

High Quality Audio Dual Operational Amplifier

■GENERAL DESCRIPTION

The NJM8801 is a high quality audio dual operational Amplifier with bipolar technology, strikes a balance between "MUSES technology" and mass-production technique.

The original process tuning and the assembly technology, based on MUSES technology, make excellent sound and absorbing cost increases.

The characteristics like Low noise ($4.5\text{nV}/\sqrt{\text{Hz}}$), Wide Bandwidth (15MHz) and low distortion (0.0005%) suitable for audio preamplifiers, active filters, and line amplifiers.

NJM8801 packages are SOP8 JEDEC 150 mil and small SSOP8 with copper frame.

■PACKAGE OUTLINE



NJM8801E
(SOP8 JEDEC 150 mil)

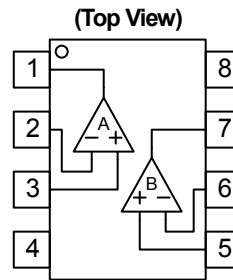


NJM8801VA3
(SSOP8)

■FEATURES

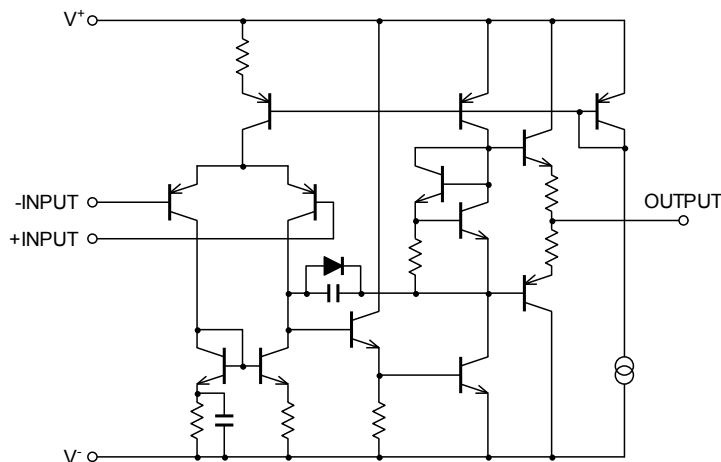
- Operating Voltage $\pm 2\text{V}$ to $\pm 18\text{V}$
- Low Noise Voltage $4.5\text{nV}/\sqrt{\text{Hz}}$ typ.
 $0.8\mu\text{V}_{\text{rms}}$ typ. (RIAA)
- Low Distortion 0.0005% typ.
- Wide GB 15MHz typ.
- Slew Rate $5\text{V}/\mu\text{s}$ typ.
- Input Offset Voltage 0.3mV typ. 3mV max.
- Input Bias Current 100nA typ. 500nA max.
- Voltage Gain 110dB typ.
- Bipolar Technology
- Package Outline SOP8 JEDEC 150 mil, SSOP8-A3 (copper frame)

■PIN CONFIGURATION



- PIN FUNCTION**
1. A OUTPUT
 2. A -INPUT
 3. A +INPUT
 4. V-
 5. B +INPUT
 6. B -INPUT
 7. B OUTPUT
 8. V+

■EQUIVALENT CIRCUIT (1/2 Shown)



NJM8801

■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V _{DD}	±18	V
Common Mode Input Voltage Range	V _{ICM}	±15 (Note1)	V
Differential Input Voltage Range	V _{ID}	±30	V
Power Dissipation	P _D	SOP8 JEDEC 150 mil: 550 (Note2) SSOP8: 460 (Note2)	mW
Operating Temperature Range	T _{OPR}	-40~+85	°C
Storage Temperature Range	T _{STG}	-40~+125	°C

(Note 1) For supply Voltages less than ±15V, the maximum input voltage is equal to the Supply Voltage.

(Note 2) Mounted on the EIA/JEDEC standard board (114.3×76.2×1.6mm, two layer, FR-4).

