

**TL074****LINEAR INTEGRATED CIRCUIT****LOW NOISE QUAD J-FET  
OPERATIONAL AMPLIFIER****■ DESCRIPTION**

The UTC **TL074** 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 slewrates:13V/ $\mu$ s(typ)

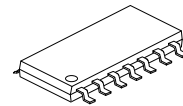
**■ ORDERING INFORMATION**

| Ordering Number |              | Package | Packing   |
|-----------------|--------------|---------|-----------|
| Lead Free       | Halogen Free |         |           |
| TL074L-D14-T    | TL074G-D14-T | DIP-14  | Tube      |
| TL074L-S14-R    | TL074G-S14-R | SOP-14  | Tape Reel |

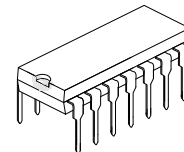
TL074L-D14-T

- (1)Packing Type
- (2)Package Type
- (3)Lead Free

- (1) T: Tube, R: Tape Reel
- (2) D14: DIP-14, S14: SOP-14
- (3) G: Halogen Free, L: Lead Free



SOP-14

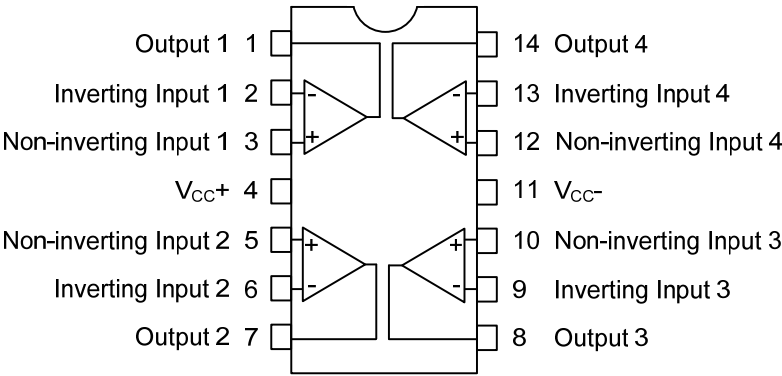


DIP-14

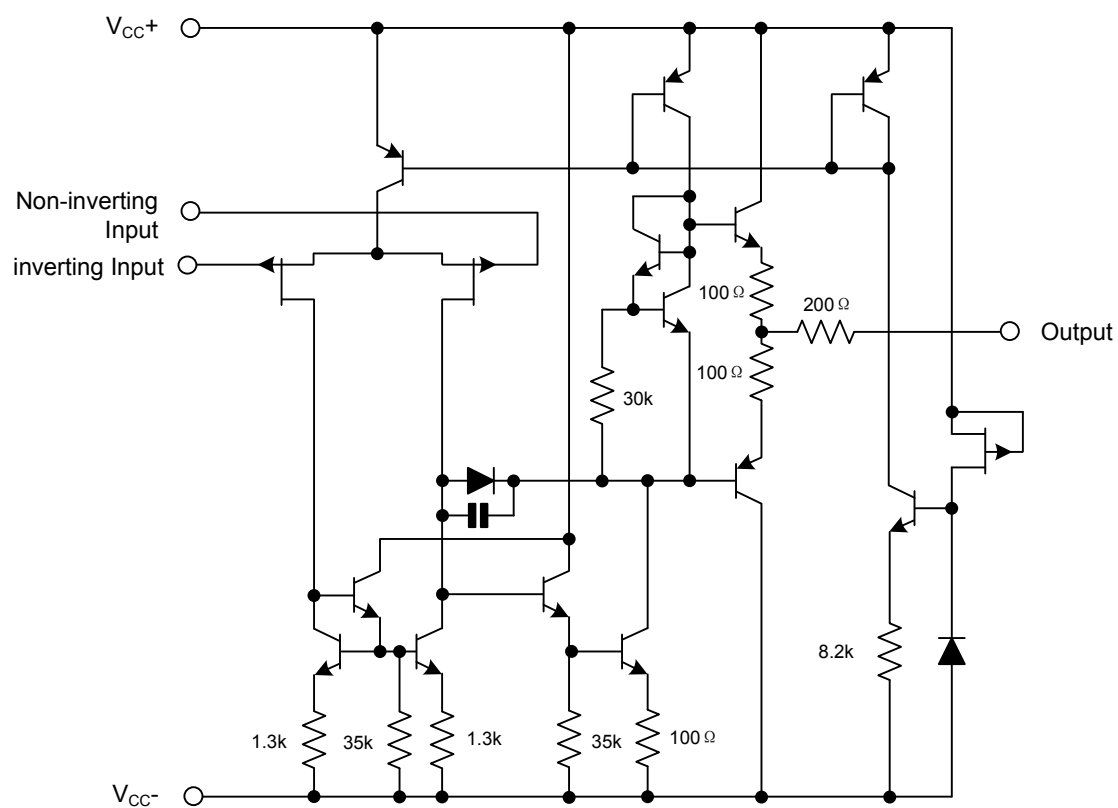
MARKING INFORMATION

| PACKAGE | MARKING                                                                                                                                                                                        |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SOP-14  | <div><div><div>141312111098</div><div>UTC TL074</div><div>1234567</div></div><div><div>→ Date Code</div><div>→ L: Lead Free</div><div>→ G: Halogen Free</div><div>→ Lot Code</div></div></div> |
