



TL072

LINEAR INTEGRATED CIRCUIT

LOW NOISE DUAL J-FET OPERATIONAL 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 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)

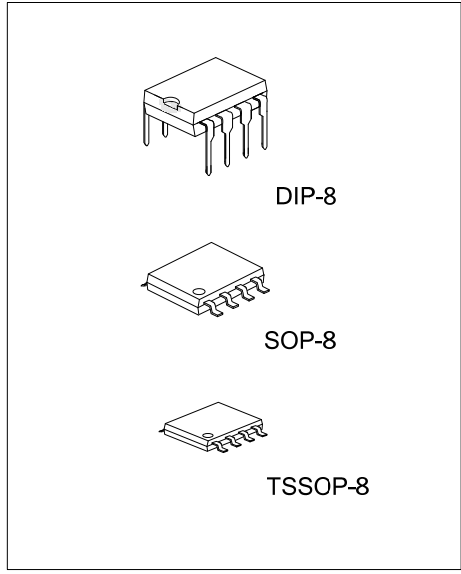
■ ORDERING INFORMATION

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

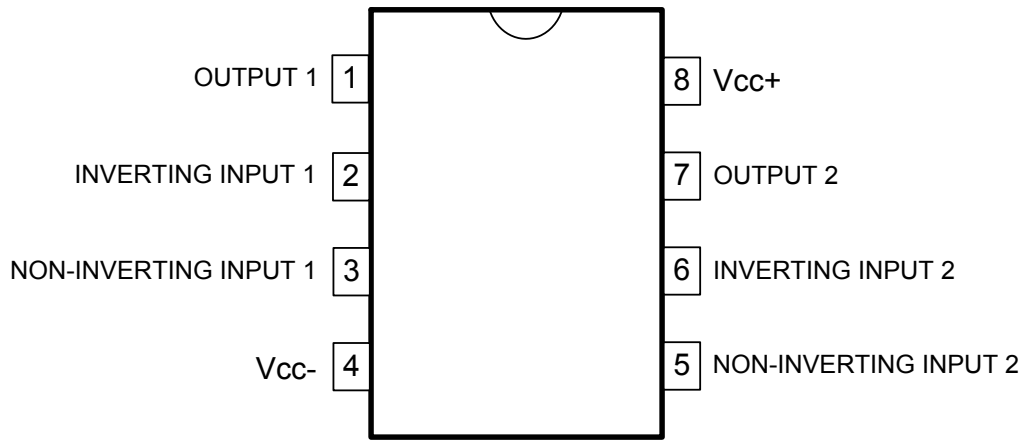
<p>TL072L-D08-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) D08: DIP-8, S08: SOP-8, P08: TSSOP-8</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING

