

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

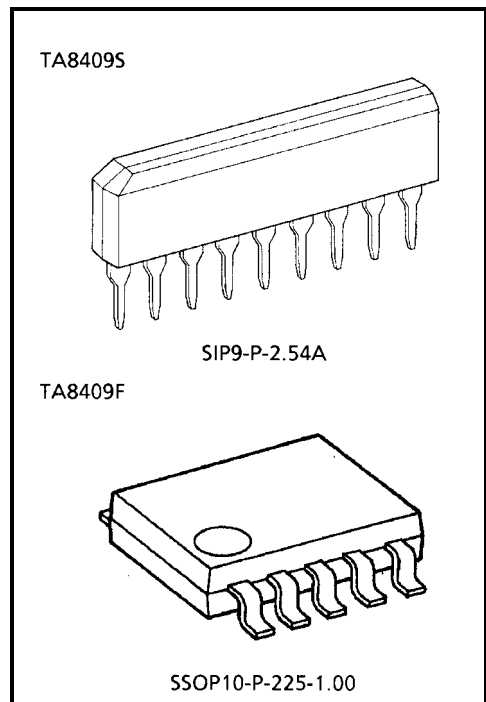
TA8409S, TA8409F

BRIDGE DRIVER

TA8409S and TA8409F are bridge driver with output voltage control.

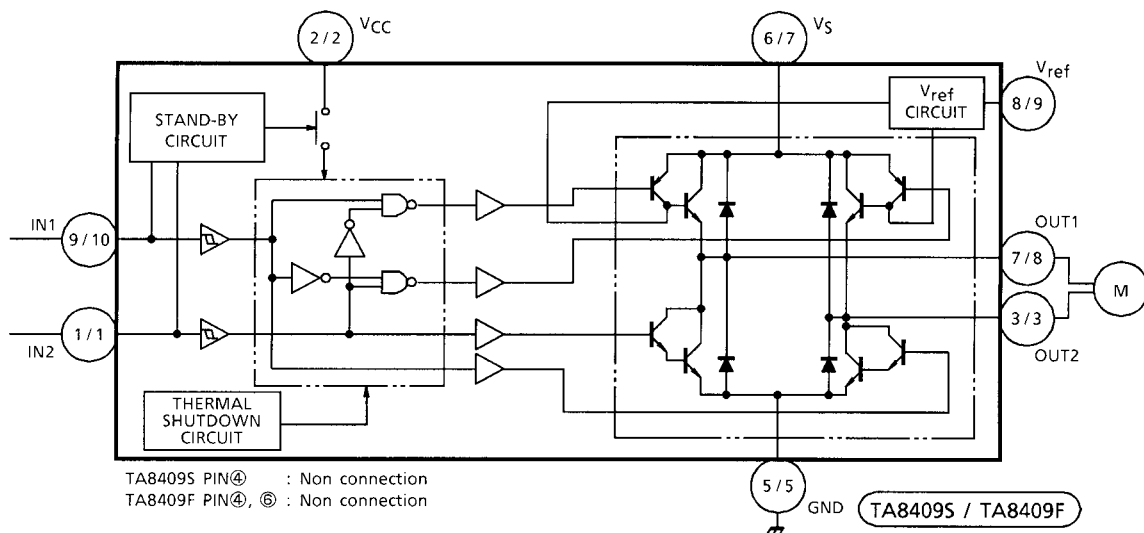
FEATURES

- Modes available (CW / CCW / STOP / BRAKE)
- Output current up to 0.4 A (AVE) and 1.0 A (PEAK)
- Wide range of operating voltage
 $V_{CC} \text{ (opr.)} = 4.5 \sim 20 \text{ V}$
 $V_S \text{ (opr.)} = 0 \sim 20 \text{ V}$
 $V_{ref} \text{ (opr.)} = 0 \sim 20 \text{ V} \quad (V_{ref} \leq V_S)$
- 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



