

# AN6153N, AN6153NS

## Speech Network Circuits

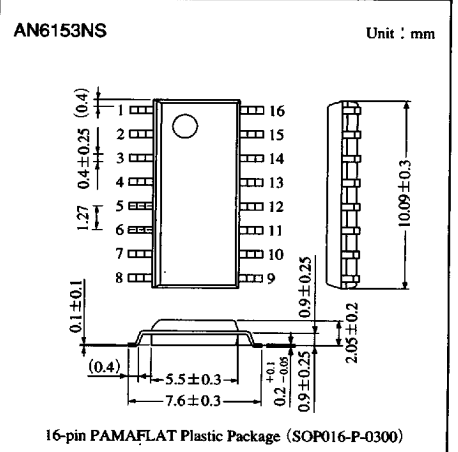
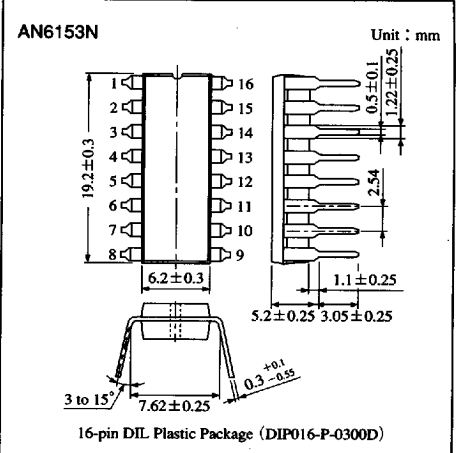
### Overview

The AN6153N and AN6153NS are ICs for speech network with excellent branch performance.

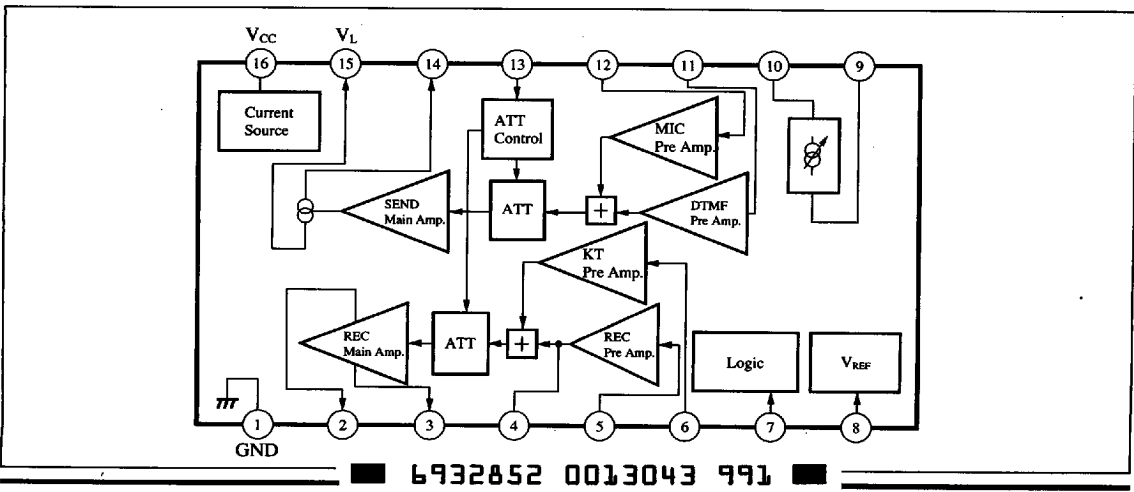
It incorporates basic speech functions to meet with various transmitters/receivers.

### Features

- Operating on a low current and voltage (2mA, 1.7V) and excellent in branch performance.
- Capable of directly interfacing with light-weight small ceramic transmitters/receivers, and with ECMs as well.
- Capable of adjusting the receiver gain by modifying the peripheral circuit constants.
- Automatic gain control according to the size of a circuit current (Automatic pad function)
- Capable of operating the automatic pad function from the outside.
- Capable of sending out onto the circuit by switching between the microphone amplifier and DTMF amplifier.
- Capable of receiving the speech by switching between the receiver preamplifier and dial tone amplifier.
- Wide receiver/transmitter dynamic range (7dBV for the transmitter, 6dBV for the receiver  $I_L=40mA$ , THD=5%)



