



STMicroelectronics' Mobile Phones Offer

STD LINEAR ICs DIVISION
APM



A global offering for mobile phones

3D Smart Digital Accelerometers

- Gesture recognition
- Man-machine interface

Displays

- Drivers for active and passive LCDs
- Drivers for passive OLEDs

SIM cards

- Innovative smartcard ICs
- Security

Storage

- NAND and NOR portfolio
- Highest memory density

Linear and Interface

- Full Class AB Amplifiers Portfolio
- Enhancement with filterless Class D
- NCP Headphone Amplifier
- 3D sound effect Stereo Amplifier

IPADs and Protection

- Integrated passive and active devices
- Enhancing signal protection and quality

Advanced Logic and Analog

- Enhancing peripheral connectivity
- XpanderLogic, Hi-speed USB-OTG

Multimedia Processors

- Best-in-class multimedia performance
- Comprehensive platform offer

Imaging Camera Modules:

- Ultra-small reflowable camera
- Autofocus up to 3 megapixels

Connectivity

- Low power consumption and size
- Bluetooth and wireless LAN coexistence

Assisted GPS

- Complete end-to-end solution
- Multi-mode location engine

Energy Management

- Innovative advanced solutions
- Single-chip IPs highly integrated

Audio codec

- HiFi and digital sound quality-level

Wireless Infrastructures

- Wireless transmission and multimedia transcoding
- System-on-chip modem and RF synthesizers





Low Voltage Audio Amplifiers





Low Voltage Audio Amplifiers family

To bring more Features to Multimedia Devices

■ **Functions:**

- Microphones Pre amplifiers
- Headphones Drive
- Audio Power Amplifiers
- Assp's

■ **Applications:**

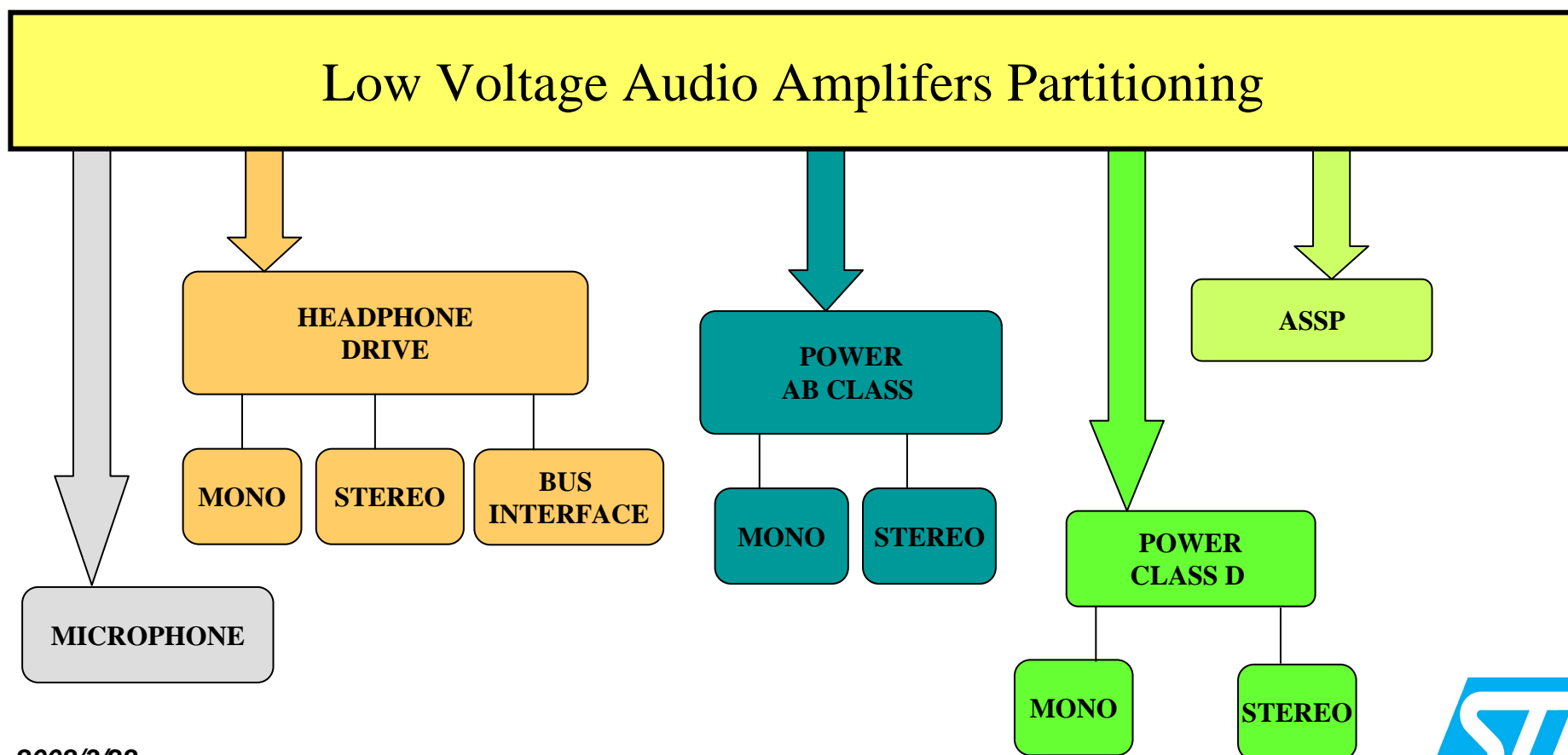
- Mobile phones
- Portable multimedia devices





Low Voltage Audio Amplifiers Portfolio

Best-in-class mobile multimedia performance



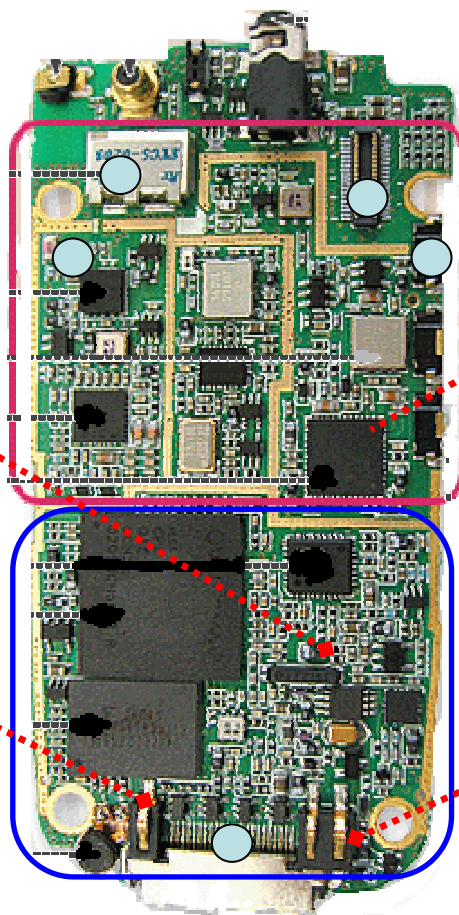


**Power
Amplifier**

Audio Sub-system IC

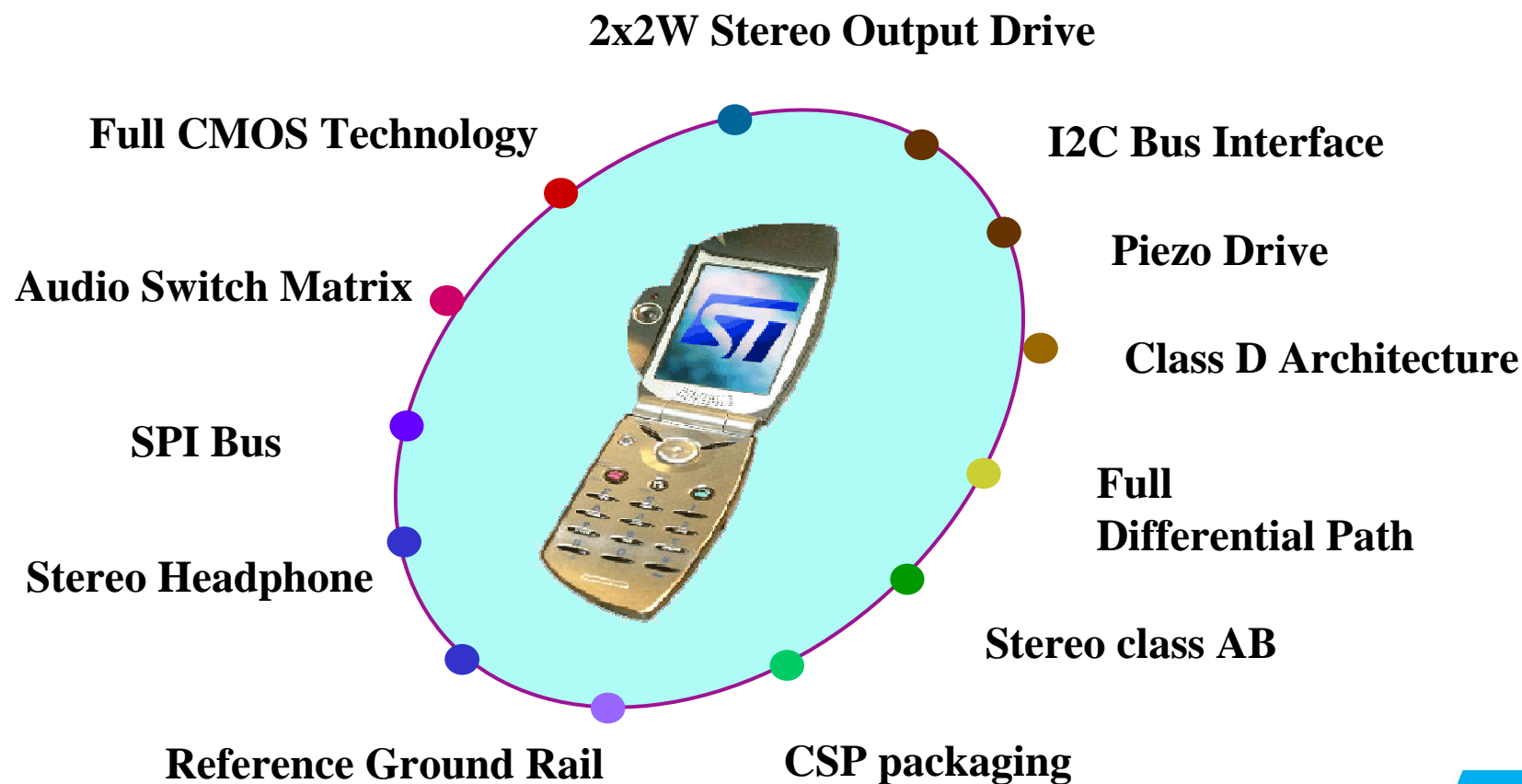
Headphone drive

**microphone
amplifier**





Audio IP's offering





Microphone Pre amplifier





TS472 Low Noise Microphone Pre Amplifier *Mastering higher record sensitivity*

■ **Function:**

- **Very Low Noise Microphone Pre-Amplifier with 2V Power Bias Output Supply**

■ **Applications:**

- Digital Still Camera
- Mobile Phones
- PDAs
- Gaming platforms





TS472 Low Noise Microphone Pre Amplifier

Mastering higher record sensitivity

■ **Key features**

- **10nV/ $\sqrt{\text{Hz}}$** equivalent Input Noise
- **2.5 to 5.5V** Single Supply
- **Very fast** turn On / Off time
- Fully-integrated **2V Output Bias**
- Internal Gain Configuration Capability
- **QFN & Flip Chip** Both Packages

