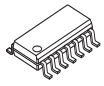
SINGLE-SUPPLY QUAD OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The NJM2902C consists of four independent, high gain, internally frequency compensated operation amplifiers, which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

Application areas include transducer amplifiers, DC gain blocks, and all the conventional op amp circuits, which now can be more easily implemented in single power supply systems. For example, the NJM2902C can be directly operated off of the standard +5V power supply voltage, which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15V power supplies.

■ PACKAGE OUTLINE

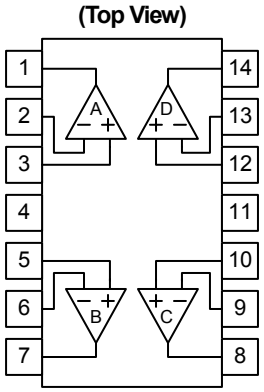


NJM2902CG
(SOP14)

■ FEATURES

- Single Supply
- Operating Voltage +3V ~ +32V
- Low Operating Current 0.7mA typ.
- Slew Rate 0.6V/μs typ.
- Bipolar Technology
- Package Outline SOP14
- Internal ESD protection
  Human body model (HBM) ±2000V typ.
- Wide temperature range -40°C to +105°C

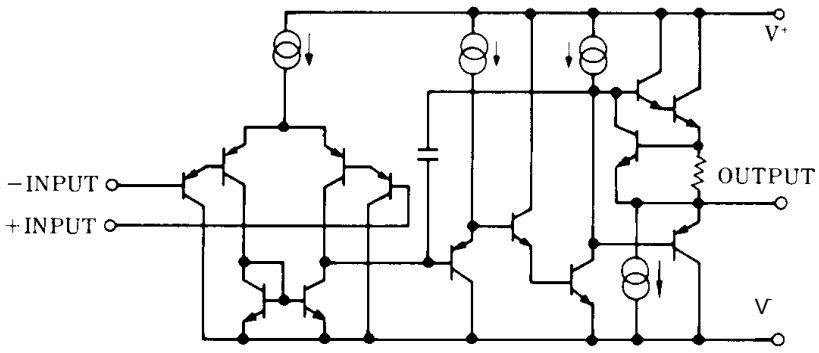
■ PIN CONFIGURATION



NJM2902CG

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

■ EQUIVALENT CIRCUIT (1/4 Shown)



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25˚C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+ (V^+/ V^-)	32 (or ±16V)	V
Differential Input Voltage (Note1)	V_{ID}	±32	V
Input Voltage (Note2)	V_{IN}	V^- - 0.3 to V^- + 32	V
Output Terminal Input Voltage	Vo	V^--0.3 to V^++0.3	V
Power Dissipation	P_D	SOP : 880(Note3) 1200(Note4)	mW
Operating Temperature Range	T_{opr}	-40 to +105	˚C
Storage Temperature Range	T_{stg}	-65 to +150	˚C

(Note1) Differential voltage is the voltage difference between +INPUT and -INPUT
(Note2) Input voltage is the voltage should be allowed to apply to the input terminal independent of the magnitude of V+.
The normal operation will establish when any input is within the Common Mode Input Voltage Range of electrical characteristics.
(Note3) EIA/JEDEC STANDARD Test board (76.2 x 114.3 x 1.6mm, 2layers, FR-4) mounting
(Note4) EIA/JEDEC STANDARD Test board (76.2 x 114.3 x 1.6mm, 4layers, FR-4) mounting

