



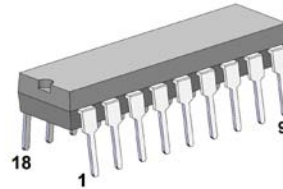
## AS3330 - Dual Voltage Controlled Amplifier (VCA)

### FEATURES

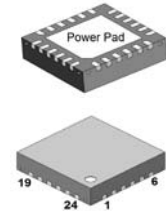
- Two Independent Voltage Controlled Amplifiers in a Single Package
- Simultaneous Linear and Exponential Control Inputs
- Wide Control Range: 120dB min.
- Very Accurate Control Scales for Excellent Gain Tracking
- Exceptionally Low Control Voltage Feedthrough - better than -80dB
- Low Distortion: Less than 0.1%
- Exceptionally Low Noise: Better than -100dB
- Class B to Class A Operation
- Summing Signal and Linear Control Inputs
- Current Outputs for Ease of Use in Voltage Controlled 2-Pole Filters
- Can Be Used in VCO and VCF Control Paths Without Causing Shift
- ±15 Volt Supplies
- Improved CEM 3330 replacement

### APPLICATIONS for electronic music

**AS3330**  
PDIP-18 (300 Mil)



**AS3330F**  
QFN-24 4x4mm 0,5mm



### General Description

The AS 3330 is a dual, high performance, voltage controlled amplifier intended for electronic musical instrument and professional audio applications. Each amplifier includes complete circuitry for simultaneous linear and exponential control of gain. In addition, the operating point of the amplifiers may be set anywhere from Class B to Class A, allowing the user to optimize those parameters critical to the particular application. Also featured are virtual ground summing nodes for both the signal and linear control inputs, so that signal and control mixing may be accomplished within the device itself. Finally, the VCA outputs are signal currents, allowing the device to be conveniently used in two-pole voltage controlled filters, as well as dual voltage controlled amplifiers.

The devices include an on-chip 7.4 volt Zener, allowing them to operate off ±15 volt supplies as well as +15, -5 volt supplies.

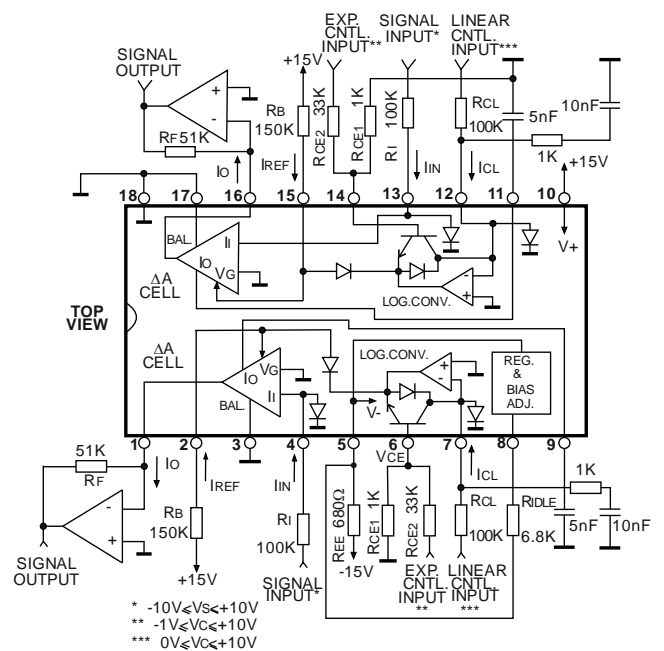
Improved protection and crosstalk level (better than -80 dB).

Power pad in QFN package highly improves thermal stability of parameters of AS3330F.

### Pin Information

| PDIP-18<br>Pin No | QFN-24L<br>Pin No | Pin Name           | Description                 |
|-------------------|-------------------|--------------------|-----------------------------|
| 1                 | 4                 | Out1               | Current Output 1            |
| 2                 | 5                 | VG1                | Gain 1                      |
| 3                 | 7                 | DTrim1             | Distortion Trim 1           |
| 4                 | 8                 | IN1                | Signal Input 1              |
| 5                 | 9                 | V <sub>EE</sub>    | Negative supply             |
| 6                 | 11                | V <sub>CE1</sub>   | Exponential Control Input 1 |
| 7                 | 12                | V <sub>CL1</sub>   | Linear Control Input 1      |
| 8                 | 14                | IDLE               | IDLE Adjust                 |
| 9                 | 15                | C <sub>COMP1</sub> | Compensation 1              |
| 10                | 16                | V <sub>CC</sub>    | Positive supply             |
| 11                | 17                | C <sub>COMP2</sub> | Compensation 2              |
| 12                | 19                | V <sub>CL2</sub>   | Linear Control Input 2      |
| 13                | 20                | IN2                | Signal Input 2              |
| 14                | 22                | V <sub>CE2</sub>   | Exponential Control Input 2 |
| 15                | 23                | VG2                | Gain 2                      |
| 16                | 24                | Out2               | Current Output 2            |
| 17                | 2                 | DTrim2             | Distortion Trim 2           |
| 18                | 3                 | GND                | Ground                      |
| -                 | Power pad         | Power pad          | Don't connect               |

