

# 2x20W I<sup>2</sup>S Input, Inductor Free, Stereo Class D Amplifier

## ■ FEATURE

- Power supply:
  - PVDD: 4.5V – 16V; -DVDD: 3.3V
- Audio Performance
  - BTL, 2x20W (PVDD=14.5V, R<sub>L</sub>=4Ω, THD+N=1%)
  - PBTL, 24W (PVDD=15V, R<sub>L</sub>=4Ω, THD+N=1%)
  - THD+N=0.04% (PVDD=12V, R<sub>L</sub>=4Ω, P<sub>o</sub>=1W)
  - Noise: 110uV (Gain = 19dBV, A weighted)
- Low Quiescent Current
  - 12mA at PVDD = 12V, no filter
- High efficiency in 1SPW mode (>90%)
- Inductor-free Operation (Ferrite Bead) and EMC compliant for most cases
  - Flexible Audio I/O
    - I<sup>2</sup>S, LJ, RJ, TDM input
    - 8, 16, 32, 44.1, 48, 88.2, 96, 192kHz Sample Rates
  - General Operational Features
    - Hardware or Software Control mode
    - 4 Programmable I<sup>2</sup>C Addresses
    - Spread Switching Frequency for Class D
  - Robustness Features
    - Clock Error, DC, Over Current, Overvoltage, Undervoltage, and Overtemperature Protection
- Packages: Pb-free Packages, QFN36L-6x6

## ■ GENERAL DESCRIPTION

The HT660 is a stereo Class D audio amplifier with multiple audio format port (I<sup>2</sup>S, LJ, RJ, TDM). It supports a variety of audio clock configurations.

The outputs of the HT660 can be configured to drive two speakers in stereo BTL mode or mono PBTL mode.

The HT660 also includes hardware and software control modes, integrated digital clipper, and a wide power supply operating range to enable use in a multitude of applications.

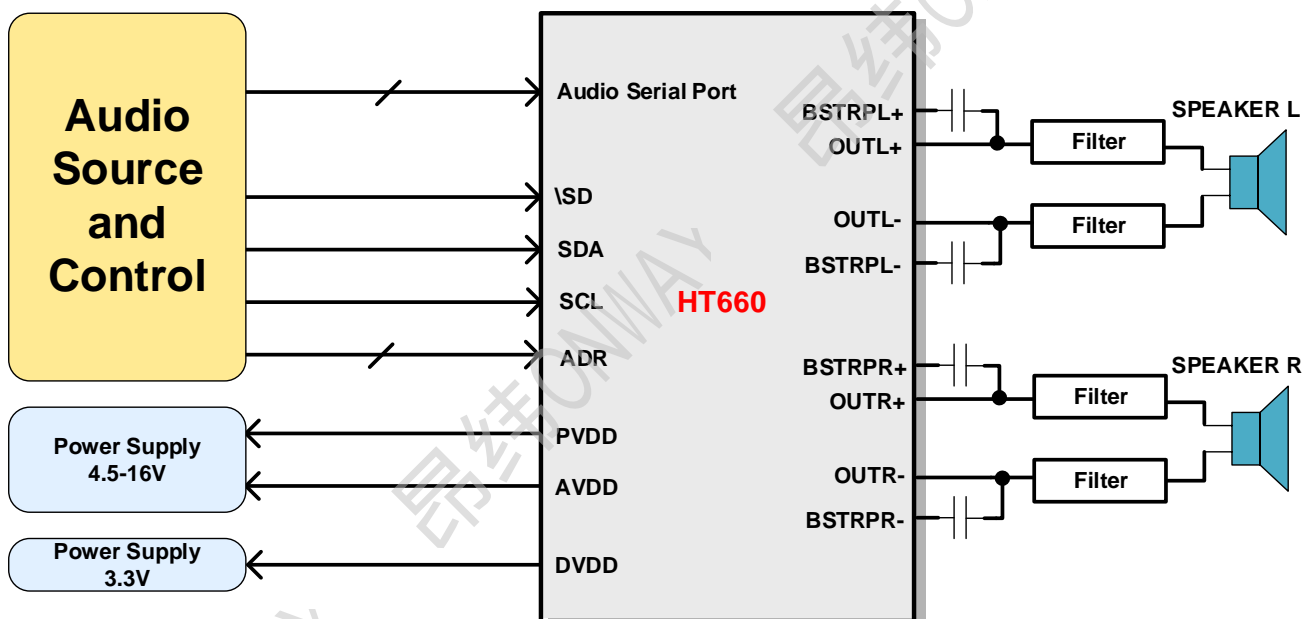
Advanced EMI Suppression with Spread Spectrum Control enables the use of inexpensive ferrite bead filters while meeting EMC requirements for system cost reduction.

