

HIGH-POWER & LOW-VOLTAGE AUDIO POWER AMPLIFIER

■ GENERAL DESCRIPTION

The **NJU7084** is an audio power amplifier designed for telephone applications. No external coupling capacitors are required because of the differential outputs. The closed loop gain is adjusted by two external resistors, and a SD pin permit power down with muting the input signal.

The **NJU7084** improves high output power compared with other amplifier.

■ PACKAGE OUTLINE



NJU7084R

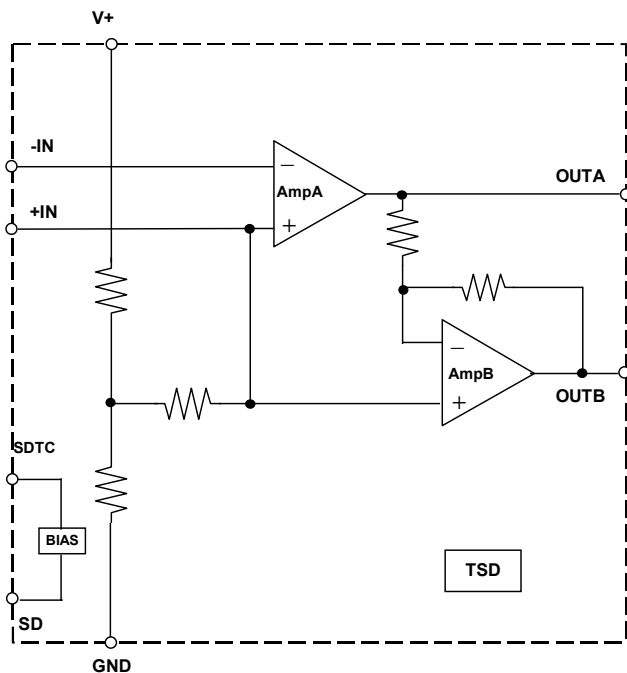
■ APPLICATION

- Cell Phone, PHS
- Portable Telephone, Wireless Telephone
- White Goods
- Security Alarm
- Monitor

■ FEATURES

- Operating Voltage $V^+ = 2.8$ to $5.5V$
- Operating Current $I_{DD1} = 2.5mA$ typ. ($V^+ = 5V, R_L = \infty$, no signal)
 $I_{DD1} = 2mA$ typ. ($V^+ = 3V, R_L = \infty$, no signal)
- Supply Current in Shutdown Mode $I_{DD2} = 2\mu A$ max.
- Output Power $P_0 = 1W$ typ. ($V^+ = 5V, R_L = 8\Omega, THD = 2\%$)
 $P_0 = 400mW$ typ. ($V^+ = 3V, R_L = 4\Omega, THD = 2\%$)
- Thermal Shutdown Circuit
- C-MOS Technology
- Package Outline VSP8

■ PIN CONFIGURATION & BLOCK DIAGRAM



1. SD
2. SDTC
3. +IN
4. -IN
5. OUTA
6. V^+
7. GND
8. OUTB

NJU7084

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------------|------------------|---|------|
| Supply Voltage | V ⁺ | +7 | V |
| Power Dissipation | P _D | 960 * ¹⁾ (VSP8) | mW |
| Output Peak Current | I _{op} | 500 | mA |
| Input Voltage Range | V _{IN} | -0.3 to V ⁺ +0.3 * ²⁾ | V |
| Operating Temperature Range | T _{opr} | -40 to +85 | °C |
| Storage Temperature Range | T _{stg} | -40 to +150 | °C |

*¹⁾ EIA/JEDEC STANDARD Test board (76.2 x 114.3 x 1.6mm, 4layers, FR-4) mounting

*²⁾ SD, SDTC, IN+, IN-, OUTA, OUTB terminals.

■ RECOMMENDED OPERATING VOLTAGE RANGE (Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-------------------------|----------------|----------------|------|------|------|------|
| Operating Voltage Range | V ⁺ | - | 2.8 | 3.0 | 5.5 | V |

■ ELECTRICAL CHARACTERISTICS

● Amplifier (Ta=25°C, V⁺=5V, G_V=6dB, f=1kHz, R_L=8Ω, Active)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-----------------------------------|------------------|--|------|------|------|------|
| Operating Current 1 | I _{DD1} | No signal, R _L =∞, Active | - | 2.5 | 6 | mA |
| Operating Current 2 | I _{DD2} | No signal, R _L =∞, V _{SD} =0.25V | - | - | 2 | μA |
| Output Power | P _{O1} | THD≤2% | 0.8 | 1 | - | W |
| Total Harmonic Distortion (THD+N) | THD | P _O =400mW | - | 0.1 | - | % |
| Supply Voltage Rejection Ratio | PSRR | C1=1μF, C2=2.2μF V _{ripple} =100mVrms | 45 | 55 | - | dB |
| Mute Attenuation | MAT | Shutdown | - | 70 | - | dB |
| Input Resistance | R _{SD} | SD Terminal | 105 | 150 | 195 | kΩ |
| Output Offset Voltage | V _{OD} | V _{IN} =0V | -50 | - | 50 | mV |

