

AN6123MS

Speech network IC with ALC

■ Overview

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

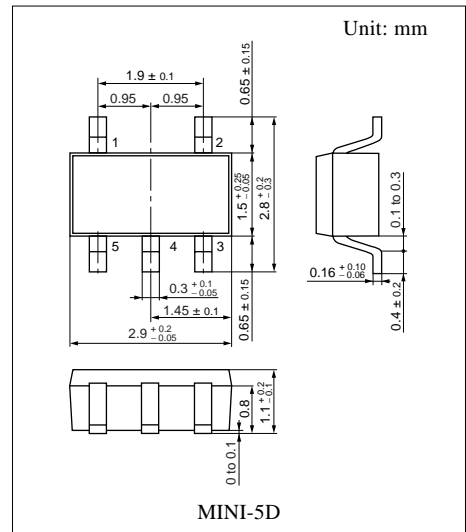
Adopting a mini 5-pin package, mounting on a small area is possible.

■ Features

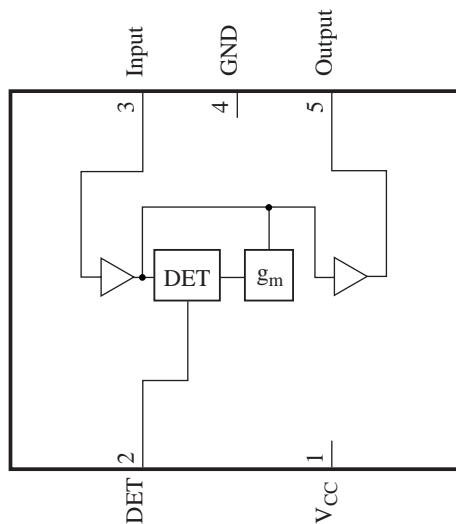
- Wide supply voltage operation range of $V_{CC} = 2.4 \text{ V}$ to 6.0 V
- Small current consumption of $I_{CC} = 500 \mu\text{A}$
- Reduction of a bad effect by the external noise thanks to a package for a rear side mounting.

■ 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

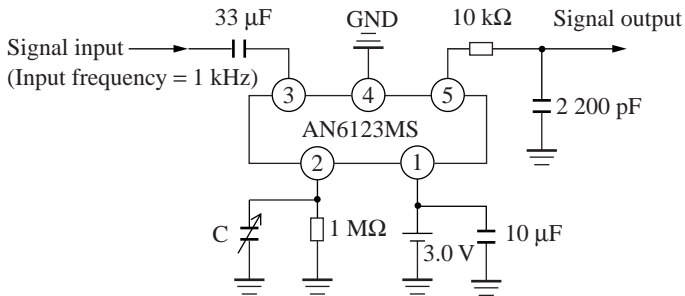
• Design reference data

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

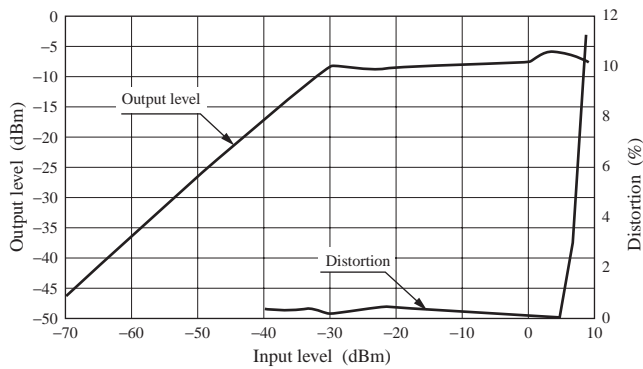
■ Application Notes

1. I/O characteristics and distortion

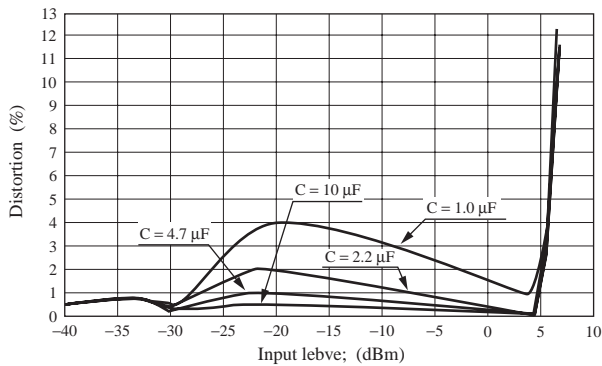


The I/O characteristics in the circuit shown on the left can be referred to in the graph below. Also note that if the C in the circuit is lowered, the distortion characteristics will become worse (Graph 2).

