QUAD OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

NJM2745 is quad operational amplifier with low voltage noise 5nV/√Hz(@f=1kHz) with high bandwidth and low distortion.

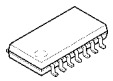
These features may be used in audio signal processing by high-level audio usages such as hi-end car audio, high-quality TV set and others.

In addition, these also suitable for audio mixer, studio-recording equipments, broadcasting equipments, and the usages in various professional sound equipments.

■ PACKAGE OUTLINE



NJM2745V

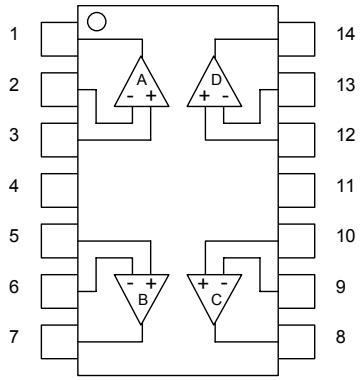


NJM2745M

■ FEATURES

● Low Input Noise Voltage	5nV/ √Hz typ
● Wide Gain Bandwidth Product	15MHz typ
● Low Distortion	0.0005% typ
● Slew Rate	5V/μs typ
● Operating Voltage	±2V to ±9.5V
● Package Outline	NJM2745M : DMP14
	NJM2745V : SSOP14
● Bipolar Technology	

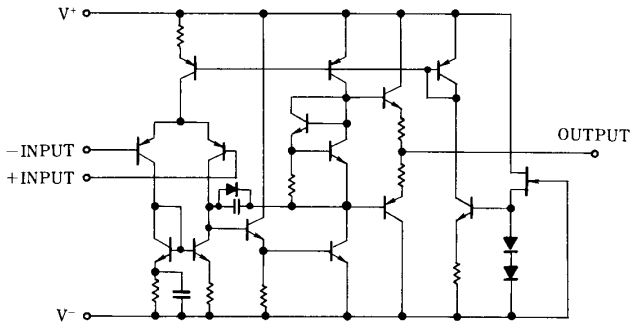
■ PIN CONFIGURATION



PIN ASIGNMENT

1. A OUTPUT	8. C OUTPUT
2. A -INPUT	9. C -INPUT
3. A +INPUT	10. C +INPUT
4. V+	11. V-
5. B +INPUT	12. D +INPUT
6. B -INPUT	13. D -INPUT
7. B OUTPUT	14. D OUTPUT

■ EQUIVALENT CIRCUIT (1/4 Shown)



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+/V^-	±16	V
Common Mode Input Voltage Range	V_{ICM}	±13 (Note 1)	V
Differential Input Voltage Range	V_{ID}	±26 (Note 1)	V
Power Dissipation	P_D	700 [DMP14] (Note 2) 570 [SSOP14] (Note 2)	mW
Load Current	I_O	±50 (Note3, Note 4)	mA
Operating Temperature Range	Topr	-40~+85	°C
Storage Temperature Range	Tstg	-40~+150	°C

(Note 1) For supply voltages less than "Absolute Maximum Ratings", the absolute maximum input voltage is equal to the supply voltage.
(Note 2) Mounted on the EIA/JEDEC standard board (76.2 ×114.3 ×1.6mm, two layer FR-4).
(Note 3) It individually takes the absolute value of the sink current and the source current of each output terminal, and it is assumed the sum total. Calculation type: $I_O=|I_{AOUTPUT}| + |I_{BOUTPUT}| + |I_{COUTPUT}| + |I_{DOUTPUT}|$
(Note 4) Please note the supply current when the load is short-circuited.

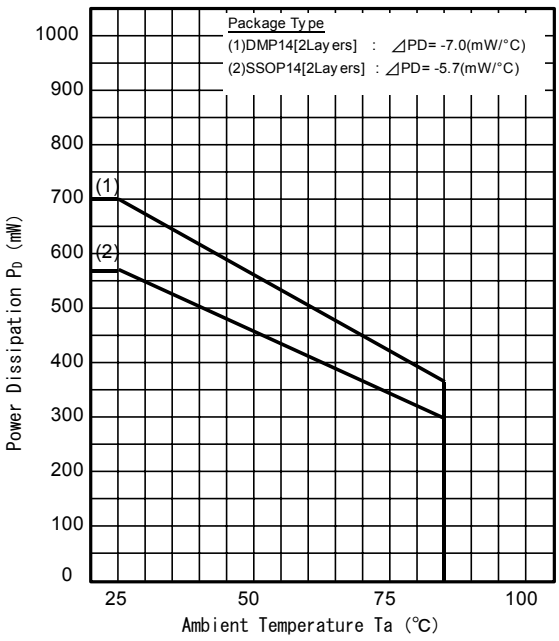
■ RECOMMENDATION OPERATING CONDITION

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V^+ / V^-	(Note 2, Note 5, Note 6) $R_L \geq 10k\Omega$	±2	-	±9.5	V

(Note 5) Do not exceed "Power dissipation: P_D" in which power dissipation in IC "Symbol: W" is shown by the absolute maximum rating. Please use it under the system requirements of NJM2745 to always satisfy "Condition: $P_D \geq W$".
The calculation type when using it in dual supplies is "$W=Icc\times2\times V^+ + 1.62\times(V^+\times V + \div(2\times R_L))$".
(Calculation type condition: Loads connected with an individual output terminal are this all characteristics, and it is assumed same resistance R_L)
(Note 6) Refer to following Figure 1 for a permissible loss when ambient temperature (Ta) is Ta≥25°C.

