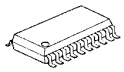
5Vrms Ground Referenced 6-Channel Line Amplifier

■ 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) singal at 8V opearating 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

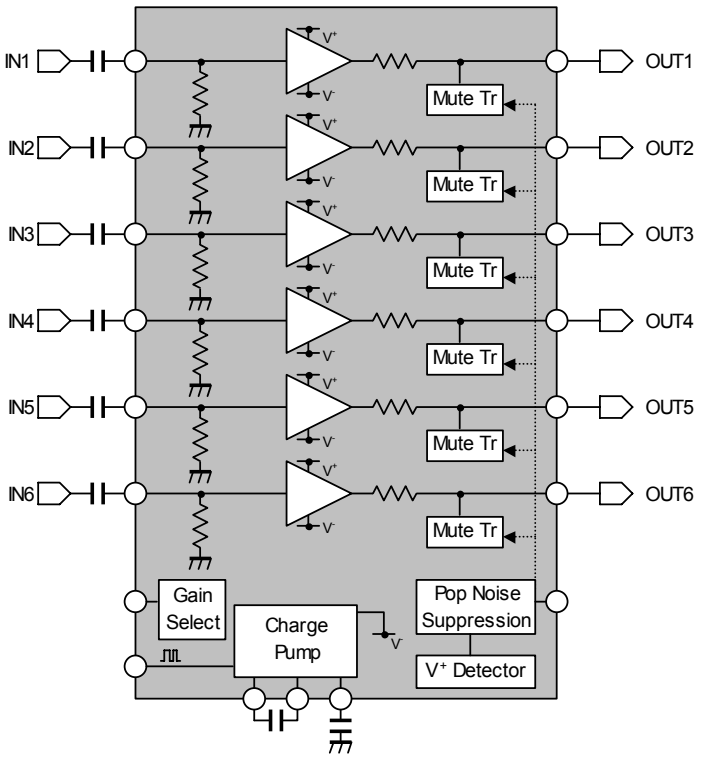


NJW1240V

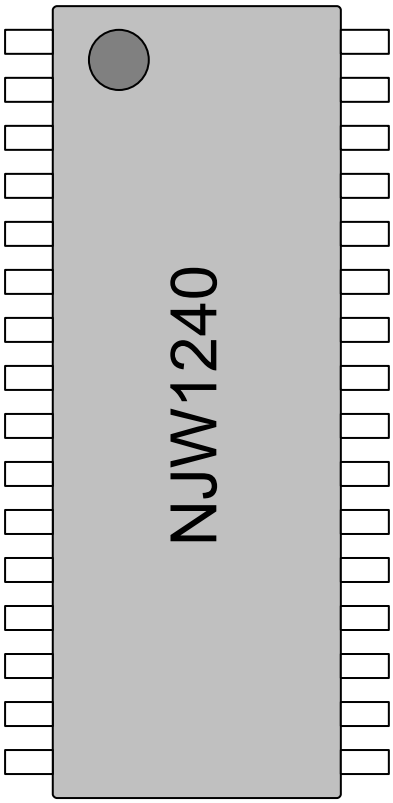
■ FEATURES

- Operating Voltage +6 to +10V
- Operating Current I_{DD}=15mA typ.
  at V^+=8V, R_L=47kΩ, 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



■ **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 Voltager	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)

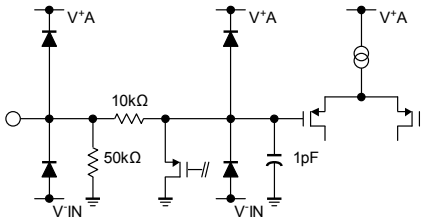
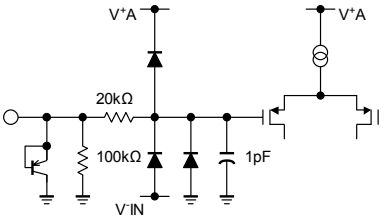
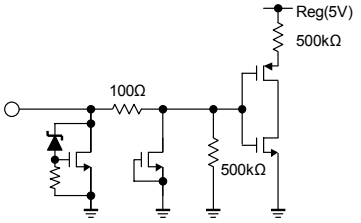
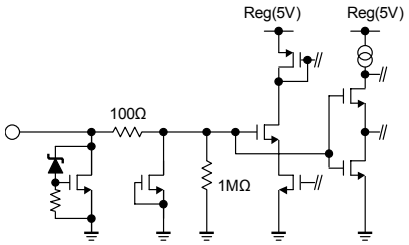
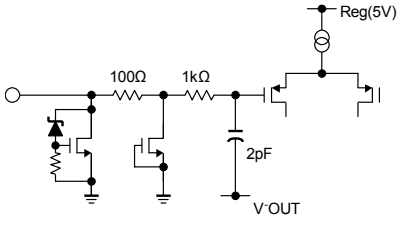
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{DD}	No signal	-	12	20	mA
Voltage Gain1	G_{V1}		5.5	6.0	6.5	dB
Voltage Gain2	G_{V2}	GAIN=High	7.8	8.3	8.8	dB
Maximum Output Voltage	V_{OMAX}	THD=1%	5	-	-	Vrms
Mute Level	V_{MUTE}	MUTE=Low	-	-100	-80	dB
Output Noise Voltage	V_{NO}	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	-	kxHz
Output Offset Voltage	V_{OS}	Rg=0Ω	-	-	8	mV