| DIP-14  | <div><div><div>141312111098</div><div>UTC TL074</div><div>1234567</div></div><div><div>→ Date Code</div><div>→ L: Lead Free</div><div>→ G: Halogen Free</div><div>→ Lot Code</div></div></div> |

PIN CONFIGURATIONS



### ■ SCHEMATIC DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C)

| PARAMETER                              | SYMBOL               | RATING    | UNIT |
|----------------------------------------|----------------------|-----------|------|
| Supply Voltage (Note 1)                | V <sub>CC</sub>      | ±18       | V    |
| Input Voltage (Note 2)                 | V <sub>IN</sub>      | ±15       | V    |
| Differential Input Voltage (Note 3)    | V <sub>I(DIFF)</sub> | ±30       | V    |
| Power Dissipation                      | P <sub>D</sub>       | 680       | mW   |
| Output Short-Circuit Duration (Note 4) |                      | Infinite  |      |
| Operating Temperature                  | T <sub>OPR</sub>     | -20 ~ +85 | °C   |
| Storage Temperature                    | T <sub>STG</sub>     | -65 ~ 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 V<sub>CC-</sub> and V<sub>CC+</sub>.
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.
5. 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<sub>CC</sub>=±15V, T<sub>A</sub>=25°C, unless otherwise specified)

