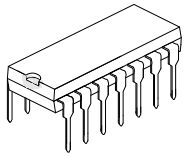
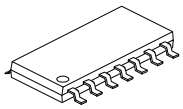
MC34074

LINEAR INTEGRATED CIRCUIT

HIGH SLEW RATE, WIDE BANDWIDTH, SINGLE SUPPLY OPERATIONAL AMPLIFIER



DIP-14



SOP-14

■ DESCRIPTION

The UTC **MC34074** offer 4.5MHz of gain bandwidth product, 13V/μs slew rate and fast setting time without the use of JFET device technology. Although it can be operated from split supplies, it is particularly suited for single supply operation, since the common mode input voltage range includes ground potential (V_{EE}). With A Darlington input stage, it exhibits high input resistance, low input offset voltage and high gain. The all NPN output stage, characterized by no deadband crossover distortion and large output voltage swing, provides high capacitance drive capability, excellent phase and gain margins, low open loop high frequency output impedance and symmetrical source/sink AC frequency response.

■ FEATURES

* Wide bandwidth: 4.5MHz
* High slew rate: 13V/μs
* Fast settling time:1.1μs to 0.1%
* Wide single supply operation: 3.0V to 44V
* Wide input common mode voltage range:
  Includes Ground (V_{EE})
* Low input offset voltage: 3.0mV maximum
* Large output voltage swing: -14.7V to +14V
  (with +-15V supplies)
* Large Capacitance Drive Capability: 0pF to 10,000pF
* Low total harmonic distortion: 0.02%
* Excellent phase margin: 60°
* Excellent gain margin: 12dB
* Output short circuit protection
* ESD Diodes/Clamps provide input protection

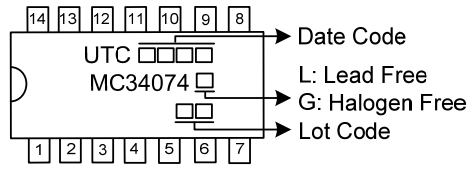
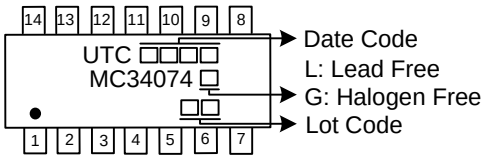
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
MC34074L-D14-T	MC34074G-D14-T	DIP-14	Tube
MC34074L-S14-R	MC34074G-S14-R	SOP-14	Tape Reel

MC34074G-D14-T

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

■ MARKING

DIP-14	SOP-14
	

■ PIN CONFIGURATIONS

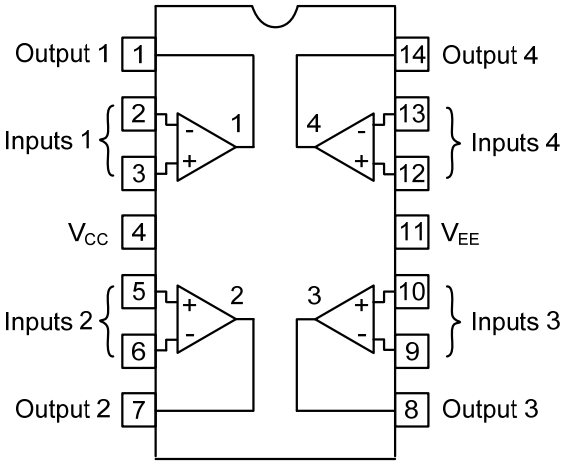


Figure 1.

