Ground Noise Isolation Amplifier

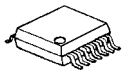
■ GENERAL DESCRIPTION

The **NJM2794** is a ground noise isolation amplifier designed for car audio system. It contains dual channel differential amplifier.

It is developed for those car audio applications where long connections between head unit and other components are necessary and ground noise has to be eliminated.

■ PACKAGE OUTLINE

NJM2794RB2
MSOP10 (TVSP10)

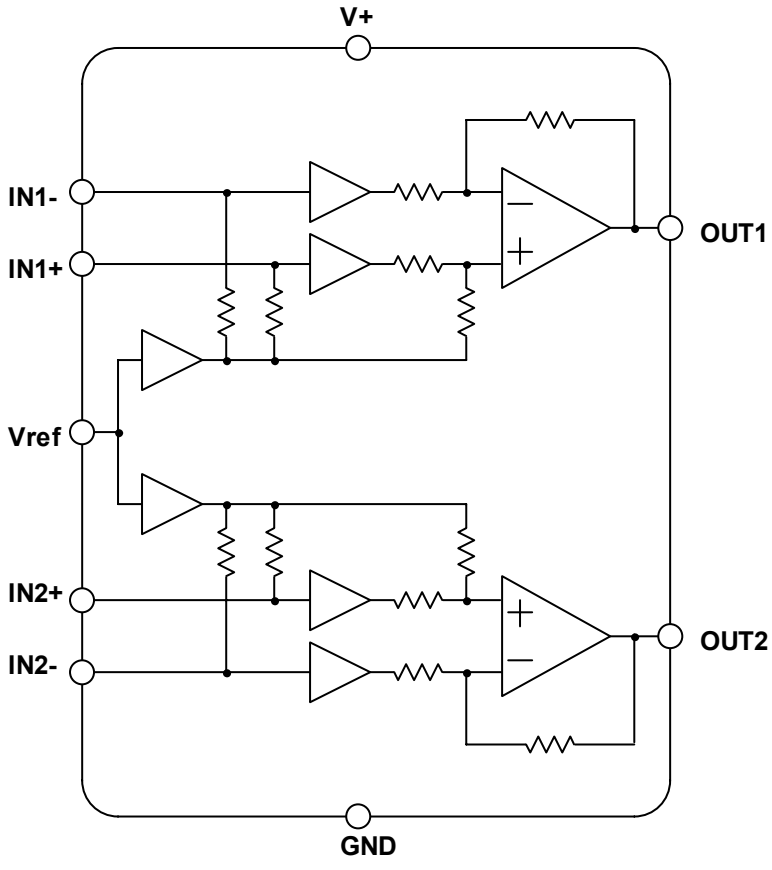


NJM2794V
(SSOP14)

■ FEATURES

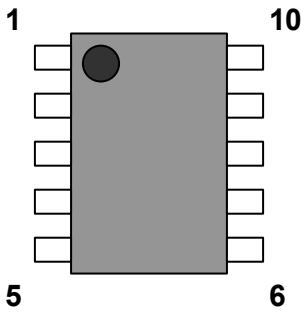
- Dual Channel Differential Amplifier
- Operating Voltage 4.3 to 13V
- Operating Current 14mA typ.
- Common mode rejection ratio CMRR=60dB typ.
- Maximum Output Voltage 2Vrms min., @ THD=0.1%
- Supply Voltage Rejection Ratio 60dB typ.
- Total Harmonic Distortion 0.002% typ.
- Noise Output Voltage 1.3μVrms typ.
- Bipolar Technology
- Package Outline MSOP10 (TVSP10)*
  SSOP14
  *MEET JEDEC MO-187-DA / THIN TYPE

■ BLOCK DIAGRAM



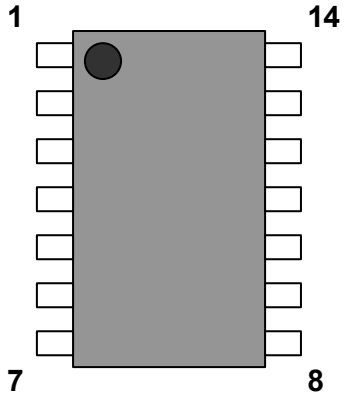
■ **PIN CONFIGURATION**

MSOP10(TVSP10)



No.	Symbol	Function
1	OUT1	Output1
2	GND	Ground
3	Vref	Reference Voltage
4	V+	Power Supply
5	OUT2	Output2
6	IN2+	+Input2
7	IN2-	-Input2
8	NC	No Connect
9	IN1-	-Input1
10	IN1+	+Input1

SSOP14



No.	Symbol	Function
1	OUT1	Output1
2	NC	No Connect
3	GND	Ground
4	Vref	Reference Voltage
5	V+	Power Supply
6	NC	No Connect
7	OUT2	Output2
8	IN2+	+Input2
9	NC	No Connect
10	IN2-	-Input2
11	NC	No Connect
12	IN1-	-Input1
13	NC	No Connect
14	IN1+	+Input1

■ **ABSOLUTE MAXIMUM RANGES** (Ta=25°C)

