

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

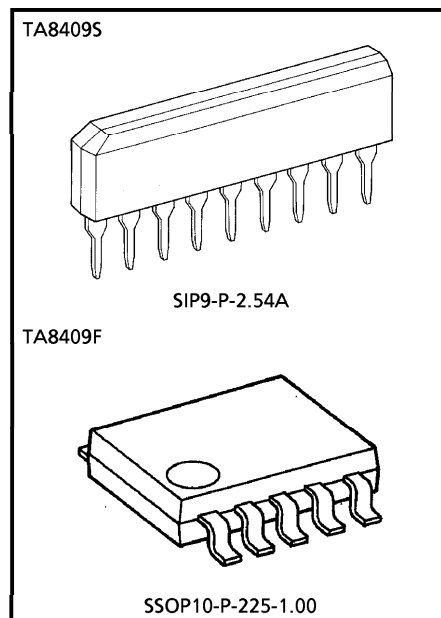
# TA8409S, TA8409F

## BRIDGE DRIVER

TA8409S and TA8409F are bridge driver with output voltage control.

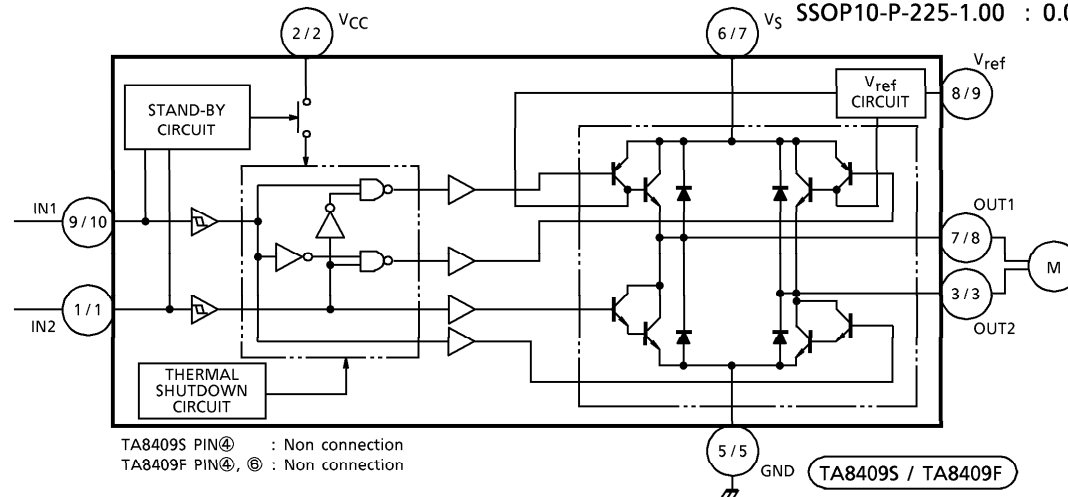
### FEATURES

- 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



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

### BLOCK DIAGRAM



980910EBA2

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**PIN FUNCTION**  
**TA8409S**

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	IN2	Input terminal
2	V <sub>CC</sub>	Supply voltage terminal for logic
3	OUT2	Output terminal
4	NC	Non connection
5	GND	GND terminal
6	V <sub>S</sub>	Supply voltage terminal for motor driver
7	OUT1	Output terminal
8	V <sub>ref</sub>	Reference voltage terminal for control circuit
9	IN1	Input terminal

**TA8409F**

PIN No.	SYMBOL	FUNCTIONAL DESCRIPTION
1	IN2	Input terminal
2	V <sub>CC</sub>	Supply voltage terminal for logic
3	OUT2	Output terminal
4	NC	Non connection
5	GND	GND terminal
6	NC	Non connection
7	V <sub>S</sub>	Supply voltage terminal for motor driver
8	OUT1	Output terminal
9	V <sub>ref</sub>	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)