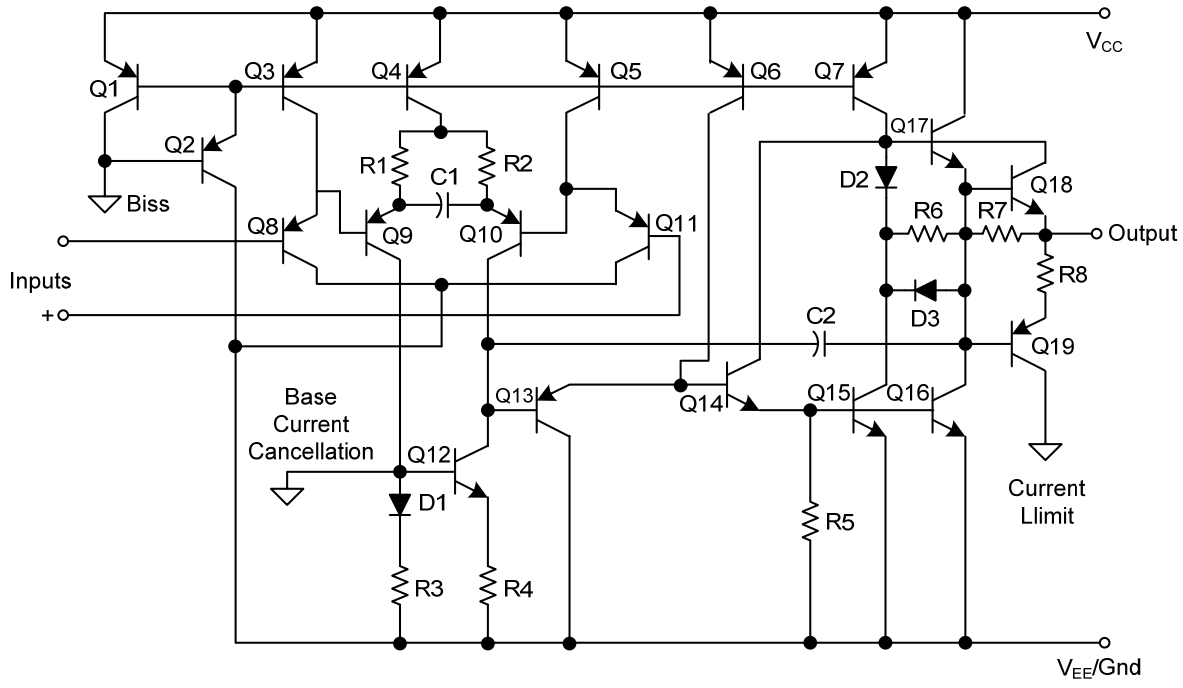


Figure 2. Representative Schermatic Diagram

■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage (from V_{EE} to V_{CC})	Vs	+44	V
Differential Input Voltage	V_{IDR}	Note 2	V
Input Voltage	V_{IR}	Note 2	V
Output Short Circuit Duration (Note 3)	t_{SC}	Indefinite	sec
Junction Temperature	T_J	+150	°C
Operating Temperature (Note 4)	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-60 ~ +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. Either or both input voltages should not exceed the magnitude of V_{CC} or V_{EE}.
3. Power dissipation must be considered to ensure maximum junction temperature (Tj) is not exceeded. (see Figure 2)
4. It is guarantee by design, not 100% be tested.

■ ELECTRICAL CHARACTERISTICS

(V_{CC}=+15V, V_{EE}=-15V, R_L=connected to ground, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{I(OFF)}$	R_S=100Ω, V_{CM}=0V, Vo=0V	V_{CC}=+15V,V_{EE}=-15V, T_A=+25°C		0.5	3.0	mV
			V_{CC}=+5V,V_{EE}=0V, T_A=+25°C		0.5	3.0	mV
			V_{CC}=+15V, V_{EE}=-15V, T_A=0°C to 70°C			5.0	mV
Average Temperature Coefficient of Input Offset Voltage	$\Delta V_{I(OFF)}/\Delta T$	R_S=10Ω,V_{CM}=0V,V_{OUT}=0V, T_A=0°C to 70°C			10		μV/°C
Input Bias Current	$I_{I(BIAS)}$	V_{CM}=0V, Vo=0V	T_A= T_A=+25°C		100	500	nA
			T_A=0°C to 70°C			700	
Input Offset Current	$I_{I(OFF)}$	V_{CM}=0V, Vo=0V	T_A= T_A=+25°C		6.0	50	nA
			T_A=0°C to 70°C			300	
Input Common Mode Voltage	$V_{I(CM)}$	T_A= T_A=+25°C		V_{EE} to (V_{CC} –1.8)			V
		T_A=0°C to 70°C		V_{EE} to (V_{CC} –2.2)			V
Large Signal Voltage Gain	G_V	V_{OUT}=±10V, R_L=2.0kΩ	T_A= T_A=+25°C	50	100		V/mV
			T_A=0°C to 70°C	25			
Output Voltage Swing (V_{ID}=+-1.0V)	V_{OH}	V_{CC}=+5.0V,V_{EE}=0V,R_L=2.0kΩ, T_A=+25°C		3.7	4.0		V
		V_{CC}=+15.0V,V_{EE}=-15V,R_L=10kΩ, T_A=+25°C		13.6	14		V
		V_{CC}=+15.0V,V_{EE}=-15V,R_L=2.0kΩ, T_A=0°C to 70°C		13.4			V
Output Voltage Swing (V_{ID}=+-1.0V)	V_{OL}	V_{CC}=+5.0V,V_{EE}=0V,R_L=2.0kΩ, T_A=+25°C			0.1	0.3	V
		V_{CC}=+15.0V,V_{EE}=-15V,R_L=10kΩ,T_A=+25°C			-14.7	-14.3	V
		V_{CC}=+15.0V,V_{EE}=-15V, R_L=2.0kΩ, T_A=0°C to 70°C				-13.5	V
Output Short Circuit current	I_{SC}	V_{ID}=1.0V,V_{OUT}=0V, T_A=25°C	Source	10	30		mA
			Sink	20	30		
Common Mode Rejection	CMR	R_S<=10kΩ,V_{CM}=V_{ICR}, T_A=+25°C		80	97		dB
Power Supply Rejection (R_S=100Ω)	PSR	V_{CC}/V_{EE}=+16.5V/-16.5V to +13.5/-13.5V, T_A=25°C		80	97		dB