■ **CONTROL CHARACTERISTICS**

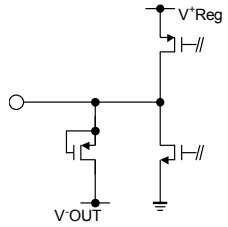
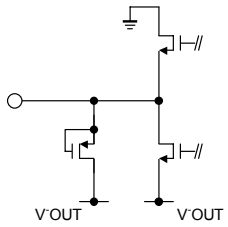
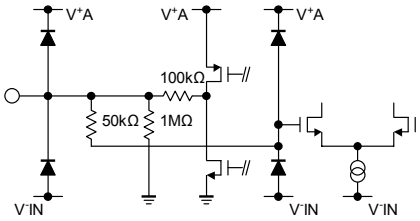
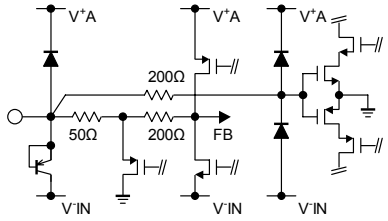
(Ta=25°C, V^+=8V, f=1kHz, Vin=0dBV, R_L=47kΩ unless otherwise specified)

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

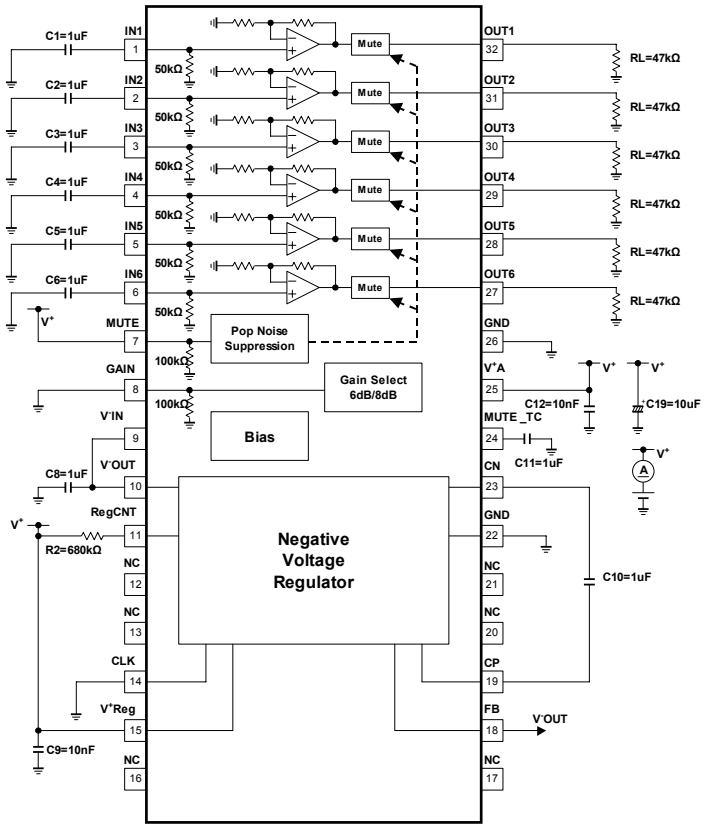
