

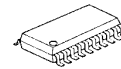
5Vrms Ground Referenced 6-Channel Line Amplifier

■ GENERAL DESCRIPTION

The **NJW1240** is a 6-channel audio line amplifier for High Voltage Pre-out of Car AV system. It can swing 5Vrms(14.1V peak-to-peak) signal at 8V operating voltage because of including the charge pump circuit.

Ground-referenced outputs eliminate output coupling capacitor. The pop noise suppression circuit reduces a pop noise at the power-on and power-off.

■ PACKAGE OUTLINE

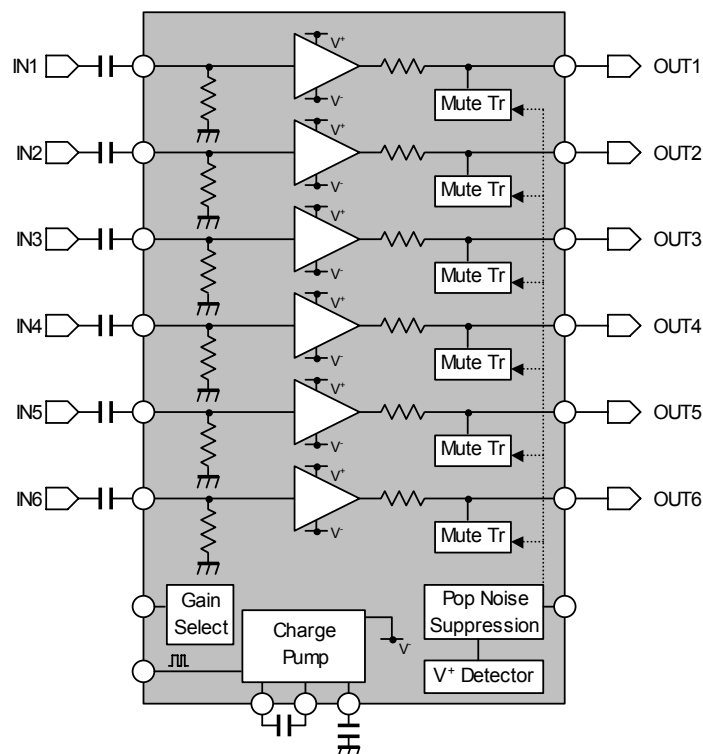


NJW1240V

■ FEATURES

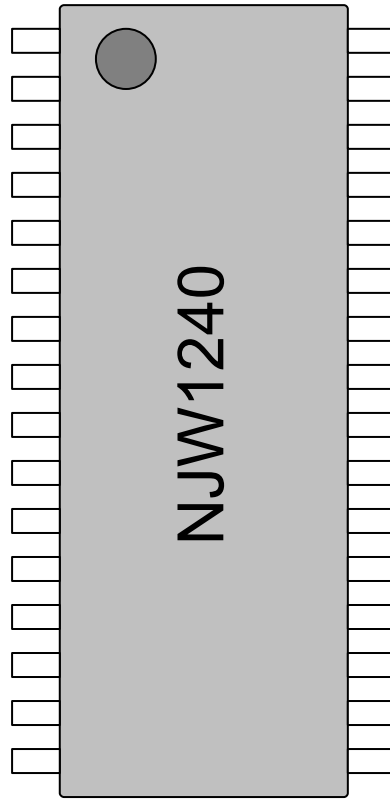
- Operating Voltage +6 to +10V
- Operating Current $I_{DD}=15\text{mA typ.}$
at $V^+=8\text{V}$, $R_L=47\text{k}\Omega$, No Signal
- Maximum Output Voltage 5.0Vrms min.
- Low Distortion 0.0008% typ
- Low Output Noise -102dB typ.
- Output Coupling Capacitor-less
- External Synchronizing Divide-by-2
- Pop Noise Suppression Circuit
- External Mute
- Gain Select +6dB/+8.3dB
- RF Immunity OpAmp tolerant to FR noise. (ex. mobile phone)
- Bi-CMOS Technology
- Package Outline SSOP32

■ BLOCK DIAGRAM



NJW1240

■ PIN CONFIGURATION



| No. | Symbol | Function | No. | Symbol | Function |
|-----|--------------------|-------------------------------|-----|------------------|------------------------------------|
| 1 | IN1 | Input 1 | 17 | NC | No Connect |
| 2 | IN2 | Input 2 | 18 | FB | V- Power Supply External Setting |
| 3 | IN3 | Input 3 | 19 | CP | Flying Capacitor Positive Terminal |
| 4 | IN4 | Input 4 | 20 | NC | No Connect |
| 5 | IN5 | Input 5 | 21 | NC | No Connect |
| 6 | IN6 | Input 6 | 22 | GND | Ground |
| 7 | MUTE | MUTE / Pop Noise Suppression | 23 | CN | Flying Capacitor Negative Terminal |
| 8 | GAIN | Gain Select | 24 | MUTE_TC | Pop Noise Suppression Capacitor |
| 9 | V ⁻ IN | V- Power Input | 25 | V ⁺ A | V+ Power Supply for Analog |
| 10 | V ⁻ OUT | V- Power Output | 26 | GND | Ground |
| 11 | RegCNT | V- Power Control | 27 | OUT6 | Output 6 |
| 12 | NC | No Connect | 28 | OUT5 | Output 5 |
| 13 | NC | No Connect | 29 | OUT4 | Output 4 |
| 14 | CLK | External Clock Input | 30 | OUT3 | Output 3 |
| 15 | V ⁺ Reg | V+ Power Supply for Regulator | 31 | OUT2 | Output 2 |
| 16 | NC | No Connect | 32 | OUT1 | Output 1 |