■ELECTRICAL CARACTERISTICS

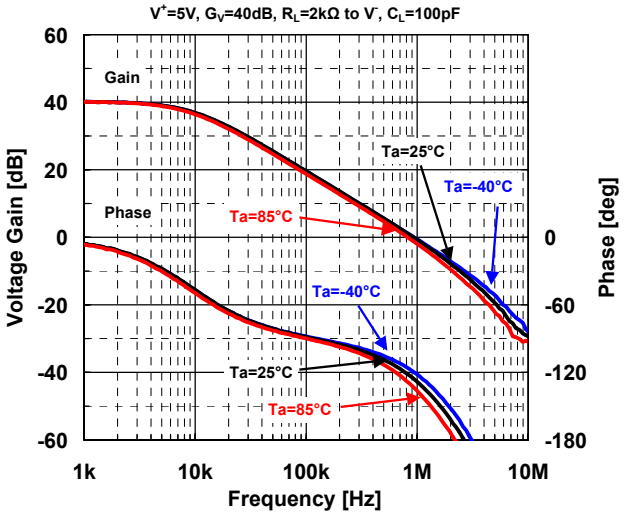
(V^+=5V, V^-=0V, Ta=25ºC, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	V^+=5V, no signal	-	1.2	2	mA
		V^+=30V, no signal	-	-	3	mA
Input Offset Voltage	V_{IO}	R_S=0Ω	-	0.5	7	mV
Input Bias Current	I_B		-	20	150	nA
Input Offset Current	I_{IO}		-	2	30	nA
Large Signal Voltage Gain	A_V	R_L≥2kΩ	94	100	-	dB
Supply Voltage Rejection Ratio	SVR	V^+=5 to 30V,Rs<10kΩ	65	110	-	dB
Input Common Mode Voltage Range	V_{ICM}	V^+=30V, CMR>70dB	0	-	V^+-1.5	V
Common Mode Rejection Ratio	CMR	Rs<10kΩ	70	100	-	dB
Output Source Current	I_{SOURCE}	V^+=15V,Vo=+2V, V_{id}=1V	20	40	-	mA
Output Sink Current	I_{SINK}	V^+=15V,Vo=+2V,V_{id}=1V	10	20	-	mA
		V^+=15V,Vo=+0.2V,V_{id}=1V	12	50	-	µA
High level output voltage	V_{OH}	R_L=2kΩ,V^+=30V	26	27	-	V
		R_L=10kΩ,V^+=30V	27	28	-	V
Low level output voltage	V_{OL}	R_L=10kΩ	-	5	20	mV
Slew Rate	SR	V^+=15V,V_{IN}=0.5 to 3V,C_L=100pF	-	0.6	-	V/µs
Gain Band Width Product	GBP	V^+=30V,f=100kHz,V_{IN}=10mVrms,R_L=2kΩ,C_L=100pF	-	1.3	-	MHz
Total Harmonic Distortions	THD	f=1kHz,G_V=20dB,R_L=2kΩ,V_o=2V_{pp},C_L=100pF	-	0.015	-	%
Equivalent input noise voltage	e_n	f=1kHz, Rs =100Ω,V^+=30V	-	30	-	nV/√Hz
Channel Separation	CS	1kHz< f <10kHz	-	120	-	dB