Refer to the following Power Dissipation and Ambient Temperature.

■RECOMMENDED OPERATING CONDITION (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V ⁺ /V ⁻		±2	-	±18	V

■ELECTRIC CHARACTERISTICS

●DC CHARACTERISTICS (V⁺/V⁻=±15V, V_{cm}=0V, Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	I _{CC}	R _L =∞, No Signal	-	6	9	mA
Input Offset Voltage	V _{IO}	R _S ≤10kΩ (Note3)	-	0.3	3	mV
Input Bias Current	I _B		-	100	500	nA
Input Offset Current	I _{IO}	(Note3)	-	5	200	nA
Voltage Gain	A _V	R _L ≥2kΩ, V _o =±10V, R _S ≤10kΩ	90	110	-	dB
Common Mode Rejection Ratio	CMR	V _{ICM} =±12V, R _S ≤10kΩ	80	110	-	dB
Supply Voltage Rejection Ratio	SVR	V ⁺ /V ⁻ =±9.0 to ±18V, R _S ≤10kΩ	80	110	-	dB
Maximum Output Voltage	V _{OM}	R _L ≥2kΩ	±12	±13.5	-	V
Common Mode Input Voltage Range	V _{ICM}	CMR≥80dB	±12	±13.5	-	V

(Note3) Written by the absolute rate.

●AC CHARACTERISTICS (V⁺/V⁻=±15V, V_{cm}=0V, Ta=25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Slew Rate	SR	R _L ≥2kΩ	-	5	-	V/us
Gain Bandwidth Product	GB	f=10kHz	-	15	-	MHz
Equivalent Input Noise Voltage	e _n	R _S =100Ω, f=1kHz	-	4.5	-	nV/√Hz
Equivalent Input Noise Voltage	V _{NI}	RIAA, R _S =2.2kΩ, 30kHz, LPF, NJM8801VA3	-	0.8	-	μVrms
Equivalent Input Noise Voltage	V _{NI}	RIAA, R _S =2.2kΩ, 30kHz, LPF, NJM8801E	-	0.8	1.4	μVrms
Total Harmonic Distortion	THD	f=1kHz, A _V =+10, V _o =5Vrms, R _L =2kΩ	-	0.0005	-	%
Channel Separation	CS	f=1kHz, A _V =-100, R _S =1kΩ, R _L =2kΩ	-	130	-	dB

■Application Notes

●Package Power, Power Dissipation and Output Power

IC is heated by own operation and possibly gets damage when the junction power exceeds the acceptable value called Power Dissipation P_D . The dependence P_D on ambient temperature is shown in Fig 1. The plots are depended on following two points. The first is P_D on ambient temperature 25°C, which is the maximum power dissipation. The second is 0W, which means that the IC cannot radiate any more. Conforming the maximum junction temperature T_{jmax} to the storage temperature T_{stg} derives this point. Fig.1 is drawn by connecting those points and conforming the P_D lower than 25°C to it on 25°C. The P_D is shown following formula as a function of the ambient temperature between those points.

$$\text{Dissipation Power } P_D = \frac{T_{jmax} - T_a}{\theta_{ja}} \text{ [W] } (T_a=25^\circ\text{C to } T_a=T_{jmax})$$

Where, θ_{ja} is heat thermal resistance which depends on parameters such as package material, frame material and so on. Therefore, P_D is different in each package.

While, the actual measurement of dissipation power on IC is obtained using following equation.

$$(\text{Actual Dissipation Power}) = (\text{Supply Voltage } V \times I) - (\text{Output Power } P_o)$$

This IC should be operated in lower than P_D of the actual dissipation power.

To sustain the steady state operation, take account of the Dissipation Power and thermal design.

