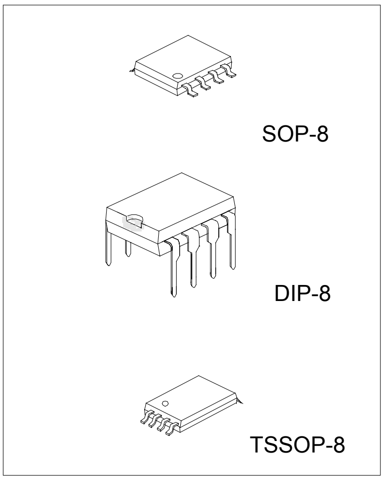
LOW NOISE DUAL J-FET OPERATIONAL AMPLIFIER



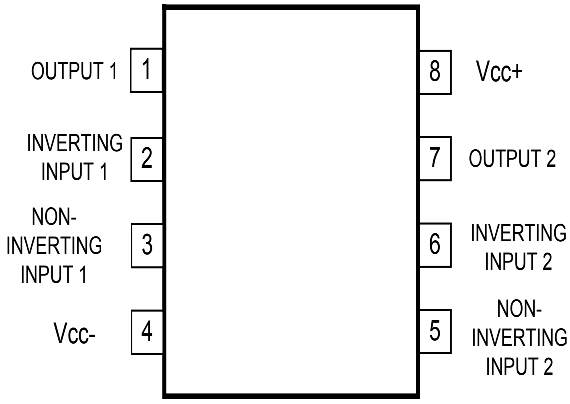
DESCRIPTION

The UTC TL072 is a high speed J-FET input dual 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.

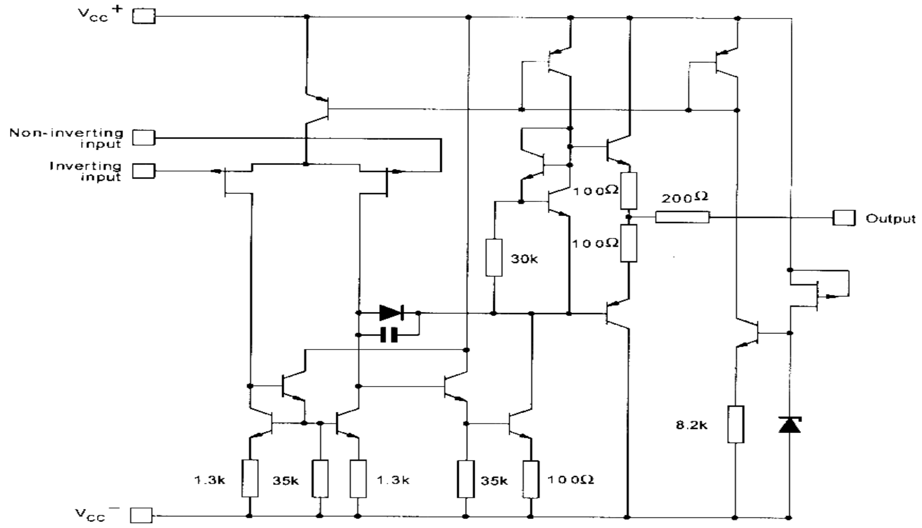
FEATURES

*Low power consumption
*Wide common-mode (up to V_{CC}^{+}) and differential voltage range
*Low input bias and offset current
*Low noise e_n = 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:16V/μs(typ)

PIN CONFIGURATIONS



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage (note 1)	Vcc	+-18	V
Input Voltage (note 2)	Vi	+-15	V
Differential Input Voltage (note 3)	Vid	+-30	V
Power Dissipation	Ptot	680	mW
Output Short-Circuit Duration (Note 4)		Infinite	
Operating Free Air Temperature Range	Toper	0 to 70	°C
Storage Temperature Range	Tstg	-65 to 150	°C

NOTES:
1. 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 Vcc- and Vcc+.
2. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
3. Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.
4. 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.