■ TYPICAL CHARACTERISTICS

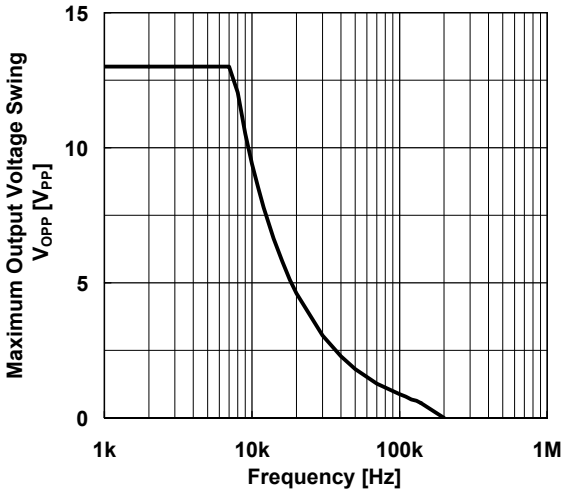
Gain/Phase vs. Frequency

V^+=5V, G_V=40dB, R_L=2kΩ to V^-, C_L=100pF



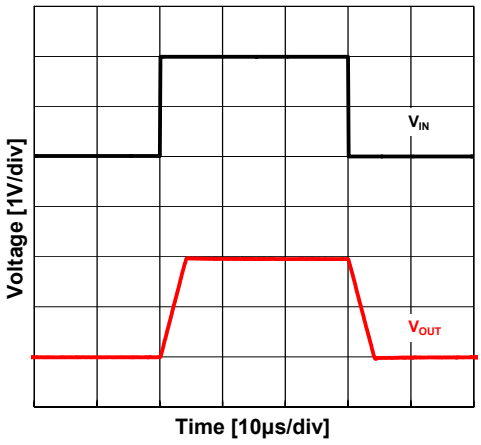
Maximum Output Voltage Swing vs. Frequency

V^+=15V, Ta=25°C



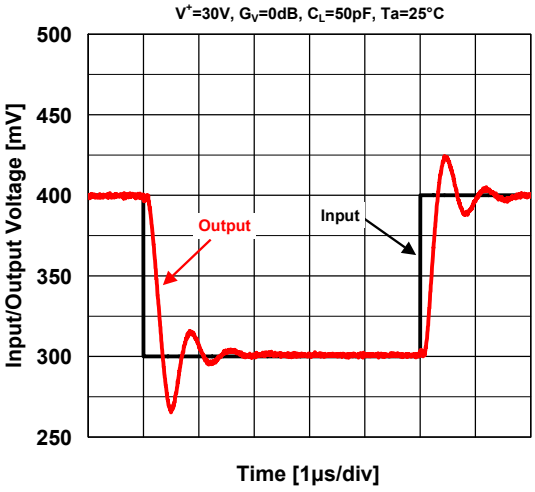
Pulse Response

V^+=15V, R_L=2kΩ, C_L=100pF, Ta=25°C



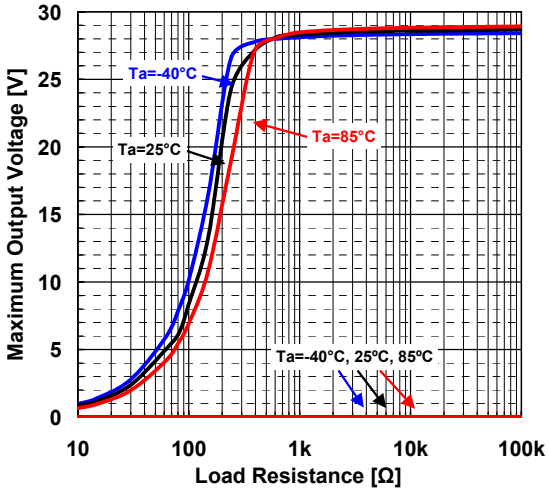
Small signal Pulse Response

V^+=30V, G_V=0dB, C_L=50pF, Ta=25°C



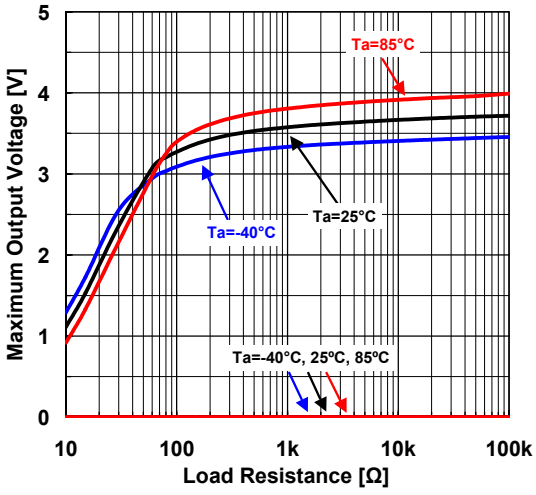
Maximum Output Voltage vs. Load Resistance

