



## MC34119

## LINEAR INTEGRATED CIRCUIT

### LOW POWER AUDIO AMPLIFIER

#### DESCRIPTION

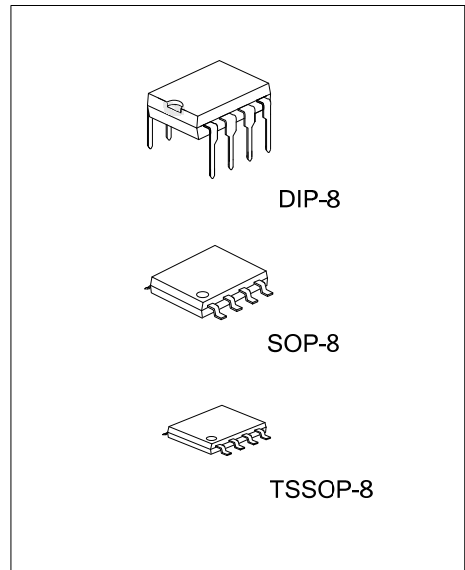
The UTC **MC34119** is a low power audio amplifier IC intended for the telephone applications, such as in speakerphones. It provides differential speaker outputs to maximize output swing at low supply voltages. Coupling capacitor to the speaker is not required. Open loop gain is 80dB, and the closed loop gain is set with two external resistors. The Mute pin permits powering down and/or muting the input signal.

#### FEATURES

- \* Wide operating supply voltage:  $V_{CC}=2V\sim 16V$
- \* Low quiescent supply current ( $I_{CC}=2.7mA$ , typ)
- \* Medium power output over 250mW at  $V_{CC}=6V$ ,  $R_L=32\Omega$ , THD < 10%
- \* Load impedance range ( $8\Omega\sim 100\Omega$ )
- \* Low total harmonic distortion (0.5% typ)
- \* Mute function ( $I_{CC}=65\mu A$ , typ)
- \* Minimum number of external parts required

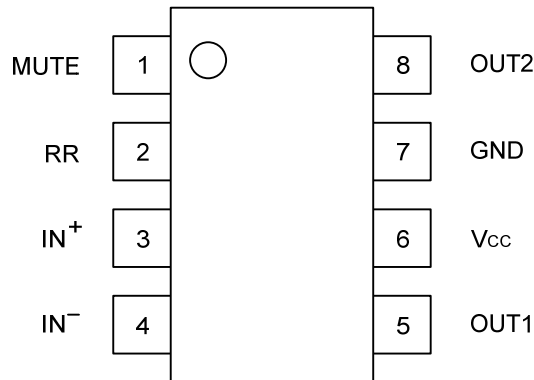
#### ORDERING INFORMATION

| Ordering Number |                | Package | Packing   |
|-----------------|----------------|---------|-----------|
| Lead Free       | Halogen Free   |         |           |
| MC34119L-D08-T  | MC34119G-D08-T | DIP-8   | Tube      |
| MC34119L-S08-R  | MC34119G-S08-R | SOP-8   | Tape Reel |
| MC34119L-S08-T  | MC34119G-S08-T | SOP-8   | Tube      |
| MC34119L-P08-R  | MC34119G-P08-R | TSSOP-8 | Tape Reel |
| MC34119L-P08-T  | MC34119G-P08-T | TSSOP-8 | Tube      |



|  |   |
|--|---|
| <p>MC34119L-D08-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Free</p> | <p>(1) T: Tube, R: Tape Reel</p> <p>(2) D08: DIP-8, P08: TSSOP-8, S08: SOP-8</p> <p>(3) G: Halogen Free, L: Lead Free</p> |
|--|---|

