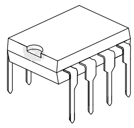
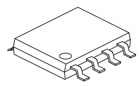
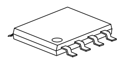
LOW NOISE DUAL J-FET OPERATIONAL AMPLIFIER



DIP-8



SOP-8



TSSOP-8

■ DESCRIPTION

The UTC **TL072** is a high speed J-FET input quad operational amplifier. It incorporates well matched, high voltage J-FET and bipolar transistors in a monolithic integrated circuit. The device features high slew rates, low input bias and offset current, and low offset voltage temperature coefficient.

■ FEATURES

* Low power consumption
* Wide common-mode (up to V_{CC+}) and differential voltage range
* Low input bias and offset current
* Low noise en = 15nV / $\sqrt{Hz}$ (typ.)
* Output short-circuit protection
* High input impedance J-FET input stage
* Low harmonic distortion:0.01% (typ.)
* Internal frequency compensation
* Latch up free operation
* High slewrate:10V/µs (typ.)

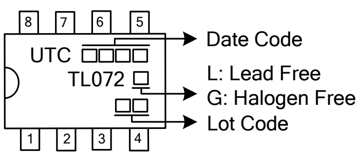
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
TL072L-D08-T	TL072G-D08-T	DIP-8	Tube
TL072L-S08-R	TL072G-S08-R	SOP-8	Tape Reel
TL072L-P08-R	TL072G-P08-R	TSSOP-8	Tape Reel

TL072G-D08-T	
(1)Packing Type	(1) T: Tube, R: Tape Reel
(2)Package Type	(2) D08: DIP-8, S08: SOP-8, P08: TSSOP-8
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

DIP-8



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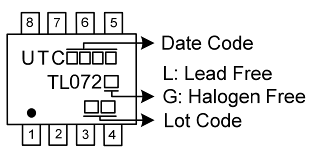
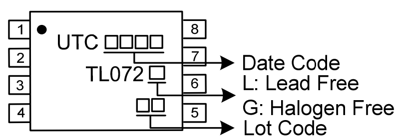
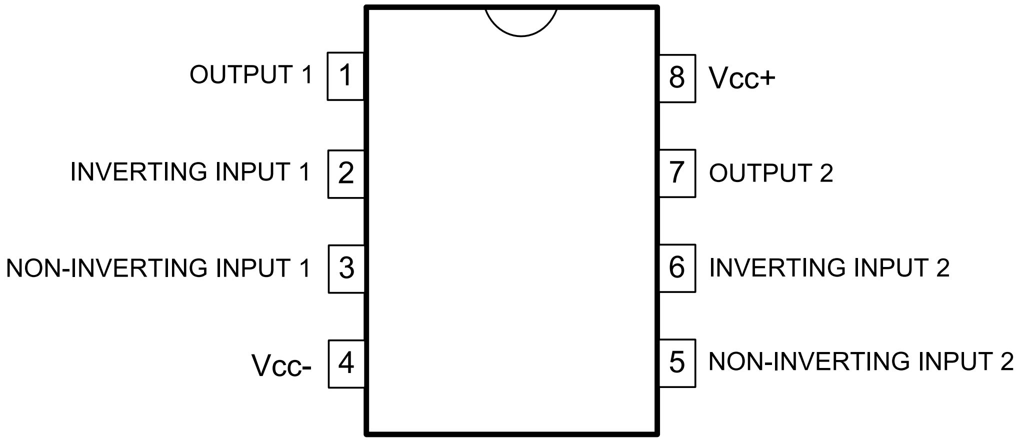