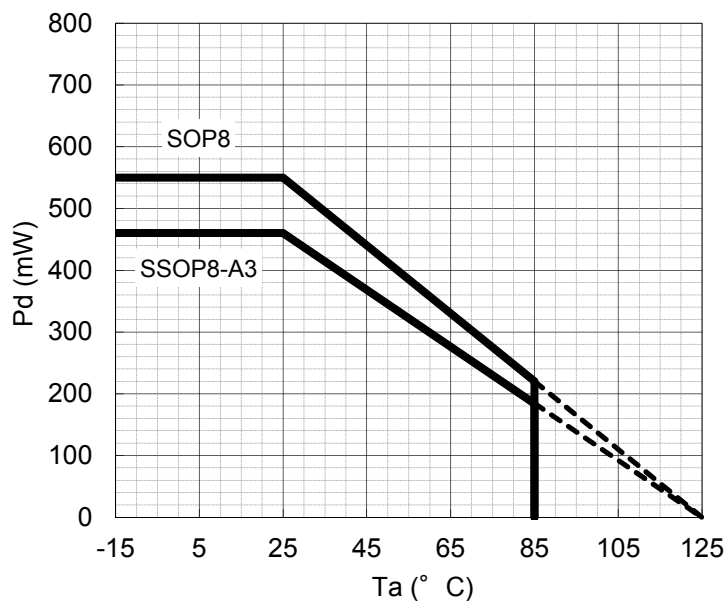
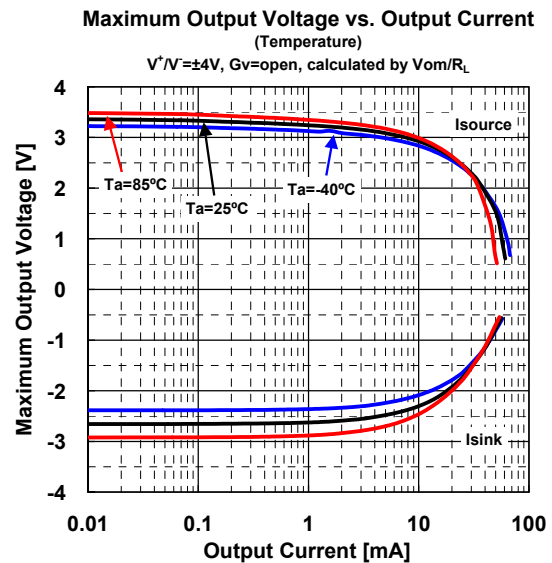
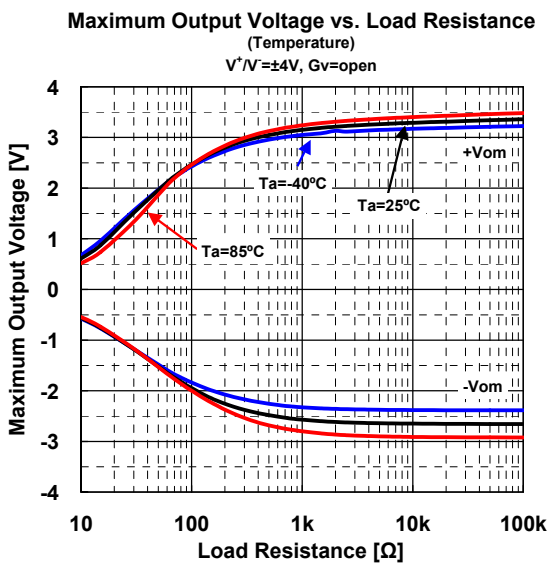
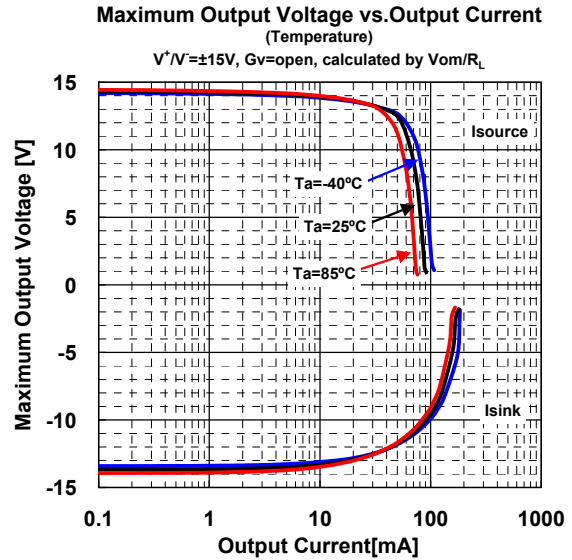