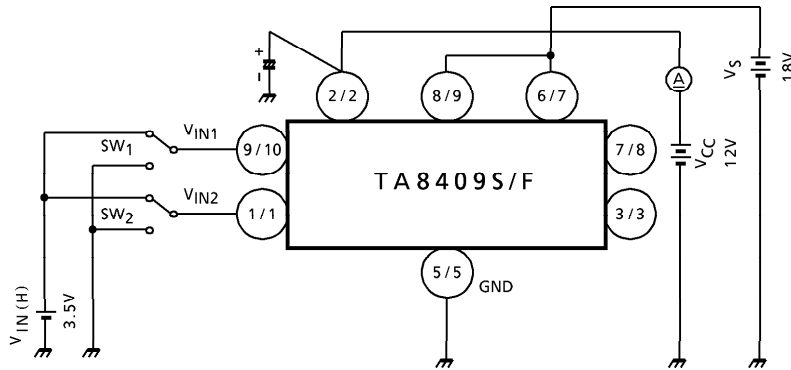
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	25	V
Motor Drive Voltage	V <sub>S</sub>	25	V
Reference Voltage	V <sub>ref</sub>	25	V
Output Current	PEAK	I <sub>O</sub> (PEAK)	1.0
	AVE	I <sub>O</sub> (AVE.)	0.4
Power Dissipation	TA8409F	P <sub>D</sub>	0.735 (Note)
	TA8409S		0.95
Operating Temperature	T <sub>opr</sub>	-30~75	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C

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

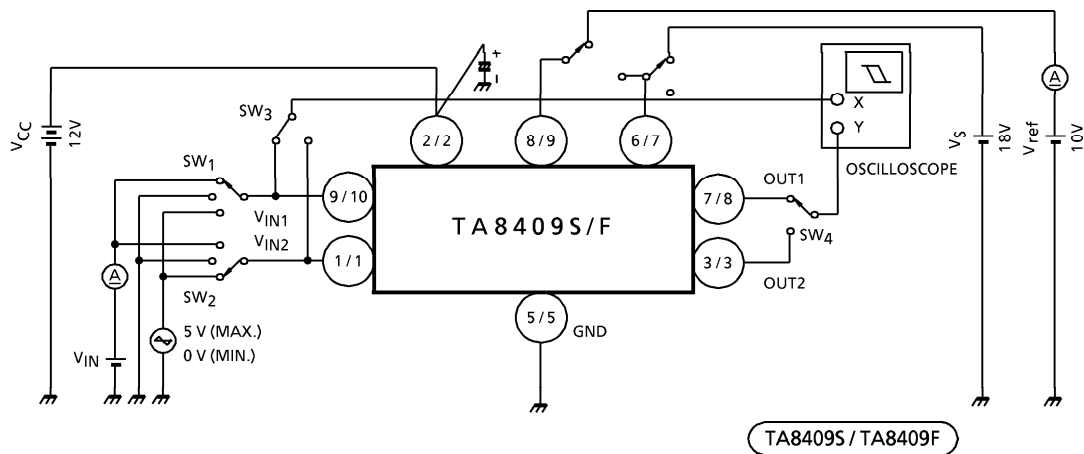
ELECTRICAL CHARACTERISTICS (Ta = 25°C, V<sub>CC</sub> = 12 V, V<sub>S</sub> = 18 V)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Supply Current	I <sub>CC1</sub>	1	Output OFF, CW/CCW mode	—	10.0	15.0	mA	
	I <sub>CC2</sub>	1	Output OFF, STOP mode	—	0	50	μA	
	I <sub>CC3</sub>	1	Output OFF, BREAK mode	—	6.5	10.0	mA	
Input Operating Voltage	1 (High)	V <sub>IN1</sub>	T <sub>j</sub> = 25°C IN1, 2	3.5	—	5.5	V	
	1 (Low)	V <sub>IN2</sub>	T <sub>j</sub> = 25°C IN1, 2	GND	—	0.8		
Input Current	I <sub>IN</sub>	2	Sink mode, V <sub>IN</sub> = 3.5 V	—	3	10	μA	
Input Hysteresis Voltage	ΔV <sub>T</sub>	2	—	—	0.7	—	V	
Saturation Voltage	Upper Side	V <sub>SAT</sub> U-1	3	V <sub>ref</sub> = V <sub>S</sub> , V <sub>OUT</sub> -V <sub>S</sub> measure I <sub>O</sub> = 0.2 A, CW/CCW mode	—	0.9	1.2	V
	Lower Side	V <sub>SAT</sub> L-1	3	V <sub>ref</sub> = V <sub>S</sub> , V <sub>OUT</sub> -GND measure I <sub>O</sub> = 0.2 A, CW/CCW mode	—	0.8	1.2	
	Upper Side	V <sub>SAT</sub> U-2	3	V <sub>ref</sub> = V <sub>S</sub> , V <sub>OUT</sub> -V <sub>S</sub> measure I <sub>O</sub> = 0.4 A, CW/CCW mode	—	1.0	1.35	
	Lower Side	V <sub>SAT</sub> L-2	3	V <sub>ref</sub> = V <sub>S</sub> , V <sub>OUT</sub> -GND measure I <sub>O</sub> = 0.4 A, CW/CCW mode	—	0.9	1.35	
Output Voltage	V <sub>SAT</sub> U-1'	3	V <sub>ref</sub> = 10 V, V <sub>OUT</sub> -GND measure I <sub>O</sub> = 0.2 A	10.4	11.2	12.2	V	
	V <sub>SAT</sub> U-2'	3	V <sub>ref</sub> = 10 V, V <sub>OUT</sub> -GND measure I <sub>O</sub> = 0.4 A	—	10.9	—		
Output Transistor Leakage Current	Upper Side	I <sub>LU</sub>	4	V <sub>L</sub> = 25 V	—	—	50	μA
	Lower Side	I <sub>LL</sub>	4	V <sub>L</sub> = 25 V	—	—	50	
Diode Forward Voltage	Upper Side	V <sub>F</sub> U-1	5	I <sub>F</sub> = 0.4 A	—	1.5	—	V
	Lower Side	V <sub>F</sub> L-1	5	I <sub>F</sub> = 0.4 A	—	0.9	—	
Reference Current	I <sub>ref</sub>	2	V <sub>ref</sub> = 10 V, source mode	—	20	40	μA	

