

AN6123MS

Speech network IC with ALC

■ Overview

The AN6123MS is an ALC IC for level control of audio signal (300 Hz to 3 kHz).

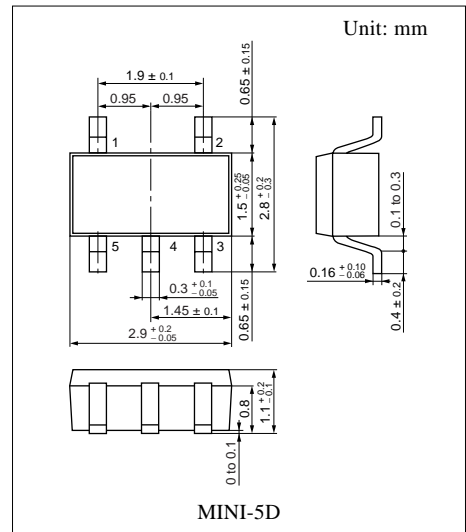
Adopting a mini 5-pin package, mounting on a small area is possible.

■ Features

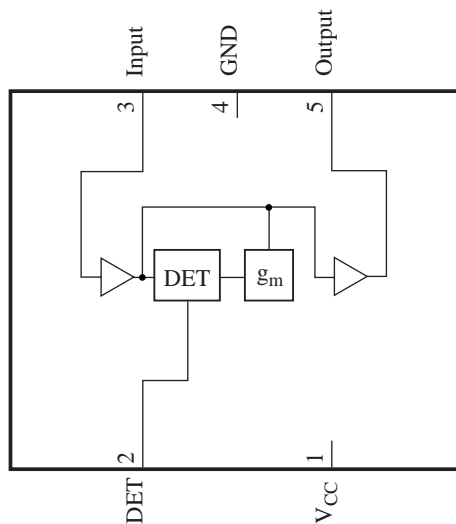
- Wide supply voltage operation range of $V_{CC} = 2.4 \text{ V}$ to 6.0 V
- Small current consumption of $I_{CC} = 500 \mu\text{A}$
- Reduction of a bad effect by the external noise thanks to a package for a rear side mounting.

■ Applications

- Cordless telephone, PDC, PHS telephone



■ Block Diagram



■ Pin Descriptions

| Pin No. | Description | |
|---------|-----------------|--------------------|
| 1 | V _{CC} | Supply voltage pin |
| 2 | DET | Detection pin |
| 3 | Input | Signal input pin |
| 4 | GND | Grounding pin |
| 5 | Output | Signal output pin |

■ Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|---------------------------------|------------------|-------------|------|
| Supply voltage | V _{CC} | 6.5 | V |
| Supply current | I _{CC} | 3.0 | mA |
| Power dissipation | P _D | 19.5 | mW |
| Operating ambient temperature * | T _{opr} | -20 to +75 | °C |
| Storage temperature * | T _{stg} | -55 to +125 | °C |

Note) *: Except for the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.

■ Recommended Operating Range

| Parameter | Symbol | Range | Unit |
|----------------|-----------------|------------|------|
| Supply voltage | V _{CC} | 2.4 to 6.0 | V |

■ Electrical Characteristics at V_{CC} = 3.0 V, f = 1 kHz, T_a = 25°C

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|-------------------|-----------------|----------------------|-----|-----|-----|------|
| Operating current | I _{CC} | Without signal input | — | 450 | 900 | μA |

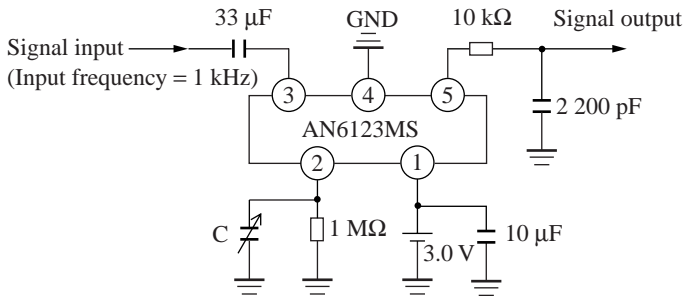
• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|----------------------------------|------------------|--|------|------|------|------|
| Voltage gain | G _V | V _{IN} = -40 dBm | 22 | 24 | 26 | dB |
| Output level | V _O | V _{IN} = -10 dBm | -9.5 | -7.5 | -5.5 | dBm |
| ALC control range | ΔALC | Output level varying amount at V _{IN} = -25 dBm, V _{IN} = 0 dBm | -1.5 | — | 1.5 | dB |
| Total harmonic distortion factor | THD | At V _{IN} = -10 dBm | — | 1 | 3 | % |
| Output noise voltage | V _{NO} | Terminated by CCIT filter input 2 kΩ | — | -70 | -60 | dBm |
| Input impedance | Z _{IN} | Pin 3 input impedance | 15 | 30 | 45 | kΩ |
| Output impedance | Z _{OUT} | Pin 5 output impedance | 200 | 400 | 600 | Ω |