■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

| PARAMETER | SYMBOL | RATING | UNIT |
|---|---------------------|------------------------|------|
| Supply Voltage | V ⁺ | 10.5 | V |
| CLK Terminal Voltage | V _{CLK} | -0.3~+6 | V |
| V ⁻ Power Supply Control Voltage | V _{RegCNT} | -0.3~+6 | V |
| FB Terminal Voltage | V _{FB} | (V _{OUT})+6 | V |
| Maximum Input Voltage | V _{IN} | V ⁺ +0.3 | V |
| Power Dissipation | P _D | 905 ^(Note1) | mW |
| Operating Temperature Range | Topr | -40 ~ +85 | °C |
| Storage Temperature Range | Tstg | -40 ~ +125 | °C |

(Note1) EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting

■ RECOMMENDED OPERATING CONDITIONS

(Ta=25°C unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|------------------|----------------|------|------|------|------|
| Operating Voltage | V ⁺ | | 6 | 8 | 10 | V |
| External Clock Input Range ^(Note2) | f _{CLK} | | 150 | - | 1250 | kHz |
| External Clock Duty Input Range | DUTY | | 45 | - | 80 | % |

(Note2) The regulator for V⁻ power supply operates by the half of f_{CLK}.

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V⁺=8V, f=1kHz, Vin=0dBV, R_L=47kΩ, GAIN=Low, MUTE=High, RegCNT=High unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--------------------------------|-------------------|-----------------------------|------|----------------|------|------------------|
| Operating Current | I _{DD} | No signal | - | 12 | 20 | mA |
| Voltage Gain1 | G _{V1} | | 5.5 | 6.0 | 6.5 | dB |
| Voltage Gain2 | G _{V2} | GAIN=High | 7.8 | 8.3 | 8.8 | dB |
| Maximum Output Voltage | V _{OMAX} | THD=1% | 5 | - | - | V _{rms} |
| Mute Level | V _{MUTE} | MUTE=Low | - | -100 | -80 | dB |
| Output Noise Voltage | V _{NO} | Rg=0Ω, A=Weighted | - | -102 (7.94) | - | dBV (μV) |
| Total Harmonic Distortion | THD | BW:400Hz-22kHz | - | 0.0008 | - | % |
| Channel Separation | CS | Rg=600Ω | 80 | - | - | dB |
| Internal Oscillating Frequency | f _{OSC} | f _{CLK} =No signal | - | 300 | - | kHz |
| Output Offset Voltage | V _{OS} | Rg=0Ω | - | - | 8 | mV |

■ CONTROL CHARACTERISTICS

(Ta=25°C, V⁺=8V, f=1kHz, Vin=0dBV, R_L=47kΩ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--------------------|-------------------|----------------|------|------|----------------|------|
| Mute Terminal High | Mute _H | MUTE OFF | 2.3 | - | V ⁺ | V |
| Mute Terminal Low | Mute _L | MUTE ON | 0 | - | 0.7 | V |
| Gain Terminal High | Gain _H | Gv=8.3dB | 2.3 | - | V ⁺ | V |
| Gain Terminal Low | Gain _L | Gv=6dB | 0 | - | 0.7 | V |
| CLK Terminal High | CLK _H | | 2.3 | - | 5.5 | V |
| CLK Terminal Low | CLK _L | | 0 | - | 0.7 | V |

