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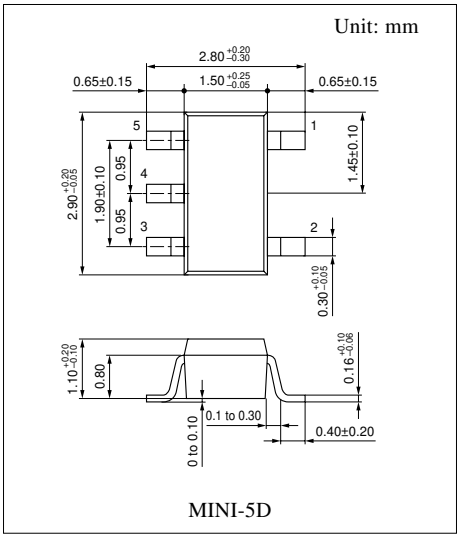
AN6123MS

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.



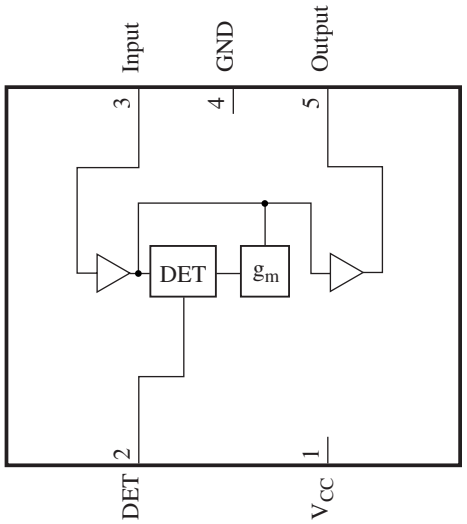
■ Features

- Wide supply voltage operation range of V_{CC} = 2.4 V to 6.0 V
- Small current consumption of I_{CC} = 500 µA
- 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

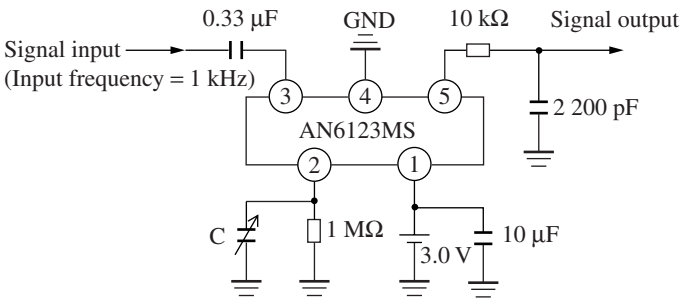
• Design reference data

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

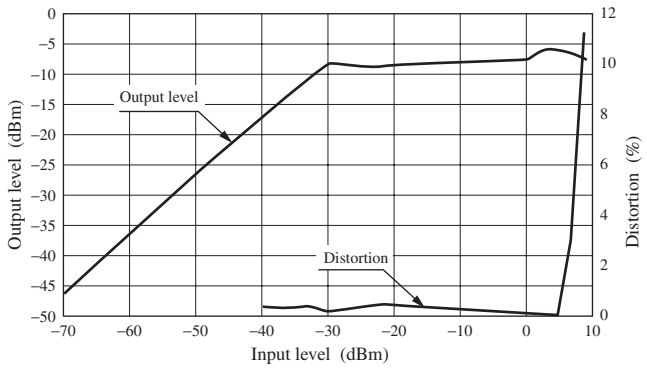
■ Application Notes

1. I/O characteristics and distortion

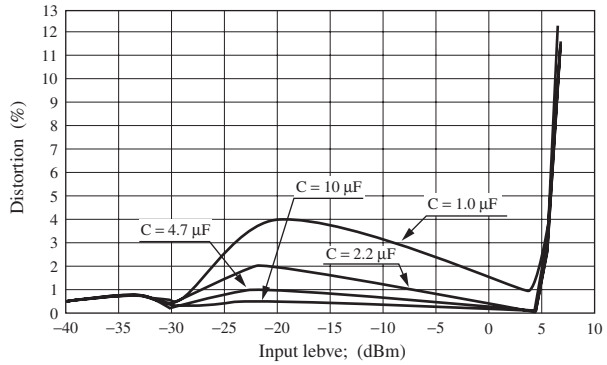


The I/O characteristics in the circuit shown on the left can be referred to in the graph below. Also note that if the C in the circuit is lowered, the distortion characteristics will become worse (Graph 2).