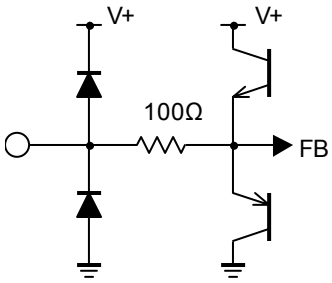
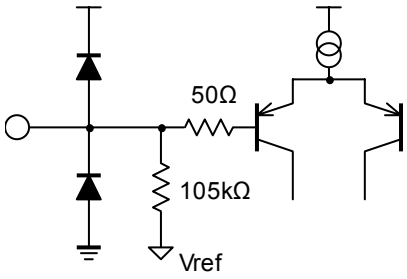
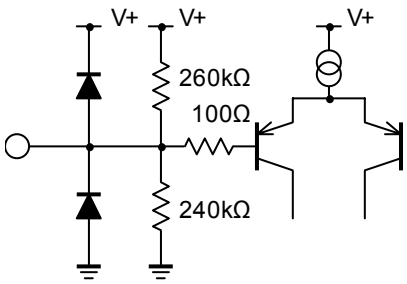
PARAMETER	SYMBOL	RANGE	UNIT
Supply Voltage	V^+	+15	V
Maximum Input Voltage	V_{IM}	0 to $V^{+(*)}$	V
Power Dissipation	P_D	MSOP10(TVSP10) : 530* SSOP14 : 550* NOTE: EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting	mW
Operating Temperature	Topr	-40 to +85	°C
Storage Temperature	Tstg	-40 to +150	°C

(∗) For the maximum input voltage less than 0 toV^+

■ **ELECTRICAL CHARACTERRISTIC** (V^+=9V,Ta=25°C)

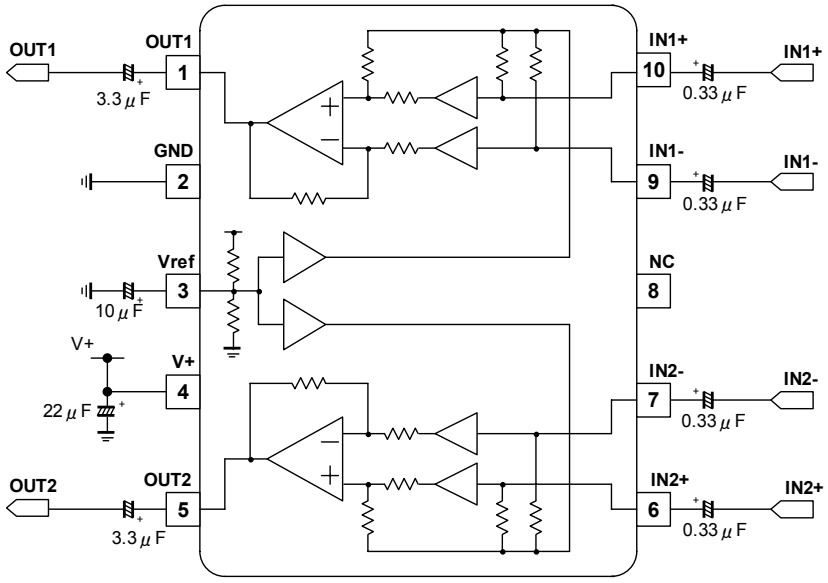
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
DC CHARACTERRISTIC						
Operating Voltage	V^+		4.3	9	13	V
Operating Current	I_{CC}	No Signal	-	14	20	mA
Reference Voltage	V_{REF}		3.8	4.3	4.8	V
AC CHARACTERRISTIC (Non-inverting circuit, f=1kHz, Vin=1Vrms, R_g=0Ω, R_L=10kΩ unless otherwise specified)						
Voltage Gain	Gv		-1.0	0.0	+1.0	dB
Channel Separation	CS	f=1kHz	90	110	-	dB
Channel Balance	BAL		-	-	0.5	dB
Roll-off High Frequency	f_{RH}	-1dB	100	-	-	kHz
Input Resistance	R_{IN}		85	105	125	kΩ
Output Resistance	R_{OUT}		-	90	-	Ω
Maximum Output Voltage 1	V_{OM1}	THD=0.1%, f = 1kHz	2	2.5	-	Vrms
Maximum Output Voltage 2	V_{OM2}	THD=0.1%, f = 1kHz, V^+=8V	1.7	2.1	-	Vrms
Maximum Output Voltage 3	V_{OM3}	Inverting, THD=0.1%, f = 1kHz	-	2.5	-	Vrms
Maximum Output Voltage 4	V_{OM4}	Inverting, THD=0.1%, f = 1kHz, V^+=8V	-	2.1	-	Vrms
Noise Output Voltage	V_{NO}	Rg=600Ω, A-weighted	-	1.3	2.5	μVrms
Total Harmonic Distortion	THD	f=1kHz , V_O=1Vrms, BW=400Hz to 30kHz	-	0.002	0.01	%
Common Mode Rejection Ratio	CMRR		50	60	-	dB
Common Mode Input Voltage	Vicm	CMRR=50dB	-	2	-	Vrms
Supply Voltage Rejection Ratio	SVR	f=100Hz , V_{ripple}=100mVrms	55	65	-	dB