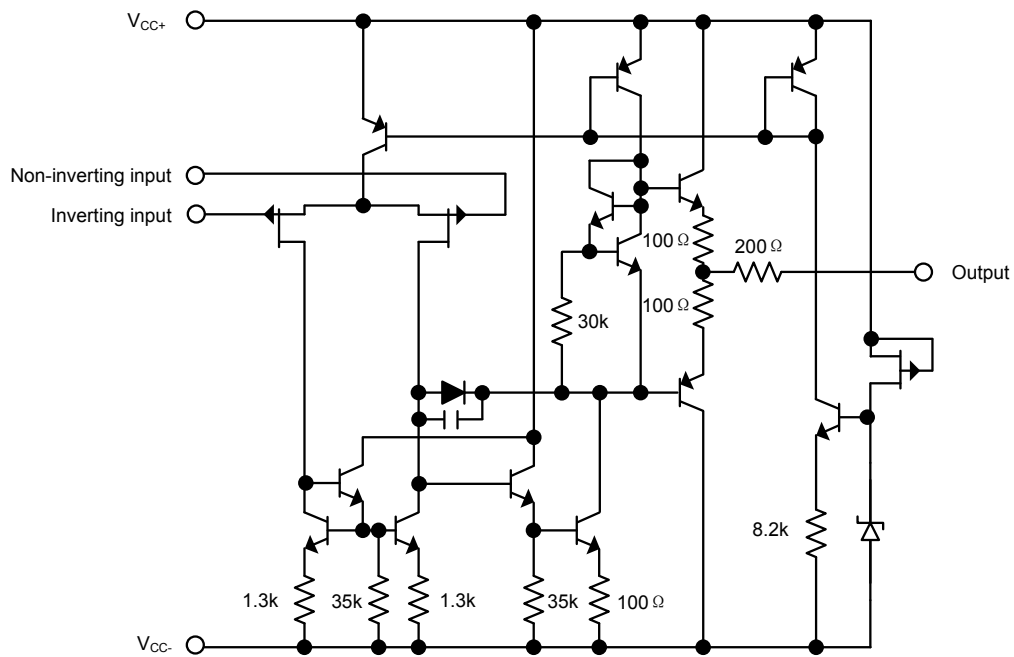
DIP-8	SOP-8	TSSOP-8
<p>UTC □□□□ → Date Code</p> <p>TL072 □ → L: Lead Free</p> <p>□□ → G: Halogen Free</p> <p>□□ → Lot Code</p>	<p>UTC □□□□ → Date Code</p> <p>TL072G □□ → Lot Code</p> <p>●</p>	<p>UTC □□□□ → Date Code</p> <p>TL072G □□ → Lot Code</p>



■ PIN CONFIGURATION



■ BLOCK DIAGRAM



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■ ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage (note 1)	V_{CC}	± 18	V
Input Voltage (note 2)	V_{IN}	± 15	V
Differential Input Voltage (note 3)	$V_{I(DIFF)}$	± 30	V
Power Dissipation	P_D	680	mW
Output Short-Circuit Duration (Note 4)		Infinite	
Operating Temperature	T_{OPR}	0 ~ +70	$^\circ\text{C}$
Storage Temperature	T_{STG}	-65 ~ +150	$^\circ\text{C}$

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 V_{CC-} and V_{CC+} .

- The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
- Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.
- 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.
- 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

($V_{CC}=\pm 15V$, $T_a=25^\circ C$, $T_{MIN}=0^\circ C$, $T_{MAX}=70^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	
Input Offset Voltage	$V_{I(OFF)}$	$R_S=50\Omega$	$T_A=25^\circ C$		3	10	mV
			$T_{MIN} \leq T_A \leq T_{MAX}$			13	mV
Temperature Coefficient of Input Offset Voltage	$\Delta V_{I(OFF)}$	$R_S=50\Omega$		10		$\mu V/^\circ C$	
Input Offset Current*	$I_{I(OFF)}$	$T_A=25^\circ C$ $T_{MIN} \leq T_A \leq T_{MAX}$		5	100	pA	
					10	nA	
