

# AN6123MS

## Speech network IC with ALC

### ■ Overview

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

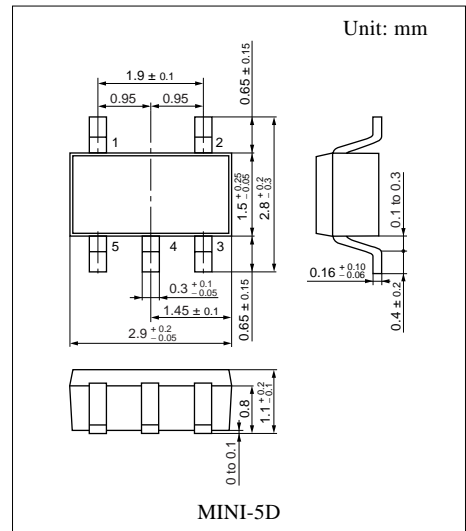
Adopting a mini 5-pin package, mounting on a small area is possible.

### ■ Features

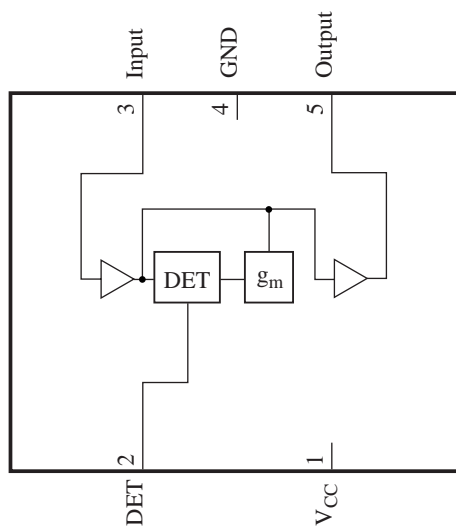
- Wide supply voltage operation range of  $V_{CC} = 2.4 \text{ V}$  to  $6.0 \text{ V}$
- Small current consumption of  $I_{CC} = 500 \mu\text{A}$
- Reduction of a bad effect by the external noise thanks to a package for a rear side mounting.

### ■ Applications

- Cordless telephone, PDC, PHS telephone



### ■ Block Diagram



### ■ Pin Descriptions

Pin No.	Description	
1	V <sub>CC</sub>	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 <sub>CC</sub>	6.5	V
Supply current	I <sub>CC</sub>	3.0	mA
Power dissipation	P <sub>D</sub>	19.5	mW
Operating ambient temperature *	T <sub>opr</sub>	-20 to +75	°C
Storage temperature *	T <sub>stg</sub>	-55 to +125	°C

Note) \*: Except for the operating ambient temperature and storage temperature, all ratings are for T<sub>a</sub> = 25°C.

### ■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	V <sub>CC</sub>	2.4 to 6.0	V

### ■ Electrical Characteristics at V<sub>CC</sub> = 3.0 V, f = 1 kHz, T<sub>a</sub> = 25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating current	I <sub>CC</sub>	Without signal input	—	450	900	μA

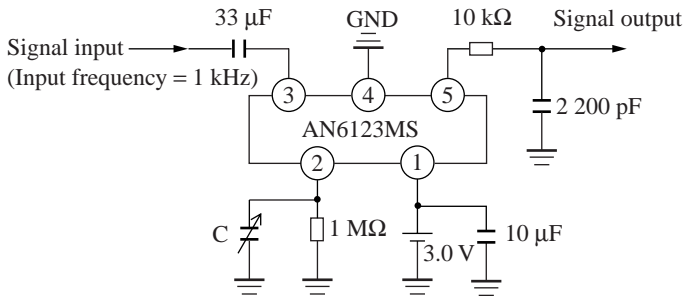
#### • Design reference data

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 <sub>V</sub>	V <sub>IN</sub> = -40 dBm	22	24	26	dB
Output level	V <sub>O</sub>	V <sub>IN</sub> = -10 dBm	-9.5	-7.5	-5.5	dBm
ALC control range	ΔALC	Output level varying amount at V <sub>IN</sub> = -25 dBm, V <sub>IN</sub> = 0 dBm	-1.5	—	1.5	dB
Total harmonic distortion factor	THD	At V <sub>IN</sub> = -10 dBm	—	1	3	%
Output noise voltage	V <sub>NO</sub>	Terminated by CCIT filter input 2 kΩ	—	-70	-60	dBm
Input impedance	Z <sub>IN</sub>	Pin 3 input impedance	15	30	45	kΩ
Output impedance	Z <sub>OUT</sub>	Pin 5 output impedance	200	400	600	Ω

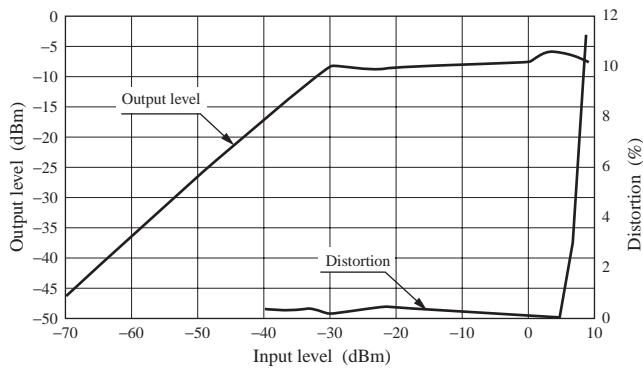
■ Application Notes

1. I/O characteristics and distortion

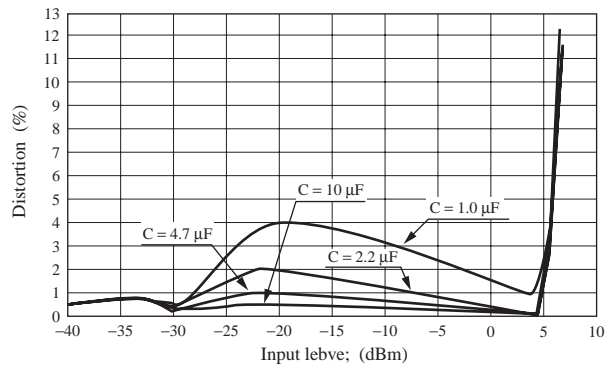


The I/O characteristics in the circuit shown on the left can be referred to in the graph below. Also note that if the C in the circuit is lowered, the distortion characteristics will become worse (Graph 2).

