

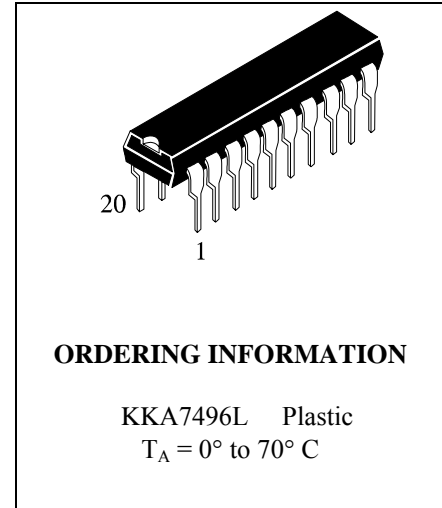
# 2W+2W AMPLIFIER WITH DC VOLUME CONTROL

## KKA7496L

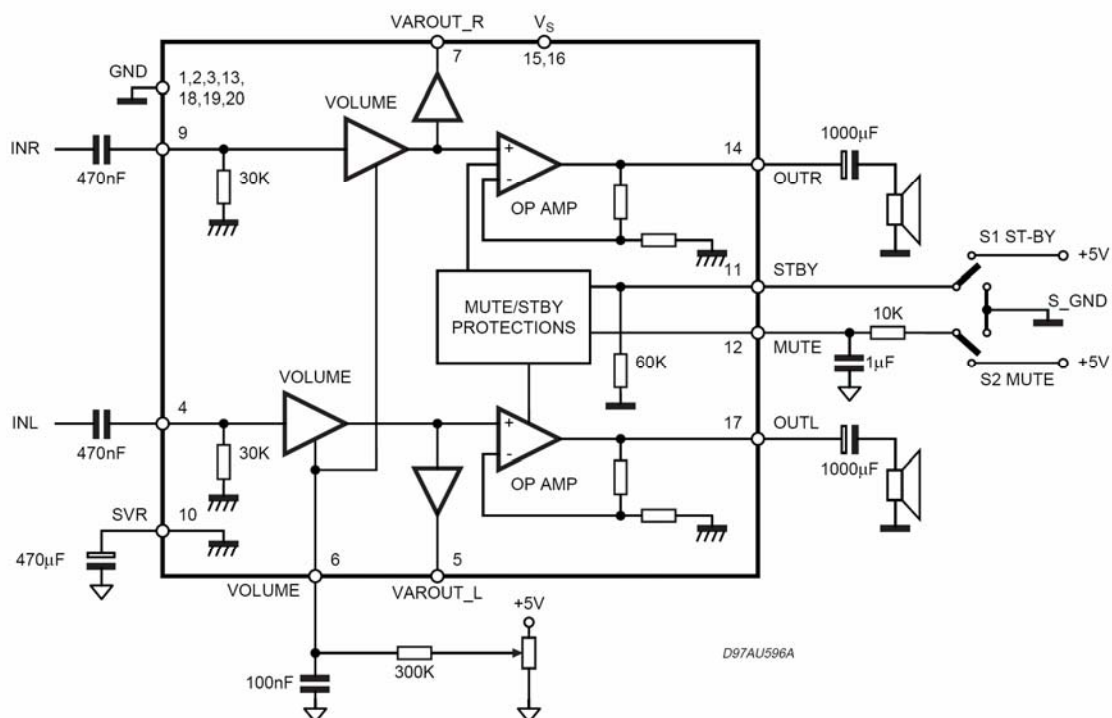
### DESCRIPTION

The KKA7496L is a stereo 2W+2W class AB power amplifier assembled in the @ Powerdip 14+3+3 package, specially designed for high quality sound, TV and Monitor applications. Features of the KKA7496L include linear volume control, Stand-by and mute functions.