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Power Supply Current (Per Amplifier, No Load)	I_D	V_{CC}=+5.0V,V_{EE}=0V,V_{OUT}=+2.5V, T_A=+25°C			1.6	2.0	mA
		V_{CC}=+15.0V,V_{EE}=-15V,V_{OUT}=0V, T_A=+25°C			1.9	2.5	mA
		V_{CC}=+15.0V,V_{EE}=-15V, V_{OOUT}=0V, T_A=0°C to 70°C				2.8	mA
Slew Rate	SR	Vin=-10V to +10V, R_L=2.0kΩ, C_L=500pF	Av=+1.0	8.0	10		V/μs
			Av=-1.0		13		
Setting Time	ts	10 Setp, Av=-1.0	to 0.1% (+1/2 LSB of 9-Bits)		1.1		μs
			to 0.01% (+1/2 LSB of 12-Bits)		2.2		
Gain Bandwidth Product	G_{BW}	f=100kHz		3.5	4.5		MHz
Power Bandwidth	BW	Av=+1.0, R_L=2kΩ, V_{OUT}=20Vpp, THD=5.0%			160		kHz
Phase Margin	fm	R_L=2kΩ			60		Deg
		R_L=2kΩ, C_L=300pF			40		
Gain Margin	Am	R_L=2kΩ			12		dB
		R_L=2kΩ, C_L=300pF			4		
Equivalent Input Noise Voltage	eN	Rs=100Ω, f=1.0kHz			32		nV/√Hz
Equivalent Input Noise Current	in	f=1.0kHz			0.22		pA/√Hz
Differential Input Resistance	R_{IN}	V_{CM}=0V			150		MΩ
Differential Input Capacitance	C_{IN}	V_{CM}=0V			2.5		pF
Total Harmonic distortion	G_N	A_V=+10,R_L=2.0kHz,2.0V_{PP}≤V_O≤20V_{PP}, f=10kHz			0.02		%
Channel Separation		f=10kHz			120		dB
Open Loop Output Impedance	IZoI	f=1.0MHz			30		W

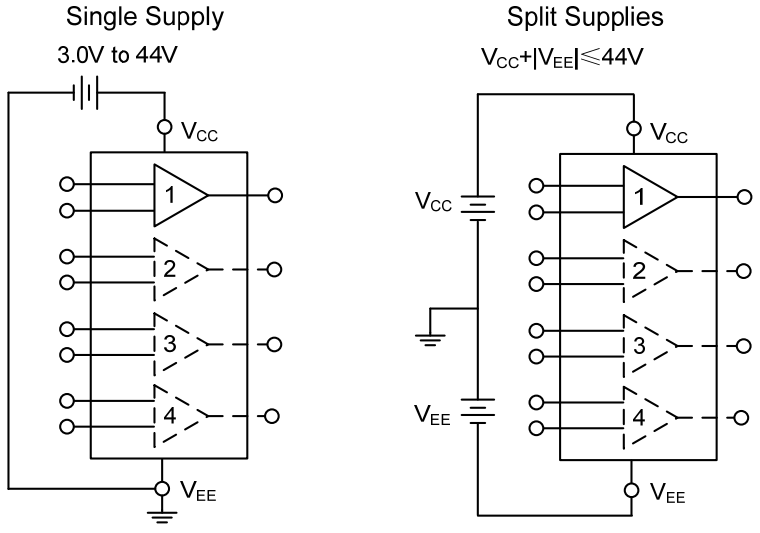
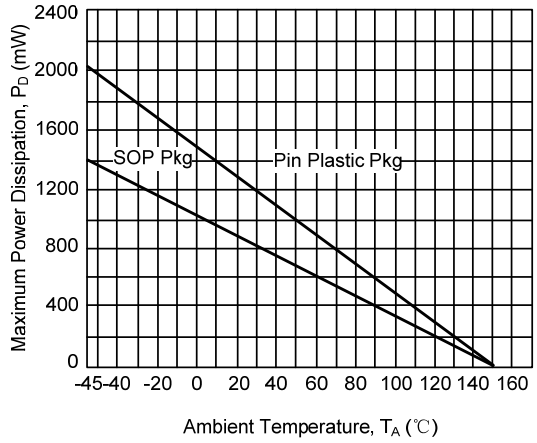


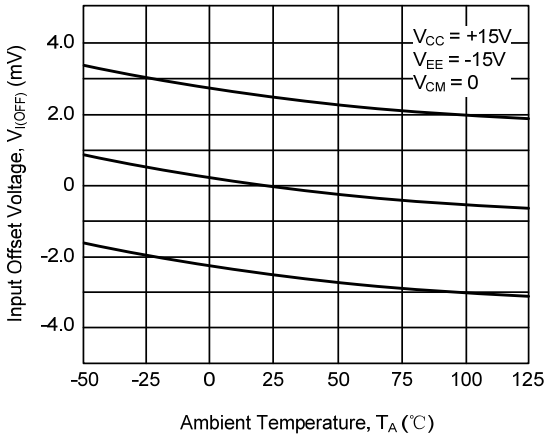
Figure 3. Power Supply Configurations

■ TYPICAL CHARACTERISTICS

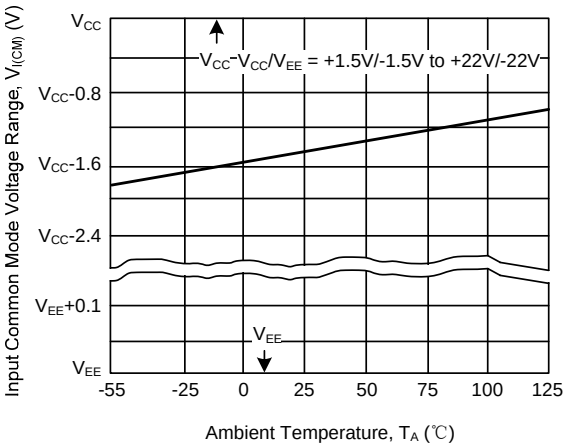
Maximum Power Dissipation vs. Temperature for Package Types