### Circuit Block and Connection Diagram (PDIP-18)





**Absolute Maximum Ratings**

|   |                  |
|---|------------------|
| Voltage between $V_{CC}$ and $V_{EE}$ pins              | +22V, -0,5V      |
| Voltage between $V_{CC}$ and GND pins                   | +18V, -0,5V      |
| Voltage between $V_{EE}$ and GND pins                   | -6V, -0,5V       |
| Voltage between Output and Distortion Trim and GND pins | +18V, -0,5V      |
| Voltage between All Other pins and GND pin              | ±6V              |
| Current through any pin                                 | ±40mA            |
| Storage Temperature Range                               | - 55°C to +150°C |
| Operating Temperature Range                             | - 25°C to +75°C  |

**ELECTRICAL CHARACTERISTICS**

$V_{CC}=+15B$   $T_A= 25^{\circ}C$

| Parameter  | Conditions              | Min.         | Typ.          | Max.       | Units          |
|--|-------------------------|--------------|---------------|------------|----------------|
| Exponential Control Range                                  |                         | 120          | 150           | -          | dB             |
| Linear Control Range                                       |                         | 100          | 130           | -          | dB             |
| Peak Cell Current, $I_{CP}$<br>(input plus output)         | Class B<br>Class A      | ±400<br>+800 | ±600<br>±1400 | -<br>-     | μA<br>μA       |
| Exponential Control Scale Sensitivity                      |                         | 2.8          | 3.0           | 3.2        | mV/dB          |
| Tempco of Exponential Control Scale                        |                         | +3000        | +3300         | +3600      | ppm            |
| Tempco of Linear Control Scale                             |                         | -            | ±100          | ±300       | ppm            |
| Exponential Control Scale Error <sup>1</sup>               |                         | -            | 0.3           | 1          | dB             |
| Linear Control Scale Error <sup>1</sup>                    | $0 < I_{CL} < 100\mu A$ | -            | 0.3           | 1.5        | %              |
| Cell Current Gain  | $V_G = 0$               | 0.83         | 1             | 1.2        |                |
| Current Gain Tempco  | $V_G = 0$               | -            | ±100          | ±300       | ppm            |
| Log Converter Output                                       | $I_{CL} = I_{REF}$      | -5           | 0             | +5         | mV             |
| Output Voltage Compliance                                  |                         | -0.3         | -             | +13.5      | V              |
| Untrimmed Distortion <sup>2</sup>                          | Class B<br>Class A      | -<br>-       | 1.5<br>0.3    | 5<br>1     | %<br>%         |
| Trimmed Distortion <sup>2</sup>                            | Class B<br>Class A      | -<br>-       | 0.2<br>0.05   | 0.8<br>0.2 | %<br>%         |
| Untrimmed Control Feedthrough <sup>3</sup>                 | Class B<br>Class A      | -<br>-       | 0.2<br>7      | 0.8<br>25  | μA<br>μA       |
| Trimmed Control Feedthrough <sup>3</sup>                   | Class B<br>Class A      | -<br>-       | 0.01<br>1     | 0.08<br>5  | μA<br>μA       |
| Output Noise Current in 20KHz<br>Bandwidth ( $V_G = 0$ )   | Class B<br>Class A      | -<br>-       | 1.2<br>3.5    | 3.5<br>12  | nARMS<br>nARMS |
| Signal Current Bandwidth <sup>4</sup>                      | Class B<br>Class A      | 30<br>100    | 100<br>350    | -<br>-     | KHz<br>KHz     |
| Signal Current Slew Rate                                   | Class B<br>Class A      | 60<br>400    | 150<br>750    | -<br>-     | μA/μS<br>μA/μS |
| Crosstalk Between VCAs                                     | $F = 10KHz$             | -80          | -90           | -          | dB             |
| Internal Bias Current at Signal & Linear<br>Control Inputs | Class B<br>Class A      | 80<br>130    | 175<br>300    | 350<br>600 | nA<br>nA       |
| Exponential Control Input Current                          | $I_{CL} = 100\mu A$     | 0.4          | 0.8           | 1.3        | μA             |
| Linear Control Input Offset Voltage                        |                         | -7           | +3            | + 15       | mV             |
| Signal Input Offset Voltage                                |                         | -15          | -5            | +5         | mV             |
| Positive Supply Current                                    | Class B<br>Class A      | 0.8<br>2.1   | 1.3<br>2.7    | 2.1<br>3.7 | mA<br>mA       |
| Positive Supply Range                                      |                         | +9           | -             | +18        | V              |
| Negative Supply Range <sup>5</sup>                         |                         | -4.5         | -             | -18        | V              |