- 2W+2W OUTPUT POWER  
RL = 8Ω @THD = 10% Vcc = 14V
- ST-BY AND MUTE FUNCTIONS
- LOW TURN-ON TURN-OFF POP NOISE
- LINEAR VOLUME CONTROL DC COUPLED WITH POWER OP. AMP.
- NO BOUCHEROT CELL
- NO ST-BY RC INPUT NETWORK
- SINGLE SUPPLY RANGING UP TO 15V
- SHORT CIRCUIT PROTECTION
- THERMAL OVERLOAD PROTECTION
- INTERNALLY FIXED GAIN
- SOFT CLIPPING
- VARIABLE OUTPUT AFTER VOLUME CONTROL CIRCUIT
- POWERDIP (14+3+3) PACKAGE

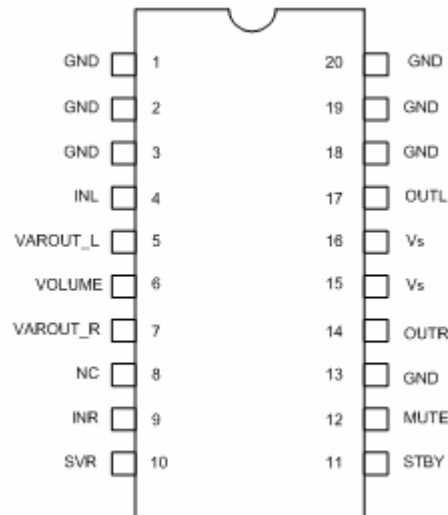


### BLOCK DIAGRAM



**Absolute Maximum Ratings**

| Symbol                            | Parameter                        | Value      | Unit            |
|-----------------------------------|----------------------------------|------------|-----------------|
| V <sub>S</sub>                    | DC Supply Voltage                | 26         | V               |
| V <sub>IN</sub>                   | Maximum Input Voltage            | 8          | V <sub>pp</sub> |
| T <sub>amb</sub>                  | Ambient Operating Temperature    | 0 to 70    | °C              |
| T <sub>stg</sub> , T <sub>j</sub> | Storage and Junction Temperature | -40 to 150 | °C              |
| V <sub>6</sub>                    | Volume CTRL DC voltage           | 7          | V               |

**PIN CONNECTION**

**ELECTRICAL CHARACTERISTICS** (Refer to the test circuit V<sub>S</sub> = 14V, R<sub>L</sub> = 80Ω, R<sub>g</sub> = 50 Ω, T<sub>amb</sub> = 25°C)

| Symbol                           | Parameter                                  | Test Condition                                       | Min  | Typ | Max  | Unit             |
|----------------------------------|--|--|------|-----|------|------------------|
| V <sub>S</sub>                   | Supply Voltage Range                       |  | 10   |     | 18   | V                |
| I <sub>q</sub>                   | Total Quiescent Current                    |  |      | 25  | 50   | mA               |
| DC/V <sub>os</sub>               | Output DC Offset Referred to SVR Potential | No Input Signal                                      |      | 200 |      | mV               |
| V <sub>o</sub>                   | Quiescent Output Voltage                   |  |      | 7   |      | V                |
| P <sub>o</sub>                   | Output Power                               | THD = 10%, R <sub>L</sub> = 8Ω                       | 1.6  | 2   |      | W                |
|                                  |  | THD = 1%, R <sub>L</sub> = 8Ω                        |      | 1.3 |      | W                |
| THD                              | Total Harmonic Distortion                  | G <sub>v</sub> = 30dB, P <sub>o</sub> = 1W, f = 1KHz |      |     | 0.4  | %                |
| I <sub>peak</sub>                | Output Peak Current                        | (internally limited)                                 | 0.7  | 0.9 |      | A                |
| V <sub>in</sub>                  | Input Signal                               |  |      |     | 2.8  | V <sub>rms</sub> |
| G <sub>v</sub>                   | Closed Loop Gain                           | Vol Ctrl > 4.5V                                      | 28.5 | 30  | 31.5 | dB               |
| G <sub>vLine</sub>               | Monitor Out Gain                           | Vol Ctrl > 4.5V, Zload > 30KΩ                        | -1.5 | 0   | 1.5  | dB               |
| A <sub>Min</sub> V <sub>OL</sub> | Attenuation at Minimum Volume              | Vol Ctrl < 0.5V                                      | 80   |     |      | dB               |
| BW                               |  |  |      | 0.6 |      | MHz              |