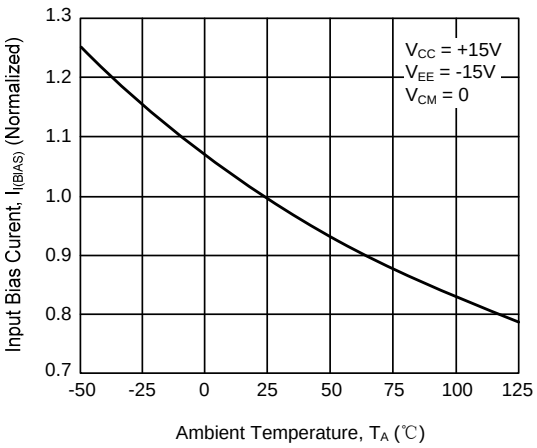
Input Offset Voltage vs. Temperature for Representative Units



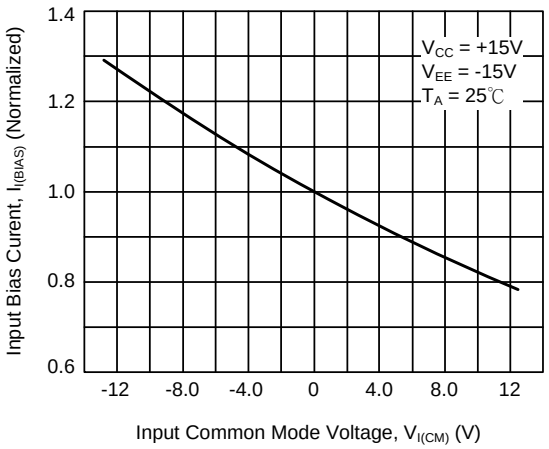
Input Common Mode Voltage Range vs. Temperature



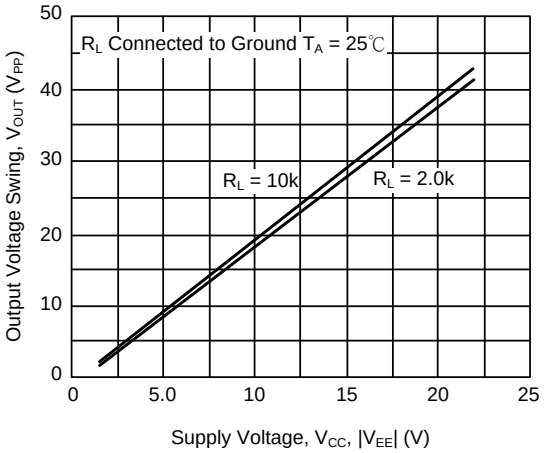
Normalized Input Bias Current vs. Temperature



Normalized Input Bias Current vs. Input Common Mode Voltage

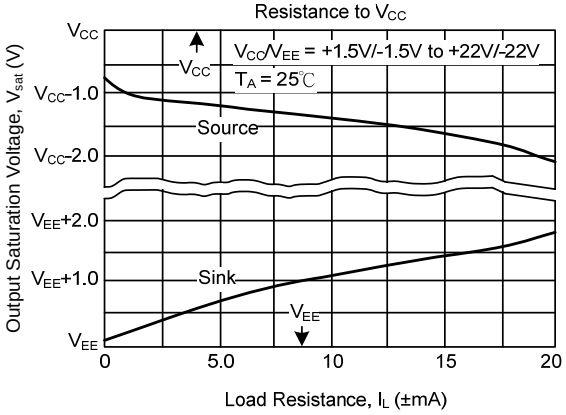


Split Supply Output Voltage Swing vs. Supply Voltage

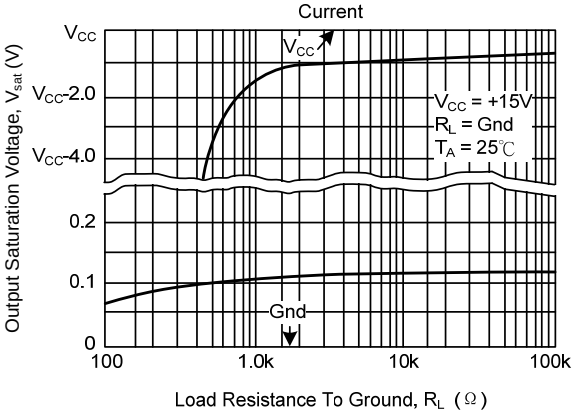


■ TYPICAL CHARACTERISTICS (Cont.)