■ TERMINAL DESCRIPTION

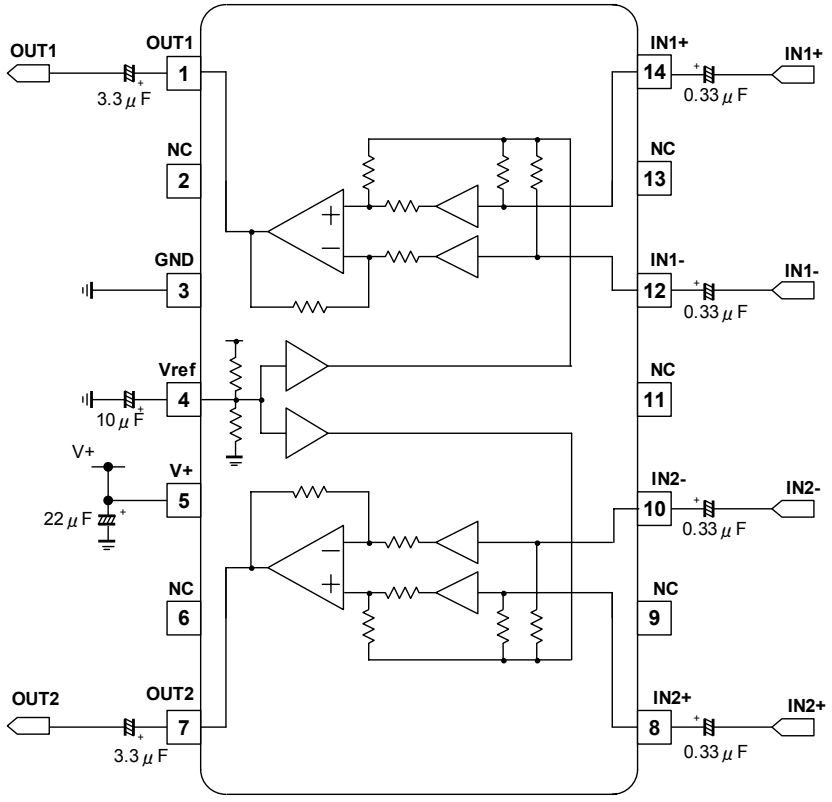
PIN NO. TVSP 10	PIN NO. SSOP 14	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	TERMINAL DC VOLTAGE
1 5	1 7	OUT1 OUT2	Output1 Output2		V^+x0.48 [V]
6 7 9 10	8 10 12 14	IN2+ IN2- IN1- IN1+	+Input2 -Input2 -Input1 +Input1		V^+x0.48 [V]
3	4	Vref	Reference Voltage		V^+x0.48 [V]

