

Haptic Driver with Auto Resonance Tracking for Linear Resonance Actuators (LRA) and Optimized Drive for Eccentric Rotating Mass Actuators (ERM)

Check for Samples: [DRV2603](#)

FEATURES

- **Flexible Haptic/Vibra Driver**
 - LRA (Linear Resonance Actuator)
 - ERM (Eccentric Rotating Mass)
- **Auto Resonance Tracking for LRA**
 - No Frequency Calibration Required
 - Automatic Drive Commutation
 - Automatic Braking Algorithm
 - Wide Input PWM Frequency Range
- **Constant Vibration Strength Over Supply**
- **Automatic Input Level Translation**
- **0% to 100% Duty Cycle Control Range**
- **Fast Start Up Time**
- **Differential Drive from Single-Ended Input**
- **Wide Supply Voltage Range of 2.5 V to 5.2 V**
- **1.8 V Compatible, 5 V Tolerant Digital Pins**
- **Available in a 2 mm x 2 mm x 0.75 mm leadless QFN package (RUN)**

APPLICATIONS

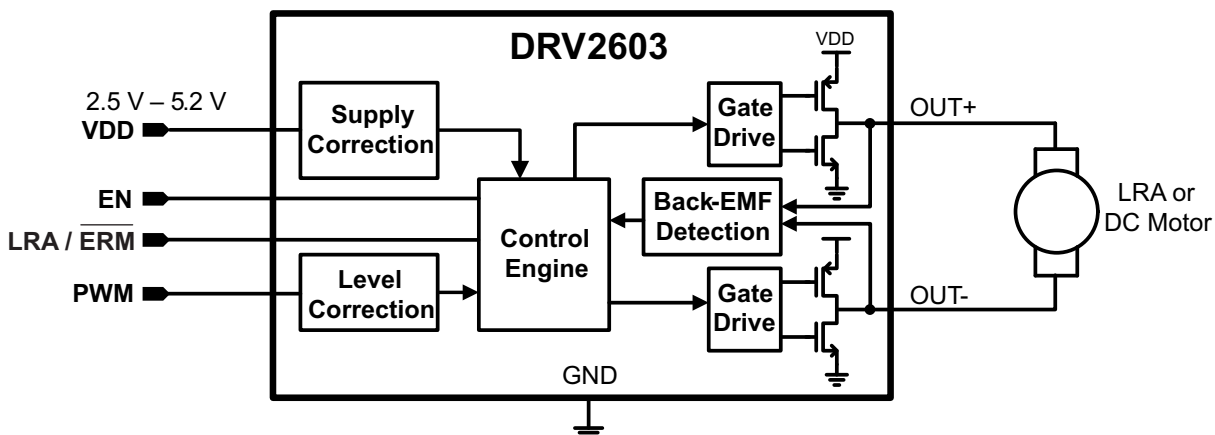
- **Mobile Phones**
- **Tablets**
- **Touch Enabled Devices**

DESCRIPTION

The DRV2603 is a haptic driver designed specifically to solve common obstacles in driving both Linear Resonance Actuator (LRA) and Eccentric Rotating Mass (ERM) haptic elements. The DRV2603 is also designed for low latency, has excellent efficiency, and plenty of drive strength for actuators commonly used in the portable market.

LRA actuators typically have a narrow frequency band over which they have an adequate haptic response. This frequency window is typically ± 2.5 Hz wide or less, so driving an LRA actuator presents a challenge. The DRV2603 solves this problem by employing auto resonance tracking, which automatically detects and tracks the optimum commutation frequency. This means that any input PWM frequency within the input range (10 kHz to 250 kHz) will automatically produce the correct resonant output frequency. As an additional benefit, the DRV2603 implements an optimal braking algorithm to stop the LRA from ringing out, leaving the user with a crisp haptic sensation.

For both ERM and LRA actuators, the DRV2603 automatic input level translation solves issues with low voltage PWM sources without adding additional external components, so if the digital I/O levels vary, the output voltage does not change. The DRV2603 also has supply correction that ensures no supply regulation is required for constant vibration strength, allowing an efficient, direct-battery connection.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
DRV2603RUNR	ACTIVE	QFN	RUN	10	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
DRV2603RUNT	ACTIVE	QFN	RUN	10	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	

⁽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.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