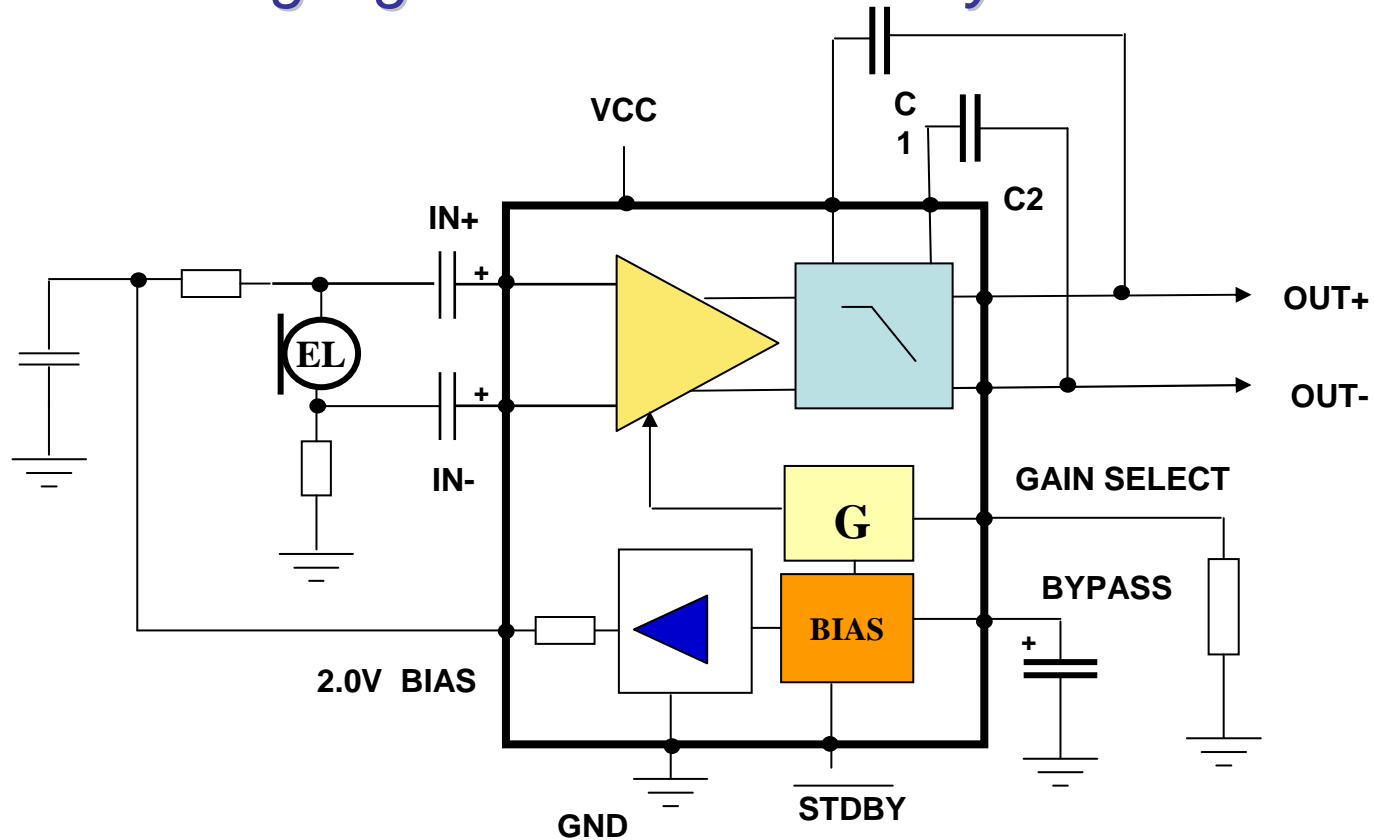
■ **Benefits**

- Fully Differential Analog Microphone
- Smallest Flip Chip solution with 12 bumps pin- counts
- Ultra-low standby power
- Simplified application integration
- Low Pass Filtering Block



TS472 Low Noise Microphone Pre Amplifier

Mastering higher record sensitivity





Headphone Amplifiers





TS4601 Referenced Ground Stereo Headphone Drive enjoying Natural Sound

■ **Function:**

- **High-performance Stereo Headphone Drive with Embedded Negative Charge Pump for Referenced Ground and I2C bus Interface.**

■ **Applications:**

- Mobile phones
- PDAs
- Gaming platforms





TS4601 Referenced Ground Stereo Headphone Drive enjoying Natural Sound

■ **Key features**

- **I2C Bus Interface**
 - Digital volume control from **-60 to +4dB**
 - Fully Differential Stereo Inputs
- **Independent** right & left Audio channel **shutdown control**
- Very Low Standby Current
- **100dB** Maximizing PSRR
- **0.9Vrms** High Performance **Line Drive** Capability

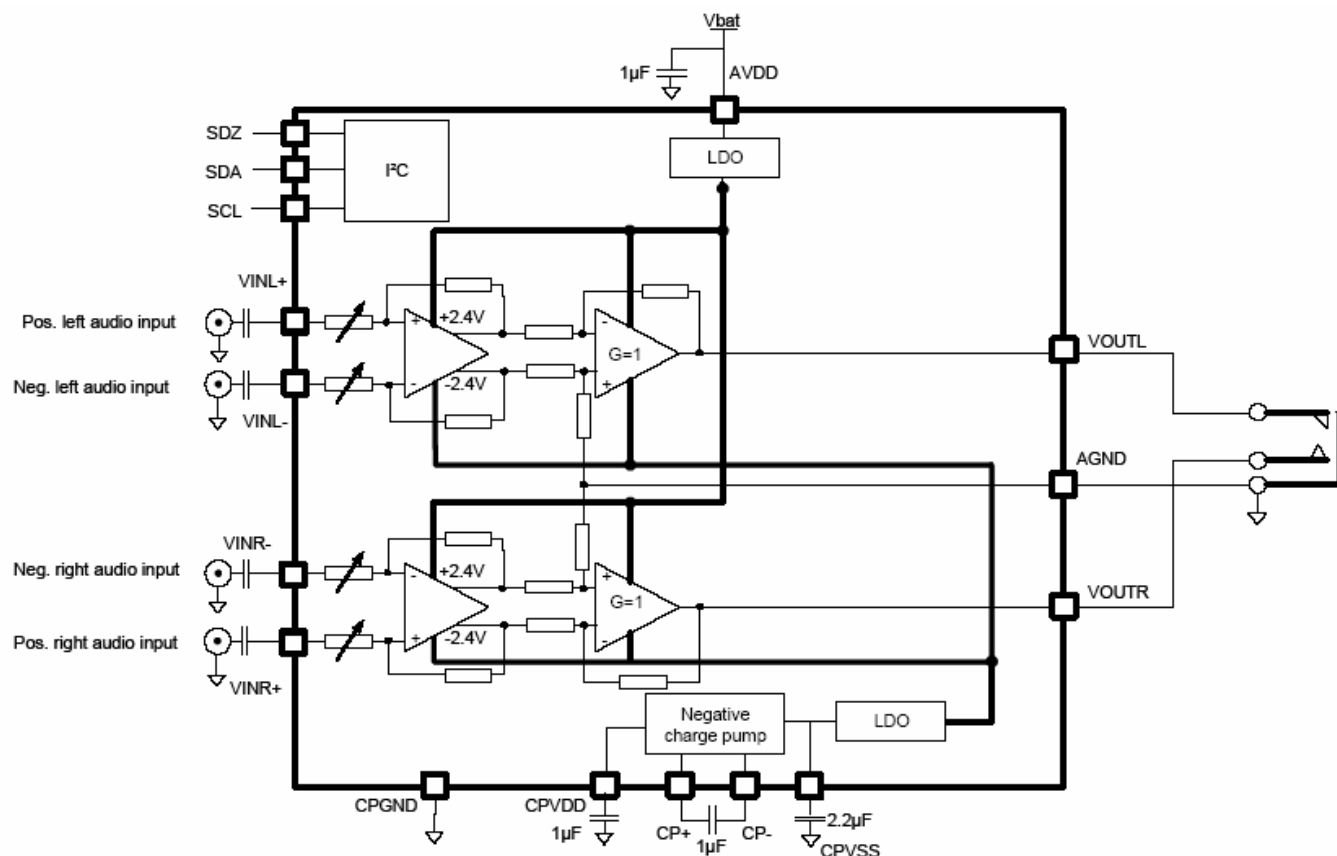
■ **Benefits**

- **True Ground Reference** Headphone Amplifier
- **Flip Chip 16 bumps** compact size
- **Extended** Listening time



Headphone Amplifier

TS4601 Referenced Ground Stereo Headphone Drive enjoying Natural Sound



2008/3/28



TS4975 Stereo Headphone Highly-integrated solution for MP3 programs

■ **Function:**

- **Stereo Headphone Amplifier with innovative 9 Output Mode selections driven by I2C Bus Interface**

■ **Applications:**

- Mobile phones
- FM Radio
- PDAs
- Gaming platforms





TS4975 Stereo Headphone Highly-integrated solution for MP3 programs

■ **Key features**

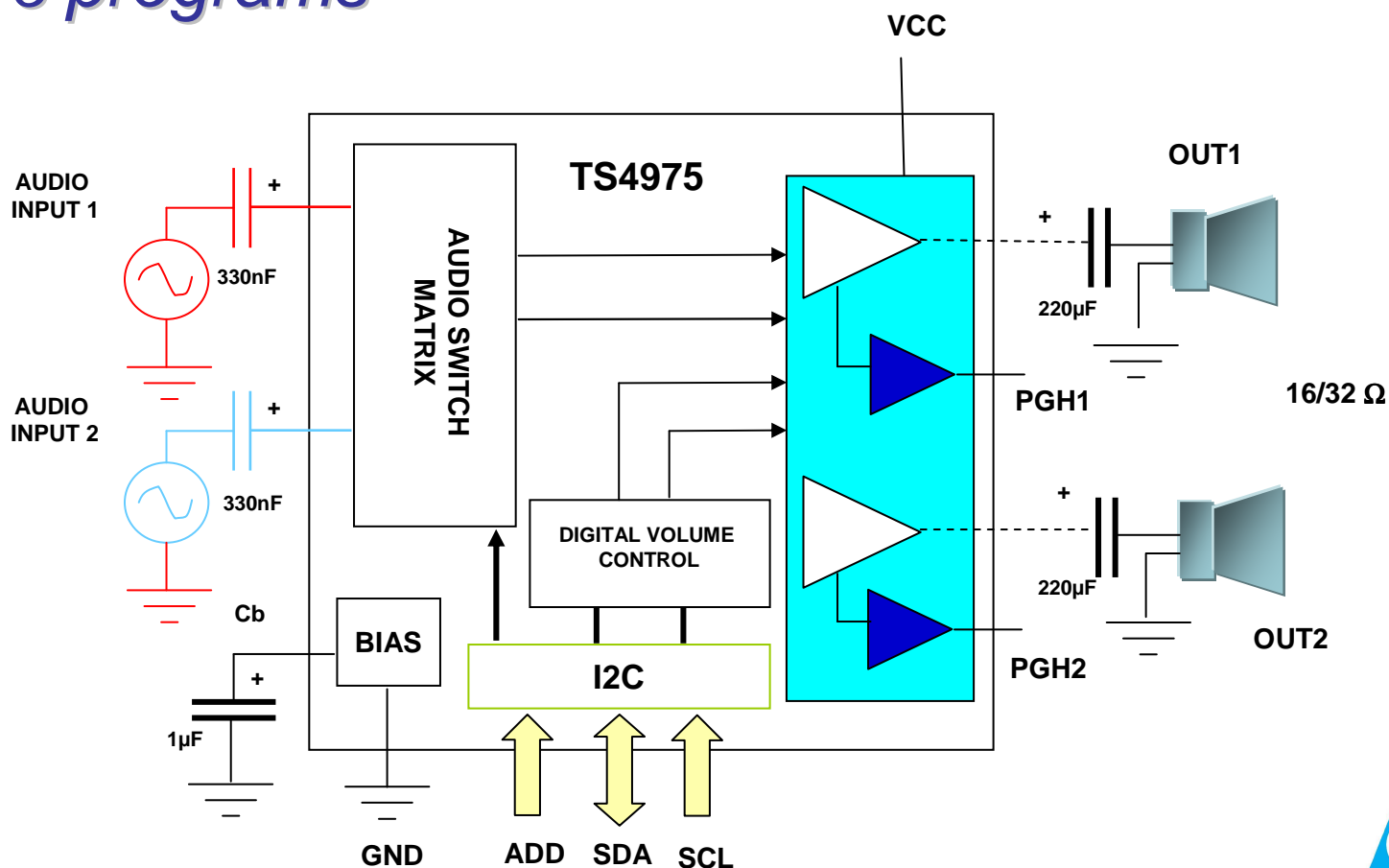
- Phantom ground sense Pin
- **Flip chip 12 bumps** 1.6 x 2.1 mm addressing the most aggressive phone designs
- **Advanced** Pop & click Circuitry
- **40mW** @3.3V under 16 Ohm load