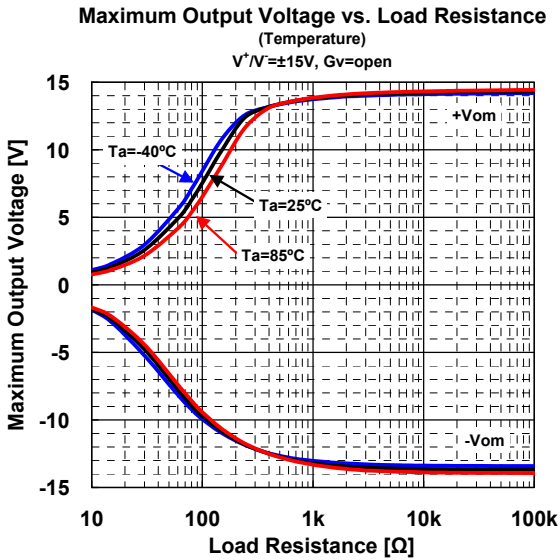
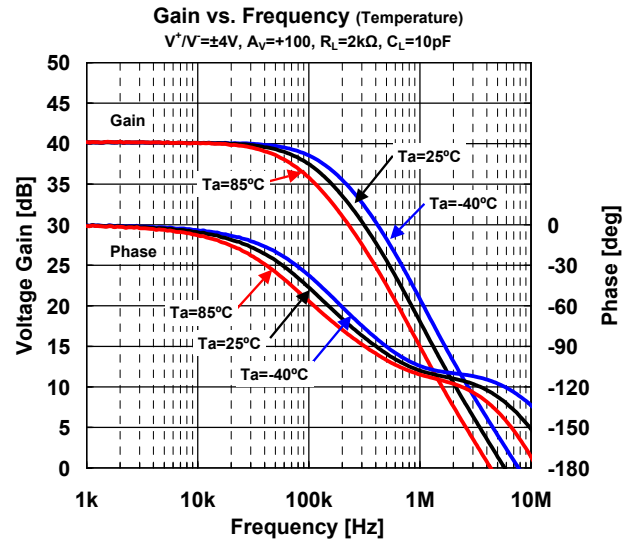
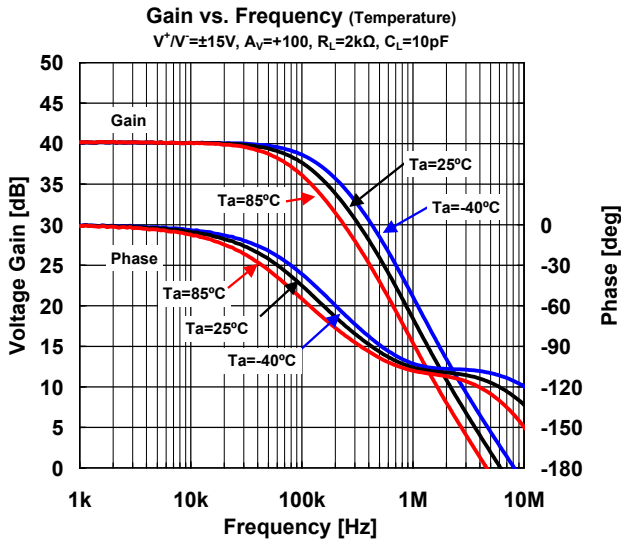


