HT2887

Sound Effect and Melody Generator

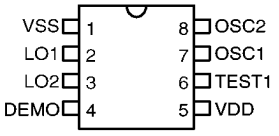
Features

- Single power supply: 2.4V~5.0V
- Low standby current: 1μA (Typ.) at V_{DD}=3V
- Maximum of eight different sound effects
- Maximum of three melodies
- Directly drive a speaker or an LED (OUT pad by mask option)
- Auto power-off function
- Directly drive LEDs or a piezo (LO1 or LO2 pad by mask option)
- 128-note melody PLA memory
- 256-note sound effect memory
- 128kHz system clock
- Minimum external components

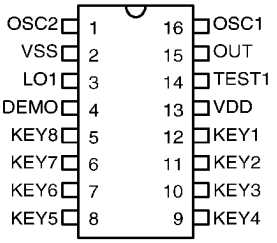
General Description

The HT2887 is a CMOS fabricated LSI designed for use in sound effects products. It contains various sound effects and melody sound stored sections. Customers are required to supply their sound samples (on CD ROM, audio cassette tapes, etc.), which can then be written into an internal ROM by changing a mask layer during device fabrication. The HT2887 is suitable for various toy applications.

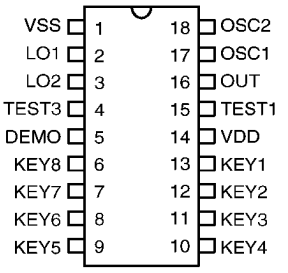
Pin Assignment



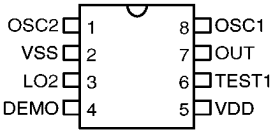
HT2887
– 8DIP-A-0



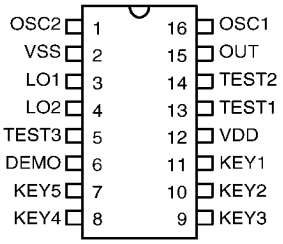
HT2887
– 16DIP-A-0
/ 16SOP-A-0



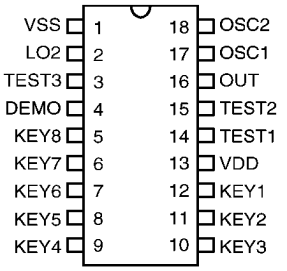
HT2887
– 18DIP-A-0



HT2887
– 8DIP-B-0



HT2887
– 16DIP-B-0
/ 16SOP-B-0



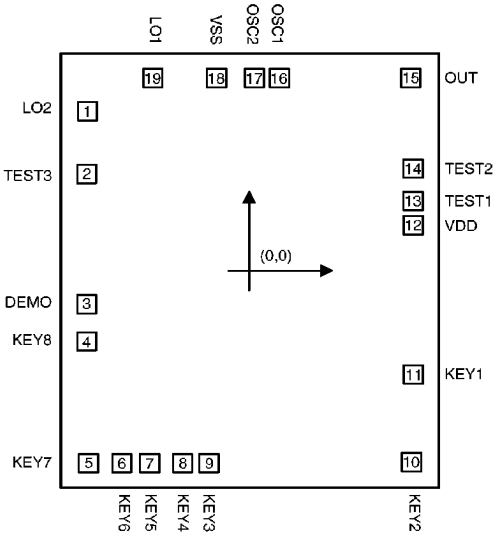
HT2887
– 18DIP-B-0

The HT2887 package contrast table:

Form	OUT	LO1	LO2	DEMO	KEY1~KEY8	Remark
8DIP-A-0	—	√	√	√	—	Drive piezo only
8DIP-B-0	√	—	√	À	—	Drive speaker only
16DIP-A-0, 16SOP-A-0	√	À	—	√	√	Drive speaker only
16DIP-B-0, 16SOP-B-0	√	À	√	√	*	KEY1~KEY5 only
18DIP-A-0	√	À	√	√	√	—
18DIP-B-0	√	—	√	√	√	—

