

### Features

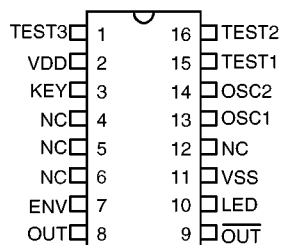
- Single power supply 2.4~3.3V
- Low standby current: 1 $\mu$ A (Typ.) at VDD=3
- Speaker or direct buzzer application
- Built-in envelope control circuit
- 1Hz~8Hz programmable LED flash output
- 32 times of sound cycles maximum
- Minimum external components

### General Description

The HT2813 is a CMOS LSI chip designed for use in sound effects products. It is equipped with tone circuit and other control logic to generate different sounds including bird sound, ghost sound, alarm sound, and so forth. The

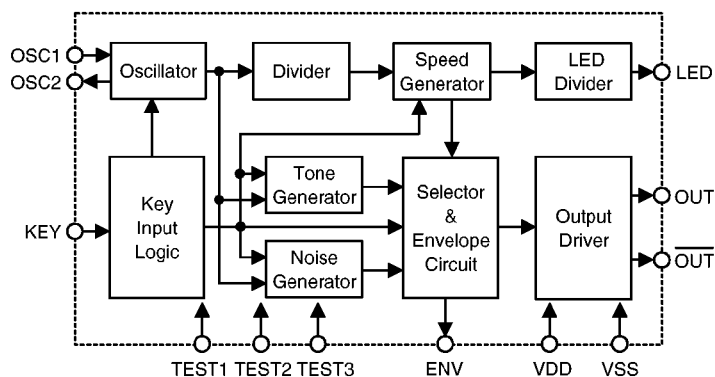
customer's audio tape can be analyzed and programmed into an internal ROM by changing a mask layer during device fabrication. The HT2813 is suitable for various toy application.

### Pin Assignment



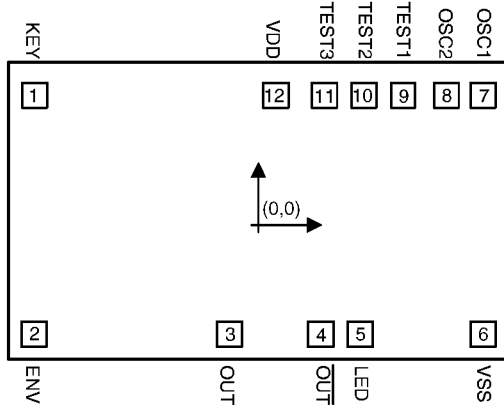
**HT2813**  
- 16 DIP

### Block Diagram



**Pad Coordinates**

Unit: mil



Pad No.	X	Y	Pad No.	X	Y
1	-43.22	23.89	7	43.39	23.89
2	-43.39	-23.89	8	35.74	23.89
3	-5.65	-23.89	9	28.09	23.89
4	12.03	-23.89	10	20.44	23.89
5	19.68	-23.89	11	12.79	23.89
6	43.39	-23.89	12	3.36	23.89

Chip size : 98 × 59 (mil)<sup>2</sup>

\* The IC substrate should be connected to VDD in the PCB layout artwork.

**Absolute Maximum Ratings\***

Supply Voltage .....	-0.3V to 5V	Storage Temperature.....	-50°C to 125°C
Input Voltage.....	V <sub>SS</sub> -0.3 to V <sub>DD</sub> +0.3V	Operating Temperature.....	0°C to 70°C

\*Note: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**Electrical Characteristics**

(T<sub>a</sub>=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>DD</sub>	Conditions				
V <sub>DD</sub>	Operating Voltage	3V	—	2.4	3	3.3	V
I <sub>STB</sub>	Standby Current	3V	—	—	1	5	μA
I <sub>DD</sub>	Operating Current	3V	No load	—	100	300	μA
I <sub>OH</sub>	Output Source Current	3V	V <sub>OH</sub> =2.5V	-1	-2	—	mA
I <sub>OL</sub>	Output Sink Current	3V	V <sub>OL</sub> =0.5	1	2	—	mA
I <sub>ENV</sub>	ENV Source Current	3V	V <sub>OH</sub> =2.5V	-1	-2	—	mA
I <sub>LED</sub>	LED Source Current	3V	V <sub>OH</sub> =2.5V	-1	-2	—	mA
F <sub>OSC</sub>	Oscillator Frequency	—	R=56kΩ	—	256	—	kHz
V <sub>IH</sub>	“H” Input Voltage	3V	—	2.4	—	—	V

