

TONE RINGER (For telephone set)

- Current consumption is small. (at no-load)
- Package is compact. (DIP-8 pin)
- Oscillation frequency is variable.
- Built-in threshold circuits prevent false triggering due to power noise as well as "chirps" due to rotary dial.
- Few external components.

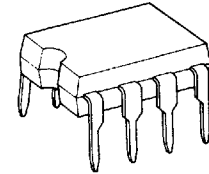
DIFFERENCE BETWEEN TA31002P/F AND TA31002AP/AF

NAME OF PRODUCT	INITIATION SUPPLY VOLTAGE	SUSTAINING SUPPLY VOLTAGE
TA31002P/F	19V (Typ.)	12V (Typ.)
TA31002AP/AF	16V (Typ.)	9V (Typ.)

MAXIMUM RATINGS (Ta=25°C)

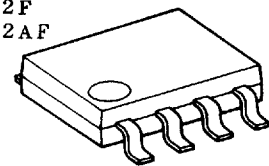
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{CC}	30	V
Power Dissipation	P/AP Type	800	mW
	F/AF Type	350	
Operating Temperature	T _{opr}	-40~85	°C
Storage Temperature	T _{stg}	-55~150	°C

TA31001P
TA31002P
TA31002AP



DIP8-P-300A

TA31001F
TA31002F
TA31002AF

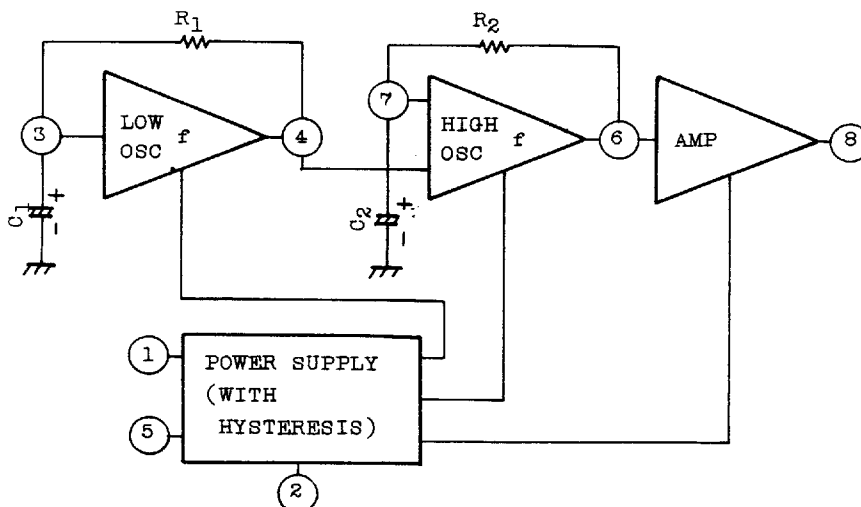


SOP8-P-225

Weight:

DIP16-P-300A: 1.0g(Typ.)
SSOP16-P-225: 0.2g(Typ.)

BLOCK DIAGRAM



Note: R₁, R₂, C₁ and C₂ are parts externally mounted.

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TA31001P-1

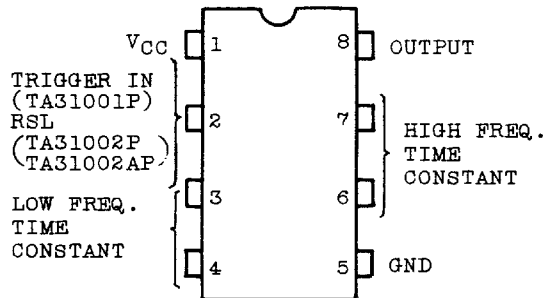
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PIN CONNECTION

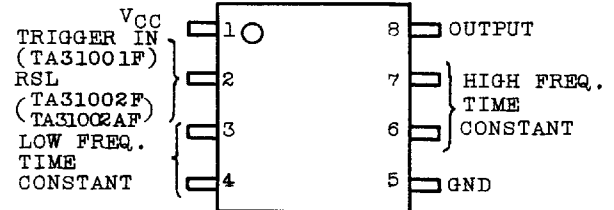
TA31001P/TA31002P/TA31002AP

(TOP VIEW)