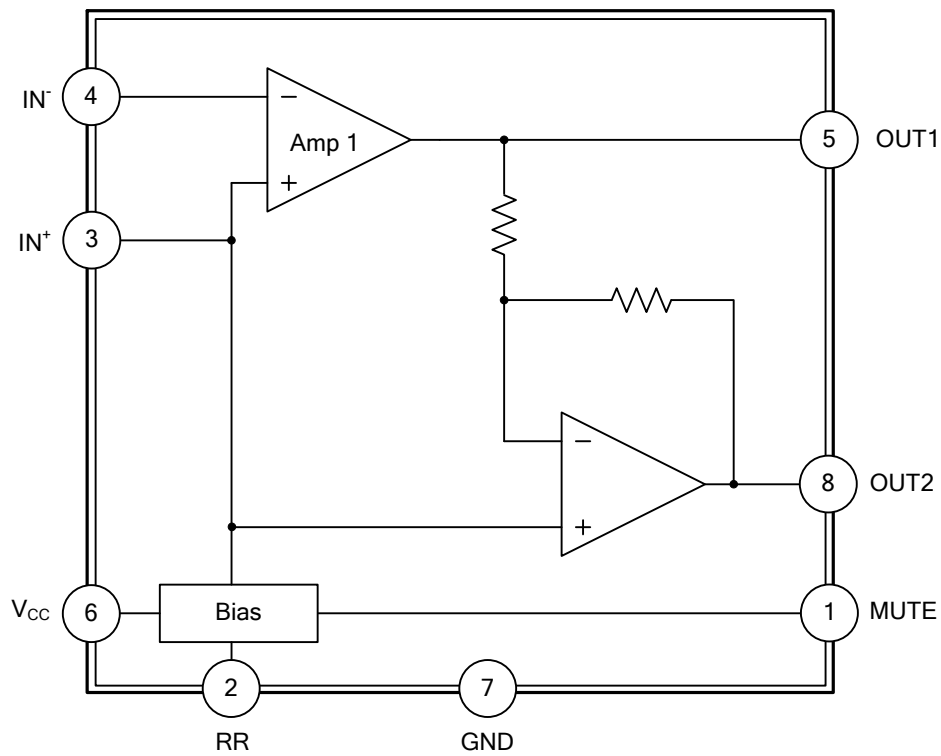
### ■ PIN CONFIGURATION



### ■ PIN DESCRIPTION

| PIN NO. | PIN NAME         | DESCRIPTION  |
|---------|------------------|--|
| 1       | Mute             | This pin can be used to power down the IC to conserve power, or for muting, or both. When at a logic "LOW" (less than 0.8V), the IC is enabled for normal operation. When at a logic "HIGH" (2V to $V_{CC}$ ), the IC is disabled. If Mute is open, that is equivalent to a logic "LOW". |
| 2       | Ripple Rejection | A capacitor at this pin increase power supply rejection, and affects turn-on time. This pin can be left open if the capacitor at pin 3 is sufficient.  |
| 3       | Input(+)         | Analog Ground for the amplifiers. A 1 $\mu$ F capacitor at this pin (with a 5 $\mu$ F capacitor at pin 2) provides 52dB( typ) of power supply rejection. Turn-on time of the circuit is affected by the capacitor on this pin. This pin can be used as an alternative input.             |
| 4       | Input(-)         | Amplifier input. The input capacitor and resistor set low frequency roll-off and input impedance. The feedback resistor is connected between this pin and output 1.  |
| 5       | Output 1         | Amplifier output 1. The DC level is about $(V_{CC}-0.7V)/2$ .  |
| 6       | $V_{CC}$         | DC supply voltage is applied to this pin ( $V_{CC}=2\sim 16V$ ).   |
| 7       | GND              | Ground pin.  |
| 8       | Output 2         | Amplifier output 2. This signal is equal in amplitude, but 180° out of phase with that output 1, the DC level is about $(V_{CC}-0.7V)/2$ .   |

## ■ BLOCK DIAGRAM



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

| PARAMETER   | SYMBOL           | RATINGS    | UNIT |
|---|------------------|------------|------|
| Supply Voltage                                    | V <sub>CC</sub>  | -1~+18     | V    |
| Output Current                                    | I <sub>OUT</sub> | ±250       | mA   |
| Maximum Input, Ripple Rejection, Mute Pin Voltage | V <sub>IN</sub>  | -1~+1      | V    |
| Applied Output Voltage (Output Pin When Disabled) | V <sub>OUT</sub> | -1~+1      | V    |
| Junction Temperature                              | T <sub>J</sub>   | +125       | °C   |
| Operating Temperature                             | T <sub>OPR</sub> | -20 ~ +85  | °C   |
| Storage Temperature                               | T <sub>STG</sub> | -40 ~ +150 | °C   |

Note: 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.