(Ta=25°C, V⁺=3V, G_V=6dB, f=1kHz, R_L=4Ω, Active)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-----------------------------------|------------------|--|------|------|------|------|
| Operating Current 1 | I _{DD1} | No signal, R _L =∞, Active | - | 2.0 | 4 | mA |
| Operating Current 2 | I _{DD2} | No signal, R _L =∞, V _{SD} =0.25V | - | - | 2 | μA |
| Output Power | P _{O1} | THD≤2% | 320 | 400 | - | mW |
| Total Harmonic Distortion (THD+N) | THD | P _O =200mW | - | 0.1 | - | % |
| Supply Voltage Rejection Ratio | PSRR | C1=1μF, C2=2.2μF V _{ripple} =100mVrms | - | 55 | - | dB |
| Mute Attenuation | MAT | Shutdown | - | 70 | - | dB |
| Output Offset Voltage | V _{OD} | V _{IN} =0V | -50 | - | 50 | mV |

V_{SD}: SD Terminal Voltage

● Mode Control (Ta=25°C)

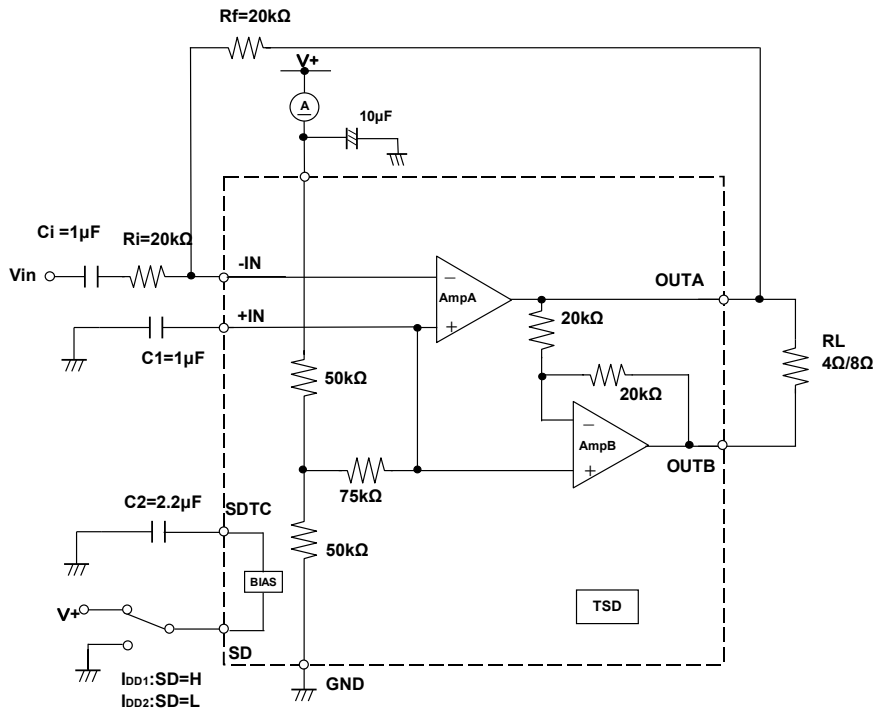
| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--------------------------|-----------------|----------------|-------------------|------|----------------|------|
| High Level Input Voltage | V _{IH} | - | 0.7V ⁺ | - | V ⁺ | V |
| Low Level Input Voltage | V _{IL} | - | 0 | - | 0.25 | |

■ CONTROL TERMINAL EXPLANATION

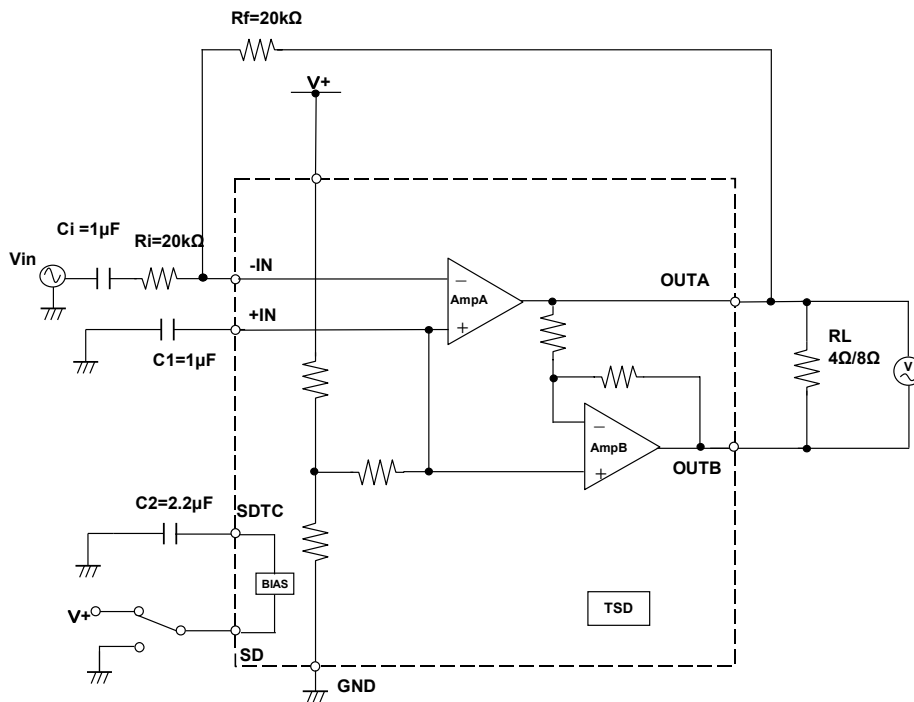
| MODE | CONTROL SIGNAL (SD Terminal) | STATUS |
|----------|------------------------------|----------------|
| Shutdown | L(=V _{IL}) | IC is standby. |
| Active | H(=V _{IH}) | IC is active. |

