



CD2904

Dual-Channel High-Voltage Operational Amplifier

Version: Rev 1.0.0 Date: 2025-5-26

Features ■■

- Internally frequency compensated for unity gain
- Large DC voltage gain: 100dB
- Wide power supply range: 3V ~ 32V (or 1.5V ~ 16V)
- Input common-mode voltage range includes ground
- Large output voltage swing: 0V DC to VCC-1.5V DC
- Power drain suitable for battery operation
- Low input offset voltage and offset current
- Differential input voltage range equal to the power supply

Application ■■

- Motor Control
- Portable Audio Device
- Power Supply and Mobile
- Personal Health
- Commercial Network and
- Motor Control

Description ■■

The CD2904 contains two independent high gain operational amplifiers with internal frequency compensation. The two op-amps operate over a wide voltage range from a single power supply. Also use a split power supply. The device has low power supply current drain, regardless of the power supply voltage. The low power drain also makes the CD2904 a good choice for battery operation.

When your project calls for a traditional op-amp function, now you can streamline your design with a simple single power supply. Use ordinary +5VDC common to practically any digital system or personal computer application, without requiring an extra 15V power supply just to have the interface electronics you need.

The CD2904 is a versatile, rugged workhorse with a thousand-and-one uses, from amplifying signals from a variety of transducers to dc gain blocks, or any op-amp function. The attached pages offer some recipes that will have your project cooking in no time.

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Pin Configurations

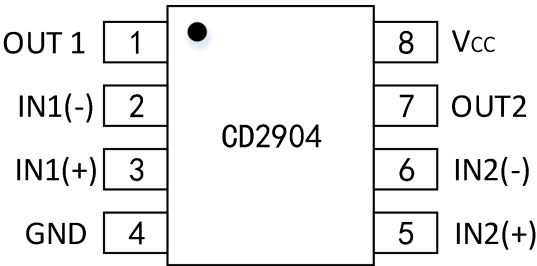


Figure 1. Pin Assignment Diagram

Absolute Maximum Ratings

Condition	Min	Max
V _{CC}	Power Supply Voltages Single Supply	32V
	Split Supplies	±16V
V _{IDR}	Input Differential Voltage Range (1)	±32V
V _{ICR}	Input Common Mode Voltage Range	-0.3~32V
I _{SC}	Output Short Circuit Duration	Continuous
T _J	Junction Temperature Plastic Packages	150°C
T _{STG}	Storage Temperature Plastic Packages	-55~125°C
I _{IN}	Input Current, per pin (2)	50mA
T _L	Lead Temperature, 1mm from Case for 10 Seconds	260°C

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V _{CC}	DC Supply Voltage	±2.5 or 5.0	±15 or 30	V
T _A	Operating Temperature, All Package Types	-40	+105	°C

Electrical characteristics

Unless otherwise specified, $T_A = 25^\circ\text{C}$

Symbol	Parameter	Min	Typ	Max	Unit
Offset Voltage					
Input Offset Voltage	$V_O=1.4\text{V}, V_{CC}=5.0\text{-}30\text{V};$ $R_S=0\Omega, V_{ICM}=0\text{V to } V_{CC}-1.7\text{V}$	--	--	9.0 5.0*	mV
Input Offset Voltage Drift	$R_S=0\Omega, V_{CC}=30\text{V}$	--	7.0	--	$\mu\text{V}/^\circ\text{C}$
Input Bias Current	$V_{CC}=5.0\text{V}$	--	--	500 250*	nA
Input Offset Current	$V_{CC}=5.0\text{V}$	--	--	500 150*	nA
Input Offset Current Drift	$R_S=0\Omega, V_{CC}=30\text{V}$	--	10	--	$\text{pA}/^\circ\text{C}$
Input Common Mode Voltage Range	$V_{CC}=30\text{V}$	0	--	28	V
Power Supply Current	$R_L=\infty, V_{CC}=30\text{V}, V_O=0\text{V}$ $R_L=\infty, V_{CC}=5\text{V}, V_O=0\text{V}$	0.3 0.3	--	3 1.2	mA
Common Mode Rejection	$V_{CC}=30\text{V}, R_S=10\text{K}\Omega$	65*	--	--	dB
Power Supply Rejection	$V_{CC}=30\text{V}$	65*	--	--	dB
Channel Separation	$f=1\text{KHz to } 20\text{KHz}, V_{CC}=30\text{V}$	-120	--	--	dB
Minimum Large Signal Open-Loop Voltage Gain	$V_{CC}=15\text{V}, R_L\geq 2\text{K}\Omega$	15 25*	--	--	V/mV
Output High-Level Voltage Swing	$V_{CC}=30\text{V}, R_L=2\text{K}\Omega$	26	--	--	V
	$V_{CC}=30\text{V}, R_L=10\text{K}\Omega$	27	--	--	V
Output Low-Level Voltage Swing	$V_{CC}=5\text{V}, R_L=10\text{K}\Omega$	--	--	20	mV
Power Supply Rejection	$V_{CM} = 2.7\text{V 至 } 5.5\text{V}$	75	89	--	dB
Output Short Circuit to GND	$V_{CC}=5.0\text{V}, V_O=0\text{V}$	--	--	--	mA
Source Output Current	$V_{IN+}=1\text{V}, V_{IN-}=0\text{V},$ $V_{CC}=15\text{V}, V_O=2\text{V}$	10	--	--	mA
Output Sink Current	$V_{IN+}=0\text{V}, V_{IN-}=1\text{V}, V_{CC}=15\text{V}, V_O=15\text{V}$	5	--	--	mA
	$V_{IN+}=0\text{V}, V_{IN-}=1\text{V}, V_{CC}=15\text{V},$ $V_O=0.2\text{V}$	10*	--	--	μA
	$V_O=0.2\text{V}$	12*	--	--	μA
Differential Input Voltage Range	All V_{IN} GND or V-Supply (if used)	--	0.01	V_{CC}^*	V

