Dual Operational Amplifiers LM2904

FEATURES

- Wide range of supply voltages
- Low supply current drain independent of supply voltage
- Low input biasing current
- Low input offset voltage and offset current
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- DC voltage gain 100V/mV Typ.
- Internally frequency compensation

SOP-8 / DIP-8 Pin Configuration

SOP-8 PKG

DIP-8 PKG

ORDERING INFORMATION

Device	Package
LM2904D	SOP-8
LM2904GD	
LM2904N	DIP-8

DESCRIPTION

The LM2904 consists of two independent, high gain, internally frequency compensated operational 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.

ABSOLUTE MAXIMUM RATING

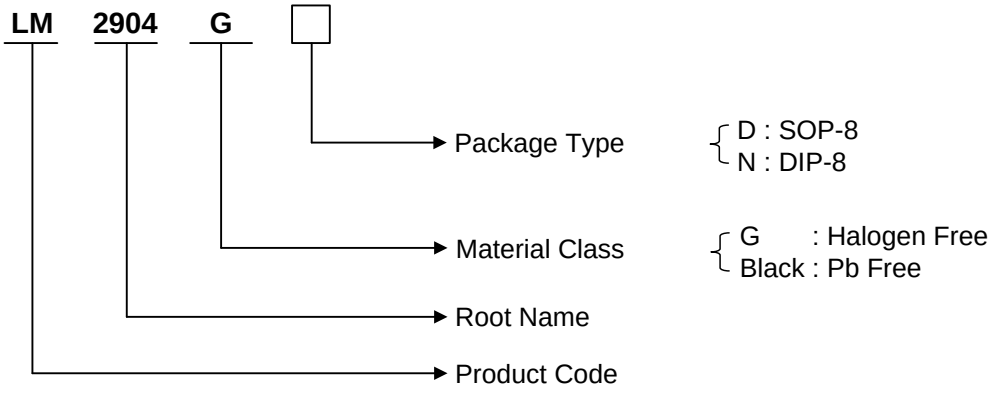
CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Supply Voltage	V_{CC}	-	45	V
Input Voltage	V_{IN}	-0.3	45	V
Input Current (V_{IN} = -0.3V)	I_{IN}	-	50	mA
Operating Temperature Range	T_{OPR}	-40	125	℃

Recommended Operating Condition

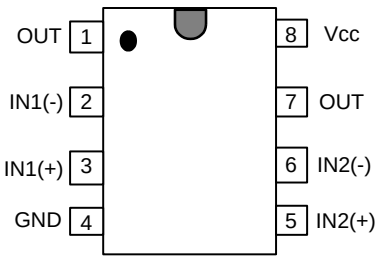
CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
Supply Voltage	Single	V_{CC}	3	40	V
	Dual	V_{CC+}	+1.5	+20	
		V_{CC-}	-1.5	-20	V

Ordering Information

Package	Order No.	Description	Supply As	Status
SOP-8	LM2904D	Dual Operational Amplifier	Reel	Contact us
SOP-8	LM2904GD	Dual Operational Amplifier, Halogen-Free	Reel	Active
DIP-8	LM2904N	Dual Operational Amplifier	Tube	Contact us



