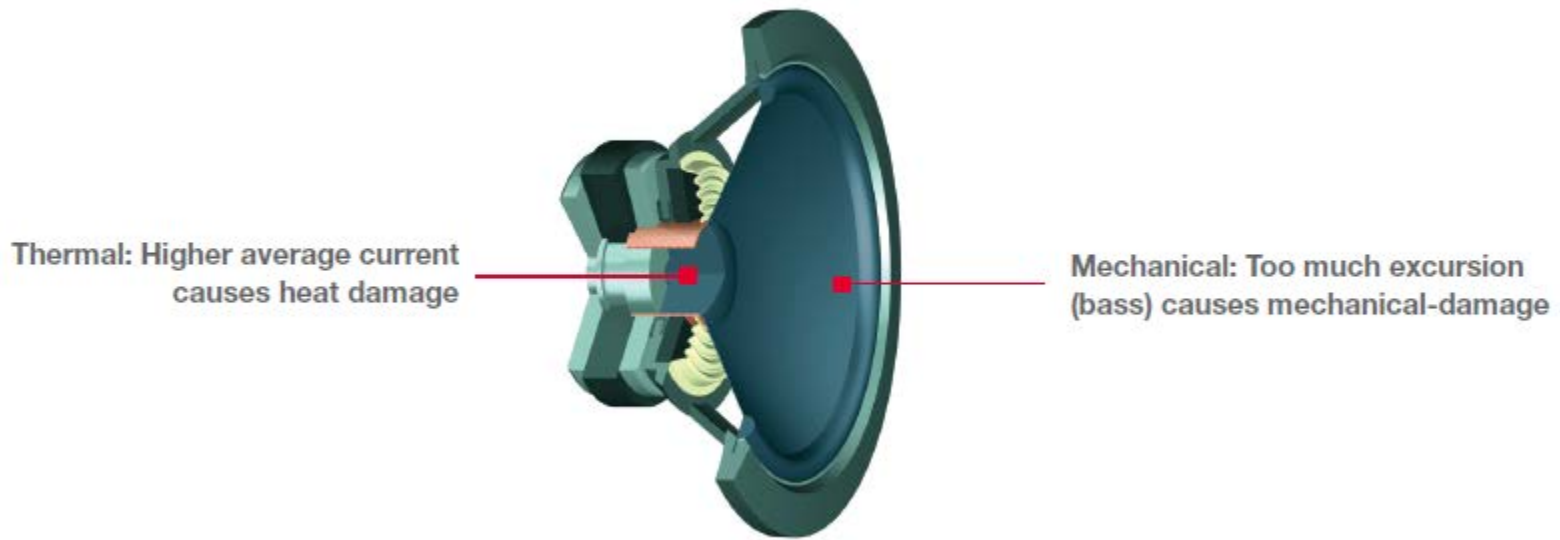


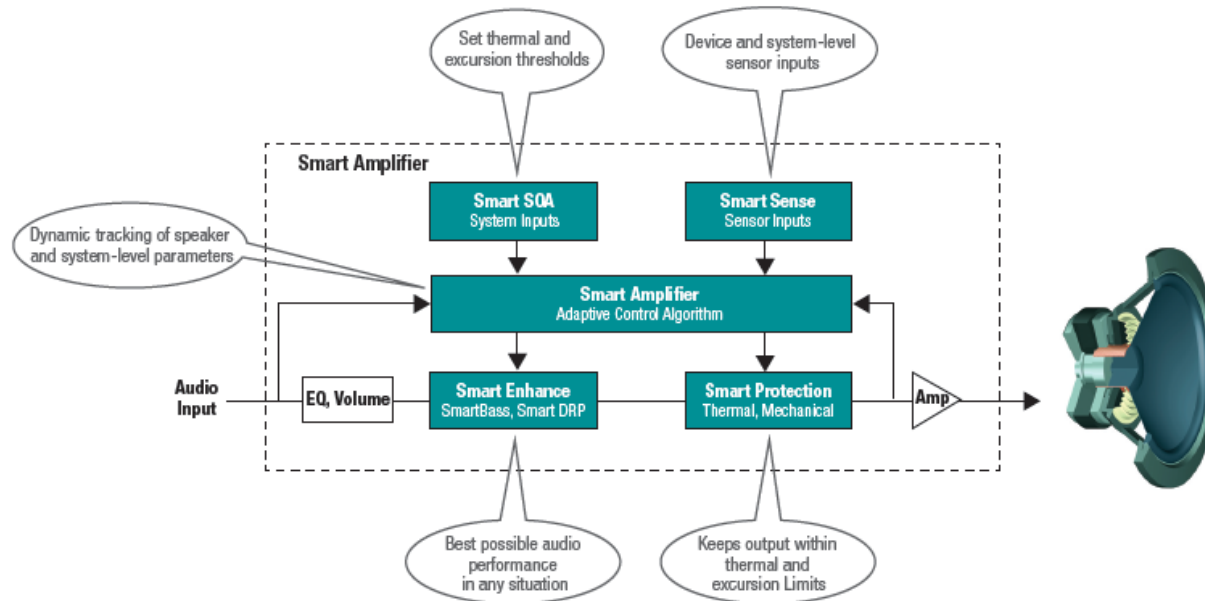
Smart Amplifiers

Basics of Speaker Protection



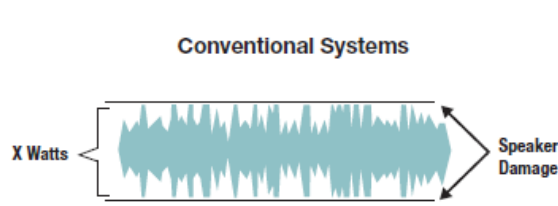
- Excursion : the air driving the speaker back and forth can damage the voice coil or foam membrane
- Temperature : when overdriving speakers, temperature is a great concern. The voice coil can be damaged if the speaker is overdriven for a long period of time

Basics of Speaker Protection

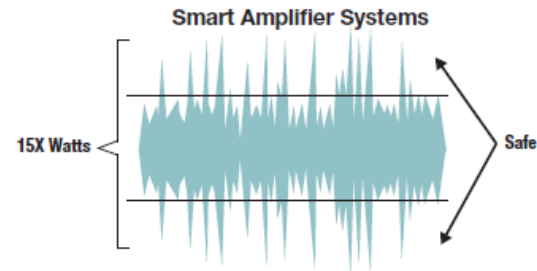


- TI Smart Amplifiers can provide big sound from small solutions by utilizing implementing an excursion limiter and temperature regulator to push the speaker near its limit for short periods of time
- Sound is further enhanced by on-chip enhancements including SmartBass and Smart DRP

Hear the difference



- Do not do continuous speaker modeling
- Use compression and clipping for protection, which leads to bad sound quality
- Limits for worst case



- System offers continuous speaker modeling
- Output power/peaks constantly optimized for max power and reliability
- Preserving peaks = better audio clarity
- Excursion headroom used for improving bass

- TI Smart Amplifiers provide:
 - Louder playback
 - More Bass
 - Increased dynamic range
 - Fewer field failures / warranty returns

TI Smart Amplifier Solutions

Features	TAS2552/3	TAS5766/68
Description	4.0W Class-D mono amplifier, Class-G Boost, DAC, and IV Sense	20W Class-D Stereo PurePath™ Smart Amp
Boost	8.5W / 7.5W	
Channels	Mono*	Stereo
Amp type	Class-D/Class-G Boost	2 x BTL Class-D
Output Power	1x4	2x20 (2x50)
Load Range	8Ω at 4.2V	2Ω - 8Ω (4.5V-26.4V)
Special Features	Analog or Digital Input	Configurable digital audio processor
Gain Control	Automatic Gain Control (AGC)	
Pin/Package	30-Ball WCSP (2.5x3.0mm ² , 0.4mm pitch)	48-pin HTSSOP or VQFN (12.5x6.1mm ² , 0.5mm pitch) (7.0x5.0mm ² , 0.4mm pitch)

