

AN6153N, AN6153NS

Speech Network Circuits

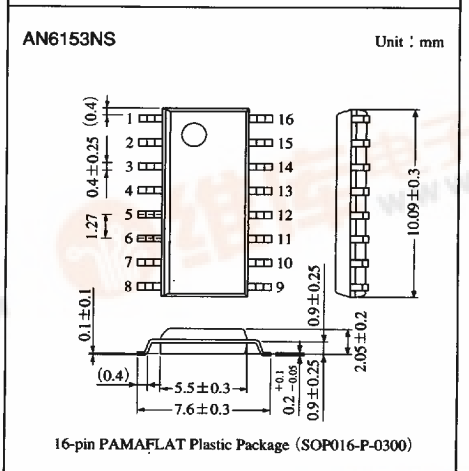
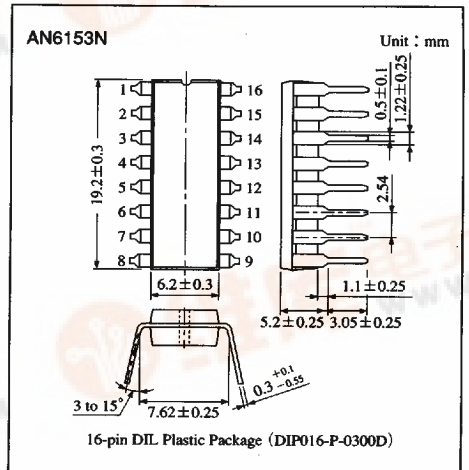
Overview

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

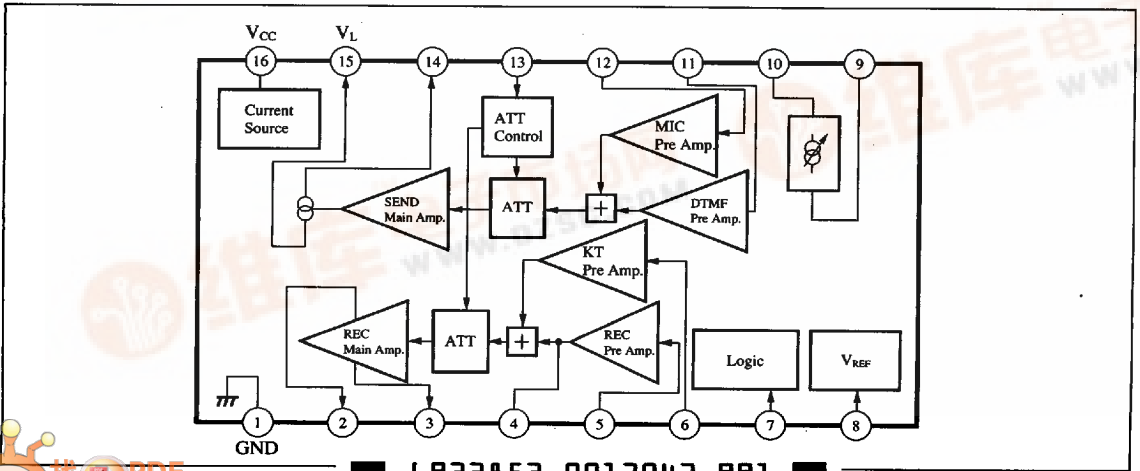
It incorporates basic speech functions to meet with various transmitters/receivers.

Features

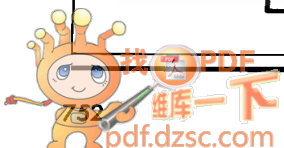
- Operating on a low current and voltage (2mA, 1.7V) and excellent in branch performance.
- Capable of directly interfacing with light-weight small ceramic transmitters/receivers, and with ECMs as well.
- Capable of adjusting the receiver gain by modifying the peripheral circuit constants.
- Automatic 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



6932852 0013043 991



■ Absolute Maximum Ratings (Ta=25°C)

| Parameter | Symbol | Rating | Unit |
|--------------------------------|------------------|-------------|------|
| Supply voltage | V _L | 14.4 | V |
| Supply current | I _L | 120 | mA |
| Power dissipation (Ta=60°C) | AN6153N | 1380 | mW |
| | AN6153NS | 290* | mW |
| Operating ambient temperature | T _{opr} | -30 to +75 | mW |
| Storage temperature | AN6153N | -55 to +150 | °C |
| | AN6153NS | -55 to +125 | °C |