**ELECTRICAL CHARACTERISTICS** (continued)

| Symbol                    | Parameter                  | Test Condition  | Min  | Typ | Max | Unit |
|---------------------------|----------------------------|---|------|-----|-----|------|
| eN                        | Total Output Noise         | f = 20Hz to 22KHz<br>Play, max volume   |      | 500 | 800 | μV   |
|                           |                            | f = 20Hz to 22KHz<br>Play, max attenuation                                      |      | 100 | 250 | μV   |
|                           |                            | f = 20Hz to 22KHz<br>Mute   |      | 60  | 150 | μV   |
| SR                        | Slew Rate                  |   | 5    | 8   |     | V/μs |
| R <sub>i</sub>            | Input Resistance           |   | 22.5 | 30  |     | KΩ   |
| R <sub>Var Out</sub>      | Variable Output Resistance |   |      | 30  | 100 | Ω    |
| R <sub>load Var Out</sub> | Variable Output Load       |   | 2    |     |     | KΩ   |
| SVR                       | Supply Voltage Rejection   | f = 1kHz, max volume<br>C <sub>SVR</sub> = 470μF, V <sub>RIP</sub> = 1Vrms      | 35   | 39  |     | dB   |
|                           |                            | f = 1kHz, max attenuation<br>C <sub>SVR</sub> = 470μF, V <sub>RIP</sub> = 1Vrms | 55   | 65  |     | dB   |
| T <sub>M</sub>            | Thermal Muting             |   |      | 150 |     | °C   |
| T <sub>s</sub>            | Thermal Shut-down          |   |      | 160 |     | °C   |