*= $@25^\circ\text{C}$

Typical Characteristics

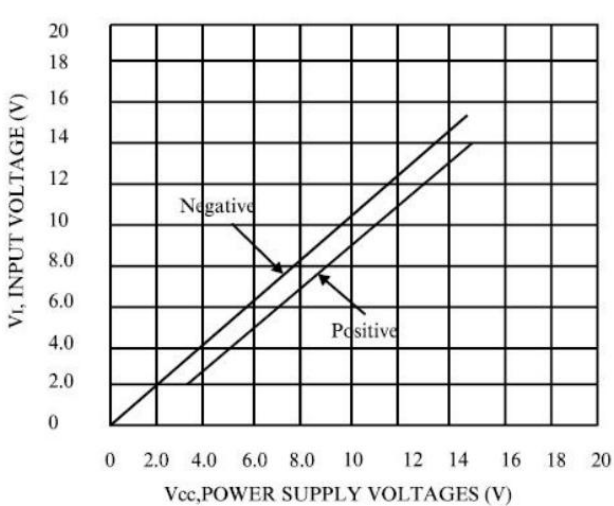


Figure 2.Input Voltage Range

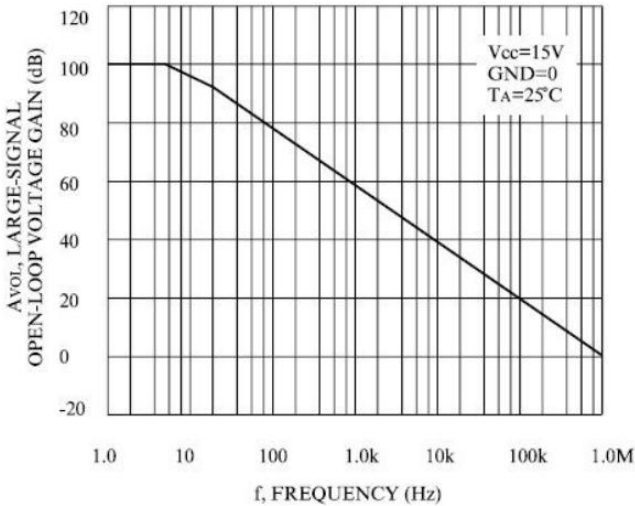


Figure 3.Open-Loop Frequency

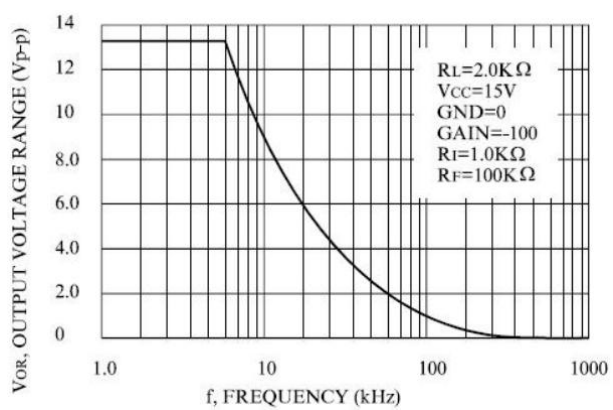


Figure 4.Large Signal Frequency Response

