

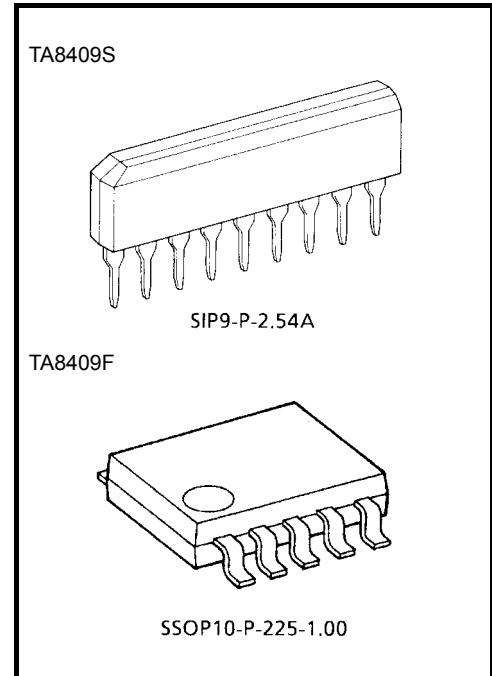
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8409S, TA8409F**Bridge Driver**

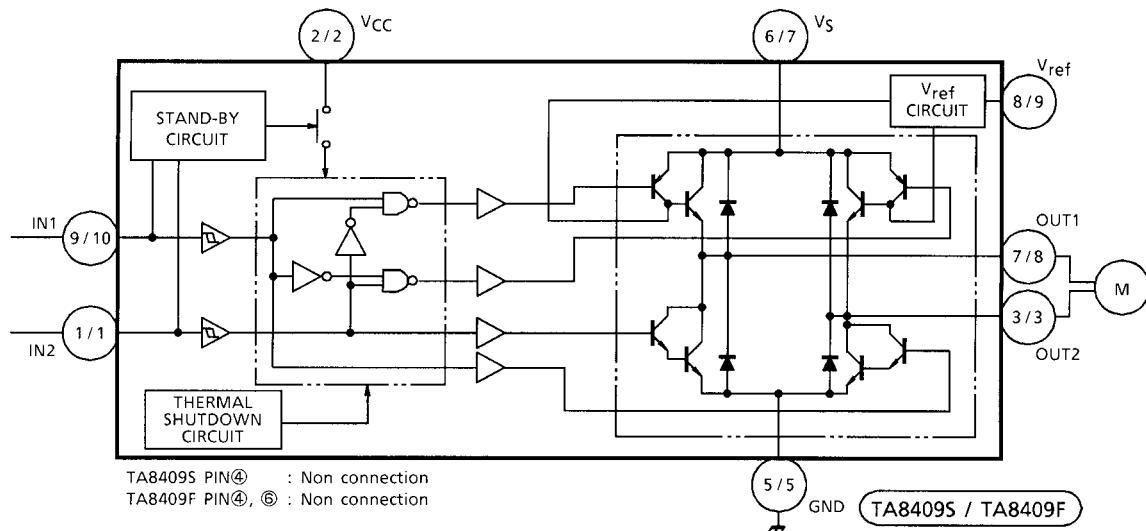
TA8409S and TA8409F are bridge driver with output voltage control.

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} (opr.) = 4.5 to 20 V
 V_S (opr.) = 0 to 20 V
 V_{ref} (opr.) = 0 to 20 V ($V_{ref} \leq V_S$)
- 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)

