

LOW VOLTAGE AUDIO POWER AMPLIFIER

■ GENERAL DESCRIPTION

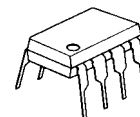
The NJM2113 is a audio power amplifier designed for telephone applications, such as in speakerphones.

Coupling capacitors to the speaker are not required, as it has differential speaker outputs. The closed loop gain is set with two external resistors. A CD pin permit powering down with muting the input signal.

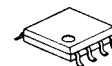
■ FEATURES

- Wide Operating Voltage (2~16V)
- Low Operating Current (2.7mA Typ.)
- CD Input to Power Down the IC with Mute
- Low Power-Down Operating Current (72μA Typ.)
- Output Power Exceeds 250mW ($V^+=6V, R_L=32\Omega$)
- Gain Adjustable ($G_{VD}=0\sim 43dB$, Voice Band)
- Package Outline DMP8, DIP8, SIP8, SSOP8, VSP8, EMP8
- Bipolar Technology

■ PACKAGE OUTLINE



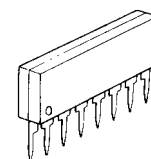
NJM2113D



NJM2113M



NJM2113V



NJM2113L



NJM2113R

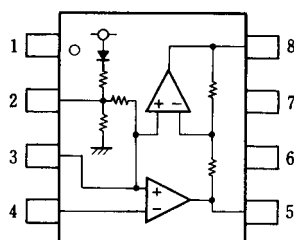


NJM2113E

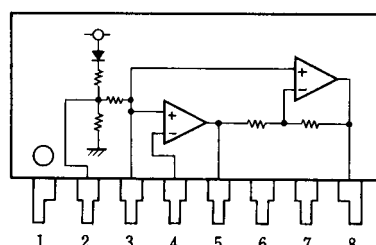
■ RECOMMENDED OPERATING CONDITIONS

- | | | |
|-----------------------|----------|-------------------------|
| • Load Impedance | R_L | 8~200Ω |
| • Differential Gain | G_{VD} | 0~43dB (5kHz bandwidth) |
| • Input Voltage at CD | V_{CD} | 0~ $V^+ V_{dc}$ |

■ PIN CONFIGURATION



NJM2113D
NJM2113M
NJM2113V
NJM2113R

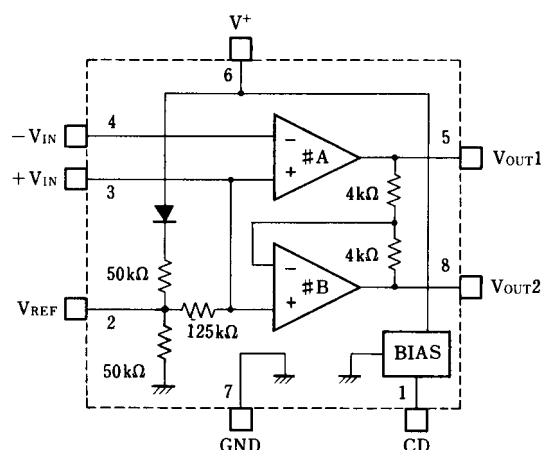


NJM2113L

PIN FUNCTION

1. CD
2. V_{REF}
3. $+V_{IN}$
4. $-V_{IN}$
5. V_{OUT1}
6. V^+
7. GND
8. V_{OUT2}

■ BLOCK DIAGRAM



NJM2113

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	+18	V
Output Peak Current	I_{OP}	± 250	mA
Input Voltage Range	V_{IN}	(1~4pin) -0.3 to $V^++0.3$ (5,8pin) -0.3 to $V^++0.3$ (when Power-Down)	V
Power Dissipation	P_D	(DIP8) 500 (SIP8) 800 (DMP8) 500 (note1) (SSOP8) 360 (note1) (VSP8) 320 (EMP8) 300	mW
Operating Temperature Range	T_{opr}	-20~+75	°C
Storage Temperature Range	T_{stg}	-40~+125	°C

