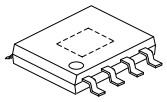
# 1.25-W MONO FULLY DIFFERENTIAL AUDIO POWER AMPLIFIER



HSOP-8

## ■ DESCRIPTION

The UTC **PA6203** is a mono fully-differential audio amplifier, capable of delivering 1.25W of continuous average power to an 8-Ω BTL load with less than 1% distortion from a 5V power supply.

The UTC **PA6203** is ideal for PDA/smart phone applications due to features such as -85-dB supply voltage rejection from 90Hz to 5kHz, improved RF rectification immunity and a fast start-up with minimal pop. The device operates from 2.5V to 5.5V, drawing only 1.7mA of quiescent supply current.

## ■ FEATURES

* 1.25W into 8Ω from a 5-V supply at THD=1% (Typ.)
* 2.5V-5.5V operation
* Low supply current: 1.7mA typ at 5V
* Shutdown Control<10μA
* Only five external components
  - Improved PSRR (90dB) for direct battery operation
  - Fully differential design reduces RF rectification
  - Improved CMRR eliminates two input coupling capacitors
  - $C_{(BYPASS)}$ is optional due to fully differential design and high PSRR

## ■ APPLICATIONS

* Designed for wireless or cellular handsets and PDAs

## ■ ORDERING INFORMATION

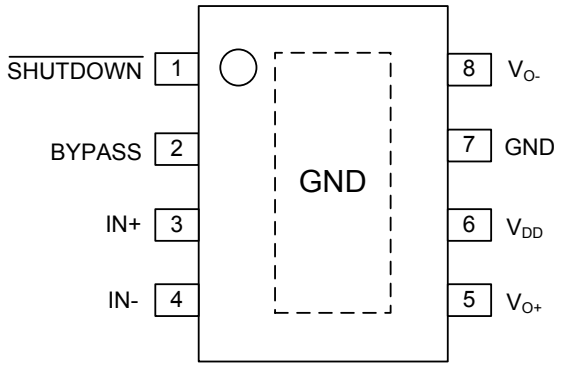
| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| PA6203L-SH2-T | PA6203G-SH2-T | HSOP-8 | Tube |
| PA6203L-SH2-R | PA6203G-SH2-R | HSOP-8 | Tape Reel |

PA6203L-SH2-T

| | |
|---|---|
| (1)Packing Type | (1) T: Tube, R: Tape Reel |
| (2)Package Type | (2) SH2: HSOP-8 |
| (3)Halogen Free | (3) L: Lead Free, G: Halogen Free |


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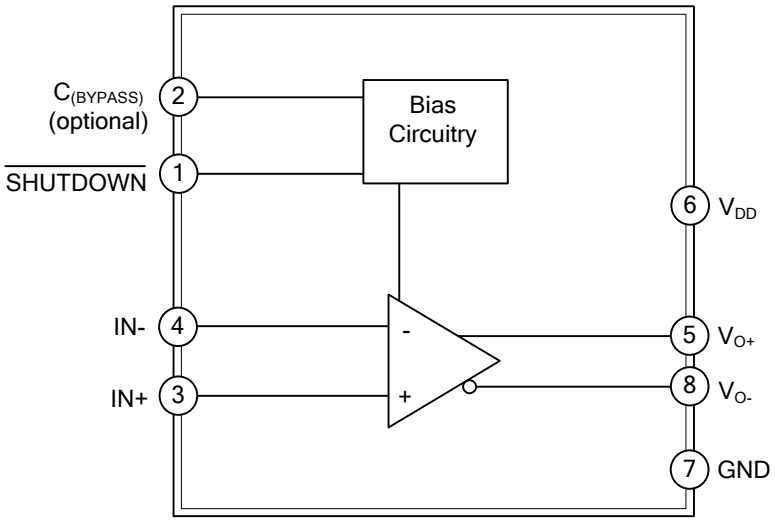
## ■ PIN CONFIGURATION




## ■ PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION |
|---|---|---|
| 1 | $\overline{\text{SHUTDOWN}}$ | Shutdown terminal (active low logic) |
| 2 | BYPASS | Mid-supply voltage, adding a bypass capacitor improves PSRR |
| 3 | IN+ | Positive differential input |
| 4 | IN- | Negative differential input |
| 5 | $V_{O+}$ | Positive BTL output |
| 6 | $V_{DD}$ | Supply voltage terminal |
| 7 | GND | High-current ground |
| 8 | $V_{O-}$ | Negative BTL output |
| | Thermal Pad | Connect to ground. Thermal Pad must be soldered down in all applications to properly secure device on the PCB. |

