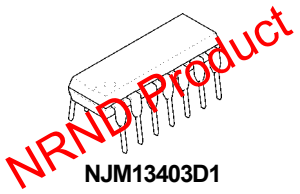
SINGLE SUPPLY QUAD OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

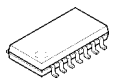
The NJM13403 is single-supply quad operational amplifier, which can operate from 2V supply. The features are low offset voltage, low bias current, high slew-rate, and free crossover distortion through the AB class output stage.

The package lineup is DIP, DMP and others compact, so that the NJM13403 is suitable for audio for low voltage operation and any other kind of signal amplifier.

■ PACKAGE OUTLINE



NJM13403D1



NJM13403M

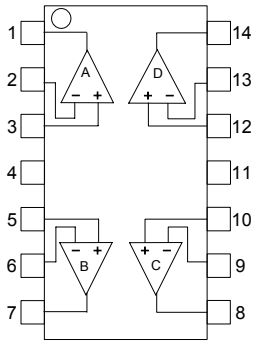


NJM13403V

■ FEATURES

- Operating Voltage (+2V~+14V)
- Slew Rate (1.2V/μs typ.)
- Operating Current (3.0mA typ.)
- Bipolar Technology
- Package Outline DIP14,DMP14,SSOP14

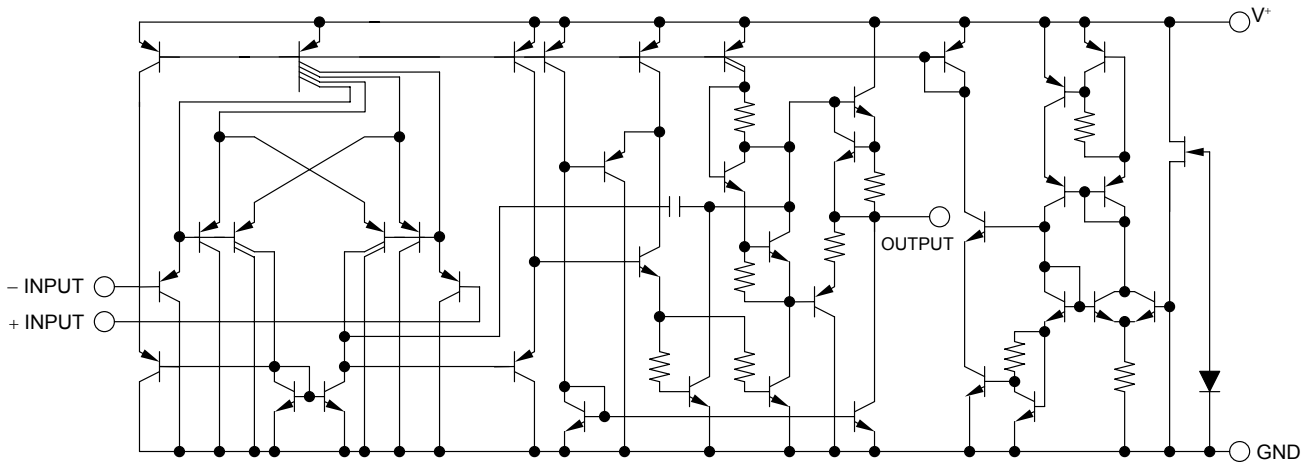
■ PIN CONFIGURATION



NJM13403D1, NJM13403M
NJM13403V

PIN FUNCTION	
1.A OUTPUT	8.C OUTPUT
2.A −INPUT	9.C −INPUT
3.A +INPUT	10.C +INPUT
4.V^+	11.GND
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^+	15	V
Differential Input Voltage	V_{ID}	14	V
Input Voltage	V_{IC}	-0.3~+14	V
Power Dissipation	P_D	(DIP14) 700 (DMP14) 300 (SSOP14) 300	mW
Operating Temperature Range	T_{opr}	-40~+85	°C
Storage Temperature Range	T_{stg}	-40~+125	°C