* Implement stereo with 2xTAS2552

Low Power Smart Amplifiers

Big Sound, Small System



- Low power smart amplifier solutions for your mobile application
- Support for the most popular mobile processors
- Up to 8.5V Class D w/ Boost
- IV sense, Temperature, and Excursion control protect the speaker while providing maximum loudness and bass



TAS2552

4W Class-D audio power amplifier with speaker I-V sense

Features

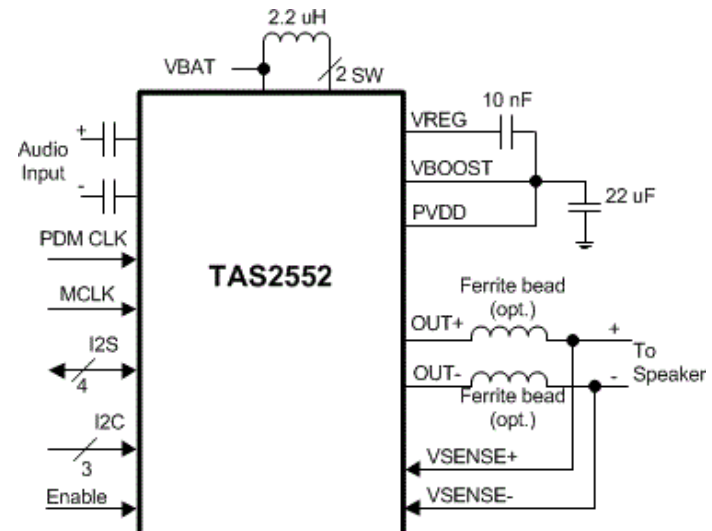
- Integrated Speaker Sense (I/V sense)
- Boosted Class-D
- Integrated Class-G controller dynamically switches between boost enabled and boost disabled
- Integrated Battery Guard