**TEST CIRCUIT 1**  
 $I_{CC1}$ ,  $I_{CC2}$ ,  $I_{CC3}$



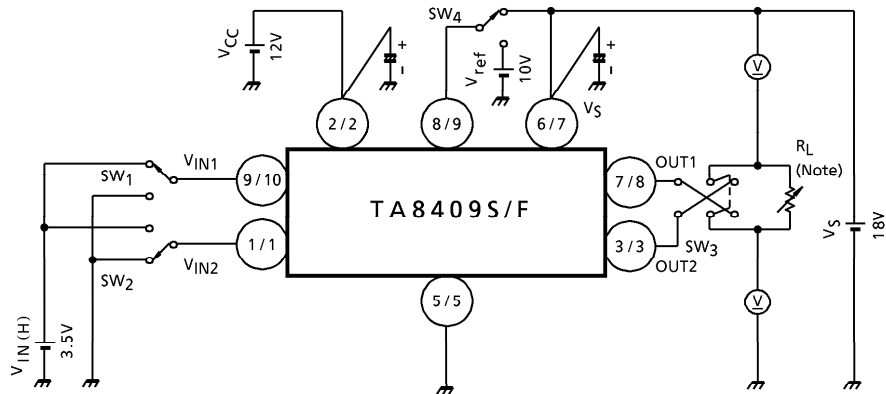
**TEST CIRCUIT 2**  
 $V_{IN1}$ ,  $V_{IN2}$ ,  $I_{IN}$ ,  $\Delta V_T$ ,  $I_{ref}$



TA8409S / TA8409F

**TEST CIRCUIT 3**

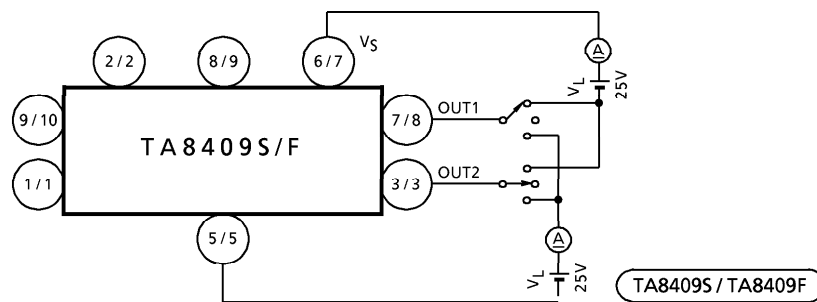
$V_{SAT}$  U-1, 2,  $V_{SAT}$  L-1, 2,  $V_{SAT}$  U-1', 2'



