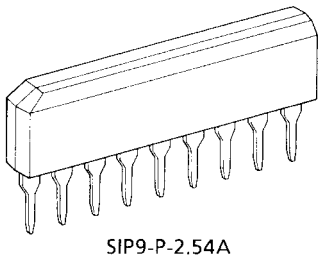
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8409S,TA8409F

Bridge Driver

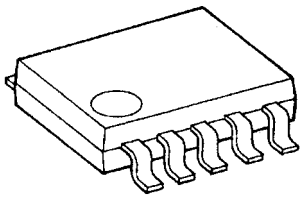
TA8409S and TA8409F are bridge driver with output voltage control.

TA8409S



SIP9-P-2.54A

TA8409F



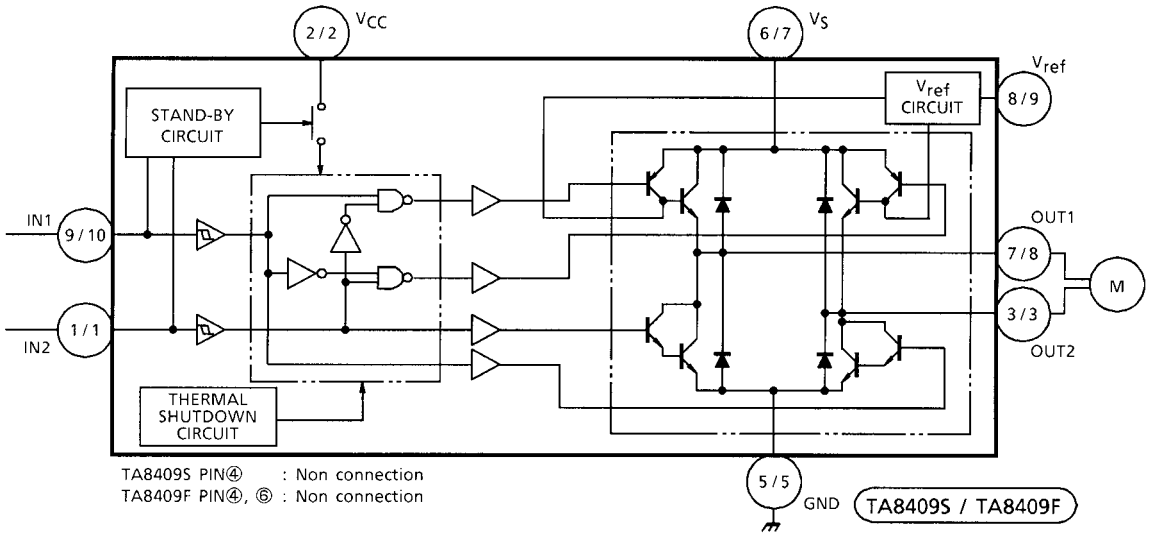
SSOP10-P-225-1.00

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 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.

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)

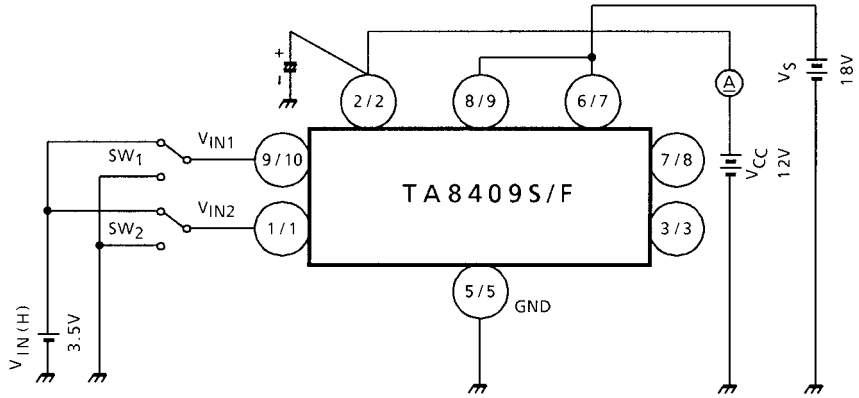
Characteristics		Symbol	Rating	Unit
Supply voltage		V_{CC}	25	V
Motor drive voltage		V_S	25	V
Reference voltage		V_{ref}	25	V
Output current	PEAK	$I_{O\ (PEAK)}$	1.0	A
	AVE.	$I_{O\ (AVE.)}$	0.4	
Power dissipation	TA8409F	P_D	0.735 (Note)	W
	TA8409S		0.95	
Operating temperature		T_{opr}	−30 to 75	°C
Storage 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.

