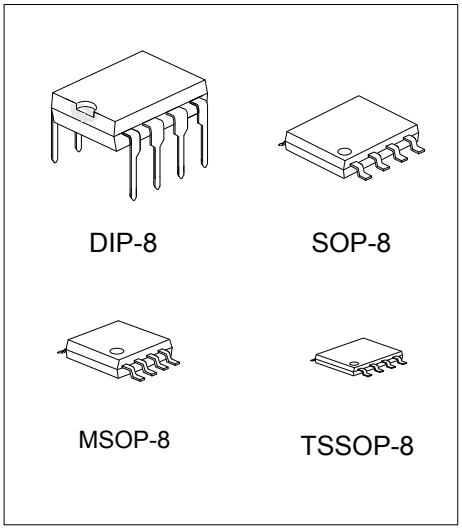
DUAL OPERATIONAL AMPLIFIER



■ DESCRIPTION

The UTC **M2904** consists of two independent, high gain, internally frequency compensated operation amplifiers which were designed specifically to operate from a single power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

■ FEATURES

*Single Supply
*Operating Voltage: +3V~+32V
*Low Operating Current: 0.7mA (typ.)
*Slew Rate: 0.5V/μs (typ.)

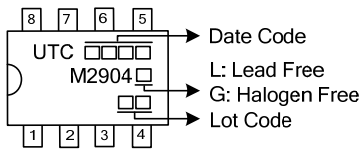
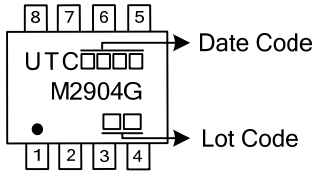
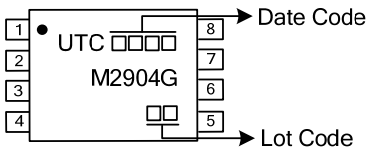
■ ORDERING INFORMATION

Order Number		Package	Packing
Lead Free	Halogen Free		
M2904L-D08-T	M2904G-D08-T	DIP-8	Tube
-	M2904G-S08-R	SOP-8	Tape Reel
-	M2904G-SM1-R	MSOP-8	Tape Reel
-	M2904G-P08-R	TSSOP-8	Tape Reel

M2904L-D08-T
(1)Packing Type
(2)Package Type
(3)Green Package

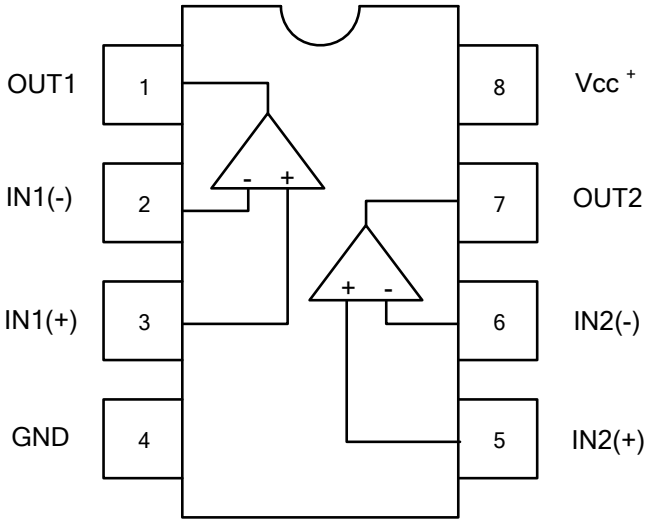
(1) T: Tube, R: Tape Reel
(2) D08: DIP-8, S08: SOP-8, SM1: MSOP-8, P08: TSSOP-8
(3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING

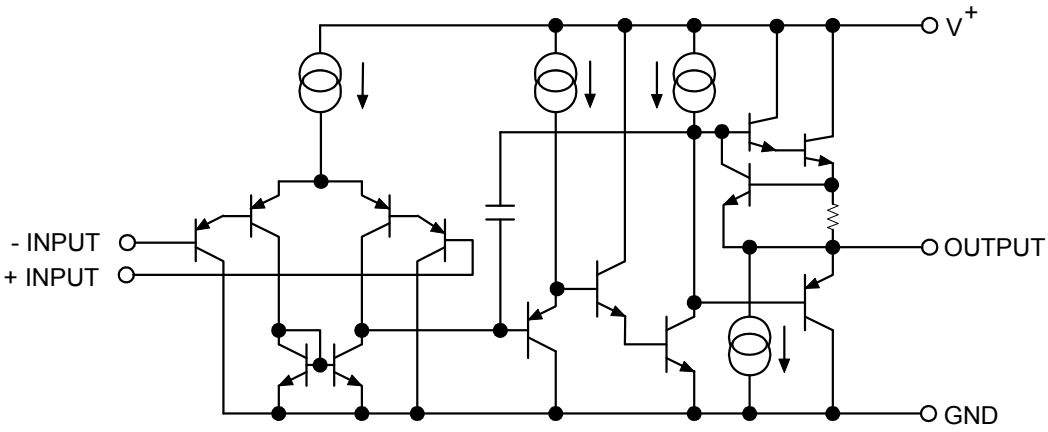
DIP-8	SOP-8 / MSOP-8	TSSOP-8
		

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■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT (1/2 shown)



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		$V^+(V^+/V^-)$	32(or±16)	V
Differential Input Voltage		$V_{I(DIFF)}$	±32	V
Input Voltage		V_{IN}	-0.3~+32	V
Power Dissipation	DIP-8	P_D	500	mW
	SOP-8		300	
	TSSOP-8		300	
	MSOP-8		225	
Junction Temperature		T_J	+125	°C
Operating Temperature		T_{OPR}	-40~+125	°C
Storage Temperature		T_{STG}	-40~+150	°C

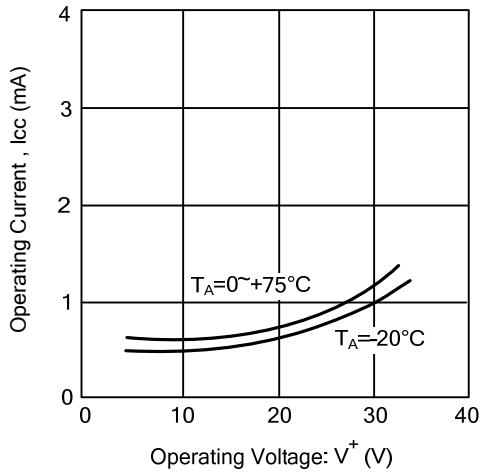
Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. The device is guaranteed to meet performance specification within 0°C ~+70°C operating temperature range and assured by design from -20°C ~+85°C.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V+=5V)

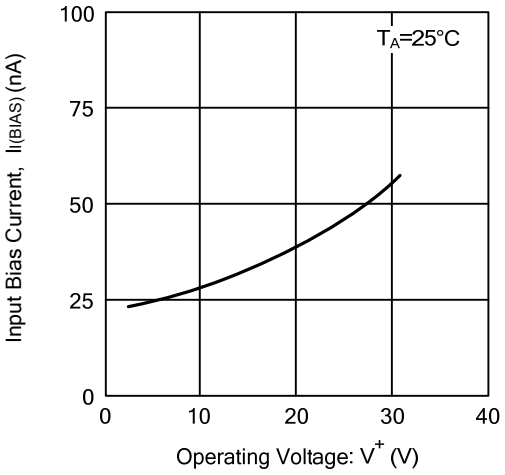
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{I(OFF)}$	R_S=0Ω		2	7	mV
Input Offset Current	$I_{I(OFF)}$			5	50	nA
Input Bias Current	$I_{I(BIAS)}$			25	250	nA
Large Signal Voltage Gain	Gv	$R_L \geqq$ 2kΩ		100		dB
Maximum Output Voltage Swing	V_{OM}	R_L=2kΩ	3.5			V
Input Common Mode Voltage	$V_{I(CM)}$		0~3.5			V
Common Mode Rejection Ratio	RR			85		dB
Supply Voltage Rejection Ratio	SVR			100		dB
Output Source Current	I_{SOURCE}	V_{IN}^+=1V,V_{IN}^-=0V	20	30		mA
Output Sink Current	I_{SINK}	V_{IN}^+=0V,V_{IN}^-=1V	8	20		mA
Channel Separation	CS	f=1k ~20kHz,Input Referred		120		dB
Operating Current	I_{CC}	R_L=∞		0.7	1.2	mA
Slew Rate	SR	V^+/V^-=±15V		0.5		V/μs
Unity Gain Bandwidth	f_T	V^+/V^-=±15V		0.2		MHz