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

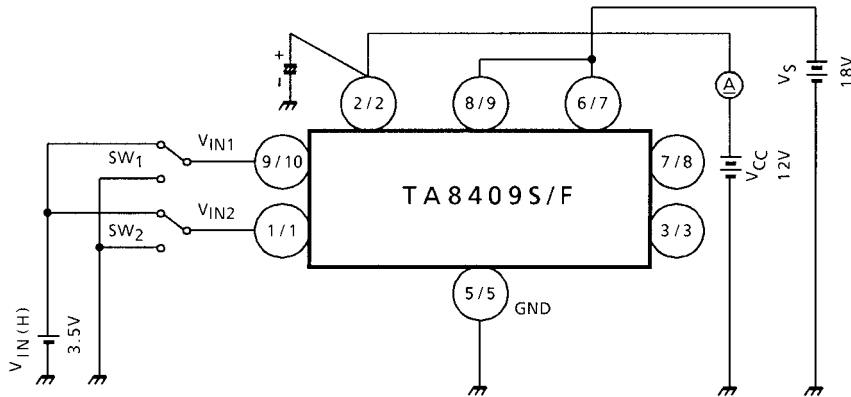
Note: This rating is obtained by mounting on 50 × 50 × 1.6 mm PCB that occupied above 30% of copper area.

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 _{IN1}	2	T _j = 25°C IN1, 2	3.5	—	5.5	V
	2 (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