## ■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING (Over operating free-air temperature range, unless otherwise noted)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Supply Voltage | | $V_{DD}$ | -0.3~6 | V |
| Input Voltage | INx and $\overline{\text{SHUTDOWN}}$ Pins | $V_I$ | -0.3~$V_{DD}$+0.3 | V |
| Continuous Total Power Dissipation | | $P_D$ | Internally Limited | |
| Operating Free-air Temperature | | $T_A$ | -40~85 | °C |
| Junction Temperature | | $T_J$ | -40~125 | °C |
| Storage Temperature | | $T_{STG}$ | -65~150 | °C |
| Lead Temperature From Case For 10 Seconds | | | 260 | °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.

## ■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Junction to Ambient | $\theta_{JA}$ | 42.3 | °C/W |
| Junction to Case | $\theta_{JC}$ | 12 | °C/W |

## ■ RECOMMENDED OPERATING CONDITIONS

| PACKAGE | | SYMBOL | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage | | $V_{DD}$ | 2.5 | | 5.5 | V |
| High-Level Input Voltage | $\overline{\text{SHUTDOWN}}$ | $V_{IH}$ | 2 | | | V |
| Low-Level Input Voltage | $\overline{\text{SHUTDOWN}}$ | $V_{IL}$ | | | 0.8 | V |
| Common-Mode Input Voltage | V=2.5V, 5.5V, CMRR≤-60dB | $V_{IC}$ | 0.5 | | $V_{DD}$-0.8 | V |
| Operating Free-Air Temperature | | $T_A$ | -40 | | 85 | °C |
| Load Impedance | | $Z_L$ | 6.4 | 8 | | Ω |

## ■ ELECTRICAL CHARACTERISTICS ($T_A$=25°C, Gain=1V/V, unless otherwise noted)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Output Offset Voltage (Measured Differentially) | $\lvert V_{OO}\rvert$ | $V_I$=0V, $V_{DD}$=2.5V~5.5V | | | | 9 | mV |
| Power Supply Rejection Radio | PSRR | $V_{DD}$=2.5V~5.5V | | | -90 | -70 | dB |
| Common Mode Rejection Ratio | CMRR | $V_{DD}$=3.6V~5.5V, $V_{IC}$=0.5V~$V_{DD}$-0.8 | | | -70 | -65 | dB |
| | | $V_{DD}$=2.5V, $V_{IC}$=0.5V~1.7V | | | -62 | -55 | |
| Low-Level Output Voltage | $V_{OL}$ | $R_L$=8Ω, $V_{IN+}$=$V_{DD}$, $V_{IN-}$=0V or $V_{IN+}$=0V, $V_{IN-}$=$V_{DD}$ | $V_{DD}$=5.5V | | 0.30 | 0.46 | V |
| | | | $V_{DD}$=3.6V | | 0.22 | | |
| | | | $V_{DD}$=2.5V | | 0.19 | 0.26 | |
| High-Level Output Voltage | $V_{OH}$ | $R_L$=8Ω, $V_{IN+}$=$V_{DD}$, $V_{IN-}$=0V or $V_{IN+}$=0V, $V_{IN-}$=$V_{DD}$ | $V_{DD}$=5.5V | 4.8 | 5.12 | | V |
| | | | $V_{DD}$=3.6V | | 3.28 | | |
| | | | $V_{DD}$=2.5V | 2.1 | 2.24 | | |
| High-Level Input Current | $\lvert I_{IH}\rvert$ | $V_{DD}$=5.5V, $V_I$=5.8V | | | | 1.2 | μA |
| Low-Level Input Current | $\lvert I_{IL}\rvert$ | $V_{DD}$=5.5V, $V_I$=-0.3V | | | | 1.2 | μA |
| Supply Current | $I_{DD}$ | $\overline{\text{SHUTDOWN}}$=2V, $V_{DD}$=2.5V~5.5V, No Load | | | 1.7 | 2 | mA |
| Supply Current in Shutdown Mode | $I_{DD(SD)}$ | $\overline{\text{SHUTDOWN}}$=0.8V, $V_{DD}$=2.5V~5.5V, No Load | | | 0.01 | 0.9 | μA |

