A Programmable Output Ultra-Low Power Buck Converter with 50mA Load Capability

Check for Samples: TPS62736

FEATURES

- **• Nano-power Buck Converter**
  - **Efficiency Optimized for 100 mA peak Output Current**
  - **2 V – 5.5 V Input Operating Range**
  - **350 nA During Active Operation**
  - **50 nA During Full Standby**
  - **High Efficiency > 90% at I_{OUT} = 15 µA**
  - **2% Voltage Regulation**
- **EN1 and EN2 Control**
  - **Two Power off states:**
    - **1) Full Standby**
    - **2) Standby + PGOOD Indication**
  - **Pass Mode State**
- **Programmable Output Regulation**
  - **Supports Peak Output Current up to 50 mA**
  - **1.3 V to 5 V Programmable Range**
- **Input Power Good Indication**
  - **Push-pull Driver**
  - **Indication is Resistor Programmable**

APPLICATIONS

- **Energy Harvesting**
- **Solar Charger**
- **Thermal Electric Generator (TEG) Harvesting**
- **Wireless Sensor Networks (WSN)**
- **Low Power Wireless Monitoring**
- **Environmental Monitoring**
- **Bridge and Structural Health Monitoring (SHM)**
- **Smart Building Controls**
- **Portable and Wearable Health Devices**
- **Entertainment System Remote Controls**

DESCRIPTION

The TPS62736 is a highly integrated Nano-Power buck converter solution that is well suited for meeting the special needs of ultra low power applications such as energy harvesting. The TPS62736 provides the system with an externally programmable regulated supply in order to preserve the overall efficiency of the power management stage versus a linear step down converter. This regulator is intended to step down the voltage from an energy storage element such as a battery or super cap while supplying the rail to low voltage electronics. The regulated output has been optimize to provide high efficiency across low output currents (< 10 µA) to high currents (50 mA). [1]

The TPS62736 integrates an optimized hysteretic controller for low power applications. The internal circuitry utilizes a time based sampling system in order to reduce the average quiescent current. This allows for the quiescent current consumption to scale with output load levels. With the use of only a 10 µH inductor, the solution size will be minimal.

To further assist users in the strict management of their energy budgets, the TPS62736 toggles the input good flag to signal an attached microprocessor when the voltage on the input supply has dropped below a pre-set critical level. This should trigger the reduction of load currents to prevent the system from entering an under voltage condition. There is also independent enable signals to allow the system to control when to run the regulated output or even put the whole IC into an ultra-low quiescent sleep state.

The input good indication and output regulator level are programmed independently via external resistors. The external resistors are periodically biased to sample and hold the reference in order to reduce the quiescent current consumption of the resistor strings.

The TPS62736 is offered in a miniature QFN package.

[1] Visit ti.com/batterymanagement for product details and design resources

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These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Block Diagram

$\eta > 90\%$ @ $I_{OUT}=15uA$

V_{IN} — 350nA → IN

NanoBuck

SW, OUT

L 10.0µH

V_{OUT}

4.7µF

22µF
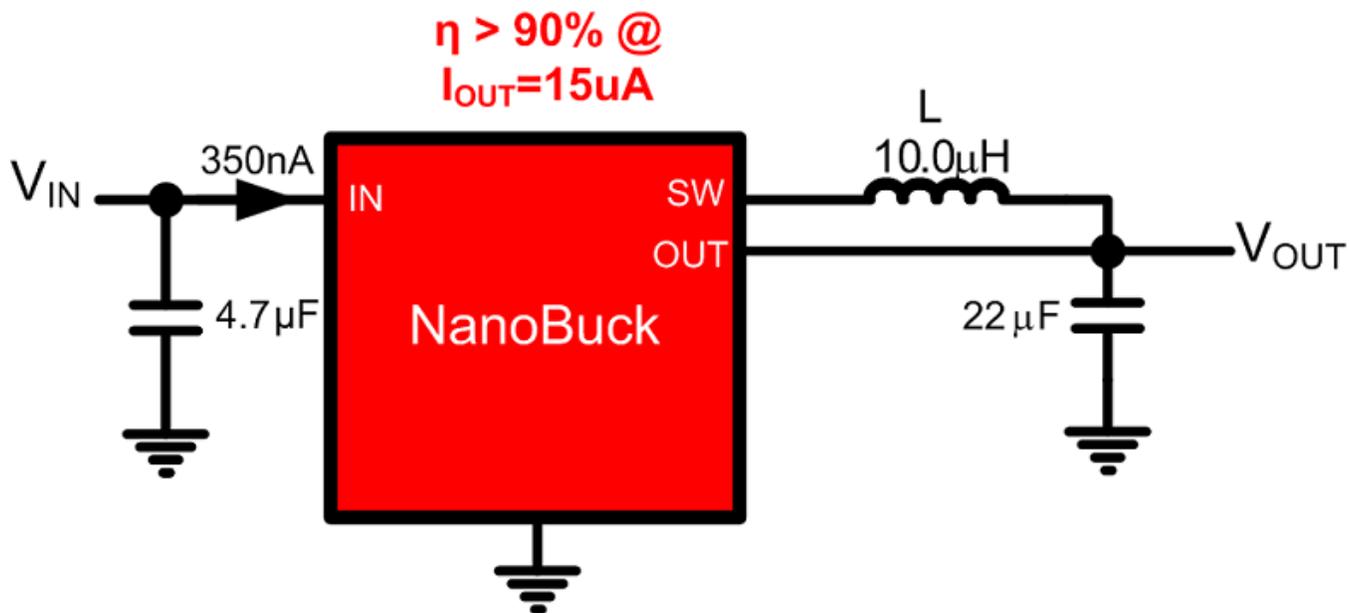
PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Samples (Requires Login)
TPS62736RGYR	PREVIEW	VQFN	RGY	14	3000	TBD	Call TI	Call TI	
TPS62736RGYT	PREVIEW	VQFN	RGY	14	250	TBD	Call TI	Call TI	