**MUTE STAND-BY & INPUT SELECTION FUNCTIONS**

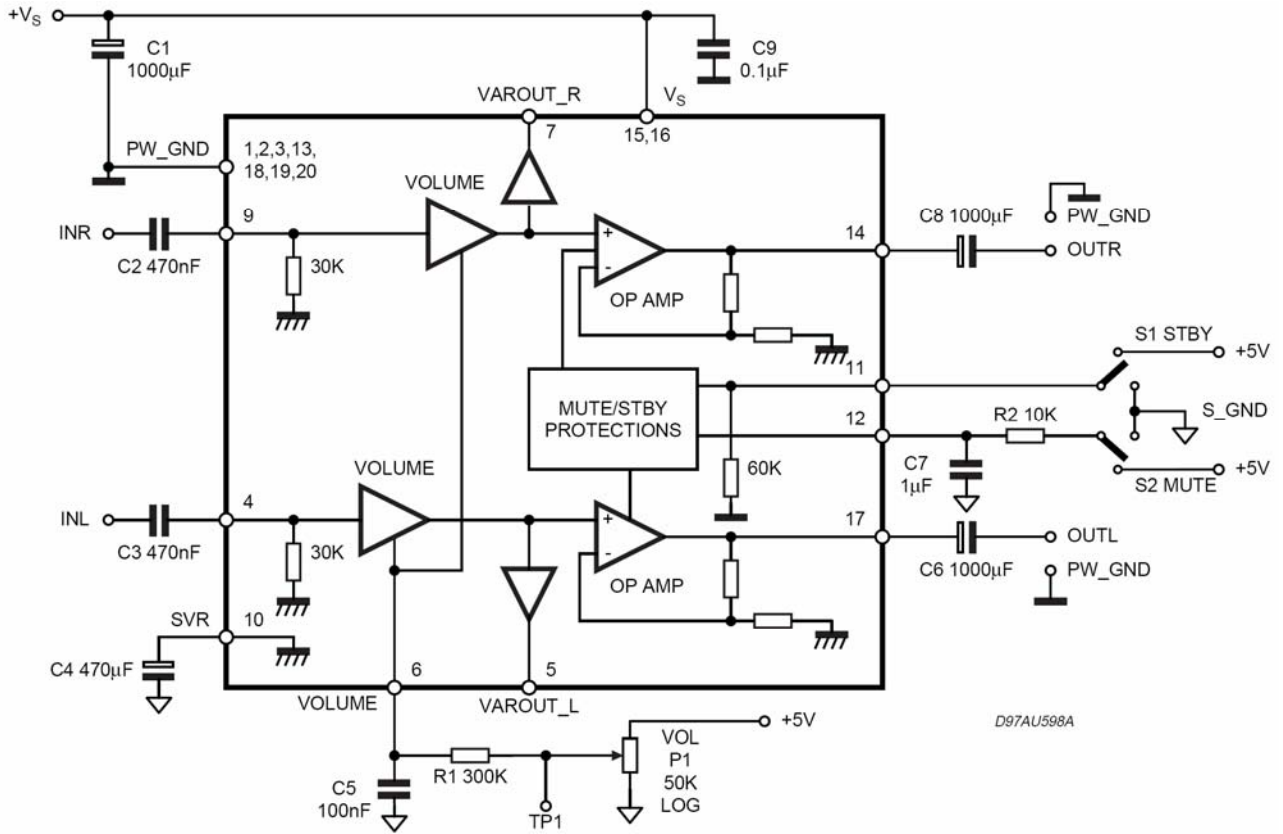
|                       |                                 |   |     |     |     |    |
|-----------------------|---------------------------------|---|-----|-----|-----|----|
| V <sub>ST ON</sub>    | Stand-by ON Threshold           |   | 3.5 |     |     | V  |
| V <sub>ST OFF</sub>   | Stand-by OFF Threshold          |   |     |     | 1.5 | V  |
| V <sub>M ON</sub>     | Mute ON Threshold               |   | 3.5 |     |     | V  |
| V <sub>M OFF</sub>    | Mute OFF Threshold              |   |     |     | 1.5 | V  |
| I <sub>qST-BY</sub>   | Quiescent Current @<br>Stand-by |   |     | 0.6 | 1   | mA |
| A <sub>MUTE</sub>     | Mute Attenuation                |   | 50  | 65  |     | dB |
| I <sub>stbyBIAS</sub> | Stand-by bias current           | Stand by on V <sub>ST-BY</sub> = 5V<br>V <sub>MUTE</sub> = 5V |     | 80  |     | μA |
|                       |                                 | Play or Mute  | -20 | -5  |     | μA |
| I <sub>muteBIAS</sub> | Mute bias current               | Mute  |     | 1   | 5   | μA |
|                       |                                 | Play  |     | 0.2 | 2   | μA |

**APPLICATION SUGGESTIONS**

The recommended values of the external components are those shown on the application circuit of figure 1A. Different values can be used, the following table can help the designer.

| COMPONENT | SUGGESTION VALUE | PURPOSE                      | LARGER THAN SUGGESTION        | SMALLER THAN SUGGESTION        |
|-----------|------------------|------------------------------|-------------------------------|--------------------------------|
| R1        | 300K             | Volume control circuit       | Larger volume regulation time | Smaller volume regulation time |
| R2        | 10K              | Mute time constant           | Larger mute on/off time       | Smaller mute on/off time       |
| P1        | 50K              | Volume control circuit       |                               |                                |
| C1        | 1000μF           | Supply voltage bypass        |                               | Danger of oscillation          |
| C2        | 470nF            | Input DC decoupling          | Lower low frequency cutoff    | Higher low frequency cutoff    |
| C3        | 470nF            | Input DC decoupling          | Lower low frequency cutoff    | Higher low frequency cutoff    |
| C4        | 470μF            | Ripple rejection             | Better SVR                    | Worse SVR                      |
| C5        | 100nF            | Volume control time constant | Larger vmlue regulation time  | Smaller volume regulation time |
| C6        | 1000μF           | Output DC decoupling         | Lower low frequency cutoff    | Higher low frequency cutoff    |
| C7        | 1μF              | Mute time constant           | Larger mute on/off time       | Smaller mute on/off time       |
| C8        | 1000μF           | Output DC decoupling         | Lower low frequency cutoff    | Higher low frequency cutoff    |
| C9        | 100nF            | Supply voltage bypass        |                               | Danger of oscillation          |