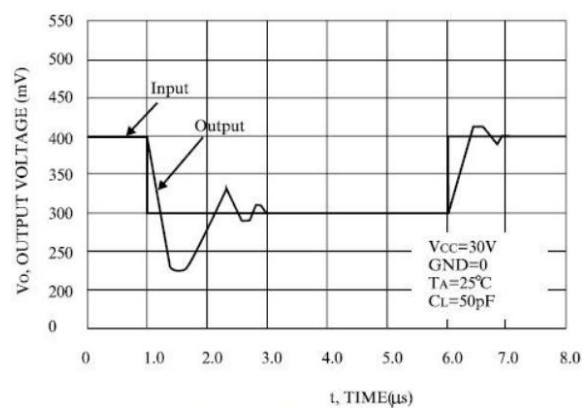


Figure 5.Small-Signal Voltage Follower Pulse Response(Noninverting)

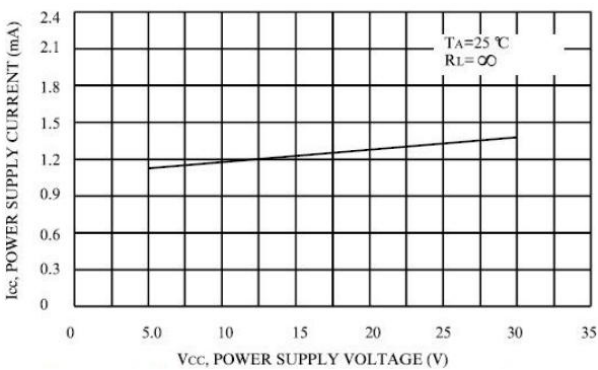


Figure 6.Power Supply Voltage VS Current

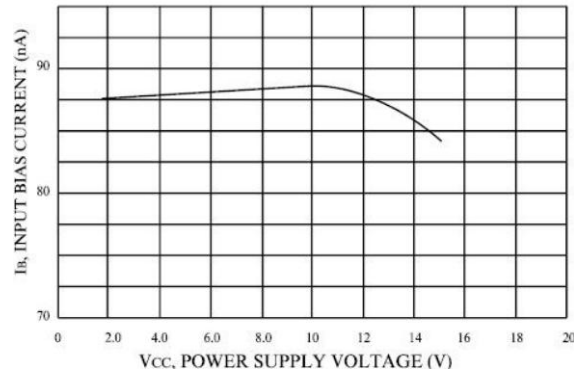
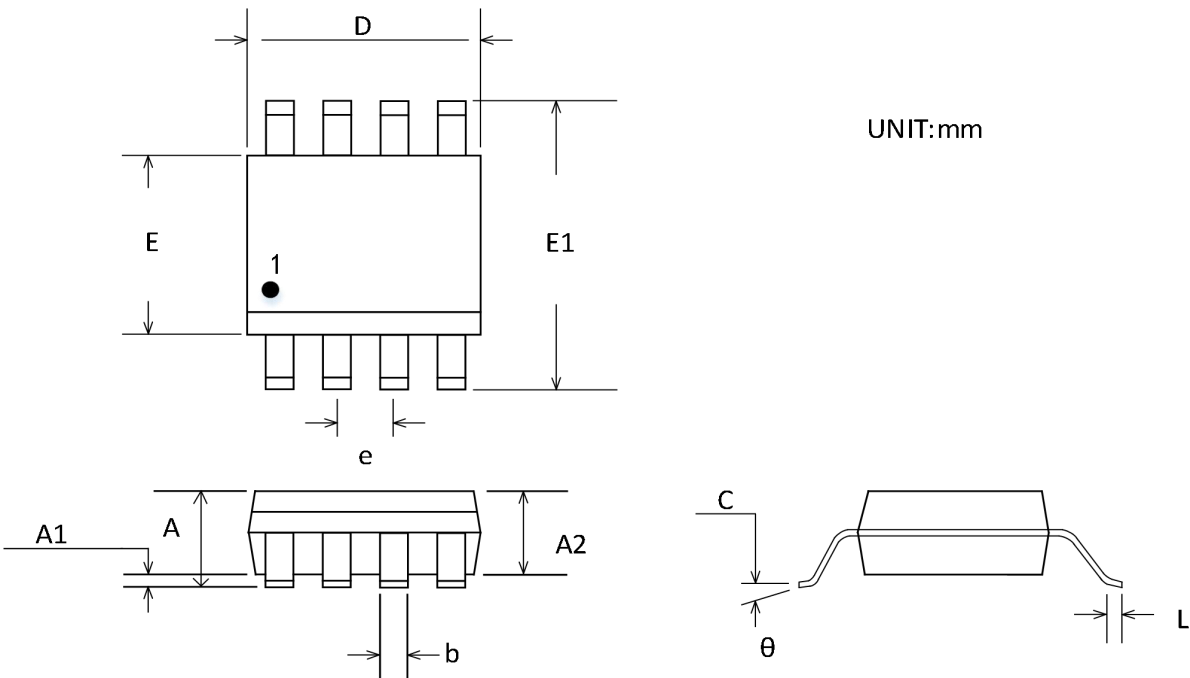