■TERMINAL DESCRIPTION

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		-

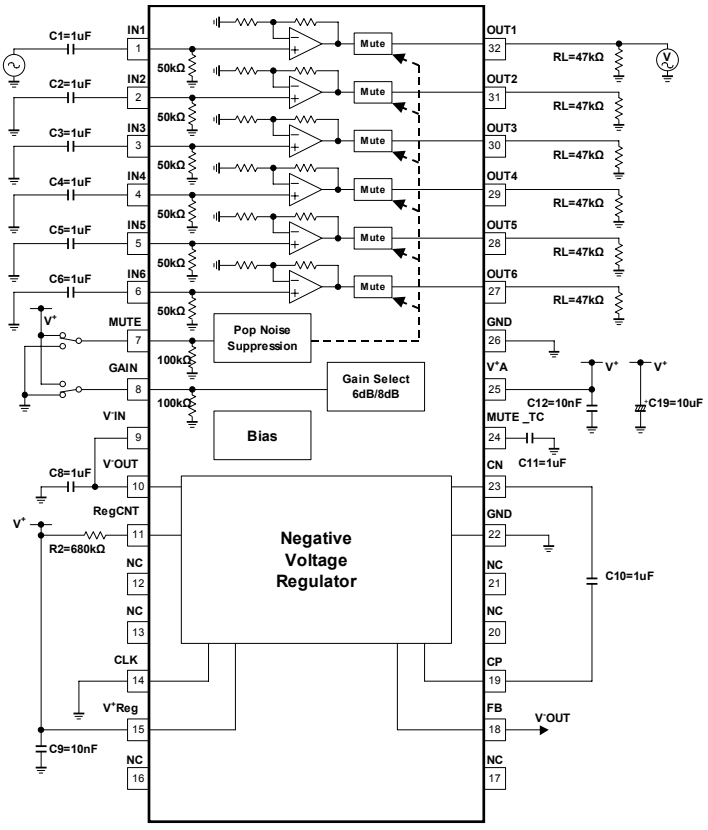
■TERMINAL DESCRIPTION

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

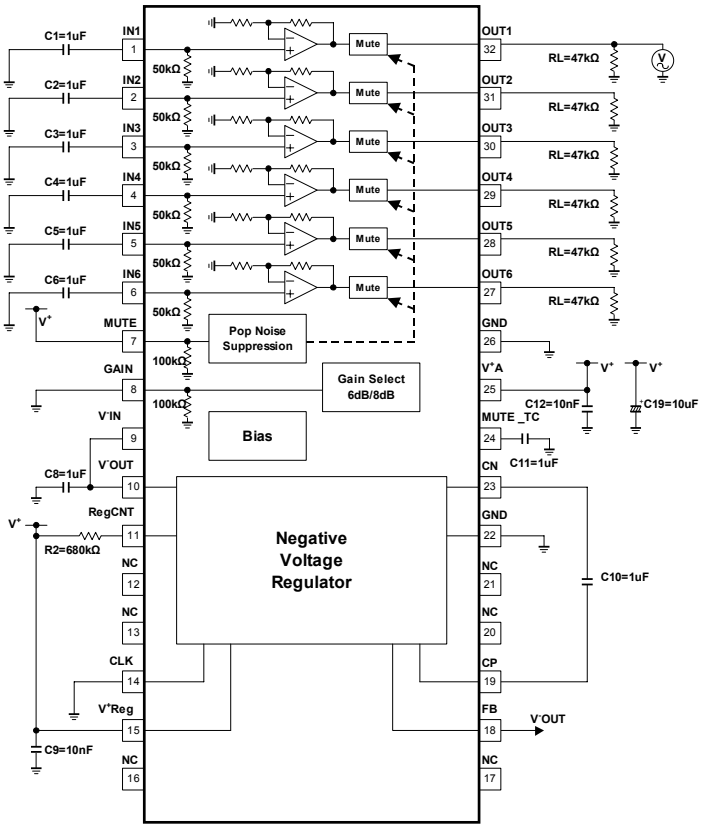
■TEST CIRCUIT (I_{DD})



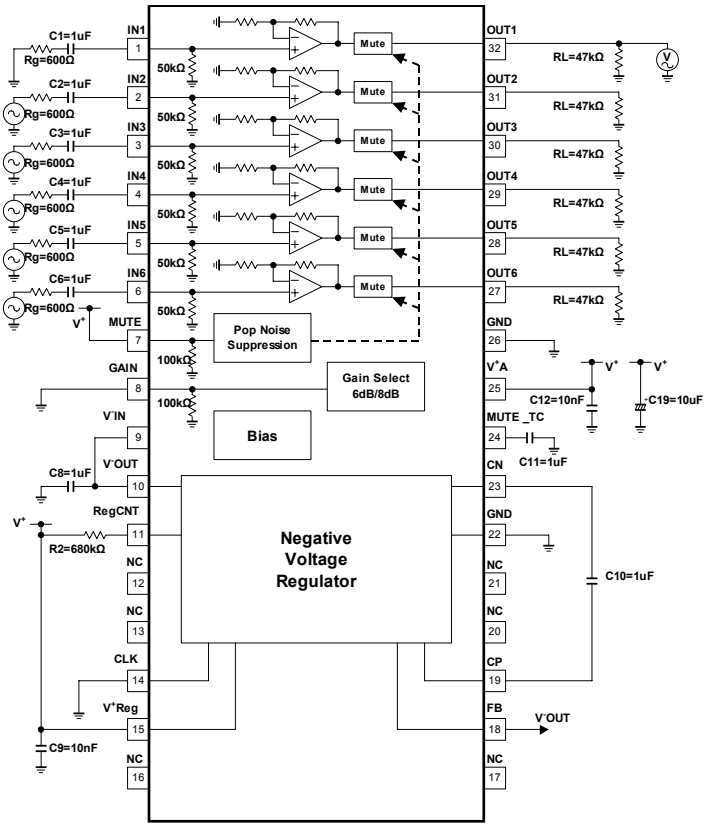
■TEST CIRCUIT (Gv, V_{OMAX}, THD, V_{MUTE})



