

# Haptic Driver for ERM and LRA with Built-In Library and Smart Loop Architecture

Check for Samples: [DRV2605](#)

## FEATURES

- **Flexible Haptic/Vibra Driver**
  - LRA (Linear Resonance Actuator)
  - ERM (Eccentric Rotating Mass)
- **I<sup>2</sup>C Controlled Digital Playback Engine**
  - Royalty-Free Integrated Immersion Library
  - 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)
- **Audio To Haptics Mode**
- **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

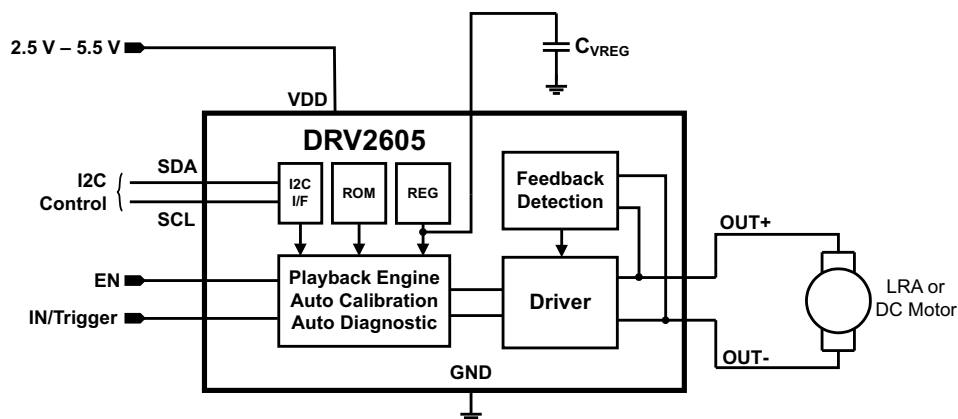
The DRV2605 is designed to give extremely flexible haptic control of ERM and LRA actuators over a shared I<sup>2</sup>C compatible bus. This relieves the host processor from ever generating pulse-width modulated (PWM) drive signals, saving both costly timer interrupts and hardware pins.

The DRV2605 gives royalty-free access to an extensive integrated library (100+ effects) from Immersion for ERM and LRA. This eliminates the need to design haptic waveforms.

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 DRV2605 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 audio-to-haptics mode automatically converts an audio input signal to meaningful haptic effects.

The DRV2605 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 DRV2605 the ideal choice for portable and touch-enabled vibratory and haptic applications.