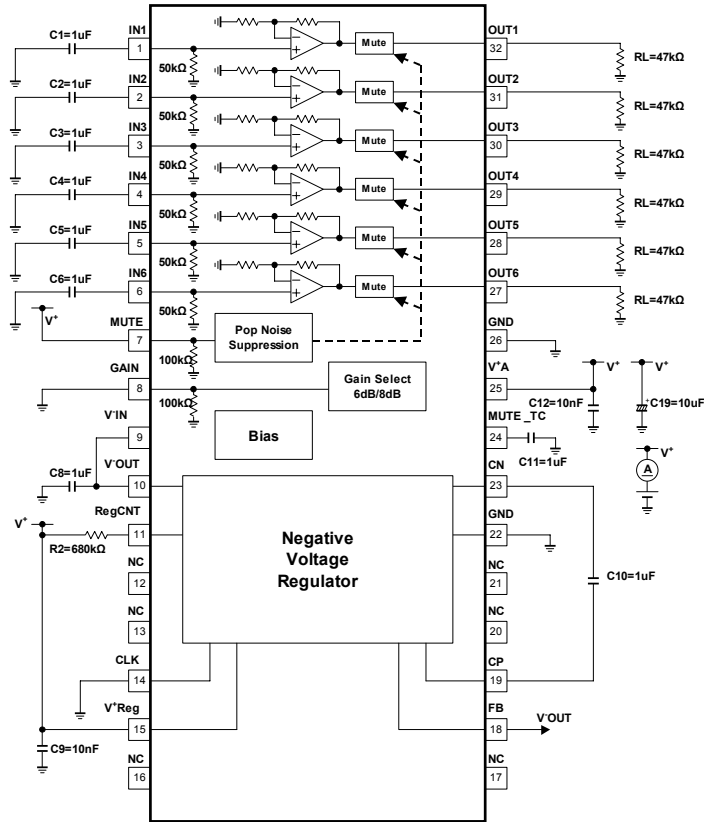
■ TERMINAL DESCRIPTION

| Terminal | SYMBOL | FUNCTION | EQUIVALENT CIRCUIT | VOLTAGE |
|----------------------------|--|--|--------------------|---------|
| 1 2 3 4 5 6 | IN1 IN2 IN3 IN4 IN5 IN6 | INPUT1 INPUT2 INPUT3 INPUT4 INPUT5 INPUT6 | | 0V |
| 7 8 | MUTE GAIN | MUTE/Pop Noise Suppression Gain Select | | 0V |
| 11 | RegCNT | V- Power Control | | 0V |
| 14 | CLK | External Clock Input | | 0V |
| 18 | FB | V- Power Supply External Setting | | - |

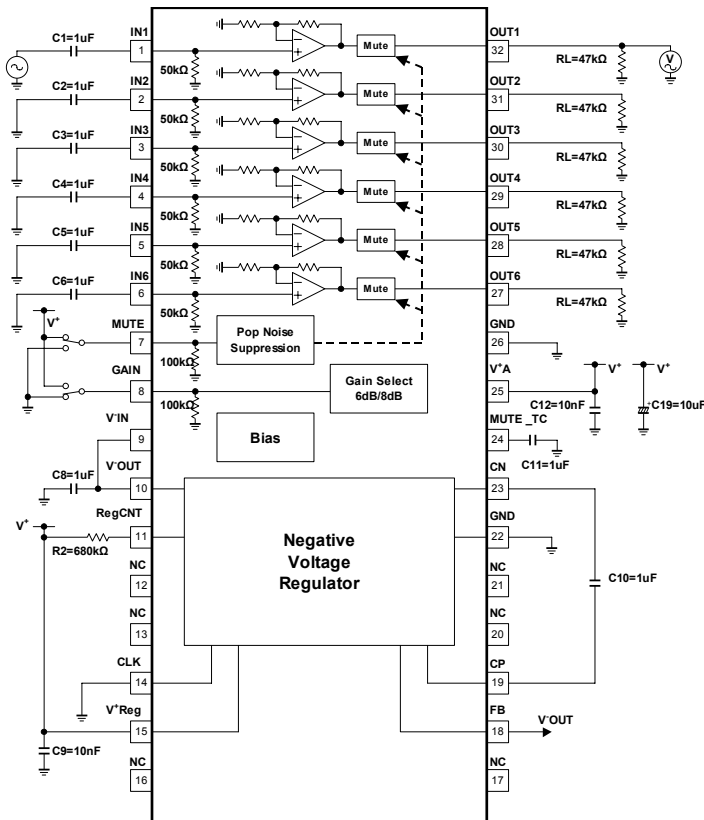
■ TERMINAL DESCRIPTION

| Terminal | SYMBOL | FUNCTION | EQUIVALENT CIRCUIT | VOLTAGE |
|----------------------------------|--|--|--------------------|---------|
| 19 | CP | Flying Capacitor Positive Terminal | | - |
| 23 | CN | Flying Capacitor Negative Terminal | | - |
| 24 | MUTE_TC | Pop Noise Suppression Capacitor | | 0V |
| 27 28 29 30 31 32 | OUT6 OUT5 OUT4 OUT3 OUT2 OUT1 | Output6 Output5 Output4 Output3 Output2 Output1 | | 0V |

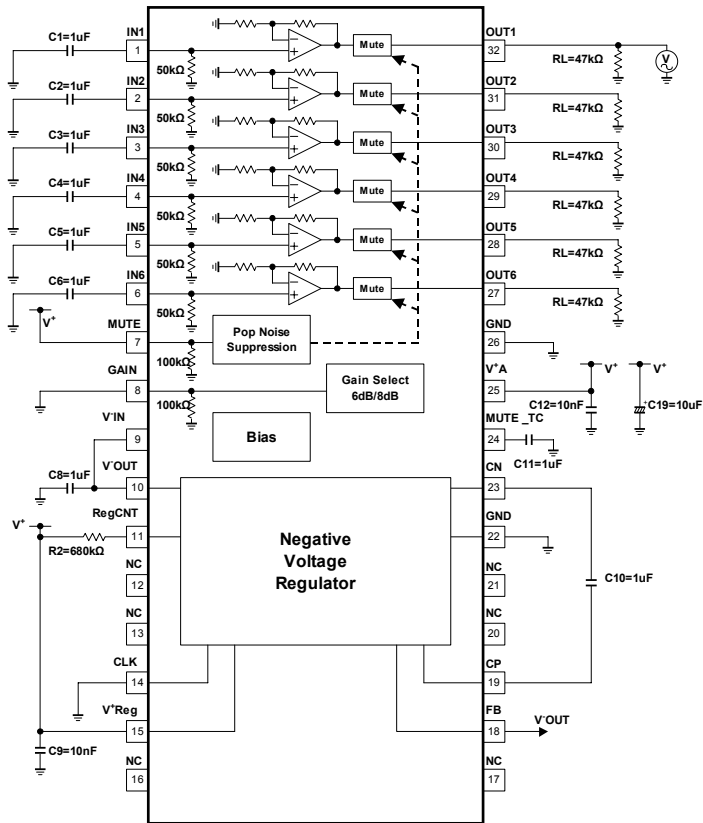
TEST CIRCUIT (I_{DD})