FIGURE1:Power Dissipation vs. Ambient Temperature



■ ELECTRIC CHARACTERISTICS

● DC CHARACTERISTICS (V+/V-=±4.5V,Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	Icc	No Signal	-	12	16	mA
Input Offset Voltage	V_{IO}	R_S≤10kΩ	-	0.3	3	mV
Input Bias Current	I_B		-	100	500	nA
Input Offset Current	I_{IO}		-	5	200	nA
Large Signal Voltage Gain	Av	R_L≥2kΩ, Vo=±1.5V	90	110	-	dB
Common Mode Rejection Ratio	CMR	R_S≤10kΩ, -2.5V≤V_{IC}≤+2.5V	70	110	-	dB
Supply Voltage Rejection Ratio	SVR	R_S≤10kΩ, V^+/V^-=±2~±7V	80	110	-	dB
Maximum Output Voltage	V_{OM}	R_L≥2kΩ	±2.5	±3	-	V
Input Common Mode Voltage Range	V_{ICM}	CMR≥70dB	-2.5	-	+2.5	V

● AC CHARACTERISTICS (V+/V-=±4.5V,Ta=25°C)

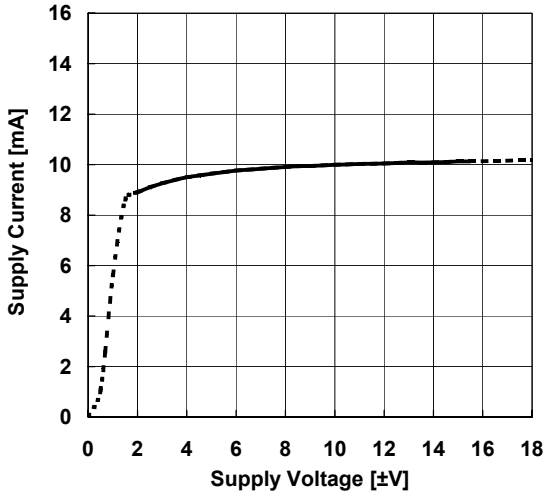
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Unity Gain Bandwidth	GB	f=10kHz	-	15	-	MHz
Equivalent input Noise Voltage	V_{NI}	R_S=0Ω	-	5	-	nV/√Hz
Total Harmonic Distortion	THD	V^+/V^-=±9V, A_V=20dB, Vo=4Vrms R_L=2KΩ, f=1kHz	-	0.001	-	%
		V^+/V^-=±4.5V, A_V=20dB, Vo=1Vrms R_L=2kΩ, f=1kHz	-	0.005	-	

● TRANSIENT CHARACTERISTICS (V+/V-=±4.5V,Ta=25°C)

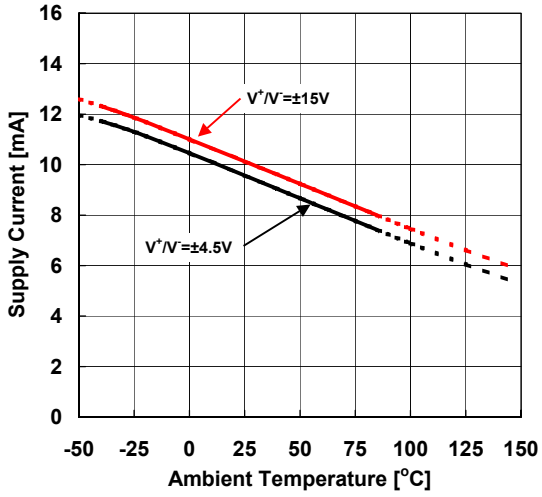
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	R_L≥2kΩ	-	5	-	V/μs

■ TYPICAL CHARACTERISTICS

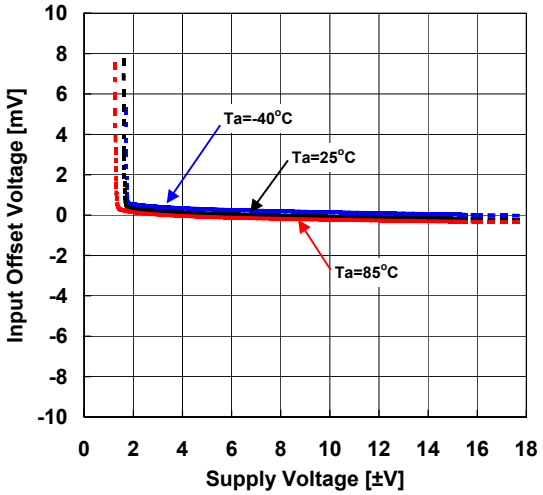
Supply Current vs. Supply Voltage
V_{IN}=0V, Ta=25°C



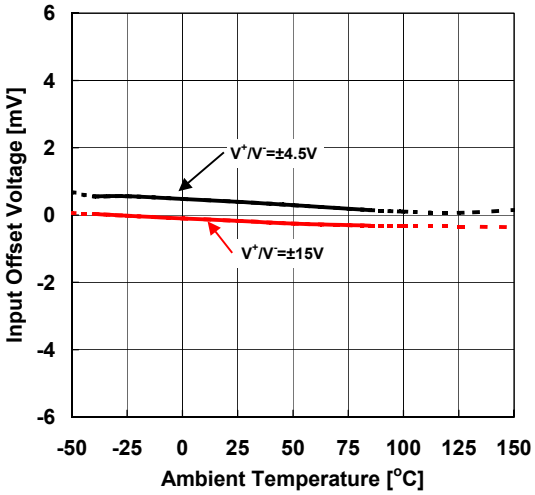
Supply Current vs. Ambient Temperature
(Supply Voltage)
V_{IN}=0V