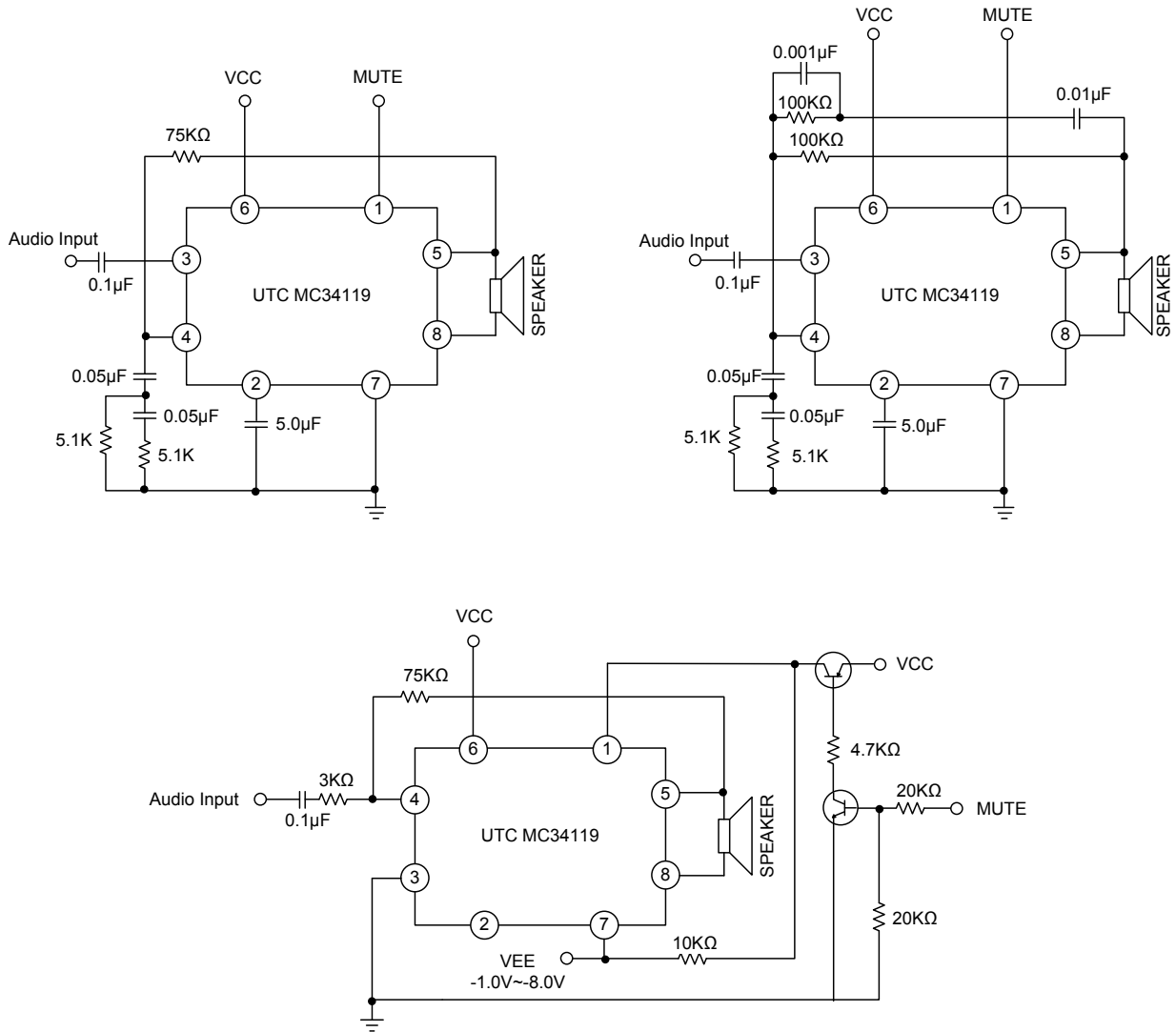
## ■ RECOMMENDED OPERATION CONDITIONS (T<sub>A</sub>=25°C)