TA31001F/TA31002F/TA31002AF

(TOP VIEW)



ELECTRICAL CHARACTERISTICS (Ta=25°C) TA31001P/F, TA31002P/F

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V _{opr}	-		-	-	29	V
Initiation Supply Voltage	V _{si}	-	(Note 1)	17	19	21	V
Sustaining Supply Voltage	V _{sus}	-	(Note 2)	10.5	12	-	V
Initiation Current Consumption	I _{si}	-	No-Load	1.4	3.3	4.2	mA
Sustaining Current Consumption	I _{sus}	-		0.7	1.4	2.5	mA
Oscillation Frequency (Note 3)	f _L	-	C ₁ =0.47μF, R ₁ =165kΩ	9	10	11	Hz
	f _{H1}	-	C ₂ =6800pF, R ₂ =191kΩ	461	512	563	
	f _{H2}	-		576	640	703	
Output Voltage	"H" Level	V _{OH}	V _{CC} =24V, I _{OH} =-10mA PIN 7=GND	20.0	21.5	22.5	V
	"L" Level	V _{OL}	V _{CC} =24V, I _{OL} =10mA PIN 7=7V	0.7	1.0	2.0	
TRIGGER IN Terminal Operating Voltage (TA31001P/F)	V _{Trig}	-	V _{CC} =15V I (PIN)=100μA	7.8	10	11.5	V

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ELECTRICAL CHARACTERISTICS (Ta=25°C) TA31002AP/AF

CHARACTERISTIC		SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage		Vopr	-		-	-	29	V
Initiation Supply Voltage		Vsi	-	(Note 1)	14	16	18	V
Sustaining Supply Voltage		Vsus	-	(Note 2)	8.4	9.0	-	V
Initiation Current Consumption		I _{si}	-	No-Load	1.1	2.7	3.6	mA
Sustaining Current Consumption		I _{sus}	-		0.3	0.8	1.8	mA
Oscillation Frequency (Note 3)		f _L	-	C ₁ =0.47μF, R ₁ =165kΩ	9	10	11	Hz
		f _{H1}	-	C ₂ =6800pF, R ₂ =191kΩ	461	512	563	
		f _{H2}	-		576	640	703	
Output Voltage	"H" Level	V _{OH}	-	V _{CC} =24V, I _{OH} =-10mA PIN 7=GND	20.0	21.5	22.5	V
	"L" Level	V _{OL}	-	V _{CC} =24V, I _{OL} =10mA PIN 7=5V	0.7	1.0	2.0	

Note 1. Initiation Supply Voltage (V_{si}) is a supply voltage required to start oscillation of the tone ringer.

2. Sustaining Supply Voltage (V_{sus}) is a supply voltage required to maintain oscillation of the tone ringer.

3. Oscillation frequency is determined by the following equations 1,2, and 3.

(1) $f_L = 1/1.234 \cdot R_1 \cdot C_1$ (Hz), (2) $f_{H1} = 1/1.515 \cdot R_2 \cdot C_2$ (Hz), (3) $f_{H2} = 1.24 f_{H1}$ (Hz)

METHOD OF USING PIN 2
1. TA31001P/F METHOD OF USING TRIGGER IN

Usually PIN 2 is used at an open state, but in the TA31001P/F, the TRIGGER IN terminal can prohibit oscillation and also can change the initiation supply voltage (V_{si}).

When the TA31001P/F is oscillating ($V_{sus} < V_s$), if PIN 2 is connected to GND as shown in Fig. 1a, the TA31001P/F can stop oscillating. Further, the oscillation of the TA31001P/F can be stopped by connecting PIN 2 to voltage V_I through the resistor R_I as shown in Fig. 1b.