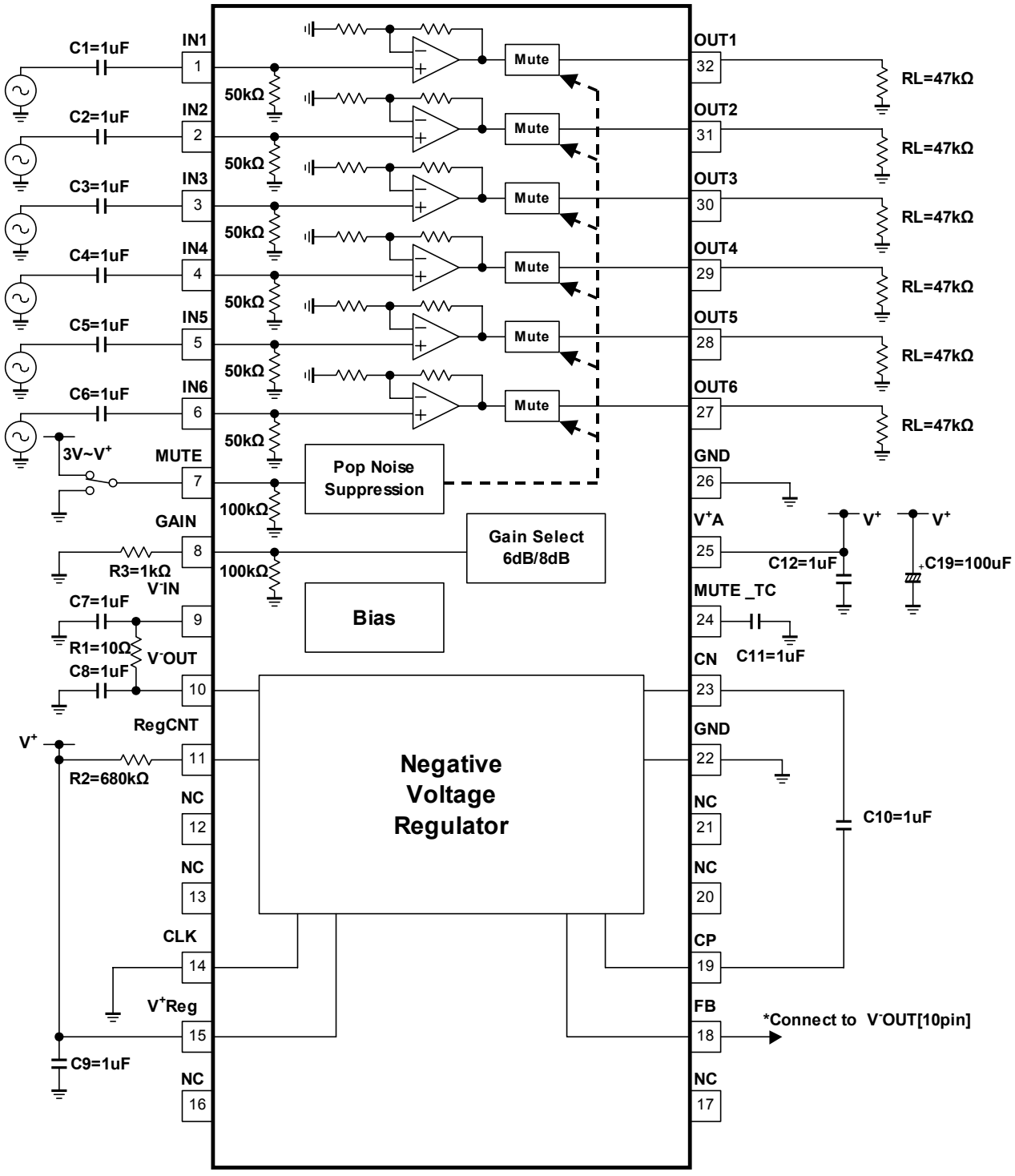
■TEST CIRCUIT (V_{NO})



■TEST CIRCUIT (CS)

