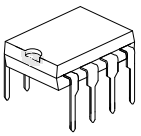
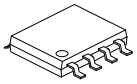
MC34072 *LINEAR INTEGRATED CIRCUIT*

HIGH SLEW RATE, WIDE BANDWIDTH , SINGLE SUPPLY OPERATIONAL AMPLIFIER



DIP-8



SOP-8

Lead-free: MC34072L
Halogen-free:MC34072G

■ DESCRIPTION

The UTC MC34072 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: 4.5 MHz
* 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 10,000 pF
* Low total harmonic distortion: 0.02%
* Excellent phase margin: 60°
* Excellent gain margin: 12dB
* Output short circuit protection
* ESD diodes/clamps provide input protection

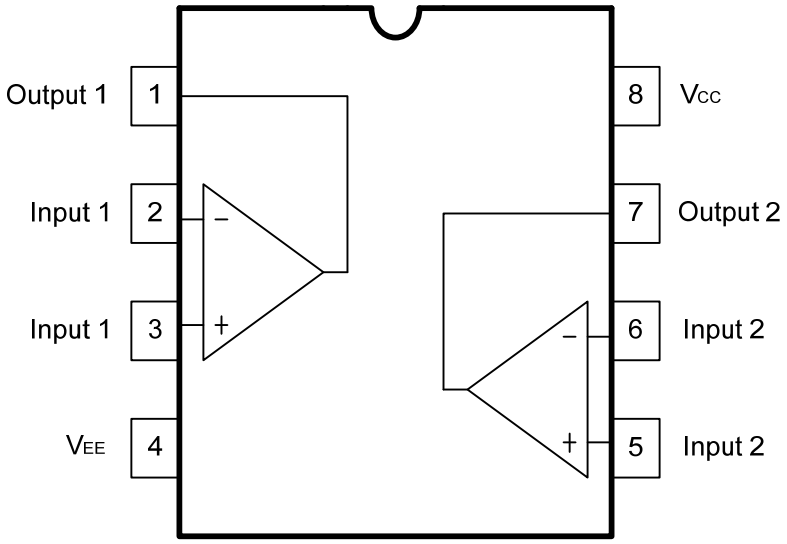
■ ORDERING INFORMATION

Ordering Number			Package	Packing
Normal	Lead Free Plating	Halogen Free		
MC34072-D08-T	MC34072L-D08-T	MC34072G-D08-T	DIP-8	Tube
MC34072-S08-R	MC34072L-S08-R	MC34072G-S08-R	SOP-8	Tape Reel

MC34072L-D08-R
(1)Packing Type
(2)Package Type
(3)Lead Plating

(1) R: Tape Reel, T: Tube
(2) D08: DIP-8, S08: SOP-8
(3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn

■ PIN DESCRIPTION



■ ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage (from V_{EE} to V_{CC})	Vs	+44	V
Differential Input Voltage	$V_{I(DIFF)}$	Note 1	V
Input Voltage	V_{IN}	Note 1	V
Output Short Circuit Duration (Note 2)	t_{SC}	Indefinite	sec
Junction Temperature	T_J	+125	°C
Operating Temperature	T_{OPR}	-20 ~ +85	°C
Storage Temperature Range	T_{STG}	-40~ +150	°C

Note 1.Either or both input voltages should not exceed the magnitude of V_{CC} or V_{EE}.
2.Power dissipation must be considered to ensure maximum junction temperature (T_J) is not exceeded. (see FIG. 1)
3.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.

