

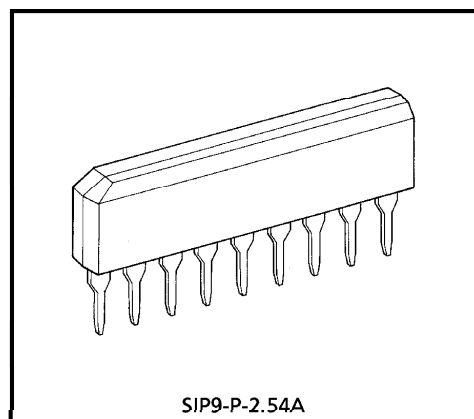
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA8029S

## FREQUENCY TO VOLTAGE CONVERTER

The TA8029S is a small 9-pin SIP IC incorporating an accurate frequency/voltage converter and two voltage comparators.

It has a Schmitt input circuit and becomes active on the positive edge of the input. Its F/V output is stable even when it is supplied with a high-frequency input. Since the V<sub>CC</sub> pin connects to a shunt regulator, stable frequency detection is assured regardless of the battery voltage. In addition, its wide operating temperature range allows it to be used for a wide variety of applications.



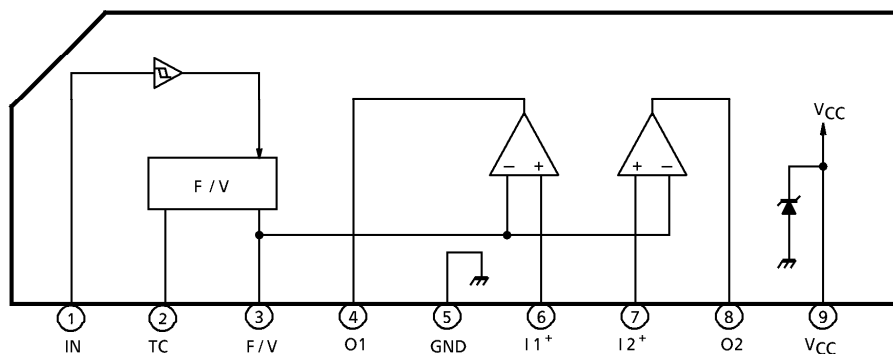
SIP9-P-2.54A

Weight : 0.92g (Typ.)

### FEATURES

- Schmitt input circuit incorporated
- Stable F/V output in response to high-frequency input
- Two comparators served by single power supplies are incorporated.
- Shunt regulator incorporated
- Operating temperature range : from  $-40\sim 85^{\circ}\text{C}$
- Small plastic SIP-9 pin

### BLOCK DIAGRAM AND PIN LAYOUT



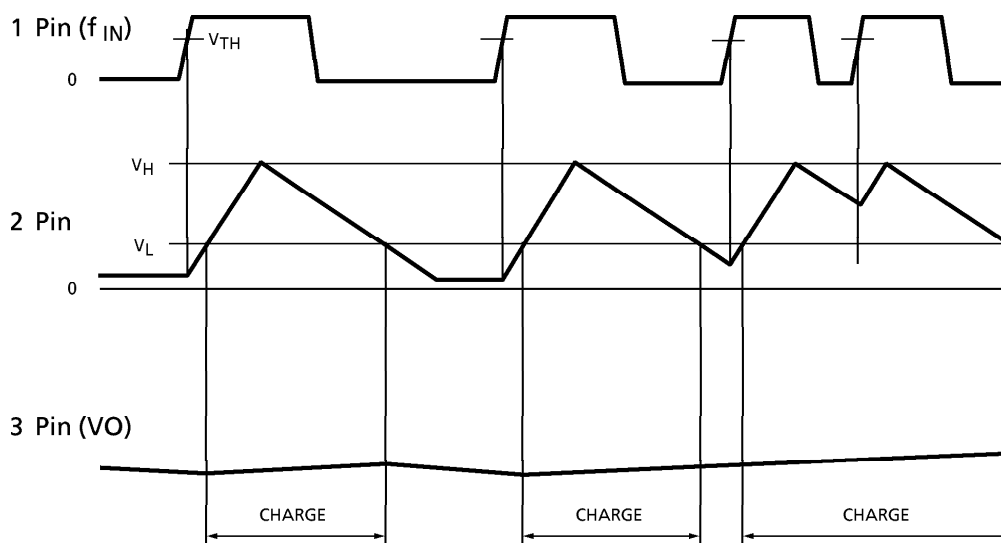
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**PIN DESCRIPTION**