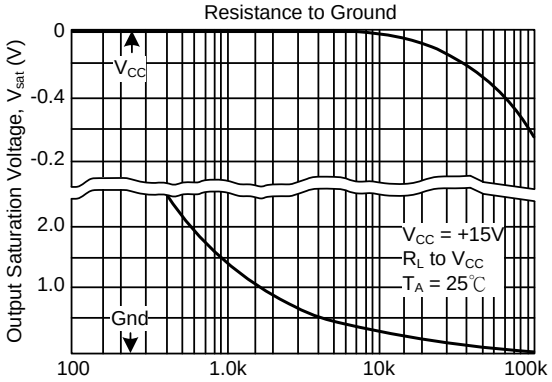
Single Supply Output Saturation versus Load Resistance to V_{CC}



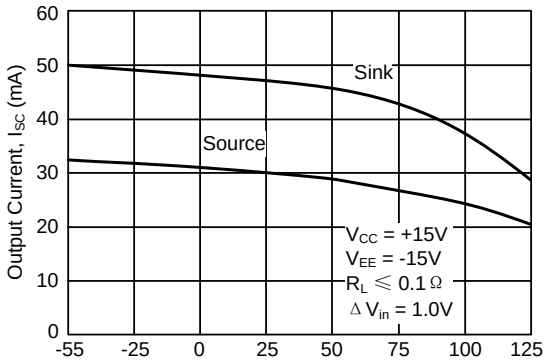
Split Supply Output Saturation versus Load Current



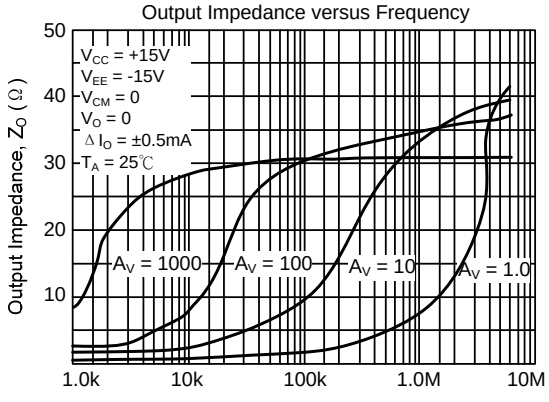
Single Supply Output Saturation versus Load Resistance to Ground



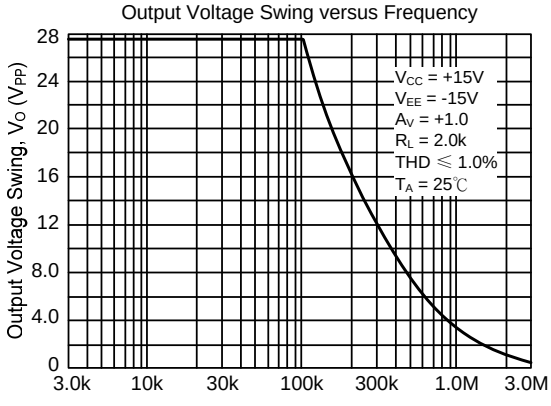
Output Short Circuit Current versus Temperature



Output Impedance versus Frequency

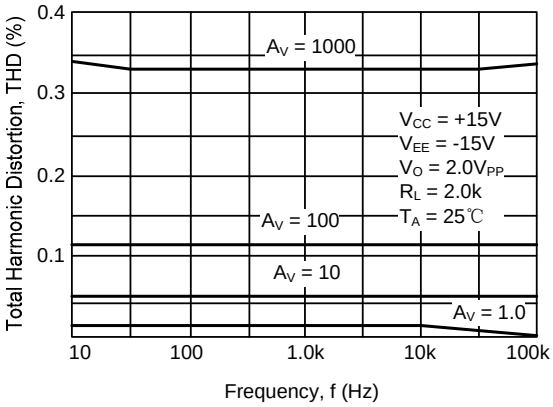


Output Voltage Swing versus Frequency

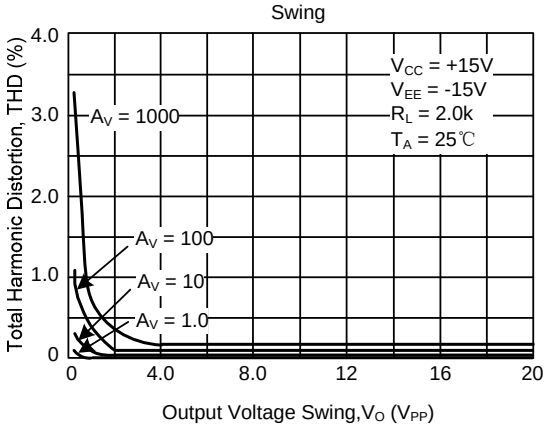


■ TYPICAL CHARACTERISTICS (Cont.)