Input Bias Current*	$I_{I(BIAS)}$	$T_A=25^\circ C$ $T_{MIN} \leq T_A \leq T_{MAX}$		20	200	pA	
					20	nA	
Input Common Mode Voltage	$V_{I(CM)}$		± 11	-12~+15		V	
Output Voltage Swing	$V_{O(SW)}$	$R_L=2k\Omega$	$T_A=25^\circ C$	10	12	V	
				$R_L=10k\Omega$	12	13.5	V
		$T_{MIN} \leq T_A \leq T_{MAX}$	$R_L=2k\Omega$	10		V	
			$R_L=10k\Omega$	12		V	
Large Signal Voltage Gain	Avd	$R_L=10k\Omega$, $V_{OUT}=\pm 10V$	$T_A=25^\circ C$	25	200	V/mV	
			$T_{MIN} \leq T_A \leq T_{MAX}$	15		V/mV	
Gain Bandwidth Product	GBW	$T_A=25^\circ C$, $R_L=10k\Omega$, $C_L=100pF$	2.5	4		MHz	
Input Resistance	R_{IN}			10^{12}		Ω	
Common Mode Rejection Ratio	CMR	$R_S=50\Omega$	$T_A=25^\circ C$	70	86	dB	
			$T_{MIN} \leq T_A \leq T_{MAX}$	70		dB	
Supply Voltage Rejection Ratio	SVR	$R_S=50\Omega$	$T_A=25^\circ C$	70	86	dB	
			$T_{MIN} \leq T_A \leq T_{MAX}$	70		dB	
Supply Current	I_{CC}	No load	$T_A=25^\circ C$		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	Ios	$T_A=25^\circ C$ $T_{MIN} \leq T_A \leq T_{MAX}$		10	40	60	mA
				10		60	mA
Slew Rate	SR	$V_{IN}=10V$, $R_L=2k\Omega$, $C_L=100pF$, unity gain	8	16		V/ μs	
Rise Time	t_R	$V_{IN}=20mV$, $R_L=2k\Omega$, $C_L=100pF$, unity gain		0.1		μs	
Overshoot Factor	Kov	$V_{IN}=20mV$, $R_L=2k\Omega$, $C_L=100pF$, unity gain		10		%	
Total Harmonic Distortion	THD	$G_V=20dB$, $f=1kHz$, $R_L=2k\Omega$, $C_L=100pF$, $V_{OUT}=2V_{pp}$		0.01		%	
Phase Margin	ϕ_m			45		Degrees	
Equivalent Input Noise Voltage	eN	$R_S=100\Omega$, $f=1kHz$		15		$\frac{nV}{\sqrt{Hz}}$	