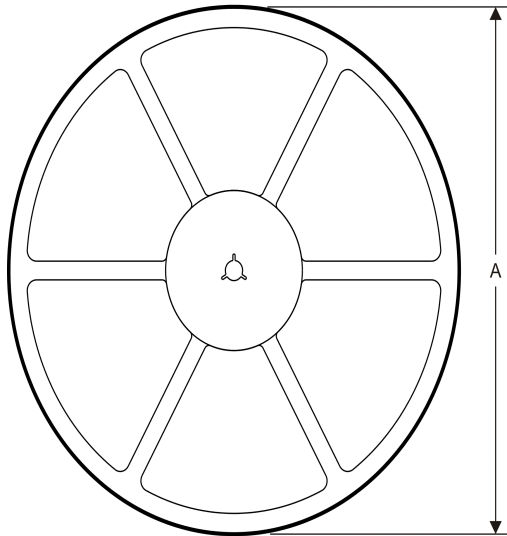
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽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
REEL DIMENSIONS

TAPE DIMENSIONS


A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*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
DRV2603RUNR	QFN	RUN	10	3000	180.0	8.4	2.3	2.3	1.15	4.0	8.0	Q2
DRV2603RUNT	QFN	RUN	10	250	180.0	8.4	2.3	2.3	1.15	4.0	8.0	Q2

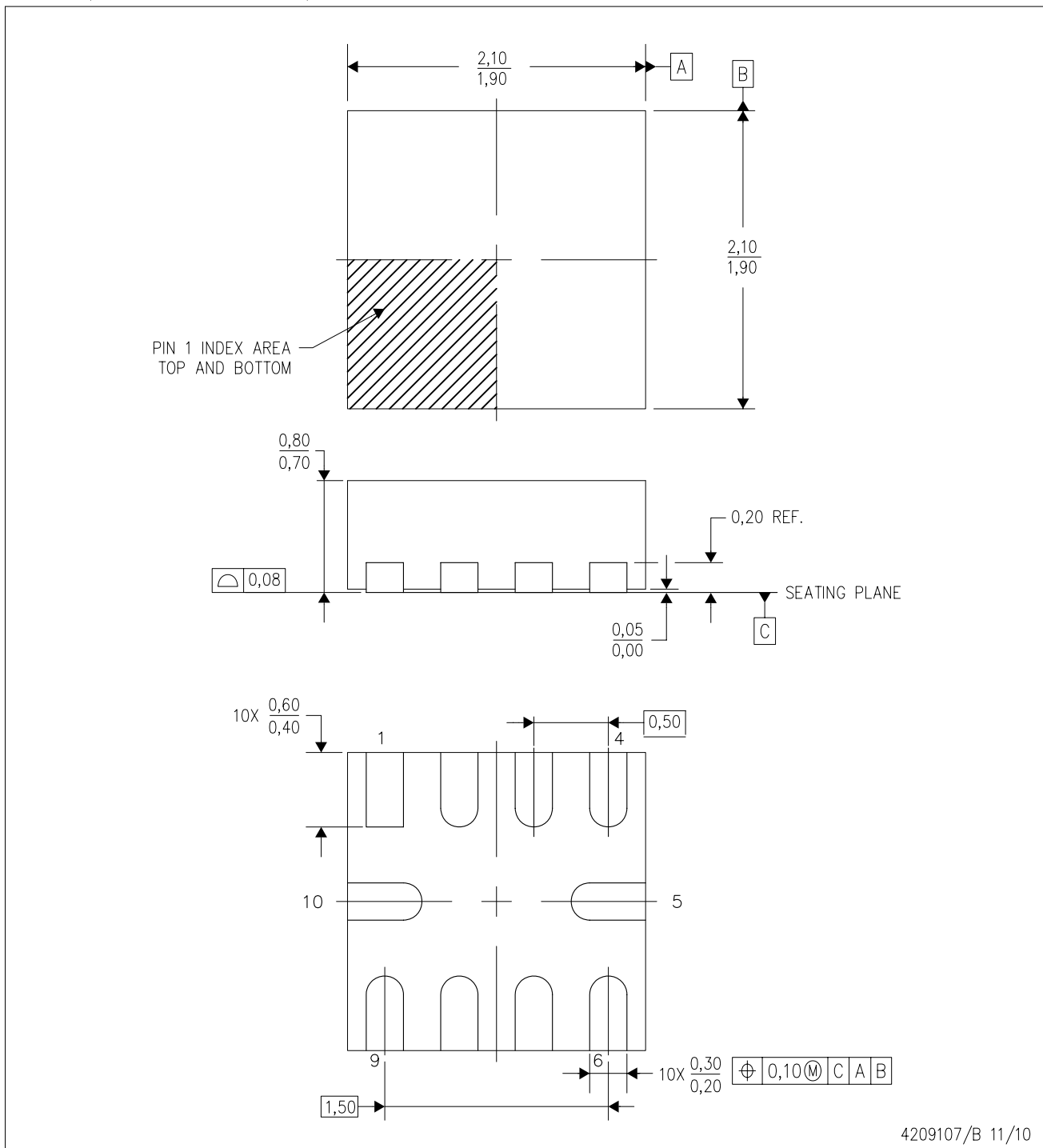
TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DRV2603RUNR	QFN	RUN	10	3000	210.0	185.0	35.0
DRV2603RUNT	QFN	RUN	10	250	210.0	185.0	35.0

