DATA SHEET
MARCH 2003

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REV 1-03

REPLACEMENT
of **KA2411**

MIKA2411
TONE RINGER

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GENERAL DESCRIPTION

The MIKA2411 is a bipolar integrated circuit designed for telephone bell replacement.

It can also be used as alarms or other alerting devices — telephones, multi-function telephones, telephone answering machines, facsimiles, equipment involving telephones.

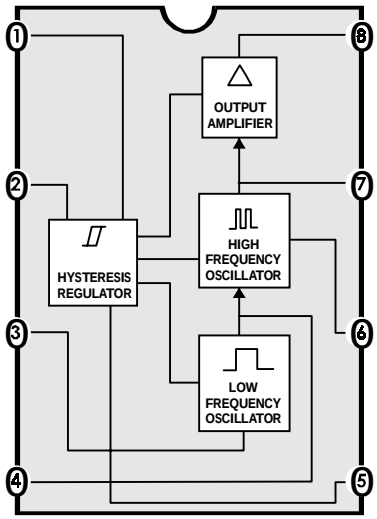
FEATURES

- Low current drain
- Adjustable 2 tone frequency
- Hysteresis circuit prevent false triggering and rotary dial «Chirps»
- Small size DIP8 plastic package
- Adjustable for reduced supply initiation current

DIP-8  **MIKA2411**

PIN DESCRIPTIONS & SCHEMATIC DIAGRAM

PIN No.	PIN NAME	NAME	FUNCTION
1	V_{CC}	Power supply pin	This is the power supply pin for the IC. It is connected to the (+) pin of the diode bridge.
2	RSL	RSL pin	This is used to change the operation initiation current when connected to the GND pin.
3	LFI	Low-frequency time constant connector pin	This is connected to the time constant that determines the oscillation frequency on the warble.
4	LFO		
5	GND	GND pin	This pin has the lowest potential on the IC. It is connected to the (-) pin of the diode bridge.
6	HFO	High-frequency time constant connector pin	This is connected to the time constant that determines the oscillation frequency on the tone side (the audible frequency side).
7	HFI		
8	OUT	Output pin	This is used to connect a piezoelectric buzzer, or to connect a dynamic speaker through a transformer.



ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	DC supply voltage	29	V
P_d	Power dissipation	450	mW
T_A	Operating ambient temperature range	-25 ÷ +75	°C
T_{STG}	Storage temperature range	-65 ÷ +150	°C

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

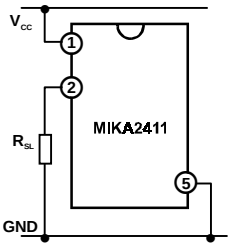
ELECTRICAL CHARACTERISTICS (V_{CC}=24V, T_A=25°C, unless otherwise noted)

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{CC}	Operating Voltage				29.0	V
Supply Initiation						
V_{SI}	Voltage	(Note 1)	17.0	19.0	21.0	V
I_{SI}	Current	V_{CC} =V_{SI}, No load	1.4	2.5	4.2	mA
Sustaining						
V_{SUS}	Voltage	(Note 2)	9.7	10.5	12.0	V
I_{SUS}	Current	V_{CC} =V_{SUS}, No load	0.2	0.9	2.5	mA
Oscillator						
f_L	Frequency Low (Note 3)	**R1** =165kΩ, **C1** =0.47μF	9.0	10.0	11.0	Hz
f_{H1}	Frequency High (Note 3)	**R2** =191kΩ, **C2** =6800pF	461.0	512.0	563.0	Hz
f_{H2}	Frequency High (Note 3)	**R2** =191kΩ, **C2** =6800pF	576.0	640.0	703.0	Hz
Output						
V_{OH}	High Voltage	V_{CC}=21V, I_{OH}=15mA	17.7	19.0	21.5	V
V_{OL}	Low Voltage	I_{OL}=15mA			1.6	V