PIN CONFIGURATION



SOP-8 / DIP-8

ELECTRICAL CHARACTERISTICS

At specified free-air temperature, V_{CC}=5V (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		MIN	TYP	MAX	UNIT
V_{IO} Input offset voltage	V_{CC}=5V to MAX, $V_{IC}=V_{ICR}$ min, V_O=1.4Vω	25℃		3	7	mV
		Full range			9	
αV_{IO} Average temperature coefficient of input offset voltage		Full range		7		μV/℃
I_{IO} Input offset current	V_O=1.4V	25℃		2	50	nA
		Full range			150	
αI_{IO} Average temperature coefficient of input offset current		Full range		10		pA/℃
I_{IB} Input bias current	V_O=1.4V	25℃		-20	-250	nA
		Full range			-500	
V_{ICR} Common-mode input voltage range	V_{CC}=5V to MAX	25℃	0 to V_{CC}-1.5			V
		Full range	0 to V_{CC}-2			
V_{OH} High-level output voltage	V_{CC}=MAX, R_L=2kΩ	Full range	26			V
	V_{CC}=MAX, R_L≥10kΩ	Full range	27	28		
V_{OL} Low-level output voltage	R_L≥10kΩ	Full range		5	20	mV
A_{VD} Large-signal differential voltage amplification	V_{CC}=15V V_O=1V to 11V R_L≥2kΩ	25℃	25	100		V/mV
		Full range	15			
CMRR Common-mode rejection ratio	Vcc = 5 V to MAX, V_{IC} = V_{ICR} min	25℃	65	80		dB
k_{SVR} Supply voltage rejection ratio ($\Delta V_{CC}/\Delta V_{IO}$)	Vcc = 5 V to MAX	25℃	65	100		dB
V_O1/V_O2 Crosstalk attenuation	f=1 kHz to 20 kHz	25℃		120		dB
I_O Output current	V_{CC}=15V, V_{ID}=1V, V_O=0V	25℃	-30	-50		mA
		Full range	-20			
	V_{CC}=15V, V_{ID}=-1V, V_O=15V	25℃	15	35		
		Full range	7			
	V_{CC} = 15 V, V_{ID}= -1 V, V_O= 2V	25℃	15	28		mA
	V_{ID}= -1 V, V_O= 200mV	25℃	12	50		μA
I_{OS} Short-circuit output current	VID = - 1 V, Vo = 15 V	25℃		50	70	mA
I_{CC} Supply current (two amplifiers)	Vo-2.5 V, No load	Full range		0.7	1.2	mA
	V_{CC} = MAX, Vo = 0.5Vcc, No load	Full range		1	2	

* All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified.

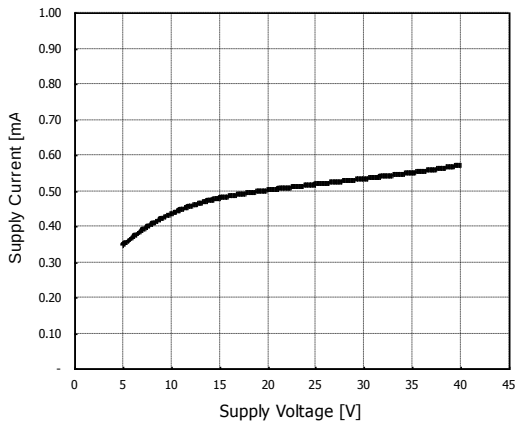
"MAX" V_{CC} for testing purposes is 36 V, Vccabsmax = 45 V, Temperature full range is -40℃ to +125℃.

ELECTRICAL CHARACTERISTICS (CONTINUED)

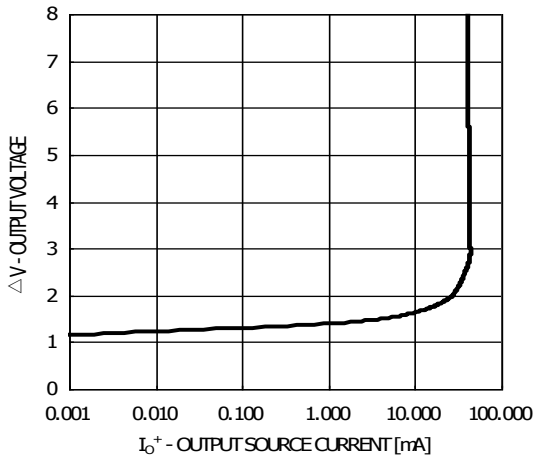
At specified free-air temperature, V_{CC}=5V (unless otherwise noted)

PARAMETER	TEST CONDITIONS*		MIN	TYP	MAX	UNIT
Slew rate	V_{CC}=15V, V_{IN}=0.5 to 3V, R_L=2kΩ, C_L=100pF, unity gain	25℃		0.7		V/us
Gain bandwidth	V_{CC}=30V, f=100kHz, V_{IN}=10mV, R_L=2kΩ, C_L=100pF	25℃		700		kHz
Total harmonic distortion	f = 1kHz, A_V = 20dB, R_L=2kΩ, V_O = 2Vpp, C_L=100pF	25℃		0.04		%