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

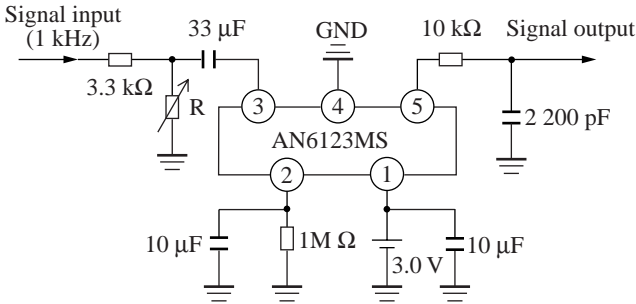


Graph 2. Distortion characteristics when C is variable



■ Application Notes (continued)

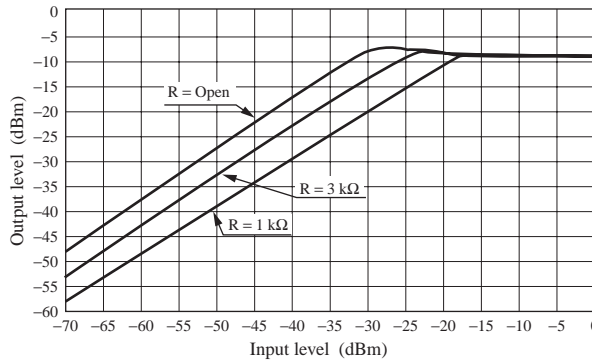
2. Input level adjustment for maximum output



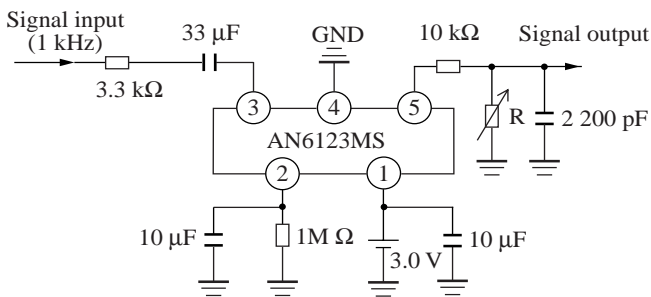
You can adjust R in the left circuit diagram to find the operation point for a maximum output level. For example, since the input level for a maximum output is  $-30$  dBm when R is open and the attenuation in the input stage is  $20 \log(3k/6.3k) = -6.4$  dB when R is  $3$  k $\Omega$ . This means a 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 $\Omega$  and the desired input level becomes  $17.3$  dBm.

I/O characteristics



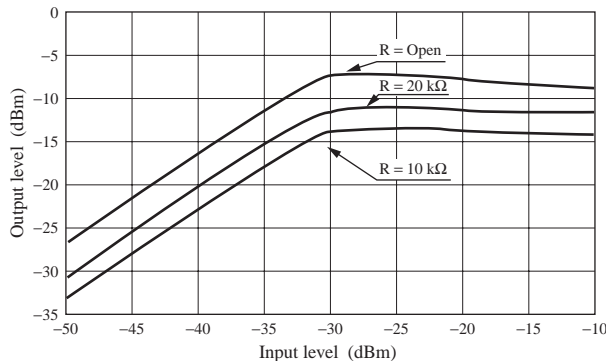
3. Output level adjustment for a maximum output



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

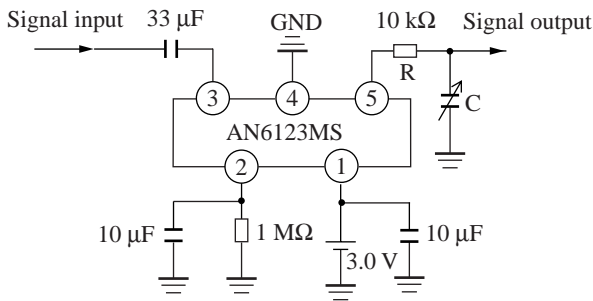
Since the maximum output is  $-7.5$  dBm when R is open, it is  $20 \log(20k/30k) = -3.5$  dBm at R =  $20$  k $\Omega$ . It is an attenuated value of by  $3.4$  dB against open mode. Therefore, the maximum output becomes  $-11$  dBm. Likewise, for R =  $10$  k $\Omega$ , attenuation is  $6$  dB and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

I/O characteristics



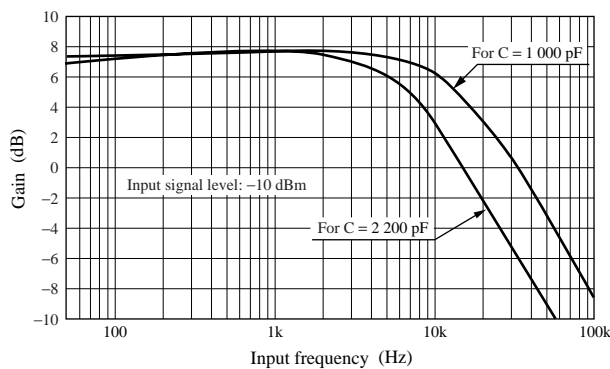
■ Application Notes (continued)

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

