HK827

VOICE RECORD/PLAYBACK IC

20-30 SEC. TIME CAPACITY

Features

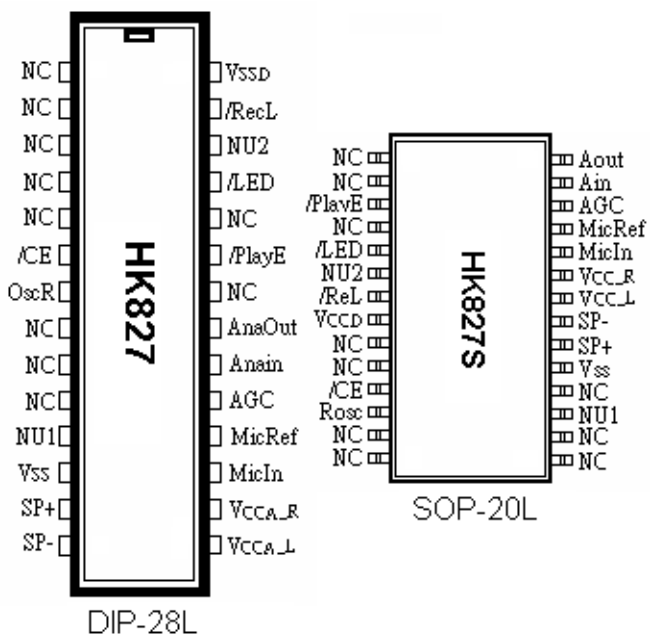
- ✷ Single-chip , high-quality voice recording & playback solution
  - No external ICs required
  - Minimum external components
- ✷ Non-volatile Flash memory technology
  - No battery backup required
  - 100,000 times record cycles (typical)
  - 100-years message retention (typical)
- ✷ Single message of 20 to 30 seconds , with external resistor selection
- ✷ User-friendly , easy-to-use operation
  - Programming & development systems not required
  - Level-activated recording & edge-activated playback switches
- ✷ Low power consumption
  - Operating current : 25 mA (typical , no load)
  - Standby current : 1 μA (typical , no load)
- ✷ Automatic power-down feature for longer battery life
- ✷ Chip Enable pin for simple message expansion
- ✷ Single 5V for power supply

General Description

The HK827device offers true single-chip solid-state storage capability and requires no software or micro-controller support . It provides high-quality recording and playback with a single 20-to 30-second message . It is ideal for portable voice recorders , toys, and many other consumer and industrial applications .

HONSITAK ELECTRONICS proprietary analog / multi-level volatile memory cells , each of which can typically store storage technology is implemented in advanced Flash non- more than 256 voltage levels . The HK827 device stores and reproduces voice signals in their natural forms , eliminating the distortion that is often introduced by encoding and compression. The device combines a small size with low power consumption , non-volatility , and ease-of-use for a cost-effective solution to voice recording and playback.

PinOut Diagram



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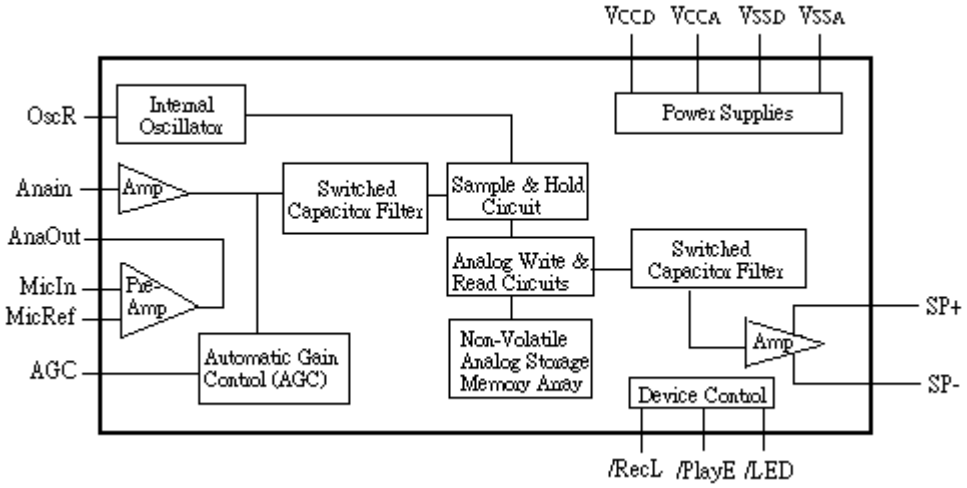
Block Diagram