■ **Benefits**

- Switch from **both BTL and SE** output configuration
- Quieter Turn-on & Turn-off
- Lowest power consumption
- **Package solution** is optimized for high-volume/low-cost manufacturing techniques



TS4975 Stereo Headphone Highly-integrated solution for MP3 programs





TS488-89 Advanced Pop Free Proven Headset, Enjoy Stereo Sound

■ **Function:**

- **Stereo Headphone Drive Amplifier with Adaptative Pop & clickless function**

■ **Applications:**

- Mobile Phone
- PDAs
- Multimedia devices





TS488-89 Advanced Pop Free Proven Headphone, Enjoy Stereo Sound

■ **Key features**

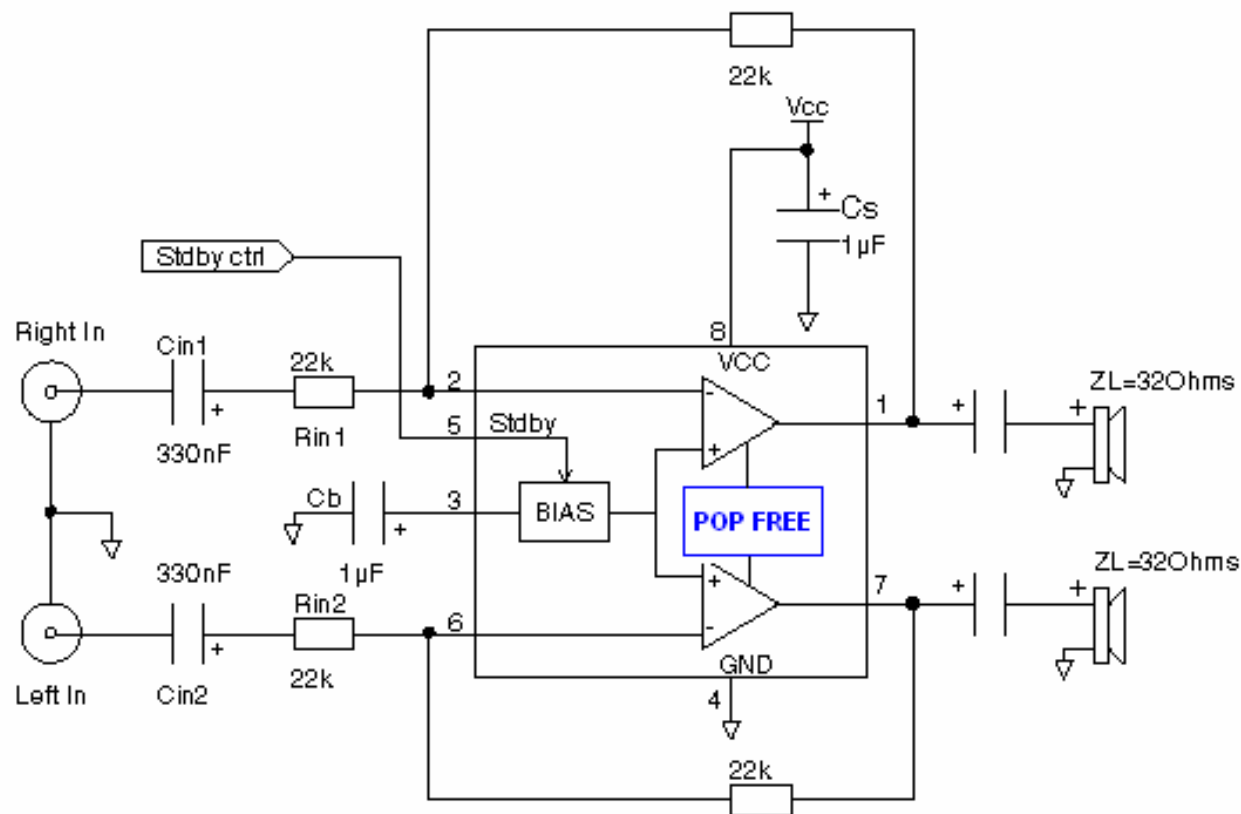
- **QFN8 2X2 mm**
- **1.8 mA** typ current consumption
- **120 mW** higher Output Power @ 5V
- Small PCB footprint (including external component)

■ **Benefits**

- Very low power consumption
- **Smallest QFN** package Size
- **Low Cost** effective



TS488-89 Advanced Pop Free Proven Headphone, Enjoy Stereo Sound





TS4909 Phantom Ground Headset, Enjoy Stereo Sound

■ **Function:**

- Stereo Headphone Drive Amplifier with Phantom Ground bias reference

■ **Applications:**

- Mobile Phone
- PDAs
- Multimedia devices





TS4909 Phantom Ground Headset, Enjoy Stereo Sound

■ **Key features**

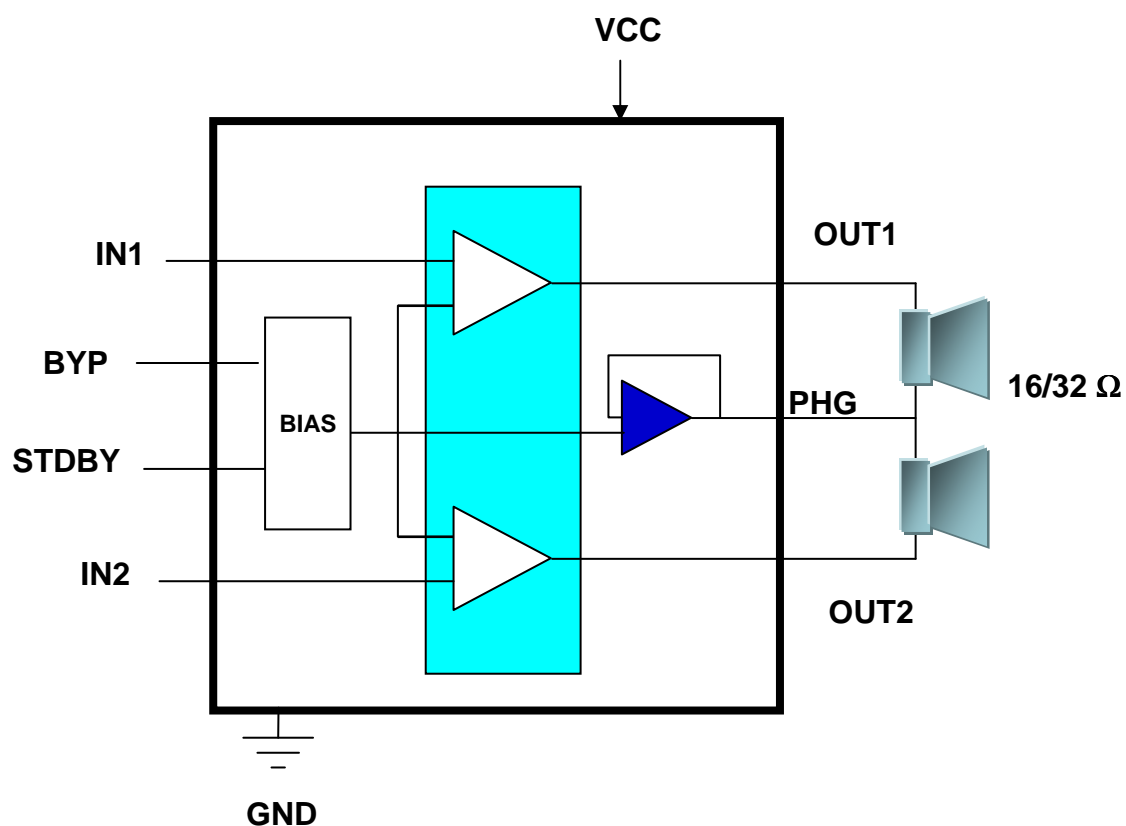
- **QFN 2X2 mm**
- **1.8 mA** typ current consumption
- **120 mW** higher Output Power @ 5V
- Small PCB footprint (including external component)
- **Internal mid rail** generation

■ **Benefits**

- Very low power consumption
- **Smallest QFN** package Size
- **Low Cost** effective



TS4909 Phantom Ground Headset, Enjoy Stereo Sound





Power Class AB Amplifiers





TS4995 Field-proven noise immunity audio Sound

■ **Function:**

- **Fully Differential Mono Audio Power Amplifier with 6 dB integrated fixed Gain**

■ **Applications:**

- Mobile handsets
- Portable devices
- PDAs





TS4995 Field-proven noise immunity audio Sound

■ **Key features**

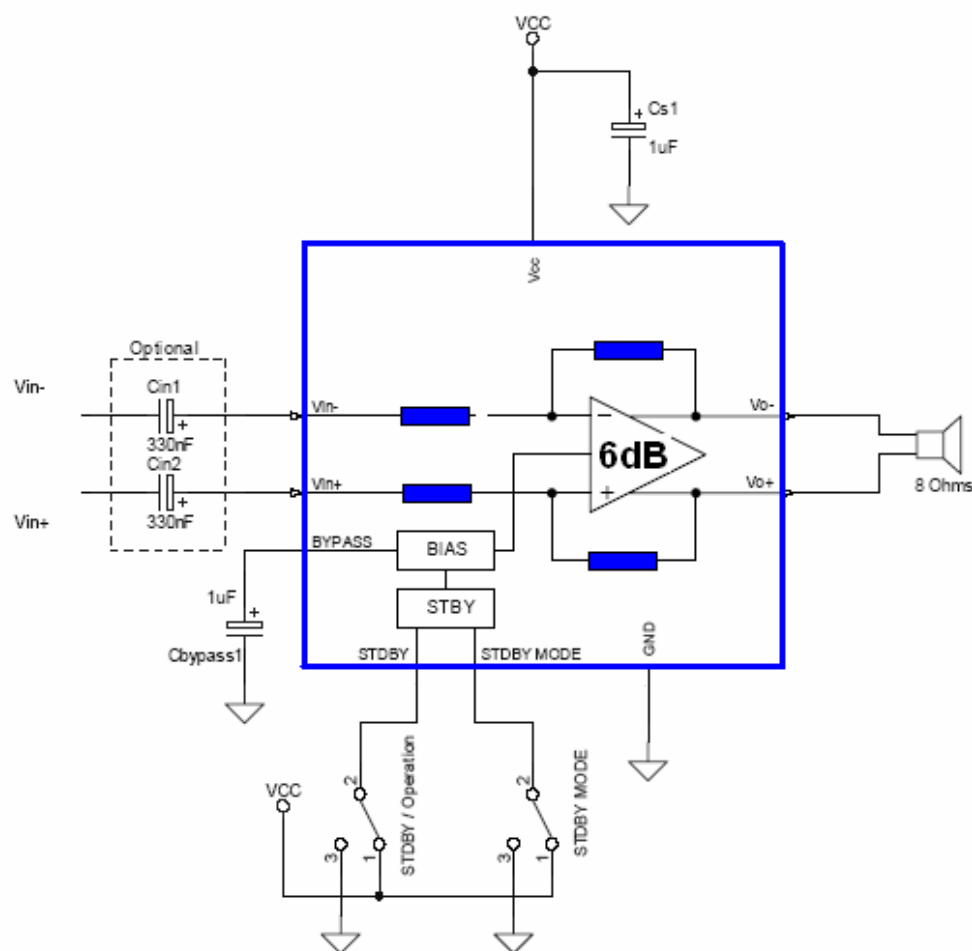
- **100dB** Highest PSRR
- **6dB** Integrated fixed gain
- Flip Chip **9 bumps**
- **Selectable High/Low** Standby mode

