

# Low On-Resistance, 3A Load Switch with Reverse Current Protection and Controlled Turn-on

Check for Samples: [TPS22963](#) , [TPS22964](#)

## FEATURES

- Integrated N-Channel Load Switch
- Input Voltage Range: 1V to 5.5V
- Internal Pass-FET  $R_{\text{DS(ON)}} = 8\text{m}\Omega$  (typ)
- Ultra-low Total ON-Resistance
  - $R_{\text{ON}} = 22\text{m}\Omega$  (typ) at  $V_{\text{IN}} = 1.8\text{V}$
  - $R_{\text{ON}} = 18\text{m}\Omega$  (typ) at  $V_{\text{IN}} = 3.3\text{V}$
  - $R_{\text{ON}} = 18\text{m}\Omega$  (typ) at  $V_{\text{IN}} = 5\text{V}$
- 3A Maximum Continuous Switch Current
- Reverse Current Protection (when disabled)
- Low Shutdown Current (2 $\mu\text{A}$ )
- Low Threshold 1.3V Control Input
- Controlled Slew-rate to Avoid Inrush Current
- CSP-6 Package 0.9mm x 1.4mm, 0.5mm Pitch
- ESD Performance Tested Per JESD 22
  - 2KV Human-Body Model (A114-B, Class II)
  - 500V Charged-Device Model (C101)

## APPLICATIONS

- Smartphones
- Notebook Computer and Ultrabook™
- Tablet PC Computer
- DTV/IP Set Top Box
- POS Terminals and Media Gateways

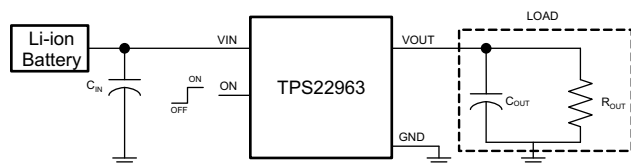
## DESCRIPTION

The TPS22963/64 is a small, ultra-low  $R_{\text{ON}}$  load switch with controlled turn on. The device contains a low  $R_{\text{DS(ON)}}$  N-Channel MOSFET that can operate over an input voltage range of 1V to 5.5V and switch currents of up to 3A. An integrated charge pump biases the NMOS switch in order to achieve a low switch ON-Resistance. The switch is controlled by an on/off input (ON), which is capable of interfacing directly with low-voltage GPIO control signals. The rise time of the TPS22963/64 device is internally controlled in order to avoid inrush current. The TPS22963/64 family has various slew rate options (see [Table 1](#)).

The TPS22963/64 provides reverse current protection. When the power switch is disabled, the device will not allow the flow of current towards the input side of the switch. The reverse current protection feature is active only when the device is disabled so as to allow for intentional reverse current (when the switch is enabled) for some applications.

The TPS22963/64 is available in an ultra-small, space-saving 6-pin CSP package and is characterized for operation over the free air temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

## TYPICAL APPLICATION


**Table 1. Feature List**

	$R_{\text{ON}}$ (typ) at 3.3 V	Rise Time (typ) at 3.3V	Quick Output Discharge	Maximum Output Current	Enable
TPS22963B	18 m $\Omega$	100 $\mu\text{s}$	No	3A	Active High
TPS22963C	18 m $\Omega$	800 $\mu\text{s}$	No	3A	Active High
TPS22963D	18 m $\Omega$	3000 $\mu\text{s}$	No	3A	Active High
TPS22964B	18 m $\Omega$	100 $\mu\text{s}$	Yes	3A	Active High
TPS22964C	18 m $\Omega$	800 $\mu\text{s}$	Yes	3A	Active High
TPS22964D	18 m $\Omega$	3000 $\mu\text{s}$	Yes	3A	Active High



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Ultrabook is a trademark of Texas Instruments.

**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
TPS22963CZYZPR	PREVIEW	DSBGA	YZP	6	250	TBD	Call TI	Call TI	-40 to 85		
TPS22963CZYZPT	PREVIEW	DSBGA	YZP	6	3000	TBD	Call TI	Call TI	-40 to 85		
TPS22964CZYZPR	PREVIEW	DSBGA	YZP	6	3000	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	DK	
TPS22964CZYZPT	PREVIEW	DSBGA	YZP	6	250	Green (RoHS & no Sb/Br)	SNAGCU	Level-1-260C-UNLIM	-40 to 85	DK	

(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.