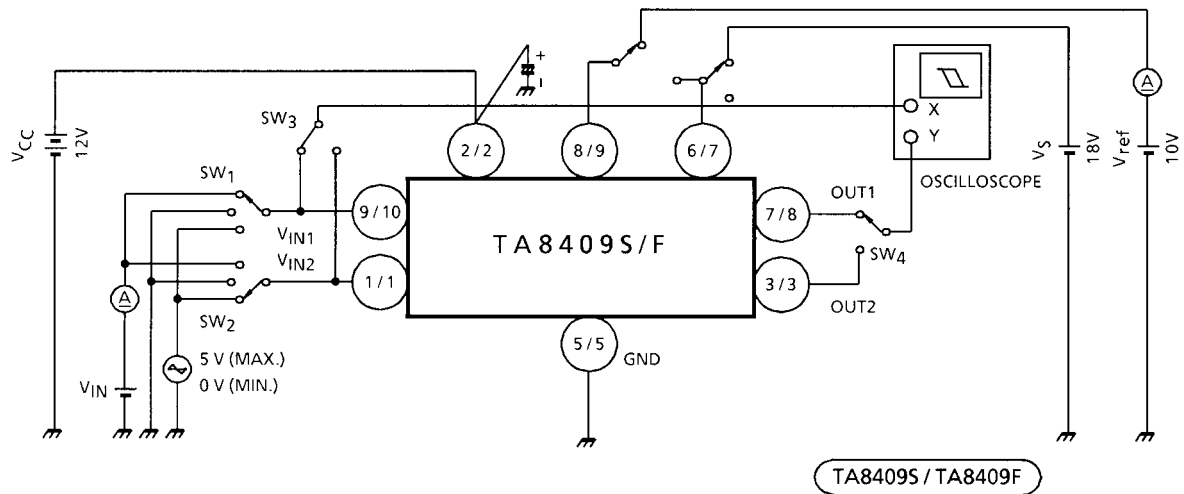
TEST CIRCUIT 1

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



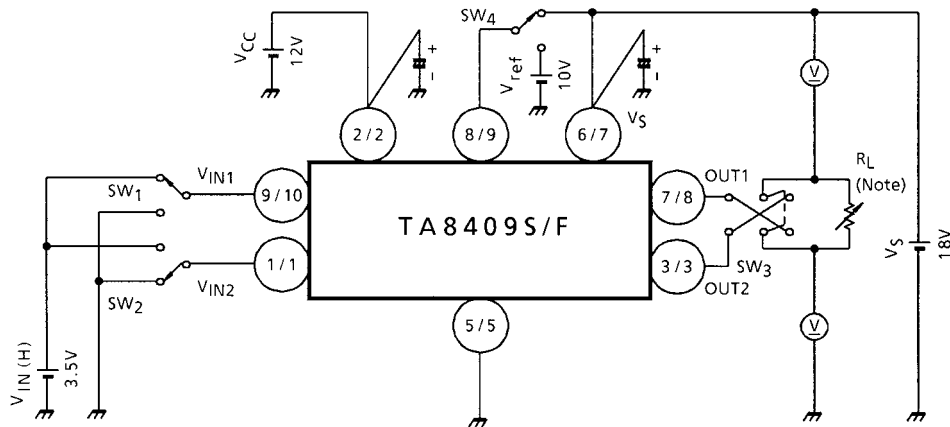
TEST CIRCUIT 2

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



TEST CIRCUIT 3

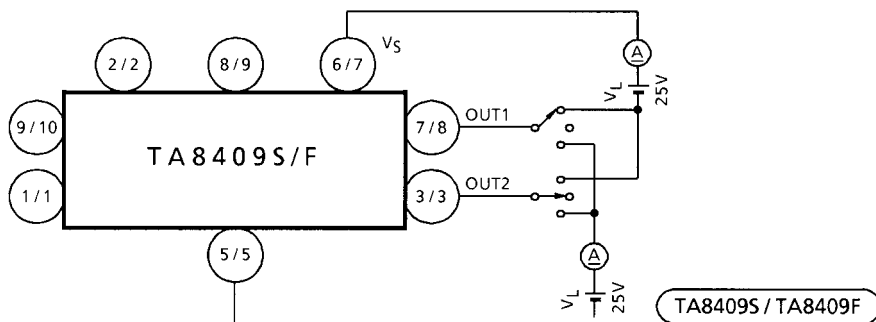
$V_{SAT\ U-1, 2}$, $V_{SAT\ L-1, 2}$, $V_{SAT\ U-1', 2'}$



