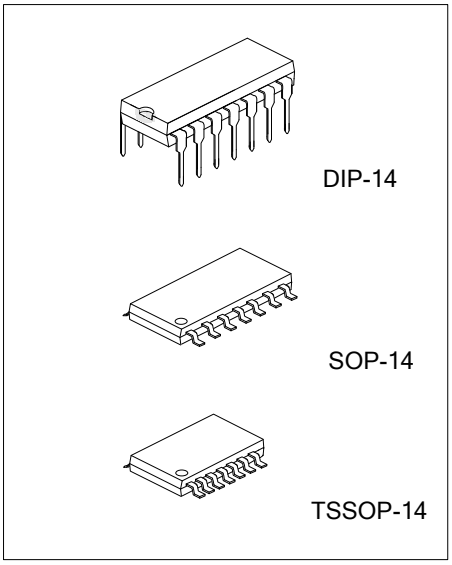
QUADRUPLE OPERATIONAL AMPLIFIERS



■ DESCRIPTION

UTC **LM2902** consist of four independent, high-gain, frequency-compensated operational amplifiers which are designed to operate from a single power supply over a wide range of voltage. Operation from split supplies is also possible so long as the difference between the two supplies is 3V ~ 32V. The low supply current drain is independent of the magnitude of the supply voltage.

The device can easily be implemented in single supply voltage system, including transducer amplifiers, DC gain blocks, and all of conventional OP Amp circuits.

■ FEATURES

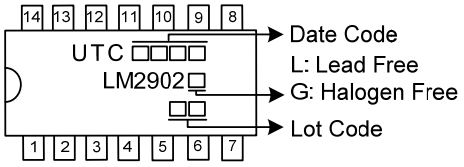
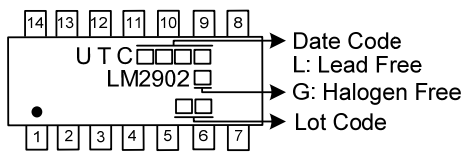
*Internally frequency compensated for unity gain
*Large DC voltage gain :100dB
*Wide operating supply range (V_{CC}=3V~32V)
*Input common-mode voltage includes ground
*Large output voltage swing: From 0V to V_{CC}-1.5V
*Power drain suitable for battery operation

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen-Free		
LM2902L-D14-T	LM2902G-D14-T	DIP-14	Tube
LM2902L-S14-R	LM2902G-S14-R	SOP-14	Tape Reel
LM2902L-P14-R	LM2902G-P14-R	TSSOP-14	Tape Reel

LM2902G-D14-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) DIP: DIP-14, S14: SOP-14, P14: TSSOP-14 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

DIP-14	SOP-14 / TSSOP-14
	

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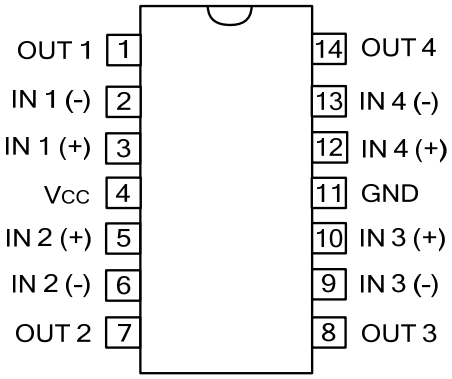
■ PIN CONFIGURATION



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage (Note 1)	V_{CC}	±16 or 32	V
Differential Input voltage (Note 2)	$V_{I(DIFF)}$	± 32	V
Input Voltage	V_{IN}	-0.3 ~ +32	V
Output Short Circuit (one amplifier) to Ground (T_A ≤ 25°C, V_{CC} ≤ 15V) (Note 3)		Continuous	
Operation Temperature	T_{OPR}	-40 ~ +125	°C
Storage Temperature	T_{STG}	-65 ~ +150	°C

Notes: 1. All voltage values (except differential voltages and V_{CC} specified for the measurement of $I_{IN(OS)}$ are with respect to the network GND.
2. Differential voltages are at IN+ with respect to IN-.
3. Short circuits from outputs to V_{CC} can cause excessive heating and eventual destruction.