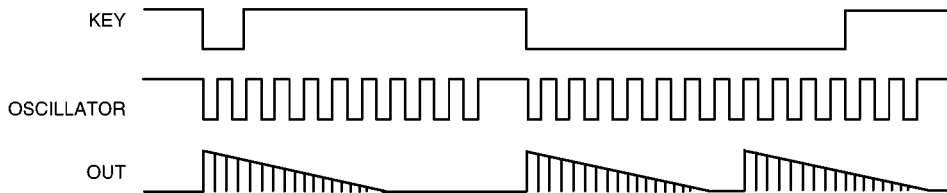
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VDD	Conditions				
V <sub>IL</sub>	"L" Input Voltage	3V	—	—	—	0.6	V

**Pin Description**

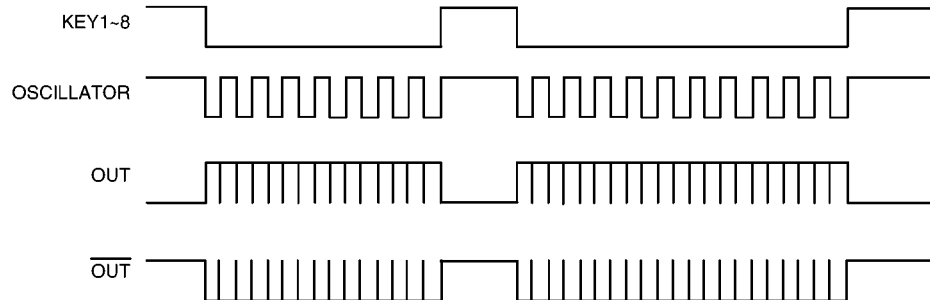
Pin No.	Pad No.	Pad Name	I/O	Description
3	1	KEY	I	Key input pad, active low
7	2	ENV	O	Sound envelope effect pad
8	3	OUT	O	Sound output pad
9	4	$\overline{\text{OUT}}$	O	Sound output pin, out of phase to pad 3
10	5	LED	O	LED flash output pad
11	6	VSS	—	Negative power supply
13	7	OSC1	I	Oscillator input pad
14	8	OSC2	O	Oscillator output pad
15	9	TEST1	I/O	For IC test only
16	10	TEST2	I/O	For IC test only
1	11	TEST3	I/O	For IC test only
2	12	VDD	—	Positive power supply