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

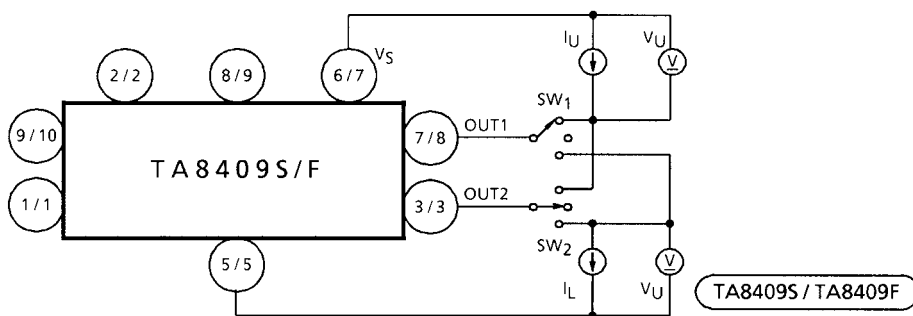
TEST CIRCUIT 4

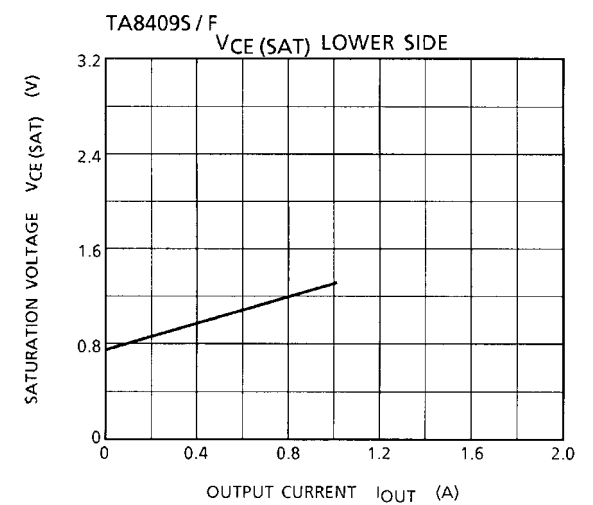
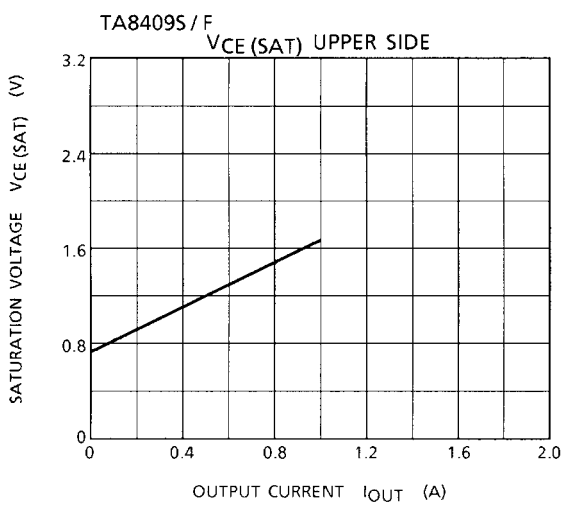
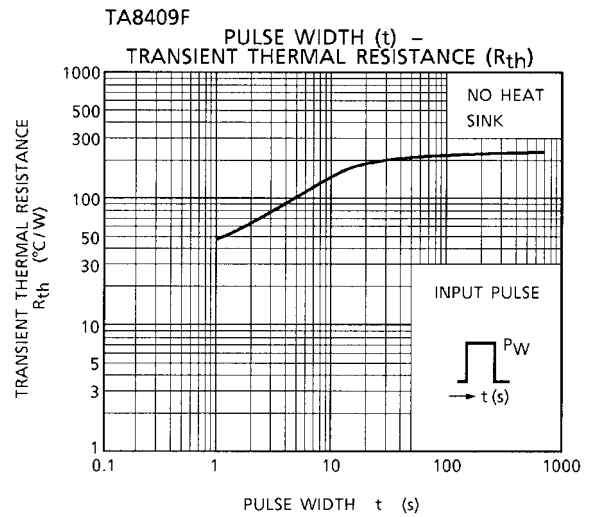
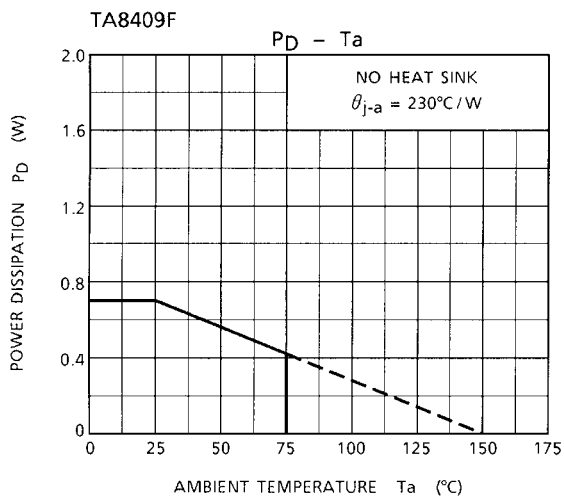
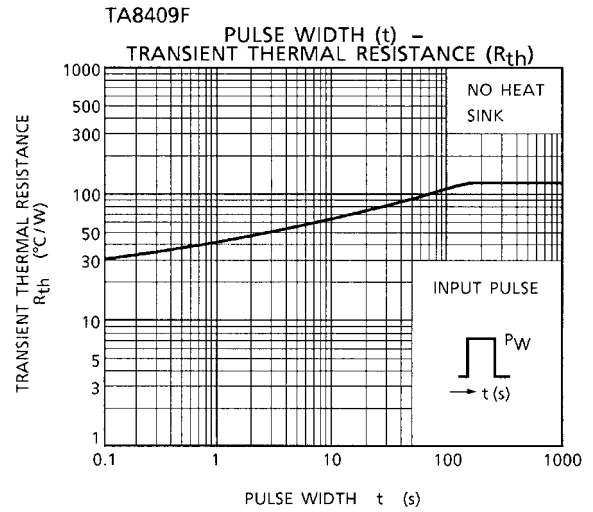
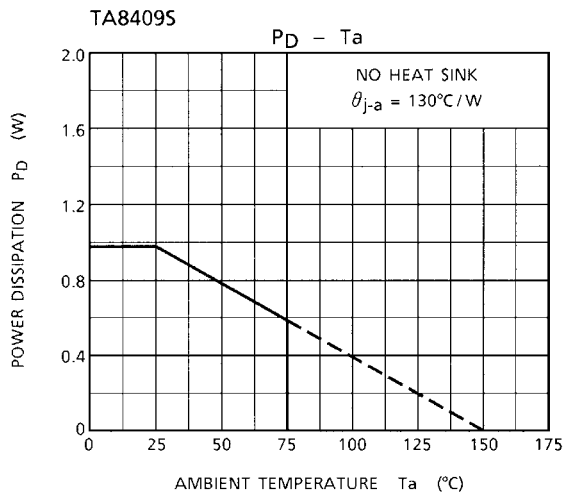
$I_{L\ U, L}$