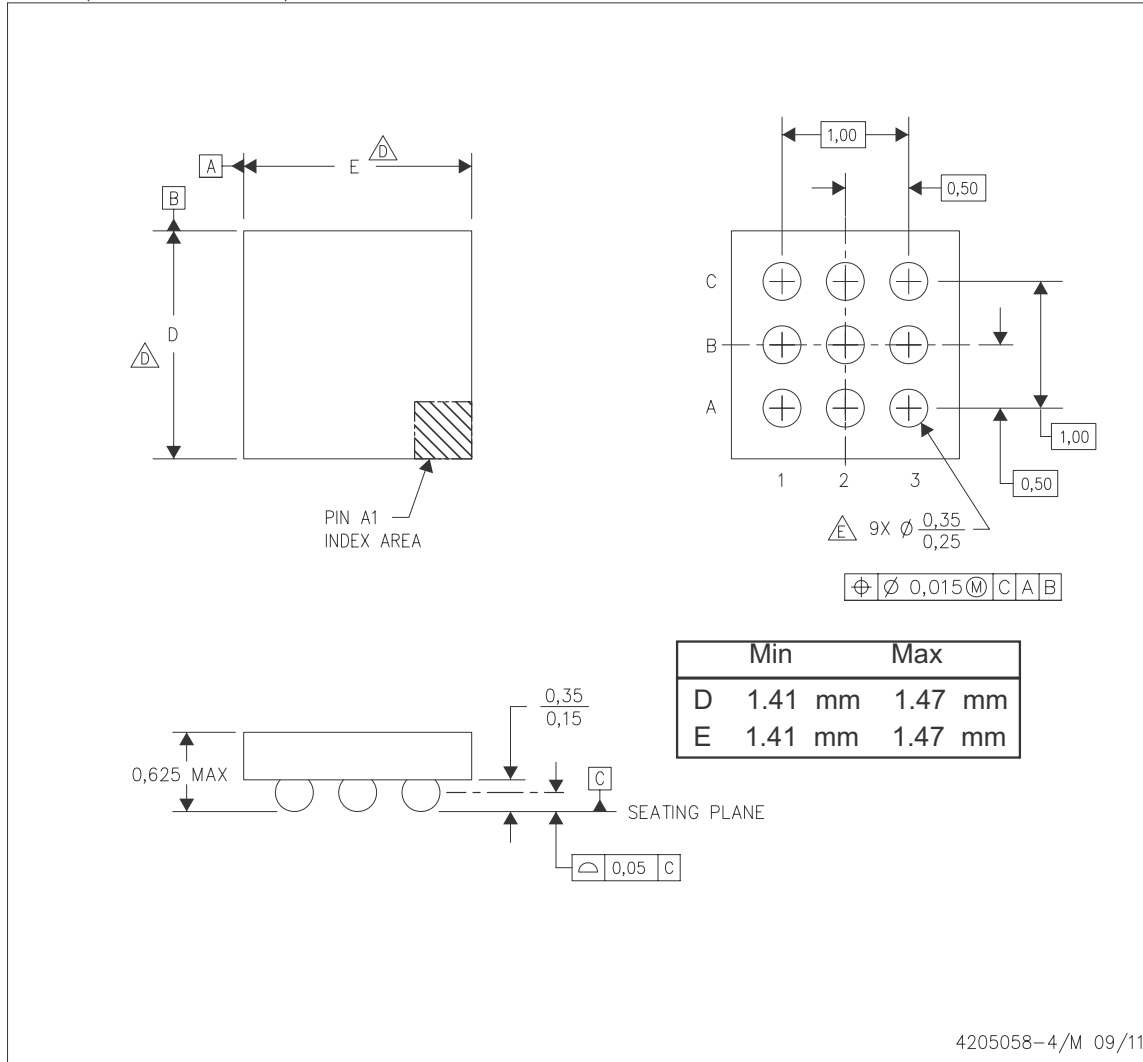


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MECHANICAL DATA

YZF (S-XBGA-N9)

DIE-SIZE BALL GRID ARRAY



- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. NanoFree™ package configuration.
  - The package size (Dimension D and E) of a particular device is specified in the device Product Data Sheet version of this drawing, in case it cannot be found in the product data sheet please contact a local TI representative.
  - Reference Product Data Sheet for array population.  
3 x 3 matrix pattern is shown for illustration only.
  - F. This package contains Pb-free balls.  
Refer to YEF (Drawing #4204181) for tin-lead (SnPb) balls.

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**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
DRV2605YZFR	ACTIVE	DSBGA	YZF	9	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	2605	<a href="#">Samples</a>
DRV2605YZFT	ACTIVE	DSBGA	YZF	9	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	2605	<a href="#">Samples</a>

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

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

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**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.

**OBSOLETE:** 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.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

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

(4) Only one of markings shown within the brackets will appear on the physical device.

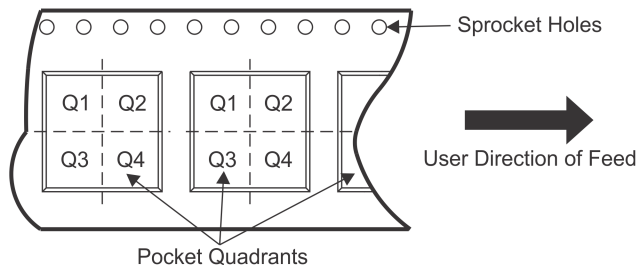
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## TAPE AND REEL INFORMATION



### 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
DRV2605YZFR	DSBGA	YZF	9	3000	180.0	8.4	1.65	1.65	0.81	4.0	8.0	Q1
DRV2605YZFT	DSBGA	YZF	9	250	180.0	8.4	1.65	1.65	0.81	4.0	8.0	Q1