| PARAMETER                                       | SYMBOL               | TEST CONDITIONS                                                                                                | MIN                                                | TYP              | MAX  | UNIT  |
|-------------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------|------|-------|
| Input Offset Voltage                            | V <sub>I(OFF)</sub>  | R <sub>S</sub> =50Ω                                                                                            | T <sub>A</sub> =25°C                               | 3                | 6    | mV    |
|                                                 |                      |                                                                                                                | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub> |                  | 7    | mV    |
| Temperature Coefficient of Input Offset Voltage | ΔV <sub>I(OFF)</sub> | R <sub>S</sub> =50Ω                                                                                            |                                                    | 10               |      | μV/°C |
| Input Offset Current (Note)                     | I <sub>I(OFF)</sub>  | T <sub>A</sub> =25°C                                                                                           |                                                    | 5                | 100  | pA    |
|                                                 |                      |                                                                                                                | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub> |                  | 4    | nA    |
| Input Bias Current (Note)                       | I <sub>I(BIAS)</sub> | T <sub>A</sub> =25°C                                                                                           |                                                    | 20               | 200  | pA    |
|                                                 |                      |                                                                                                                | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub> |                  | 20   | nA    |
| Input Common Mode Voltage                       | V <sub>I(CM)</sub>   |                                                                                                                | ±11                                                | -12~+15          |      | V     |
| Output Voltage Swing                            | V <sub>O(SW)</sub>   | R <sub>L</sub> =2kΩ                                                                                            | T <sub>A</sub> =25°C                               | 10               | 12   | V     |
|                                                 |                      | R <sub>L</sub> =10kΩ                                                                                           |                                                    | 12               | 13.5 | V     |
|                                                 |                      | R <sub>L</sub> =2kΩ                                                                                            | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub> | 10               |      | V     |
|                                                 |                      | R <sub>L</sub> =10kΩ                                                                                           |                                                    | 12               |      | V     |
| Large Signal Voltage Gain                       | G <sub>V</sub>       | R <sub>L</sub> =10kΩ, V <sub>OUT</sub> =±10V                                                                   | T <sub>A</sub> =25°C                               | 50               | 200  | V/mV  |
|                                                 |                      |                                                                                                                | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub> | 25               |      | V/mV  |
| Gain Bandwidth Product                          | GB <sub>W</sub>      | R <sub>L</sub> =10kΩ, C <sub>L</sub> =100pF                                                                    |                                                    | 2                | 3    | MHz   |
| Input Resistance                                | R <sub>IN</sub>      |                                                                                                                |                                                    | 10 <sup>12</sup> |      | Ω     |
| Common Mode Rejection Ratio                     | CMR                  | R <sub>S</sub> =50Ω                                                                                            | T <sub>A</sub> =25°C                               | 80               | 86   | dB    |
|                                                 |                      |                                                                                                                | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub> | 80               |      | dB    |
| Supply Voltage Rejection Ratio                  | SVR                  | R <sub>S</sub> =50Ω                                                                                            | T <sub>A</sub> =25°C                               | 80               | 86   | dB    |
|                                                 |                      |                                                                                                                | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub> | 80               |      | dB    |
| Supply Current                                  | I <sub>CC</sub>      | No Load                                                                                                        | T <sub>A</sub> =25°C                               | 1.4              | 2.5  | mA    |
|                                                 |                      |                                                                                                                | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub> |                  | 2.5  | mA    |
| Channel Separation                              | V <sub>O1/V02</sub>  | G <sub>V</sub> =100                                                                                            |                                                    | 120              |      | dB    |
| Output Short-circuit Current                    | I <sub>O(SC)</sub>   | T <sub>A</sub> =25°C                                                                                           | 10                                                 | 40               | 60   | mA    |
|                                                 |                      | T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub>                                                             | 10                                                 |                  | 60   | mA    |
| Slew Rate                                       | SR                   | V <sub>IN</sub> =10V, R <sub>L</sub> =2kΩ, C <sub>L</sub> =100pF, unity gain                                   | 8                                                  | 13               |      | V/μs  |
| Rise Time                                       | t <sub>R</sub>       | V <sub>IN</sub> =20mV, R <sub>L</sub> =2kΩ, C <sub>L</sub> =100pF, unity gain                                  |                                                    | 0.1              |      | μs    |
| Overshoot Factor                                | K <sub>OV</sub>      | V <sub>IN</sub> =20mV, R <sub>L</sub> =2kΩ, C <sub>L</sub> =100pF, unity gain                                  |                                                    | 10               |      | %     |
| Total Harmonic Distortion                       | THD                  | G <sub>V</sub> =20dB, f=1kHz, R <sub>L</sub> =2kΩ, C <sub>L</sub> =100pF, V <sub>OUT</sub> =2V <sub>pp</sub> ) |                                                    | 0.01             |      | %     |
| Phase Margin                                    |                      |                                                                                                                |                                                    | 45               |      | Deg.  |
| Equivalent Input Noise Voltage                  | e <sub>N</sub>       | R <sub>S</sub> =100Ω, f=1KHz                                                                                   |                                                    | 15               |      |       |