■ **Benefits**

- **Superior audio** performance
- **Lowest cost**
- **Smallest Package**
- **Reduced External components**



TS4995 Field-proven noise immunity audio Sound





TS4998 Field-proven noise immunity audio Sound

■ **Function:**

- **2x1.2W Stereo Fully Differential Audio Power Amplifier**

■ **Applications:**

- Mobile handsets
- Portable devices
- PDAs





TS4998 Field-proven noise immunity audio Sound

■ **Key features**

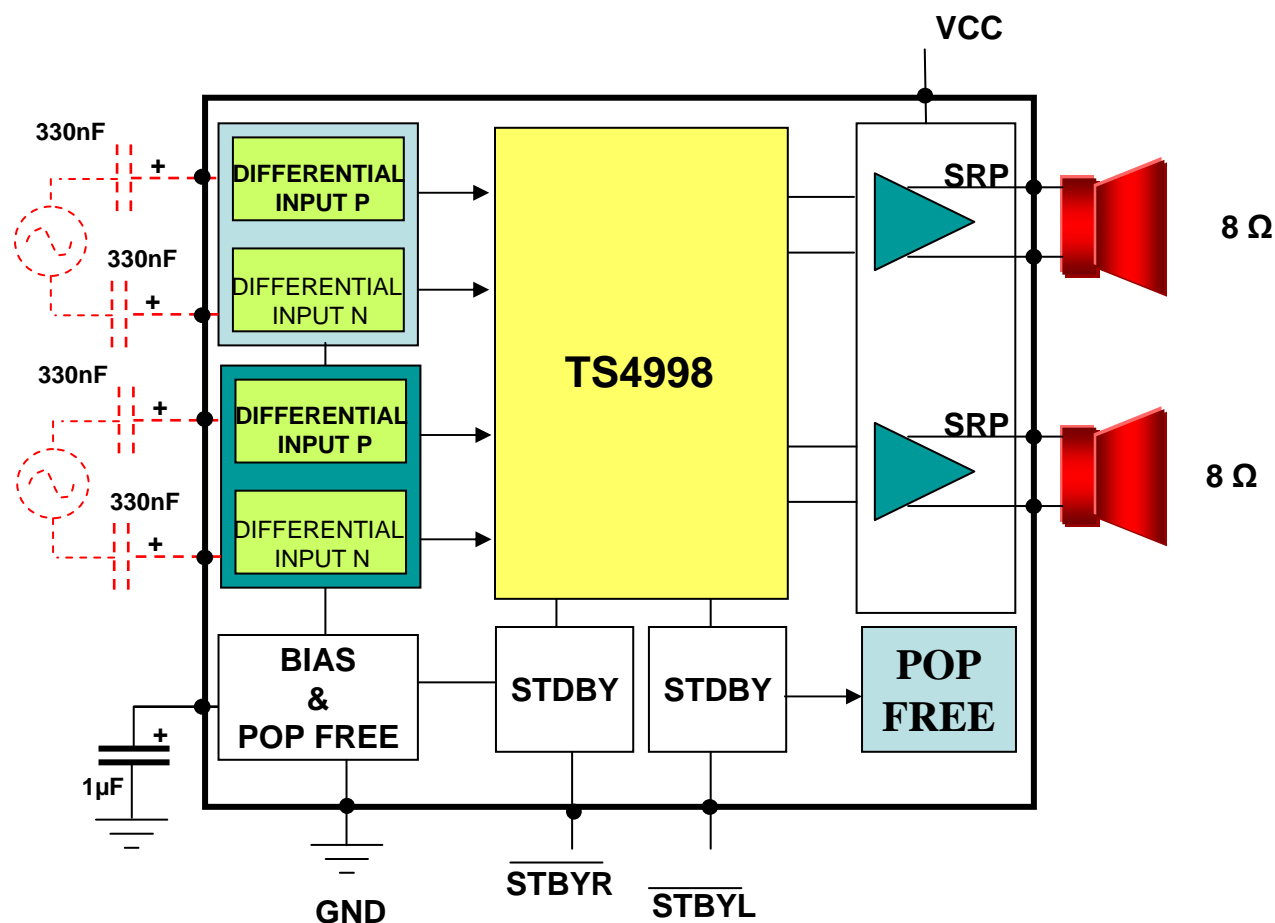
- **2x1.2W** Output Power
- From **2.5v to 5.5v** Supply Operation
- **10 nA** in Standby mode
- **90 dB** highest PSRR
- **Dedicated** Standby Audio Channels

■ **Benefits**

- Mono/Stereo Audio exchange
- Low Power Consumption in sleep mode - longer battery life
- Extended Audio quality
- **QFN16** reduced space requirements



TS4998 Field-proven noise immunity audio Sound





TS4997 3D True Audio Sound illusion

■ **Function:**

- **2x1.2W Stereo Fully Differential Audio Power Amplifier with Programmable 3D effects**

■ **Applications:**

- Mobile handsets
- Portable devices
- PDAs





TS4997 3D True Audio Sound illusion

■ **Key features**

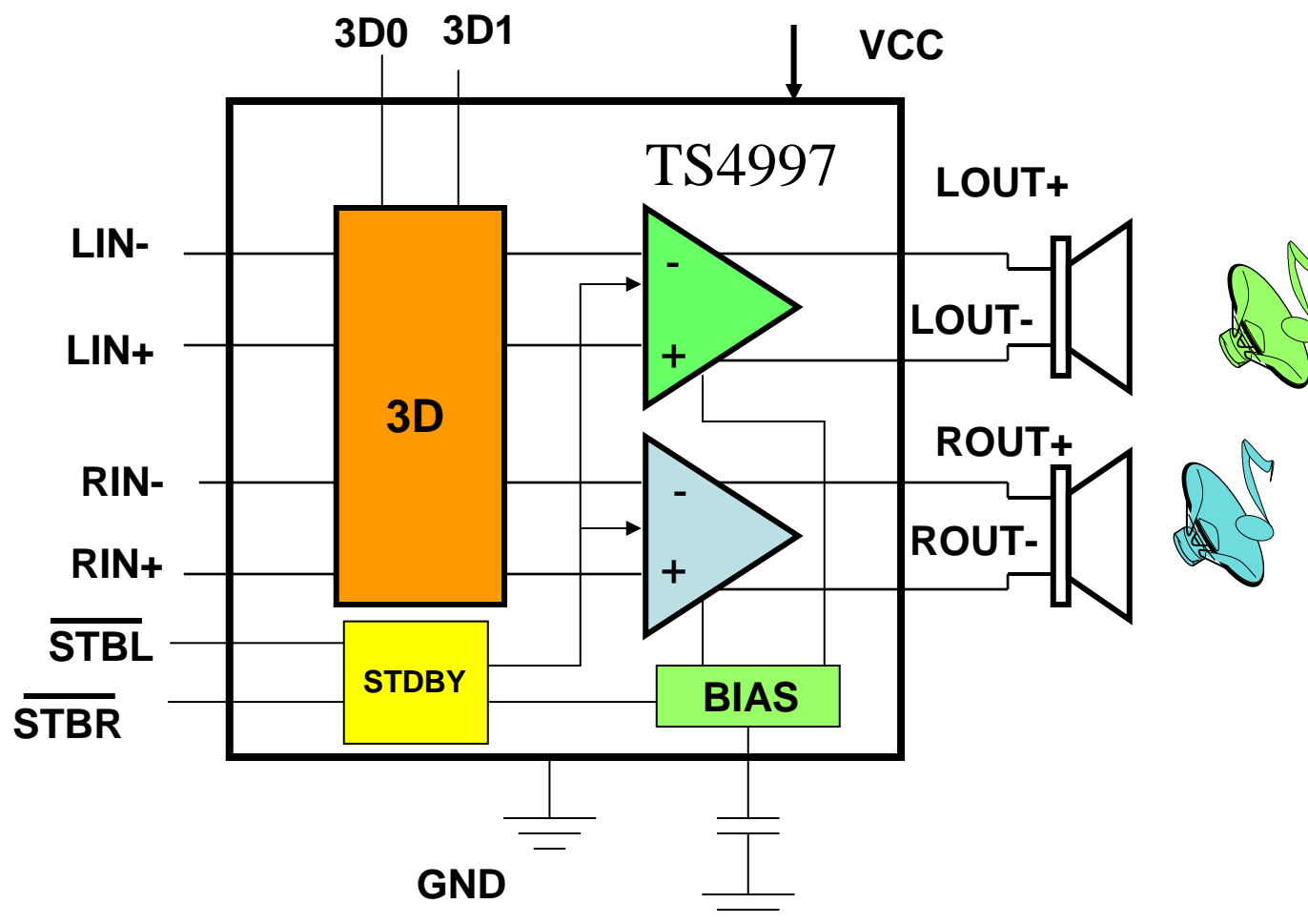
- **2x1W** Stereo Output Power
- Up to **2dB** 3D effect Gain
- **3D** Digital input Pins
- **85 dB** highest PSRR
- **Dedicated Standby** Audio Channels

■ **Benefits**

- **Compact 3D** digital volume Control function
- Optimal Phase shift Difference
- **Extended Audio** quality
- QFN 4x4 mm reduced space application requirements



TS4997 3D True Audio Sound illusion





TS4974 Pumping up the Volume

■ **Function:**

- **1.2W Mono Differential Audio Power Amplifier with Integrated Digital Volume Control**

■ **Applications:**

- Mobile handsets
- Portable devices
- PDAs





TS4974 Pumping up the Volume

■ **Key features**

- **1.2W** Higher Mono Output Power
- **16 Steps** Digital volume Control
- **Integrated Debouncing** System
- **Up to +12dB** Programmable gain
- **5 ms** Ultra fast start up time