In case of $V_{sus} < V_s \leq V_{si}$, the oscillation of the TA31001P/F can be started by forcing a current I_E ($4\mu A < I_E < 1mA$) into PIN 2.

If PIN 2 is connected to V_s as shown in Fig. 2a, oscillation can be started under a lower supply voltage than the initiation supply voltage at the time when PIN 2 is used at an open state.

Further, the initiation supply voltage (V_{si}) can be changed by using a zener diode as shown in Fig. 2b.

V_{si} is determined by the following formulas:

$$V_{si} = V_{Trig} + V_Z + 4R_E$$

$$R_E = (M\Omega)$$

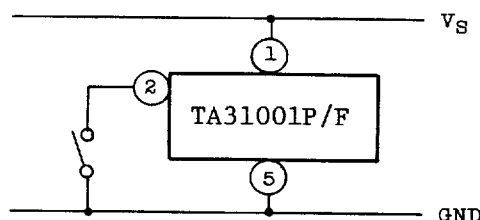


Fig. 1a

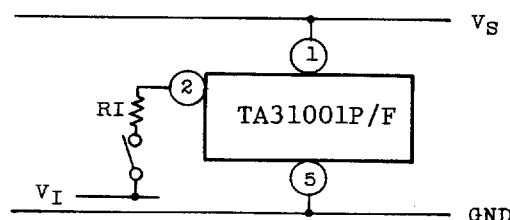
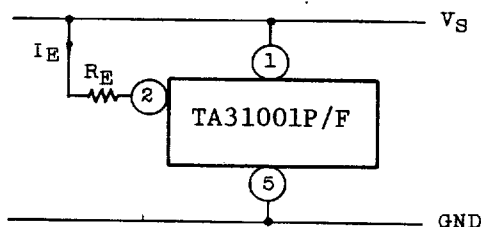


Fig. 1b $0 \leq V_I \leq 0.5V$
 $0 \leq R_I \leq 20k\Omega$



$$10k\Omega < R_E < \frac{(V_s - 10)}{4} \quad (M\Omega)$$

Fig. 2a

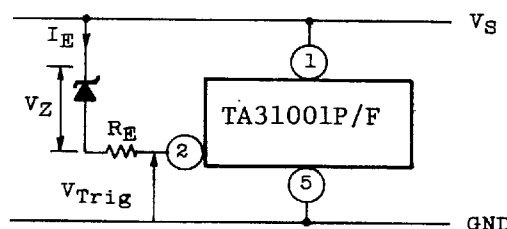


Fig. 2b

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2. TA31002P/F, TA31002AP/AF METHOD OF USING RSL

In the TA31002P/F, TA31002AP/AF the initiation current consumption (I_{Si}) can be changed by using the RSL terminal.

The resistor RSL is connected to GND from PIN 2 as shown in Fig. 3.

Further, the initiation current consumption (I_{Si}) can be changed by changing the value of RSL.

Fig. 4 and Fig. 5 show the graph of V_S - I_S

characteristic at the time when RSL has been changed to three values. The V_S - I_S characteristic in TA31002P/F at the time when $R_{SL}=6.8k\Omega$ coincides with that at the time when PIN 2 of the TA31001P/F has been used at an open state.