### Block Diagram



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

Parameter		Symbol	Rating	Unit
Supply voltage		V <sub>L</sub>	14.4	V
Supply current		I <sub>L</sub>	120	mA
Power dissipation (Ta=60°C)	AN6153N	P <sub>D</sub>	1380	mW
	AN6153NS		290*	mW
Operating ambient temperature		T <sub>opr</sub>	-30 to +75	mW
Storage temperature	AN6153N	T <sub>sig</sub>	-55 to +150	°C
	AN6153NS		-55 to +125	°C

\* Power dissipation P<sub>D</sub>=475mW at Ta=60°C when mounted onto the glass epoxy PCB (50mm×50mm×1.6mm)

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

Parameter	Symbol	Range
Operating supply voltage range	V <sub>L</sub>	2.5 to 11.5V

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

Parameter	Symbol	Condition	min	typ	max	Unit
<b>Receiver System</b>						
Receiver gain (1)	G <sub>V-R1</sub>	Set to I <sub>L</sub> =30mA. Input a signal (-50dBV) to the Pin⑤ and measure the output between the Pins② and ③ (load 0.055 μF).	41.3	43.8	46.3	dB
Receiver gain (2)	G <sub>V-R2</sub>	Set to I <sub>L</sub> =80mA. Input a signal (-50 dBV) to the Pin⑤ and measure the output between the Pins② and ③.	38.4	40.9	43.4	dB
Maximum receiver level	V <sub>O-R</sub>	Input a signal to the Pin⑤ and measure the output when an output distortion factor is 5% between the Pins② and ③. I <sub>L</sub> =15mA	-2	1.5	—	dBV
KEY IN TONE gain	G <sub>V-KT1</sub>	I <sub>L</sub> =30mA. Ground DM (Pin⑦), input a signal (-50dBV) to the Pin⑥ and measure the output between the Pin② and ③.	27.1	29.6	32.1	dB
<b>Transmitter System</b>						
Transmitter gain (1)	G <sub>V-T1</sub>	I <sub>L</sub> =30mA. Input a signal (-50dBV) to the Pin② and measure a transmission signal at the 600 Ω load end between the Pin⑨ and GND.	37.5	40	42.5	dB
Transmitter gain (2)	G <sub>V-T2</sub>	I <sub>L</sub> =80mA. Input a signal (-50dBV) to the Pin② and measure a transmission signal.	33.6	36.1	38.6	dB
Maximum transmission level	V <sub>O-T</sub>	I <sub>L</sub> =15mA. Input a signal (-50dBV) to the Pin② and measure a transmission signal when a transmission distortion factor is 5%.	-2	5.7	—	dBV
DTMF gain (1)	G <sub>V-DT1</sub>	I <sub>L</sub> =30mA. Ground DM (Pin⑦), input a signal to the Pin①, and measure a transmission signal.	26.9	28.9	30.9	dB
DTMF gain (2)	G <sub>V-DT2</sub>	I <sub>L</sub> =80mA. Ground DM (Pin⑦), input a signal to the Pin①, and measure a transmission signal.	22.9	24.9	26.9	dB
DTMF maximum transmission level	V <sub>O-DT</sub>	I <sub>L</sub> =15mA. Ground DM (Pin⑦), input a signal to the Pin①, and measure a transmission signal when a transmission distortion factor is 5%.	-2	5.6	—	dBV