| PARAMETER                          | SYMBOL               | RATINGS           | UNIT |
|------------------------------------|----------------------|-------------------|------|
| Supply Voltage                     | V <sub>CC</sub>      | 2~16              | V    |
| Load Impedance                     | Z <sub>L</sub>       | 8~100             | Ω    |
| Peak Load Current                  | I <sub>L(PEAK)</sub> | ±200              | mA   |
| Differential Gain (5KHz Bandwidth) | ΔG <sub>V</sub>      | 0~46              | dB   |
| Voltage at Mute                    | V <sub>I(MUTE)</sub> | 0~V <sub>CC</sub> | V    |
| Ambient Temperature                | T <sub>a</sub>       | -20~+70           | °C   |

## ■ ELECTRICAL CHARACTERISTICS (V<sub>CC</sub>=6V, T<sub>A</sub>=25°C, unless otherwise specified)

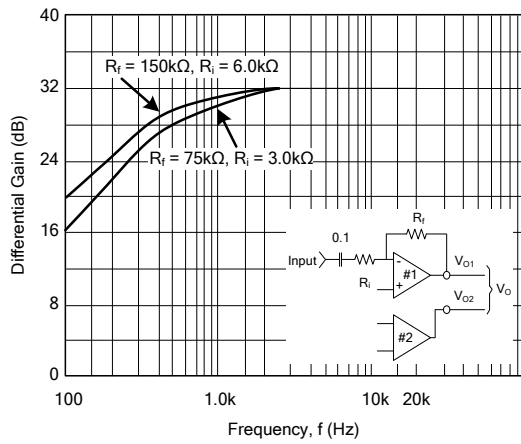
| PARAMETER  | SYMBOL               | TEST CONDITIONS  | MIN   | TYP                | MAX  | UNIT |
|--|----------------------|--|-------|--------------------|------|------|
| <b>DC PARAMETER</b>  |                      |  |       |                    |      |      |
| Operating Current  | I <sub>CC</sub>      | V <sub>CC</sub> =3V, Mute=0.8V                                     |       | 2.7                | 4    | mA   |
|  |                      | V <sub>CC</sub> =16V, Mute=0.8V                                    |       | 3.3                | 5    | mA   |
|  |                      | V <sub>CC</sub> =3V, Mute=2V                                       |       | 65                 | 100  | μA   |
| Output Voltage   | V <sub>OUT</sub>     | R <sub>L</sub> =16Ω, R <sub>1</sub> =75KΩ, V <sub>CC</sub> =3V     | 1     | 1.15               | 1.25 | V    |
|  |                      | R <sub>L</sub> =16Ω, R <sub>1</sub> =75KΩ, V <sub>CC</sub> =6V     |       | 2.65               |      | V    |
|  |                      | R <sub>L</sub> =16Ω, R <sub>1</sub> =75KΩ, V <sub>CC</sub> =12V    |       | 5.65               |      | V    |
| Output Offset Voltage  | V <sub>O(OFF)</sub>  | V <sub>CC</sub> =6V, R <sub>F</sub> =75KΩ, R <sub>L</sub> =32Ω     | -30   | 0                  | 30   | mV   |
| Output High Level  | V <sub>OH</sub>      | 2V < V <sub>CC</sub> < 16V, I <sub>OUT</sub> =-75mA                |       | V <sub>CC</sub> -1 |      | V    |
| Output Low Level   | V <sub>OL</sub>      | 2V < V <sub>CC</sub> < 16V, I <sub>OUT</sub> =75mA                 |       | 0.16               |      | V    |
| Input Bias Current   | I <sub>I(BIAS)</sub> |  |       | -100               | -200 | nA   |
| Equivalent Resistance  | R <sub>EQ</sub>      | Pin 3  | 100   | 150                | 220  | KΩ   |
|  |                      | Pin 2  | 18    | 25                 | 40   | KΩ   |
| <b>AC PARAMETER</b>  |                      |  |       |                    |      |      |
| Open Loop Gain of Amp. 1   | G <sub>V1</sub>      |  | 80    |                    |      | dB   |
| Open Loop Gain of Amp. 2   | G <sub>V2</sub>      | f=1KHz, R <sub>L</sub> =32Ω  | -0.35 | 0                  | 0.35 | dB   |
| Output Power   | P <sub>OUT</sub>     | V <sub>CC</sub> =3V, R <sub>L</sub> =16Ω, THD<10%                  | 55    |                    |      | mW   |
|  |                      | V <sub>CC</sub> =6V, R <sub>L</sub> =32Ω, THD<10%                  | 250   |                    |      | mW   |
|  |                      | V <sub>CC</sub> =12V, R <sub>L</sub> =100Ω, THD<10%                | 400   |                    |      | mW   |
| Total Harmonic Distortion (f=1KHz)                                 | THD                  | V <sub>CC</sub> =6V, R <sub>L</sub> =32Ω, P <sub>OUT</sub> =125mW  |       | 0.5                | 1    | %    |
|  |                      | V <sub>CC</sub> ≥3V, R <sub>L</sub> =8Ω, P <sub>OUT</sub> =20mW    |       | 0.5                |      | %    |
|  |                      | V <sub>CC</sub> ≥12V, R <sub>L</sub> =32Ω, P <sub>OUT</sub> =200mW |       | 0.6                |      | %    |
| Gain Bandwidth Product   | GB <sub>W</sub>      |  |       | 1.5                |      | MHz  |
| Power Supply Rejection (V <sub>CC</sub> =6V, ΔV <sub>CC</sub> =3V) | RR                   | C1=∞, C2=0.01μF  | 50    |                    |      | dB   |
|  |                      | C1=0.1μF, C2=0, f=1KHz   |       | 12                 |      | dB   |
|  |                      | C1=1μF, C2=5μF, f=1KHz   |       | 52                 |      | dB   |
| Muting   | G <sub>V(MUTE)</sub> | Mute=2V, 1KHz < f < 20KHz  | 70    |                    |      | dB   |