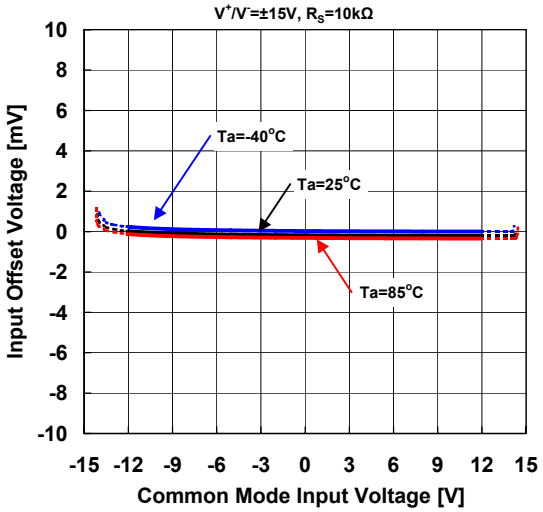
Input Offset Voltage vs. Supply Voltage
(Ambient Temperature)
V_{ICM}=0V, RS=10kΩ



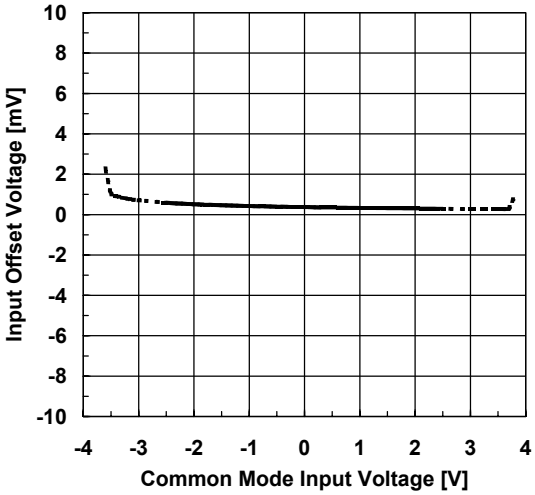
Input Offset Voltage vs. Ambient Temperature
V^+/V^-=±15V, V_{ICM}=0V



Input Offset Voltage
vs. Common Mode Input Voltage
(Ambient Temperature)
V^+/V^-=±15V, R_S=10kΩ

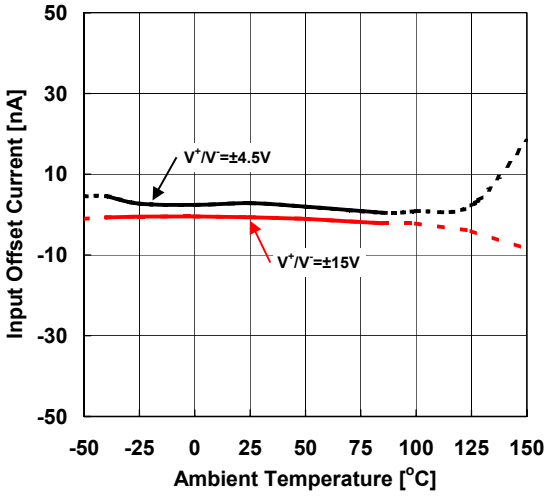


Input Offset Voltage
vs. Common Mode Input Voltage
V^+/V^-=±4.5V, R_S=10kΩ, Ta=25°C

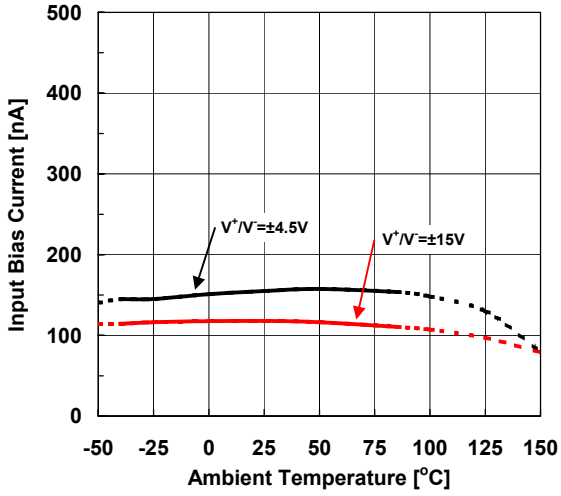


■ TYPICAL CHARACTERISTICS

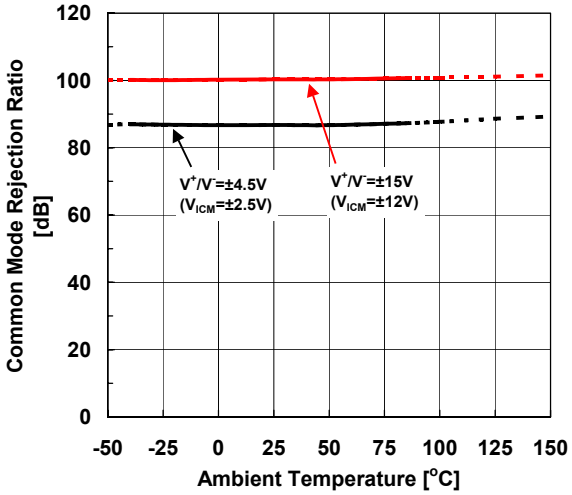
Input Offset Current vs. Ambient Temperature
V_{ICM}=0V, R_S=50kΩ



