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AN6123MS

Speech network IC with ALC

■ Overview

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

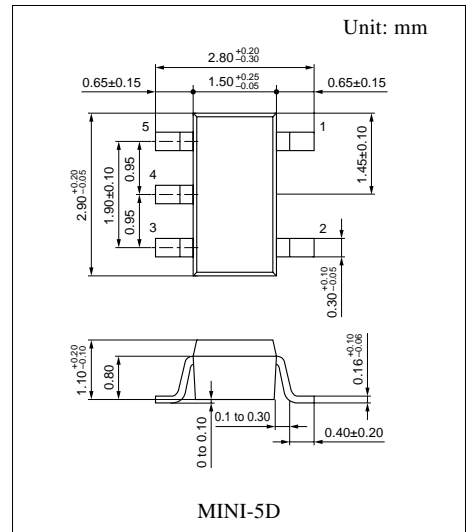
Adopting a mini 5-pin package, mounting on a small area is possible.

■ Features

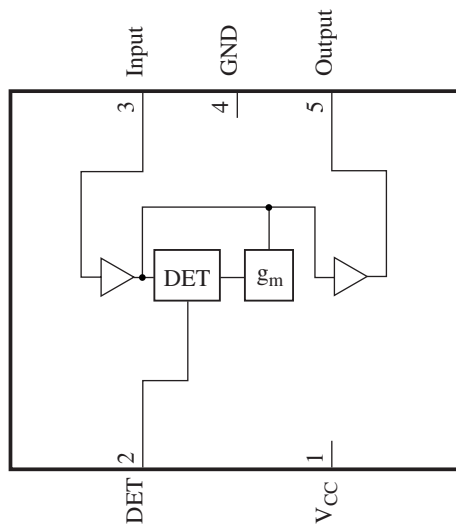
- Wide supply voltage operation range of $V_{CC} = 2.4 \text{ V}$ to 6.0 V
- Small current consumption of $I_{CC} = 500 \mu\text{A}$
- Reduction of a bad effect by the external noise thanks to a package for a rear side mounting.

■ 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

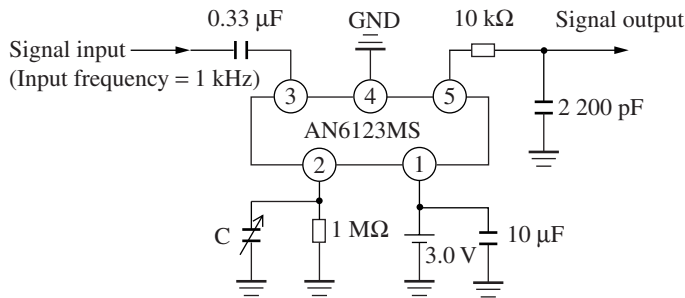
• Design reference data

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

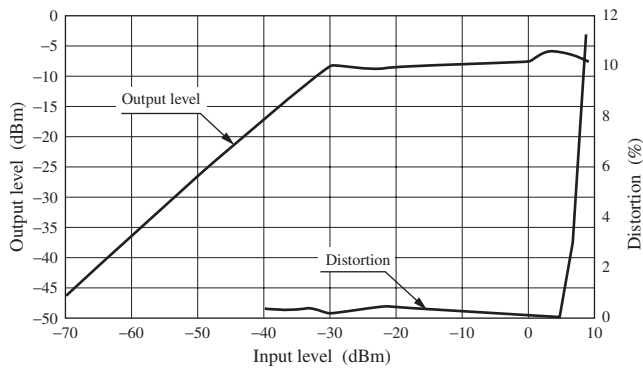
■ Application Notes

1. I/O characteristics and distortion

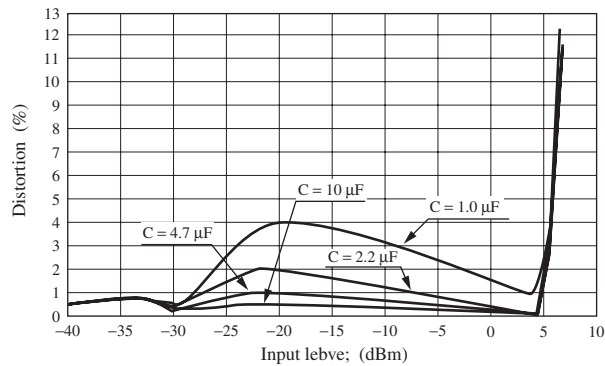


The I/O characteristics in the circuit shown on the left can be referred to in the graph below. Also note that if the C in the circuit is lowered, the distortion characteristics will become worse (Graph 2).