### ■ TYPICAL CIRCUIT

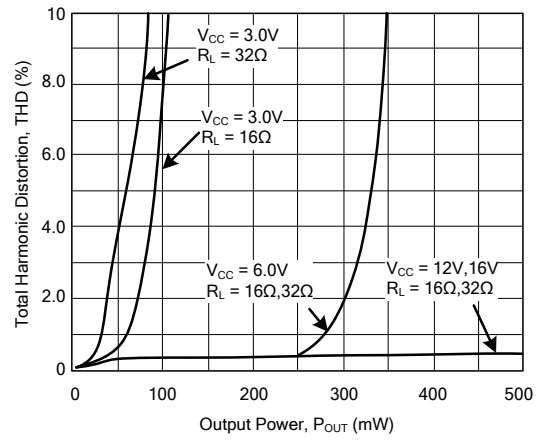


## TYPICAL CHARACTERISTICS

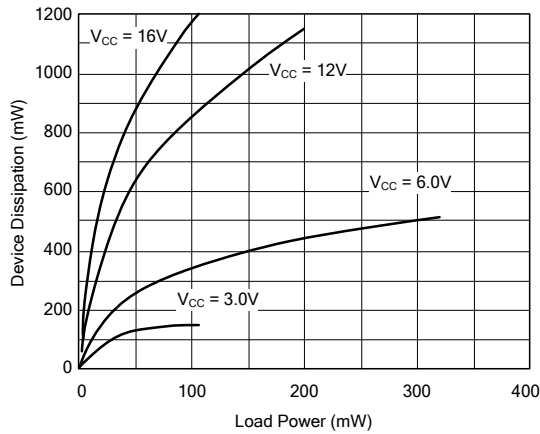
Differential Gain Versus Frequency



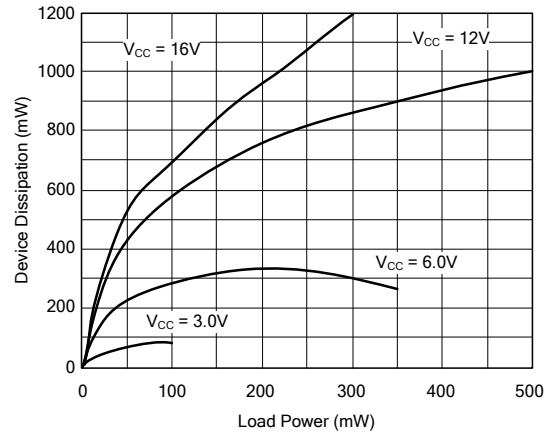
Distortion Versus Power  
(f = 1, 3.0kHz, AVD = 12dB)



