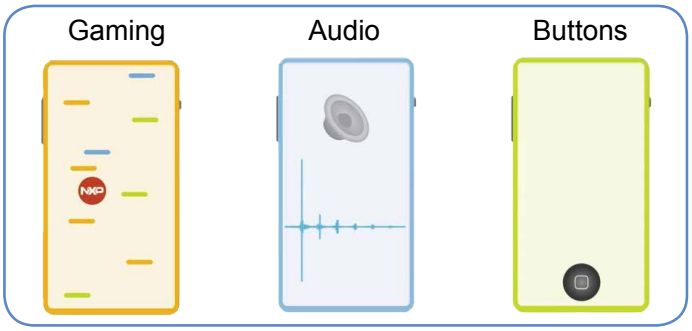
High Efficiency Class-D Amplifier for Haptic, TFA9914

Introducing NXP's haptic amplifier solution associated with transducer

A high-efficiency 10 V boosted Class-D haptic driver IC with a sophisticated smart haptic and LRA protection algorithm, delivering up to 5.6 W (AVG) output power into an 8 Ω LRA.

OVERVIEW

The TFA9914 is a high-efficiency 10 V boosted class-D haptic Driver IC with a sophisticated smart haptic and LRA protection algorithm. It can deliver up to 5.6 W (AVG) output power into an 8 Ohm LRA. The internal boost converter raises the supply voltage to 10 V, providing ample headroom for major improvements in LRA performance of clean haptic effects and audio display features. Unlike competing solutions, the adaptive haptic boost algorithm uses feedback to accurately calculate both the temperature, the excursion, and resonance frequency, allowing the TFA9914 to adapt to changes in the LRA condition and environment. It enables audio display, audio to haptic, and short click use cases.