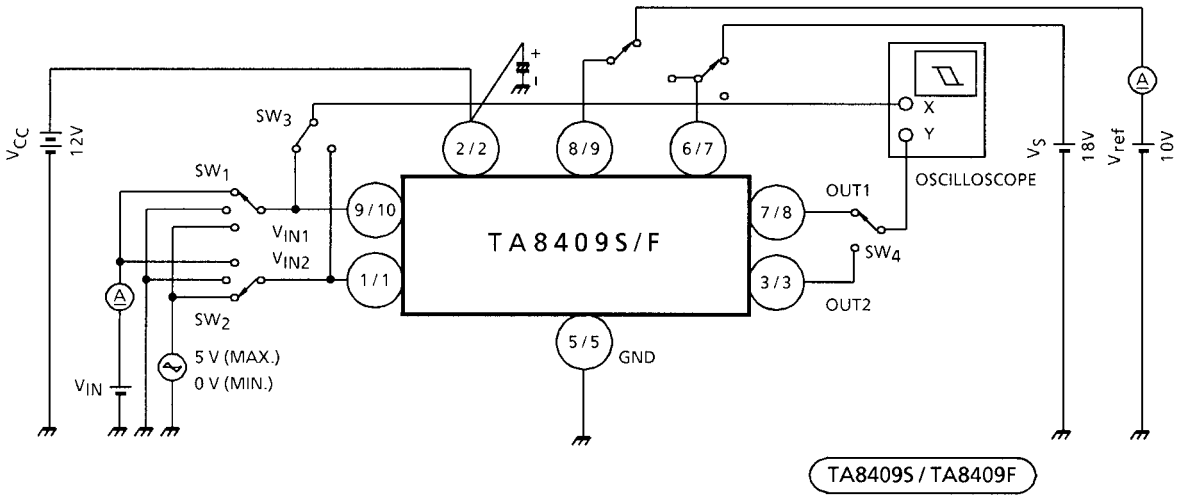
Electrical Characteristics (Ta = 25°C, V_{CC} = 12 V, V_S = 18 V)

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	1 (High)	$V_{IN\,1}$	2	T_j = 25°C IN1, 2	3.5	—	5.5	V
	2 (Low)	$V_{IN\,2}$	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	$V_{F\,U-1}$	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}