■ APPLICATION CIRCUIT

● MSOP10(TVSP10) : NJM2794RB2

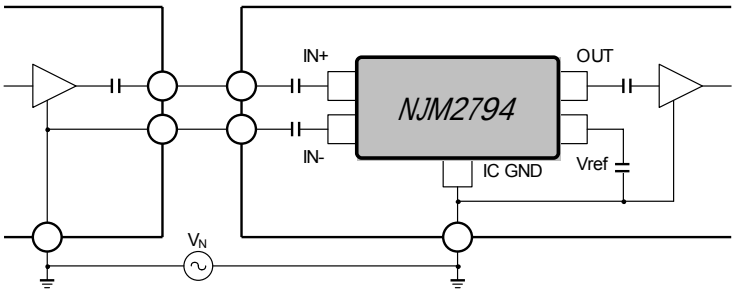


● SSOP14 : NJM2794V

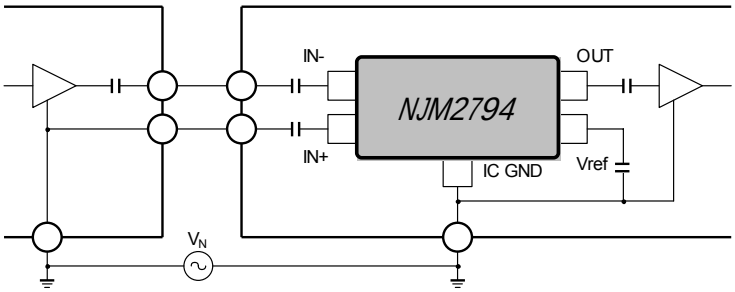


■ APPLICATION BLOCK DIAGRAM

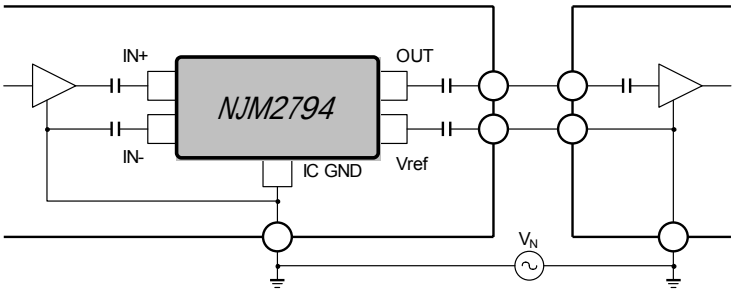
(1) Non-inverting line input



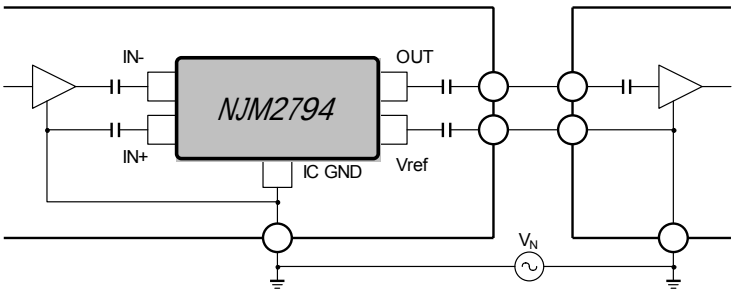
(2) Inverting line input



(3) Non-inverting line output

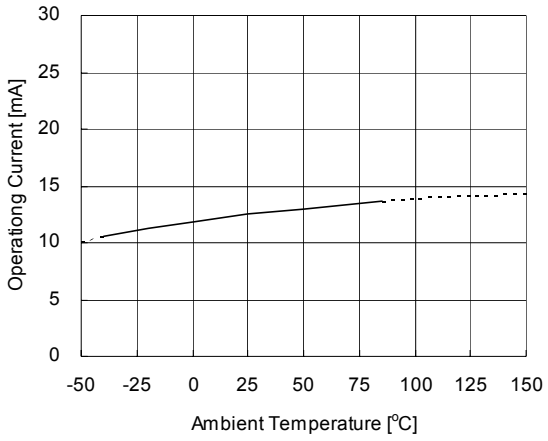


(4) Inverting line output

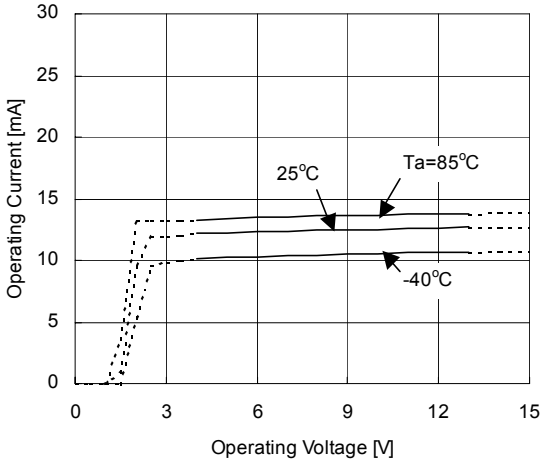


■ TYPICAL CHARACTERISTICS

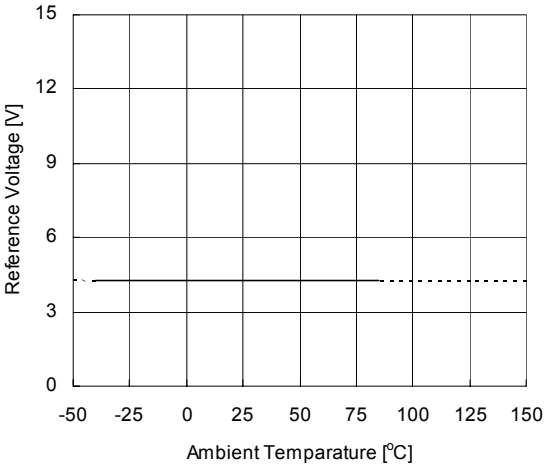
Operating Current vs. Ambient Temperature
V+=9V



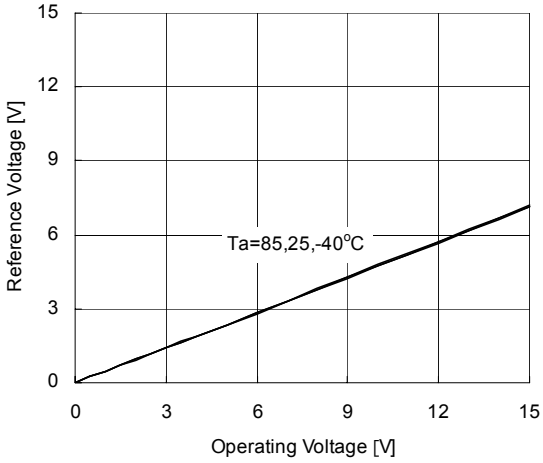
Operating Current vs. Operating Voltage



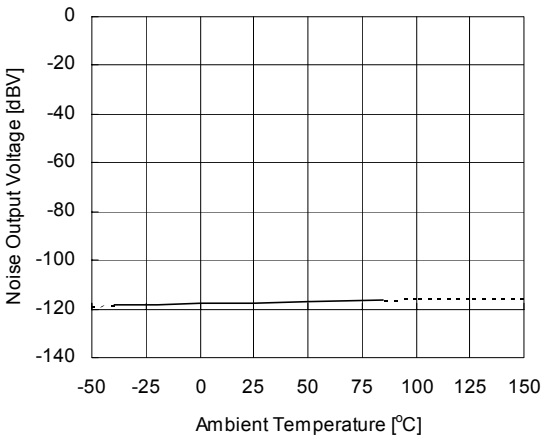
Reference Voltage vs. Ambient Temperature
V+=9V