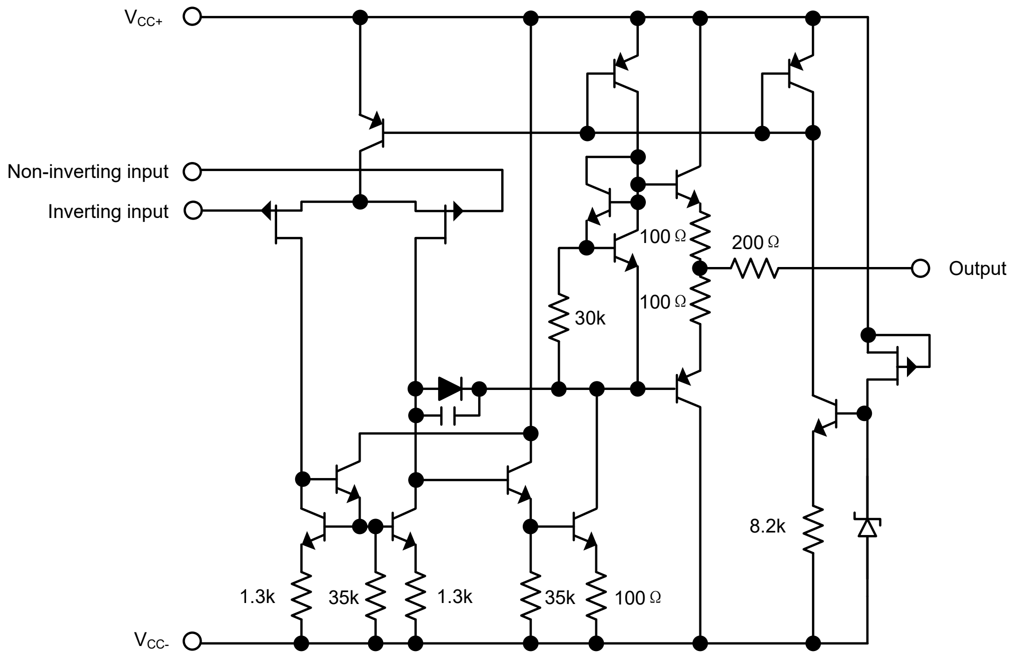
TSSOP-8



■ PIN CONFIGURATION



■ BLOCK DIAGRAM



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

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage (Note 2)		V_{CC}	±18	V
Input Voltage (Note 3)		V_{IN}	±15	V
Differential Input Voltage (Note 4)		$V_{I(DIFF)}$	±30	V
Power Dissipation	DIP-8	P_D	625	mW
	SOP-8		440	mW
	TSSOP-8		360	mW
Output Short-Circuit Duration (Note 5)			Infinite	
Operating Temperature		T_{OPR}	-40 ~ +125 (Note 6)	°C
Storage Temperature		T_{STG}	-65 ~ +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. All voltage values, except differential voltage, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is the midpoint between V_{CC}- and V_{CC}+.
3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
4. Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.
5. The output may be shorted to ground or to either supply. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.
6. It is guarantee by design, not 100% be tested.

■ ELECTRICAL CHARACTERISTICS (V_{CC}=±15V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Input Offset Voltage	$V_{I(OFF)}$	R_S=50Ω	T_A=25°C		3	10	mV
			$T_{MIN} \leq T_A \leq T_{MAX}$			13	mV
Temperature Coefficient of Input Offset Voltage	$\Delta V_{I(OFF)}$	R_S=50Ω			10		μV/°C
Input Offset Current (Note)	$I_{I(OFF)}$	T_A=25°C			5	100	pA
		$T_{MIN} \leq T_A \leq T_{MAX}$				10	nA
Input Bias Current (Note)	$I_{I(BIAS)}$	T_A=25°C			20	200	pA
		$T_{MIN} \leq T_A \leq T_{MAX}$				20	nA
Input Common Mode Voltage	$V_{I(CM)}$			±11	-12~+15		V
Output Voltage Swing	$V_{O(SW)}$	R_L=2kΩ	T_A=25°C	±10	±12		V
		R_L=10kΩ		±12	±13.5		V
		R_L=2kΩ	$T_{MIN} \leq T_A \leq T_{MAX}$	±10			V
		R_L=10kΩ		±12			V
Large Signal Voltage Gain	G_V	R_L=2kΩ, V_{OUT}=±10V	T_A=25°C	25	200		V/mV
			$T_{MIN} \leq T_A \leq T_{MAX}$	15			V/mV
Gain Bandwidth Product	GB_W	T_A=25°C, R_L=10kΩ, C_L=100pF		2.5	4		MHz
Input Resistance	R_{IN}				10^{12}		Ω
Common Mode Rejection Ratio	CMR	R_S=50Ω	T_A=25°C	70	86		dB
			$T_{MIN} \leq T_A \leq T_{MAX}$	70			dB
Supply Voltage Rejection Ratio	SVR	R_S=50Ω	T_A=25°C	70	86		dB
			$T_{MIN} \leq T_A \leq {}_{MAX}$	70			dB
Supply Current	I_{CC}	No load	T_A=25°C		1.4	2.5	mA
			$T_{MIN} \leq T_A \leq T_{MAX}$			2.5	mA
Channel Separation	V01/V02	G_V=100			120		dB
Output Short-circuit Current	I_{OS}	T_A=25°C		10	40	60	mA
		$T_{MIN} \leq T_A \leq T_{MAX}$		10		60	mA
Slew Rate	SR	V_{IN}=10V, R_L=2kΩ, C_L=100pF, unity gain		6	10		V/μs
Rise Time	t_R	V_{IN}=20mV, R_L=2kΩ, C_L=100pF, unity gain			0.1		μs
Overshoot Factor	Kov	V_{IN}=20mV,R_L=2kΩ,C_L=100pF, unity gain			10		%
Total Harmonic Distortion	THD	G_V=20dB, f=1kHz, R_L=2kΩ, C_L=100pF, V_{OUT}=2Vpp			0.01		%
Phase Margin	φm				45		Degrees
Equivalent Input Noise Voltage	eN	R_S=100Ω, f=1KHz			15		$\frac{nV}{\sqrt{Hz}}$

Note: The Input bias currents are junction leakage currents, which approximately double for every 10 °C increase in the junction temperature.