Figure 2 shows the function block diagram



Function Description

Figure 3 shows the diagram for a single, 20-second message recording and playback application using the HK827 device. When pins are connected as shown in this example , the operating modes are as follows :

Record Mode (Level-Activated)

The /LED pin will go low during the actual recording process to provide a visual indication if an LED light is connected to this pin . A single voice message of up to 20 seconds can be recorded . The chip is in record mode as long as the /RecL pin stays low (level-activated) . If the message lasts longer than 20 seconds, recording will terminate automatically after the last available memory cell is written . If the message is shorter than 20 seconds, the recording operation will stop when the /RecL pin goes high . The speaker driver is automatically tri-stated during the recording operation . Messages of up to 30 seconds can be recorded by using different OscR resistor values (see Table 1).

Power Down Mode (/CE="1")

The chip is always in standby state . No recording or playback is allowed . Current consumption is typically less than 1 μA .

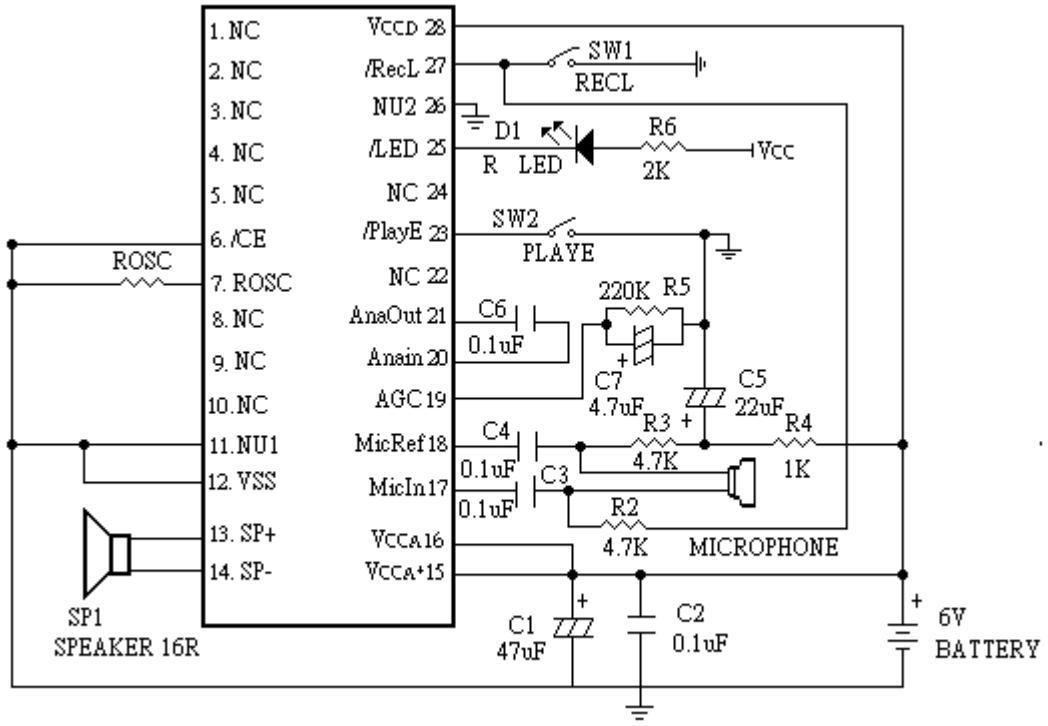
Playback Mode (Edge-Activated)

Playback always starts from the beginning of the message . The chip is in playback mode after the /PlayE pin pulses low (edge-activated) . Playback will stop immediately when the /PlayE pin pulses low a second time . If the newly recorded message is shorter than the previously recorded message , the remaining portion of the previous message will be played after the new message is played back . The input pre-amplifier, AGC and main amplifier circuits are disabled during playback .

Standby Mode (/CE="0")

The chip will automatically return to the standby state after recording or playback operating is completed .

Figure 3 shows the application circuit



NC = No Connect (must be floating)
NU = Not Used (must be grounded)
Pins 23 and 27 have internal pull-up resistors.
The typical sampling frequency is 6.4 kHz with OscR = 52 KΩ.

