

4.5-V TO 16-V INPUT, HIGH CURRENT, SYNCHRONOUS STEP DOWN DUAL BUCK CONVERTER WITH INTEGRATED FETS

Check for Samples: [TPS65253](#)

FEATURES

- **Wide Input Supply Voltage Range:**
4.5 V - 16 V
- **Output Range: 0.8 V to $\sim V_{IN}-1$ V**
- **Fully Integrated Dual Buck, 3.5-A/2.5-A Continuous Current (4-A/3-A Maximum Current)**
- **High Efficiency**
- **300-kHz - 1.2-MHz Switching Frequency Set by External Resistor**
- **External Enable/Sequencing Pins**
- **Adjustable Cycle-by-Cycle Current Limit Set by External Resistor**
- **Soft-Start Pins**

- **Current-Mode Control With Simple Compensation Circuit**
- **Power Good and Reset Generator**
- **Low Power Mode Set By External Signal**
- **Supervisory Circuit**
- **QFN Package, 28-Pin 5 mm x 5 mm RHD**

APPLICATIONS

- **DTV**
- **DSL Modems**
- **Cable Modems**
- **Set Top Boxes**
- **Car DVD Players**
- **Home Gateway and Access Point Networks**
- **Wireless Routers**

DESCRIPTION/ORDERING INFORMATION

The TPS65253 features two synchronous wide input range high efficiency buck converters. The converters are designed to simplify product application while giving designers the options to optimize their usage according to the target application.

The converters can operate in 5-, 9- and 12-V systems and have integrated power transistors. The output voltage can be set externally using a resistor divider to any value between 0.8 V and the input supply minus 1 V. Each converter features an enable pin that allows a delayed start-up for sequencing purposes, soft-start pin that allows adjustable soft-start time by choosing the soft-start capacitor, and a current limit (RLIMx) pin that enables designer to adjust current limit by selecting an external resistor and optimize the choice of inductor. The CMP pin allows optimizing transient versus dc accuracy response with a simple RC compensation.

The switching frequency of the converters is set by an external resistor connected to R_{OSC} pin. The switching regulators are designed to operate from 300 kHz to 1.2 MHz. The converters operate with 180° phase between them to minimize the input filter requirements.

TPS65253 also features a low power mode enabled by an external signal, which allows for a reduction on the input power supplied to the system when the host processor is in stand-by (low activity) mode.

TPS65253 features a supervisor circuit that monitors both converters and provides a PGOOD signal (End of Reset) with a 32-ms timer.

TPS65253 is packaged in a small, thermally efficient 28-pin QFN package.

ORDERING INFORMATION⁽¹⁾

T _A	PACKAGE ⁽²⁾	PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	28-Pin (QFN) - RHD	TPS65253RHD	TPS65253

- (1) For the most current packaging and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.
- (2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.