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

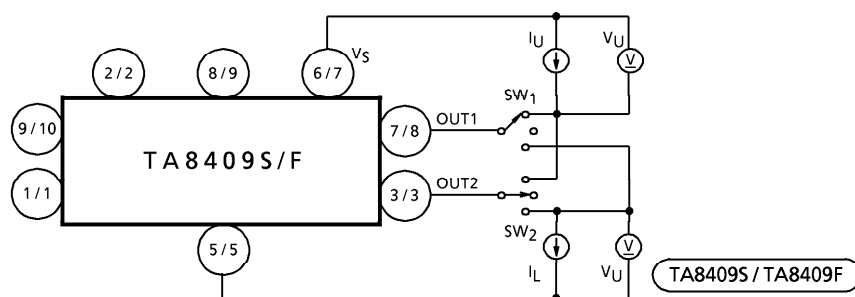
**TEST CIRCUIT 4**

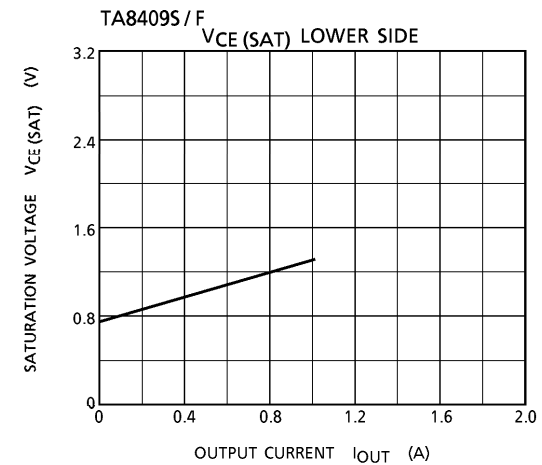
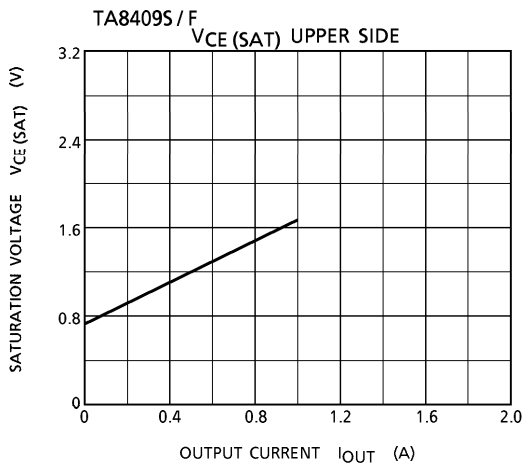
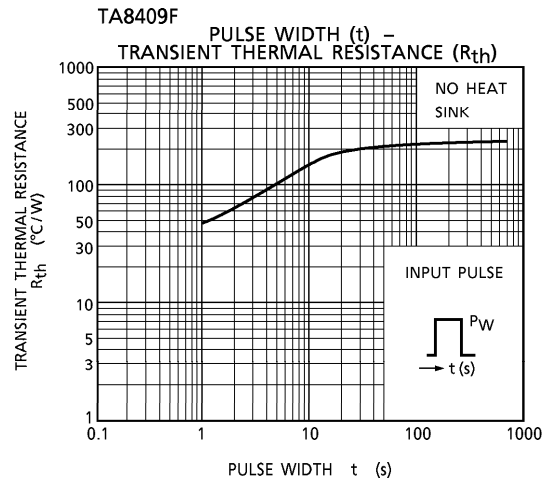
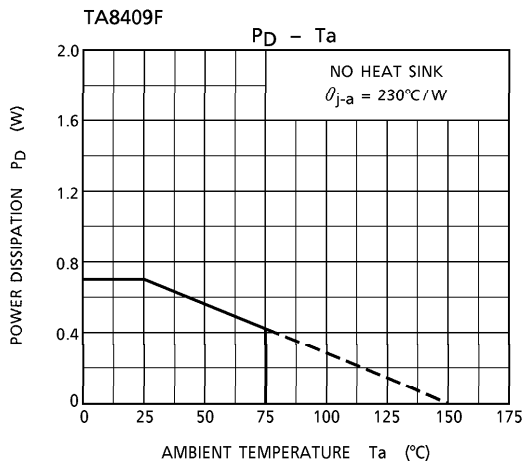
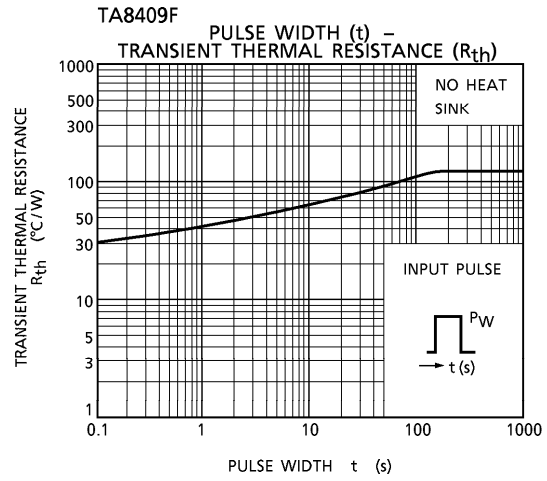
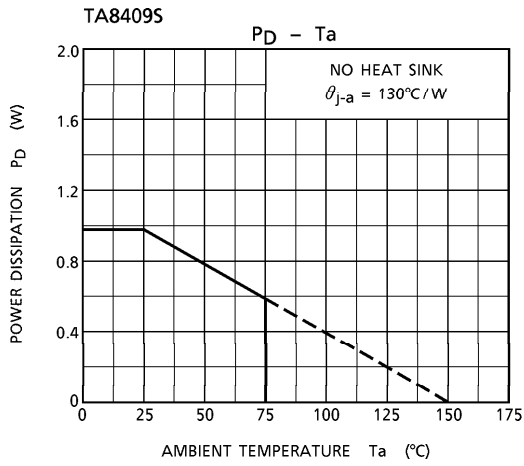
$I_L$  U, L