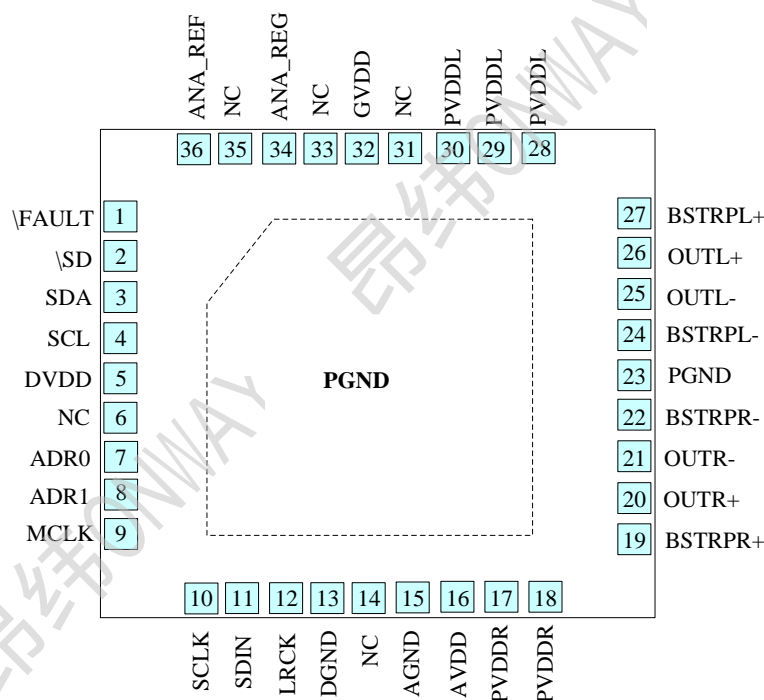
An optimal mix of thermal performance and device cost is provided in the 150-mΩ R<sub>DS(ON)</sub> of the output MOSFETs. Additionally, a thermally enhanced 36-Pin QFN provides excellent operation in the elevated ambient temperatures found in modern consumer electronic devices.

## ■ APPLICATIONS

- Bluetooth/Wi-Fi Speakers
- Portable Speakers
- Smart speakers
- LCD TV/Monitor
- Sound Bars, Docking stations, PC Audio

## ■ TYPICAL APPLICATION



**■ TERMINAL CONFIGURATION**


Top View

**■ TERMINAL FUNCTION**

| Terminal No.      | Name   | I/O <sup>1</sup> | Description  |
|-------------------|--------|------------------|--|
| 1                 | \FAULT | OD               | Speaker amplifier fault terminal, which is pulled LOW when an internal fault occurs, open-drain output.  |
| 2                 | \SD    | I                | Places the speaker amplifier in shutdown mode while pulled low level.  |
| 3                 | SDA    | I                | I <sup>2</sup> C data input pin.   |
| 4                 | SCL    | I                | I <sup>2</sup> C clock input terminal.   |
| 5                 | DVDD   | P                | Power supply for the internal digital circuitry  |
| 6, 14, 31, 33, 35 | NC     | -                | Not connected inside the device (they be connected to ground for better thermal performance; however, they can be used as routing channels if required.) |
| 7                 | ADR0   | I                | Determine the I <sup>2</sup> C Address of the device   |
| 8                 | ADR1   | I                | Determine the I <sup>2</sup> C Address of the device   |
| 9                 | MCLK   | I                | Master Clock used for internal clock tree, sub-circuit/state machine, and Serial Audio Port clocking   |
| 10                | SCLK   | I                | Bit clock for the digital signal that is active on the serial data port's input data line  |
| 11                | SDIN   | I                | Data line to the serial data port  |
| 12                | LRCK   | I                | Word select clock for the digital signal that is active on the serial port's input data line   |
| 13                | DGND   | G                | Ground for digital circuitry (NOTE: This pin should be connected to the system ground)   |
| 15                | AGND   | G                | Ground for analog circuitry (NOTE: This pin should be connected to the system ground)  |