■ 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, V_{OUT}=0V	V_{CC}=+15V,V_{EE}=-15V,Ta=+25°C		0.5	3.0	mV
			V_{CC}=+5V,V_{EE}=0V, Ta=+25°C		0.5	3.0	mV
			V_{CC}=+15V,V_{EE}=-15V,Ta=0°C to 70°C			5.0	mV
Average Temperature Coefficient of Input Offset Voltage	$\Delta V_{IO}/\Delta T$	R_S=10Ω,V_{CM}=0V, V_{OUT} =0V, Ta=0°C to 70°C			10		μV/°C
Input Bias Current	$I_{I(BIAS)}$	V_{CM}=0V, V_{OUT} =0V	Ta=+25°C		100	500	nA
			Ta=0°C to 70°C			700	nA
Input Offset Current	$I_{I(OFF)}$	V_{CM}=0V, V_{OUT} =0V	Ta=+25°C		6.0	50	nA
			Ta=0°C to 70°C			300	nA
Input Common Mode Voltage	V_{ICR}	Ta=+25°C		V_{EE} to (V_{CC} –1.8)			V
		Ta=0°C to 70°C		V_{EE} to (V_{CC} –2.2)			V
Large Signal Voltage Gain	G_V	V_{OUT} =±10V, RL=2.0kΩ	Ta=+25°C	50	100		V/mV
			Ta=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, Ta=+25°C		3.7	4.0		V
		V_{CC}=+15.0V,V_{EE}=-15V, R_L=10kΩ, Ta=+25°C		13.6	14		V
		V_{CC}=+15.0V,V_{EE}=-15V, R_L=2.0kΩ, Ta=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, Ta=+25°C			0.1	0.3	V
		V_{CC}=+15.0V,V_{EE}=-15V, R_L=10kΩ,TA=+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}	$V_{I(DIFF)}$=1.0V,V_{OUT}=0V, Ta=25°C	Source	10	30		mA
			Sink	20	30		
Common Mode Rejection	CMR	R_S<=10kΩ,V_{CM}=V_{ICR}, Ta=25°C		80	97		dB
Power Supply Rejection (R_S=100Ω)	SVR	V_{CC}/V_{EE}=+16.5V/-16.5V to +13.5/-13.5V, Ta=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, Ta=+25°C			1.6	2.0	mA
		V_{CC}=+15.0V,V_{EE}=-15V, V_{OUT} =0V,Ta=+25°C			1.9	2.5	mA
		V_{CC}=+15.0V,V_{EE}=-15V, V_{OUT} =0V, Ta=0°C to 70°C				2.8	mA
Slew Rate	SR	V_{IN}=-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) to 0.01% (+1/2 LSB of 12-Bits)			 1.1 2.2		μs
Gain Bandwidth Product	GB_W	f=100kHz		3.5	4.5		MHz
Power Bandwidth	B_W	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		Deg
Gain Margin	Am	R_L=2kΩ			12		dB
		R_L=2kΩ, C_L=300pF			4		dB
Equivalent Input Noise Voltage	eN	Rs=100Ω, f=1.0kHz			32		$nV/\sqrt{Hz}$
Equivalent Input Noise Current	eN	f=1.0kHz			0.22		$pA/\sqrt{Hz}$
Differential Input Resistance	R_{IN}	V_{CM}=0V			150		MΩ
Differential Input Capacitance	C_{IN}	V_{CM}=0V			2.5		pF
Total Harmonic distortion	THD	Av=+10,R_L=2.0kHz,2.0Vpp≤V_{OUT}≤20Vpp, f=10kHz			0.02		%
Channel Separation		f=10kHz			120		dB
Open Loop Output Impedance	IZoI	f=1.0MHz			30		W

■ REPRESENTATIVE SCHEMATIC DIAGRAM

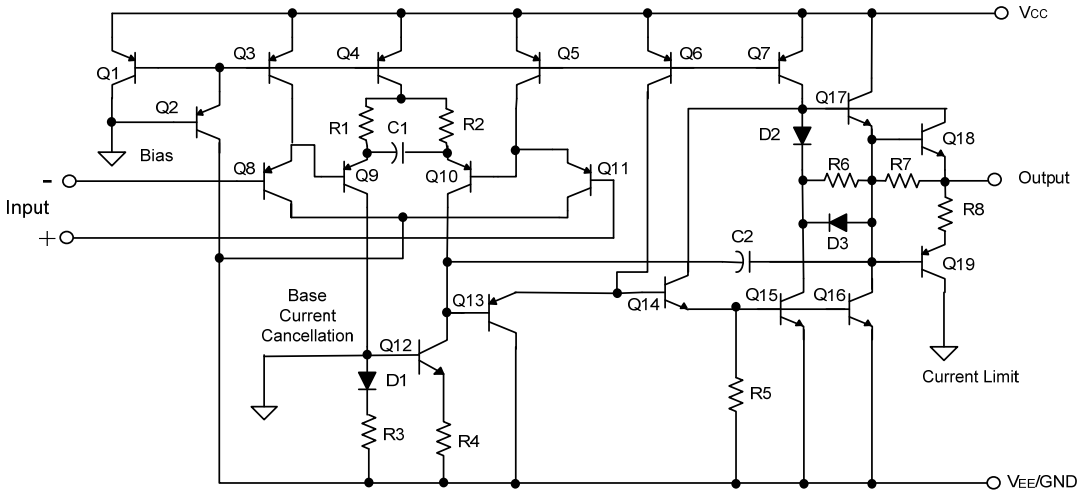
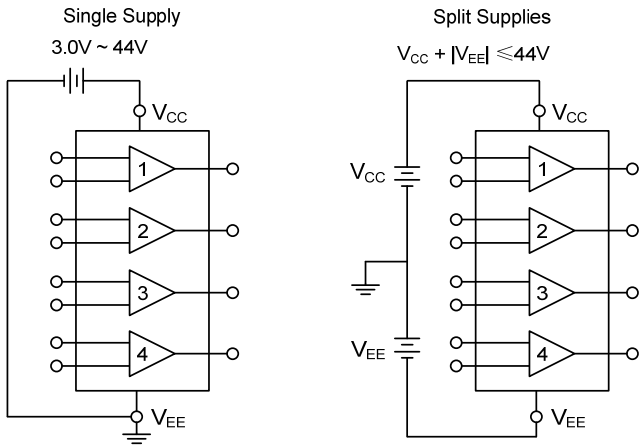