■ PARAMETER MEASUREMENT INFORMATION

Figure 1. Voltage Follower

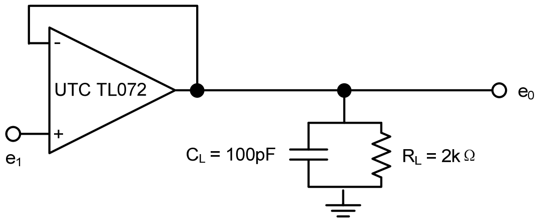
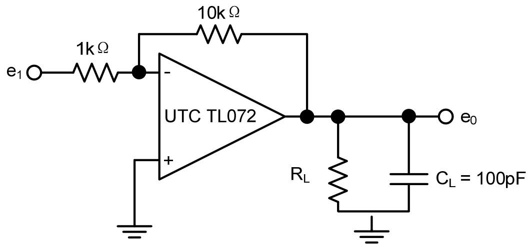
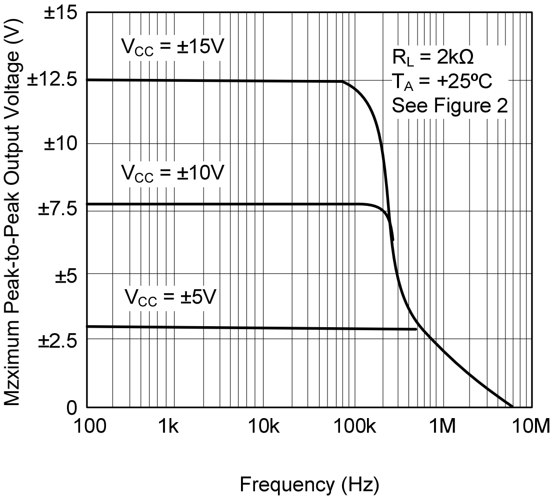


Figure 2. Gain-of-10 Inverting Amplifier

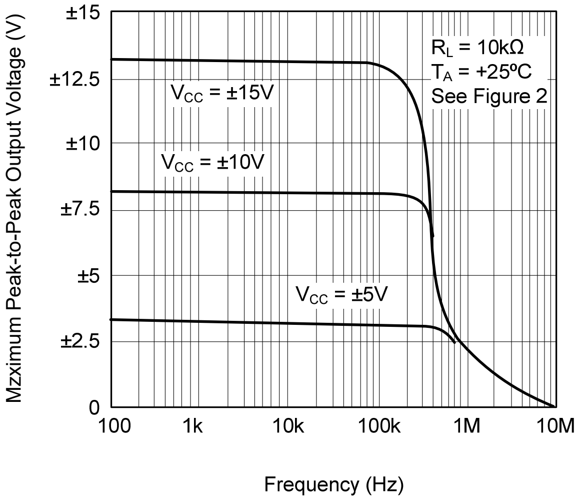


■ TYPICAL CHARACTERISTICS

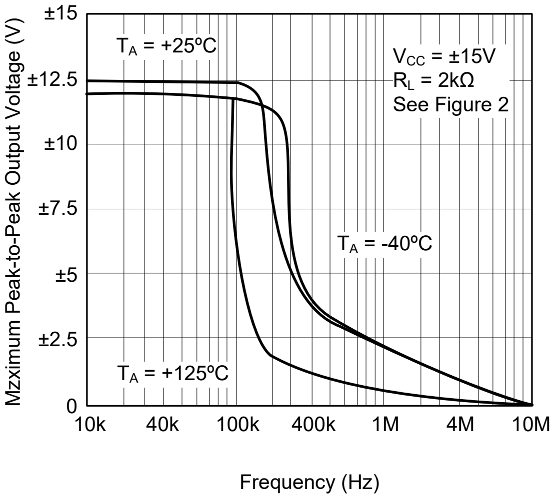
Maximum Peak-to-Peak Output Voltage vs. Frequency