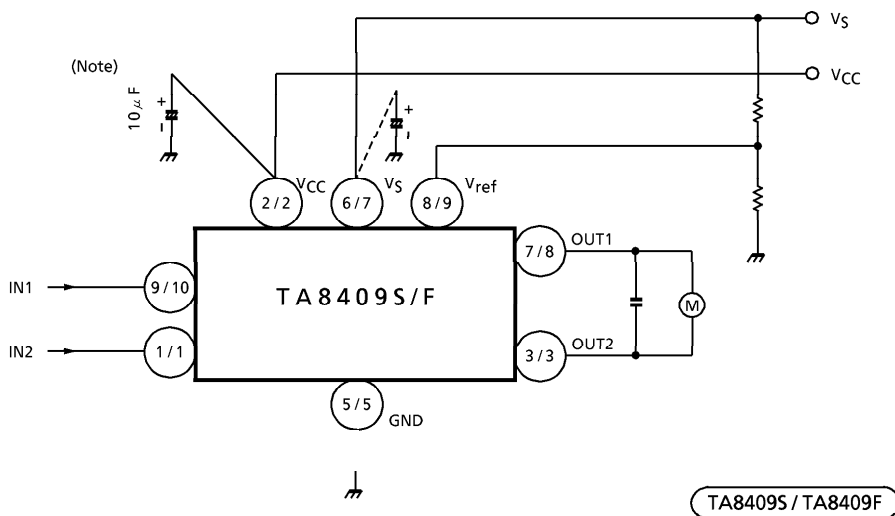
**TEST CIRCUIT 5**

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





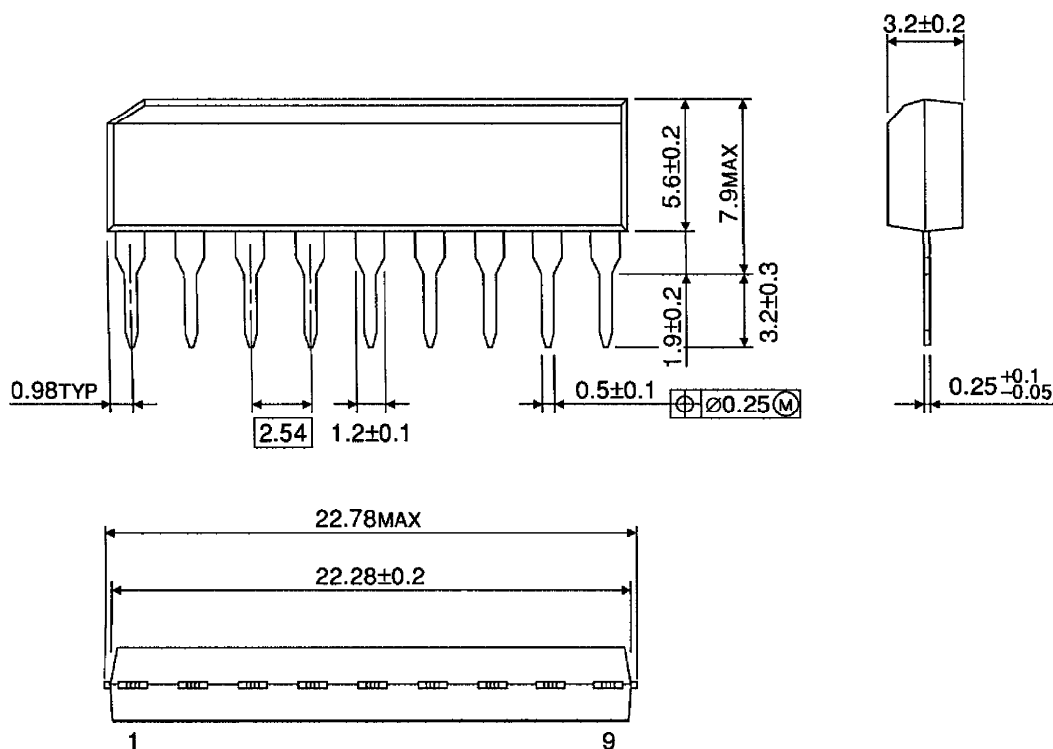
APPLICATION CIRCUIT



- (Note 1) Connect if required.