UTC TL072 C ELECTRICAL CHARACTERISTICS(Vcc=+-15V, Ta=25°C, Tmin=0°C ,Tmax=70°C , unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Input Offset Voltage (Rs=50Ω, Ta=25°C Tmin<=Ta<=Tmax	Vio		3	10 13	mV
Temperature Coefficient of Input Offset Voltage (Rs=50Ω)	Dvio		10		μV/°C
Input Offset Current* Ta=25°C Tmin<=Ta<=Tmax	Iio		 5	 100 10	 Pa nA
Input Bias Current* Ta=25°C Tmin<=Ta<=Tmax	Iib		 20	 200 20	 pA nA
Input Common Mode Voltage	Vicm	+-11	-12~+15		V
Output Voltage Swing (R_L=10kΩ) Ta=25°C, R_L=2kΩ, Ta=25°C, R_L=10kΩ Tmin<=Ta<=Tmax, R_L=2kΩ Tmin<=Ta<=Tmax, R_L=10kΩ	Vopp	 10 12 10 12	 12 13.5		 V
Large Signal Voltage Gain (R_L=10kΩ, Vo=+-10V) Ta=25°C Tmin<=Ta<=Tmax	Avd	25 15	200		V/mV
Gain Bandwidth Product (Ta=25°C, R_L=10kΩ, C_L=100pF)	GBP	2.5	4		MHz
Input Resistance	Ri		10^{12}		Ω
Common Mode Rejection Ratio (R_S=50Ω) Ta=25°C Tmin<=Ta<=Tmax	CMR	 70 70	 86		dB
Supply Voltage Rejection Ratio (R_S=50Ω) Ta=25°C Tmin<=Ta<=Tmax	SVR	 70 70	 86		dB
Supply Current(no load) Ta=25°C Tmin<=Ta<=Tmax	Icc		 1.4	 2.5 2.5	mA
Channel Separation (Av=100, Ta=25°C)	V_{01}/V_{02}		120		dB
Output Short-circuit Current Ta=25°C Tmin<=Ta<=Tmax	Ios	 10 10	 40	 60 60	mA
Slew Rate (Vi=10V, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	SR	8	16		V/μs
Rise Time (Vi=20mV, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	t_r		0.1		μs
Overshoot Factor (Vi=20mV, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	Kov		10		%
Total Harmonic Distortion (Av=20dB, f=1kHz R_L=2kΩ, C_L=100pF, Ta=25°C, Vo=2Vpp)	THD		0.01		%
Phase Margin	ϕm		45		Degrees
Equivalent Input Noise Voltage(R_S=100Ω, f=1KHz)	e_n		15		$\frac{nV}{\sqrt{Hz}}$

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

UTC TL072 AC ELECTRICAL CHARACTERISTICS(V_{CC}=+-15V, Ta=25°C, Tmin=0°C ,Tmax=70°C, unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Input Offset Voltage (Rs=50Ω, Ta=25°C Tmin<=Ta<=Tmax	Vio		3	6 7	mV
Temperature Coefficient of Input Offset Voltage (Rs=50Ω)	Dvio		10		μV/°C
Input Offset Current* Ta=25°C Tmin<=Ta<=Tmax	Iio		 5	 100 4	 pA nA
Input Bias Current* Ta=25°C Tmin<=Ta<=Tmax	Iib		 20	 200 20	 pA nA
Input Common Mode Voltage	Vicm	+-11	-12~+15		V
Output Voltage Swing (R_L=10kΩ) Ta=25Ω, R_L=2kΩ, Ta=25°C, R_L=10kΩ Tmin<=Ta<=Tmax, R_L=2kΩ Tmin<=Ta<=Tmax, R_L=10kΩ	Vopp	 10 12 10 12	 12 13.5		 V
Large Signal Voltage Gain (R_L=10kΩ, Vo=+-10V) Ta=25°C Tmin<=Ta<=Tmax	Avd	 50 25	 200		 V/mV
Gain Bandwidth Product (Ta=25°C, R_L=10kΩ, C_L=100pF)	GBP	2.5	4		MHz
Input Resistance	Ri		10^{12}		Ω
Common Mode Rejection Ratio (R_S=50Ω) Ta=25°C Tmin<=Ta<=Tmax	CMR	 80 80	 86		dB
Supply Voltage Rejection Ratio (R_S=50Ω) Ta=25°C Tmin<=Ta<=Tmax	SVR	 80 80	 86		dB
Supply Current (no load) Ta=25°C Tmin<=Ta<=Tmax	Icc		 1.4	 2.5 2.5	mA
Channel Separation (Av=100, Ta=25°C)	V_{01}/V_{02}		120		dB
Output Short-circuit Current Ta=25°C Tmin<=Ta<=Tmax	Ios	 10 10	 40	 60 60	mA
Slew Rate (Vi=10V, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	SR	8	16		V/μs
Rise Time (Vi=20mV, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	t_r		0.1		μs
Overshoot Factor (Vi=20mV, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	Kov		10		%
Total Harmonic Distortion (Av=20dB, f=1kHz R_L=2kΩ, C_L=100pF, Ta=25°C, Vo=2Vpp)	THD		0.01		%
Phase Margin	φm		45		Degrees
Equivalent Input Noise Voltage (R_S=100Ω, f=1KHz)	e_n		15		$\frac{nV}{\sqrt{Hz}}$