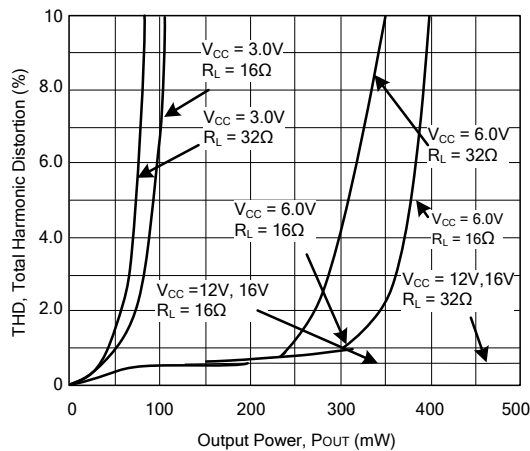
Device Dissipation, 16Ω Load



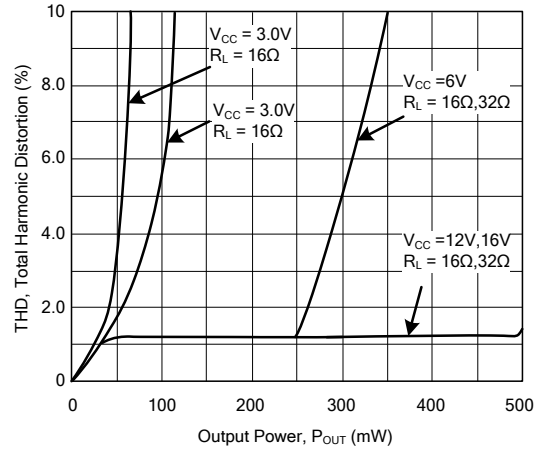
Device Dissipation, 32Ω Load



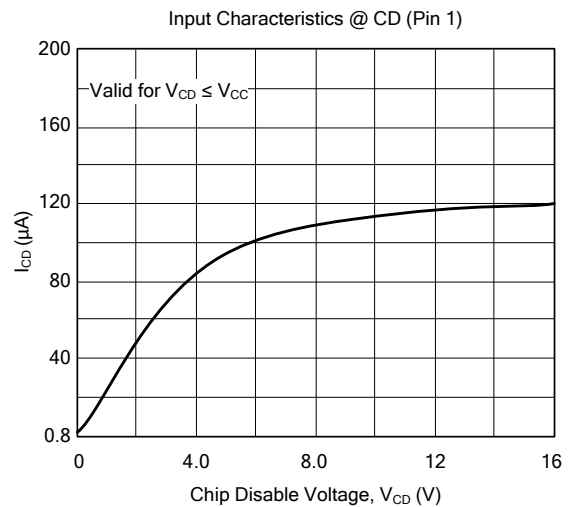
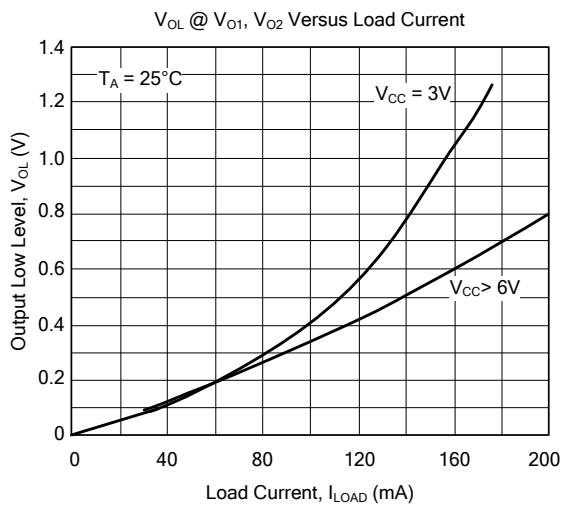
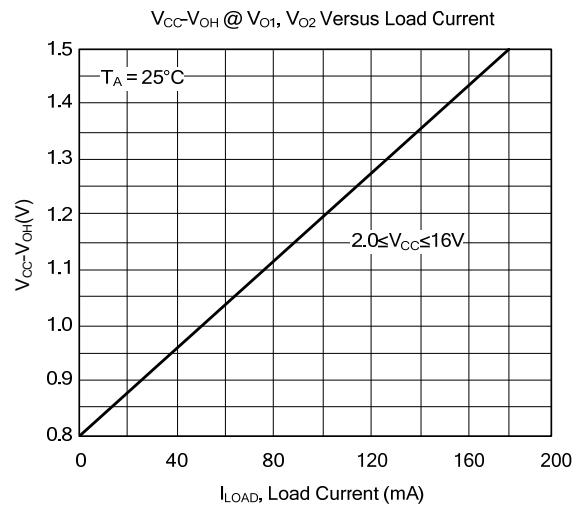
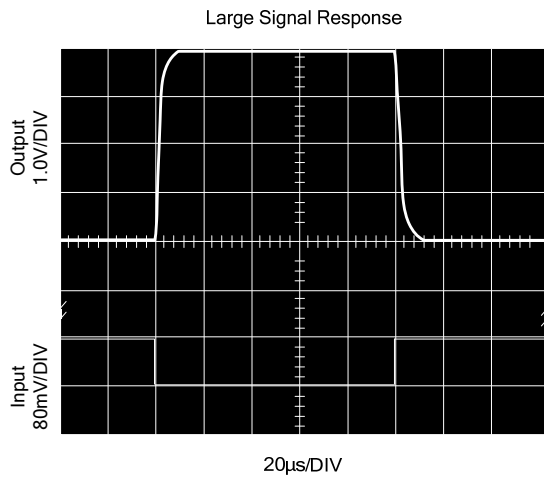