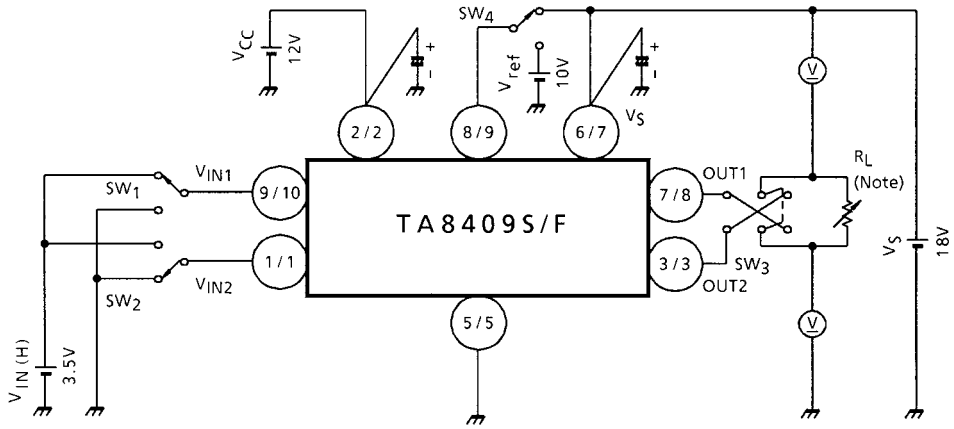


Test Circuit 2
V_{IN1}, V_{IN2}, I_{IN}, ΔV_T, I_{ref}



Test Circuit 3

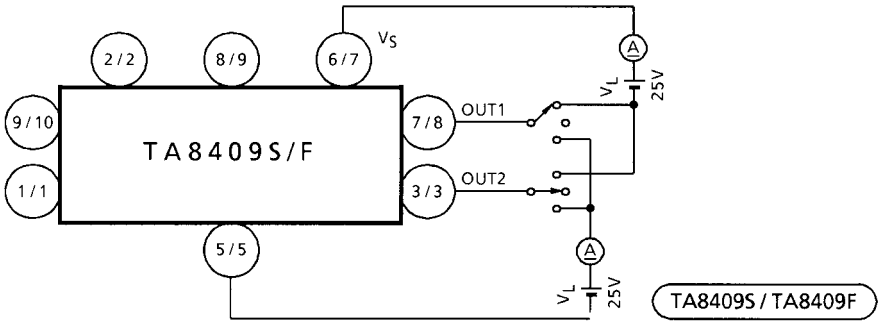
$V_{SAT\ U-1,\ 2}$, $V_{SAT\ L-1,\ 2}$, $V_{SAT\ U-1',\ 2'}$