**Figure 1 A. Application Circuit**

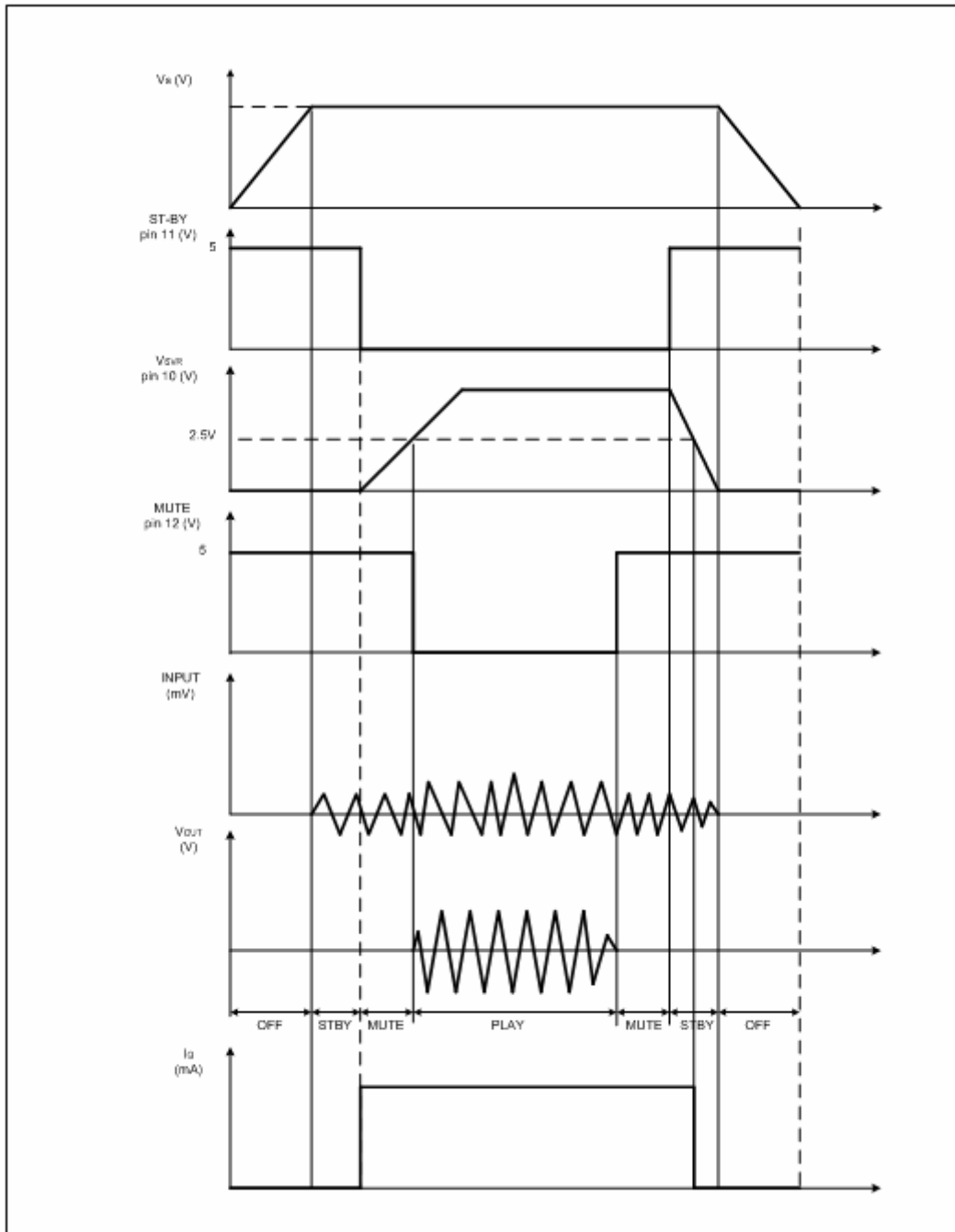


## MUTE STAND-BY TRUTH TABLE

| MUTE | ST-BY | OPERATING CONDITIO |
|------|-------|--------------------|
| H    | H     | STANDBY            |
| L    | H     | STANDBY            |
| H    | L     | MUTE               |
| L    | L     | PLAY               |