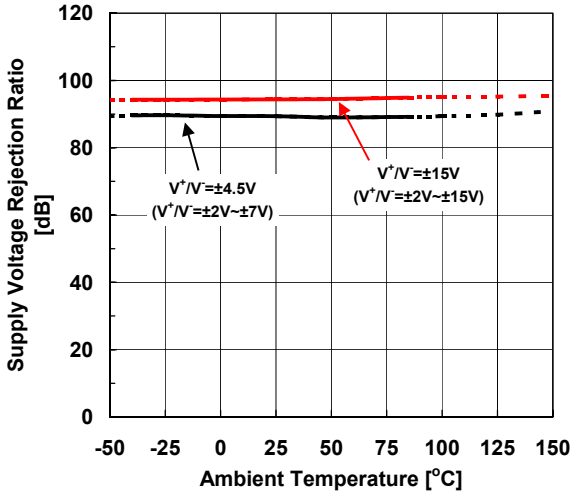
Input Bias Current vs. Ambient Temperature
V_{ICM}=0V, R_S=10kΩ



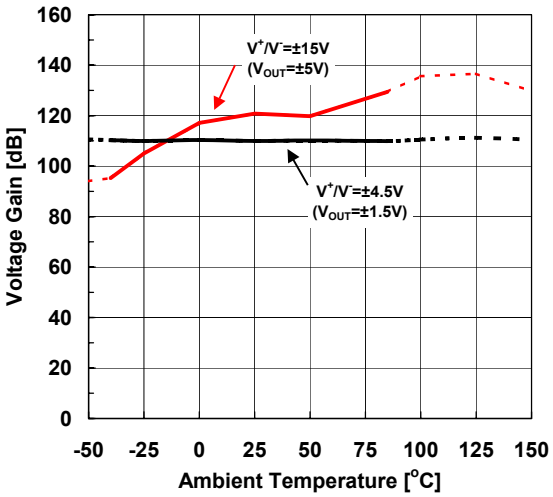
Common Mode Rejection Ratio
vs. Ambient Temperature
R_S=10kΩ



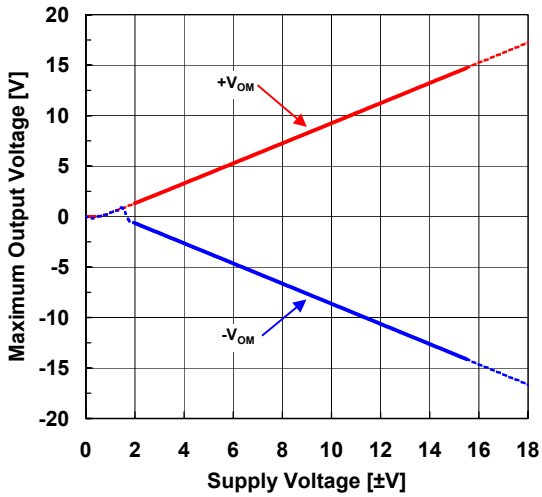
Supply Voltage Rejection Ratio
vs. Ambient Temperature
R_S=10kΩ



Voltage Gain vs. Ambient Temperature
R_L=2kΩ



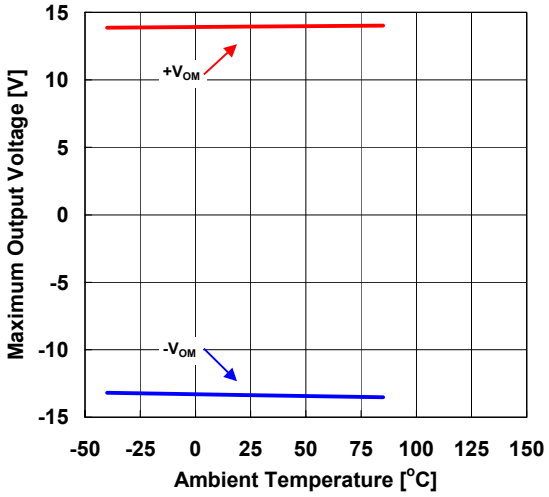
Maximum Output Voltage vs. Supply Voltage
V_{IN}+=±1V, V_{IN}-=0V, R_L=10kΩ, Ta=25°C



■ TYPICAL CHARACTERISTICS

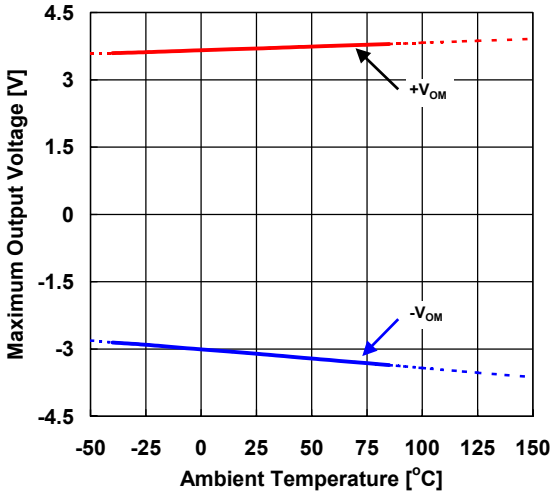
Maximum Output Voltage vs. Ambient Temperature