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

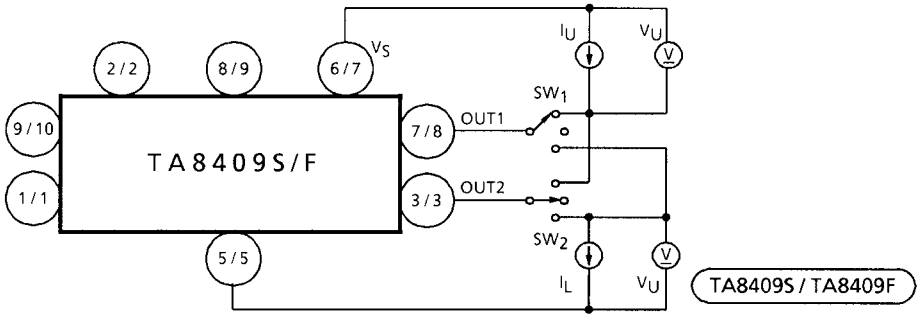
Test Circuit 4

$I_{L\ U,\ L}$

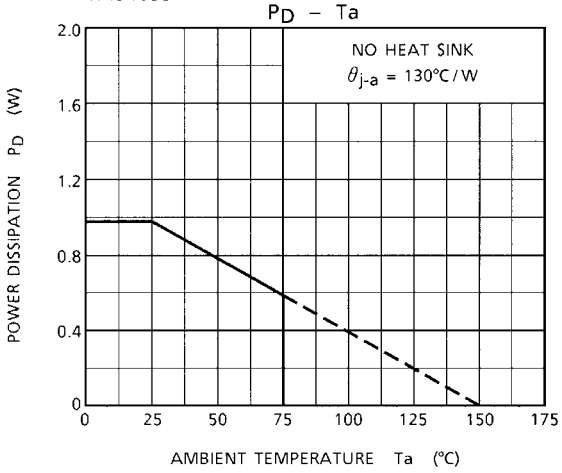


Test Circuit 5

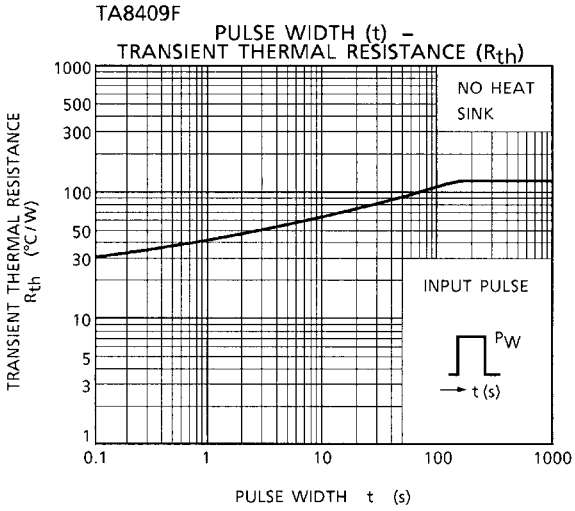
$V_{F\ U-1,\ 2}$, $V_{F\ L-1,\ 2}$



TA8409S



TA8409F



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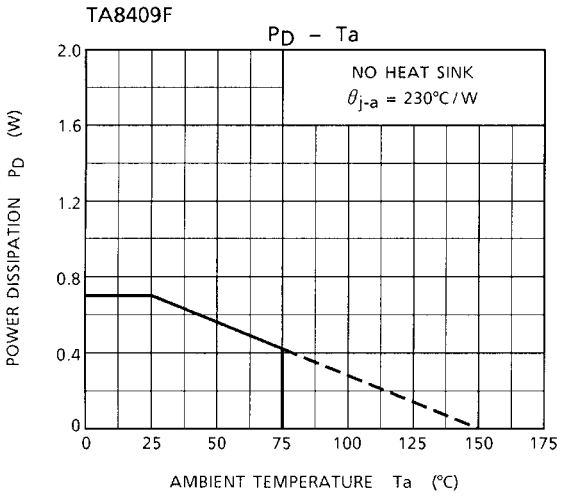

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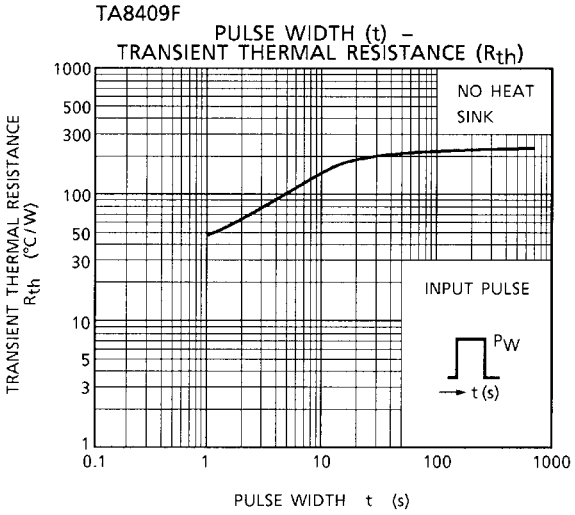
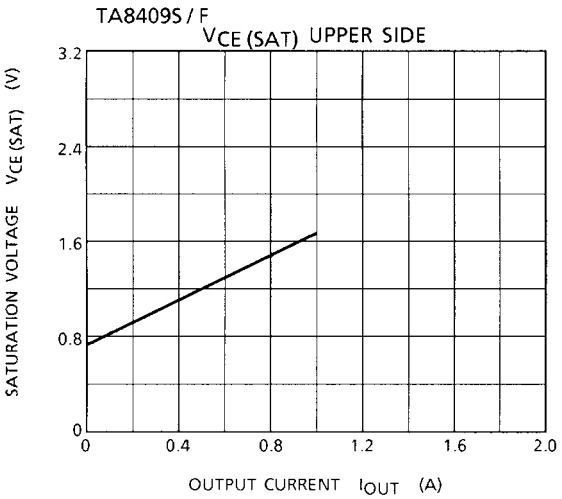
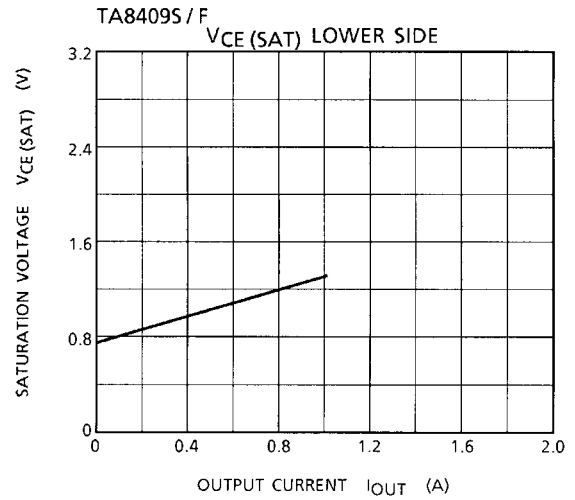