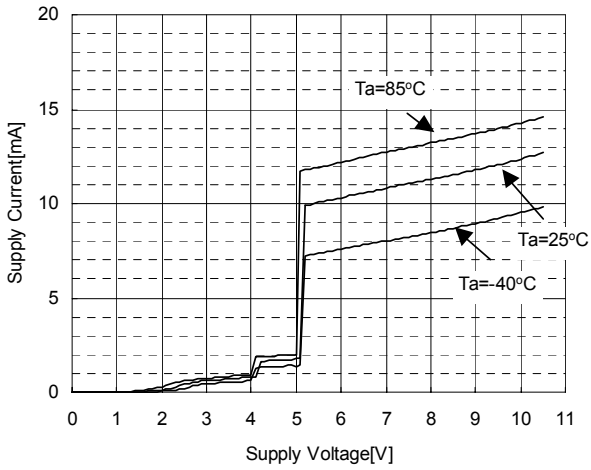


■APPLICATION CIRCUIT

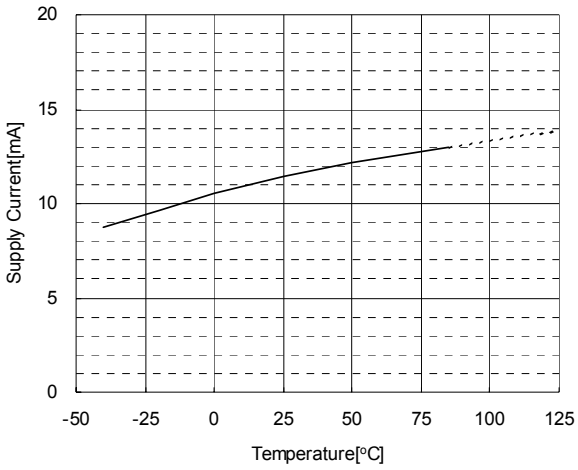


■TYPICAL CHARACTERISTICS

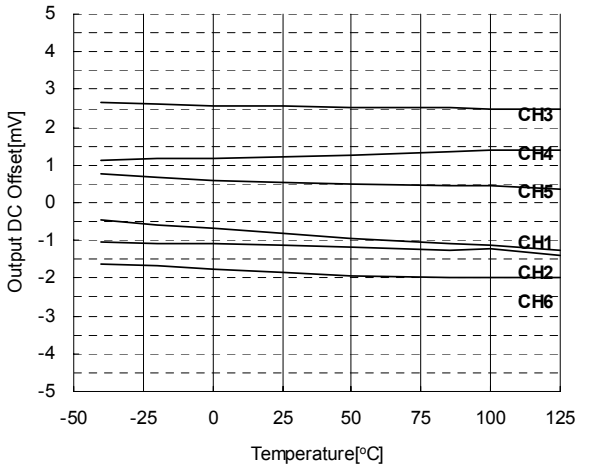
Supply Current vs Supply Voltage
RL=NoLoad , MUTE=H , GAIN=L



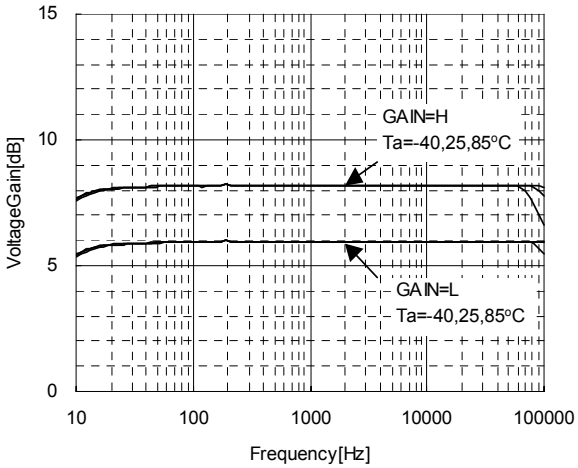
Supply Current vs Temperature
V+=8V , RL=NoLoad , MUTE=H , GAIN=L



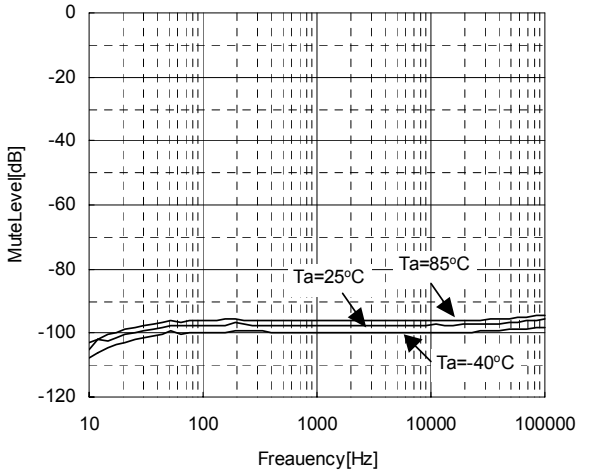
Output DC Offset vs Temperature
V+=8V , Vin=NoSignal , RL=47kΩ
MUTE=H , GAIN=L