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

■ PARAMETER MEASUREMENT INFORMATION

Figure 1. Voltage Follower

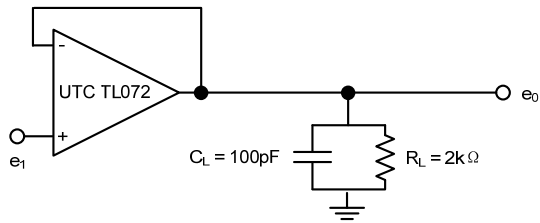
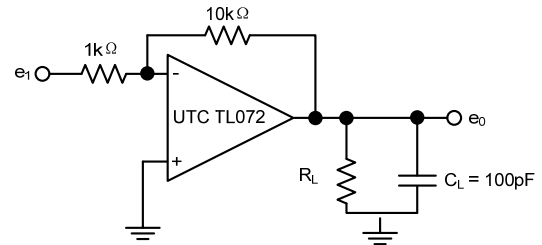
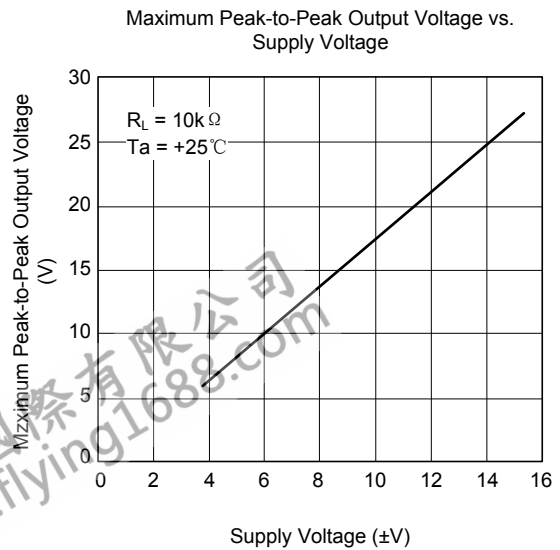