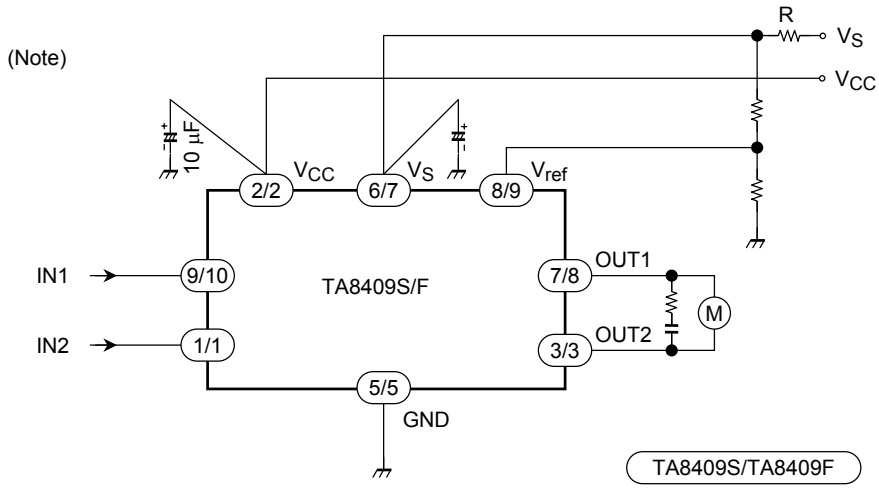
TA8409S / F



TA8409S / F



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, V_S, V_{CC} 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.

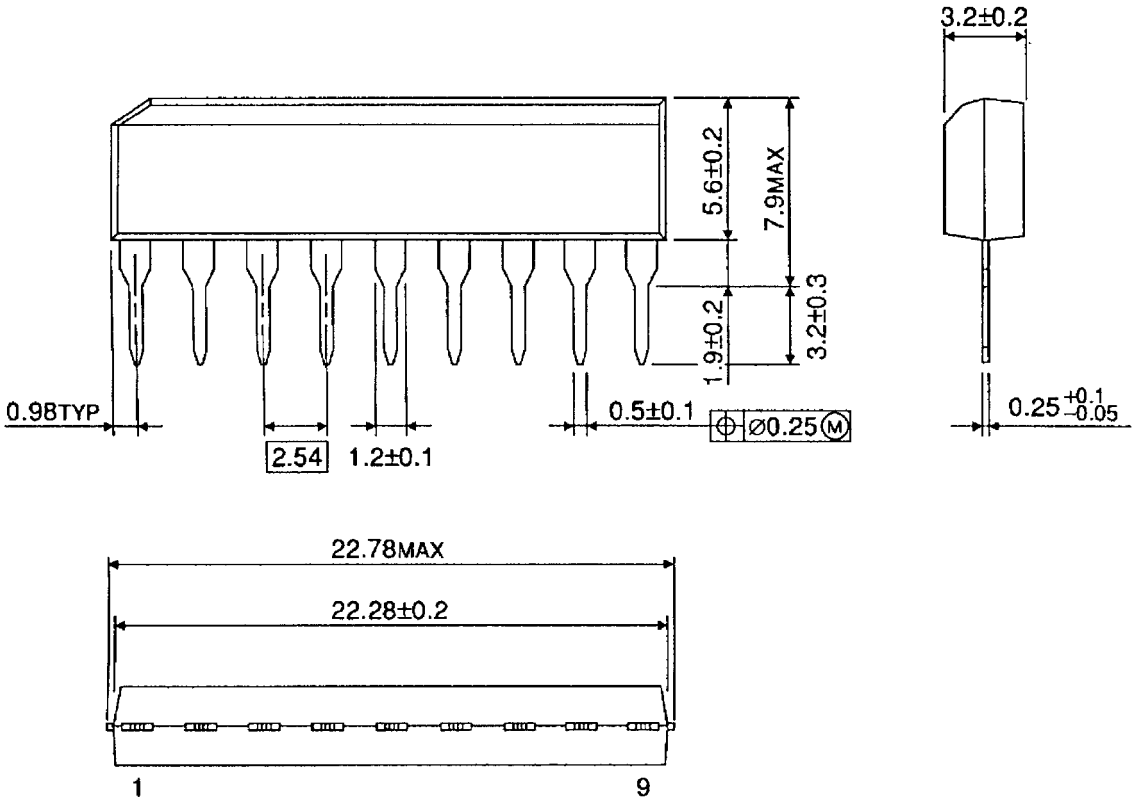
Note 3: Switching the inputs may allow a pass-through current to flow. Keep the IC device in the STOP mode (for at least 100 μs) during the switching. Alternatively, insert a current limiting resistor R.