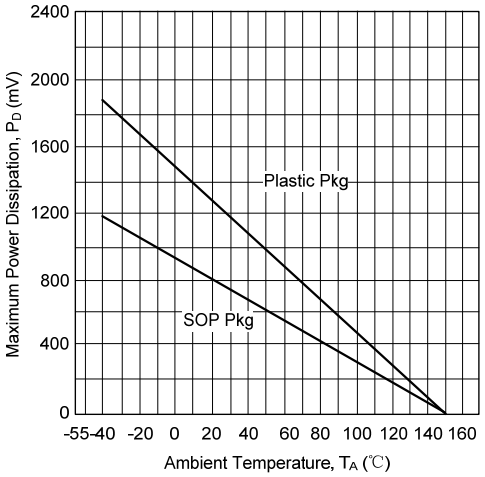
FIG.1

■ POWER SUPPLY CONFIGURATIONS

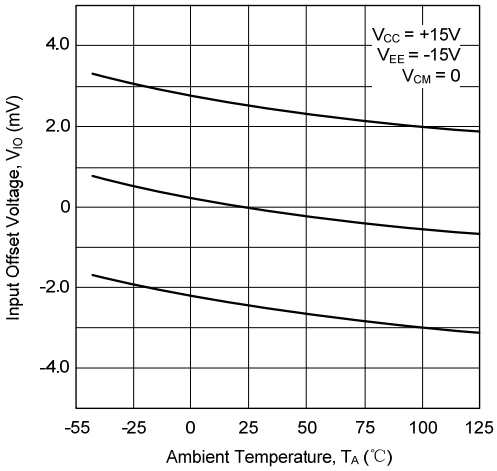


■ TYPICAL CHARACTERISTICS

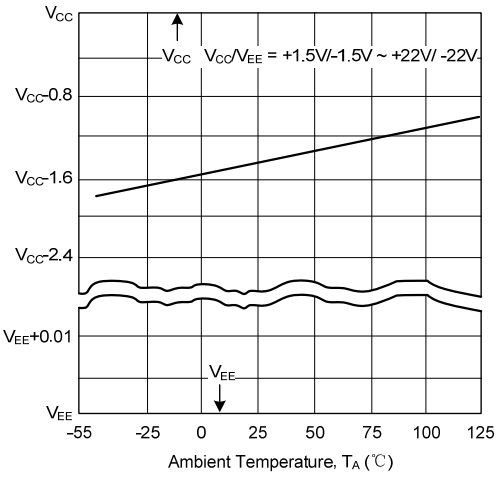
Maximum Power Dissipation vs. Temperature for Package Types



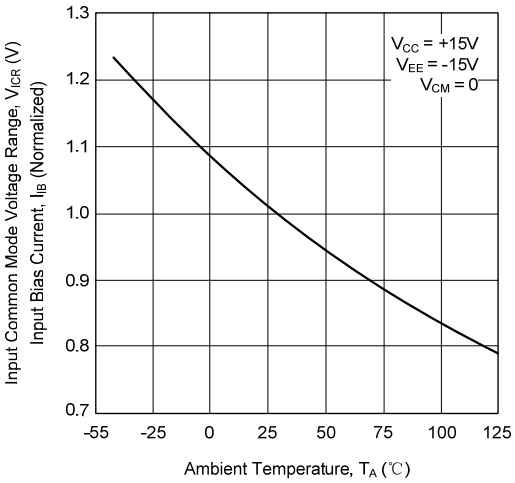
Input Offset Voltage vs. Temperature for Representative Units



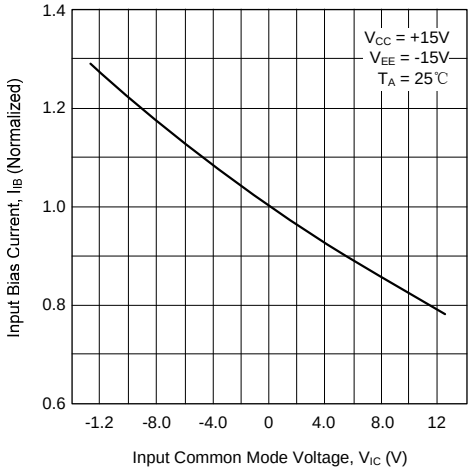
Input Common Mode Voltage Range vs. Temperature



