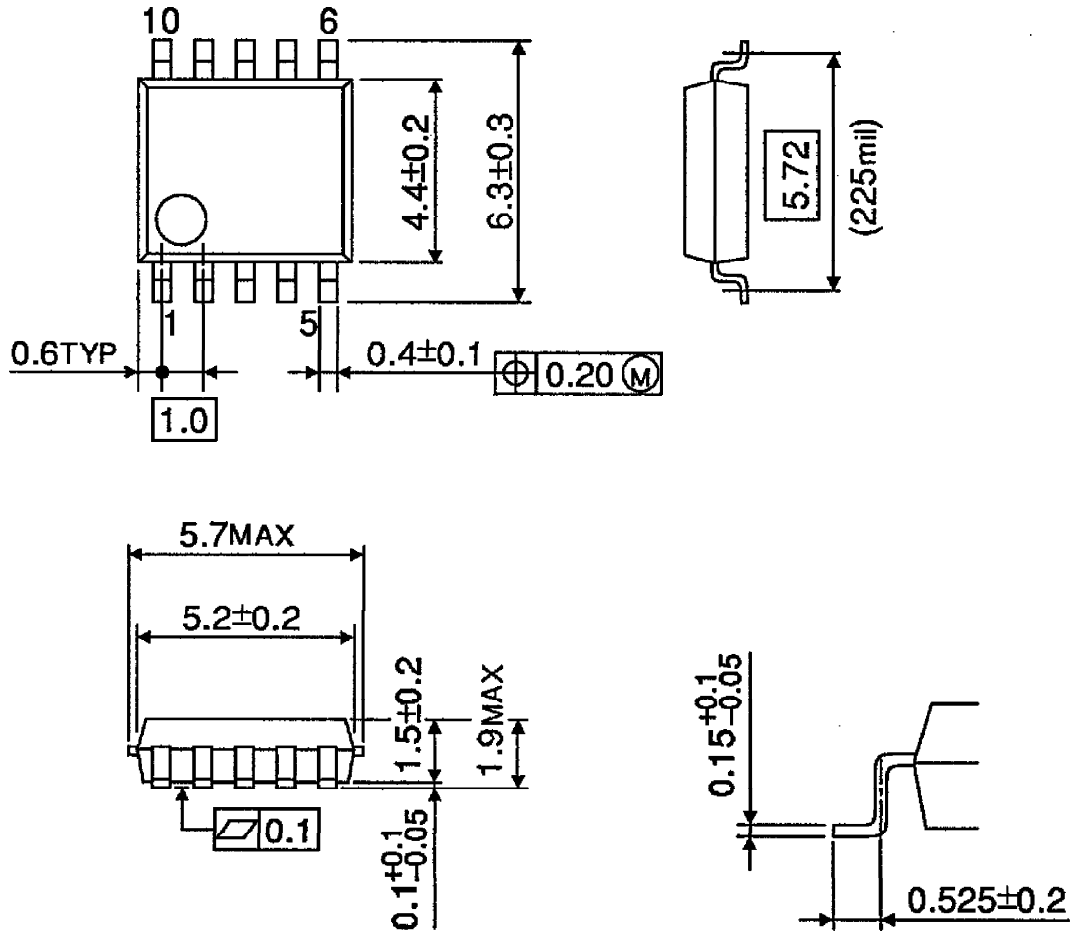
Unit : mm



Weight : 0.92 g (Typ.)

OUTLINE DRAWING
SSOP10-P-225-1.00

Unit : mm



Weight : 0.09 g (Typ.)