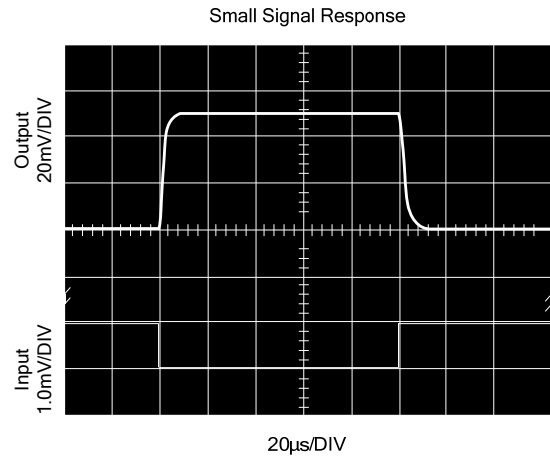
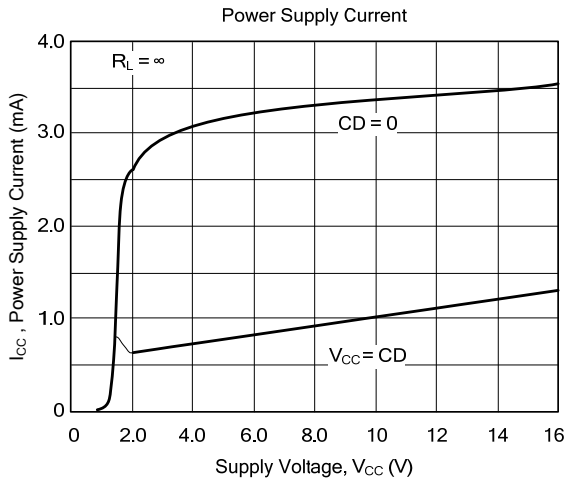
Distortion Versus Power  
(f = 1.0kHz, AVD = 34dB)



Distortion Versus Power  
(f = 3.0kHz, AVD = 34dB)



## ■ TYPICAL CHARACTERISTICS(Cont.)



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