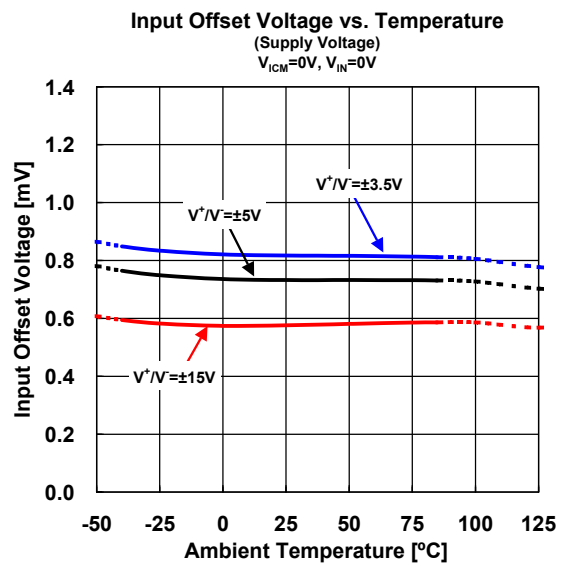
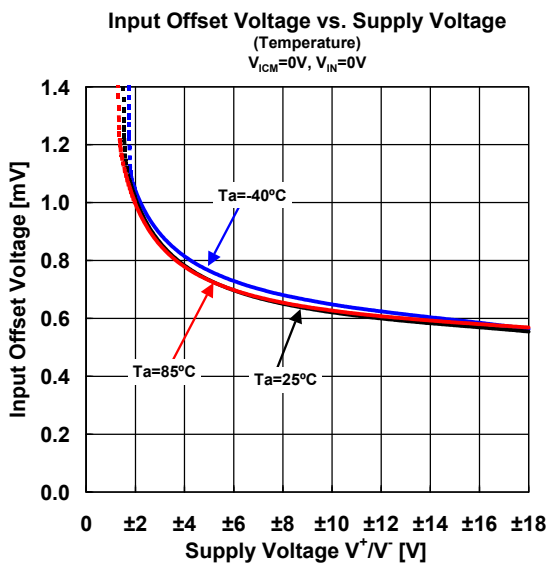
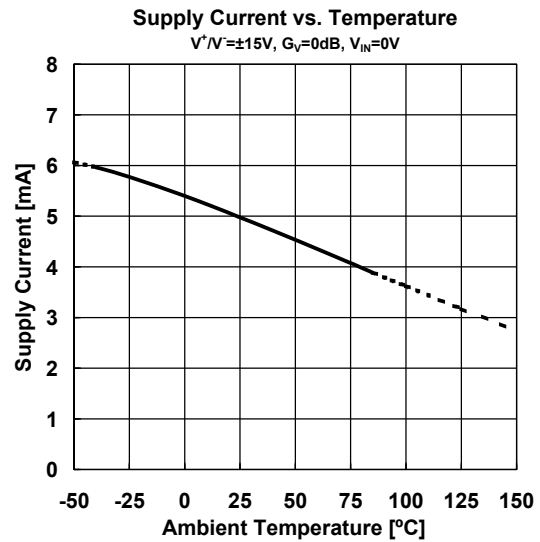
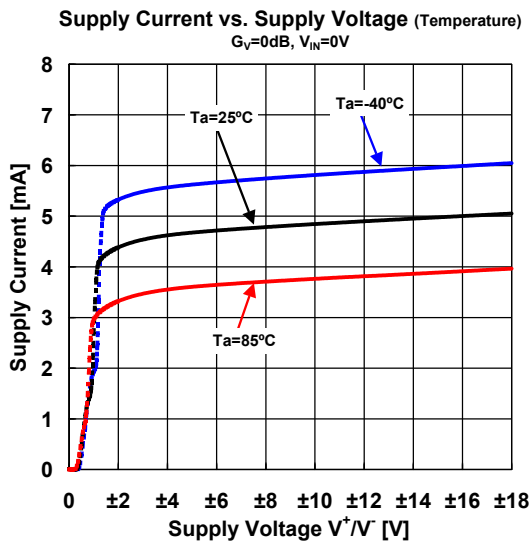