V^+=30V, R_L to V^-



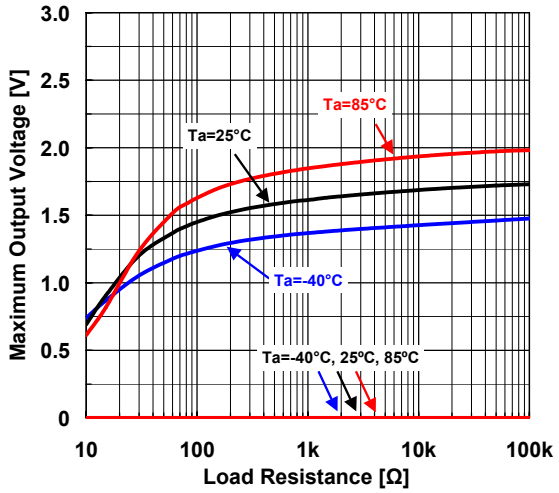
Maximum Output Voltage vs. Load Resistance

V^+=5V, R_L to V^-

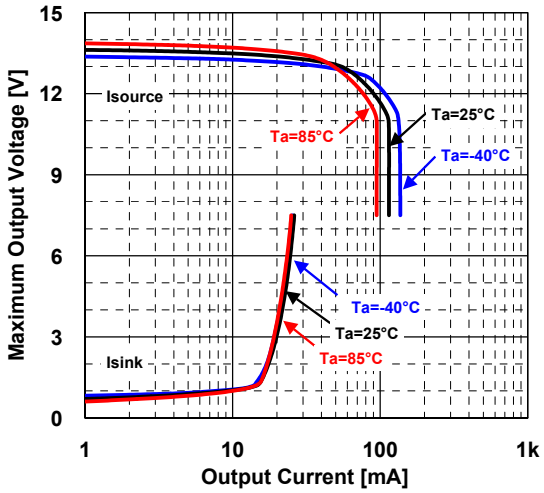


■ TYPICAL CHARACTERISTICS

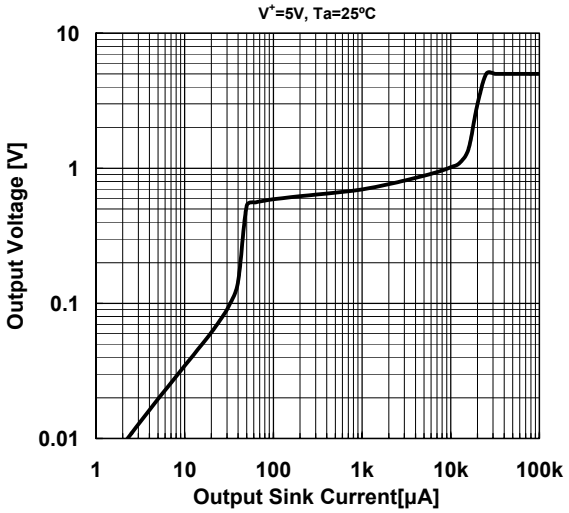
Maximum Output Voltage vs. Load Resistance



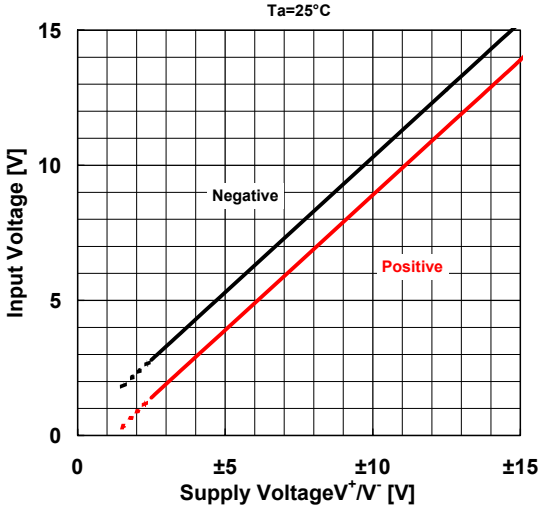
Maximum Output Voltage vs. Output Current