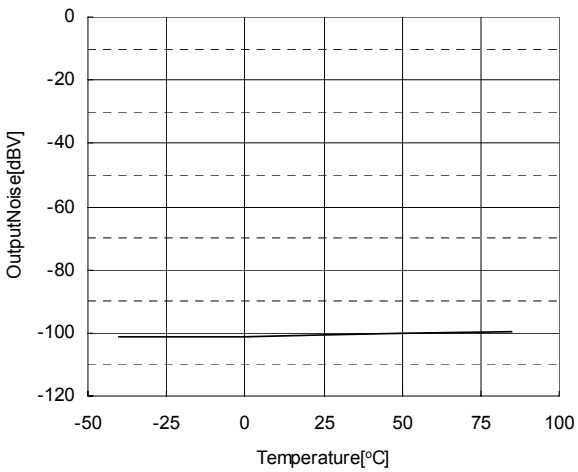
VoltageGain vs Frequency
V+=8V , Vin=0dBV , RL=47kΩ , MUTE=H



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

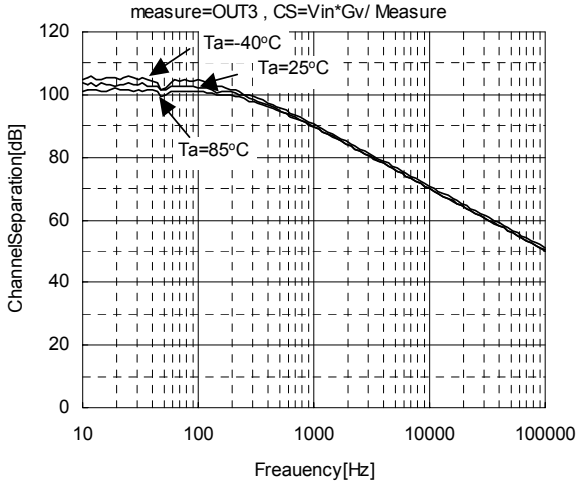


OutputNoisel vs Temperature
V+=8V, Rg=0Ω , RL=47kΩ , MUTE=H , GAIN=L
Filter=A-w eighted

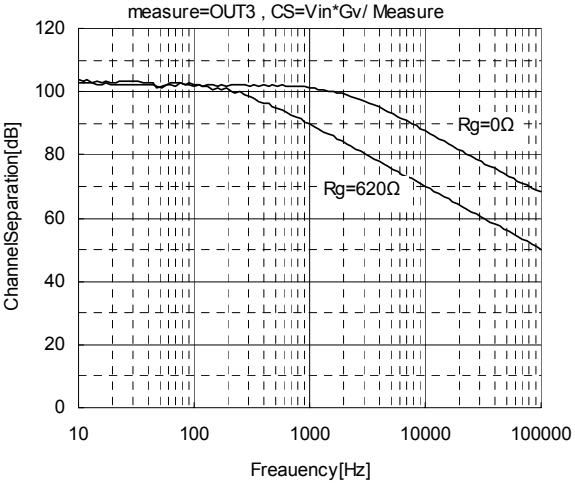


■TYPICAL CHARACTERISTICS

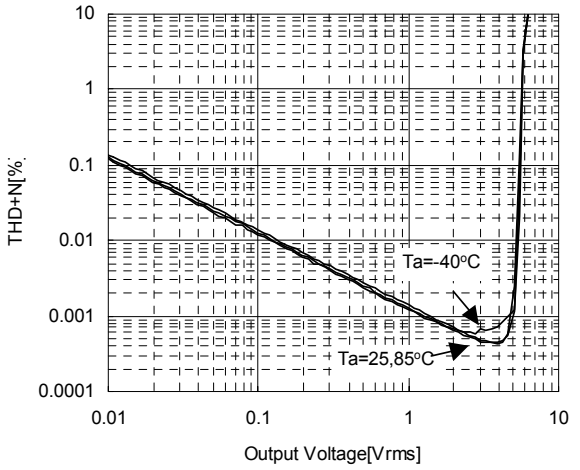
ChannelSeparation vs Frequency
V+=8V, Vin=0dBV , Input=IN1,2,4,5,6 , Rg=620Ω
RL=47kΩ , MUTE=H , GAIN=L , Filter=Bandpass
measure=OUT3 , CS=Vin*Gv/ Measure



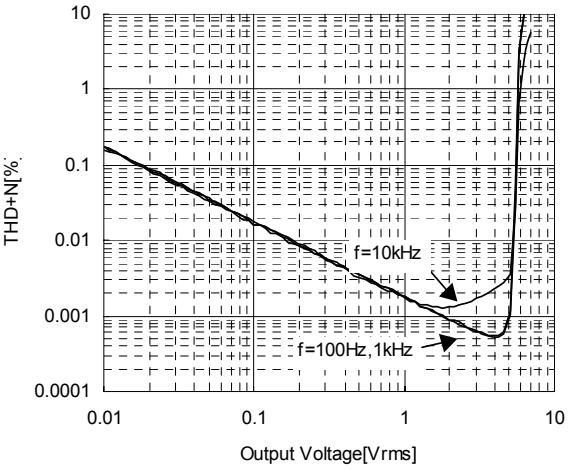
ChannelSeparation vs Frequency
V+=8V, Vin=0dBV , Input=IN1,2,4,5,6 , RL=47kΩ
MUTE=H , GAIN=L , Ta=25°C , Filter=Bandpass
measure=OUT3 , CS=Vin*Gv/ Measure