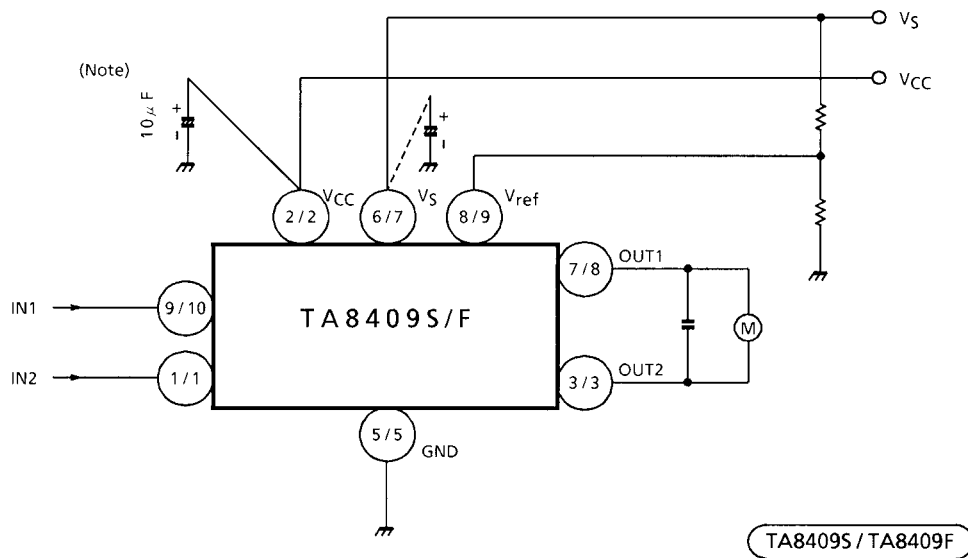
TEST CIRCUIT 5

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





APPLICATION CIRCUIT



Note 1: Connect if required.

Note 2: Utmost care is necessary in the design of the output line, VS 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.

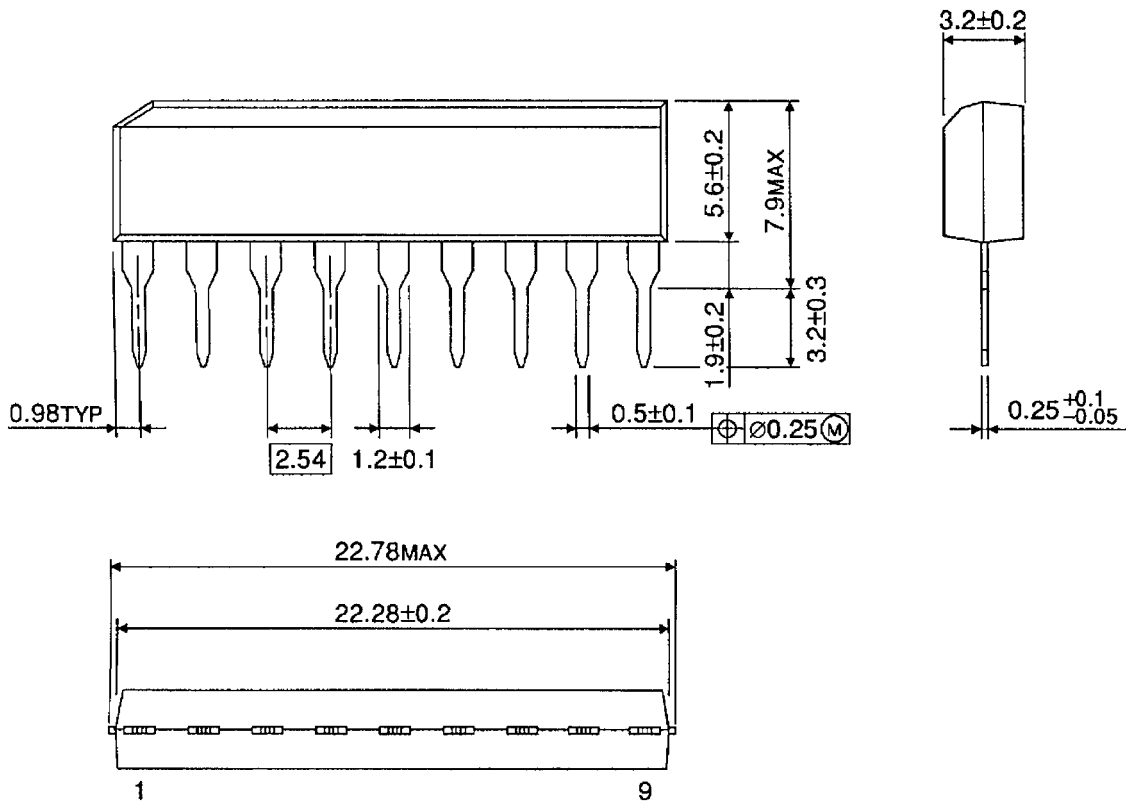
Note 4: The IC functions cannot be guaranteed when turning power on or off.