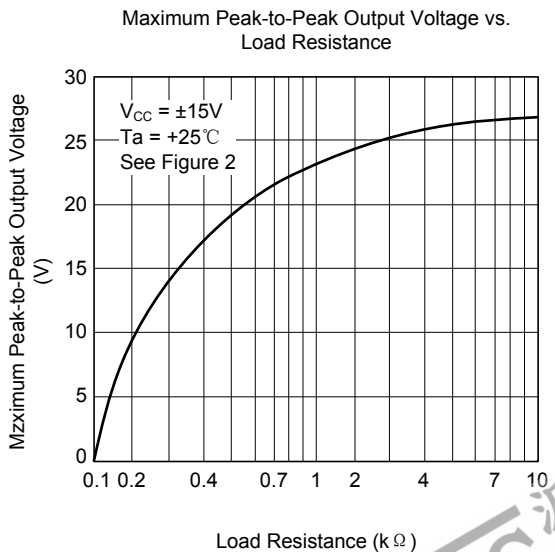
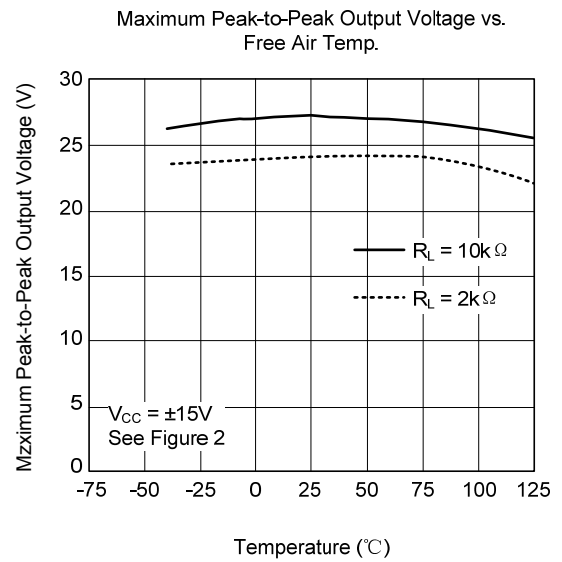
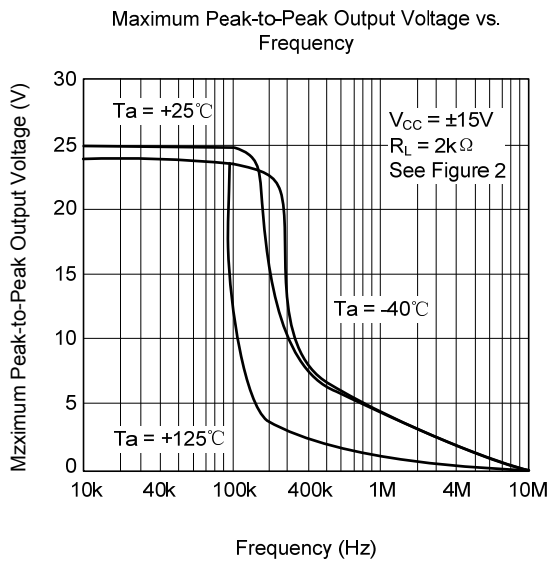
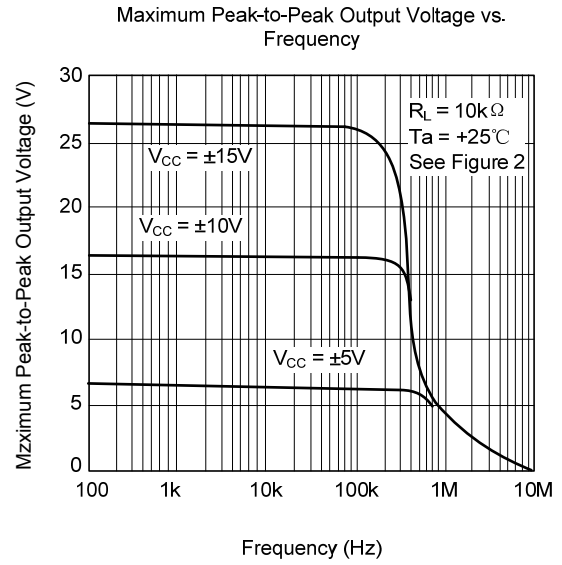
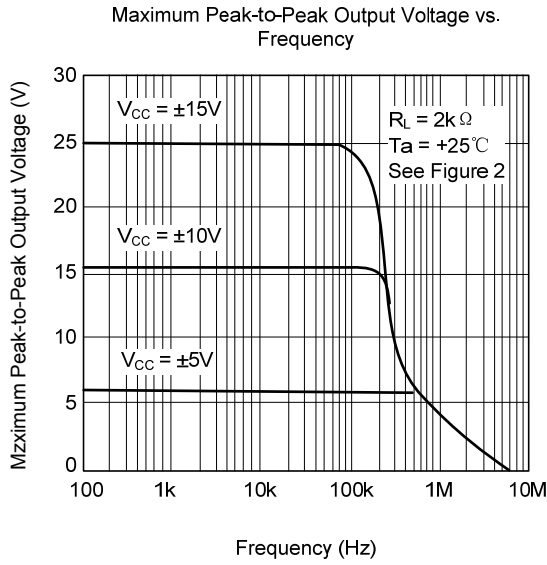