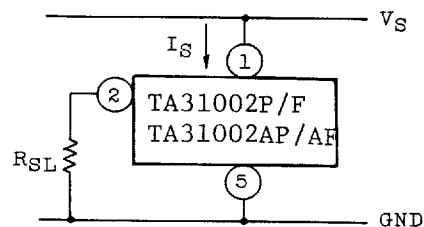


Fig. 3

TA31002P/F SUPPLY VOLTAGE-CURRENT CONSUMPTION

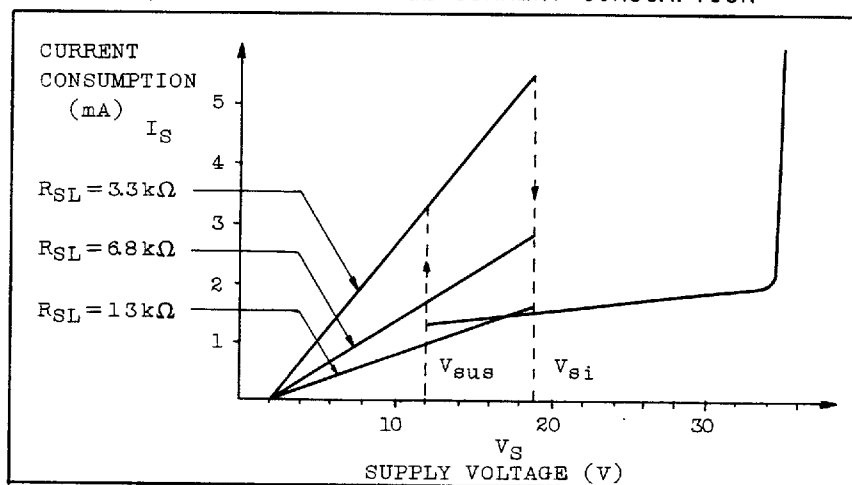


Fig. 4

TA31002AP/AF SUPPLY VOLTAGE-CURRENT CONSUMPTION

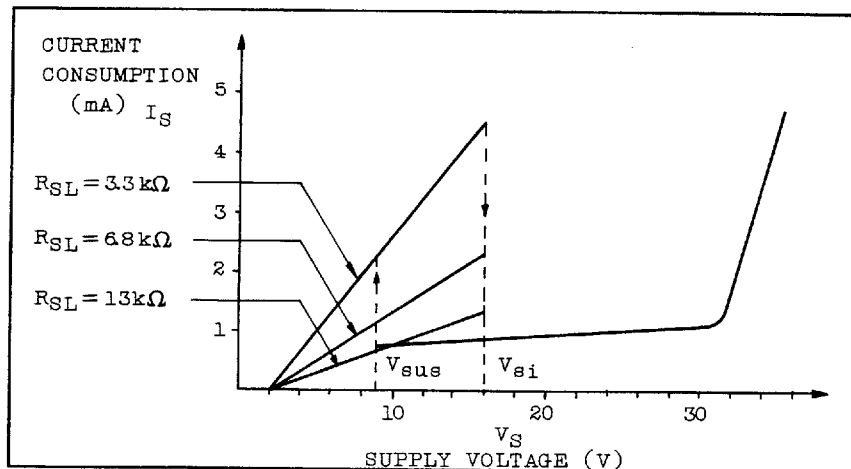
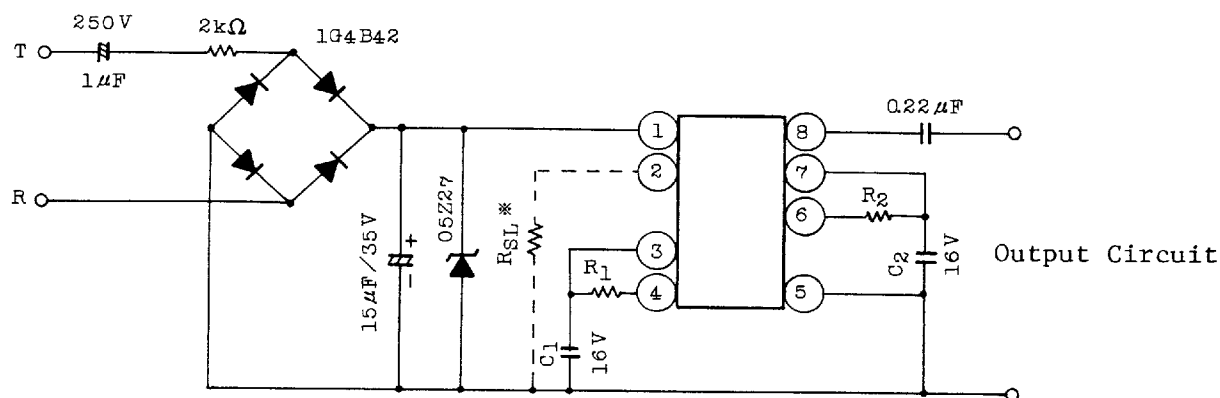