**Timing Diagram**

**With an envelope**

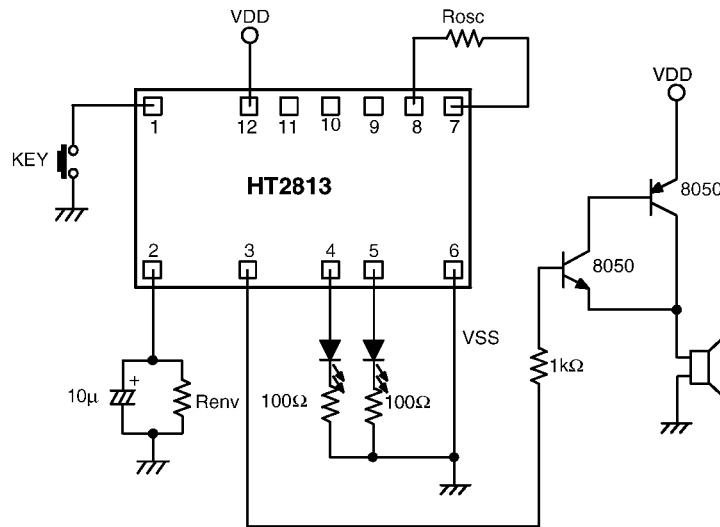


**Without an envelope**

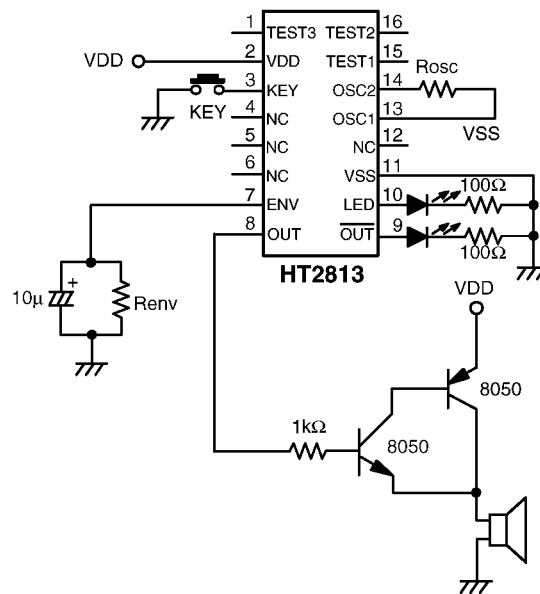


Application Circuits

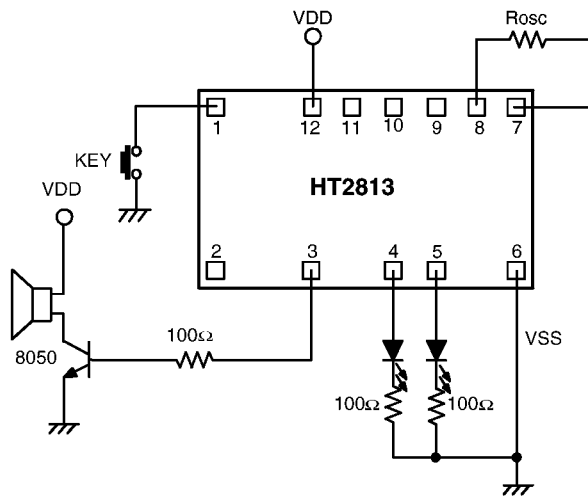
Speaker application with an envelope



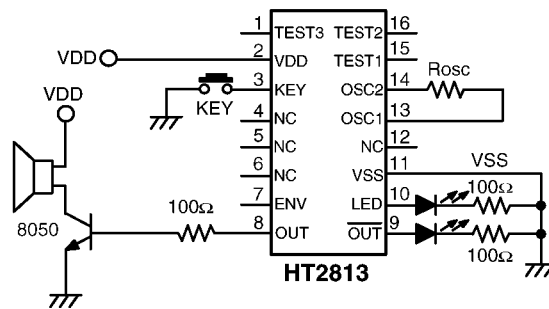
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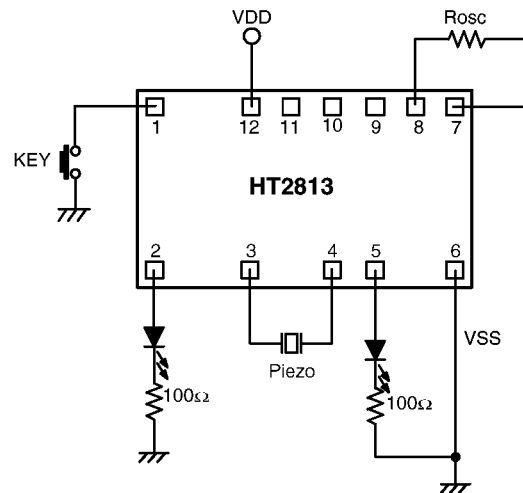
Speaker application without an envelope



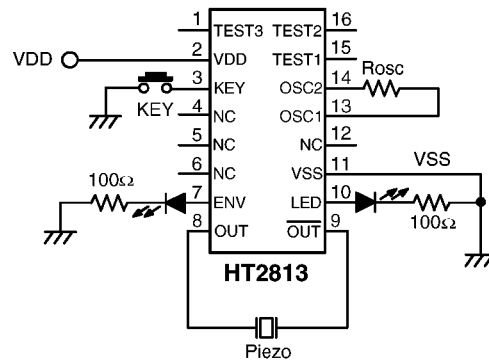
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Piezo application