(note1) Mounted on PC Board

■ ELECTRICAL CHARACTERISTICS

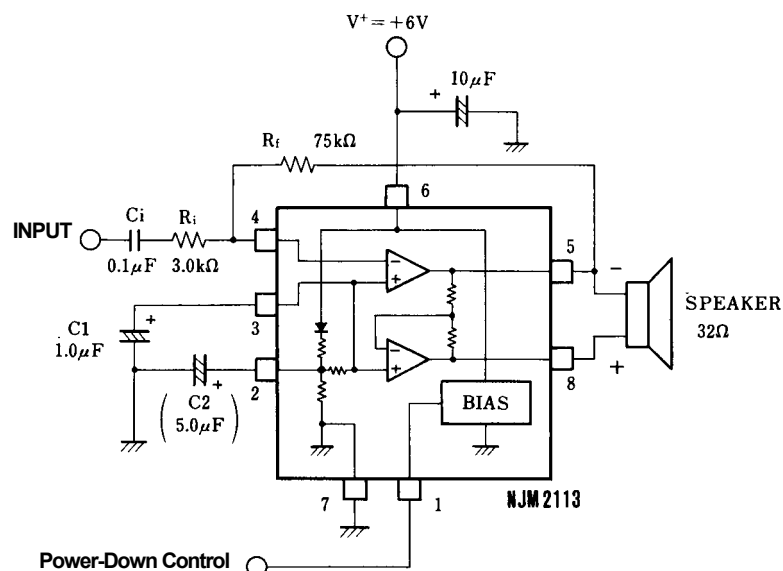
($V^+=6V$, Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC1}	$V^+=3.0V, R_L=\infty, 1pin=0.8V$	-	2.7	4.0	mA
(no signal)	I_{CC2}	$V^+=16.0V, R_L=\infty, 1pin=0.8V$	-	3.4	5.0	mA
	I_{CCD}	$V^+=3.0V, R_L=\infty, 1pin=2.0V$	-	72	100	μA
Open Loop Gain	A_{V1}	Amplifier#A, $f<100Hz$	77	83	-	dB
Closed Loop Gain	A_{V2}	Amplifier#B, $f=1kHz, R_L=32\Omega$	-0.35	0	+0.35	dB
Output Power	P_{O1}	$V^+=3.0V, R_L=16\Omega, THD\leq 10\%$	55	-	-	mW
(note2)	P_{O2}	$V^+=6.0V, R_L=32\Omega, THD\leq 10\%$	250	-	-	mW
	P_{O3}	$V^+=12.0V, R_L=100\Omega, THD\leq 10\%$ (note3)	400	-	-	mW
Total Harmonic Distortion	THD1	$V^+=6V, R_L=32\Omega, P_O=125mW, G_{VD}=34dB$	-	0.5	1.0	%
($f=1kHz$)	THD2	$V^+\geq 3V, R_L=8\Omega, P_O=20mW, G_{VD}=12dB$	-	0.5	-	%
	THD3	$V^+\geq 12V, R_L=32\Omega, P_O=200mW, G_{VD}=34dB$	-	0.6	-	%
Power Supply Rejection Ratio	PSRR1	$C1=\infty, C2=0.01\mu F, DC$	50	-	-	dB
($V^+=6.0V, \Delta V^+=3.0V$)	PSRR2	$C1=0.1\mu F, C2=0, f=1kHz$	-	12	-	dB
	PSRR3	$C1=1.0\mu F, C2=5.0\mu F, f=1kHz$	-	52	-	dB
Mute Attenuation	MAT	$f=1kHz\sim 20kHz, 1pin=2.0V$	-	70	-	dB
Output Voltage	V_{O1}	$V^+=3.0V, R_L=16\Omega$	1.00	1.18	1.25	V
($R_f=75k\Omega, DC$)	V_{O2}	$V^+=6.0V$	-	2.68	-	V
	V_{O3}	$V^+=12.0V$	-	5.71	-	V
Output High Level	V_{OH}	$I_{OUT}=-75mA, V^+=2.0\sim 16.0V$	-	$V^+-1.1$	-	V
Output Low Level	V_{OL}	$I_{OUT}=75mA, V^+=2.0\sim 16.0V$	-	0.21	-	V
Output DC Offset	ΔV_O	$R_f=75k\Omega, R_L=32\Omega, 5pin\sim 8pin$	-30	0	+30	mV
Input Bias Current	I_B	4pin	-	-30	-200	nA
Equivalent Resistance	R_{+IN}	3pin	100	150	220	k Ω
	R_{REF}	2pin	18	25	40	k Ω
CD Input Voltage H	V_{CDH}	1pin	2.0	-	V^+	V
CD Input Voltage L	V_{CDL}	1pin	0.0	-	0.8	V
CD Input Resistance	R_{CD}	$V_{CD}=16.0V, 1pin$	50	75	175	k Ω