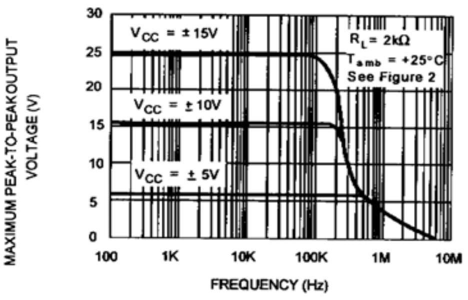
*The Input bias currents are junction leakage currents, which approximately double for every 10°C increase in the junction temperature.

UTC TL072 BC ELECTRICAL CHARACTERISTICS(V_{CC}=+- 15V, Ta=25°C, Tmin=0°C ,Tmax=70°C, unless otherwise specified unless otherwise specified)

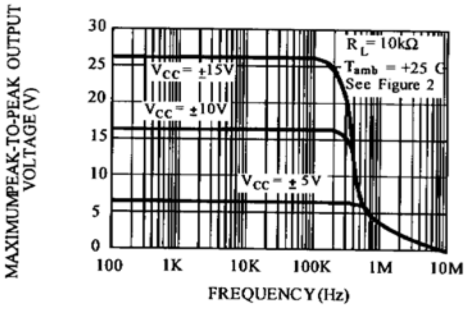
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Input Offset Voltage (Rs=50Ω), Ta=25°C Tmin<=Ta<=Tmax	Vio		1	3 5	mV
Temperature Coefficient of Input Offset Voltage (Rs=50Ω)	Dvio		10		µV/℃
Input Offset Current* Ta=25°C Tmin<=Ta<=Tmax	Iio		 5	 100 4	 pA nA
Input Bias Current* Ta=25°C Tmin<=Ta<=Tmax	Iib		 20	 200 20	 pA nA
Input Common Mode Voltage	Vicm	+-11	-12~+15		V
Output Voltage Swing (R_L=10kΩ) Ta=25°C, R_L=2kΩ Ta=25°C, R_L=10kΩ Tmin<=Ta<=Tmax, R_L=2kΩ Tmin<=Ta<=Tmax, R_L=10kΩ	Vopp	 10 12 10 12	 12 13.5		 V
Large Signal Voltage Gain (R_L=10kΩ, Vo=+-10V) Ta=25°C Tmin<=Ta<=Tmax	Avd	 50 25	 200		 V/mV
Gain Bandwidth Product (Ta=25°C, R_L=10kΩ, C_L=100pF)	GBP	2.5	4		MHz
Input Resistance	Ri		10^{12}		Ω
Common Mode Rejection Ratio (R_S=50Ω) Ta=25°C Tmin<=Ta<=Tmax	CMR	 80 80	 86		dB
Supply Voltage Rejection Ratio (R_S=50Ω) Ta=25°C Tmin<=Ta<=Tmax	SVR	 80 80	 86		dB
Supply Current (no load) Ta=25°C Tmin<=Ta<=Tmax	Icc		 1.4	 2.5 2.5	mA
Channel Separation (Av=100, Ta=25°C)	V_{01}/V_{02}		120		dB
Output Short-circuit Current Ta=25°C Tmin<=Ta<=Tmax	Ios	 10 10	 40	 60 60	mA
Slew Rate (Vi=10V, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	SR	8	16		V/µs
Rise Time (Vi=20mV, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	t_r		0.1		µs
Overshoot Factor (Vi=20mV, R_L=2kΩ, C_L=100pF, Ta=25°C, unity gain)	Kov		10		%
Total Harmonic Distortion (Av=20dB, f=1kHz R_L=2kΩ, C_L=100pF, Ta=25°C, Vo=2Vpp)	THD		0.01		%
Phase Margin	φm		45		Degrees
Equivalent Input Noise Voltage (R_S=100Ω, f=1KHz)	e_n		15		$\frac{nV}{\sqrt{Hz}}$

