



FORWARD INTERNATIONAL ELECTRONICS LTD.

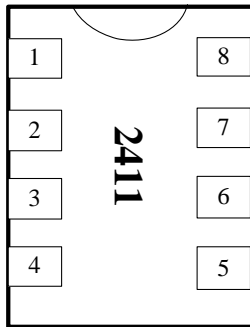
SEMICONDUCTOR  
TECHNICAL DATA**K2411**

TELEPHONE TONE RINGER

The 2411 is a bipolar integrated circuit designed for telephone tone ringer.

**Features**

- \* Designed for telephone bell replacement
- \* Adjustable 2-tone frequency
- \* Hysteresis circuit prevents false triggering and rotary dial "Chirps"
- \* Adjustable for reduced supply initiation current

**Package: DIP-8**

Pin No	Name	Function
1	VCC	Power supply (+)
2	RSL	Resistor select
3	LFI	Low freq osc input
4	LFO	Low freq osc output
5	GND	Ground (-)
6	HFO	High freq osc output
7	HFI	High freq osc input
8	OUT	Signal output

**ABSOLUTE MAXIMUM RATING**

Parameter	Symbol	Rating	Unit
DC Supply Voltage	V <sub>cc</sub>	36	V
Power Dissipation	P <sub>d</sub>	450	mW
Operating Temperature	T <sub>opr</sub>	-25~+75	
Storage Temperature	T <sub>stg</sub>	-55~+125	

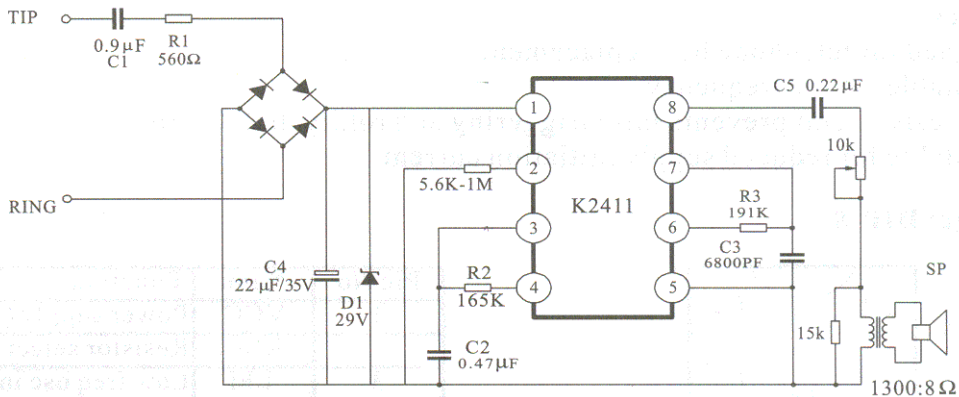
**ELECTRICAL CHARACTERISTICS V<sub>CC</sub>=24V, T<sub>a</sub>=25 (Unless otherwise specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Operating Supply Voltage	V <sub>cc</sub>				36	V
Initiation Supply Voltage (note 1)	V <sub>si</sub>		17	19	21	V
Initiation Supply Current	I <sub>si</sub>	V <sub>cc</sub> =V <sub>si</sub> , No Load, R <sub>sl</sub> =6.8k	1.4	3.5	4.2	mA
Sustaining Voltage (note 2)	V <sub>sus</sub>		9.7	11	13	V
Sustaining Current	I <sub>sus</sub>	V <sub>cc</sub> =V <sub>sus</sub> , No Load	0.2	1.4	2.5	mA
Output High Voltage	V <sub>OH</sub>	V <sub>cc</sub> =21V, I <sub>OH</sub> =15mA	17	19	21	V
Output Low Voltage	V <sub>OL</sub>	V <sub>cc</sub> =21V, I <sub>OL</sub> =15mA			1.6	V
High Frequency 1	F <sub>H1</sub>	R3=191K, C3=6800pF	461	512	563	Hz
High Frequency 2	F <sub>H2</sub>	R3=191K, C3=6800pF	576	640	703	Hz
Low Frequency	F <sub>L</sub>	R2=165K, C2=0.47uF	9	10	11	Hz

Note:

1. initiation supply voltage (V<sub>si</sub>) is the supply voltage required to start the tone ringer oscillating.
2. sustaining voltage (V<sub>sus</sub>) is the supply voltage required to maintain oscillation.

# APPLICATION CIRCUIT



$$F_L = 1/1.289R2C2$$

$$F_{H1} = 1/1.504R3C3$$

$$F_{H2} = 1/1.203R3C3$$