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**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.

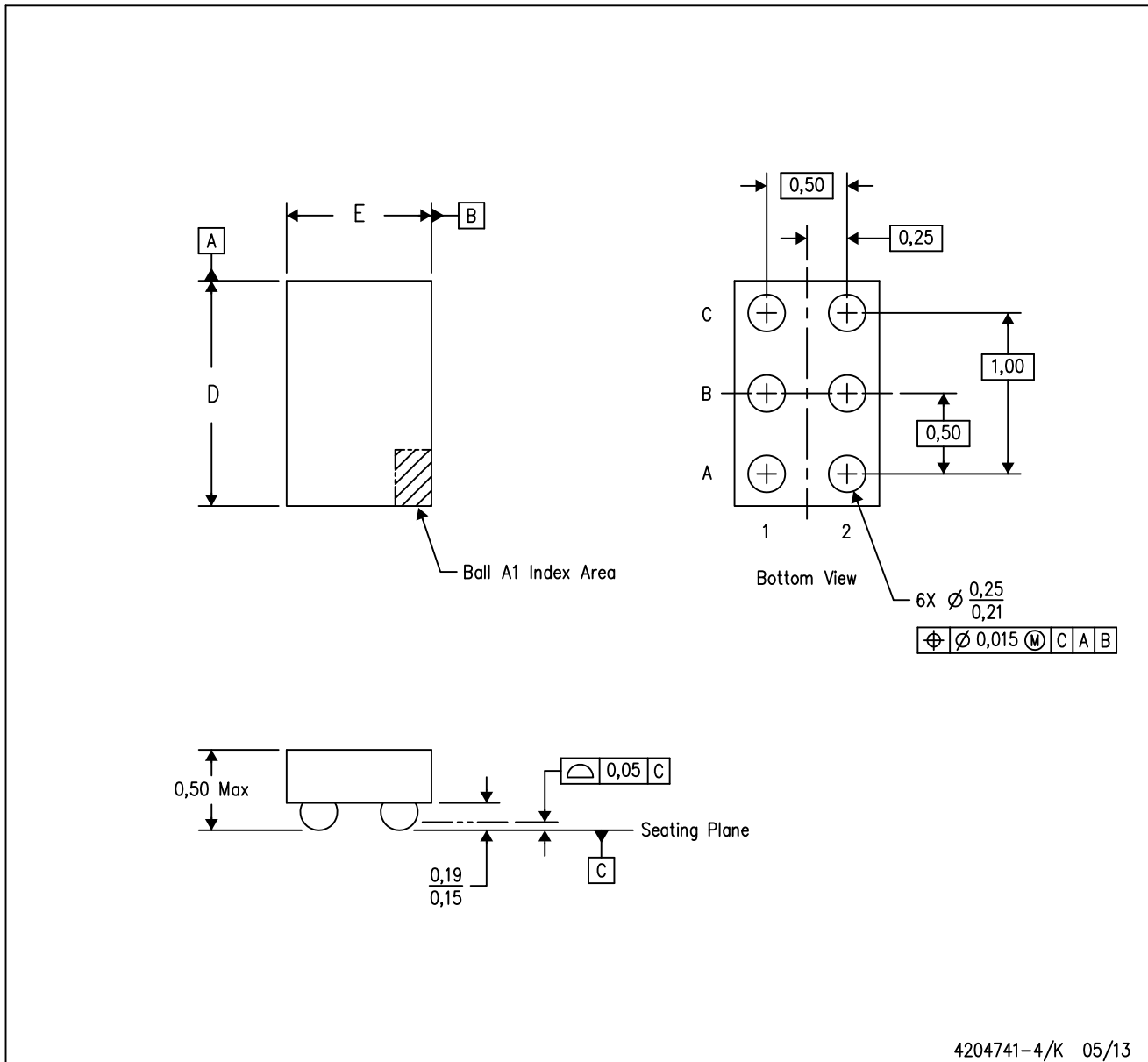
(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "--" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

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YZP (R-XBGA-N6)

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.

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