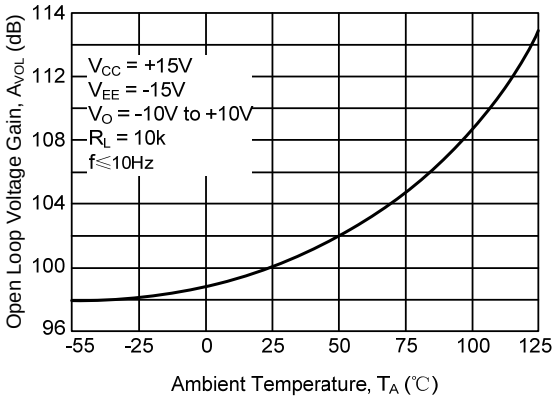
Total Harmonic Distortion versus Frequency



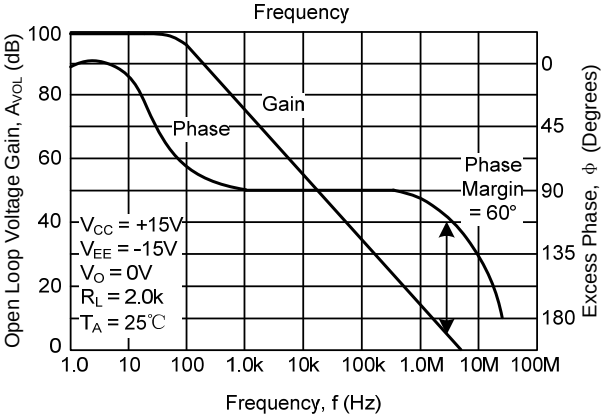
Total Harmonic Distortion versus Output Voltage Swing



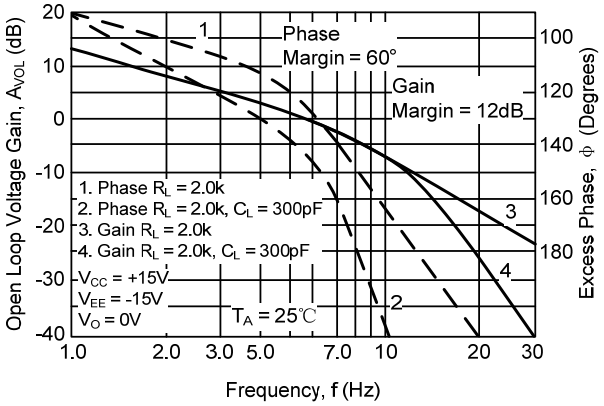
Open Loop Voltage Gain versus Temperature



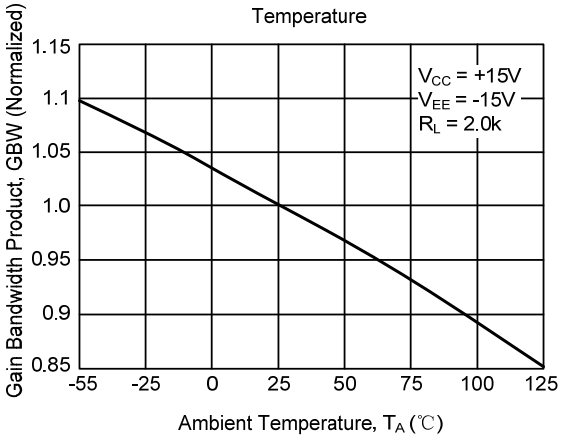
Open Loop Voltage Gain and Phase versus Frequency



Open Loop Voltage Gain And Phase versus Frequency

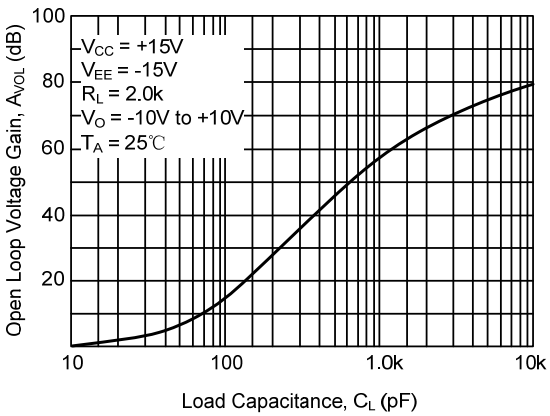


Normalized Gain Bandwidth Product versus Temperature

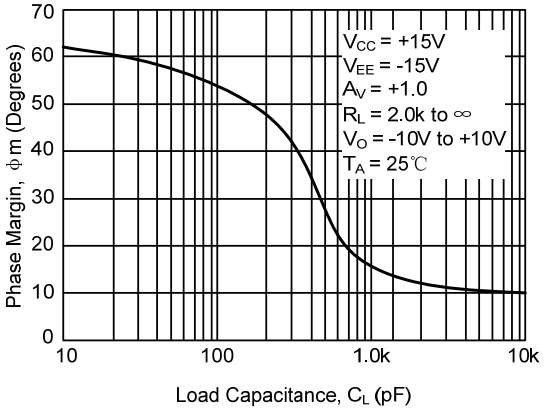


■ TYPICAL CHARACTERISTICS (Cont.)