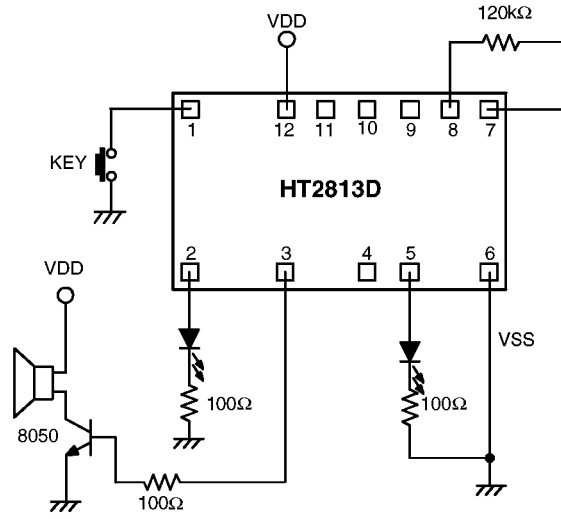


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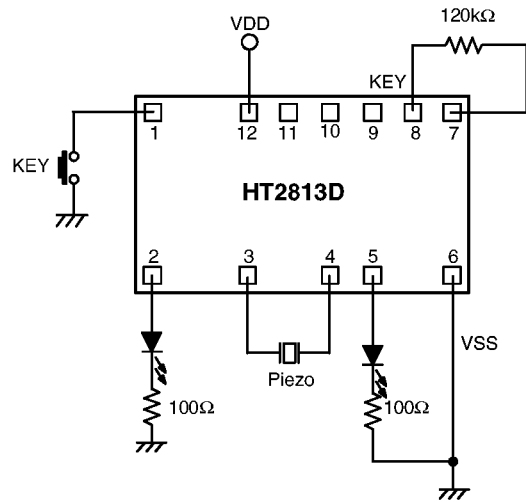


### Application Circuit (HT2813D — GHOST)

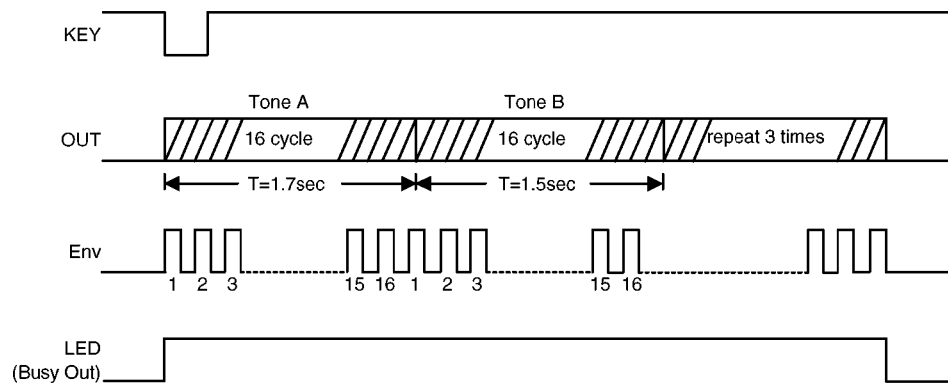
Speaker application



Piezo application



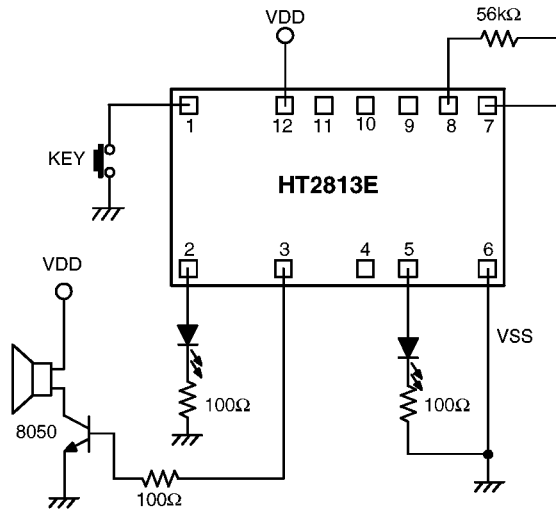
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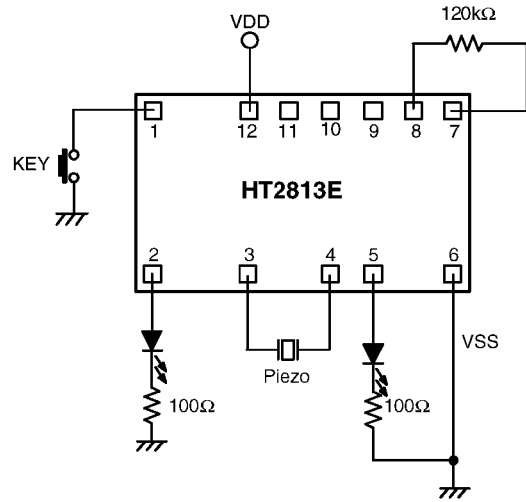