* Power dissipation P_D=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 _L | 2.5 to 11.5V |

■ Electrical Characteristics (Ta=25°C)

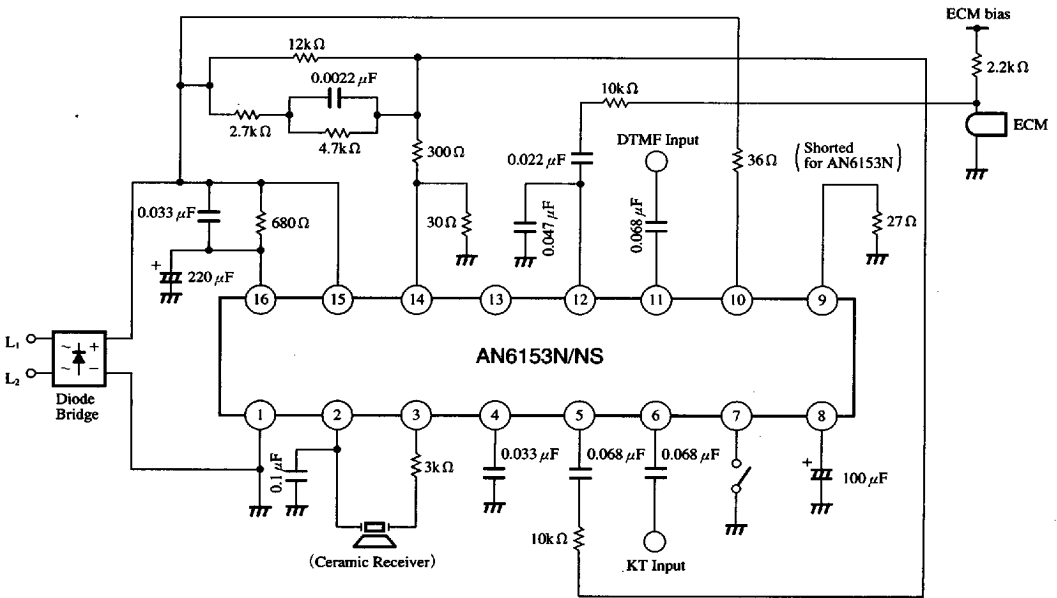
| Parameter | Symbol | Condition | min | typ | max | Unit |
|---------------------------------|--------------------|--|------|------|------|------|
| Receiver System | | | | | | |
| Receiver gain (1) | G _{V-R1} | Set to I _L =30mA. Input a signal (-50dBV) to the Pin(5) and measure the output between the Pins(2) and (3) (load 0.055 μF). | 41.3 | 43.8 | 46.3 | dB |
| Receiver gain (2) | G _{V-R2} | Set to I _L =80mA. Input a signal (-50 dBV) to the Pin(5) and measure the output between the Pins(2) and (3). | 38.4 | 40.9 | 43.4 | dB |
| Maximum receiver level | V _{O-R} | Input a signal to the Pin(5) and measure the output when an output distortion factor is 5% between the Pins(2) and (3). I _L =15mA | -2 | 1.5 | — | dBV |
| KEY IN TONE gain | G _{V-KT1} | I _L =30mA. Ground DM (Pin(7)), input a signal (-50dBV) to the Pin(6) and measure the output between the Pin(2) and (3). | 27.1 | 29.6 | 32.1 | dB |
| Transmitter System | | | | | | |
| Transmitter gain (1) | G _{V-T1} | I _L =30mA. Input a signal (-50dBV) to the Pin(2) and measure a transmission signal at the 600 Ω load end between the Pin(9) and GND. | 37.5 | 40 | 42.5 | dB |
| Transmitter gain (2) | G _{V-T2} | I _L =80mA. Input a signal (-50dBV) to the Pin(2) and measure a transmission signal. | 33.6 | 36.1 | 38.6 | dB |
| Maximum transmission level | V _{O-T} | I _L =15mA. Input a signal (-50dBV) to the Pin(2) and measure a transmission signal when a transmission distortion factor is 5%. | -2 | 5.7 | — | dBV |
| DTMF gain (1) | G _{V-DT1} | I _L =30mA. Ground DM (Pin(7)), input a signal to the Pin(1), and measure a transmission signal. | 26.9 | 28.9 | 30.9 | dB |
| DTMF gain (2) | G _{V-DT2} | I _L =80mA. Ground DM (Pin(7)), input a signal to the Pin(1), and measure a transmission signal. | 22.9 | 24.9 | 26.9 | dB |
| DTMF maximum transmission level | V _{O-DT} | I _L =15mA. Ground DM (Pin(7)), input a signal to the Pin(1), and measure a transmission signal when a transmission distortion factor is 5%. | -2 | 5.6 | — | dBV |