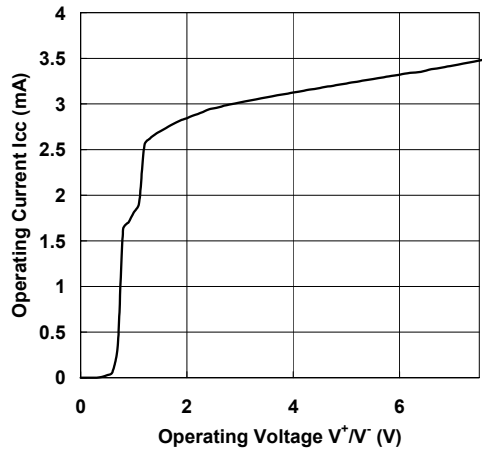
■ ELECTRICAL CHARACTERISTICS

(V^+=5V,Ta=25°C)

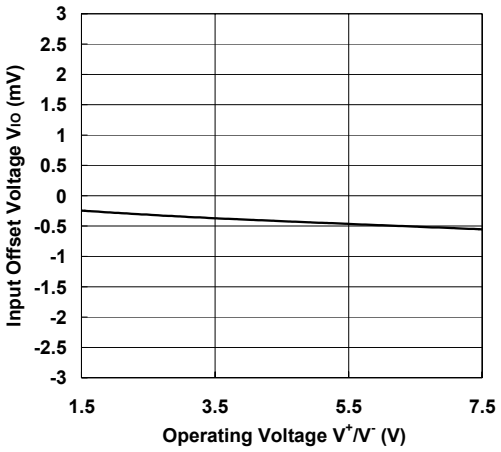
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V_{opr}		2	-	14	V
Input Offset Voltage	V_{IO}	R_S=0Ω	-	0.5	4	mV
Input Offset Current	I_{IO}		-	5	50	nA
Input Bias Current	I_B		-	25	150	nA
Large Signal Voltage Gain	A_V	R_L≥2kΩ	88	100	-	dB
Maximum Output Voltage Swing	V_{OM}	R_L=2kΩ	4.0	4.2	-	V
Input Common Mode Voltage Range	V_{ICM}		0~3.5	-	-	V
Common Mode Rejection Ratio	CMR		70	90	-	dB
Supply Voltage Rejection Ratio	SVR		80	94	-	dB
Output Source Current	I_{SOURCE}	V_{IN}^+=1V,V_{IN}^-=0V	20	35	-	mA
Output Sink Current	I_{SINK}	V_{IN}^+=0V,V_{IN}^-=1V	10	30	-	mA
Operating Current	I_{CC}	R_L=∞	-	3.0	5.0	mA
Slew Rate	SR	V^+/V^-=±2.5V,R_L=2kΩ, A_V=0dB,f=1kHz	-	1.2	-	V/μs
Unity Gain Bandwidth	f_T	R_L=2kΩ	-	2.0	-	MHz
Total Harmonic Distortion	THD	R_L=2kΩ, A_V=40dB, f=20kHz,V_O=1.0Vrms	-	0.2	-	%

■ TYPICAL CHARACTERISTICS

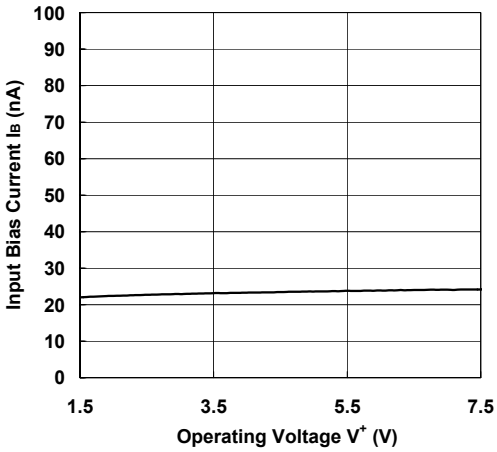
Operating Current vs. Operating Voltage
(Ta=25°C)



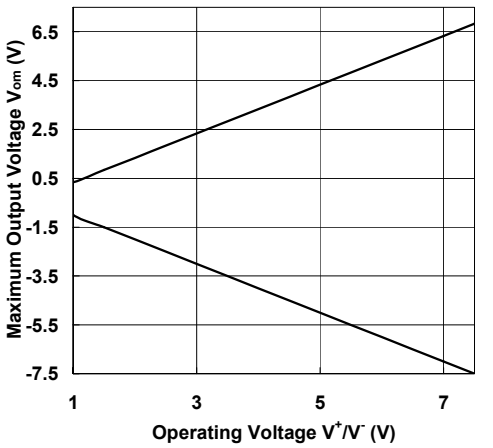
Input Offset Voltage vs. Operating Voltage
(Ta=25°C)