### Turn ON/OFF Sequences (for optimizing the POP performances)

#### A) USING MUTE AND STAND-BY FUNCTIONS

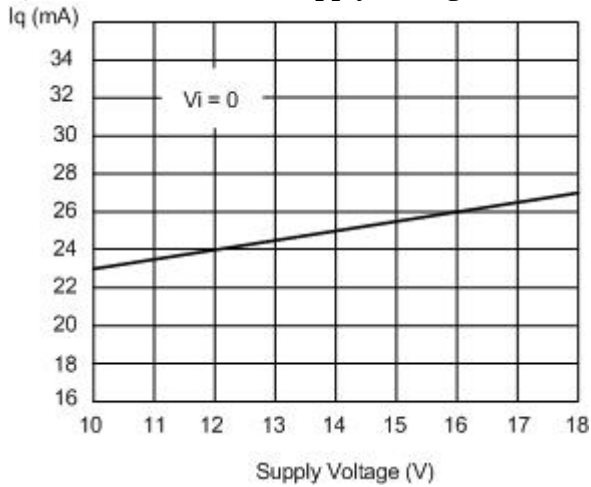


#### B) USING ONLY THE MUTE FUNCTION

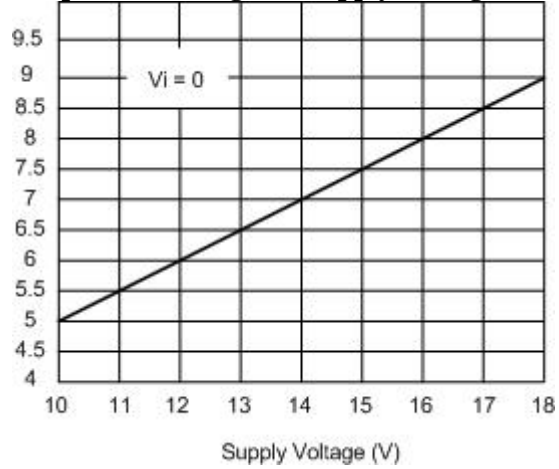
To simplify the application, the stand-by pin can be connected directly to Ground. During the ON/OFF transitions is recommend to respect the following conditions.

- At the turn-on, the transition mute-play must be made when the SVR pin is higher than 2.5V
- At the turn-off, the KKA7496L must be brought to mute from the play condition when the SVR pin is higher than 2.5V

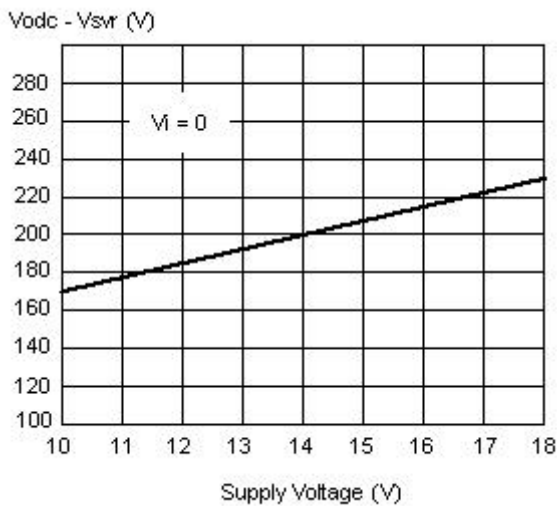
**Quiescent current vs. Supply Voltage**