Application Circuit (HT2813E — Bird Song I)

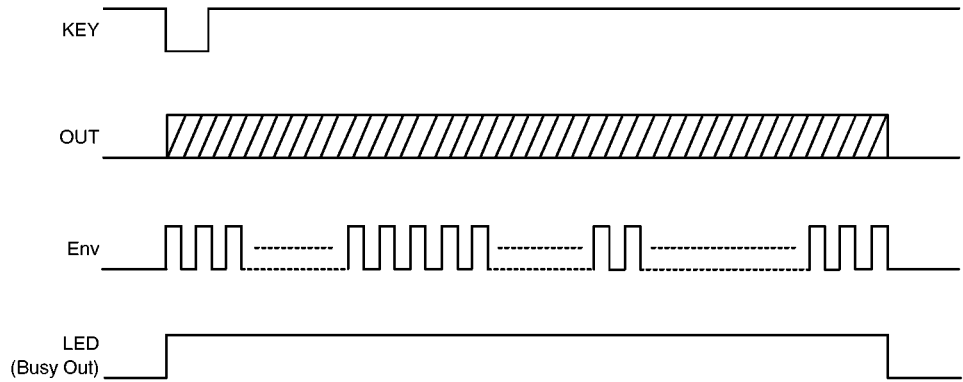
Speaker application



Piezo application

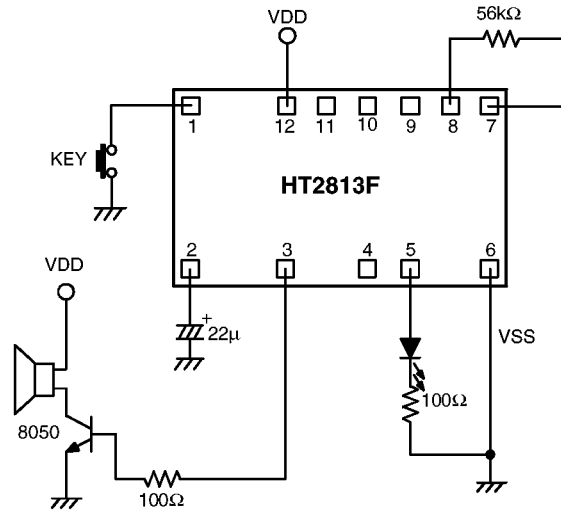


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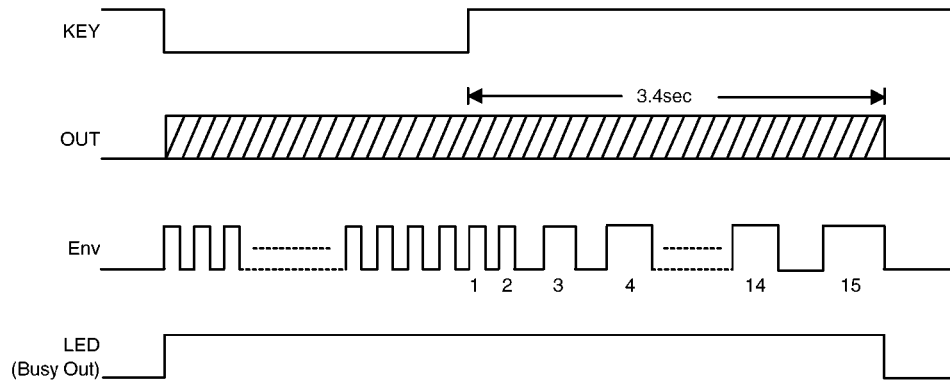