TEST CIRCUIT

TEST CIRCUIT1 (Operating Current I_{DD1} , I_{DD2})

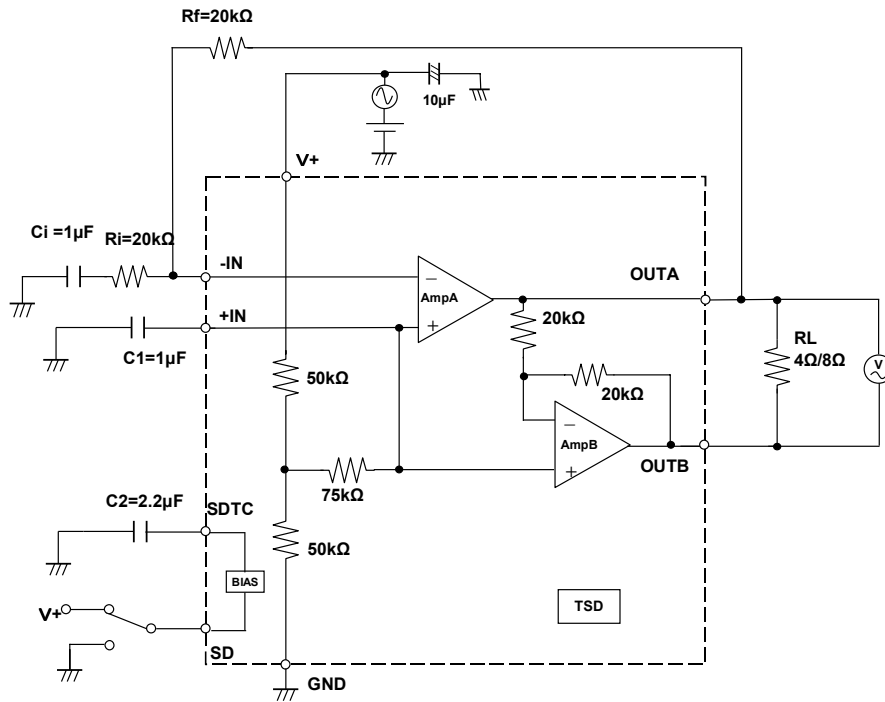


TEST CIRCUIT2 (Output Power P_O , Total Harmonic Distortion THD)

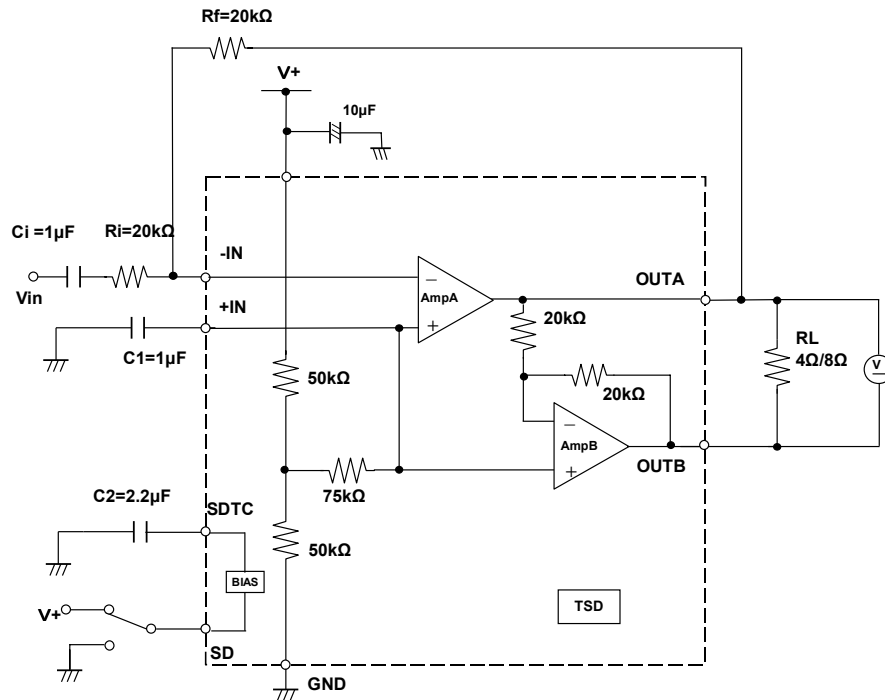


TEST CIRCUIT

TEST CIRCUIT3 (Supply Voltage Rejection Ratio PSRR)



TEST CIRCUIT4 (Output Offset Voltage V_{OD})

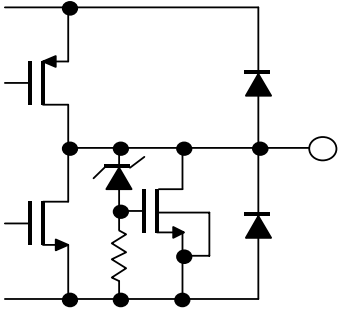
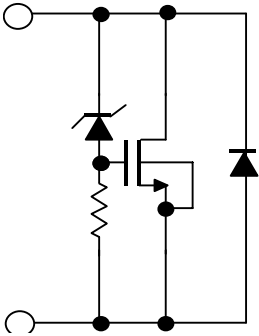


