



## KA2410/KA2411

## TELEPHONE TONE RINGERS

### DESCRIPTION

THE **KA2410/2411** IS A BIPOLAR INTEGRATED CIRCUIT DESIGNED 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 prevents false triggering and rotary dial "CHIRPS"
- ♦ 8 pin DIP plastic package
- ♦ External triggering or ringer disables (KA2410)
- ♦ Adjustable for reduced supply initiation current (KA2411)

8-pin DIP



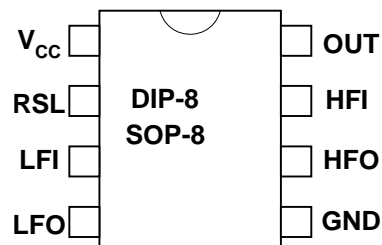
### APPLICATIONS

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

### PIN ASSIGNMENT

PIN	NAME	FUNCTION
1	V <sub>CC</sub>	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

### PIN CONFIGURATION (TOP VIEW)



### ABSOLUTE MAXIMUM RATINGS

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

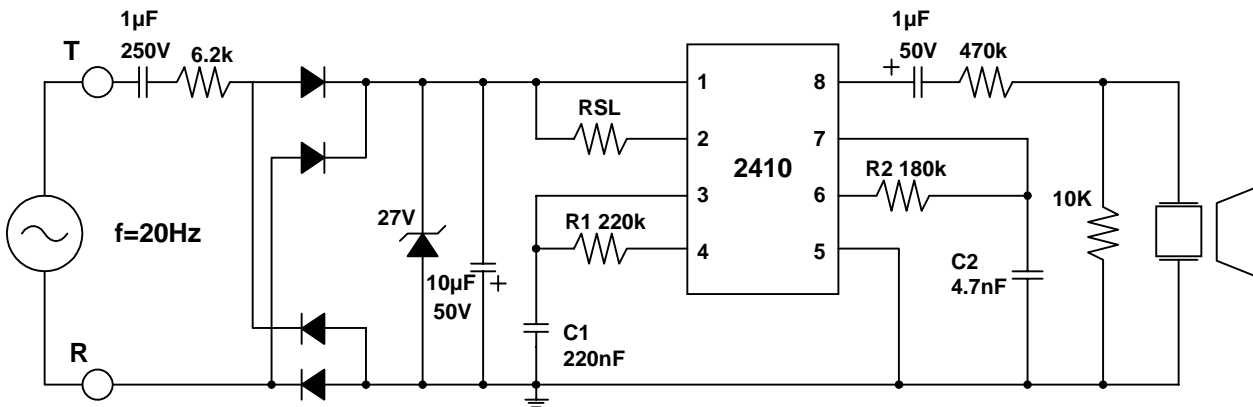
PARAMETER	SYMBOL	RATING	UNITS
DC Supply Voltage	V <sub>CC</sub>	36	V
Power Dissipation	P <sub>D</sub>	450	mW
Operating Ambient Temperature Range	T <sub>A</sub>	-25~+75	°C
Storage Temperature Range	T <sub>STG</sub>	-65~+150	

ELECTRICAL CHARACTERISTICS ( $V_{CC}=24V, T_A=25^{\circ}C$ , UNLESS OTHERWISE NOTED)