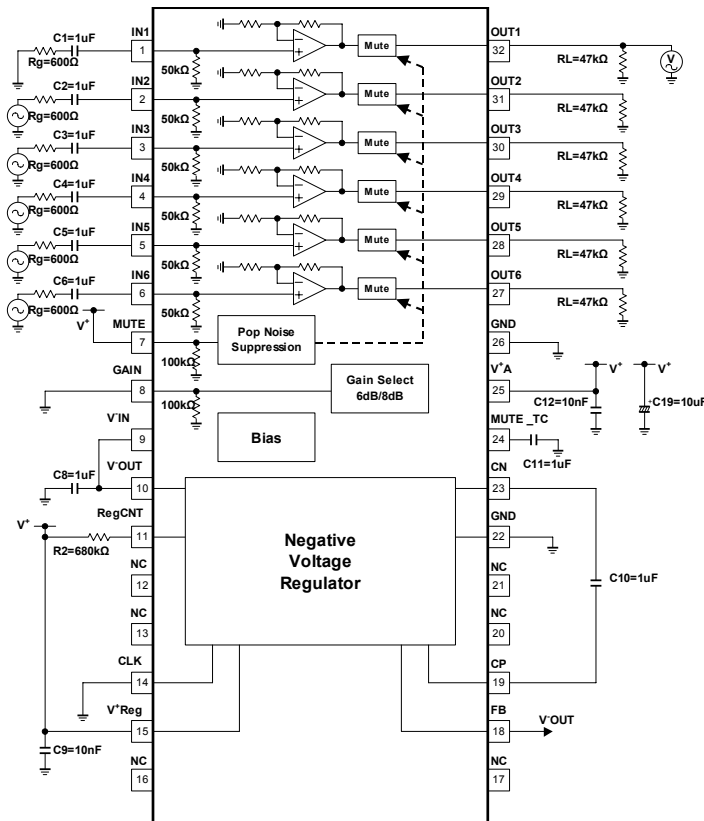
TEST CIRCUIT (G_v , V_{OMAX} , THD, V_{MUTE})



TEST CIRCUIT (V_{NO})