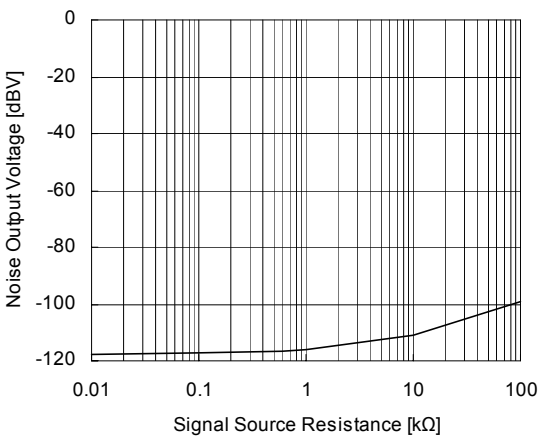
Reference Voltage vs. Operating Voltage



Noise Output Voltage vs. Ambient Temperature
V+=9V, Rg=600Ω, A-Weighted

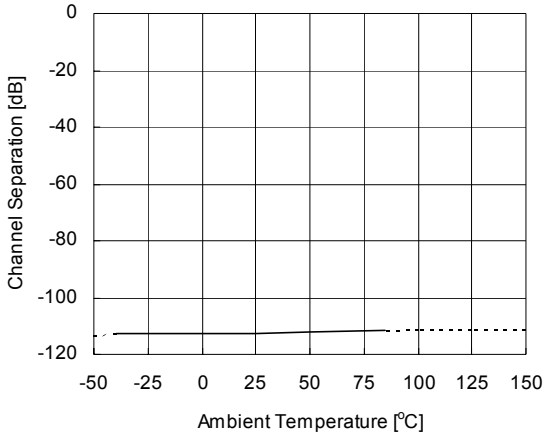


Noise Output Voltage vs. Signal Source Resistance
V+=9V, Ta=25°C, A-Weighted

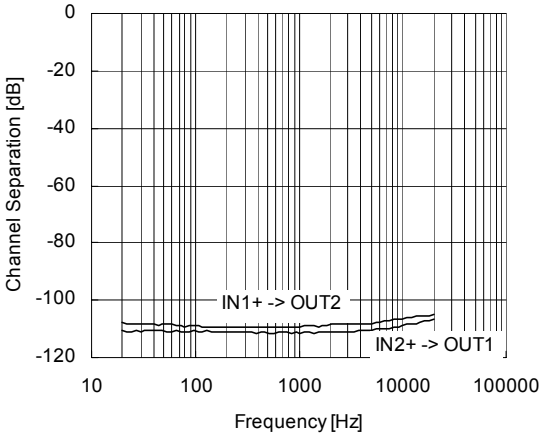


■ TYPICAL CHARACTERISTICS

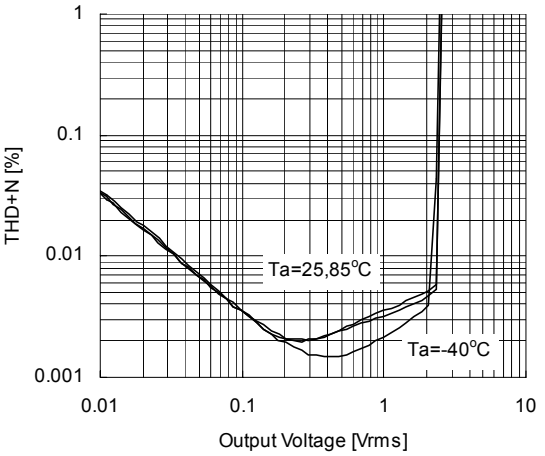
Channel Separation vs. Ambient Temperature
V+=9V, Rg=600Ω, Vin=1Vrms, BW=400Hz-30kHz
IN1+ -> OUT2



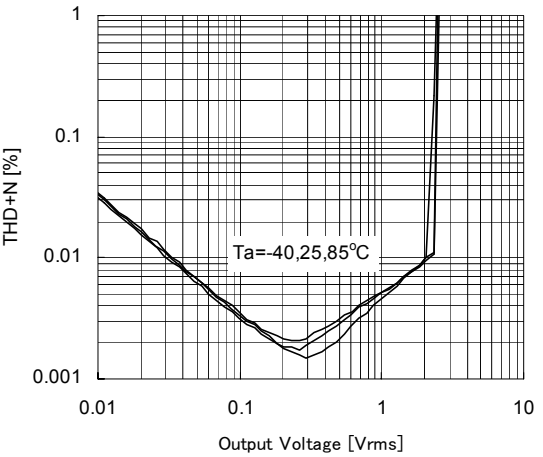
Channel Separation vs. Frequency
V+=9V, Rg=600Ω, Vin=1Vrms, BW=10Hz-30kHz