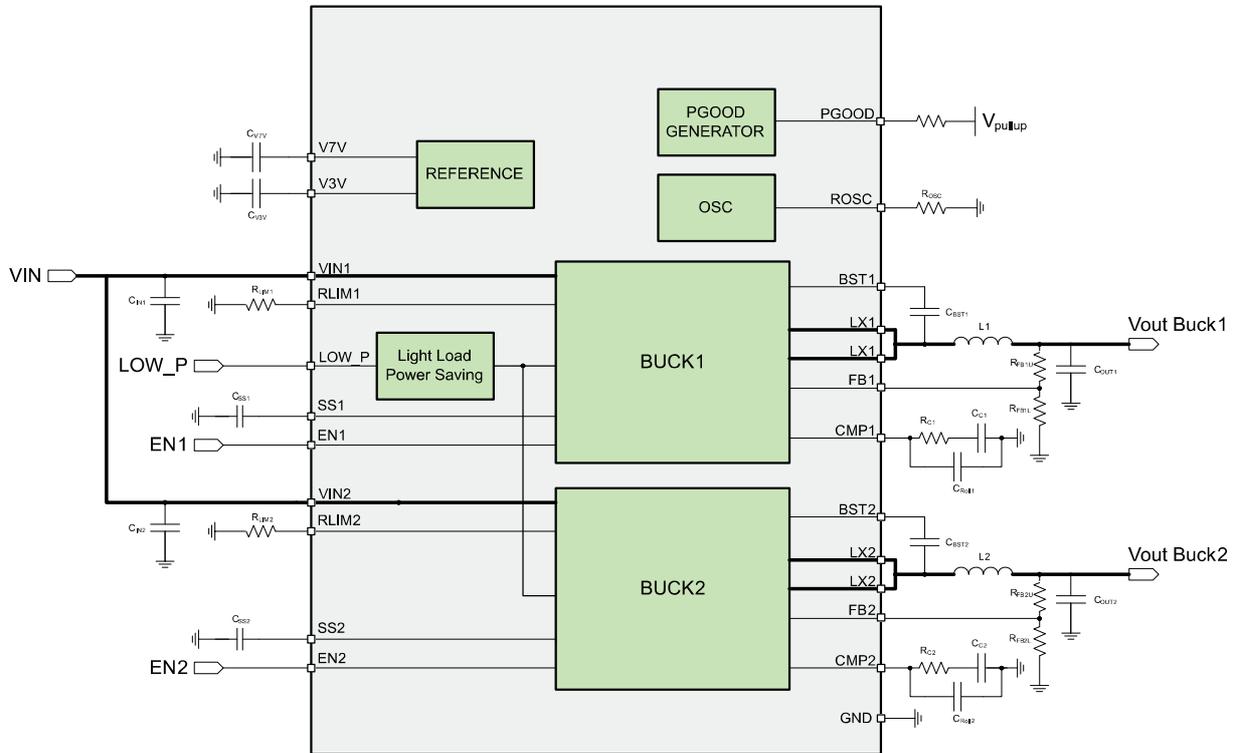
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



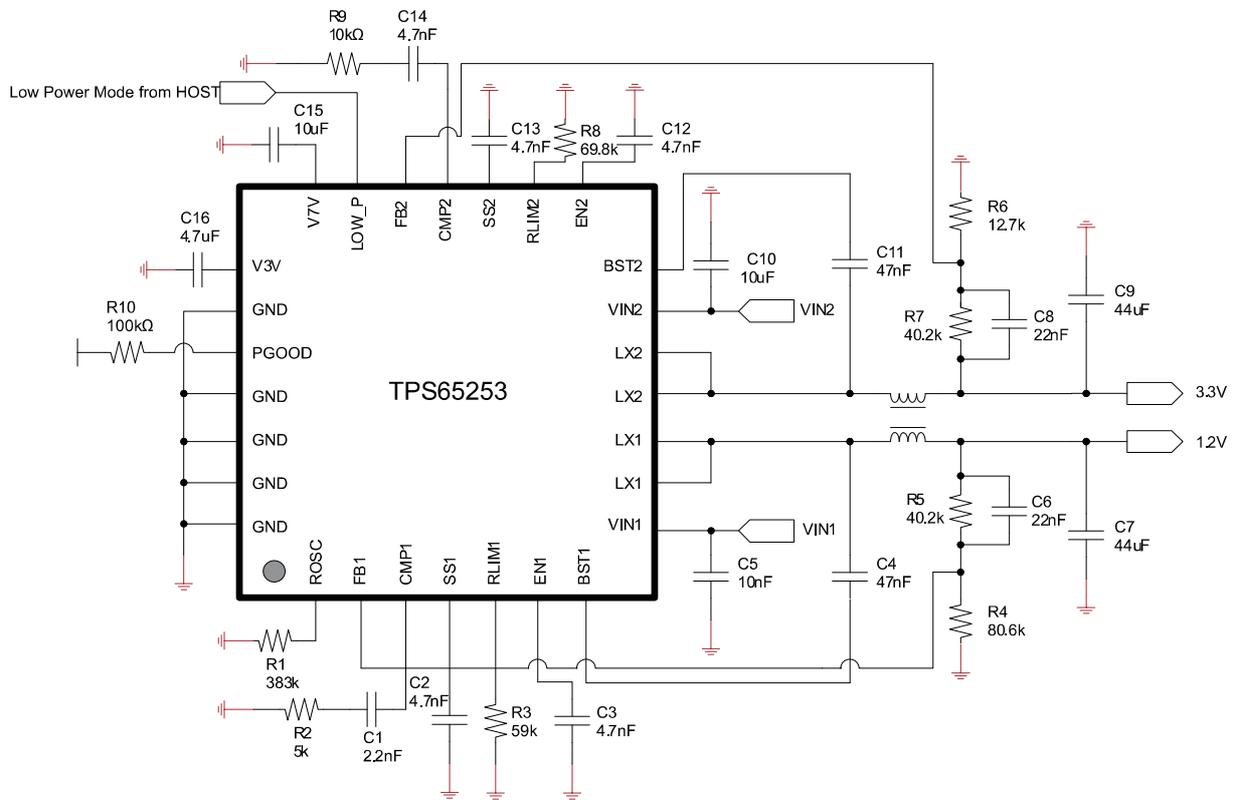
This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