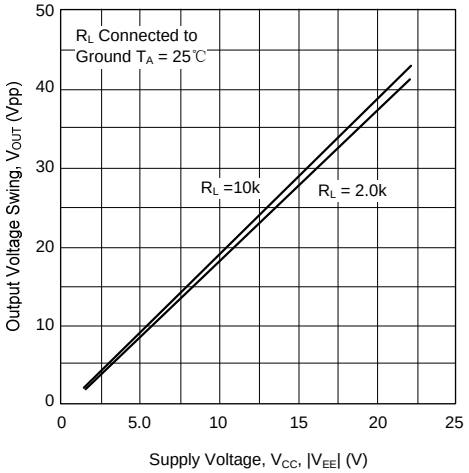
Normalized Input Bias Current vs. Temperature



Normalized Input Bias Current vs. Input Common Mode Voltage

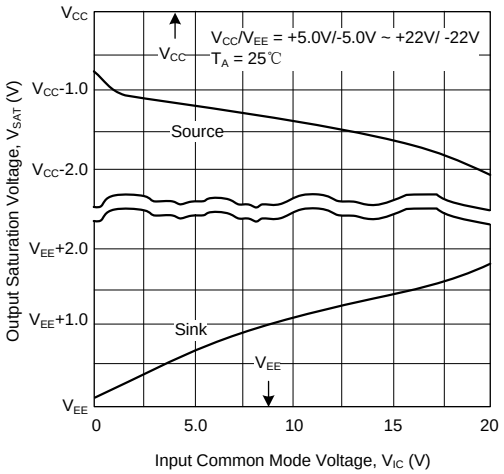


Split Supply Output Voltage Swing vs. Supply Voltage

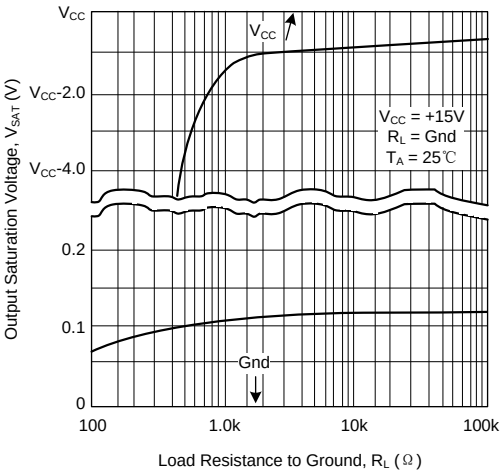


■ TYPICAL CHARACTERISTICS (Cont)

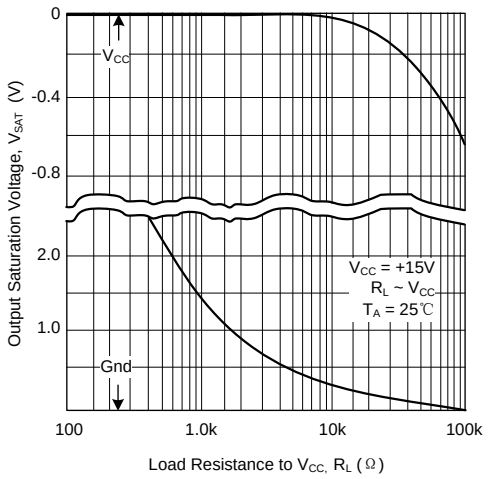
Single Supply Output Saturation vs. Load Resistance to V_{CC}



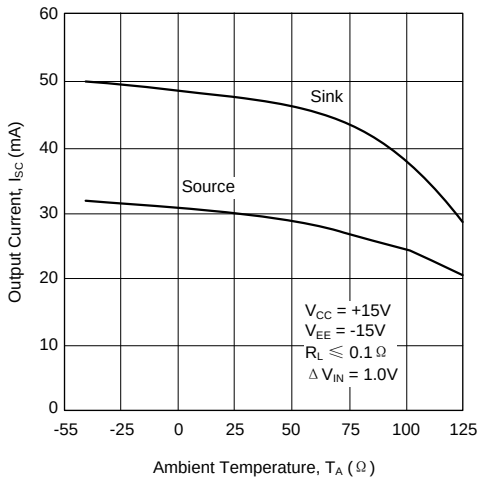
Split Supply Output Saturation vs. Load Current



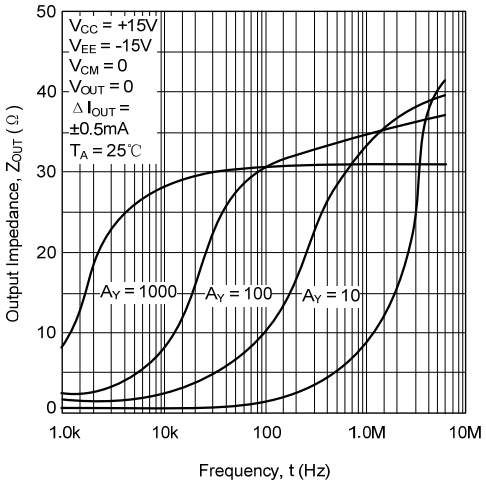
Single Supply Output Saturation vs. Load Resistance to Ground