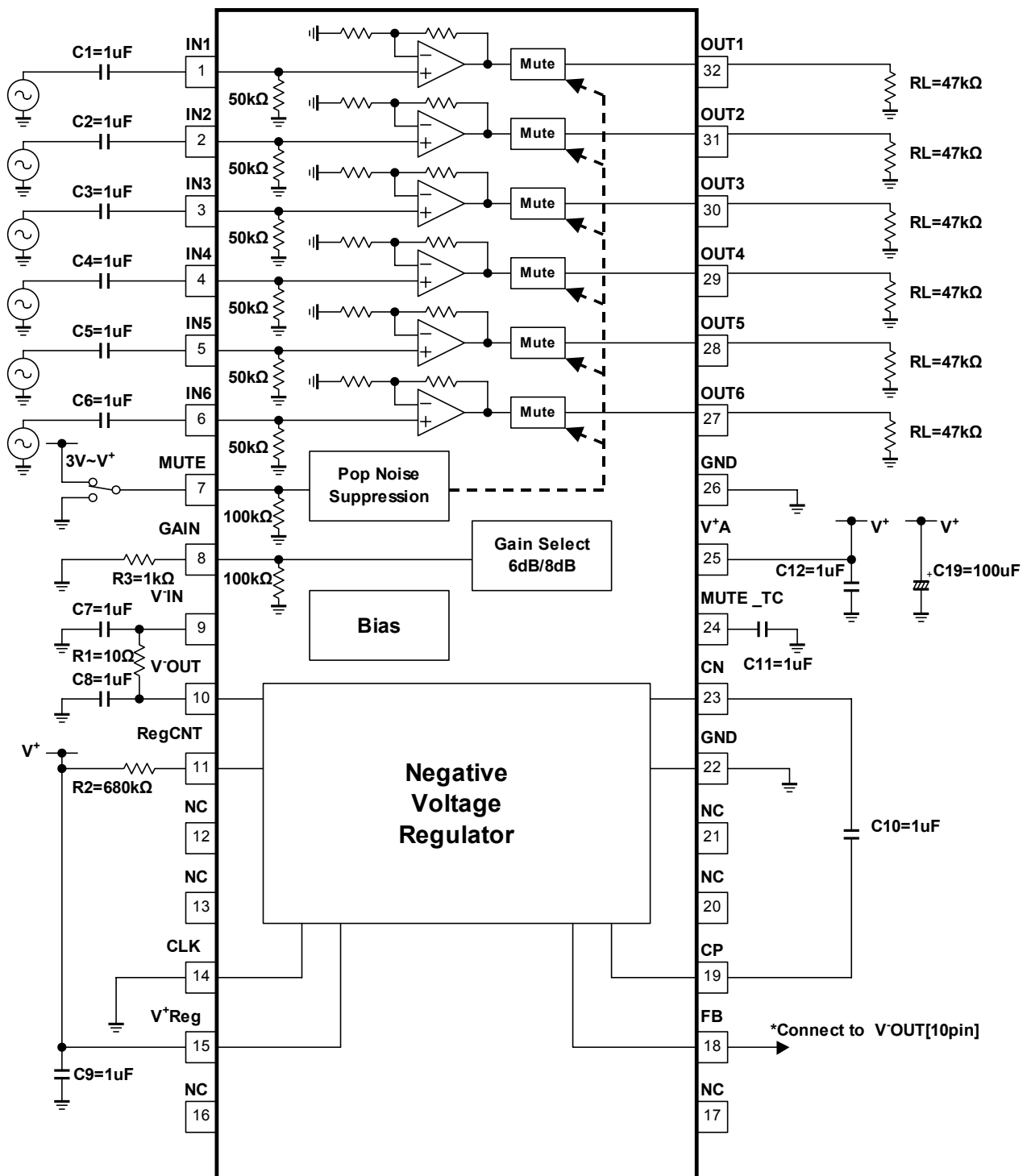


TEST CIRCUIT (CS)



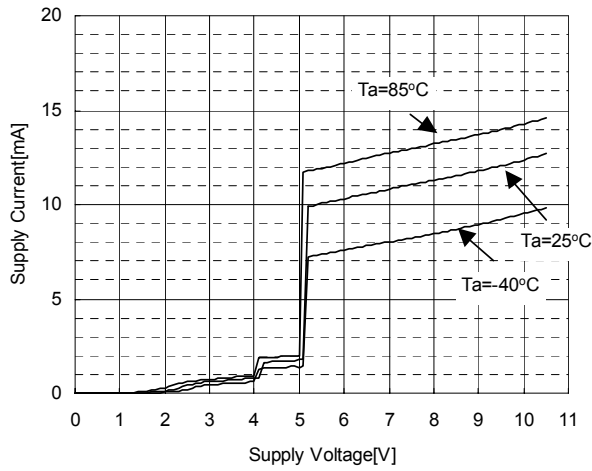
NJW1240

APPLICATION CIRCUIT

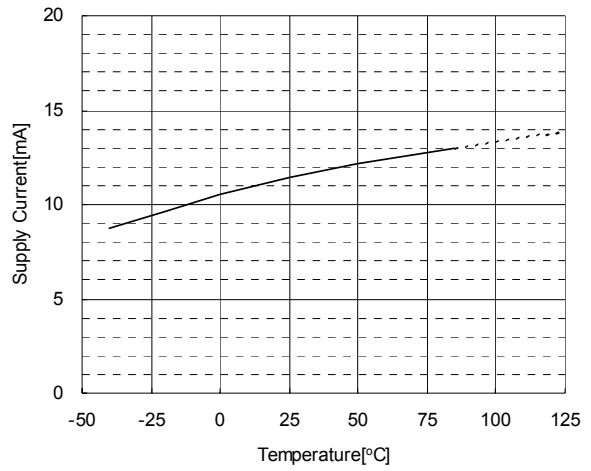


TYPICAL CHARACTERISTICS

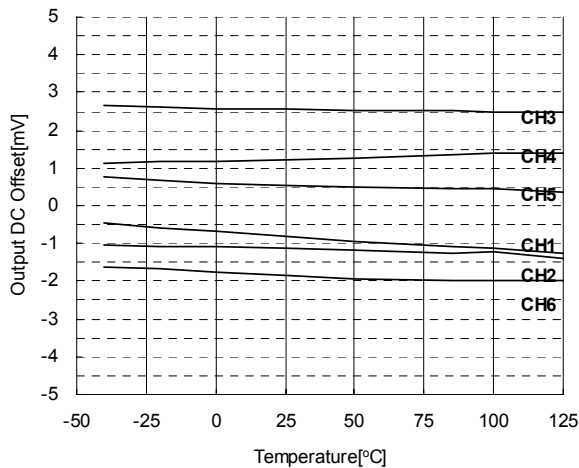
Supply Current vs Supply Voltage
 RL=NoLoad, MUTE=H, GAIN=L



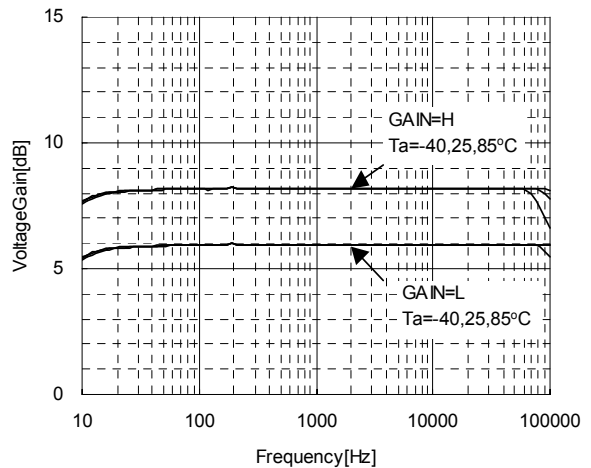
Supply Current vs Temperature
 V+=8V, RL=NoLoad, MUTE=H, GAIN=L



