

# AN6166NK

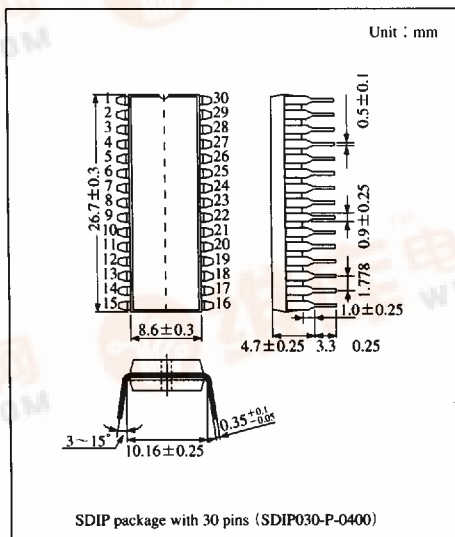
## Cordless Telephone Speech Network IC

### Overview

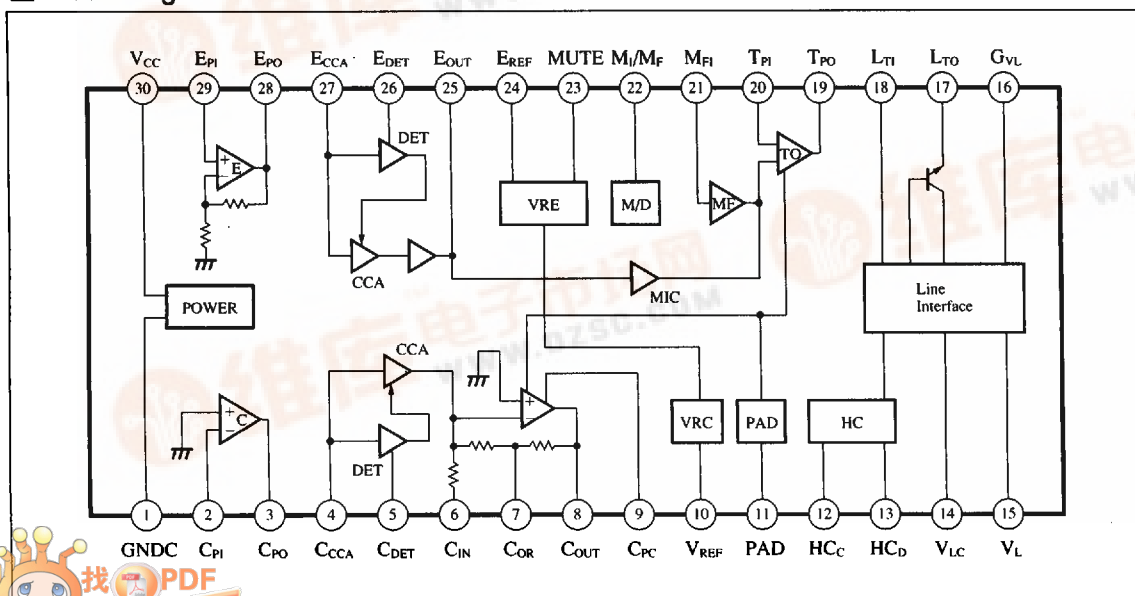
The AN6166NK is a speech network IC for the base set of a cordless telephone. It incorporates a line interface (speech network), a compander circuit, and an automatic hold-reset circuit. With a minimal number of external components, it can perform all the functions of the base set of a cordless telephone.

### Features

- The compressor/expander circuit incorporates preamplifiers to make level and frequency adjustments easier.
- Incorporates a MUTE function to make the compander circuit independent of the speech network.
- The speech network consumes minimal current, operates on low voltage, and supports telephone branching.
- Incorporates an MF amplifier, an automatic-pad circuit, and an automatic hold-reset circuit, making the required number of external components minimal.



### Block Diagram



ICs for Telephone



### ■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage (1)	V <sub>CC</sub>	7.5	V
Supply voltage (2)	V <sub>L</sub>	10	V
Supply current	I <sub>L</sub>	150	mA
Power dissipation (Ta = 75°C)	P <sub>D</sub>	1,070	mW
Operating ambient temperature	T <sub>opr</sub>	-20 to +75	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

### ■ Recommended Operating Range (Ta=25°C)

Parameter	Symbol	Range
Operating supply voltage range (1)	V <sub>CC</sub>	2.5 to 4.5V
Operating supply voltage range (2)	V <sub>L</sub>	1 to 8V
Operating supply current	I <sub>L</sub>	3 to 120mA