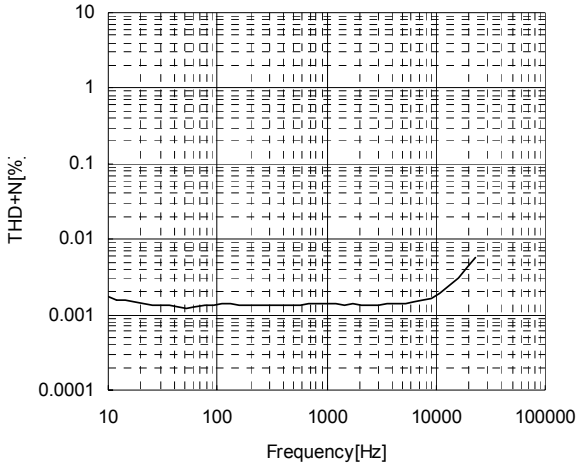
THD+N vs Output Voltage
V+=8V , f=1kHz , RL=47kΩ , MUTE=H , GAIN=L
Filter=400Hz to 22kHz



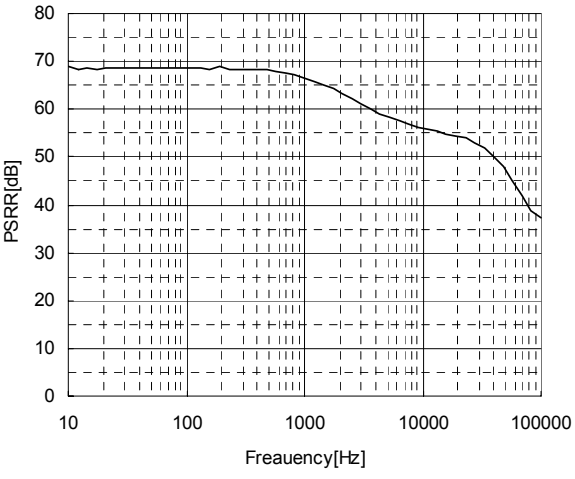
THD+N vs Output Voltage
V+=8V , RL=47kΩ , MUTE=H , GAIN=L , Ta=25°C
Filter=22Hz to 22kHz



THD+N vs Frequency
V+=8V , Vin=0dBV , RL=47kΩ , MUTE=H , GAIN=L
Ta=25°C , Filter=22Hz to 80kHz

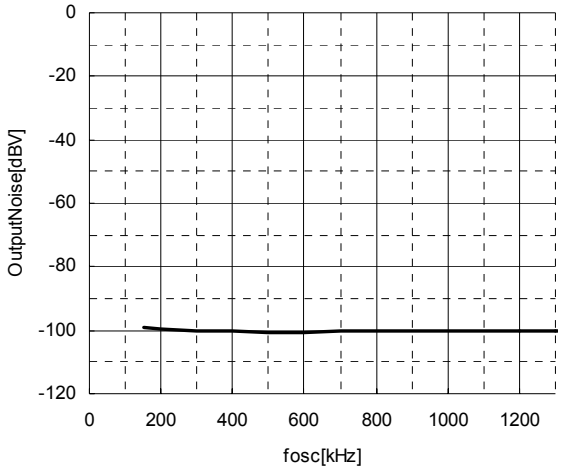


PSRR vs Frequency
V+=8V, Vripple=100mVrms , RL=47kΩ , MUTE=H
GAIN=L , Ta=25°C , Filter=Bandpass