(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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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.
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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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RGY (S−PVQFN−N14)   PLASTIC QUAD FLATPACK NO−LEAD

3,65
3,35
A
B

13   9

14   8

3,65
3,35

1   7

2   6

Pin 1 Index Area
Top and Bottom
F

1,00
0,80

0,20 Nominal
Lead Frame

Seating Plane

0,08 C

0,05
0,00
Seating Height

C

2,00

0,50

14X 0,50
0,30

2   6

1   7

THERMAL PAD

SIZE AND SHAPE
SHOWN ON SEPRATE SHEET

1,50

14   8

13   9

14X 0,30
0,18

0,10 Ⓜ C A B
0,05 Ⓜ C

Bottom View   4203539−2/I 06/2011
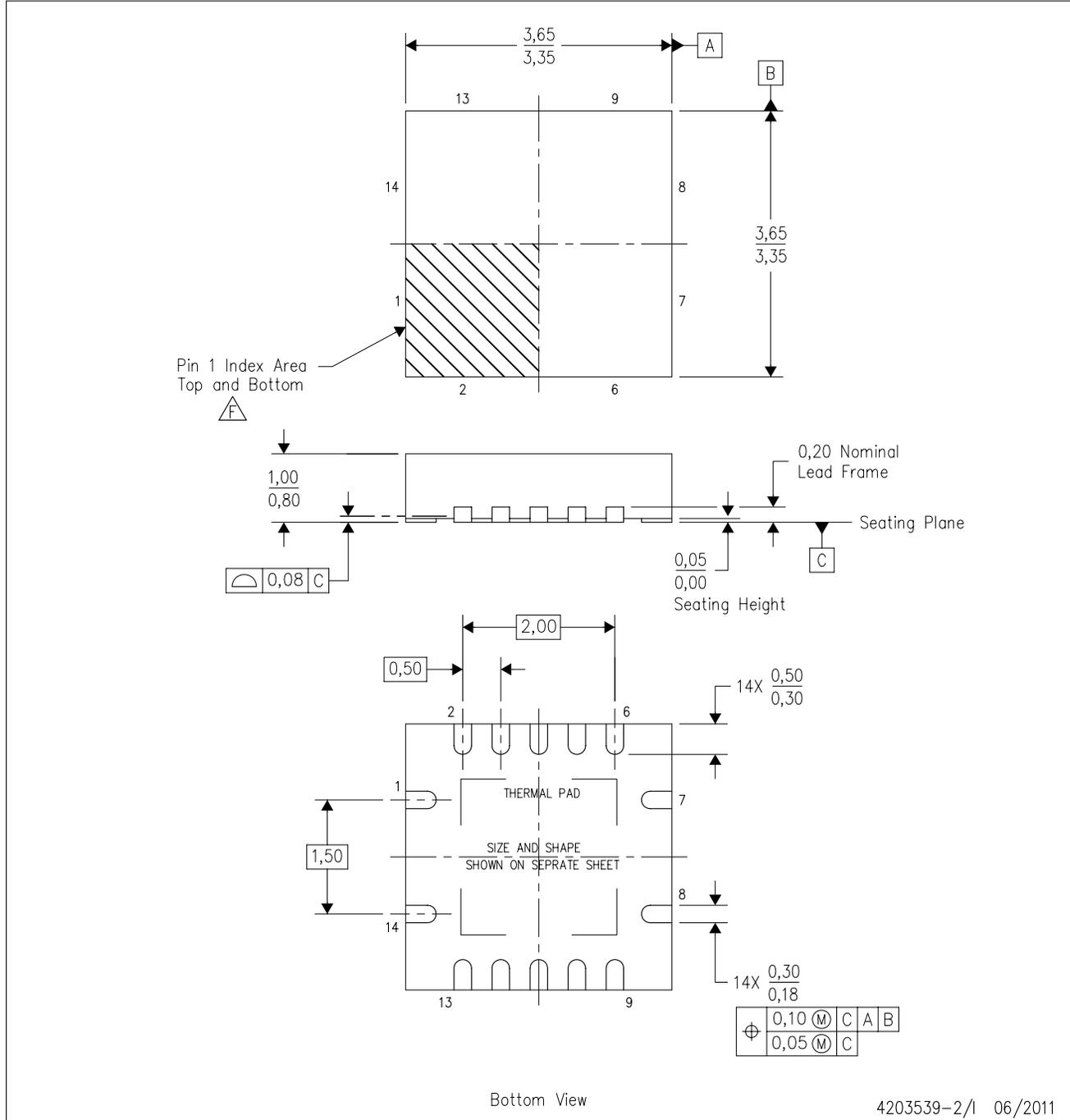
NOTES: A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M−1994.
        B. This drawing is subject to change without notice.
        C. QFN (Quad Flatpack No−Lead) package configuration.
        D. The package thermal pad must be soldered to the board for thermal and mechanical performance.
        E. See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.
        F. Pin 1 identifiers are located on both top and bottom of the package and within the zone indicated.
            The Pin 1 identifiers are either a molded, marked, or metal feature.
        G. Package complies to JEDEC MO−241 variation BA.

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