

Powering TPS84k Devices from a 3.3-V Bus

Jason Arrigo

PMP-DCS Plug-in Power

As applications with only a 3.3-V rail are becoming more popular, lower input voltage power supplies are required. Many products that can switch lower input voltages still require some higher bias voltage to power the internal circuitry of the power supply. Therefore, the ability to easily produce a higher bias voltage from a 3.3-V rail is becoming more important.

The TPS84k family of mid-input voltage (4.5 V to 14.5 V) devices can switch voltages as low as 1.6 V, but require a bias voltage of at least 4.5 V. The mid-input voltage TPS84k devices have both PVIN and VIN inputs and can operate off of a split rail where PVIN is the input switching voltage and VIN is the input bias voltage. The input switching voltage (PVIN) is the voltage that is converted to a lower output voltage and requires higher current. The input bias voltage (VIN) powers the internal circuitry of the device and requires very little current. See [Table 1](#) for the maximum VIN current per device for all mid-input voltage TPS84k devices.

[Figure 1](#) shows a typical application where only a 3.3-V rail is available. The 3.3 V is connected to the PVIN pins of the TPS84k device and is also fed into the input of a TPS60151 charge pump device. The TPS60151 boosts the 3.3 V to 5.0 V, delivers up to 150 mA, and is packaged in a 2 mm × 2 mm QFN package. A single TPS60151 can be used to power the VIN pin of multiple TPS84k devices. See [Table 1](#) for maximum VIN current ratings per device. The input voltage range of the TPS60151 is 2.7 V to 5.5 V.

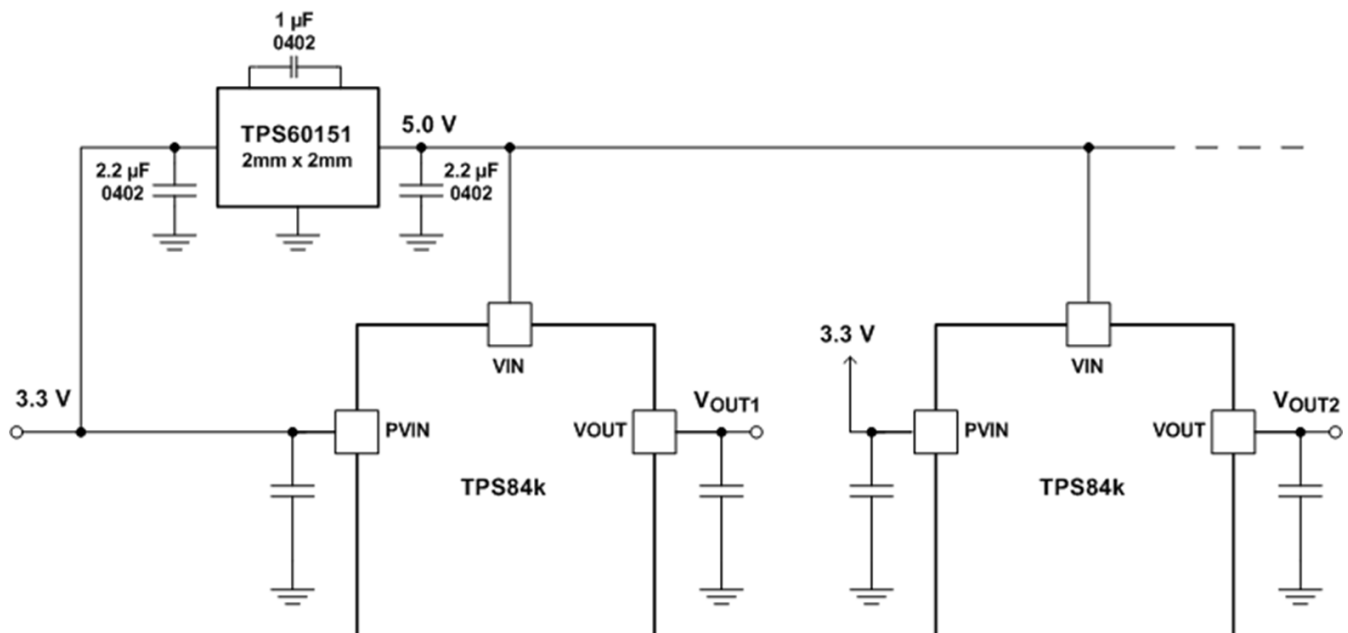


Figure 1. Typical 3.3-V Input Application Circuit

[Table 1](#) lists the maximum VIN current draw for each TPS84k device when operated from PVIN = 3.3 V.

Table 1. Maximum V_{IN} Current

Part Number	Max VIN Current
TPS84320	4 mA
TPS84621/620	8 mA
TPS84A20	20 mA
TPS84B20	30 mA
TPS84C20	30 mA

Based on which TPS84k devices are used and the number of devices being powered, the TPS60151 may not have enough current for some applications. In that case, the TPS81256 boost converter can be used which can deliver greater than 550 mA of output current. The input voltage range of the TPS81256 is 2.5 V to 5.5 V.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com