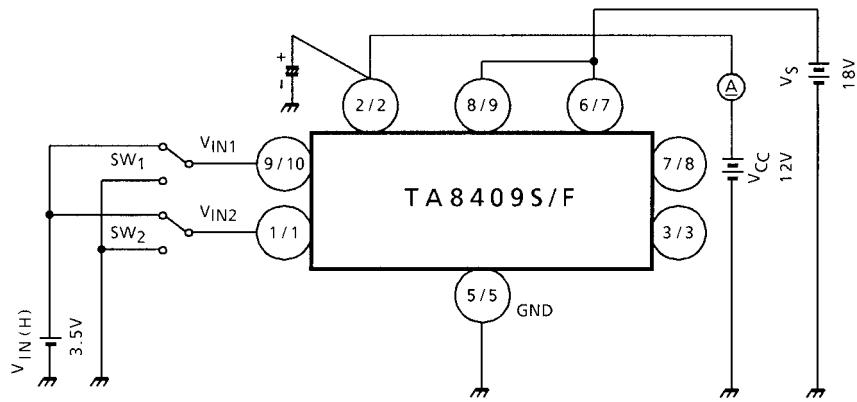
Characteristics		Symbol	Rating	Unit
Supply voltage		V _{CC}	25	V
Motor drive voltage		V _S	25	V
Reference voltage		V _{ref}	25	V
Output current	PEAK	I _O (PEAK)	1.0	A
	AVE.	I _O (AVE.)	0.4	
Power dissipation	TA8409F	P _D	0.735 (Note)	W
	TA8409S		0.95	
Operating temperature		T _{opr}	-30 to 75	°C
Storage temperature		T _{stg}	-55 to 150	°C

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

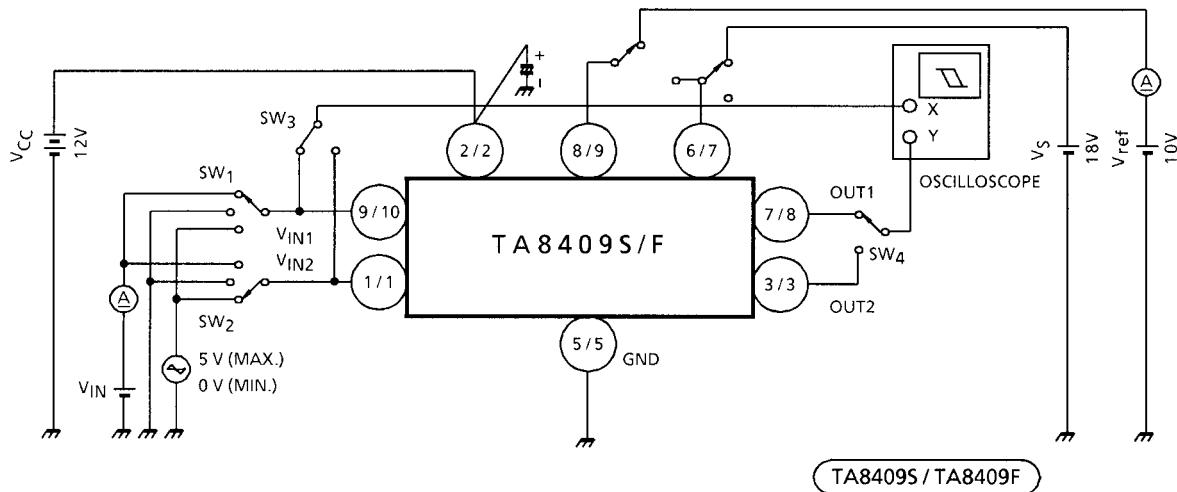
Electrical Characteristics (Ta = 25°C, V_{CC} = 12 V, V_S = 18 V)

Characteristics		Symbol	Test Circuit	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	V _{IN} 1	2		T _j = 25°C IN1, 2	3.5	—	5.5	V
	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 _{FU-1}	5	I _F = 0.4 A	—	1.5	—	V
	Lower side	V _{FL-1}	5	I _F = 0.4 A	—	0.9	—	
Reference current		I _{ref}	2	V _{ref} = 10 V, source mode	—	20	40	μA