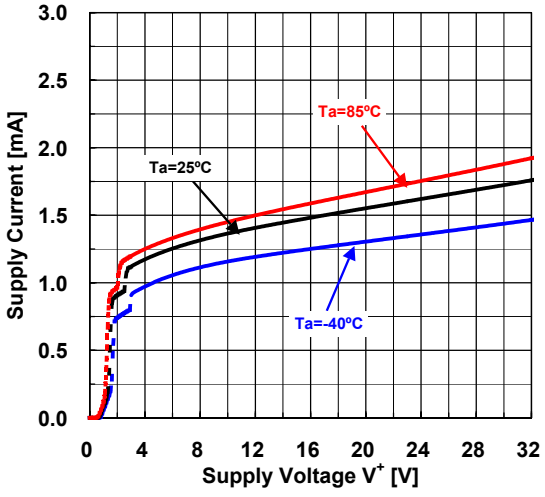
Output Voltage vs. Output Sink Current



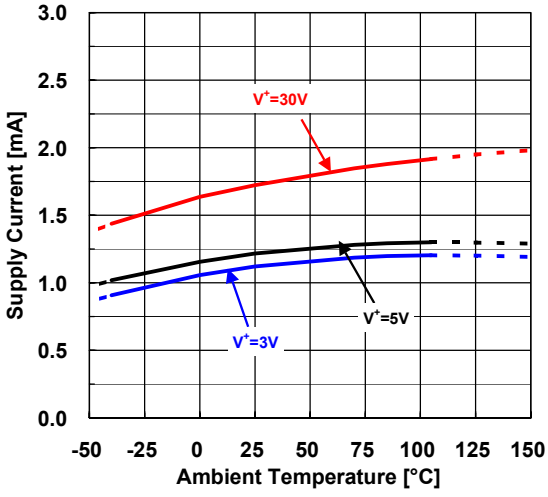
Input Voltage Range vs. Supply Voltage



Supply Current vs. Supply Voltage

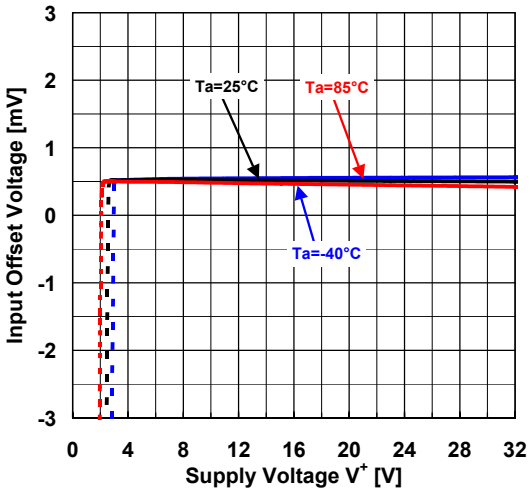


Supply Current vs. Temperature

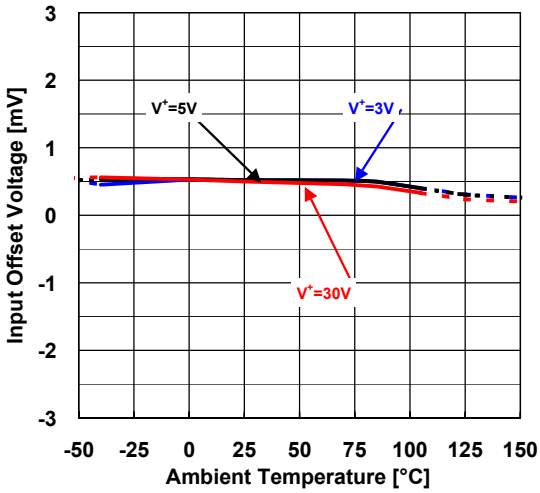


■ TYPICAL CHARACTERISTICS

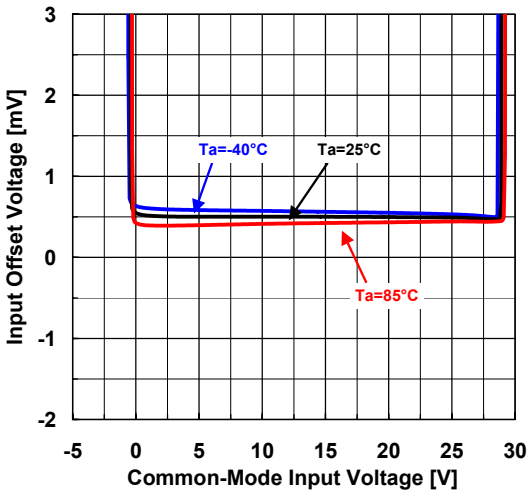