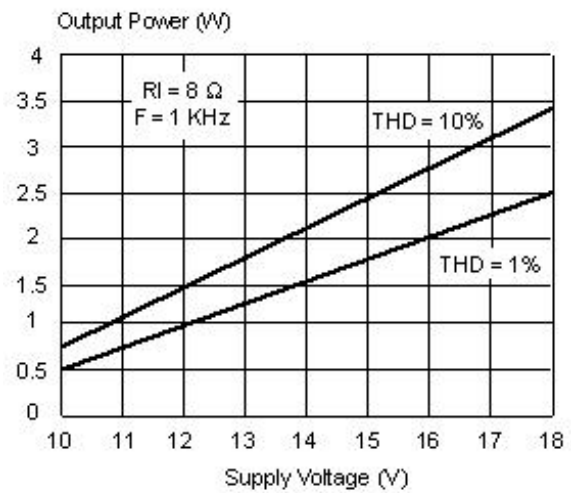
**Output DC Voltage vs. Supply Voltage**



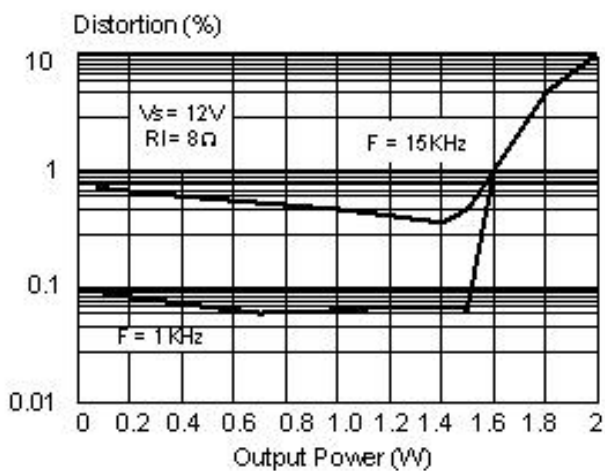
**Output DC Offset vs. Supply Voltage**



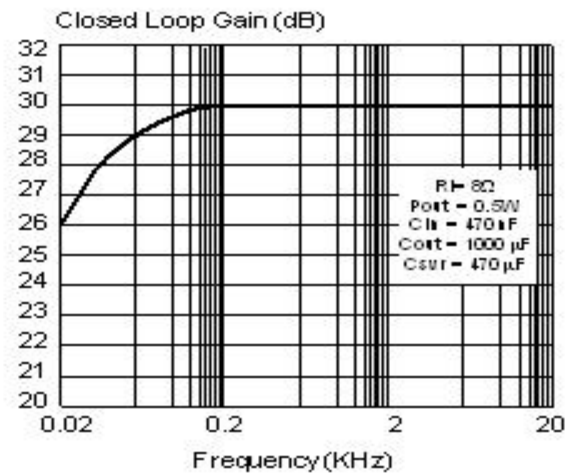
**Output Power vs. Supply Voltage**



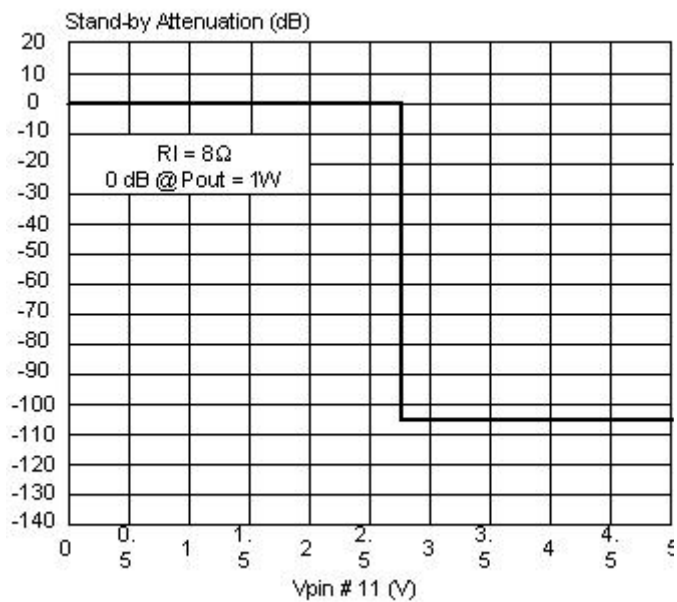
**Distortion vs. Output Power**



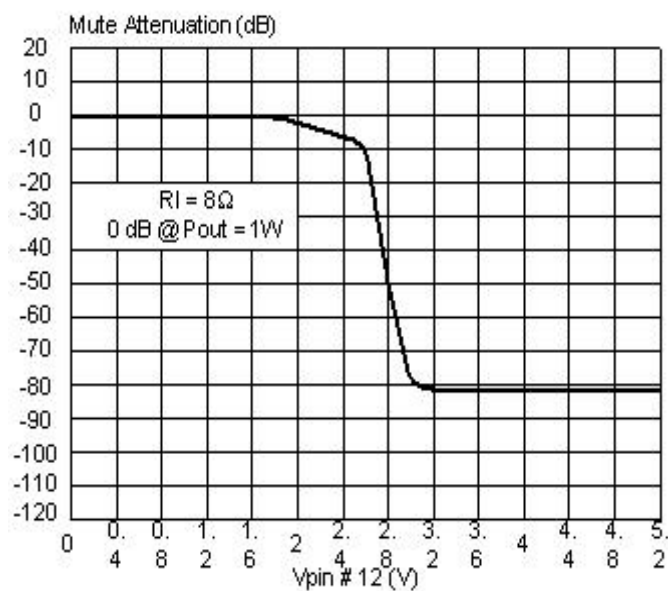
**Closed Loop gain vs. Frequency**



### St-By Attenuation vs. Vpin 11

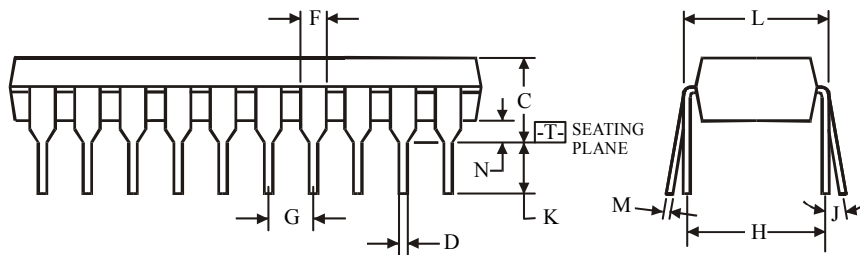
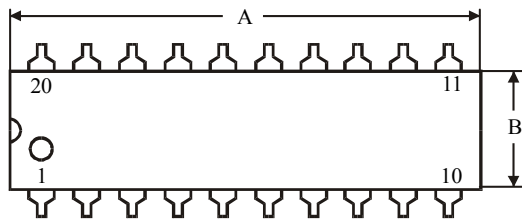
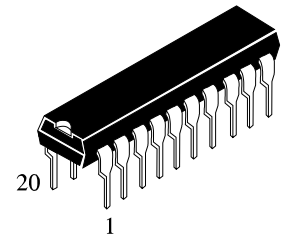


### Mute Attenuation vs. Vpin 12



**PACKAGE DIMENSION**

**N SUFFIX PLASTIC DIP  
(MS - 001AD)**



| Symbol | Dimension, mm |       |
|--------|---------------|-------|
|        | MIN           | MAX   |
| A      | 24.89         | 26.92 |
| B      | 6.10          | 7.11  |
| C      |               | 5.33  |
| D      | 0.36          | 0.56  |
| F      | 1.14          | 1.78  |
| G      | 2.54          |       |
| H      | 7.62          |       |
| J      | 0°            | 10°   |
| K      | 2.92          | 3.81  |
| L      | 7.62          | 8.26  |
| M      | 0.20          | 0.36  |
| N      | 0.38          |       |

**NOTES:**

$\oplus 0.25 (0.010) \text{M T}$

1. Dimensions "A", "B" do not include mold flash or protrusions.

Maximum mold flash or protrusions 0.25 mm (0.010) per side.