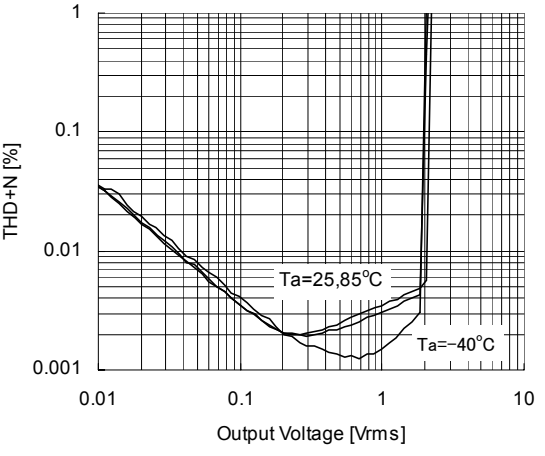
THD+N vs. Output Voltage
V+=9V, f=1kHz, Non-Inverting Circuit



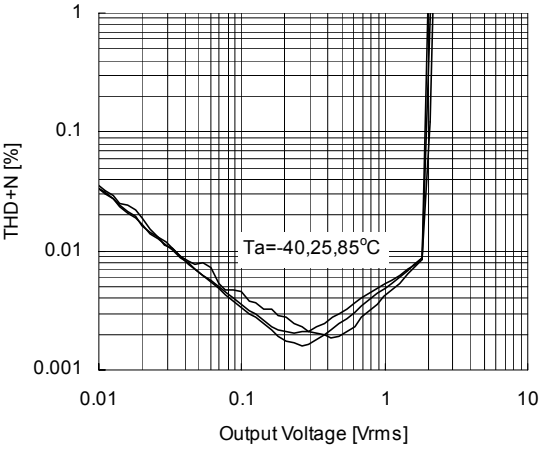
THD+N vs. Output Voltage
V+=9V, f=1kHz, Inverting Circuit



THD+N vs. Output Voltage
V+=8V, f=1kHz, Non-Inverting Circuit

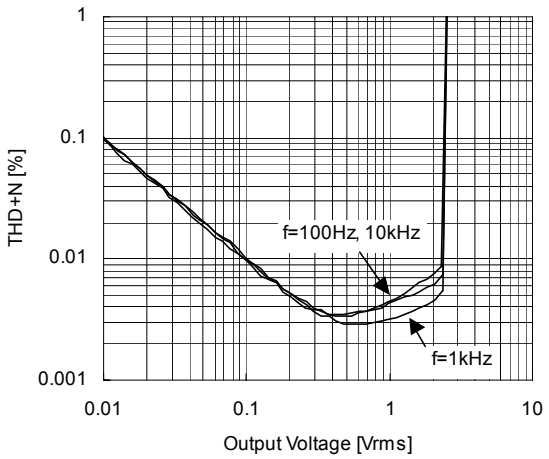


THD+N vs. Output Voltage
V+=8V, f=1kHz, Inverting Circuit

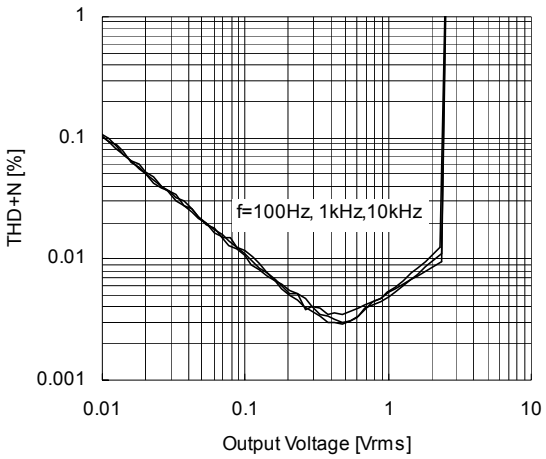


■ TYPICAL CHARACTERISTICS

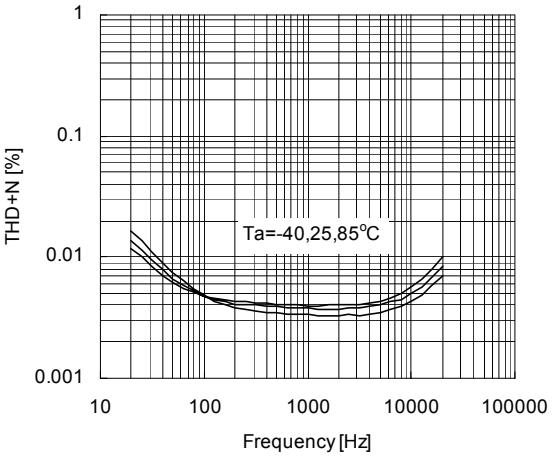
THD+N vs. Output Voltage
V+=9V, Ta=25°C, Non-Inverting Circuit