Input Offset Voltage vs. Supply Voltage
$V_{CM}=V^+/2$



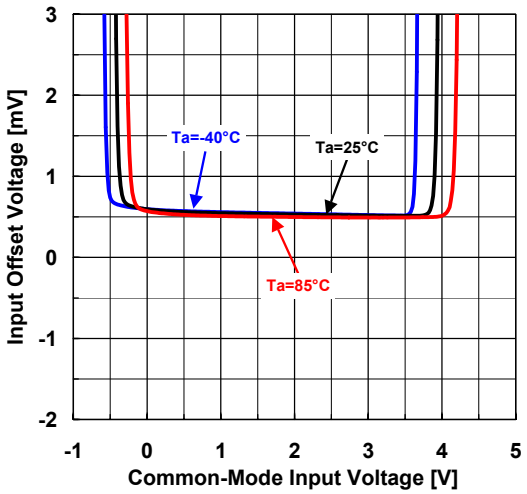
Input Offset Voltage vs. Temperature
$V_{CM}=V^+/2$



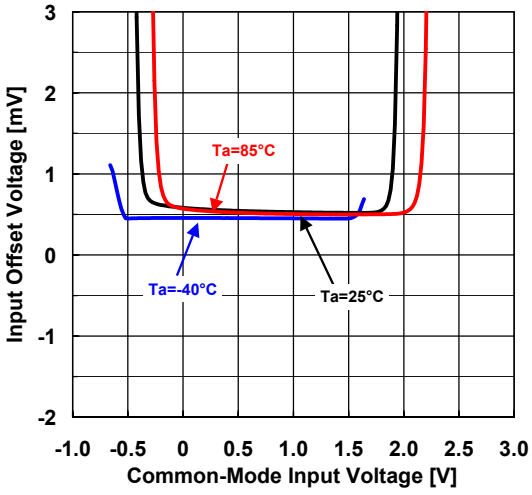
Input Offset Voltage
vs. Common-Mode Input Voltage
$V^+=30V$



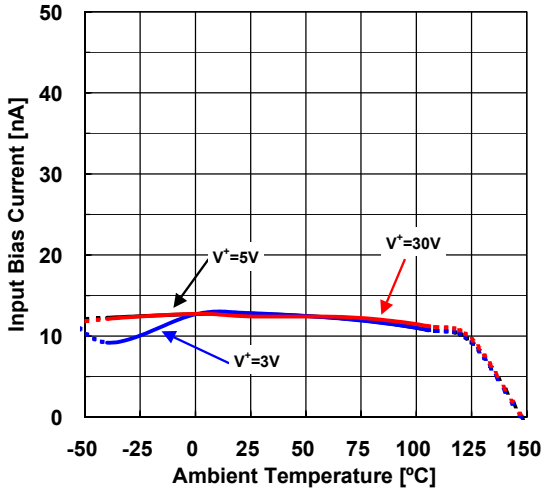
Input Offset Voltage
vs. Common-Mode Input Voltage
$V^+=5V$