■ EQUIVALENT CIRCUIT

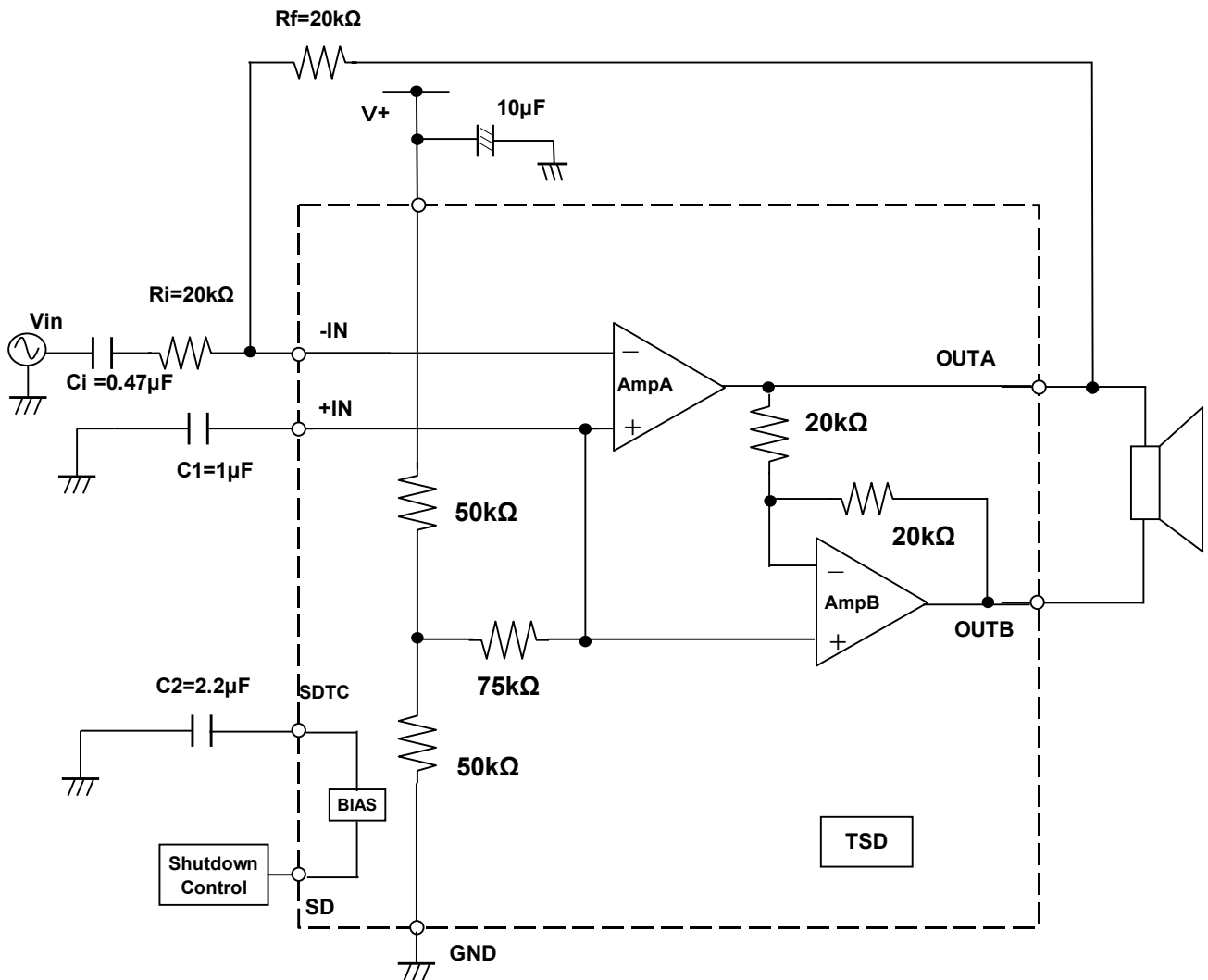
| PIN No. | SYMBOL | EQUIVALENT CIRCUIT | TERMINAL VOLTAGE | Note |
|---------|--------|--------------------|------------------|------|
| 1 | SD | | - | |
| 2 | SDTC | | $2*V^+/3$ | |
| 3 | +IN | | $V^+/2$ | |
| 4 | -IN | | $V^+/2$ | |

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■ EQUIVALENT CIRCUIT

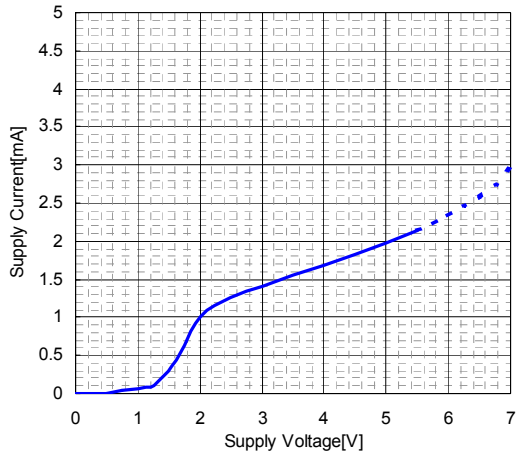
| PIN No. | SYMBOL | EQUIVALENT CIRCUIT | TERMINAL VOLTAGE | Note |
|---------|--------------|--|------------------|------|
| 5 8 | OUTA OUTB |  | $V^+/2$ | |
| 6 7 | V^+ GND |  | - | |

