Telephone Tone Ringers

February 1995 - revised October 1999

DESCRIPTION

The KA2410/KA2411 is a bipolar integrated circuits for telephone tone ringer.
These devices consists of an output amplifier, two oscillators, and power supply control circuit.

FEATURES

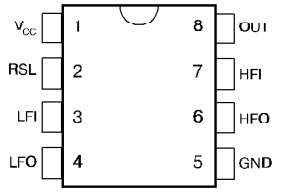
- Low current drain
- Adjustable 2 tone frequency
- Hysteresis circuit prevent false triggering and rotary dial «Chirps»
- 8 pin DIP plastic package
- External triggering or ringer disable (KA2410)
- Adjustable for reduced supply initiation current (KA2411)

APPLICATIONS

- Telephone bell replacement
- Extension tone ringer modules
- Alarms or other alerting devices

Pin Configuration

(TOP VIEW)



Pin Assignment

Pin	Name	Function
1	V_{CC}	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	Output

Absolute maximum ratings

Parameter	Symbol	Rating	Units
DC Supply voltage	V_{CC}	36	V
Power Dissipation	P_d	450	mW
Operating Ambient Temperature Range	T_A	-25...+75	°C
Storage Temperature Range	T_{STG}	-65...+150	

Note 1: Voltage values are with respect to the anode terminal unless otherwise noted

Electrical characteristics (V_{CC}=24V, T_a=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	MIN	TYP	MAX	UNIT
Operating Voltage	V_{CC}				36	V
Supply Initiation						
Voltage	V_{SI}	(Note 1)	17	19	21	
Current	I_{SI}	$V_{CC}=V_{SI}$, No load	1.4	2.5	4.2	mA
Sustaining						
Voltage	V_{SUS}	(Note 2)	9.7	10.5	12	V
Current	I_{SUS}	$V_{CC}=V_{SUS}$, No load	0.2	0.9	2.5	mA
Oscillator Freq. (Note 3)	f_L	R1=165kΩ, C1=0.47μF	9	10	11	Hz
Oscillator Freq. (Note 3)	f_{H1}	R2=191kΩ, C2=6800pF	461	512	563	Hz
Oscillator Freq. (Note 3)	f_{H2}	R2=191kΩ, C2=6800pF	576	640	703	Hz
Output		V_{CC}=21V				
High Voltage	V_{OH}	I_{OH}=15mA	17.7	19	21.5	V
Low Voltage	V_{OL}	I_{OL}=15mA			1.6	
Trigger						
Voltage (Note 4)	V_{TRG}	V_{CC}=15V	8.5		10.5	V
Current (Note 5)	I_{TRG}	KA2410 Only (2 pin)		20	1000	μA
Disable						
Voltage	V_{DIS}			0.4	0.8	V
Current (Note 6)	I_{DIS}	KA2410 Only (2 pin)	-40	-20		μA

Notes:
1. Supply initiation voltage is the value of DC supply voltage required to start the tone ringer oscillating.
2. Sustaining voltage is the value of DC supply voltage required to maintain the oscillation.
3. Oscillator frequency is determined by the following equations:
   $f_L=1/(1.359xR1xC1)$ (Hz)
   $f_{HI}=1/(1.518xR2xC2)$ (Hz)
   $f_{H2}=1.214xf_{HI}$ (Hz)
4. V_{tr} and I_{tr} the conditions applied to trigger input to start oscillation for $V_{sus} \le V_{CC} \le V_{si}$.
5. Trigger current must be limited to this value externally.
6. V_{dis} and I_{dis} are the conditions applied to trigger input to inhibit oscillation for $V_{si} \le V_{CC}$.