Input Offset Voltage
vs. Common-Mode Input Voltage
$V^+=3V$

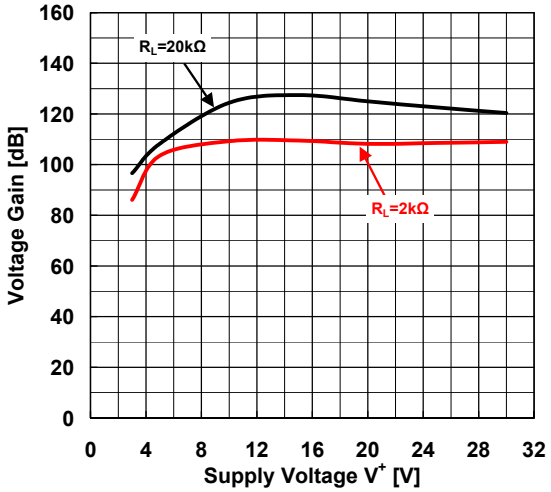


Input Bias Current vs. Temperature
$V_{CM}=V^+/2$

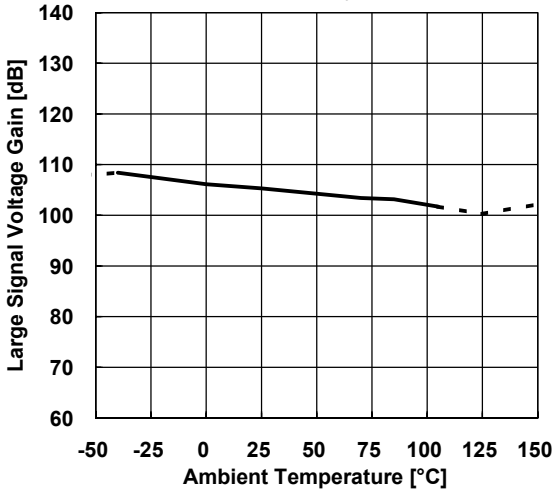


■ TYPICAL CHARACTERISTICS

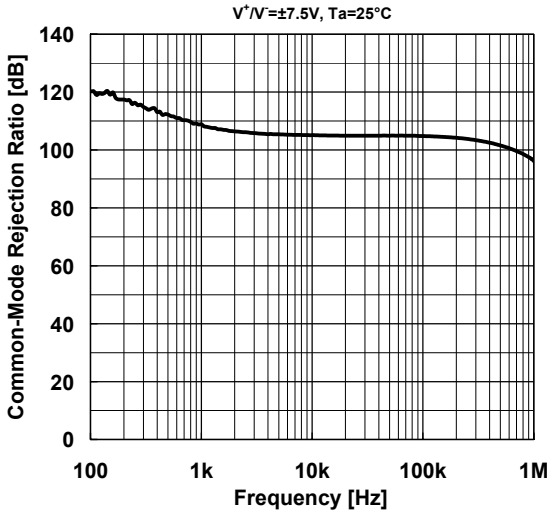
Voltage Gain vs. Supply Voltage
Ta=25 °C



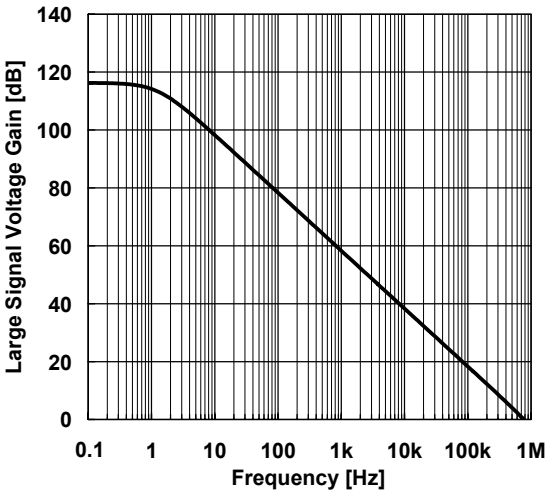
Large Signal Voltage Gain vs. Temperature
V+=5V, RL=2kΩ, VO=2V to 3V