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 Follow

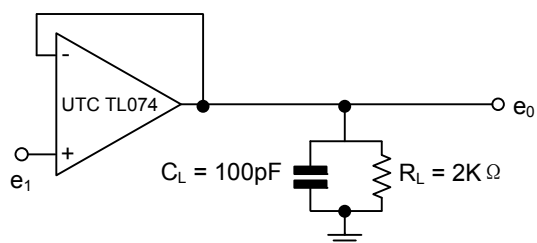
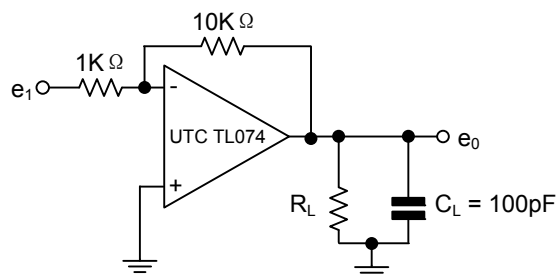
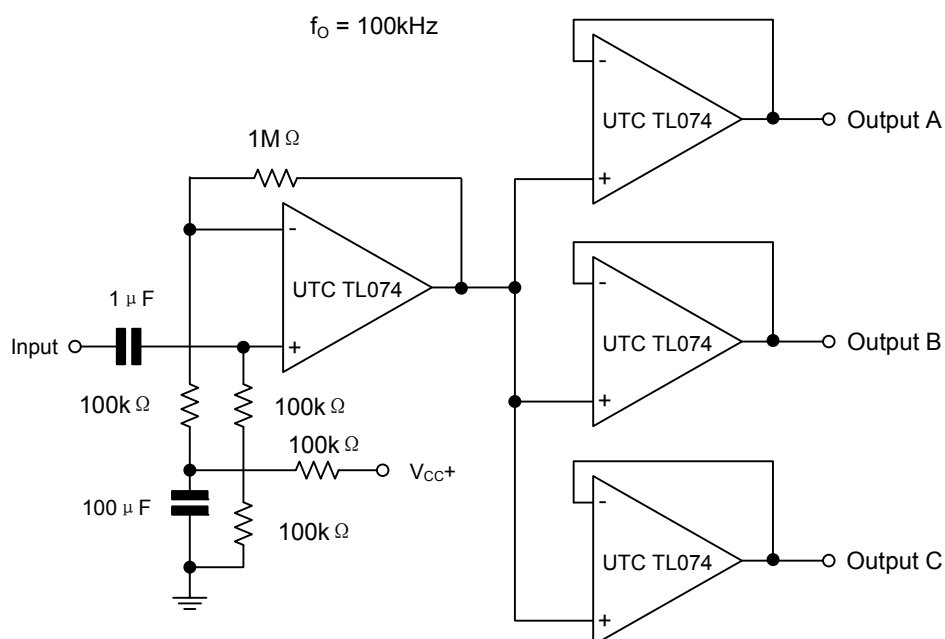