Pad Coordinates

Unit: mil

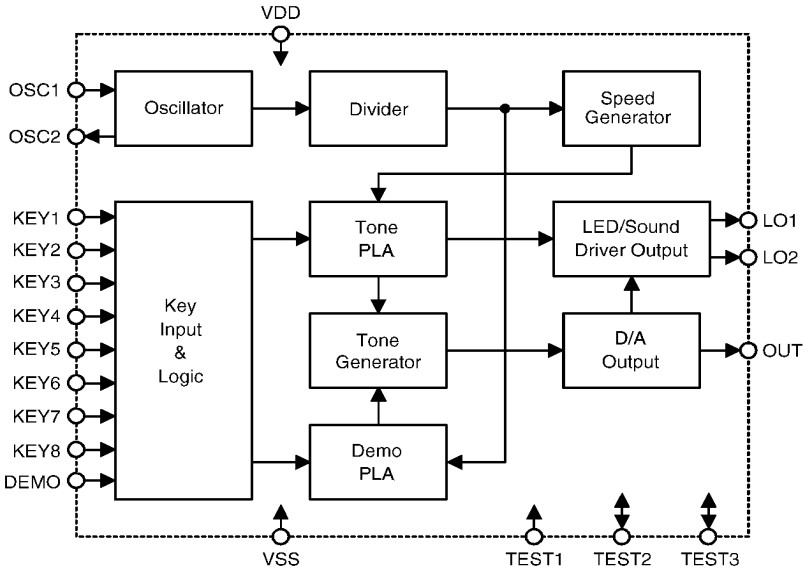


Pad No.	X	Y	Pad No.	X	Y
1	–42.904	44.179	11	43.541	–28.794
2	–43.116	26.839	12	43.541	12.601
3	–43.159	–9.329	13	43.499	19.316
4	–43.159	–19.656	14	43.499	28.284
5	–42.606	–53.401	15	42.819	53.401
6	–33.809	–53.401	16	8.011	53.401
7	–26.414	–53.401	17	1.381	53.401
8	–17.701	–53.401	18	–8.691	53.401
9	–10.689	–53.401	19	–25.564	53.401
10	43.074	–53.061			

Chip size: 98 × 119 (mil)^2

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

Block Diagram



Pad Description

Pad No.	Pad Name	I/O	Internal Connection	Description
2	TEST3	I/O	CMOS	For IC test only
3	DEMO	I	CMOS Pull-High	Key input pad, low active and retriggerable Connect this pad low to play a melody or melody with sound effects
4~11	KEY8~KEY1	I	CMOS Pull-High	Key input pads, low active and retriggerable Presses a key of KEY1~KEY8 plays a sound effect. KEY6 and KEY8 can also be defined as a melody playing function by mask option.
12	VDD	I	—	Power supply (positive)
13	TEST1	I	CMOS Pull-High	For IC test only
14	TEST2	I/O	CMOS	For IC test only
15	OUT	O	PMOS Open Drain	Sound output drive speaker, or signal generation to drive an LED (mask option)
16	OSC1	I	CMOS	Oscillator input
17	OSC2	O	CMOS	Oscillator output
18	VSS	I	—	Power supply (ground)

Pad No.	Pad Name	I/O	Internal Connection	Description
19, 1	LO1, LO2	O	CMOS	The LO1 and LO2 generate LED drive signals or sound output signals to drive a piezo (mask option).

Absolute Maximum Ratings*

Supply Voltage ..... –0.3V to 5.5V
Input Voltage..... V_{SS}–0.3V to V_{DD}+0.3V
Storage Temperature..... –50°C to 125°C
Operating Temperature..... –20°C to 75°C

*Note: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damageto 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