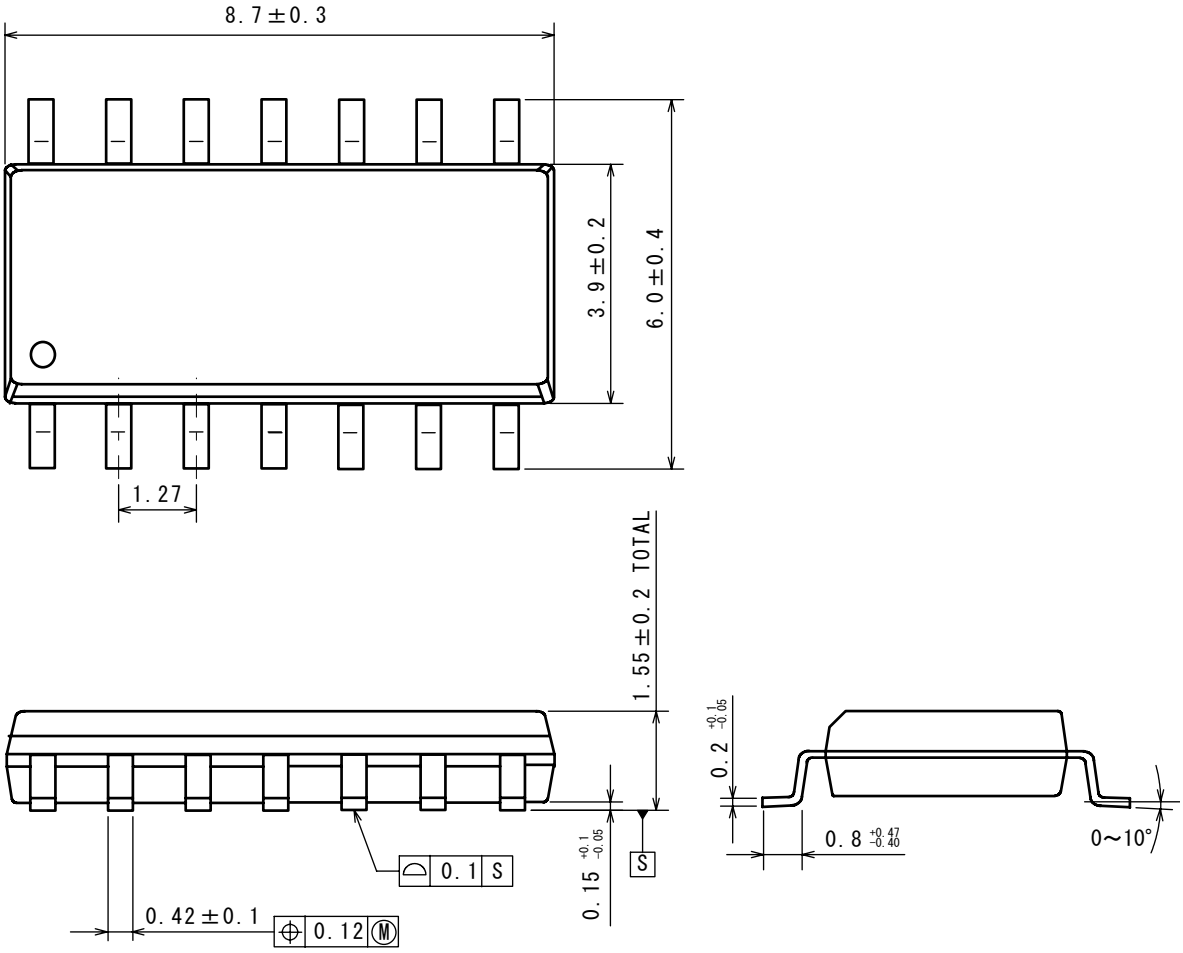
CMR vs. Frequency
V+/V-=±7.5V, Ta=25°C



Large Signal Voltage Gain vs. Frequency
V+=30V



■PACKAGE OUTLINE UNIT : mm



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