Figure 2. Gain-of-10 Inverting Amplifier

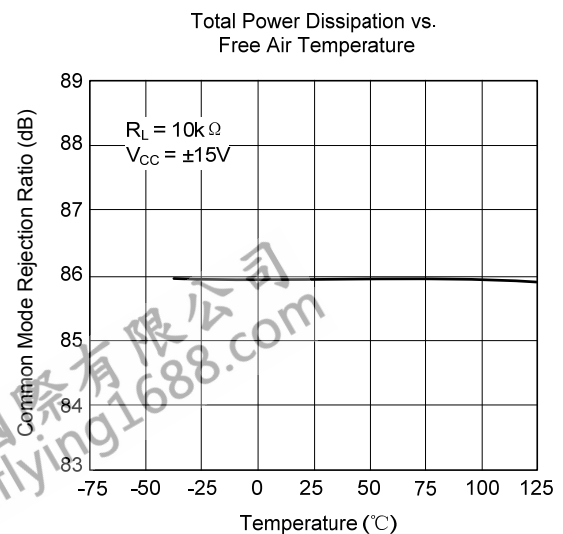
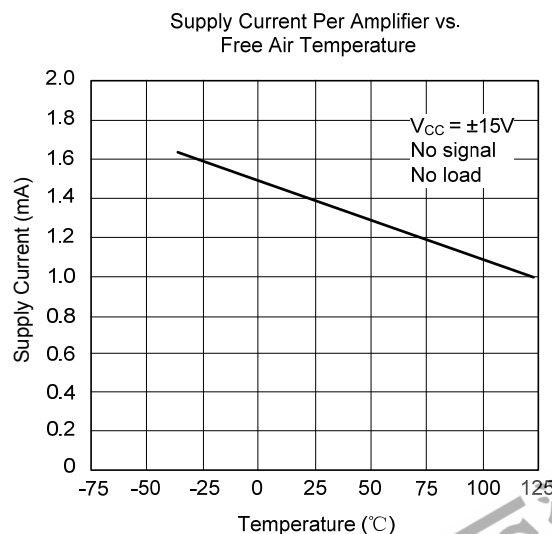
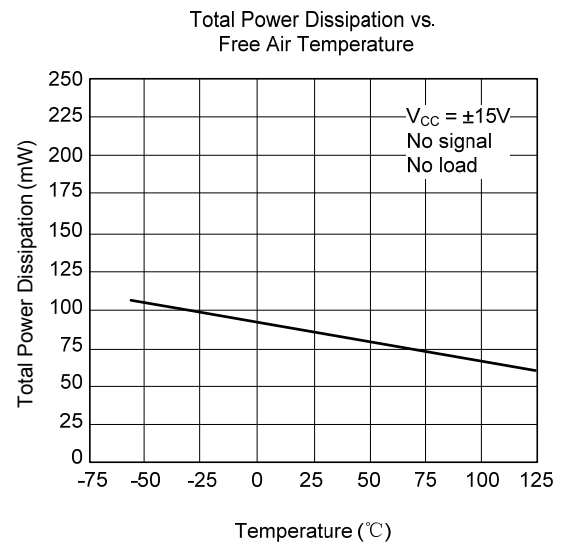
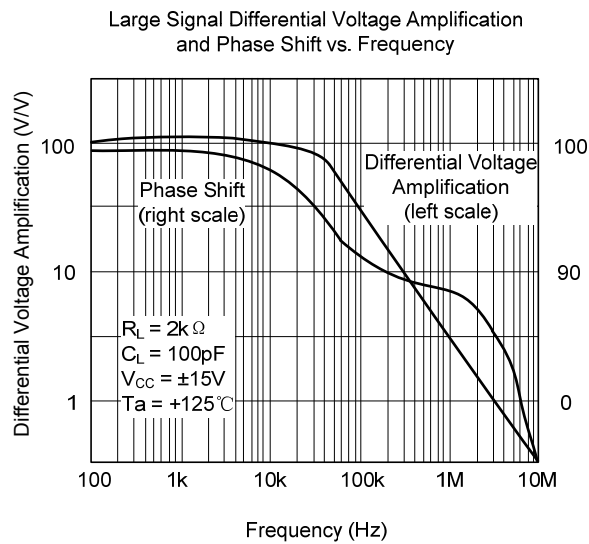
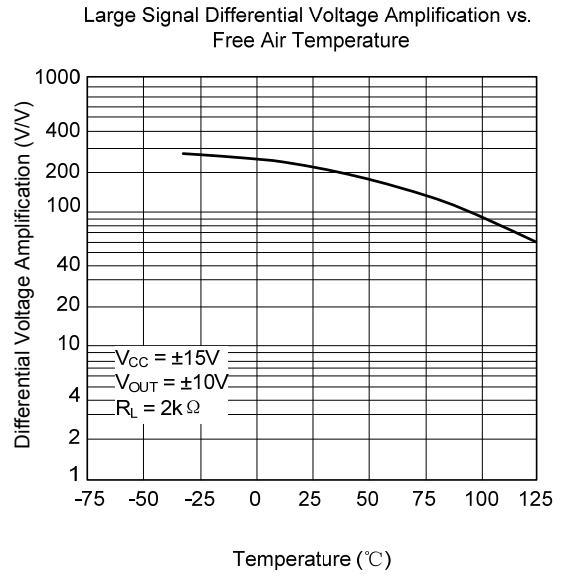
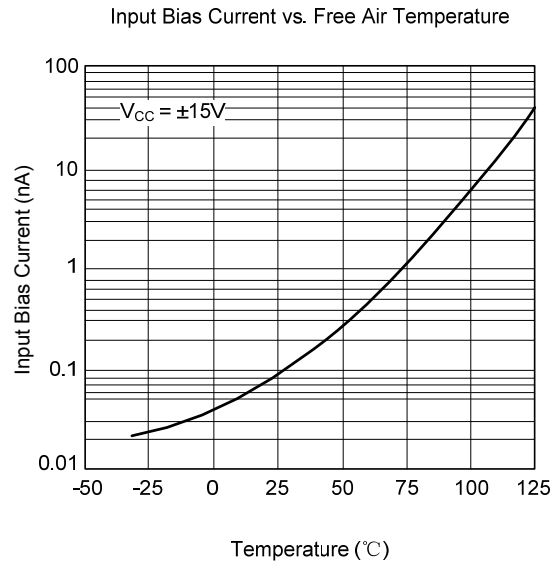