**Application Circuit (HT2813F — Bird Song II with an Envelope)**

Speaker application with an envelope

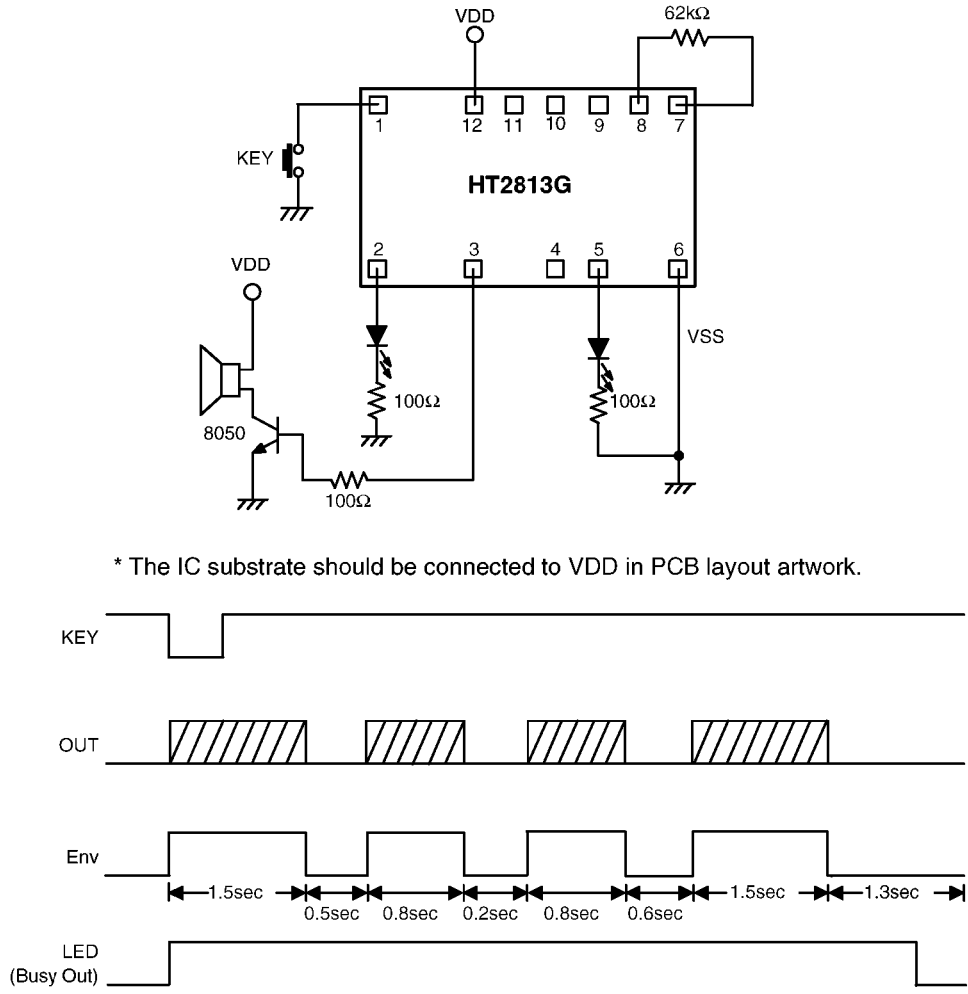


\* The IC substrate should be connected to VDD in PCB layout artwork.



**Application Circuit (HT2813G — COW)**

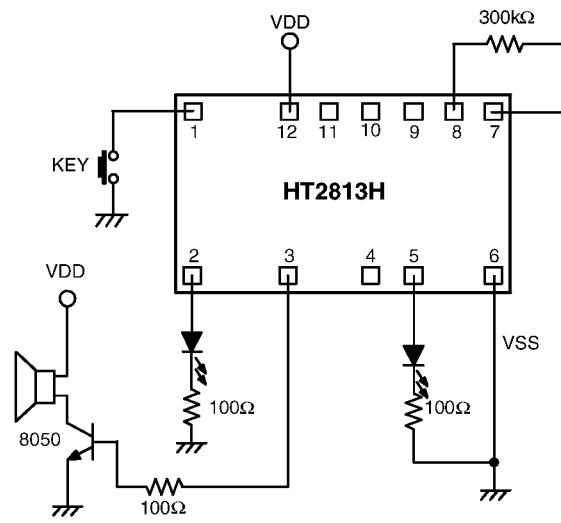
Speaker application



\* The IC substrate should be connected to VDD in PCB layout artwork.

**Application Circuit (HT2813H — Little Dog)**

Speaker application



\* The IC substrate should be connected to VDD in PCB layout artwork.