PIN No.	SYMBOL	DESCRIPTION
1	IN	Frequency input pin. The IC becomes active on the leading edge of the input.
2	TC	One-shot pulse setting pin which connects to a capacitor.
3	F/V	F/V conversion output pin which connects to an charging capacitor and resistor. The signal from this pin is also the input to the two built-in comparator.
4	O <sub>1</sub>	Comparator 1 output pin. This pin provides an NPN transistor open-collector output and has a current capacity of up to 30mA.
5	GND	Grounded
6	I <sub>1</sub> <sup>+</sup>	Non-inverted PNP input pin for comparator 1.
7	I <sub>2</sub> <sup>+</sup>	Non-inverted PNP input pin for comparator 2.
8	O <sub>2</sub>	Comparator 2 output pin. This pin provides an NPN transistor open-collector output and has a current capacity of up to 30mA.
9	V <sub>CC</sub>	Power supply pin which connects to a 6V Zener diode.

**TIMING CHART**



## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Current	I <sub>CC</sub>	30	mA
Input Voltage	V <sub>IN</sub>	-0.3~30	V
Output Voltage	V <sub>OUT</sub>	-0.3~30	V
Output Current	I <sub>OUT</sub>	30	mA
Power Dissipation	P <sub>D</sub>	350 (Note)	mW
Operating Temperature	T <sub>opr</sub>	-40~85	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C

(Note) Ta ≤ 85°C

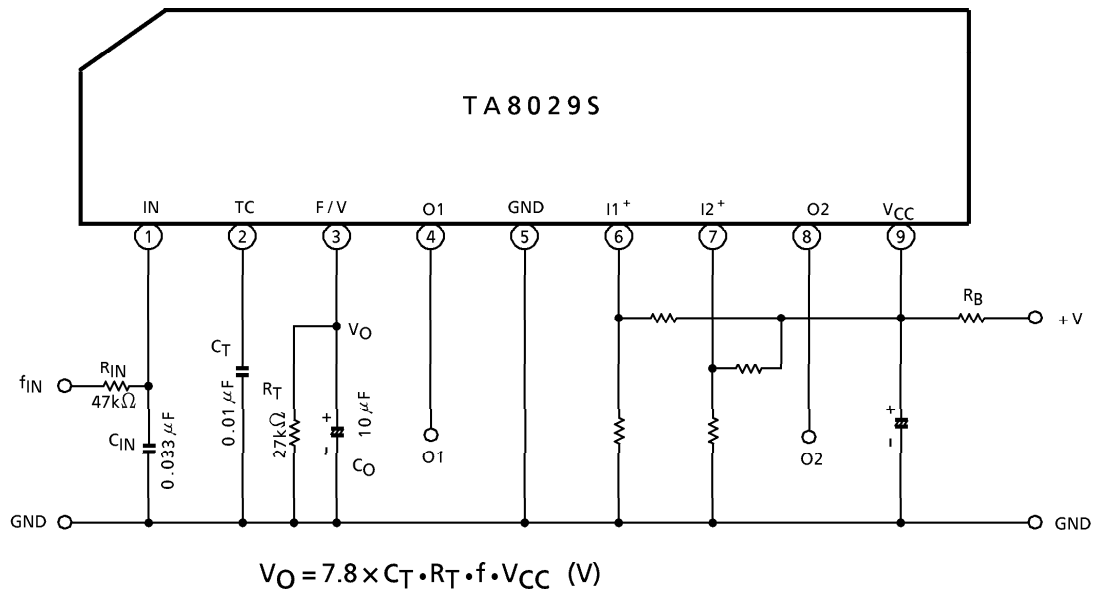
ELECTRICAL CHARACTERISTICS (Ta = 25°C, V<sub>CC</sub> = 5V)