(note2) NJM2113M, NJM2113V : At on PC Board

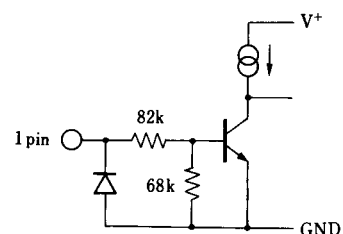
(note3) Not specified for NJM2113V, NJM2113R

■ APPLICATION CIRCUIT

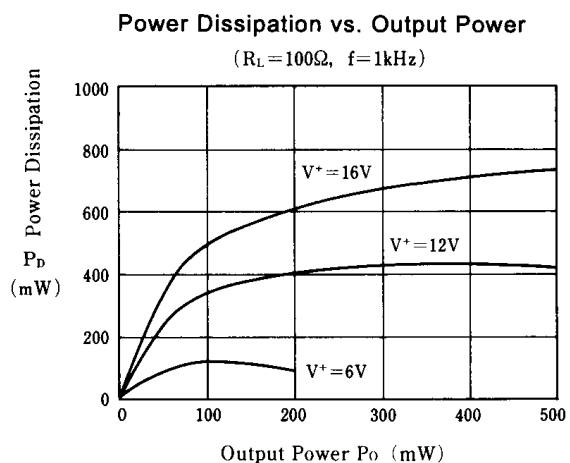
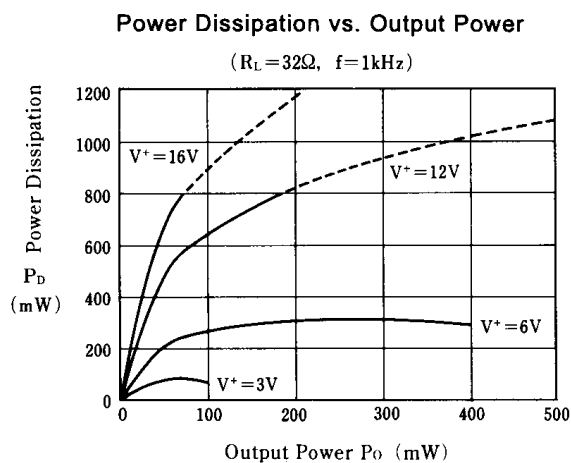
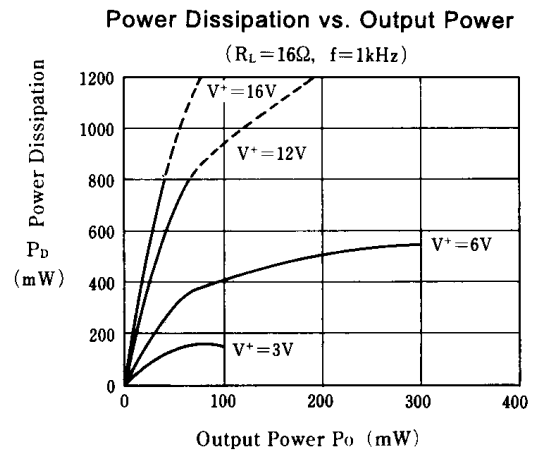
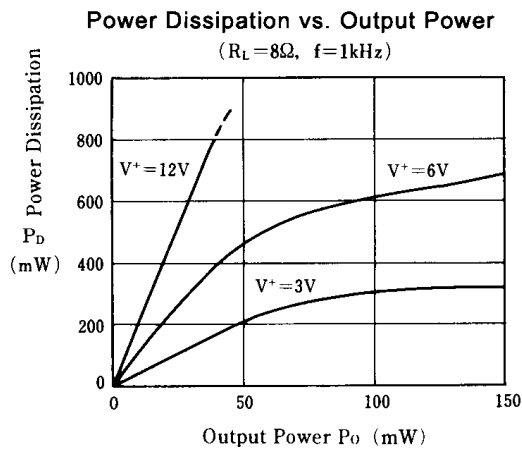
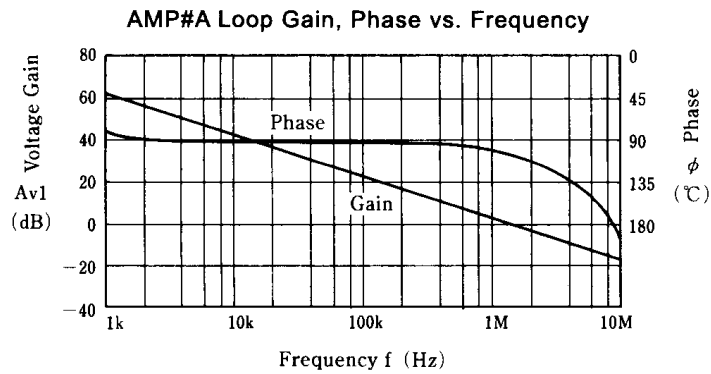