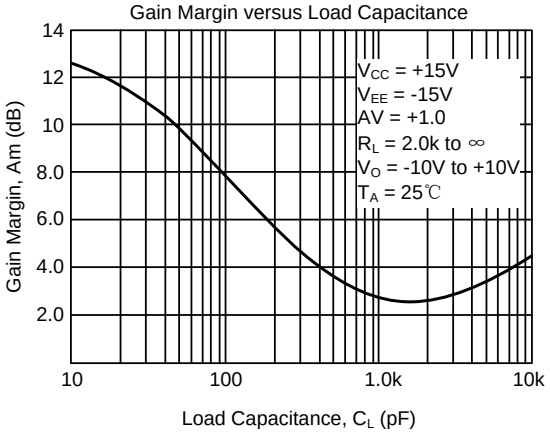
Percent Overshoot versus Load Capacitance



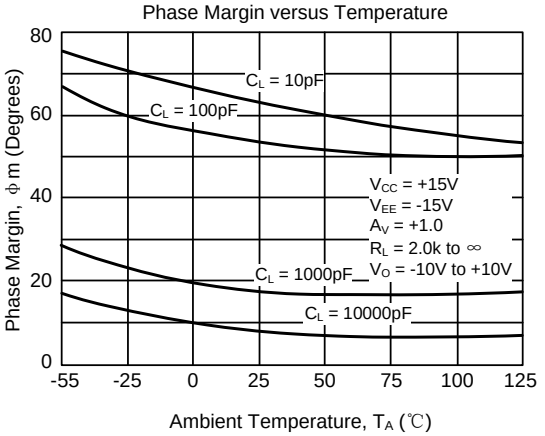
Phase Margin versus Load Capacitance



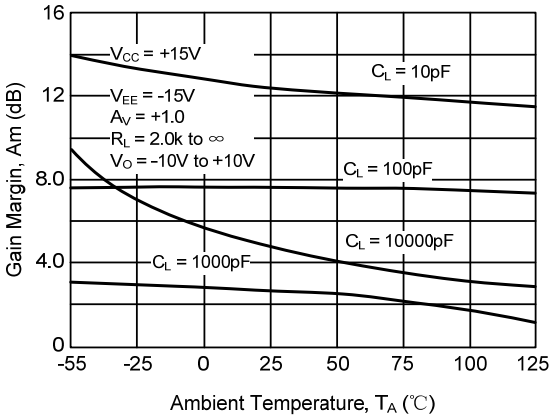
Gain Margin versus Load Capacitance



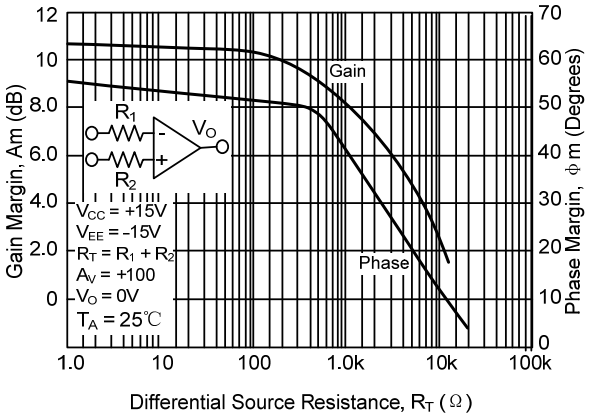
Phase Margin versus Temperature



Gain Margin versus Temperature

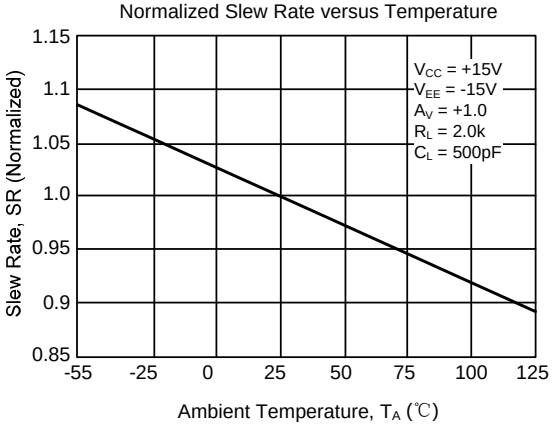


Phase Margin And Gain Margin versus Differential Source Resistance

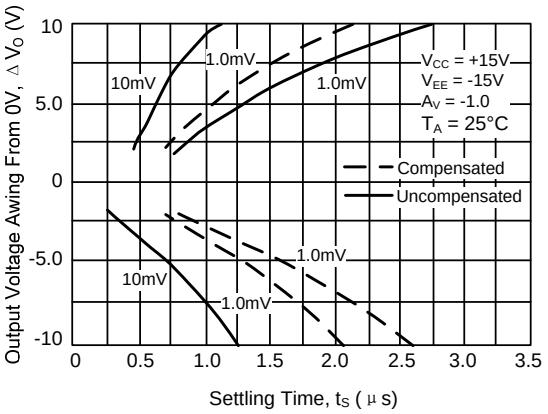


■ TYPICAL CHARACTERISTICS (Cont.)