RUN (S-PWQFN-N10)

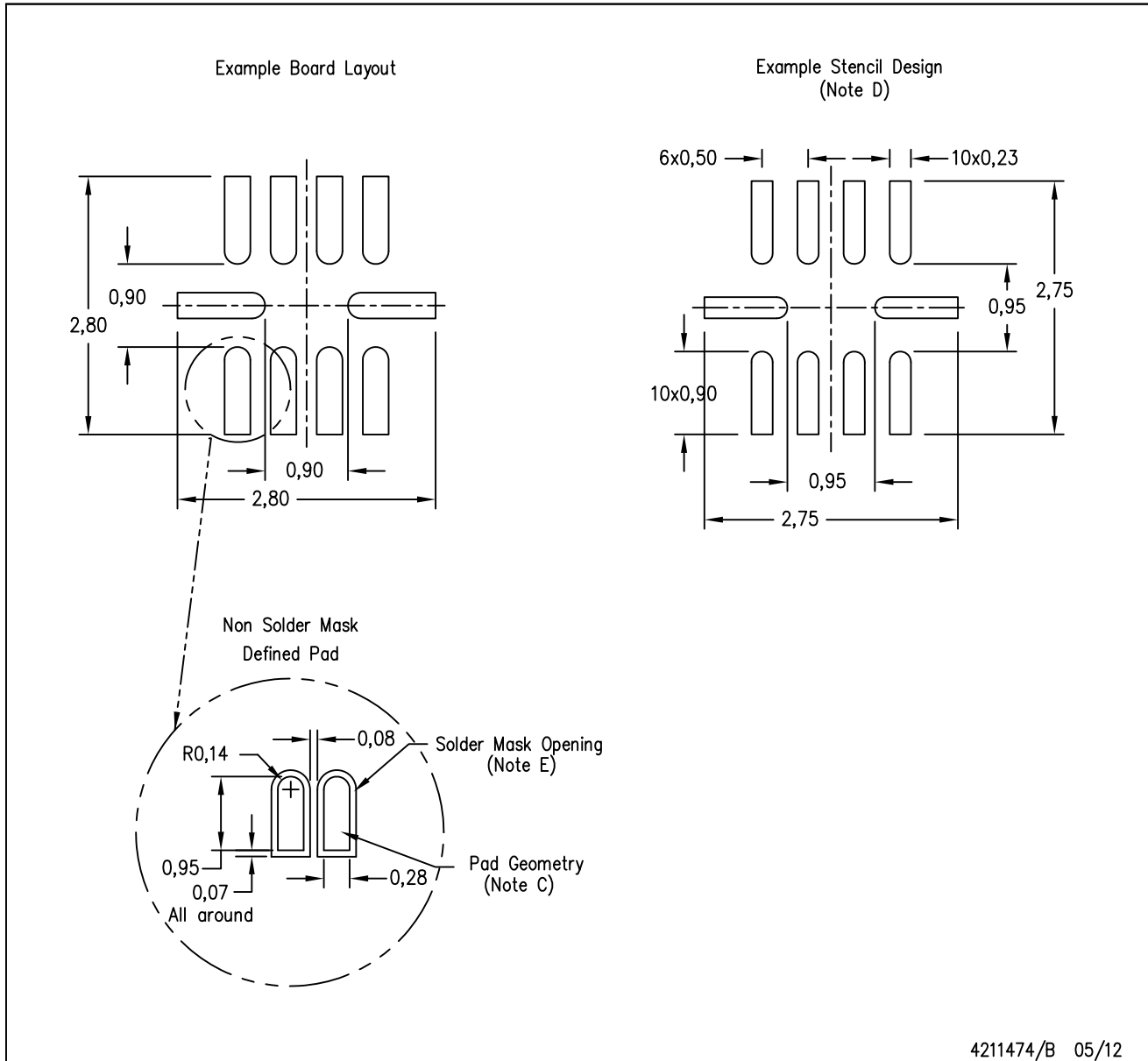
PLASTIC QUAD FLATPACK NO-LEAD



- 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. Quad Flatpack, No-Leads (QFN) package configuration.

RUN (S-PWQFN-N10)

PLASTIC QUAD FLATPACK NO-LEAD



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Publication IPC-7351 is recommended for alternate designs.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
 - E. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.

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