



## 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



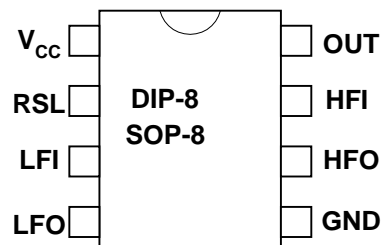
### APPLICATIONS

- ♦ 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

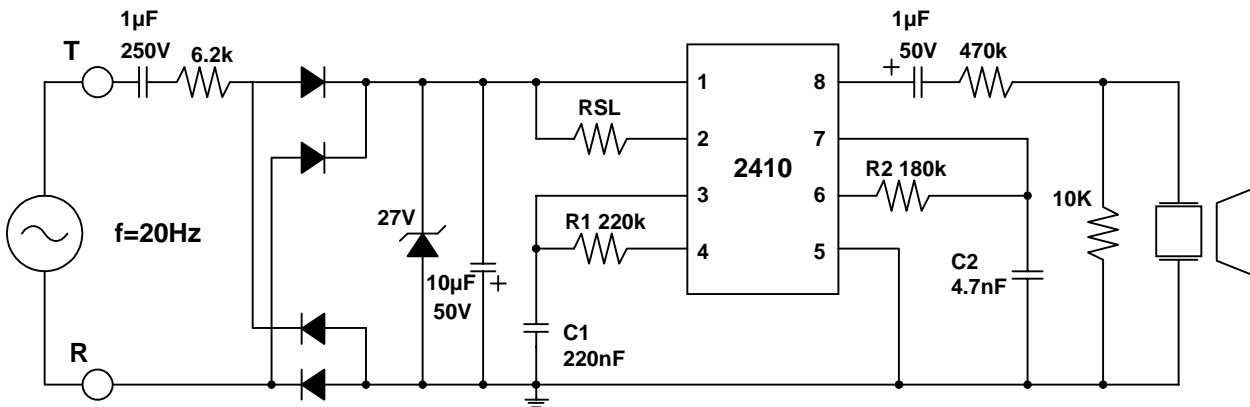
| PARAMETER                           | SYMBOL           | RATING   | UNITS |
|-------------------------------------|------------------|----------|-------|
| DC Supply Voltage                   | V <sub>CC</sub>  | 36       | V     |
| Power Dissipation                   | P <sub>D</sub>   | 450      | 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)

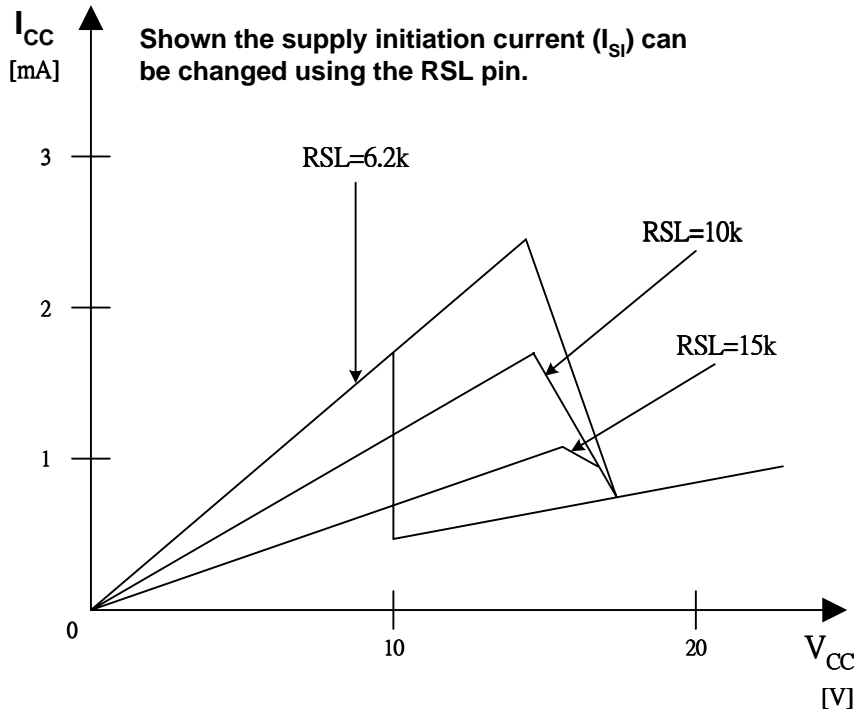
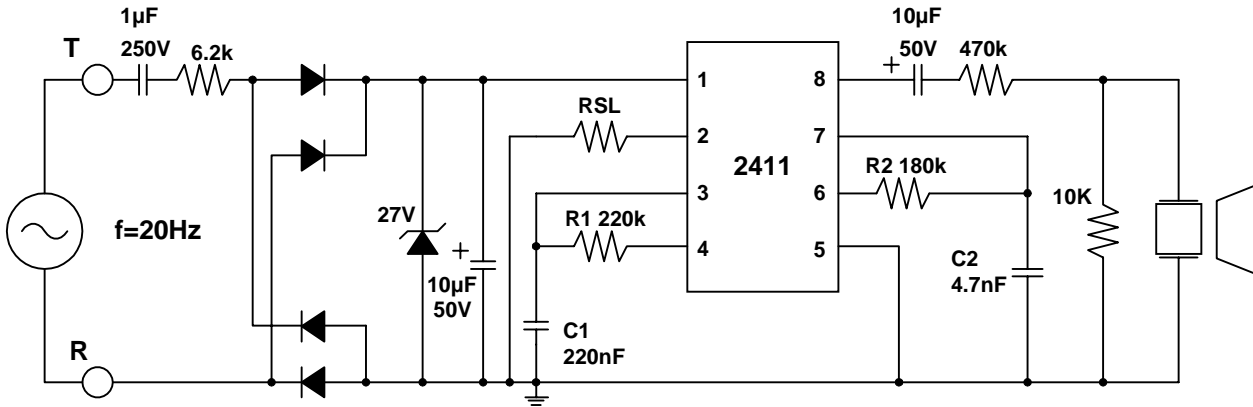
| PARAMETER                 | SYMBOL    | TEST CONDITIONS               | MIN  | TYP  | MAX  | UNIT |
|---------------------------|-----------|-------------------------------|------|------|------|------|
| Operating Voltage         | $V_{CC}$  |                               |      |      | 36   | V    |
| 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       | $V_{OH}$  | $V_{CC}=21V$<br>$I_{OH}=15mA$ | 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