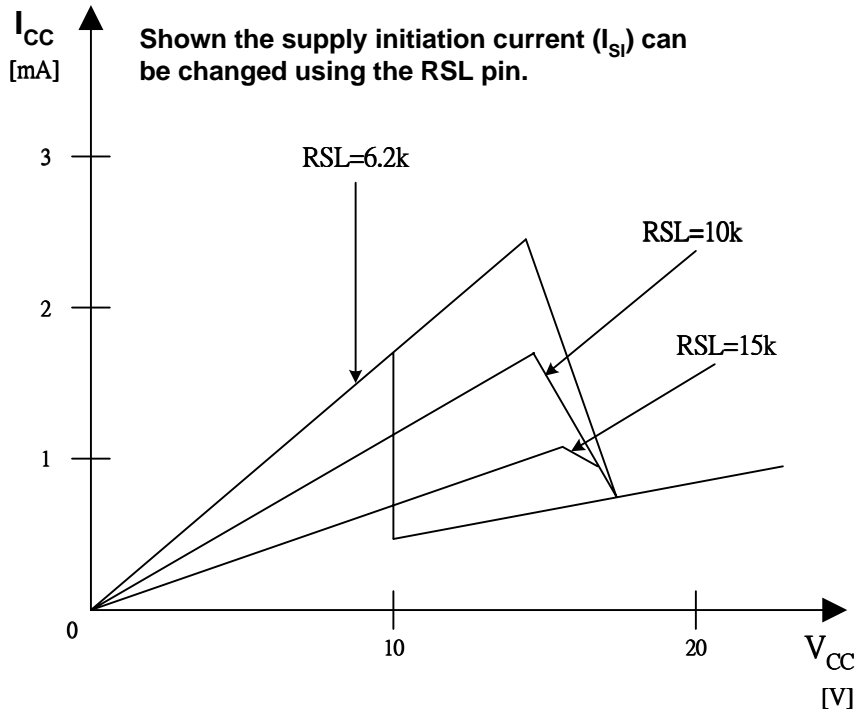
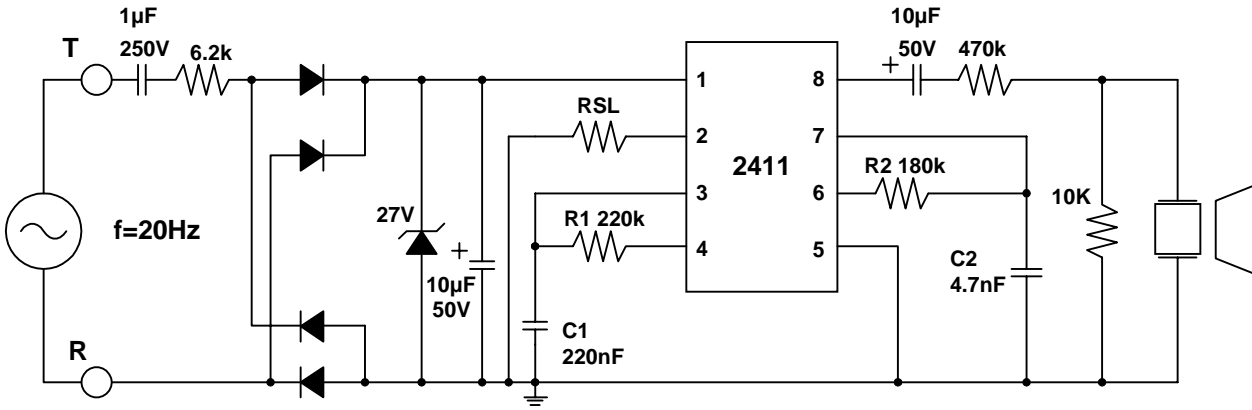
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	$V_{CC}$				36	V
Supply Initiation Voltage	$V_{SI}$		17	19	21	
Supply Initiation Current	$I_{SI}$	$V_{CC}=V_{SI}$ , No load #1	1.4	2.5	4.2	mA
Sustaining Voltage	$V_{SUS}$		9.7	10.5	12	V
Sustaining Current	$I_{SUS}$	$V_{CC}=V_{SUS}$ ,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

- #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:  
 $f_L = 1/(1.359XR1XC1)(Hz)$   
 $f_{H1} = 1/(1.518XR2XC2)(Hz)$   
 $f_{H2} = 1.214Xf_{H1} (Hz)$
- #4.  $V_{TR}$  and  $I_{TR}$  the conditions applied to trigger input to start oscillation for  $V_{SUS} \leq V_{CC} \leq V_{SI}$ .
- #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  $V_{SI} \leq V_{CC}$ .