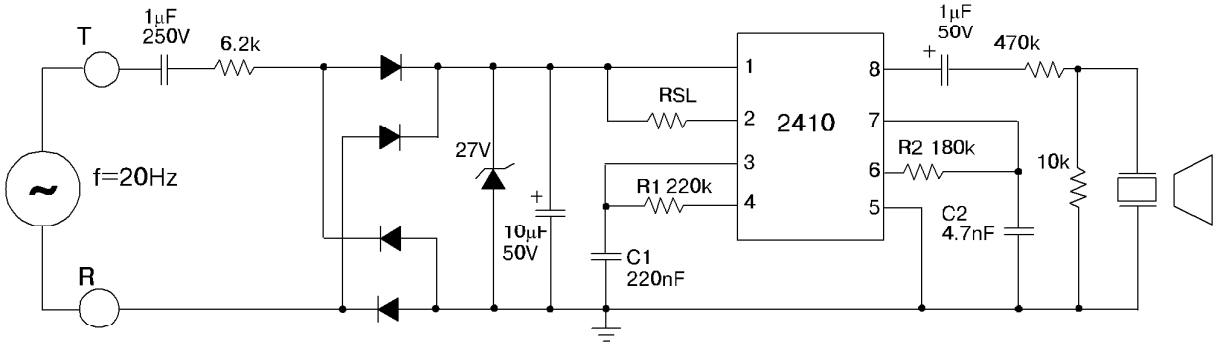


Fig.1 Application Circuit for 2410

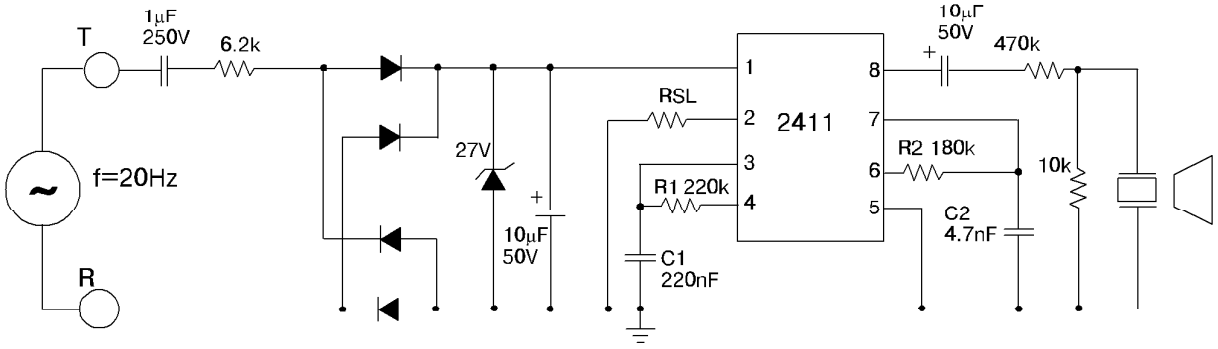


Fig.2 Application Circuit for 2411

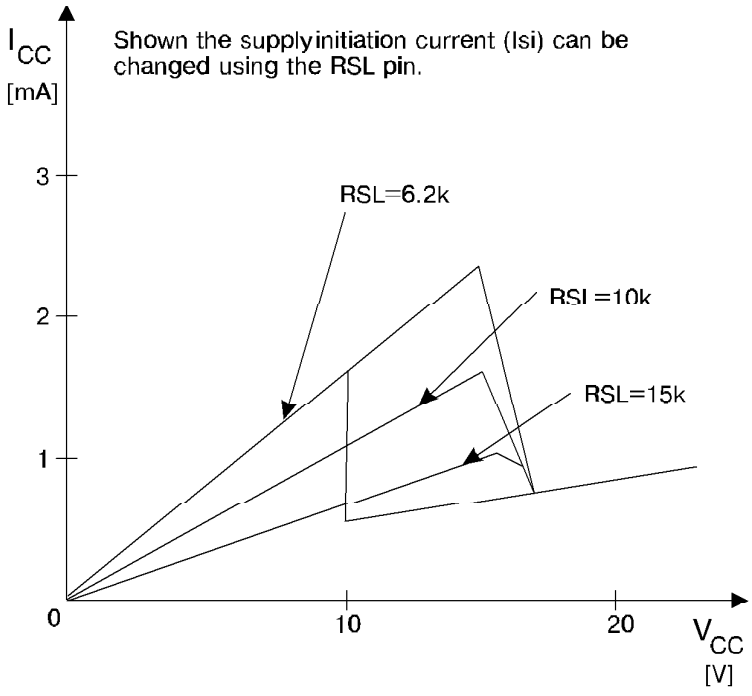
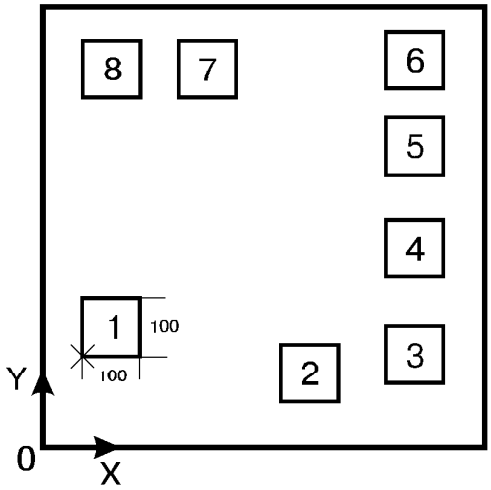


Fig.3 Use of RSL pin (for KA2411 only)

Pad Location KA2410/KA2411



Chip size 1.25x1.25 mm

Pad N	Pad Name	Coordinates	
		X (µm)	Y (µm)
1	VCC	75	250
2	RSL	640	81
3	LFI	1095	81
4	LFO	1095	469
5	GND	1095	731
6	HFO	1095	1037
7	HFI	447	1037
8	OUT	75	1037