## ■ OPERATING CHARACTERISTICS ($T_A$=25°C, Gain=1V/V, $R_L$=8Ω)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Output Power | $P_O$ | THD+N=1%, f=1kHz | $V_{DD}$=5V | | 1.25 | | W |
| | | | $V_{DD}$=3.6V | | 0.63 | | W |
| | | | $V_{DD}$=2.5V | | 0.3 | | W |
| Total Harmonic Distortion Plus Noise | THD+N | $V_{DD}$=5V, $P_O$=1W, f=1kHz | | | 0.06 | | % |
| | | $V_{DD}$=3.6V, $P_O$=0.5W, f=1kHz | | | 0.07 | | |
| | | $V_{DD}$=2.5V, $P_O$=200mW, f=1kHz | | | 0.08 | | |
| Supply Ripple Rejection Ratio | $K_{SVR}$ | $C_{(BYPASS)}$=0.47μF, $V_{DD}$=3.6V~5.5V, Inputs Ac-Grounded with $C_I$=2μF | f=217Hz~2kHz, $V_{RIPPLE}$=200m$V_{PP}$ | | -87 | | dB |
| | | $C_{(BYPASS)}$=0.47μF, $V_{DD}$=2.5V~3.6V, Inputs Ac-Grounded with $C_I$=2μF | f=217Hz~2kHz, $V_{RIPPLE}$=200m$V_{PP}$ | | -82 | | dB |
| | | $C_{(BYPASS)}$=0.47μF, $V_{DD}$=2.5V~5.5V, Inputs Ac-Grounded with $C_I$=2μF | f=40Hz~20kHz, $V_{RIPPLE}$=200m$V_{PP}$ | | ≤-74 | | dB |
| Signal-To-Noise Radio | SNR | $V_{DD}$=5V, $P_O$=1W | | | 104 | | dB |
| Output Voltage Noise | $V_N$ | f=20Hz~20kHz | No Weighting | | 17 | | μ$V_{RMS}$ |
| | | | A Weighting | | 13 | | |
| Common Mode Rejection Radio | CMRR | $V_{DD}$=2.5V~5.5V, Resistor Tolerance=0.1%, Gain=4V/V, $V_{ICM}$=200m$V_{PP}$ | f=20Hz~1kHz | | ≤-85 | | dB |
| | | | f=20Hz~20kHz | | ≤-74 | | dB |
| Input Impedance | $Z_I$ | | | | 2 | | MΩ |
| Output Impedance | $Z_O$ | Shutdown Mode | | >10k | | | |
| Shutdown Attenuation | | f=20Hz~20kHz, $R_F$=$R_I$=20kΩ | | | -80 | | dB |

## ■ TYPICAL APPLICATION CIRCUIT

Table 1. Typical Component Values

| COMPONENT | VALUE | UNIT |
|---|---|---|
| $R_I$ | 10 | kΩ |
| $R_F$ | 10 | kΩ |
| $C_{(BYPASS)}$ (Note 1) | 0.22 | μF |
| $C_S$ | 1 | μF |
| $C_I$ | 0.22 | μF |