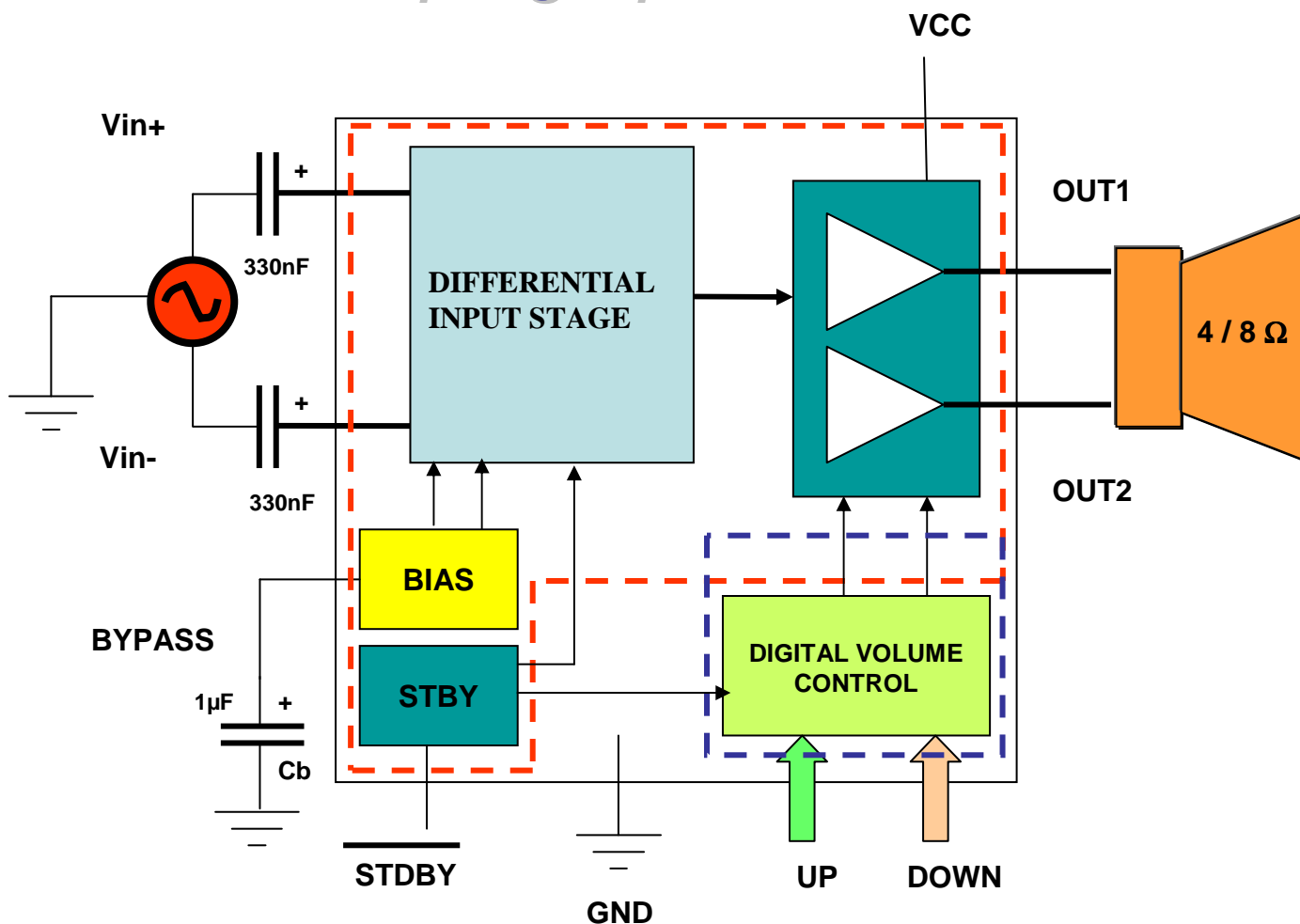
■ **Benefits**

- **Optimized solution** for mid-range portable equipments
- **Simplifies** customer audio applications
- **Lowest Cost** Solution



POWER CLASS AB AUDIO AMPLIFIER

TS4974 Pumping up the Volume





Power Class D Amplifiers





TS4962M Never out of battery when powering wide sound

■ **Function:**

- **3W Mono Filter Free Class-D Power Audio Amplifier**

■ **Applications:**

- Medium-size displays
- Mobile phones
- Business mobile phones
- PDAs
- PMP players
- GPS





TS4962M Never out of battery when powering wide sound

■ **Features**

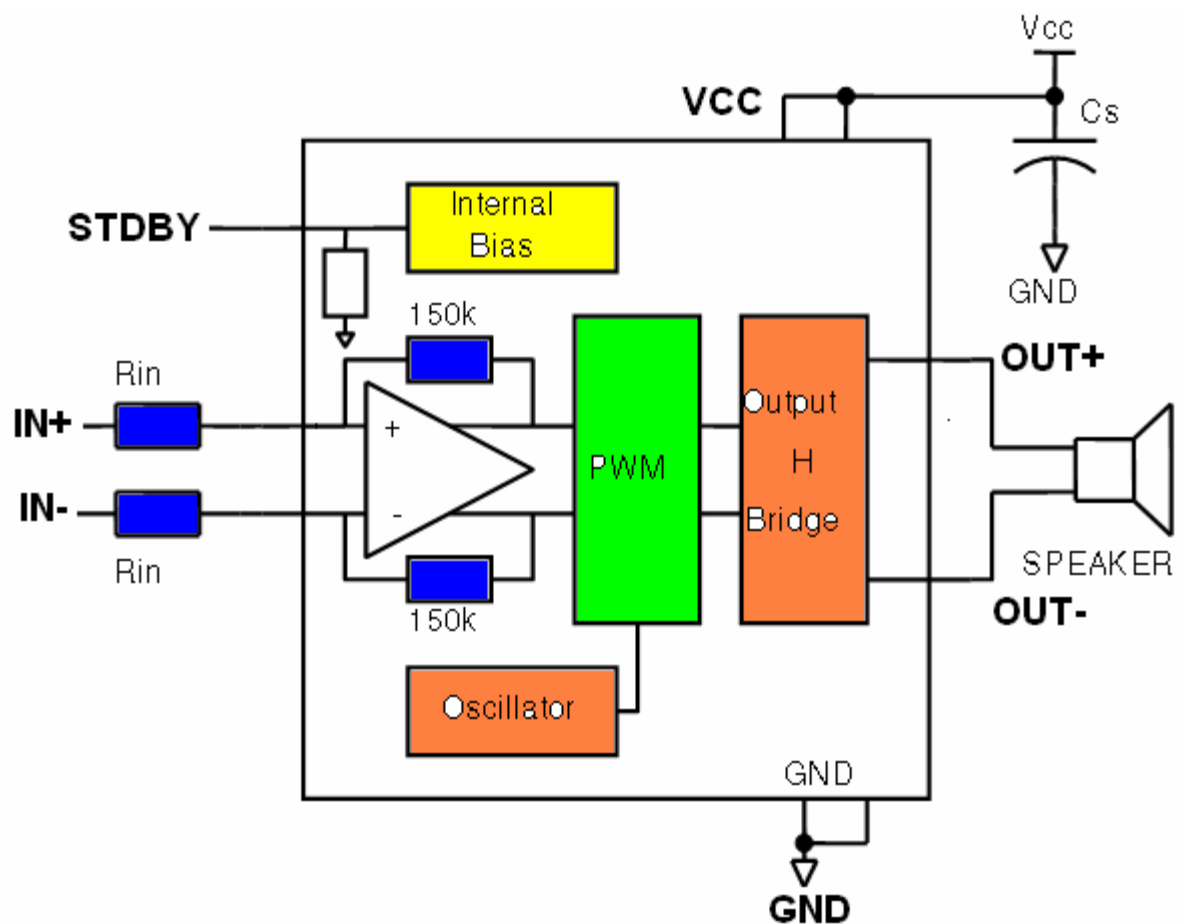
- Up to **3 W speaker** output
- Very high efficiency > **90%**
- Low distortion (1% THD+N max.)
- **Tiny 9-bumps** Flip-chip package and **QFN8 3x3mm**

■ **Benefits**

- **More gain** for less power consumption
- **No external filtering** required
- fewer external components
- Gives a real boost to high-quality media functions



TS4962M Never out of battery when powering wide sound





TS2007 Never out of battery when powering wide sound

■ **Function:**

- **6-12dB Fixed Gain 3W Mono Filter free Class-D Power Audio Amplifier**

■ **Applications:**

- Medium-size displays
- Mobile phones
- Business mobile phones
- PDAs
- PMP players





TS2007 Never out of battery when powering wide sound

■ **Features**

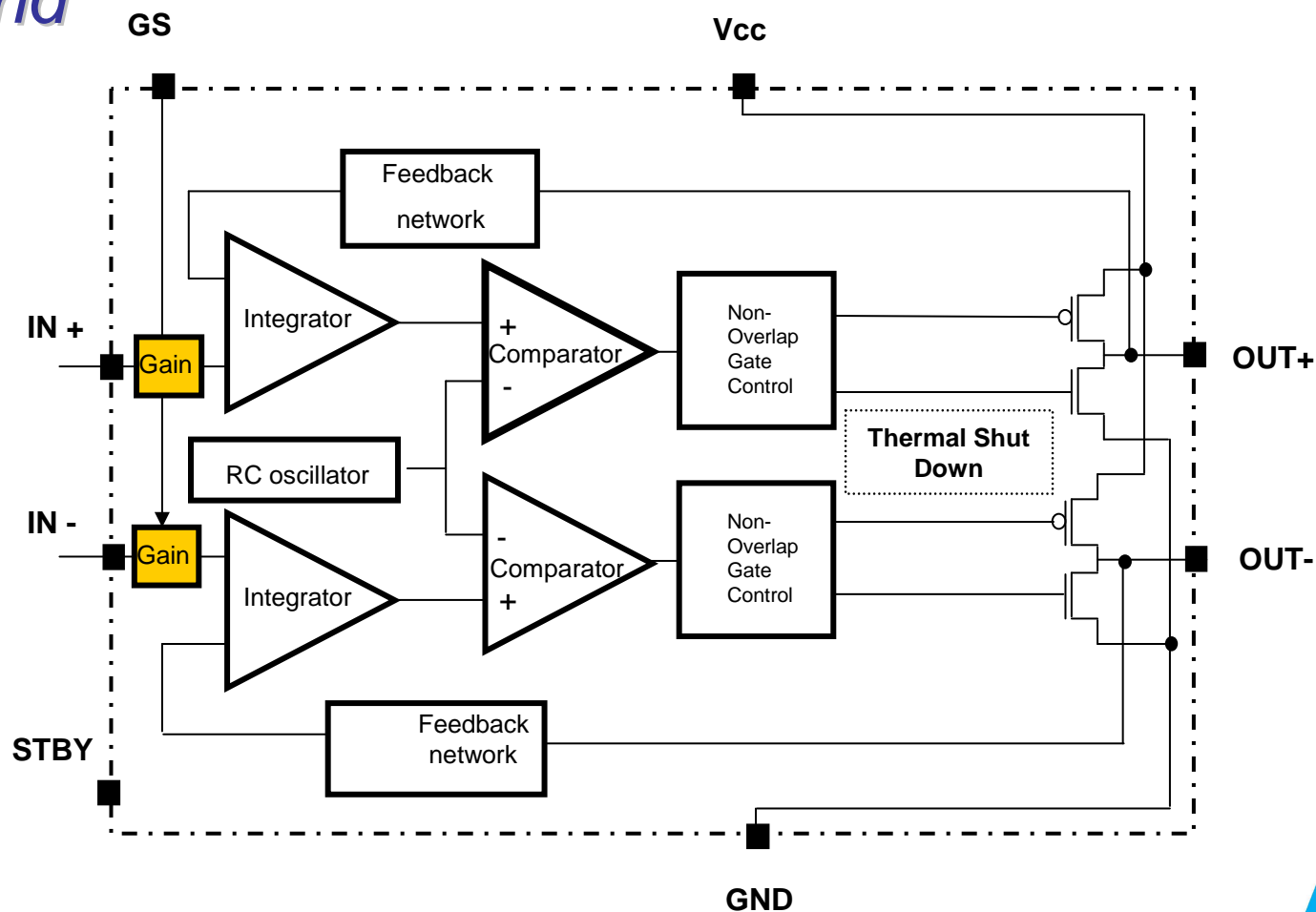
- Up to **3 W speaker** Output Power
- **6-12dB** Internal fixed gain by digital input pin
- Very high efficiency > **90%**
- Low distortion (1% THD+N max.)
- **QFN8 3X3 mm** package
- Flip Chip Available in **Q307**