APPLICATION CIRCUIT FOR 2410



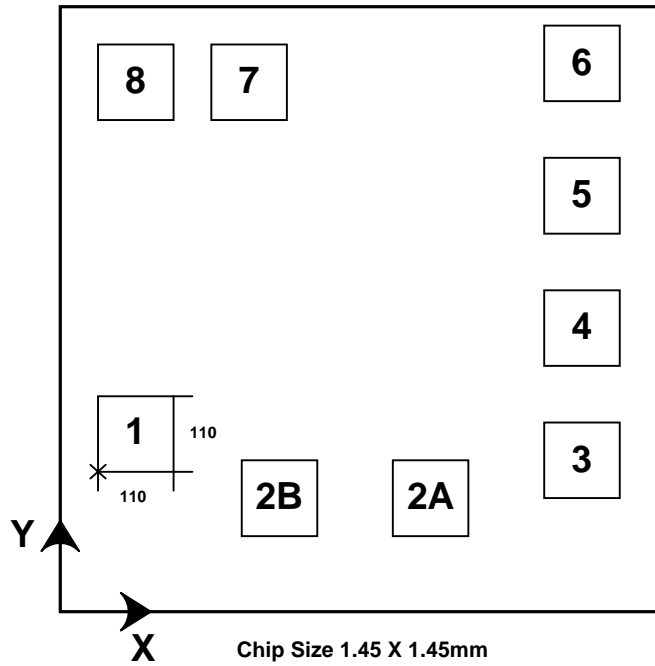
APPLICATION CIRCUIT FOR 2411



Shown the supply initiation current ( $I_{SI}$ ) can be changed using the RSL pin.

Use of RSL pin (for KA2411 only)

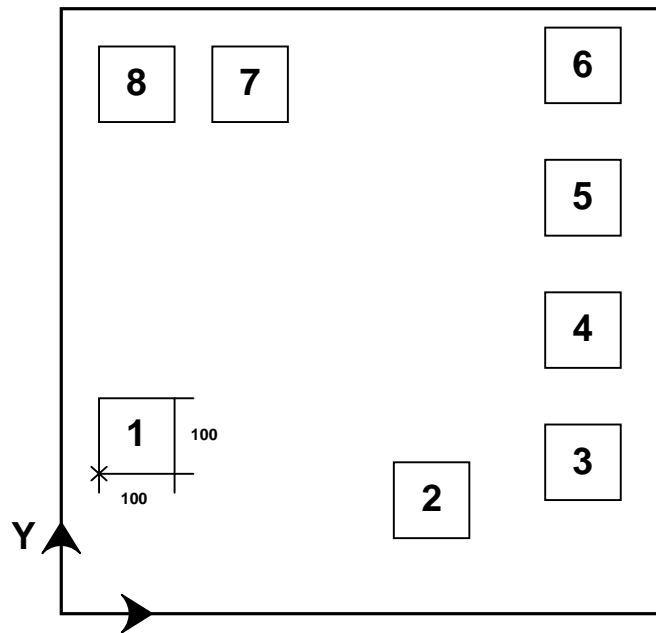
**Pad Location KA2410 / KA2411**



**For KA2410 2A pad to be used, 2B pad not connected;  
For KA2411 2B pad to be used, 2A pad not connected.**

Pad N	Pad Name	Coordinates	
		X (µm)	Y (µm)
1	V <sub>CC</sub>	95	270
2A	RSL	925	90
2B		690	90
3	LFI	1245	90
4	LFO	1245	490
5	GND	1245	765
6	HFO	1245	1185
7	HFI	460	1185
8	OUT	95	1185

**Pad Location KA2410 / KA2411 ( new design )**



Chip Size 1.25 X 1.25mm

Pad N	Pad Name	Coordinates	
		X (µm)	Y (µm)
1	V <sub>CC</sub>	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