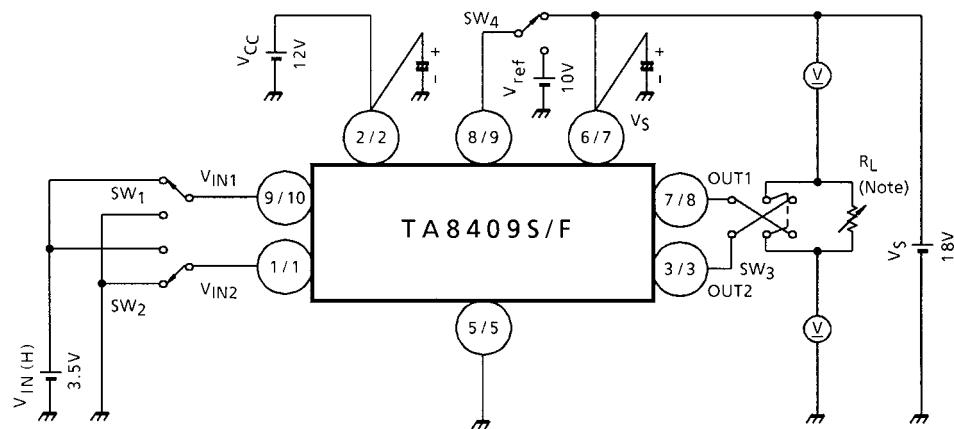
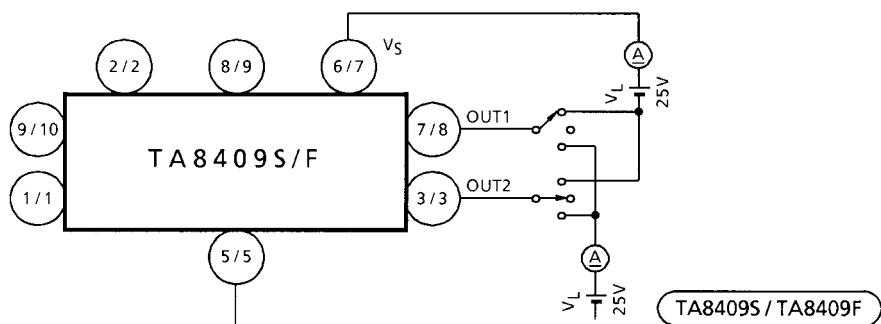
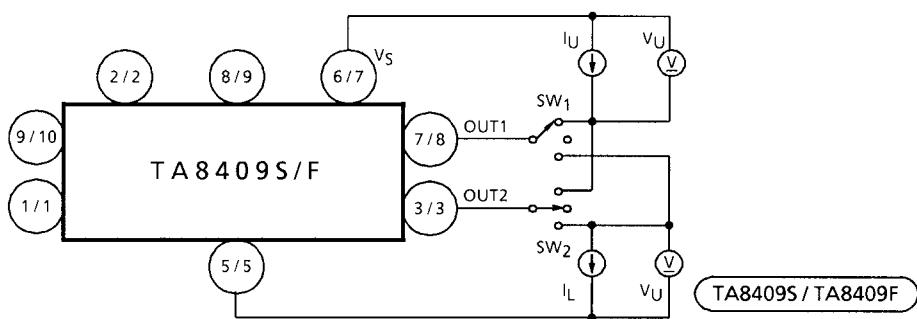
Test Circuit 1
 I_{CC1} , I_{CC2} , I_{CC3}