Benefits

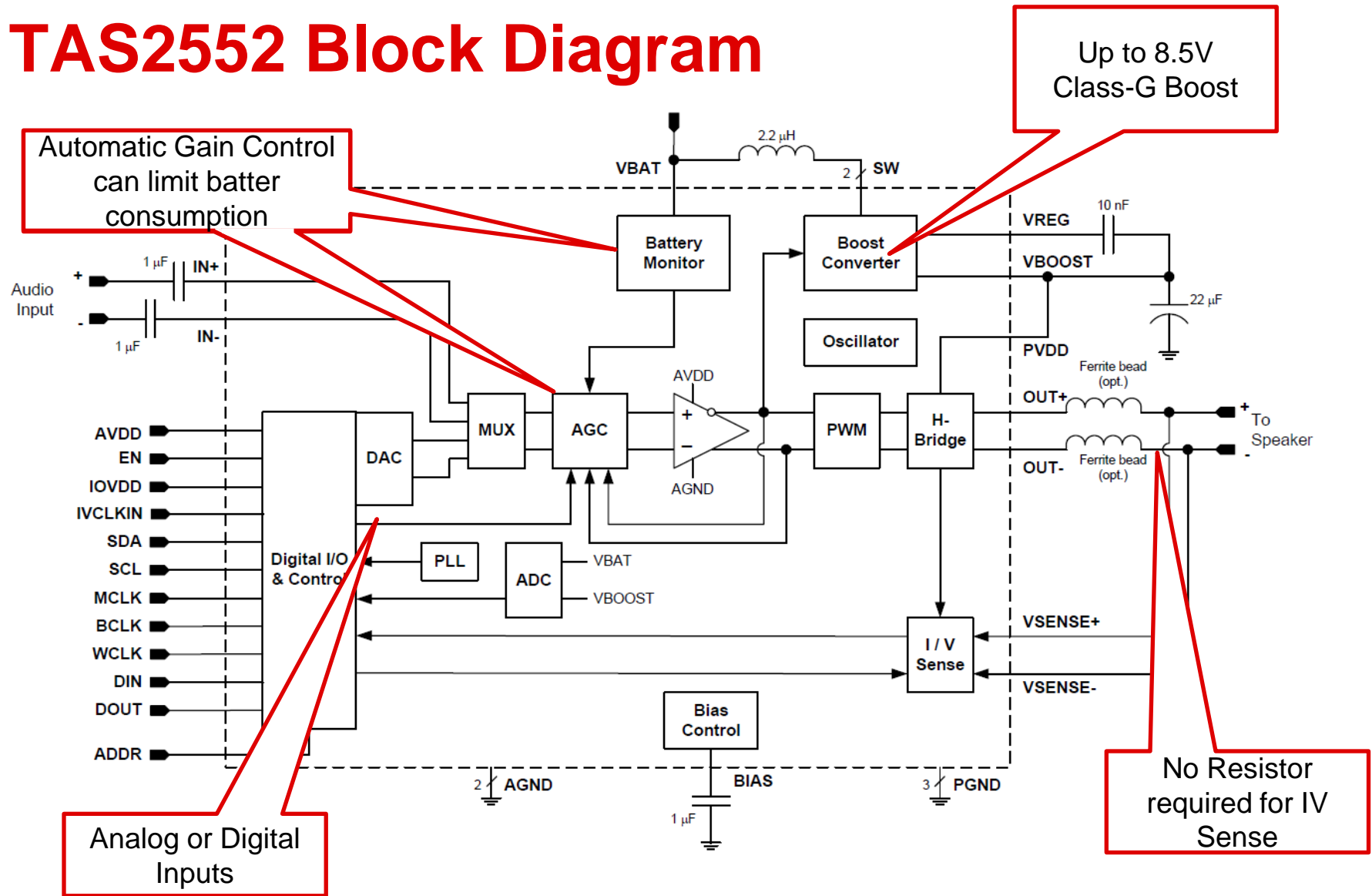
- I/V values for the speaker signal can be used to implement advanced speaker protection algorithms which allows louder and clearer sound and improved bass performance without speaker damage.
- Measures Speaker Current and Voltage; Measures VBAT and VBOOST Voltage
- Provides boost upto 8.5V to deliver 7W peak (4W rms) power with 8 ohm load
- Most efficient operation Save power during softer playback and also during idle periods during speakerphone conversations
- Protects against large boost voltages causing issues in their devices power systems

Applications

- Portable Audio Devices
- Smart Phones
- Tablets
- Portable Navigation Device



TAS2552 Block Diagram



TAS255x IV Sense Amplifiers, Key Features

Playback Path

- TAS2552 8.5V Boost Converter
- $4W_{\text{rms}}$ ($7W_{\text{peak}}$) Output Power
1% THD, 4 or 8Ω Load
- TAS2553 7.5V Boost Converter
- Class-DG improves efficiency
- Edge rate control
- Analog Input
- Integrated DAC
I2S, LJF, RJF, DSP, PDM, TDM
- Battery tracking AGC

Load Sensing

- Fully integrated load sensing
no external components
required
- Outputs I/V/gain/battery
voltage
I2S, LJF, RJF, DSP, PDM,
TDM
- Package
2.5x3.0mm², 0.4mm pitch,
30-ball WCSP

Demo #1 Details



Lenovo Yoga 10HD+
w/ TAS2552

VS.



Lenovo Yoga 10HD+
w/ Class D

- Lenovo 10HD+ Android Tablet modified with 2 x TAS2552
 - Includes same speaker modules
 - Tuned to TAS2552 algorithm
 - Stereo Implemented
- Head to head comparison with factory model with competitor Class-D Amplifier
- Result:
 - Better Sound, More Bass
 - SPL 102.5 dBA vs 87.3dBA



Demo #2 Details



LG G3 Smartphone
w/ TAS2552

VS.