Table 1. Typical Dependence of Sampling Frequency and Total Voice Duration on OscR Resistor Value
(V_{CCA} = V_{CCD} = 5V ; V_{SSA} = V_{SSD} = 0 V ; T_A =25℃)

Pin 7 – OscR	Typical Sampling Frequency	Typical Total Voice Duration
52kΩ	6.4 kHz	20 seconds
67kΩ	5.3 kHz	24 seconds
89kΩ	4.0 kHz	30 seconds

Electrical Characteristics

Absolute maximum Ratings

Item	Sym.	Condition	Min	Typ.	Max	Unit
Power supply voltage	V_{CC}	T_A = 25℃	3.8	6.0	7.0	V
Input voltage	V_{IN1}	T_A =25℃	-0.3	-	V_{CC} + 0.3	V
Input voltage	V_{IN2}	I I_{IN} I < 20 mA	-1.0	-	V_{CC} + 1.0	V
Storage temperature	T_{STG}	-	-65	25	150	℃
Temperature under bias	T_{BS}	-	-65	25	125	℃
Lead temperature	T_{LD}	< 10 s	-0.3	25	300	℃

DC Characteristics*

Item	Sym.	Condition	Min	Typ.	Max	Unit
Input high voltage	V_{IH}	-	0.8*VCC	-	-	V
Input low voltage	V_{IL}	-	-	-	0.8	V
Output high voltage	V_{OH}	I_{OH} = -1.6 mA	2.4	-	-	V
Output low voltage	V_{OL}	I_{OL} = 4.0 mA	-	-	0.45	V
Input leakage current	I_{IH}	V_{IH} = V_{CC}	-	-	1.0	μA
Input leakage current	I_{IL}	V_{IL} = V_{CC}	-1.0	-	-	μA
Output tristate Leakage current	I_{OZ}	V_{OUT} = V_{CC} or V_{OUT} = V_{SS}	-1.0	-	1 .0	μA
Operating current Consumption	I_{CC}	Internal Clock, no load	-	25	-	mA
Standby current consumption	I_{CCS}	No load	-	1.0	-	μA

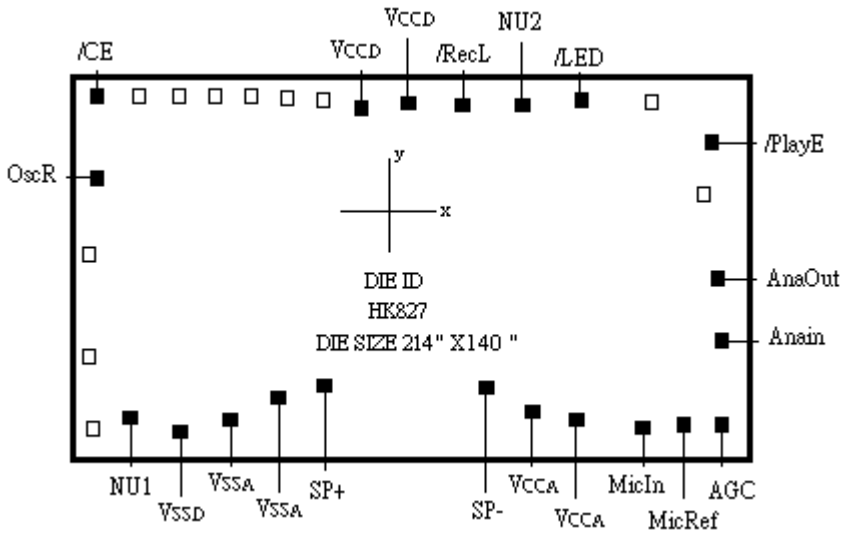
Analog Characteristics*

Item	Sym.	Condition	Min	Typ.	Max	Unit
MicIn input voltage	V_{MI}	-	-	-	20	mVp-p
MicIn input resistance	R_{MI}	-	-	10	-	KΩ
MicIn amp gain (1)	G_{MI1}	AGC = 0 V	-	24	-	dB
MicIn amp gain (2)	G_{MI2}	AGC = 2.5 V	-	-45	-15	dB
AnaIn input voltage	V_{ANI}	-	-	-	50	mVp-p
Anain input resistance	R_{ANI}	-	-	10	-	KΩ
AnaIn amp gain	G_{ANI}	AnaIn to SP +/-	-	22	-	DB
AGC output resistance	R_{AGC}	-	-	1	-	KΩ
Sp +/- output power	P_{sp}	R_{SP} +/- = 16Ω	-	12.2	-	mW
Voltage amplitude across SP +/-	Vsp	R_{SP}≥16 Ω	-	1.25	-	Vp-p