(note)

1. The NJM2113 is active mode during the CD terminal is Low level ($<0.8V$) and it is stand-by mode during the CD terminal is High level ($>2.0V$)
2. C1 and C2 improve power supply rejection ratio.
In case of C1 is enough large, C2 is unnecessary.
3. Please note that the C1 and C2 make slow power rise up to the NJM2113 regardless the external power supply condition.
4. Input current flow on the internal resistor shown in the equivalent circuit of CD terminal.
5. No snubber resistor and capacitor are required normally.
But the snubber resistor and capacitor are required if the NJM2113 oscillates by Condition of PCB layout, stray capacitor and speaker wire length.



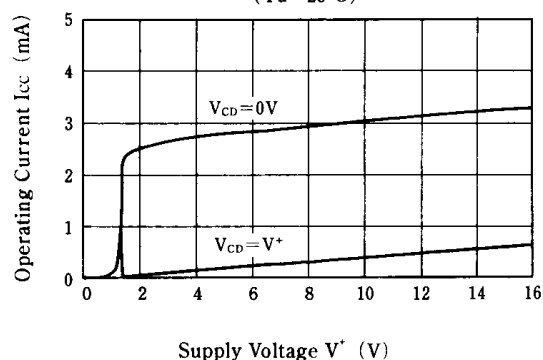
■ TYPICAL CHARACTERISTICS



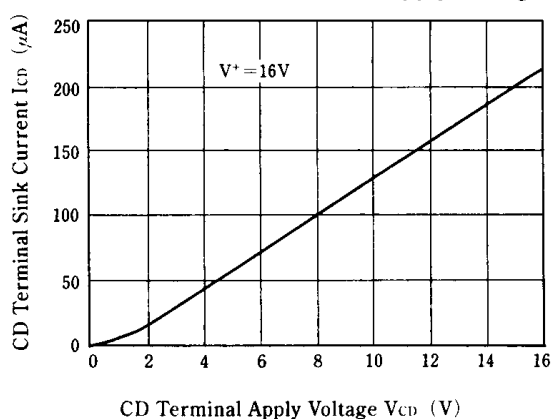
■ TYPICAL CHARACTERISTICS

Operating Current vs. Supply Voltage

($T_a = 25^\circ\text{C}$)