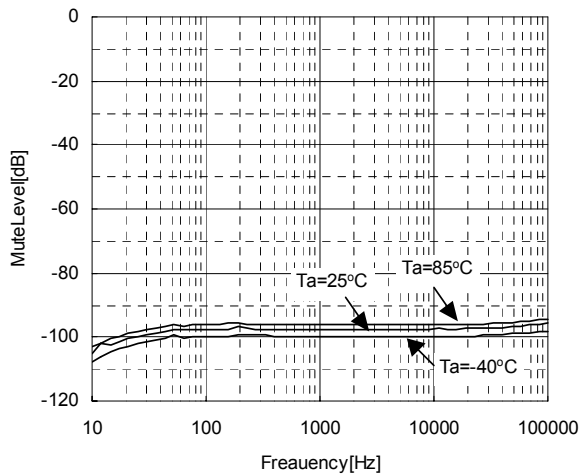
Output DC Offset vs Temperature
 V+=8V, Vin=NoSignal, RL=47kΩ
 MUTE=H, GAIN=L



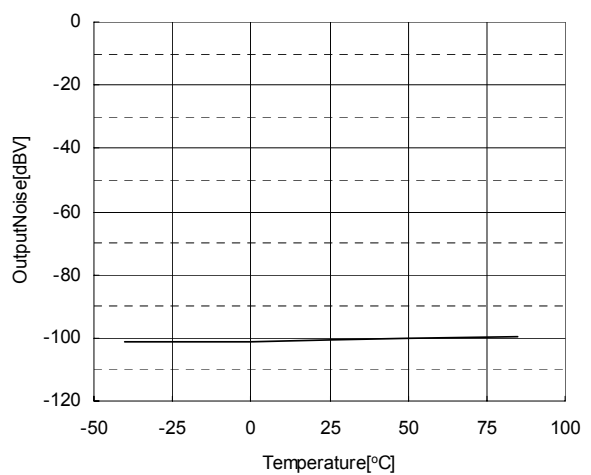
Voltage Gain vs Frequency
 V+=8V, Vin=0dBV, RL=47kΩ, MUTE=H