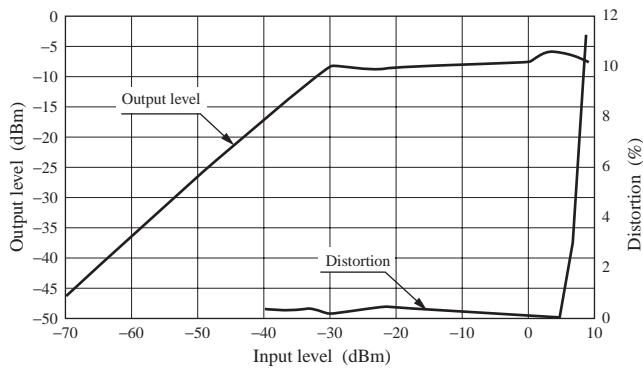
■ Application Notes

1. I/O characteristics and distortion

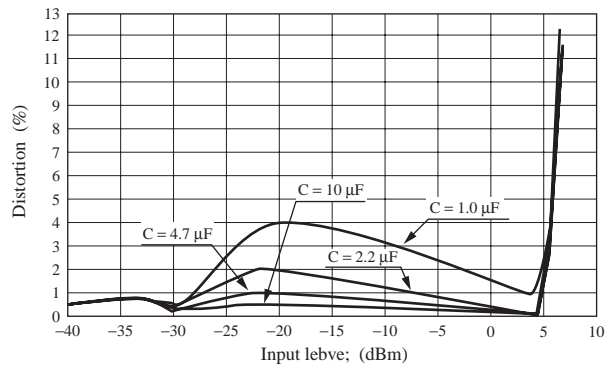


The I/O characteristics in the circuit shown on the left can be referred to in the graph below. Also note that if the C in the circuit is lowered, the distortion characteristics will become worse (Graph 2).

Graph 1. I/O characteristics and distortion (when C = 10 μF)

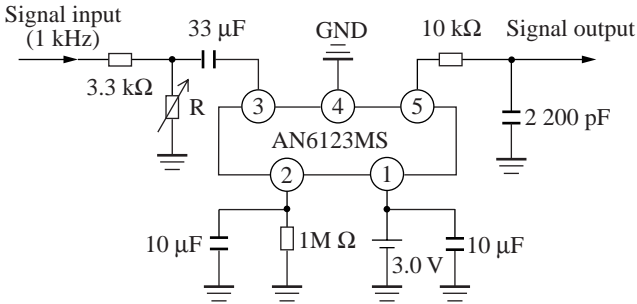


Graph 2. Distortion characteristics when C is variable



■ Application Notes (continued)

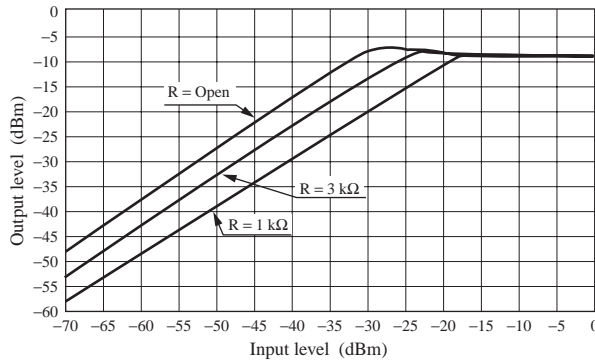
2. Input level adjustment for maximum output