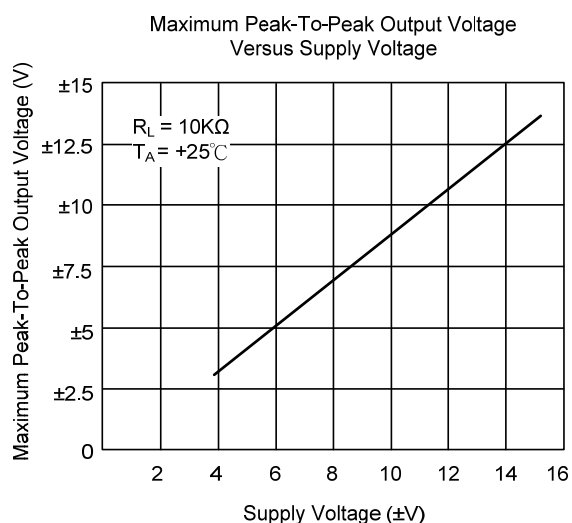
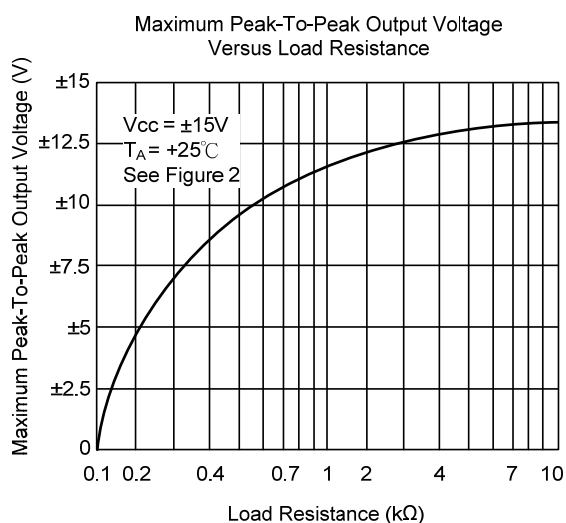
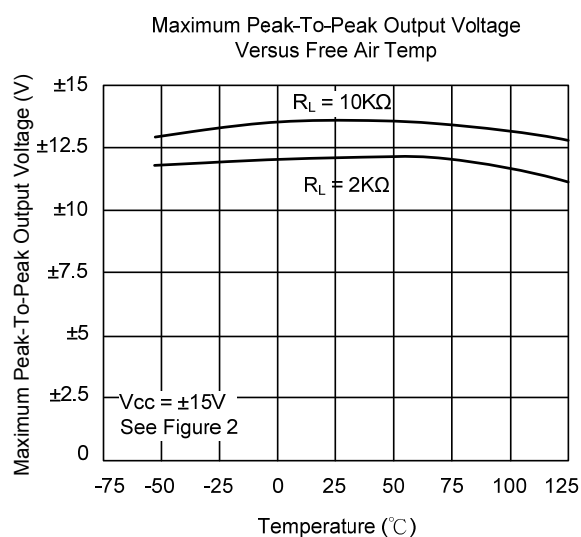
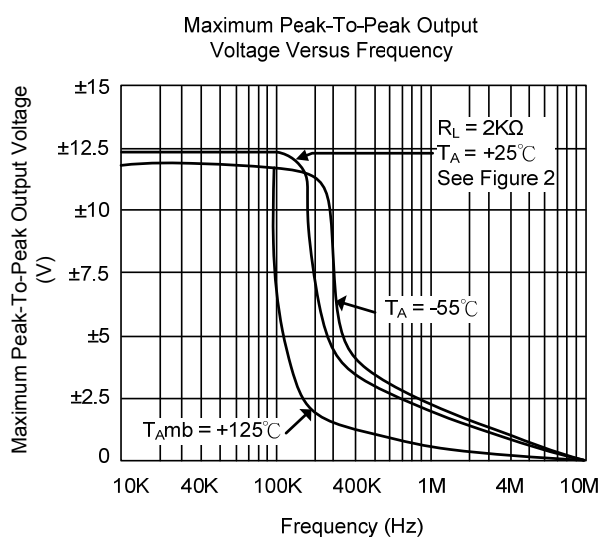