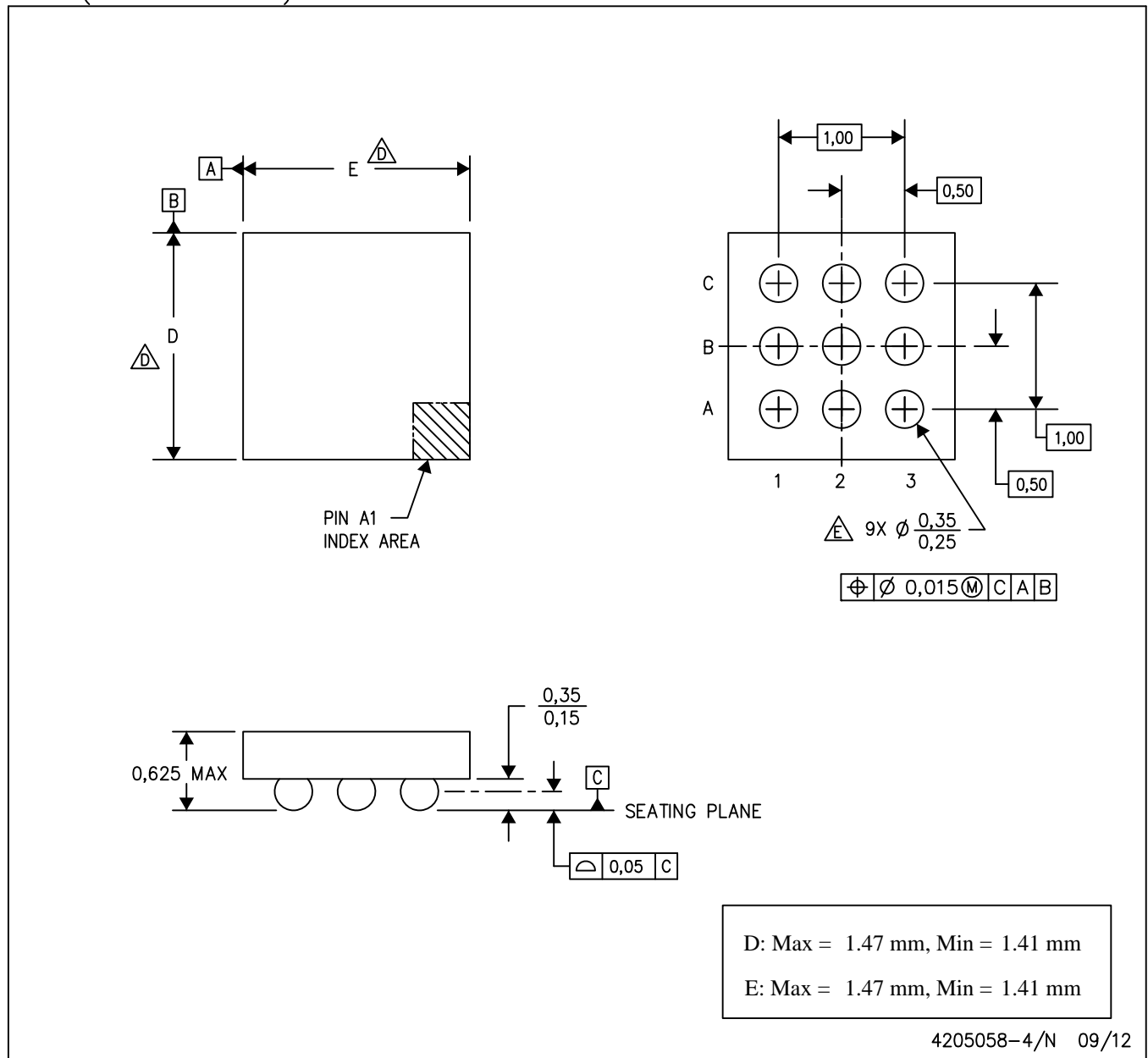
**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DRV2605YZFR	DSBGA	YZF	9	3000	210.0	185.0	35.0
DRV2605YZFT	DSBGA	YZF	9	250	210.0	185.0	35.0

YZF (S-XBGA-N9)

DIE-SIZE BALL GRID ARRAY



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