Fig. 5

APPLICATION CIRCUIT OF TONE RINGER


* Use for TA31002P/F, TA31002AP/AF

$$f_L = 1 / 1.234 R_1 \cdot C_1$$

$$f_{H1} = 1 / 1.515 R_2 \cdot C_2$$

$$f_{H2} = 1.24 f_{H1}$$

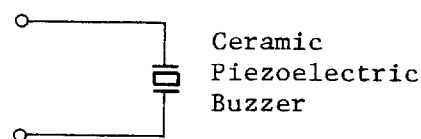
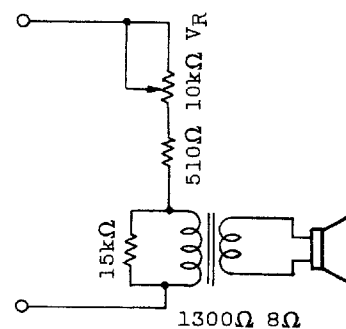
Example $R_1 = 165k\Omega$ $R_2 = 191k\Omega$
 $C_1 = 0.47\mu F$ $C_2 = 0.0068\mu F$

$$f_L \approx 10Hz$$

$$f_{H1} \approx 500Hz$$

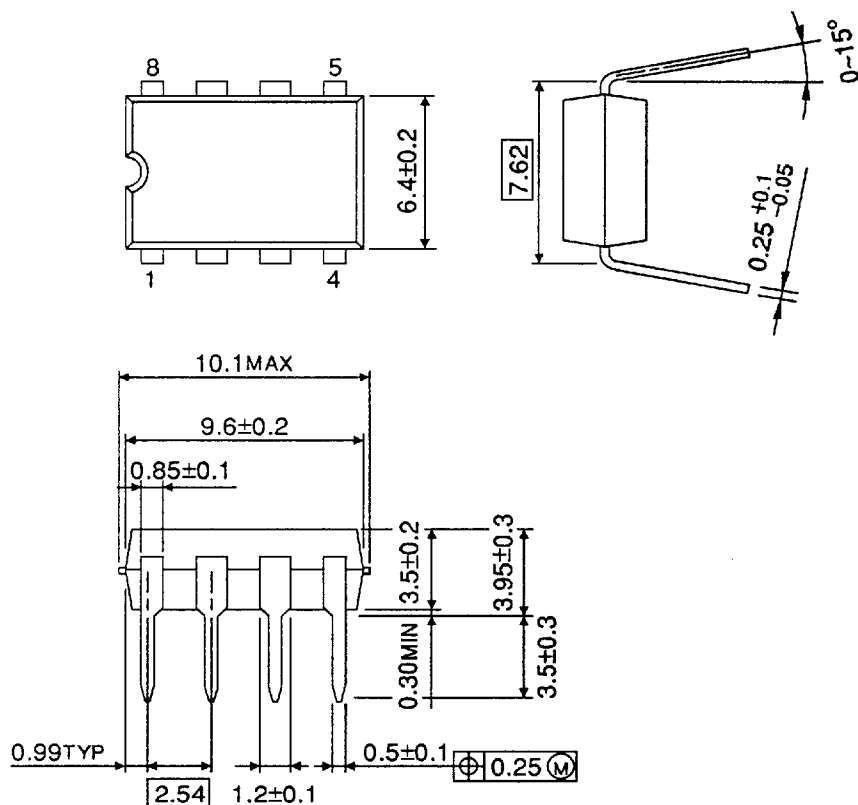
$$f_{H2} \approx 630Hz$$

Example of
Output Circuit



OUTLINE DRAWING
DIP8-P-300A

Unit in mm



Weight : 0.5g (Typ.)