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

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



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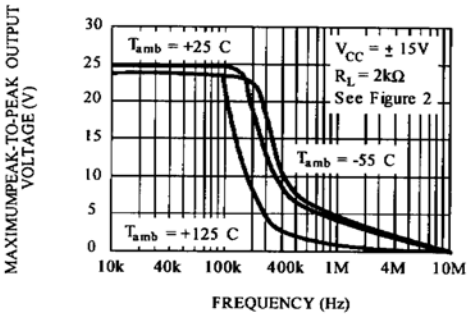
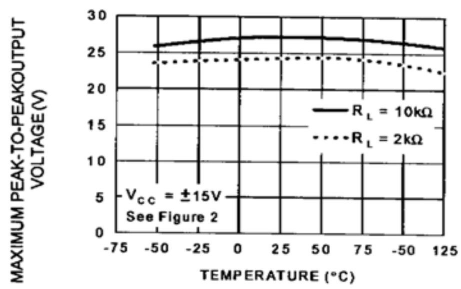
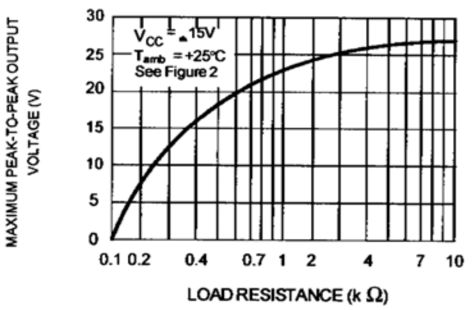


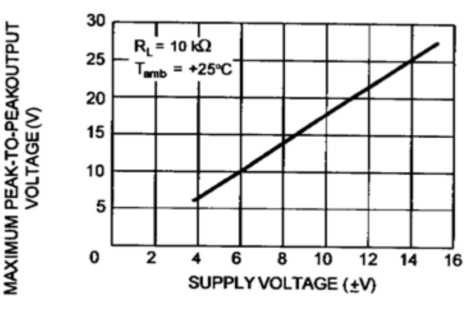
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS FREE AIR TEMP.



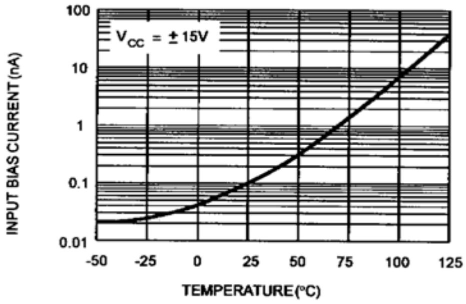
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS LOAD RESISTANCE



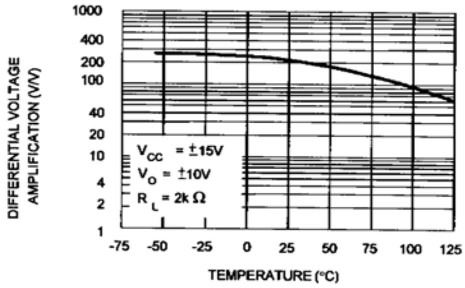
MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE VERSUS SUPPLY VOLTAGE



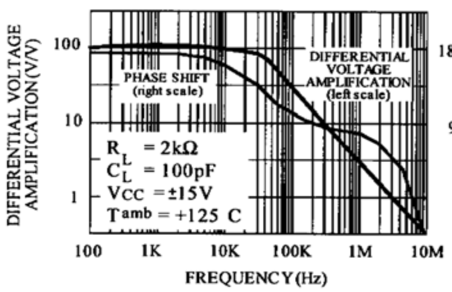
INPUT BIAS CURRENT VERSUS FREE AIR TEMPERATURE



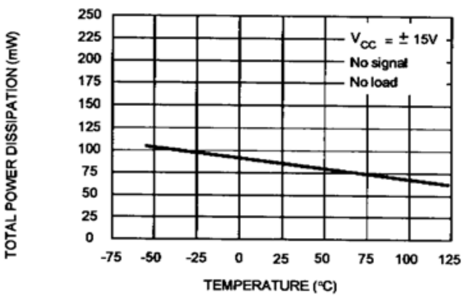
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VERSUS FREE AIR TEMPERATURE