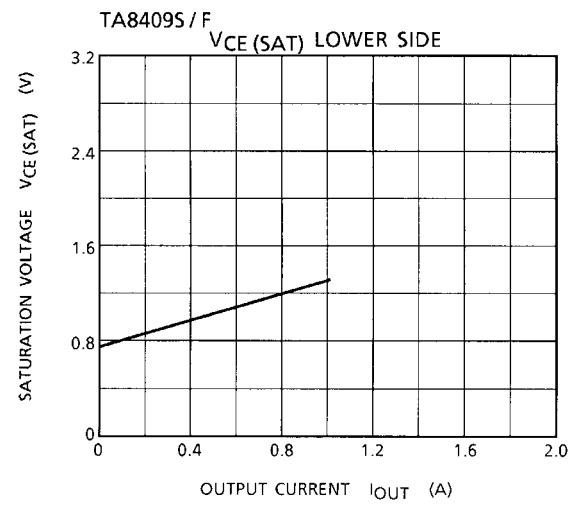
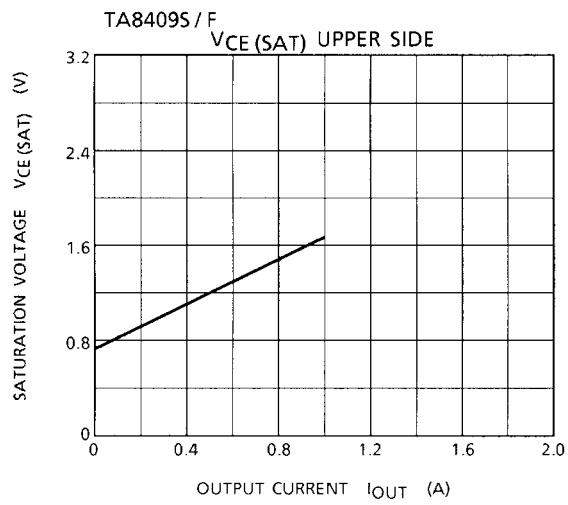
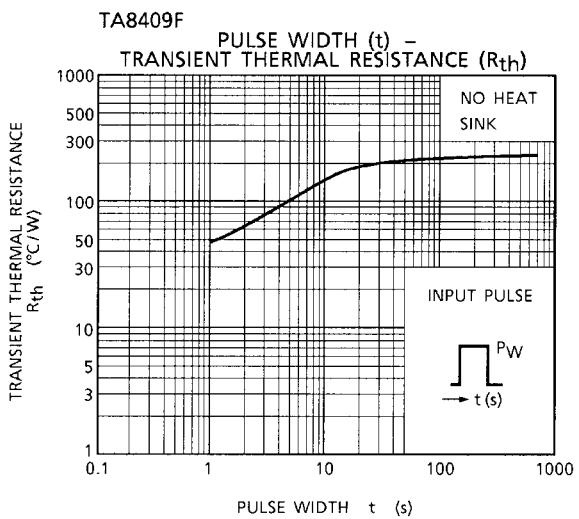
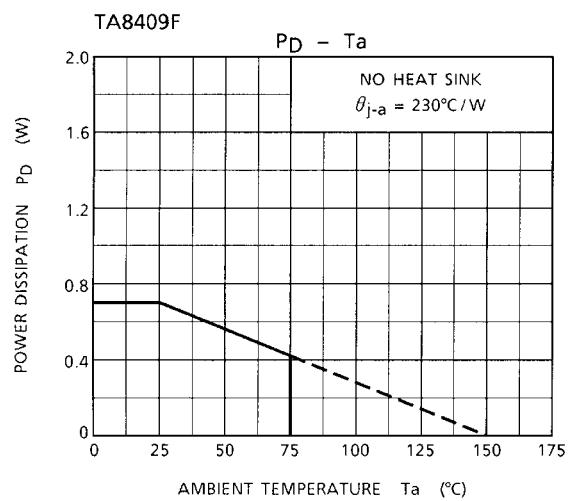
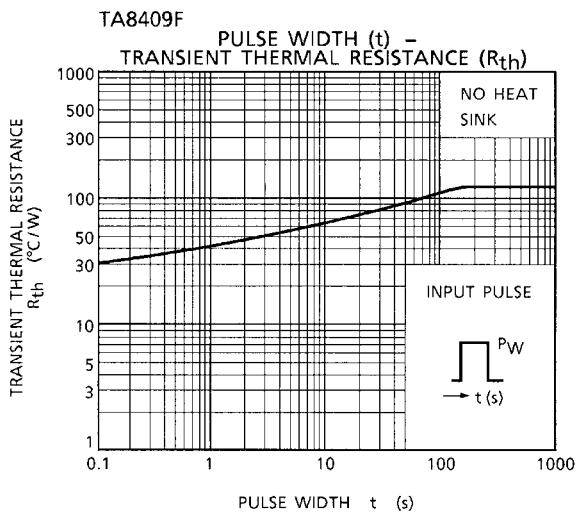
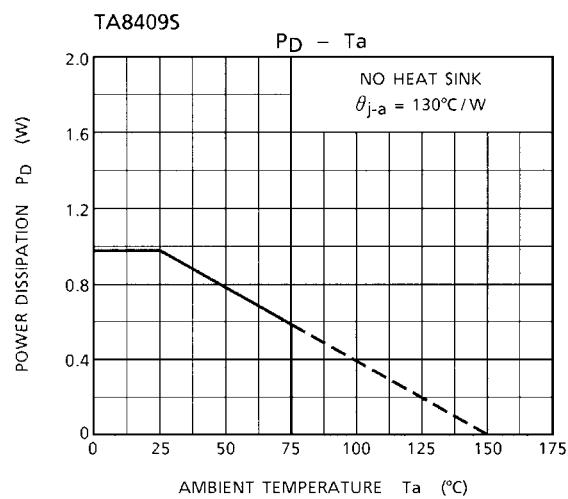