FUNCTIONAL BLOCK DIAGRAM



TYPICAL APPLICATION



TERMINAL FUNCTIONS

NAME	NO.	I/O	DESCRIPTION
ROSC	1	I	Oscillator set. This resistor sets the frequency of internal autonomous clock.
FB1	2	I	Feedback pin for Buck 1. Connect a divider set to 0.8 V from the output of the converter to ground.
CMP1	3	O	Compensation pin for Buck 1. Fit a series RC circuit to this pin to complete the compensation circuit of this converter.
SS1	4	I	Soft-start pin for Buck 1. Fit a small ceramic capacitor to this pin to set the converter soft-start time.
RLIM1	5	I	Current limit setting pin for Buck 1. Fit a resistor from this pin to ground to set the peak current limit on the output inductor.
EN1	6	I	Enable pin for Buck 1. A high signal on this pin enables the regulator Buck. For a delayed start-up add a small ceramic capacitor from this pin to ground.
BST1	7	I	Bootstrap capacitor for Buck 1. Fit a 47-nF ceramic capacitor from this pin to the switching node.
VIN1	8	I	Input supply for Buck 1. Fit a 10- μ F ceramic capacitor close to this pin.
LX1	9, 10	O	Switching node for Buck 1
LX2	11, 12	O	Switching node for Buck 2
VIN2	13	I	Input supply for Buck 2. Fit a 10- μ F ceramic capacitor close to this pin.
BST2	14	I	Bootstrap capacitor for Buck 1. Fit a 47-nF ceramic capacitor from this pin to the switching node.
EN2	15	I	Enable pin for Buck 2. A high signal on this pin enables the regulator Buck. For a delayed start-up add a small ceramic capacitor from this pin to ground.
RLIM2	16	I	Current limit setting pin for Buck 2. Fit a resistor from this pin to ground to set the peak current limit on the output inductor.
SS2	17	I	Soft-start pin for Buck 2. Fit a small ceramic capacitor to this pin to set the converter soft-start time.
CMP2	18	O	Compensation pin for Buck 2. Fit a series RC circuit to this pin to complete the compensation circuit of this converter.
FB2	19	I	Feedback pin for Buck 2. Connect a divider set to 0.8 V from the output of the converter to ground.
LOW_P	20	I	Low power operation mode (active high) input for TPS65253
V7V	21	O	Internal supply. Connect a 4.7- μ F to 10- μ F ceramic capacitor from this pin to ground.
V3V	22	O	Internal supply. Connect a 3.3- μ F to 10- μ F ceramic capacitor from this pin to ground.
GND	23, 25, 26, 27, 28		Ground
PGOOD	24	O	Open drain power good output
PowerPAD			PowerPAD. Connect to system ground for electrical and thermal connection.