■ TYPICAL CHARACTERISTICS

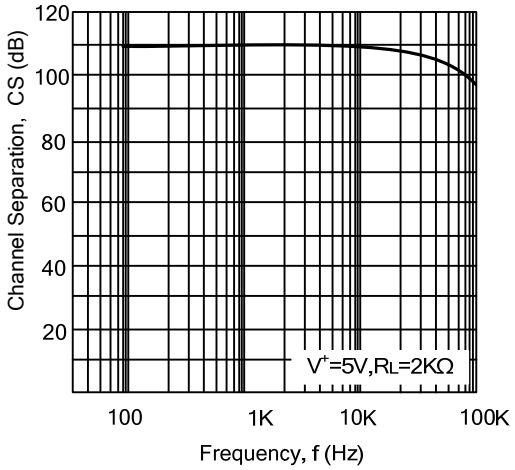
Operating Current vs.Operating Voltage



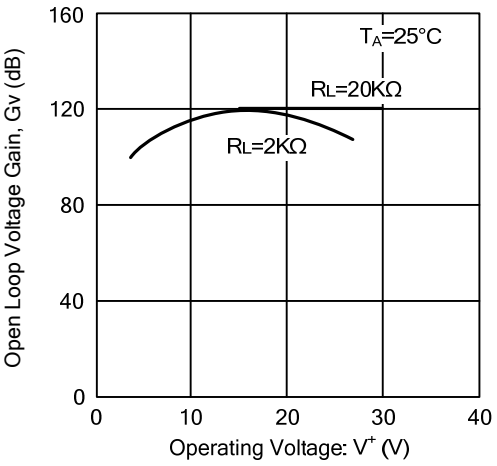
Input Bias Current vs.Operating Voltage



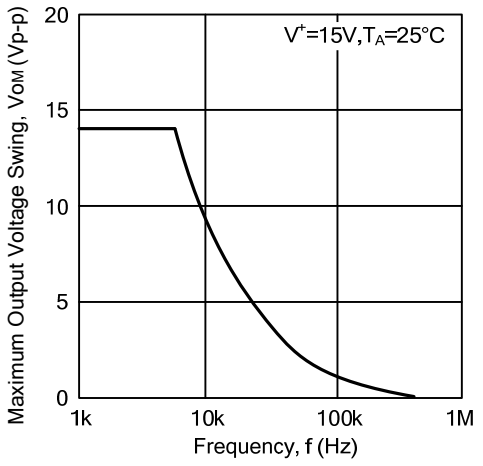
Channel Separation vs. Frequency



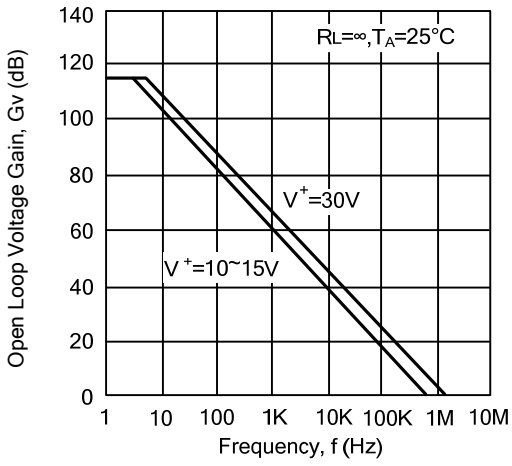
