

# Haptic Driver for ERM and LRA with Internal Memory and Smart Loop Architecture

Check for Samples: [DRV2604](#)

## FEATURES

- **Flexible Haptic/Vibra Driver**
  - LRA (Linear Resonance Actuator)
  - ERM (Eccentric Rotating Mass)
- **I<sup>2</sup>C Controlled Digital Playback Engine**
  - Internal RAM for Customized Waveforms
  - Real-Time Playback Mode via I<sup>2</sup>C
- **Smart Loop Architecture<sup>(1)</sup>**
  - Automatic Overdrive/Braking (ERM/LRA)
  - Automatic Resonance Tracking (LRA)
  - Automatic Actuator Diagnostic (ERM/LRA)
  - Automatic Level Calibration (ERM/LRA)
- **Optional PWM Input with 0% to 100% Duty Cycle Control Range**
- **Optional Analog Input Control**
- **Optional Hardware Trigger Pin**
- **Efficient Output Drive**
- **Fast Start Up Time**
- **Constant Acceleration Over Supply Voltage**
- **1.8 V Compatible, VDD Tolerant Digital Pins**
- **Available in a 9-Ball, 0.5 mm Pitch WCSP**

<sup>(1)</sup> Patent pending control algorithm

## APPLICATIONS

- **Mobile Phones**
- **Tablets**
- **Touch-Enabled Devices**

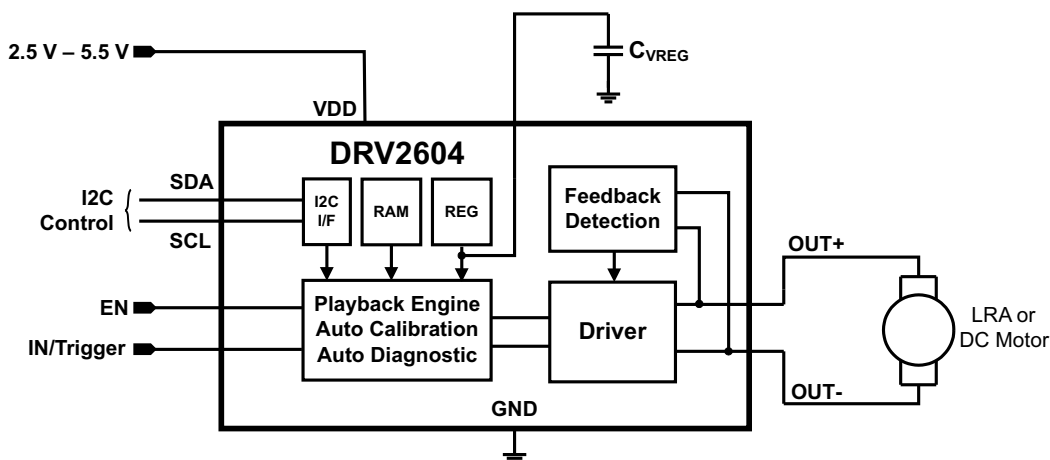
## DESCRIPTION

The DRV2604 is designed to give extremely flexible haptic control of ERM and LRA actuators over a shared I<sup>2</sup>C compatible bus. This relieves the host processor from ever generating pulse-width modulated (PWM) drive signals, saving both costly timer interrupts and hardware pins.

The DRV2604 includes enough integrated RAM to allow the user to pre-load over 100 customized waveforms. These waveforms can be instantly played back via I<sup>2</sup>C or optionally triggered via a hardware trigger pin. Additionally, the real-time playback mode allows the host processor to bypass the library playback engine and play waveforms directly from the host via I<sup>2</sup>C.

The DRV2604 also contains a smart loop architecture, which allows effortless auto resonant drive for LRA as well as feedback-optimized ERM drive. This feedback gives automatic overdrive and braking, which creates a simplified input waveform paradigm as well as reliable motor control and consistent motor performance.

The DRV2604 features a trinary-modulated output stage, providing greater efficiency than linear-based output drivers. The 9-ball WCSP footprint, flexible operation, and low component count make the DRV2604 the ideal choice for portable and touch-enabled vibratory and haptic applications.



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**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan<br>(2)         | Lead/Ball Finish | MSL Peak Temp<br>(3) | Samples<br>(Requires Login) |
|------------------|---------------|--------------|-----------------|------|-------------|-------------------------|------------------|----------------------|-----------------------------|
| DRV2604YZFR      | ACTIVE        | DSBGA        | YZF             | 9    | 3000        | Green (RoHS & no Sb/Br) | SNAGCU           | Level-1-260C-UNLIM   |                             |
| DRV2604YZFT      | ACTIVE        | DSBGA        | YZF             | 9    | 250         | Green (RoHS & no Sb/Br) | SNAGCU           | Level-1-260C-UNLIM   |                             |

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

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**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSELETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

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(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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## TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

| Device      | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| DRV2604YZFR | DSBGA        | YZF             | 9    | 3000 | 180.0              | 8.4                | 1.65    | 1.65    | 0.81    | 4.0     | 8.0    | Q1            |

TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device      | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-------------|--------------|-----------------|------|------|-------------|------------|-------------|
| DRV2604YZFR | DSBGA        | YZF             | 9    | 3000 | 210.0       | 185.0      | 35.0        |

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|                               |  |
|-------------------------------|--|
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