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

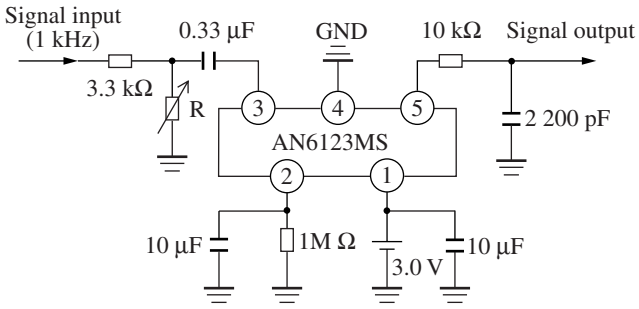


Graph 2. Distortion characteristics when C is variable



■ Application Notes (continued)

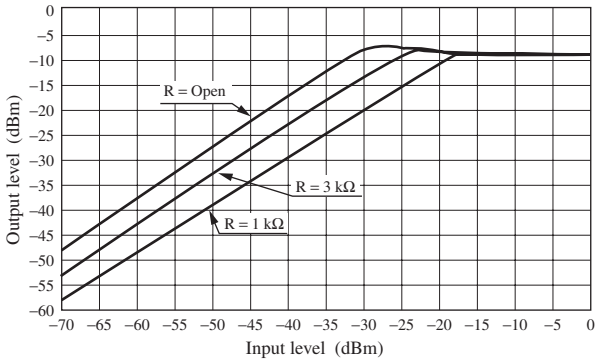
2. Input level adjustment for maximum output



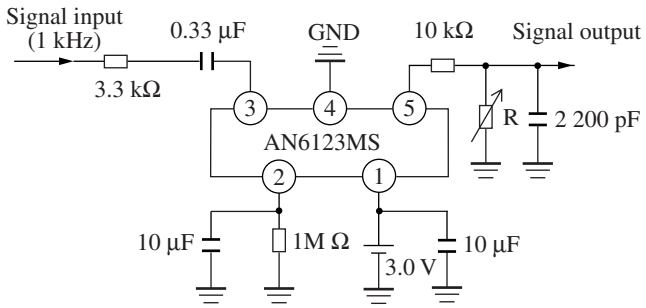
You can adjust R in the left circuit diagram to find the operation point for a maximum output level. For example, since the input level for a maximum output is −30 dBm when R is open and the attenuation in the input stage is 20 log (3k/6.3k) = −6.4 dB when R is 3 kΩ. This means a total gain loss is −6.4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

I/O characteristics



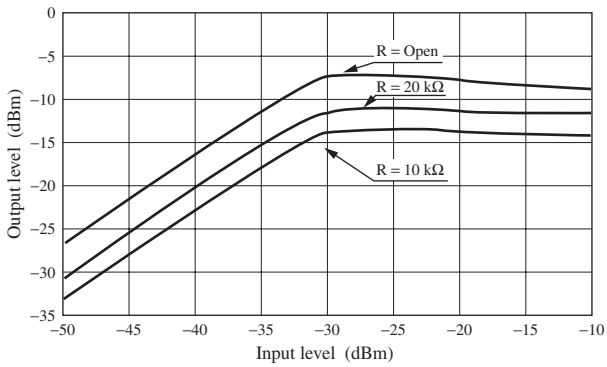
3. Output level adjustment for a maximum output