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

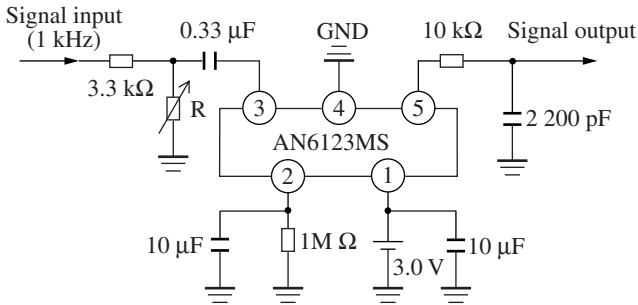


Graph 2. Distortion characteristics when C is variable



■ Application Notes (continued)

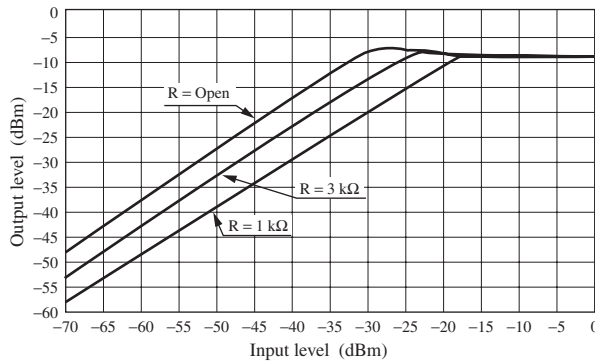
2. Input level adjustment for maximum output



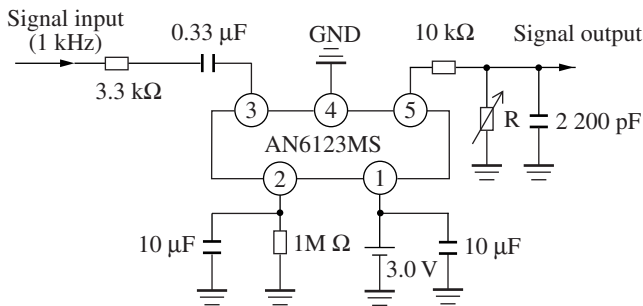
You can adjust R in the left circuit diagram to find the operation point for a maximum output level. For example, since the input level for a maximum output is -30 dBm when R is open and the attenuation in the input stage is $20 \log(3k/6.3k) = -6.4$ dB when R is 3 k Ω . This means a total gain loss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



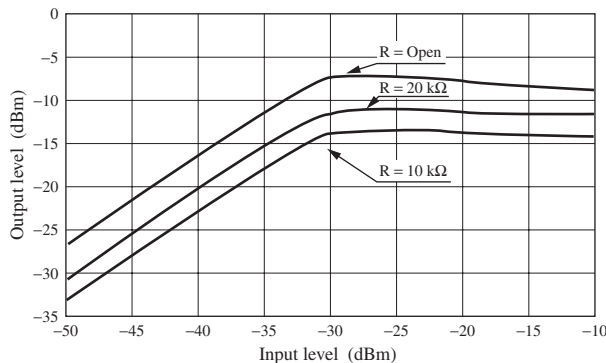
3. Output level adjustment for a maximum output