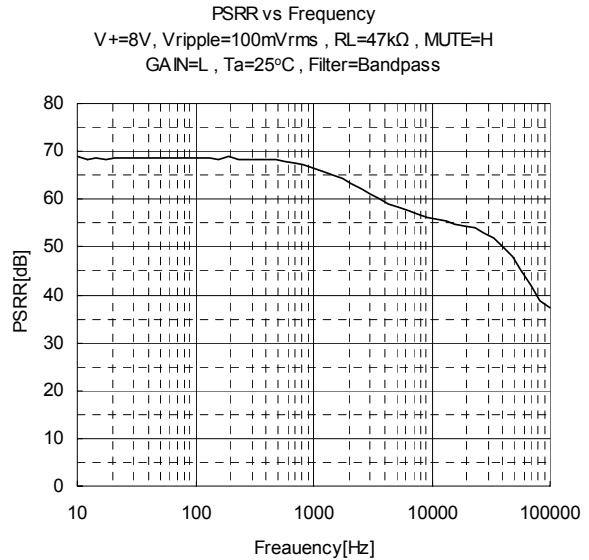
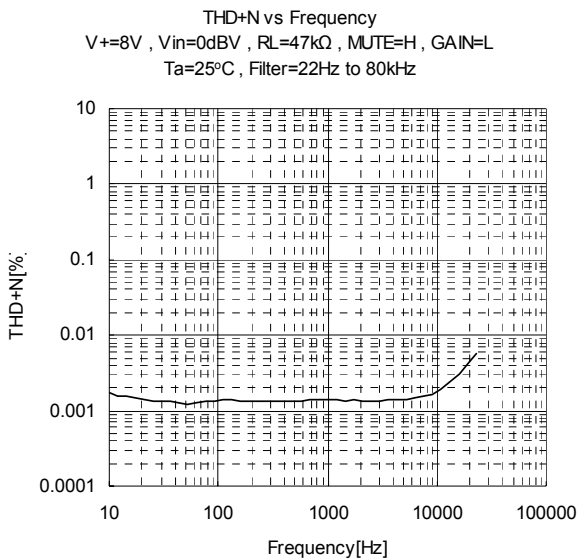
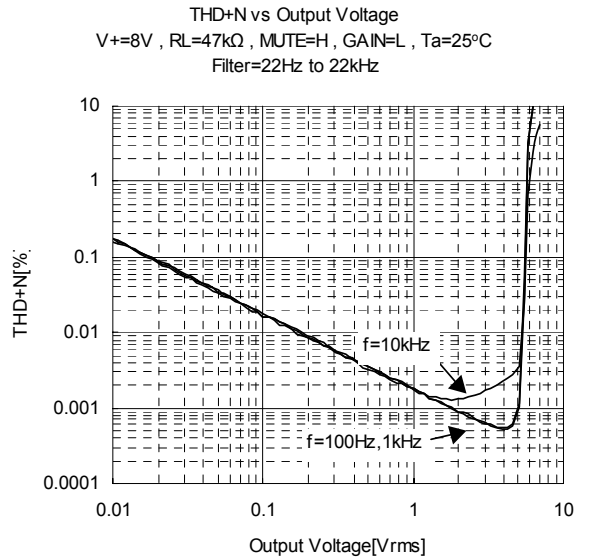
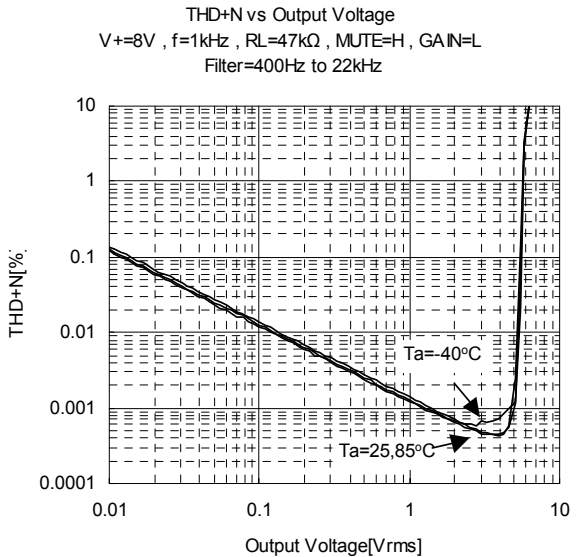
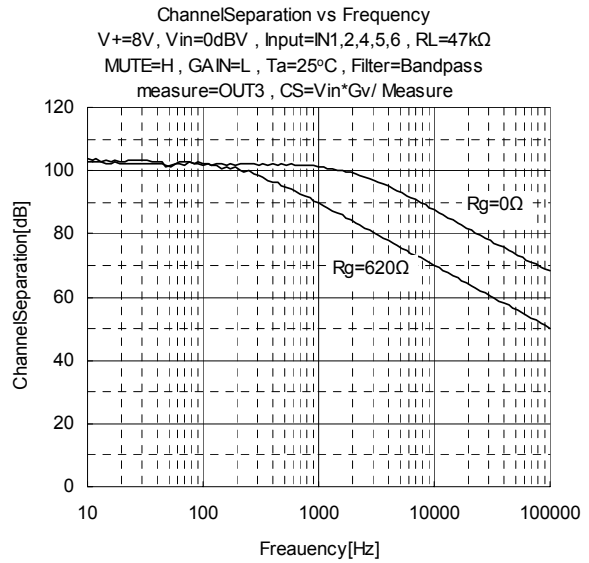
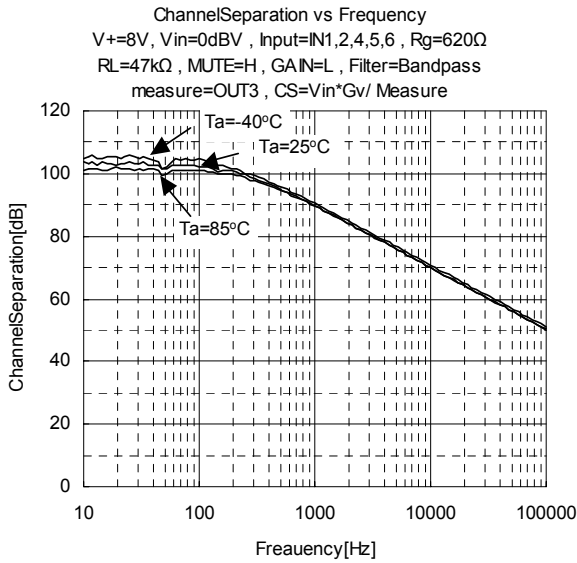
MuteLevel vs Frequency
 V+=8V, RL=47kΩ, MUTE=L, GAIN=L
 Filter=Bandpass