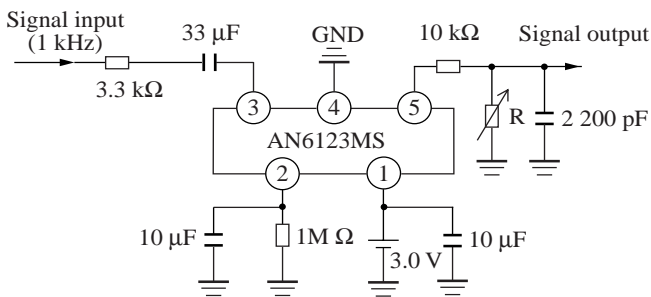
You can adjust R in the left circuit diagram to find the operation point for a maximum output level. For example, since the input level for a maximum output is -30 dBm when R is open and the attenuation in the input stage is $20 \log(3k/6.3k) = -6.4$ dB when R is 3 k Ω . This means a total gain loss is -6.4 dB as compared with open mode, hence the input level to get the maximum output is -23.6 dBm.

Likewise, the attenuation is 12.7 dB for R = 1 k Ω and the desired input level becomes 17.3 dBm.

I/O characteristics



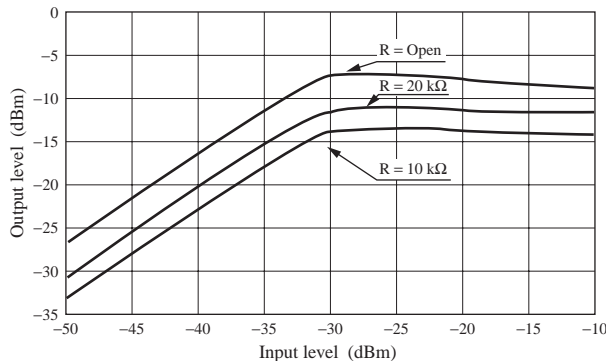
3. Output level adjustment for a maximum output



The maximum output level can be adjusted by R in the left circuit diagram.

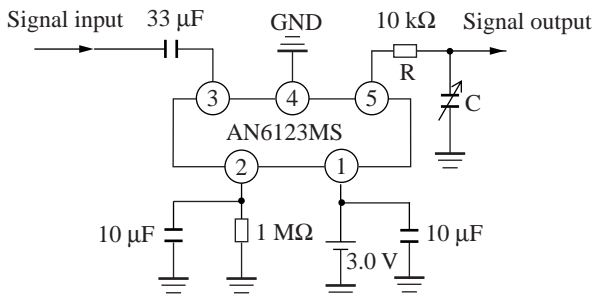
Since the maximum output is -7.5 dBm when R is open, it is $20 \log(20k/30k) = -3.5$ dBm at R = 20 k Ω . It is an attenuated value of by 3.4 dB against open mode. Therefore, the maximum output becomes -11 dBm. Likewise, for R = 10 k Ω , attenuation is 6 dB and the maximum output becomes -13.5 dBm.

I/O characteristics



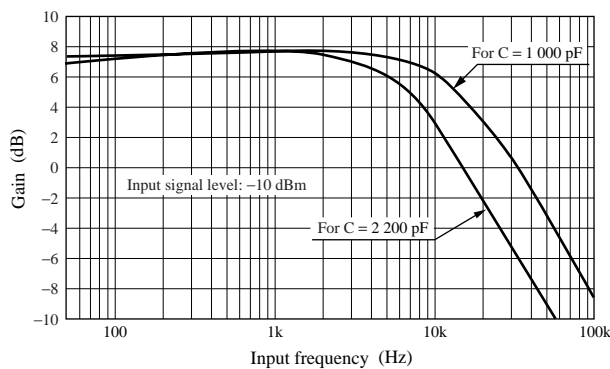
Application Notes (continued)

4. Frequency characteristics



The AN6123MS itself has an almost flat frequency characteristic in the audio frequency band. The high-band frequency is set with R and C shown in the left circuit. The cut-off frequency f_C at $R = 10 \text{ k}\Omega$ and $C = 2\,200 \text{ pF}$, that is the frequency at which the frequency characteristic deteriorates by 3 dB, is $f_C = 1/2\pi CR = 7.2 \text{ kHz}$. At $R = 10 \text{ k}\Omega$ and $C = 1\,000 \text{ pF}$, it is 16 kHz. (Refer to the graph.)

Frequency characteristics



Application Circuit Example