**Note 1:** From current gains of +20dB to -80dB. Peak cell current is less than 100μA.

**Note 2:** Output signal is 10dB below clipping and is at a frequency of 1 KHz.  $V_G = 0$ .

**Note 3:** Current gain varies from unity to maximum attenuation (>110dB).

**Note 4:** Peak Output Current is ±200μA.

**Note 5:** Current limiting resistor required for negative voltages greater than -6 volts.

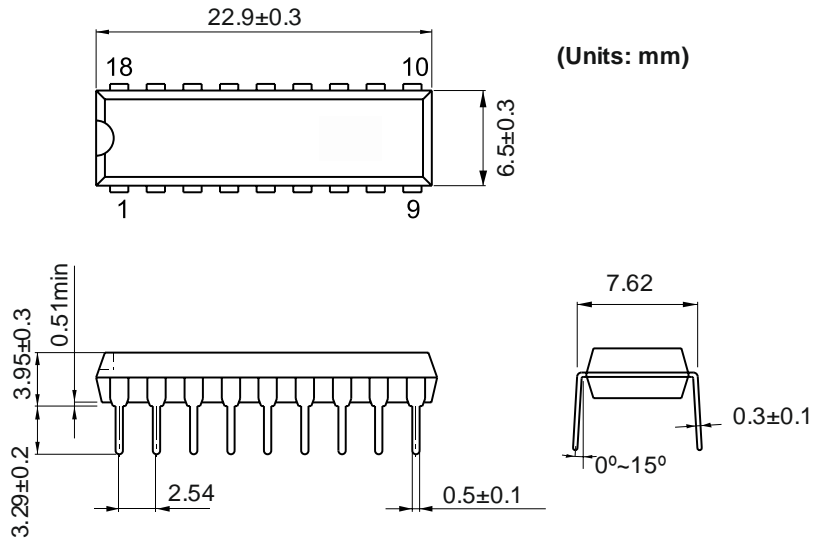
**Note 6:** Class B is defined at an idle current of 1 μA; Class A is at an idle current of 100μA.

**Specifications subject to change without notice.**

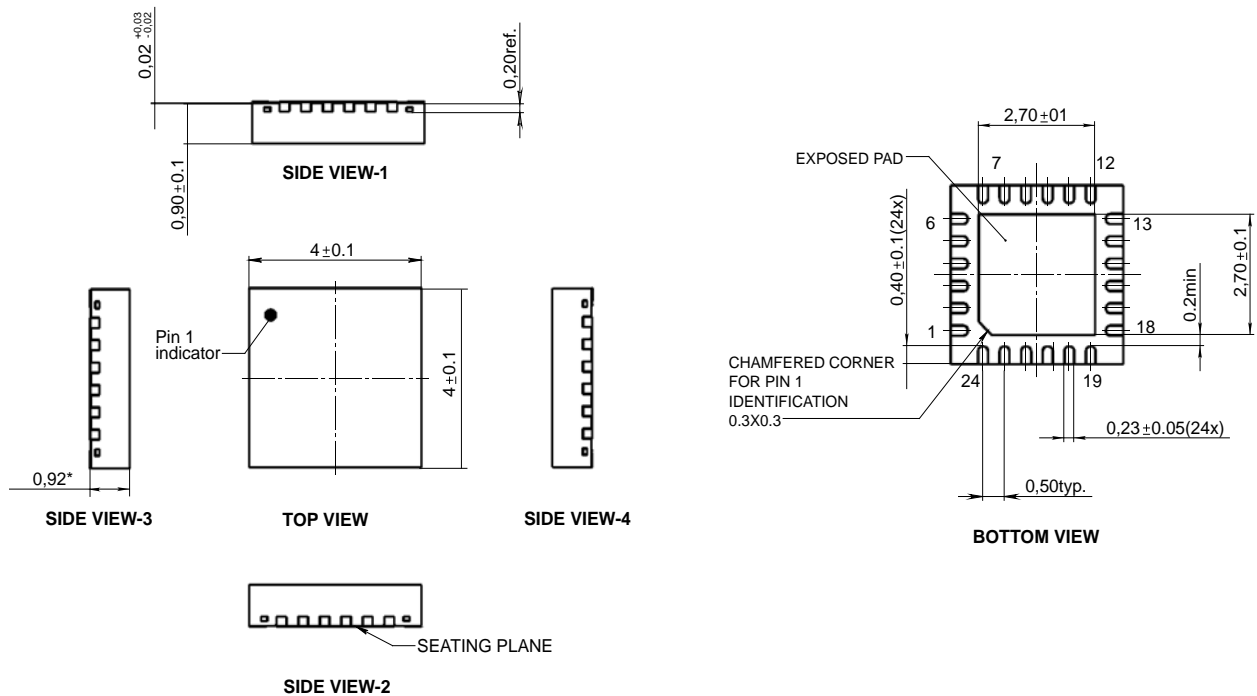
| Device type | Package          |
|-------------|------------------|
| AS3330      | PDIP-18 (300Mil) |
| AS3330F     | QFN-24L (4x4 mm) |

**Package Information**

**PDIP-18 (300Mil)**



**QFN-24 4x4 mm, 0.5 mm**



**Revision history**

| Date        | Revision | Changes           |
|-------------|----------|-------------------|
| 18-Dec-2017 | 1        | Initial version 1 |