V^+/V^-=±15V, V_{IN}+=±1V, V_{IN}-=0V, R_L=2kΩ



Maximum Output Voltage vs. Ambient Temperature

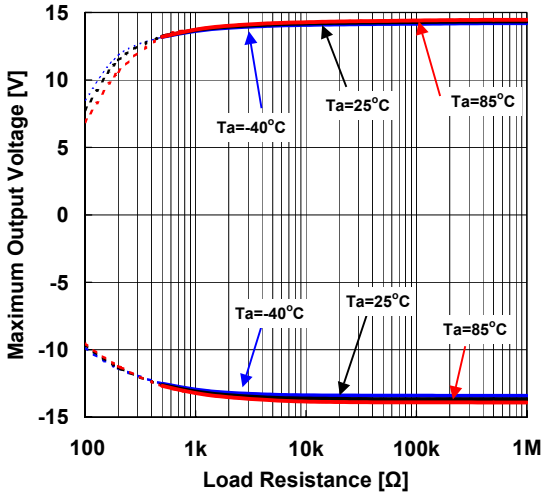
V^+/V^-=±4.5V, V_{IN}=±1V, R_L=2kΩ



Maximum Output Voltage vs. Load Resistance

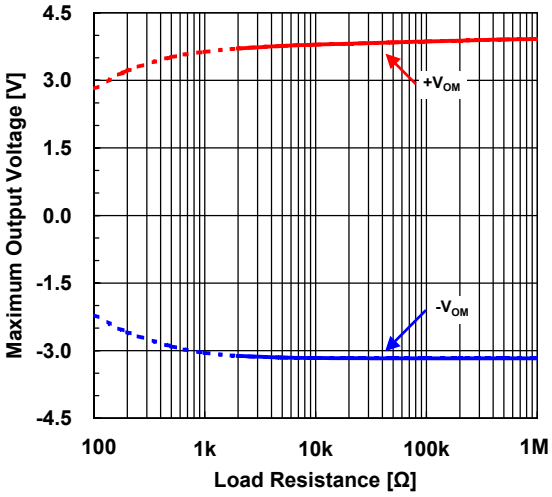
(Ambient Temperature)

V^+/V^-=±15V, V_{IN}+=±1V, V_{IN}-=0V



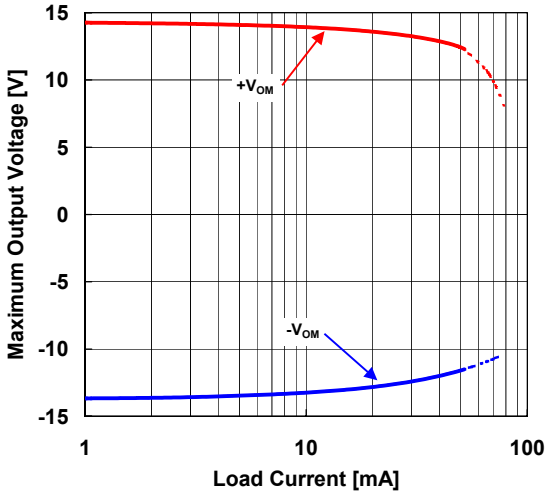
Maximum Output Voltage vs. Load Resistance