■ **Benefits**

- **More gain** for less power consumption
- **No external filtering** required
- **Saves space on PCB** due to integration
- Gives a boost such as TV viewing, Visio phone



TS2007 Never out of battery when powering wide sound





Audio ASSP





TS4956 Be prepared to share your mobile

■ **Function:**

- Full Stereo Audio sub-System IC with I2C Bus interface

■ **Applications:**

- Mobile phones
- Portable equipments





TS4956 Be prepared to share your mobile

■ **Key features**

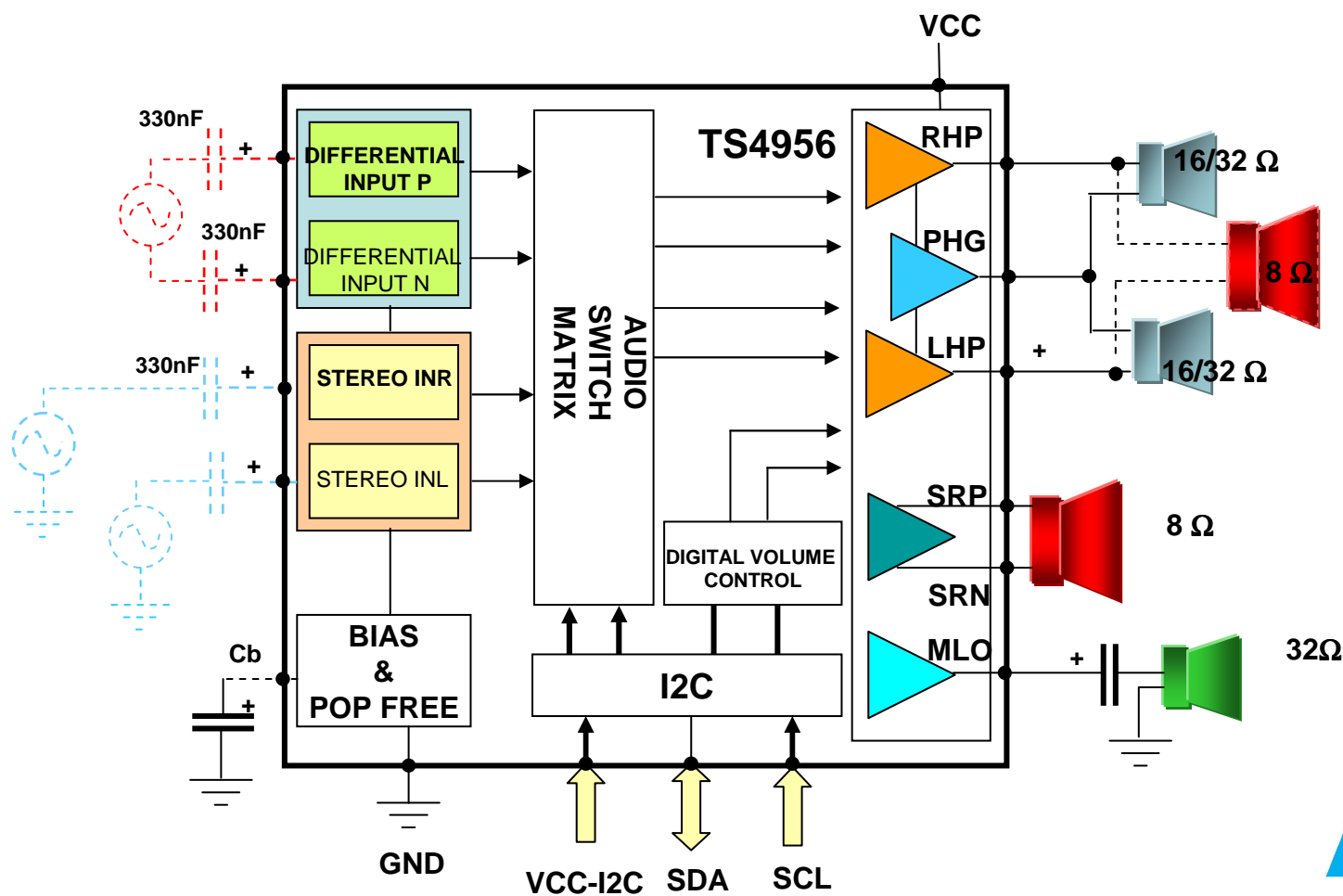
- **2x1W Full Stereo Speaker Mode**
- **9 Output Mode Selection**
- I2C bus Interface
- More than **110mW Stereo Headset Power Drive**
- **32 Steps Digital Volume Control**

■ **Benefits**

- **Design platform flexibility**
- **Size and cost optimized application board**
- Optimized for portable applications
- **Innovative features** without compromising performance



TS4956 Be prepared to share your mobile





2007 New Audio Products Introduction





TS4657 Full Digital Stereo Audio Line Driver

■ **Function:**

- **Single Supply Full Digital Stereo Audio Line Driver with 2.2V Outputs Capability**

■ **Applications:**

- DVD Players
- Digital Set Top Boxes
- Digital TV





TS4657 Full Digital Stereo Audio Line Driver

■ **Key features**

- **3.0v to 5.5v** Single Supply
- **DAC & Line Drive**
- **2.2V** Audio line Output level
- **I2S** for Digital Audio Interface
- **16 bit** Multi-bit Sigma Delta DAC

■ **Device Status**

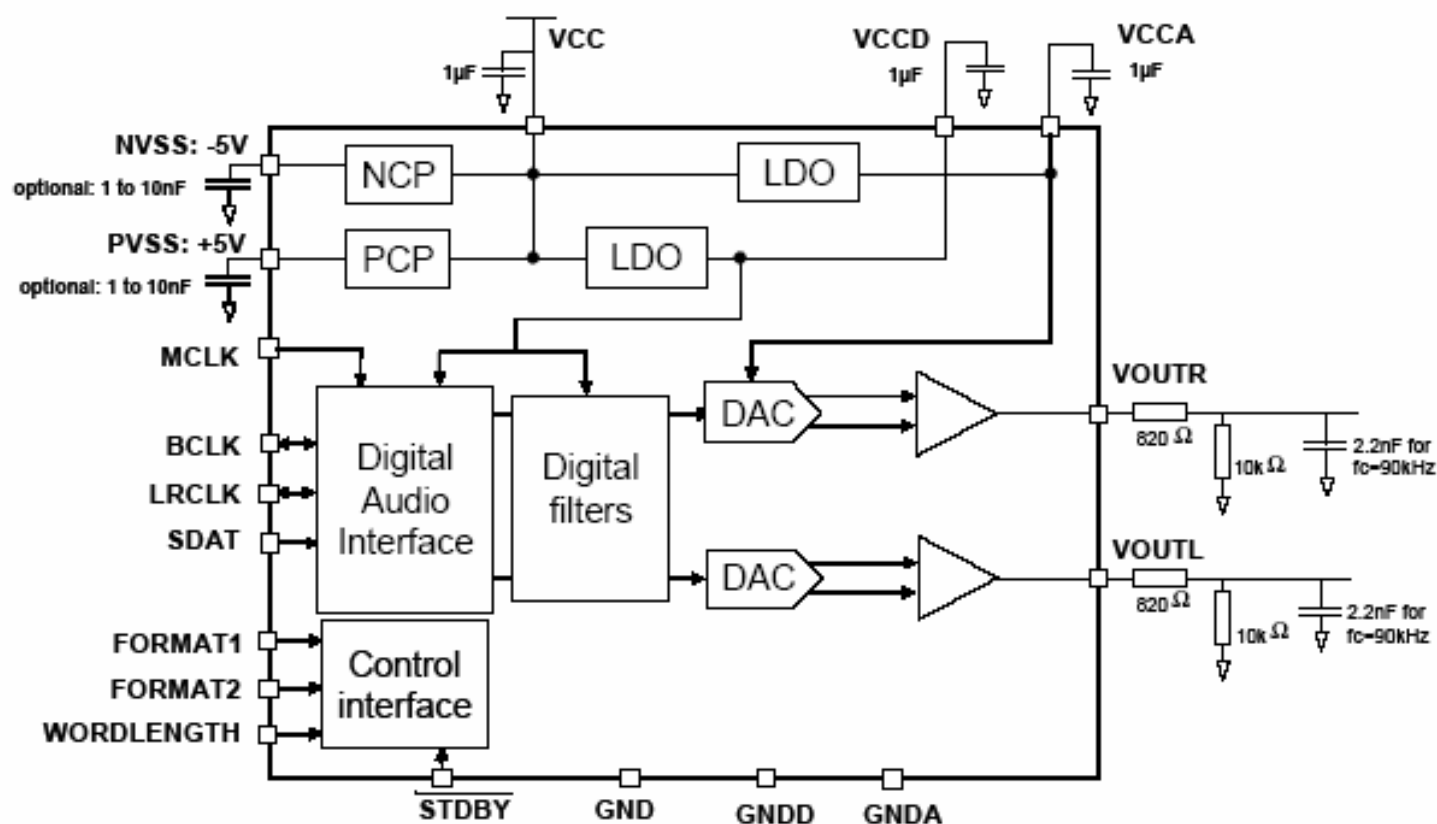
- E/S available **Q407**
- Full Production **Q108**

■ **Packaging**

- **QFN20** 4X4 mm



TS4657 Full Digital Stereo Audio Line Driver





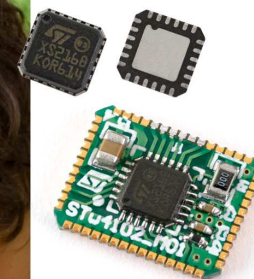
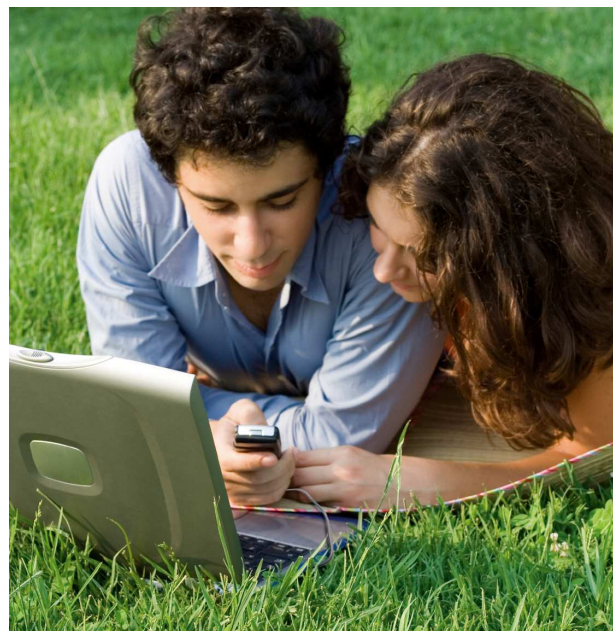
TS4982 Audio Sub System for Windows Vista Notebooks

■ **Function:**

- **2W Stereo Audio Power Amplifier with Referenced Ground Headset & 3D effects**