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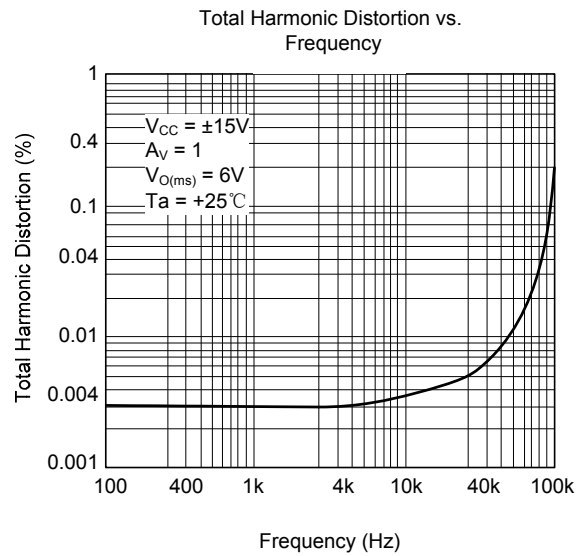
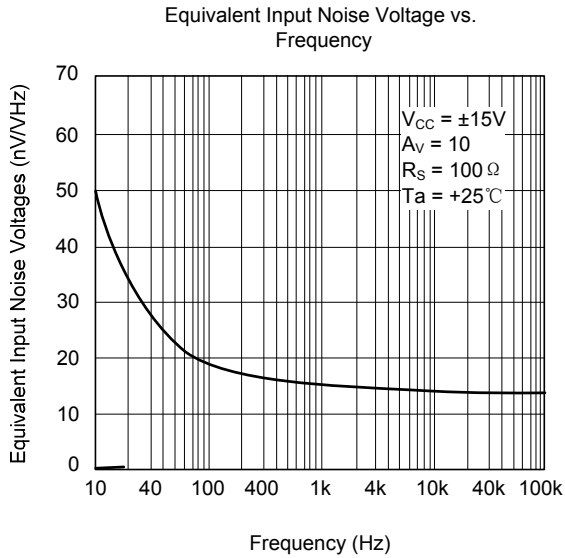
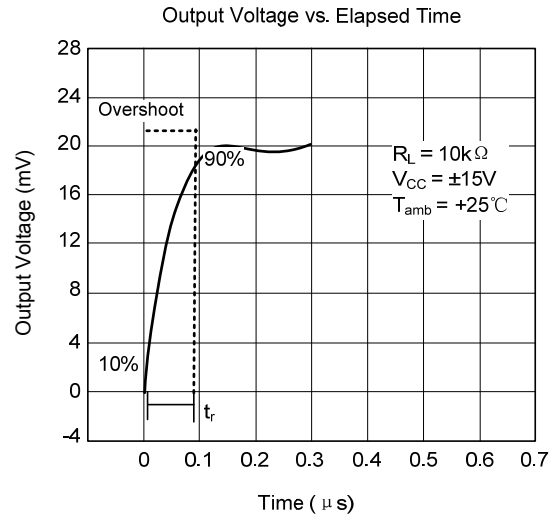
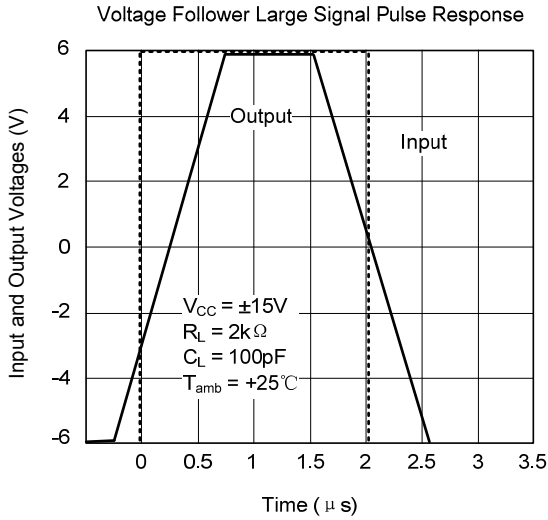
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



■ TYPICAL CHARACTERISTICS(Cont.)



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