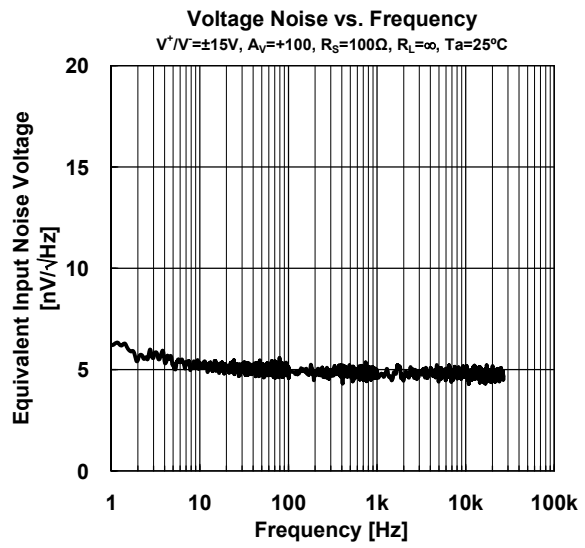
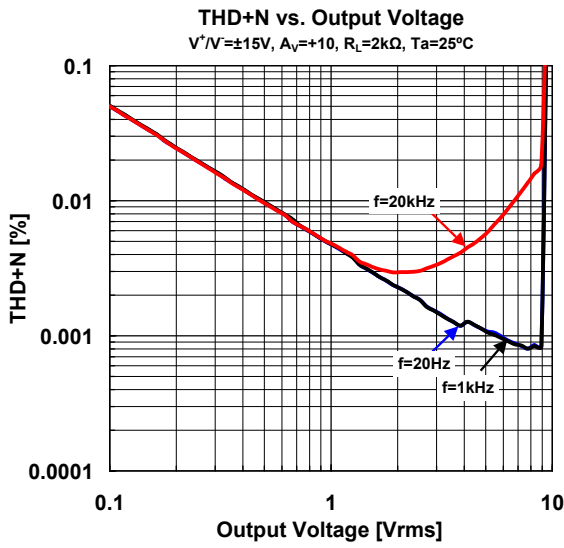
Fig.1 Power Dissipations vs. Ambient Temperature