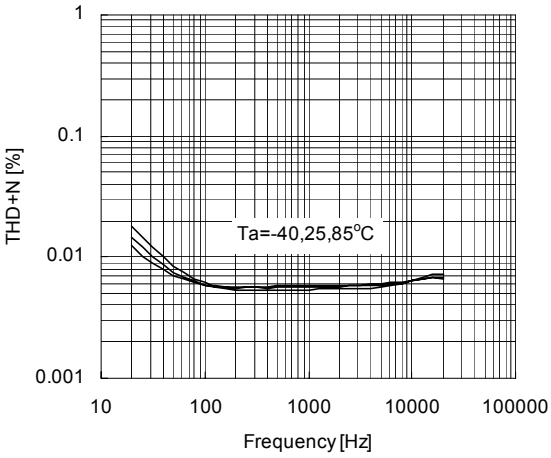
THD+N vs. Output Voltage
V+=9V, Ta=25°C, Inverting Circuit



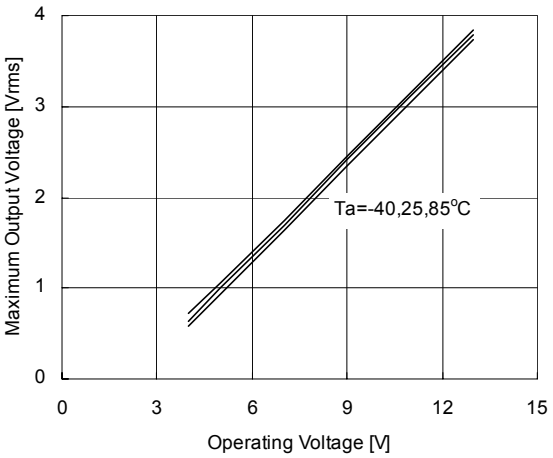
THD+N vs. Output Voltage
V+=9V, Vin=1Vrms, BW=22Hz-80kHz,
Non-Inverting Circuit



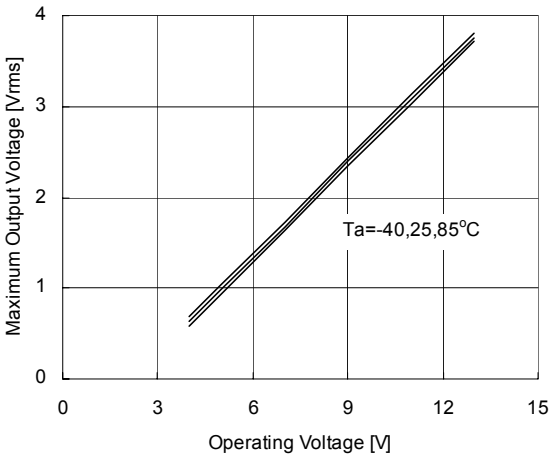
THD+N vs. Output Voltage
V+=9V, Vin=1Vrms, BW=22Hz-80kHz,
Inverting Circuit



Maximum Output Voltage vs. Operating Voltage
f=1kHz, THD=0.1%, Non-Inverting Circuit

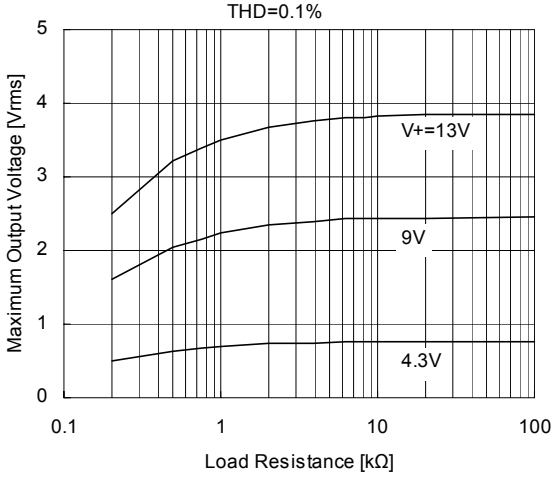


Maximum Output Voltage vs. Operating Voltage
f=1kHz, THD=0.1%, Inverting Circuit

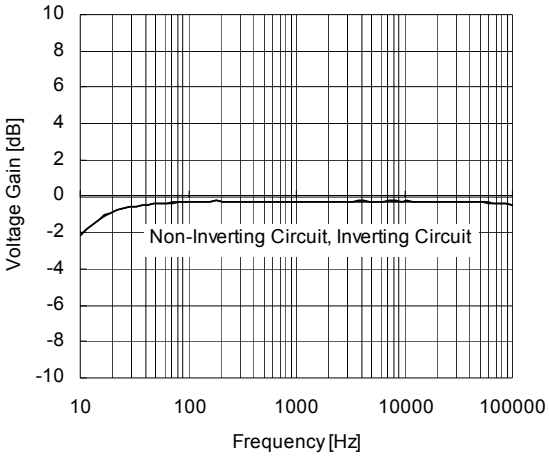


■ TYPICAL CHARACTERISTICS

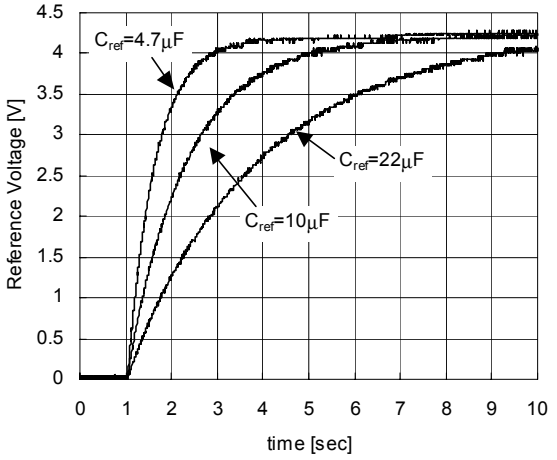
Maximum Output Voltage vs. Load Resistance
V+=9V, f=1kHz, Ta=25°C, BW=400 - 30kHz
THD=0.1%