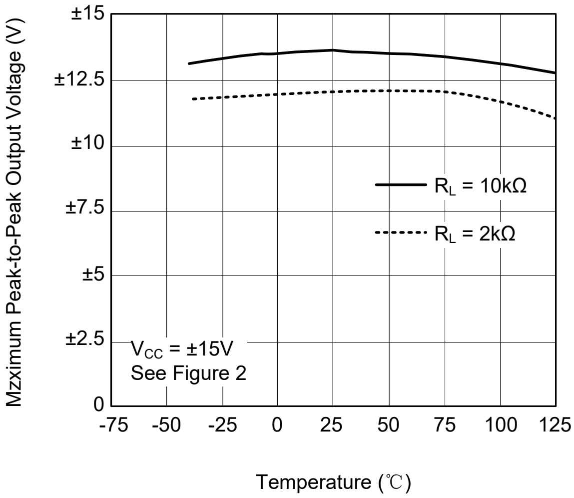
Maximum Peak-to-Peak Output Voltage vs. Frequency



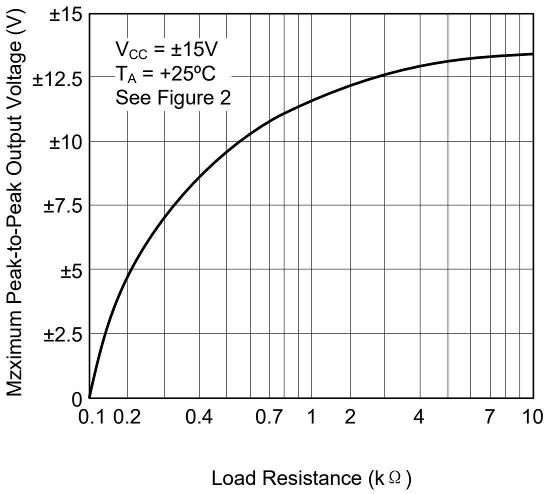
Maximum Peak-to-Peak Output Voltage vs. Frequency



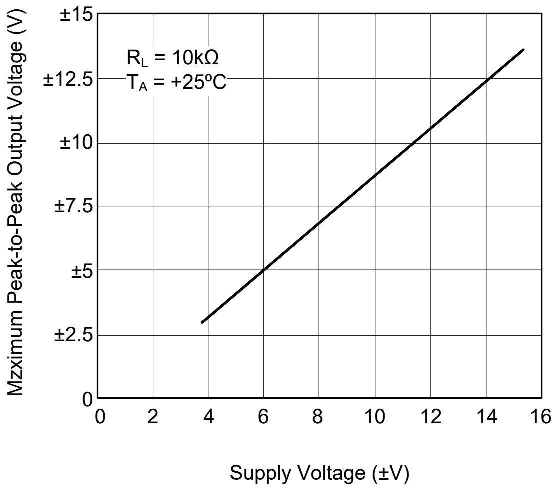
Maximum Peak-to-Peak Output Voltage vs. Free Air Temp.



Maximum Peak-to-Peak Output Voltage vs. Load Resistance

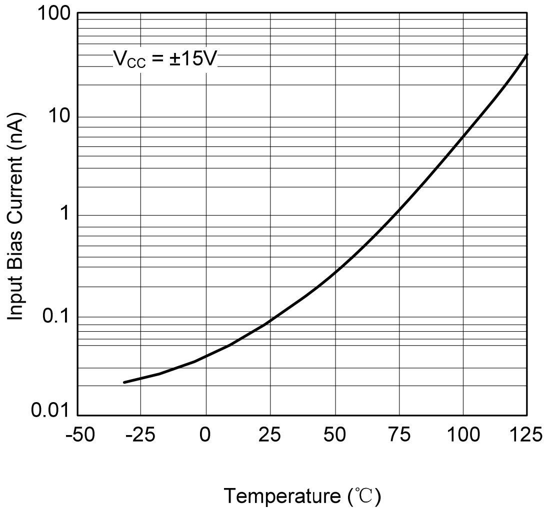


Maximum Peak-to-Peak Output Voltage vs. Supply Voltage

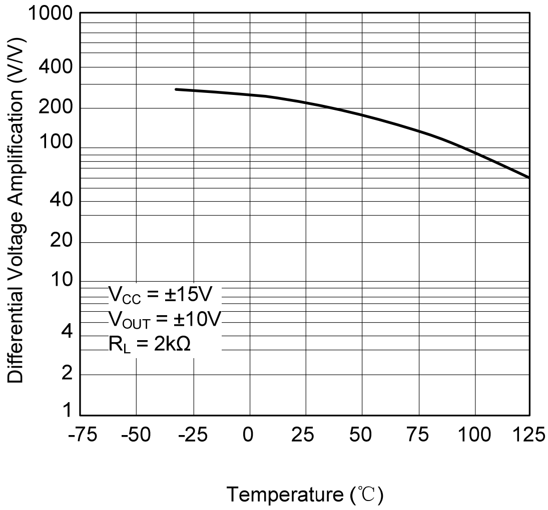


■ TYPICAL CHARACTERISTICS (Cont.)