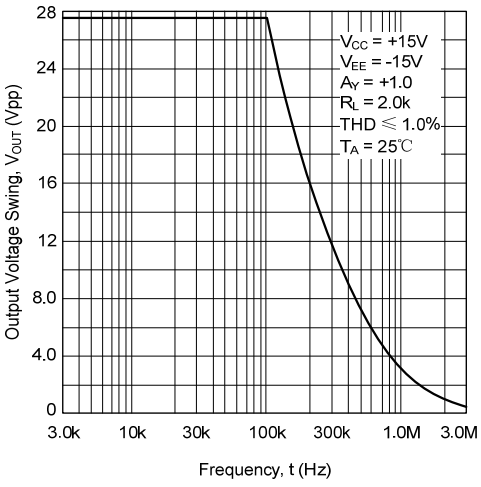
Output Short Circuit Current vs. Temperature



Output Impedance vs. Frequency

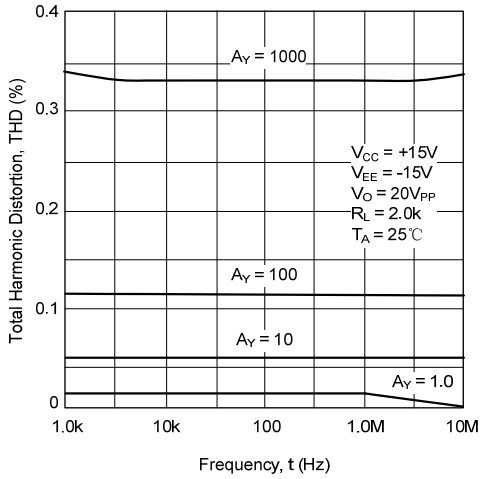


Output Voltage Swing vs. Frequency

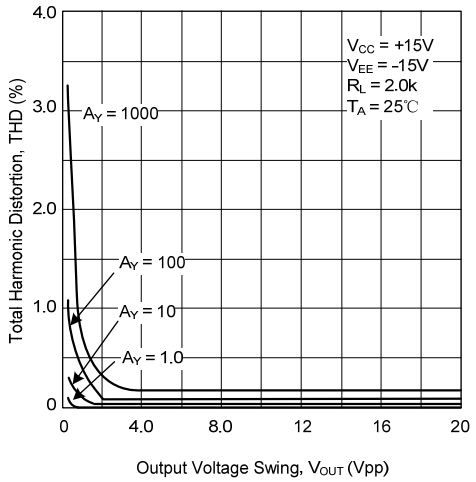


■ TYPICAL CHARACTERISTICS(Cont.)

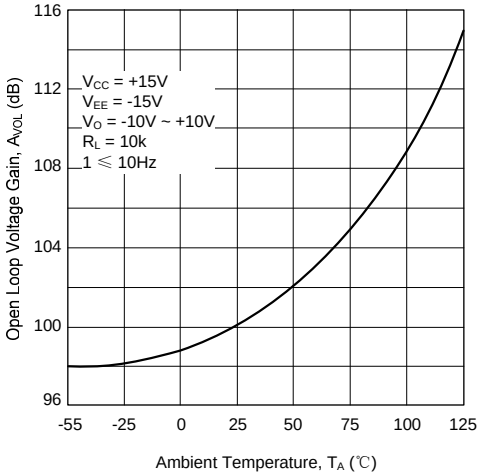
Total Harmonic Distortion vs. Frequency



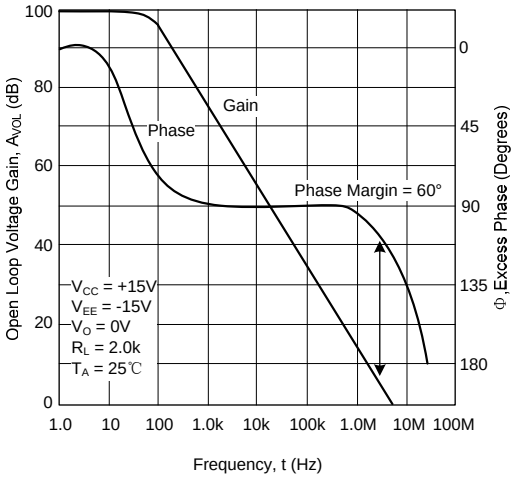
Total Harmonic Distortion vs. Output Voltage Swing