APPLICATION CIRCUIT

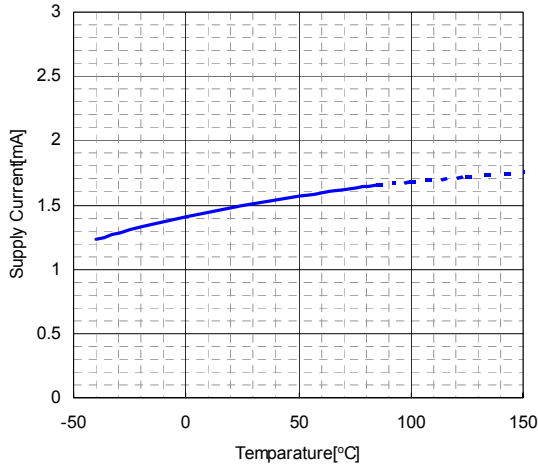


TYPICAL CHARACTERISTICS

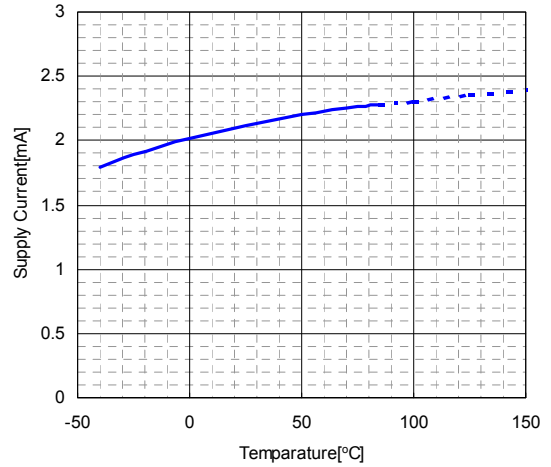
Supply Current vs Supply Voltage
RL=OPEN, Ta=25°C



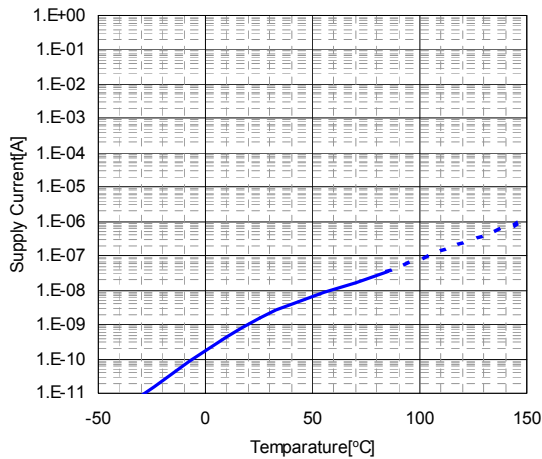
Supply Current vs Temperature
V+=3V, Gv=6dB, RL=OPEN



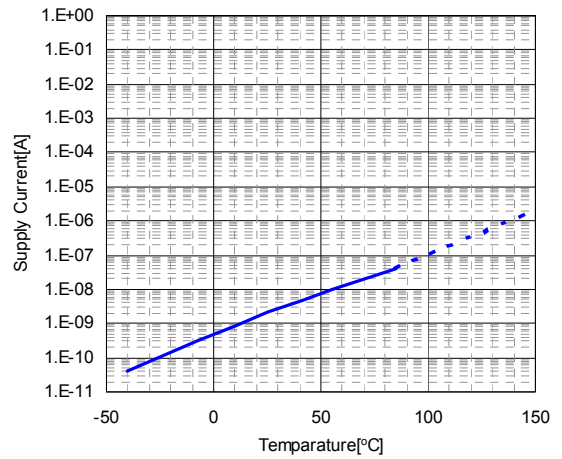
Supply Current vs Temperature
V+=5V, Gv=6dB, RL=OPEN