■ THERMAL DATA

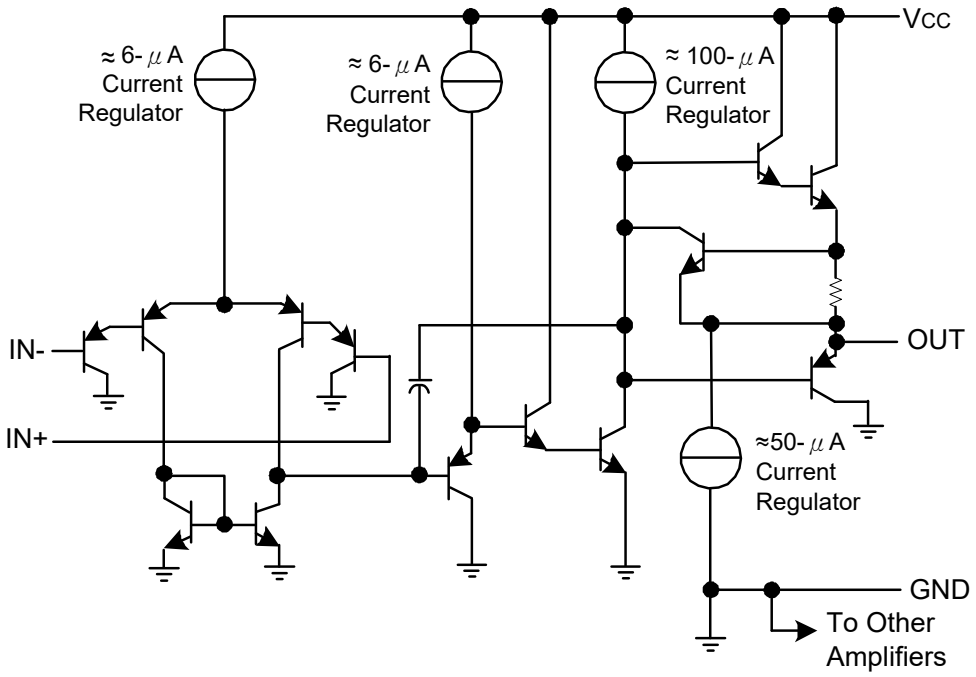
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-14	θ_{JA}	80	°C/W
	SOP-14		86	°C/W
	TSSOP-14		113	°C/W

■ ELECTRICAL CHARACTERISTICS (V_{CC}=5V, unless otherwise specified, V_{CC}=30V for testing only.)

PARAMETER		SYMBOL	TEST CONDITIONS*		MIN	TYP	MAX	UNIT
Input Offset Voltage		$V_{I(OFF)}$	V_{CC}=5V to 30V, V_{IC}=$V_{ICR(min)}$, V_{OUT}=1.4V	T_A=25°C		3	5	mV
				T_A=-40~+125°C			7	mV
Input Offset Current		$I_{I(OFF)}$	V_{OUT}=1.4V	T_A=25°C		2	30	nA
				T_A=-40~+125°C			100	nA
Input Bias Current		$I_{I(BIAS)}$	V_{OUT}=1.4V	T_A=25°C		-20	-150	nA
				T_A=-40~+125°C			-300	nA
Input Common-mode Voltage Range		$V_{I(CM)}$	V_{CC}=5V to 30V	T_A=25°C	0		V_{CC}-1.5	V
				T_A=-40~+125°C	0		V_{CC}-2	V
Output Voltage Level	High	V_{OH}	R_L=2kΩ	T_A=25°C	V_{CC}-1.5			V
			V_{CC}=30V, R_L=2kΩ	T_A=-40~+125°C	26			V
			V_{CC}=30V, R_L≥10kΩ		27	28		V
	Low	V_{OL}	R_L ≤ 10kΩ	T_A=-40~+125°C		5	20	mV
Large Signal Current Gain		G_V	V_{CC}=15V, V_{OUT}=1V ~ 11V R_L≥2kΩ	T_A=25°C	50	100		V/mV
				T_A=-40~+125°C	25			V/mV
Common-mode Rejection Ratio		CMRR	V_{IC}=$V_{ICR(min)}$	T_A=25°C	70	80		dB
Supply Voltage Rejection Ratio ($\Delta V_{CC}/\Delta V_{IO}$)		PSRR		T_A=25°C	65	100		dB
Crosstalk Attenuation		V_{O1}/V_{O2}	f =1kHz ~ 20 kHz	T_A=25°C		120		dB
Output Current		I_{OUT}	V_{CC}=15V, V_{ID}=1V, V_{OUT}=0	T_A=25°C	-20	-30	-60	mA
				T_A=-40~+125°C	-10			mA
			V_{CC}=15V, V_{ID}=-1V, V_{OUT}=15V	T_A=25°C	10	20		mA
				T_A=-40~+125°C	5			mA
			V_{ID}=-1V, V_{OUT}=200mV	T_A=25°C	12	30		µA
Short-circuit Output Current		I_{OS}	V_{CC}=5V, V_{OUT}=0, GND at -5V	T_A=25°C		± 40	± 60	mA
Supply Current (four amplifiers)		I_{CC}	V_{OUT}=2.5V, R_L=∞	T_A=-40~+125°C		0.7	1.2	mA
			V_{CC}=30V, V_{OUT}=0.5V_{CC}, R_L=∞			1.4	3	mA