NJM8801

TYPICAL CHARACTERISTICS

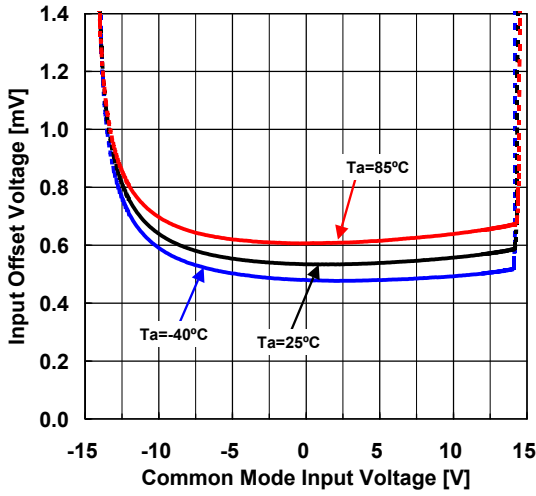


■ TYPICAL CHARACTERISTICS

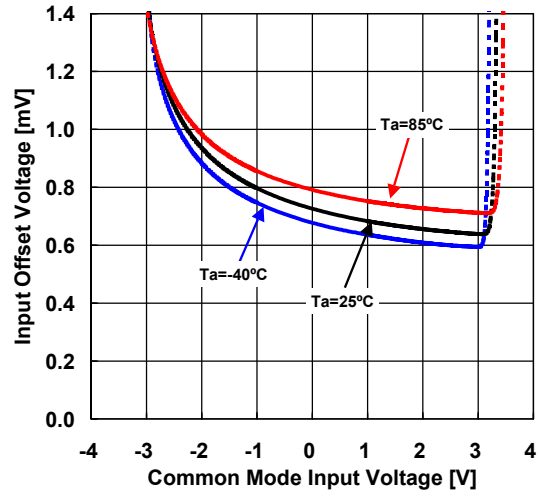


TYPICAL CHARACTERISTICS

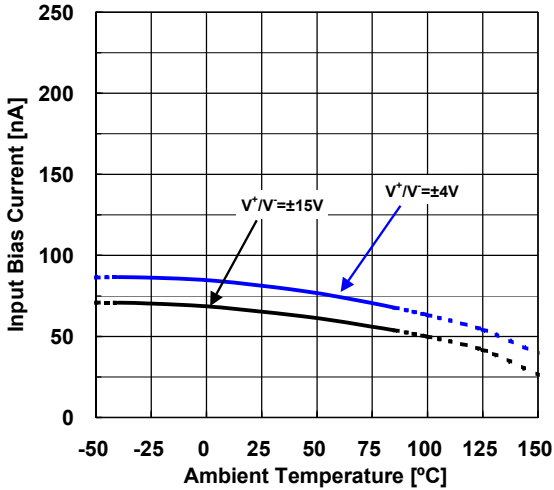
Input Offset Voltage vs. Common Mode Input Voltage (Temperature)
 $V^+ / V^- = \pm 15V$



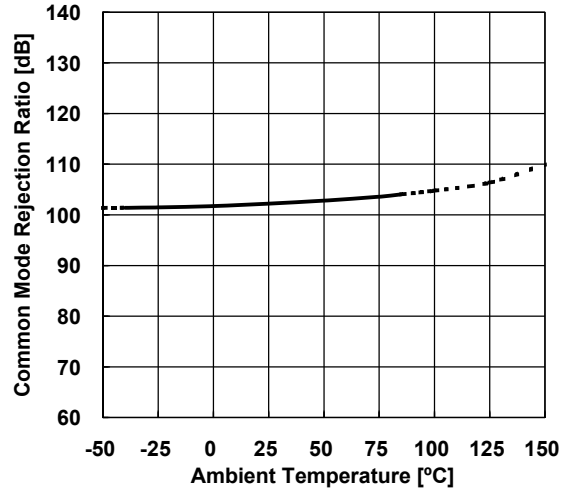
Input Offset Voltage vs. Common Mode Input Voltage (Temperature)
 $V^+ / V^- = \pm 4V$



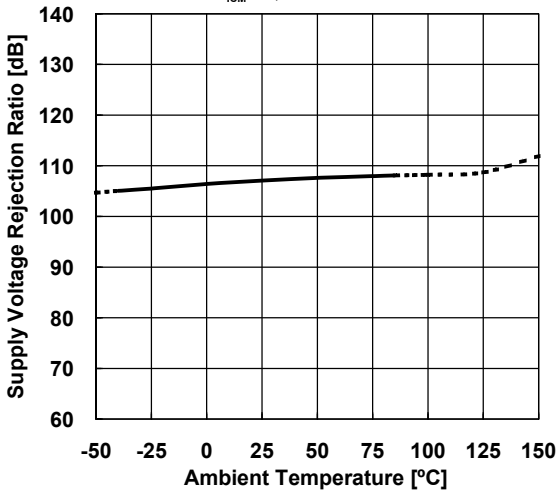
Input Bias Current vs. Temperature (Supply Voltage)
 $V_{ICM} = 0V$



