BOS1921 Piezo Haptic Driver with Digital Front End

1 Features

- High-Voltage Low Power Piezo Driver
  - Drives 100 nF at 190 V_{pk-pk} and 300 Hz while consuming only 350 mW
  - Drives Capacitive Loads up to 820 nF
  - Energy Recovery
  - Differential Output
  - Small Solution Footprint, QFN & WLCSP
- Advanced Piezo Sensing Capabilities
  - 7.6 mV Sensing Resolution
  - Interrupt Generation
  - Automatic Triggering of Haptic Feedback
- Integrated Digital Front End with I3C/I^2C
  - 1024 sample Internal FIFO Interface
  - 1.8 V to 5.0 V Digital I/O Supply
  - Waveform Synthesizer (WFS)
  - Supports Continuous Waveforms Playback
  - State Retention in SLEEP Mode
- Fast Start Up Time of Less Than 300 µs
- Multi-Actuator Synchronization
- Wide Supply Voltage Range of 3 V to 5.5 V

2 Applications

- Mobile Phones and Tablets
- Portable Computers, Keyboards and Mice
- Gaming Controllers, Wearables
- Electronic Cooling

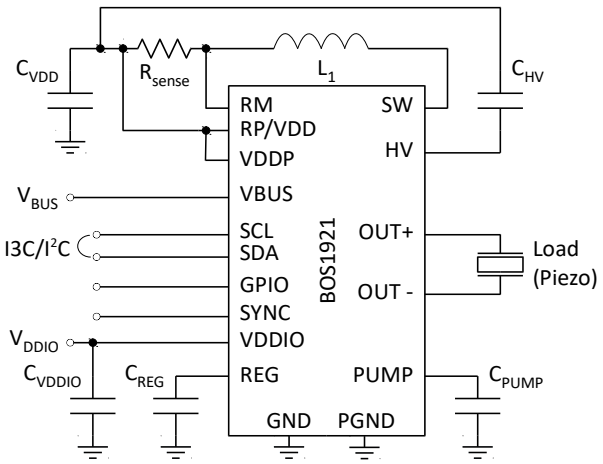

Figure 1: Simplified schematic

3 Description

The BOS1921 is a single-chip piezo actuator driver with energy recovery, based on Boreas' patented CapDrive™ technology. It can drive actuators with waveforms up to 190 V_{pk-pk} while operating from a 3 to 5.5 V supply voltage. Its low power and small size make it ideal for a variety of applications requiring minimal power consumption.

The BOS1921 features high-resolution piezo sensing capabilities allowing haptic feedback to be automatically played when detection conditions are met.

The BOS1921 differential driver achieves low distortion waveforms and quiet actuator operation. All settings are adjustable through the digital front end to reduce the BOM.

Data and configuration parameters are easily communicated to the BOS1921 through its two-wire MIPI I3C interface. The MIPI I3C is also backward compatible with I^2C for easy integration in most systems. A flexible deep FIFO enables the streaming of digital waveform data for playback or the transmission of burst data for more bandwidth efficiency. The BOS1921 also integrates a waveform synthesizer and 2 kB of RAM waveform memory to generate HD haptic waveforms with minimal communication bandwidth.

A dedicated SYNC pin can synchronize multiple BOS1921 controllers to simultaneously drive multiple actuators within 2 µs.

With a typical start-up time of less than 300 µs, the BOS1921 latency is negligible in most systems.

Various safety systems protect the BOS1921 from damage in case of a fault.

Table 1: Product information

PART NUMBER	DESCRIPTION
BOS1921CQ	QFN 24L 4.0mm × 4.0mm
BOS1921CW	WLCSP 20B 2.1mm × 1.7mm

4 Notice and Warning

Warning High Voltage

For safety, this integrated circuit must be used by qualified and skilled personnel familiar with all applicable safety standards.

ESD Caution

This integrated circuit is ESD (Electrostatic Discharge) sensitive. Therefore, proper ESD precautions and procedures are recommended for handling and installation to avoid damage.

Boréas Technologies Datasheet Status:

Advance Information Datasheet:	Design Data
Preliminary Information Datasheet:	Prototype information
Final Datasheet:	Production information