(Ta=25°C)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	2.4	3	5.0	V
I_{STB}	Standby Current	3V	—	—	1	5	μA
I_{DD}	Operating Current	3V	F_{OSC}=128kHz No load	—	200	400	μA
I_{OH1}	OUT Pad Source Current	3V	V_{OH}=0.6V	–0.7	–1	—	mA
I_{OH2}	LO1, LO2 Pad Source Current	3V	V_{OH}=2.7V	–1.0	–1.5	—	mA
I_{OL}	LO1, LO2 Pad Sink Current	3V	V_{OL}=0.3V	2	3	—	mA
V_{IH}	"H" Input Voltage	—	—	0.8V_{DD}	—	—	V
V_{IL}	"L" Input Voltage	—	—	—	—	0.2V_{DD}	V
F_{OSC}	System Frequency	3V	R=120kΩ	—	128	—	kHz

Mask Option

The HT2887 provides some mask options to be selected, such as key pressing mode, sound effect or melody playing, speaker or piezo driving etc., as is shown in the following table.

Operation	Mask Option
Key pressed mode (for KEY1~KEY8, DEMO)	1) Level hold (retriggerable) 2) Normal mode (retriggerable)
Sound output and LED flash operation	1) OUT drives a speaker and LO1, LO2 drive LEDs 2) LO1, LO2 drive a piezo and OUT drives an LED

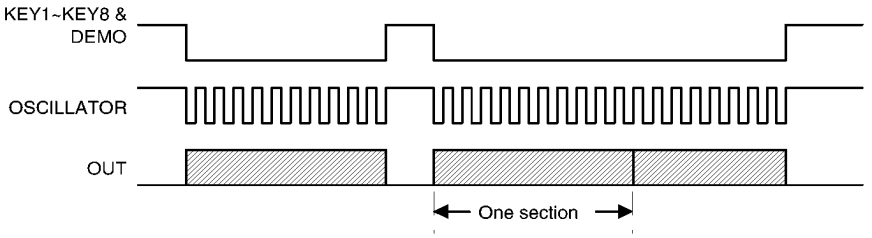
Operation	Mask Option
Sound effect memory (Total memory is 256 notes)	1) 8 keys, 32 notes per key 2) 4 keys, 64 notes per key 3) 4 keys (32 notes per key) and 2 keys (64 notes per key)

Operation		Mask Option		
		KEY6	KEY8	DEMO
Melody operating selection (for KEY6, KEY8 and DEMO. The total memory is 128 notes)	1	—	—	128 notes
	2	32 notes	32 notes	64 notes
	3	—	64 notes	64 notes

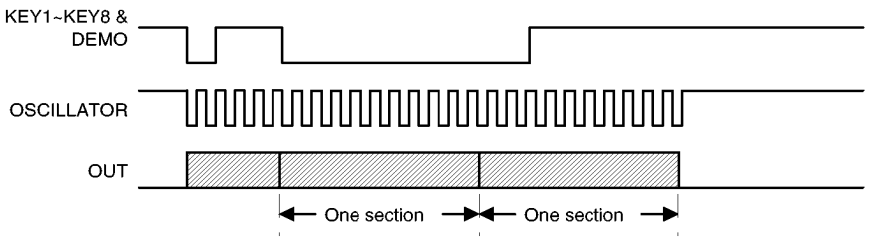
∗ Note: "—" denotes sound effect playing mode.