Note: 1. $C_{(BYPASS)}$ is optional

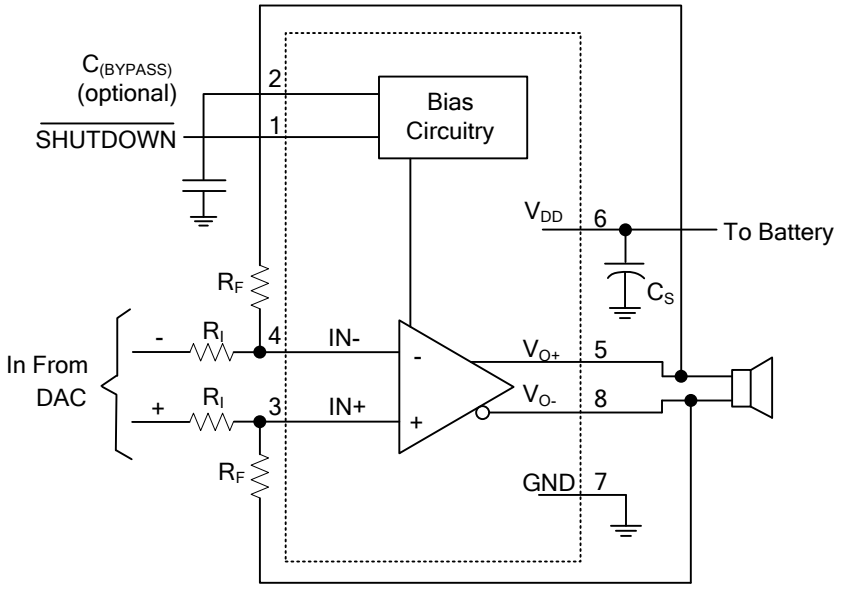



**Figure 1. Typical Differential Input Application Schematic**

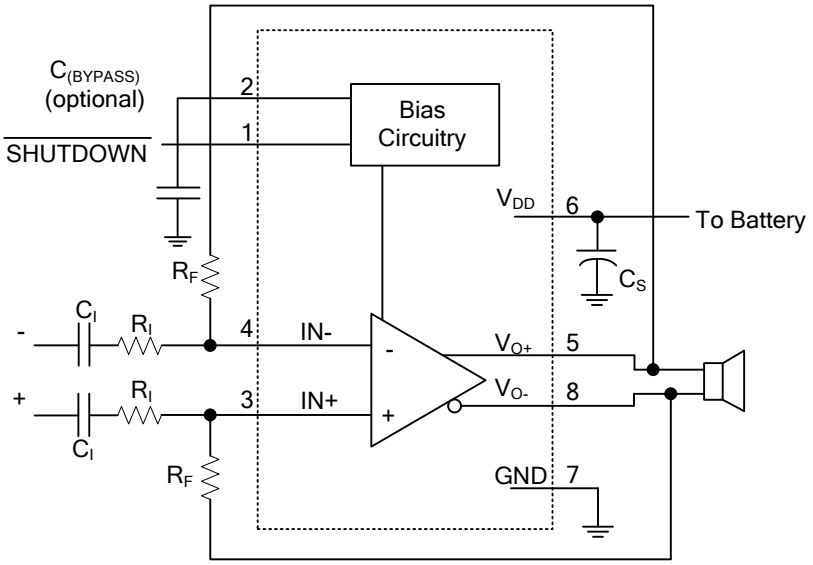



**Figure 2. Differential Input Application Schematic Optimized With Input Capacitors**

## ■ TYPICAL APPLICATION CIRCUIT(Cont.)

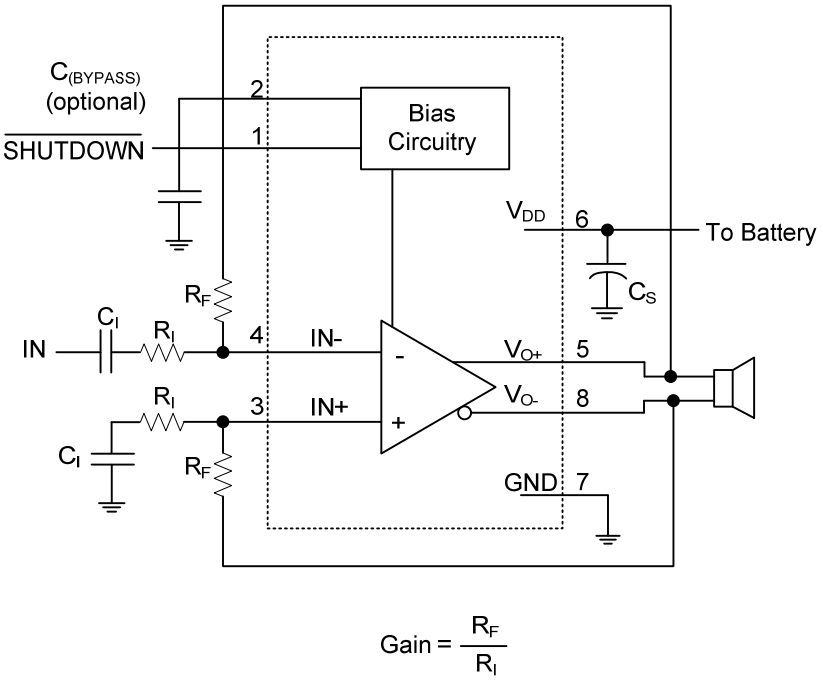



**Figure 3. Single-Ended Input Application Schematic**

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