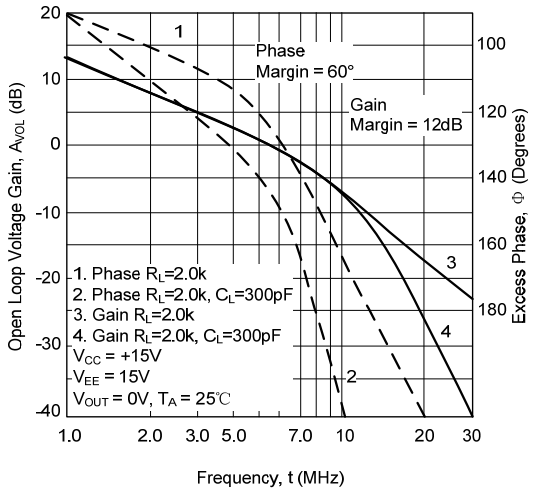
Open Loop Voltage Gain vs. Temperature



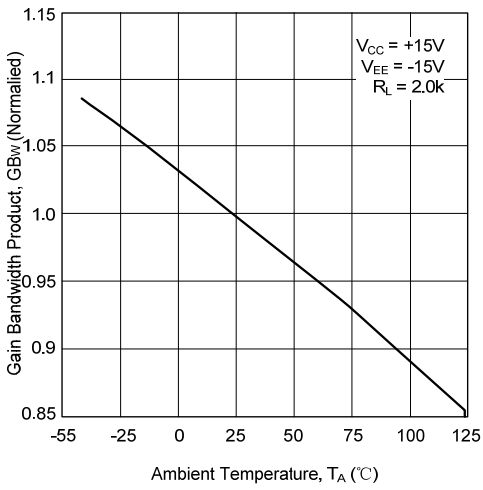
Open Loop Voltage Gain and Phase vs. Frequency



Open Loop Voltage Gain and Phase vs. Frequency

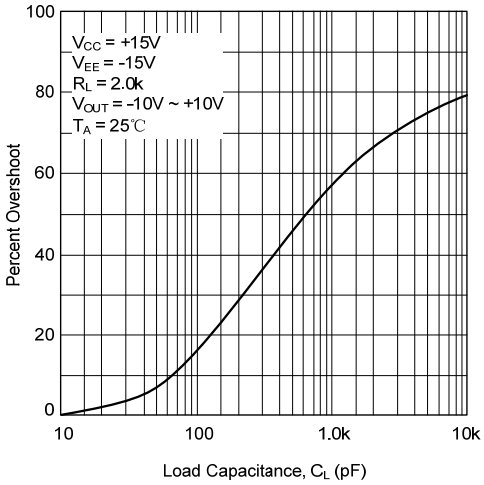


Normalized Gain Bandwidth Product vs. Temperature

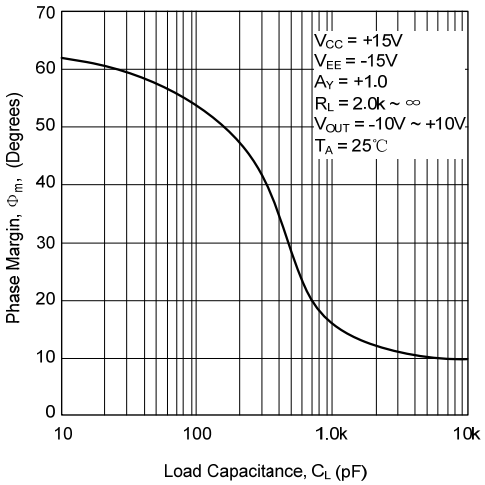


■ TYPICAL CHARACTERISTICS(Cont.)