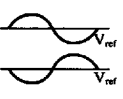
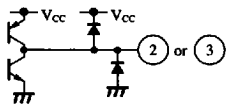

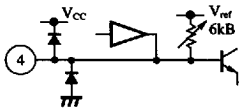
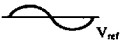
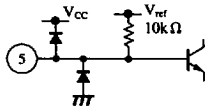
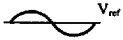
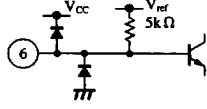
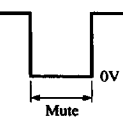
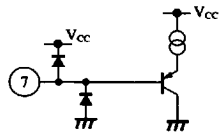
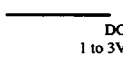
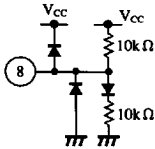
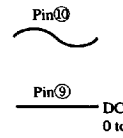
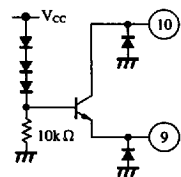
■ Electrical Characteristics (cont.) (Ta=25°C)

| Parameter | Symbol | Condition | min | typ | max | Unit |
|-----------------------------|-------------|--|------|------|----------|---------------|
| Power Supply | | | | | | |
| DC line voltage (1) | V_{L-1} | Measure the DC voltage at the Pin⑮ when $I_L = 20\text{mA}$. | 3.1 | 3.6 | 4.1 | V |
| DC line voltage (2) | V_{L-2} | Measure the DC voltage at the Pin⑮ when $I_L = 120\text{mA}$. | 7.2 | 8.1 | 10.2 | V |
| Internal supply voltage (1) | V_{CC-1} | Measure the DC voltage at the Pin⑯ when $I_L = 20\text{mA}$. | 1.64 | 1.94 | 2.24 | V |
| Internal supply voltage (2) | V_{CC-2} | Measure the DC voltage at the Pin⑰ when $I_L = 120\text{mA}$. | 3.9 | 4.6 | 5.3 | V |
| Dial Mute | | | | | | |
| Dial mute OFF (1) | V_{DM-H1} | DM (Pin⑦) is at the High level when $V_{CC} = 1.8\text{V}$. | 0.8 | — | V_{CC} | V |
| Dial mute ON (1) | V_{DM-L1} | DM (Pin⑦) is at the Low level when $V_{CC} = 1.8\text{V}$. | — | — | 0.3 | V |
| Dial mute OFF (2) | V_{DM-H2} | DM (Pin⑦) is at the High level when $V_{CC} = 4.6\text{V}$. | 2.4 | — | V_{CC} | V |
| Dial mute ON (2) | V_{DM-L2} | DM (Pin⑦) is at the Low level when $V_{CC} = 4.6\text{V}$. | — | — | 1.4 | V |
| Input current (1) | V_{DM-H} | Pin⑦ inflow current when $V_{DM} = V_{CC}$ | -2 | 0.1 | 2 | μA |
| Input current (2) | V_{DM-L} | Pin⑦ inflow current when $V_{DM} = 0\text{V}$ | -2 | -0.2 | -0.02 | μA |

■ Application Circuit

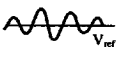
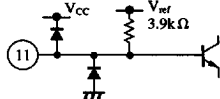

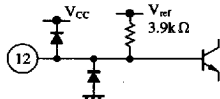
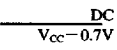
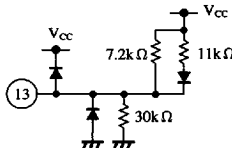
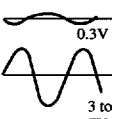
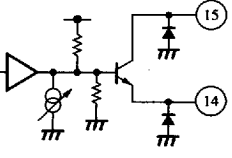
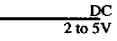



■ Pin Descriptions

| 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 _{ref} |  | 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 _L 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 _L . |  |

ICs for Telephone

■ 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 Vcc or GND. |  |
| 14 15 | Side tone V _L |  | 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 _{cc} |  | 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_a = 25°C)

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

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

■ 6932852 0013047 537 ■

■ Characteristics Curve