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

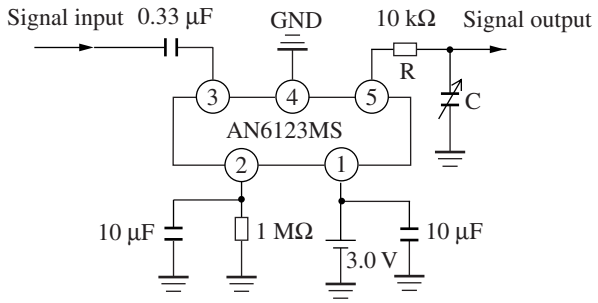
Since the maximum output is −7.5 dBm when R is open, it is 20 log (20k/30k) = −3.5 dBm at R = 20 kΩ. It is an attenuated value of by 3.4 dB against open mode. Therefore, the maximum output becomes −11 dBm. Likewise, for R = 10 kΩ, attenuation is 6 dB and the maximum output becomes −13.5 dBm.

I/O characteristics



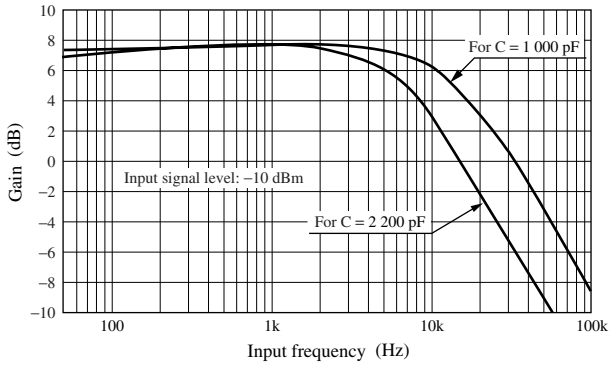
■ Application Notes (continued)

4. Frequency characteristics

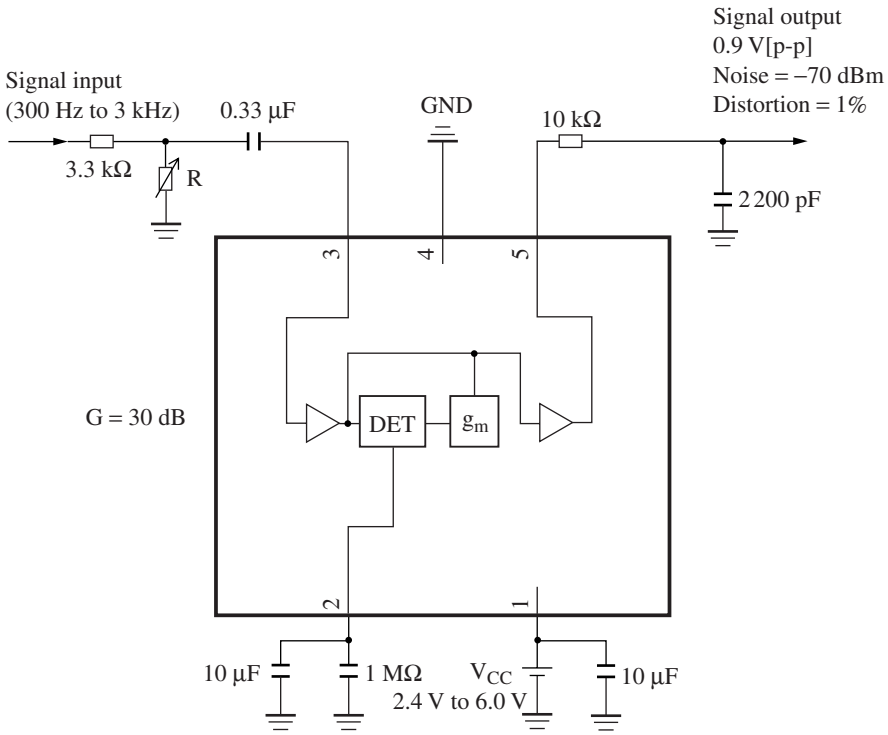


The AN6123MS itself has an almost flat frequency characteristic in the audio frequency band. The high-band frequency is set with R and C shown in the left circuit. The cut-off frequency f_C at R = 10 kΩ and C = 2 200 pF, that is the frequency at which the frequency characteristic deteriorates by 3 dB,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

Frequency characteristics



■ Application Circuit Example



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