UNISONIC TECHNOLOGIES CO., LTD

TL072

LINEAR INTEGRATED CIRCUIT

DIP-8

SOP-8

LOW NOISE DUAL J-FET OPFRATIONAL AMPLIFIER

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 ar offset voltage temperature coefficient.

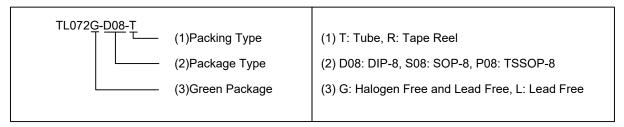
FFATURES

- * Low power consumption
- * Wide common-mode (up to $V_{\text{CC+}}$) and di
- * Low input bias and offset current
- * Low noise en = $15\text{nV} / \sqrt{\text{Hz}}$ (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.)

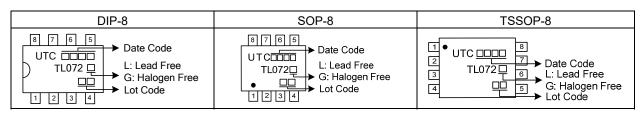
ORDERING INFORMATION

nd offset current, and low	Willest .
	TSSOP-8
differential voltage range	
Э	

Ordering Number		Dookogo	Dooking		
Lead Free	Halogen Free	Package	Packing		
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		

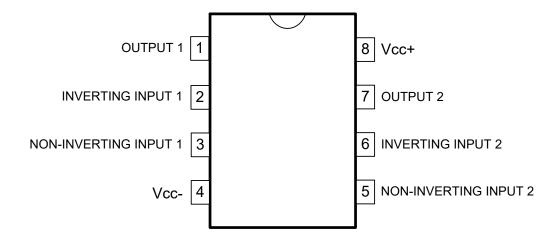


MARKING

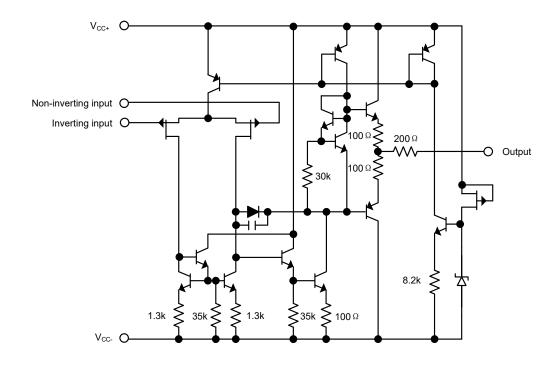


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■ PIN CONFIGURATION



BLOCK DIAGRAM



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

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage (Note 2)		V _{CC}	±18	٧
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	Ô

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
	VI(OFF)	NS-3022	$T_{MIN}\! \le \! T_{A}\! \le \! T_{MAX}$			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	pА
Input Offset Current (Note)		$T_{MIN} \le T_A \le T_{MAX}$				10	nA
Input Diog Current (Nata)	I _{I(BIAS)}	T _A =25°C			20	200	pА
Input Bias Current (Note)		$T_{MIN} \leq T_A \leq T_{MA}$	$T_{MIN} \le T_A \le T_{MAX}$			20	nA
Input Common Mode Voltage	V _{I(CM)}		_	±11	-12~+15		V
	, ,	$R_L=2k\Omega$	T _A =25°C	±10	±12		V
Outmut Valtage Suing	\/	$R_L=10k\Omega$	TA=25°C	±12	±13.5		V
Output Voltage Swing	$V_{O(SW)}$	$R_L=2k\Omega$	T <t <t<="" td=""><td>±10</td><td></td><td></td><td>V</td></t>	±10			V
		$R_L=10k\Omega$	$T_{MIN} \le T_A \le T_{MAX}$	±12			V
	0	$R_L=2k\Omega$,	T _A =25°C	25	200		V/mV
Large Signal Voltage Gain	G∨	V _{OUT} =±10V	$T_{MIN} \le T_A \le T_{MAX}$	15			V/mV
Gain Bandwidth Product	GBw	T _A =25°C, R _L =	T _A =25°C, R _L =10kΩ, C _L =100pF		4		MHz
Input Resistance	Rin		·		10 ¹²		Ω
0 N I D : 1: D !:	OMB	D 500	T _A =25°C	70	86		dB
Common Mode Rejection Ratio	CMR	$R_s=50\Omega$	$T_{MIN} \le T_A \le T_{MAX}$	70			dB
0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	SVR	R _S =50Ω	T _A =25°C	70	86		dB
Supply Voltage Rejection Ratio			$T_{MIN} \le T_A \le MAX$	70			dB
O	Icc	No load	T _A =25°C		1.4	2.5	mA
Supply Current			$T_{MIN}\!\leq\!T_{A}\!\leq\!T_{MAX}$			2.5	mA
Channel Separation	V01/V02	G _V =100			120		dB
Outrout Shart aircuit Commant	los	T _A =25°C		10	40	60	mA
Output Short-circuit Current		$T_{MIN}\!\leq\!T_{A}\!\leq\!T_{MAX}$		10		60	mA
Slew Rate	SR	V_{IN} =10V, R_L =2k Ω , C_L =100pF, unity gain		6	10		V/µs
Rise Time	t _R	V_{IN} =20mV, R_L =2k Ω , C_L =100pF, unity gain			0.1		μs
Overshoot Factor	Kov	V_{IN} =20mV,R _L =2k Ω ,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	Rs=100Ω, f=1	KHz		15		$\frac{\text{nV}}{\sqrt{\text{Hz}}}$