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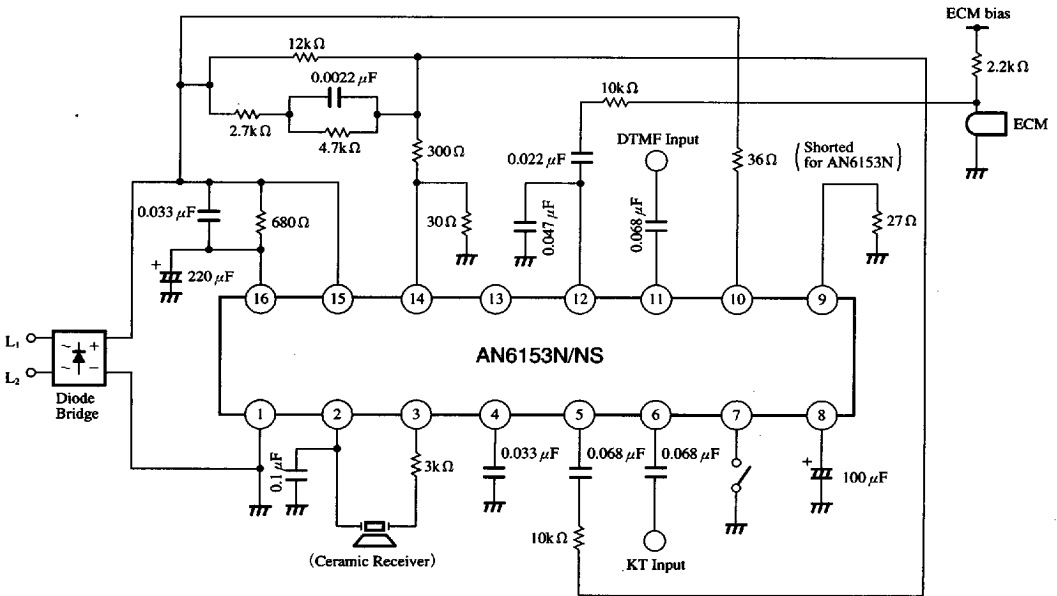
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■ Electrical Characteristics (cont.) (Ta=25°C)

Parameter	Symbol	Condition	min	typ	max	Unit
<b>Power Supply</b>						
DC line voltage (1)	$V_{L-1}$	Measure the DC voltage at the Pin⑮ when $I_L=20mA$ .	3.1	3.6	4.1	V
DC line voltage (2)	$V_{L-2}$	Measure the DC voltage at the Pin⑮ when $I_L=120mA$ .	7.2	8.1	10.2	V
Internal supply voltage (1)	$V_{CC-1}$	Measure the DC voltage at the Pin⑯ when $I_L=20mA$ .	1.64	1.94	2.24	V
Internal supply voltage (2)	$V_{CC-2}$	Measure the DC voltage at the Pin⑯ when $I_L=120mA$ .	3.9	4.6	5.3	V
<b>Dial Mute</b>						
Dial mute OFF (1)	$V_{DM-H1}$	DM (Pin⑦) is at the High level when $V_{CC}=1.8V$ .	0.8	—	$V_{CC}$	V
Dial mute ON (1)	$V_{DM-L1}$	DM (Pin⑦) is at the Low level when $V_{CC}=1.8V$ .	—	—	0.3	V
Dial mute OFF (2)	$V_{DM-H2}$	DM (Pin⑦) is at the High level when $V_{CC}=4.6V$ .	2.4	—	$V_{CC}$	V
Dial mute ON (2)	$V_{DM-L2}$	DM (Pin⑦) is at the Low level when $V_{CC}=4.6V$ .	—	—	1.4	V
Input current (1)	$V_{DM-H}$	Pin⑦ inflow current when $V_{DM}=V_{CC}$	-2	0.1	2	$\mu A$
Input current (2)	$V_{DM-L}$	Pin⑦ inflow current when $V_{DM}=0V$	-2	-0.2	-0.02	$\mu A$



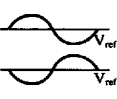
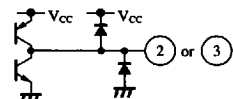
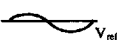
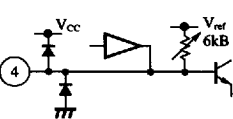
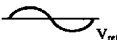
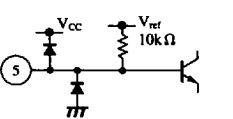
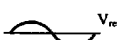
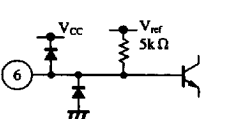
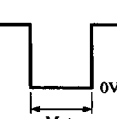
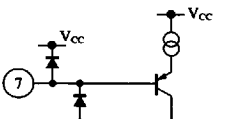
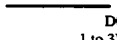
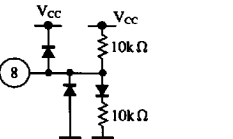
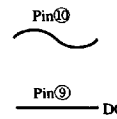
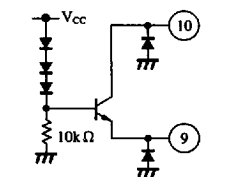
■ Application Circuit