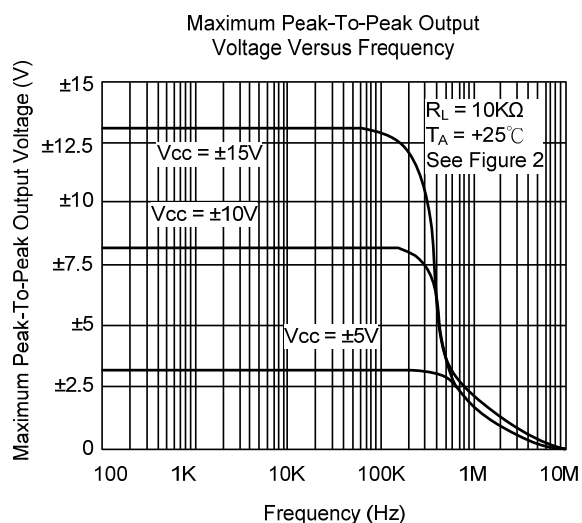
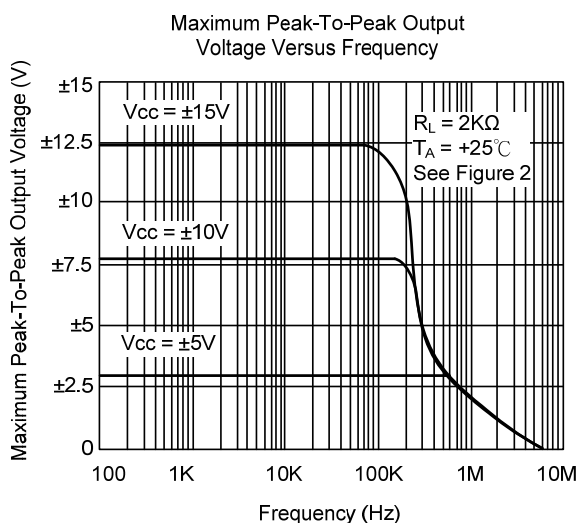
Figure 2. Gain-of-10 Inverting Amplifier