LG G3 Smartphone
w/ Competitor Smart Amp

- LG G3 smartphone modified to be driven by TAS2552
 - Includes same speaker module
 - Tuned to TAS2552 algorithm
- Head to head comparison with factory model with competitor smart amplifier product
- Result:
 - Better Sound, More Bass
 - SPL 100.2dBA vs 98.2dBA

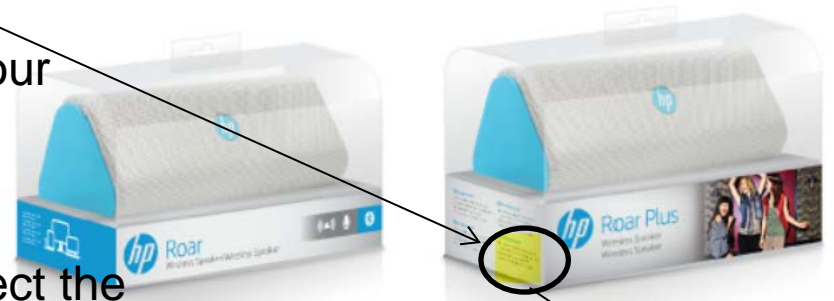


Mid Power Smart Amplifiers

Big Sound, Small System



- Mid power smart amplifier solutions for your BT/Wireless speakers, TV etc.
- Supports 4.5V to 26V
- Temperature, and Excursion control protect the speaker while providing maximum loudness and bass



EN Wireless Speaker
Colorful style meets serious sound

- Maintains clarity when you go louder and delivers fuller bass with Texas Instrument's Smart Amp technology.
- 1-year limited warranty



TAS5766/68M

Mid-Power Smart Amplifier

TI Confidential – NDA Restrictions

TAS5766M/68M

20W Class-D Stereo PurePath™ Smart Amp

Features

- **PurePath™ Console Feed Forward Protection Algorithms**
- **Smart Amp characterization and tuning tools**
- 20W/4Ω/12V continuous and 50W/4Ω/24V peak (10% THD+N)
- Wide 4.5V to 26V supply voltage operation
- Available in two 12.5x6 TSSOP and 5x7mm QFN packages
- Ternary Switching Mode

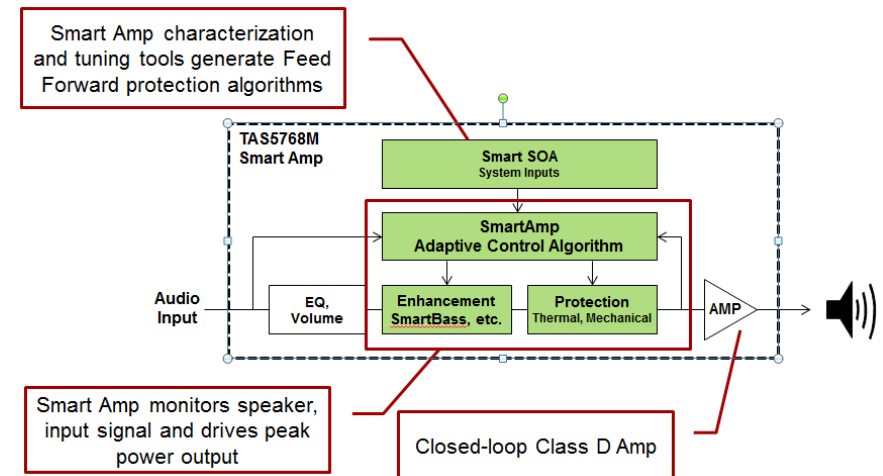
Benefits

- **10-15dB increase of sound pressure level while protects speakers**
- **Fast speaker modeling to improve performance**
- High peak power to delivers clarity and loudness
- Works in 12V, 24V and 2S battery systems
- TSSOP for maximum thermal performance, QFN for systems with minimal board space
- Simplifies EMI design efforts

Applications

Low Power, Small Footprint

- Wireless and Bluetooth Speakers
- Sound Bars
- PCs: Notebooks and All in One Computers
- Digital TVs



**For more information on TI Smart
Amplifiers, please visit:**

ti.com/audio

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