Test Circuit 2
 V_{IN1} , V_{IN2} , I_{IN} , ΔV_T , I_{ref}

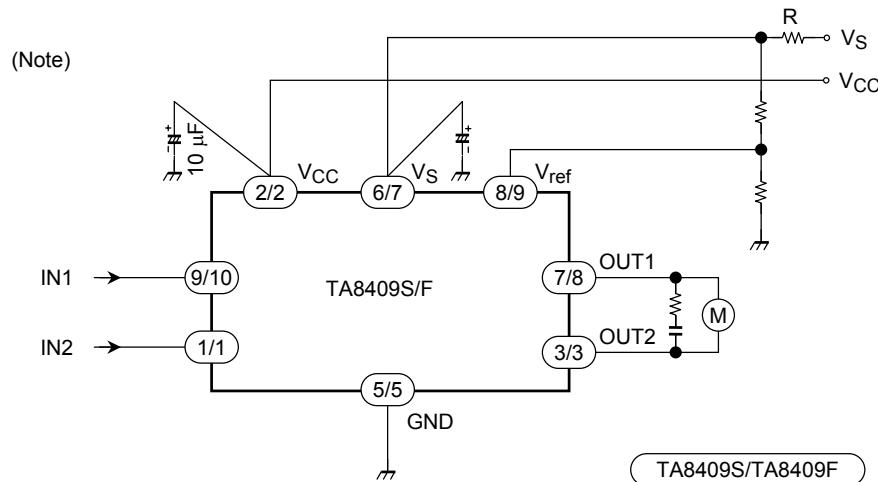


TA8409S / TA8409F

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: Attach a bypass capacitor to the Vs pin as required.

Note 2: Utmost care is necessary in the design of the output line, Vs, VCC and GND line since IC may be destroyed due to short-circuit between outputs, to supply fault, or to ground. Also note in mind that mounting the IC in the reverse orientation may also cause a breakdown.

Note 3: Switching the inputs may allow a pass-through current to flow. Keep the IC device in the STOP mode (for at least 100 μs) during the switching. Alternatively, insert a current limiting resistor R.

Note 4: Use a current limiting resistor R or fuse for overcurrent protection.

Note 5: When turning on the power for the IC device, apply VS after VCC (or VCC and Vs simultaneously).

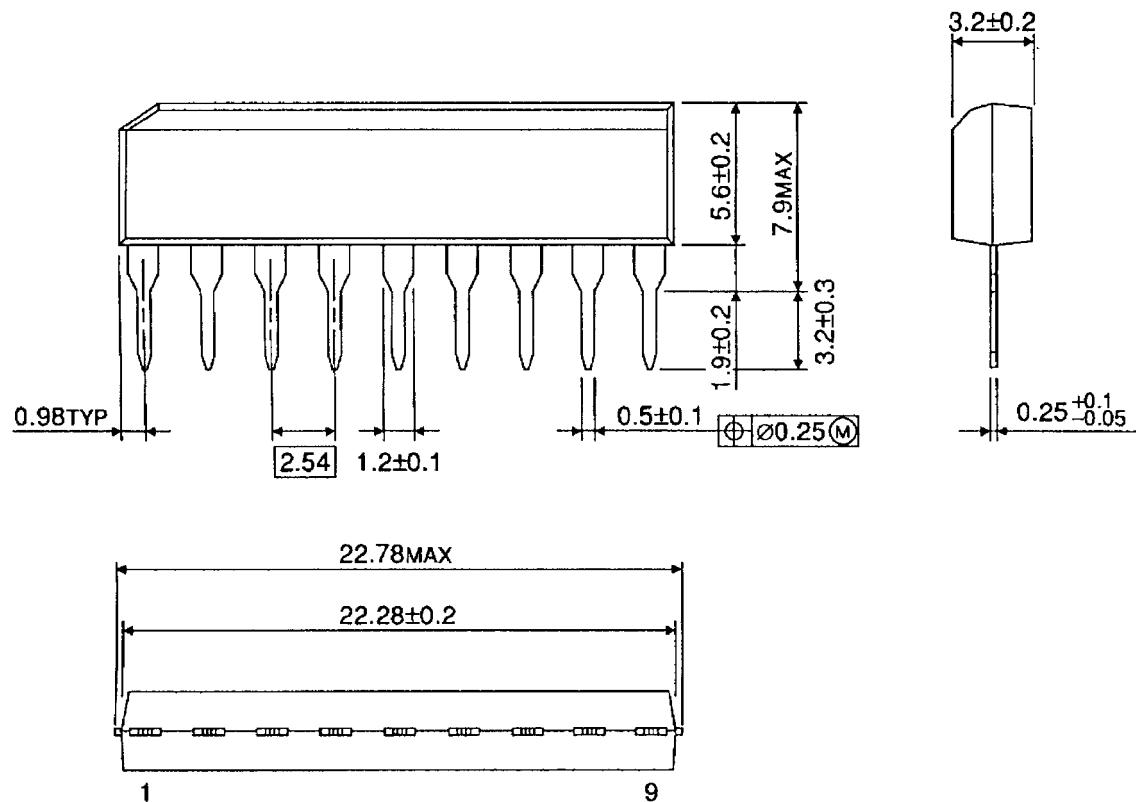
When shutting off the power, drop Vs before VCC (or Vs and VCC simultaneously).