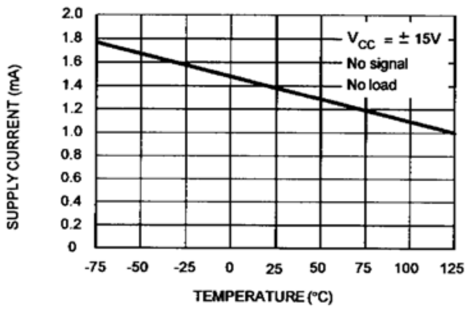
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT VERSUS FREQUENCY



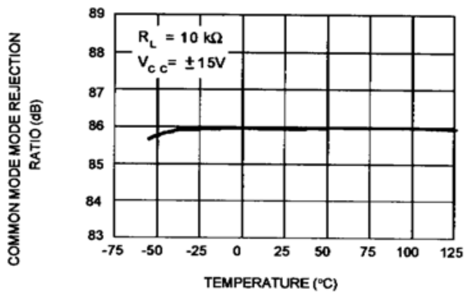
TOTAL POWER DISSIPATION VERSUS FREE AIR TEMPERATURE



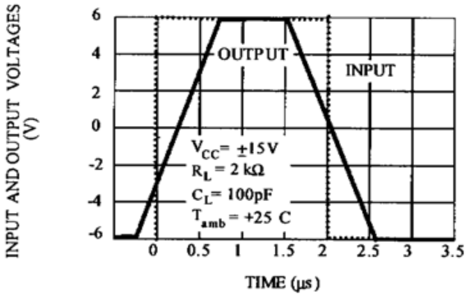
SUPPLY CURRENT PER AMPLIFIER VERSUS FREE AIR TEMPERATURE



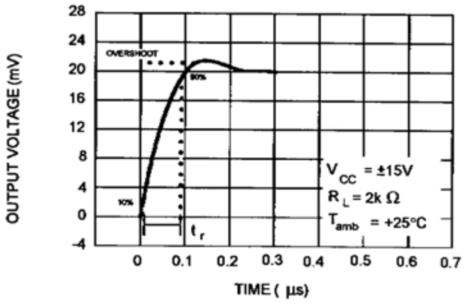
COMMON MODE REJECTION RATIO VERSUS FREE AIR TEMPERATURE



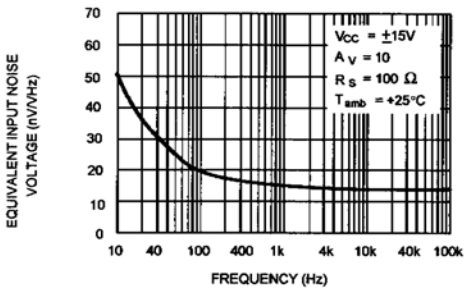
VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



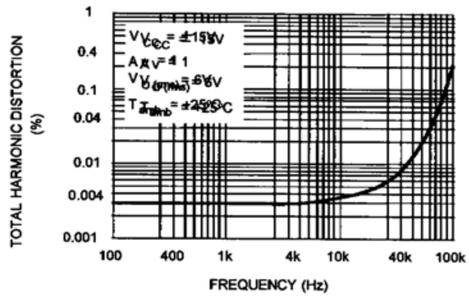
OUTPUT VOLTAGE VERSUS ELAPSED TIME



EQUIVALENT INPUT NOISE VOLTAGE VERSUS FREQUENCY



TOTAL HARMONIC DISTORTION VERSUS FREQUENCY



PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower

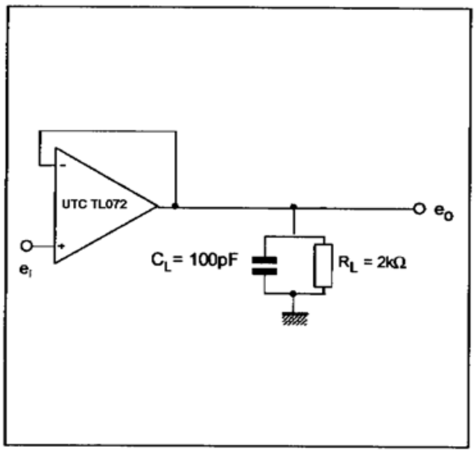


Figure 2 : Gain-of-10 Inverting Amplifier