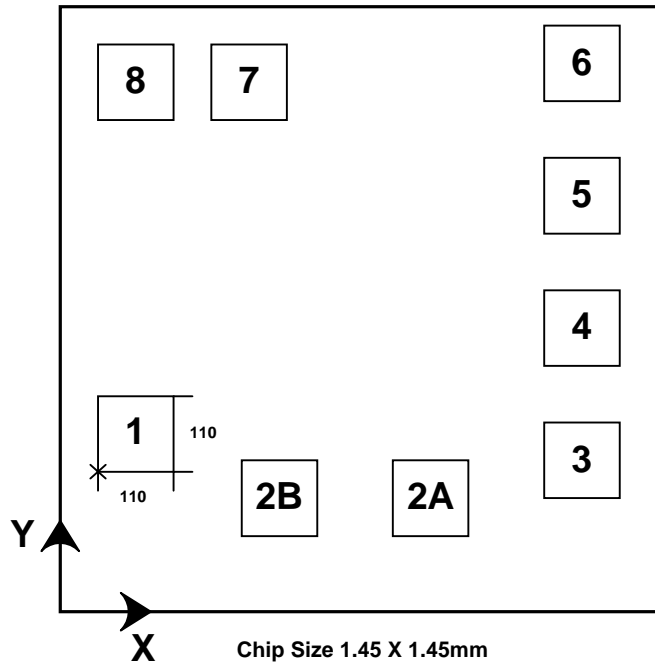


APPLICATION CIRCUIT FOR 2411



Use of RSL pin (for KA2411 only)

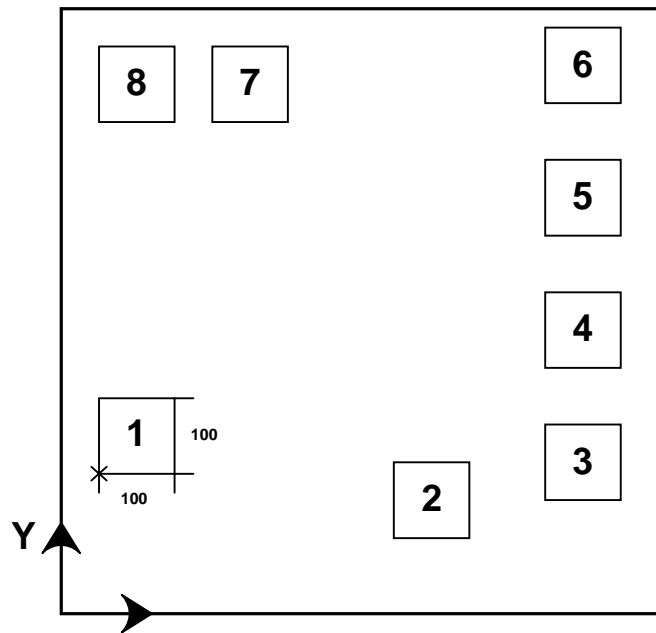
**Pad Location KA2410 / KA2411**



**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   |