### ■ Electrical Characteristics (Ta=25°C)

Parameter	Symbol	Condition	min	typ	max	Unit
<b>Compressor</b>						
Preamplifier voltage gain	G <sub>PC</sub>	RA/RB = 51kΩ/5.1kΩ, V <sub>in</sub> = -40dBV	19	20	21	dB
Preamplifier output voltage	V <sub>PC</sub>	RA/RB = 51kΩ/5.1kΩ, THD = 5%, R <sub>L</sub> = 1kΩ	-10	-7	—	dBV
Reference output	V <sub>ORC</sub>	V <sub>IRC</sub> = -20dBV (Ref. output)	-13	-11	-9	dBV
Δ Gain (1)	ΔC <sub>1</sub>	V <sub>in</sub> = V <sub>IRC</sub> - 20dB, ΔC <sub>1</sub> = V <sub>ORC</sub> - V <sub>OC1</sub>	-11	-10	-9	dB
Δ Gain (2)	ΔC <sub>2</sub>	V <sub>in</sub> = V <sub>IRC</sub> - 40dB, ΔC <sub>2</sub> = V <sub>ORC</sub> - V <sub>OC2</sub>	-22	-20	-19	dB
Distortion	THD <sub>C</sub>	V <sub>in</sub> = -20dBV	—	0.5	1	%
Maximum output voltage	V <sub>OCM</sub>	THD = 5%, R <sub>L</sub> = 1kΩ	-10	-7	—	dBV
Output noise voltage	V <sub>NOC</sub>	R <sub>g</sub> = 2kΩ, with a CCITT filter	—	-60	55	dBV
Receiver automatic PAD	ΔP <sub>C</sub>	V <sub>in</sub> = -20dBV, I <sub>L</sub> = 20 to 100mA	-3.5	-2	-1	dB
<b>Expander</b>						
Preamplifier voltage gain	G <sub>PE</sub>	V <sub>in</sub> = -20dBV	10	12	14	dB
Preamplifier output voltage	V <sub>PE</sub>	THD = 5%, R <sub>L</sub> = 1kΩ	-10	-7	—	dBV
Reference output	V <sub>ORE</sub>	V <sub>IRE</sub> = -20dBV (Ref. output)	-32	-29	-26	dBV
Δ Gain (1)	ΔE <sub>1</sub>	V <sub>in</sub> = V <sub>IRE</sub> - 10dB, ΔE <sub>1</sub> = V <sub>ORE</sub> - V <sub>OE1</sub>	-21	-20	-19	dB
Δ Gain (2)	ΔE <sub>2</sub>	V <sub>in</sub> = V <sub>IRE</sub> - 20dB, ΔE <sub>2</sub> = V <sub>ORE</sub> - V <sub>OE2</sub>	-41.5	-40	-38.5	dB
Distortion	THD <sub>E</sub>	V <sub>in</sub> = -20dBV	—	0.5	1	%
Maximum output voltage	V <sub>OFM</sub>	THD = 5%, R <sub>L</sub> = 1kΩ	-10	-7	—	dBV
Output noise voltage	V <sub>NOE</sub>	R <sub>g</sub> = 2kΩ, with a CCITT filter	—	-95	-90	dBV
<b>Speech network</b>						
Line voltage (1)	V <sub>L1</sub>	I <sub>L</sub> = 20mA	2.5	3.5	4	V
Line voltage (2)	V <sub>L2</sub>	I <sub>L</sub> = 100mA	6.5	8	9.5	V
MIC amp. voltage gain	G <sub>MIC</sub>	V <sub>in</sub> (Pin <sup>Ⓢ</sup> ) = -30dBV, MUTE - ON	22	24	26	dB
MIC amp. distortion	THD <sub>M</sub>	V <sub>in</sub> (Pin <sup>Ⓢ</sup> ) = -30dBV, MUTE - ON	—	0.5	2	%
MIC amp. automatic PAD	ΔP <sub>M</sub>	V <sub>in</sub> (Pin <sup>Ⓢ</sup> ) = -30dBV, I <sub>L</sub> = 20 to 100mA	-6	-4.5	-3	dBV

### ■ Electrical Characteristics (Cont.) ( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Condition	min	typ	max	Unit
<b>Speech network (Cont.)</b>						
MIC amp. max output voltage	$V_{OM}$	THD=5%	3	—	—	dBV
MIC amp. output noise voltage	$V_{NOM}$	MIC input pin=OPEN, MUTE ON	—	-60	-55	dBV
DTMF amp. voltage gain	$G_{MF}$	$V_{in}$ (Pin②) = -40dBV, MI/MF ON	36	38	40	dB
DTMF amp. gain	$THD_{MF}$	$V_{in}$ (Pin②) = -40dBV, MI/MF ON	—	0.2	1.5	%
DTMF amp. automatic PAD	$\Delta P_{MF}$	$V_{in}$ (Pin②) = -40dBV, $I_L=20$ to $100\text{mA}$	-6	-4.5	-3	dB
DTMF amp. max output voltage	$V_{OMF}$	THD=5%	3	—	—	dBV
<b>Power supply</b>						
Current consumption	$I_{CC}$	$V_{CC}=3\text{V}$ , no signal	2	3	6	mA
Sink current at the hold-reset pin	$I_{HC}$	20 hold-reset signal ON	0.5	—	—	mA

### ■ Pin Descriptions

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	GNDC	Comander GND	16	$G_{VL}$	Line GND
2	$C_{PI}$	COMP preamp. input	17	$L_{TO}$	Line transmission
3	$C_{PO}$	COMP preamp. output	18	$L_{TI}$	Line transmission signal input
4	$C_{CCA}$	COMP-CCA input	19	$T_{PO}$	Speech preamp. output
5	$C_{DET}$	COMP detection	20	$T_{PI}$	Speech preamp. input
6	$C_{IN}$	COMP signal input	21	$M_{FI}$	DTMF signal input
7	$C_{OR}$	COMP output $V_{REF}$	22	$M_I/M_F$	MIC/DTMF switching
8	$C_{OUT}$	COMP output	23	MUTE	Comander MUTE
9	$C_{PC}$	COMP phase adjustment	24	$E_{REF}$	EXP- $V_{REF}$
10	$V_{REF}$	COMP- $V_{REF}$	25	$E_{OUT}$	EXP output
11	PAD	PAD adjustment	26	$E_{DET}$	EXP detection
12	$H_{CC}$	Hold adjustment	27	$E_{CCA}$	EXP-CCA input
13	$H_{CO}$	Hold-reset signal output	28	$E_{PO}$	EXP preamp. output
14	$V_{LC}$	Line regulated power supply	29	$E_{PI}$	EXP preamp. input (+)
15	$V_L$	Line power supply	30	$V_{CC}$	Supply voltage

■ Application Circuit