■ **Applications:**

- Notebook PCs
- Tablet PCs
- Portable DVD Players





TS4982 Audio Sub System for Windows Vista Notebooks

■ **Key features**

- **5.0v** Single-Supply Operation
- **80 mW** Stereo Headset Output Power
- **2.0 W** Output Power per Loudspeaker Channel
- **4 Overall** Programmable Gains
- **PC Beep** Input Signal

■ **Device Status**

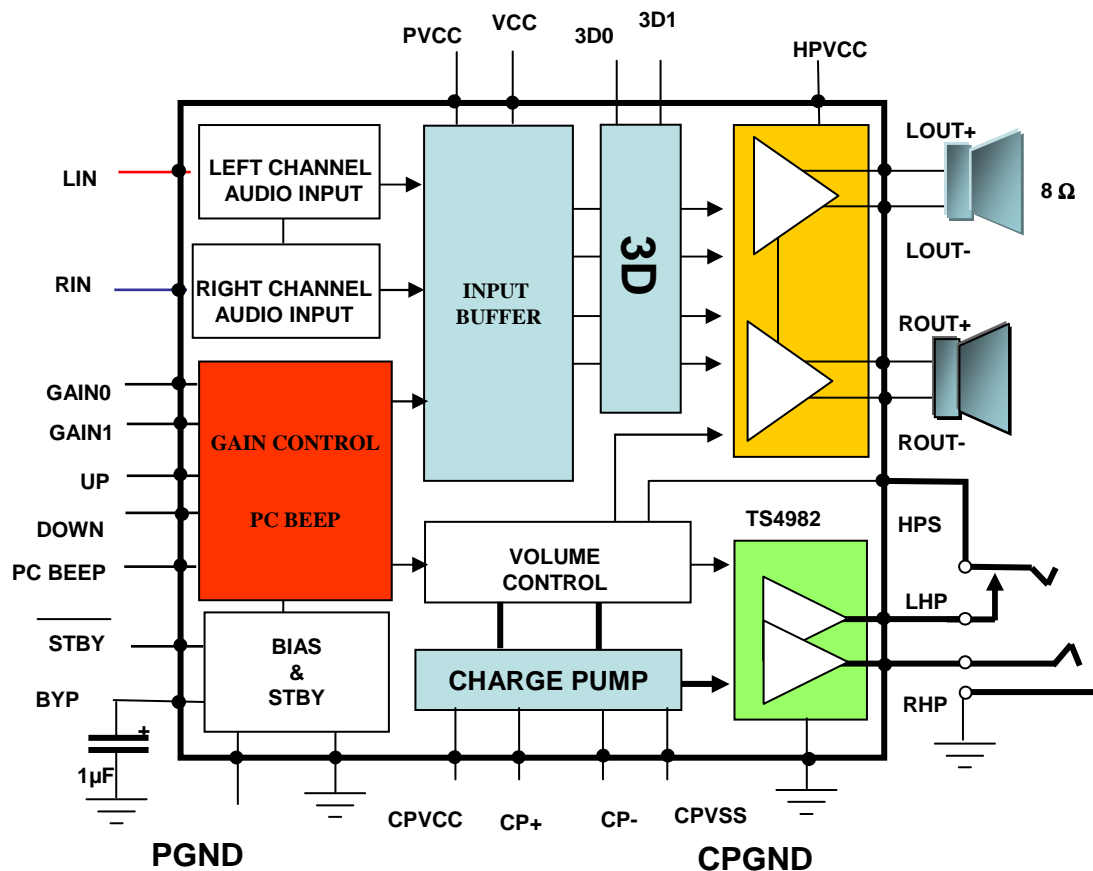
- E/S Available in **Q407**
- Full Production **Q108**

■ **Packaging**

- QFN28 5X5 mm



TS4982 Audio Sub System for Windows Vista Notebooks





TS2012 Highly-integrated Stereo Class D Audio Power Amplifier

■ **Function:**

- **3W Stereo Filter-Free Class D Audio Power Amplifier**

■ **Applications:**

- Mobile phones
- Portable DVD Player
- PDAs





TS2012 Highly-integrated Stereo Class D Audio Power Amplifier

■ **Key features**

- Power Supply from **2.4v to 5.5v**
- **Independent Shutdown** control per Channel
- **75dB** High PSRR
- Space Saving in both packages
- **4 Gains** Output Configuration

■ **Device Status**

- E/S Available in **Q207**
- Full Production **Q307**

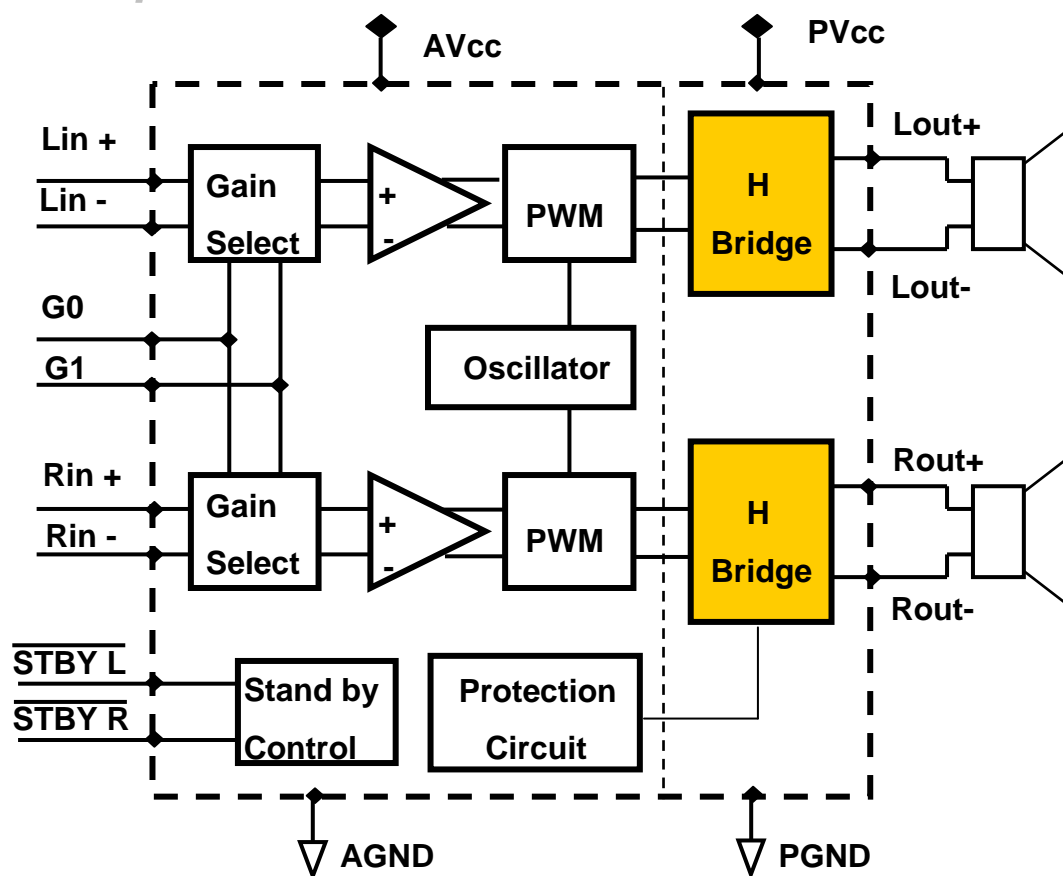
■ **Packaging**

- QFN20 4X4 mm
- Flip Chip 16 Bumps



AUDIO INTRODUCTION

TS2012 Highly-integrated Stereo Class D Audio Power Amplifier





ST4999 Play & Enjoy Stereo 3D Sound

■ **Function:**

- **3W Stereo Filter-Free Class D with 3D effects Sound Audio Power Amplifier**

■ **Applications:**

- Mobile phones
- Portable DVD Player
- PDAs





ST4999 Play & Enjoy Stereo 3D sound

■ **Key features**

- Power Supply from **2.4v to 5.5v**
- **Independent Shutdown** control per Channel
- **75dB** High PSRR
- Programmable **3D effects**
- **4 Gains** Select Pins

■ **Device Status**

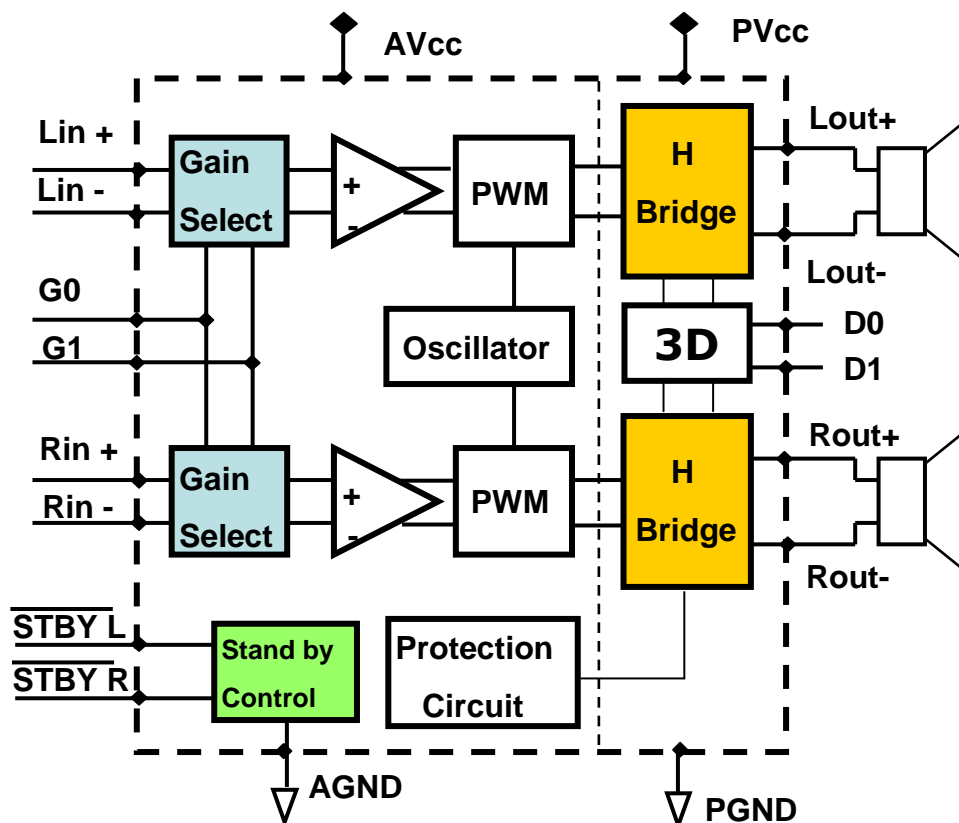
- E/S Available in **Q407**
- Full Production **Q108**

■ **Packaging**

- QFN20 4X4 mm



TS4999 Play & Enjoy Stereo 3D Sound





TS4951 Enhanced Audio Power Amplifier for Slim Phone

■ **Function:**

- 1.8W Wide Voltage for Piezo Speaker Drive Audio Power Amplifier

■ **Applications:**

- Slim Mobile phones
- Portable DVD Player
- PDAs





TS4951 Enhanced Audio Power Amplifier for Slim Phone

■ **Key features**

- Power Supply from **2.7v to 9v**
- **1.8w** Mono BTL on 8Ω Load
- **65dB** High PSRR
- **20 ms** Fast Turn on Time