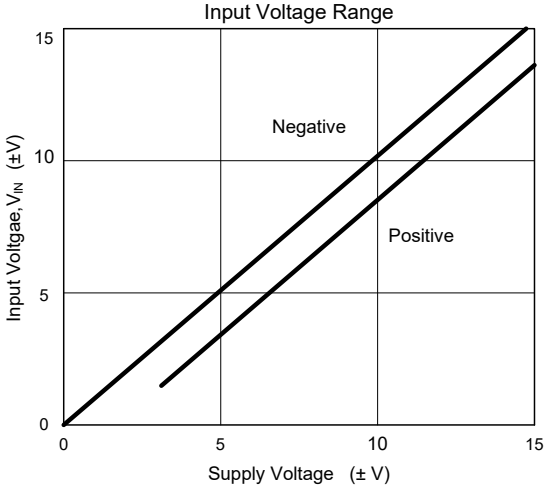
Note: All characteristics are measured under open-loop conditions with zero common-mode input voltage.

■ SCHEMATIC DIAGRAM (One Section Only)

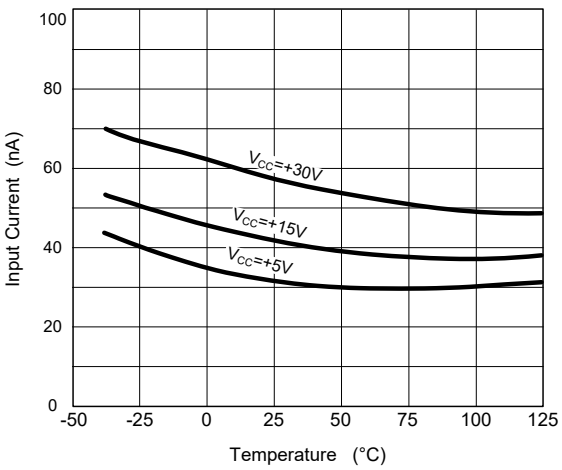


■ TYPICAL CHARACTERISTICS

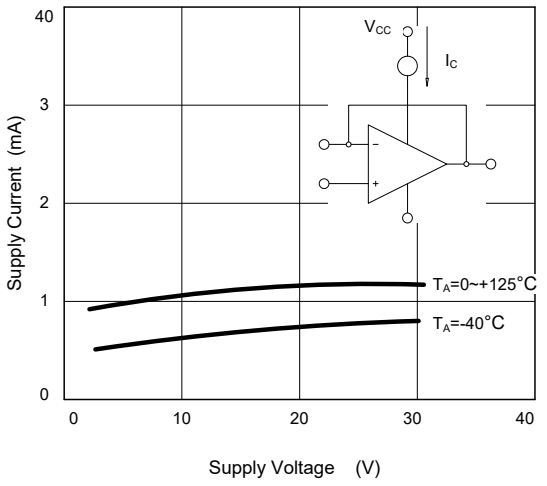
Input Voltage Range



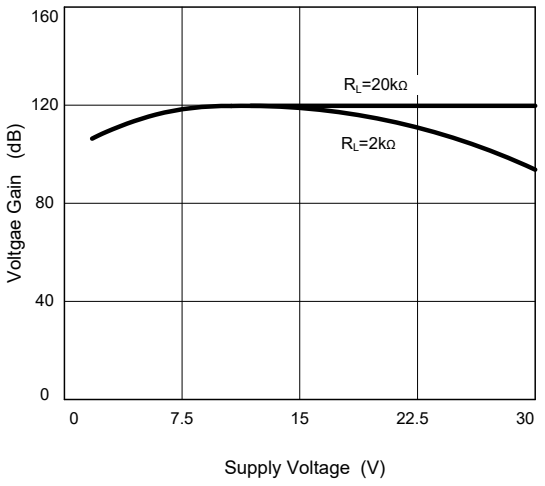
Input Current



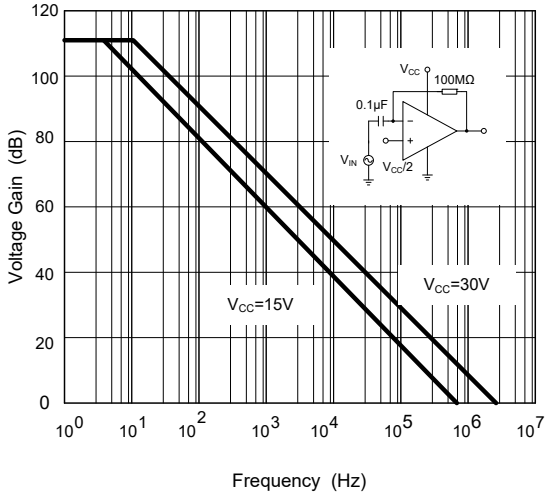
Supply Current



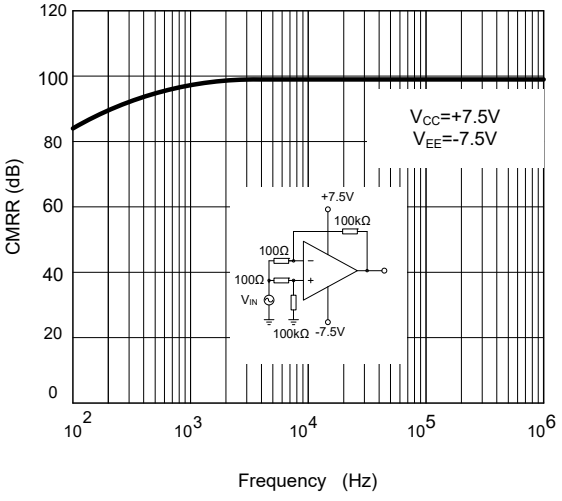
Voltage Gain