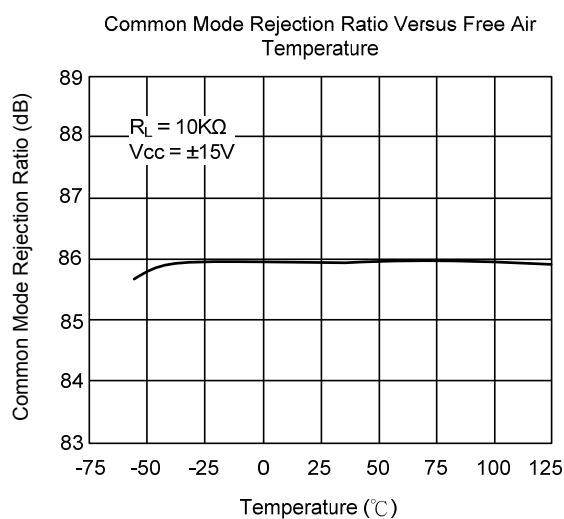
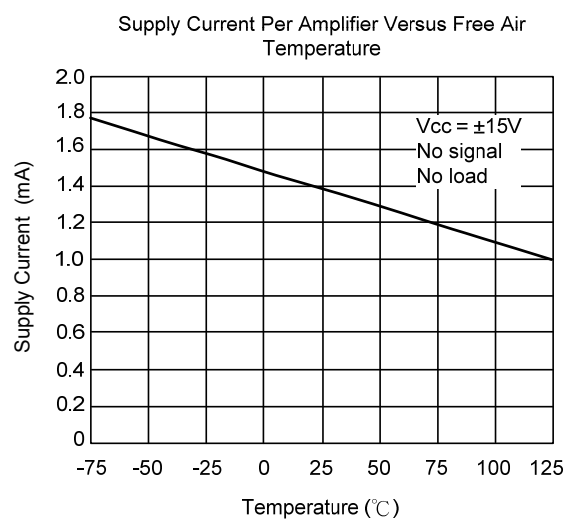
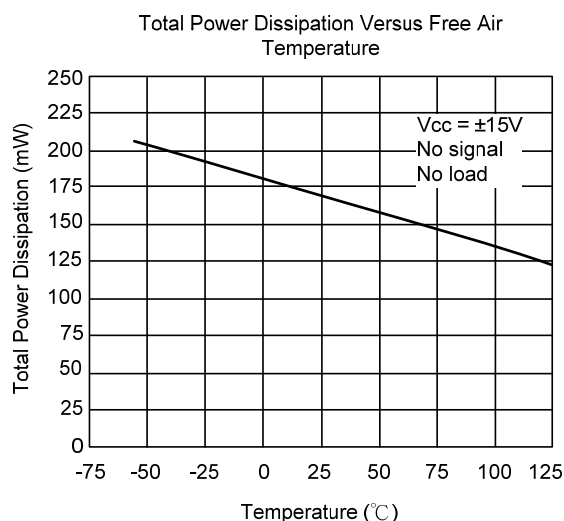
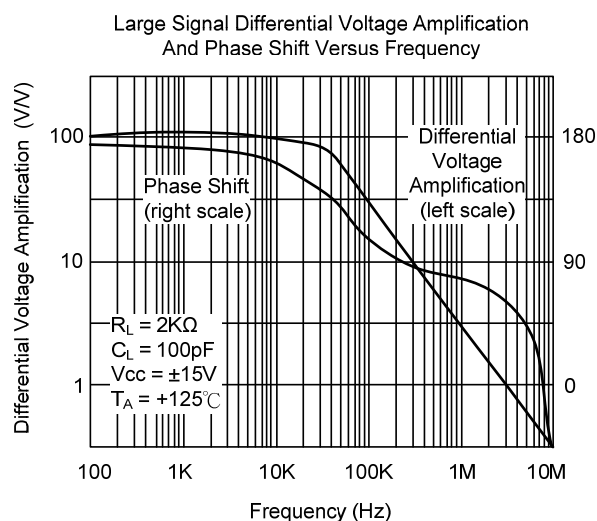
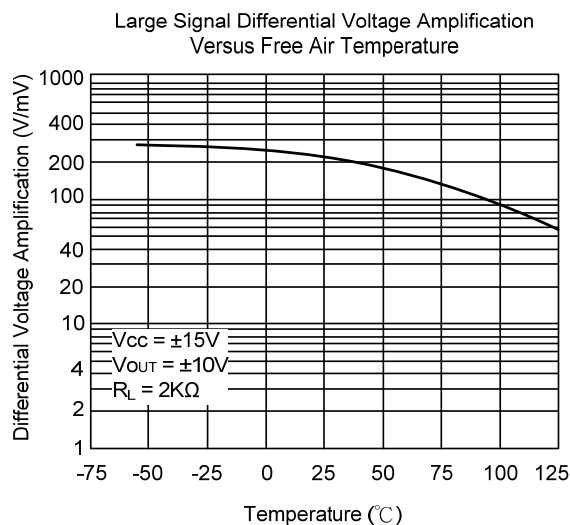
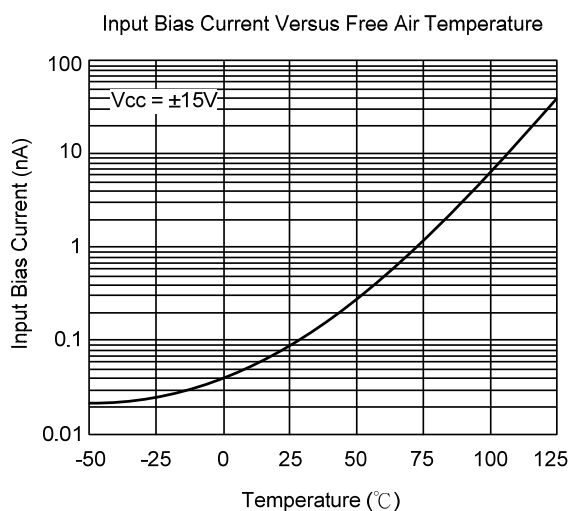
### ■ TYPICAL APPLICATION