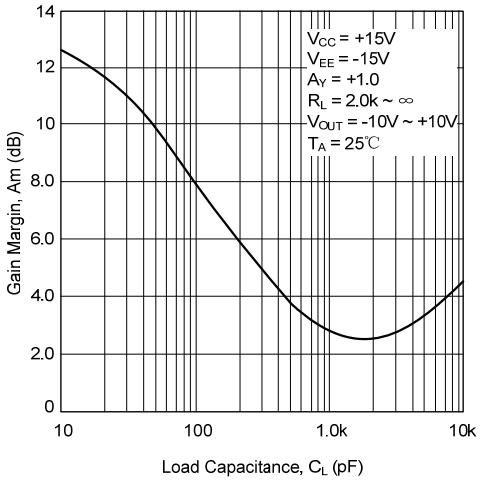
Percent Overshoot vs. Load Capacitance



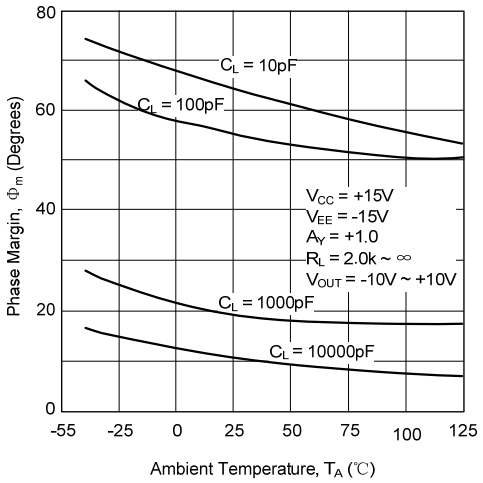
Phase Margin vs. Load Capacitance



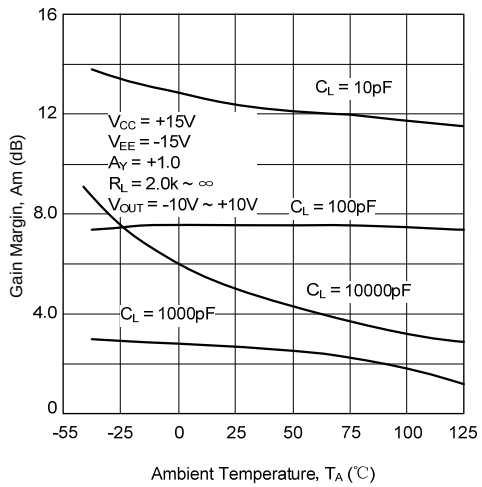
Gain Margin vs. Load Capacitance



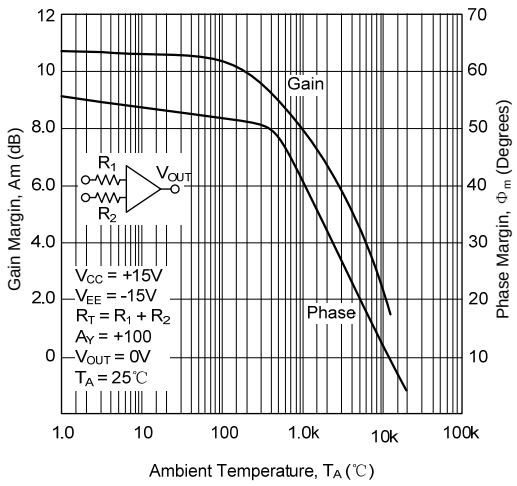
Phase Margin vs. Temperature



Gain Margin vs. Temperature

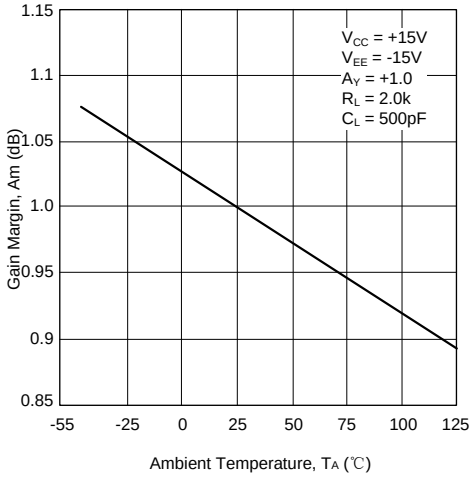


Phase Margin and Gain Margin vs. Differential Source Resistance

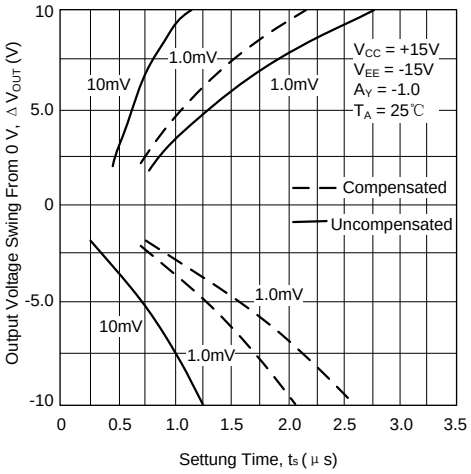


■ TYPICAL CHARACTERISTICS(Cont.)