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**Pin Descriptions**

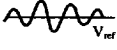
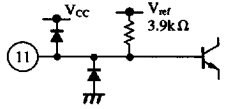

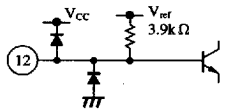
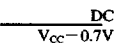
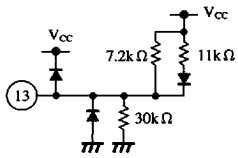
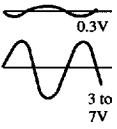
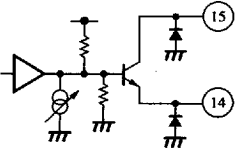
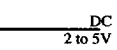
Pin No.	Pin name	Typical waveform	Description	Equivalent circuit
1	GND		Ground pin. Connect to the - output of the diode bridge.	
2 3	REC OUT		Receiver output pin. The Pins ② and ③ are of BTL output.	
4	REC filter		Receiver system filter pin. Between the receiver preamplifier step and output amplifier step.	
5	REC IN		Receiver input pin. A signal is output to the Pins ②, ③, and ④ when the DM (Pin ⑦) is at the High level, and not output when at the Low level.	
6	Key in tone IN		KT signal input pin. A signal is output to the Pins ②, ③, and ④ when the DM (Pin ⑦) is at the Low level, and not output when at the High level.	
7	Dial mute SW		Dial mute SW pin. Switches between the transmission signals (MIC, DTMF) and reception signals (REC, KT). MIC and REC are output at the high level, and KT and DTMF are output at the Low level.	
8	V <sub>ref</sub>		Internal reference voltage output pin. Pin to determine the operating point of the internal circuit. Current input/output to this pin is not allowed.	
9 10	I <sub>L</sub> bipas		Circuit current bypass pin. Most of circuit currents except one (about 10mA) required for operating the IC circuit flows. Power is consumed and power consumption of the IC itself is reduced by connecting the resistors between the Pins ⑨ and ⑩, and GND and V <sub>L</sub> .	

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### Pin Descriptions (cont.)

Pin No.	Pin name	Typical waveform	Description	Equivalent circuit
11	DTMF IN		DTMF signal input. Input a DTMF signal from the dialer, etc. Sent to the circuit when DM (Pin⑦) is at the Low level, and not sent when at the High level.	
12	MIC IN		MIC input pin. Input pin for the microphone. Sent to the circuit when DM (Pin⑦) is at the High level, and not sent when at the Low level.	
13	ATT cont.		Automatic pad control pin. Normally, this pin is used open. The circuit current characteristics of automatic pad by connecting a resistor between this pin and V <sub>CC</sub> or GND.	
14 15	Side tone V <sub>L</sub>		Transmitter output pin. Circuit input pin. A transmission signal is output to the Pins⑭ and ⑮. Respective inverted signals are output. Connect the Pin⑮ to the + output of the diode bridge.	
16	V <sub>CC</sub>		Internal supply voltage pin. Since this pin is not stabilized, it is not allowed to input/output a current to it.	—