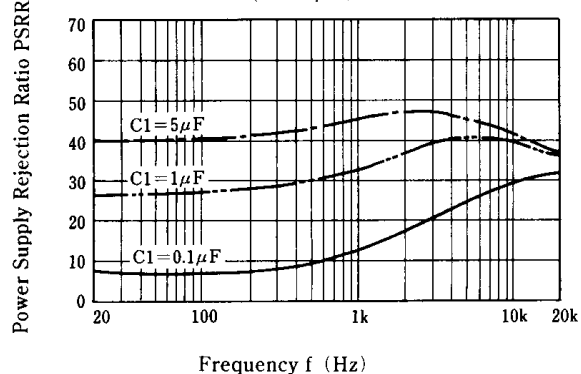


CD Terminal Sink Current vs. Apply Voltage



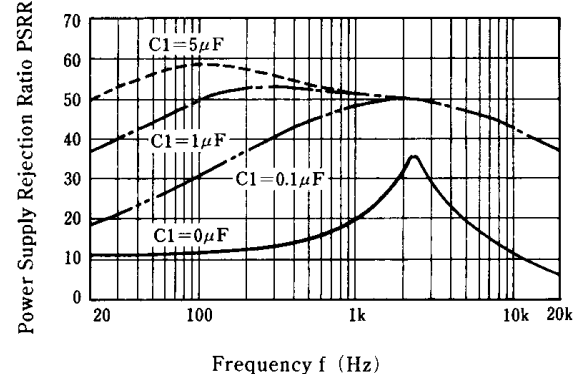
Power Supply Rejection Ratio vs. Frequency

($C_2 = 0\mu\text{F}$)



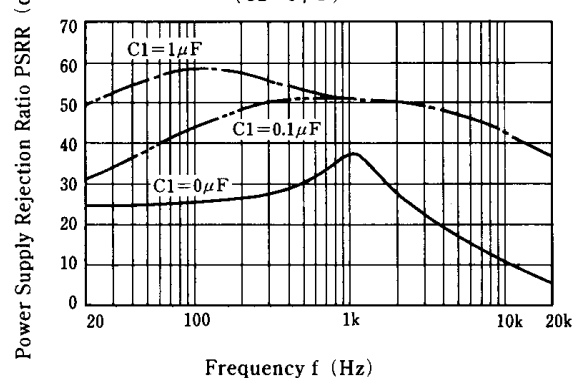
Power Supply Rejection Ratio vs. Frequency

($C_2 = 1\mu\text{F}$)



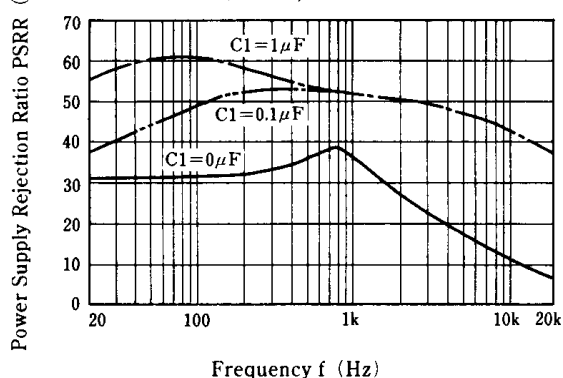
Power Supply Rejection Ratio vs. Frequency

($C_2 = 5\mu\text{F}$)