Note 1: Supply initiation voltage is the value of DC supply voltage required to start the tone ringer oscillating.
Note 2: Sustaining voltage is the value of DC supply voltage required to maintain the oscillation.
Note 3: Oscillator frequency is determined by the following equations:
f_L =1/(1.359 x R1 x C1) (Hz)
f_{HI} =1/(1.518 x R2 x C2) (Hz)
f_{H2} =1.214 x f_{HI} (Hz)

CIRCUIT OPERATION

With the MIKA2411, the **RSL** pin can be used to change the initial supply current (I_{SI}).
As shown in Figure 1, resistor R_{SL} is connected from the **RSL** pin (Pin 2) to the **GND**. The operation initiation current consumption can be changed by changing the value of the resistor R_{SL}.
Figure 2 shows the supply voltage (V_{CC}) – supply current (I_{CC}) characteristics when the value of the resistor R_{SL} is changed.



↑ Fig. 1

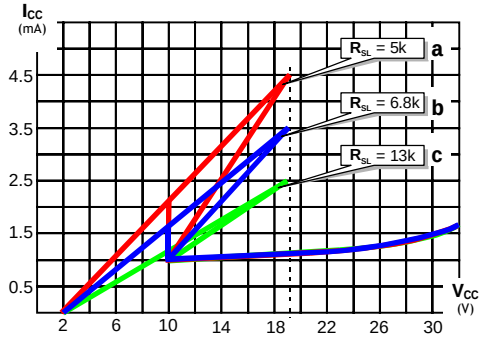


Fig. 2 ↗

APPLICATION INFORMATION

The application circuit illustrates the use of the MIKA2411 device in typical telephone or extensive tone ringer applications. The AC ringer signal voltage appears across the **TIP** and **RING** inputs of the circuit and is attenuated by capacitor C1 and resistor R1. C1 also provides isolation from DC voltages (48V) on the exchange line.

After full wave rectification by the bridge diode, the waveform is filtered by capacitor C2 to provide a DC supply for the tone ringer chip. When this voltage exceeds the initiation (V_{SI}), oscillation starts.

With the components shown, the output frequency chops between 512 Hz (f_{H1}) and 640Hz (f_{H2}) at a 10Hz (f_L) rate. The loudspeaker load is coupled through a 1300Ω to 8Ω transformer. The output coupling capacitor C4 is required with transformer coupled loads.

When driving a piezo-ceramic transducer type load, the coupling C4 and transformer (1300Ω:8Ω) are not required. However, a current limiting resistor is required. The low frequency oscillator oscillates at a rate (f_L) controlled by an external resistor (R2) and capacitor (C3). The frequency can be determined using the relation $f_L = 1/(1.289\ R2 \times C3)$. The high frequency oscillates at a f_{H1}, f_{H2} controlled by an external resistor (R3) and capacitor (C5). The frequency can be determined using the relation $t_{HI} = 1/(1.504\ R3 \times C5)$ voltage remains constant independent of R_{SL}.

Pin 2 of the MIKA2411 allows connection of an external resistor R_{SL}, which is used to program the slope of the supply current vs supply voltage characteristics (see Fig. 2) and hence the supply current up to the initial voltage (V_{SI}). This initial voltage remains constant independent of R_{SL}.

The supply current drawn prior to triggering varies inversely with R_{SL}, decreasing for an increasing value of resistance. Thus, increasing the value of R_{SL}, will decrease the amount of AC ringing current required to trigger the device. As such longer subscriber loops are possible since less voltage is dropt per unit length of loop wire due to the lower current level. R_{SL} can also be used to compensate for smaller AC coupling capacitors (C4 on Fig. 3) (higher impedance) to the line which is used to alter the ringer equivalence number of a tone ringer circuit.

The graph in Fig. 2 illustrates the variation of supply current with supply voltage of the MIKA2411. Three curves are drawn to show the variation of initiation current with R_{SL}. Blue curve (**b**) (R_{SL} = 6.8kΩ) shows the V_{CC}/I_{CC} characteristic for the MIKA2411 tone ringer. Red curve (**a**) is a plot with R_{SL} < 6.8kΩ and shows an increase in the current drawn up to the initiation voltage V_{SI}. After initiation, the V_{CC}/I_{CC} characteristic remain unchanged. Green curve (**c**) illustrates the effect of increasing R_{SL} above 6.8kΩ initiation current decreases but is unchanged again after triggering.