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

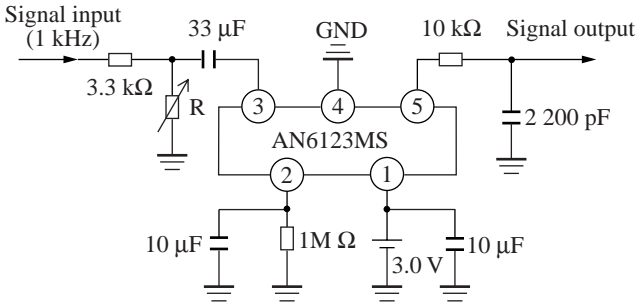


Graph 2. Distortion characteristics when C is variable



■ Application Notes (continued)

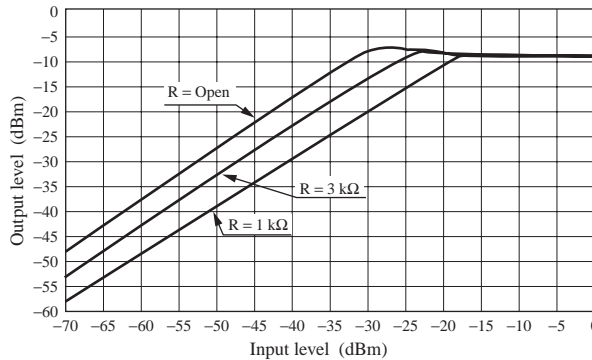
2. Input level adjustment for maximum output



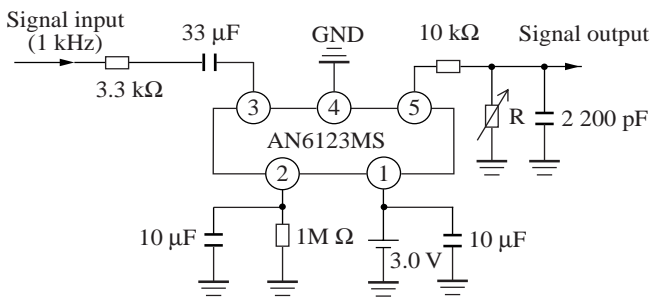
You can adjust R in the left circuit diagram to find the operation point for a maximum output level. For example, since the input level for a maximum output is -30 dBm when R is open and the attenuation in the input stage is $20 \log(3k/6.3k) = -6.4$ dB when R is 3 k Ω . This means a total gain loss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



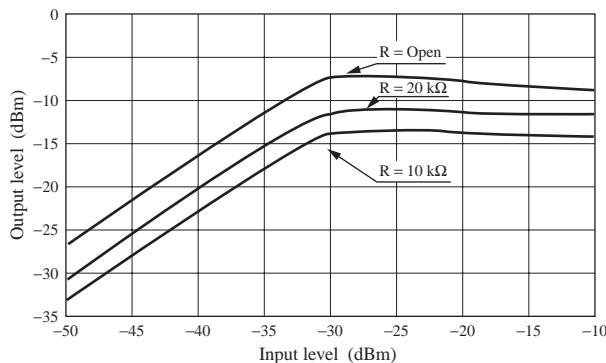
3. Output level adjustment for a maximum output



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

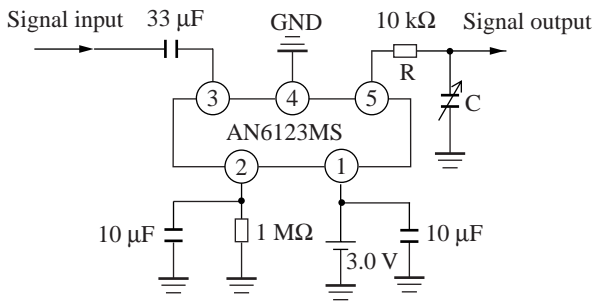
Since the maximum output is -7.5 dBm when R is open, it is $20 \log(20k/30k) = -3.5$ dBm at R = 20 k Ω . It is an attenuated value of by 3.4 dB against open mode. Therefore, the maximum output becomes -11 dBm. Likewise, for R = 10 k Ω , attenuation is 6 dB and the maximum output becomes -13.5 dBm.

I/O characteristics



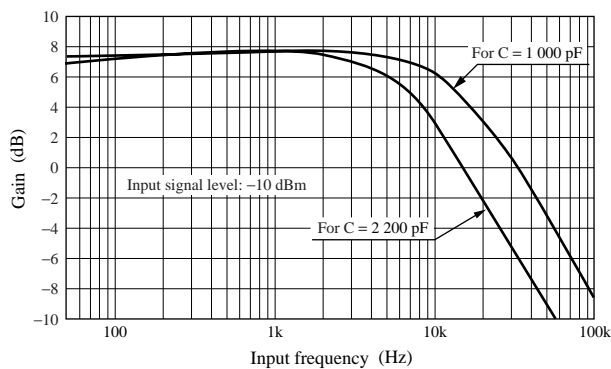
■ Application Notes (continued)

