

Efficient, High-Voltage, TacTouch™, Haptic Actuator Controller with I²C Interface

General Description

The MAX11835 haptic (tactile) actuator controller provides a complete solution to drive haptic actuators to add haptic feedback to products featuring user-touch interfaces. The MAX11835 drives actuators including single-layer, multilayer piezo, or electroactive polymer actuators. The device efficiently generates any type of user-programmable waveform including sine waves, trapezoidals, squares, and pulses to drive the piezo loads to create custom haptic sensations. The low-power device directly interfaces with an application processor or host controller through an I²C interface and integrates various blocks including a boost regulator, pattern storage memory, and waveform generator block in one package, thus providing a complete haptic feedback controller solution.

The MAX11835 contains a boost regulator that uses an external flyback to efficiently generate high-voltage waveforms up to 250V to drive haptic actuators while limiting current drain. The boost regulator features an internal n-channel MOSFET with current limit to control the drain from the battery or power supply.

The MAX11835 features user-programmable haptic feedback pattern storage memory that drives the waveform generator with piecewise linear data using 8-bit resolution. The device also offers a single trigger interface to allow the implementation of fast haptics directly from the touch controller. This allows use of multiple controllers in parallel to provide haptic sensations for larger displays. The device provides smart low-power and standby modes to reduce power consumption before, during, and after waveform generation. The MAX11835 enters low-power mode after a haptic event to automatically save power.

The MAX11835 offers a fast 400kHz I²C serial interface to allow programming of various modes of operation, status checking, and haptic waveforms. The operating supply range is 1.7V to 3.6V for the digital supply (DVDD) and 2.7V to 5.25V for the boost supply (BVDD) and analog supply (AVDD).

Applications

Mobile Communication Devices
PDA, GPS, and Media Players
Notebooks, Netbooks, and e-Readers
Handheld Gaming Consoles
Infotainment for Automotive Applications
Keypads and Keyboards

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Features

- ◆ Supports Multiple High- or Low-Voltage Haptic Actuators
 - Single-Layer Piezo Actuators
 - Multilayer Piezo Actuators
 - Electroactive Polymers
- ◆ Create Custom User-Programmable Waveforms with Up to 8-Bit Resolution
- ◆ On-Chip, Multiple Haptic Waveform Storage Up to 192 Bytes
- ◆ Analog Input Through AIN
 - Provides Boost Tracking Up to 300Hz Signal
 - Provides Up/Down Scaling for Small/Large Amplitude Signals
- ◆ TRIG to Optionally Start a Preprogrammed Haptic Waveform—Up to 16 Stored Waveforms
- ◆ On-Chip DC Boost Regulator
 - On-Chip 30V High-Voltage Boost Switch with Programmable Maximum Peak Current
 - Flyback Converter Generates High-Voltage Supply
 - Efficient Design to Minimize Drain on Battery Applications
- ◆ DIS Input to Disable or Enter Lower Power Boost Operation During High-Current Events
- ◆ 1.7V to 3.6V Digital Supply
- ◆ Boost/Flyback (BVDD) and Analog Power Supply (AVDD) 2.7V to 5.25V
- ◆ Programmable Low-Power Modes
 - 1μA Deep-Sleep Shutdown Current
- ◆ Thermal Shutdown
- ◆ Available in 400kHz I²C
- ◆ ESD Protection: ±2kV HBM, ±1kV CDM, ±200V MM

Ordering Information

| PART | TEMP RANGE | PIN-PACKAGE |
|--------------|----------------|---------------------------|
| MAX11835EWA+ | -40°C to +85°C | 25 WLP (2.1mm x 2.1mm) |

+Denotes lead(Pb)-free/RoHS-compliant package.

Functional Diagram appears at end of data sheet.