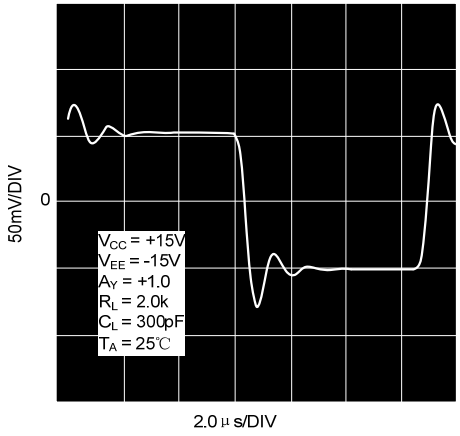
Normalized Slew Rate vs. Temperature



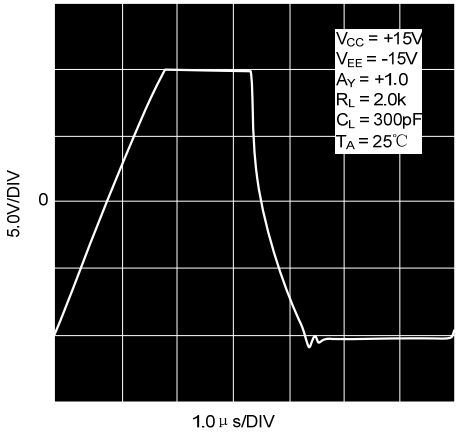
Output Setting Time



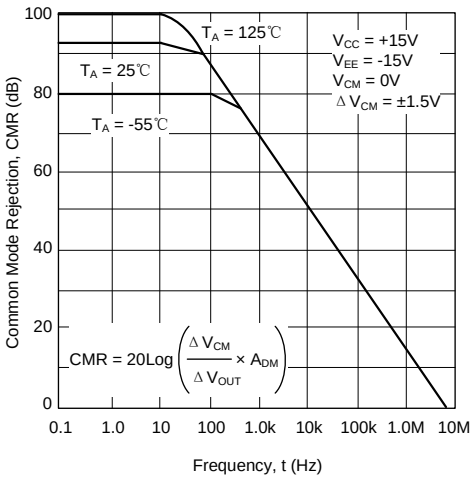
Small Signal Transient Response



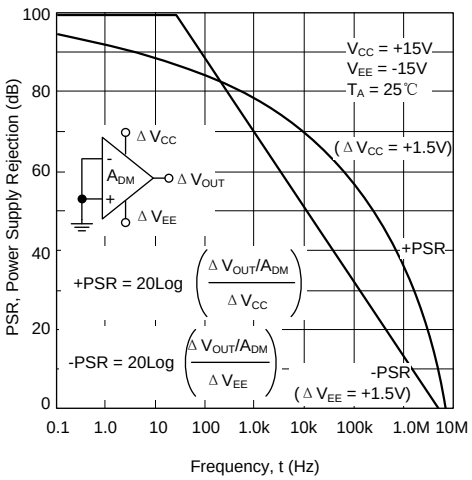
Large Signal Transient Response



Common Mode Rejection vs. Frequency

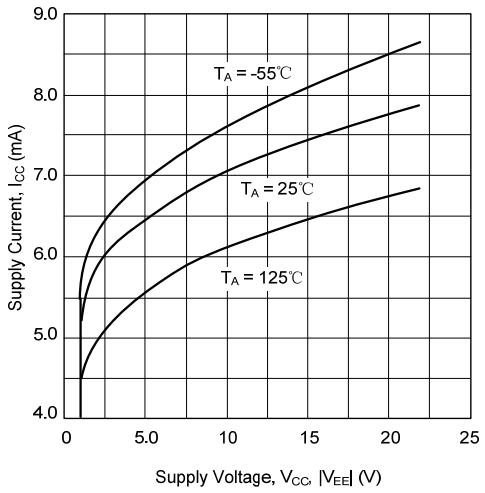


Power Supply Rejection vs. Frequency

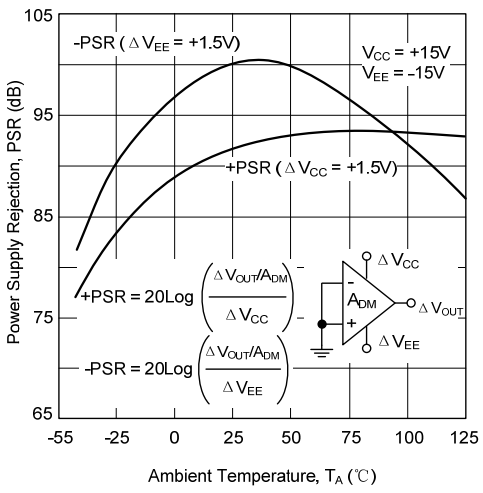


■ TYPICAL CHARACTERISTICS(Cont.)

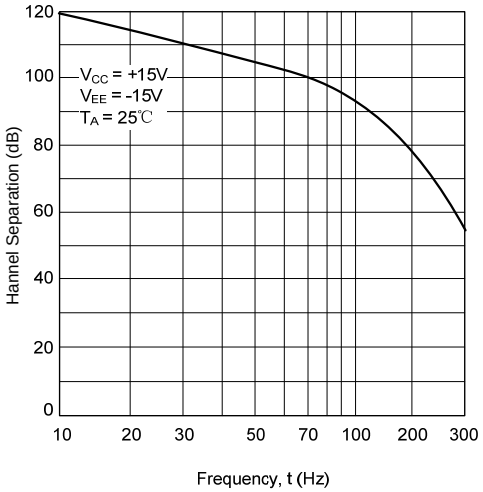
Supply Current vs. Supply Voltage



Power Supply Rejection vs. Temperature



Channel Separation vs. Frequency



Input Noise vs. Frequency