Before using the IC for application, check that there are no problems.

PACKAGE DIMENSIONS

SIP9-P-2.54A

Unit: mm

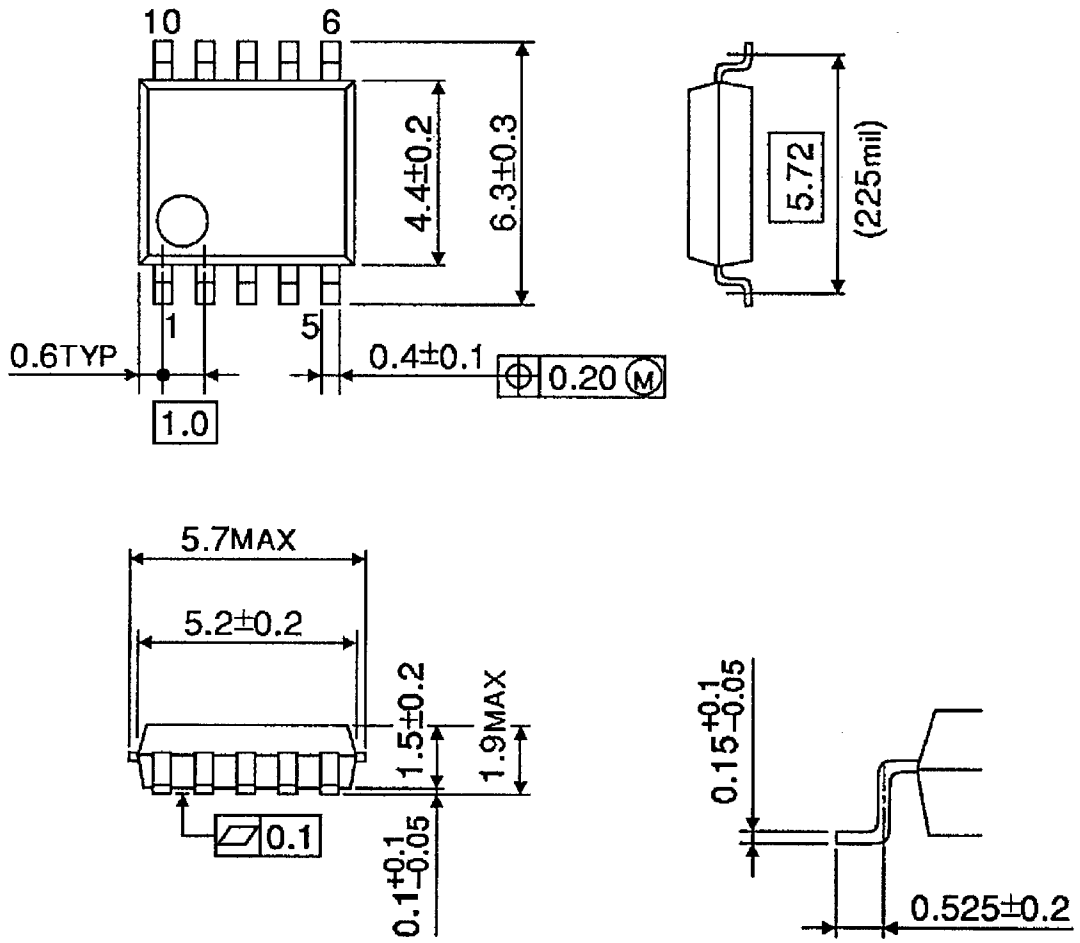


Weight: 0.92 g (Typ.)

PACKAGE DIMENSIONS

SSOP10-P-225-1.00

Unit: mm



Weight: 0.09 g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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