V^+/V^-=±4.5V, V_{IN}=±1V, Ta=25°C



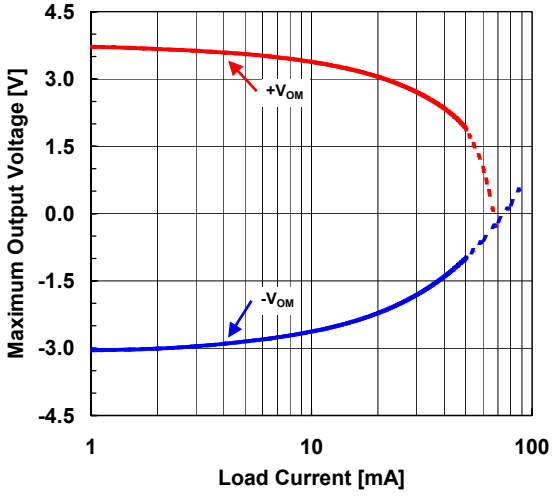
Maximum Output Voltage vs. Load Current

V^+/V^-=±15V, V_{IN}+=1V, V_{IN}-=0V, Ta=25°C



Maximum Output Voltage vs. Load Current

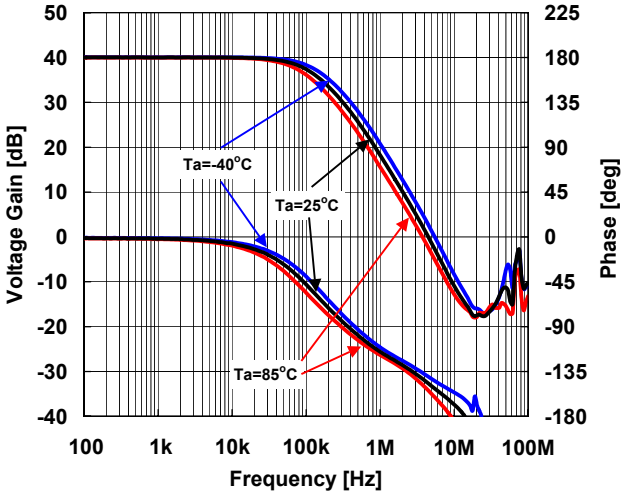
V^+/V^-=±4.5V, V_{IN}=±1V, Ta=25°C



■ TYPICAL CHARACTERISTICS

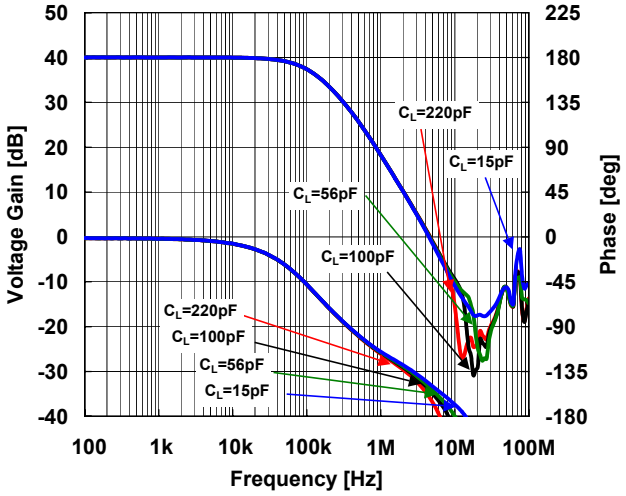
40dBGain/Phase vs. Frequency (Ambient Temperature)

V^+/V^-=±15V, G_V=40dB, R_T=50Ω, R_L=2kΩ, C_L=15pF



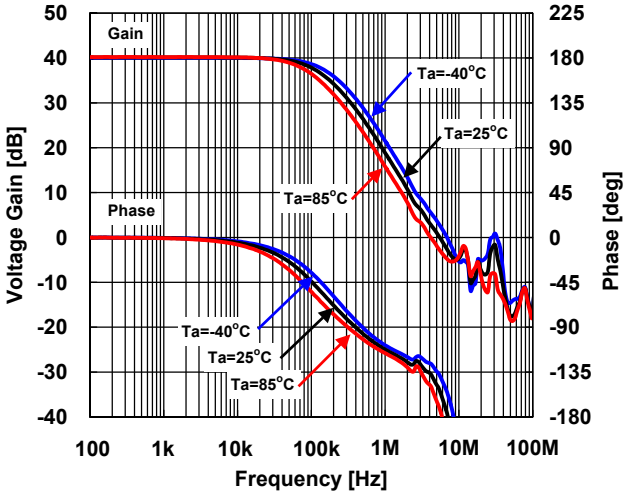
40dBGain/Phase vs. Frequency (Load Capacitance)

V^+/V^-=±15V, G_V=40dB, R_T=50Ω, R_L=2kΩ, Ta=25°C



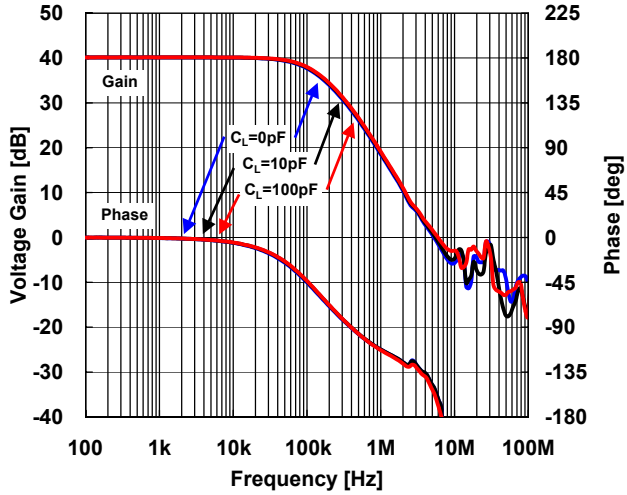
40dBGain/Phase vs. Frequency (Ambient Temperature)

V^+/V^-=±4.5V, G_V=40dB, R_L=2kΩ, C_L=10pF



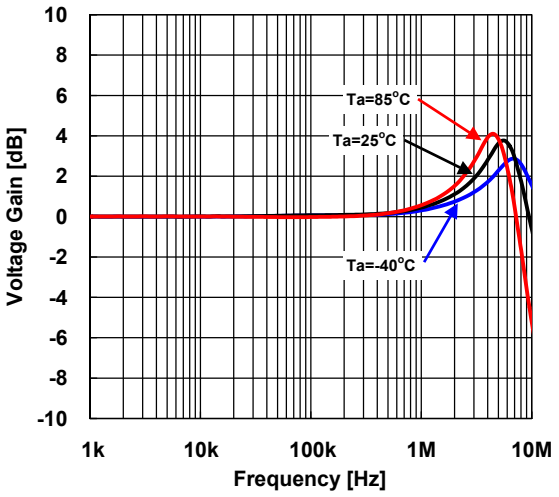
40dBGain/Phase vs. Frequency (Load Capacitance)

V^+/V^-=±4.5V, G_V=40dB, R_L=2kΩ, Ta=25°C



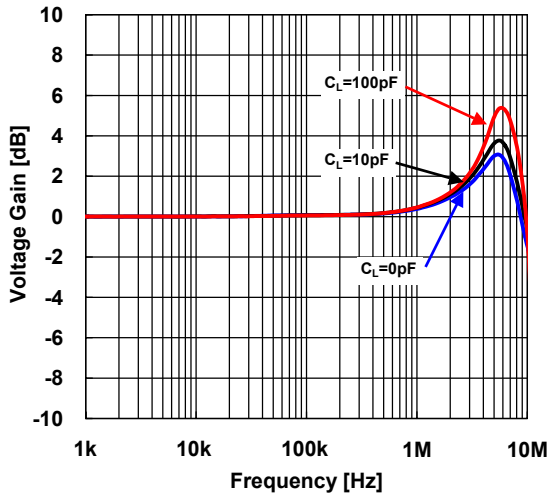
V.F.Peak vs. Frequency (Ambient Temperature)