Voltage Gain vs.Operating Voltage



Maximum Output Voltage Swing vs.Frequency

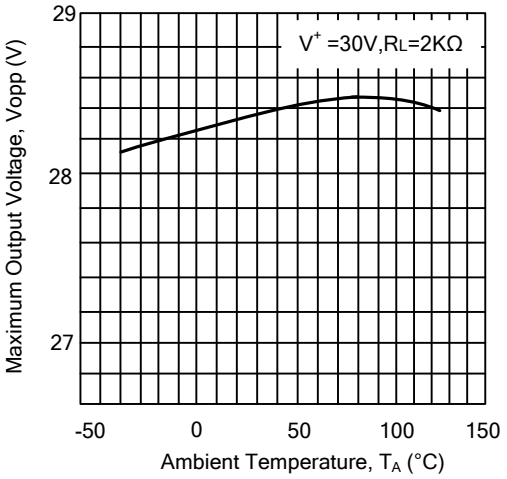


Open Loop Voltage Gain vs. Frequency

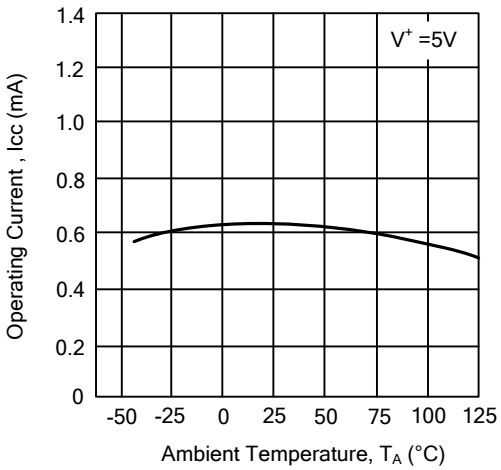


■ TYPICAL CHARACTERISTICS(Cont.)

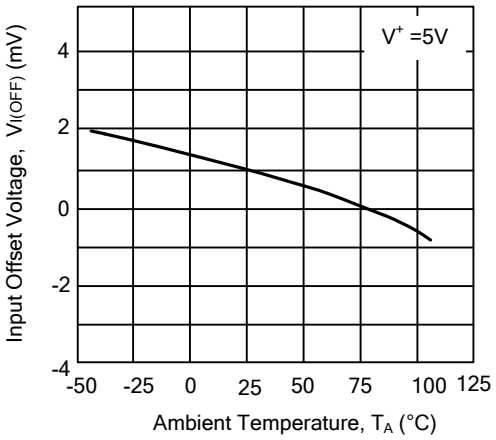
Maximum Output Voltage Swing vs. Temperature