### Electrical Characteristics Design Reference Values (T<sub>a</sub> = 25°C)

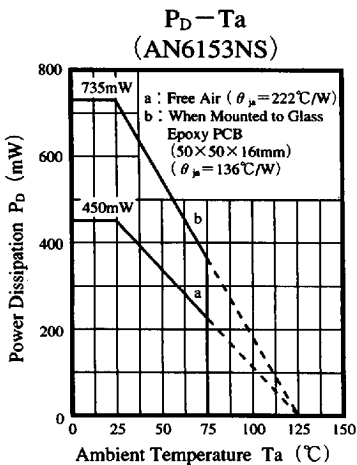
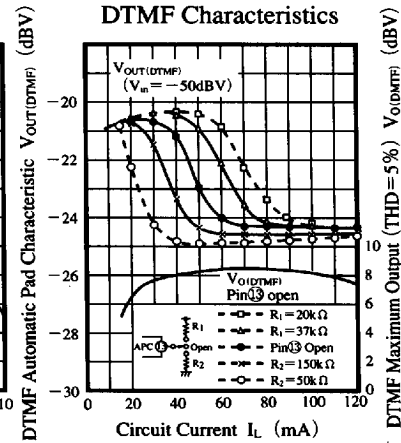
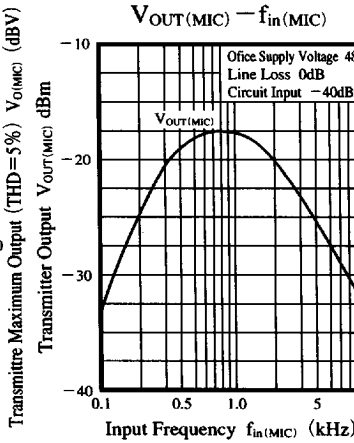
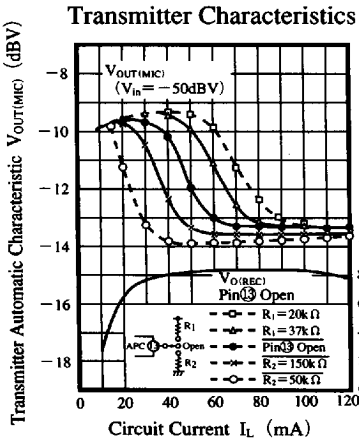
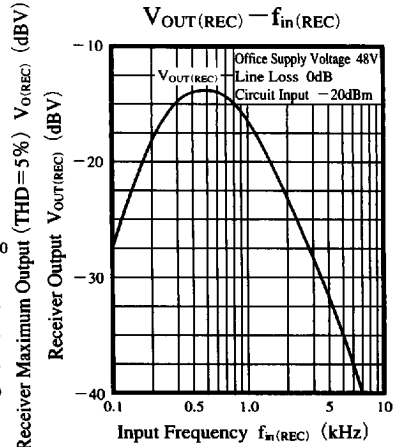
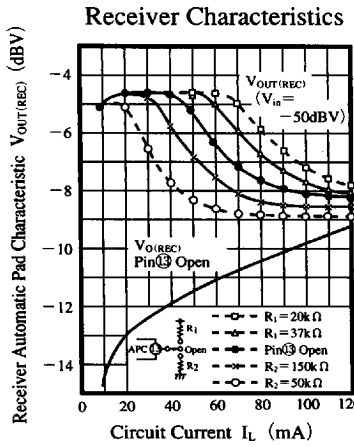
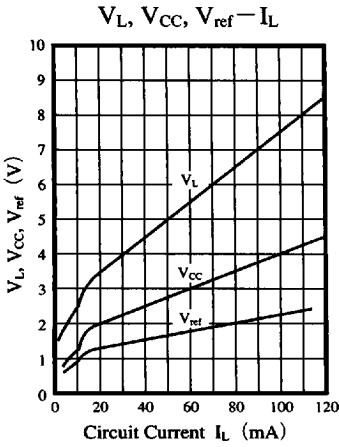
Parameter	Symbol	Condition	min	typ	max	Unit
<b>Receiver System</b>						
Receiver distortion factor	THD <sub>-R</sub>	I <sub>L</sub> = 30mA. Input from Pin⑤ and measure a distortion factor when the output between the Pins② and ③ V <sub>OUT</sub> = -10dBV.	—	0.11	2	%
KEY IN TONE gain	G <sub>V-KT</sub>	I <sub>L</sub> = 80mA. Ground DM (Pin⑦) and measure the output between the Pins② and ③ when the Pin⑥ input V <sub>IN</sub> = -50dBV.	24.3	26.8	29.3	dB
<b>Transmitter System</b>						
Transmitter distortion factor	THD <sub>-T</sub>	I <sub>L</sub> = 30mA. Input from the Pin⑫ and measure a distortion factor when the transmission signal V <sub>OUT</sub> = -5dBV.	—	0.14	3	%
<b>Power Supply Block</b>						
AC impedance (1)	Z <sub>AC-1</sub>	I <sub>L</sub> = 30mA. AC impedance between the Pins⑮ and ① when f <sub>IN</sub> = 1kHz.	450	610	750	Ω
AC impedance (2)	Z <sub>AC-2</sub>	I <sub>L</sub> = 90mA. AC impedance between the Pins⑮ and ① when f <sub>IN</sub> = 1kHz.	450	610	750	Ω

Note) The above characteristics are design reference values and not guaranteed ones.

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Characteristics Curve



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