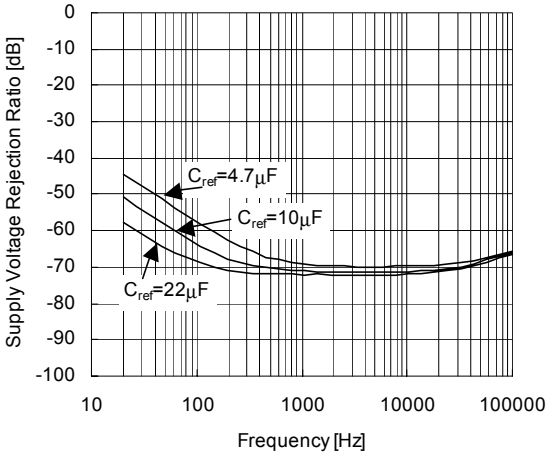
Voltage Gain vs. Frequency
V+=9V, Vin=1Vrms, Ta=25°C



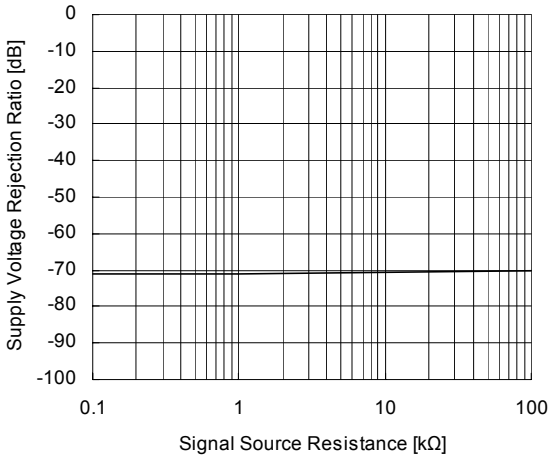
Reference Voltage Turn-on behaviour
V+=9V, Ta=25°C



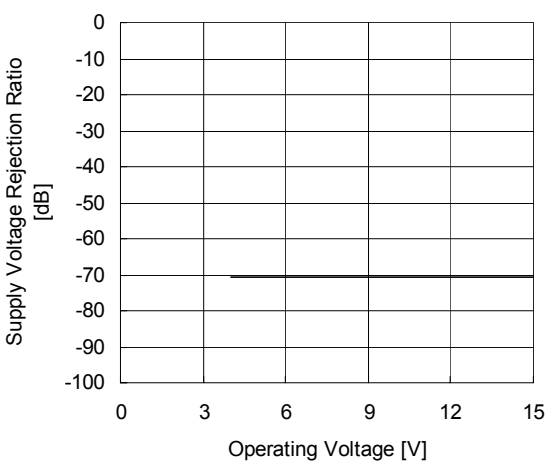
Supply Voltage Rejection Ratio
vs. Frequency
V+=9V, Vripple=100mV, Rg=600Ω, Ta=25°C



Supply Voltage Rejection Ratio
vs. Signal Source Resistance
V+=9V, Vrippple=100mV, f=100Hz, Ta=25°C

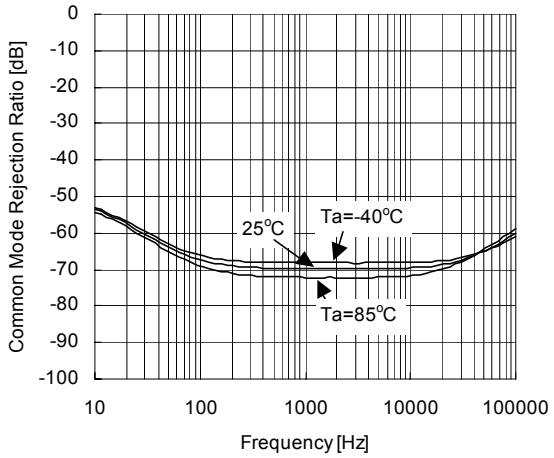


Supply Voltage Rejection Ratio
vs. Operating Voltage
Vripple=100mV, f=100Hz, Rg=600Ω, Ta=25°C



■ TYPICAL CHARACTERISTICS

Common Mode Rejection Ratio vs. Frequency
V+=9V, Vin=1Vrms



Common Mode Rejection Ratio vs. Input Voltage
V+=9V, f=1kHz, Ta=25°C, BW=400 - 30kHz