Figure 7.Input Bias Current VS Power Supply Voltage

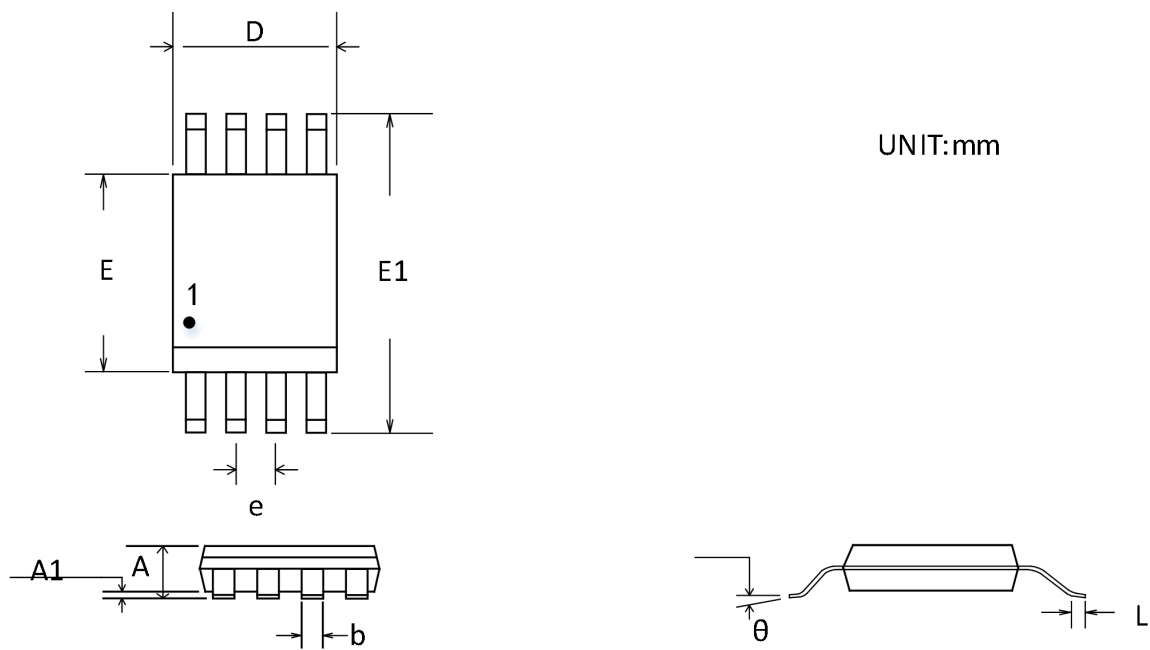
Package Outline Dimensions

SOP-8



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.800	5.000
E	3.800	4.000
E1	5.800	6.200
e	1.270 BSC	
L	0.400	1.270
θ	0°	8°

TSSOP-8



Symbol	Dimensions In Millimeters	
	Min	Max
A	--	1.20
A1	0.05	0.15
b	0.19	0.30
D	2.90	3.10
E	4.30	4.50
E1	6.40BSC	
e	0.65 BSC	
L	0.45	0.75
θ	0°	8°

Package/Ordering Information

MODEL	TEMPERATURE	PACKAGE DESCRIPTION	PACKAGE OPTION
CD2904AS8	-40°C~105°C	SOP-8	Tape and Reel, 2500
CD2904ATS8	-40°C~105°C	TSSOP-8	Tape and Reel, 3000

Revision Log

Version	Revision date	Change content	Reason for Change	Modified by	Reviewed By	Note
V1.0	2025.5.26	Initial version	Regular update	WW	LYL	