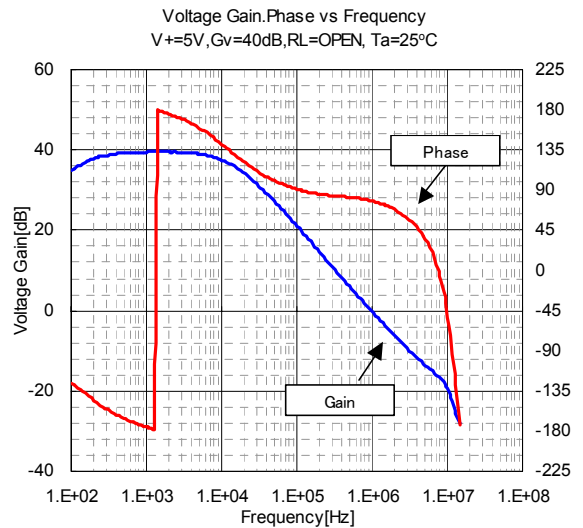
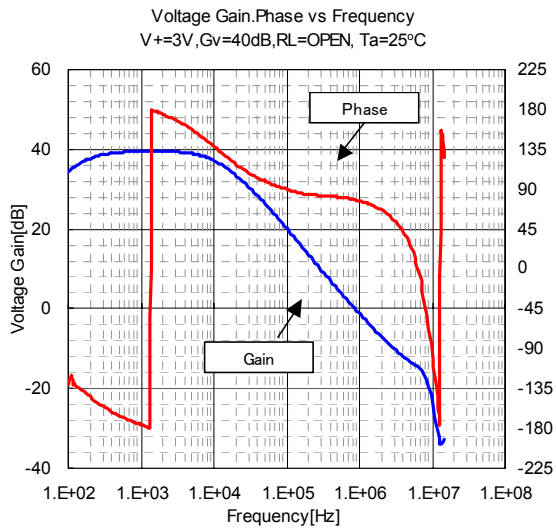
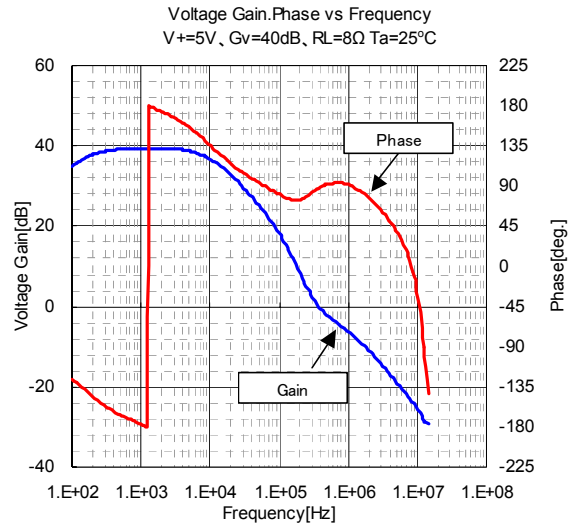
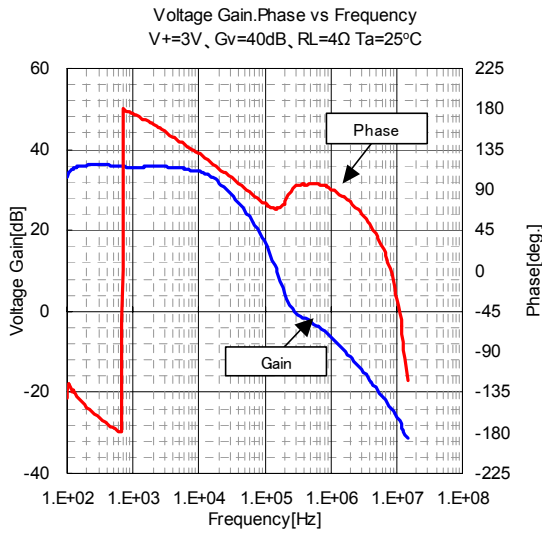
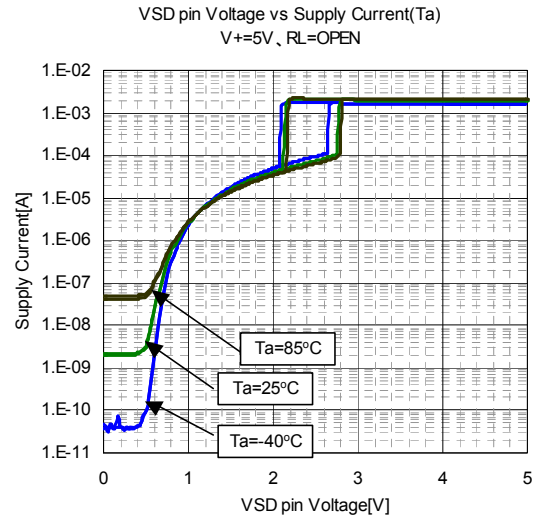
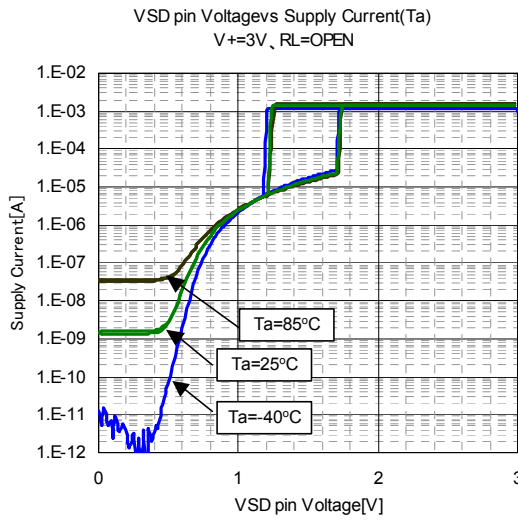
Supply Current vs Temperature(STANBY)
V+=3V, RL=OPEN, VSD=0.25V