4. Frequency characteristics

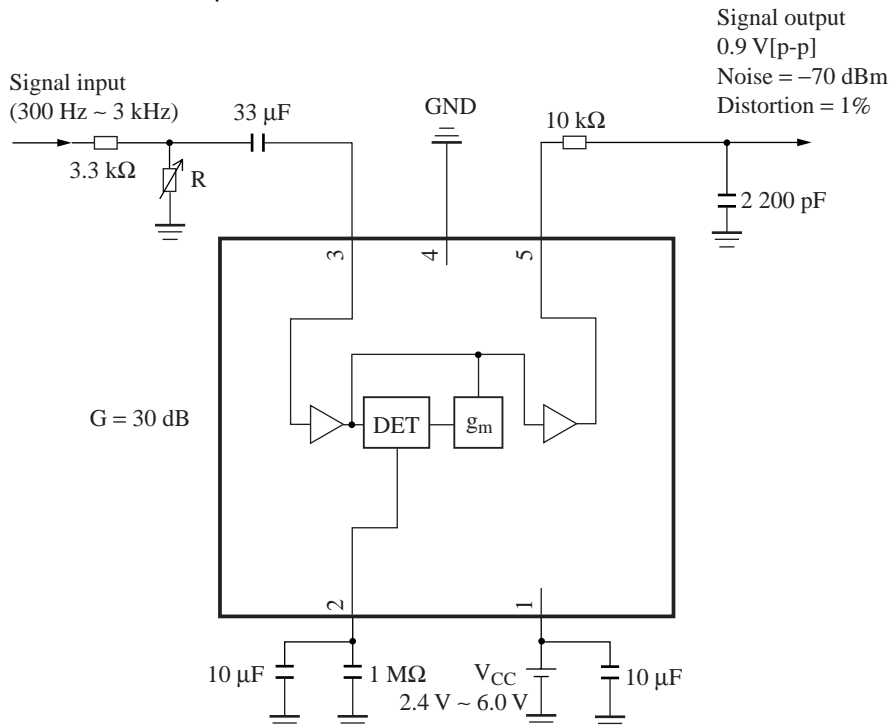


The AN6123MS itself has an almost flat frequency characteristic in the audio frequency band. The high-band frequency is set with R and C shown in the left circuit. The cut-off frequency f_C at $R = 10\text{ k}\Omega$ and $C = 2\text{ 200 pF}$, that is the frequency at which the frequency characteristic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

Frequency characteristics



■ Application Circuit Example



Request for your special attention and precautions in using the technical information and semiconductors described in this material

- (1) An export permit needs to be obtained from the competent authorities of the Japanese Government if any of the products or technologies described in this material and controlled under the "Foreign Exchange and Foreign Trade Law" is to be exported or taken out of Japan.
- (2) The technical information described in this material is limited to showing representative characteristics and applied circuit examples of the products. It does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.
- (3) The products described in this material are intended to be used for standard applications or general electronic equipment (such as office equipment, communications equipment, measuring instruments and household appliances).
Consult our sales staff in advance for information on the following applications:
 - Special applications (such as for airplanes, aerospace, automobiles, traffic control equipment, combustion equipment, life support systems and safety devices) in which exceptional quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or harm the human body.
 - Any applications other than the standard applications intended.
- (4) The products and product specifications described in this material are subject to change without notice for reasons of modification and/or improvement. At the final stage of your design, purchasing, or use of the products, therefore, ask for the most up-to-date Product Standards in advance to make sure that the latest specifications satisfy your requirements.
- (5) When designing your equipment, comply with the guaranteed values, in particular those of maximum rating, the range of operating power supply voltage and heat radiation characteristics. Otherwise, we will not be liable for any defect which may arise later in your equipment.
Even when the products are used within the guaranteed values, redundant design is recommended, so that such equipment may not violate relevant laws or regulations because of the function of our products.
- (6) When using products for which dry packing is required, observe the conditions (including shelf life and after-unpacking standby time) agreed upon when specification sheets are individually exchanged.
- (7) No part of this material may be reprinted or reproduced by any means without written permission from our company.

Please read the following notes before using the datasheets

- A. These materials are intended as a reference to assist customers with the selection of Panasonic semiconductor products best suited to their applications.
Due to modification or other reasons, any information contained in this material, such as available product types, technical data, and so on, is subject to change without notice.
Customers are advised to contact our semiconductor sales office and obtain the latest information before starting precise technical research and/or purchasing activities.
- B. Panasonic is endeavoring to continually improve the quality and reliability of these materials but there is always the possibility that further rectifications will be required in the future. Therefore, Panasonic will not assume any liability for any damages arising from any errors etc. that may appear in this material.
- C. These materials are solely intended for a customer's individual use.
Therefore, without the prior written approval of Panasonic, any other use such as reproducing, selling, or distributing this material to a third party, via the Internet or in any other way, is prohibited.