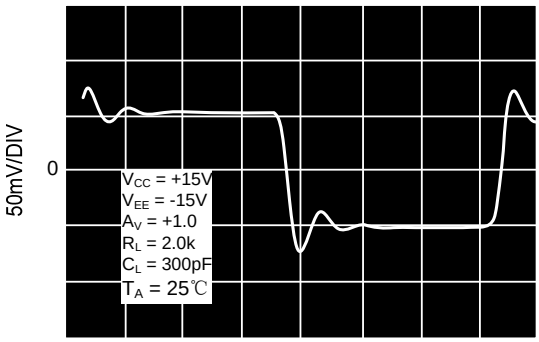
Normalized Slew Rate versus Temperature



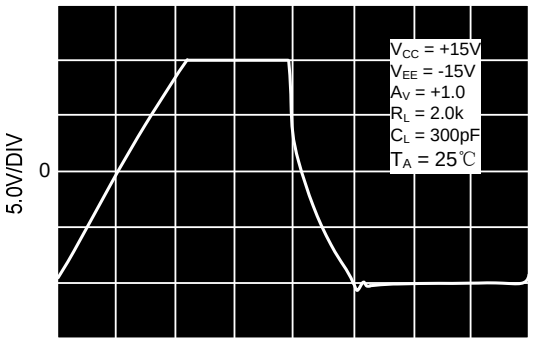
Output Settling Time



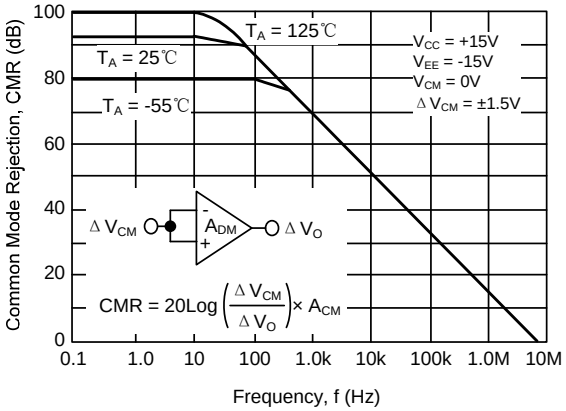
Small Signal Transient Response



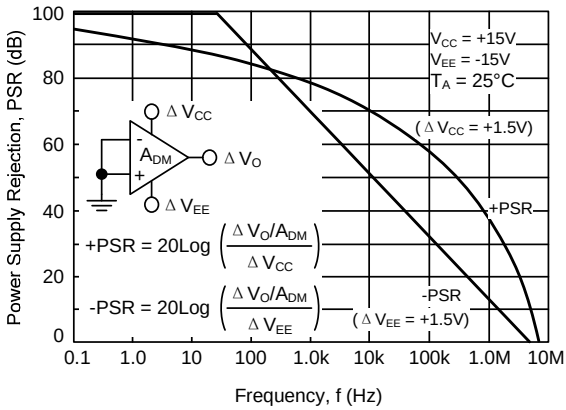
Large Signal Transient Response



Common Mode Rejection versus Frequency

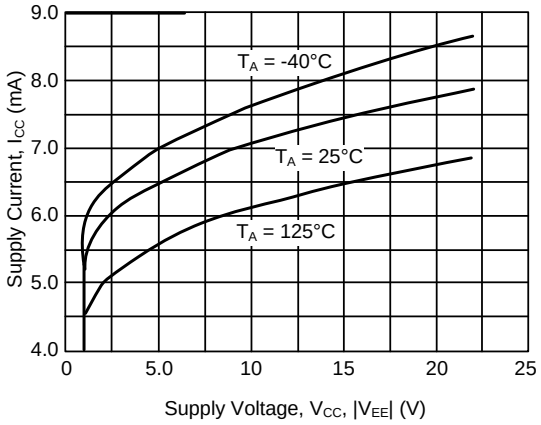


Power Supply Rejection versus Frequency

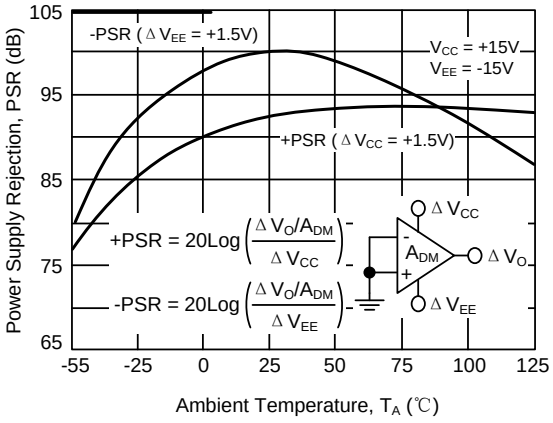


■ TYPICAL CHARACTERISTICS (Cont.)

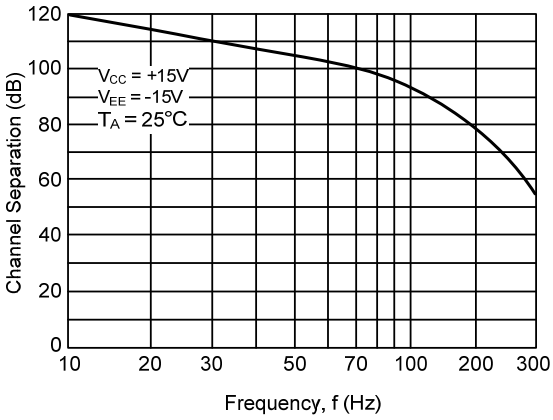
Supply Current versus Supply Voltage



Power Supply Rejection versus Temperature



Channel Separation versus Frequency



Input Noise versus Frequency