V^+/V^-=±4.5V, G_V=0dB, R_L=2kΩ,C_L=10pF



V.F.Peak vs. Frequency (Load Capacitance)

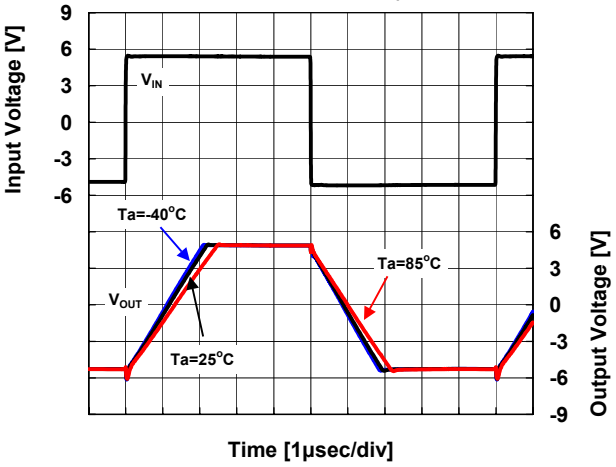
V^+/V^-=±4.5V, G_V=0dB, R_L=2kΩ, Ta=25°C



■ TYPICAL CHARACTERISTICS

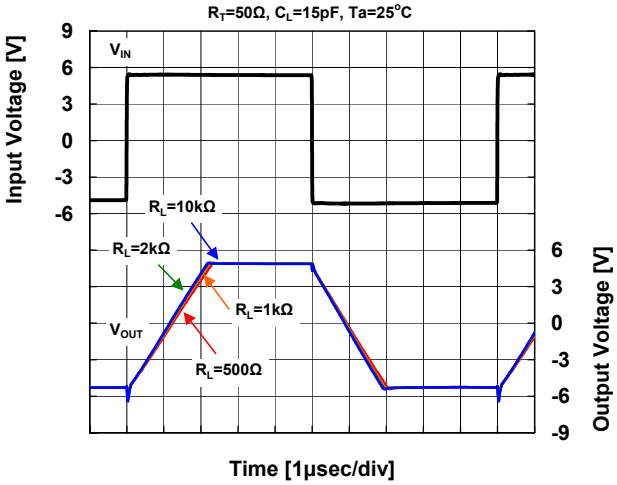
Pulse Response (Ambient Temperature)

V^+/V^-=±15V, V_{IN}=10V_{PP}, f_{IN}=1kHz, G_V=0dB,
R_T=50Ω, R_L=50kΩ, C_L=15pF



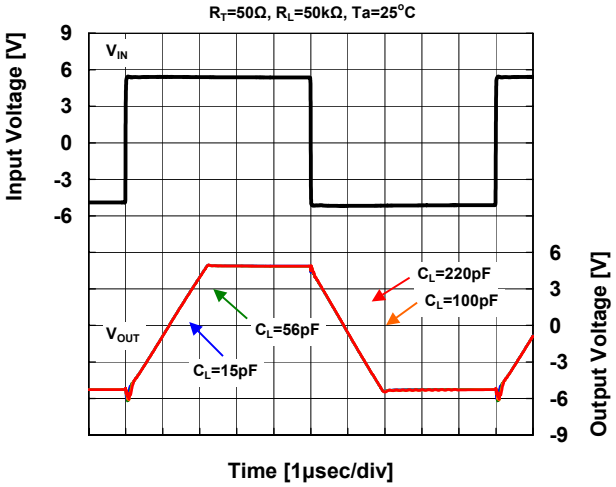
Pulse Response (Load Resistance)

V^+/V^-=±15V, V_{IN}=10V_{PP}, f_{IN}=1kHz, G_V=0dB,
R_T=50Ω, C_L=15pF, Ta=25°C



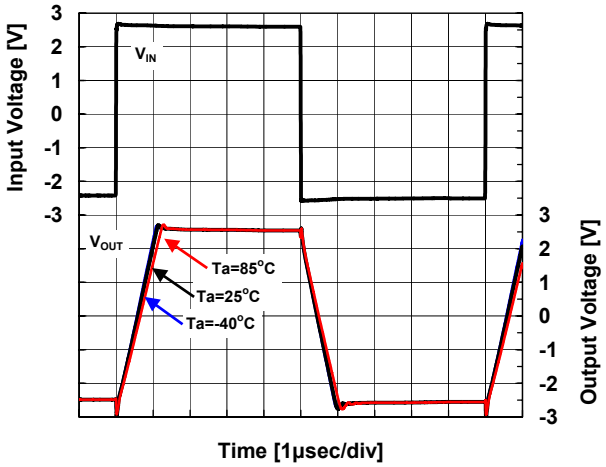
Pulse Response (Load Capacitance)