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 V_{CC} (or V_{CC} and V_S simultaneously).
When shutting off the power, drop V_S before V_{CC} (or Vs and V_{CC} simultaneously).
When turning on the power (V_{CC}), keep both the inputs (IN1 and IN2) on a low level.

Package Dimensions

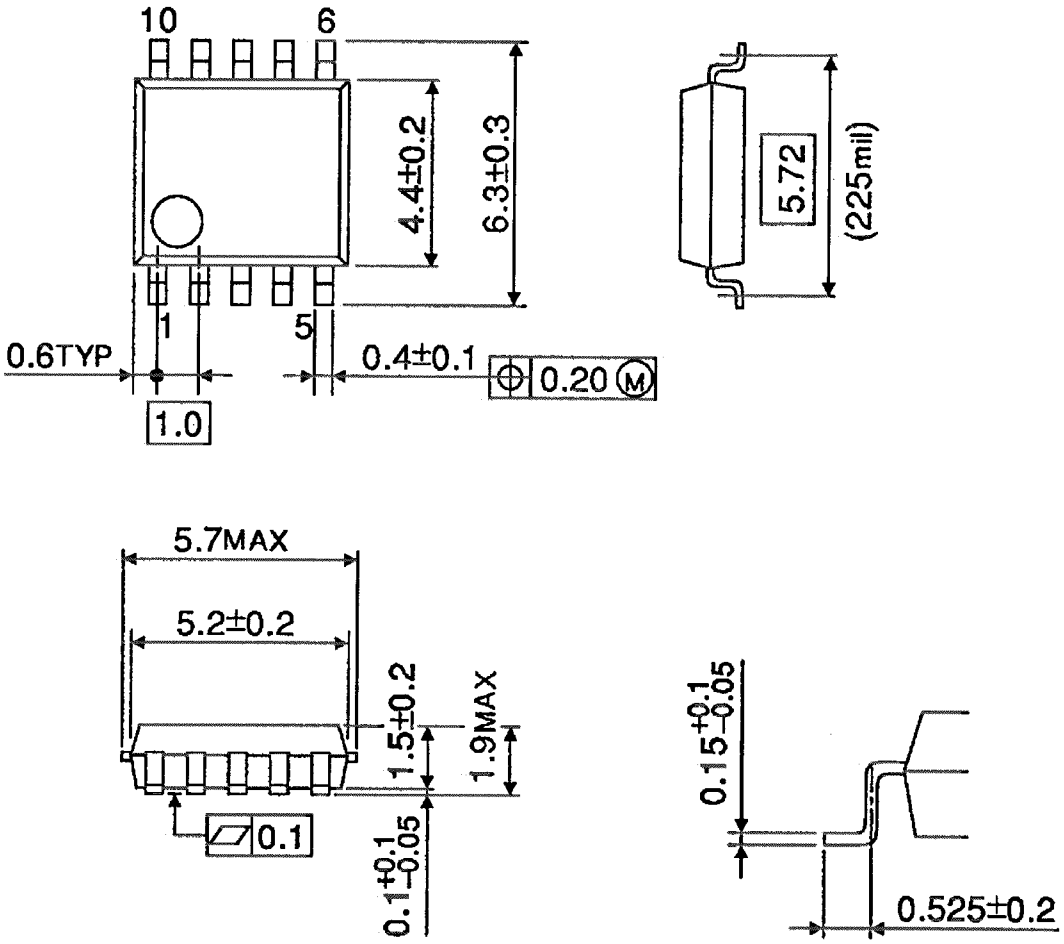
SIP9-P-2.54A Unit : mm



Weight: 0.92 g (typ.)

Package Dimensions

SSOP10-P-225-1.00 Unit : mm



Weight: 0.09 g (typ.)

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