When turning on the power (VCC), keep both the inputs (IN1 and IN2) on a low level.

Package Dimensions

SIP9-P-2.54A

Unit : mm

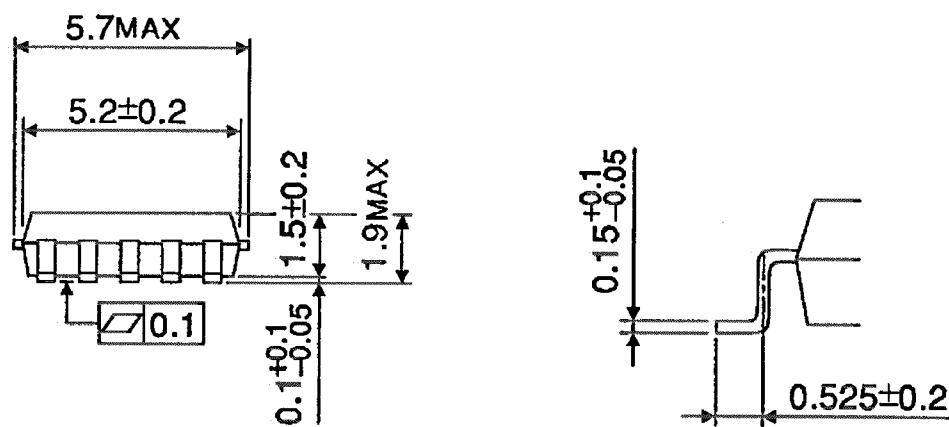
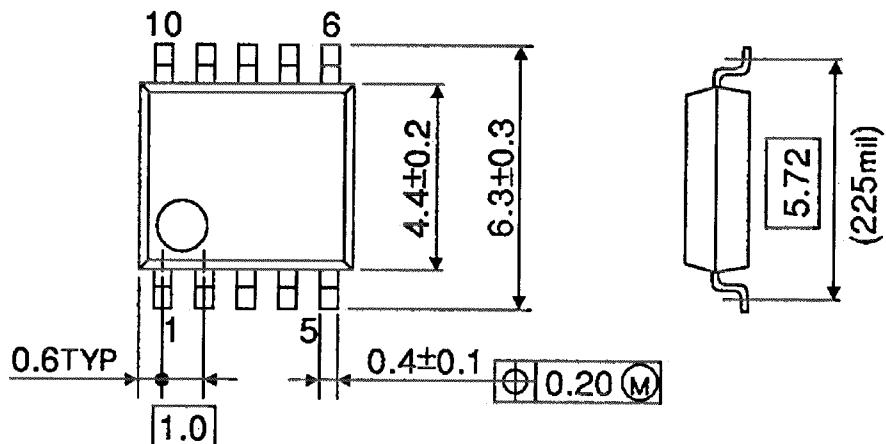


Weight: 0.92 g (typ.)

Package Dimensions

SSOP10-P-225-1.00

Unit : mm



Weight: 0.09 g (typ.)

RESTRICTIONS ON PRODUCT USE

030619EBA

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.