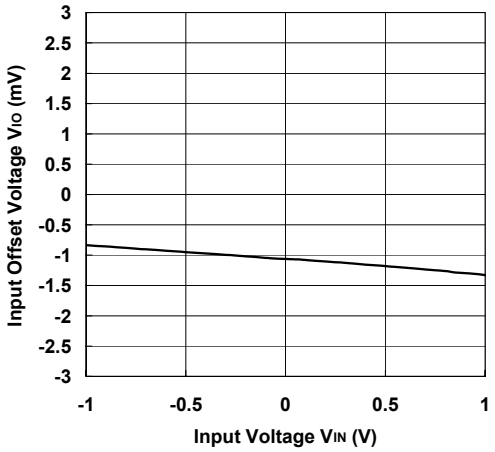
Input Bias Current vs. Operating Voltage
(ta=25°C)



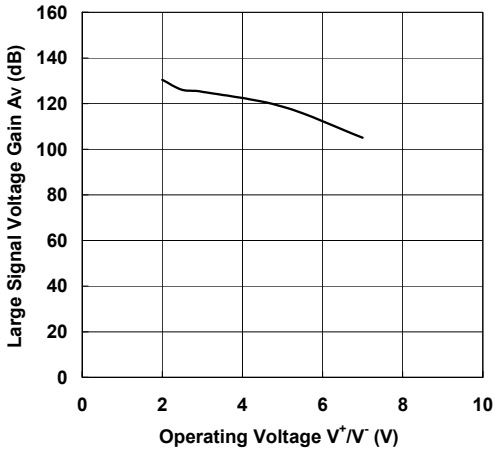
Maximum Output Voltage Swing
vs. Operating Voltage
(Ta=25°C)



Input Commom Mode Voltage Range
(V+=5V, Ta=25°C)

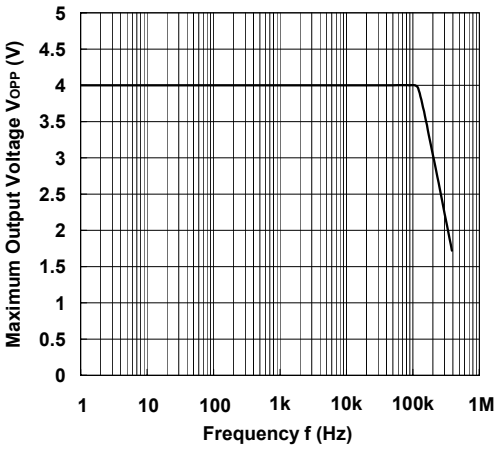


Large Signal Voltage Gain
vs. Operating Voltage
(Ta=25°C, RL=2kΩ)

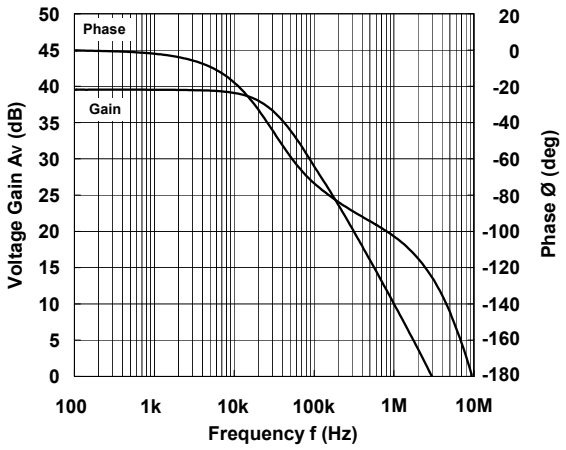


■ TYPICAL CHARACTERISTICS

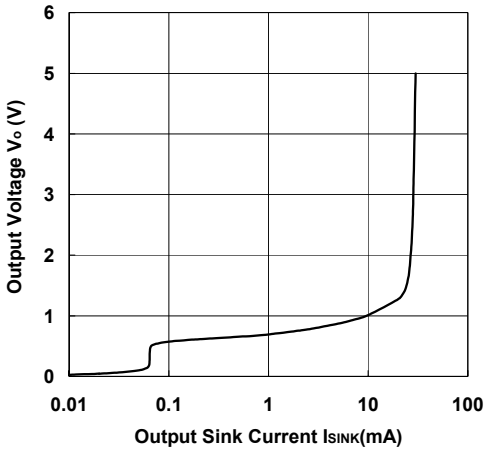
Maximum Output Voltage vs. Frequency
(Ta=25°C)