Timing Diagram

• Level hold mode



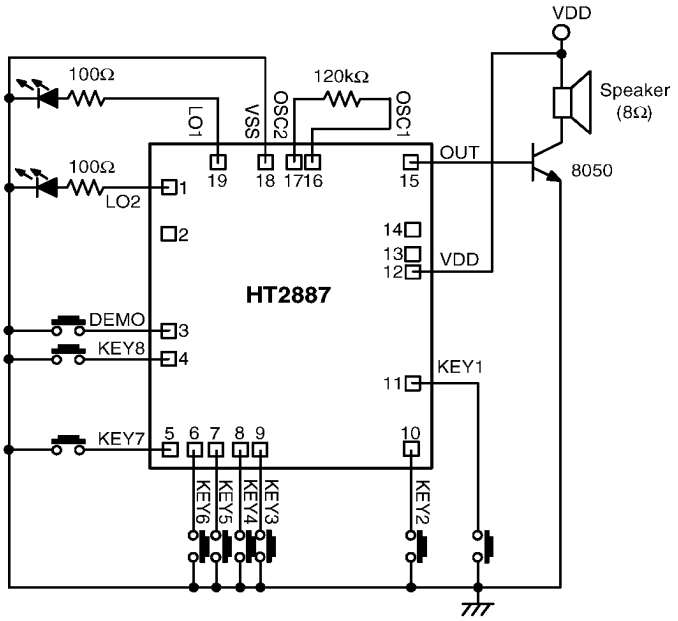
• Normal mode



Application Circuits

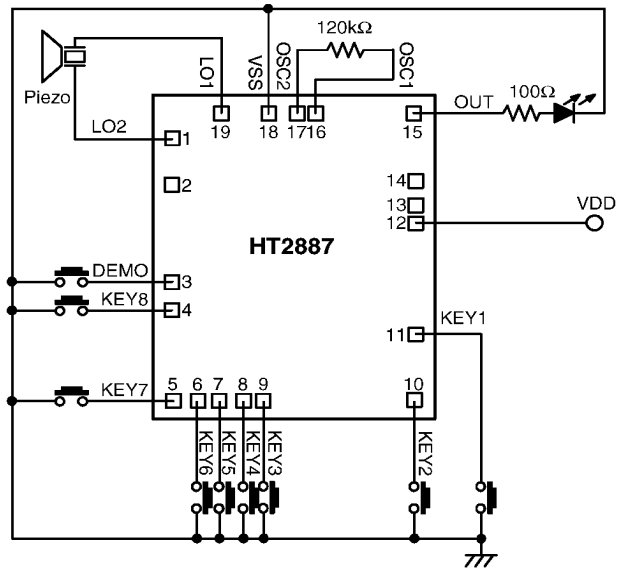
Chip form

• Speaker application



KEY1: Sound effect 1
KEY2: Sound effect 2
KEY3: Sound effect 3
KEY4: Sound effect 4
KEY5: Sound effect 5
KEY6: Sound effect 6
(or Melody)
KEY7: Sound effect 7
KEY8: Sound effect 8
(or Melody)
DEMO: Melody with sound effect
(or Melody only)

• Piezo application



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(or Melody)
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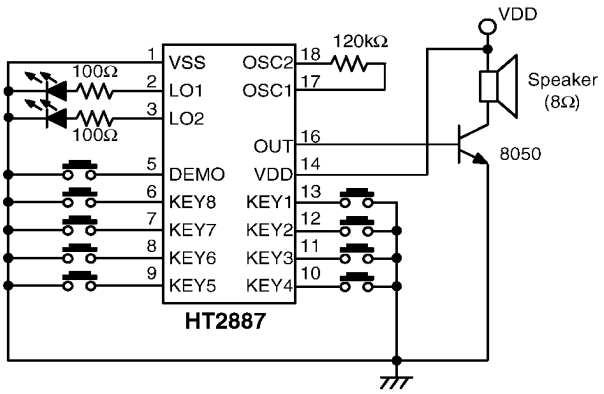
KEY8: Sound effect 8
(or Melody)
DEMO: Melody with sound effect
(or Melody only)

Package form (for 18DIP-A-0 package)

• Speaker application



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(or Melody)
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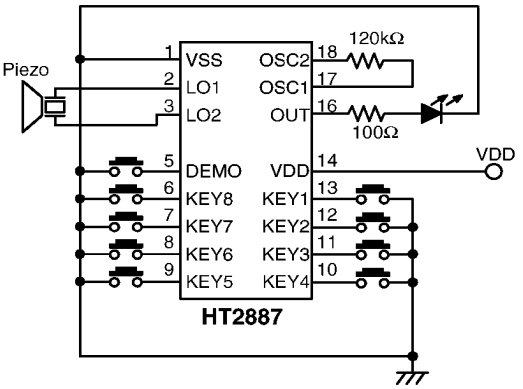

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