- (Note 2) Utmost care is necessary in the design of the output line, V<sub>S</sub> 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

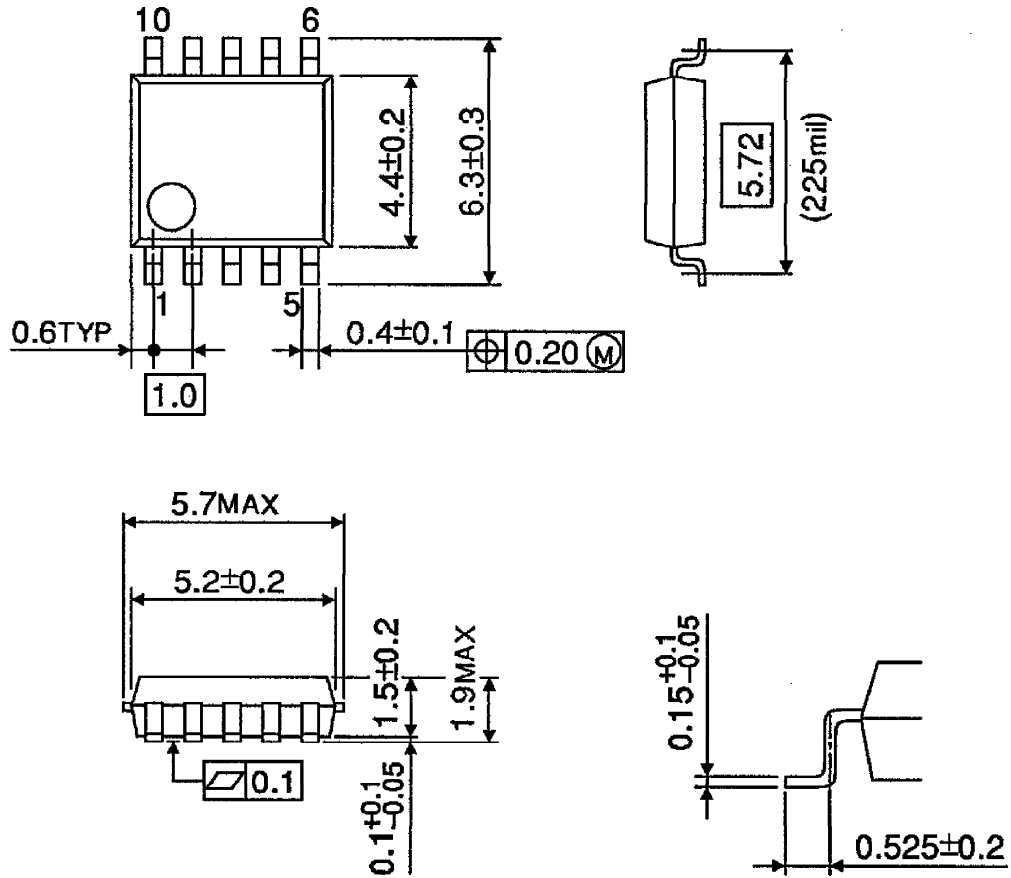


Weight : 0.92 g (Typ.)



OUTLINE DRAWING  
SSOP10-P-225-1.00

Unit : mm



Weight : 0.09 g (Typ.)