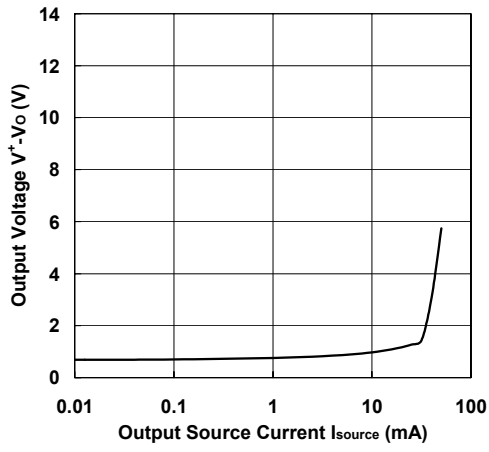
Gain/Phase vs. Frequency
(Ta=25°C)



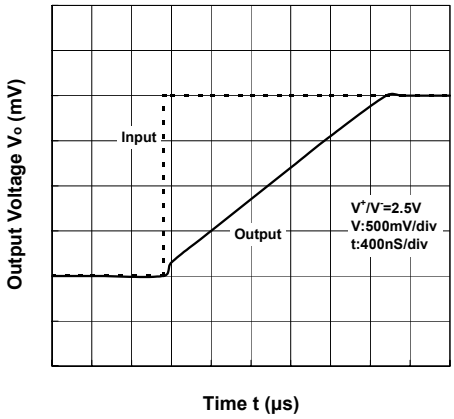
Output Voltage vs. Output Sink Current
(Ta=25°C)



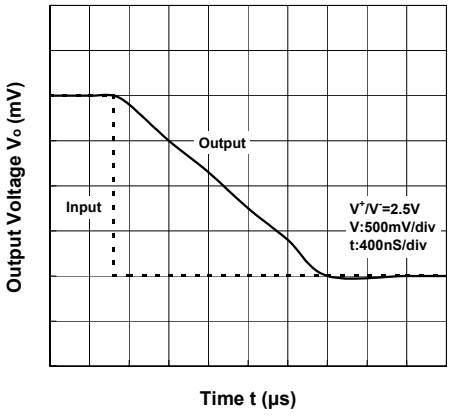
Output Voltage vs. Output Source Current
(Ta=25°C)



Slew Rate (Rise)

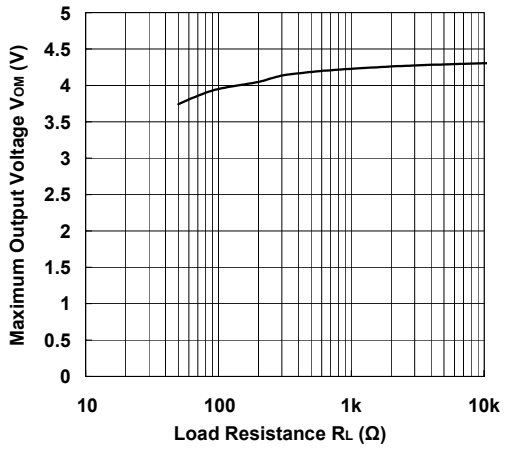


Slew Rate (Fall)