V^+/V^-=±15V, V_{IN}=10V_{PP}, f_{IN}=1kHz, G_V=0dB,
R_T=50Ω, R_L=50kΩ, Ta=25°C



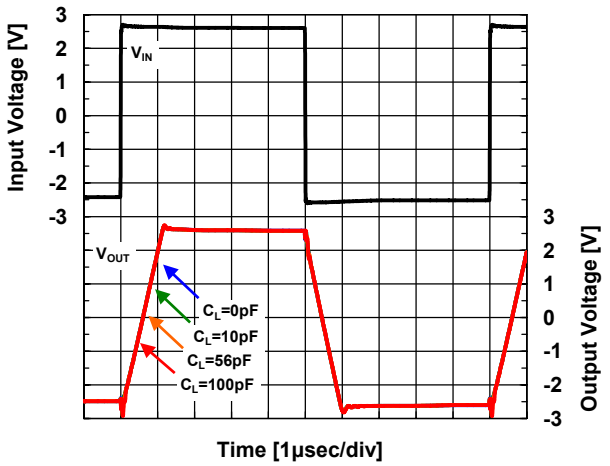
Pulse Response (Ambient Temperature)

V^+/V^-=±4.5V, V_{IN}=±2.5V,
f_{IN}=1kHz, G_V=0dB, R_L=2kΩ, C_L=10pF



Pulse Response (Load Capacitance)

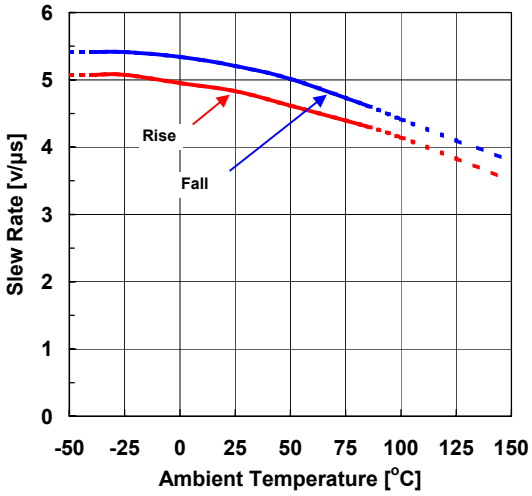
V^+/V^-=±4.5V, V_{IN}=±2.5V,
f_{IN}=1kHz, G_V=0dB,R_L=2kΩ, Ta=25°C



■ TYPICAL CHARACTERISTICS

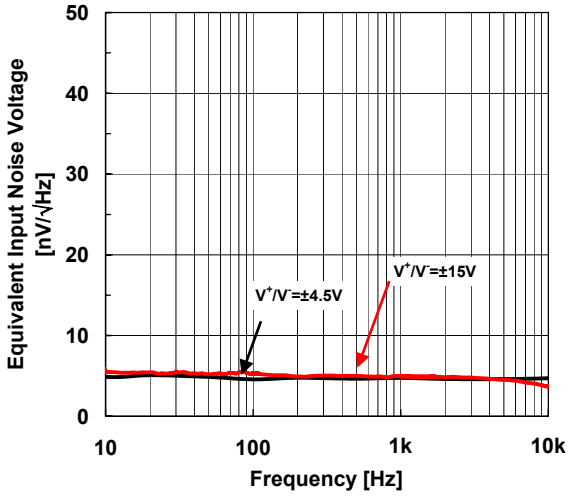
Slew Rate vs. Ambient Temperature

V^+/V^-=±15V, V_{IN}=10V_{PP}, f_{IN}=1kHz, G_V=0dB,
R_T=50Ω, R_L=2kΩ, C_L=15pF



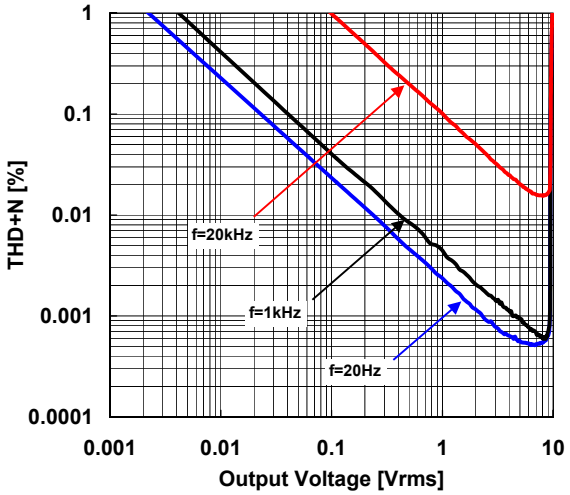
Equivalent Input Noise Voltage

R_S=50Ω, R_L=100kΩ, G_V=60dB, Ta=25°C



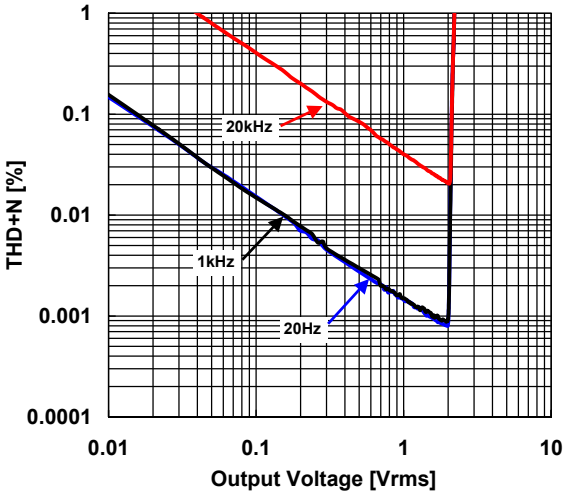
THD+N vs. Output Voltage

V^+/V^-=±15V, G_V=20dB, R_L=2kΩ, Ta=25°C



THD+N vs. Output Voltage

V^+/V^-=±4.5V, G_V=20dB, R_L=2kΩ, Ta=25°C



■ MEMO

[CAUTION]
The specifications on this databook are only given for information , without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.