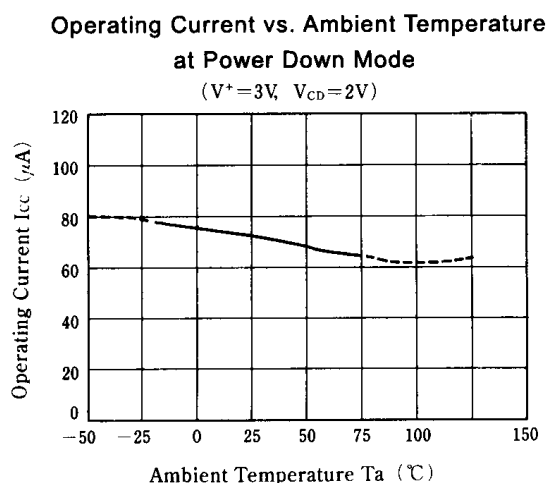
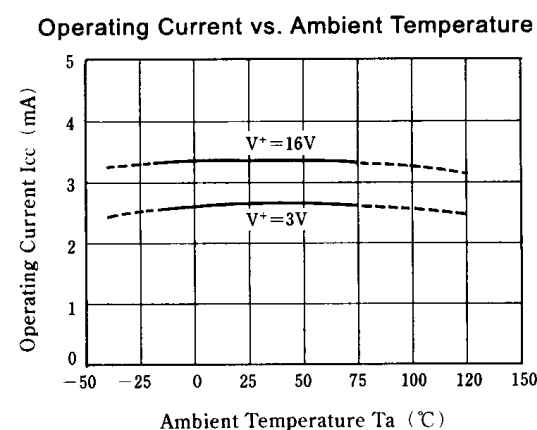
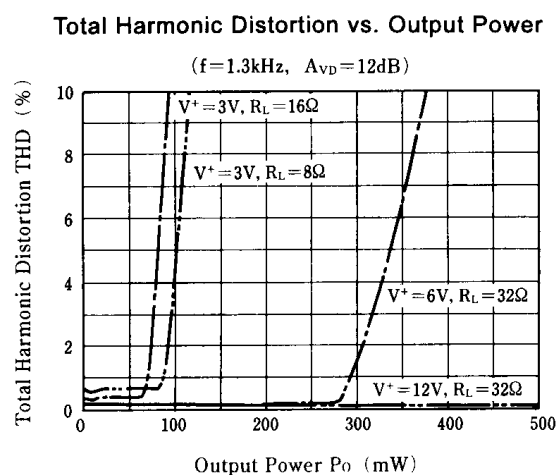
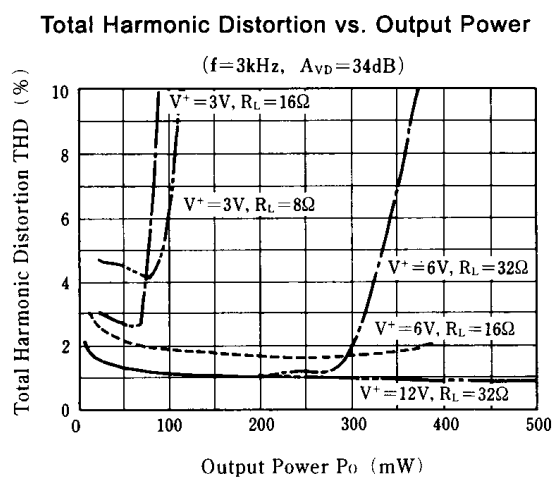
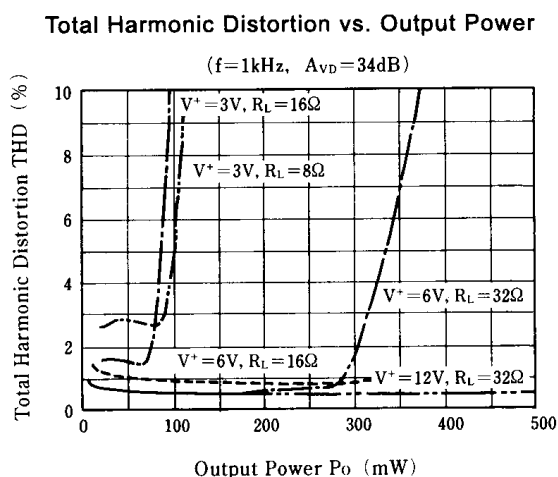


Power Supply Rejection Ratio vs. Frequency

($C_2 = 10\mu\text{F}$)



■ TYPICAL CHARACTERISTICS



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