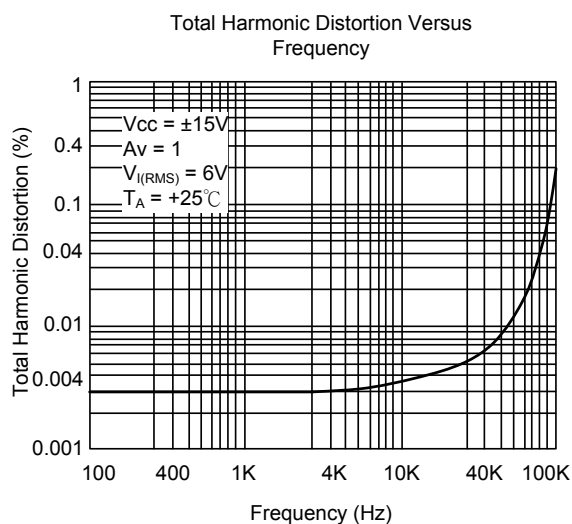
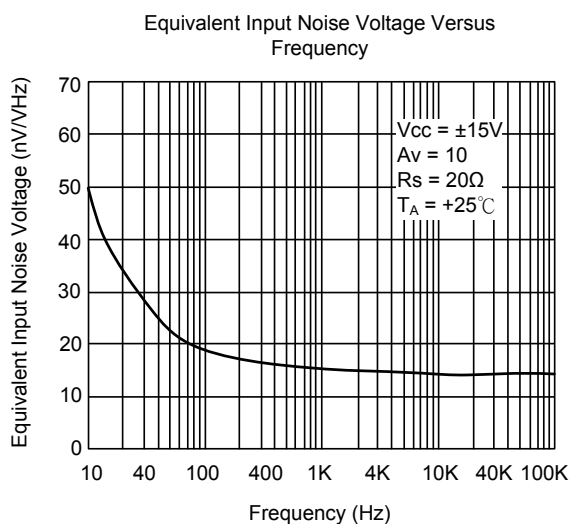
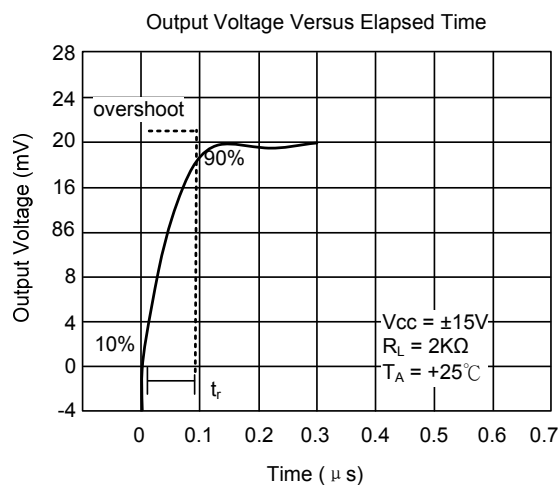
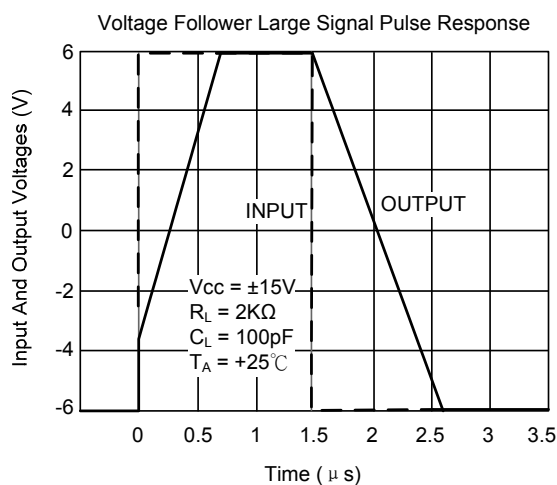
## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS(Cont.)



### ■ TYPICAL CHARACTERISTICS(Cont.)



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