■ **Device Status**

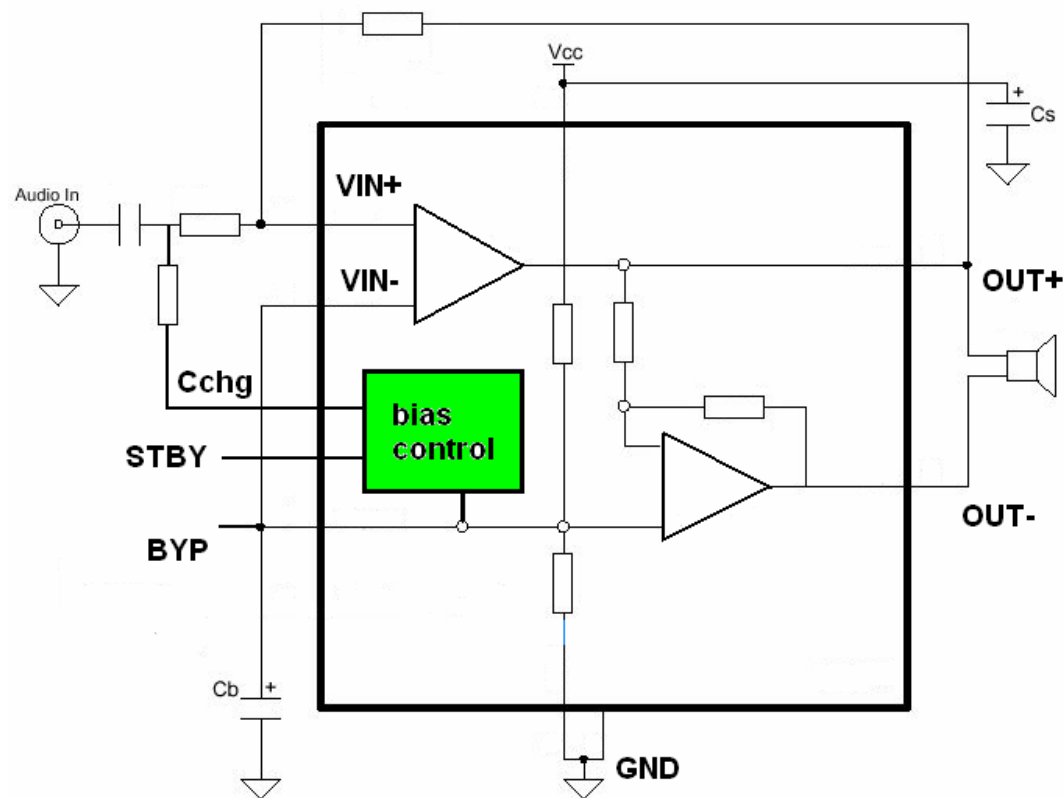
- E/S Available in **Q307**
- Full Production **Q108**

■ **Packaging**

- FLIP CHIP 9 BUMPS
- QFN10 3X3 mm



TS4951 Enhanced Audio Power Amplifier for Slim Phone





TS4610 Enhanced Stereo Headset Drive

■ ***Function:***

**STEREO HEADPHONE DRIVE WITH
NCP AND 2 DIGITAL VOLUME
CONTROL INPUT PINS**

■ ***Applications:***

- Mobile phones
- Portable DVD Player
- PDAs





TS4610 Enhanced Stereo Headset Drive

■ *Key features*

- Power Supply from **2.4v to 5.5v**
- **50mW** on 32 Ω Load @ 3v Vcc
- Reference to Ground
- Digital volume control with **2 input Pins**
- **From -33dB to +12dB** Overall Gain

■ *Device Status*

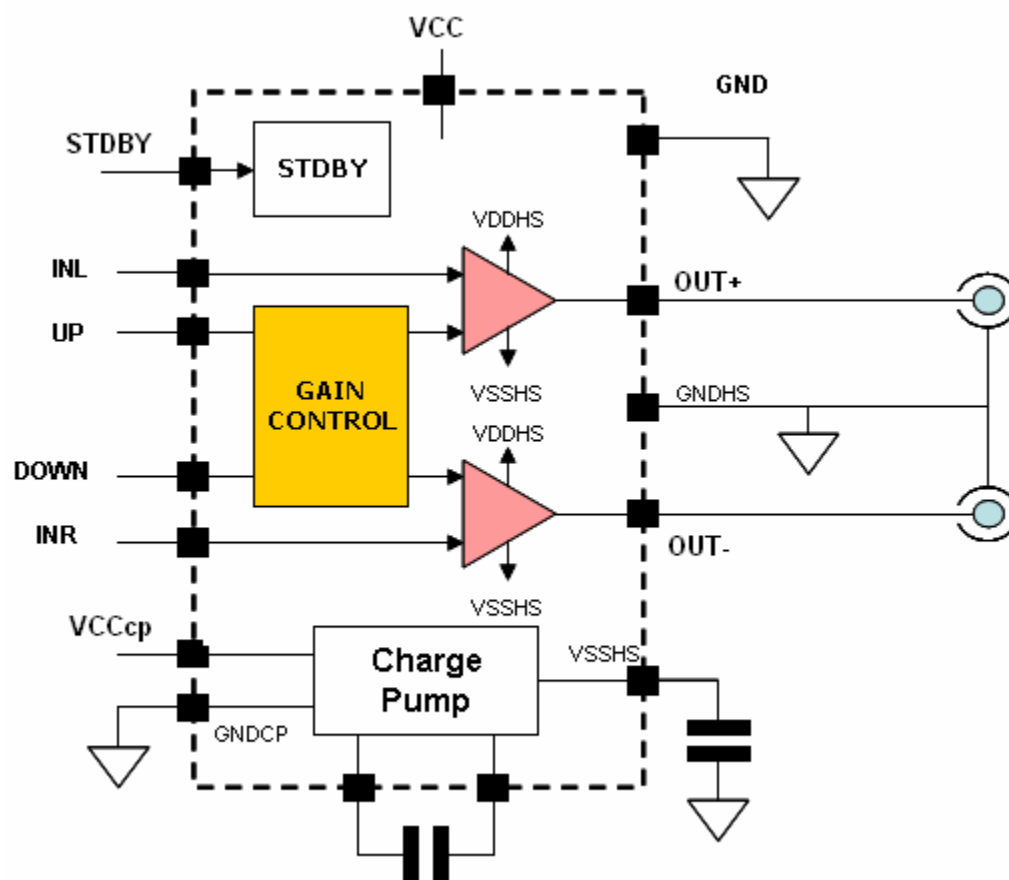
- E/S Available in **Q307**
- Full Production **Q108**

■ *Packaging*

- QFN16 4X4 mm



TS4610 Enhanced Stereo Headset Drive





Next Audio Products





TS475 Full Audio –Video Sub System

■ **Function:**

- Full Audio-Video Sub System with Microphone Pre-Amplifier and Mono Line Video Amplifier

■ **Applications:**

- Digital Still Camera
- Portable terminals & media players





TS475 Full Audio –Video Sub System

■ **Target features**

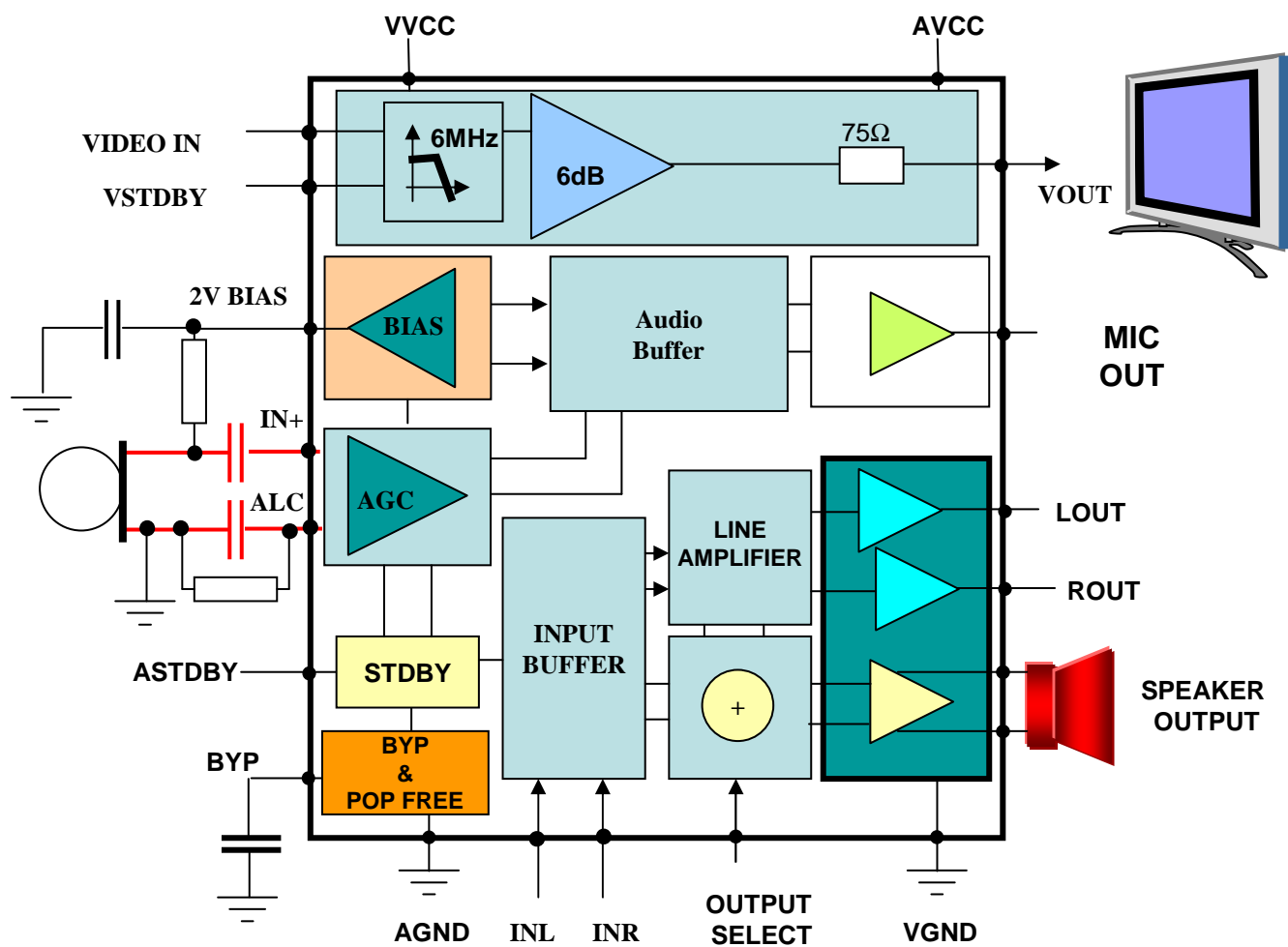
- Integrated **Mono video driver**
- **6 MHZ** Low Pass Filter for Video Part
- Low power consumption /10 nA in stand-by Mode
- **AGC** Microphone with **25 dB** overall Gain
- **500mW** Loudspeaker Output Power @ 3.3v Supply operation

■ **Benefits**

- Most **cost-effective** solution
- Optimized component count: few passives, **no external video driver**
- Low power adapted to portable applications
- High video quality
- Space-saving PCB



TS475 Full Audio –Video Sub System



2008/3/28



TS4701 2W Stereo Class D Power Amplifier with Stereo Headset Drive and LDO

■ **Function:**

- Full Stereo class D Audio Amplifier and Headset Drive + LDO

■ **Applications:**

- Notebooks
- Tablet PCs
- Portable terminals & media players





TS4701 2W Stereo Class D Power Amplifier with Stereo Headset Drive and LDO

■ **Target features**

- **2W Stereo class D Amplifier**
- **150mA** integrated LDO block
- 4 overall Gain from 6 to 21.6 dB

■ **Device Status**

- E/S Available in **Q407**
- Full Production **Q208**

■ **Packaging**

- QFN32 5X5 mm