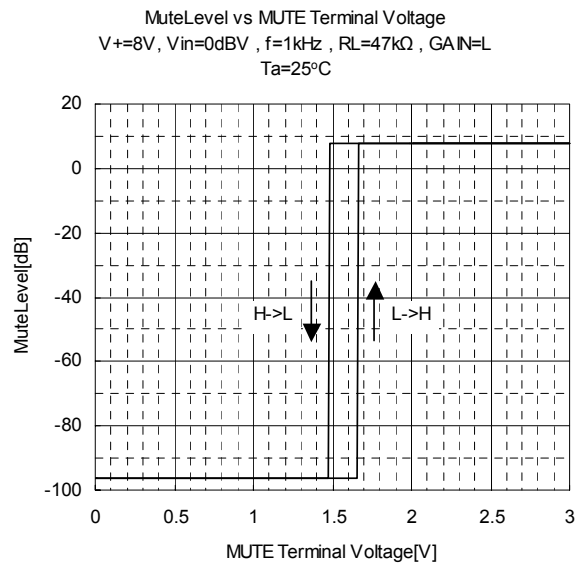
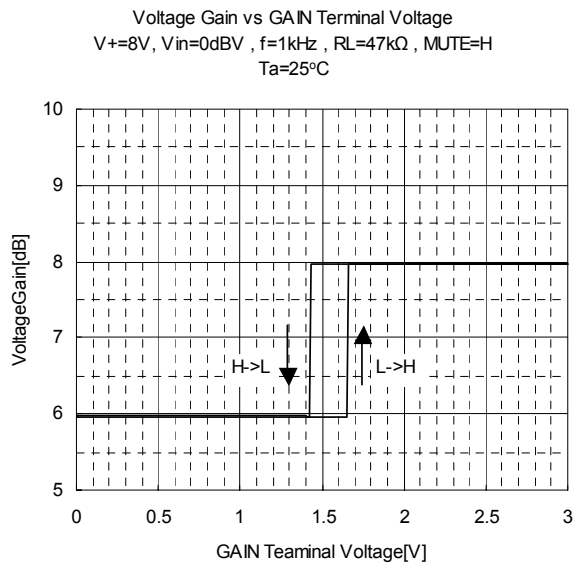
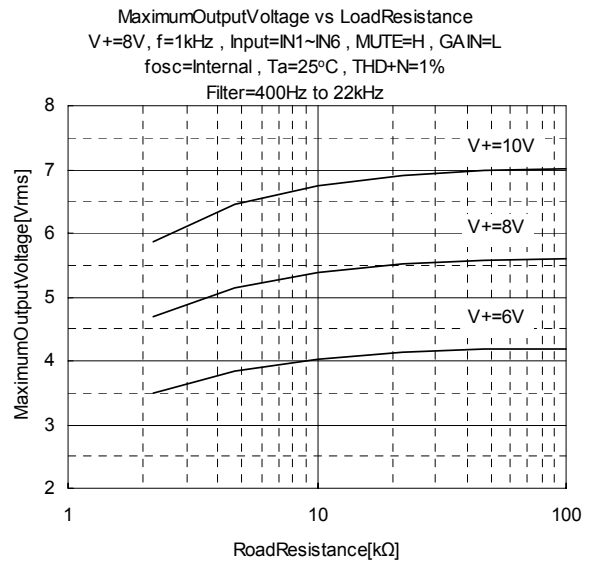
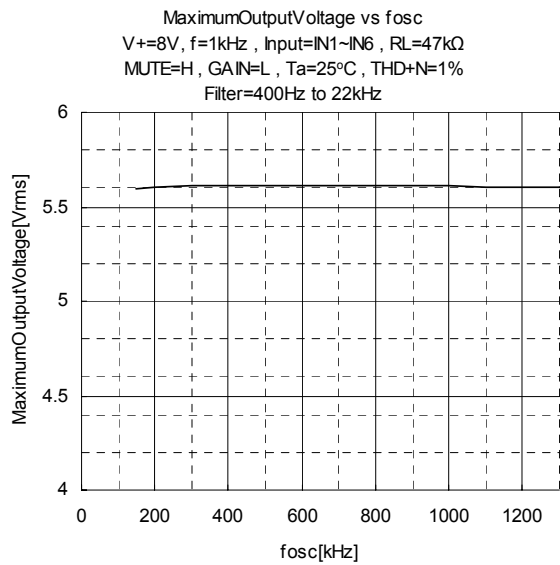
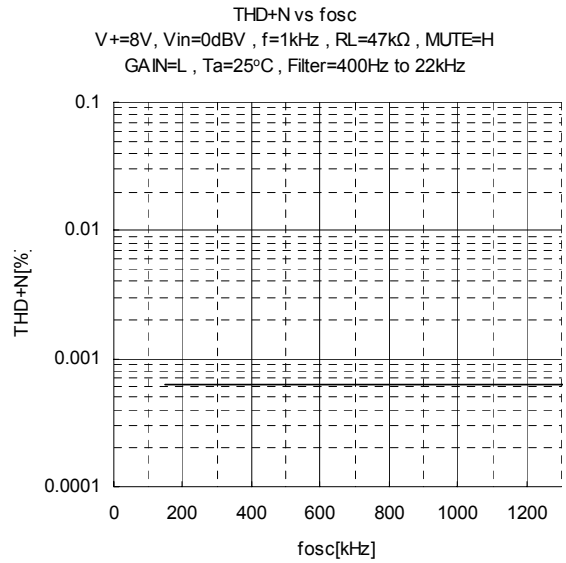
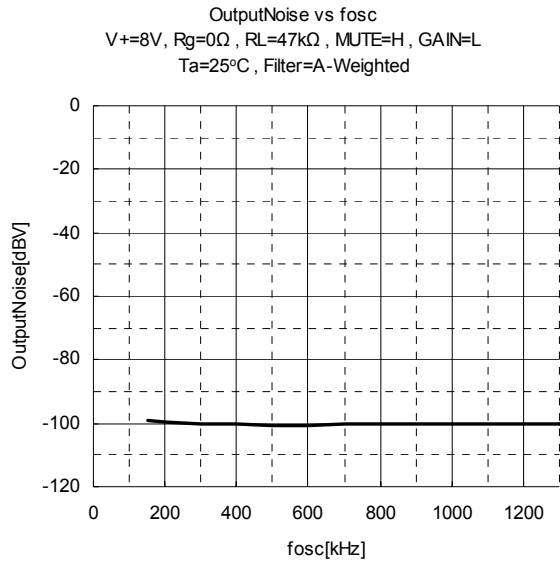
Output Noise vs Temperature
 V+=8V, Rg=0Ω, RL=47kΩ, MUTE=H, GAIN=L
 Filter=A-weighted



TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS



[CAUTION]

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