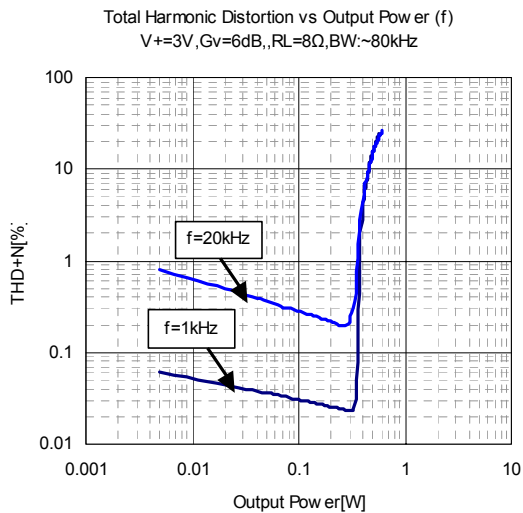
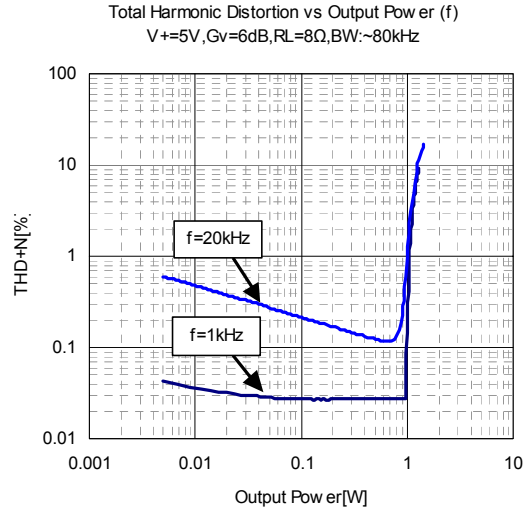
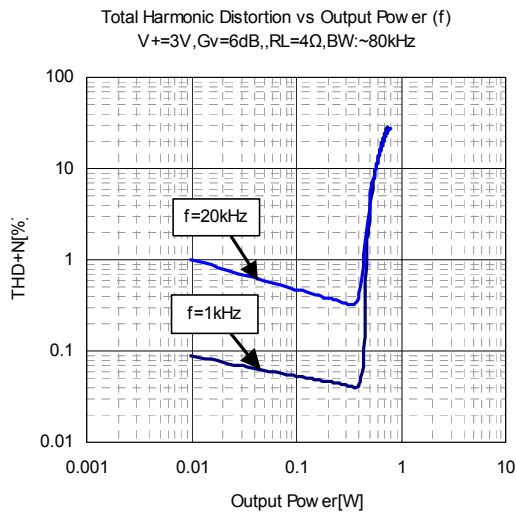
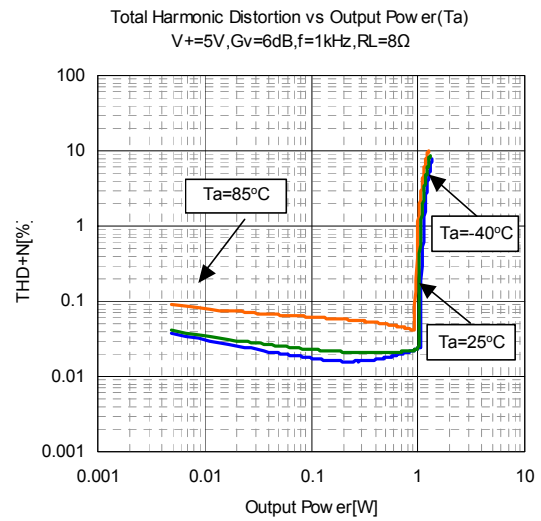
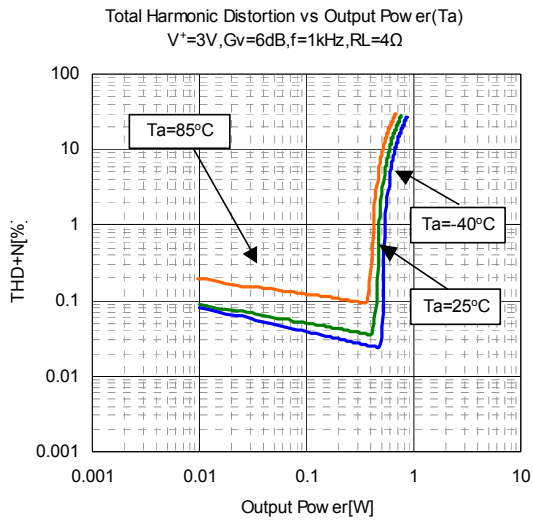
Supply Current vs Temperature(STANBY)
V+=5V, RL=OPEN, VSD=0.25V



TYPICAL CHARACTERISTICS

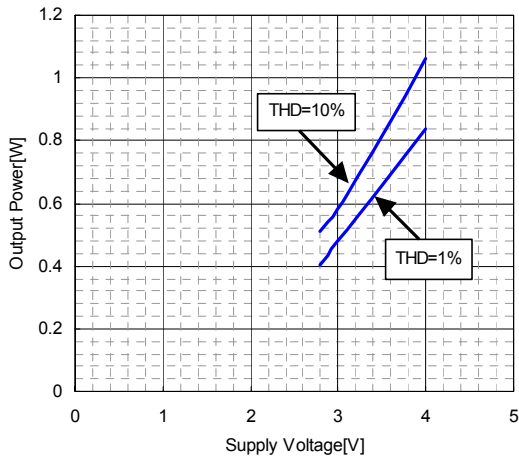


TYPICAL CHARACTERISTICS

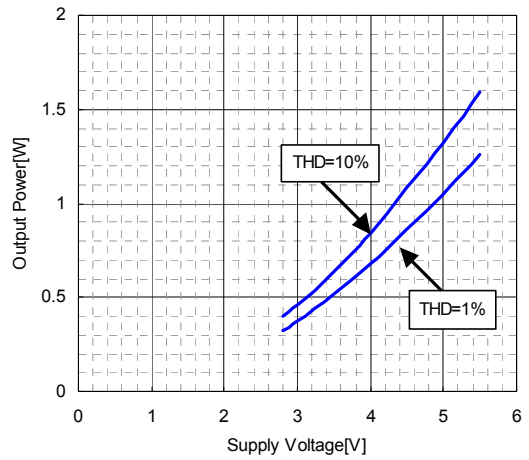


TYPICAL CHARACTERISTICS

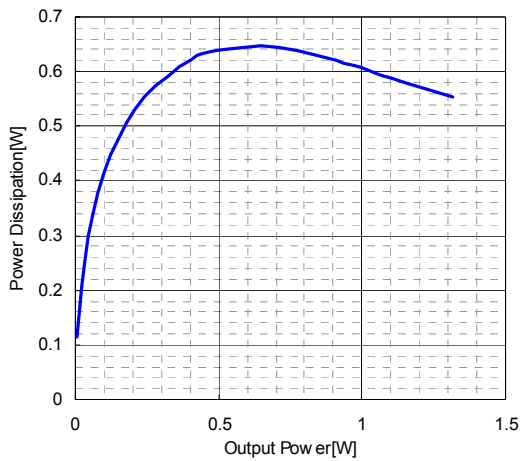
Output Voltage vs Supply Voltage (THD)
RL=4Ω, Ta=25°C