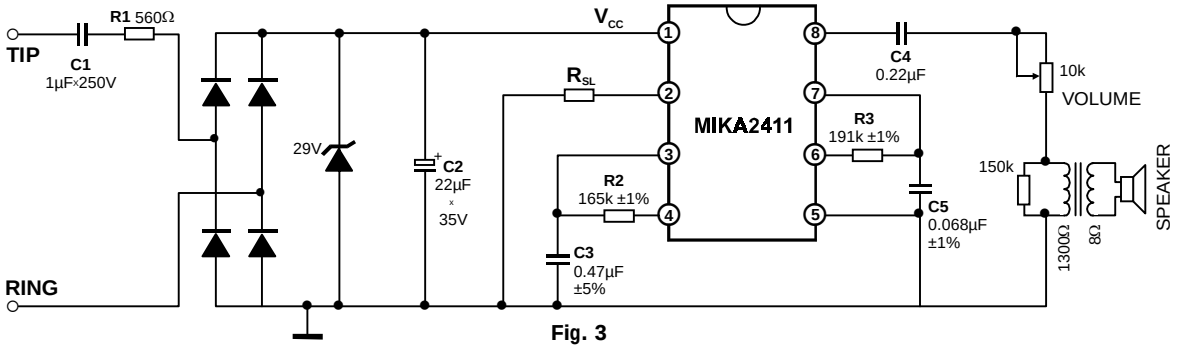
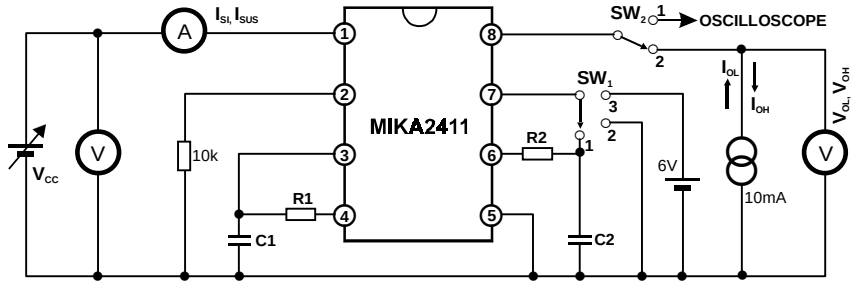