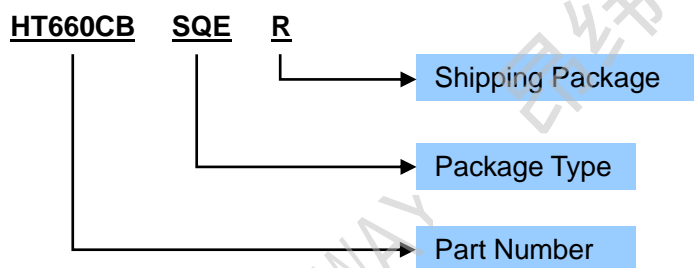
<sup>1</sup>: I: Input; O: Output; G: Ground; P: Power; BST: BOOT Strap; OD: Open drain

|           |             |          |   |
|-----------|-------------|----------|---|
| 16        | AVDD        | P        | Power supply for internal analog circuitry  |
| 17        | PVDDR       | P        | Power Supply for internal power circuitry of Channel R  |
| 18        | PVDDR       | P        |   |
| 19        | BSBRPR+     | BST      | Connection point for the OUTR+ bootstrap capacitor, which is used to create a power supply for the high-side gate drive for OUTR+   |
| 20        | OUTR+       | O        | Positive pin for differential speaker amplifier output R  |
| 21        | OUTR-       | O        | Negative pin for differential speaker amplifier output R  |
| 22        | BSBRPR-     | BST      | Connection point for the OUTR- bootstrap capacitor, which is used to create a power supply for the high-side gate drive for OUTR-   |
| 23        | PGND        | G        | Ground for power device circuitry (NOTE: This terminal should be connected to the system ground)  |
| 24        | BSTRPL-     | BST      | Connection point for the OUTL- bootstrap capacitor, which is used to create a power supply for the high-side gate drive for OUTL-   |
| 25        | OUTL-       | O        | Negative pin for differential speaker amplifier output L  |
| 26        | OUTL+       | O        | Positive pin for differential speaker amplifier output L  |
| 27        | BSBRPL+     | BST      | Connection point for the OUTL+ bootstrap capacitor, which is used to create a power supply for the high-side gate drive for OUTL  |
| 28        | PVDDL       | P        | Power Supply for internal power circuitry of Channel L  |
| 29        | PVDDL       | P        |   |
| 30        | PVDDL       | P        |   |
| 32        | GVDD        | O        | Voltage regulator derived from PVDD supply (NOTE: This pin is provided as a connection point for filtering capacitors for this supply and must not be used to power any external circuitry)   |
| 34        | ANA_REG     | P        | Voltage regulator derived from AVDD supply (NOTE: This terminal is provided as a connection point for filtering capacitors for this supply and must not be used to power any external circuitry)  |
| 36        | ANA_REF     | P        | Connection point for internal reference used by ANA_REG filter capacitors.<br><b>And connect to system GND.</b>   |
| <b>EP</b> | <b>PGND</b> | <b>G</b> | Provides both <b>electrical and thermal connection</b> from the device to the board. <b>A matching ground pad must be provided on the PCB and the device connected to it via solder.</b> For proper electrical operation, this ground pad must be connected to the system ground. |

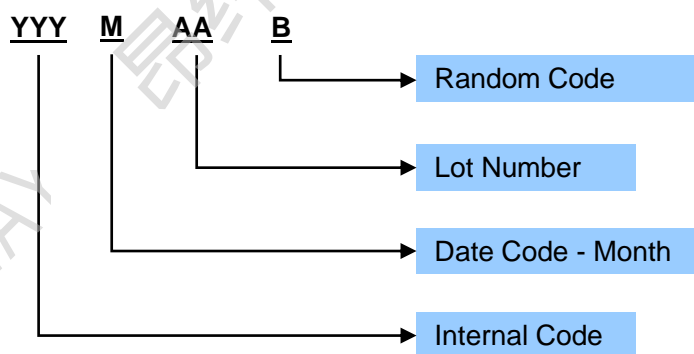
**ORDERING INFORMATION**

| Ordering Number | Package Type | Marking                          | Operating Temperature Range | MOQ/Shipping Package    |
|-----------------|--------------|----------------------------------|-----------------------------|-------------------------|
| HT660CBSQER     | QFN36L-6x6   | HT660sq<br>YYYYMAAB <sup>1</sup> | -25°C ~ 85°C                | Tape and Reel / 2500pcs |

**Ordering Number**



**Production Tracking Code**



<sup>1</sup> YYYYMAAB is production tracking code