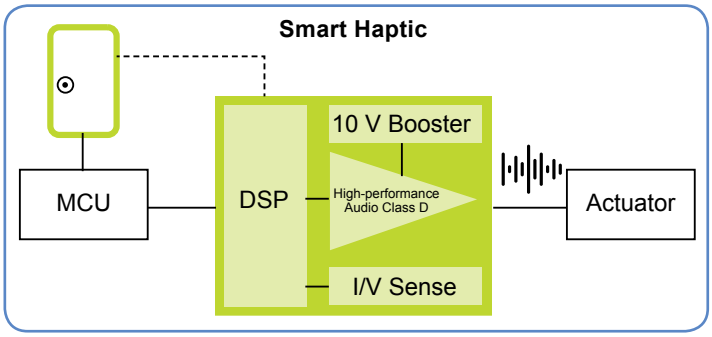


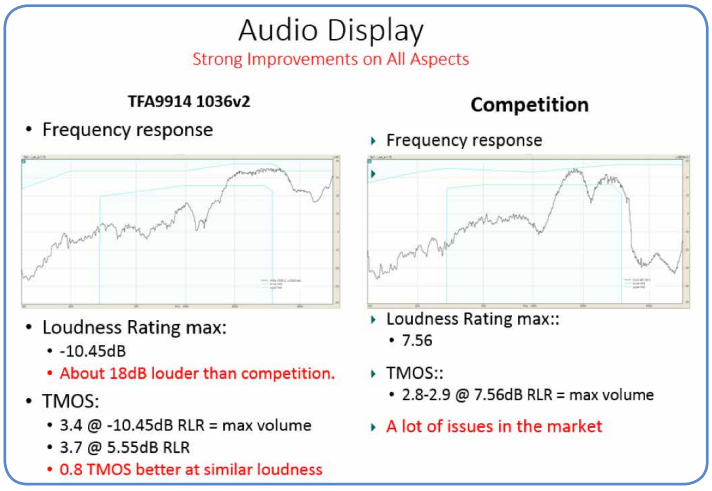
KEY FEATURES AND BENEFITS

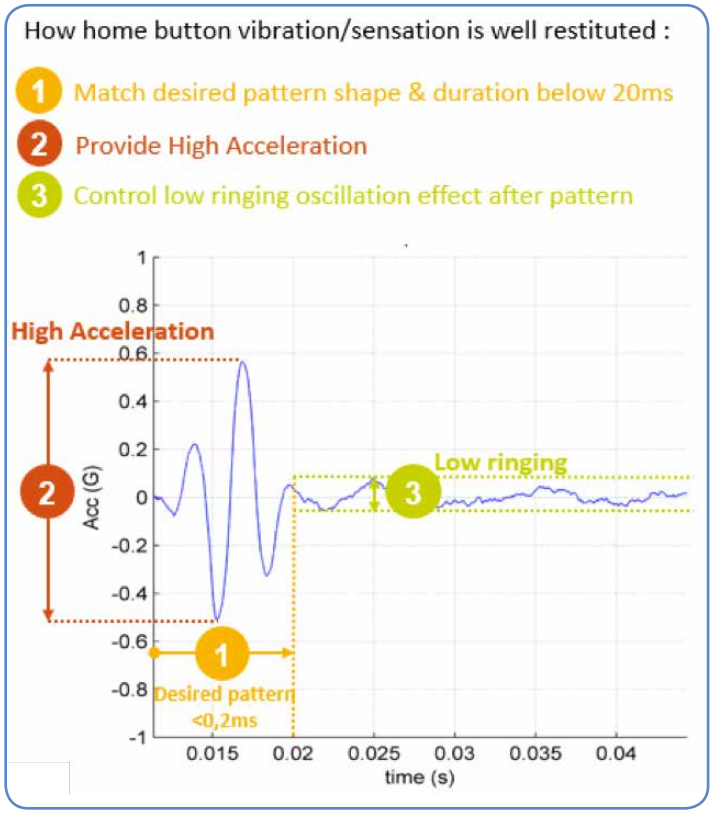
- Wave table playback: allowing user defined patterns to be stored and playback
- Tone generator: resonant tone playback with resonant frequency (f0) tracking at ±2 Hz accuracy
- Automatic boost/brake effect for fast ramp-up/ramp-down and ringing compensation
- TDM real-time streaming support (for external pattern playback)
- Concurrent playback of tone generator/wavetable, with streaming inputs
- Dedicated sequencer for complex haptic feedback
- Preprocessing libraries (available from NXP for host execution) supporting Audio-to-Haptics (gaming and multimedia experience enhancement)
- Audio-Display (voice call handset mode with LRA in place for a regular RCV speaker).
- Specifically tailored haptic boost algorithm embedded on chip
- Enable the same LRA to work as a haptic device and an actuator for voice display

KEY SPECS:

- SPK Class-D
  - 5.6W with 8ohm load (THD <1%; VBAT = 4V)
  - 6.2W with 4ohm load (THD <1%; VBAT = 4V)
  - 14uVrms noise floor
  - 91% peak efficiency for 600mW sinewave
- Four TDM/I²S I/O pins.
  - Support for 8 slots
  - Input for main audio stream
  - Stereo sync between left and right devices
  - Input for selected secondary audio stream.
- HapticBoost algorithm Integrated
- NXP® Haptic Software suite
- Enhanced battery safeguard







SMART HAPTIC PRODUCT OVERVIEW

Features	TFA9914
Boosted Voltage and Adaptive Boost	10V Adaptive
High Perf. With Low Impedance Transducer	5.6W @ 8Ohm
Audio Quality Drive Signal	Yes
Triggering Method	I²C
Triggering Latency	3ms
Low Current While Waiting for Events	10uA
I²S/TDM Stream Pattern	Yes
f0 Calibration/Tracking	<2Hz
Custom Haptic Effects on Chip	9
Haptic Effects Sequencer	Yes
Temperature & Excursion protection	Yes (only on TDM)
Clocking Scheme	19.2M
Embedded Algorithms	FW on Chip
Support for Haptic Effect optimization	Yes
Multi-Source Mixing	Yes
Internal Resonant Sig. Generator	Yes
Automatic Acceleration/Braking	Yes
Transducer Diagnostic	Yes
Package size (mm2)	8.9

www.nxp.com/i2clogic

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