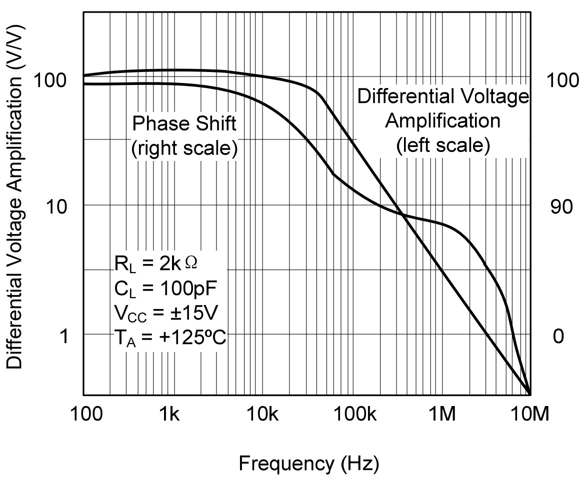
Input Bias Current vs. Free Air Temperature



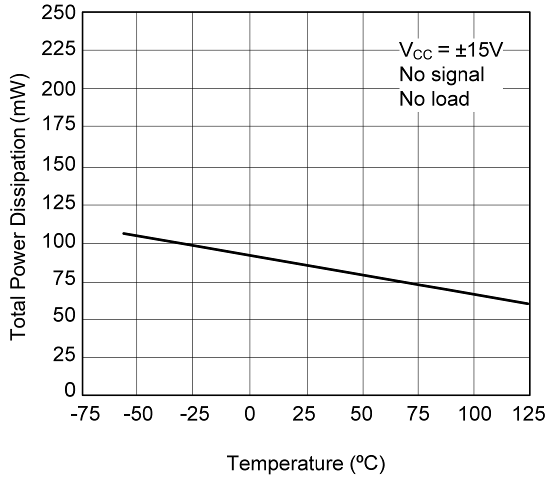
Large Signal Differential Voltage Amplification vs. Free Air Temperature



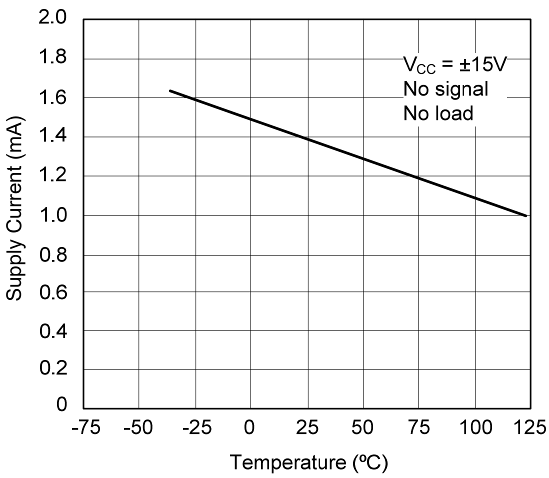
Large Signal Differential Voltage Amplification and Phase Shift vs. Frequency



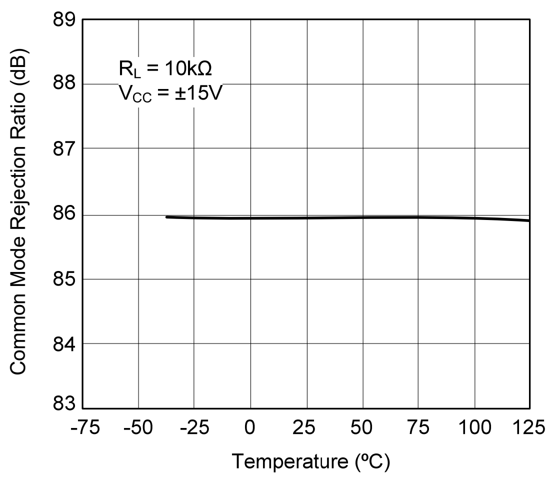
Total Power Dissipation vs. Free Air Temperature



Supply Current Per Amplifier vs. Free Air Temperature



Total Power Dissipation vs. Free Air Temperature



■ TYPICAL CHARACTERISTICS (Cont.)