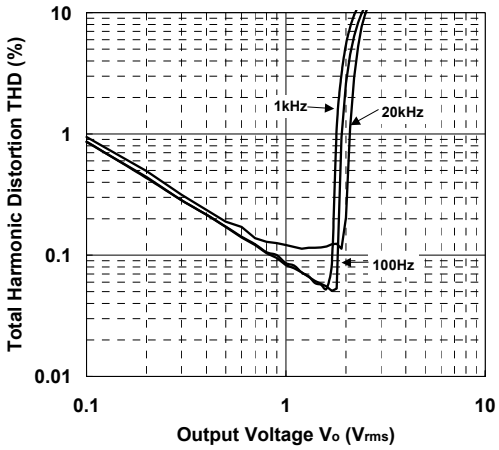


■ TYPICAL CHARACTERISTICS

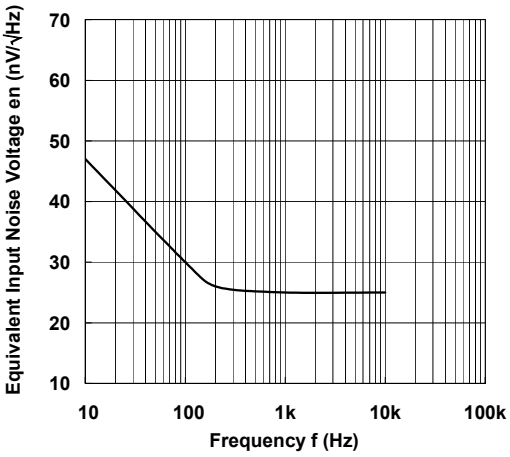
Maximum Output Voltage vs. Load Resistance (Ta=25°C)



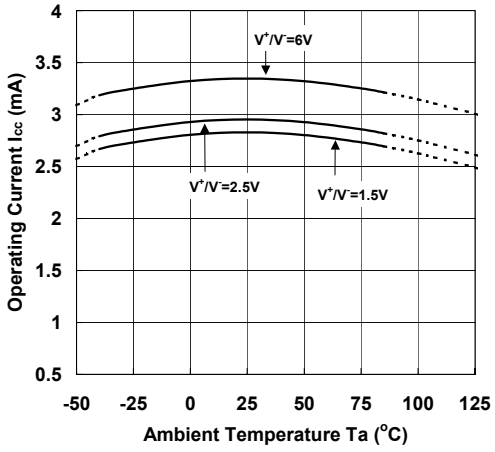
Total Harmonic Distortion



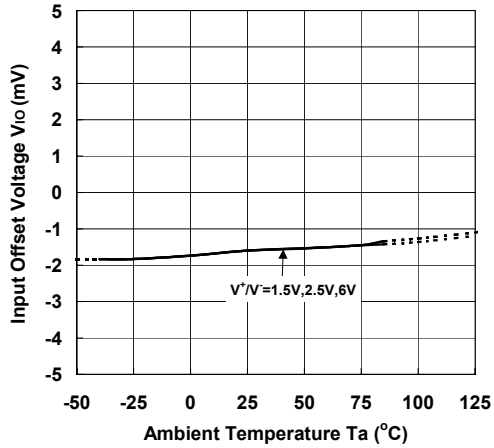
Equivalent Noise Voltage vs. Frequency



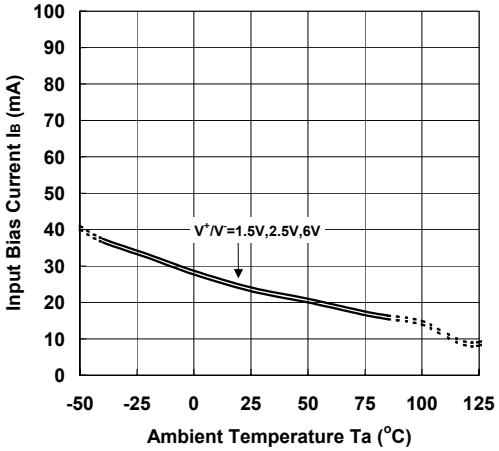
Operating Voltage vs. Ambient Temperature