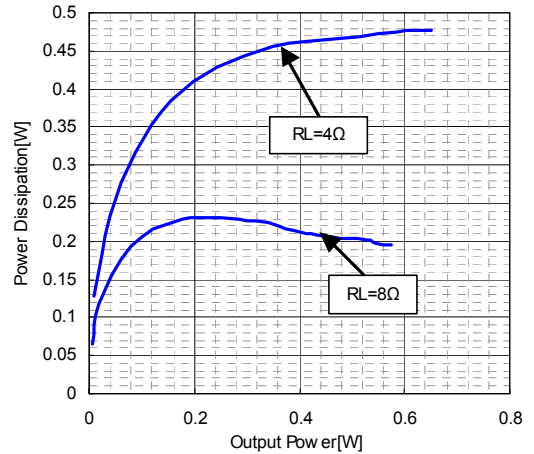
Output Voltage vs Supply Voltage (THD)
RL=8Ω, Ta=25°C



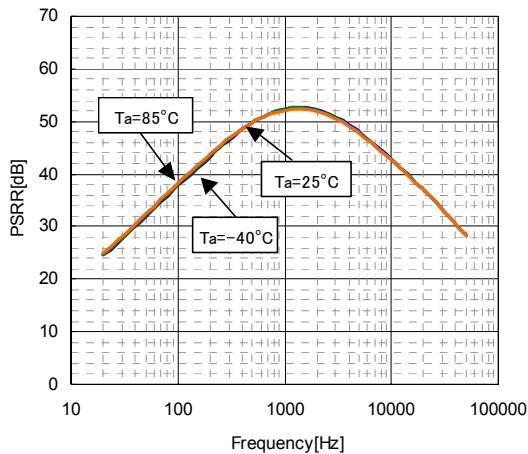
Power Dissipation vs Output Power
V+=5V, Gv=6dB, RL=8Ω, Ta=25°C



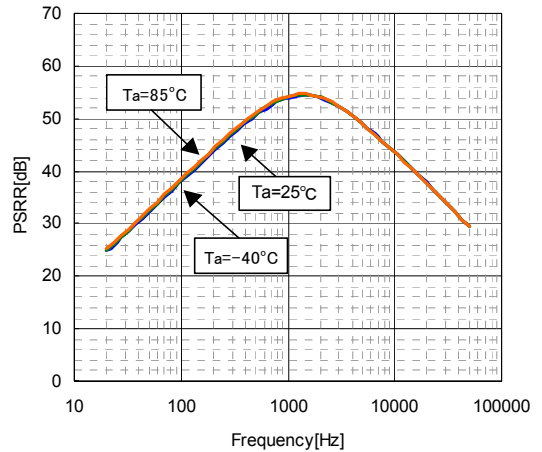
Power Dissipation vs Output Power (RL)
V+=3V, Gv=6dB, Ta=25°C



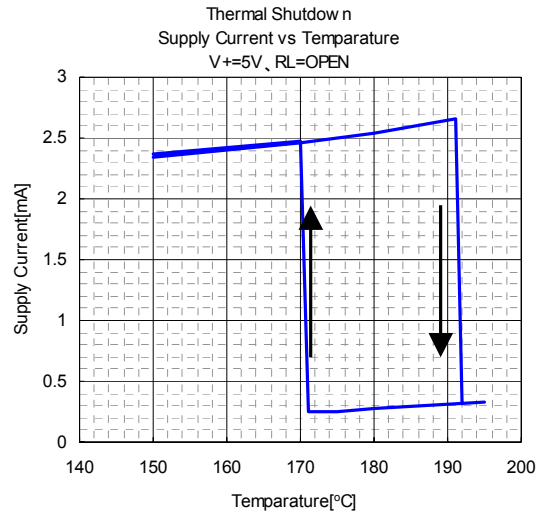
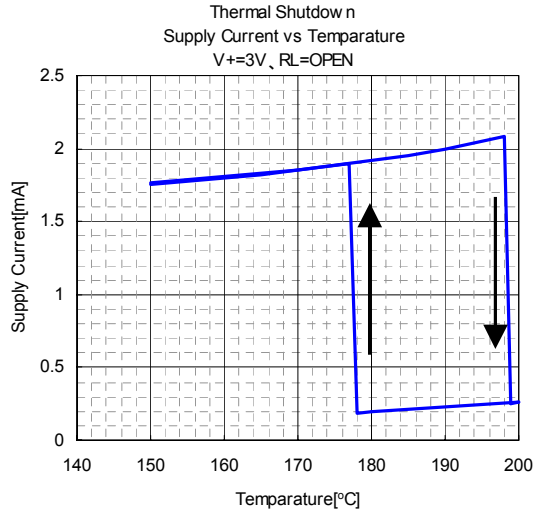
PSRR vs Frequency
V+=3V, RL=4Ω, Ta=25°C, RIN=GND



PSRR vs Frequency
V+=5V, RL=8Ω, Ta=25°C, RIN=GND



TYPICAL CHARACTERISTICS



[CAUTION]

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