CHARACTERISTIC	SYMBOL	PIN	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Current Consumption	I <sub>CC</sub>	V <sub>CC</sub>	—	—	—	3.0	5	mA
Regulated Voltage	V <sub>R</sub>	V <sub>CC</sub>	—	I <sub>CC</sub> = 12mA	5.5	6.0	6.5	V
Input Current	I <sub>IN</sub>	IN	—	V <sub>IN</sub> = 0~20V	-10	—	10	μA
Input Voltage	V <sub>IH</sub>	IN	—	—	2.8	—	—	V
	V <sub>IL</sub>		—	—	—	—	0.8	
Input Rise Rate	V <sub>LH</sub>	IN	—	—	0.5	—	—	V/ms
Input Fall Rate	V <sub>HL</sub>	IN	—	—	0.1	—	—	V/ms
Output Current	I <sub>OL</sub>	TC	—	V <sub>TC</sub> = 2.5V	—	4.3	—	μA
	I <sub>OH</sub>		—	V <sub>TC</sub> = 2.5V	—	-73	—	
	I <sub>OH</sub>	F/V	—	—	-250	-350	-500	
F/V Conversion Coefficient	K	F/V	—	C <sub>T</sub> = 0.01μF, R <sub>T</sub> = 27kΩ f = 100Hz (Note 1)	—	7.8	—	—
Linearity	—	—	—	C <sub>T</sub> = 0.01μF, R <sub>T</sub> = 27kΩ (Note 2)	—	±3.0	—	%
Input Offset Voltage	V <sub>IO</sub>	I <sub>1</sub> <sup>+</sup> / I <sub>2</sub> <sup>+</sup>	—	—	—	2	10	mV
Input Current	I <sub>IN</sub>	I <sub>1</sub> <sup>+</sup> / I <sub>2</sub> <sup>+</sup>	—	—	—	-0.2	-1	μA
Common-mode Input Voltage	V <sub>CM</sub>	I <sub>1</sub> <sup>+</sup> / I <sub>2</sub> <sup>+</sup>	—	—	0	—	V <sub>CC</sub> -1.5	V
Voltage Gain	A <sub>V</sub>	—	—	—	—	100	—	dB
Output Voltage	V <sub>OL</sub>	O <sub>1</sub> / O <sub>2</sub>	—	I <sub>OL</sub> = 10mA	—	—	0.5	V
Output Leakage Current	I <sub>LEAK</sub>	O <sub>1</sub> / O <sub>2</sub>	—	V <sub>O</sub> = 16V	—	—	5	μA

Notes :

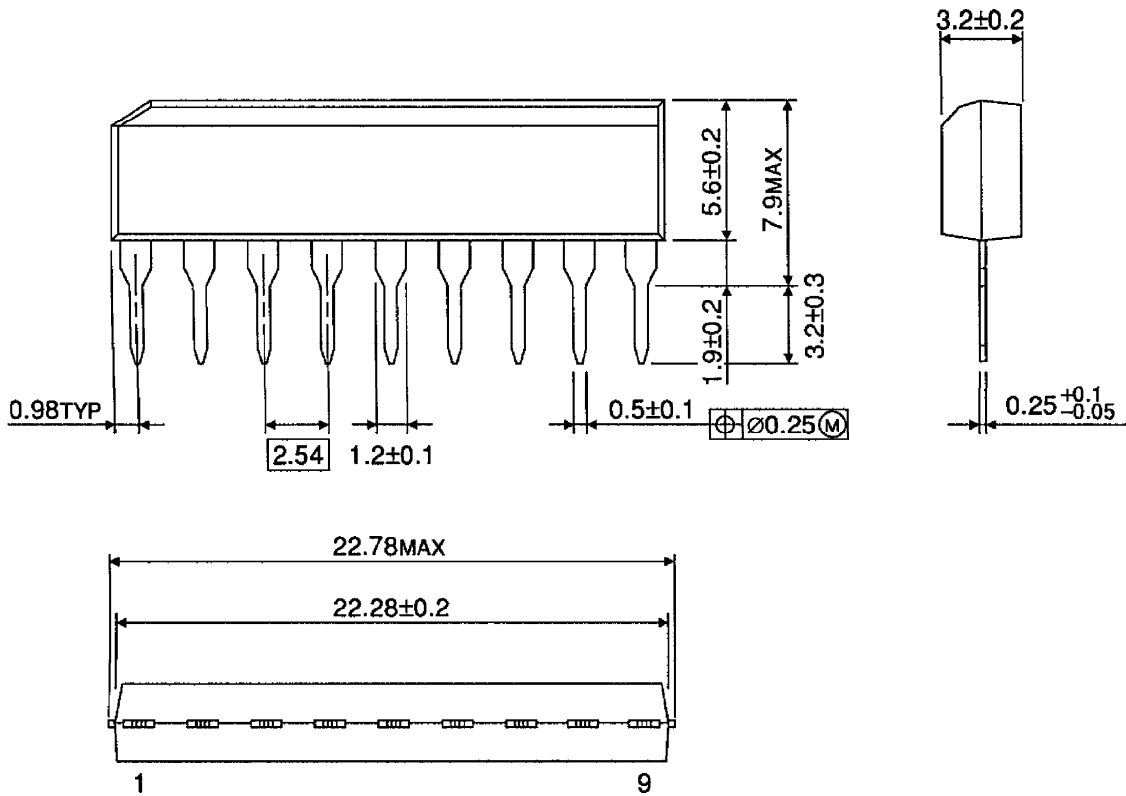
1. Calculated from  $V_O = K \cdot V_{CC} \cdot C_T \cdot R_T \cdot f$
2. Straight line deviation at f = 50Hz and f = 150Hz relative to that at f = 100Hz

EXAMPLE OF APPLICATION CIRCUIT



OUTLINE DRAWING  
SIP9-P-2.54A

Unit : mm



Weight : 0.92g (Typ.)