Typical Values : V_{CCD} = V_{CCA} = 5V ; V_{SSD} = V_{SSA} = 0V ; T_A = 25℃

Bonding Pad Diagram & Description Of Bonding Pad Coordinates

Figure 4 shows the die bonding pad

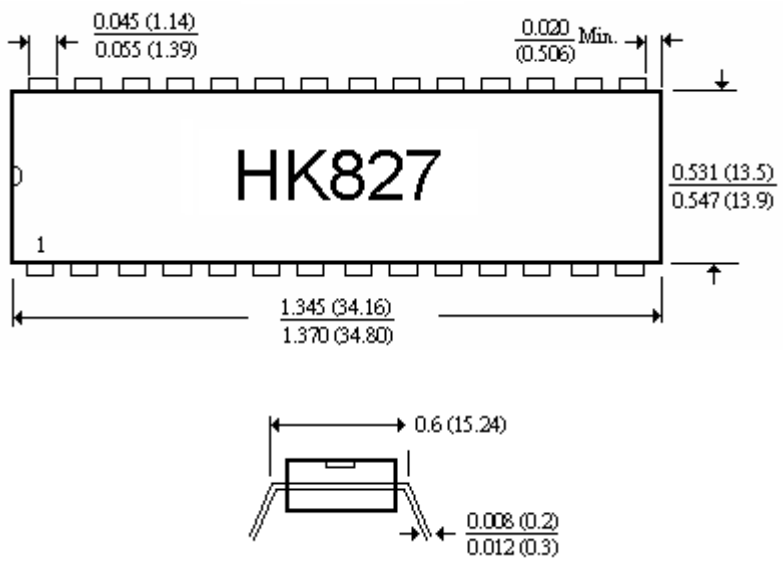


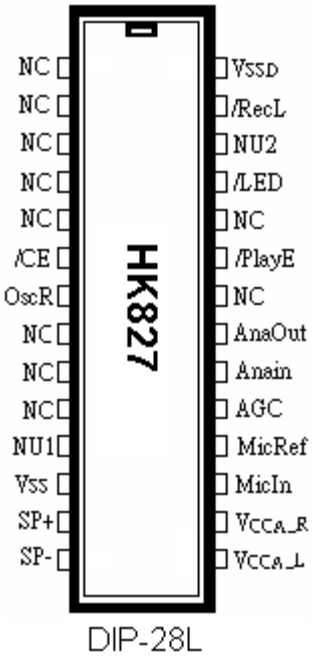
Substrate must be connected to V_{SSD} & V_{SSA}_L & V_{SSA}_R

Pin	Pin Name	X Axis*	Y Axis*
/CE	Chip enable	-2496.20	1565.80
OscR	Oscillator frequency-setting resistor	-2459.55	729.80
NU1	Connect to ground	-1808.45	-1496.10
V_{SSD}	Digital ground supply	-1564.05	-1572.00
V_{SSA}	Analog ground supply	-1384.05	-1548.70
V_{SSA}	Analog ground supply	-1204.35	-1477.10
SP+	Non-inverting speaker output	-707.15	-1390.00
SP-	Inverting speaker output	479.15	-1389.90
V_{CCA}	Analog power supply	976.45	-1492.00
V_{CCA}	Analog power supply	1190.40	-1523.70
MicIn	Microphone input	1619.45	-1551.40
MicRef	Microphone reference input	2035.45	-1551.40
AGC	Automatic gain control	2487.45	-1551.40
AnaIn	Analog signal input	2487.45	-1049.90
AnaOut	Analog signal output	2487.45	-949.90
/PlayE	Edge-activated playback	2493.65	1371.10
/LED	LED output	1430.70	1565.80
NU2	Connect to ground	865.75	1565.80
/RecL	Level-activated record	258.15	1565.80
V_{CCD}	Digital power supply	-229.40	1579.05
V_{CCD}	Digital power supply	-510.80	1541.60

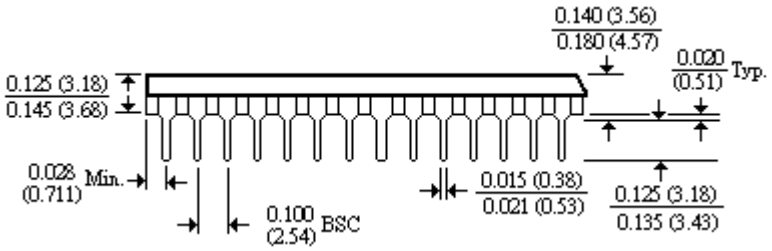
Package Outlines

The HK827 device is available in the DIP and SOP package forms , Packages conform to JEDEC and EIAJ standards.





(A) 28-Pin Plastic Dual In-Line Package (DIP-28L, P-600)



(B) 28-Pin Plastic Small-Outline Integrated Circuit (SOP-28L)