Input Offset Voltage vs. Ambient Temperature

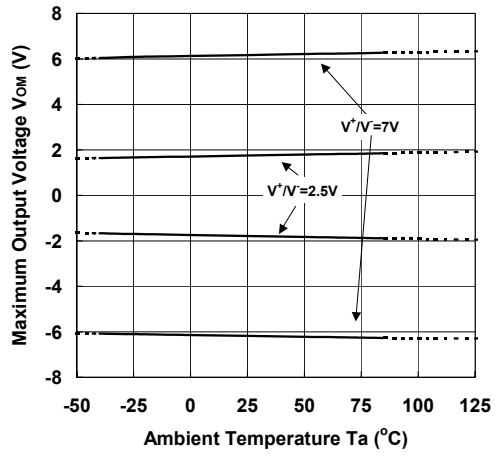


Input Bias Current vs. Ambient Temperature

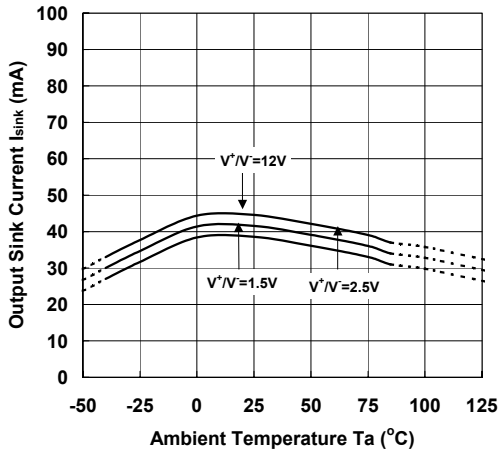


■ TYPICAL CHARACTERISTICS

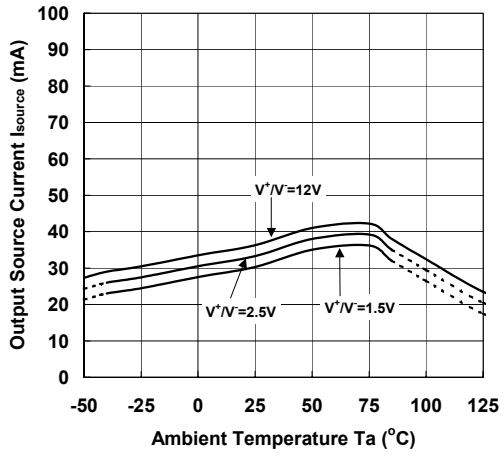
Maximum Output Voltage vs. Ambient Temperature



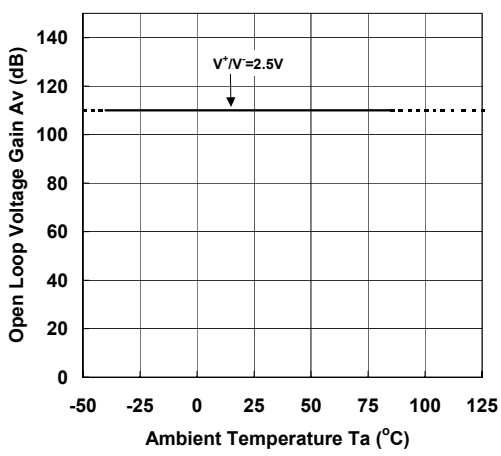
Output Sink Current vs. Ambient Temperature



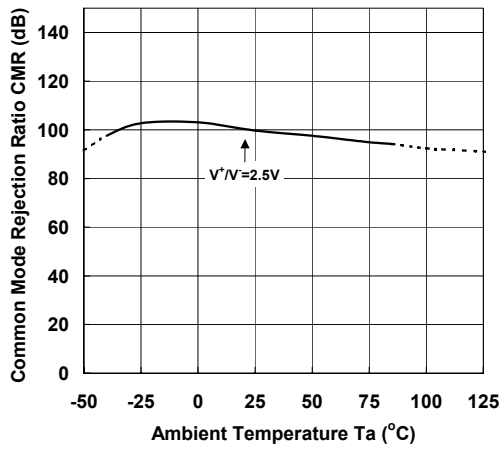
Output Source Current vs. Ambient Temperature



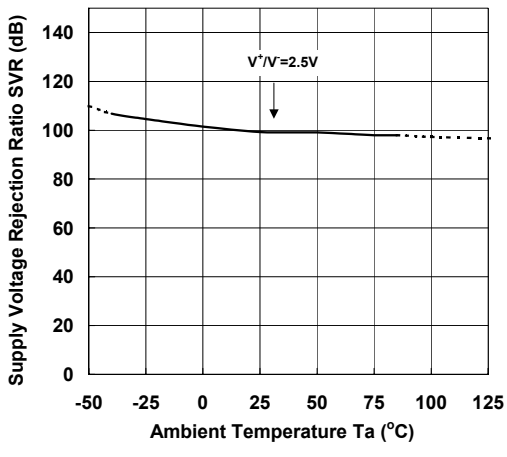
Open Loop Voltage Gain vs. Ambient Temperature



Common Mode Rejection Ratio vs. Ambient Temperature



Supply Voltage Rejection Ratio vs. Ambient Temperature



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