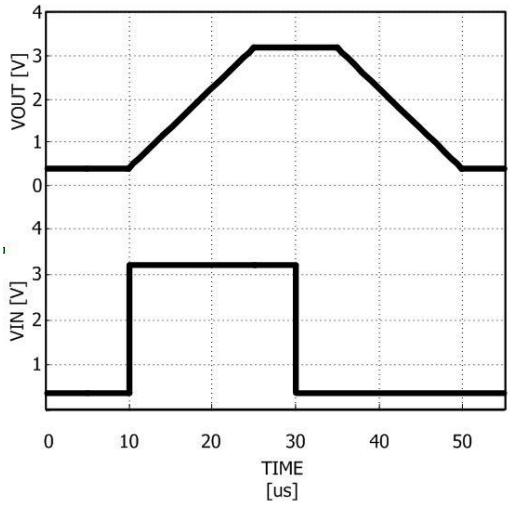
TYPICAL ELECTRICAL CHARACTERISTICS



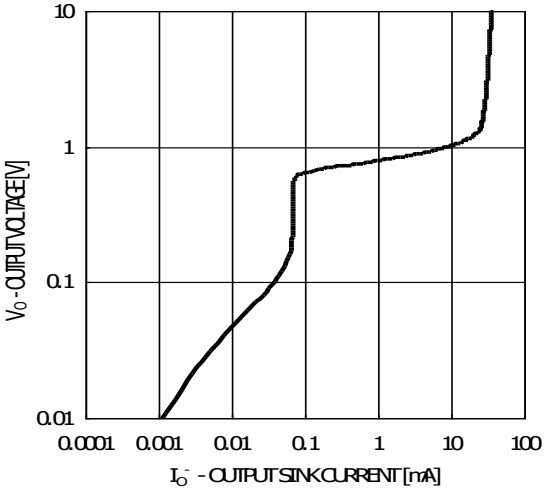
Supply current vs. Supply voltage



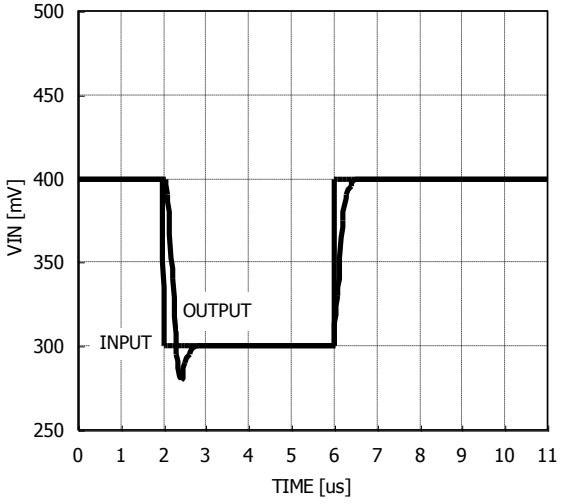
Current Sourcing vs. Output Characteristics



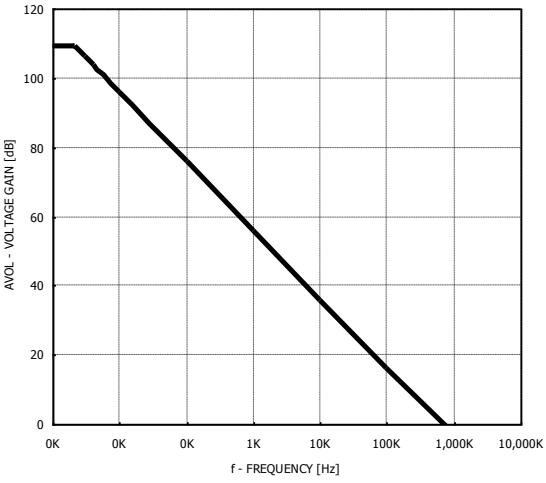
Voltage Follower Pulse Response



Current Sinking vs. Output Characteristics



Voltage Follower Pulse Response (Small Signal)



Open Loop Frequency Response

REVISION NOTICE

The description in this data sheet can be revised without any notice to describe its electrical characteristics properly.