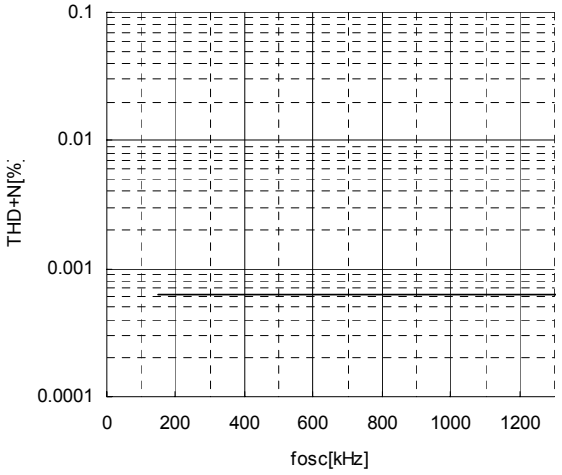


■TYPICAL CHARACTERISTICS

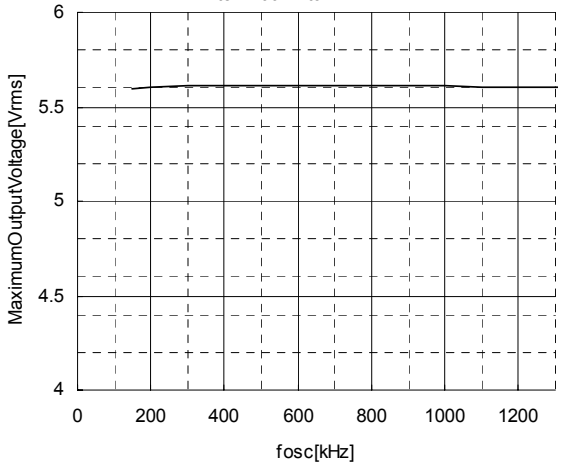
OutputNoise vs fosc
V+=8V, Rg=0Ω , RL=47kΩ , MUTE=H , GAIN=L
Ta=25°C , Filter=A-Weighted



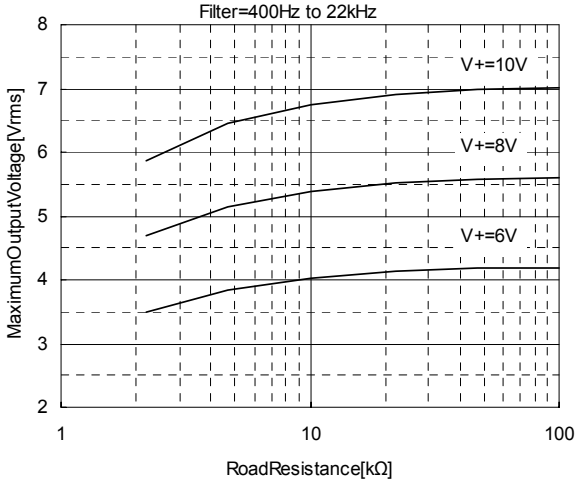
THD+N vs fosc
V+=8V, Vin=0dBV , f=1kHz , RL=47kΩ , MUTE=H
GAIN=L , Ta=25°C , Filter=400Hz to 22kHz



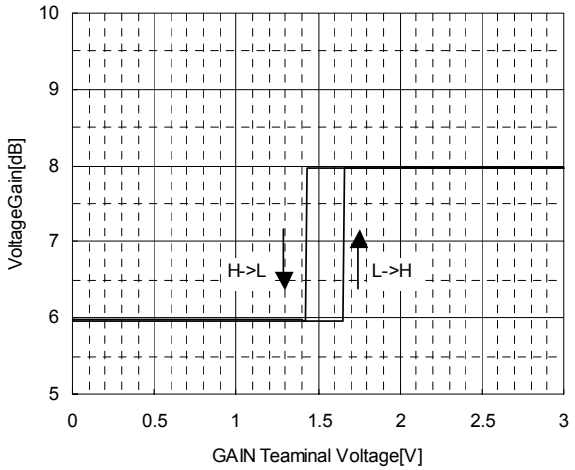
MaximumOutputVoltage vs fosc
V+=8V, f=1kHz , Input=IN1~IN6 , RL=47kΩ
MUTE=H , GAIN=L , Ta=25°C , THD+N=1%
Filter=400Hz to 22kHz



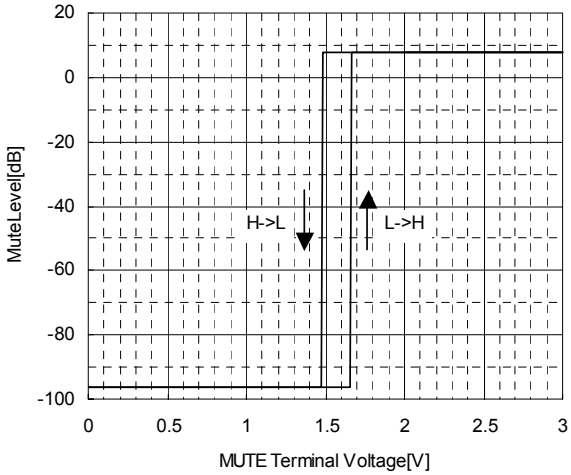
MaximumOutputVoltage vs LoadResistance
V+=8V, f=1kHz , Input=IN1~IN6 , MUTE=H , GAIN=L
fosc=Internal , Ta=25°C , THD+N=1%
Filter=400Hz to 22kHz



Voltage Gain vs GAIN Terminal Voltage
V+=8V, Vin=0dBV , f=1kHz , RL=47kΩ , MUTE=H
Ta=25°C



MuteLevel vs MUTE Terminal Voltage
V+=8V, Vin=0dBV , f=1kHz , RL=47kΩ , GAIN=L
Ta=25°C



[CAUTION]
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