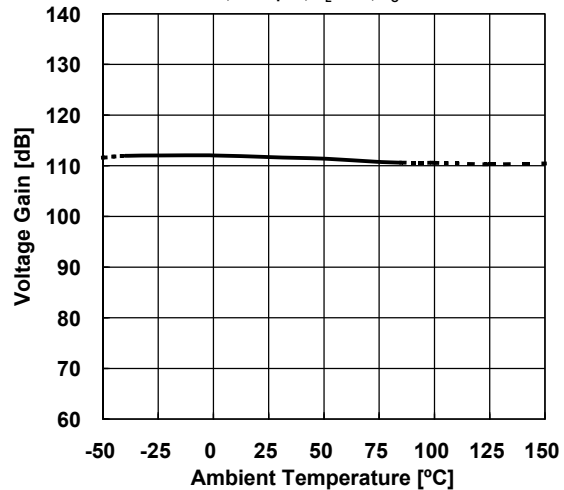
CMR vs. Temperature
 $V^+ / V^- = \pm 15V, V_{ICM} = -12V$ to $+12V$



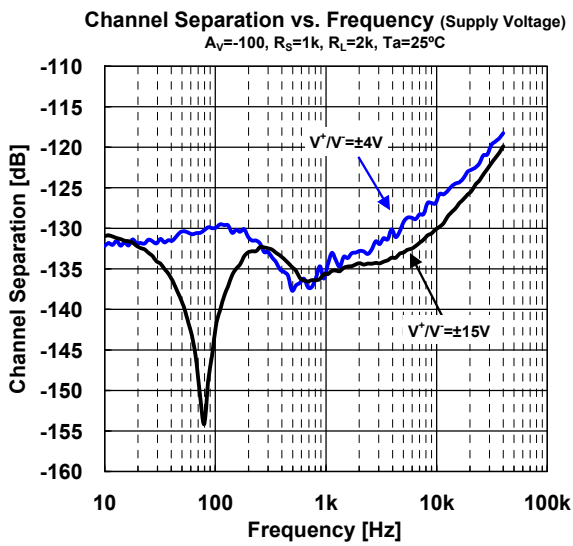
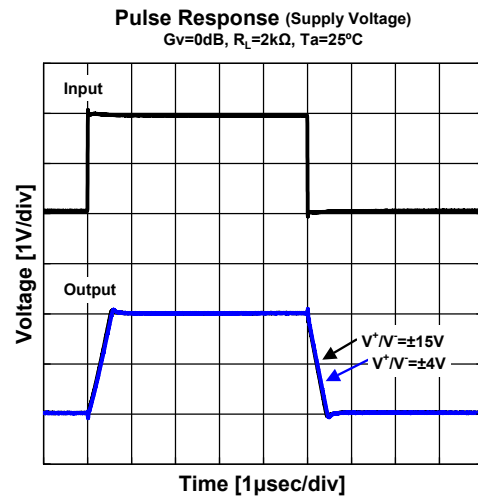
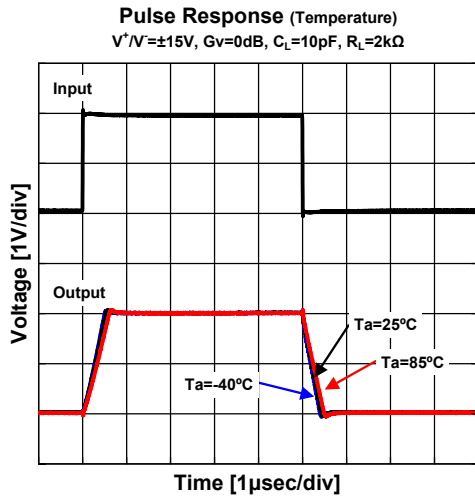
SVR vs. Temperature
 $V_{ICM} = 0V, V^+ / V^- = \pm 9V$ to $\pm 18V$



Open Loop Gain vs. Temperature
 $V^+ / V^- = \pm 15V, G_v = \text{open}, R_t = 2k\Omega, V_o = -10V$ to $+10V$



■ TYPICAL CHARACTERISTICS



[CAUTION]

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