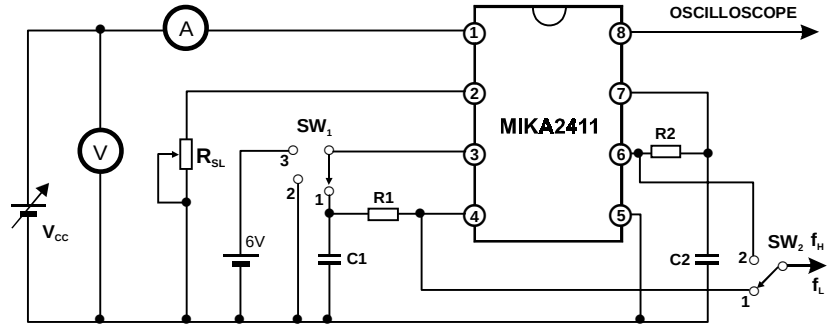
Fig. 3

MEASUREMENT CIRCUITS



ITEM	SW_1	SW_2
V_{Si}, V_{SUS}	1	1
I_{Si}, I_{SUS}	1	1
V_{OH}	2	2
V_{OL}	2	2

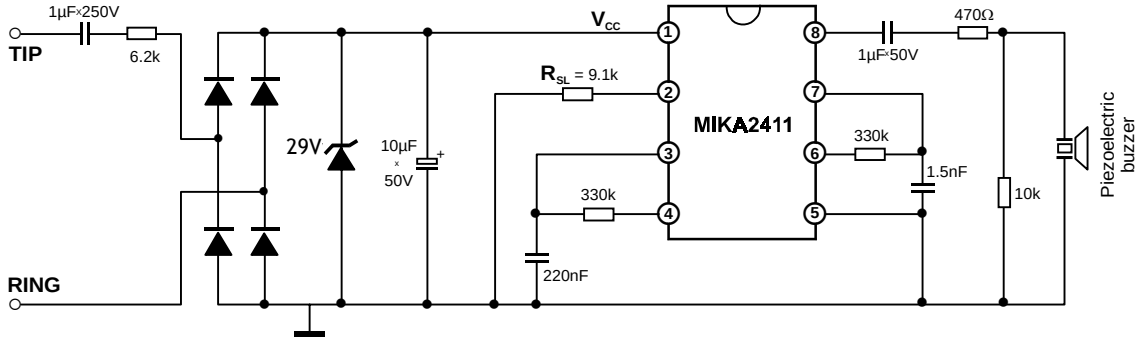
R1 = 165k, **C1** = 0.47µF
R2 = 191k, **C2** = 6800pF



ITEM	SW_1	SW_2
f_L	1	1
f_{H1}	3	2
f_{H2}	2	2

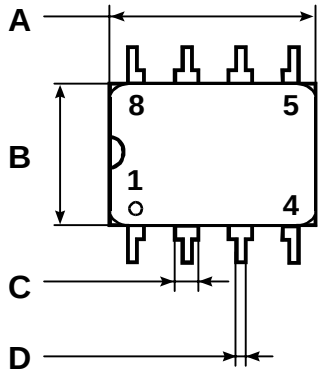
R1 = 165k, **C1** = 0.47µF
R2 = 191k, **C2** = 6800pF

APPLICATION EXAMPLE

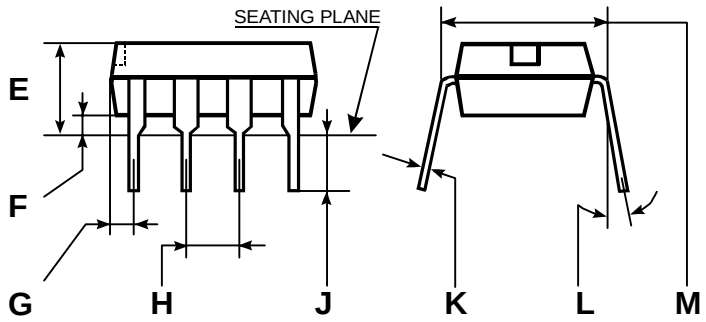


PHYSICAL DIMENSIONS AND MARKING DIAGRAMS

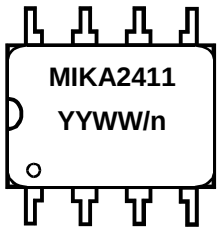
DIP-8
PACKAGE



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	1.02	1.78	0.040	0.070
D	0.38	0.51	0.015	0.020
E	3.94	4.45	0.155	0.175
F	0.76	1.01	0.030	0.040
G	0.76	1.27	0.030	0.050
H	2.54	2.54	0.100	0.100
J	2.92	3.43	0.015	0.135
K	0.20	0.30	0.008	0.012
L	–	10°	–	10°
M	7.62	7.62	0.300	0.300



DIP-8
MARKING DIAGRAM



ABBREVIATION	ABBREVIATION EXPANSION
YY	Year
WW	Work Week
n	Assembly Location

ORDERING INFORMATION

DEVICE	PACKAGE	OPERATING TEMPERATURE	SHIPPING
MIKA2411	DIP8	0°C to +70°C	50 Units/Rail

NOTE: The form of packing is stipulated in the contract.

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NOTES

The information presented in this Data sheet is believed to be accurate and reliable. Application circuits shown are typical examples illustrating the operation of the device. MIKRON can assume no responsibility for use of any application circuits.

In the interest of product improvement, MIKRON reserves the right to change specifications and data without notice.

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