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

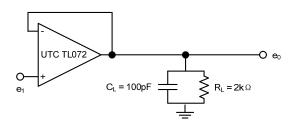
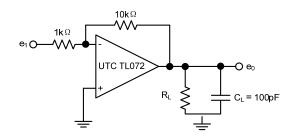
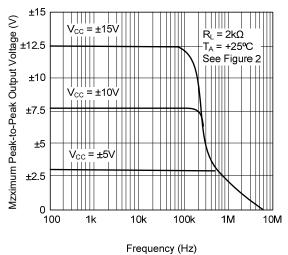


Figure 2. Gain-of-10 Inverting Amplifier

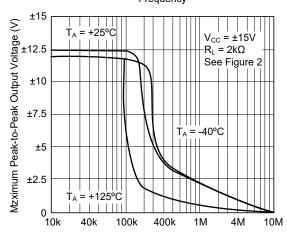


■ TYPICAL CHARACTERISTICS

Maximum Peak-to-Peak Output Voltage vs. Frequency

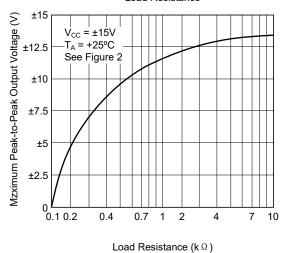


Maximum Peak-to-Peak Output Voltage vs. Frequency

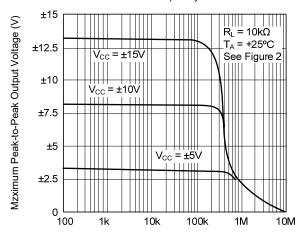


Maximum Peak-to-Peak Output Voltage vs. Load Resistance

Frequency (Hz)

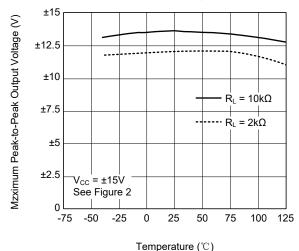


Maximum Peak-to-Peak Output Voltage vs. Frequency

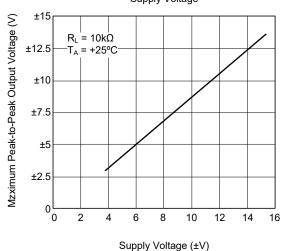


Frequency (Hz)

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



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

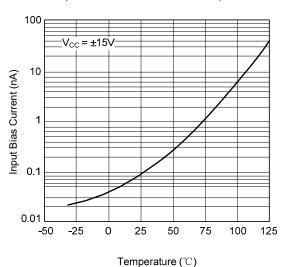


Large Signal Differential Voltage Amplification vs.

Free Air Temperature

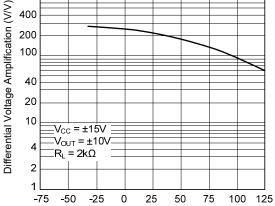
TYPICAL CHARACTERISTICS (Cont.)

Input Bias Current vs. Free Air Temperature



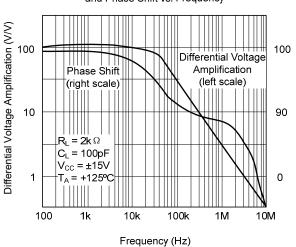
400 200 100

1000

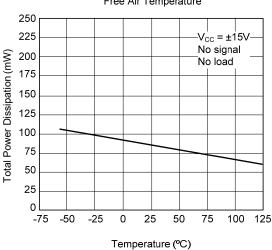


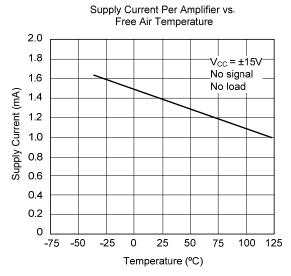
Temperature (°C)

Large Signal Differential Voltage Amplification and Phase Shift vs. Frequency

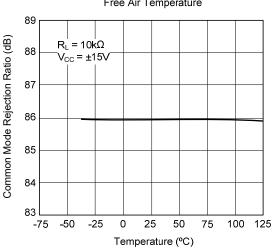


Total Power Dissipation vs. Free Air Temperature

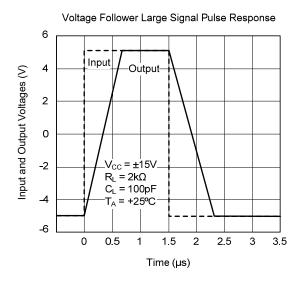


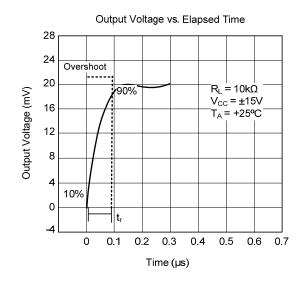


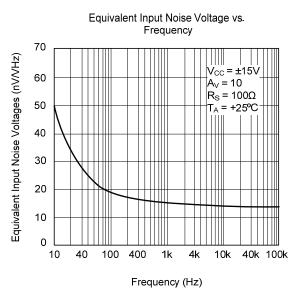
Total Power Dissipation vs. Free Air Temperature

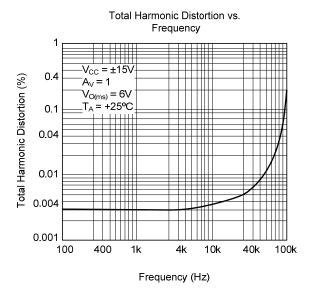


■ TYPICAL CHARACTERISTICS (Cont.)









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