Open Loop Frequency response

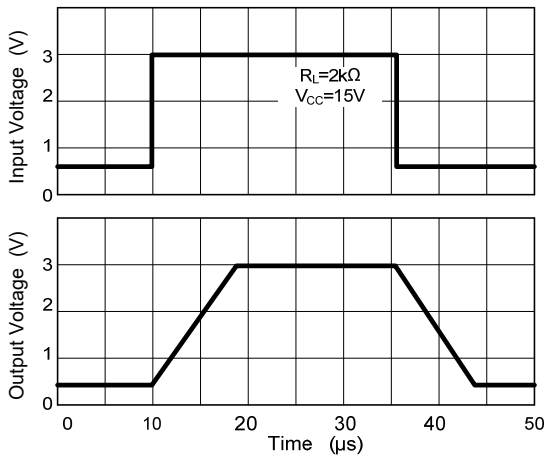


Common-Mode Rejection Ratio

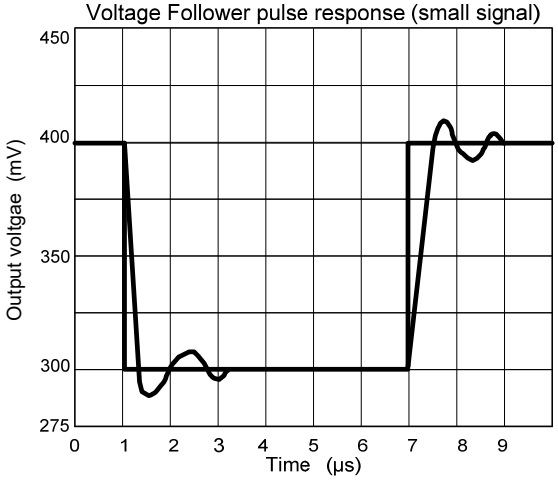


■ TYPICAL CHARACTERISTICS (Cont.)

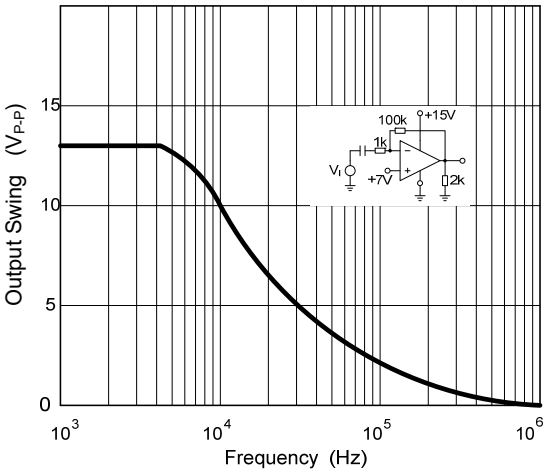
Voltage Follower Pulse Response



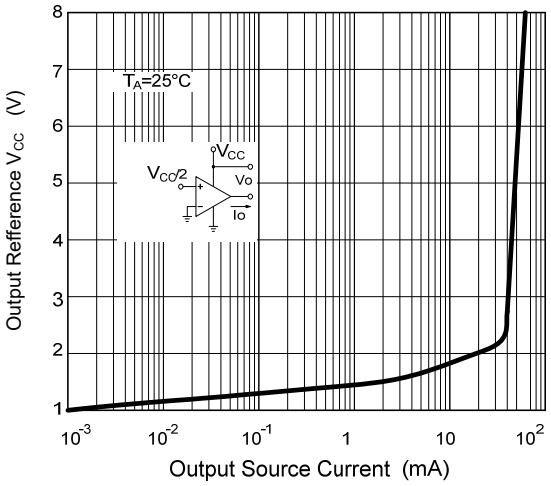
Voltage Follower pulse response (small signal)



Large Signal Frequency Response



Output Characteristics Current Sourcing



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