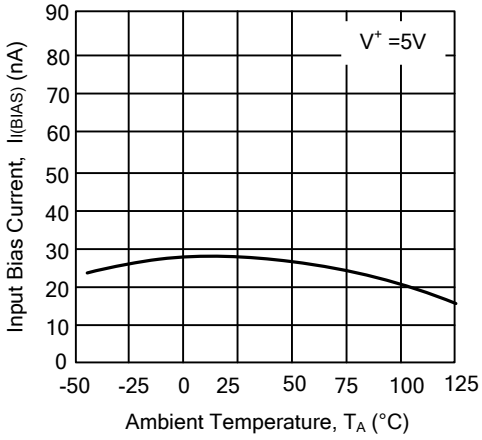
Operating Current vs.Temperature



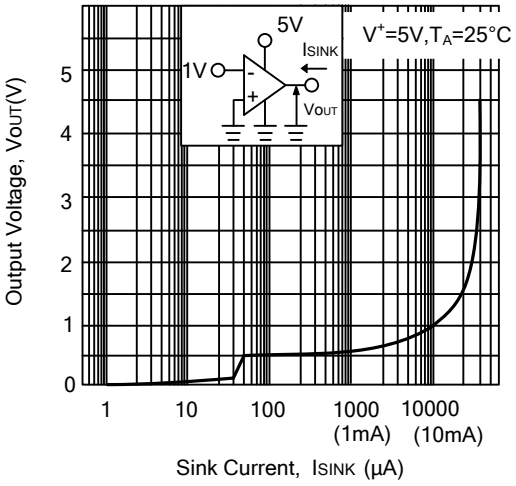
Input Offset Voltage vs.Temperature



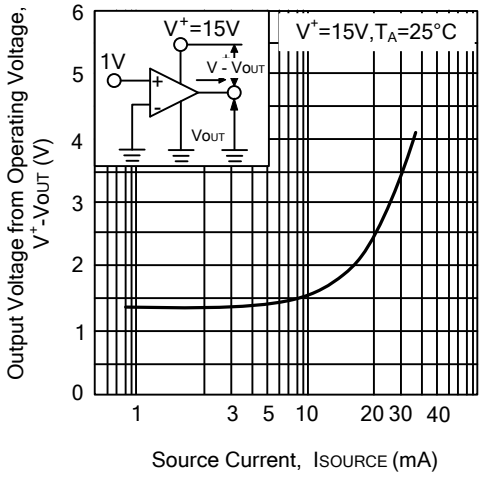
Input Bias Current vs.Temperature



Output Voltage vs.Sink Current

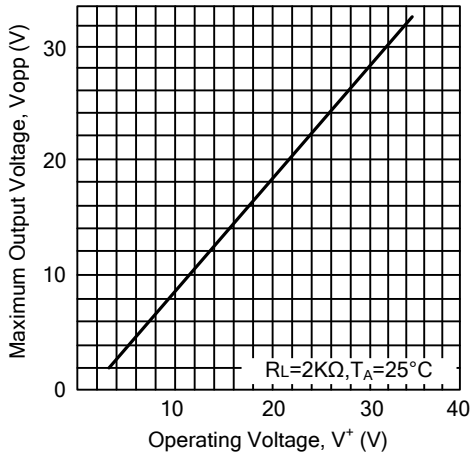


Source Current

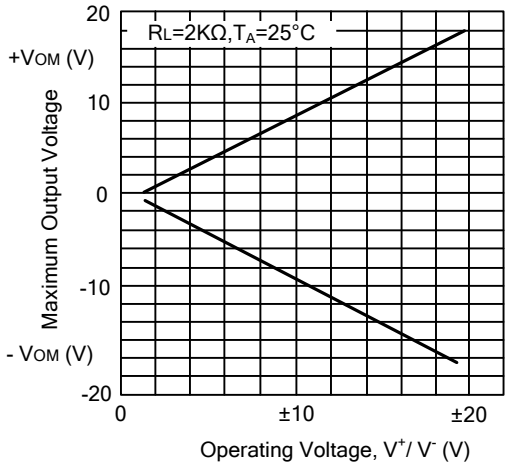


■ TYPICAL CHARACTERISTICS(Cont.)

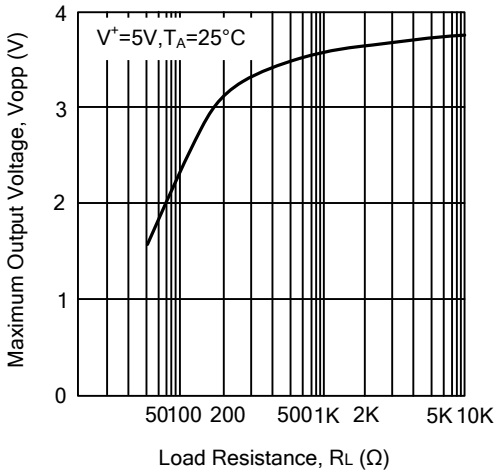
Maximum Output Voltage



Maximum Output Voltage vs.Operating Voltage



Maximum Output Voltage Swing vs..Load Resistance



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