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

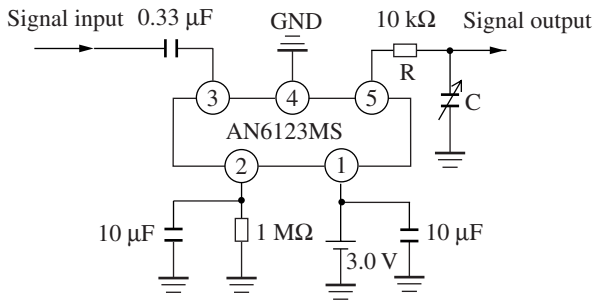
Since the maximum output is -7.5 dBm when R is open, it is $20 \log(20k/30k) = -3.5$ dBm at $R = 20$ k Ω . It is an attenuated value of by 3.4 dB against open mode. Therefore, the maximum output becomes -11 dBm. Likewise, for $R = 10$ k Ω , attenuation is 6 dB and the maximum output becomes -13.5 dBm.

I/O characteristics



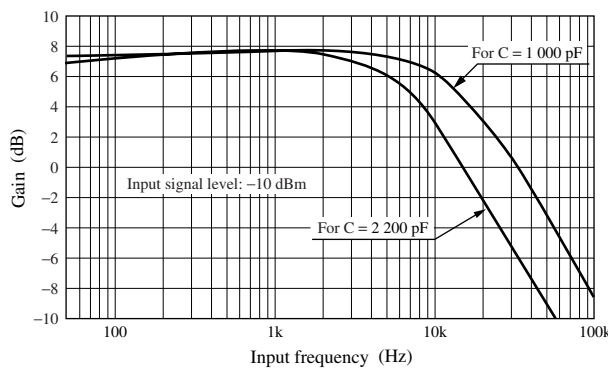
Application Notes (continued)

4. Frequency characteristics

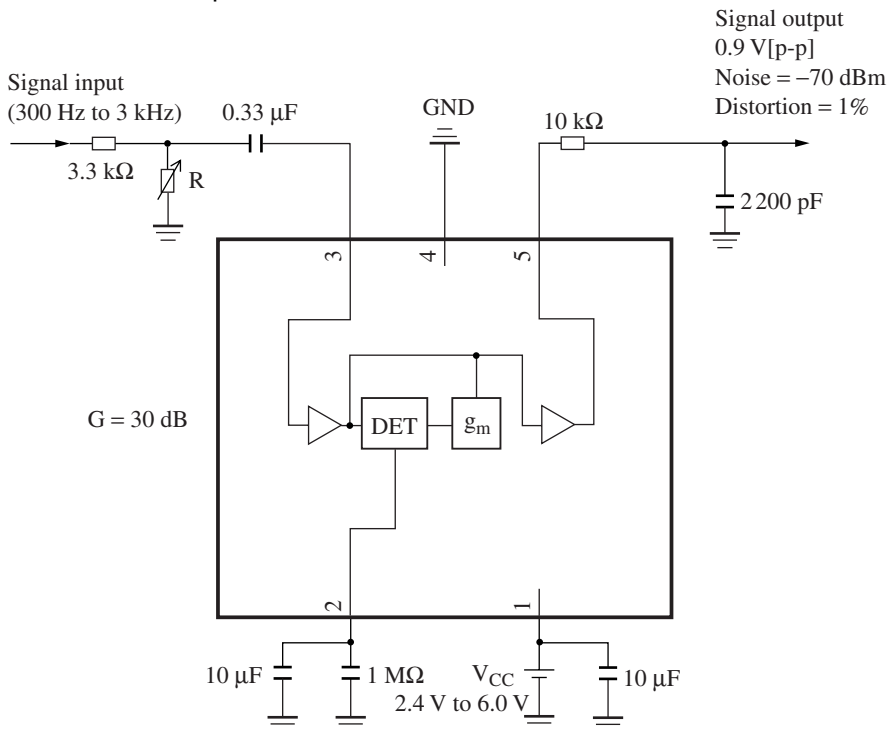


The AN6123MS itself has an almost flat frequency characteristic in the audio frequency band. The high-band frequency is set with R and C shown in the left circuit. The cut-off frequency f_c at $R = 10 \text{ k}\Omega$ and $C = 2\,200 \text{ pF}$, that is the frequency at which the frequency characteristic 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



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